



L180E Wheel Loader

WEB EDITION

Service Manual

Document Title: Description	Function Group: 000	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Description

The L180E is a four-wheel drive wheel loader with articulated frame steering.

The L180E has a six-cylinder, direct-injected, four-stroke, turbocharged diesel engine of type D12C.

The hydraulic transmission, HTE220, is hydromechanical with all gear wheels in constant mesh.

Between the engine and transmission, there is a single-stage hydraulic torque converter.

Front and rear axles have fully floating drive axles with planetary gears in the hubs. The front axle is equipped with a differential lock.

The parking and service brakes of the machine are wet multi-disc brakes. The parking brake is positioned on the output shaft in the hydraulic transmission and the service brakes are built into each wheel hub.

The steering system is hydrostatic with a variable load-sensing axial piston pump and two hydraulic cylinders (steering cylinders).

Hydraulic system, see Section 9.

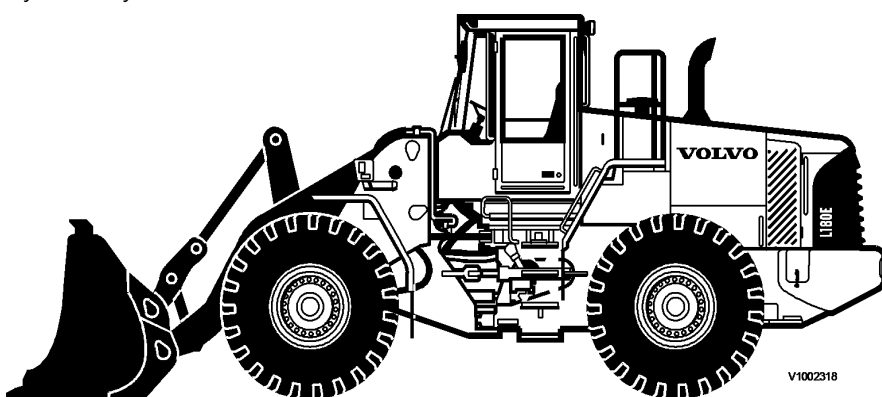


Figure 1
L180E wheel loader



Construction Equipment

Service Information

Document Title: E1711	Function Group: 080	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

E1711

E1711

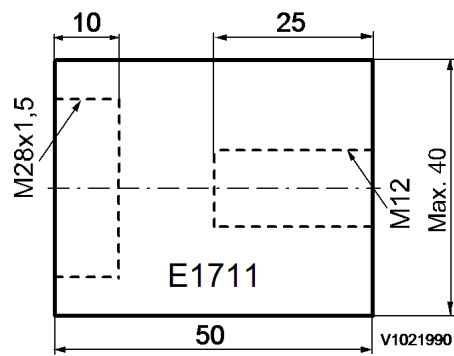


Figure 1
E1711

VOLVO

Construction Equipment

Service Information

Document Title: Section 4.5 Power transmission, Brakes	Function Group: 080	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Section 4.5 Power transmission, Brakes

E 1234 Nipple

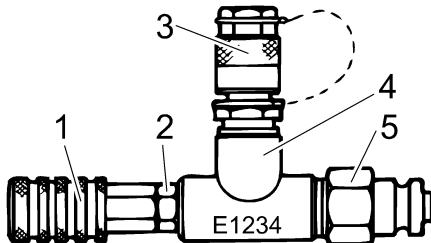


Figure 1

E 1234 Nipple

1. 999 3522
2. Standard pipe bushing, R1/4" - R1/8"
3. Testing nipple, part no. 930032
4. Standard T-pipe, R 1/4"
5. Nipple 999 3758

E 1281 Nipple

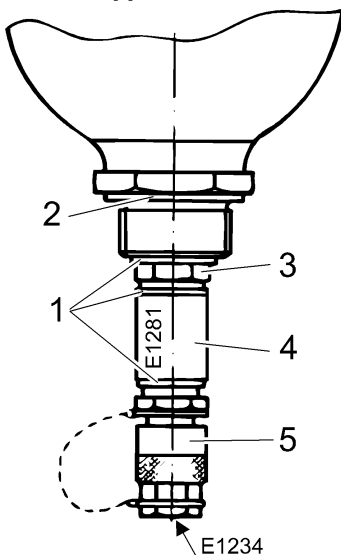


Figure 2

E 1281 Nipple

1. Sealing washer
2. Accumulator with thread, M16 x 1.5 internal
3. Nipple, part no. 957030
4. Sleeve, standard R1/4"
5. Testing nipple, part no. 930032

Thank you for your purchase.
Have a nice day.

Document Title: Safety concerns everybody!	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

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Safety concerns everybody!

Always follow the instructions in the machine's operator's manual which supplements this Service Manual.

The Operator's Manual **must always** be kept in the cab for easy reference.

Volvo designs and manufactures machines with a high level of safety as well as effectiveness. All this work may be wasted if anyone who is about to perform service on any of our machines does not read the safety instructions, or does not follow them, e.g., does not replace guards, climbs on slippery machine parts instead of using a ladder, grabs a hold of hoses instead of handles or uses the wrong tools for the job.

In order to maintain safe and efficient function, always use genuine Volvo spare parts intended and adapted for the machine. If other spare parts than genuine Volvo are used then Volvo Construction Equipment cannot be held responsible for machine damage, and warranty claims will be denied.

Machines seldom cause accidents, instead people often do.

A safety-conscious person and a well-maintained machine make for a safe, effective and profitable combination.

Those who do not follow the safety instructions and observe the warnings in this manual must make sure that their work method is safe. Otherwise, there is a great risk of accidents, perhaps even accidents that result in fatalities.



WARNING SYMBOL

This symbol is shown at various points throughout the manual. The appearance of it means "Warning, stay alert! Your safety may be involved!"

Get to know the capacity and limits of your machine!



Construction Equipment

Service Information

Document Title: CE-marking, EMC-directive	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

CE-marking, EMC-directive

CE-marking

(Declaration of Conformity, and CE-marking, only machines marketed within the EU/EEA). This machine is CE-marked. This means that when delivered the machine meets the applicable "Essential Health and Safety Requirements", as stated in EU's so-called Machine Safety Directive, 98/37/EC. Any person who makes changes that affect machine safety is also responsible for the same, and that governing legislation/standards are fulfilled.

As proof that the requirements are met, an **EU Declaration of Conformity**, issued by Volvo CE, is supplied with each separate machine. This EU declaration also covers attachments and equipment manufactured by Volvo CE. The documentation is a valuable document, which should be kept safe and retained for at least 10 years. **The document should always accompany the machine when it is sold.**

If the machine is used for other purposes or with other attachments than described in this manual, safety must be maintained at all times and in each individual case. The person carrying out such action is also responsible for the action which, in some cases, may require a new CE-marking and the issue of a new EU Declaration of Conformity.

The EU's EMC-directive

The electronic equipment of the machine may in some cases cause interference with other electronic equipment, or the equipment may be adversely affected by external electromagnetic interference, which may constitute safety risks.

The EU's EMC-directive on "Electromagnetic compatibility" provides a general description of what demands can be made of the machine from a safety perspective, where permitted limit values have been determined and stated according to international standards.

A machine or device which meets the requirements should be CE-marked. Our machines have been specifically tested for electromagnetic interference. The CE marking of the machine and the declaration of conformity also cover the EMC directive.

If other electronic equipment is fitted to this machine, the equipment must be CE-marked and tested on the machine with regard to electromagnetic interference.

EU's noise directive

Within the EU there is a noise directive, dictating that the machine may not have noise values that exceed a certain level. Values are given on a decal that can be read from the outside of the machine. Also, every machine is delivered with a noise certificate where Volvo CE ensures that the machine meets governing legislation. **It is also important that this certificate accompanies the machine when it is sold.** It is also important that no changes are made to the machine's noise-damping components in order to meet the limit values.

NOTE!

Modification of or removal of material which affects sound, e.g., noise-insulating, noise-dampening, or noise-absorbing materials, is not allowed. Also, it is not permitted to make openings/holes in the cab or engine compartment as this may increase the noise level in the cab.

Unauthorized modifications to the cab's roll-over protective structure (ROPS/FOPS)

Never make any unauthorized modifications to the ROPS, such as lowering the roof height, drilling, welding on fire extinguisher brackets, radio antenna or other equipment.

Such unauthorized modifications will affect the structural strength of the ROPS cab and will void the certification.

The Roll Over Protective Structure (ROPS) has been approved following testing and meets standards according to ISO 3471-1.

The cab's roof is also tested and approved according to the standard for FOPS (Falling object protective structure, protection from falling objects) according to ISO 3449.

All planned modifications of the cab's supporting construction must be discussed in advance with Volvo CE's engineering department to determine if the modification can be performed without affecting the approval.

It is important that all persons in your organization, including management, are made fully aware of these rules involving ROPS.

If anyone in your company discovers that a certain machine has been modified in a non-approved manner, your company must notify the customer and manufacturer in writing regarding the applicable machine and how it was modified.

Document Title: Safety when handling the machine	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Safety when handling the machine

Volvo Construction Equipment is only responsible if:

- the machine has been used correctly and has been maintained according to recommendations in the service manuals and the machine's Operator's manual.
- prescribed service and inspections have been performed at the specified intervals.
- lubricant recommendations in the manual have been followed.
- no safety seals have been opened by an unauthorized person.
- all modifications and repairs have been performed in the manner prescribed by Volvo.
- only genuine Volvo parts/accessories, or attachments that fulfil Volvo's requirements have been used.



Machine operators must have sufficient skills and knowledge of the content in the Operator's Manual before operating the machine.

It is important that the operator reads and follows the instructions in the machine's Operator's Manual.

An untrained operator may cause serious injuries and fatalities.

Never operate a machine for which there is no Operator's Manual available.

Learn to understand the warning plates, symbols and operating instructions for the machine before you start operating.

A few simple safety rules

General

- Repair malfunctions or defects that affect safety as soon as possible.



Figure 1

Entering/leaving the machine

- Always wear a hard hat, protective goggles, gloves, work shoes and other safety items that your work requires.
- Avoid standing in front of or behind the machine when the engine is running.
- Always use a rubber window scraper or brush with a long handle when cleaning the outside of the windows in order to avoid unnecessary climbing on the machine.
- When servicing the machine, i.e. changing light bulbs, a ladder may be needed.
- Make sure that stepping surfaces, service areas, handles and slip-protection are clean and free from oil, diesel fuel, dirt and ice and that they're replaced if they are defective or missing.
- Check at regular intervals that all slip-protection is firmly attached. If not, these shall be attached or replaced.
- Always face the machine and use the steps and handrails when entering or leaving the machine. Use two hands and one foot, or two feet and one hand. Do not jump!

Before operating

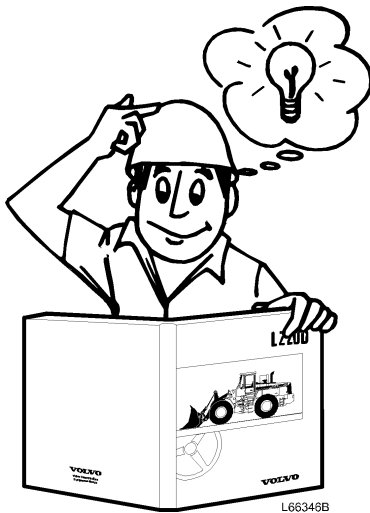


Figure 2

Read the Operator's Manual, plates and instructions before you operate the machine.

- Read the Operator's manual before you operate the machine! Follow the instructions for operating and perform the indicated recommended actions before operating.
Some important rules below:
- Perform a control light test before starting the engine by turning the ignition key to position I, see Operator's Manual.
- Perform all safety checks prescribed in the Operator's manual.



Never operate the machine if you are tired or under the influence of alcohol, medicine or other drugs.

- Before starting the engine indoors, make sure that the extraction capacity of the ventilation system is sufficient. The machine is equipped with a diesel engine and the exhausts may be hazardous to your health. Make sure that ventilation is sufficient, and avoid running the engine indoors for longer than necessary where ventilation is insufficient.
- Read all plates and instructions on the machine and in the Operator's manual before you operate or perform service on the machine. Each one of these contains important information regarding safety, handling and service.
- Use the seat belt during all operation.
- Always sit in the operator's seat when you start the engine.
- The machine must be fully functional before it's put into operation, that is, all defects that may cause eventual accidents must have been repaired.
- Never operate the machine for long periods without ventilation, or with a completely closed cab without the fan on (to avoid lack of oxygen).
- Only step and stand on surfaces with slip-protected treads and hold on to the available handles and handrails.

Hip-type seatbelt

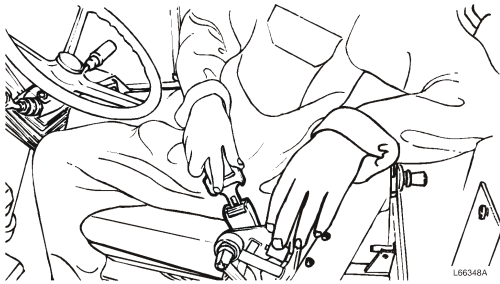


Figure 3

Use the seat belt during all operation

- If the seatbelt needs washing: Use a mild soap solution when washing and let the belt dry while it's fully pulled out before it's rolled up. Make sure that the belt is installed correctly.
- Replace the seatbelt immediately if it's worn, damaged or the machine has been involved in an accident where the belt had to take some strain.
- Modifications of the belt or its mountings is never permitted.
- The hip-type seatbelt is intended for one adult, not more.
- Always keep the belt rolled up when not in use.

When the engine is running

- Respect the warning lights. The red lights require immediate attention or consideration, see instructions in the Operator's manual in the section Instruments.
- Apply the parking brake and make sure that the attachment/attachment bracket rests on the ground.
- Move the gear selector to neutral before you leave the machine.



Risk of crushing injuries

- Do not stand near the frame joint unless it has been locked with the frame joint lock.
- Empty and tilt back the attachment before operating the machine on a road.
- Stop the engine and lower the attachment so that it rests on the ground before you leave the machine unattended.

When there is a risk of roll-over

The cab is the operator's protection and meets the standards for roll-over protection according to test standards, (ROPS), see further [191 CE-marking, EMC-directive](#) Prerequisite for protection is that the operator uses the lap-type seat belt and remains in the cab in case of a roll-over. Therefore, hold on to the steering wheel if the machine rolls over. **Do not jump!**

Falling objects

The cab is dimensioned to fulfill the requirements for objects falling on to the cab roof according to given test methods (that is, FOPS, see further [191 CE-marking, EMC-directive](#)

Emergency exits from cab

The cab has two emergency exits, the door and the right side window.

Actions before recovering and towing

See Section 1, Towing

Actions after recovering and towing



Do not forget to unlock the frame joint lock and secure it in the running position when the machine is to be operated again.

See Section 1, Service and Maintenance

Document Title: Safety rules when servicing	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Safety rules when servicing

This section covers general safety rules when checking and servicing.

Other rules, information and warning texts are given in the Operator's manual.

CE marking

This machine is CE-marked. This means that, when delivered, the machine meets the applicable "Essential Health and Safety Requirements", which are given in the EU Machine Safety Directive. If changes are made that affect the safety of the machine, the person making the changes is responsible for the same.

Therefore, the following applies:

- Install communication equipment (two-way radio), mobile phone unit, etc. according to the manufacturer's instructions in order to eliminate interference with electronic systems and components intended for the machine's function. See further [191 CE-marking, EMC-directive](#).
- When retro-fitting equipment in or on the cab; do not drill, weld or cut in the cab structure since such actions may impair the operator's protection in case of roll-over. See further [191 CE-marking, EMC-directive](#).

Before you begin any service work:

Service work done incorrectly is dangerous.

Make sure that you have sufficient knowledge, correct information, the right tools and the correct equipment to perform the service in a correct manner.

Repair or replace damaged tools and defective equipment.

Park the machine on a level and hard surface and prepare it for service by placing it in the service position according to figure:

Service position

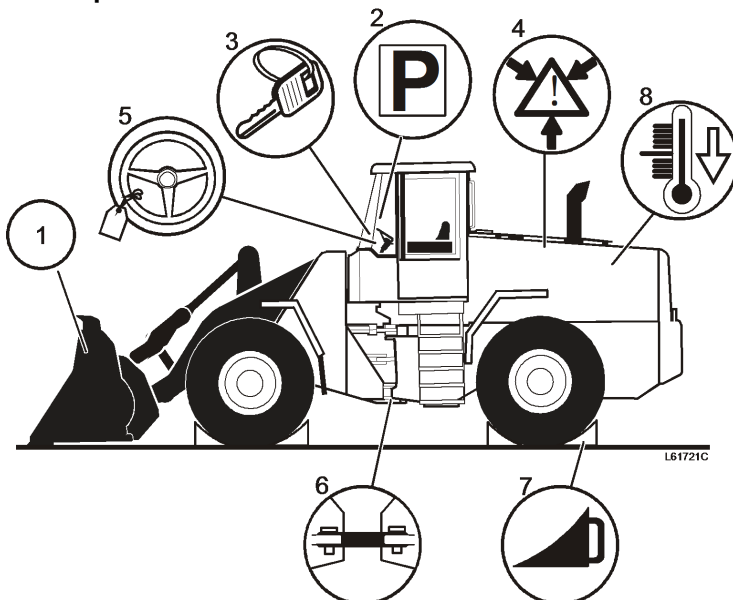


Figure 1

Service position

1. Attachment resting on the ground.
2. Parking brake applied.

3. Engine off and ignition key removed. (Does not apply for special checks).
4. Pressurized lines and pressure tanks shall be depressurized carefully so that the high pressure is released without risk. [191 Safety when working on hydraulic systems](#) [1] ⓘ
5. Yellow-black warning flag should be attached to the steering wheel (USA - a red flag may be used instead)
6. Frame joint lock connected.
7. Wheels blocked with wedges or similar.
8. Allow the machine to cool down. [2] ⓘ

NOTICE

When lifting the machine, the frame joint should be locked and the marked eyes intended for lifting should be used.

NOTE!

No work may be done on the machine until you have the correct skills and knowledge of the machine to do the work.



Figure 2

Read the Operator's Manual, plates and instructions before you operate the machine.

General

- Machine working in a environmentally contaminated area, see [191 Working in environmentally contaminated areas](#)
See also [191 Checklist after a fire or heat exposure](#).
- If someone is to take over the job that you have started, make sure that this person is informed about what part of the work has been completed and what remains to be done.
- When high-pressure washing the machine, do not aim the water jet directly at anti-slip surfaces or decals that are glued on.



WARNING

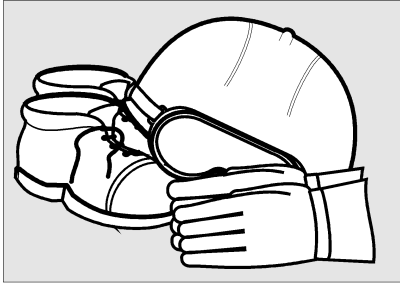
Only walk or step on the machine's prepared stepping surfaces, see operator's manual.



Figure 3

Do not step on engine covers.

- Never wear loose fitting clothing, for example, a scarf or jewellery, that can get caught and cause injury when working on the machine.
- Always use a hard hat, safety glasses, gloves, protective work shoes and other protective items as required by the work situation.



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Figure 4

Protective equipment

- Always stop the engine when servicing the machine unless instructions on plates or in this manual state otherwise.
- Do not stand near the frame joint unless it has been locked with the frame joint lock.

NOTICE

There is a risk of crushing even with the engine off if the machine is equipped with an electric secondary steering pump.

- Turn off the engine before opening engine covers, radiator casing, etc. Make sure that no tools or other objects that can cause damage are forgotten in the machine.



Figure 5

Keep engine covers, etc. closed when the engine is running and when the machine is operating.

[1]. No plugs or pressure lines may be loosened before the system has been depressurized when working on the brake or hydraulic system.

[2]If you have to work on the machine before it has cooled down, beware of hot fluids and parts as these may cause scalding or burn injuries.

Document Title: Working under raised boom	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Working under raised boom

Always secure the loader linkage with Support 999 3831 (2 pcs. L330, L350) before starting to work. Position the support on an even and firm ground surface.

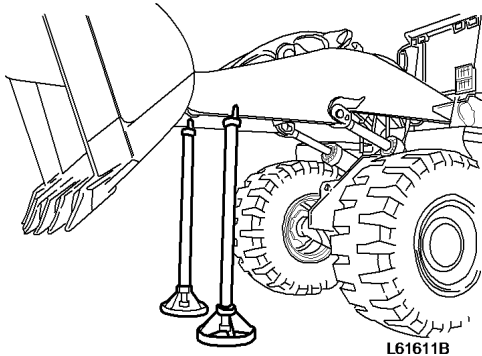


Figure 1
Securing the boom (L330, L350)

999 3831 Support (2 pcs.)



WARNING

Note the exact positioning of the support against the lifting arm!

If the support is positioned too far forward, it may be knocked out of position when the attachment bracket is tilted forward.

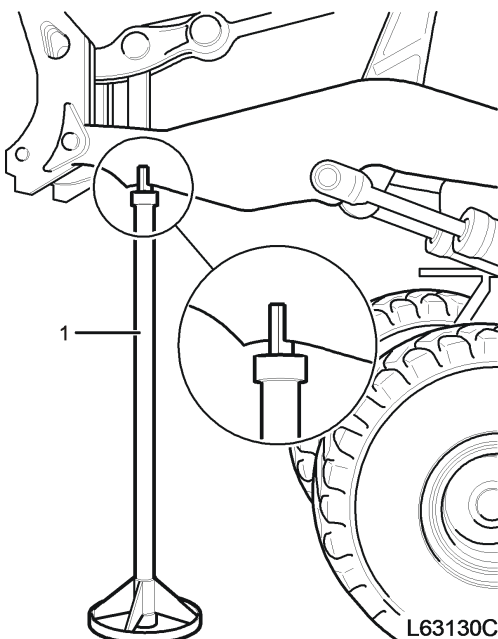


Figure 2
Securing the boom

1. 999 3831 Support

Document Title: Fire prevention measures	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Fire prevention measures

General

- There is always a risk of fire. Find out which type of fire extinguisher to use, where it is located and how to use it. The fire extinguisher in the machine should be located according to the figure or in an external box that can be locked.
- Fire-fighting equipment installed in or on the machine must be maintained in working order. Such equipment should be regarded as a complement to the operator's own efforts in case of a fire. The equipment should not be considered as a replacement of the operator's own fire fighting efforts.
- Fire extinguishers mounted on the machine or used when working on the machine must fulfil certain requirements. See the Operator's Manual.
- At the slightest sign of fire, if the situation allows it and keeping in mind your own safety, take the following action:
 - drive the machine away from the danger area.
 - lower the lift arms to their bottom position so that the attachment rests on the ground.
 - stop the engine by turning the ignition key to the "0" position.
 - leave the cab.
 - turn off the battery disconnect switch.
 - start fighting the fire and call the fire department if necessary.



Figure 2

Smoking and open flames are absolutely forbidden when filling fuel or any time diesel fuel is in contact with the open air.

- Smoking or open flames are absolutely forbidden close to the machine when filling fuel or at any time the fuel system is in contact with the open air.
- Diesel fuel is flammable and must not be used for cleaning. Use an approved solvent instead.
- Remember that certain solvents can cause skin rashes and are usually flammable. Avoid inhaling solvent vapour.
- Engine starting aids are flammable. Store such items in cool and adequately ventilated areas. Remember that such aids must not be used in combination with electric preheating of induction air.

Cleanliness

- Cleanliness is a decisive factor for operational reliability of the machine's systems. Therefore, keep the servicing area clean. Oil or water make floors and steps slippery and are also dangerous in combination with electrical systems or tools. Oily clothes or clothes drenched in grease constitute a serious fire hazard.
- Check daily that the machine and equipment, such as underbody skid plates, are free from dirt and oil. This reduces the risk of fire and makes it easier to detect defective components or loose parts.

NOTICE

If a high-pressure washer is used when cleaning, work carefully since damage may be caused to electrical components and insulation of the electrical cabling even at relatively moderate water pressure and temperature. Protect electrical cabling in a suitable manner.

- Keep the machine especially clean when operating in environments with fire hazards, such as saw mills, garbage dumps, etc. In such environments, suitable equipment to reduce the risk of accumulation of material and spontaneous combustion should be fitted (for example muffler guard, radiator screen, heavy-duty cyclone pre-cleaner, etc.).

Electrical system

- Check electrical cables with regard to chafing damage and make sure that they cannot be damaged in such a way. This applies particularly to unfused electrical cables, which are red.
For example, electrical cables between:
 - Batteries
 - Battery–starter motor
 - Alternator–starter motor
 - Cable to engine preheating coil.
- When unfused cables have been disconnected, it is important to check that they are re-connected and clamped in such a way that they cannot be exposed to chafing. Unfused cables must not rest against oil and fuel hoses.
- When fitting any optional equipment, make sure that all cables (circuits) are connected across a fuse and routed and clamped so that there is no risk of chafing.

Fuel, hydraulic and brake systems

- Check to make sure that there is no chafing damage to fuel, hydraulic and brake hoses.

Welding and grinding

- Welding and grinding on the machine may only be performed on well-cleaned areas and not in places filled with combustible fluids, e.g., tanks, hydraulic pipes.
Work with extra care when welding and grinding near flammable objects.
- Never weld on a painted surface without first removing the paint. Welding on a painted surface generates, in addition to health-hazardous vapours, technically inferior welds which may lead to future failures, with subsequent accidents.
Use personal protective equipment and, where possible, air extraction shall be used to handle gases from welding and grinding.

Actions after a fire: see [191 Checklist after a fire or heat exposure](#).

Document Title: Some simple rules regarding tyre handling	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Some simple rules regarding tyre handling



Tires installed on a split rim may explode and cause very severe injuries.

Inflating

- Never stand to the side of the tyre while inflating which is fitted on a split rim. Use a self-locking outlet with a hose long enough to allow you to stand outside of the hazard zone during inflation, see the illustration.
- Make sure that the hazard zone is clear when the tyre is inflated.
- The machine must be unladen when checking tyre pressure.
- Spare tyres should only be filled with enough air to allow the rim parts to be held in place.
- Secure a loose wheel with an inflation cage, cable or chains before inflating. Before removing the inflation cage, check that the tyre is properly fitted to the rim. Adjustments should be made before the wheel is inflated.
- Do not attempt to adjust side rings or lock rings when the tyre is inflated.
- Tyres used at less than 80% of normal pressure and rims or tyres suspected of being damaged should not be inflated with the wheel attached to the machine.

Fitting of tyres and rims

- Handling of tyres should be performed by authorised personnel only.
- The tyre should be deflated before removal from the machine.
- Never install a tyre on a rim that has not been recommended for that tyre.
- Never assemble rim parts for different dimensions or use damaged or faulty parts.
- Exercise caution if using reconditioned wheel details. Welding errors, faulty heating or soldering may have weakened the parts and may cause the detail to break.
- Make sure the lock ring groove in the rim is cleaned from foreign matter and rust before fitting the lock ring.
- Use a lubricant recommended by the tyre manufacturer when fitting onto the rim.

Repairing tyres and rims

- Never cut, weld nor heat the wheel parts in any manner.
- Exercise caution when using bead breakers and hydraulic jacks. Remain outside the hazard zone when removing foreign objects from the tyres. A bead breaker that releases can cause severe personal injury and may result in death.

Document Title: Safety when lifting and supporting complete machine	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Safety when lifting and supporting complete machine

Place the machine in service position, see [191 Safety rules when servicing](#)

Always use jacks and support equipment with sufficient capacity.

It is important to support the front and/or rear axle in a safe way before doing other work.



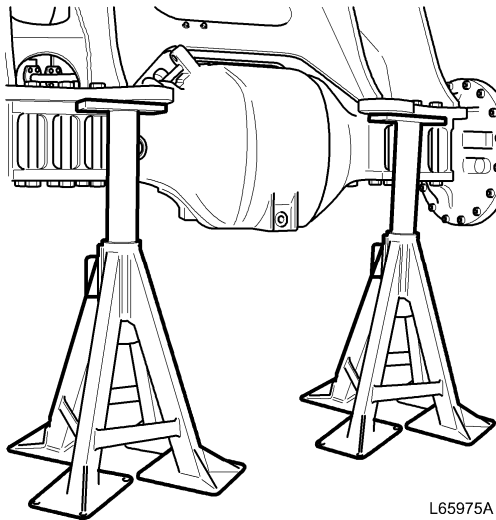
Entering or working under the machine is not allowed when the machine is only supported on jacks.

Always work on one axle at a time, e.g., when changing wheel, changing brakes.

Method for front axle

Lift the machine with the machine's lift arms.

Place supports at the designated support points according to the example.



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Figure 1
Before E-models

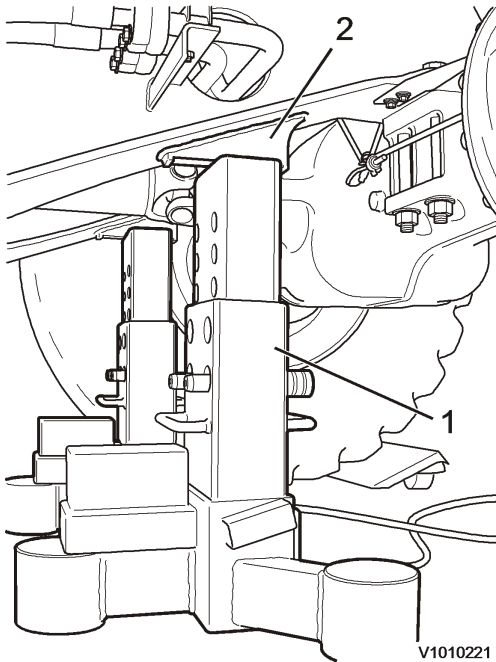


Figure 2
E-models

1. 11668007 Stand jack
2. Support point

Recommended method for rear axle

Prevent the rear axle from oscillating by locking it with jacks or wooden blocks between the frame and axle on both sides.

NOTE!

Do not forget to remove the oscillation lock before lowering the machine.

The machine must be secured with axle stands or stand jacks with sufficient capacity, 5–15 tons.

Support on each side under the rear frame's edge (not the belly plate) on an even and sufficiently large surface, see example in figure.

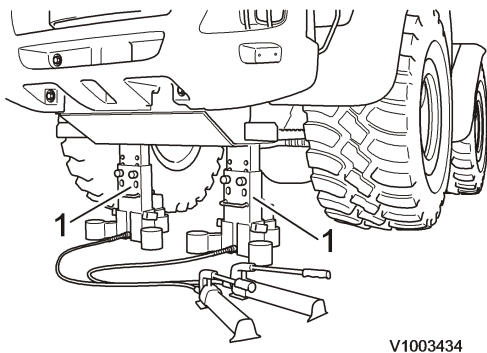


Figure 3
Support points

1. 11668007 Stand jack

With both wheels raised it is easier to rotate the hubs to get the wheel nuts in place.

Alternative method for rear axle

If there is no stand jack available, two garage jacks can be used instead (L150–L220).

NOTE!

Make sure that there is enough room for positioning axle stands.

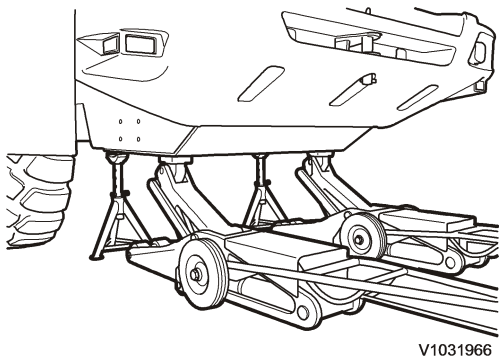


Figure 4
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On smaller machines (L50–L120), use a garage jack under the differential carrier assembly. Do not forget to lock the axle to prevent oscillation. Place the axle stands under the frame's rear edge.

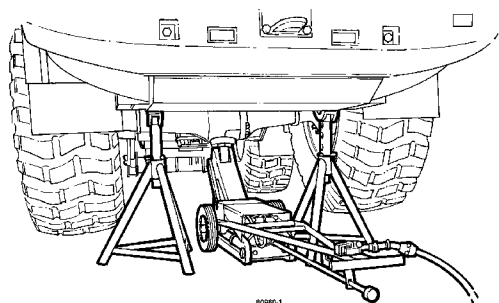


Figure 5
Support points

Do not use a jack with a small lifting surface under the differential carrier assembly.
Use a wheel trolley for safe handling of the wheels.

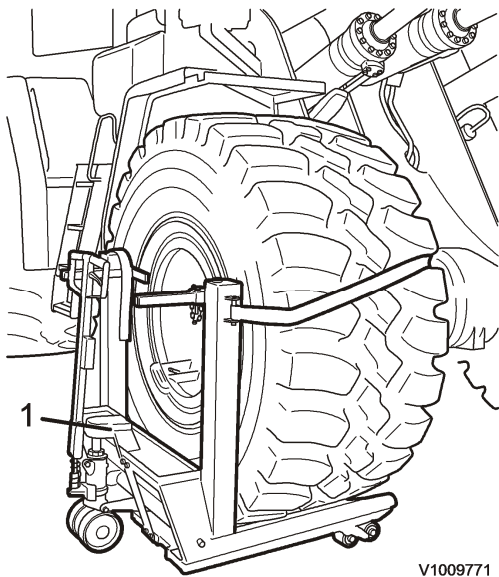


Figure 6

1. 11668010 Wheel trolley

Document Title: Safety when working with batteries	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Safety when working with batteries

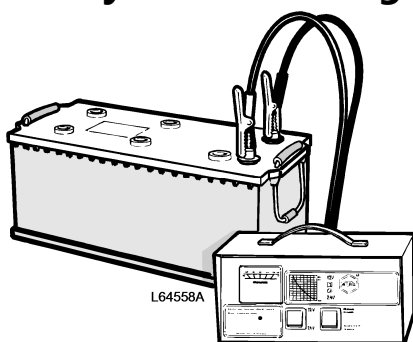


Figure 1
Battery charging



Risk of serious corrosive injuries!

Batteries contain sulphuric acid which is very corrosive to the human body and parts of the machine. In addition, batteries give off hydrogen gas when they are loaded (supplying electricity) or being charged. Together with the oxygen in the air, hydrogen gas forms a very explosive mixture.

This combination, **corrosive acid and explosive gas**, means a high risk of accidents during all work with batteries used in vehicles.

Therefore, it is very important that you take great care and follow the rules below when you are working with batteries.

Follow these instructions when charging batteries:

- Batteries give off explosive gases. Never smoke near batteries.



Figure 2
Do not smoke near batteries!

- Begin by disconnecting the ground lead when removing a battery. In order to reduce the risk of sparks that can cause fire, always connect the ground lead last when fitting a battery.
- Never tilt a battery to any great extent in any direction. Battery electrolyte may leak out.
- Do not connect a discharged battery in series with a fully charged battery. The current surge can cause the batteries to explode.
- Do not allow metal objects (such as tools, rings, wristwatches) to come in contact with battery terminals. Risk of fire and personal injury.

- Always cover the top of the battery with a rag or other non-conducting material when you work close to the batteries.
- Always refit the terminal caps on the batteries.
- Batteries contain substances hazardous to health and the environment. Therefore, discarded batteries be handled according to governing local/national regulations. See [191 Environmentally safe handling](#)

Charging batteries

Explosion hazard

When a battery is being charged, an explosive mixture of oxygen and hydrogen is formed. A short circuit, open flame or spark near the battery can cause a powerful explosion. Always turn off the charging current before disconnecting the charging clamps. Ventilate well, especially if the battery is charged in a confined space.



WARNING

Risk of serious corrosive injuries!



Figure 3

Corrosive acid

Corrosive sulphuric acid

The battery electrolyte contains corrosive sulphuric acid. Electrolyte spilled on bare skin must be removed immediately. Wash with soap and plenty of water. If electrolyte gets into your eyes or any other sensitive body part, rinse immediately with plenty of water and seek immediate medical attention.

Document Title: Starting with booster batteries	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Starting with booster batteries

When starting with booster batteries, the following must be observed:

Check that the booster batteries or other power source have **the same voltage** as the standard batteries.



The batteries could explode due to the current surge if a fully charged battery is connected to a completely discharged battery. Since the batteries contain sulphuric acid, this could result in personal injuries.

Follow these steps:

1. Move the gear selector to neutral.
2. Apply the parking brake.
3. Check that the booster batteries or other power source have the same voltage as the standard batteries.
4. Do not disconnect the cables to the standard batteries!
5. Connect (+) on the booster battery to (+) on the battery nearest the starter motor.
6. Connect the other start cable from (-) on the booster battery to the machine chassis, such as on the frame member close to the starter motor.
7. Start the engine with the ignition key in the cab.
8. Once the engine has started, remove the start cable between the chassis and the booster battery negative terminal (-). Then remove the start cable between the positive terminals (+).
9. Refit the terminal caps on the battery terminals.



Construction Equipment

Service Information

Document Title: Safety when handling oils and fuel	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Safety when handling oils and fuel

- When changing oil in engine, hydraulic system or transmission: Keep in mind that the oil may be hot and can cause scalding or burn injuries.
- Engine, hydraulic and transmission oils as well as diesel fuel have a corrosive effect on mucous membranes, for example, in eyes and throat and on skin. Therefore, take special care to keep such oils away from these sensitive body parts.
- When emptying/draining oils or fuel, steps must be taken to avoid unnecessary spills. In places where a container for collecting the liquid cannot be used, use a pump or connect a hose to ensure safe handling. Oil released or spilled on the ground will harm the environment and could also cause a fire.
Waste oils/fluids shall always be taken care of by a company authorized for this work. See [191 Environmentally safe handling](#)
- Remember the fire hazard!

Document Title: Safety when working with air conditioning refrigerant	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Safety when working with air conditioning refrigerant

General

Special competence is required for service work and more involved work which requires opening of the air conditioning system.

Many countries also require special training and official authority approval. Find out about governing regulations for your country and follow them!

Refrigerant R134a is used in the air conditioning unit, see also Section 8.

The type of refrigerant and the amount to be filled are shown on the type plate.

NOTE!

R134a adds to the greenhouse effect and should never be intentionally released into the open air.

Personal protective equipment

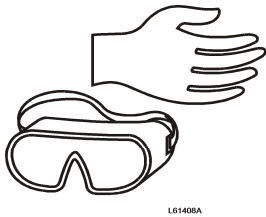


Figure 1

Protective goggles and gloves should be worn when there is a risk of contact with refrigerant.

When there is a risk of skin contact with refrigerant, use:

Tight-fitting protective goggles and protective gloves, and protect other bare skin (risk of frostbite).

Risks



The gases have no smell and may cause serious damage to the lungs already at low concentrations.

Refrigerant R134a may, if incorrectly handled, cause serious personal injuries as well as damage to the environment. Therefore, great care must be taken in all work with air conditioning units! The rules given below may be a great help to avoid injuries to all who come into contact with refrigerants.



Risk of frostbite! Wear protective work gloves.

- In liquid form the refrigerant may cause:
Frostbite.
- When in the form of a gas and at low concentration, the gas may:
Have some effect, especially on the nervous system.
- When in the form of a gas and at high concentration it may:
Have an anaesthetic effect.
- The air conditioning unit is pressurized and the refrigerant can unintentionally leak out. **Never disconnect hoses or**

remove the filler plug on the compressor.

If you suspect a leak, certified and trained personnel at a licensed workshop should be contacted for troubleshooting and repair.

- The refrigerant gas is heavier than air and will sink to the floor. Therefore, make sure that any escaped gas is ventilated before work is started in any low-lying areas.

Smoking, welding or other open flames are not allowed in a workplace where work with refrigerant is in progress. The refrigerant gas will then burn and form a toxic gas which is very dangerous to inhale. The gases formed when heating the refrigerant have a pungent smell at high concentrations.

The symptoms may appear several hours (perhaps up to 24 hours) after exposure to the gases.

Action in case of accidents

Inhalation

If escape of gas is suspected, leave the area, try to find fresh air and move affected persons out of the danger area. Small amounts of vapour from refrigerant R134a may have some effect especially on the nervous system. In large amounts, the gas may have an anaesthetic effect. In serious cases, seek immediate medical attention.

Skin contact

In case of frostbite, flush with lukewarm water for a long time. If a large amount of liquid refrigerant comes into contact with unprotected skin, the injured area should be carefully warmed with lukewarm water or warm clothes.

Seek medical attention immediately if symptoms persist.

Splash in eyes

Flush with warm water until the irritation ceases. Seek immediate medical attention.

Document Title: Safety when handling accumulators	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L60E, L120E, L90E, L180E HL, L330E, L50E, L220E, L110E, L180E, L70E, L150E [GB]			

Safety when handling accumulators

WARNING

If the pressure is not released before opening the system, oil under high pressure will jet out, resulting in serious personal injuries.

Before an accumulator is removed from the machine, the system must first always be depressurized, see [191 Safety when working on hydraulic systems](#).

Some accumulators contain pressure even if they are removed from the machine, so-called pre-charge pressure. Therefore, be very careful during all handling and work with accumulators.

The pre-charge pressure must be lowered to atmospheric pressure before working on a piston accumulator.

Avoid exposing the accumulator to high temperatures and careless handling.

WARNING

A discarded accumulator which is not punctured may still contain high pressure and must always be handled with great care.

Discarded accumulators shall be punctured before they are scrapped to avoid the risk of explosion. See [527 Accumulator, discarding](#).

Document Title: Safety when working on hydraulic systems	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Safety when working on hydraulic systems

The hydraulic systems in our loaders operate at very **high pressures, up to approx. 42 MPa (6090 psi)**. To avoid serious personal injuries it is very important that the systems are maintained in the right way, and that all persons who come into contact with the machines are very careful in their work and are very attentive to any defects.

Those who follow the simple rules below have laid a good foundation for avoiding accidents.

General

- Never adjust a pressure limiting valve to a higher pressure than that recommended by the manufacturer.
- A hydraulic hose that swells, e.g., at a connection, shows that it is about to rupture. Replace the hose as soon as possible! Pay attention to leaks from hydraulic hoses and connection. Repair the leak before the part ruptures!
- Discarded pressure accumulators shall be punctured before they are scrapped to avoid the risk of explosion. See [527 Accumulator, discarding](#).

WARNING

If the pressure is not released before opening the system, oil under high pressure will jet out, resulting in serious personal injuries.

Releasing pressure (depressurizing)

An accumulated pressure remains in the system when the engine has been stopped. Before loosening or opening hose couplings, plugs, etc. in the hydraulic system or brake system, the residual pressure in the system must be released by so-called depressurizing.

In case the engine stops, the accumulators for lowering the lift arms are depressurized by moving the lift lever back and forth several times.

- Accumulators for the boom suspension system are depressurized as follows:

1. Place two supports 999 3831 under the boom.
Place the supports on an even and firm surface

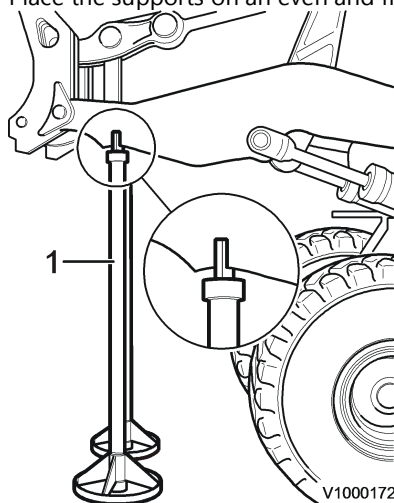


Figure 1
Securing the boom

1. 999 3831, Support, 2 pcs.

2. Start the engine and engage float mode with the switch SW903 on the instrument panel
3. Activate the boom suspension system in gear-dependent position.
4. Move the control lever (lift/lower) forward to float position and wait for 30 seconds.

NOTE! The engine shall run at idle since there is a risk that the machine lifts in case float mode is not activated. Since the lever has to pass the lowering position to reach float position, the lever shall be pulled quickly to the float position to minimize the lowering function.

5. Hold the servo lever in float position and turn off the engine at the same time.

Now the accumulators shall be drained and the boom suspension system should be pressureless. Only a residual pressure of approx. 300 kPa (44 psi) shall be left in the system. To make sure that the system is depressurized before starting any service work, proceed as follows:

6. Connect a loose pressure check connection on a hose.
7. Place the end with the loose pressure check connection in a suitable container and connect the other end of the hose to the pressure check connection on the boom suspension system's valve block. In case the hose cannot be connected to the boom suspension system's valve, the residual pressure in the system may be too high. Repeat steps 1 up to and incl. 5.
8. Any residual pressure in the system is drained through the hose.

- All pressurized tanks/vessels shall be opened carefully so that any residual pressure is released.
- Check-tightening of leaking couplings and connections shall only be performed after the system is completely depressurized.



Leaking high-pressure hydraulic hoses may cause severe injuries. Fine jets have high penetrating capacity on bare skin.

- To check for leaks, use a steel plate or a stiff board, **never use your hand**.

Document Title: Safety when using lifting equipment	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Safety when using lifting equipment

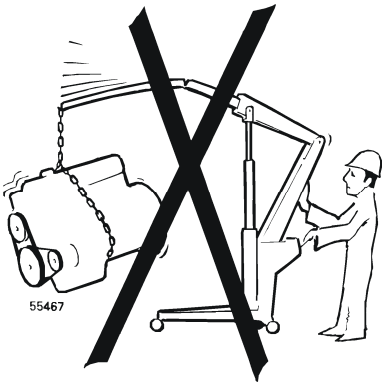


Figure 1

Do not overload lifting or support equipment.

- All lifting devices, e.g., slings, straps, ratchet blocks, etc., must meet governing national regulations for lifting devices.
We will not accept any responsibility if other lifting devices, tools or work methods are used, other than those described in this publication.
- Make sure that the ground surface is flat and has sufficient strength to support the expected load for lifting device with load.
- When lifting or supporting machine parts, use equipment with a lifting capacity that at least equals the weight of the part in question.
- Use the lifting eyes or lifting points that are located on certain machine components.

Document Title: Checklist after a fire or heat exposure	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Checklist after a fire or heat exposure

- As a precaution, seal rings (O-rings or axle/shaft seals) should always be handled as if they were made of fluor rubber, see also section "Fluor rubber".



Avoid splashing when washing a machine damaged by fire. For this reason, never use high-pressure washing equipment.

- Never touch burned components or parts with your bare hands when there is a risk that you may be exposed to contact with melted polymers. First, wash thoroughly with plenty of lime water (a solution or a suspension of calcium hydroxide, i.e. slaked lime).
Use thick, protective gloves made of rubber and wear goggles that are certain to protect your eyes.
- Seek medical attention if your skin may have come in contact with burnt fluor rubber. The skin should be treated with Hydrofluoric Acid Burn Jelly or similar.
Symptoms may not appear until several hours after contact with burnt fluor rubber.
- Discard protective gloves, rags and other items that may have come into contact with burnt fluor rubber.
- Ensure good ventilation during the work.
- In case of splash in eyes: rinse immediately with plenty of water for at least 15 minutes. Contact a doctor.

Document Title: Health hazards with paint, plastics and rubber	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Health hazards with paint, plastics and rubber

Work on painted surfaces

Never weld or cut with a torch on painted surfaces. All paint decomposes when heated and generates a vast number of different substances that may be irritating and, in case of repeated exposure, be very hazardous to health

The following safety actions must be taken:

- Remove the paint by sandblasting at least 10 cm (4 in) around the welding or cutting point (use breathing mask). If the paint cannot be removed by sandblasting, it must be removed in another way, such as with paint solvent.
NOTE!
If the paint is removed with a paint solvent, use an air extractor, face mask/breathing protection and protective gloves.
- Grinding machines with high-speed grinding discs also heat the paint and should only be used if equipped with an air extractor. Also wear a face mask or other breathing protection.

Rubber and plastics



WARNING

When heated, rubber and plastics can give off substances that are hazardous to personal health and the environment.

The following safety rules must be followed:

- Do not weld or cut with a torch near polymer materials (plastics and rubber) without first protecting them from the heat.
- Never burn polymer materials when scrapping them.
- Be careful when handling machines that have been exposed to fire or other intense heat. See also [191 Checklist after a fire or heat exposure](#).
- Always use gloves, safety goggles and a face mask or other breathing protection.

Fluor rubber



WARNING

Risk of serious corrosive injuries!



WARNING

When hydrogen fluoride rubber is heated, there is a risk of hydrogen fluoride gas build-up already at approx. 320 °C (610 °F). When inhaled, the gas is extremely corrosive to respiratory tracts.

Certain seals designed to withstand high operating temperatures (i.e. in engines, transmissions, axles, brakes, hydraulic motors and pumps) may be made of fluor rubber which, when heated to high temperatures, forms hydrogen fluoride and hydrofluoric acid.

Hydrofluoric acid is highly acidic and corrosive. It cannot be rinsed or washed off the skin and causes very severe burn and corrosive injuries that take a very long time to heal. As a rule, injured tissue must be removed surgically.

Hydrofluoric acid may remain on machine parts for a very long time (several years) after a fire.

NOTE!

In case of contact with hydrofluoric acid, it may take several hours before any symptoms appear.

If swelling, redness, or burning pain appears, and contact with heated fluor rubber is suspected as the cause, seek immediate medical attention.

If a machine or a component for a machine has been burnt in a fire or has been exposed to other intense heat, it may only be handled by specially trained service personnel.

For all handling of machines after a fire, wear heavy-duty, neoprene rubber gloves and effective protective goggles. See [191 Checklist after a fire or heat exposure](#).



Burning of painted parts, plastic or rubber parts constitutes a health hazard.

See [191 Environmentally safe handling](#)

Decontamination

The area around a heated machine part that is suspected to be made of fluor rubber shall be decontaminated by thorough and ample washing with lime water (a solution or suspension of calcium hydroxide, that is, slaked lime) in water. After completing the decontamination work, wash the gloves in the lime water and then discard them.

If the machine has been exposed to a fire or other intense heat, the safety actions in the following checklist shall be followed unconditionally at all times: [191 Checklist after a fire or heat exposure](#)

Asbestos information

The components in Volvo CE's machines are free from asbestos, that is why it is important to use genuine Volvo spare parts.

Document Title: Environmental handling for the future	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Environmental handling for the future



Figure 1

The world stands before gigantic challenges on environmental matters where clean water, climate change, and use of chemicals are some of the most important issues. Volvo has an important function in meeting these challenges and contributing to a more ecologically sustainable development. Quality, safety and environment are Volvo core values and have for a long time been integral parts of our company and our products.

Volvo Construction Equipment works with continuous improvement of the machines' environmental performance. An important factor to retain the machine's performance is the service offered by the workshops. This service manual contains recommendations, warning texts, etc. to facilitate your work for the environment.



Construction Equipment

Service Information

Document Title: Waste handling	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Waste handling

Contribute to careful use of natural resources by following the steps below when handling waste.
If possible, deposit the waste for recycling.

REUSE of products is the best from an environmental aspect.

MATERIAL RECYCLING for use in new products is a good environmental alternative.

ENERGY RECOVERY by burning combustible materials is a good alternative when recycling is not possible.

DESTRUCTION is used for hazardous waste. Destruction is performed in special facilities.

DEPOSITION is the worst from an environmental aspect and should be avoided as much as possible.

STORAGE is a temporary measure until a suitable recycling method has been developed.

Document Title: Environmentally safe handling	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Environmentally safe handling

Always choose an environmentally friendly alternative where one is available, e.g., biodegradable oils.

Always follow national and local environmental regulations.

All waste shall be brought to a waste handling company, approved by the authorities.

Oils and fluids

Oils and fluids, e.g., coolant, that are not reused shall be collected in tight-sealing containers and left for destruction.

Filters

Oil and fuel filters shall be drained and put into sealed containers before they are left for destruction.

Refrigerant R134a

Refrigerant R134a contains substances that affect the greenhouse effect and may never be released into the open air. Shall be recycled according to instructions in separate component manual for the air conditioning.

Batteries



Risk of serious corrosive injuries!



Figure 1
Corrosive acid

Batteries contain environmentally hazardous substances and corrosive acid. Shall be left for recycling.

Chemicals

Chemicals, paints, glue, cleaning agents, etc. shall be left for recycling and destruction.

Rubber and plastics

Rubber materials and plastics may not be burned. Shall be left for recycling.

Tires shall be handled according to special rules.

Electronics

Electrical and electronic waste, e.g., circuit boards and bulbs, shall be left for recycling.



Construction Equipment

Service Information

Document Title: Environmentally hazardous fluids	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Environmentally hazardous fluids

Pay attention to leakage of fuel, oils and other fluids from the machine that may contaminate the environment.

Take appropriate actions to seal the leak immediately and decontaminate contaminated ground as soon as possible.

See [191 Decontamination](#).

Oils and fuels

When emptying/draining oils and fuels, take appropriate actions so that unnecessary spills are avoided. In places where containers for draining cannot be used, use a pump or hose for safe handling.

Air conditioning

Refrigerant R134a contains substances that affect the greenhouse effect and may never be released into the open air.

Service personnel who work with refrigerants must know the laws/rules that apply in the local country but also international rules.

Special training is recommended for all service work on the air conditioning. Many countries require certification from an authority for such work. See also [191 Safety when working with air conditioning refrigerant](#)



Construction Equipment

Service Information

Document Title: Working environmentally contaminated areas	in 191	Function Group:	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]				

Working in environmentally contaminated areas

Machines that are used in environmentally contaminated and/or health-hazardous areas shall be specially equipped for operation in such an environment.

Used cab and engine air filters from machines working in environments with asbestos or other hazardous dust shall be put into tight-sealing plastic bags that the new filters come in, then leave the used filters for destruction.



Construction Equipment

Service Information

Document Title: Decontamination	Function Group: 191	Information Type: Service Information	Date: 2014/5/9 0
Profile: WLO, L180E [GB]			

Decontamination

Start decontamination as soon as possible. Certain substances spread quickly in the environment.

Decontamination after leaks/spills

Use suitable absorbing materials to collect leaking oil or fuel, e.g., absorbent mats.

Prevent leaking oil/fuel from draining into rain water/storm water drains.

Contaminated soils and ground materials must be removed and collected in suitable containers.

Collected soils and absorbent materials shall be left for destruction.

Decontamination after accident

If possible, seal leaks from the machine.

Isolate the leakage area using banks drain booms.

Add absorbent materials, e.g., absorbent sand or bark cuttings.

Stop leaking fluids so that they do not drain into rain water/storm water drains or ditches.

Collect the absorbent materials and the top layer of soil, put it into sealed containers for transport to destruction.

Decontamination after fire

First of all, put out the fire.

Decontaminate in the same way as after an accident.

NOTE!

Pay attention and be aware that certain substances may be poisonous after a fire. See [191 Health hazards with paint, plastics and rubber](#).

See also [191 Checklist after a fire or heat exposure](#).

Thank you for your purchase.
Have a nice day.

Document Title: Recommended lubricants, oils	Function Group: 160	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Recommended lubricants, oils

	Oil grade	Recommended viscosity at various outdoor temperatures									
		°C	-30	-20	-10	0	+10	+20	+30	+40	+50
		°F	-22	-4	+14	+32	+50	+68	+86	+104	+122
Engine	Volvo Ultra Diesel Engine Oil or engine oil VDS-3 or Global DHD-1 + VDS-2 or ACEA-E5 + VDS-2 or API CH-4 + VDS-2 or API CI-4 + VDS-2	SAE 5W/30 SAE 10W/30 SAE 15W/40 SAE 30 SAE 40									
Axles Hub reductions	Volvo WB 101 Brand names and requirements for the oil, see specifications, axles, in the operator's manual for each machine.	WB 101									
Transmission Dropbox	Volvo Automatic Transmission Fluid Volvo standard 97341	Volvo Automatic Transmission Fluid									
Hydraulic system	Volvo Super hydraulic Oil Swedish norm SS 15 54 34 alt. international standard Vickers 35 VQ/25 test viscosity acc. to ISO 3448 class acc. to ISO 6743-4	V46/AV 46 V68/AV 68 ISO VG 46 HV ISO VG 68 HV									
		°C	-30	-20	-10	0	+10	+20	+30	+40	+50
		°F	-22	-4	+14	+32	+50	+68	+86	+104	+122



Construction Equipment

Service Information

Document Title: Cleanliness, brake and hydraulic systems	Function Group: 170	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E, L180D [GB]			

Cleanliness, brake and hydraulic systems

Maintain the best possible cleanliness when working on these systems. Wipe off all pipe and hose connections before disconnecting and remove paint flakes, etc. Plug all pipes, hoses, cylinders, etc. immediately after disconnecting. Never install a hydraulic hose which has not been plugged until it has been thoroughly cleaned.



Construction Equipment

Service Information

Document Title: Working on the electrical system of the machine	Function Group: 170	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Working on the electrical system of the machine

- Only use test instruments with a light-emitting diode, never a test light with a light bulb, for example, during trouble-shooting of the electrical system!
The high firing voltage of the bulb can destroy expensive electronic components.
- When installing a two-way radio, mobile phone, etc., installation must be performed according to manufacturer's instructions in order to eliminate interference with electronic systems and components intended for the function of the machine.



Construction Equipment

Service Information

Document Title: Electric welding	Function Group: 170	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Electric welding

For electric welding on the machine or on attachments on machine:

- ☐ ground connection turned off with battery disconnect switch.
- ☐ fuse FH4 must be removed, located next to the battery disconnect switch.
- ☐ connectors for all control units (ECUs) must be unplugged.

NOTE!

Ground the welding unit as close as possible to the welding point.



Construction Equipment

Service Information

Document Title: Charging batteries	Function Group: 170	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Charging batteries

Explosion hazard

Charging produces hydrogen in the battery, which mixes with oxygen to produce an explosive mixture. A short circuit, naked flame or spark near a battery can cause a powerful explosion. Always switch off the charging current before removing the charger clamps. Ensure appropriate ventilation, especially if the battery is charged in a confined area.

Corrosive sulphuric acid

The battery electrolyte contains corrosive sulphuric acid. Electrolyte spilled on bare skin must be removed immediately. Wash with soap and plenty of water. If electrolyte gets into your eyes or onto any other sensitive part of the body, rinse immediately with plenty of water and seek immediate medical attention.



Construction Equipment

Service Information

Document Title: Warranty inspection 100 hours	Function Group: 172	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Warranty inspection 100 hours

The service points where "optional equipment" is stated are not included in the accounted time for the interval

Op nbr 172-002

[11666020 Pressure gauge](#)

[11666051 Pressure gauge](#)

[11666037 Hose](#)

[14290266 Hose](#)

[9993831 Support](#)

Oil filter pliers

Torque wrenches

Torque amplifier

Sleeves

Extension

Glycol tester

Collection container

Grease gun

Air pressure gauge

min. 140 (103 lbf ft) - max. 1400 Nm (1032 lbf ft)

41, 36 and 32 mm

approx. 250 mm (10 in)

Test-run and check

Start and stop function

Instruments, lighting, direction indicators, reflectors, flashing hazard lights, wipers, washers, horn, and back-up alarm (if installed).

Steering system

Gear positions / automatic shifting

Differential lock

Brake system

Control light for low brake pressure

Parking brake

Climate control system, fan and controls including air conditioning

Loader unit's functions including automatic tilt (bucket positioner) and automatic lift (boom kick-out)

Optional equipment

Steering pressure, check

2.
 1. Secure the frame joint with the steering joint lock and place blocks in front of and behind the wheels.
 2. Connect the pressure gauge to the pressure check connection on the steering valve.
 3. Start the engine and let it run at low idle. Make sure that the system has normal operating temperature.
 4. Steer against the steering joint lock's end-position and check the steering pressure.

Steering pressure, see: [030 Pump 2 \(P2\) Steering and other hydraulics, specifications](#)

NOTE!

In neutral position the pressure gauge normally shows approx. 2.5 MPa (363 psi), which is the priority valve's opening pressure in the central block.

5. Stop the engine.

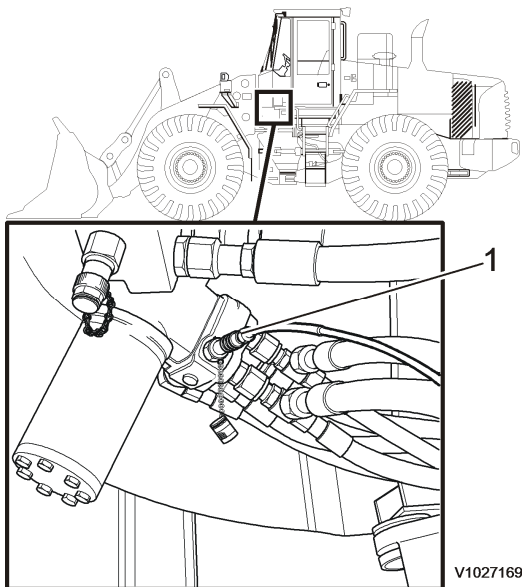


Figure 1
Steering pressure, checking

1. 11666020 + 11666037

Tires as well as inflation pressure in tires, check

3. See: [191 Some simple rules regarding tyre handling](#)

For inflation pressure in tires, see operator's manual

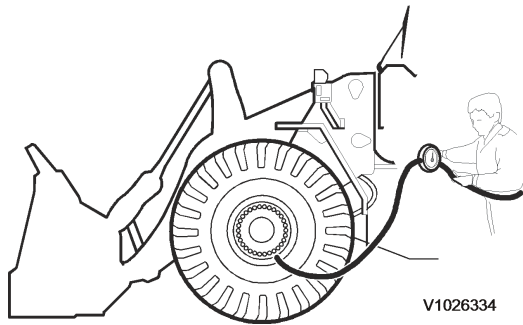


Figure 2
Inflation pressure in tires, check

Wheel nuts and tightening torques, check

4. Tightening torques, see: [030 Wheels, tightening torques](#)

Cab mounts, tightening torques, check

5. Tightening torques, see: [030 Cab, tightening torques](#)

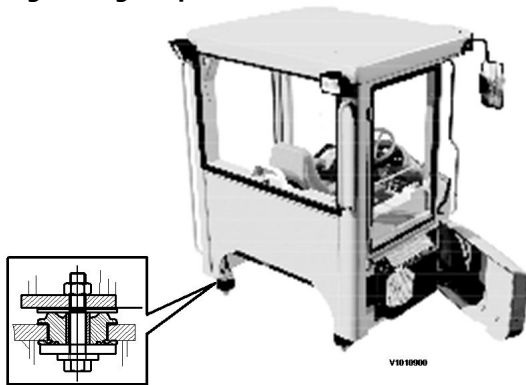


Figure 3
Cab mounts

Propeller shafts and support bearing, tightening torques, check

6. Support bearing

Tightening torques, see: [030 Propeller shaft, tightening torque](#)

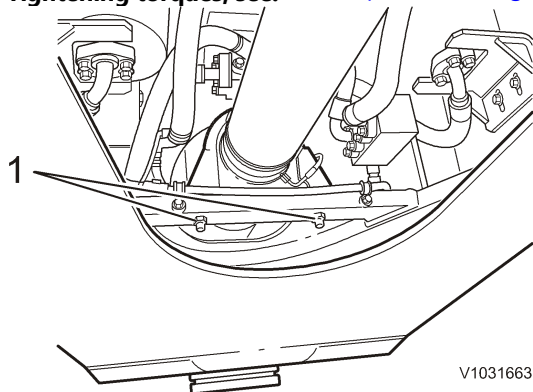


Figure 4
Support bearing

1. Bolts for support bearing

7. bolted flange

Tightening torques, see: [030 Propeller shaft, tightening torque](#)

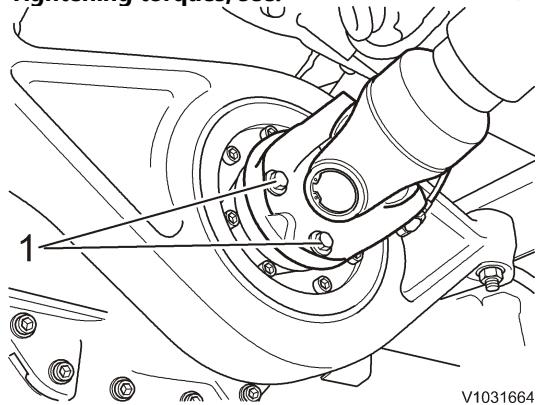


Figure 5
Propeller shaft

1. Screw

Axles, attaching bolts, tightening torques, check

8. Front axle

Tightening torques, see: [030 Front axle, tightening torque](#)

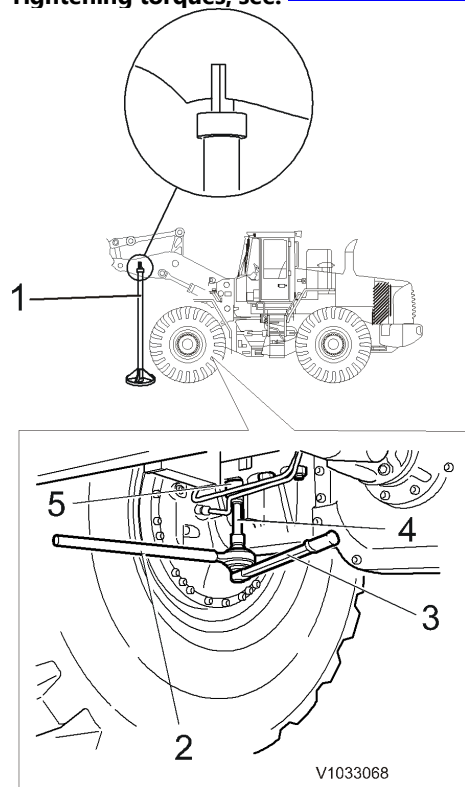


Figure 6
Front axle

1. 9993831
2. Torque amplifier
3. Torque wrench
4. Extension
5. Socket 41 mm

9. Rear axle

Tightening torques, see: [030 Rear axle, tightening torques](#)

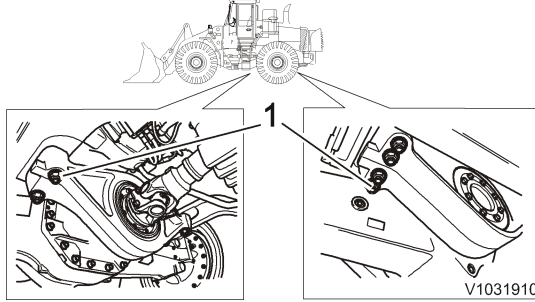


Figure 7
Rear axle

1. Attaching bolts

Leakage

10. Check that all visible gaskets are intact and that they are not exposed to leakage.

Pipes and hoses

11. Check that all pipes and hoses are intact and not deformed.



Open the expansion tank cap slowly and carefully. The cooling system operates at high pressure and hot coolant may rush out and cause severe burns.

Cooling system, check level and freezing point

12. Level check

Fill coolant in the expansion tank.

NOTE!

Use genuine Volvo coolant.

The coolant level shall be between max. and min.

Filling

1. The engine shall be run warm and the temperature control shall be set to "warm".
2. Let the engine cool down.
3. Fill coolant up to the max. marking on the expansion tank.
4. Run the engine warm and top up so that the cooling system is completely filled and bled free from air.

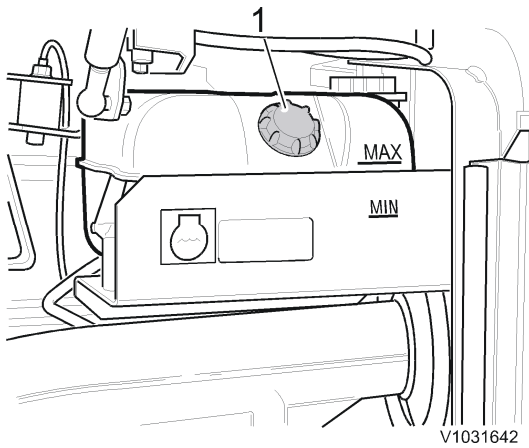


Figure 8
Coolant level

1. Cap

13. Freezing point, check

Check the freezing point with a glycol tester at the expansion tank.

The glycol tester's value should show approx. -38°C (-36°F).

The machine is delivered with a coolant mixture of 50% glycol and 50% water for optimal cooling and corrosion characteristics. That is why the same coolant mixture shall be filled, regardless of ambient temperature conditions.

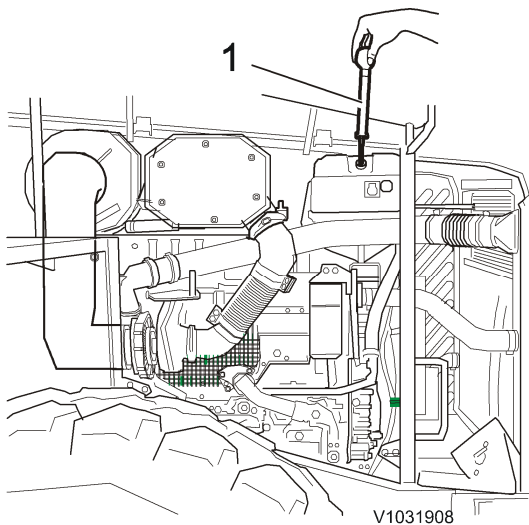


Figure 9
Coolant check (principle illustration)

1. Glycol tester

Cab, ventilation unit

14. Primary filter, clean and check

NOTE!

Use breathing protection when handling filters

1. Open the side cover.

2. Remove the pre-filter.
3. Remove the nuts that hold the plastic casing for the primary filter.

NOTE!

Keep track of the sheet metal strip that is located at the top of the plastic casing

4. Remove the primary filter.
5. Shake the filter carefully, without damaging it. Avoid compressed air, vacuum cleaners and water.
6. Reinstall the plastic casing with the sheet metal strip at the top.
7. Install the pre-filter and close the side cover.

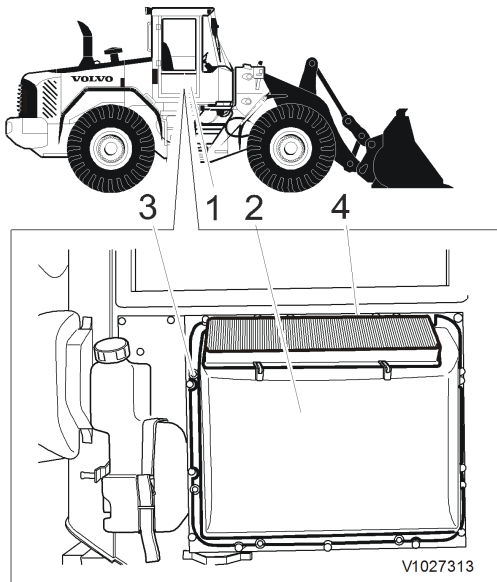


Figure 10
Primary filter, principle illustration

1. Side cover
2. Primary filter. Inside plastic casing
3. Nuts, 8 pcs.
4. Pre-filter

Water trap, check

15. Drain as needed.

NOTE!

Collect fuel by using a collection container or a plastic hose

NOTICE

Always handle oils and other environmentally hazardous fluids in an environmentally safe manner.

Draining of water from the fuel must be done manually.

A non-return valve in the filter head prevents the fuel from flowing back to the tank. Since no fuel can flow back the pressure will remain and thus the water will not be drained unless new fuel is pumped in.

When draining, proceed as follows:

1. Place the end of the hose in a container.
2. Loosen the drain nipple.
3. Pump with the hand pump until all water has been forced out from the water trap.
4. Tighten the drain nipple.

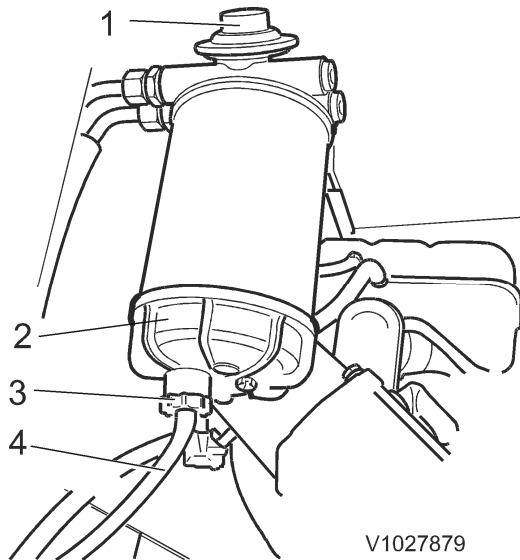


Figure 11
Water trap

1. Hand pump
2. Water trap
3. Draining nipple
4. Drain hose

Drive belts, check

16. At the correct belt tension, it should be possible to press down the belt between the belt pulleys approx. 8 mm (0.32 in) with a force of 25-30 Nm (18-22 lbf ft).

Adjusting

1. Loosen the alternator's attaching bolt
2. Adjust to the correct belt tension. Check the belt tension and tighten the attaching bolt.

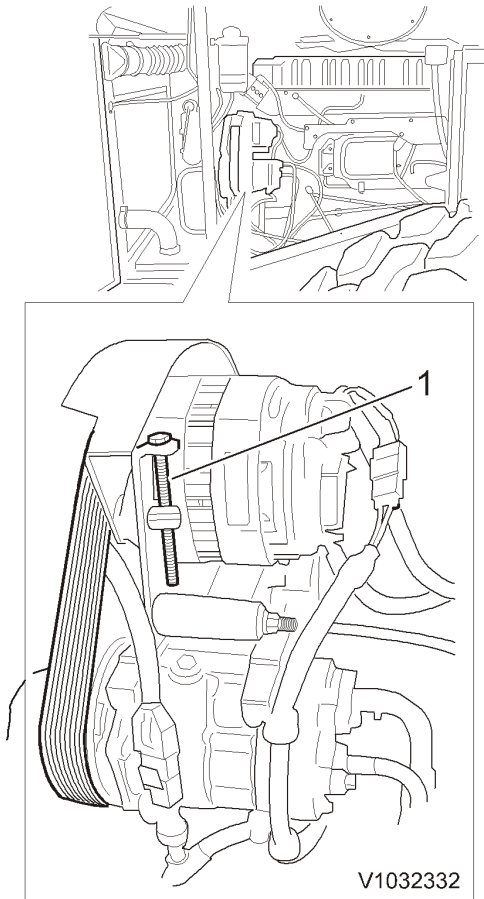


Figure 12

1. Adjusting screw

Oil-bath air cleaner (optional equipment)

17. Change oil as needed.

Volume: **9.1 litres (2.4 US gal)**

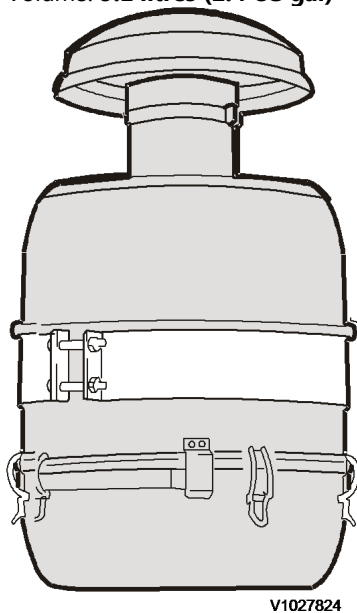
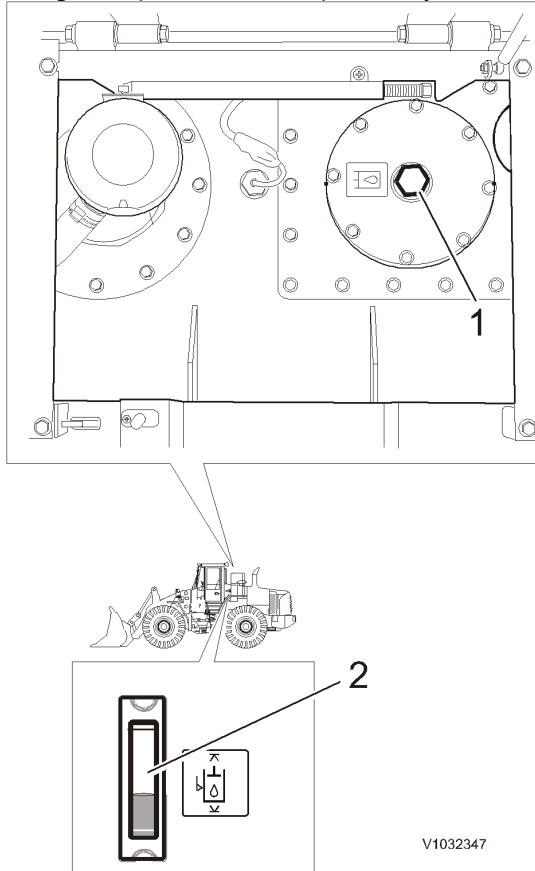


Figure 13
Oil-bath air cleaner

Hydraulic oil, check the level

18. The hydraulic oil level shall be between max. and min.
Filling takes place from the top of the hydraulic tank.



V1032347

Figure 14
Hydraulic oil, checking level

1. Cap, filling up
2. Sight-glass

! WARNING

The battery electrolyte contains corrosive sulphuric acid. Electrolyte spilled on bare skin should be removed immediately. Wash the affected area with soap and plenty of water. If electrolyte gets into your eyes or any other sensitive body part, rinse immediately with plenty of water and seek immediate medical attention.

Battery, electrolyte level, cables and connections, check

19. The battery electrolyte shall be 10 mm (0.4 in) over the plates in the battery.
Top up with distilled water as needed.

Check:

1. Cable terminals and terminal studs must be well cleaned, tightened and greased externally with, e.g., vaseline as corrosion protection.
2. That the batteries are securely tightened.

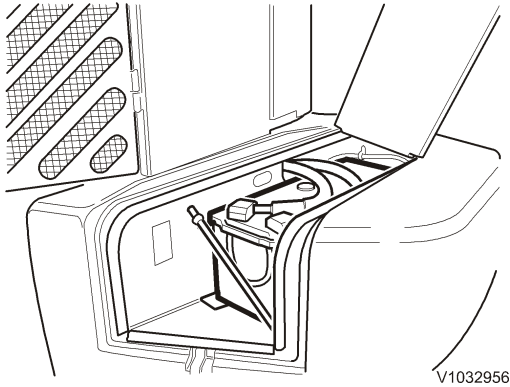


Figure 15
Battery box, left side (principle illustration)



Risk of burns! Use protective work gloves.

Transmission, oil filter, change

20. Use oil filter pliers when removing the oil filter.

Installing filter:

1. Brush new oil on the rubber seal.
2. Spin on the filter until the gasket just touches the sealing surface. Tighten another 1/2 to 3/4 turn by hand.

Warm up the machine and check that the oil filter gasket seals tight. If not, remove the filter and check the sealing surface. Normally, it does not help to tighten more.

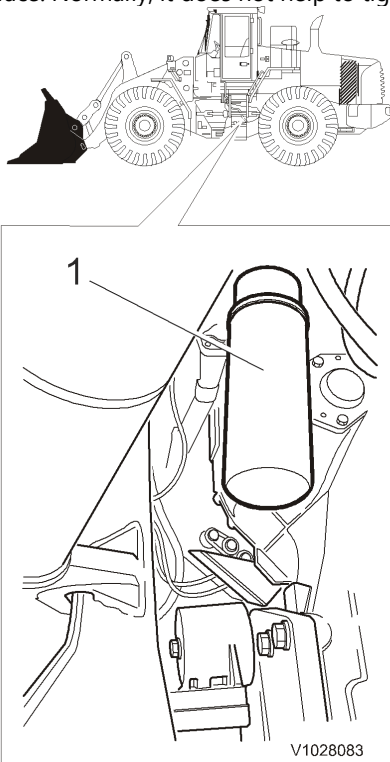


Figure 16

1. Transmission oil filter

Transmission oil level, check

21. The machine shall be parked on level ground when checking. The gear selector shall be in neutral position and the parking brake shall be applied.

When checking the oil with the engine running and machine at operating temperature, the level shall be between the markings High and Low on the **lower** part of the glass.

The level can also be checked with cold machine. Then the oil level shall be between the markings High and Low on the **upper** part of the glass.

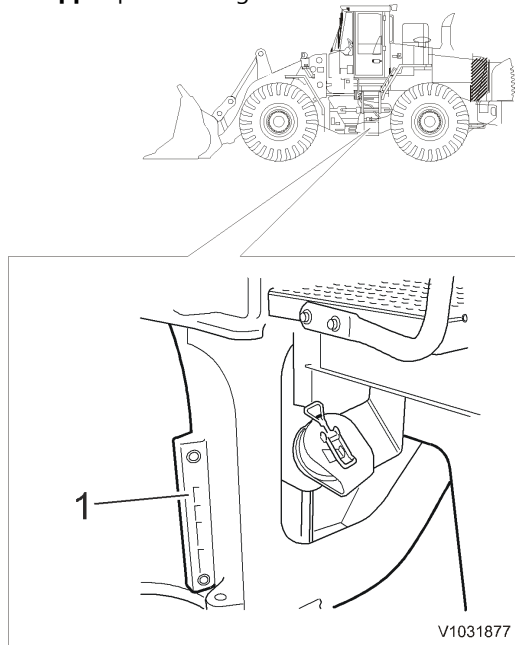


Figure 17

1. Sight-glass

Framework, grease

22. Boom

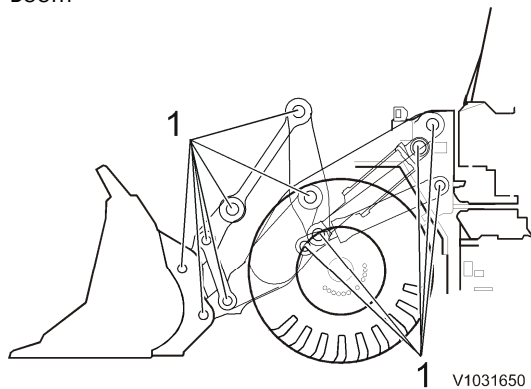


Figure 18
Boom

1. Grease nipples.

Greasing bearings

Service life of bushings and pins can be extended if the machine is greased regularly and in the right way.

Before greasing. Wipe off the grease nipples and grease gun so that sand and dirt particles are not introduced when greasing.

Greasing of bearings has two main purposes:

- Add grease to the bearing to reduce friction between pin and bushing.
- Replace old grease that may be dirty.

The grease space under the outer seal collects and prevents dirt particles and fluid from penetrating into the bearing.

Grease the bearing until new grease comes out through the outer seal.

Recommended grease: Lithium-based grease with EP-additive and consistency NLGI-grease class 2

If the machine is equipped with central lubrication system, see: [993 Central lubrication system description](#)



Construction Equipment

Service Information

Document Title: Warranty inspection 1000 hours	Function Group: 172	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Warranty inspection 1000 hours

The service points where "optional equipment" is stated are not included in the accounted time for the interval

Op nbr 172-004

[11666051 Pressure gauge](#)
[11666020 Pressure gauge](#)
[11666019 Pressure gauge](#)
[11666003 Pressure gauge](#)
[11666017 Pressure gauge](#)
[11666018 Pressure gauge](#)
[14290266 Hose](#)
[11666037 Hose](#)
[9993721 Service display](#)
[11666167 Disassembly tool](#)
[930032 Testing nipple](#)
[9993831 Support](#)

Equipment for Matris read-out

Air pressure gauge	
Torque wrenches	min. 24 (18 lbf ft) - max. 1400 Nm (1032 lbf ft)
Torque amplifier	
Sleeves	41, 36 and 32 mm
Extension	approx. 250 mm (10 in)
Collection container	
Grease gun	

Required materials

Engine oil	48 litres (12.68 US gal)
Engine oil filter	Full-flow filter, 2 pcs.
Engine oil filter	Part-flow filter, 1 pc.
Transmission oil	50 litres (13.2 US gal)
Transmission oil filter	one
O-ring for the transmission's suction strainer	one
Axle oil	101 litres (26.7 US gal)
Air cleaner, primary filter	one
Coolant filter	one
Fuel filter: Primary filter	one
Fuel filter: Secondary filter	one
Cab: Pre-filter	one
Cab: Main filter	one

Test-run and check

1.

Start and stop function.

Instruments, lighting, direction indicators, reflectors, flashing hazard lights, wipers, washers, horn, and back-up alarm (if installed).

Steering system.

Gear positions / automatic shifting.

Differential lock.

Brake system.

Control light for low brake pressure.

Parking brake

Climate control system, fan and controls including air conditioning

Loader unit's functions including automatic tilt (bucket positioner) and automatic lift (boom kick-out).

Optional equipment.

Matris read-off

2. Matris read-off is performed to follow up the machine's history.

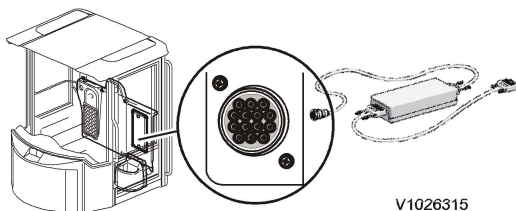


Figure 1
Matris read-off, connection point

Steering pressure, check

3.
 1. Secure the frame joint with the steering joint lock and place blocks in front of and behind the wheels.
 2. Connect pressure gauge 11666020 and hose 11666037 to the pressure check connection on the steering valve.
 3. Start the engine and let it run at low idle. Make sure that the system has normal operating temperature.
 4. Steer against the steering joint lock's end-position and check the steering pressure.

Steering pressure, see: [030 Pump 2 \(P2\) Steering and other hydraulics, specifications](#)

NOTE!

In neutral position the pressure gauge normally shows approx. 2.5 MPa (363 psi), which is the priority valve's opening pressure in the central block.

5. Stop the engine.

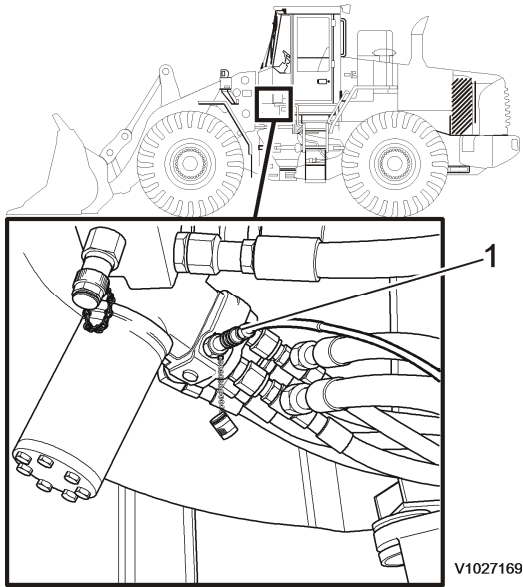


Figure 2
Steering pressure, checking

1. pressure gauge 11666020 + hose 11666037

Hydraulic pressure, check

4. See: [913 Hydraulic pump, checking and adjusting standby pressure](#)
and
[913 Hydraulic pump, checking and adjusting max working pressure](#)

Transmission incl. torque converter, pressure check

5. See: [421 Hydraulic transmission, checking oil pressure](#)

Brakes, checking

6. Pressure and function check
See: [520 Brake system, check and adjusting pressure in circuit](#)
7. Brake discs, checking wear
Service programme 5:2
See: [510 Brake discs, checking wear](#)

Tires as well as inflation pressure in tires, check

8. See: [191 Some simple rules regarding tyre handling](#)

For inflation pressure in tires. See operator's manual.

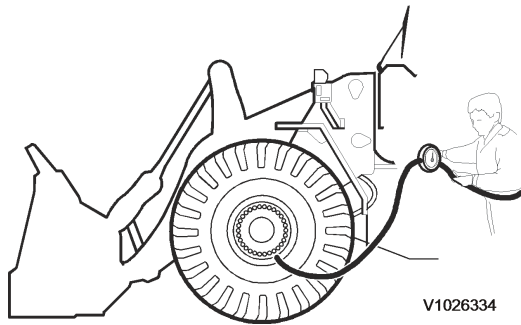


Figure 3
Inflation pressure in tires, check

Wheel nuts and tightening torques, check

9. Tightening torques, see: [030 Wheels, tightening torques](#)

Cab mounts, tightening torques, check

10. Tightening torques, see: [030 Cab, tightening torques](#)

Checking of tightening torques is not needed for machines with viscous cab mounts.

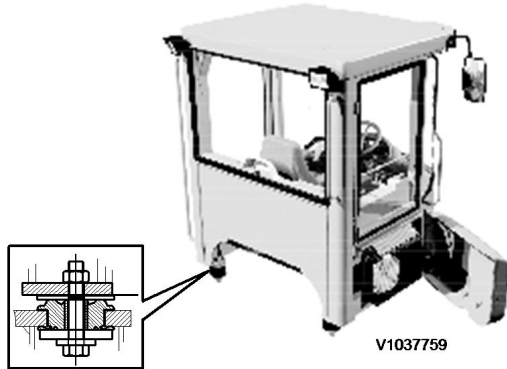


Figure 4
Cab mounts

Propeller shafts and support bearing, tightening torques, check

11. Support bearing

Tightening torques, see: [030 Propeller shaft, tightening torque](#)

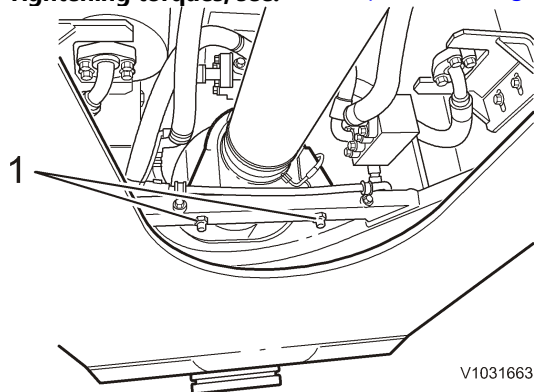


Figure 5
Support bearing

1. Bolts for support bearing

12. Bolted flange

Tightening torques, see: [030 Propeller shaft, tightening torque](#)

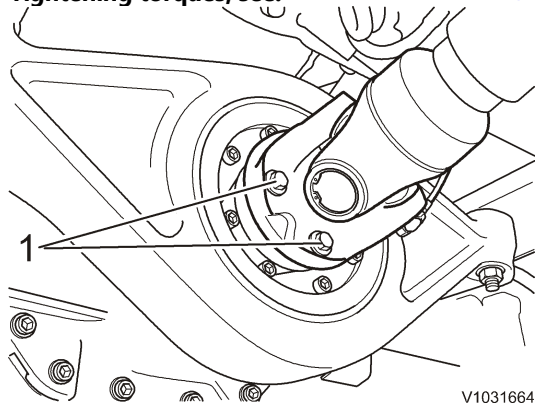


Figure 6
Propeller shaft

1. Bolt

Axles, attaching bolts, tightening program, check

13. Front axle

Tightening torques, see: [030 Front axle, tightening torque](#)

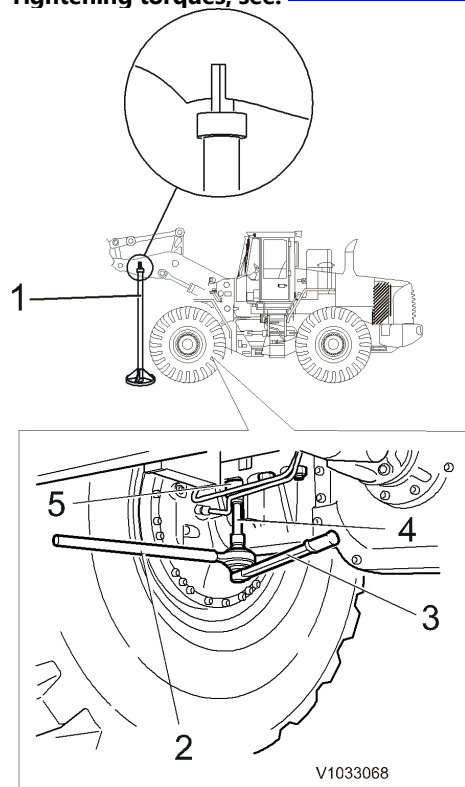


Figure 7
Front axle

1. Support 9993831
2. Torque amplifier
3. Torque wrench
4. Extension
5. Socket, 44 mm

14. Rear axle

Tightening torques, see: [030 Rear axle, tightening torques](#)

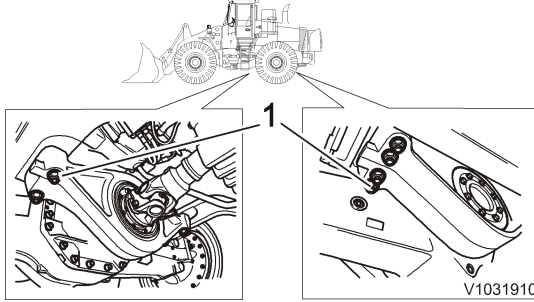


Figure 8
Rear axle

1. Attaching bolts



Risk of burns. The fluid may be hot.

Transmission, oil and filter, changing

15. Transmission oil, change

The oil is drained at the drain plug when the machine is at operating temperature.
Clean the suction strainer when changing.

Cleaning

1. Remove the cover and clean the parts.
2. Install a new gasket between the cover and transmission.
3. Change the O-ring on the suction strainer's connecting pipe.
4. Refit the cap.
5. Fill up with oil.
6. Warm up the machine and check that there are no leaks.

Oil volume when changing, see: [030 Hydraulic transmission, volume](#)

NOTE!

Handle the waste oil in an environmentally safe way.

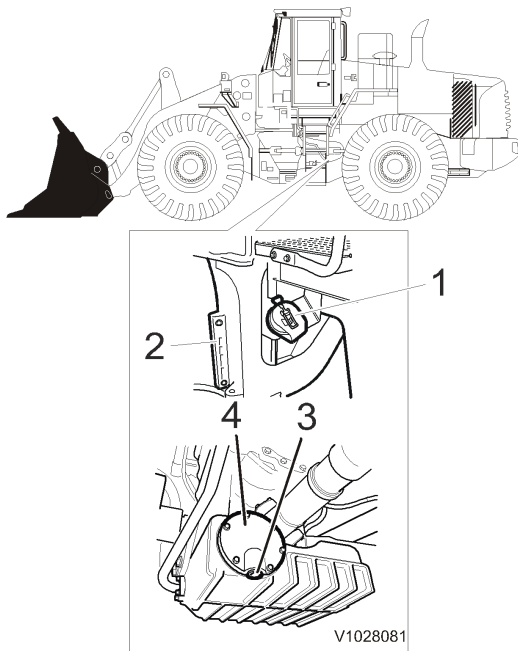


Figure 9
Transmission, principle illustration

1. Cap for filler pipe
2. Oil level check
3. Drain plug
4. Cover, suction strainer

16. Transmission oil filter, changing

Use oil filter pliers when removing the filter.

Installing filter

1. Brush new oil on the gasket.
2. Spin on the filter until the gasket just touches the sealing surface. Tighten another 1/2 to 3/4 turn by hand.

Warm up the machine and check that the oil filter gasket seals tight. If not, remove the filter and check the sealing surface. Normally, it does not help to tighten more.

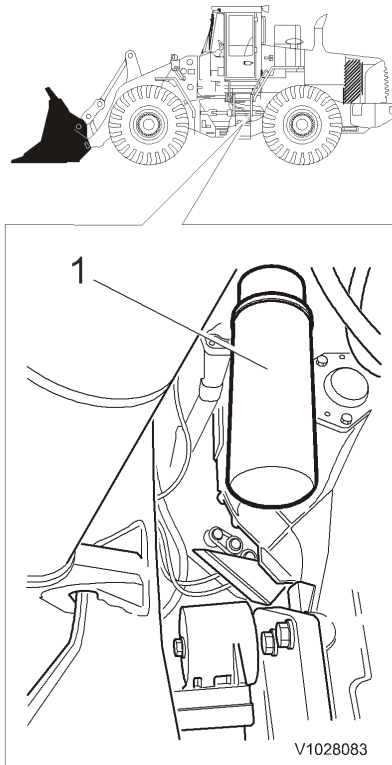


Figure 10

1. Transmission oil filter

Oil-bath air cleaner (optional equipment)

17. Change oil as needed.
Volume: **9.1 litres (2.4 US gal)**

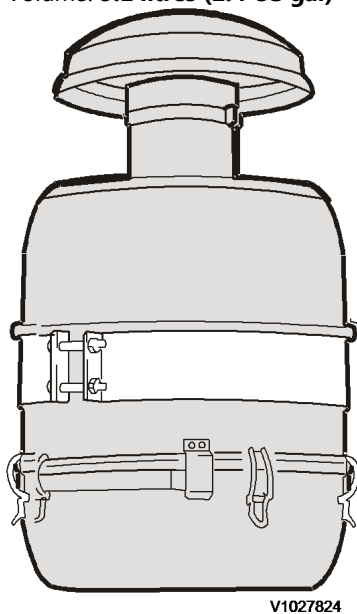


Figure 11
Oil-bath air cleaner

Air cleaner, changing

18. Primary filter

When the alarm text "Clogged air filter" is shown, or every 1000 hours, the filter shall be changed or cleaned. Operating time between filter changes can vary depending on the machine's operating environment. Certain environments may require frequent filter changes. The filter can be cleaned after instruction from an authorized brand name workshop. After five cleanings, or if the filter is damaged, it shall be changed.

NOTE!

Record the number of main filter changes or cleanings on the decal near the secondary filter's end-plate.

In connection with filter change, also clean the cover for the air cleaner since it acts as a reservoir for particles that are not trapped in the filter.

Check that all hose and pipe connections from the air cleaner to the engine inlet manifold are tight.

Check-tighten hose clamps.

If the alarm text remains after the filter change, change the secondary filter as well.

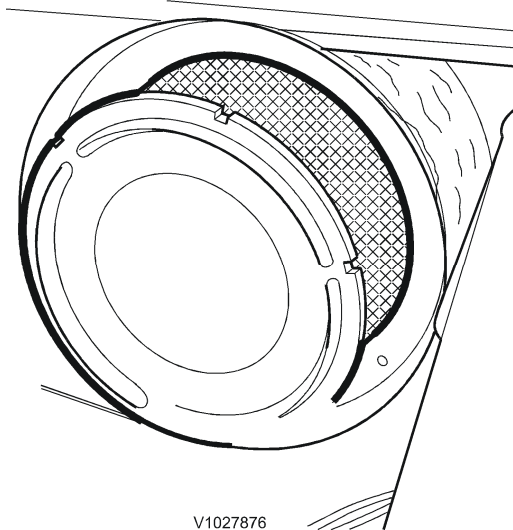


Figure 12
Air cleaner, primary filter



Work carefully when changing oil as hot oil can cause severe burns to unprotected skin.

Axles and hub, change oil

19. Front axle

If the machine is equipped with axle oil cooler, change axle oil every 4000 hours.

NOTE!

Handle the waste oil in an environmentally safe way.

Oil volume, see: [030 Front axle, capacity](#)

When filling, operate the machine for a few minutes and check the level again. Topping up may be needed.

NOTE!

When filling, operate the machine for a few minutes and check the level again. Topping up may be needed.

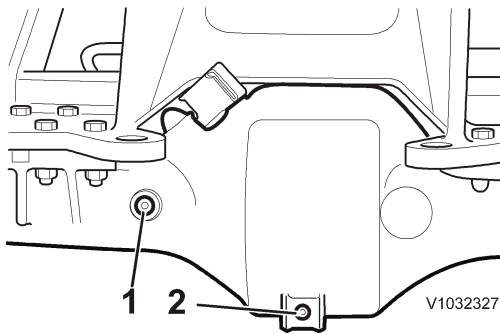


Figure 13
Front axle

1. Level check and filling
2. Draining

20. Rear axle

If the machine is equipped with axle oil cooler, change axle oil every 4000 hours.

NOTE!

Handle the waste oil in an environmentally safe way.

Oil volume, see: [030 Rear axle, capacity](#)

When filling, operate the machine for a few minutes and check the level again. Topping up may be needed.

NOTE!

When filling, operate the machine for a few minutes and check the level again. Topping up may be needed.

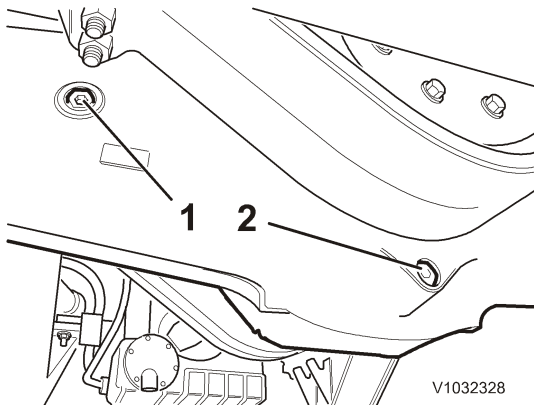


Figure 14
Rear axle

1. Level check and filling
2. Draining

21. Hub

NOTE!

Handle the waste oil in an environmentally safe way.

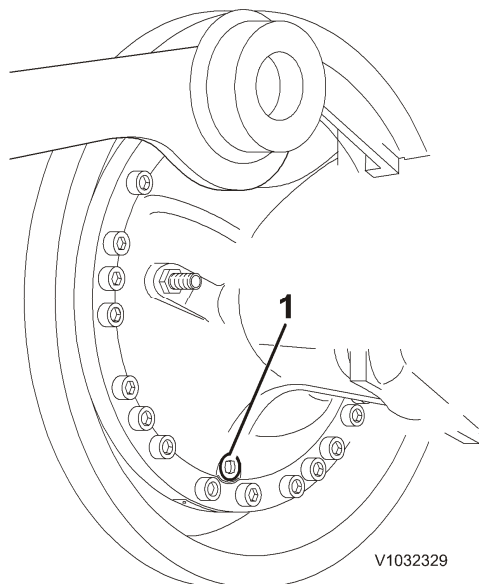


Figure 15
Hub

1. Draining

Hydraulic oil, draining sediment and level check

22. Draining sediment

Drain sludge and condensation water from the hydraulic oil tank through the drain on the machine's right side.

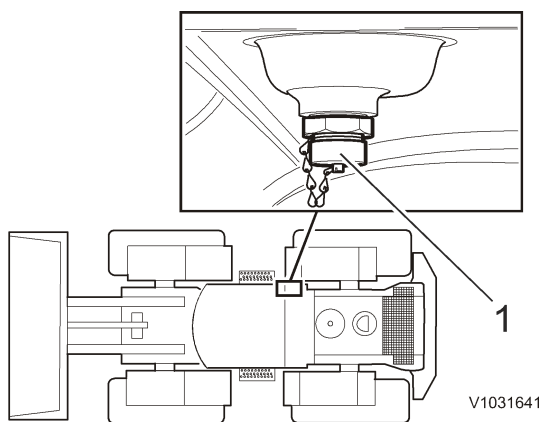


Figure 16
Hydraulic oil, drain point for sludge

23. Level check

The hydraulic oil level shall be between max. and min.
Filling takes place from the top of the hydraulic tank.

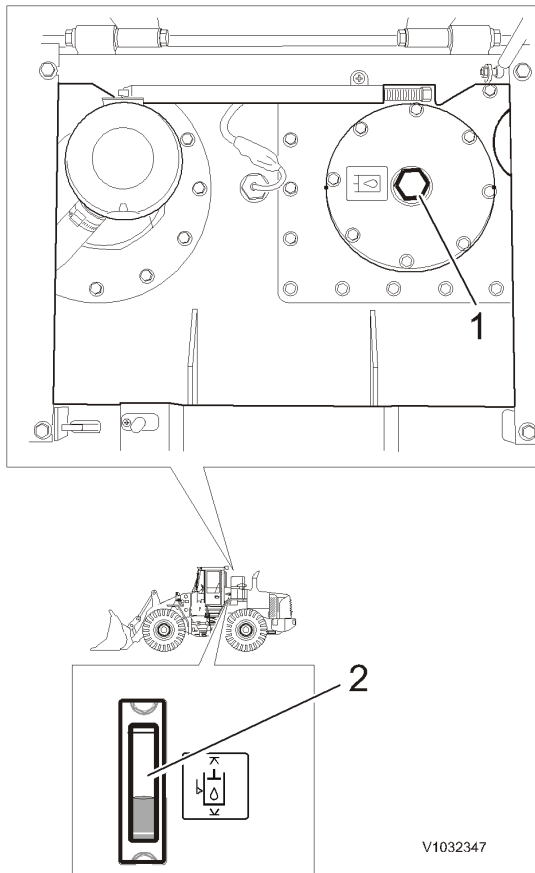


Figure 17
Hydraulic oil, checking level

1. Cap, filling up
2. Sight-glass

WARNING

Open the expansion tank cap slowly and carefully. The cooling system operates at high pressure and hot coolant may rush out and cause severe burns.

Cooling system, checking level and freezing point

24. Level check

Fill coolant in the expansion tank.

NOTE!

Use genuine Volvo coolant.

The coolant level shall be between max. and min.

Filling

1. The engine shall be run warm and the temperature control shall be set to "warm".
2. Let the engine cool down.
3. Fill coolant up to the max. marking on the expansion tank.
4. Run the engine warm and top up so that the cooling system is completely filled and bled free from air.

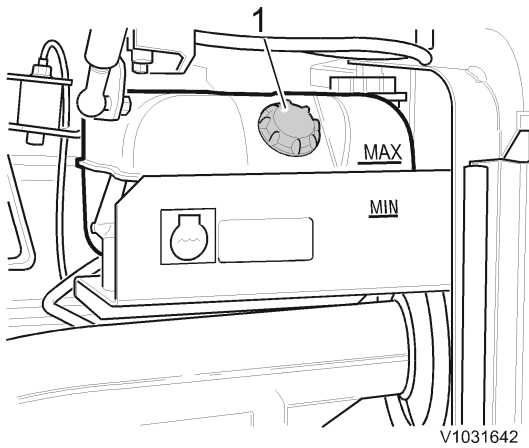


Figure 18
Coolant level

1. Cap



Open the expansion tank cap slowly and carefully. The cooling system operates at high pressure and hot coolant may rush out and cause severe burns.

25. Freezing point, check

Service program 2:14

Check the freezing point with a glycol tester at the expansion tank. The glycol tester's value should show approx. -38° C (-36° F).

The machine is delivered with a coolant mixture of 50% glycol and 50% water for optimal cooling and corrosion characteristics. That is why the same coolant mixture shall be filled, regardless of ambient temperature conditions.

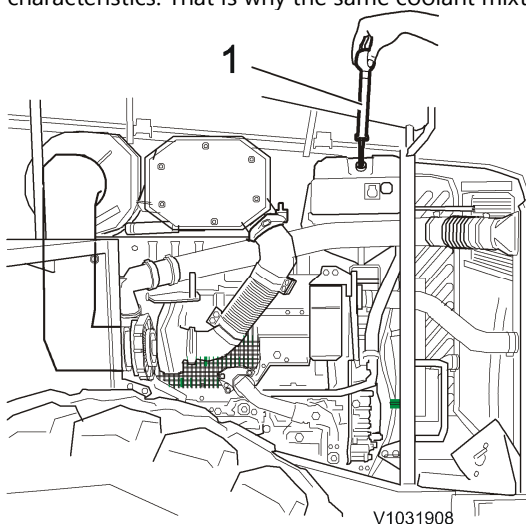


Figure 19
Coolant check

1. Glycol tester

Steering cylinders, locks for pivot pins, check

26. Tightening torques, see: [030 Steering cylinder, tightening torque](#)

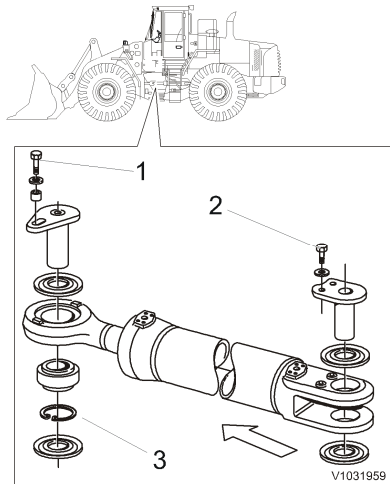


Figure 20
Steering cylinder

1. Pin lock, front bolt
2. Pin lock, rear bolt
3. Lock



Risk of burns! Use protective work gloves.

Engine oil and engine oil filter, change

27. Draining engine oil

Drain the oil when the engine is warm.
Connect drain hose and drain the oil in a collection container.

Service programme 2:6

NOTE!

Handle the oil in an environmentally safe way.

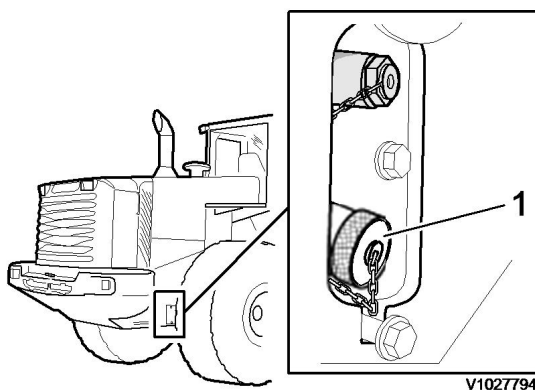


Figure 21
Draining point

1. Drain for engine oil

28. Removing oil filters

1. Open right and left engine cover.
2. Remove the cover on the intermediate wall to access the oil filters.

3. Use oil filter pliers when removing the oil filters

Installing oil filters

1. Fill the filters with engine oil and brush oil on the gaskets

NOTE!

New oil shall be used

2. Spin on the filters until the gaskets just touch the sealing surfaces. Then tighten another full turn.

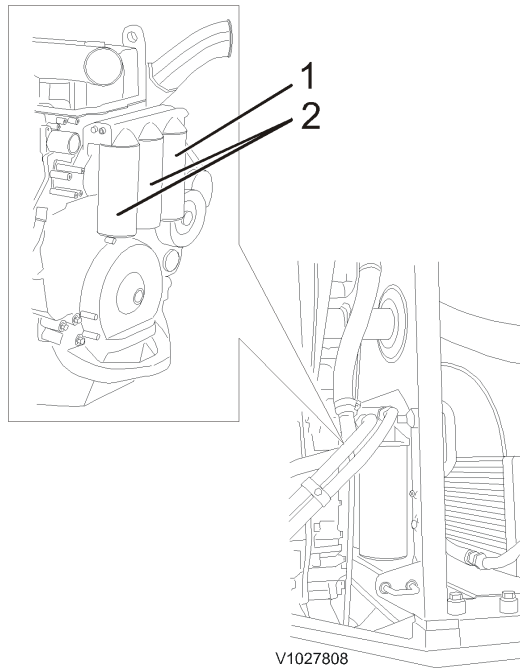


Figure 22

1. Part-flow filter
2. Full-flow filter

29. Filling engine oil

Oil volume, see: [030 Engine. volume](#)

Fill the indicated oil volume.

Run the engine warm and check that the oil filters' gaskets seal tight. If not, remove the filter and check the sealing surface. Normally, it does not help to tighten more.

NOTE!

After replacing the oil filter, the engine must be run at low idle for at least one minute to guarantee satisfactory lubrication of the engine before the machine is put to work.

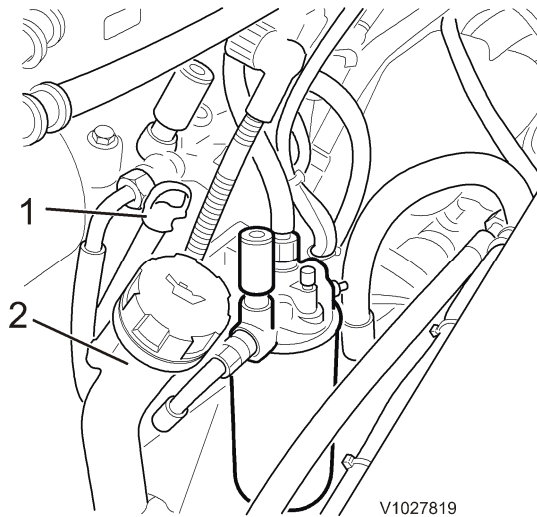


Figure 23

1. Oil dipstick
2. Filler pipe

Fuel filter, primary and secondary filter, change

30. When installing, only tighten the filters by hand.
For removing and installing bowl, use tool 11666167.
Bleed the system, see [230 Fuel system, bleeding](#)

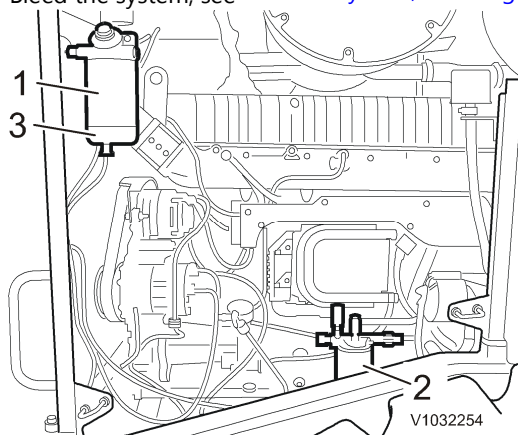


Figure 24

1. Primary fuel filter
2. Secondary fuel filters
3. Bowl

Coolant filter, change

31. The filter cannot be cleaned, it must be changed as a complete unit.

The coolant filter can be accessed inside the engine cover on the machine's left side.

Close the valve on the filter head before removing the filter.

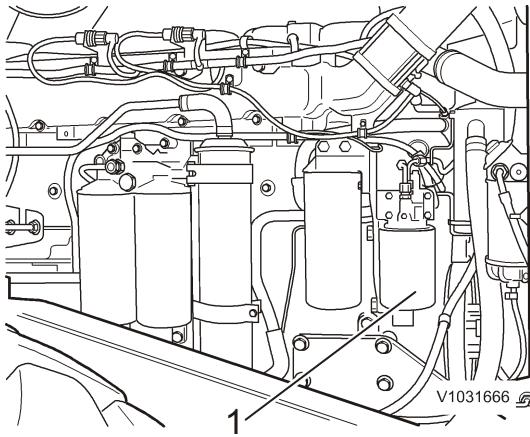


Figure 25
Coolant filter

Drive belts, check

32. At the correct belt tension, it should be possible to press down the belt between the belt pulleys approx. 8 mm (0.32 in) with a force of 25-30 Nm (18-22 lbf ft).

Adjusting

1. Loosen the alternator's attaching bolt
2. Adjust to the correct belt tension. Check the belt tension and tighten the attaching bolt.

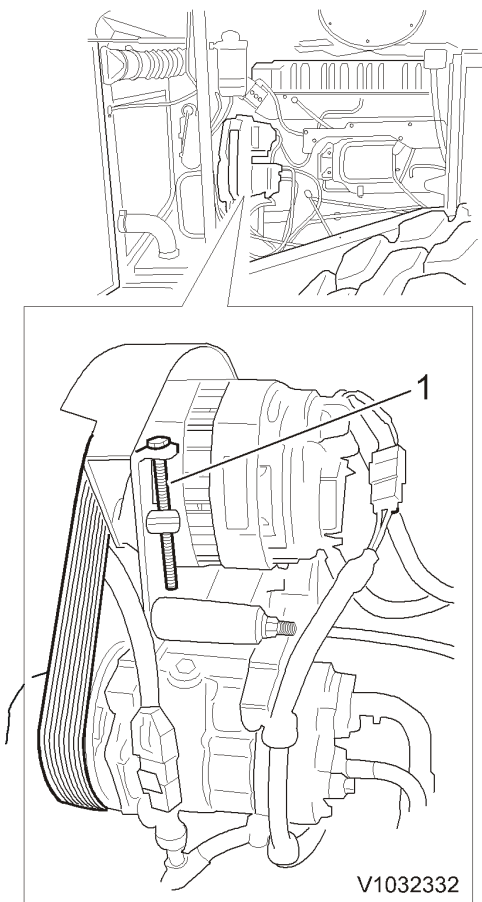


Figure 26

1. Adjusting screw

WARNING

The battery electrolyte contains corrosive sulphuric acid. Electrolyte spilled on bare skin should be removed immediately. Wash the affected area with soap and plenty of water. If electrolyte gets into your eyes or any other sensitive body part, rinse immediately with plenty of water and seek immediate medical attention.

Battery, electrolyte level, cables and connections, check

33. Service program 3:1

The battery electrolyte shall be 10 mm (0.4 in) over the plates in the battery.
Top up with distilled water as needed.

Check:

1. Cable terminals and terminal studs must be well cleaned, tightened and greased externally with, e.g., vaseline as corrosion protection.
2. That the batteries are securely tightened.

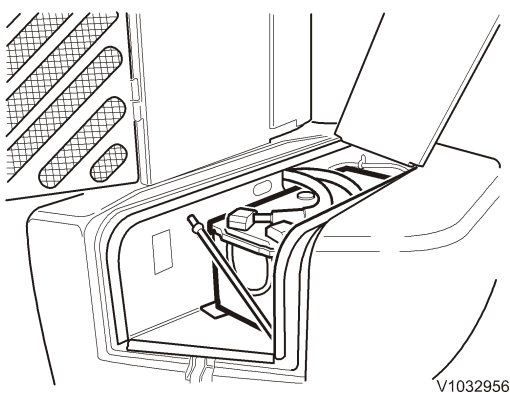


Figure 27
Battery box, left side (principle illustration)

Leakage, general, check

34. Check that all visible gaskets are intact and that they are not exposed to leakage.

Pipes and hoses, check

35. Check that all pipes and hoses are intact and not deformed.

Cab, ventilation unit

36. Cab (ventilation filter), change

The cab's filters consist of pre-filter and a primary filter. The filters should be checked once a week.

NOTE!

The change interval may be longer or shorter, depending on how dusty the environment is

NOTE!

Use breathing protection when changing filters

1. Open the side cover
2. Loosen the clasps for the pre-filter and remove it
3. Install the new filter carefully

4. Close the side cover

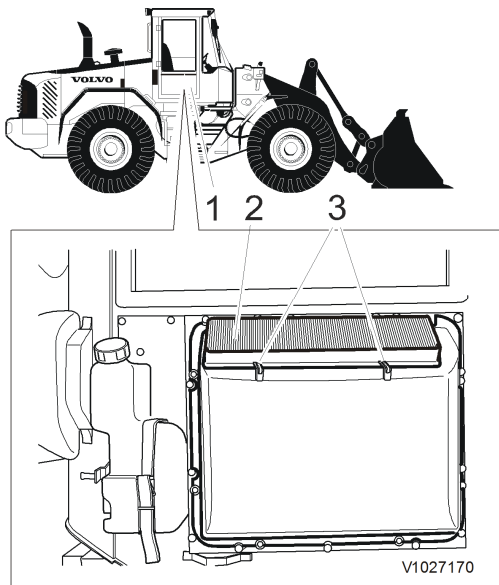


Figure 28
Pre-filter, principle illustration

1. Side cover
2. Pre-filter
3. Clasps for pre-filter

37. Main filter, changing

NOTE!

Use breathing protection when handling filters

1. Open the side cover
2. Remove the pre-filter
3. Remove the nuts that hold the plastic casing for the primary filter

NOTE!

Keep track of the sheet metal strip that is located at the top of the plastic casing

4. Remove the primary filter
5. Shake the filter carefully, without damaging it. Avoid compressed air, vacuum cleaners and water.
6. Reinstall the plastic casing with the sheet metal strip at the top
7. Install the pre-filter and close the side cover

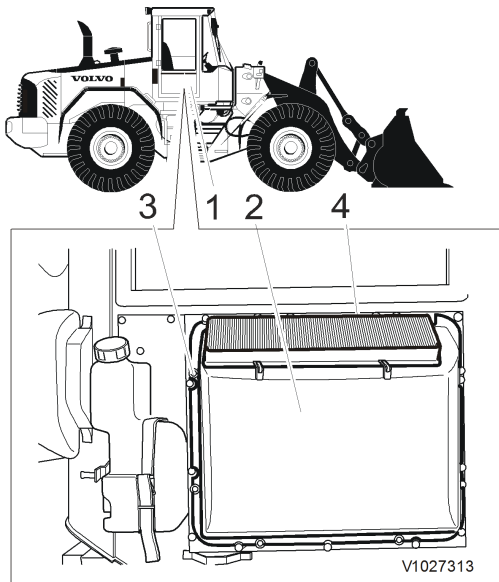


Figure 29
Primary filter, principle illustration

1. Side cover
2. Primary filter. Inside plastic casing
3. Nuts, 8 pcs.
4. Pre-filter

Framework, grease

38. Boom

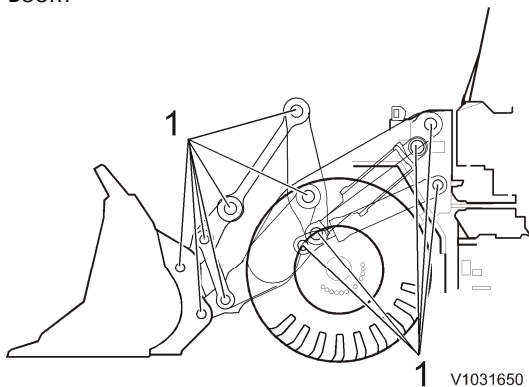


Figure 30
Boom

1. Grease nipples

The boom's lower bucket pin's shall be greased daily in tough operating conditions

39. Frame and cab

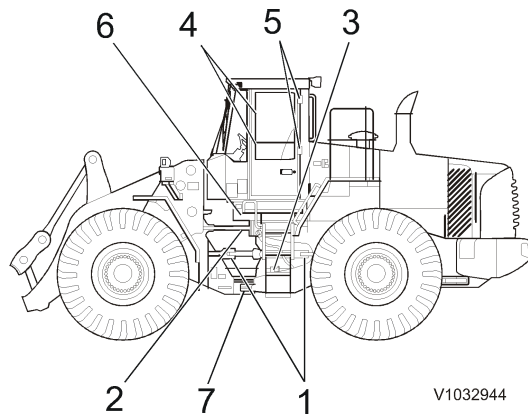


Figure 31
Grease points

1. Steering cylinders' pivot points
2. Frame joint's upper bearing
3. Propeller shafts and support bearings
4. Side window's hinges (right side)
5. Cab's door
6. Grease nipples for rear axle bearing
7. Frame joint's lower bearing

Greasing bearings

Service life of bushings and pins can be extended if the machine is greased regularly and in the right way.

Before greasing. Wipe off the grease nipples and grease gun so that sand and dirt particles are not introduced when greasing.

Greasing of bearings has two main purposes:

- Add grease to the bearing to reduce friction between pin and bushing.
- Replace old grease that may be dirty.

The grease space under the outer seal collects and prevents dirt particles and fluid from penetrating into the bearing.

Grease the bearing until new grease comes out through the outer seal.

Recommended grease: Lithium-based grease with EP-additive and consistency NLGI-grease class 2

If the machine is equipped with central lubrication system, see: [993 Central lubrication system, description](#)

Document Title: Maintenance service, daily	Function Group: 173	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Maintenance service, daily

The service points where "optional equipment" is stated are not included in the accounted time for the interval

Op nbr 173-002

Air pressure gauge

Grease gun

Test-run and check

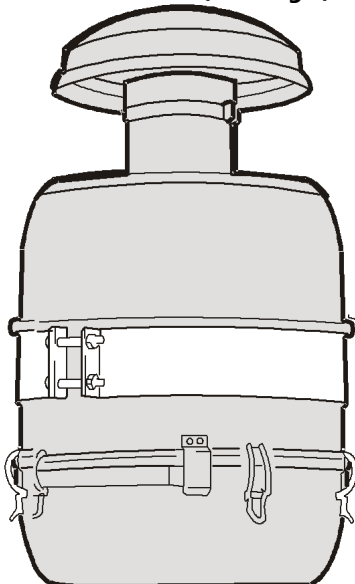
1.

Check function of the control lights

Instruments, lighting, direction indicators, reflectors, flashing hazard lights, wipers, washers, horn, and back-up alarm (if installed).

Oil-bath air cleaner (optional equipment)

2. Change oil as needed.
Volume: **9.1 litres (2.4 US gal)**



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Figure 1
Oil-bath air cleaner

Framework, grease

3. Boom

Service programme 1:5

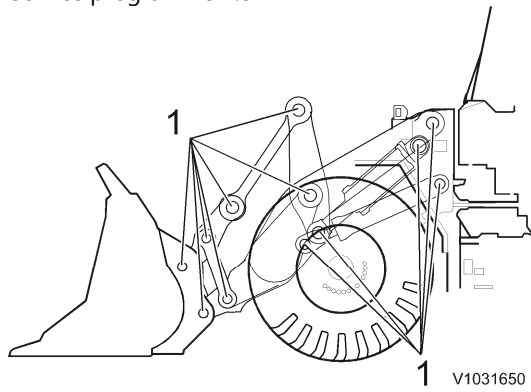


Figure 2
Boom

1. Grease nipples

The boom's lower bucket pin's shall be greased daily in tough operating conditions.



Construction Equipment

Service Information

Document Title: Maintenance service, every 50 hours	Function Group: 173	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Maintenance service, every 50 hours

The 50 hr interval includes daily service interval,

The service points where "optional equipment" is stated are not included in the accounted time for the interval

Op nbr 173-004

Air pressure gauge

Grease gun

Test-run and check

1.

Start and stop function

Instruments, lighting, direction indicators, reflectors, flashing hazard lights, wipers, washers, horn, and back-up alarm (if installed).

Steering system

Gear positions / automatic shifting

Differential lock

Brake system

Control light for low brake pressure

Parking brake

Climate control system, fan and controls including air conditioning

Loader unit's functions including automatic tilt (bucket positioner) and automatic lift (boom kick-out)

Optional equipment

Oil-bath air cleaner (optional equipment)

2. Change oil as needed.

Volume: **9.1 litres (2.4 US gal)**

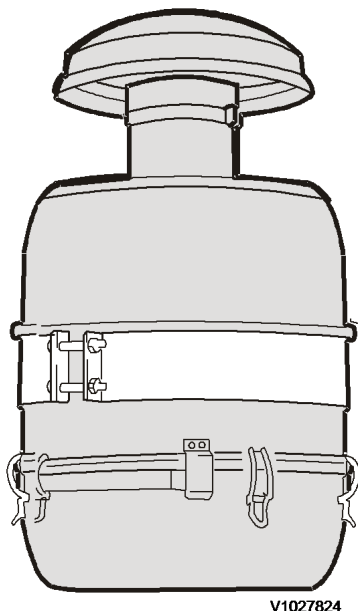


Figure 1
Oil-bath air cleaner

Tires as well as inflation pressure in tires, check

3. See: [191 Some simple rules regarding tyre handling](#)

For inflation pressure in tires, see operator's manual.

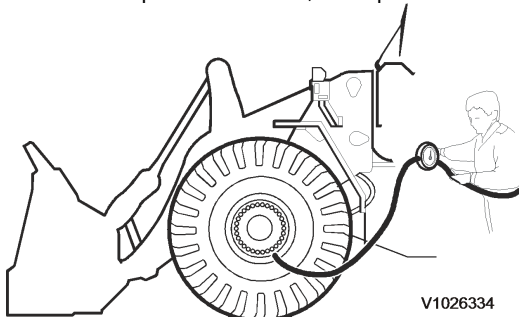


Figure 2
Inflation pressure in tires, check

Engine oil level, check

4. When checking, the machine shall be parked on a level ground surface.

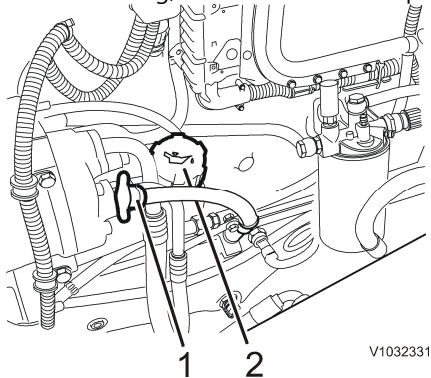


Figure 3

1. Oil dipstick
2. Filler pipe



WARNING

Open the expansion tank cap slowly and carefully. The cooling system operates at high pressure and hot coolant may rush out and cause severe burns.

Cooling system, checking level

5. Level check

The coolant level shall be between max. and min.

Fill coolant in the expansion tank.

NOTE!

Use genuine Volvo coolant.

Filling

1. The engine shall be run warm and the temperature control shall be set to "warm".
2. Let the engine cool down.
3. Fill coolant up to the max. marking on the expansion tank.
4. Run the engine warm and top up so that the cooling system is completely filled and bled free from air.

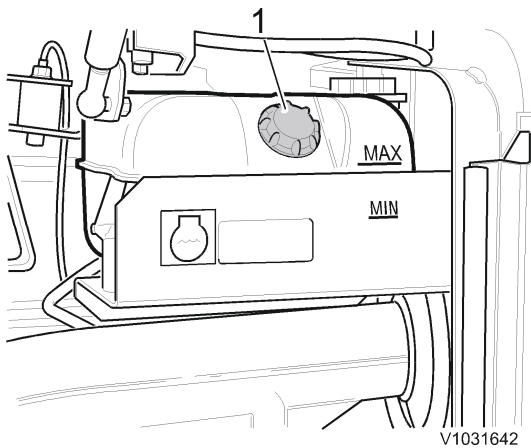


Figure 4
Coolant level

1. Cap

Framework, grease

6. Boom

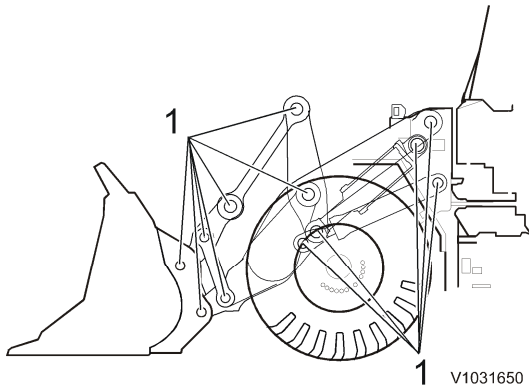


Figure 5
Boom

1. Grease nipples.

7. Frame and cab

Grease points 1 - 4 if machines operate in an aggressive or corrosive environment.

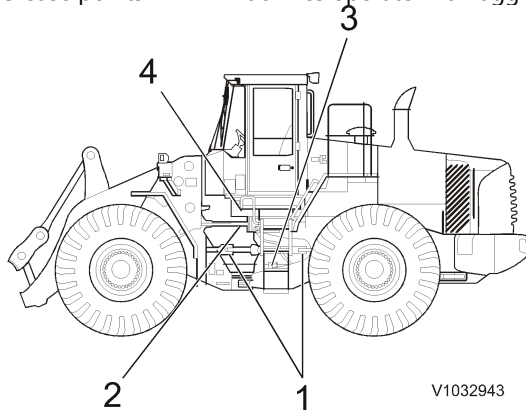


Figure 6
Grease points

1. Steering cylinders' pivot points
2. Frame joint's upper bearing
3. Grease nipples for rear axle bearing
4. Propeller shafts and support bearings

Greasing bearings

Service life of bushings and pins can be extended if the machine is greased regularly and in the right way.

Before greasing. Wipe off the grease nipples and grease gun so that sand and dirt particles are not introduced when greasing.

Greasing of bearings has two main purposes:

- Add grease to the bearing to reduce friction between pin and bushing.
- Replace old grease that may be dirty.

The grease space under the outer seal collects and prevents dirt particles and fluid from penetrating into the bearing.

Grease the bearing until new grease comes out through the outer seal.

Recommended grease: Lithium-based grease with EP-additive and consistency NLGI-grease class 2

If the machine is equipped with central lubrication system, see: [993 Central lubrication system, description](#)



Construction Equipment

Service Information

Document Title: Maintenance service, every 250 hours	Function Group: 173	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Maintenance service, every 250 hours

The 250 hr service interval includes daily as well as the 50 hr service interval.

The service points where "optional equipment" is stated are not included in the accounted time for the interval

Op nbr 173-007

Air pressure gauge

Grease gun

Test-run and check

1.

Start and stop function

Instruments, lighting, direction indicators, reflectors, flashing hazard lights, wipers, washers, horn, and back-up alarm (if installed).

Steering system

Gear positions / automatic shifting

Differential lock

Brake system

Control light for low brake pressure

Parking brake

Climate control system, fan and controls including air conditioning

Loader unit's functions including automatic tilt (bucket positioner) and automatic lift (boom kick-out)

Optional equipment

Oil-bath air cleaner (optional equipment)

2. Change oil as needed.

Volume: **9.1 litres (2.4 US gal)**

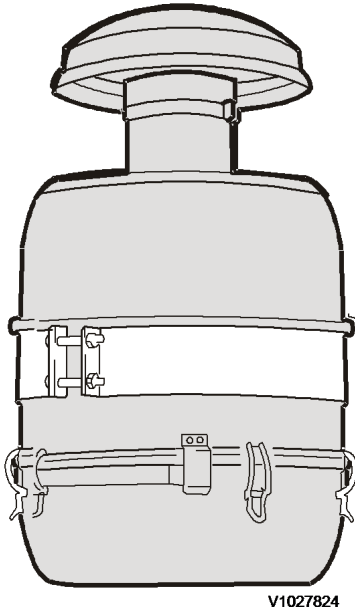


Figure 1
Oil-bath air cleaner

Tires as well as inflation pressure in tires, check

3. See: [191 Some simple rules regarding tyre handling](#)

For inflation pressure in tires, see operator's manual.

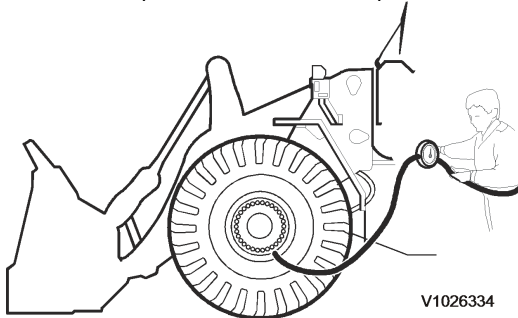


Figure 2
Inflation pressure in tires, check

Engine oil level, check

4. When checking, the machine shall be parked on a level ground surface

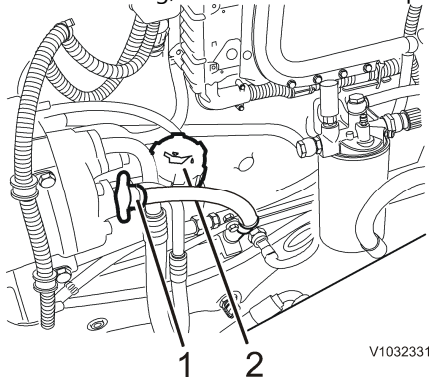


Figure 3

1. Oil dipstick
2. Filler pipe

Hydraulic oil, check the level

5. The hydraulic oil level shall be between max. and min.
Filling takes place from the top of the hydraulic tank.

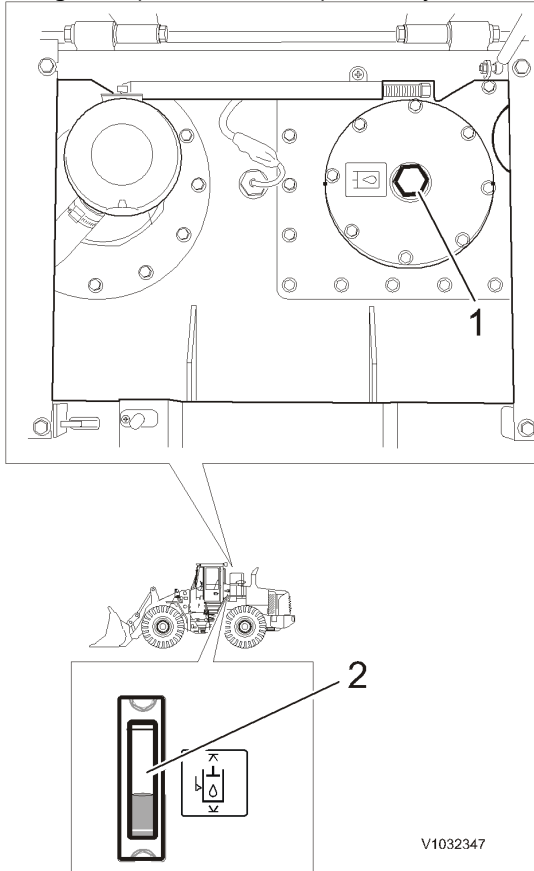


Figure 4
Hydraulic oil, checking level

1. Cap, filling up
2. Sight-glass

WARNING

The battery electrolyte contains corrosive sulphuric acid. Electrolyte spilled on bare skin should be removed immediately. Wash the affected area with soap and plenty of water. If electrolyte gets into your eyes or any other sensitive body part, rinse immediately with plenty of water and seek immediate medical attention.

Battery, electrolyte level, cables and connections, check

6. The battery electrolyte shall be 10 mm (0.4 in) over the plates in the battery.
Top up with distilled water as needed.

Check:

1. Cable terminals and terminal studs must be well cleaned, tightened and greased externally with, e.g., vaseline as corrosion protection.
2. That the batteries are securely tightened

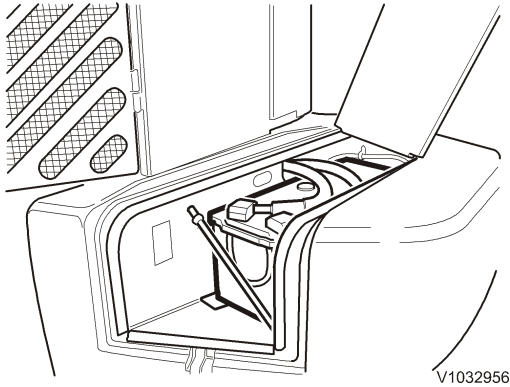


Figure 5
Battery box, left side (principle illustration)

! WARNING

Open the expansion tank cap slowly and carefully. The cooling system operates at high pressure and hot coolant may rush out and cause severe burns.

Cooling system, checking level

7. Level check

Fill coolant in the expansion tank.

NOTE!

Use genuine Volvo coolant.

The coolant level shall be between max. and min.

Filling

1. The engine shall be run warm and the temperature control shall be set to "warm".
2. Let the engine cool down.
3. Fill coolant up to the max. marking on the expansion tank.
4. Run the engine warm and top up so that the cooling system is completely filled and bled free from air.

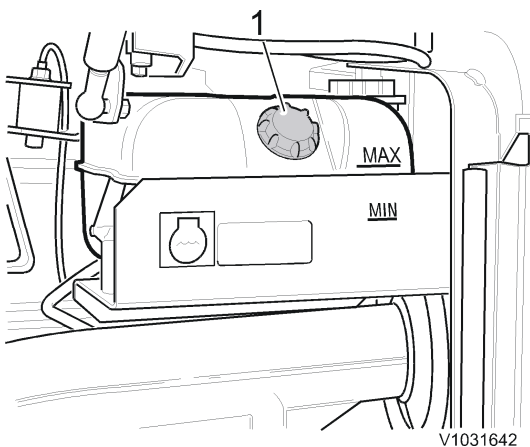


Figure 6
Coolant level

1. Cap

Cab, ventilation unit

8. Primary filter, clean and check

NOTE!

Use breathing protection when handling filters

1. Open the side cover
2. Remove the pre-filter
3. Remove the nuts (8 pcs.) that hold the plastic casing for the primary filter

NOTE!

Keep track of the sheet metal strip that is located at the top of the plastic casing

4. Remove the primary filter
5. Shake the filter carefully, without damaging it. Avoid compressed air, vacuum cleaners and water.
6. Reinstall the plastic casing with the sheet metal strip at the top
7. Install the pre-filter and close the side cover

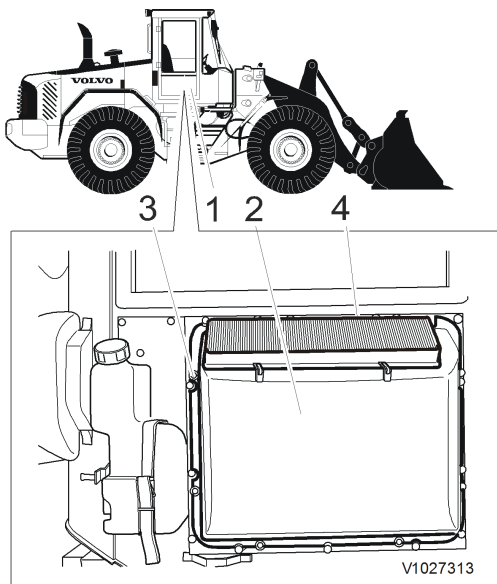


Figure 7
Primary filter, principle illustration

1. Side cover
2. Primary filter. Inside plastic casing
3. Nuts, 8 pcs.
4. Pre-filter

Water trap, check

9. Drain as needed.

NOTE!

Collect fuel by using a collection container or a plastic hose

NOTICE

Always handle oils and other environmentally hazardous fluids in an environmentally safe manner.

Draining of water from the fuel must be done manually.

A non-return valve in the filter head prevents the fuel from flowing back to the tank. Since no fuel can flow back the pressure will remain and thus the water will not be drained unless new fuel is pumped in.

When draining, proceed as follows:

1. Place the end of the hose in a container
2. Loosen the drain nipple
3. Pump with the hand pump until all water has been forced out from the water trap
4. Tighten the drain nipple

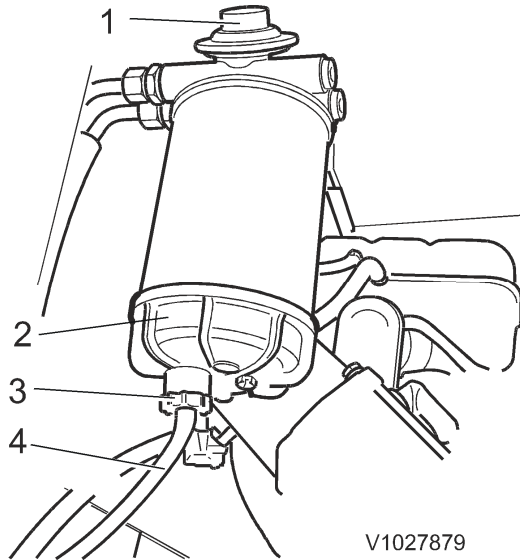


Figure 8
Water trap

1. Hand pump
2. Water trap
3. Draining nipple
4. Drain hose

Leakage

10. Check that all visible gaskets are intact and that they are not exposed to leakage.

Pipes and hoses

11. Check that all pipes and hoses are intact and not deformed.

Framework, grease

12. Boom

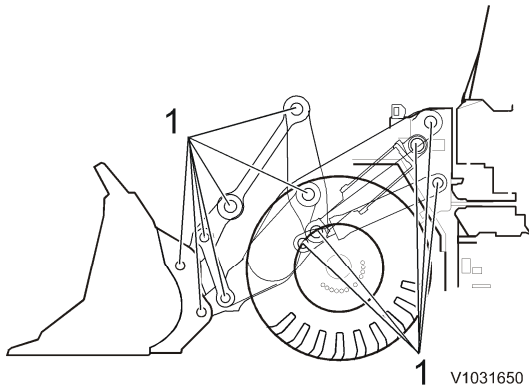


Figure 9
Boom

1. Grease nipples

13. Frame and cab

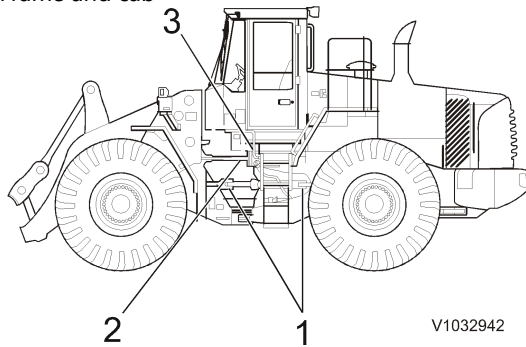


Figure 10
Grease points

1. Steering cylinders' pivot points
2. Frame joint's upper bearing
3. Rear axle bearing

Radiator, engine, check

14. Clean as needed

NOTE!

The radiator should be cleaned at regular intervals to ensure cooling of the engine. If the machine's operating site is dusty, the radiator should be checked daily.

1. Unlock and raise the radiator casing
2. Swing out the fan completely to open position
3. Blow clean the radiator with compressed air from the inside

NOTE!

The radiator's fins may be damaged if handled carelessly

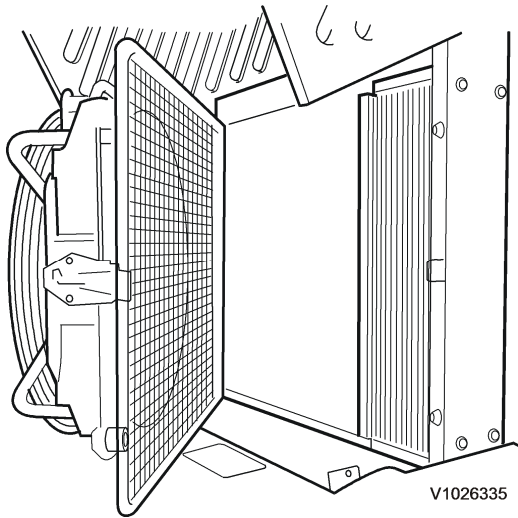


Figure 11
Radiator (principle illustration)

Greasing bearings

Service life of bushings and pins can be extended if the machine is greased regularly and in the right way. Before greasing. Wipe off the grease nipples and grease gun so that sand and dirt particles are not introduced when greasing.

Greasing of bearings has two main purposes:

- Add grease to the bearing to reduce friction between pin and bushing.
- Replace old grease that may be dirty.

The grease space under the outer seal collects and prevents dirt particles and fluid from penetrating into the bearing. Grease the bearing until new grease comes out through the outer seal.

Recommended grease: Lithium-based grease with EP-additive and consistency NLGI-grease class 2

If the machine is equipped with central lubrication system, see: [993 Central lubrication system, description](#)



Construction Equipment

Service Information

Document Title: Maintenance service, every 500 hours	Function Group: 173	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Maintenance service, every 500 hours

The 500 hr service interval includes daily, 50 hr, 250 hr service intervals,

The service points where "optional equipment" is stated are not included in the accounted time for the interval

Op nbr 173-010

[11666020 Pressure gauge](#)

[11666051 Pressure gauge](#)

[14290266 Hose](#)

[11666037 Hose](#)

[9993721 Service display](#)

[11666167 Disassembly tool](#)

Collection container

Torque wrench

600 Nm (443 lbf ft)

Sleeve

32 mm

Extension

approx. 250 mm (10 in)

Air pressure gauge

Required materials

Oil filter pliers

Grease gun

Engine oil

48 litres (12.68 US gal)

Engine oil filter: full-flow filter

2

Engine oil filter: part-flow filter

one

Test-run and check

1.

Start and stop function

Instruments, lighting, direction indicators, reflectors, flashing hazard lights, wipers, washers, horn, and back-up alarm (if installed).

Steering system

Gear positions / automatic shifting

Differential lock

Brake system

Control light for low brake pressure

Parking brake

Climate control system, fan and controls including air conditioning

Loader unit's functions including automatic tilt (bucket positioner) and automatic lift (boom kick-out)

Optional equipment

Oil-bath air cleaner (optional equipment)

2. Change oil as needed.

Volume: **9.1 litres (2.4 US gal)**

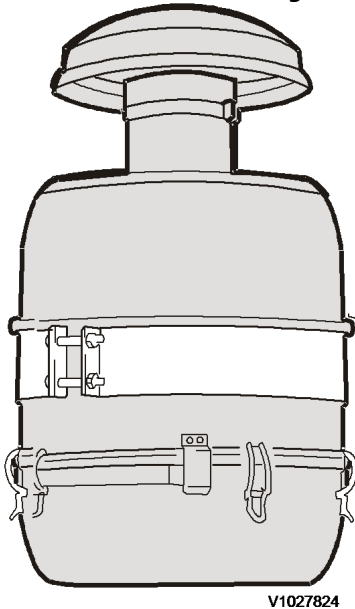


Figure 1
Oil-bath air cleaner

Transmission oil level, check

3. The machine shall be parked on level ground when checking. The gear selector shall be in neutral position and the parking brake shall be applied.

When checking the oil with the engine running and machine at operating temperature, the level shall be between the markings High and Low on the **lower** part of the glass.

The level can also be checked with cold machine. Then the oil level shall be between the markings High and Low on the **upper** part of the glass.

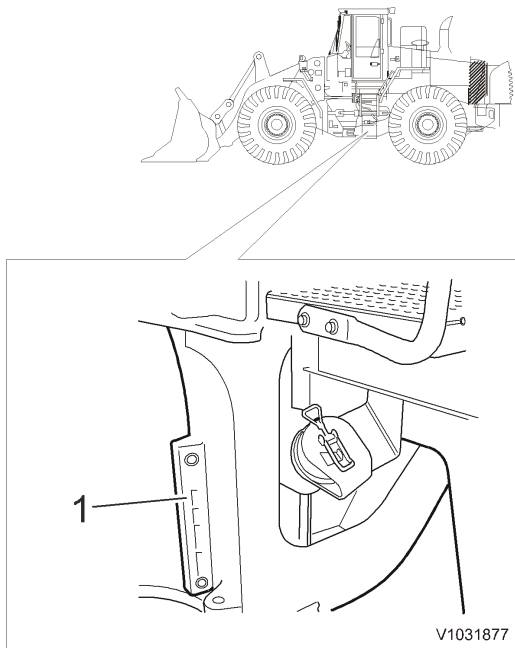


Figure 2

1. Sight-glass

Wheel nuts and tightening torques, check

4. **Tightening torques, see:** [030 Wheels, tightening torques](#)

Tires as well as inflation pressure in tires, check

5. **See:** [191 Some simple rules regarding tyre handling](#)

For inflation pressure in tires, see operator's manual.

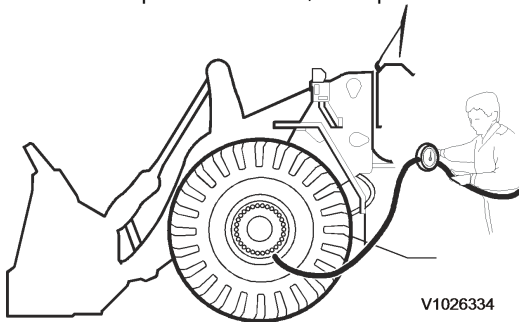


Figure 3
Inflation pressure in tires, check



Risk of burns! Use protective work gloves.

Engine oil and engine oil filter, change

6. Draining engine oil.

Drain the oil when the engine is warm.
Connect drain hose and drain the oil in a collection container.

NOTE!

Handle the oil in an environmentally safe way.

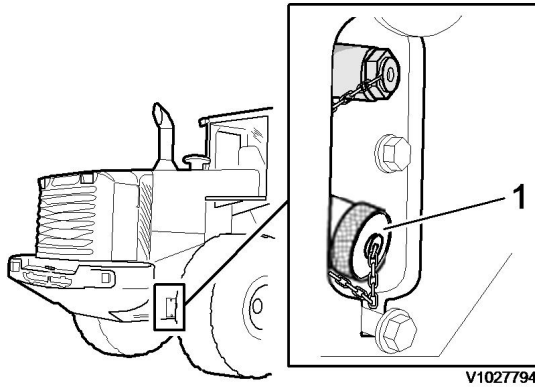


Figure 4
Draining point

1. Drain for engine oil
7. Removing oil filters
1. Open right and left engine cover.
 2. Remove the cover on the intermediate wall to access the oil filters.
 3. Use oil filter pliers when removing the oil filters.

Installing oil filters

1. Fill the filters with engine oil and brush oil on the gaskets.

NOTE!

New oil shall be used.

2. Spin on the filters until the gaskets just touch the sealing surfaces. Then tighten another full turn.

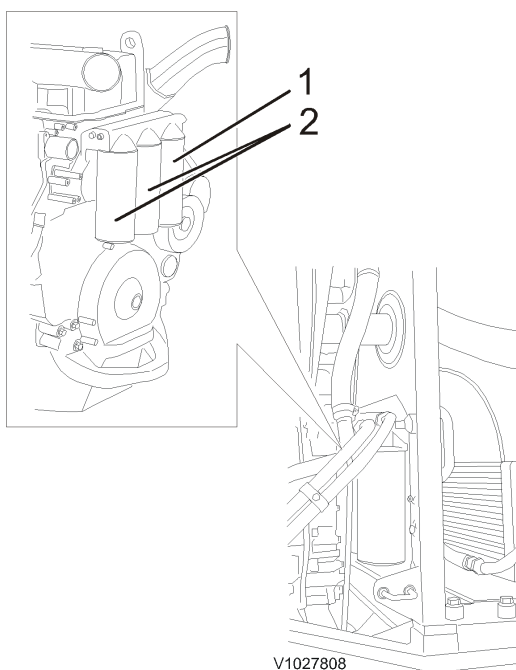


Figure 5

1. Part-flow filter
2. Full-flow filter

8. Filling engine oil

Oil volume, see: [030 Engine. volume](#)

Fill the indicated oil volume.

Run the engine warm and check that the oil filters' gaskets seal tight. If not, remove the filter and check the sealing surface. Normally, it does not help to tighten more.

NOTE!

After replacing the oil filter, the engine must be run at low idle for at least one minute to guarantee satisfactory lubrication of the engine before the machine is put to work.

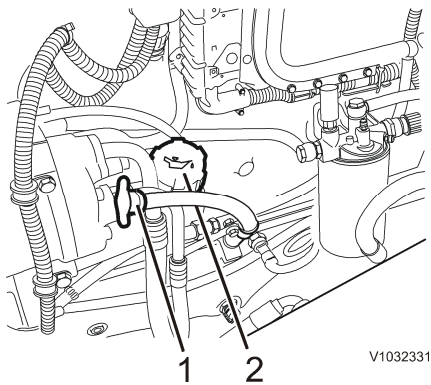


Figure 6

1. Oil dipstick
2. Filler pipe

Fuel filter, secondary and primary filter, change

9. When installing, only tighten the filters by hand.
For removing and installing bowl, use tool 11666167.
Bleed the system, see [230 Fuel system. bleeding](#)

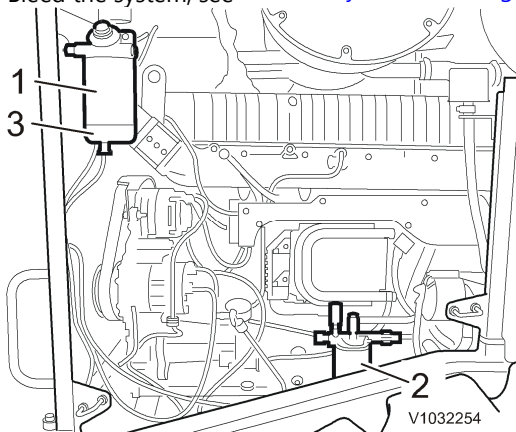
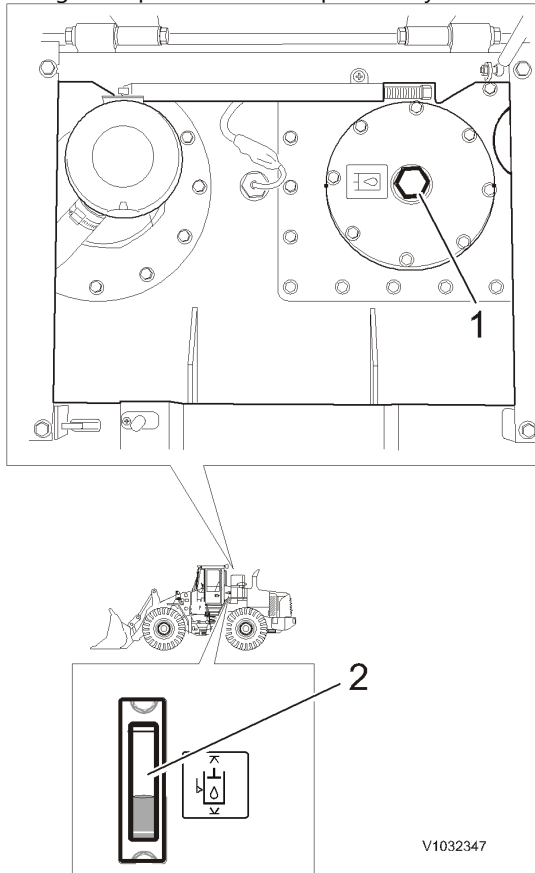


Figure 7

1. Primary fuel filter
2. Secondary fuel filters
3. Bowl

Hydraulic oil, check the level

10. The hydraulic oil level shall be between max. and min.
Filling takes place from the top of the hydraulic tank.



V1032347

Figure 8
Hydraulic oil, checking level

1. Cap, filling up
2. Sight-glass

! WARNING

The battery electrolyte contains corrosive sulphuric acid. Electrolyte spilled on bare skin should be removed immediately. Wash the affected area with soap and plenty of water. If electrolyte gets into your eyes or any other sensitive body part, rinse immediately with plenty of water and seek immediate medical attention.

Battery, electrolyte level, cables and connections, check

11. The battery electrolyte shall be 10 mm (0.4 in) over the plates in the battery.
Top up with distilled water as needed.

Check:

1. Cable terminals and terminal studs must be well cleaned, tightened and greased externally with, e.g., vaseline as corrosion protection.
2. That the batteries are securely tightened.

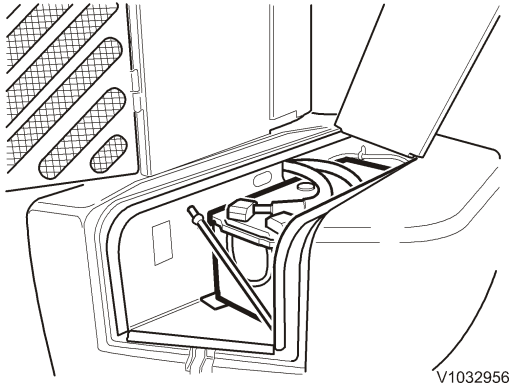


Figure 9
Battery box, left side (principle illustration)

! WARNING

Open the expansion tank cap slowly and carefully. The cooling system operates at high pressure and hot coolant may rush out and cause severe burns.

Cooling system, checking level

12. Level check

Fill coolant in the expansion tank.

NOTE!

Use genuine Volvo coolant

The coolant level shall be between max. and min.

Filling

1. The engine shall be run warm and the temperature control shall be set to "warm".
2. Let the engine cool down.
3. Fill coolant up to the max. marking on the expansion tank.
4. Run the engine warm and top up so that the cooling system is completely filled and bled free from air.

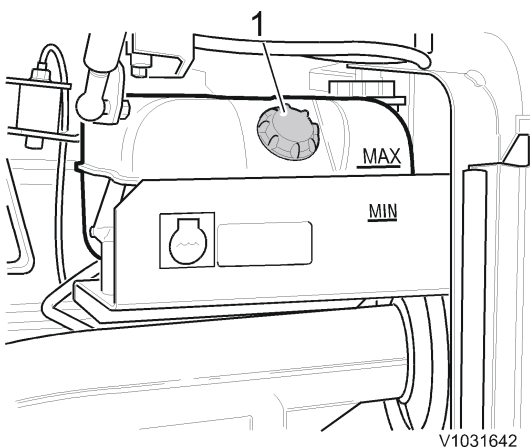


Figure 10
Coolant level

1. Cap

Cab, ventilation unit

13. Primary filter, clean and check

NOTE!

Use breathing protection when handling filters

1. Open the side cover
2. Remove the pre-filter
3. Remove the nuts that hold the plastic casing for the primary filter

NOTE!

Keep track of the sheet metal strip that is located at the top of the plastic casing

4. Remove the primary filter
5. Shake the filter carefully, without damaging it. Avoid compressed air, vacuum cleaners and water.
6. Reinstall the plastic casing with the sheet metal strip at the top
7. Install the pre-filter and close the side cover

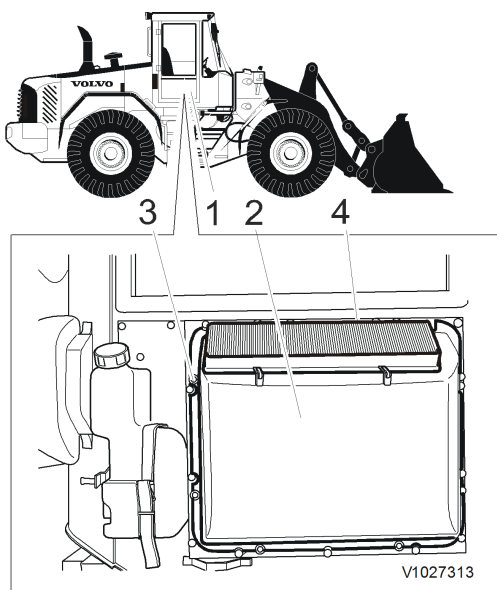


Figure 11

Primary filter, principle illustration

1. Side cover
2. Primary filter. Inside plastic casing
3. Nuts, 8 pcs.
4. Pre-filter

Drive belts

14. At the correct belt tension, it should be possible to press down the belt between the belt pulleys approx. 8 mm (0.32 in) with a force of 25-30 Nm (18-22 lbf ft).

Adjusting

1. Loosen the alternator's attaching bolt
2. Adjust to the correct belt tension. Check the belt tension and tighten the attaching bolt.

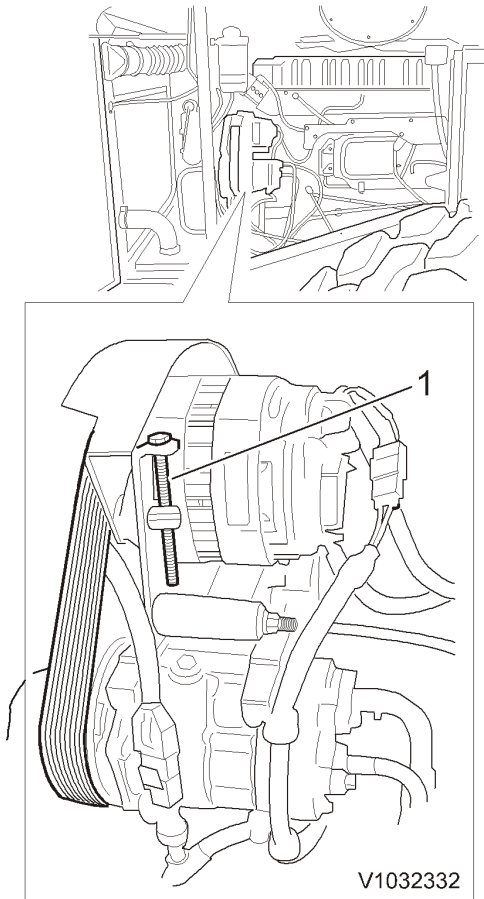


Figure 12

1. Adjusting screw

Condenser, check

15. Clean as needed

NOTE!

High-pressure washer may not be used.

Cleaning

1. Open the radiator casing.
2. Blow clean with compressed air.
3. Close the radiator casing.

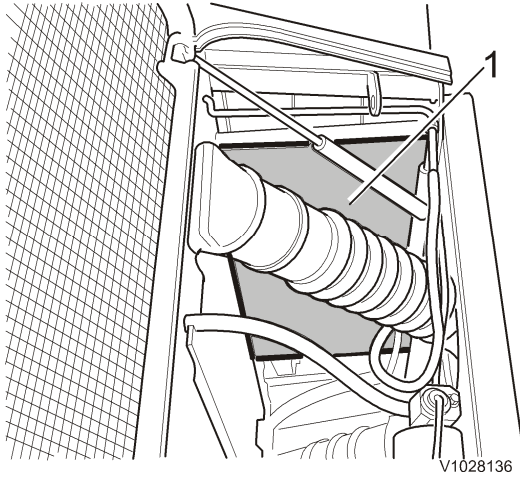


Figure 13

1. Condenser

Brakes, checking

16. Brake accumulators, checking precharge pressure
See: [520 Brake system, checking hydraulic function](#)

Leakage, general, check

17. Check that all visible gaskets are intact and that they are not exposed to leakage.

Pipes and hoses, check

18. Check that all pipes and hoses are intact and not deformed.

Boom, grease

19. Framework

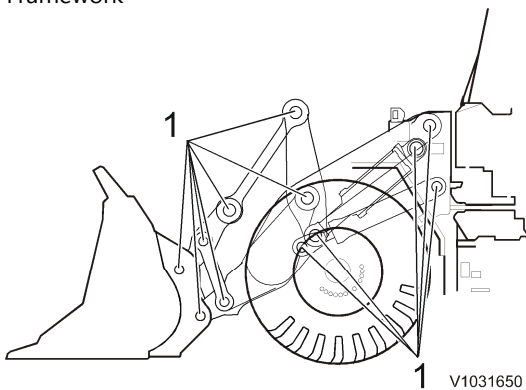


Figure 14
Boom

1. Grease nipples.
20. Frame and cab

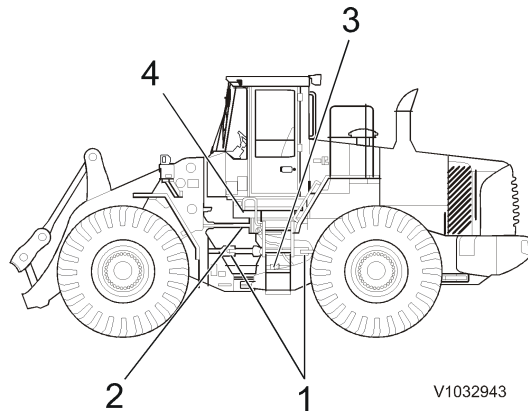


Figure 15
Grease points

1. Steering cylinders' pivot points
2. Frame joint's upper bearing
3. Rear axle bearing
4. Propeller shafts and support bearings

The propeller shafts' splined joints shall only be greased as needed.



Beware of rotating parts. Keep a safe distance.

Radiator, engine, check

21. Clean as needed

NOTE!

The radiator should be cleaned at regular intervals to ensure cooling of the engine. If the machine's operating site is dusty, the radiator should be checked daily.

1. Unlock and raise the radiator casing
2. Swing out the fan completely to open position
3. Blow clean the radiator with compressed air from the inside

NOTE!

The radiator's fins may be damaged if handled carelessly

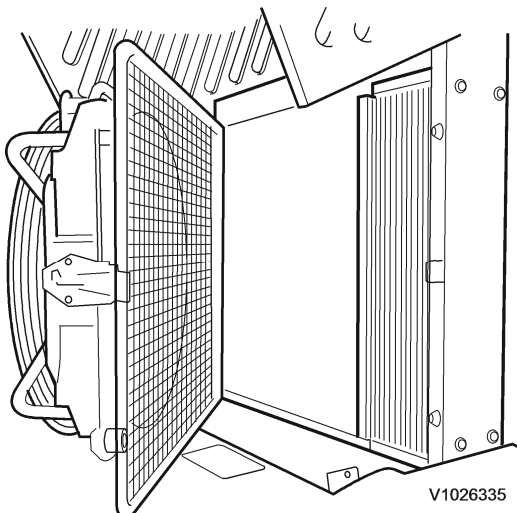


Figure 16

Radiator (principle illustration)

Greasing bearings

Service life of bushings and pins can be extended if the machine is greased regularly and in the right way.

Before greasing. Wipe off the grease nipples and grease gun so that sand and dirt particles are not introduced when greasing.

Greasing of bearings has two main purposes:

- Add grease to the bearing to reduce friction between pin and bushing.
- Replace old grease that may be dirty.

The grease space under the outer seal collects and prevents dirt particles and fluid from penetrating into the bearing.

Grease the bearing until new grease comes out through the outer seal.

Recommended grease: Lithium-based grease with EP-additive and consistency NLGI-grease class 2

If the machine is equipped with central lubrication system, see: [993 Central lubrication system, description](#)



Construction Equipment

Service Information

Document Title: Maintenance service, every 1000 hours	Function Group: 173	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Maintenance service, every 1000 hours

The 1000 hr service interval includes daily, 50 hr, 250 hr, 500 hr service intervals,

The service points where "optional equipment" is stated are not included in the accounted time for the interval

Op nbr 173-012

[11666020 Pressure gauge](#)

[11666051 Pressure gauge](#)

[11666037 Hose](#)

[14290266 Hose](#)

[9993721 Service display](#)

[11666167 Disassembly tool](#)

Equipment for Matris read-out

Air pressure gauge

Torque wrench

600 Nm (443 lbf ft)

Sleeve

32 mm

Extension

approx. 250 mm (10 in)

Collection container

Grease gun

Required materials

Engine oil

48 litres (12.68 US gal)

Engine oil filter: full-flow filter

2

Engine oil filter: part-flow filter

one

Air cleaner, primary filter

one

Coolant filter

one

Fuel filter: Primary filter

one

Fuel filter: Secondary filter

one

Cab: Pre-filter

one

Cab: Main filter

one

Test-run and check

1.

Start and stop function

Instruments, lighting, direction indicators, reflectors, flashing hazard lights, wipers, washers, horn, and back-

up alarm (if installed).

Steering system

Gear positions / automatic shifting

Differential lock

Brake system

Control light for low brake pressure

Parking brake

Climate control system, fan and controls including air conditioning

Loader unit's functions including automatic tilt (bucket positioner) and automatic lift (boom kick-out)

Optional equipment

Warning decals and plates. Check that they are legible and not damaged.

Matris read-off

2. Matris read-off is performed to follow up the machine's history

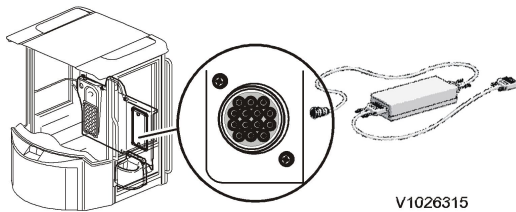


Figure 1
Matris read-off, connection point

Steering pressure, check

- 3.
1. Secure the frame joint with the steering joint lock and place blocks in front of and behind the wheels.
2. Connect pressure gauge 11666020 and hose 11666037 to the pressure check connection on the steering valve.
3. Start the engine and let it run at low idle. Make sure that the system has normal operating temperature.
4. Steer against the steering joint lock's end-position and check the steering pressure.

Steering pressure, see: [030 Pump 2 \(P2\) Steering and other hydraulics, specifications](#)

NOTE!

In neutral position the pressure gauge normally shows approx. 2.5 MPa (363 psi), which is the priority valve's opening pressure in the central block.

5. Stop the engine.

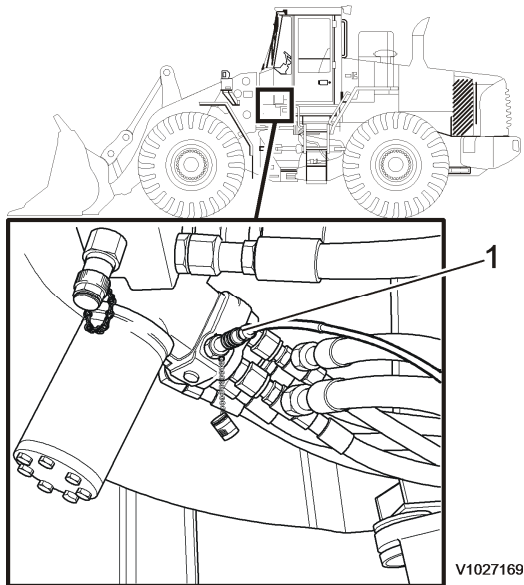


Figure 2
Steering pressure, checking

1. 11666020 pressure gauge + 11666037 hose

Brakes, checking

4. Brakes, pressure and function check

See: [520 Brake system, check and adjusting pressure in circuit](#)

5. Brake accumulators, checking precharge pressure

See: [520 Brake system, checking hydraulic function](#)

6. Brake discs, checking wear

See: [510 Brake discs, checking wear](#)

Tires as well as inflation pressure in tires, check

7. **See:** [191 Some simple rules regarding tyre handling](#)

For inflation pressure in tires, see operator's manual.

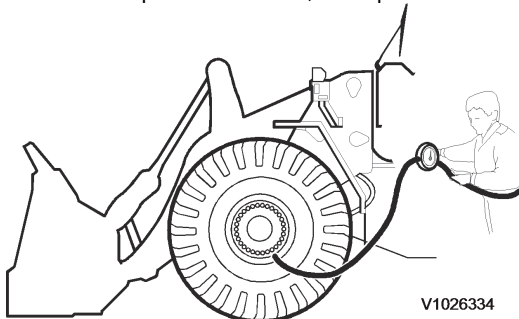


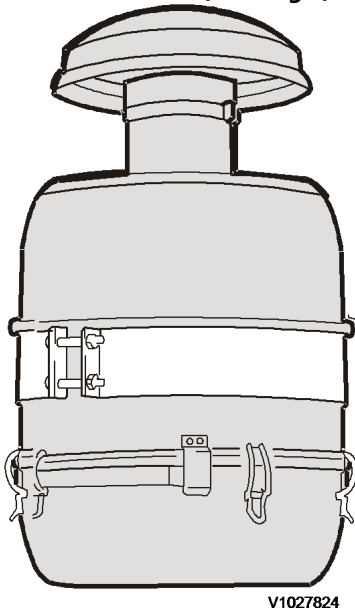
Figure 3
Inflation pressure in tires, check

Wheel nuts and tightening torques, check

8. **Tightening torques, see:** [030 Wheels, tightening torques](#)

Oil-bath air cleaner (optional equipment)

9. Change oil as needed.
Volume: **9.1 litres (2.4 US gal)**



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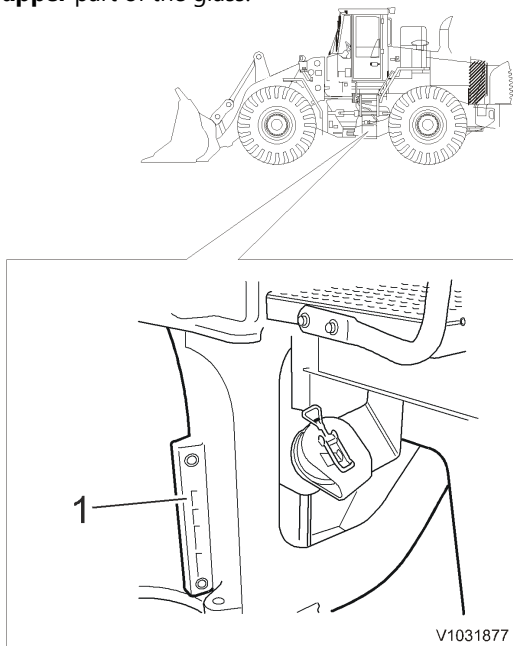
Figure 4
Oil-bath air cleaner

Transmission oil level, check

10. The machine shall be parked on level ground when checking. The gear selector shall be in neutral position and the parking brake shall be applied.

When checking the oil level with the engine running and oil at operating temperature, the level shall be between the markings High and Low on the **lower** part of the glass.

The level can also be checked with cold oil. Then the oil level shall be between the markings High and Low on the **upper** part of the glass.



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Figure 5

1. Sight-glass

Air cleaner, changing

11. Primary filter

When the alarm text "Clogged air filter" is shown, or every 1000 hours, the filter shall be changed or cleaned. Operating time between filter changes can vary depending on the machine's operating environment. Certain environments may require frequent filter changes. The filter can be cleaned after instruction from an authorized brand name workshop. After five cleanings, or if the filter is damaged, it shall be changed.

NOTE!

Record the number of main filter changes or cleanings on the decal near the secondary filter's end-plate.

In connection with filter change, also clean the cover for the air cleaner since it acts as a reservoir for particles that are not trapped in the filter.

Check that all hose and pipe connections from the air cleaner to the engine inlet manifold are tight.

Check-tighten hose clamps.

If the alarm text remains after the filter change, change the secondary filter as well.

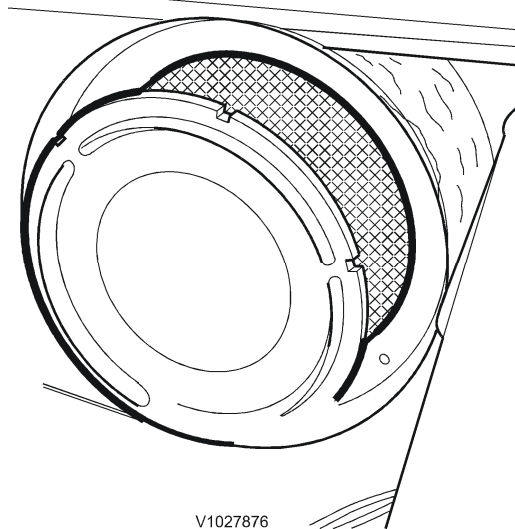


Figure 6
Air cleaner, primary filter



Work carefully when changing oil as hot oil can cause severe burns to unprotected skin.

Axle and hub, change oil

12. Front axle

If the machine is equipped with axle oil cooler, change every 4000 hours.

NOTE!

Handle the waste oil in an environmentally friendly way

Oil volume, see: [030 Front axle, capacity](#)

NOTE!

When filling, operate the machine for a few minutes and check the oil level again. Topping up may be needed.

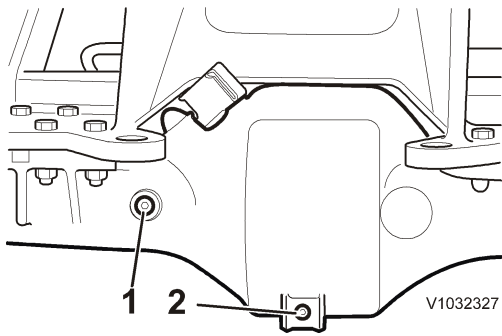


Figure 7
Front axle

1. Level check and filling
2. Draining

13. Rear axle

If the machine is equipped with axle oil cooler, change every 4000 hours.

NOTE!

Handle the waste oil in an environmentally friendly way

Oil volume. See: [030 Rear axle, capacity](#)

NOTE!

When filling, operate the machine for a few minutes and check the oil level again. Topping up may be needed.

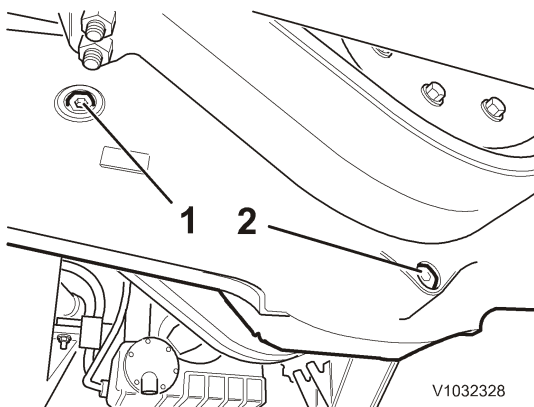


Figure 8
Rear axle

1. Level check and filling
2. Draining

14. Hub

If the machine is equipped with axle oil cooler, change every 4000 hours.

NOTE!

Handle the waste oil in an environmentally friendly way

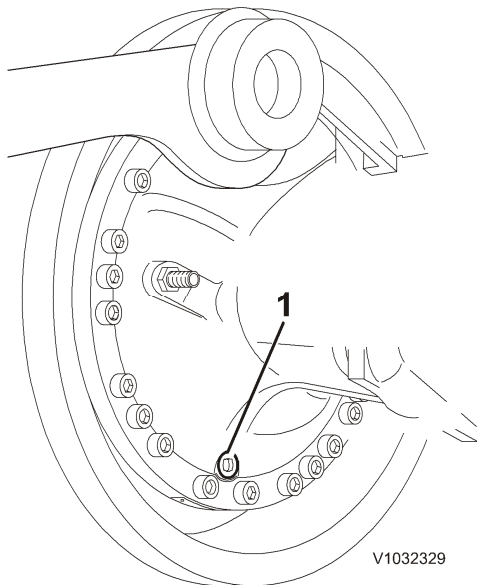


Figure 9
Hub

1. Draining

Axles, oil cooling (optional equipment), filter, change

15. Front axle

Start the engine and raise the boom. Use support 9993831 to secure the boom.

The filter cannot be cleaned; it must be replaced.

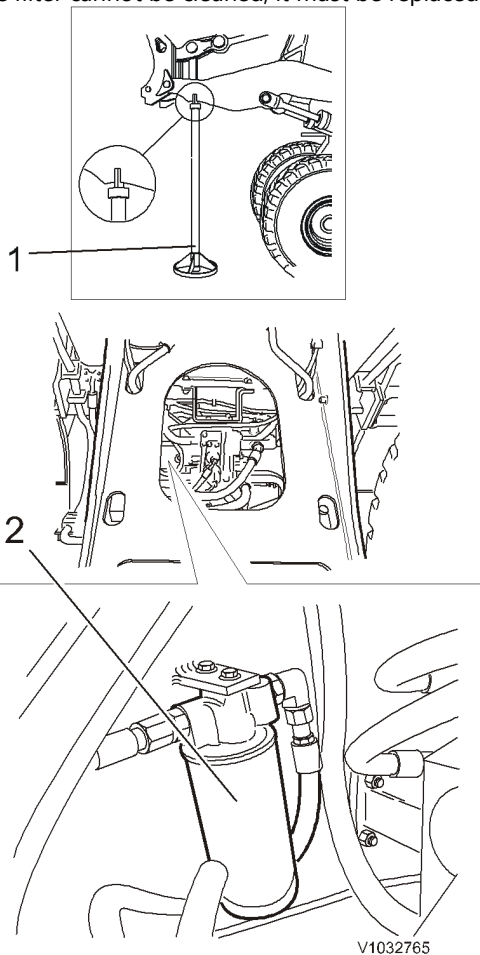


Figure 10
Axle oil cooling, front axle

1. 9993831
2. Filters

16. Rear axle

The filter cannot be cleaned; it must be replaced.

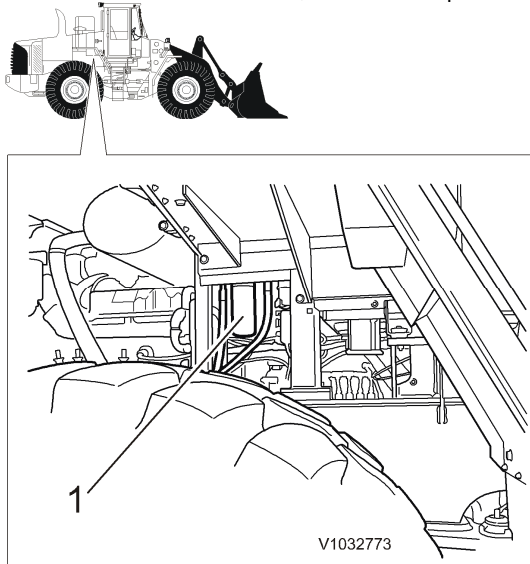


Figure 11
Axle oil cooling, rear axle

1. Filters

Hydraulic oil, draining sediment and level check

17. Draining sediment

Drain sludge and condensation water from the hydraulic oil tank through the drain on the machine's right side.

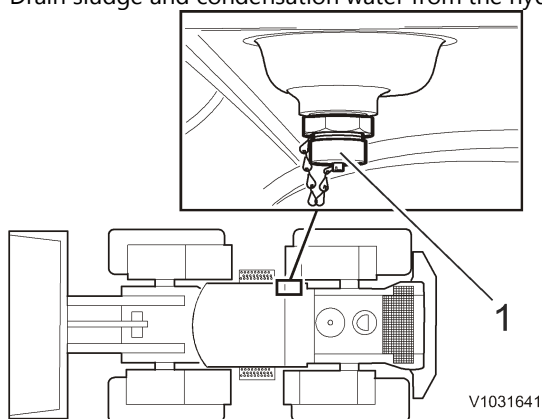
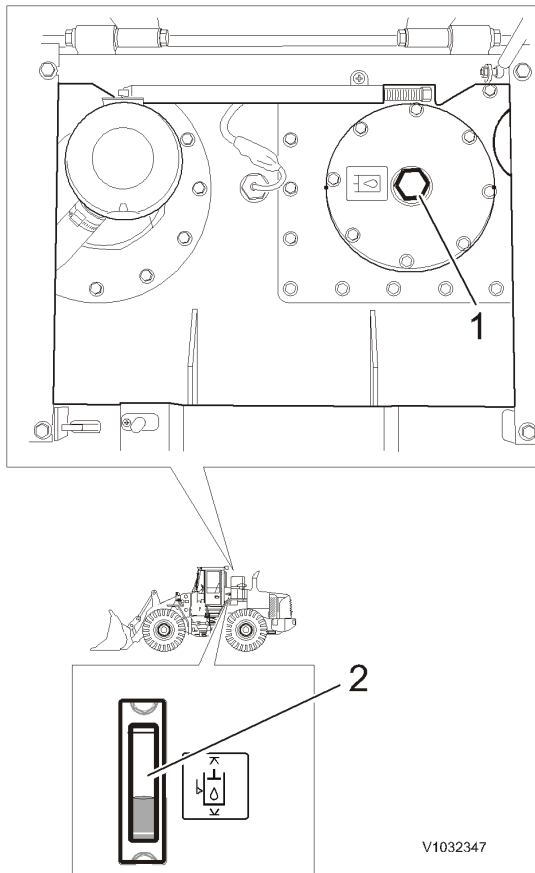


Figure 12
Hydraulic oil, drain point for sludge

18. Level check

The hydraulic oil level shall be between max. and min.
Filling takes place from the top of the hydraulic tank.



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Figure 13
Hydraulic oil, checking level

1. Cap, filling up
2. Sight-glass

WARNING

Open the expansion tank cap slowly and carefully. The cooling system operates at high pressure and hot coolant may rush out and cause severe burns.

Cooling system, checking level and freezing point

19. Level check

Fill coolant in the expansion tank.

NOTE!

Use genuine Volvo coolant.

The coolant level shall be between max. and min.

Filling

1. The engine shall be run warm and the temperature control shall be set to "warm".
2. Let the engine cool down.
3. Fill coolant up to the max. marking on the expansion tank.
4. Run the engine warm and top up so that the cooling system is completely filled and bled free from air.

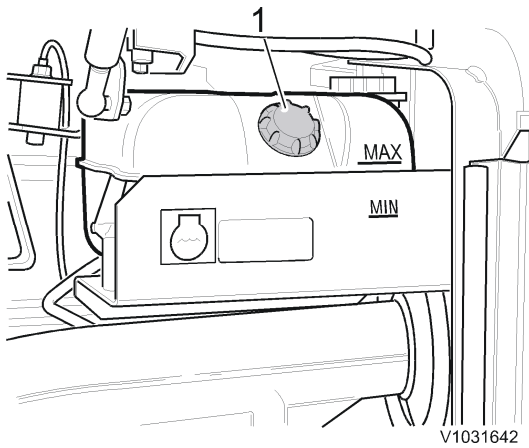


Figure 14
Coolant level

1. Cap for filler
20. Freezing point, check

Check the freezing point with a glycol tester at the expansion tank. The glycol tester's value should show approx. -38°C (-36°F).

The machine is delivered with a coolant mixture of 50% glycol and 50% water for optimal cooling and corrosion characteristics. That is why the same coolant mixture shall be filled, regardless of ambient temperature conditions.

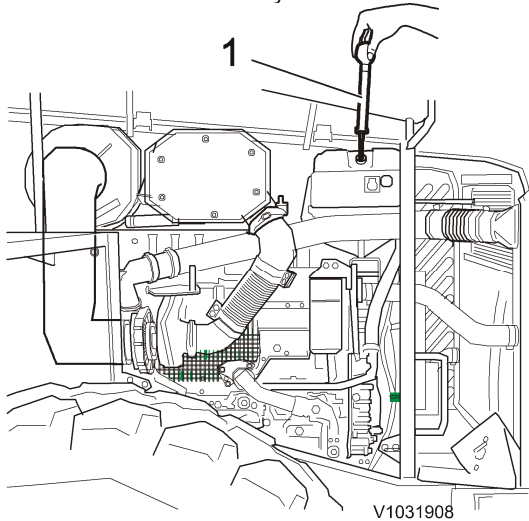


Figure 15
Coolant check

1. Glycol tester



Risk of burns! Use protective work gloves.

Engine oil and engine oil filter, change

21. Draining engine oil

Drain the oil when the engine is warm.
Connect drain hose and drain the oil in a collection container.

Oil volume, see: [030 Engine, volume](#)

NOTE!

Handle the oil in an environmentally safe way.

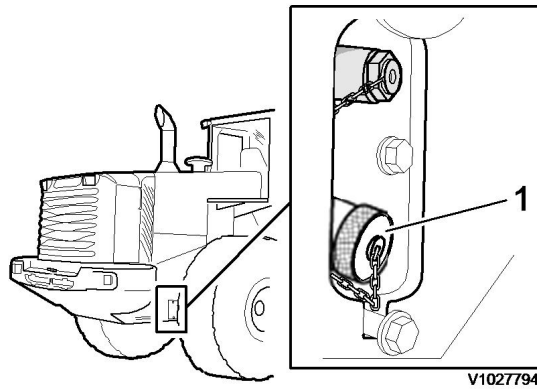


Figure 16
Draining point

1. Drain for engine oil
22. Removing oil filters
1. Open right and left engine cover.
 2. Remove the cover on the intermediate wall to access the oil filters.
 3. Use oil filter pliers when removing the oil filters.

Installing oil filters

1. Fill the filters with engine oil and brush oil on the gaskets

NOTE!

New oil shall be used.

2. Spin on the filters until the gaskets just touch the sealing surfaces. Then tighten another full turn.

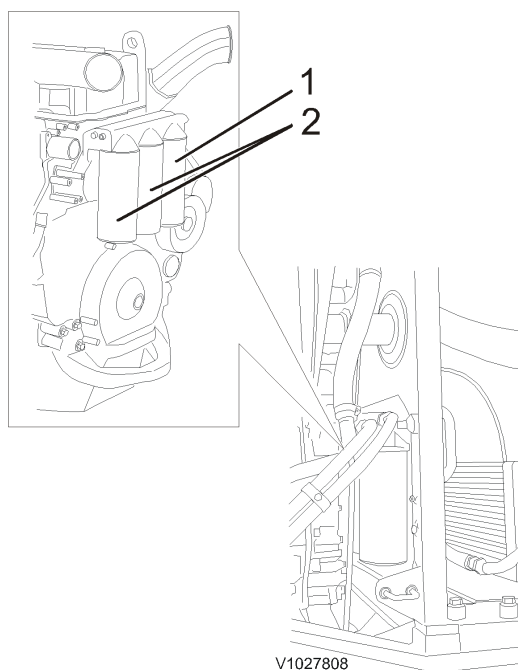


Figure 17

1. Part-flow filter
2. Full-flow filter

23. Filling engine oil

Oil volume, see: [030 Engine. volume](#)

Fill the indicated oil volume.

Start the engine and check that the oil filter gaskets seal tight. If not, remove the filter and check the sealing surface. Normally, it does not help to tighten more.

NOTE!

After replacing the oil filter, the engine must be run at low idle for at least one minute to guarantee satisfactory lubrication of the engine before the machine is put to work.

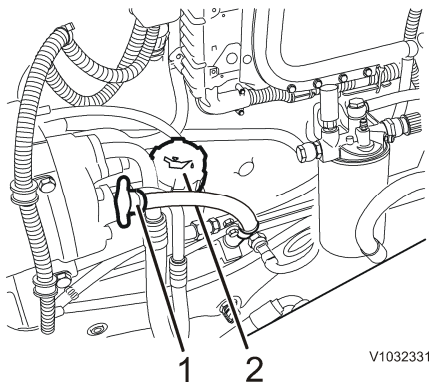


Figure 18

1. Oil dipstick
2. Filler pipe

Fuel filter, primary and secondary filter, change

24. When installing, only tighten the filters by hand.
For removing and installing bowl, use tool 11666167.

Bleed the system, see [230 Fuel system. bleeding](#)

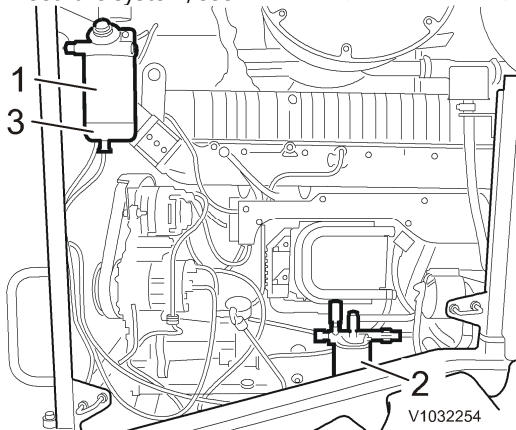


Figure 19

1. Primary fuel filter
2. Secondary fuel filters
3. Bowl

Coolant filter, change

25. Coolant filter, change

The filter cannot be cleaned, it must be changed as a complete unit

Close the valve on the filter head before removing the filter.

NOTE!

Time interval 1000 hours or max. 6 months

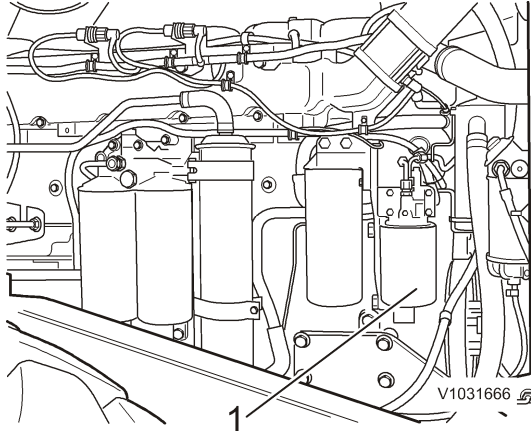


Figure 20

1. Coolant filter

Drive belts, check

26. At the correct belt tension, it should be possible to press down the belt between the belt pulleys approx. 8 mm (0.32 in) with a force of 25-30 Nm (18-22 lbf ft).

Adjusting

1. Loosen the alternator's attaching bolt
2. Adjust to the correct belt tension. Check the belt tension and tighten the attaching bolt.

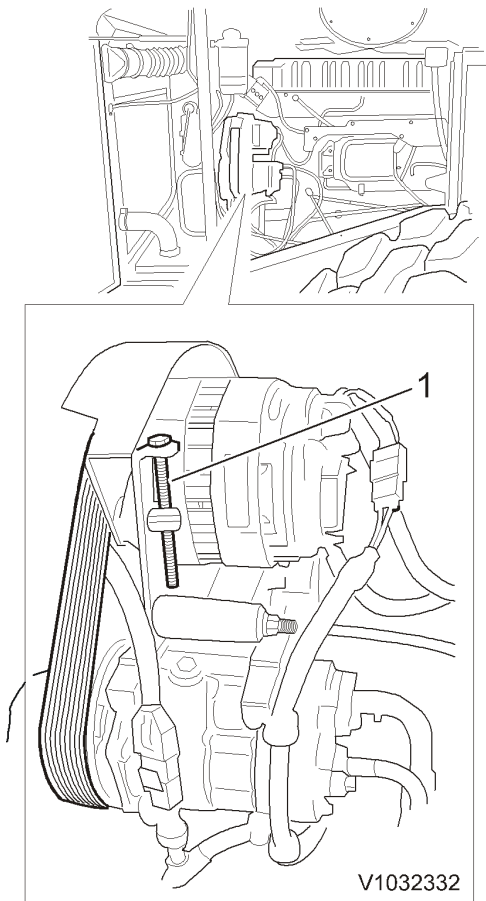


Figure 21

1. Adjusting screw

Intercooler, drain

27. Screw out the drain plug and drain any condensation water or oil.

NOTE!

Handle the fluids in an environmentally safe way

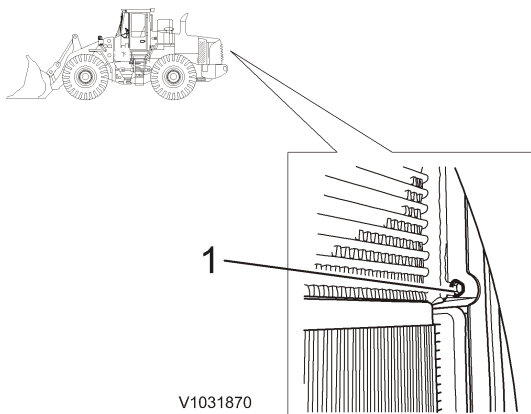


Figure 22
Intercooler

1. Drain plug



The battery electrolyte contains corrosive sulphuric acid. Electrolyte spilled on bare skin should be removed immediately. Wash the affected area with soap and plenty of water. If electrolyte gets into your eyes or any other sensitive body part, rinse immediately with plenty of water and seek immediate medical attention.

Battery, electrolyte level, cables and connections, check

28. The battery electrolyte shall be 10 mm (0.4 in) over the plates in the battery.
Top up with distilled water as needed.

Check

1. Cable terminals and terminal studs must be well cleaned, tightened and greased externally with, e.g., vaseline as corrosion protection.
2. That the attachments are securely tightened.

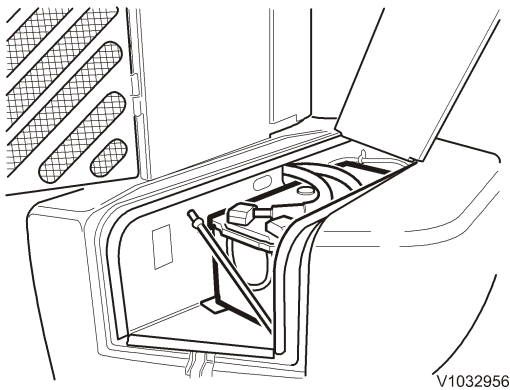


Figure 23
Battery box left side (principle illustration)

Leakage

29. Check that all visible gaskets are intact and that they are not exposed to leakage.

Pipes and hoses

30. Check that all pipes and hoses are intact and not deformed.

Cab, ventilation device

31. Cab (ventilation filter), change

The cab's filters consist of pre-filter and a primary filter. The filters should be checked once a week.

NOTE!

The change interval may be longer or shorter, depending on how dusty the environment is

NOTE!

Use breathing protection when changing filters

1. Open the side cover
2. Loosen the clasps for the pre-filter and remove it
3. Install the new filter carefully
4. Close the side cover

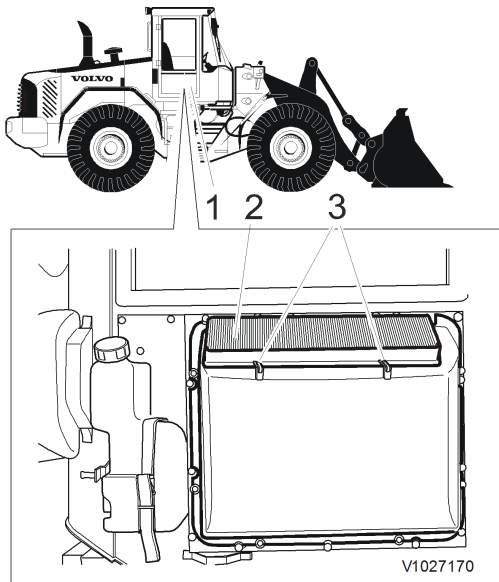


Figure 24
Pre-filter, principle illustration

1. Side cover
2. Pre-filter
3. Clasps for pre-filter

32. Primary filter, clean and check

Service programme 8:3

NOTE!

Use breathing protection when handling filters

1. Open the side cover
2. Remove the pre-filter
3. Remove the nuts that hold the plastic casing for the primary filter

NOTE!

Keep track of the sheet metal strip that is located at the top of the plastic casing

4. Remove the primary filter
5. Shake the filter carefully, without damaging it. Avoid compressed air, vacuum cleaners and water.
6. Reinstall the plastic casing with the sheet metal strip at the top
7. Install the pre-filter and close the side cover

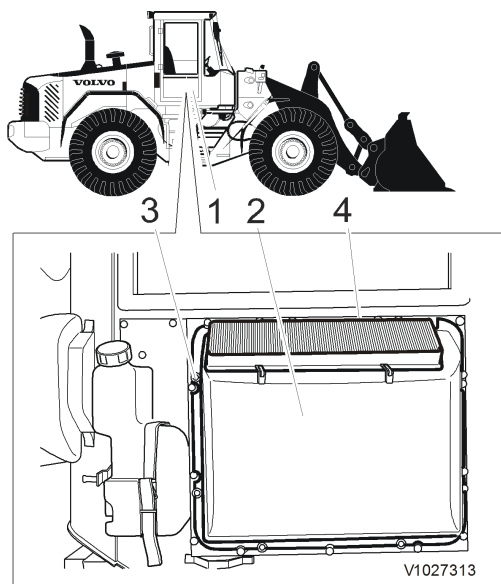


Figure 25
Primary filter, principle illustration

1. Side cover
2. Primary filter. Inside plastic casing
3. Nuts, 8 pcs.
4. Pre-filter

Framework, grease

33. Boom

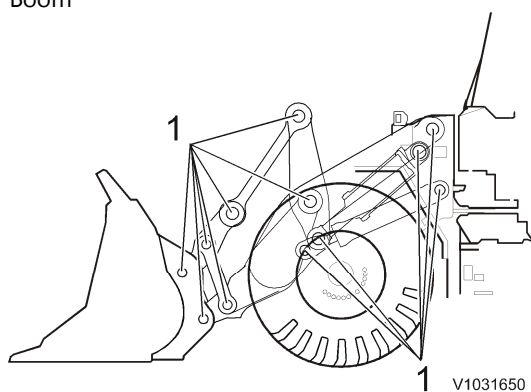


Figure 26
Boom

1. Grease nipples.

34. Frame and cab

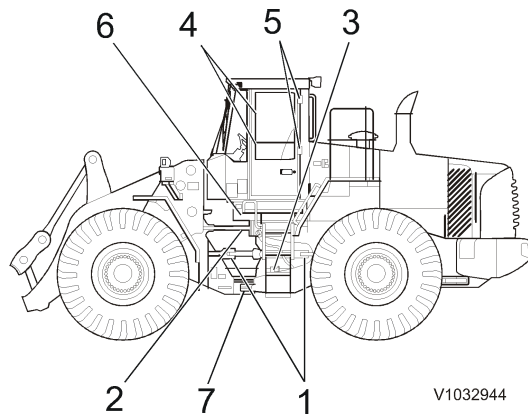


Figure 27
Grease points

1. Steering cylinders' pivot points
2. Frame joint's upper bearing
3. Propeller shafts and support bearings
4. Side window's hinges (right side)
5. Cab's door
6. Rear axle bearing
7. Frame joint's lower bearing

Condenser, check

35. Clean as needed

NOTE!

High-pressure washer may not be used

Cleaning

1. Open the radiator casing
2. Blow clean with compressed air
3. Close the radiator casing

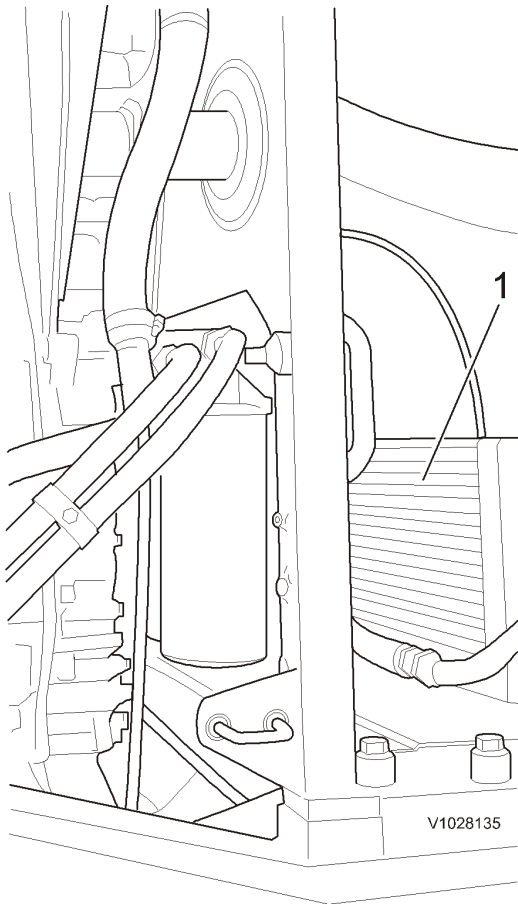


Figure 28
Condenser.



Beware of rotating parts. Keep a safe distance.

Radiator, engine, check

36. Clean as needed

NOTE!

The radiator should be cleaned at regular intervals to ensure cooling of the engine. If the machine's operating site is dusty, the radiator should be checked daily.

1. Unlock and raise the radiator casing
2. Swing out the fan completely to open position
3. Blow clean the radiator with compressed air from the inside

NOTE!

The radiator's fins may be damaged if handled carelessly

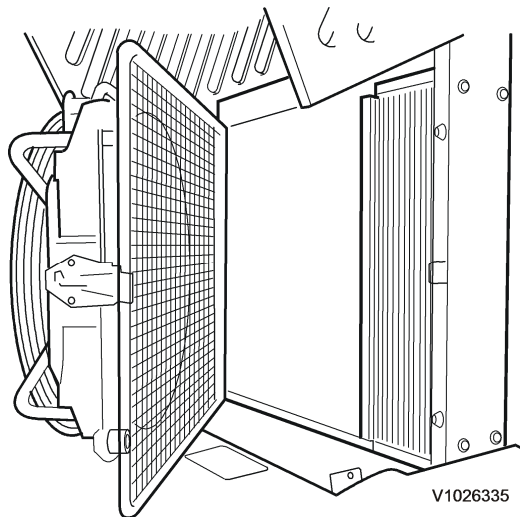


Figure 29
Radiator (principle illustration)

Greasing bearings

Service life of bushings and pins can be extended if the machine is greased regularly and in the right way. Before greasing. Wipe off the grease nipples and grease gun so that sand and dirt particles are not introduced when greasing.

Greasing of bearings has two main purposes:

- Add grease to the bearing to reduce friction between pin and bushing.
- Replace old grease that may be dirty.

The grease space under the outer seal collects and prevents dirt particles and fluid from penetrating into the bearing. Grease the bearing until new grease comes out through the outer seal.

Recommended grease: Lithium-based grease with EP-additive and consistency NLGI-grease class 2

If the machine is equipped with central lubrication system, see: [993 Central lubrication system, description](#)



Construction Equipment

Service Information

Document Title: Maintenance service, every 2000 hours	Function Group: 173	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Maintenance service, every 2000 hours

The 2000 hr service interval includes daily, 50 hr, 250 hr, 500 hr, 1000 hr service intervals,

The service points where "optional equipment" is stated are not included in the accounted time for the interval

Op nbr 173-014

[11666020 Pressure gauge](#)

[11666051 Pressure gauge](#)

[11666037 Hose](#)

[14290266 Hose](#)

[9993721 Service display](#)

[9993831 Support](#)

[11666167 Disassembly tool](#)

Equipment for Matris read-out

Air pressure gauge

Torque wrench

600 Nm (443 lbf ft)

Sleeve

32 mm

Extension

approx. 250 mm (10 in)

Collection container

Grease gun

Required materials

Engine oil

48 litres (12.68 US gal)

Engine oil filter: full-flow filter

2

Engine oil filter: part-flow filter

one

Axle oil

101 litres (26.7 US gal)

Axle oil filter (optional equipment)

2

Transmission oil

50 litres (13.2 US gal)

Transmission oil filter

one

O-ring for the transmission's suction strainer

one

Engine oil or bio-oil for hydraulic system

156 litres (41.2 US gal)

Return oil filter, hydraulic system

one

Ventilation filter, cab

one

Breather filter, transmission

one

Breather filter, front axle

one

Breather filter, rear axle

one

Breather filter, fuel tank

one

Breather filter, hydraulic system

one

Cab, main filter

one

Cab, pre-filter

one

Coolant filter	one
Fuel filter: Secondary filter	one
Fuel filter: Primary filter	one
Air cleaner: Safety filter	one
Air cleaner: Main filter	one
Glycol	325 litres (6.6 US gal)

Test-run and check

1.

Start and stop function

Instruments, lighting, direction indicators, reflectors, flashing hazard lights, wipers, washers, horn, and back-up alarm (if installed).

Steering system

Gear positions / automatic shifting

Differential lock

Brake system

Control light for low brake pressure

Parking brake

Climate control system, fan and controls including air conditioning

Loader unit's functions including automatic tilt (bucket positioner) and automatic lift (boom kick-out)

Optional equipment

Warning decals and plates. Check that they are legible and not damaged.

Matris read-off

2. Matris read-off is performed to follow up the machine's history

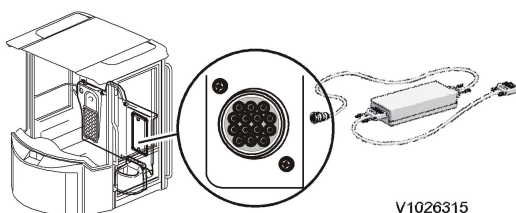


Figure 1
Matris read-off, connection point

Steering pressure, check

3.

1. Secure the frame joint with the steering joint lock and place blocks in front of and behind the wheels.
2. Connect pressure gauge 11666020 and hose 11666037 to the pressure check connection on the steering valve.
3. Start the engine and let it run at low idle. Make sure that the system has normal operating temperature.
4. Steer against the steering joint lock's end-position and check the steering pressure.

Steering pressure, see: [030 Pump 2 \(P2\) Steering and other hydraulics, specifications](#)

NOTE!

In neutral position the pressure gauge normally shows approx. 2.5 MPa (363 psi), which is the priority valve's opening pressure in the central block.

5. Stop the engine.

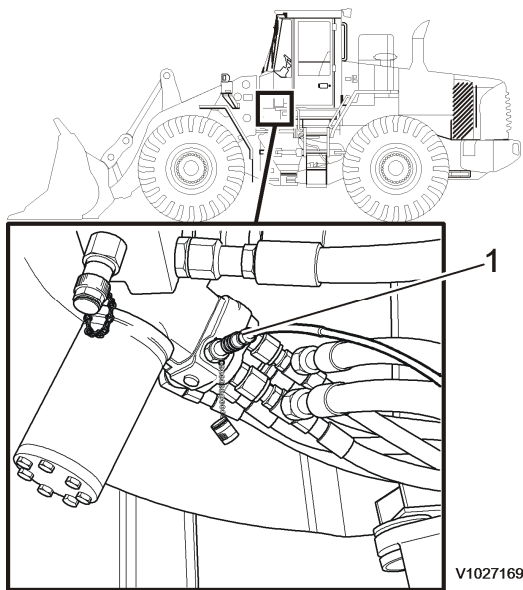


Figure 2
Steering pressure, checking

1. pressure gauge 11666020 + hose 11666037

Brakes, checking

4. Brakes, pressure and function check

See: [520 Brake system, check and adjusting pressure in circuit](#)

5. Brake accumulators, checking precharge pressure

See: [520 Brake system, checking hydraulic function](#)

6. Brake discs, checking wear

See: [510 Brake discs, checking wear](#)

Hydraulic oil, drain point (when using bio-oil)

7. **If the hydraulic tank is filled with engine oil or bio-oil, the oil shall be changed at 200 hours. Machines filled with hydraulic oil, change at 4000 hours.**

NOTE!

When changing hydraulic oil, use the hose that is used for draining engine oil. The hose is located in the battery box. Temporarily replace the rubber hose with a 3/4" hose. Length = 3.5 metres.

Hydraulic oil volume, see: [030 Hydraulic system, volume](#)

1. Run the machine until the oil in the hydraulic system is at normal working temperature.
2. Park the machine on level ground with the attachment lowered to the ground.
3. Stop the engine and depressurize the brake system by depressing the brake pedal repeatedly.
4. Spin off the protective cap for draining.
5. Get the hose from the tool box. Extend it with a suitable hose so that it reaches the drain container.
6. Place the end of the hose in a suitable collection container and screw the hose to the drain point.
7. Repeat the same draining on the opposite side.

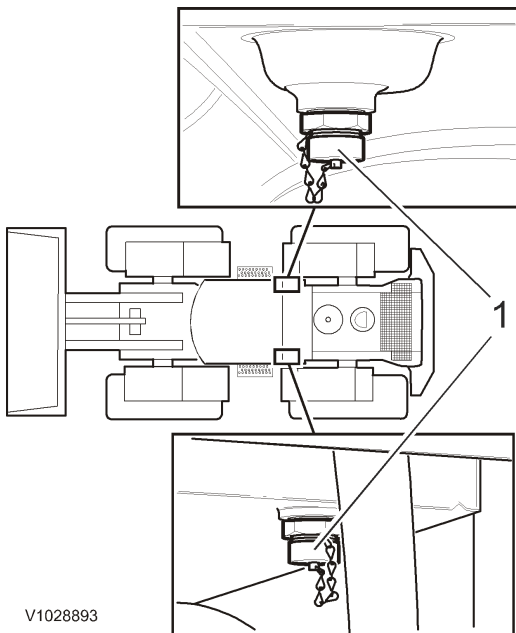


Figure 3
Hydraulic oil, draining

Tires as well as inflation pressure in tires, check

8. See: [191 Some simple rules regarding tyre handling](#)

For inflation pressure in tires, see operator's manual.

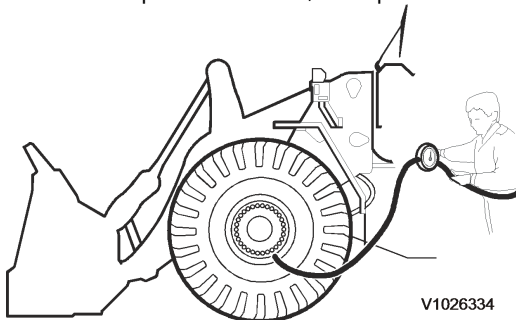


Figure 4
Inflation pressure in tires, check

Wheel nuts and tightening torques, check

9. **Tightening torques, see:** [771 Wheels, tightening torques](#)

Oil-bath air cleaner (optional equipment)

10. Service programme 2:2

Change oil as needed.

Volume: **9.1 litres (2.4 US gal)**

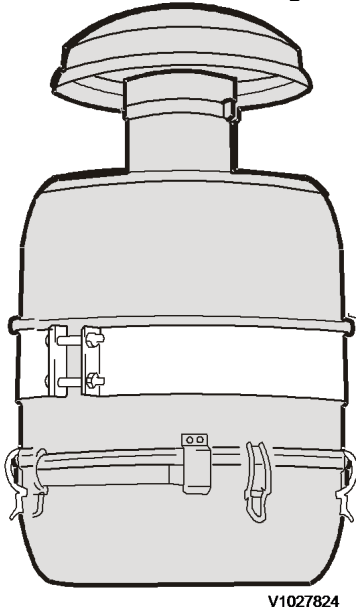


Figure 5
Oil-bath air cleaner



Work carefully when changing oil as hot oil can cause severe burns to unprotected skin.

Axles and hub, change oil

11. Front axle

If the machine is equipped with axle oil cooler, change every 4000 hours.

NOTE!

Handle the waste oil in an environmentally safe way.

Oil volume, see: [030 Front axle, capacity](#)

NOTE!

When filling, operate the machine for a few minutes and check the level again. Topping up may be needed.

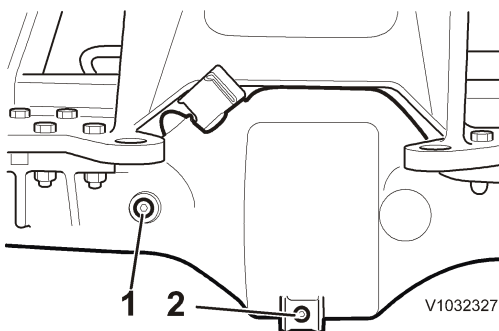


Figure 6
Front axle, oil change

1. Level check and filling
2. Draining

12. Rear axle

If the machine is equipped with axle oil cooler, change every 4000 hours.

NOTE!

Handle the waste oil in an environmentally safe way.

Oil volume, see: [030 Rear axle capacity](#)

NOTE!

When filling, operate the machine for a few minutes and check the level again. Topping up may be needed.

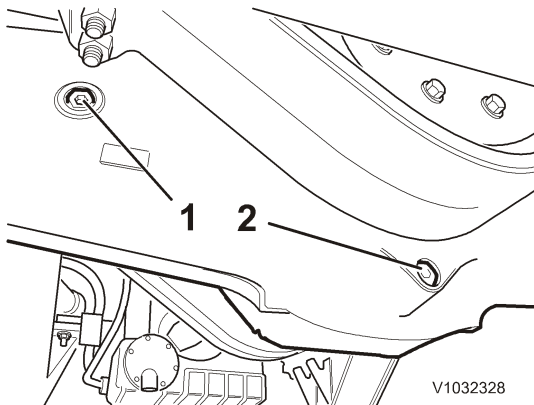


Figure 7
Rear axle, oil change

1. Level check and filling
2. Draining

13. Hub

NOTE!

Handle the waste oil in an environmentally safe way.

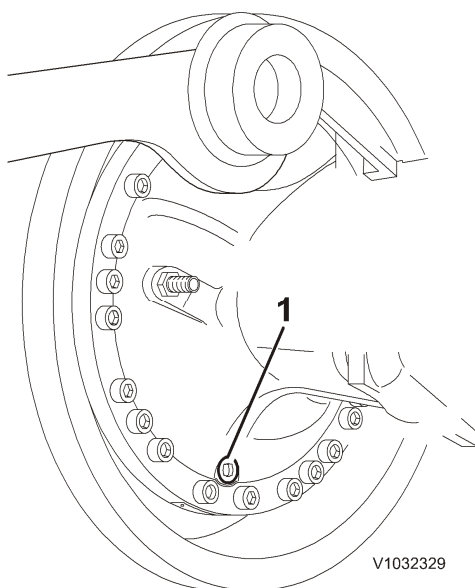


Figure 8
Hub

1. Draining

Axles, oil cooling (optional equipment), filter, change

14. Front axle

Start the engine and raise the boom. Use support 9993831 to secure the boom

The filters cannot be cleaned, they must be changed

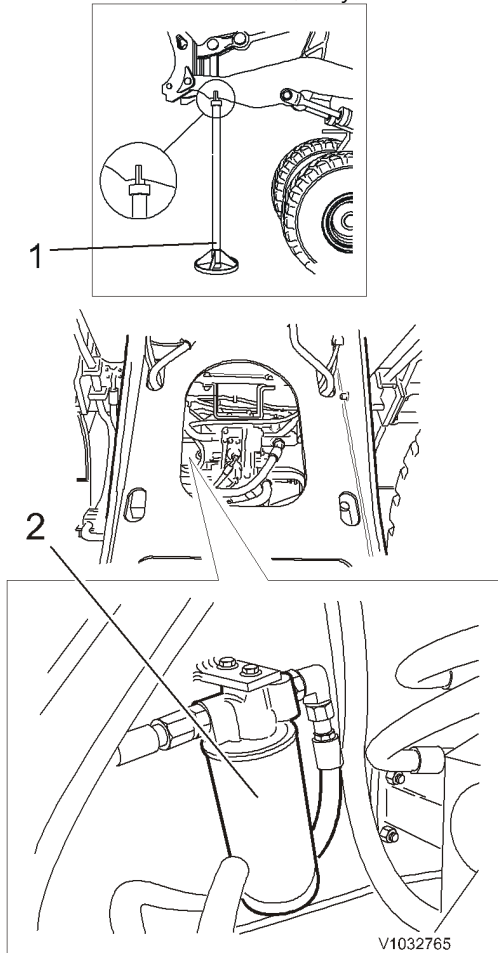


Figure 9
Axle oil cooling, front axle

1. Support 9993831
2. Filters

15. Rear axle

The filters cannot be cleaned, they must be changed

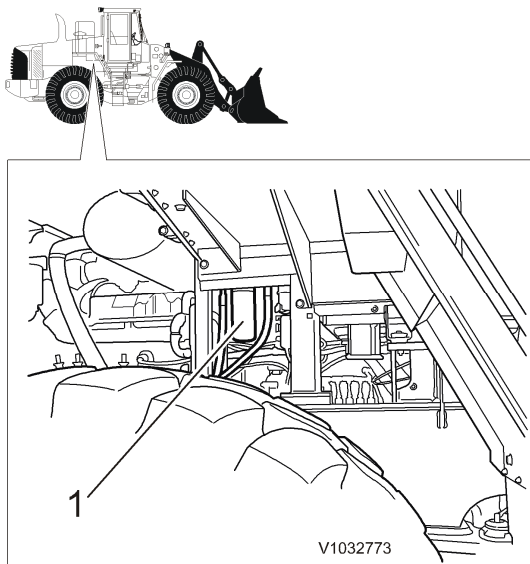


Figure 10
Axle oil cooling, rear axle

1. Filters

Hydraulic oil, draining sediment and level check

16. Draining sediment

Drain sludge and condensation water from the hydraulic oil tank through the drain on the machine's right side.

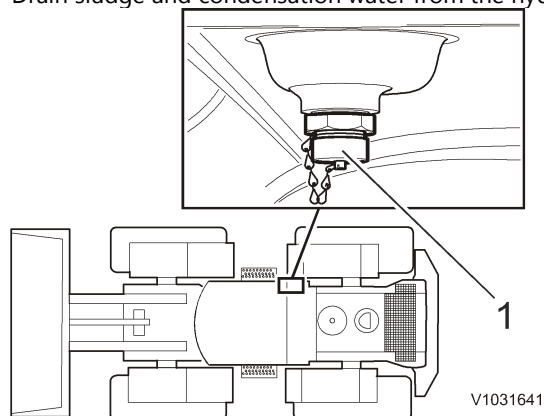


Figure 11
Hydraulic oil, draining sludge

1. Plug

17. Level check.

The hydraulic oil level shall be between max. and min. Filling takes place from the hydraulic tank's top side.

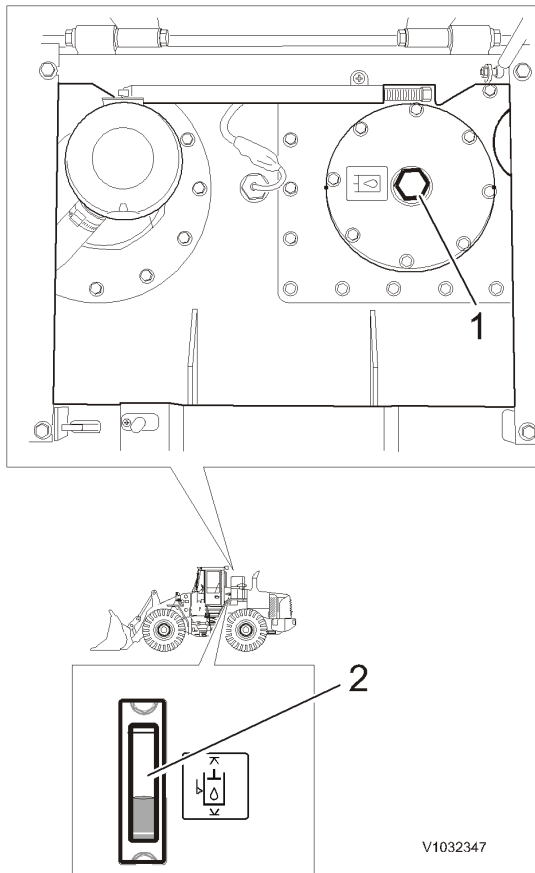


Figure 12
Hydraulic oil, checking level

1. Cap, filling up
2. Sight-glass

WARNING

Work carefully when changing oil as hot oil can cause severe burns to unprotected skin.

Transmission, oil and filter, changing

18. Transmission oil, change

The oil is drained at the drain plug when the machine is at operating temperature.
Clean the suction strainer when changing oil.

Cleaning

1. Remove the cover and clean the parts
2. Install a new gasket between the cover and transmission
3. Change the O-ring on the suction strainer's connecting pipe
4. Refit the cap
5. Fill up with oil
6. Check that there are no leaks

Oil volume when changing oil, see: [030 Hydraulic transmission, volume](#)

NOTE!

Handle the waste oil in an environmentally friendly way.

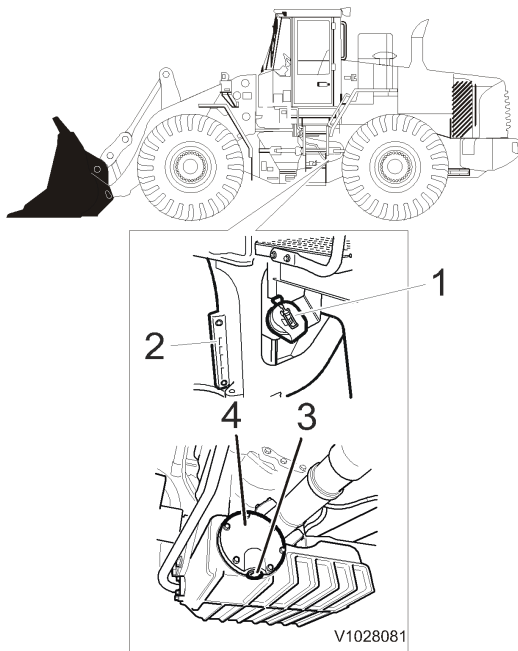


Figure 13
Transmission, principle illustration

1. Cap for filler pipe
2. Oil level check
3. Drain plug
4. Cover, suction strainer

19. Transmission oil filter, changing

Use oil filter pliers when removing the oil filter.

Installing filter.

1. Brush new oil on the rubber seal.
2. Spin on the filter until the gasket just touches the sealing surface. Tighten another 1/2 to 3/4 turn by hand.

Warm up the machine and check that the oil gasket seals tight. If not, remove the filter and check the sealing surface. Normally, it does not help to tighten more.

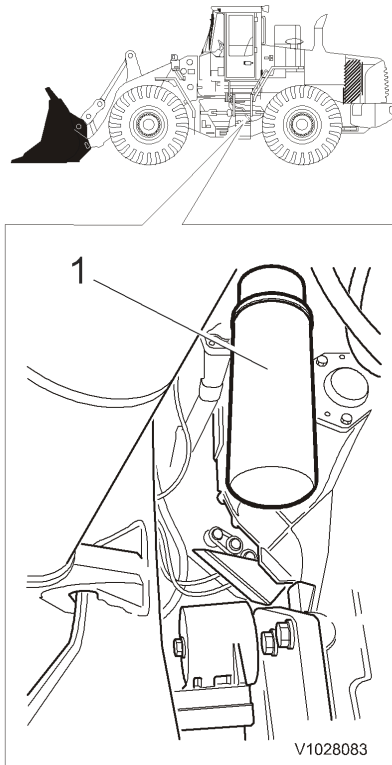


Figure 14

1. Transmission oil filter

Hydraulic system's return oil filter, change

20. Proceed as follows

1. Remove the cap
2. Lift out and dismantle the filter insert
3. Remove the filter and install a new filter

NOTE!

The filter is for 'one-time' use only and must be changed

4. Check the seal rings when installing

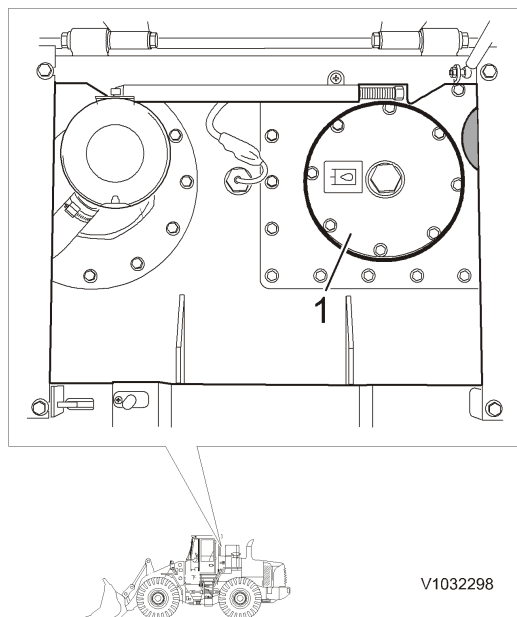


Figure 15
Hydraulic system's return oil filter, principle illustration

1. Cap, return oil filter

Hydraulic oil, filling point (when using bio-oil)

21. **Hydraulic oil volume, see:** [030 Hydraulic system, volume](#)

The hydraulic oil level shall be between max. and min.

Filling takes place from the top of the hydraulic tank.

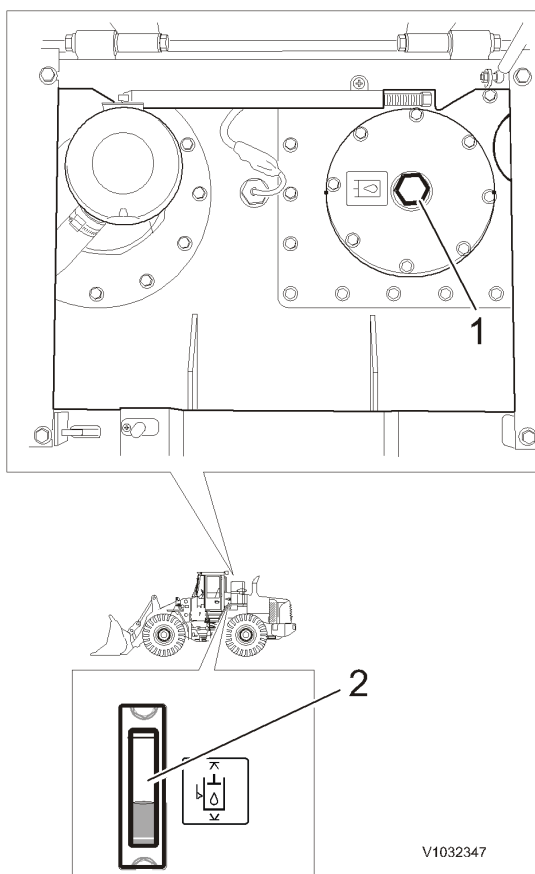


Figure 16
Hydraulic oil, checking level

1. Cap, filling up
2. Sight-glass

Coolant filter, changing

22. Coolant filter, change.

The filter cannot be cleaned, it must be changed as a complete unit.
Close the valve on the filter head before removing the filter.

NOTE!

Time interval 1000 hours or max. 6 months

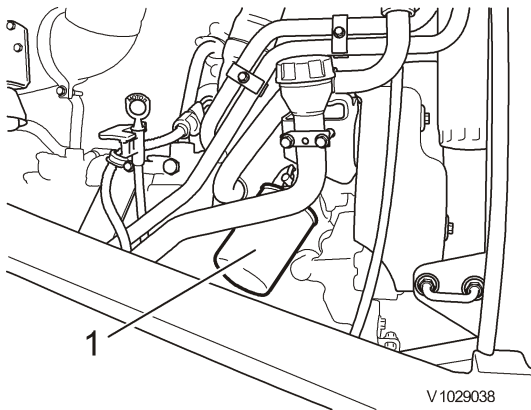


Figure 17

1. Coolant filter



Risk of burns! Use protective work gloves.

Engine oil and engine oil filter, change

23. Draining engine oil

Drain the oil when the engine is warm.
Connect drain hose and drain the oil in a collection container.

NOTE!

Handle the oil in an environmentally safe way.

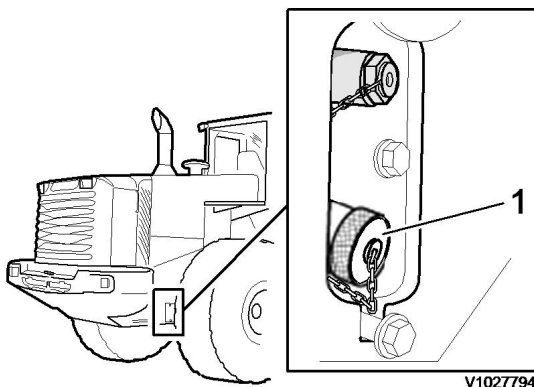


Figure 18
Draining point

1. Drain for engine oil
24. Removing oil filters
1. Open right and left engine cover.
 2. Remove the cover on the intermediate wall to access the oil filters.
 3. Use oil filter pliers when removing the oil filters.

Installing oil filters

1. Fill the filters with engine oil and brush oil on the gaskets.

NOTE!

New oil shall be used.

2. Spin on the filters until the gaskets just touch the sealing surfaces. Then tighten another full turn.

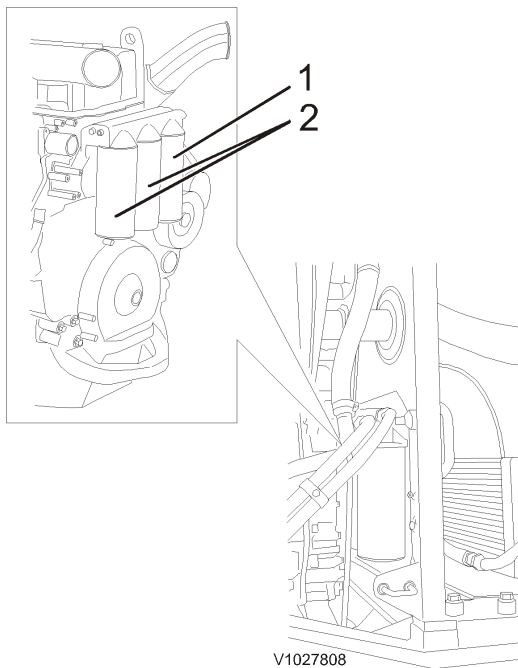


Figure 19

1. Part-flow filter
 2. Full-flow filter
25. Filling engine oil

Volume, see: [030 Engine, volume](#)

Fill the indicated oil volume.

Run the engine warm and check that the gasket seal tight. If not, remove the filter and check the sealing surface. Normally, it does not help to tighten more.

NOTE!

After replacing the oil filter, the engine must be run at low idle for at least one minute to guarantee satisfactory lubrication of the engine before the machine is put to work.

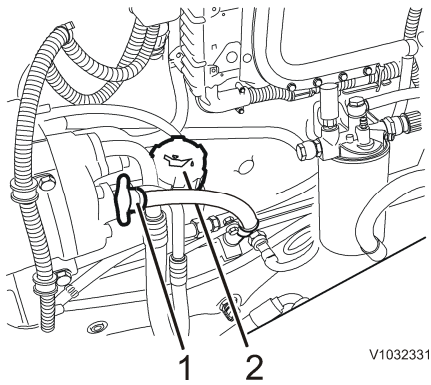


Figure 20

1. Oil dipstick
2. Filler pipe

Fuel filter, primary and secondary filter, change

26. When installing, only tighten the filters by hand.
For removing and installing bowl, use tool 11666167.

Bleed the system, see [230 Fuel system, bleeding](#)

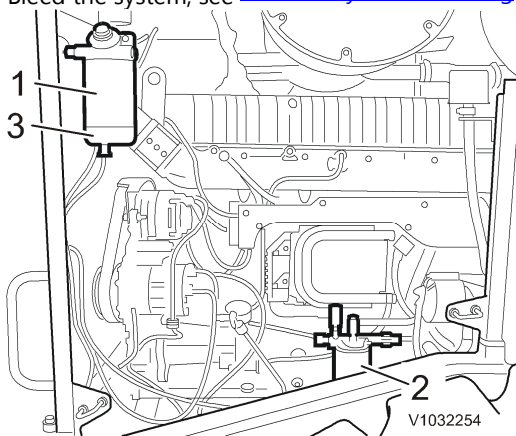


Figure 21

1. Primary fuel filter
2. Secondary fuel filters
3. Bowl

Drive belts, check

27. At the correct belt tension, it should be possible to press down the belt between the belt pulleys approx. 8 mm (0.32 in) with a force of 25-30 Nm (18-22 lbf ft).

Adjusting

1. Loosen the alternator's attaching bolt
2. Adjust to the correct belt tension. Check the belt tension and tighten the attaching bolt.

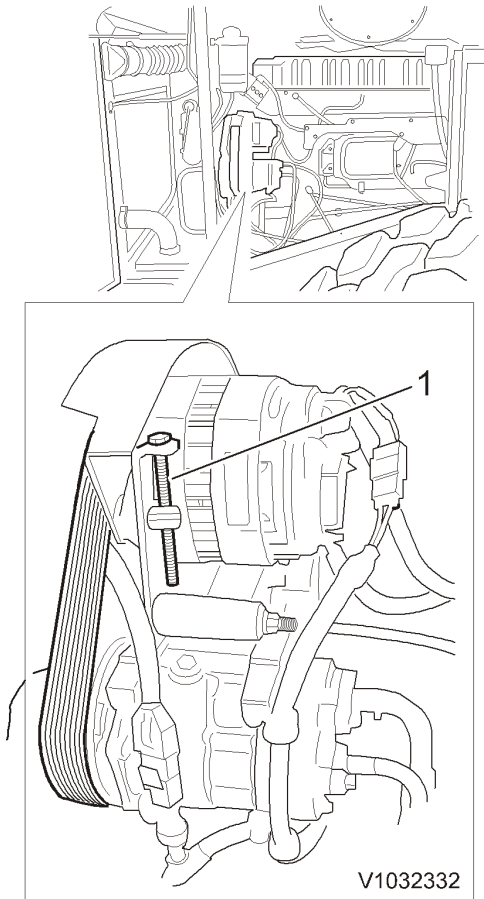


Figure 22

1. Adjusting screw

Intercooler, drain

28. Screw out the drain plug and drain any condensation water or oil.

NOTE!

Handle the fluids in an environmentally safe way

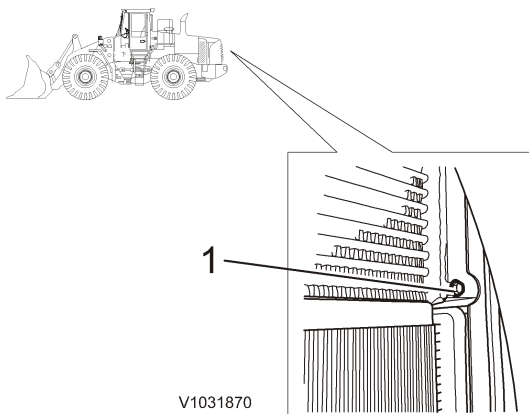


Figure 23
Intercooler

1. Drain plug



The battery electrolyte contains corrosive sulphuric acid. Electrolyte spilled on bare skin should be removed immediately. Wash the affected area with soap and plenty of water. If electrolyte gets into your eyes or any other sensitive body part, rinse immediately with plenty of water and seek immediate medical attention.

Battery, electrolyte level, cables and connections, check

29. The battery electrolyte shall be 10 mm (0.4 in) over the plates in the battery.
Top up with distilled water as needed.

Check

1. Cable terminals and terminal studs must be well cleaned, tightened and greased externally with, e.g., vaseline as corrosion protection.
2. That the batteries are securely tightened.

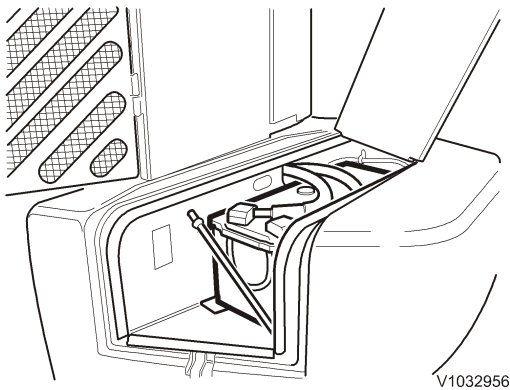


Figure 24
Battery box, left side (principle illustration)



Open the expansion tank cap slowly and carefully. The cooling system operates at high pressure and hot coolant may rush out and cause severe burns.

Cooling system, checking level and freezing point

30. Level check

Fill coolant in the expansion system.

NOTE!

Use genuine Volvo coolant

The coolant level shall be between max. and min.

Filling

1. The engine shall be run warm and the temperature control shall be set to "warm".
2. Let the engine cool down.
3. Fill coolant up to the max. marking on the expansion tank.
4. Run the engine warm and top up so that the cooling system is completely filled and bled free from air.

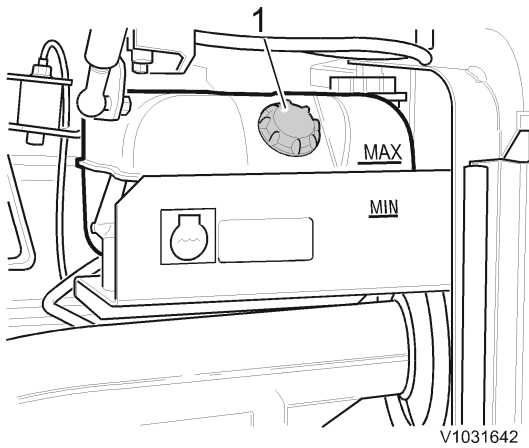


Figure 25
Coolant level

1. Cap

31. Coolant, freezing point, check

Check the freezing point with a glycol tester at the expansion tank. The glycol tester's value should show approx. -38°C (-36°F).

The machine is delivered with a coolant mixture of 50% glycol and 50% water for optimal cooling and corrosion characteristics. That is why the same coolant mixture shall be filled, regardless of ambient temperature conditions.

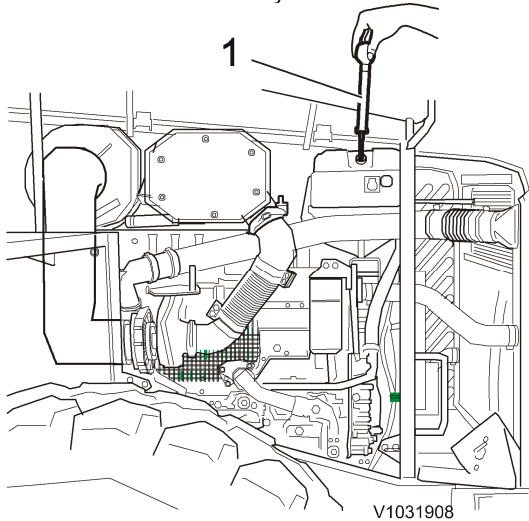


Figure 26
Coolant check

1. Glycol tester

Leakage

32. Check that all visible gaskets are intact and that they are not exposed to leakage.

Pipes and hoses

33. Check that all pipes and hoses are intact and not deformed.

Air cleaner, changing

34. Secondary filter

Change the filter every 2000 hours or when the filter head has been changed three times.
The filter cannot be cleaned; it must be replaced.
The safety filter acts as a protective filter if the primary filter is damaged.

NOTE!

Never remove the safety filter unless it is to be changed

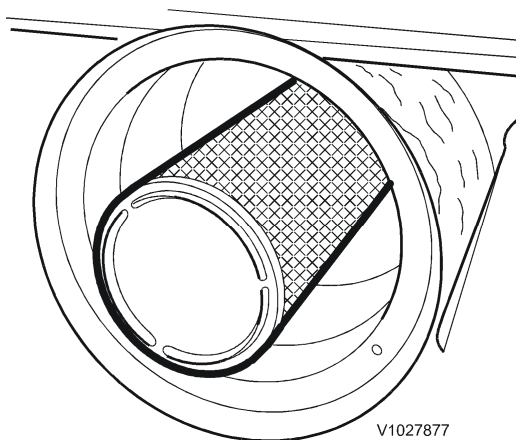


Figure 27
Secondary filter

35. Primary filter

When the alarm text "Clogged air filter" is shown, or every 1000 hours, the filter shall be changed or cleaned.
Operating time between filter changes can vary depending on the machine's operating environment. Certain environments may require frequent filter changes.

The filter can be cleaned after instruction from an authorized brand name workshop. After five cleanings, or if the filter is damaged, it shall be changed.

NOTE!

Record the number of main filter changes or cleanings on the decal near the secondary filter's end-plate.

In connection with filter change, also clean the cover for the air cleaner since it acts as a reservoir for particles that are not trapped in the filter.

Check that all hose and pipe connections from the air cleaner to the engine inlet manifold are tight. Check-tighten hose clamps.

If the alarm text remains after the filter change, change the secondary filter as well.

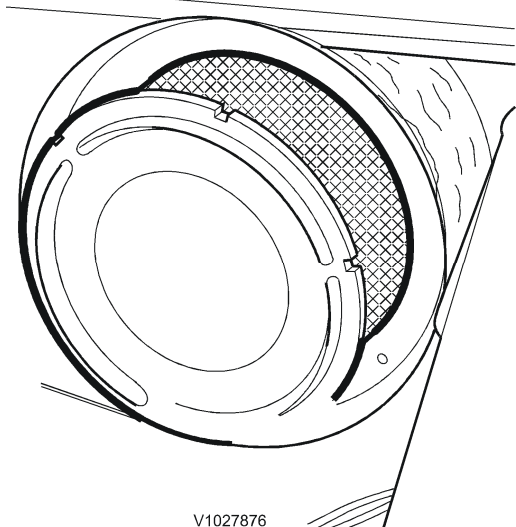


Figure 28
Primary filter

Cab, ventilation unit

36. Cab (ventilation filter), change

The cab's filters consist of pre-filter and a primary filter. The filters should be checked once a week.

NOTE!

The change interval may be longer or shorter, depending on how dusty the environment is

NOTE!

Use breathing protection when changing filters

1. Open the side cover
2. Loosen the clasps for the pre-filter and remove it
3. Install the new filter carefully
4. Close the side cover

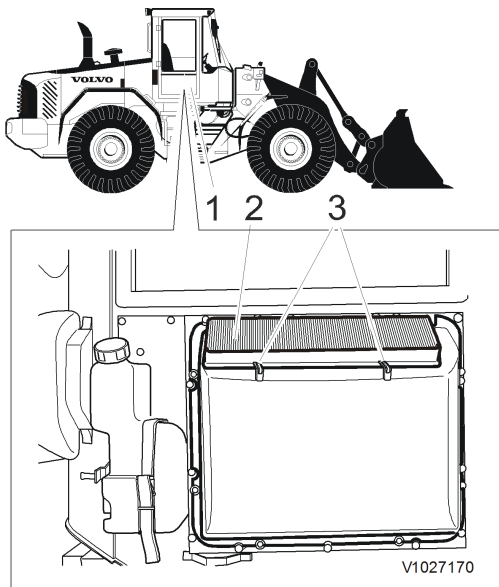


Figure 29

Pre-filter, principle illustration

1. Side cover
2. Pre-filter
3. Clasps for pre-filter

37. Main filter, changing

NOTE!

Use breathing protection when changing filters

1. Open the side cover
2. Remove the pre-filter
3. Remove the nuts that hold the plastic casing for the primary filter

NOTE!

Keep track of the sheet metal strip that is located at the top of the plastic casing

4. Remove the primary filter

5. Carefully install a new primary filter
6. Reinstall the plastic casing with the sheet metal strip at the top
7. Install the pre-filter and close the side cover

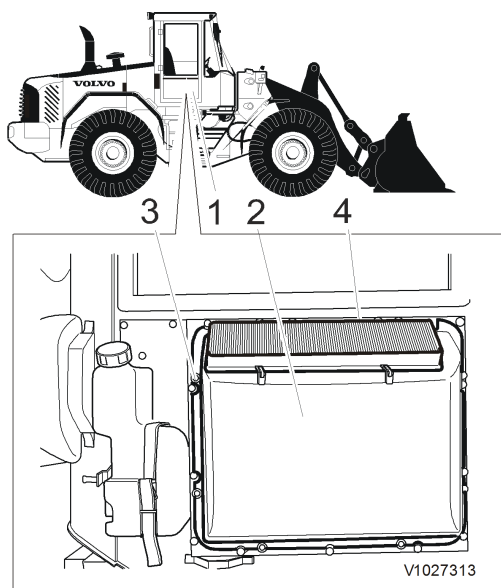


Figure 30
Primary filter, principle illustration

1. Side cover
2. Primary filter. Inside plastic casing
3. Nuts, 8 pcs.
4. Pre-filter

Breather filter, changes

38. Transmission

The filter cannot be cleaned; it must be replaced.

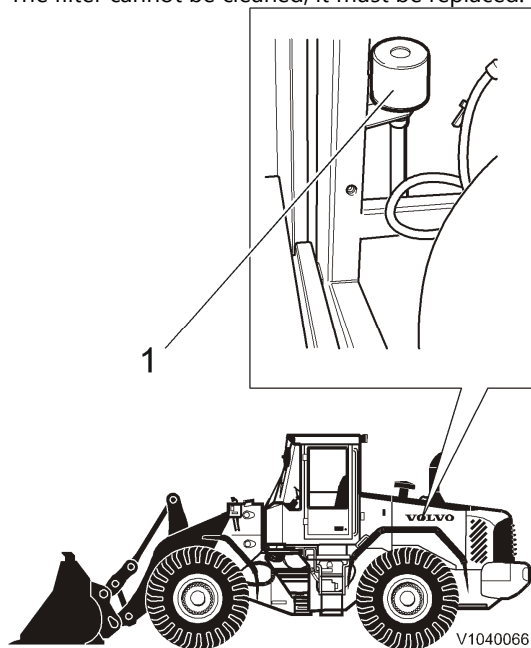
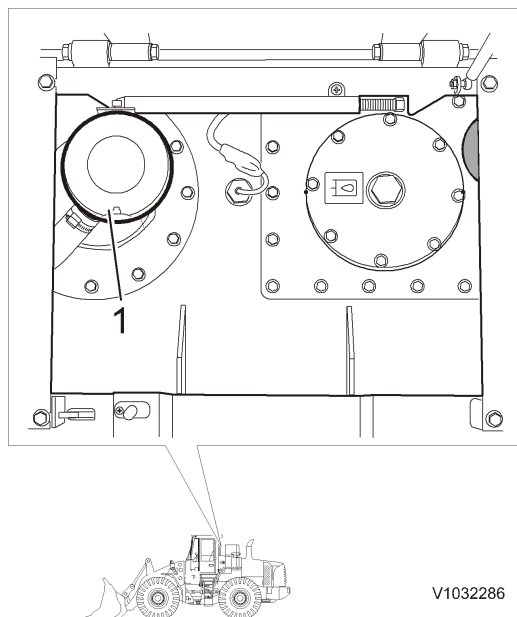


Figure 31
Breather filter, transmission

1. Breather filter

39. Hydraulic system

The filter cannot be cleaned; it must be replaced.



V1032286

Figure 32
Breather filter, hydraulic system

1. Breather filter

40. Front axle

The filter cannot be cleaned; it must be replaced.

Start the engine and raise the boom. Use support 9993831 to secure the boom.

The front axle's breather filter is located to the right inside the front cover under the boom.

The filter cannot be cleaned; it must be replaced.

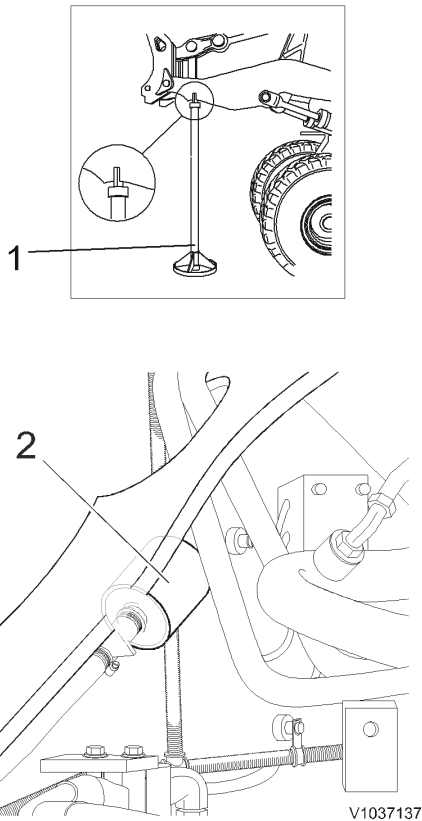


Figure 33
Breather filter, front axle

1. 9993831
2. Breather filter

41. Rear axle

The filter cannot be cleaned; it must be replaced.

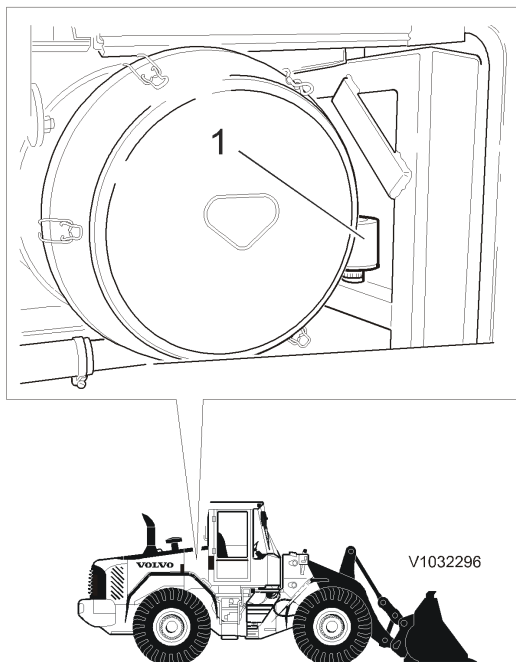


Figure 34
Breather filter, rear axle

1. Breather filter

42. Fuel tank

The filter cannot be cleaned; it must be replaced.

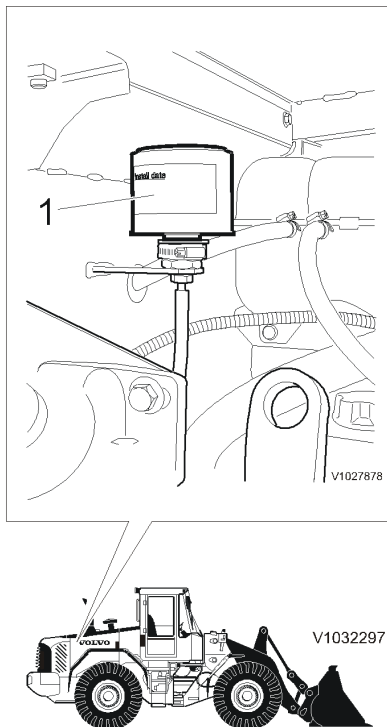


Figure 35
Breather filter, fuel tank

1. Breather filter

Framework, grease

43. Boom

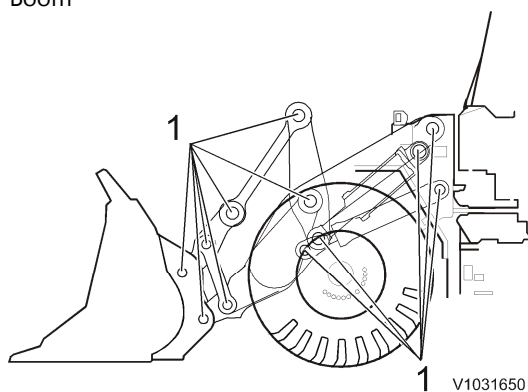
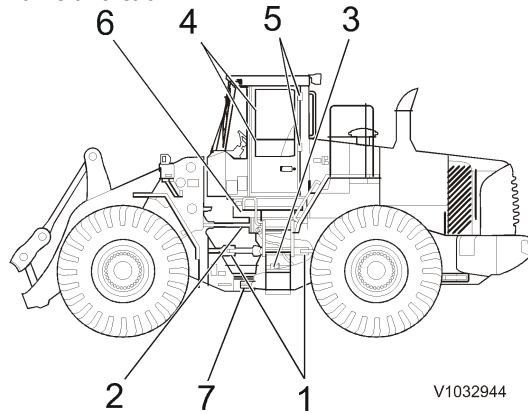


Figure 36
Boom

1. Grease nipples.

44. Frame and cab



V1032944

Figure 37
Grease points

1. Steering cylinders' pivot points
2. Frame joint's upper bearing
3. Propeller shafts and support bearings
4. Side window's hinges (right side)
5. Cab's door
6. Rear axle bearing
7. Frame joint's lower bearing

Condenser, check

45. Clean as needed

NOTE!

High-pressure washer may not be used

Cleaning

1. Open the radiator casing
2. Blow clean with compressed air
3. Close the radiator casing

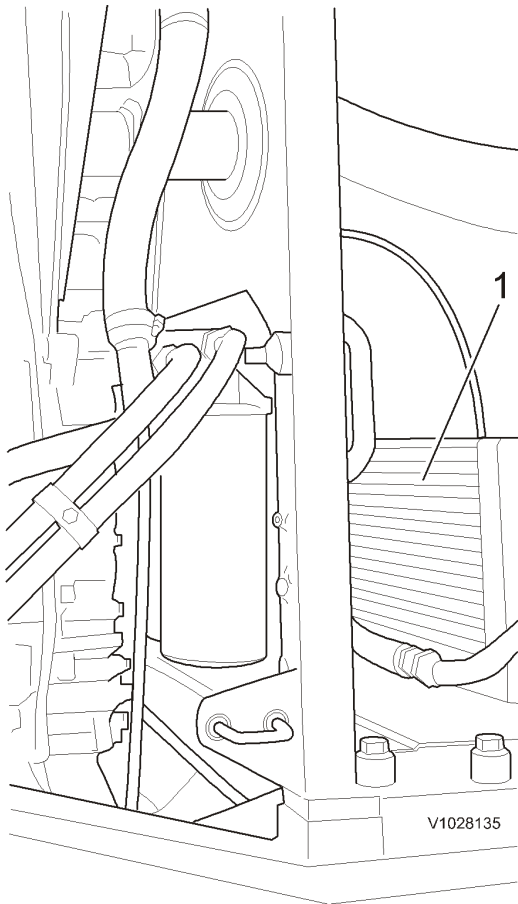


Figure 38

1. Condenser



Beware of rotating parts. Keep a safe distance.

Radiator, engine, check

46. Clean as needed

NOTE!

The radiator should be cleaned at regular intervals to ensure cooling of the engine. If the machine's operating site is dusty, the radiator should be checked daily.

1. Unlock and raise the radiator casing
2. Swing out the fan completely to open position
3. Blow clean the radiator with compressed air from the inside

NOTE!

The radiator's fins may be damaged if handled carelessly

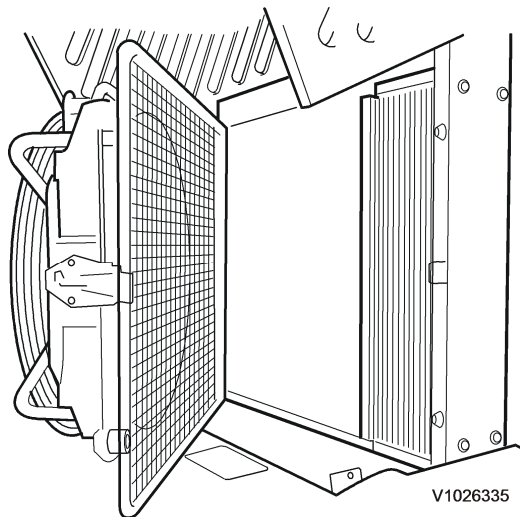


Figure 39
Radiator (principle illustration)

Greasing bearings

Service life of bushings and pins can be extended if the machine is greased regularly and in the right way. Before greasing. Wipe off the grease nipples and grease gun so that sand and dirt particles are not introduced when greasing.

Greasing of bearings has two main purposes:

- Add grease to the bearing to reduce friction between pin and bushing.
- Replace old grease that may be dirty.

The grease space under the outer seal collects and prevents dirt particles and fluid from penetrating into the bearing. Grease the bearing until new grease comes out through the outer seal.

Recommended grease: Lithium-based grease with EP-additive and consistency NLGI-grease class 2

If the machine is equipped with central lubrication system, see: [993 Central lubrication system, description](#)



Construction Equipment

Service Information

Document Title: Maintenance service, every 4000 hours	Function Group: 173	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Maintenance service, every 4000 hours

The 4000 hr service interval includes daily, 50 hr, 250 hr, 500 hr, 1000 hr as well as the 2000 hr service intervals

The service points where "optional equipment" is stated are not included in the accounted time for the interval

Op nbr 173-018

[11666051 Pressure gauge](#)

[11666020 Pressure gauge](#)

[11666037 Hose](#)

[14290266 Hose](#)

[9993721 Service display](#)

[9993831 Support](#)

[11666167 Disassembly tool](#)

Equipment for Matris read-out

Air pressure gauge

Torque wrench

600 Nm (443 lbf ft)

Extension

approx. 250 mm (10 in)

Sleeve

32 mm

Collection container

Grease gun

Required materials

Engine oil

40 litres (10.6 US gal)

Engine oil filter: full-flow filter

2

Engine oil filter: part-flow filter

one

Axle oil

101 litres (26.7 US gal)

Transmission oil

50 litres (13.2 US gal)

Transmission oil filter

one

O-ring for the transmission's suction strainer

one

If hydraulic oil is used, change shall take place every 4000 hours. 156 litres (41.2 US gal)

If engine oil or bio-oil is used for the hydraulic system, change shall take place every 2000 hours

Return oil filter, hydraulic system

Ventilation filter, cab

one

Breather filter, transmission

one

Breather filter, front axle

one

Breather filter, rear axle

one

Breather filter, fuel tank

one

Breather filter, hydraulic system

one

Cab, main filter

one

Cab, pre-filter

one

Coolant filter	one
Fuel filter: Secondary filter	one
Fuel filter: Primary filter	one
Air cleaner: Safety filter	one
Air cleaner: Main filter	one
Glycol	25 litres (6.6 US gal)

Test-run and check

1.

Start and stop function.

Instruments, lighting, direction indicators, reflectors, flashing hazard lights, wipers, washers, horn, and back-up alarm (if installed).

Steering system.

Gear positions / automatic shifting.

Differential lock.

Brake system.

Control light for low brake pressure.

Parking brake

Climate control system, fan and controls including air conditioning.

Loader unit's functions including automatic tilt (bucket positioner) and automatic lift (boom kick-out).

Optional equipment

Warning decals and plates. Check that they are legible and not damaged.

Matris read-off

2. Matris read-off is performed to follow up the machine's history.

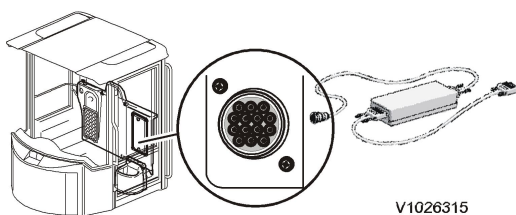


Figure 1
Matris read-off, connection point

Steering pressure, check

3.

1. Secure the frame joint with the steering joint lock and place blocks in front of and behind the wheels.
2. Connect the pressure gauge 11666020 and the hose 11666037 to the pressure check connection on the steering valve.
3. Start the engine and let it run at low idle. Make sure that the system has normal operating temperature.
4. Steer against the steering joint lock's end-position and check the steering pressure.

Steering pressure, see: [030 Pump 2 \(P2\) Steering and other hydraulics specifications](#)

NOTE!

In neutral position the pressure gauge normally shows approx. 2.5 MPa (363 psi), which is the priority valve's opening pressure in the central block.

5. Stop the engine.

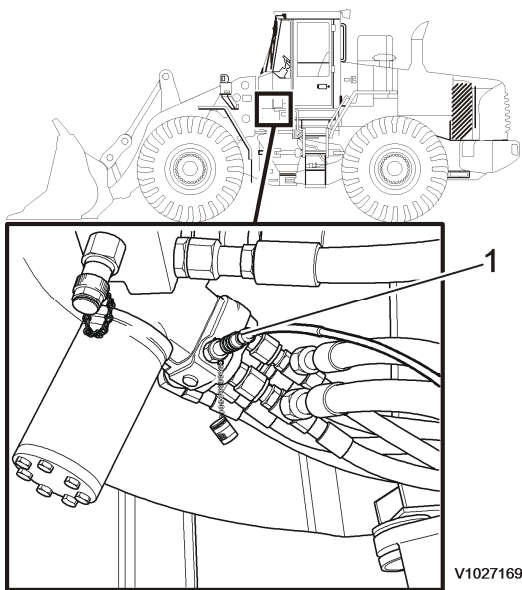


Figure 2
Steering pressure, checking

1. Pressure gauge 11666020 + hose 11666037

Brakes, checking

4. Brakes, pressure and function check

See: [520 Brake system, check and adjusting pressure in circuit](#)

5. Brake accumulators, checking precharge pressure

Service programme:

See: [520 Brake system, checking hydraulic function](#)

6. Brake discs, checking wear

See: [510 Brake discs, checking wear](#)

Hydraulic oil, draining

7. **If the hydraulic tank is filled with engine oil or bio-oil, the oil shall be changed at 2000 hours. Machines that are filled with hydraulic oil, change at 4000 hours.**

NOTE!

When changing hydraulic oil, use the hose that is used for draining engine oil. The hose is located in the battery box. Temporarily replace the rubber hose with a 3/4" hose. Length = 3.5 metres.

Hydraulic oil volume, see: [030 Hydraulic system, volume](#)

1. Run the machine until the oil in the hydraulic system is at normal working temperature.
2. Park the machine on level ground with the attachment lowered to the ground.
3. Switch off the engine and depressurise the brake system by depressing the brake pedal repeatedly.
4. Spin off the protective cap for draining.
5. Place the end of the hose in a suitable collection container and screw the hose to the drain point.
6. Repeat the same draining on the opposite side.

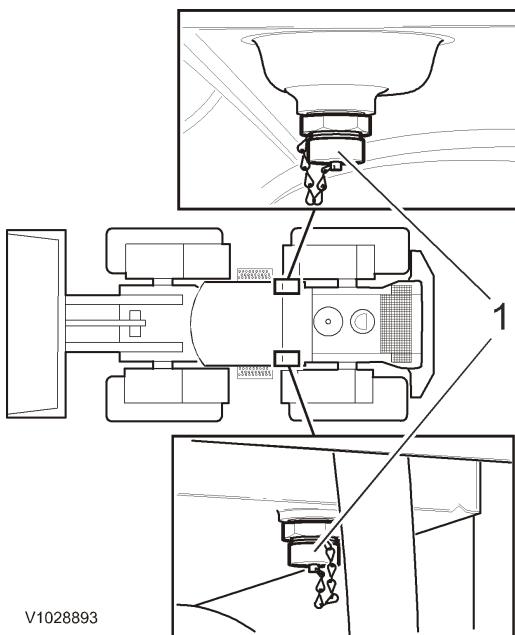


Figure 3
Hydraulic oil, draining

Tires as well as inflation pressure in tires, check

8. **See:** [191 Some simple rules regarding tyre handling](#)

For pressure in tires, see operator's manual.

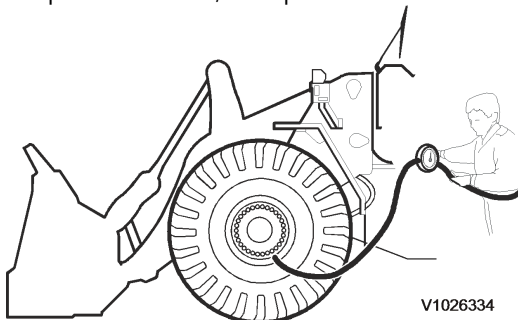


Figure 4
Inflation pressure in tires, check

Wheel nuts and tightening torques, check

9. Tightening torques, see: [030 Wheels, tightening torques](#)

Oil-bath air cleaner (optional equipment)

10. Clean the insert and change the oil

Volume: **9.1 litres (2.4 US gal)**

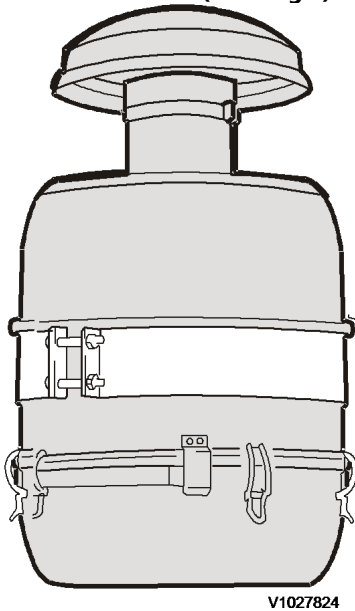


Figure 5
Oil-bath air cleaner



Work carefully when changing oil as hot oil can cause severe burns to unprotected skin.

Axles and hub, change oil

11. Front axle

If the machine is equipped with axle oil cooling, then change the axle oil every 4000 hours.

NOTE!

Handle the waste oil in an environmentally safe way.

Oil volume, see: [030 Front axle, capacity](#)

NOTE!

When filling, operate the machine for a few minutes and check the level again. Topping up may be needed.

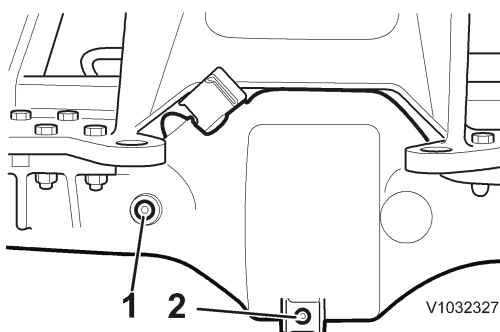


Figure 6
Front axle

1. Level check and filling
2. Draining

12. Rear axle

If the machine is equipped with axle oil cooling, then change the axle oil every 4000 hours.

NOTE!

Handle the waste oil in an environmentally safe way.

Oil volume, see: [030 Rear axle, capacity](#)

NOTE!

When filling, operate the machine for a few minutes and check the level again. Topping up may be needed.

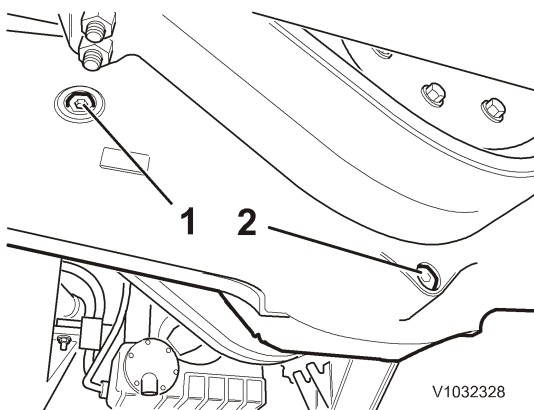


Figure 7
Rear axle

1. Level check and filling
2. Draining

13. Hub

NOTE!

Handle the waste oil in an environmentally safe way.

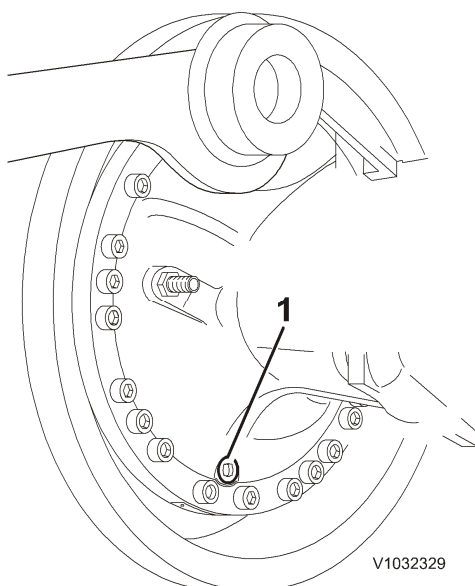


Figure 8
Hub

1. Draining

Axles, oil cooling (optional equipment), filter, change

14. Front axle

Start the engine and raise the boom. Use support 9993831 to secure the boom.

The filter cannot be cleaned; it must be replaced.

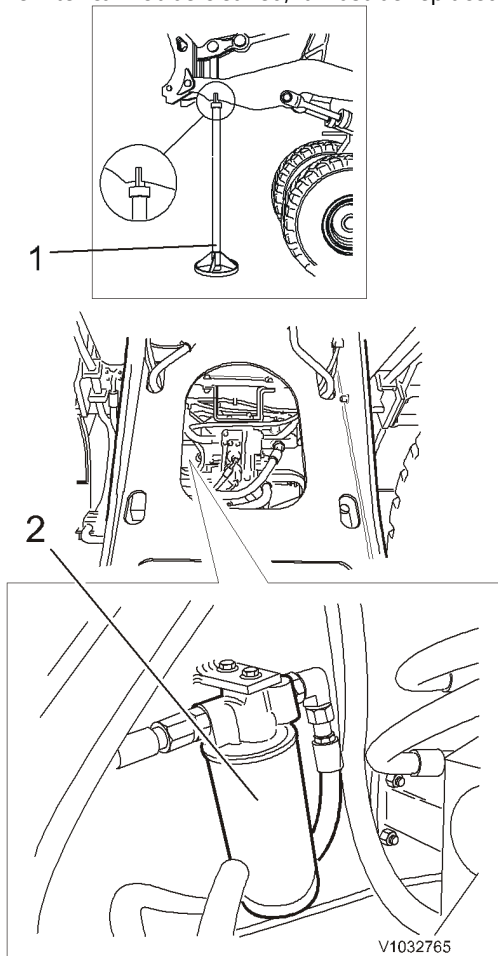


Figure 9
Axle oil cooling, front axle

1. 9993831
2. Filters

15. Rear axle

The filter cannot be cleaned; it must be replaced.

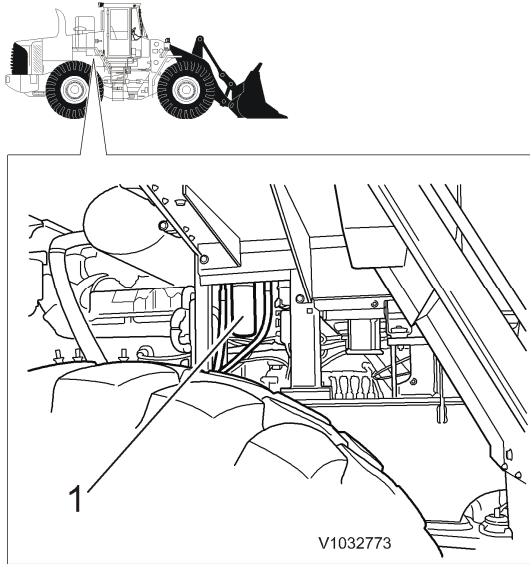


Figure 10
Axle oil cooling, rear axle

1. Filters



Work carefully when changing oil as hot oil can cause severe burns to unprotected skin.

Transmission, oil and filter, changing

16. Transmission oil

The oil is drained at the drain plug when the machine is at operating temperature.
Clean the suction strainer when changing oil.

Cleaning

1. Remove the cover and clean the parts.
2. Install a new gasket between the cover and transmission.
3. Change the O-ring on the suction strainer's connecting pipe.
4. Refit the cap.
5. Fill up with oil.
6. Check that there are no leaks.

Oil volume when changing oil, see: [030 Hydraulic transmission, volume](#)

NOTE!

Handle the waste oil in an environmentally friendly way.

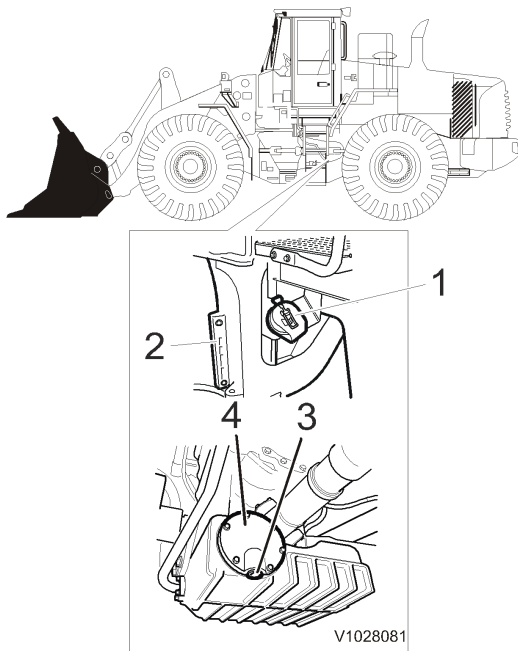


Figure 11
Transmission, principle illustration

1. Cap for filler pipe
2. Oil level check
3. Drain plug
4. Cover, suction strainer

17. Transmission oil filter

Use oil filter pliers when removing the oil filter.

Installing filter

1. Brush new oil on the rubber seal.
2. Spin on the filter until the gasket just touches the sealing surface. Tighten another 1/2 to 3/4 turn by hand.

Warm up the machine and check that the oil filter gasket seals tight. If not, remove the filter and check the sealing surface. Normally, it does not help to tighten more.

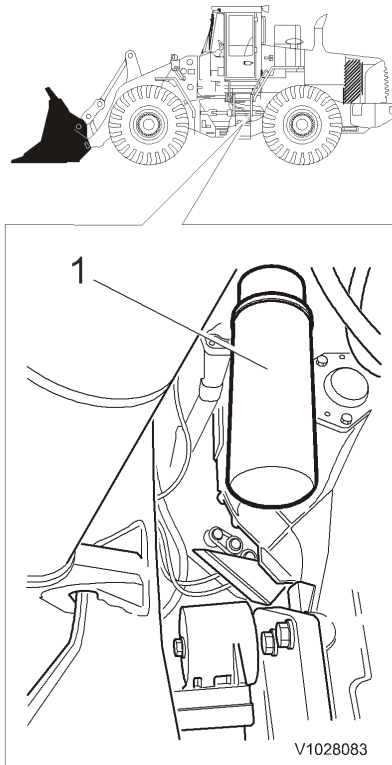


Figure 12

1. Transmission oil filter

Hydraulic system's return oil filter, change

18. Proceed as follows

1. Remove the cap.
2. Lift out and dismantle the filter insert.
3. Remove the filter and install a new filter.

NOTE!

The filter is for 'one-time' use only and must be changed.

4. Check the seal rings when installing.

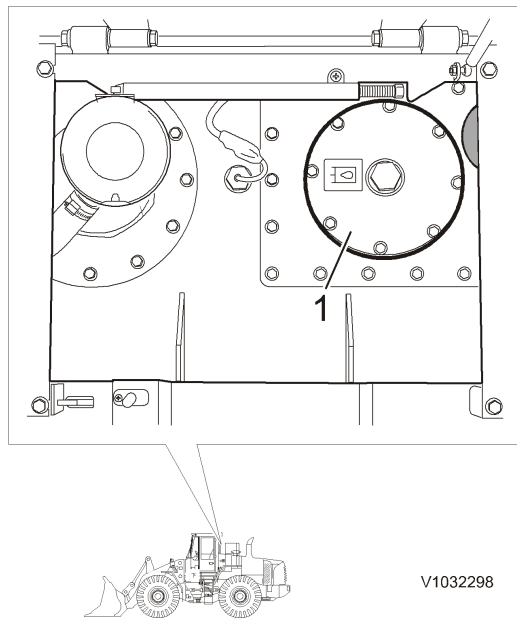


Figure 13
Hydraulic system's return oil filter, principle illustration

1. Cap, return oil filter

Hydraulic oil, filling

19. **Hydraulic oil volume, see:** [030 Hydraulic system, volume](#)

The hydraulic oil level shall be between max. and min.

Filling takes place from the top of the hydraulic tank.

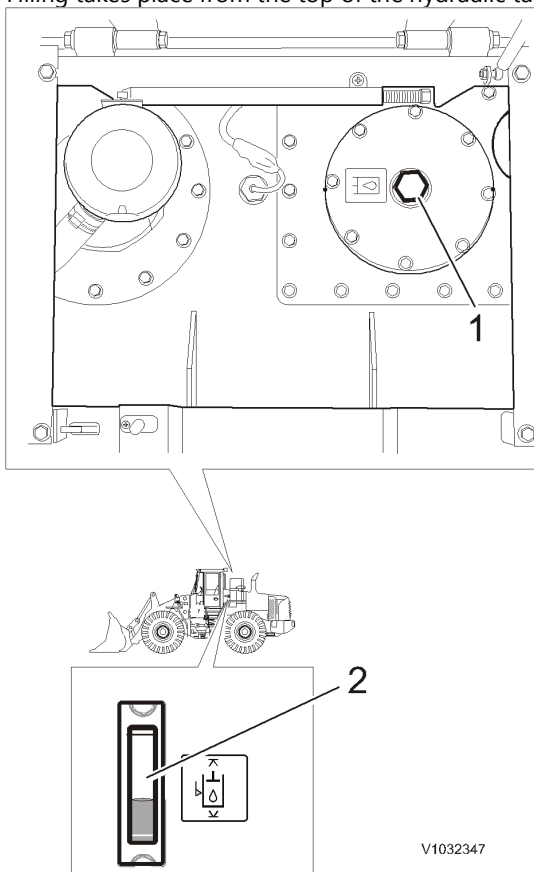


Figure 14
Hydraulic oil, checking level

1. Cap, filling up
2. Sight-glass

Coolant filter, changing

20. Coolant filter, change

The filter cannot be cleaned, it must be changed as a complete unit.
Close the valve on the filter head before removing the filter.

NOTE!

Time interval 1000 hours or max. 6 months

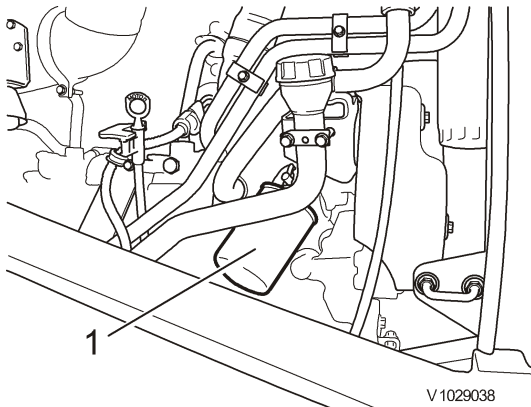


Figure 15

1. Coolant filter



Risk of burns! Use protective work gloves.

Engine oil and engine oil filter, change

21. Draining engine oil.

Drain the oil when the engine is warm.
Connect drain hose and drain the oil in a collection container.

NOTE!

Handle the oil in an environmentally safe way.

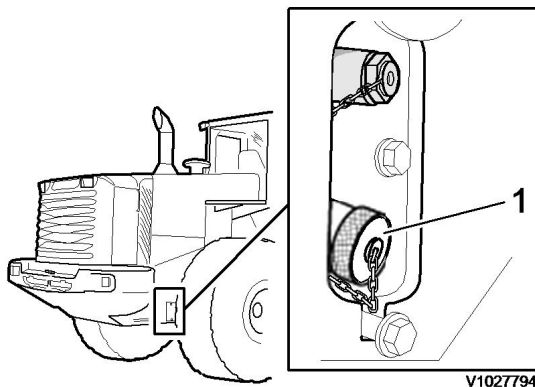


Figure 16

Draining point

1. Drain for engine oil
22. Removing oil filters
1. Open left engine cover.
 2. Use oil filter pliers when removing the oil filters.

Installing oil filters

1. Fill the filters with engine oil and brush oil on the gaskets.

NOTE!

New oil shall be used.

2. Spin on the filters until the gaskets just touch the sealing surfaces. Then tighten another full turn.

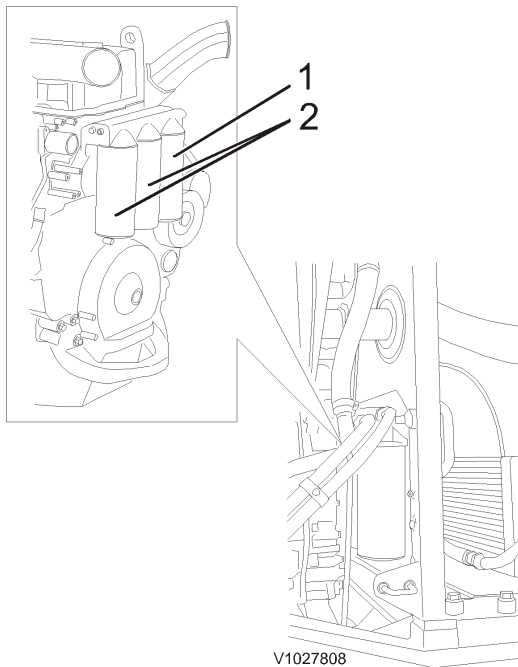


Figure 17

1. Part-flow filter
 2. Full-flow filter
23. Filling engine oil

Oil volume, see: [030 Engine. volume](#)

Fill the indicated oil volume.

Run the engine warm and check that the oil filters' gaskets seal tight. If not, remove the filter and check the sealing surface. Normally, it does not help to tighten more.

NOTE!

After replacing the oil filter, the engine must be run at low idle for at least one minute to guarantee satisfactory lubrication of the engine before the machine is put to work.

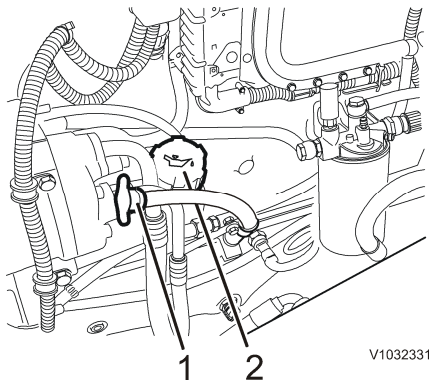


Figure 18

1. Oil dipstick
2. Filler pipe

Fuel filter, primary and secondary filter, change

24. When installing, only tighten the filter by hand.
For removing and installing bowl, use tool 11666167.

Bleed the system, see [230 Fuel system, bleeding](#)

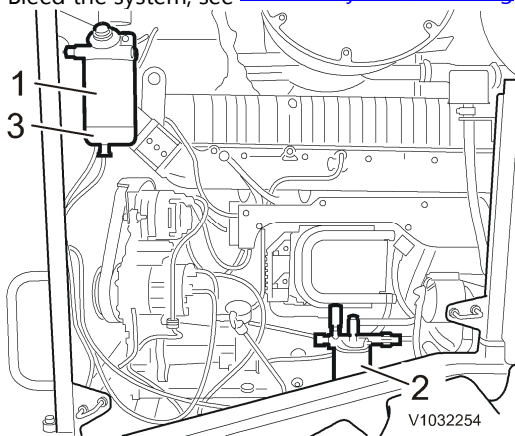


Figure 19

1. Primary fuel filter
2. Secondary fuel filters
3. Bowl

Drive belts, check

25. At the correct belt tension, it should be possible to press down the belt between the belt pulleys approx. 8 mm (0.32 in) with a force of 25-30 Nm (18-22 lbf ft).

Adjusting

1. Loosen the alternator's attaching bolt
2. Adjust to the correct belt tension. Check the belt tension and tighten the attaching bolt.

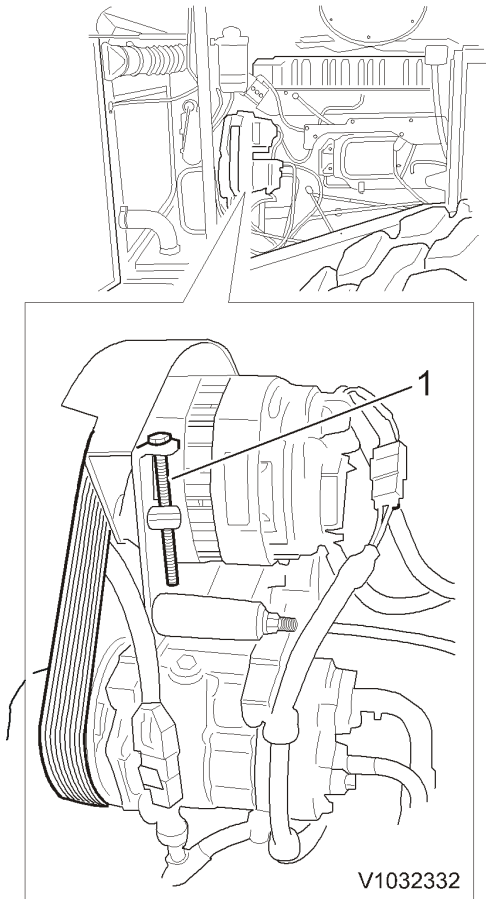


Figure 20

1. Adjusting screw

Intercooler, drain

26. Screw out the drain plug and drain any condensation water or oil.

NOTE!

Handle the fluids in an environmentally safe way

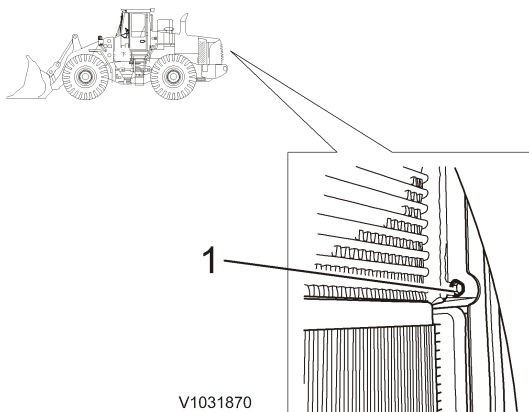


Figure 21
Intercooler

1. Drain plug



The battery electrolyte contains corrosive sulphuric acid. Electrolyte spilled on bare skin should be removed immediately. Wash the affected area with soap and plenty of water. If electrolyte gets into your eyes or any other sensitive body part, rinse immediately with plenty of water and seek immediate medical attention.

Battery, electrolyte level, cables and connections, check

27. The battery electrolyte shall be 10 mm (0.4 in) over the plates in the battery.
Top up with distilled water as needed.

Check

1. Cable terminals and terminal studs must be well cleaned and greased externally with, e.g., vaseline as corrosion protection.
2. That the batteries are securely tightened.

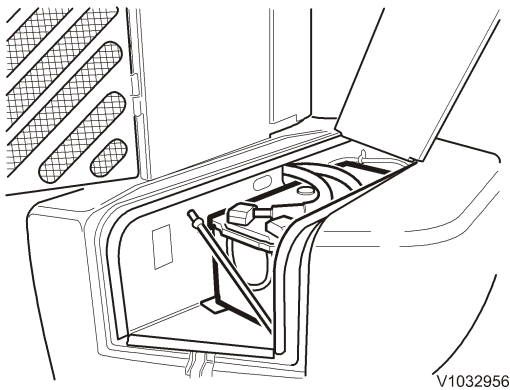


Figure 22
Battery box, left side (principle illustration)



Open the expansion tank cap slowly and carefully. The cooling system operates at high pressure and hot coolant may rush out and cause severe burns.

Cooling system, checking level and freezing point

28. Level check

Fill coolant in the expansion tank.

NOTE!

Use genuine Volvo coolant.

The coolant level shall be between max. and min.

Filling

1. The engine shall be run warm and the temperature control shall be set to "warm".
2. Let the engine cool down.
3. Fill coolant up to the max. marking on the expansion tank.
4. Run the engine warm and top up so that the cooling system is completely filled and bled free from air.

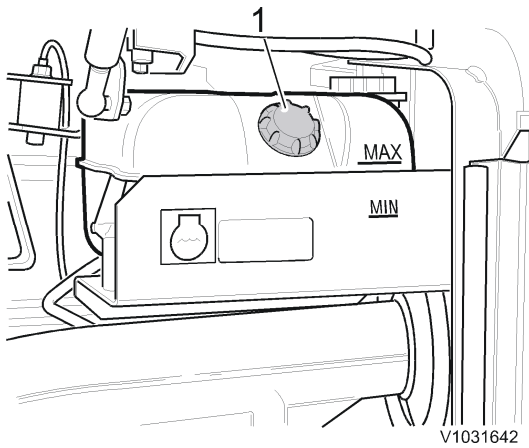


Figure 23
Coolant level

1. Cap

29. Freezing point, check

Check the freezing point with a glycol tester at the expansion tank. The glycol tester's value should show approx. -38°C (-36°F).

The machine is delivered with a coolant mixture of 50% glycol and 50% water for optimal cooling and corrosion characteristics. That is why the same coolant mixture shall be filled, regardless of ambient temperature conditions.

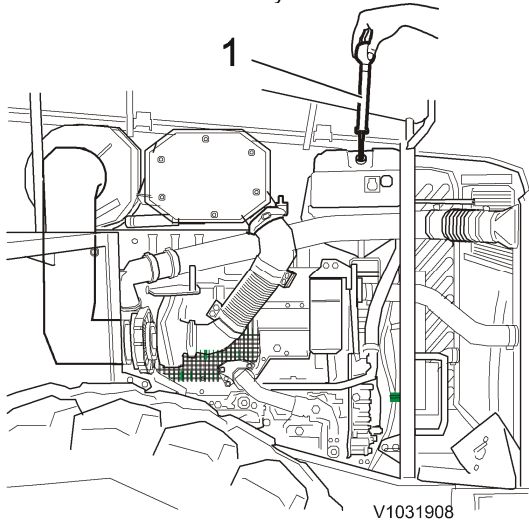


Figure 24
Coolant check

1. Glycol tester

Leakage

30. Check that all visible gaskets are intact and that they are not exposed to leakage.

Pipes and hoses

31. Check that all pipes and hoses are intact and not deformed.

Air cleaner, changing

32. Secondary filter

Change the filter every 2000 hours or when the filter head has been changed three times.

The filter cannot be cleaned; it must be replaced.

The safety filter acts as a protective filter if the primary filter is damaged.

NOTE!

Never remove the safety filter unless it is to be changed

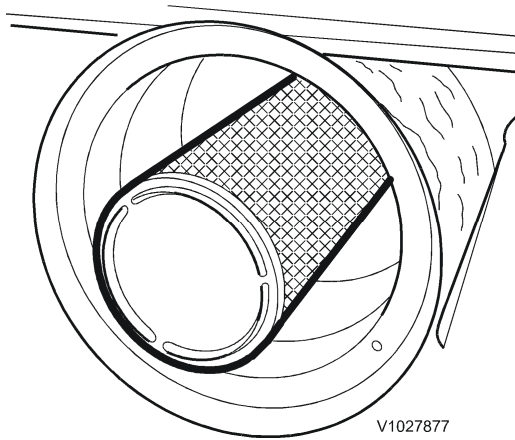


Figure 25
Secondary filter

33. Primary filter

When the alarm text "Clogged air filter" is shown, or every 1000 hours, the filter shall be changed or cleaned. Operating time between filter changes can vary depending on the machine's operating environment. Certain environments may require frequent filter changes.

The filter can be cleaned after instruction from an authorized brand name workshop. After five cleanings, or if the filter is damaged, it shall be changed.

NOTE!

Record the number of main filter changes or cleanings on the decal near the secondary filter's end-plate.

In connection with filter change, also clean the cover for the air cleaner since it acts as a reservoir for particles that are not trapped in the filter.

Check that all hose and pipe connections from the air cleaner to the engine inlet manifold are tight. Check-tighten hose clamps.

If the alarm text remains after the filter change, change the secondary filter as well.

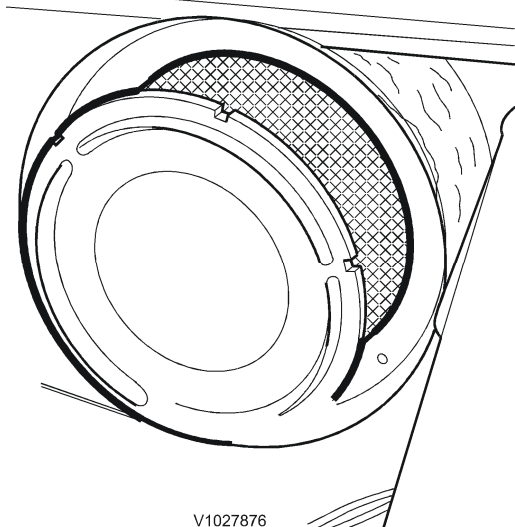


Figure 26
Primary filter

Cab, ventilation equipment

34. Cab (ventilation filter), change

The cab's filters consist of pre-filter and a primary filter. The filters should be checked once a week.

NOTE!

The change interval may be longer or shorter, depending on how dusty the environment is

NOTE!

Use breathing protection when changing filters

1. Open the side cover
2. Loosen the clasps for the pre-filter and remove it
3. Install the new filter carefully
4. Close the side cover

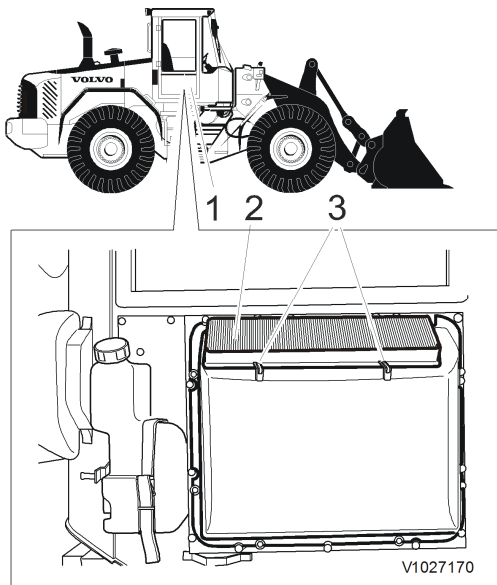


Figure 27
Pre-filter, principle illustration

1. Side cover
2. Pre-filter
3. Clasps for pre-filter

35. Main filter, changing

NOTE!

Use breathing protection when changing filters

1. Open the side cover
2. Remove the pre-filter
3. Remove the nuts that hold the plastic casing for the primary filter

NOTE!

Keep track of the sheet metal strip that is located at the top of the plastic casing

4. Remove the primary filter

5. Carefully install a new primary filter
6. Reinstall the plastic casing with the sheet metal strip at the top
7. Install the pre-filter and close the side cover

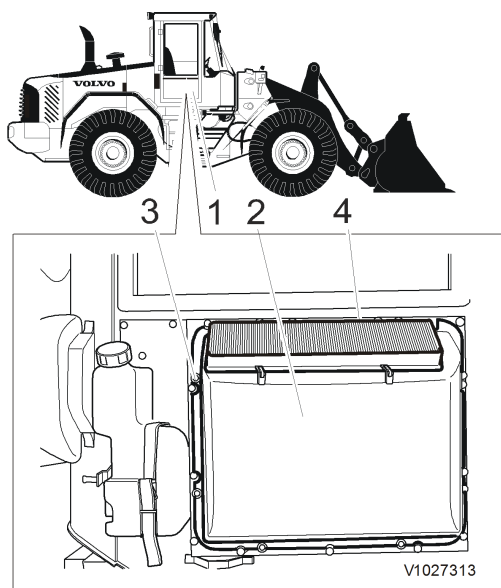


Figure 28
Primary filter, principle illustration

1. Side cover
2. Primary filter. Inside plastic casing
3. Nuts, 8 pcs.
4. Pre-filter

Valve clearance, checking and adjusting

36. See: [214 Valves, adjusting](#)

Breather filter, changes

37. Transmission

The filter cannot be cleaned; it must be replaced.

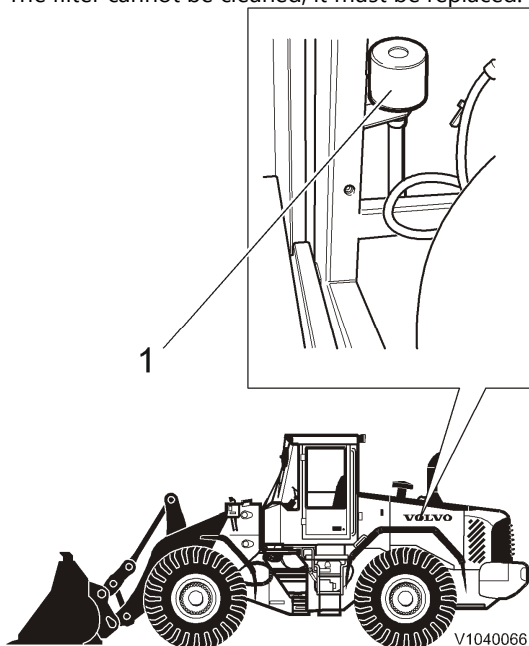
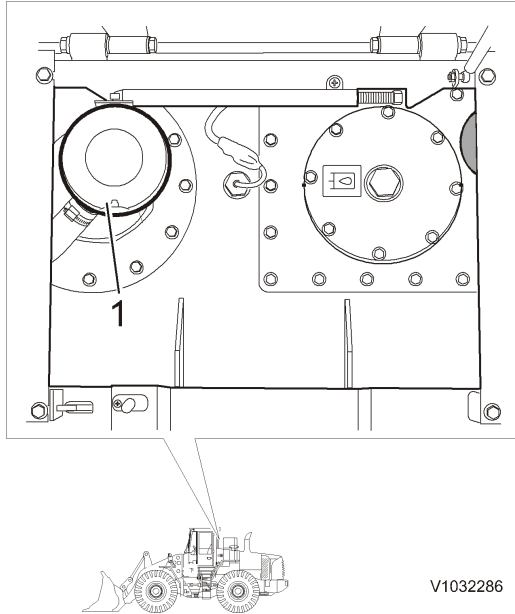


Figure 29
Breather filter, transmission

1. Breather filter

38. Hydraulic system

The filter cannot be cleaned; it must be replaced.



V1032286

Figure 30
Breather filter, hydraulic system

1. Breather filter

39. Front axle

Start the engine and raise the boom. Use support 9993831 to secure the boom.

The front axle's breather filter is located to the right inside the front cover under the boom.

The filter cannot be cleaned; it must be replaced.

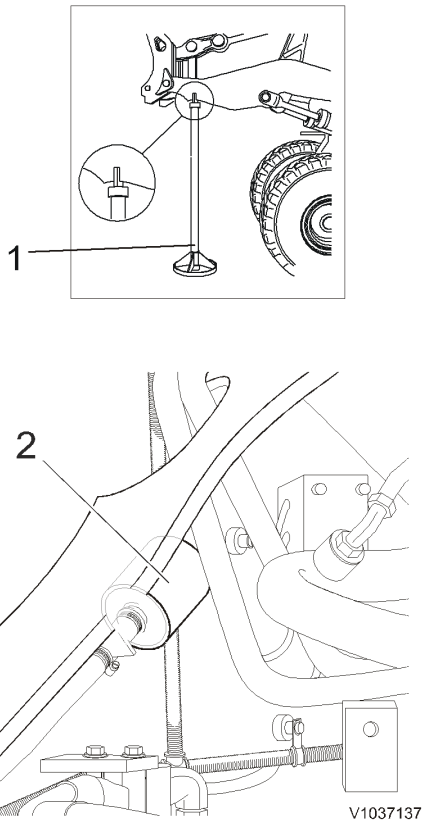


Figure 31
Breather filter, front axle

1. 9993831
2. Breather filter

40. Rear axle

The filter cannot be cleaned; it must be replaced.

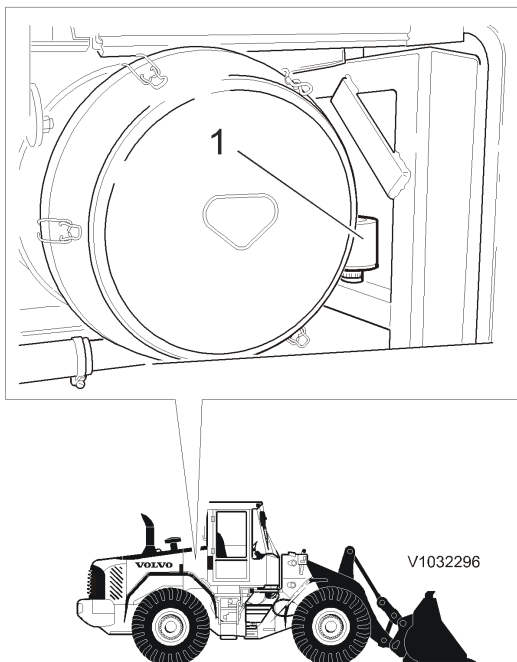


Figure 32
Breather filter, rear axle

1. Breather filter

41. Fuel tank

The filter cannot be cleaned; it must be replaced.

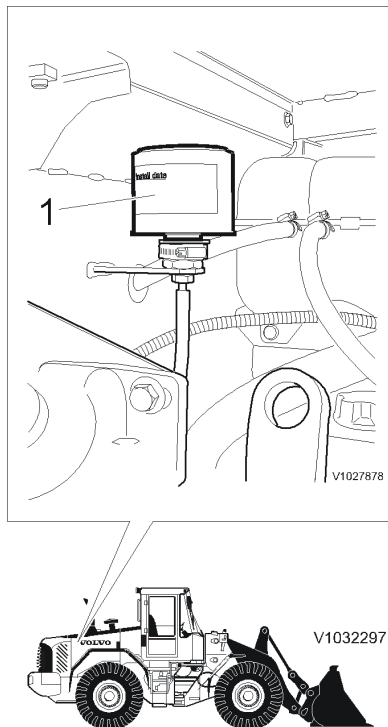


Figure 33
Breather filter, fuel tank

1. Breather filter

Framework, grease

42. Boom

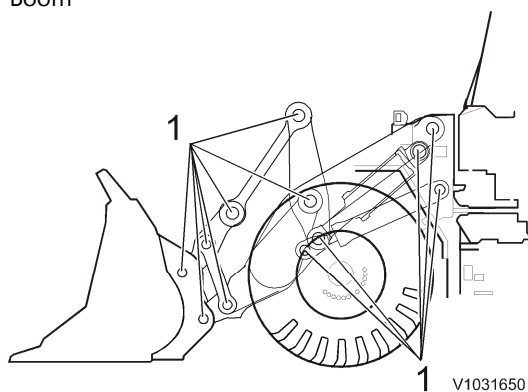


Figure 34
Boom

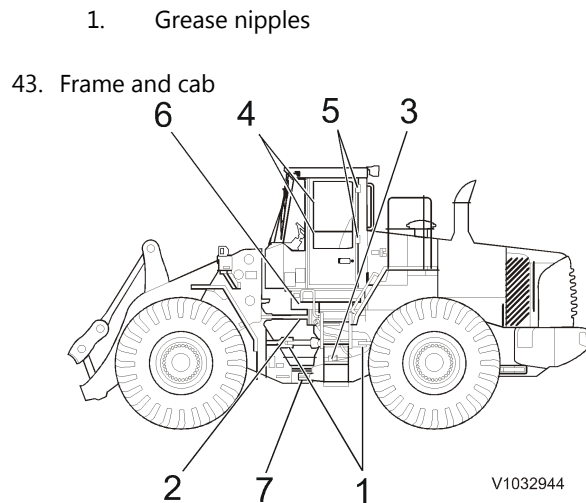


Figure 35
Grease points

1. Steering cylinders' pivot points
2. Frame joint's upper bearing
3. Propeller shafts and support bearings
4. Side window's hinges (right side)
5. Cab's door
6. Grease nipples for rear axle bearing
7. Frame joint's lower bearing

Condenser, check

44. Clean as needed

NOTE!

High-pressure washer may not be used

Cleaning

1. Open the radiator casing
2. Blow clean with compressed air
3. Close the radiator casing

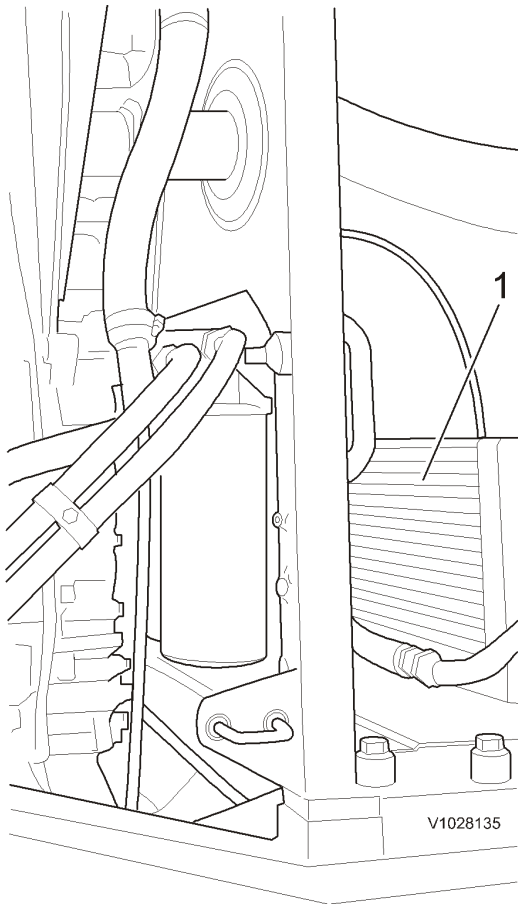


Figure 36

1. Condenser



Beware of rotating parts. Keep a safe distance.

Radiator, engine, check

45. Clean as needed

NOTE!

The radiator should be cleaned at regular intervals to ensure cooling of the engine. If the machine's operating site is dusty, the radiator should be checked daily.

1. Unlock and raise the radiator casing
2. Swing out the fan completely to open position
3. Blow clean the radiator with compressed air from the inside

NOTE!

The radiator's fins may be damaged if handled carelessly

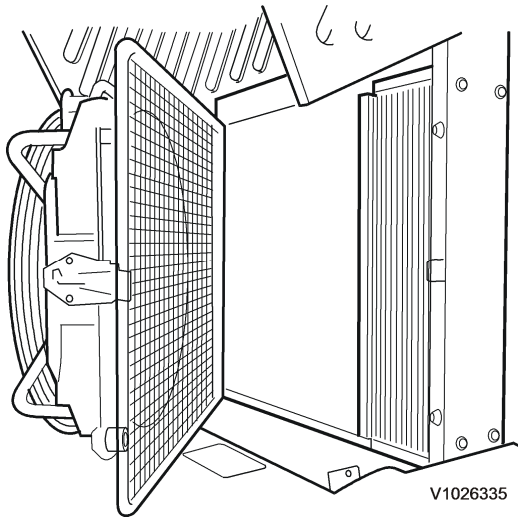


Figure 37
Radiator (principle illustration)

Greasing bearings

Service life of bushings and pins can be extended if the machine is greased regularly and in the right way. Before greasing. Wipe off the grease nipples and grease gun so that sand and dirt particles are not introduced when greasing.

Greasing of bearings has two main purposes:

- Add grease to the bearing to reduce friction between pin and bushing.
- Replace old grease that may be dirty.

The grease space under the outer seal collects and prevents dirt particles and fluid from penetrating into the bearing.

Grease the bearing until new grease comes out through the outer seal.

Recommended grease: Lithium-based grease with EP-additive and consistency NLGI-grease class 2

If the machine is equipped with central lubrication system, see: [993 Central lubrication system, description](#)

Document Title: Maintenance service, every 6000 hours	Function Group: 173	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Maintenance service, every 6000 hours

Op nbr 173-022

NOTE!

Time interval 6000 hours or max. 4 years

Coolant, changing



WARNING

Open the expansion tank cap slowly and carefully. The cooling system operates at high pressure and hot coolant may rush out and cause severe burns.

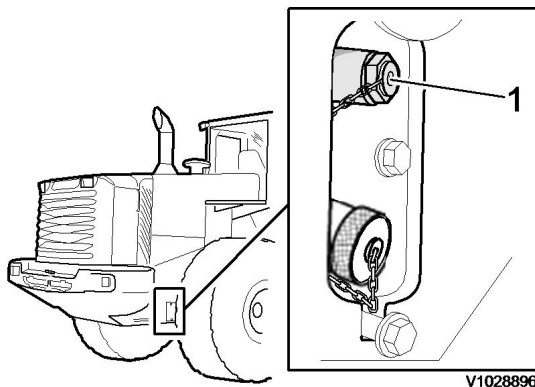
1. Draining

Coolant volume, see: [030 Cooling system volume](#)

1. Remove the cap from the expansion tank.
2. Loosen the cover inside the right rear wheel and swing it to the side.
3. Get the drain hose from the battery box. Place the end of the hose in a suitable container and connect the hose to the drain nipple.

NOTE!

Handle the coolant in an environmentally friendly way.



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Figure 1

Coolant, drain point

1. Drain point for coolant

2. Filling

NOTE!

Use genuine Volvo coolant.

NOTE!

The machine is delivered with a coolant mixture of 50% glycol and 50% water for optimal cooling and corrosion characteristics. That is why the same coolant mixture shall be filled, regardless of ambient temperature conditions.

1. Fill the cooling system to max. level in the expansion tank. Fit the cap on the expansion tank.
2. Run the engine warm and set the control to "warm".
3. Stop the engine and let it cool down.
4. Run the engine warm and top up so that the cooling system is completely filled and bled free from air.

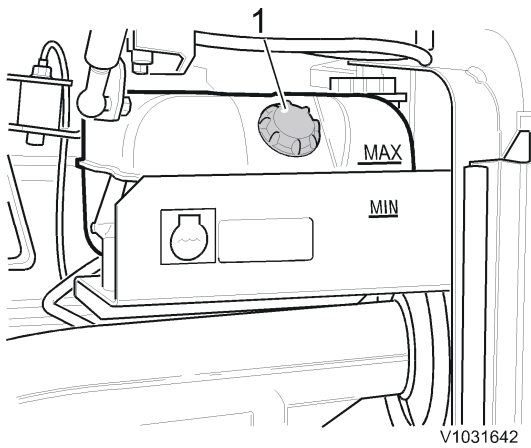


Figure 2
Coolant level

1. Cap

Document Title: Mechanical release of parking brake	Function Group: of 176	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Mechanical release of parking brake

Op nbr 176-001



WARNING

Risk of burns! Use protective work gloves.

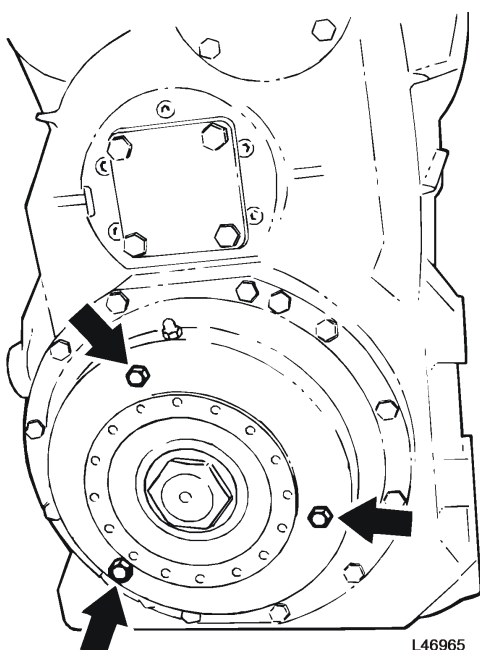


Figure 1

Plugs for releasing parking brake

If the parking brake cannot be released with the parking brake control, release it manually as follows:

- Lower the attachment to the ground or otherwise prevent the machine from rolling.
- Remove the three plugs at the front of the transmission and replace them with (M10 x 90 mm) bolts and washers. Tighten the bolt by hand.

NOTE!

Since oil will run until the bolt is completely secured, replace the plugs one at a time.

- Repeat the procedure for the other two bolts.
- Alternately tighten the bolts completely until the parking brake is released.
The machine may now be moved, but the parking brake is no longer functional. The towed machine can now only be braked by the tow bar from the towing vehicle, see "TOWING". Travel speed and towing vehicle must be adjusted when considering travelling on inclines.
- Parking brake function is restored by alternately removing the bolts and re-fitting the plugs.
- If parking brake function has not been restored after towing, indicate this by attaching a notice to the steering wheel including information regarding lack of parking brake function.

Document Title: Towing	Function Group: 176	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Towing

NOTE!

Towing of machine may not take place other than in exceptional cases, then a tow bar must be used and towing speed may be max. 10 km/h (6.2 mph).

The tow bar shall be connected to the tow hitch at the rear of the machine and must not be connected to the lifting eyes.

The speed and towing vehicle must be adapted with consideration of the grades that have to be passed.

An operator must operate the towed machine.

Towing distance should not exceed 10 km (6.2 miles). Towing for longer distances may damage the hydraulic transmission as the oil pump is not driven and lubrication is unsatisfactory.

When towing over longer distances, both the front and rear propeller shaft drive flanges must be disconnected at the axles in order to disengage the transmission.



When the diesel engine cannot be started:

After a few manoeuvres the brake and steering functions will be lost in this situation, and that is why towing should only be performed in emergencies and according to a competent/ trained person's instructions and guidance.

The following shall be performed:

- Secure the machine so that it cannot start to roll.
- Unload any load.
- Release the parking brake. Follow instructions in Manual release of parking brake.
- Take any other required actions so that the machine can be towed.
- When disconnecting the tow vehicle, ensure that the towed machine cannot start to roll.

Document Title: On another vehicle's platform	Function Group: 179	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

On another vehicle's platform

The frame joint must be locked if the machine is lifted up onto another vehicle.

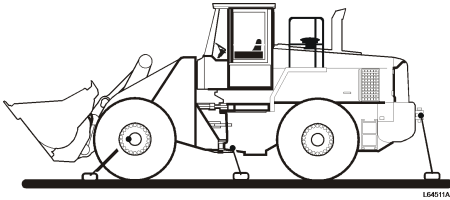


Figure 1

Transport the machine with the bucket facing the transport vehicle's direction of travel.

1. Park the machine completely straight and switch off the engine.
2. Remove the pin and lower the frame joint lock to the correct position. Insert and lock the pin.

Chock the wheels and secure the machine on the transport vehicle's platform so that it cannot tip or begin to roll. Use the following attachment points:

- Front frame attaching eyes (in front of the front axle retaining bolt).
- Rear frame attaching eyes (at frame joint) and in the towing hook.

NOTE!

To avoid air being forced into the exhaust pipe during transit, resulting in damage to the turbocharger, the exhaust pipe must be covered with a suitable protector (not plastic).

Document Title: Lift	Function Group: 179	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Lift

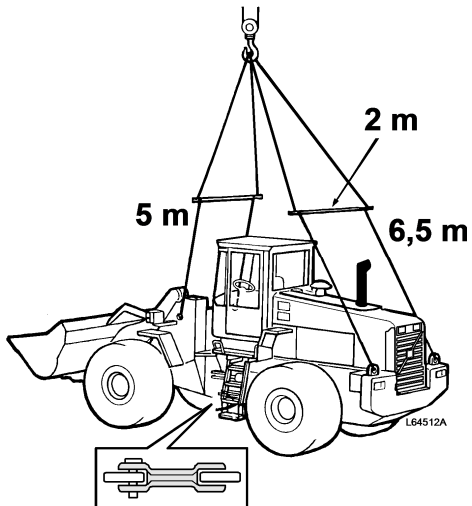


Figure 1
Lifting eyes

Only use lifting eyes intended for this purpose and lock the frame joint.



Construction Equipment

Service Information

Document Title: Over ramp	Function Group: 179	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Over ramp

First check that the ramp has the adequate width and durability required and that it cannot shift.



Construction Equipment

Service Information

Document Title: In a lift or other confined space	Function Group: 179	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

In a lift or other confined space

1. Back the machine in.
2. Apply the parking brake and switch off the engine before starting the lift.



If the machine is to be driven from a loading dock onto the platform of a truck trailer or railway car, make sure that the vehicle is securely braked, for example, wheels blocked. Make sure that there is no risk that the vehicle cannot roll over or sway in a dangerous manner when the machine is driven on.

NOTE!

In other respects, follow the national rules and regulations.

Thank you for your purchase.
Have a nice day.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [General description](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

- [General description](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Asheville, Arvika
Serial number start: 62501, 5001
Serial number stop: 69999, 7398

Document Title: General description	Function Group: 200	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

General description

The engine is a straight six-cylinder, turbocharged, four-stroke and direct-injected diesel engine with an air-cooled intercooler.

It has an overhead camshaft, four valves per cylinder and unit injectors.

The engine designation is D12DLBE3.

The engine is of low-emission version.

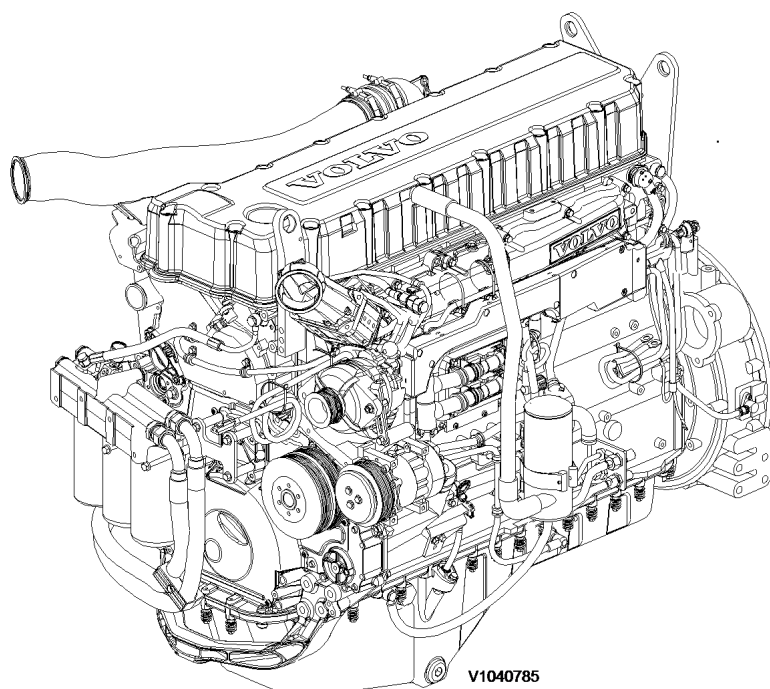


Figure 1

The cooling fan with vane motor is located in front of the radiator and is driven hydrostatically with a variable piston pump, Pump 3, (P3).

The speed of the fan is controlled by the vehicle ECU (V-ECU), which receives information about temperature in the following systems:

- Coolant temperature, radiator
- Coolant temperature, engine
- Transmission oil temperature
- Hydraulic oil temperature
- Temperature in front and rear axle (only when machine is equipped with axle oil cooler).
- Induction air temperature
- Charge-air temperature

Hydrostatically controlled cooling fan speed gives the engine high power as well as low sound level, since the cooling fan does not work at max. rpm as often.

The cooling system is based on a concept where cooling for engine, transmission, hydraulics and axle oil cooling (optional equipment) are integrated.

These systems' cooling depends on the cooling fan speed.

Engine identification

Identification plate 1

Engine designation, serial number, part number and assembly plant are stamped in one field on the engine block's left rear edge

Identification plate 2

A decal with the software's ID-number, the engine's serial number and assembly plant is located on the valve cover to ensure installation of correct ECU on the engine in production. On the back of the ECU, there is a decal indicating its hardware number.

Assembly plants:

A = Skövde, Sweden

E = Curitiba, Brazil

F = Flen, Sweden

L = Lyon, France

Identification plate 3

The certification decal is located on the valve cover as well as on the machine frame.

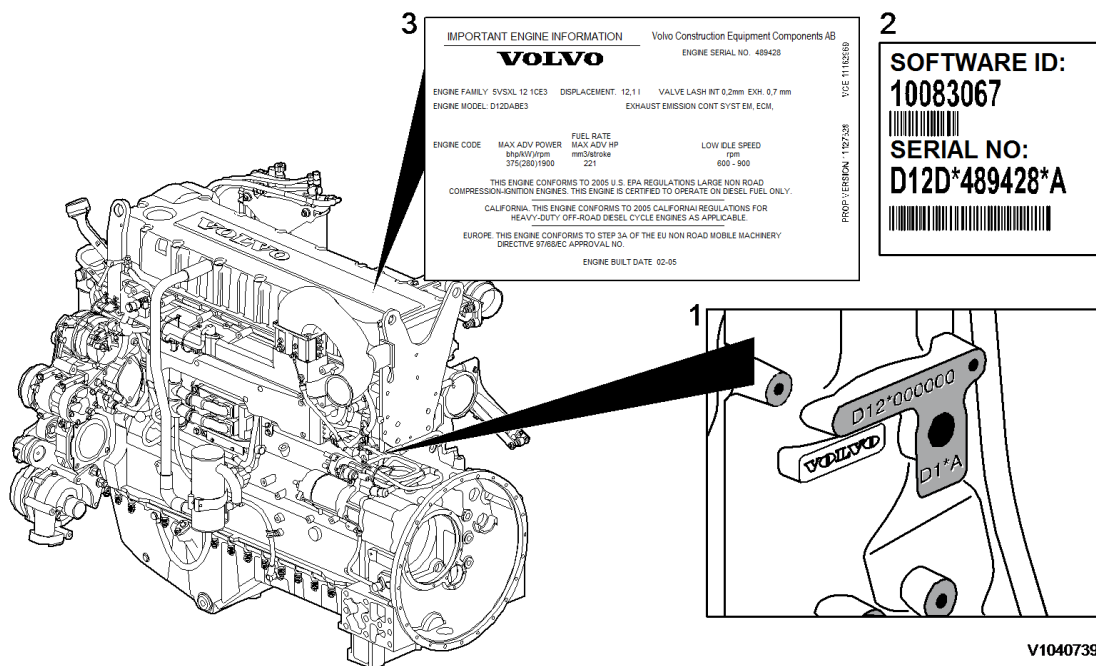


Figure 2
Engine identification, D12D

Document Title: General description	Function Group: 200	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

General description

The engine is a straight, six-cylinder, four-stroke, direct-injection, turbocharged diesel engine with an air-cooled intercooler. It is provided with an overhead camshaft, four valves per cylinder and unit injectors.

The engine type designation is D12CLBE2.

The engine is of the low-emission version.

Information about the engine and in which machine it is installed is stamped-in both on the right side of the cylinder block and on a plate next to the stamped-in information. It can also be found on a label on the engine ECU (E-ECU).

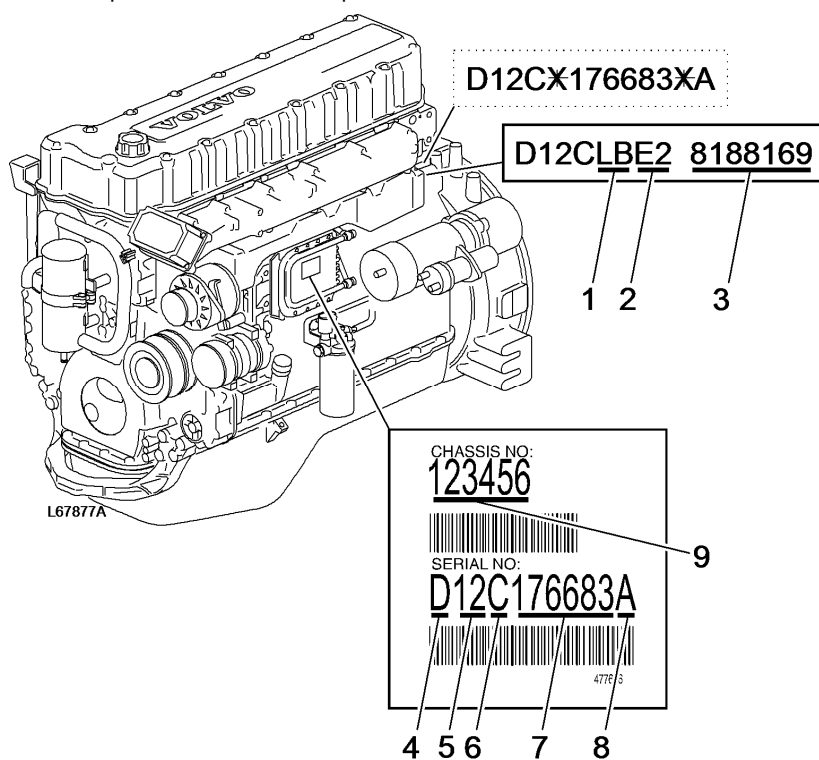


Figure 1

1. Machine connection, for example L220E
2. Euro 2, emission version
3. Product number
4. Diesel
5. Cylinder capacity
6. Generation
7. Serial number
8. Place of manufacture
9. Machine chassies number

The cooling fan with vane motor is positioned behind the radiator and is hydrostatically driven by a variable piston pump, Pump 3, (P3).

The fan speed is controlled by the vehicle ECU (V-ECU), which receives information about the temperature in the following systems:

- Coolant temperature, radiator
- Coolant temperature, engine
- Transmission oil temperature
- Hydraulic oil temperature
- Temperature in the front and rear axles (only if the machine is equipped with axle oil coolers.)
- Induction air temperature
- Charge air temperature

The hydrostatically controlled cooling fan speed results in higher engine output and a low sound level, as the cooling fan does not often work at maximum speed.

The cooling system is based on a concept where the cooling of the engine, transmission, hydraulics and axle oil cooling, (optional equipment) is integrated.

The cooling of these systems are dependent on the cooling fan speed.

More than one document matches chosen profile <https://truckmanualshub.com/>

- [Engine, removing](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7398, 69999

- [Engine, removing](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

Document Title: Engine, removing	Function Group: 210	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Engine, removing

Op nbr 21070[9998257 Lifting tool](#)[9998547 Lifting device](#)

Bolt M14 x 35 mm, 2 pcs

Lifting eye M16, 4 pcs

1. Remove the engine hood, see [821 Engine hood, removing](#)

2. **WARNING**

Risk of burns when removing the header tank cap because of excess pressure in the cooling system.

Remove the cap from the header tank.

Drain the coolant. Use the drain hose stored in the right-hand battery box or the toolbox on the machine.

Volume: **approx. 41 litres (10.8 US gal) (approx. 3 litres (2.6 US gal) will remain in the engine block)**

Drain the oil if necessary. Use the drain hose stored in the toolbox on the machine.

Volume: **approx. 48 litres (2.7 US gal).**

Remove the clamp securing the oil drain plug.

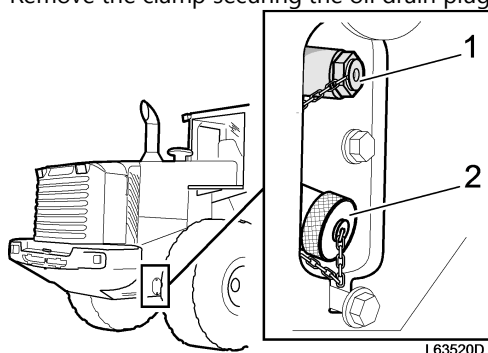


Figure 1

1. Draining the coolant
2. Draining the engine oil

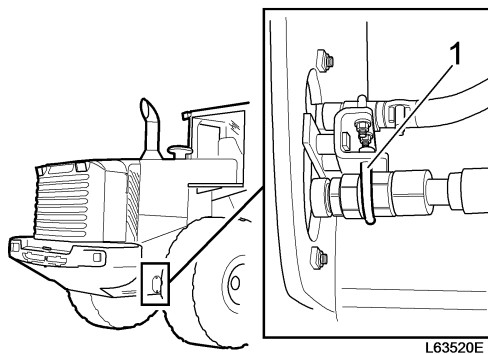


Figure 2

1. Clamp
3. Disconnect the oil pipe between the flywheel housings and the hydraulic transmissions from the flywheel housing.
 - Disconnect the hose to the cab heater from the engine block.
 - Remove the charge air pipe. Remove the header tank.
 - Remove the upper radiator hose.Disconnect the cable to the optional engine heater.

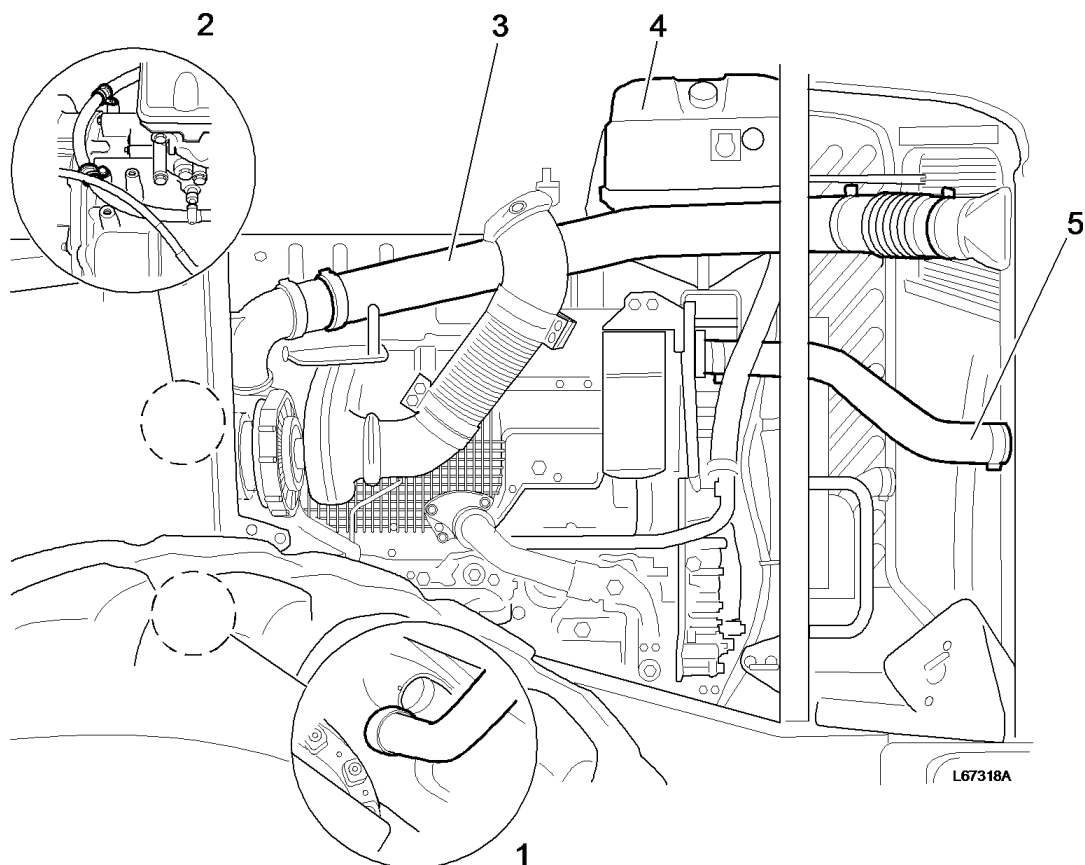


Figure 3

1. Oil pipe
2. Hose to cab heater
3. Charge air pipe
4. Header tank
5. Upper radiator hose

4. **! WARNING**

Do not disconnect or loosen connections for the air conditioning unit (AC). Risk of gas leakage.

Remove the condenser and place it on the radiator.

- Detach the receiver drier. Remove the protective plate.
 - Detach the lower radiator hose from the engine.
 - Disconnect the fuel lines from the fuel pump and fuel filter.
 - Remove the charge air pipe and the hose between the preheating coil and radiator.
 - Remove the relay and clamps along with the bracket located on the member behind the hydraulic tank.
 - Disconnect the connector from the E-ECU, the cables from the starter motor and the connector from the oil level sensor.
 - Undo the alternator at the adjustment point for the belt tensioner. Remove the belt.
 - Unplug the connectors by the A/C compressor.
- Remove the A/C compressor from the engine.

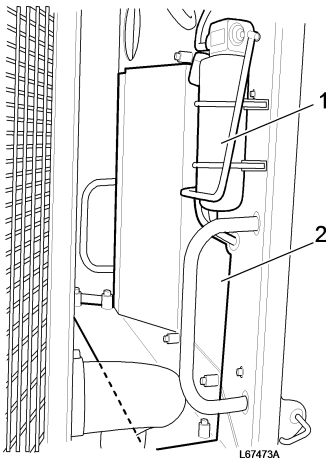


Figure 4

1. Receiver drier
2. Protective plate

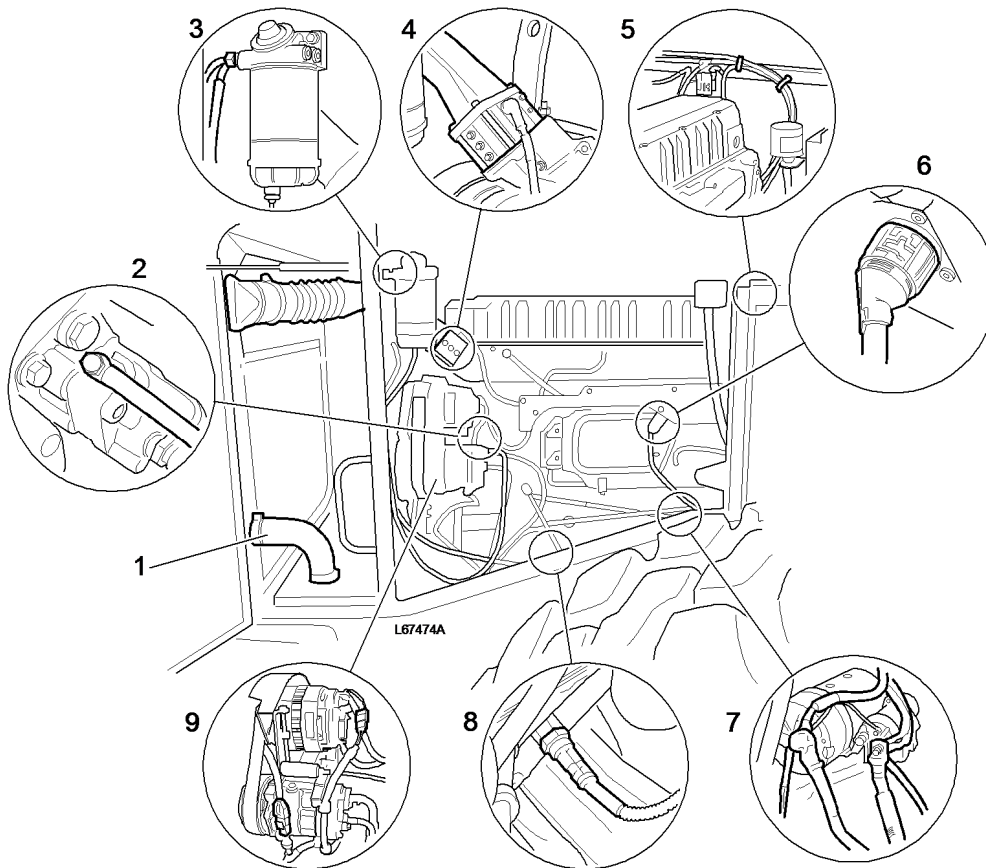


Figure 5

- | | | | |
|---|----------------------------------|---|------------------------------------|
| 1 | Lower radiator hose | 6 | Connector, E-ECU |
| 2 | Fuel line, fuel pump | 7 | Wiring, starter motor |
| 3 | Fuel connection, fuel filter | 8 | Connector, oil level sensor SE213 |
| 4 | Charge air pipe, preheating coil | 9 | Alternator, compressor, connectors |
| 5 | Relay, clamp | | |

5. Remove the side panels.

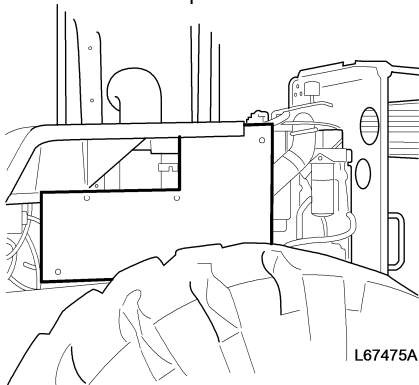


Figure 6

6. Remove the partition wall.
Partition wall, weight: **approx. 45 kg (approx. 100 lbs).**

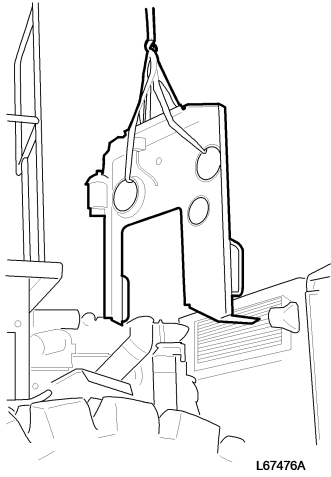


Figure 7

7. Secure the hydraulic transmission in place with a sling and a ratchet blocks as illustrated.

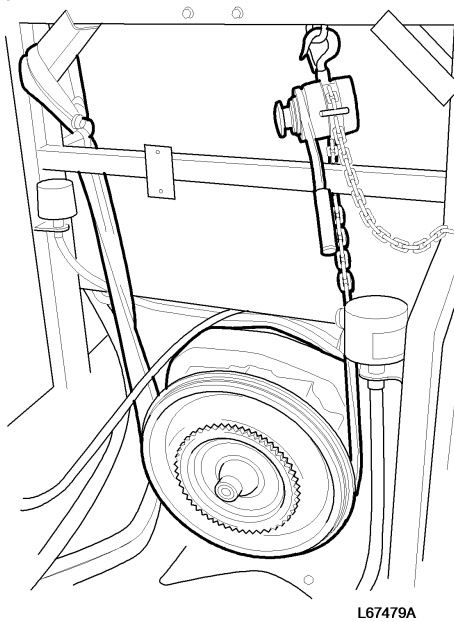


Figure 8
Hydraulic transmission secured (engine removed)

8. Fit tool 9998257 and connect 9998547 and a lifting device to the engine.

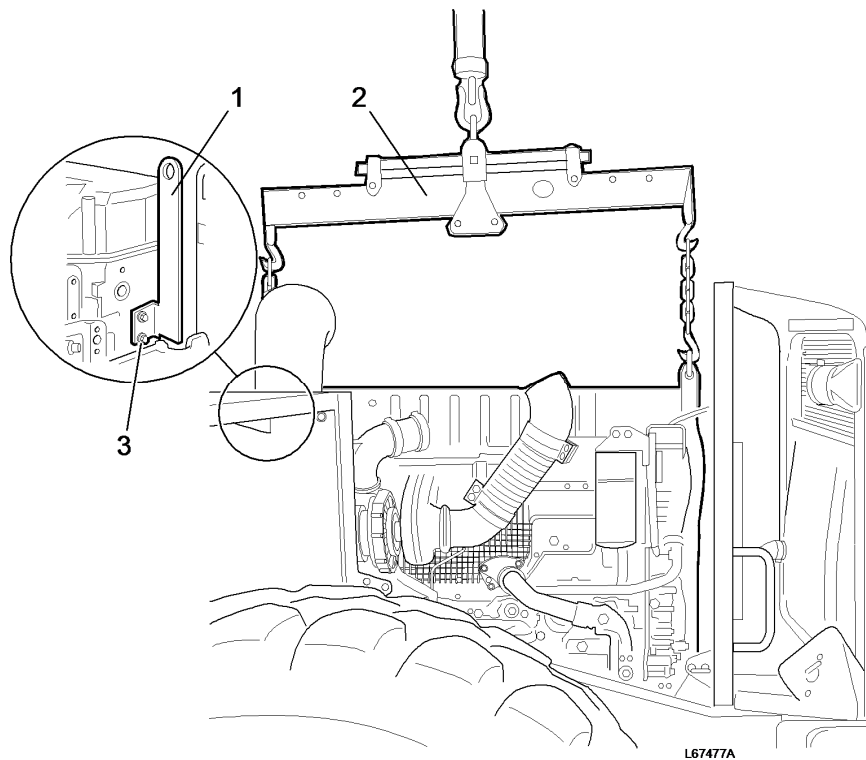


Figure 9

1. 9998257
2. 9998547
3. Bolts M14 x 35, 2 pcs

9. Remove the retaining bolts securing the hydraulic transmission.

NOTE!

To remove one of the bolts, remove the protective plate by the gear selector valve.

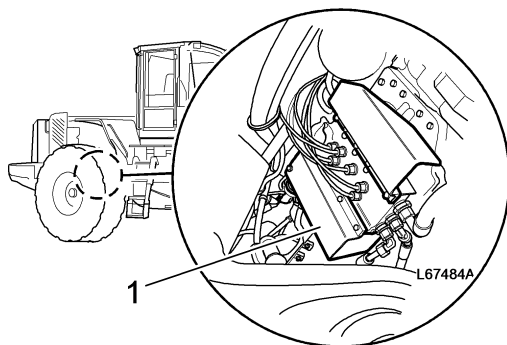
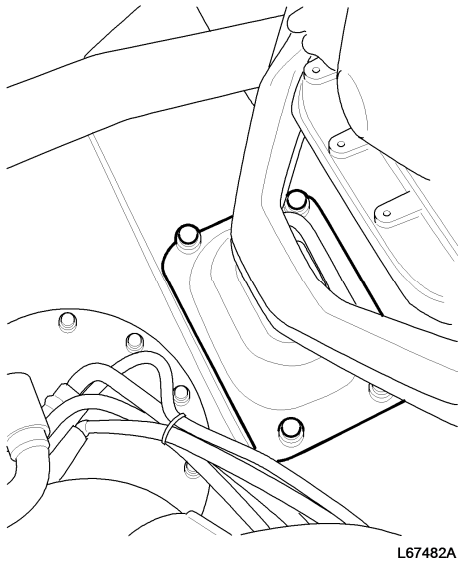


Figure 10

1. Protective plate

10. Remove the bolts securing the engine mounting.
Remove the engine.
Engine's weight, including oil: **approx. 1350 kg (approx. 3000 lbs).**



L67482A

Figure 11

11. If changing the engine, transfer the components required to the new engine.

NOTE!

Never transfer a component that could cause a malfunction.

Document Title: Engine, removing	Function Group: 210	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Engine, removing

Op nbr 210-070

[9998547 Lifting tool](#)

Sling, 3 m, 2 pcs.

Sling, 4 m, 1 pcs.

Lifting eye M12, 2 pcs.

Washer M12, 2 pcs.

Nut M12, 2 pcs.

Shackle, 6 pcs.

Ratchet block, 750 kg

The operation also includes tools and times for steps to which references are given.

1. Place the machine in service position, see [191 Safety rules when servicing](#).
2. Turn off the main electric power with the battery disconnect switch.



WARNING

Risk of burns when removing the header tank cap because of excess pressure in the cooling system.

3. Remove the cap from the expansion tank.
Drain the coolant. Use the drain hose located in the machine's toolbox.
Volume, see [260 Cooling system volume](#).

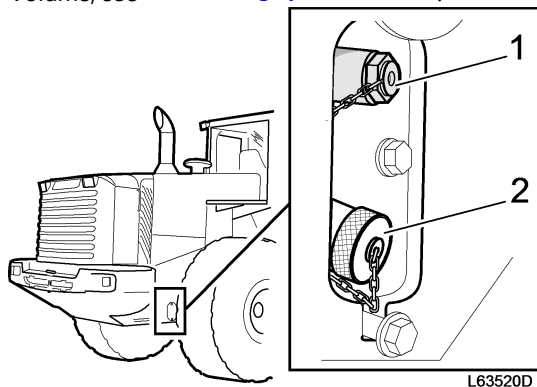


Figure 1

1. Drain point for coolant
 2. Drain for engine oil
4. Remove the engine hood, see [821 Engine hood, removing](#).
 5. Drain the engine oil. Use the drain hose located in the machine's toolbox.
Volume, see [210 Engine, volume](#).
 6. Remove the side panels by the engine and remove the clamp that holds the oil drain.

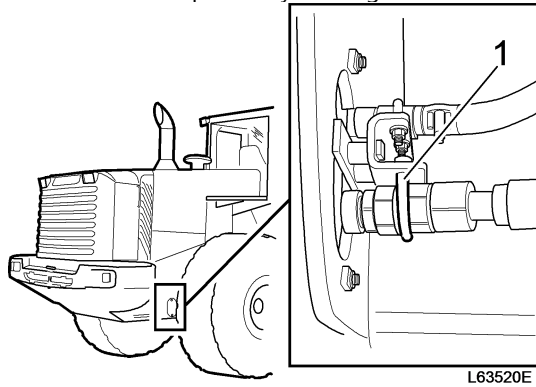


Figure 2

1. Clamp
7. Drain the transmission oil. Volume, see [030 Hydraulic transmission, volume](#)
 8. Remove the oil pipe from the flywheel housing.

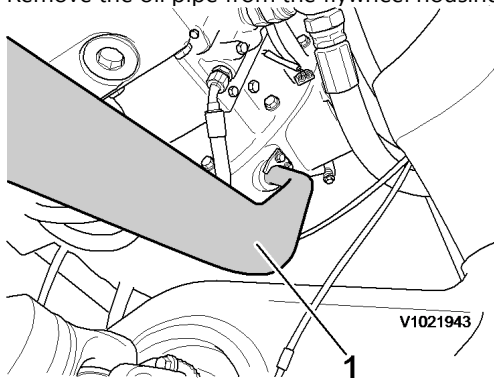


Figure 3

1. Oil pipe

Left side

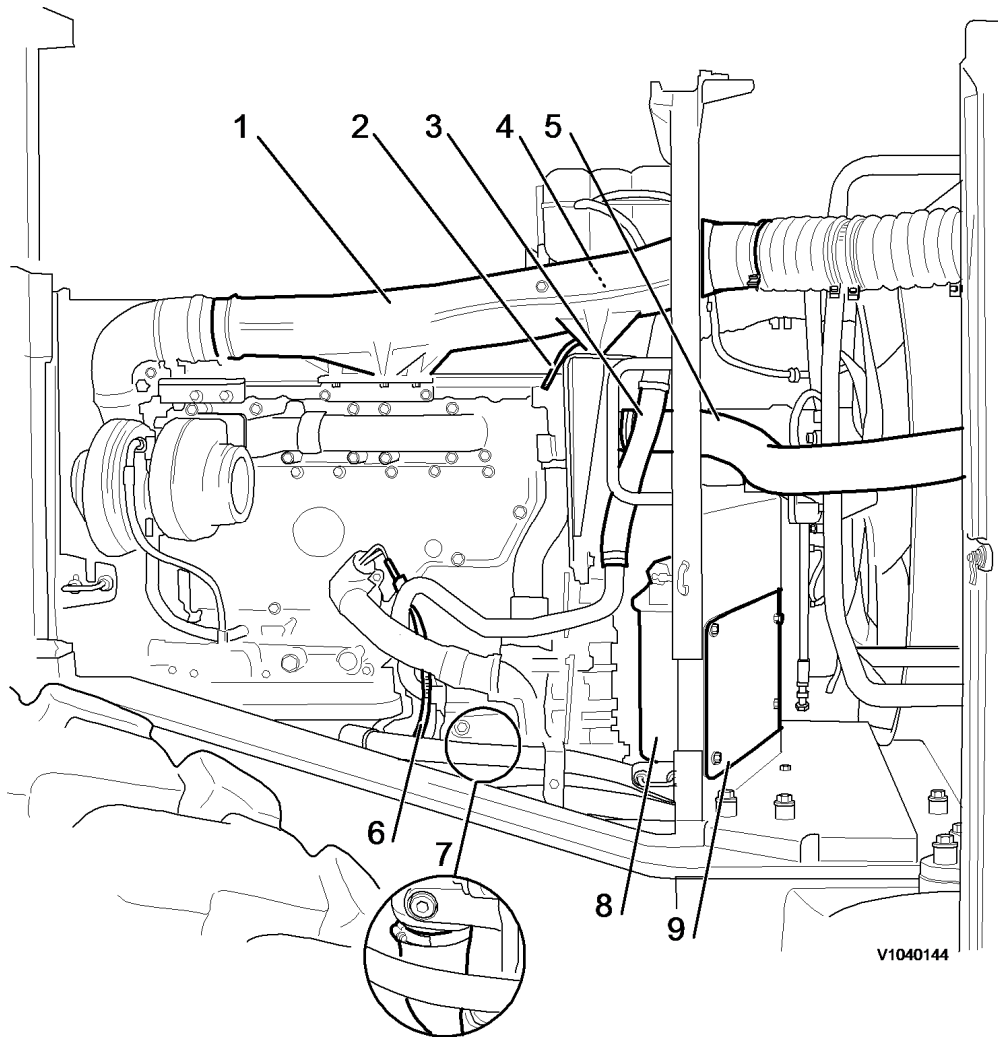


Figure 4

- | | |
|-------------------------|-------------------------|
| 1. Charge-air pipe | 6. Cable, engine heater |
| 2. Radiator hose | 7. Radiator hose, lower |
| 3. Hose | 8. Filter housing |
| 4. Connector (SE2603) | 9. Plate |
| 5. Radiator hose, upper | |
9. Remove the charge-air pipe.
 10. Disconnect the upper and lower radiator hose from the engine.
 11. Disconnect the cable to the optional engine heater.
 12. Disconnect the hose at the cylinder head and the hose at the expansion tank.
Unplug the connector for the coolant level sensor (SE2603) on the expansion tank.
 13. Remove the plate by the oil filters.
 14. Remove the filter housing from the intermediate wall and remove the clamp.

Right side

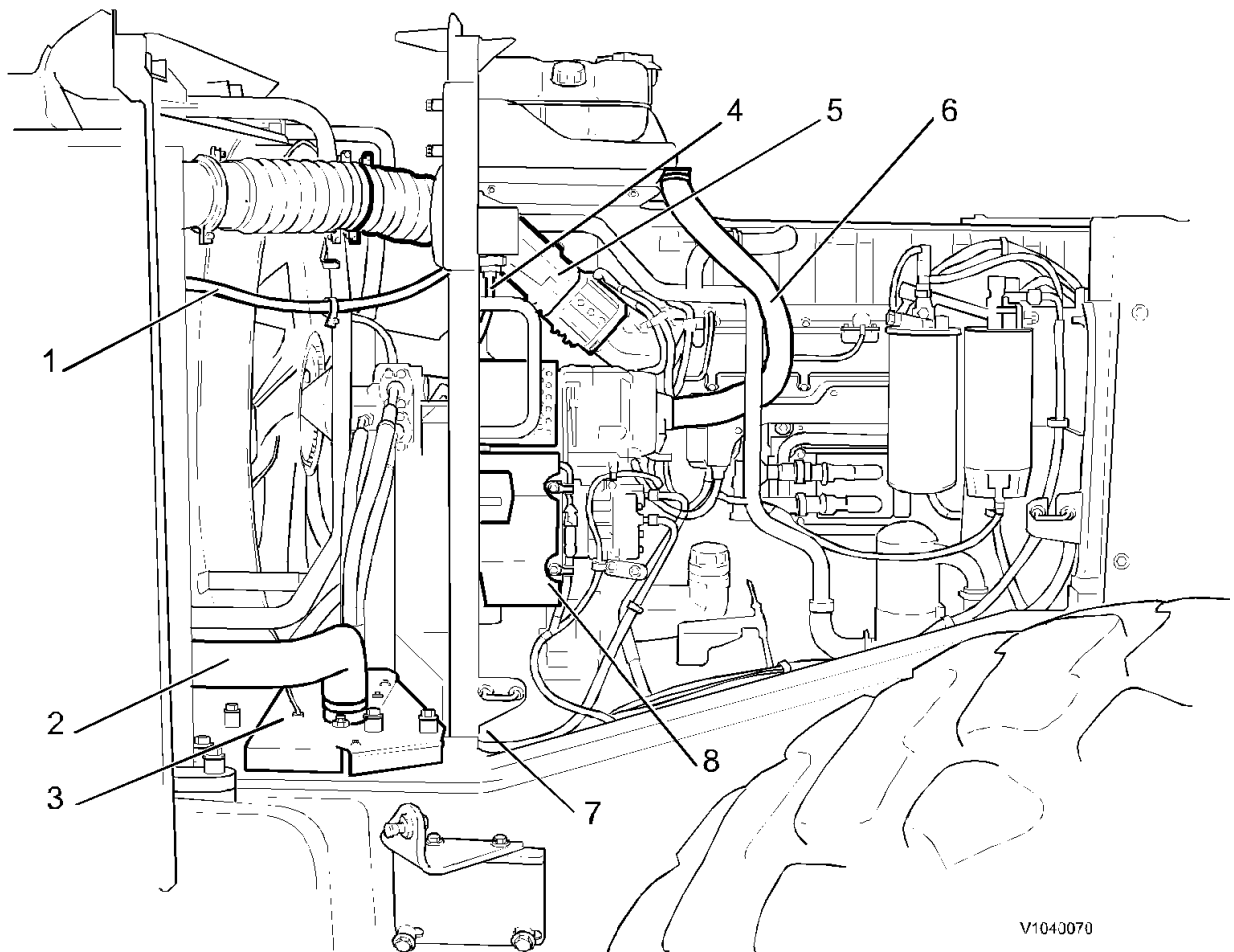


Figure 5

- | | |
|------------------------|--------------------|
| 1. Upper radiator hose | 5. Charge-air pipe |
| 2. Radiator hose | 6. Air hose |
| 3. Bottom plate | 7. Bracket |
| 4. Breather hose | 8. Guard |

15. Remove the protection for the AC compressor.
16. Disconnect the hose from the radiator.
17. Remove the clamps for the breather hose and drain hose. Disconnect the hose from the breather filter.
18. Disconnect the air hose from the alternator.



Do not disconnect or loosen connections for the air conditioning unit (AC). Risk of gas leakage.

19. Disconnect the charge-air pipe in the space between the radiator and the intermediate wall. Remove the bolts that hold the preheating coil. Fold aside the heating coil and remove the pipe.
20. Disconnect the bracket for the AC hoses from the intermediate wall.
21. Disconnect the radiator hose and remove the bottom plate.
22. Remove the intermediate wall.
Weight approx.: **65 kg (143 lbs)**

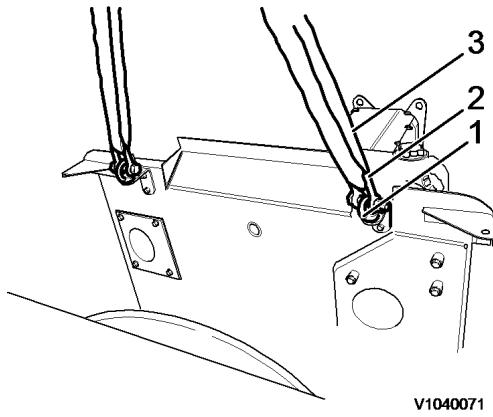
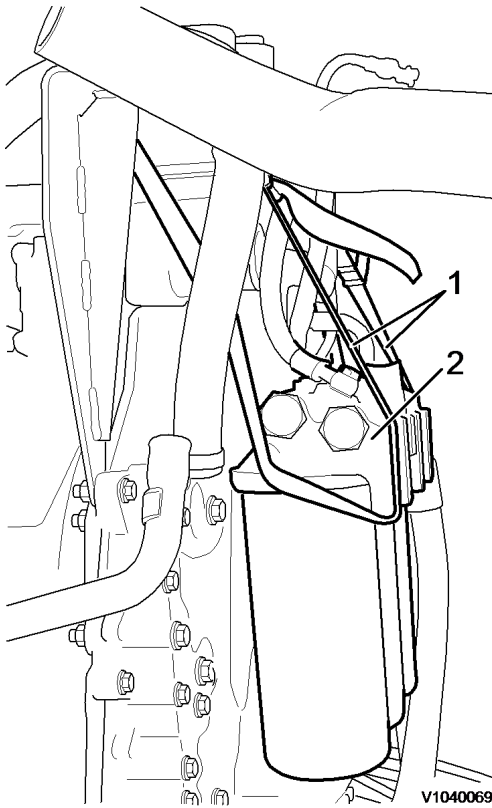


Figure 6

1. Lifting eye M12, 2 pcs.
2. Shackle M16, 2 pcs.
3. Sling, 4 m (13 ft)



23.

Figure 7

1. Tensioning strap
2. Bracket with oil filter

Tighten up the oil filters against the engine with a tensioning strap.

24. Disconnect the connectors for the AC compressor and alternator.

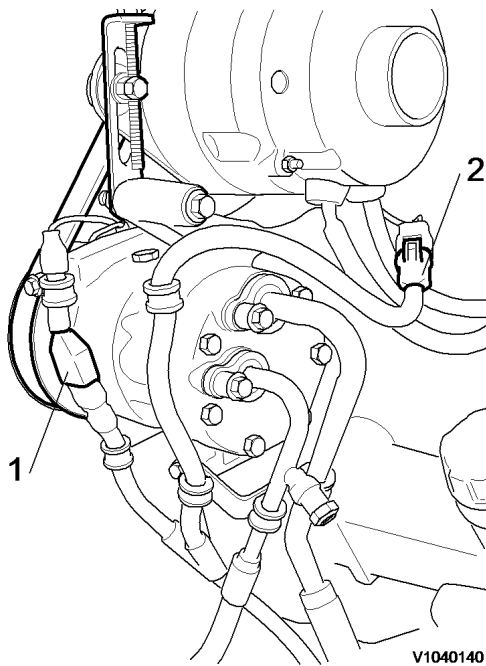


Figure 8

1. Connector, MA802
2. Connector, RD

25. Loosen the belt tensioner and remove the belt. Disconnect the AC compressor and lay it on the frame.
26. Mark the hose connections on the fuel filter bracket. Disconnect the fuel hoses from the fuel filters and collect the fuel that drains.
Disconnect the connectors SE2301 and SE2302 and remove their clamps
Remove the bracket with the filters.

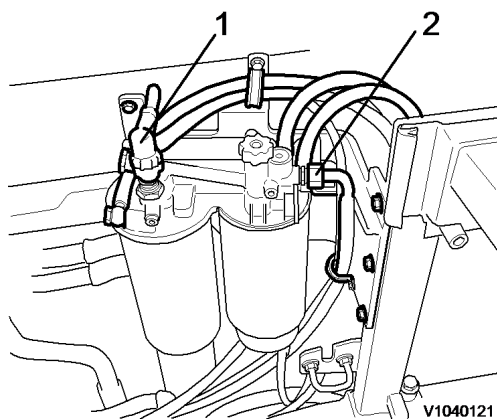


Figure 9

1. SE2301
2. SE2302

27. Disconnect the connectors EMS and EL and remove their clamping. Disconnect the cables on the starter motor.

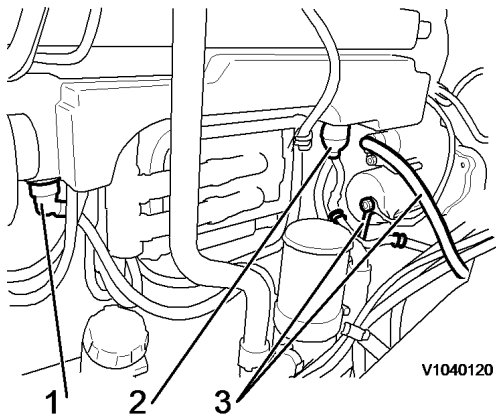


Figure 10

1. Connector EL
2. Connector EMS
3. Starter motor connections

28. Remove the clamps. Disconnect the hose and connector RT.

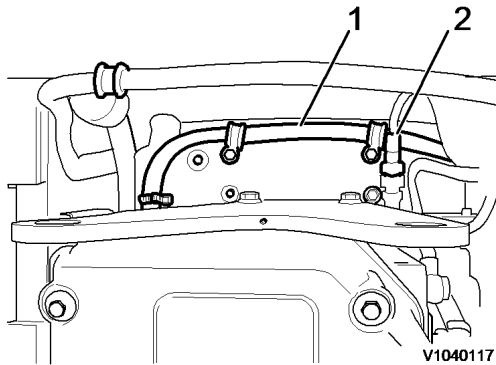


Figure 11

1. Hose
2. Connector, RT

29. Remove the cover for the box with the main fuses and disconnect the cables and their clamps. See fig.

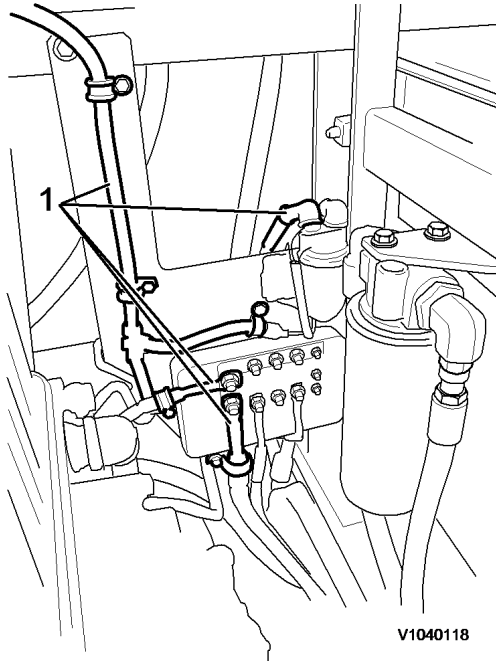


Figure 12

1. Cables
30. Disconnect the bracket and move it aside.
31. Disconnect the bridge for the contacts to the shift solenoids from the transmission.

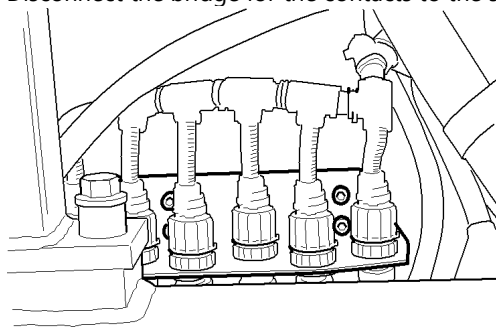


Figure 13

32. Remove the air filters for the transmission and rear axle.
Secure the hydraulic transmission with lifting eyes, shackle, sling and ratchet block.

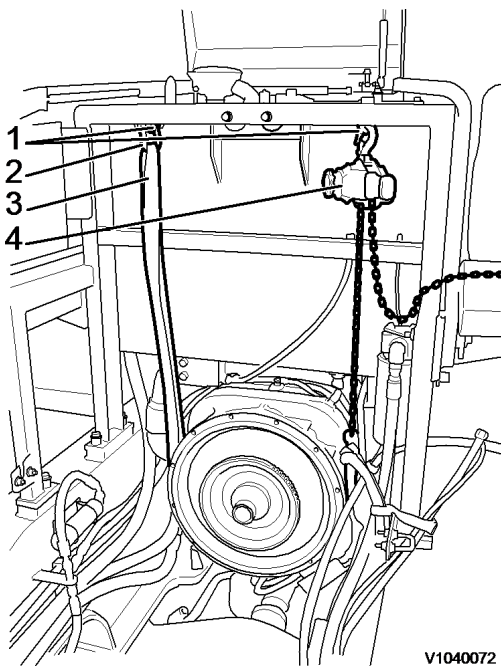


Figure 14
(Engine removed.)

1. Lifting eye M12, 2 pcs.
2. Shackle M16, 1 pc.
3. Sling, 4 m (13 ft)
4. Ratchet block, 750 kg

NOTE!

Do not tighten up the transmission.

33. Install tool 9998547 on the engine.

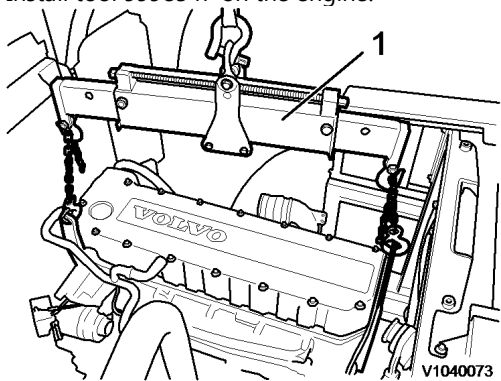


Figure 15

1. Lifting tool

34. Remove the bolts for the engine mount.

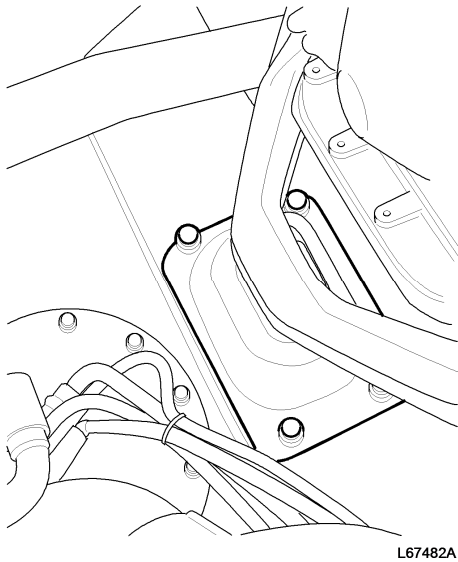


Figure 16

35. Remove the bolts on the hydraulic transmission, except the two upper bolts. Tighten up the transmission using the lifting device. Remove the two upper bolts. Remove the engine. Engine's weight: **1250 kg (2756 lbs)**
36. If changing the engine, transfer the components required to the new engine.
NOTE!
Never transfer a component that could cause a malfunction.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Engine, installing](#)

Product Line: WLO
Model Variant: L180E (Volvo)
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- [Engine, installing](#)

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Serial number start: 8001
Serial number stop: 10999

Document Title: Engine, installing	Function Group: 210	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

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Engine, installing

Op nbr 21072

[9998257 Lifting tool](#)

[9998547 Lifting device](#)

Bolt M14 x 35 mm, 2 pcs.

Lifting eye M16, 4 pcs.

1. Fit tool 9998257 and connect 9998547 and a lifting device to the engine. Fit the engine.
Engine's weight: **approx. 1350 kg (approx. 3000 lbs).**

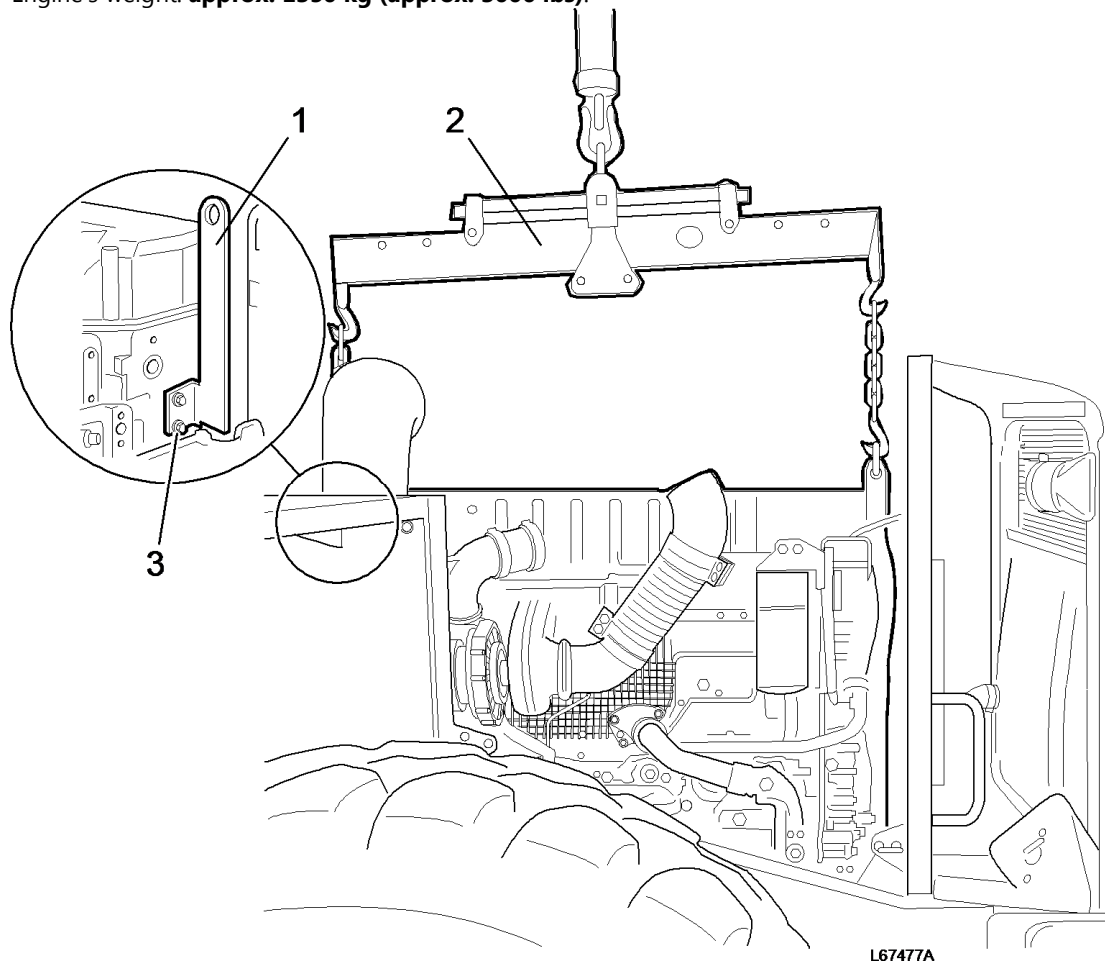


Figure 1

1. 9998257

2. 9998547
3. Bolt M14 x 35 mm, 2 pcs.

2. Fit the bolts for the engine mount.
Tightening torque: **85 Nm (63 lbf ft)**.

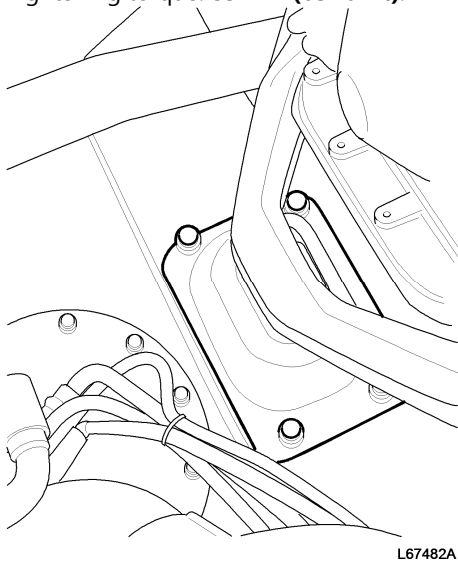


Figure 2

3. Fit the attaching bolts for the hydraulic transmission.
Tightening torque: **54 Nm (40 lbf ft)**.
Fit the protective plate by the gear selector valve.

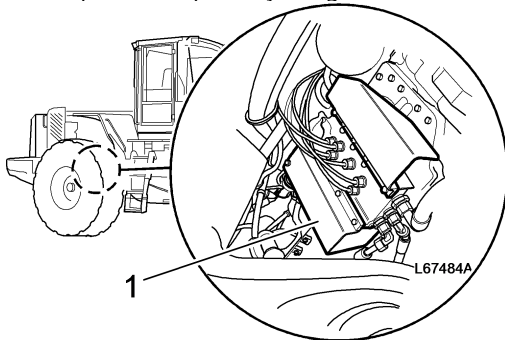


Figure 3

1. Protective plate
4. Fit the partition wall.
Partition wall, weight: **approx. 45 kg (approx. 100 lbs)**.

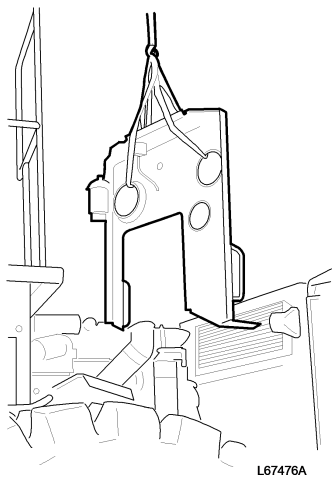


Figure 4

5. Connect the lower radiator hose.

- Connect the fuel lines by the fuel filter and the fuel pump.
- Fit the charge-air pipe and the hose between the preheating coil and the radiator.
- Fit the relay together with the bracket, located on the member behind the hydraulic tank.
- Connect the connector for E-ECU.
- Connect the cables on the starter motor.
- Connect the connector for the oil level sensor.
- Fit the AC compressor.
- Fit the alternator loosely. Fit the drive belt.
- Connect the connectors.

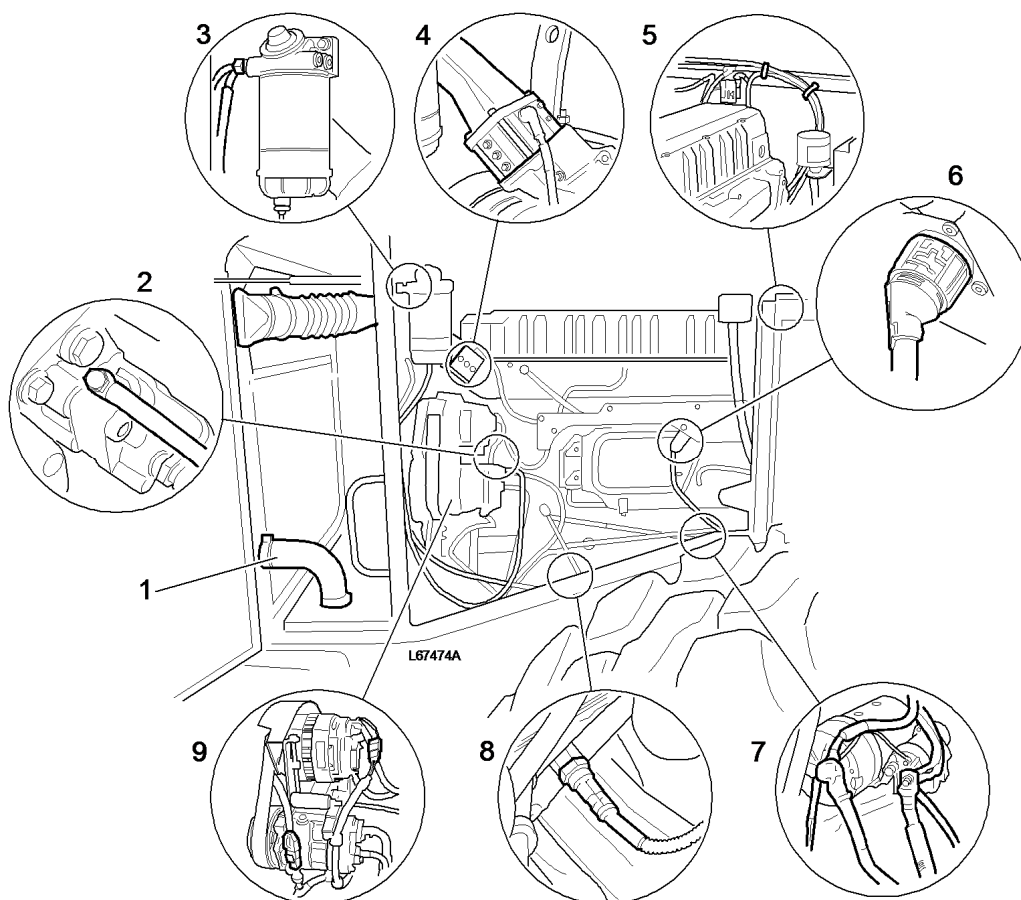


Figure 5

- | | | | |
|---|----------------------------------|---|------------------------------------|
| 1 | Lower radiator hose | 6 | Connector, E-ECU |
| 2 | Fuel line, fuel pump | 7 | Cabling, starter motor |
| 3 | Fuel connection, fuel filter | 8 | Connector, oil level sensor SE213 |
| 4 | Charge-air pipe, preheating coil | 9 | Alternator, compressor, connectors |
| 5 | Relay, clamp | | |

6. Install the drive belt.

Tighten the drive belt as follows:

- Turn the adjusting screw until the belt is so tight that it can only be pushed in **8 mm (0.3 in)**.
- Tighten the alternator's attaching bolts.

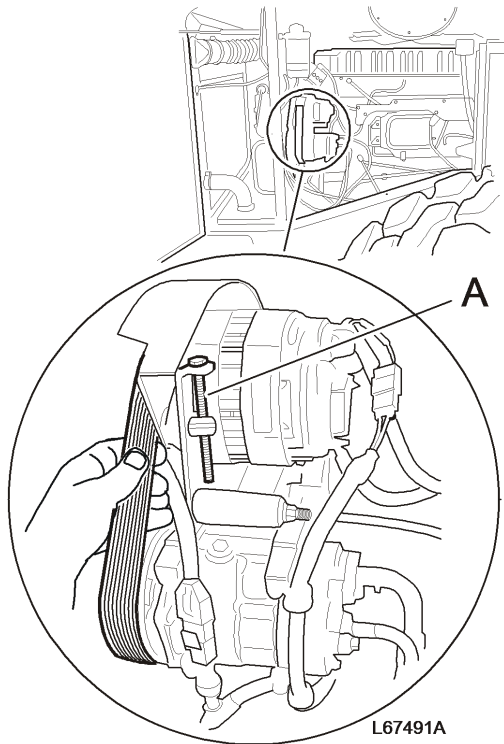


Figure 6

A. Adjusting screw

7. Fit the oil pipe between the flywheel housing and the hydraulic transmission. Use a new O-ring.

- Connect the hose from the heating coil in the cab to the engine block.
- Fit the charge-air pipe. Fit the expansion tank.
- Fit the upper radiator hose.
- Connect cable for engine heater, if installed.

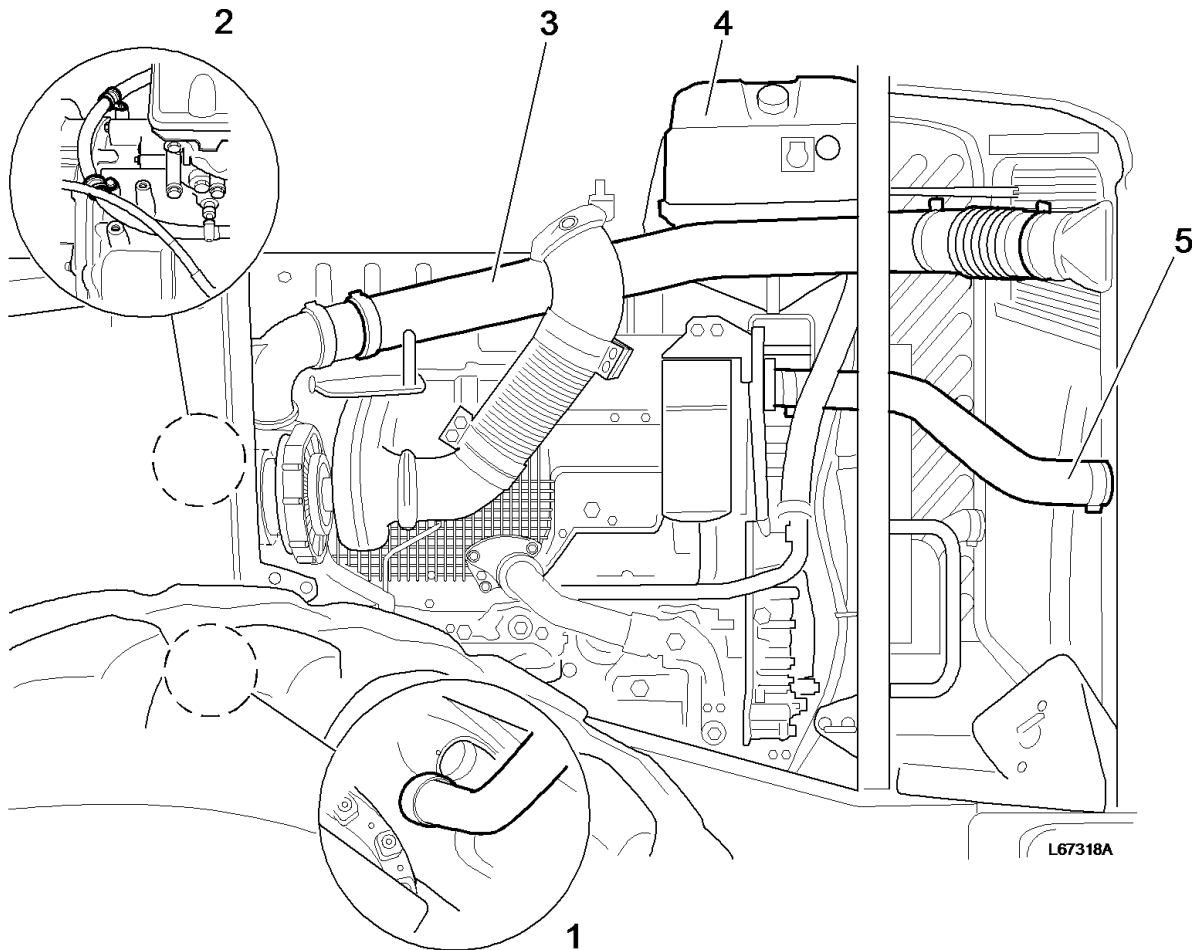


Figure 7

1. Oil pipe
2. Hose from heating coil in cab
3. Charge-air pipe
4. Expansion tank
5. Upper radiator hose

8. Fit the condenser.
Fit the receiver drier and protective plate.

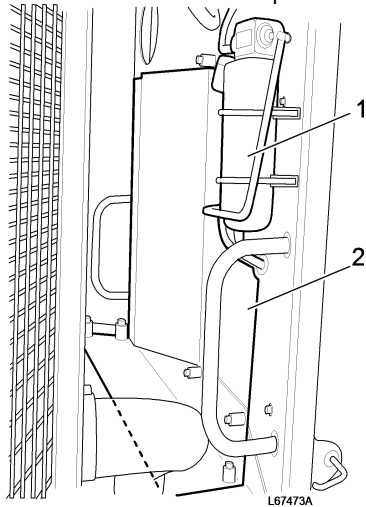


Figure 8

1. Receiver drier
 2. Protective plate
9. Fit the clamp securing the oil drain.
Fill oil.
Volume: **approx. 43 litres (11.4 US gal).**
Fill coolant.
Volume: **approx. 41 litres (10.8 US gal).**

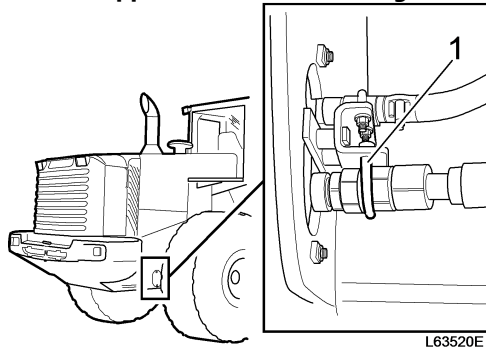


Figure 9

1. Clamp
10. Fit the engine hood. See [821 Engine hood, installing](#)
11. Bleed the fuel system. See [230 Fuel system, bleeding](#)
12. Start the engine, operating at an increased idle speed for approx. 10 minutes to bleed any remaining air from the fuel system. Check for leakage. Check the oil and coolant levels.

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Engine, installing

Op nbr 210-072

[9998547 Lifting tool](#)

Washer M12, 2 pcs.

Nut M12, 2 pcs.

Ratchet block, 750 kg

Sling, 3 m, 2 pcs.

Sling, 4 m, 1 pcs.

Lifting eye M12, 2 pcs.

Shackle, 6 pcs.

The operation also includes tools and times for steps to which references are given.

1. Oil in the O-ring on the transmission. If the O-ring is in poor condition, it shall be changed.

2. Install tool 9 998 547 on the engine and lift.

Weight (D12D) approx.: **1250 kg (2756 lbs)**

Fold aside the upper radiator hose and make sure that the oil drain hose and the hose from the crankcase ventilation hang down between the rear axle and the fuel tank. Secure the engine with two bolts in the transmission. Then remove the lifting device for the transmission and install the remaining bolts.

Tightening torque: See [210 Engine mounting, tightening torque](#)

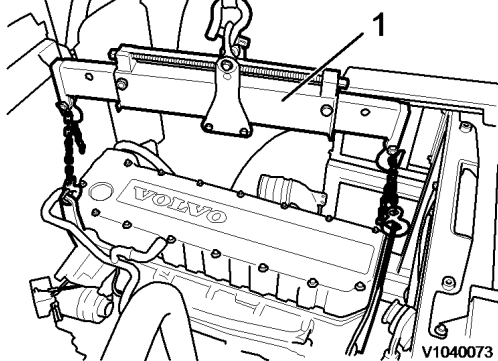


Figure 1

1. Lifting tool

3. Lower the engine and install the bolts for the engine mount. Then remove the lifting device.
Tightening torque: See [210 Engine mounting, tightening torque](#)

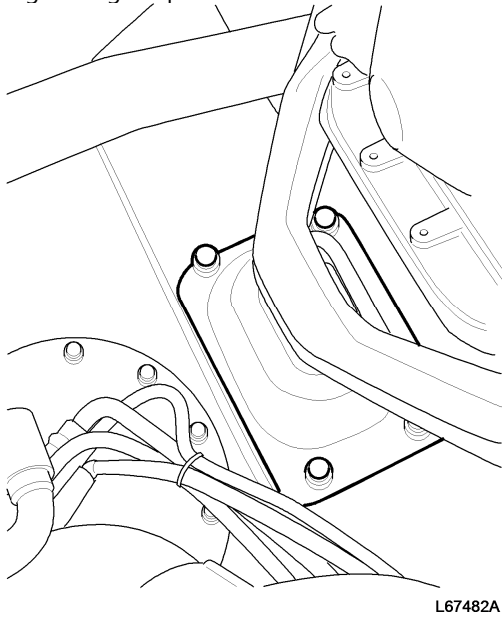


Figure 2

4. Remove the tensioning straps that hold up the engine oil filters.

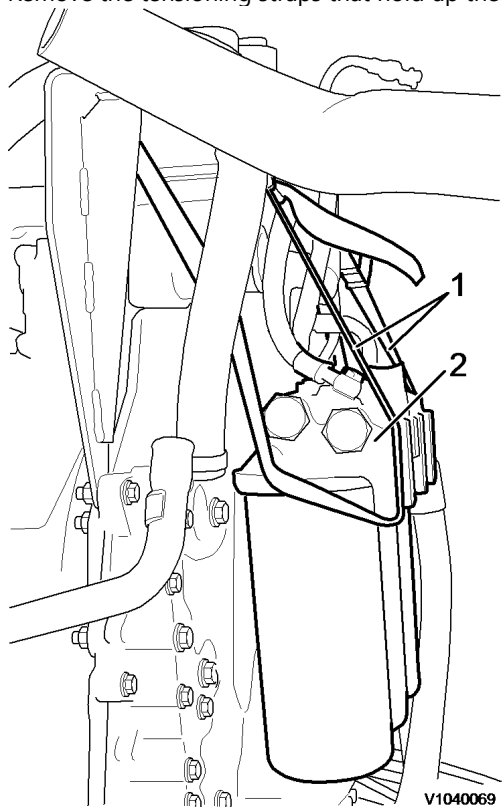


Figure 3

1. Tensioning strap
2. Bracket with oil filter

5. Install the bracket with the relay. Connect the cables and clamp them. Install the cover. Install the filters for the transmission and rear axle.

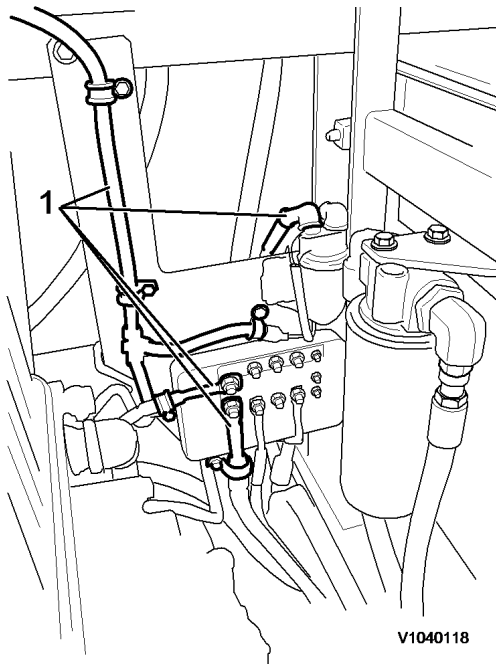


Figure 4

1. Cables
6. Install the hose for the heater. Plug in connector RT. Install the clamp.

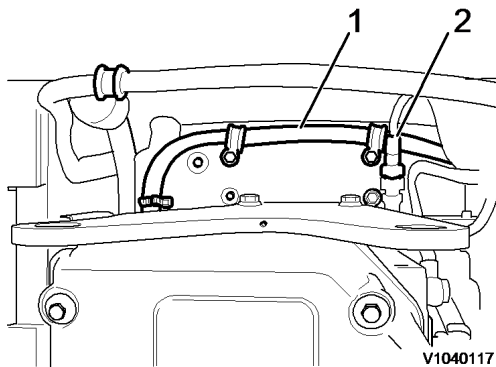


Figure 5

1. Hose
2. Connector RT
7. Install the bridge for the contacts to the shift solenoids on the transmission's right side.

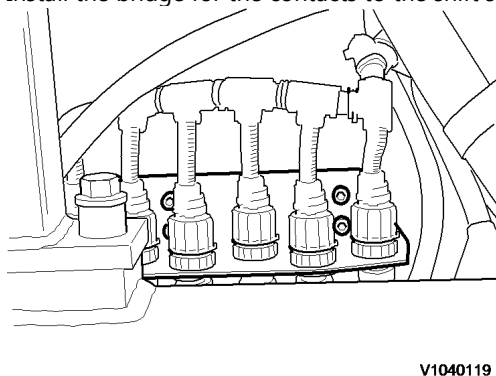


Figure 6

8. Install the clamps for the cable harness and plug in connectors EMS and EL. Connect the cables to the starter motor.

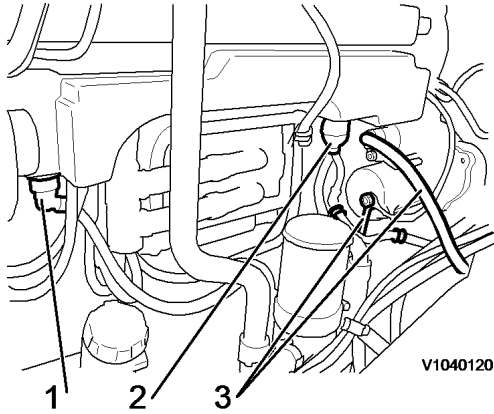


Figure 7

1. Connector EL
2. Connector EMS
3. Starter motor connections

9. Install the bracket with fuel filters and connect the hoses acc. to marking. Plug in connectors SE2301 and SE2302. Install the clamps.

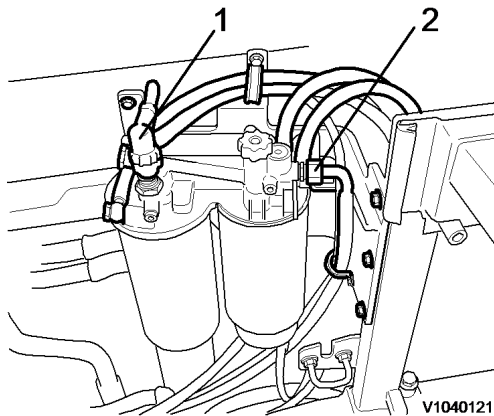


Figure 8

1. SE2301
2. SE2302

10. Install the AC compressor and plug in connectors MA802 and RD. Install the belt and tighten up.

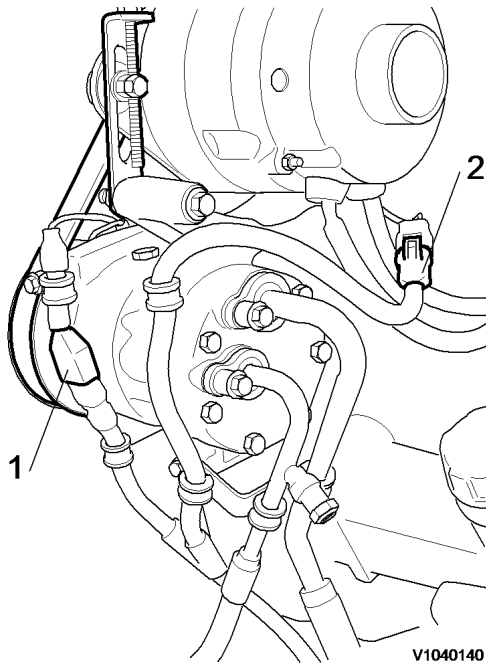


Figure 9

1. MA802
2. Connector RD

11. Lift the intermediate wall into place and install the bolts. Remove the lifting tool.
Weight approx.: **65 kg (143 lbs)**

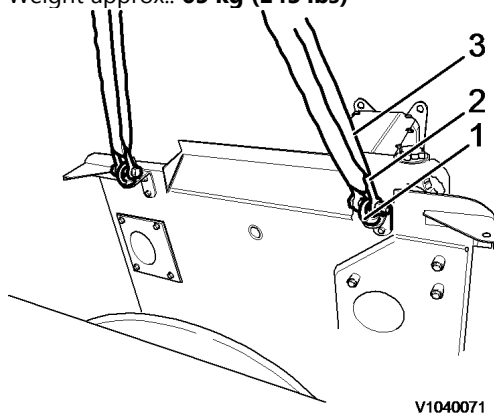


Figure 10

1. Lifting eye M12, 2 pcs.
2. Shackle M16, 2 pcs.
3. Sling, 4 m (13 ft)

12. Install the clamp for the oil drain hose.

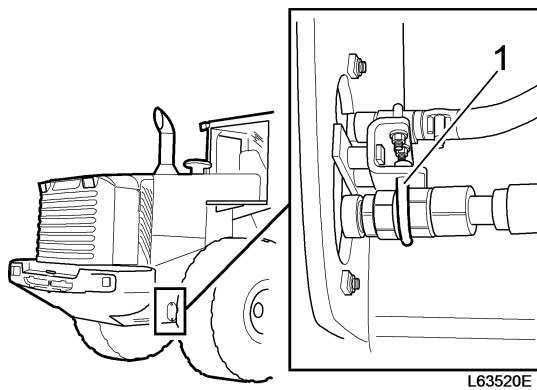


Figure 11

Right side

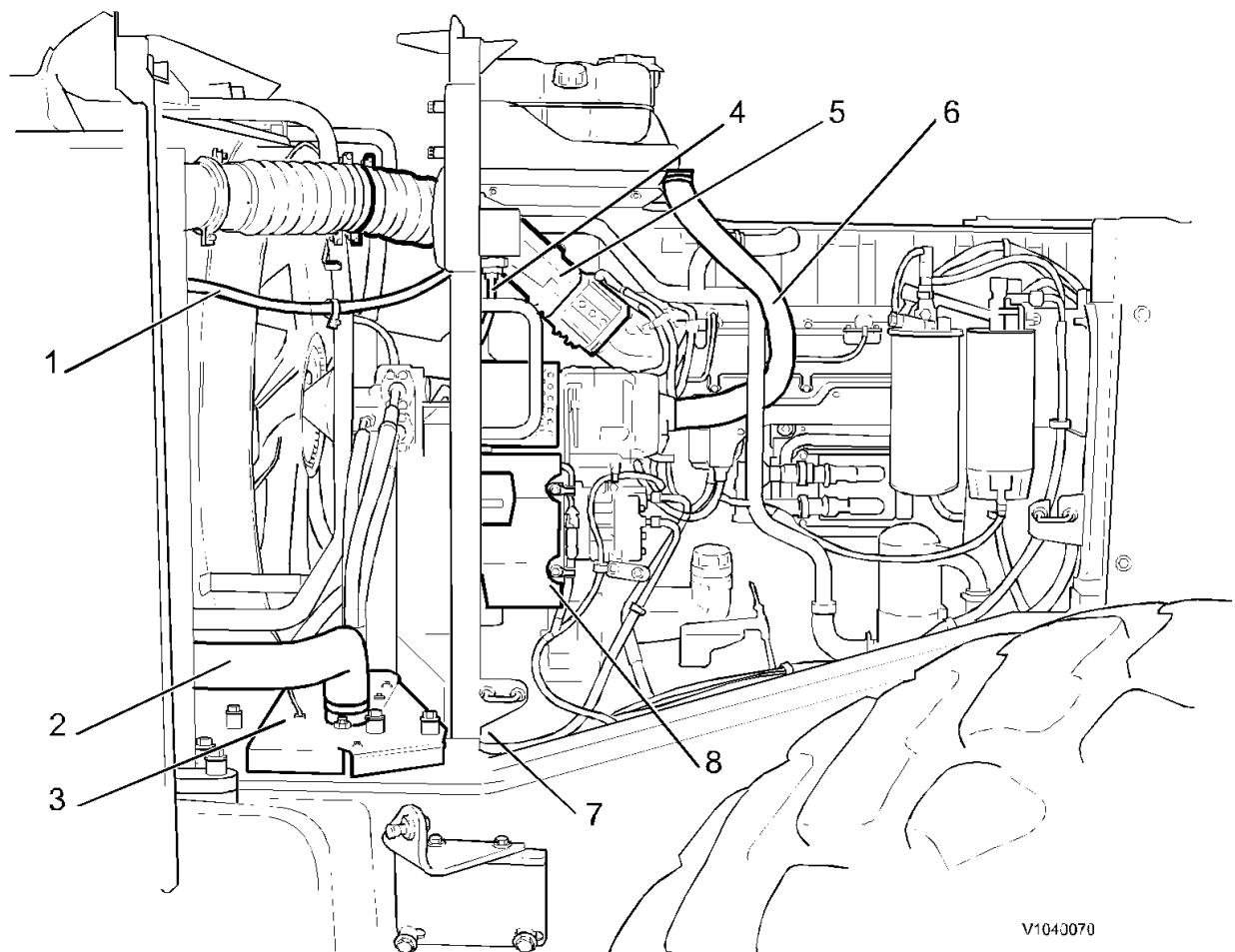


Figure 12

- | | |
|------------------------|--------------------|
| 1. Upper radiator hose | 5. Charge-air pipe |
| 2. Radiator hose | 6. Air hose |
| 3. Bottom plate | 7. Guard |
| 4. Breather hose | 8. Bracket |

13. Install the bottom plate and the radiator hoses.
14. Install the bracket for the AC hoses.
15. Install the charge-air pipe and the preheating coil.

16. Clamp the air hose and the drain hose.
17. Install the air hose on the alternator and secure it with cable ties.
18. Install the protection over the AC compressor.

Left side

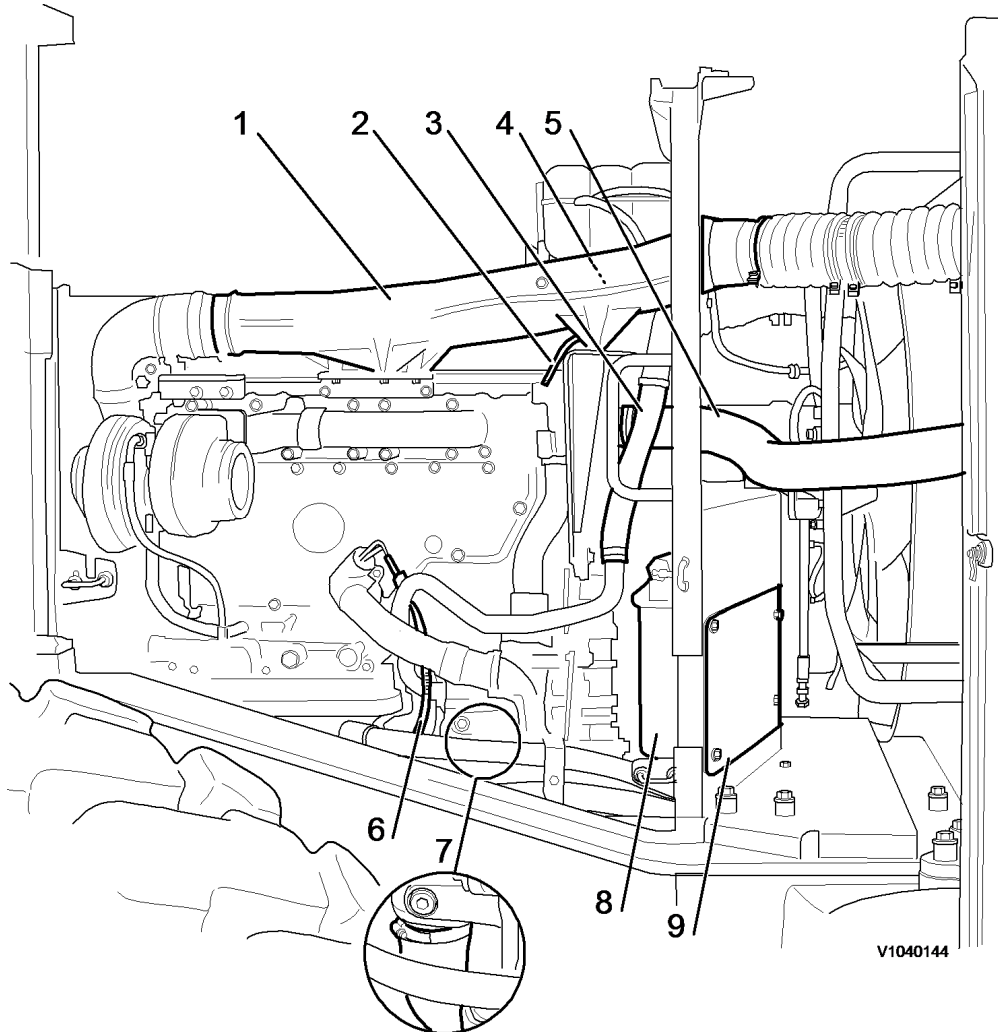


Figure 13

- | | |
|--------------------|-------------------------|
| 1. Charge-air pipe | 5. Radiator hose, upper |
| 2. Hose | 6. Cable, engine heater |
| 3. Hose | 7. Radiator hose, lower |
| 4. SE2603 | 8. Filter housing |
| 4. Radiator hose | 9. Plate |

19. Hang up the filter housing on the intermediate wall and then clamp the hoses. Bolt the filter housing into place.
20. Install the plate by the oil filters.
21. Install the lower and upper radiator hose.
22. Install the hose on the cylinder head and the hose on the expansion tank. Plug in SE2603.
23. Install the cable for the engine heater, if installed.
24. Fit the charge-air pipe.

25. Fit the oil pipe between the flywheel housing and the hydraulic transmission.

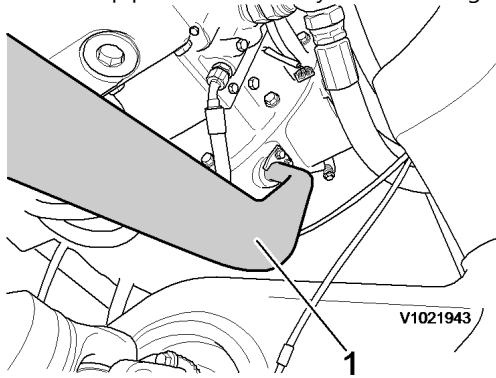


Figure 14

1. Oil pipe

26. Install the hood, see [821 Engine hood, installing](#)
27. Fill coolant. Volume, see [260 Cooling system volume](#)
28. Fill engine oil. Approx. 35 l. Volume, see [210 Engine, volume](#)
29. Fill transmission oil. Volume, see [421 Hydraulic transmission, capacity](#)
30. Bleed the fuel system, see [233 Fuel system, bleeding](#)
- NOTE!**
Air bleeding may not be performed using the starter motor.
- NOTE!**
The hand pump must not be used when the engine is running.
31. Warm up the engine and check that there are no any leaks.
32. Install the side panels by the engine.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Compression test](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 7398, 69999

- [Compression test](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8001

Serial number stop: 10999

Document Title: Compression test	Function Group: 210	Information Type: Service Information	Date: 2014/5/13
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Compression test

Op nbr 210-002

[9990185 Lifting tool](#)

[9998248 Adapter](#)

[9998248 Adapter](#)

[9998248 Adapter](#)

[9998248 Adapter](#)

[9998248 Adapter](#)

[9998248 Adapter](#)

[9988539 Pressure gauge](#)

[9993590 Gear wheel](#)

[9998599 Cleaning tool](#)

[9996400 Impact puller](#)

[9990006 Puller](#)

[9990262 Adapter](#)

[9998665 Adapter](#)

1. Place the machine in service position, see [191 Safety rules when servicing](#).
2. Remove the engine hood, see [821 Engine hood, removing](#).
3. Remove the valve cover.
4. Remove the electric connections for all unit injectors and the VEB adapter.
5. Remove the stud for the valve cover behind the VEB adapter.
Remove the VEB adapter.

NOTICE

Plug all pipes, hoses and connections when removing.

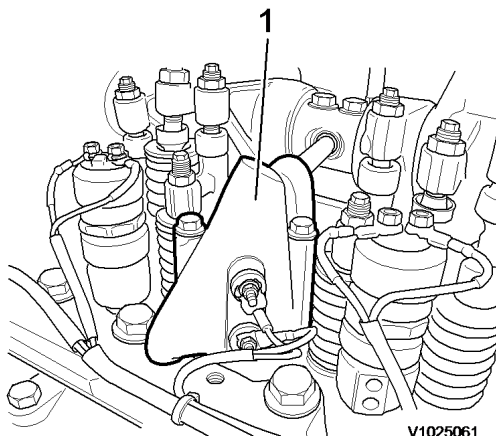


Figure 1

1. VEB adapter
6. Loosen the bolts for the rocker arm shaft evenly along the whole shaft, so that the rocker arm shaft is not loaded unevenly.
Remove the bolts and fit lifting tool 999 8255. Carefully, lift away the rocker arm shaft.

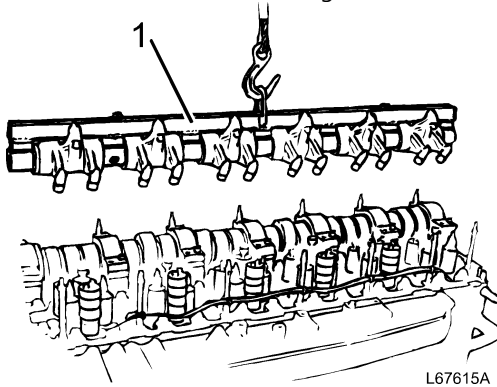


Figure 2

1. Lifting tool 999 8255
 7. Remove the unit injectors with puller 999 0006 and impact puller 999 6400.
- NOTE!**
Clean very thoroughly around the injectors before removing them.

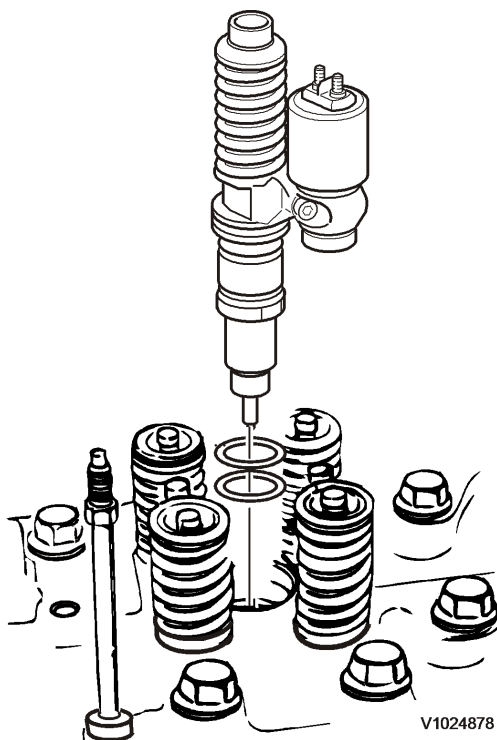


Figure 3
Unit injector with seal rings

8. Clean the unit injectors' copper sleeves.
Fit the protective sleeve in the unit injector's place. Fit the brush on the extension and clean the copper sleeve.
Clean all copper sleeves.

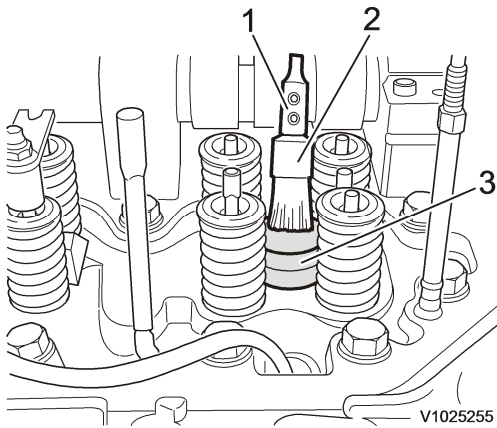


Figure 4
9998599 Cleaning tool

1. Extension
2. Brush
3. Protective sleeve

9. Fit the six adapters 999 8248 in the cylinder head and tighten down these with the unit injectors' attaching yokes.

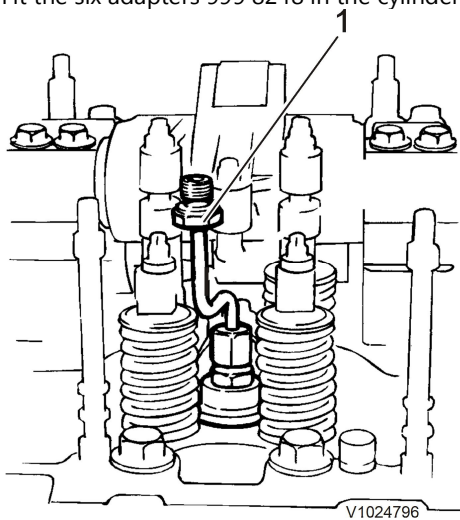


Figure 5

1. Adapter 999 8248

10. Fit the rocker arm bridge with lifting tool 999 8255.

Tightening of rocker arm bridge shall take place according to the tightening diagram below.

Tighten the bolts (marked with black) in step 1 in stages along the whole rocker arm shaft so that it will not be deformed, and so that the guide pins guide accurately in the camshaft support bearings.

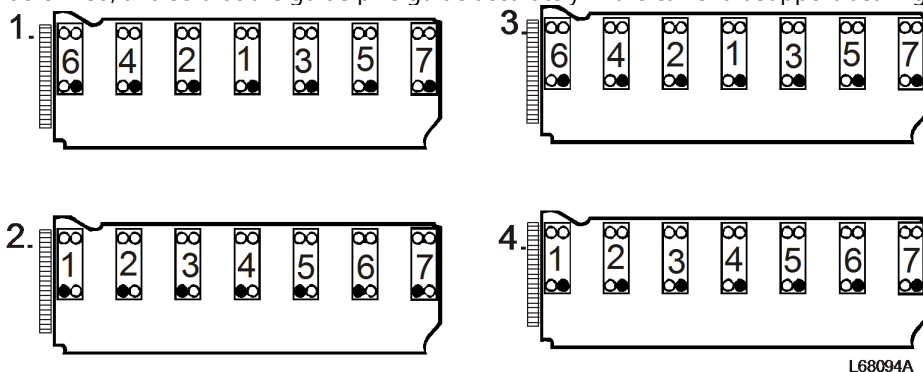


Figure 6

Tightening diagram for rocker arm shaft

1. Tightening torque step 1: Tightening in stages, 60 Nm (44.3 lbf ft)
2. Tightening torque step 2: 15 Nm (11.1 lbf ft)+ 120°
3. Tightening torque step 3: Loosen the bolts, 60–0 Nm (44.3–0 lbf ft)
4. Tightening torque step 4: 15 Nm (11.1 lbf ft)+ 120°

11. Fit the VEB adapter.

12. Check that valve clearances are correct, see [214 Valves adjusting](#).

13. Fit the adapter 999 8665 and compression gauge 998 8539 to the adapter 999 8248 on cylinder 1. Run the engine with the starter motor until the indicator needle on the compression gauge stops (max. compression value). Repeat the procedure for the other cylinders.

NOTE!

Do not run the starter motor for longer than 15 seconds at a time, with intervals of 60 seconds.

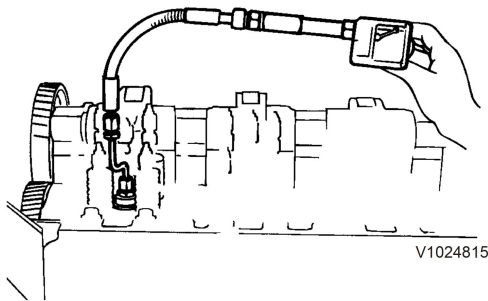


Figure 7

14. Remove the VEB adapter.

15. Loosen the bolts for the rocker arm shaft evenly along the whole shaft, so that the rocker arm shaft is not loaded unevenly. Remove the bolts and fit lifting tool 999 8255. Carefully, lift away the rocker arm shaft.

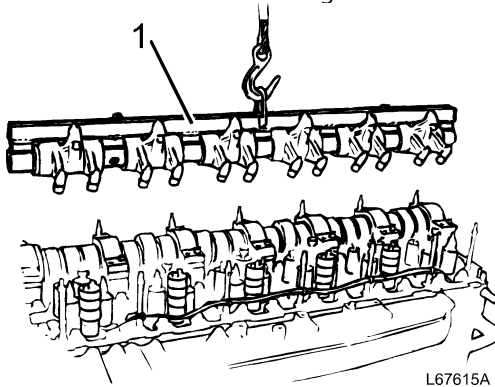


Figure 8

16. Remove the adapters 999 8248 from all cylinders.

17. Fit the unit injectors with new seals.

NOTE!

Clean thoroughly before assembling, dust and dirt particles can cause malfunctions.

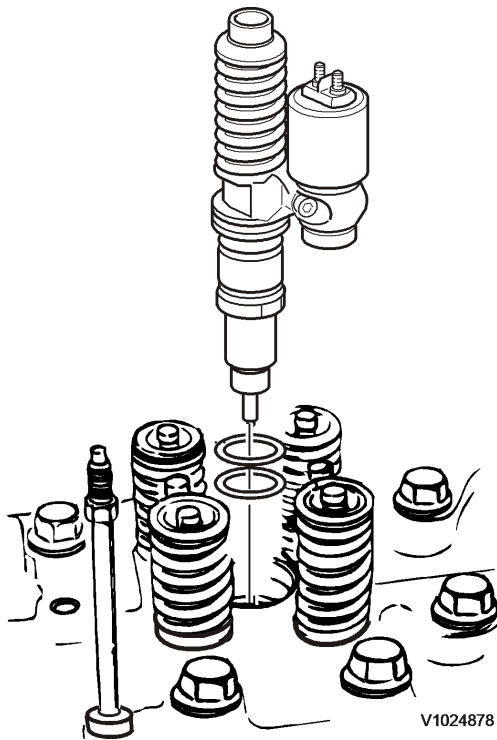


Figure 9

18. Fit the rocker arm bridge according to item 10.
19. Fit the VEB adapter with new seals.
Fit the stud for the valve cover behind the VEB adapter.

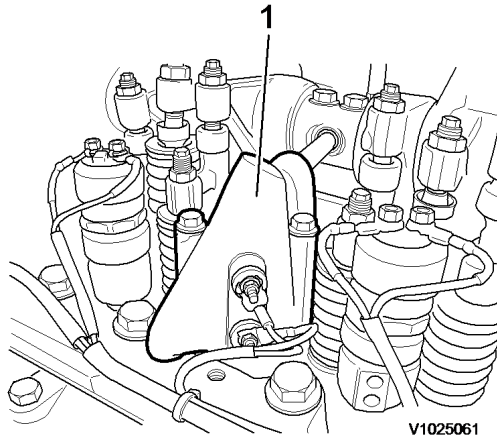


Figure 10

1. VEB adapter
20. Adjust valve clearances and unit injectors, see [214 Valves adjusting](#).
21. Fit the electric connections for all unit injectors and the VEB adapter.
Tightening torque: **1.5 Nm (1.1 lbf ft)**
22. Fit the valve cover.
Tightening torque: **20 Nm (14.75 lbf ft)**.

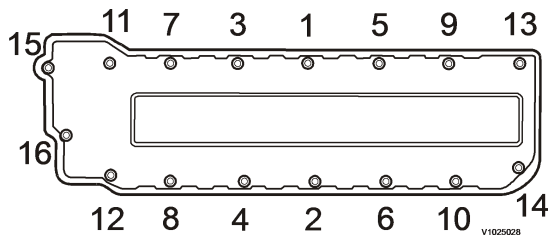


Figure 11
Tightening diagram for valve cover

23. Bleed the fuel system.
24. Fit the engine hood, see [821 Engine hood, installing](#).
25. Restore the machine to operating condition.

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Compression test

Op nbr 210-002

[9990185 Lifting tool](#)

[9998248 Adapter](#)

[9998248 Adapter](#)

[9998248 Adapter](#)

[9998248 Adapter](#)

[9998248 Adapter](#)

[9998248 Adapter](#)

[9988539 Pressure gauge](#)

[9993590 Gear wheel](#)

[9998599 Cleaning tool](#)

[9996400 Impact puller](#)

[9990006 Puller](#)

[9990262 Adapter](#)

[9998665 Adapter](#)

[88880003 Bracket](#)

1. Place the machine in service position, see [191 Safety rules when servicing](#).
2. Remove the engine hood, see [821 Engine hood, removing](#).
3. Drain the fuel in the cylinder head by disconnecting the hose between the cylinder head and the fuel filter at the fuel filter.

NOTE!

Collect the excess fuel in a container.

4. Open the air nipple on the overflow valve and use a blow-off nozzle to lead out the fuel.
Connect the hose to the fuel filter.

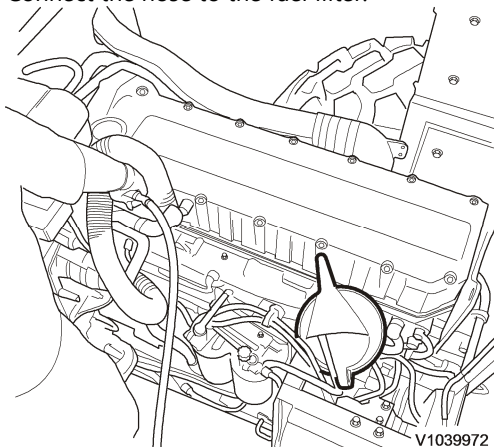


Figure 1

5. Remove the hose from the oil trap. Remove the hose between the expansion tank and the cylinder head, and remove the valve cover.

NOTE!

Do not use a nut runner since the studs bolts may come loose from the cylinder head and damage electrical cables and valve cover.

6. Remove the unit injector's electrical connections. Remove the electrical connections for the control valve.
7. Remove the valve cover's stud bolt located in front of the control valve.
Remove the control valve and the pipe between the valve and rocker arm shaft.

NOTICE

Plug all pipes, hoses and connections when removing.

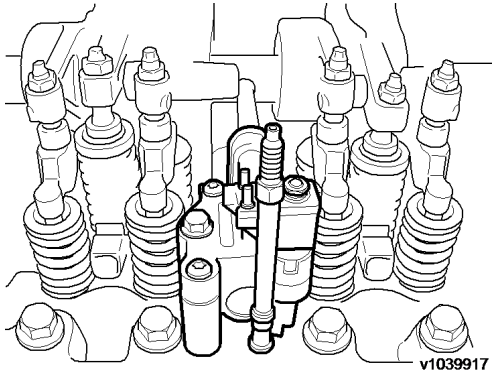


Figure 2
Control valve

8. Loosen the bolts for the rocker arm bridge equally in sequences, so that the rocker arm shaft is not bent. Remove the bolts and carefully lift away the rocker arm bridge with 9990185 and 88880003. Use 2 M12X70 mm to attach the tool.

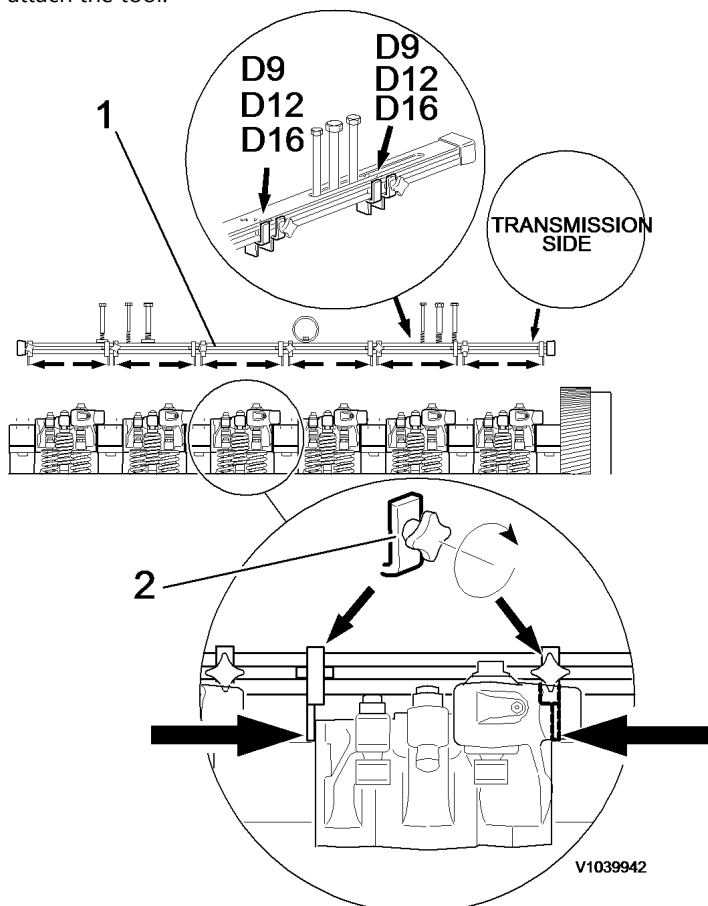


Figure 3

1. 9990185
2. 88880003

9. Remove the bolt for the unit injectors' attaching yoke. Remove the unit injectors. Fit 9998249 on the unit injectors and place them in separate, well sealed plastic bags.

NOTE!

Clean very thoroughly around the injectors before removing them.

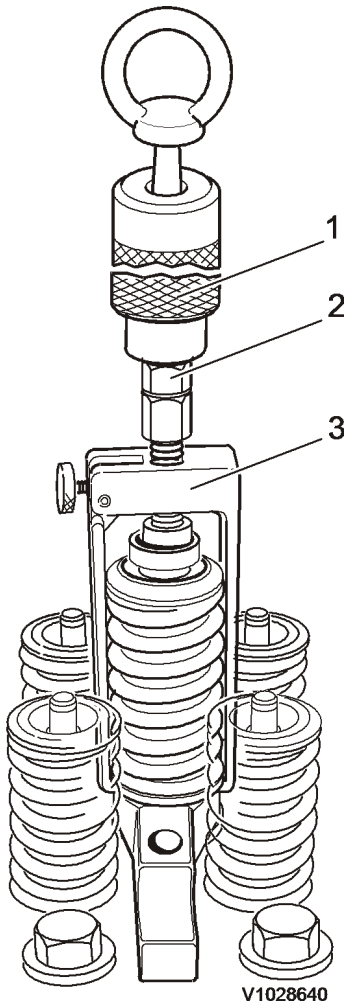


Figure 4
Removing unit injectors, Delphi E3

1. 9996400
2. 9990262
3. 9990006

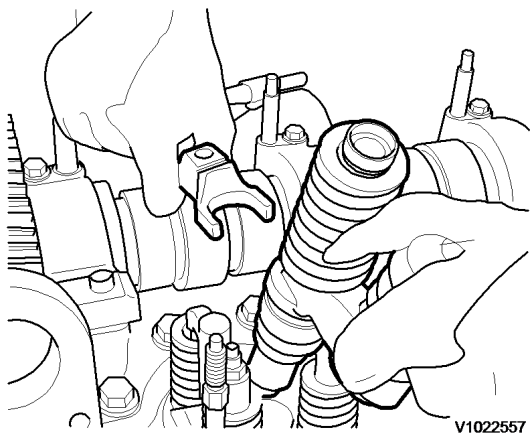


Figure 5

10. Clean the unit injectors' copper sleeves.
Fit the brush on the extension and clean the copper sleeve. Clean all copper sleeves.

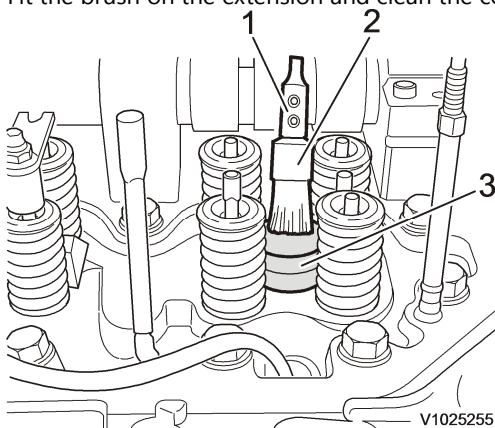


Figure 6
9998599 Cleaning tool

1. Extension
2. Brush
3. Protective sleeve

11. Fit the six adapters 999 8248 in the cylinder head and tighten down these with the unit injectors' attaching yokes.

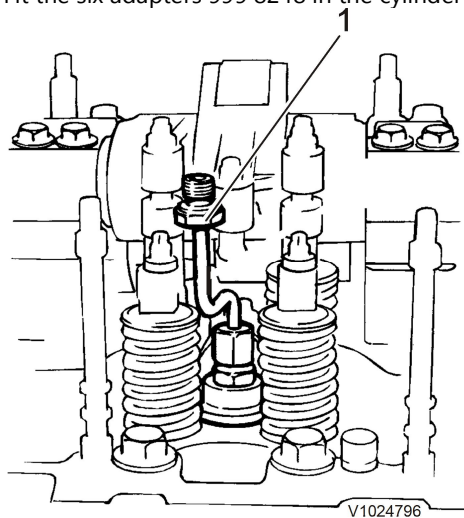


Figure 7

1. Adapter 999 8248
12. Install the rocker arm bridge with lifting tool 9998255 and 88880003.
Tightening of rocker arm bridge shall take place according to [214 Rocker arm shaft, tightening torques](#).
13. Check that the valve clearances are correct, see [214 Valves, adjusting](#).
14. Install the adapter 9998665 and compression gauge 9988539 to the adapter 9998248 on cylinder 1.
Remove the fuse FU18.
Run the engine with the starter motor until the indicator needle on the compression gauge stops (max. compression value).
Repeat the procedure for the other cylinders.
NOTE!
Do not run the starter motor for longer than 15 seconds at a time, with intervals of 60 seconds.

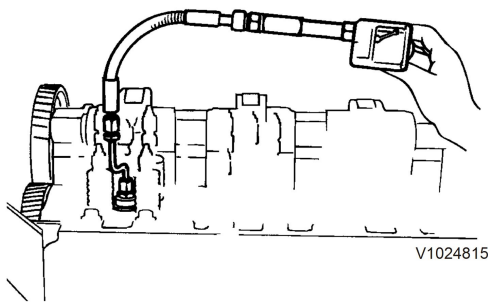


Figure 8

15. Loosen the bolts for the rocker arm shaft evenly along the whole shaft, so that the rocker arm shaft is not loaded unevenly.
Remove the bolts and fit lifting tools 9990185 and 88880003. Carefully lift away the rocker arm shaft.

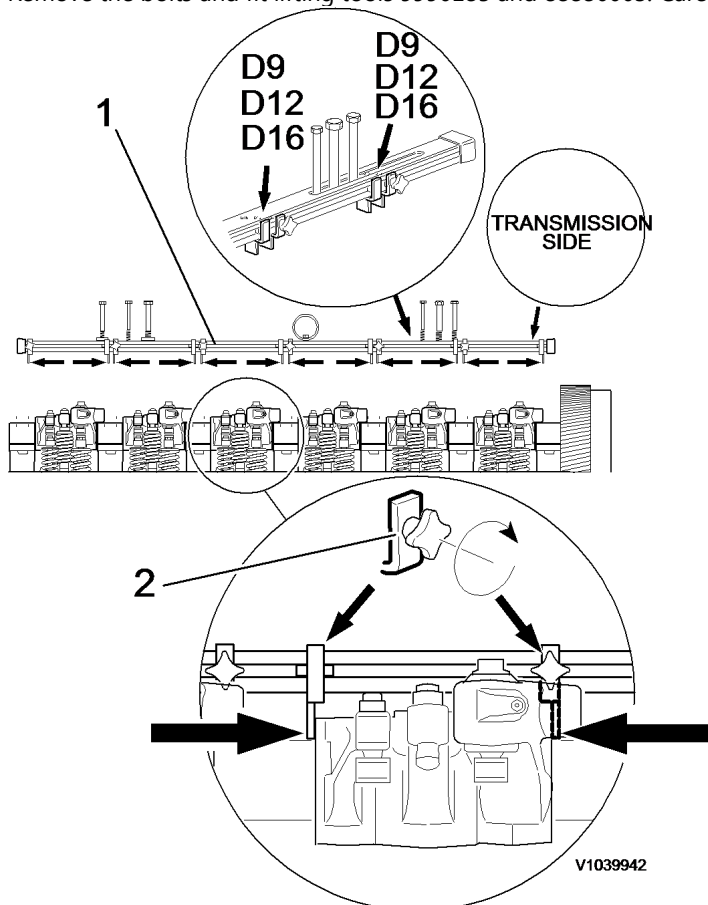


Figure 9

1. 9990185
2. 88880003

16. Remove the adapters 9998248 from all cylinders.

17. Install the unit injectors with new O-rings and centre the unit injectors between the valve springs. Install the attaching yokes.

Tightening torque: see [237 Tightening torques, unit injector](#)

NOTE!

Clean thoroughly before assembling, dust and dirt particles can cause malfunctions.

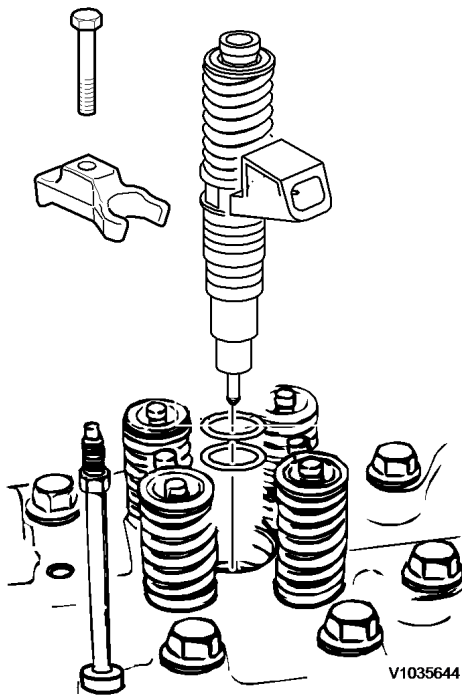


Figure 10

18. Install the rocker arm bridge with lifting tools 9990185 and 88880003.

Tightening of the rocker arm bridge shall take place according to [214 Rocker arm shaft, tightening torques](#) step 2–5.

19. Install the control valve with new O-rings.

Install the stud bolt in front of the control valve.

NOTE!

Use lock fluid on the stud bolt.

20. Adjust the valve clearances and the unit injectors, see [214 Valves, adjusting](#).

21. Fit the electrical connections for all unit injectors and the control valve.

Tightening torque: **1.5 Nm(1.1 lbf ft)**

22. Install the valve cover, see [211 Valve cover, tightening torque](#).

23. Bleed the fuel system, see [230 Fuel system, bleeding](#).

24. Fit the engine hood, see [821 Engine hood, installing](#).

25. Restore the machine to operating condition.



Construction Equipment

Service Information

Document Title: Cylinder compression, VCADS Pro	Function Group: 210	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Cylinder compression, VCADS Pro

Connect VCADS Pro computer and perform 21006-3 Cylinder compression, test.

(21006-3) This test indicates if there is any deviation in compression in any cylinder in relation to the other cylinders.



Construction Equipment

Service Information

Document Title: Stall speed, VCADS Pro	Function Group: 210	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Stall speed, VCADS Pro

Connect VCADS Pro computer and perform 28407-8, Sensor values check.

(28407-8) This test shows the instantaneous values of the sensors.



Construction Equipment

Service Information

Document Title: Idle, VCADS Pro	Function Group: 210	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Idle, VCADS Pro

Connect VCADS Pro computer and perform 17030-2, parameter, programming.

(17030-2) This test shows, among others, the parameter value for the set speed interval.

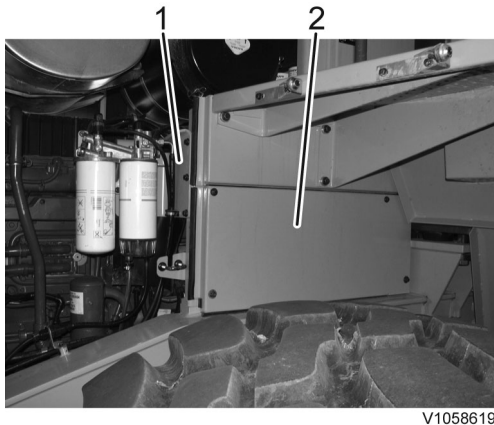
Document Title: Engine rotation speed sensor, replacing	Function Group: 210	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Engine rotation speed sensor, replacing

Op nbr 386-008

[9998517 Setting tool](#)

1. Place the machine in service position 1, see [191 Service position](#).
2. Remove the side panel (2).
Remove and move aside the fuel filter bracket (1).



V1058619

Figure 1

3. Remove the engine speed sensor SE2701 with an Allen head key 5 mm. Clean and check so that the sensor's contact surface is free from burrs.



V1058615

Figure 2

4. Remove the cable clamp under the starter motor.

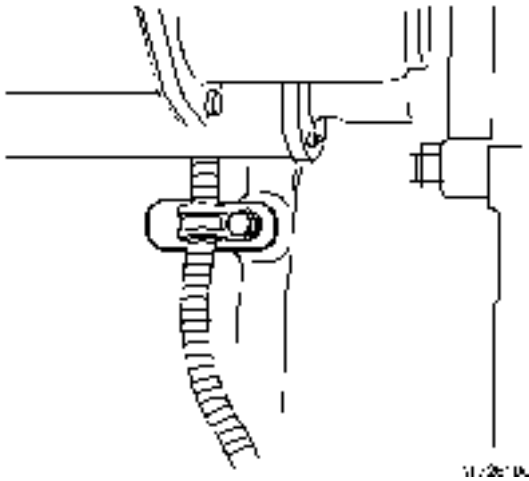


Figure 3

5. Remove the cable box's outer casing (1).



Figure 4

6. Remove the intermediate wall in the cable box.
7. Loosen the cable clamp (2). Remove and unplug the connector (1).

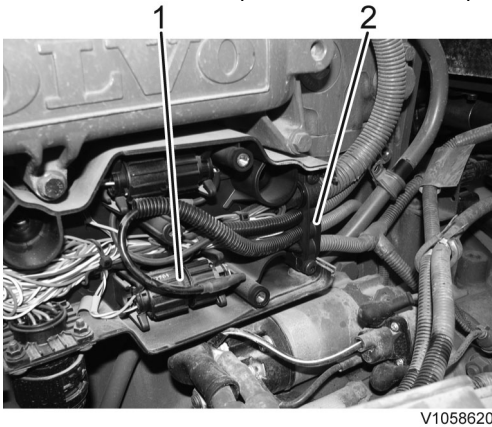


Figure 5

8. Move the lock ring to the middle on the setting tool 9998517 Setting tool.

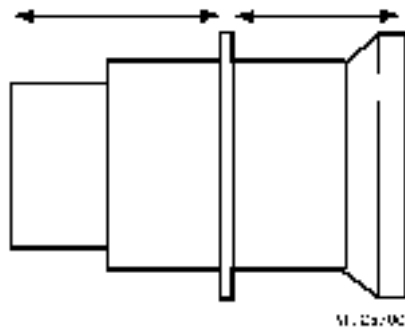


Figure 6

9. Insert the tool in the hole for the sensor and press it to stop against the flywheel.

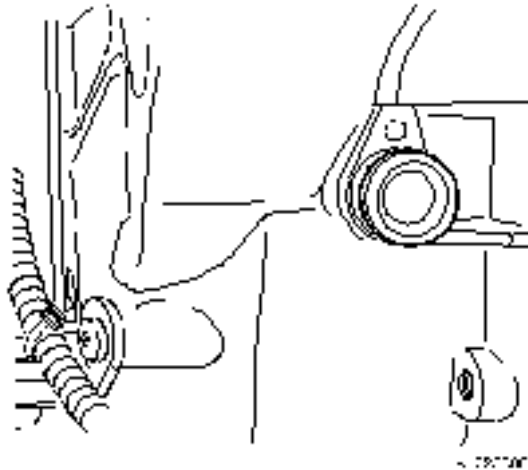


Figure 7

10. Remove the tool and measure the distance between the lock ring and the end of the tool. Note the value **A**.

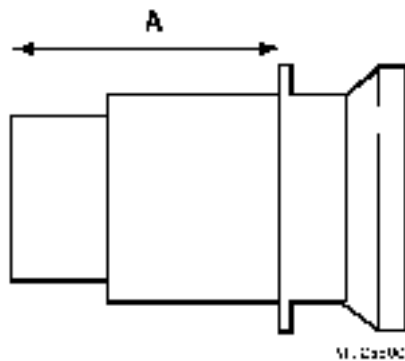


Figure 8

11. Insert the sensor in the tool and measure the distance between the sensor contact surface and the end of the tool. Note the value **B**.

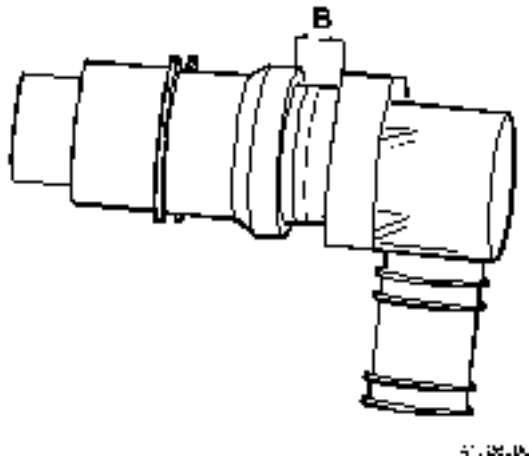


Figure 9

12. Calculate the speed sensor distance as follows.

Distance, lock ring – end of tool (A)	
Distance, sensor – end of tool (B)	
Tool depth	20 mm (0.787 in)
Distance, speed sensor = A - B - 20	

13. Check that the O-ring is intact and grease it with vaseline.
Install the speed sensor with correct shim so that correct distance is obtained between the speed sensor and flywheel, see [030 Speed sensor specifications](#).
14. Install the cable clamp under the starter motor.
15. Plug in the connector (1) and secure it in the cable box. Install the cable clamp (2).

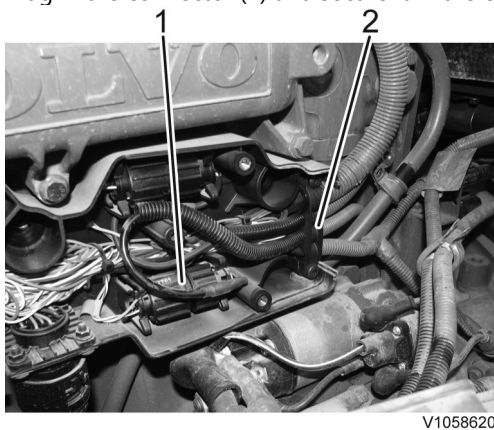


Figure 10

16. Install the intermediate wall in the cable box.
17. Install the cable box's outer casing.
18. Start the machine and check functions.

19. Install the side panel.

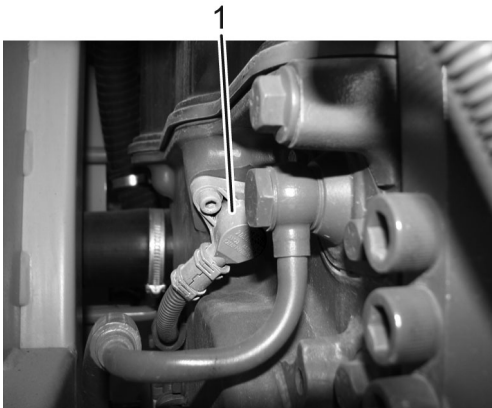
Document Title: Engine rotation speed sensor (camshaft), replacing	Function Group: 210	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Engine rotation speed sensor (camshaft), replacing

Op nbr 386-088

[9998517 Setting tool](#)

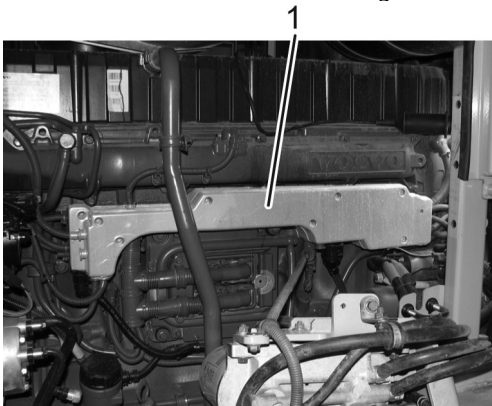
1. Place the machine in service position 1, see [191 Service position](#).
2. Remove the cable clamps on the front of the engine.
3. Remove the camshaft sensor SE2703 with an Allen head key 5 mm. Clean and check so that the sensor's contact surface is free from burrs.



V1058936

Figure 1

1. Camshaft sensor SE2703
4. Remove and move aside the fuel filter bracket.
5. Remove the cable box's outer casing (1).



V1058681

Figure 2

6. Remove the intermediate wall in the cable box.
7. Remove and unplug the connector (1).

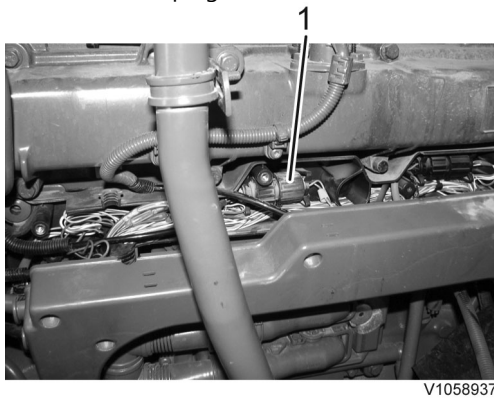


Figure 3

8. Move the lock ring to the middle on the setting tool 9998517 Setting tool.

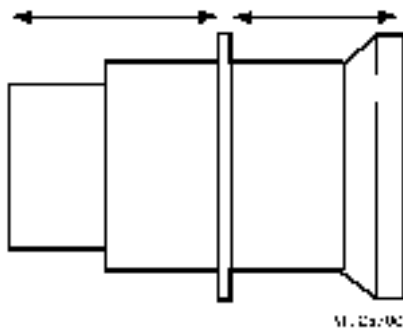


Figure 4

9. Insert the tool in the sensor hole and press it to stop against the camshaft gear.
10. Remove the tool and measure the distance between the lock ring and the end of the tool. Note the value **A**.

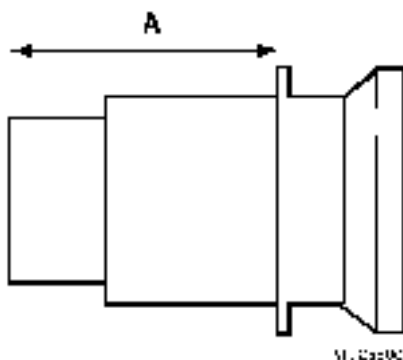


Figure 5

11. Insert the sensor in the tool and measure the distance between the sensor contact surface and the end of the tool. Note the value **B**.

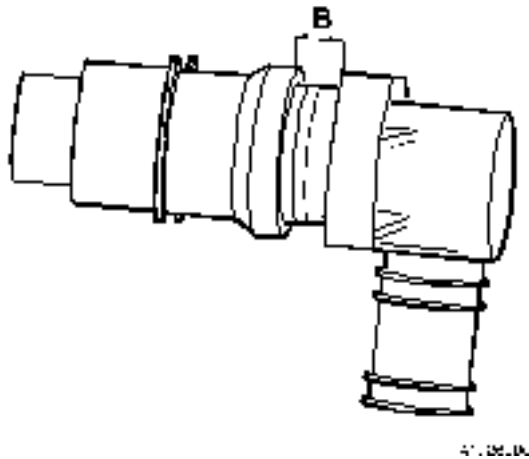


Figure 6

12. Calculate the speed sensor distance as follows.

Distance, lock ring – end of tool (A)	
Distance, sensor – end of tool (B)	
Tool depth	20 mm (0.787 in)
Distance, speed sensor = A - B - 20	

13. Check that the O-ring is intact and grease it with vaseline.
Install the speed sensor with correct shim so that correct distance is obtained between the speed sensor and flywheel, see [030 Speed sensor specifications](#).
14. Install the cable clamps on the front of the engine.
15. Plug in the connector (1) and secure it in the cable box.

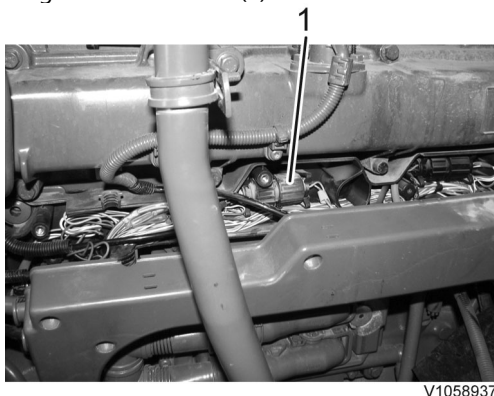


Figure 7

16. Install the intermediate wall in the cable box.
17. Install the cable box's outer casing.
18. Start the machine and check functions.



Construction Equipment

Service Information

Document Title: Camshaft and flywheel signals, checking with VCADS Pro and oscilloscope	Function Group: 210	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E, L220E [GB]			

Camshaft and flywheel signals, checking with VCADS Pro and oscilloscope

Op nbr 210-090

[9990014 Break out harness](#)

[9990062 Cable](#)

[9998699 Adapter](#)

[88890040 Oscilloscope](#)

[VCADS Pro VCADS Pro Service Tool](#)

1. Connect 88890040 Oscilloscope to the VCADS Pro computer and perform 28420-6, Flywheel and camshaft signals, test.

NOTE!

Instructions for how to connect the equipment are described in the VCADS Pro operation.

To be able to start the oscilloscope operation when USB-interface is default in VCADS Pro, then 88890180 Interface must be connected to the computer. However, in this case the interface does not have to be connected to the machine.

For computers with only one USB-port, the interface configuration must be changed to 9998555. However, in this cases the interface does not have to be connected to the machine.

Detailed user support is available under the the menu Help in the software.

NOTE!

The function "Save" overwrites the original file. Therefore, choose "Save as..." to save the read-off.

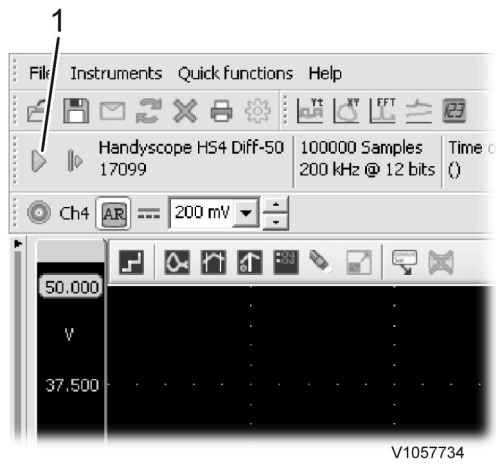


Figure 1

1. Click to start and stop the read-off

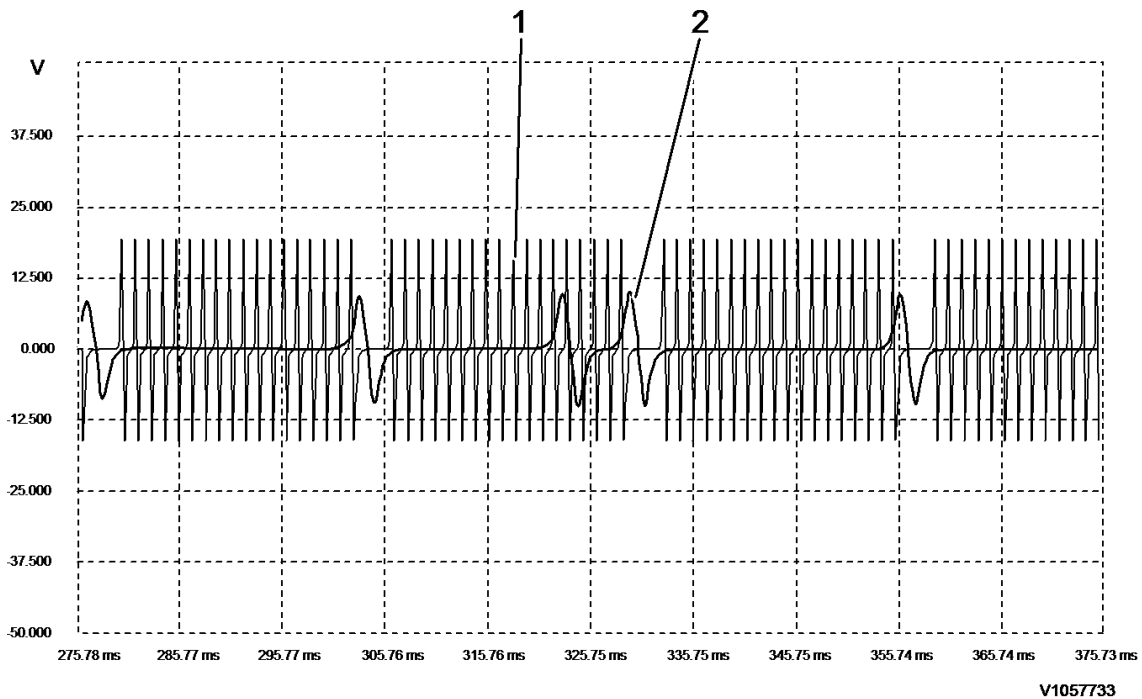


Figure 2

1. Signal from flywheel sensor
 2. Signal from camshaft sensor
2. Check that the signal from the camshaft sensor crosses the signal from the flywheel sensor within the marked area.
 - If the signal for the camshaft sensor is displaced **to the left** the camshaft is displaced **one gear tooth in the camshaft's rotational direction**.
 - If the signal for the camshaft sensor is displaced **to the right** the camshaft is displaced **one gear tooth opposite to the camshaft's rotational direction**.

For adjusting the camshaft's position, see service manual for respective engine.

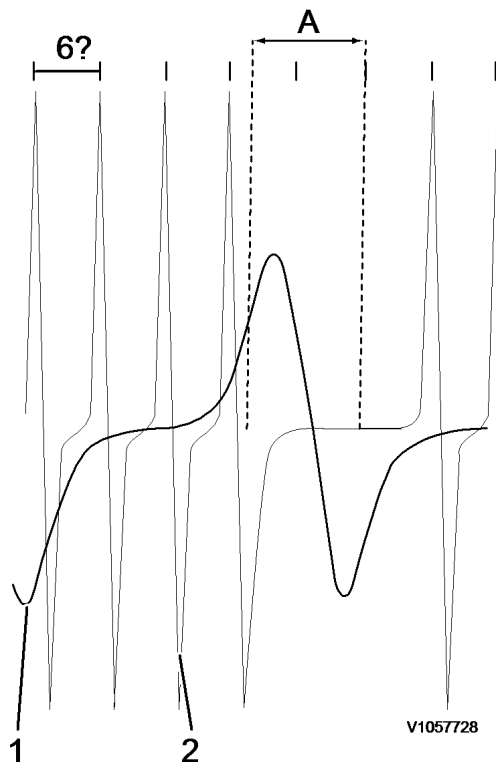


Figure 3
Relationship between camshaft signal and crankshaft signal

- A. Area where the signal from the camshaft shall cross the signal from the flywheel sensor
- 1. Camshaft sensor
- 2. Flywheel sensor

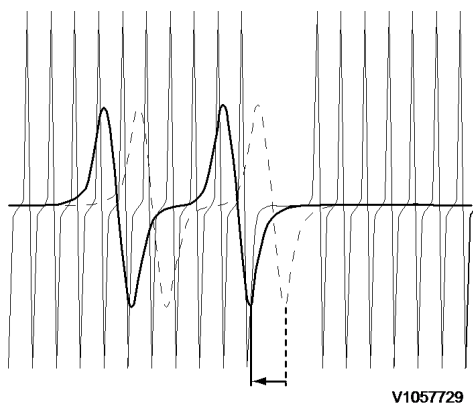


Figure 4
Example of incorrect signal

In this case, the signal for the camshaft sensor is displaced.

- 1. Camshaft sensor
 - 2. Flywheel sensor
3. Check that the curves are not mirror-imaged (see figure). If the curves are mirror-imaged:
- ☐ Check the connection to the oscilloscope.
 - ☐ If the connection to the oscilloscope is correct, check that the connections for the flywheel sensor are installed correctly. If needed, unplug the connector for the flywheel sensor and change place of the cable connections.

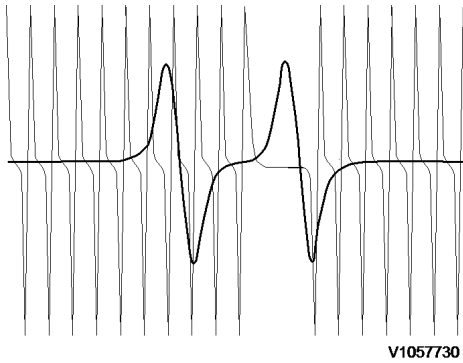


Figure 5

Example of incorrect signal

In this case, the signal for the flywheel sensor is mirror-imaged

4. Check the voltage across the camshaft sensor.

To ensure reliable start and operation of the engine, the voltage across the sensors shall be according to [302 SE2703, description and measuring](#).

If the signal is too low:

- Check that the sensor is correctly installed and adjusted.
- Remove the sensor and check that it is not damaged. Check the distance between the sensor and the sensor ring gear is according to [210 Engine rotation speed sensor \(camshaft\), replacing](#). Install the sensor and check the signal again.

If the sensor is damaged, rotate the crankshaft and check if the camshaft gear has any damage that has caused damage to the sensor.

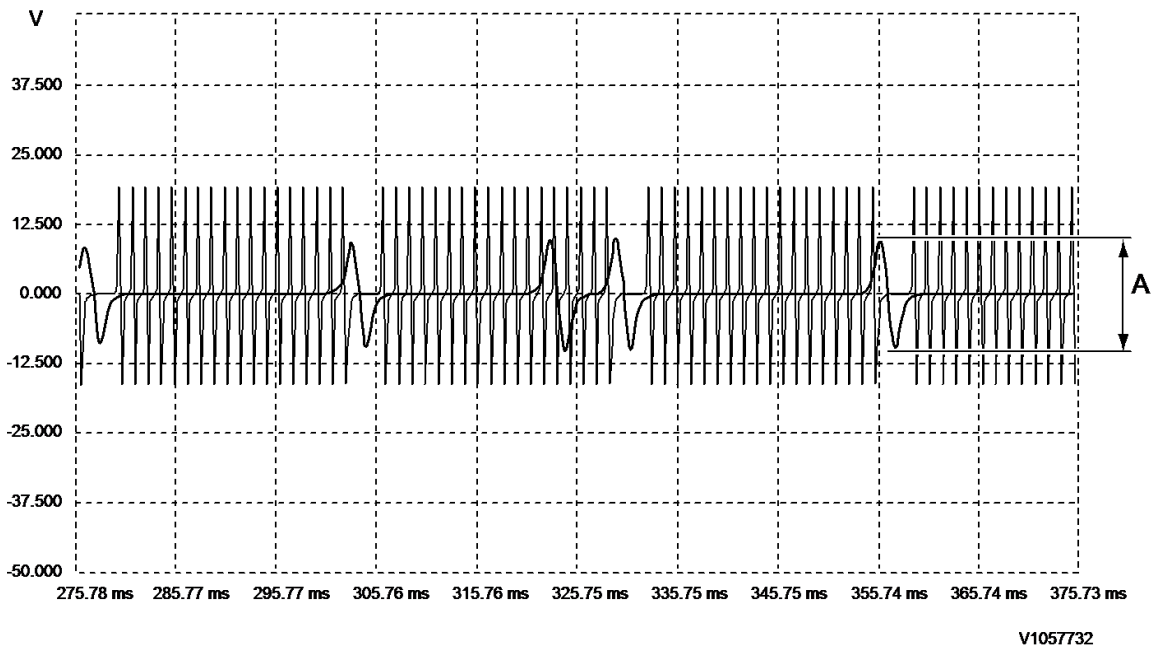


Figure 6

A. Signal voltage camshaft sensor (V)

5. Check the voltage across the flywheel sensor.

To ensure reliable start and operation of the engine, the voltage across the sensors shall be according to [302 SE2701, description and measuring](#).

If the signal is too low:

- Check that the sensor is correctly installed and adjusted.
- Remove the sensor and check that it is not damaged. Check the distance between the sensor and the sensor ring gear/flywheel is according to [210 Engine rotation speed sensor, replacing](#). Install the sensor and check the signal again.

If the sensor is damaged, rotate the crankshaft and check if the flywheel has any damage that has caused damage to the sensor.

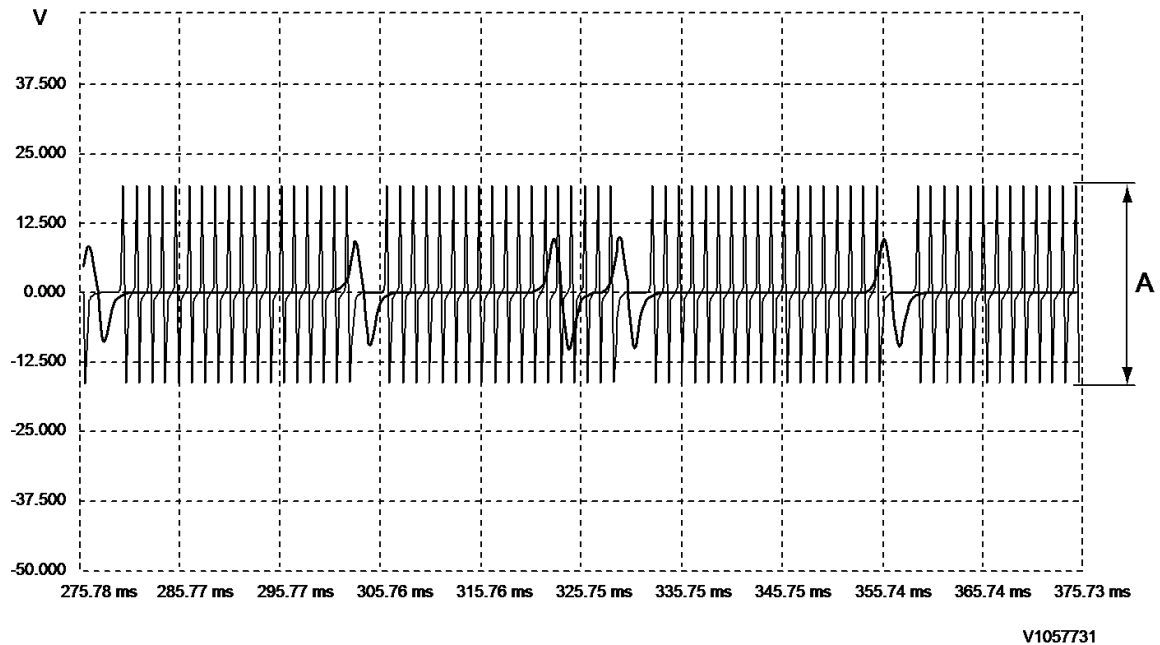


Figure 7

A. Signal voltage flywheel sensor (V)



Construction Equipment

Service Information

Document Title: Camshaft and flywheel signals, checking with VCADS Pro and oscilloscope	Function Group: 210	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E, L220E [GB]			

Camshaft and flywheel signals, checking with VCADS Pro and oscilloscope

Op nbr 210-090

[9990014 Break out harness](#)

[9990062 Cable](#)

[9998699 Adapter](#)

[88890040 Oscilloscope](#)

[VCADS Pro VCADS Pro Service Tool](#)

1. Connect 88890040 Oscilloscope to the VCADS Pro computer and perform 28420-6, Flywheel and camshaft signals, test.

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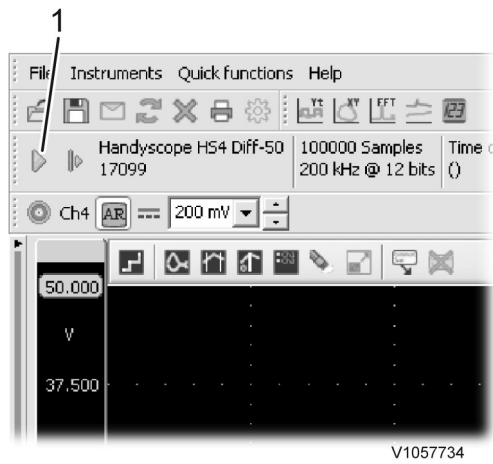


Figure 1

1. Click to start and stop the read-off

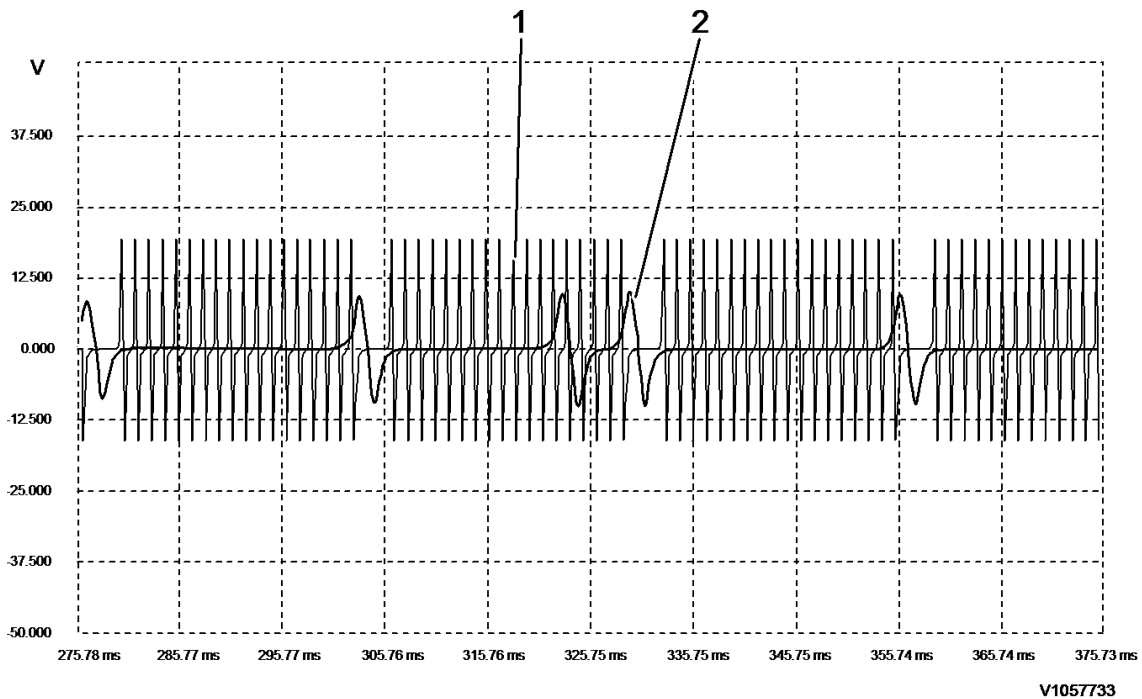


Figure 2

1. Signal from flywheel sensor
 2. Signal from camshaft sensor
2. Check that the signal from the camshaft sensor crosses the signal from the flywheel sensor within the marked area.
 - If the signal for the camshaft sensor is displaced **to the left** the camshaft is displaced **one gear tooth in the camshaft's rotational direction**.
 - If the signal for the camshaft sensor is displaced **to the right** the camshaft is displaced **one gear tooth opposite to the camshaft's rotational direction**.

For adjusting the camshaft's position, see service manual for respective engine.

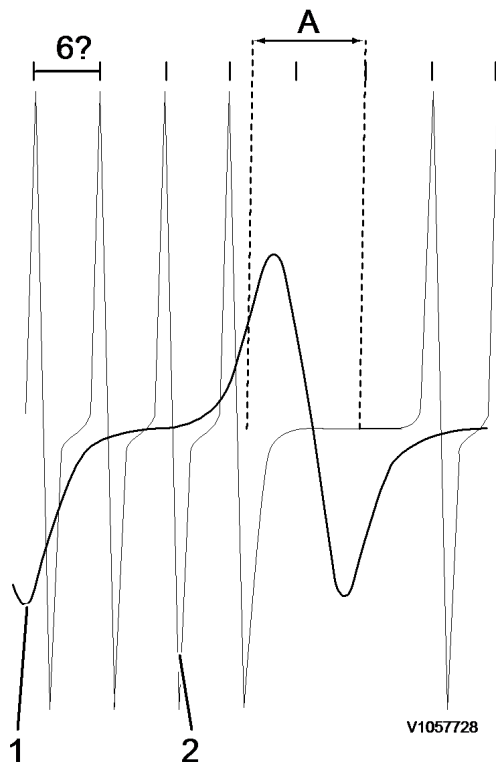


Figure 3
Relationship between camshaft signal and crankshaft signal

- A. Area where the signal from the camshaft shall cross the signal from the flywheel sensor
- 1. Camshaft sensor
- 2. Flywheel sensor

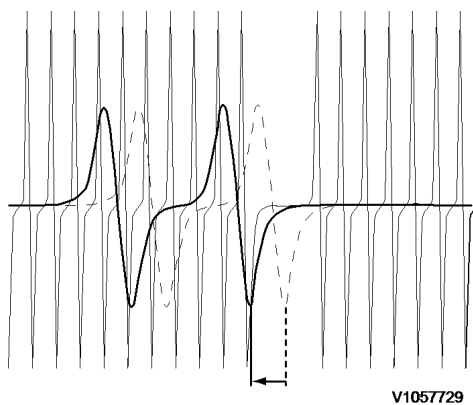


Figure 4
Example of incorrect signal

In this case, the signal for the camshaft sensor is displaced.

- 1. Camshaft sensor
 - 2. Flywheel sensor
3. Check that the curves are not mirror-imaged (see figure). If the curves are mirror-imaged:
- ☐ Check the connection to the oscilloscope.
 - ☐ If the connection to the oscilloscope is correct, check that the connections for the flywheel sensor are installed correctly. If needed, unplug the connector for the flywheel sensor and change place of the cable connections.

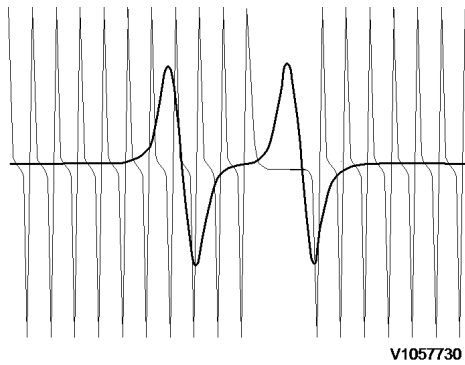


Figure 5

Example of incorrect signal

In this case, the signal for the flywheel sensor is mirror-imaged

4. Check the voltage across the camshaft sensor.

To ensure reliable start and operation of the engine, the voltage across the sensors shall be according to [302 SE2703, description and measuring](#).

If the signal is too low:

- Check that the sensor is correctly installed and adjusted.
- Remove the sensor and check that it is not damaged. Check the distance between the sensor and the sensor ring gear is according to [210 Engine rotation speed sensor \(camshaft\), replacing](#). Install the sensor and check the signal again.

If the sensor is damaged, rotate the crankshaft and check if the camshaft gear has any damage that has caused damage to the sensor.

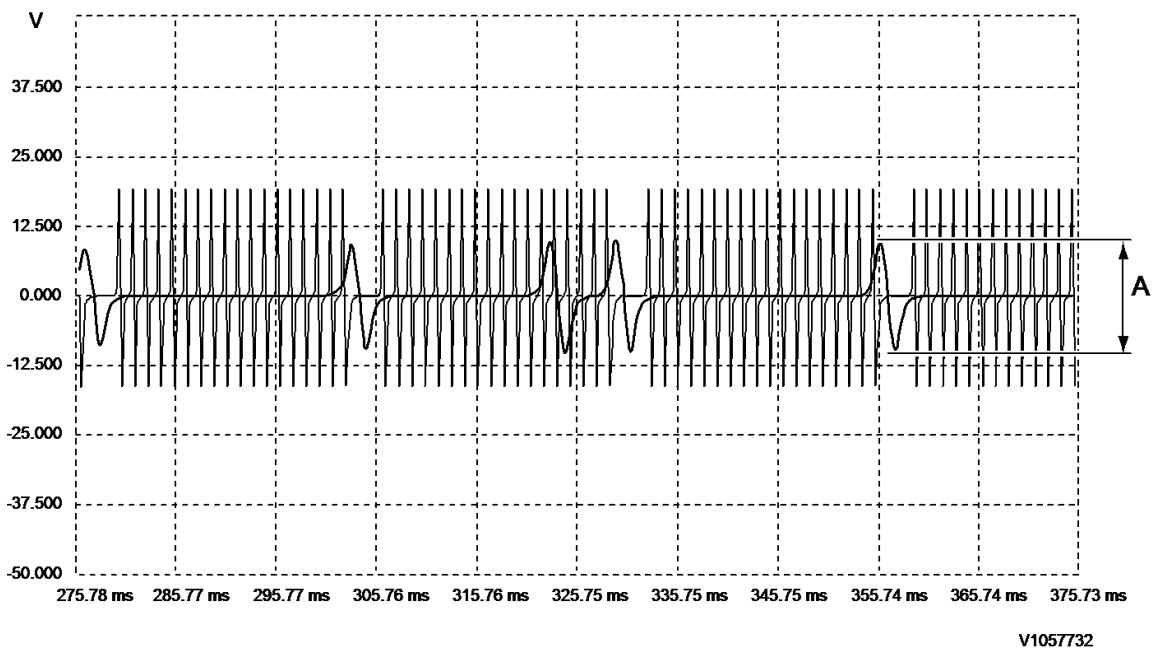


Figure 6

A. Signal voltage camshaft sensor (V)

5. Check the voltage across the flywheel sensor.

To ensure reliable start and operation of the engine, the voltage across the sensors shall be according to [302 SE2701, description and measuring](#).

If the signal is too low:

- Check that the sensor is correctly installed and adjusted.
- Remove the sensor and check that it is not damaged. Check the distance between the sensor and the sensor ring gear/flywheel is according to [210 Engine rotation speed sensor, replacing](#). Install the sensor and check the signal again.

If the sensor is damaged, rotate the crankshaft and check if the flywheel has any damage that has caused damage to the sensor.

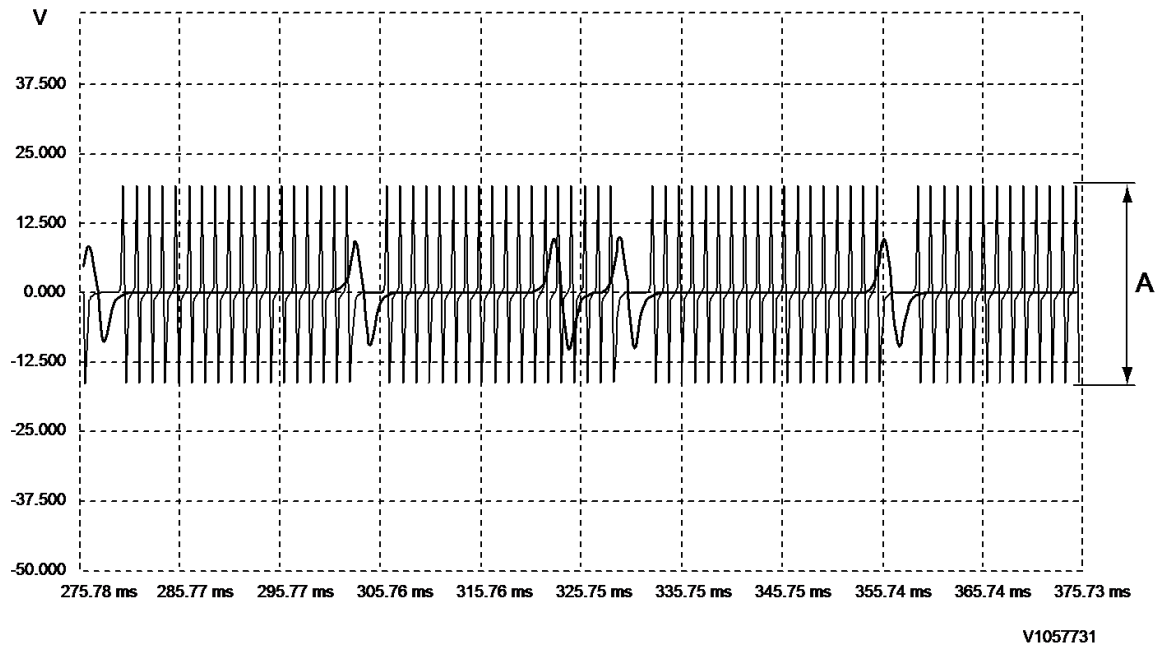


Figure 7

A. Signal voltage flywheel sensor (V)

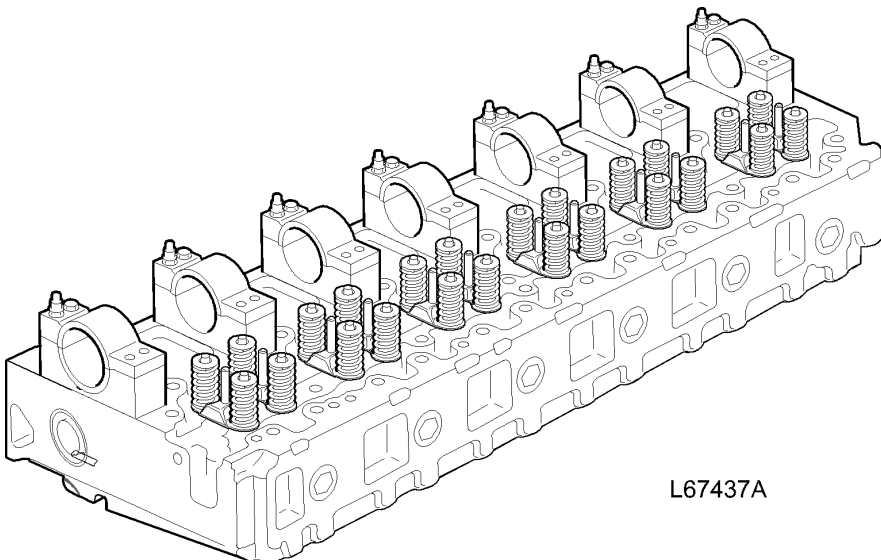
Document Title: Cylinder head, description	Function Group: 211	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Cylinder head, description

The cylinder head is made of cast iron and made in one piece, which is a condition for a stable support for the overhead camshaft in its bearings. The camshaft is journalled in seven bearing housings provided with replaceable bearing shells. Because the engine has a four-valve system and centrally positioned injectors, the combustion chambers are completely symmetrical. The cylinder head is secured with 38 M16 bolts, evenly distributed around each cylinder.

Each cylinder has separate inlet and exhaust ducts and so called cross-flow. The valve guides, which are made of alloy cast iron, and the steel valve seats, are replaceable. All valve guides have oil seals.

The lower end of the injector is located in a copper sleeve, the lower end of which is flared. The upper end of the copper sleeve is sealed with a rubber ring. The fuel duct to the injectors is machined directly in the cylinder head. The coolant thermostat is integrated in the cylinder head.



L67437A

Figure 1
Cylinder head

Document Title: Valve cover, changing the gasket (in field)	Function Group: 211	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Valve cover, changing the gasket (in field)

Op nbr 21436

Removing

1. Clean the valve cover and surrounding components thoroughly. This is to avoid dirt entering the cylinder head when the cover is removed.
2. Remove the retaining bolts from the engine hood (4 bolts).

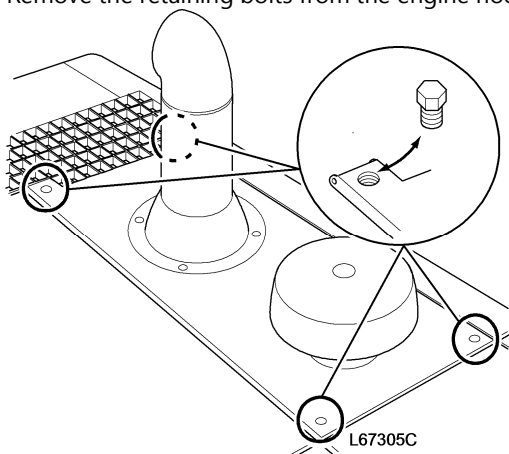


Figure 1

3. Undo the exhaust pipe clamp and disconnect the pipe from the silencer. Disconnect the air hose between the turbocharger and air cleaner from the air cleaner. Leave the hose connected to the turbocharger. Raise the engine hood as far as possible with the tool supplied with the machine placed on the hydraulic tank. Secure the engine hood with the tool retainer.

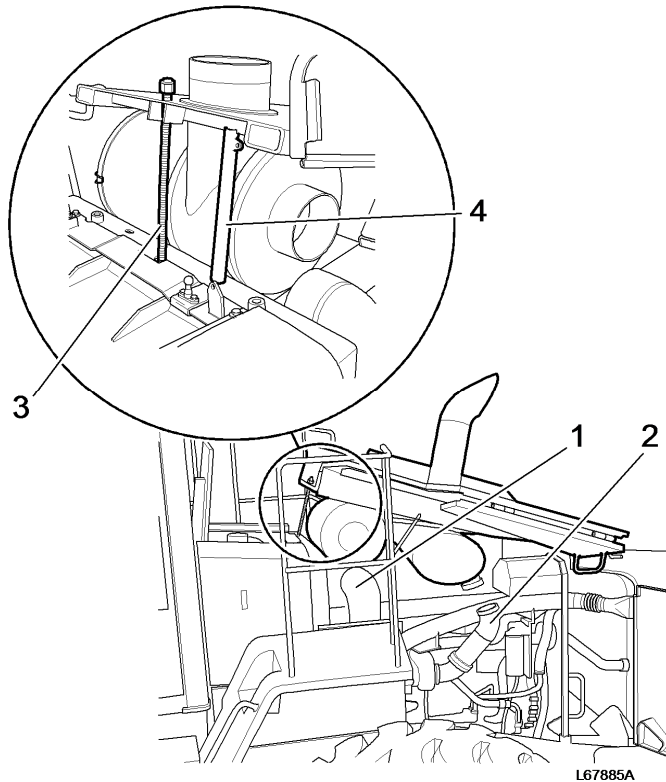


Figure 2

1. Air hose
2. Exhaust pipe clamp
3. Tool for raising the engine hood
4. Retainer, securing the engine hood

! WARNING

4.

Risk of burns when removing the header tank cap because of excess pressure in the cooling system.

Open the header tank cap.

Drain enough coolant to empty the header tank. Use the drain hose stored in the right-hand battery box or the tool box on the machine.

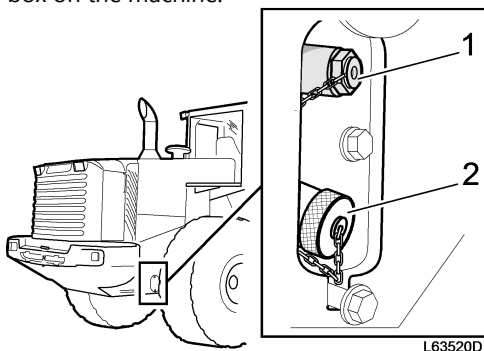


Figure 3

1. Draining the coolant
2. Draining the engine oil

5. Disconnect the three coolant hoses from the header tank. Unplug the connector for SE2603.

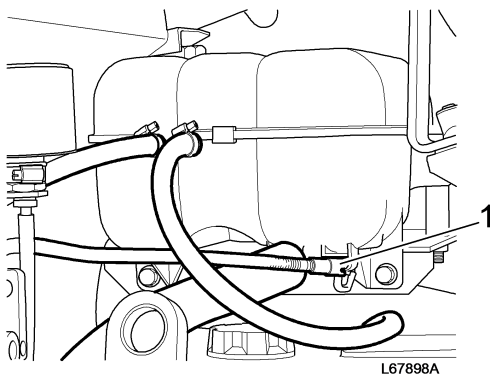


Figure 4

1. SE2603
6. Detach the bracket on which the heater tank is mounted.
Move the bracket to one side and secure it to the hood with a strap or similar.

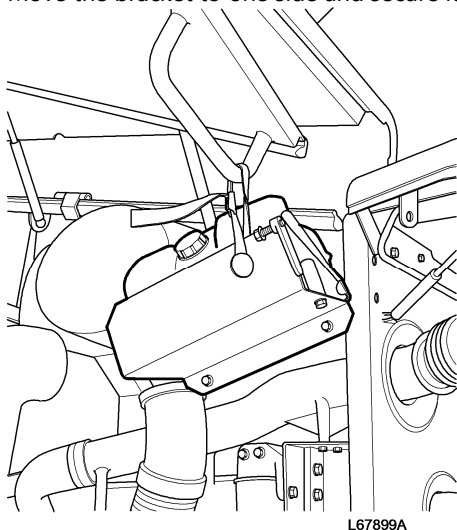


Figure 5

7. Remove the cable clamps on the member behind the hydraulic tank, the rear axle breather filter and the relay, if fitted.

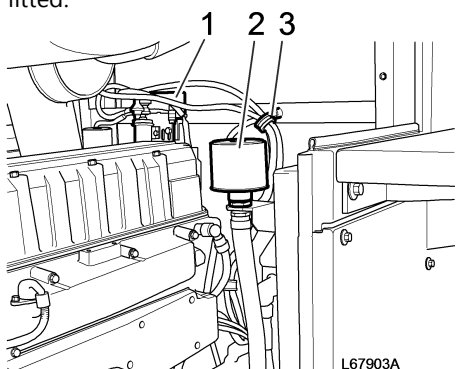


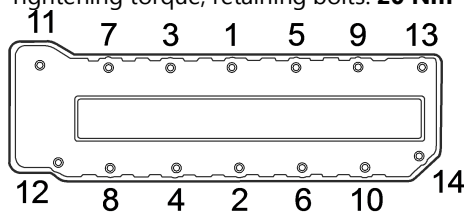
Figure 6

1. Relay
2. Clamps
3. Breather filter

8. Remove the valve cover.

Installation

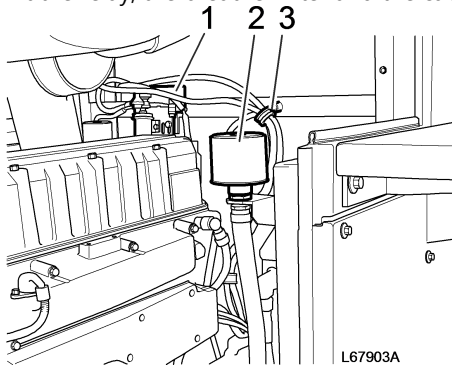
9. Clean the valve cover and fit the new gasket.
Fit the valve cover. Tighten the bolts in the sequence specified in the diagram.
Tightening torque, retaining bolts: **20 Nm**



L67909A

Figure 7
Tightening sequence, valve cover

10. Fit the relay, the breather filter and the cable clamps.

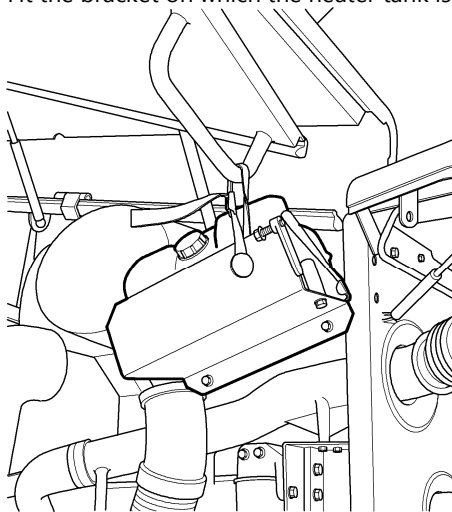


L67903A

Figure 8

1. Relay
2. Clamps
3. Breather filter

11. Fit the cable clamps on the member behind the hydraulic tank and the relay (if applicable).
12. Fit the bracket on which the heater tank is mounted.



L67899A

Figure 9

13. Connect the three coolant hoses to the header tank. Plug in the connector to SE2603.

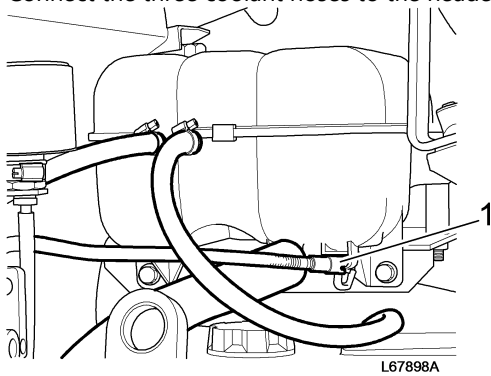


Figure 10

1. SE2603

14. Remove the tool retainer securing the hood. Lower the hood. Fit the exhaust pipe clamp and the pipe to the silencer. Connect the air hose between the turbocharger and air cleaner.

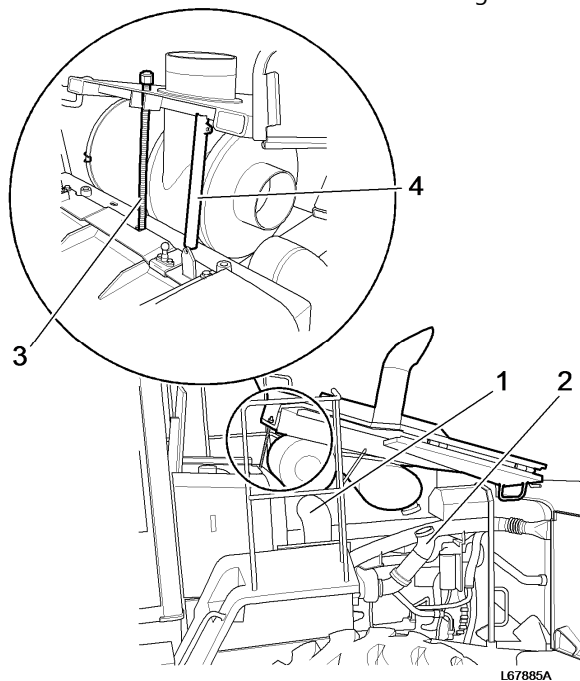


Figure 11

1. Air hose
2. Exhaust pipe clamp
3. Tool for raising the engine hood
4. Retainer, securing the engine hood

15. Fit the bolts retaining the engine hood.

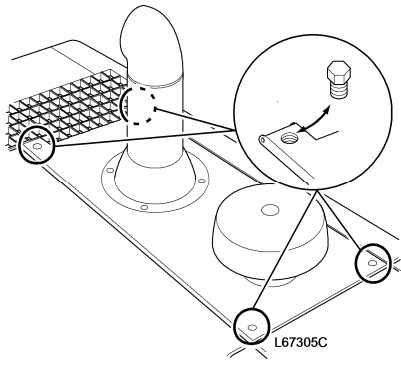


Figure 12

Document Title: Valve cover, changing gasket	Function Group: 211	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Valve cover, changing gasket

Op nbr

999 3590 Rotation tool

Exhaust valves

1. Remove the engine hood, see [821 Engine hood, removing](#).
2. Remove the valve cover.
3. Remove the old gasket from the valve cover.
4. Clean the valve cover and the cylinder head from remains of the old gasket.
5. Fit the new gasket in the valve cover.
6. Fit the valve cover. Tightening torque: **20 Nm**

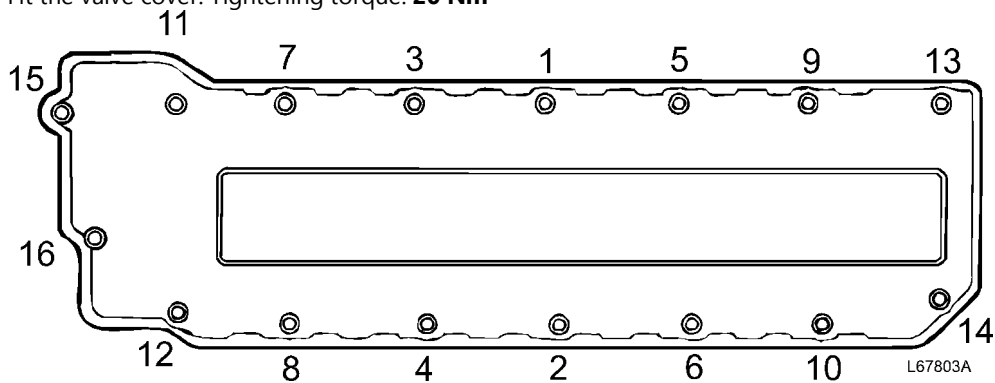


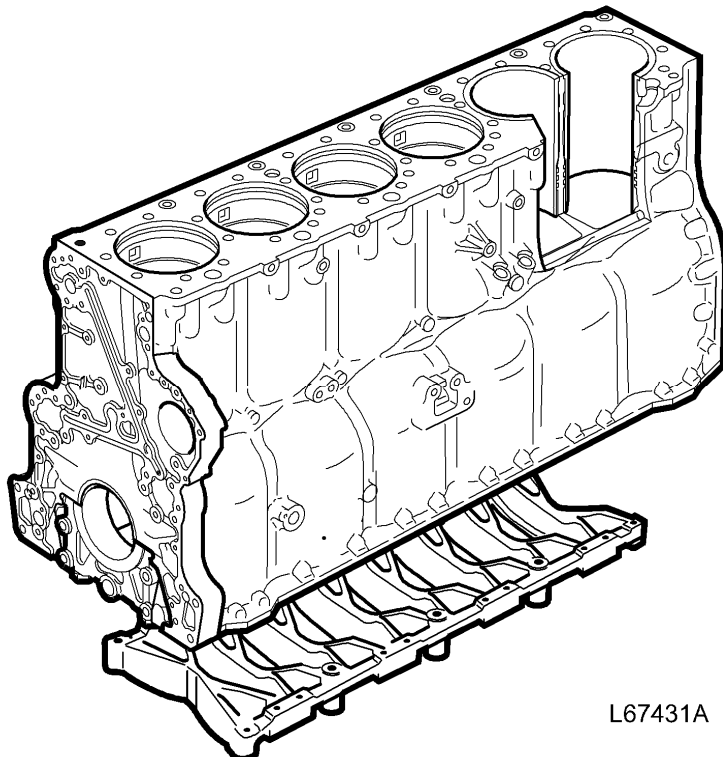
Figure 1
Tightening diagram for valve cover

7. Fit the engine hood, see [821 Engine hood, installing](#).

Document Title: Cylinder block, description	Function Group: 212	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Cylinder block, description

The cylinder block is made of cast iron and provided with so called wet cylinder liners. For the cylinder block to obtain high rigidity and good sound dampening its sides are curved round each cylinder. To further stiffen the block construction a frame, made of nodular iron, is bolted to its bottom plane.



L67431A

Figure 1
Cylinder block

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Cylinder liner, description](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8002

Serial number stop: 10999

- [Cylinder liner, description](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Document Title: Cylinder liner, description	Function Group: 213	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Cylinder liner, description

The cylinder liner seals against the coolant casing with rubber rings.

At the top with a seal (1) of EPDM-rubber, installed in a groove in the liner. The lower seal consists of three rings installed in grooves in the block. The two upper (2) are of EPDM-rubber (black) and the lower (3) of fluor rubber (violet). Also, a thin bead of silicone is applied between the liner collar and the block's liner shelf.

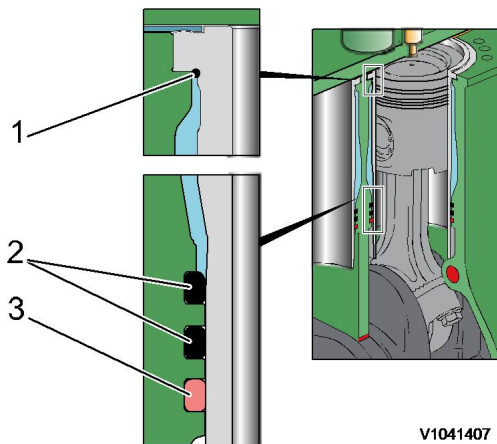


Figure 1
Cylinder liner with seal rings and piston

The gasket is made of a single piece of solid steel for the whole engine. There are rubber ring seals for coolant and oil connections between cylinder head and block. The liner's contact face against the steel gasket has a convex shape and its height above the block face is 0.15–0.21 mm.

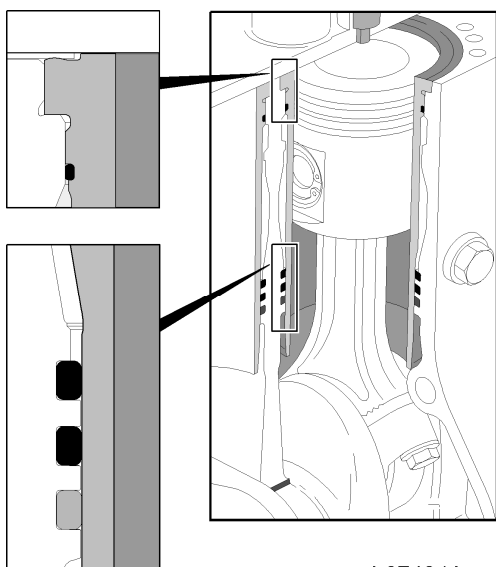
Document Title: Cylinder liner, description	Function Group: 213	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Cylinder liner, description

The cylinder liner is sealed against the coolant jacket with rubber rings.

At the upper edge there is a seal ring made of EPDM rubber mounted in a groove in the liner. The lower seal consist of three rings mounted in grooves in the block. The two upper ones are made of EPDM rubber (black) and the lower one from fluor rubber (violet). In addition, a thin bead of silicone rubber is applied between the liner flange and the liner location in the block, before the liner is installed.



L67434A

Figure 1
Cylinder liner with seal rings, piston

The gasket is made of solid steel in one piece for the whole engine. There are rubber ring seals for the coolant and oil ducts between cylinder head and block. The liner contact face against the steel gasket has a convex curve and its height above the block face is 0.15–0.20 mm (0.006–0.008 in).

Document Title: Pistons, description	Function Group: 213	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Pistons, description

The aluminium piston has oil cooling.
The compression ratio is 18.5:1.

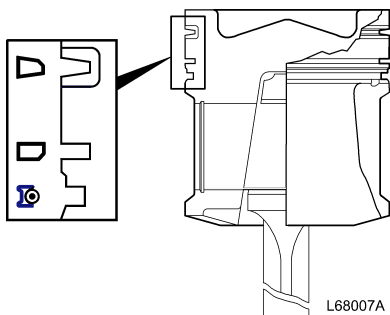


Figure 1

All aluminium piston with piston rings

The piston has three piston rings, two compression rings and one oil control ring. The upper compression ring is of the "keystone" type.

The connecting rod is made of forged steel and has a trapezoidal upper part.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Valve mechanism, description](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8002

Serial number stop: 10999

- [Valve mechanism, description](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 7398, 69999

Document Title: Valve mechanism, description	Function Group: 214	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Valve mechanism, description

The D12D has a four-valve system and overhead camshaft.

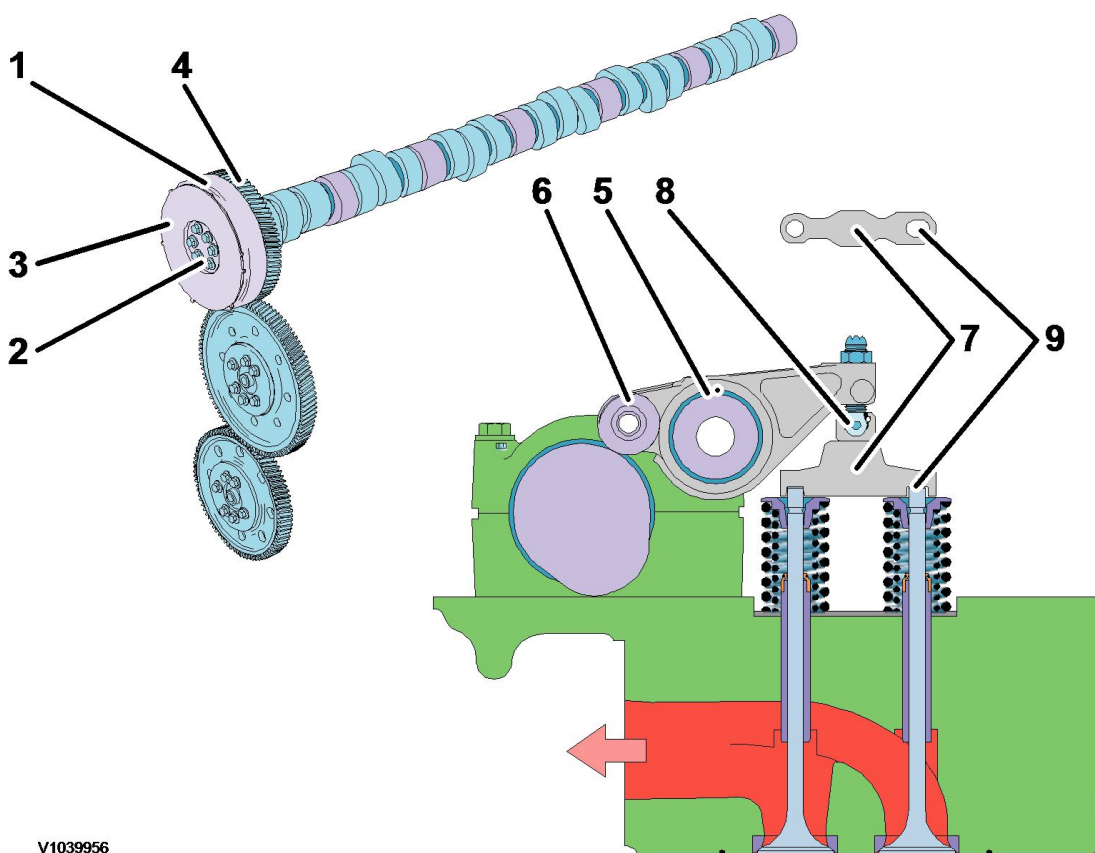
The camshaft is journaled in 7 bearing brackets with replaceable bearing shells. The foremost bearing is a thrust bearing. The camshaft is induction hardened and has three cams per cylinder. In addition to the inlet and exhaust cams there are cams for the unit injectors.

A vibration damper, a spacer and a toothed wheel for the position sensor are bolted on the camshaft's front flange outside of the cam gear.

The rocker arms have pressed-in bushings and are carried on a shaft secured by the same bolts as the camshaft's bearing houses. The rocker arms' contact against the camshaft takes place via rollers and against the valve yokes via ball sockets.

The valves yokes are of floating type, without guide pin. Seen from below, the yokes have two machined grooves (one round and one oval), which fit against the valve stems when installing. The yokes shall face with the oval machined groove away from the camshaft, as shown in the figure.

The exhaust valves have two springs and the inlet valves one spring each. All valve guides have oil seals.



V1039956

Figure 1
Valve mechanism

1. Vibration damper
2. Spacer
3. Toothed wheel
4. Cam gear
5. Bushing
6. Roller
7. Valve yoke
8. Ball socket
9. Machined groove

Document Title: Valve mechanism, description	Function Group: 214	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Valve mechanism, description

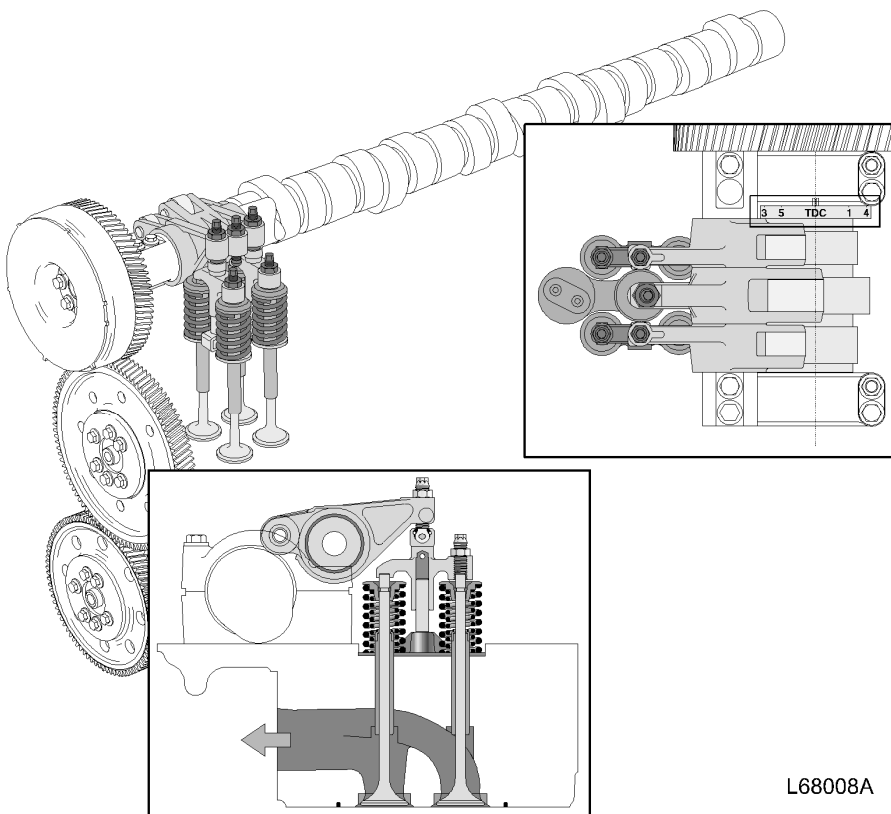
The D12 C has a four-valve system and overhead camshaft.

The camshaft is journaled in 7 bearing brackets with replaceable bearing shells. The foremost bearing is a thrust bearing. The camshaft is induction hardened and has three cams per cylinder. In addition to the inlet and exhaust cams there are cams for the unit injectors.

There is a vibration damper and a sensor wheel for the position sensor bolted to the camshaft gear on the camshaft's front flange. The vibration damper is of the hydraulic type (its function is shown in figure 9).

The rocker arms have pressed bushings and are journaled on a shaft that is retained by the same bolts as the camshaft's bearing housings. There are rollers between the rocker arms and camshaft and ball seats between the arms and valves.

The exhaust valves have two springs and the inlet valves one spring each. All valve guides have oil seals.



L68008A

Figure 1
Valve mechanism

Document Title: Internal Exhaust Gas Recirculation description	Function Group: 214	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Internal Exhaust Gas Recirculation (IEGR), description

As a part of V-ACT (Volvo Advanced Combustion Technology), a system is used for IEGR (**I**nternal **E**xhaust **G**as **R**ecirculation). On D12D this takes place using a double rocker arm, consisting of an exhaust rocker arm and a follower arm, which enables a second opening of the exhaust valves. When activated, the follower arm will give a limited valve opening of the exhaust valves during the inlet phase, which leads exhausts back into the cylinder.

The clearance between the follower arm and the camshaft is adjusted on the camshaft's base circle. The clearance shall always be checked and adjusted, if needed, when the valve clearance is checked and adjusted.

When replacing follower arm due to damage or wear, the entire double rocker arm shall be replaced, complete.

It is important to keep the follower arm clean, pay special attention to the contact face against the camshaft.

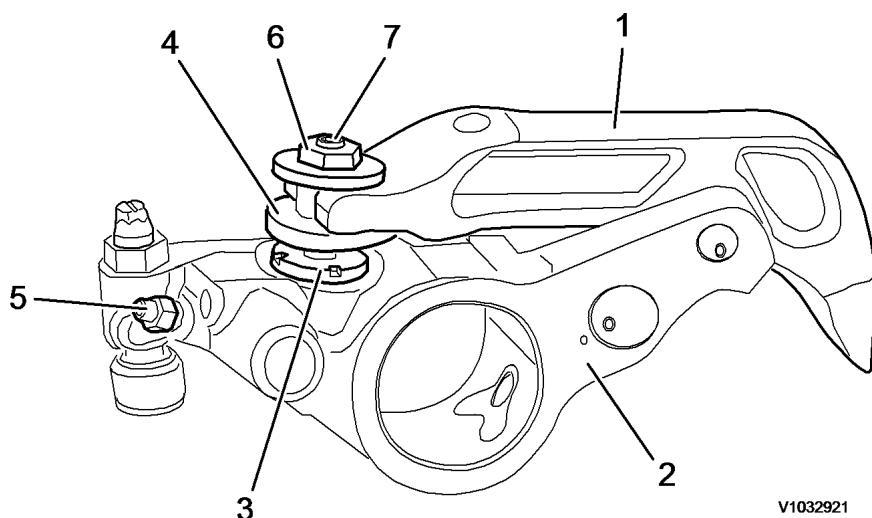


Figure 1
Double rocker arm with follower arm

1. Follower arm
2. Exhaust rocker arm
3. Stop nut
4. Sleeve
5. Nipple
6. Lock nut
7. Adjusting screw/piston

Hydraulic system for piston movement

The piston controls the follower arm.

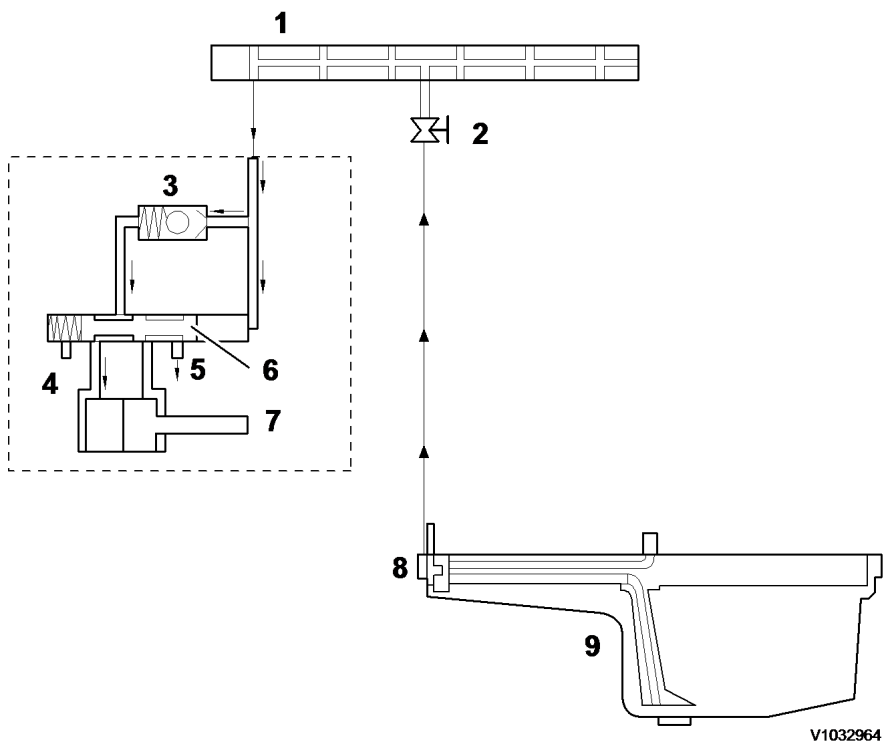


Figure 2
Oil system for double rocker arm, engaging and disengaging IEGR

1. Rocker arm shaft
2. IEGR valve
3. Non-return valve
4. Drain valve
5. Drain valve
6. Control slide
7. Piston
8. Oil pump
9. Oil sump

The oil comes from the oil sump and passes via the oil pump, the IEGR valve and rocker arm shaft to the double rocker arm. The rocker arm shaft is provided with lubrication oil through a hole in the rocker arm bushing (oil is only allowed through the non-return valve in one direction).

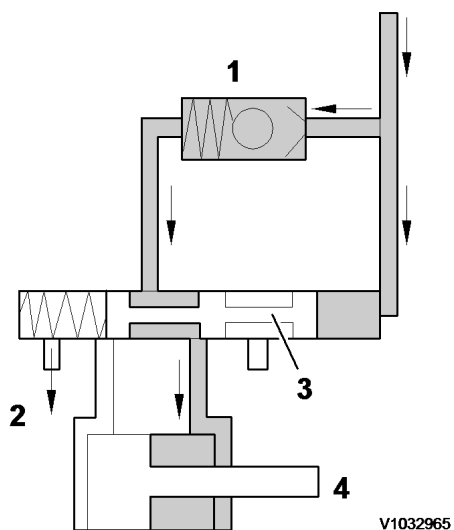


Figure 3
IEGR disengaged

1. Non-return valve
2. Drain valve
3. Control slide
4. Piston

If the oil pressure in the rocker arm is 150 kPa (1.5 bar, 21.8 PSI) or lower, the spring force in the control slide will not be overcome. The control slide will remain in the original position.

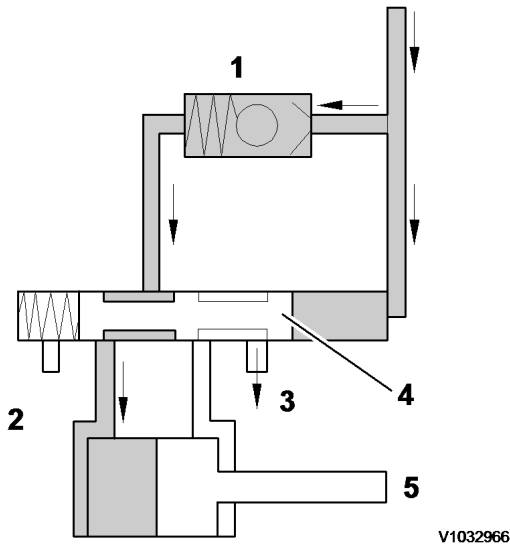


Figure 4
IEGR engaged

1. Non-return valve
2. Drain valve
3. Drain valve
4. Control slide
5. Piston

If the oil pressure exceeds 180 kPa (1.8 bar, 26.1 PSI), the spring force in the control slide will be overcome. The slide will move toward the left position.

IEGR not activated

Oil pressure forces the piston to its bottom position, the follower arm follows along. The camshaft will now pass without touching with the follower arm's contact face.

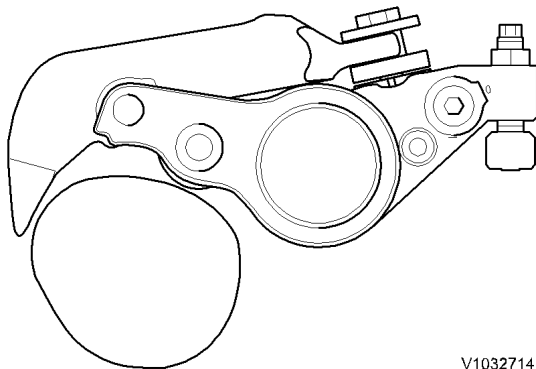


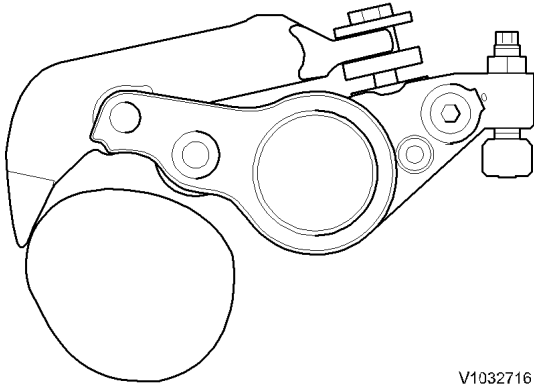
Figure 5
Double rocker arm not activated

IEGR activated

The oil pressure forces the piston to its upper position. The follower arm follows along.

When the camshaft rotates, it will first strike "the roller" on the exhaust rocker and the normal valve lift will take place.

The next step is that the camshaft will strike the contact face on the follower arm. The camshaft forces the follower arm and piston downward. The force passes through the piston via compressed oil to the exhaust rocker which gives a second, smaller, valve lift.



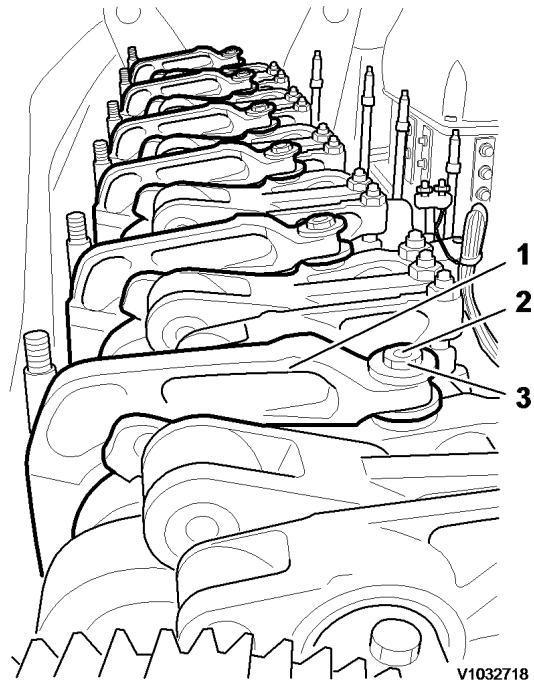
V1032716

Figure 6

Double rocker arm activated

Checking and adjusting

The double rocker arm's adjustment shall be checked after the engine's first 1000 hours, adjust as needed. Thereafter checking and adjusting shall be performed together with valves, checking and adjusting.



V1032718

Figure 7

Double rocker arm, installed in engine

1. Double rocker arm
2. Adjusting screw
3. Lock nut

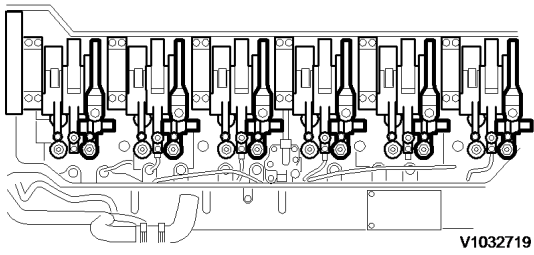


Figure 8
Valves with double rocker arm

Document Title: Valves, adjusting	Function Group: 214	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Valves, adjusting

Op nbr 214-012

[9998583 Gauge](#)

[9993590 Gear wheel](#)

Dial indicator

Magnetic base

1. Place the machine in service position, see [191 Safety rules when servicing](#).
2. Remove the engine hood, see (missing hyperlink).
3. Remove the valve cover.
4. Rotate the flywheel with tool 999 3590, until the closest digit marking on the camshaft is positioned between the two marks on the bearing cap.
The digit indicates on which cylinder valve clearance and unit injector shall be adjusted.

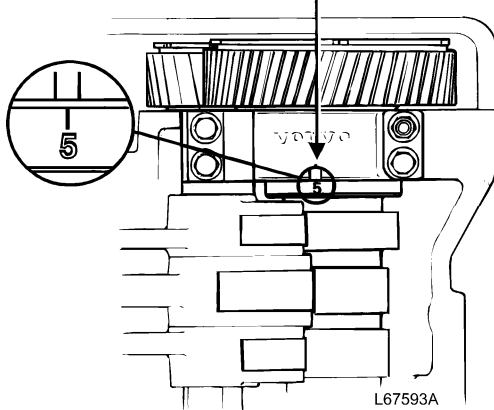


Figure 1
Camshaft marking

5. Adjust zero clearance on the valve yoke so that it does not have contact with the valve spindle.

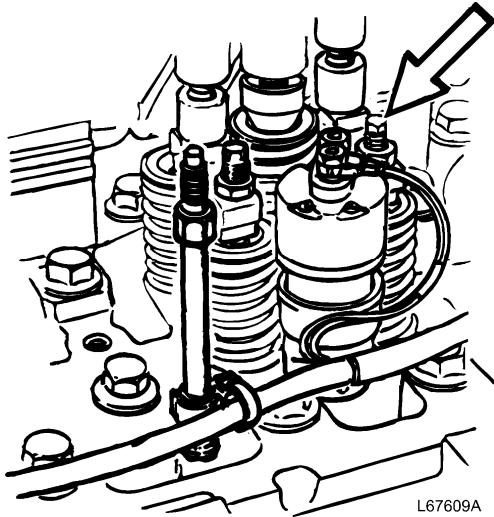


Figure 2
Valve yoke's adjusting screw

6. Screw down the adjusting screw to contact with the valve spindle, and then another hex edge (60°). Tighten the lock nut. Tightening torque: **38 Nm (28 lbf ft)**

NOTE!

When the adjusting screw is screwed down, the valve yoke must be pressed to contact with the valve stems at the same time. It is very important that the pressure is applied as close as possible to the adjusting screw, see fig.

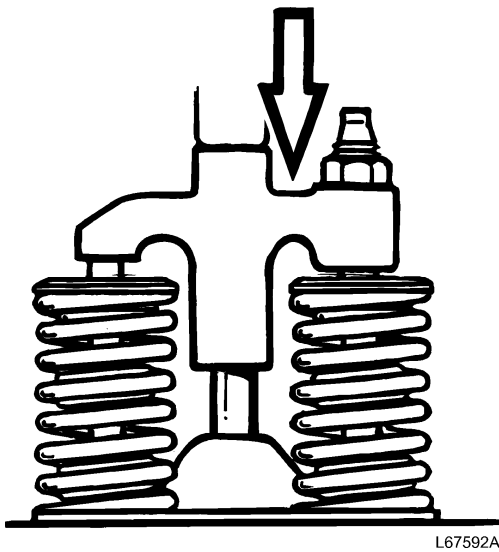


Figure 3

7. Adjust correct valve clearance and tighten the lock nut.
Tightening torque: **38 Nm (28 lbf ft)**.
Adjust both inlet and exhaust valves on the cylinder in question.

Valve clearance

Inlet	0.20 mm (0.008 in)
Exhaust	0.50 mm (0.020 in)

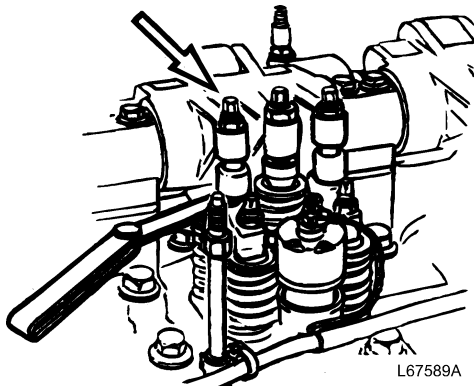


Figure 4

Unit injectors, adjusting

8. Fit gauge 999 8583 on a dial indicator with magnetic base.
Place the dial indicator so that the gauge's flange has contact with the unit injector's spring plate and the point is aimed at the plane surface between the spring seat and the solenoid valve.

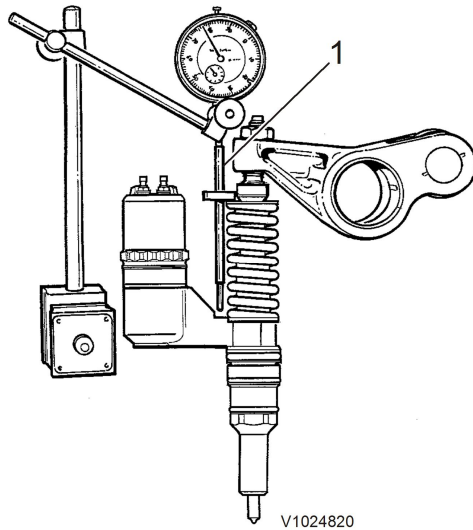


Figure 5

1. 999 8583 Gauge
9. Set 5 mm pre-load on the dial indicator.
Set the unit injector's pre-load by turning the rocker arm's adjusting screw until the gauge's point lands on the plane surface and the indicator on the dial indicator stops.
Tighten the adjusting screw's nut.

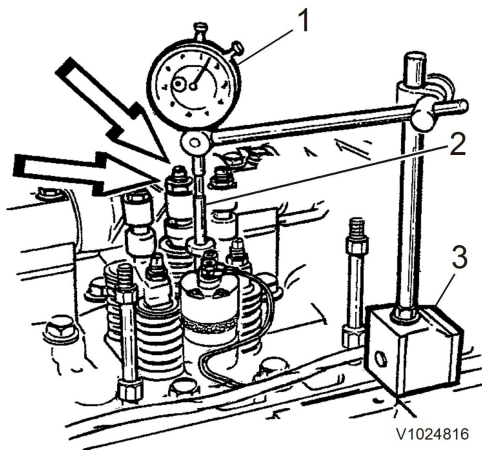


Figure 6

1. Dial indicator
2. 999 8583 Gauge
3. Magnetic base

10. Rotate the engine so that the next digit marking on the camshaft is positioned between the two marks on the bearing cap.
Adjust the other cylinders in the same way.

11. Fit the valve cover.

Tightening torque: **20 Nm (14.75 lbf ft)**.

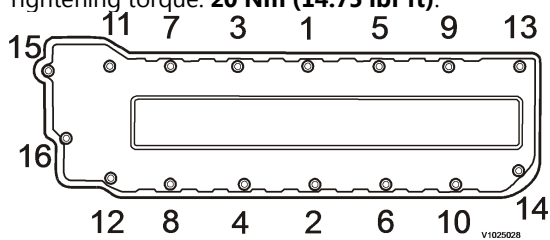


Figure 7

Tightening diagram for valve cover

12. Fit the engine hood, see (missing hyperlink).
13. Restore the machine to operating condition.

Document Title: Valves, adjusting	Function Group: 214	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Valves, adjusting

Op nbr 214-012

[88820003 Setting tool](#)

[9993590 Gear wheel](#)

Feeler gauge

1. Place the machine in service position, see [191 Safety rules when servicing](#).
2. Remove the engine hood, see [821 Engine hood, removing](#)
3. Remove the valve cover.
4. Remove the protective cover on the flywheel housing and install 9993590, an extension and a ratchet handle.

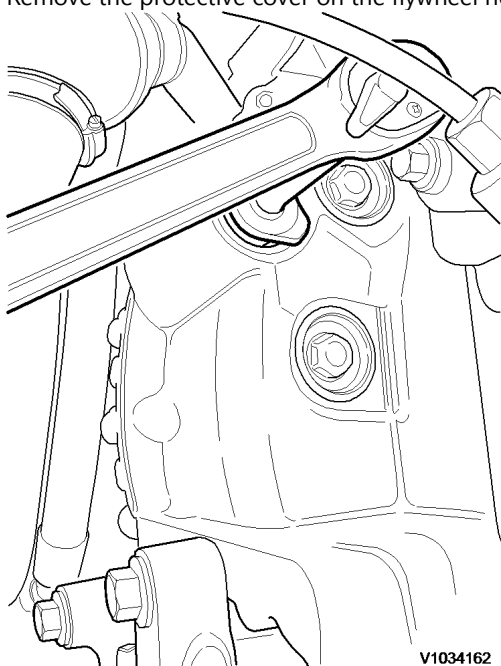


Figure 1
9993590, extension and ratchet handle

Adjusting inlet valve

5. Turn the flywheel with 9993590 until the nearest dash marking on the camshaft is between the marks on the bearing cap.

NOTE!

The number matches the cylinder for which the inlet and exhaust valves are in correct position for adjusting.

NOTE!

Cylinder 1 is closest to the engine timing gear.

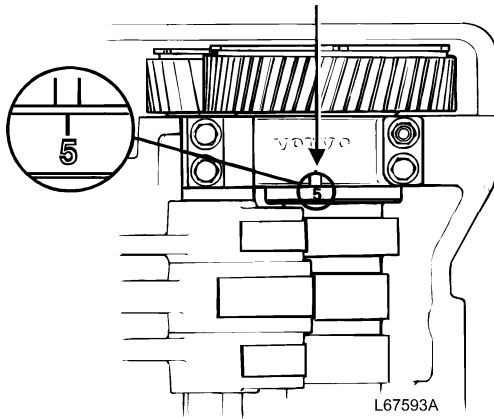


Figure 2
Camshaft marking

6. Loosen the lock nut on the rocker arm and adjust to correct valve clearance according to [214 Valve mechanism, double rocker arm](#) and tighten the lock nut. Tightening torque: see [030 Valve mechanism, tightening torques](#)

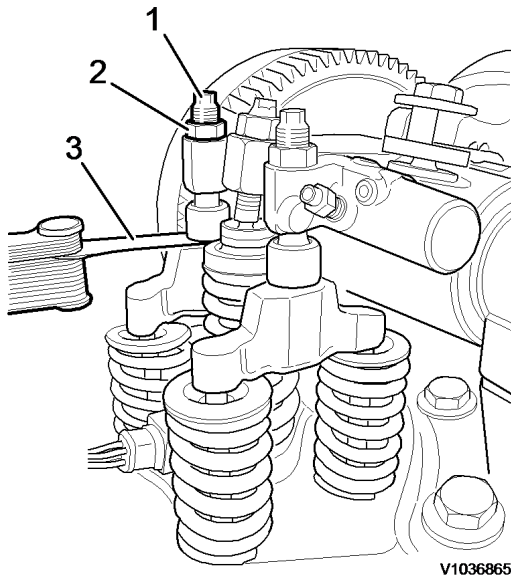


Figure 3

1. Adjusting screw
2. Lock nut
3. Feeler gauge

Adjusting exhaust valve

7. Loosen the lock nut on the rocker arm and adjust to correct valve clearance according to [214 Valve mechanism, double rocker arm](#) and tighten the lock nut. Tightening torque: see [030 Valve mechanism, tightening torques](#)

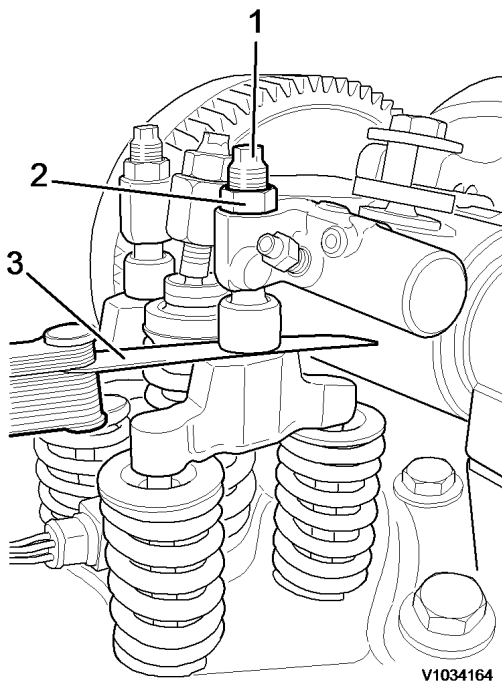


Figure 4

1. Adjusting screw
2. Lock nut
3. Feeler gauge

8. Check-measure the valve clearance according to [214 Valve mechanism, double rocker arm](#).

NOTE!

Before checking the double rocker arm's clearance, check that the exhaust valve clearance is correct according to [214 Valve mechanism, double rocker arm](#).

Checking, double rocker arm (IEGR)

9. Loosen the drain nipple and drain the double rocker arm from air and oil.

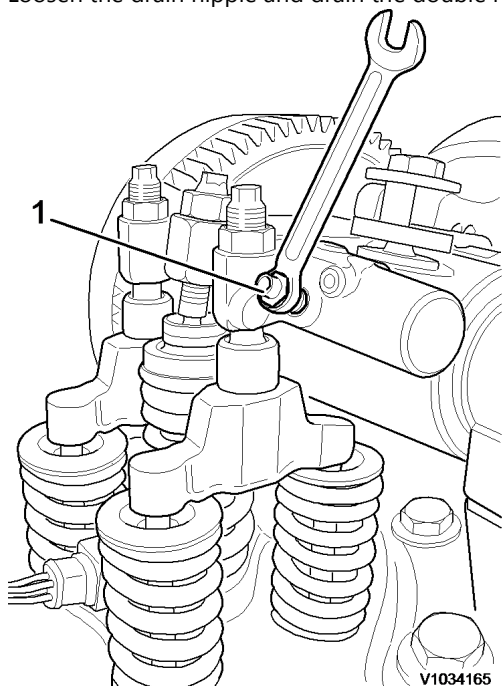


Figure 5

1. Draining nipple

10. Insert the go-side of 88820003 between the double rocker arm's contact surface and the camshaft's basic circle. The checking tool must **be able to pass** between the contact surface and the camshaft, if the IEGR-"lift" is not too great.

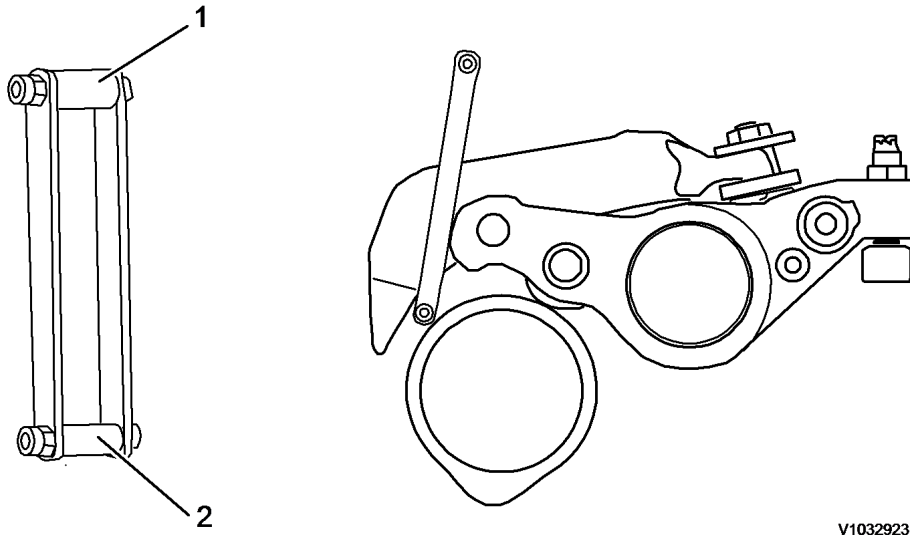


Figure 6
Go-and-stop gauge 88820003

1. Stop-side of gauge
2. Go-side of gauge

11. Insert the stop-side of 88820003 between the double rocker arm's contact surface and the camshaft's basic circle. The checking tool **must not** be able to pass between the contact surface and the camshaft. If it does, the IEGR-"lift" is too small.
12. If the go-side of the gauge passes between the double rocker arm's contact surface and the camshaft's basic circle and if the stop-side does not, the clearance for the double rocker arm is correct. If not, the double rocker arm must be adjusted as follows.
13. Tighten the drain nipple. Tightening torque: see [030 Valve mechanism, tightening torques](#)
14. Adjust the other valves and check-measure the double rocker arm in the same way.

NOTE!

The drain nipple on the double rocker arm shall be open during the adjustment procedure.

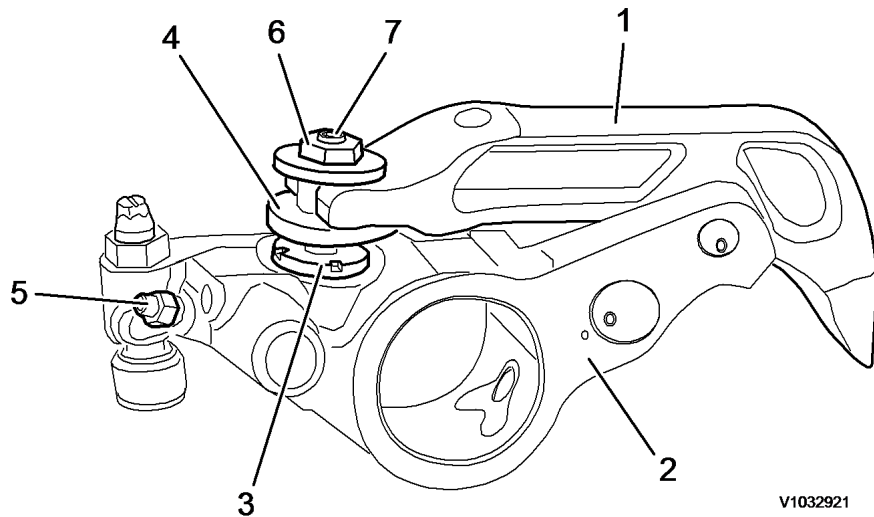


Figure 7
Double rocker arm

1. Follower arm (IEGR-rocker arm)
2. Exhaust rocker arm
3. Stop nut
4. Sleeve
5. Nipple
6. Lock nut
7. Piston

Adjusting, double rocker arm (IEGR)

15. Keep the camshaft in the same position as when adjusting valve clearance. Loosen the lock nut and counterhold the piston with an Allen head wrench.
16. Insert 88820003 between the double rocker arm's contact surface and the camshaft's basic circle. Screw on the piston with an Allen key so that zero clearance is obtained between the double rocker arm, the adjusting tool and the camshaft.

NOTE!

Zero clearance means that the adjusting tool does not slide smoothly between the double rocker arm and the camshaft.

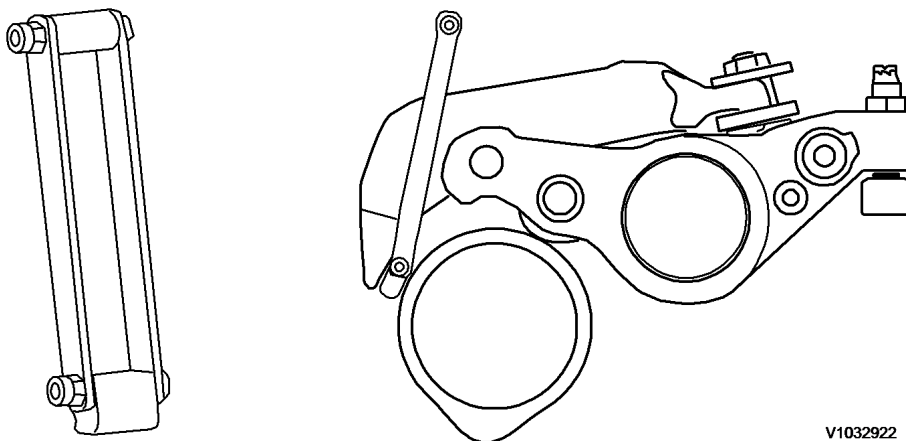


Figure 8
Adjusting tool 88820003

17. Tighten the lock nut at the same time as the piston is held in its correct position. Tightening torque: see [030 Valve mechanism, tightening torques](#)

18. Check-measure according to step 6-10.
19. Install the valve cover, see [211 Valve cover, tightening torque](#)
20. Fit the engine hood, see [821 Engine hood, installing](#).
21. Restore the machine to operating condition.

Document Title: Engine timing gears, description	Function Group: 215	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Engine timing gears, description

The engine timing gears are positioned at the front end of the engine on a 10 mm (0.39 in) thick steel plate, which is bolted to the cylinder block.

The plate is flush with the front end of the cylinder head and is sealed against the cylinder head with a sealing strip (14) made of reinforced rubber.

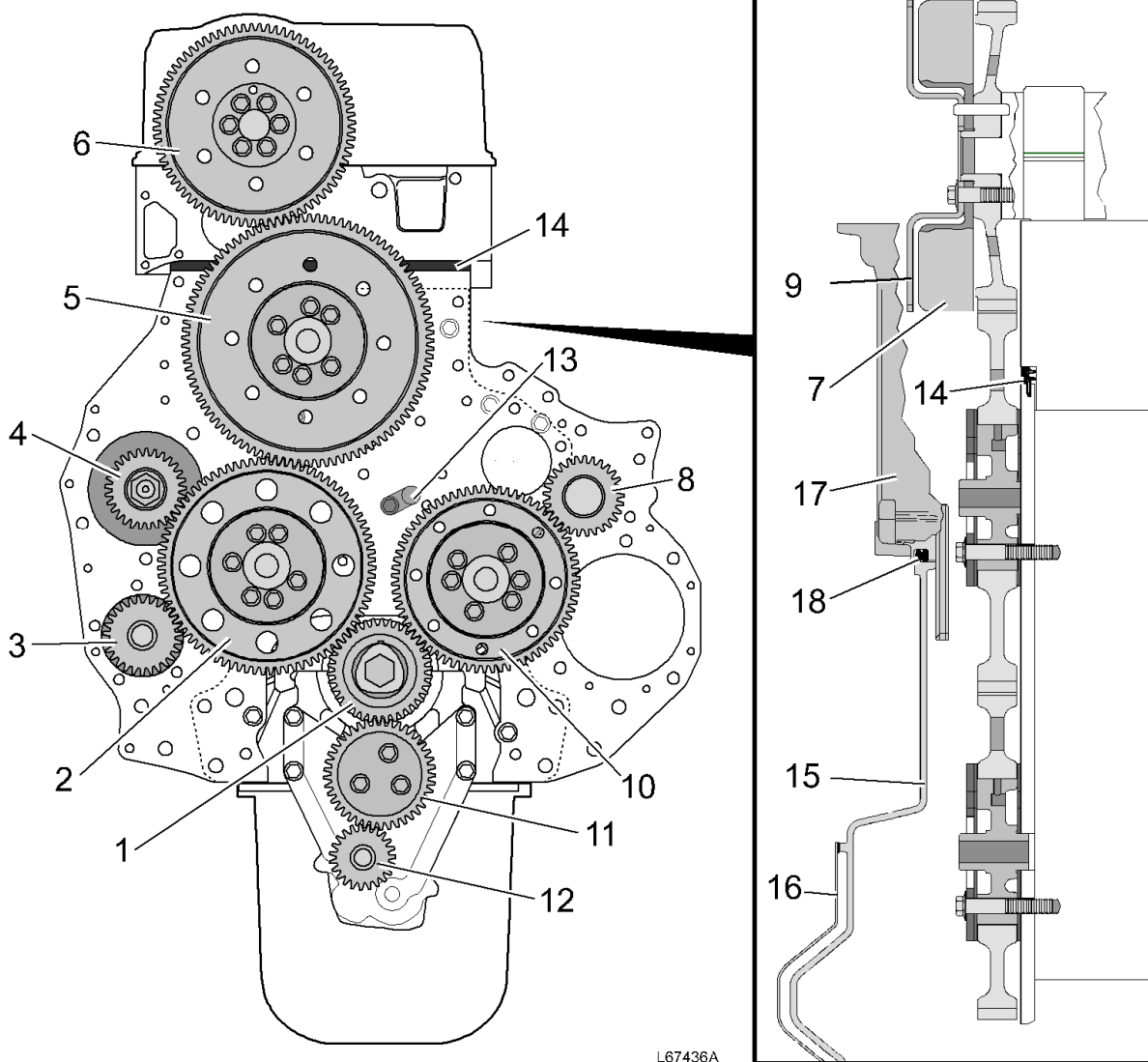
The timing casing cover is divided into an upper and a lower part.

The lower cover (15) is of die-cast aluminium and partly covered by sound insulation made of laminated steel sheeting (16).

In the upper cover (17), which is made of nodular iron, there is a connection for the crankcase breather. Both covers are sealed against the plate with silicone rubber and against each other with an H-shaped rubber moulding (18).

All gears are helically cut.

Intermediate gears (2, 5, 10 and 11) are carried in bearing bushings and force-feed lubricated. Further lubrication is arranged via a spray-nozzle (13). The hub of the upper intermediate gear (5) is bolted to the cylinder block and is adjustable.



L67436A

Figure 1

Transmission

1. Crankshaft gear
2. Intermediate gear
3. Coolant pump
4. Air compressor (engine D12CAABE2 and D12CABE2)
5. Intermediate gear (adjustable)
6. Camshaft gear
7. Oscillation damper, camshaft
8. Fuel pump and belt pulley
9. Toothed wheel, position sensor
10. Intermediate gear
11. Intermediate gear
12. Lubricating oil pump
13. Spray nozzle
14. Sealing strip
15. Lower timing casing cover
16. Sound insulation
17. Upper timing casing cover
18. Sealing strip

Document Title: Camshaft, description	Function Group: 215	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

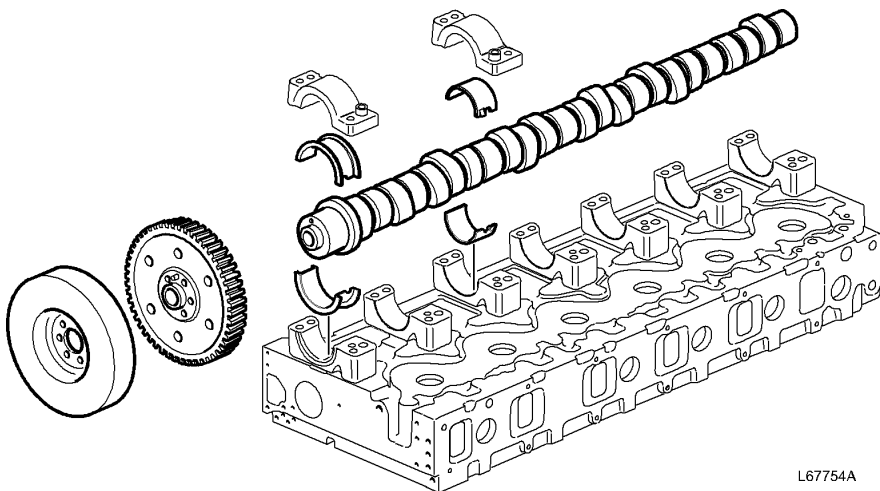
Camshaft, description

The engine has an overhead camshaft journalled in seven bearing housings bolted to the cylinder head.

There are two bearing housing variants, the production version and the spare parts version.

The two bearing housing variants must not be mixed when reconditioning the engine. Also note that the bearing housings and their bearing caps are machined together and this applies both to the production version and the spare parts version.

The camshaft has three cams per cylinder, one for the inlet valves, one for the exhaust valves and one for the unit injector.



L67754A

Figure 1

The camshaft is, like the crankshaft, induction hardened.

This means that instructions, which apply to inspection and reconditioning of the crankshaft, in applicable parts, also apply to the camshaft.

Document Title: Timing gear case, fitting new gasket in machine	Function Group: 215	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Timing gear case, fitting new gasket in machine

Op nbr 215-032

[9998602 Press tool](#)

[9998628 Press tool](#)

NOTE!

Make sure that the engine and areas around the engine are thoroughly cleaned before starting to work.

1. Place the machine in service position, see [191 Safety rules when servicing](#).
2. Drain the coolant from the engine.
Volume approx. **44 dm³ (11.6 US gal)**.
3. Remove the engine hood, see [821 Engine hood, installing](#).
4. Remove the bolts at the front of the radiator grill's upper part.
Remove the protective grating on top of the radiator grill.

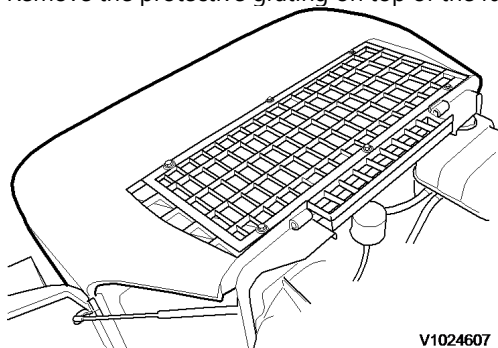


Figure 1

5. Loosen the fuel system's water trap, with clamps, from the partition wall.

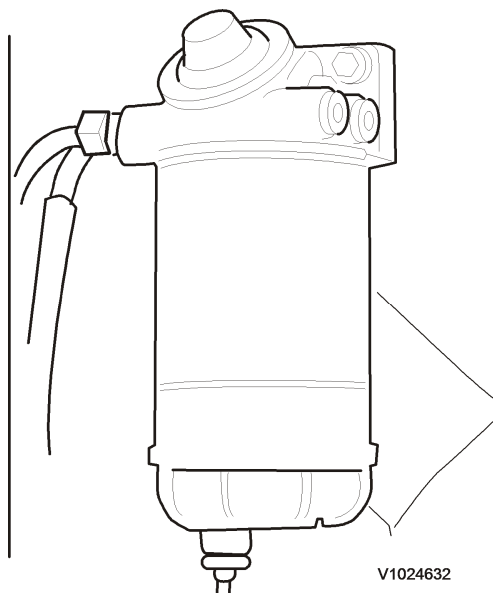


Figure 2

6. Remove the rear partition wall and the bottom plate for the engine compartment.

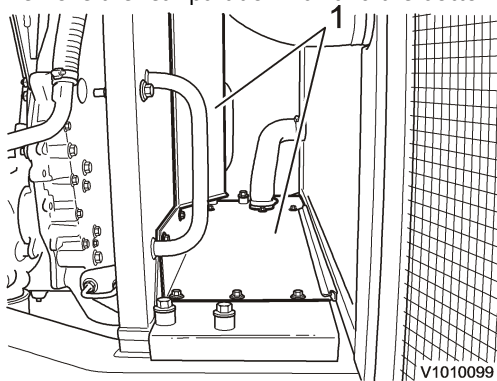


Figure 3

1. Rear partition wall and bottom plate
7. Remove the cabling from the preheating coil.
Remove the preheating coil and part the induction pipe at the partition wall.

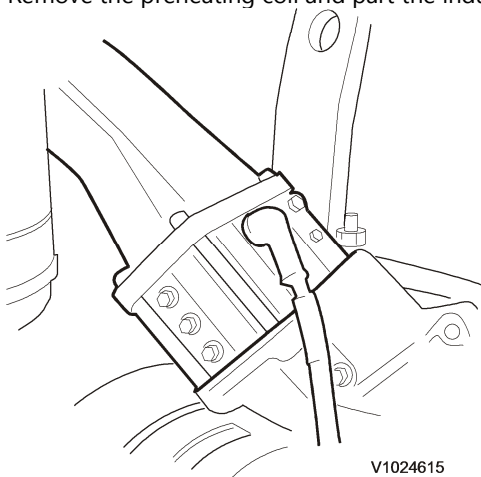


Figure 4
Preheating coil

NOTICE

8.

Refrigerant under pressure. Do not disconnect any hoses or connections on the air conditioning, thereby involuntarily releasing refrigerant.

For machines equipped with air conditioning.

Loosen the air conditioning's receiver dryer from the partition wall.

Mark up and remove the cables from the pressure monitor.

Remove the condenser from the partition wall and anchor it against the partition wall's upper support brackets.

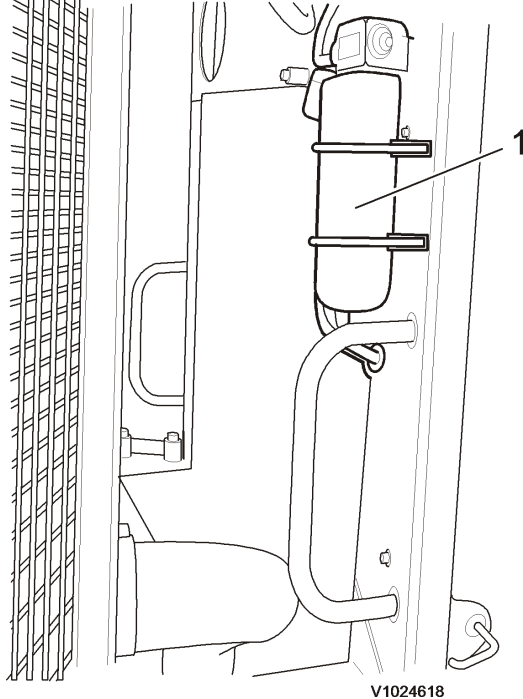


Figure 5

1. Receiver dryer

9. Remove the induction pipe between the intercooler and the turbo.
Remove the intercooler pipe's bracket.

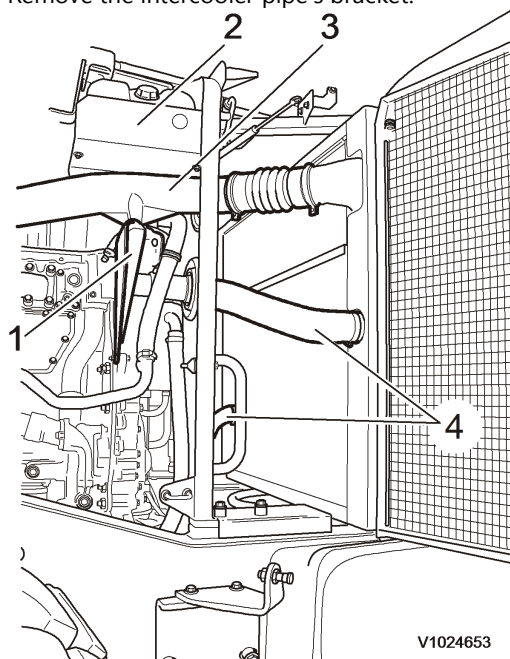


Figure 6

1. Bracket for induction pipe
 2. Expansion tank
 3. Induction pipe
 4. Upper and lower radiator hose
10. Disconnect the expansion tank from the coolant hoses and the connection to the coolant level sensor. Remove the expansion tank.
 11. Remove the hose from the tank's breather filter.
 12. Remove the upper and lower radiator hose. Remove the lower radiator hose's connecting sleeve from the partition wall's lower right attachment.
 13. Remove the bolts for the partition wall's upper support brackets. Remove the bolts for the partition wall's lower attachments.

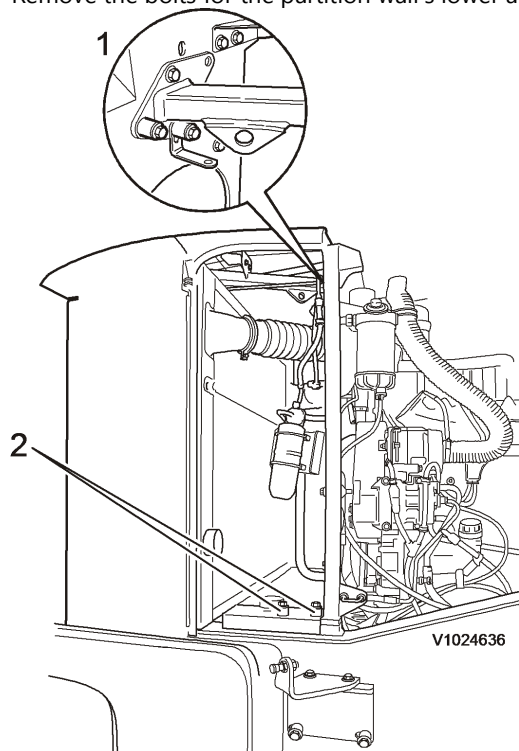


Figure 7

1. Partition wall's upper support brackets
 2. Partition wall's lower attachments
14. Connect a lifting sling to the partition wall. Lift away the partition wall.

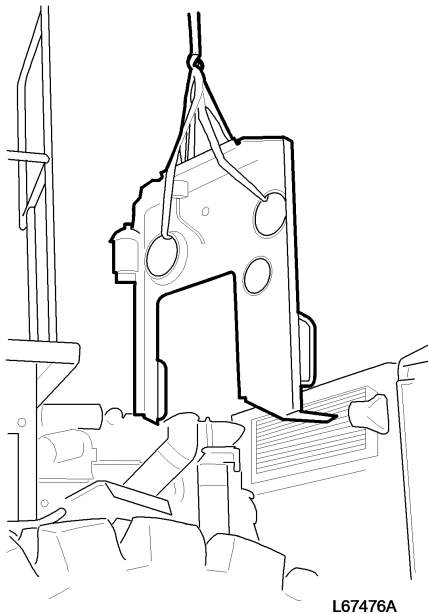


Figure 8

15. Remove the oil trap from the engine's timing gear casing.

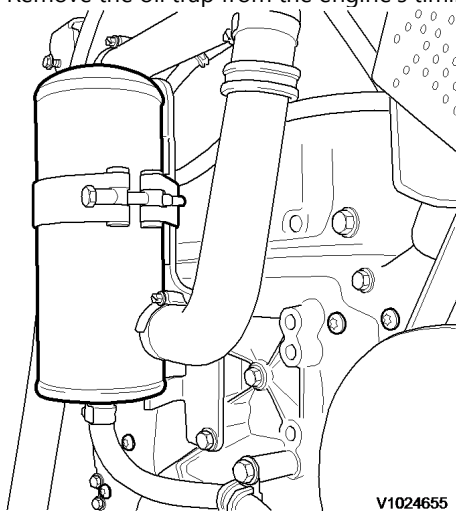


Figure 9

NOTICE

Refrigerant under pressure. Do not disconnect any hoses or connections on the air conditioning, thereby involuntarily releasing refrigerant.

16. Remove the alternator and AC compressor (if installed) from the engine. Remove the alternator's and compressor's bracket.

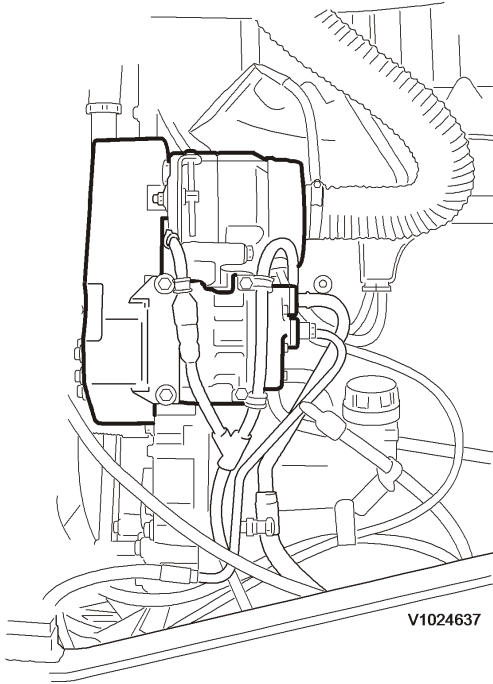


Figure 10

17. Remove the belt pulley.

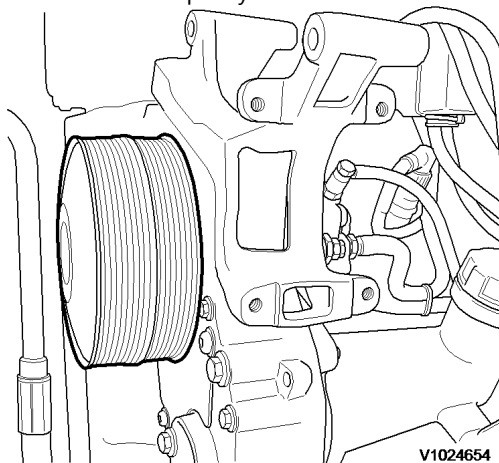


Figure 11

18. Remove the drive gear for the belt pulley and the fuel pump.

NOTE!

Make sure that the fuel pump's drive shaft is not damaged.

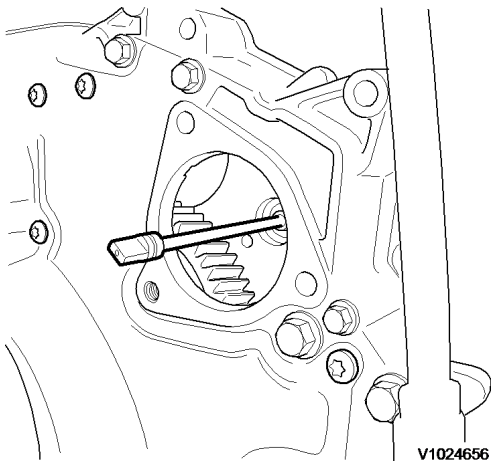


Figure 12
Fuel pump's drive shaft

19. Remove the hose and pipe for the crankcase ventilation.

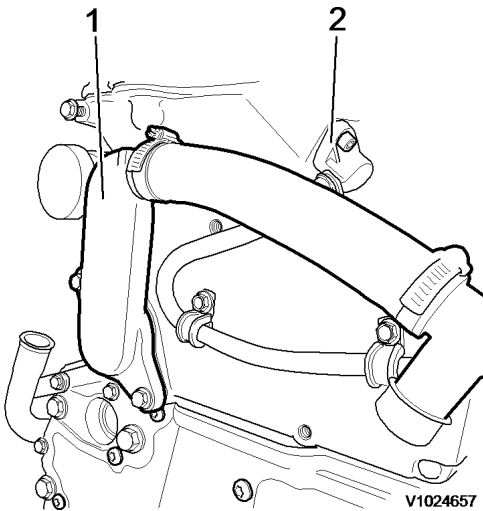


Figure 13

- 1. Crankcase ventilation
- 2. Camshaft sensor

20. Remove the camshaft sensor.

NOTE!

Retain any adjusting shims.

21. Remove the valve cover.

22. Remove the coolant pipe to the coolant pump.

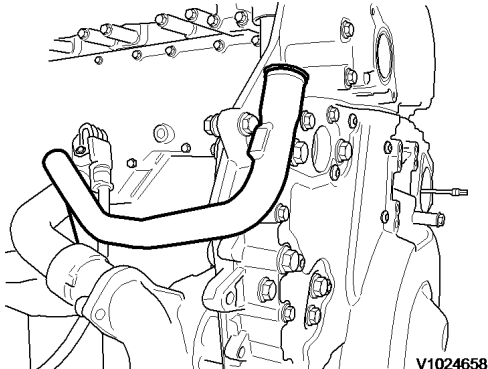


Figure 14

23. Remove the hose connection for the upper radiator hose.

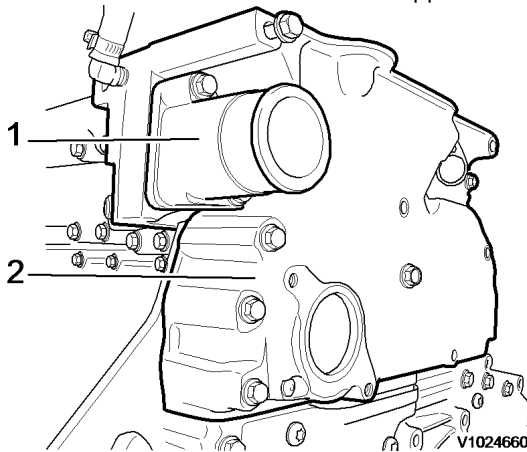


Figure 15

1. Hose connection, upper radiator hose
2. Upper timing gear casing

24. Remove the upper timing gear casing.

25. Remove the lower timing gear casing.

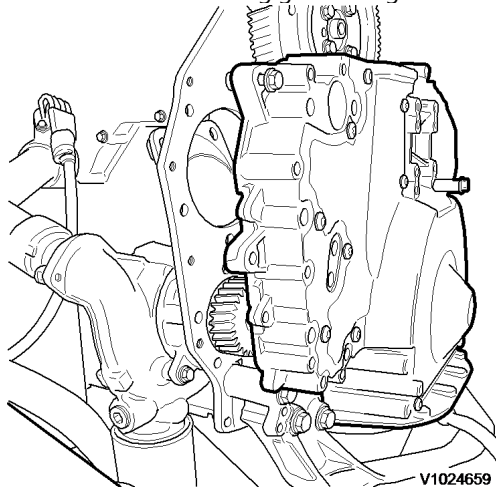


Figure 16

26. Clean the sealing surfaces on the timing gear plate and timing gear casings.
Cover the opening at the front of the oil sump so that impurities and gasket fragments cannot fall down.

Timing gear casing, installing

27. Apply a two mm thick bead of sealant on the lower timing gear casing's sealing surfaces.

NOTE!

The bolted joints must be torque-tightened within 20 minutes of applying the sealant.

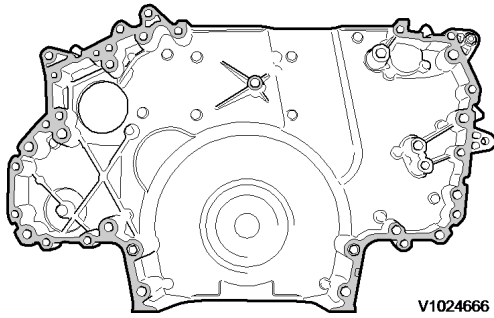


Figure 17
Lower timing gear casing's sealing surfaces

28. Fit the lower timing gear casing, fit all bolts and tighten the timing gear casing against the timing gear plate using a low torque value, max. 10 Nm.
29. Fit the bolts for the oil sump.
Tightening torque: **24 Nm (17.7 lbf ft)**.
30. Tighten down the timing gear casing crosswise.
Tightening torque, M8: **24 Nm (17.7 lbf ft)**.
Tightening torque, M10: **48 Nm (35.4 lbf ft)**.
Tightening torque, M12: **85 Nm (62.7 lbf ft)**.
31. Fit a new rubber seal at the lower edge of the upper timing gear casing.
32. Apply a two mm thick bead of sealant on the upper timing gear casing's sealing surfaces against the timing gear plate.

NOTE!

The bolted joints must be torque-tightened within 20 minutes of applying the sealant.

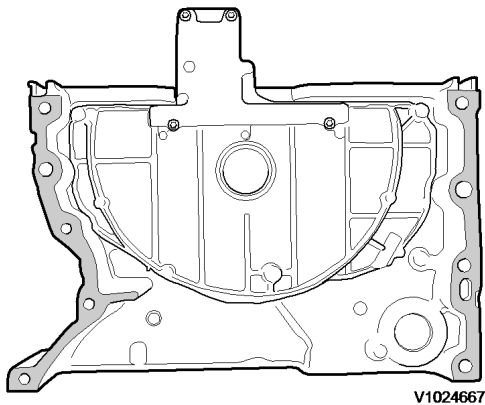


Figure 18
Upper timing gear casing's sealing surfaces

33. Lay sealant in the lower timing gear casing's upper corner against the timing gear plate.

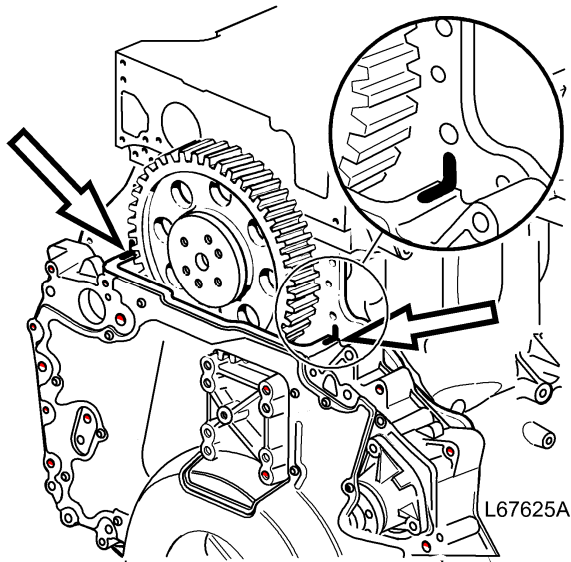


Figure 19

34. Fit the upper timing gear casing in place, fit the bolts in the timing gear casing's oval holes. Tighten the casing to contact, do not tighten down.
35. Fit press tools 999 8602 and 999 8628
Press down the timing gear casing so that the timing gear casing's and the cylinder head's sealing surface are in line with each other.
Fit the other bolts and tighten them.
Tightening torque, M8: **24 Nm (17.7 lbf ft)**.
Tightening torque, M10: **48 Nm (35.4 lbf ft)**.

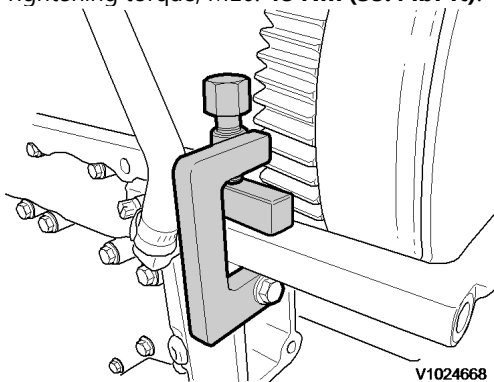


Figure 20
Press tool 999 8628

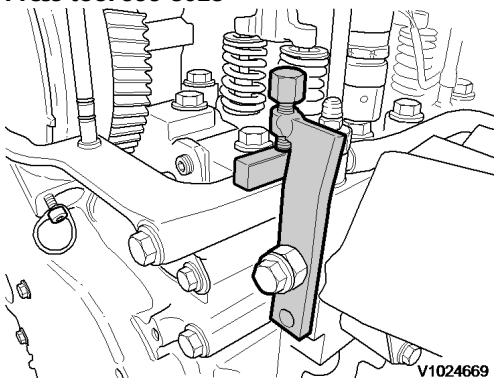


Figure 21
Press tool 999 8602

36. Fit the upper radiator hose's connecting sleeve against the cylinder head.
37. Fit the valve cover.

Tightening torque: **20 Nm (14.7 lbf ft).**

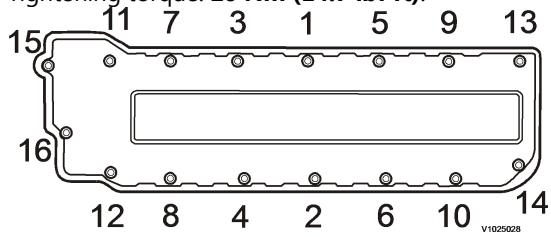


Figure 22
Tightening diagram for valve cover

38. Fit the drive gear for the belt pulley and the fuel pump.
39. Fit the alternator's and compressor's bracket.
40. Fit the belt pulley.

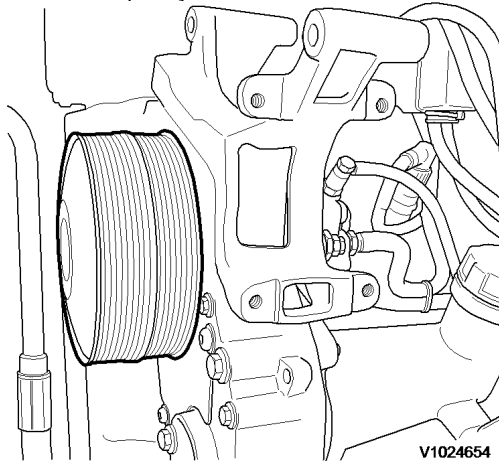


Figure 23

41. Fit the alternator, and compressor for the air conditioning (if installed).

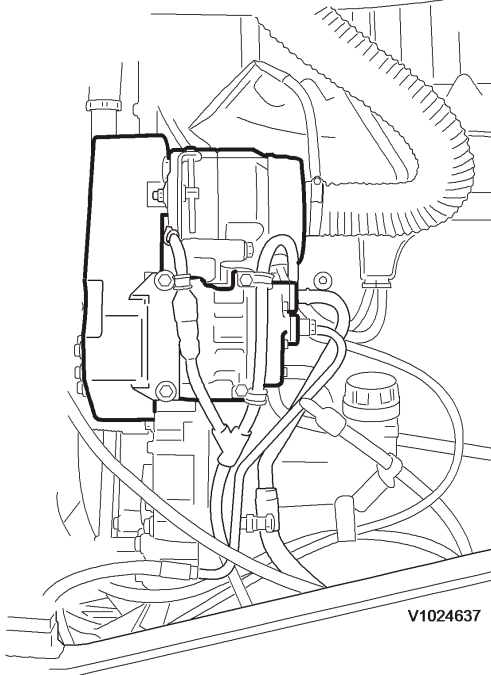


Figure 24

42. Fit the coolant pipe to the coolant pump.

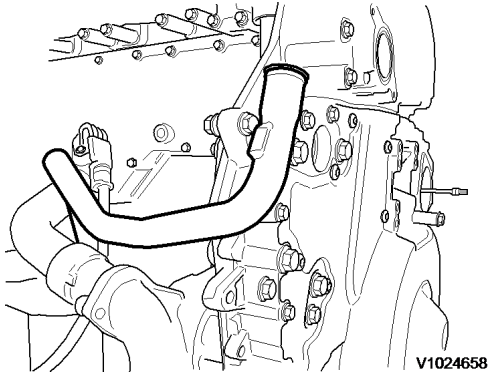


Figure 25

43. Fit the camshaft sensor.
Fit the hose and pipe for the crankcase ventilation.

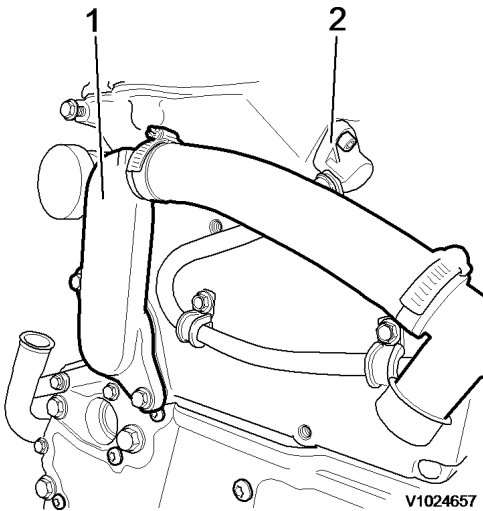


Figure 26

1. Crankcase ventilation
2. Camshaft sensor

44. Fit the oil trap on the timing gear casing.

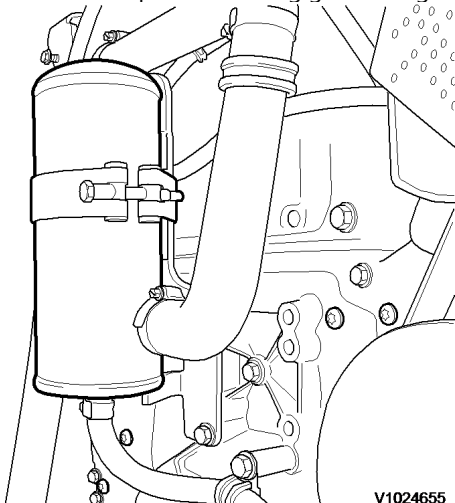


Figure 27

45. Lift the partition wall into place, tighten the bolts for the partition wall's lower and upper attachments.
46. Fit the charge-air pipe's bracket.
Fit the induction pipe between the intercooler and the turbo.

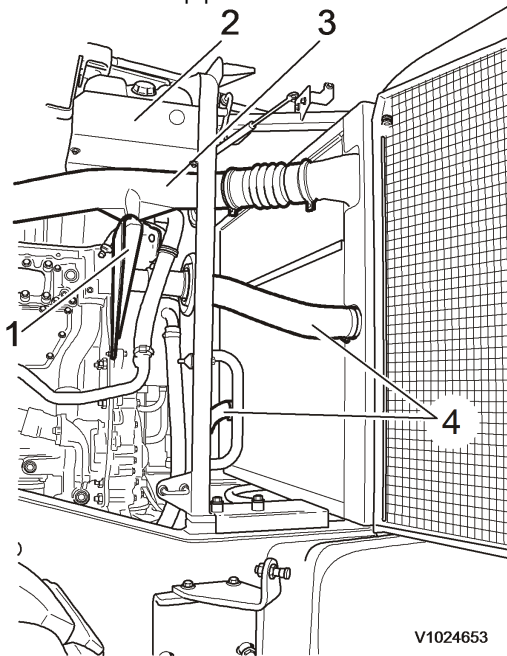


Figure 28

1. Bracket for induction pipe
 2. Expansion tank
 3. Induction pipe
 4. Upper and lower radiator hose
47. Fit the lower radiator hose's connecting sleeve on the partition wall's lower right attachment.
Fit the upper and lower radiator hose.
 48. Fit the hose on the tank's breather filter.
 49. Fit the expansion tank, connect coolant hoses and level sensor.
 50. Fit the air conditioning's receiver dryer on the partition wall.
Connect the cables on the pressure monitor.
Fit the condenser.

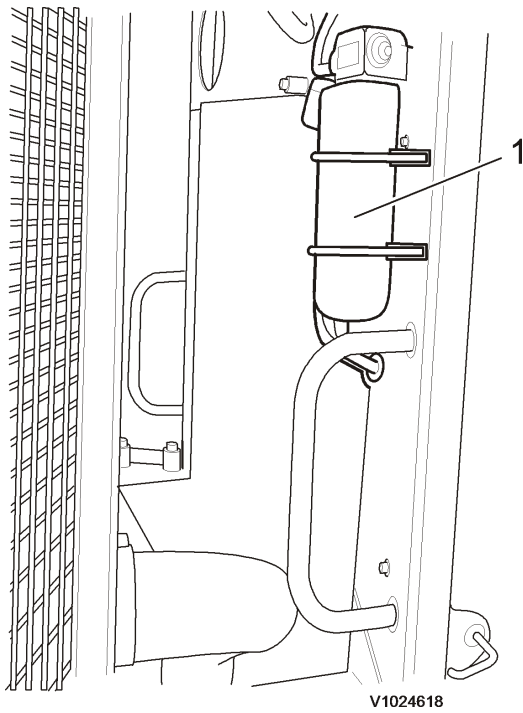


Figure 29

1. Receiver dryer

51. Fit the preheating coil and fit the induction pipe. Connect the cables on the preheating coil.

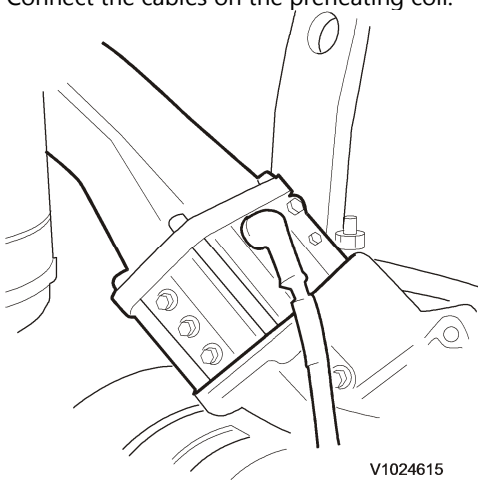


Figure 30

52. Fit the rear partition wall and the bottom plate.

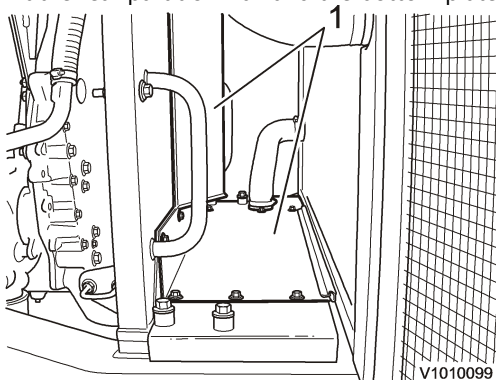


Figure 31

1. Rear partition wall and bottom plate

53. Fit the fuel system's water trap on the partition wall.

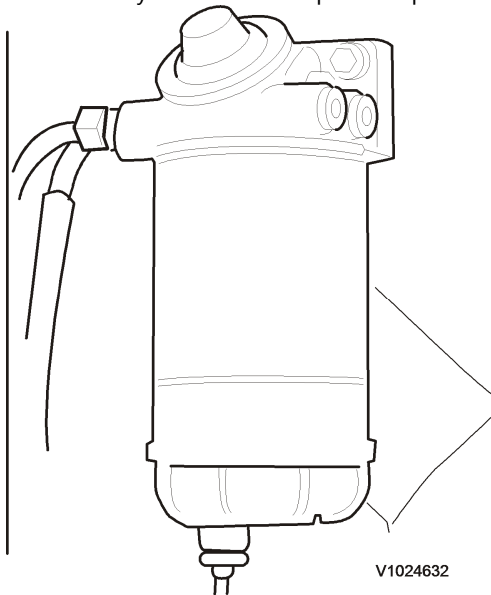


Figure 32

54. Fit the protective grating on top of the radiator grill.
Tighten the bolts at the front of the radiator grill's upper part.

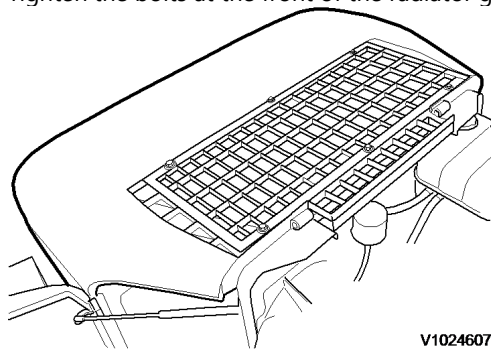


Figure 33

55. Fit the engine hood, see [821 Engine hood, installing.](#)
56. Fill coolant in the engine.
57. Start and run the engine until warm, check for leaks.
58. Check the engine's fluid levels, adjust if needed.
59. Restore the machine to operating condition.



Construction Equipment

Service Information

Document Title: Crankshaft, description	Function Group: 216	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Crankshaft, description

The crankshaft is drop forged and has induction hardened bearing surfaces and recesses. It is journaled by seven main bearings, of which the centre bearing is a thrust bearing. The gear wheel at the front of the shaft is pressed onto the shaft and also has a wedge-shaped cross. The hub, which has a polygonal profile, is also pressed onto the shaft. There is a so-called lip seal between the crankshaft and flywheel housing.

The flywheel is bolted to the crankshaft. Its position is determined by a locating pin. The outside edge of the flywheel has a starter ring gear, and a number of milled grooves used by the injection system's tachometer sensor.

Document Title: Connecting rods, description	Function Group: 216	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Connecting rods, description

The connecting rods have an I-shaped cross section and are drilled through to provide force-feed lubrication of the piston pins.

Because the connecting rods have an obliquely split bearing location, the rods can be pulled up through the cylinder liners for removal.

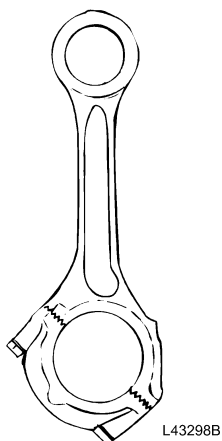


Figure 1
Connecting rod

Document Title: Description	Function Group: 217	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Description

The oil sump is made of aluminium. In order to provide a good sound insulation, the oil sump is completely rubber insulated from the cylinder block.

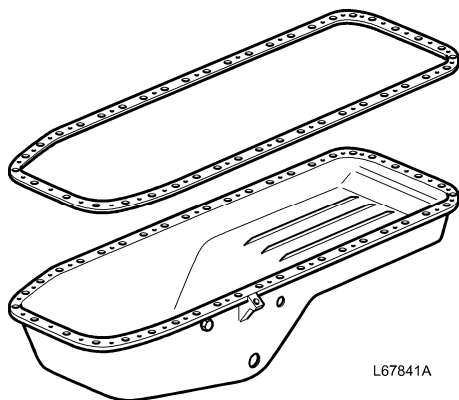


Figure 1
Oil sump



Construction Equipment

Service Information

Document Title: Description	Function Group: 218	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Description

The engine is suspended in the frame at a single point. The suspension consists of rubber elements vulcanised onto a mounting. The rear central mounting consists of a bow made of cast steel bolted to the engine and a rubber element bolted onto the rear cross member. The suspension of the transmission in the frame makes up the front mounting points.

Document Title: Rubber cushion, changing	Function Group: 218	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Rubber cushion, changing

Op nbr 21801

Sling 2000 mm

Removing

1. Remove the engine hood. See [821 Engine hood, removing](#)
2. Remove the bolts for the protective plate above the transmission oil cooler. Remove the protective plate. Remove the bolts for the partition wall. Remove the partition wall.

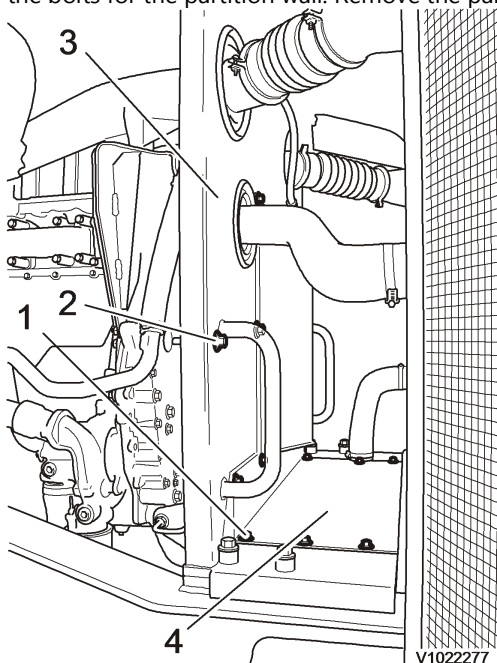


Figure 1

1. Bolt, 6 pcs.
 2. Bolt, 10 pcs.
 3. Partition wall
 4. Protective plate
3. Screw a shackle in the lifting eye on the engine. Connect a sling in the shackle using the lifting equipment.

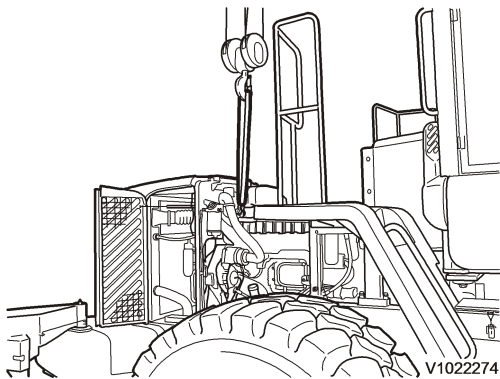


Figure 2

4. Loosen the bolts for the rubber cushion. Lift the engine enough so that the engine's weight is taken off the rubber cushion.

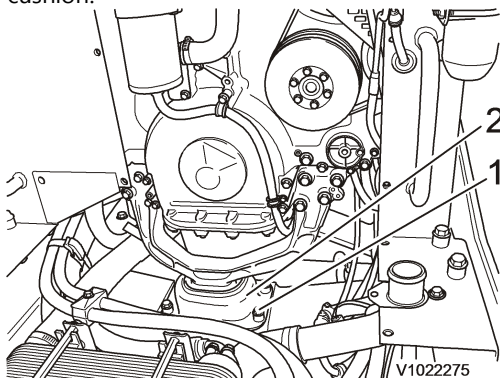


Figure 3

1. Bolt, 4 pcs.
2. Rubber cushion

5. Loosen the bolts for the engine bracket and remove it.

NOTE!

Bolt with nut on the outermost bolted joint.

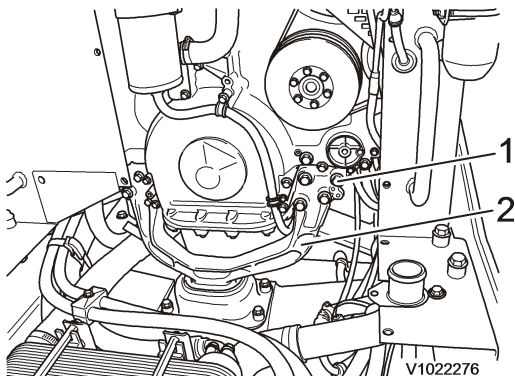


Figure 4

1. Bolt, 8 pcs.
2. Engine bracket

6. Lift the engine enough so that the rubber cushion can be removed from the engine member.

7. Tighten down the engine bracket in a vice or similar, according to the figure, and remove the rubber cushion from the engine bracket.

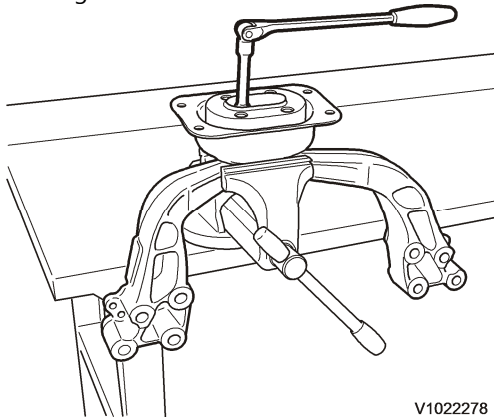


Figure 5

8. Fit the new rubber cushion on the engine bracket and tighten down.
Tightening torque: **150 ±15 Nm (110 ±11 lbf ft)**

Installing

9. Fit the engine bracket on the engine and tighten the bolts.
Tightening torque: **175 ±20 Nm (129 ± 15 lbf ft)**

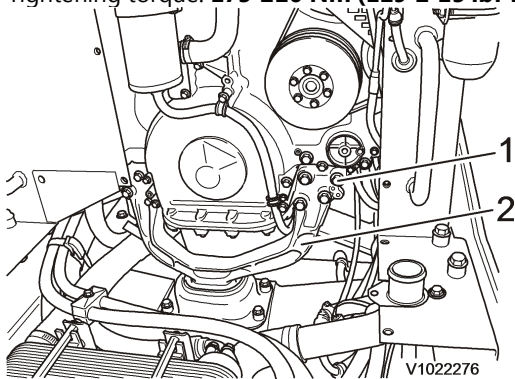


Figure 6

1. Bolt, 8 pcs.
2. Engine bracket

10. Lower the engine and fixate the bolts between the holes in the rubber cushion and the holes in the member.

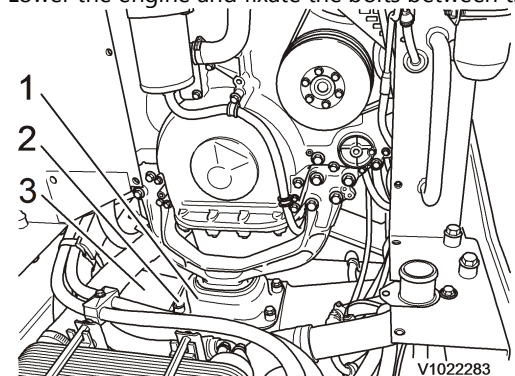


Figure 7

1. Rubber cushion

2. Bolt, 4 pcs.
3. Member

11. Tighten the bolts for the rubber cushion.
Tightening torque: **92 ±9 Nm (68 ±6 lbf ft)**

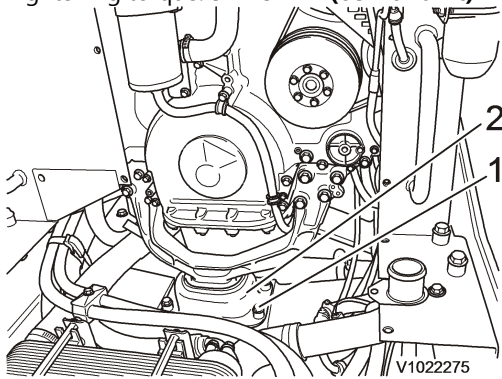


Figure 8

1. Bolt, 4 pcs.
2. Rubber cushion

12. Disconnect the sling from the engine and move aside the lifting equipment.
13. Fit the partition wall and tighten the bolts. Fit the protective plate above the oil transmission and tighten the bolts.

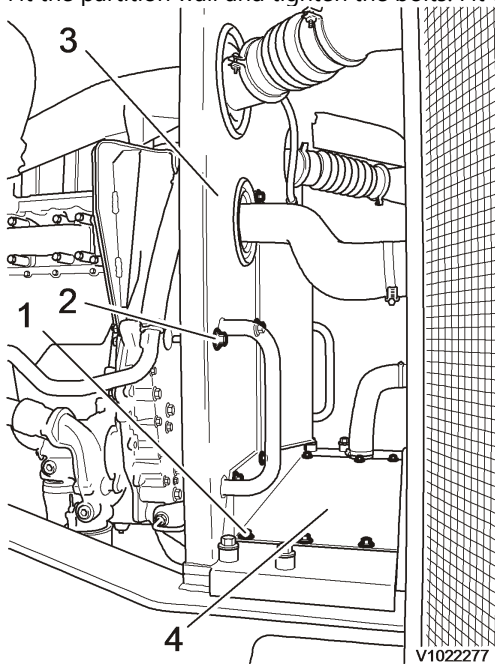


Figure 9

1. Bolt, 6 pcs.
2. Bolt, 10 pcs.
3. Partition wall
4. Protective plate

14. Refit the engine hood. See [821 Engine hood, installing](#)



Construction Equipment

Service Information

Document Title: Lubrication description	Function Group: system, 220	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Lubrication system, description

The engine is force-feed lubricated through a pump driven from the crankshaft via an intermediate gear.

The lubrication system has two full-flow filters and one by-pass filter.

The oil flow is controlled through six valves.

Three of the valves are so called unit valves.

These are colour marked to eliminate the risk of incorrect installation.

The colour markings may be replaced by number markings, indicating the opening pressure of the valve.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Lubrication system, principle](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 7398, 69999

- [Lubrication system, principle](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Document Title: Lubrication principle	Function Group: system, 220	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

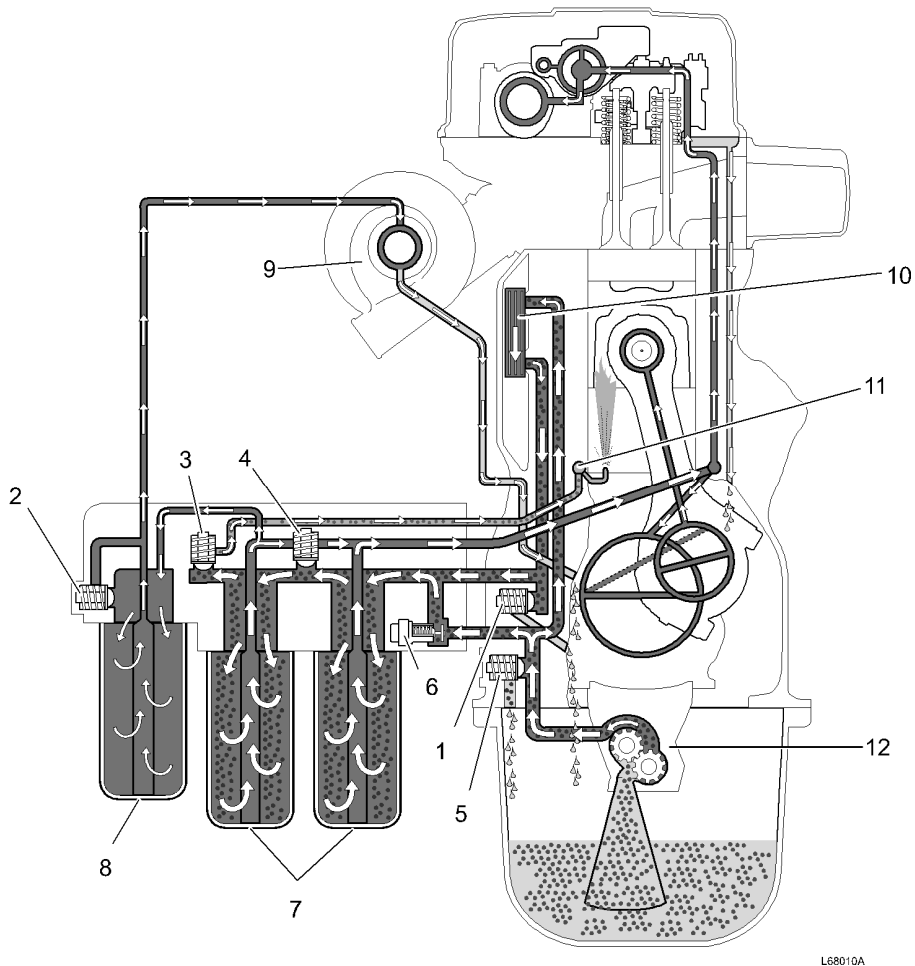
Lubrication system, principle

The gear pump (12) forces the lubrication oil, via the oil cooler (10) integrated in the cooling jacket, to the filter housing with both full-flow filters (7) and the by-pass filter (8). Then the oil is led to the engine block's distribution pipe and is distributed via channels to all lubrication points in the engine.

The camshaft and rocker arm mechanism are lubricated via a channel in the cylinder block and the cylinder head.

Function of the valves:

1. The pressure limiting valve controls the engine's oil pressure and the surplus oil is led back to the sump.
2. The overflow valve for the by-pass filter (8) opens if the filter is clogged to ensure lubrication of the turbo.
3. The piston cooling valve is pressure-sensing and opens at just over normal idle pressure. The oil is led into the longitudinal channel in the block and is sprayed via nozzles (11), one for each piston, against the insides of the pistons.
4. The overflow valve for the full-flow filters (7) opens if the filters are clogged to ensure lubrication of the engine.
5. The safety valve opens if the pressure in the lubrication system becomes too high, for example, at cold-start in wintertime.
6. The by-pass valve for the oil cooler has the function of leading the oil past the cooler during the engine's warm-up phase. In this way the oil is lubricated faster during cold-starts, and warm-up time is reduced. This valve is thermostat-controlled.



L68010A

Figure 1
Principle illustration of lubrication system

1. Pressure limiting valve
2. Overflow valve for by-pass filter
3. Piston cooling valve
4. Overflow valve for full-flow filters
5. Safety valve
6. By-pass valve
7. Full-flow filter
8. By-pass filter
9. Turbocharger
10. Oil cooler
11. Nozzle
12. Oil pump

Document Title: Lubrication principle	Function Group: system, 220	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Lubrication system, principle

the gear driven oil pump (12) forces the lubricating oil to the original oil filter housing and from there on to an additional Volvo CE filter housing, where all the oil filters are located for better serviceability. Then the oil is led to the engine block's distribution pipe and is distributed via channels to all lubrication points in the engine. The camshaft and rocker arm mechanism are lubricated via a channel in the cylinder block and the cylinder head.

The overflow valve (2) for the full flow filters is located in the additional oil filter housing. The full flow filter overflow valve (4) in the original oil filter housing is still present but is not in use. It is kept inactive by increased spring force.

There is no overflow valve for the by-pass filter. It is no longer necessary as the by-pass flow is directed directly back to the oil sump via the oil refilling pipe.

Function of the valves:

1. The pressure limiting valve controls the engine's oil pressure and the surplus oil is led back to the sump.
2. The piston cooling valve is pressure-sensing and opens at just over normal idle pressure. The oil is led into the longitudinal channel in the block and is sprayed via nozzles (11), one for each piston, against the insides of the pistons.
3. The overflow valve for the full-flow filters (7) opens if the filters are clogged to ensure lubrication of the engine.
4. The safety valve opens if the pressure in the lubrication system becomes too high, for example, at cold-start in wintertime.
5. The by-pass valve for the oil cooler has the function of leading the oil past the cooler during the engine's warm-up phase. In this way the oil is lubricated faster during cold-starts, and warm-up time is reduced. This valve is thermostat-controlled.

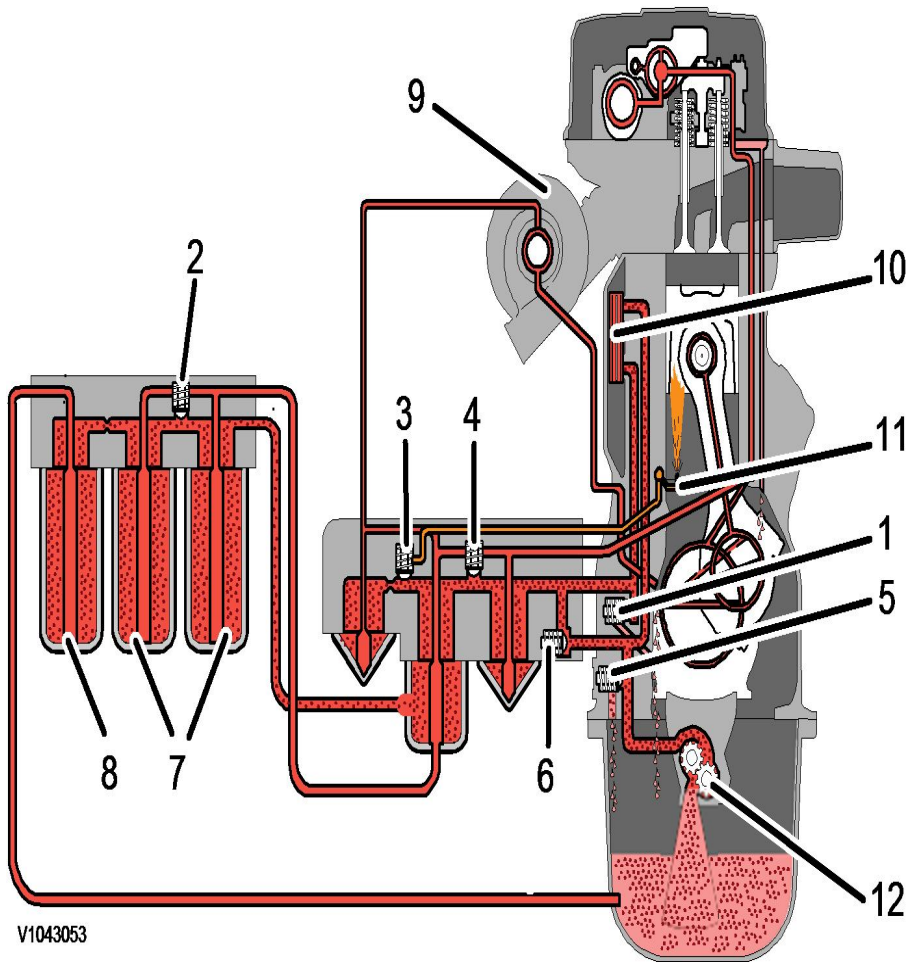


Figure 1
Principle illustration of lubrication system

1. Pressure limiting valve
2. Overflow valve for full-flow filters
3. Piston cooling valve
4. Overflow valve for full-flow filters (not in use)
5. Safety valve
6. By-pass valve
7. Full-flow filter
8. By-pass filter
9. Turbocharger
10. Oil cooler
11. Nozzle
12. Oil pump

Document Title: Oil pump, description	Function Group: 221	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Oil pump, description

The gear type oil pump is entirely made of aluminium and bolted to the front main bearing cap.

The pump housing and the rear end plate are machined together and cannot be replaced separately.

The suction pipe is also made of aluminium, whereas the pressure pipe is made of steel. Both are sealed with rubber seals against the rear end plate on the pump.

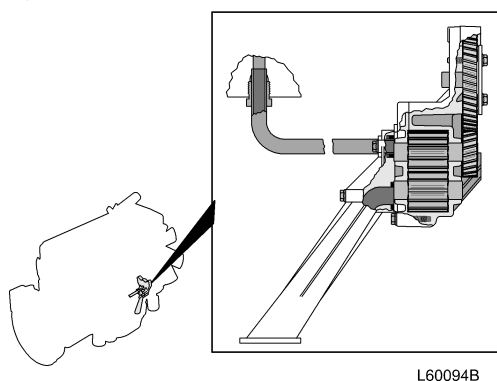


Figure 1
Oil pump

Document Title: Lubrication oil pressure, checking with pressure gauge	Function Group: 221	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Lubrication oil pressure, checking with pressure gauge

Op nbr 221-022

[11666052 Pressure gauge](#)

[14290266 Hose](#)

14211660 Measuring nipple

1. Remove the plug and connect 14211660, 14290266 Hose and 11666052 Pressure gauge.

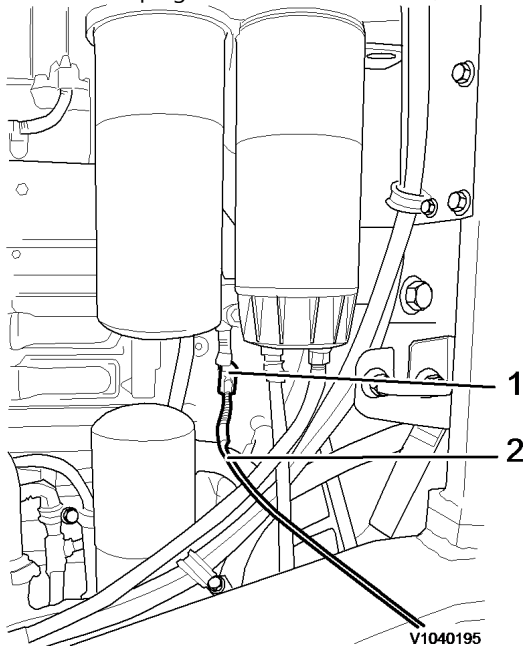


Figure 1

1. 14211660
2. 14290266

2. Start the engine. Check the oil pressure, see [220 Lubrication system, specifications](#).
3. Restore the machine.

Document Title: Oil cooler, description	Function Group: 223	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Oil cooler, description

The oil cooler is bolted directly against the cylinder block inside the cover for the cylinder block coolant duct and is thus entirely surrounded by the coolant.

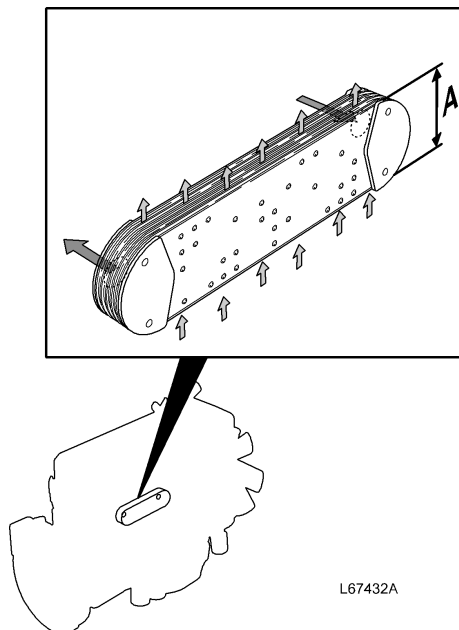


Figure 1
Oil cooler

A. 125 mm (4.92 in)

Document Title: Oil cooler, replacing	Function Group: 223	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Oil cooler, replacing

Op nbr 223-006

1. Place the machine in service position, see [191 Safety rules when servicing](#).
2. Drain the coolant from the engine.
Volume approx. **44 dm3 (11.6 US gal)**
3. Remove the turbo's flex hose and inlet hose.
Remove the clamp on the pipe to the intercooler.

NOTICE

Always cover open air connections with a plastic bag and rubber bands. Gravel, dust and other particles in these connections may result in engine failure!

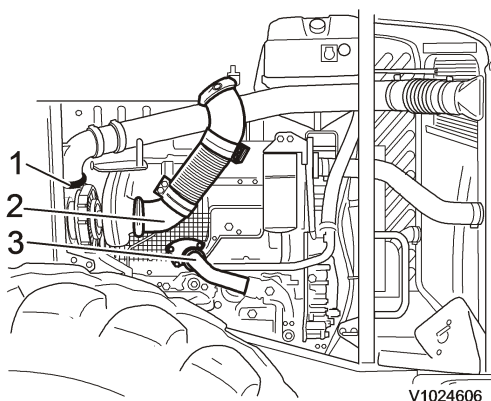


Figure 1

1. Clamp for intercooler pipe
 2. Flex hose
 3. Oil cooler casing's water line
4. Remove the oil cooler casing's water line to the coolant pump.
 5. Loosen the turbo's pressure oil (delivery)/ and return oil line.
Remove the turbo from the exhaust manifold.

NOTICE

Plug all pipes, hoses and connections when removing.

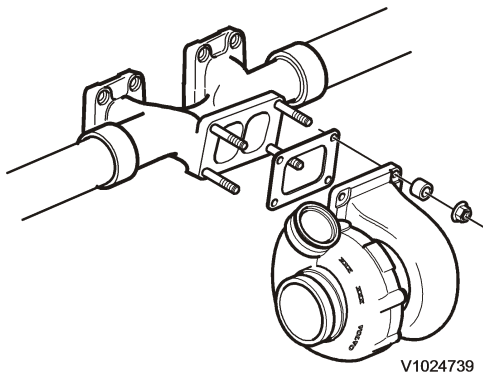


Figure 2

6. Loosen the coolant hose for the cab heating coil from the oil cooler casing's rear edge.
7. Remove all bolts for the oil cooler casing.
Remove the casing.

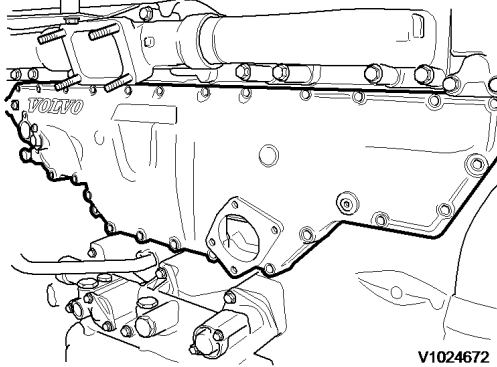


Figure 3

8. Remove the oil cooler and its seal rings from the engine block.

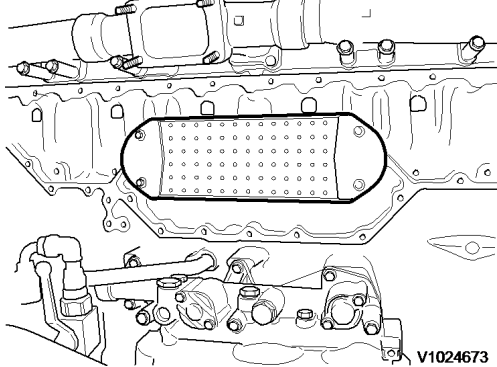


Figure 4

9. Clean all sealing surfaces.
Oil cooler, mounting
10. Fit the oil cooler on the engine block, use new seal rings.

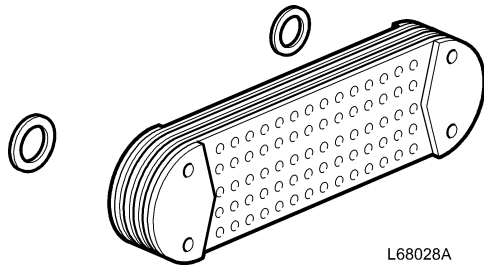


Figure 5
Oil cooler with seal rings

11. Check the oil cooler casing's seal, change if needed.

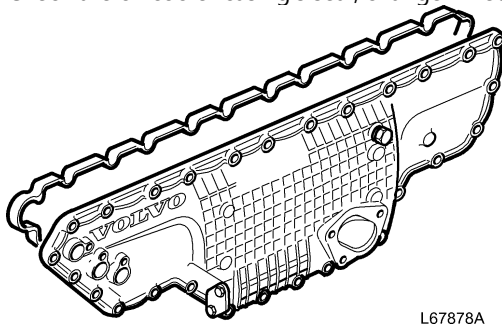


Figure 6

12. Fit the oil cooler casing on the engine block.
Tightening torque: **24 Nm**.

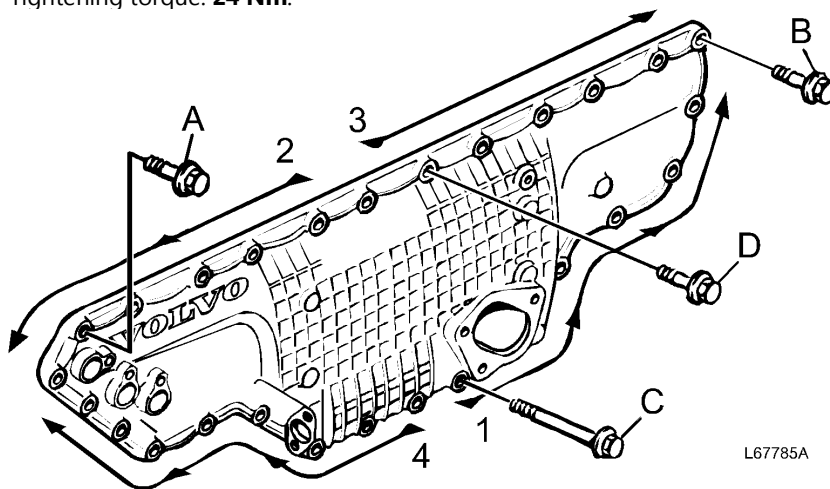


Figure 7
Tightening diagram for oil cooler casing.

13. Fit the coolant hose for the cab heating coil on the oil cooler casing's rear edge.
14. Fit the turbo on the exhaust manifold.
Clean the sealing surfaces and fit a new gasket.
15. Fit the turbo's pressure oil (delivery) and return oil line.
Clean the sealing surfaces and fit new gaskets.
16. Fit:
 - the oil cooler casing's water line to the coolant pump
 - the clamp on the pipe to the intercooler.
 - the turbo's flex hose and inlet hose.

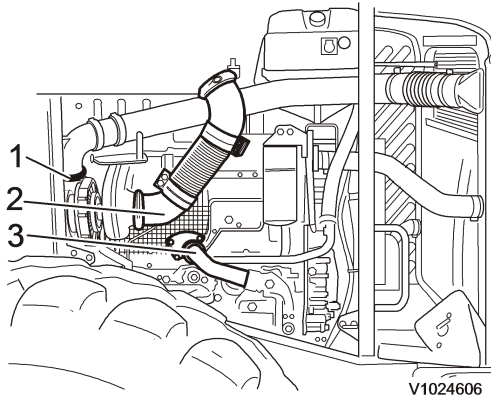


Figure 8

1. Clamp for intercooler pipe
2. Flex hose
3. Oil cooler casing's water line

17. Fill coolant in the cooling system.
18. Start, run the engine until warm, check for leaks.
If needed, adjust the coolant level in the cooling system.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Fuel system, description](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8002
Serial number stop: 10999

- [Fuel system, description](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7418, 62543

Document Title: Fuel system, description	Function Group: 230	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Fuel system, description

Schematic description of the low pressure fuel system at continuous operation

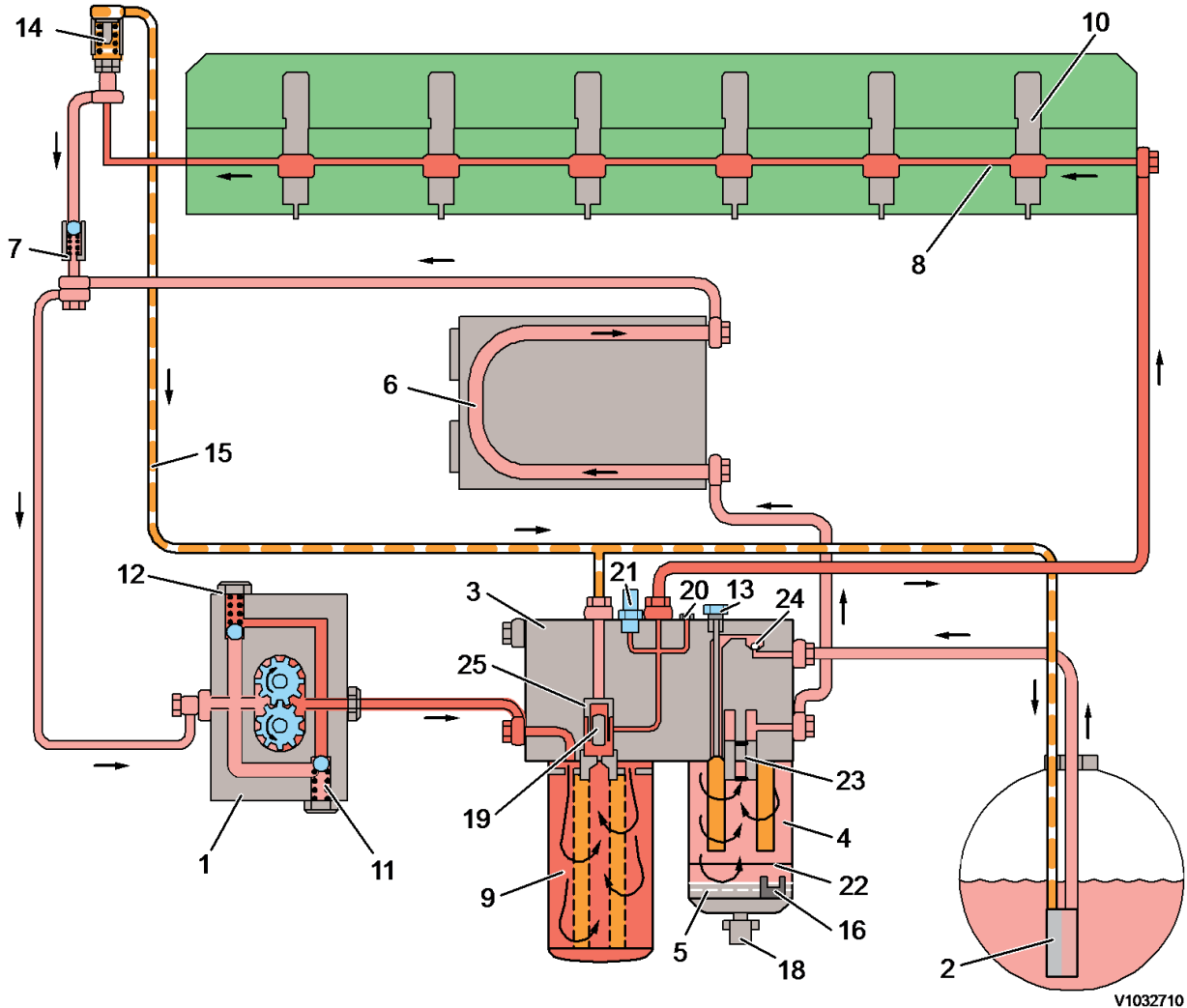


Figure 1
Schematic description of the low pressure fuel system at continuous operation

1.	Fuel feed pump	14.	Breather valve
2.	Tank	15.	Fuel return line
3.	Filter head	16.	Sensor, water in fuel
4.	Prefilter	17.	Cylinder head
5.	Water trap	18.	Drain valve
6.	Cooling circuit, Engine control unit	19.	Breather valve
7.	Overflow valve	20.	Measuring point for fuel pressure

8.	Fuel channel	21.	Pressure indicator
9.	Primary filter	22.	Heater for water trap, optional equipment
10.	Injector	23.	Outlet prefilter
11.	Safety valve	24.	Non-return valve
12.	Non-return valve	25.	Breather valve
13.	Hand pump		

Fuel is pumped by the fuel feed pump (1) via the tank (2), the prefilter (4), water trap (5) in to the filter head (3). Then it is pumped on through the engine control unit's cooling circuit (6) to the overflow valve (7). There fuel from the tank is mixed with fuel from the return line (8) and continues to the suction side of the fuel feed pump (1).

The fuel feed pump pumps the fuel via the fuel filter head (3), through the primary filter (9), to the cylinder head's fuel channel (8). The injectors (10) are supplied with fuel from the channel (8) via a ring-shaped passage around each injector in the cylinder head. The pressure in the unit pumps is controlled in the overflow valve.

Valves in fuel feed pump

The fuel feed pump has two valves:

- The safety valve (11), which allows fuel to flow back to the suction side when the fuel pressure becomes too high, e.g., in case of clogged filter.
- The non-return valve (12), which opens when the hand pump on the filter head (13) is used.

Automatic bleeding of fuel system

If air has entered the system, then automatic bleeding of the fuel system will take place when the engine is started.

Air is forced through the breather valve (14) down to the tank via the fuel return line (15) from the cylinder head.

When replacing filter, check air bleeding of valves 19, 25 and 14 in the filter head.

Manual hand pump

The manual hand pump (13) is located in the filter head. It is used to pump fuel when the fuel system is empty and the engine is off. The non-return valve (24) for the hand pump is located in the filter head.

Manual water drain

The 'water in fuel' sensor (16) will, via the engine control unit, indicate on the operator's panel when the water trap (5) has to be drained manually via the drain valve (18).

Document Title: Fuel system, description	Function Group: 230	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Fuel system, description

General

The fuel system has electronically controlled unit injectors, one for each cylinder, operating at very high pressure (approx. 150 MPa/21800 psi).

This pressure is created mechanically by rocker arms from an overhead camshaft.

The illustration shows the flow of fuel in the feed system and its main components.

Components

1. The feed pump is a gear pump driven by the engine transmission by the same gear wheel as the power take-off for the belt transmission. The drive shaft has two seals, providing a seal against fuel and oil.

The pump contains three valves: a pressure limiting valve, a non-return valve for the hand pump and a valve for the return fuel line leading to the fuel tank.

2. Two fuel filters. Primary filter with water trap and feed pump. Secondary filter with feed pump.

The secondary filter housing has two nipples.

The upper marked "VENT" is for bleeding and the nipple on the side marked "DRAIN" is for draining the system.

The hand pump is mounted directly behind the filter housing, which also contains the hand pump's non-return valves.

3. The control unit is bolted to the engine with a shock absorbing rubber block.

The control unit is cooled with fuel. Fuel on the suction side passes through a cooling coil that is bolted to the outside of the control unit.

4. Unit injectors.

5. The overflow (relief) valve, located on the return line from the cylinder head, regulates the pressure in the fuel cavity around the injectors.

6. There is a bleeder nipple in the return line connection on the leading edge of the cylinder head.

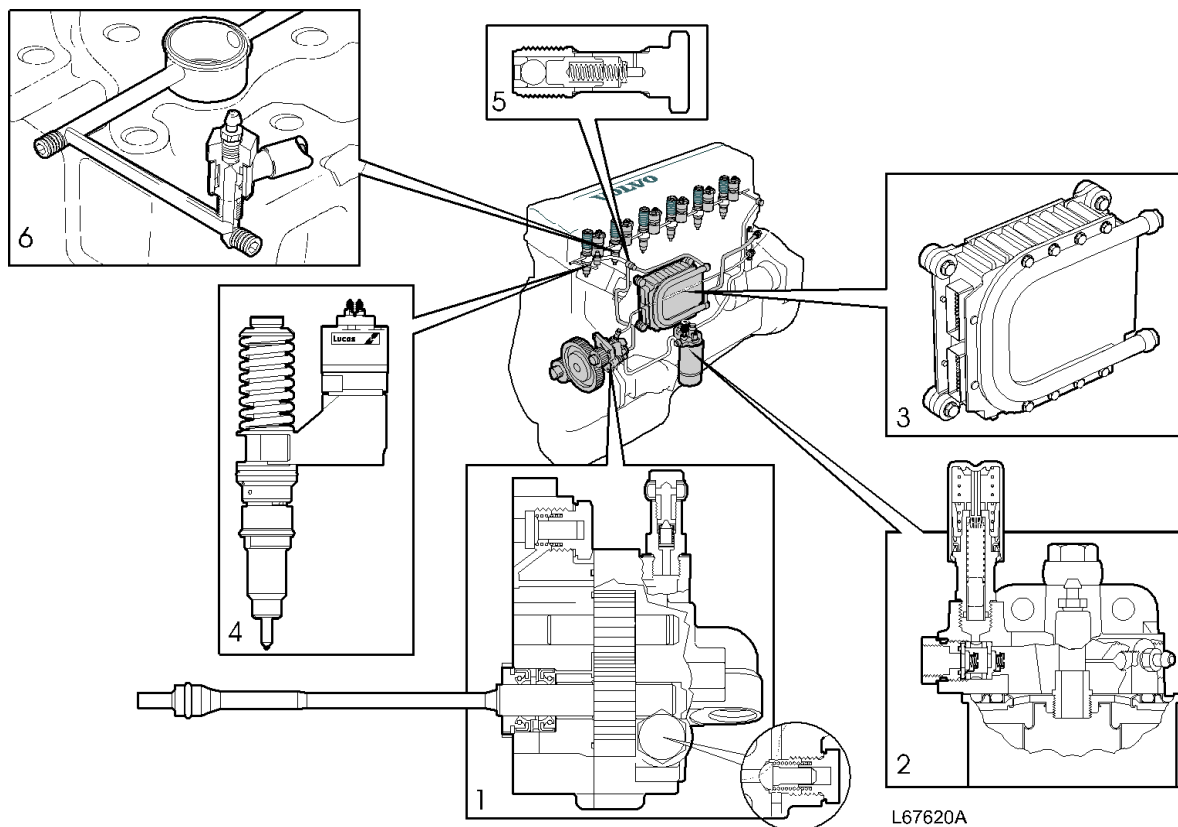


Figure 1
Schematic diagram of fuel system

1. Feed pump
2. Fuel filter
3. Control unit
4. Unit injectors
5. Overflow (relief) valve
6. Bleeder nipple

Fuel feed system, principles

General

The illustration shows the feed side of the fuel flow. Fuel is drawn up by the fuel feed pump (1) in the combined tank unit, passed the water trap (6), through the cooling coil (5), if the control unit (4) is fuel cooled, up to the overflow (relief) valve (8) and from there, along with the return fuel that passes through the overflow valve, to the suction side of the fuel pump.

The pump forces the fuel to the filter housing, passed the two non-return valves (10) for the hand pump (2) and through the filter (3) to the longitudinal duct in the cylinder head.

There is a ring-shaped groove around each unit injector (9). The overflow valve (8) maintains the fuel fed to the unit injectors at a constant pressure.

The fuel feed pump contains three valves. A pressure limiting valve (11) allows fuel to flow back to the suction side of the pump when the pressure is too high. The non-return valve (13) opens when the hand pump (2) is used.

The system is bled automatically to the fuel tank through a valve (12). There are three bleeder screws; on the cylinder head (14), filter bracket (15) and primary filter (17).

A fourth screw (16) is used to drain the fuel system.

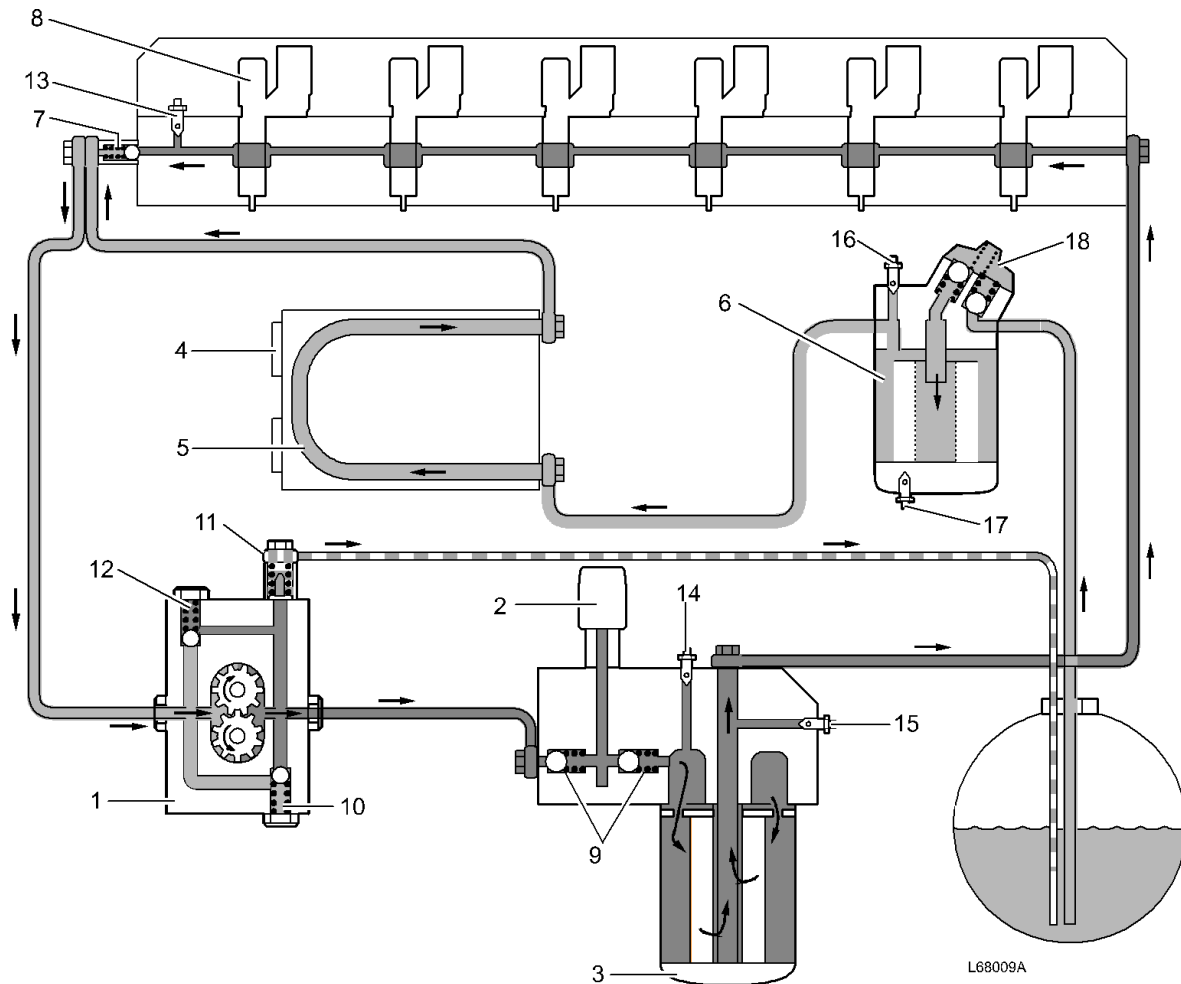


Figure 2
Fuel feed system, schematic diagram

1. Fuel feed pump
2. Hand pump on secondary filter head
3. Secondary filter
4. Control unit
5. Cooling coil
6. Primary filter
7. Overflow (relief) valve
8. Unit injectors
9. Non-return valves
10. Pressure limiting valve
11. Bleeder valve
12. Non-return valve, hand pump
13. Bleeder screw on cylinder head
14. Bleeder screw on secondary filter head
15. Bleeder screw on secondary filter head
16. Bleeder screw on primary filter head
17. Bleeder screw on primary filter head
18. Hand pump on primary filter head



Construction Equipment

Service Information

Document Title: Instructions for working with electronic fuel injection	Function Group: 230	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L60E, L180F, L220F, L150E, L220E, L180E, L110E, L90E, L70E, L150F, L330E, L120F, L110F, L70F, L60F, L350F, L90F, L120E, L180F HL [GB]			

Instructions for working with electronic fuel injection

- Never disconnect any cables from the control unit or from the sensors, when the engine is running. The ignition key must be in position 0 and the engine stopped.
- Never disconnect a battery cable while the engine is running.
- Before carrying out welding work, the control unit connectors must be disconnected from the control unit.
NOTE!
The main current supply must be switched off when the connectors are disconnected.
- Only batteries must be used as starting aid. Starting aid units may supply overvoltage and damage the electronics.
- During rapid charging of the batteries, the battery cables must be disconnected. (This does not apply during normal trickle charging.)
- If a connector has been disconnected, make sure it is correctly reconnected, and that it is completely free from oil or other contamination, which may cause a poor contact.

Document Title: Fuel system, bleeding	Function Group: 230	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Fuel system, bleeding

NOTE!

Avoid unnecessary fuel spills, collect the fuel with collection containers and by using a plastic hose on the bleeder screws.

Op nbr

1. Open the bleeder screw on the primary filter head.

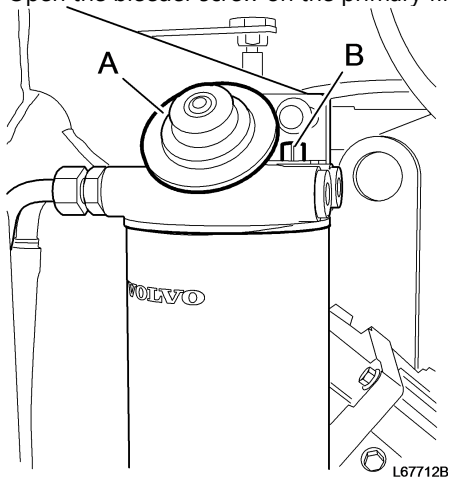


Figure 1

- A. Hand pump on primary filter head
- B. Bleeder screw on primary filter head

2. Pump the hand pump on the primary filter head until the fuel flowing out is free from air bubbles.
3. Close the bleeder screw.
4. Connect a transparent plastic hose on the bleeder screw located on the secondary filter head.
5. Open the bleeder screw and pump the hand pump on the secondary filter head until the fuel flowing out is free from air bubbles.

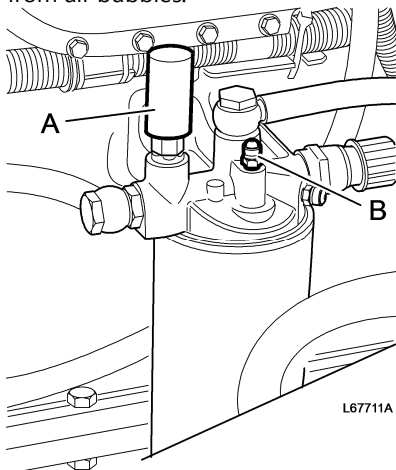


Figure 2

- A. Hand pump on secondary filter head
- B. Bleeder screw on secondary filter head

6. Close the bleeder screw.
7. Move the plastic hose to the bleeder screw by the cylinder head.

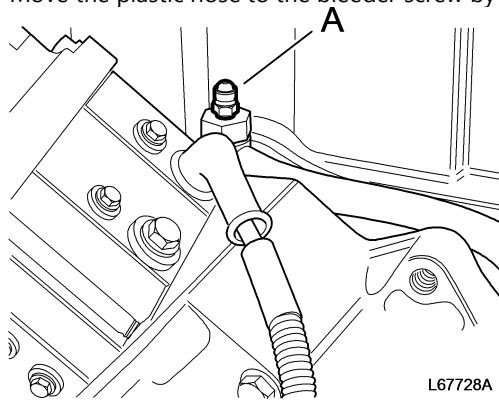


Figure 3

- A. Bleeder screw by cylinder head

8. Pump the hand pump on the secondary filter head until the fuel flowing out is free from air bubbles.
9. Close the bleeder screw.
10. Start the engine and run at increased idle for approx. 10 minutes to bleed any remaining air from the fuel system.

NOTE!

Check for leaks after starting.

Document Title: Fuel system, bleeding	Function Group: 230	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Fuel system, bleeding

Op nbr 233-001

1. Place the machine in service position, see [191 Safety rules when servicing](#)
2. Turn off the main electric power with the battery disconnect switch.

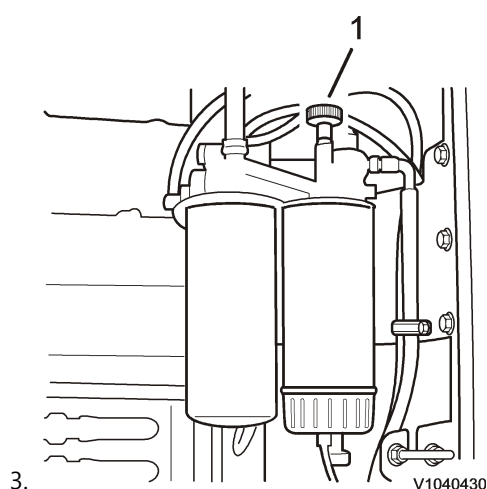


Figure 1

1. Hand pump on filter head.

Turn the hand pump counter-clockwise so it can be pumped. Pump approx. 200 to 300 strokes until a resistance can be felt in the hand pump. Then turn the hand pump clockwise to stop.

NOTE!

Air bleeding may not be performed using the starter motor.

4. Turn on the electric power, start the engine and let it idle at low idle speed for a few minutes. If the engine is difficult to start, bleed again with the hand pump.

NOTE!

The hand pump must not be used when the engine is running.

Document Title: Fuel system, bleeding	Function Group: 230	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L220E, L180E [GB]			

Fuel system, bleeding

Op nbr 233-001

1. Place the machine in service position, see [191 Safety rules when servicing](#)
2. Turn off the main electric power with the battery disconnect switch.

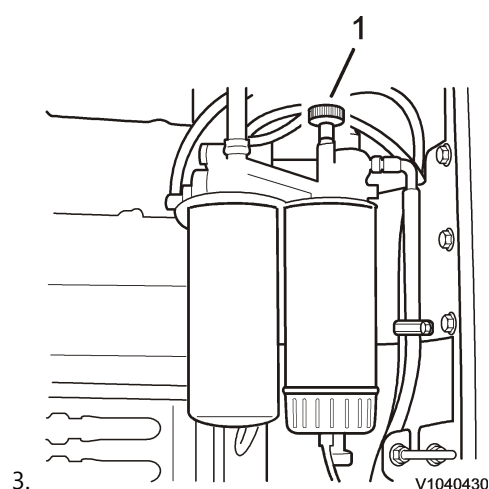


Figure 1

1. Hand pump on filter head.

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NOTE!

Air bleeding may not be performed using the starter motor.

4. Turn on the electric power, start the engine and let it idle at low idle speed for a few minutes. If the engine is difficult to start, bleed again with the hand pump.

NOTE!

The hand pump must not be used when the engine is running.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Fuel filter, description](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8002
Serial number stop: 10999

- [Fuel filter, description](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7398, 69999

Document Title: Fuel filter, description	Function Group: 233	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Fuel filter, description

The fuel system is equipped with two fuel filters, a primary filter with water trap, and a secondary filter. The filters have a common filter head that is mounted on the machine frame.

There is a hand pump on the filter head which is used when the fuel system has been emptied. On the secondary filter side there is a fuel pressure sensor which measures the fuel feed pressure to the unit injectors.

In the water trap, there is a drain valve and a level sensor.

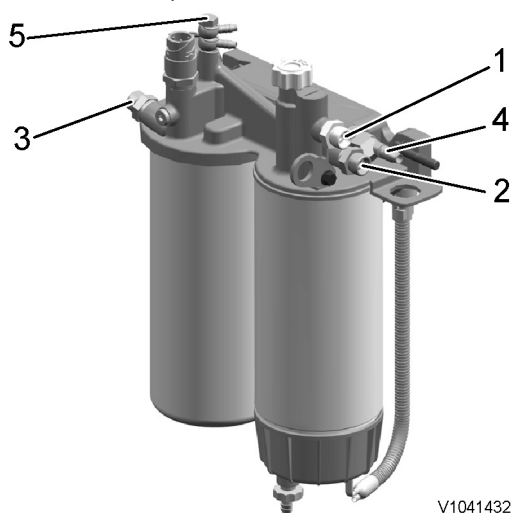


Figure 1

1. Inlet from fuel tank to prefilter
2. Outlet from prefilter to fuel feed pump
3. Inlet from fuel feed pump to main filter
4. Outlet from secondary filter to unit injector
5. Air nipple

The filter insert consists of a folded filter made of special paper with very good filtration capacity.

On the suction line in the fuel tank, there's also a fine filter (net type) that separates any coarse solid impurities before the fuel is drawn into the system.

Document Title: Fuel filter, description	Function Group: 233	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Fuel filter, description

The fuel system is provided with two fuel filters, one primary filter with water trap and one secondary filter.

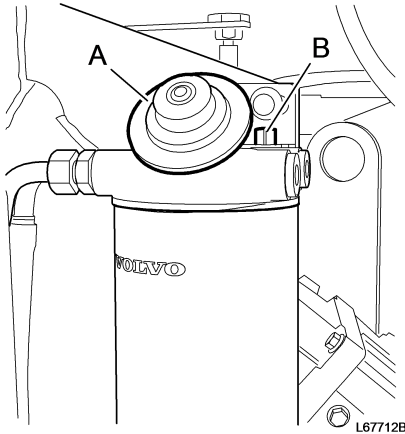


Figure 1
Primary filter

- A. Hand pump
- B. Bleeder screw

The filter insert consists of a pleated filter made of special paper with very good filtering ability.

On the suction line in the fuel tank there is also a close-meshed gauze filter which separates any coarser solid impurities before the fuel is sucked into the system.

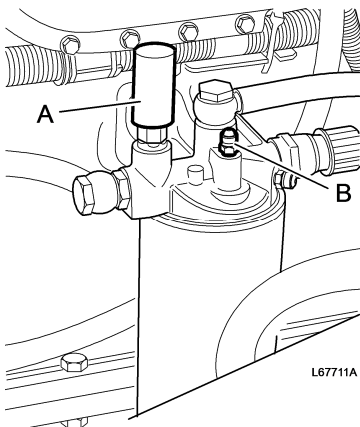


Figure 2
Secondary filter

- A. Hand pump
- B. Bleeder screw

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Fuel filter, description](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8002
Serial number stop: 10999

- [Fuel filter, description](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7398, 69999

Document Title: Fuel filter, description	Function Group: 233	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Fuel filter, description

The fuel system is equipped with two fuel filters, a primary filter with water trap, and a secondary filter. The filters have a common filter head that is mounted on the machine frame.

There is a hand pump on the filter head which is used when the fuel system has been emptied. On the secondary filter side there is a fuel pressure sensor which measures the fuel feed pressure to the unit injectors.

In the water trap, there is a drain valve and a level sensor.

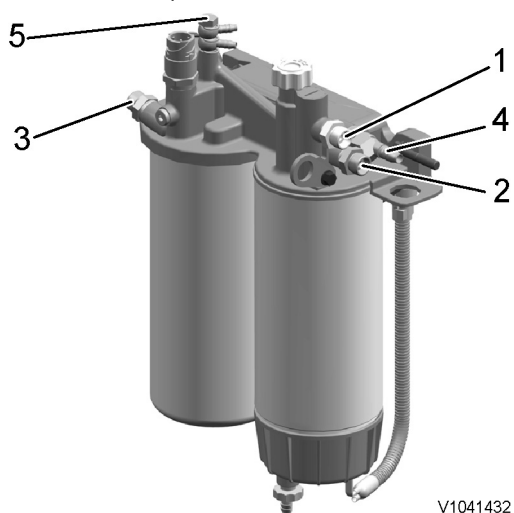


Figure 1

1. Inlet from fuel tank to prefilter
2. Outlet from prefilter to fuel feed pump
3. Inlet from fuel feed pump to main filter
4. Outlet from secondary filter to unit injector
5. Air nipple

The filter insert consists of a folded filter made of special paper with very good filtration capacity.

On the suction line in the fuel tank, there's also a fine filter (net type) that separates any coarse solid impurities before the fuel is drawn into the system.

Document Title: Fuel filter, description	Function Group: 233	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Fuel filter, description

The fuel system is provided with two fuel filters, one primary filter with water trap and one secondary filter.

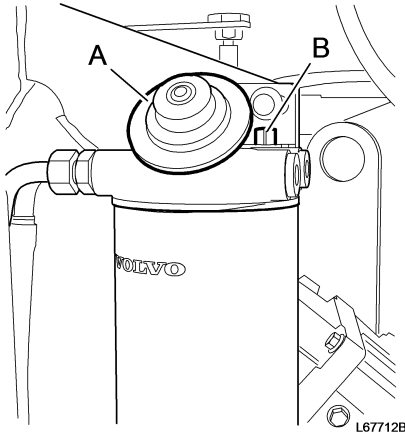


Figure 1
Primary filter

- A. Hand pump
- B. Bleeder screw

The filter insert consists of a pleated filter made of special paper with very good filtering ability.

On the suction line in the fuel tank there is also a close-meshed gauze filter which separates any coarser solid impurities before the fuel is sucked into the system.

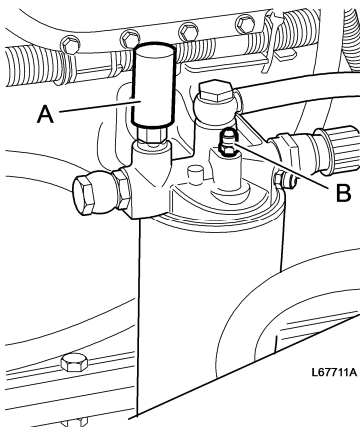


Figure 2
Secondary filter

- A. Hand pump
- B. Bleeder screw

Document Title: Overflow valve, description	Function Group: 233	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Overflow valve, description

The overflow valve is positioned in the outlet from the cylinder head fuel duct.

The overflow valve controls the feed pressure in the fuel system. The opening pressure is approx. 3.5 bar (51 psi).

The high feed pressure provides an adequate filling of the unit injectors.

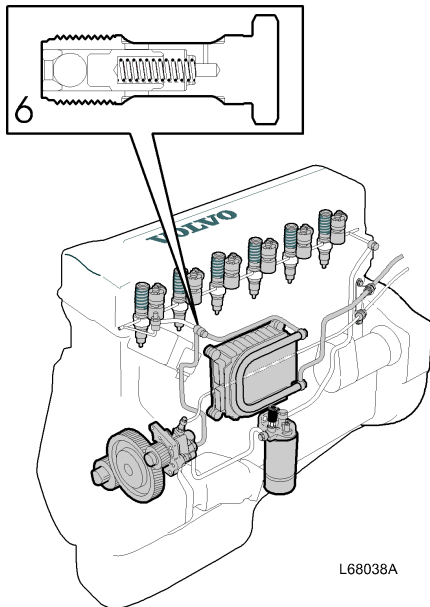


Figure 1

Document Title: Feed pump, checking feed pressure	Function Group: 233	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Feed pump, checking feed pressure

Op nbr 233-004

[11666017 Pressure gauge](#)

[11666037 Hose](#)

[13933485 Testing nipple](#)

1. Clean thoroughly and remove the drain nipple (Drain) on the fuel filter housing.
2. Fit the measuring nipple. The feed pressure shall always be checked after the fuel filter.

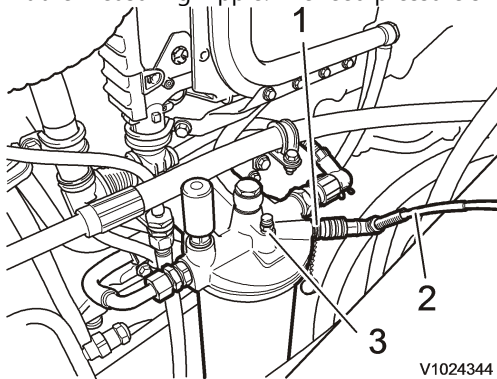


Figure 1
Engine D9

1. 13933485 Measuring nipple
2. 11666037 Hose
3. Breather nipple (Vent)

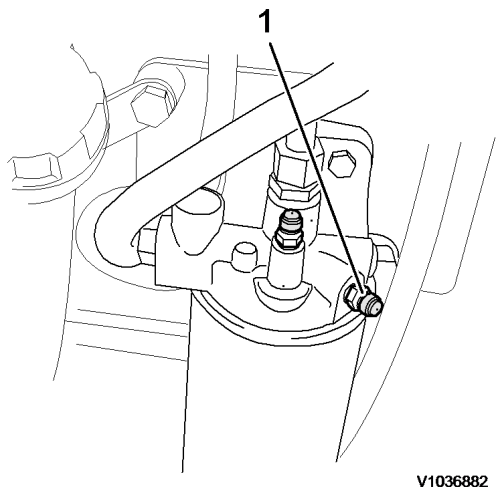


Figure 2
Engine D10

1. Drain plug
3. Connect the hose and pressure gauge to the measuring nipple.
4. Make sure that the gearshift selector is in neutral and that the parking brake is applied. Start the engine and check that the feed pressure is at least **350 kPa (3.5 bar)** at **1200 rpm**.

NOTE!

When low feed pressure is suspected, check the feed pressure with loaded engine, for example, at stall speed or full load.

5. Run the engine to stall rpm and read off the pressure gauge at the same time. The pressure may not be below 300 kPa during the test.

NOTE!

Keep in mind that the pressure gauge's reading may be delayed.

In case pressure is too high:

If the pressure is too high, the overflow valve has to be changed.

In case pressure is too low:

If the feed pressure is too low, the cause may be a clogged suction line, defective feed pump, clogged fuel filters or defective overflow valve.

The filter can be checked by measuring the feed pressure before the filter. Connect the pressure gauge to the breather nipple (Vent) on the filter head.

6. Restore the machine to operating condition.

Document Title: Feed pump, checking feed pressure	Function Group: 233	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Feed pump, checking feed pressure

Op nbr 233-004

[11666052 Pressure gauge](#)

[14290266 Hose](#)

[9993720 Nipple](#)

[14341364 Adapter](#)

936442 Measuring nipple

1. Remove the plug and connect 936442, 14290266 Hose and 11666052 Pressure gauge to the fuel filter housing.

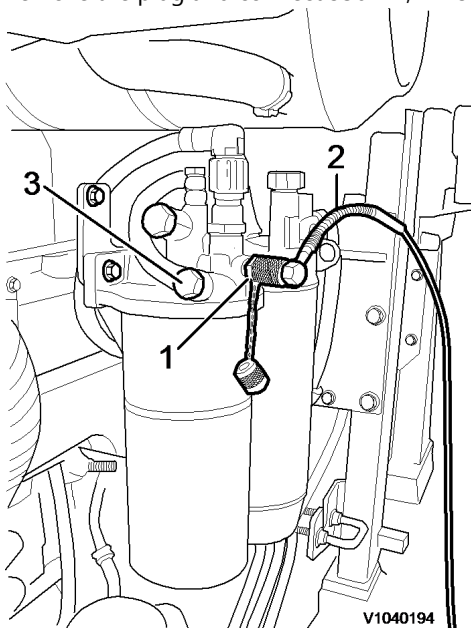


Figure 1

1. 936442
 2. 14290266
 3. Connection for 9993720 as needed
2. Make sure that the gear selector is in neutral position.
Start the engine and check the feed pressure.
Feed pressure, see [233 Fuel feed pump, specifications](#).

NOTE!

In case low feed pressure is suspected, check the feed pressure with loaded engine, e.g., at stall speed or max. load.
Keep in mind that the pressure gauge reading may be delayed.

In case pressure is too high:

If the pressure is too high, the overflow valve has to be checked.

In case pressure is too low:

If the feed pressure is low, the cause may be clogged suction line, defective feed pump, clogged fuel filter, defective overflow valve, or the pump sucks air on the suction side.

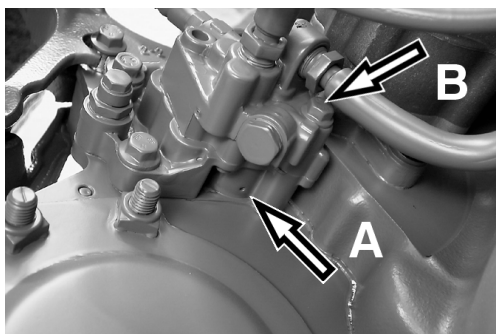
The filters can be checked by measuring the feed pressure before the filter. Use 9993720 Nipple and 14341364 Adapter to measure the pressure before the filters.

3. Restore the machine to operating condition.

Document Title: Fuel pump, inspection	Function Group: 233	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Fuel pump, inspection

Op nbr 233-010



1.

Figure 1

A Overflow hole's placement

B M8 screw

Check if engine oil or fuel leaks through the overflow hole (A), located between the seals in the feed pump's housing (easiest done using a mirror).

NOTE!

Traces of oil on the pump's underside may come from the M8 screw (B). Seal the threads on the screw with sealant (1161231).

Check that the overflow hole is not clogged. Leakage through the overflow hole indicates that the seals in the feed pump's drive are worn.

2. Remove the feed pump.
3. Dismantle the feed pump and check the feed pump's drive for damage. If damaged, change the feed pump.
4. If undamaged, clean all parts very thoroughly and assemble the pump.
5. Install the feed pump.
6. Following any action, check the feed pressure.

Document Title: Fuel pump (valves), inspection	Function Group: 233	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Fuel pump (valves), inspection

Op nbr 233-009

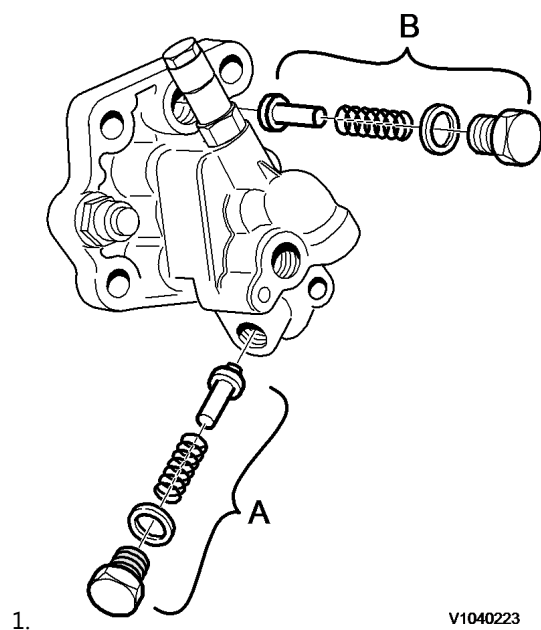


Figure 1

- A Safety valve
- B Non-return valve for bleeding of fuel system

Screw out the safety valve's plug (A) on the feed pump and remove the valve peg and the spring. Check the valve peg's sealing surface for damage and dirt. If needed, change valve peg. If the valve peg shows wear marks, also check the pump housing's corresponding valve seat for damage. If damaged, change feed pump.

2. Check the non-return valve (B) in the same way as the safety valve. If needed, change valve peg.
3. Install the valves in the feed pump.
4. Following any action, check the feed pressure.

Document Title: Fuel filter, checking	Function Group: 233	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E, L220E [GB]			

Fuel filter, checking

Op nbr 233-020

1. Check that the fuel is not contaminated in the bowl under the primary filter. The check is performed to make sure that the primary filter is not clogged.
In case of impurities, the filter is probably clogged. Change primary filter and clean the water collection bowl.
In winter, one can also check if any water in the water collection bowl has frozen and thus causes a clog.
In case of suspected impurities in the tank, clean the tank.

Draining water collection bowl

2. Open the valve (1) on the water collection bowl and collect waste fuel in a suitable container.



Figure 1

Document Title: Fuel system, bleeding	Function Group: 233	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Fuel system, bleeding

Op nbr 233-001

1. Place the machine in service position, see [191 Safety rules when servicing](#)
2. Turn off the main electric power with the battery disconnect switch.

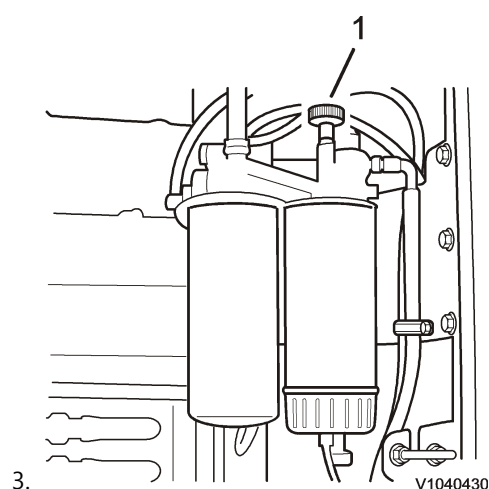


Figure 1

1. Hand pump on filter head.

Turn the hand pump counter-clockwise so it can be pumped. Pump approx. 200 to 300 strokes until a resistance can be felt in the hand pump. Then turn the hand pump clockwise to stop.

NOTE!

Air bleeding may not be performed using the starter motor.

4. Turn on the electric power, start the engine and let it idle at low idle speed for a few minutes. If the engine is difficult to start, bleed again with the hand pump.

NOTE!

The hand pump must not be used when the engine is running.

Document Title: Fuel tank, removing, mounting	Function Group: 234	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Fuel tank, removing, mounting

Op nbr 23410

999 8547 Lifting device

Ratchet block 750 kg (1650 lbs), 2 pcs.

Sling, 3 m, 2 pcs.

1. Place the machine in service position.
2. For machine versions with extra counterweight, remove the extra counterweight, see [716 Extra counterweight, removing and installing](#)
3. Connect the lifting device with two slings, that are connected to a shackle under the rear protective plate. Tighten up the lifting device and remove the protective plate's attaching bolts on both sides. Lower the protective plate.
Protective plate weight **105 kg (230 lbs)**.

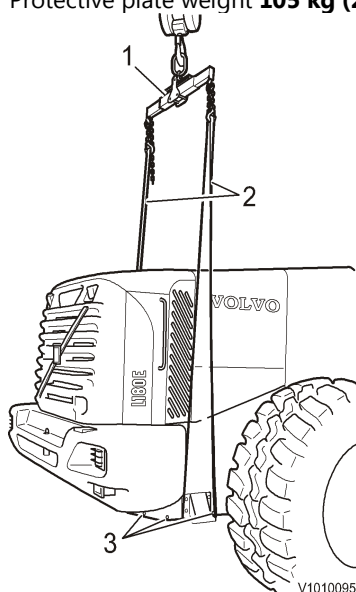


Figure 1
Removing, protective plate

1. 999 8547
 2. Sling, 3 m, 2 pcs.
 3. Protective plate's attaching bolts
4. Remove the rear partition wall and the bottom plate for the engine compartment.

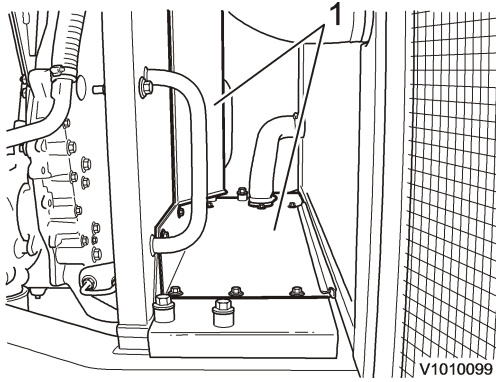


Figure 2

1. Rear partition wall and bottom plate

5. Remove the fan shroud.

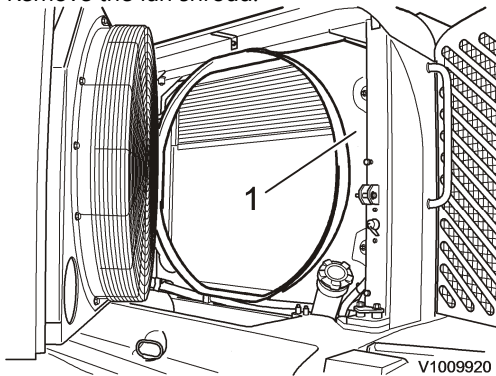


Figure 3

1. Fan shroud

6. Remove the upper clamp on the fuel tank's filler pipe.

7. Remove the bolt for the drain lines' clamps on the left front edge of the fuel tank.

8. Remove the breather hose and the fuel lines on the tank fixture, unplug the tank fixture's connector.

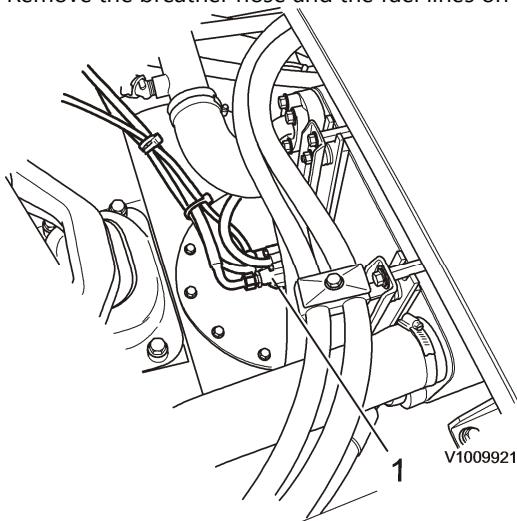


Figure 4

1. Tank fixture with connections

9. Fit shackle and ratchet block in each lifting eye on the partition wall's reinforcement brackets.

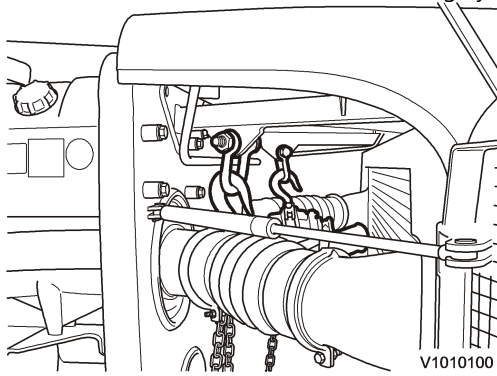


Figure 5

10. Connect the ratchet blocks' lift hooks in the fuel tank's both lifting eyes, these are located vertically under the reinforcement brackets' lifting points.
Tighten up the lifting devices.

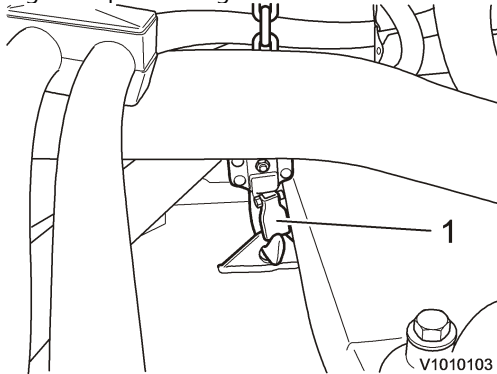


Figure 6

1. Lifting hook

11. Remove the bolt for the clamp for the coolant's drain hose on the right front edge of the fuel tank.
Remove the fuel tank's right front bolted joint in the frame member.

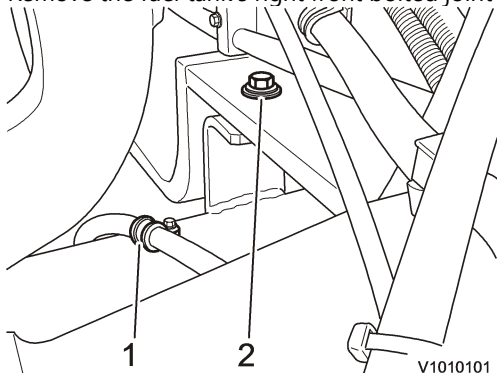


Figure 7

1. Drain hose
2. Tank bracket, right front

12. Remove the fuel tank's left front bolted joint in the frame member.

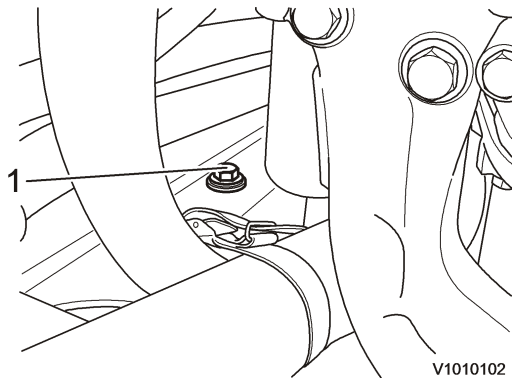


Figure 8

1. Tank bracket, left front

13. Remove the tank's rear bolted joint.

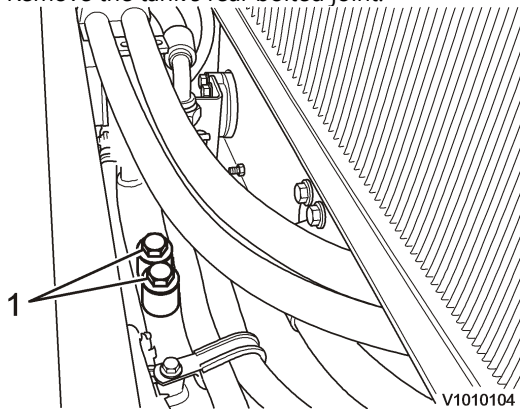


Figure 9

1. Tank's rear bolted joint

14. Lower the tank with the ratchet block.
Tank's empty weight: **110 kg**

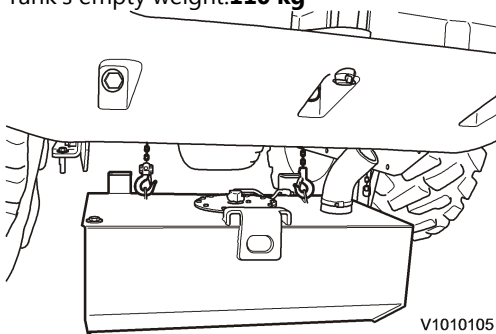


Figure 10

Document Title: Stall speed, checking	Function Group: 236	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Stall speed, checking

Op nbr 236-002

1. Warm up the machine until engine and transmission have reached working temperature, approx. 70°–90°C.
All major current consuming equipment and air conditioning (if fitted) must be switched off when conducting this check.

NOTE!

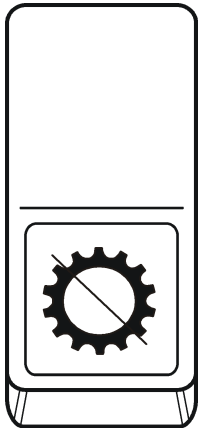
Checking speed readings should only be conducted from the cab for safety reasons and should last for a maximum duration of 10 seconds. Longer checks imply risk for overheating in the torque converter.



WARNING

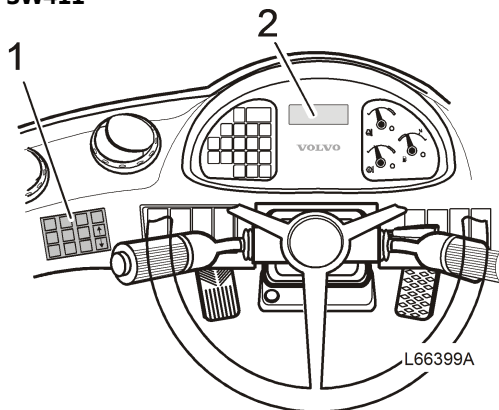
Risk of personal injury! Make sure that no persons are in front of or behind the machine.

2. Check that the function transmission disengagement is not activated. On earlier machines, the function is activated/deactivated with SW411, located on the right front instrument panel. On later machines, the function is activated/deactivated via the keypad.



V1045048

Figure 1
SW411



L66399A

Figure 2

1. Keypad
 2. Display unit
3. Check the high idle speed, see [210 Engine. specifications](#)
4. Apply the parking brake. Also apply the service brake so that the wheels lock and the machine cannot move. Set the gearshift mode selector in position man/service. Engage third gear, forward or reverse.
5. Rev up the engine to full speed. Read off engine speed, see stall speed with torque converter
[210 Engine. specifications](#)
If the measured rpm is higher than that which is stated, this may be due to a problem in the torque converter or the hydraulic transmission.
If the rpm is lower than that which is stated, this may be due to a problem in the torque converter, the engine, or equipment associated with the engine.
A divergent stall speed is not in itself a fault that leads to repair but which should be used as an aid during fault diagnosis.

Document Title: Unit injectors, description	Function Group: 237	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Unit injectors, description

The engine has six unit injectors, one for each cylinder. The unit injector is a combination of an injection pump and an injector and it can work at considerable higher pressure than an ordinary injector. The unit injector is positioned vertically in the centre between the four valves.

The force required to create the pressure in the unit injector is transferred via a rocker arm from a cam on the overhead camshaft.

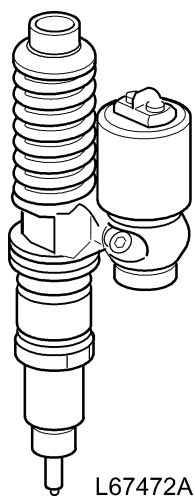


Figure 1
Unit injector

The unit injector consists of three main parts:

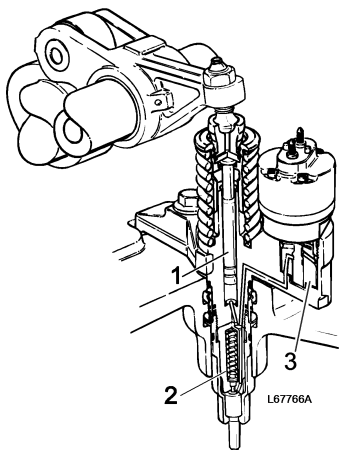


Figure 2
Unit injector parts

1. Pump part, which contains cylinder and piston, corresponding to the pump element in an injection pump.
2. Injector part with nozzle sleeve, nozzle needle and spring.
3. Valve housing with an electromagnetically controlled fuel valve.

The lower part of the unit injector is, in the same way as an ordinary injector, positioned in a copper sleeve against the bottom of the cylinder head.

The intermediate part of the unit injector, where the inlet and outlet holes for the fuel are positioned, lies in the cylinder head fuel duct.

The unit injector takes in the fuel directly from the fuel duct. The uppermost part of the unit injector with compression spring and valve housing, lies above the cylinder head.

The injection timing and the injected amount of fuel is determined by the control unit (E-ECU), which sends signals to the electromagnetically controlled fuel valve in the valve housing on the unit injector. The duration of the fuel injection determines the amount of fuel injected into the cylinder.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Unit injector, Delphi, description](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

- [Unit injector, Delphi, description](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7418, 62543

Document Title: Unit injector, Delphi, description	Function Group: 237	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Unit injector, Delphi, description

Unit injectors, tolerance classification

The unit injectors are manufactured with tolerance classification. Each unit injector is marked with a code (1) on top of the electric connection.

When replacing one or more of the unit injectors, the new codes must be programmed for the cylinder where a unit injector has been replaced. This is done through parameter programming using the service tool VCADS Pro.

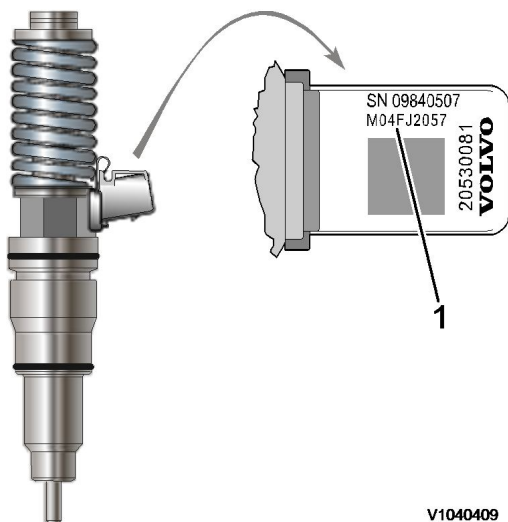


Figure 1

Tolerance classification, unit injectors

1. Position, code

The unit injector consists of three main parts:

1. **Pump part**, which contains cylinder and piston, corresponding to the pump element in an injection pump.
2. **Valve housing**, with an electro-magnetically controlled fuel valve.
3. **Injector part**, with injector sleeve, injector needle and spring.

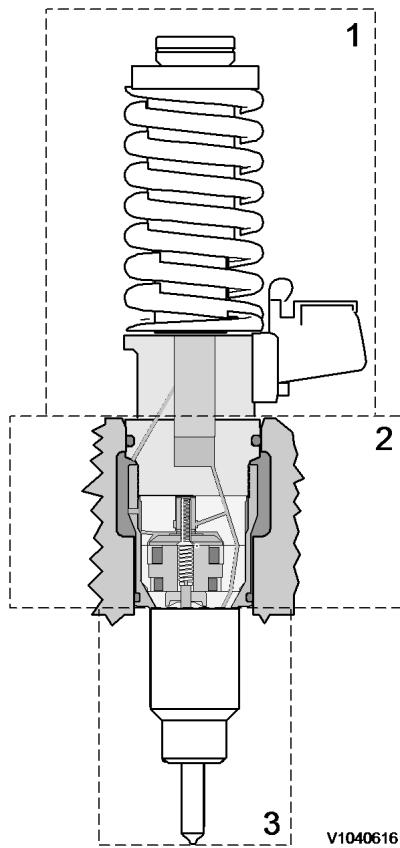


Figure 2
Unit injector

1. Pump part
2. Valve part
3. Injector part

The time of injection and the amount of fuel to be injected is determined by the control unit, which sends signals to the electro-magnetically controlled fuel valve in the unit injector's valve housing. The duration of the injection determines the amount of fuel that is injected into the cylinder.

The lower part of the unit injector is placed in a copper sleeve against the bottom of the cylinder head, like an ordinary injector.

The middle part of the unit injector, where the inlet and outlet holes for the fuel are located, is located in the cylinder head fuel duct. The unit injector takes in fuel directly from the fuel duct. The top part of the unit injector, with thrust spring and valve housing, is located above the cylinder head.

Document Title: Unit injector, Delphi, description	Function Group: 237	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Unit injector, Delphi, description

On D12D and later versions of D12C, unit injectors made by Delphi are used

The visible difference from earlier versions is that the solenoid valve has been placed inside the injector body. This gives faster injector response as the inner ducts to the fuel valve is shorter. In other aspects, the function is the same as for the earlier version of unit injector.

Unit injectors, tolerance classification

The unit injectors are manufactured with tolerance classification. Each unit injector is marked with a code (1) on top of the electric connection.

When replacing one or more of the unit injectors, the new codes must be programmed for the cylinder where a unit injector has been replaced. This is done through parameter programming using the service tool VCADS Pro.

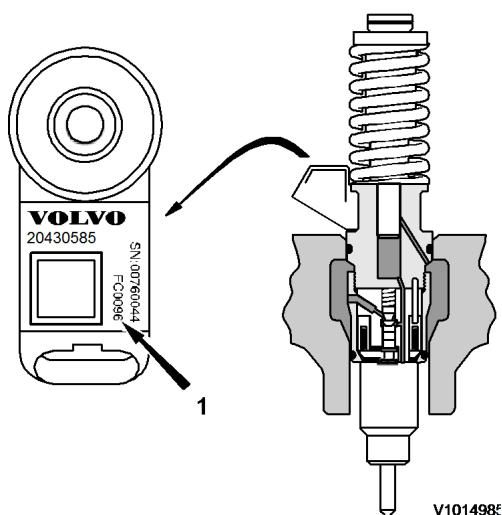


Figure 1
Tolerance classification, unit injectors

1. Position, code

The unit injector consists of three main parts:

1. **Pump part**, which contains cylinder and piston, corresponding to the pump element in an injection pump.
2. **Valve housing**, with an electro-magnetically controlled fuel valve.
3. **Injector part**, with injector sleeve, injector needle and spring.

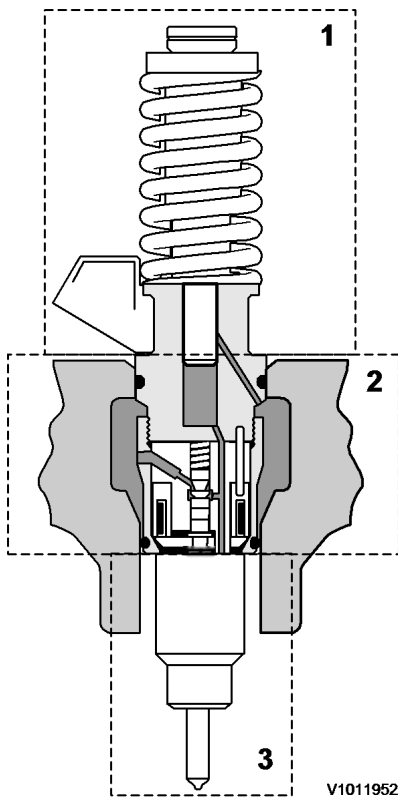


Figure 2
Unit injector

1. Pump part
2. Valve part
3. Injector part

The time of injection and the amount of fuel to be injected is determined by the control unit, which sends signals to the electro-magnetically controlled fuel valve in the unit injector's valve housing. The duration of the injection determines the amount of fuel that is injected into the cylinder.

The lower part of the unit injector is placed in a copper sleeve against the bottom of the cylinder head, like an ordinary injector.

The middle part of the unit injector, where the inlet and outlet holes for the fuel are located, is located in the cylinder head fuel duct. The unit injector takes in fuel directly from the fuel duct. The top part of the unit injector, with thrust spring and valve housing, is located above the cylinder head.

Document Title: Unit injector working phases	Function Group: 237	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Unit injector working phases

Filling phase

The filling phase lasts all the time while pump piston (1) moves upwards. Fuel valve (2) is open while solenoid valve (3) is not energised. The fuel can therefore be sucked from inlet duct (4), through the open valve and into the pump cylinder.

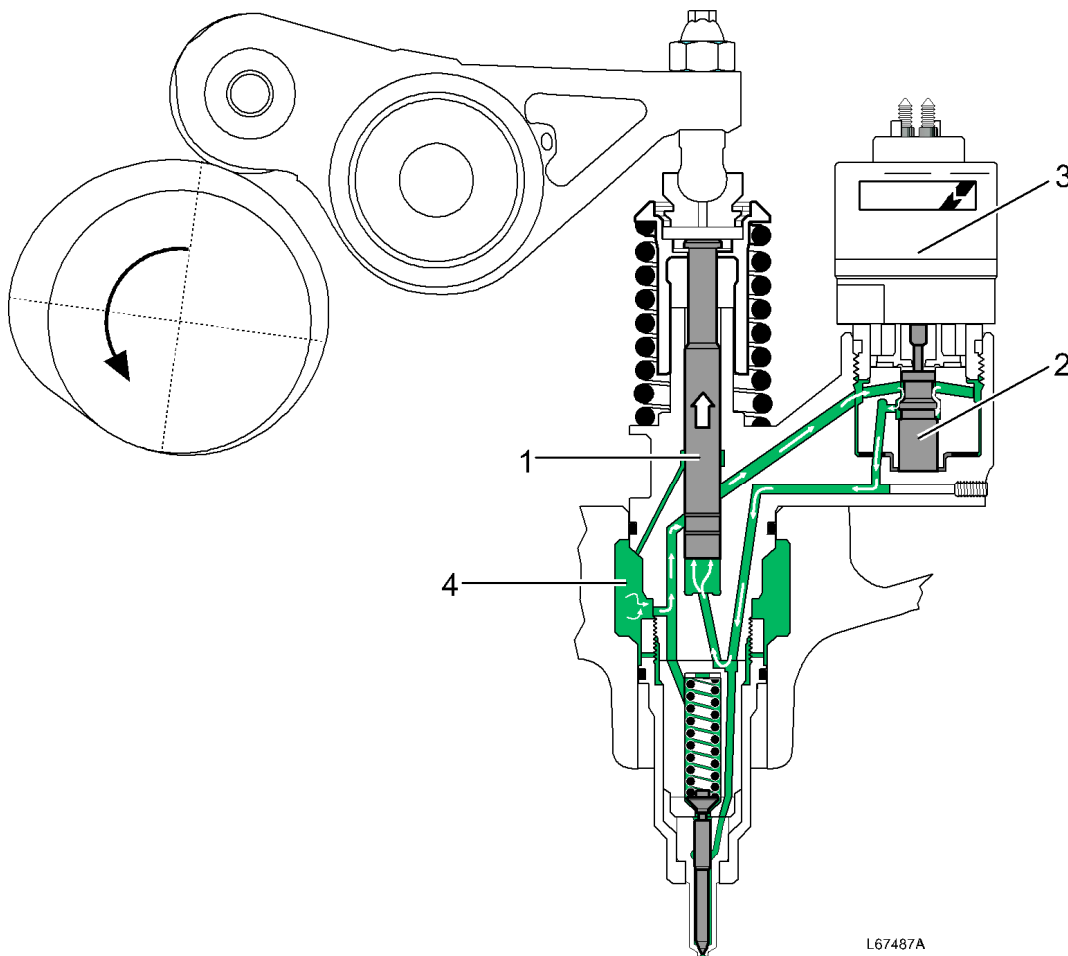


Figure 1
Unit injector filling phase

Overflow flow phase

Pump piston (1) moves downwards. As long as solenoid valve (3) is not energised, fuel valve (2) remains open and the fuel flows back out into inlet duct (4).

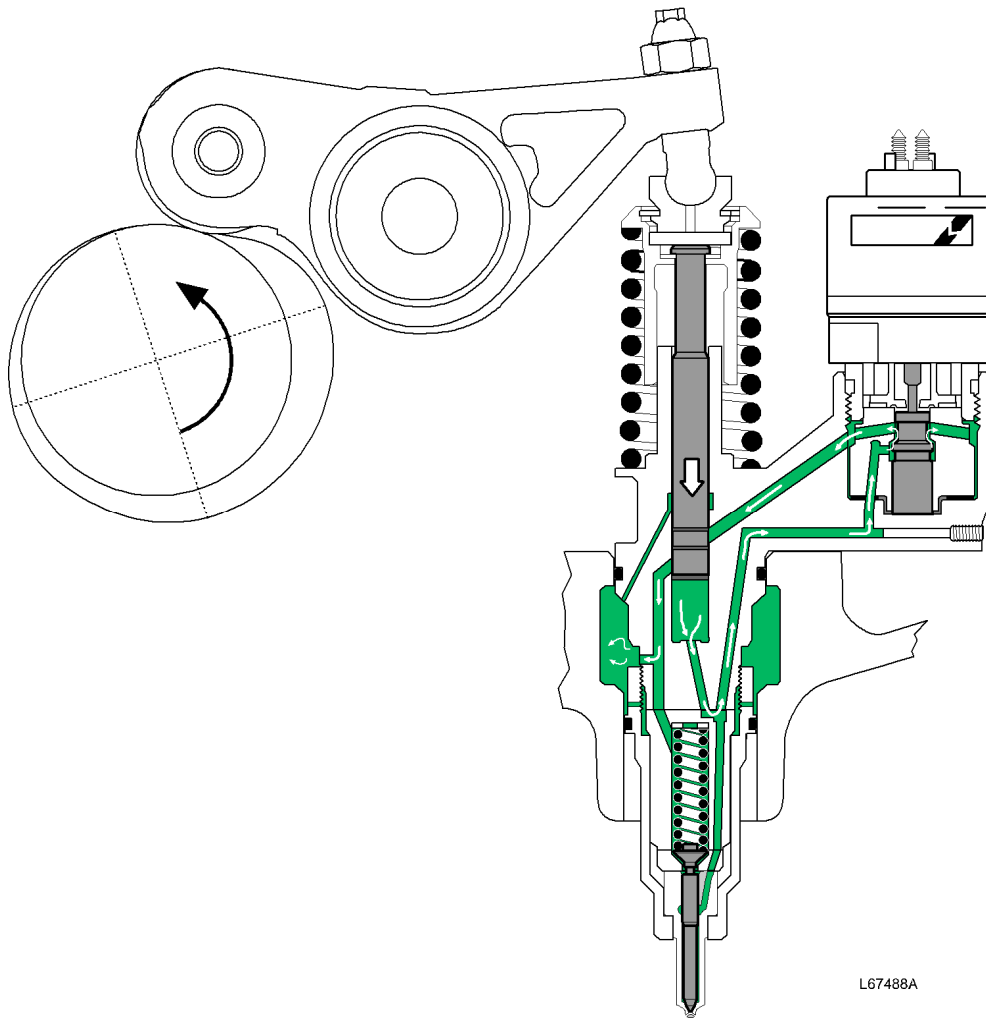


Figure 2
Unit injector return flow phase

Injection phase

Pump piston (1) is still moving downwards. The control unit has now caused solenoid valve (3) to be energised. The valve poppet is then pulled up and closes valve (2). As the fuel cannot pass through the valve, pressure rapidly builds up and lifts nozzle needle (5) and fuel is injected.

The injection lasts as long as the valve remains closed while the pump piston is moving downwards. The injection timing and the amount of injected fuel is determined by the duration of the current pulse. It is the control unit that determines the current pulse based on the information it receives from the control system.

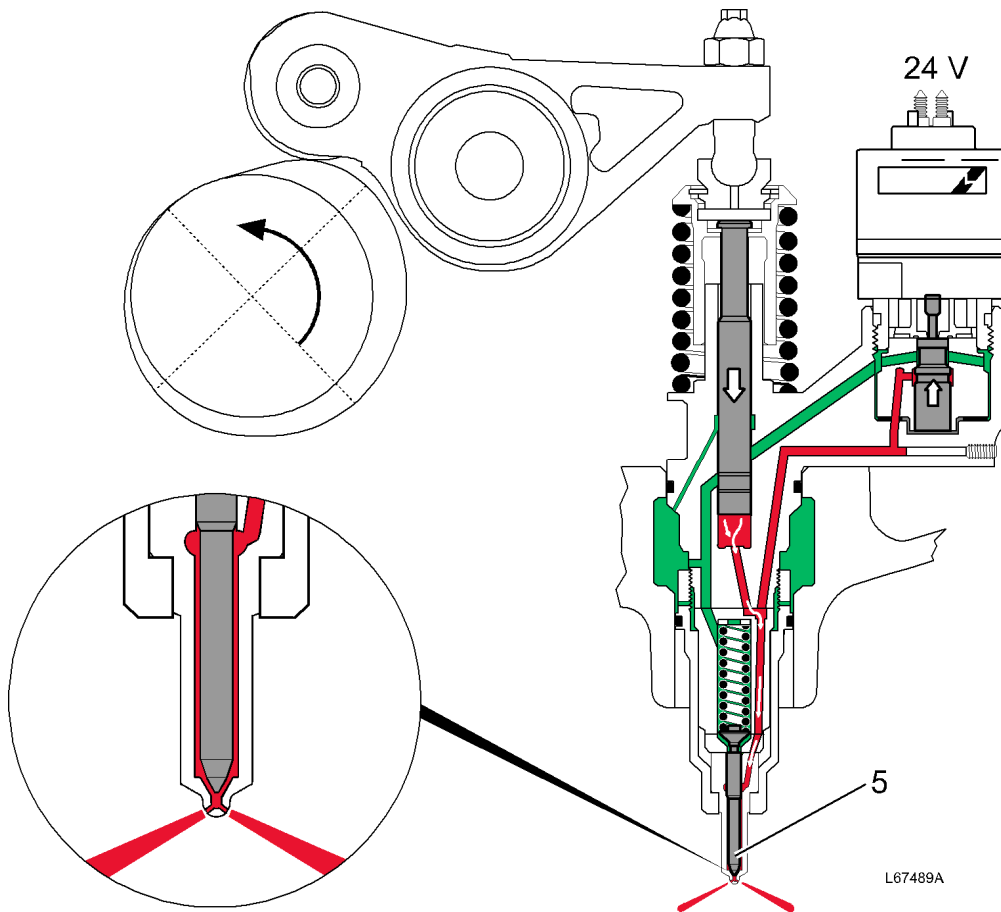


Figure 3
Unit injector injection phase

Pressure reduction phase

Pump piston (1) is still moving downwards. The control unit interrupts the current pulse, when the engine has received the amount of fuel required at this moment. Fuel valve (2) opens and again allows a return flow of fuel out through inlet duct (4). The pressure then drops rapidly and nozzle needle (5) closes.

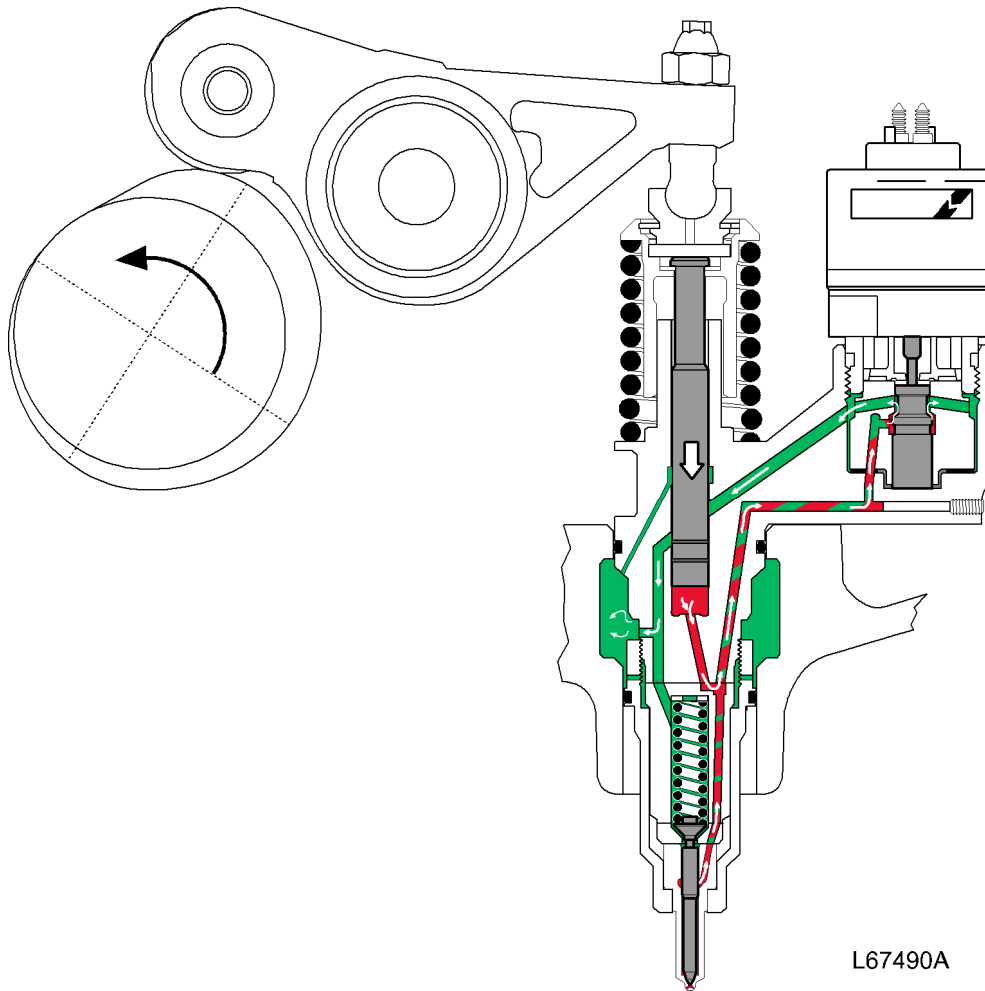


Figure 4
Unit injector pressure reduction phase

Document Title: Unit injector, Delphi, description	Function Group: 237	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Unit injector, Delphi, description

Unit injectors, tolerance classification

The unit injectors are manufactured with tolerance classification. Each unit injector is marked with a code (1) on top of the electric connection.

When replacing one or more of the unit injectors, the new codes must be programmed for the cylinder where a unit injector has been replaced. This is done through parameter programming using the service tool VCADS Pro.

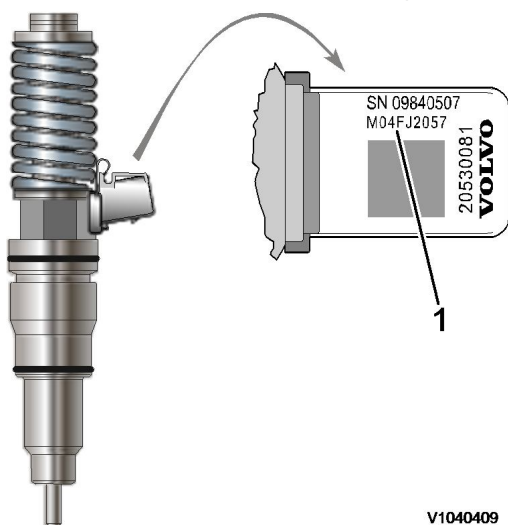


Figure 1

Tolerance classification, unit injectors

1. Position, code

The unit injector consists of three main parts:

1. **Pump part**, which contains cylinder and piston, corresponding to the pump element in an injection pump.
2. **Valve housing**, with an electro-magnetically controlled fuel valve.
3. **Injector part**, with injector sleeve, injector needle and spring.

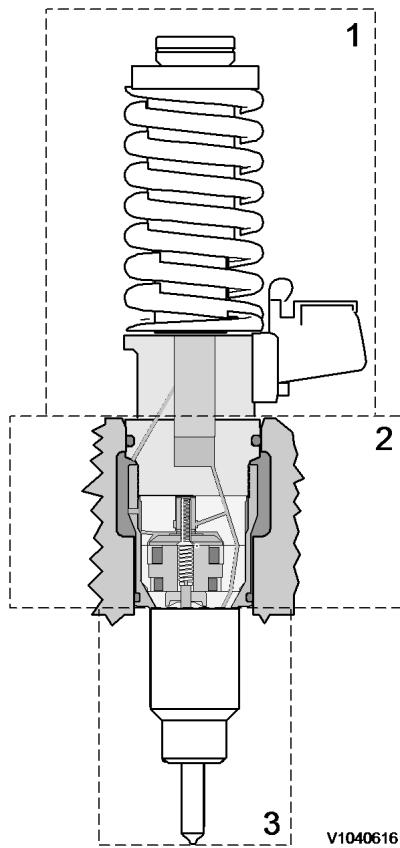


Figure 2
Unit injector

1. Pump part
2. Valve part
3. Injector part

The time of injection and the amount of fuel to be injected is determined by the control unit, which sends signals to the electro-magnetically controlled fuel valve in the unit injector's valve housing. The duration of the injection determines the amount of fuel that is injected into the cylinder.

The lower part of the unit injector is placed in a copper sleeve against the bottom of the cylinder head, like an ordinary injector.

The middle part of the unit injector, where the inlet and outlet holes for the fuel are located, is located in the cylinder head fuel duct. The unit injector takes in fuel directly from the fuel duct. The top part of the unit injector, with thrust spring and valve housing, is located above the cylinder head.

Document Title: Unit injectors, checking	Function Group: 237	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Unit injectors, checking

Op nbr

1. In order to determine which unit injector is not functioning, work according to Op. no. 23712-6, Injector shut-off, manual, 21006-6, Cylinder compression, test, as well as 23106-6, Cylinder balancing, test in the PC-tool VCADS-Pro.
2. Before checking the unit injector, check the cable harness, connectors as well as control unit. See Section 3.

Dismantling

3. Clean the valve cover and surrounding components thoroughly. This is to avoid dirt entering the cylinder head when the cover is removed.
4. Remove the attaching bolts from the engine hood (4 bolts).

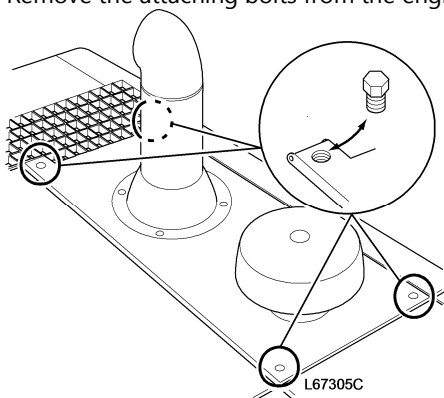


Figure 1

5. Disconnect the exhaust pipe clamp and the pipe from the muffler.
Disconnect the air hose between the turbocharger and air cleaner. Leave the hose connected to the turbocharger.
Lift the engine hood as far as possible with the tool supplied with the machine, located on top of the hydraulic tank.
Secure the engine hood with the tool retainer.

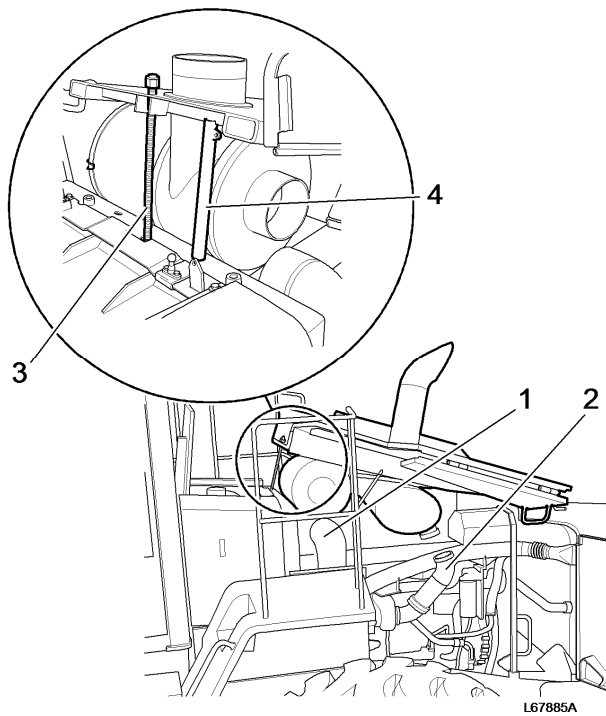


Figure 2

1. Air hose
2. Exhaust clamp
3. Tool for raising engine hood
4. Retainer, securing engine hood

⚠ WARNING

6. **Risk of burns when removing the header tank cap because of excess pressure in the cooling system.**

Open the cap for the expansion tank.

Drain enough coolant to empty the expansion tank. Use the drain hose in the right battery box or the tool box on the machine.

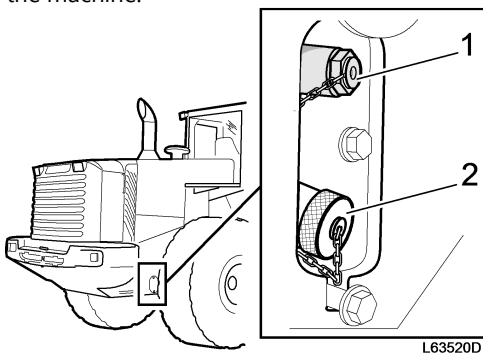


Figure 3

1. Draining coolant
2. Draining engine oil

7. Disconnect the three coolant hoses from the expansion tank. Unplug the connector for SE2603.

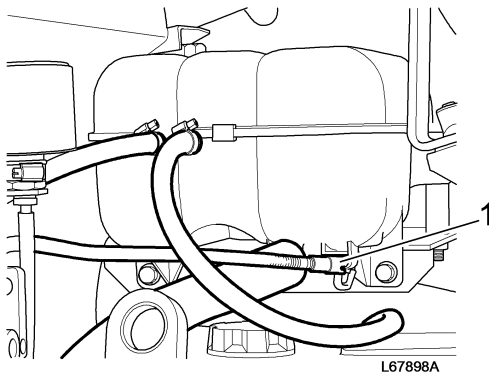


Figure 4

8. Disconnect the bracket on which the expansion tank is mounted. Move the bracket aside and attach it to the hood with a strap or similar.

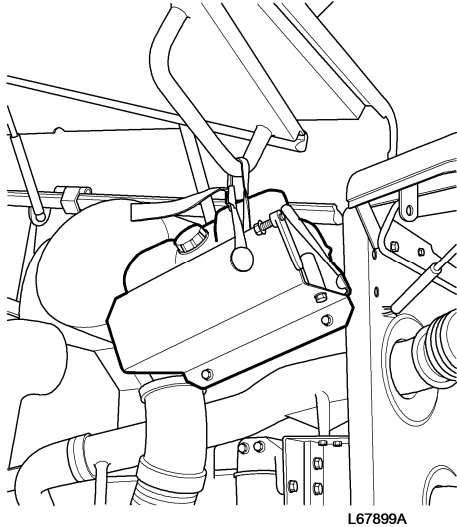


Figure 5

9. Remove the valve cover.
10. Disconnect the cabling connections from the unit injector. Measure the resistance between the pins. Resistance: **1.5–2.0 Ω**
Check that there is no connection between the contacts and ground.



Figure 6
Unit injector

11. For changing unit injector, see service manual Engine D12C.

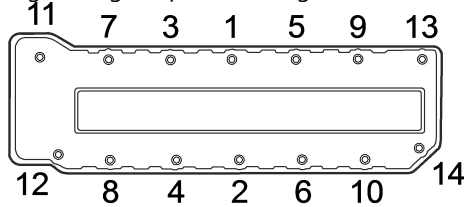
Connect the cabling connections on the unit injector.

Tightening torque, nuts: **1.4 ±0.1 Nm**

Assembling

12. Clean around the valve cover and fit a new gasket, if needed.
Fit the valve cover. Tighten the bolts in the sequence specified in the diagram.

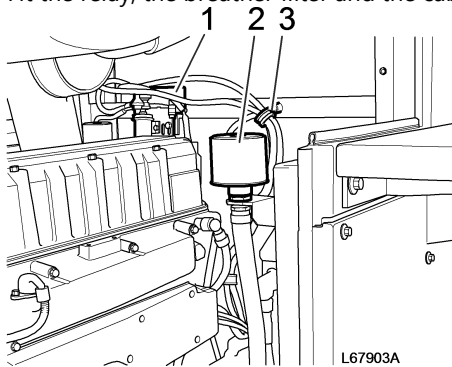
Tightening torque, attaching bolts: **20 Nm**



L67909A

Figure 7
Tightening sequence, valve cover

13. Fit the relay, the breather filter and the cable clamps.

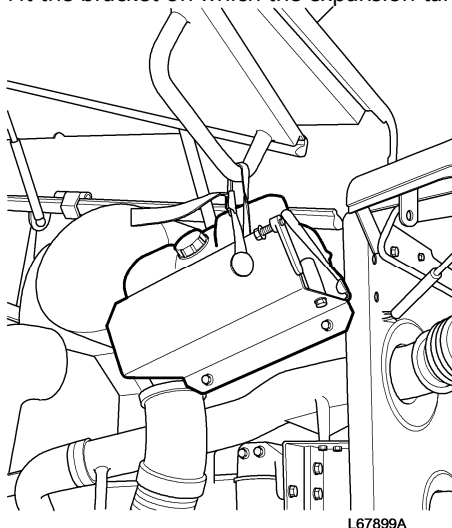


L67903A

Figure 8

1. Relay
2. Clamps
3. Breather filter

14. Fit the cable clamps on the member behind the hydraulic tank as well as the relay.
15. Fit the bracket on which the expansion tank is mounted.



L67899A

Figure 9

16. Connect the three coolant hoses to the expansion tank. Plug in the connector for SE2603.

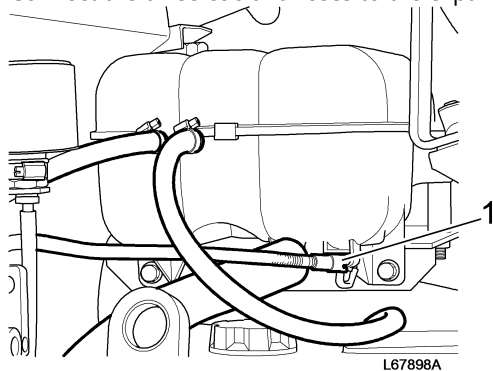


Figure 10

17. Remove the tool retainer securing the hood. Lower the hood.
Fit the exhaust clamp and the pipe on the muffler.
Connect the air hose between the turbocharger and air cleaner.

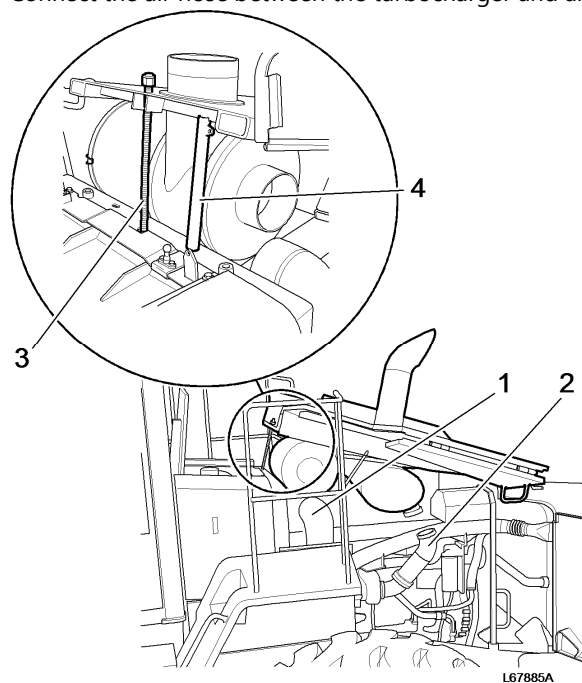


Figure 11

- 1. Air hose
- 2. Exhaust clamp
- 3. Tool for raising engine hood
- 4. Retainer, securing engine hood

18. Fit the attaching bolts for the engine hood.

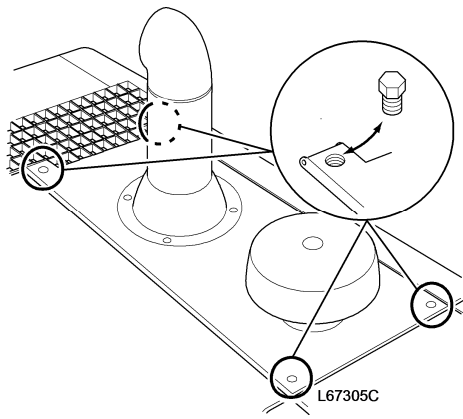


Figure 12

Document Title: Unit injector, replacing	Function Group: 237	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Unit injector, replacing

Op nbr 237-012

[9990185 Lifting tool](#)

[9998251 Sealing plug](#)

[9998599 Cleaning tool](#)

[9998249 Protecting sleeve](#)

[9996400 Impact puller](#)

[9990262 Adapter](#)

[9990006 Puller](#)

[88880003 Bracket](#)

Removing

1. Place the machine in service position, see [191 Safety rules when servicing](#).
2. Remove the engine hood, see [821 Engine hood, removing](#).
3. Drain the fuel in the cylinder head by disconnecting the hose between the cylinder head and the fuel filter at the fuel filter.
NOTE!
Collect the excess fuel in a container.
4. Open the air nipple on the overflow valve and use a blow-off nozzle to lead out the fuel.
Connect the hose to the fuel filter.

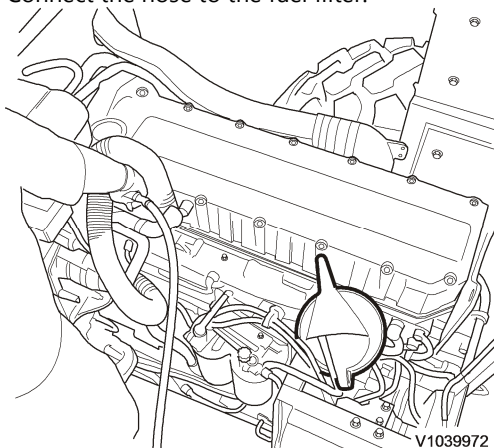


Figure 1

5. Remove the hose from the oil trap. Remove the hose between the expansion tank and the cylinder head, and remove the valve cover.
NOTE!
Do not use a nut runner since the studs bolts may come loose from the cylinder head and damage electrical cables and valve cover.

6. Remove the unit injector's electrical connections.
7. Remove the electrical connections for the control valve.
8. Remove the valve cover's stud bolt located in front of the control valve.

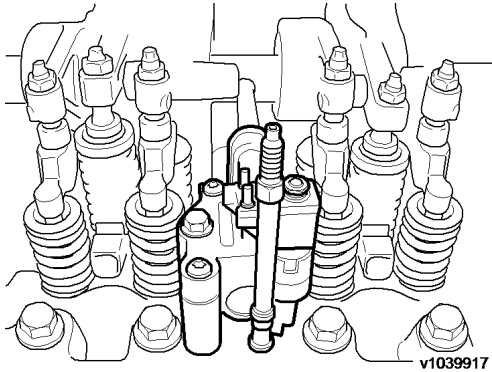


Figure 2

1. Control valve
9. Remove the control valve and the pipe between the valve and rocker arm shaft.
NOTE!
Catch the O-rings on both sides of the pipe.
10. Loosen the bolts for the rocker arm bridge equally in sequences, so that the rocker arm shaft is not bent. Remove the bolts and carefully lift away the rocker arm bridge with 9990185 and 88880003.

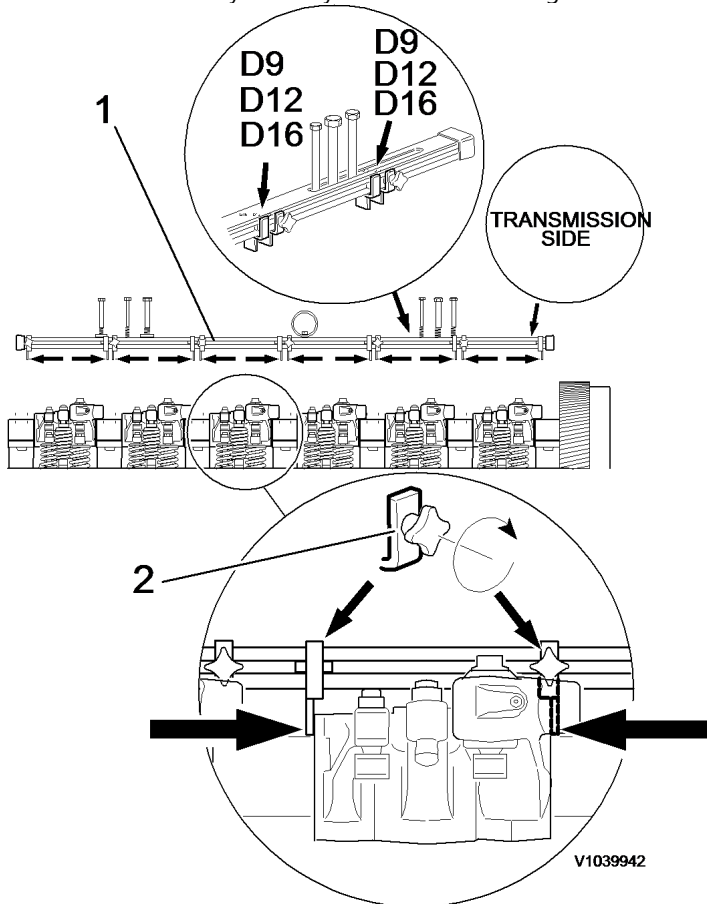


Figure 3

1. 9990185
2. 88880003

11. Remove the bolt for the unit injector's attaching yoke.

NOTE!

Clean very thoroughly around the unit injector that is to be removed.

12. Remove the unit injector. Fit 9998249 on the unit injector.

NOTE!

To protect the unit injectors from dirt particles, etc., place them in separate, well sealed plastic bags.

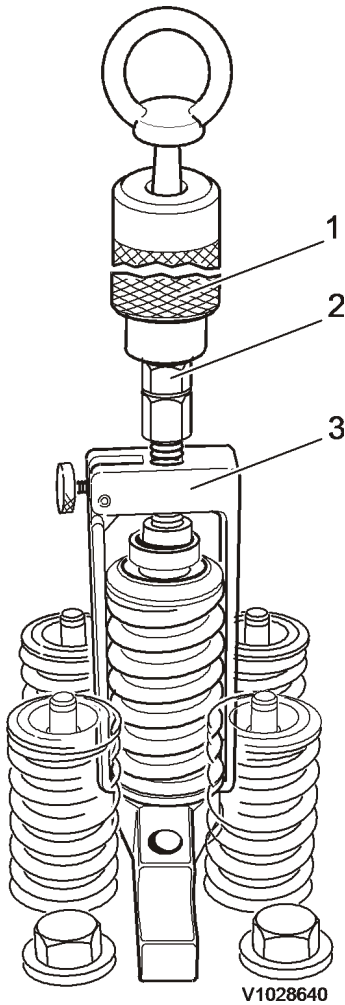


Figure 4
Removing unit injectors, Delphi E3

1. 9996400
2. 9990262
3. 9990006

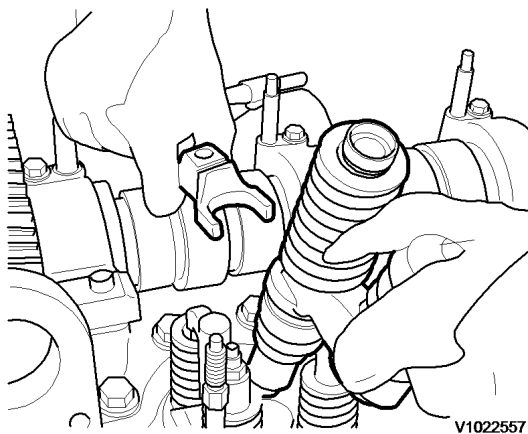


Figure 5

13. Clean the unit injectors' copper sleeves.

Fit the brush on the extension and clean the copper sleeve. Clean all copper sleeves. Check that the unit injector's copper sleeve is free from damage.

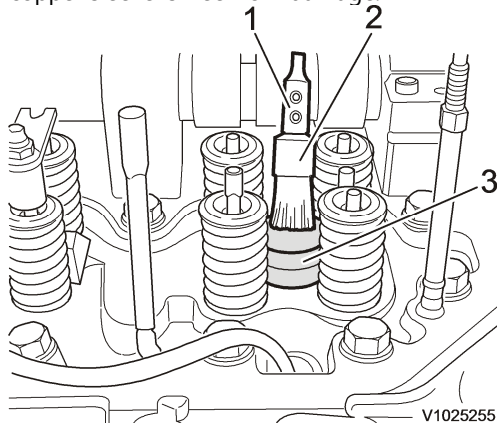


Figure 6
Cleaning kit 9998599

- 1. 9998616
- 2. 9998570
- 3. 9998580

14. Fit protective plug 9998251 in the cylinder head and tighten it with the unit injector's attaching yoke.

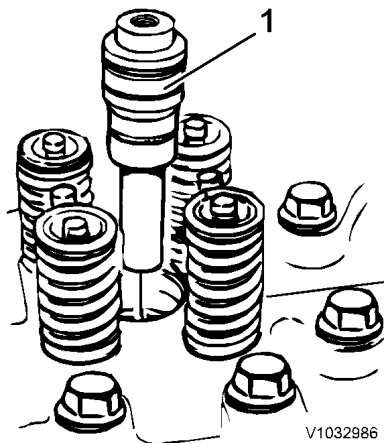


Figure 7

- 1. 9998251

Installing

15. Fit new O-rings on the unit injector.
16. Install the unit injector and centre it between the valve springs. Install the attaching yoke. Tightening torque: see [237 Tightening torques, unit injector](#).

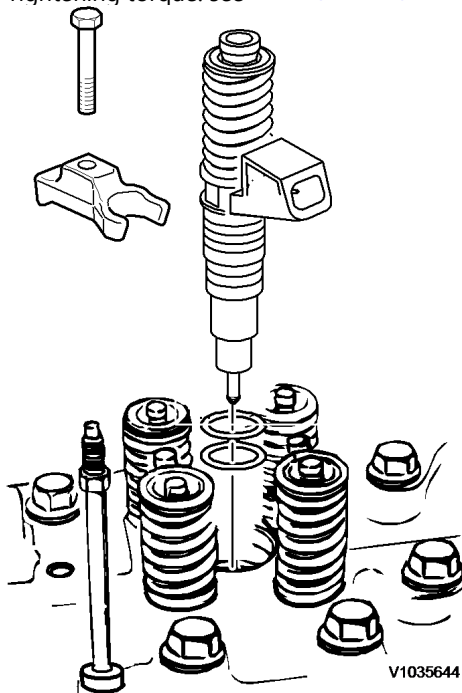


Figure 8

17. Connect the unit injectors' electrical cables.
18. Plug in the connector. Press in the connector until a distinct click can be heard.
19. Lubricate valve yokes and camshaft cams with engine oil. Install the rocker arm bridge with 9990185.

NOTE!

Check that the guide pins end up correctly in the bearing brackets.

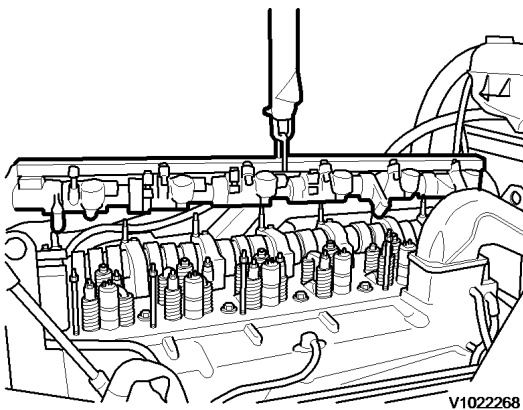


Figure 9

20. Install the rocker arm bridge according to [030 Rocker arm shaft, tightening torques](#) step 2-5.
21. Wipe clean around the cylinder head by the control valve.

NOTE!

Check that there is no debris in the cylinder head's oil channel.

22. Install new O-rings on the pipe between the rocker arm shaft and the control valve. Lubricate the O-rings with oil and install the pipe in the rocker arm shaft.
23. Check that the seal ring on the pipe is installed correctly before the bolts for the control valve are tightened. Tightening torque: see [030 Tightening torques, control valve](#).
24. Install the stud bolt in front of the control valve.

Tightening torques, see [030 Valve cover, tightening torque](#)

NOTE!

Use lock fluid on the stud bolt.

When replacing one or several unit injectors, the new codes shall be programmed for the cylinder for which the unit injector is replaced. The code is given on the unit injector. Programming is done with the service tool VCADS Pro (Op. no. 17030-2) and is necessary, e.g., to safeguard the engine's function and emission requirements. The code only has to be given for the replaced unit injector if the new code is different from the code for the old unit injector.

The following applies to unit injector with injector trim:

25. Adjust valves and the unit injectors, see [214 Valves, adjusting](#).
26. Install the valve cover. Tightening torque, see [030 Valve cover, tightening torque](#).
27. Bleed the fuel system, see [230 Fuel system, bleeding](#).
28. Fit the engine hood, see [821 Engine hood, installing](#).
29. Start the engine and check for leaks.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Control unit, description](#)

Product Line: WLO

Model Variant: L180E (Volvo)

- [Control unit, description](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8001

Serial number stop: 10999

Document Title: Control unit, description	Function Group: 238	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Control unit, description

The control unit (E-ECU) is the central part of the injection system.

Control unit (A) is positioned on the left side on the engine and suspended in damping rubber mountings. All cable connections for the engine sensors have connectors of the DIN standard type and they are placed together in a so called cable box (B). The cable box, which is positioned above the control unit, is made of plastic and divided into three parts. The inner part, toward the engine, contains all cables and connectors to do with the engine. There is also a partition (C) and an outer cover (D). Inside the outer cover there is room for other cable harnesses which serve other parts of the machine.

The control unit continuously receives information from the accelerator pedal and from a number of sensors on the engine and calculates the amount of fuel and the injection timing.

Control signals to the unit injectors pass via electrical leads to the fuel valve on the unit injectors.

As the control unit registers the engine speed and also differences in speed during each revolution through the flywheel sensor, it makes sure that each unit injector receives the correct amount of fuel.

The control unit stores information if a fault should arise, or if anything in the system is abnormal.

Faults, which occur sporadically, are also stored in the control unit and can thus be traced later on.

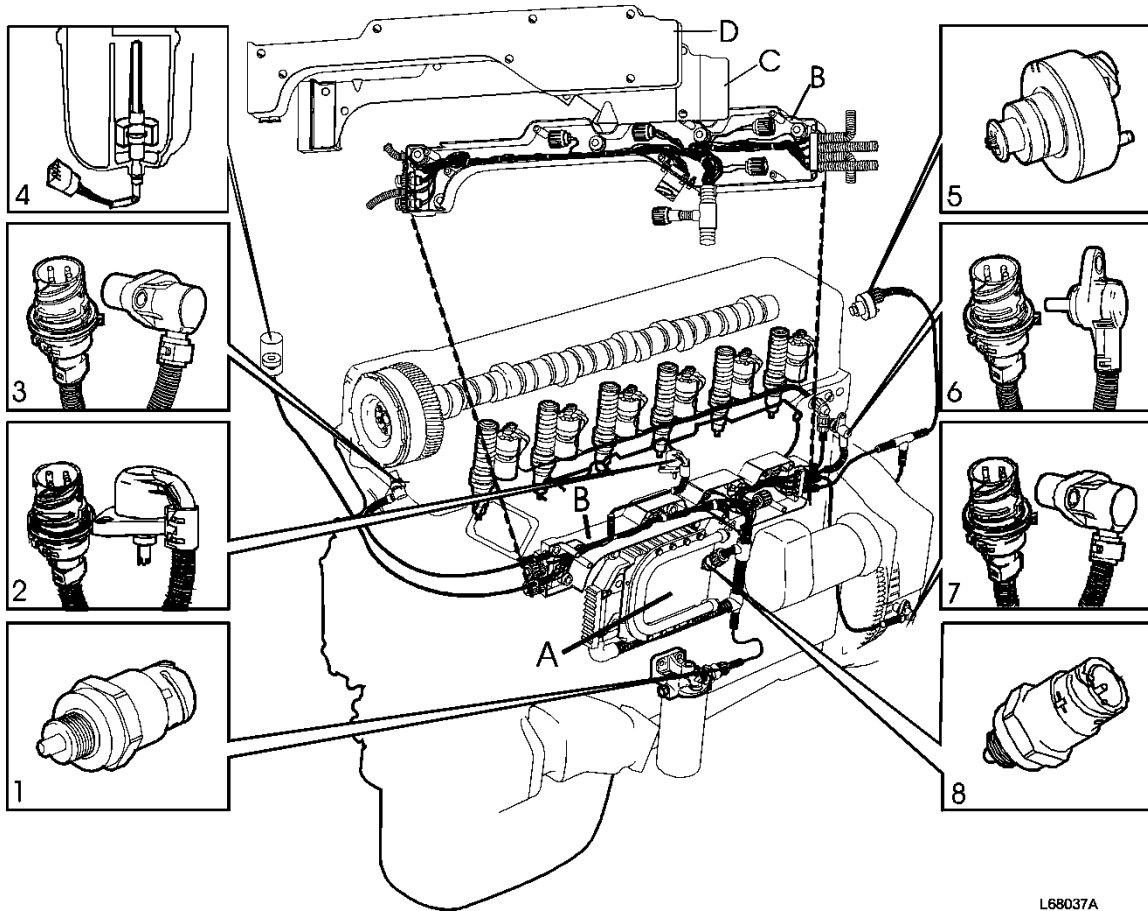
Control unit sensors

There are a number of sensors on the engine. The purpose of the sensors is to provide the control unit with signals.

The sensors are positioned at the following places on the engine:

1. Fuel pressure, positioned on the fuel filter bracket. It senses the feed pressure after the filter.
2. Charge air pressure and charge air temperature. A combined sensor positioned on the inlet manifold.
3. Cam shaft position. Positioned in the upper timing casing.
4. Coolant level. Positioned in the expansion tank
5. Air pressure and air temperature. Combined sensor, positioned on the connecting pipe between air filter and turbocharger.
6. Coolant temperature. Positioned at the rear end of the cylinder head.
7. Flywheel position and speed. Positioned in the flywheel housing.
8. Oil pressure and oil temperature. Combined sensor positioned in the lubrication system main duct in the cylinder block.

In the control unit there is also a sensor for atmospheric pressure.



L68037A

Figure 1
The fuel system sensors

1. Fuel pressure sensor positioned on the fuel filter bracket. It senses the fuel feed pressure after the filter.
2. Combined sensor for charge air pressure och charge air temperature positioned on the inlet manifold.
3. Cam shaft sensor, which indicates the camshaft position, positioned in the timing casing.
4. Coolant level sensor, positioned in the expansion tank.
5. Combined sensor for air pressure and air temperature, positioned on the connecting pipe between air filter and turbocharger.
6. Coolant temperature sensor, positioned at the rear end of the cylinder head.
7. Combined sensor for flywheel position and rotational speed, positioned in the flywheel housing.
8. Combined sensor for oil pressure and oil temperature, positioned in the main duct of the lubrication system in the cylinder block.

In the control system there is also a sensor for atmospheric pressure.

Document Title: Control unit, description	Function Group: 238	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Control unit, description

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Control signals to the unit injectors pass via electrical leads to the fuel valve on the unit injectors.

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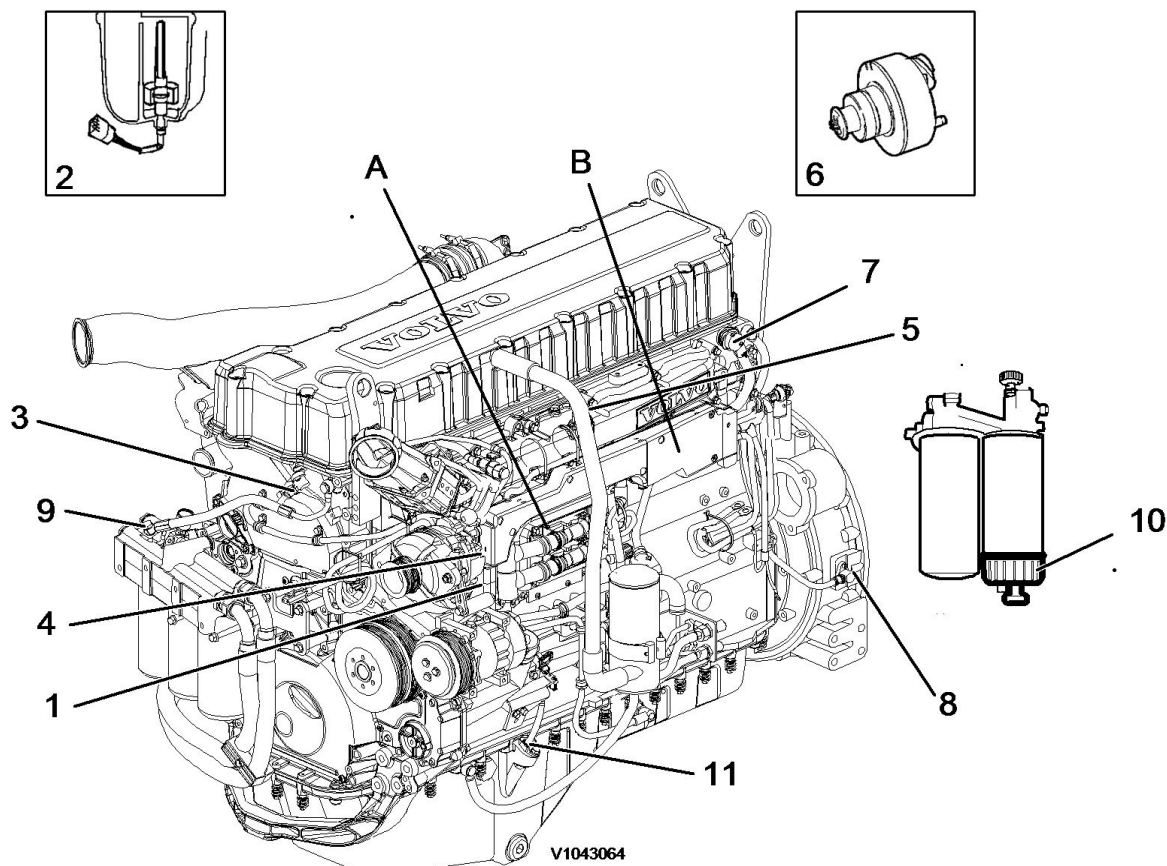


Figure 1

The fuel system sensors

1. 1. Crankcase pressure sensor
2. Coolant level sensor
3. Camshaft speed sensor
4. Oil pressure sensor
5. Charge air pressure and temperature sensor
6. Air pressure and temperature sensor
7. Coolant temperature sensor
8. Crank shaft speed sensor
9. Fuel pressure sensor
10. Water in fuel sensor
11. Oil level and temperature sensor

In the control system there is also a sensor for atmospheric pressure.

Document Title: Intake and exhaust system, description	Function Group: 250	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Intake and exhaust system, description

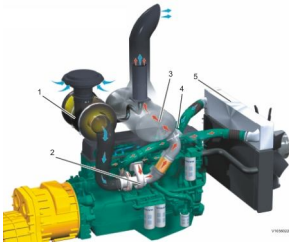


Figure 1
Inlet and exhaust system

1. Air cleaner
2. Turbocharger
3. Muffler
4. Preheating coil
5. Intercooler

Inlet system

The air is sucked in via the air cleaner and passes to the turbo. Then the air is cooled through the intercooler. Before the air is sucked into the cylinders via the inlet valves, it passes the preheating coil. The preheating, the function of which is to warm the air at start, is activated as needed with a switch in the cab. A small part of the air that is sucked into the air cleaner passes directly to the muffler where it is mixed with the exhausts.

Exhaust system

The exhausts pass via the exhaust valves out in the manifold and then through the turbo to the muffler. In the muffler the exhausts are mixed with air from the air cleaner before passing out through the exhaust pipe.

For descriptions of each component, see:

- [256 Air cleaner, description](#)
- [255 Turbocharger, description](#)
- [256 Preheating, description](#)
- [258 Intercooler, description](#)

Document Title: Turbocharger, description	Function Group: 255	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Turbocharger, description

The turbocharger is driven by the exhaust gasses as they pass through the turbine housing.

The exhaust gas flow causes the turbine rotor in the turbine housing to rotate. The compressor rotor is positioned on the same shaft as the turbine rotor. The compressor rotor is positioned in a housing which is connected between the air cleaner and the engine induction manifold.

When the compressor rotor rotates, air is drawn from the air cleaner. The air is compressed and forced into the engine cylinders, after it first has been cooled down while passing through the intercooler.

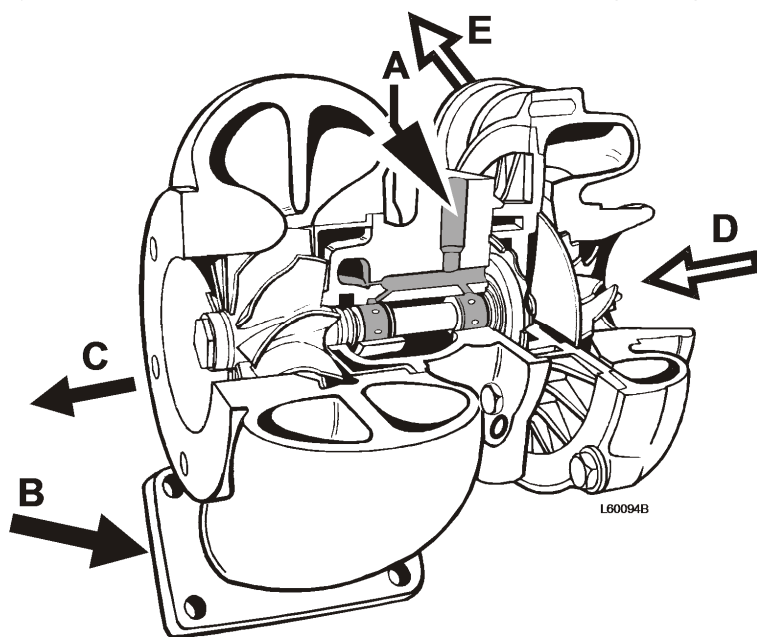


Figure 1
Turbocharger, principle diagram

- A. Supply of lubricating oil
- B. Exhaust gases from engine into turbocharger
- C. Exhaust gases out from turbocharger
- D. Air via air filter
- E. Air to inlet manifold

Document Title: Turbocharger, description	Function Group: 255	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Turbocharger, description

The turbocharger is driven by the exhaust gasses as they pass through the turbine housing.

The exhaust gas flow causes the turbine rotor in the turbine housing to rotate. The compressor rotor is positioned on the same shaft as the turbine rotor. The compressor rotor is positioned in a housing which is connected between the air cleaner and the engine induction manifold.

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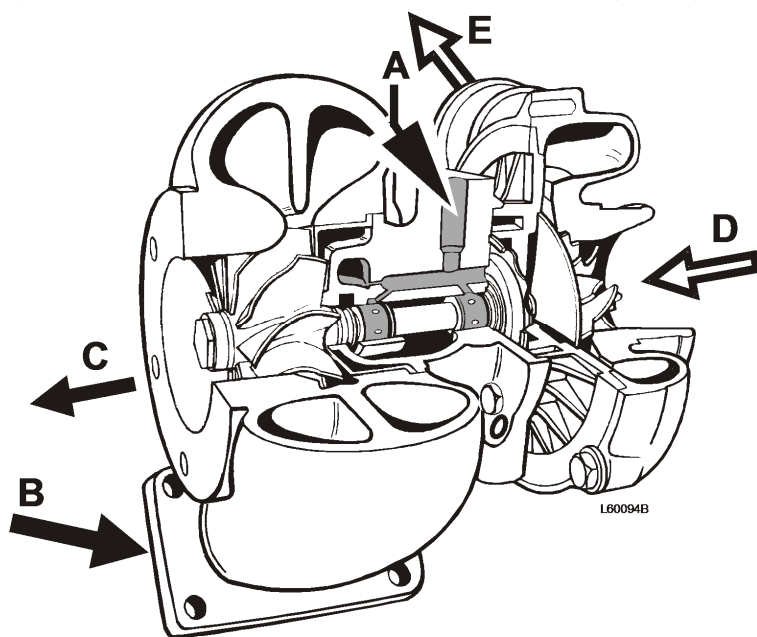


Figure 1
Turbocharger, principle diagram

- A. Supply of lubricating oil
- B. Exhaust gases from engine into turbocharger
- C. Exhaust gases out from turbocharger
- D. Air via air filter
- E. Air to inlet manifold

Document Title: Turbocharger, inspection	Function Group: 255	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Turbocharger, inspection

Op nbr 255-002

If the engine loses a lot of charge pressure, it becomes weak. The best way of checking the engine performance is to check the stall speed of the machine. If the engine loses a little charge pressure, this will not noticeably affect the performance. The engine may possibly emit a little more black smoke. A slightly impaired charge, because of a small air leakage in the charge-air system, may manifest itself as a high-frequency whistling noise at full load. This may be confused with a bearing noise.

1. Remove any plate, heat shields or similar, which may prevent detachment of hoses and pipes to and from the turbocharger.
2. Disconnect the inlet hose from the turbocharger.

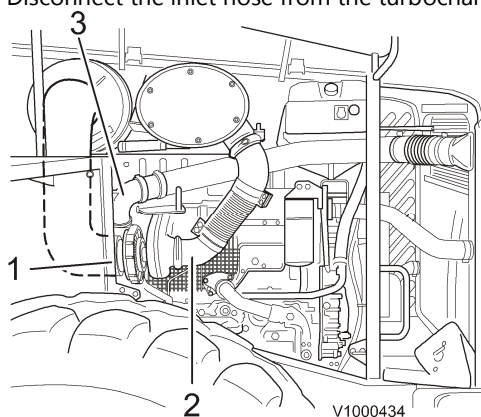


Figure 1
Principle illustration

1. Inlet hose
 2. Exhaust pipe
 3. Charge air pipe
3. Check the compressor rotor. In case of damage to the compressor rotor, replace turbocharger. See [255 Turbocharger, changing](#).
 4. Remove charge air hose between the charge air pipe and intercooler.
 5. Check if there is oil in a fluid form in the charge air hose, as this would be an indication of worn bearings and seals in the turbocharger.
 6. Detach the exhaust pipe from the turbocharger.
 7. Check the turbine rotor. If the turbine rotor is damaged, replace turbocharger, see [255 Turbocharger, changing](#).
 8. Restore the machine.

Document Title: Turbocharger, changing	Function Group: 255	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Turbocharger, changing

Op nbr 25571

Removing

1. Place the machine in service position, see [191 Safety rules when servicing](#).
2. Loosen hose, exhaust pipe and connection pipe on the turbocharger.

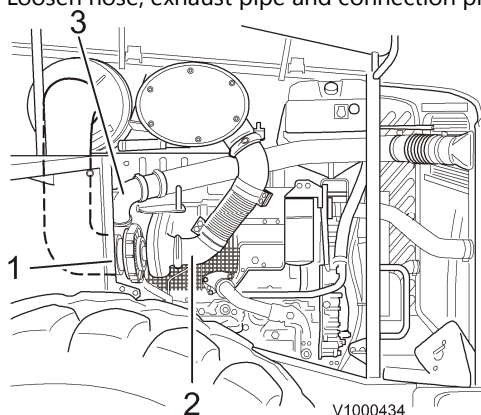


Figure 1

1. Hose
 2. Exhaust pipe
 3. Connection pipe
3. Loosen the pressure (delivery) oil pipe and return oil pipe on the turbocharger.
 4. Remove the turbocharger.

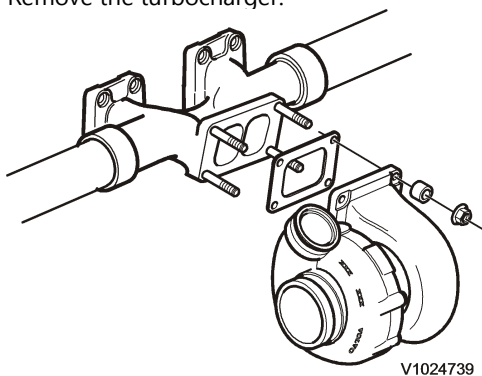


Figure 2

5. Clean all sealing surfaces.

NOTE!

In case of turbocharger failure, all inlet pipes and hoses shall be checked and cleaned. Remains of broken fan

blades in the inlet pipes can result in engine failure.

Installing

NOTE!

Always use new seals when installing.

6. Fit the turbocharger.

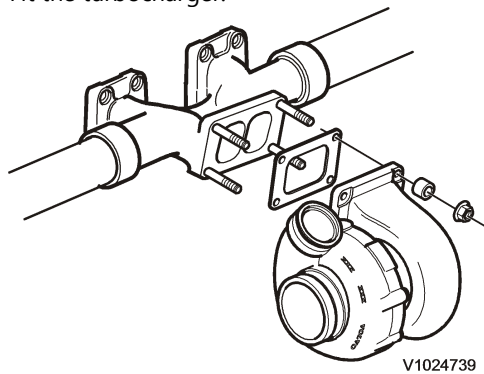


Figure 3

7. Fit the return oil pipe on the turbocharger.
8. Fill clean oil in the turbocharger, use an oil can.
Make sure that no impurities enter the connection. Use a strainer when filling.
9. Fit the pressure (delivery) oil pipe on the turbocharger.
10. Fit the hose, exhaust pipe and connection pipe on the turbocharger.

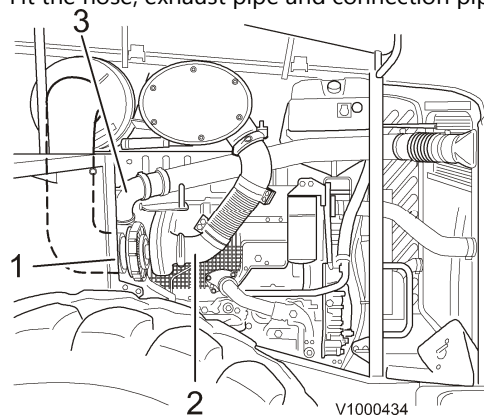


Figure 4

1. Hose
2. Exhaust pipe
3. Connection pipe

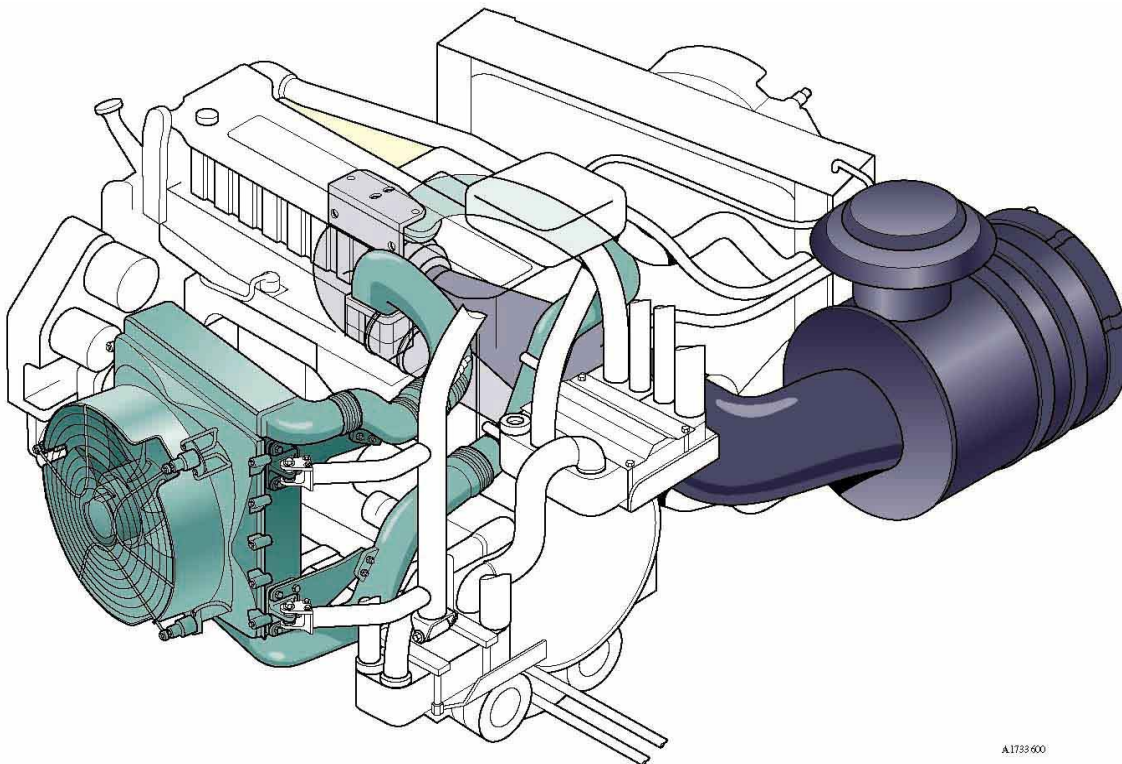
11. Start the engine and check for leaks.
12. Restore the machine to operating condition.

Document Title: Air cleaner, description	Function Group: 256	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Air cleaner, description

The air cleaner prevents dust and other impurities from entering the engine. The air passes through the main filter and the safety filter, after having circulated in the precleaner. At the inlet between the filter housing and the turbo, there is a combined pressure-drop and air temperature sensor. The pressure-drop function shows when the filter starts to clog up by a control light on the operator's display.

There is also a preheating coil in the induction manifold.



A1733600

Figure 1
Air cleaner and intercooler, position

Document Title: Preheating coil, description	Function Group: 256	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Preheating coil, description

There is an electrical preheating element on the inlet side of the engine. Provided the engine coolant temperature is below +20 °C (+68 °F), the element will be connected when the operator turns the ignition key to the running position and presses the preheating switch. If the engine starts, the preheating will be disconnected. Extra preheating will be provided after the engine has started, if the temperature so requires. The pre- and after-heating time is controlled by the engine control system. The advantages are easier start and less white smoke in the exhaust.

The control lamp on the instrument panel lights when the preheating element is connected.

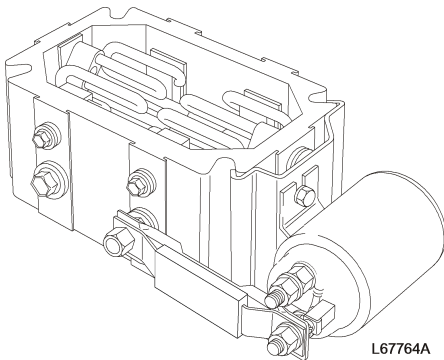


Figure 1
Preheating element

NOTE!

The preheating element must not be connected to ground.



Construction Equipment

Service Information

Document Title: Intercooler, description	Function Group: 258	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Intercooler, description

The engine is equipped with an intercooler which lowers the temperature of the air before it is forced into the engine cylinders.

Engine overcharging, or air forced into the cylinders by the turbocharger, raises air temperature. When the air is cooled after the turbocharger, air volume is reduced and more air (oxygen) can be forced into the cylinders.

The intercooler lowers the air temperature by approximately 100 °C (212 °F), which increases engine efficiency by approximately 10%. Engine torque is increased and fuel consumption is decreased.

Document Title: Charge air system, inspection	Function Group: 258	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Charge air system, inspection

Op nbr 258-030

1. Check if the intercooler is damaged in the cells and connections. If there are damages, change the intercooler. See [261 Radiator replacing](#).
2. Check if the intercooler is clogged externally. If the intercooler is clogged, clean the intercooler externally.

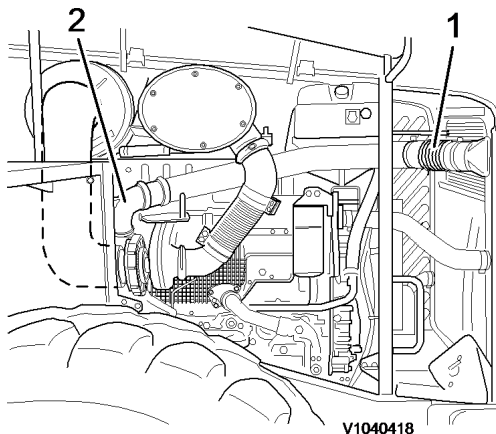


Figure 1

1. Intercooler hose
 2. Connection pipe
3. Remove the charge-air hoses on both sides of the intercooler from the intercooler.
 4. Remove the connecting pipe between the turbocharger and the charge-air pipe.
 5. Check that the intercooler is clean internally by the charge-air hoses. If there is oil, check the turbocharger, see [255 Turbocharger inspection](#).
 6. Check the charge-air pipes and their O-rings for visible cracks and external damage.
 7. Check that there is no oil in the charge-air hoses. If the pipes are damaged or leak in the connections' seal rings, the boost pressure may become too low and the engine's performance deteriorates.
 8. In case of oil, check the turbocharger, see [255 Turbocharger inspection](#).
- NOTE!**
If there is oil in charge-air pipes and charge-air hoses, then all pipes and hoses in the charge-air system shall be wiped clean internally before the engine is started.
9. Reinstall the charge-air hoses on the intercooler and the connecting pipe between the turbocharger and charge-air pipe.

Document Title: Intercooler, replacing	Function Group: 258	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Intercooler, replacing

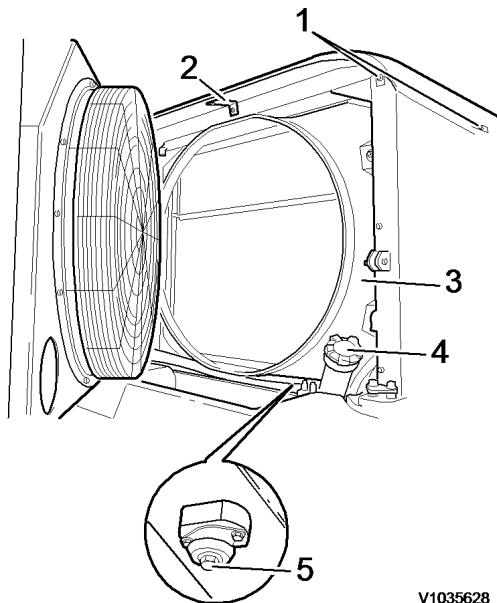
Op nbr 258-002

Sling 2 m (6.6 ft)

1. Place the machine in service position, see [191 Safety rules when servicing](#).

Removing

2. Remove the bottom plate in front of the radiator.
3. Remove the plastic cover from the radiator.



V1035628

Figure 1

1. Bolt
2. Angle iron
3. Fan shroud
4. Fuel filler pipe
5. Lower radiator attachment

4. Remove the fan shroud.
5. Remove the fuel filler pipe and the bolt for the right lower radiator bracket. Plug the tank connection.
6. Loosen the gas struts and lift away the grating doors.

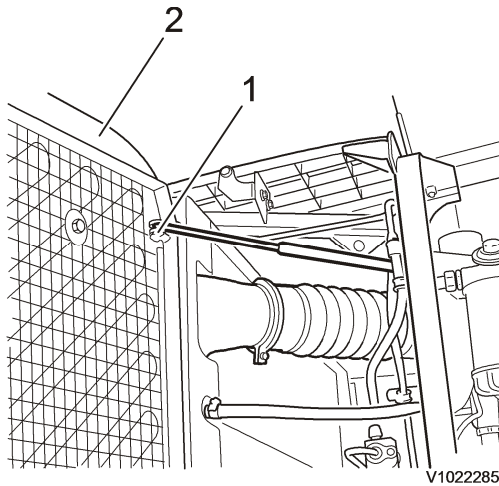


Figure 2

1. Striker plate
2. Grating door

7. Remove the side panels from the radiator framework.
8. Remove the grille from the condenser.

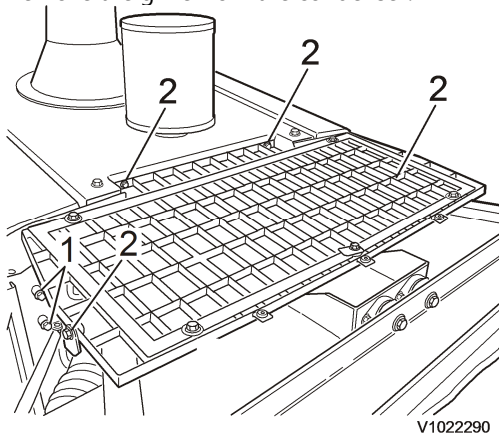


Figure 3

1. Bolts for expansion tank
2. Bolts for grating

9. Loosen the condenser's four mounting points.
Loosen the clamps for the condenser's pipes.

NOTE!

The expansion tank must be disconnected from the intermediate wall to access the nut for the condenser.

NOTE!

Do not loosen the AC connections.

10. Remove the right member and the bolts for the upper radiator bracket.

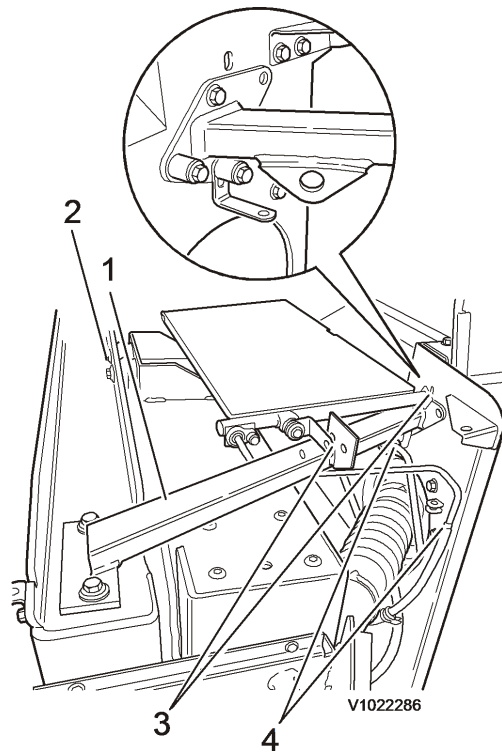


Figure 4

- 1. Member
- 2. Radiator bracket
- 3. Condenser brackets
- 4. Clamps AC-pipes

- 11. Loosen and plug the air hoses from the intercooler.
- 12. Lift the radiator on the right side so that the bolts for the radiator frame can be accessed.

NOTE!

Secure the lift under the radiator frame against the frame, see figure.

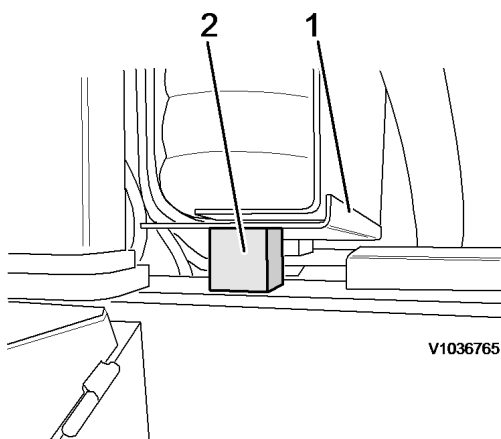


Figure 5

- 1. Radiator frame
- 2. Blocking

- 13. Remove the upper and the right member of the radiator frame.
- 14. Connect lifting device to the intercooler and lift away.

Weight: **30 kg (53 lb)**

NOTE!

Make sure that the condenser is not damaged.

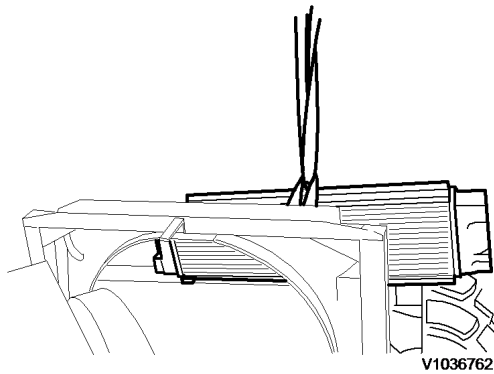


Figure 6

Installing

15. Install rubber strips on the intercooler.
Check the rubber spacers in the radiator frame.

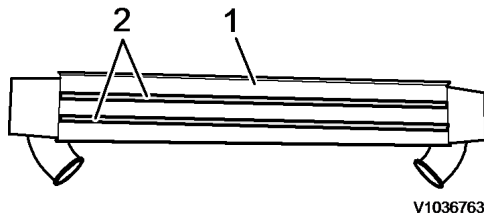


Figure 7

1. Intercooler
2. Rubber strips

16. Fit the rubber spacers when the intercooler is lifted into place.

NOTE!

Make sure that the condenser is not damaged.

17. Install the right and the upper member of the radiator frame. Use tensioning straps or similar to press the radiator frame's member into place.
18. Lower the radiator frame into position on the frame and install the bolt for the lower right radiator bracket.
19. Install the fuel filler pipe.
20. Install the bolts for the upper radiator bracket and the member between the radiator framework and the intermediate wall.
21. Install the condenser, its clamps and the expansion tank.
22. Install the grating over the condenser.
23. Connect the intercooler's hoses.
24. Install the side panels on the radiator framework.
25. Install the grating doors and connect the gas struts.
26. Install the fan shroud.

27. Install the plastic casing over the radiator.
28. Install the bottom plate in front of the radiator.
29. Restore the machine to operating condition.

Document Title: Intercooler, replacing	Function Group: 258	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Intercooler, replacing

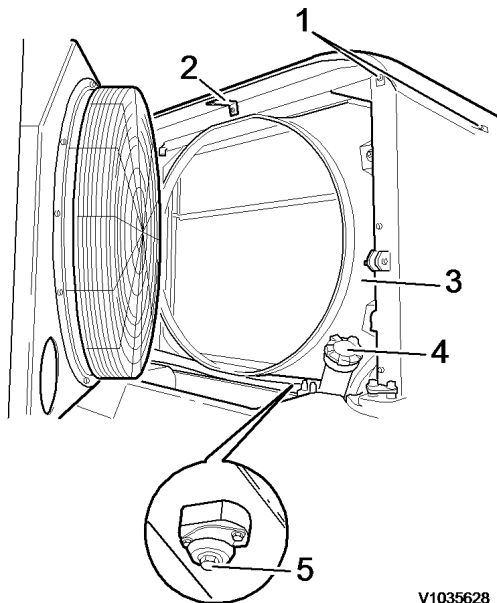
Op nbr 258-002

Sling 2 m (6.6 ft)

1. Place the machine in service position, see [191 Safety rules when servicing](#).

Removing

2. Remove the bottom plate in front of the radiator
3. Remove the plastic cover from the radiator.



V1035628

Figure 1

1. Bolt
2. Angle iron
3. Fan shroud
4. Fuel filler pipe
5. Lower radiator attachment

4. Remove the fan shroud.
5. Remove the fuel filler pipe and the bolt for the right lower radiator bracket. Plug the tank connection.
6. Loosen the gas struts and lift away the grating doors.

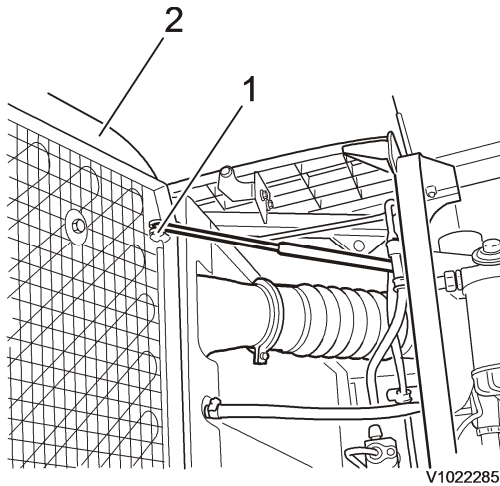


Figure 2

1. Striker plate
2. Grating door

7. Remove the side panels from the radiator framework.
8. Remove the grille from the condenser.

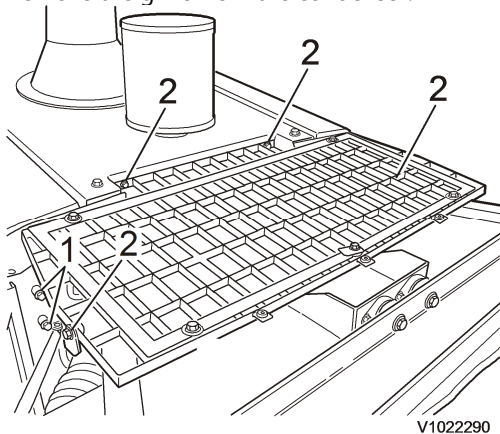


Figure 3

1. Bolts for expansion tank
2. Bolts for grating

9. Loosen the condenser's four mounting points.
Loosen the clamps for the condenser's pipes.

NOTE!

The expansion tank must be disconnected from the intermediate wall to access the nut for the condenser.

NOTE!

Do not loosen the AC connections.

10. Remove the right member and the bolts for the upper radiator bracket.

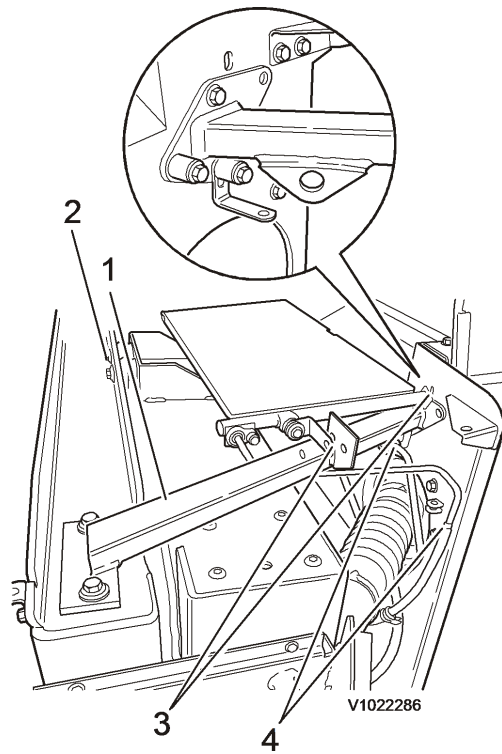


Figure 4

1. Member
2. Radiator bracket
3. Condenser brackets
4. Clamps AC-pipes

11. Loosen and plug the air hoses from the intercooler.
12. Lift the radiator on the right side so that the bolts for the radiator frame can be accessed.

NOTE!

Secure the lift under the radiator frame against the frame, see figure.

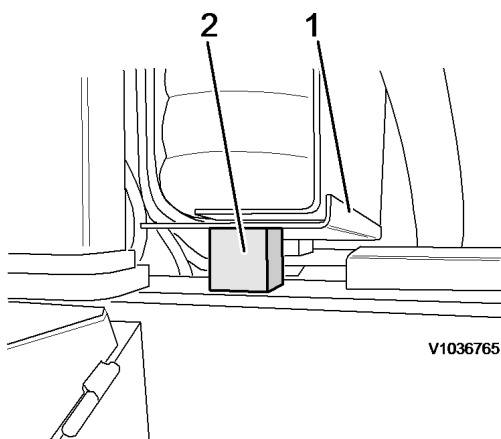


Figure 5

1. Radiator frame
2. Blocking

13. Remove the upper and the right member of the radiator frame.
14. Connect lifting device to the intercooler and lift away.

Weight: **30 kg (53 lb)**

NOTE!

Make sure that the condenser is not damaged.

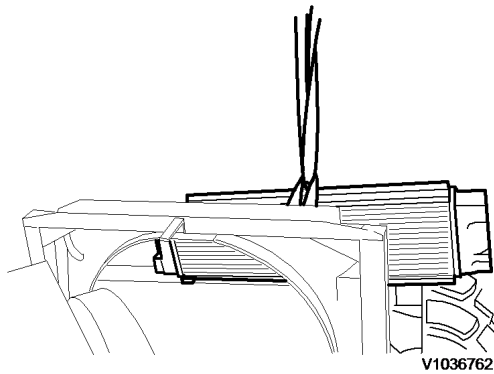


Figure 6

Installing

15. Install rubber strips on the intercooler.
Check the rubber spacers in the radiator frame.

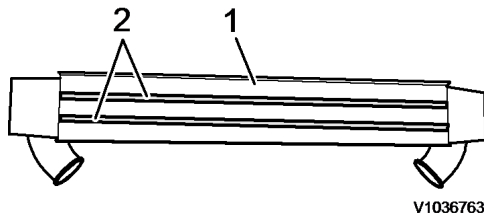


Figure 7

1. Intercooler
2. Rubber strips

16. Fit the rubber spacers when the intercooler is lifted into place.

NOTE!

Make sure that the condenser is not damaged.

17. Install the right and the upper member of the radiator frame. Use tensioning straps or similar to press the radiator frame's member into place.
18. Lower the radiator frame into position on the frame and install the bolt for the lower right radiator bracket.
19. Install the fuel filler pipe.
20. Install the bolts for the upper radiator bracket and the member between the radiator framework and the intermediate wall.
21. Install the condenser, its clamps and the expansion tank.
22. Install the grating over the condenser.
23. Connect the intercooler's hoses.
24. Install the side panels on the radiator framework.
25. Install the grating doors and connect the gas struts.
26. Install the fan shroud.

27. Install the plastic casing over the radiator.
28. Install the bottom plate in front of the radiator.
29. Restore the machine to operating condition.

Document Title: Cooling system, description	Function Group: 260	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Cooling system, description

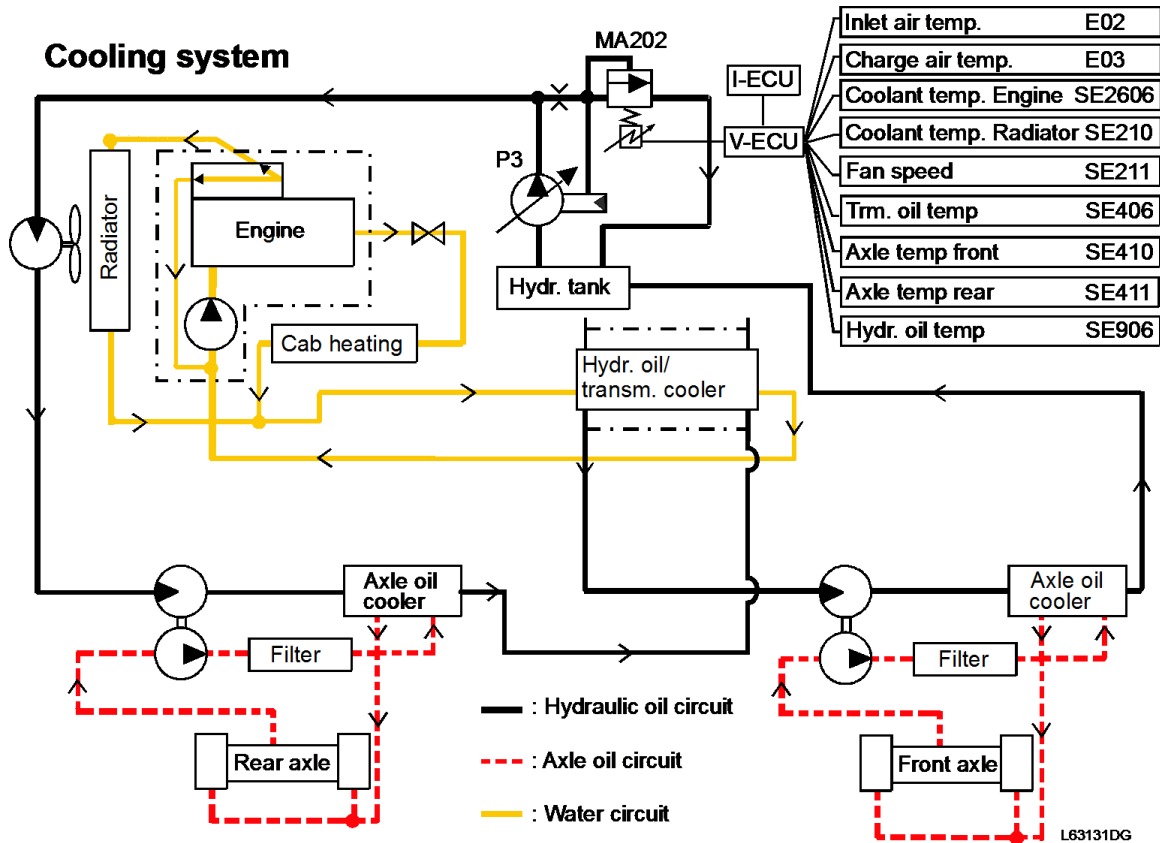


Figure 1
Cooling system

The advantages with an integrated cooling system

- Higher engine output and lower sound level as the cooling fan rarely works at maximum speed.
- Faster warming up of the transmission.
- Faster warming up of the drive axles.
- The axle oil is cooled also when the machine is stationary. (Applies provided the machine is equipped with axle oil cooling).
- Warming of the oil in the hydraulic oil tank, also during transport operation.
- Improved heating of the cab because of a higher flow of warm water through the heating radiator in the cab even at a low engine speed.

Document Title: Cooling system, description	Function Group: 260	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Cooling system, description

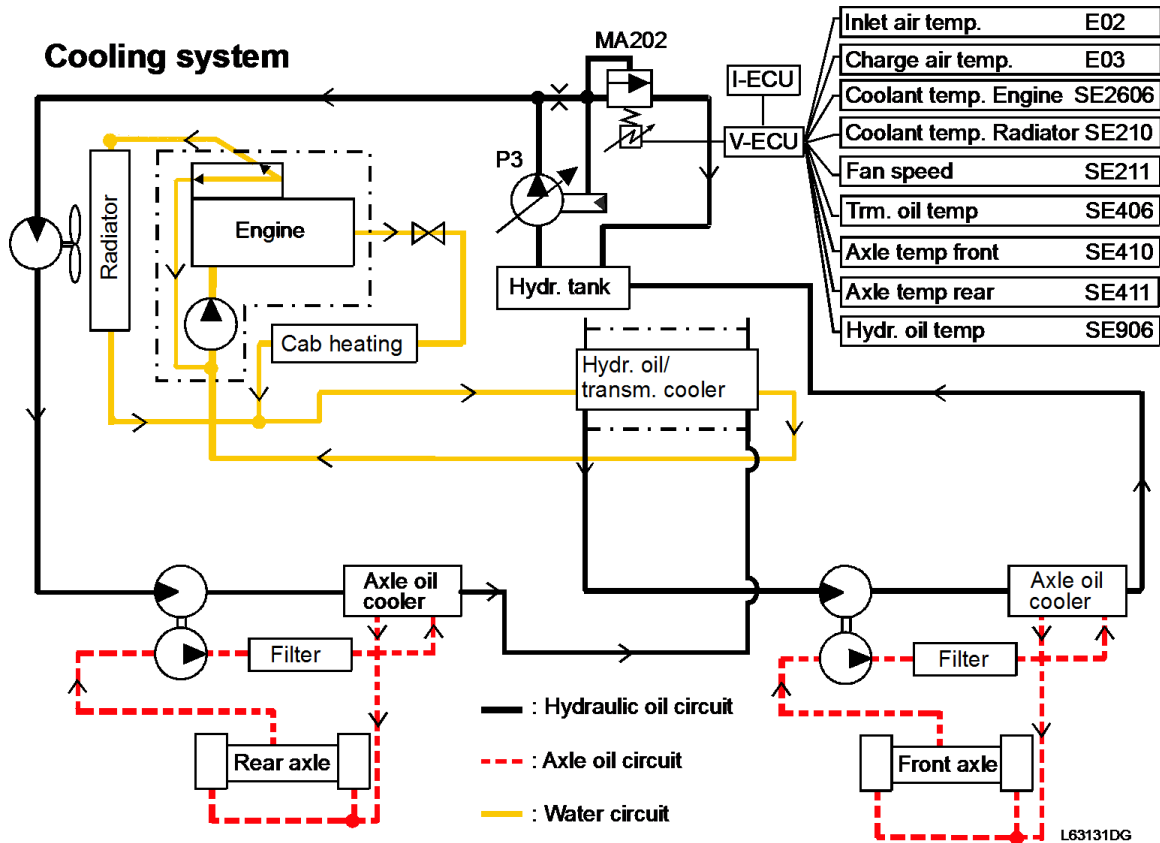


Figure 1
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- Faster warming up of the transmission.
- Faster warming up of the drive axles.
- The axle oil is cooled also when the machine is stationary. (Applies provided the machine is equipped with axle oil cooling).
- Warming of the oil in the hydraulic oil tank, also during transport operation.
- Improved heating of the cab because of a higher flow of warm water through the heating radiator in the cab even at a low engine speed.

Document Title: Coolant circulation in engine, description	Function Group: 260	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Coolant circulation in engine, description

The coolant is pumped via a pipe into the distribution jacket in the side of the engine cylinder block. The main part of the coolant is forced upward between the oil cooler flanges, whereas a small part of the coolant is circulated into the lower cooling jackets around the cylinder liners.

After the oil cooler coolant is distributed via calibrated holes to the upper cooling jackets around the cylinders and to the cylinder head.

The cylinder head also receives the return flow of coolant from the cylinder liner jackets. This part of the coolant enters the cylinder head via nozzles which direct the coolant flow toward the exhaust ducts and the injector sleeves.

All coolant flows in return to the pump or the radiator via the thermostat at the front end of the cylinder head.

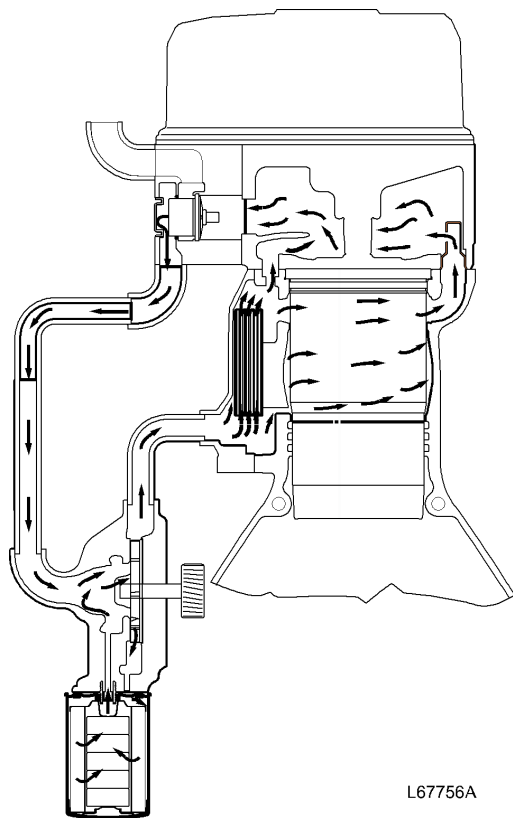


Figure 1
Coolant circulation in engine

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Radiator, replacing](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 7418, 62543

- [Radiator, replacing](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8002

Serial number stop: 10999

Document Title: Radiator, replacing	Function Group: 261	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Radiator, replacing

Op nbr 261-008

Tools: Lifting eye M10 lifting sling

Removing

Tools:

Lifting eye M 10, 2 pcs.

Sling

1. Secure the frame joint with the frame joint lock. Place blocks in front of and behind the wheels.

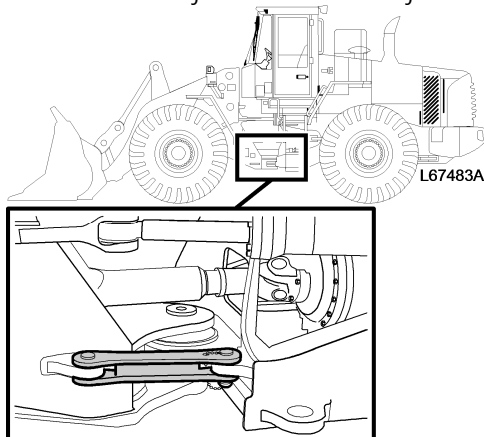


Figure 1

2. Turn off the electric power with the battery disconnect switch.

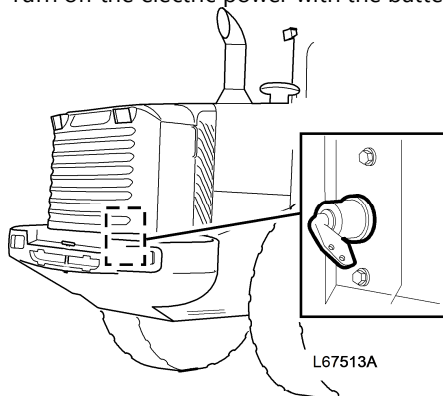


Figure 2



Risk of burns when removing the header tank cap because of excess pressure in the cooling system.

3. Remove the cap from the expansion tank.
Drain the coolant. Use existing located in the right battery box or the tool box on the machine.
Volume: See [030 Engine, volume](#)

NOTE!

approx. 3 litres (0.8 US Gal) will remain in the engine block.

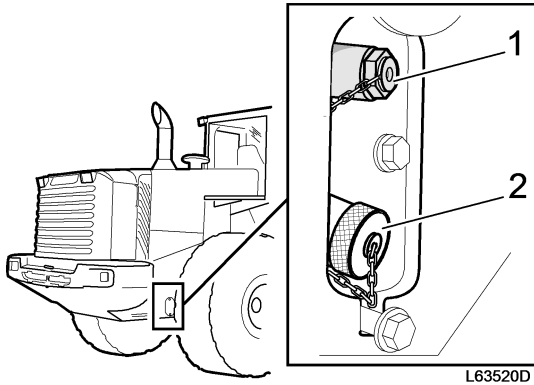


Figure 3

4. Remove the bolts that hold the plastic cover. Loosen the bolt and fold down the angle iron. Remove the fan shroud and the filler pipe.

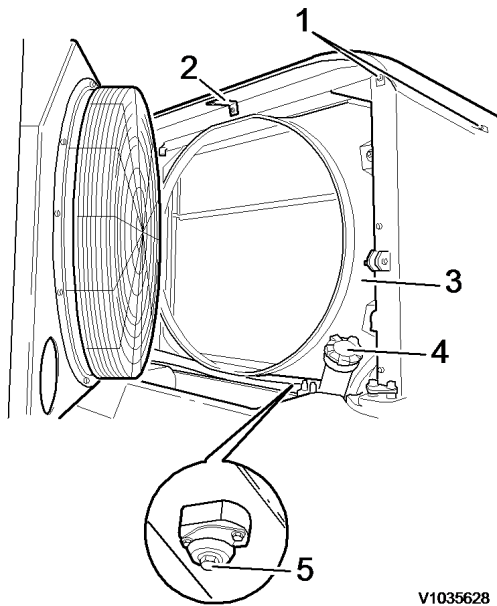


Figure 4

1. Screw, 4 pcs.
2. Angle iron
3. Fan shroud
4. Filler pipe
5. Lower radiator attachment

5. Remove the striker plate for the gas damper and lift away the grating door. Remove the side panel from the radiator frame on the side the cooler unit is removed.

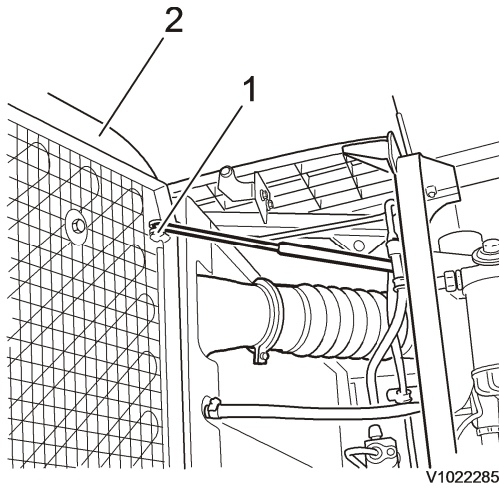


Figure 5

1. Striker plate
2. Grating door

6. Loosen the hose clamps for the coolant hoses and disconnect them. Loosen the pipe clamps and remove the air hose.

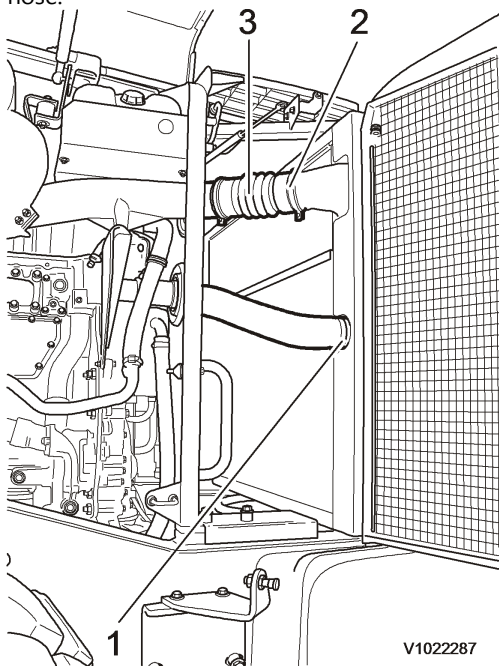


Figure 6

1. Hose clamp
2. Pipe clamp
3. Air hose

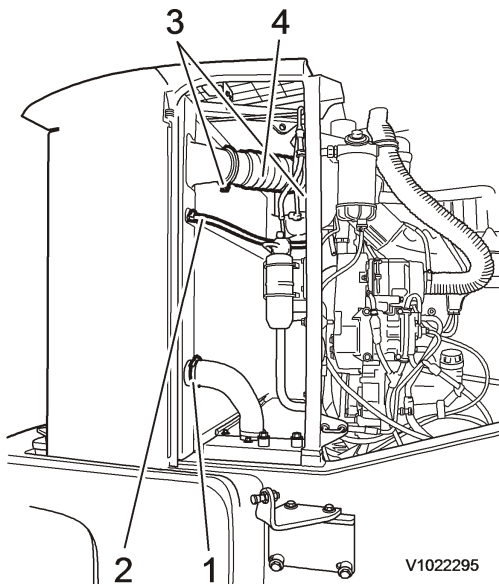


Figure 7

1. Hose clamp
2. Hose clamp
3. Pipe clamp
4. Air pipe

7. Remove the bolts for the grating above the condenser.
Remove the bolts for the expansion tank.

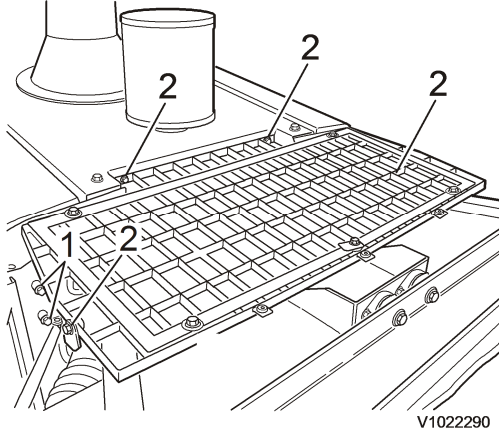


Figure 8

1. Bolts for expansion tank, 3 pcs.
2. Bolts for grating

8. Remove the bolts for the bracket for the AC condenser's gas pipe.
Remove the bolts for the AC condenser's brackets and lift it to the side.

NOTE!

Do not loosen the pipe connections on the AC condenser.

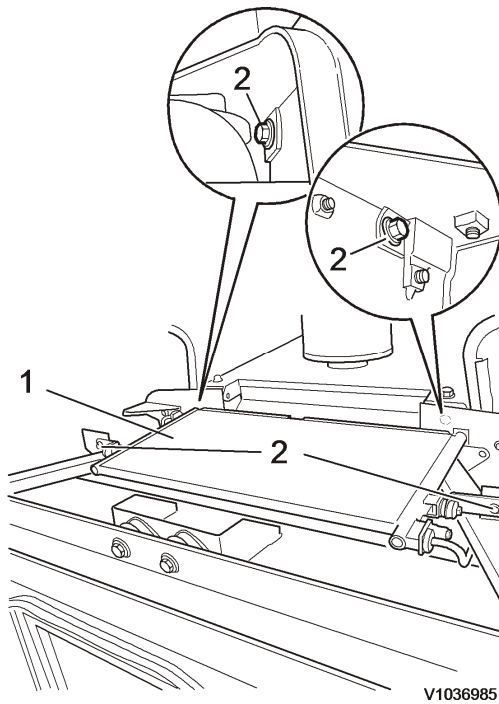


Figure 9

- 1. Condenser
- 2. Bolt

9. Remove the member on both sides.

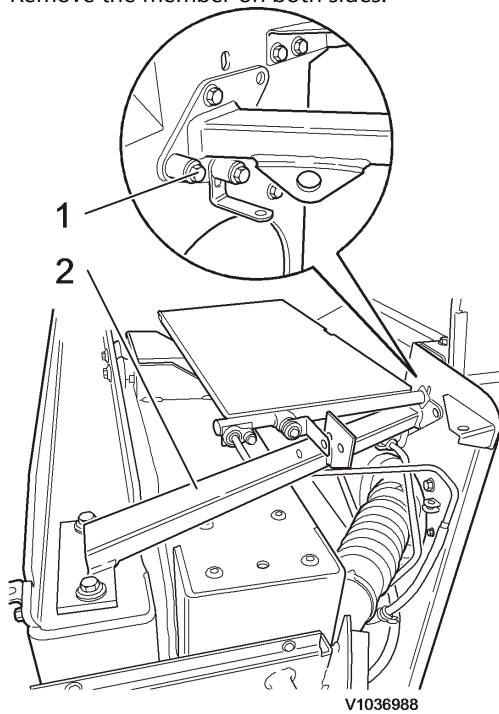


Figure 10

- 1. Bolt
- 2. Member

10. Connect a lifting device and sling to the cooler unit. Remove the radiator's upper and lower attachments. Weight: **160 kg (353 lbs)**

11. Lift away the cooler unit.

NOTE!

Make sure that the AC condenser and its components are not damaged.

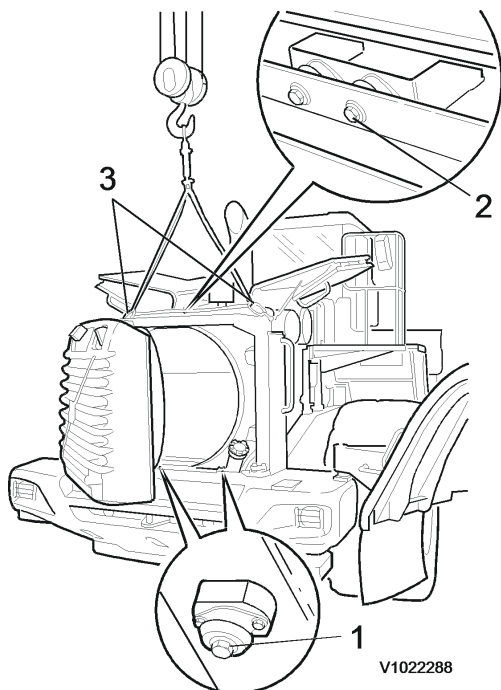


Figure 11

1. Lower radiator attachment
2. Upper radiator bracket
3. Lifting eye M10, 2 pcs.

12. Place the cooler unit on a clean and level surface.

Remove the bolts and disconnect the radiator or intercooler from the radiator frame.

NOTE!

Keep track of the rubber spacers in the radiator frame.

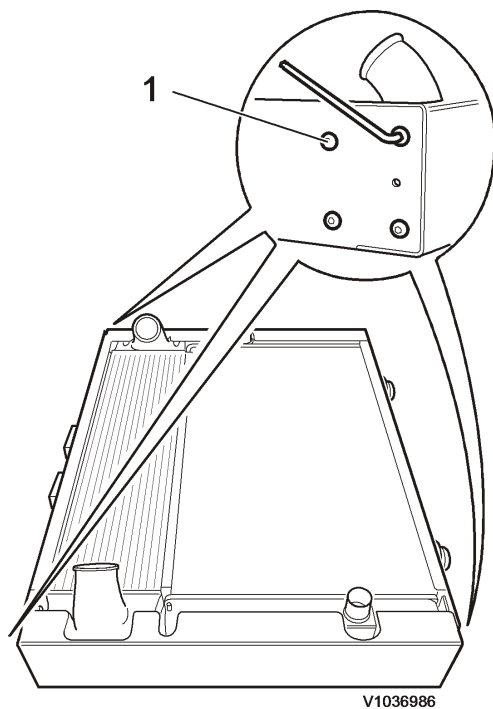


Figure 12

1. Bolt

Installing

13. Install the rubber spacers in the radiator frame. Place the radiator and intercooler in the frame and bolt together with the bolts.
Use tensioning straps or similar to press the end parts of the frame into place.

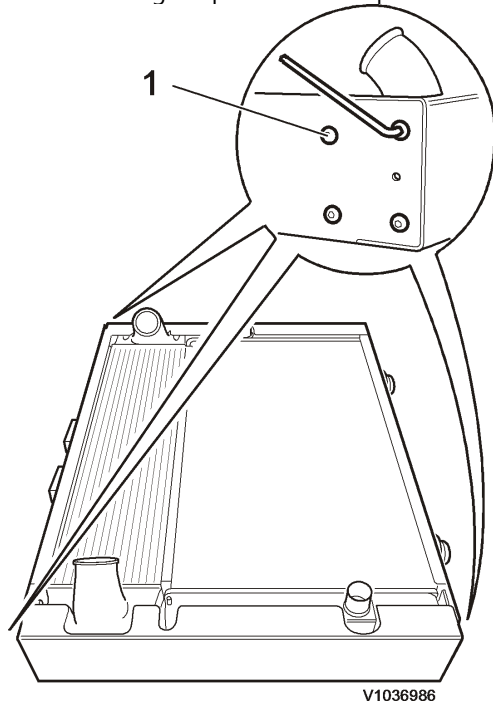


Figure 13

1. Bolt

14. Connect a sling to the cooler unit, lift up and reinstall.
Weight: **160 kg (353 lbs)**

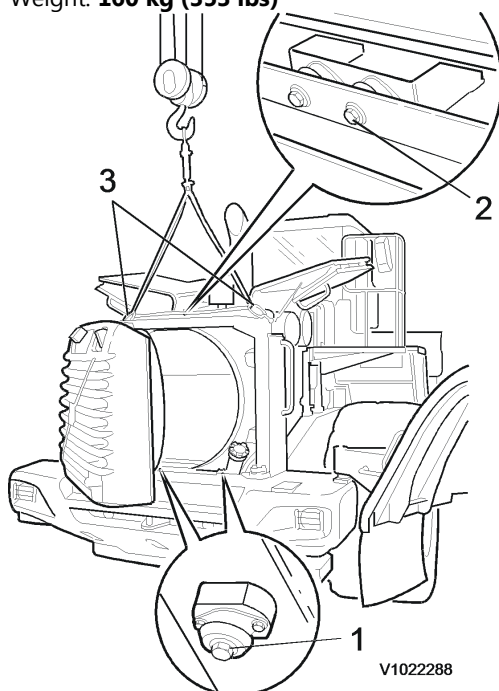


Figure 14

1. Lower radiator attachment
2. Upper radiator bracket
3. Lifting eye M10

15. Fit the members and tighten the bolts.

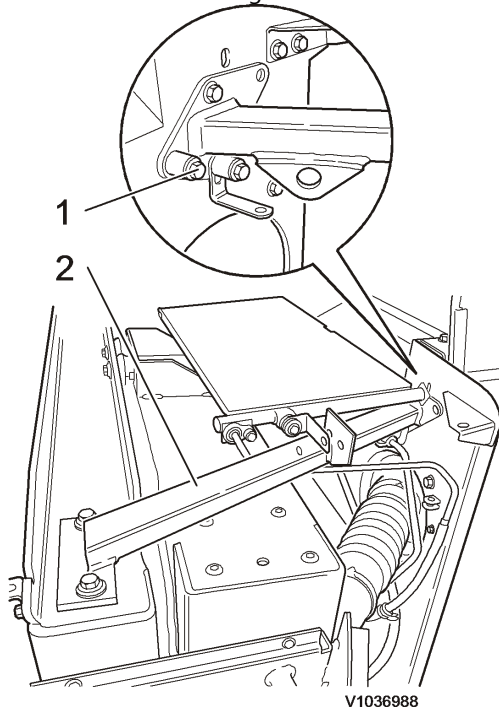


Figure 15

1. Bolt
2. Member

16. Lift back the condenser and bolt it down.

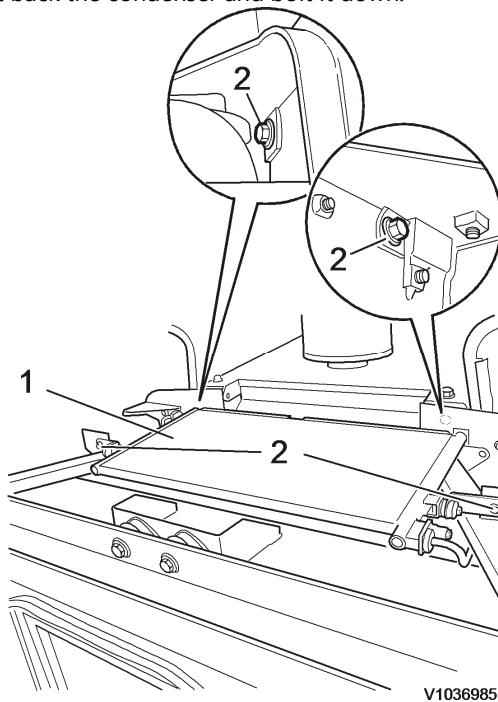


Figure 16

1. Condenser
2. Bolt

17. Fit the grating above the condenser and bolt it down. Refit the bracket for the expansion tank.

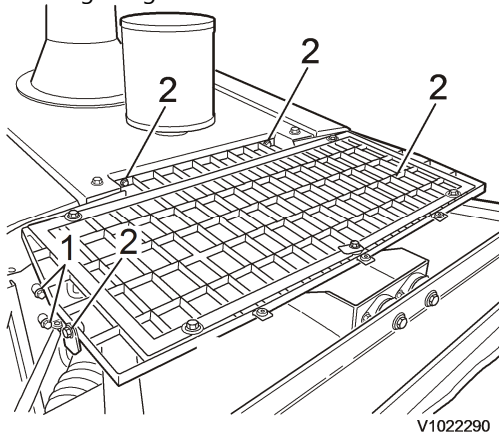


Figure 17

1. Bolts for expansion tank
2. Bolts for grating

18. Fit the coolant hoses and the air hose, and tighten them down with the clamps.

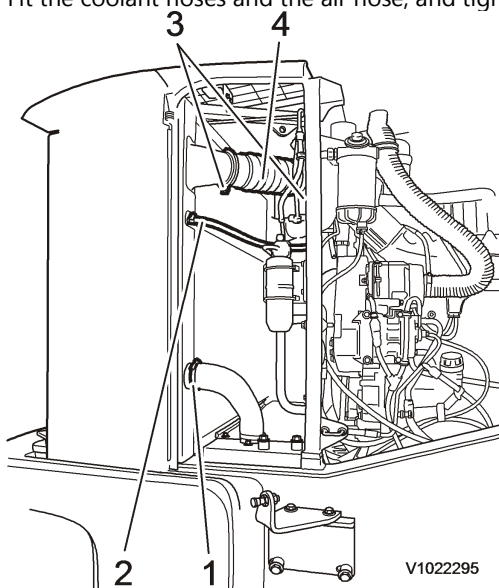


Figure 18

1. Hose clamp
2. Hose clamp
3. Pipe clamp
4. Air pipe

19. Fit the coolant and air hose, and tighten them down with the clamps.

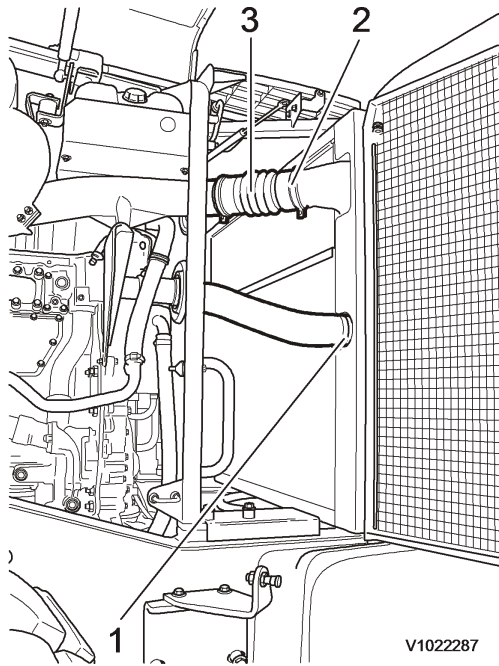


Figure 19

1. Hose clamp
2. Pipe clamp
3. Air hose

20. Install the side panel and the grating door, and secure the gas damper with the striker plate.

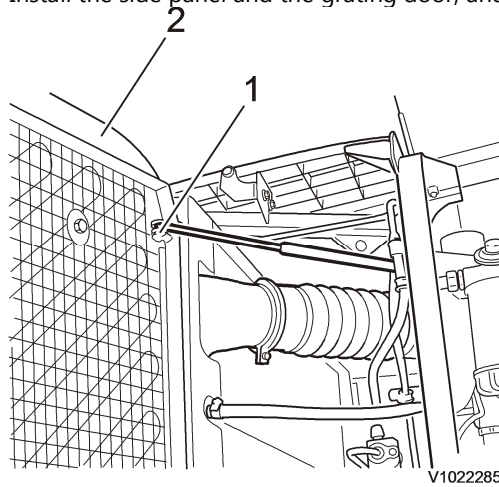


Figure 20

1. Striker plate
2. Grating door

21. Install the plastic casing and bolt it down. Secure the angle iron. Install the filler pipe.

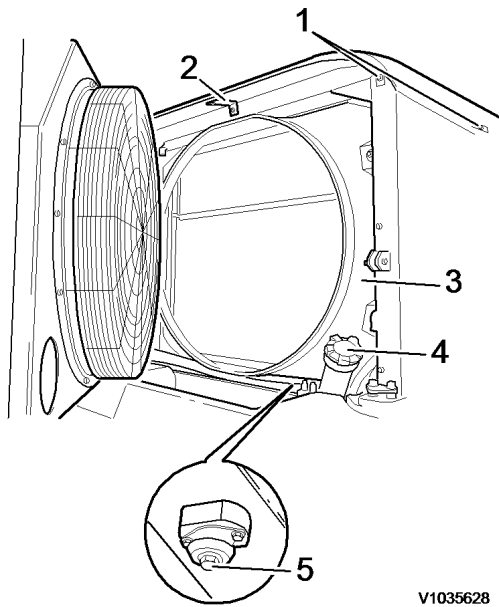


Figure 21

1. Bolt, 4 pcs.
2. Angle iron
3. Fan shroud
4. Filler pipe
5. Lower radiator attachment

22. Fill coolant. Volume, see [030 Engine. volume](#)

23. Start the engine and check that there are not any leaks.

Document Title: Radiator, replacing	Function Group: 261	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Radiator, replacing

Op nbr 261-008

Lifting eye M10, 2 pcs.

Shackle M16, 2 pcs.

Lifting sling, 2 m (6.6 ft), 2 pcs

Bolt, M9x35, 2 pcs.

Removing

1. Place the machine in safety position, see [191 Safety rules when servicing](#)



Risk of burns when removing the header tank cap because of excess pressure in the cooling system.

2. Remove the cap from the expansion tank.
Drain the coolant. Use existing located in the right battery box or the tool box on the machine.
Volume: See [030 Cooling system, volume](#)

NOTE!

approx. 3 litres (0.8 US Gal) will remain in the engine block.

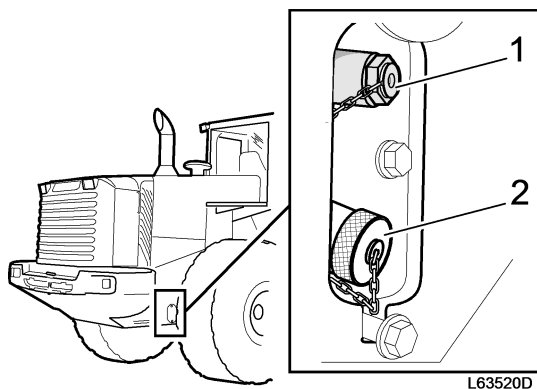


Figure 1

3. Remove the engine hood, see [821 Engine hood, removing](#).
4. Loosen the hose clamps for the coolant hoses on both sides and disconnect them from the radiator. Loosen the pipe clamps and remove the intercooler hoses.

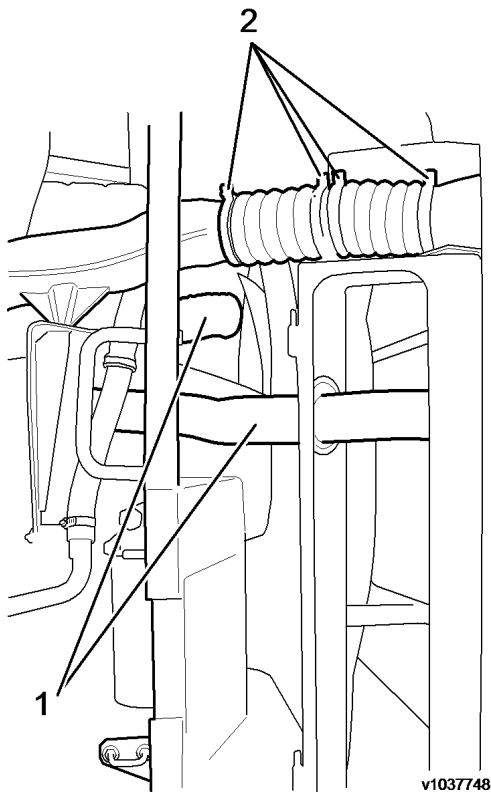


Figure 2

1. Intercooler hose
2. Pipe clamp

5. Remove the plate on the intermediate wall's lower edge (under fan shroud). Remove the plate in the bottom of the fan shroud.
6. Loosen the hydraulic connections under the fan shroud. Mark the hoses.

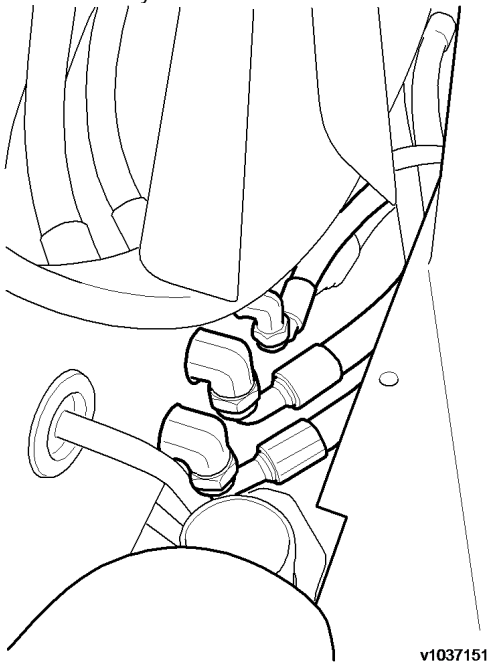


Figure 3

7. Unplug the connector for sensor RZ from the door frame.

Remove the bolts for the AC condenser's brackets and loosen required clamps. Lift aside the AC condenser.

NOTE!

Avoid folding the hoses.

NOTICE

Hoses must not be disconnected as they contain refrigerant. See the Service Manual regarding the handling of air conditioning systems.

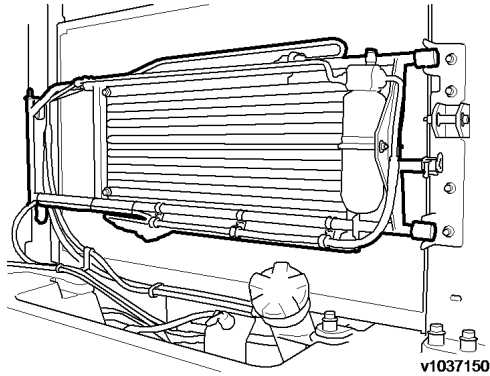


Figure 4

8. Fixate the radiator against the frame with two M8x35 bolts.

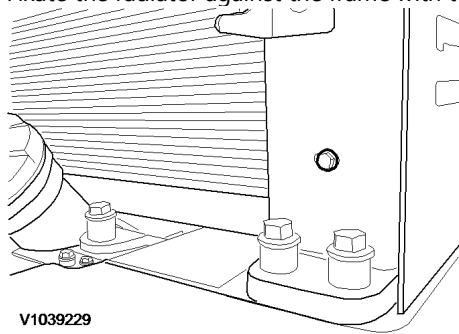


Figure 5
V1039922

1. Holes for retaining bolts
9. Connect a lifting device and sling to the cooler unit.
Remove the cooler unit's lower attachments and lift away the cooler unit.
Weight: **355 kg (783 lbs)**
10. Support the cooler unit on the floor.

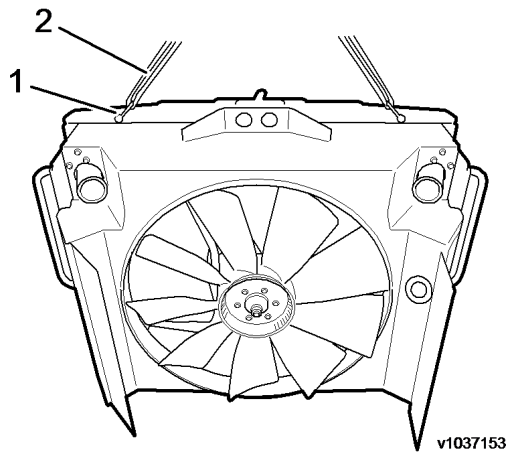


Figure 6

1. Shackle M16, 2 pcs.
2. Lifting sling, 2 m (6.6 ft), 2 pcs

11. Connect a lifting device and lifting sling to the fan shroud. Remove the fan shroud, complete with fan motor and fan.
12. Loosen the retaining bolts at the lower edge on the back so that the radiator hangs freely. Connect lifting eyes and sling. Remove the upper attachments and lift away the cooler unit from the frame.

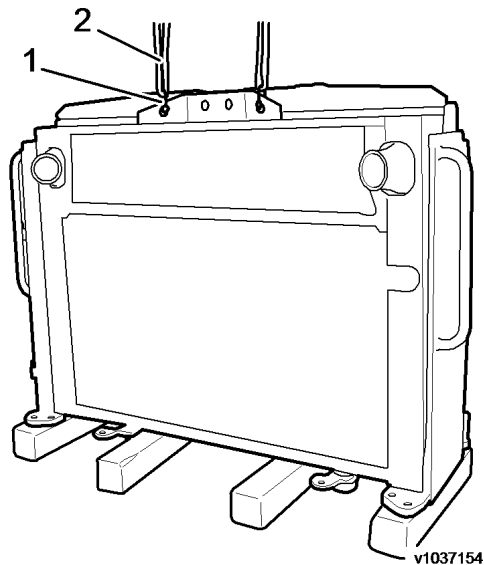


Figure 7

1. Shackle M16, 2 pcs.
2. Lifting sling, 2 m (6.6 ft), 2 pcs

13. Place the cooler unit on a clean and level surface. Remove the bolts and disconnect the radiator or intercooler from the radiator frame.

NOTE!

Keep track of the rubber spacers in the radiator frame.

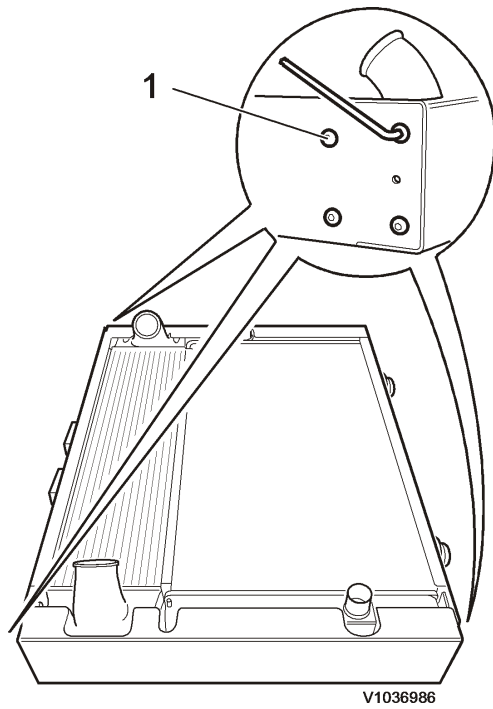


Figure 8

1. Bolt

Installing

14. Install the rubber spacers in the radiator frame. Place the radiator and intercooler in the frame and bolt together with the bolts.
Use tensioning straps or similar to press the end parts of the frame into place.
15. Install the radiator in the radiator frame.

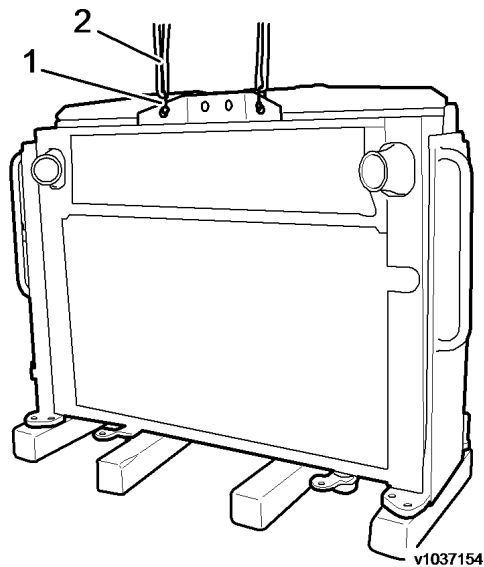


Figure 9

1. Shackle M16, 2 pcs.
2. Lifting sling, 2 m (6.6 ft), 2 pcs

16. Install the cooler unit's upper attachment in the frame.

17. Fixate the radiator against the frame with two M8x35 bolts.
18. Install the fan shroud, complete with fan motor and fan.
Weight: **45 kg (99 lbs)**
19. Connect a sling to the cooler unit, lift up and reinstall.
Weight: **355 kg (783 lbs)**
20. Remove the retaining bolts that fixate the radiator against the frame.
21. Lift back the condenser and bolt it down. Reinstall clamps and plug in the connector for sensor RZ on the door frame.
22. Connect the coolant hoses and the charge-air hoses, and tighten down with clamps.

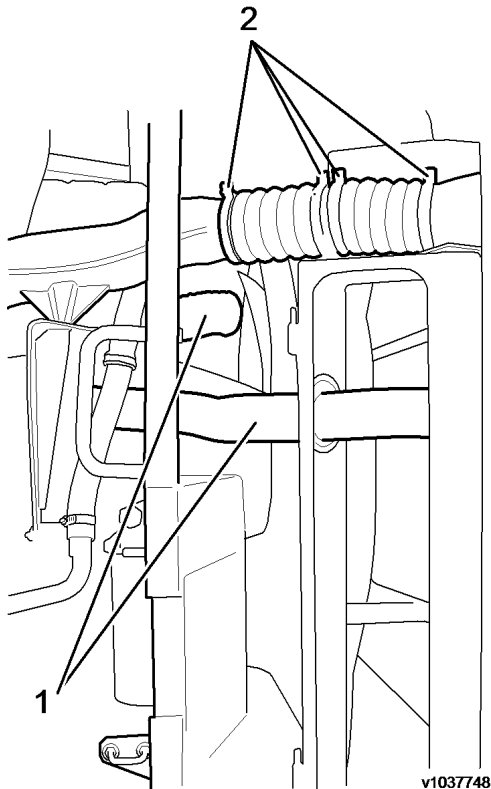


Figure 10

1. Intercooler hose
2. Pipe clamp

23. Install the hydraulic connections under the fan shroud.

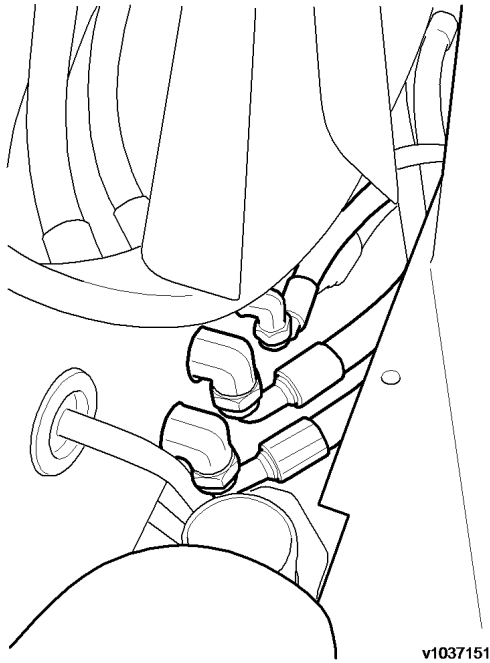


Figure 11

24. Install the plate on the intermediate wall's lower edge (under fan shroud). Install the plate in the bottom of the fan shroud.
25. Fit the engine hood, see [821 Engine hood, installing](#).
26. Fill coolant. Volume, see [030 Cooling system, volume](#).
27. Start the engine and check that there are not any leaks.

Document Title: Coolant pump, description	Function Group: 262	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Coolant pump, description

The coolant pump is installed on the timing gear casing back plate and is driven from the engine timing gears.

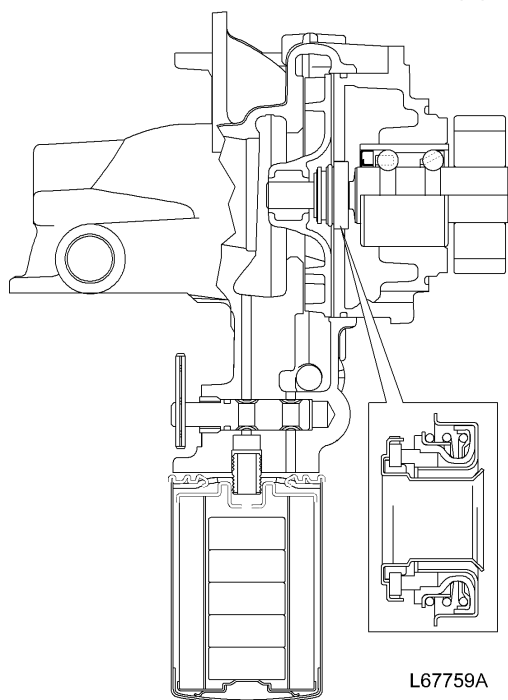


Figure 1
Coolant pump, cross section

The seal for the coolant is made in one piece and made of hard coals ceramics.

The pump shaft is journalled in a double ball bearing.

The coolant pump is provided with a by-pass type filter, which continuously adds anti-corrosion agent and cleans the coolant.

The duct to the coolant filter is provided with a shut-off valve to prevent the coolant from running out of the system when replacing the filter.

The valve should always be in the open position, i.e. the handle must be vertical. However, the valve is to be closed in connection with filter replacement.

The valve is closed by moving the handle to the horizontal position.

Document Title: Thermostat housing, description	Function Group: 262	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Thermostat housing, description

The engine is provided with a piston-type thermostat.

The thermostat housing is integrated in the cylinder head.

The sensor for the coolant temperature is found on the thermostat housing.

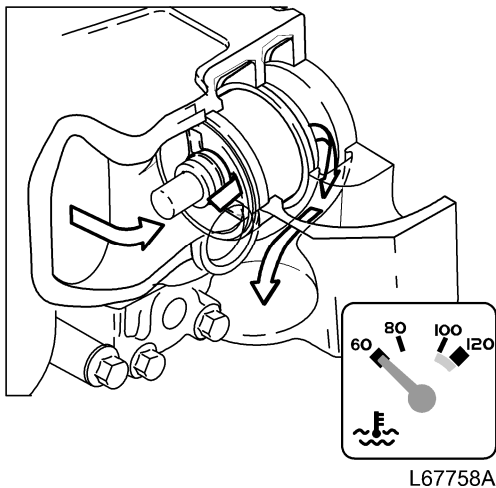


Figure 1
Thermostat closed

The thermostat is closed while the engine is warming up and the coolant passes from the cylinder head through the outer space in the thermostat housing back to the coolant pump.

When the engine has reached operating temperature and the thermostat opens, the duct to the coolant pump gradually closes.

The coolant passes through the inner space in the thermostat housing and further on out to the radiator.

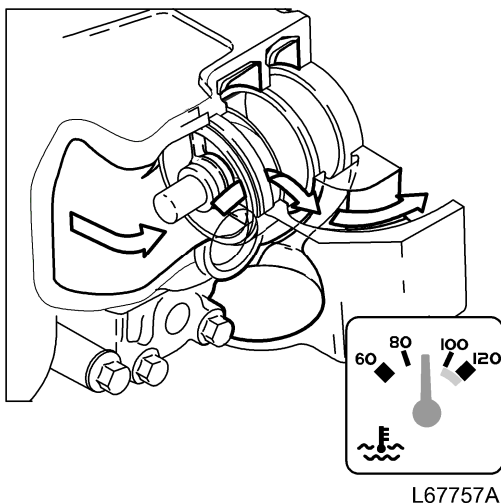


Figure 2
Thermostat open

Document Title: Thermostat, replacing	Function Group: 262	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Thermostat, replacing

Op nbr 262-098

[9998619 Drift](#)

Flange bolt (M8x20)

Flange bolt (M8)

1. Place the machine in service position, see [191 Safety rules when servicing](#)
2. Drain the coolant from the engine.
3. Remove the coolant pipe from the connection to the thermostat housing.
4. Remove the two bolts from the exhaust manifold located closest to the thermostat housing.

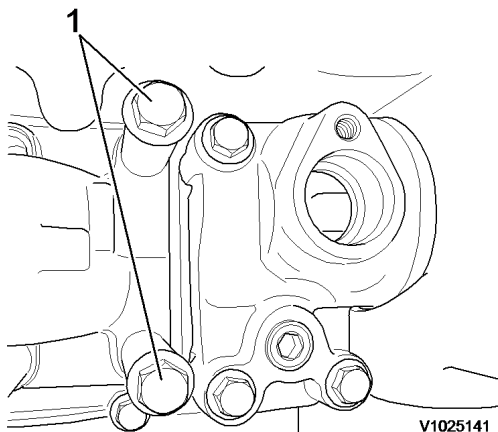


Figure 1

1. Exhaust manifold's front attaching bolts
5. Remove the thermostat housing, gasket and the thermostat.
NOTE!
Check the bolts for the thermostat housing, these shall be of tensile strength class 10.9, if not or if there is any doubt, replace them.
6. Remove the thermostat seal. Tap on the seal with a drift, turn and remove the seal.
7. Clean all sealing surfaces.
8. Fit a new seal ring on installation tool 999 8619.
NOTE!
The seal's plane surface shall face the installation tool's plane.

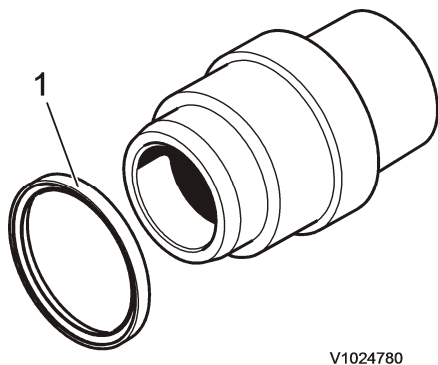


Figure 2

1. Seal ring

9. Fit the seal ring by pressing in the installation tool with a pry bar until the tool bottoms out in the engine block.
10. Fit the shim and the new thermostat.

NOTE!

The shim shall end up inside of the thermostat against the engine block.

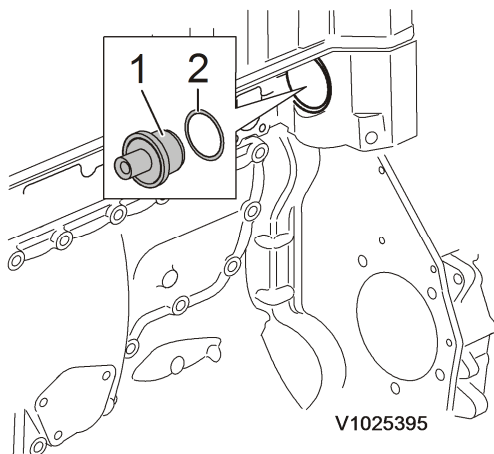


Figure 3

1. Thermostat
2. Shim

11. Fit the thermostat housing with a new gasket. Tighten the bolts by hand and check that the gasket ends up in the correct position.

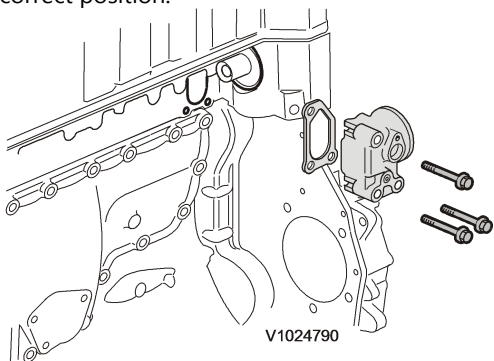


Figure 4

12. Fit the bolts on the exhaust manifold.
Tightening torque: **52 Nm (38.3 lbf ft)**
13. Fit a flange bolt (M8x20) and a flange nut between the exhaust manifold and the thermostat housing.
Screw apart the flange bolt and flange nut so that the thermostat housing is pressed against the cylinder head.

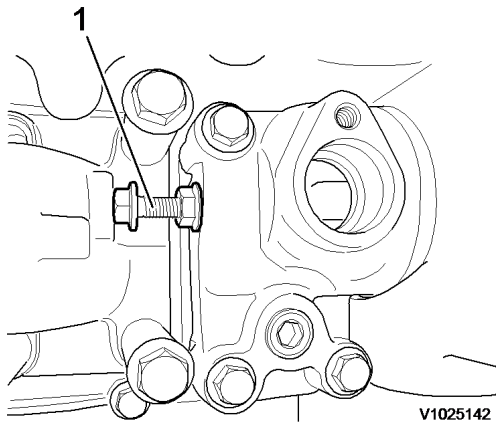


Figure 5

1. Flange bolt (M8x20) and flange nut

14. Tighten the thermostat housing's bolts in two steps.
Tightening torque, step 1: **10 Nm (7.4 lbf ft)**.
Tightening torque, step 2: **30 Nm (22.1 lbf ft)**.

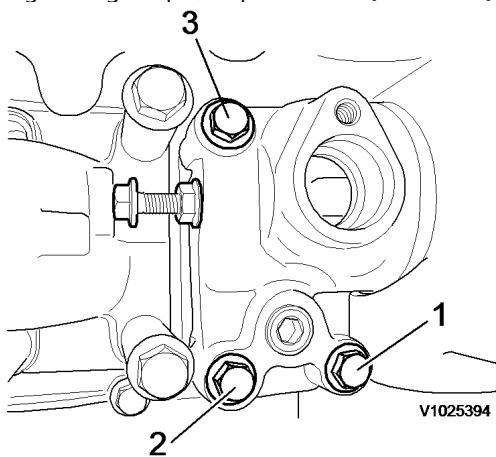


Figure 6
Tightening diagram for thermostat housing

15. Fit the coolant pipe on the thermostat housing.
16. Fill coolant in the engine.
17. Start and run the engine until warm, check for leaks.
If needed, adjust the coolant level.
18. Restore the machine to operating condition.

Document Title: Coolant pump, replacing	Function Group: 262	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Coolant pump, replacing

Op nbr 262-002

Coolant pump, removing

1. Place the machine in service position, see [191 Safety rules when servicing](#).
2. Drain the coolant from the engine.
Volume approx. **44 dm³ (11.6 US gal)**.

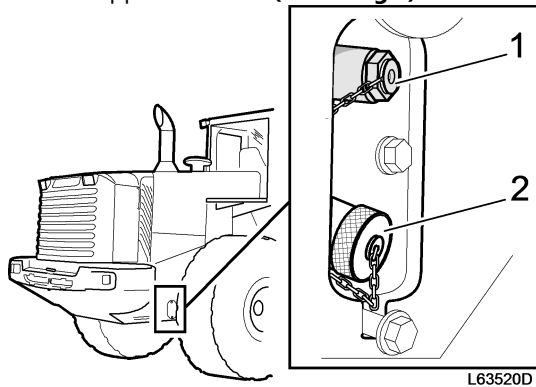


Figure 1

1. Draining coolant
2. Draining engine oil

3. Remove the coolant pipes from the expansion tank, the oil cooler and thermostat housing.

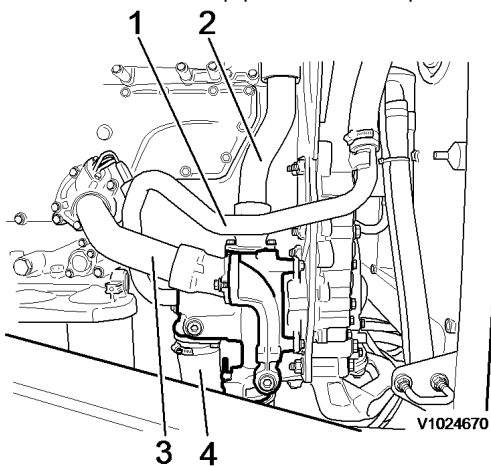


Figure 2

1. Coolant pipe, expansion tank
2. Coolant pipe, thermostat housing

3. Coolant pipe, oil cooler casing
4. Lower radiator hose

4. Loosen the lower radiator hose from the coolant pump.
5. Loosen the coolant pump's attaching bolts on the front of the timing gear casing.

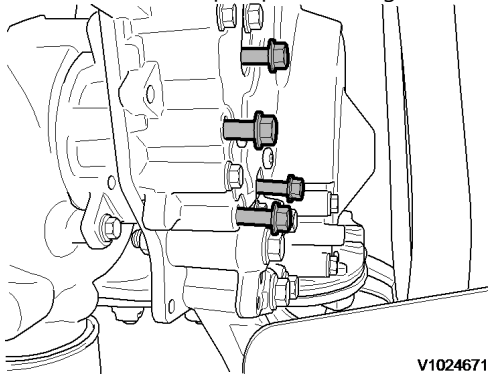


Figure 3
Coolant pump's attaching bolts

6. Lift out the coolant pump.

Coolant pump, mounting

NOTE!

New seals shall be used when fitting the coolant pump.

7. Lift the coolant pump into place, make sure that the seal ring is positioned correctly.
Tightening torque: **48 Nm (35.4 lbf ft)**.
8. Fit the lower radiator hose.
9. Fit the coolant pipes from the expansion tank, the oil cooler and thermostat housing.
10. Fit a new coolant filter.
11. Fill coolant in the cooling system.
12. Start, run the engine until warm, check for leaks.
If needed, adjust the coolant level in the cooling system.

Document Title: Hydraulic cooling fan, description	Function Group: 263	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Hydraulic cooling fan, description

The fan control shall adjust the cooling fan speed (rpm) in an optimal way so that energy consumption and sound level are minimized, with sufficient cooling capacity. Cooling is achieved by continuous sensing of the temperature in the components to give optimal cooling fan speed. When the cooling fan's speed is reduced, this takes place significantly slower than a speed increase in order to accumulate a cooling reserve. If there is a system error for monitoring of the cooling fan speed, the operator is informed via the information display unit, continued operation may result in damage to engine, transmission, etc.

The cooling fan is common for the diesel engine's radiator and the intercooler.

Cooling fan speed, control

The following input signals and systems are used to control fan speed

- Induction temperature E02
 - Charge-air temperature, E03
 - Coolant temperature, at outlet from diesel engine, SE2606
 - Coolant temperature, at outlet from radiator, SE210
 - Transmission oil temperature, SE406
 - Axle oil temperature, front and rear axle (if axle oil cooler is installed) SE410 and SE411
 - Hydraulic oil temperature, SE906
 - Diesel engine speed, SE201
 - Fan speed, SE211
 - Slipping in transmission, calculated between SE402 and SE403.
 - Setting cooling fan mode (max. allowed fan speed) A, B or C.
 - Request for pressure test (On/Off).
 - Request for sound test (On/Off).
 - Request for brake pressure charging, from SE504.
-
- Axle oil temperature (front and rear) is only considered if equipment for axle oil cooling is installed (set via service display unit).
 - Since the diesel engine's thermostat restricts the coolant flow to the transmission/hydraulic oil cooler when the coolant temperature is too low, transmission and hydraulic oil temperature only considered if the thermostat has started to open (>85 °C). At min. 95 °C, full consideration is given to the temperatures.
 - The diesel engine's thermostat controls the coolant temperature for the engine.
 - Proportional valve MA202, which controls the cooling fan speed, is located on the central block, see Section 9 description central block.

Calculation of fan speed

The fan constant, k_{fi} , is calculated by the ECU according to the formula:

$$k_{fi} = \max. (A1, A3, (A2 \times A5), (A4 \times A5), A6)$$

If one selects the individual constants according to the examples, then $k_{fi} = 0.7$ (highest constant)

If the user has selected fan speed level B=1400 rpm, it gives 980 rpm in this case.

The result gives the fan speed's control value:

$$- k_{fi} = 0 \text{ gives Min. speed} - k_{fi} = 1 \text{ gives Max. speed} - 0 < k_{fi} < 1 \text{ gives } k_{fi} \times \text{Max. speed which gives } 0.7 \times 1400 = 980 \text{ rpm}$$

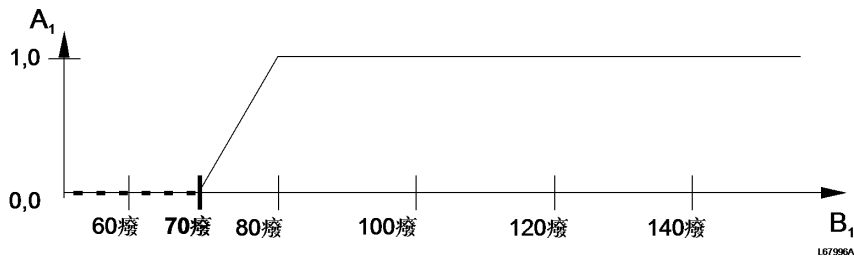


Figure 1
Outlet temperature, radiator, 70–80 °C

A1 **Radiator constant**
B1 Temperature
Selected temperature: **70 °C** gives **A1 = 0.0**

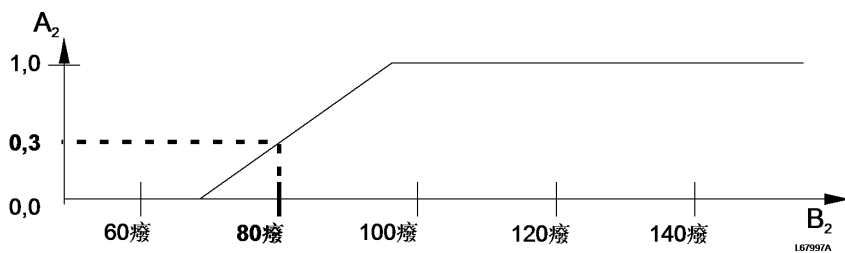


Figure 2
Hydraulic oil temperature, 70–95 °C

A2 **Hydraulic oil temperature, constant**
B2 Temperature
Selected temperature: **80 °C** gives **A2 = 0.3**

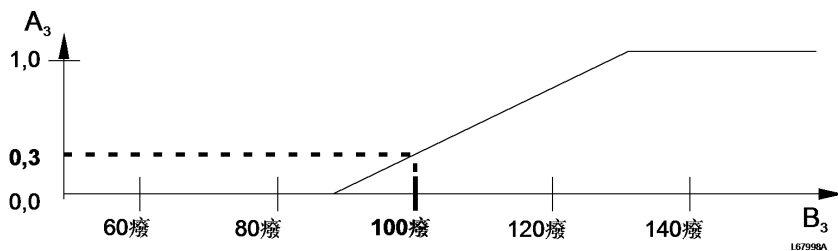


Figure 3
Axle oil temperature, 90–133 °C

A3 **Front and rear axle temperature (respectively), constant**
B2 Temperature
Selected temperature: **100 °C** gives **A3 = 0.3**

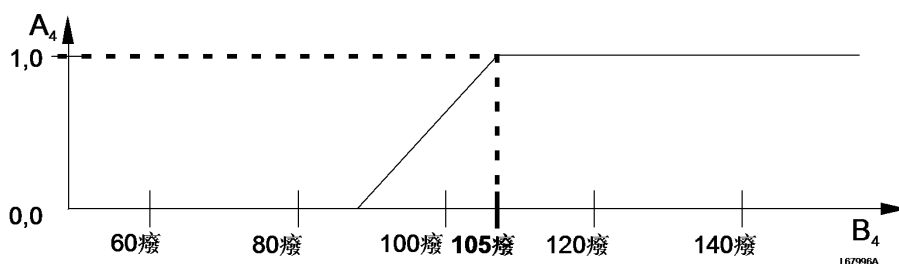


Figure 4
Transmission oil temperature 90–105 °C

A4 **Transmission oil temperature, constant**

B4 Temperature

Selected temperature: **105 °C** gives **A4 = 1.0**

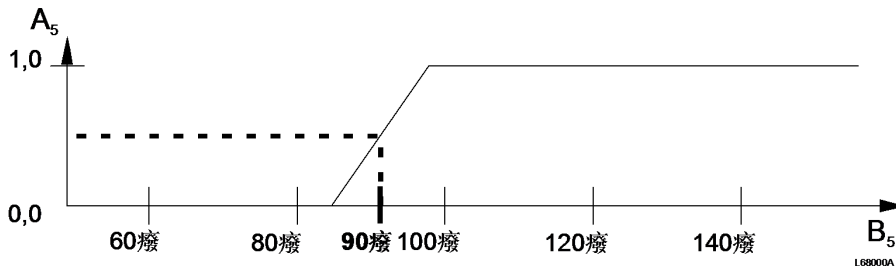


Figure 5
Coolant temperature, engine 85–95 °C

A5 **Coolant temperature, constant**

B5 Temperature

Selected temperature: **90 °C** gives **A5 = 0.5**

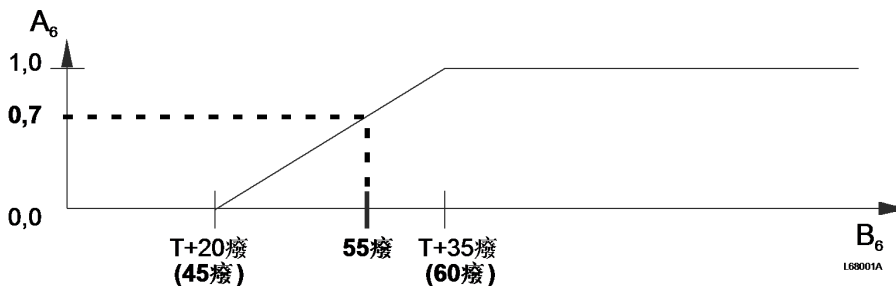


Figure 6
Charge-air temperature (T)+20 °C–(T)+35 °C

A6 **Charge-air temperature, constant**

B6 Temperature= Induction temperature (T) +20 °C

T Induction temperature. If $T \leq 25$ °C is set $(T)+20$ °C= 45 °C and $(T)+35$ °C= 60 °C

Selected temperature: **55 °C** gives **A6 = 0.7** (Induction temperature = 25 °C)

Charge-air temperature

There is no consideration given to the charge-air temperature at engine speed < 800 rpm. At start, the engine shall run for 2 minutes before consideration is given to the charge-air temperature. This is due to the temperature sensor's delayed response (inertia) at warm start. Temperature sensor E03 (signal PID 105) is compensated down by 8 °C.

Temperature limits

At the lower temperature limit, the cooling fan speed shall be approx. 400 rpm 100 rpm.

The cooling fan's max. speed at the upper temperature limit is adjustable at different levels, A, B or C via the service display unit.

The relationship for the speed is linear between the limits, see the specification:

"Temperature limits for cooling fan speed".

Cooling fan's max. speed

With the service display unit, different speeds can be selected for the cooling fan according to levels A, B or C, see the specification:

"Cooling fan's max. speed".

Sound test

When measuring sound, service personnel can use the service display unit to request that the fan is run at a constant speed. The request applies until the computer system is shut off. The constant speed is the same as 70% of the max. allowed speed in the current setting (see cooling fan's max. speed).

Auxiliary brake, at slipping in transmission

In order to assist in braking the engine, the system can request a higher fan speed than normal, which then requires higher output. This function shall not be activated if turn-around is in progress or if the gear selector is in neutral. At slipping > 1.2 (see description in "Slipping in Transmission"), max. speed is set according to level C (High cooling performance) instead of the speed that is supplied by the fan control.

Incorrect input signals

In case of a defect of any sensor, this is indicated on the machine's information display unit.

-
- In case of a defective sensor for coolant temperature SE210, induction temperature E02 or the sensor for charge-air temperature E03, the cooling fan will be controlled toward max. speed according to setting (A, B or C), performed via the service display unit.
- In case of a defective sensor for coolant temperature diesel engine, SE2606, full (100%) consideration is given to signals from sensor for transmission oil temperature, SE406, and hydraulic oil temperature, SE906.
- In case of defective current fan speed; The control (adjustment) is still controlled according to cooling demand from respective unit, however, without feedback to current fan speed.
- In case of defective request for brake pressure charging, request is considered to exist.
- In case of defective setting axle oil cooling installed or not, the equipment is considered not installed.

Other sensor specifications, see Section 3.

Document Title: Cooling fan motor, description	Function Group: 263	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Cooling fan motor, description

The cooling fan is driven by a vane motor with fixed displacement.

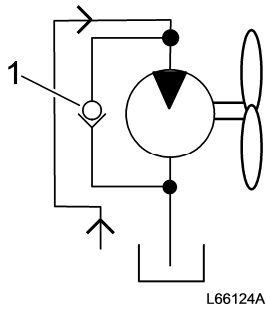


Figure 1
Cooling fan motor, principle diagram

1. Non-return valve

A non-return valve, located in the vane motor, prevents cavitation in the motor when the motor stops and the cooling fan continues to rotate.

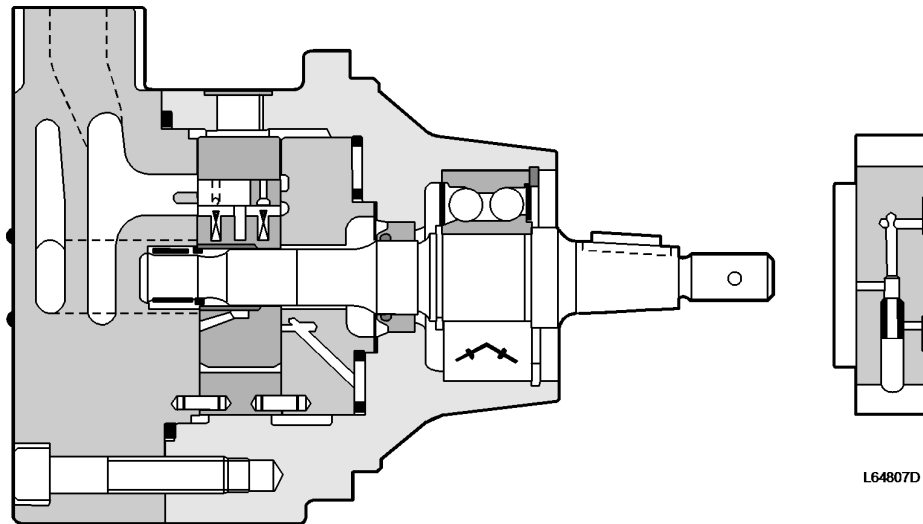


Figure 2
Cooling fan motor



Construction Equipment

Service Information

Document Title: Reversible cooling fan, hydraulic diagram description	Function Group: 263	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Reversible cooling fan, hydraulic diagram description

The valve block for controlling the reversible fan consists of four pressure-controlled directional valves and two solenoid valves.

- MA205 controls the flow direction to the fan.
- In activated position, MA204 drains all directional valves which leads to the flow being directed to tank instead of the fan.

Pump 3 delivers oil in adequate amount for the fan rpm and cooling that is required.

This is controlled via the V-ECU and MA202. The oil with adequate flow comes from the central valve connection PFF.

Normal phase

Oil enters the block via connection P. Some of the oil is diverted via a restriction and via MA204 to MA205.

- When MA205 is not activated, a control pressure is directed to the rear of directional valves 2 and 3. Thus, these remain closed.
- Directional valve 1 and 4 are drained at the rear.

Oil from inlet P opens valve 4 and flows on through valve 3 to the fan. Return oil from the fan is able to open valve 1 and oil is directed to the cooler and tank.

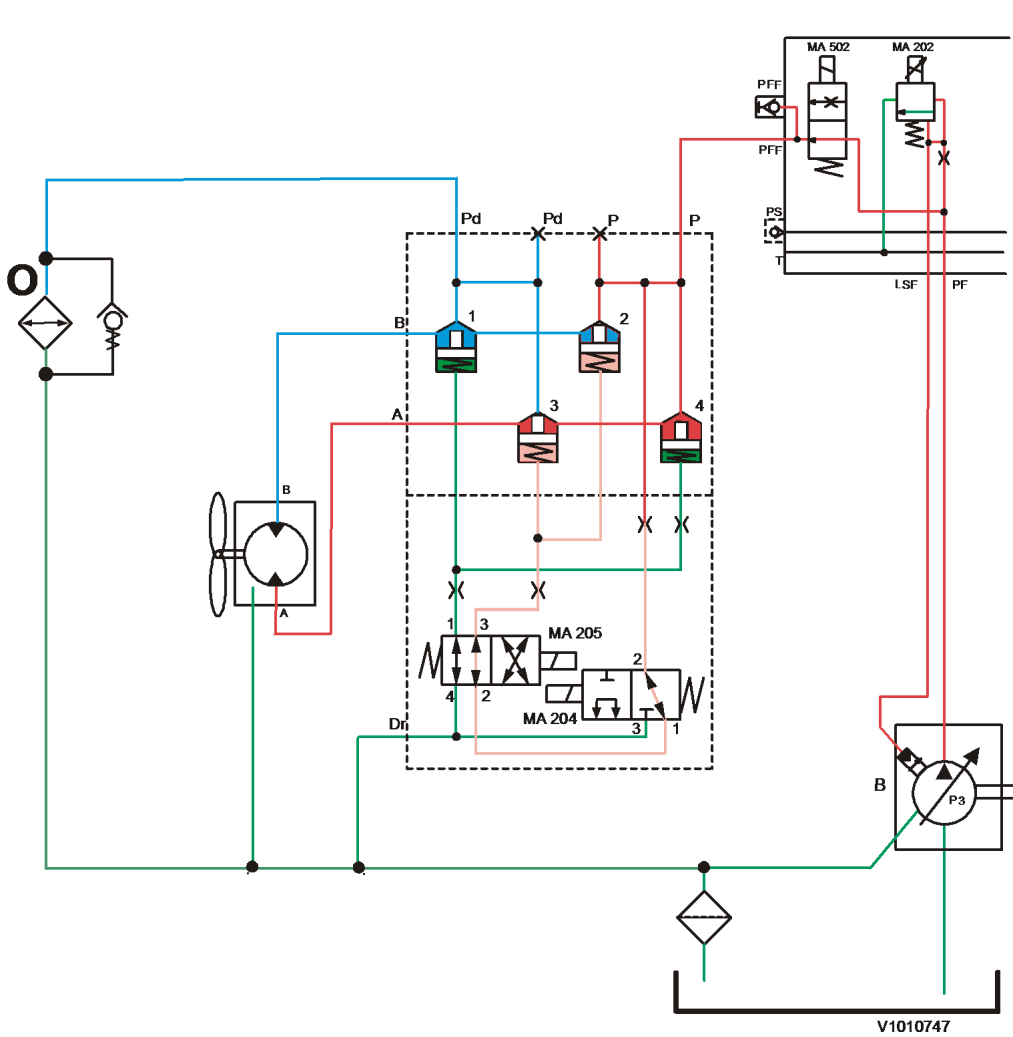


Figure 1

Retardation phase

- The V-ECU reduces the output voltage to MA202, the LS-pressure drops and the flow decreases.
- MA204 is activated and the rear sides on all directional valves are drained to tank. Thus, the flow will be directed to tank via the directional valves.
- Due to the fan mass inertia, rpm reduction is slow. The retardation phase is in progress until the fan has reached a speed of 100 rpm.

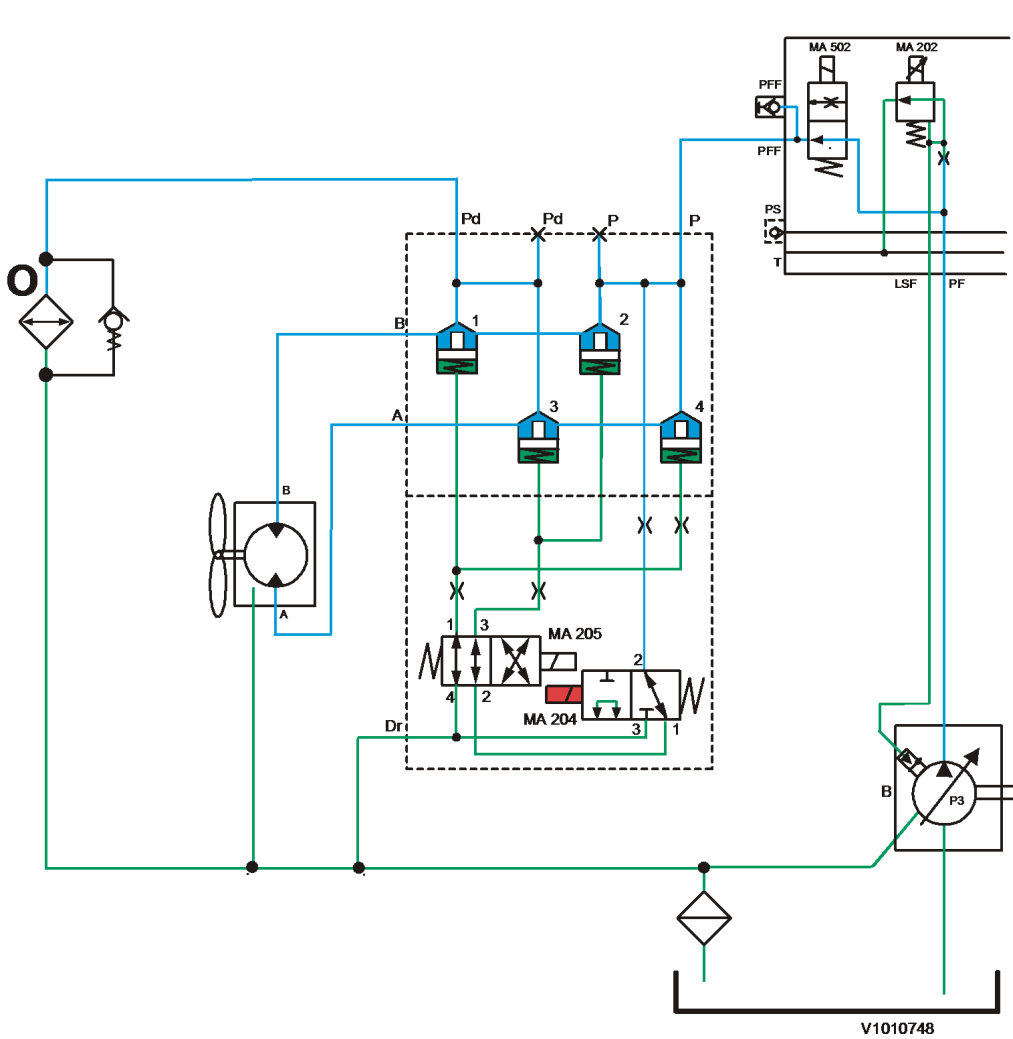


Figure 2

Reversing phase

- MA205 is activated and the control pressure is now directed to the rear of directional valve 1 and 4, which then are closed.
- Directional valve 2 and 3 are drained to tank.
- MA202 receives PWM signal corresponding to maximum speed from V-ECU.

Oil from inlet P opens valve 2 and flows on through valve 1 to the fan. Return oil from the fan is able to open valve 3 and oil is directed to the cooler and tank.

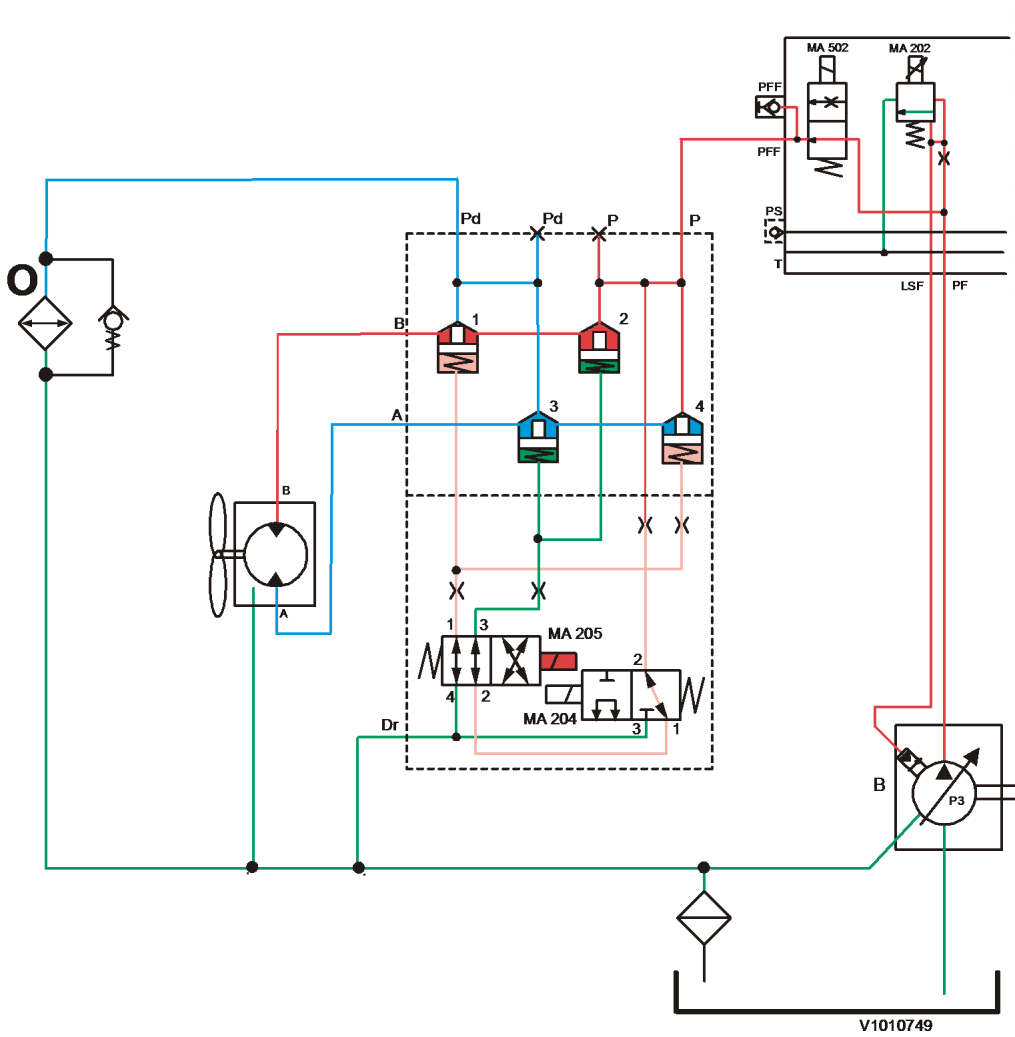


Figure 3



Construction Equipment

Service Information

Document Title: Reversible cooling fan, electric description	Function Group: 263	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Reversible cooling fan, electric description

For electric description of reversible cooling fan, see [301 Reversible cooling fan](#).

Document Title: Pump 3 (P3) Cooling fan pump / Brake pumpFlow and pressure control, description	Function Group: 263	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Pump 3 (P3) Cooling fan pump / Brake pumpFlow and pressure control, description

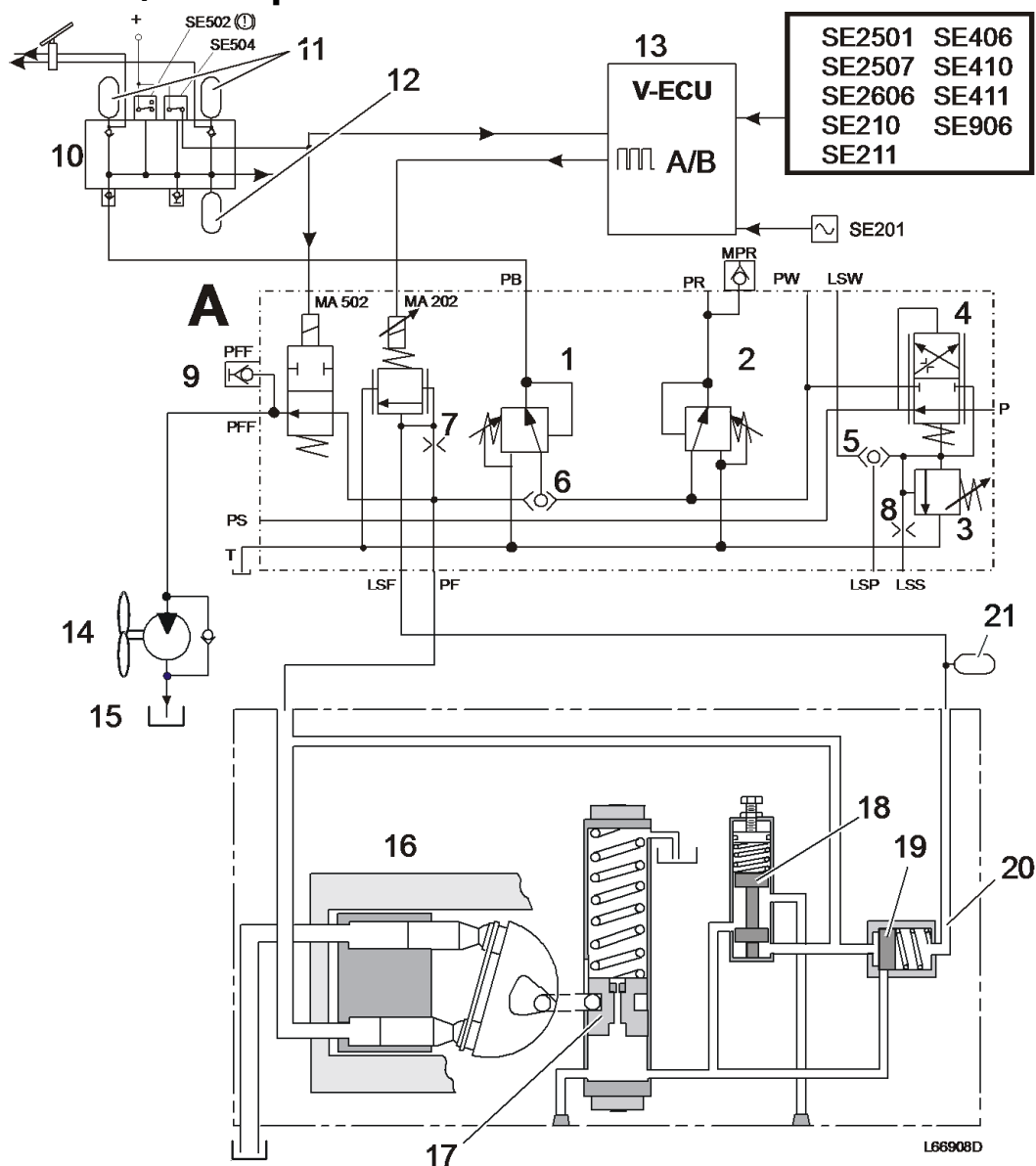


Figure 1
Pump 3 (P3) Fan pump/Brake pump, Flow and pressure control

- | | | | |
|---|---|----|--|
| 1 | Pressure reducing valve, max. hydraulic brake charging pressure | 20 | LS line |
| 2 | Pressure reducing valve, max. servo pressure | 21 | Accumulator, for damping pulses in LS line |

3	Pilot valve, max. steering pressure		
4	Priority slide		
5	Shuttle valve, selects highest LS pressure		
6	Shuttle valve, selects highest pressure to ensure brake charging	SE201	Sensor, engine speed
7	Restriction	SE2606	Sensor, coolant temperature engine
8	Restriction	SE210	Sensor, coolant temperature, radiator outlet
9	Pressure check connection, P3	SE211	Sensor, fan speed
10	Brake accumulator block	SE406	Sensor, transmission oil temperature
11	Diaphragm accumulators	SE502	Sensor, warning light, low brake pressure
12	Diaphragm accumulator, common	SE504	Sensor, electrically controlled brake charging
13	V-ECU, I-ECU, as a unit	SE906	Sensor, hydraulic oil temperature/hydraulic oil level
14	Cooling fan motor	MA202	Proportional valve, controls P3's work, LS pressure
15	Hydraulic tank	MA502	Solenoid valve, turns off fan for electrically controlled brake charging
16	Pump 3 (P3)	A/B	Brake/Fan status (PWM signal)
17	Control piston		
18	Pressure compensator		
19	Flow compensator		

Document Title: Pump 3 (P3) standby pressure, checking and adjusting (LS-line removed)	Function Group: 263	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Pump 3 (P3) standby pressure, checking and adjusting (LS-line removed)

(LS disconnected)

Op nbr 263-011

[14290266 Hose](#)

[11666052 Pressure gauge](#)

[14341364 Adapter](#)

Part no. 935100 Plug

NOTE!

Measuring connections are available in earlier and later versions. For earlier version measuring connections, use adapter.

The stand-by pressure is a product resulting partly from adjustment of P3's flow compensator and partly the V-ECU's trigger to MA202. Normally, the stand-by pressure is not checked or adjusted unless there's a malfunction in the fan/brake charging circuit.

Checking

1. Disconnect the LS hose from the central block (LSF). Plug the connection in the central block. Collect any oil from the free end of the hose.

Connect the pressure gauge to the central block at the connection marked "PFF".

To avoid interference with the measurement from brake charging, unplug the connector for MA502.

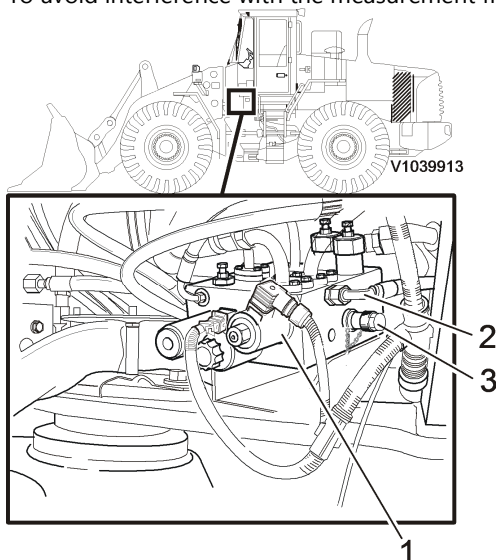


Figure 1

1. MA502
2. LS hose, the connection in the central block is plugged with plug, part no. 935100

3. Pressure check connection
2. Run the machine until the engine, hydraulic transmission and hydraulic system are at operating temperature.
3. Read off the stand-by pressure for the cooling fan at high idle.

Stand-by pressure, see [263 Pump 3 \(P3\) Cooling fan pump/Brake pump specifications](#)

Adjusting

4. Adjust the stand-by pressure by changing the number of adjusting shims in the flow compensator (1).

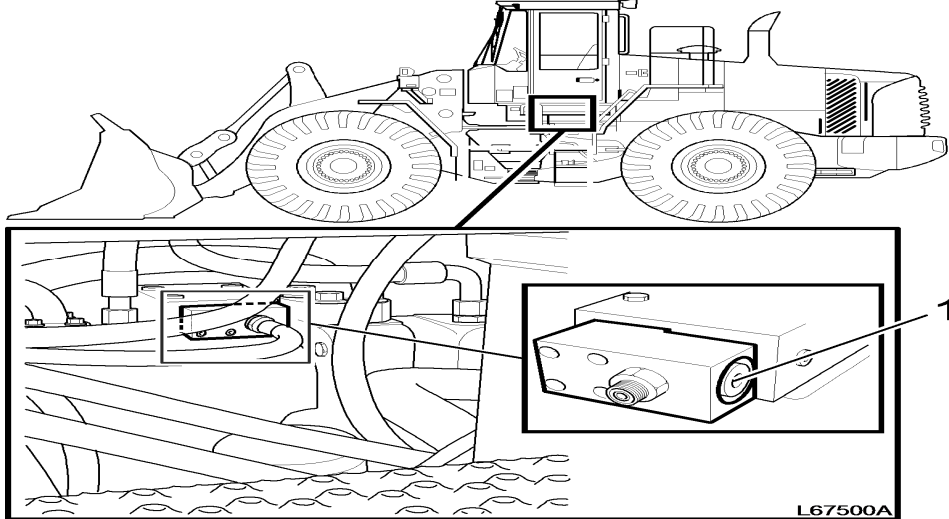


Figure 2

1. Flow compensator
5. Plug in the connector for sensor MA502. Install the LS hose on the central block.

Document Title: Fan motor, checking working pressure	Function Group: 263	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Fan motor, checking working pressure

Op nbr 263-004

[11666052 Pressure gauge](#)

[14290266 Hose](#)

[9993721 Service display](#)

[11666020 Pressure gauge](#)

[11666037 Hose](#)

NOTE!

In cases where correct cooling fan speed is achieved, there is no need to carry out a pressure check.

NOTICE

Check and when necessary clean the radiator. A clogged radiator with a reduced air flow will result in inaccurate values.

Checking

1. Lock the frame joint.

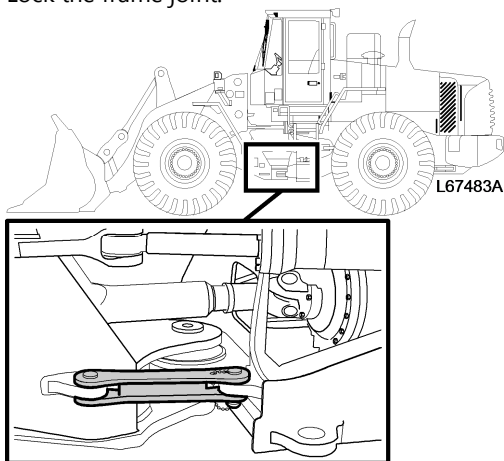


Figure 1

2. Connect the service display unit to the socket on the rear wall.

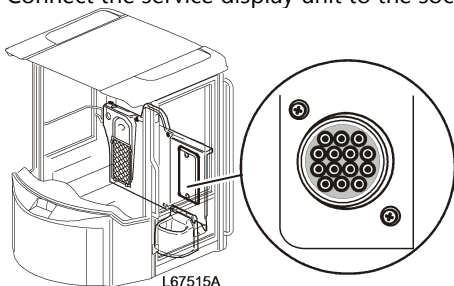


Figure 2

3. Start the engine and go to the service display for cooling fan speed under the Engine menu.

FAN PRESSURE TEST	
Max Press. Test	x *
Fan rev	yyyy rpm
Engine rev	zzzz rpm

4. Press * and then apply full throttle. Read off the cooling fan speed.
Max. speed (rpm) at pressure test, see [263 Cooling fan max. speed. specifications](#)
If the fan speed is incorrect, check the radiator and clean it if necessary.
5. If the fan speed is incorrect, remove the right side panel under the cab and check the pressure compensator on P3.
Then check the proportional valve MA202 (located on the central block).

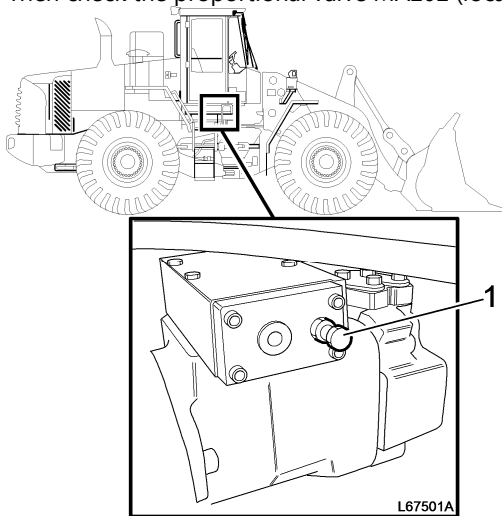


Figure 3

1. Pressure compensator, P3

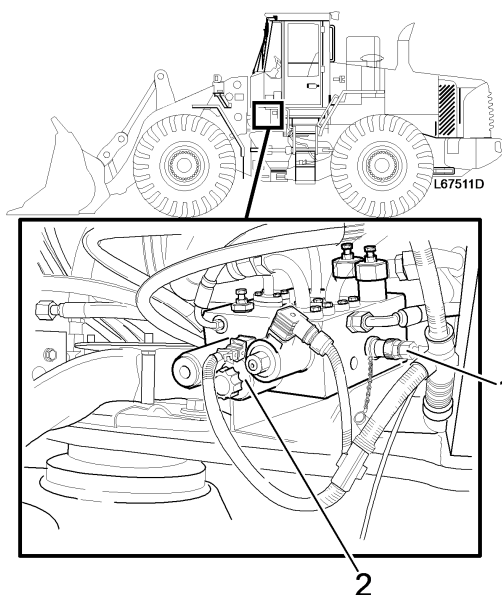


Figure 4

1. Pressure check connection
 2. MA202
6. If the components are fully functional, check the output pressure to the cooling fan, by connecting measuring equipment to the pressure check connection on the central block.

Max. operating pressure, see [263 Pump 3 \(P3\) Cooling fan pump/Brake pump specifications](#).

NOTE!

The pressure compensator is set to the maximum permitted pressure from factory. Do not overtighten the pressure compensator as this could result in damage and subsequent malfunction.

7. Remove the pressure gauge and the service display unit.

Document Title: Pump 3 (P3) standby pressure, checking and adjusting (LS-line removed)	Function Group: 263	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Pump 3 (P3) standby pressure, checking and adjusting (LS-line removed)

Op nbr 263-011

[11666052 Pressure gauge](#)

[14290266 Hose](#)

[11666019 Pressure gauge](#)

[11666037 Hose](#)

[9993721 Service display](#)

NOTICE

Check and when necessary clean the radiator. A clogged radiator with a reduced air flow will result in inaccurate values.

Checking

1. Lock the frame joint.

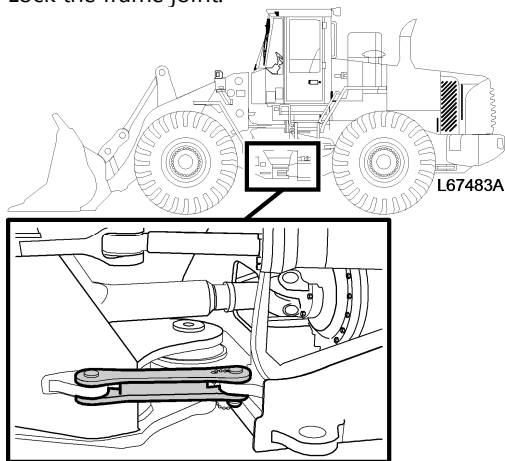


Figure 1

2. Connect the pressure gauge to the pressure outlet (PFF) on the central block. Unplug connectors MA502 and MA202. This is to ensure that brake charging is not started and that the correct stand-by pressure and radiator fan speed (=400 rpm) are attained.

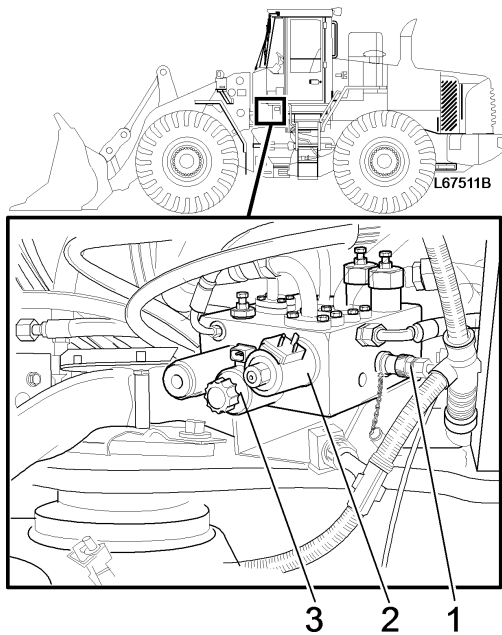


Figure 2

1. 11 666 019, 11 666 037 or 11666052, 14290266
 2. MA502
 3. MA202
3. Connect 9993721 to the socket in the rear wall.

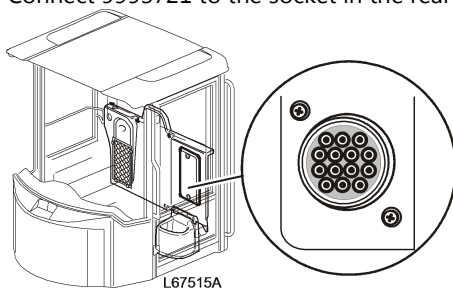


Figure 3

4. Start the engine and go to the service display for radiator fan speed under the Engine menu.

FAN PRESSURE TEST	
Max Press. Test	x *
Fan rev	yyyy rpm
Engine rev	zzzz rpm

5. Read off the stand-by pressure and the fan speed at high idle speed.
 Stand-by pressure, high idle, see [263 Pump 3 \(P3\) Cooling fan pump/Brake pump, specifications](#)
 Fan speed, see [263 Cooling fan motor, specifications](#).
 Turn off the engine.
 If the correct values are attained, plug in connectors MA502 and MA202. Remove the pressure gauge and 9993721.
 If the fan speed is incorrect, check the radiator and clean it if necessary.
 If the stand-by pressure is incorrect, adjust as described below.

Adjusting

6. Remove the left side panel under the cab. Adjust the stand-by pressure by removing or installing adjusting shims on the flow compensator on P3.

Recheck the stand-by pressure.

Turn off the engine.

Pug in connectors MA502 and MA202. Remove the pressure gauge and 9993721.

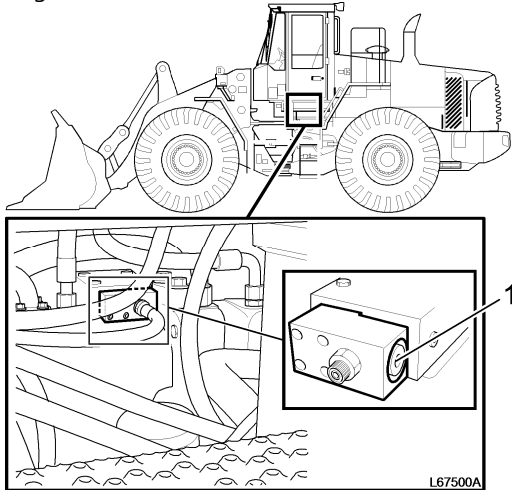


Figure 4

1. Flow compensator, P3

Document Title: Cooling fan hydraulics, funktion check	Function Group: 263	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Cooling fan hydraulics, funktion check

Op nbr 263-051

[9993721 Service display](#)

[11666051 Pressure gauge](#)

[14290266 Hose](#)

[14290262 Adapter](#)

NOTE!

Earlier and later type checking points occur. For checking points of earlier type, use adapter.

The cooling fan circuit and the brake charging circuit have many components in common and, if any of these components are faulty, both systems may be affected. It is therefore advisable to treat both systems as one when checking. Any error messages should be rectified first.

Carry out the checks in the following order:

1. Check the basic speed:
Connect the service display unit to the socket on the rear wall.
Wait for brake charging to cease, if applicable.

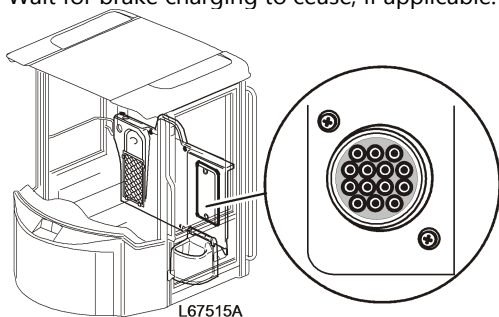


Figure 1

2. Read off the basic speed (rotational speed at stand-by pressure), see [263 Cooling fan motor, specifications](#).
3. If the correct basic speed is not achieved, check the stand-by pressure according to [263 Pump 3 \(P3\) standby pressure, checking and adjusting \(LS-line removed\)](#).
4. Check maximum speed according to [263 Pump 3 \(P3\) Radiator fan/Brake pump Max. fan speed, checking the setting](#).
5. If the correct maximum speed is not achieved, check the maximum pressure according to [263 Fan motor, checking working pressure](#).
6. Check the brake system according to [520 Brake system, checking hydraulic function](#)

Document Title: Reversible cooling fan, funktion check	Function Group: 263	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Reversible cooling fan, funktion check

Op nbr 263-017

[9993721 Service display](#)

NOTE!

Before the check, carry out [263 Brake/fan hydraulics, checking function](#).

1. Connect the service display unit to the socket under the fuse box cover.
2. Start the engine.
3. On the service display unit select the menu "ENGINE" and browse on to sub menu "COOLING FAN PRESSURE TEST".
This menu is only used for reading off the cooling fan speed, do **not** press *.

VOLVO SERVICE CONTRONIC		ENGINE
		
		
		
		FAN PRESSURE TEST

4. Select "SETUP" on the operator display unit.



Figure 1

5. Scroll to sub menu "Reversible cooling fan" and select mode "manual"

ENGINE	
Reversible Fan Mode	XXXXXX

6. Select "ENGINE" on the operator display unit and browse on to sub menu "reversible fan".



Figure 2

7. Browse on to sub menu "Reversible fan".

ENGINE	
Reversible Fan	
Mode	xxxxxx
Activate	Sel.

8. Increase the engine speed to ≥ 1900 rpm. Monitor the cooling fan speed on the service display unit and press "SELECT" on the operator's information panel.
The text "Manual reversing activated" will be shown on the display unit at the same time as the amber central warning will be flashing for a couple of seconds.



Figure 3

9. The cooling fan speed should now drop to below 50 rpm.
10. After at the most 6 seconds the fan speed should increase to the maximum speed for the selected fan programme.
11. Run the engine at low idling speed. The reversing lasts for 3 minutes.
Check that the fan has changed direction of rotation. While reversing, the fan draws air from the rear.
12. After the reversing stage (3 minutes), the speed again begins to drop to under 50 rpm.
After max. 6 seconds, the fan speed shall increase to the speed that is requested at this time by the machine's temperature sensor.

Document Title: Pump 3 (P3) Radiator fan/ Brake pump Max. fan speed, checking the setting	Function Group: 263	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Pump 3 (P3) Radiator fan/Brake pump Max. fan speed, checking the setting

Op nbr

[999 3721 Service display unit](#)

NOTICE

Check and when necessary clean the radiator. A clogged radiator with a reduced air flow will result in inaccurate values.

Checking

1. Lock the frame joint. Place chocks in front and behind the wheels.

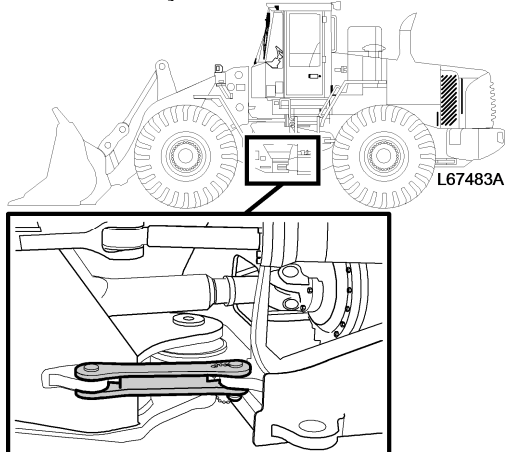


Figure 1

2. Disconnect SE210, to simulate a high temperature coming from the radiator. This generates a signal to increase the radiator fan speed to max. This maximum speed depends on the sound level (more accurately, the fan speed) that has been selected using the service display unit.

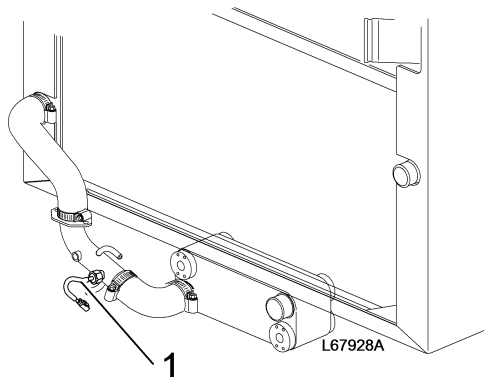


Figure 2

1. SE210

Max. radiator fan speed		
The following maximum speeds can be selected from the service display unit.		
On service display unit	Meaning	Equivalent to max. speed
A	Noise reduction kit	1280 rpm
B	EU execution	1400 rpm
C	High cooling performance	1550 rpm (machine without axle oil cooling) 1400 rpm (machine with axle oil cooling)

3. Connect the service display unit to the socket on the rear wall.

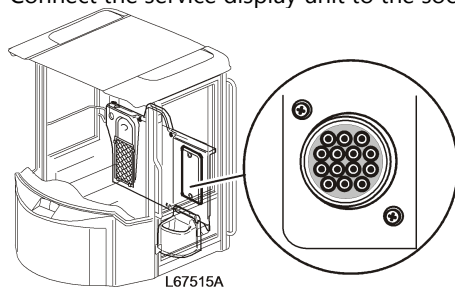


Figure 3

4. Start the engine and go to the service display for setting the radiator fan speed.

SETUP	
Engine, fan	x *
Engine rev	y #

5. Select level A, B or C and apply full throttle.
6. Go to the service display for checking the radiator fan speed.
A = 1280 rpm
B = 1400 rpm
C = 1550 rpm (machine without axle oil cooling)
C = 1400 rpm (machine with axle oil cooling)

SETUP	
Max Press. Test	x *
Fan rev	yyyy rpm

Engine rev

zzzz rpm

7. Plug in SE210.
Remove the service display unit.

Document Title: Cooling fan motor, changing	Function Group: 263	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Cooling fan motor, changing

Op nbr 263-062

Lifting eye M10, 2 pcs.

Lifting sling, 2 m (6.6 ft), 2 pcs.

Lifting sling, 1 m

Shackle M16, 2 pcs.

Shackle M10, 2 pcs.

Removing

1. Place the machine in service position, see [191 Safety rules when servicing](#)
2. Remove the hood, see [821 Engine hood, removing](#)
3. Remove the panel behind the filter bracket.



V1038100

Figure 1
V1038100

4. Loosen the filter bracket from the intermediate wall.
5. Disconnect the charge-air pipe from the engine.

6. Remove the bracket for the expansion tank from the intermediate wall.
Remove the guards for drive belts and alternator.
Disconnect the cable harness and the hoses from the intermediate wall.
7. Remove the intermediate wall.
Weight, intermediate wall: **approx. 45 kg (99 lbs).**

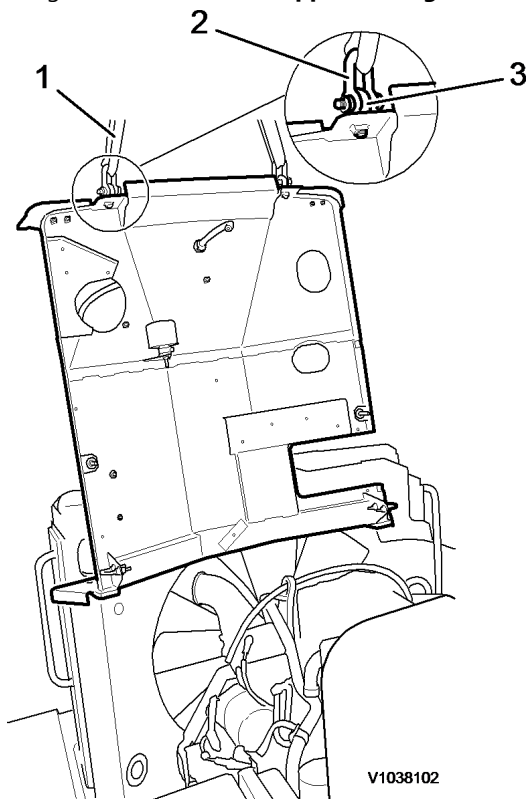


Figure 2

1. Sling, 2 m
2. Shackle M16
3. Lifting eye M10

8. Remove the lock pin and nut. Carefully tap on the shaft and remove the fan rotor.

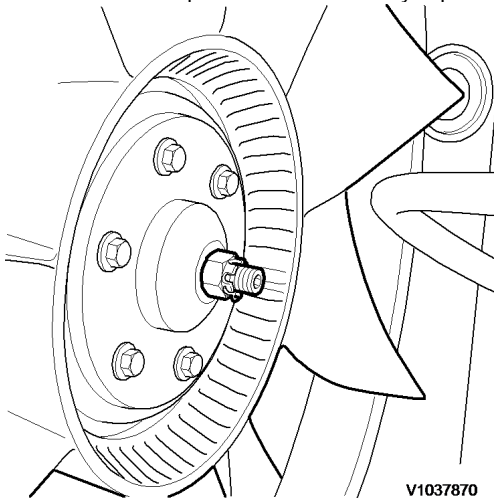


Figure 3

9. Remove the speed (rpm) sensor.

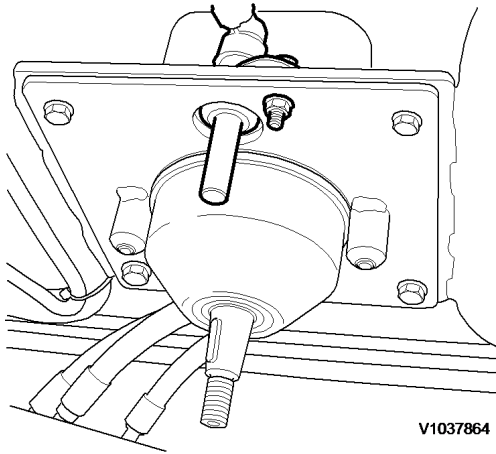


Figure 4

10. Mark and disconnect the hoses for the fan motor.

NOTE!

Collect any oil spills.

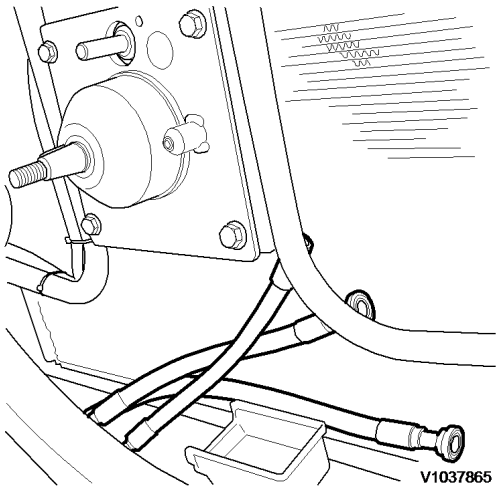


Figure 5

11. Remove the two upper bolts from the fan motor bracket and install the lifting eyes in the holes. Secure the fan motor with a sling. Remove the fan motor.
Weight, fan motor: **20 kg (44 lbs)**.

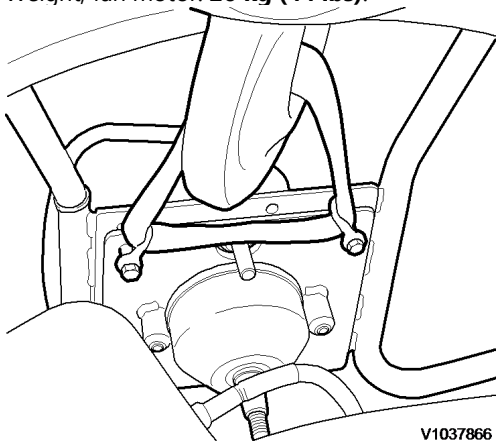


Figure 6

12. Remove the two bolts and tap away the attaching plate with a rubber mallet.

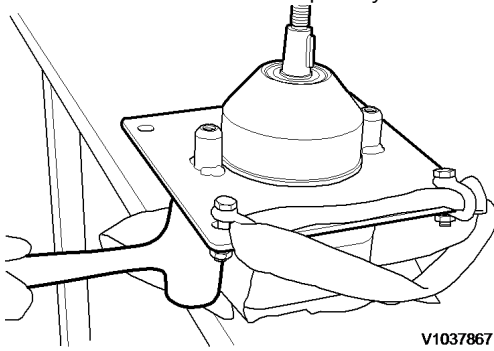


Figure 7

Installing

13. Install the attaching plate on the engine.

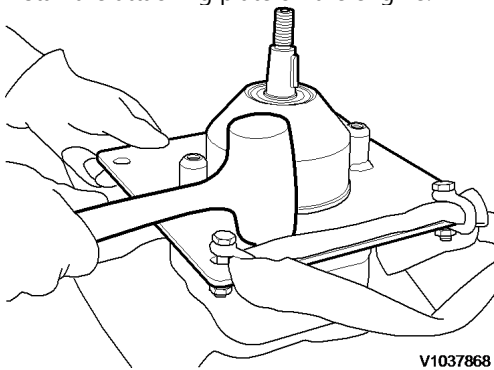


Figure 8

14. Install the fan motor.
Weight, fan motor: **20 kg (44 lbs)**

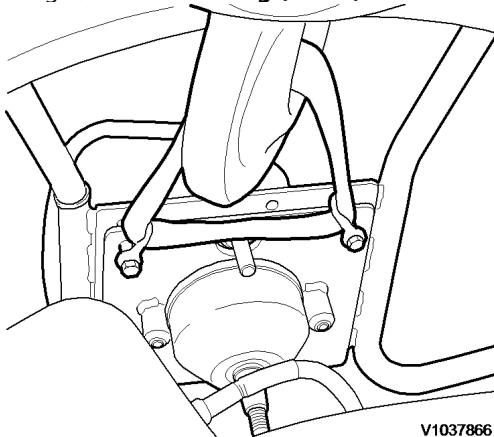


Figure 9

15. Install the speed (rpm) sensor.

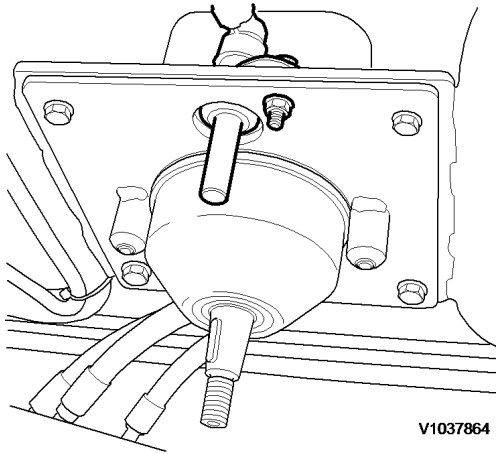


Figure 10

16. Connect the hoses. (Start with the one closest to the fan housing.)



Figure 11

17. Install the fan rotor and the hub. Install the nut and the lock pin.
Tightening torque, see [030 Tightening torques, cooling fan](#)

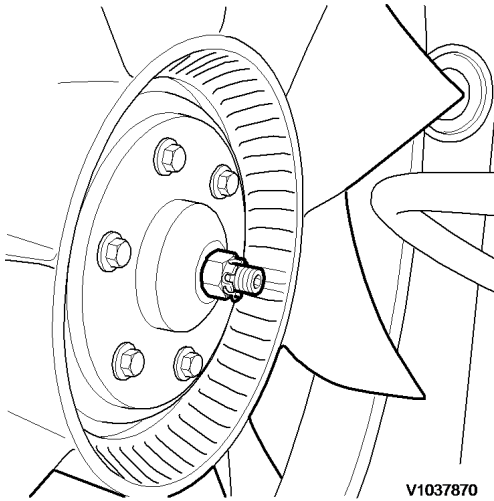


Figure 12

18. Install the intermediate wall.
Weight: **45 kg (99 lbs)**

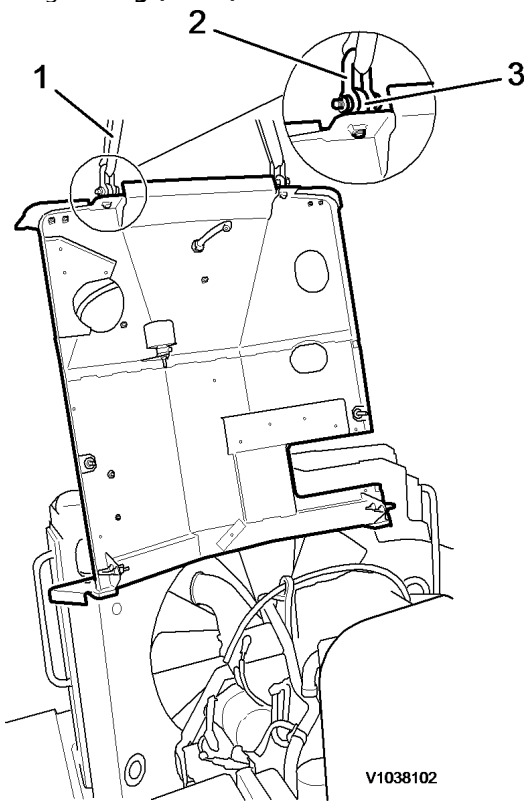
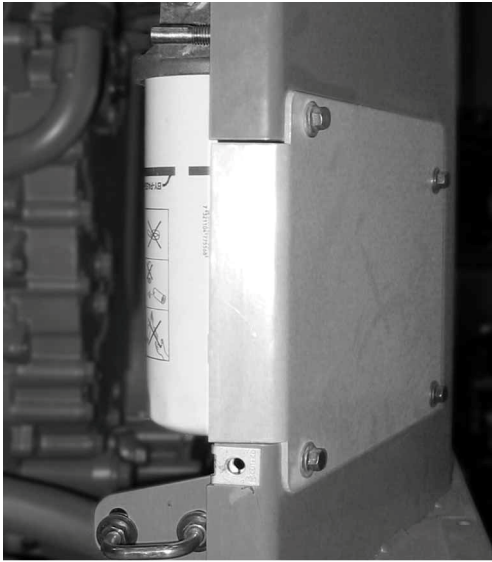


Figure 13

- 1. Sling, 2 m
- 2. Shackle M16
- 3. Lifting eye M10

19. Install the filter bracket on the intermediate wall.
Install the panel behind the filter bracket on the intermediate wall.



V1038100

Figure 14
V1038100

20. Install the bracket for the expansion tank on the intermediate wall.
21. Clamp the cable harness and hoses against the intermediate wall. Install the guards for the drive belts and alternator.
22. Fit the engine hood, see [821 Engine hood, installing](#)
23. Start the engine and check for leaks.

Thank you for your purchase.
Have a nice day.

Document Title: Electrical system, work instructions	Function Group: 300	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Electrical system, work instructions

1. Fully charged and otherwise satisfactory batteries must always be used when testing the electrical system.
2. Test the batteries with an acid tester. The battery disconnect switch should be turned off.
3. When fitting a battery, make sure that the battery is connected with the correct polarity.
4. When changing batteries connected in series, make sure they are of equal capacity, for example, 2 batteries of 105 Ah. The batteries should have the same age (same quality) as the charging current required to reach a certain voltage varies with battery age.
5. If a booster battery is required to start the engine, the instructions in the Operator's Manual must be strictly followed.
See also: Safety.
6. Before any tests are performed on the alternator or regulator, check the batteries and electrical leads for defective insulation, loose contacts and corrosion. Check the alternator belts. All possible defects described above must be corrected before starting electrical checks.
7. For all testing of alternating current equipment, use "secure" connections in order to prevent sparks and voltage transients. A loose cable may result in destruction of both the alternator and regulator.
8. Never disconnect the alternator leads while the engine is running. This could damage both the alternator and regulator.
9. If the current alternator output socket should be connected to the chassis, damage may occur to the alternator and regulator.
10. When removing or fitting components in the electrical system, the chassis connection should be interrupted or the battery disconnect switch should be turned off.
11. For electric welding on the machine or on attachments on machine:
 - ground connection turned off with battery disconnect switch.
 - fuse FH4 must be removed, located next to the battery disconnect switch.
 - connectors for all control units (ECUs) must be unplugged.

NOTE!

Ground the welding unit as close as possible to the welding point.

Document Title: Electrical description	Function Group: system, 300	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Electrical system, description

The machine has a 24 V electrical system with two 12 volt batteries located on each side of the rear frame behind the rear wheels.

The battery disconnect switch is located under the radiator casing.

Serial number Arvika 5001—5049, Asheville 62001—62505

Voltage feed takes place via a fuse box located in the engine compartment. The fuse box contains main fuse as well as fuses for preheating coil and starter motor.

Serial number Arvika 5050—, Asheville 62506—

Voltage feed takes place via a fuse box located in the engine compartment. The fuse box contains main fuse as well as fuses for preheating coil and secondary steering pump.

Relays and fuses are placed in the electrical distribution box behind the operator's seat and are accessible when the cover is opened. On the inside of the cover, a decal showing which current-consuming device is connected to respective relays and fuses. The relays in the electrical distribution box are interchangeable.

The components are marked according to function group. The first digit in the marking, i.e. SE201, indicates that the component belongs to engine (group 2). Other digits are sequential numbers. There are also components with a four-digit designation, i.e. SE2203. The first two digits indicate function group and the other indicate sequential numbers.

NOTE!

For working on the electrical system, follow the instructions in section [300 Electrical system, work instructions](#).

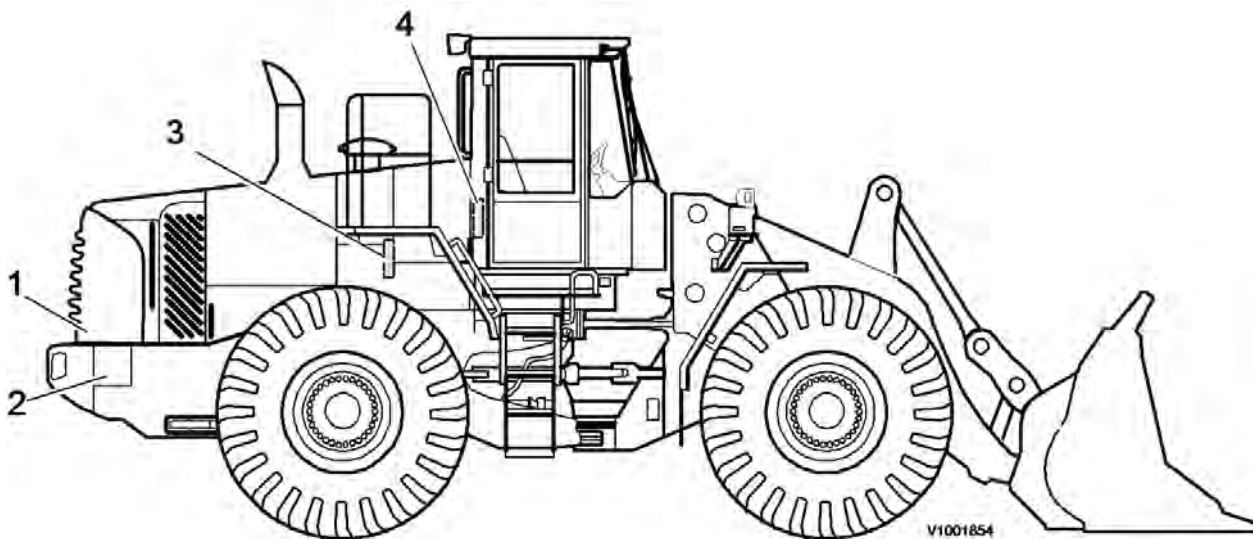
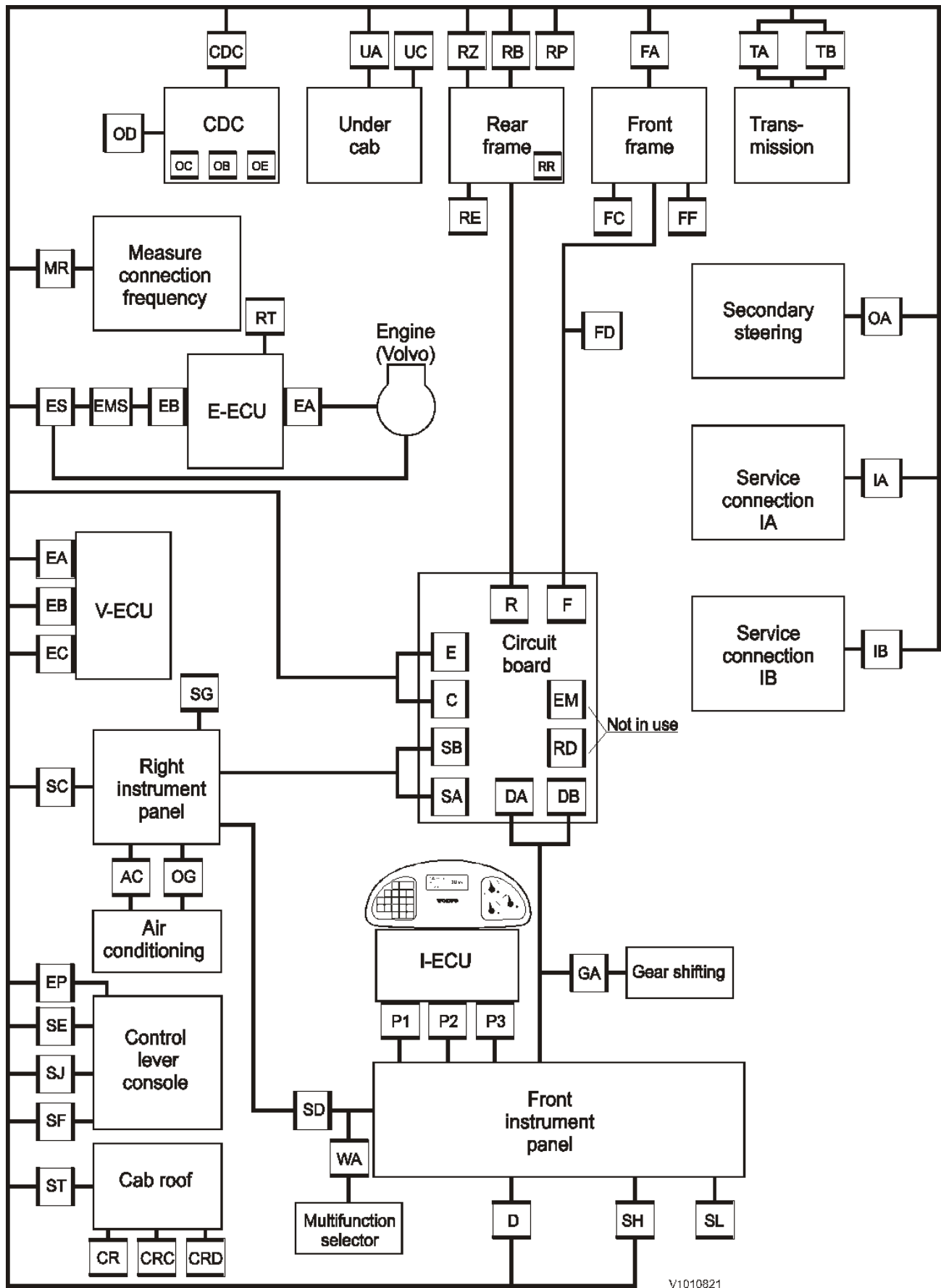


Figure 1
Position

1. Battery disconnect switch
2. Battery
3. Fuse box
4. Electrical distribution box



V1010821

Figure 2
Principle illustration of electrical system

Document Title: Electronic control system, description	Function Group: 300	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Electronic control system, description

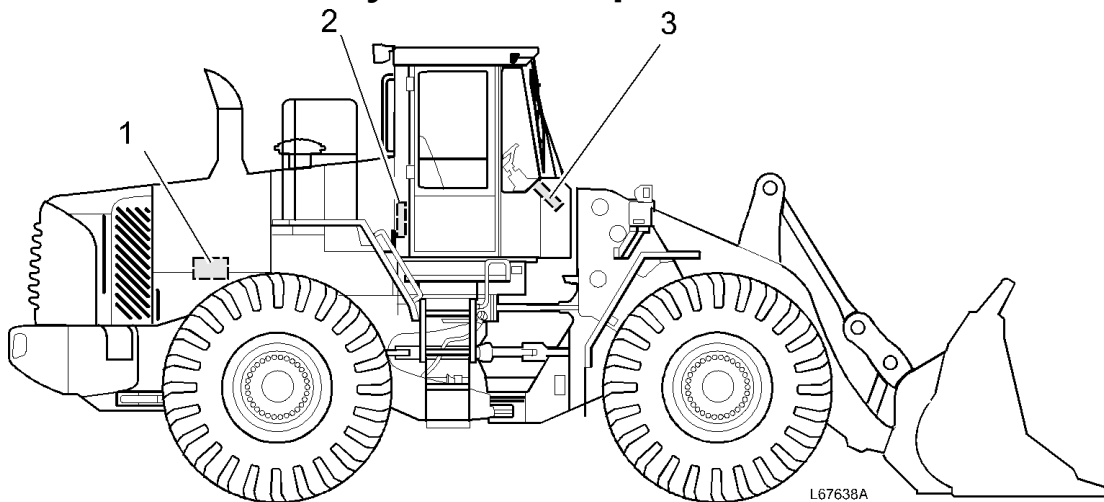


Figure 1
Position of control units

1. Engine control unit E-ECU
2. Vehicle control unit V-ECU
3. Instrument control unit I-ECU

General

The machine electronics include three control units that communicate with each other via two data busses. Each control unit processes values from sensors and controls and helps to control components so that desired function is maintained.

The control units included in the system include the instrument control unit I-ECU, the vehicle control unit V-ECU and the engine control unit E-ECU.

The vehicle electronics facilitate troubleshooting through an extensive diagnostic system. The operator is informed of the location of the malfunction with a warning light and a text message.

The service display unit or computer (VCADS Pro) can be connected via service sockets located in the electrical distribution box behind the operator's seat.

The **Instrument control unit I-ECU** is located in the instrument panel and contains software for presenting operator information on the information display unit, including warning and control lights. The control unit receives information from the other control units via data busses.

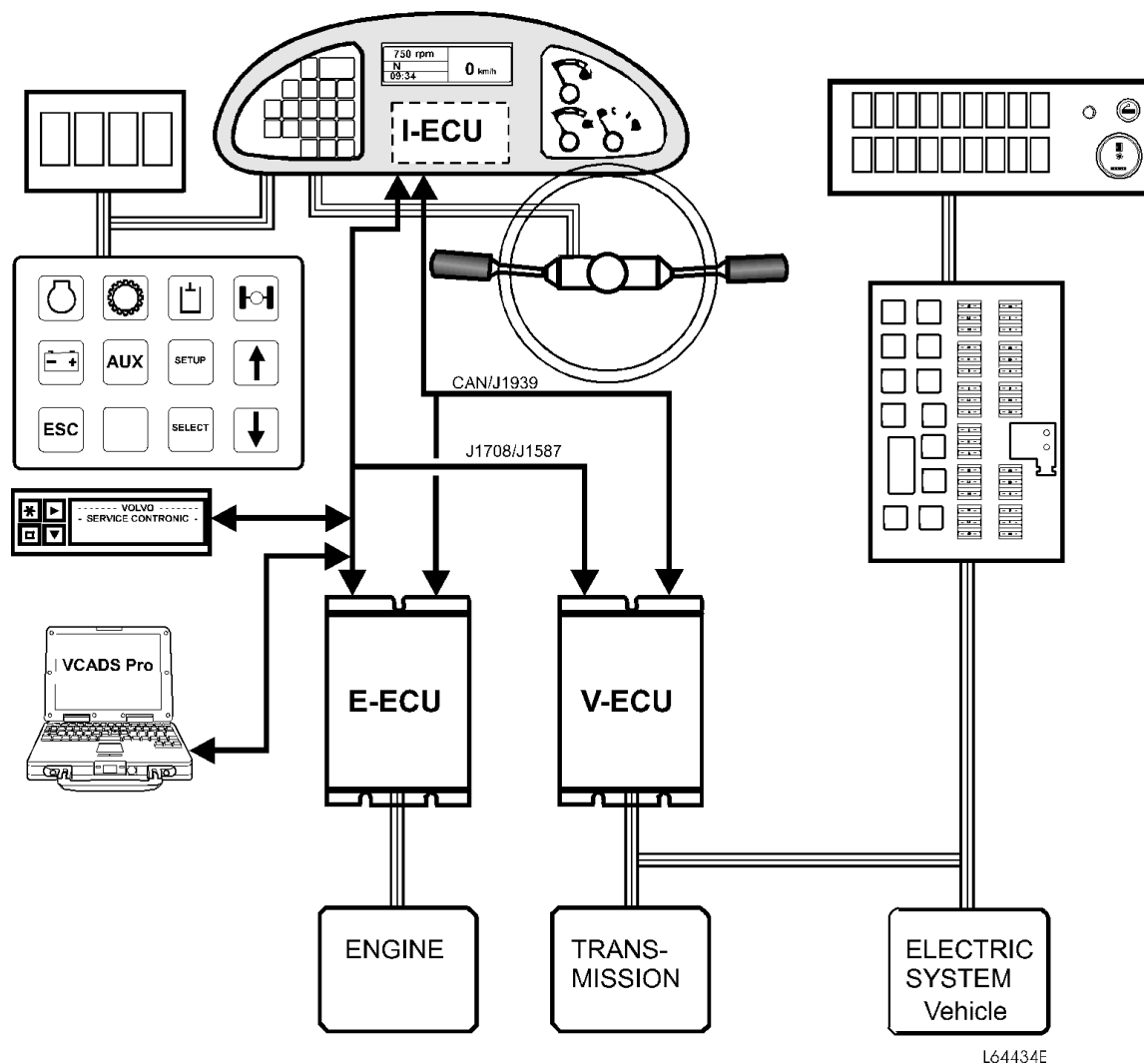
The **Engine control unit E-ECU** is located on the engine and contains engine function control software. The control unit receives information from the engine sensors as well as from a data bus. The control unit sends information to the other control units via data busses.

The **Vehicle control unit V-ECU** is located near the electrical distribution box behind the operator seat and contains software for handling of components and information from sensors located outside the cab. The vehicle control unit is linked to the other control units via data busses.

Communication for programming, changing of parameters, reading of error codes, component tests and checks etc. is made possible with VCADS Pro.

Reading input and output signals on the V-ECU, settings, vehicle information readings etc. is performed with the service display unit.

If a malfunction occurs in any system, information sent via the data bus can be read by the operator in the operator's information display unit or with the service display unit and VCADS Pro.



L64434E

Figure 2
Principle diagram with ECUs

Document Title: Software, description	Function Group: 300	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Software, description

Software is stored in the control units E-ECU, I-ECU and V-ECU. To determine which software is installed in the machine, the part number is read off from the software (Main software) in the machine control units V-ECU and I-ECU with the service display unit in menu figure "ECU IDENTITY" or with the service tool VCADS Pro.

Also, the part number of the software (Main software) for the engine's control unit E-ECU can be read off using VCADS Pro.

Updating of the machine's software is handled through release of a new edition. The releases are designated with Year:edition, for example, R2001:5 and gets a new part number.

Updating of software for control units takes place through downloading of new software from VOLVO with VCADS Pro.

Document Title: Instrument control unit I-ECU, description	Function Group: 300	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Instrument control unit I-ECU, description

The instrument control unit is integrated with the main instrument and receives information from the data bus. The information is processed and shown on gauges, control lights, warning lights and information display.



Figure 1
Instrument control unit with information display

Functions

- Values for gear position, operating hours as well as status values for parking brake and warning messages are processed and result in a number of figures on the information display.
- Special warnings, for example, central warnings, low engine oil pressure are detected and the corresponding warning lights are activated.
- Values for transmission oil temperature, coolant temperature engine and fuel level are shown on gauges.
- Setting of display alternatives and parameter alternatives for information display
- Storing and displaying operating hours
- Activation of theft protection via keypad

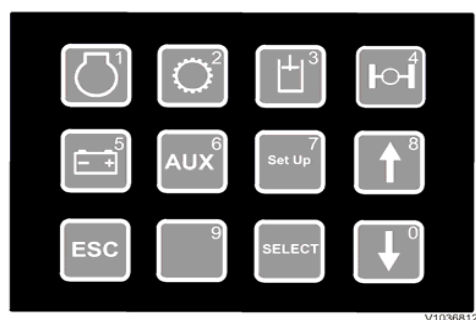


Figure 2
Keypad for information display

Document Title: Communication with data buses	Function Group: 300	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Communication with data buses

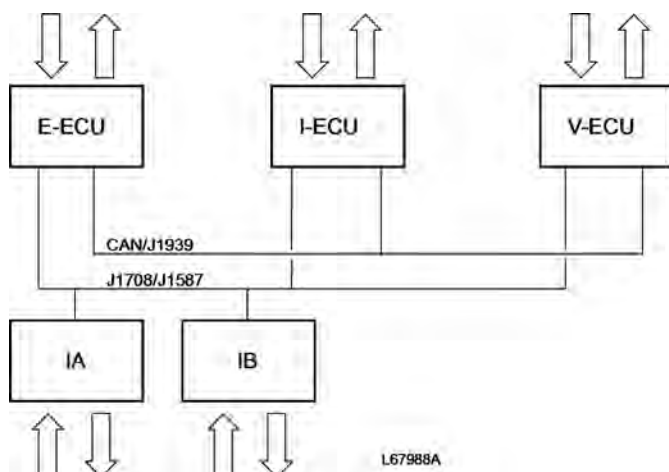


Figure 1
Communication

E-ECU	Engine control unit
I-ECU	Instrument control unit
V-ECU	Vehicle control unit
IA	Service socket for service display unit
IB	Service socket for VCADS Pro

General

Vehicle electronics are based on the principle that all communication between controls units takes place via two data buses. The machine's three control units are connected to the buses to be able to communicate with each other.

Communication between the different control units as well as reporting from control units to service sockets takes place on data buses CAN/J1939 and J1708/J1587.

The buses follow SAE standards and consist of two pair-twisted cables. The purpose of the twisted cabling is to protect the bus from electrical interference.

If a malfunction should occur in the system, a signal is sent on the information bus, making it possible to read the information, either on the operator's instruments or via the service display unit or VCADS Pro.

The figure shows the principle for how the control units and service sockets are connected to the buses.

CAN/J1939 Control bus

System control signals are sent via this bus. The control bus is very quick, which is necessary for control of the entire system to work and quickly adapt to changing conditions.

The main communication alternative is the CAN/J1939 bus. However, for E-ECU, some control data is only sent on the J1708/J1587 bus.

J1708/J1587 information bus

The information bus is connected to the control units and service sockets. Information and diagnostic signals are sent on this bus. In addition, some control data is sent from the engine control unit via this bus.

The bus also functions as a "back-up" for the control bus, if it should fail for some reason.

The system status is continuously updated and available for reading via the information bus.

By connecting the service display unit or VCADS Pro to service sockets, it's possible to read error codes, perform tests, empty logged information, download parameters and download software.

Document Title: Vehicle control unit V-ECU, description	Function Group: 300	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Vehicle control unit V-ECU, description

The vehicle control unit is the controlling unit in the system for the functions below and contains overall functionality that is machine-related.

The vehicle control unit is located near the electrical distribution box behind the operator seat.

The vehicle control unit is connected to the other control units via data link for coordination with the engine control unit (E-ECU) and instrument control unit (I-ECU).

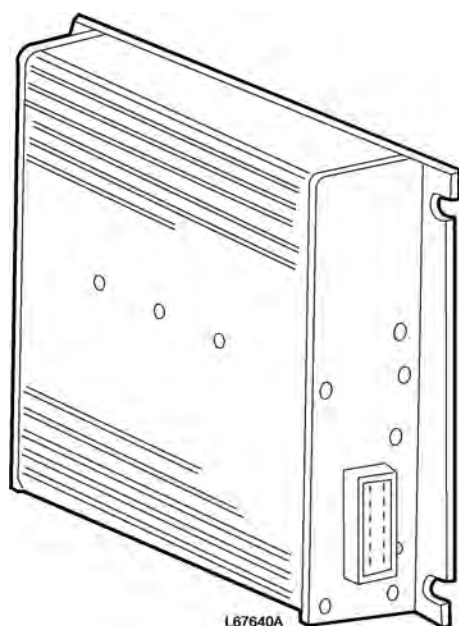


Figure 1
Vehicle control unit V-ECU

Functions

- Monitoring of engine oil level
- Monitoring fuel level
- Monitoring of starter motor engagement
- Monitoring of system voltage
- Monitoring of pressure, temperature, level and filter for transmission oil
- Monitoring of slipping in transmission clutches
- Monitoring of axle oil temperature
- Monitoring brake pressure
- Monitoring of level and temperature for hydraulic oil
- Monitoring of lubrication oil level for central lubrication
- Calculation of vehicle travel speed
- Parking brake
- Gear shifting strategy
- Fully automatic
- Request for engine rpm and/or torque limitation
- Transmission disengagement
- Engagement of differential lock

- Warming of hydraulic oil
- Boom Suspension System
- Automatic lift arm lowering (Return to dig)
- Secondary steering
- Cooling fan adjustment
- Reversal of cooling fan
- Attachment lock
- Brake pressure charging
- Soft start and safety for AC
- Hydraulic power limitation

Document Title: Engine control unit E-ECU, description	Function Group: 300	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Engine control unit E-ECU, description

The engine control unit is the central part in the injection system. It is located on the engine, on the machine's right side and is mounted in rubber-dampened mounts.

The control module, which continuously receives information from the accelerator pedal and the sensors on the engine, calculates the amount of fuel and at which time point fuel should be injected into the cylinders.

Control signals to the unit injectors travel via electrical cables to the fuel valves of the unit injectors.

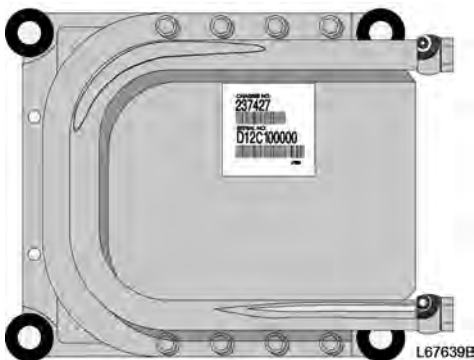


Figure 1
Engine control unit, D12C

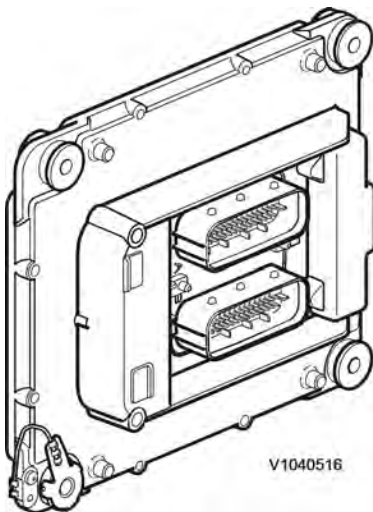


Figure 2
Engine control unit, D12D

The control unit stores information if a malfunction should occur or if any part of the system reacts abnormally. Sporadic malfunctions are stored in the control unit and can then be traced at a later time.

Functions

- Control of fuel volumes and unit injectors

- Monitoring of temperatures, pressure levels
- Engagement of preheating
- Detecting engaged preheating
- Monitoring of water in fuel (D12D)
- Monitoring of crankcase pressure (D12D)
- Monitoring of EGR valve (D12D)

Document Title: Software functions per function group	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Software functions per function group

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- [301 Engine oil temperature](#)

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- [301 Speed limitation for lever steering \(CDC\)](#)
- [301 Back-up alarm](#)
- [301 Transmission oil pressure](#)
- [301 Transmission oil level](#)
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99 Other

- [301 Central lubrication](#)
- [301 Central lubrication, status indication](#)

Document Title: Description of table for software functions	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Description of table for software functions

Input signals	Conditions for output functions	Output functions
1 ☐ Charge-air temperature, SE2507	2 ☐ High temperature > 90 °C (194 °F)	3 ☐ Amber central warning ☐ WARNING High Temp. Charge Air
4 ☐ Monitoring, SE2507	5 ☐ System error, signal outside limits See 302 ERROR Monitoring Charge Air Temp. (MID 128 PID 105)	6 ☐ Amber central warning ☐ ERROR Monitoring Charge Air Temp.

1. Signals from sensors and functions
2. Conditions for obtaining output signals. All conditions must be fulfilled (and functions)
3. Output functions: Warnings, information displays and signals used as input signals to other functions
4. Monitoring of relevant component for error/malfunction detection
5. Error/malfunction detection of relevant component
6. Output functions: Error display and central warning

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Engine oil pressure](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 7398, 62543

- [Engine oil pressure](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8001

Serial number stop: 10999

Document Title: Engine oil pressure	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Engine oil pressure

This function monitors engine oil pressure and informs the operator if the pressure is too low or if system error occurs.

The Engine Shutdown function, which limits engine speed to 900 rpm, is activated if the engine oil pressure is too low, see [301 Engine Shutdown](#).

Input signals	Conditions for output functions	Output functions
○ Engine oil pressure, SE2203 ○ Directional gear	○ Low engine oil pressure Alarm limits for low engine oil pressure: < 50 kPa (0,5 bar) (7.3 psi) at engine speed 500 rpm < 100 kPa (1 bar) (14.5 psi) at engine speed 1000 rpm < 150 kPa (1,5 bar) (21.8 psi) at engine speed 1300 rpm < 150 kPa (1,5 bar) (21.8 psi) at engine speed 1500 rpm	○ Warning light ○ Red central warning ○ WARNING Low Engine Oil Pressure ○ Engine Shutdown
	According to the above information and including: ○ Directional gear in Forward or Reverse	○ Buzzer
○ Monitoring, SE2203	○ System error, signal outside limits See 302 ERROR Monitoring Engine Oil Pressure (MID 128 PID 100)	○ Amber central warning ○ ERROR Monitoring Engine Oil Pressure

Document Title: Engine oil pressure	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Engine oil pressure

This function monitors engine oil pressure and informs the operator if the pressure is too low or if system error occurs.

Engine oil pressure is also used as an input signal for [301 Engine Protection](#).

Input signals	Conditions for output functions	Output functions
○ Engine oil pressure, SE2203 ○ Directional gear	○ Low engine oil pressure Warning limits for low engine oil pressure: < 50 kPa (0.5 bar) (7.3 psi) at engine speed 500 rpm < 100 kPa (1 bar) (14.5 psi) at engine speed 1000 rpm < 150 kPa (1.5 bar) (21.8 psi) at engine speed 1300 rpm < 150 kPa (1.5 bar) (21.8 psi) at engine speed 1500 rpm	○ Warning light ○ Red central warning lamp ○ WARNING Low Engine Oil Pressure ○ Reduction of engine's torque (engine protection)
	According to the above information and including: ○ Directional gear in Forward or Reverse	○ Buzzer
○ Monitoring, SE2203	○ System fault, signal outside limits See 302 ERROR Monitoring Engine Oil Pressure (MID 128 PID 100)	○ Amber central warning lamp ○ ERROR Monitoring Engine Oil Pressure

Document Title: Engine Oil Level	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Engine Oil Level

This function monitors engine oil level and informs the operator if the level is below permissible levels or if system fault occurs.

NOTE!

The engine oil level is not monitored continuously but only in connection with start (before engine is started) and according to the conditions below, depending on to ECU which the sensor is connected.

Information about the engine oil level's status is shown under function group Engine in the information display unit.

Level sensor connected to V-ECU

Check of the engine oil level is only performed with the ignition in operating position (position 1) and the engine has been off for more than 10 minutes. This is due to the time that it takes for the oil to run back to the sump.

Level sensor connected to E-ECU

Check of the engine oil level is only performed with the ignition in operating position (position 1) and the E-ECU has sent the message that measurement can be performed (PPID13). The message is sent after the engine has been off for a time that is calculated depending on the oil's temperature. The time may vary between 5-117 minutes.

This is due to the time that it takes for the oil to run back to the sump.

To make sure that the E-ECU has time to check the oil level, wait for approx. 20 seconds in operating position before starting the engine.

NOTE!

Because of the nature of the sensor, incorrect information regarding low engine oil level can be given if the machine is parked on an incline during start. This information remains until a new oil level check is made during the following engine start.

Input signals	Conditions for output functions	Output functions
	Overall conditions for the function ○ VCADS Pro parameter BJD ○ Off ○ Connected to V-ECU ○ Connected to E-ECU	
Level sensor connected to V-ECU		
○ VCADS Pro parameter BJD ○ Engine oil level, SE213 ○ Engine On/Off ○ System voltage On/Off	○ VCADS Pro parameter BJD "Connected to V-ECU" ○ Low engine oil level ○ Engine Off > 10 minutes ○ System voltage On (Ignition switch in position 1)	○ Amber central warning lamp ○ INFO Min. Engine Oil Level

○ Monitoring, SE213	○ System fault, signal outside limits See 302 ERROR Monitoring Engine Oil Level (MID 187 PID 098)	○ Amber central warning lamp ○ ERROR Monitoring Engine Oil Level
Level sensor connected to E-ECU		
○ VCADS Pro parameter BJD ○ Engine oil level, SE2205 ○ Engine On/Off ○ Correct measurement of engine oil level ○ System voltage On/Off	○ VCADS Pro parameter BJD "Connected to E-ECU" ○ Low engine oil level ○ Correct measurement of engine oil level from E-ECU ○ System voltage On (Ignition switch in position 1)	○ Amber central warning lamp ○ INFO Min. Engine Oil Level
○ Monitoring, SE2205	○ System fault, signal outside limits See 302 ERROR Monitoring Engine Oil Level (MID 128 PID 098)	○ Amber central warning lamp ○ ERROR Monitoring Engine Oil Level

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Engine oil temperature](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 7398, 62543

- [Engine oil temperature](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8001

Serial number stop: 10999

Document Title: Engine oil temperature	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Engine oil temperature

This function monitors engine oil temperature and informs the operator if the engine oil temperature is too high or if system malfunction occurs.

Input signals	Conditions for output functions	Output functions
○ Engine oil temperature, SE2202	○ High oil temperature > 127 °C (260 °F)	○ Amber central warning ○ INFO High Temp. Engine Oil
○ Monitoring, SE2202	○ System malfunction, signal outside limits 302 ERROR Monitoring Engine Oil Temp. (MID Se 128 PID 175)	○ Amber central warning ○ ERROR Monitoring Engine Oil Temp.

Document Title: Engine oil temperature	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Engine oil temperature

This function monitors engine oil temperature and informs the operator if the engine oil temperature is too high or if there is a malfunction in the system.

Engine oil temperature is also used as an input signal for [301 Engine Protection](#).

Input signals	Conditions for output functions	Output functions
○ Engine oil temperature, SE2202	○ High engine oil temperature 127–135 °C (260–275 °F)	○ Amber central warning lamp ○ INFO High Temp. Engine Oil ○ Reduction of engine's torque dependent on coolant temperature and engine rpm (engine protection)
○ Monitoring, SE2202	○ System fault, signal outside limits See 302 ERROR Monitoring Engine Oil Temp. (MID 128 PID 175)	○ Amber central warning lamp ○ ERROR Monitoring Engine Oil Temp.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Fuel Level](#)

Product Line: WLO

Model Variant: L180E (Volvo)

- [Fuel Level](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Software release start: V2005.6.0

Software release stop: V2006.6.0

Document Title: Fuel Level	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Fuel Level

This function monitors fuel level in the fuel tank and informs the operator if the level is too low or if system fault occurs.

Fuel for approximately 1 hour of operation remains after low fuel level is indicated.

To identify sensors, the "Old sensor" has the connector located on the sensor's cabling, while the "new sensor" has the connector located on the sensor.

Input signals	Conditions for output functions	Output functions
VCADS Pro parameter CWL ☐ Fuel level, SE207	Overall conditions for the function ☐ VCADS Pro parameter CWL "0" = New sensor "1" = Old sensor	
	☐ Low fuel level for > 10 seconds	☐ Warning lamp low fuel level
☐ Monitoring, SE207	☐ System fault, signal outside limits See 302 ERROR Monitoring Fuel Level (MID 187 PID 096)	☐ Amber central warning lamp ☐ ERROR Monitoring Fuel Level

Document Title: Fuel Level	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Fuel Level

This function monitors fuel level in the fuel tank and informs the operator if the level is too low or if there is a system malfunction.

Fuel for approximately 1 hour of operation remains after low fuel level is indicated.

To identify sensors, the "Old sensor" has the connector located on the sensor's cable harness while the "new sensor" has the connector located on the sensor.

Input signals	Conditions for output functions	Output functions
VCADS Pro parameter CWL ○ Fuel level, SE207	Overall conditions for the function ○ VCADS Pro parameter CWL "0" = New sensor, part no. 11170093 "1" = Old sensor, part no. 11039821 "2" = New sensor, part no. 11170093 with plastic tank part no. 11410999 (L110E, L120E)	
	○ Low fuel level for > 10 seconds	○ Warning light low fuel level
○ Monitoring, SE207	○ System fault, signal outside limits See 302 ERROR Monitoring Fuel Level (MID 187 PID 096)	○ Amber central warning lamp ○ ERROR Monitoring Fuel Level

Document Title: Fuel feed pressure	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Fuel feed pressure

This function monitors feed pressure and informs the operator if system malfunction occurs.

Feed pressure is used internally in E-ECU engine control.

Input signals	Conditions for output functions	Output functions
○ Monitoring, SE2301	○ System malfunction, signal outside limits See 302 ERROR E-ECU PID 094	○ Amber central warning ○ ERROR E-ECU PID 094

Document Title: Water in fuel	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Water in fuel

The function monitors fuel in the water trap and informs the operator when water is detected.

Input signals	Conditions for output functions	Output functions
○ Sensor, SE2302	○ Water in fuel	○ Amber central warning lamp ○ INFO Water in fuel

Document Title: Injectors	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Injectors

The function monitors the fuel injectors and informs the operator if there is a system malfunction.

Input signals	Conditions for output functions	Output functions
○ Monitoring, injectors MA2301-2306	○ System malfunction, open circuit or short circuit MA2301-MA2306 (SID 001-006) See 302 ERROR E-ECU SID 001 - E-ECU SID 006	○ Amber central warning ○ ERROR E-ECU SID 001 ○ ERROR E-ECU SID 002 ○ ERROR E-ECU SID 003 ○ ERROR E-ECU SID 004 ○ ERROR E-ECU SID 005 ○ ERROR E-ECU SID 006

Document Title: Air filter pressure	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Air filter pressure

The function monitors the extent to which the air filter is blocked and informs the operator when changing is required or if system malfunction occurs.

Input signals	Conditions for output functions	Output functions
○ Air filter pressure, SE2502	○ High vacuum pressure (clogged filter)	○ Amber central warning ○ INFO Clogged Engine Air Filter
○ Monitoring, SE2502	○ System error, signal outside limits See 302 ERROR Monitoring Engine Air Filter (MID 128 PID 107)	○ Amber central warning ○ ERROR Monitoring Engine Air Filter

Document Title: Temperature induction air	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Temperature induction air

The function monitors intake air temperature and informs the operator if there's a system malfunction.

Temperature is used internally in E-ECU engine control.

Temperature induction air is also used as input signal for cooling fan adjustment, see [301 Cooling fan adjustment](#).

Input signals	Conditions for output functions	Output functions
○ Monitoring, SE2501	○ System error, signal outside limits See 302 ERROR E-ECU PID 172	○ Amber central warning light ○ ERROR E-ECU PID 172

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Charge-air temperature](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 7398, 62543

- [Charge-air temperature](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8001

Serial number stop: 10999

Document Title: Charge-air temperature	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Charge-air temperature

This function monitors charge-air temperature and informs the operator if the temperature is too high or if there is a system malfunction.

Charge-air temperature is also used as an input signal for cooling fan adjustment, see [301 Cooling fan adjustment](#).

Input signals	Conditions for output functions	Output functions
○ Charge-air temperature, SE2507	○ High temperature > 90 °C (194 °F)	○ Amber central warning ○ WARNING High Temp. Charge Air
○ Monitoring, SE2507	○ System malfunction, signal outside limits See 302 ERROR Monitoring Charge Air Temp. (MID 128 PID 105)	○ Amber central warning ○ ERROR Monitoring Charge Air Temp.

Document Title: Charge-air temperature	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Charge-air temperature

This function monitors charge-air temperature and informs the operator if the temperature is too high or if there is a system malfunction.

Charge-air temperature is also used as an input signal for:

- [301 Cooling fan adjustment](#)
- [301 Engine Protection](#)

Input signals	Conditions for output functions	Output functions
○ Boost temperature, SE2507	○ High charge-air temperature 81–91 °C (178–196 °F)	○ Amber central warning lamp ○ WARNING High Temp. Charge Air ○ Reduction of engine's torque dependent on coolant temperature and engine rpm (engine protection)
○ Monitoring, SE2507	○ System fault, signal outside limits See 302 ERROR Monitoring Charge Air Temp. (MID 128 PID 105)	○ Amber central warning lamp ○ ERROR Monitoring Charge Air Temp.

Document Title: Boost pressure	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Boost pressure

This function monitors boost pressure and informs the operator if there is a system malfunction.

The boost pressure is used internally in the E-ECU for engine control.

Input signals	Conditions for output functions	Output functions
○ Monitoring, SE2508	○ System error, signal outside limits See 302 ERROR E-ECU PID 102	○ Amber central warning ○ ERROR E-ECU PID 102

Document Title: Barometric pressure	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Barometric pressure

This function monitors barometric pressure and informs the operator if system fault occurs.

Barometric pressure is used internally in E-ECU to calculate charge air pressure and to compensate the amount of fuel when operating at high altitudes.

The sensor is fitted in the E-ECU.

Input signals	Conditions for output functions	Output functions
○ Monitoring, barometric pressure	○ System fault, signal outside limits See 302 ERROR E-ECU PID 108	○ Amber central warning lamp ○ ERROR E-ECU PID 108

Document Title: Preheating of inlet air	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Preheating of inlet air

The function activates preheating and informs the operator if there is a system error/malfunction.

The operator activates the preheating with switch SW201 and E-ECU connects the preheating if the coolant temperature is lower than +20 °C (68 °F).

During the engine's start-up phase, no preheating takes place.

When the engine has started, the E-ECU will engage the preheating coil for post-start heating.

Engagement times for preheating and post-start heating are dependent on coolant temperature.

Preheating can be interrupted by starting the engine or by turning off the ignition.

Input signals	Conditions for output functions	Output functions
○ Activation preheating, SW201 ○ Coolant temperature, SE2606	Preheating (before start) ○ Ignition SW101 in position 1 ○ SW201 is pressed in to activate preheating When the control light for preheating has gone off, the engine is started by turning the ignition SW101 to position 3 Maximum two activations can be performed in a row before start attempts, with a 10 second pause between activations. ○ Post-start heating is engaged after engine start by E-ECU if preheating has been activated Engagement times ○ 50 seconds at coolant temperature < -10 °C (14 °F) ○ 25 seconds at coolant temperature -10 – +20 °C (14–68 °F) ○ At coolant temperature > +20 °C (68 °F), no preheating is engaged	○ E-ECU engages the preheating coil HE2501 via preheating relay RE2501 ○ Control light for preheating LC15 lights up
○ Monitoring, RE2501	○ System malfunction, open circuit or short circuit See 302 ERROR Preheating Relay (MID 128 PID 45)	○ Amber central warning ○ ERROR Preheating Relay

Incorrect input signals

- Activation of preheating is considered incorrect if SW201 has been activated more than 10 seconds (short-circuited or operator is trying to operate manually).

Document Title: Exhaust Gas Recirculation (EGR)	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Exhaust Gas Recirculation (EGR)

The function monitors the EGR valve for return of combustion gases and informs the operator if the function is not ensured or if there is a system malfunction.

The function is also used as an input signal for [301 Engine Protection](#).

Input signals	Conditions for output functions	Output functions
○ EGR-valve, MA2504	○ Mechanical problem	○ Amber central warning lamp ○ INFO EGR not working ○ Reduction of engine's torque (engine protection)
○ Monitoring, MA2504	○ System fault, signal outside limits See 302 ERROR Monitoring EGR (MID 128 PPID 19)	○ Amber central warning lamp ○ ERROR Monitoring EGR

Document Title: Engine crankcase pressure	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Engine crankcase pressure

The function monitors the crankcase pressure and informs the operator when the pressure is too high or if there is a system malfunction.

Crankcase pressure is also used as an input signal for [301 Engine Protection](#).

Input signals	Conditions for output functions	Output functions
○ Crankcase pressure, SE2509	○ Crankcase pressure > 5 kPa (0.05 bar) (0.73 PSI) above atmospheric pressure	○ Red central warning lamp ○ WARNING High Crankcase Pr ○ Reduction of engine's torque, limitation of engine rpm and speed as well as engine shut-off (engine protection)
○ Monitoring, SE2509	○ System fault, signal outside limits See 302 ERROR Monitoring Crankcase Pr (MID 128 PID 153)	○ Amber central warning lamp ○ ERROR Monitor Crankcase Pr

Document Title: Coolant Level	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Coolant Level

The function monitors the coolant level and informs the operator if the level is too low or if there is a system malfunction

Input signals	Conditions for output functions	Output functions
○ Coolant Level, SE2603 ○ Directional gear	○ Low coolant level	○ Red central warning ○ WARNING Low Engine Coolant Level
	According to above as well as: ○ Directional gear in position Forward or Reverse	○ Buzzer
○ Monitoring, SE2603	○ System malfunction, open circuit or short circuit See 302 ERROR Monitoring Coolant Level (MID 128 PID 111)	○ Amber central warning ○ ERROR Monitoring Coolant Level

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Coolant temperature, engine](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7398, 62543

- [Coolant temperature, engine](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

Document Title: Coolant temperature, engine	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Coolant temperature, engine

This function monitors the engine coolant temperature and informs the operator if the temperature is too high or if there is a system malfunction.

The Engine Shut Down function, which limits engine speed to 900 rpm, is activated if the coolant temperature is too high, see [301 Engine Shutdown](#).

Coolant temperature is also used as input signal for:

- [301 Cooling fan adjustment](#)
- [301 Preheating of inlet air](#)

Input signals	Conditions for output functions	Output functions
○ Coolant temperature engine, SE2606 ○ Directional gear	○ High coolant temperature > 103 °C (217 °F)	○ Warning light The gauge increases deflection more than the temperature, so the pointer ends up in the red area. ○ Red central warning ○ WARNING High Engine Coolant Temperature ○ Engine Shut Down
	According to the above and: ○ Directional gear in Forward or Reverse	○ Buzzer
○ Monitoring, SE2606	○ System malfunction, signal outside limit values 302 ERROR Monitoring Engine Coolant Temp. See (MID 128 PID 110)	○ Amber central warning ○ ERROR Monitoring Engine Coolant Temp.

Document Title: Coolant temperature, engine	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Coolant temperature, engine

This function monitors the engine coolant temperature and informs the operator if the temperature is too high or if there is a system malfunction.

Coolant temperature is also used as input signal for:

- [301 Cooling fan adjustment](#)
- [301 Preheating of inlet air](#)
- [301 Engine Protection](#)

Input signals	Conditions for output functions	Output functions
○ Coolant temperature engine, SE2606 ○ Directional gear	○ High coolant temperature 103–105 °C (217– 221 ° F)	○ Warning light The gauge increases deflection more than the temperature, so the pointer ends up in the red area. ○ Red central warning lamp ○ WARNING High Engine Coolant Temperature ○ Reduction of engine's torque dependent on coolant temperature and engine rpm (engine protection)
	According to the above information and including: ○ Directional gear in Forward or Reverse	○ Buzzer
○ Monitoring, SE2606	○ System fault, signal outside limits 302 ERROR Monitoring Engine Coolant Temp. See (MID 128 PID 110)	○ Amber central warning lamp ○ ERROR Monitoring Engine Coolant Temp.

Document Title: Coolant temperature, outlet radiator	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Coolant temperature, outlet radiator

This function monitors the coolant temperature after the radiator and warns the operator if system fault occurs.

Coolant temperature is used as input signal for cooling fan adjustment, see [301 Cooling fan adjustment](#).

Input signals	Conditions for output functions	Output functions
○ Coolant temperature, radiator outlet, SE210	○	○ Signal to cooling fan control
○ Monitoring, SE210	○ System fault, signal outside limits 302 ERROR Monitoring Coolant Outlet Temp. See (MID 187 PPID 1157)	○ Amber central warning lamp ○ ERROR Monitoring Coolant Outlet Temp.

Document Title: Cooling fan adjustment	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Cooling fan adjustment

This function optimally controls cooling fan speed to achieve minimal energy consumption and sound level, provides adequate cooling and informs the operator if system fault occurs.

With the service display unit or VCADS Pro max. cooling fan speed is set by selecting rpm range (A, B or C) depending on the cooling demands for the engine.

	Rpm range	Description
A	400 - 1280 rpm	Noise reduction
B	400 - 1400 rpm	Sound requirements according to EU
C	400 - 1550 rpm	Maximum cooling

The basic cooling fan speed is 400 rpm $\pm$ 100 rpm for all settings.

If AC is installed, see [301 Increased fan speed for AC](#).

When brake pressure charging is requested, the cooling fan rpm is reduced until the brake pressure has been restored.

See also [263 Hydraulic cooling fan, description](#).

Input signals	Conditions for output functions	Output functions
○ Coolant temperature engine, SE2606 ○ Coolant temperature, radiator outlet, SE210 ○ Transmission oil temperature, SE406 ○ Hydraulic oil temperature, SE906 ○ Axle oil cooler installed[T1] ⓘ ○ Axle oil temperature front, SE410 ○ Axle oil temperature rear, SE411 ○ Charge-air temperature, SE2507 ○ Induction temperature, SE2501 ○ Engine speed, SE201	Cooling fan adjustment ○ Rpm range A, B or C ○ Coolant temperature, outlet radiator ○ Coolant temperature, engine ○ Transmission oil temperature ○ Hydraulic oil temperature ○ Axle oil temperature, front (if axle oil cooling is installed) ○ Axle oil temperature, rear (if axle oil cooling is installed) ○ Charge air temperature at engine speed > 800 rpm and engine has been running > 2 minutes ○ Intake temperature ○ Axle oil cooling installed^(a)	○ Adjustment of cooling fan rpm within selected rpm range
	Sound test[T2] ⓘ ○ Rpm range A, B or C ○ Request for sound level test from service panel	○ Constant cooling fan speed 70% of max. rpm within selected rpm range
	Pressure test ○ Request for pressure test from service panel (maximum flow and hydraulic pressure to cooling fan)	○ Output signal = 1000 mA to MA202 Cooling fan speed > 1800 rpm
	Auxiliary brake	○ Cooling fan speed 1550

○ Cooling fan speed, SE211 ○ Rpm range cooling fan ○ Request for brake pressure charging ○ Request for increased pressure for attachment locking ○ Request for warming of hydraulic oil ○ Request for pressure test ○ Request sound level test ○ Request for auxiliary brake ○ Request for increased fan rpm at AC	○ At slipping in transmission > 1.2 and engine speed > 1400 rpm This function is not activated while turning or if the gear selector is in position N	rpm (Max. speed for rpm range C)
	Brake pressure charging ○ Request for brake pressure charging	○ Brake pressure charging ○ The cooling fan slows to low rpm until the brake pressure has been restored.
	Attachment locking ○ Request for increased pressure for attachment locking	○ Brake pressure charging during 10 seconds
	Warming of hydraulic oil ○ Request for warming of hydraulic oil	○ Triggers pressure for warming of hydraulic oil ○ The cooling fan slows to low rpm until the hydraulic oil temperature is < 15°C (59°F)
	Increased fan speed at AC ○ Request for increased fan rpm at AC	○ Increased fan rpm to 800 rpm[1] ⓘ
○ Monitoring, SE211	○ System fault, no frequency See 302 ERROR Monitoring Radiator Fan Revolutions (MID 187 PPID 1161)	○ Amber central warning lamp ○ ERROR Monitoring Radiator Fan Revolutions
○ Monitoring, MA201	○ System fault, signal outside limits See 302 ERROR Radiator Fan Control	○ Amber central warning lamp ○ ERROR Radiator Fan Control

[T1] If axle oil cooler is installed, the parameter is selected to Yes in the service display unit or with VCADS Pro Parameter ACL.

[T2] To obtain sufficient hydraulic oil flow to the cooling fan, the engine speed shall be > 1400 rpm.

Incorrect input signals

In case of incorrect input signal from any of these sensors, Max. cooling fan rpm is engaged for the selected setting (A, B or C):

- Coolant temperature, outlet radiator
- Charge air temperature
- Intake temperature

In case of incorrect input signal from any of these sensors, full consideration is given to other sensors that adjust the cooling fan rpm for the selected setting (A, B or C):

- Transmission oil temperature
- Hydraulic oil temperature
- Coolant temperature, engine
- Front axle oil temperature
- Rear axle oil temperature

In case of malfunction of request for brake pressure charging, request is considered to exist.

Request is not considered in case the following signals are incorrect:

- Request for pressure test
- Request sound test
- Request for auxiliary brake
- Request for brake pressure charging
- Request for increased pressure for attachment locking
- Request for increased fan rpm at AC

Axle oil cooling fault indicates that the equipment has not been installed.

In case of malfunction of setting of rpm range (A , B) the rpm range is set to C (max. cooling).

In case of malfunction of fan speed in question, the control is adjusted according to cooling need from respective unit without feedback to the current fan speed.

[1]Increased fan rpm is activated at increased pressure in the AC system to increase air flow through the condenser when cooling fan adjustment does not call for cooling.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Reversible cooling fan](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 7398, 62543

- [Reversible cooling fan](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8001

Serial number stop: 10999

Document Title: Reversible cooling fan	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Reversible cooling fan

The function controls reversal of the cooling fan to prevent clogging of the air passages in the radiator and informs if the operator if there is a system malfunction.

Reversal of cooling fan (changed rotational direction) can take place acc. to four interval modes, selected with the SELECT key.

- ☐ Manual reversal, mode Manual activated with SELECT key.
- ☐ Automatic reversal, mode 3/30 and 1/15 activated acc. to table below.
- ☐ With mode Off, there is no reversal.

Mode	Basic setting	
	Reversal	Interval
Manual	3 min.	—
3/30	3 min.	30 min.
1/15	1 min.	15 min.
Off	No reversal	

With VCADS Pro parameters BGN and BGO, the times can be changed within a certain interval:

- ☐ Time for reversal can be selected within the range 1–3 minutes.
- ☐ Interval between reversals can be selected within the range 15–180 minutes.

Reversal sequence

1. The output signal to MA202 is reduced and the cooling fan speed drops slowly.
2. When the speed is sufficiently low (after 2–6 seconds), MA204 opens for stopping the fan.
3. When the fan speed is < 100 rpm or MA204 has been open for > 13 seconds, MA205 switches to reversal (reversed rotational direction).
4. MA204 is closed for start of the cooling fan.
5. MA202 is controlled to MAX speed for selected cooling fan mode and reversal takes place according to interval mode.
6. When the time for reversal has run out, the output signal to MA202 is reduced and the cooling fan speed drops slowly.
7. When the speed is sufficiently low (after 2–6 seconds), MA204 opens for stopping the fan.
8. When the fan speed is < 100 rpm or MA204 has been open for > 13 seconds, MA205 switches to normal fan operation.
9. MA204 is closed for start of the cooling fan.
10. Selected rpm range (A, B or C) is activated for control of the cooling fan via MA202.

Input signals	Conditions for output functions	Output functions
☐ VCADS Pro parameter BGK ☐ VCADS Pro parameter BGN, BGO ☐ SELECT key	Overall conditions for the function ☐ VCADS Pro parameter BGK "On"	
	Overall conditions for reversal sequence If any of the below should occur during on-going reversal, the reversal sequence is not started. If reversal is not	

○ Charge-air temperature, SE2507 ○ Hydraulic oil temperature, SE906 ○ Engine On/Off ○ Cooling fan speed, SE211 ○ Rpm range cooling fan (A, B, C) ○ Request for brake pressure charging ○ Request for increased pressure for attachment locking ○ Request for warming of hydraulic oil ○ Request for pressure test ○ Request for sound level test ○ Request for auxiliary brake ○ Request for increased fan rpm at AC	allowed, a new reversal attempt is performed every 10th second until reversal is allowed: ○ Charge-air temperature High ○ Request for auxiliary brake ○ Request for brake pressure charging ○ Request for pressure test ○ Request for sound level test ○ Request for increased fan speed If any of the below conditions occur before start of reversal, the reversal sequence is interrupted: ○ Request for pressure test ○ Request for sound level test ○ Request for increased fan speed at AC If any of the below conditions occur during retardation of the cooling fan to Normal operation, MA202 is set to Max. speed. New attempt for Normal operation is made every 5th second until Normal operation is allowed: ○ Charge-air temperature High ○ Request for auxiliary brake ○ Request for brake pressure charging ○ Request for increased pressure for attachment locking ○ Request for warming of hydraulic oil	
	Automatic reversal ○ Mode 3/30 or 1/15 ○ Engine = On ○ Hydraulic oil temperature > 0 °C (32 °F)	○ Reversal sequence acc. to selected Mode ○ AC compressor disengaged
	Manual reversal ○ Mode Manual ○ SELECT key ON ○ Engine = On ○ Hydraulic oil temperature > 0 °C (32 °F)	○ Amber central warning ○ INFO Reversible fan Manual reverse activated ○ Reversal sequence Manual ○ AC compressor disengaged
	Denied manual reversal ○ SELECT key ON ○ Engine Off - or - Hydraulic oil temperature < 0 °C (32 °F)	○ Amber central warning ○ INFO Reversible fan Manual reverse denied. See instr. ○ Reversal sequence not allowed
○ Monitoring, MA204	○ System error, signal outside limits See 302 ERROR Solenoid valve Reversible fan	○ Amber central warning ○ ERROR Solenoid valve Reversible fan

Incorrect input signals

In case of incorrect input signals for the following, reversal will not be activated:

- VCADS Pro parameter BGK (Reversible fan installed)
- VCADS Pro parameters BGN and BGO (Setting of interval times)
- SELECT key

In case of incorrect input signals for the following, reversal will take place according to pre-selected interval mode:

- Engine On/Off
- Charge-air temperature
- Current fan speed
- Request for brake pressure charging
- Request for pressure test
- Request for sound level test
- Request for auxiliary brake
- Request for increased fan rpm at AC

Document Title: Reversible cooling fan	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Reversible cooling fan

The function controls reversal of the cooling fan to prevent clogging of the air passages in the radiator and informs if the operator if there is a system malfunction.

Reversal of cooling fan (changed rotational direction) can take place acc. to four interval modes, selected with the SELECT key.

- ☐ Manual reversal, mode Manual activated with SELECT key.
- ☐ Automatic reversal, mode 30 and 15 min. activated acc. to table below.
- ☐ With mode Off, there is no reversal.

Mode	Basic setting	
	Reversal	Interval
Manual	30 seconds	—
30 min.	30 seconds	30 min.
15 min.	30 seconds	15 min.
Off	No reversal	

With VCADS Pro parameters BGN and BGO, the times can be changed within a certain interval:

- ☐ Time for reversal can be selected within the range 20–180 seconds.
- ☐ Interval between reversals can be selected within the range 5–180 minutes.

Reversal sequence

1. The output signal to MA202 is reduced and the cooling fan speed drops slowly.
2. When the speed is sufficiently low (after 2–6 seconds), MA204 opens for stopping the fan.
3. When the fan speed is < 100 rpm or MA204 has been open for > 13 seconds, MA205 switches to reversal (reversed rotational direction).
4. MA204 is closed for start of the cooling fan.
5. MA202 is controlled to MAX speed for selected cooling fan mode and reversal takes place according to interval mode.
6. When the time for reversal has run out, the output signal to MA202 is reduced and the cooling fan speed drops slowly.
7. When the speed is sufficiently low (after 2–6 seconds), MA204 opens for stopping the fan.
8. When the fan speed is < 100 rpm or MA204 has been open for > 13 seconds, MA205 switches to normal fan operation.
9. MA204 is closed for start of the cooling fan.
10. Selected rpm range (A, B or C) is activated for control of the cooling fan via MA202.

Input signals	Conditions for output functions	Output functions
☐ VCADS Pro parameter BGK ☐ VCADS Pro parameter BGN, BGO ☐ SELECT key	Overall conditions for the function ☐ VCADS Pro parameter BGK "On"	
	Overall conditions for reversal sequence If any of the below should occur during on-going reversal, the reversal sequence is not started. If reversal is not	

○ Charge-air temperature, SE2507 ○ Hydraulic oil temperature, SE906 ○ Engine On/Off ○ Cooling fan speed, SE211 ○ Rpm range cooling fan (A, B, C) ○ Request for brake pressure charging ○ Request for increased pressure for attachment locking ○ Request for warming of hydraulic oil ○ Request for pressure test ○ Request for sound level test ○ Request for auxiliary brake ○ Request for increased fan rpm at AC	allowed, a new reversal attempt is performed every 10th second until reversal is allowed: ○ Charge-air temperature High ○ Request for auxiliary brake ○ Request for brake pressure charging ○ Request for pressure test ○ Request for sound level test ○ Request for increased fan speed If any of the below conditions occur before start of reversal, the reversal sequence is interrupted: ○ Request for pressure test ○ Request for sound level test ○ Request for increased fan speed at AC If any of the below conditions occur during retardation of the cooling fan to Normal operation, MA202 is set to Max. speed. New attempt for Normal operation is made every 5th second until Normal operation is allowed: ○ Charge-air temperature High ○ Request for auxiliary brake ○ Request for brake pressure charging ○ Request for increased pressure for attachment locking ○ Request for warming of hydraulic oil	
	Automatic reversal ○ Mode 30 min. or 15 min. ○ Engine = On ○ Hydraulic oil temperature > 20 °C (68 °F)	○ Reversal sequence acc. to selected Mode ○ AC compressor disengaged
	Manual reversal ○ Mode Manual ○ SELECT key ON ○ Engine = On ○ Hydraulic oil temperature > 20 °C (68 °F)	○ Amber central warning ○ INFO Reversible fan Manual reverse activated ○ Reversal sequence Manual ○ AC compressor disengaged
	Denied manual reversal ○ SELECT key ON ○ Engine Off - or - Hydraulic oil temperature < 20 °C (68 °F)	○ Amber central warning ○ INFO Reversible fan Manual reverse denied. See instr. ○ Reversal sequence not allowed
○ Monitoring, MA204	○ System fault, signal outside limits See 302 ERROR Solenoid valve Reversible fan	○ Amber central warning lamp ○ ERROR Solenoid valve Reversible fan

Incorrect input signals

In case of incorrect input signals for the following, reversal will not be activated:

- ☐ VCADS Pro parameter BGK (Reversible fan installed)
- ☐ VCADS Pro parameters BGN and BGO (Setting of interval times)
- ☐ SELECT key

In case of incorrect input signals for the following, reversal will take place according to pre-selected interval mode:

- ☐ Engine On/Off
- ☐ Charge-air temperature
- ☐ Current fan speed
- ☐ Request for brake pressure charging
- ☐ Request for pressure test
- ☐ Request for sound level test
- ☐ Request for auxiliary brake
- ☐ Request for increased fan rpm at AC

Document Title: Increased fan speed for AC	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Increased fan speed for AC

Increased fan speed for cooling fan is engaged in case of increased pressure in the AC system to increase air flow through the condenser when cooling fan control doesn't call for cooling.

Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter BIH ○ Pressure monitor, SE804 ○ Engine, On/Off	Overall conditions for the function ○ VCADS Pro parameter BIH "On"	
	○ Pressure monitor (3rd function) On 1.8 MPa (18 bar) (261 psi) ○ Engine ON	○ Increased fan speed 800 rpm for 15 minutes
	○ Pressure monitor (3rd function) On > 15 minutes	○ Increased radiator fan speed 800 rpm until pressure monitor is Off

Document Title: Accelerator Pedal	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Accelerator Pedal

The function transfers the accelerator pedal's position to a throttle application on the engine and engages the secondary function (Limp Home) in case of a system error/malfunction.

Accelerator pedal SW214 consists of APS (pedal position sensor) for accelerator pedal function and IVS (idle sensor) that are used to engage the Limp Home function.

If APS fault occurs and if the IVS is in the On position (depressed), the Limp-Home function is activated. This means that increased fuel feed is provided proportionally to time as long as the IVS is in the On position.

When the accelerator pedal is released and the IVS is in the Off position, the engine returns to idling speed.

If the IVS switch malfunctions, the operator is informed that no reserve function (Limp-Home function) is available.

NOTE!

If hand throttle is installed, it will work even if there is a system error/malfunction for n APS or IVS.

Input signals	Conditions for output functions	Output functions
○ Accelerator pedal, SE214 APS ○ Accelerator pedal, SE214 IVS	○ APS 0-100% ○ IVS in On position (accelerator pedal engaged)	○ Desired throttle setting
○ Monitoring, SE214 APS	○ IVS in On position ○ System fault, signal outside limits See 302 ERROR Accelerator Pedal Reduced Function Activated	○ Limp-Home function ○ Amber central warning lamp ○ ERROR Accelerator Pedal Reduced Function Activated
○ Monitoring, SE214 IVS	○ System fault, signal outside limits 302 ERROR Accelerator Pedal No Back-up Function See Function	○ Amber central warning lamp ○ ERROR Accelerator Pedal No Back-up Function

Document Title: Hand Throttle	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hand Throttle

The function makes it possible to set a working rpm for the engine and informs the operator if there is a system malfunction. When starting the machine, the hand throttle is disengaged regardless of the hand throttle's position. For re-engaging hand throttle, the control is turned counter-clockwise to position 0 and then to the desired rpm.

The hand throttle is disengaged when the brake pedal is applied or if the hand throttle is turned counter-clockwise to position 0.

Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter ACI ○ Brake pedal applied, SE501 ○ Hand throttle position, R205	Overall conditions for the function ○ VCADS Pro parameter ACI "On"	
	Engagement hand throttle ○ Desired working rpm[T1] ⓘ ○ Brake pedal not applied < 1 MPa (10 bar) (145 psi)	○ Hand throttle rpm range 800–2100 rpm
	Hand throttle is disengaged if any of the following conditions is fulfilled: ○ Start of machine ○ Desired working rpm = 0 ○ Brake pedal applied ≥ 1 MPa (10 bar) (145 psi) ○ Incorrect input signal hand throttle	○ Disengaging hand throttle
○ Monitoring, R205	○ System malfunction, open circuit or short circuit See 302 ERROR Hand throttle	○ Amber central warning ○ ERROR Hand throttle

[T1] Mechanical stop counter-clockwise.

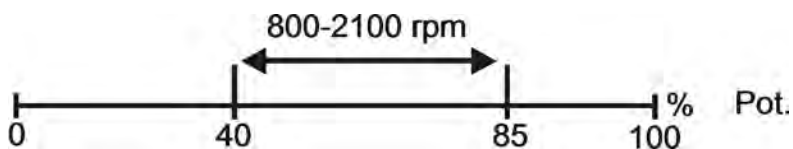


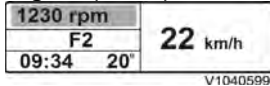
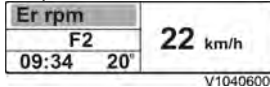
Figure 1
Speed range

Document Title: Engine speed for V-ECU	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Engine speed for V-ECU

This functions reads engine speed on the input shaft of the transmission and informs the operator if there is a system malfunction.

The engine speed is presented in the operating display on the information display unit. The engine speed is also used as input signal for different software functions.

Input signals	Conditions for output functions	Output functions
☐ Engine speed, SE201	☐ Machine operating	☐ Engine speed rpm 
☐ Monitoring, SE201	☐ System malfunction, open circuit or short circuit See 302 ERROR Monitoring Engine Revolutions (MID 187 PID 190)	☐ Amber central warning ☐ ERROR Monitoring Engine Revolutions ☐ Er rpm 

Document Title: Engine On/Off	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Engine On/Off

Engine On/Off is used as a condition in software functions to define when the engine is considered to be On and Off, respectively.

Input signals	Conditions for output functions	Output functions
○ Engine speed, SE201	○ Engine speed < 50 rpm	○ Engine = Off
	○ Engine speed > 600 rpm	○ Engine = On



Construction Equipment

Service Information

Document Title: Limitation of engine speed on first gear	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Limitation of engine speed on first gear

Funktionen begränsar motorvavtalet på första växeln vid manuell vald växling för att uppfylla ljudkraven.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Engine speed for E-ECU](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 7398, 62543

- [Engine speed for E-ECU](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8001

Serial number stop: 10999

Document Title: Engine speed for E-ECU	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Engine speed for E-ECU

This function monitors boost pressure and informs the operator if there is a system malfunction.

Engine speed is used internally in E-ECU engine control.

In case of engine speed sensor malfunction, the E-ECU uses sensor SE2703 for camshaft speed instead.

Input signals	Conditions for output functions	Output functions
○ Monitoring, SE2701	○ System malfunction, signal missing or abnormal frequency See 302 ERROR E-ECU SID 022	○ Amber central warning light ○ ERROR E-ECU SID 022

Document Title: Engine speed for E-ECU	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Engine speed for E-ECU

This function monitors boost pressure and informs the operator if there is a system malfunction.

The engine rpm is used internally in the E-ECU for engine control and as input signal for [301 Engine Protection](#).

In case of engine speed sensor malfunction, the E-ECU uses sensor SE2703 for camshaft speed instead.

Input signals	Conditions for output functions	Output functions
Monitoring, SE2701	System malfunction, no signal or abnormal frequency See 302 ERROR E-ECU SID 022	- Amber central warning lamp - ERROR E-ECU SID 022 - Reduction of engine's torque I (engine protection)

Document Title: Camshaft speed	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Camshaft speed

This function monitors camshaft speed and informs the operator if there is a system malfunction.

The E-ECU uses camshaft speed for engine control.

Input signals	Conditions for output functions	Output functions
○ Monitoring, SE2703	○ System error, signal missing or abnormal frequency See 302 ERROR E-ECU SID 021	○ Amber central warning ○ ERROR E-ECU SID 021

Document Title: Engine Shutdown	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Engine Shutdown

The function makes limited movement of the machine possible even if alarm levels for coolant temperature, engine oil pressure, transmission oil temperature or clutch slipping have been reached.

Input signals	Conditions for output functions	Output functions
○ High coolant temperature, SE2606 ○ Low engine oil pressure, SE2203 ○ High transmission oil temperature, SE406 ○ Slippage, transmission clutches	Rpm is limited if any of the following conditions are met: ○ High coolant temperature ○ Low engine oil pressure ○ High transmission oil temperature ○ Slippage, Alarm level 2	○ Signal to the E-ECU regarding limiting engine speed to 900 rpm

Document Title: Time-controlled high idle	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Time-controlled high idle

The function limits the engine speed to reduce the sound level during the set time.

Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter BGS ○ VCADS Pro parameter BGV, BGU, BGX, BGW ○ VCADS Pro parameter BGT ○ Clock time V-ECU ○ Engine speed, SE201	Overall conditions for the function ○ VCADS Pro parameter BGS "On"	
	○ VCADS Pro parameters BGV, BGU, BGX, BGW Setting of start and stop time (00:00-24:00) ○ VCADS Pro parameter BGT Setting of limitation speed (1800–2500 rpm)	○ Speed limitation to set speed during set time

Incorrect input signals

If any input signal is incorrect, the function is not activated.

Document Title: Automatic engine shut-off	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Automatic engine shut-off

The function control engine shut-off when the conditions according to the table have been fulfilled, and informs the operator that the engine will be shut off within 1 minute. When the engine is shut off the parking brake will also be applied.

The operator can interrupt engine shut-off by affecting the throttle pedal, hand throttle or the gear selector.

Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter FAU ○ VCADS Pro parameter FAV ○ Directional gear, SW402 ○ Accelerator pedal, SE214 APS ○ Hand throttle, R205 ○ Engine On/Off ○ Travelling speed	Overall conditions for the function ○ VCADS Pro parameter FAU "On"	1. Activation of the function automatic engine shut-off (4–99 min.) 2. When 1 minute remains of the set time WARNING Eng Shutoff in 1 min[T1] ⓘ 3. Engine shut-off and parking brake applied (MA501 without voltage)
	○ VCADS Pro parameter FAV "4–99 minutes" ○ Directional gear in position N ○ Accelerator pedal < 5% ○ Hand throttle not activated ○ Engine On ○ Travel speed < 5 km/h (3 mph)	

[T1] is shown. Engine shut-off is interrupted in case of activation of throttle pedal, hand throttle or the gear selector is moved to position F or R.

Document Title: Engine Protection	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Engine Protection

The function informs the operator and limits the engine's rpm and torque as well as machine speed to prevent any engine damage. Engine shut-off takes place first when speed is below 2 km/h (1.2 mph). This makes it possible to move the machine away from hazardous situations before engine shut-off takes place.

The function is monitored by the engine control unit E-ECU and, depending on which component is generating the alarm, then any of the following functions is activated:

- reduction of engine's torque
- limitation of engine's rpm
- limitation of machine speed
- engine shut-off

Input signals	Conditions for output functions	Output functions
○ Engine oil temperature, SE2202	○ High engine oil temperature 127–135 °C (260–275 °F)	○ Amber central warning lamp ○ INFO High Temp. Engine Oil ○ Reduction of engine's torque dependent on engine oil temperature and engine rpm
○ Engine oil pressure, SE2203	○ Low engine oil pressure	○ Red central warning lamp ○ WARNING Low Engine Oil Pressure ○ Reduction of engine's torque
○ EGR-valve, MA2504	○ Mechanical or electrical malfunction	○ Amber central warning lamp ○ INFO EGR not working ○ Reduction of engine's torque by max. 7% (to reduce the turbo's rpm)
○ Boost temperature, SE2507	○ High charge-air temperature 81–91 °C (178–196 °F)	○ Amber central warning lamp ○ WARNING High Temp. Charge Air ○ Reduction of engine's torque dependent on charge-air temperature and engine rpm
○ Crankcase pressure, SE2509	○ Crankcase pressure > 5 kPa (0.05 bar) (0.73 PSI) above atmospheric pressure	○ Red central warning lamp ○ WARNING High Crankcase Pr ○ Reduction of engine's torque ○ Limitation of engine rpm to 750 rpm ○ Limitation of speed to 5 km/h (3.1 mph)

○ Engine shut-off after 5 seconds if speed is < 2 km/h (1.2 mph) NOTE! The parking brake is applied automatically at engine shut-off		
○ Engine coolant level, SE2603	○ Low coolant level	○ Red central warning lamp ○ WARNING Low Engine Coolant Level
○ Coolant temperature, SE2606	○ High coolant temperature 103–105 °C (217– 221 °F)	○ Red central warning lamp ○ WARNING High Engine Coolant Temperature ○ Reduction of engine's torque dependent on coolant temperature and engine rpm
○ Engine rpm flywheel, SE2701	○ No or incorrect signal from the sensor	○ Amber central warning lamp ○ ERROR E-ECU SID 022 ○ Reduction of engine's torque by 2% per second ○ Max. torque engine 90%

Document Title: System voltage	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

System voltage

The function monitors system voltage and informs the operator if the system voltage is too high or too low.

Input signals	Conditions for output functions	Output functions
○ Engine On/Off ○ System voltage	○ Voltage level > 31 V	○ Amber central warning lamp ○ INFO High Voltage
	○ Engine On ○ Voltage level < 19 V	○ Amber central warning lamp ○ INFO Low Voltage

Document Title: Voltage feed for sensors	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Voltage feed for sensors

This function monitors 5 V voltage feed for sensors and informs the operator if the voltage is too high or too low.

Input signals	Conditions for output functions	Output functions
Monitoring voltage feed for sensors	High voltage > 5.5 V	- Amber central warning - ERROR E-ECU SID 232 See troubleshooting information 302 ERROR E-ECU SID 232
	Low voltage < 4.5 V	



Construction Equipment

Service Information

Document Title: Voltage feed E-ECU, I-ECU, V-ECU	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Voltage feed E-ECU, I-ECU, V-ECU

System voltage for start of I-ECU and V-ECU takes place via RE12.

When voltage is supplied to I-ECU and V-ECU, an I-ECU frame ground connection for relay RE11 is activated. RE11 uses and connects voltage feed for E-ECU, I-ECU and V-ECU.

Machine stop deactivates the ECU with delay via relay RE11 to allow the ECU to save data.

See [379 Wiring diagram 1](#) and [370 Wiring diagram 2](#)

Document Title: Key feed	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Key feed

Key feed is used as a condition in software functions to define when voltage feed considered to be On and Off, respectively.

Input signals	Conditions for output functions	Output functions
○ System voltage	○ Voltage < 8 V	○ Key feed Off
	○ Voltage > 12 V	○ Key feed On

Document Title: Theft protection	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Theft protection

The function has the task of preventing machine theft. The function is activated with VCADS Pro.

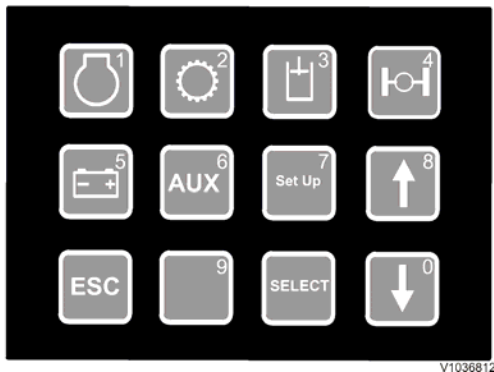


Figure 1
Keypad

When the theft protection is activated, a correct four-digit code has to be entered via the keypad and then the "SELECT"-button has to be pressed before the engine can be started, the parking brake can be released and directional gear selected.

Selection and change of theft protection code is performed with VCADS Pro parameter ABQ. The code is stored in the control units I-ECU (MID 140) and V-ECU (MID 187).

When stopping the machine (ignition to position 0), the engine will be turned off, the parking brake will be applied and then the theft protection will be activated after a 60 second delay.

When theft protection is activated, the engine **cannot** be started, the parking brake cannot be released and directional gear cannot be selected.

NOTE!

In case of a start attempt with activated theft protection, the starter motor will crank the engine but the engine will not start.

The machine can be restarted without entering the code within the delay period of 60 seconds.

Input signals	Conditions for output functions	Output functions
- VCADS Pro parameter ABP - VCADS Pro parameter ABQ - Delay period - Keypad, SW807 - Ignition switch, SW101 - Time from latest ignition Off	Overall conditions for the function - VCADS Pro parameter ABP "On" (activation of the function) - VCADS Pro parameter ABQ "xxxx" (theft protection code) - Delay period 60 seconds	
	Deactivation of theft protection - Ignition On (operating position) Information display unit shows "ENTER COD XXXX" - Enter the correct four-digit code via keypad, then press "SELECT"	Theft protection is deactivated The engine can be started, the parking brake can be released and directional gear can be selected.

Activation of theft protection	
○ Ignition (position 0) > 60 seconds (delay period)	○ Directional gear N ○ Engine stop ○ Parking brake applied, MA501 without voltage [T1] ⓘ

[T1]Prevents operation of the parking brake via switch SW501.

Document Title: Starter motor engagement	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Starter motor engagement

The function monitors the time that the starter motor is engaged to prevent overheating of the starter motor and informs the operator to wait 5 minutes before the next start attempt.

Input signals	Conditions for output functions	Output functions
○ VCADS Pro Parameter BRH ○ Engine speed, SE201	Overall conditions for the function ○ VCADS Pro Parameter BRH "On"	
	○ Engine speed has been between 50–400 rpm continuously for 30 seconds or ○ If less than 5 minutes have passed since the previous conditions and engine speed once again enters the speed range 50–400 rpm	○ Amber central warning ○ Starter motor Risk of Overheating! Wait 5 minutes

Document Title: Indication of serious engine fault	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Indication of serious engine fault

This function provides information on immediate engine stop due to serious system fault.

Possible system faults:

- SID 240, Programming error
- SID 253, Error in EEPROM
- SID 254, Serious engine computer fault

Input signals	Conditions for output functions	Output functions
○ Message from E-ECU	○ E-ECU function disturbances See 302 STOP! Turn Off Engine SID 240 See 302 STOP! Turn Off Engine SID 253 See 302 STOP! Turn Off Engine SID 254	○ Red central warning lamp ○ Buzzer ○ STOP! Turn Off Engine xxxx yy

Document Title: Interval Wiper	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Interval Wiper

This function controls the front and rear intermittent wipers and informs the operator if there is a system malfunction.

The wiper is activated for 0.5 seconds with a 5 second pause. The sequence is repeated until the control is set to position 0.

Input signals	Conditions for output functions	Output functions
○ Control front intermittent wiper, SW801A	○ Control in position J	○ Control of front wiper MO801 in intervals via relay RE6
○ Control rear intermittent wiper, SW803	○ Control in position Intermittent	○ Control of rear wiper MO803 in intervals via relay RE5
○ Monitoring, RE5	○ System malfunction, defective relay See 302 ERROR Relay Interval Wiper	○ Amber central warning ○ ERROR Relay Interval Wiper
○ Monitoring, RE6	○ System malfunction, defective relay See 302 ERROR Relay Interval Wiper	○ Amber central warning ○ ERROR Relay Interval Wiper

Document Title: Wiping during and after washing	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Wiping during and after washing

This function controls the front and rear wipers during washing.

Wiper control starts when each washer control is held in position On and stops when the control is released. Wiping continues for 5 seconds following washing.

Input signals	Conditions for output functions	Output functions
○ Control front washer, SW801B	○ Control held in On position 5 additional seconds of wiping continues after the control is released	○ Control of front wiper MO801 via relay RE6
○ Control rear washer, SW804	○ Control held in position On 5 additional seconds of wiping continues after the control is released	○ Control of rear wiper M0803 via relay RE5

Document Title: Fuel consumption	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Fuel consumption

This function calculates machine fuel consumption which is shown on the display panel.

Fuel consumption calculations according to the following:

- Current consumption in litres per hour, dissolution 0.1 litre.
- Average consumption in litres per hour, dissolution 0.1 litre.
- Total consumption in litres since last reset; up to 99999 litres.

Fuel consumption reset completed with "INFORMATION II" information display.

Input signals	Conditions for output functions	Output functions
○ Time/Distance/ Cycle Reset ○ Total engine fuel consumption ○ Current engine fuel consumption ○ Machine time	○	○ FUEL CONSUMPTION • Current fuel consumption • Average consumption per hour • Total fuel consumption See 387 Display panel, information displays

Document Title: Reduced computer communication	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Reduced computer communication

This function informs the operator in the event of ECU system communication malfunction and continued operation with reduced performance.

Input signals	Conditions for output functions	Output functions
○ ECU communication interruption	○ Communication interruption 302 ATTENTION! Reduced Computer Function Se (J1708/J1587) and 302 ATTENTION! Reduced Computer Function (J1939)	○ Red central warning light ○ ATTENTION! Reduced Computer Function ○ Safety mode[T1] ⓘ

[T1] The machine can only be operated in 1st and 2nd gear in both travel directions. If there's a communication interruption at a gear > 2nd gear, downshifting takes place according to the ordinary APS shifting strategy and thereafter max. 2nd gear.

Document Title: Interruption in computer communication	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Interruption in computer communication

This function informs the operator in the event of ECU system communication malfunction, continued operation may result in damage.

Input signals	Conditions for output functions	Output functions
○ ECU communication interruption	○ Communication interruption	○ Red central warning light ○ Buzzer ○ STOP! COMPUTER FAILURE STOP THE VEHICLE ○ Gear set to Neutral

Document Title: Service interval	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Service interval

1. This function informs the operator about the time remaining to next service and which service interval should be performed and to inform when 8 operating hours remain to next service.
2. This function informs the operator about the time remaining to next engine oil change and which service interval should be performed, and when 8 operating hours remain to next engine oil change.

Engine oil change

Information about oil change having to be done before the regular 500-hour change interval (oil degradation function).

In case of repeated alarms about early oil changes, the change interval can be reset to fixed 125 or 250 hour intervals with VCADS Pro.

The oil degradation function is active within the interval 250–500 operating hours, if < 50 operating hours remain to ordinary service interval no alarm is generated for engine oil change.

When changing interval for engine oil change before ordinary service interval has been passed, the new interval will apply starting with the next service interval.

Input signals	Conditions for output functions	Output functions
○ Operating hours ○ Time remaining to next engine oil change from E-ECU ○ VCADS Pro parameter ACN ○ Key "SELECT"	Service interval ○ Operating hours ○ Service intervals 250, 500, 1000, 2000 hours	○ Time to next service Read off on information panel in display NEXT SERVICE
	○ < 8 hours to next service Acknowledge warning with "SELECT" key when display "NEXT SERVICE" is active.	○ Amber central warning ○ SERVICE INFO Time For Service
	Engine oil change ○ VCADS Pro parameter ACN, selection of interval for engine oil change. ○ 125 hours (fixed interval) ○ 250 hours (fixed interval) ○ 500 hours with oil degradation function. Time remaining to next engine oil change from E-ECU.	○ Time remaining to next engine oil change Read off on information panel in display NEXT SERVICE
	○ < 8 hours to next engine oil change Acknowledge warning with "SELECT" key when display "NEXT SERVICE" is active.	○ Amber central warning ○ SERVICE INFO Time For Engine Oil Change

Document Title: Washer fluid level	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Washer fluid level

This function monitors washer fluid level and provides appropriate warning for low fluid level.

Input signals	Conditions for output functions	Output functions
○ Washer fluid level [T1] ⓘ	○ Low level > 10 seconds	○ Amber central warning lamp ○ INFO Low Level Washer Fluid

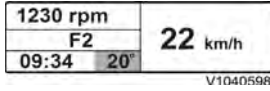
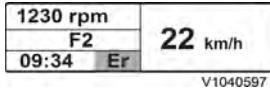
[T1]Level monitor included in MO802.

Document Title: Outdoor temperature	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Outdoor temperature

This function monitors the outdoor temperature and provides the operator with temperature information or if system fault occurs.

Unit settings °C or °F are made with the display panel keyboard.

Input signals	Conditions for output functions	Output functions
☐ Outdoor temperature, SE807	☐	☐  Temperature in °C or °F
☐ Monitoring, SE807	☐ System fault, signal outside limits See 302 "Er" ambient temperature (MID 187 PID 171)	☐ 

Document Title: APS	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

APS

The function controls shifting based on current operating mode, which gear is to be used, and when shifting shall take place to protect the transmission. The mode selector enables the operator to select different shifting programs depending on operation conditions.

The mode selector with positions L–M–H–AUTO–SERVICE.



Figure 1
Mode selector

L	The machine shifts automatically at low engine rpms and low speed.
M	The machine shifts automatically at higher engine rpms than at L.
H	The machine shifts automatically at higher engine rpms and speed than at M.
AUTO	The machine shifts automatically and selects shifting program for optimal comfort and economy.
SERVICE	The gears are shifted manually.

At activation of the function fully automatic, downshifting to first gear is automatic when it is required.

NOTE!

If the service brake is applied, there will be no downshifting to first gear.

If the fully automatic function is not activated, downshifting to first gear will take place with the kick-down function.

Input signals	Conditions for output functions	Output functions
- Mode selector, SW412 - Gear control travelling direction, SW402 - Gear selector, SW401B - Transmission disengagement - Kick-down - Engine retarding, SW406 - Engine speed, SE201	Manual shifting - Mode selector in mode SERVICE - Selected directional gear - Selected speed gear	- Directional gear F–N–R - Travelling speed gear 1–4
	Fully automatic - Mode selector in mode L–M–H or AUTO - Fully automatic activated - Brake pressure < 2.5 bar (Brake pedal not activated) - Selected directional gear - Engine speed - Turbine speed	- Directional gear F–N–R - Speed gear 1–4[T1]

○ Travelling speed, SE403 ○ Turbine speed, SE402 ○ Brake pressure, SE501 ○ Fully automatic, SW417	○ Travelling speed ○ Vehicle distance (only in AUTO mode)	
	Automatic with manual kick-down function ○ Mode selector in mode L–M–H or AUTO ○ Fully automatic not activated ○ Selected directional gear ○ Engine speed ○ Turbine speed ○ Travelling speed ○ Vehicle distance (only in AUTO mode)	○ Directional gear F–N–R ○ Speed gear 2–4^(a)
	Manual kick-down ○ Fully automatic not activated ○ Kick-down activated[1] ⓘ ○ Travel speed < 8 km/h (5 mph)	○ Kick-down (downshifting to first gear)
	Transmission disengagement ○ Transmission disengagement requested. See 301 Transmission disengagement	○ Transmission disengagement (neutral gear)
	Engine brake ○ Engine retarding in position On	○ Engine brake (downshifting to first gear)
	○ Incorrect signal from APS See 302 ERROR APS switch/ERROR APS II-switch Acknowledge by turning off machine	○ Amber central warning lamp ○ ERROR APS switch ○ Shifting program "transport"

[T1]Shifting takes place according to selected shifting program L–M–H or AUTO.

Protective functions

- Warning for overspeeding of transmission in active gear. See [301 Overspeed, transmission](#)
- Overspeeding protection of transmission in active by upshifting to next gear when exceeding rpm for the protective function. See [301 Overspeed, transmission](#)
- Overspeeding protection engine in active gear by upshifting to next gear when exceeding rpm for the protective function.

Incorrect input signals

- In case of incorrect input signal from speed gear with mode selector in mode SERVICE, 4th gear is obtained.
- In case of incorrect input signal turbine rpm in mode L–M–H or AUTO, downshifting and upshifting are blocked. However, in mode SERVICE shifting is possible but without overspeed and downshift protection.

Mode selector in mode "SERVICE"

- The speed gears are shifted manually to the desired gear position.
- The directional gear is shifted manually to the desired position.
- Engine brake (downshifting) is activated with SW406.
- Transmission disengagement is activated via the information display unit.

Directional gear

When shifting from N (neutral) to F or R, the travelling speed gear is changed from selected gear to engaged gear as follows:

Selected Gear	Engaged gear	Travelling speed
1	1	< 9 km/h (5.6 mph)
1	2	9–16 km/h (5.6–9.9 mph)
1	3	16–34 km/h (9.9–21.1 mph)
1	4	> 34 km/h (21.1 mph)
2	2	< 16 km/h (9.9 mph)
2	3	> 16–34 km/h (9.9–21.1mph)
2	4	> 34 km/h (21.1 mph)
3	3	< 34 km/h (21.1 mph)
3	4	> 34 km/h (21.1 mph)
4	4	No condition

The mode selector is set within any of the automatic modes "L–M–H–AUTO"

Start

When starting a stationary machine with the gear control in position 3 or 4, select directional gear F or R for machine start in 2nd gear. When the machine is in motion, starting takes place in 3rd gear according to the table.

Travelling speed	Speed output shaft	Starting gear
> 7 km/h (4.4 mph)	458 rpm	3

Changing travelling direction

Travelling direction change at lower travelling speed occurs in 2nd gear. If travelling speed is too fast, 3rd gear is engaged first and when the machine is stationary, 2nd gear engages according to the table below.

Gear	Travelling speed conditions
2	<= 15 km/h (9.3 mph)
3	> 15 km/h (9.3 mph)
3-2	0 km/h (0 mph)

Manual speed shifting

When shifting manually from one travelling speed gear to another, the gear is changed from **Selected gear** to **Engaged gear** according to travelling speed conditions in the table below.

Selected Gear	Obtained gear	Travelling speed conditions
1	1	< 9 km/h (5.6 mph)
1	2	9–16 km/h (5.6–9.9 mph)
1	3	16–34 km/h (9.9–21.1 mph)
1	4	> 34 km/h (21.1 mph)
2	2	< 16 km/h (9.9 mph)
2	3	16–34 km/h (9.9–21.1 mph)
2	4	> 34 km/h (21.1 mph)
3	2 3	Depending on engine speed and travel speed
3	4	> 34 km/h (21.1 mph)
4	2 3 4	Depending on engine speed and travel speed

Automatic shifting with fully automatic activated

Shifting is handled automatically. The conditions for shifting are a combination the mode selector's setting, engine rpm, and machine speed. In AUTO mode, consideration is also given to operating cycle.

Automatic shifting takes place between gears 1–4.

NOTE!

Downshifting to 1st can also be manual with any of the kick-down controls if speed is below 8 km/h (5 mph) within 8 seconds to get earlier downshifting.

The gear shifting points vary depending on whether the engine is pulling or retarding.

At least 1 second must elapse between two upshifts or downshifts. The time between an upshift and a downshift (or the reverse) must be at least 3 seconds.

Automatic shifting with manual kick-down

Shifting is handled automatically. The conditions for shifting are a combination the mode selector's setting, engine rpm, and machine speed. In AUTO mode, consideration is also given to operating cycle.

Automatic shifting takes place between gears 2–4.

Downshifting to 1st takes place first after kick-down has been activated with any of the kick-down controls and the speed is below 8 km/h (5 mph) within 8 seconds.

Upshifting to 2nd gear takes place on further activation of any of the kick-down controls or if certain critical engine speeds and travelling speeds are exceeded.

The gear shifting points vary depending on whether the engine is pulling or retarding.

At least 1 second must elapse between two upshifts or downshifts. The time between an upshift and a downshift (or the reverse) must be at least 3 seconds.

[1]Activated kick-down remains for 8 seconds.

Document Title: APS II	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

APS II

The function controls gear shifting based on current operating mode and determines which gear should be used and when shifting should take place in order to protect the transmission.

Mode selector SW412 has two ranges; "MANUAL" and "AUTOMATIC".

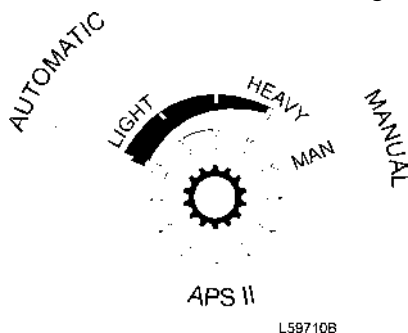


Figure 1
Mode selector, SW412

Gears are shifted manually with "MANUAL" in position "MAN".

"AUTOMATIC" includes four shifting program positions, "LIGHT position 1, LIGHT position 2, ▽ (Normal), HEAVY", which can be selected by the operator in various driving conditions.

Input signals	Conditions for output functions	Output functions
○ Mode selector, SW412 ○ Gear control travelling direction, SW402 ○ Gear selector, SW401B ○ Transmission disengagement, SW411 ○ Kick-down steering column, SW401C ○ Kick-down lever steering, SW410 ○ Kick-down lever carrier, SW405 ○ Engine retarding, SW406 ○ Engine speed, SE201 ○ Travelling speed, SE403 ○ Turbine speed,	○ Mode selector in position MAN	○ Gears are shifted manually with gear selector ○ Directional gear F, N, R ○ Alarm overspeed transmission
	Mode selector in AUTOMATIC range ○ LIGHT position 1 ○ LIGHT position 2 ○ ▽ (Normal) ○ HEAVY	○ Travelling speed gear 1, 2, 3, 4 ○ Directional gear F, N, R ○ Alarm overspeed transmission ○ Engine speed limiting ○ Kick-down
	○ Transmission disengagement in position On	○ Transmission disengagement
	○ Engine retarding in position On	○ Engine retarding (downshifting)

SE402	☐ Kick-down activated	☐ Kick-down
	☐ Incorrect input signal from APS II See 302 ERROR APS switch/ERROR APS II-switch Acknowledge by turning off machine	☐ Amber central warning ☐ ERROR APS II-switch ☐ Gear mode LIGHT position 1

Mode selector in position MAN

- ☐ Speed gears are shifted manually with gear selector SW401B to the desired gear position 1-4.
- ☐ Directional gear is shifted manually with gear control SW402 to the desired gear position F-N-R.
- ☐ Engine brake (downshifting) is activated with SW406.
- ☐ Kick-down is activated with SW401C, SW405 or SW410.
- ☐ Transmission disengagement is activated with SW402.

Directional gear

When shifting from N (neutral) to F or R, the travelling speed gear is changed from selected gear to engaged gear as follows:

Selected Gear	Engaged gear	Travelling speed
1	1	< 9 km/h (5.6 mph)
1	2	9–16 km/h (5.6–9.9 mph)
1	3	16–34 km/h (9.9–21.1 mph)
1	4	> 34 km/h (21.1 mph)
2	2	< 16 km/h (9.9 mph)
2	3	> 16–34 km/h (9.9–21.1mph)
2	4	> 34 km/h (21.1 mph)
3	3	< 34 km/h (21.1 mph)
3	4	> 34 km/h (21.1 mph)
4	4	No condition

Mode selector set in range AUTOMATIC

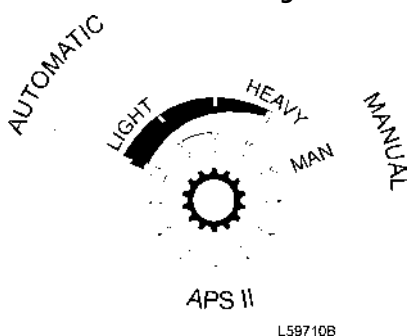


Figure 2
Mode selector, SW412

Start

When starting a stationary machine with the gear control in position 3 or 4, select directional gear F or R for machine start in 2nd gear. When the machine is in motion, starting takes place in 3rd gear according to the table.

Travelling speed	Speed output shaft	Starting gear
> 7 km/h (4.4 mph)	458 rpm	3

Changing travelling direction

Travelling direction change at lower travelling speed occurs in 2nd gear. If travelling speed is too fast, 3rd gear is engaged first and when the machine is stationary, 2nd gear engages according to the table below.

Gear	Travelling speed conditions
2	<= 15 km/h (9.3 mph)
3	> 15 km/h (9.3 mph)
3-2	0 km/h (0 mph)

Manual travel speed shifting and mode selector in AUTOMATIC range

When shifting manually from one travelling speed gear to another, the gear is changed from **Selected gear** to **Engaged gear** according to travelling speed conditions in the table below.

Selected Gear	Obtained gear	Travelling speed conditions
1	1	< 9 km/h (5.6 mph)
1	2	9–16 km/h (5.6–9.9 mph)
1	3	16–34 km/h (9.9–21.1 mph)
1	4	> 34 km/h (21.1 mph)
2	2	< 16 km/h (9.9 mph)
2	3	16–34 km/h (9.9–21.1 mph)
2	4	> 34 km/h (21.1 mph)
3	2 3	Depending on engine speed and travel speed
3	4	> 34 km/h (21.1 mph)
4	2 3 4	Depending on engine speed and travel speed

Automatic shifting

Shifting is automatic. Shifting conditions occur with a combination of mode selector (SW412) setting, engine speed and machine travelling speed.

Automatic shifting takes place between gears,

Forward: 2nd – 3rd – 4th. and Reverse: 2nd – 3rd – 4th.

Downshifting to 1st gear does not take place until Kick-down has been activated with one of the Kick-down controls on the steering column, lever carrier or lever steering (if lever steering is installed).

Upshifting to 2nd gear takes place on further activation of any of the kick-down controls or if certain critical engine speeds and travelling speeds are exceeded.

The gear shifting points vary depending on whether the engine is pulling or retarding.

At least 1 second must elapse between two upshifts or downshifts. The time between an upshift and a downshift (or the reverse) must be at least 3 seconds.

Shifting modes

- LIGHT position 1, shifting at low engine speed
- LIGHT position 2, shifting at slightly higher engine speed than in position 1
- ∇ (Normal), shifting at slightly higher engine speed than in position 2
- HEAVY, shifting at slightly higher engine speed than in position ∇

Document Title: Fully automatic	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Fully automatic

By activating the function with switch SW417, automatic downshifting to first gear via APS takes place when downshifting conditions are fulfilled. See [301 APS](#).

Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter CVN ○ Activation fully automatic, SW417	Overall conditions for the function ○ VCADS Pro parameter CVN "On" (Default)	
	○ SW417 in position On	○ Activates the function fully automatic for APS

Document Title: Travelling speed	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Travelling speed

The function calculates travelling speed, provides the operator with travelling speed information and informs the operator if system fault occurs.

Travelling speed is used as an input signal to several functions.

Unit setting to km/h or mph is made with the display panel keyboard, see [387 Display panel information displays](#).

Input signals	Conditions for output functions	Output functions					
○ Propeller shaft speed, SE403 ○ Tyre radius[T1] ⓘ	○ Propeller shaft speed ○ Tyre radius	○ Travelling speed in km/h or mph <table><tr><td>1230 rpm</td><td rowspan="2">22 km/h</td></tr><tr><td>F2</td></tr><tr><td>09:34</td><td>20°</td></tr></table>	1230 rpm	22 km/h	F2	09:34	20°
1230 rpm	22 km/h						
F2							
09:34	20°						
○ Monitoring, SE403	○ System fault, signal outside limits See 302 ERROR Monitoring Travel Speed (MID 187 PID 84)	○ Amber central warning lamp ○ ERROR Monitoring Travel Speed ○ Er km/h <table><tr><td>1230 rpm</td><td rowspan="2">Er km/h</td></tr><tr><td>F2</td></tr><tr><td>09:34</td><td>20°</td></tr></table>	1230 rpm	Er km/h	F2	09:34	20°
1230 rpm	Er km/h						
F2							
09:34	20°						

[T1]Setting with service display unit.

Document Title: Tire radius	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Tire radius

This function provides input data for calculation of travel speed.
Setting of tire dimension is performed with the service display unit.

Tires	Tire radius	Axle ratio
26.5"	885 mm	22.67:1

Document Title: Speed limitation	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Speed limitation

The function limits the vehicle speed to the governing legal max. travel speeds.

Setting of travel speed for speed limitation is performed with VCADS Pro.

Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter ACO ○ Travel speed ○ Engine speed, SE201	○ VCADS Pro parameter ACO "Off" ○ Travel speed ○ Engine speed > 1100 rpm	No speed limitation
	○ VCADS Pro parameter ACO " 20 km/h, 30 km/h" ○ Travel speed ○ Engine speed > 1100 rpm	○ Speed limitation to selected travel speed (20 or 30 km/h)

Incorrect input signals

In case of incorrect travel speed signal or engine speed signal when speed limitation is activated, Safety mode is activated.

Safety mode means that the machine can only be operated in 1st and 2nd gear in both directions.

Document Title: Speed limitation for lever steering (CDC)	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Speed limitation for lever steering (CDC)

The function limits the vehicle speed when lever steering (comfort drive control) is activated.
Setting of travel speed for speed limitation is performed with VCADS Pro.

Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter AMU ○ Activation of lever steering (CDC)	Overall conditions for the function ○ VCADS Pro parameter AMU "30 km/h"	
	○ Activated comfort drive control (lever steering) (Lowered armrest SW407 and activation of lever steering SW408)	○ Speed limitation to 30 km/h

Document Title: Back-up alarm	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Back-up alarm

The function informs bystanders and surroundings that the machine is reversing.

Input signals	Conditions for output functions	Output functions
☐ Directional gear	☐ Directional gear in position Reverse	☐ Reversing alarm SE 803

Document Title: Transmission oil pressure	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Transmission oil pressure

The function monitors the HT-transmission main oil pressure and informs the operator if transmission oil pressure is low or if there's a system malfunction.

Input signals	Conditions for output functions	Output functions
○ Engine speed, SE201 ○ Transmission oil pressure, SE405 ○ Directional gear	○ Low transmission oil pressure > 1 second During start issues no alarm for a period of 5 seconds after engine start Alarm limits for transmission oil pressure: 1. < 0.50 MPa (5 bar) (72.5 psi) at 600 rpm 2. < 1.1 MPa (11 bar) (159.5 psi) at 1200 rpm 3. < 1.2 MPa (12 bar) (174 psi) at 2100 rpm Monitoring during gear shifting: • When engine speed is below alarm limit 2, transmission pressure is not monitored for 3 seconds • When engine speed is above alarm limit 2, transmission pressure is not monitored for 2 seconds	○ Warning light ○ Red central warning light ○ WARNING Low Transmission Oil Pressure
	According to the above information and including: ○ Directional gear in Forward or Reverse	○ Buzzer
○ Monitoring, SE405	○ System error, signal outside limits See 302 ERROR Monitoring Transmission Oil Pressure (MID 187 PID 127)	○ Amber central warning light ○ ERROR Monitoring Transmission Oil Pressure

Document Title: Transmission oil level	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Transmission oil level

This function monitors transmission oil level and informs the operator if level is low or if system fault occurs.

Level check occurs only when all conditions are met after machine start.

NOTE!

If the transmission oil temperature is below +45 °C (113 °F) at machine start, no check of the transmission oil level is performed before the transmission oil temperature exceeds +55 °C (131 °F) and the other conditions are fulfilled.

Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter BJC ○ Transmission oil level, SE413 ○ Current gear ○ Transmission oil temperature, SE406 ○ Travelling speed, SE403 ○ Engine speed, SE201	Overall conditions for the function ○ VCADS Pro parameter BJC "On"	
	If transmission oil temperature is below +45 °C (113 °F) first level check takes place when the following conditions are fulfilled > 5 seconds: ○ Transmission oil temperature exceeds +55 °C (131 °F) ○ No gear engaged ○ Travelling speed < 5 km/h ○ Engine speed < 1000 rpm	Low transmission oil level is indicated as follows: ○ Amber central warning lamp ○ INFO MIN Transmission Oil Level
	○ If gear is engaged before travelling speed reached < 5 km/h for > 10 seconds, check is stopped	○ Amber central warning lamp ○ INFO Transmission Oil Level Not Checked
○ Monitoring, SE413	○ System fault, signal outside limits See 302 ERROR Monitoring Transmission Oil Level (MID 187 PID 124)	○ Amber central warning lamp ○ ERROR Monitoring Transmission Oil Level

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Transmission oil temperature](#)

Product Line: WLO

Model Variant: L180E (Volvo)

- [Transmission oil temperature](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 10999, 69999

Document Title: Transmission oil temperature	Function Group: oil 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Transmission oil temperature

This function monitors the transmission oil temperature and warns the operator if the temperature is too high or if there's a system malfunction.

The Engine Shutdown function, which limits engine speed to 900 rpm, is activated if the transmission oil temperature continues to rise, see [301 Engine Shutdown](#)

The transmission oil temperature is also used as input signal for:

- [301 Cooling fan adjustment](#)
- [301 Transmission oil filter](#)
- [301 Transmission oil level](#)

Input signals	Conditions for output functions	Output functions
○ Transmission oil temperature, SE406 ○ Directional gear	○ Transmission oil temperature over 110 °C (230 °F) > 2 seconds	○ Warning light, gauge ○ Red central warning light ○ WARNING High Transmission Oil Temp.
	According to the above information and including: ○ Directional gear in Forward or Reverse	○ Buzzer
	○ Transmission oil temperature over 120 °C (248 °F) > 2 seconds Engine Shutdown is active until the temperature drops to > 2 °C (1.8 °F) during temperature condition < 2 seconds	○ Engine Shutdown
○ Monitoring, SE406	○ System error, signal outside limits See 302 ERROR Monitoring Transmission Oil Temp. (MID 187 PID 177)	○ Amber central warning light ○ ERROR Monitoring Transmission Oil Temp.

Document Title: Transmission oil temperature	Function Group: oil 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Transmission oil temperature

This function monitors the transmission oil temperature and warns the operator if the temperature is too high or if there's a system malfunction.

If the transmission oil temperature increases even more, the function Transmission protection is engaged, limiting the engine rpm to 1500 rpm via the engine control unit E-ECU, see Transmission protection.

The transmission oil temperature is also used as input signal for:

- [301 Cooling fan adjustment](#)
- [301 Transmission oil filter](#)
- [301 Transmission oil level](#)

Input signals	Conditions for output functions	Output functions
○ Transmission oil temperature, SE406 ○ Directional gear	○ Transmission oil temperature exceeds 110 °C (230 °F)	○ Warning light, gauge ○ Red central warning lamp ○ WARNING High Transmission Oil Temp.
	According to the above information and including: ○ Directional gear in Forward or Reverse	○ Buzzer
	○ Transmission oil temperature exceeds 120 °C (248 °F) The function Transmission protection is active until the temperature has been reduced to > 2 °C (1.8 °F) below the temperature condition.	○ Transmission protection
○ Monitoring, SE406	○ System error, signal outside limits See 302 ERROR Monitoring Transmission Oil Temp. (MID 187 PID 177)	○ Amber central warning lamp ○ ERROR Monitoring Transmission Oil Temp.

Document Title: Transmission oil filter	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Transmission oil filter

The function monitors the condition of the transmission oil filter and informs the operator if filter change is required or if there is a system malfunction.

The transmission oil filter must be changed to avoid opening of the filter by-pass valve, which can result in reduced transmission performance or loss of function.

Input signals	Conditions for output functions	Output functions
○ Differential pressure, SE401 ○ Transmission oil temperature, SE406	○ Differential pressure > 0.276 MPa (2.76 bar) (40 psi) ○ Transmission oil temperature > 50 °C (122 °F)	○ Amber central warning ○ INFO Clogged Transmission Oil Filter
○ Monitoring, SE401	○ System malfunction, signal outside limit values 302 ERROR Monitoring Transmission Oil Filter See (MID 187 PPID 1029)	○ Amber central warning ○ ERROR Monitoring Transmission Oil Filter

Document Title: Turbine speed	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Turbine speed

This function monitors turbine speed and informs the operator if system fault occurs.

Turbine speed is used to calculate transmission clutch slipping.

Input signals	Conditions for output functions	Output functions
○ Turbine speed, SE402	○ Machine in operation	○ Turbine speed
○ Monitoring, SE402	○ System fault, signal outside limits See 302 ERROR Monitoring Turbine Revolutions (MID 187 PPID 1160)	○ Amber central warning lamp ○ ERROR Monitoring Turbine Revolutions

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Transmission slipping](#)

Product Line: WLO
Model Variant: L180E (Volvo)

- [Transmission slipping](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 10999, 69999

Document Title: Transmission slipping	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Transmission slipping

The function monitors and informs the operator about slipping in transmission clutches. If slipping continues for more than 0.5 seconds, the Engine Shut Down function is activated, which limits engine speed to 900 rpm to protect the transmission, see [301 Engine Shutdown](#).

Input signals	Conditions for output functions	Output functions
○ Slipping[T1] ⓘ ○ No gearshifting in progress ○ Engine speed, SE201	Alarm level 1: ○ Slipping < 0.5 seconds ○ No gearshifting in progress ○ Engine speed > 600 rpm	○ Amber central warning ○ INFO Slip In Transmission Clutches ○ Increased PWM signal to slipping shift solenoid
	Alarm level 2: ○ Slipping > 0.5 seconds ○ No gearshifting in progress ○ Engine speed > 600 rpm	○ Red central warning ○ WARNING Slip In Transmission Clutches ○ Engine Shut Down

[T1]EPS Control, which controls shifting sequence for the transmission based on the current operating mode, senses engine speed and turbine speed and calculates output speed and compares with the current output speed.

Document Title: Transmission slipping	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Transmission slipping

The function monitors and informs the operator about slipping in transmission clutches. If slipping continues for more than 0.5 seconds, the function Transmission protection is activated, limiting the engine rpm to 1500 rpm via the engine control unit E-ECU to protect the transmission, see [301 Transmission protection](#).

Input signals	Conditions for output functions	Output functions
○ Slipping[T1] ⓘ ○ No gearshifting in progress ○ Engine speed, SE201	Alarm level 1: ○ Slipping < 0.5 seconds ○ No gearshifting in progress ○ Engine speed > 600 rpm	○ Amber central warning lamp ○ INFO Slip In Transmission Clutches ○ Increased PWM signal to slipping shift solenoid
	Alarm level 2: ○ Slipping > 0.5 seconds ○ No gearshifting in progress ○ Engine speed > 600 rpm	○ Red central warning lamp ○ WARNING Slip In Transmission Clutches ○ Transmission protection

[T1]EPS Control, which controls shifting sequence for the transmission based on the current operating mode, senses engine speed and turbine speed and calculates output speed and compares with the current output speed.

Document Title: Transmission disengagement	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Transmission disengagement

This function engages transmission disengagement (Neutral gear) during braking and informs the operator if there is a system malfunction.

Input signals	Conditions for output functions	Output functions
○ Output brake pressure, SE501 ○ Transmission disengagement, SW411	○ Transmission disengagement in position On ○ Output brake pressure > 1.8 MPa (18 bar) (261 psi)	○ Transmission disengagement
	○ Transmission disengagement in position On ○ Output brake pressure < 1.6 MPa (16 bar) (232 psi) - or ○ Transmission disengagement in position Off	○ No transmission disengagement

Transmission disengagement via information display unit

Selection of the function transmission disengagement is moved to the information display unit from and incl. introduction of fully automatic (APS). See [387 Information display unit, setting](#).

Input signals	Conditions for output functions	Output functions
○ Output brake pressure, SE501 ○ Transmission disengagement, via information display unit	○ Transmission disengagement in position On ○ Output brake pressure > 1.8 MPa (18 bar) (261 psi)	○ Transmission disengagement
	○ Transmission disengagement in position On ○ Output brake pressure < 1.6 MPa (16 bar) (232 psi) - or ○ Transmission disengagement in position Off	○ No transmission disengagement

Document Title: Overspeed, transmission	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Overspeed, transmission

This function monitors transmission speed and warns the operator if transmission speeds are too high. Shifting will take place to the nearest higher gear at exceptionally high transmission speeds. The same speed limit applies both to forward and reverse.

The functions apply to both manual and automatic gear shifting.

Input signals	Conditions for output functions	Output functions
○ Output speed, transmission, SE403 ○ Travelling speed gear	Level 1 (warning): ○ Speed for active gear exceeds > 2 seconds ○ Travelling speed gear 1-4	○ Red central warning light ○ Buzzer ○ WARNING Overspeeding Selected Gear On
	Level 2 (upshifting): ○ Speed for active gear exceeds > 2 seconds ○ Speed gear 1-3	○ Upshifting

Document Title: Gear Selector	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Gear Selector

This function coordinates the three gear selectors for travel direction and informs the operator as to which control is active and if there is a system malfunction.

- The three gear selectors for travel direction (Forward/Reverse) are located on the steering column, lever carrier and armrest lever steering (CDC).
- To coordinate the three Kick-down controls steering column, lever carrier and lever steering (CDC).

This function means that Forward/Reverse shifting can be carried out using the gear control located in the steering column, lever carrier or armrest depending on which control is active. Kick-down can be activated with one of the three Kick-down controls. For Kick-down on the armrest to work, the armrest must be lowered and lever steering must be activated.

Priority of the gear selectors means that if a gear selector with higher priority than the active gear selector is activated, the gear selector with lower priority is deactivated.

When lever steering (CDC) is active, steering can also be controlled with arm rest lever SE603.

Input signals	Conditions for output functions	Output functions
○ Gear selector steering column, SW401B ○ Gear selector steering column, SW402 ○ Gear selector lever steering, SW409 ○ Gear selector lever carrier, SW404 ○ Single lever (joystick), SW416 ○ Activation lever carrier, SW403 ○ Activation lever steering, SW408 ○ Kick-down steering column, SW401C ○ Kick-down lever carrier, SW405 ○ Kick-down lever steering, SW410	Lever carrier, activating (F/R) ○ Gear selector steering column in position N ○ Gear selector lever steering in position N ○ Speed Off (< 5 km/h (3 mph)) ○ Engine = On ○ Armrest Off (raised) ○ Gear selector F/R gear carrier in position N ○ Control activation F/R lever carrier in position On	○ Activation gear selector lever carrier (F/R) ○ Operating display: Active gear selector F/R
	Attempt to activate lever carrier (F/R) when lever steering (CDC) is active ○ Control activation F/R lever carrier in position On	○ Gear selector lever steering (F/R) remains active ○ INFO No Engagement F/R CDC Active
	Deactivation of lever carrier (F/R) takes place if any of the following functions are activated ○ Gear selector steering column in position F or R ○ Engine Off and Speed Off (< 5 km/h (3 mph)) ○ Armrest On (lowered) and control activation Lever steering in position On (see Activation of lever steering when F/R lever carrier is active)	○ Deactivation gear selector lever carrier (CDC) ○ Activation of gear selector steering column ○ INFO F/R Deactivated

○ Armrest, SW407 ○ Engine On/Off ○ Travel speed	Activation of lever steering (CDC) ○ Gear selector steering column in position N ○ Gear selector lever steering in position N ○ Speed Off (< 5 km/h (3 mph)) ○ Engine = On ○ Armrest Off (lowered) ○ Control activation lever steering in position On	○ Activation gear selector lever steering (CDC) ○ Control light lever steering (CDC) ○ Operating display: Active gear selector CDC
	Activation of lever steering (CDC) when lever carrier (F/R) is active ○ Gear selector steering column in position N ○ Gear selector lever steering in position N ○ Speed Off (< 5 km/h (3 mph)) ○ Engine = On ○ Armrest On (lowered) ○ Control activation lever steering in position On	○ Deactivation of gear selector lever carrier (CDC) ○ Activation gear selector lever steering ○ Control light lever steering (CDC) ○ INFO F/R Deactivated
	Deactivation of lever steering (CDC) takes place if any of the following functions are activated ○ Gear selector steering column in position F or R ○ Armrest Off (raised) ○ Engine Off and Speed Off (< 5 km/h (3 mph))	○ Deactivation gear selector lever steering (CDC) ○ Activation gear selector steering column
	Activation of single lever (joystick) ○ Engine = On ○ Speed Off (< 5 km/h (3 mph)) ○ Gear selector steering column in position N ○ Armrest Off (raised) ○ Control activation F/R lever carrier in position On	○ Activation single lever (F/N/R) ○ Operating display: Active gear selector F/R
	Activation of Kick-down if any of the following functions are activated ○ Control Kick-down steering column ○ Control Kick-down lever carrier ○ Control Kick-down lever steering (if lever steering is installed)	○ Request for Kick-down.
○ Monitoring, SW401B	○ System malfunction, incorrect signal combination See 302 ERROR Gear Selector	○ Amber central warning ○ ERROR Gear Selector
○ Monitoring, SW404	○ System malfunction, simultaneous F and R signals See 302 ERROR Gear Selector F/R	○ Amber central warning ○ ERROR Gear Selector F/R
○ Monitoring, SW409	○ System malfunction, simultaneous F and R signals See 302 ERROR Gear Selector CDC	○ Amber central warning ○ ERROR Gear Selector CDC

○ Monitoring,
RE602

○ System malfunction, open circuit or short circuit
See [302 ERROR Lever Steering CDC](#)

○ Amber central warning
○ ERROR Lever Steering
CDC

Document Title: Gearshifting solenoids	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Gearshifting solenoids

The gearshifting solenoids are controlled according to the gear engagement shifting mode. In the event of system malfunction, the operator is informed.

Input signals	Conditions for output functions	Output functions
Selected gear from V-ECU	The gearshifting solenoids are controlled according to the shifting mode	- Gearshifting solenoid SA (Gear F) - Gearshifting solenoid SD (Gear R) - Gearshifting solenoid SB (Gear 1) - Gearshifting solenoid SC (Gear 2) - Gearshifting solenoid SF (Gear 3) - Gearshifting solenoid SE (Gear 4)
Monitoring gearshifting solenoids	System error, open circuit or short circuit See 302 ERROR Gear shifting solenoids	- Amber central warning light - ERROR Gear shifting solenoids

Defective gearshifting solenoids

In case of defect of any gearshifting solenoid, manual shifting function is obtained

In case of defective gearshifting solenoid SA or SD, Neutral is obtained

In case of defective gearshifting solenoid SB, SC, SE, or SF, gear is obtained according to the table.

Solenoid SB, SC, SE, SF	Selected Gear	Obtained gear
Defective SB	1	2
Defective SC	2	3
Defective SE	4	3
Defective SF	3	4
Defective SB, SC	1	3
	2	3
Defective SB, SE	1	2
	4	3
Defective SB, SF	1	2
	3	4
Defective SC, SE	2	1
	4	3
Defective SC, SF	2	1

Defective SE, SF	3	4
	4	2
	3	2
Defective SB, SC, SE	1	3
	2	3
	4	3
Defective SB, SC, SF	1	4
	2	4
	3	4

Document Title: Downshifting signal	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Downshifting signal

This function notifies the operator that a downshift to 1st gear has been performed with a brief buzzer signal.

Input signals	Conditions for output functions	Output functions
☐ Active gear	☐ Downshifting to 1st gear	☐ Buzzer

Document Title: Transmission protection	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Transmission protection

The function limits the engine speed to 1500 rpm via the engine control unit E-ECU to protect the transmission at high transmission oil temperature or in case of slipping in the transmission.

Input signals	Conditions for output functions	Output functions
○ Transmission oil temperature ○ Slipping transmission	○ High transmission oil temperature or slipping in transmission.	○ Limitation of engine speed to 1500 rpm

Document Title: Axle oil temperature	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Axle oil temperature

This function monitors the front and rear axle oil temperatures and informs the operator if the temperature is too high or if system malfunction occurs.

If axle oil temperature is too high, an alarm is triggered at two levels for each axle.

Axle oil temperature for front and rear axles is used as input signals for radiator fan adjustment, see [301 Cooling fan adjustment](#).

Input signals	Conditions for output functions	Output functions
○ Axle oil temperature, front axle, SE410 ○ Axle oil temperature, rear axle, SE411 ○ Directional gear	○ Front axle temperature (SE410) exceeds 110 °C (230 °F) The alarm remains active until the temperature drops below 108 °C (226 °F)	○ Amber central warning ○ INFO Increasing Front Axle Oil Temp.
	○ Rear axle temperature (SE411) exceeds 110 °C (230 °F) The alarm remains active until the temperature drops below 108 °C (226 °F)	○ Amber central warning ○ INFO Increasing Rear Axle Oil Temp.
	○ Front axle temperature (SE410) exceeds 140 °C (284 °F) The alarm remains active until the temperature drops below 138 °C (280 °F)	○ Warning light ○ Red central warning ○ WARNING High Front Axle Oil Temp.
	○ Rear axle temperature (SE411) exceeds 140 °C (284 °F). The alarm remains active until the temperature drops below 138 °C (280 °F)	○ Warning light ○ Red central warning ○ WARNING High Rear Axle Oil Temp.
	Output functions according to the above and including: ○ Directional gear in Forward or Reverse	○ Buzzer
○ Monitoring SE410, SE411	○ System error, signal outside limits 302 ERROR Monitoring Axle Oil Temp. (Front axle) (MID 187 PPID 1154) See and 302 ERROR Monitoring Axle Oil Temp. (Rear axle) (MID 187 PPID 1153)	○ Amber central warning ○ ERROR Monitoring Axle Oil Temp.

Document Title: Differential lock	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Differential lock

This function controls differential lock engagement and informs the operator if the differential lock is engaged or if there is a system malfunction.

The differential lock is engaged with the foot switch that via I-ECU and V-ECU activates solenoid valve MA407. When the diff lock is engaged, the mechanical monitor SE408 gives a signal to the V-ECU for acknowledging that the diff lock is engaged and the control light is activated on the instrument panel.

Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter CVZ ○ Foot switch, SW414 ○ Acknowledgement of engaged differential lock, SE408	Overall conditions for the function ○ VCADS Pro parameter CVZ "On"	
	○ Foot switch in position On	○ Differential lock MA407
	○ Engaged differential lock	○ Amber control light differential lock engaged
○ Monitoring, MA407	○ System malfunction, open circuit or short circuit See 302 ERROR Differential lock	○ Amber central warning ○ ERROR Differential lock

Document Title: Brake pressure	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Brake pressure

This function monitors brake pressure and informs the operator if brake pressure is too low.

Input signals	Conditions for output functions	Output functions
○ Brake pressure, SE502 ○ Engine On/Off ○ Directional gear	○ Low brake pressure < 9 MPa (90 bar) (1305 psi) ○ Engine = Off	○ Warning light
	○ Low brake pressure < 9 MPa (90 bar) (1305 psi) ○ Engine = On	○ Red central warning ○ WARNING Low Brake Pressure[T1] ⓘ
	According to above as well as: ○ Directional gear in Forward or Reverse	○ Buzzer

[T1]For troubleshooting see WARNING! Low Brake Pressure

Document Title: Output brake pressure	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Output brake pressure

This function monitors output brake pressure and warns the operator if system fault occurs.

The function is used as an input signal for:

- [301 Transmission disengagement](#)
- [301 Hand Throttle](#) disengagement

For identification, the sensors are marked with part no.

Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter CWO	Overall conditions for the function ○ VCADS Pro parameter CWO "0" = 0–120 bar part no. 11170123 (New sensor) "1" = 0–100 bar part no. 11039577 (Old sensor)	
○ Monitoring, SE501	○ System malfunction, signal outside limit values See 302 ERROR Monitoring Output Brake Pressure (MID 187 PPID 1155)	○ Amber central warning ○ ERROR Monitoring Output Brake Pressure

Document Title: Brake pressure charging	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Brake pressure charging

The function controls brake pressure charging and warns the operator in the event of malfunctions in the brake charging system.

During brake charging, the cooling fan is disengaged until brake pressure has been restored, see [301 Cooling fan adjustment](#).

With VCADS Parameter BRK, one selects if the brake pressure valve MA502 is software-controlled or hardware-controlled.

Input signals	Conditions for output functions	Output functions
○ VCADS Parameter BRK ○ Brake charging pressure, SE504 ○ Accumulator brake pressure, SE502 ○ Engine speed, SE201 ○ Directional gear	Hardware-controlled MA502 ○ VCADS Pro parameter BRK "Off" ○ Low brake charging pressure (SE504) < 12.5 MPa [T1] ⓘ (125 bar) (1813 psi) for ≥ 10 seconds - or ○ Low accumulator brake pressure (SE502) < 9 MPa (90 bar) (1305 psi)	○ Brake pressure charging, MA502 ○ Fan control valve MA202 (triggers for brake pressure charging > 18 MPa (180 bar, 2610 psi))
	Software-controlled MA502 ○ VCADS Pro parameter BRK "On" ○ Low brake charging pressure (SE504) < 12.5 MPa (125 bar) (1813 psi) for ≥ 10 seconds ○ Engine speed > 700 rpm - or ○ Low accumulator brake pressure (SE502) < 9 MPa (90 bar) (1305 psi) ○ Engine speed > 700 rpm	○ Brake pressure charging, MA502 ○ Fan control valve MA202 (triggers for brake pressure charging > 18 MPa (180 bar, 2610 psi))
	Alarm conditions ○ Engine on and low brake charging pressure (SE504) < 12.5 MPa^(a) (125 bar) (1813 psi) for 60 seconds ○ Engine speed > 700 rpm (condition does not apply for hardware-controlled MA502) - or ○ Recurring low brake charging pressure (SE504) with a frequency of 10 times in 20 seconds - or ○ Low accumulator brake pressure (SE502) < 9 MPa (90 bar) (1305 psi) and brake charging pressure (SE504) > 12.5 MPa^(a) (125 bar) (1813 psi)	○ Control light ○ Red central warning light ○ WARNING Brake Charging Failure
	According to the above information and including: ○ Directional gear in Forward or Reverse	○ Buzzer
Monitoring MA502 (For software-controlled)	System malfunction, open circuit or short circuit See 302 ERROR Solenoid valve Brake pressure charging	○ Amber central warning

MA502)

○ ERROR Sol.valve Brake
pres. charging

[T1] Machines manufactured before 2003 can be equipped with sensor with limit value < 12 MPa (120 bar) (1740 psi).

Document Title: Brake test	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Brake test

This function calculates the ability of the machine to retard in order to obtain information concerning the condition of the brakes.

The brake test can be performed at a travel speed of

> 20 km/h (12 mph). Retardation is calculated, with the result and average brake pressure shown on the display panel.

If the test is not approved, no test results will appear on the display panel.

When the travel speed exceeds 10 km/h (6 mph) for the first time after a completed test, the results will be removed until a new test is completed.

The last three approved tests are saved for presentation in the service display unit.

NOTE!

Measurements are depend greatly on the type and incline of the driving surface.

Input signals	Conditions for output functions	Output functions
○ Brake test display ○ Travel speed, SE403 ○ Output brake pressure SE501	○ Brake test figure active ○ Travel speed > 20 km/h (12 mph) when the testing is started, short buzzer signal when the travel speed is exceeded ○ Retardation is calculated based on the time that it takes between 15-5 km/h (9-3 mph) when braking and may be max. 8 m/s²[T1] ⓘ	○ Buzzer ○ BRAKE TEST See 387 Display panel, information displays

[T1]When the wheels are locked, V=0 is calculated, which results in an unreasonably high (calculated) retardation.

Document Title: Parking brake	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Parking brake

This function controls the parking brake and notifies the operator if an attempt to drive with the parking brake applied is made or if there is a system malfunction.

An applied parking brake is released with the parking brake switch when the engine is running.

When the machine is switched off, the parking brake is applied irrespective of the parking brake switch position.

NOTE!

In order to protect the transmission, there's a safety function that releases the parking brake when it is applied automatically if operation of the machine is attempted.

Input signals	Conditions for output functions	Output functions
○ Ignition switch, SW101 ○ Parking brake applied, SE503 ○ Engine speed, SE201 ○ Engine On/Off ○ Travel speed, SE403 ○ Directional gear ○ Switch, parking brake, SW501	Machine stationary: ○ Engine Off ○ Travel speed < 0.5 km/h (0.3 mph) ○ Ignition switch in position 0	○ Parking brake applied, no voltage to MA501 and no pressure to SE503
	Machine in starting position: ○ Engine Off ○ Travel speed < 0.5 km/h (0.3 mph) ○ Directional gear in position Neutral ○ Ignition switch in position 1	○ Parking brake applied, no voltage to MA501 and no pressure to SE503 ○ Warning light, parking brake
	Machine in operation with gear control in Neutral position: ○ Parking brake switch in Applied position ○ Engine On ○ Directional gear in position Neutral	○ Parking brake applied, no voltage to MA501 and no pressure to SE503 ○ Warning light, parking brake
	Machine in operation with gear control in Forward or Reverse position: ○ Parking brake switch in Applied position ○ Engine On ○ Directional gear in Forward or Reverse	○ Parking brake applied, no voltage to MA501 and no pressure to SE503 ○ Warning light, parking brake ○ Red central warning light ○ WARNING Applied Parking Brake ○ Buzzer

	Parking brake release when machine is running and parking brake is applied with parking brake switch: ○ Parking brake switch in Released position ○ Directional gear in position Neutral ○ Engine On	○ Parking brake is released, MA501 supplied with voltage and SE503 pressurized
	The Safety function[T1] ⓘ "Parking brake release" when the machine is running and the parking brake is applied by stopping the machine with ignition switch in position 0: ○ Directional gear in Forward or Reverse ○ Parking brake applied ○ Engine speed > 1600 rpm ○ Parking brake switch in Released position	○ Parking brake released, MA501 supplied with voltage and SE503 pressurized
○ Monitoring, MA501	○ System malfunction, monitoring of MA501 ○ See 302 ERROR Parking Brake	○ Amber central warning light ○ ERROR Parking Brake
○ Logic diagnostics	○ When MA501 receives signal about pressure change, SE503 should indicate the change within ≤ 3 seconds See 302 ERROR Parking Brake Circuit	○ Amber central warning light ○ ERROR Parking Brake Circuit

[T1] The Safety function protects the transmission and must not be used to release the parking brake with the switch.

Document Title: Secondary steering	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Secondary steering

The function makes it possible for the operator to steer the machine in case the primary steering pump fails. The function notifies the operator if there is a malfunction in the primary steering system or if there is a system malfunction.

The secondary steering pump is engaged when the primary steering pump capacity is insufficient, for example, at low engine speeds.

Input signals	Conditions for output functions	Output functions
○ Secondary steering installed ○ Control test secondary steering, SW601 ○ Differential pressure secondary steering, SE601 ○ Steering pressure, SE602 ○ Engine On/Off ○ Travelling speed, SE403	Start of secondary steering pump for back-up of primary steering pump: ○ Secondary steering installed ○ Travel speed exceeds > 3 km/h (2 mph) for > 5 seconds ○ Differential pressure secondary steering low for > 0.5 seconds Secondary pump is activated for as long as the above conditions apply.	○ RE601, start secondary steering pump MO601 ○ Control light, Secondary steering engaged
	Start of secondary steering pump for secondary steering: ○ Secondary steering installed ○ Speed above > 3 km/h (2 mph) > 5 seconds ○ Differential pressure secondary steering low for > 0.3 seconds ○ Steering pressure low for > 0.3 seconds Secondary steering pump operates until speed has dropped below < 3 km/h (2 mph) for > 2 seconds.	○ RE601, start secondary steering pump MO601 ○ WARNING Low Steering System Oil Pressure ○ Warning light, Malfunction in primary steering system ○ Red central warning ○ Buzzer
	Secondary steering function test: ○ Secondary steering installed ○ Engine Off ○ Control test, secondary steering engaged ○ Differential pressure secondary steering low ○ Steering pressure low Secondary steering pump is activated until the control is released	○ RE601, start secondary steering pump MO601 ○ Control light, Secondary steering engaged
○ Monitoring, SE601 and SE602	○ Engine Off ○ System malfunction, open circuit See 302 ERROR Monitoring Steering System Oil Pressure (SE601) (MID 187 PPID 1046) and 302 ERROR Monitoring Steering System Oil Pressure (SE602) (MID 187 PSID 1303)	○ Amber central warning ○ ERROR Monitoring Steering System Oil Pressure
○ Monitoring,	○ System malfunction, open circuit or short circuit	○ Amber central warning

RE601	See 302 ERROR Secondary Steering Relay	○ ERROR Secondary Steering Relay
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Incorrect input signals

- Speed malfunction (SE403) speed considered to be > 3 km/h (2 mph).
- In case of malfunction of Engine On/Off (engine rpm), the engine is considered to be Off.
- In case of malfunction of Control test secondary steering (SW601), the control is considered to be Off.
- In case of malfunction of Steering pressure (SE602), the steering pressure is considered to be low.
- In case of malfunction of Diff pressure secondary steering (SE601), the diff pressure is considered to be high.

Document Title: Secondary steering	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Secondary steering

The function makes it possible for the operator to steer the machine in case the primary steering pump fails. The function notifies the operator if there is a malfunction in the primary steering system or if there is a system malfunction.

The secondary steering pump is engaged when the primary steering pump capacity is insufficient, for example, at low engine speeds.

Function test of secondary steering is automatic at start of the machine.

Input signals	Conditions for output functions	Output functions
○ Secondary steering installed ○ Secondary steering pressure, SE606 ○ Differential pressure secondary steering, SE601 ○ Steering pressure, SE602 ○ Engine On/Off ○ Travel speed, SE403	Start of secondary steering pump for back-up of primary steering pump: ○ Secondary steering installed ○ Travel speed exceeds > 3 km/h (2 mph) for > 5 seconds ○ Differential pressure secondary steering low for > 0.5 seconds Secondary pump is activated for as long as the above conditions apply.	○ RE601, start secondary steering pump MO601 ○ Control light, Secondary steering engaged
	Start of secondary steering pump for secondary steering: ○ Secondary steering installed ○ Speed above > 3 km/h (2 mph) > 5 seconds ○ Differential pressure secondary steering low for > 0.3 seconds ○ Steering pressure low for > 0.3 seconds Secondary steering pump operates until speed has dropped below < 3 km/h (2 mph) for > 2 seconds.	○ RE601, start secondary steering pump MO601 ○ WARNING Low Steering System Oil Pressure ○ Warning light, Malfunction in primary steering system ○ Red central warning ○ Buzzer
	Automatic function test of secondary steering at start of the machine: ○ Secondary steering installed ○ Engine = On ○ Secondary steering pressure	○ RE601, start secondary steering pump MO601 The secondary steering pump operates until the secondary steering pressure is > 9.9 Mpa (1436 psi) within 5 seconds. ○ Control light, Secondary steering engaged The following is obtained if the secondary steering pressure does not reach 9.9 Mpa (1436 psi) within 5 seconds: ○ Red central warning ○ Warning Secondary

Steering No Function		
○ Monitoring, SE601 and SE602	○ Engine Off ○ System malfunction, open circuit See 302 ERROR Monitoring Steering System Oil Pressure (SE601) (MID 187 PPID 1046) and 302 ERROR Monitoring Steering System Oil Pressure (SE602) (MID 187 PSID 1303)	○ Amber central warning ○ ERROR Monitoring Steering System Oil Pressure
○ Monitoring, RE601	○ System malfunction, open circuit or short circuit See 302 ERROR Secondary Steering Relay	○ Amber central warning ○ ERROR Secondary Steering Relay

Incorrect input signals

- Speed malfunction (SE403) speed considered to be > 3 km/h (2 mph).
- In case of malfunction of Engine On/Off (engine rpm), the engine is considered to be Off.
- In case of malfunction of Control test secondary steering (SW601), the control is considered to be Off.
- In case of malfunction of Steering pressure (SE602), the steering pressure is considered to be low.
- In case of malfunction of Differential pressure secondary steering (SE601), the differential pressure is considered to be low.

Document Title: Soft start and safety for AC	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Soft start and safety for AC

This function controls engagement and disengagement of the cooling compressor and informs the operator if there's a system malfunction.

Selection of which AC system is installed on the machine is performed with VCADS Pro.

Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter BIH ○ VCADS Pro parameter BGJ ○ VCADS Pro parameter BRJ ○ Pressure monitor, SE804 ○ Activation AC, SW806 ○ ATC, CU803, On/Off ○ Engine speed, SE201 ○ Engine On/Off ○ Reversal cooling fan ○ Activation attachment locking, SW904 ○ Outdoor temperature, SE807 ○ Key feed On/Off	Soft start at start-up of machine ○ Key feed has been Off > 4 hours ○ Engine speed > 100 rpm ○ Pressure monitor On	○ Engagement of cooling compressor via RE806 for 10 seconds
	Monitoring at start-up of machine ○ Pressure monitor Off at < 0.1–0.2 MPa (1–2 bar) (14.5–29 psi) ○ System voltage On ○ Ambient temperature > 10 °C (50 °F)	○ Amber central warning ○ ERROR AC-system See operators manual See troubleshooting information 302 ERROR AC-system See operators manual
	Normal operation for AC ○ VCADS Pro parameter BGJ system "AC" ○ Activation AC On ○ Engine On ○ Pressure monitor On	○ Engagement of cooling compressor via RE806
	Normal operation for ATC ○ VCADS Pro parameter BGJ system "ATC" ○ Activation AC On ○ ATC On ○ Engine On ○ Pressure monitor On	○ Engagement of cooling compressor via RE806
	Reversal of cooling fan during normal operation of AC or ATC ○ Requested reversal of cooling fan ○ Cooling compressor engaged	○ Disengagement of cooling compressor until reversal sequence is finished
	Safety during normal operation ○ Activation AC On ○ Engine On ○ Pressure monitor (1-2nd function[1] ⓘ) Off at < 0.1-0.2 Mpa (1-2 bar) (14.5-29 psi) or > 2.1-2.5 Mpa (21-25 bar) (305-363 psi) Restart to normal operation	○ Disengagement of cooling compressor via RE806

	After the malfunction has been corrected, the AC must be deactivated and then activated again with SW806.	
	Return to normal operation at manoeuvring of attachment locking with SW904 ○ Pressure monitor Off (1-2nd function^(a)) at < 0.1-0.2 Mpa (1-2 bar) (14.5-29 psi) or > 2.1-2.5 Mpa (21-25 bar) (305-363 psi) ○ < 10 seconds since SW904 has changed status ○ Pressure monitor On within < 60 seconds	○ 10 seconds after the pressure monitor is ON, the cooling compressor is engaged via RE806
	Alarm conditions increased pressure at not installed attachment locking ○ VCADS Pro parameter BGJ system "AC" or "ATC" or VCADS Pro parameter BIH increased fan rpm "On" ○ VCADS Pro parameter BRJ attachment locking "Off" ○ Ambient temperature < 25°C (77°F) ○ Engine On ○ Pressure monitor (3rd function[2] ⓘ) On > 1.8 MPa (18 bar) (261 psi)	○ Amber central warning ○ INFO Check / Clean Condenser
	Alarm conditions increased pressure at installed attachment locking ○ VCADS Pro parameter BGJ system "AC" or "ATC" or VCADS Pro parameter BIH increased fan rpm "On" ○ VCADS Pro parameter BRJ attachment locking "On" ○ Ambient temperature < 25°C (77°F) ○ Engine On ○ Pressure monitor (3rd function^(b)) On > 1.8 MPa (18 bar) (261 psi) ○ > 120 seconds since SW904 attachment locking was operated	○ Amber central warning ○ INFO Check / Clean Condenser
	Alarm conditions high pressure at not installed attachment locking ○ VCADS Pro parameter BGJ system "AC" or "ATC" ○ Ambient temperature > 0 °C (32 °F) ○ Engine On ○ Pressure monitor (1-2nd function^(a)) Off at < 0.1-0.2 Mpa (1-2 bar) (14.5-29 psi) or > 2.1-2.5 Mpa (21-25 bar) (305-363 psi) ○ Pressure monitor (3rd function^(b)) On > 1.8 MPa (18 bar) (261 psi)	○ Amber central warning ○ INFO Check / Clean Condenser
	Alarm conditions high pressure at installed attachment locking ○ VCADS Pro parameter BGJ system "AC" or "ATC" ○ Ambient temperature > 0 °C (32 °F) ○ Engine On ○ Pressure monitor (1-2nd function^(a)) Off at <	○ Amber central warning ○ INFO Check / Clean Condenser

	0.1-0.2 Mpa (1-2 bar) (14.5-29 psi) or > 2.1-2.5 Mpa (21-25 bar) (305-363 psi)
○	Pressure monitor (3rd function ^b) On > 1.8 MPa (18 bar) (261 psi)
○	> 120 seconds since SW904 attachment locking was operated

Incorrect input signals

In case of malfunction of any VCADS-Pro parameter, it is considered to be Off.

In case of malfunction of pressure monitor SE804, it is considered to be Off.

In case of malfunction of Activation of AC or ATC, it is considered to be Off.

In case of malfunction of Engine On/Off, it is considered to be On.

In case of malfunction of Activation of attachment locking, it is considered to be Locked.

In case of malfunction of Ambient temperature, it is considered to be > 25 °C.

In case of malfunction of Key feed, Soft start shall be performed again.

[1]Low and high pressure monitor.

[2]Monitor for engagement of increased cooling fan rpm.

Document Title: Hydraulic Oil Level	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic Oil Level

This function monitors the hydraulic oil level and informs the operator that it is time to fill hydraulic oil and to warn if the level drops below the allowed level or if there is a system malfunction.

The sensor for the hydraulic oil level is available in two versions, analogue level sensor and level monitor (digital). Selection of installed sensor is performed with VCADS Pro.

Analogue level sensor[1] ⓘ

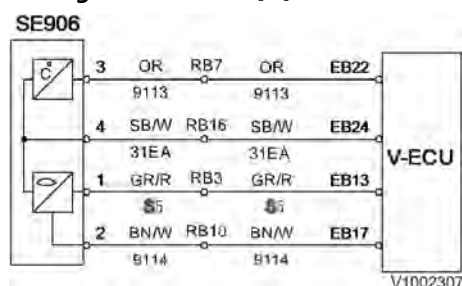


Figure 1
Analogue level and temperature sensor

Alarm level (filling and warning level) is temperature-dependent.

The nominal warning level (not temperature-compensated) in the hydraulic oil tank is 350 mm from the flange edge.

Calculation of real alarm levels:

- Filling level, $X - k (T - 25)$
- Warning level, $350 - k (T - 25)$

T = Hydraulic oil temperature

Model	Filling level, X[T1] ⓘ	Constant, k
L60E	153	0.4
L70E	153	0.4
L90E	153	0.4
L110E	153	0.35
L120E	190	0.35
L150E	190	0.5
L180E	190	0.5
L330E	217	0.5

[T1] From flange edge

Level monitor

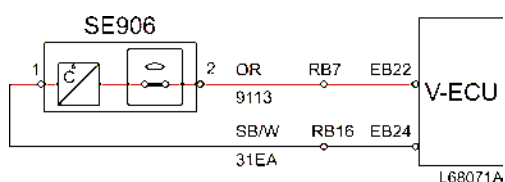


Figure 2
Level monitor with analogue temperature sensor

NOTE!

that the level monitor is connected in series with the temperature sensor, and that is why no sensing of the hydraulic oil temperature can take place if the hydraulic oil level is under the warning level.

Input signals	Conditions for output functions	Output functions
- VCADS Pro parameter BGY - Hydraulic oil level, SE906 - Hydraulic oil temperature, SE906 - Directional gear - Travel speed, SE403	Level check with analogue level sensor Level check is only performed when machine is started. - VCADS Pro parameter BGY selected to "Analogue" - Directional gear in position Neutral - Travel speed ≤ 0.5 km/h (0.3 mph) - Hydraulic oil level under filling level[T1] ⓘ	- Amber central warning lamp - INFO Min. Hydraulic Oil Level
	Analogue level sensor - VCADS Pro parameter BGY selected to "Analogue" - Hydraulic oil level under warning level > 2 seconds[T2] ⓘ	- Warning lamp - Red central warning lamp - WARNING Low Hydraulic Oil Level
	Level monitor - VCADS Pro parameter BGY selected to "Digital" (level monitor) - Hydraulic oil level under warning level > 2 seconds	- Warning lamp - Red central warning lamp - WARNING Low Hydraulic Oil Level
	Analogue level sensor or level monitor according to above as well as: Directional gear in Forward or Reverse	Buzzer
Monitoring, SE906	- System fault, signal outside limits - See 302 ERROR Monitoring Hydraulic Oil Temp. (MID 187 PPID 1041)	- Amber central warning lamp - ERROR Monitoring Hydraulic Oil Temp. [T3] ⓘ

[T1]In case of incorrect input signal on the hydraulic oil temperature, the nominal filling level is used as alarm level.

[T2]In case of incorrect input signal on the hydraulic oil temperature, the nominal warning level is used as alarm level.

[T3]The information display is common for system malfunction for hydraulic oil level and hydraulic oil temperature.

[1]Does not apply to L220E

Document Title: Hydraulic oil temperature	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic oil temperature

This function monitors the hydraulic oil temperature and informs the operator when the temperature is too high or if a system fault occurs.

Hydraulic oil temperature is used as input signal for cooling fan adjustment, see [301 Cooling fan adjustment](#).

Input signals	Conditions for output functions	Output functions
○ Hydraulic oil temperature, SE906 ○ Directional gear	○ Hydraulic oil temperature > 110°C (230 °F)	○ Red central warning lamp ○ Warning High hydraulic oil temp.
	According to the above information and including: ○ Directional gear in Forward or Reverse	○ Buzzer
○ Monitoring, SE906	○ System fault, signal outside limits See 302 ERROR Monitoring Hydraulic Oil Temp. (MID 187 PPID 1041)	○ Amber central warning lamp ○ ERROR Monitoring Hydraulic Oil Temp.[T1] ①

[T1] The information display is the same if system fault for hydraulic oil level and hydraulic oil temperature occurs.

Document Title: Warming of hydraulic oil	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Warming of hydraulic oil

The function makes sure that the temperature in the hydraulic oil quickly reaches operating temperature in case of low outdoor temperature. Warming takes place through pressure-drop across the brake pressure valve, which has a small restriction.

Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter BRL ○ Hydraulic oil temperature, SE906 ○ Coolant temperature engine, SE2606 ○ Charge-air temperature, SE2507 ○ Induction temperature, SE2501 ○ Engine On/Off	Overall conditions for the function ○ VCADS Pro parameter BRL "On"	
	Overall conditions for warming ○ Engine On ○ Coolant temperature > 90°C or ○ Intake temperature < 25°C ○ Charge-air temperature > 45°C If the above conditions are fulfilled, warming of the hydraulic oil takes place according to the conditions below.	○ No warming
	Warming 1 ○ Hydraulic oil temperature 0 – 5°C ○ Engine On Warming of the hydraulic oil stops when the hydraulic oil temperature reaches > 15°C.	○ Brake pressure charging ○ Fan control valve MA202, 15 MPa (150 bar) (2176 psi)
	Warming 2 ○ Hydraulic oil temperature < 0°C ○ Engine On When the hydraulic oil temperature reaches > 0, the triggering pressure for MA202 changes according to warming 1.	○ Brake pressure charging ○ Fan control valve MA202, 21 MPa (210 bar) (3046 psi)

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Boom Suspension System \(BSS\)](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Software release start: V2005.1.0

Software release stop: V2005.6.0

- [Boom Suspension System \(BSS\)](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Software release start: V2006.1.0

Software release stop: V2006.6.0

Document Title: Boom Suspension System (BSS)	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Boom Suspension System (BSS)

This function activates and deactivates the boom suspension system and informs the operator regarding activating or if a system fault occurs.

With switch SW925 speed or gear dependent boom suspension is activated and selected. When activated, a control light is lit on the instrument panel.

When fully automatic is activated with speed-dependent boom suspension system, engagement of boom suspension takes place with a combination of speed and gear positions. The speed for disengaging is set with VCADS Pro parameter CWP within the interval 8–20 km/h (5–12 mph) 5 km/h (3 mph). Basic setting is 8 km/h (5 mph).

The gear-dependent boom suspension system is not affected by fully automatic.

On the information display unit under the menu HYDRAULICS, one can read if the boom suspension is engaged or not, see [387 Display panel, information displays](#).

Boom suspension with Fully automatic not activated		
Input signals	Conditions for output functions	Output functions
○ Boom suspension system, SW925 ○ Activation Fully automatic, SW417 ○ Engine On/Off ○ Travelling speed, SE403 ○ Kick-down ○ Directional gear ○ Active gear	Overall conditions at not activated Fully automatic ○ SW417 Off Speed-dependent: ○ SW 925 in position travel speed dependent boom suspension system (boom suspension system control light is lit)[T1] ⓘ ○ Engine On ○ Directional gear in position Forward, Reverse or Neutral ○ Travelling speed > 6 km/h (4 mph) or ○ Speed gear in position R2, R3, R4 Disengagement of boom suspension system takes place if any of the following conditions are fulfilled: ○ Directional gear in position Forward and travel speed < 5 km/h (3 mph) ○ Directional gear in position Reverse and travelling speed < 2 km/h (1 mph) ○ Directional gear in position Neutral and Travelling speed < 2 km/h (1 mph)	○ Engagement of boom suspension system via relay RE7
	Gear-dependent:	○ Disengagement of boom suspension system via relay RE7
		○ Engagement of boom

	○ SW 925 in gear-dependent boom suspension position (boom suspension system control lamp switched on)^(a) ○ Engine On ○ Directional gear in position Forward, Reverse or Neutral ○ Gear not in position F1 or R1 ○ Kick-down not requested Disengagement of boom suspension system takes place if any of the following conditions is fulfilled: ○ Gear in position F1 or R1 ○ Kick-down requested	suspension system via relay RE7 ○ Disengagement of boom suspension system via relay RE7
○ Monitoring, RE7	○ System fault, open circuit or short circuit See 302 ERROR Relay BSS	○ Amber central warning lamp ○ ERROR Relay BSS

[T1]Control light is lit continuously as long as function is activated.

Boom suspension system with Fully automatic activated		
Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter CWP ○ Boom suspension system, SW925 ○ Activation Fully automatic, SW417 ○ Engine On/Off ○ Travelling speed, SE403 ○ Kick-down ○ Directional gear ○ Active gear	Overall conditions at activated Fully automatic ○ SW417 On Speed-dependent: ○ SW 925 in position travel speed dependent boom suspension system (boom suspension system control light is lit)[T1] ⓘ ○ Engine On ○ Directional gear in position Forward, Reverse or Neutral ○ Kick-down not requested ○ VCADS Pro parameter CWP speed > 8–20 km/h (5–12 mph) or ○ Speed gear in position R2, R3, R4 Disengagement of boom suspension system takes place if any of the following conditions are fulfilled: ○ Directional gear in position Forward or Neutral and VCADS Pro parameter CWP speed < 8–20 km/h (5–12 mph) ○ Gear in position R1 ○ Request for Kick-down	○ Engagement of boom suspension system via relay RE7 ○ Disengagement of boom suspension system via relay RE7

	Gear-dependent: ○ SW 925 in gear-dependent boom suspension position (boom suspension system control lamp switched on)^(a) ○ Engine On ○ Directional gear in position Forward, Reverse or Neutral ○ Gear not in position F1 or R1 ○ Kick-down not requested Disengagement of boom suspension system takes place if any of the following conditions is fulfilled: ○ Gear in position F1 or R1 ○ Kick-down requested	○ Engagement of boom suspension system via relay RE7 ○ Disengagement of boom suspension system via relay RE7
○ Monitoring, RE7	○ System fault, open circuit or short circuit See 302 ERROR Relay BSS	○ Amber central warning lamp ○ ERROR Relay BSS

[T1]Control light is lit continuously as long as function is activated.

Incorrect input signals

In case of malfunction of any of the following input signals, the boom suspension system will not be engaged:

- Engine On/Off
- Travel speed
- Kick-down
- Directional gear
- Active gear
- Function and activation Boom Suspension System, SW925

Document Title: Boom Suspension System (BSS)	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Boom Suspension System (BSS)

This function activates and deactivates the boom suspension system and informs the operator regarding activating or if a system error occurs.

With switch SW925 speed or gear dependent boom suspension is activated and selected. When activated, a control light is lit on the instrument panel.

Limit values for engagement and disengagement of speed-dependent boom suspension is set with separate VCADS Pro parameters for directional gears forward and reverse with and without activated fully automatic (SW417).

In case of activated gear-dependent boom suspension (SW925), the boom suspension is always engaged except in the lowest gears F1 and R1 as well as kick-down. The gear-dependent boom suspension is not affected by fully automatic.

On the information panel under the menu HYDRAULICS, it's possible to see if the boom suspension system is engaged or disengaged, see [387 Information display unit, information displays](#).

Gear dependent boom suspension system		
Input signals	Conditions for output functions	Output functions
○ Boom suspension system, SW925 ○ Engine On/Off ○ Kick-down On/Off ○ Directional gear ○ Active gear ○ Travelling speed, SE403	Overall conditions ○ SW 925 in position gear-dependent boom suspension (boom suspension system control light is lit)[T1] ⓘ ○ Engine = On ○ Kick-down Off Directional gear Neutral ○ Directional gear in position Neutral ○ Travel speed < 2 km/h (1 mph) Directional gear Forward ○ Directional gear in position Forward ○ Speed gear in position F2, F3, F4 Directional gear Reverse ○ Directional gear in position Reverse ○ Speed gear in position R2, R3, R4	○ Engagement of boom suspension system via relay RE7

○ Monitoring, RE7	Disengagement of boom suspension system takes place if any of the following conditions are fulfilled: ○ Directional gear in position Forward and speed gear in position F1 ○ Directional gear in position Reverse and speed gear in position R1 ○ Kick-down On	○ Disengagement of boom suspension system via relay RE7 Under the menu "Hydraulics" in the information panel, the status shows disengaged/engaged.
	○ System malfunction, open circuit or short circuit See 302 ERROR Relay BSS	○ Amber central warning lamp ○ ERROR Relay BSS

[T1]Control light is lit continuously as long as function is activated.

Speed-dependent boom suspension without activated Fully automatic		
Input signals	Conditions for output functions	Output functions
○ Boom suspension system, SW925 ○ Activation Fully automatic, SW417 ○ Engine On/Off ○ Kick-down On/Off ○ Directional gear ○ Active gear ○ Travelling speed, SE403 ○ VCADS Pro parameter HBN ○ VCADS Pro parameter HBO	Overall conditions ○ SW925 in position speed-dependent boom suspension (boom suspension system control light switched on)[T1] ⓘ ○ SW417 Fully automatic Off ○ Engine = On ○ Kick-down Off Directional gear Forward ○ Directional gear in position Forward ○ Speed gear in position F1, F2, F3, F4 ○ Speed > VCADS Pro parameter HBN + 1 km/h (1 mph) HBN = 5–20 km/h (3–12 mph), default 5 km/h (3 mph) Directional gear Reverse R ○ Directional gear in position Reverse ○ Speed gear in position R1, R2, R3, R4 ○ Speed > VCADS Pro parameter HBO HBO = 5–20 km/h (3–12 mph), default 6 km/h (4 mph) Disengagement of boom suspension system takes place if any of the following conditions are fulfilled: ○ Directional gear in position Forward and speed < VCADS Pro parameter HBN ○ Directional gear in position Reverse and travel speed < 2 km/h (1 mph) ○ Directional gear in position Neutral and Travel speed < 2 km/h (1 mph)	○ Engagement of boom suspension system via relay RE7 Under the menu “Hydraulics” in the information panel, the status shows disengaged/engaged.
○ Monitoring, RE7	○ System malfunction, open circuit or short circuit See 302 ERROR Relay BSS	○ Amber central warning lamp ○ ERROR Relay BSS

[T1]Control light is lit continuously as long as function is activated.

Speed-dependent boom suspension with activated Fully automatic		
Input signals	Conditions for output functions	Output functions
○ Boom suspension system, SW925 ○ Activation Fully automatic, SW417 ○ Engine On/Off ○ Kick-down On/Off ○ Directional gear ○ Active gear ○ Travelling speed, SE403 ○ VCADS Pro parameter HFD ○ VCADS Pro parameter HBM	Overall conditions ○ SW 925 in speed dependent boom suspension system position (boom suspension system control light switched on)[T1] ⓘ ○ SW417 Fully automatic On ○ Engine = On ○ Kick-down Off Directional gear Forward ○ Directional gear in position Forward ○ Speed gear in position F1, F2, F3, F4 ○ Speed > VCADS Pro parameter HFD + 1 km/h (1 mph) ○ HFD = 8–20 km/h (5–12 mph), default 8 km/h (5 mph) Directional gear Reverse ○ Directional gear in position Reverse ○ Speed gear in position R1, R2, R3, R4 ○ Speed > VCADS Pro parameter HBM + 1 km/h (1 mph) ○ HBM = 0–20 km/h (0–12 mph), default 0 km/h (0 mph) Disengagement of boom suspension system takes place if any of the following conditions are fulfilled: ○ Directional gear in position Forward and speed < VCADS Pro parameter HFD ○ Directional gear in position Reverse and speed < VCADS Pro parameter HBM	○ Engagement of boom suspension system via relay RE7 Under the menu “Hydraulics” in the information panel, the status shows disengaged/engaged.
○ Monitoring, RE7	○ System malfunction, open circuit or short circuit See 302 ERROR Relay BSS	○ Amber central warning lamp ○ ERROR Relay BSS

[T1]Control light is lit continuously during function activation.

Incorrect input signals

In case of malfunction of any of the input signals, the boom suspension system will not be engaged.

Document Title: Attachment locking	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Attachment locking

The function informs the operator that attachment locking is open and that the operator must confirm locking when changing attachments by acknowledging the warning with the SELECT- button on the keypad.

Attachment locking is operated with switch SW904.

In order to obtain sufficiently high pressure when opening/closing the attachment lock, brake pressure charging is requested when the attachment lock is to be opened/closed.

If the charge-air temperature exceeds 90°C (194°F), there is no active brake pressure charging until the temperature is below 90°C (194°F).

Start-up of machine

At start of the machine and switch SW904 for attachment locking in position Locked, then attachment locking will be active for 60 seconds before attachment locking can be opened with SW904.

Opening attachment lock

Release the catch on switch SW904 and move it to open position. Brake pressure charging is requested for 10 seconds and MA946 is acted on to open the attachment lock. When the attachment lock is open, red central warning is activated with the message "WARNING Attachment Lock Open".

Closing attachment lock

Move switch SW904 to closed position. Brake pressure charging is requested for 10 seconds and MA947 is acted on to close the attachment lock during 30 seconds. When the attachment lock is to be closed, red central warning is activated with the message "WARNING Attachment Lock Check Lock! Acknowledge: Sel.", after which locking is acknowledged by the operator with the SELECT- button on the keypad.

Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter BRJ ○ Engine On/Off ○ Switch attachment locking, SW904 ○ Acknowledgement, SELECT[T1] ⓘ ○ Charge-air temperature, SE2507 ○ Key feed On/Off	Overall conditions for the function ○ VCADS Pro parameter BRJ "On"	
	Opening ○ Key feed On ○ Engine On ○ SW904 in position Open (MA946 to position open attachment lock) ○ Charge-air temperature < 90°C (194°F)	○ Brake pressure charging during 10 seconds ○ Red central warning ○ WARNING Attachment Lock Open
	Closing ○ Key feed On ○ Engine On ○ SW904 in position Locked ○ Charge-air temperature < 90°C (194°F)	○ Brake pressure charging during 10 seconds ○ MA947 to position closing of attachment lock for 30 seconds ○ Red central warning ○ WARNING Attachment Lock Check Lock! Acknowledge: Sel.
Monitoring MA947	System error, open circuit or short circuit See 302 ERROR Sol. valve Attachment lock	○ Amber central warning light

○	ERROR	Sol.	valve
	Attachment lock		

[T1]On keypad

Document Title: Automatic lift arm lowering (Return to dig)	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Automatic lift arm lowering (Return to dig)

The function automatic lift arm lowering (Return to dig) is engaged when the lever for operating the lift arms is moved to hold position for lift arm lowering. The lift arms will then be lowered, the lever releases from hold position and the lift arms stop at a pre-set position via position sensors on the boom. By moving the lever back to hold position, float mode is engaged.

Activation of automatic lift arm lowering (Return to dig) and float mode with switch SW933.

Input signals	Conditions for output functions	Output functions
○ VCADS Pro parameter CWM ○ Lift arm position SE922 ○ Lever in hold position SE932 ○ Engine On/Off ○ Travel speed	Overall conditions for the function ○ VCADS Pro parameter CWM "On" ○ SW933 for automatic lift arm lowering (Return to dig)/float mode in position "On"	
	Locking lever in hold position ○ Engine = On ○ Speed < 15 km/h (9.3 mph) ○ Lever in hold position (SE932) > 200 ms	○ Relay RE913 is activated and hold solenoid MA904 locks the lever in hold position
	Lowering ○ Lift arms leave "High position" (SE922) ○ Lever in hold position (SE932)	○ MA959 Starts slow-down (braking) ○ The lever releases from hold position after set time
	Stop of lowering ○ Lift arms reach "Low position" (SE922)	○ MA959 Lift arms stop at pre-set position
○ Monitoring, RE913	○ System malfunction, open circuit or short circuit. See 302 ERROR Relay Hold position	○ Amber central warning ○ ERROR Relay Hold position
○ Monitoring, MA959	○ System malfunction, open circuit or short circuit. See 302 ERROR Pressure regulator RTD	○ Amber central warning ○ ERROR Pressure regulator RTD

Document Title: Central lubrication	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Central lubrication

The function engages central lubrication (CU802) and prevents the machine from being greased unnecessarily, for example, when the machine runs at idle and has the gear selector in Neutral position.

To ensure lubrication even in case of lost signal, for example, severed lead, the signal to central lubrication is inverted, that is, no signal on pin gives engagement of central lubrication.

To obtain correct lubrication for the current work load, three different pre-programmed lubrication cycles can be selected with switch SW808.

Indication of selected lubrication cycle takes place by the control light in switch SW808 flashing once, twice or three times, depending on the selected lubrication cycle.

Input signals	Conditions for output functions	Output functions
○ Directional gear ○ Engine On/Off	○ Directional gear in position Forward or Reverse ○ Engine = On	○ Engagement of central lubrication[T1] ⓘ

[T1]Timer in pump unit CU802 controls lubrication interval

Document Title: Central lubrication, status indication	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Central lubrication, status indication

The function monitors the lubrication oil level and informs the operator in case of low lubrication oil level or if there's a system malfunction.

Input signals	Conditions for output functions	Output functions
○ VCADS pro-parameter BGR ○ Indication central lubrication	Overall conditions for the function ○ VCADS Pro parameter BGR "On"	
	○ Indication central lubrication flashes with 1 Hz > 5 seconds	○ Amber central warning ○ INFO Low Lubricant Level
	○ Indication central lubrication On > 5 seconds	○ Amber central warning ○ ERROR Central Lubrication System See troubleshooting information 302 ERROR Central Lubrication System

Document Title: Setting software parameters	Function Group: 301	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Setting software parameters

The machine is equipped to set certain software parameters in order to affect functionality and display format. The parameters can be read and set using the information display unit, service display unit and VCADS Pro.

NOTE!

Parameters which are incorrectly set can result in malfunction symptoms.

Check parameter values so that these are reasonable by comparing them to possible values and reference values according to the tables.

The tables present the parameters that can be set with the information display unit, service display unit and VCADS Pro.

NOTE!

From and incl. release R517 the languages in the information display unit are divided into two groups. The division is due to there being two different softwares (MSW) for the instrument electronic control unit (I-ECU).

Information display unit

Designation	Description	Possible values
Setting	Selection of language and units for information display unit	Language group 1: Svenska / English / Deutsch / Français / Español / Italiano / Nederlands / Português Language group 2: Svenska / English / Español / Suomi / Türkiye / Português / Polski and Russian / Japanese, shown with each language's characters. Metrics / US
Operating hours	Setting of machine hours when changing V-ECU	Hours xxxxx
Date / Time	Setting of display alternative and date / time	Alt 1. yyyy-mm-dd, yy:yy 2. yyyy-mm-dd, yy:yy, am/pm 3. mm.dd.yyyy, yy:yy 4. mm.dd.yyyy, yy:yy, am/pm 5. dd.mm.yyyy, yy:yy 6. dd.mm.yyyy, yy:yy, am/pm
Reversible cooling fan	Selection of reversing mode	☐ Manual ☐ 3/30 ☐ 1/15 ☐ Off
Transmission disengagement	Selecting activating transmission disengagement	☐ On ☐ Off

Service display unit

Designation	Description	Possible values
Language and units	Language selection	Svenska / English / Deutsch / Francais / Espanol
	Selection of units	Metrics / US
Engine, fan	Maximum rpm setting for cooling fan engine	A / B / C
Axleoilcooler	Indicates if the machine is equipped with axle oil cooler or not	Y / N
Tire	–	35/65
Single lever Control	Single lever control equipment, activating	Y / N
Hand Throttle	Electric hand throttle equipment, activating	Y / N
Engine	Engine oil change interval setting	125h / 250h / 500h

VCADS Pro

Code	Description
ABP	Activates the anti-theft device that prevent starting of the vehicle.
ABQ	Select PIN code for anti-theft device
ACD	Selecting the language for the service display
ACE	Selecting the units for the service display
ACF	Selecting the language for the driver display
ACG	Selecting the units for the driver display
ACH	Date/time format in the driver display
ACI	Indicates whether a hand throttle is installed
ACJ	Indicates whether a single lever control is installed
ACK	Selecting the speed of the engine cooler fan
ACL	Indicates whether there is axle oil cooling
ACM	Selecting the tyre sizes
ACN	Indicates the engine oil change intervals
ACO	The maximum vehicle speed. The maximum speed is determined by legal requirements.
AMU	Speed limit for an active Comfort Drive Control control lever.
ASH	The parameter activates/deactivates idling delay
BGJ	AC mode installed
BGK	Cooling Fan reversal activated
BGL	Interval between activation of each reversal
BGM	Reversion long duration
BGN	Interval between activation of each reversal
BGO	Reversion short duration
BGP	Reversion manual duration
BGQ	Reversion mode
BGR	Automatic lubrication system installed and activated
BGS	Time controlled high idle, installed
BGT	Time controlled high idle, level
BGU	Time controlled high idle, from hour
BGV	Time controlled high idle, from minute
BGW	Time controlled high idle, to hour
BGX	Time controlled high idle, to minute
BGY	Hydraulic oil sensor is digital switch or analog sensor
BIH	Air conditioning. Increased fan capacity
BJC	Transmission oil level gauge 11144494 installed

BJD	Engine oil level gauge 11144494 installed
BRH	Should crank times be considered to avoid overheating of starter motors
BRJ	To govern the hydraulic function of the attachment bracket.To inform the driver that he has chosen to open the attachment locking and when locking he has to verify and confirm that the pins are in lock position.
BRK	Active charging of Brake pressure system
BRL	To rapidly reach a acceptable working temperature in the hydraulic system
CWL	Selection of installed sensor 0 = Connection on sensor 1 = Connection on sensor cable 2 = Connection on sensor (L110E, L120E)
CWM	Activation of the function if the equipment is installed on the machine
CWN	Activation of the function automatic kick-down
CWO	Activation of the function automatic kick-down
CWP	Setting of speed for disengaging of boom suspension
CVZ	Activation of the function when differential lock is installed on the machine
DYP	Selection of overlap time between gear shifting 1F-2R
DYQ	Overlap F1 to R2 delay 2
FAU	Activation of the function automatic engine shut off
FAV	Setting of time until automatic engine shut off
FAX	Pressure Cut Off P1 installed
XY	Activating monitoring of main fuel filter
HFD	Disconnection BSS, Forward, FAPS on (km/h)
HBM	Disconnection BSS, Reverse, FAPS on (km/h)
HBN	Disconnection BSS, Forward, FAPS off (km/h)
HBO	Engagement BSS, Reverse, FAPS off (km/h)
HFE	Disconnection BSS, Forward, Machine without FAPS (km/h)
HFF	Engagement BSS, Reverse, Machine without FAPS (km/h)
XZ	Activating control lamp for preheat
YA	Idle speed, desired value

Document Title: General fault diagnosis information	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

General fault diagnosis information

The section entitled "Fault diagnosis" provides descriptions of symptom and function disturbance fault diagnosis with regards to the electrical system. Information regarding the different functions of the electrical components, measurement values and possible fault detection is also available.

The basis for all fault diagnosis is that a fault, symptom or function disturbance has been recorded.

Faults can be indicated by:

- flashing red central warning lamp
- buzzer sounding
- flashing amber central warning lamp
- error texts in the display panel
- an error symptom is detected.

Different actions should be taken depending on the manner in which the fault is indicated.

- For faults resulting in:
Flashing amber central warning lamp - promptly inspect the cause during following stop.
- For faults resulting in:
Flashing red central warning lamp - stop the machine immediately and investigate the cause of the fault!



Continued operation following a malfunction indication may result in damage to persons and property.

It is of the utmost importance to determine the cause of the fault as quickly as possible when one is suspected or found.

The first step in fault diagnosis is to collect information from the operator regarding the fault symptom. Afterwards, attempt to localise the cause of the fault by performing checks in a specific order, see [302 Troubleshooting strategy](#).

In order to facilitate and make fault diagnosis more effective, a number of auxiliary instruments are available, for example VCADS Pro service tools and service display unit, see [302 Troubleshooting tools](#)

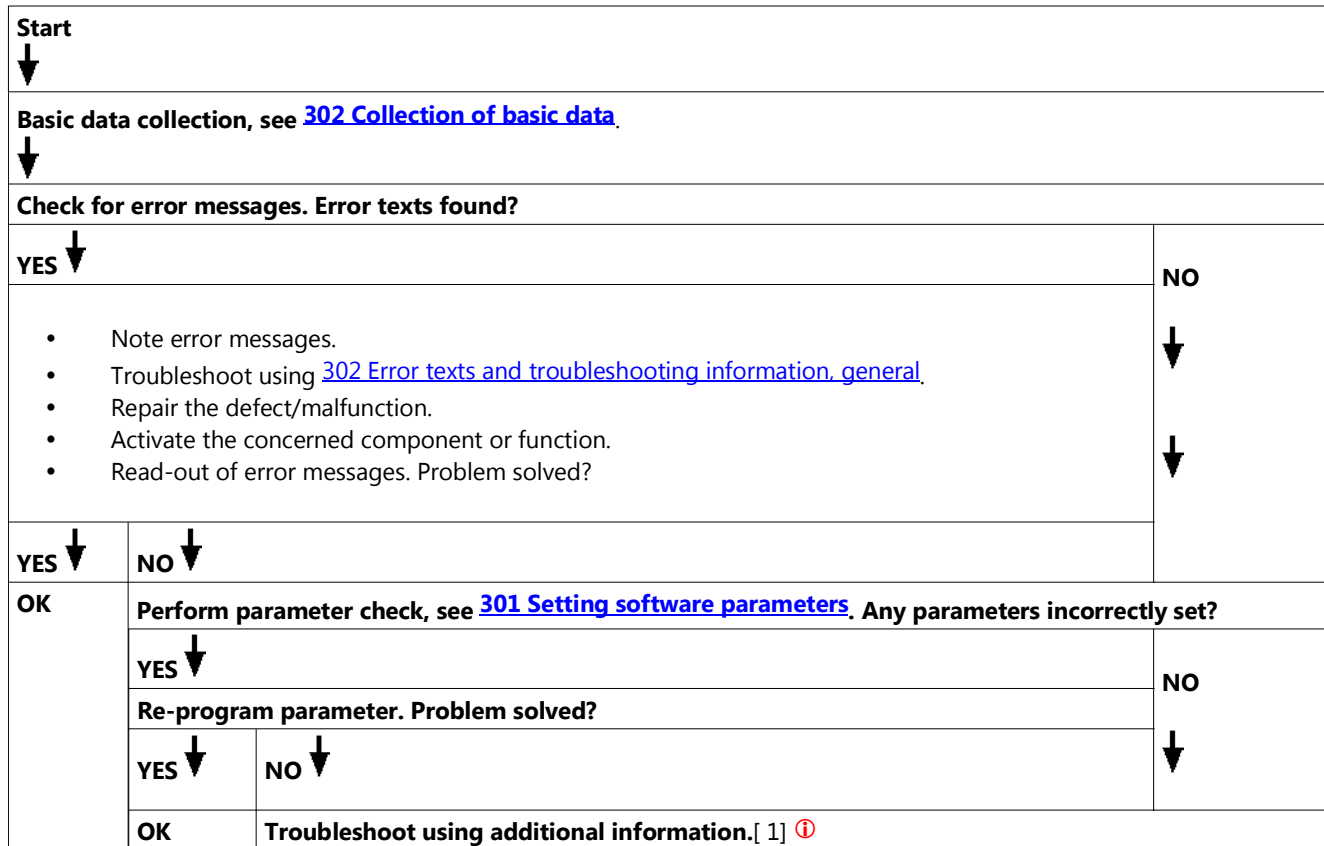


During troubleshooting and all work with the electrical system, carefully follow all instructions in Electrical system, work instructions.

Document Title: Troubleshooting strategy	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Troubleshooting strategy

The basis for all troubleshooting is that a malfunction, symptom or defect is noticed. Troubleshooting strategy and procedures are illustrated in the following flow chart.



The included steps in the troubleshooting strategy are described below.

1. **Basic data collection.** The basis for all troubleshooting is a symptom or malfunction. In order to establish a basis for troubleshooting, data should be collected about the symptom/malfunction.

A data collection model is available as [302 Collection of basic data](#).

2. **Error messages** provide a clear indication about the cause of the symptom or malfunction. As a result, display panel error messages should be read before troubleshooting begins.

NOTE!

If new or repeated error messages are generated during troubleshooting, then these must be solved first before continuing to troubleshoot.

- A. If an error message is displayed, troubleshooting must be conducted according to [302 Error messages by function group](#).
- B. Error messages are registered and compared with new or recurring error messages.
- C. To verify that the problem has been repaired, the appropriate machine components/functions must be activated to allow the control unit to conduct a self-diagnosis and display new or recurring error messages. The machine should be started and the component/function should be activated in order to ensure that a self-diagnosis is conducted.

- D. Error messages are examined to verify that the symptom/malfunction has been repaired and to ensure that no additional defects have occurred as a result of the repair procedure.

- 3. **Parameters** are checked to ensure that reasonable values are set. See [301 Setting software parameters](#).

[1]Additional information includes wiring diagrams, function descriptions and component troubleshooting.

Document Title: Troubleshooting tools	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Troubleshooting tools

Service manual

Service information for troubleshooting is available in the service manual. The different types of information are listed below:

- **Instructions for lead and connector checks**
A general description of these checks can be found in [302 Lead and connector checks](#).
- **Wiring diagrams**
Wiring diagrams are an important aid during troubleshooting and provide lead designation, lead colours and component and connector designations, etc.
- **Component diagram**
Supplemental information to the wiring diagrams is available in the form of component lists that illustrate the location machine components.
- **Function descriptions**
Function descriptions provide explanations for machine sub-functions regarding input and output signals' relation to other functions.
Function descriptions are found in [301 Software functions per function group](#).
- **Component specifications**
For a description of component troubleshooting, see [302 Component fault diagnosis, general](#).
- **Error texts and troubleshooting information**
[302 Error texts and troubleshooting information, general](#) includes error text conditions, possible malfunction causes, control unit reactions and noticeable symptoms/malfunctions.

VCADS Pro

VCADS Pro is a PC-based service tool which has been developed in order to facilitate the troubleshooting work. Components/functions can be activated and values can be examined with VCADS Pro through the use of tests. Error text examination can also be conducted using VCADS Pro.

For a description of VCADS Pro, see the separate operator's manual and [302 VCADS Pro service tool](#).

Service display unit

Input signals, output signals and parameters can be read using the service display unit. See [387 Service display unit, general](#).

Information display unit

The information display unit is used to read error texts, see [302 Error texts and troubleshooting information, general](#).

Special tools

[302 Special tools for troubleshooting](#) includes tools that recommended when conducting troubleshooting.

Document Title: VCADS Pro service tool	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

VCADS Pro service tool

General



Figure 1
VCADS Pro computer

The following is a short description of the VCADS Pro service tool:
The name VCADS Pro is short for **V**ehicle **C**omputer **A**ided **D**iagnostic **S**ystem **P**rofessional.

VCADS Pro structure

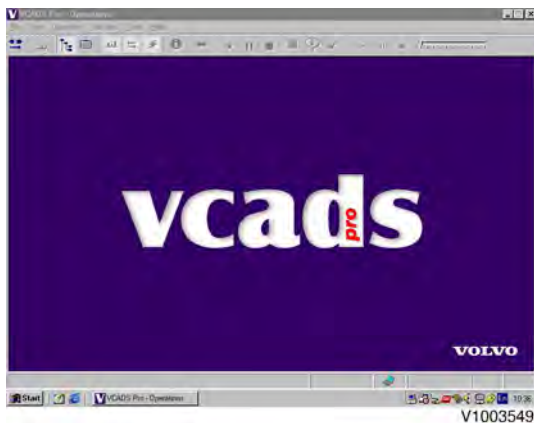


Figure 2
Initial display

VCADS Pro comprises programs for:

- Component and function tests
- Download of software to control units
- Storing performed work operations on job card

Operations

Under Operations, there are several tests and programming possibilities divided according to function group. The tests show, for example, sensor values, as well as graphic display of how a signal varies in time. Programming is used to reprogram control units.

Read-out of error codes from operations, function group 1 - Service and maintenance. To pin-point malfunction causes, it's advantageous to use the service tool VCADS Pro. From VCADS Pro, it's possible to obtain error codes of the SAE-type, from which the malfunction cause can be determined, see [302 SAE error codes, translation to error messages, general](#).

The screenshot shows the VCA05 Pro - Operations software interface. The top menu bar includes File, View, Database, and Help. Below it is a toolbar with icons for file operations and a search bar. The main window displays a tree view on the left with folders like '128 Engine ECU', '140 Instrument, centre module', and '187 Vehicle Control Unit'. The right pane shows a table of installed modules. The table has columns: ID, Name, Min, Value, Error, and Unit. The 'Value' column contains various status values like 'Not installed', 'No', 'OE', 'On', 'B', '500', '100.00', '180.00', '100.00', '180.00', and '180.00'. The bottom status bar shows 'Model: L70E 021001' and 'VCA05 Pro - Operati...'.

ID	Name	Min	Value	Error	Unit
BOJ	Air conditioning, installed, mode		Not installed		
CV	Aircondition installed		No		
ACL	Axle oil cooling, entailed		No		
AMR	CDC speed limit		OE		
BCR	Central lubrication installed		OE		
ASB	Delayed idle On/Off		On		
AGK	Engine coolant fan control		B		
ACN	Engine oil, change interval		500		
BOJ	Fan reversal function, mode		OE		
BOJ	Fan reversal, activated		OE		
BGL	Fan reversal, long duration	60.00	180.00	100.00	s
BGL	Fan reversal, long interval	900.00	180.00	1000.00	s
BGL	Fan reversal, manual duration	60.00	180.00	180.00	s

Model: L70E 021001

VCA05 Pro - Operati...

Figure 5
Example, read-out parameters

Read-out and programming of parameters take place from operation, function group 1 - Service and maintenance. For more information about parameters, see [301 Setting software parameters](#).

Job Card

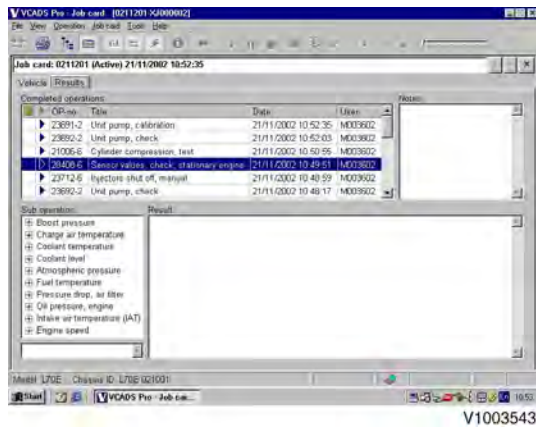


Figure 6
Example, job card

The job card function is used to store work operations that have been performed with VCADS Pro, for example, test results and results of error code read-outs and programming of parameters. The job card is stored locally in the computer in question.



Construction Equipment

Service Information

Document Title: Special tools for 302 troubleshooting	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Special tools for troubleshooting

The recommended measuring tools for checking electrical leads and components, for example, are listed below.

302 Multi-pin breaker box 999 8699
302 Extension cable 999 0062
302 Template 999 0130
302 Template 999 0133
302 Adapter cable 951 1355
302 Adapter cable 981 3194
302 Adapter cable 999 0014
302 Adapter cable 999 0020
302 Adapter cable 999 0191
302 Adapter cable 999 0216
302 Adapter cable 999 8505
302 Adapter cable 999 8533
302 Adapter cable 999 8534
302 Multimeter 981 2519
302 Test pins 999 0008
302 Service display unit 999 3721
302 Extension cable 11 668 006

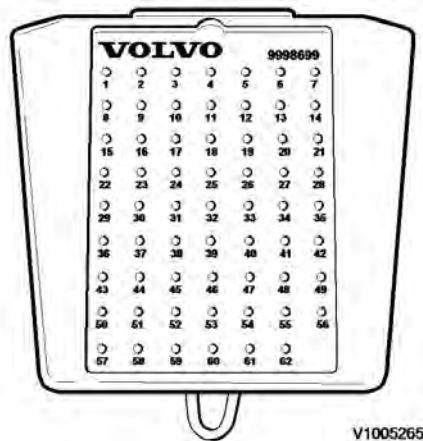
VOLVO

Construction Equipment

Service Information

Document Title: Multi-pin breaker box 999 8699	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Multi-pin breaker box 999 8699



Description: Multi-pin breaker box
Part no. 999 8699
Specification: Multi-pin breaker box 62-pin with D-SUB connector.
The multi-pin breaker box is universal and can be used for measuring a number of different connector types.

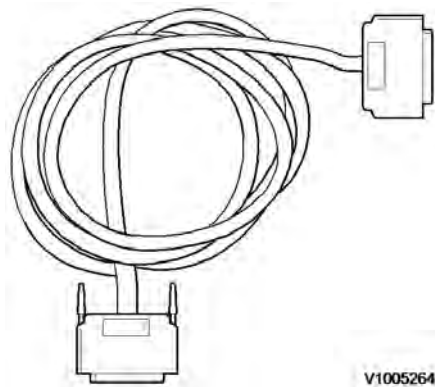
VOLVO

Construction Equipment

Service Information

Document Title: Extension cable 999 0062	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Extension cable 999 0062



V1005264

Description: Extension cable
Part no. 999 0062
Specification: Extension cable 2.5 m for multi-pin breaker box 999 8699.

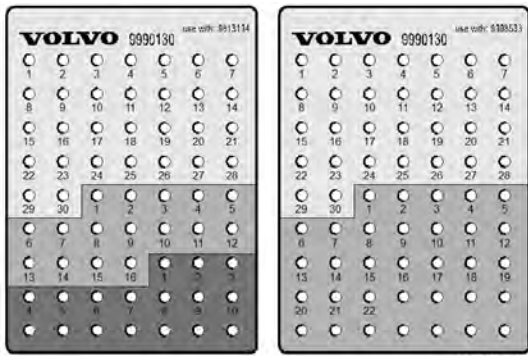


Construction Equipment

Service Information

Document Title: Template 999 0130	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Template 999 0130



V1005284

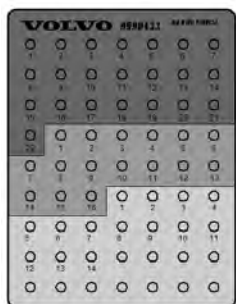
Description: Template
 Part no. 999 0130
 Specification: Template for Multi-pin breaker box 999 8699.
 Front and back adapted for adapter cables 981 3194
 for measuring to I-ECU, connection P1 and 999 8533
 for connection to I-ECU P2.

NOTE!

The numbers on the template correspond to the pin-numbering on the connector.

Document Title: Template 999 0133	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Template 999 0133



V1011089

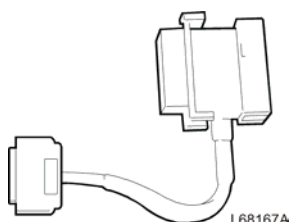
Description: Template
Part no. 999 0133
Specification: Template for Multi-pin breaker box 999 8699.
Adapted for adapter cable 999 0020 for measuring to I-ECU connection P3 and for connection to 16-pin connector in the electrical distribution box.

NOTE!

The numbers on the template correspond to the pin-numbering on the connector.

Document Title: Adapter cable 951 1355	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

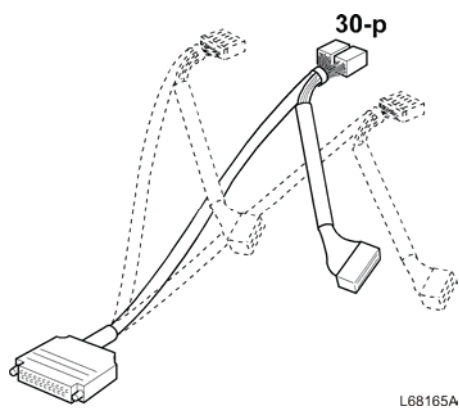
Adapter cable 951 1355



Description: Adapter cable
Part no. 951 1355
Specification: Adapter cable 42-pin for Multi-pin breaker box 999 8699.
Used for measuring vehicle control unit (V-ECU) connector EA, EB and EC, for example.

Document Title: Adapter cable 981 3194	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

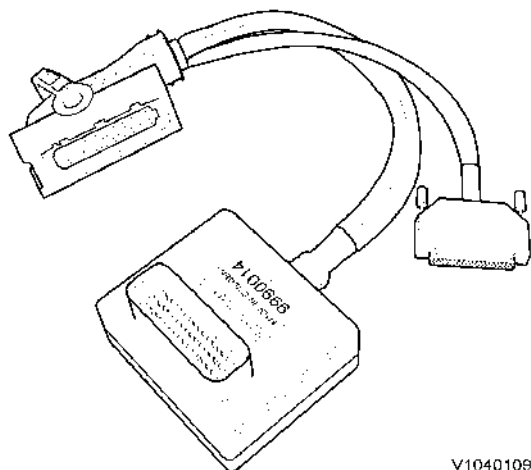
Adapter cable 981 3194



Description: Adapter cable
Part no. 981 3194
Specification: 30-pin adapter cable for testing instrument control unit (I-ECU) connector P1.

Document Title: Adapter cable 999 0014	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Adapter cable 999 0014

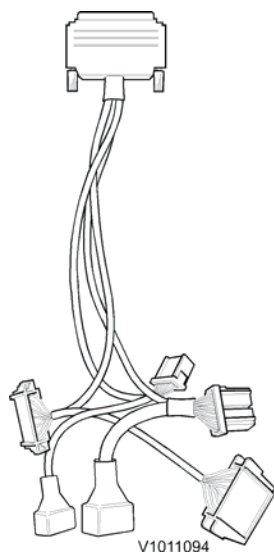


Description: Adapter cable
Part no. 999 0014
Specification: The adapter cable is used for measuring engine control unit (E-ECU) connector EA and EB.
Note! For active measuring of E-ECU, 2 adapter cables are required.

V1040108

Document Title: Adapter cable 999 0020	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Adapter cable 999 0020



Description: Adapter cable
Part no. 999 0020
Specification: Adapter cable 22-pin for measuring to I-ECU connector P3 and for connection to 16-pin connector in the electrical distribution box.

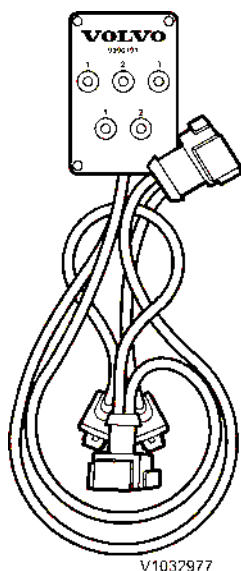
VOLVO

Construction Equipment

Service Information

Document Title: Adapter cable 999 0191	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

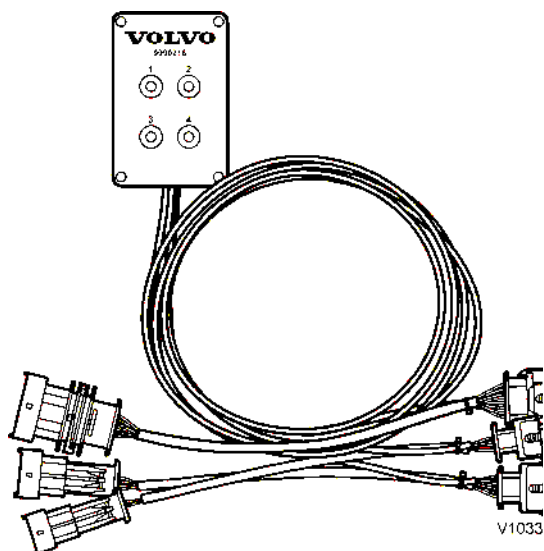
Adapter cable 999 0191



Description: Adapter cable
Part no. 999 0191
Specification: Adapter cable for measuring against component with 2-pin and 3-pin connectors.

Document Title: Adapter cable 999 0216	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Adapter cable 999 0216



Description: Adapter cable
Part no. 999 0216
Specification: Adapter cable for measuring against component with 2-pin, 3-pin, and 4-pin connectors.

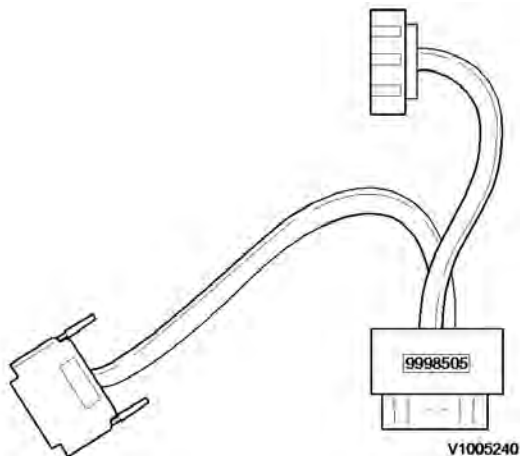
VOLVO

Construction Equipment

Service Information

Document Title: Adapter cable 999 8505	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Adapter cable 999 8505



Description: Adapter cable

Part no. 999 8505

Specification: The adapter cable is used for measuring engine control unit (E-ECU) connector EA and EB.
Note! For active measuring of E-ECU, 2 adapter cables are required.

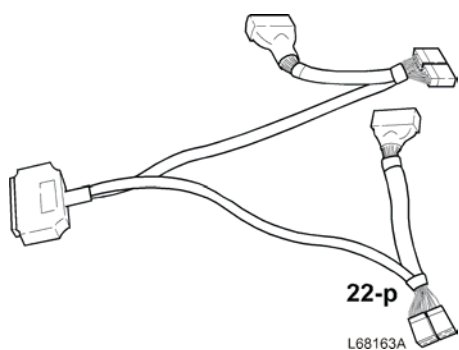
VOLVO

Construction Equipment

Service Information

Document Title: Adapter cable 999 8533	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Adapter cable 999 8533



Description: Adapter cable
Part no. 999 8533
Specification: 22-pin adapter cable for testing instrument control unit (I-ECU) connector P2.

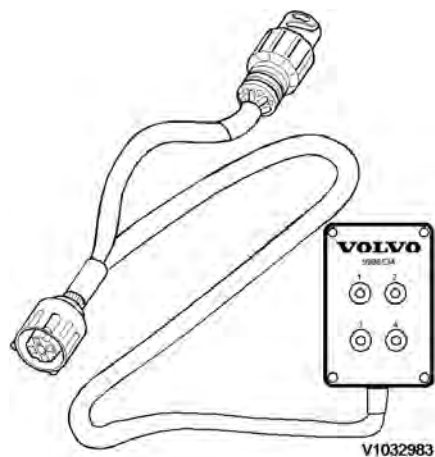
VOLVO

Construction Equipment

Service Information

Document Title: Adapter cable 999 8534	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Adapter cable 999 8534



Description: Adapter cable
Part no. 999 8534
Specification: Adapter cable for testing components with a 4-pin DIN connector.

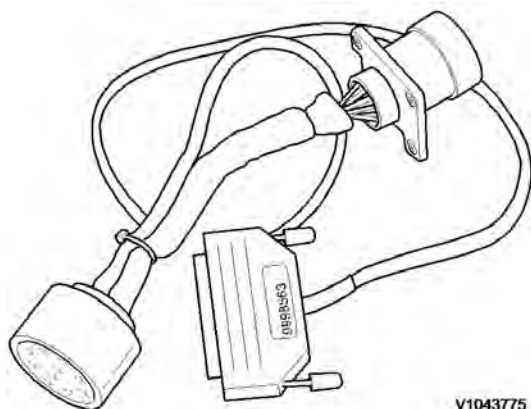
VOLVO

Construction Equipment

Service Information

Document Title: Adapter cable 999 8563	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

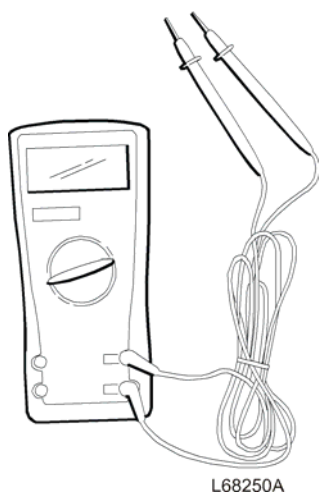
Adapter cable 999 8563



Description: Adapter cable
Part no. 999 8563
Specification: Adapter cable for measuring in 12-pin engine cable harness.

Document Title: Multimeter 981 2519	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Multimeter 981 2519



Description: Multimeter
Part no. 981 2519
Specification: Multimeter used for fault diagnosis. (Similar multimeters can also be used)

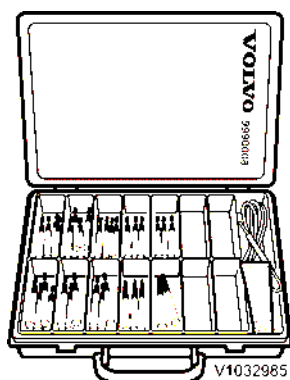
VOLVO

Construction Equipment

Service Information

Document Title: Test pins 999 0008	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Test pins 999 0008



Description: Test pins
Part no. 999 0008
Specification: Test pins used together with multimeter

Document Title: Collection of basic data	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Collection of basic data

General

Collection of basic data is the first step in all troubleshooting. This is done to get a quick and improved overall picture of how the malfunction shows up.

In addition to information about machine and customer, it is important to get as much information as possible about events in connection with the occurrence of the malfunction.

The operator can often have valuable information on the circumstances when the malfunction occurred. The operator is almost always the person who notices the problem first.

Since it's seldom possible to recreate the experienced problems, without having exactly the same conditions, information from the operator is of vital importance for correct assessments in continued troubleshooting.

Interview the operator using the following questions.

The answers should be noted and saved together with the work order.

The operator should be able to answer the following questions:

General information

- Customer information
- Dealer information
- Operator
- Machine specifications:
 - Machine
 - Serial number
 - Machine hours
 - Engine type
 - Engine number
 - Model year
 - Delivery date
 - Transmission type
 - Transmission serial number
- Have you detected any error messages?
- Has any new electrical equipment been installed on the machine?

Description of malfunction or symptom

- Describe the problem.
- When did the problem occur?
- How was the problem discovered and what happened just before?
- Does the problem reappear?
- How often does the problem occur?
- For how long does the problem last when it occurs?
- Does the problem always occur during the same conditions, if so, what are the conditions?
- Does the operator have any idea of what the probable cause of the problem may be?
- Does the problem still exist?

Engine data

- Under what operating conditions does the problem occur?

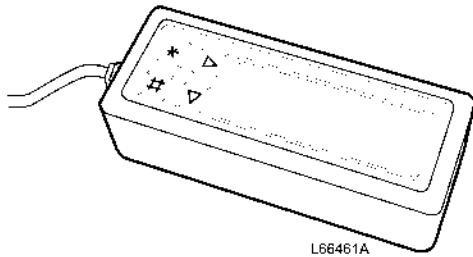
- External circumstances that affect the problem?
- Is the engine difficult to start?
- Is there abnormal smoke?
- Is there any abnormal engine noise?
- Have you detected/confirmed any changes in fuel consumption, oil consumption or engine power?
- What type of fuel is used?
- Any additives used in the fuel? If yes, which ones?
- What repairs or other work has been performed on the engine?
- Other information?

Power transmission, data

- Under what operating conditions does the problem occur?
- External circumstances that affect the problem?
- What type of oil is used?
- Any additives used in the oil? If yes, which ones?
- When was the last oil change performed?
- Is difference in rolling circumference between tyres more than 1.5%?
- Other information?

Document Title: Service display unit 999 3721	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Service display unit 999 3721



Description: Service display unit

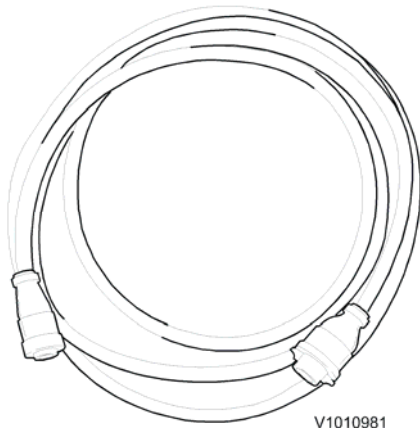
Part no. 999 3721

Specification: The service display unit can be used for fault diagnosis when additional information is required from the display panel.

See also [387 Service display unit, general](#).

Document Title: Extension cable 11 668 006	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Extension cable 11 668 006



Description: Extension cable
Part no. 11 668 006
Specification: Extension cable for Service display unit.

Document Title: Lead and connector checks	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Lead and connector checks

General

An important part of electrical system fault diagnosis is lead and connector checks, which can provide the cause of malfunctions in the form of loose connections or damaged electrical leads.

NOTE!

Before troubleshooting leads and connectors is conducted, the appropriate fuses should be checked.

These checks are conducted with help of a multimeter, test unit and cable adapters, see [302 Special tools for troubleshooting](#).

For repairing electrical leads and connectors, see separate Service Manual: LEADS AND CONNECTORS.

Refer to the wiring diagrams to find suitable test points.

NOTICE

The following should be observed when working on electrical systems.

- Testing should not be conducted by sticking objects through electrical lead insulation.
- Exercise caution while testing with a test cable in connectors to avoid damage to or widening of connector pins and sleeves.

NOTE!

For troubleshooting of information bus and control bus, see

- [302 ATTENTION! Reduced Computer Function \(J1708/J1587\)](#)
- [302 ATTENTION! Reduced Computer Function \(J1939\)](#)

Connector and cable terminal checks

For all tests and checks during which connectors are dismantled, connectors and cable terminals should be visually checked as follows:

1. Look for cable terminal oxidation. Oxidation can impair the contact.
2. Check for cable terminal damage, correct placement in the insulator and that the leads are correctly connected to the terminals.
3. Check for good mechanical contact in the cable terminals. Use a separate cable terminal for checking.

NOTE!

A special gauge is used for the engine control unit connector.

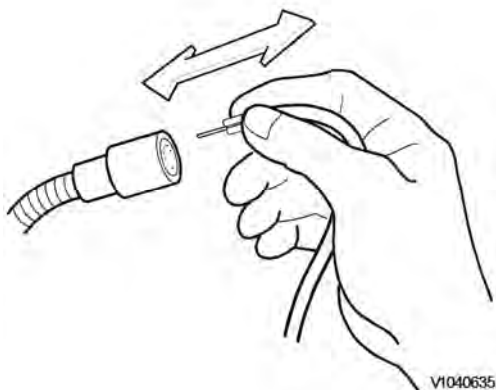


Figure 1
Connector, mechanical contact check

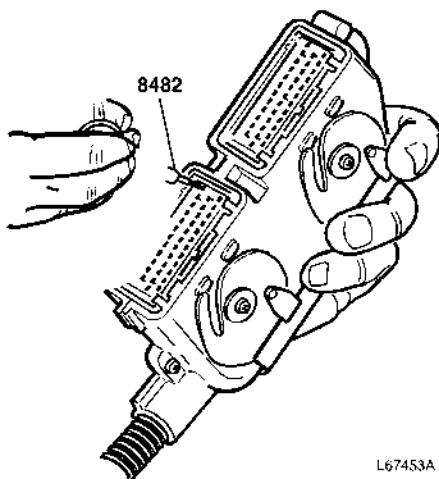


Figure 2
Engine control unit connector, check of mechanical contact

Open circuit, check

Open circuits in electrical cables and cable harnesses can be caused by chafing due to friction, pressure due to squeezing and tension load. Checks for open circuits are conducted as follows:

1. Dismantle the appropriate connector in both ends of the cable harness.
2. Conduct a resistance test between the lead ends. The resistance should be $\approx 0 \Omega$ for an open circuit.
3. Shake the cable harness and pull lightly on the connectors simultaneously during testing to find possible open circuits.

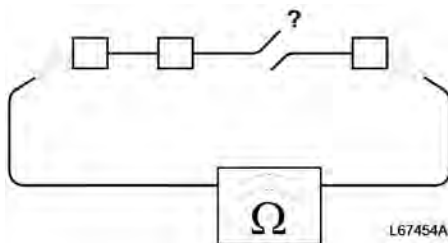


Figure 3
Check for open circuit with resistance testing

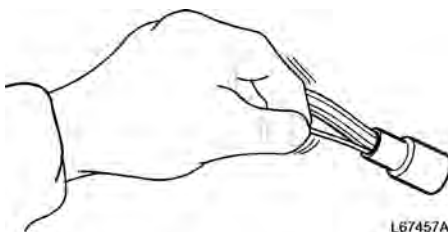


Figure 4
Troubleshooting open circuit

Short circuit to ground, check

A short circuit between the power supply lead and ground often leads to fuse failure. A check for short circuit to ground is conducted as follows:

1. Ignition in position 1.
2. Close all breakers, activate circuit functions and check if any fuses are tripped.
3. Dismantle the appropriate connector to the circuit components so they do not affect the test.
4. Resistance test between lead and ground. The resistance should be $\infty \Omega$ for a lead without short circuit to ground.

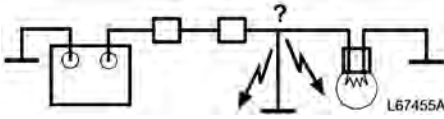


Figure 5

Check for short circuit to ground (frame ground connection) with resistance testing

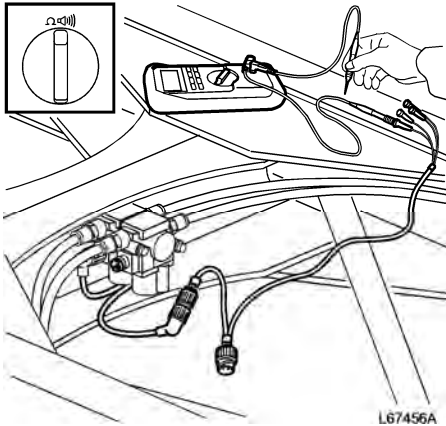


Figure 6

Basis for test of short circuit to ground (frame ground connection)

Short circuit to voltage, check

A short circuit between a lead and voltage often leads to fuse failure.

1. Test the voltage with a multimeter on suitable circuit points while the switch is connected and the sensor is activated.
The voltage value is dependent on several parameters. See wiring diagram, signal description and component information.
2. Dismantle the appropriate connector in both ends of the cable harness.
Resistance test between the leads that can be short-circuited with each other. The resistance should be $\infty \Omega$ for leads which are not cross short-circuited.

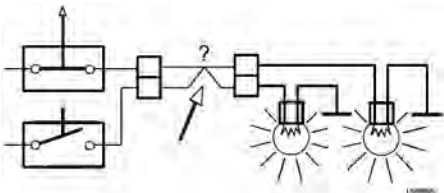


Figure 7

Check for short circuit to voltage with resistance testing

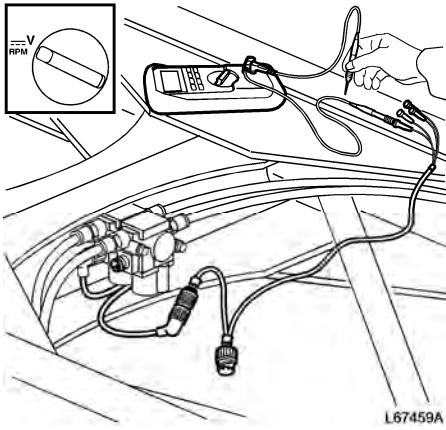


Figure 8
Basis for test of short circuit to voltage

Contact resistance and oxidation, check

Loose contacts or temporary recurring malfunctions can be difficult to diagnose and are often caused by corrosion, vibrations of poorly connected leads.

Dampness in the connectors can also cause contact problems as well as damaged pins or sleeves.

Resistance in the connectors and leads should be $\approx 0 \Omega$. Some resistance, however, can occur due to corrosion in the cable terminals.

If the contact resistance is too large, function disruption can occur. The amount of resistance that may occur without disruption varies according to the circuit load.

To check contact resistance and oxidation, see Connector and cable terminal checks.

NOTICE

Shake the cable harness and pull lightly on the connectors while measuring to find eventual loose connections.

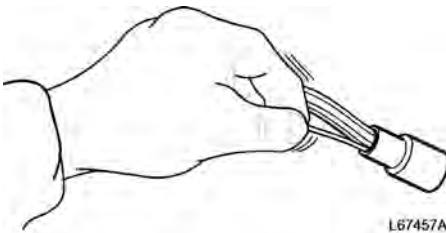


Figure 9

Pins and sleeves, cleaning

1. Open the battery disconnect switch.
2. Clean the connectors using compressed air.
3. Spray the connectors with contact spray. Avoid spraying for preventive purposes.
4. Use compressed air once again on the connectors.

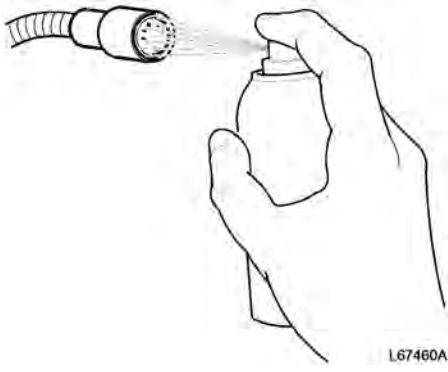


Figure 10
Connectors, spraying with contact spray

Document Title: Component fault diagnosis, general	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Component fault diagnosis, general

The following is a description of component and circuit fault diagnosis. The section contains the following information:

- [302 Component fault diagnosis, description](#)
- [302 Test methods, description](#)
- [302 Conditions when checking](#)

Document Title: Component fault diagnosis, description	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Component fault diagnosis, description

Check-measurement of components and electrical cabling should be performed when an error message has been detected. Measurements are performed to check component, cabling, output signals from control units and frame ground connections.

NOTICE

The specified measuring values should only be considered as the desired values. The measuring values are only intended for troubleshooting through the evaluation of the error source.

Component description table:

Component:	SE 2501 Sensor in induction in temperature
Function:	Measures induction in temperature after air cleaner. The sensor is combined with SE 2502 Monitor air filter pressure.
References:	- L150E 3 01 Temperature induction in - L150E 3 70 Electrical diagram - VCA DS Pro, test 28407-8
Tools:	- L150E 3 02 Multimeter 1 866 140 - L150E 3 02 Adapter cable 99 8534

Simplified wiring diagram:

EB 8, ground pressure
EB 13, ground temperature sensor
EB 3, temperature signal
EB 17, pressure signal

Conditions for detecting error/malfunction:

Malfunction detection conditions	Detected if engine control unit (ECU) registers battery voltage on EB 3e exceeds 0.91 x system voltage or is below 0.09 x system voltage	
Type of error/malfunction	Symptom	Possible cause
FM 13	- Error message - Amber central warning - Blue exhaust smoke in cold weather - Cooling fan runs at max. speed	- Signal cable or ground cables short-circuited to voltage - Signal cable or ground cables open circuit - Signal lines short circuit to ground - Defective sensor

Check-measuring table:

Testing	Test points	Setpoint	Condition	Test method
Component	3 - 4	Resistance values according to table		
Subsystem	3 - 4	$\approx 2.6V$ ($20^\circ C/68^\circ F$) $\approx 1.2V$ ($50^\circ C/122^\circ F$)		
Control unit/cable harness	4 -	$\approx 0W$		

SE 2501 resistance values:

Air temp. (°C)	Air temp. (°F)	Resistance	Air temp. (°C)	Air temp. (°F)	Resistance
-30	-22	88.6 ± 5.5k W	+40	+104	2063 ± 77 W
-20	-4	48.6 ± 2.8k W	+50	+122	1831 ± 45 W
-10	+14	27.6 ± 1.4k W	+60	+140	1244 ± 29 W
0	+32	16.3 ± 0.8k W	+70	+158	876 ± 16 W
+10	+50	10.0 ± 0.4k W	+80	+176	629.0 ± 9.5 W
+20	+68	6.2 ± 0.33k W	+90	+194	458.7 ± 6.0 W
+30	+86	4.0 ± 0.14k W	+100	+212	339.9 ± 3.4 W

V1025324

Figure 1
Explanation of component troubleshooting

1. Component designation and description.
2. Simplified wiring diagram with signal description.
3. Conditions for detecting error/malfunction.

4. Symptoms caused by error/malfunction source.
5. Possible causes of error/malfunction.
6. Type of error/malfunction acc. to FMI, see [302 SAE error codes, translation to error messages, general](#).
7. Reference value (set point) for check-measurement.
8. The column indicates which test points are referred to.
9. Recommended measuring method, see [302 Test methods, description](#).
10. Check-measurement of separate component
11. Check-measurement of sub-system, that is, connected and active circuit.
12. Check-measurement of control unit and/or cable harness.
13. Example of summary of characteristics for component.

Document Title: Test methods, description	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Test methods, description

Test methods and their symbols are described below.

See also [3020 Connecting special tools](#).

Testing of control unit and cable harness.

Tools: [302 Adapter cable 999 0191](#), [302 Adapter cable 999 8534](#), [302 Multimeter 981 2519](#)

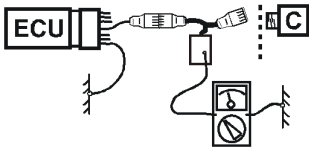


Figure 1

Control unit and cable harness, testing

Ground cable

This test checks ground cable conductivity to ground. The test instrument is set for resistance testing (ohm).

Feed cable

This test checks supply cable voltage in relation to ground. The test instrument is set for voltage testing (VDC).

Signalling circuit

This test checks signalling circuit conductivity to the control unit. The test instrument is set for resistance testing (ohm).

Test of cable harness only

Tools E-ECU: [302 Multi-pin breaker box 999 8699](#), [302 Adapter cable 999 8505](#), [302 Test pins 999 0008](#), [302 Multimeter 981 2519](#)

Tools V-ECU: [302 Multi-pin breaker box 999 8699](#), [302 Adapter cable 951 1355](#), [302 Test pins 999 0008](#), [302 Multimeter 981 2519](#)

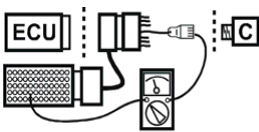


Figure 2

Cable harness only, testing

This test of cable harness only is used when testing to the control unit is not applicable. The test instrument is set for resistance testing (ohm).

Test of cable harness and component

Tools E-ECU: [302 Multi-pin breaker box 999 8699](#), [302 Adapter cable 999 8505](#), [302 Multimeter 981 2519](#)

Tools V-ECU: [302 Multi-pin breaker box 999 8699](#), [302 Adapter cable 951 1355](#), [302 Multimeter 981 2519](#)

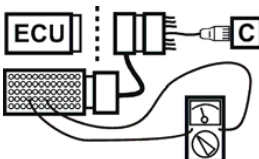


Figure 3
Cable harness and component, test

If access to component to be diagnosed is difficult, test the cable harness and component. The test instrument is connected to the test box and is set for resistance testing (ohm).

Test of component only

Tools: [302 Adapter cable 999 0191](#), [302 Adapter cable 999 8534](#), [302 Multimeter 981 2519](#)

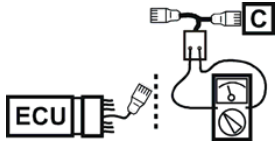


Figure 4
Component only, test

Resistance testing is used for component testing and most often at different temperatures or levels. See also [3020 Connecting special tools](#).

Testing of subsystem

Tools E-ECU: [302 Multi-pin breaker box 999 8699](#), [302 Adapter cable 999 8505](#), [302 Multimeter 981 2519](#)

Tools V-ECU: [302 Multi-pin breaker box 999 8699](#), [302 Adapter cable 951 1355](#), [302 Multimeter 981 2519](#)

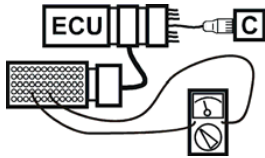


Figure 5
Subsystem, test

Active testing with test box or adapter between the control unit and cable harness for subsystem testing. The test instrument is connected to the test box and is set for voltage testing (VDC).

Document Title: Conditions when checking	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Conditions when checking

The following checks (measurements) are mostly described using symbols, in order to clarify the conditions and to reduce reading time. The symbols are described below.

NOTICE

When checking components, i.e. relays and solenoid valves controlled by a control unit, certain conditions must be fulfilled.

Conditions are described in [301 Software functions per function group](#).

NOTICE

To avoid changing functioning components, check the connectors with regards to loose connections and oxidation.

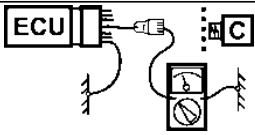
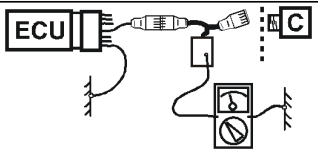
See [302 Lead and connector checks](#).

General symbols

Symbol	Description	Symbol	Description
	Battery disconnect switch in position Off .		Ignition in position 0 , 1 , or 3 .
	Resistance measurement		Engine at idle speed, ignition in position 1 .
	Voltage measurement (DC)		Frame ground connection
	Component		

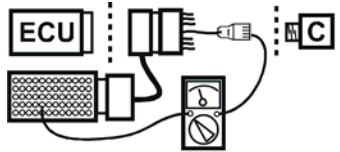
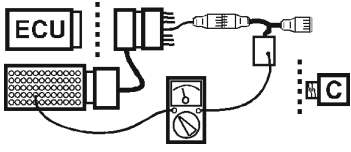
Measuring control unit and cable harness, symbols

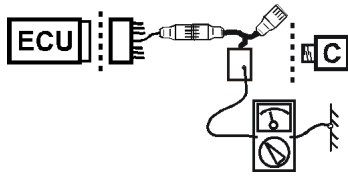
Measuring through cable harness to ECU. Component disconnected.

Symbol	Description	Symbol	Description
	Measuring in connector with test pin.		Measuring with adapter.

Checking cable harness, symbols

Measuring cable harness only. Component and ECU disconnected.

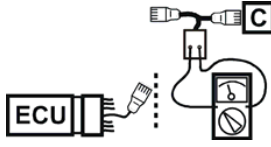
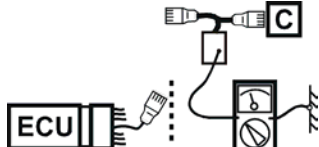
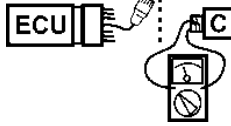
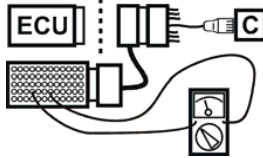
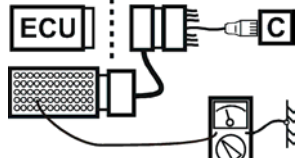
Symbol	Description	Symbol	Description
	Measuring with multi-pin breaker box and test pin.		Measuring with multi-pin breaker box and adapter.



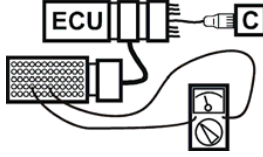
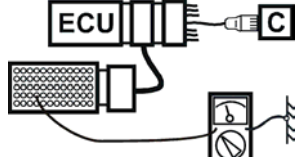
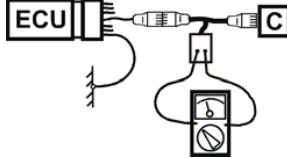
Measuring of cable harness, short-circuiting to ground.

Checking component/cable harness, symbols

Measuring component with or without connected cable harness.

Symbol	Description	Symbol	Description
	Measuring with adapter.		Measuring short-circuiting to ground with adapter.
	Measuring against component with test pins.		Measuring short-circuiting to ground in component with test pin.
	Measuring component with connected cable harness. ECU disconnected.		Measuring short-circuiting to ground through cable harness.

Checking sub-system, symbols

Symbol	Description	Symbol	Description
	Multi-pin breaker box and adapter connected between ECU and cable harness.		Multi-pin breaker box and adapter connected between ECU and cable harness. Test instrument ground to ground connection.
	Adapter connected between component and cable harness. ECU connected.		PC tool VCADS Pro connected.



Construction Equipment

Service Information

Document Title: Error texts and troubleshooting information, general	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Error texts and troubleshooting information, general

The machine control units include integrated diagnostic programs which monitor input and output signals for components and functions. Any error signals generate error texts in the information display panel.

ERROR
Monitoring
Engine Oil Level

Examples of error texts

The following is a list of error texts that can appear on the display panel in connection with electrical malfunctions.

The list contains all possible error texts with reference to actions for troubleshooting, see [302 Error messages by function group](#).



Construction Equipment

Service Information

Document Title: Error messages by function group	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Error messages by function group

22 Lubrication system
302 ERROR Monitoring Engine Oil Level (MID 128 PID 098)
302 ERROR Monitoring Engine Oil Level (MID 187 PID 098)
302 ERROR Monitoring Engine Oil Temp. (MID 128 PID 175)
302 ERROR Monitoring Engine Oil Pressure (MID 128 PID 100)
23 Fuel system
302 ERROR Monitoring Fuel Level (MID 187 PID 096)
25 Inlet and exhaust systems
302 ERROR Preheating Relay (MID 128 PID 45)
302 ERROR Monitoring Charge Air Temp. (MID 128 PID 105)
302 ERROR Monitoring Engine Air Filter (MID 128 PID 107)
302 ERROR Monitoring EGR (MID 128 PPID 19)
302 ERROR Monitoring Crankcase Pr (MID 128 PID 153)
26 Cooling system
302 ERROR Radiator Fan Control
302 ERROR Solenoid valve Reversible fan
302 ERROR Monitoring Radiator Fan Revolutions (MID 187 PPID 1161)
302 ERROR Monitoring Engine Coolant Temp. (MID 128 PID 110)
302 ERROR Monitoring Coolant Level (MID 128 PID 111)
302 ERROR Monitoring Coolant Outlet Temp. (MID 187 PPID 1157)
27 Engine controls
302 ERROR Accelerator Pedal Reduced Function Activated
302 ERROR Accelerator Pedal No Back-up Function
302 ERROR Hand throttle
302 ERROR Monitoring Engine Revolutions (MID 187 PID 190)
36 Other electrical equipment
302 ERROR Relay Interval Wiper
302 "Er" ambient temperature (MID 187 PID 171)
38 Instruments, sensors, warning and system information
302 ATTENTION! Reduced Computer Function (J1708/J1587)
302 ATTENTION! Reduced Computer Function (J1939)
302 STOP! COMPUTER FAILURE STOP THE VEHICLE
302 ERROR E-ECU PID 094

302 ERROR E-ECU PID 102
302 ERROR E-ECU PID 108
302 ERROR E-ECU PID 172
302 ERROR E-ECU SID 001 - E-ECU SID 006
302 ERROR E-ECU SID 021
302 ERROR E-ECU SID 022
302 ERROR E-ECU SID 232
302 STOP! Turn Off Engine SID 240
302 STOP! Turn Off Engine SID 253
302 STOP! Turn Off Engine SID 254

42 Hydraulically controlled transmission
302 ERROR APS switch/ERROR APS II-switch
302 ERROR Monitoring Travel Speed (MID 187 PID 84)
302 ERROR Monitoring Transmission Oil Filter (MID 187 PPID 1029)
302 ERROR Monitoring Transmission Oil Level (MID 187 PID 124)
302 ERROR Monitoring Transmission Oil Temp. (MID 187 PID 177)
302 ERROR Monitoring Transmission Oil Pressure (MID 187 PID 127)
302 ERROR Monitoring Turbine Revolutions (MID 187 PPID 1160)
302 ERROR Gear Selector
302 ERROR Gear Selector CDC
302 ERROR Gear Selector F/R
302 ERROR Gear shifting solenoids

46 Drive axles
302 ERROR Monitoring Axle Oil Temp. (Front axle) (MID 187 PPID 1154)
302 ERROR Monitoring Axle Oil Temp. (Rear axle) (MID 187 PPID 1153)
302 ERROR Differential lock

5 Brakes
302 ERROR Solenoid valve Brake pressure charging
302 WARNING! Low Brake Pressure
302 ERROR Monitoring Output Brake Pressure (MID 187 PPID 1155)
302 WARNING Brake Charging Failure
302 ERROR Parking Brake
302 ERROR Parking Brake Circuit

6 Steering
302 ERROR Secondary Steering Relay
302 ERROR Lever Steering CDC

87 Air conditioning
302 ERROR AC-system See operators manual

9 Hydraulic system
302 ERROR Central Lubrication System
302 ERROR Monitoring Hydraulic Oil Temp. (MID 187 PPID 1041)
302 ERROR Relay BSS
302 ERROR Monitoring Steering System Oil Pressure (SE601) (MID 187 PPID 1046)
302 ERROR Monitoring Steering System Oil Pressure (SE602) (MID 187 PSID 1303)

302 ERROR Sol. valve Attachment lock
302 ERROR Pressure regulator RTD
302 ERROR Relay Hold position

Document Title: SAE error codes, translation to error messages, general	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

SAE error codes, translation to error messages, general

The VCADS Pro service tool uses SAE error codes that are designed using identification numbers divided into groups such as, MID, PID and FMI. See [302 VCADS Pro service tool](#).

The error codes consist of three digit groups with meaning according to the following.

Abbreviation	Explanation
MID	M essage I dentification D escription (identification of control unit). A unique number for every control unit.
PID	P arameter I dentification D escription (identification of parameter/value). A unique number for every parameter.
PPID	P roprietary P arameter I dentification D escription (Volvo-unique identification of parameter/value). A Volvo-unique number for each parameter.
SID	S ubsystem I dentification D escription (identification of component). SID-number depends on which control unit (MID) they're sent from. Every control unit has a number series of its own for SID. Exceptions are SID-number 151–255, these are general for all systems.
PSID	P roprietary S ubsystem I dentification D escription (Volvo-unique identification of component).
FMI	F ailure M ode I dentifier (identification of error/malfunction type). 0 Data applicable to but above normal working range (gives warning) 1 Data applicable to but below normal working range (gives warning) 2 Intermittent or incorrect data 3 Abnormally high voltage or short-circuiting to higher voltage Described in troubleshooting information with "voltage too high". 4 Abnormally low voltage or short-circuiting to lower voltage Described in troubleshooting information with "voltage too low". 5 Abnormally low current or open circuit. Described in troubleshooting information with "current too low". 6 Abnormally high current or short-circuiting to frame ground. Described in troubleshooting information with "current too high". 7 Incorrect response from mechanical system. Described in troubleshooting information with "mechanical malfunction". 8 Abnormal frequency 9 Abnormal updating rate 10 Abnormally large variations 11 Non-identifiable error/malfunction. Described in troubleshooting information with "other malfunction/error". 12 Defective unit or component 13 Calibration values outside limits 14 Special instructions 15 Reserved for future use 16 Incorrect input signal to the function 17 Function cannot perform its task 18 Function gives an unreasonable result

The troubleshooting information in this service manual is based on Volvo error texts. During reading of error codes from VCADS Pro, SAE error codes must be translated to Volvo error texts for further troubleshooting. The following references are for tables used when translating from SAE error codes to Volvo error texts.

MID 128 Engine control unit (E-ECU)	302 SAE error codes MID 128 Engine control unit (E-ECU)
MID 140 Instrument control unit (I-ECU)	Information missing
MID 187 Vehicle control unit (V-ECU)	302 SAE error codes MID 187 Vehicle control unit (V-ECU)

Document Title: SAE error codes MID 128 Engine control unit (E-ECU)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

SAE error codes MID 128 Engine control unit (E-ECU)

SAE code	Reference to troubleshooting information
PID 045	302 ERROR Preheating Relay (MID 128 PID 45)
PID 094	302 ERROR E-ECU PID 094
PID 098	302 ERROR Monitoring Engine Oil Level (MID 128 PID 098)
PID 100	302 ERROR Monitoring Engine Oil Pressure (MID 128 PID 100)
PID 102	302 ERROR E-ECU PID 102
PID 105	302 ERROR Monitoring Charge Air Temp. (MID 128 PID 105)
PID 107	302 ERROR Monitoring Engine Air Filter (MID 128 PID 107)
PID 108	302 ERROR E-ECU PID 108
PID 110	302 ERROR Monitoring Engine Coolant Temp. (MID 128 PID 110)
PID 111	302 ERROR Monitoring Coolant Level (MID 128 PID 111)
PID 153	302 ERROR Monitoring Crankcase Pr (MID 128 PID 153)
PID 172	302 ERROR E-ECU PID 172
PID 175	302 ERROR Monitoring Engine Oil Temp. (MID 128 PID 175)
PPID 19	302 ERROR Monitoring EGR (MID 128 PPID 19)
SID 001 – 006	302 ERROR E-ECU SID 001 - E-ECU SID 006
SID 021	302 ERROR E-ECU SID 021
SID 022	302 ERROR E-ECU SID 022
SID 232	302 ERROR E-ECU SID 232
SID 240	302 STOP! Turn Off Engine SID 240
SID 253	302 STOP! Turn Off Engine SID 253
SID 254	302 STOP! Turn Off Engine SID 254

Document Title: SAE error codes MID 187 Vehicle control unit (V- ECU)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

SAE error codes MID 187 Vehicle control unit (V-ECU)

SAE code	Reference to troubleshooting information
PID 084	302 ERROR Monitoring Travel Speed (MID 187 PID 84)
PID 096	302 ERROR Monitoring Fuel Level (MID 187 PID 096)
PID 098	302 ERROR Monitoring Engine Oil Level (MID 187 PID 098)
PID 124	302 ERROR Monitoring Transmission Oil Level (MID 187 PID 124)
PID 127	302 ERROR Monitoring Transmission Oil Pressure (MID 187 PID 127)
PID 171	302 "Er" ambient temperature (MID 187 PID 171)
PID 177	302 ERROR Monitoring Transmission Oil Temp. (MID 187 PID 177)
PID 190	302 ERROR Monitoring Engine Revolutions (MID 187 PID 190)
PPID 1029	302 ERROR Monitoring Transmission Oil Filter (MID 187 PPID 1029)
PPID 1041	302 ERROR Monitoring Hydraulic Oil Temp. (MID 187 PPID 1041)
PPID 1046	302 ERROR Monitoring Steering System Oil Pressure (SE601) (MID 187 PPID 1046)
PPID 1153	302 ERROR Monitoring Axle Oil Temp. (Rear axle) (MID 187 PPID 1153)
PPID 1154	302 ERROR Monitoring Axle Oil Temp. (Front axle) (MID 187 PPID 1154)
PPID 1155	302 ERROR Monitoring Output Brake Pressure (MID 187 PPID 1155)
PPID 1157	302 ERROR Monitoring Coolant Outlet Temp. (MID 187 PPID 1157)
PPID 1160	302 ERROR Monitoring Turbine Revolutions (MID 187 PPID 1160)
PPID 1161	302 ERROR Monitoring Radiator Fan Revolutions (MID 187 PPID 1161)
PSID 1303	302 ERROR Monitoring Steering System Oil Pressure (SE602) (MID 187 PSID 1303)

Document Title: ERROR Monitoring Engine Oil Level (MID 128 PID 098)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Engine Oil Level (MID 128 PID 098)

Component: SE2205 Sensor engine oil level		
Function	Measures the engine oil level after the engine has been off for a time that is calculated depending on the oil's temperature. The time may vary between 5-117 minutes (PPID13).	
References	○ 301 Engine Oil Level ○ 387 Display panel, information displays ○ 370 Wiring diagram 28	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Adapter cable 999 0014 ○ 302 Multi-pin breaker box 999 8699	

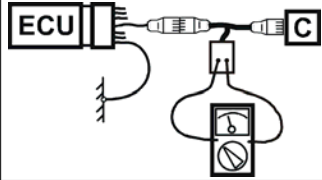
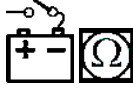
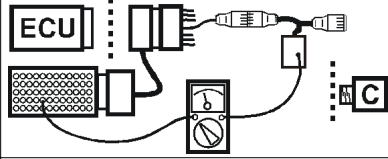
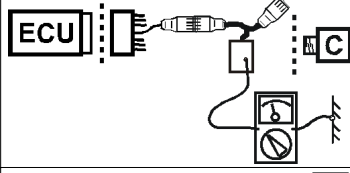
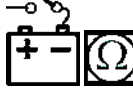
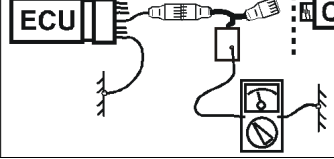
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EB3-EB4 exceeds 4.95 V or is below 0.5 V.

Type of error/malfunction	Symptom	Possible cause
FMI 1	○ Error message ○ Amber central warning lamp	○ Low oil level ○ Leakage.
FMI 4		○ Signal cable short-circuited to ground. ○ Defective sensor.
FMI 5		○ Signal cable short-circuited to voltage. ○ Signal cable or ground cable open circuit. ○ Defective sensor.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	1 – 2	≈ 12 Ω		

Sub-system	1 – 2	$\approx 3 \text{ V}$, pulse every 30 second (normal level)		
Control unit/ cable harness	Signal cable 1 – EB4	$\approx 0 \Omega$		
	Signal cable 1 – 	$\approx \infty \Omega$		
	Ground cable 2 – 	$\approx 0 \Omega$		

Document Title: ERROR Monitoring Engine Oil Level (MID 187 PID 098)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Engine Oil Level (MID 187 PID 098)

Component: SE213 Sensor engine oil level		EB24, ground EB13, 5 V feed EB31, signal
Function	Measures engine oil level when engine is shut off for more than 10 minutes and system voltage is on.	
References	○ 301 Engine Oil Level ○ 370 Wiring diagram 5 ○ 387 Service panel, electrical feed sensor	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355	
Other	Analogue sensor, used as monitor. ○ < 1.7 V = Low engine oil level (INFO Min. Engine Oil Level) ○ > 1.7–4.85 V = Normal engine oil level	

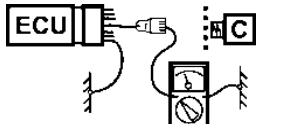
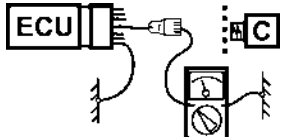
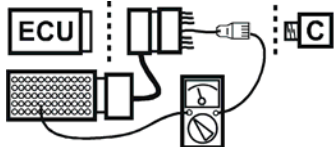
Malfunction detection conditions

Detected if the vehicle control unit (V-ECU) registers that voltage on EB31 exceeds 4.85 V or below 0.25 V.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Sensor not connected (open circuit). ○ Contact resistance in connectors. ○ Signal line open circuit, short circuit to ground or short circuit to higher voltage. ○ Feed cable (5 V) open circuit or short circuit to ground. ○ Ground cable open circuit. ○ Defective sensor.

Check-measuring

Testing	Test points	Set point	Condition	Test method
Sub-system	EB31 – EB24	0.25–4.85 V		

Control unit/ cable harness	Ground cable 2 – 	$\approx 0 \Omega$		
	Feed cable 1 – 	$\approx 5 \text{ V}$		
	Signalling circuit 3 – EB31	$\approx 0 \Omega$		

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [ERROR Monitoring Engine Oil Pressure \(MID 128 PID 100\)](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 7398, 62543

- [ERROR Monitoring Engine Oil Pressure \(MID 128 PID 100\)](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8001

Serial number stop: 10999

Document Title: ERROR Monitoring Engine Oil Pressure (MID 128 PID 100)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

ERROR Monitoring Engine Oil Pressure (MID 128 PID 100)

Component: SE2203 Sensor engine oil pressure		
Function	Engine oil pressure meter.	
References	○ 301 Engine oil pressure ○ 370 Wiring diagram 29 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 8505	

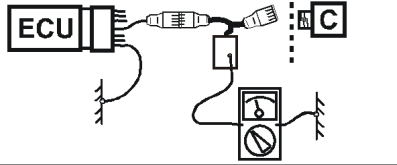
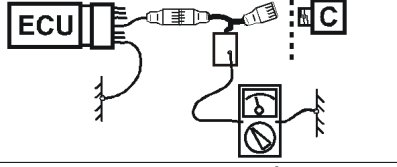
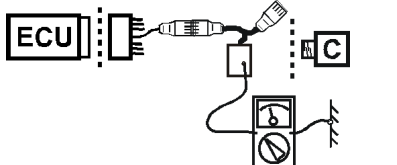
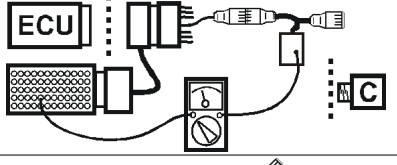
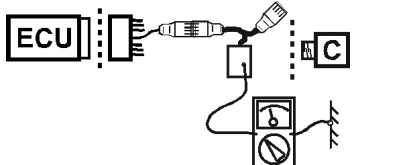
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EA14 is higher than 4.95 V or lower than 0.08 V.

Type of error/malfunction	Symptom	Possible cause
FMI 3	○ Error message ○ Amber central warning lamp	○ Feed line or signal line short-circuited to voltage.
FMI 4		○ Feed line or signal line open circuit. ○ Feed line or signal line short-circuited to ground.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Sub-system	2 – 4	≈ 0.5 V (engine off)		

Control unit/ cable harness	Ground cable 4 – 	$\approx 0 \Omega$		
	Feed cable 1 – 	$\approx 5 V$		
	Feed cable – 	$\approx \infty \Omega$		
	Signal cable 2 – EA14	$\approx 0 \Omega$		
	Signal cable 2 – 	$\approx \infty \Omega$		

Document Title: ERROR Monitoring Engine Oil Pressure (MID 128 PID 100)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

ERROR Monitoring Engine Oil Pressure (MID 128 PID 100)

Component: SE2203 Sensor engine oil pressure		
Function	Engine oil pressure meter.	
References	○ 301 Engine oil pressure ○ 370 Wiring diagram 29 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 0014	

EB18, ground
EB11, signal
EB17, feed

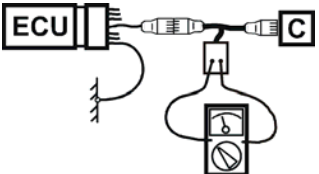
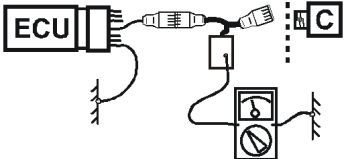
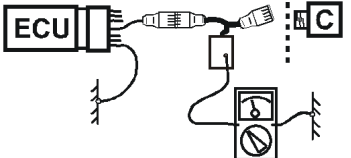
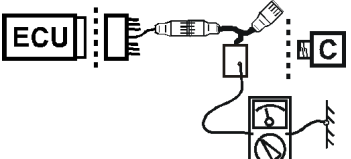
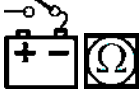
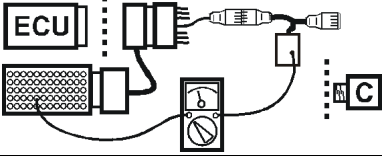
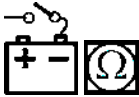
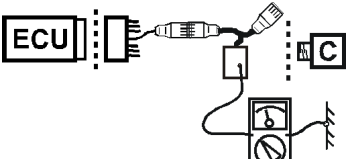
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EB11 is higher than 4.75 V or lower than 0.29 V.

Type of error/malfunction	Symptom	Possible cause
FMI 1	○ Error message ○ Amber central warning lamp	○ Leakage. ○ Defective pump. ○ Clogged lubrication system.
FMI 3		○ Signal cable short-circuited to voltage. ○ Ground cable open circuit.
FMI 5		○ Feed cable open circuit. ○ Signal line, open circuit or short-circuited to ground.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
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Sub-system	2 – 4	$\approx 0.5 \text{ V}$ (engine off)		
Control unit/ cable harness	Ground cable 4 – 	$\approx 0 \Omega$		
	Feed cable 1 – 	$\approx 5 \text{ V}$		
	Feed cable 1 – 	$\approx \infty \Omega$		
	Signal cable 2 – EB11	$\approx 0 \Omega$		
	Signal cable 2 – 	$\approx \infty \Omega$		

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [ERROR Monitoring Engine Oil Temp. \(MID 128 PID 175\)](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 7398, 62543

- [ERROR Monitoring Engine Oil Temp. \(MID 128 PID 175\)](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8001

Serial number stop: 10999

Document Title: ERROR Monitoring Engine Oil Temp. (MID 128 PID 175)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR Monitoring Engine Oil Temp. (MID 128 PID 175)

Component: SE2202 Sensor engine oil temperature		
Function	Measures engine oil temperature. The sensor is combined with SE2203 engine oil pressure.	
References	○ 301 Engine oil temperature ○ 370 Wiring diagram 29 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 8505	

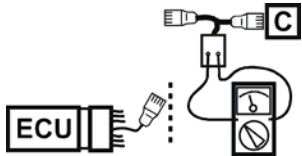
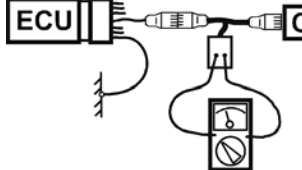
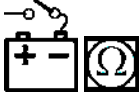
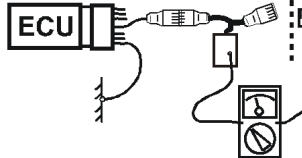
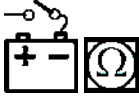
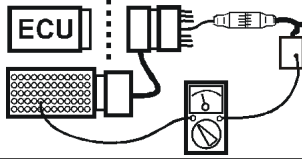
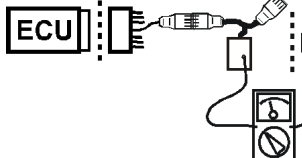
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EA1 is higher than 4.95 V or lower than 0.08 V.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning lamp	○ Sensor not connected (open circuit). ○ Contact resistance in connectors. ○ Feed cable (5 V) open circuit or short circuit to ground. ○ Ground cable open circuit.
FMI 3		○ Signal cable short-circuited to voltage. ○ Signal line open circuit. ○ Defective sensor.
FMI 4		○ Signal cable short-circuited to ground. ○ Defective sensor.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
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Component	3 – 4	Resistance values according to table		
Sub-system	3 – 4	$\approx 3 \text{ V}$ (20 °C/68 °F) $\approx 0.4 \text{ V}$ (100 °C/212 °F)		
Control unit/ cable harness	Ground cable 4 – 	$\approx 0 \Omega$		
	Signal cable 3 – EA1	$\approx 0 \Omega$		
	Signal cable 3 – 	$\approx \infty \Omega$		

Resistance values

Oil temp. (°C)	Oil temp. (°F)	Resistance		Oil temp. (°C)	Oil temp. (°F)	Resistance
-30	-22	27.5±3.1 kΩ		+60	+140	376±20 Ω
-20	-4	15.0±1.6 kΩ		+70	+158	267±13 Ω
-10	+14	8.5±0.8 kΩ		+80	+176	191±9 Ω
0	+32	4.9±0.4 kΩ		+90	+194	140±6 Ω
+10	+50	3.0±0.3 kΩ		+100	+212	104±4 Ω
+20	+68	1.9±0.1 kΩ		+110	+230	78±3 Ω
+30	+86	1205±85 Ω		+120	+248	60±3 Ω
+40	+104	798±52 kΩ		+130	+266	46±2 Ω
+50	+122	541±32 Ω				

Document Title: ERROR Monitoring Engine Oil Temp. (MID 128 PID 175)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR Monitoring Engine Oil Temp. (MID 128 PID 175)

Component: SE2202 Sensor engine oil temperature		SE2205 1 GR EB4 2 BL/GN EB3 3 GN EA31 4 BN/W EA11 E-ECU SE2202 EA11, ground EA31, signal V1040203
Function	Measures engine oil temperature. The sensor is combined with SE2205 engine oil level.	
References	○ 301 Engine oil temperature ○ 370 Wiring diagram 29 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 0014	

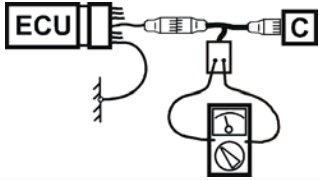
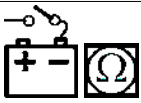
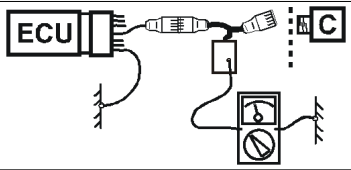
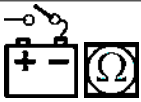
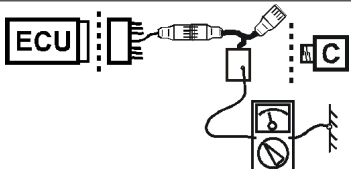
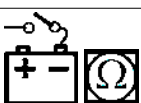
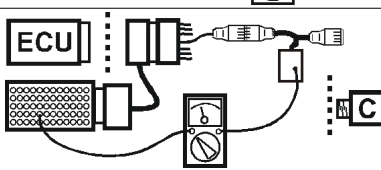
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EA31 is higher than 4.96 V or lower than 0.12 V.

Type of error/malfunction	Symptom	Possible cause
FMI 4	○ Error message ○ Amber central warning lamp	○ Signal cable short-circuited to ground. ○ Defective sensor.
FMI 5		○ Signal cable short-circuited to voltage. ○ Signal line open circuit. ○ Contact resistance in connectors. ○ Defective sensor.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	3 – 4	Resistance values according to table		

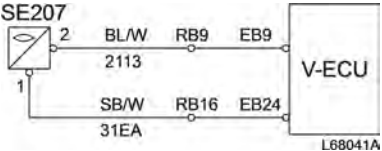
Sub-system	3 – 4	$\approx 3 \text{ V}$ (20 °C/68 °F) $\approx 0.4 \text{ V}$ (100 °C/212 °F)		
Control unit/ cable harness	Ground cable 4 – 	$\approx 0 \Omega$		
	Signal cable 3 – 	$\approx \infty \Omega$		
	Signal cable 3 – EA31	$\approx 0 \Omega$		

Resistance values

Oil temp. (°C)	Oil temp. (°F)	Resistance		Oil temp. (°C)	Oil temp. (°F)	Resistance
-30	-22	27.5±3.1 kΩ		+60	+140	376±20 Ω
-20	-4	15.0±1.6 kΩ		+70	+158	267±13 Ω
-10	+14	8.5±0.8 kΩ		+80	+176	191±9 Ω
0	+32	4.9±0.4 kΩ		+90	+194	140±6 Ω
+10	+50	3.0±0.3 kΩ		+100	+212	104±4 Ω
+20	+68	1.9±0.1 kΩ		+110	+230	78±3 Ω
+30	+86	1205±85 Ω		+120	+248	60±3 Ω
+40	+104	798±52 kΩ		+130	+266	46±2 Ω
+50	+122	541±32 Ω				

Document Title: ERROR Monitoring Fuel Level (MID 187 PID 096)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Fuel Level (MID 187 PID 096)

Component: SE207 Sensor fuel level		 EB9, signal EB24, ground
Function	Senses the level in the fuel tank for display in the gauge on the information display unit.	
References	○ 301 Fuel Level ○ 370 Wiring diagram 4	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534	
Miscellaneous	○ To identify sensors, the "Old sensor" has the connector located on the sensor's cabling, while the "new sensor" has the connector located on the sensor. ○ Selection of connected sensor takes place with VCADS Pro parameter CWL. "0" = New sensor part no. 11170094 "1" = Old sensor part no. 11039720	

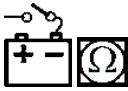
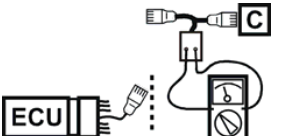
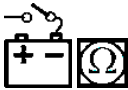
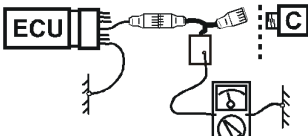
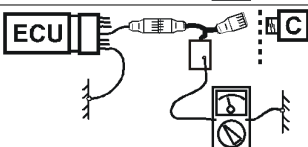
Malfunction detection conditions

- Sensor with part no. 11039720 (old sensor)
Detected if vehicle control unit (V-ECU) registers resistance on EB9 exceeding 71 Ω or below 4 Ω .
- Sensor with part no. 11170094 (new sensor)
Detected if vehicle control unit (V-ECU) registers resistance on EB9 exceeding 249 Ω or below 28 Ω .

Type of malfunction/error	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Fuel level set to 0 litres (empty tank). ○ Fuel level gauge shows empty tank.	○ Signal line short circuit to ground or open circuit. ○ Signal line short circuit to voltage. ○ Defective sensor.

Check-measurement

Testing	Test points	Set point	Condition	Test method
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Component	1 – 2	According to table		
Control unit/ cable harness	Ground cable 1 – 	$\approx 0 \Omega$		
	Signal line 2 – 	$\approx 5 \text{ V}$		

Resistance values SE207 part no. 11039720

Display in instrument	Usable fuel volume (litres)	Float position[1] ⓘ (mm)	Resistance (Ω)
Full tank	373	>372	7
		372	11
		356	15
		335	18
		314	22
	275	293	26
		272	29
		251	32
		230	34
	187	209	37
		188	40
		167	42
		146	45
		130	48
	95	114	51
		98	54
		82	58
		66	62
Empty tank	35[T1] ⓘ	50	67

[T1]At indication of empty tank, there's fuel for approx. 1 hour of operation.

Resistance values SE207 part no. 11170094

Display in instrument	Usable fuel volume (litres)	Fuel level [2] ⓘ (mm)	Resistance (Ω)
Full tank	357	>391	33
		391	38
		370	43
		349	48
		328	53
	311	307	62
		286	70
		265	78
		244	88

	223	223	37
		202	108
		186	118
		170	128
		154	140
	132	138	152
		122	164
		106	176
		90	191
		74	206
		58	221
Empty tank	35[T1] ⓘ	42	241

[T1]At indication of empty tank, there's fuel for approx. 1 hour of operation.

[1]Distance from sensor's lower edge to top edge of float.

[2]Distance from lower edge of sensor to current fuel level.

More than one document matches chosen profile
<https://truckmanualshub.com/>

- [ERROR Preheating Relay \(MID 128 PID 45\)](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Asheville, Arvika
Serial number start: 62501, 5001
Serial number stop: 62543, 7398

- [ERROR Preheating Relay \(MID 128 PID 45\)](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

Document Title: ERROR Preheating Relay (MID 128 PID 45)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR Preheating Relay (MID 128 PID 45)

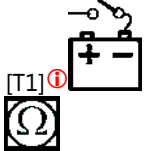
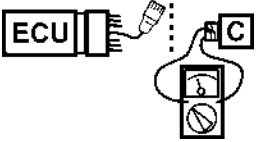
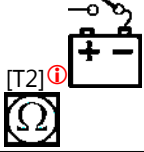
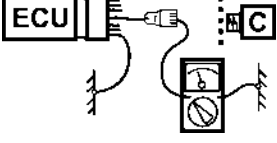
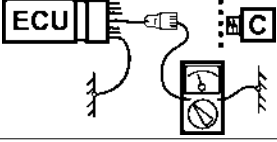
Component: RE2501 Preheating relay induction air	
Function	Activates preheating coil.
References	○ 301 Preheating of inlet air ○ 370 Wiring diagram 31
Tools	○ 302 Multimeter 981 2519
EB31, signal activation preheating relay EB5, diagnostic signal	

Malfunction detection conditions
Detected if engine control unit (E-ECU) registers open circuit or short-circuit on EB5.

Type of malfunction/error	Symptom	Possible cause
FMI 3	○ Error message ○ Amber central warning ○ Engine start difficult in cold weather. ○ White smoke at cold start.	○ Short-circuiting to voltage on cable between preheating relay and control unit or short-circuiting in preheating relay. ○ Activation of preheating not allowed.
FMI 4	○ Error message ○ Amber central warning ○ Poor batteries.	○ Short-circuiting to ground on cable between preheating relay and control unit. Preheating relay always activated.

FMI 5	○ Error message ○ Amber central warning ○ Engine start difficult in cold weather. ○ White smoke at cold start.	○ Defective fuse for feed of preheating relay. ○ Open circuit on cable between control unit and preheating relay, open circuit in relay or on its feed cable. ○ Activation of preheating not allowed.
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Check-measurement

Testing	Test points	Set point	Condition	Test method
Component	Screw connections on the relay	$\approx 20 \Omega$		
Control unit / cable harness	Control cable Blue/red cable – 	$\approx 200 \text{ k}\Omega$		
	Feed cable – 	$\approx 24 \text{ V}$		

[T1] Blue/red cable to relay disconnected (cable routed towards the control unit)

[T2] Blue/red cable to relay disconnected (cable routed towards the control unit)

[1] Feed cable to relay disconnected

Document Title: ERROR Preheating Relay (MID 128 PID 45)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR Preheating Relay (MID 128 PID 45)

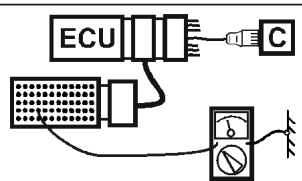
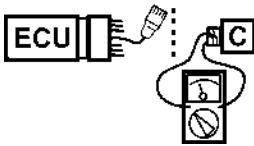
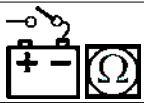
Component: RE2501 Preheating relay induction air	
Function	Activates preheating coil.
References	○ 301 Preheating of inlet air ○ 370 Wiring diagram 31
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Adapter cable 999 0014 ○ 302 Extension cable 999 0062
	EB25, signal activation preheating relay EB7, diagnostic signal V1040212

Malfunction detection conditions
○ Detected if engine control unit (E-ECU) registers open circuit or short circuit on EB25 at start. ○ Detected if engine control unit (E-ECU) registers open circuit or short-circuit on EB7.

Type of error/ malfunction	Symptom	Possible cause
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FMI 3	○ Error message ○ Amber central warning lamp ○ Engine start difficult in cold weather. ○ White smoke at cold start.	○ Short-circuiting to voltage on cable between preheating relay and control unit or short-circuiting in preheating relay. ○ Activation of preheating not allowed.
FMI 4	○ Error message ○ Amber central warning lamp ○ Poor batteries.	○ Short-circuiting to ground on cable between preheating relay and control unit. ○ Preheating relay always activated.
FMI 5	○ Error message ○ Amber central warning lamp ○ Engine start difficult in cold weather. ○ White smoke at cold start.	○ Defective fuse for feed of preheating relay. ○ Open circuit on cable between control unit and preheating relay, open circuit in relay or on its feed cable. ○ Activation of preheating not allowed.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Sub-system	Control circuit EB25 – 	≈ 24 V		
Component	Small screws on relay	≈ 20 Ω		
Control unit/ cable harness	Large screw on relay – EB7	≈ 0 Ω		—
	Large screw on relay (voltage feed) – 	≈ 24 V		—

NOTE!

Engagement of preheating takes place via RE2501 through grounding of the control cable by E-ECU. Preheating cannot be activated at a coolant temperature above +20 °C. See [301 Preheating of inlet air](#).

More than one document matches chosen profile <https://truckmanualshub.com/>

- [ERROR Monitoring Charge Air Temp. \(MID 128 PID 105\)](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7398, 62543

- [ERROR Monitoring Charge Air Temp. \(MID 128 PID 105\)](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

Document Title: ERROR Monitoring Charge Air Temp. (MID 128 PID 105)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR Monitoring Charge Air Temp. (MID 128 PID 105)

Component: SE2507 Sensor charge-air temperature		EA5, ground EA2, signal EA4, feed
Function	Measures charge-air temperature. The sensor is combined with SE2508 Sensor boost pressure.	
References	○ 301 Charge-air temperature ○ 370 Wiring diagram 29 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 8505	

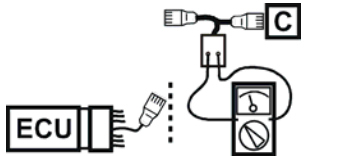
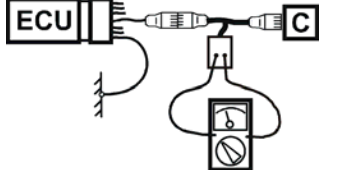
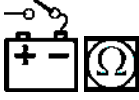
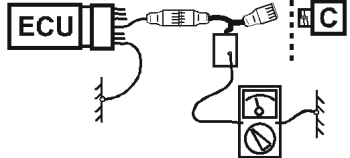
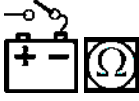
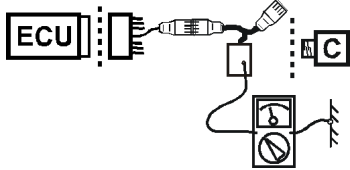
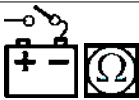
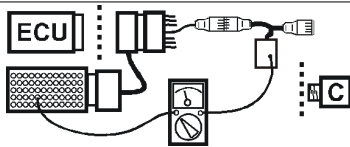
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EA2 is higher than 4.95 V or lower than 0.08 V.

Type of error/malfunction	Symptom	Possible cause
FMI 3	○ Error message ○ Amber central warning lamp ○ Cooling fan runs at max. speed.	○ Ground cable short circuit to voltage.
		○ Signal cable or ground cable short-circuited to voltage. ○ Signal line open circuit. ○ Defective sensor.
		○ Signal cable short-circuited to ground. ○ Defective sensor.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
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Component	3 – 4	Resistance values according to table		
Sub-system	3 – 4	$\approx 2.6 \text{ V}$ (20 °C/68 °F) $\approx 1.6 \text{ V}$ (40 °C/104 °F)		
Control unit/ cable harness	Ground cable 4 – 	$\approx 0 \Omega$		
	Signal cable 3 – 	$\approx \infty \Omega$		
	Signal cable 3 – EA2	$\approx 0 \Omega$		

SE2507 resistance values

Air temp. (°C)	Air temp. (°F)	Resistance	Air temp. (°C)	Air temp. (°F)	Resistance
-40	-40	168±13 kΩ	+60	+140	1240±42 Ω
-30	-22	88±6 kΩ	+70	+158	873±33 Ω
-20	-4	48±3 kΩ	+80	+176	627±26 Ω
-10	+14	27±2 kΩ	+90	+194	458±20 Ω
0	+32	16±1 kΩ	+100	+212	339±15 Ω
+10	+50	9.9±0.5 kΩ	+110	+230	255±12 Ω
+20	+68	6.2±0.3 kΩ	+120	+248	195±10 Ω
+30	+86	4.0±0.2 kΩ	+130	+266	150±8 Ω
+40	+104	2648±97 Ω	+140	+284	117±7 Ω
+50	+122	1793±58 Ω	+150	+302	93±6 Ω

Document Title: ERROR Monitoring Charge Air Temp. (MID 128 PID 105)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR Monitoring Charge Air Temp. (MID 128 PID 105)

Component: SE2507 Sensor charge-air temperature		
Function	Measures charge-air temperature. The sensor is combined with SE2508 Sensor boost pressure.	
References	○ 301 Charge-air temperature ○ 370 Wiring diagram 29 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 0014	

EA11, ground
EA47, signal

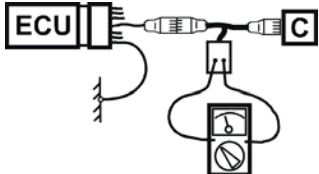
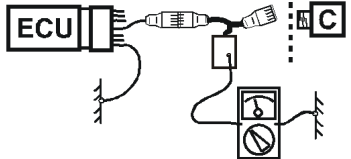
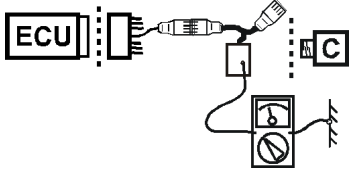
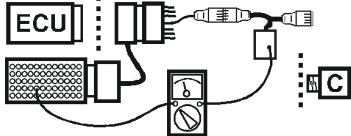
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EA47 is higher than 4.57 V or lower than 0.02 V.

Type of error/malfunction	Symptom	Possible cause
FMI 4	○ Error message ○ Amber central warning lamp	○ Signal cable short-circuited to ground. ○ Defective sensor.
FMI 5		○ Signal line short-circuited to higher voltage. ○ Interrupted/open circuit ○ Defective sensor.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	3 – 4	Resistance values according to table		

Sub-system	3 – 4	$\approx 2.6 \text{ V}$ (20 °C/68 °F) $\approx 1.6 \text{ V}$ (40 °C/104 °F)		
Control unit/ cable harness	Ground cable 4 – 	$\approx 0 \Omega$		
	Signal cable 3 – 	$\approx \infty \Omega$		
	Signal cable 3 – EA47	$\approx 0 \Omega$		

SE2507 resistance values

Air temp. (°C)	Air temp. (°F)	Resistance	Air temp. (°C)	Air temp. (°F)	Resistance
-40	-40	168±13 kΩ	+60	+140	1240±42 Ω
-30	-22	88±6 kΩ	+70	+158	873±33 Ω
-20	-4	48±3 kΩ	+80	+176	627±26 Ω
-10	+14	27±2 kΩ	+90	+194	458±20 Ω
0	+32	16±1 kΩ	+100	+212	339±15 Ω
+10	+50	9.9±0.5 kΩ	+110	+230	255±12 Ω
+20	+68	6.2±0.3 kΩ	+120	+248	195±10 Ω
+30	+86	4.0±0.2 kΩ	+130	+266	150±8 Ω
+40	+104	2648±97 Ω	+140	+284	117±7 Ω
+50	+122	1793±58 Ω	+150	+302	93±6 Ω

Document Title: Communication with data buses	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Communication with data buses

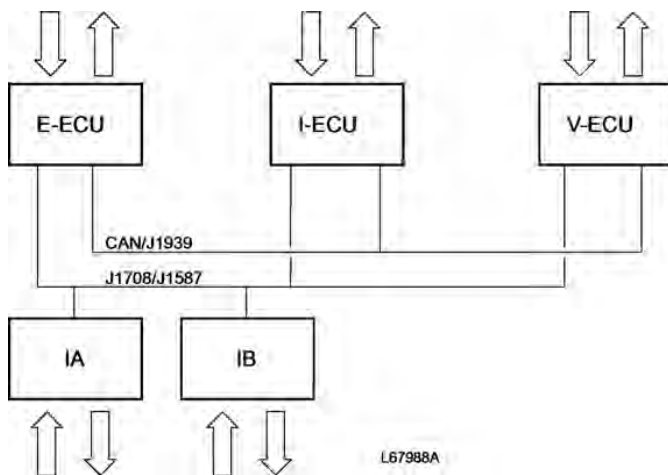


Figure 1
Communication

E-ECU	Engine control unit
I-ECU	Instrument control unit
V-ECU	Vehicle control unit
IA	Service socket for service display unit
IB	Service socket for VCADS Pro

General

Vehicle electronics are based on the principle that all communication between controls units takes place via two data buses. The machine's three control units are connected to the buses to be able to communicate with each other.

Communication between the different control units as well as reporting from control units to service sockets takes place on data buses CAN/J1939 and J1708/J1587.

The buses follow SAE standards and consist of two pair-twisted cables. The purpose of the twisted cabling is to protect the bus from electrical interference.

If a malfunction should occur in the system, a signal is sent on the information bus, making it possible to read the information, either on the operator's instruments or via the service display unit or VCADS Pro.

The figure shows the principle for how the control units and service sockets are connected to the buses.

CAN/J1939 Control bus

System control signals are sent via this bus. The control bus is very quick, which is necessary for control of the entire system to work and quickly adapt to changing conditions.

The main communication alternative is the CAN/J1939 bus. However, for E-ECU, some control data is only sent on the J1708/J1587 bus.

J1708/J1587 information bus

The information bus is connected to the control units and service sockets. Information and diagnostic signals are sent on this bus. In addition, some control data is sent from the engine control unit via this bus.

The bus also functions as a "back-up" for the control bus, if it should fail for some reason.

The system status is continuously updated and available for reading via the information bus.

By connecting the service display unit or VCADS Pro to service sockets, it's possible to read error codes, perform tests, empty logged information, download parameters and download software.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [ERROR Monitoring Engine Air Filter \(MID 128 PID 107\)](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 7398, 62543

- [ERROR Monitoring Engine Air Filter \(MID 128 PID 107\)](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8001

Serial number stop: 10999

Document Title: ERROR Monitoring Engine Air Filter (MID 128 PID 107)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

ERROR Monitoring Engine Air Filter (MID 128 PID 107)

Component: SE2502 Monitor air filter pressure		
Function	Detects clogged air filter. The monitor is combined with SE2501 Sensor, induction air temperature.	
References	○ 301 Air filter pressure ○ 370 Wiring diagram 28 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534	

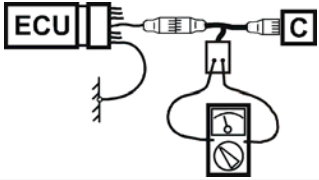
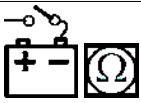
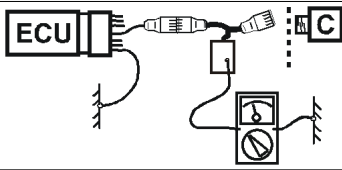
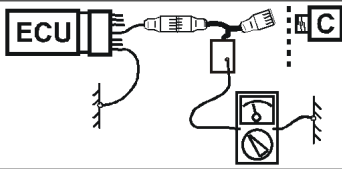
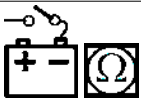
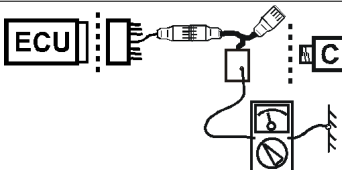
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EB17 exceeds $0.91 \times$ system voltage or is below $0.09 \times$ system voltage.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning lamp	○ Defective sensor.
FMI 3		○ Signal cable short-circuited to voltage. ○ Ground cable short circuit to voltage.
FMI 4		○ Signal cable short-circuited to ground.
FMI 5		○ Signal cable or ground cable open circuit.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	1 – 2	$\approx 330 \Omega$		

Sub-system	1 – 2	$\approx 3\text{ V}$		
Control unit/ cable harness	Ground cable 2 – 	$\approx 0\ \Omega$		
	Feed cable 1 – 	$\approx 0.8 \times \text{system voltage}$		
	Feed cable 1 – 	$\approx \infty\ \Omega$		

Document Title: ERROR Monitoring Engine Air Filter (MID 128 PID 107)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

ERROR Monitoring Engine Air Filter (MID 128 PID 107)

Component: SE2502 Monitor air filter pressure		
Function	Detects clogged air filter. The monitor is combined with SE2501 Sensor, induction air temperature.	
References	○ 301 Air filter pressure ○ 370 Wiring diagram28 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534	

 EA15, ground
 EA29, signal

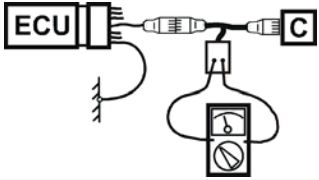
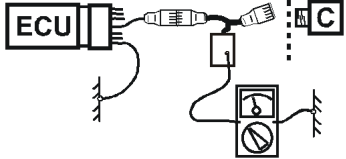
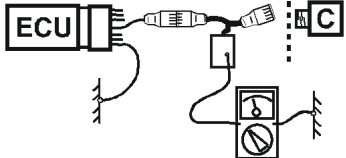
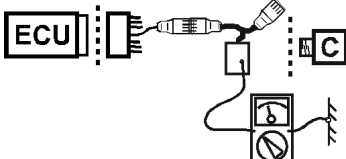
Malfunction detection conditions

 Detected if engine control unit (E-ECU) registers that voltage on EA29 exceeds $0.91 \times$ system voltage or is below $0.09 \times$ system voltage.

Type of error/malfunction	Symptom	Possible cause
FMI 3	○ Error message ○ Amber central warning lamp	○ Signal cable short-circuited to voltage. ○ Defective sensor.
FMI 4		○ Signal cable short-circuited to ground. ○ Defective sensor.
FMI 5		○ Signal cable or ground cable open circuit. ○ Defective sensor.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	1 – 2	$\approx 330 \Omega$		

Sub-system	1 – 2	$\approx 3 \text{ V}$		
Control unit/ cable harness	Ground cable 2 – 	$\approx 0 \Omega$		
	Feed cable 1 – 	$\approx 0.8 \times \text{system voltage}$		
	Feed cable 1 – 	$\approx \infty \Omega$		

Document Title: ERROR Monitoring EGR (MID 128 PPID 19)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring EGR (MID 128 PPID 19)

Component: MA2504 EGR-valve		
Function	Return of exhausts for maximal combustion.	
References	○ 301 Exhaust Gas Recirculation (EGR) ○ 370 Wiring diagram 31	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Adapter cable 999 0014 ○ 302 Adapter cable 999 0191	

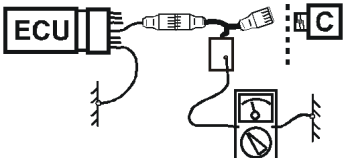
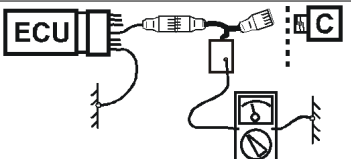
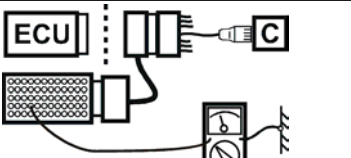
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers open circuit or short-circuit on EB30.

Type of error/ malfunction	Symptom	Possible cause
FMI 3	○ Error message ○ Amber central warning lamp	○ Feed line or signal line short-circuited to higher voltage.
FMI 4		○ Feed line or signal line short-circuited to lower voltage.
FMI 5		○ Feed or signal cable open circuit or short-circuited to ground.
FMI 7		○ Mechanical problem

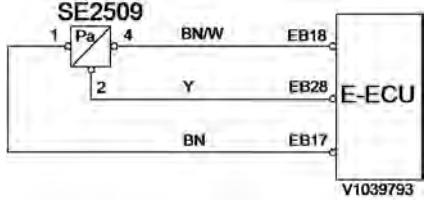
Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	FU63 – EB30	$\approx 70 \Omega$		

Sub-system	EB30 – 	$\approx U_{\text{bat}}$ (inaktiv) $\approx 0 V_{\text{bat}}$ (active)		
Control unit/ cable harness	EMS7 – 	$\approx U_{\text{bat}}$		
	EB30 – 	$\approx \infty \Omega$		 FU63 removed

Document Title: ERROR Monitoring Crankcase Pr (MID 128 PID 153)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Crankcase Pr (MID 128 PID 153)

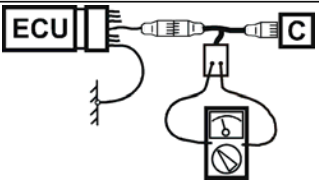
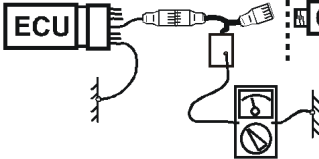
Component: SE2509 Sensor crankcase pressure		 EB18, ground EB28, signal EB17, feed 5 V	
Function	Measures crankcase pressure		
References	○ 301 Engine crankcase pressure ○ 370 Wiring diagram 29 ○ VCADS Pro, Test28407-3 Sensor values, monitoring		
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534		

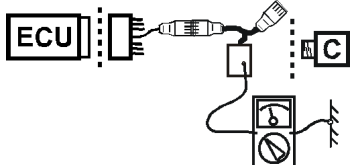
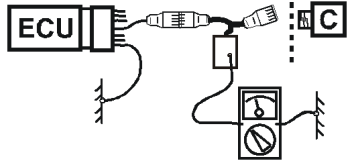
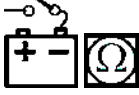
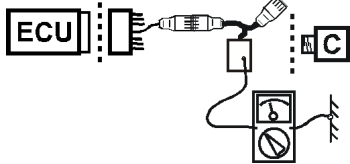
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EB28 exceeds 4.75 V or is below 0.3 V.

Type of error/ malfunction	Symptom	Possible cause
FMI 3	○ Error message ○ Amber central warning lamp	○ Signal cable short-circuited to voltage.
FMI 5		○ Feed or signal cable open circuit or short-circuited to ground. ○ Defective sensor.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Sub-system	EB18 – EB28	$\approx 2.8 - 3 \text{ V}$ (Engine off) At sea level, air pressure 100 kpa (14.5 psi).		
Control unit/ cable harness	Feed cable 1 – 	$\approx 5 \text{ V}$		

Feed cable EB17 – 	$\approx \infty \Omega$		
Ground cable 4 – 	$\approx 0 \Omega$		
Signal cable EB28 – 	$\approx \infty \Omega$		

Document Title: ERROR Radiator Fan Control	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Radiator Fan Control

Component: MA202 Proportional valve cooling fan		EC18, feed EC19, ground	
Function	Controls cooling fan rpm.		
References	○ 301 Cooling fan adjustment ○ 370 Wiring diagram 5 ○ 387 Service display unit, electrical control output signals 1		
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355 ○ 302 Adapter cable 999 0191		

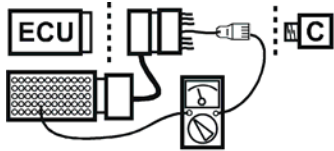
Malfunction detection conditions

Detected if vehicle control unit (V-ECU) registers circuit voltage below 50 mA or exceeding 1.25 A.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Low cooling fan speed ○ No brake pressure charging	○ Open circuit or short circuit.

Check-measuring

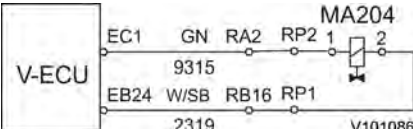
Measurement	Measuring points	Correct value	Condition	Measuring method
Component	1 – 2	$\approx 10\text{--}30\ \Omega$ [T1] ⓘ		
Control unit/cable harness	Return line 2 – EC19	$\approx 0\ \Omega$		

Feed cable 1 – EC18	$\approx 0 \Omega$		
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[T1]Resistance increase with temperature increase

Document Title: ERROR Solenoid valve Reversible fan	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Solenoid valve Reversible fan

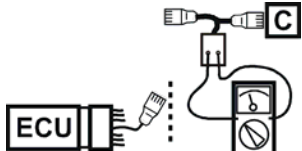
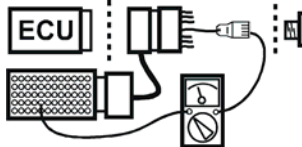
Component: MA204 Solenoid valve retardation		 EC1, feed EB24, ground
Function	Controls retardation of cooling fan.	
References	○ 301 Reversible cooling fan ○ 370 Wiring diagram 5 ○ 387 Service display unit, electrical control output signals 1	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355 ○ 302 Adapter cable 999 0191	

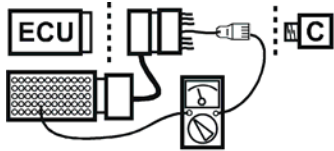
Malfunction detection conditions

Detected if vehicle control unit (V-ECU) registers circuit voltage below 50 mA or exceeding 1.25 A.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Reversal not performed.	○ Open circuit/short circuit.

Check-measuring

Testing	Test points	Reference value	Condition	Test method
Component	1 – 2	$\approx 36 \Omega$ [T1] ①		
Control unit/cable harness	Ground cable 2 – EB24	$\approx 0 \Omega$		

Feed cable 1 – EC1	$\approx 0 \Omega$		
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[T1]Resistance increase with raised temperature

Document Title: ERROR Monitoring Radiator Fan Revolutions (MID 187 PPID 1161)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Radiator Fan Revolutions (MID 187 PPID 1161)

Component: SE211 Sensor cooling fan speed		EA28, signal EA42, ground
Function	Measures cooling fan speed.	
References	○ 301 Cooling fan adjustment ○ 370 Wiring diagram 5	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355 ○ 302 Test pins 999 0008	

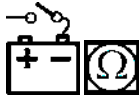
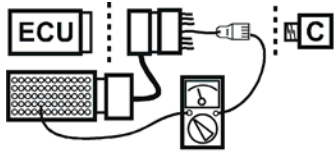
Malfunction detection conditions

Detected at open circuit or short-circuiting.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Sensor not connected (open circuit). ○ Signal line or ground cable open circuit. ○ Defective sensor.

Check-measuring

Testing	Test points	Set point	Condition	Test method
Component	1 – 2	$\approx 1050 \pm 100 \Omega$		
	1 – 2 –	$\approx \infty \Omega$ $\approx \infty \Omega$		
Cable harness	Ground cable 1 – EA42	$\approx 0 \Omega$		

Signalling circuit 2 – EA28	$\approx 0 \Omega$		
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More than one document matches chosen profile <https://truckmanualshub.com/>

- [ERROR Monitoring Engine Coolant Temp. \(MID 128 PID 110\)](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Asheville, Arvika
Serial number start: 62501, 5001
Serial number stop: 62543, 7398

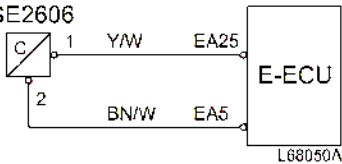
- [ERROR Monitoring Engine Coolant Temp. \(MID 128 PID 110\)](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

Document Title: ERROR Monitoring Engine Coolant Temp. (MID 128 PID 110)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

ERROR Monitoring Engine Coolant Temp. (MID 128 PID 110)

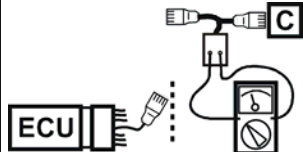
Component: SE2606 Sensor coolant temperature engine block		 EA25, signal / feed 5 V EA5, ground
Function	Reads coolant temperature in engine.	
References	○ 301 Coolant temperature, engine ○ 370 Wiring diagram 29 ○ VCADS Pro, test 28408-6	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534	

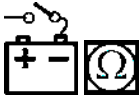
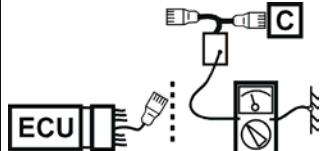
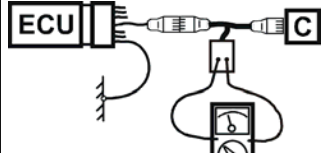
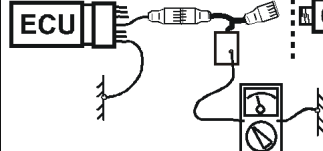
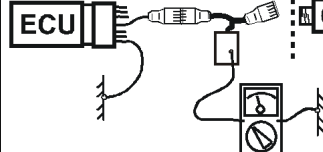
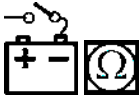
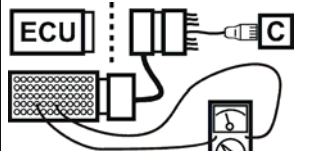
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EA25 is higher than 4.95 V or lower than 0.08 V.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning lamp	○ Ground cable short-circuited to voltage or open circuit. ○ Defective sensor.
FMI 3	○ Coolant temperature gauge shows 0 on the instrument.	○ Signal cable short-circuited to voltage. ○ Signal/feed cable or ground cable open circuit.
FMI 4		○ Signal cable short-circuited to ground.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	1 – 2	Resistance value acc. to table.		

Sub-system	1 – 	$\approx \infty \Omega$ $\approx \infty \Omega$		
	1 – 2	$\approx 3.0 \text{ V}$ (20 °C/68 °F) $\approx 0.6 \text{ V}$ (85 °C/185 °F)		
Control unit/ cable harness	Ground cable 2 – 	$\approx 0 \Omega$		
	Signal cable 1 – 	$\approx 5 \text{ V}$		
	EA2 – EA5	Resistance value acc. to table.		

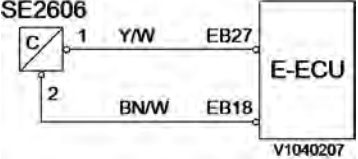
SE2606 resistance values

Coolant temp.		Resistance	Coolant temp.		Resistance
(°C)	(°F)		(°C)	(°F)	
-30	-22	24 - 31 kΩ	60	140	356 - 396 Ω
-20	-4	13 - 17 kΩ	70	158	254 - 280 Ω
-10	14	7.7 - 9.3 kΩ	80	176	183 - 200 Ω
0	32	4.5 - 5.3 kΩ	90	194	134 - 145 Ω
10	50	2.8 - 3.3 kΩ	100	212	100 - 107 Ω
20	68	1.8 - 2.0 kΩ	110	230	75 - 81 Ω
30	86	1.1 - 1.3 kΩ	120	248	57 - 62 Ω
40	104	746 - 850 Ω	130	266	44 - 48 Ω
50	122	510 - 574 Ω			

Document Title: ERROR Monitoring Engine Coolant Temp. (MID 128 PID 110)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR Monitoring Engine Coolant Temp. (MID 128 PID 110)

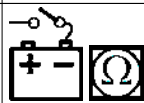
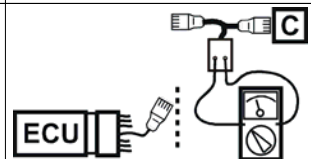
Component: SE2606 Sensor coolant temperature engine block		 EB27, signal / feed 5 V EB18, ground
Function	Reads coolant temperature in engine.	
References	○ 301 Coolant temperature, engine ○ 370 Wiring diagram 29 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Adapter cable 999 0014 ○ 302 Multi-pin breaker box 999 8699	

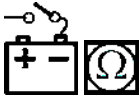
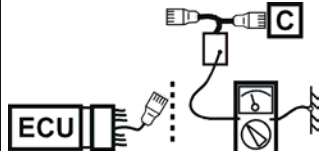
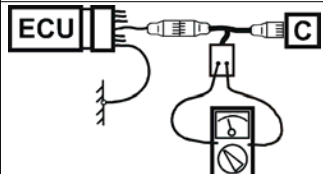
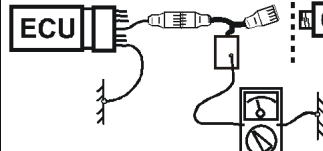
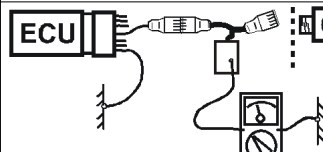
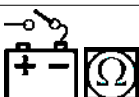
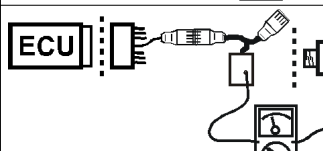
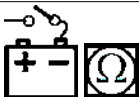
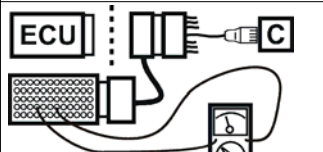
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EB27 is higher than 4.92 V or lower than 0.12 V.

Type of error/malfunction	Symptom	Possible cause
FMI 4	○ Error message ○ Amber central warning lamp	○ Signal cable short-circuited to ground. ○ Defective sensor.
FMI 5	○ Coolant temperature gauge shows 0 on the instrument.	○ Signal line short-circuited to higher voltage. ○ Interrupted/open circuit ○ Defective sensor.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	1 – 2	Resistance value acc. to table.		

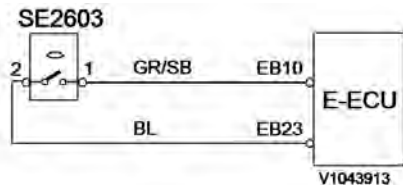
Sub-system	1 – 	$\approx \infty \Omega$ $\approx \infty \Omega$		
	1 – 2	$\approx 3.0 \text{ V}$ (20 °C/68 °F) $\approx 0.6 \text{ V}$ (85 °C/185 °F)		
Control unit/ cable harness	Ground cable 2 – 	$\approx 0 \Omega$		
	Signal cable 1 – 	$\approx 5 \text{ V}$		
	Signal cable 1 – 	$\approx \infty \Omega$		
	EB27 – EB18	Resistance value acc. to table.		

SE2606 resistance values

Coolant temp.			Coolant temp.		
(°C)	(°F)	Resistance	(°C)	(°F)	Resistance
-30	-22	24 - 31 kΩ	60	140	356 - 396 Ω
-20	-4	13 - 17 kΩ	70	158	254 - 280 Ω
-10	14	7.7 - 9.3 kΩ	80	176	183 - 200 Ω
0	32	4.5 - 5.3 kΩ	90	194	134 - 145 Ω
10	50	2.8 - 3.3 kΩ	100	212	100 - 107 Ω
20	68	1.8 - 2.0 kΩ	110	230	75 - 81 Ω
30	86	1.1 - 1.3 kΩ	120	248	57 - 62 Ω
40	104	746 - 850 Ω	130	266	44 - 48 Ω
50	122	510 - 574 Ω			

Document Title: ERROR Monitoring Coolant Level (MID 128 PID 111)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Coolant Level (MID 128 PID 111)

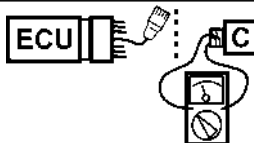
Component: SE2603 Sensor coolant level		 EB23, signal EB10, ground
Function	Monitors coolant level.	
References	○ 301 Coolant Level ○ 370 Wiring diagram 28 ○ 387 Service display unit, electrical control output signals 1	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 0014 ○ 302 Adapter cable 999 0191	

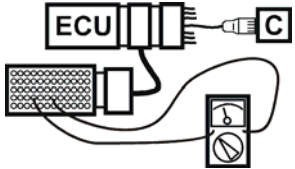
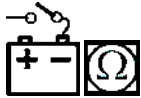
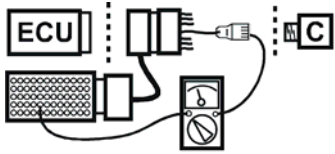
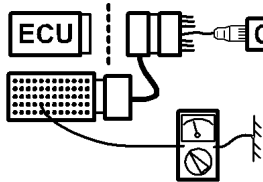
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EB23 is higher than $0.95 \times U_{bat}$.

Type of error/malfunction	Symptom	Possible cause
FMI 1	○ Error message ○ Red central warning	○ Coolant level too low. ○ Signal cable short-circuited to ground.
FMI 3	○ Error message ○ Amber central warning lamp	○ Signal cable short-circuited to voltage. ○ Defective sensor

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	1 – 2	$\approx \infty \Omega$ (normal level) $\approx 0 \Omega$ (low level)		

Sub-system	EB23 – EB11	$\approx 0.8 \times U_{\text{bat}}$ (normal level) $\approx 0 \text{ V}$ (low level)		
Control unit/ cable harness	Signal cable 1 – EB10	$\approx 0 \Omega$		
	Signal cable EB23 – 	$\approx 0 \Omega$		

Document Title: ERROR Monitoring Coolant Outlet Temp. (MID 187 PPID 1157)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Coolant Outlet Temp. (MID 187 PPID 1157)

Component: SE210 Sensor coolant temperature outlet radiator		EB7, signal EB24, ground
Function	Reads coolant temperature at radiator outlet.	
References	○ 301 Coolant temperature, outlet radiator ○ 370 Wiring diagram 5	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355 ○ 302 Test pins 999 0008	

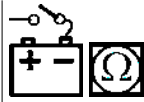
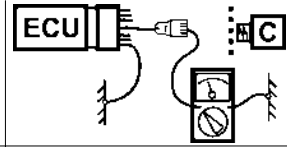
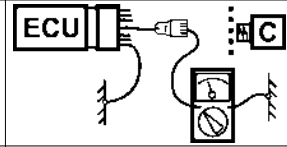
Malfunction detection conditions

Detected if vehicle control unit (V-ECU) registers EB7 voltage exceeding 4.79 V or below 0.20 V (nominal +5.0 V feed).

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Cooling fan runs at maximum speed.	○ Sensor not connected (open circuit). ○ Signal line short circuit to 5 V or higher voltage, short circuit to ground or open circuit. ○ Ground cable short circuit to voltage or open circuit. ○ Defective sensor.

Check-measuring

Testing	Test points	Set point	Condition	Test method
Component	1 – 2	Resistance values according to table		
Sub-system	EB7 – EB24	Voltage values according to table		

Control unit/ cable harness	Ground cable 1 – 	$\approx 0 \Omega$		
	Signalling circuit 2 – 	$\approx 5 \text{ V}$		

SE210 resistance and voltage values

Temp. (°C)	Temp. (°F)	Resistance	Voltage (V)	Temp. (°C)	Temp. (°F)	Resistance	Voltage (V)
-40	-40	3.8 k Ω	4.64	+60	+140	0.5 k Ω	3.04
-30	-22	3.7 k Ω	4.62	+70	+158	0.4 k Ω	2.66
-20	-4	3.4 k Ω	4.60	+80	+176	0.3 k Ω	2.27
-10	+14	3.0 k Ω	4.55	+90	+194	0.2 k Ω	1.92
0	+32	2.6 k Ω	4.48	+100	+212	150 Ω	1.60
+10	+50	2.1 k Ω	4.37	+110	+230	110 Ω	1.32
+20	+68	1.7 k Ω	4.22	+120	+248	86 Ω	1.08
+30	+86	1.3 k Ω	4.01	+130	+266	67 Ω	0.89
+40	+104	0.9 k Ω	3.74	+140	+284	52 Ω	0.73
+50	+122	0.7 k Ω	3.41				

Document Title: ERROR Accelerator Pedal Reduced Activated	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Accelerator Pedal Reduced Function Activated

Component: SE214 APS Sensor accelerator pedal position		
Function	To give the desired, calibrated set point for throttle setting.	
References	○ 301 Accelerator Pedal ○ 370 Wiring diagram 27 ○ VCADS Pro, test 27102-8	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 0020 ○ 302 Template 999 0133 ○ 302 Test pins 999 0008	

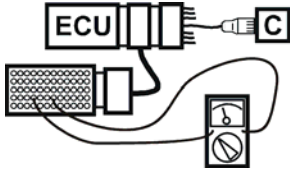
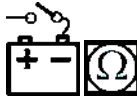
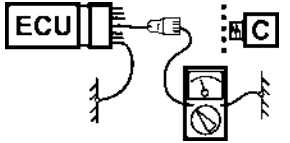
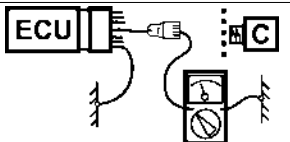
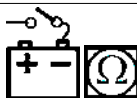
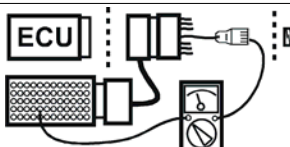
Malfunction detection conditions

Detected if instrument control unit (I-ECU) registers P3.9 voltage exceeding 4.75 V or below 0.25 V (nominal +5.0 V feed).

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning	

Check-measuring

Testing	Test points	Set point	Condition	Test method
Component	3 – 10	≈ 2.5 kΩ		

Sub-system	9 – 3	$\approx 0.35 \text{ V}$ (accelerator pedal not applied) $\approx 2.2 \text{ V}$ (accelerator pedal fully applied)		
Control unit/ cable harness	Ground cable B – 	$\approx 990 \Omega$		
	Feed cable C – 	$\approx 5 \text{ V}$		
	Signalling circuit A – 9	$\approx 0 \Omega$		

Document Title: ERROR Accelerator Pedal No Back-up Function	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Accelerator Pedal No Back-up Function

Component: SE214 IVS Sensor applied accelerator pedal		
Function	To engage Limp Home function if an accelerator pedal APS (Accelerator Pedal Sensor) malfunction is detected.	
References	○ 301 Accelerator Pedal ○ 370 Wiring diagram 27 ○ VCADS Pro, test 27102-8	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 0020 ○ 302 Template 999 0133 ○ 302 Test pins 999 0008	

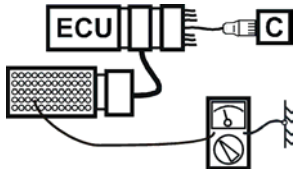
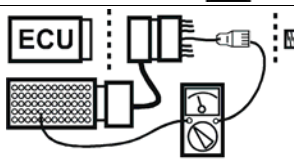
Malfunction detection conditions

Detected if instrument control unit (I-ECU) registers that voltage on P3.9 (APS) exceeds 2.1 V and 0 V on P2.13 (IVS).

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning lamp	○ Open circuit/short circuit.

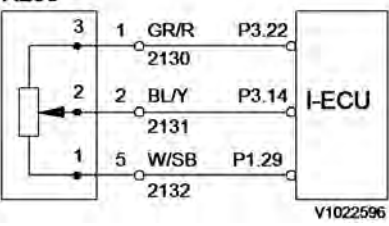
Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	P2.13 – P3.15	Applied accelerator pedal $\approx 40 \Omega$ Accelerator pedal not applied $\approx 0 \Omega$		

Control unit/ Cable harness	Feed cable P3.15 – 	$\approx 24\text{ V}$		
	Signal cable D – 13	$\approx 0\ \Omega$		

Document Title: ERROR Hand throttle	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Hand throttle

Component: R205 Potentiometer		R205  P3.22, 5 V feed P3.14, signal P1.29, ground
Function	- The hand throttle consists of a rotary potentiometer that gives increased voltage with clockwise rotation. The hand throttle is disengaged when the accelerator pedal or brake pedal is applied. - The hand throttle is disengaged during machine start regardless of previous settings. - Depending on the position of the control at disengagement, the control may require counter-clockwise rotation during activation, followed by clockwise rotation, in order to allow for adjustable engine speed.	
References	301 Hand Throttle 370 Wiring diagram 27	
Tools	302 Multimeter 981 2519 302 Multi-pin breaker box 999 8699 302 Extension cable 999 0062 302 Adapter cable 999 0020 302 Template 999 0133	
Other	Non-linear signal. Connector attached under instrument panel.	

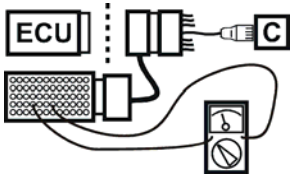
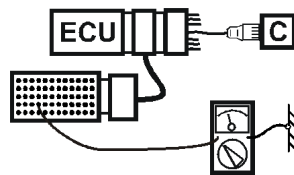
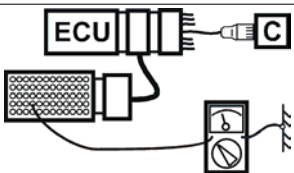
Malfunction detection conditions

Detected if instrument control unit (I-ECU) registers that voltage on P3.14 exceeds 4.85 V or is below 0.15 V.

Type of error/malfunction	Symptom	Possible cause
	- Error message - Amber central warning	Open circuit or short circuit.

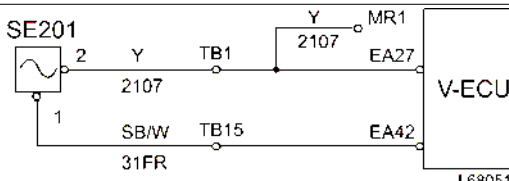
Check-measuring

Testing	Test points	Set point	Condition	Test method
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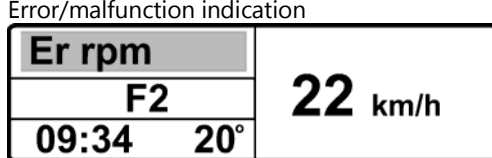
Component	14 - 22	$\approx 80\text{--}900\ \Omega$		
	22 - 	5 V		
	14 - 	0.7–4.6 V		

Document Title: ERROR Monitoring Engine Revolutions (MID 187 PID 190)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

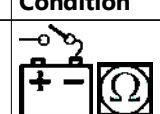
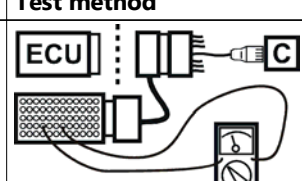
ERROR Monitoring Engine Revolutions (MID 187 PID 190)

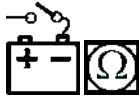
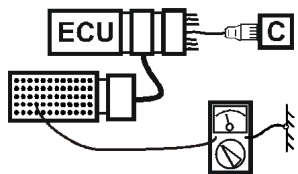
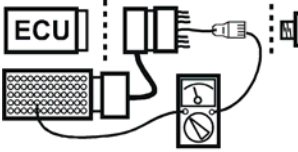
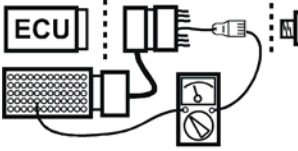
Component: SE201 Sensor engine speed converter		 EA27, signal EA42, ground	
Function	Measures the input transmission speed for the V-ECU. The measurement is made against the converter gear wheel.		
References	○ 301 Engine speed for V-ECU ○ 370 Wiring diagram 4 ○ VCADS Pro, test 28407-8		
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355		

Malfunction detection conditions
Detected at open circuit or short-circuiting.

Type of error/ malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Error/malfunction indication 	○ Open circuit/short circuit

Check-measuring

Testing	Test points	Set point	Condition	Test method
Component	EA27 – EA42	$\approx 1080 \pm 20 \Omega$		

Cable harness	EA27 –  EA42 – 	$\approx \infty \Omega$ $\approx \infty \Omega$		
	Ground cable 1 – EA42	$\approx 0 \Omega$		
	Signalling circuit 2 – EA27	$\approx 0 \Omega$		

Document Title: ERROR Relay Interval Wiper	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Relay Interval Wiper

Component:	RE5 Relay interval wiper rear RE6 Relay interval wiper front
Function	Controls interval wiping.
References	○ 301 Interval Wiper ○ 370 Wiring diagram 18 ○ 302 RE Relay, general check ○ 387 Service display unit, electrical control input signals 3 ○ 387 Service display unit, electrical control output signals 1
Suitable action	Tips! Shift relays to troubleshoot.

Malfunction detection conditions
○ Open circuit/short circuit

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Relay not connected. ○ Defective relay.

Document Title: "Er" ambient temperature (MID 187 PID 171)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

"Er" ambient temperature (MID 187 PID 171)

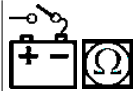
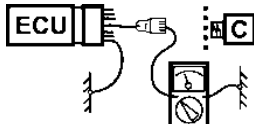
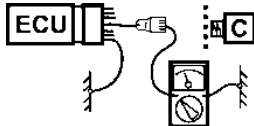
Component: SE807 Sensor ambient temperature		EB36, signal EB24, ground
Function	The sensor measures ambient temperature (outdoor temperature) which is presented in the information display unit.	
References	○ 301 Outdoor temperature ○ 370 Wiring diagram 20	
Tools	○ 302 Multimeter 981 2519	
Other	NTC-resistors	

Malfunction detection conditions
Detected if vehicle control unit (V-ECU) registers that voltage on EB36 exceeds 4.92 V or is below 0.45 V (nominal +5.0 V feed).

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ "Er" shown in information display unit.	○ Sensor not connected (open circuit). ○ Contact resistance in connectors. ○ Signal line open circuit, short circuit to higher voltage or short circuit to ground. ○ Ground cable open circuit or short circuit to higher voltage. ○ Defective sensor.

Check-measuring

Testing	Test points	Set point	Condition	Test method
Component	1 – 2	Resistance values according to table		
Component/cable harness	EB24 – EB36	Resistance values according to table		

Control unit/ cable harness	Ground cable 2 – 	$\approx 0 \Omega$		
	Signal line 1 – 	$\approx 5 \text{ V}$		

SE807 resistance and voltage values

Air temp. (°C)	Air temp. (°F)	Resistance (kΩ)
-30	-22	6.1
-20	-4	3.6
-10	+14	2.2
0	+32	1.4
+10	+50	0.9
+20	+68	0.6
+30	+86	0.5
+40	+104	0.4
+50	+122	0.3

Document Title: ATTENTION! Reduced Computer Function (J1708/J1587)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ATTENTION! Reduced Computer Function (J1708/J1587)

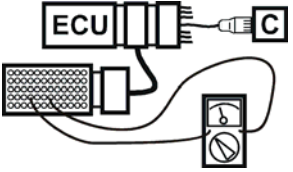
Component: SAE J1708/J1587 Information bus	
Function	The information bus is connected to all control units and service sockets. Information and diagnostic signals are sent by the bus.
References	○ 301 Reduced computer communication ○ 370 Wiring diagram 2 ○ 370 Wiring diagram 24 and others
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355 - alt. ○ 302 Adapter cable 999 8505
	IA, service sockets for service display unit IB, service sockets for VCADS Pro service tool

Malfunction detection conditions
Data bus CAN/J1939 or J1708/J1587 not functional.

Type of error/malfunction	Symptom	Possible cause

	○ Error message ○ Red central warning ○ Function Safety mode ○ The machine can only be operated in 1st and 2nd gear in both travel directions (Safety mode).	○ Data bus open circuit. ○ Data bus short circuit to voltage or ground. ○ Internal data bus short circuit in cable harness.
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Check-measuring

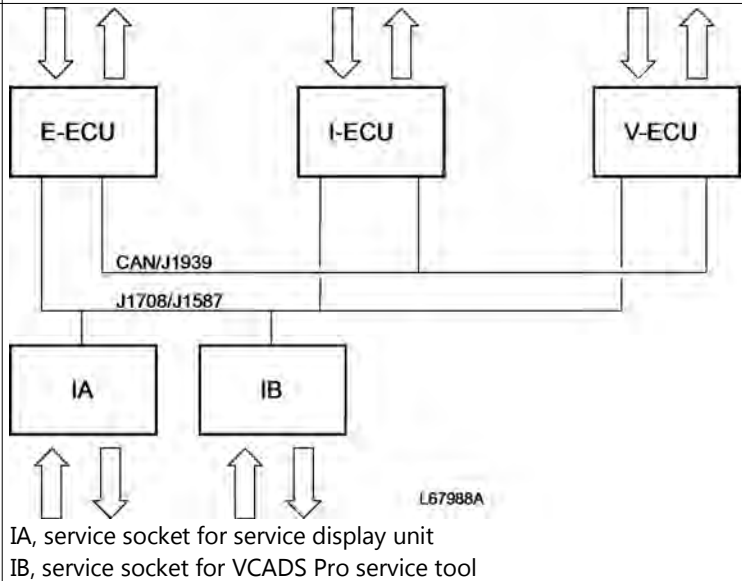
Testing	Test points	Set point	Condition	Test method
Subsystem	SAE J1708A EB11 – EB42	$U \approx 0-5 \text{ V DC}^{(a)}$ $U_{\max} \approx 5 \text{ V DC}^{(b)}$ $U_{\min} \approx 0 \text{ V DC}^{(b)}$		V-ECU  NOTE! Information bus voltage varies and depends on bus signal intensity. Test values should therefore only be considered as standard values.
	SAE J1708B EB38 – EB42	$U \approx 0-5 \text{ V DC}^{(a)}$ $U_{\max} \approx 5 \text{ V DC}^{(b)}$ $U_{\min} \approx 0 \text{ V DC}^{(b)}$		
	SAE J1708A – SAE J1708B EB11 – EB38	$U \approx 2-5 \text{ V DC}$		

(a) Voltage varies within indicated interval.

(b) Test value valid for testing with MIN and MAX function in the multimeter.

Document Title: ATTENTION! Reduced Computer Function (J1939)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ATTENTION! Reduced Computer Function (J1939)

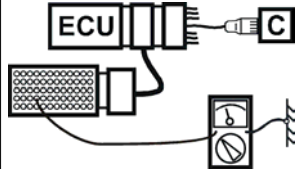
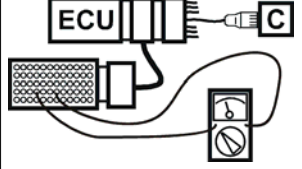
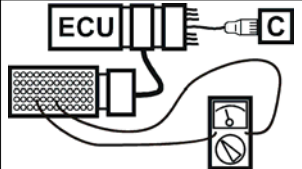
Component: SAE J1939 Control bus (CAN-bus)	
Function	The control bus is connected to all control units. The system's control signals are sent on the control bus.
References	○ 301 Reduced computer communication ○ 370 Wiring diagram 24 etc.
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355 - alt. ○ 302 Adapter cable 999 8505
 IA, service socket for service display unit IB, service socket for VCADS Pro service tool	

Malfunction detection conditions
Data bus CAN/J1939 or J1708/J1587 not working.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Red central warning ○ Function Safety mode ○ The machine can only be operated in 1st and 2nd gear on both travel	○ Data bus open circuit. ○ Data bus short-circuit to voltage or ground. ○ Data bus internal short-circuit in cable harness.

directions (Safety mode)

Check-measuring

Testing	Test points	Set point	Condition	Test method
Sub-system	CAN High EC16 –  CAN Low EC17 – 	$U \approx 2-5 \text{ V DC}$ $U \approx 0-3 \text{ V DC}$		V-ECU 
	CAN High – CAN Low EC16 – EC17	$U \approx 0-1 \text{ V DC}$		 NOTE! The voltage on the information bus varies and depends on the intensity of the signals on the bus. Therefore, measuring values shall only be regarded as guideline values.
Control unit / cable harness	CAN High – CAN Low EC16 – EC17 CAN High – CAN Low EC16 – EC17	$R \approx 60 \Omega$ $R \approx 120 \Omega$ [T1] ⓘ	 	

[T1]Disconnected terminating resistor or E-ECU.

Document Title: STOP! COMPUTER FAILURE STOP THE VEHICLE	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

STOP! COMPUTER FAILURE STOP THE VEHICLE

Component: SAE J1708/J1587 Information bus SAE J1939 Check bus (CAN-bus)	
References	○ 301 Interruption in computer communication ○ 302 ATTENTION! Reduced Computer Function (J1708/J1587) ○ 302 ATTENTION! Reduced Computer Function (J1939) ○ 370 Wiring diagram 24 ○ 370 Wiring diagram 31
The diagram illustrates the communication network between various Electronic Control Units (ECUs) and input/output modules. At the top, three ECUs are shown: E-ECU, I-ECU, and V-ECU. Each ECU has two external connection points indicated by double-headed arrows. Below these, two data buses are depicted: the CAN/J1939 bus and the J1708/J1587 bus. The E-ECU, I-ECU, and V-ECU are all connected to both of these buses. At the bottom, two input/output modules, IA and IB, are shown. IA is connected to the J1708/J1587 bus, while IB is connected to both the J1708/J1587 bus and the CAN/J1939 bus. Each of these modules also has two external connection points indicated by double-headed arrows. The entire diagram is identified by the code L67988A.	

Malfunction detection conditions
Both data buses, J1939 and J1708/J1587 not functional at the same time.

Type of malfunction/error	Symptom	Possible cause
	○ Error message ○ Red central warning ○ Buzzer ○ In case of defective V-ECU gear is set to Neutral. ○ Gear set to Neutral	○ Defective voltage feed or ground to V-ECU and E-ECU. ○ Data bus open circuit. ○ Data bus short circuit to voltage or ground. ○ Internal data bus short circuit in cable harness. ○ Malfunction of any of the ECUs.

More than one document matches chosen profile <https://truckmanualshub.com/>

- [ERROR E-ECU PID 094](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7398, 62543

- [ERROR E-ECU PID 094](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

Document Title: ERROR E-ECU PID 094	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

ERROR E-ECU PID 094

Component: SE2301 Sensor fuel pressure		
Function	Measures the feed pressure after the fuel filter.	
References	○ 301 Fuel feed pressure ○ 370 Wiring diagram 29 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Adapter cable 999 8534 ○ 302 Adapter cable 999 8505	

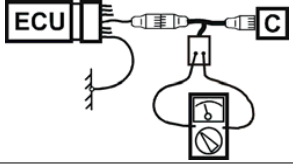
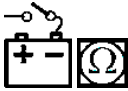
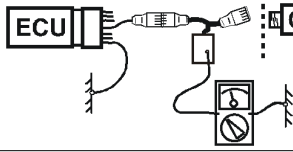
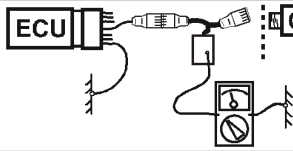
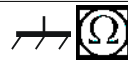
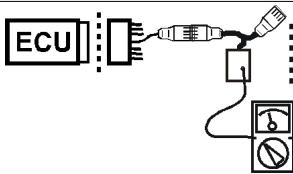
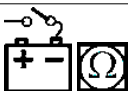
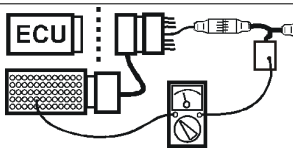
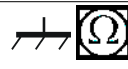
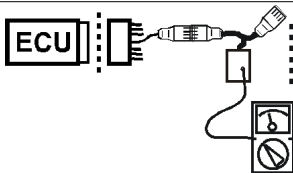
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EA27 is higher than 4.75 V or lower than 0.29 V.

Type of error/malfunction	Symptom	Possible cause
FMI 1	○ Error message ○ Amber central warning lamp ○ Low engine power. ○ Engine difficult to start.	High differential pressure across filter caused by: ○ Clogged fuel filter. ○ Leakage in fuel system. ○ Defective fuel line, fuel pump or sensor.
FMI 3		○ Signal cable short-circuited to voltage. ○ Ground cable open circuit.
FMI 5		○ Feed cable open circuit. ○ Signal line, open circuit or short-circuited to ground.
FMI 7		High differential pressure across filter caused by: ○ Clogged fuel filter. ○ Leakage in fuel system. ○ Defective fuel line, fuel pump or sensor.

Check-measuring

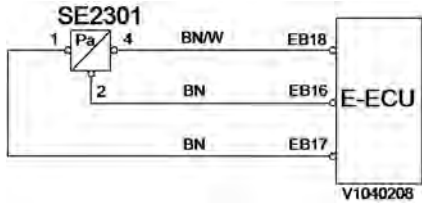
Measuremen	Measuring points	Set point	Condition	Measuring method
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t				
Sub-system	2 – 4	$\approx 0.5 \text{ V}$ (engine off)		
Control unit/ cable harness	Ground cable 4 – 	$\approx 0 \Omega$		
	Feed cable 1 – 	$\approx 5 \text{ V}$		
	Feed cable 1 – 	$\approx \infty \Omega$		
	Signal cable 2 – EA27	$\approx 0 \Omega$		
	2 – 	$\approx \infty \Omega$		

Document Title: ERROR E-ECU PID 094	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR E-ECU PID 094

Component: SE2301 Sensor fuel pressure		 EA18, ground EA16, signal EA17, feed
Function	Measures the feed pressure after the fuel filter.	
References	○ 301 Fuel feed pressure ○ 370 Wiring diagram 29 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Adapter cable 999 0014	

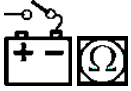
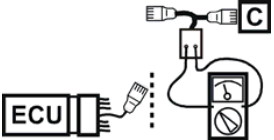
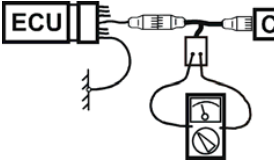
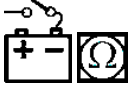
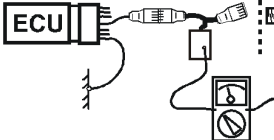
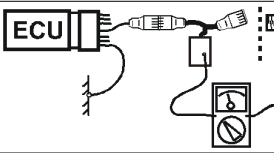
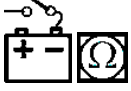
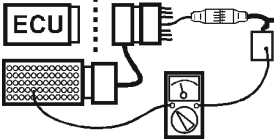
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EB16 is higher than 4.75 V or is lower than 0.29 V.

Type of error/malfunction	Symptom	Possible cause
FMI 1	○ Error message ○ Amber central warning lamp ○ Low engine power. ○ Engine difficult to start.	High differential pressure across filter caused by: ○ Clogged fuel filter. ○ Leakage in fuel system. ○ Defective fuel line, fuel pump or sensor.
FMI 3		○ Signal cable short-circuited to voltage. ○ Ground cable open circuit.
FMI 5		○ Feed cable open circuit. ○ Signal line, open circuit or short-circuited to ground.
FMI 7		High differential pressure across filter caused by: ○ Clogged fuel filter. ○ Leakage in fuel system. ○ Defective fuel line, fuel pump or sensor.

Check-measuring

Measuremen	Measuring points	Set point	Condition	Measuring method
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t				
Component	2 – 4	$\approx 100 \text{ k}\Omega$		
Sub-system	2 – 4	$\approx 0.5 \text{ V}$ (engine off)		
Control unit/ cable harness	Ground cable 4 – 	$\approx 0 \Omega$		
	Feed cable 1 – 	$\approx 5 \text{ V}$		
	Feed cable 1 – 	$\approx \infty \Omega$		
	Signal cable 2 – EB16	$\approx 0 \Omega$		
	Signal cable 2 – 	$\approx \infty \Omega$		

More than one document matches chosen profile <https://truckmanualshub.com/>

- [ERROR E-ECU PID 102](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7398, 62543

- [ERROR E-ECU PID 102](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

Document Title: ERROR E-ECU PID 102	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR E-ECU PID 102

Component: SE2508 Sensor boost pressure		
Function	Measures boost pressure. The sensor is combined with SE2507 Sensor, charge-air temperature.	
References	○ 301 Boost pressure ○ 370 Wiring diagram 29 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 8505	

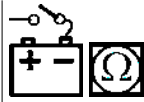
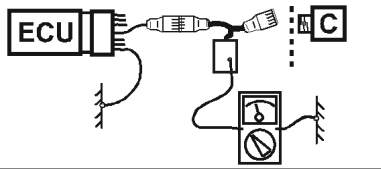
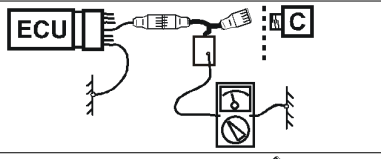
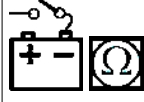
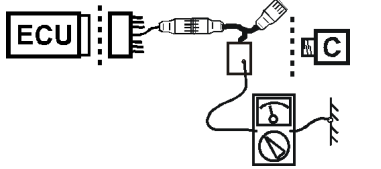
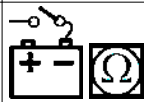
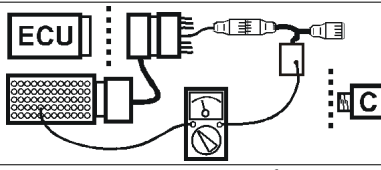
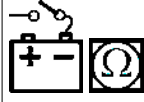
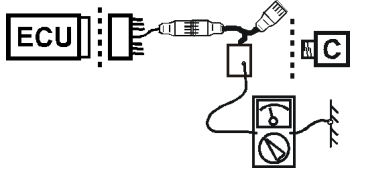
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EA2 is higher than 4.95 V or lower than 0.08 V.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning lamp	○ Ground cable short circuit to voltage. ○ Defective sensor.
FMI 3	○ Cooling fan runs at max. speed.	○ Feed line or signal line short-circuited to voltage.
FMI 4		○ Feed line or signal line open circuit. ○ Feed line or signal line short-circuited to ground.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Sub-system	2 – 4	$\approx 1.1 \text{ V}$ (engine off [T1]) 		

Control unit/ cable harness	Ground cable 4 – 	$\approx 0 \Omega$		
	Feed cable 1 – 	$\approx 5 \text{ V}$		
	Feed cable 1 – 	$\approx \infty \Omega$		
	Signal cable 2 – EA3	$\approx 0 \Omega$		
	Signal cable 2 – 	$\approx \infty \Omega$		

[T1]At elevation ≈ 0 meters above sea level.

Document Title: ERROR E-ECU PID 102	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR E-ECU PID 102

Component: SE2508 Sensor boost pressure		
Function	Measures boost pressure. The sensor is combined with SE2507 Sensor, charge-air temperature.	
References	○ 301 Boost pressure ○ 370 Wiring diagram 29 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 0014	

EA11, ground
EA22, signal
EA7, feed

Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EA22 is higher than 4.94 V or lower than 0.16 V.

Type of error/malfunction	Symptom	Possible cause
FMI 3	○ Error message ○ Amber central warning lamp ○ Reduced engine power	○ Signal line short-circuit to voltage. ○ Ground cable open circuit. ○ Defective sensor.
FMI 5	○ Error message ○ Amber central warning lamp ○ Reduced engine power	○ Feed cable open circuit. ○ Signal line open circuit or short-circuit to ground. ○ Defective sensor.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Sub-system	2 – 4	$\approx 1.1 \text{ V}$ (engine off [T1]) 		

Control unit/ cable harness	Ground cable 4 –	$\approx 0 \Omega$		
	Feed cable 1 –	$\approx 5 \text{ V}$		
	Feed cable 1 –	$\approx \infty \Omega$		
	Signal cable 2 – EA22	$\approx 0 \Omega$		
	Signal cable 2 –	$\approx \infty \Omega$		

[T1]At elevation ≈ 0 meters above sea level.

Document Title: ERROR E-ECU PID 108	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR E-ECU PID 108

Component: Sensor in E-ECU	
Function	The signal from the air pressure sensor is used to calculate boost pressure and to compensate the amount of fuel when operating at high altitudes.
References	○ 301 Barometric pressure ○ VCADS Pro, test 28407-8 and 28408-6.

Malfunction detection conditions
Detected if engine control unit (E-ECU) registers internal sensor voltage exceeding 4.95 V or below 0.08 V.

Type of error/malfunction	Symptom	Possible cause
FMI 3 FMI 4	○ Error message ○ Amber central warning ○ Reduced power at high altitude.	○ Internal malfunction in control unit. ○ The control unit has been exposed to extreme high or low pressure.

More than one document matches chosen profile <https://truckmanualshub.com/>

- [ERROR E-ECU PID 172](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7398, 62543

- [ERROR E-ECU PID 172](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

Document Title: ERROR E-ECU PID 172	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR E-ECU PID 172

Component: SE2501 Sensor induction air temperature		
Function	Measures induction air temperature after air cleaner. The sensor is combined with SE2502 Monitor, air filter pressure.	
References	○ 301 Temperature induction air ○ 370 Wiring diagram 28 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Adapter cable 999 8505	

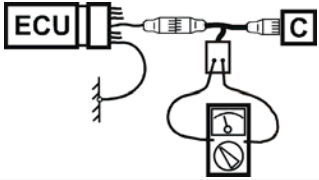
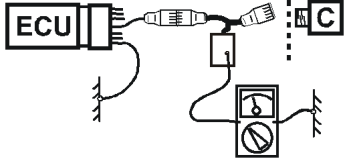
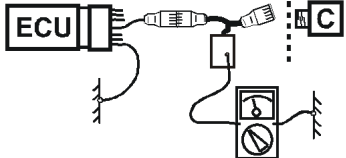
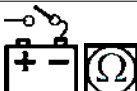
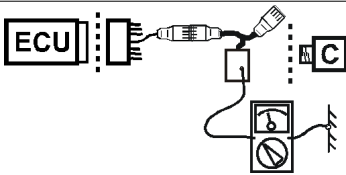
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EB3 exceeds $0.91 \times$ system voltage or is below $0.09 \times$ system voltage.

Type of error/malfunction	Symptom	Possible cause
FMI 3	○ Error message ○ Amber central warning lamp	○ Signal cable or ground cable short-circuited to voltage. ○ Signal cable or ground cable open circuit.
FMI 4	○ Blue exhaust smoke in cold weather. ○ Cooling fan runs at max. speed.	○ Signal cable short-circuited to ground. ○ Defective sensor.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	3 – 4	Resistance values according to table		

Sub-system	3 – 4	$\approx 2.6 \text{ V}$ (20 °C/68 °F) $\approx 1.2 \text{ V}$ (50 °C/122 °F)		
Control unit/ cable harness	Ground cable 4 – 	$\approx 0 \Omega$		
	Signal cable 3 – 	$\approx 5 \text{ V}$		
	Signal cable 3 – 	$\approx \infty \Omega$		

SE2501 resistance values

Air temp. (°C)	Air temp. (°F)	Resistance		Air temp. (°C)	Air temp. (°F)	Resistance
-30	-22	88.6±5.5 kΩ		+40	+104	2663±77 Ω
-20	-4	48.6±2.8 kΩ		+50	+122	1831±45 Ω
-10	+14	27.6±1.4 kΩ		+60	+140	1244±29 Ω
0	+32	16.3±0.8 kΩ		+70	+158	876±16 Ω
+10	+50	10.0±0.4 kΩ		+80	+176	629.0±9.5 Ω
+20	+68	6.2±0.33 kΩ		+90	+194	458.7±6.0 Ω
+30	+86	4.0±0.14 kΩ		+100	+212	339.9±3.4 Ω

Document Title: ERROR E-ECU PID 172	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR E-ECU PID 172

Component: SE2501 Sensor induction air temperature		
Function	Measures induction air temperature after air cleaner. The sensor is combined with SE2502 Monitor, air filter pressure.	
References	○ 301 Temperature induction air ○ 370 Wiring diagram28 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534	

 EB18, ground
 EB31, signal

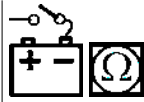
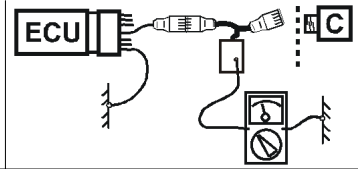
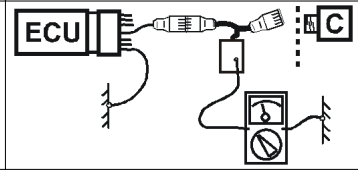
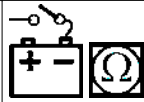
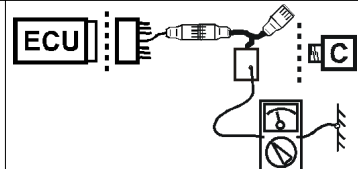
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EB31 is too low or too high.

Type of error/malfunction	Symptom	Possible cause
FMI 4	○ Error message ○ Amber central warning lamp	○ Signal cable short-circuited to ground. ○ Defective sensor.
FMI 5	○ Blue exhaust smoke in cold weather. ○ Cooling fan runs at max. speed.	○ Signal cable short-circuited to voltage. ○ Signal cable or ground cable open circuit.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	3 – 4	Resistance values according to table		
Sub-system	3 – 4	$\approx 2.6 \text{ V}$ (20 °C/68 °F) $\approx 1.2 \text{ V}$ (50 °C/122 °F)		

Control unit/ cable harness	Ground cable 4 – 	$\approx 0 \Omega$		
	Signal cable 3 – 	$\approx 5 \text{ V}$		
	Signal cable 3 – 	$\approx \infty \Omega$		

SE2501 resistance values

Air temp. (°C)	Air temp. (°F)	Resistance		Air temp. (°C)	Air temp. (°F)	Resistance
-30	-22	88.6±5.5 kΩ		+40	+104	2663±77 Ω
-20	-4	48.6±2.8 kΩ		+50	+122	1831±45 Ω
-10	+14	27.6±1.4 kΩ		+60	+140	1244±29 Ω
0	+32	16.3±0.8 kΩ		+70	+158	876±16 Ω
+10	+50	10.0±0.4 kΩ		+80	+176	629.0±9.5 Ω
+20	+68	6.2±0.33 kΩ		+90	+194	458.7±6.0 Ω
+30	+86	4.0±0.14 kΩ		+100	+212	339.9±3.4 Ω

- [ERROR E-ECU SID 001 - E-ECU SID 006](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7398, 62543

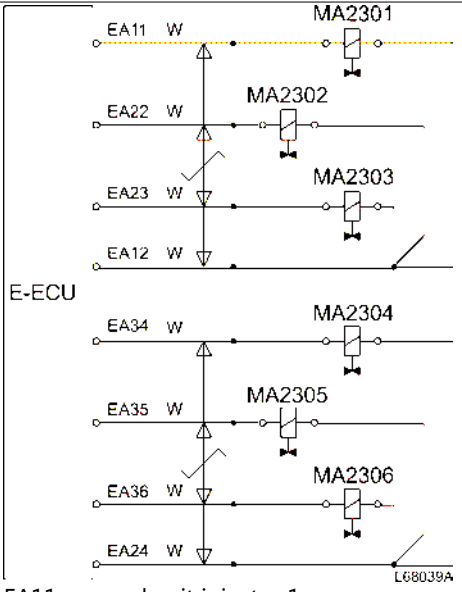
- [ERROR E-ECU SID 001 - E-ECU SID 006](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

Document Title: ERROR E-ECU SID 001 - E-ECU SID 006	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR E-ECU SID 001 - E-ECU SID 006

Component: MA2301–MA2306 Unit injectors 1–6		 EA11, ground unit injector 1 EA22, ground unit injector 2 EA23, ground unit injector 3 EA12, feed EA34, ground unit injector 4 EA35, ground unit injector 5 EA36, ground unit injector 6 EA24, feed
Function	Unit injectors for fuel.	
References	○ 301 Injectors ○ 370 Wiring diagram 30	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8505	

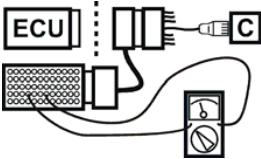
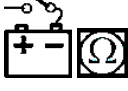
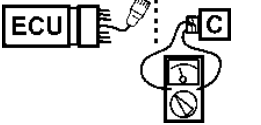
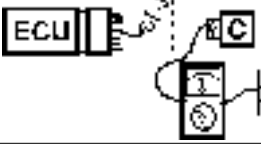
Malfunction detection conditions

- Detected if engine control unit (E-ECU) registers that a unit injector is activated and, at the same time, there is an open circuit or short-circuit to the unit injector's high or low side.
- Detected if engine control unit (E-ECU) registers that cylinder balancing data are too high or too low.

Type of error/malfunction	Symptom	Possible cause
FMI 2	○ Error message ○ Amber central warning	○ Short-circuit to voltage in cable harness to injector's high side.

FMI 3	○ lamp ○ Low power. ○ Rough running. ○ Abnormal sound.	○ Short-circuit between high and low side. ○ Short-circuit to voltage in cable harness to injector's low side.
FMI 4	○ 3 or 5 cylinder operation.	○ Short-circuit to voltage in cable harness on respective injector's low or high side.
FMI 5		○ Open circuit on low or high side. If 3 error codes (a bank) are generated, then the open circuit is on the bank's high side, only one error code indicates that the open circuit is on the low side of the injector in question.
FMI 7		○ Defective unit injector. ○ Poor cylinder compression.
FMI 11		○ Intermittent malfunctions.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component/ cable harness	EA11 – EA12 EA22 – EA12 EA23 – EA12 EA34 – EA24 EA35 – EA24 EA36 – EA24	Bosch ≈ 1.5–2.0 Ω (20 °C) Delphi ≈ 4–5.6 Ω (20 °C)		
	EA11 –  EA22 –  EA23 –  EA34 –  EA35 –  EA36 – 	≈ ∞ Ω		
Component [T1] ⓘ	High – Low	Bosch ≈ 1.5–2.0 Ω (20 °C) Delphi ≈ 4–5.6 Ω (20 °C) [T2] ⓘ		
	High –  Low – 	≈ ∞ Ω ≈ ∞ Ω		

[T1] On the condition that both cables are disconnected on respective unit injector

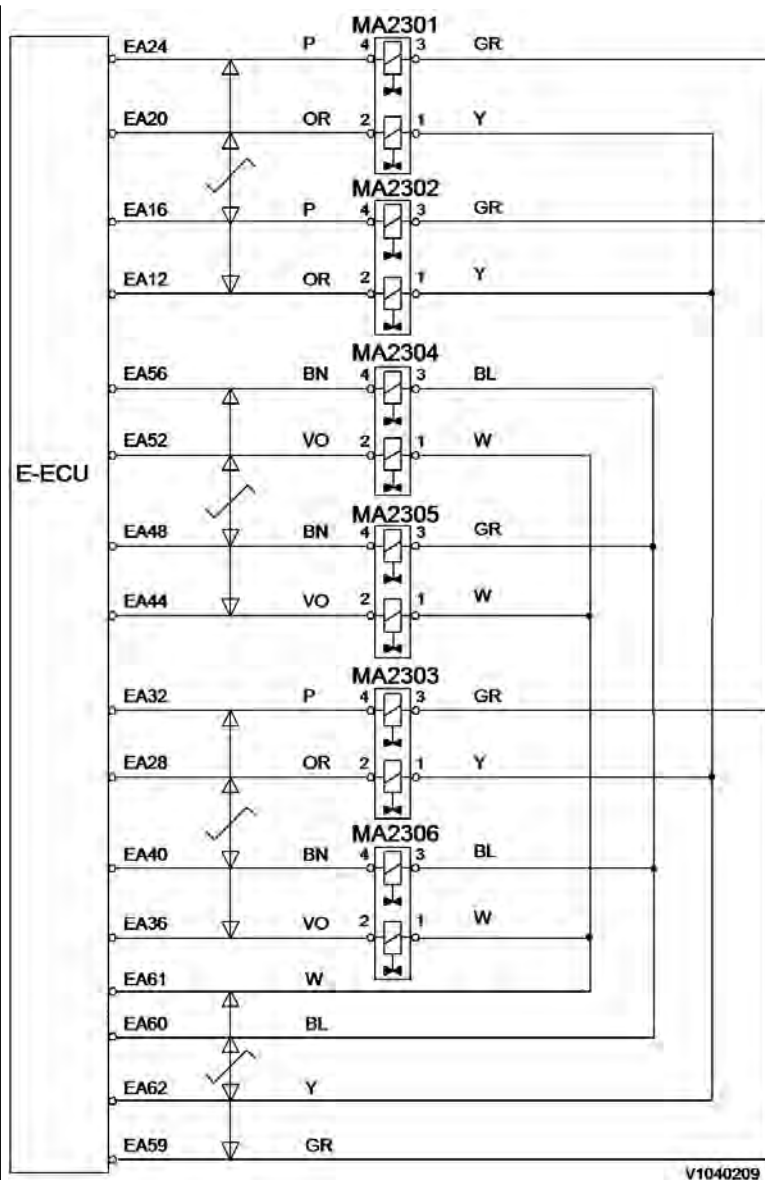
[T2] NOTE! Small resistance values are difficult to measure. Values shall be regarded as guideline values and as help to detect any open circuits in the injector circuits.

Document Title: ERROR E-ECU SID 001 - E-ECU SID 006	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR E-ECU SID 001 - E-ECU SID 006

Component: MA2301-MA2306 Unit injectors 1-6		
Function	Unit injectors for fuel.	
References	○ 301 Injectors ○ 370 Wiring diagram 30	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Adapter cable 999 0014	



EA59, EA60, EA61, EA62 high voltage side

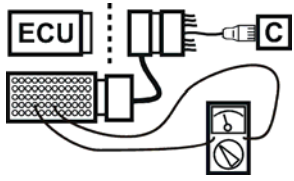
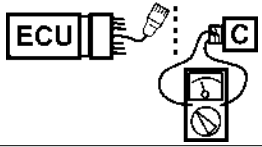
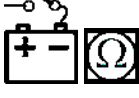
EA12, EA16, EA20, EA24, EA28, EA32, EA36, EA40, EA44, EA52, EA56 low voltage side

Malfunction detection conditions

- Detected if engine control unit (E-ECU) registers that a unit injector is activated and, at the same time, there is an open circuit or short-circuit to the unit injector's high or low side.
- Detected if engine control unit (E-ECU) registers that cylinder balancing data are too high or too low.

Type of error/malfunction	Symptom	Possible cause
FMI 3	○ Error message ○ Amber central warning lamp	○ Short-circuit to voltage in cable harness to injector's low side.
FMI 5	○ Low power. ○ Rough running. ○ Abnormal sound. ○ 3 or 5 cylinder operation.	○ Short-circuit to ground in cable harness to injector's low side. ○ Short-circuit or open circuit in injector's high side.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component/ cable harness	EA12 – EA62 EA16 – EA59 EA20 – EA62 EA24 – EA59 EA28 – EA62 EA32 – EA59 EA36 – EA61 EA40 – EA60 EA44 – EA61 EA48 – EA60 EA52–EA61 EA56 – EA60	$\approx 2.3\text{--}2.8 \Omega$ (20 °C)		
	EA59 –  EA60 –  EA61 –  EA62 – 	$\approx \infty \Omega$		
Component [T1] ⓘ	High – Low	$\approx 2.3\text{--}2.8 \Omega$ (20 °C) [T2] ⓘ		
	High –  Low – 	$\approx \infty \Omega$ $\approx \infty \Omega$		

[T1] ⓘ On the condition that both cables are disconnected on respective unit injector

[T2] ⓘ NOTE! Small resistance values are difficult to measure. Values shall be regarded as guideline values and as help to detect any open circuits in the injector circuits.

More than one document matches chosen profile
<https://truckmanualshub.com/>

- [ERROR E-ECU SID 021](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7398, 62543

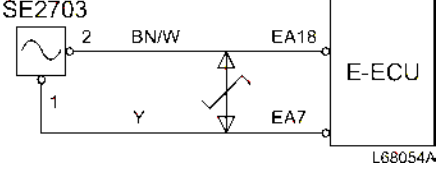
- [ERROR E-ECU SID 021](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

Document Title: ERROR E-ECU SID 021	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR E-ECU SID 021

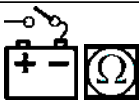
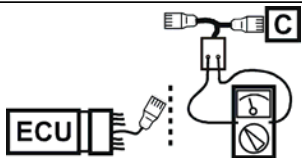
Component: SE2703 Sensor camshaft rpm		 EA18, frequency (-) EA7, frequency (+)
Function	Measures rpm on camshaft and indicates camshaft's position.	
References	○ 301 Camshaft speed ○ 370 Wiring diagram 28	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 8534 ○ 302 Adapter cable 999 8505	

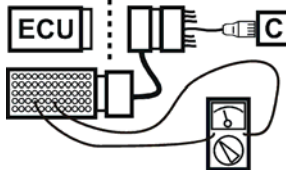
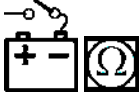
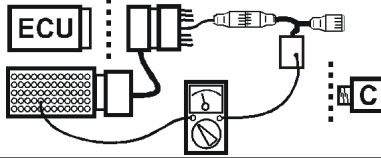
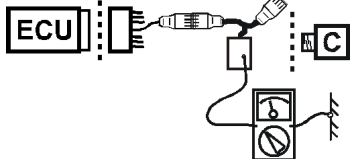
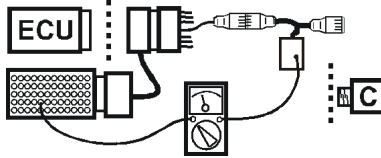
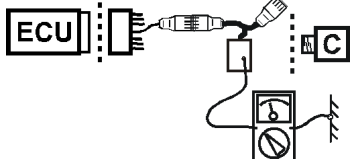
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that signal from sensor is missing or if signal has abnormal frequency.

Type of error/malfunction	Symptom	Possible cause
FMI 3	○ Error message ○ Amber central warning lamp ○ Difficult to start at next start (no symptom if malfunction/error is generated when engine is running).	○ Positive or negative cable short-circuited to voltage. ○ Positive cable short-circuited to ground. ○ Positive or negative open circuit. ○ Defective sensor or incorrectly installed sensor. ○ Incorrectly connected polarity or damaged ring gear.
FMI 8		○ Electrical interference on rpm signal caused by, for example, poor insulation or damaged cable. ○ Defective or incorrectly installed sensor (incorrect distance from ring gear). ○ Damaged ring gear.

Check-measuring

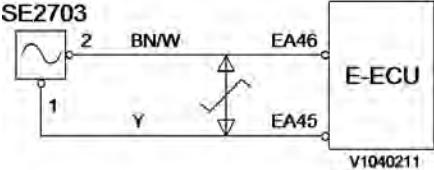
Measurement	Measuring points	Set point	Condition	Measuring method
Component	1 – 2	≈ 775–945 Ω		

Component/ cable harness	1 – 	$\approx \infty \Omega$ $\approx \infty \Omega$		
	EA7–EA18	$\approx 775\text{--}945 \Omega$		
Cable harness	Signal cable (+) 1 – EA7	$\approx 0 \Omega$		
	Signal cable (+) EA7 – 	$\approx \infty \Omega$		
	Signal cable (-) 2 – EA18	$\approx 0 \Omega$		
	Signal cable (-) EA18 – 	$\approx \infty \Omega$		

Document Title: ERROR E-ECU SID 021	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR E-ECU SID 021

Component: SE2703 Sensor camshaft rpm		 EA46, frequency (-) EA45, frequency (+)
Function	Measures rpm on camshaft and indicates camshaft's position.	
References	○ 301 Camshaft speed ○ 370 Wiring diagram 28	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Adapter cable 999 0014 ○ 302 Extension cable 999 0062	

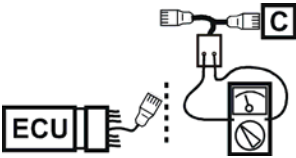
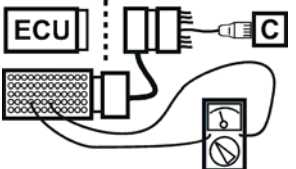
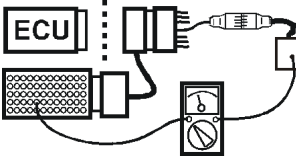
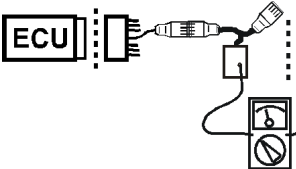
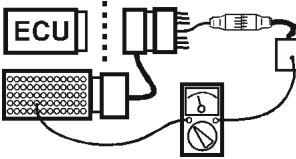
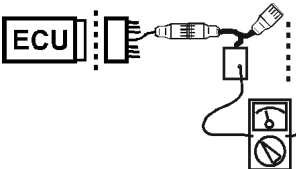
Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that signal from sensor is missing or if signal has abnormal frequency.

Type of error/malfunction	Symptom	Possible cause
FMI 2	○ Error message ○ Amber central warning lamp ○ Increased fuel consumption	○ Defective phase ○ Open circuit or short circuit in cable harness. ○ Defective sensor or incorrectly installed sensor.
FMI 3	○ Error message ○ Amber central warning lamp ○ Difficult to start.	○ No signal ○ Open circuit or short circuit in cable harness. ○ Defective sensor or incorrectly installed sensor.
FMI 8	○ Error message ○ Amber central warning lamp ○ Difficult to start.	○ Defective signal, too many pulses ○ Open circuit or short circuit in cable harness. ○ Defective sensor or incorrectly installed sensor.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
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Component	1 – 2	$\approx 775\text{--}945\ \Omega$		
	1 –  2 – 	$\approx \infty\ \Omega$ $\approx \infty\ \Omega$		
Component/ cable harness	EA45 – EA46	$\approx 775\text{--}945\ \Omega$		
Cable harness	Signal cable (+) 1 – EA45	$\approx 0\ \Omega$		
	Signal cable (+) EA45 – 	$\approx \infty\ \Omega$		
	Signal cable (-) 2 – EA46	$\approx 0\ \Omega$		
	Signal cable (-) EA46 – 	$\approx \infty\ \Omega$		

More than one document matches chosen profile
<https://truckmanualshub.com/>

- [ERROR E-ECU SID 022](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7398, 62543

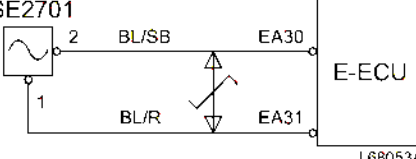
- [ERROR E-ECU SID 022](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

Document Title: ERROR E-ECU SID 022	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR E-ECU SID 022

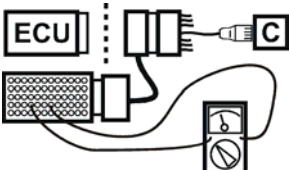
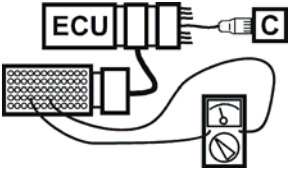
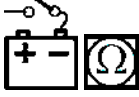
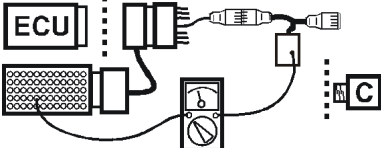
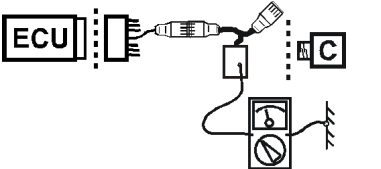
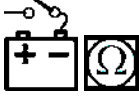
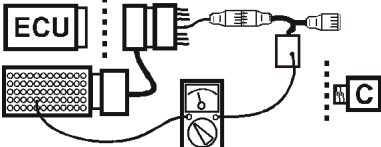
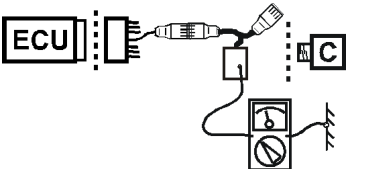
Component: SE2701 Sensor engine rpm flywheel		 EA30, frequency + EA31, frequency -
Function	Measures engine rpm on flywheel and indicates flywheel position.	
References	○ 301 Engine speed for E-ECU ○ 370 Wiring diagram 28 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 8505 ○ 302 Adapter cable 999 8534	

Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that signal from sensor is missing or if signal has abnormal frequency.

Type of error/malfunction	Symptom	Possible cause
FMI 2	○ Error message ○ Amber central warning lamp ○ The engine control unit uses the camshaft signal instead. If the camshaft signal also is incorrect, the engine is turned off. ○ Rough running/rpm. ○ Misfiring.	○ Electrical interference on rpm signal, or loose connection. ○ Poor insulation or defective cable ○ Defective sensor ○ Incorrectly installed sensor (incorrect distance from ring gear). ○ Damaged teeth on flywheel
FMI 3		○ Positive or negative cable short-circuited to voltage or open circuit. ○ Positive cable short-circuited to ground. ○ Short-circuiting between the cables or in the sensor. ○ Loose connection, defective sensor or incorrectly installed sensor.
FMI 8		○ Electrical interference. ○ Defective sensor ○ Incorrectly installed sensor. ○ Damaged teeth on flywheel.

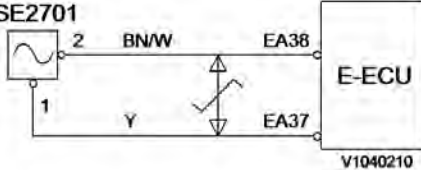
Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component/ cable harness	EA30–EA31	$\approx 775\text{--}945\ \Omega$		
Sub-system	EA30–EA31	$\approx 10.5\ \text{V}$	 1000 rpm	
Control unit/ cable harness	Signal cable (-) 1 – EA31	$\approx 0\ \Omega$		
	Signal cable (-) EA31 – 	$\approx \infty\ \Omega$		
	Signal cable (+) 2 – EA30	$\approx 0\ \Omega$		
	Signal cable (+) EA30 – 	$\approx \infty\ \Omega$		

Document Title: ERROR E-ECU SID 022	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR E-ECU SID 022

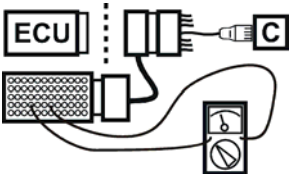
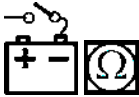
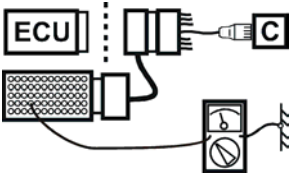
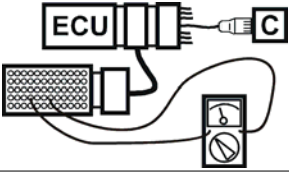
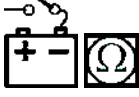
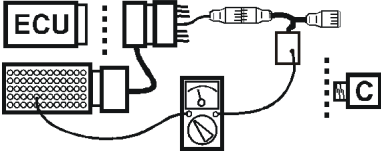
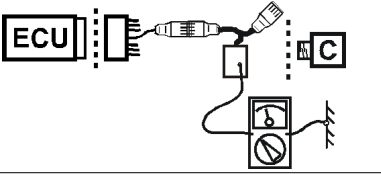
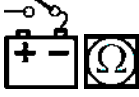
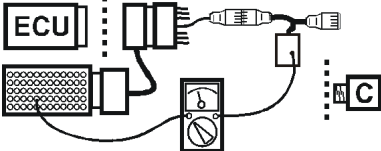
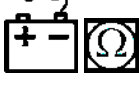
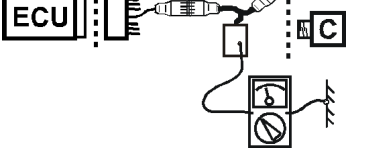
Component: SE2701 Sensor engine rpm flywheel		SE2701  EA38, frequency + EA37, frequency -
Function	Measures engine rpm on flywheel and indicates flywheel position.	
References	○ 301 Engine speed for E-ECU ○ 370 Wiring diagram28 ○ VCADS Pro, Test28407-3 Sensor values, monitoring	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Adapter cable 999 0014 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 8534	

Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that signal from sensor is missing or if signal has abnormal frequency.

Type of error/malfunction	Symptom	Possible cause
FMI 2	○ Error message ○ Amber central warning lamp ○ The engine control unit uses the camshaft signal instead. If the camshaft signal also is incorrect, the engine is turned off. ○ Rough running/rpm. ○ Misfiring.	○ Electrical interference on rpm signal, or loose connection. ○ Poor insulation or defective cable ○ Defective sensor ○ Incorrectly installed sensor (incorrect distance from ring gear). ○ Damaged teeth on flywheel
FMI 3		○ Positive or negative cable short-circuited to voltage or open circuit. ○ Positive cable short-circuited to ground. ○ Short-circuiting between the cables or in the sensor. ○ Loose connection, defective sensor or incorrectly installed sensor.
FMI 8		○ Electrical interference. ○ Defective sensor ○ Incorrectly installed sensor. ○ Damaged teeth on flywheel.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component/ cable harness	EA37 – EA38	$\approx 775\text{--}945\ \Omega$		
	EA37 –  EA38 – 	$\approx \infty\ \Omega$ $\approx \infty\ \Omega$		
Sub-system	EA37 – EA38	$\approx 10.5\ \text{V AC}$	 1000 rpm	
Control unit/ cable harness	Signal cable (-) 1 – EA37	$\approx 0\ \Omega$		
	Signal cable (-) EA37 – 	$\approx \infty\ \Omega$		
	Signal cable (+) 2 – EA38	$\approx 0\ \Omega$		
	Signal cable (+) EA38 – 	$\approx \infty\ \Omega$		

More than one document matches chosen profile
<https://truckmanualshub.com/>

- [ERROR E-ECU SID 232](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7398, 62543

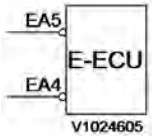
- [ERROR E-ECU SID 232](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

Document Title: ERROR E-ECU SID 232	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

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ERROR E-ECU SID 232

Component: E-ECU		 EA5, ground EA4, feed sensor 5 V	
Function	Checking voltage feed 5 V to sensor.		
References	○ 301 Voltage feed for sensors ○ 370 Wiring diagram 29		
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 8505		

Malfunction detection conditions

Detected if engine control unit (E-ECU) registers that voltage on EA4 is higher than 5.5 V or lower than 4.5 V.

Type of malfunction/error	Symptom	Possible cause
FMI 3	○ Error message ○ Amber central warning	○ EA4 short-circuited to voltage.
FMI 4	○ Error/malfunction indication for engine oil pressure and boost pressure. ○ Low engine power.	○ EA4 short-circuited to ground. ○ Defective sensor.

Check-measurement

Check-measure connected sensors under the following error messages:

- [302 ERROR Monitoring Engine Oil Pressure \(MID 128 PID 100\)](#)
- [302 ERROR E-ECU PID 102](#)

Document Title: STOP! Turn Off Engine SID 240	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

STOP! Turn Off Engine SID 240

Component: E-ECU	
Function	Engine protection
References	○ 301 Indication of serious engine fault
Suitable action	○ If an error has occurred while programming, the parameters should be checked, see 301 Setting software parameters. ○ If a malfunction occurs during operation, control unit (E-ECU) should be re-programmed or replaced.

Malfunction detection conditions
Incorrect check sum in program memory (flash memory).

Type of error/malfunction	Symptom	Possible cause
FMI 2	○ Error message ○ Red central warning ○ Buzzer	○ Programming error. ○ Internal malfunction in control unit (E-ECU).
FMI 12	○ Engine cannot be started	○ Internal malfunction in control unit (E-ECU).

Document Title: STOP! Turn Off Engine SID 253	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

STOP! Turn Off Engine SID 253

Component: E-ECU	
Function	Engine protection
References	○ 301 Indication of serious engine fault
Suitable action	○ If an error has occurred while programming, the parameters should be checked, see 301 Setting software parameters. ○ If a malfunction occurs during operation, control unit (E-ECU) should be re-programmed or replaced.

Malfunction detection conditions
Incorrect check sum in data memory.

Type of error/malfunction	Symptom	Possible cause
FMI 2	○ Error message ○ Red central warning ○ Buzzer	○ Programming error. ○ Internal malfunction in control unit (E-ECU).
FMI 12	○ Engine cannot be started.	○ Internal malfunction in control unit (E-ECU).

Document Title: STOP! Turn Off Engine SID 254	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

STOP! Turn Off Engine SID 254

Component: E-ECU	
Function	Engine protection
References	○ 301 Indication of serious engine fault
Suitable action	If a malfunction occurs during operation, control unit (E-ECU) should be re-programmed or replaced.

Malfunction detection conditions
Incorrect self-diagnosis in engine control unit (E-ECU).

Type of error/malfunction	Symptom	Possible cause
FMI 2, 8, 9, 11, 12	○ Error message. ○ Red central warning.	○ Programming error.
FMI 13	○ Engine control unit (E-ECU) re-starts. ○ Buzzer. ○ Engine runs rough.	○ Internal malfunction in control unit (E-ECU).

Document Title: ERROR APS switch/ERROR APS II-switch	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR APS switch/ERROR APS II-switch

Component: SW412 Mode selector	
Function	Shifting programs are selected with switch SW412.
References	○ 301 APS ○ 301 APS II ○ 370 Wiring diagram 12 ○ 387 Service display unit, electrical control input signals 3 ○ VCADS Pro, test 40012-2
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 981 3194 ○ 302 Template 999 0130
	P1.24, signal M (Light mode 2)[T1] ⓘ P1.11, signal H (Normal)^(a) P1.2, signal AUTO (Heavy)^(a) P1.25, signal SERVICE (Man)^(a)

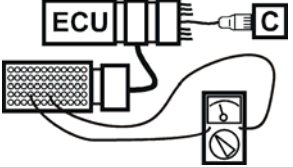
[T1]Position of mode selector APS II.

Malfunction detection conditions
Combinations for the mode selector not indicated in the table below are considered invalid. Invalid combination more than 0.5 sec. gives error indication as well as shifting program Light 1.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Shifting program Light 1 is selected until the machine is restarted. ○ Mode selector non-	○ Defective switch.

functional.

Check-measuring

Testing	Test points	Set point	Condition	Test method
Sub-system	13 – 2 13 – 11 13 – 24 13 – 25	24 V at AUTO (Heavy)[T1] ⓘ 24 V at H (Normal) ^(a) 24 V at M (Light mode 2) ^(a) 24 V at SERVICE (Man) ^(a)		

[T1]Position of mode selector APS II.

Checking with service display unit.

Position	Service display unit EL CONTROL IN 3 Connector pin			
	7 – 6	2 – 6	3 – 6	4 – 6
L (Light mode 1)[T1] ⓘ	0	0	0	0
M (Light mode 2) ^(a)	1	0	0	0
H (Normal) ^(a)	0	1	0	0
AUTO (Heavy) ^(a)	0	0	1	0
SERVICE (Man) ^(a)	0	0	0	1

[T1]Position of mode selector APS II.

0 = open circuit, **1** = closed circuit

Document Title: ERROR Monitoring Travel Speed (MID 187 PID 84)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Travel Speed (MID 187 PID 84)

Component: SE403 Sensor travel speed		
Function	Measures transmission output shaft speed. The value is used to calculate machine speed.	
References	○ 301 Travelling speed ○ 370 Wiring diagram 10 ○ VCADS Pro, test 40901-3	
Other	Measurement done on countershaft gearwheel. The sensor is inductive and emits sine wave current.	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355	

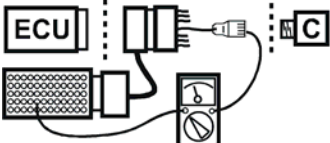
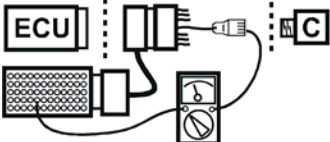
Malfunction detection conditions

Detected at open circuit or short-circuiting.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ "Er" shown in information display. ○ No upshifting or downshifting with the mode selector (APSII) in automatic position. ○ Manual shifting possible but overspeed protection and downshift inhibitor lost.	○ Sensor not connected (open circuit). ○ Signal line or ground cable open circuit. ○ Defective sensor.

Check-measuring

Testing	Test points	Set point	Condition	Test method
Component	1 – 2	$\approx 1080 \pm 20 \Omega$		

cable harness	1 –  2 – 	$\approx \infty \Omega$ $\approx \infty \Omega$		
	Ground cable 1 – EA42	$\approx 0 \Omega$		
	Signalling circuit 2 – EA14	$\approx 0 \Omega$		

Document Title: ERROR Monitoring Transmission Oil Filter (MID 187 PPID 1029)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Transmission Oil Filter (MID 187 PPID 1029)

Component: SE401 Monitor differential pressure		
Function	The monitor senses pressure-drop at the transmission oil filter. The monitor opens at a differential pressure of approx. 276 kPa (2.8 bar) (40 psi) and closes at a differential pressure of approx. 207 kPa (2.0 bar) (30 psi).	
References	○ 301 Transmission oil filter ○ 370 Wiring diagram 10 ○ 387 Service display unit, electrical control input signals 1 ○ VCADS Pro, test 40901-3	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355	

Malfunction detection conditions

Detects open circuit if the monitor is open when the engine is off.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Sensor not connected (open circuit). ○ Ground cable open circuit. ○ Defective monitor.

Check-measuring

Testing	Test points	Set point	Condition	Test method
Component	1 –	$\approx 0 \Omega$		
Control unit/cable harness	EA38 –	$\approx 0 \Omega$		

Document Title: ERROR Monitoring Transmission Oil Level (MID 187 PID 124)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Transmission Oil Level (MID 187 PID 124)

Component: SE413 Sensor transmission oil level		SE413 3 2 1 SB/W TB16 EB24 31EA R/GR TB2 EB40 SS GN/R TB14 EB32 4143 V-ECU L68065A EB24, ground EB40, 5 V feed EB32, signal
Function	Monitors oil level in transmission oil sump.	
References	○ 301 Transmission oil level ○ 370 Wiring diagram 13 ○ 387 Service panel, electrical feed sensor ○ VCADS Pro, test 40901-3	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355	
Other	Analogue sensor, used as monitor. ○ < 1.7 V = Low transmission oil level (INFO MIN Transmission Oil Level) ○ > 1.7–4.85 V = Normal transmission oil level	

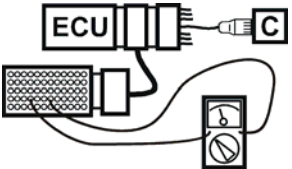
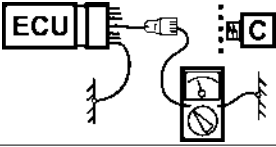
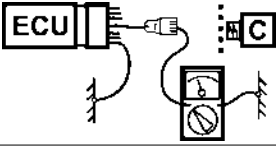
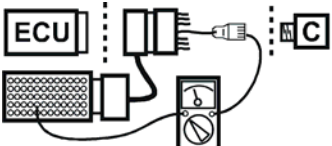
Malfunction detection conditions

Detected if the vehicle control unit (V-ECU) registers that voltage on EB32 exceeds 4.85 V or below 0.25 V.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Sensor not connected (open circuit). ○ Contact resistance in connectors. ○ Signal line open circuit, short circuit to ground or short circuit to higher voltage. ○ Feed cable (5 V) open circuit or short circuit to ground. ○ Ground cable open circuit. ○ Defective sensor.

Check-measuring

Testing	Test points	Set point	Condition	Test method
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Sub-system	EB32 – EB24	0.25–4.85 V		
Control unit/ cable harness	Ground cable 2 – 	$\approx 0 \Omega$		
	Feed cable 1 – 	$\approx 5 \text{ V}$		
	Signalling circuit 3 – EB32	$\approx 0 \Omega$		

Document Title: ERROR Monitoring Transmission Oil Pressure (MID 187 PID 127)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Transmission Oil Pressure (MID 187 PID 127)

Component: SE405 Sensor transmission oil pressure		EB40, 5 V feed EB4, signal EB24, ground
Function	Monitors oil pressure in the transmission in order to warn the operator in the event of low lubricating oil pressure.	
References	○ 301 Transmission oil pressure ○ 370 Wiring diagram 12 ○ 387 Service panel, electrical feed sensor ○ VCADS Pro, test 40901-3	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355	

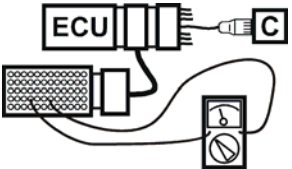
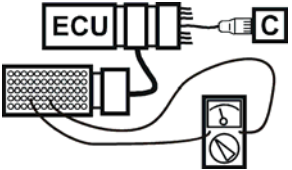
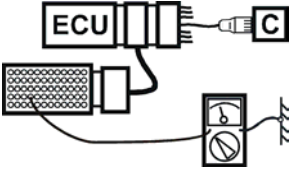
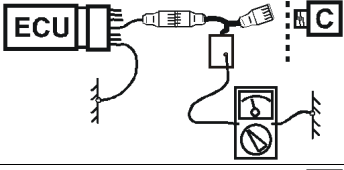
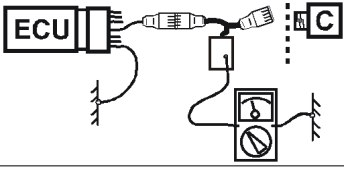
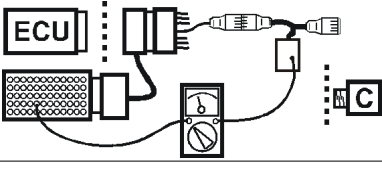
Malfunction detection conditions

- Detected if vehicle control unit (V-ECU) registers EB4 voltage exceeding 4.75 V or below 0.25 V for more than 100 ms (nominal +5.0 V feed).
- Detected if the engine is off for at least 2 sec. at the same time as the pressure exceeds 200 kPa (2 bar) (29 psi) for at least 2 sec.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Sensor not connected (open circuit). ○ Contact resistance in connectors. ○ Signal line open circuit, short circuit to ground or short circuit to higher voltage. ○ Feed cable (5 V) open circuit or short circuit to ground. ○ Ground cable open circuit. ○ Defective sensor.

Check-measuring

Testing	Test points	Reference value	Condition	Test method
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Sub-system	EB4 – EB24	$\approx 0.5 \text{ V}$ (engine off)		
		$\approx 4 \text{ k}\Omega$ (engine off)		
	EB4 –  EB24 –  EB40 – 	$\approx \infty \Omega$		
Control unit/ cable harness	Ground cable 4 – 	$\approx 0 \Omega$		
	Feed cable 1 – 	$\approx 5 \text{ V}$		
	Signalling circuit 2 – EB4	$\approx 0 \Omega$		

Document Title: ERROR Monitoring Transmission Oil Temp. (MID 187 PID 177)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Transmission Oil Temp. (MID 187 PID 177)

Component: SE406 Sensor transmission oil temperature		
Function	Senses transmission oil temperature after the oil cooler.	
References	○ 301 Transmission oil temperature ○ 370 Wiring diagram 12 ○ VCADS Pro, test 40901-3	
Tools	○ 302 Multimeter 981 2519 ○ 302 Test pins 999 0008 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355	

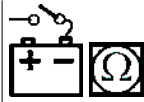
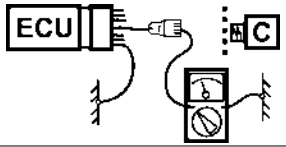
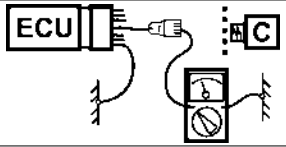
Malfunction detection conditions

Detected if vehicle control unit (V-ECU) registers EB21 voltage exceeding 4.79 V or below 0.20 V (nominal +5.0 V feed).

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Temperature displays 0 °C (32 °F).	○ Sensor not connected (open circuit). ○ Signal line short circuit to 5 V or higher voltage, short circuit to ground or open circuit. ○ Ground cable short circuit to voltage or open circuit. ○ Defective sensor.

Check-measuring

Testing	Test points	Set point	Condition	Test method
Component	1 – 2	Resistance values according to table		
Sub-system	EB21 – EB24	Voltage values according to table		

Control unit/ cable harness	Ground cable 1 – 	$\approx 0 \Omega$		
	Signalling circuit 2 – 	$\approx 5 \text{ V}$		

SE406 resistance and voltage values

Oil temp. (°C)	Oil temp. (°F)	Resistance	Voltage (V)	Oil temp. (°C)	Oil temp. (°F)	Resistance	Voltage (V)
-40	-40	3.8 kΩ	4.64	+60	+140	0.5 kΩ	3.04
-30	-22	3.7 kΩ	4.62	+70	+158	0.4 kΩ	2.66
-20	-4	3.4 kΩ	4.60	+80	+176	0.3 kΩ	2.27
-10	+14	3.0 kΩ	4.55	+90	+194	0.2 kΩ	1.92
0	+32	2.6 kΩ	4.48	+100	+212	150 Ω	1.60
+10	+50	2.1 kΩ	4.37	+110	+230	110 Ω	1.32
+20	+68	1.7 kΩ	4.22	+120	+248	86 Ω	1.08
+30	+86	1.3 kΩ	4.01	+130	+266	67 Ω	0.89
+40	+104	0.9 kΩ	3.74	+140	+284	52 Ω	0.73
+50	+122	0.7 kΩ	3.41				

Document Title: ERROR Monitoring Turbine Revolutions (MID 187 PPID 1160)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Turbine Revolutions (MID 187 PPID 1160)

Component: SE402 Sensor turbine speed		
Function	Measures turbine speed in the transmission. Measurement is performed against clutch drum (96 splines).	
References	○ 301 Turbine speed ○ 370 Wiring diagram 10 ○ VCADS Pro, test 40901-3	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355	
Other	The sensor is inductive and emits sine wave current.	

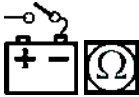
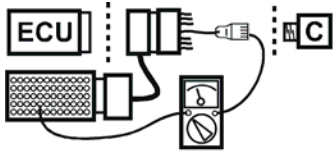
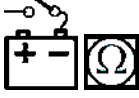
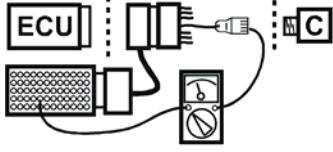
Malfunction detection conditions

Detected at open circuit or short-circuiting.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Sensor not connected (open circuit). ○ Signal line or ground cable open circuit. ○ Defective sensor.

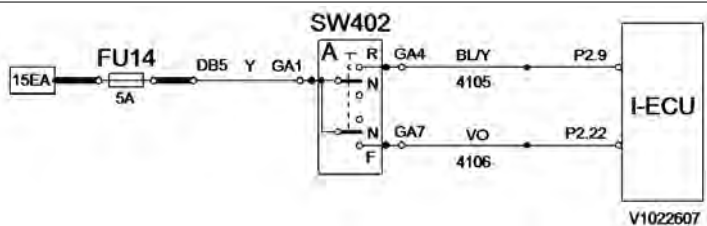
Check-measuring

Testing	Test points	Set point	Condition	Test method
Component	1 – 2	$\approx 1080 \pm 20 \Omega$		
	1 – 2 –	$\approx \infty \Omega$ $\approx \infty \Omega$		

Cable harness	Ground cable 1 – EA42	$\approx 0 \Omega$		
	Signalling circuit 2 – EA41	$\approx 0 \Omega$		

Document Title: ERROR Gear Selector	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Gear Selector

Component: SW402 Gear selector steering wheel column directional gear	
Function	Selection of forward/reverse.
References	○ 301 Gear Selector ○ 370 Wiring diagram 9 ○ 387 Service display unit, electrical control input signals 3 ○ VCADS Pro, test 40012-2
Tools	○ 302 Service display unit 999 3721 ○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 999 8533 ○ 302 Template 999 0130
	 P2.9, signal reverse P2.22, signal forward

Malfunction detection conditions
Combinations not indicated in the following table are not valid. Non-valid combinations result in error message and neutral position.

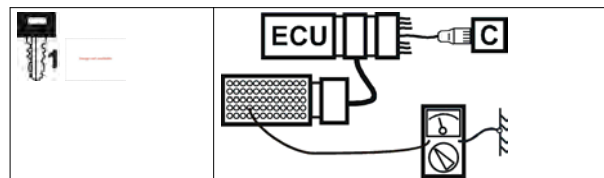
Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Gear placed in neutral. ○ No gear engagement possible, neutral position obtained.	○ Defective gear selector.

Check-measuring

Testing	Test points	Set point	Condition	Test method
Sub-system	9 - 	$\approx U_{bat}$ at reverse		

22 – 

$\approx U_{bat}$ at forward



Checking with service display unit.

Gear position	Service display unit EL. ON/OFF INPUT 3 (pos.)	
	I1 (P2.22)	I2 (P2.9)
N1	0	0
N2	0	0
N3	0	0
N4	0	0
F1	1	0
F2	1	0
F3	1	0
F4	1	0
R1	0	1
R2	0	1
R3	0	1
R4	0	1

In case of malfunction of F or R signals for more than 0.5 s, then malfunctions must be acknowledged. Acknowledgement is performed by moving the lever to N for more than 0.2 s.

Document Title: ERROR Gear Selector CDC	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Gear Selector CDC

Component: SW409 Gear selector lever steering	
Function	Gear selector lever steering (SW409) is engaged with switch SW408. Gear selector lever steering is disengaged when the engine is shut off, the steering column gear selector (SW401B) is activated or if the CDC armrest is raised.
References	○ 301 Gear Selector ○ 370 Wiring diagram 17 ○ 387 Service display unit, electrical control input signals 1 ○ VCADS Pro, test 40012-2
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 11 668 006 ○ 302 Adapter cable 951 1355
	EA5, signal reverse EA32, signal forward

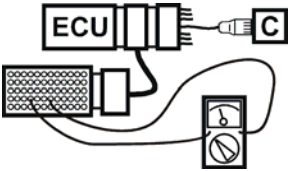
Malfunction detection conditions

Detected if F and R signals are received simultaneously for more than 0.5 s. In this case, neutral position is engaged and the error must be acknowledged by setting the switch to N for more than 0.2 s.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Gear placed in neutral. ○ No gear engagement possible, gear placed in neutral position.	○ Short circuit in cable harness or switch.

Check-measuring

Testing	Test points	Set point	Condition	Test method
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Sub-system	EA5 - EA42 EA32 - EA42	U_{bat} at position reverse U_{bat} at position forward		
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Document Title: ERROR Gear Selector F/R	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Gear Selector F/R

Component: SW404 Gear selector lever carrier	
Function	The gear selector F/R lever carrier (SW404) is engaged with switch SW403. The gear selector F/R lever carrier is disengaged when the engine is shut off, the steering column gear selector (SW401B) is activated or if the CDC armrest is lowered.
References	○ 301 Gear Selector ○ 370 Wiring diagram 9 ○ 387 Service display unit, electrical control input signals 1 ○ VCADS Pro, test 40012-2
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355
	EA31, signal reverse EA17, signal forward

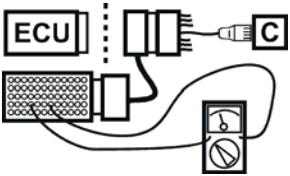
Malfunction detection conditions

Detected if F and R signals are received simultaneously for more than 0.5 s. In this case, neutral position is engaged and the error must be acknowledged by setting the switch to N for more than 0.2 s.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Gear placed in neutral. ○ No gear engagement possible, gear placed in neutral position.	○ Short circuit in cable harness or switch.

Check-measuring

Testing	Test points	Set point	Condition	Test method
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Sub-system	EA31 - EA42 EA17 - EA42	U_{bat} at position reverse U_{bat} at position forward		
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Document Title: ERROR Gear shifting solenoids	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Gear shifting solenoids

Component: Gearshifting solenoids		
Function	The solenoids regulate transmission gear changing.	
References	○ 301 Gearshifting solenoids ○ 370 Wiring diagram 11 ○ 387 Service display unit, electrical control output signals 1 ○ 387 Service display unit, electrical control output signals 2	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355	

Malfunction detection conditions
Open circuit or short-circuit in circuit.

Type of malfunction/error	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Depending on which gear is engaged when the solenoid malfunction occurs, upshifting and downshifting occur according to pre-determined patterns. ○ Gearshifting problems.	○ Open circuit or short circuit.

Check-measurement

Testing	Test points	Set point	Condition	Test method
Component	1 – 2	$\approx 22 \Omega$ [T1] ①		
	1 – 2 –	$\approx \infty \Omega$ $\approx \infty \Omega$		
Cable harness	Feed cable EC20 – 1 EC22 – 1 EC24 – 1 EC26 – 1 EC28 – 1 EC33 – 1	$\approx 0 \Omega$ $\approx 0 \Omega$ $\approx 0 \Omega$ $\approx 0 \Omega$ $\approx 0 \Omega$ $\approx 0 \Omega$		
	Return line EC21 – 2 EC23 – 2 EC25 – 2 EC27 – 2 EC32 – 2 EC34 – 2	$\approx 0 \Omega$ $\approx 0 \Omega$ $\approx 0 \Omega$ $\approx 0 \Omega$ $\approx 0 \Omega$ $\approx 0 \Omega$		

[T1] Emitted at a temperature of $\approx 20^\circ\text{C}$. The solenoids should have relatively similar resistance values.

Document Title: ERROR Monitoring Axle Oil Temp. (Front axle) (MID 187 PPID 1154)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Axle Oil Temp. (Front axle) (MID 187 PPID 1154)

Component: SE410 Sensor front axle temperature		EB35, signal EB24, ground
Function	Senses front axle oil temperature.	
References	○ 301 Axle oil temperature ○ 370 Wiring diagram 13	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Adapter cable 951 1355	

Malfunction detection conditions

Detected if vehicle control unit (V-ECU) registers that voltage on EB35 is higher than 4.79 V or lower than 0.20 V (at nom. +5.0 V feed).

Type of malfunction/error	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Sensor not connected (open circuit). ○ Signal line short circuit to 5 V or higher voltage, short circuit to ground or open circuit. ○ Ground cable short-circuited to voltage or open circuit. ○ Defective sensor.

Check-measurement

Testing	Test points	Set point	Condition	Test method
Component	1 – 2	According to table.		
Sub-system	EB35 – EB24	According to table.		
Control unit / cable harness	Ground cable 1 –	≈ 0 Ω		



SE410 resistance and voltage values

Oil temp. (°C)	Oil temp. (°F)	Resistance	Voltage (V)	Oil temp. (°C)	Oil temp. (°F)	Resistance	Voltage (V)
-40	-40	3.8 kΩ	4.64	+60	+140	0.5 kΩ	3,04
-30	-22	3.7 kΩ	4.62	+70	+158	0.4 kΩ	2.66
-20	-4	3.4 kΩ	4,60	+80	+176	0.3 kΩ	2.27
-10	+14	3.0 kΩ	4.55	+90	+194	0.2 kΩ	1.92
0	+32	2.6 kΩ	4.48	+100	+212	150 Ω	1.60
+10	+50	2.1 kΩ	4.37	+110	+230	110 Ω	1.32
+20	+68	1.7 kΩ	4.22	+120	+248	86 Ω	1,08
+30	+86	1.3 kΩ	4,01	+130	+266	67 Ω	0.89
+40	+104	0.9 kΩ	3.74	+140	+284	52 Ω	0.73
+50	+122	0.7 kΩ	3.41				

Document Title: ERROR Monitoring Axle Oil Temp. (Rear axle) (MID 187 PPID 1153)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Axle Oil Temp. (Rear axle) (MID 187 PPID 1153)

Component: SE411 Sensor rear axle temperature		EB8, signal EB24, ground
Function	Senses rear axle oil temperature.	
References	○ 301 Axle oil temperature ○ 370 Wiring diagram 13	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Adapter cable 951 1355	

Malfunction detection conditions

Detected if vehicle control unit (V-ECU) registers that voltage on EB8 is higher than 4.79 V or lower than 0.20 V (at nom. +5.0 V feed).

Type of malfunction/error	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Sensor not connected (open circuit). ○ Signal line short circuit to 5 V or higher voltage, short circuit to ground or open circuit. ○ Ground cable short-circuited to voltage or open circuit. ○ Defective sensor.

Check-measurement

Testing	Test points	Set point	Condition	Test method
Component	1 – 2	According to table.		
Sub-system	EB8 – EB24	According to table.		
Control unit / cable harness	Ground cable 1 –	≈ 0 Ω		

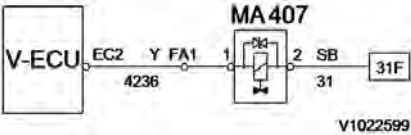


SE411 resistance and voltage values

Oil temp. (°C)	Oil temp. (°F)	Resistance	Voltage (V)	Oil temp. (°C)	Oil temp. (°F)	Resistance	Voltage (V)
-40	-40	3.8 kΩ	4.64	+60	+140	0.5 kΩ	3,04
-30	-22	3.7 kΩ	4.62	+70	+158	0.4 kΩ	2.66
-20	-4	3.4 kΩ	4,60	+80	+176	0.3 kΩ	2.27
-10	+14	3.0 kΩ	4.55	+90	+194	0.2 kΩ	1.92
0	+32	2.6 kΩ	4.48	+100	+212	150 Ω	1.60
+10	+50	2.1 kΩ	4.37	+110	+230	110 Ω	1.32
+20	+68	1.7 kΩ	4.22	+120	+248	86 Ω	1,08
+30	+86	1.3 kΩ	4,01	+130	+266	67 Ω	0.89
+40	+104	0.9 kΩ	3.74	+140	+284	52 Ω	0.73
+50	+122	0.7 kΩ	3.41				

Document Title: ERROR Differential lock	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Differential lock

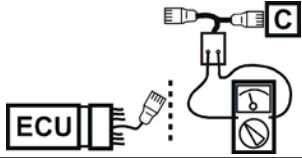
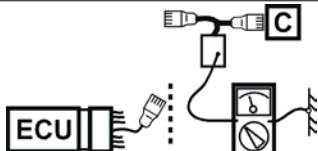
Component: MA407 Solenoid valve Differential lock		 EC2, signal
Function	Differential lock engagement takes place with switch SW414, which supplies voltage to the I-ECU when activated. The V-ECU activates solenoid valve MA407. When the differential lock is engaged, monitor SE408 closes and supplies voltage to V-ECU for acknowledgement that differential lock has been engaged.	
References	○ 301 Differential lock ○ 370 Wiring diagram 12 ○ 387 Service display unit, electrical control input signals 1 ○ 387 Service display unit, electrical control input signals 3 ○ 387 Service display unit, electrical control output signals 1 ○ 1	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 0191	

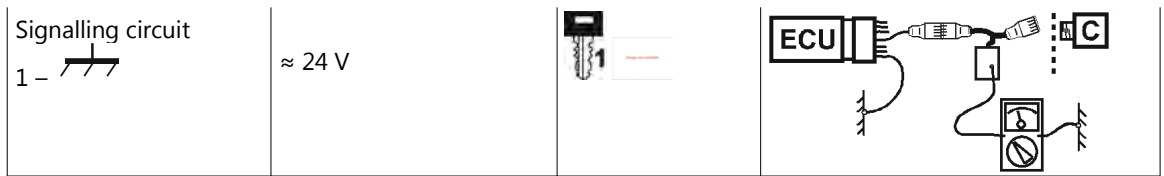
Malfunction detection conditions

Detected if vehicle control unit (V-ECU) registers an open circuit or short circuit on EC2.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Differential lock not functional.	○ Signal line open circuit. ○ Defective solenoid valve.

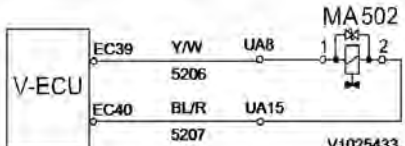
Check-measuring

Testing	Test points	Set point	Condition	Test method
Component	1 – 2	$\approx 20 \Omega$		
Cable harness	Ground cable 2 – 	$\approx 0 \Omega$		



Document Title: ERROR Solenoid valve Brake pressure charging	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

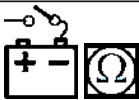
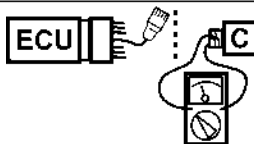
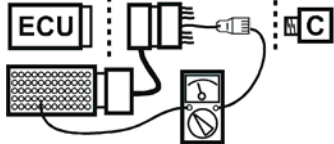
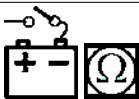
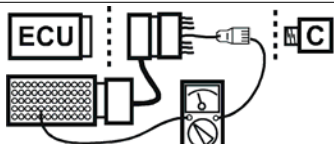
ERROR Solenoid valve Brake pressure charging

Component: MA502 Solenoid valve brake pressure charging		 EC39, feed EC40, ground	
Function	Controls brake pressure charging.		
References	○ 301 Brake pressure charging ○ 370 Wiring diagram 15B		
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355 ○ 302 Adapter cable 999 0191		

Malfunction detection conditions
Detected if the vehicle control unit (V-ECU) registers that current in the circuit is too high or too low.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Open circuit/short circuit.

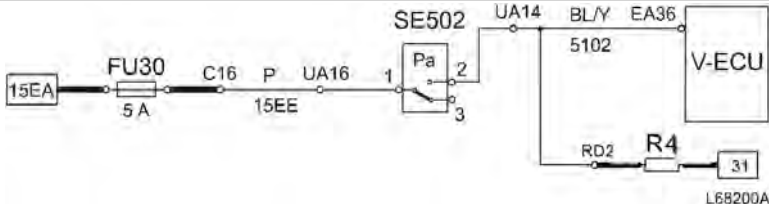
Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	1 – 2	$\approx 26 \Omega$ [T1] ⓘ		
Control unit/cable harness	Ground cable 2 – EC40	$\approx 0 \Omega$		
	Feed cable 1 – EC39	$\approx 0 \Omega$		

[T1]Resistance increases with increasing temperature

Document Title: WARNING! Low Brake Pressure	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

WARNING! Low Brake Pressure

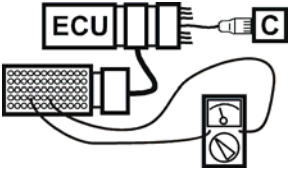
Component: SE502 Monitor low brake pressure	
Function	Reads low brake pressure.
References	○ 301 Brake pressure ○ 370 Wiring diagram 15B ○ 387 Service display unit, electrical control input signals 1
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355
 EA36, signal	

Malfunction detection conditions
Detected if the vehicle control unit (V-ECU) registers an open circuit on EA36.

Type of error/malfunction	Symptom	Possible cause
	○ Warning ○ Red central warning	○ Signal line open circuit. ○ Not connected monitor (open circuit). ○ Low brake pressure. NOTE! The warning can be generated by a mechanical defect of the brake pressure charging or an electrical defect in the circuit.

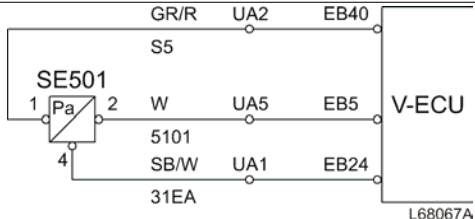
Check-measuring

Testing	Test points	Set point	Condition	Test method

Sub-system	EA36 - EA42	= 0 V (low pressure < 9 MPa (90 bar) (1305 psi)) ≈ 24 V (high pressure > 9 MPa (90 bar) (1305 psi))		
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Document Title: ERROR Monitoring Output Brake Pressure (MID 187 PPID 1155)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Output Brake Pressure (MID 187 PPID 1155)

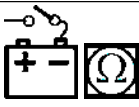
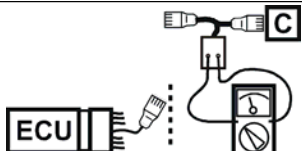
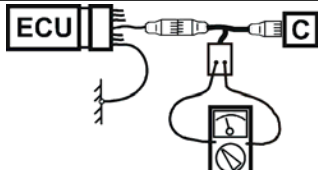
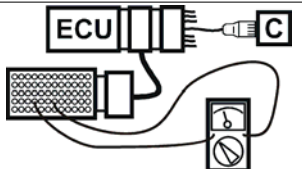
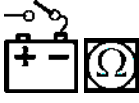
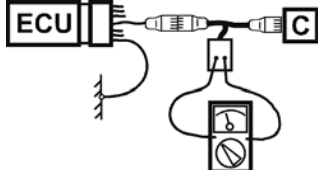
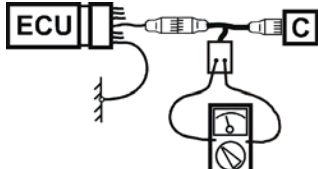
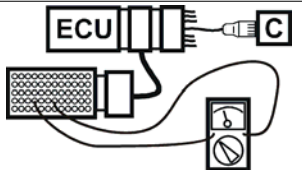
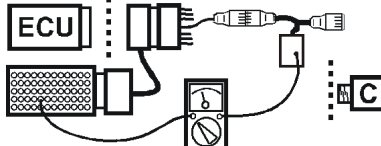
Component: SE501 Sensor output brake pressure		 EB40, 5 V feed EB5, signal EB24, ground
Function	Measures brake pressure to brakes.	
References	○ 301 Output brake pressure ○ 370 Wiring diagram 15B ○ 387 Service panel, electrical feed sensor ○ 387 Service display unit, axles and brakes	
Tools	○ 302 Multimeter 981 2519 ○ 302 Adapter cable 999 8534 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355	
Other	The sensor is available in two versions: 0–120 bar (0.5–4.5 V) Part no. 11170123 (New sensor) 0–100 bar (0.5–4.5 V) Part no. 11039577 Selection of installed sensor is performed with VCADS Pro parameter CWO.	

Malfunction detection conditions

Detected if vehicle control unit (V-ECU) registers EB5 voltage exceeding 4.75 V or below 0.25 V for more than 100 ms (nominal +5.0 V feed).

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Sensor not connected (open circuit). ○ Contact resistance in connectors. ○ Signal line open circuit, short circuit to ground or short circuit to higher voltage. ○ Feed cable (5 V) open circuit or short circuit to ground. ○ Ground cable open circuit. ○ Defective sensor.

Check-measuring

Testing	Test points	Set point	Condition	Test method
Component	2 – 4	$\approx 40 \text{ k}\Omega$		
Sub-system	Alternative 1: 2 – 4	0.5 V when brake is not applied > 2 V at applied brake ^(a) (full brake pressure)		
	Alternative 2: EB5 – EB24	0.5 V when brake is not applied > 2 V at applied brake [T1]  (full brake pressure)		
Control unit/ cable harness	Ground cable 4 – 	$\approx 0 \Omega$		
	Feed cable 1 – 	$\approx 5 \text{ V}$		
	Feed cable EB40 – EB24	$\approx 5 \text{ V}$		
	Signalling circuit 2 – EB5	$\approx 0 \Omega$		

[T1] The magnitude of the output signal is dependent on installed sensor and max. brake pressure for respective machine model.

Document Title: WARNING Brake Charging Failure	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

WARNING Brake Charging Failure

Component:	SE502 Monitor, low brake pressure SE504 Monitor, brake pressure charging
Function	The sensors control brake pressure charging and warn the operator in case of a malfunction in the brake charging system.
References	○ 301 Brake pressure charging ○ 370 Wiring diagram 15B ○ 302 WARNING! Low Brake Pressure ○ 302 SE504 Monitor brake pressure charging ○ 387 Service display unit, electrical control input signals 1
Hardware-controlled brake pressure charging Software-controlled brake pressure charging EA36, signal low brake pressure EA10, signal brake pressure charging	

Malfunction detection conditions

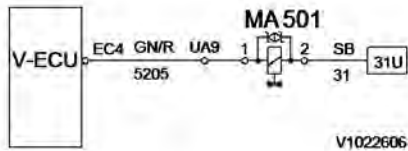
- Engine on and low brake charging pressure (SE504) < 12 MPa (120 bar) (1740 psi) for 60 sec.
- Recurring low brake charging pressure (SE504) with a frequency of 10 times in 20 seconds.
- Low accumulator brake pressure (SE502) < 9 MPa (90 bar) (1305 psi) and brake charging pressure (SE504) > 12 MPa (120 bar) (1740 psi).

Type error/	of Symptom	Possible cause
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malfunction	
	○ Error message ○ Amber central warning ○ Control light Break in circuit

Document Title: ERROR Parking Brake	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Parking Brake

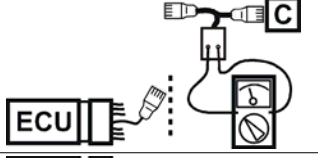
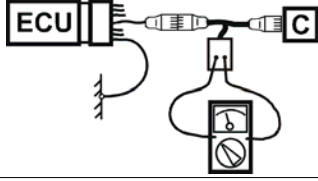
Component: MA501 Solenoid valve parking brake		 EC4, signal
Function	V-ECU supplies solenoid valve MA501 with voltage for releasing parking brake.	
References	○ 301 Parking brake ○ 370 Wiring diagram 15B ○ 387 Service display unit, electrical control output signals 1	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355 ○ 302 Adapter cable 999 0191	

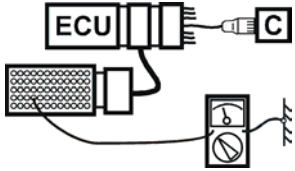
Malfunction detection conditions

Detected if vehicle control unit (V-ECU) registers an open circuit or short circuit on EC4.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Parking brake cannot be released.	○ Signal line open circuit. ○ Defective solenoid valve.

Check-measuring

Testing	Test points	Set point	Condition	Test method
Component	1 – 2	$\approx 20 \Omega$		
Sub-system	Alternative 1: 1 – 2	$= 0 \text{ V (applied)}$ $\approx 24 \text{ V (released)}$		

Alternative 2: EC4 – 	= 0 V (applied) ≈ 24 V (released)		
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Document Title: ERROR Parking Brake Circuit	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Parking Brake Circuit

Component: SE503 Monitor parking brake pressure	
Function	Sense the hydraulic oil pressure in the parking brake circuit.
References	○ 301 Parking brake ○ 370 Wiring diagram 15B ○ 387 Service display unit, electrical control input signals 1 ○ 387 Service display unit, electrical control input signals 3
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355
EA9, signal	

Malfunction detection conditions	
○	Detected if vehicle control unit (V-ECU) registers that EA9 is not supplied with voltage within 3 s when engine is running and the parking brake is released (MA501 supplied with voltage).
○	Detected if vehicle control unit (V-ECU) registers voltage supply to EA9 after 3 s even though the parking brake is applied (MA501 not supplied with voltage).

Type of error/ malfunction	Symptom	Possible cause
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	○ Error message ○ Amber central warning ○ Parking brake does not function. ○ Control light is on despite parking brake being released.	○ Signal line open circuit. ○ Sensor not connected (open circuit). ○ Hydraulic malfunction
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Document Title: ERROR Secondary Steering Relay	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Secondary Steering Relay

Component: RE601 Relay secondary steering		EC3, signal
Function	Controls engagement of secondary steering pump.	
References	○ 301 Secondary steering ○ 370 Wiring diagram 16 ○ 302 RE Relay, general check ○ 387 Service display unit, electrical control input signals 2 ○ 387 Service display unit, electrical control input signals 3 ○ 387 Service display unit, electrical control output signals 1	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355	

Malfunction detection conditions
Open circuit/short circuit.

Type of malfunction/error	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Relay not connected (open circuit). ○ Defective relay.

Check-measurement

Testing	Test points	Set point	Condition	Test method
Sub-system	EC3 –	$\approx U_{bat}$ V	SW601 pressed in	Measure directly on the relay.

Document Title: ERROR Lever Steering CDC	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Lever Steering CDC

Component: RE602 Relay lever steering CDC	
Function	Engagement of lever steering.
References	○ 301 Gear Selector ○ 370 Wiring diagram 17 ○ 387 Service display unit, electrical control output signals 1

Malfunction detection conditions
Open circuit/short circuit.

Type of error/malfunction	Symptom	Possible cause
	○ Error message. ○ Amber central warning.	○ Relay not connected (open circuit). ○ Defective relay.

Document Title: ERROR AC-system See operators manual	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR AC-system See operators manual

Component: SE804 Pressure monitor	
Function	Informs the operator that there is a system error for monitoring of the AC system. The monitor SE804 monitors the refrigerant pressure. At low pressure < 1.45-2.9 MPa (1-2 bar) (14.5-29 psi) or high pressure > 2.1-2.5 MPa (21-25 bar) (305-363 psi) the monitor opens.
References	○ 370 Wiring diagram 19 ○ 370 Wiring diagram 33 ○ 301 Soft start and safety for AC
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355
	EA33, signal high/low pressure EA30, signal increased cooling fan rpm

Malfunction detection conditions
Detected by vehicle control unit (V-ECU) when SE804 cuts out at low or high pressure in the air conditioning.

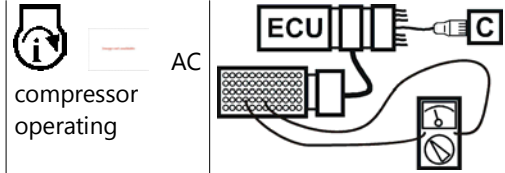
Type of malfunction/error	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Clogged condenser. ○ Leakage in air conditioning.

Check-measurement

Testing	Test points	Set point	Condition	Test method
Sub-system	EA33 – EA42	≈ 24 V		

EA33 – EA42

0 V



Document Title: ERROR Central Lubrication System	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Central Lubrication System

Component: CU802 Electronic unit central lubrication system		EC7, signal (activation) EA29, indication	
Function	The electronic unit controls and monitors the central lubrication system.		
References	○ 370 Wiring diagram 26 ○ 301 Central lubrication ○ 301 Central lubrication, status indication		

Malfunction detection conditions

Detected if VCADS Pro parameter Central lubrication installed and set to ON at the same time as indication central lubrication is ON (24 V) for more than 5 s continuously.

Type of malfunction/error	Symptom	Possible cause
	○ Error message ○ Amber central warning	See Service manual Central lubrication system where troubleshooting and separate diagnostic tools are described.

Document Title: ERROR Monitoring Hydraulic Oil Temp. (MID 187 PPID 1041)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Hydraulic Oil Temp. (MID 187 PPID 1041)

Error message only applies to temperature sensor. Level sensor is not diagnosed.

NOTE!

The component for monitoring the hydraulic oil temperature is available in two different versions:

1. Combined temperature and level sensor.
2. Combined temperature sensor and level monitor.

Version 1. Combined temperature and level sensor

Component: SE906 Temperature and level sensor hydraulic oil		
Function	Reads oil level and oil temperature in the hydraulic oil tank.	
References	○ 301 Hydraulic oil temperature ○ 370 Wiring diagram 23	
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355	

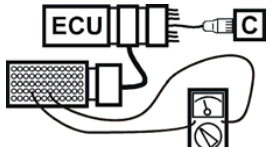
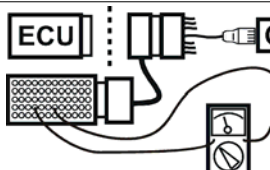
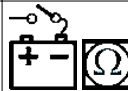
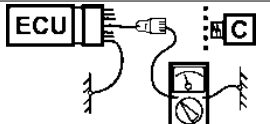
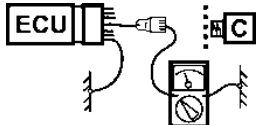
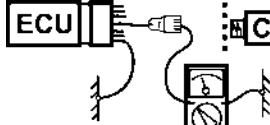
Malfunction detection conditions

Detected if vehicle control unit (V-ECU) registers that voltage on EB22 (sensor hydraulic oil temperature) is higher than 4.75 V or lower than 0.75 V (at nom. +5.0 V feed).

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning lamp ○ Cooling fan runs at max. speed.	○ Short-circuiting or open circuit in circuit. ○ Defective sensor.

Check-measuring

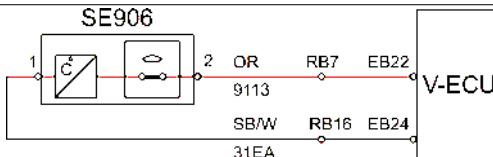
Measurement	Measuring points	Set point	Condition	Measuring method
Component: Temperature sensor	3 – 4	Resistance values according to table		

Sub-system Temperature sensor	EB22 – EB24	0.75-4.75 V		
Sub-system Level sensor	EB13 – EB17	0.5-4.5 V		
Control unit/ cable harness	Ground cable 4 – 	$\approx 0 \Omega$		
	Signal cable 3 – 	$\approx 5 \text{ V}$		
	Feed cable 1 – 	$\approx 5 \text{ V}$		

SE906 resistance values for temperature sensor

Oil temp. (°C)	Oil temp. (°F)	Resistance
-40	-40	3.82 kΩ
-20	-4	3.39 kΩ
0	+32	2.60 kΩ
+20	+68	1.66 kΩ
+40	+104	924 Ω
+60	+140	492 Ω
+80	+176	265 Ω
+100	+212	148 Ω
+120	+248	86 Ω
+140	+284	52 Ω

Version 2. Combined temperature sensor and level monitor

Component: SE906 Temperature sensor and level monitor hydraulic oil	
Function	Reads oil level and oil temperature in the hydraulic oil tank.
References	○ 301 Hydraulic oil temperature ○ 370 Wiring diagram 23
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Adapter cable 951 1355
	

EB22, signal
EB24, ground

Malfunction detection conditions

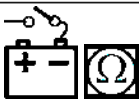
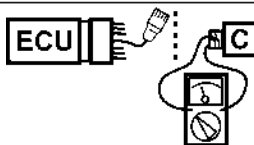
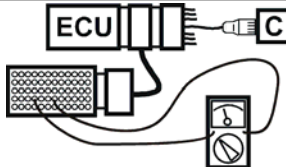
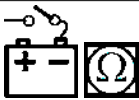
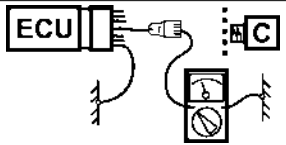
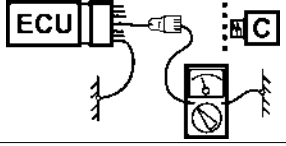
Detected if vehicle control unit (V-ECU) registers that voltage on EB22 (sensor hydraulic oil temperature) is higher than 4.75 V or lower than 0.75 V (at nom. +5.0 V feed).

NOTE!

that the temperature sensor is connected in series with the level monitor, and that is why no error/malfunction detection of the temperature sensor can take place at a hydraulic oil level under the warning level (WARNING Low Hydraulic Oil Level).

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning lamp ○ Cooling fan runs at max. speed.	○ Short-circuiting or open circuit in circuit. ○ Defective sensor.

Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	1 – 2	According to following table.		
Sub-system	EB22 – EB24	According to table below. [T1] 		
Control unit/cable harness	Ground cable 1 – Ground connection	≈ 0 Ω		
	Signal cable 2 – Ground connection	≈ 5 V		

[T1]Out signal > 4.79 V more than 1.0 sec. gives message about low oil level.

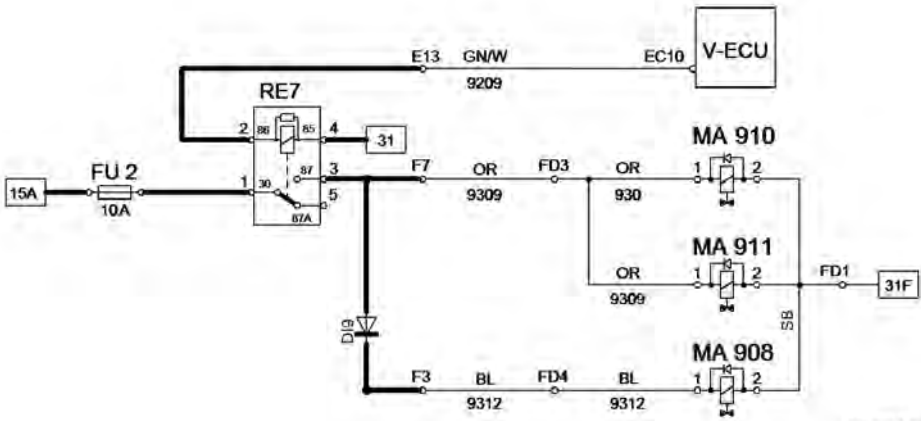
SE906 resistance values for temperature sensor

Oil temp. (°C)	Oil temp. (°F)	Resistance
-40	-40	3.82 kΩ
-20	-4	3.39 kΩ
0	+32	2.60 kΩ
+20	+68	1.66 kΩ
+40	+104	924 Ω
+60	+140	492 Ω

+80	+176	265 Ω
+100	+212	148 Ω
+120	+248	86 Ω
+140	+284	52 Ω

Document Title: ERROR Relay BSS	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

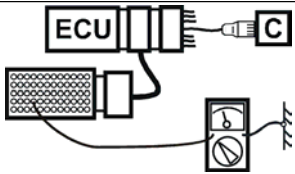
ERROR Relay BSS

Component: RE7 Relay Boom Suspension System (BSS)	
Function	Controls voltage feed to solenoid valves for boom suspension system.
References	○ 301 Boom Suspension System (BSS) ○ 370 Wiring diagram 23 ○ 302 RE Relay, general check ○ 387 Service display unit, electrical control input signals 1 ○ 387 Service display unit, electrical control output signals 1
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355
	

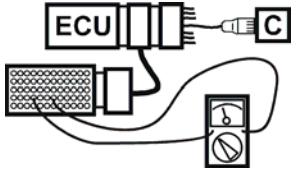
Malfunction detection conditions
Open circuit/short circuit.

Type of malfunction/error	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Reduced operator comfort.	○ Relay not connected. ○ Defective relay.

Check-measurement

Testing	Test points	Set point	Condition	Test method
Sub-system	EC10 - 	$\approx U_{bat} \text{ V}$	 SW925 in position speed or gear dependent boom suspension system	

Testing	Test points	Set point	Condition	Test method
Sub-system	EA22 – EA42	$\approx 24 \text{ V}$		

EA22 – EA42	= 0 V		
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Document Title: ERROR Monitoring Steering System Oil Pressure (SE602) (MID 187 PSID 1303)	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Monitoring Steering System Oil Pressure (SE602) (MID 187 PSID 1303)

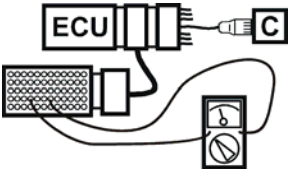
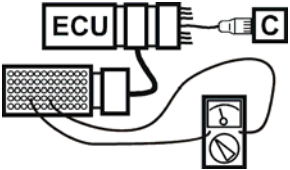
Component: SE602 Sensor steering pressure	
Function	The sensor measures steering pressure for secondary steering.
Reference	○ 301 Secondary steering ○ 370 Wiring diagram 16 ○ 387 Service display unit, electrical control input signals 1
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355
	EA8, signal EA42, ground

Malfunction detection conditions
Engine off, inactive secondary steering pump and open circuit for more than 1 s results in circuit error.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Signal line open circuit. ○ Defective sensor.

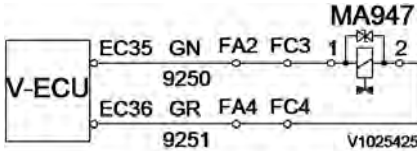
Check-measuring

Testing	Test points	Set point	Condition	Test method
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Sub-system	EA8 – EA42	$\approx 24\text{ V}$		
	EA8 – EA42	$= 0\text{ V}$		

Document Title: ERROR Sol. valve Attachment lock	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

ERROR Sol. valve Attachment lock

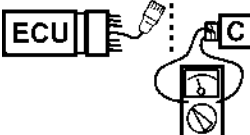
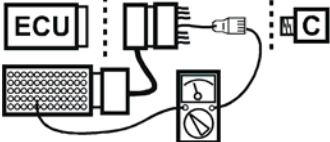
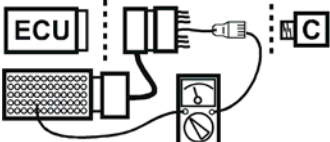
Component: MA947 Solenoid valve attachment locking		 EC35, feed EC36, ground	
Function	Controls attachment locking.		
References	○ 301 Attachment locking ○ 370 Wiring diagram 21		
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355		

Malfunction detection conditions

Detected if vehicle control unit (V-ECU) registers that current in circuit is below 50 mA or exceeds 1.25 A.

Type of error/malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Attachment locking is not performed.	○ Open circuit/short circuit.

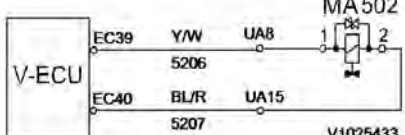
Check-measuring

Testing	Test points	Reference value	Condition	Test method
Component	1 – 2	$\approx 25 \Omega$ [T1] ①		
Control unit/cable harness	2 – EC36	$\approx 0 \Omega$		
	1 – EC35	$\approx 0 \Omega$		

[T1]Resistance increase with raised temperature

Document Title: ERROR Pressure regulator RTD	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

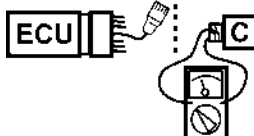
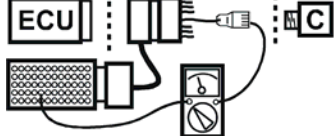
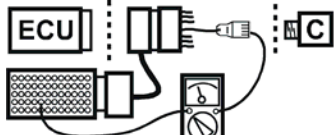
ERROR Pressure regulator RTD

Component: MA959 Solenoid valve for pressure reduction		 EC37, feed EC38, ground	
Function	Controls pressure reduction for automatic lift arm lowering (Return to dig).		
References	○ 301 Automatic lift arm lowering (Return to dig) ○ 370 Wiring diagram 35		
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355 ○ 302 Adapter cable 999 0191		

Malfunction detection conditions
Detected if the vehicle control unit (V-ECU) registers that current in the circuit is too high or too low.

Type of error/ malfunction	Symptom	Possible cause
	○ Error message ○ Amber central warning	○ Open circuit/short circuit.

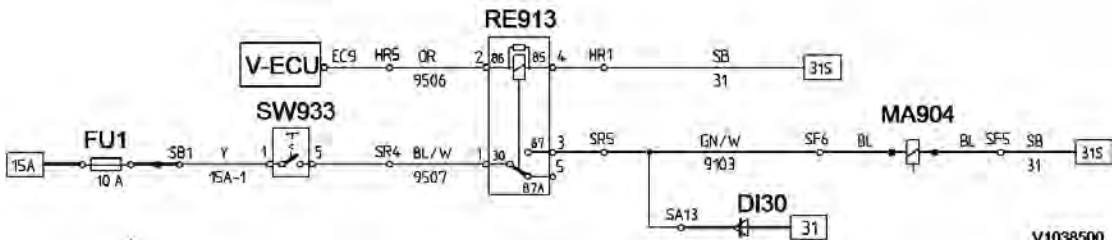
Check-measuring

Measurement	Measuring points	Set point	Condition	Measuring method
Component	1 – 2	$\approx 12 \Omega$ [T1] ①		
Control unit/ cable harness	Ground cable 2 – EC38	$\approx 0 \Omega$		
	Feed cable 1 – EC37	$\approx 0 \Omega$		

[T1]

Document Title: ERROR Relay Hold position	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

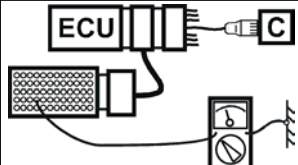
ERROR Relay Hold position

Component: RE913 Relay	
Function	Controls voltage feed to solenoid valve for automatic lift arm lowering (Return to dig).
References	○ 301 Automatic lift arm lowering (Return to dig) ○ 370 Wiring diagram 35 ○ 302 RE Relay general check
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355
 V1038500	

Malfunction detection conditions
Detected if vehicle control unit (V-ECU) registers an open circuit or short circuit on EC9.

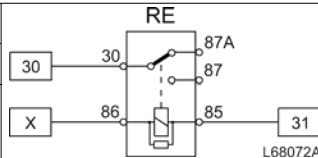
Type of malfunction/error	Symptom	Possible cause
	○ Error message ○ Amber central warning ○ Reduced operator comfort.	○ Relay not connected. ○ Defective relay.

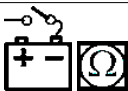
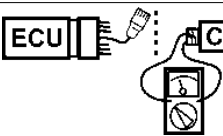
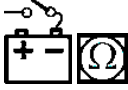
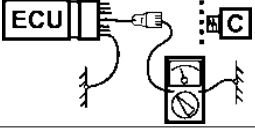
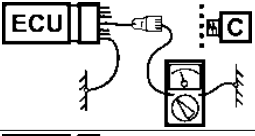
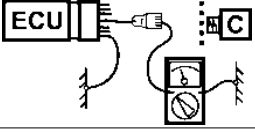
Check-measurement

Testing	Test points	Set point	Condition	Test method
Sub-system	EC9 - 	$\approx U_{bat} \text{ V}$	 SW933 in position On	

Document Title: RE Relay, general check	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

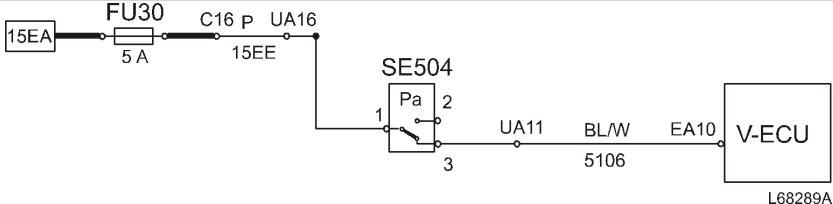
RE Relay, general check

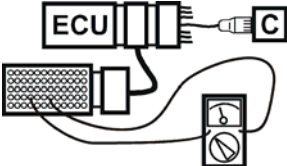
Component: RE Relay, general check		 30, feed X, control signals 31, ground
Function	Measures current and activates functions.	
Tools	○ 302 Multimeter 981 2519	
Suitable action	Shift relay when troubleshooting to determine if the relay is OK or defective. All relays in the electrical distribution box are interchangeable.	

Measurement	Measuring points	Set point	Condition	Measuring method
Component	85 – 86	$\approx 290\text{--}320\ \Omega$ (at 20 °C (+68 °F))		
	30 – 87A	$\approx 0\ \Omega$		
	Other combinations	test > 2 M Ω		
Control unit/ cable harness	Ground cable 85 – 	$\approx 0\ \Omega$		
	Feed cable 30 – 	$\approx 24\ \text{V}$		
	Control lead 86 – 	$\approx 24\ \text{V}$ at activation of relay		

Document Title: SE504 Monitor brake pressure charging	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

SE504 Monitor brake pressure charging

Component: SE504 Monitor brake pressure charging	
Function	Reads pressure for brake pressure charging.
References	○ 301 Brake pressure charging ○ 370 Wiring diagram 15B ○ 387 Service display unit, electrical control input signals 1
Tools	○ 302 Multimeter 981 2519 ○ 302 Multi-pin breaker box 999 8699 ○ 302 Extension cable 999 0062 ○ 302 Adapter cable 951 1355
 EA10, signal	

Testing	Test points	Set point	Condition	Test method
Subsystem	EA10 – EA42	= 0 V (high pressure > 14.5 MPa (145 bar) (2103 psi)) ≈ 24 V (low pressure < 12.5 MPa (125 bar) (1813 psi)) Machines manufactured prior to 2003 may be equipped with sensors with the following data: = 0 V (high pressure > 13.7 MPa (137 bar) (1987 psi)) ≈ 24 V (low pressure < 120 MPa (1200 bar) (1740 psi))		

VOLVO

Construction Equipment

Service Information

Document Title: SE901/SE902 Sensor, automatic boom kick-out and bucket positioner	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

SE901/SE902 Sensor, automatic boom kick-out and bucket positioner

Component: SE901/SE902 Sensor, automatic bucket positioner and boom kick-out	
Function	Indicates loader unit position.
References	○ 370 Wiring diagram 21

Testing	
Subsystem	Sensor function can be checked by placing a metal object in front of the unit. The internal LED should light provided the unit has a voltage feed and chassis connection. Sensor's output signal ≈ 24 V, shall activate relay RE1/RE3.

Document Title: Instrument control unit I-ECU, error symptom	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Instrument control unit I-ECU, error symptom

For trouble-free function of the machine, all ECUs and buses that transmit information between ECUs have to be fully functional. The electronic system monitors itself, and that's why there isn't always an error message in case of a malfunction of a control unit.

If one suspects that a control unit is defective, always check the ground connection and voltage feed first, also the ground connection on the circuit board in the electrical distribution box.

Before any ECU is replaced, check-measure the data buses' cable harnesses, see [302 ATTENTION! Reduced Computer Function \(J1939\)](#), [302 ATTENTION! Reduced Computer Function \(J1708/J1587\)](#).

NOTE!

The following error symptoms have been noticed for defective I-ECU.

Error symptoms for defective I-ECU

Electronics don't start up, the information display unit is "dark". The only light on is the charging light.

Document Title: Instrument control unit I-ECU, changing	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Instrument control unit I-ECU, changing

General

ECUs can be delivered with or without software.

Without software

- Replace the vehicle control unit according to the VCADS Pro operation "Replace control unit".
- Continue according to the following method.

With software

- Continue according to the following method.

Op nbr



WARNING

During troubleshooting and all work with the electrical system, carefully follow all instructions in Electrical system, work instructions.

1. Park the machine in the service position.
2. Turn off the voltage with the battery disconnect switch.
3. Lower the steering wheel against the operator's seat.

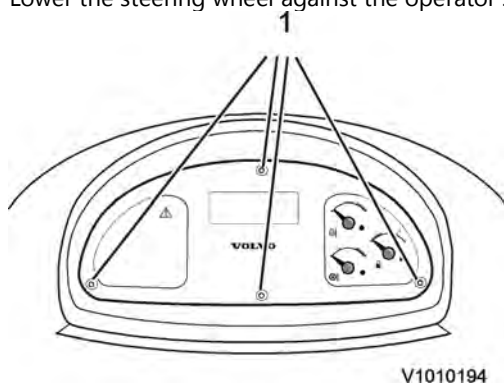


Figure 1

Removing

4. Remove the screws (1).
5. Lower the I-ECU, bring it forward.
6. Press in the catch and unplug the connectors P1, P2 and P3 for the I-ECU.
7. Remove the I-ECU.

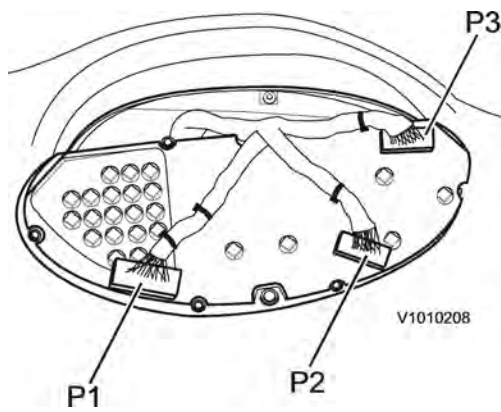


Figure 2

Mounting

8. Fit the connectors P1, P2 and P3.
9. Fit the I-ECU with the screws (1).
10. Raise the steering wheel to the operating position.
11. Turn on the machine's voltage with the battery disconnect switch.
12. Start the machine and check that no error messages appear.

Document Title: Engine control unit E-ECU, error symptom	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Engine control unit E-ECU, error symptom

For trouble-free function of the machine, all ECUs and buses that transmit information between ECUs have to be fully functional. The electronic system monitors itself, and that's why there isn't always an error message in case of a malfunction of a control unit.

If one suspects that a control unit is defective, always check the ground connection and voltage feed first, also the ground connection on the circuit board in the electrical distribution box.

Before any ECU is replaced, check-measure the data buses' cable harnesses, see [302 ATTENTION! Reduced Computer Function \(J1939\)](#), [302 ATTENTION! Reduced Computer Function \(J1708/J1587\)](#).

Error symptoms for defective E-ECU

NOTE!

The following error symptoms have been noticed for defective E-ECU.

- Engine doesn't start.
- Red central warning may flash.
- One of the error messages are shown on the information display unit:
 - ATTENTION! Reduced Computer Function
 - STOP! COMPUTER FAILURE STOP THE VEHICLE
- Machine cannot be shut off, engine runs and the information display unit is on even when the key has been turned to position 0.

More than one document matches chosen profile <https://truckmanualshub.com/>

- [Engine control unit E-ECU. changing](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 7398, 62543

- [Engine control unit E-ECU. changing](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8001

Serial number stop: 10999

Document Title: Engine control unit E-ECU, changing	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Engine control unit E-ECU, changing

Op nbr



During troubleshooting and all work with the electrical system, carefully follow all instructions in Electrical system, work instructions.

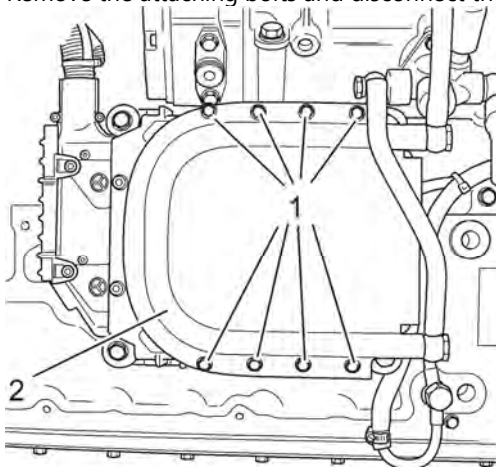
NOTE!

The connector may be connected with the cable connection facing up or down, depending on engine type.

1. Place the machine in service position.
2. Turn off the voltage with the battery disconnect switch.

Removing

3. Remove the attaching bolts and disconnect the cooling coil from the E-ECU.



V1019879

Figure 1

1. Attaching bolts for cooling coil
 2. Cooling coil
4. Remove the attaching bolts and take out the E-ECU.

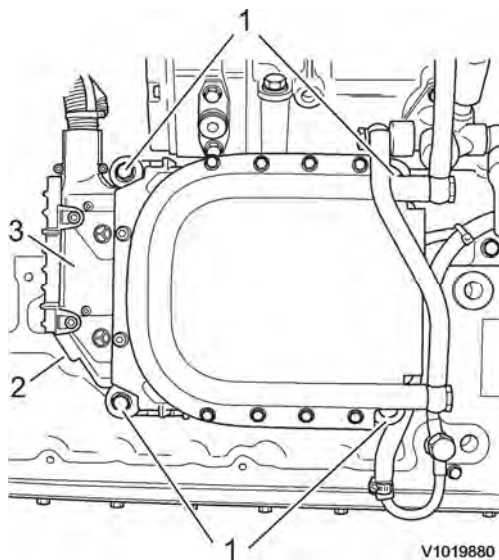


Figure 2

1. Attaching bolts for E-ECU
2. Catch
3. Connector

5. Press in the catch and unplug the connector.

6. Remove the E-ECU.

Installing

7. Fit the E-ECU on the engine block with the attaching bolts.

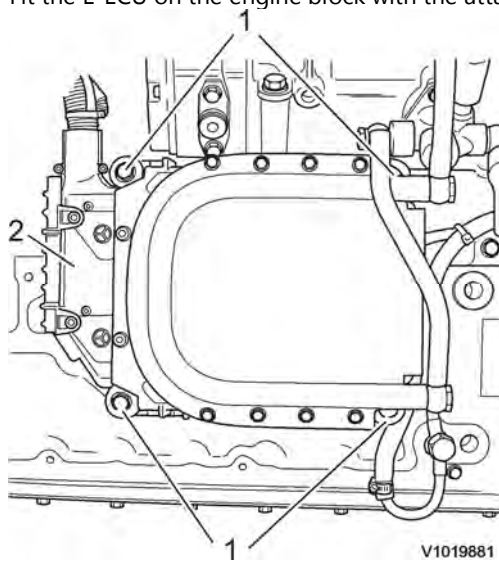


Figure 3

1. Attaching bolts for E-ECU
2. Connector

8. Plug in the connector.

9. Fit the cooling coil with the attaching bolts.

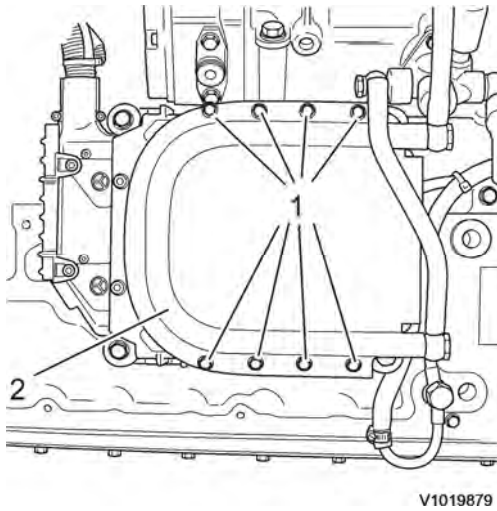


Figure 4

1. Attaching bolts for cooling coil
2. Cooling coil

10. Close the fan shroud and turn on the electric power with the battery disconnect switch.
11. Start the machine and check that no error messages appear.

Document Title: Engine control unit E-ECU, changing	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Engine control unit E-ECU, changing

General

For changing E-ECU, these can be supplied with or without software.

Changing non-programmed E-ECU

- A. Connect VCADS Pro computer and perform operation 28423-3 MID 128 Control unit Parameter, programming.
- B. When instructed to connect the new control unit (E-ECU), perform steps 1–9.
- C. After changing E-ECU, finish the operation 28423-3 MID 128 Control unit, programming.
- D. Start the machine and check that no error messages appear.

Changing programmed E-ECU

- A. If it is possible to communicate with the E-ECU. Connect VCADS Pro computer and perform the operation 17030-3 Parameter, programming. Use the function – Save all read-out parameters to job card.
- B. Change E-ECU acc. to steps 1–9.
- C. After changing E-ECU, perform the operation 17030-3 Parameter, programming. Program earlier read-out parameters acc. to job card.
- D. Start the machine and check that no error messages appear.

Op nbr



During troubleshooting and all work with the electrical system, carefully follow all instructions in Electrical system, work instructions.

Removing E-ECU

1. Place the machine in service position.
2. Turn off the voltage for the machine with the battery disconnecter.
3. Remove the clamps for the cable harness with the screws (1).
4. Unplug the connectors (2) from the E-ECU.
5. Remove the screws (3) for the cooling circuit.
6. Remove the screws (4) and lift away the E-ECU.

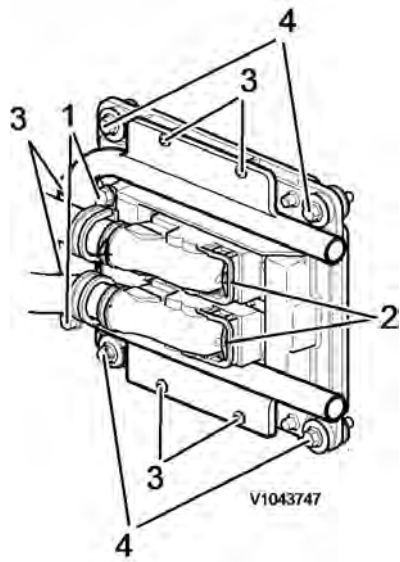


Figure 1

Installing E-ECU

7. Install the new E-ECU with the screws (4).
8. Install the screws (3) for the cooling circuit.
9. Plug in the connectors on the E-ECU (2).
10. Install the clamps for the cable harness with the screws (1).
11. Turn on the machine's voltage with the battery disconnect switch.

Document Title: Vehicle control unit V-ECU, error symptom	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Vehicle control unit V-ECU, error symptom

For trouble-free function of the machine, all ECUs and buses that transmit information between ECUs have to be fully functional. The electronic system monitors itself, and that's why there isn't always an error message in case of a malfunction of a control unit.

If one suspects that a control unit is defective, always check the ground connection and voltage feed first, also the ground connection on the circuit board in the electrical distribution box.

Before any ECU is replaced, check-measure the data buses' cable harnesses, see [302 ATTENTION! Reduced Computer Function \(J1939\)](#), [302 ATTENTION! Reduced Computer Function \(J1708/J1587\)](#).

Error symptoms for defective V-ECU

NOTE!

The following error symptoms have been noticed for defective V-ECU.

- Buzzer may sound.
- Red central warning may flash.
- One of the error messages are shown on the information display unit:
 - ATTENTION! Reduced Computer Function
 - STOP! COMPUTER FAILURE STOP THE VEHICLE
- Gearshifting functions not functional, partly or completely.
- One or several of the following error messages is shown on the information display unit:
 - ERROR Relay Interval Wiper
 - ERROR Relay BSS
 - ERROR Secondary Steering Relay
 - ERROR Gear Selector F/R
- Information on the information display unit may not be shown and only – – is seen.
- With the engine on, one or several warnings and error messages are shown on the information display unit:
 - WARNING Brake Charging Failure
 - WARNING Low Brake Pressure
 - ERROR Parking Brake

NOTE!

During operation, the brake pressure may be lost, the hydraulic cooling fan stops and several important functions are lost, with risk of machine damage as a result. Therefore, respect the warning "STOP! COMPUTER FAILURE STOP THE VEHICLE"

Document Title: Vehicle control unit V-ECU, changing	Function Group: 302	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Vehicle control unit V-ECU, changing

General

ECUs can be delivered with or without software.

Without software

- ☐ Replace the vehicle control unit according to the VCADS Pro operation "Replace control unit".
- ☐ Continue according to the following method.

With software

- ☐ Continue according to the following method.

Op nbr



For ECUs delivered pre-programmed from Volvo Parts, customer parameters are set according to default standard value.



During troubleshooting and all work with the electrical system, carefully follow all instructions in Electrical system, work instructions.

1. Park the machine in the service position.
2. Turn off the voltage with the battery disconnect switch.
3. Lower the operator's seat.

Removing

4. Remove the screws (1) and remove the rear cab panel.

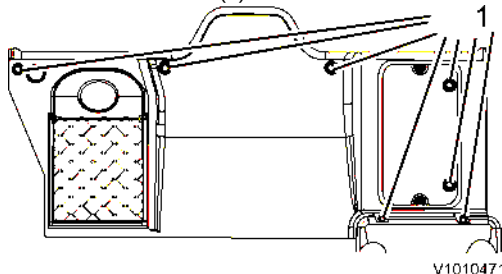


Figure 1
Rear cab panel

5. Remove the nuts (2).

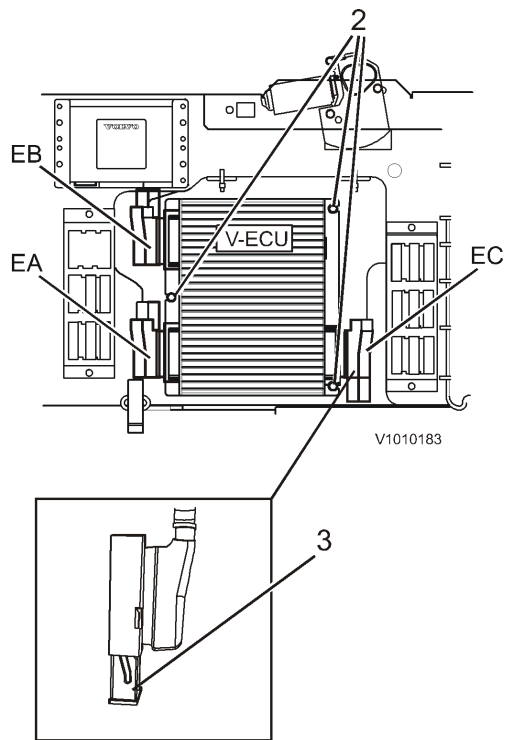


Figure 2

V-ECU located by electrical distribution box behind operator's seat

6. Unplug the connectors EA, EB and EC for the V-ECU.

NOTE!

To unplug the connectors, the catch (3) must be pulled out.

7. Remove the V-ECU.

Mounting

8. Check the setting of the trim screws (4, 5).

Trim screw 4 = B

Trim screw 5 = B

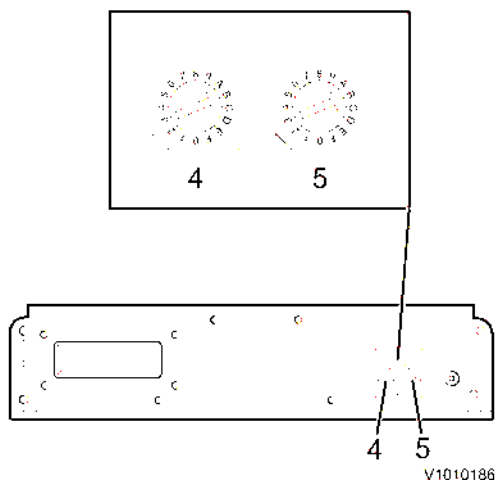


Figure 3

Right side of V-ECU

9. Fit the connectors EA, EB and EC.
10. Fit the V-ECU with the nuts.
11. Fit the rear cab panel.

12. Raise the operator's seat.
13. Turn on the machine's voltage with the battery disconnect switch.
14. Start the machine and check that no error messages appear.

Document Title: Connecting special tools	Function Group:	Information Type: Service Information	Date: 2014/5/12
Profile: WLO, L180E [GB]			

Connecting special tools

Component testing

NOTE!

The images below are intended for components with a 4-pin DIN connector only. The basic test principle is identical for all other connector types.

NOTICE

Take great care when attaching test cables to connectors so as not to damage or expand the pins and sleeves.

NOTICE

When measuring directly in connectors, good lighting and access is required to avoid short-circuiting between the leads. Carefully follow all instructions in Electrical system, work instructions.

See also [302 Special tools for troubleshooting](#) and [302 Component fault diagnosis, general](#).

Active testing of component and circuit

Active testing implies testing of a closed circuit.

The adapter cable is connected between the cable harness and the component.

Tools: [302 Adapter cable 999 8534](#), [302 Multimeter 981 2519](#)

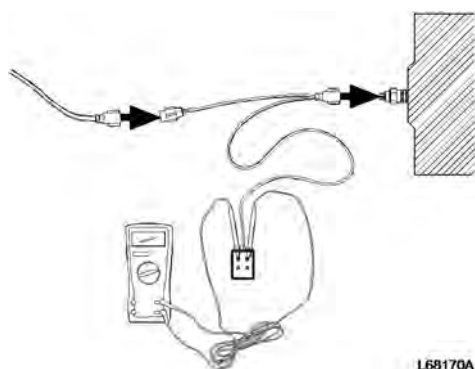


Figure 1
Examples of active component testing with adapter cable

Passive component testing

Passive testing implies testing of an open circuit.

The adapter cable is connected to the component or cable harness.

Tools: [302 Adapter cable 999 8534](#), [302 Multimeter 981 2519](#)

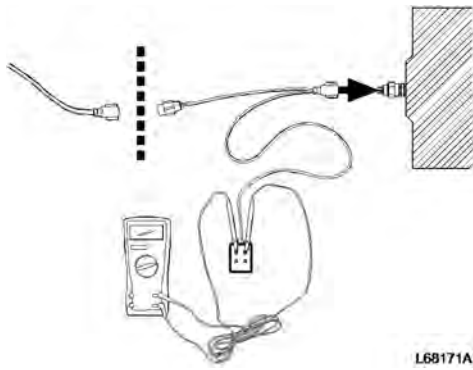


Figure 2
Examples of passive component testing with a 4-pin DIN adapter cable

Tools: [302 Multi-pin breaker box 999 8699](#), [302 Adapter cable 951 1355](#), [302 Multimeter 981 2519](#)

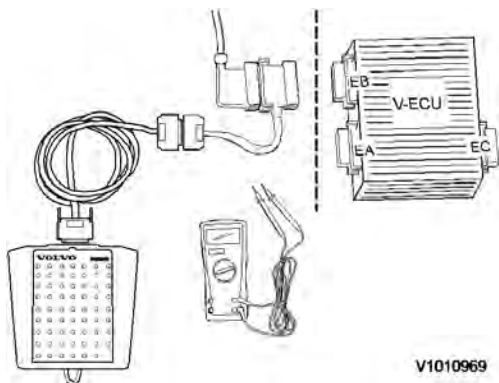


Figure 3
Examples of passive testing through the cable harness to the component. ECU not connected.

Active testing of E-ECU

Active testing implies testing of a closed circuit.

The multi-pin breaker box is connected between the cable harness and control unit with the adapter cable. For the cable harness that is not measured, an alternative to using adapter cable 999 8505 is to use interconnector cable 999 8540 to maintain closed circuit.

Tools: [302 Adapter cable 999 8505](#) (2 pcs.), [302 Multi-pin breaker box 999 8699](#), [302 Multimeter 981 2519](#) and, when needed, extension cable 9990062.

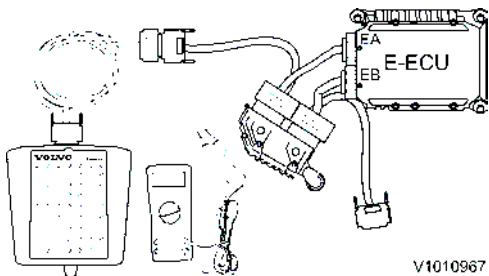


Figure 4
Active measuring of engine control unit E-ECU connection EA.

Active testing of V-ECU

Active testing implies testing of a closed circuit.

The test box is connected between the cable harness and control unit.

Tools: [302 Multi-pin breaker box 999 8699](#), [302 Adapter cable 951 1355](#), [302 Multimeter 981 2519](#)

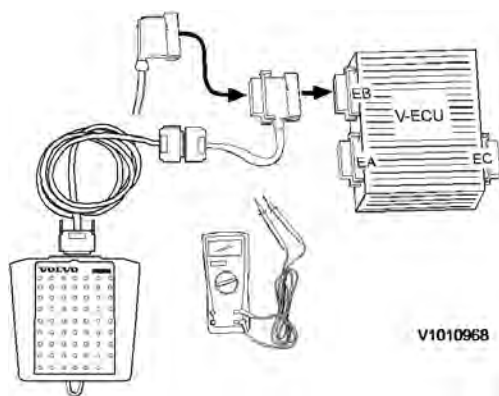


Figure 5
Active testing of vehicle control unit V-ECU.

Document Title: Battery, description	Function Group: 310	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Battery, description

The battery consists of two 12 V batteries connected in a series, which together provide 24 V with a capacity of 170Ah. The batteries are located behind the rear wheels on either side of the rear frame. The battery disconnect switch is located under the radiator casing at the rear of the machine on the right-hand side.

The batteries should be in good condition when troubleshooting the system. If needed, charge the batteries with a battery charger. If the batteries do not take the charge, replace the batteries.

Document Title: Battery, charging	Function Group: 310	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Battery, charging

WARNING

Hydrogen gas is formed during battery charging. Hydrogen gas is flammable and may be explosive. A short circuit, open flame or spark near the battery can cause a powerful explosion. Therefore, ventilate well. Never smoke near batteries.

- Batteries must only be charged using a battery charger.
- Check the battery terminal connections and make sure that they are adequately tightened and free from corrosion and dirt.
- Check the battery voltage when the batteries are at rest (before starting). Each battery must be at least half-charged.

NOTICE

Always turn off the current to the battery charger before disconnecting the charging clamps.

WARNING

Corrosive sulphuric acid

The battery electrolyte includes corrosive sulphuric acid. Electrolyte spilled on bare skin must be removed immediately. Wash with soap and plenty of water. If electrolyte gets into your eyes or any other sensitive body part, rinse immediately with plenty of water and seek immediate medical attention.

Document Title: Battery, changing	Function Group: 310	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Battery, changing



Batteries contain corrosive acid. Handle batteries according to instructions in Section 3 and Section Safety.

Op nbr

1. Park the machine in the service position.

Removing

1. Swing out the radiator casing and turn off the voltage with the battery disconnect switch (1).

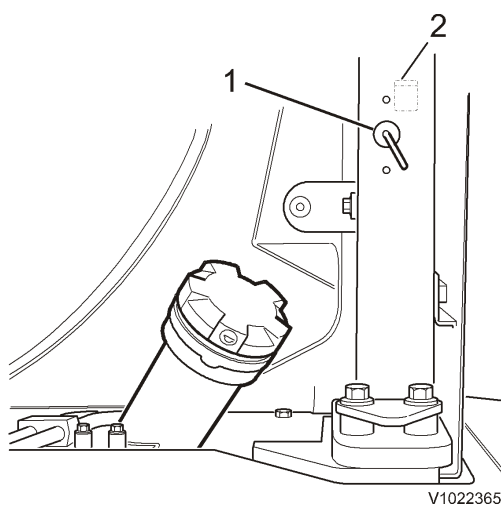


Figure 1
Battery disconnect switch and fuse FH4

2. Remove fuse FH4 [1] ⓘ (2).
3. Open the battery cover.
4. Remove the terminal caps.
5. Loosen and remove the cable terminals from the battery terminals.
NOTE!
Start by removing the cable terminal from the minus terminal.
6. Loosen the clamp and remove the battery.

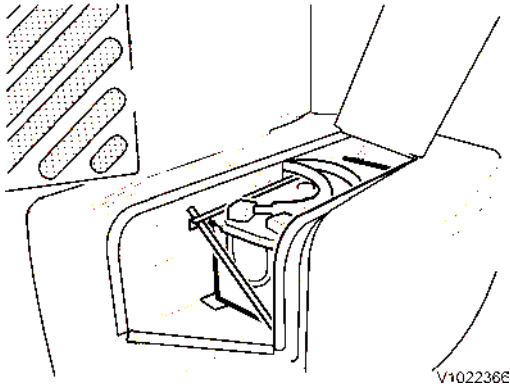


Figure 2
Battery box
Installing

7. Lift the battery into place and fit the clamp.
8. Clean the battery terminals and cable terminals.
9. Fit the cable terminals and lube with vaseline.
10. Fit the terminal caps and close the battery cover.
11. Fit the fuse (2).
12. Turn on the voltage with the battery disconnect switch (1) and close the radiator casing.
13. Start the machine and check that no error messages appear.

[**1**]Fuse FH4 serves voltage converter CU801, for which the ground connection is not disconnected by the battery disconnect switch.

Document Title: Alternator, description	Function Group: 320	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Alternator, description

The alternator is a 55 A alternating current generator with a normal charge voltage of 28.5 V and a built-in charge regulator. Machines that have been equipped with a large number of components using electric power, for example, extra work lights, can be equipped with an 80 A alternator as an alternative.

When the engine is turned off, the batteries normally give a voltage of approx. 24-26 V, depending on their charging status. When the engine is running, the batteries are normally charged by the alternator, since the alternator's normal charging - voltage is higher than the battery voltage.

If the batteries do not seem to take a charge, this may be due to incorrect charge voltage from the alternator. Also check the acidity in the battery electrolyte, see [310 Battery. charging](#).

Document Title: Starting description	Function Group: system, 331	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Starting system, description

When battery disconnecter SW100 is closed, ignition SW101, relay RE8 and relay RE202 are supplied with power.

When the key is turned to position 1, relay RE2 is energised and supplies alternator ALT1 with a pre-magnetisation voltage. Resistor R1 limits this voltage to 3 volts.

When the key is turned to position 3, relay RE8 is energized and relay RE202 is energized via relay RE9, supplying the starter motor with power.

When Forward or Reverse gear is engaged (SW402), engagement of the starter motor is prevented by relay RE9 (starter inhibitor).

The key cannot be turned to position 3 to prevent starter motor engagement while the engine is running.

If starting fails, the key must be turned back to position 0 before a new attempt can be made.

NOTE!

From and incl. serial no. 5050 (ARV), 62506 (ASH), relay RE202 is discontinued, which means that the starter motor is supplied with voltage directly via RE9.

See [370 Wiring diagram 3](#).

Document Title: Preheating coil, description	Function Group: 333	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Preheating coil, description

There is an electrical preheating element on the inlet side of the engine. Provided the engine coolant temperature is below +20 °C (+68 °F), the element will be connected when the operator turns the ignition key to the running position and presses the preheating switch. If the engine starts, the preheating will be disconnected. Extra preheating will be provided after the engine has started, if the temperature so requires. The pre- and after-heating time is controlled by the engine control system. The advantages are easier start and less white smoke in the exhaust.

The control lamp on the instrument panel lights when the preheating element is connected.

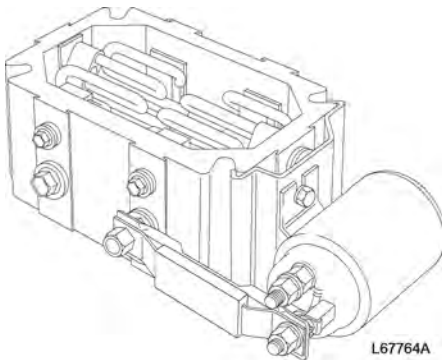


Figure 1
Preheating element

NOTE!

The preheating element must not be connected to ground.

Document Title: Preheating, description	Function Group: 333	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Preheating, description

The function of the preheating coil is to warm the air in the induction manifold when the engine is started. The warm air facilitates start at very low temperatures and reduces smoke during cold starts.

When the key is turned to position 1, there's voltage to switch SW201 and relay RE2501.

Preheating is activated by pressing down SW201, which gives an input signal to the I-ECU which activates RE2501 via the E-ECU.

RE2501 activates preheating coil HE2501, and control light LC15 on the middle instrument panel lights up. The control light remains on for as long as the preheating coil is activated.

The engine is started when the control light turns off at the end of the preheating period. **Post-start heating** is engaged after engine start by the E-ECU if the temperature requires it.

The preheating period is dependent on the coolant temperature. If the coolant temperature is above +20 °C, the preheating coil is not activated.

For preheating periods and conditions, see [301 Preheating of inlet air](#).

Also see [370 Wiring diagram 3](#) and [370 Wiring diagram 31](#).

Document Title: Lighting, description	Function Group: 350	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Lighting, description

Headlights

Travel lights are operated with switch SW301, located on the right-hand instrument panel.

- First position: parking lights and instrument lighting
- Second position: parking lights, instrument lighting and travel lights.

Main and dipped beams are controlled with SW302, the right-hand stalk switch on the steering column

- Lever in neutral position, low beams.
- Stalk switch pressed away from steering wheel: main beams and control lamp LC12 on the instrument panel lights up.

Work lights

The front working lights are controlled with switch SW303, located on the right-hand instrument panel. Control lamp LC7 on the instrument panel is lit when the working lights are on.

- First position: regular front working lights
- In second position, regular working lights front and extra working lights front via relay RE10.

Rear working lights are controlled with switch SW304, located on the right-hand instrument panel. Control lamp LC7 on the instrument panel is lit when the working lights are on.

- First position: regular rear working lights.
- In second position, regular working lights rear and extra working lights rear.

See [370 Wiring diagram 6](#) and [370 Wiring diagram 7](#).

Rotating beacon

The rotating warning beacon is operated with switch SW305. When the rotating warning beacon is switched on, control lamp LC14 on the instrument panel is alight.

See [370 Wiring diagram 8](#).

Optional equipment for work in tough operating conditions

Automatic work lights

Automatic work lights rear are activated via V-ECU and relay RE303 when a gear is engaged. When the work lights are on, control light LC7 on the instrument panel is lit.

See [370 Wiring diagram 101](#).

Double work lights cab front

Double work lights cab front are activated via V-ECU and relay RE303. When the work lights are on, control light LC7 on the instrument panel is lit.

See [370 Wiring diagram 103](#).

Electrically controlled battery disconnect switch

Voltage is connected to the electrically controlled battery disconnecter RE104 via the ignition SW101 if the ordinary battery disconnecter is on. Voltage feed of E-ECU takes place via relay RE105, the function of which is to prevent voltage discharge via RE104. The machine is stopped with the ignition or emergency stop SW102.

See [370 Wiring diagram 102](#).

Flashing light

Flashing light is activated for as long as the battery disconnect switch is on. When the flashing light is activated, control light LC14 on the instrument panel is lit.

See [370 Wiring diagram 102](#).

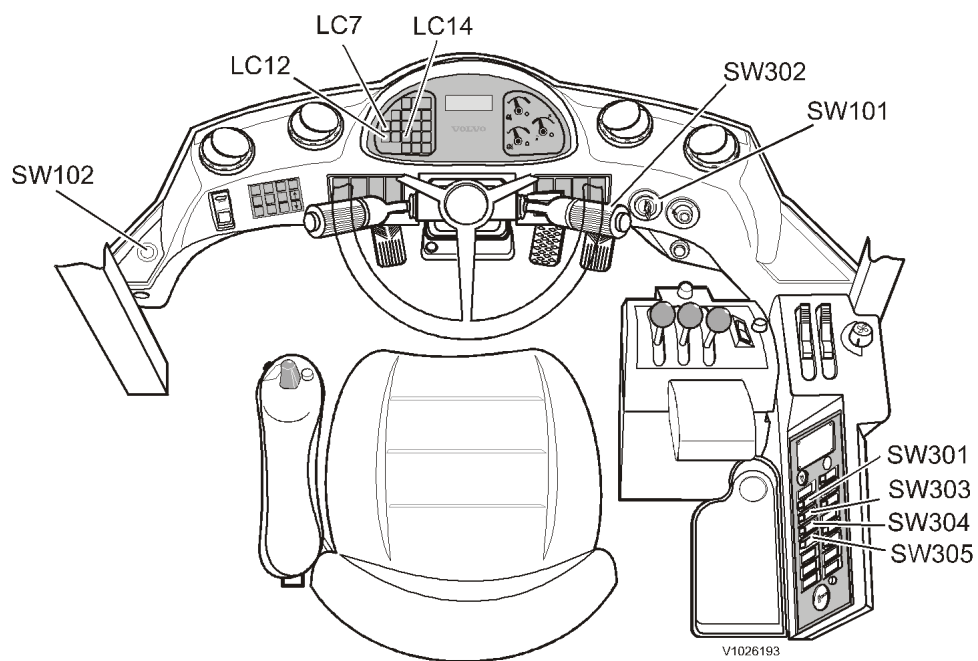
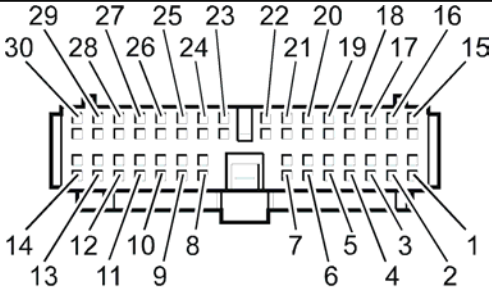
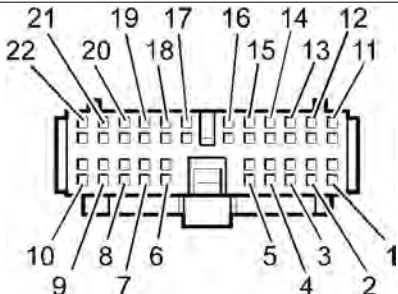
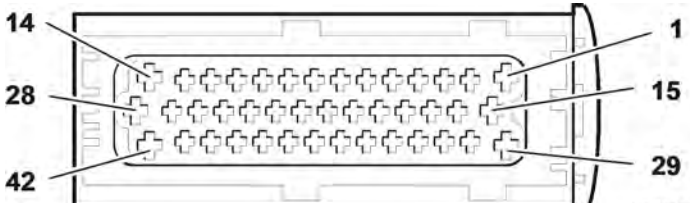
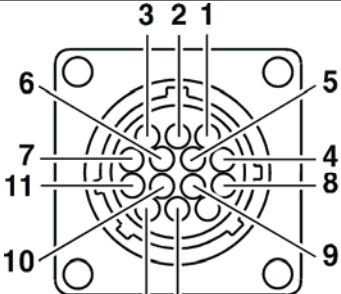
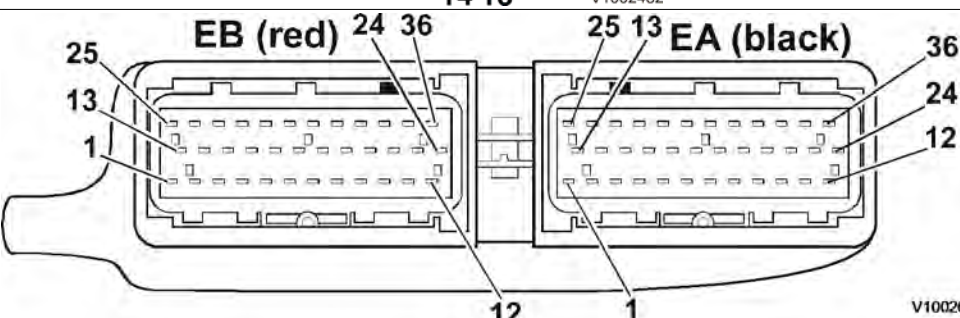
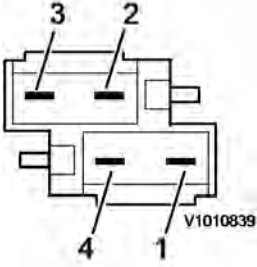
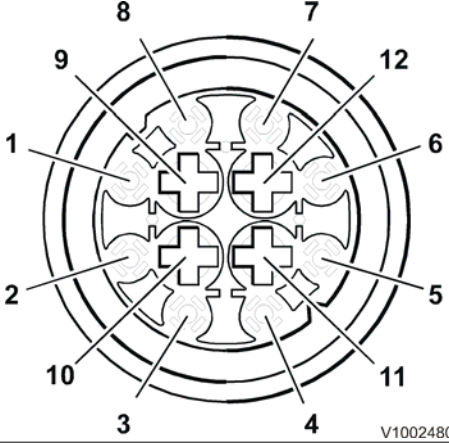
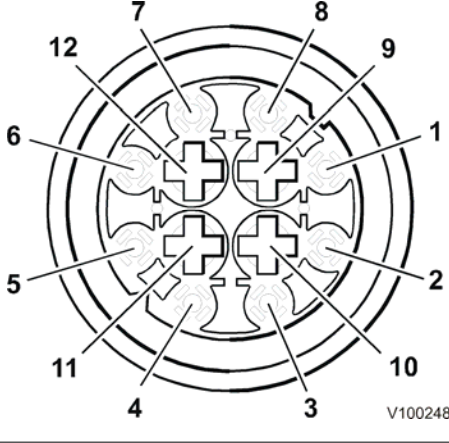
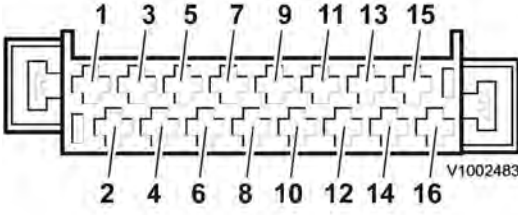
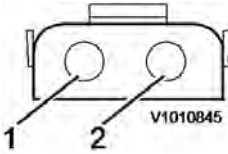
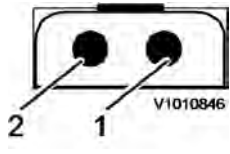
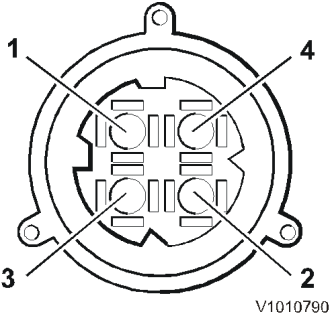
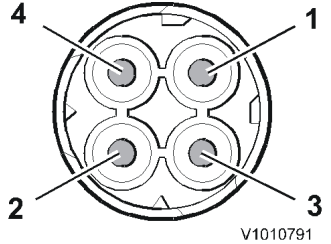
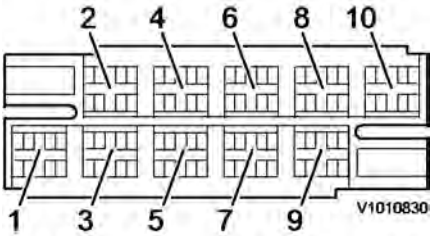
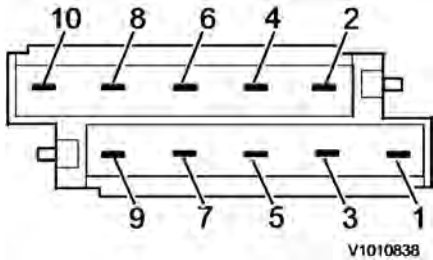


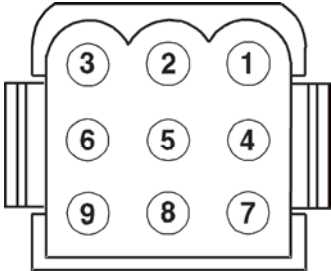
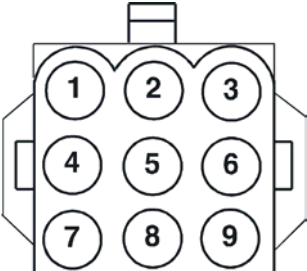
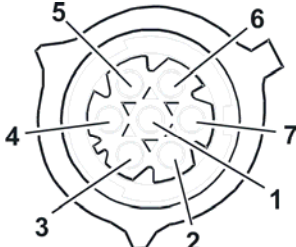
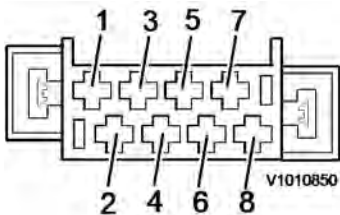
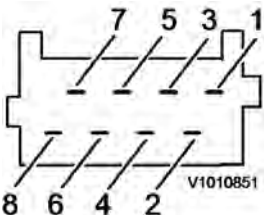
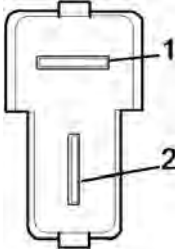
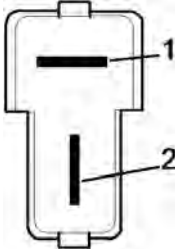
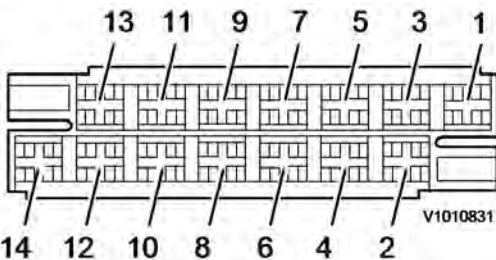
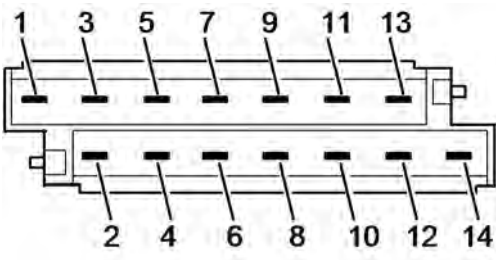
Figure 1

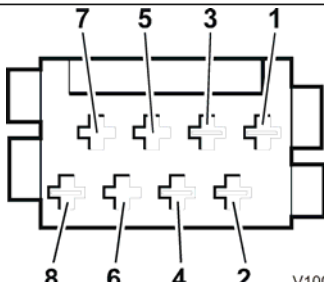
Document Title: Connectors, overview	Function Group: 364	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Connectors, overview

Designation	Plug-in side (female)
P1 (green, I-ECU)	 V1002477
P2 (green, I-ECU) P3 (blue, I-ECU)	 V1010919
EA, EB, EC (V-ECU)	 V1025336
IA (Service display unit)	 V1002482
EA, EB (E-ECU)	 V1002646

Designation	Plug-in side (female)	Pin-side (male)
CR, OD, OE		
EMS		
C, CDC, D, DA, DB, E, EM, ES, F, FA, MR, OA, OG, R, RA, RB, RD, SA, SB, SC, SD, SE, ST, SH, TA, TB, UA		
FF, RR		
FD, RC, RP, RZ		
GA, OB, OC		

SF	 V1010795	 V1010796
RT, EL	 V1010797	 V1010798
SG	 V1010850	 V1010851
SJ	 V1010792	 V1010793
WA	 V1010831	 V1010837

Designation	Pin-side (male)
IB (VCADS Pro)	 V1002485

Document Title: Cable and component designations	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Cable and component designations

Cables and components in wiring diagrams are designated according to function group assignment.

Cable designations:

Lead marked, for example, 30–20 indicates that there is 30 feed via 20 to a component. After the component, the designation may be, for example, 6101 where 6 indicates function group, 01 is running number.

Component designation:

Component marked SW601 (for example), SW is switch, 6 indicates function group, 01 is running (sequential) number.

NOTE!

Relays and fuses located on the circuit board are not marked according to function group assignment.

Function group assignment

- | | |
|---|-----------------------------------|
| 1 | Feeds and ground connections |
| 2 | Engine |
| 3 | Electrical system, lighting, etc. |
| 4 | Power transmission |
| 5 | Brakes |
| 6 | Steering |
| 7 | Other |
| 8 | Cab |
| 9 | Hydraulics |

Plus feed

Designation 30, 15, 15E, etc. in squares

The current direction is from a large box with a thick line to a small box with a thin line.

Squares with the same designation have connection with each other on the circuit board via printed circuits.

- | | |
|------|---|
| 30 | Battery feed |
| 30A | Battery feed via main fuse FU70 |
| 30K | Battery feed circuit board via main fuse FU70 |
| 15A | Ignition-dependent voltage feed via relay RE2 |
| 15B | Ignition-dependent voltage feed via relay RE4 |
| 15EA | Ignition-dependent voltage feed for ECU-controlled functions via RE12 |
| RA | Ignition-dependent voltage feed for radio |

Ground connection

Designation 31xx in squares

Current direction is from small square with thin line to big square with heavy line.

Squares with the same designation have connection with each other on the circuit board via printed circuits.

Colour marking of cables

BL = Blue

OR = Orange

VO = Violet

BN = Brown

P = Pink

W = White

GN = Green

R = Red

Y = Yellow

GR = Grey

SB = Black

Colour marking of cables, plus feed/ground connection

30 feed

Red

15 feed

Red/white

5 volt feed

Red/grey

24 volt feed, ECUs

Red/white

Ground connection

Black

Ground connection, electric

Black/white

Document Title: Cable and component marking explanations	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]WLO, L180E [GB]			

Cable and component marking explanations

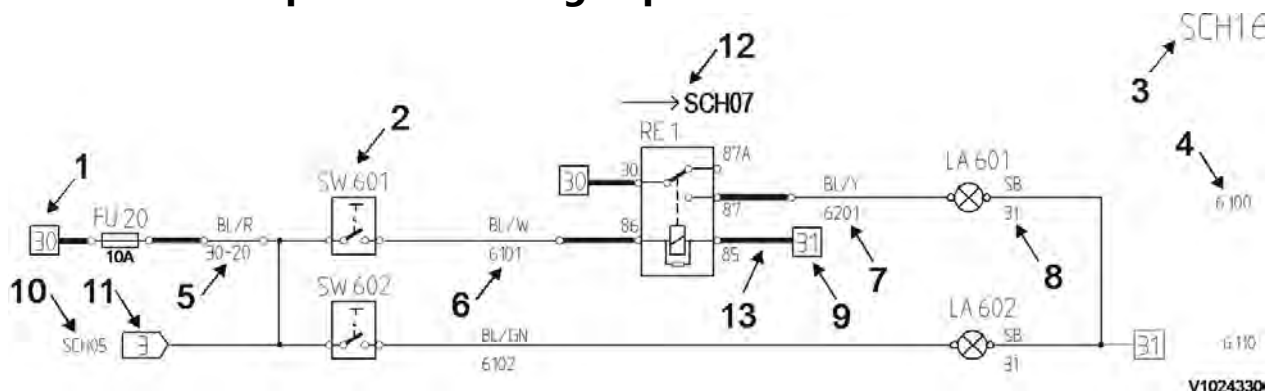


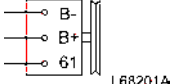
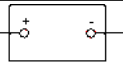
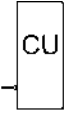
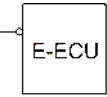
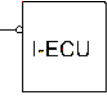
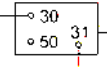
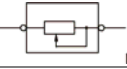
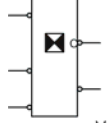
Figure 1
Principle illustration wiring diagram

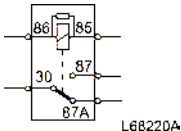
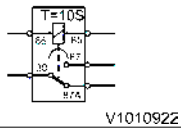
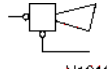
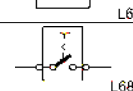
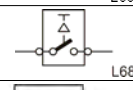
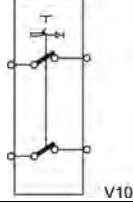
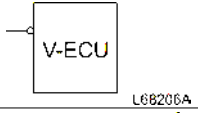
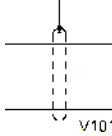
Example of cable and component designations				
1	30	Box with designation for feed	Plus feed (30, 15, 15E, etc.)	
2	SW601	SW = switches	6 = Function group	01 = Running number
3	SCH16	Diagram number		
4	6.100	6 = Function group	100 = Running number	
5	30-20	30 = Feed (30, 15, 15E, etc.)	20 = Fuse number	
6	6101	6 = Function group	1 = Electric event [1] ⓘ	01 = Running number
7	6201	6 = Function group	2 = Electric event ^(a)	01 = Running number
8	31	31 = DIN marking (30, 15, 31 etc.)		
9	31	Box with designation for ground connection	Ground connection (31, etc.)	
10	SCH05	Diagram number next to an arrow-shaped box is a reference to another diagram		
11	3	Reference number in an arrow-shaped box can be found in an arrow-shaped box in the diagram to which it refers.		
12	SCH07	Diagram number with arrow before means that more information can be found on the indicated diagram		
13	Lead	A lead drawn with a thick line shows that it is a printed circuit on the circuit board		

[1]Used to a certain extent. Electric event is that the lead has passed something, for example, a switch or a relay which may have resulted in an electrical change (electric event). For each such electric event, the digit changes, 1 becomes 2 and so on.

Document Title: Electrical symbols and designations	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Electrical symbols and designations

Designation	Symbol	Explanation
ALT	 L68201A	Alternator with charging regulator
BA	 L68202A	Battery
C	 L68219A	Capacitor
CU	 V1010923	Electronic unit
DI	 L68203A	Diode
E-ECU	 L68204A	Engine control unit
FC FH FU	 L68207A	Fuse
I-ECU	 L68205A	Instrument control unit
IM	 L68222A	Instrument, i.e. hour meter
LA	 L68229A	Light, fixed light
	 L68231A	Light, flashing light
LC	 L68218A	Control light, fixed light
LC	 V101092C	Control light, flashing light
MA	 L68227A	Solenoid valve or PWM-valve for control of oil
MO	 L68230A	Electric motor
	 L68215A	Starter motor
R	 L68216A	Resistor
	 L68228A	Rheostat
RF	 V101092	Flasher relay

RE		Relay: No control current on 86–85 contact position 30–87A (Permitted load 10A) Control current on 86–85 contact position 30–87 (Permitted load 20A)
RT		Time relay
SA		Audible signal
		Audible signal
SE		Frequency sensor, i.e. rpm transmission
		Inductive sensor
		Level sensor
		Temperature sensor
		Pressure sensor
		Pressure monitor
		Mechanical monitor
SW		Single terminal switch with manual on and off, i.e. activation of air conditioning
		Single terminal switch with manual on and automatic off, i.e. horn
		Double terminal switch with manual on and off with lock-out, e.g., SW911
V-ECU		Vehicle control unit
		Ground connection
		Ground connection engine block
		Shielded cable

Document Title: Cable and component marking explanations	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]WLO, L180E [GB]			

Cable and component marking explanations

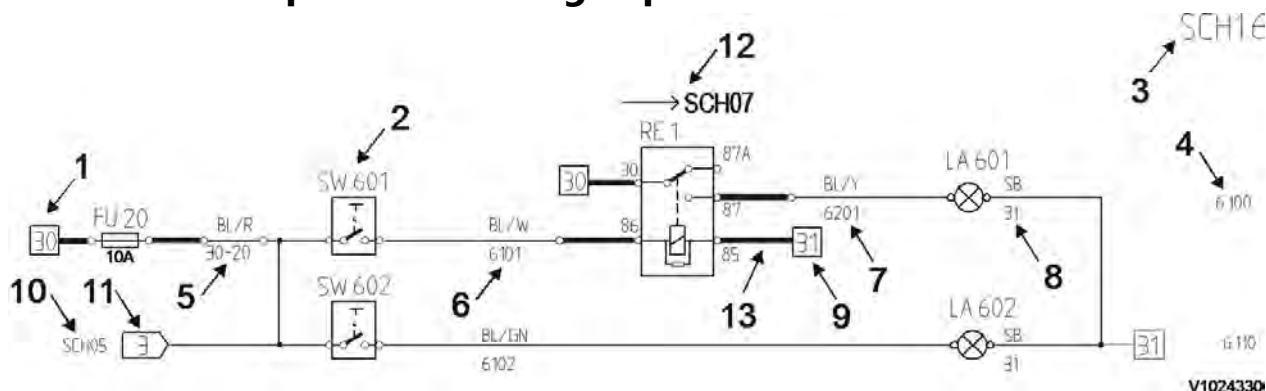


Figure 1
Principle illustration wiring diagram

Example of cable and component designations				
1	30	Box with designation for feed	Plus feed (30, 15, 15E, etc.)	
2	SW601	SW = switches	6 = Function group	01 = Running number
3	SCH16	Diagram number		
4	6.100	6 = Function group	100 = Running number	
5	30-20	30 = Feed (30, 15, 15E, etc.)	20 = Fuse number	
6	6101	6 = Function group	1 = Electric event [1] ⓘ	01 = Running number
7	6201	6 = Function group	2 = Electric event ^(a)	01 = Running number
8	31	31 = DIN marking (30, 15, 31 etc.)		
9	31	Box with designation for ground connection	Ground connection (31, etc.)	
10	SCH05	Diagram number next to an arrow-shaped box is a reference to another diagram		
11	3	Reference number in an arrow-shaped box can be found in an arrow-shaped box in the diagram to which it refers.		
12	SCH07	Diagram number with arrow before means that more information can be found on the indicated diagram		
13	Lead	A lead drawn with a thick line shows that it is a printed circuit on the circuit board		

[1]Used to a certain extent. Electric event is that the lead has passed something, for example, a switch or a relay which may have resulted in an electrical change (electric event). For each such electric event, the digit changes, 1 becomes 2 and so on.

Document Title: Frame ground connections and signal ground	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Frame ground connections and signal ground

	Designation	Connected to	Serves
Frame ground connections	31	31C	Circuit board in electrical distribution box
	31AC	31C	Air conditioning (AC, ATC)
	31B1	31R1 via starter motor	Engine
	31C	Cab ground	31AC, 31D, 31E, 31F 31I, 31M, 31S, 31U
	31D	31C	Components operated with switches on left front instrument panel
	31E	31C	E-ECU
	31F	31C	Components located on front frame
	31F1	31F	Front frame
	31F2	31F	Connection box front frame for connection of optional equipment
	31I	31C	I-ECU
	31M	31C	Service connections IA and IB, V-ECU
	31R	31R4	Cab frame - rear frame
	31R1	Battery disconnect switch	Electrical system
	31R3	Rear frame	Engine, alternator, starter motor
	31R4	31R	Rear frame - cab frame
	31S	31C	Components operated with switches on right instrument panel
	31U	31C	Components located under cab
Signal ground	31EA	V-ECU (EB24)[T1] ⓘ	Analogue ground
	31FR	V-ECU (EA42) ^(a)	Frequency ground

[T1]See Wiring diagram 2

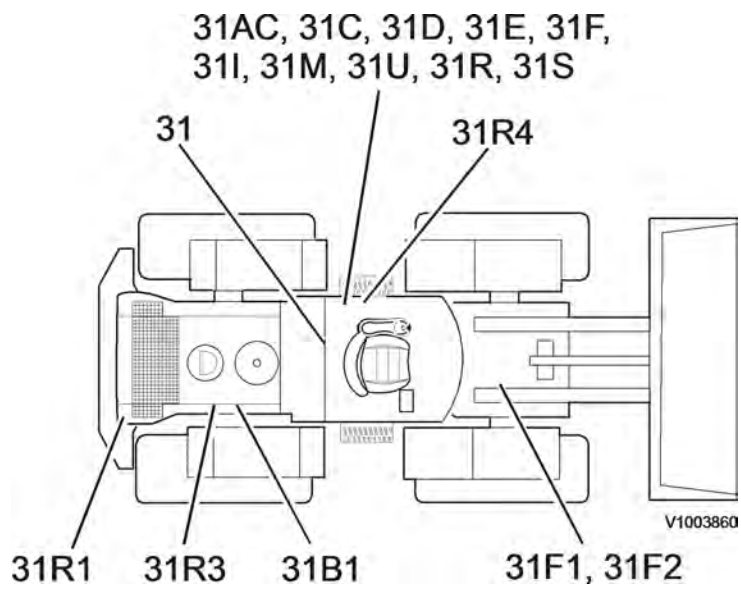


Figure 1
Frame ground connections

Document Title: Component list 1: Alternator, batteries, capacitors, electronic units	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list 1: Alternator, batteries, capacitors, electronic units

Components	Designation	Wiring diagram	Circuit no.	Function
Alternator	ALT1	1	—	Alternator
Batteries	BA1	1, 102	—	Battery
	BA2	1, 102	—	Battery
Capacitor	C1	1	—	Delayed cut-out of RE12 [T1] ⓘ
	C801	19	8.090	Delayed cut-in of RE801 (Air conditioning , AC) [T2] ⓘ
Electronic units	control E-ECU	—	—	Engine control unit
	I-ECU	—	—	Instrument control unit
	V-ECU	—	—	Vehicle control unit
	CU601	17	6.020	Comfort Drive Control (CDC) ^(b)
	CU801	20	8.150	Voltage converter for radio
	CU802	26	—	Central lubrication system ^(b)
	CU803	33	8.100	Automatic temperature control ^(b)

[T1] Located on circuit board

[T2] Optional equipment

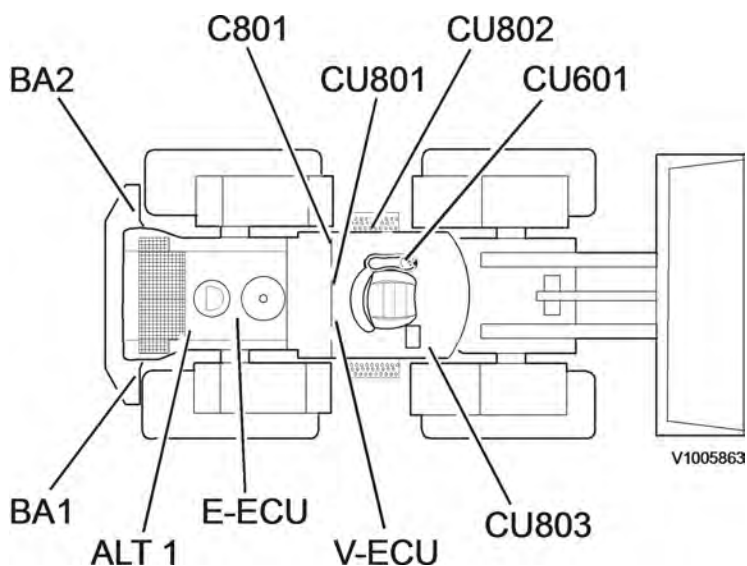


Figure 1

Component position: Alternator, batteries, electronic units

Document Title: Component list 2: Diodes	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list 2: Diodes

Designation	Wiring diagram	Circuit no.	Function
Di1	7, 101, 103	3.210	Work light dependent parking lights
Di2	7, 101, 103	3.220	Work light indicator lamp
Di3	7, 101, 103	3.220	Work light indicator lamp
Di4	6	3.060	Guide light voltage reduction
Di5	6	3.060	Guide light voltage reduction
Di6	6	3.060	Guide light voltage reduction
Di7	6	3.080	Guide light voltage reduction
Di8	6	3.080	Guide light voltage reduction
Di9	23	9.100	Boom Suspension System, MA908 [T1] ⓘ
Di10	9, 9B	4.030	Forward signal
Di11	9, 9B	4.020	Reverse signal
Di12	19, 33	8.090, 8.100	Quench diode ^(a)
Di20	23	9.090	Single-acting lift MA908 ^(a)
Di21	21, 21B, 21C	9.010	Quench diode
Di22	21, 21B, 21C	9.010	Quench diode MA901, automatic tilt (bucket positioner)
Di23	21, 21B, 21C	9.020	Blocking diode
Di24	21, 21B, 21C	9.020	Quench diode MA902, automatic lift (boom kick-out)
Di25	1	—	Quench diode
Di26	9, 9B	4.030	Quench diode
Di27	1	—	Blocking diode
Di28	1	—	Delayed cut-out, RE12
Di29	21, 21B, 21C	9.020	Blocking diode
Di30	21, 21B, 21C	9.050	Quench diode, MA904 float position
Di30	35	—	Quench diode MA904 ^(a)
Di31	9, 9B	4.020	Quench diode
Di32	2, 102	—	Quench diode, RE11
Di101	102	—	Blocking diode
Di102	102	—	Quench diode
Di801	19, 33	8.090, 8.100	Quench diode, compressor clutch ^(a)
Di802	19, 33	8.090, 8.100	Feed compressor clutch ^(a)
Di804	33	8.100	Blocking diode, activation RE801 ^(a)
Di909	21C	9.065	Quench diode MA916 ^(a)

[T1]Optional equipment

Document Title: Component list 3: Fuses	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list 3: Fuses

NOTICE

Always use a fuse with correct rating.

Designation	Feed	AMP	Wiring diagram	Circuit no.	Function
FU1	15A	10	35	—	Automatic lift arm lowering ^(a)
			21	9.010 – 9.050	Automatic tilt and lift, float position and automatic float position, attachment change and attachment locking
			21B	9.010 – 9.060	Automatic boom kick-out and bucket positioner, float mode, attachment change. Electric lever lock-out for 4th hydraulic function[T1] ⓘ
			21C	9.010 – 9.065	Automatic boom kick-out and bucket positioner, float position. Single lever, lever lock-out ^(a)
			35	—	Automatic lift arm lowering ^(a)
FU2	15A	10	23	9.090, 9.100	Boom suspension system, single-acting lift ^(a)
			1	—	—
FU3	15A	10	18	8.010, 8.030	Windscreen wiper and washer, horn
FU4	15B	20	19, 33	8.080	Cab fan, air conditioning ^(a)
FU5	15B	5	4	2.460	Electrically heated fuel filter ^(a)
			20	8.170, 8.180	Heat operator's seat, air-suspended operator's seat ^(a)
			26	—	Central lubrication system ^(a)
			33	8.100	Air conditioning (ATC) ^(a)
			34	8.130	Back-up camera ^(a)
			34	8.140	Electrically heated rear-view mirrors ^(a)
FU6	30K via SW301	5	6	3.040 – 3.080	Parking light right front and left rear, running light right front, license plate light, guide lights switches
FU7	30K via SW301	5	6	3.010, 3.250	3.030, Parking light left front and right rear, running light left front, instrument lighting

[T1]Optional equipment

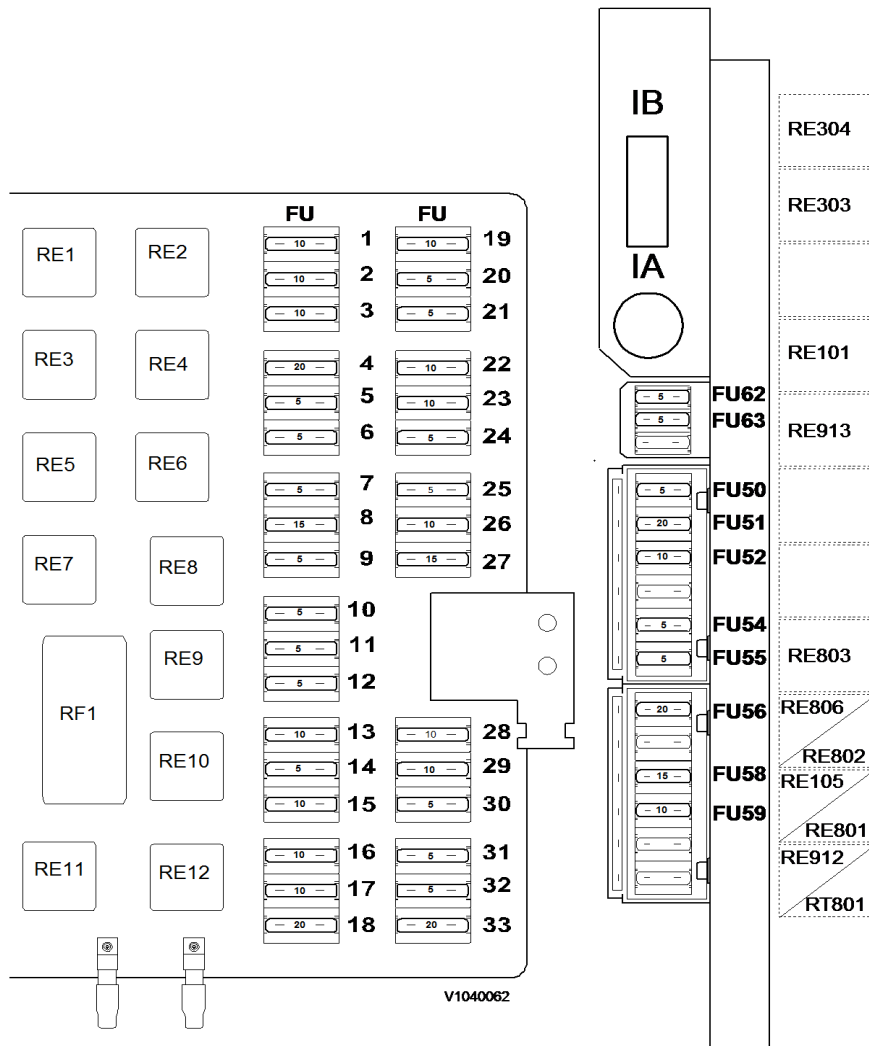


Figure 1
Component position: Fuses in electrical distribution box

Designation	Feed	AMP	Wiring diagram	Circuit no.	Function
FU8	30K	15	3	2.010	Starter motor relay
FU9	30K	5	8	3.285	Hazard flashers
FU10	RA	5	20	8.150	Voltage converter for radio
FU11	30K via SW302	5	6	3.100	Low beam, right
FU12	30K via SW302	5	6	3.090	Low beam, left
FU13	30K	10	7	3.170 – 3.190	Work lights front fenders and attachment[T1]
FU14	15EA	5	1	—	—
			3	2.020	Preheating
			9, 9B	4.010 – 4.030	Gear selector steering column, Kick-down steering column, directional gear Forward/reverse steering column

			11	4.170	Transmission disengagement
			11	4.260	Fully automatic
			12	4.210	Mode selector, differential lock
			24	—	Service connections IA and IB
FU15	15EA	10	2	—	Ignition dependent voltage feed I-ECU and V-ECU
			15B	5.045	Parking brake
			1	—	—
FU16	15EA	10	19	8.090	Air conditioning (AC) ^(a)
			33	8.100	Air conditioning (ATC) ^(a)
FU17	30K via RE11	10	2, 102	—	Voltage feed I-ECU and V-ECU

[T1]Optional equipment

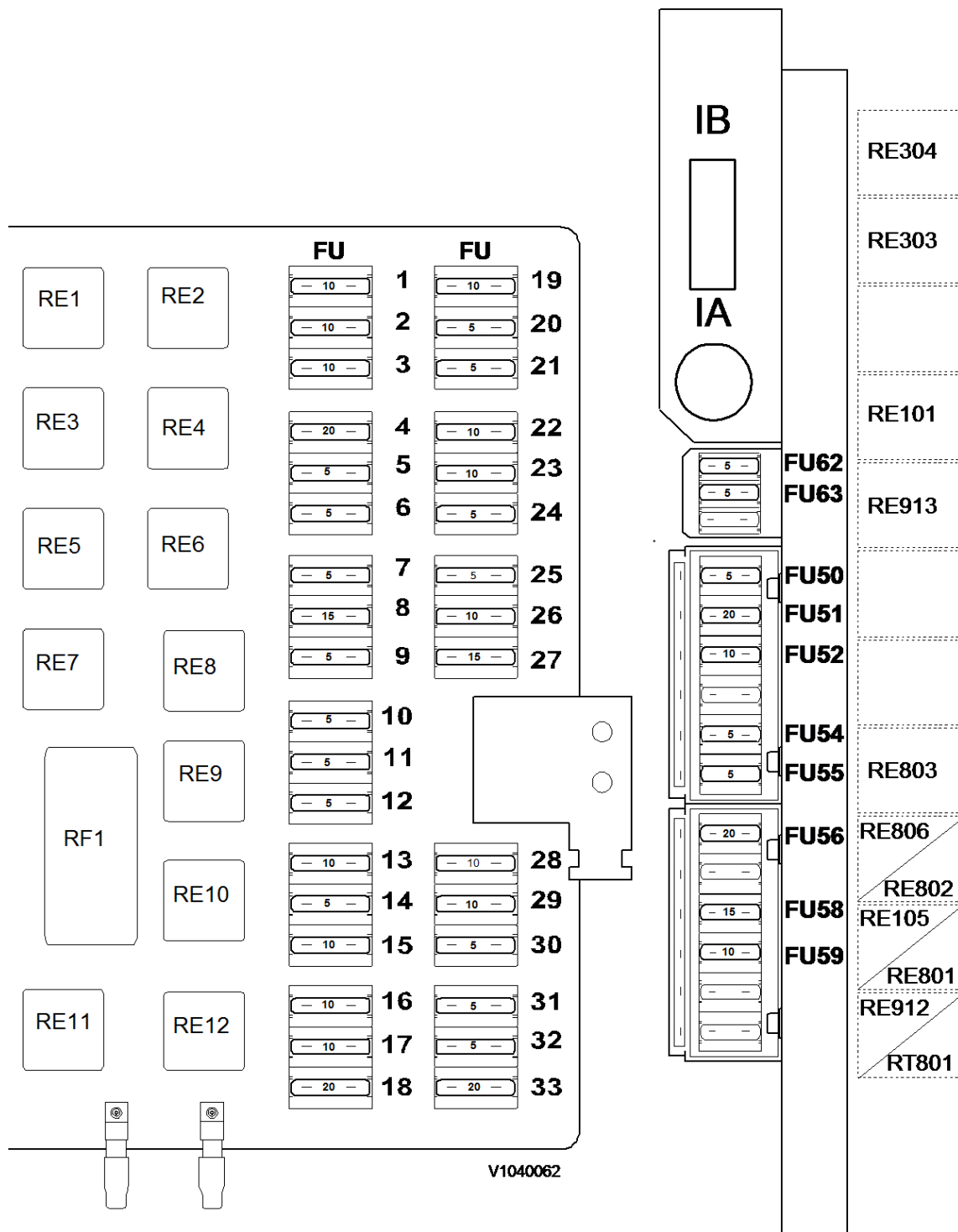


Figure 2
Component position: Fuses in electrical distribution box

Designation	Feed	AMP	Wiring diagram	Circuit no.	Function
FU18	30K via RE11	20	2, 102	—	Voltage feed E-ECU
FU19	30K	10	20	8.190	Cigarette lighter
FU20	15A	5	8	3.270 – 3.330	Brake lights, direction indicators
FU21	15A	5	1	—	Hour meter, magnetization of alternator,

					control light charging
			8	3.250	Instrument lighting
			18	8.040 – 8.050	Wiper and washer rear[T1] ⓘ
			24	—	Instrument lighting service display unit
FU22	30K	10	7	3.200 – 3.220	Work lights radiator casing, control light work lights ^(a)
FU23	30K	10	20	8.150	Voltage converter for radio
FU24	30K via SW302	5	6	3.120 – 3.130	High beam right, control light high beam
FU25	30K via SW302	5	6	3.110	High beam, left
FU26	30K	10	7	3.140 – 3.190	Interior lighting, work lights cab front, front fenders, attachment and control light work lights
		10	103	3.165	Interior lighting, work lights cab front, front fenders, attachment and control light work lights ^(a)
FU27	30K	15	6	3.010 - 3.130	Main fuse lighting
FU28	30K	10	7	3.230 - 3.240	Work lights cab ^(a)
			8	3.260	Rotating beacon ^(a)
			101	3.200, 3.265	Automatic back-up light and flashing light ^(a)
FU29	30K	10	1, 102	—	Ignition voltage feed ^(a)

[T1]Optional equipment

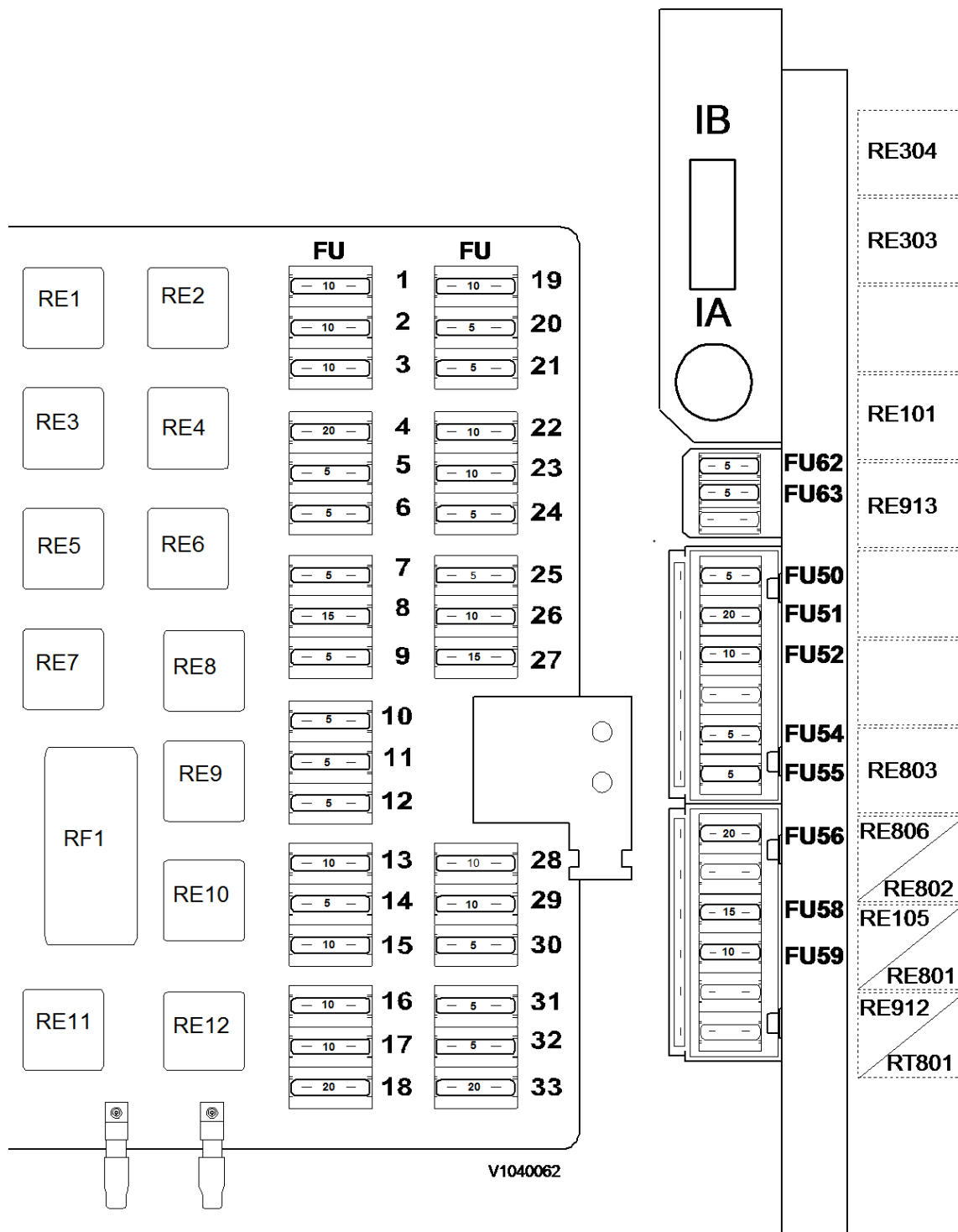


Figure 3
Component position: Fuses in electrical distribution box

Designation	Feed	AMP	Wiring diagram	Circuit no.	Function
FU30	15EA	5	9, 9B	4.040 – 4.070	Lever carrier[T1] ⓘ
			15B	5.020 – 5.050	Brake pressure accumulator and brake pressure charging
			16	6.010	Secondary steering ^(a)
			17	4.080 – 4.110	Comfort Drive Control (CDC) ^(a)
			23	9.085	Boom Suspension System ^(a)
			1	—	—

FU31	15EA	5	1 19, 33	— 8.090, 8.100	Feed rear frame Pressure monitor, increased fan speed ^(a)
FU32	15EA	5	1 12	— 4.220	Feed front frame, transmission Differential lock (feedback)
FU33	30K	20	1	—	—
FU50	30A	5	19, 33 101	8.090, 8.100 3.340	Air conditioning ^(a) —
FU51	30A	20	101	3.340	Automatic back-up light ^(a)
FU52	30A	10	20	8.180	Air-suspended operator's seat ^(a)
FU54	15B	5	4 20 26 33 34	2.460 8.180 — 8.100 8.130	— Operator's seat with air suspension — — Back-up camera ^(a)
FU55	15B	5	4 26 33 34	2.460 — 8.100 8.140	— — — Electrically heated rear-view mirrors ^(a)
FU56	103	20	103	3.165	Optional work lights front ^(a)
FU58	30A	15A	4	2.460	Electrically heated fuel filter ^(a)
FU59	30A	10	26 33 100	— 8.100 —	Central lubrication system ^(a) Air conditioning (ATC) ^(a) Reversible cooling fan (relay-controlled) ^(a)
FU62	5A	5	2	—	Preheating relay (D12D)
FU63	5A	5	2	—	EGR valve (D12D)

[T1]Optional equipment

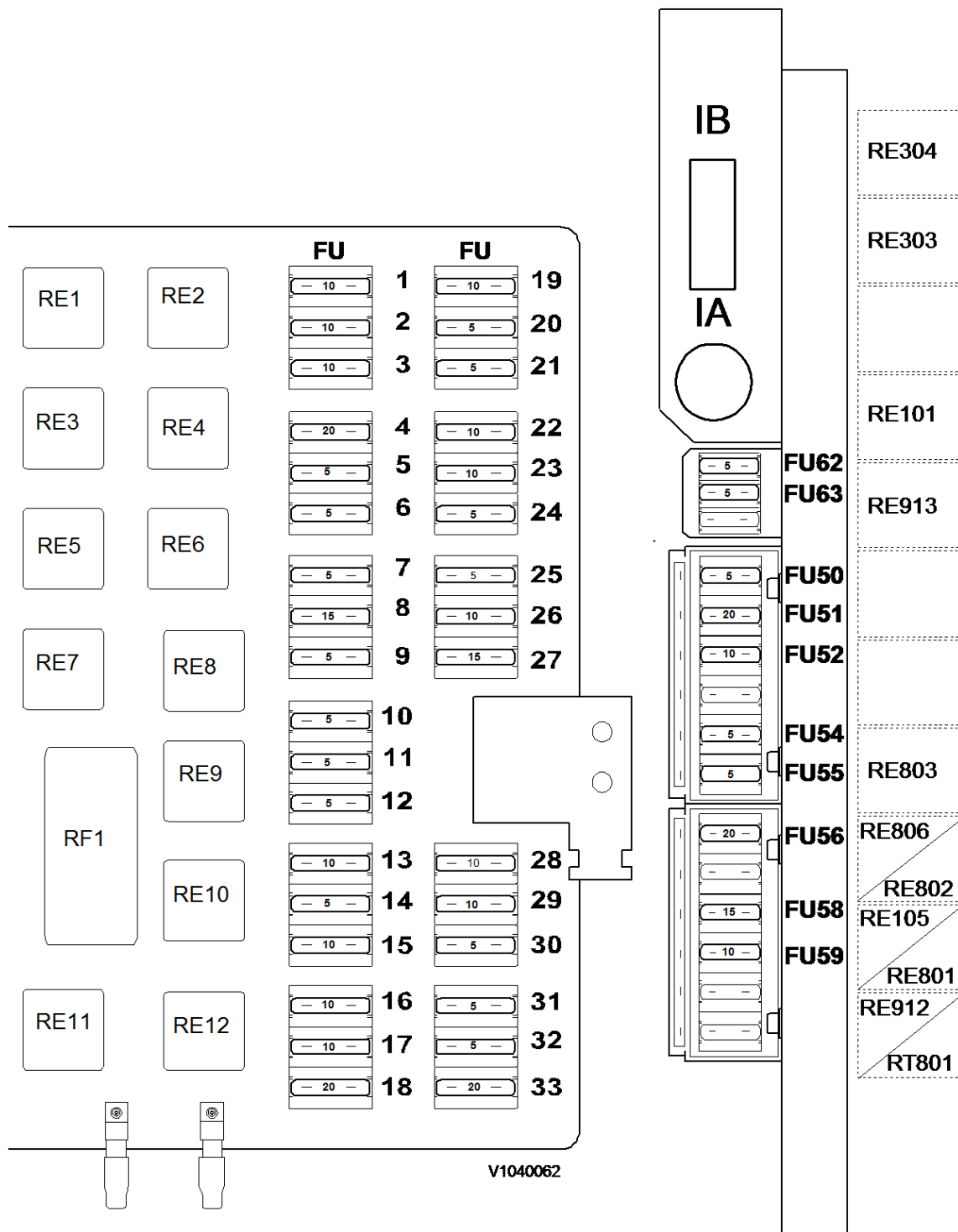


Figure 4
Component position: Fuses in electrical distribution box

Designation	Feed	AMP	Wiring diagram	Circuit no.	Function
FU70	30	125 [T1] ①	1, 102	—	Main fuse for electrical distribution box
FU71	30	125 ^(a)	16	6.010	Secondary steering[T2]①
FU72	30	125	31	2.370	Preheating

FU73	30	60	3	2.010	Starter motor
FH1	30	5	31	2.370	Control light preheating
FH3	30 via RE601	5	16	6.010	Control light secondary steering ^(b)
FH4	—	5	20	8.150	Constant ground to voltage converter CU801
FH7	15B	5	34	8.130	Back-up camera ^(b)
FH8	—	5	34	8.130	Back-up camera ^(b)

[T1]Was previously 150A

[T2]Optional equipment

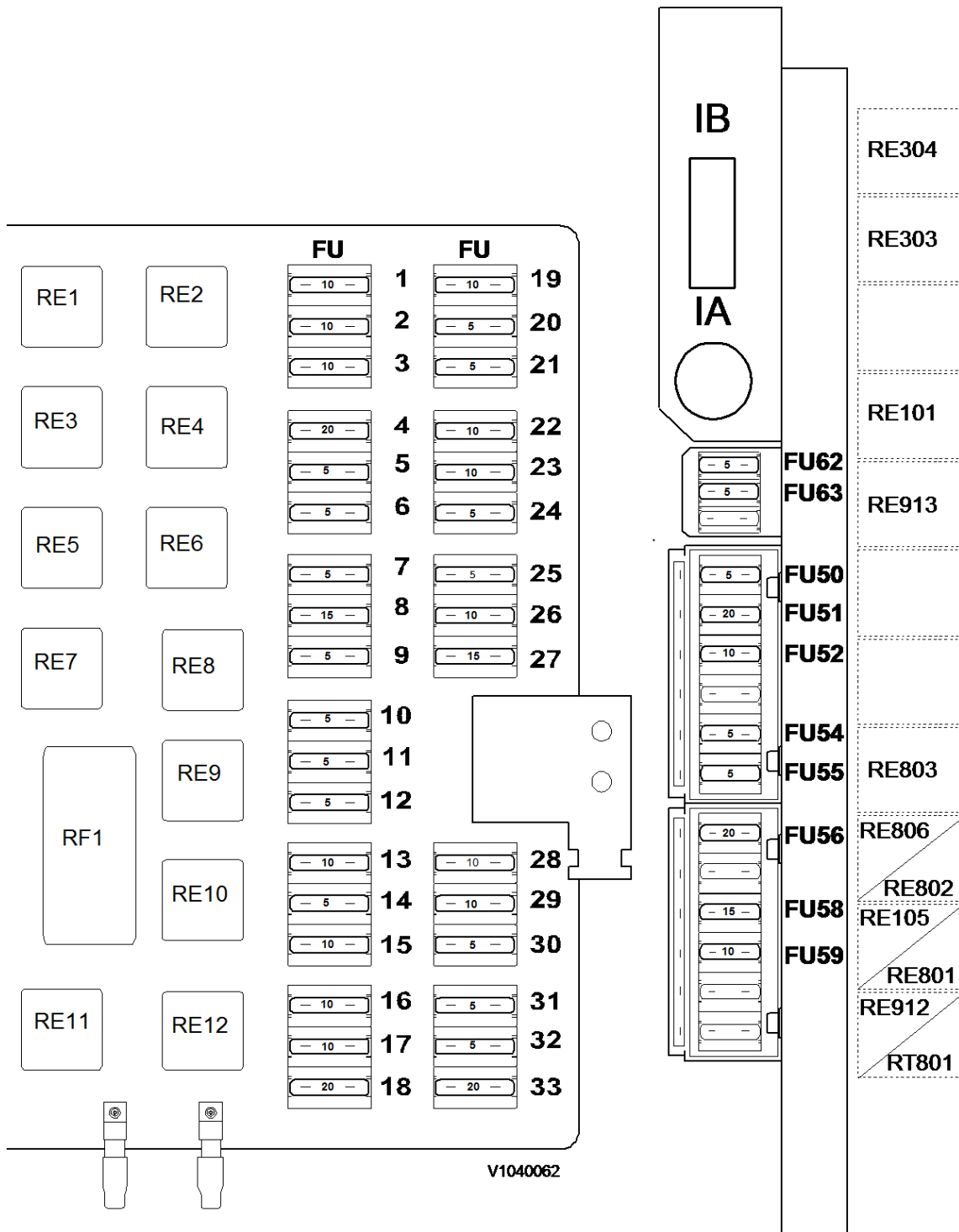


Figure 5
Component position: Fuses in electrical distribution box

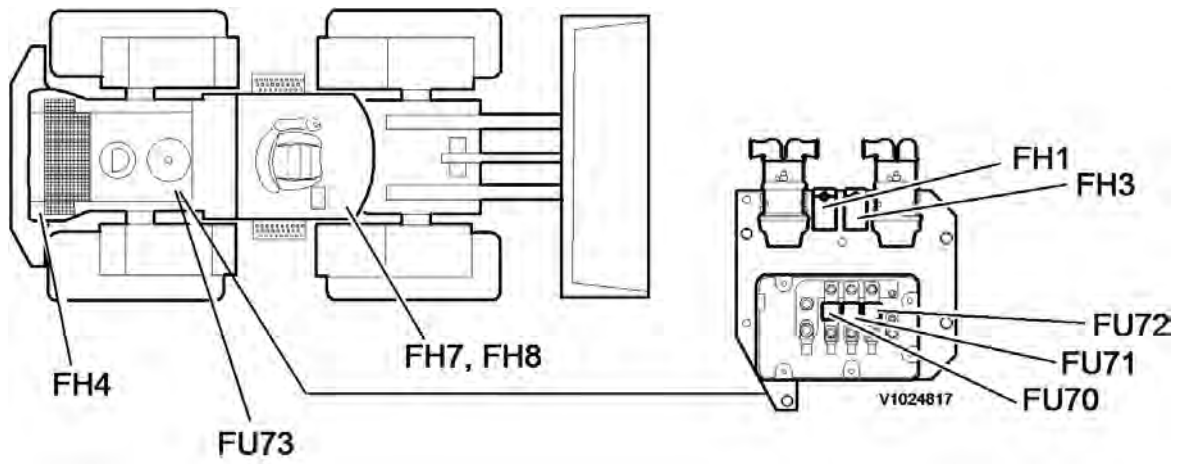


Figure 6
Component position: Fuses outside electrical distribution box

Document Title: Component list 4: Heating coils, instruments, service connections	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list 4: Heating coils, instruments, service connections

Component	Designation	Wiring diagram	Circuit no.	Function
Heating element	HE801	20	8.190	Cigarette lighter
	HE802	20	8.170	Heat operator's seat[T1] ⓘ
	HE803	34	8.140	Electrically heated rear-view mirror ^(a)
	HE804	34	8.140	Electrically heated rear-view mirror ^(a)
	HE2301	4	2.460	Electrically heated fuel filter ^(a)
	HE2501	31	2.370	Preheating
Instruments	IM1	24	—	Information display unit
	IM2	24	—	Gauge, coolant temperature
	IM3	24	—	Gauge, fuel level
	IM4	24	—	Gauge, transmission oil temperature
	IM201	1	—	Hour recorder
Service socket	IA	24	—	Service display unit
	IB	24	—	VCADS Pro

[T1]Optional equipment.

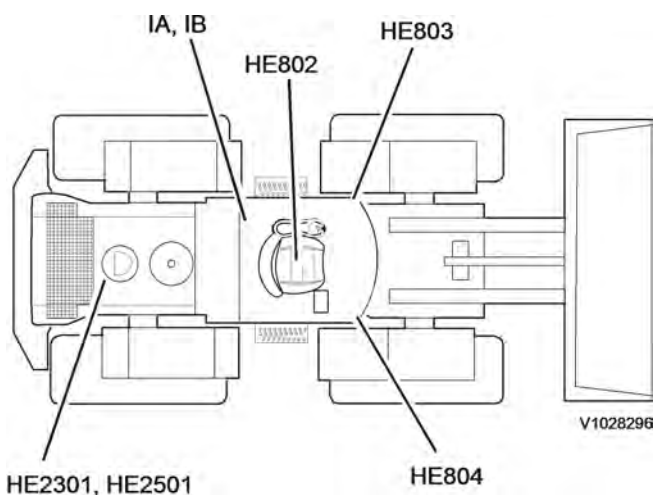


Figure 1
Heating coil, service connection

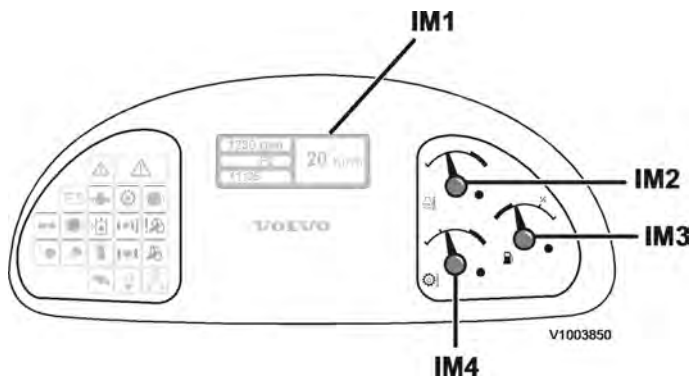


Figure 2
Instruments

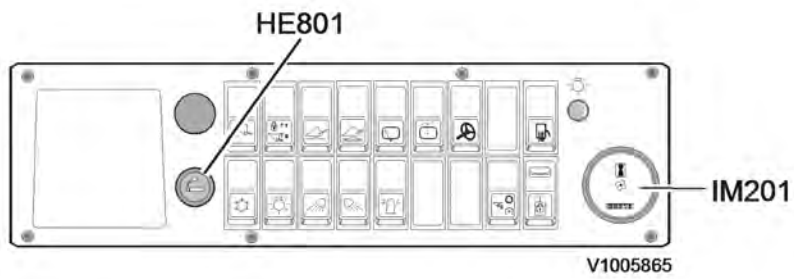


Figure 3
Instruments

Document Title: Component list 5: Lights	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list 5: Lights

Designation	Wiring diagram	Circuit no.	Function
LA1 - 5	8	3.250	Instrument lighting
LA301	6	3.010	Left, front parking light
LA302	6	3.020	Left front side light
LA303	6	3.030	Right rear parking light
LA304	6	3.040	Front right parking light
LA305	6	3.050	Right front side light
LA306	6	3.060	Rear left parking light
LA307	6	3.070	Licence plate light[T1] ⓘ
LA308	6	3.080	Guide lights switches, side panel
LA309	6	3.080	Guide lights switches, front panel
LA310	6	3.090	Low beam left
LA311	6	3.100	Low beam right
LA312	6	3.110	High beam left
LA313	6	3.120	High beam, right
LA314	7	3.140	Interior lighting
LA315	7	3.150	Work light cab, front left
LA315A	103	3.165	Optional work light cab, left front ^(a)
LA315B	103	3.165	Optional work lights cab, left front ^(a)
LA316	7	3.160	Work light cab, front right
LA316A	103	3.165	Optional work light cab, right front ^(a)
LA316B	103	3.165	Optional work lights cab, right front ^(a)
LA317	7	3.170	Work light left front fender ^(a)
LA318	7	3.180	Work light attachment ^(a)
LA319	7	3.190	Work light right front fender ^(a)
LA320	7	3.200	Work light left radiator casing ^(a)
LA320	101	3.200	Automatic back-up light ^(a)
LA321	7	3.210	Work light right radiator casing ^(a)
LA321	101	3.200	Automatic back-up light ^(a)
LA322	7	3.230	Work light cab, left rear ^(a)
LA323	7	3.240	Work light cab, right rear ^(a)
LA325	8	3.260	Rotating beacon ^(a)
LA326	8	3.270	Brake light left
LA327	8	3.280	Brake light right

LA328	8	3.300	Direction indicator, front left
LA329	8	3.310	Direction indicator, rear left
LA330	8	3.320	Direction indicator, front right
LA331	8	3.330	Direction indicator, rear right
LA339	101	3.265	Automatic flashing light (hazard light) ^(a)

[T1]Optional equipment

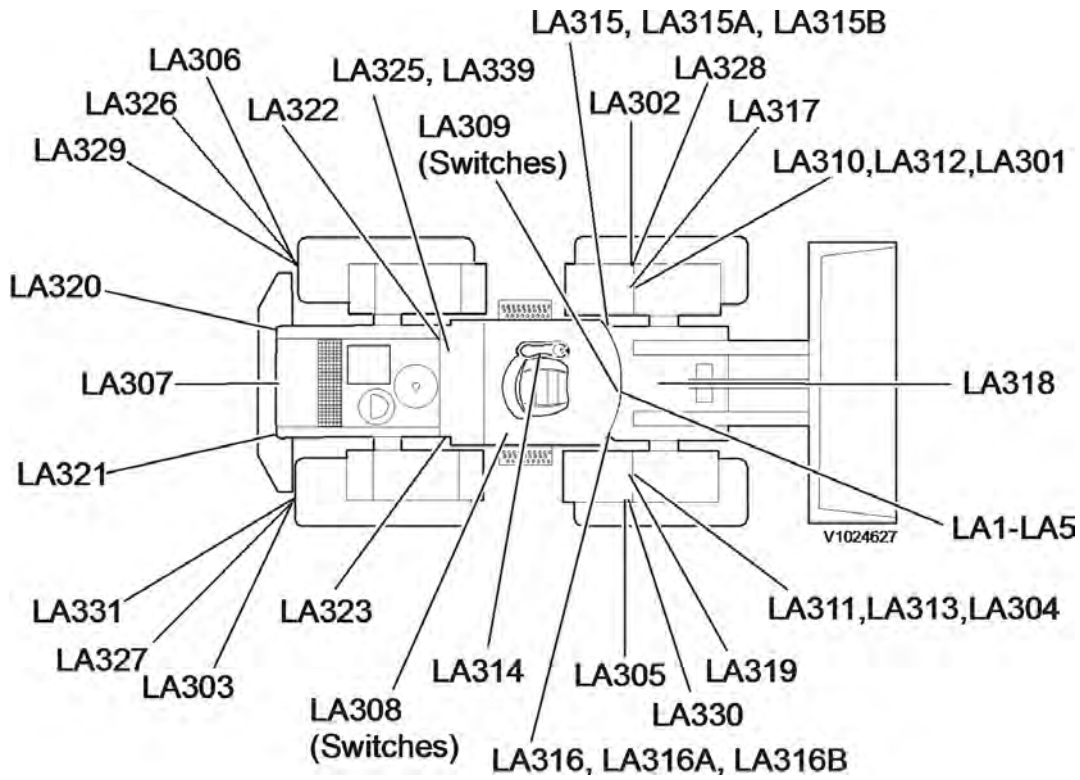


Figure 1
Component position: Lights

Document Title: Component list 6: Control lights/warning lights	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list 6: Control lights/warning lights

Designation	Wiring diagram	Circuit no.	Function
LC1	24	—	Amber central warning lamp
LC2	24	—	Red central warning
LC3	1	—	Charging
LC4	24	—	Low engine oil pressure
LC5	24	—	Low transmission oil pressure
LC6	24	—	Low brake pressure
LC7	7, 103	3.220	Working lights
LC7	101	3.220	Automatic back-up light[T1] ⓘ
LC8	24	—	Applied parking brake
LC9	24	—	Low hydraulic oil level
LC10	24	—	High axle oil temperature, front and rear axle
LC11	24	—	Malfunction in primary steering system
LC12	6	3.130	High beams
LC13	8	3.290	Direction indicators
LC14	8	3.260	Rotating beacon ^(a)
LC14	101	3.265	Automatic flashing light (hazard light) ^(a)
LC15	3	2.020	Preheating
LC16	16	6.010	Secondary steering engaged ^(a)
LC17	24	—	Differential lock engaged
LC18	24	—	Boom Suspension System activated ^(a)
LC19	24	—	Comfort Drive Control (CDC) activated ^(a)
LC20	24	—	Warning light, high coolant temperature
LC21	24	—	Warning light low fuel level
LC22	24	—	Warning light, high transmission oil temperature

[T1]Optional equipment

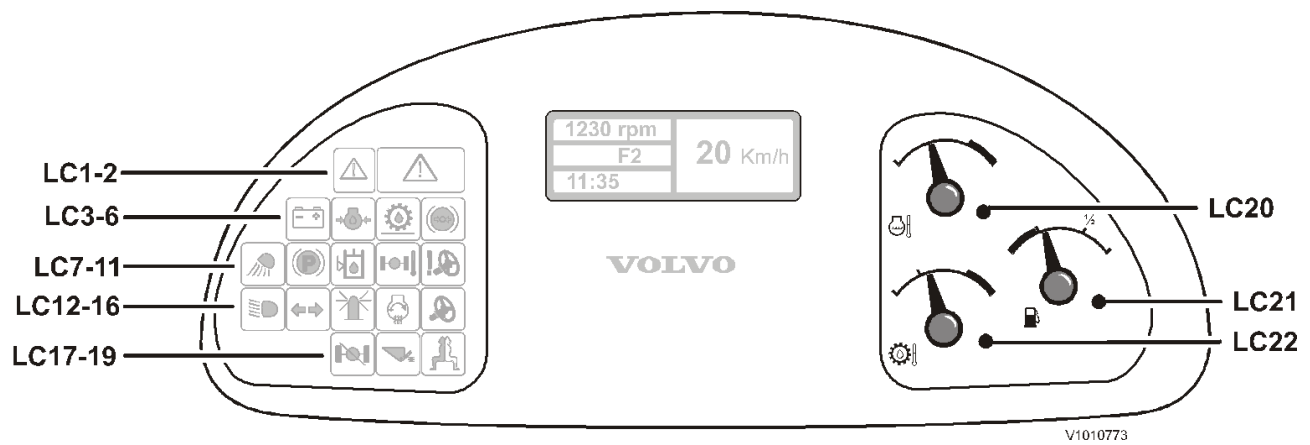


Figure 1
Component position: Control lights/warning lights

Document Title: Component list 7: Solenoid valves	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list 7: Solenoid valves

Designation	Wiring diagram	Circuit no.	Type	Function
MA202	5	2.130	Proportional valve	LS-pressure (Cooling fan / brake pump P3)
MA204	5	2.180	Hydraulic valve	Reversal cooling fan[T1] ⓘ
MA204	100	—	Hydraulic valve	Reversal cooling fan ^(a) (Relay-controlled)
MA205	5	2.180	Hydraulic valve	Reversal cooling fan ^(a)
MA205	100	—	Hydraulic valve	Reversal cooling fan ^(a) (Relay-controlled)
MA407	12	4.220	Hydraulic valve	Differential lock
MA501	15B	5.045	Hydraulic valve	Parking brake
MA502	15B	5.050	Hydraulic valve	Brake pressure charging
MA601	17	6.020	Proportional valve	Comfort Drive Control (CDC) ^(a)
MA801	19, 33	8.090, 8.100	Magnet clutch	Compressor air conditioning ^(a)
MA802	33	8.100	Magnet clutch	Water valve ^(a)
MA901	21, 21B, 21C	9.010	Hold solenoid	Bucket kickout
MA902	21, 21B, 21C	9.020	Hold solenoid	Boom kickout
MA904	21, 21B, 21C	9.050	Hold solenoid	Float position
MA904	35	—	Hold solenoid	Automatic lift arm lowering ^(a) float position
MA905	21	9.040	Hydraulic valve	Attachment locking ^(a)
MA908	23	9.090	Hydraulic valve	Boom suspension system, single-acting lift ^(a)
MA910	23	9.100	Hydraulic valve	Boom Suspension System ^(a)
MA911	23	9.100	Hydraulic valve	Boom Suspension System ^(a)
MA912	21B	9.060	Hydraulic valve	Electric lever lock ^(a) Machine with 4th hydraulic function
MA913	21	9.030	Hydraulic valve	Attachment change (increased pressure) ^(a)
MA916	21C	9.065	Hydraulic valve	Single lever (joystick), lever lock-out ^(a)
MA946	21	9.040	Hydraulic valve	Attachment locking ^(a)
MA947	21	9.040	Hydraulic valve	Attachment locking ^(a)
MA959	35	—	PWM valve	Automatic lift arm lowering ^(a)
MA2301	30	2.350	Unit pump	Injection
MA2302	30	2.350	Unit pump	Injection
MA2303	30	2.350	Unit pump	Injection
MA2304	30	2.350	Unit pump	Injection

MA2305	30	2.350	Unit pump	Injection
MA2306	30	2.350	Unit pump	Injection
MA2306	30	2.350	Unit pump	Injection
MA2504	31	2.470	Solenoid valve	EGR

[T1]Optional equipment

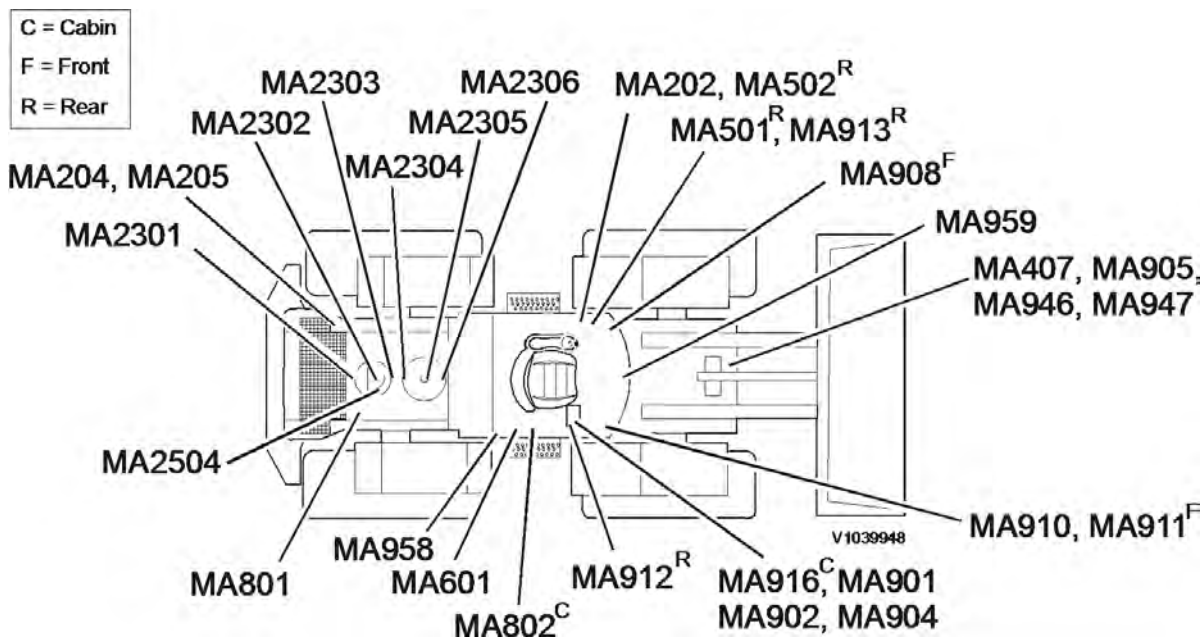


Figure 1
Component position: Solenoid valves

Document Title: Component list: Motors, resistors, monitoring system	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list: Motors, resistors, monitoring system

Component	Designation	Wiring diagram	Circuit no.	Function
Motors	MO201	1	—	Starter motor
	MO201	3	2.010	Starter motor
	MO601	16	6.010	Pump motor secondary steering[T1] ⓘ
	MO801	18	8.010	Wiper motor front ^(a)
	MO802	18	8.025	Washer pump front with level monitor ^(a)
	MO803	18	8.040	Wiper motor rear ^(a)
	MO804	18	8.050	Washer pump rear ^(a)
	MO805	19, 33	8.080	Cab fan
	MO810	20	8.180	Air-suspended operator's seat ^(a)
Resistors	R1	1	—	Pre-magnetization alternator[T2] ⓘ
	R2	9, 9B	4.030	Load resistor ^(b)
	R3	15B	5.020	Load resistor ^(b)
	R4	15B	5.045	Load resistor ^(b)
	R5	16	6.010	Load resistor ^(b)
	R6	15B	5.050	Load resistor ^(b)
	R11	1	—	Load resistor ^(b)
	R205	27	2.220	Hand throttle ^(a) [T3] ⓘ
	R301	8, 24	3.250	Rheostat instrument lighting ^(c) (for instrument panel and service display unit)
	R702	24	—	Terminating resistor (Located between P1.1 and P1.15 on I-ECU)
Monitoring system	RC8401	34	8.130	Monitor, camera ^(a)

[T1]Optional equipment

[T2]Located on circuit board

[T3]See figure of switches.

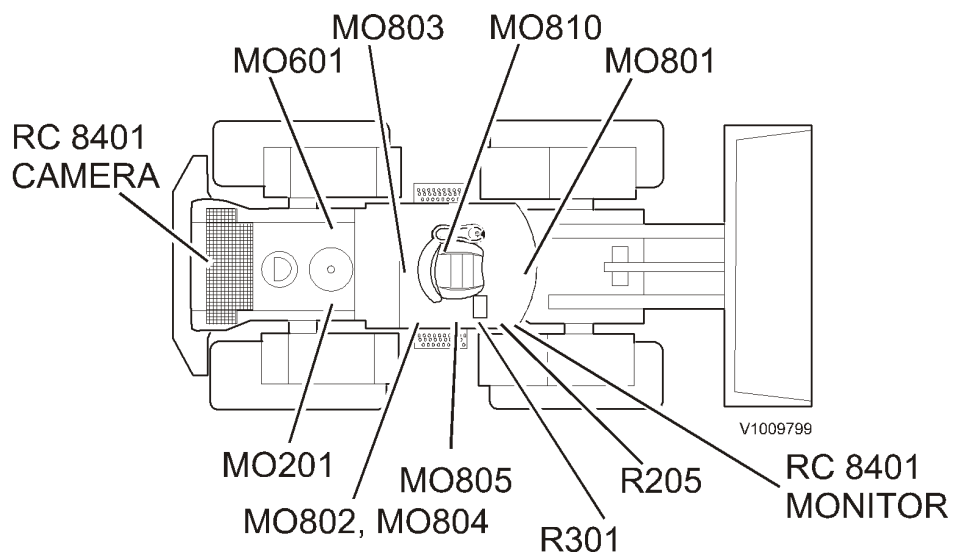


Figure 1
Component position: Motors, monitoring system

Document Title: Component list 9: Relays	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list 9: Relays

Designation	Wiring diagram	Circuit no.	Function
RE1	21, 21B, 21C	9.010	Bucket kickout
RE2	1	—	15A feed
RE3	21, 21B, 21C	9.020	Boom kickout
RE4	1	—	15B feed
RE5	18	8.040	Interval wiper rear[T1] ⓘ
RE6	18	8.010	Interval wiper front
RE7	23	9.100	Boom Suspension System ^(a)
RE8	3	2.010	Voltage to start interlock
RE9	3	2.010	Start interlock
RE10	7	3.170	Work lights, optional ^(a)
RE11	2, 102	—	30 feed controlled by I-ECU
RE12	1	—	15EA feed
RE101	4	4.260	Electrically heated fuel filter ^(a)
RE101	26	—	Central lubrication system ^(a)
RE101	33	8.100	Automatic temperature control ^(a)
RE104	102	—	Electrically controlled battery disconnect switch ^(a)
RE105	102	—	Voltage feed E-ECU ^(a)
RE202	3	2.010	Deactivation of starter inhibitor
RE303	101	3.340	Automatic back-up light ^(a)
RE304	103	3.165	Optional work light ^(a)
RE601	16	6.010	Secondary steering pump ^(a)
RE602	17	4.110	Activation lever steering CDC ^(a) [T2] ⓘ
RE801	19	8.090	Air conditioning (AC) ^(a)
RE801	33	8.100	Air conditioning (ATC) ^(a)
RE802	19	8.090	Air conditioning (AC) ^(a)
RE802	33	8.100	Air conditioning (ATC) ^(a)
RE803	20	8.180	Air-suspended operator's seat ^(a)
RE806	19	8.090	Air conditioning (AC) ^(a)
RE806	33	8.100	Air conditioning (ATC) ^(a)
RE912	35	—	Automatic lift arm lowering ^(a)
RE913	35	—	Automatic lift arm lowering ^(a) and float position
RE2501	31	2.370	Preheating
RF1	8	3.290–3.295	Flasher relay

RT801	19	8.090	Time relay air conditioning (AC) ^(a)
RT801	33	8.100	Time relay air conditioning (ATC) ^(a)
RT803	100	—	Time relay reversal cooling fan ^(a)
RT804	100	—	Time relay reversal cooling fan ^(a)
RT805	100	—	Time relay reversal cooling fan ^(a)
RT806	100	—	Time relay reversal cooling fan ^(a)

[T1]Optional equipment

[T2]RE602 is located in armrest for lever steering (CDC)

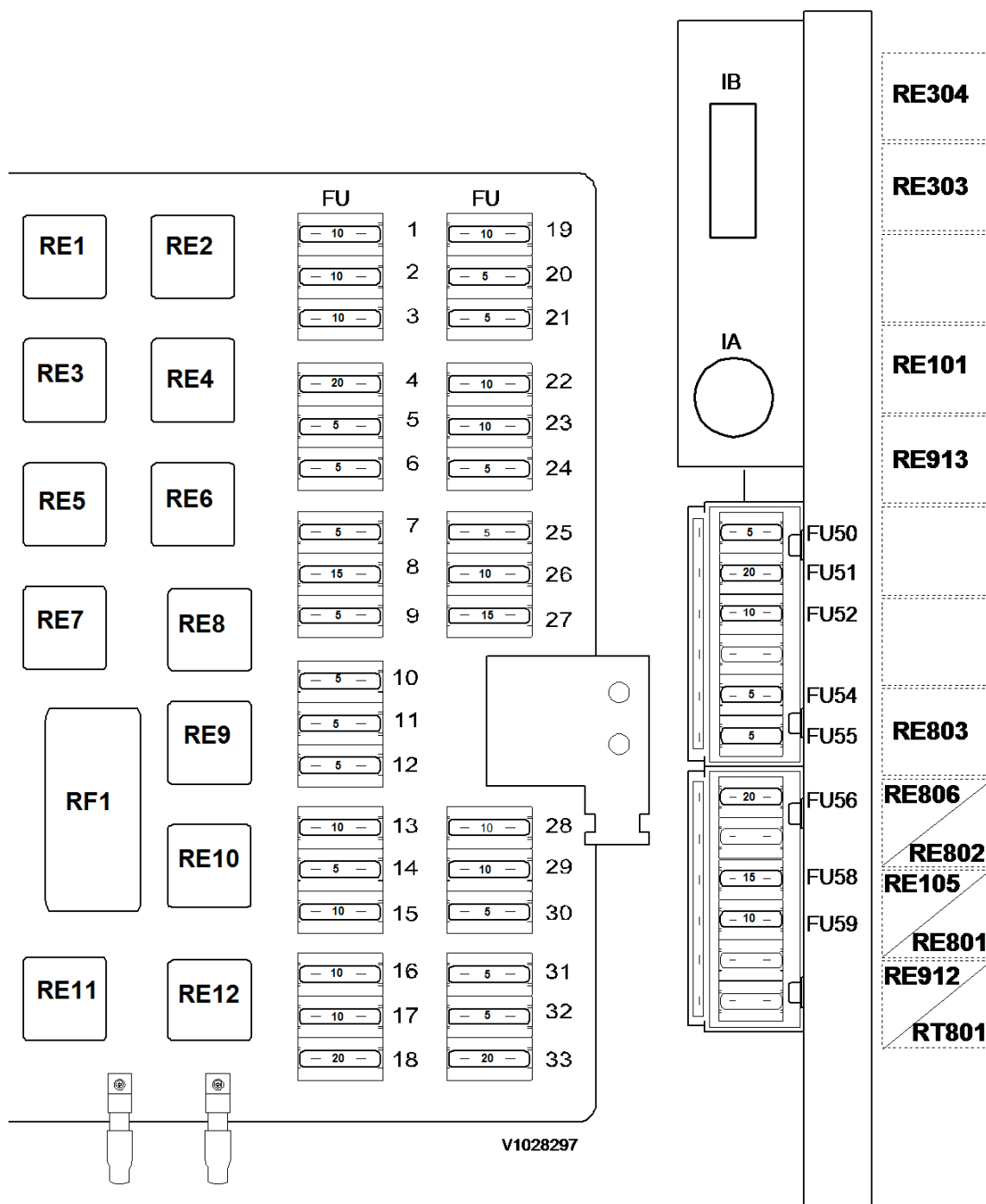


Figure 1
Component position: Relays in electrical distribution box

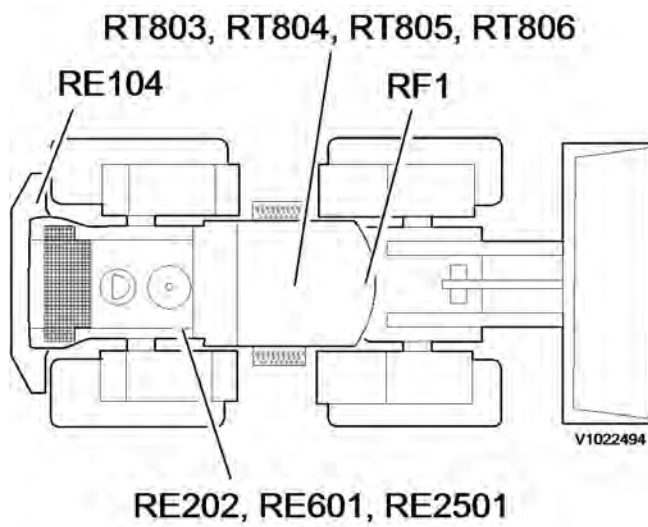


Figure 2
Component position: Relays outside electrical distribution box

Document Title: Component list 10: Signals, shift solenoids	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list 10: Signals, shift solenoids

Component	Designation	Wiring diagram	Circuit no.	Function
Signals	SA801	18	8.030	Horn
	SA802	20	8.210	Central warning
	SA803	20	8.200	Back-up alarm
Gearshifting solenoids	SA	11	4.150	Shift solenoid, Forward
	SB	11	4.160	Shift solenoid, 1st gear
	SC	11	4.160	Shift solenoid, 2nd gear
	SD	11	4.150	Shift solenoid, Reverse
	SE	11	4.160	Shift solenoid, 4th gear
	SF	11	4.160	Shift solenoid, 3rd gear

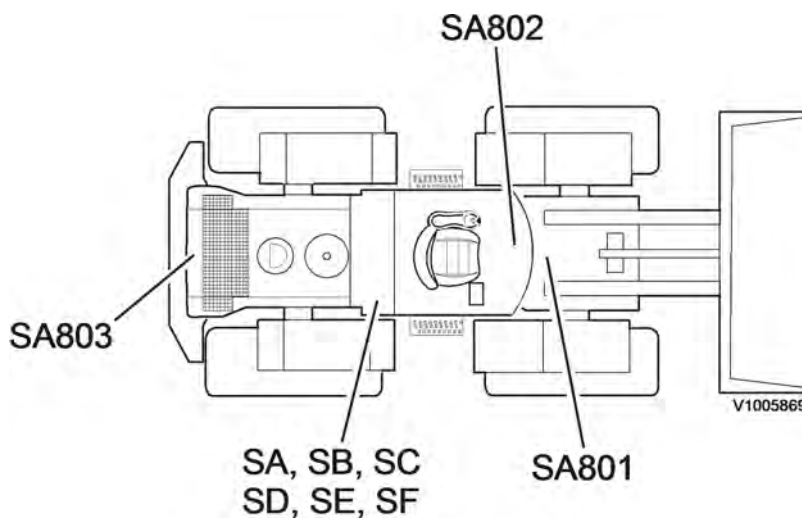


Figure 1
Component position: Signals, shift solenoids

Document Title: Component list 11: Sensors	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list 11: Sensors

Designation	Wiring diagram	Circuit no.	Sensor type	Function
SE201	4	2.040	Frequency	Engine rpm for vehicle control unit V-ECU
SE207	4	2.100	Level	Fuel level
SE210	5	2.130	Temperature	Coolant temperature, outlet radiator
SE211	5	2.130	Frequency	Fan speed
SE213	5	2.150	Level	Engine oil level
SE214	27	2.210	Position	Throttle pedal
SE301	8	3.270–3.280	Pressure	Brake lights
SE302	7	3.140	Mechanical	Interior lighting
SE401	10	4.120	Pressure	Filter indicator transmission
SE402	10	4.130	Frequency	Turbine speed
SE403	10	4.140	Frequency	Output rpm transmission (for travel speed)
SE405	12	4.180	Pressure	Transmission oil pressure
SE406	12	4.190	Temperature	Transmission oil temperature
SE408	12	4.220	Mechanical	Differential lock
SE410	13	4.230	Temperature	Axle oil temperature, front axle
SE411	13	4.240	Temperature	Axle oil temperature, rear axle
SE413	13	4.310	Level	Transmission oil level
SE501	15B	5.010	Pressure	Output brake pressure/Transmission disengagement
SE502	15B	5.020	Pressure	Low brake pressure
SE503	15B	5.045	Pressure	Parking brake
SE504	15B	5.050	Pressure	Brake pressure charging
SE601	16	6.010	Mechanical	Secondary steering differential pressure[T1] ⓘ
SE602	16	6.010	Pressure	Secondary steering, steering pressure ^(a)
SE603	17	6.020	Mechanical	Joystick Comfort Drive Control (CDC) ^(a)
SE606	16	6.010	Pressure	Automatic test of secondary steering
SE804	19	8.090	Pressure	Air conditioning (AC), pressure monitor ^(a)
SE804	33	8.100	Pressure	Air conditioning (ATC) ^(a)
SE805	26	—	Pressure	Central lubrication ^(a)
SE807	20	8.250	Temperature	Ambient temperature
SE808	33	8.100	Temperature	Temperature evaporator ^(a)
SE809	33	8.100	Temperature	Temperature ambient air ^(a)

[T1]Optional equipment

Designation	Wiring diagram	Circuit no.	Sensor type	Function
SE810	33	8.100	Temperature	Temperature after heating coil[T1] ⓘ
SE811	33	8.100	Temperature	Temperature cab ^(a)
SE901	21, 21B, 21C	9.010	Inductive	Bucket kickout
SE902	21, 21B, 21C	9.020	Inductive	Boom kickout
SE906	23	9.120	Temp./Level	Hydraulic oil tank, temperature and level
SE922	35	—	Inductive	lift arm position ^(a)
SE932	35	—	Mechanical	Hold position for automatic lift arm lowering ^(a)
SE2202	29	2.310	Temperature	Engine oil temperature
SE2202	29	2.310	Temperature	Engine oil temperature (D12D)
SE2203	29	2.310	Pressure	Engine oil pressure
SE2205	28	2.150	Level	Engine oil level (D12D)
SE2301	29	2.330	Pressure	Fuel pressure
SE2302	28	2.490	Level	Water in fuel (D12D)
SE2306	29	2.330	Temperature	Fuel temperature (not used)
SE2501	28	2.260	Temperature	Temperature induction air
SE2502	28	2.260	Pressure monitor	Air filter monitor
SE2507	29	2.290	Temperature	Charge-air temperature
SE2508	29	2.290	Pressure	Boost pressure
SE2509	29	2.480	Pressure	Crankcase pressure (D12D)
SE2603	28	2.250	Level	Coolant level
SE2606	29	2.280	Temperature	Coolant temperature
SE2701	28	2.230	Frequency	Engine speed/flywheel position for E-ECU
SE2703	28	2.240	Frequency	Camshaft speed/position for E-ECU

[T1]Optional equipment

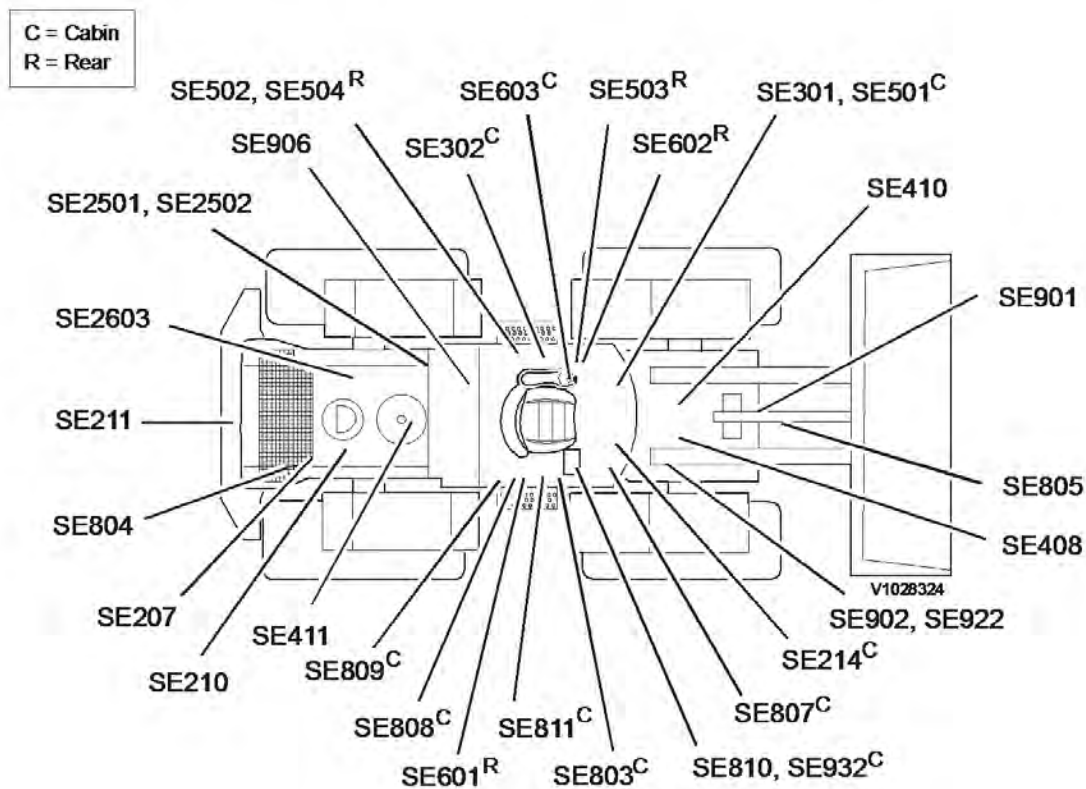


Figure 1
Component position: Sensors

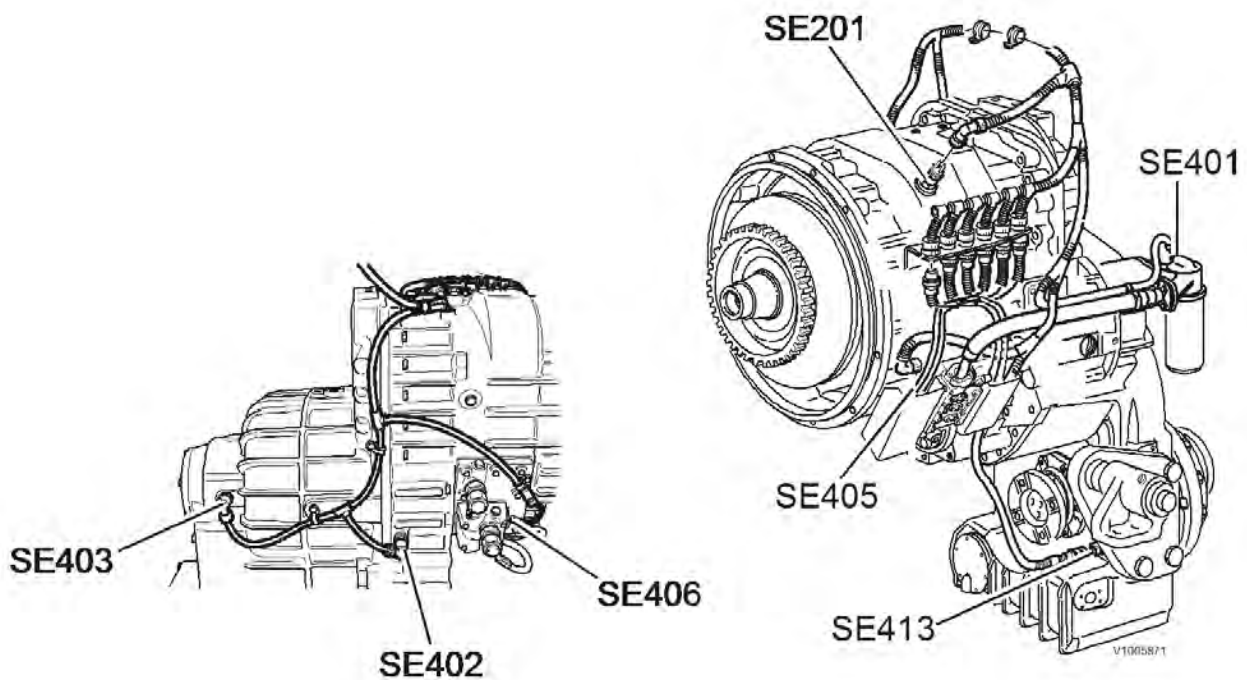


Figure 2
Component position: Sensors on transmission

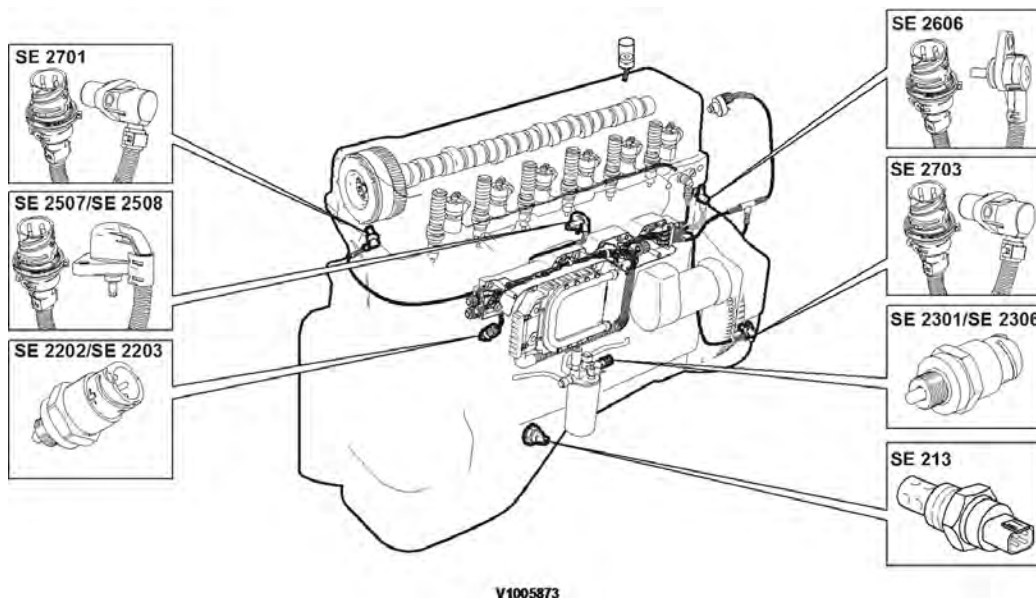


Figure 3
Component position: Sensors on engine D12C

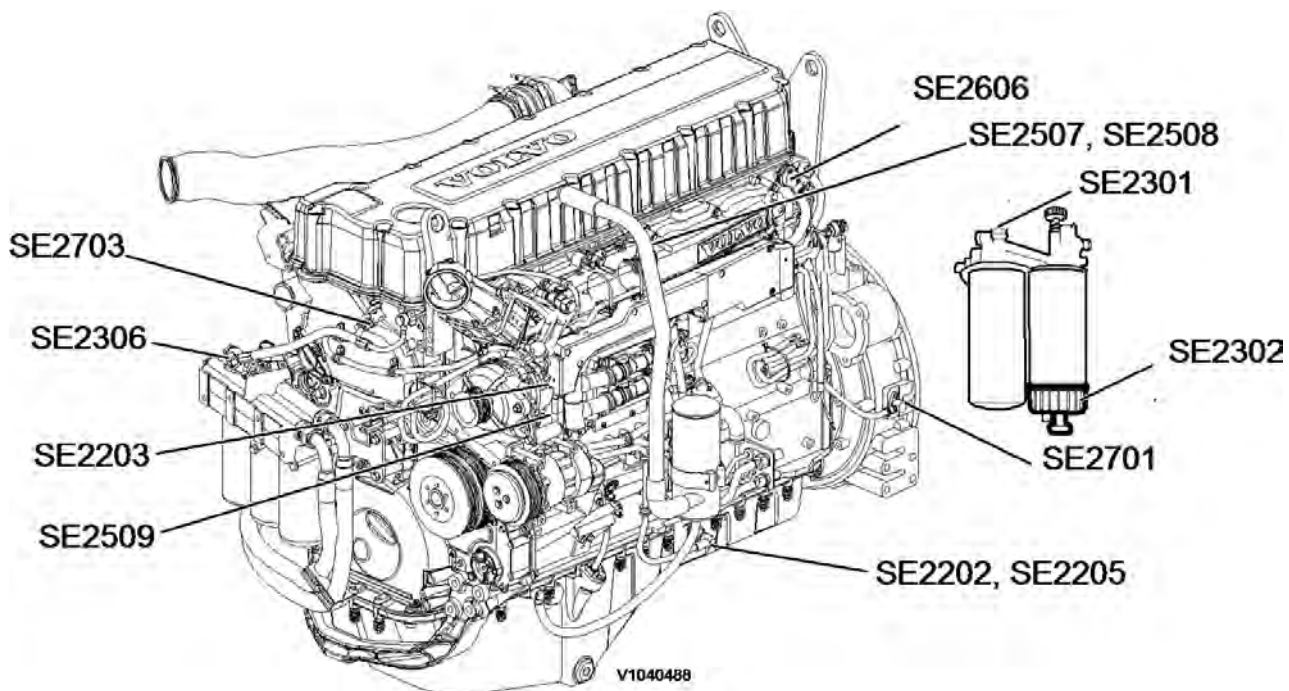


Figure 4
Component position: Sensors on engine D12D

Document Title: Component list 12: Switches	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list 12: Switches

Designation	Wiring diagram	Circuit no.	Function
SW100	1, 102	—	Battery disconnect switch
SW101	1, 102	—	Ignition
SW101	3	2.010	Ignition
SW101	19, 33	8.090, 8.100	Ignition
SW102	102	—	Emergency stop, electrically controlled battery disconnect switch[T1] ⓘ
SW201	3	2.020	Preheating
SW301	6	3.010–3.130	Parking lights and headlights
SW302	6	3.090–3.130	High and low beams, function selector
SW303	7	3.150–3.190	Work lights cab front and front fender ^(a)
SW303	103	3.165	Work lights cab front and front fender ^(a)
SW304	7	3.200–3.240	Work lights cab rear and radiator casing ^(a)
SW304	101	3.200	Work lights cab rear and radiator casing ^(a)
SW305	8	3.260	Rotating beacon ^(a)
SW306	8	3.285–3.330	Hazard flashers
SW307	8	3.300–3.330	Direction indicators right and left
SW401B	9, 9B	4.010–4.020	Gear selector, steering column
SW401C	9, 9B	4.010–4.020	Kick-down, steering column
SW402	9, 9B	4.030	Forward/Reverse, steering column
SW403	9, 9B	4.040	Activation Forward/Reverse lever carrier ^(a)
SW404	9	4.050	Forward/Reverse, lever console ^(a)
SW405	9, 9B	4.060	Kick-down, lever carrier
SW406	9, 9B	4.070	Engine retarder, lever carrier
SW407	17	4.080	Armrest Comfort Drive Control (CDC) ^(a)
SW408	17	4.090	Activation Comfort Drive Control (CDC) ^(a)
SW409	17	4.100	Forward/Reverse, Comfort Drive Control (CDC) ^(a)
SW410	17	4.110	Kick-down Comfort Drive Control (CDC) ^(a)
SW411	11	4.170	Transmission disengagement
SW412	12	4.210	Mode selector
SW414	12	4.220	Differential lock
SW416	9B	4.050	Forward/Reverse, lever console ^(a)

[T1]Optional equipment

Designation	Wiring diagram	Circuit no.	Function
SW417	11	4.260	Fully automatic (Replaces SW411)
SW501	15B	5.045	Parking brake
SW601	16	6.010	Secondary steering test [T1] ①
SW801A	18	8.010–8.025	Front wiper
SW801B	18	8.025	Front washer
SW801C	18	8.030	Horn
SW802	18	8.030	Horn
SW803	18	8.040	Wiper rear ^(a)
SW804	18	8.050	Washer rear ^(a)
SW805	19, 33	8.080	Cab fan
SW806	19, 33	8.090, 8.080	Air conditioning ^(a)
SW807	25	—	Keypad
SW808	26	—	Central lubrication system ^(a)
SW810	33	8.080	Air conditioning (ATC) ^(a)
SW811	34	8.140	Electrically heated rear-view mirrors ^(a)
SW901	21, 21B, 21C	9.010	Bucket kickout
SW902	21, 21B, 21C	9.020	Boom kickout
SW903	21, 21B, 21C	9.050	Hold solenoid float position
SW904	21	9.040	Attachment lock ^(a)
SW909	23	9.090	Boom suspension system, single-acting lift ^(a)
SW910	21	9.030	Attachment change (increased pressure) ^(a)
SW911	21B	9.060	Electric lever lock, machine with 4th hydraulic function ^(a)
SW920	21C	9.065	Hydraulics with single lever ^(a)
SW925	23	9.085	Boom Suspension System, activation and function selection ^(a)
SW933	35	—	Activation automatic lift arm lowering and float position (Replaces SW903)

[T1]Optional equipment

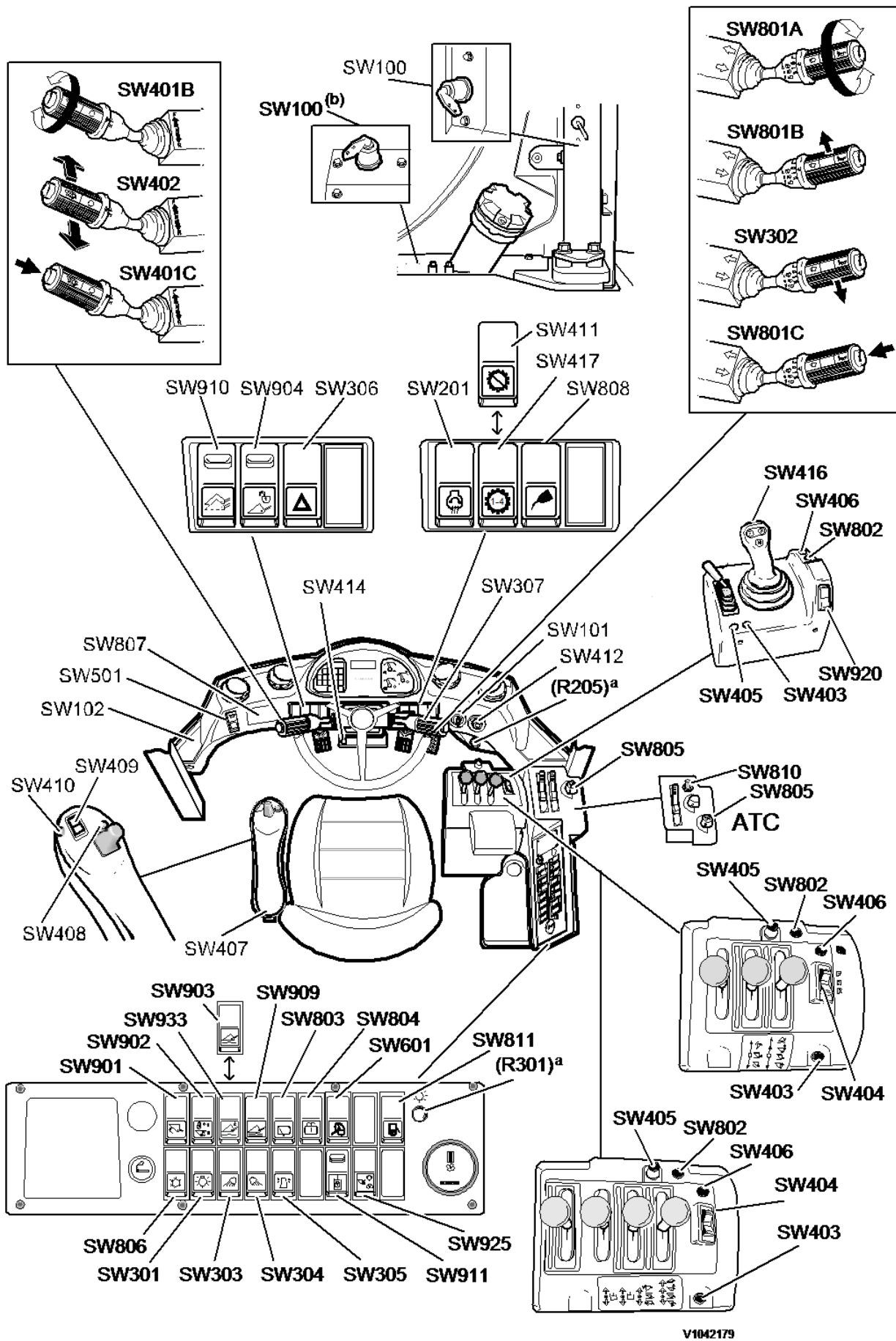


Figure 1

- a) See component list 8: Motors, resistors.
- b) New position from introduction of engine D12D.

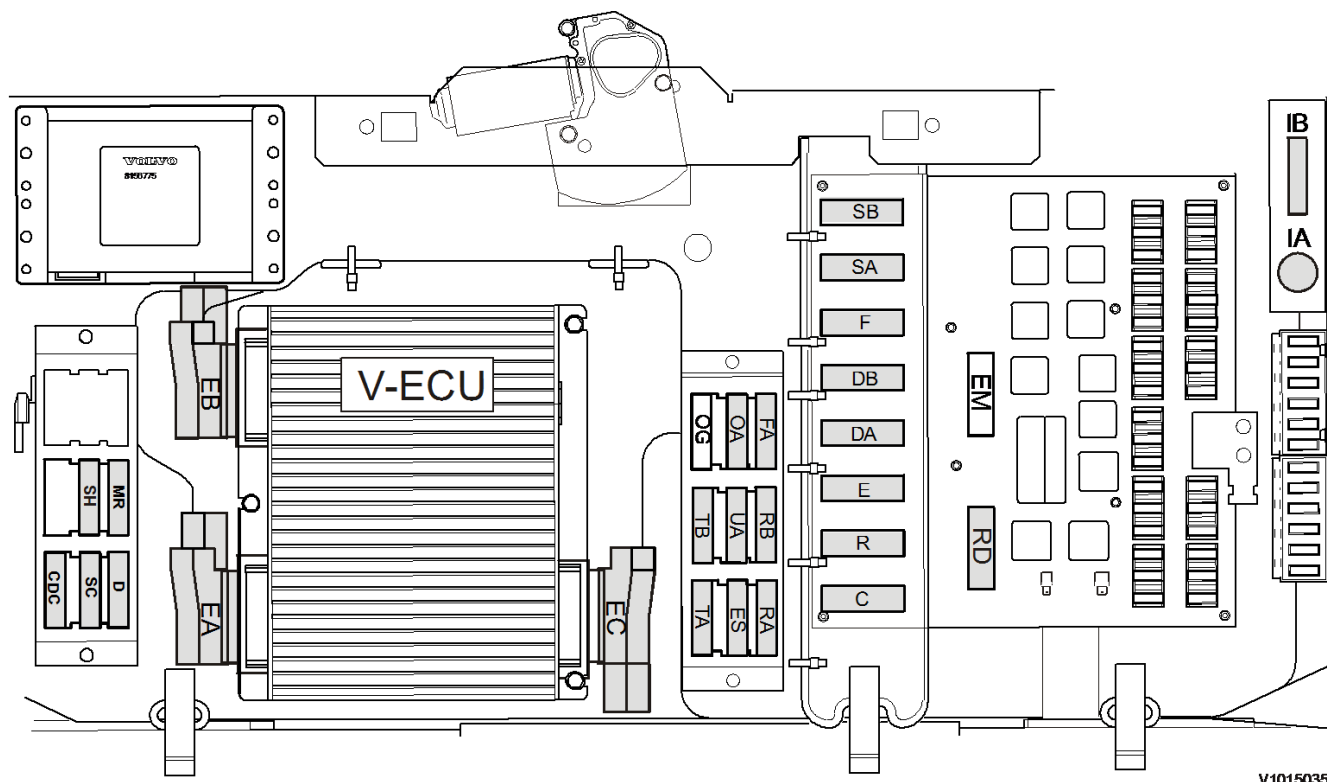
Document Title: Connectors, position	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Connectors, position

Connectors	Position	Serves
C	Electrical distribution box, circuit board	Electrical distribution box, AC
CDC	Electrical distribution box	CDC
CL	Electrical distribution box	Central lubrication
CR	Cab roof	Radio
D	Electrical distribution box	Front instrument panel
DA	Electrical distribution box, circuit board	Front instrument panel
DB	Electrical distribution box, circuit board	Front instrument panel
E	Electrical distribution box, circuit board	V-ECU, RE5, RE6, RE7
EA	E-ECU	E-ECU
EA	Electrical distribution box	V-ECU
EB	E-ECU	E-ECU
EB	Electrical distribution box	V-ECU
EC	Electrical distribution box	V-ECU
EM	Electrical distribution box	—
EL	Engine	E-ECU, MO201, SE2302
EMS	Engine	Engine and E-ECU
ES	Electrical distribution box	Engine
F	Electrical distribution box, circuit board	Front frame
FA	Electrical distribution box	Front frame
FC	Front frame	Hydraulics
FD	Front frame	Boom Suspension System (BSS)[T1] ⓘ
FF	Front frame	Work lights, attachment ^(a)
GA	Instrument panel	Gear selector
IA	Electrical distribution box	Socket for service display unit
IB	Electrical distribution box	Socket for VCADS Pro
MR	Electrical distribution box	Connection for frequency measurements
OA	Electrical distribution box	Secondary steering ^(a)
OB	Electrical distribution box	CDC ^(a)
OC	CDC	SW407 - SW410
OD	Electrical distribution box	MA601 ^(a)
OE	CDC	CU601 ^(a)
OG	Electrical distribution box	—
P1	Front instrument panel	I-ECU
P2	Front instrument panel	I-ECU
P3	Front instrument panel	I-ECU
R	Electrical distribution box, circuit board	Rear frame
RA	Electrical distribution box	MA801, RP ^(a)
RB	Electrical distribution box	Rear frame

RC	Rear frame	SE211 (D12D)
RD	Electrical distribution box	AC, ATC ^(a)
RP	Rear frame	Reversible cooling fan, MA204, MA205 ^(a)
RR	Rear frame	Constant ground to voltage converter CU801
RT	Engine	SE2501, SE2502, RE2501
RZ	Rear frame	LA320, LA321, SA803, SE211
SA	Electrical distribution box, circuit board	Right instrument panel
SB	Electrical distribution box, circuit board	Right instrument panel
SC	Electrical distribution box	Right instrument panel
SD	Right instrument panel	Front instrument panel
SE	Right instrument panel	Lever carrier
SF	Right instrument panel	Automatic lift and tilt, float mode
SG	Right instrument panel	Fan cab
SH	Electrical distribution box	I-ECU
SJ	Right instrument panel	Hold function
SR	Electrical distribution box and Right instrument panel	Automatic lift arm lowering, float position
ST	Right instrument panel	Cab roof
TA	Electrical distribution box	Transmission
TB	Electrical distribution box	Transmission
UA	Electrical distribution box	Under cab
WA	Front instrument panel	Direction indicators

[T1]Optional equipment



V1015035

Figure 1
Connectors, position in electrical distribution box.

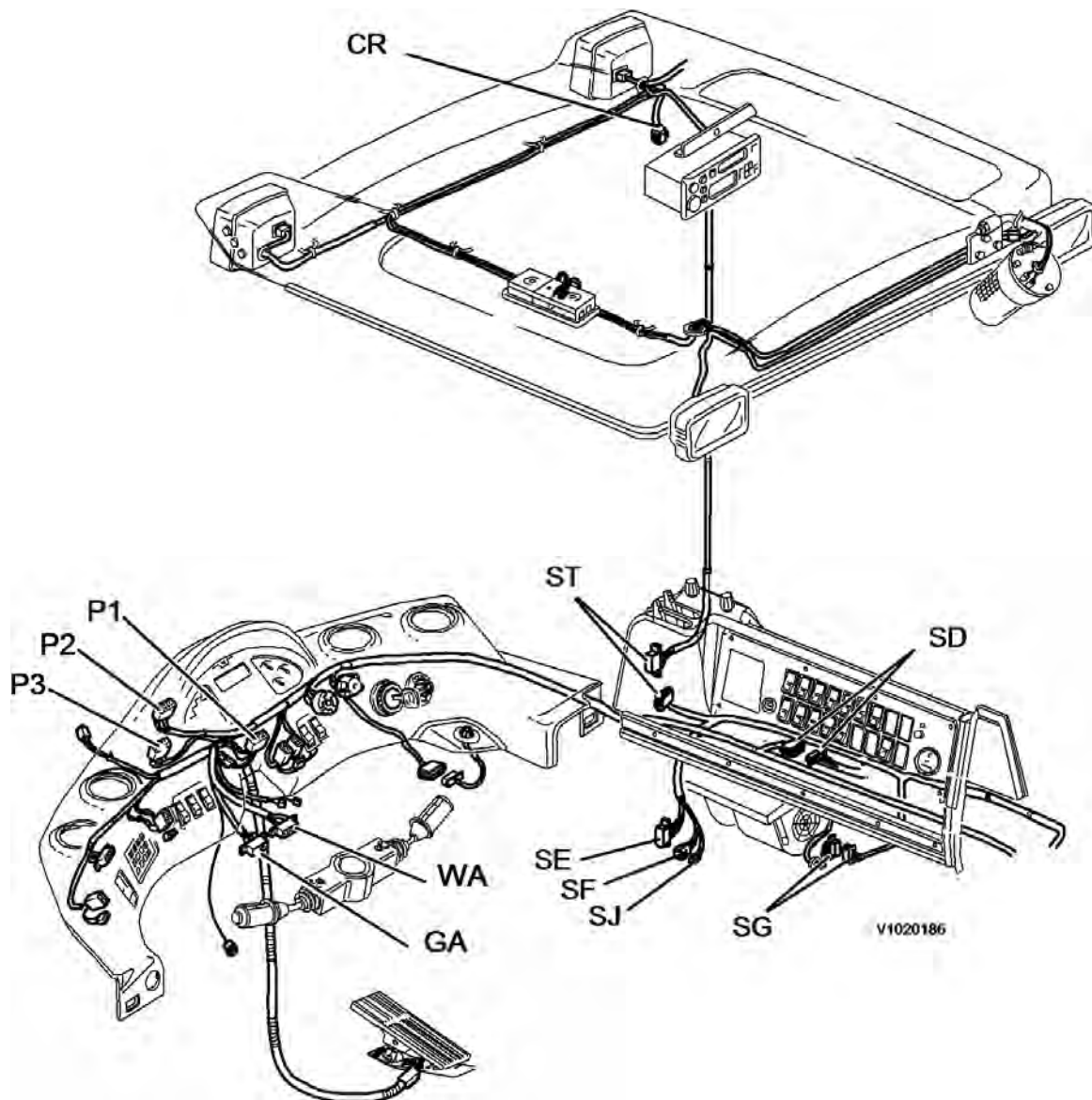


Figure 2
Connectors, position in cab.

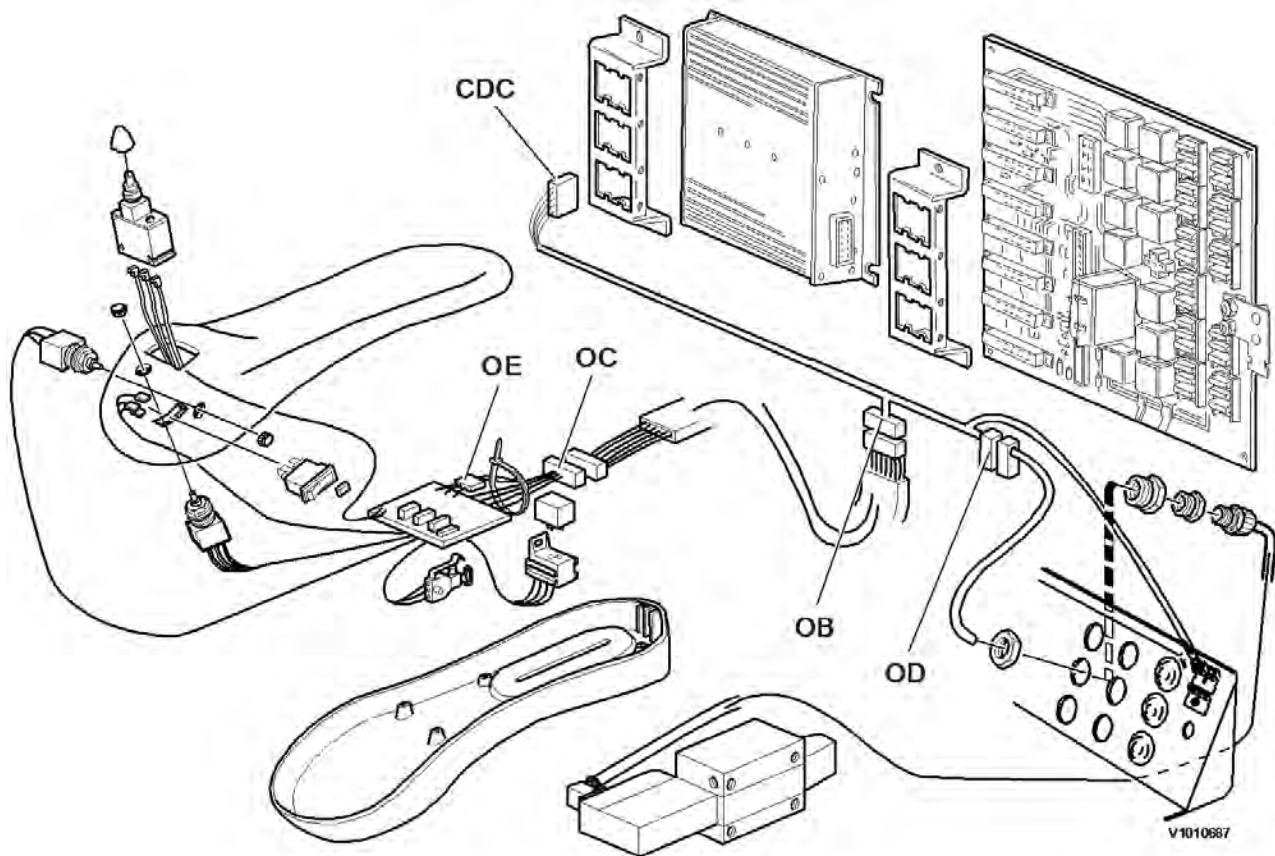


Figure 3
Connectors, CDC

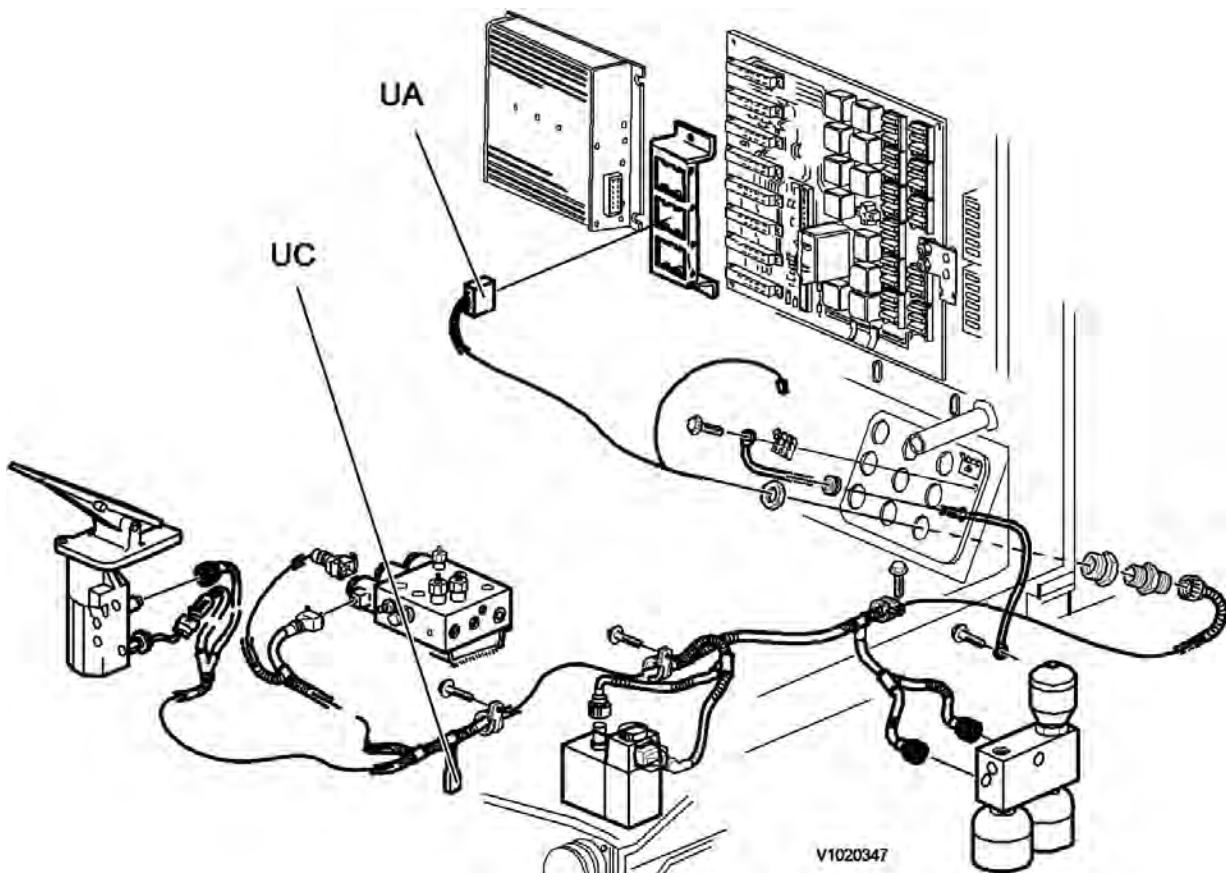


Figure 4
Connectors, position under cab.

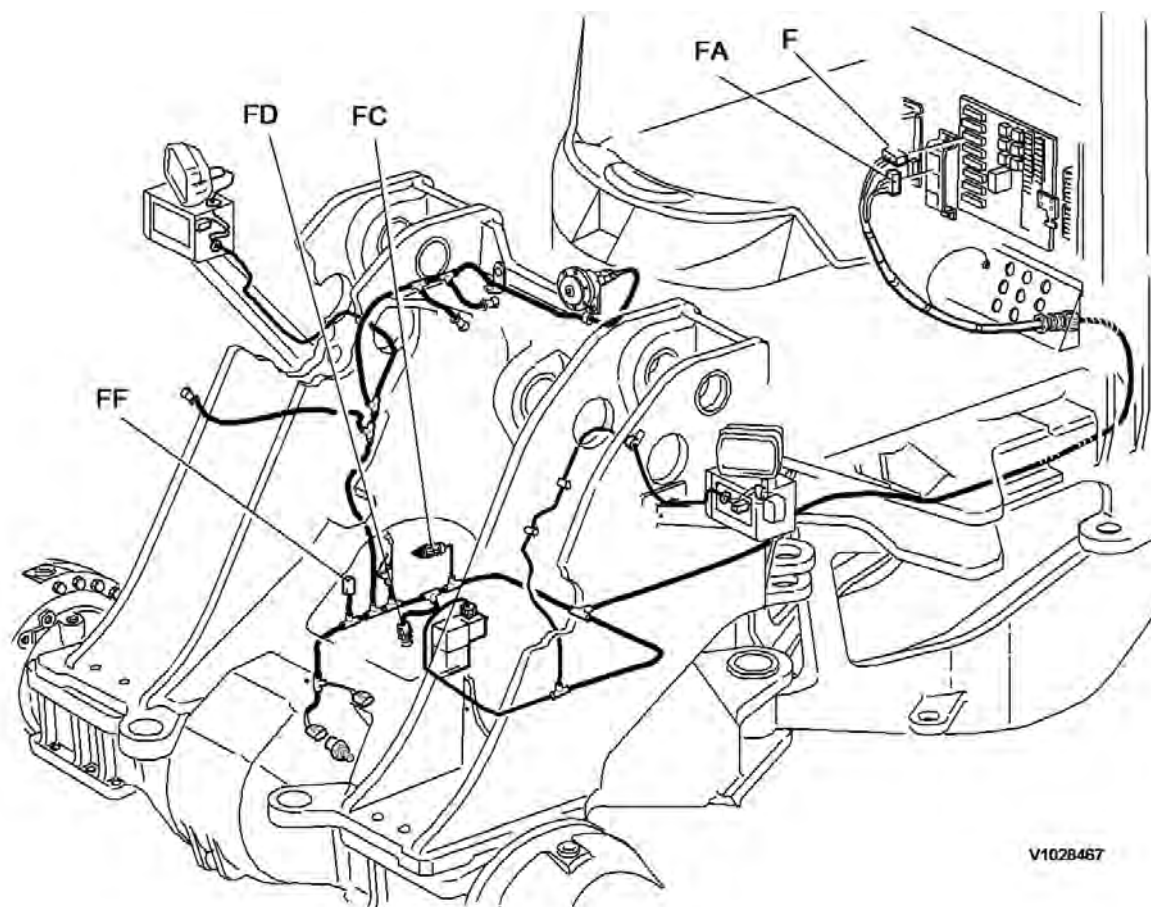
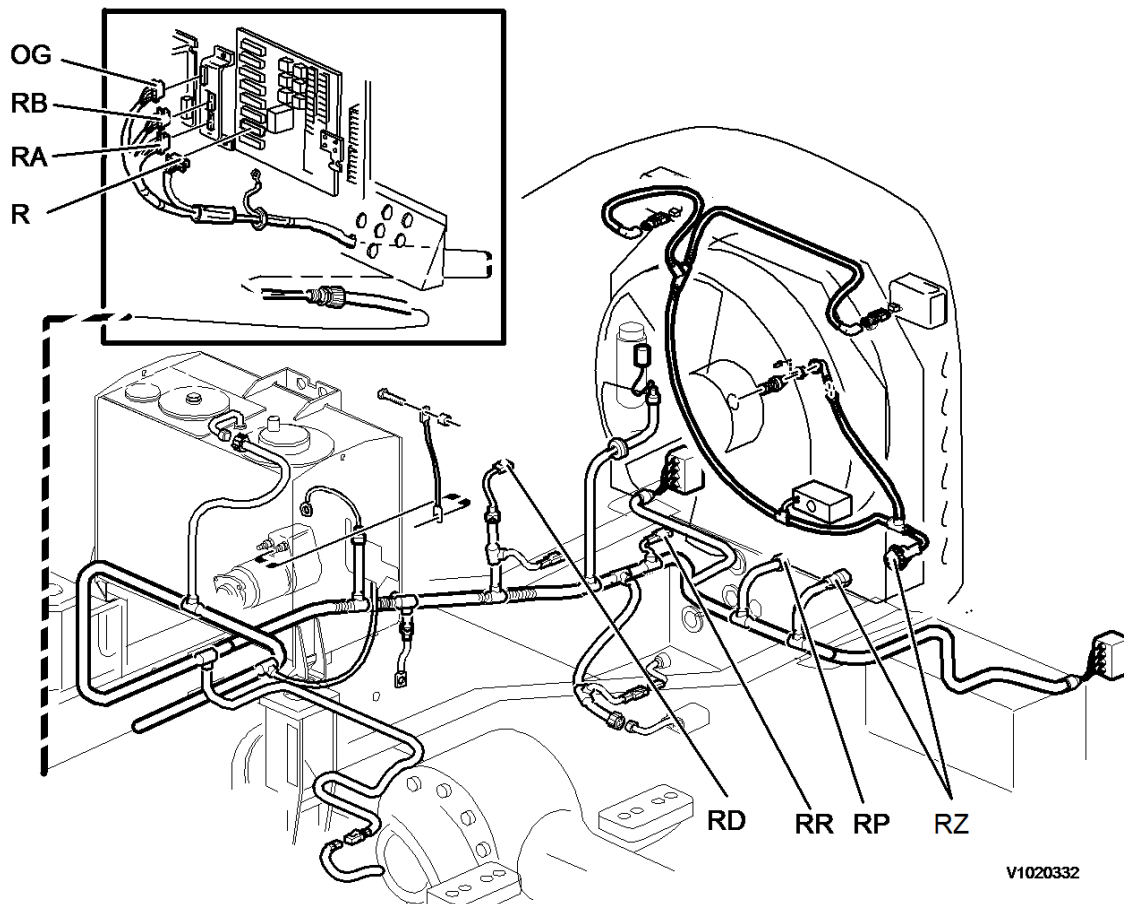
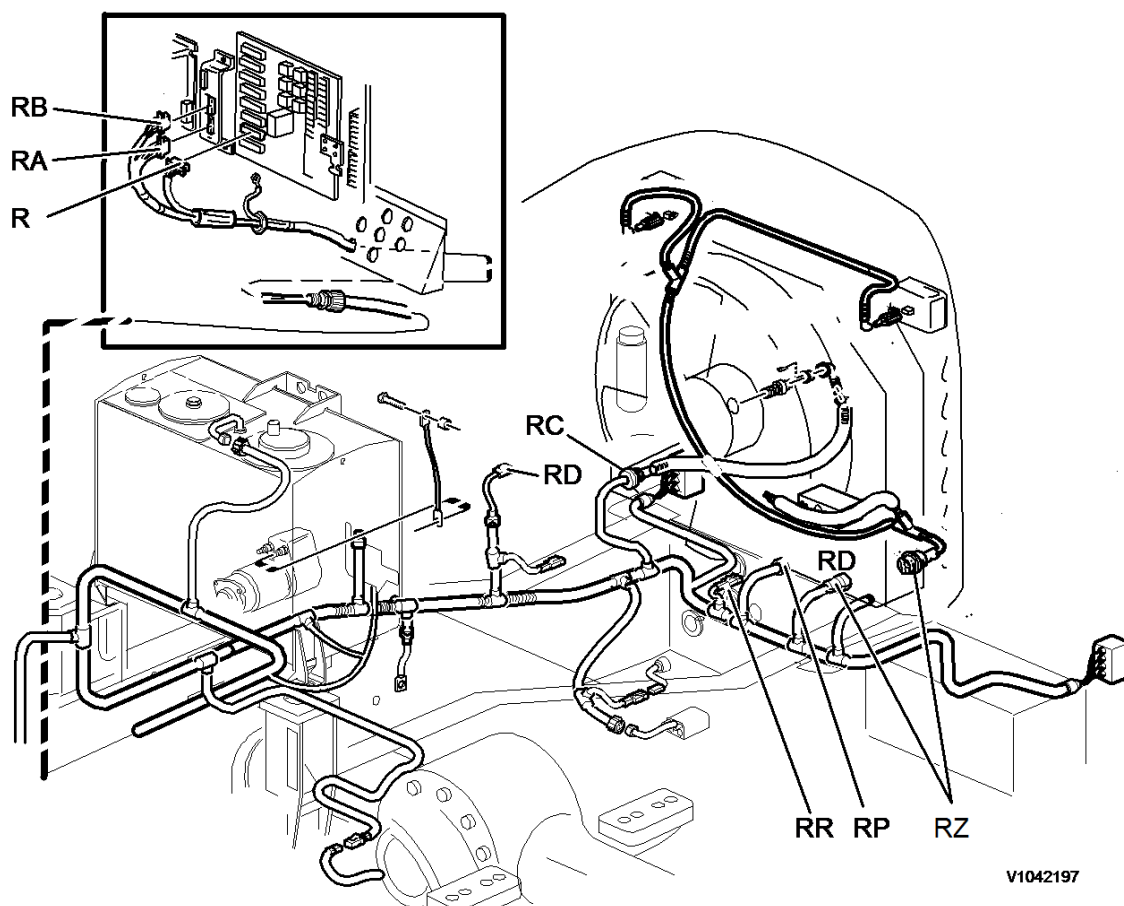


Figure 5
Connectors, position front frame



V1020332

Figure 6
Connectors, positions rear frame (D12C)



V1042197

Figure 7
Connectors, positions rear frame (D12D)

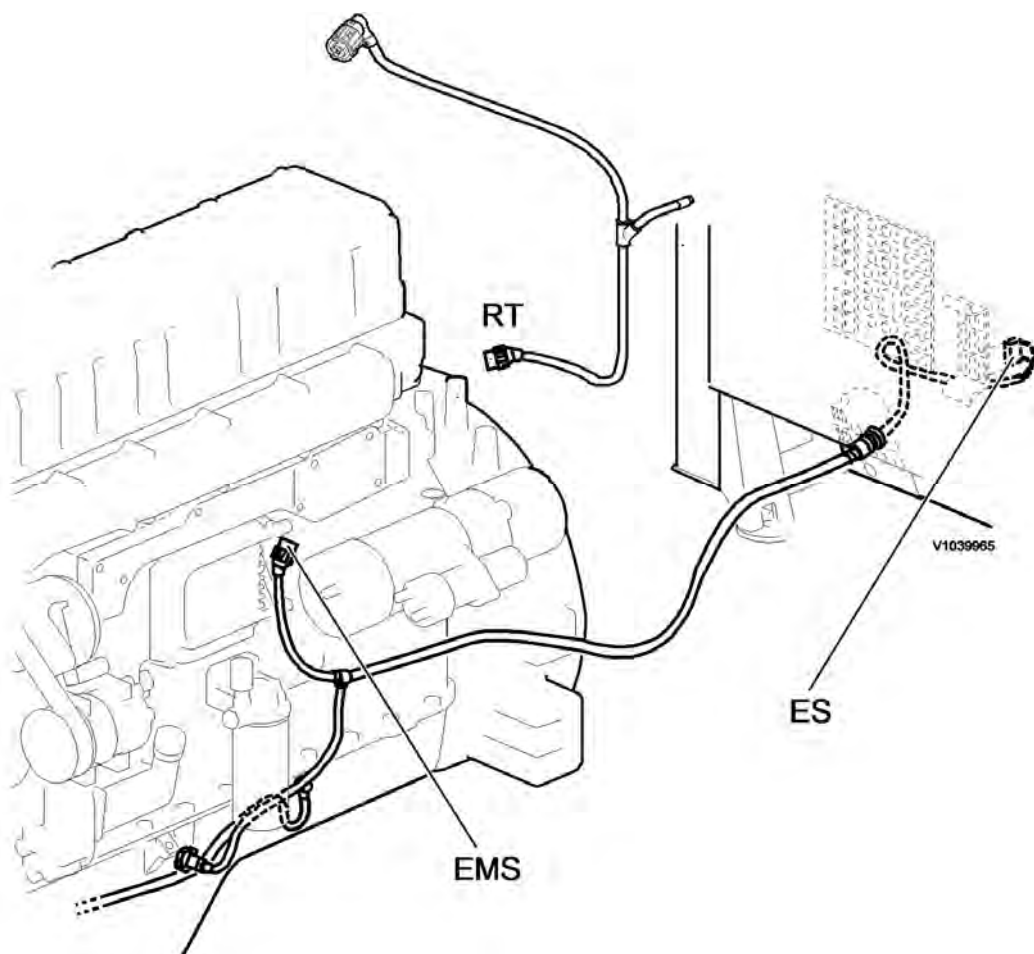


Figure 8
Connectors, engine (D12C)

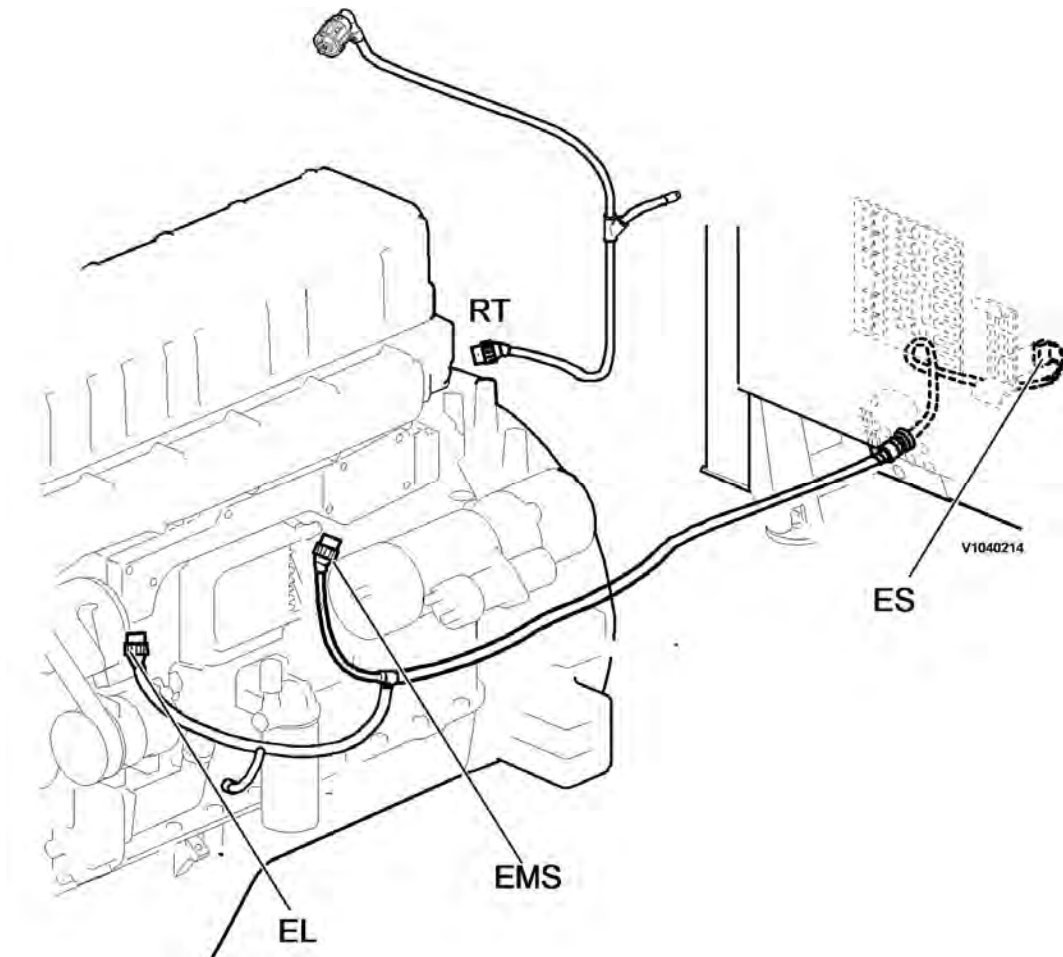


Figure 9
Connectors, engine (D12D)

Document Title: Circuit list	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Circuit list

Circuit no.	Wiring diagram	Function
2.010	3	Starter motor with starter inhibitor
2.020	3	Preheating (switch)
2.040	4	Engine speed
2.100	4	Fuel level
2.130	5	Radiator fan adjustment
2.150	5	Engine oil level
2.150	28	Engine oil level, engine oil temperature (D12D)
2.180	5	Reversible fan
2.210	27	Accelerator pedal
2.220	27	Hand throttle
2.230	28	Engine speed
2.240	28	Camshaft speed
2.250	28	Coolant level
2.260	28	Temperature, induction air
2.270	28	Pressure monitor, air filter
2.280	29	Coolant temperature
2.290	29	Charge-air temperature
2.300	29	Charge air pressure
2.310	29	Engine oil temperature
2.320	29	Engine oil pressure
2.330	29	Fuel temperature
2.340	29	Fuel pressure
2.350	30	Injectors
2.360	31	Communication E-ECU
2.370	31	Preheating (preheater with preheating relay)
2.380	31	Voltage feed and chassis connection E-ECU
2.460	4	Electrically heated fuel filter
2.470	31	EGR (D12D)
2.480	29	Crankcase pressure (D12D)
2.490	28	Water in fuel (D12D)
3.010	6	Parking light, front left
3.020	6	Left front side light

3.030	6	Parking light, rear right
3.040	6	Parking light, front right
3.050	6	Right front side light
3.060	6	Parking light, rear left
3.070	6	Number plate lighting
3.080	6	Guide light, switches
3.090	6	Low beam, left
3.100	6	Low beam, right
3.110	6	High beam, left
3.120	6	High beam, right
3.130	6	Control lamp, high beam
3.140	7	Interior lighting
3.150	7	Work light cab, front left
Circuit no.	Wiring diagram	Function
3.160	7	Work light cab, front right
3.165	103	Automatic back-up light
3.170	7	Work light, front left mudguard
3.180	7	Work lights, attachment
3.190	7	Work light, front right mudguard
3.200	7, 101	Work light, left-hand radiator casing
3.210	7, 101	Work light, right-hand radiator casing
3.220	7, 101, 103	Control lamp, work lights
3.230	7	Work light, cab, rear left
3.240	7	Work light, cab, rear right
3.250	8	Instrument lighting
3.260	8	Rotating warning beacon
3.265	101	Flashing light
3.270	8	Brake light, left
3.280	8	Brake light, right
3.285	8	Hazard flashers
3.290	8	Control lamp, direction indicators
3.295	8	Flasher relay
3.300	8	Direction indicator, front left
3.310	8	Direction indicator, rear left
3.320	8	Direction indicator, front right
3.330	8	Direction indicator, rear right
3.340	101	Back-up light
4.010	9, 9B	Steering column, gear selector
4.020	9, 9B	Steering shaft, kickdown
4.030	9, 9B	Steering column, Forward/Reverse
4.040	9	Control lever carrier, activation Forward/Reverse

4.040	9B	Single lever, activation Forward/Reverse
4.050	9	Control lever carrier, Forward/Reverse
4.050	9B	Single lever, Neutral/Forward/Reverse
4.060	9	Control lever carrier, kickdown
4.060	9B	Single lever, kick-down
4.070	9	Control lever carrier, engine brake
4.070	9B	Single lever, engine brake
4.080	17	Comfort Drive Control (CDC), armrest
4.090	17	Comfort Drive Control (CDC), activation
4.100	17	Comfort Drive Control (CDC), Forward/Reverse
4.110	17	Comfort Drive Control (CDC), kickdown
4.120	10	Filter indicator, transmission
4.130	10	Turbine speed
4.140	10	Travel speed
Circuit no.	Wiring diagram	Function
4.150	11	Gear shifting solenoid, Neutral/Forward/Reverse
4.160	11	Gearshifting solenoid, gears
4.170	11	Transmission disengagement
4.180	12	Transmission oil pressure
4.190	12	Transmission oil temperature
4.210	12	Mode selector
4.220	12	Differential lock
4.230	13	Axle oil temperature, front axle
4.240	13	Axle oil temperature, rear axle
4.260	11	Fully automatic
4.310	13	Transmission oil level
5.010	15B	Output brake pressure
5.020	15B	Low brake pressure
5.045	15B	Parking brake
5.050	15B	Brake pressure charging
6.010	16	Secondary steering
6.020	17	Comfort Drive Control (CDC), control lever
8.010	18	Wiper, front
8.025	18	Washer, front
8.030	18	Horn
8.040	18	Wiper, rear
8.050	18	Washer, rear
8.080	19, 33	Cab fan
8.090	19	Air conditioning (AC)
8.100	33	Automatic temperature control (ATC)
8.130	34	Camera

8.140	34	Electrically heated rear-view mirrors
8.150	20	Radio
8.170	20	Heating, operator's seat
8.180	20	Operator's seat with air suspension
8.190	20	Cigarette lighter
8.200	20	Reversing alarm
8.210	20	Central warning buzzer
8.250	20	Ambient temperature
9.010	21, 21B, 21C	Bucket positioner
9.020	21, 21B, 21C	Boom kick-out
9.030	21	Attachment change
9.040	21	Attachment locking
9.050	21, 21B, 21C	Float position
9.060	21B	4th hydraulic function, electric lever lock
9.065	21C	Lever lock, single lever control
9.085	23	Boom suspension system, activation and mode selection
9.090	23	Boom suspension system, single-acting lift function
9.100	23	Boom suspension system
9.120	23	Hydraulic oil tank, temperature and level

Document Title: Communication cable explanation	Function Group: 370	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Communication cable explanation

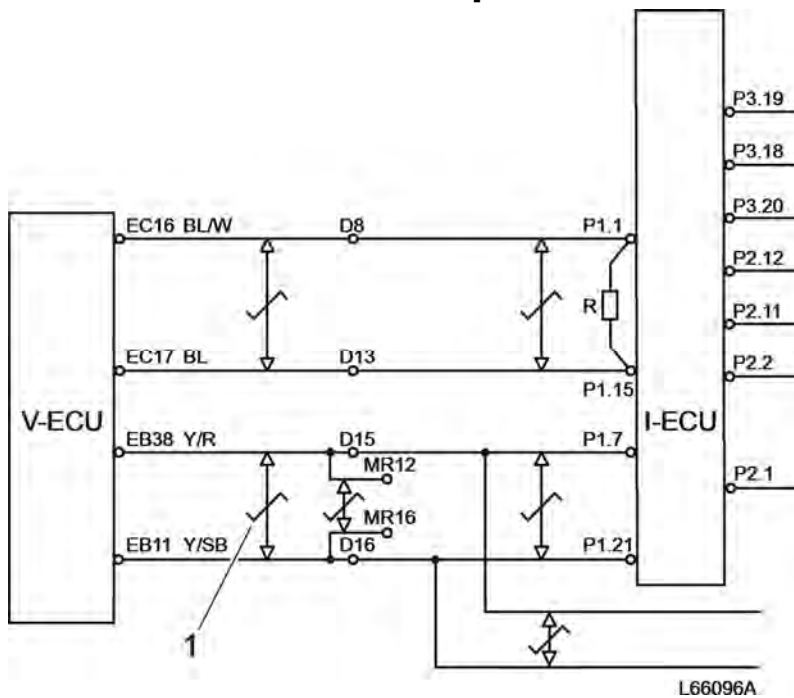


Figure 1
Communication cables between the V-ECU and I-ECU

1. Twisted cable symbol

Twisted cables reduce sensitivity to interference with regards to electromagnetic compatibility (EMC).

VOLVO

Construction Equipment

Service Information

Document Title: Wiring diagram 1	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 1

Main diagram

Serial no. —5380

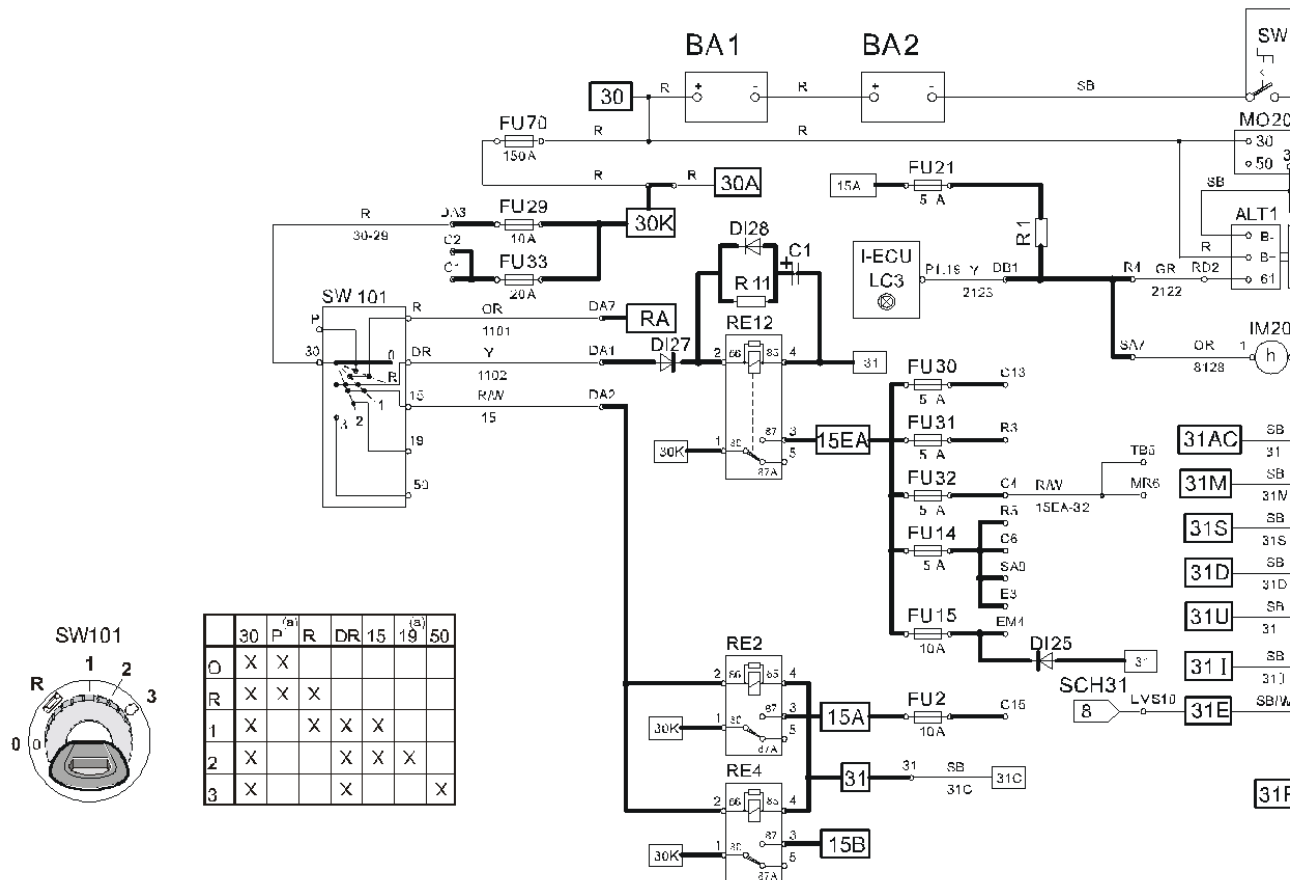
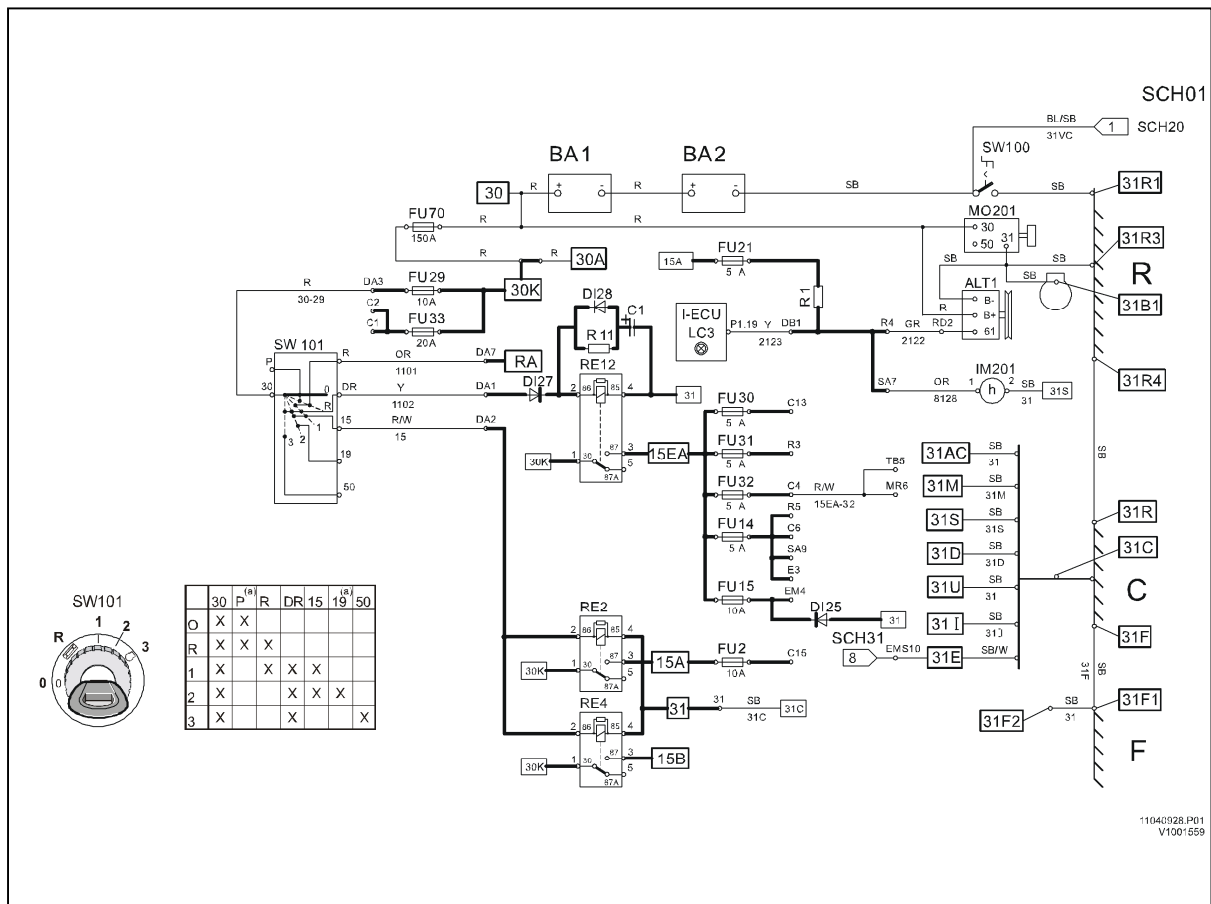


Figure 1

a. SW101, connection P and 19 not used.

Serial no. 5381—



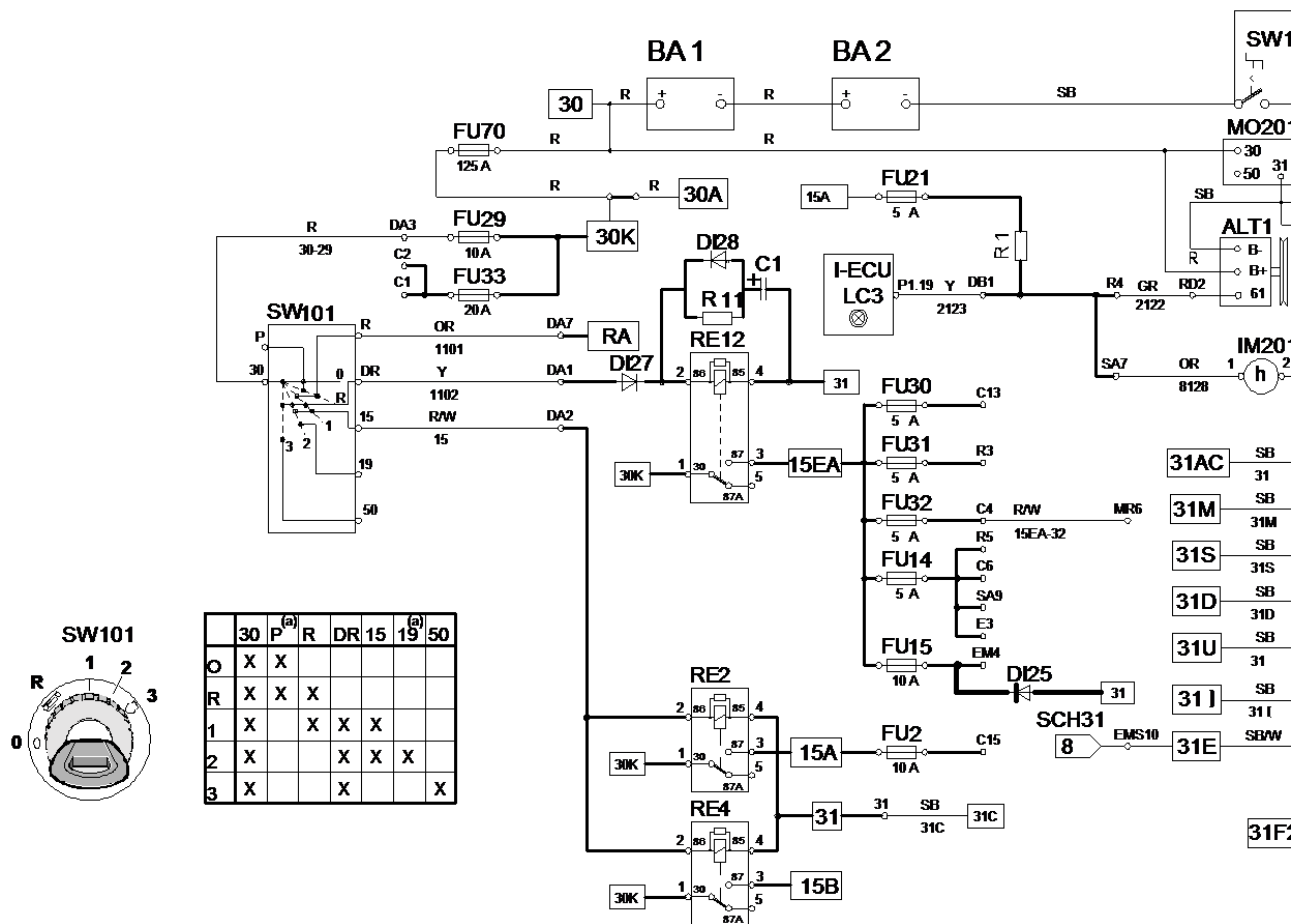
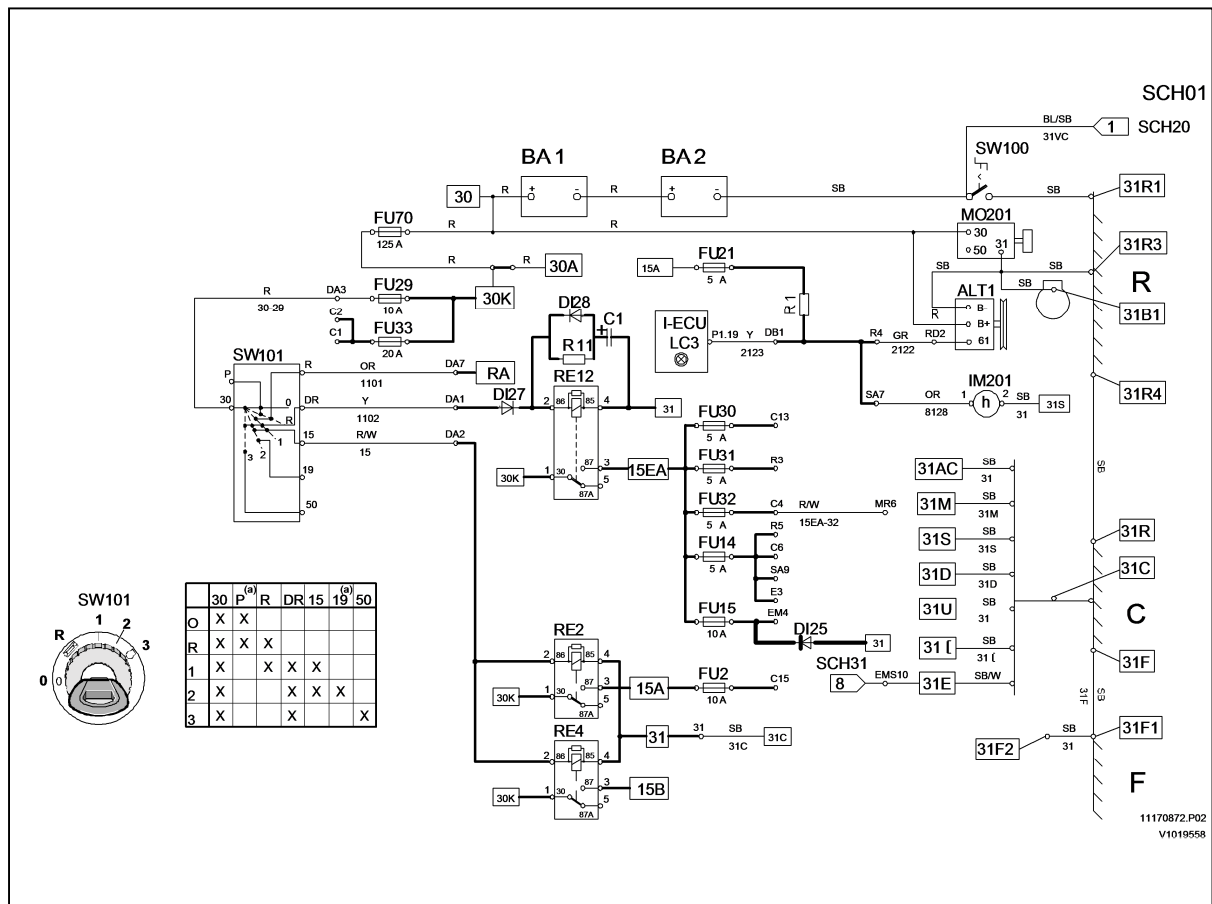


Figure 2
a. SW101, connection P and 19 not used.





Construction Equipment

Service Information

Document Title: Wiring diagram 2	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 2

Feeds E-ECU, I-ECU, V-ECU

Serial no. —7418

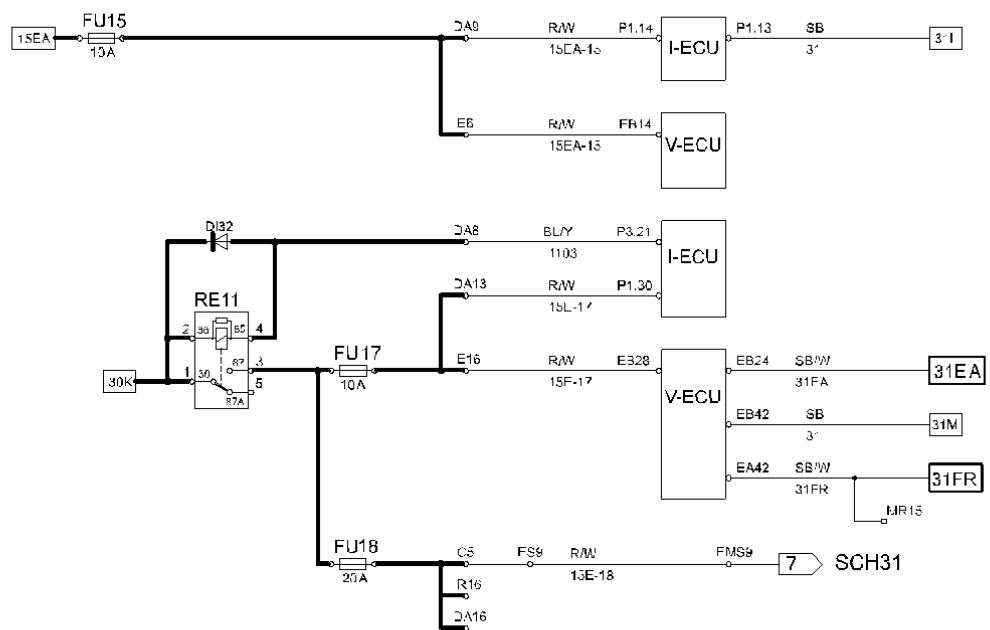


Figure 1

Serial no. 8001–

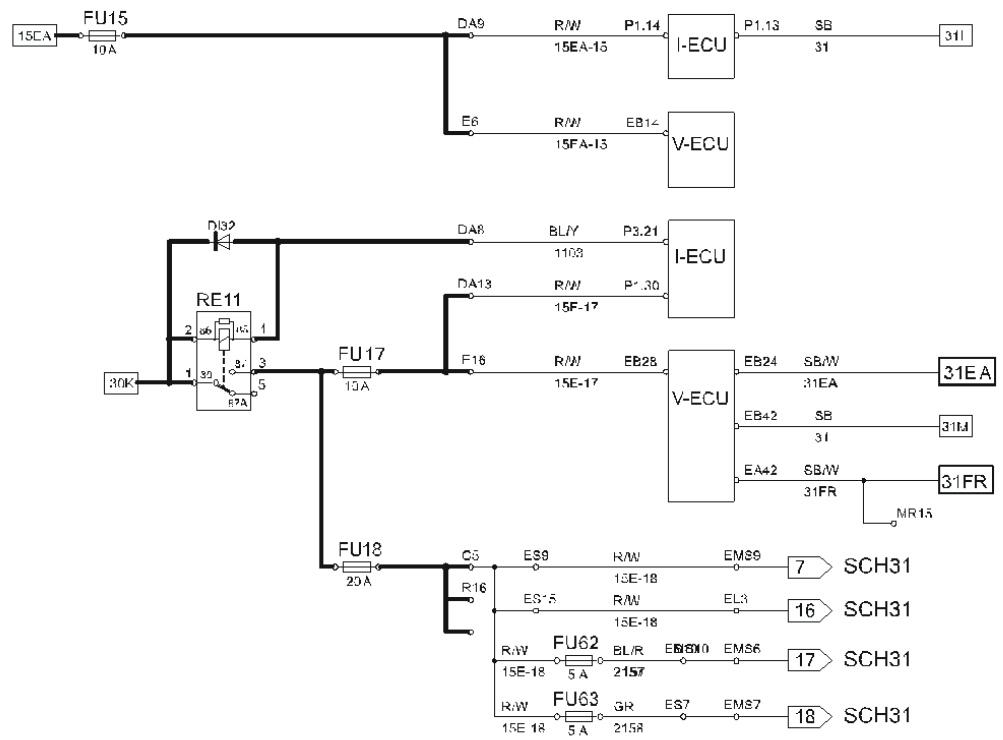


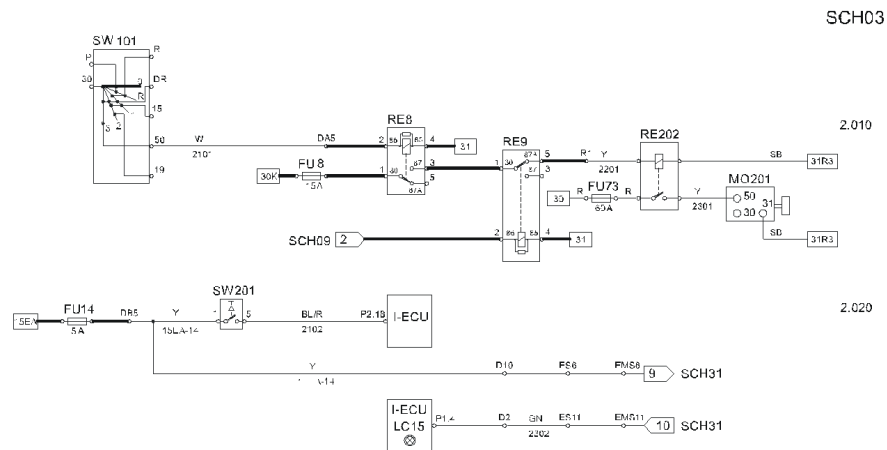
Figure 2

Document Title: Wiring diagram 3	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 3

Starter motor, preheating

Serial no. —5049

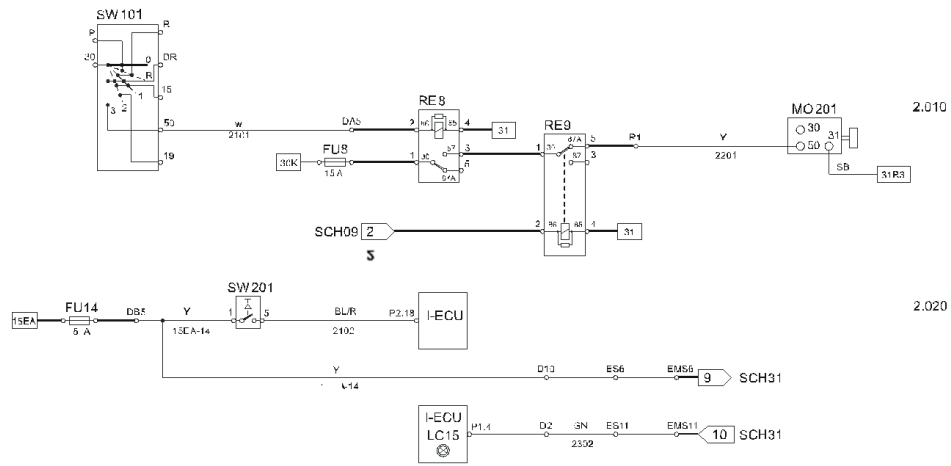


11040903 P01
V1031590

Figure 1

Serial no. 5050—7418

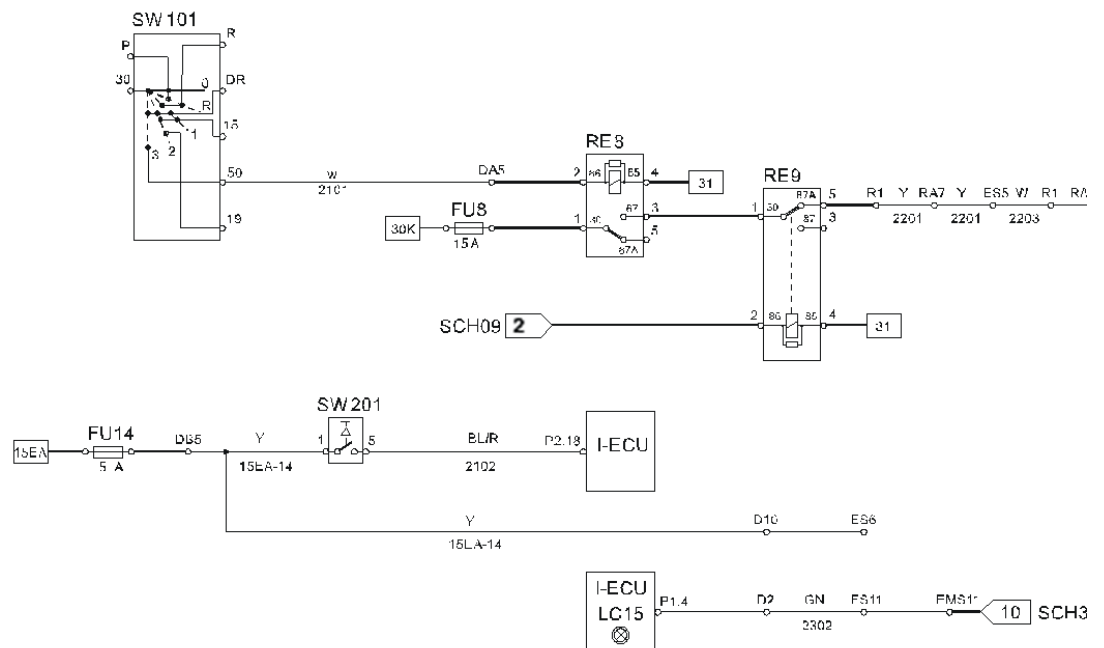
SCH03



11040833.P01
V1001396

Figure 2

Serial no. 8001—



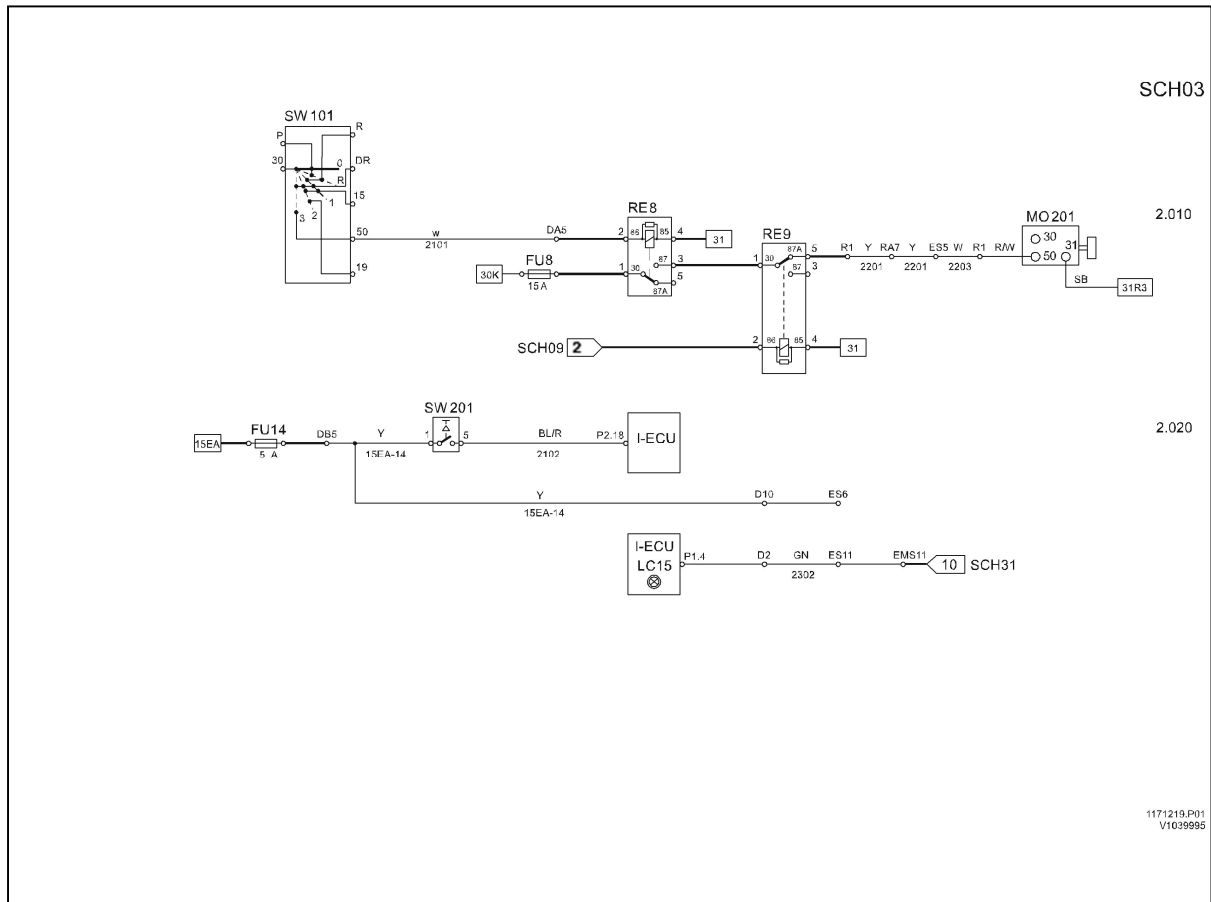
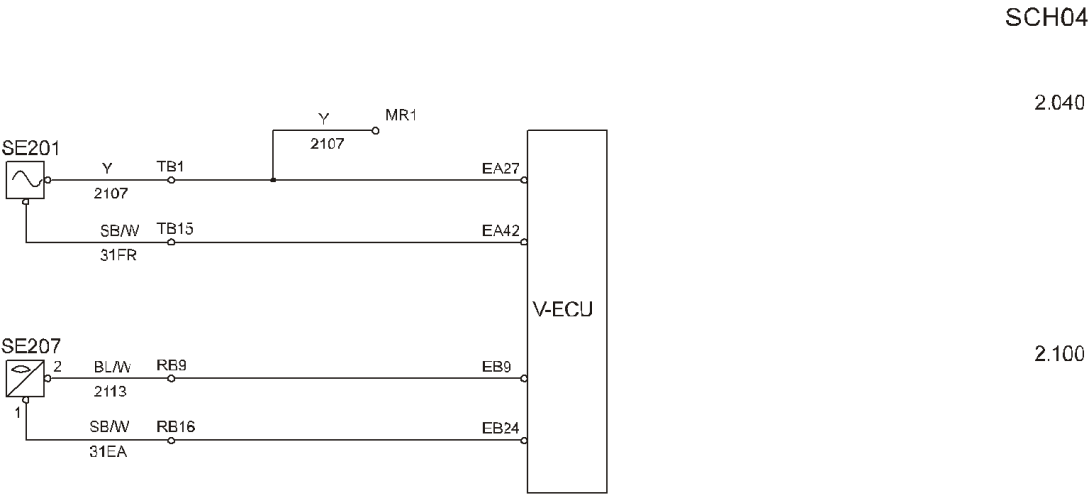


Figure 3

Document Title: Wiring diagram 4	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 4

Engine speed, fuel level
Serial no. —6027



11040727.P02
V1C01627

Figure 1

Serial no. 6028—

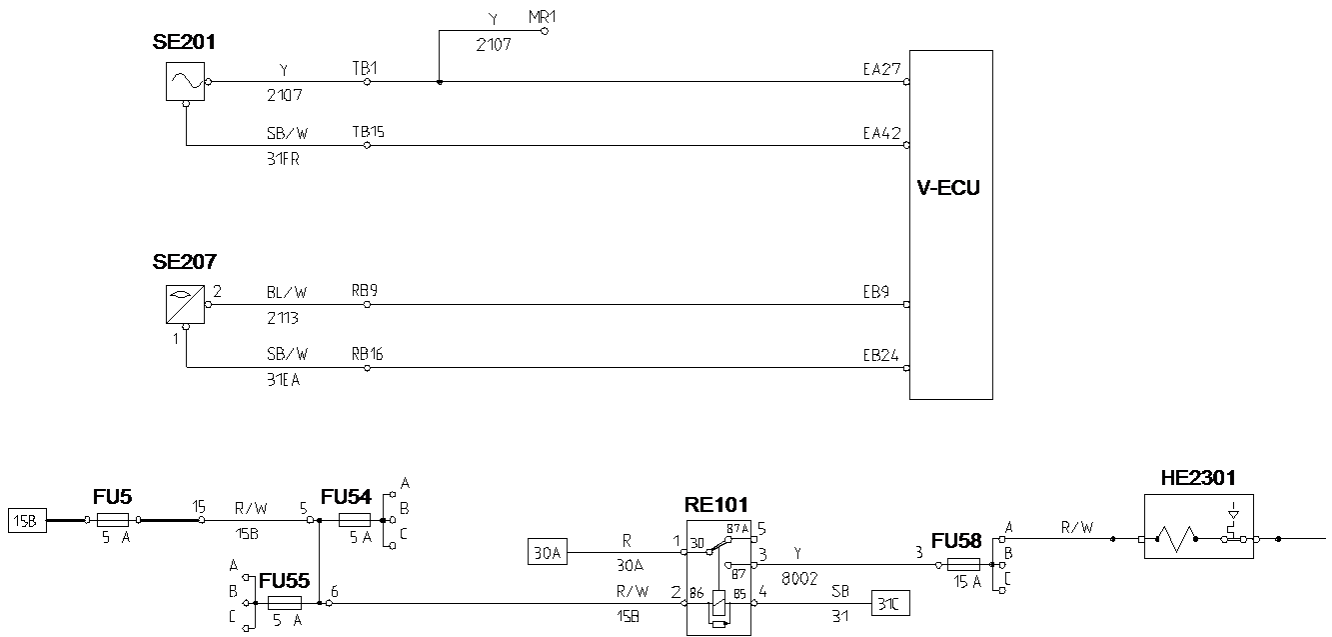
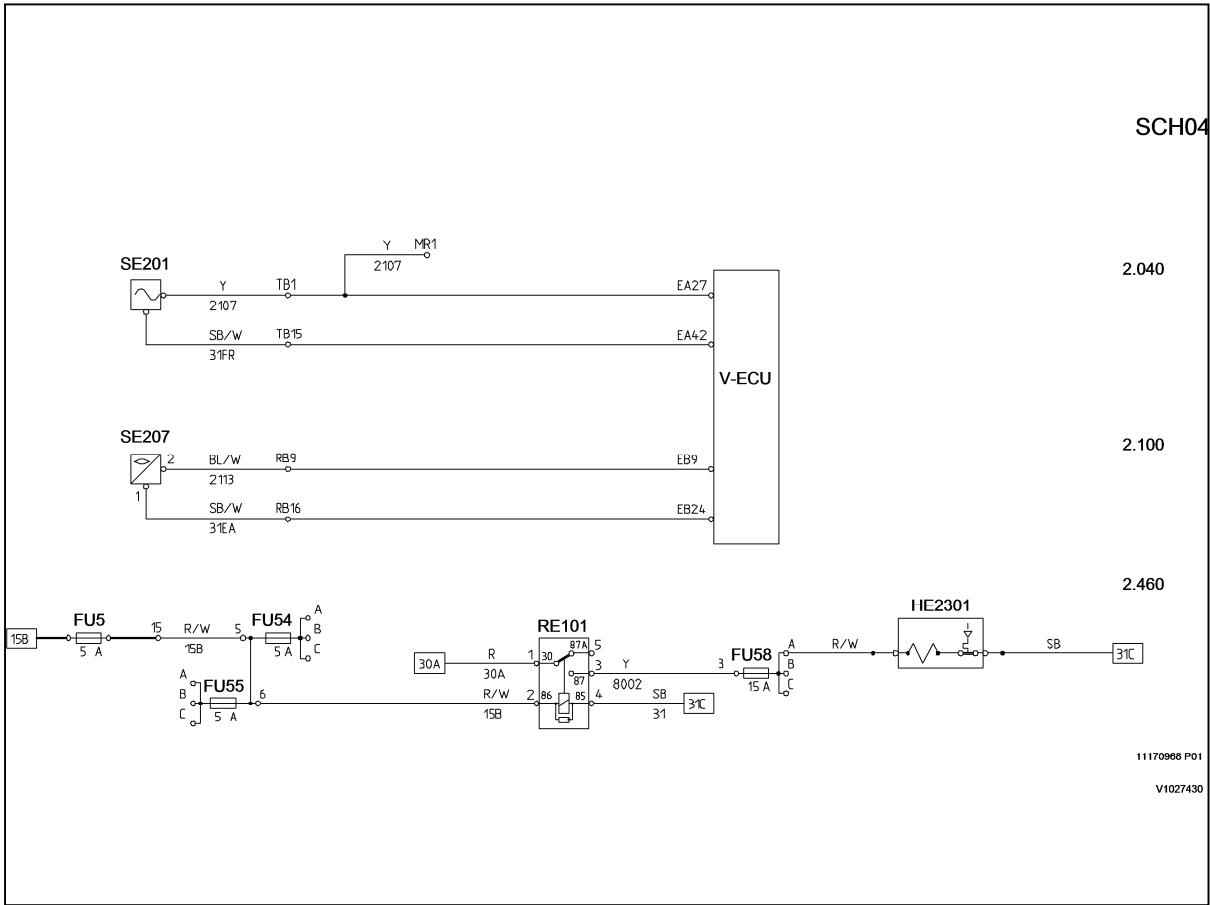


Figure 2



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Construction Equipment

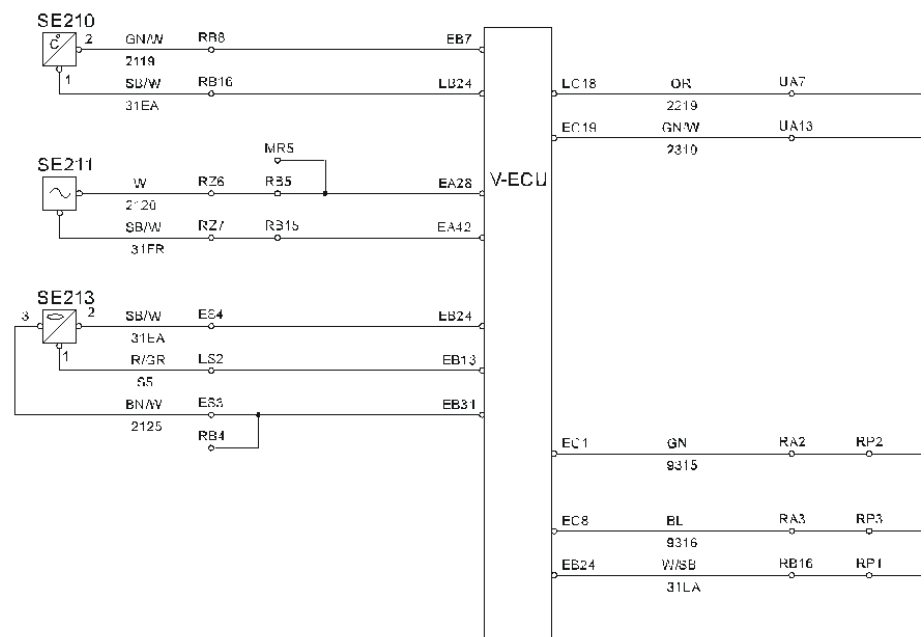
Service Information

Document Title: Wiring diagram 5	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 5

Engine cooling, engine oil level, reversal cooling fan

Serial no. —7418

**Figure 1**

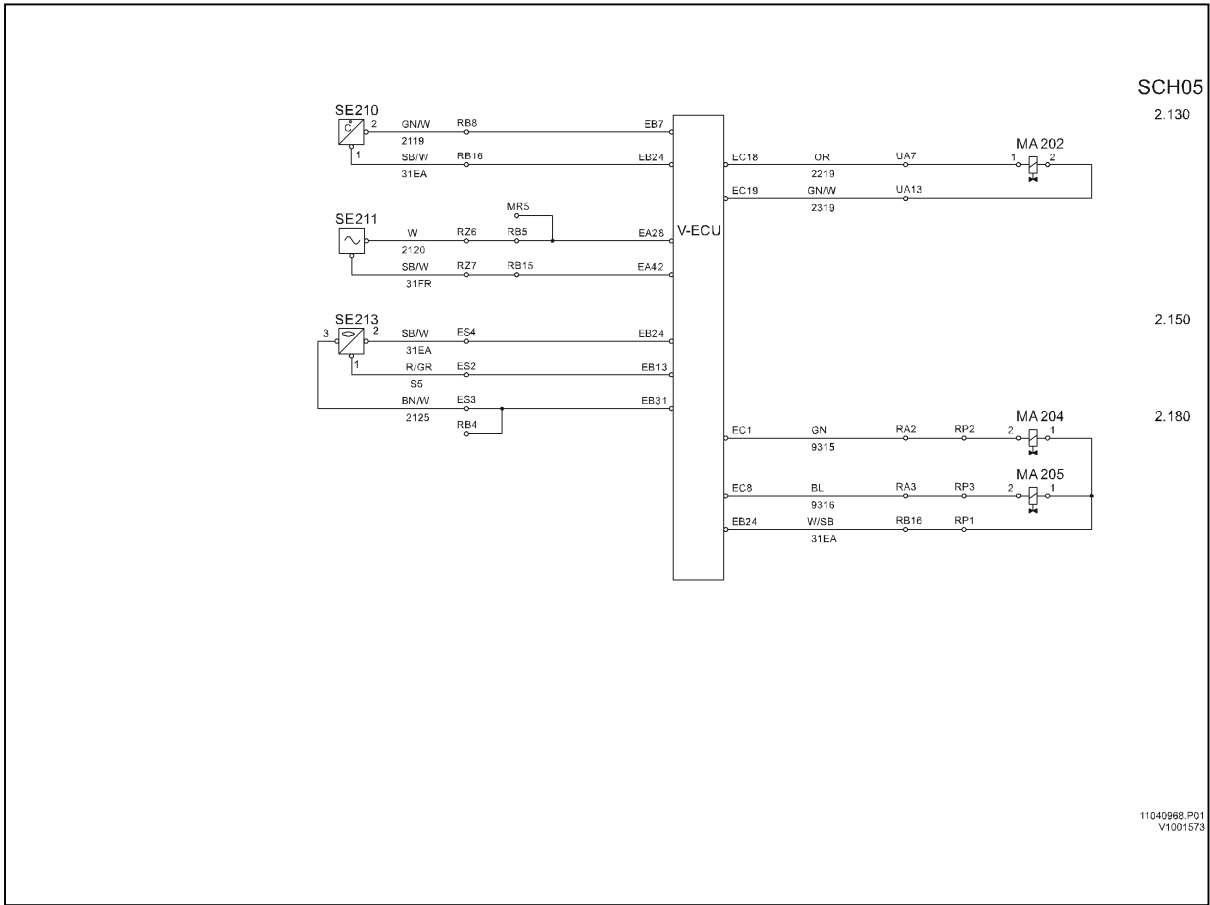
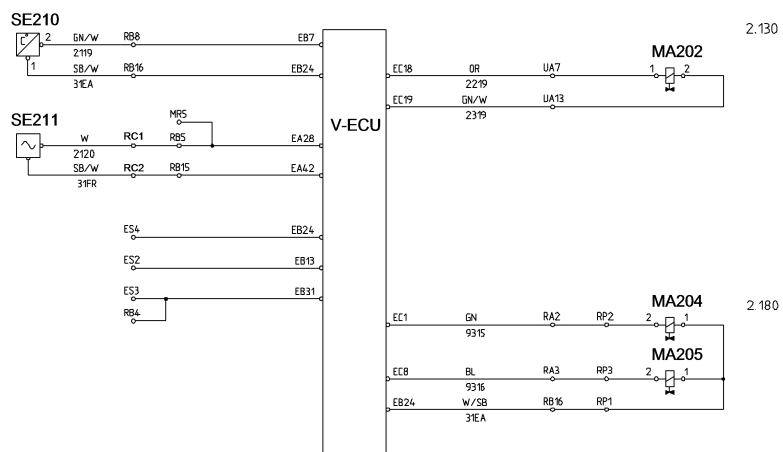


Figure 2

SCH05



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Construction Equipment

Service Information

Document Title: Wiring diagram 6	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 6

Lighting

Serial no. —7418

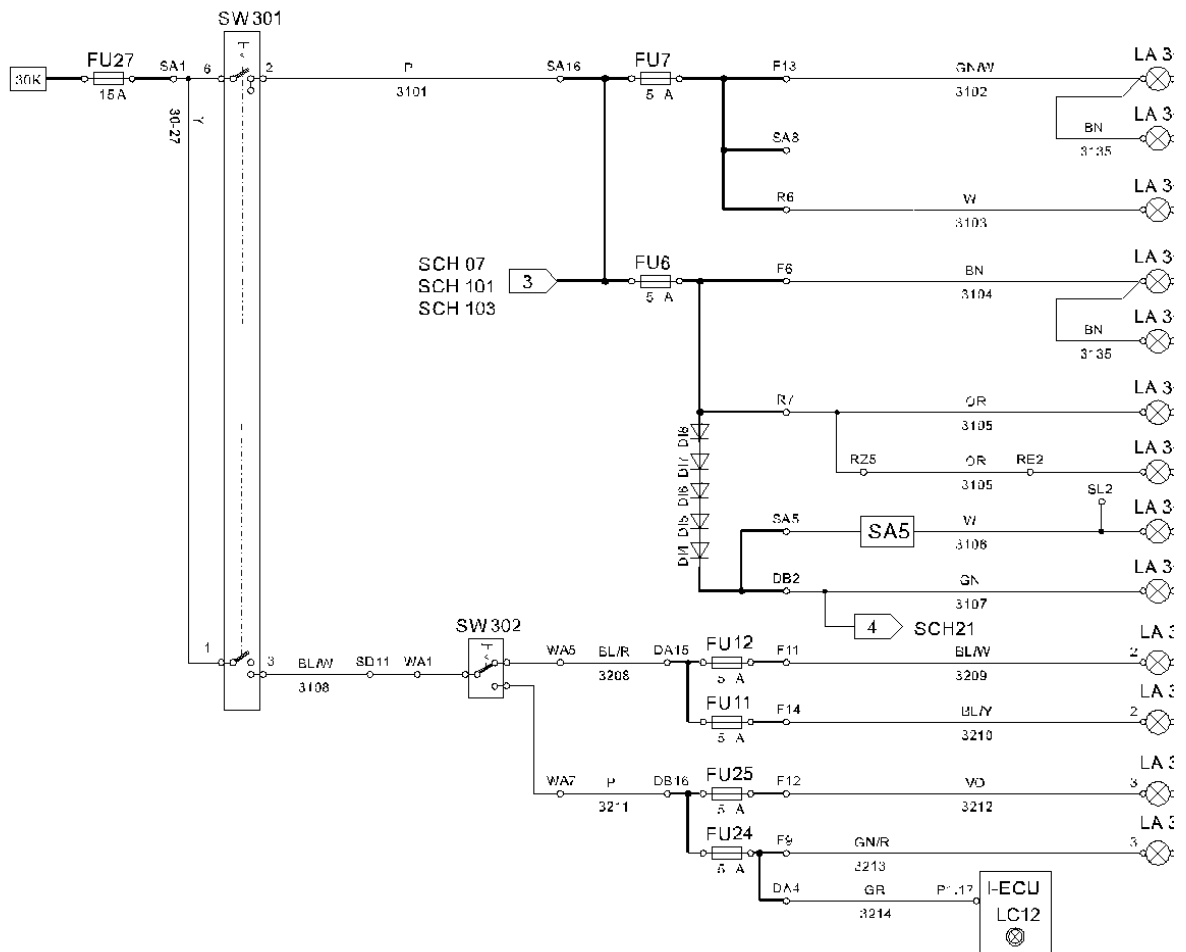
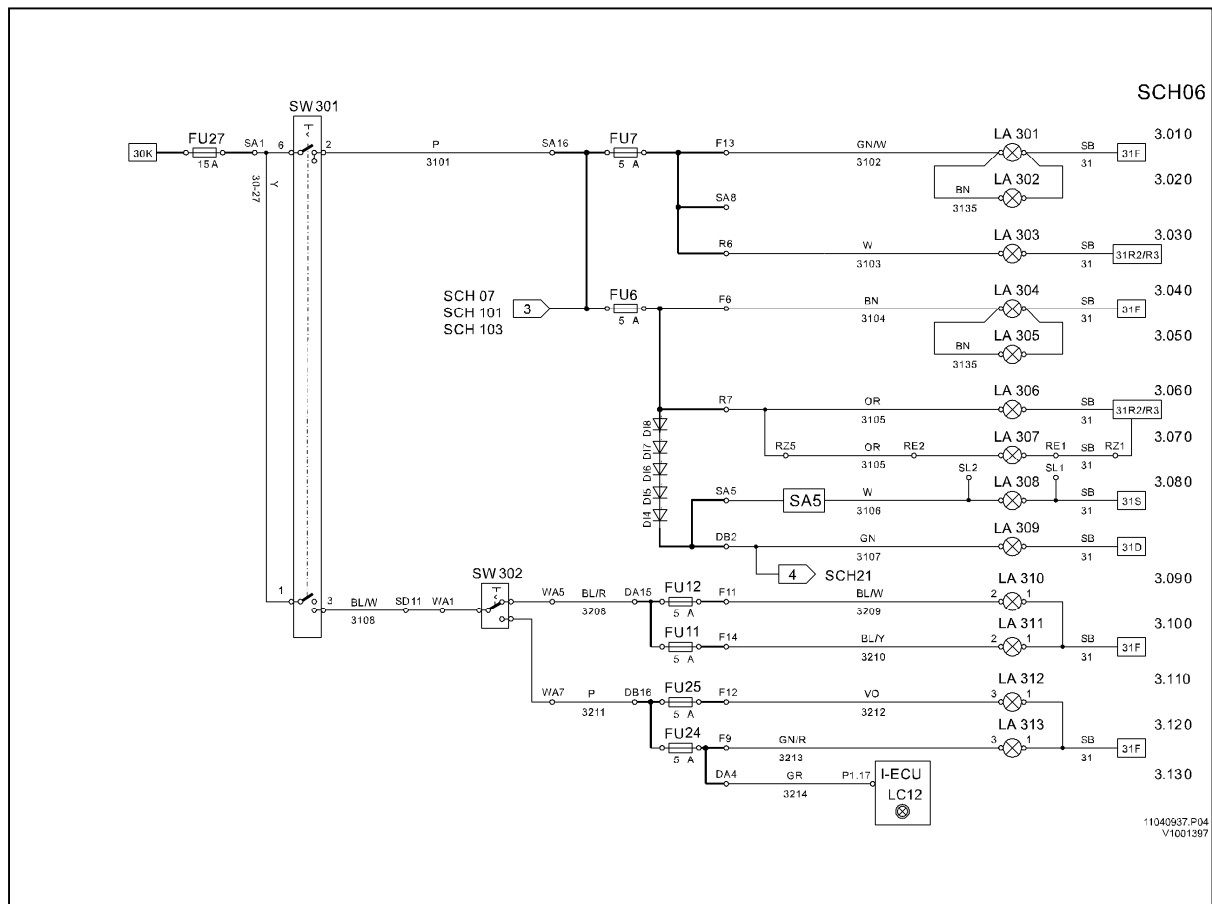


Figure 1

Serial no. 8001–



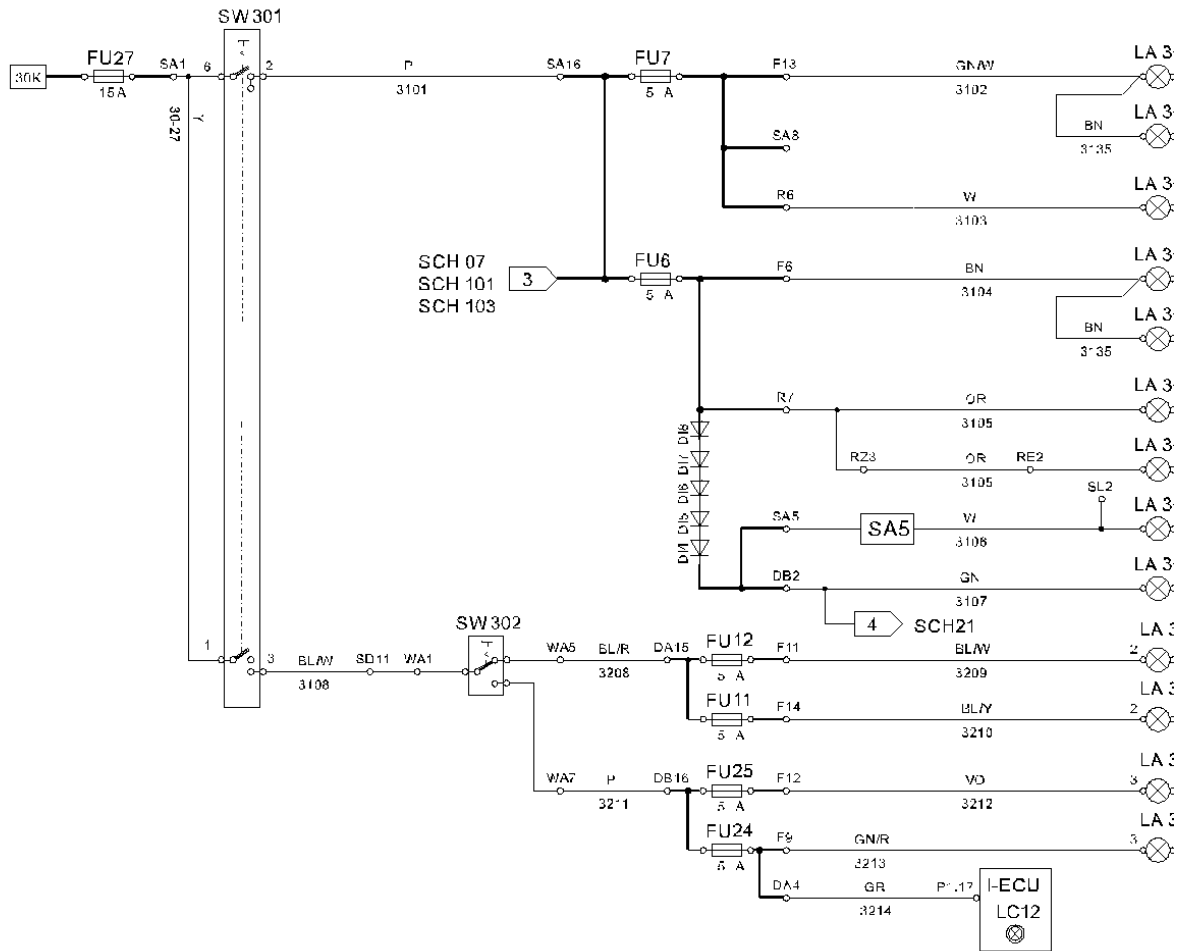
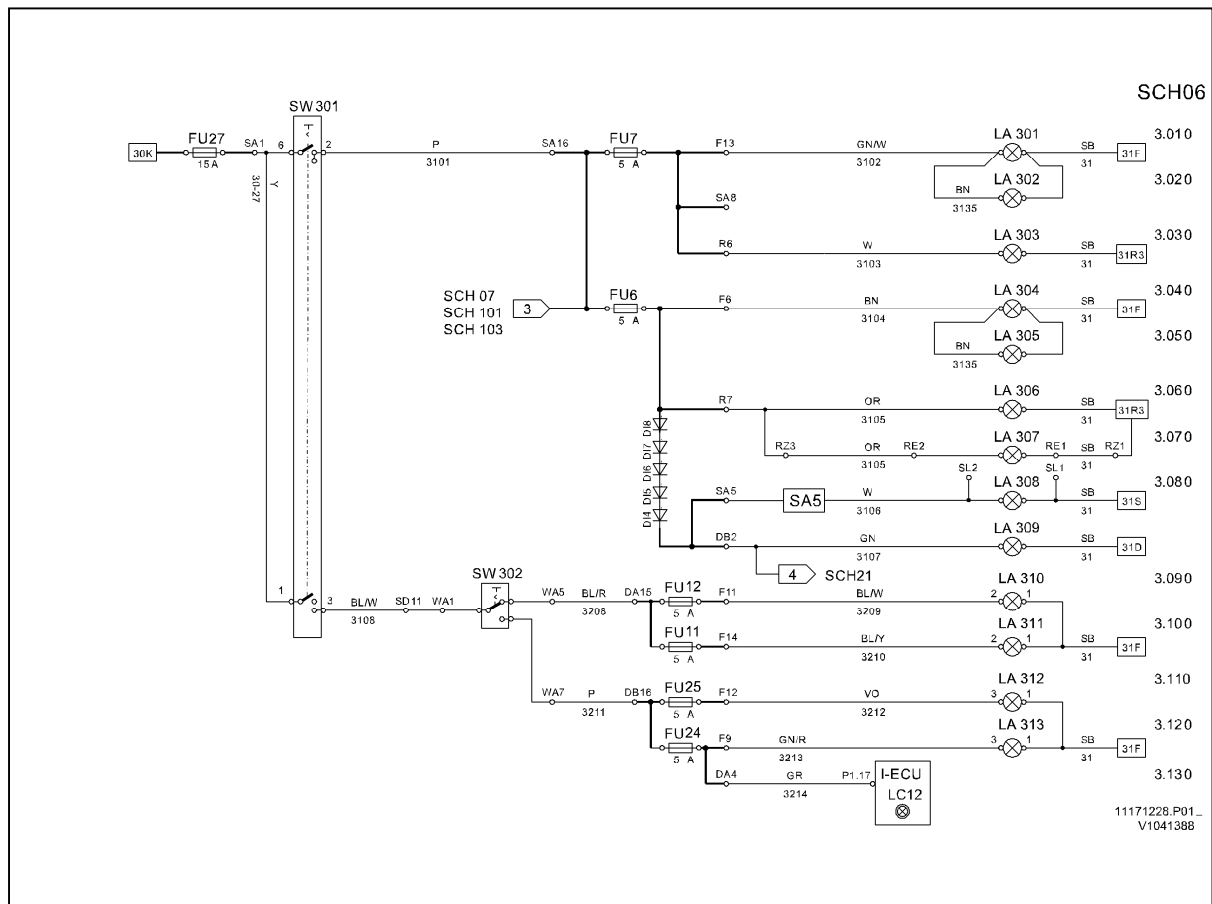


Figure 2



VOLVO

Construction Equipment

Service Information

Document Title: Wiring diagram 7	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 7

Working lights

Serial no. —5820

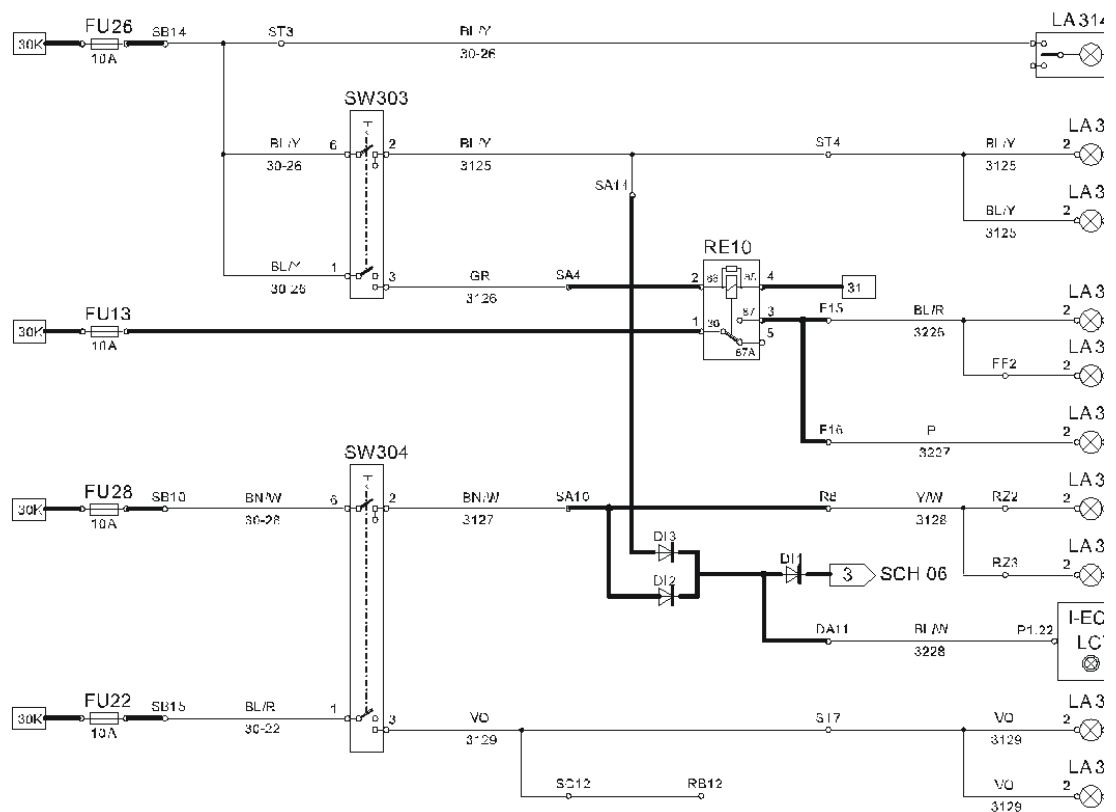
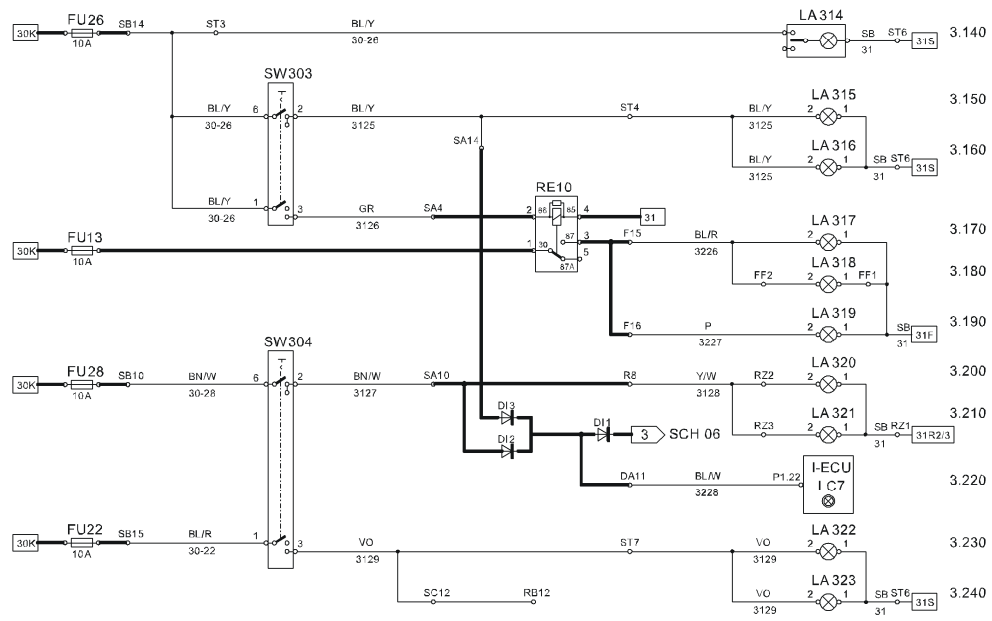


Figure 1

Serial no. 5821—7418

SCH07



11040960.P01
V1001566

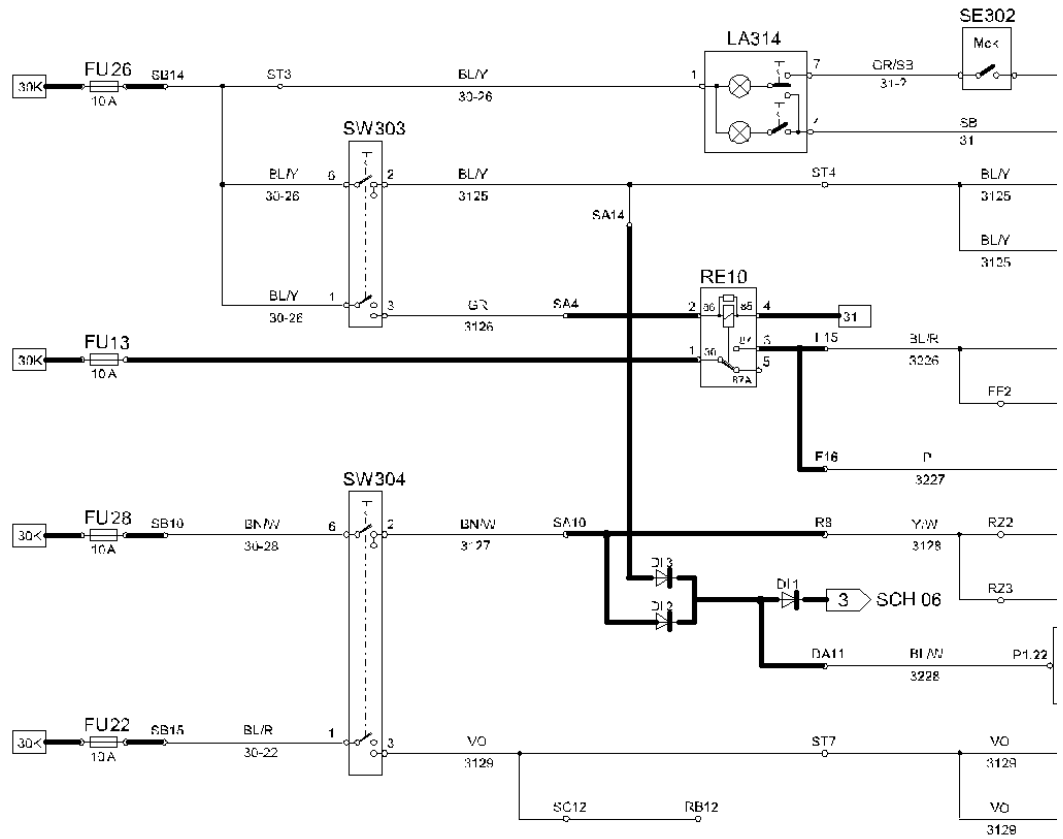


Figure 2

Serial no. 8001-

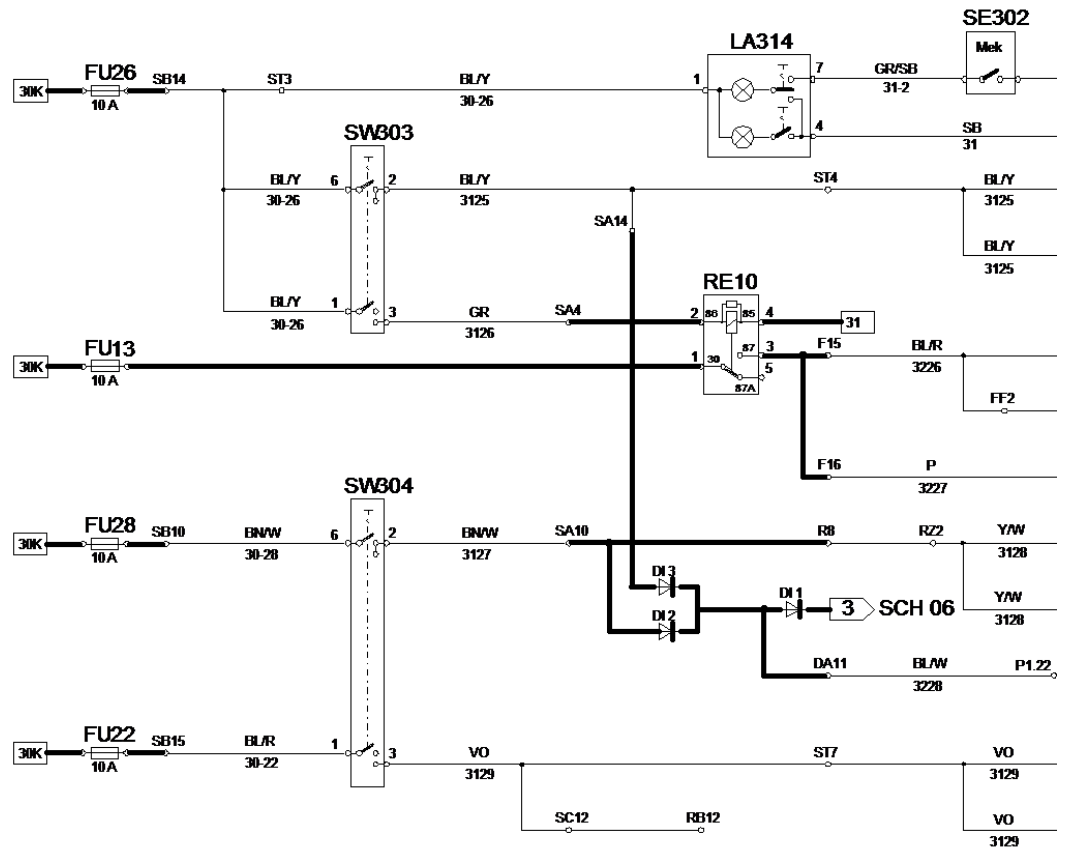
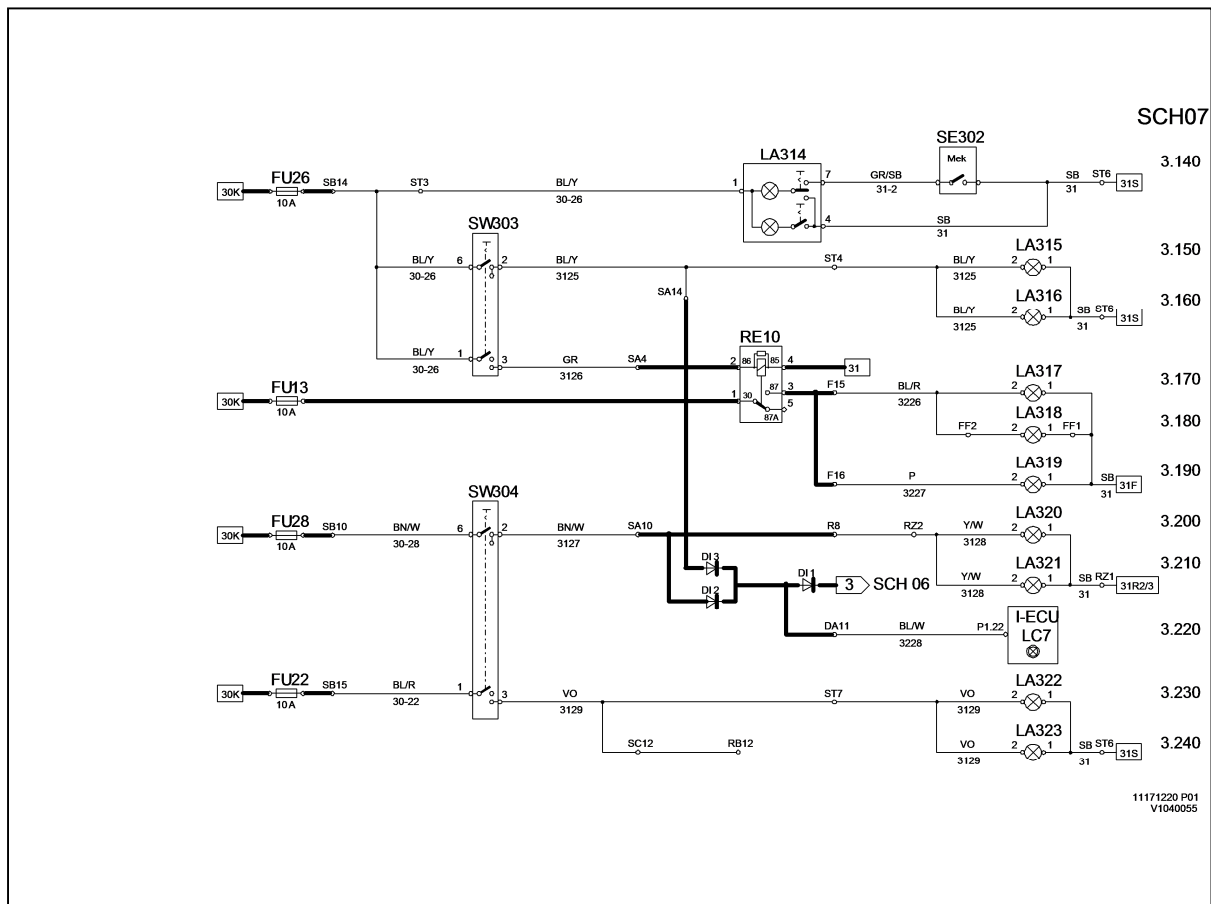


Figure 3



Document Title: Wiring diagram 8	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 8

Rotating beacon, direction indicators, brake lights

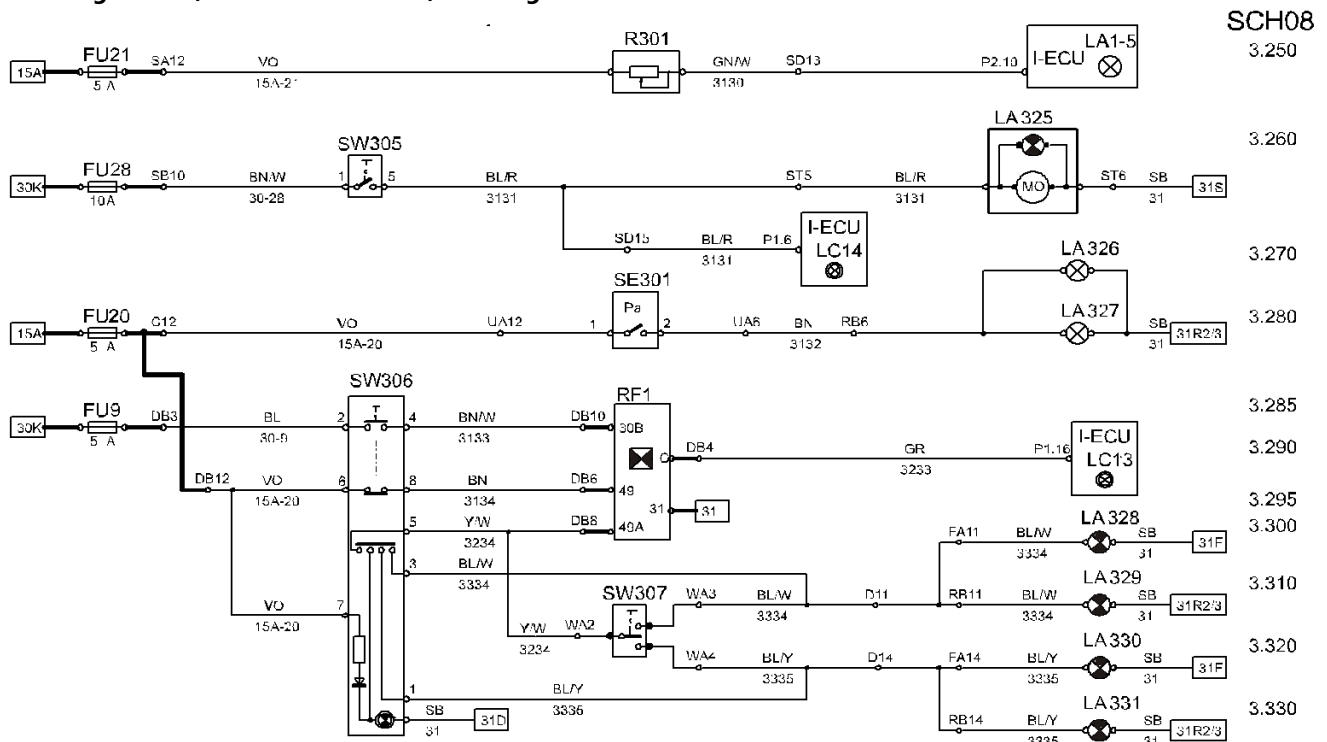


Figure 1

Document Title: Wiring diagram 9	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 9

Gear selector steering column, lever carrier

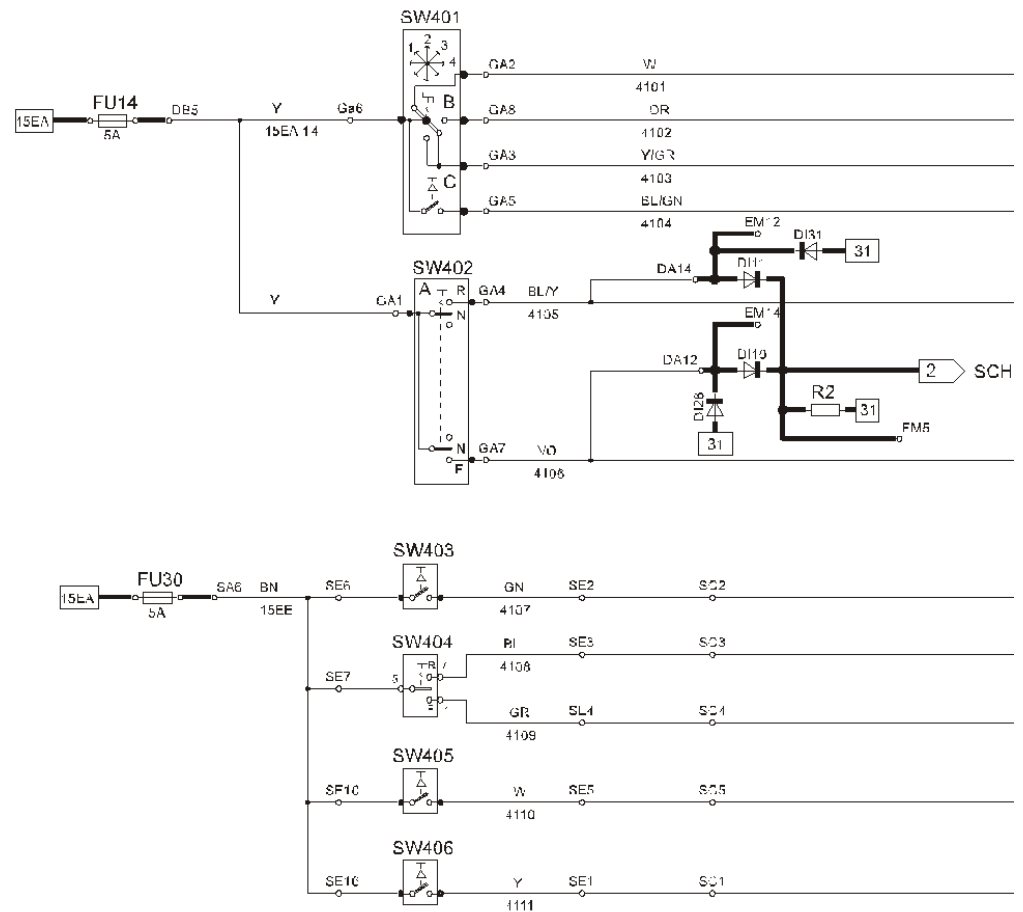
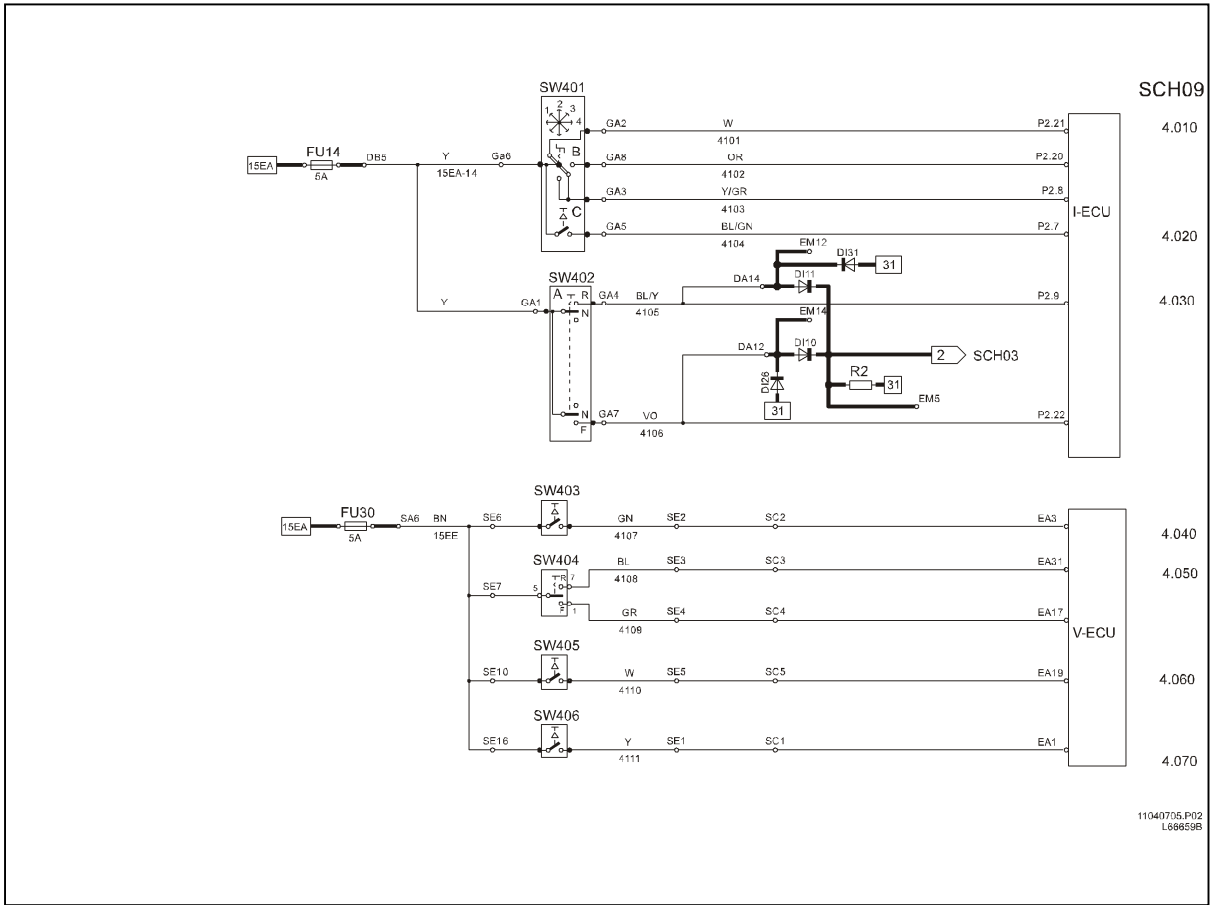


Figure 1



Document Title: Wiring diagram 9B	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 9B

Gear selector steering column, single lever

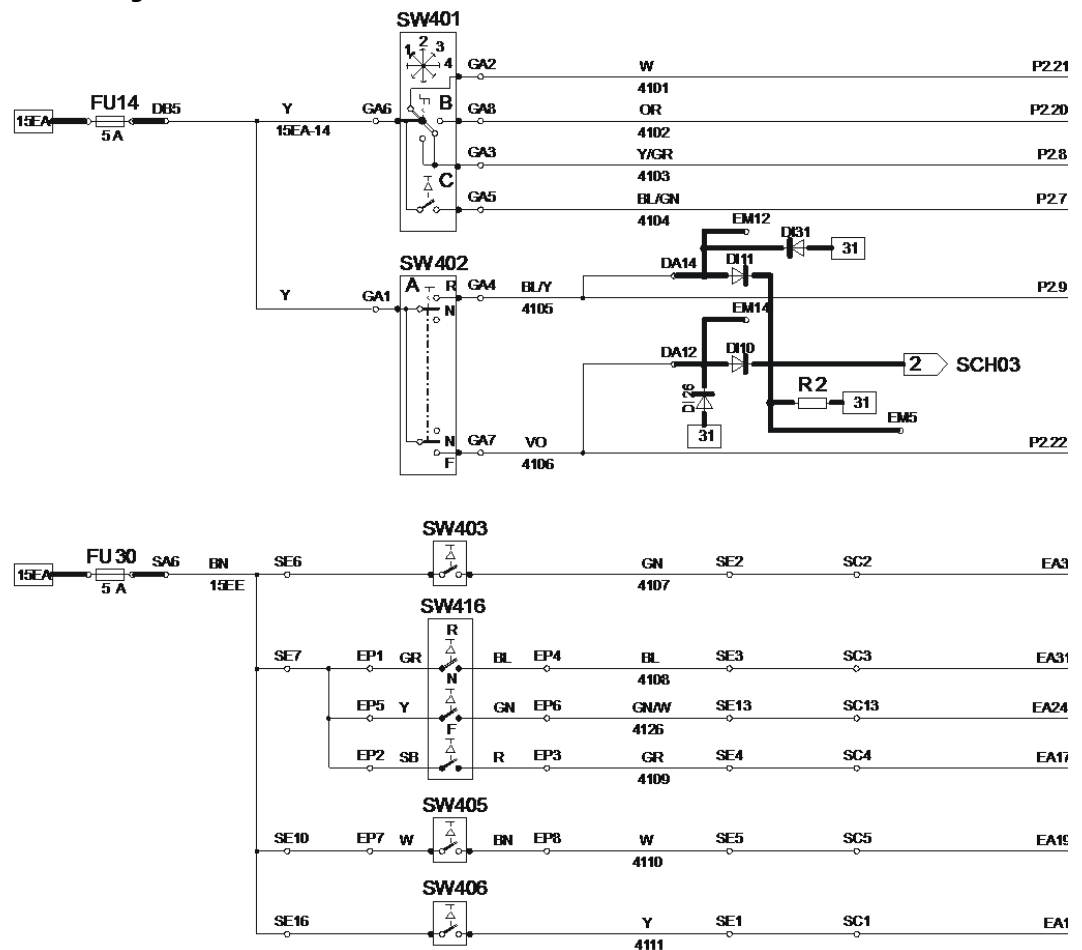
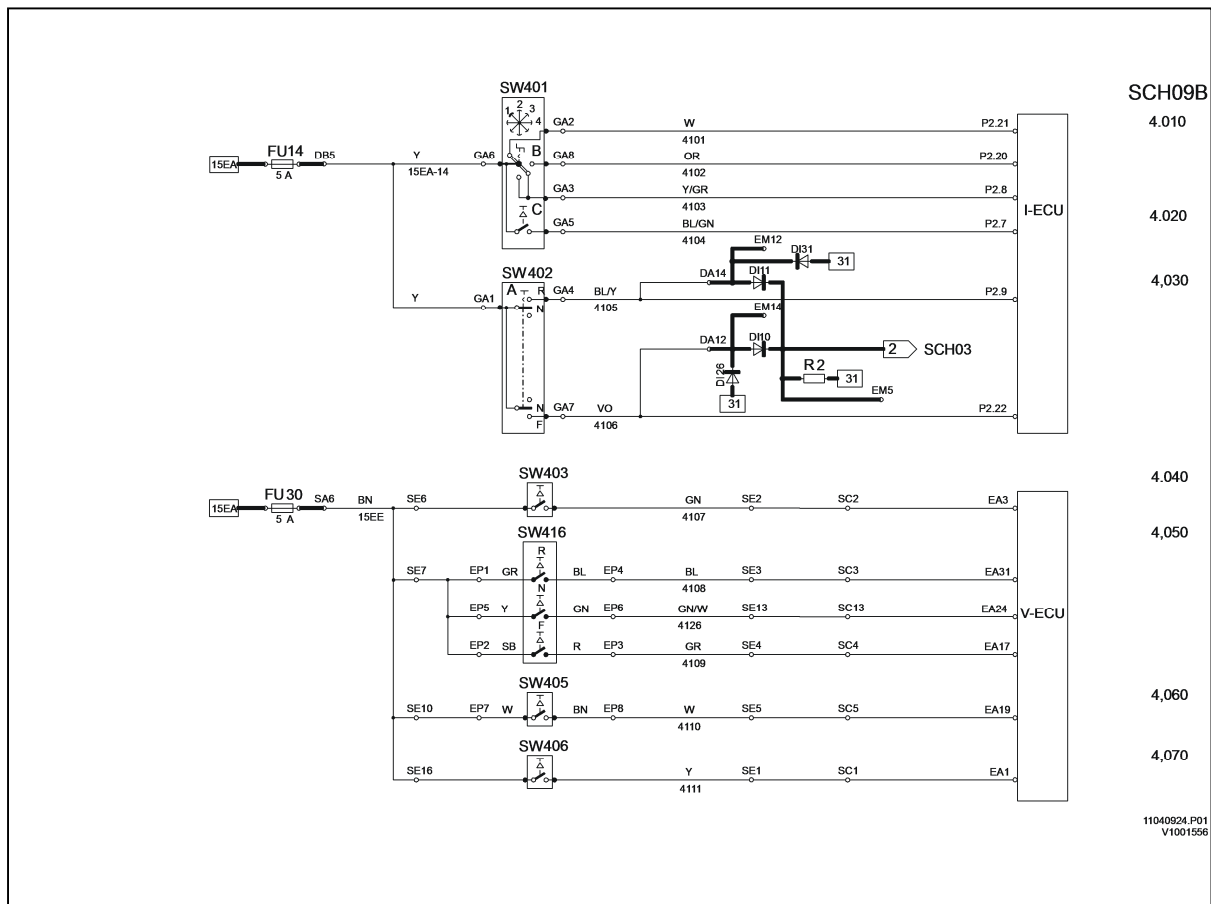


Figure 1



Document Title: Wiring diagram 10	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 10

Sensor transmission

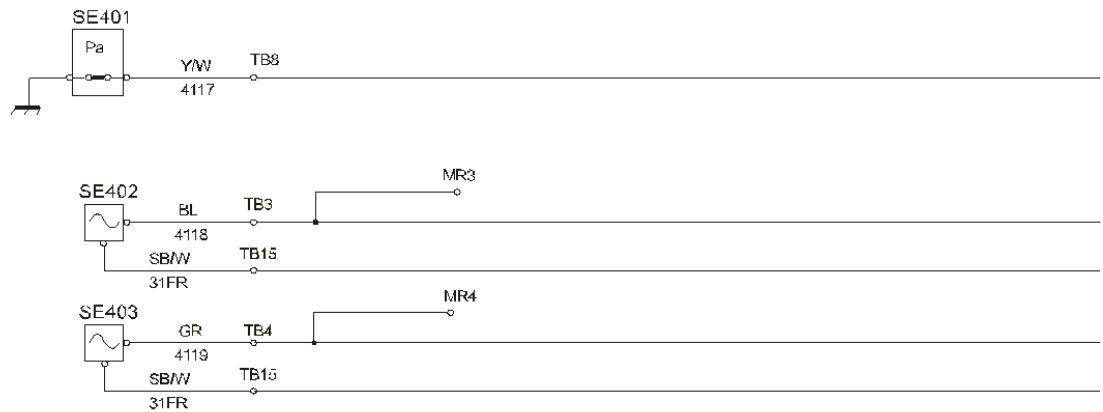
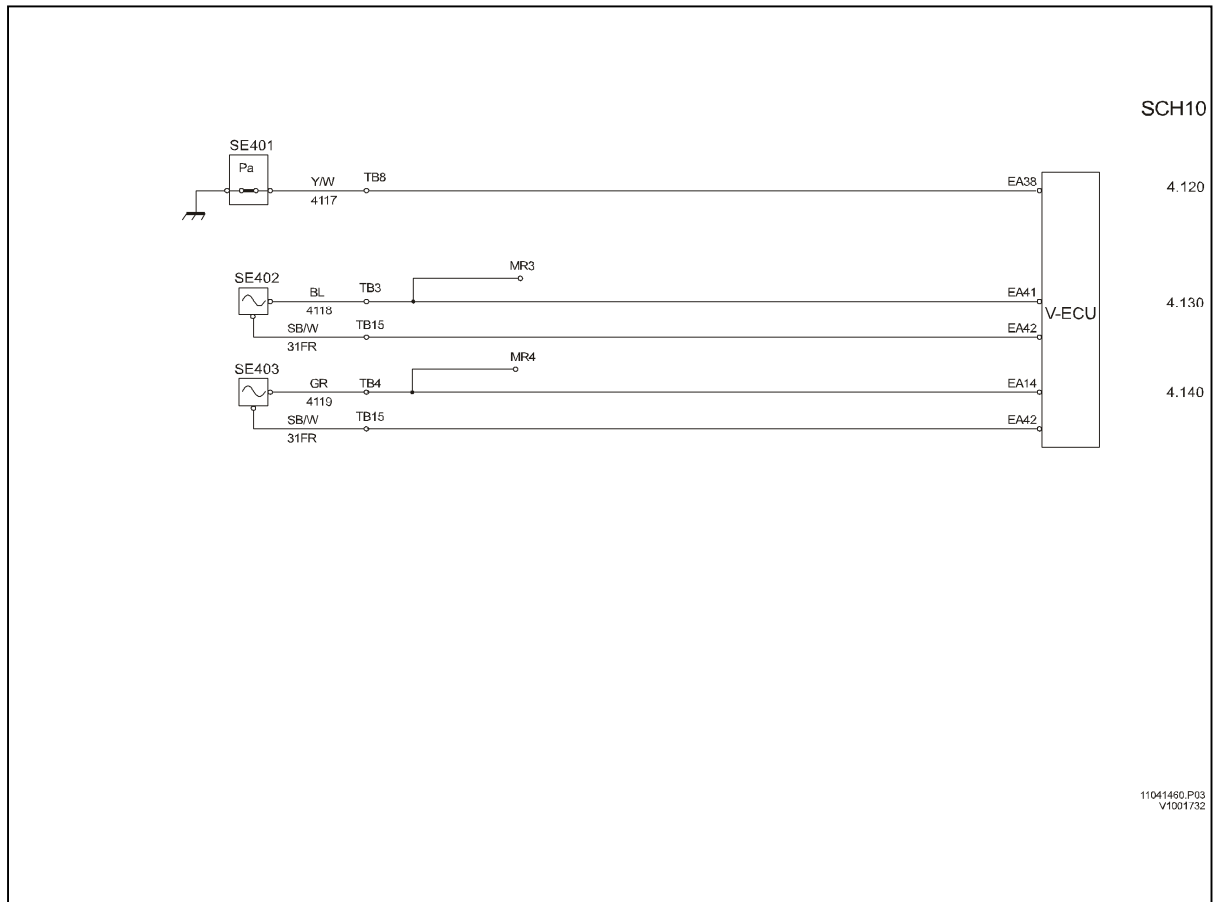


Figure 1





Construction Equipment

Service Information

Document Title: Wiring diagram 11	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 11

Shift solenoids, transmission disengagement

Serial no. —6095

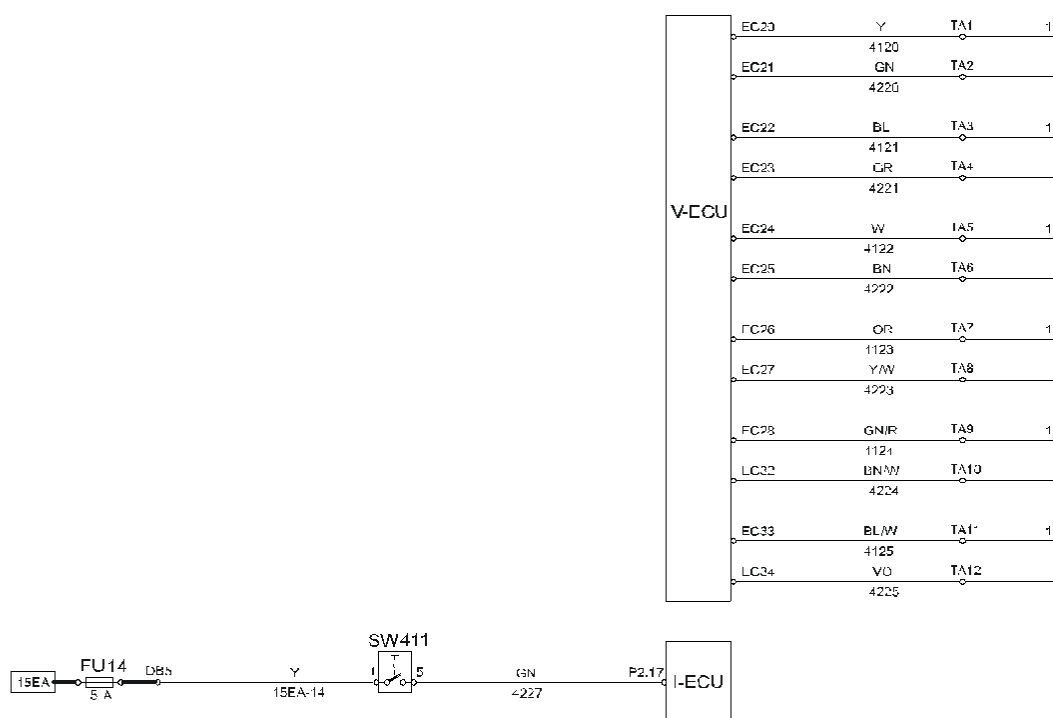
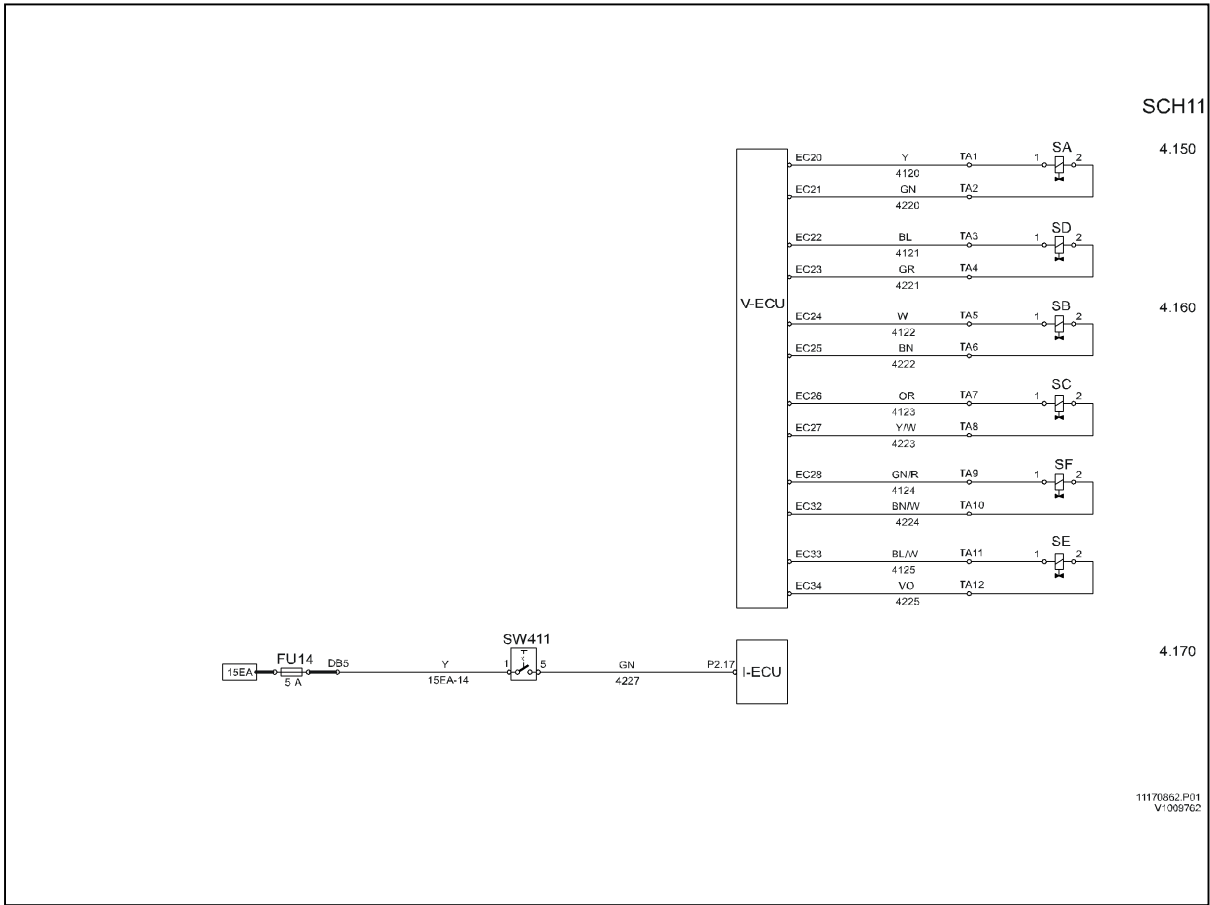


Figure 1

Serial no. 6096—



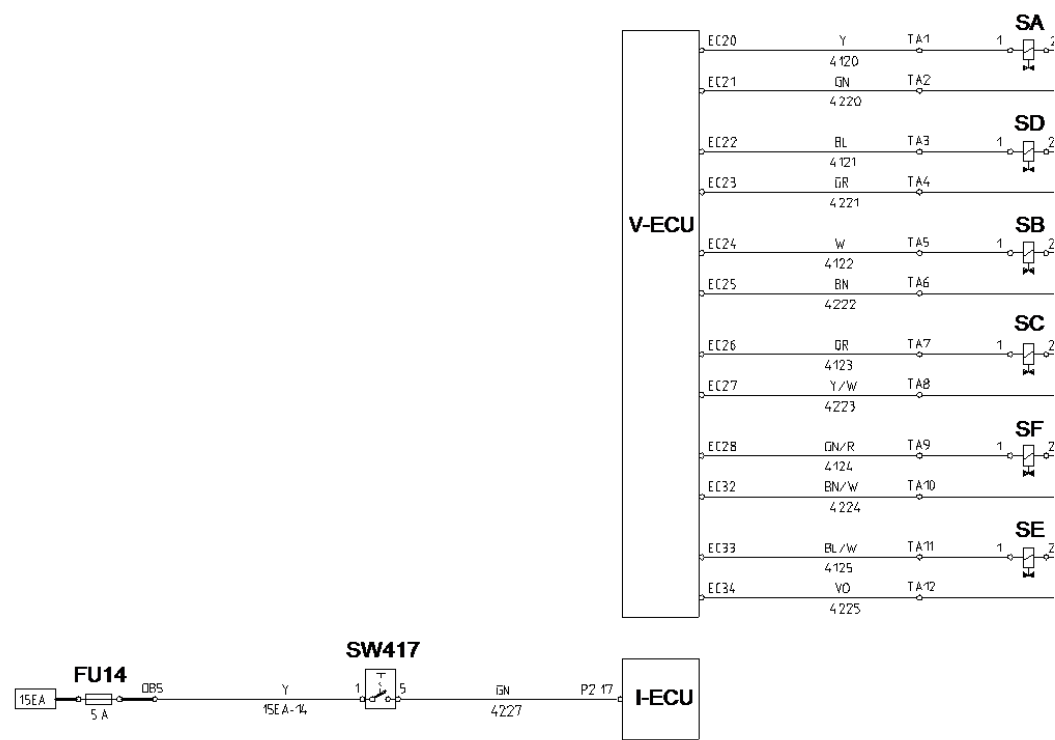
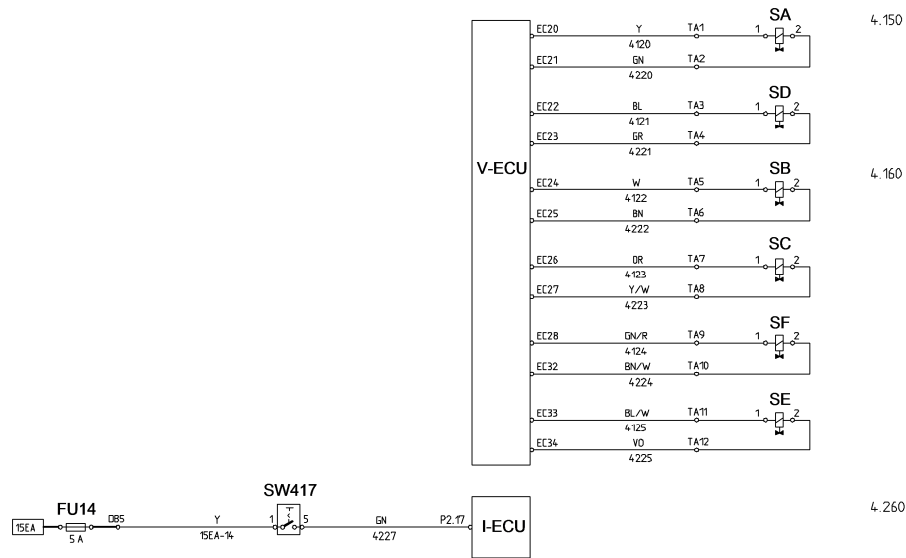


Figure 2

SCH11



11170879 P01
V1027431

Document Title: Wiring diagram 12	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 12

Sensors transmission oil, mode selector, kick-down

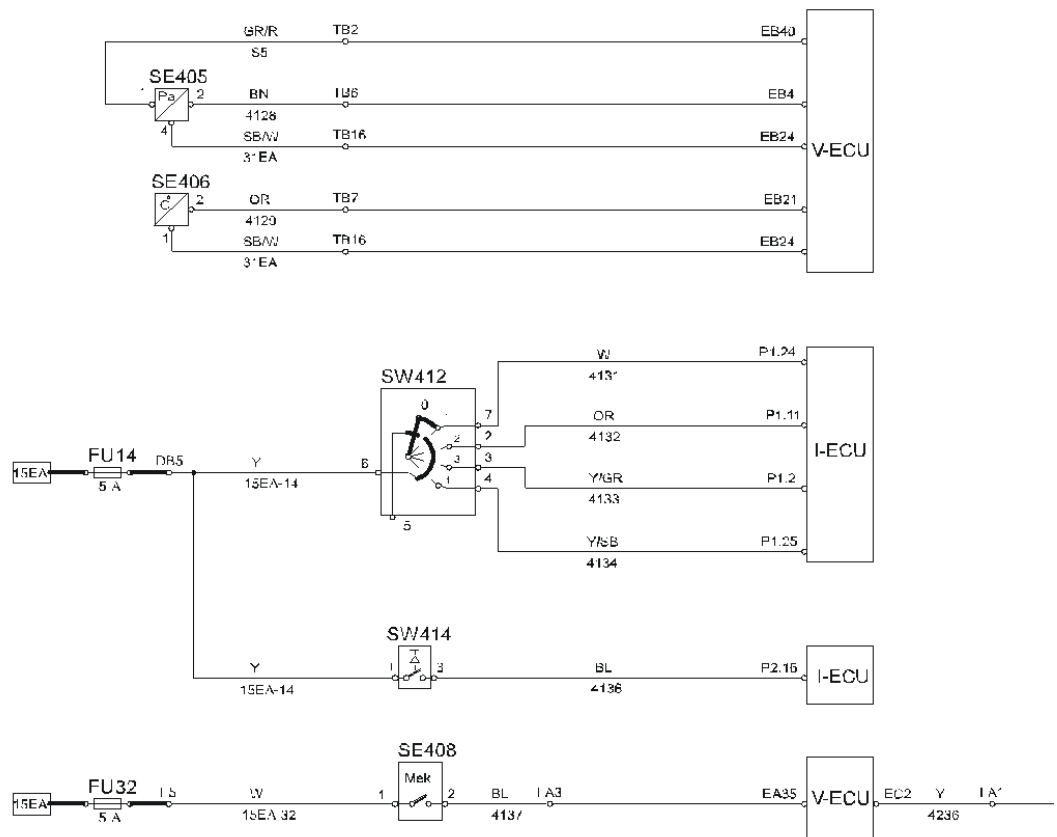
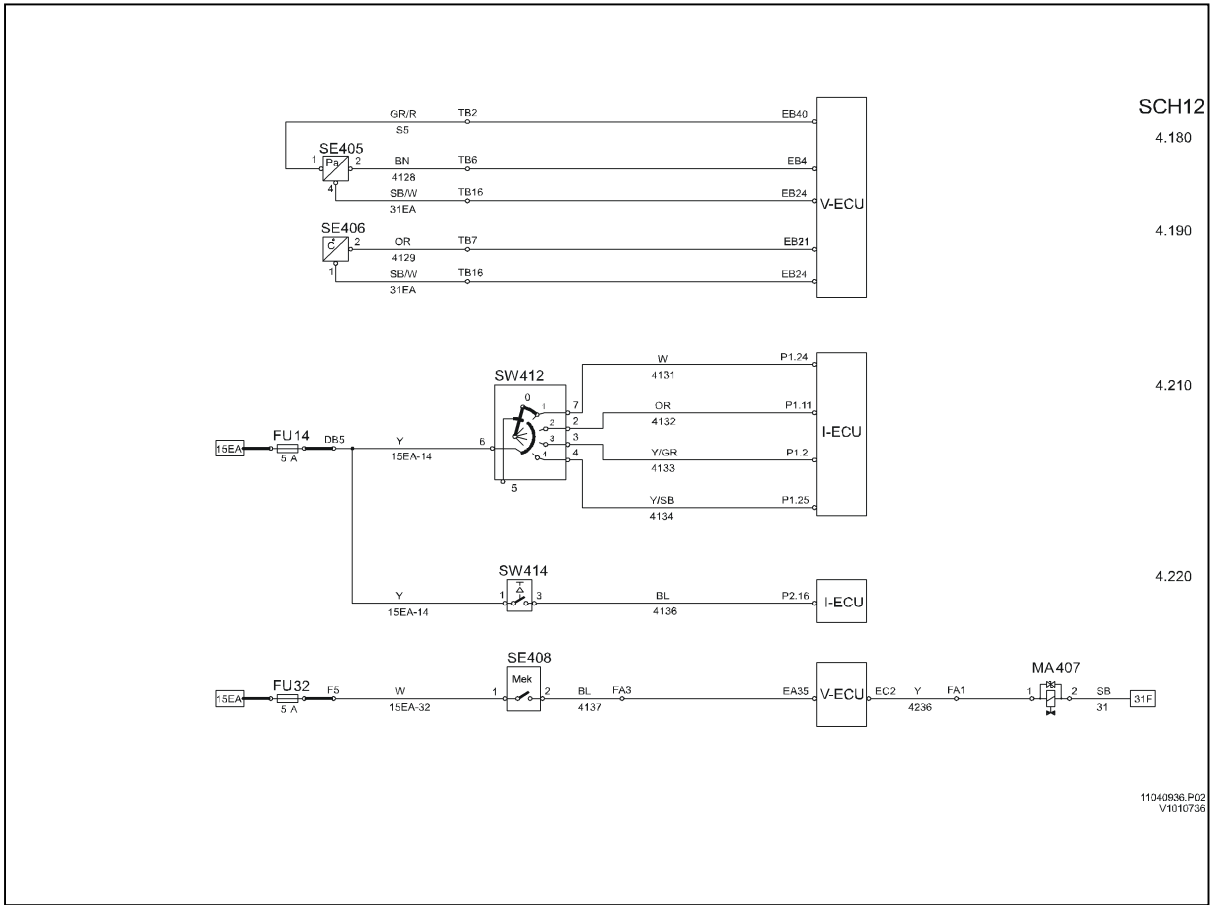


Figure 1





Construction Equipment

Service Information

Document Title: Wiring diagram 13	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 13

Axle oil temperature, transmission oil level

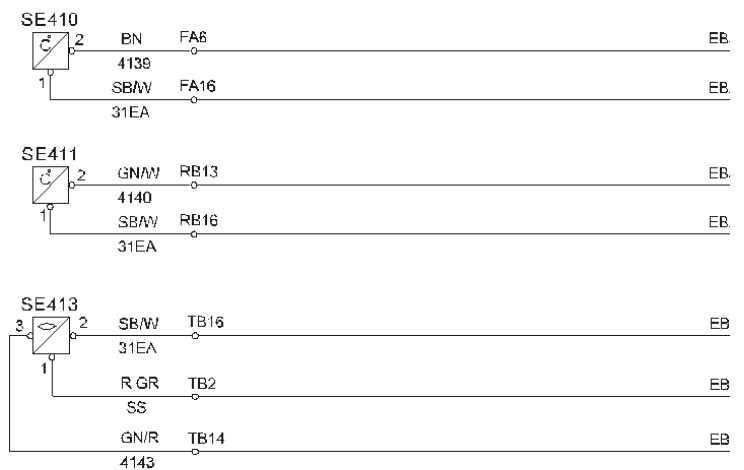
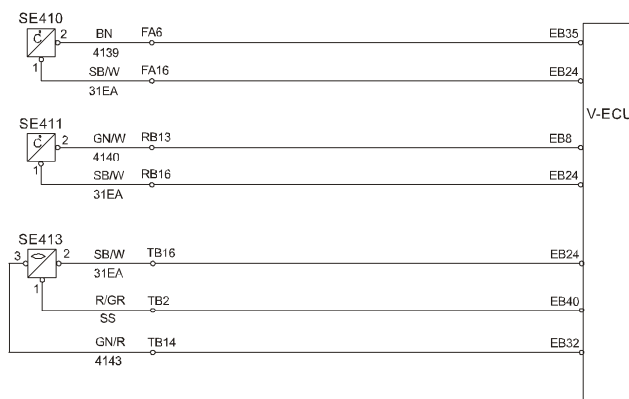


Figure 1

SCH13



Document Title: Wiring diagram 15B	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 15B

Brakes

Serial no. —5380

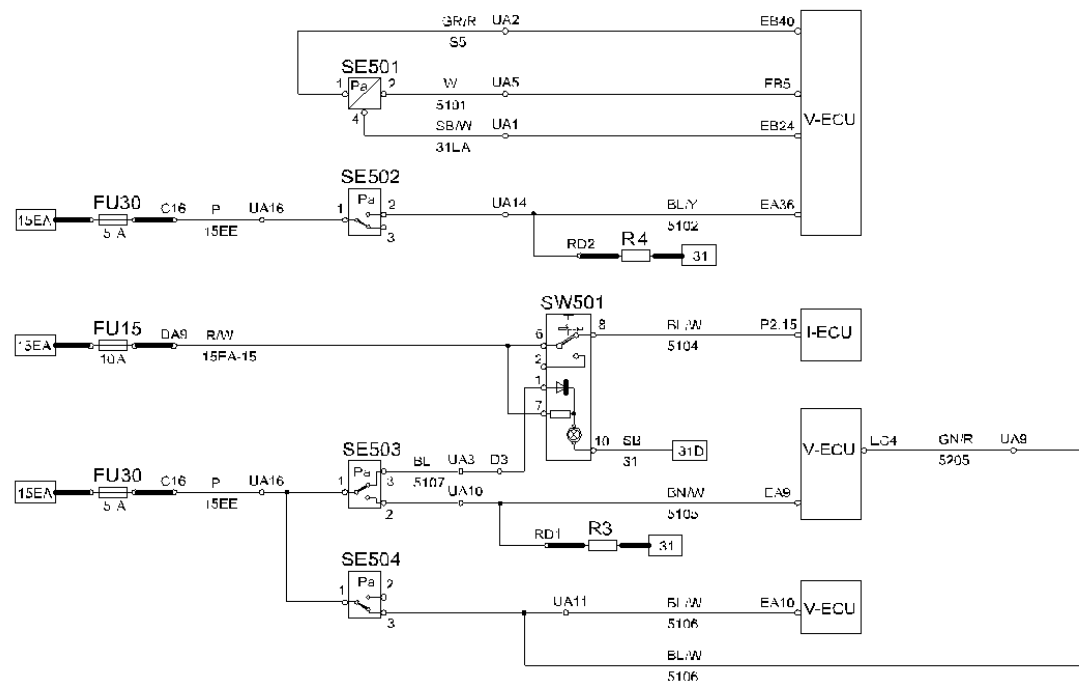
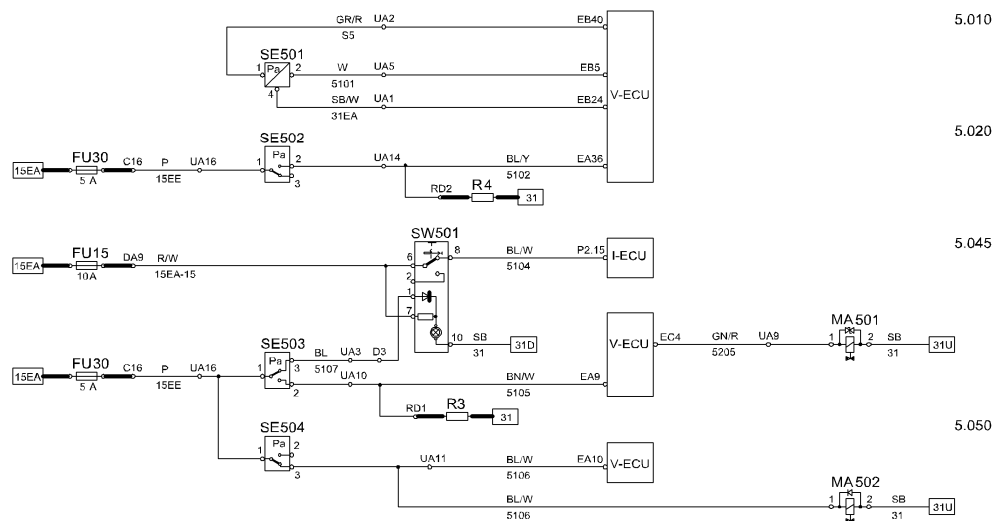


Figure 1

Serial no. 5381—5931

SCH15B



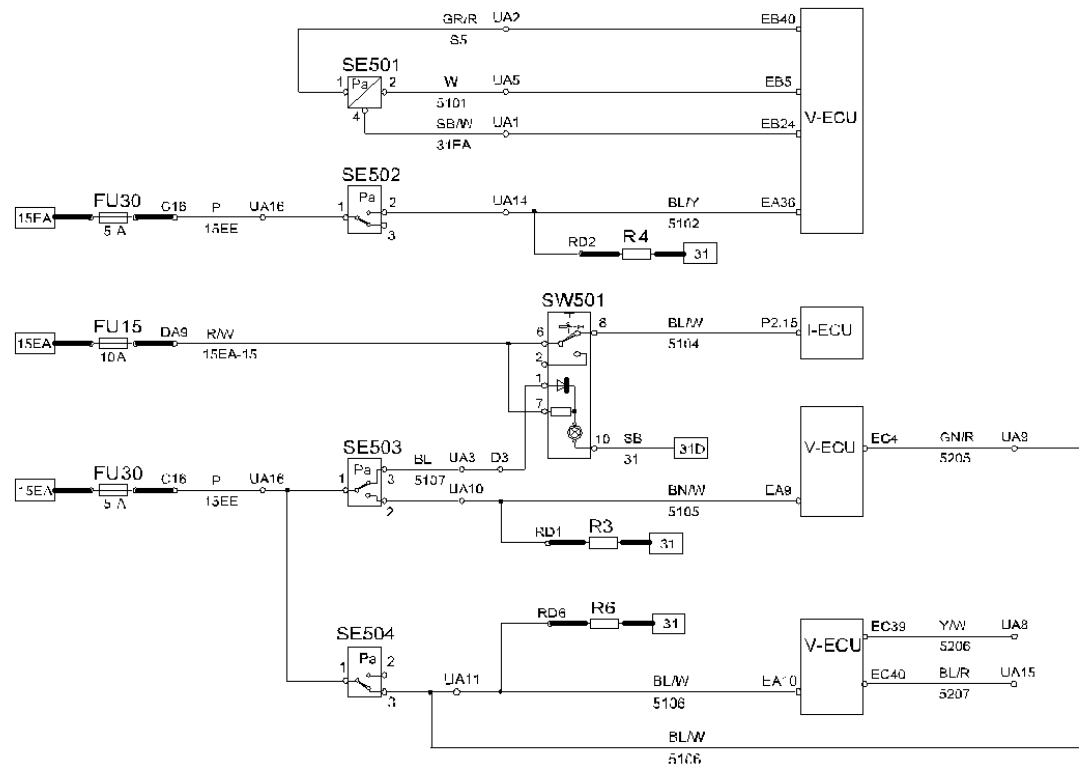
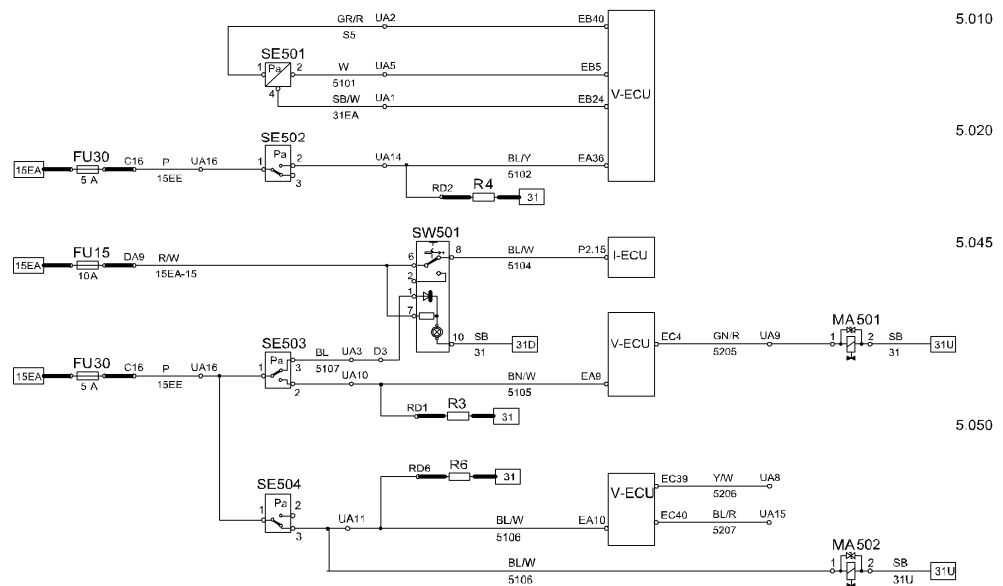


Figure 2

Serial no. 5932—

SCH15B



11170773 P01
V10:9570

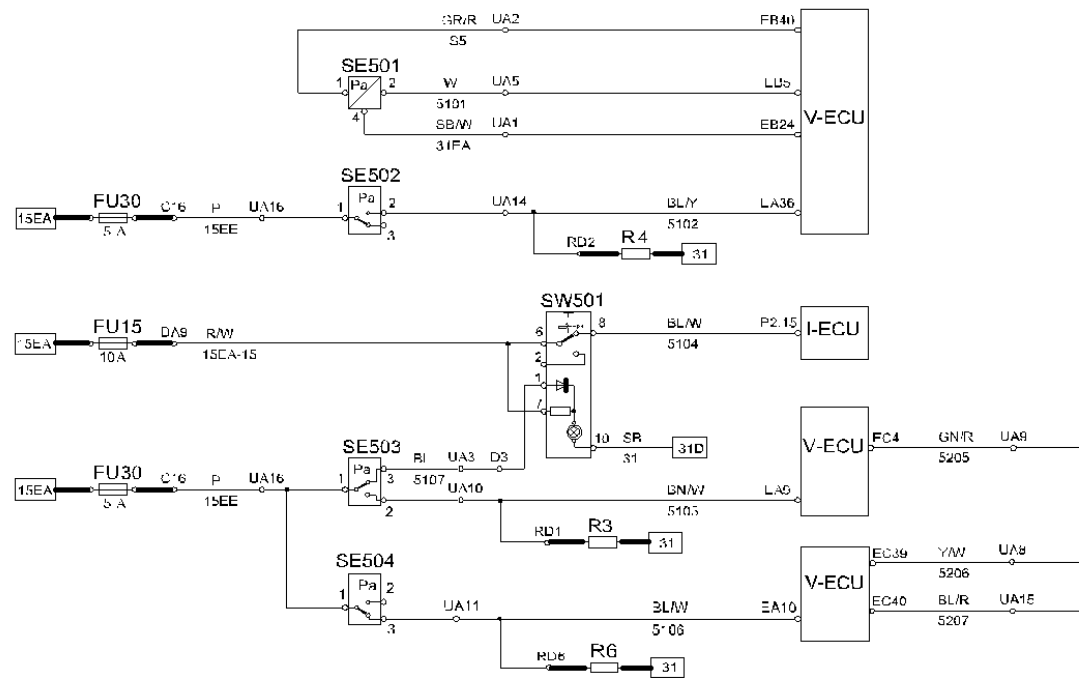
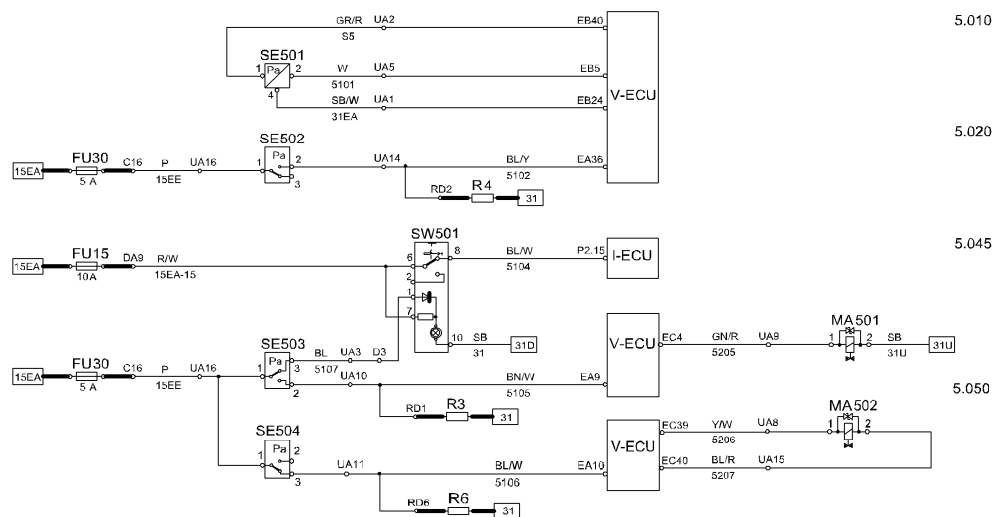


Figure 3

SCH15B



Document Title: Wiring diagram 16	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 16

Secondary steering

Serial no. —5380

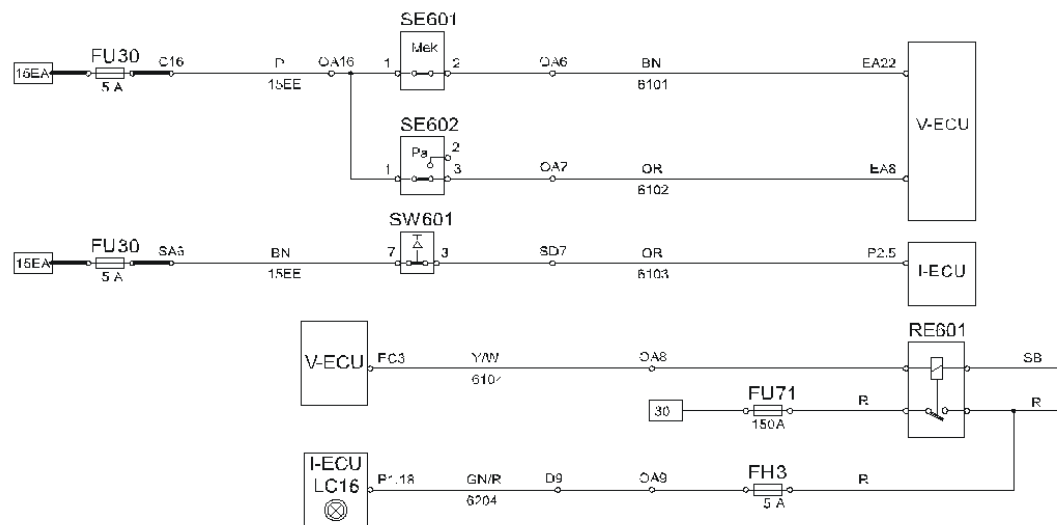
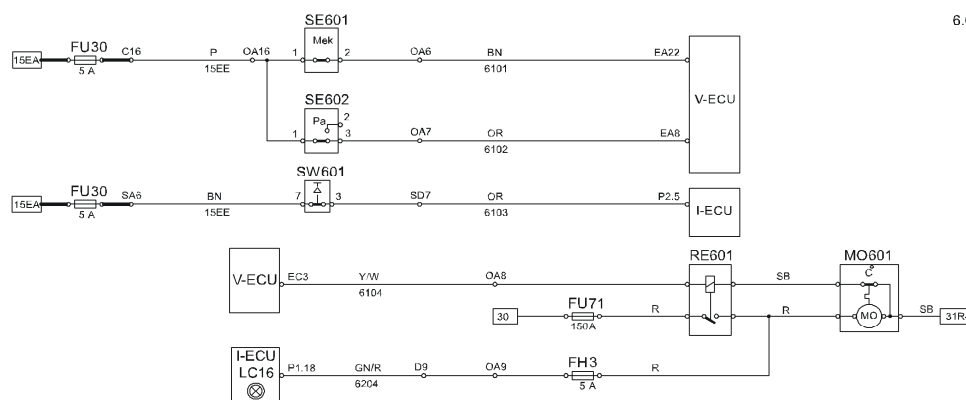


Figure 1

Serial no. 5381—7418

SCH16

6.010



11040531.P01
V1001561

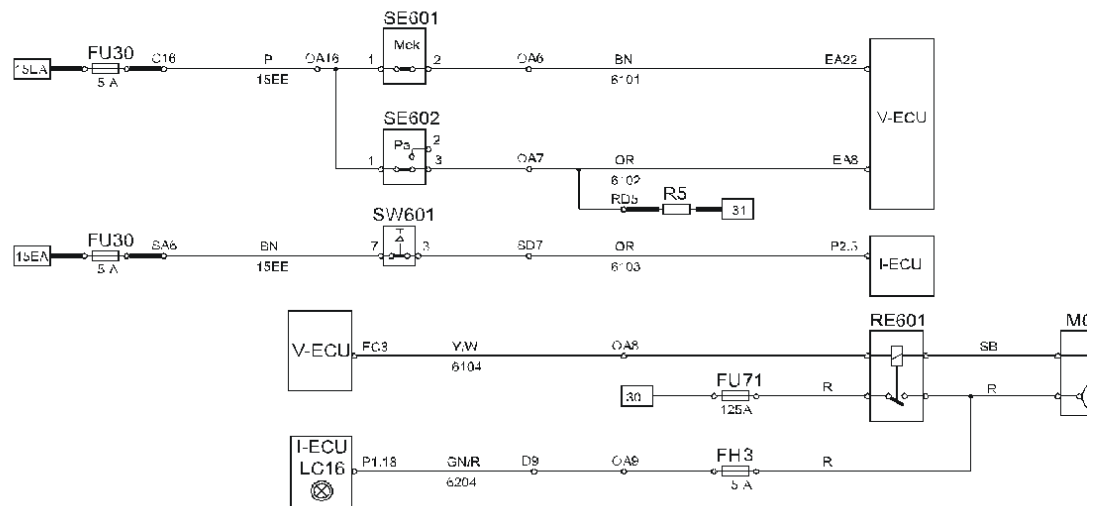
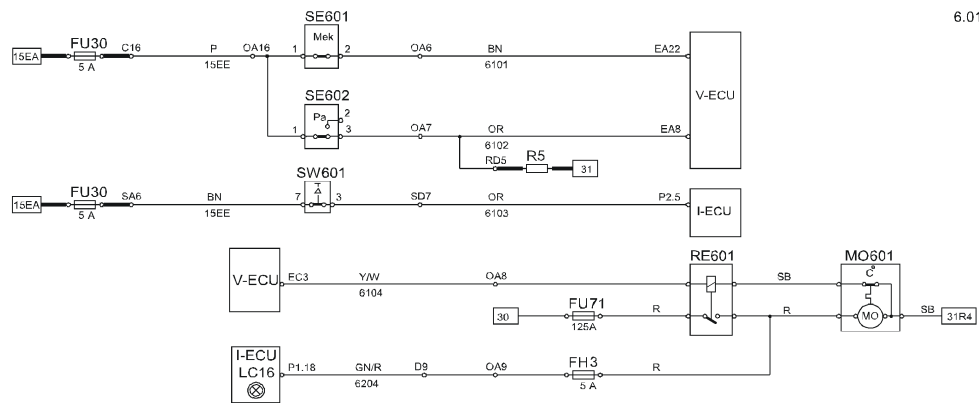


Figure 2

Serial no. 8001-

SCH16

6.010



11170755.P02
V1019604

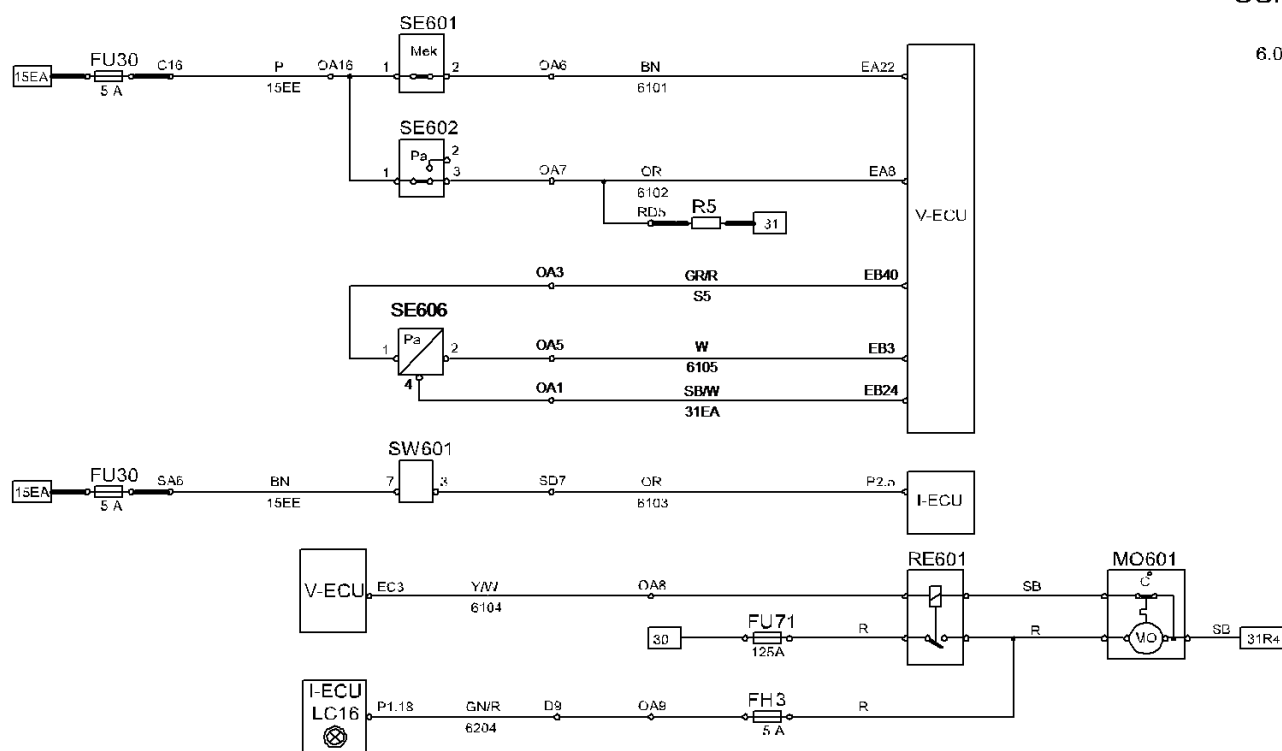
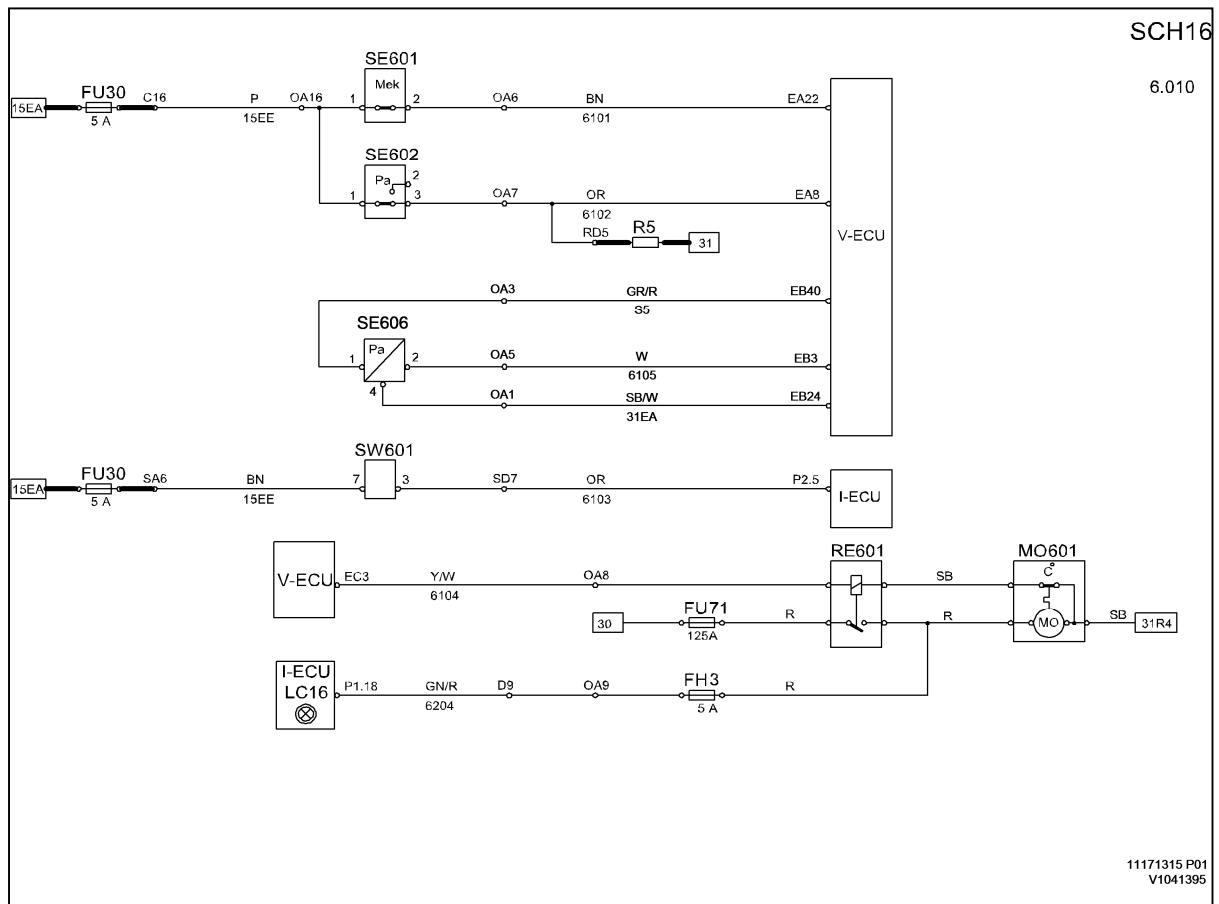


Figure 3



Document Title: Wiring diagram 17	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 17

Comfort Drive Control (CDC)

Serial no. —5966

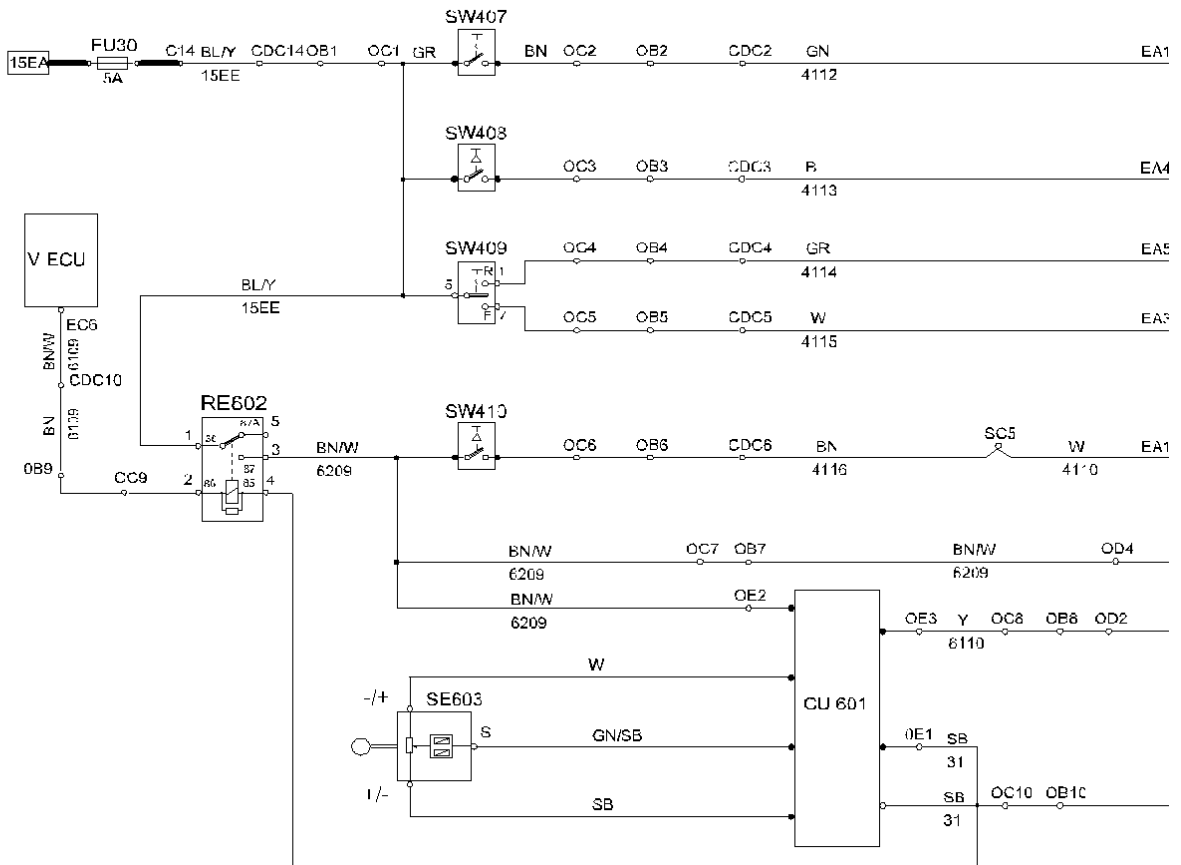
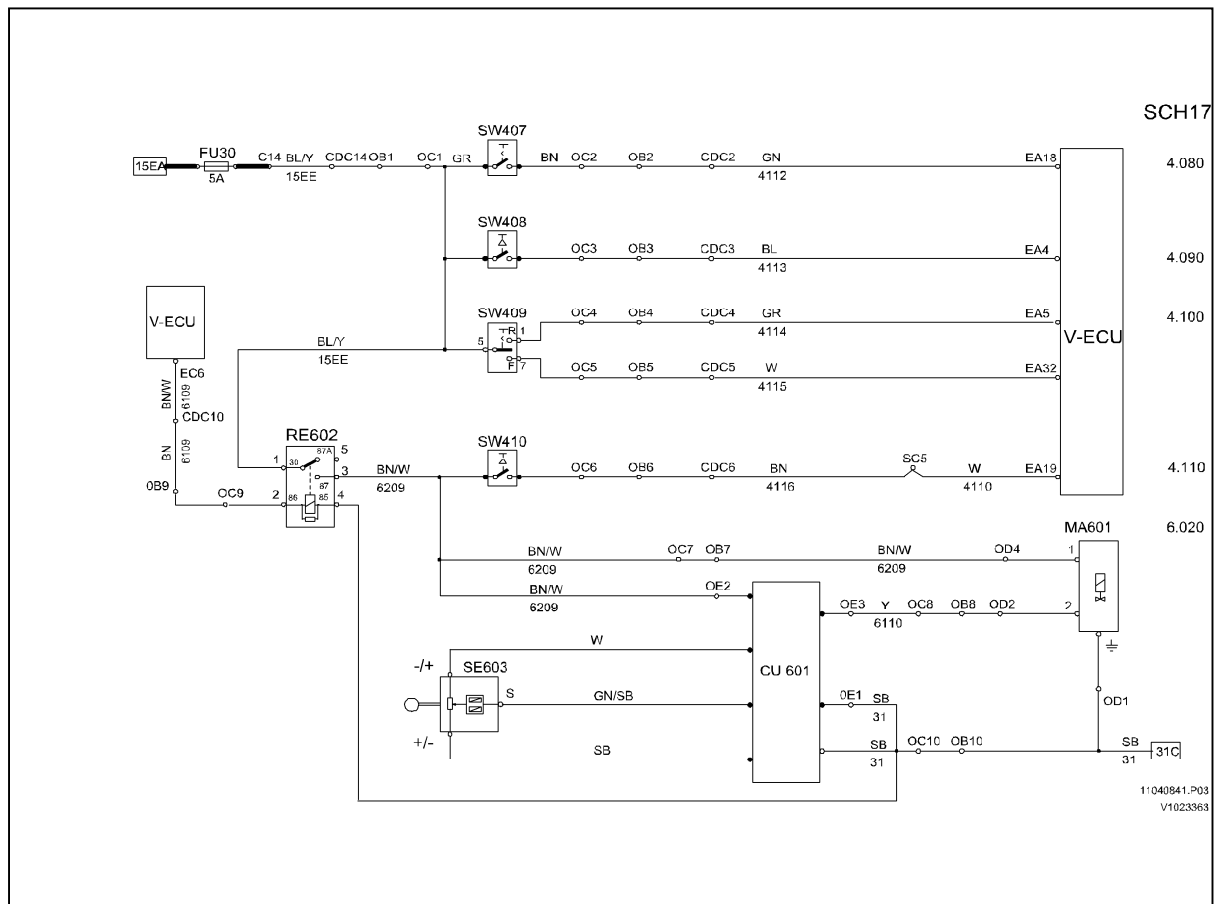


Figure 1

Serial no. 5967—



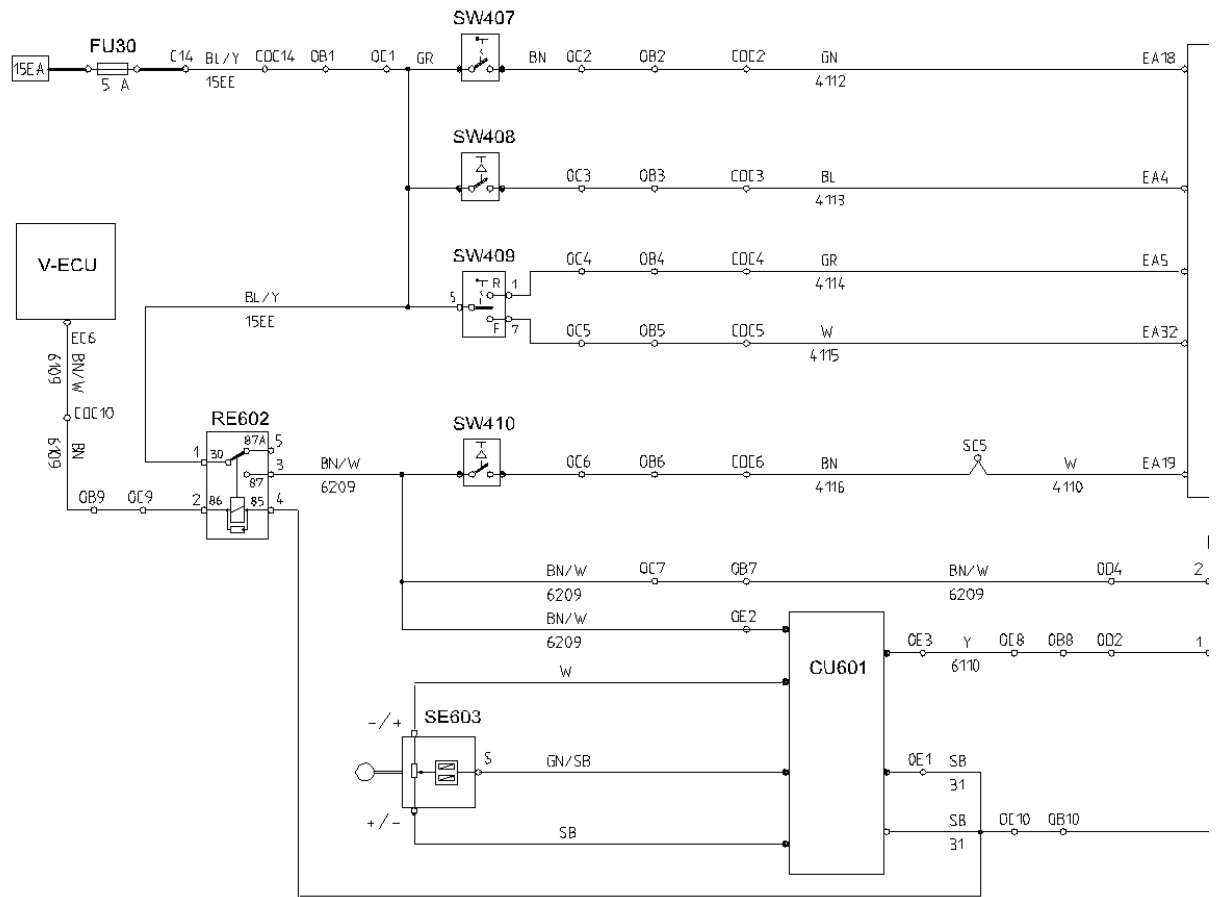


Figure 2

Document Title: Wiring diagram 17 Updateted CDC	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L60E, L180E, L110E, L120E, L220E, L180E HL, L90E, L70E, L150E [GB]			

Wiring diagram 17 Updateted CDC

Comfort Drive Control (CDC)

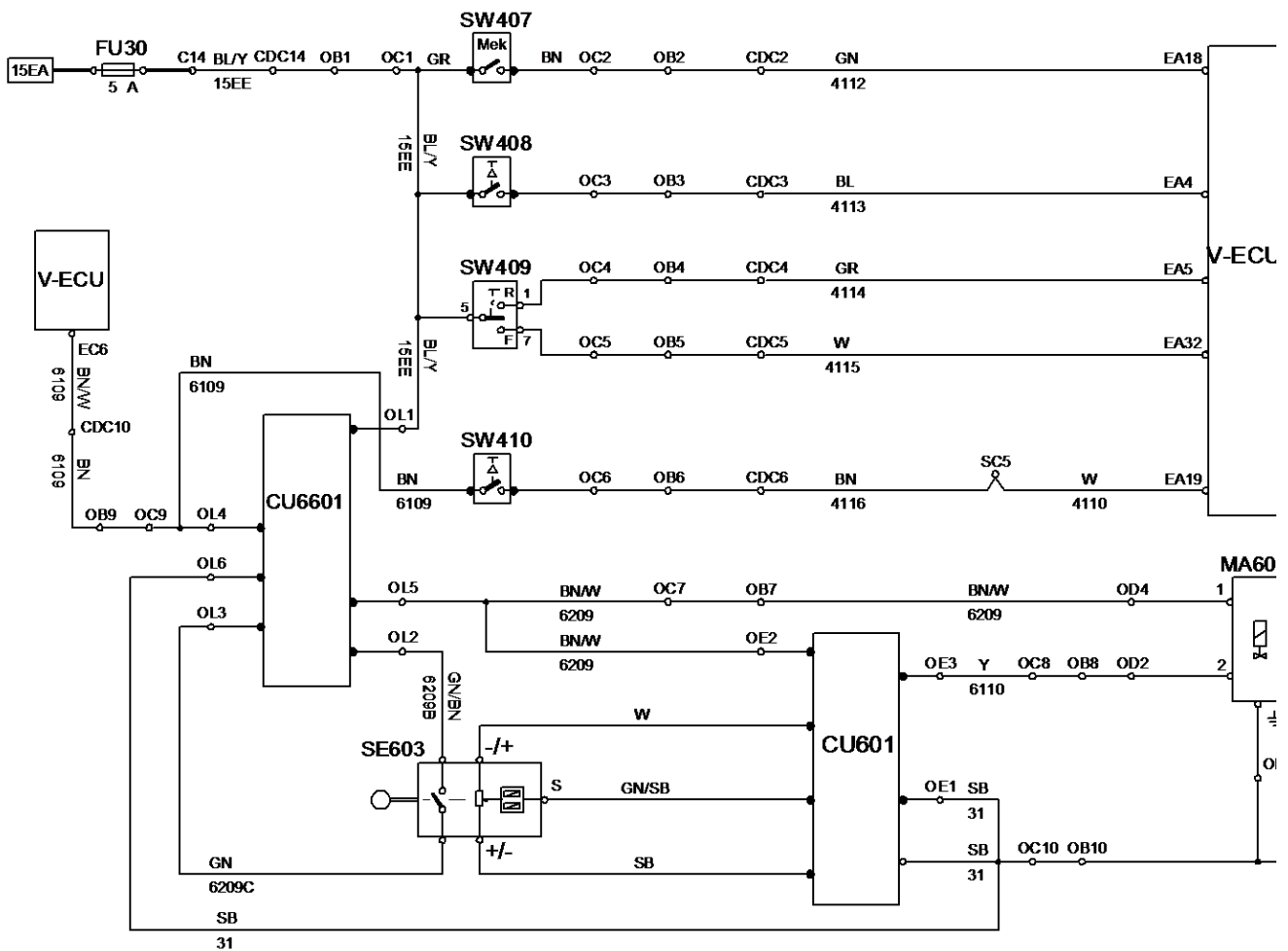
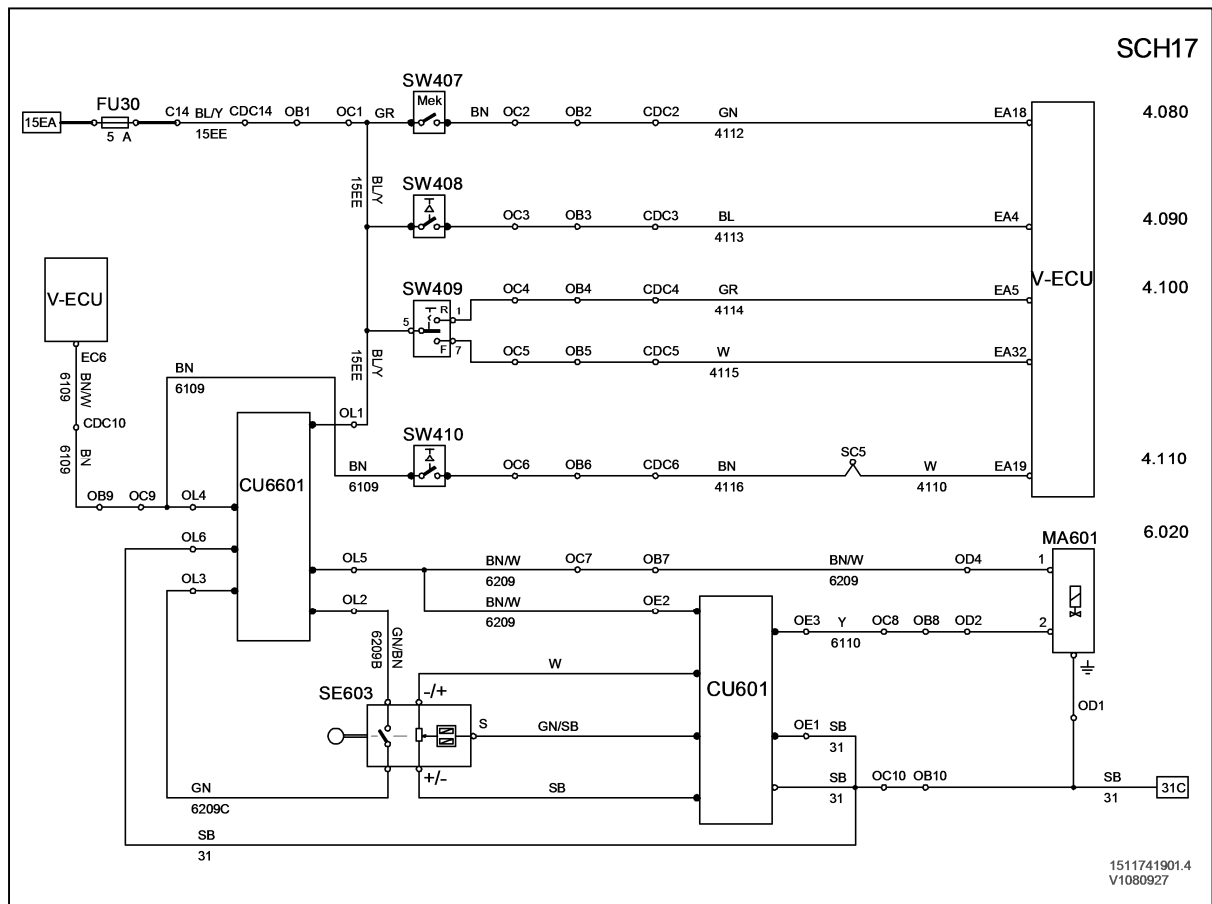


Figure 1



Document Title: Wiring diagram 18	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 18

Wiper, washer, horn

SC

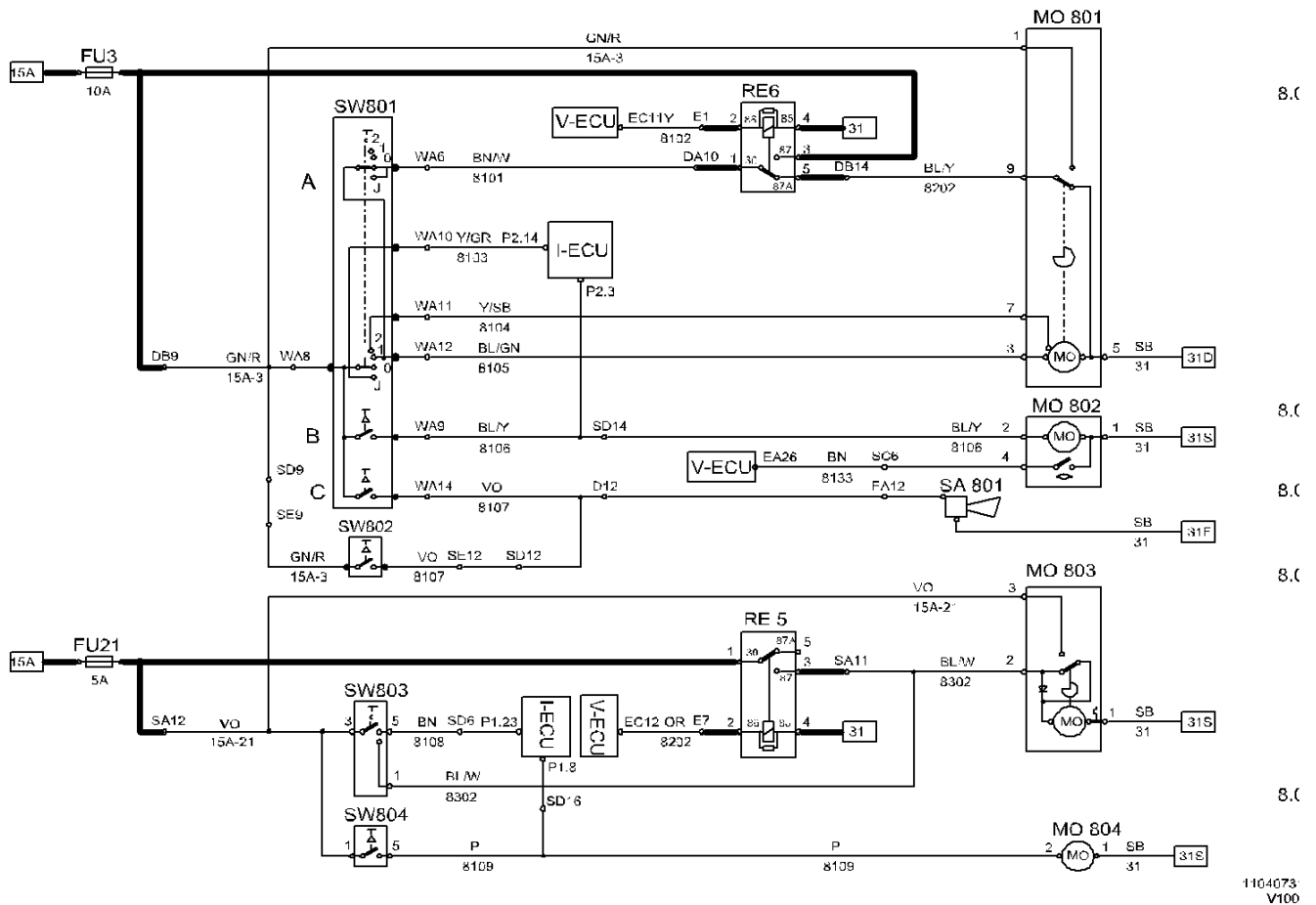


Figure 1

Document Title: Wiring diagram 19	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 19

Climate control, air conditioning (AC)

Serial no. —5498

SCH19

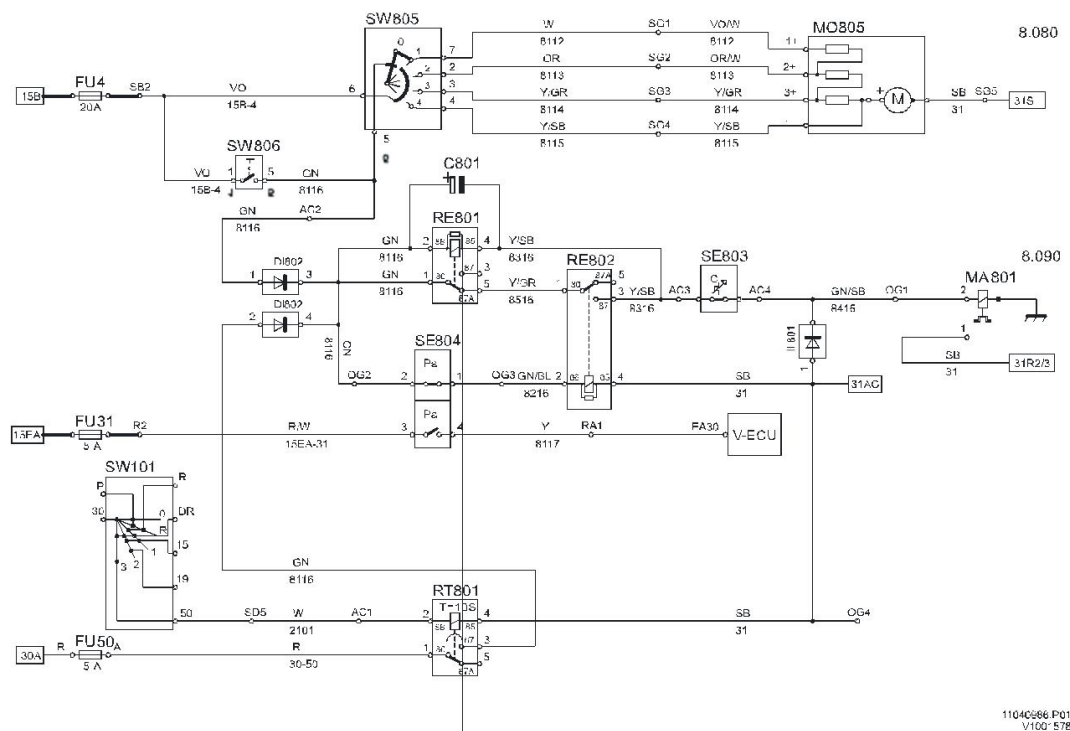


Figure 1

Serial no. 5499—

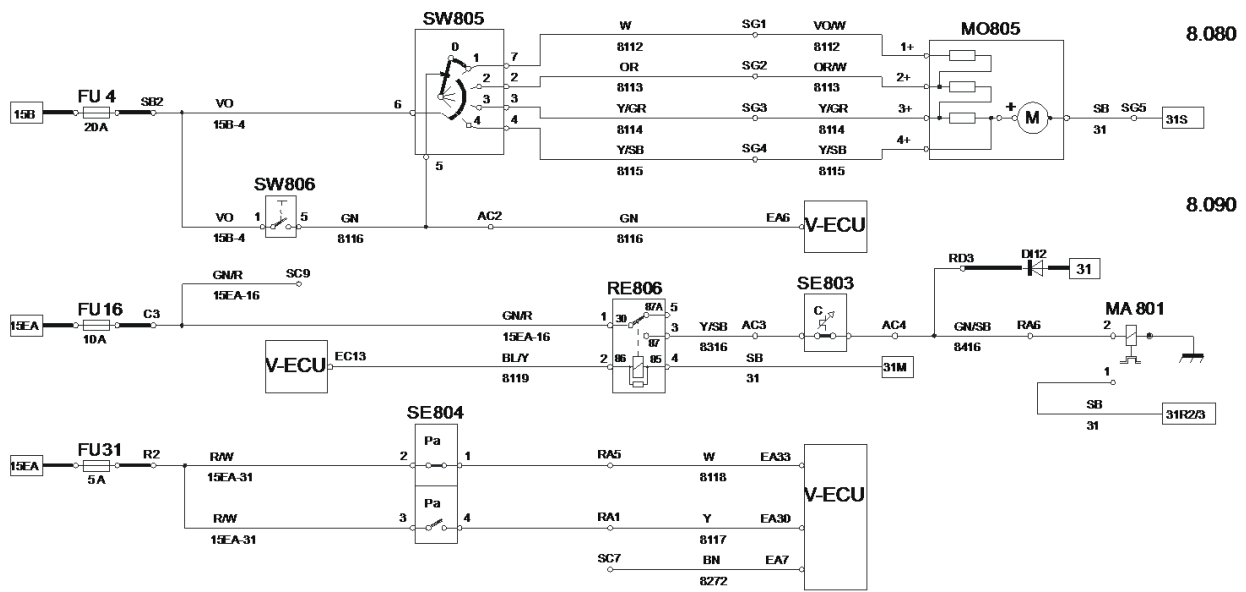


Figure 2

Document Title: Wiring diagram 20	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 20

Cab

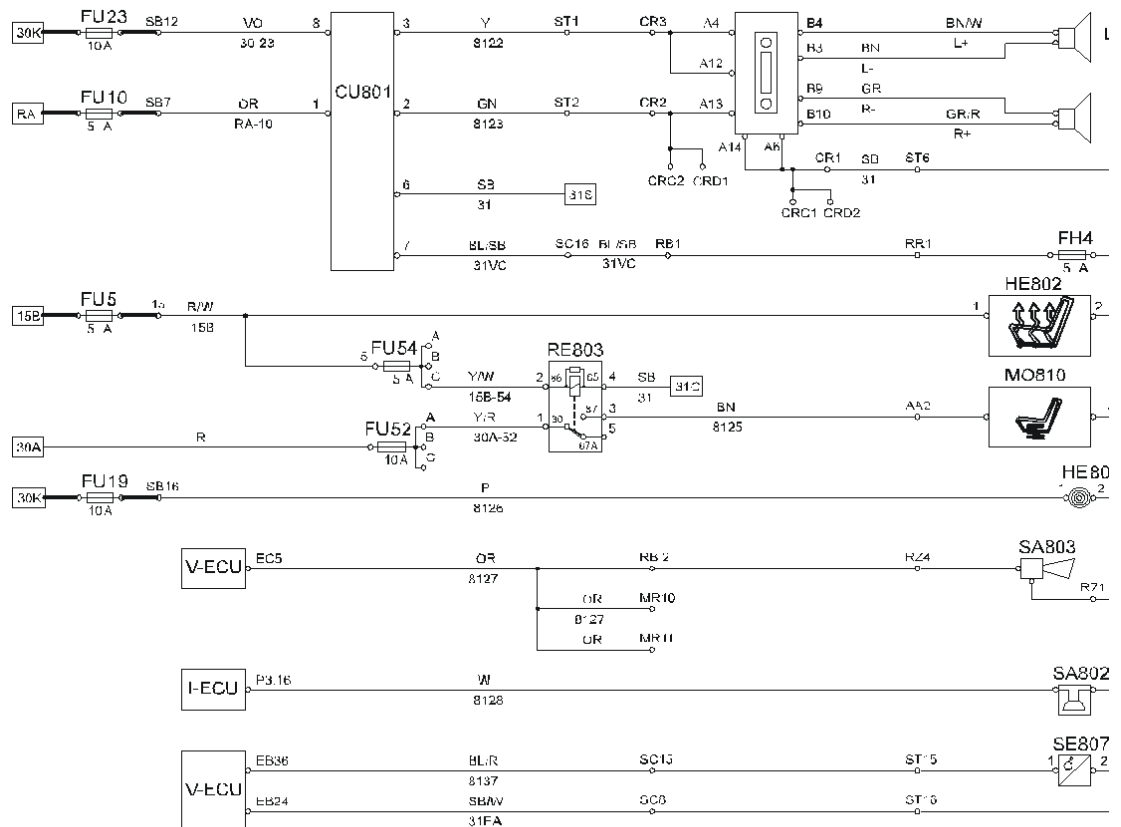
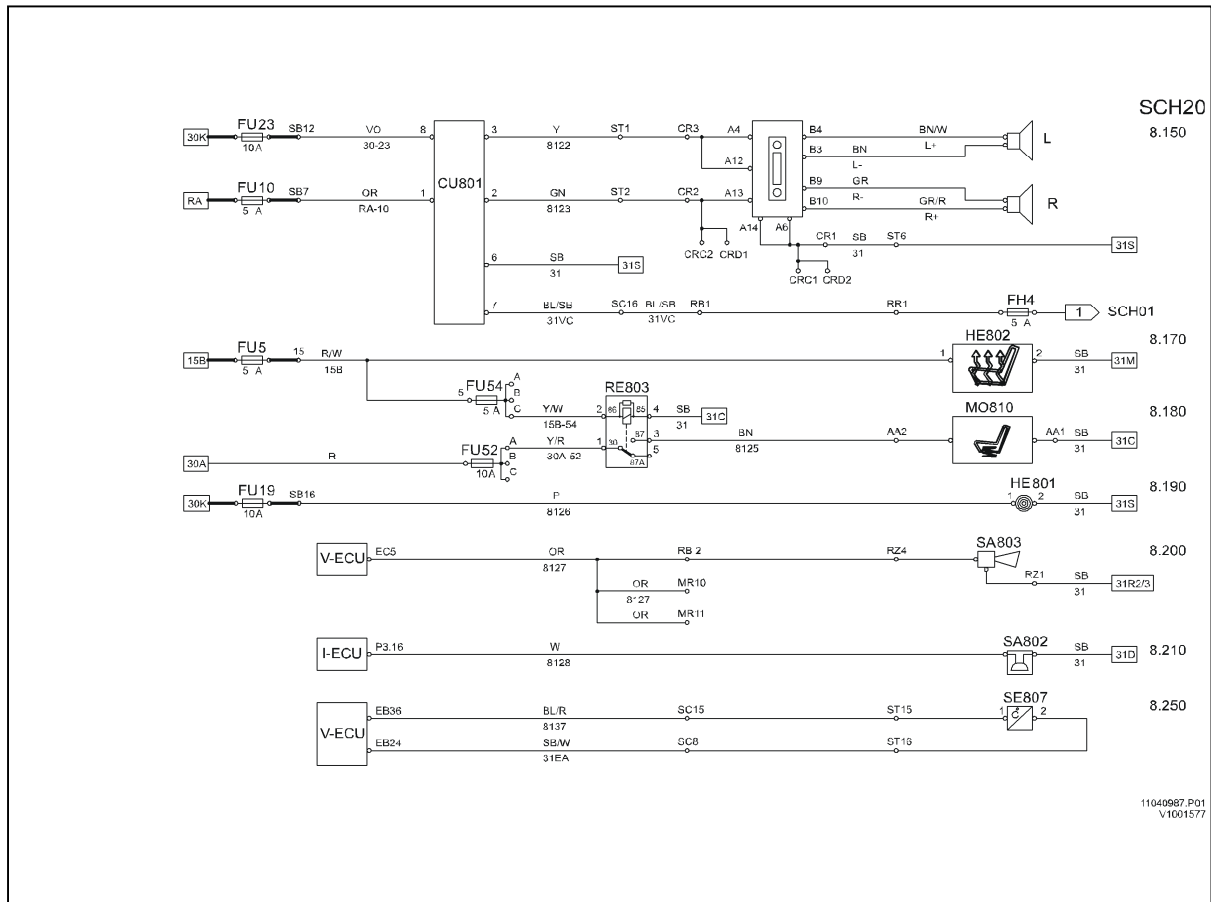


Figure 1

From equipment no. 80518 (radio)



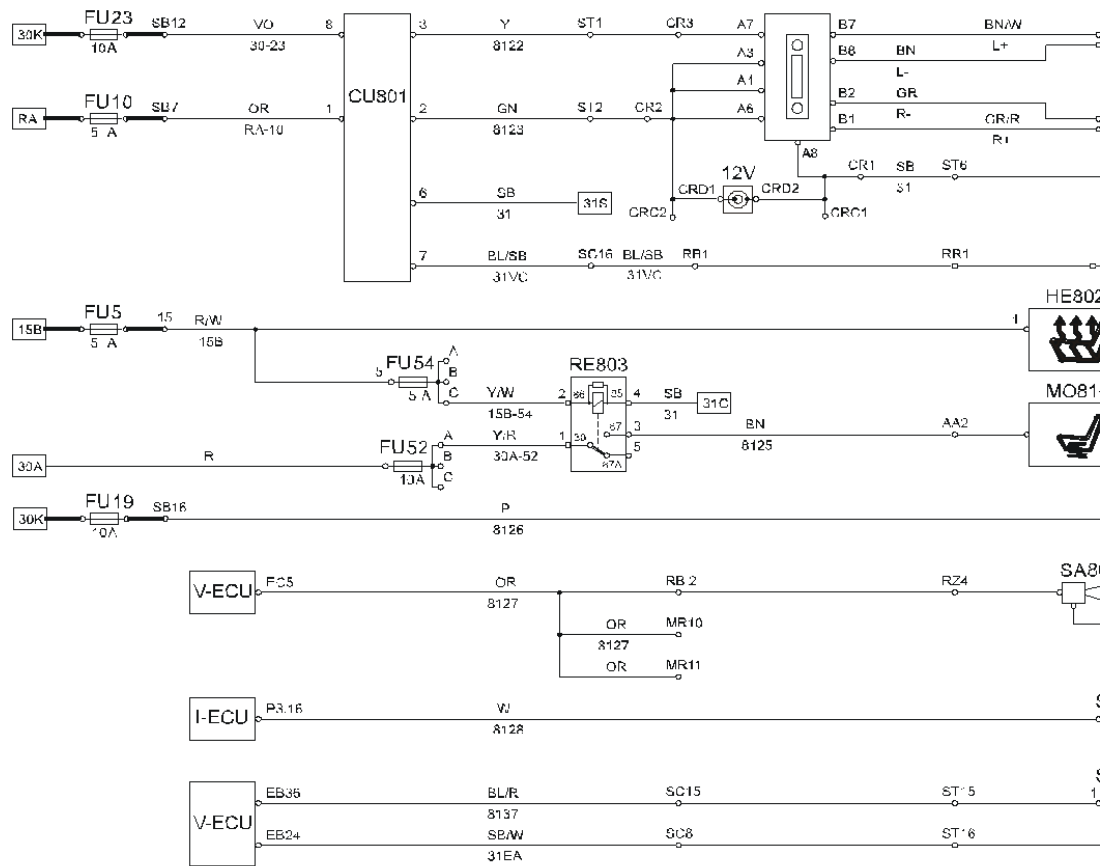
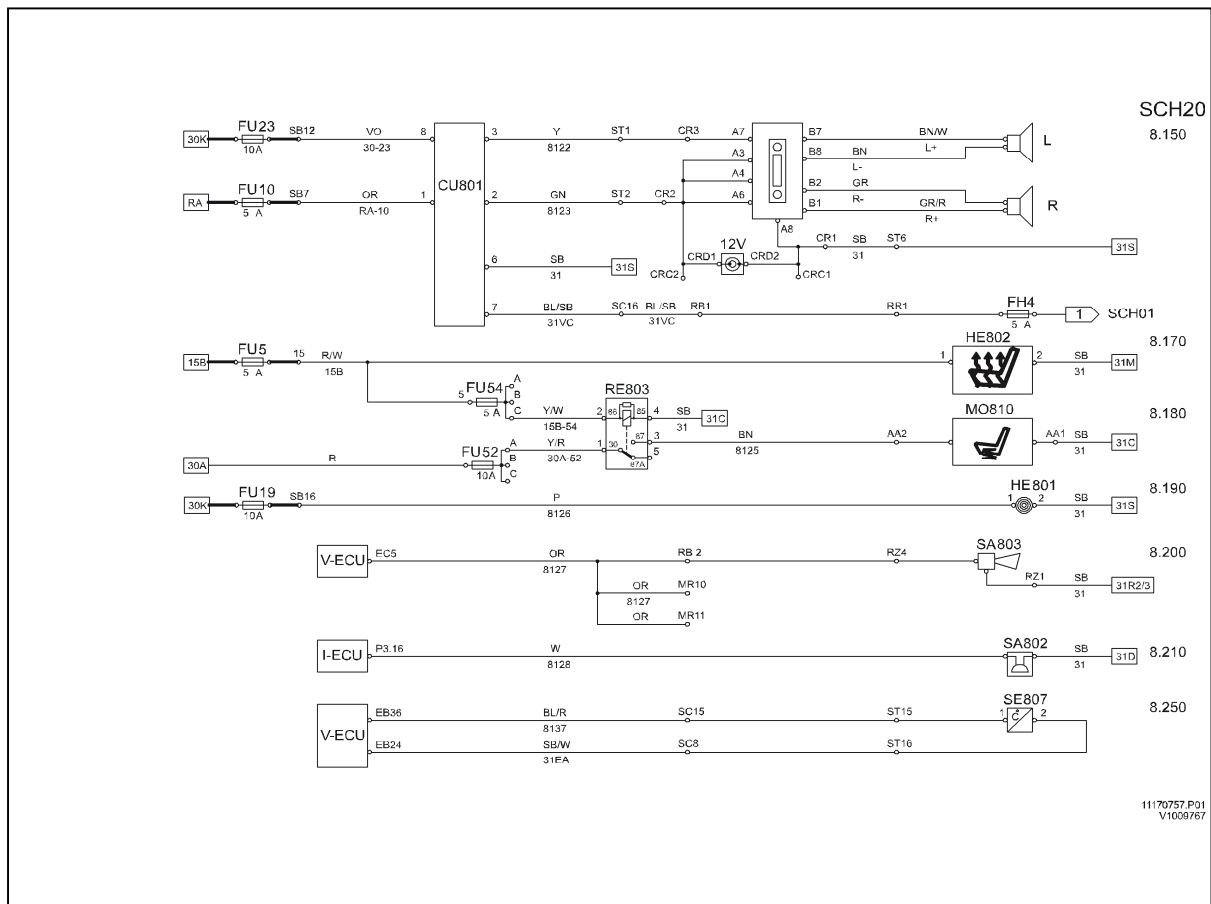


Figure 2



Document Title: Wiring diagram 21	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 21

Working hydraulics

Serial no. —5220

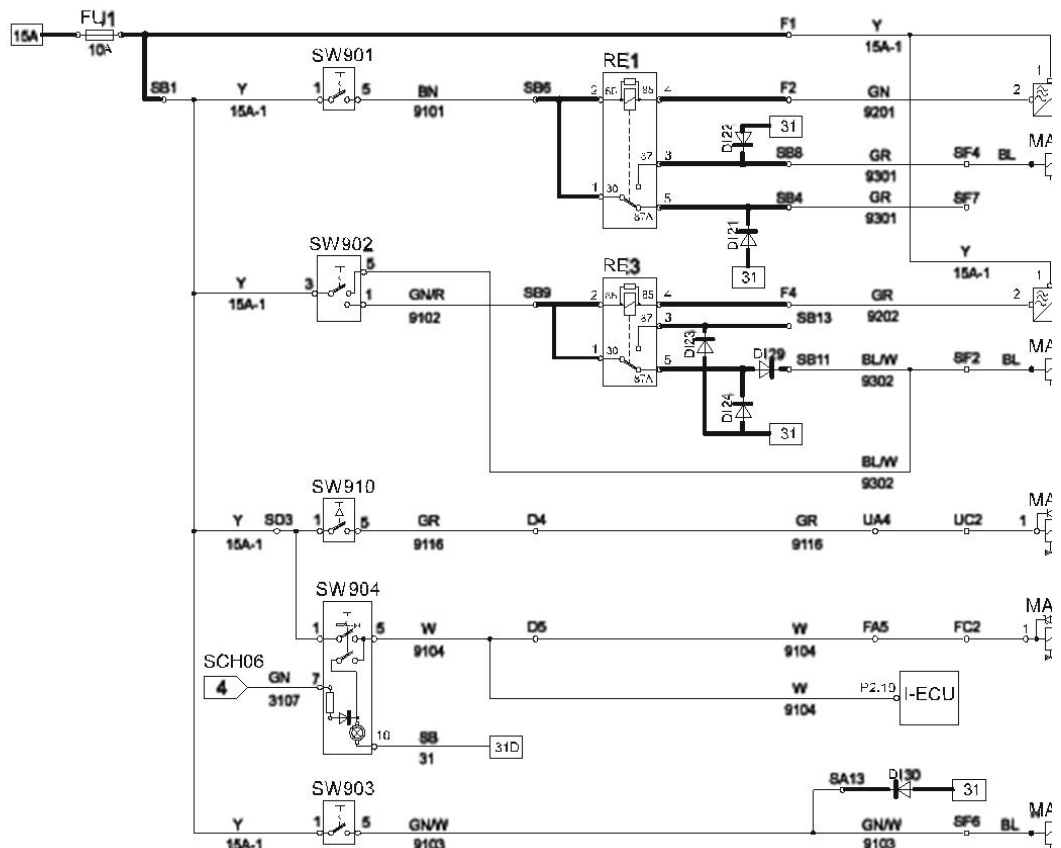
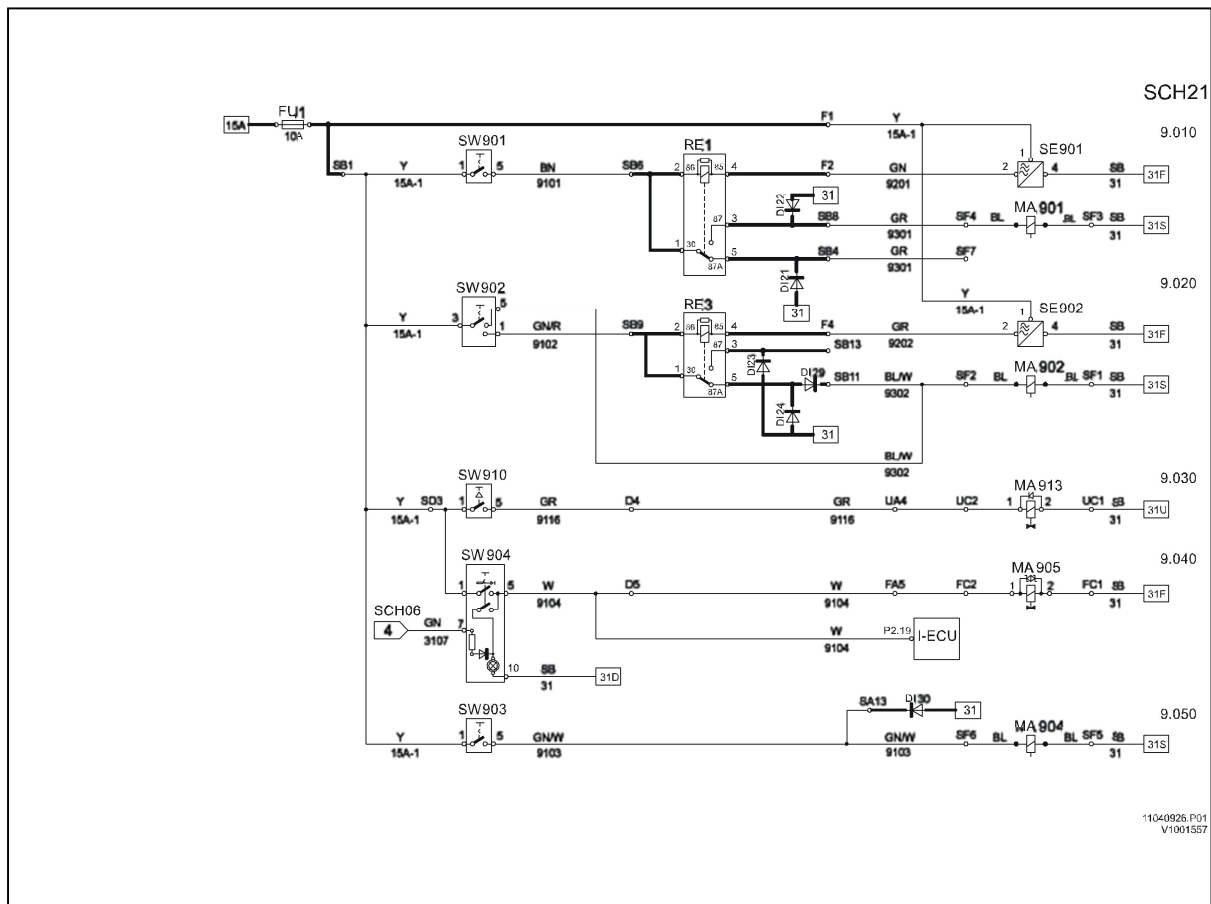


Figure 1

Serial no. 5221—5380



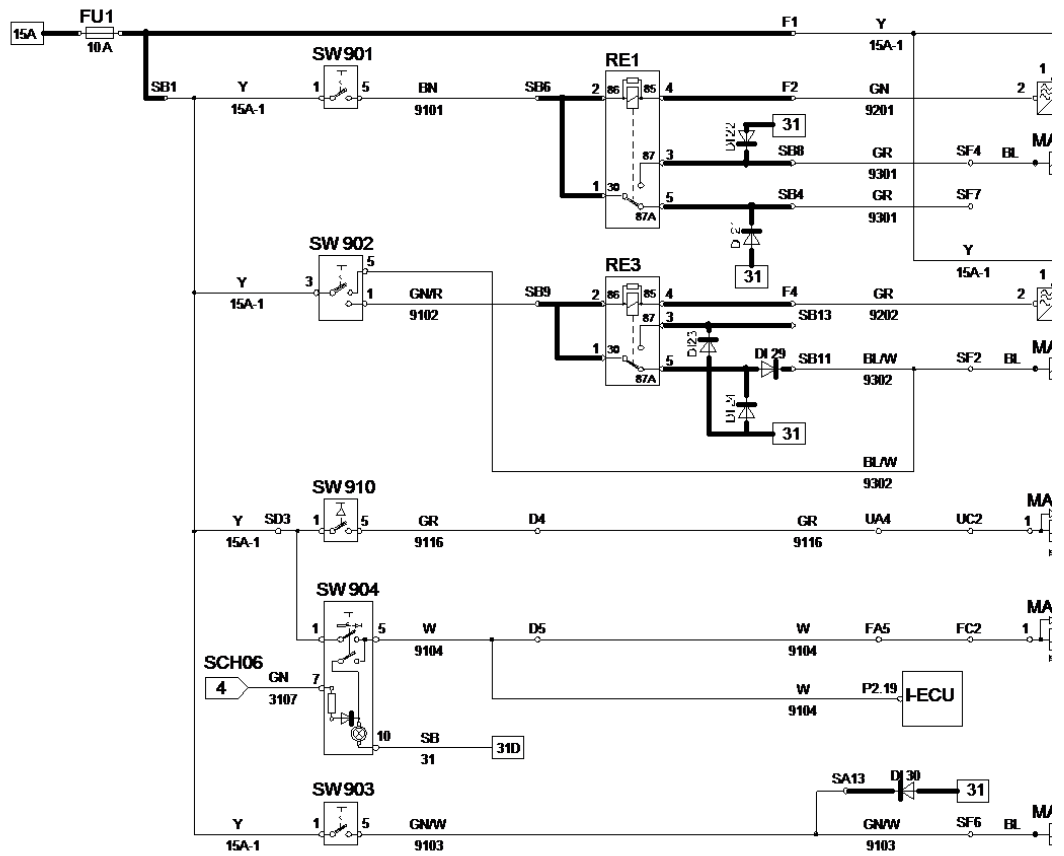
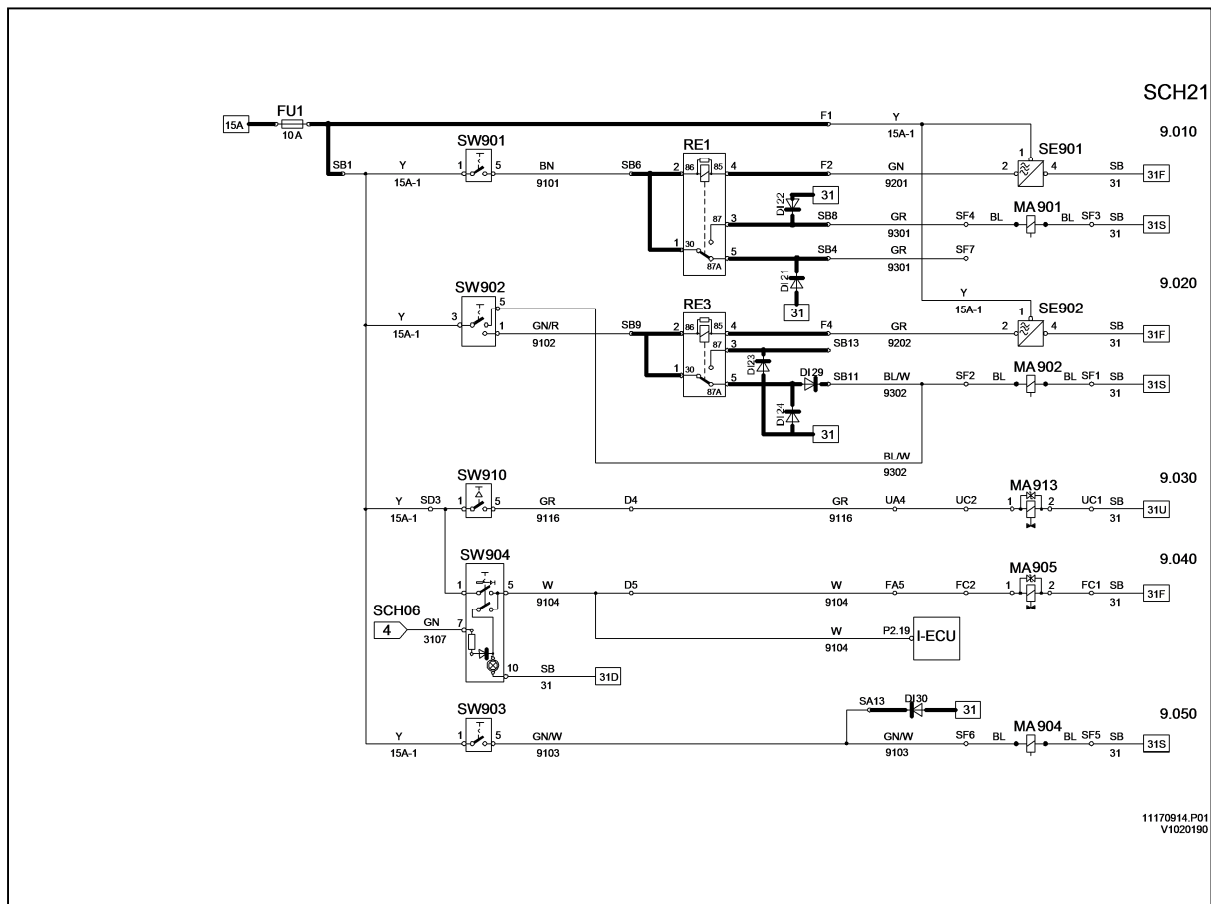


Figure 2

Serial no. 5381—5931



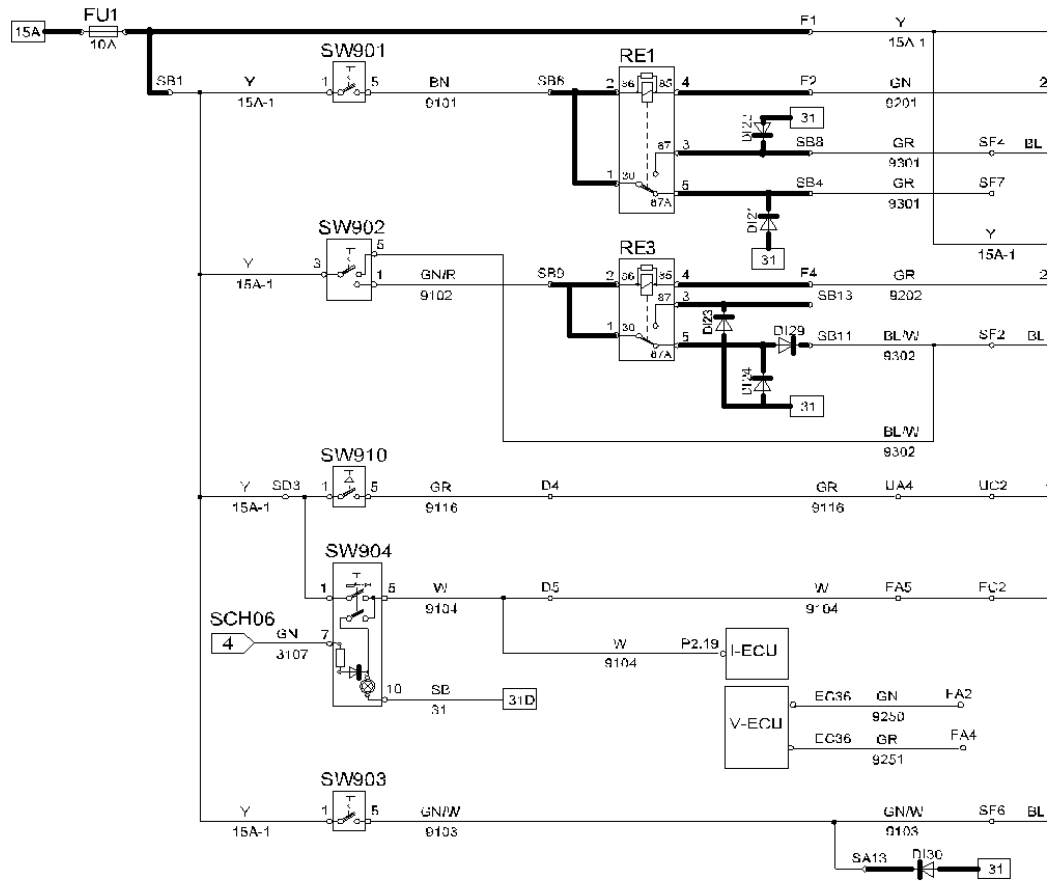


Figure 3

Serial no. 5932—6095

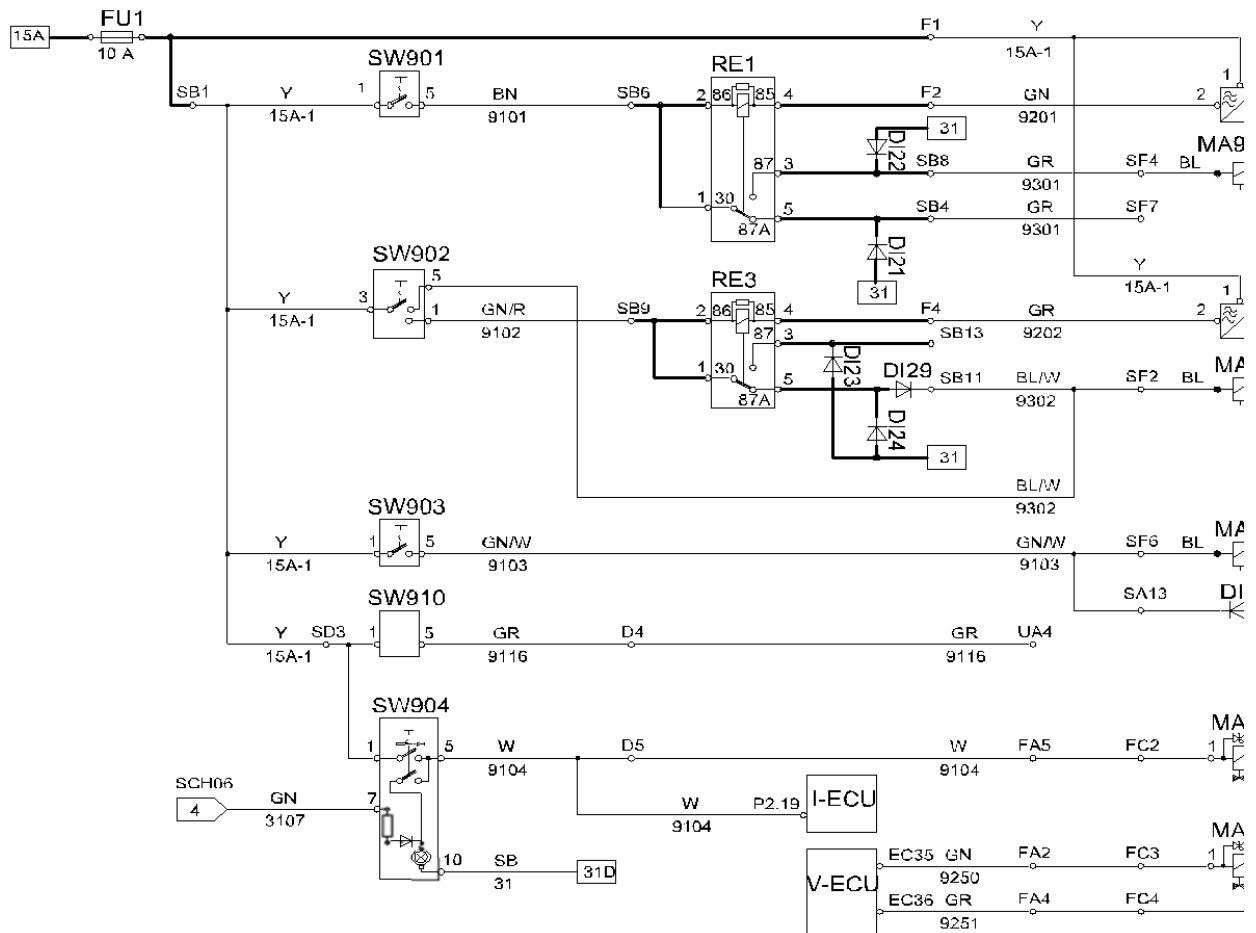
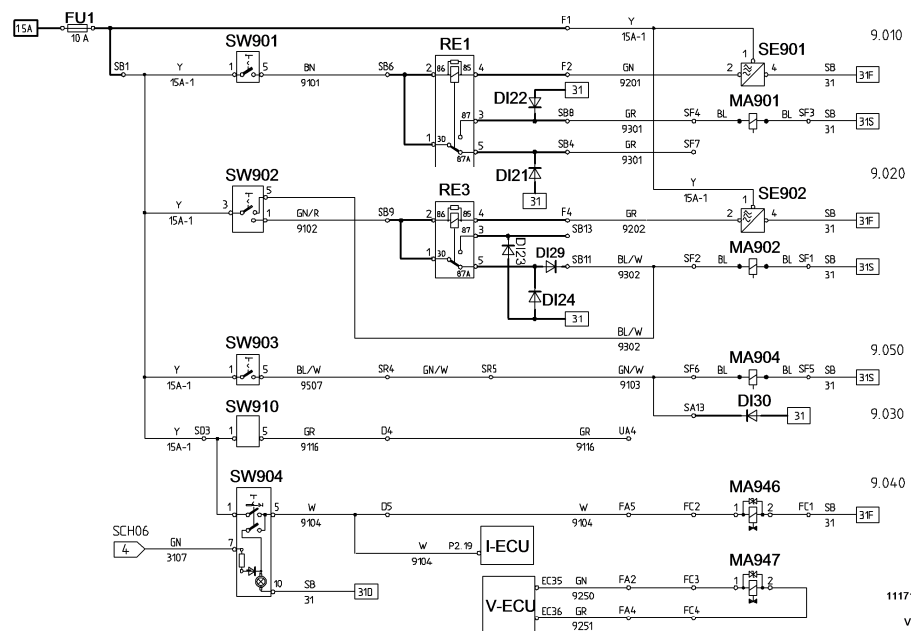


Figure 4

Serial no. 6096—

Figure 5

SCH21



VOLVO

Construction Equipment

Service Information

Document Title: Wiring diagram 21B	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 21B

Working hydraulics with 4th hydraulic function

Serial no. —5220

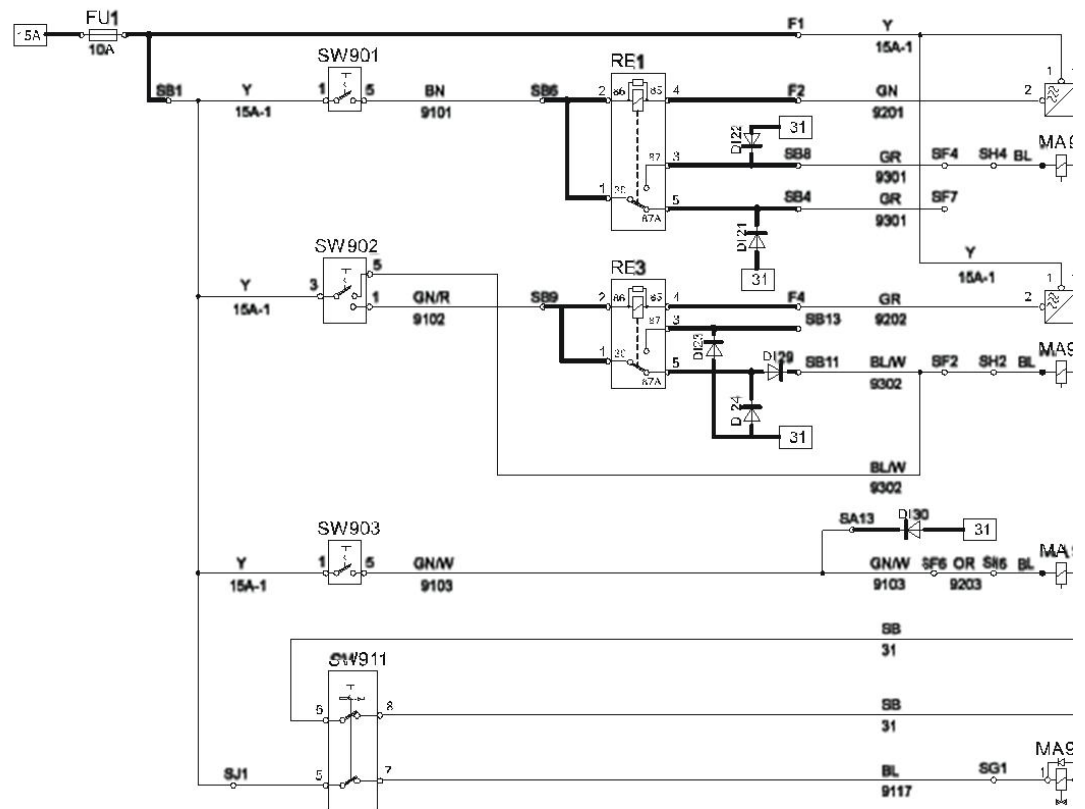
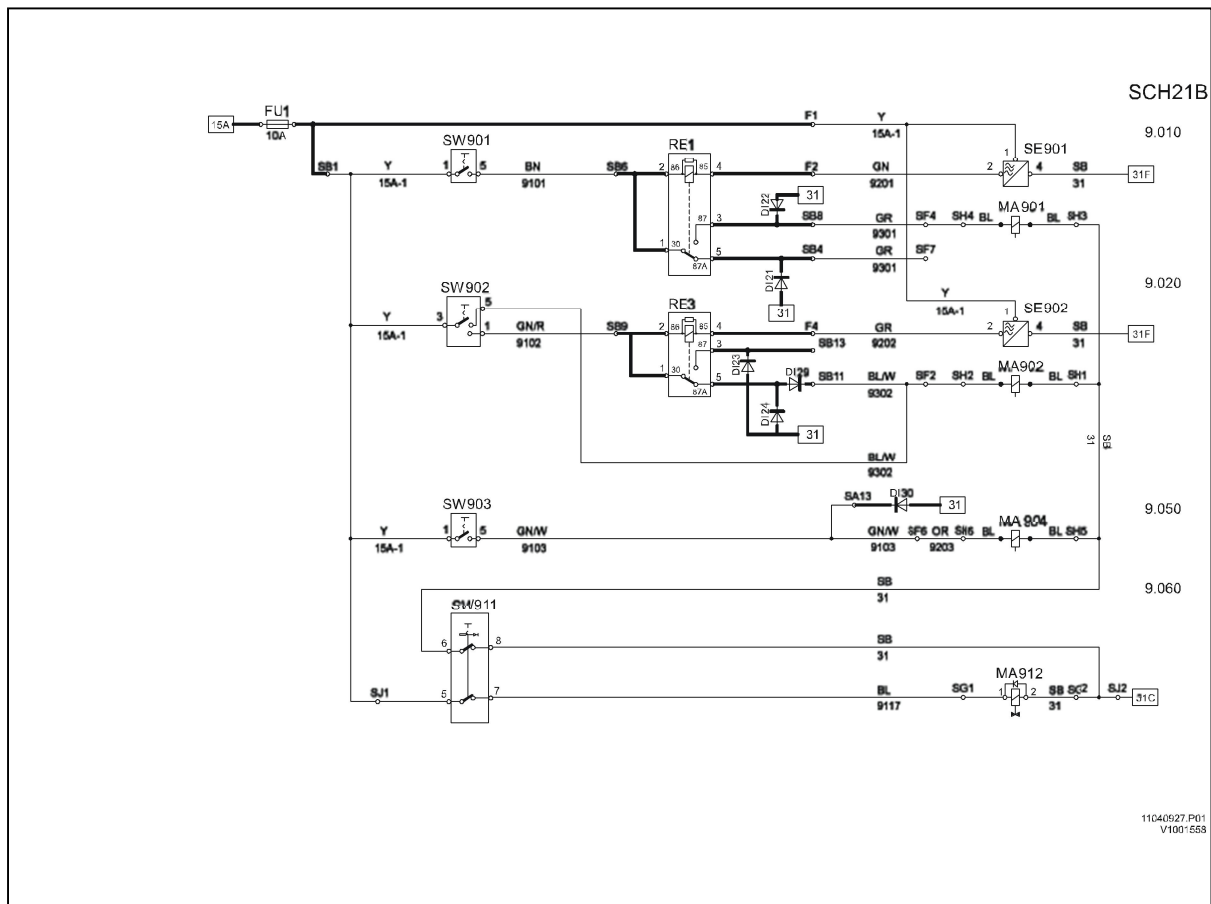


Figure 1

Serial no. 5221—6095



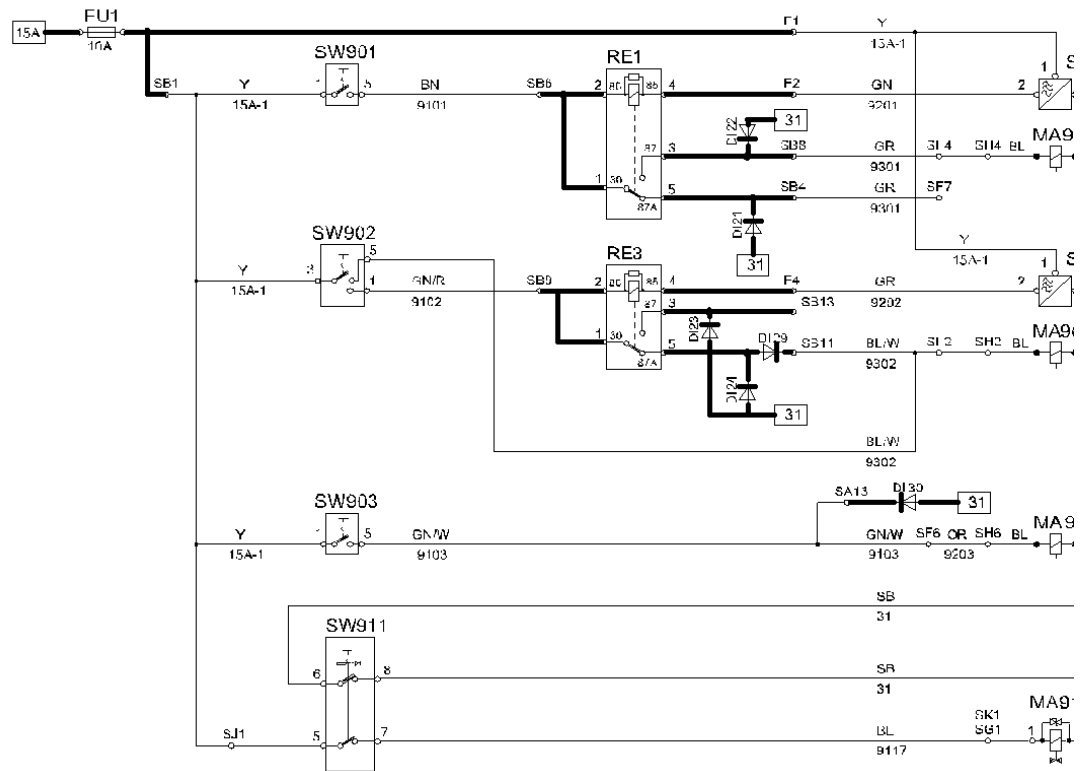
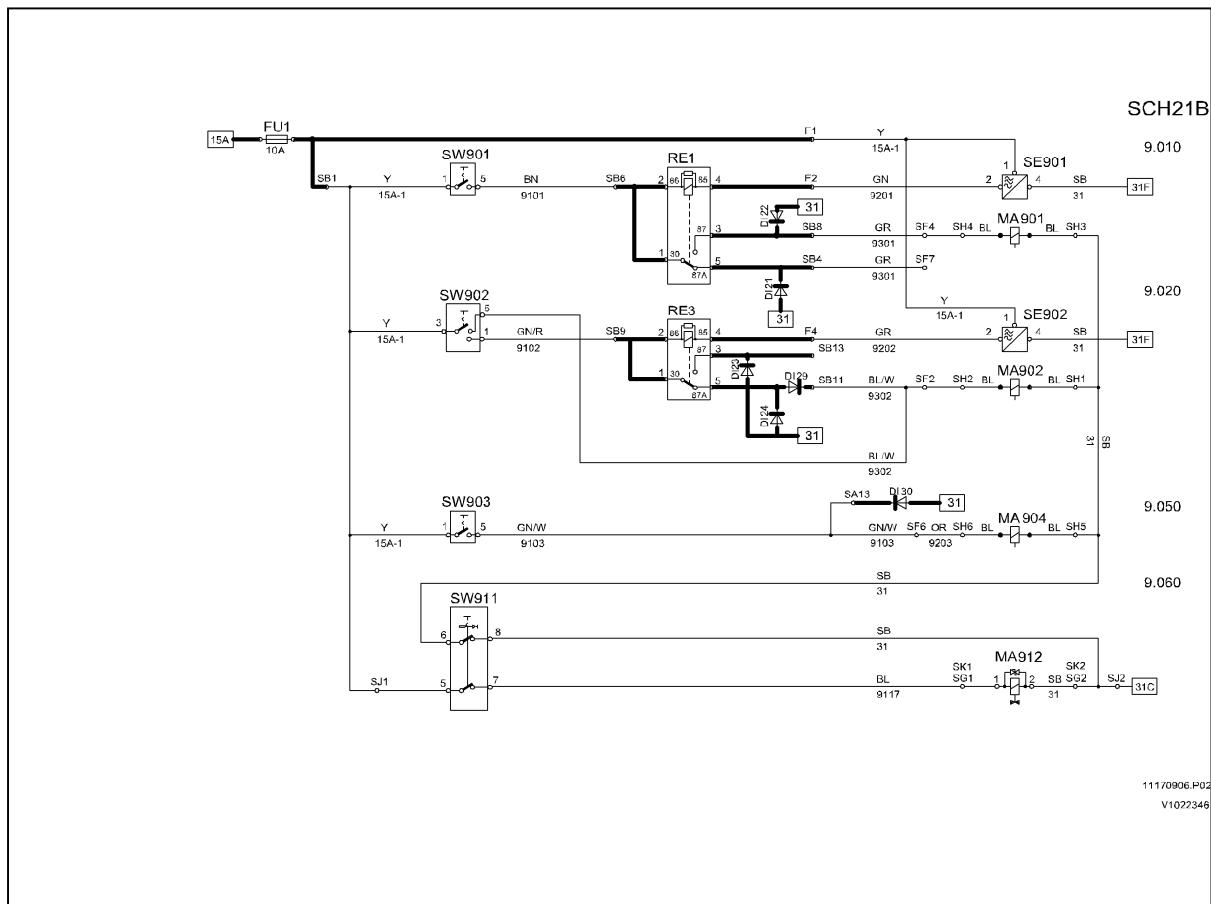


Figure 2

Serial no. 6096—



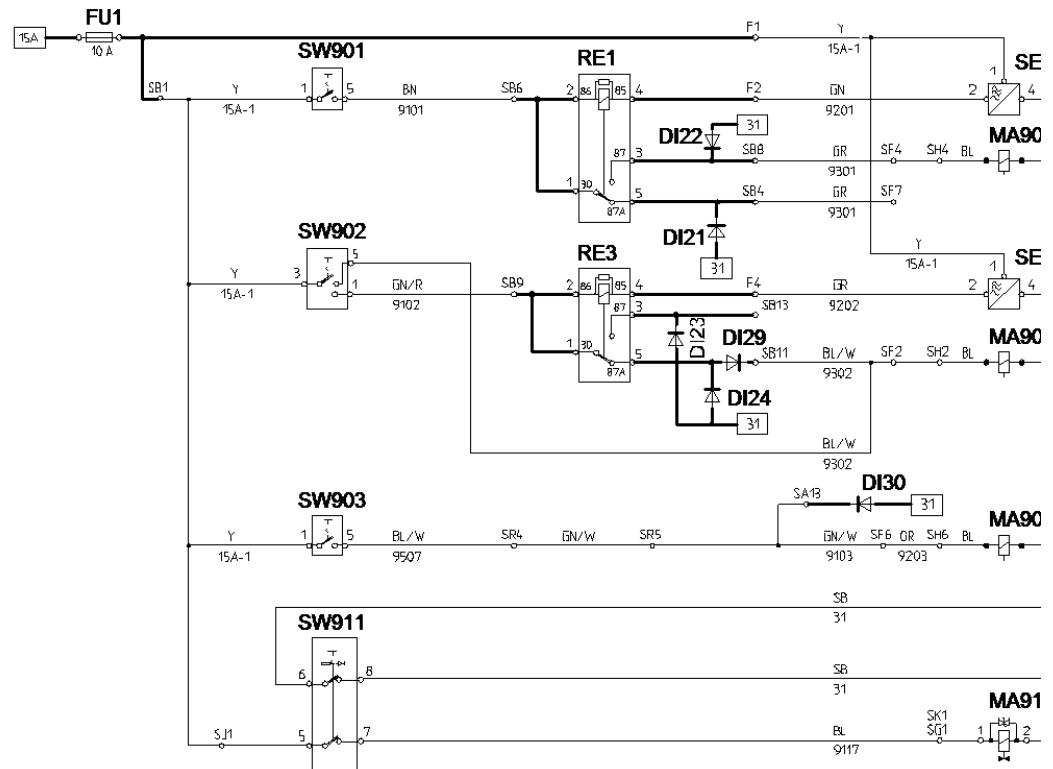
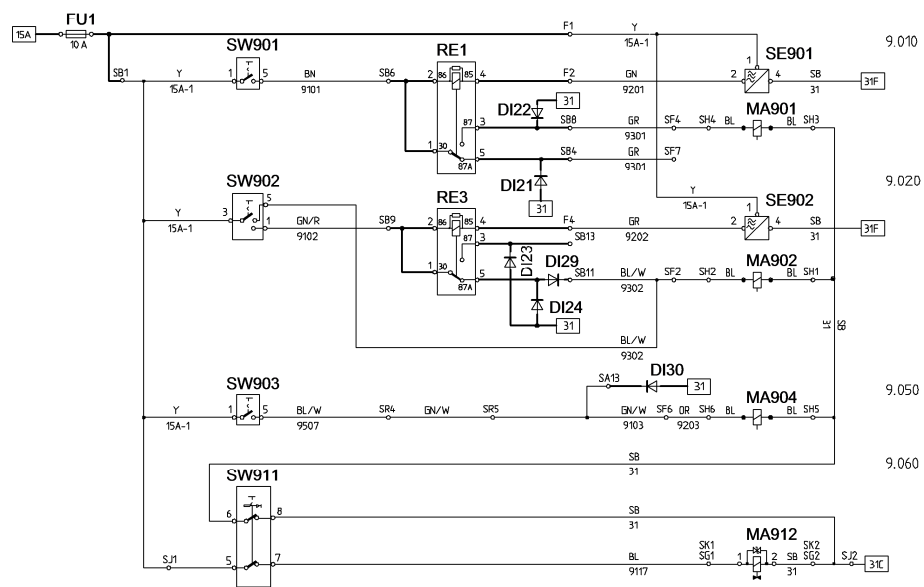


Figure 3

SCH21B



11171069 P01
V1027434

VOLVO

Construction Equipment

Service Information

Document Title: Wiring diagram 21C	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 21C

Working hydraulics with joystick (single lever)

Serial no. —6095

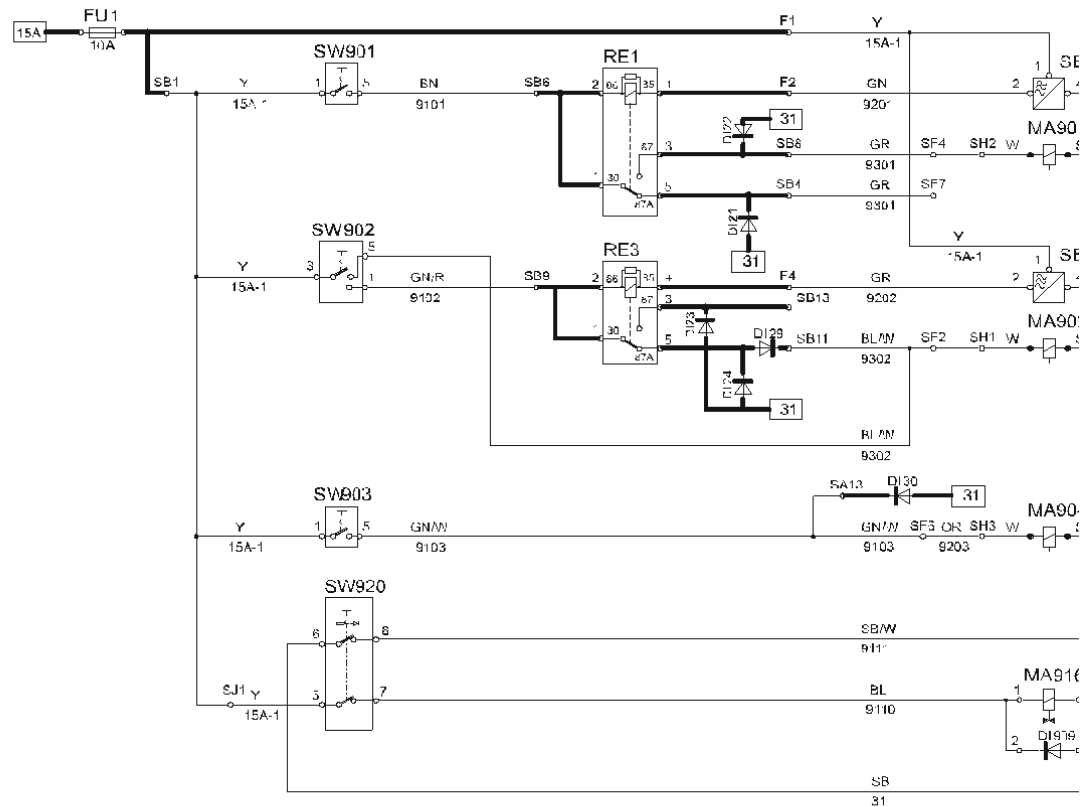
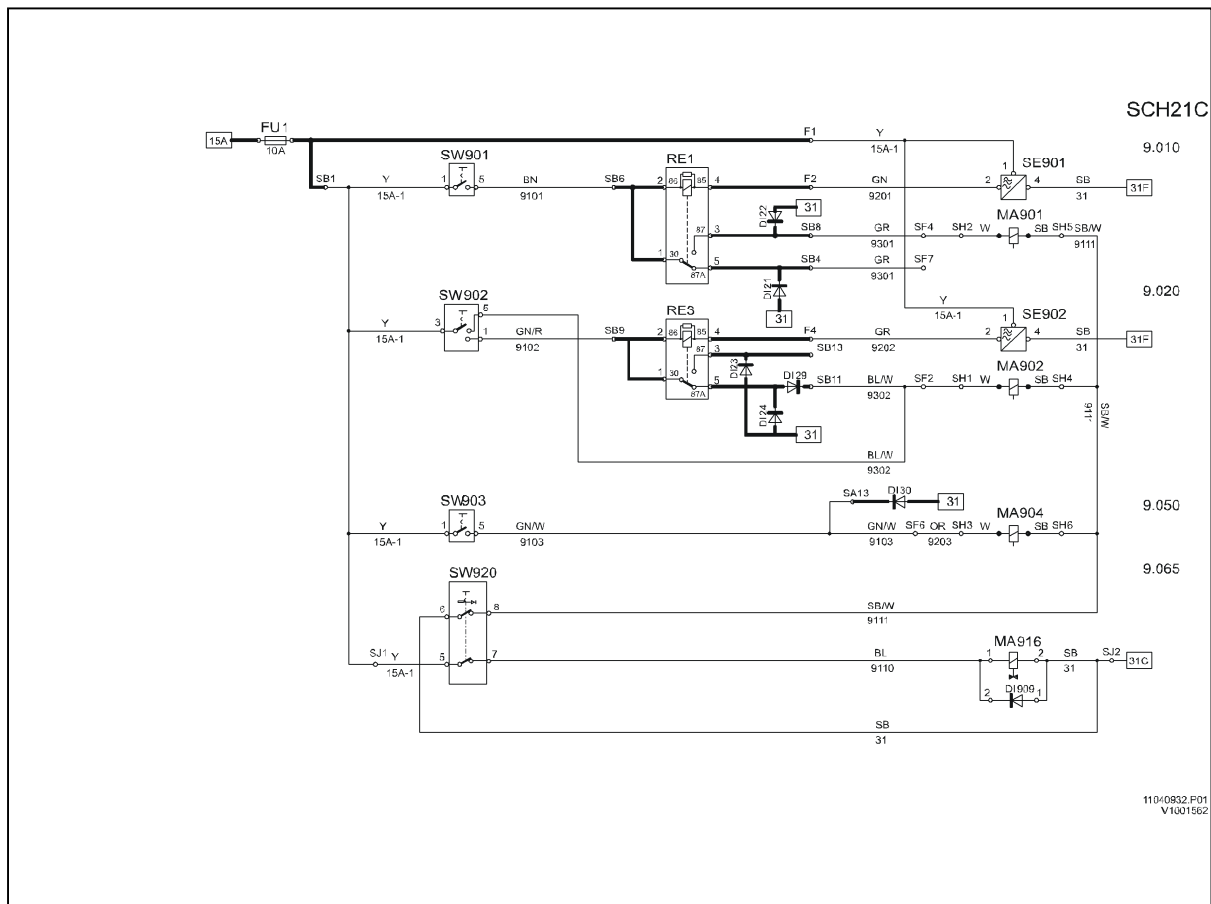


Figure 1

Serial no. 6096—



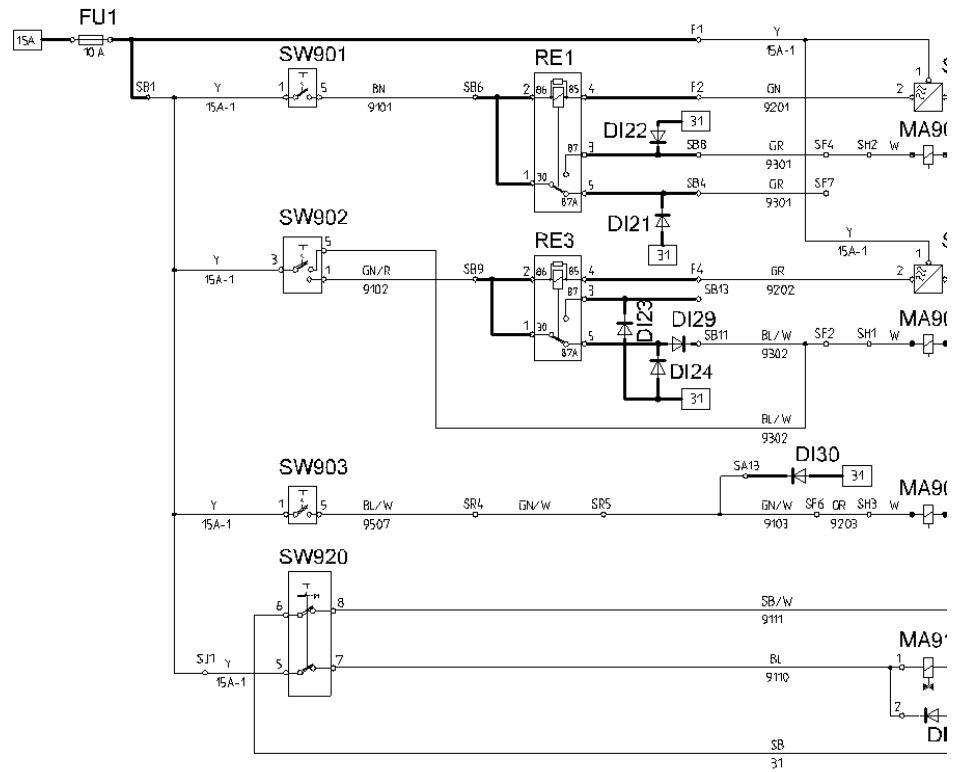
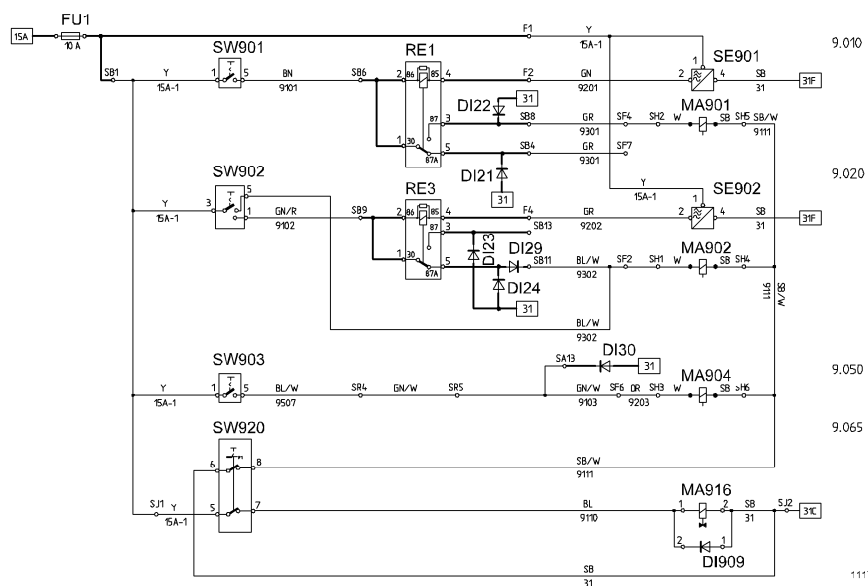


Figure 2

SCH21C



Document Title: Wiring diagram 23	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 23

Boom Suspension System (BSS), hydraulic oil temperature/level

Serial no. —5498

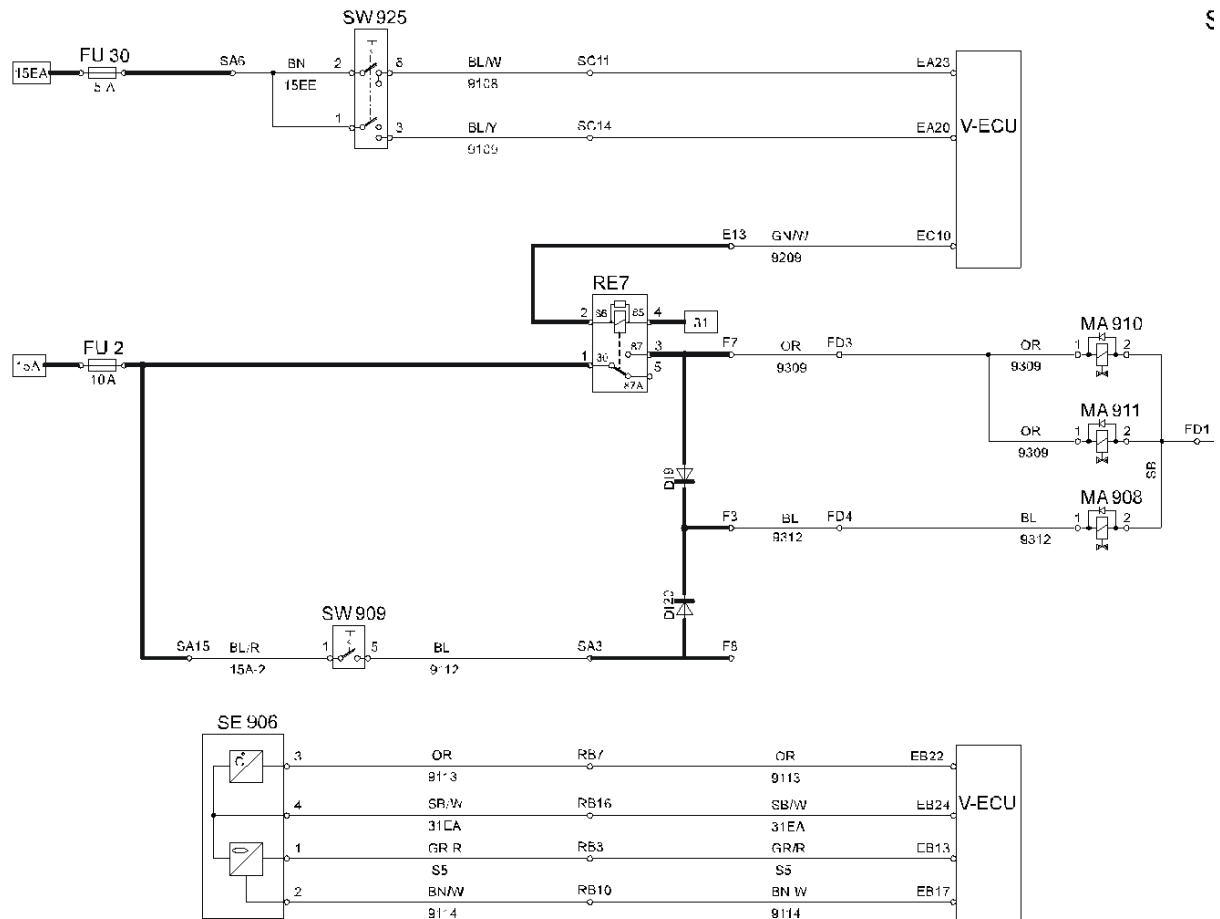
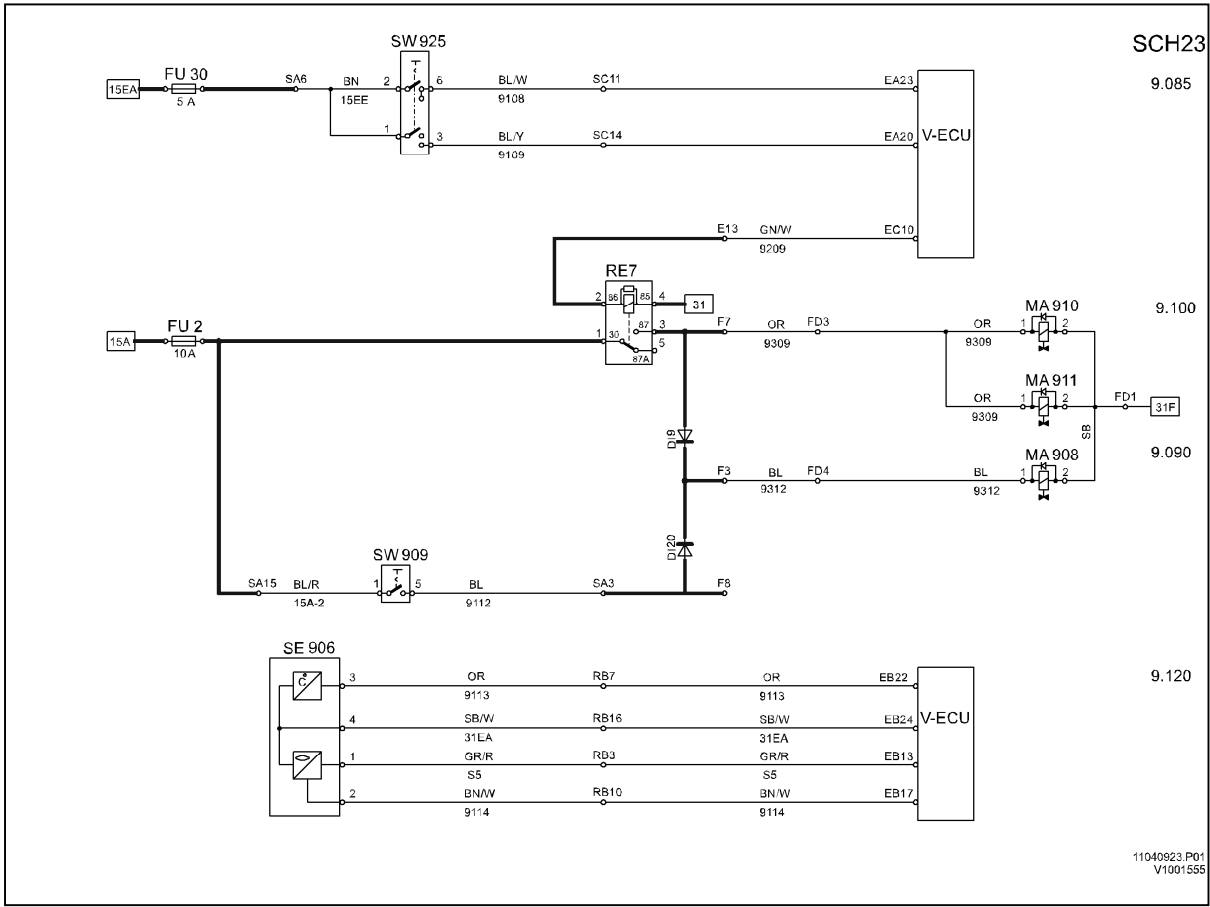


Figure 1

Serial no. 5499—



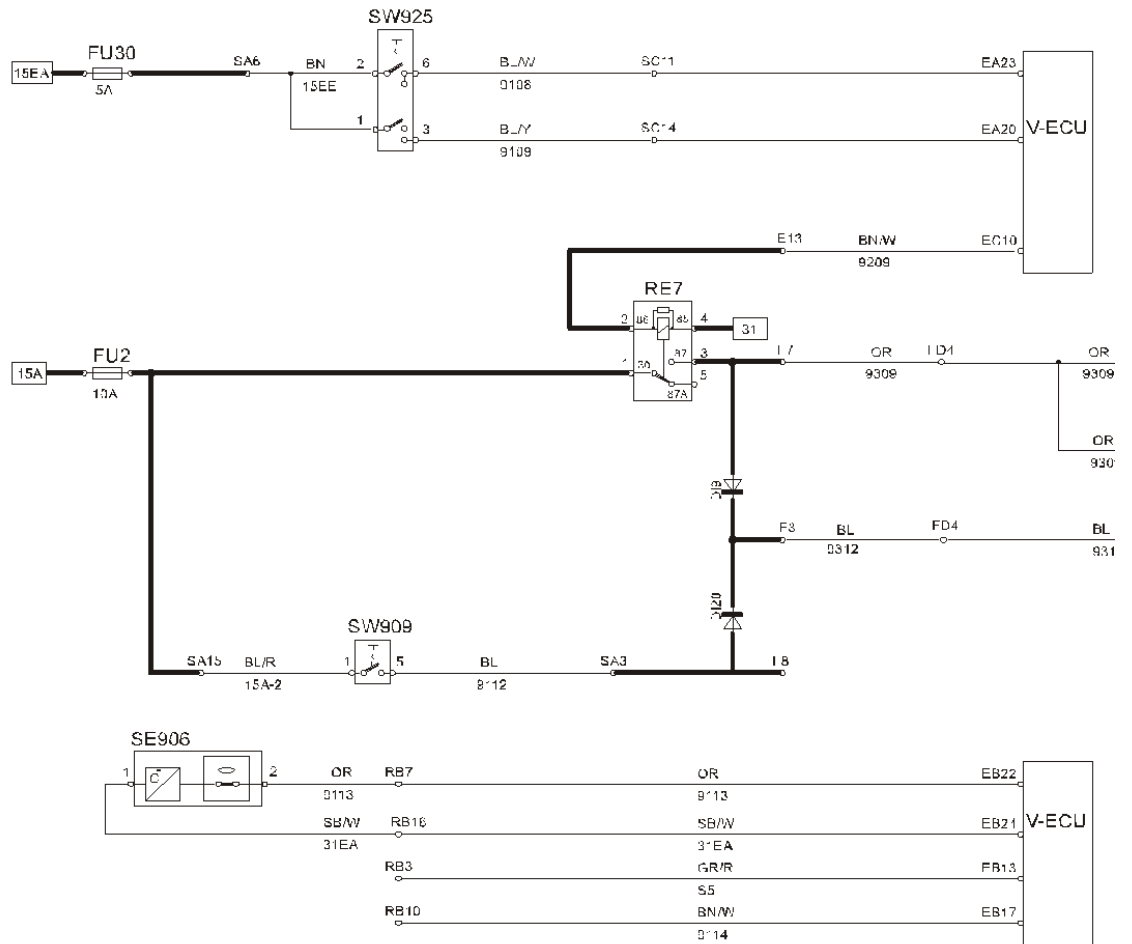


Figure 2

Document Title: Wiring diagram 24	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 24

Communication ECUs

Serial no. — 7418

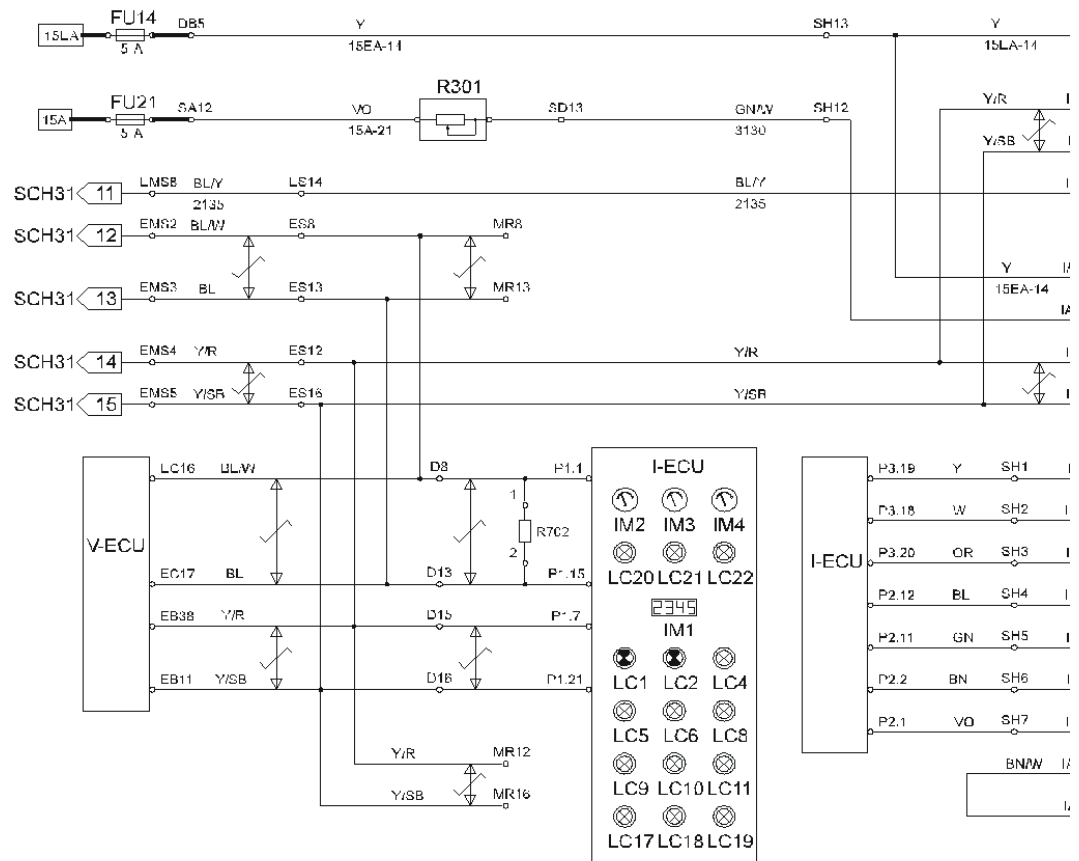


Figure 1

Serial no. 8001–

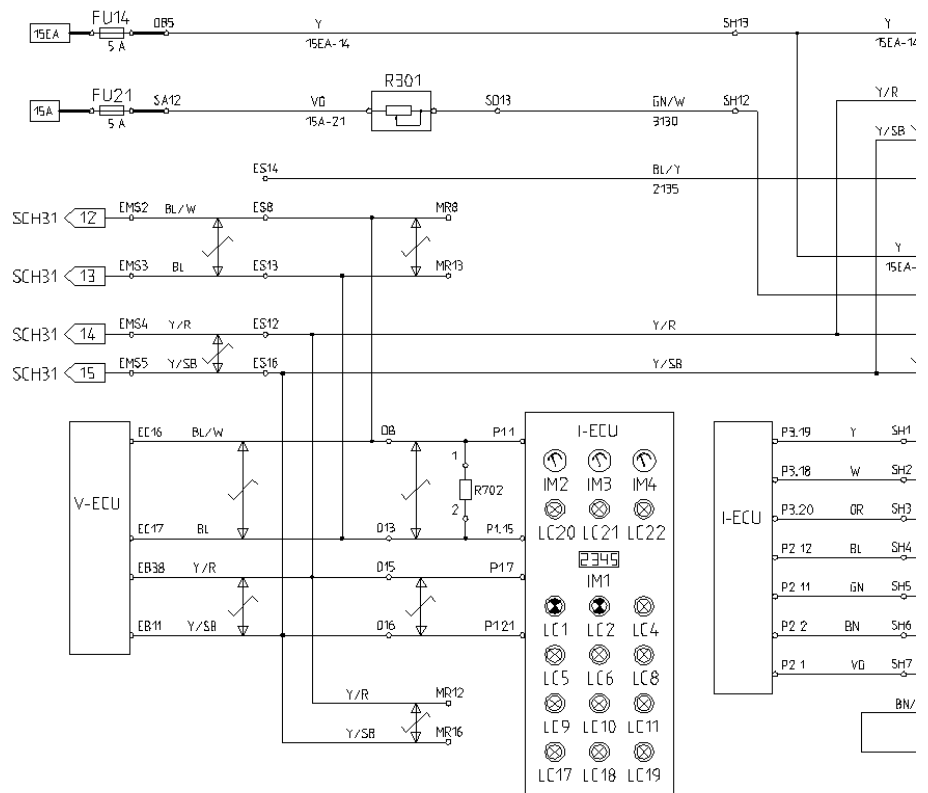


Figure 2

Document Title: Wiring diagram 25	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 25

Keypad for information display unit

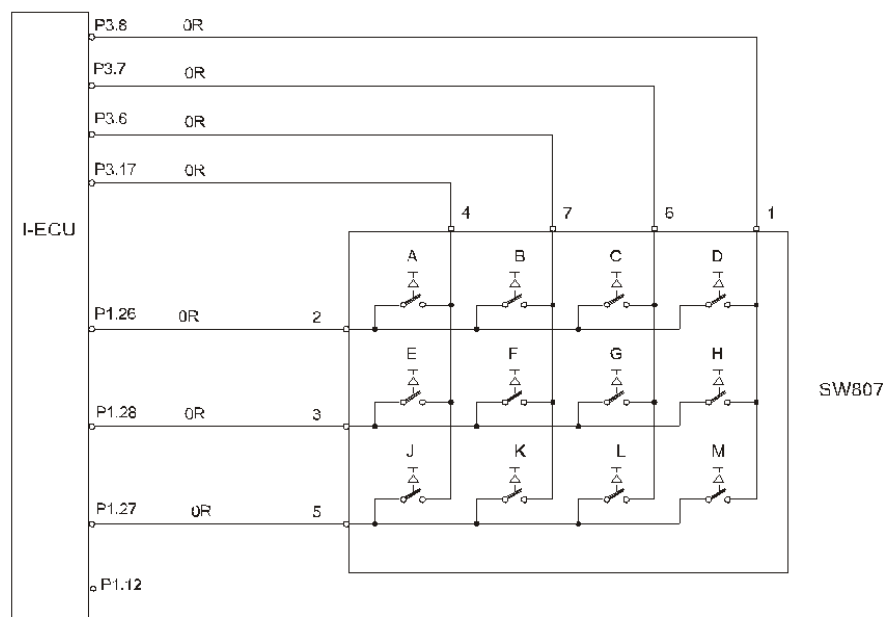


Figure 1

Document Title: Wiring diagram 26	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 26

Central lubrication system

Optional equipment 80958

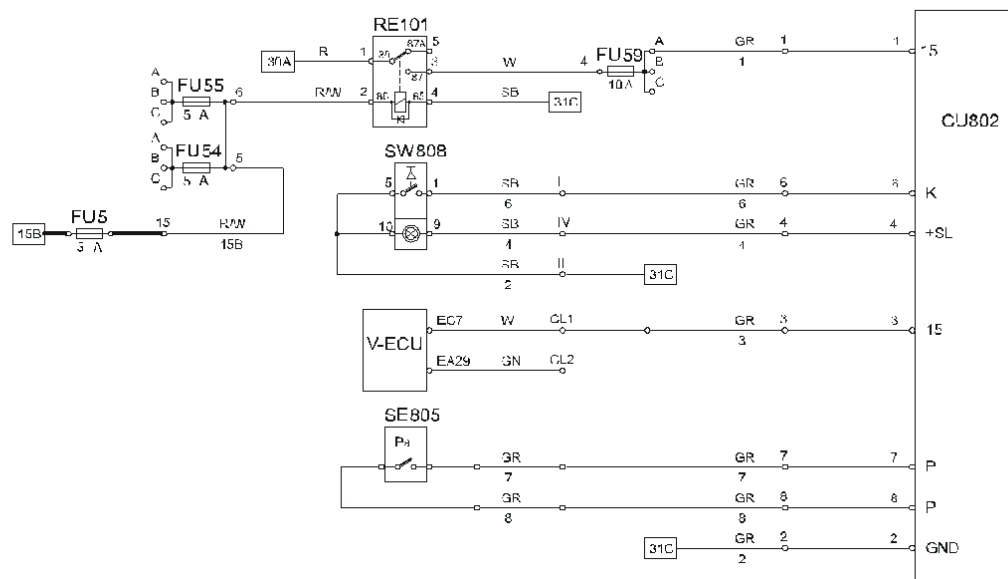


Figure 1

Optional equipment 82111

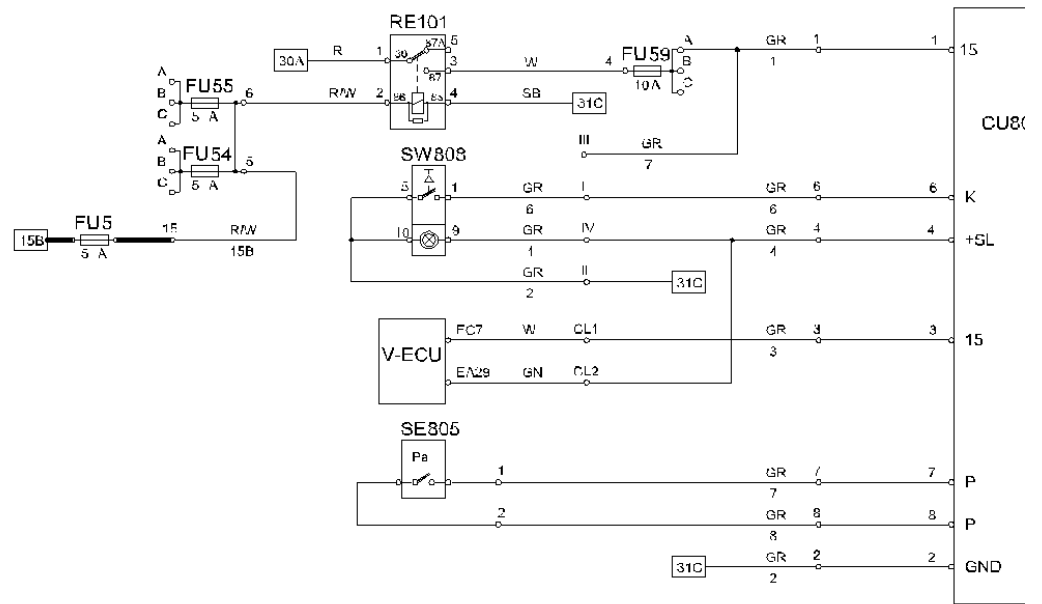
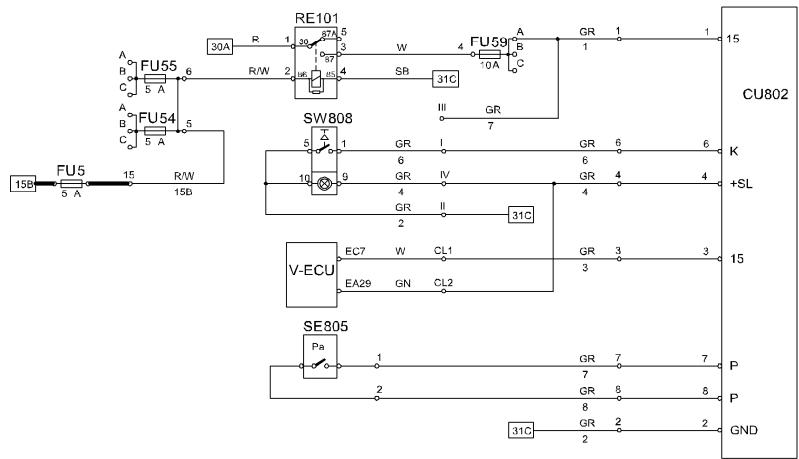


Figure 2

SCH26



Document Title: Wiring diagram 27	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 27

Accelerator pedal, hand throttle

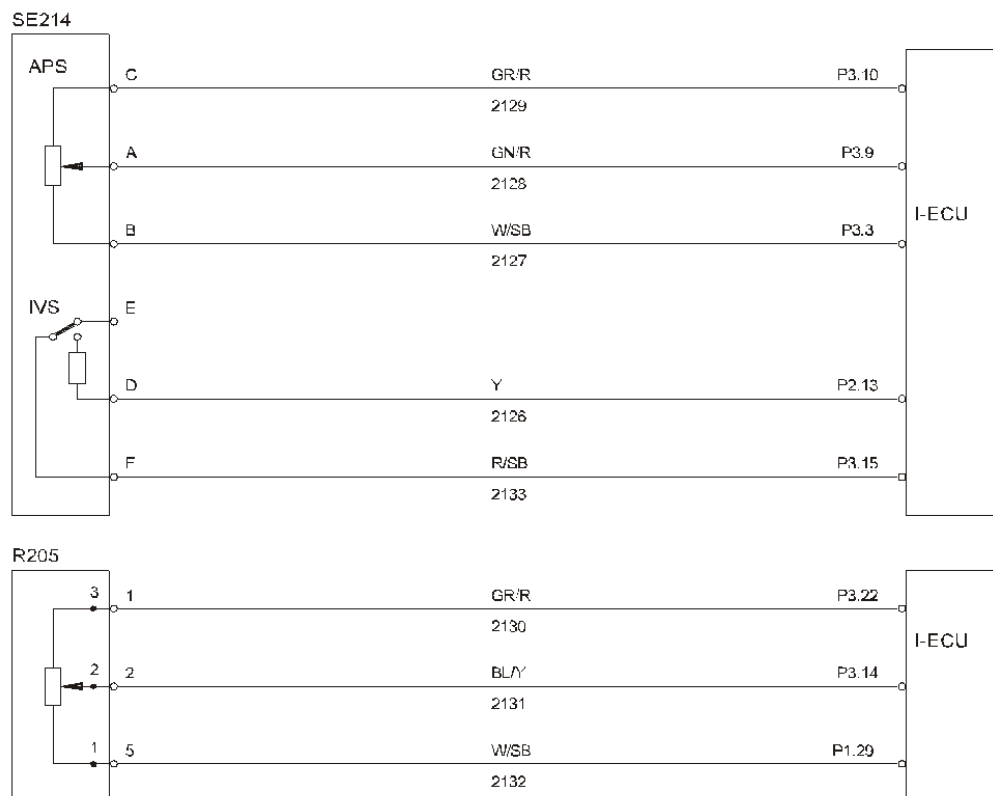


Figure 1

Document Title: Wiring diagram 28	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 28

Sensors connected to E-ECU

Serial no. —7418

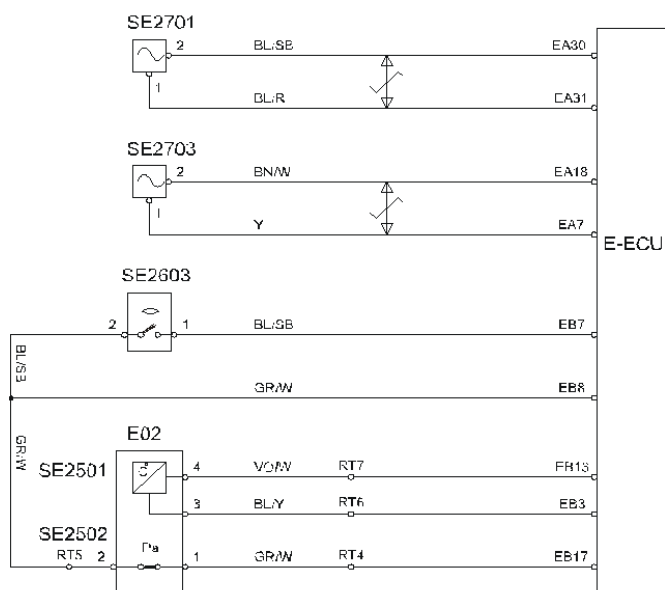


Figure 1

Serial no. 8001–

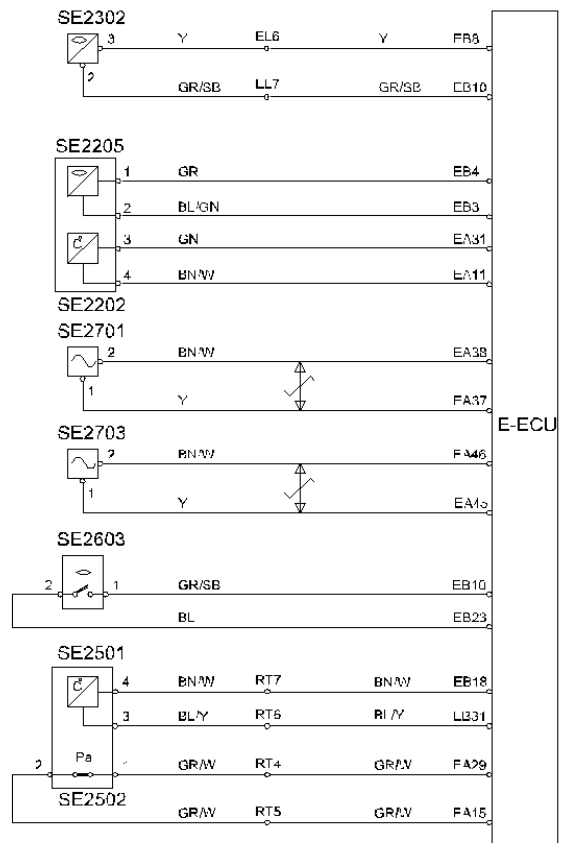


Figure 2

Document Title: Wiring diagram 29	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 29

Sensors connected to E-ECU

Serial no. —7418

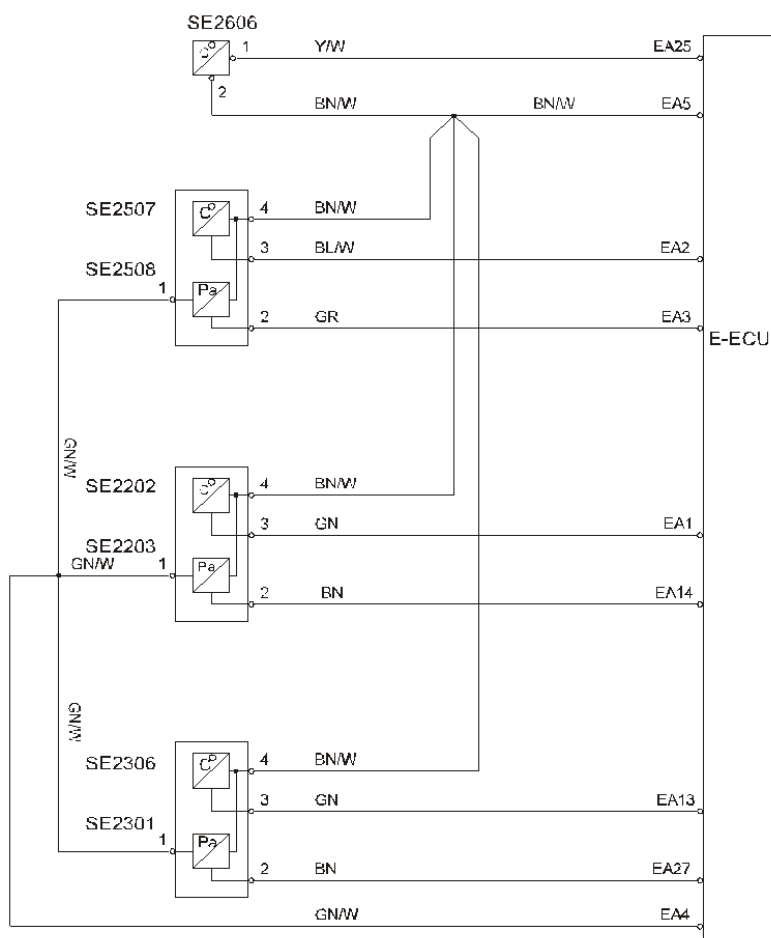


Figure 1

Serial no. 8001–

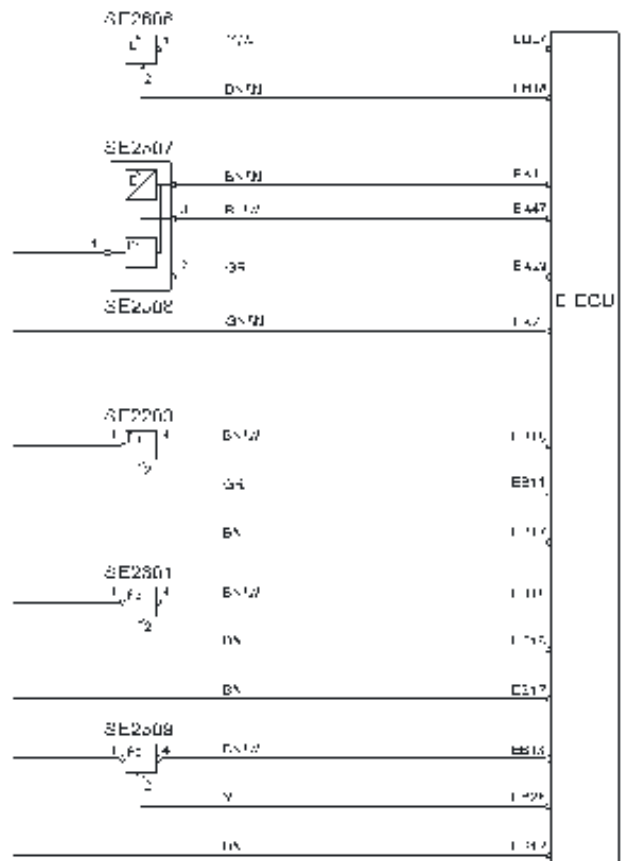


Figure 2

Document Title: Wiring diagram 30	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 30

Injection

Serial no. —7418

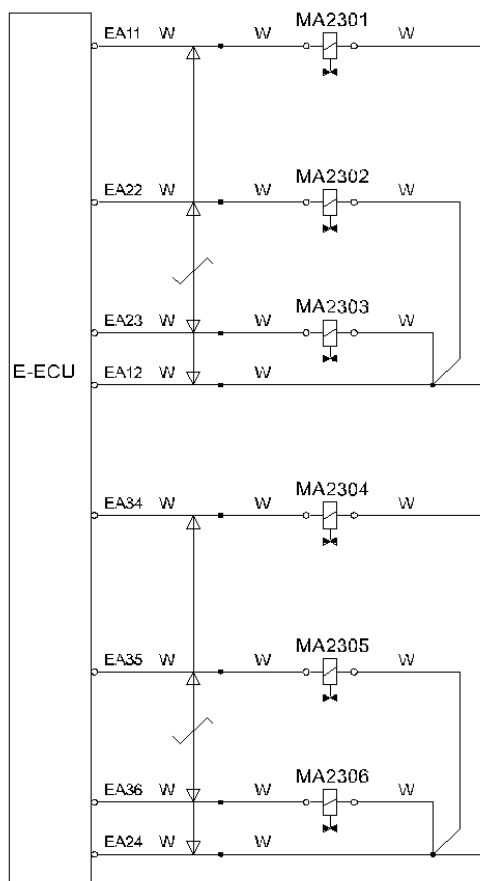


Figure 1

Serial no. 8001–

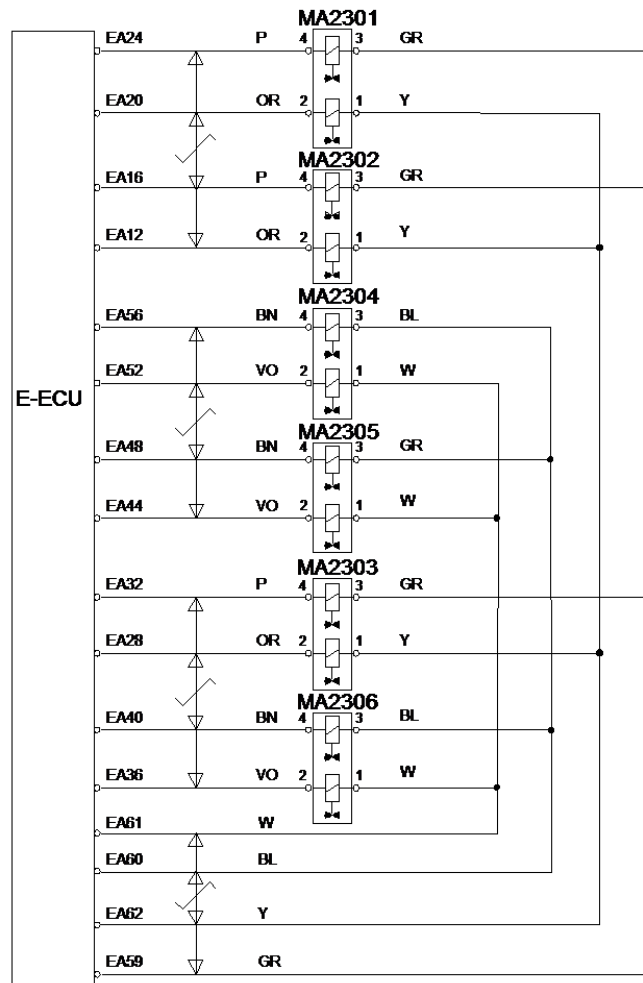


Figure 2

Document Title: Wiring diagram 31	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 31

Communication ECUs, preheating

Serial no. —7418

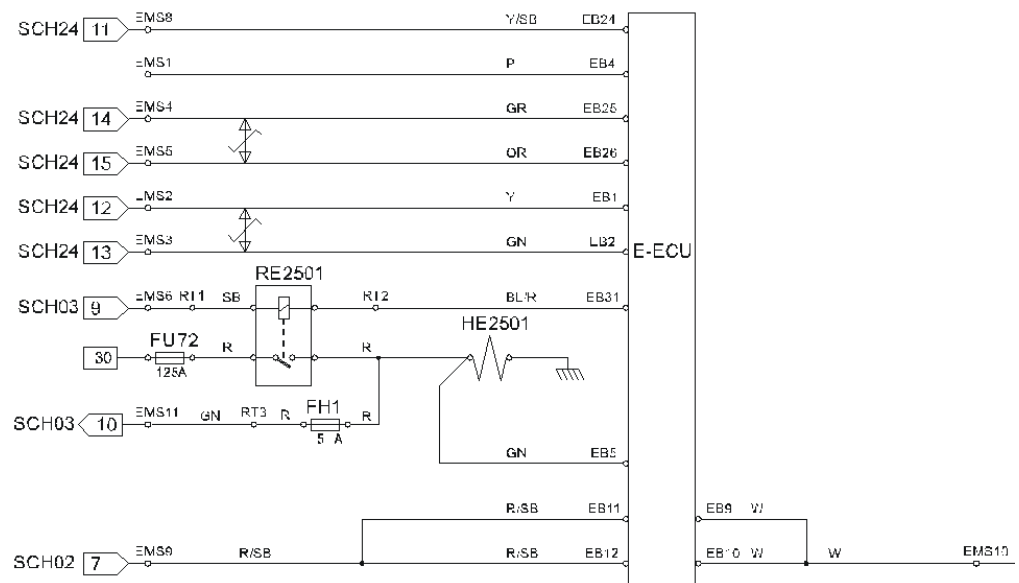
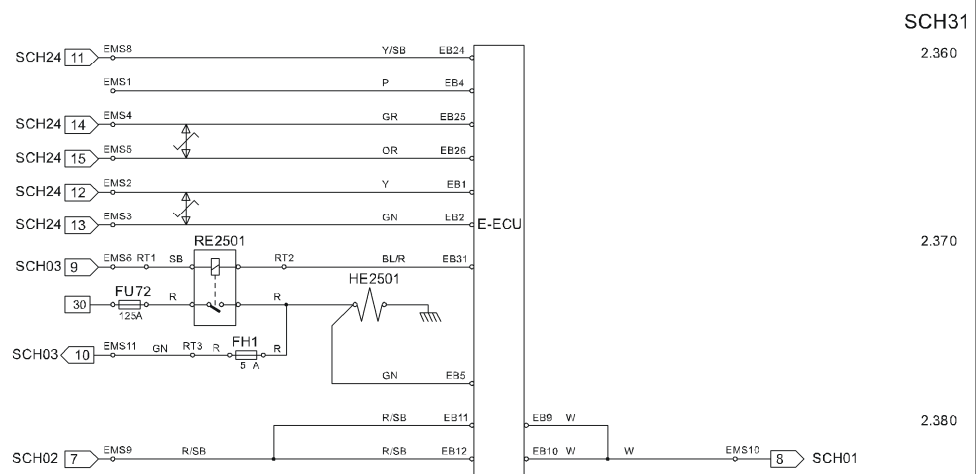


Figure 1

Serial no. 8001–



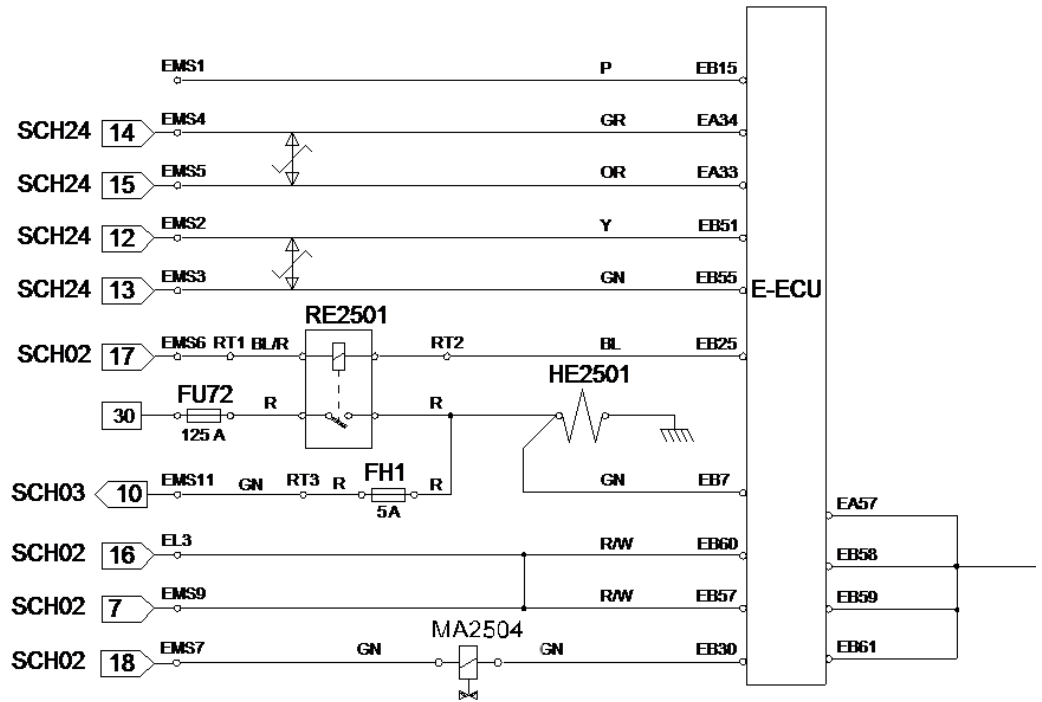
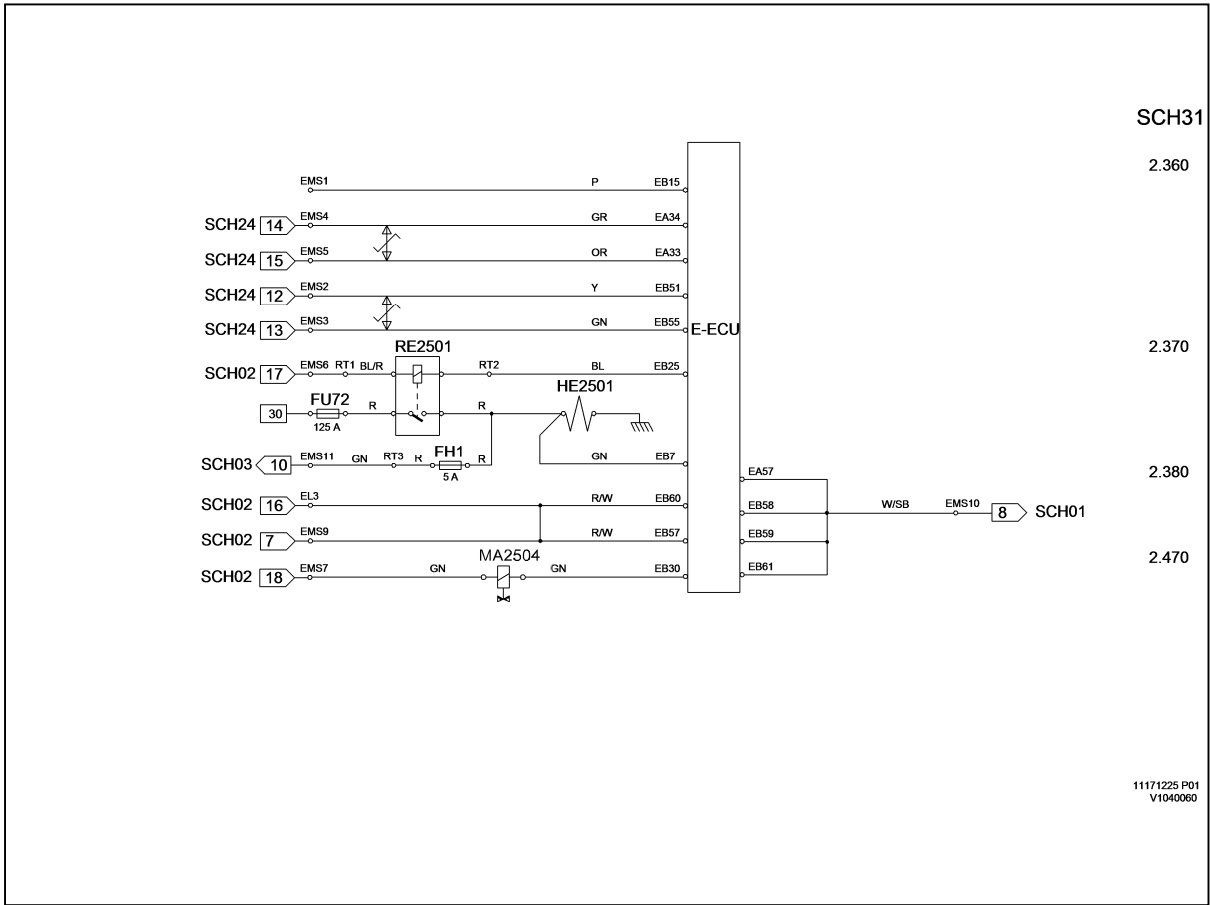


Figure 2



VOLVO

Construction Equipment

Service Information

Document Title: Wiring diagram 33	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 33

Air conditioning, automatic temperature control (ATC)

Serial no. —5498

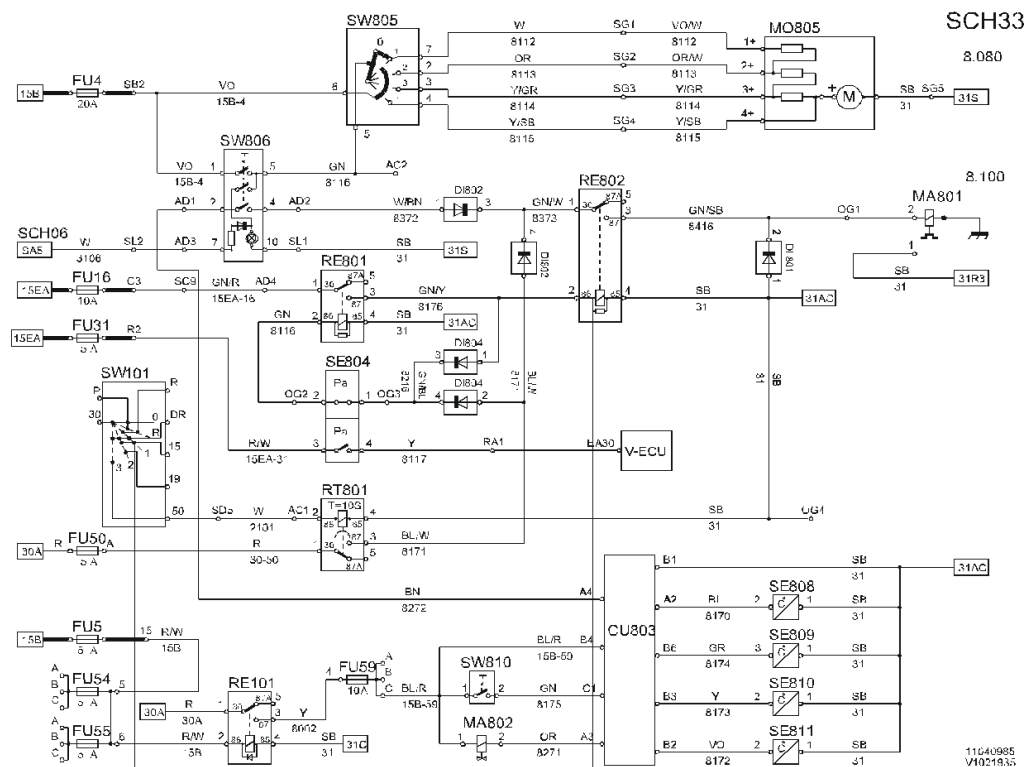


Figure 1

Serial no. 5499—

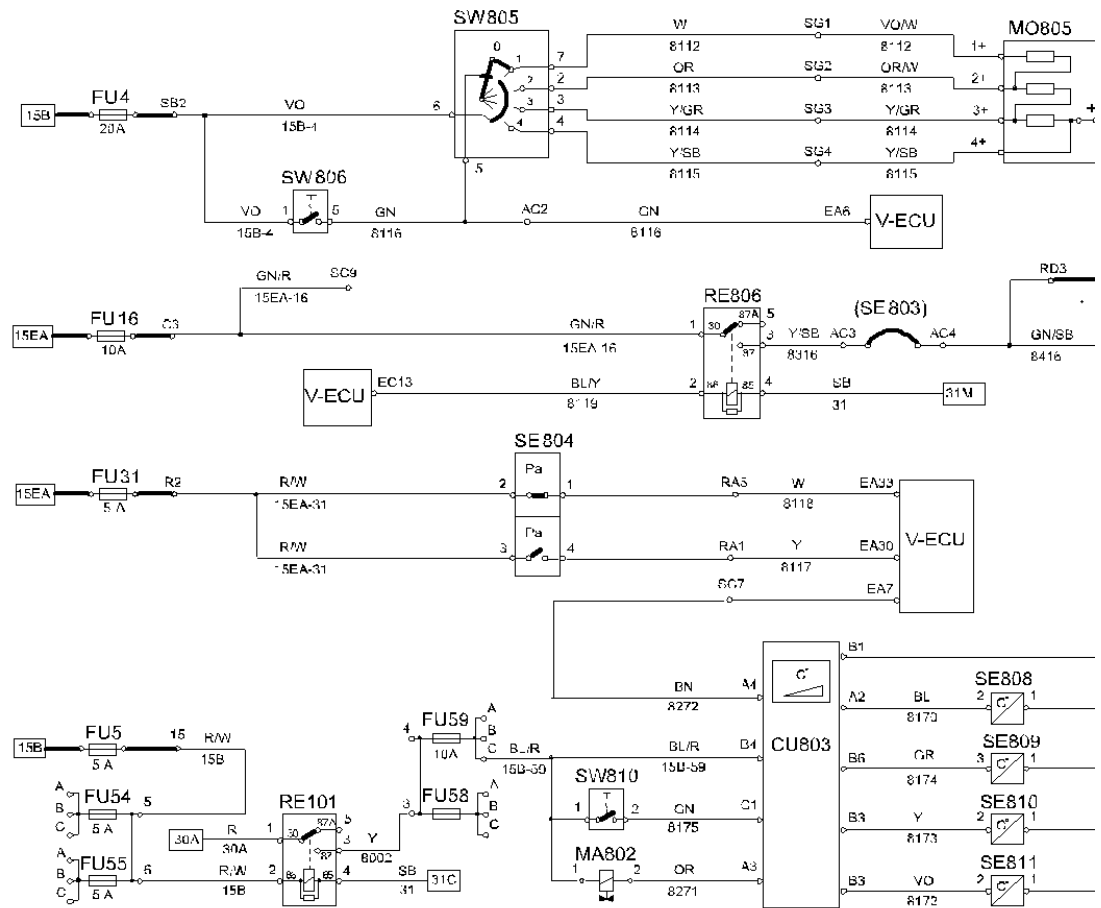
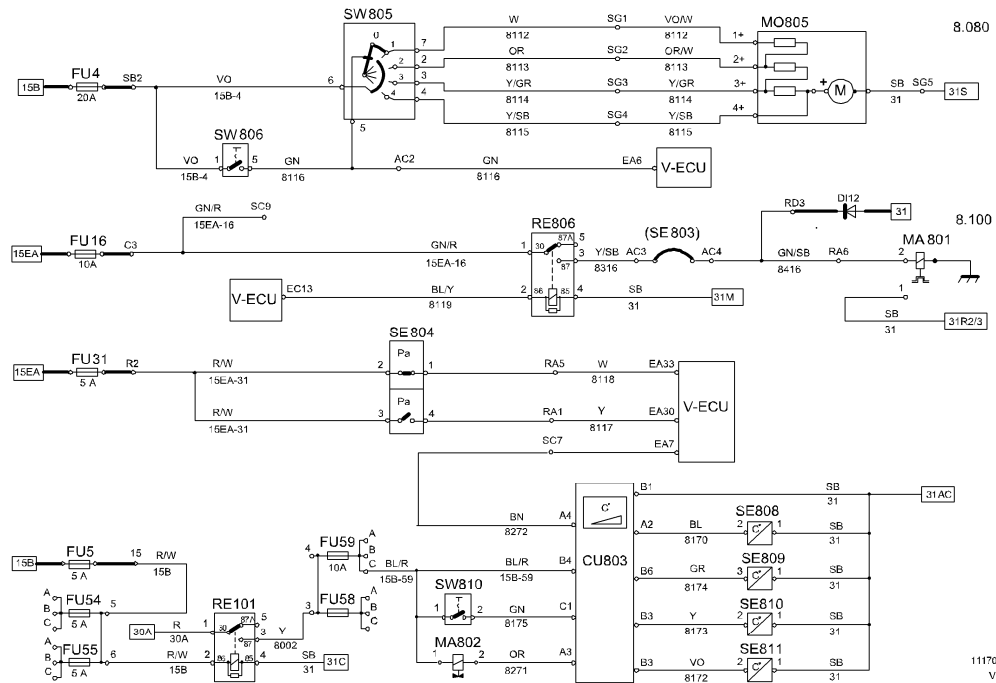


Figure 2

SCH33

8.080



11170772.P04
V1027432

Document Title: Wiring diagram 34	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 34

Back-up camera, electrically heated rear-view mirrors

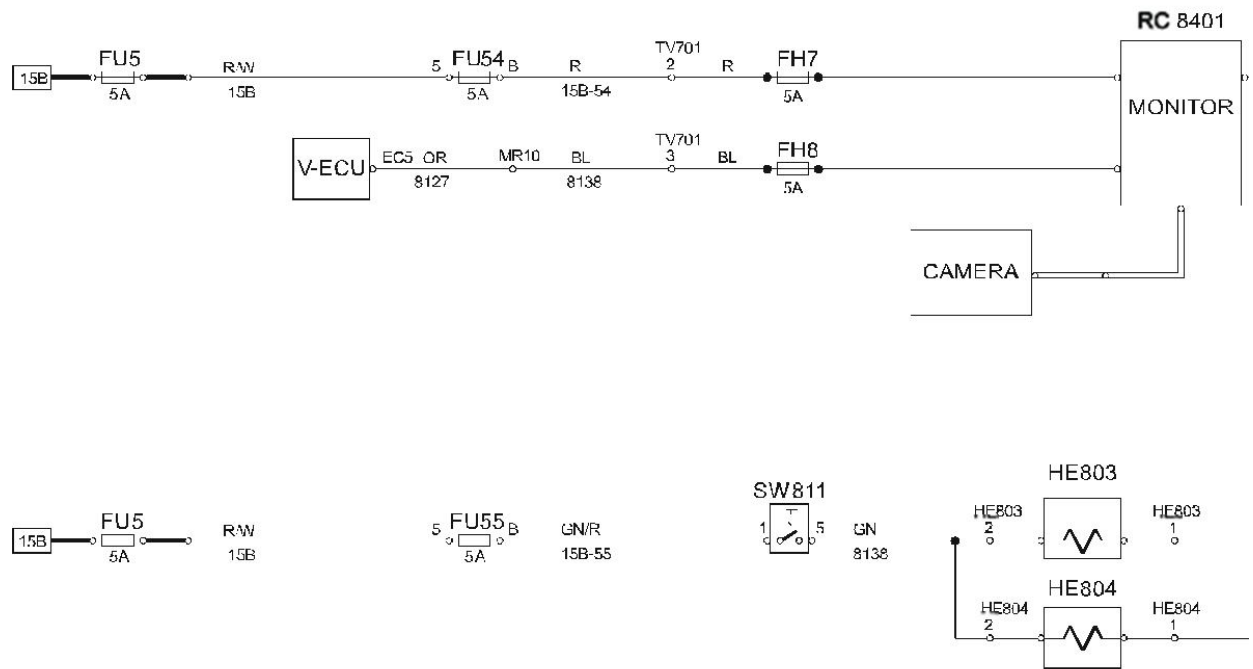
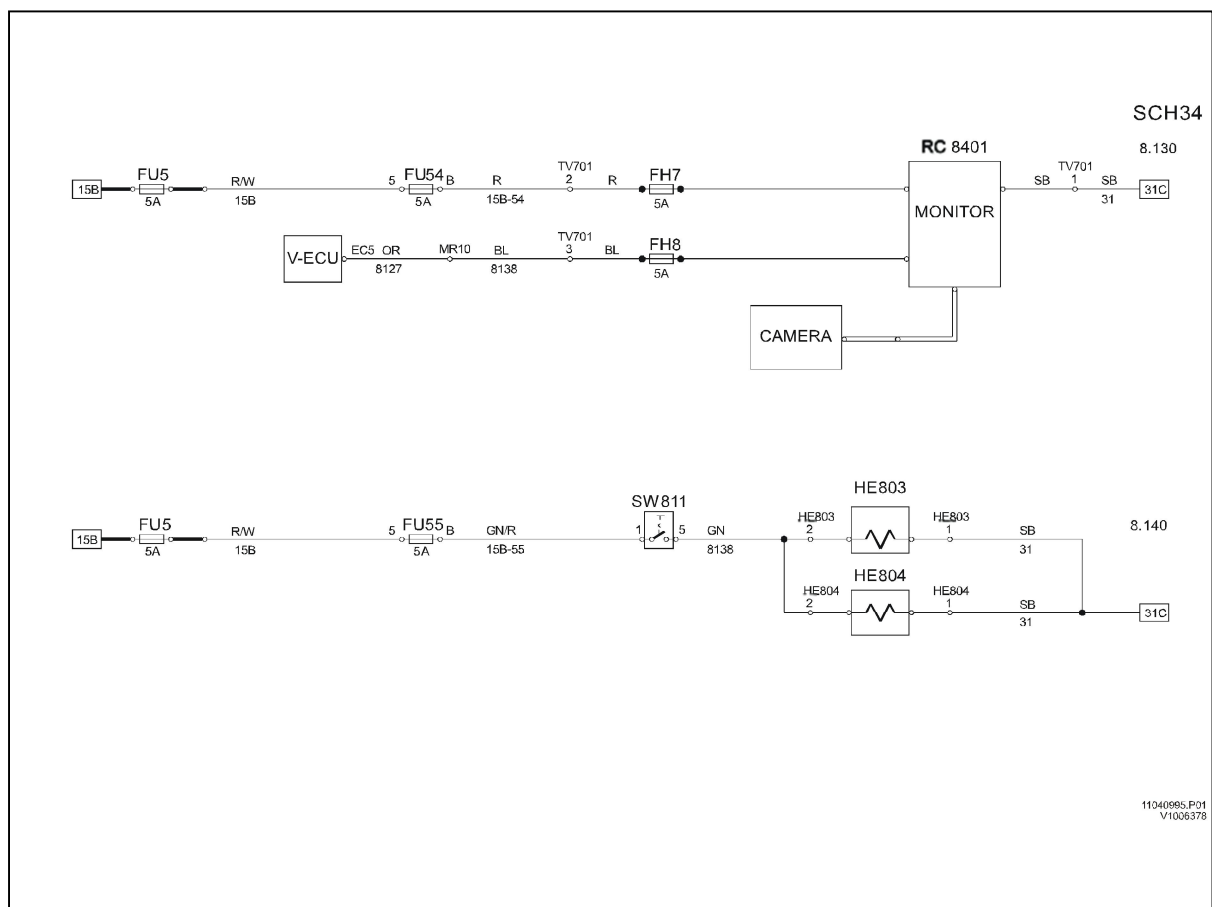


Figure 1



Document Title: Wiring diagram 35	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 35

Automatic lift arm lowering (Return to dig)

Serial no. 6096—

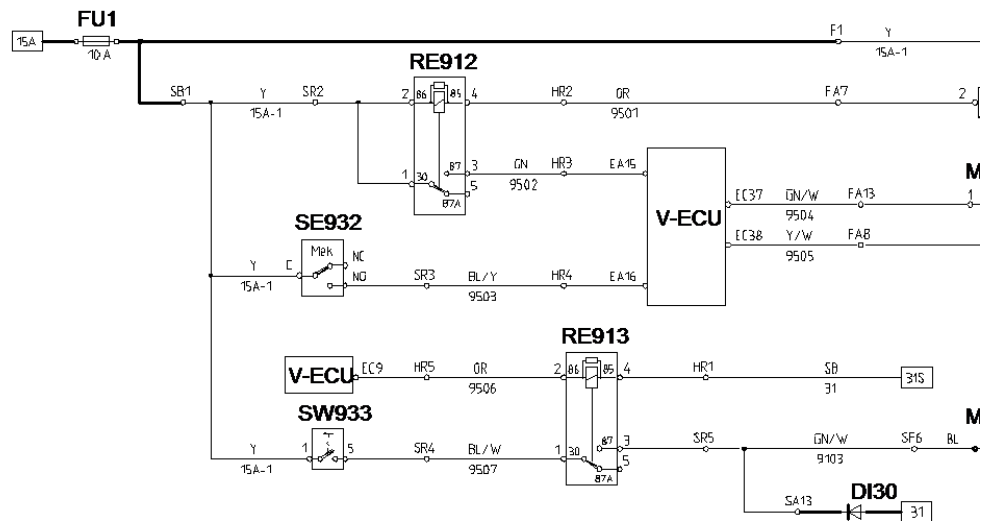
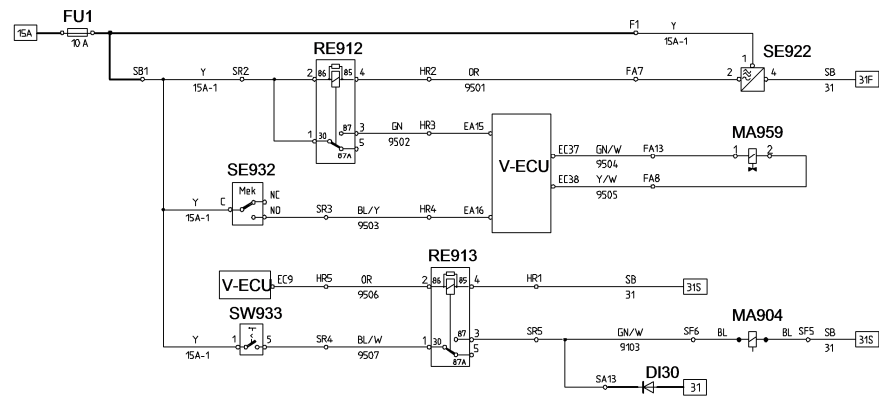


Figure 1

SCH35



11171064 P01
V1027436

Document Title: Wiring diagram 100	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 100

Reversible cooling fan, relay-controlled

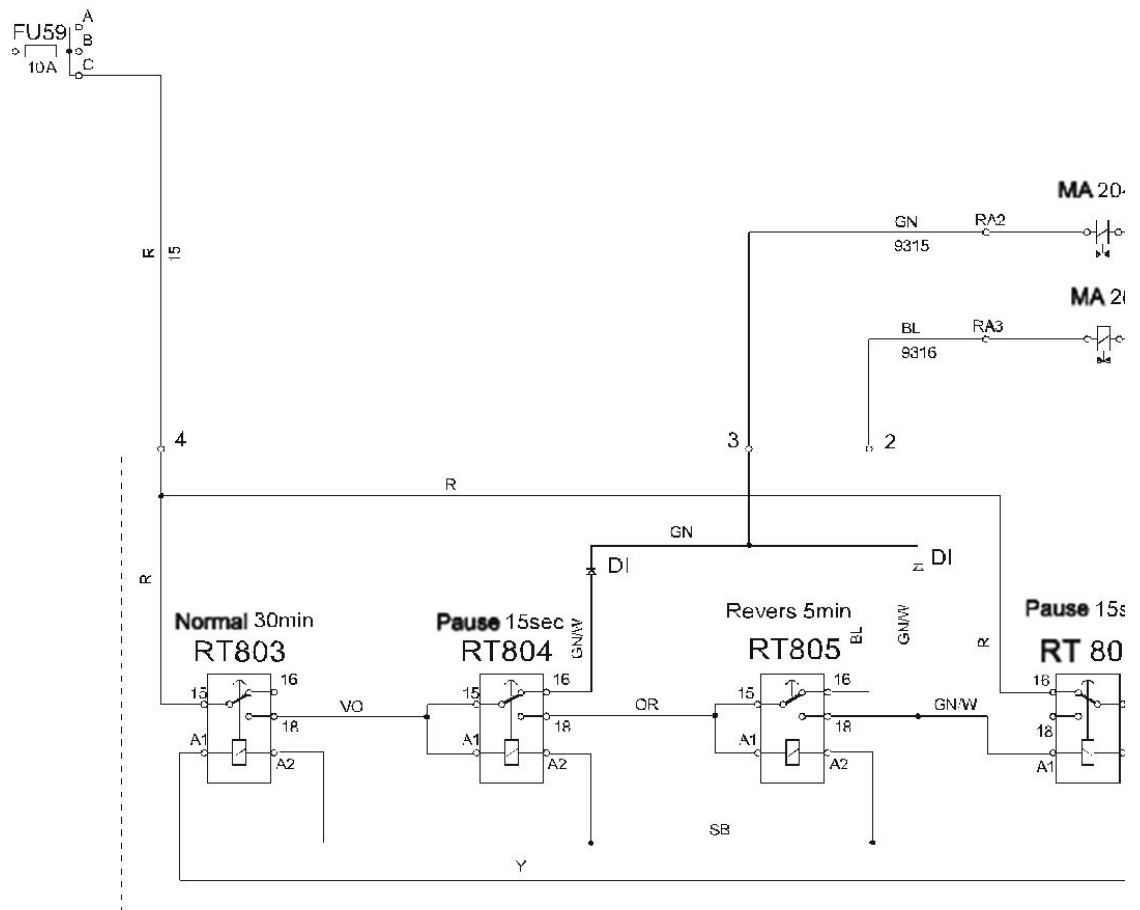
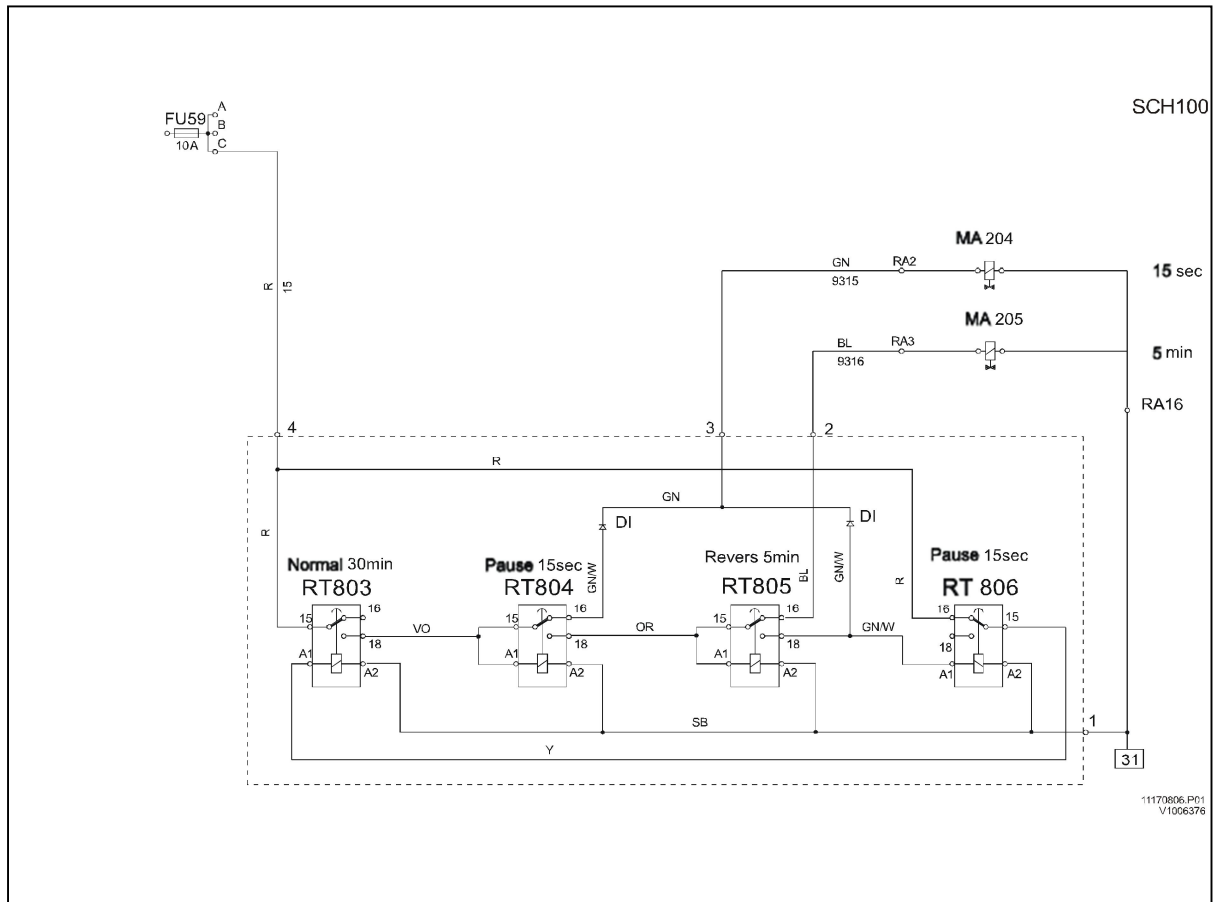


Figure 1



Document Title: Wiring diagram 101	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 101

Automatic back-up light, flashing light

Serial no. —7418

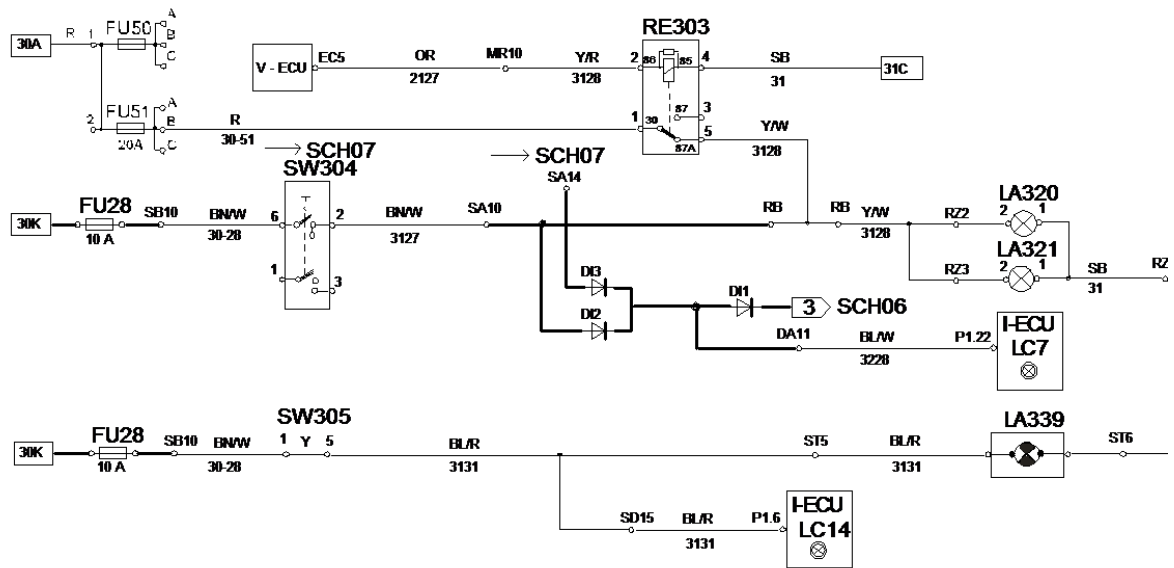


Figure 1

Serial no. 8001—

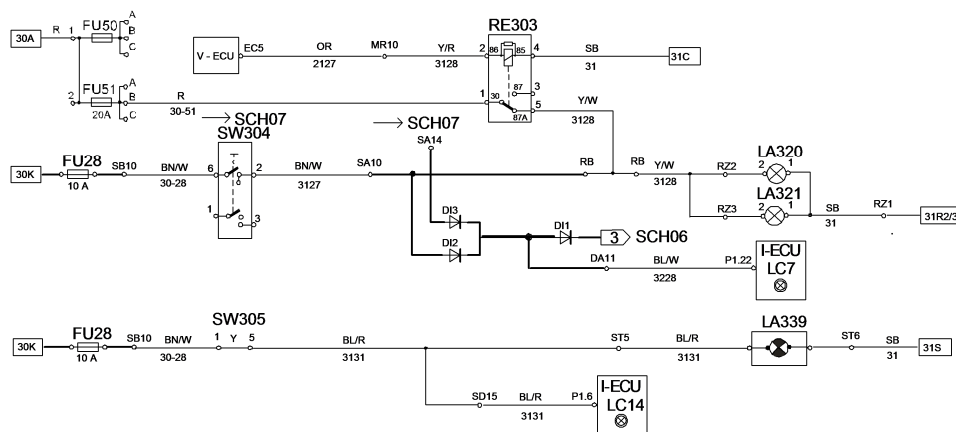
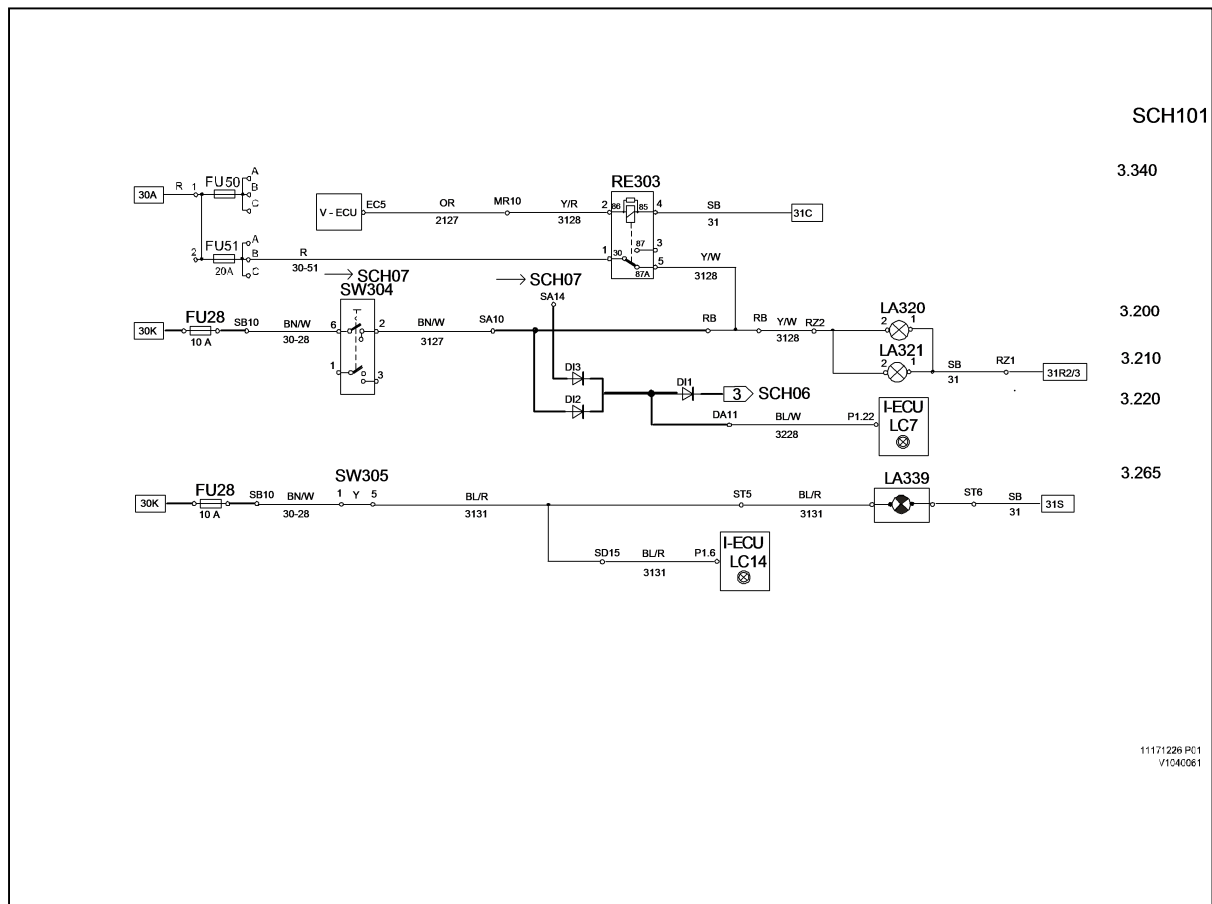


Figure 2



Document Title: Wiring diagram 102	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 102

Electrically controlled battery disconnect switch

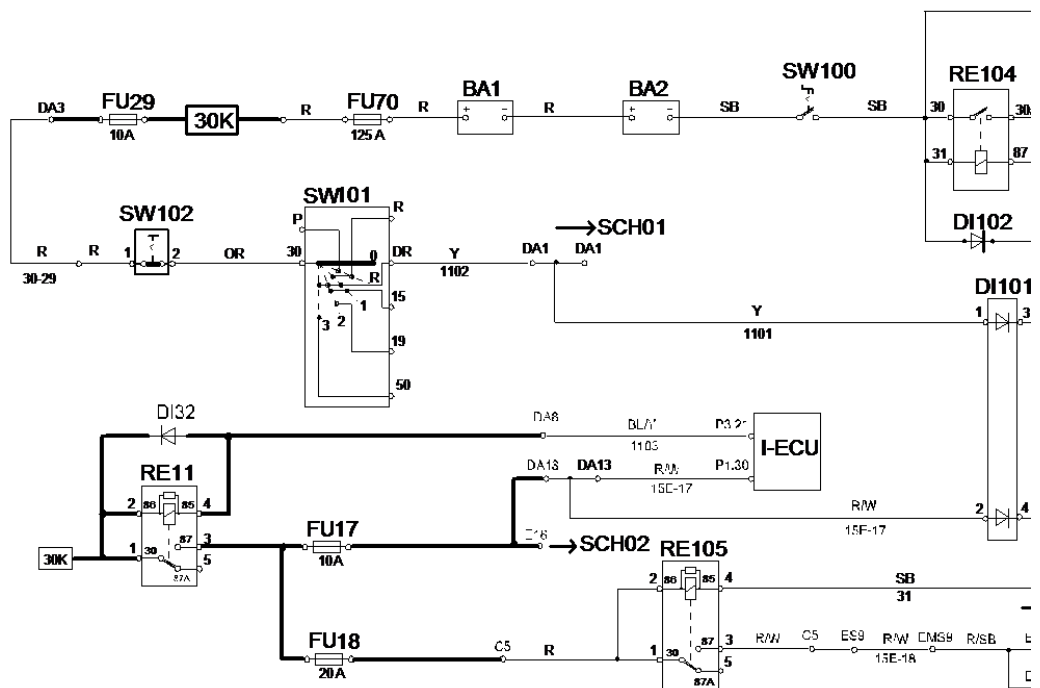
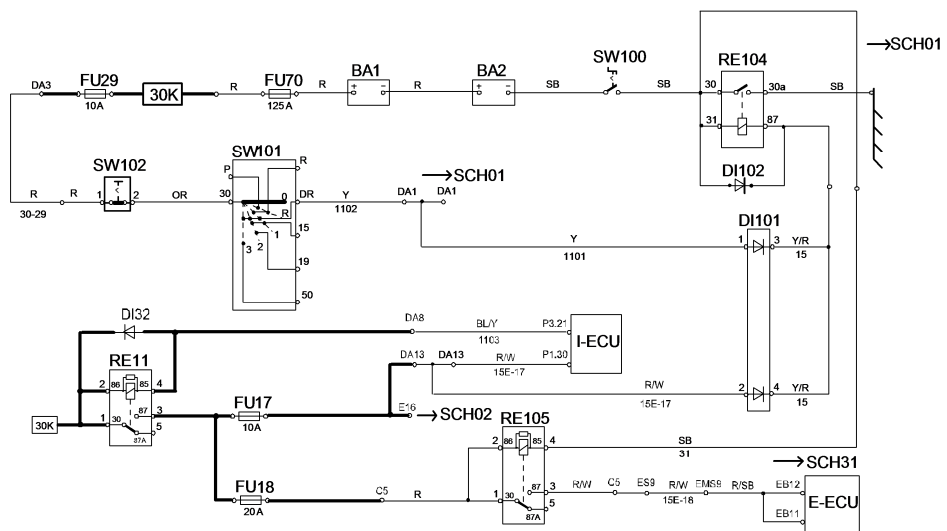


Figure 1

SCH102



Document Title: Wiring diagram 103	Function Group: 370	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 103

Optional work lights front

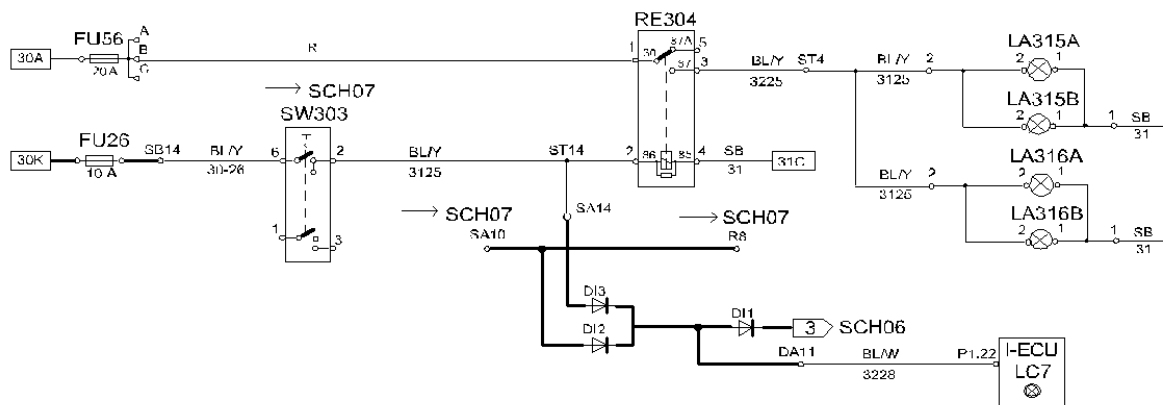
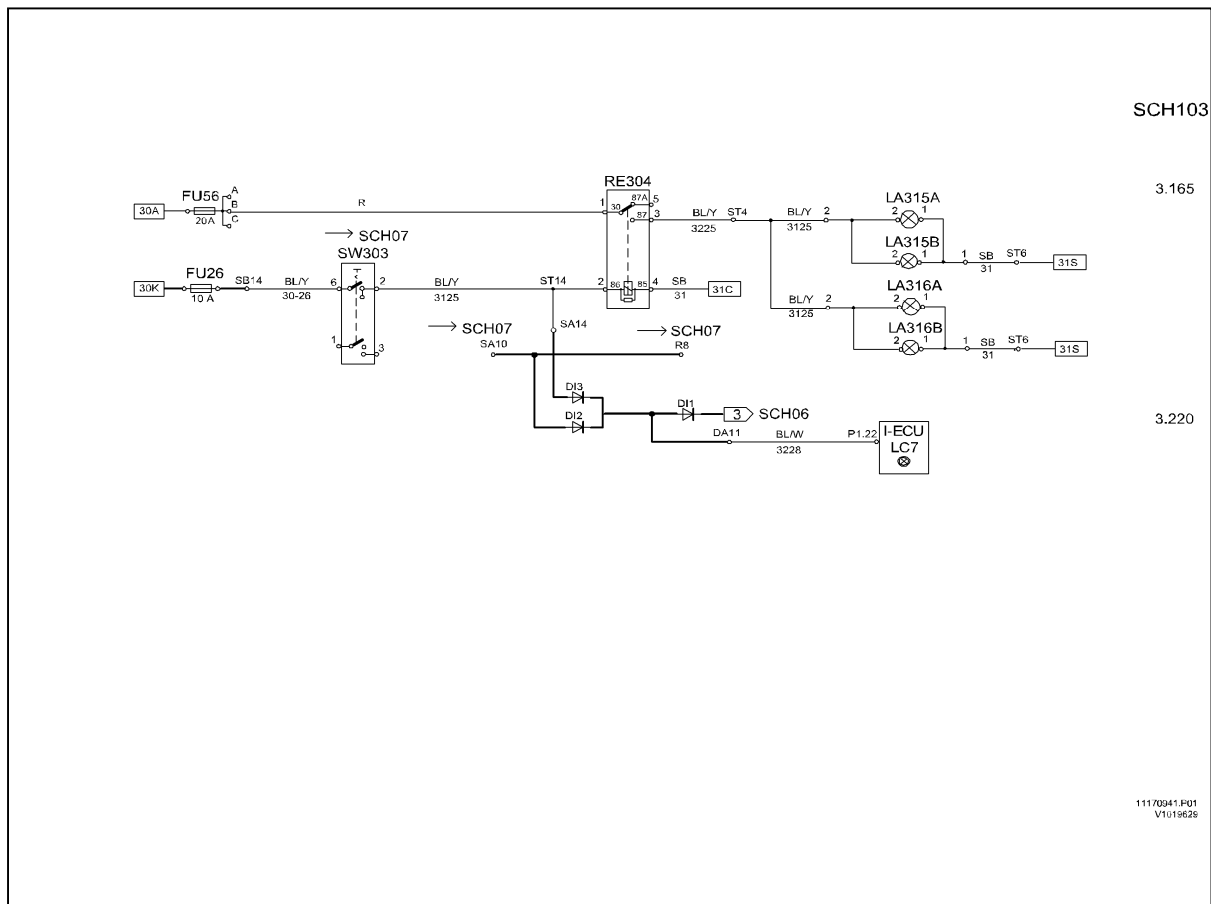


Figure 1



Document Title: Electrical distribution box, description	Function Group: 372	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Electrical distribution box, description

Relays and fuses are mainly located in the electrical distribution box behind the operator's seat and can be accessed once the distribution box cover has been opened. The inside of the cover is provided with a decal which specifies what power user (component) is connected to the respective relay and fuse.

NOTE!

Relays on the circuit board and interchangeable.

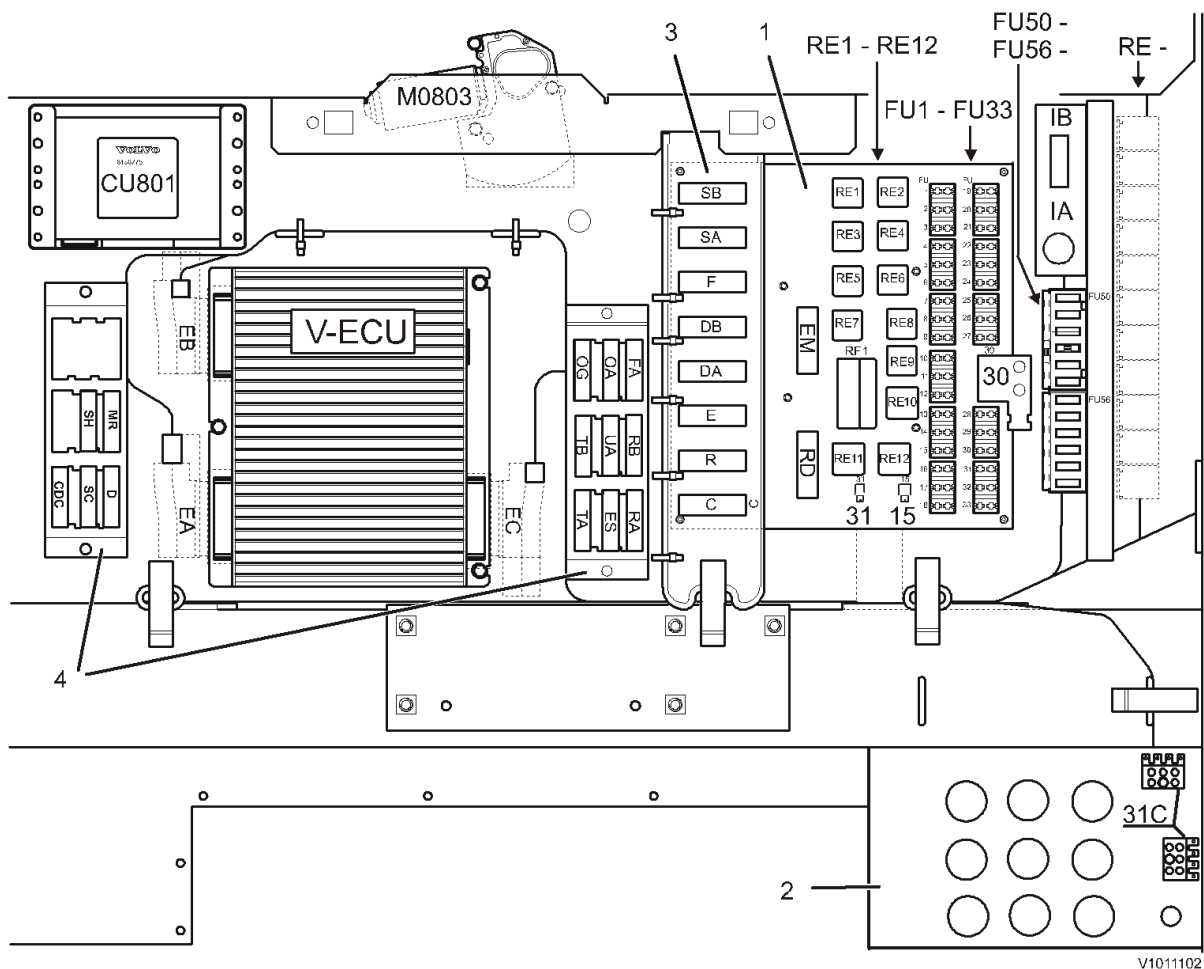


Figure 1
Rear cab wall with electrical distribution box

1	Circuit board	30	30-feed to circuit board
2	Cable lead-through cab wall	15	15-feed to circuit board
3	Connectors on circuit board	31	Frame ground connection on circuit board
4	Connectors	31C	Frame ground connection cab
RE -	Separate relays	MO803	Wiper motor rear
FU50 -	Separate fuses	V-ECU	Vehicle control unit

FU56 –	Separate fuses	CU801	Voltage converter for radio
FU1 – FU33	Fuses on circuit board	IA	Service socket for service display unit
RE1 – RE12	Relays on circuit board	IB	Service socket for VCADS Pro
RF1	Flash relay		



Construction Equipment

Service Information

Document Title: Component list: Diodes	Function Group: 379	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list: Diodes

Beteckning	Elschema	Funktion
Di25	1	Släckdiod
Di27	1	Spärrdiod
Di28	1	Fördröjt frånslag, RE12
Di32	2	Släckdiod, RE11



Construction Equipment

Service Information

Document Title: Component list: Fuses	Function Group: 379	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list: Fuses

NOTICE

Always use a fuse with correct rating.

Beteckning	Matning	AMP	Elschema	Funktion
FU2	15A	10	1	—
FU14	15EA	5	1	—
FU15	15EA	10	2	Startlåsberoende spänningsmatning I-ECU och V-ECU
			1	—
FU17	30K via RE11	10	2	Spänningsmatning I-ECU och V-ECU
FU21	15A	5	1	Timräknare, magnetisering av generator, kontrollampa laddning
			24B	Instrumentbelysning servicepanel
FU29	30K	10	1	Startlås
FU30	15EA	5	1	—
FU31	15EA	5	1	Matning bakre ram
FU32	15EA	5	1	Matning främre ram, transmission
FU33	30K	20	1	—
FU70	30	125	1	Huvudsäkring för elcentral

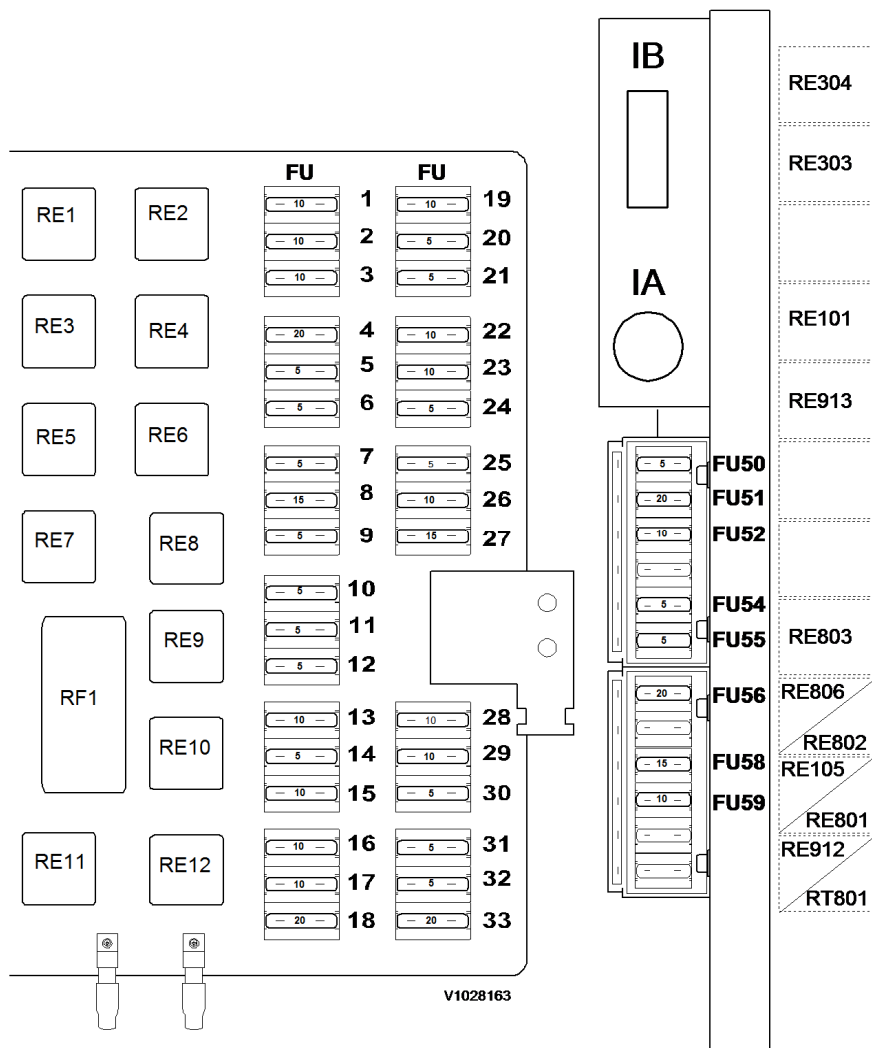


Figure 1
Komponentplacering: Säkringar i elcentral

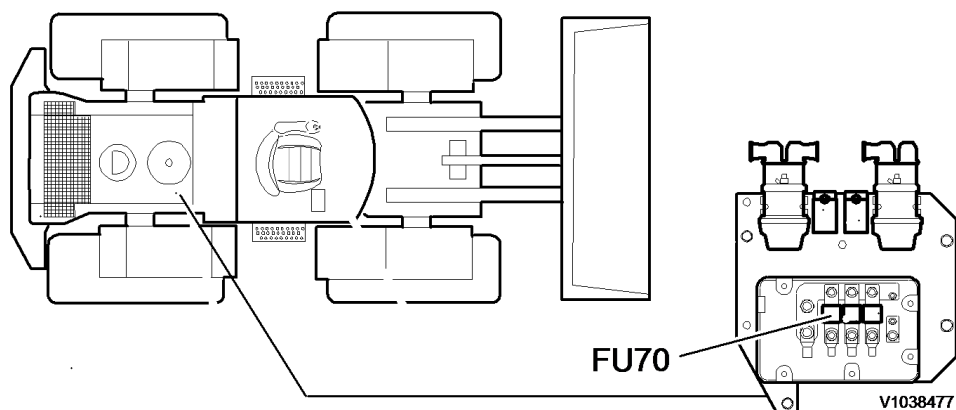


Figure 2
Komponentplacering: Säkringar utanför elcentral

Document Title: Component Instruments, sockets	list: service	Function Group: 379	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]				

Component list: Instruments, service sockets

Komponent	Beteckning	Elschema	Funktion
Instrument	IM1	24B	Informationspanel
	IM2	24B	Visarinstrument, kylvätsketemperatur
	IM3	24B	Visarinstrument, bränslenivå
	IM4	24B	Visarinstrument, transmissionsoljetemperatur
	IM201	1	Timräknare
Serviceuttag	IA	24B	Servicepanel
	IB	24B	VCADS Pro

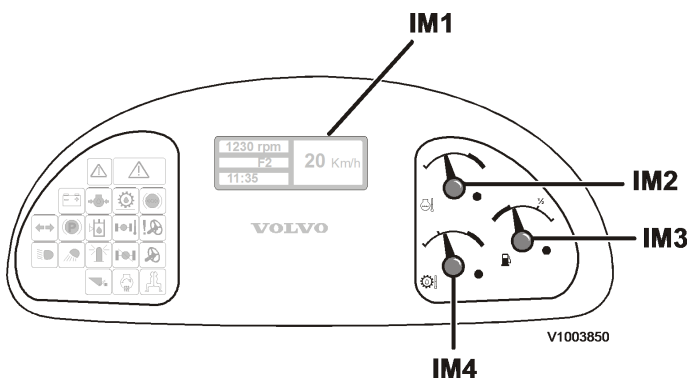


Figure 1
Komponentplacering: Instrument

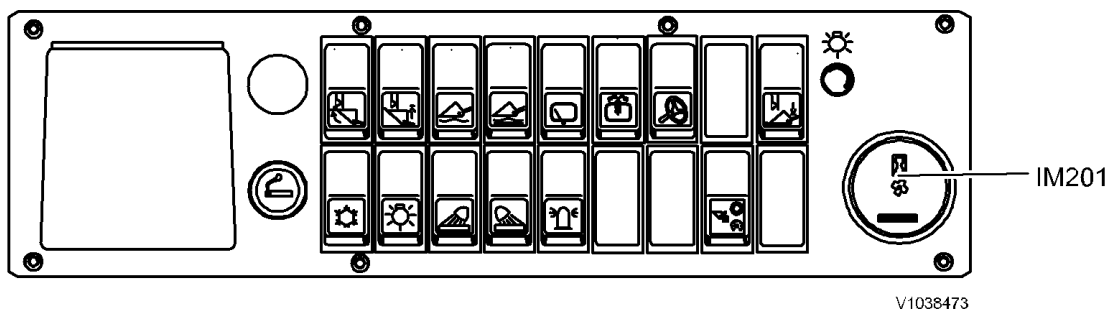


Figure 2
Komponentplacering: Instrument

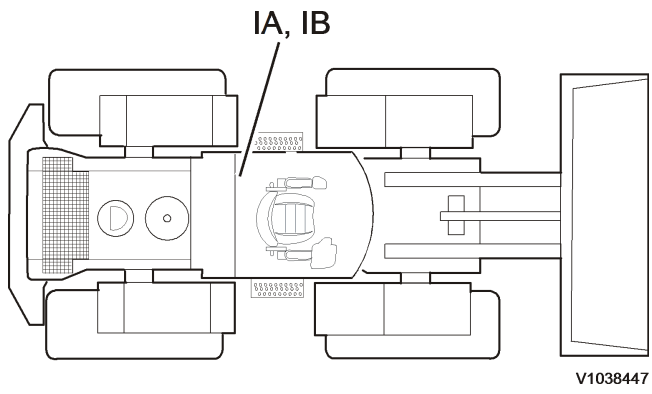


Figure 3
Komponentplacering: Serviceuttag

Document Title: Component list: Control lights/warning lights	Function Group: 379	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list: Control lights/warning lights

Beteckning	Elschema	Funktion
LC1	24B	Gul centralvarning
LC2	24B	Röd centralvarning
LC3	1	Laddning
LC4	24B	Lågt motoroljetryck
LC5	24B	Lågt transmissionsoljetryck
LC6	24B	Lågt bromstryck
LC8	24B	Ansatt parkeringsbroms
LC9	24B	Låg hydrauloljenivå
LC10	24B	Hög axeloljetemperatur, fram- och bakaxel
LC11	24B	Fel i ordinarie styrsystem
LC17	24B	Differentialspär inkopplad
LC18	24B	Lastarmsfjädring aktiverad ^(a)
LC19	24B	Spakstyrning (CDC) aktiverad ^(a)
LC20	24B	Varningslampa hög kylvätsketemperatur
LC21	24B	Varningslampa låg bränslenivå
LC22	24B	Varningslampa hög transmissionsoljetemperatur

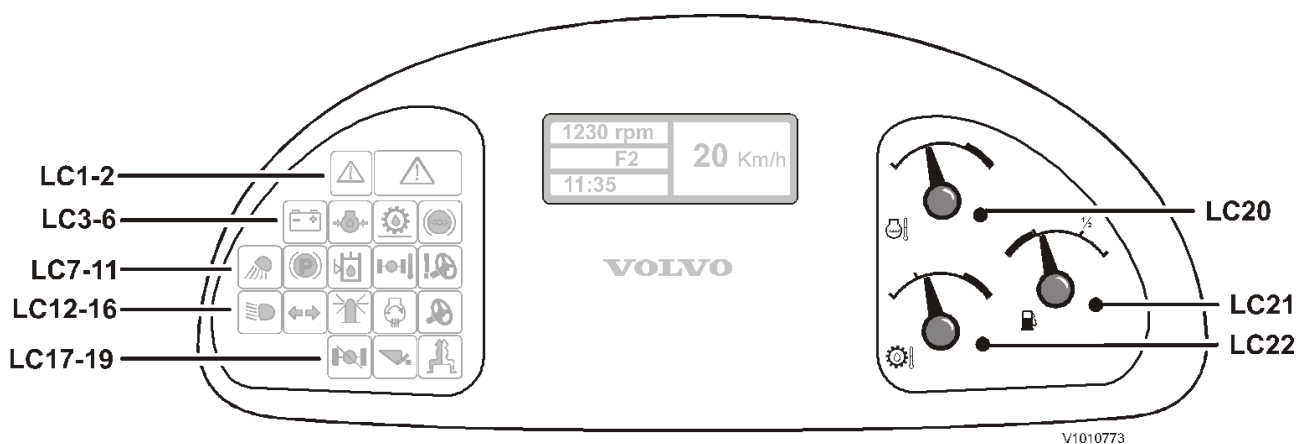


Figure 1
Komponentplacering: Kontrollampor/varningslampor

Document Title: Component list: Solenoid valves	Function Group: 379	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list: Solenoid valves

Beteckning	Elschema	Typ	Funktion
MA602	40	Proportionalventil	Styrning vänster
MA603	40	Proportionalventil	Styrning höger
MA948	38	Hållmagnet	Hållmagnet Tilt in
MA949	38	Hållmagnet	Hållmagnet Lyft/sänk
MA950	39	Proportionalventil	Lyft
MA951	39	Proportionalventil	Sänk
MA952	39	Proportionalventil	Tilt in
MA953	39	Proportionalventil	Tilt ut
MA954	39	Proportionalventil	3:funktion, Positiv riktning
MA955	39	Proportionalventil	3:funktion, Negativ riktning
MA956	39	Proportionalventil	4:funktion, Positiv riktning
MA957	39	Proportionalventil	4:funktion, Negativ riktning

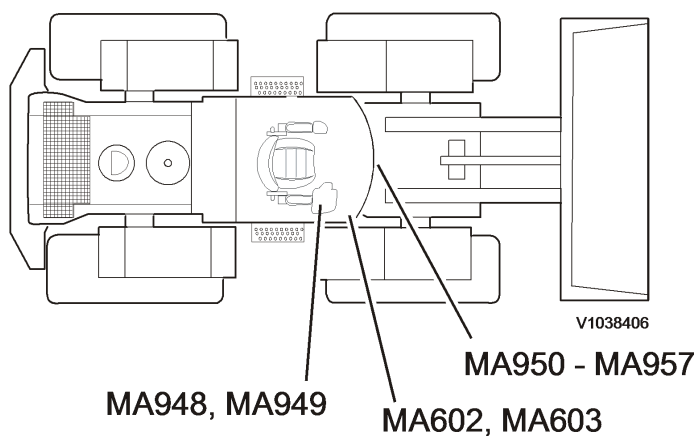


Figure 1
Komponentplacering: Magnetventiler



Construction Equipment

Service Information

Document Title: Component list: Resistors	Function Group: 379	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list: Resistors

Komponent	Beteckning	Elschema	Funktion
Motstånd	R301	24B	Reostat instrumentbelysning (för instrumentpanel och servicepanel)
	R702	24B	Termineringsmotstånd (Placerad mellan P1.1 och P1.15 på I-ECU)

Document Title: Component list: Relays	Function Group: 379	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component list: Relays

Beteckning	Elschema	Funktion
RE2	1	15A matning
RE4	1	15B matning
RE11	2	30 matning styrd av I-ECU för E- ECU, I-ECU och V-ECU
RE12	1	15EA matning
RE911	36	Spänningsmatning för V2-ECU

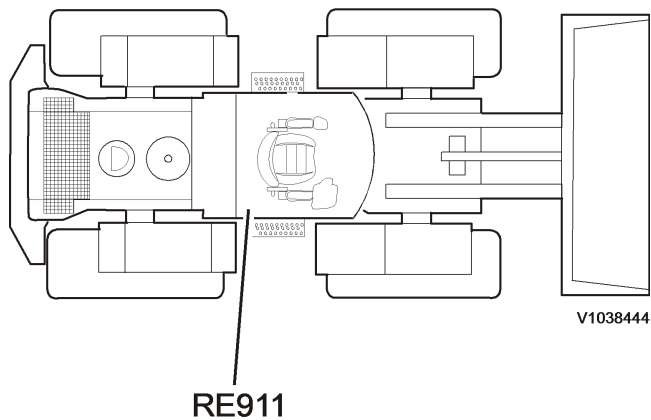


Figure 1
Komponentplacering: Reläer placerade utanför elcentralen

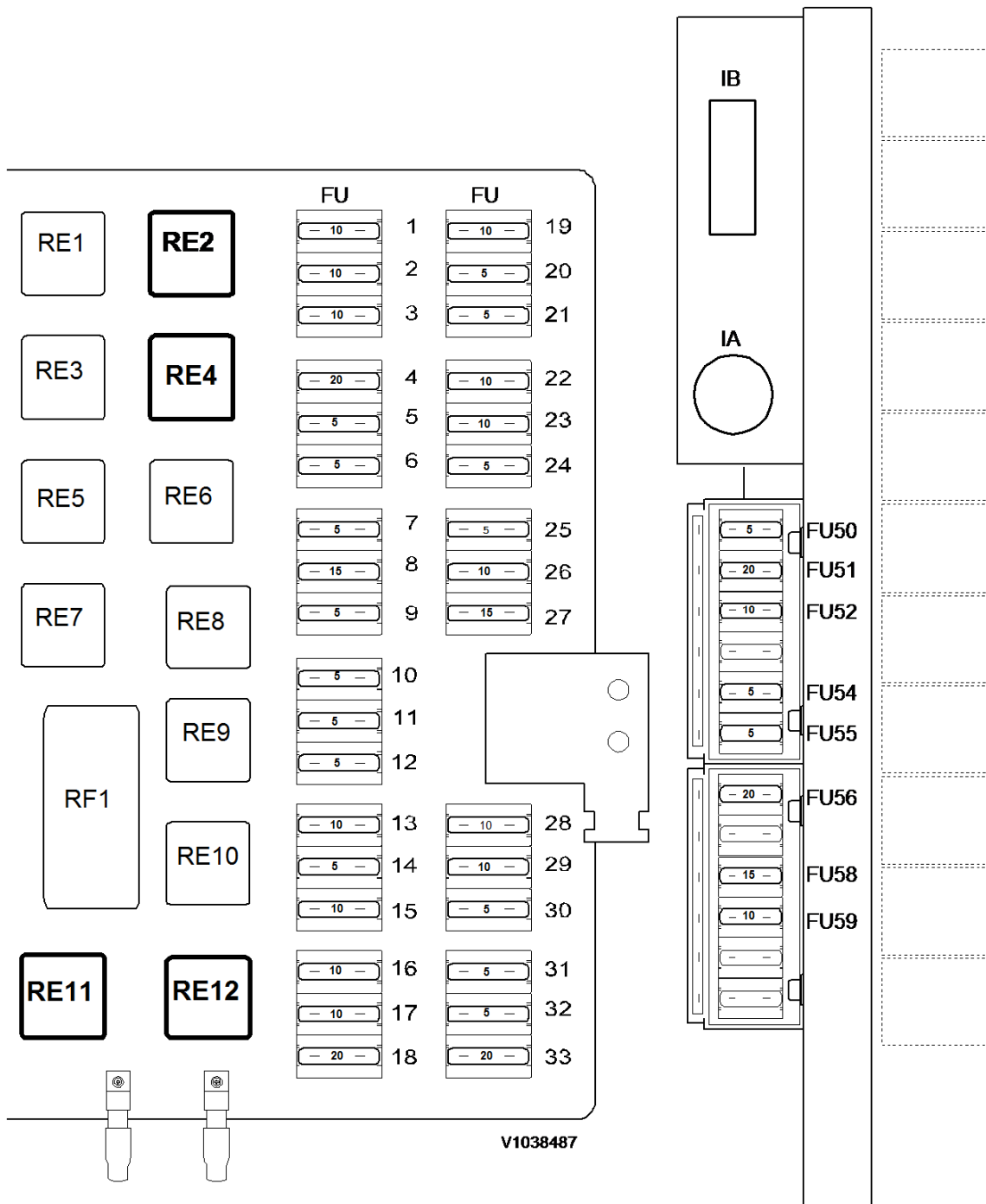


Figure 2
Komponentplacering: Reläer placerade i elcentralen

Document Title: Wiring diagram 1	Function Group: 379	Information Type: Service Information	Date: 2014/5/13
Profile: WLO, L180E [GB]			

Wiring diagram 1

Huvudschema

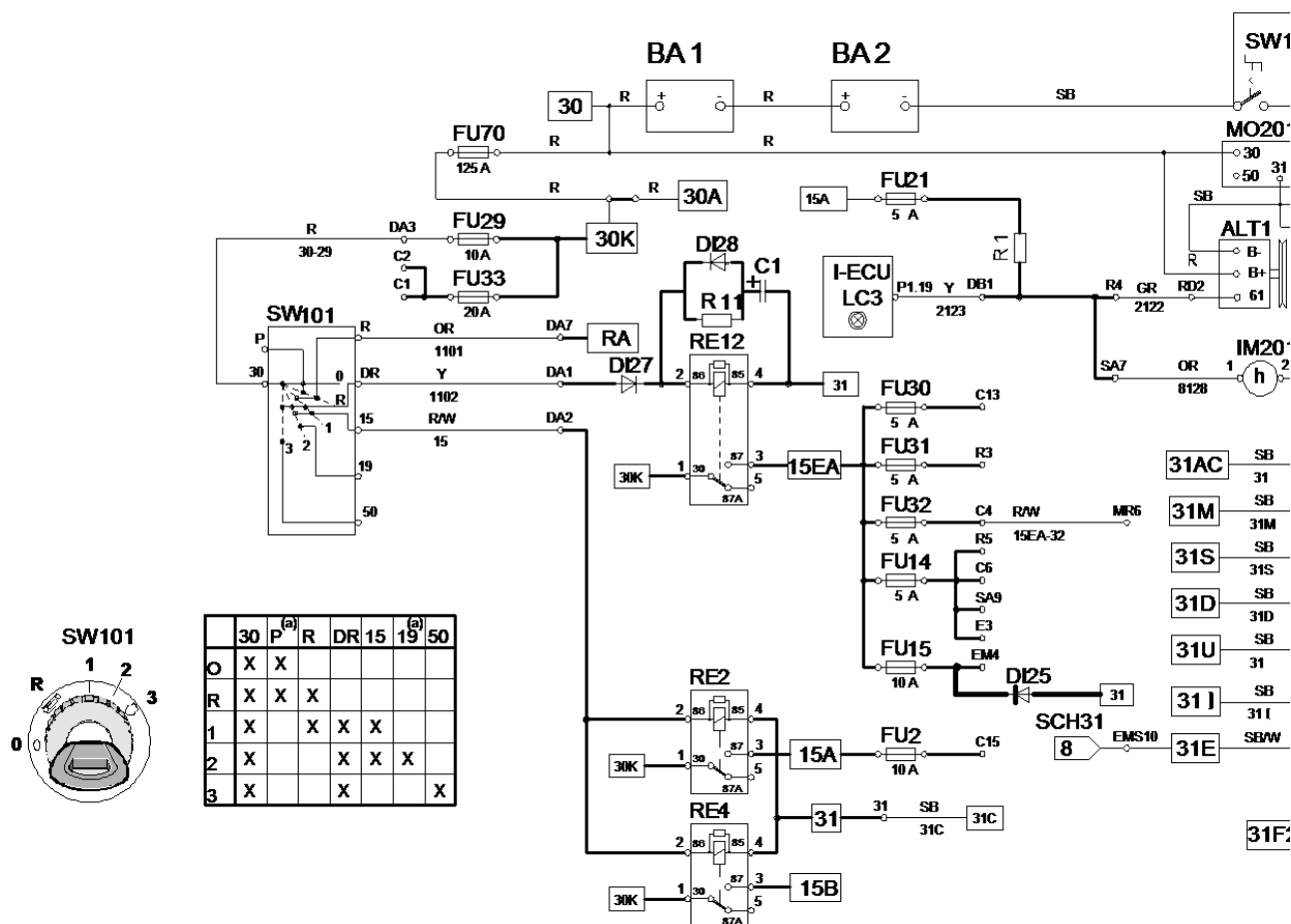
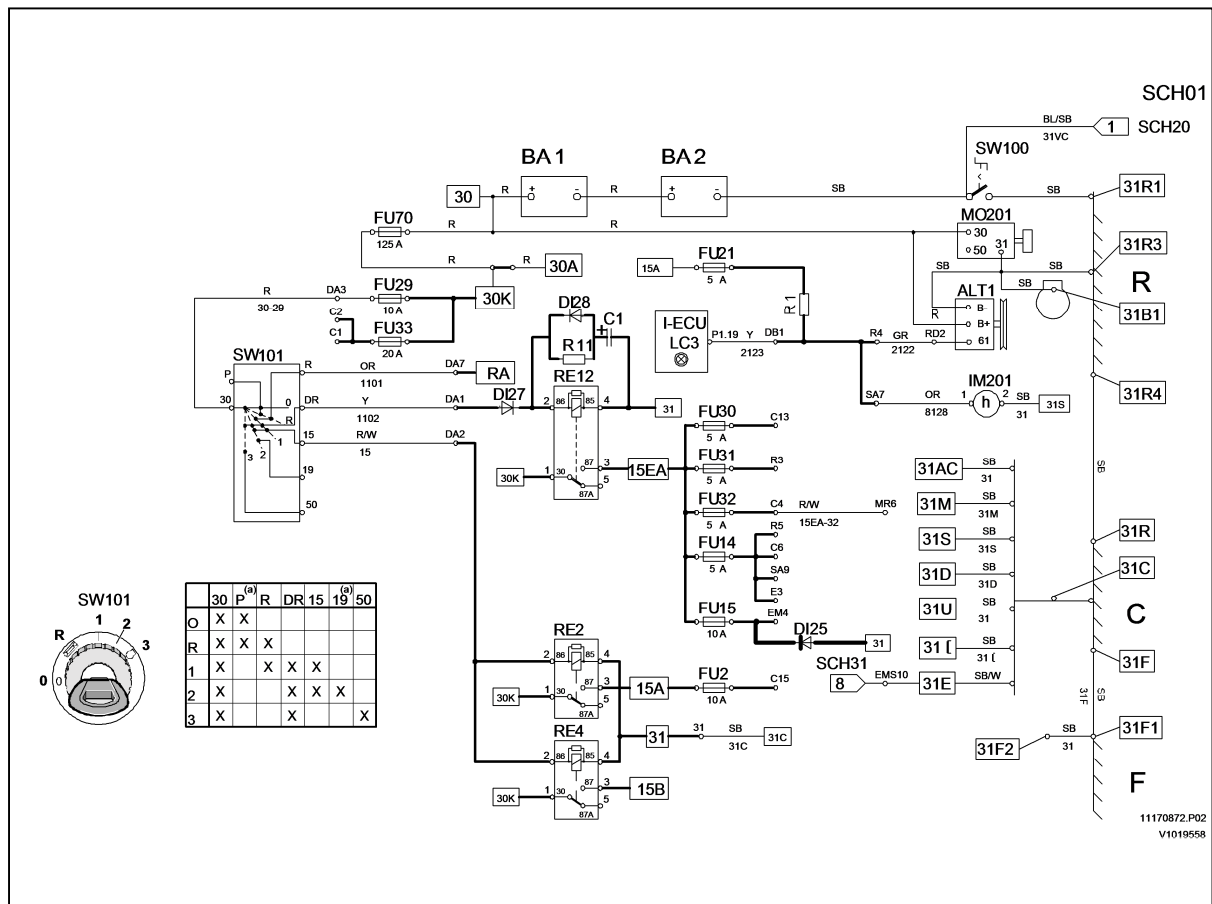


Figure 1

a. SW101, anslutning P och 19 används inte.



Document Title: Instruments	Function Group: 380	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Instruments

Instrument panels, position

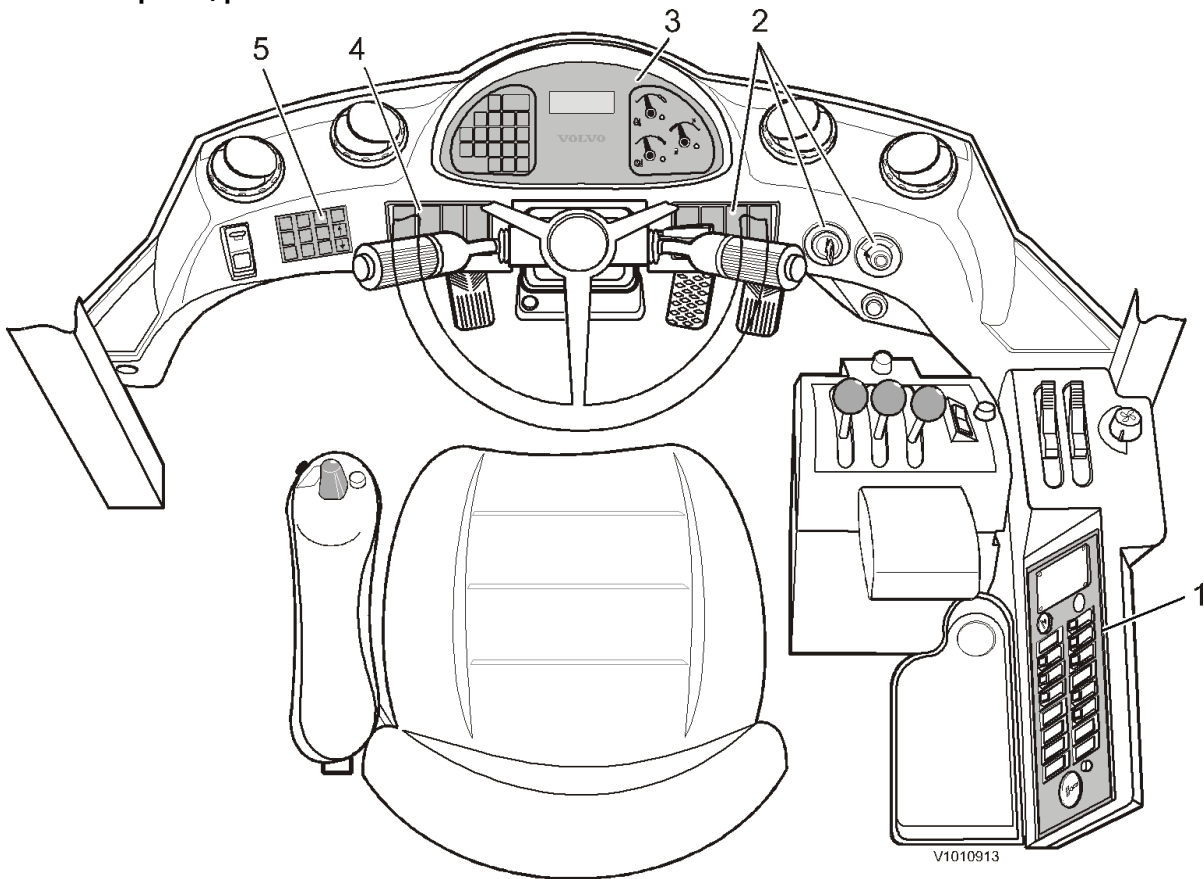


Figure 1

Instrument panels

1. Side panel, (switches, gauges)
2. Right instrument panel (switches, gauges)
3. Centre instrument panel (instrument panel, control lamps, gauges)
4. Left instrument panel (switches)
5. Keyboard

Document Title: Middle instrument panel with warning lights	Function Group: 380	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Middle instrument panel with warning lights

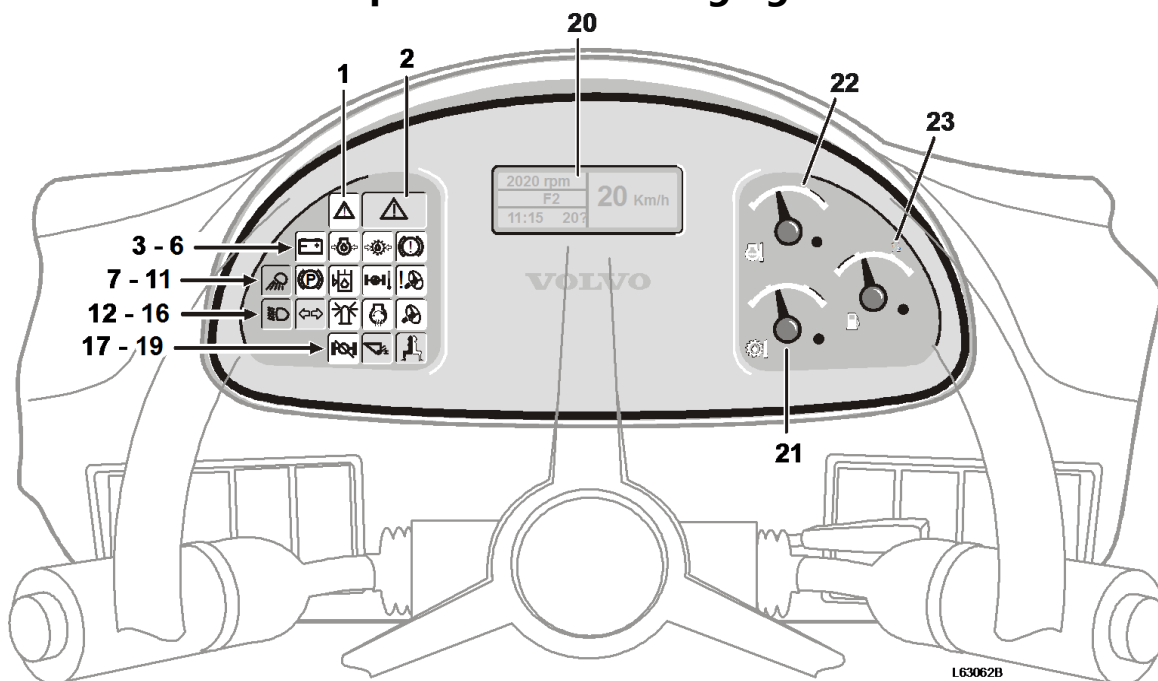


Figure 1
Middle instrument panel (control lights, warning lights, information display unit, gauges)

- | | |
|---|--|
| 1 Amber central warning | 12 High beams (blue) |
| 2 Red central warning | 13 Direction indicators (green) |
| 3 Charging, battery (red) | 14 Rotating beacon[T1] (amber) |
| 4 Low engine oil pressure (red) | 15 Preheating of engine activated (amber) |
| 5 Low transmission oil pressure (red) | 16 Secondary steering ^(a) engaged (amber) |
| 6 Low brake pressure or malfunction brake pressure charging (red) | 17 Differential lock engaged (amber) |
| 7 Work lights (amber) | 18 Boom Suspension System (BSS) ^(a) activated (green) |
| 8 Parking brake applied (red) | 19 Comfort Drive Control (CDC) ^(a) activated (green) |
| 9 Low hydraulic oil level (red) | 20 Display unit |
| 10 High axle oil temperature (red) | 21 Transmission oil temperature (gauge + warning light high temperature) |
| 11 Malfunction primary steering system (red) | 22 Coolant temperature engine (gauge + warning light high temperature) |
| | 23 Fuel level (gauge + warning light low level) |

[T1]Optional equipment.

Amber central warning

An amber central warning light for Operator Information flashes to indicate that a function is activated/deactivated or that a

function requires observation (such as a clogged filter, etc.).

At the same time, information is shown on the information display unit.

Red central warning

A red central warning light flashes and a warning appears on the information display unit at the same time. If the function has a warning light, the light will be activated.

If a directional gear is engaged (Forward or Reverse), the buzzer is also activated.

Buzzer (reinforces central warning)

The buzzer sounds and the red central warning light flashes at the same time if a malfunction occurs in any of the following functions:

- Serious engine malfunction (E-ECU)
- Interrupted computer communication
- Primary steering system malfunction (low steering pressure)

If the directional gear (Forward or Reverse) is engaged, the buzzer sounds and the red central warning light flashes simultaneously if a malfunction occurs in any of the following functions:

1. Low engine oil pressure
2. Low transmission oil pressure
3. Low brake pressure
4. Parking brake applied
5. Low hydraulic oil level
6. High hydraulic oil temperature
7. High axle oil temperature, front and rear axles
8. High transmission oil temperature
9. High engine coolant temperature
10. Low coolant level, engine
11. Brake pressure charging malfunction
12. High charge-air temperature
13. Overspeed for selected gear

Document Title: Travelling speed	Function Group: 386	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Travelling speed

The function calculates travelling speed, provides the operator with travelling speed information and informs the operator if system fault occurs.

Travelling speed is used as an input signal to several functions.

Unit setting to km/h or mph is made with the display panel keyboard, see [387 Display panel information displays](#).

Input signals	Conditions for output functions	Output functions					
○ Propeller shaft speed, SE403 ○ Tyre radius[T1] ⓘ	○ Propeller shaft speed ○ Tyre radius	○ Travelling speed in km/h or mph <table><tr><td>1230 rpm</td><td rowspan="2">22 km/h</td></tr><tr><td>F2</td></tr><tr><td>09:34 20°</td><td></td></tr></table>	1230 rpm	22 km/h	F2	09:34 20°	
1230 rpm	22 km/h						
F2							
09:34 20°							
○ Monitoring, SE403	○ System fault, signal outside limits See 302 ERROR Monitoring Travel Speed (MID 187 PID 84)	○ Amber central warning lamp ○ ERROR Monitoring Travel Speed ○ Er km/h <table><tr><td>1230 rpm</td><td rowspan="2">Er km/h</td></tr><tr><td>F2</td></tr><tr><td>09:34 20°</td><td></td></tr></table>	1230 rpm	Er km/h	F2	09:34 20°	
1230 rpm	Er km/h						
F2							
09:34 20°							

[T1]Setting with service display unit.

Document Title: Travelling speed	Function Group: 386	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Travelling speed

The function calculates travelling speed, provides the operator with travelling speed information and informs the operator if system fault occurs.

Travelling speed is used as an input signal to several functions.

Unit setting to km/h or mph is made with the display panel keyboard, see [387 Display panel information displays](#).

Input signals	Conditions for output functions	Output functions					
○ Propeller shaft speed, SE403 ○ Tyre radius[T1] ⓘ	○ Propeller shaft speed ○ Tyre radius	○ Travelling speed in km/h or mph <table><tr><td>1230 rpm</td><td rowspan="2">22 km/h</td></tr><tr><td>F2</td></tr><tr><td>09:34</td><td>20°</td></tr></table>	1230 rpm	22 km/h	F2	09:34	20°
1230 rpm	22 km/h						
F2							
09:34	20°						
○ Monitoring, SE403	○ System fault, signal outside limits See 302 ERROR Monitoring Travel Speed (MID 187 PID 84)	○ Amber central warning lamp ○ ERROR Monitoring Travel Speed ○ Er km/h <table><tr><td>1230 rpm</td><td rowspan="2">Er km/h</td></tr><tr><td>F2</td></tr><tr><td>09:34</td><td>20°</td></tr></table>	1230 rpm	Er km/h	F2	09:34	20°
1230 rpm	Er km/h						
F2							
09:34	20°						

[T1]Setting with service display unit.



Construction Equipment

Service Information

Document Title: Information display unit, general	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Information display unit, general

The information display units gives the operator information about the functions monitored by the instrument control unit I-ECU.

In case of abnormal operating values or malfunctions, the display unit shows an alarm figure, a warning light is activated and red central warning flashes. Also, a buzzer will sound if directional gear Forward or Reverse is selected.

When engaging/disengaging a function or when a function needs to be kept under observation, an amber central warning will flash at the same time as information is shown on the information display unit.

- In case of alarms that generate:
Flashing amber central warning – investigate the cause next time the machine is stopped
- In case of alarms that generate:
Flashing red central warning – stop the machine immediately and investigate the cause

Communication with the information display unit takes place with the keypad located to the left on the instrument panel.

Two unit combinations can be selected:

- SI/ Metric (°C, km/h, km, bar, litre)
- Foot-pound (°F, mph, mile, psi, USgal)

When the machine is started, the initial display is shown for approx. 4 seconds, then the operating display, see [387 Display panel, initial display](#).

Document Title: Display panel and keypad, general	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Display panel and keypad, general

The display panel and keyboard are located on the instrument panel. The instrument panel is linked to the Instrument control unit (I-ECU).

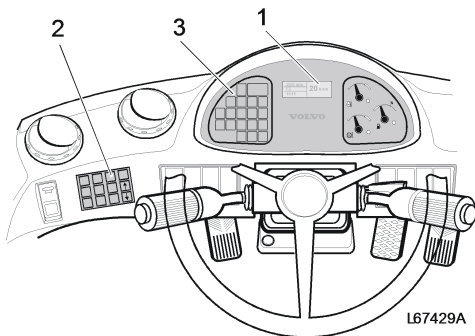


Figure 1
Instrument panel

- 1 Display unit
- 2 Keyboard
- 3 Warning lamps and control lamps

Information organization

The information is divided into a number of groups:

- ☐ Initial display
- ☐ Operating information
- ☐ Engine
- ☐ Transmission
- ☐ Hydraulics
- ☐ Axles
- ☐ Electrical system
- ☐ Other information
- ☐ Setup, settings

Keyboard

The following can be performed:

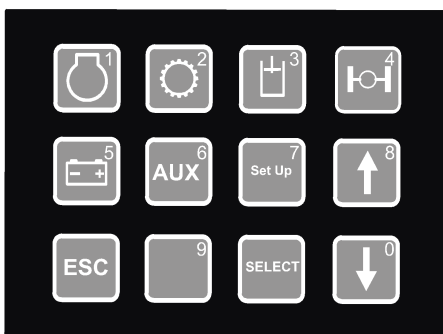


Figure 2
Keyboard

- Select function group by direct selection (function key)
- Scroll within the function group (arrow keys)
- Activate/deactivate functions (on/off)
- Reset to zero/acknowledge (time/distance/cycles)
- Numerical settings (arrow keys)
- Alphanumeric settings (arrow keys)
- Simpler settings

Key functions

 L68365A	ENGINE	 L68370A	AUX, Additional information
 L68366A	TRANSMISSION	 L68371A	SETUP, Settings
 L68367A	HYDRAULIC SYSTEM	 L68372A	ARROW UP, ARROW DOWN, Used for scrolling in menus
 L68368A	AXLES	 L68374A	SELECT, Confirms selected setting
 L68369A	ELECTRICAL SYSTEM	 L68373A	ESC, Return

Display unit

The information is divided into the following three categories:

1230 rpm	22 km/h
F2	
09:34 20°	

L67493B

Figure 3
Display panel (example of operating display)

- Operating information, such as engine rpm, travelling speed, etc.
- Warning messages for low pressure, high temperature, etc.
- Error texts, components and circuits

Changing display screen

Moving from one function group can be done with the keyboard function keys.

When changing functions, the first screen or menu of the selected function will always be displayed.

Press the ESC key to return to the "operating information" display.

As well, return to the display for "operating information" is automatic when the machine speed is above 20 km/h.

Setup (settings)

Language selection/units/machine hours and date/time setting are made in the function group SETUP.

Alarm classes

Alarms are divided into four classes, an alarm display is shown for two seconds at speeds over 20 km/h (12.4 mph) for all classes.

After two seconds, the "operating information" display resumes for three seconds and returns to alarm, and so on.

"WARNING"

- Shown irrespective of activated display
- An alarm display is shown for two seconds and returns to the previous display for three seconds (repeated as long as fault situation remains)
- Red central warning flashes

For description of possible alarm message, see [301 Software functions per function group](#).

"INFO"

- Shown irrespective of activated display
- An alarm display is shown for two seconds and returns to the previous display for three seconds (repeated three times)
- Amber central warning lamp flashes while warning display is shown

The alarm is repeated at next start if still "active".

For description of possible alarm message, see [301 Software functions per function group](#).

"ERROR"

- Shown irrespective of activated display
- An alarm display is shown for two seconds and returns to the previous display for three seconds (repeated as long as fault situation remains)
- Amber central warning lamp flashes

For error texts, see [302 Error texts and troubleshooting information, general](#).

"SERVICE INFO"

- Shown irrespective of activated display
- An alarm display is shown for two seconds and returns to the previous display for three seconds (repeated until acknowledgement from keyboard or end of alarm for specified function)
- Amber central warning lamp flashes

For description of possible alarm message, see [301 Software functions per function group](#).

Document Title: Display panel, initial display	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Display panel, initial display

Starting sequence

Ignition key in position 1, operating position.

The start sequence takes approximately 4 - 5 seconds and entails the running of a test program for system verification.

The test is continued on the display panel with black square markings from 1 to 7.

During the first part, the control lamps will come on and the gauge pointers point straight up.

The operator is not prevented from starting the machine but should wait until the test has been completed.

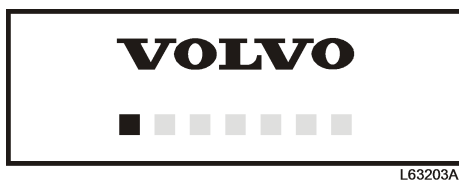


Figure 1
Initial display

The ignition switch has five different positions

- 0 = Stop engine
- R = Radio position
- 1 = Operating position
- 2 = No electric function[T1] ⓘ
- 3 = Starter motor

[T1]Position 2 prevents re-engagement of starter motor from position 1 when the engine is running.

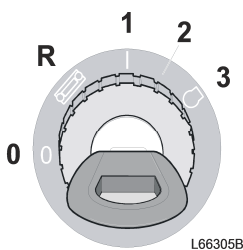


Figure 2
Ignition switch

Document Title: Display panel, operating display	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Display panel, operating display

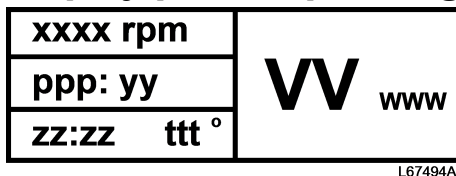


Figure 1
Operating display

Operating display

- "Operating information" text is shown on the display panel after starting (if no other display was set when the current was turned off).
- At a travel speed above 20 km/h, "operating information" shows the current travel speed (regardless of other selected displays).
- If a display other than "operating information" has been selected, the system will return to that display when travel speed drops below 20 km/h.
- Change of display with the keyboard is possible only if travel speed is below 20 km/h.

x =	Engine speed/Er/ –
y =	Selected gear: N / F1 / F2 / F3 / F4 / R1 / R2 / R3 / R4 / Er / –
p =	Active gear control: CDC / F / R / Er / –
z =	Clock, Hours and minutes, 24 h or 12 h display mode
v =	Speed / Er / –
w =	km/h or mph
t =	Outside temperature, ttt° (or °C / °F) / Er / –, first character for °C - (minus) if necessary

"Er" (Error) indicates that a system malfunction/error has occurred (electrical circuits or functions).

When "Er" is displayed, the following occurs:

- Error text for 2 seconds. Afterwards, previous display is shown for 3 seconds. This is repeated as long as the malfunction/error exists.
- Amber central warning light flashes.

For outside temperature, only "Er" is displayed.

"–" indicates that no information is available.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Information display unit, setting](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika, Asheville

Serial number start: 5001, 62501

Serial number stop: 7398, 62543

- [Information display unit, setting](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8001

Serial number stop: 10999

Document Title: Information display unit, setting	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Information display unit, setting

Setup



SETUP

English

Units

xx xxxx xx xxxx

- Press SETUP to come to the "SETUP" menu.
- Press SELECT to choose language. (If setting is not required, press SELECT to go to the "Units" line.)
- Scroll to desired language with the arrow keys.
- After selecting language, press SELECT to go to the "Units" line.
- Select settings for desired units with the arrow keys and press SELECT.
- Press arrow down to continue to the next menu "MACHINE HOURS".

Setting machine hours

MACHINE HOURS

Hours

xxxxx

NOTE!

Machine hour setting should only be performed after vehicle control unit V-ECU replacement. This will reset total machine hours.

- Press SELECT to change existing machine hours.
- Scroll to the number value for the existing machine hours with the arrow keys.
- When the first digit is selected, press SELECT to move cursor to the next digit, and so on.

If no setting is required, press SELECT for each digit only.

To confirm machine hour setting, press SELECT after entering the last digit.

- Press arrow down to continue to the next menu "DATE/TIME".

Setting date and time

DATE/ TIME

yyyy-mm-dd

Alt x

yy:yy

- Press SELECT to change display alternative.
- Select display alternative 1-6 with the arrow keys.

The following display alternatives are available for date/time:

1. yyyy-mm-dd, yy:yy, (24 h)
 2. yyyy-mm-dd, yy:yy, am/pm
 3. mm.dd.yyyy, yy:yy, (24 h)
 4. mm.dd.yyyy, yy:yy, am/pm
 5. dd.mm.yyyy, yy:yy, (24 h)
 6. dd.mm.yyyy, yy:yy, am/pm
- After choosing display alternative, press SELECT.
 - To change a digit value, scroll to the next digit with the arrow keys and confirm with SELECT. The cursor moves to the next digit, and so on.

NOTE!

Press ESC to undo settings; continue with settings from the top of the selected menu.

Setting reversible cooling fan

Reversible Fan	
Select Mode	XXXXXX

- Select mode Manual, 3/30, 1/15 or Off with the arrow keys.
- Press SELECT to activate selected Mode.

Mode	Reversal	Interval
Manual	3 minutes	–
3/30	3 minutes	30 minutes
1/15	1 minute	15 minutes
Off	No reversal	

To start reversal of cooling fan with selected Mode Manual, press SELECT under menu Engine.

Selecting transmission disengagement

TRANSM.DISENG	
Select	xxx

x = On, transmission disengagement activated
x = Off, transmission disengagement deactivated

- Select desired function with the arrow keys.
- Press SELECT to activate selected function.

Document Title: Information display unit, setting	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Information display unit, setting



Setup

SETUP

English

Units

xx xxxx xx xxxx

- Press SETUP to come to the "SETUP" menu.
- Press SELECT to choose language. (If setting is not required, press SELECT to go to the "Units" line.)
- Scroll to desired language with the arrow keys.
- After selecting language, press SELECT to go to the "Units" line.
- Select settings for desired units with the arrow keys and press SELECT.
- Press arrow down to continue to the next menu "MACHINE HOURS".

Setting machine hours

MACHINE HOURS

Hours

xxxxx

NOTE!

Machine hour setting should only be performed after vehicle control unit V-ECU replacement. This will reset total machine hours.

- Press SELECT to change existing machine hours.
- Scroll to the number value for the existing machine hours with the arrow keys.
- When the first digit is selected, press SELECT to move cursor to the next digit, and so on.

If no setting is required, press SELECT for each digit only.

To confirm machine hour setting, press SELECT after entering the last digit.

- Press arrow down to continue to the next menu "DATE/TIME".

Setting date and time

DATE/ TIME

yyyy-mm-dd

Alt x

yy:yy

- Press SELECT to change display alternative.

- Select display alternative 1-6 with the arrow keys.

The following display alternatives are available for date/time:

1. yyyy-mm-dd, yy:yy, (24 h)
 2. yyyy-mm-dd, yy:yy, am/pm
 3. mm.dd.yyyy, yy:yy, (24 h)
 4. mm.dd.yyyy, yy:yy, am/pm
 5. dd.mm.yyyy, yy:yy, (24 h)
 6. dd.mm.yyyy, yy:yy, am/pm
- After choosing display alternative, press SELECT.
 - To change a digit value, scroll to the next digit with the arrow keys and confirm with SELECT. The cursor moves to the next digit, and so on.

NOTE!

Press ESC to undo settings; continue with settings from the top of the selected menu.

Setting reversible cooling fan

Reversible Fan	
Select Mode	XXXXXX

- Select mode Manual, 30 min., 15 min. or Off with the arrow keys.
- Press SELECT to activate selected Mode.

Mode	Reversal	Interval
Manual	30 seconds	–
30 min.	30 seconds	30 minutes
15 min.	30 seconds	15 minutes
Off	No reversal	

To start reversal of cooling fan with selected Mode Manual, press SELECT under menu Engine.

Selecting transmission disengagement

TRANSM.DISENG	
Select	xxx

x = On, transmission disengagement activated
 x = Off, transmission disengagement deactivated

- Select desired function with the arrow keys.
- Press SELECT to activate selected function.

Document Title: Display panel, information displays	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Display panel, information displays

Information displays, general

Each function group consists of one or more displays.

To scroll within the function group, press arrow up or arrow down.

"Er" (Error) indicates that a system fault has occurred (electrical circuit or function fault).

When "Er" is displayed, the following occurs:

- Error text is shown for 2 seconds. Afterwards, previous display is shown for 3 seconds. This is repeated as long as the malfunction situation exists.
- Amber central warning lamp flashes.

"—" indicates that no information is available.



Engine

ENGINE	
Temp.	xxx xx
Rev.	yyy0 rpm
Pressure	zzzzzz

x = Coolant temperature / Er / –, Unit °C / °F (temperature shown down to 0 °C and below 0 °C, the following is shown:
< 0 / < 32)

y = Engine speed / Er / –

z = Engine oil pressure: Normal / Low / Er / –

ENGINE	
Reversible Fan	
Mode	xxxxxx

x = Selected Mode: 1/15, 3/30, Manual, Off

To change Mode, see setting of reversible cooling fan under Setup

.

ENGINE	
Reversible Fan	
Mode	xxxxxx
Activate	Sel.

To activate reversal of cooling fan with selected Mode Manual, press SELECT.

ENGINE		
Oil Lev.		xxxxxx

x = Engine oil level: Normal / Low / Er / –
 – – – – = Engine oil level not checked



Power transmission

TRANSMISSION		
Lever xx		Gear yy
Temp.		zzz zz
Pressure		vvvvvv

x = Gear lever position: N / F1 / F2 / F3 / FA / R1 / R2 / R3 / RA / Er / –
 y = Selected gear: N / F1 / F2 / F3 / FA / R1 / R2 / R3 / RA / Er / –
 z = Transmission oil temperature/ Er / –, Unit °C / °F (temperature shown down to 0 °C and below 0 °C < 0 / < 32 is shown)
 v = Transmission oil pressure: Normal / Low / Er / –

TRANSMISSION		
Level		xxxxxx
Filter		yyyyyy

x = Transmission oil level: Normal / Low / Er / –
 y = Transmission oil filter: Normal / Clogged / Er / –

Mode selector APS II[1] ⓘ

TRANSMISSION		
APS II		xxxxxx
Transm.Diseng.		yyy

x = APS II: Light 1 / Light 2 / Normal / Heavy / Man / Er / –
 y = Transmission disengagement: On (Activated) / Off (Not activated) / –

Mode selector APS

TRANSMISSION		
APS		xxxxxx
Transm.Diseng.		yyy

x = APS: L / M / H / AUTO / SERVICE / Er / –
 y = Transmission disengagement: On (Activated) / Off (Not activated) / –



Hydraulics

HYDRAULICS

Level	xxxxxx
Temp.	yyyyyy
BSS	vvv

- x = Hydraulic oil tank level: Normal / Fill / Low / Er / –
y = Hydraulic oil temperature: Normal / High / Er / –
v = Boom suspension system: On (Engaged) / Off (Disengaged) / –



Axles / Brakes

AXLES/BRAKES

Br.Pressure	xxxxxx
Temp.Front	yyyyyy
Temp.Rear	zzzzzz

- x = Brake pressure: Normal / Low / Er / –
y = Temperature, front axle: Normal / High / Er / –
z = Temperature, rear axle: Normal / High / Er / –

BRAKE TEST

Speed	xx yyy
z.zz m/s2	vvv bar
See Instructions	

- x = Machine's speed
y = km/h or mph
z = Measured retardation in m/s2 / –
v = Output brake pressure in bar / –



Electrical system

ELECTRICAL SYSTEM

Voltage	xx.x V
----------------	--------

- x = Current voltage in electrical system in V (volts) / –



Additional information

DATE/ TIME

xxxx-xx-xx	yy:yy
------------	-------

Date / time

x = Date / –

y = Time: 24h / am/pm / –

Use SETUP menu to select settings.

INFORMATION I

Wheelloader

xxxx

Tyres

yyyy

Wheel loaders / tyres

x = Machine type: L50X, L70X, etc. / –

y = Tyre size: 15.5, 17.5, 20.5, 23.5, 26.5, 29.5 / –

Setting of tire size is performed with the service display unit or VCADS Pro.

INFORMATION II

Time

xx;xx,xx

Distance

yy.y yy

Cycles zzz

Cl=Sel.

Stop watch / trip meter / cycle counter

x = Machine time: Hours, minutes, seconds / –

y = Distance: km or miles / –

z = F/R Count / –

Cl = Sel. SELECT, Reset (resets fuel consumption)

FUEL CONSUMPTION

Inst.

xxxx x/h

Avg.

yyyy y/h

Total

zzz z

Fuel consumption

x = Current fuel consumption in l/h / –

y = Average consumption per/h (hour) / –

z = Total consumption / –

Fuel consumption reset completed simultaneously if reset completed in previous menu "INFORMATION II" using the SELECT key.

NEXT SERVICE

Resid. Time

xxxx h

Interval

yyyy h

Acknowledge:

Sel.

Service interval

x = Time to next service / –

y = Interval, 250/500/1000/2000 hours / –

Sel. = SELECT, Acknowledge performed service / –

When 8 hours remain until the next service, "SERVICE INFO" "Time For Service" is displayed and the amber central warning lamp flashes.

SERVICE INFO

Time For Service

To acknowledge service has been carried out, press SELECT (also applies to oil change).

NEXT SERVICE

Resid. Time

En.Oil Change



Engine oil change

Each rectangle represents 50 hours, the scale is used from right to left

SERVICE INFO

**Time For
Engine oil change**

When 8 hours remain to next service, " SERVICE INFO Time For Service" is shown and amber central warning flashes.

To acknowledge completed oil change, go to previous menu "NEXT SERVICE" and press SELECT.

[1]Earlier version of mode selector.

Document Title: Service display unit, general	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Service display unit, general

The service panel plugs into a socket in the electrical distribution box behind the operator's seat. The service panel is used for servicing/fault tracing and gives additional information to that supplied by the display panel.

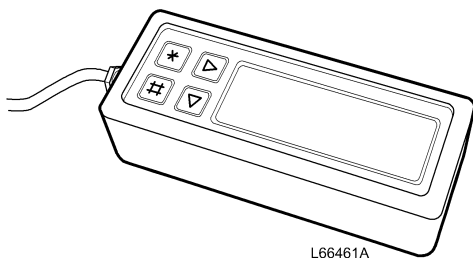


Figure 1
Service display unit 999 3721

The service panel can be used to read stored information such as pressures and temperatures. It is also possible to change settings and reset logged values.

The service panel is started by pressing the keys  and  at the same time.

The displays are divided into 6 groups:

1. Initial display and setup (settings)
2. Engine
3. Electrical system
4. Transmission
5. Axles/brakes
6. Hydraulics

The upper display key  is used to go to the first display in the next group, regardless of which display is being shown.

The lower display key  is used to go to the next display in the group. When the final display in the group has been reached, you are returned to the first display in that group.

To make settings, use the  and  keys.

The panel consists of 4 rows of information with 20 characters/row. It is updated at intervals of 0.5 seconds.

Five different languages can be selected: Swedish, English, German, Spanish and French.

There are two unit combinations that can be selected: Metric (°C, km, bar)/ Foot-pound (°F, mile, psi).

Connection

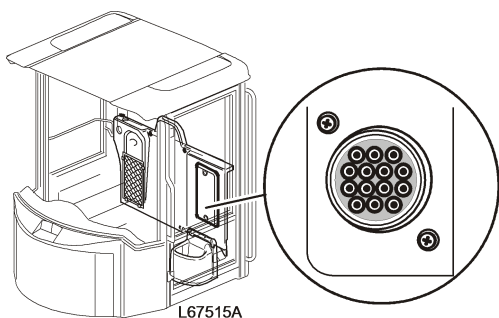
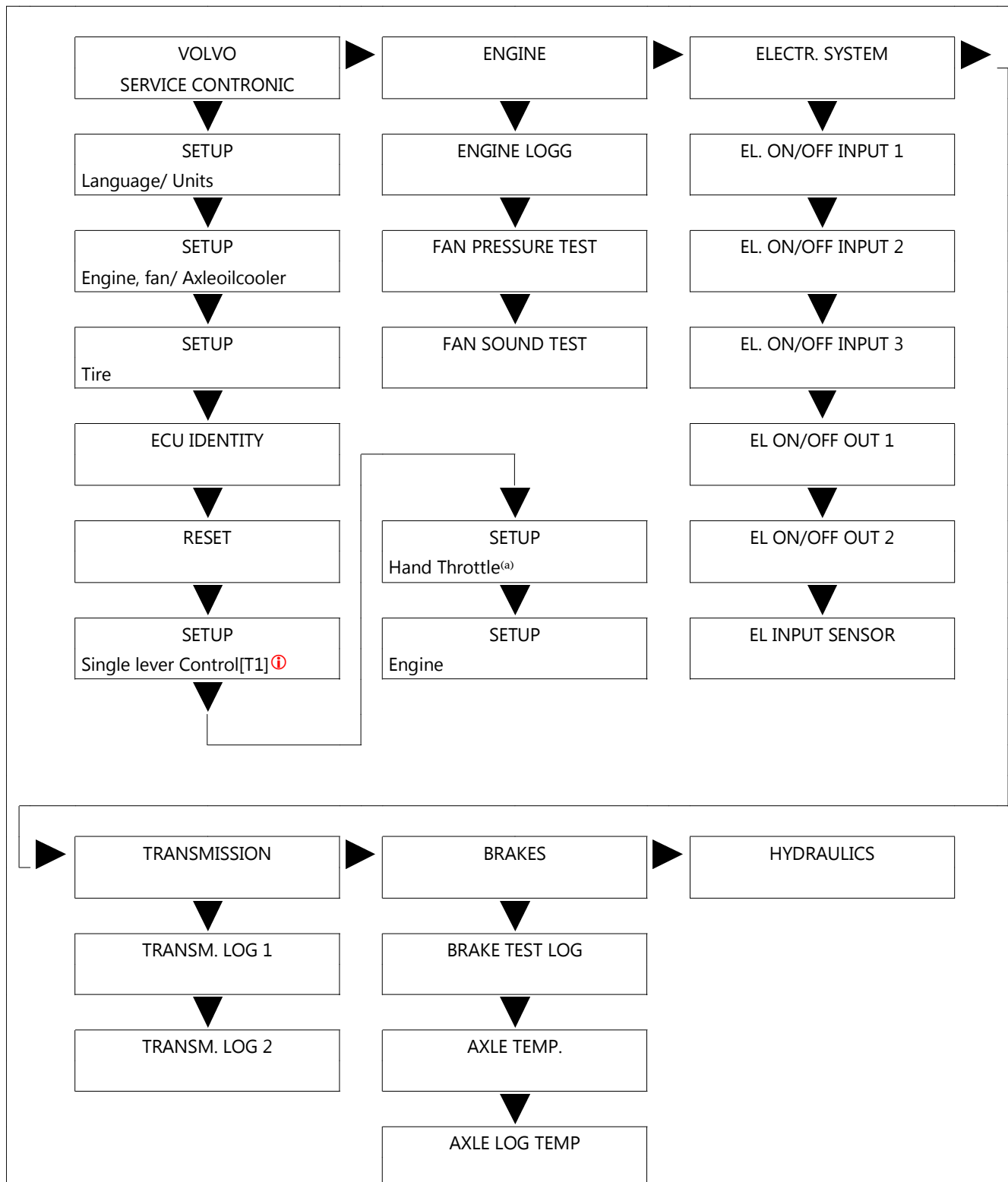


Figure 2
Socket for service display unit

The service panel is connected to the socket in the electrical distribution box.

Overview of service panel displays



[T1]Optional equipment.



Construction Equipment

Service Information

Document Title: Service display unit, engine	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Service display unit, engine

Engine

ENGINE	
Pressure	xxx xxx
Temp.	yyy y
Temp.outlet	zzz z

- xxx = Engine oil pressure in bar / psi or ERo / ERs if sensor fault occurs
 yyy = Coolant temperature in °C / °F or ERo / ERs if sensor fault occurs
 zzz = Temperature in radiator outlet in °C / °F or ERo / ERs if sensor fault occurs

Engine log

ENGINE LOGG	
Pressure	cl = *
Temp high	xx,xx min
Air filter	yy:yy h
	zz:zz h

- xx = Time with engine oil pressure < alarm limit in min, seconds
 yy = Time with high coolant temperature, corresponding to > warning limit in hours:min
 zz = Time with high pressure-drop in air filter, corresponding > to alarm limit in hours:min
 * = Resetting

Cooling fan pressure test

FAN PRESSURE TEST	
Max Press. Test	x *
Fan rev	yyyy rpm
Engine rev	zzzz rpm

- x = Use * to select where x is displayed with characters for YES or NO
 By indicating the first letter in the word YES in any language, the setting for maximum cooling fan hydraulic pressure is selected.
 By indicating the first letter in the word NO in any language, the setting for normal working pressure is selected.
 yy = Shows current cooling fan speed in rpm
 zz = Shows engine speed in rpm

Cooling fan sound level test

FAN SOUND TEST	
Soundtest	x *
Fan rev	yyyy rpm

Test rev

zzzz rpm

- x = Use * to select where x is displayed with characters for YES or NO
- By indicating the first letter in the word YES in any language, the setting for cooling fan speed reduction by 70% in connection with sound level test.
- By indicating the first letter in the word NO in any language, no setting for maximum cooling fan speed is selected.
- During start, sound level test is set to NO regardless of previous setting.
- yy = Shows current cooling fan speed in rpm
- zz = Shows cooling fan test speed in rpm (70% of maximum fan speed setting)



Construction Equipment

Service Information

Document Title: Service display unit, settings	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Service display unit, settings

Start display

VOLVO SERVICE CONTRONIC	
Loader	xxxxx
Manuf. No.:	yyyyyy

x = Machine model
y = Machine's serial number

Language and units

SETUP	
English	*
Units	#
xx xxxx xx xxx	

x = Shows selected units: °C km/h km bar or °F mph mile psi
Selection of language is performed with key *
Selection of units is performed with key #

Engine fan / axle oil cooling

SETUP	
Engine, fan	x *
Axle oil cooler	y #

x = Shows selected cooling fan mode: A, B or C
Selection of cooling fan mode is performed with key *I
y = Shows selected status for axle oil cooling
Y = Machine is equipped with axle oil cooler
N = Machine is not equipped with axle oil cooler
Selection of axle oil cooling is performed with key #I

Tyres

SETUP	
Tire	xxxx*

x = Shows selected tyre dimension
 Selection of tyre dimension is performed with key *

ECU identity

ECU IDENTITY	
Instr	xxxxxxxx
Machine	yyyyyyyy

x = Part no. for software I-ECU
 y = Part no. for software V-ECU

Resetting data stored in machine and service display unit

Logged data for:

Low engine oil pressure
 High coolant temperature
 High pressure-drop in air filter
 Malfunction in electric feed output 1
 Malfunction in electric feed output 2
 Selected Gear
 F/R count
 Transmission oil pressure
 Slipping gear
 High temperature in front axle
 High temperature in rear axle
 Retardation when braking
 Output brake pressure when braking

NOTE!

"RESET" will reset all logs above. For reset of a specific log, see description for respective log.

RESET	
RESET	*

* = Moves to display for acknowledgement of RESET

RESET	
Confirm	#

RESET	
Reset completed	

= Confirm reset and go to display for Reset completed.
 Use the arrow keys (> arrow right or v arrow down) to return to the previous display.

Use the arrow keys (> arrow right or v arrow down) to return to the first display.

Single lever control (joystick)

SETUP	
Single lever Control	z *

z = Shows status for single lever control
Y = Machine is equipped with single lever control
N = Machine is not equipped with single lever control
Selection of status is performed with key *

Hand throttle

SETUP	
Hand Throttle	z *

z = Shows status for hand throttle
Y = Machine is equipped with hand throttle
N = Machine is not equipped with hand throttle
Selection of status is performed with key *

Engine oil change

SETUP	
Engine xxxx	*

x = Shows selected engine oil change interval 500h or 250h
Selection of interval is performed with key *. and setting is acknowledged with key #



Construction Equipment

Service Information

Document Title: Service display unit, electrical system battery voltage	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Service display unit, electrical system battery voltage

ELECTR. SYSTEM		cl = *
Voltage		xx.x V
> 31 V		yy:yy h

- xx = Present battery voltage (V)
yy = Time with battery voltage > 31 V (hours:min)
* = Resetting

Document Title: Service display unit, electrical control input signals 1	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Service display unit, electrical control input signals 1

Electrical control input signals 1 shows the current status of input signals to the vehicle control unit (V-ECU) from different controls and monitoring functions.

EL. ON/OFF INPUT 1	
V 1:	XXXX XXXX XXXX
V13:	XXXX XXXX XXXX
V25:	XXXX XXXX XXXX

In the display, **x** represents different pins in connectors EA and EB. Connectors EA and EB are connected to the vehicle control unit (V-ECU).

The value of **x** may be 1 or 0, depending on whether the input signal is activated or not activated.

The pins are presented in numerical order from left to right and grouped in the following rows:

V 1: position V1-V12

V 13: position V13-V24

V 25: position V25-V36

Signal description

Pos. (x)	Value (x)	Explanation	Conditions	Connect or pin	Wiring diagram
V1		Engine brake, status		EA1	9
	0	Not activated			
	1	Activated	- SW406 depressed		
V2		Not connected		EA15	-
V3		Not connected		EA29	-
V4		Not connected		EA2	-
V5		Not connected		EA16	-
V6		Engagement of increased fan speed, SE804, status		EA30	19, 33
	0	Not activated			
	1	Activated	- Engagement at pressure > 1.6 MPa (16 bar) (232 psi)		
V7		Activation of forward/reverse function, lever carrier, status		EA3	9
	0	Not activated			
	1	Activated	- SW403 depressed		
V8		Gear selector lever carrier position F , status		EA17	9
	0	Not activated			
	1	Activated	- SW404 in position F		
V9		Gear selector lever carrier position R , status		EA31	
	0	Not activated			
	1	Activated	- SW404 in position R		
V10		Lever steering, activating, status		EA4	17
	0	Not activated			

V11	1	Activated	- SW408 depressed	EA18	17
	Lever steering armrest switch SW407, status				
	0	Open	- armrest raised		
	1	Closed	- armrest lowered		
V12	Lever steering position F, status			EA32	17
	0	Not activated			
	1	Activated	- SW409 in position F		
V13	Lever steering position R, status			EA5	
	0	Not activated	- activating conditions not fulfilled or - incorrect input signal		
	1	Activated	- SW409 in position R		
V14	Kick-down lever steering, status			EA19	17
	0	Not activated			
	1	Activated	- engine speed > 0 rpm - travel speed < 5 km/h (3 mph) - ordinary gear selector in position N - armrest lowered - SW408 activating depressed - SW410 kick-down depressed		
V15	Monitoring pressure refrigerant, SE804, status			EA33	19, 33
	0	Not activated	High or low pressure 2.1- 2.5 MPa / 0.1-0.2 MPa (21- 25 bar / 1-2 bar) (305-363 psi / 14.5- 29 psi)		
	1	Activated	Normal operation, within limit values		
V16	Engagement AC, status			EA6	33
	0	Not activated			
	1	Activated			
V17	Travel speed-dependent boom suspension system: - SW925 in travel speed-dependent position. V26 also shows that 1 and EA23 are supplied with voltage			EA20	23
V18	Not connected			EA34	-
V19	Engagement AC from CU803, status			EA7	33
	0	Not activated			
	1	Activated			
V20	Not connected			EA21	-
V21	Differential lock re-engagement, status			EA35	12
	0	Not engaged			
	1	Engaged	- travel speed < 10 km/h (6 mph) - SW414 in position On - SE408 closed (differential lock engaged)		
V22	Secondary steering, monitoring of working pressure SE602			EA8	16
	0	Normal	- working pressure > 0.95 MPa (9.5 bar) (138 psi)		
	1	Low	- working pressure < 0.95 MPa (9.5 bar) (138 psi)		
V23	Secondary steering, monitoring differential pressure SE601			EA22	
	0	Normal	- differential pressure > 0.7 MPa (7 bar) (102 psi)[T1]①		
	1	Low	- differential pressure < 0.7 MPa (7 bar) (102 psi)		
V24	Brake pressure accumulator, monitoring working pressure SE502			EA36	15B
	0	Low	- working pressure < 9 MPa (90 bar) (1305 psi)		
	1	High	- working pressure > 9 MPa (90 bar) (1305 psi)		
V25	Parking brake, status SE503			EA9	15B
	0	Low, applied	- working pressure < 9 MPa (90 bar) (1305 psi)		

V26	1	High, released	- working pressure > 9 MPa (90 bar) (1305 psi)	EA23	23
	Boom suspension system, status				
	0	Not activated	- SW925 boom suspension system not activated		
	1	Activated	Gear-dependent boom suspension system: - SW925 in gear-dependent position Travel speed-dependent boom suspension system: - SW925 in travel speed-dependent position. V17 also shows that 1 and EA20 are supplied with voltage		
V27	Not connected			EA37	
V28	Brake pressure charging, monitoring working pressure SE504[T2]ⓘ			EA10	15B
	0	High	- working pressure > 14.5 MPa (145 bar) (2103 psi)		
	1	Low	- working pressure < 12.5 MPa (125 bar) (1813 psi)		
V29	Single lever control (optional equipment only)			EA24	
	0	Not activated			
	1	Activated			
V30	Not connected			EB39	
V31	Reserved test			EB12	
V32	Transmission filter, monitoring condition SE401			EA38	10
	0	Clogged	- pressure-drop > 0.276 MPa (2.76 bar) (40 psi)		
	1	OK	- pressure-drop < 0.21 MPa (2.1 bar) (30.5 psi) or - incorrect signal		
V33	Not connected			EA11	-
V34	Not connected			EA25	-
V35	Not connected			EA39	-
V36	Not connected			EA12	-

[T1] See description for secondary steering in section 6.

[T2] Machines manufactured before 2003 can be equipped with sensors with limit values 13.7 MPa (137 bar) (1987 psi) and 12 MPa (120 bar) (1740 psi), respectively

Document Title: Service display unit, electrical control input signals 2	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Service display unit, electrical control input signals 2

Electrical control input signals 2 shows the current status of input signals to the vehicle control unit (V-ECU) from monitoring functions.

EL. ON/OFF INPUT 2	
V 37:	xxxx

In the display, **x** represents different pins in connectors EA and EC. Connectors EA and EC are connected to the vehicle control unit (V-ECU).

The pins are presented in numerical order from left to right and grouped in the following rows:

V 37: position V37-V40

The value of **x** may be 1 (24 V) or 0 (0 V) , depending on whether the input signal is activated or not activated.

Signal description

Pos.	Value (x)	Explanation	Conditions	Connect or pin	Wiring diagram
V37	Washer fluid level, monitoring MO802			EA26	18
	0	Low	- low level		
	1	OK	- normal level or - incorrect input signal		
V38	Not connected			EA40	-
V39	Not connected			EA13	-
V40	Secondary steering, test MO601			EC3	16
	0	Activated	- SW601 in position On - primary steering pressure low SE602 - differential pressure low SE601 - engine off		
	1	Not activated			

Document Title: Service display unit, electrical control input signals 3	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Service display unit, electrical control input signals 3

Electrical control input signals 3 show current status for input signals to instrument control unit (I-ECU) from controls and monitoring functions.

EL. ON/OFF INPUT 3			
I 1:	XXXX	XXXX	XXXX
I13:	XXXX	XXXX	XXXX
I25:	XXXX	XXXX	x

In the display, **x** represents different pins in connectors P1 and P2. Connectors P1 and P2 are connected to the instrument control unit (I-ECU).

The pins are presented in numerical order from left to right and grouped in the following rows:

I 1: position I1-I12

I 13: position I13-I24

I 25: position I25-I33

The value for **x** can be 1 (24 V) or 0 (0 V) depending on if the input signal is activated or not activated.

Signal description

Pos. (x)	Value (x)	Explanation	Conditions	Connect or pin	Wiring diagram
I1		Steering column gear control position F , status		P2: 22	9
	0	Not activated			
	1	Activated	- gear control SW402 in position F		
I2		Steering column gear control position R , status		P2: 9	
	0	Not activated			
	1	Activated	- gear control SW402 in position R		
I3 and I4		Steering column gear control position 1 , status		P2: 21 and P2:8	9
	0	Not activated			
	1	Activated	- gear control SW401B in position 1		
I4		Steering column gear control position 2, status		P2: 8	
	0	Not activated			
	1	Activated	- gear control SW401B in position 2		
I5		Steering column gear control position 4, status		P2: 20	
	0	Not activated			
	1	Activated	- gear control SW401B in position 4		
I6		Kick-down steering column, status		P2: 7	9
	0	Not activated			
	1	Activated	- kick-down SW401C activated		
I7		Not connected		P2: 19	
I8		Not connected		P2: 6	
I9		Preheating, status		P2: 18	3

	0	Not activated	- SW201 not activated or - ignition switch position 0 after activating or - engine running after start attempt or - incorrect input signal		
	1	Activated	- SW201 activated (depressed) Note! The maximum time for preheating activation is 10 s. A pause of at least 10 s is required between activating sequences. A maximum of 2 activating sequences are allowed before start attempt.		
I10	Transmission disengagement, status			P2: 17	11
	0	Not activated	- SW411 in position Off or - incorrect input signal		
	1	Activated	- SW411 in position On		
I11	Differential lock, status			P2: 16	12
	0	Not activated	- SW414 not activated		
	1	Activated	- SW414 activated		
I12	Secondary steering function test, status			P2: 5	16
	0	Not activated	- SW601 in position Off or - incorrect input signal		
	1	Activated	- SW601 in position On Note: Secondary steering operation must not be tested for more than 1 minute due to pump overheating risk.		
I13	Electric parking brake, status			P2: 15	15B
	0	Not activated (applied)	- SW501 in Applied position (depressed)		
	1	Activated (released)	- SW501 in Released position (not depressed)		
I14		-	-		
I15	Intermittent wiper front, status			P2: 14	18
	0	Not activated	- SW801A in position 0		
	1	Activated	- SW801A in position J		
I16	Washer front, status			P2: 3	
	0	Not activated	- SW801B in position Off		
	1	Activated	- SW801B in position On		
I17	Intermittent wiper rear, status			P1: 23	18
	0	Not activated	- SW803 in position Off		
	1	Activated	- SW803 in position Intermittent		
I18	Washer rear, status			P1: 8	
	0	Not activated	- SW804 in position Off		
	1	Activated	- SW804 in position On		
I19	-			P1: 9	
I20	Mode selector APS position M (LIGHT 2)[1]  , status			P1: 24	12
	0	Not activated			
	1	Activated	- SW412 in position M (LIGHT 2) ^(a)		
I21	Mode selector APS position H (NORMAL) ^(a) , status			P1: 11	
	0	Not activated			
	1	Activated	- SW412 in position H (NORMAL) ^(a)		
I22	Mode selector APS position AUTO (HEAVY) ^(a) , status			P1: 2	

I23	0	Not activated		P1: 25	24
	1	Activated	- SW412 in position AUTO (HEAVY) ^(a)		
	Mode selector APS position SERVICE (MAN) ^(a) , status				
	0	Not activated			
	1	Activated	- SW412 in position SERVICE (MAN) ^(a)		
I26	Service socket			P2: 12	24
I27	Service socket			P2: 11	
I28	Service socket			P2: 2	
I29	Service socket			P2: 1	
I30	Line 1 Keyboard			P1: 26	25
I31	Line 2 Keyboard			P1: 28	
I32	Line 3 Keyboard			P1: 27	
I33	Line 4 Keyboard			P1: 12	

[1] Position of mode selector APS II (earlier version of mode selector)

Document Title: Service display unit, electrical control output signals 1	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Service display unit, electrical control output signals 1

Electrical control output signals 1 shows the current status of output signals from the vehicle control unit (V-ECU).

EL ON/OFF OUT 1	cl = *
V 1:	xyxyxy xyxyxy
V 7:	xyxyxy xyxyxy
V13:	xyxyxy xyxyxy

In the display, **xy** represents different pins in connector EC. Connector EC is connected to the vehicle control unit (V-ECU).

The pins are presented in numerical order from left to right and grouped in the following rows:

V 1: position V1-V6 (connector pins EC1-EC6)

V 7: position V7-V12 (connector pins EC7-EC12)

V13: position V13-V18 (connector pins EC13-EC24)

The value for **x** can be 1 (24 V) or 0 (0 V) depending on if the output signal is activated or not activated.

The value of **y** is explained according to the table below.

Value (y)	Explanation
blank	Normal and fully functional circuit
o	Open circuit
s	Short circuit in circuit
m	Malfunction detected in last operating cycle/ignition switch activation
M	Malfunction detected in earlier operating cycle/operating cycles

Resetting of memory functions m and M completed by pressing * button.

Signal description

Pos. (xy)	Value (x)	Explanation	Conditions	Connect or pin	Wiring diagram
V1	Reversal of cooling fan, status MA204			EC1	5
	0	Not activated	- Normal operation		
	1	Activated	- Retardation phase		
V2	Differential lock, status MA407			EC2	12
	0	Not activated	- SW414 in position Off or - incorrect input signal		
	1	Activated	- SW414 in position On		
V3	Secondary steering, status RE601			EC3	16
	0	Not activated	- activating conditions not met or - incorrect input signal		
	1	Activated	- travel speed > 3 km/h (2 mph) - steering differential pressure low ≥ 0.5 s		

			or - travel speed > 3 km/h (2 mph) - steering differential pressure low 0.3 s - primary steering pressure low or - SW601 secondary steering test in position On - steering pressure low - steering differential pressure low - engine speed, 0 rpm		
V4	Parking brake, status MA501			EC4	15B
	0	Not activated (applied)	- ignition switch SW101 in position 0 or - ignition switch SW101 in position 1 - engine off or - SW501 in Applied position (depressed)		
	1	Activated (not applied)	- engine running - SW501 from Applied position to Released position or - SW501 parking brake in position Released - gear engaged - engine speed > 1600 rpm		
V5	Back-up alarm, status SA803			EC5	20
	0	Not activated			
	1	Activated	- ignition switch SW101 in position 1 - gear control in position R		
V6	Lever steering, status RE602			EC6	17
	0	Not activated	- steering column control in position F or R or - engine off or - armrest raised		
	1	Activated	- steering column control in position N - CDC control in position N - engine on - travel speed < 5 km/h (3 mph) - armrest lowered - SW408 CDC in position On		
V7	Central lubrication, status CU802			EC7	26
	0	Not activated			
	1	Activated			
V8	Reversible cooling fan, rotational direction, status MA205			EC8	5
	0	Not activated	- Normal operation		
	1	Activated	- Reversal		
V9	-	-	-	-	-
V10	Boom suspension system, status RE7			EC10	23
	0	Not activated	Gear-dependent boom suspension system: - gear in position F1 or R1 or - kick-down requested or - incorrect input signal Travel speed-dependent boom suspension system: - directional gear in position F - travel speed < 5 km/h (3 mph) or		

			- directional gear in position R or N - travel speed < 2 km/h (1 mph) or incorrect input signal		
	1	Activated	Gear-dependent boom suspension system: - gear in position F2, F3, F4, R2, R3 or R4 - SW925 boom suspension system activated - kick-down not requested Travel speed-dependent boom suspension system: - directional gear in position F, R or N - travel speed > 6 km/h (4 mph)		
V11	Interval wiper front windshield, status RE6			EC11	18
	0	Not activated			
	1	Activated	- ignition switch SW101 in position 1 - SW801 in position J		
V12	Interval wiper rear window, status RE5			EC12	18
	0	Not activated			
	1	Activated	- ignition switch SW101 in position 1 - SW803 in position Interval		
V13	Engagement of cooling, MA801 via RE806			EC13	19, 33
	0	Not activated			
	1	Activated			
V14	-	-	-	-	-
V15	Cooling fan, status MA202			EC18	5
	0	Not activated			
	1	Activated	- cooling fan speed adjustment, see 301 Cooling fan adjustment		
V16	Gear shifting solenoid SA (F), status			EC20	11
	0	Not active			
	1	Active	- gear in position F1, F2, F3, F4		
V17	Gear shifting solenoid SD (R), status			EC22	
	0	Not activated			
	1	Activated	- gear in position R1, R2, R3, R4		
V18	Gear shifting solenoid SB (1st gear), status			EC24	11
	0	Not activated			
	1	Activated	- gear in position F1 or R1		

Document Title: Service display unit, electrical control output signals 2	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Service display unit, electrical control output signals 2

Electrical control output signals 2 shows the current status of certain output signals from the vehicle control unit (V-ECU).

EL ON/OFF OUT 2	cl = *
V19:	xyxyxy xyxyxy
V25:	xy

In the display, **xy** represents different pins in connector EC. Connector EC is connected to the vehicle control unit (V-ECU).

The pins are presented in numerical order from left to right and grouped in the following rows:

V 19: position V19-V24 (connector pins EC26-EC39)

V 25: position V25 (connector pin EC41)

The value of **x** may be either 1 (24 V) or 0 (0 V) , depending on whether the output signal is activated or not activated.

The value of **y** is explained according to the table below.

Value (y)	Explanation
glossy	Normal and fully-functional circuit
o	Break in circuit
s	Short circuit in circuit
m	Malfunction/error detected in last operating cycle/ignition switch activation
M	Malfunction/error detected in earlier operating cycle/operating cycles

Resetting of memory functions m and M completed by pressing * button.

Signal description

Pos. (xy)	Value (x)	Explanation	Condition	Connect or pin	Wiring diagram
V19		Gearshifting solenoid SC (2nd gear), status		EC26	11
	0	Not activated			
	1	Activated	- gear selector in position F2 or R2		
V20		Gearshifting solenoid SF (3rd gear), status		EC28	
	0	Not activated			
	1	Activated	- gear selector in position F3 or R3		
V21		Gearshifting solenoid SE (4th gear), status		EC33	
	0	Not activated			
	1	Activated	- gear selector in position F4 or R4		
V22	-	-	-	-	-
V23	-	-	-	-	-
V24	-	-	-	-	-
V25	-	-	-	-	-



Construction Equipment

Service Information

Document Title: Service panel, electrical feed sensor	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Service panel, electrical feed sensor

Electrical feed to sensors shows the current voltage feed from the vehicle control unit (V-ECU) to certain sensors

EL INPUT SENSOR	
V 1:	x.xV x.xV x.xV
V 4:	xx.xV xx.xV

In the display, **x.xV** represents different pins in connector EB. Connector EB is connected to the vehicle control unit (V-ECU). The value of **x.x** indicates the feed in volts (**V**).

The pins are presented in numerical order from left to right with the following meaning:

Pos.	Connector pin	Correct value	Feed to components
V1			-
V2	EB40	5.0 V	SE405 Transmission oil pressure SE413 Transmission oil level SE501 Output brake pressure
V3	EB13	5.0 V	SE213 Engine oil level
V4			-
V5			-



Construction Equipment

Service Information

Document Title: Service display unit, transmission	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Service display unit, transmission

TRANSMISSION	
Temp.	xxx x
Pressure	yyy yyy
Turb. speed	zzzz rpm

xx = Temperature in °C / °F or ERO/ERs in case of sensor malfunction
 yy = Pressure in bar/psi or ERO/ERs in case of sensor malfunction
 zz = Turbine speed in rpm

TRANSM. LOG 1	cl = *
Gear	xx# yyyy h
F/R Count	zzzzzz
Pressure	åå:åå min

xx = Selected gear (F1, F2, F3, F4, R1, R2, R3, R4).
 Gear is selected using the # button.
 yy = Number of hours in selected gear
 zz = Number of F-R shifts
 åå = Time with low transmission pressure (alarm signal) in min, sec
 * = Resetting

TRANSM. LOG 2	cl = *
Slipping gear	xx #
Time	yy:yy min
Number	zzz

xx = Gear
 Gear selection made with * button
 yy = Time in min, sec
 zz = Total number, slipping clutch
 * = Resetting



Construction Equipment

Service Information

Document Title: Service display unit, axles and brakes	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Service display unit, axles and brakes

BRAKES	
Br.press.in	xxxxxx
Br.press.out	yy zzz

xx = Input brake pressure, normal/low.

yy = Output brake pressure in bar/psi or ERo/ERs in case of sensor malfunction

BRAKE TEST LOG	
zz.z zz.z zz.z	m/s2
xxx xxx xxx	yyy

z = Retardation memory for the 3 most recent brake applications in m/s2

x = Output brake pressure memory for the 3 most recent brake applications in bar/psi

The results from the latest brake test are on the far left

y = Unit in bar / psi

AXLE TEMP.	
Front	xxx x
Rear	yyy y

xx = Axle oil temperature in front axle in °C / °F or ERo / ERs if sensor fault occurs

yy = Axle oil temperature in rear axle in °C / °F or ERo / ERs if sensor fault occurs

AXLE LOG TEMP		cl = *
Front	xxx# yy:yy h	
Rear	xxx# zz:zz h	

xx = Selects between two warning trigger limits for temperature in axles (selected in °C / °F)
It is possible to select the warning trigger points at 110 °C, (230 °F) or 140 °C, (284 °F).

yy = Time (hours:min) with temperature above selected warning trigger point for front axle

zz = Time (hours:min) with temperature above selected warning trigger point for rear axle

Warning trigger point is selected using #

* = Resetting



Construction Equipment

Service Information

Document Title: Service display unit, hydraulics	Function Group: 387	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Service display unit, hydraulics

HYDRAULICS			
Temp.			xxx x

xx = Oil temperature in hydraulic oil tank °C / °F or ERo / ERs in case of sensor malfunction.

Document Title: VCADS Pro service tool	Function Group: 390	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

VCADS Pro service tool

General

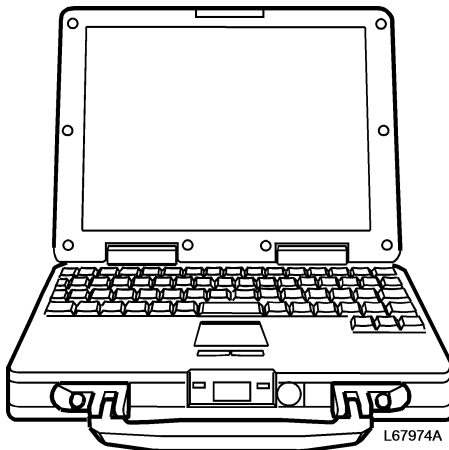


Figure 1
VCADS Pro computer

The following is a short description of the VCADS Pro service tool:
The name VCADS Pro is short for **V**olvo **C**omputer **A**ided **D**iagnostics **S**ystem **P**rofessional.

VCADS Pro structure

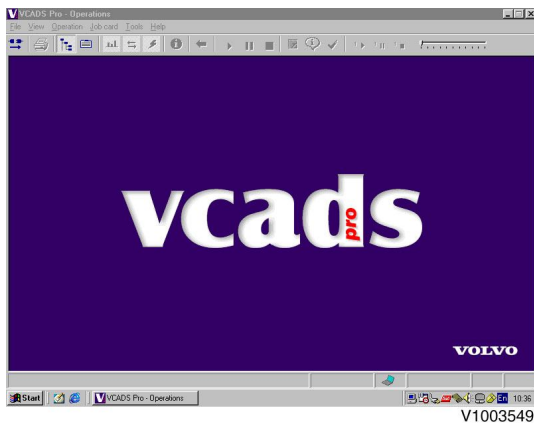


Figure 2
Initial display

VCADS Pro comprises programs for:

- Component and function tests
- Download of software to control units
- Storing performed work operations on job card

Operations

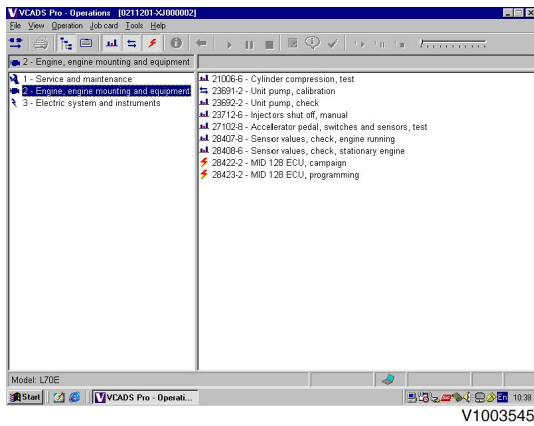


Figure 3
Example, tests and programming possibilities

Under Operations, there are several tests and programming possibilities divided according to function group.

The tests show, for example, sensor values, as well as graphic display of how a signal varies in time.

Programming is used to reprogram control units.

Reading of error codes

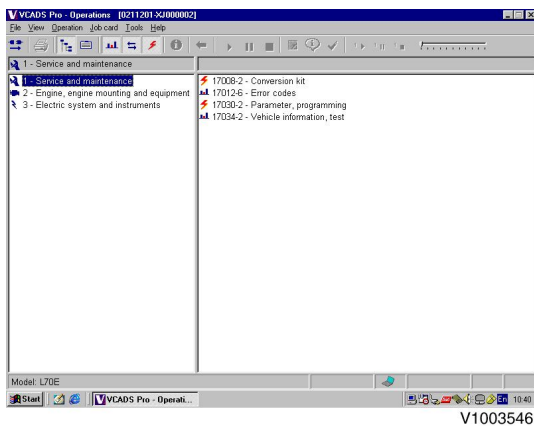


Figure 4
Operations, read-out of error codes

Read-out of error codes from operations, function group 1 - Service and maintenance. To pin-point malfunction causes, it's advantageous to use the service tool VCADS Pro. From VCADS Pro, it's possible to obtain error codes of the SAE-type, from which the malfunction cause can be determined, see [390 SAE error codes, translation to error messages, general](#).

Parameters

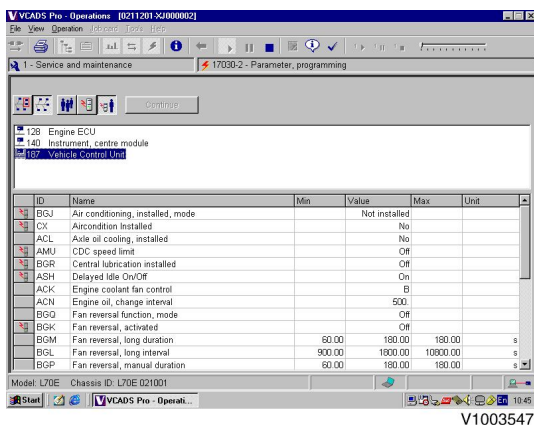


Figure 5
Example, read-out parameters

Read-out and programming of parameters take place from operation, function group 1 - Service and maintenance. For more information about parameters, see [390 El-servo](#).

Job Card

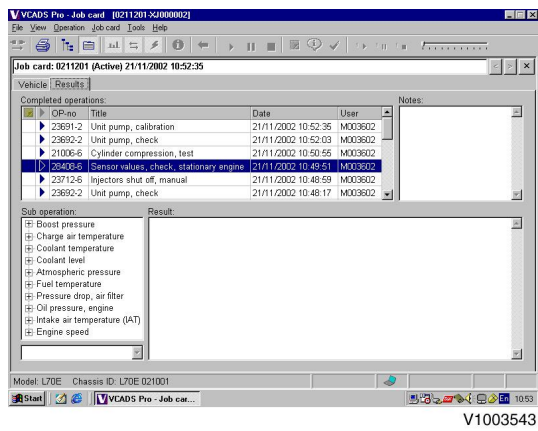


Figure 6
Example, job card

The job card function is used to store work operations that have been performed with VCADS Pro, for example, test results and results of error code read-outs and programming of parameters. The job card is stored locally in the computer in question.

Document Title: Component fault diagnosis, description	Function Group: 390	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Component fault diagnosis, description

Check-measurement of components and electrical cabling should be performed when an error message has been detected. Measurements are performed to check component, cabling, output signals from control units and frame ground connections.

NOTICE

The specified measuring values should only be considered as the desired values. The measuring values are only intended for troubleshooting through the evaluation of the error source.

1 Component designation and description.

2 Simplified wiring diagram with signal description.

3 Conditions for detecting error/malfunction.

4 Component description and function:

Component	SE 2501 Sensor in duct for air temperature
Function	Measures induction air temperature after air cleaner. The sensor is combined with SE 2502 Monitor, air filter pressure
References	- L150E, 3 01 Temperature induction air - L150E, 3 70 Electrical schematic - VCA DS Pro, test 28407-8
Tools	- L150E, 3 02 Multimeter 1 668 140 - L150E, 3 02 Adapter cable 99 8534

5 Detection conditions:

Malfunction detection conditions
Detected if engine control unit (ECU) registers that voltage on EB3e exceeds 0.91 x system voltage or is below 0.09 x system voltage.

6 Error/malfunction types:

Type of error/malfunction	Symptom	Possible cause
FM 13	- Error message - Amber central warning - Blue exhaust smoke in cold weather	- Signal cable or ground cables short-circuited to voltage. - Signal cable or ground cable open circuit.
FM 14	Cooling fan runs at max. speed	- Signal lines short-circuited or ground. - Defective sensor.

7 Check-measuring:

Testing	Test points	Set point	Condition	Test method
Component	3 - 4	Resistance values according to table		
Subsystem	3 - 4	$\approx 2.6V$ ($20^\circ C/68^\circ F$) $\approx 1.2V$ ($50^\circ C/122^\circ F$)		
Control unit/cable/harness	Ground cable 4 -	$\approx 0W$		

8 SE 2501 resistance values:

Air temp. ($^{\circ}C$)	Air temp. ($^{\circ}F$)	Resistance	Air temp. ($^{\circ}C$)	Air temp. ($^{\circ}F$)	Resistance
-30	-22	$88.6 \pm 5.5k\Omega$	+40	+104	$2663 \pm 77\Omega$
-20	-4	$48.6 \pm 2.8k\Omega$	+50	+122	$1831 \pm 45\Omega$
-10	+14	$27.6 \pm 1.4k\Omega$	+60	+140	$1244 \pm 29\Omega$
0	+32	$16.3 \pm 0.8k\Omega$	+70	+158	$876 \pm 16\Omega$
+10	+50	$10.0 \pm 0.4k\Omega$	+80	+176	$629.0 \pm 9.5\Omega$
+20	+68	$6.2 \pm 0.3k\Omega$	+90	+194	$458.7 \pm 6.0\Omega$
+30	+86	$4.0 \pm 0.14k\Omega$	+100	+212	$339.9 \pm 3.4\Omega$

9 Testing procedure diagram.

10 Component testing.

11 Subsystem testing.

12 Control unit/cable/harness testing.

13 Resistance table.

V1025324

Figure 1
Explanation of component troubleshooting

1. Component designation and description.
2. Simplified wiring diagram with signal description.
3. Conditions for detecting error/malfunction.

4. Symptoms caused by error/malfunction source.
5. Possible causes of error/malfunction.
6. Type of error/malfunction acc. to FMI, see [390 SAE error codes, translation to error messages, general](#).
7. Reference value (set point) for check-measurement.
8. The column indicates which test points are referred to.
9. Recommended measuring method, see [390 Measuring methods, description](#).
10. Check-measurement of separate component
11. Check-measurement of sub-system, that is, connected and active circuit.
12. Check-measurement of control unit and/or cable harness.
13. Example of summary of characteristics for component.



Construction Equipment

Service Information

Document Title: Error texts and troubleshooting information, general	Function Group: 390	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Error texts and troubleshooting information, general

The machine control units include integrated diagnostic programs which monitor input and output signals for components and functions. Any error signals generate error texts in the information display panel.

ERROR
Monitoring
Engine Oil Level

Examples of error texts

The following is a list of error texts that can appear on the display panel in connection with electrical malfunctions.

The list contains all possible error texts with reference to actions for troubleshooting, see [390 Error messages by function group](#).

Thank you for your purchase.
Have a nice day.

Document Title: General description	Function Group: 400	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

General description

The power from the engine to the wheels is transferred hydraulically and mechanically through transmission (1), via a torque converter, which adapts its output torque to the torque requirement and on to the drive axles (4, 5).

The transmission is of the HTE type, a hydro-mechanical four-speed Power Shift transmission with torque converter, spur gearings and hydraulically controlled disc clutches.

It has four forward gears and four reverse gears.

The "E" in the designation means that the transmission has a gear selector valve with gear shifting solenoids of the PWM type, (Pulse Width Modulated). This means that the V—ECU sends out a pulsating continuous voltage with constant frequency, but with variable length of the voltage pulses.

The drive axles have floating half shafts and hub reduction gears of the planetary gear type with built-in oil cooled multi-disc brakes. Each axle has a common space for the hub reduction gears, the brakes and the differential carrier assembly.

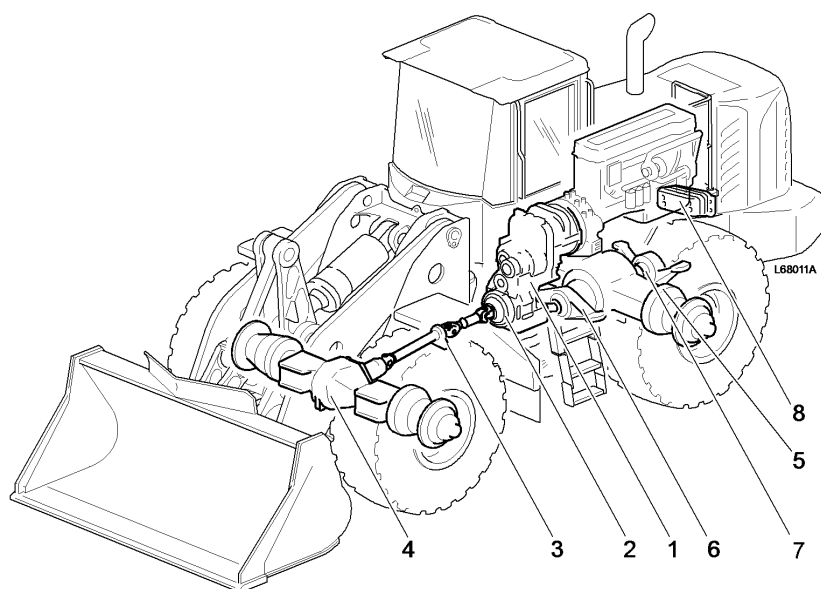


Figure 1
Power transmission

1. Transmission
2. Parking brake
3. Support bearing
4. Front axle
5. Rear axle
6. Front rear axle bearing
7. Rear rear axle bearing
8. Transmission oil cooler

Document Title: Description	Function Group: 414	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Description

Torque converter

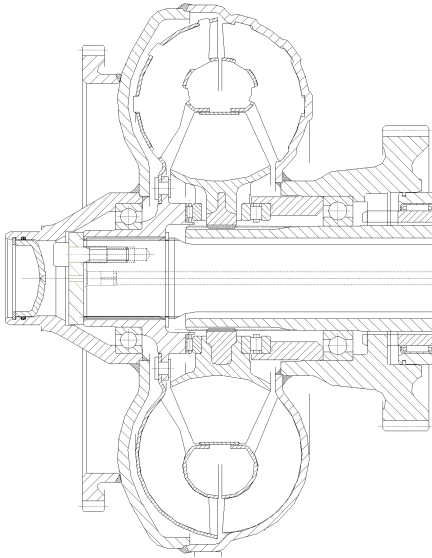


Figure 1

Torque converter

The torque converter consists of an engine-driven impeller and a turbine rotor that drives the transmission's mechanical part, the gearbox. A fixed stator is located between the impeller and the rotor.

Function

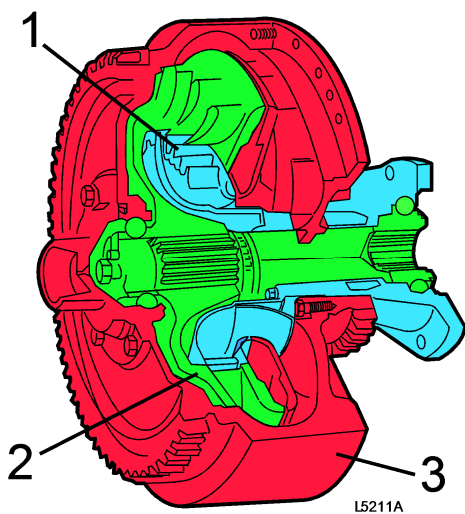


Figure 2
Principle diagram

1. Stator
2. Turbine rotor
3. Pump rotor

The red guide rails designate the pump rotor, which is run by the engine. The red arrow shows the direction of rotation.

The green guide rails designate the turbine rotor, which is connected to the transmission.

The blue guide rails designate stators, while the black arrows indicate oil flow.

The pump and turbine rotors can rotate freely and individually. If we imagine that the torque converter is filled with oil and the pump rotor is rotating, oil will flow as indicated by the thicker arrows.

Suppose the turbine rotor is stationary. Almost all of the kinetic energy the oil receives from the pump, after leaving the pump, remains. When the oil returns to the pump rotor, it receives an additional boost of kinetic energy.

At maximum oil speed, the turbine rotor torque will be three times greater than the torque supplied by the pump rotor. When the turbine rotor speed equals that of the pump rotor, torque increase is almost nil (smaller arrows).

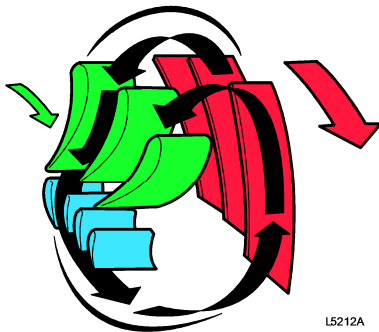


Figure 3
Principle diagram

The pump rotor speed is high; the turbine is stationary or rotates slowly. The eddy current, and thereby the torque increase, is greatest.

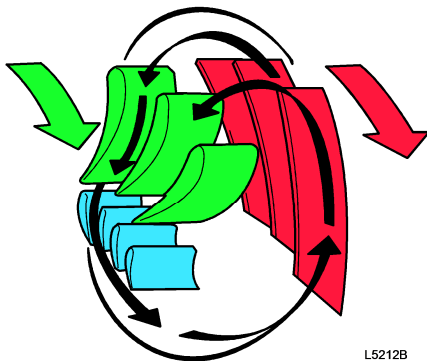


Figure 4
Principle diagram

The pump rotor and turbine speeds are almost identical. The eddy current and subsequent torque increase is least.

Document Title: Torque converter, removing, installing	Function Group: 414	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Torque converter, removing, installing

Op nbr 41403

NOTE!

The engine has been removed and the transmission is left in the machine.

Removing

1. Make the transmission safe with a sling and a ratchet block according to the figure.

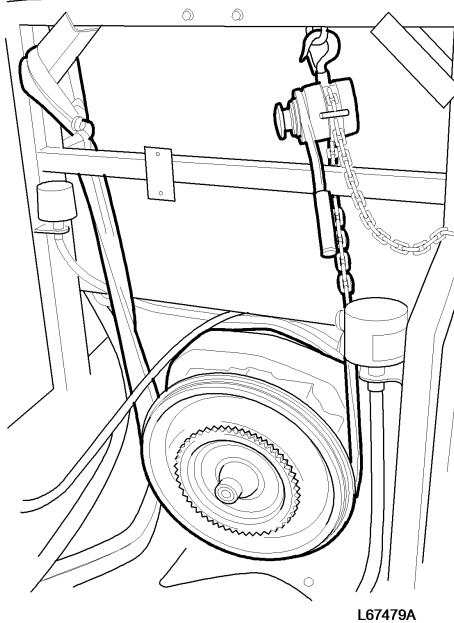


Figure 1
Transmission made safe (engine removed)

2. Remove the lock ring and the cover. Remove the bolts.

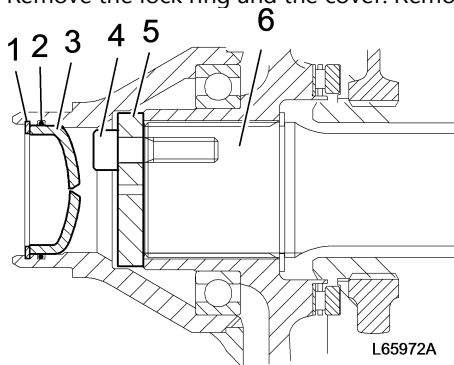


Figure 2

Torque converter – turbine shaft (sectional view)

1. Lock ring
2. O-ring
3. Cover
4. Bolts (3 pcs)
5. Washer
6. Turbine shaft

3. Remove the torque converter.

Torque converter weight: **approx. 50 kg (110 lb)**

Installing

4. Position the pump drive aligned according to figure.

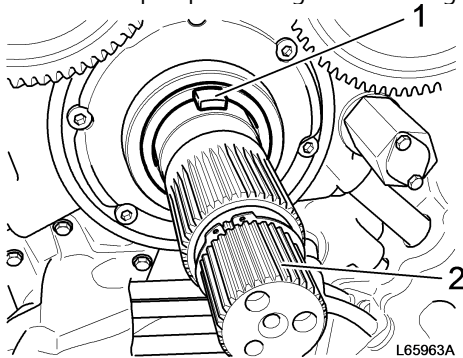


Figure 3

1. Pump drive
2. Turbine shaft

5. Make a mark on the torque converter opposite the pump drive notch.

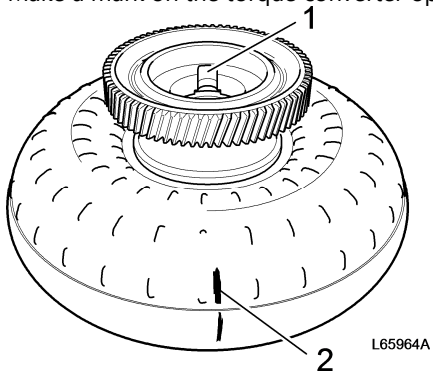


Figure 4

1. Notch for pump drive lug
2. Marking

6. Install the torque converter aligning it with the pump drive lug with the aid of the marking on the torque converter.

Torque converter weight: **approx. 50 kg (110 lb)**

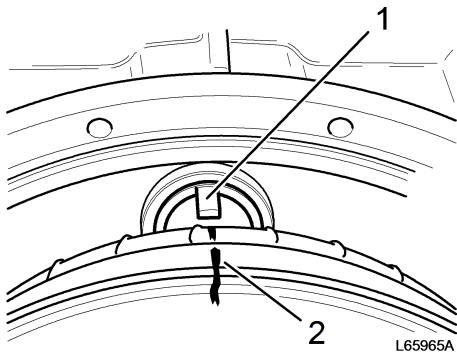


Figure 5

1. Pump drive
2. Marking

7. The torque converter is in the correct position when the washer fits up against the turbine shaft.

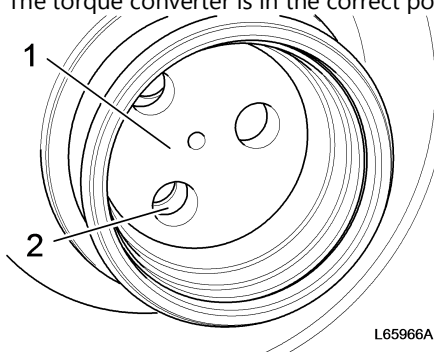


Figure 6

1. Washer
2. Turbine shaft

8. Apply locking fluid to the bolts and install them.
Tightening torque: **40 N m (30 lbf ft)**

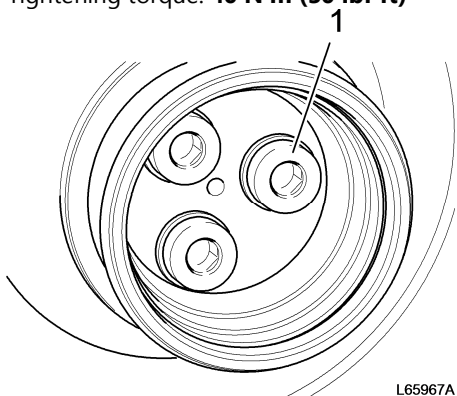


Figure 7

1. Bolts (3 pcs)

9. Install the O-ring, the cover and the lock ring.

NOTE!

Make sure that the hole in the cover is not blocked.

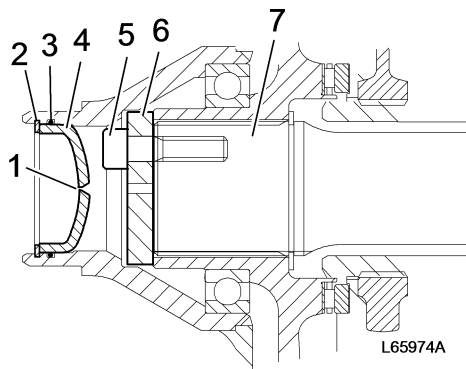


Figure 8
Torque converter – turbine shaft (sectional view)

1. Hole
2. Lock ring
3. O-ring
4. Cover
5. Bolts (3 pcs)
6. Washer
7. Turbine shaft

Document Title: Hydraulic transmission, description	Function Group: 421	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic transmission, description

The transmission is a hydro-mechanical Power Shift transmission with four speeds (gears) and torque converter, spur gearings and hydraulically controlled disc clutches.

It has four forward gears and four reverse gears.

The "E" in the designation means that the transmission has a gear selector valve with PWM (Pulse Width Modulation) controlled proportional valves. The gear shifting solenoids are controlled by the V-ECU and provides possibility of better control and comfort at the application of the respective disc clutch (gear) because of the variable PWM control.

All pistons on the clutch shafts are of the single stage type.

The application time is controlled electronically through a variable signal from the V-ECU.

The clutch drums for the different gears rotate freely on the clutch shafts. When a gear is engaged, the clutch drum, which is transferring the power, is mechanically connected to the respective clutch shafts by the disc clutches hydraulically actuated at the time.

The mechanical transfer of power in the transmission takes place via gears, which are in constant mesh.

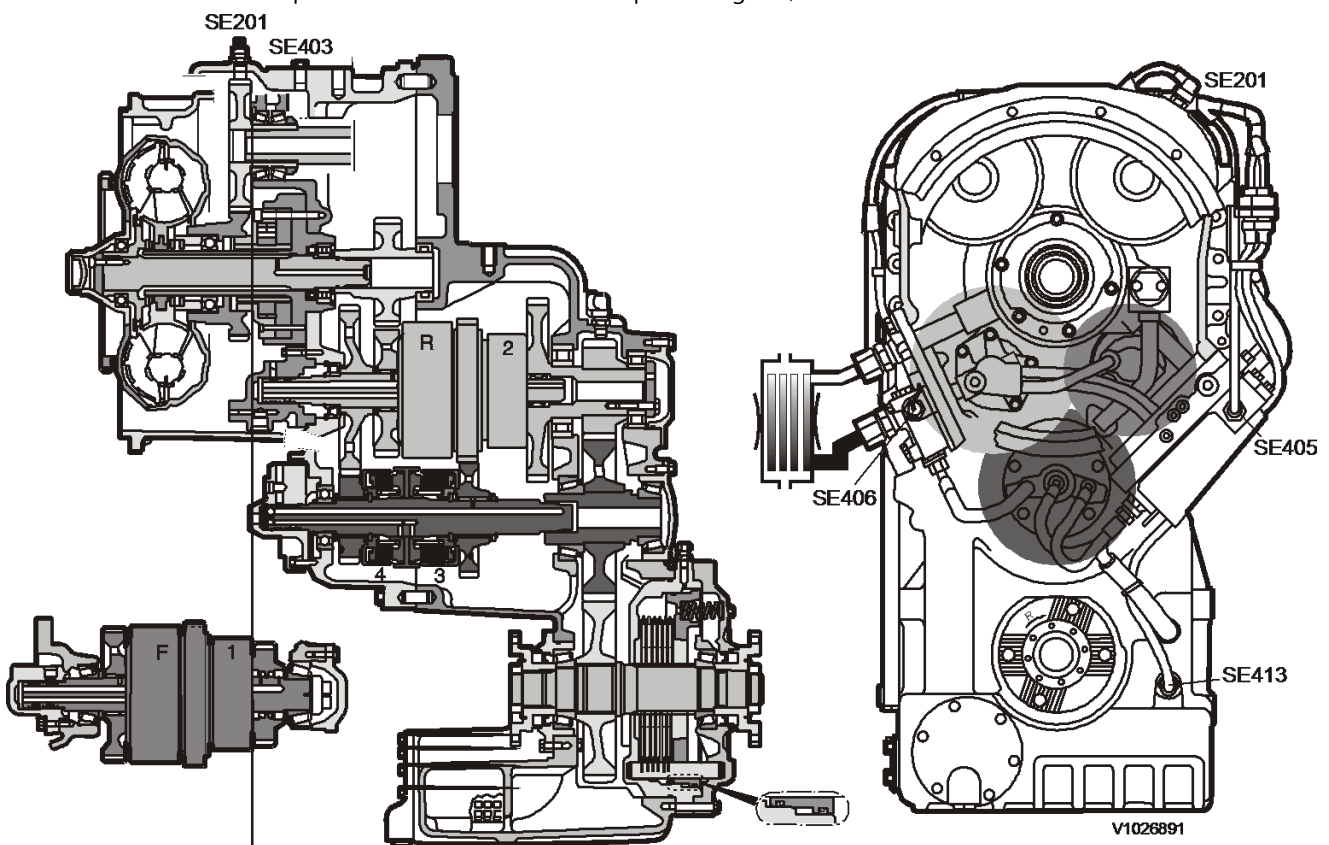


Figure 1
HTE transmission

SE201	Engine speed
SE403	Output speed
SE405	Transmission oil pressure

SE406	Transmission oil temperature
SE413	Transmission oil level

Oil filler point and level sight glass are located under the steps on the left side of the machine.

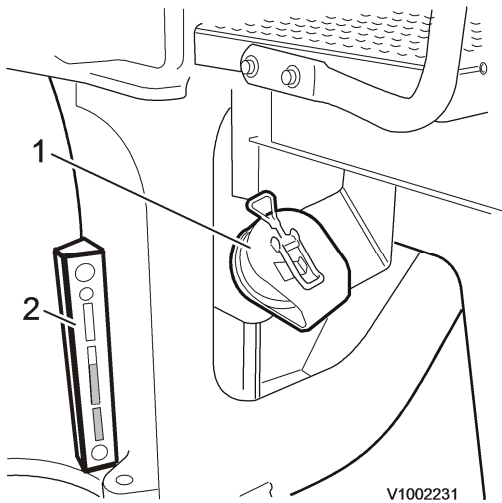


Figure 2

Position of oil filler point and level sight glass

1. Oil filler point
2. Level sight glass

A block with the transmission checking points is, on earlier machines, positioned under the upper entry step on the left and right side respectively on the machine, depending on machine type.

On later machines the checking points are positioned directly on the gear selector valve.

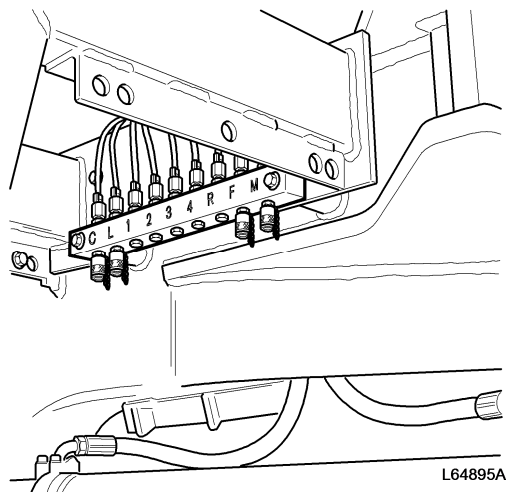


Figure 3
Block under entry step

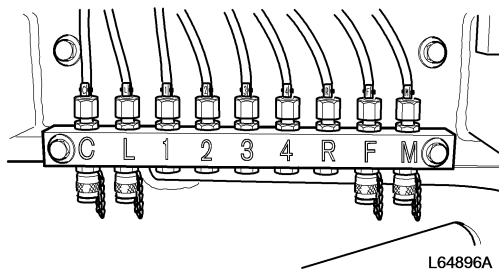


Figure 4
Marking on block

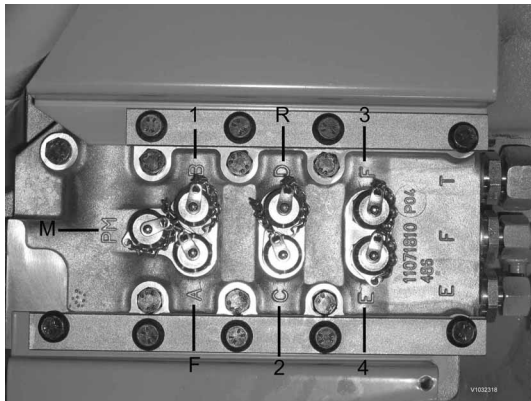


Figure 5
Checking points, positioned on the gear selector valve

Marking			
1	Checking point, 1st gear clutch	4	Checking point, 4th gear clutch
2	Checking point, 2nd gear clutch	R	Checking point, reverse clutch
3	Checking point, 3rd gear clutch	F	Checking point, forward clutch
M	Checking point, main pressure		

Slippage control

The transmission is provided with the following sensors:

SE201, engine speed

SE401, filter indicator

SE402, turbine speed

SE403, travelling speed (output speed)

SE405, transmission oil pressure

SE406, transmission oil temperature

SE413, transmission oil level

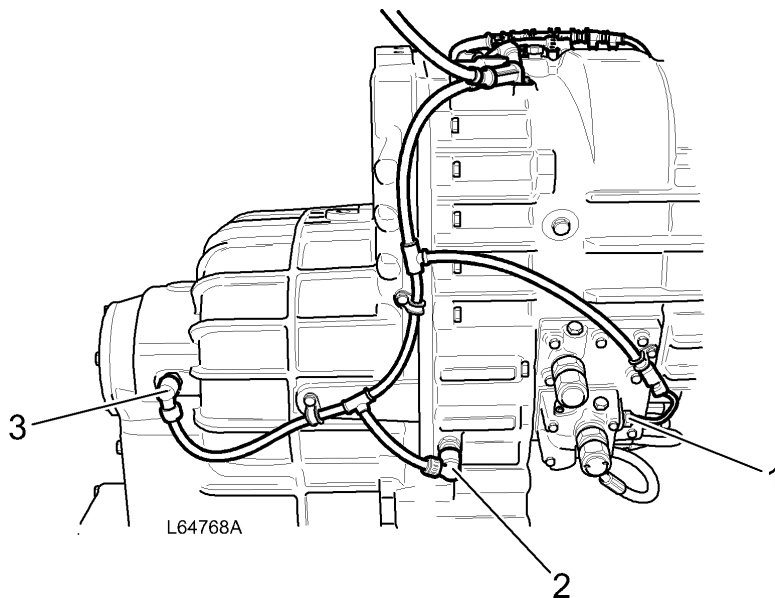


Figure 6

1. SE406
2. SE402
3. SE403

The information from these sensors makes it possible for V-ECU, among other things, to register any slippage in any of the clutches. In case of a slipping clutch, the clutch pressure will be raised up to the existing main pressure in order to stop the slippage in that the V-ECU increases the signal / the pressure to the gear shifting solenoid of the slipping clutch. If the slippage persists, the operator will be informed through warning text on the display unit.

Auto idle (i.e. the engine speed is reduced to 900 rpm) cuts in if the slippage persists for more than 0.5 seconds, or if the transmission oil temperature is too high, the engine oil pressure is low or in case of high coolant temperature.

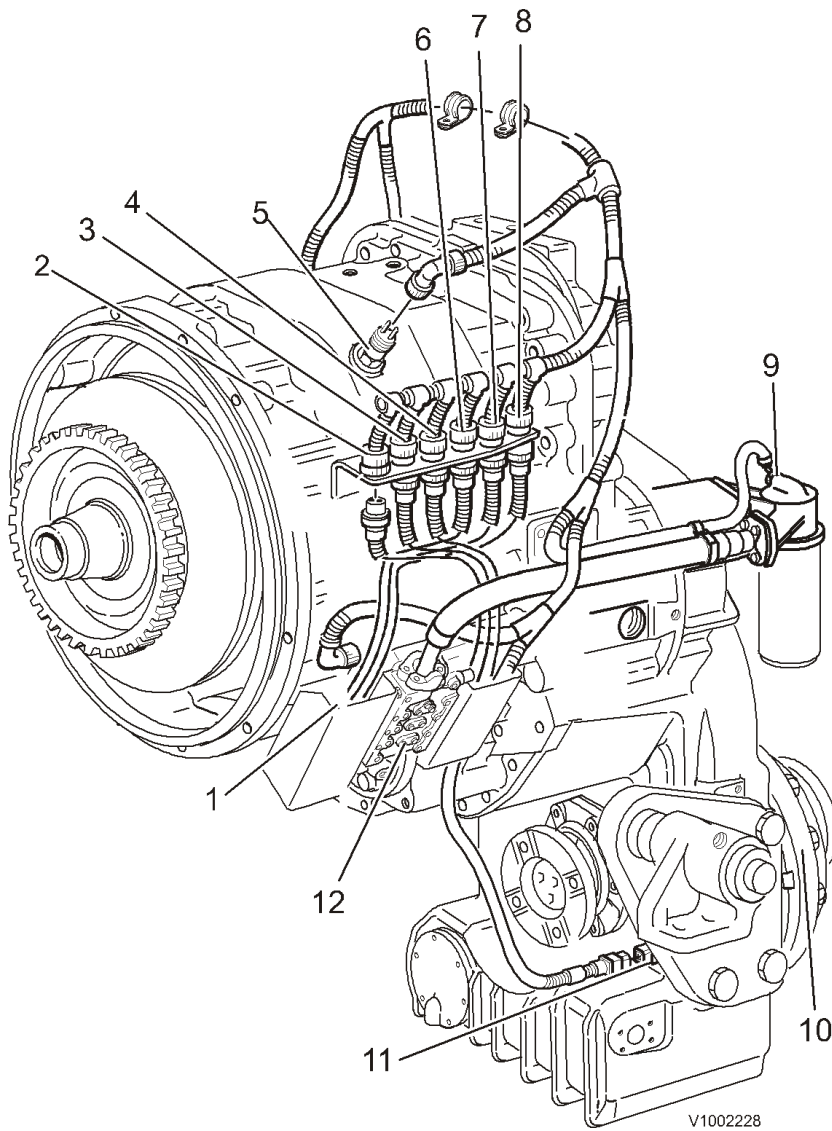


Figure 7
Transmission

1. SE405, main pressure
2. SB, connector for gear shifting solenoid (1)
3. SD, connector for gear shifting solenoid (R)
4. SF, connector for gear shifting solenoid (3)
5. SE201, engine speed
6. SE, connector for gear shifting solenoid (4)
7. SC, connector for gear shifting solenoid (2)
8. SA, connector for gear shifting solenoid (F)
9. SE401, filter indicator
10. Parking brake, built into transmission
11. Gear selector valve

1. Engine
2. Transmission

Gear selector valve

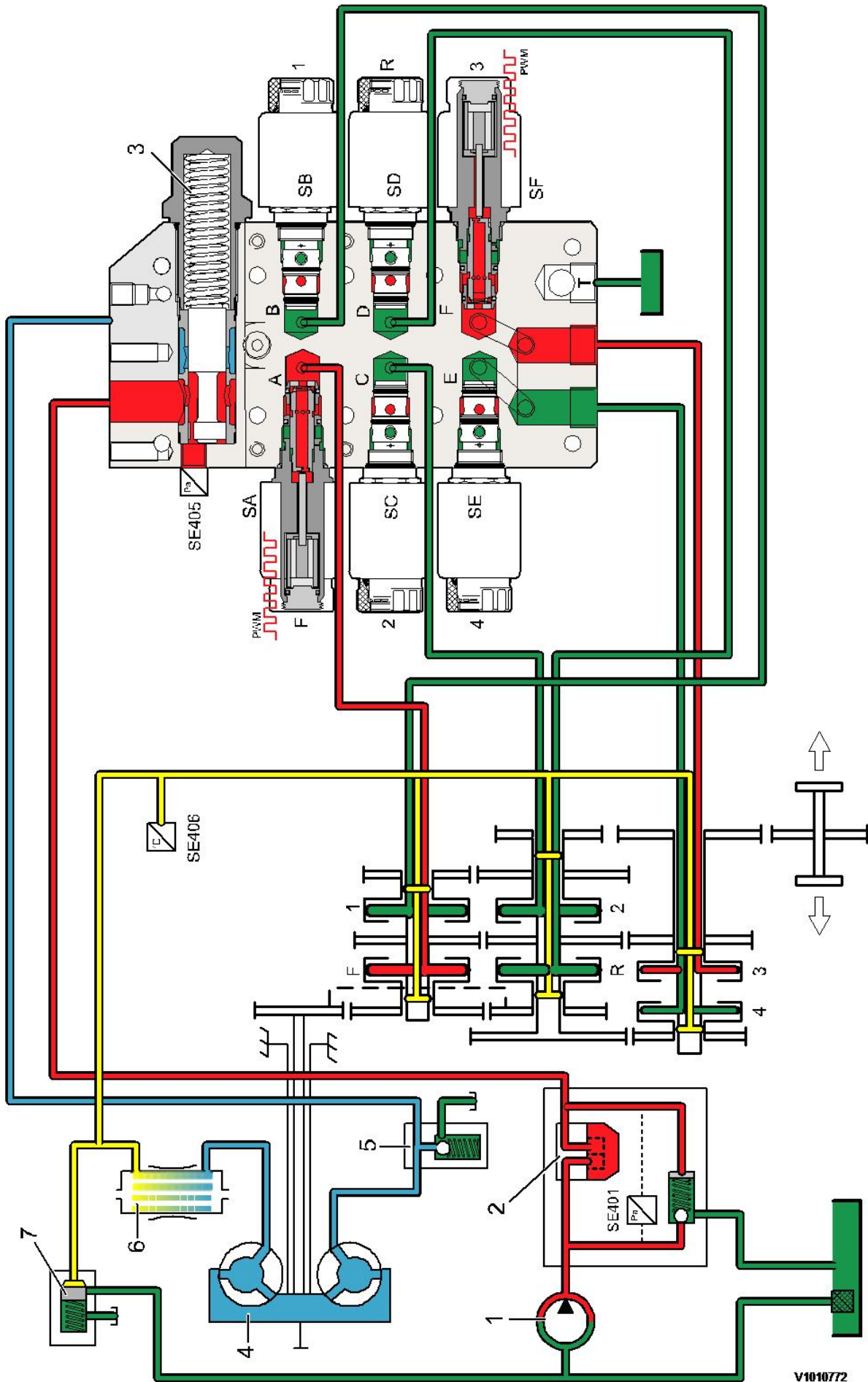


Figure 9
Gear selector valve

SA	Gear shifting solenoid, forward
SB	Gear shifting solenoid, 1st gear
SC	Gear shifting solenoid, 2nd gear
SD	Gear shifting solenoid, reverse
SE	Gear shifting solenoid, 4th gear
SF	Gear shifting solenoid, 3rd gear
SE401	Filter indicator
SE405	Sensor, transmission oil pressure
SE406	Sensor, transmission oil temperature

Transmission oil pump (1) draws oil from the transmission oil sump via suction strainers. The oil flow from the pump is supplied to filter retainer (2), which contains filter, filter indicator SE401 and overflow valve. This valve returns the oil to the oil sump when the pressure drop across the filter is too great (clogged filter). The cleaned oil passes on to the gear selector valve and its main pressure limiter (3).

When the pressure reaches main pressure limiter (3), pressure builds up on the left side, where the transmission oil pressure sensor SE405 is positioned. The spool moves over to the right and directs the surplus oil to torque converter (4) and its safety valve (5). When the safety valve opens, the surplus oil is conducted back to the sump. From the torque converter the oil is conducted out of the transmission to the externally positioned transmission oil cooler (6).

The transmission oil cooler is cooled or alternatively is heated by the engine coolant. From transmission oil cooler (6) the oil is conducted on to lubricating oil pressure valve (7). The lubricating oil pressure valve ensures the lubricating oil pressure to all clutch shafts. The sensor for the transmission oil temperature SE406 is located by lubricating oil pressure valve (7).

From the main pressure limiter (3) the oil is conducted on to the PWM controlled proportional valves for the respective gear (SA=F, SB=1, SC=2, SD=R, SE=4 and SF=3). Without a PWM signal from the V-ECU all clutch shafts are without pressure. In the example PWM signal is sent from the V-ECU to the solenoids SA (for forward gear) and SF (for 3rd gear), which will result in 3rd gear forward. In proportion to the PWM signal the valve sends a pressure to the respective clutch shaft. This pressure cannot be higher than the existing main pressure.

Proportional valve, gear selector

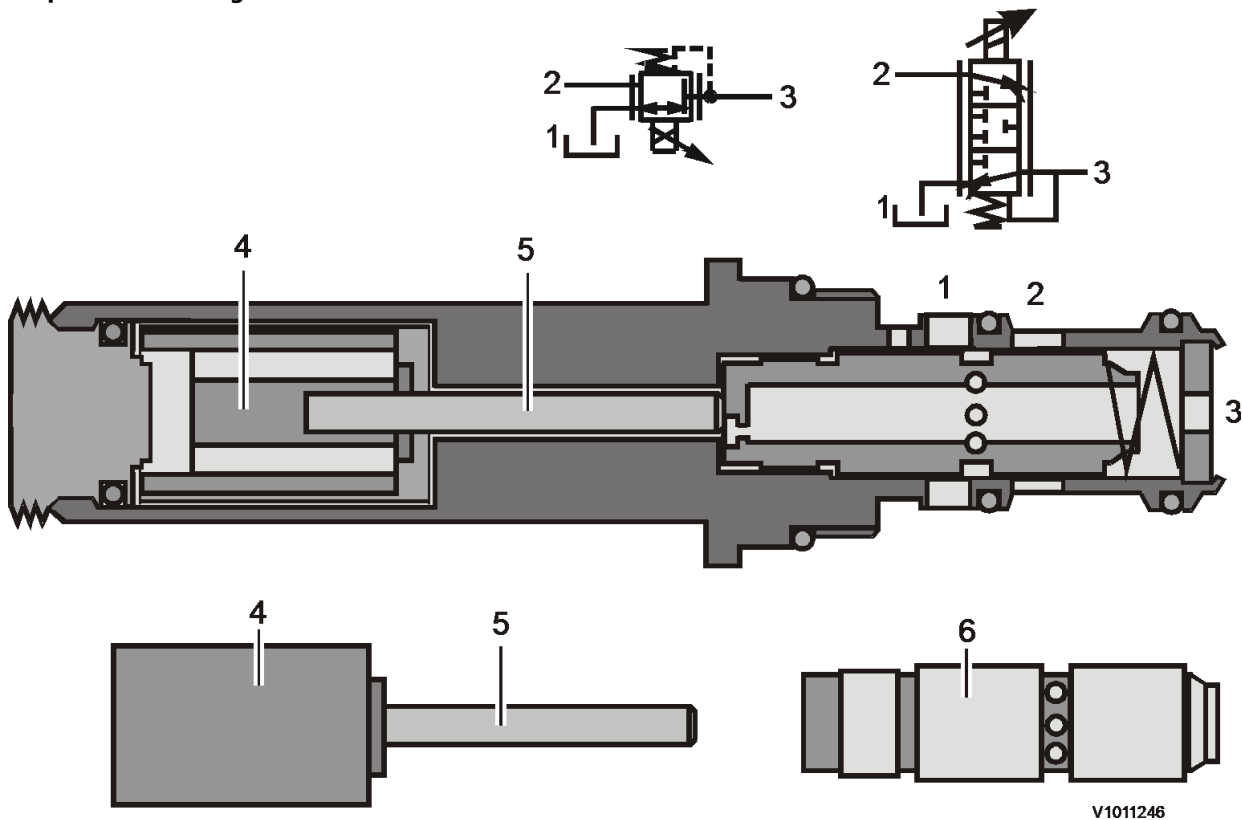


Figure 10

Proportional valve

1. Tank connection
2. Pressure connection
3. Outlet to clutch
4. Magnet iron core
5. Push rod
6. Valve spool

Hydraulic diagram, transmission

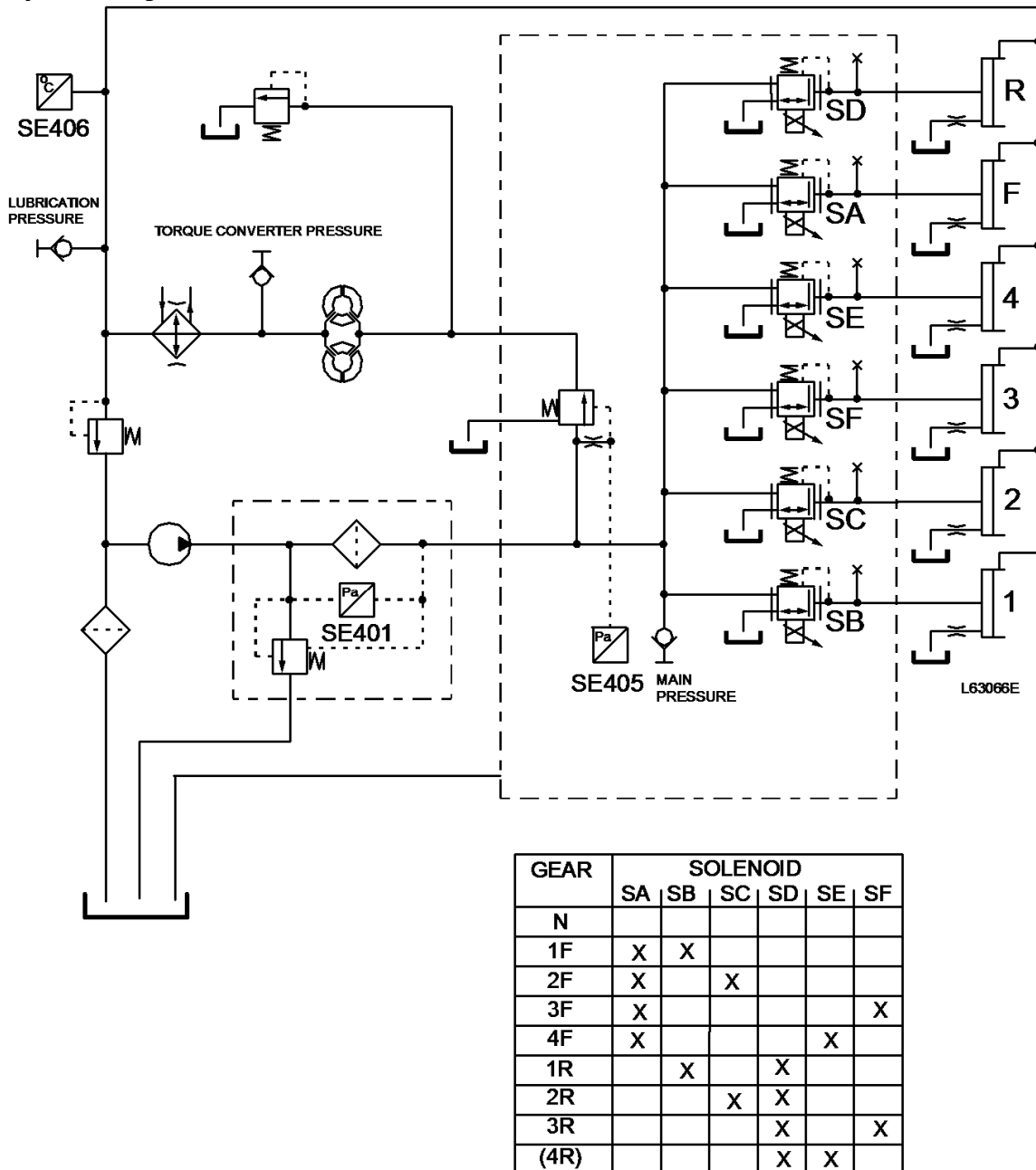


Figure 11
Hydraulic diagram, transmission

Pressure build-up in disc clutches, gear shifting from forward 1 to reverse 2

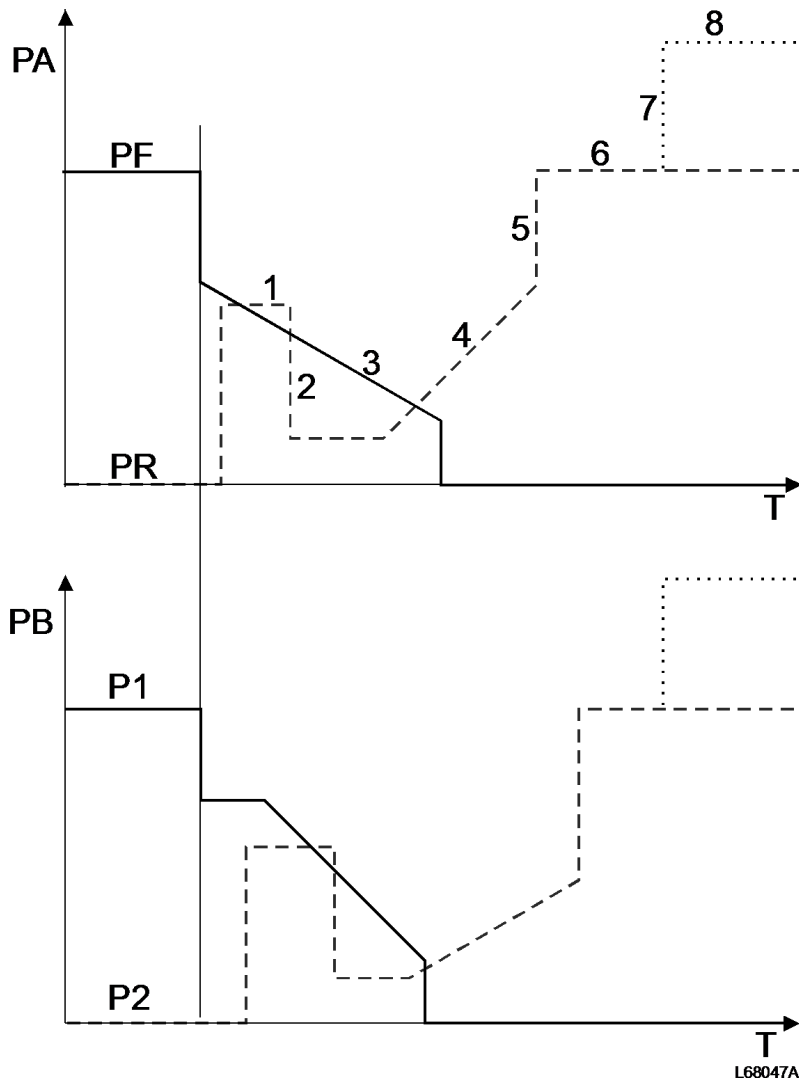


Figure 12
Principle for pressure build-up in disc clutch with gear shifting solenoid of the PWM type

PA	Pressure, directional gear
PB	Pressure, speed gear
T	Time
PF	Pressure, forward clutch
PR	Pressure, reverse clutch
P1	Pressure, 1st gear clutch
P2	Pressure, 2nd gear clutch

1. Pressure for application of selected gear disc clutch.
2. Drop in pressure after that the disc clutch has been applied.
3. Drop in pressure in previously selected gear disc clutch.
4. Application stage for selected gear disc clutch.
5. Pressure build-up for full application of disc clutch.
6. Normal pressure up to existing main pressure for applied disc clutch.
7. Raised pressure if slippage is indicated in disc clutch.
8. Auto idle if auto idle function has been selected and slippage in disc clutch still is indicated.

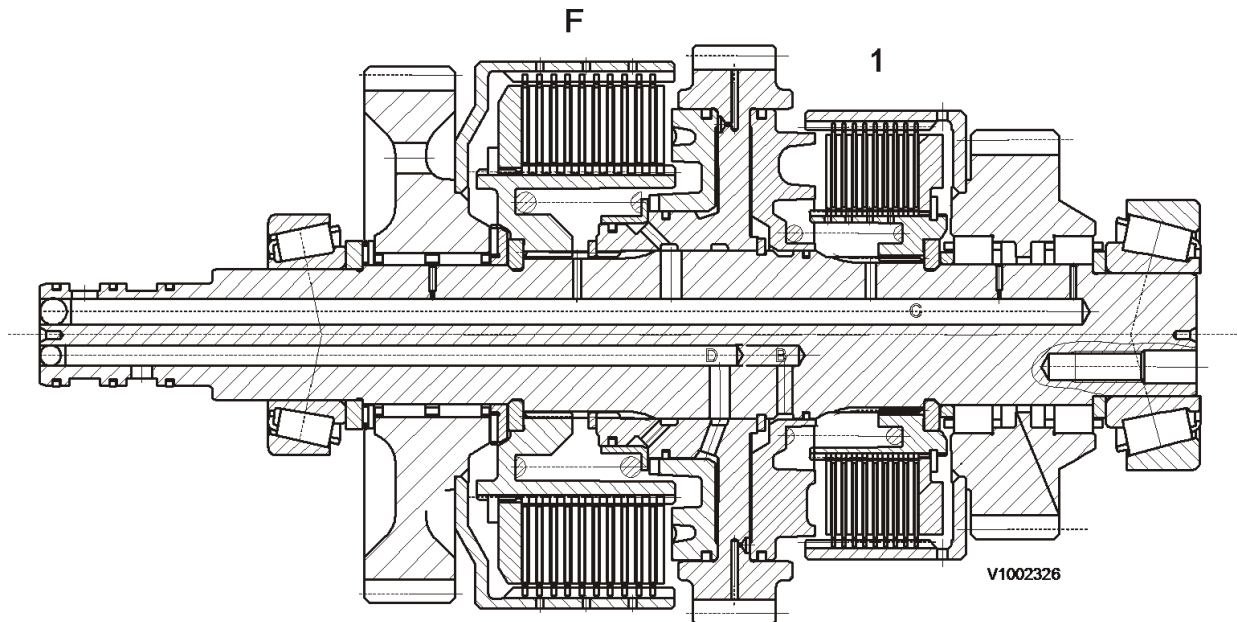


Figure 13
Clutch shaft Forward / 1st gear

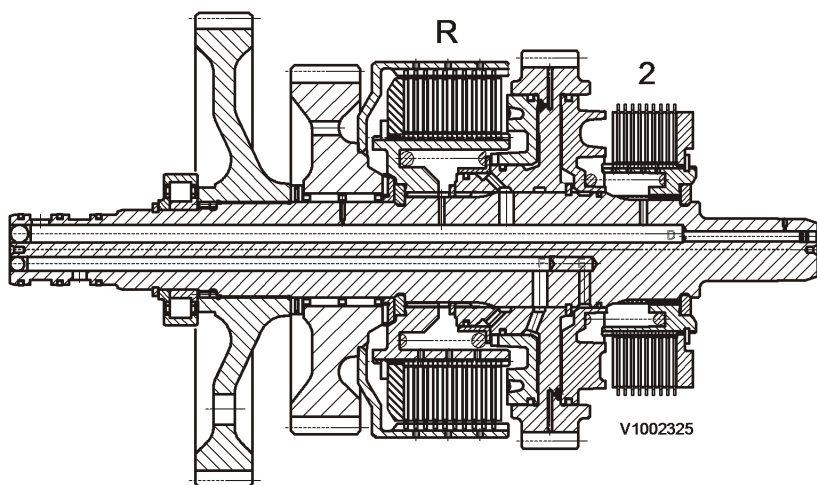


Figure 14
Clutch shaft Reverse / 2nd gear

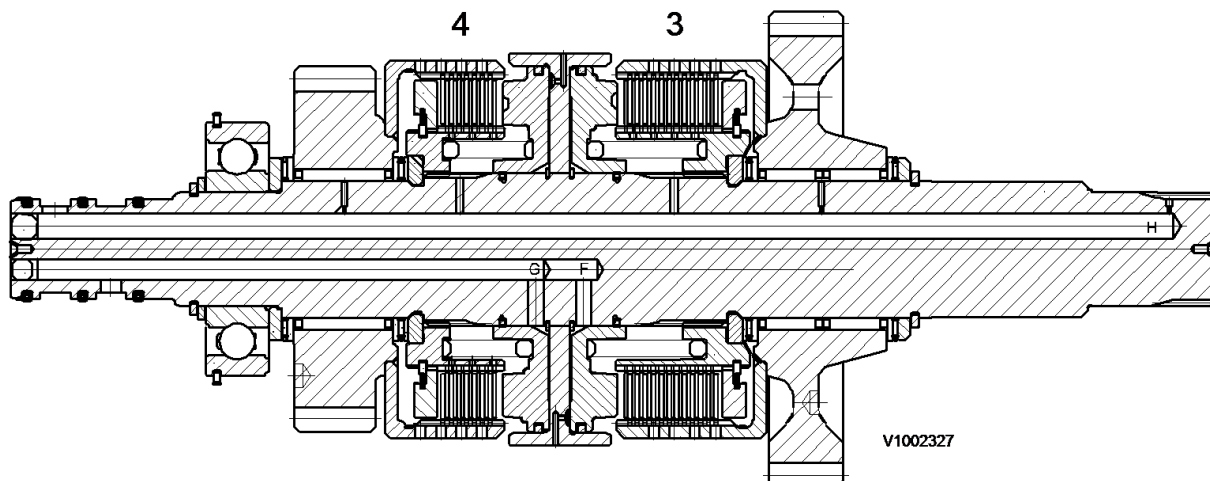


Figure 15

Clutch shaft 3rd gear / 4th gear

Parking brake

The parking brake is built into the transmission, on the front output shaft. It is a multi-disc brake that is applied with spring pressure and released with hydraulic pressure. See Section 5. Parking brake, description.

Document Title: Gearshifting, description	Function Group: 421	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Gearshifting, description

The gear-shift mode programme can be adjusted to suit different operating and working conditions. To this end there is a mode selector (SW412), positioned on the front instrument panel. In combination with the gear selector the operator can choose between manual gear shifting or various automatic gear-shift mode programmes.

The gear-shift mode programme is available as an earlier or later version.

The versions differ in among other ways in the design of the mode selector, see figure.

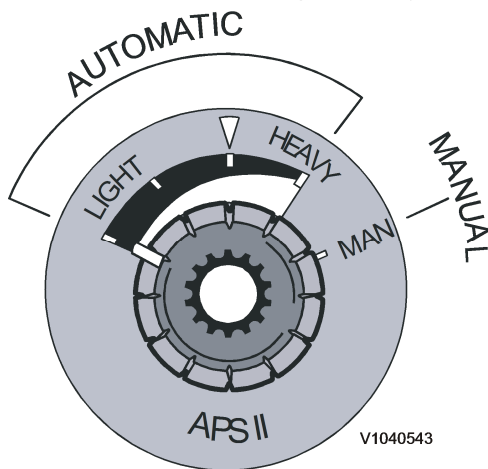


Figure 1
Mode selector (SW412), earlier version

Gear-shifting programme, positions (earlier version)

LIGHT (I)	The machine shifts already at low engine speed.
LIGHT (II)	The machine shifts at a slightly higher engine speed than in the first position.
NORMAL (V)	Is used for "normal handling" and operation.
HEAVY:	The machine only shifts at a higher engine speed.
MAN	Shifting is done manually.

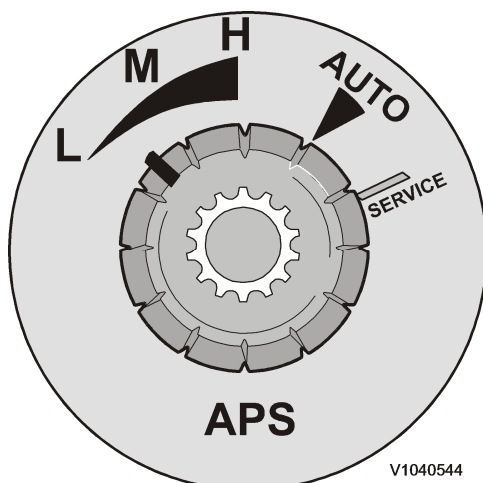


Figure 2
Mode selector (SW412), later version

Gear-shifting programme, positions (later version)

L	The machine shifts already at low engine speed.
M	The machine shifts at a slightly higher engine speed than in the first position.
H	The machine shifts at a higher engine speed than when in position M.
AUTO	The machine shifts fully automatically and selects gear-shifting programme for best comfort and economy.
SERVICE	Shifting is done manually.

Manual shifting

The mode selector (SW412) set to position "MAN" or "SERVICE" depending on version.

Changing travelling direction

Changing travelling direction at low travelling speed takes place in 2nd gear and at higher speed in 3rd gear and downshifting to 2nd gear does not take place until the machine has stopped and before it begins to move in the opposite direction.

The change is done with the gear selector (SW402) or switch on the control lever carrier (SW416), or, if the machine is equipped with lever steering, SW409. As a safety measure upshifting to a higher gear takes place if certain critical engine or travelling speeds are exceeded.

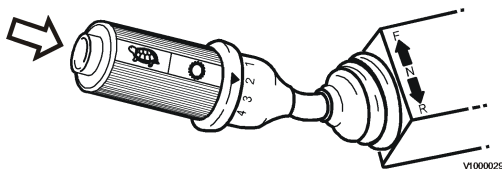


Figure 3
Gear selector control with SW401B for gear shifting 1–4, SW402 for shifting Forward/Reverse and SW401C for Kick-down

Kick-down function

Kick-down means that the operator requests gear shifting to 1st gear by actuating the kick-down button, for example SW401C. This choice is always available, regardless of machine version.

The moment of downshifting to 1st gear depends on the mode selector position, the engine speed and the travelling speed of the machine.

1st gear will be engaged if the machine is travelling at a sufficiently low speed or if the speed within 8 seconds of activating kick-down, is less than 8 km/h (5 mph).

1st gear remains engaged for at least 5 seconds, if the engine speed and the travelling speed of the machine so require, thereafter upshifting takes place according to the gear-shifting mode programme.

When changing travelling direction the kick-down function is cancelled immediately and upshifting to 2nd gear takes place.

Overspeed protection

When downshifting, V—ECU always checks that the travelling speed is not too high for the selected gear. Should this be the case, the current gear is retained until the speed has dropped to within the permitted range.

Automatic gear shifting

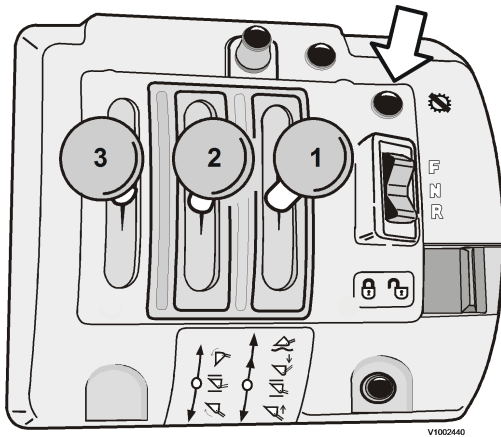


Figure 4
Switch downshifting / engine breaking

If SW412 is in position "Light—HEAVY" or "L—AUTO", depending on machine version, gear shifting takes place automatically. The conditions for gear shifting are a combination of travelling speed and engine revolutions.

2nd gear is the basic gear and the gear in which the machine normally starts.

To achieve engine retarding, release the accelerator control fully and press the downshift / engine retarding button (SW406) once for each downshift. Downshifting takes place at the correct moment in order to achieve the greatest possible engine retarding effect from 4th gear via 3rd gear down to 2nd gear.

Further downshifting to 1st gear takes place, on earlier version, after that kick-down has been activated. On later version, this may also take place automatically, if SW412 is in position "AUTO" and if fully automatic function has been activated (SW417 in ON position).

Upshifting from 2nd gear to 3rd gear reverse takes place at a fairly high engine speed.

If the downshift / engine breaking button is kept pressed in while the accelerator is actuated, upshifting is prevented.

The gear-shifting points vary depending on whether the engine is pulling or breaking.

Transmission declutch

When the transmission declutch function is activated the transmission will be disengaged (to neutral) when braking. On earlier machines the function is activated with SW411, positioned on the front right instrument panel. On later machines the function is activated via the keypad.

For further description, see [301 Transmission disengagement](#).

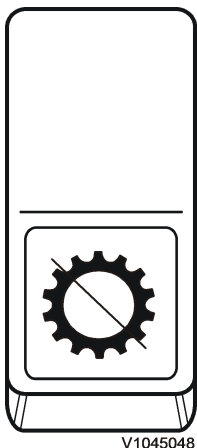


Figure 5
SW411

Fully automatic function

Later version machines are provided with the "Fully Automatic Function". When this function is activated, downshifting takes place automatically also to 1st gear. The function is activated with SW417, positioned on the front right instrument panel.



Figure 6
SW417

For further description, see [301 Fully automatic](#).

See also [301 APS](#) and [301 APS II](#).

Document Title: Gear selector valve, measuring resistance of solenoids	Function Group: 421	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Gear selector valve, measuring resistance of solenoids

Op nbr 42151

[9998534 Adapter](#)

[11666140 Multimeter](#)

Park the machine in the service position.

The check is normally only performed if error code " ERROR Transmission solenoids" has been generated.

1. Raise the right engine cover.
2. Disconnect all connectors from the connector console for the solenoids on the gear selector valve.
3. Connect 9998534 to a solenoid.

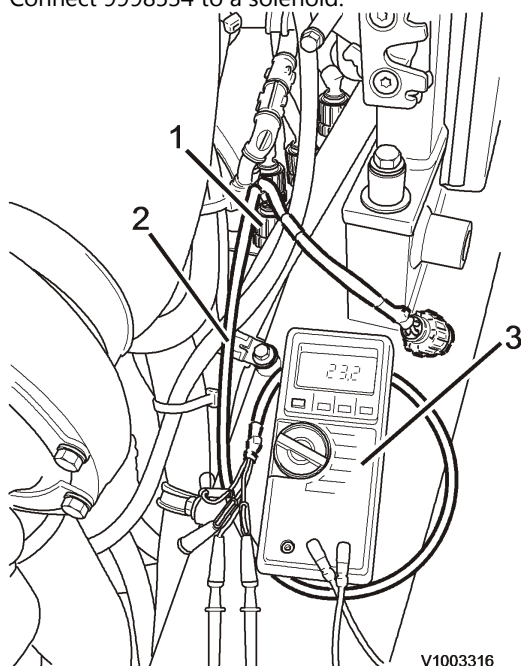


Figure 1

1. Connector, solenoid
2. 9998534
3. 11666140
4. Connect 11666140 in red and black connector on 9998534.
5. Read off the resistance.
Correct resistance: **23 ± 10Ω**

Document Title: Transmission, fault diagnosis	Function Group: 421	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Transmission, fault diagnosis

The machine has insufficient pulling power

If the machine has insufficient pulling power the fault could be found in the engine or transmission.

Check engine stalling speed, see Section 2.

Verify hydraulic pressure is not outside of the specification limits and that the brakes are not applied (service brake or parking brake).

1. If the stalling speed is too low, the fault can be found in the engine.
2. If the engine stalling speed is within or higher than the specified limits, the fault can be found in the transmission.
 - Check that 1st gear can be engaged.
 - Insufficient pulling power in combination with the transmission running hot indicates a fault in the torque converter. Start by checking torque converter pressure.

Shifting gears is not possible

Gear engagement failure may be caused by:

- Electrical malfunction.
- Defective gear selector valve
- Hydraulic or other fault in the clutch shaft

Check the main pressure and the clutch pressure for the clutch in question.

- If the correct clutch pressure is obtained, the fault is in the clutch (slipping).
- Correct main pressure and low clutch pressure could be due to leakage between the oil distributor and clutch shaft or in the gear selector valve.
- If the correct main pressure is obtained but no clutch pressure is present, an electrical fault or a fault in the gear selector valve could be the cause.

A temporary functional disorder (pressure loss) could be due to:

- Electric malfunction (loose connection) etc.
- Binding valve spool in the gear selector valve.
- Leakage between oil distributor and clutch shaft (functions when the oil is cold, malfunctions when the oil heats).

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Transmission, check oil pressure](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 5001
Serial number stop: 6301

- [Transmission, check oil pressure](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 6302
Serial number stop: 10999

Document Title: Transmission, check oil pressure	Function Group: 421	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Transmission, check oil pressure

Op nbr 421-002

[11666052 Pressure gauge](#)

[14290266 Hose](#)

[9993721 Service display](#)

[14341364 Adapter](#)

930032 Testing nipple

Use testing nipple 930032 where there is none already installed.

NOTE!

When checking pressure, apply the service brakes and the parking brake. Also make sure that the transmission declutch function is **not** activated.

NOTE!

Earlier and later type checking points occur. For checking points of earlier type, use adapter.

Check that the engine speed at high idling and the engine stall speed agree with specifications, see [210 Engine, specifications](#).

1. Warm up the machine until engine, transmission and hydraulic system have reached normal working temperature. Place the machine in service position.

Main pressure, checking (alternative 1)

2. Connect the service display unit to the outlet on the rear wall of the cab.

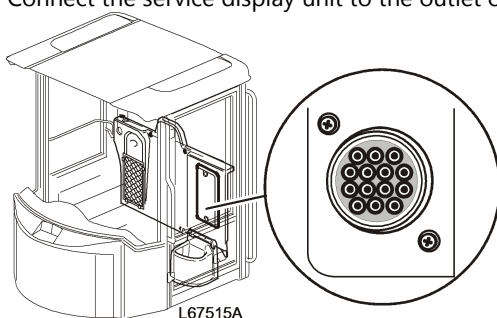


Figure 1

3. Start the engine, move the gear selector to neutral position and browse until you get the correct screen on the service display unit under the transmission menu for reading off data.

TRANSMISSION		
Temp.		xxx x

Pressure
Turb. speed

yyy yyy
zzzz rpm

- 4. Rev up the engine to full speed.
Read off the pressure.
Main pressure, see [421 Transmission oil pressure. specifications](#).

Main pressure, checking (alternative 2)

- 5. Connect the pressure gauge to the checking point marked M on the checking panel positioned between the two top steps of the ladder on the right or left side of the cab (depending on machine type).
Start the engine and move the gear selector to neutral position.
Rev up the engine to full speed.
Read off the pressure gauge.
Main pressure, see [421 Transmission oil pressure. specifications](#).

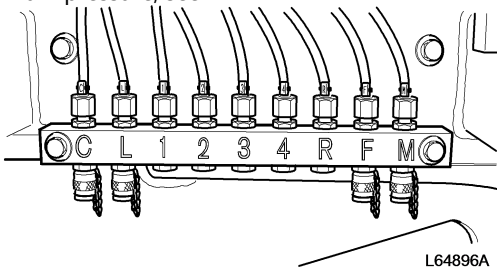


Figure 2

M	Checking point, main pressure
---	-------------------------------

Clutch pressure, 1st gear – 4th gear, checking

- 6. Select position (mode) MAN/SERVICE on gear-shift mode selector (SW412).

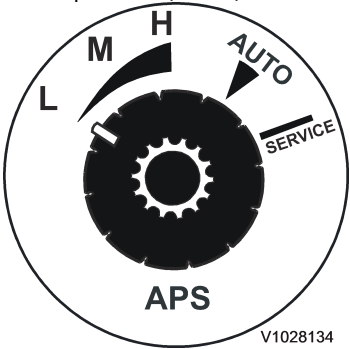


Figure 3
Mode selector (SW412), APS

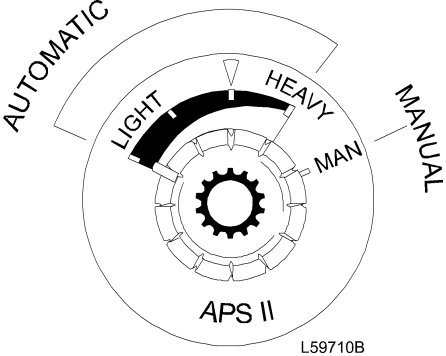


Figure 4
Mode selector (SW412), APSII

7. Connect the pressure gauge to the checking point marked 1, 2, 3 or 4.
Start the engine, move the gear selector to the respective gear positions and check in both forward and reverse position.
Rev up the engine to full speed.
Read off the pressure gauge for the respective clutch pressure.
Clutch pressure, see [421 Transmission oil pressure. specifications](#).

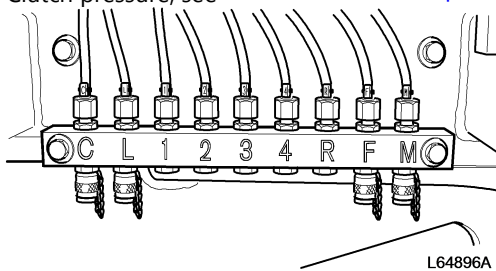


Figure 5

1, 2, 3, 4	Checking point, clutch pressure
------------	---------------------------------

Clutch pressure, forward and reverse gears, checking

8. Connect the pressure gauge to the checking point marked F or R.
Start the engine and move the gear selector to the 3rd gear position in both forward and reverse position.
Rev up the engine to full speed.
Read off the pressure gauge.
Clutch pressure, see [421 Transmission oil pressure. specifications](#).

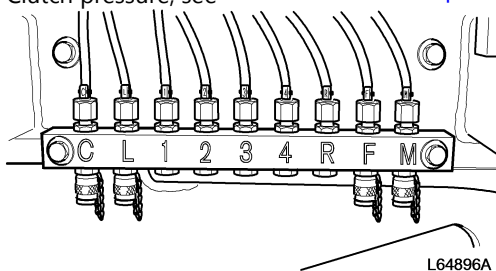


Figure 6

F, R	Checking point, clutch pressure, forward and reverse
------	--

Lubricating oil pressure, checking

9. Connect the pressure gauge to the checking point marked L.
Start the engine and move the gear selector to neutral position.
Rev up the engine to full speed.
Read off the pressure gauge.
Lubricating oil pressure, see [421 Transmission oil pressure. specifications](#).

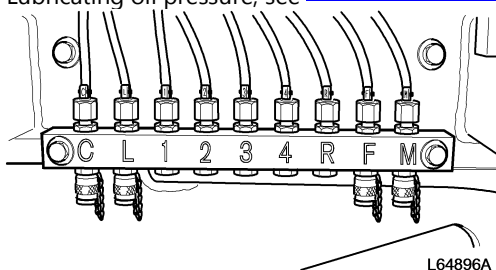


Figure 7

L	Checking point, lubricating oil pressure
---	--

Torque converter pressure, checking

10. Connect the pressure gauge to the checking point marked C.
Start the engine and move the gear selector to neutral position.
Rev up the engine to full speed.
Read off the pressure gauge.
Torque converter pressure, see [421 Transmission oil pressure, specifications](#).

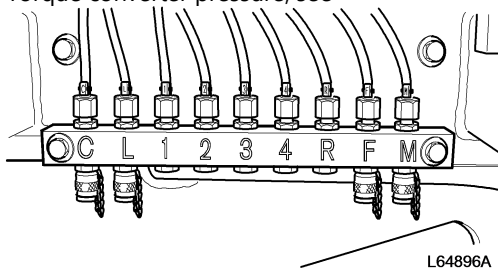


Figure 8

C	Checking point, torque converter pressure
---	---

Document Title: Transmission, check oil pressure	Function Group: 421	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Transmission, check oil pressure

Op nbr 421-002

[11666052 Pressure gauge](#)

[14290266 Hose](#)

[9993721 Service display](#)

[14341364 Adapter](#)

NOTE!

When checking pressure, apply the service brakes and the parking brake. Also make sure that the transmission declutch function is **not** activated.

NOTE!

Earlier and later version checking points occur. For checking points of earlier versio, use adapter.

Check that the engine speed at high idling and the engine stall speed agree with specifications, see [210 Engine specifications](#).

1. Warm up the machine until engine, transmission and hydraulic system have reached normal working temperature. Place the machine in service position.

Main pressure, checking (alternative 1)

2. Connect the service display unit to the outlet on the rear wall of the cab.

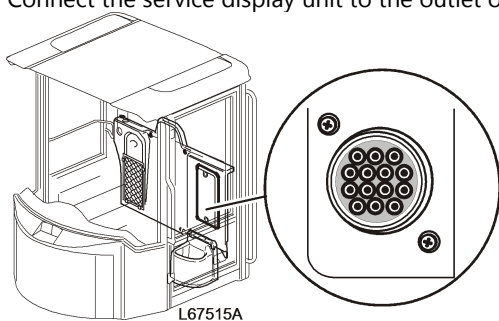


Figure 1

3. Start the engine, move the gear selector to neutral position and browse until you get the correct screen on the service display unit under the transmission menu for reading off data.

TRANSMISSION		
Temp.		xxx x
Pressure		yyy yyy
Turb. speed		zzzz rpm

4. Rev up the engine to full speed.
Read off the pressure.
Main pressure, see [421 Transmission oil pressure, specifications](#).

Main pressure, checking (alternative 2)

5. Open the cover under the transmission and connect a pressure gauge to the checking point on the transmission.
Start the engine and move the gear selector to neutral position.
Rev up the engine to full speed.
Read off the pressure gauge.
Main pressure, see [421 Transmission oil pressure, specifications](#).

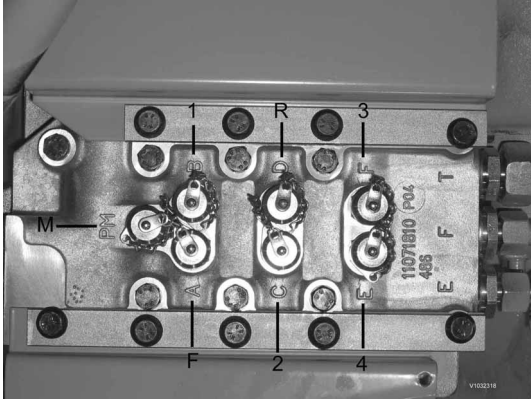


Figure 2

M	Checking point, main pressure
---	-------------------------------

Clutch pressure, 1st gear – 4th gear, checking

6. Select position (mode) SERVICE on gear-shift mode selector (SW412).

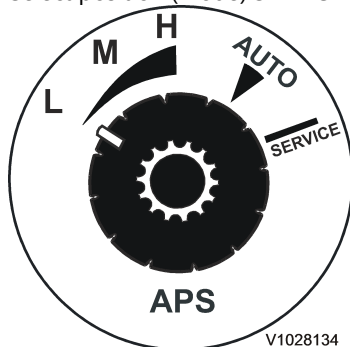


Figure 3
Mode selector (SW412), APS

7. Connect the pressure gauge to either of the checking points for clutch pressure.
Start the engine, move the gear selector to the respective gear positions and check in both forward and reverse position.
Rev up the engine to full speed.
Read off the pressure gauge for the respective clutch pressure.
Clutch pressure, see [421 Transmission oil pressure, specifications](#).

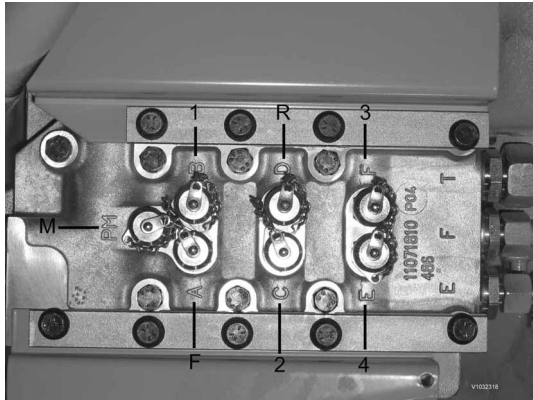


Figure 4

1, 2, 3, 4	Checking point, clutch pressure
------------	---------------------------------

Clutch pressure, forward and reverse gears, checking

8. Connect the pressure gauge to the checking point for forward or reverse.
Start the engine and move the gear selector to the 3rd gear position in both forward and reverse position.
Rev up the engine to full speed.
Read off the pressure gauge.

Clutch pressure, see [421 Transmission oil pressure, specifications](#).

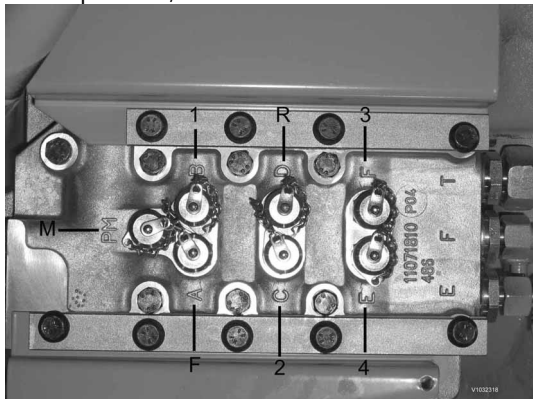


Figure 5

F, R	Checking point, clutch pressure, forward and reverse
------	--

Lubricating oil pressure, checking

9. Connect the pressure gauge to the checking point marked L.
Start the engine and move the gear selector to neutral position.
Rev up the engine to full speed.
Read off the pressure gauge.
Lubricating oil pressure, see [421 Transmission oil pressure, specifications](#).

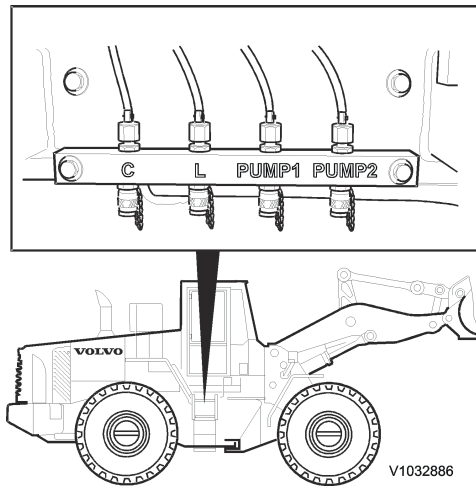


Figure 6

L	Checking point, lubricating oil pressure
---	--

Torque converter pressure, checking

10. Connect the pressure gauge to the checking point marked C.
Start the engine and move the gear selector to neutral position.
Rev up the engine to full speed.
Read off the pressure gauge.
Torque converter pressure, see [421 Transmission oil pressure, specifications](#).

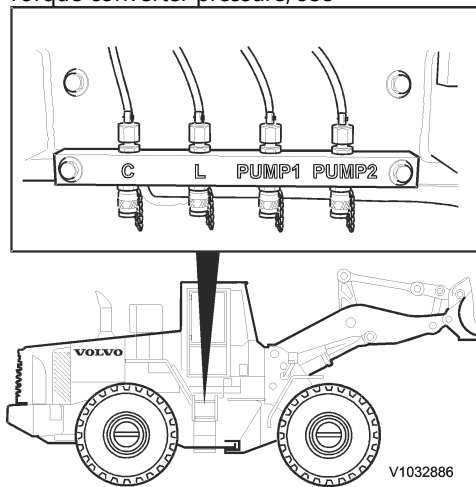


Figure 7

C	Checking point, torque converter pressure
---	---

Document Title: Gear selector valve, removing and installing	Function Group: 421	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Gear selector valve, removing and installing

Op nbr 42108

1. Drain the oil from the transmission.
2. Remove the protective plates over the gear selector valve.

NOTE!

The screws have different lengths. Make sure they are placed correctly during re-fitting.

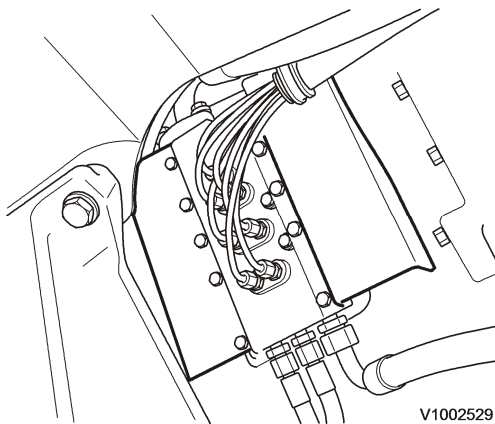


Figure 1
Gear selector valve

3. Remove the spools by removing the cover and O-ring.

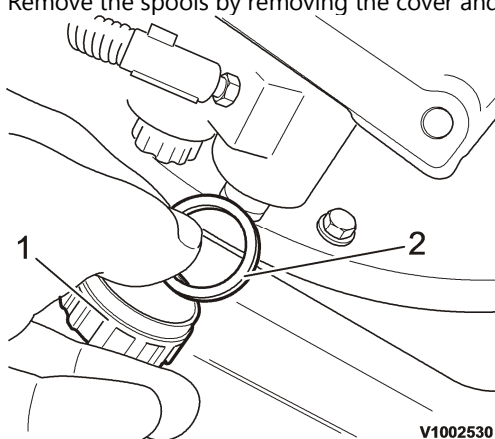


Figure 2
Removing cover and O-ring

1. Cover
 2. O-ring
4. Mark the location of the spools.

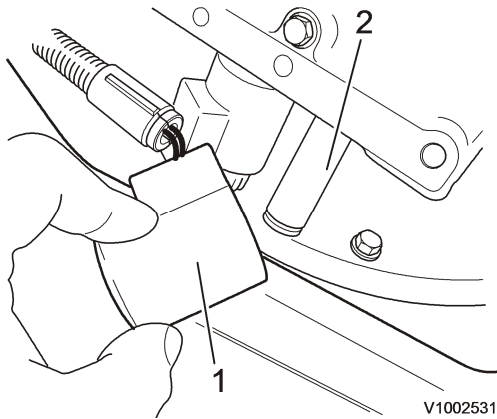


Figure 3

1. Spool
2. Solenoid valve

NOTE!

If the spools are to be changed together with the gear selector valve, leave the spools in place and unplug the connectors on the attaching plate by the converter housing on the machine's right side.

5. Remove the connector to sensor SE405 on the upper part of the block.

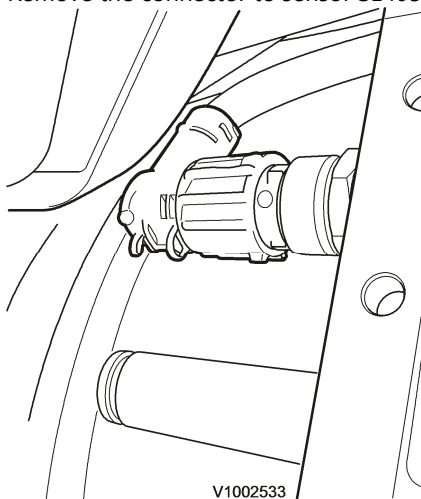


Figure 4
SE405

6. Remove the pressure check hoses and plug the connections. Mark the location of the hoses.

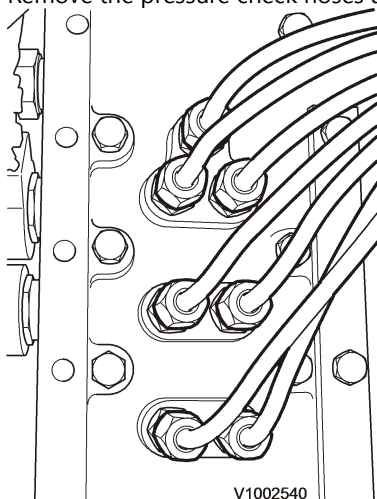


Figure 5

7. Remove the three lower hydraulic oil hoses and plug the connections.

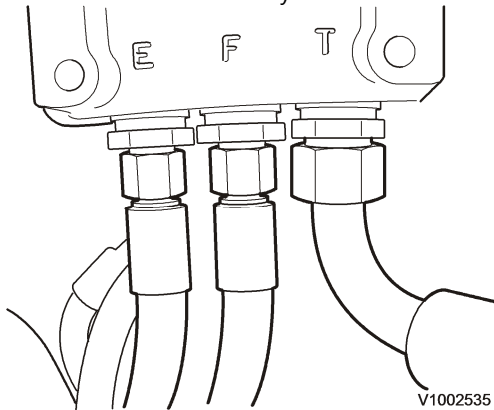


Figure 6

8. Remove the upper hydraulic oil hose and plug the connections.

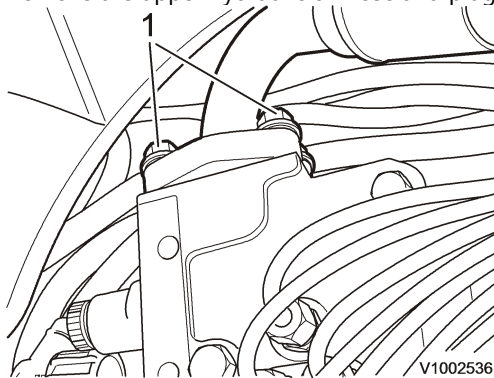


Figure 7

1. Screws (4 pcs.)

9. Remove the gear selector valve, (7 screws).

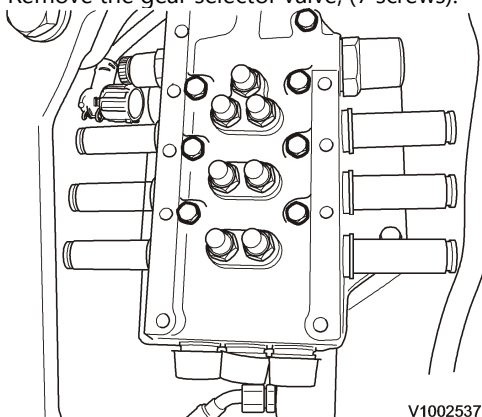


Figure 8

Solenoid valve, changing

10. Remove the spool, see steps 3 and 4.

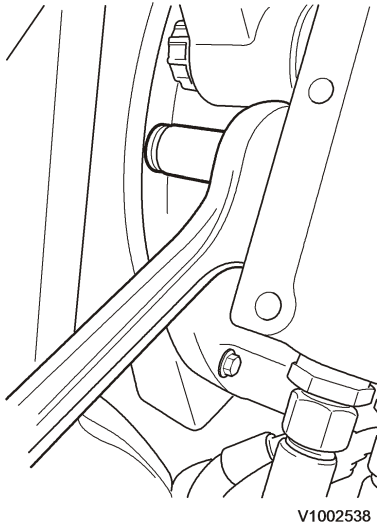


Figure 9

11. Remove the solenoid valve and plug the hole where the solenoid valve is located.

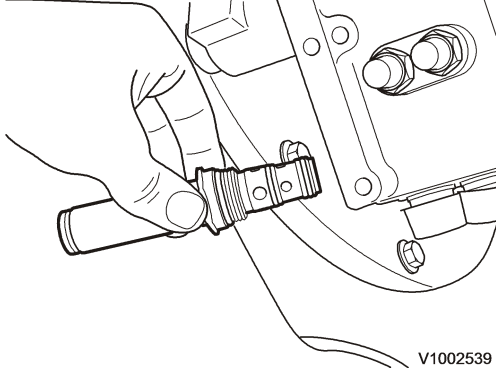


Figure 10

Gear selector valve, installing

12. Fit the gear selector valve.
Tightening torque: **25 Nm (18.5 lbf ft)**

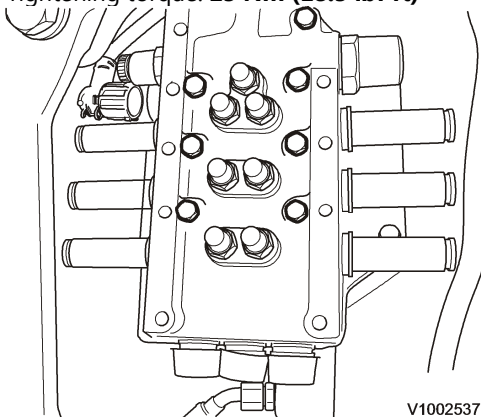


Figure 11

13. Fit the three lower hydraulic oil hoses.

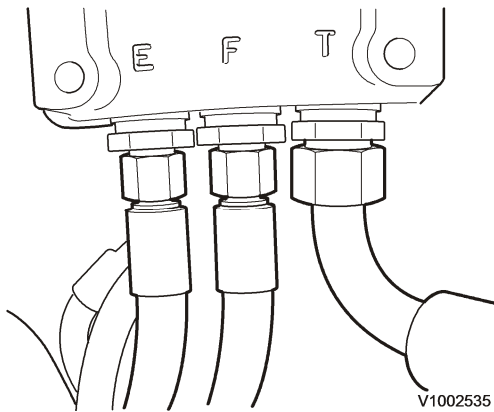


Figure 12

14. Fit the upper hydraulic oil hose.
Tightening torque: **50 Nm (37 lbf ft)**

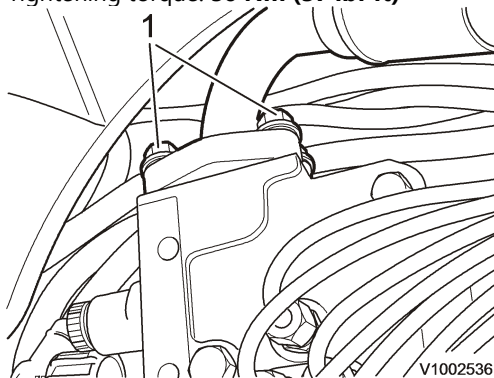


Figure 13

1. Screws (4 pcs.)

15. Fit the spools. Tighten the covers by hand.

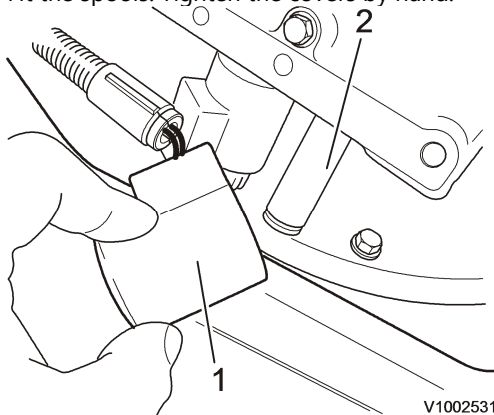


Figure 14

1. Spool
2. Solenoid valve

16. Fit the connector to sensor SE405.

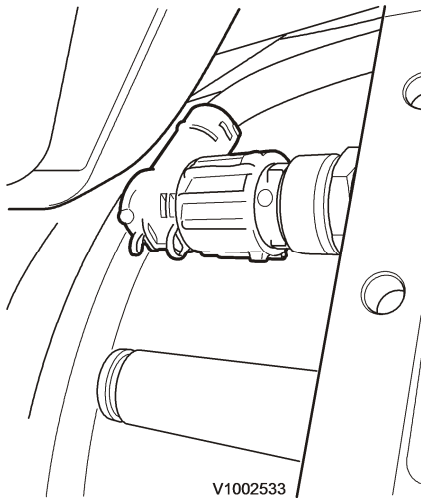


Figure 15
SE405

17. Fit the pressure connection hoses.

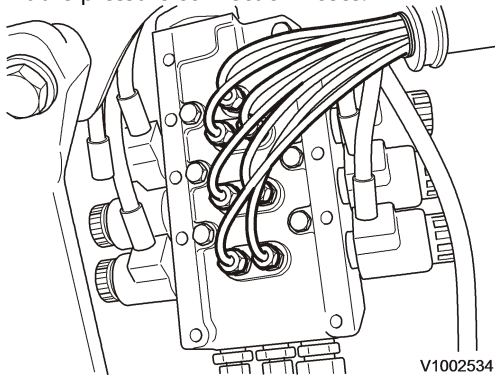


Figure 16

18. Fit the protective plates over the spools.
Tightening torque: **25 Nm (18.5 lbf ft)**
Fit the cable clamps.

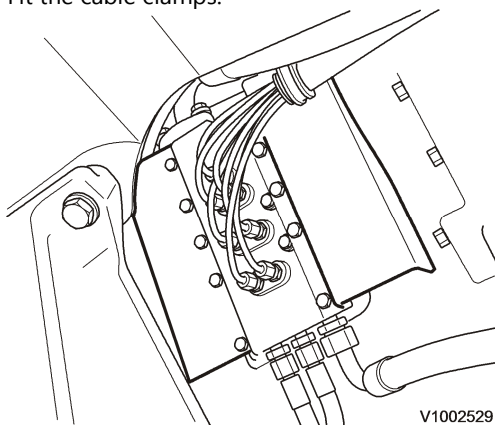


Figure 17

19. Fill the transmission with oil. Test overall function and check for leakage.

Document Title: Gear selector valve, removing and installing	Function Group: 421	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Gear selector valve, removing and installing

Op nbr 42108

1. Drain the oil from the transmission.
2. Remove the protective plates over the gear selector valve.

NOTE!

The screws have different lengths. Make sure they are placed correctly during re-fitting.

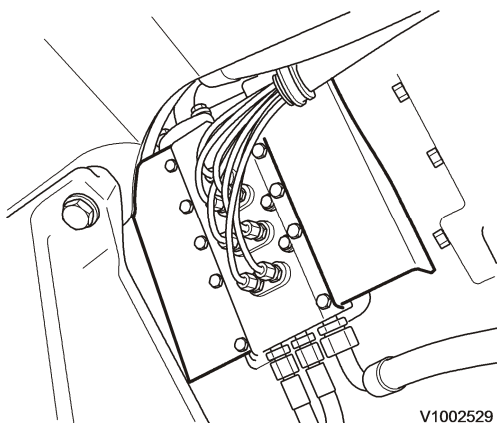


Figure 1
Gear selector valve

3. Remove the spools by removing the cover and O-ring.

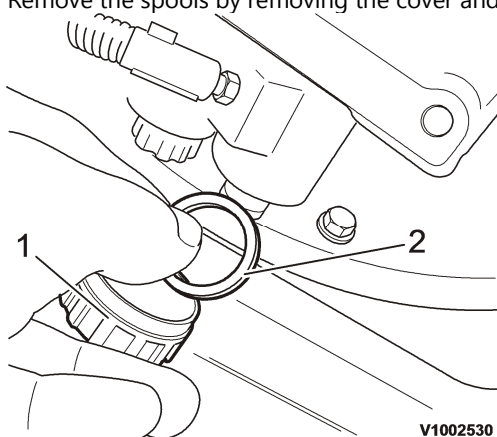


Figure 2
Removing cover and O-ring

1. Cover
 2. O-ring
4. Mark the location of the spools.

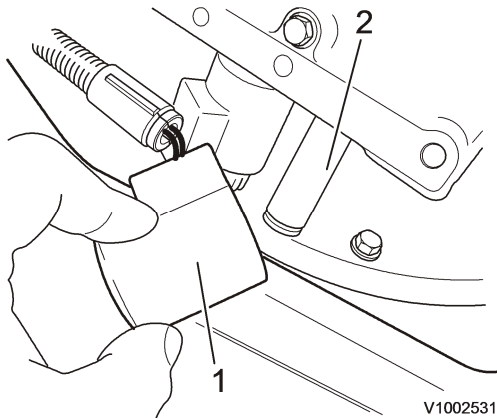


Figure 3

1. Spool
2. Solenoid valve

NOTE!

If the spools are to be changed together with the gear selector valve, leave the spools in place and unplug the connectors on the attaching plate by the converter housing on the machine's right side.

5. Remove the connector to sensor SE405 on the upper part of the block.

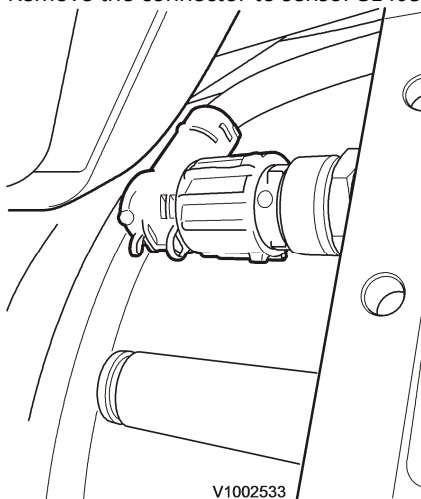


Figure 4
SE405

6. Remove the pressure check hoses and plug the connections. Mark the location of the hoses.

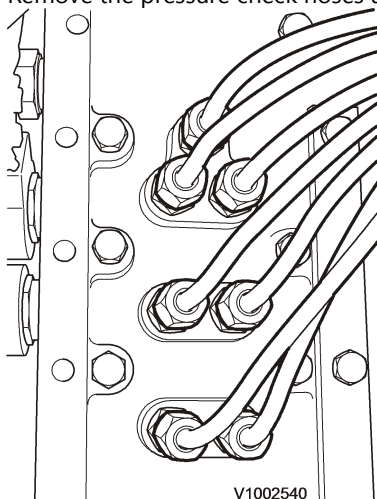


Figure 5

7. Remove the three lower hydraulic oil hoses and plug the connections.

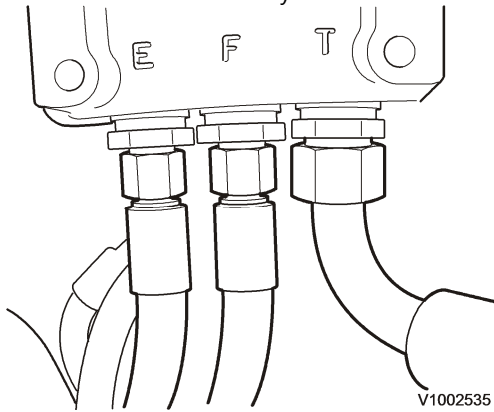


Figure 6

8. Remove the upper hydraulic oil hose and plug the connections.

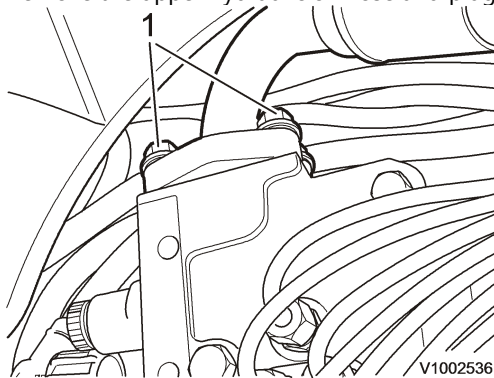


Figure 7

1. Screws (4 pcs.)

9. Remove the gear selector valve, (7 screws).

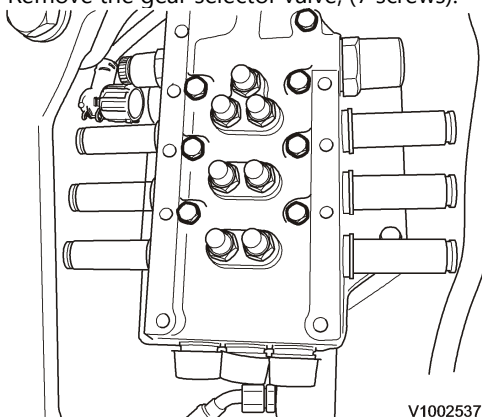


Figure 8

Solenoid valve, changing

10. Remove the spool, see steps 3 and 4.

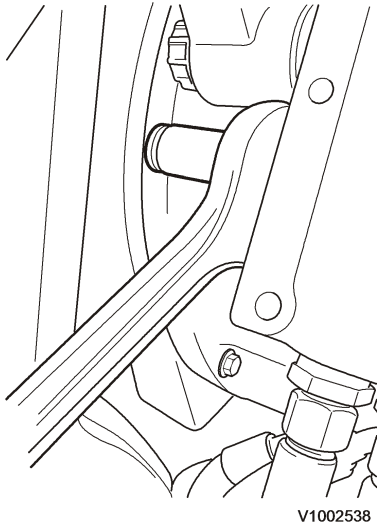


Figure 9

11. Remove the solenoid valve and plug the hole where the solenoid valve is located.

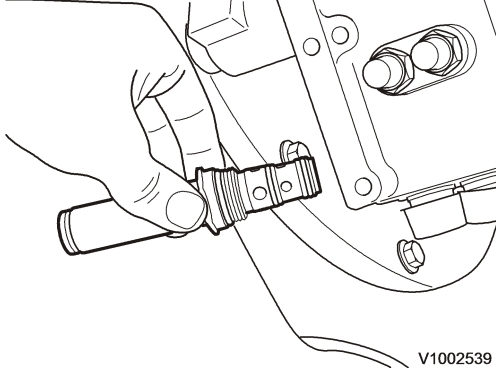


Figure 10

Gear selector valve, installing

12. Fit the gear selector valve.
Tightening torque: **25 Nm (18.5 lbf ft)**

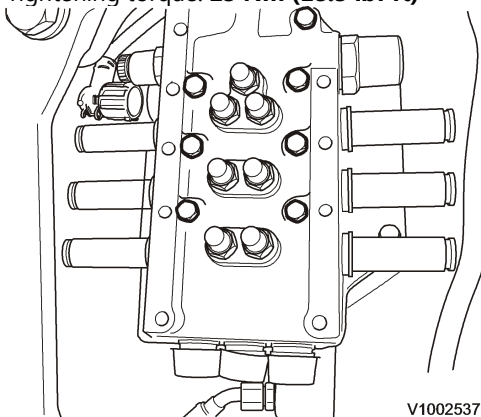


Figure 11

13. Fit the three lower hydraulic oil hoses.

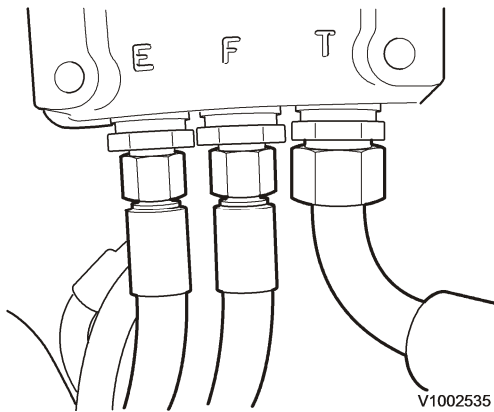


Figure 12

14. Fit the upper hydraulic oil hose.
Tightening torque: **50 Nm (37 lbf ft)**

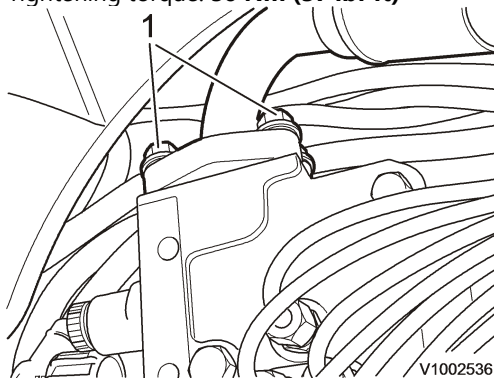


Figure 13

1. Screws (4 pcs.)

15. Fit the spools. Tighten the covers by hand.

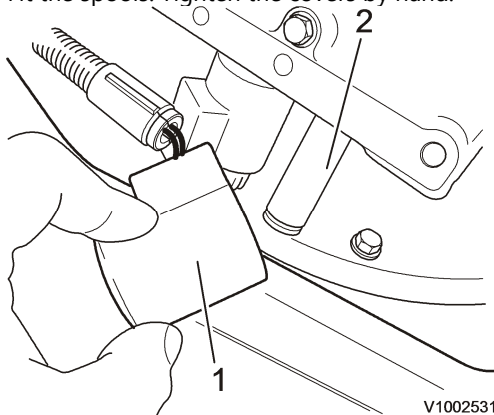


Figure 14

1. Spool
2. Solenoid valve

16. Fit the connector to sensor SE405.

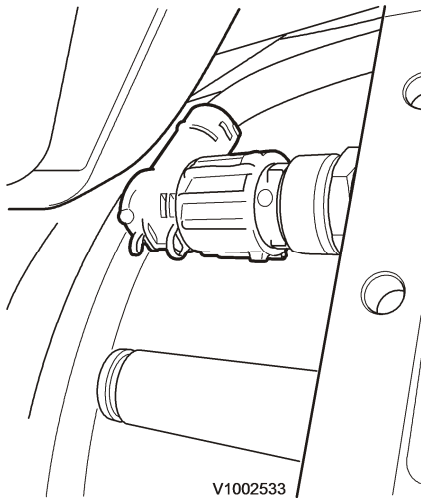


Figure 15
SE405

17. Fit the pressure connection hoses.

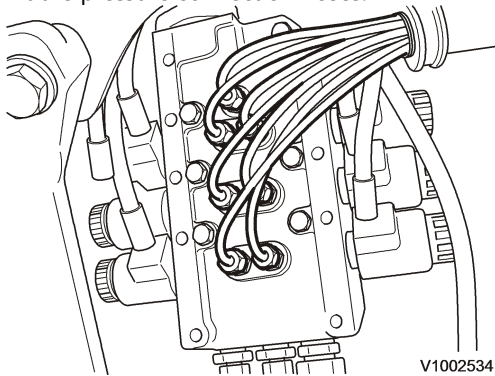


Figure 16

18. Fit the protective plates over the spools.
Tightening torque: **25 Nm (18.5 lbf ft)**
Fit the cable clamps.

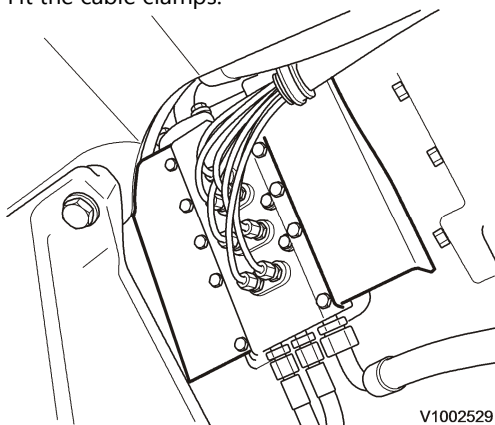


Figure 17

19. Fill the transmission with oil. Test overall function and check for leakage.

Document Title: Transmission oil cooler, changing	Function Group: 421	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Transmission oil cooler, changing

Op nbr 42106

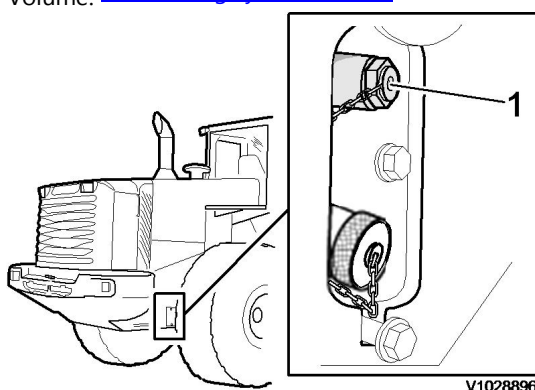
Removing

1. Place the machine in Service Position, see [191 Safety rules when servicing](#).
2. Turn off the electric power with the battery disconnecter.



WARNING
Risk of scalding and burns. The coolant may be hot.

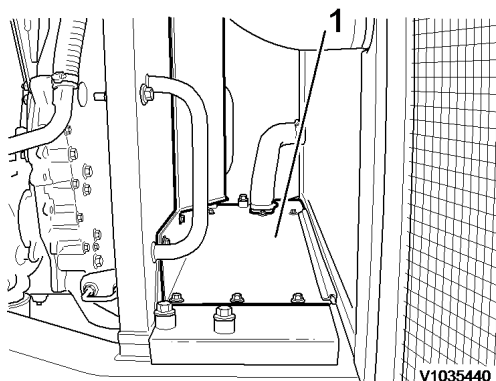
3. Drain the coolant. Use existing located in the right battery box or the tool box on the machine.
Volume: [260 Cooling system volume](#)



V1028896

Figure 1
Draining coolant

1. Draining coolant
4. Remove the bottom plate.



V1035440

Figure 2
Intermediate walls

1. Bottom plate
5. Remove the fuel filler pipe.
Remove the fan shroud.

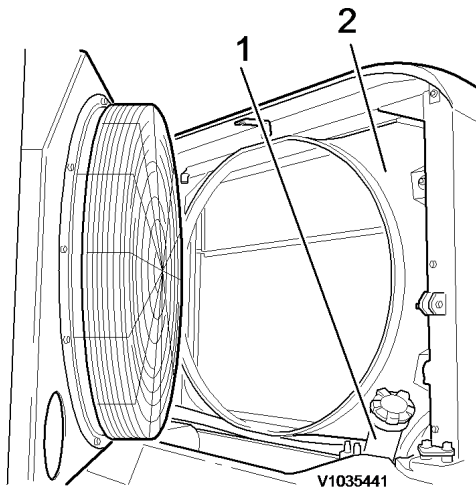


Figure 3
Fan shroud

1. Fuel filler pipe
2. Fan shroud

6. Remove the hydraulic connections from the oil cooler's backside. Plug and mark the hoses.

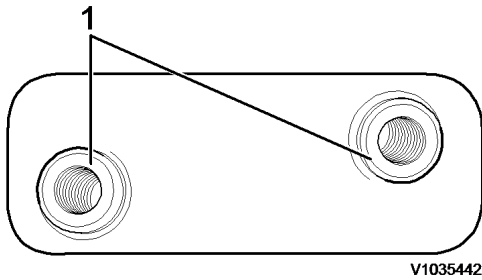


Figure 4
Transmission oil cooler

1. Hydraulic connections

7. Disconnect the coolant connections from the oil cooler.
8. Remove the hydraulic connections from front of the transmission oil cooler. Plug and mark the hoses.
Place containers that collect spilled oil.

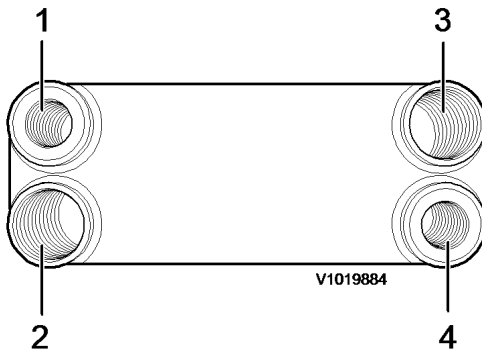


Figure 5
Transmission oil cooler

1. Oil in
2. Coolant out
3. Coolant in
4. Oil out

9. Remove the transmission oil cooler.

Weight: **30 kg (66 lb)**

10. Remove the oil cooler's bracket.

Installing

11. Install the oil cooler on the bracket.

12. Install the oil cooler with bracket on the rear frame.

Weight: **30 kg (66 lb)**

13. Install new seals on the hoses.

14. Connect the hoses to the transmission oil cooler.

15. Install the fan shroud and fuel filler pipe.

16. Install the bottom plate.

17. Fill coolant:

Volume: [260 Cooling system volume](#)

18. Test-run the machine and check that there are no leaks.

19. Check and adjust fluid levels.

Document Title: Seal for rear output shaft, replacing	Function Group: 421	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Seal for rear output shaft, replacing

Op nbr 421-054

[9993590 Gear wheel](#)

[9993870 Gear segment](#)

[9993799 Spanner](#)

[9993623 Drift ring](#)

Spacer SVO 3520

1. Place the machine in the service position, see [191 Safety rules when servicing](#).
2. Drain the transmission oil.
Capacity, see [421 Hydraulic transmission, capacity](#).
3. Detach the front propeller shaft and move it to one side.
4. Release the parking brake, see [550 Parking brake, mechanical release](#).
5. Detach the rear propeller shaft from the transmission and move it to one side.
6. Remove the transmission oil level sensor, SE413 and the hose.
7. Remove the lock ring and the nut from the drive flange. Mark the drive flange position against the axle.
8. Remove the drive flange nut with the aid of 9993799, 9993870 and 9993590.

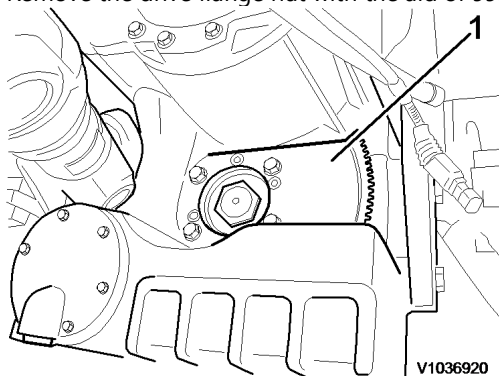


Figure 1

1. 9993870
9. Remove the drive flange.
10. Remove the old seal ring.

11. Install the new seal ring.

Pull in the seal ring with the aid of 9993623 to the end of the threads. Then loosen the nut and use SVO 3520 for pulling in the seal ring until it bottoms.

NOTE!

Do not tighten so hard that the seal ring becomes compressed.

12. Install the drive flange according to marking. Install the nut.

Tightening torque: **600 N m (443 lbf ft)**

NOTE!

The tools increase the torque by 15 times on the nut.

Install the lock ring.

NOTE!

Two lock rings with different hole spacing are supplied as spare parts. Before the tools are removed, check that the lock washer fits, otherwise continue the tightening until correct hole spacing is achieved.

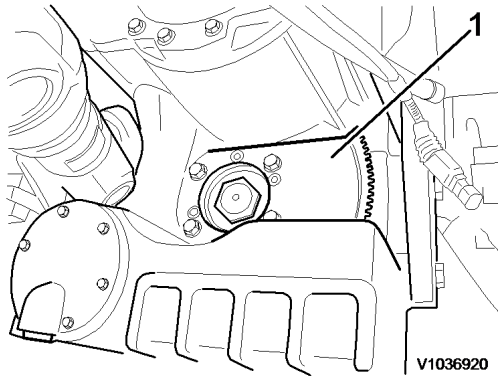


Figure 2

1. 9993870

13. Connect the rear propeller shaft to the transmission.

Tightening torque: **190 N m (140 lbf ft)**

14. Connect the front propeller shaft to the transmission.

Tightening torque: **190 N m (140 lbf ft)**

15. Remove the bolts which were used for releasing the parking brake.

16. Install the transmission oil level sensor, SE413 and the hose to the transmission.

17. Fill the transmission with oil.

Capacity, see [421 Hydraulic transmission, capacity](#).

Restore the machine.

Document Title: Transmission, removing (upwards)	Function Group: 421	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Transmission, removing (upwards)

Op nbr 421-068

Ratchet block 1500 kg (3310 lb)

Ratchet block 750 kg (1655 lb), 2 pcs

Sling 1 m, (3.3 ft), 3 pcs

Sling 2 m (6.6 ft)

Sling 3 m (10 ft)

Sling 4 m (13 ft), 4 pcs

Sling 5 m (16.4 ft)

Shackle, 2 pcs

Lifting eye M 12.2 pcs

Hose 19 mm (3/4") 3.5 m (11.5 ft)

The operation also includes the use of tools and times applicable to parts of the following work:

- [810 Cab, removing](#)
- [911 Hydraulic oil tank, removing](#)
- [913 Hydraulic pump P1, removal](#)
- [913 Hydraulic pumps P2 and P3, replacing](#)

1. Secure the frame joint with the frame joint lock. Place chocks in front of and behind the wheels. Release the pressure in the hydraulic system.

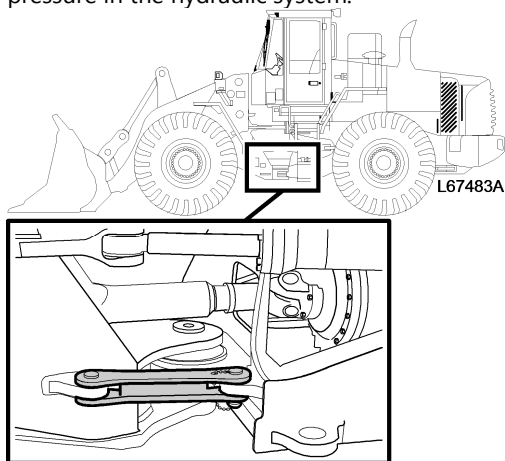


Figure 1

2. Turn off the current with the battery disconnect switch.

3. Remove the side plates under and behind the cab.

Drain the oil from the hydraulic tank using both draining points.

The draining connections are the same as on the hose for draining engine oil supplied with the machine. Extend the existing hose or replace it with a hose approximately 3.5 m (11.5 ft) in length in order to reach the collecting vessel. Hose size 19 mm (3/4") inside diameter.

Capacity, hydraulic tank, see [911 Hydraulic system, volume](#)

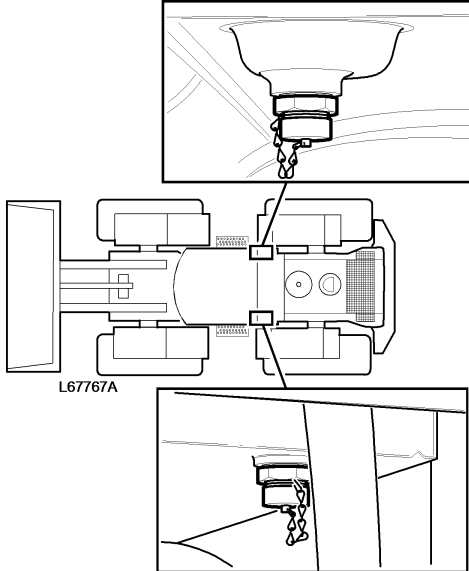


Figure 2
Draining connections

4. Drain the oil from the transmission.

Capacity, transmission, see [421 Hydraulic transmission, capacity](#).

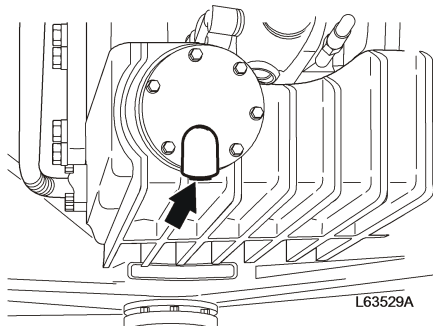


Figure 3
Draining, transmission

5. Remove the cab, see [810 Cab, removing](#).

6. Detach the front propeller shaft from the transmission. Remove the rear propeller shaft.

Weight: **approx. 40 kg (88 lb)**

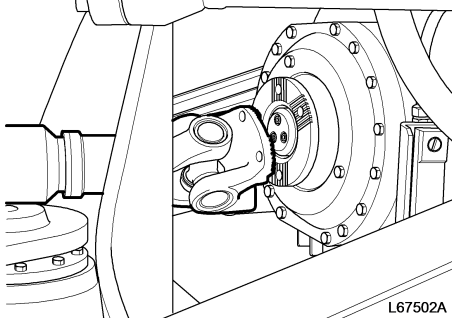


Figure 4

7. Disconnect the hoses for the checking points for P1 and P2 from the checking panel (later machines).
Detach the checking panel from the frame.

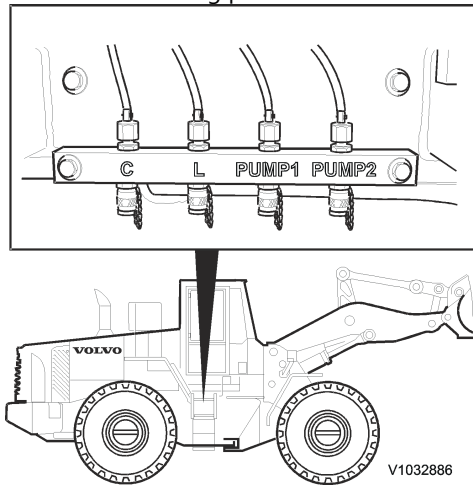


Figure 5

8. Earlier machines: In order to be able to remove the lower attaching bolts between the transmission and the flywheel housing, detach the rear guard from the gear selector valve and disconnect the cable harness from SE405. Remove the lower attaching bolts for the transmission. Install the guard on the gear selector valve.

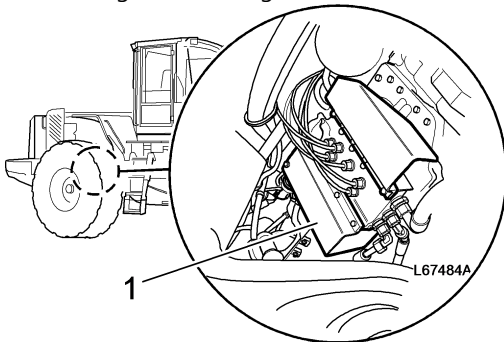


Figure 6

1. Guard

9. Disconnect the breather hose from the top of the transmission.
Loosen the bracket for the connectors on the right side of the transmission.
Remove the attaching bolts between the transmission and the flywheel housing. Remove the remaining attaching bolts but leave the two upper bolts, which are removed later, when the transmission has been secured with a lifting device.
10. Remove the hydraulic tank, see [911 Hydraulic oil tank, removing](#).
11. Remove the hydraulic pumps, see [913 Hydraulic pump P1, removal](#) and [913 Hydraulic pumps P2 and P3, replacing](#).
Weight, P1: **approx. 80 kg (176 lb)**
Weight, P2+P3: **approx. 100 kg (220 lb)**
12. Disconnect the hoses for the transmission oil cooler from the transmission. Plug the connections.
13. Secure the engine by connecting a lifting device.

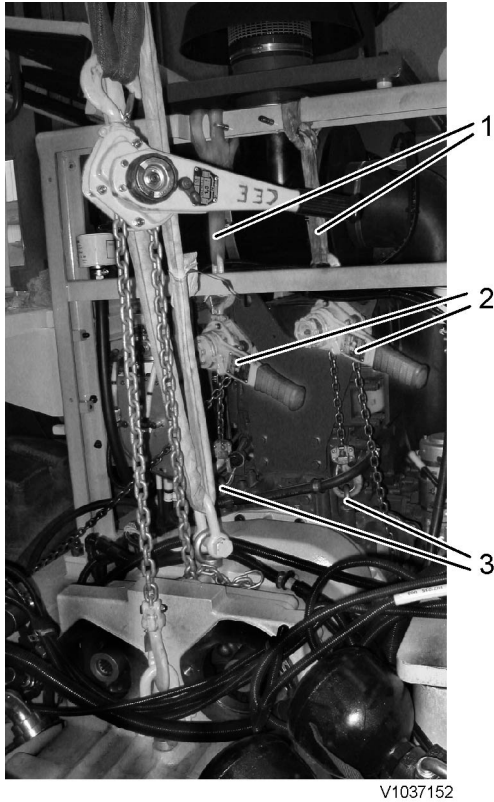


Figure 7

1. Sling 1 m (3.3 ft), 2 pcs
2. Ratchet block, 750 kg (1655 lb), 2 pcs
3. Lifting eyes, M12, 2 pcs, shackle, 2 pcs

14. Connect a lifting device to the transmission.

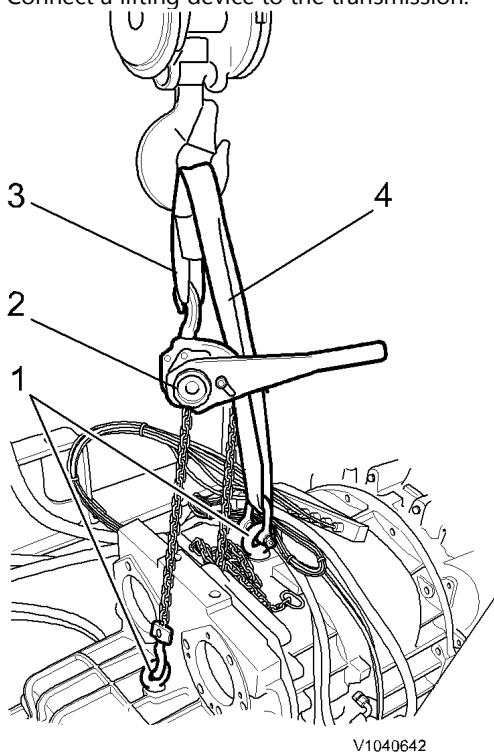


Figure 8

1. Shackle, 1 pc, Lifting eye M12, 2 pcs
 2. Ratchet block, 1500 kg (3310 lb)
 3. Sling 1 m (3.3 ft)
 4. Sling, 2 m (6.6 ft)
15. Loosen the accumulator block for the brake system from the frame. Disconnect the hose for the parking brake.
 16. Detach the oil pipe and oil filler pipe from the transmission. On certain machines, disconnect the hose for the sight glass from the transmission.
 17. Remove the transmission mountings.
 18. Remove the remaining attaching bolts between engine and transmission.
 19. Prize out the transmission until it is clear of the engine
Angle the transmission until it clears any obstructions, see figure.

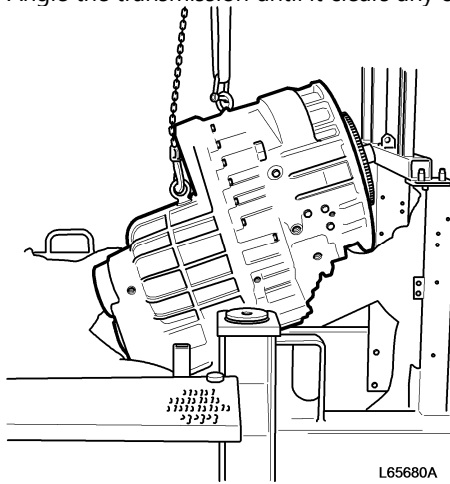


Figure 9

20. Lift away the transmission.
Transmission weight: **approx. 1000 kg (2200 lb)**

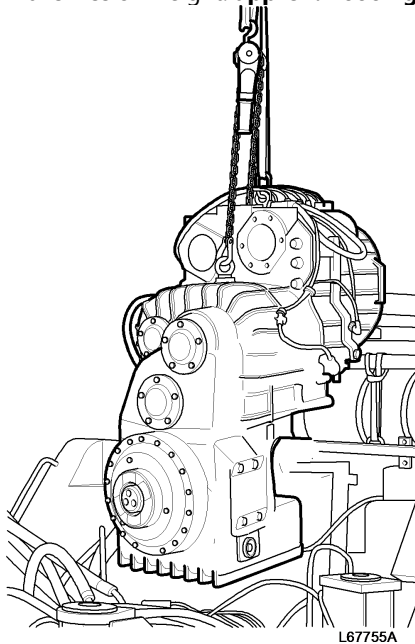


Figure 10

21. When replacing transmission, transfer required parts to the new transmission.

NOTE!

Never transfer a part that possibly may cause malfunctions.



Construction Equipment

Service Information

Document Title: Transmission, installing (from above)	Function Group: 421	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Transmission, installing (from above)

Op nbr 421-069

Ratchet block 1500 kg (3310 lb)

Ratchet block 750 kg (1655 lb), 2 pcs

Sling 1 m (3.3 ft), 3 pcs

Sling 2 m (6.6 ft), 2 pcs

Sling 3 m (10 ft)

Sling 4 m (13 ft), 4 pcs

Sling 5 m (16.4 ft)

Shackle, 2 pcs

Lifting eye M 12.2 pcs

The operation also includes the use of tools and times applicable to parts of the following work:

- [913 Hydraulic pump P1, removal](#)
- [913 Hydraulic pumps P2 and P3, replacing](#)
- [911 Hydraulic oil tank, installing](#)
- [810 Cab, installing](#)

1. Install a new O-ring on the connection flange on the transmission. Lubricate the O-ring.
2. Connect a lifting device.

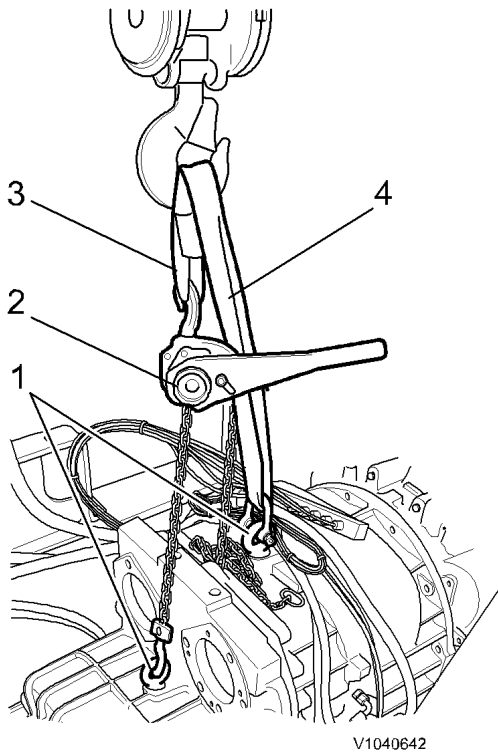


Figure 1

1. Shackle, 1 pc, Lifting eye M12, 2 pcs
 2. Ratchet block 1500 kg (3310 lb)
 3. Sling, 1 m (3.3 ft)
 4. Sling, 2 m (6.6 ft)
3. Lift the transmission into position.
Transmission weight: **approx. 1000 kg (2200 lb)**

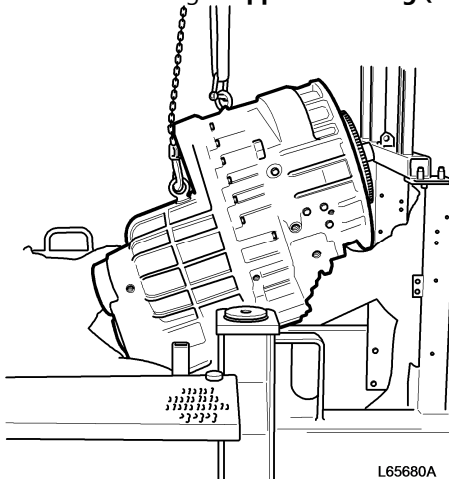


Figure 2

4. Align the transmission with the flywheel housing and install the upper attaching bolts.
Install the transmission mountings.
5. Remove the lifting device for the transmission.
6. To facilitate the installation of attaching bolts, loosen the bracket for the connectors on the right side of the transmission.
On earlier machines even the rear guard for the gear selector valve may have to be loosened to facilitate the

installation of the attaching bolts.

Install the attaching bolts, transmission – flywheel housing.

Tightening torque, see [421 Hydraulic transmission, tightening torques](#).

7. Tighten down the bolts for the transmission mountings.
Tightening torque, see [421 Hydraulic transmission, tightening torques](#).
8. Remove the lifting device retaining the engine.
9. Connect the hoses from the transmission oil cooler.
10. Install the rear propeller shaft. Install the front propeller shaft.
Tightening torque, see [451 Propeller shaft, tightening torque](#).

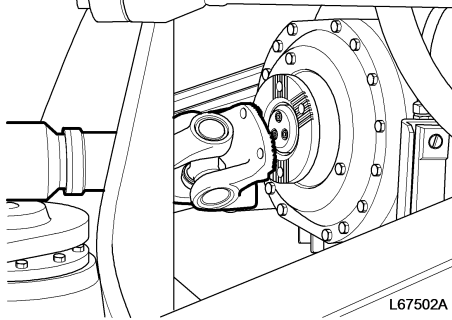


Figure 3

11. Install the breather hose and clamp it to the transmission. Install the oil pipe and the oil filler pipe. On certain machines, connect the hose for the sight glass to the transmission.
12. Install the accumulator block for the brake system. Install the hose for the parking brake.
13. Install the drive shafts for the hydraulic pumps. Install the hydraulic pumps, see [913 Hydraulic pump P1, removal](#) and [913 Hydraulic pumps P2 and P3, replacing](#).
Weight, P1: **approx. 80 kg (176 lb)**
Weight, P2+P3: **approx. 100 kg (220 lb)**
Tightening torque, attaching bolts: **275 ±45 N m (204 ±33 lbf ft)**
14. Install the checking panel. Later machines, connect the hoses to the checking points for P1 and P2.

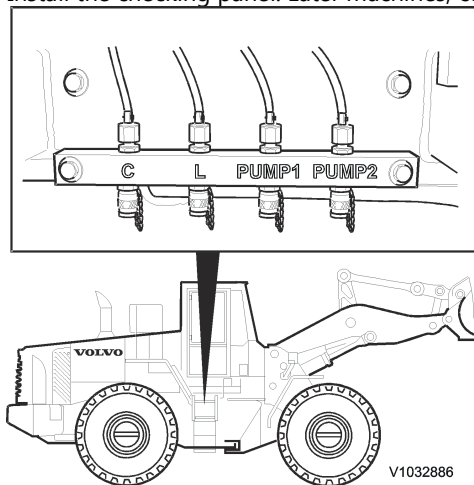


Figure 4

15. Install the hydraulic oil tank, see [911 Hydraulic oil tank, installing](#)

16. Connect the cable harness from SE405 to the gear selector valve. If the rear guard was removed to facilitate access, install the guard.
Connect the breather hose to the top of the transmission.
17. Install the cab, see [810 Cab, installing](#)
18. Install the side plates under and behind the cab.
19. Fill the hydraulic tank with hydraulic oil and the transmission with transmission oil.
Capacity, hydraulic tank, see [911 Hydraulic system, volume](#)
Capacity, transmission, see [421 Hydraulic transmission, capacity](#)
Warm up the machine and check the oil levels which should stand at about 3/4 of the height of the sight glasses.
The oil level in the transmission is checked with the engine running.
20. Bleed the hydraulic system, see [900 Hydraulic system, bleeding](#).

VOLVO

Construction Equipment

Service Information

Document Title: Propeller shaft, changing support bearing	Function Group: 451	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Propeller shaft, changing support bearing

Op nbr 45102

[999 3582 Spanner](#)

[999 3586 Tooth segment](#)

[999 3590 Gear wheel](#)

Kukko 20-20 Puller

Removing

1. Secure the frame joint with the frame joint lock. Place chocks in front of and behind the wheels.

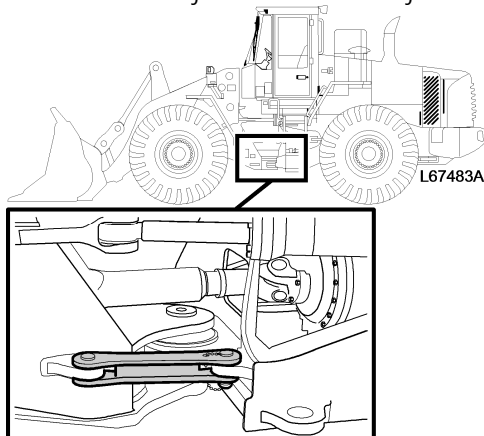


Figure 1

2. Disconnect the current with the battery disconnect switch.

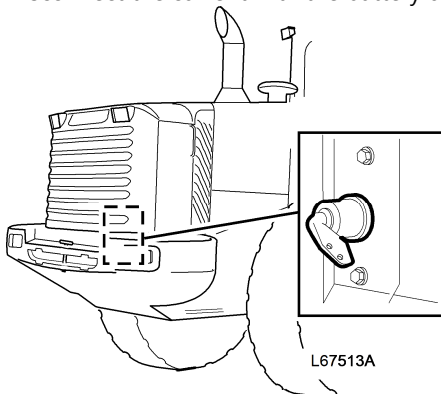


Figure 2

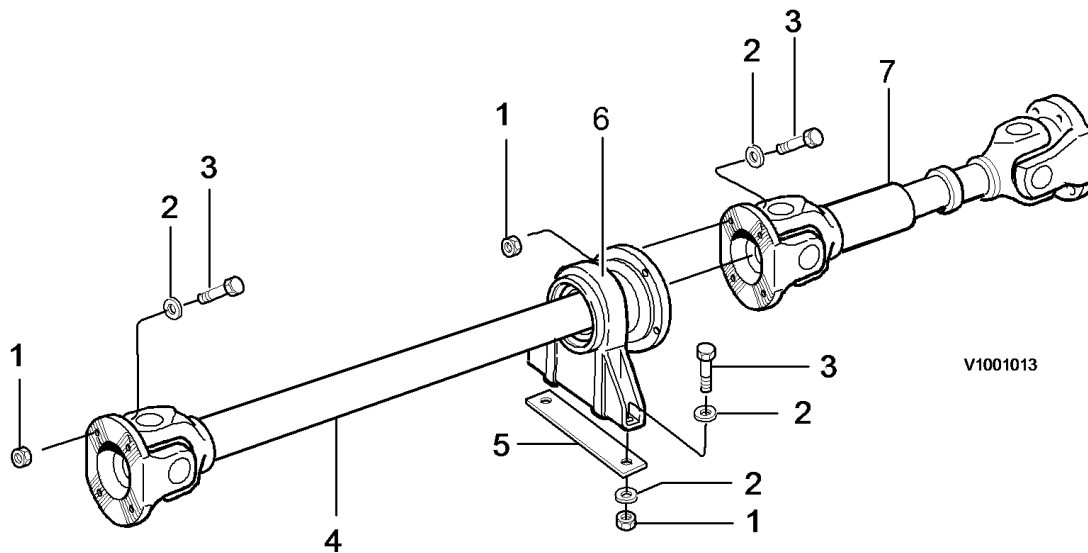


Figure 3
Propeller shaft

- | | |
|-----------------|------------------------|
| 1. Nut | 5. Spacer washer |
| 2. Washer | 6. Support bearing |
| 3. Bolt | 7. Intermediate cardan |
| 4. Front cardan | |

3. Remove the bolts from the driver at the support bearing.

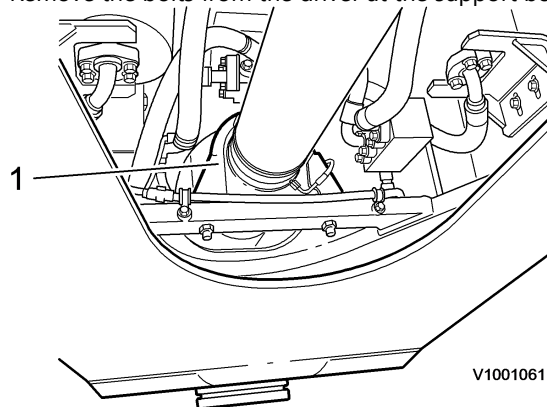


Figure 4

1. Support bearing
4. Secure the front propeller shaft with a small ratchet block.
5. Remove the bolts from the driver at the front axle.
6. Detach the lubrication hoses at the block in the frame.
7. Remove the support bearing bolts.
8. Lower the propeller shaft with support bearing. Axle weight: **38 kg (84 lbs)**.

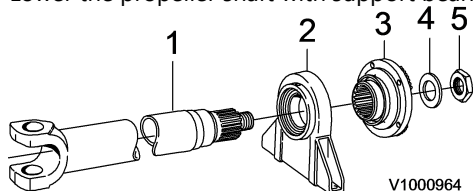


Figure 5

- | | |
|--------------------|-----------|
| 1. Front cardan | 4. Washer |
| 2. Support bearing | 5. Nut |
| 3. Driver | |

9. Remove the driver nut and washer at the support bearing. Use a torque amplifier.

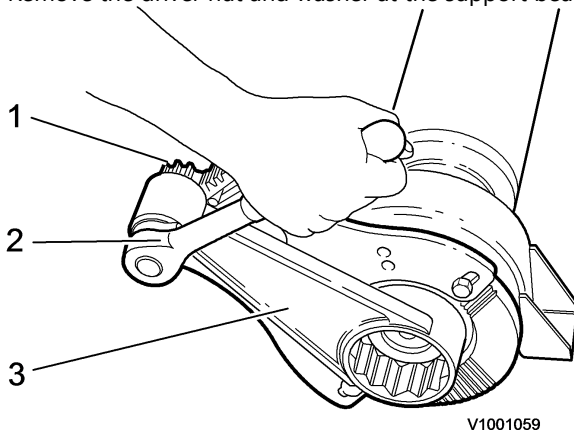


Figure 6
Driver nut, removing

- | | |
|----|----------|
| 1. | 999 3590 |
| 2. | 999 3582 |
| 3. | 999 3586 |

10. First remove the driver followed by the support bearing.

Installing

11. Fit the support bearing on the axle.
12. Fit the driver and washer. Apply thread lock (medium strength), fit and tighten the washer. Tightening torque: **1200 Nm (885 lbf ft)**.
13. Lift the propeller shaft in place. Begin by securing the support bearing to the frame.
14. Fit the bolted joints for the drivers. Tightening torque: **190 Nm (140 lbf ft)**.
15. Place the spacer washer under the support bearing and fit the bolts. Check that the propeller shaft is correctly aligned and tighten the support bearing bolts. Tightening torque: **150 Nm (110.6 lbf ft)**.
16. Fit lubrication hoses to the block on the frame.
17. Reset the machine.

Document Title: Description AWB40B	Function Group: 460	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Description AWB40B

The AWB40B axles have floating drive shafts and planetary gear hub reductions with built-in oil-cooled disc brakes.

The brakes are hydraulically-controlled and are joined to the hub reductions so that the brakes, through the use of planetary gears, utilise the reduction ratio of the planetary gears.

Mounted on either side of the brake discs are impellers that push the shaft oil alongside the brake discs to provide oil circulation in the shaft and brake cooling.

The shafts have a common oil space for the hub reductions and differential carrier assembly.

Some of the shafts may also be fitted with a separate circulation oil pump on the pinion shaft in combination with an external oil cooler.

In the front axle configuration, the axles are equipped with a hydraulically-controlled differential lock with dog clutch. See [468 Differential lock](#).

Certain axle configurations can be equipped with an automatic "Limited Slip" differential brake. See [461 Differential brake, description](#).

For information regarding axle product numbers, see [460 Drive shafts, specifications](#).

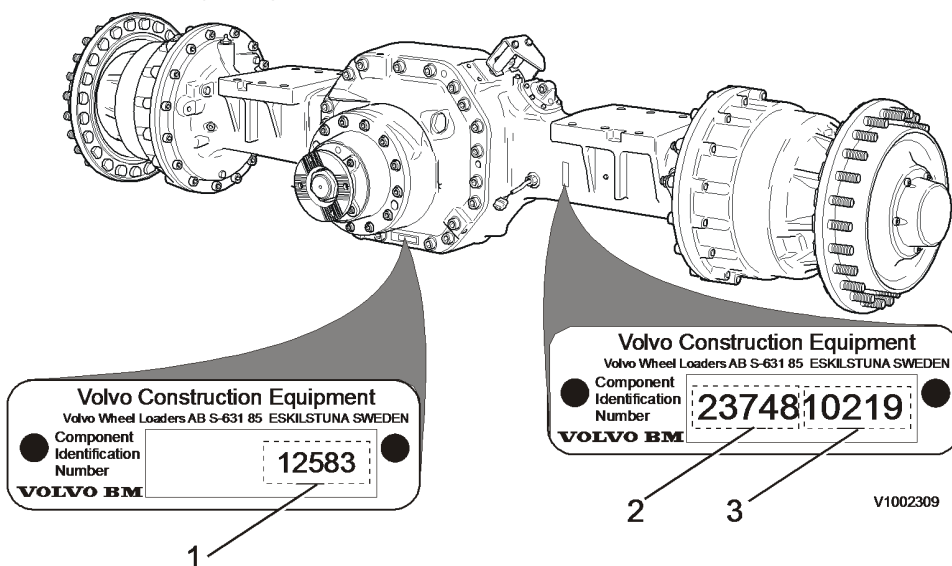


Figure 1
Identification plates, drive shafts AWB40B

1. Serial number, differential carrier assembly
2. Product number, drive shaft
3. Serial number, drive shaft

Document Title: Description AWB40B	Function Group: 460	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Description AWB40B

The AWB40B axles have floating drive shafts and planetary gear hub reductions with built-in oil-cooled disc brakes.

The brakes are hydraulically-controlled and are joined to the hub reductions so that the brakes, through the use of planetary gears, utilise the reduction ratio of the planetary gears.

Mounted on either side of the brake discs are impellers that push the shaft oil alongside the brake discs to provide oil circulation in the shaft and brake cooling.

The shafts have a common oil space for the hub reductions and differential carrier assembly.

Some of the shafts may also be fitted with a separate circulation oil pump on the pinion shaft in combination with an external oil cooler.

In the front axle configuration, the axles are equipped with a hydraulically-controlled differential lock with dog clutch. See [468 Differential lock](#).

Certain axle configurations can be equipped with an automatic "Limited Slip" differential brake. See [461 Differential brake, description](#).

For information regarding axle product numbers, see [460 Drive shafts, specifications](#).

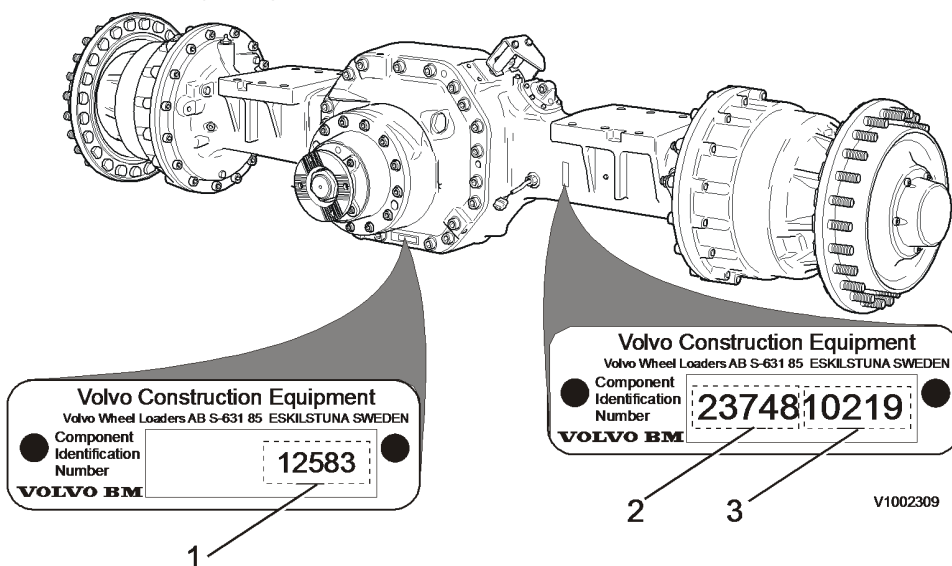


Figure 1
Identification plates, drive shafts AWB40B

1. Serial number, differential carrier assembly
2. Product number, drive shaft
3. Serial number, drive shaft

Document Title: Description AWB40B	Function Group: 460	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Description AWB40B

The AWB40B axles have floating drive shafts and planetary gear hub reductions with built-in oil-cooled disc brakes.

The brakes are hydraulically-controlled and are joined to the hub reductions so that the brakes, through the use of planetary gears, utilise the reduction ratio of the planetary gears.

Mounted on either side of the brake discs are impellers that push the shaft oil alongside the brake discs to provide oil circulation in the shaft and brake cooling.

The shafts have a common oil space for the hub reductions and differential carrier assembly.

Some of the shafts may also be fitted with a separate circulation oil pump on the pinion shaft in combination with an external oil cooler.

In the front axle configuration, the axles are equipped with a hydraulically-controlled differential lock with dog clutch. See [468 Differential lock](#).

Certain axle configurations can be equipped with an automatic "Limited Slip" differential brake. See [461 Differential brake, description](#).

For information regarding axle product numbers, see [460 Drive shafts, specifications](#).

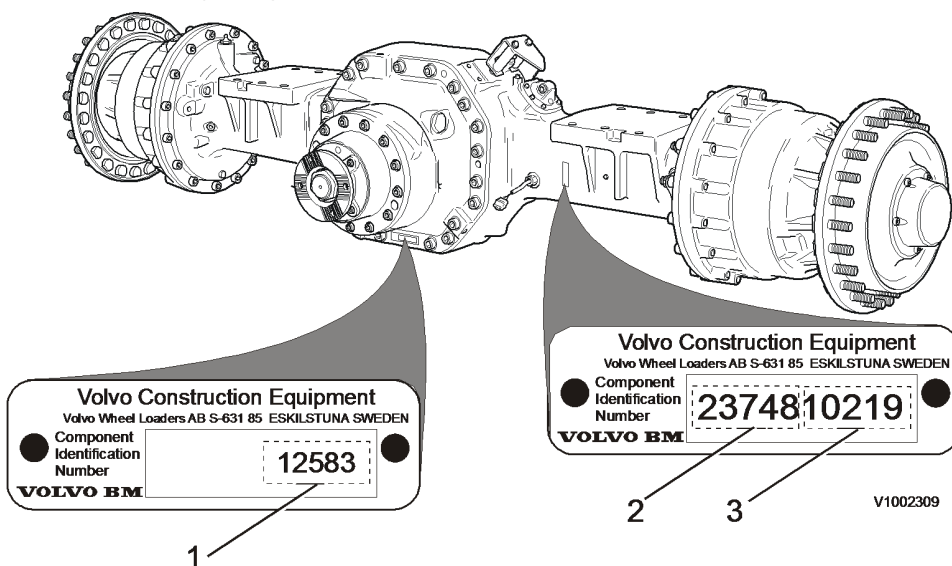


Figure 1
Identification plates, drive shafts AWB40B

1. Serial number, differential carrier assembly
2. Product number, drive shaft
3. Serial number, drive shaft

VOLVO

Construction Equipment

Service Information

Document Title: Differential AWB40B	Function Group: carrier 460	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Differential carrier AWB40B

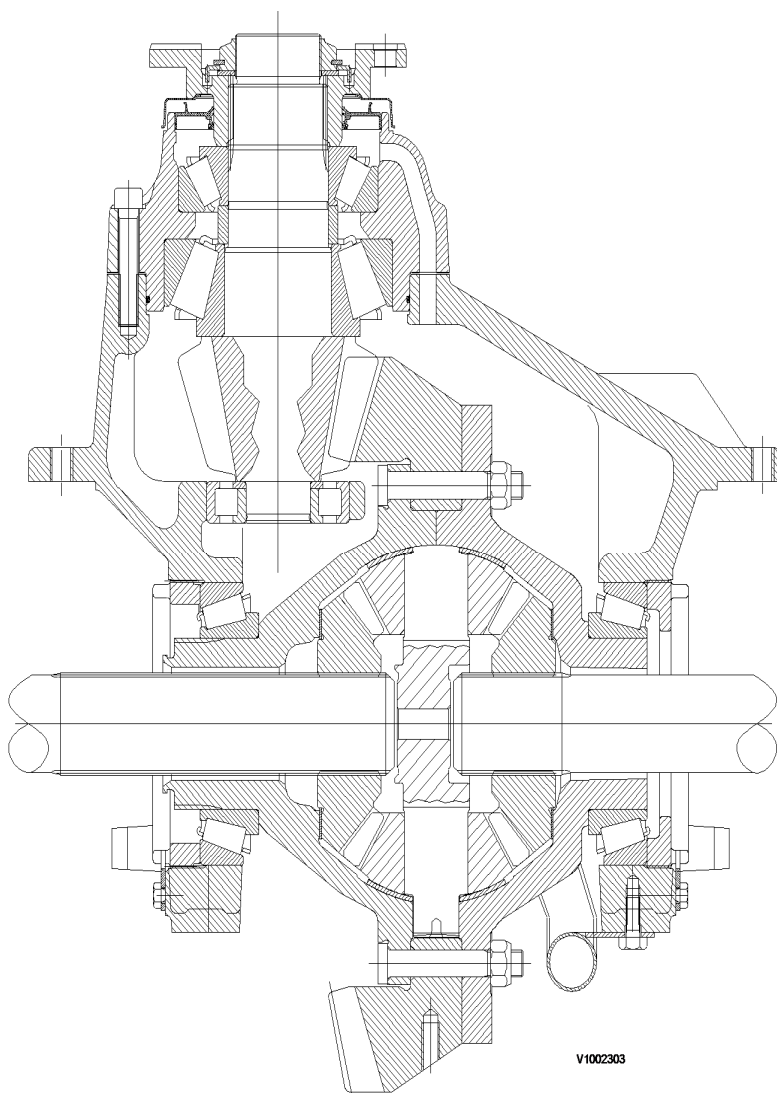


Figure 1
Differential carrier AWB40B

Document Title: Hub reduction AWB40B	Function Group: 460	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hub reduction AWB40B

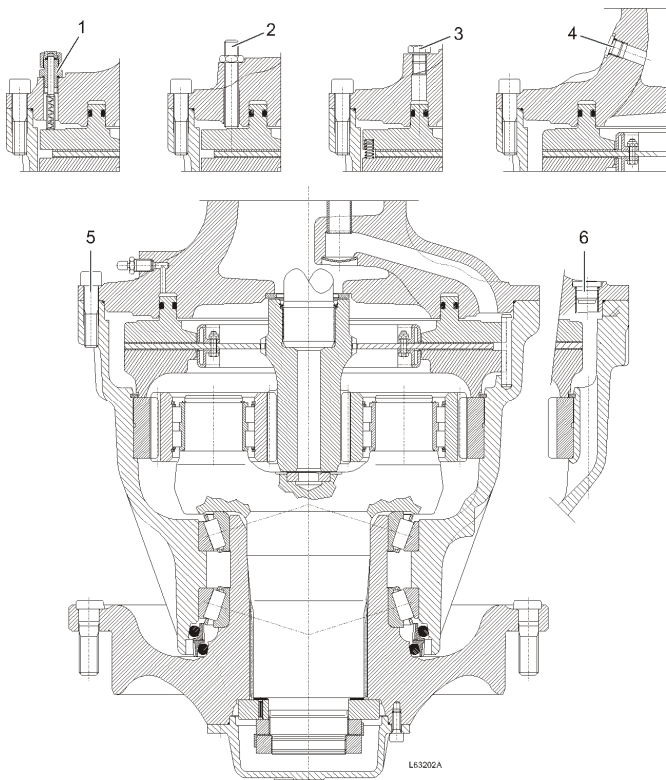


Figure 1
Hub reduction AWB40B

1. Wear indicator
2. Adjusting screw
3. Hydraulic oil connection
4. Return, cooling oil
5. Bleeder nipple
6. Drain plug

Document Title: Differential description	Function Group: brake, 461	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Differential brake, description

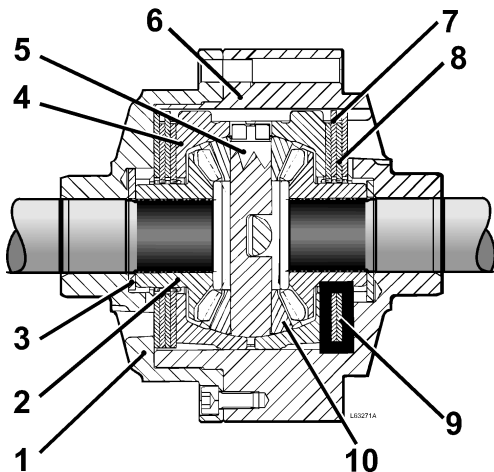


Figure 1
Automatic differential brake, principle diagram

1 Cover	6 Differential housing
2 Differential side gear	7 Friction plate (steel)
3 Thrust washer	8 Friction disc
4 Pressure plate	9 Clutch pack
5 Spider	10 Differential pinion

Limited slip automatic differential brake

The difference between a conventional axle with differential and an axle with automatic differential brakes lies in the distribution of the available torque.

A conventional differential can only transfer as much torque as the slipping wheel succeeds in transferring to the wheel with the best grip.

An automatic differential brake can transfer up to **4** times as much torque.

A. Normal operation - no slipping

When driving forward or reverse in a straight line, the automatic differential brake, or limited slip differential, works in the same way as a conventional differential. 50% of the torque is transferred to each wheel.

B. Braking effect function in the differential

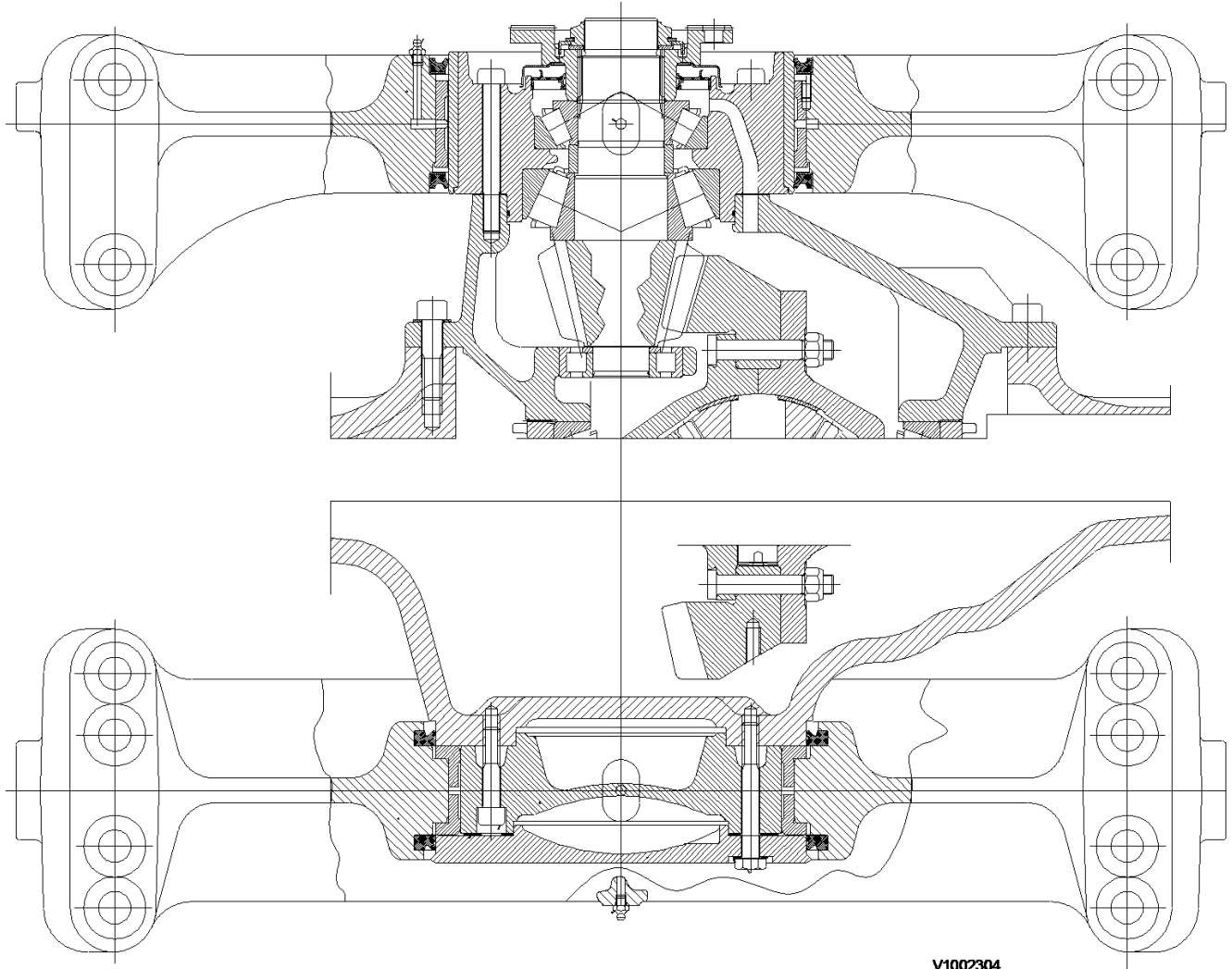
When one wheel begins to rotate faster than the other, the clutch pack slips to the fastest rotating wheel. The difference in torque causes the spider (**5**) to rotate. The pressure plates (**4**) are then pressed apart and the clutch packs are engaged.

Up to 80% of the torque is then transferred to the other wheel. Only 20% of the input torque is then available to the slipping wheel.

The available torque for the wheel with the best grip becomes $80/20 = 4$ times greater.

Document Title: Rear axle mounting	Function Group: 463	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Rear axle mounting



V1002304

Figure 1
Rear axle mounting

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Adjusting axial play, rear axle mounting](#)

Product Line: WLO

Model Variant: L180E (Volvo)

- [Measuring axial and radial play, rear axle mounting](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Document Title: Adjusting axial play, rear axle mounting	Function Group: 463	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Adjusting axial play, rear axle mounting

Op nbr 46002

=

1. Remove the cover and shims.
Select shims so that the play will be 0.3 - 0.5 mm (0.012 - 0.020 in), see

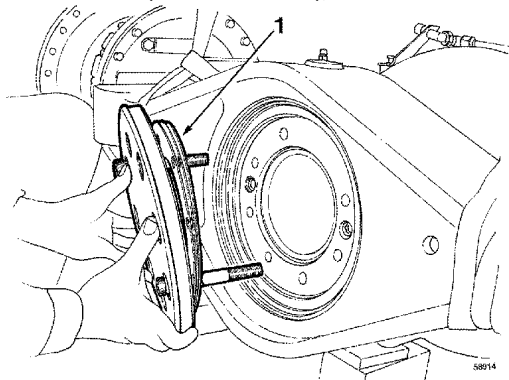


Figure 1
Removing/Fitting the cover

1. Shims
2. Fit the cover and shims.
Tighten the flange retaining bolts to **220 Nm (162 lbf ft)**.

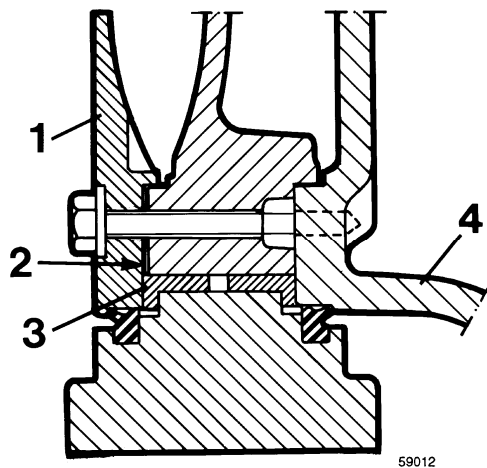


Figure 2
Rear axle bridge

1. Cover
2. Shims
3. Bushing
4. Rear axle casing

3. Recheck the axial play.

Document Title: Measuring axial and radial play, rear axle mounting	Function Group: 463	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Measuring axial and radial play, rear axle mounting

Op nbr 46001

Pillar jacks (2)

Dial gauge with magnetic base

Axial play

1. Raise the machine to relieve the axle of load.
Press the axle using two pillar jacks against the rear axle attachment.

NOTE!

Alternatively, use ratchet blocks between the axle and frame to pull the axle forward or backward.

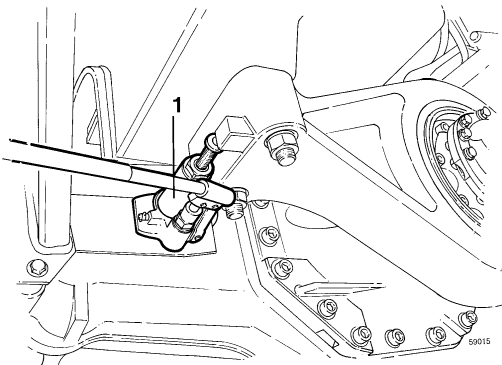


Figure 1
Pressing the axle

1. Pillar jack
2. Place a dial gauge between the flange on the rear bearing and the axle attachment.
Zero the dial gauge.

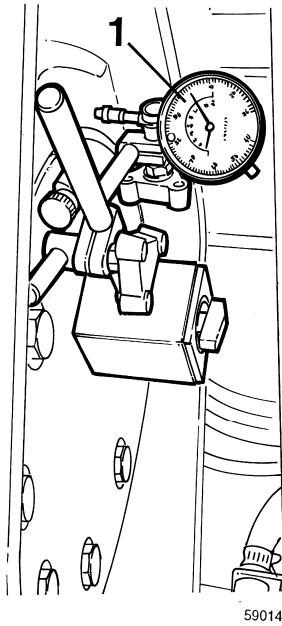


Figure 2
Measuring play

1. Dial gauge with magnetic base
3. Press the axle against the front axle attachment and note the axial play indicated on the dial gauge.
Permissible play: 0.3 - 0.5 mm (0.012 - 0.020 in).

Radial play

4. Place a dial gauge between the flange on the rear bearing and underside of the axle attachment.
5. Raise the rear frame of the machine and note the radial play indicated on the dial gauge.
Max. play 1.5 mm (0.059 in). If the play exceeds this, change the bushing.

Document Title: Replacing the bushing in the axle mounting	Function Group: 463	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Replacing the bushing in the axle mounting

Op nbr 46003

=

The method applies when changing the steel bushing. Plastic bushings are also available.

NOTE!

Fitting the bushings is facilitated if they are chilled to -25 °C (-13 °F) prior to fitting.

1. Remove the rear axle.
2. Place the axle on a firm surface so that it cannot tip over.
Lift the front axle attachment away from the axle, using a hoist.
Attachment weight approx. **110 kg (240 lbs)**.
3. Attach a hoist to the rear axle attachment.
Remove the cover and shims from the bearing.
Lift the rear axle attachment away.
Attachment weight approx. **125 kg (275 lbs)**.

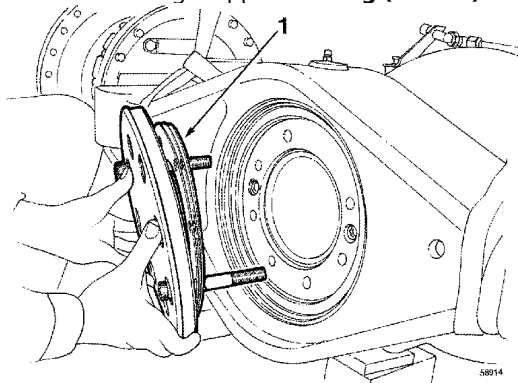


Figure 1
Removing/Fitting the cover

1. Shims

Front axle attachment

4. Break off the sealing rings.
5. Remove the bushings by first undoing the three locking screws (secured with thread-locking compound) and then driving out the bushings with a hammer and drift.

NOTE!

If a bushing is firmly seated, heat the bushing then cool it rapidly with a rag soaked in water.

6. Clean the bushing seat and drive home the chilled bushings with a hammer and wooden block.

Position the bushing with the close-spaced oil grooves according to , i.e. upwards in the bearing seat.

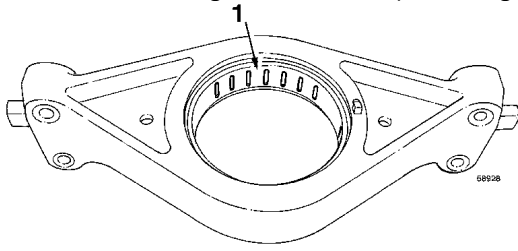


Figure 2
Bushing position

1. Oil groove

7. Secure the bushing by drilling three holes (7 mm) 5 degrees away from the previous holes. Protect all oil holes with tape. Cut an M8 thread in the holes and fit new locking screws (use strong locking fluid). Brush or blow away all swarf, etc. and remove the protective tape.

NOTE!

A recess must be milled in the axle attachment with a rotating file or similar so that holes can be drilled in the mating face between the bushing and axle attachment.

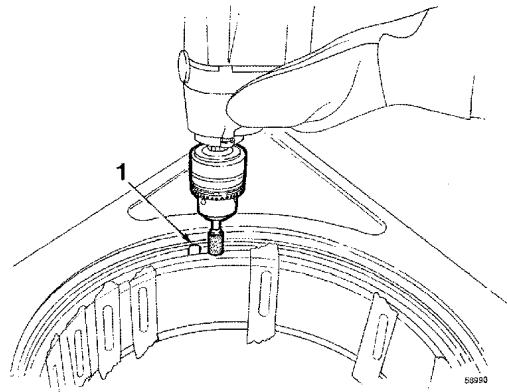


Figure 3
Milling out the axle attachment

1. Previously drilled hole

8. Drive home new sealing rings. The sealing lip should face outwards away from the bearing.
9. If the bearing sleeve is damaged it must be changed. Hammer the sleeve along a straight line on each side of the centre opposite each other until the bearing sleeves comes loose. Use the back of a blacksmith's hammer.

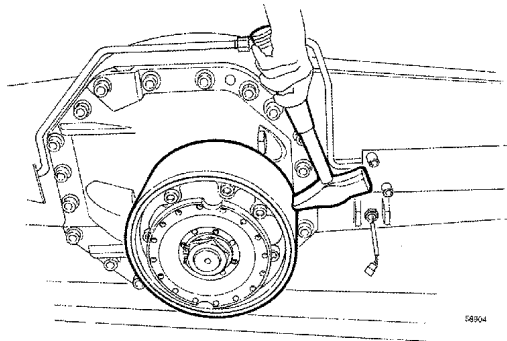


Figure 4
Removing the bearing sleeve

10. Heat the new sleeve in an oven to about 240 °C (460 °F).
Drive the bearing sleeve into place.

NOTE!

The recess inside of the sleeve should face the final drive.

Rear axle attachment

11. Remove the seals and drive out the bushings using a hammer and drift.
12. Clean the bushing seat and drive home the chilled bushings with a hammer and wooden block.
13. Fit the sealing rings in place.
The sealing lip should face outwards away from the bearing.
14. If the bearing trunnion is damaged it must be changed.
Tightening torque **220 Nm (162 lbf ft)**.

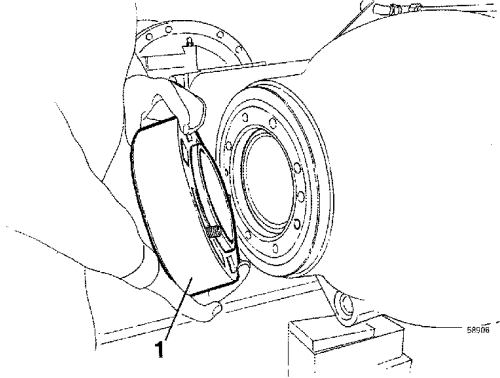


Figure 5

1. Bearing trunnion

15. Measure the width of the axle casing's bearing trunnion.

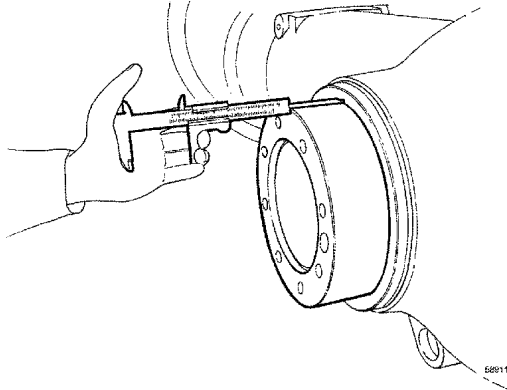


Figure 6
Measuring the width, bearing trunnion

16. Measure the width of the rear attachment's thrust bearing surfaces.
Add shims to the width of the bearing trunnion measured in point 15 so that its width will be 0.3 - 0.5 mm (0.012 - 0.020 in) greater than that of the attachment's thrust bearing surfaces.
The play should be as close as possible to 0.3 mm (0.012 in).

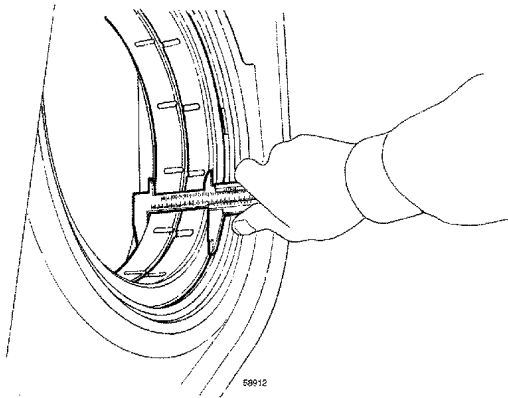


Figure 7
Measuring the width, thrust bearing surface of attachment

17. Grease the bearing surfaces, sealing rings and the cover's sealing surface.
Lift the rear attachment into position on the axle.
18. Fit the cover and shims.
Using two M14 x 120 mm bolts, tighten so that the sealing rings slide up on their sealing surfaces.
Fit the cover's bolts (remove the 120 mm bolts) and tighten to **220 Nm (162 lbf ft)** .

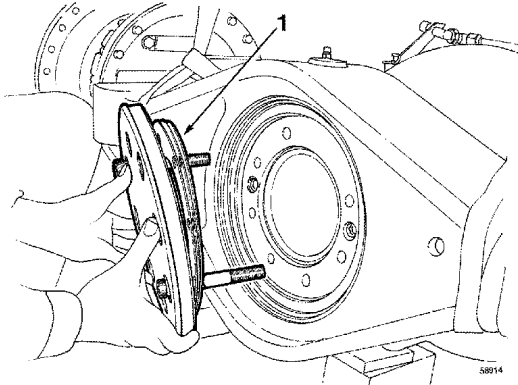


Figure 8
Installing the cover

1. Shims
19. Grease the front axle attachment's bearing surfaces and sealing rings.
Lift the axle attachment into place on the axle.
 20. Fit the rear axle.

VOLVO

Construction Equipment

Service Information

Document Title: Differential lock	Function Group: 468	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Differential lock

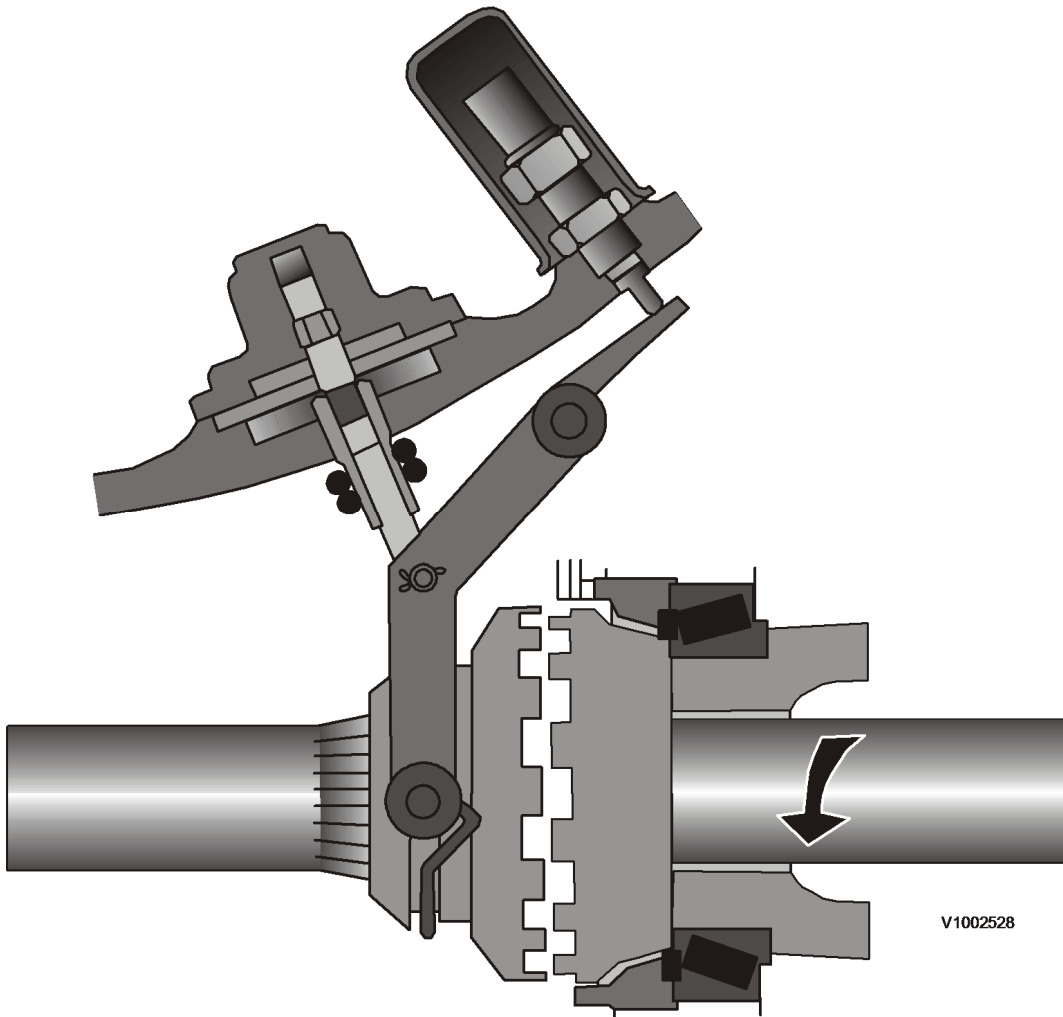


Figure 1
Differential lock

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Sensor for differential lock, adjusting](#)

Product Line: WLO

Model Variant: L180E (Volvo)

- [Differential lock, adjusting](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Document Title: Sensor for differential lock, adjusting	Function Group: 468	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Sensor for differential lock, adjusting

Op nbr 38631

[11666140 Multimeter](#)

[11668007 Jack 15 metric tons, 2 pcs.](#)

1. Lock the steering joint.
2. Place 2 jacks 11668007 under the lifting points on the front frame and raise the wheels.

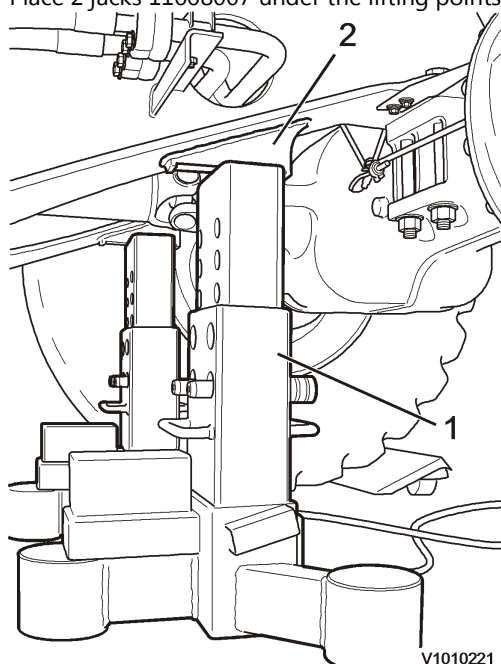


Figure 1

1. 11668007
 2. Support point
3. Activate the differential lock and make sure that it's engaged (dog-clutches in mesh).
 4. Screw in the sensor until it comes to its disengagement position, use 11666140 or similar to check this. When the multimeter beeps, the sensor has come to its disengagement position.

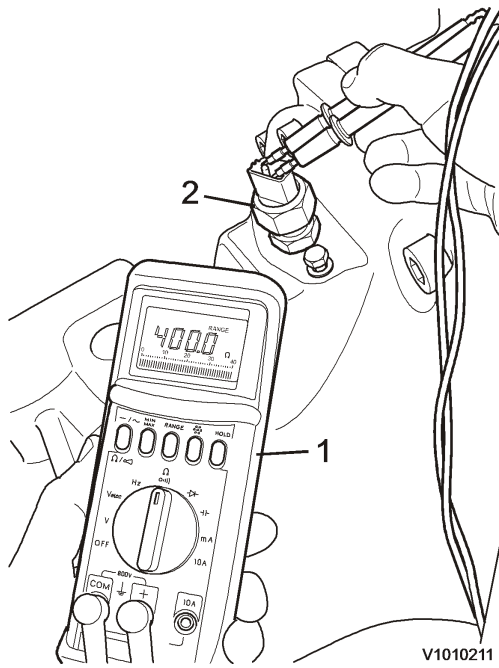


Figure 2

1. 11666140
2. SE408

5. Screw the sensor **counter-clockwise 3/4 of a turn** to obtain correct adjustment.

Document Title: Differential lock, adjusting	Function Group: 468	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Differential lock, adjusting

Op nbr 46805

[999 3831 Support](#)

[999 3806 Adjusting plate](#)

[11 666 140 Multimeter](#)

1. Place axle stands under the front axle so that both front wheels can rotate freely over the ground.
2. Place support 999 3831 under the lifting frame.

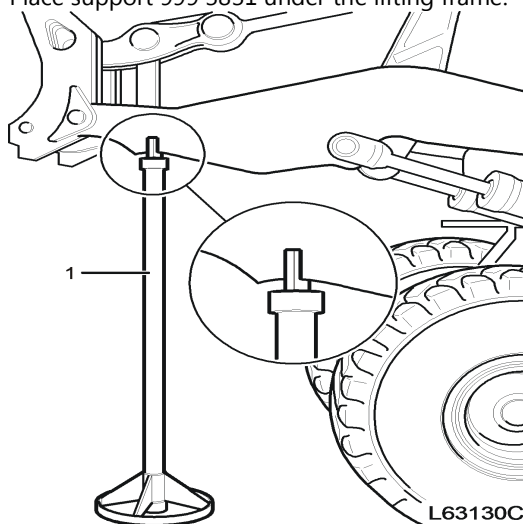


Figure 1
Securing the lifting frame

1. 999 3831
3. Remove the guard over the differential contact.
4. Remove the differential cover diaphragm sleeve.
5. Remove the lock screw in the diaphragm sleeve.
6. Fit an M10 bolt with a locking nut in the diaphragm sleeve.

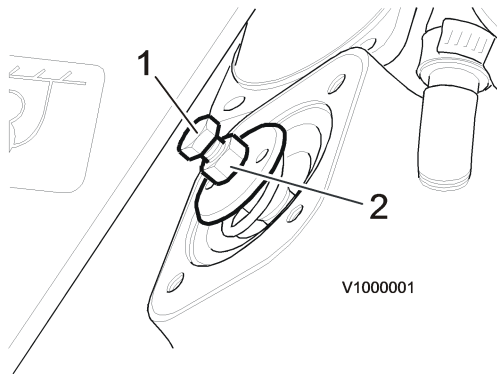


Figure 2

1. M10 bolt
2. Locking nut

7. Fit tool 999 3806 over the diaphragm sleeve.

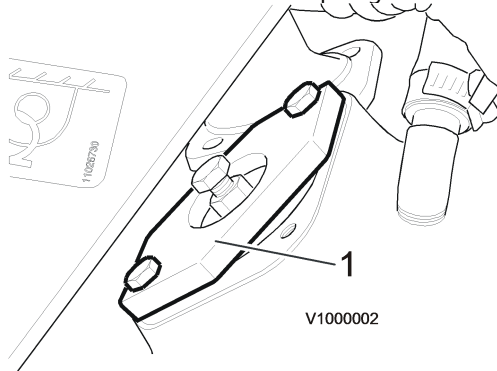


Figure 3

1. 999 3806

8. Check that the driver teeth mesh by rotating a wheel, a ticking sound should be heard. Adjust if necessary by screwing the diaphragm sleeve anti-clockwise to move the driver closer and clockwise to move closer.
9. Remove the M10 bolt with locking nut and fit the lock screw in the diaphragm sleeve **without changing the setting**.
10. Adjust the driver so that it reaches breakout position. Check with tool 11666140 or similar. Afterwards, screw the sensor **anti-clockwise 3/4 turn** to obtain the correct setting.
11. Remove tool 999 3806 and refit the differential cover.
12. Check the function.
Activate the differential lock and make sure it is securely engaged (drive flanges meshed)
Adjust the sensor so that it comes to its breakout position. Check with tool 11666140 or similar.
Screw the sensor clockwise **2 3/4 turns** to obtain the correct setting.

Differential lock sensor, adjusting (Differential cover fitted)

Thank you for your purchase.
Have a nice day.



Construction Equipment

Service Information

Document Title: Wear indicator, description	Function Group: 510	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Wear indicator, description

The wear indicator consists of a pin pressed into a spring pin for each individually adapted hub reduction length.

The wear indicator is permanently mounted in the axle housing and should be used for checking individual brake disc wear.

Document Title: Brake discs, checking wear	Function Group: 510	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Brake discs, checking wear

Op nbr 51701

[9993721 Service display unit](#)

[9993831 Support](#)

The following applies when checking:

Brakes: Brakes must be applied.

NOTE!

Brake work should be conducted under clean conditions.

1. Start the engine and charge the accumulators. Raise the lift arms. Secure the boom with support 999 3831. Stop the engine and apply the brake fully. Connect the service display unit to the machine or a pressure gauge to the pressure check connection for output brake pressure to check that the brake is fully applied.

NOTICE

The brake must be applied during the whole wear check.

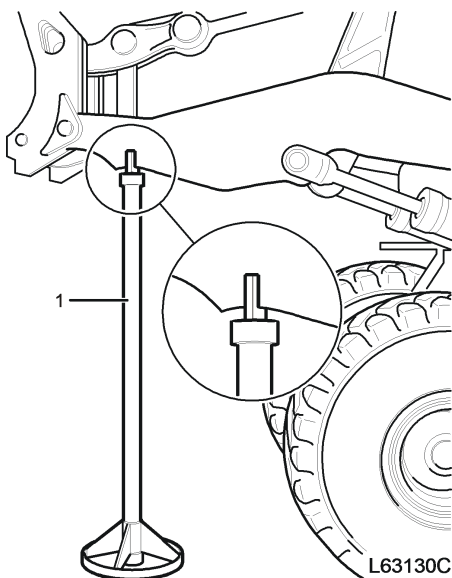


Figure 1

1. 999 3831 Support
2. Remove the wear indicator cap.

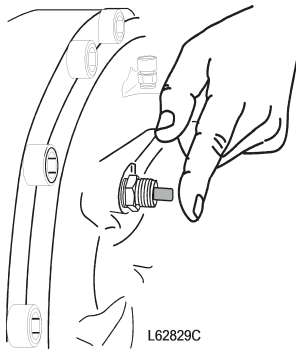


Figure 2

1. Wear indicator

3. Press in the wear indicator pin until it stops.

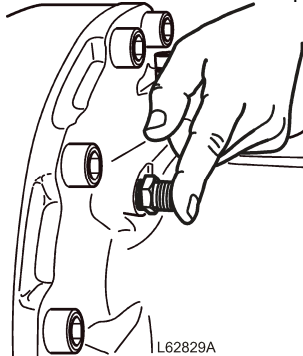


Figure 3
Press in the wear indicator pin

4. Brake disc wear is indicated by the position of flat surface B on the wear indicator pin in relation to flat surface A of the nipple.

The position of the flat pin surface varies depending on the extent of brake disc wear. For new brake discs, the indicator pin cannot be pressed in farther once the flat pin surface protrudes 2.3 mm (0.1 in) from the flat nipple surface.

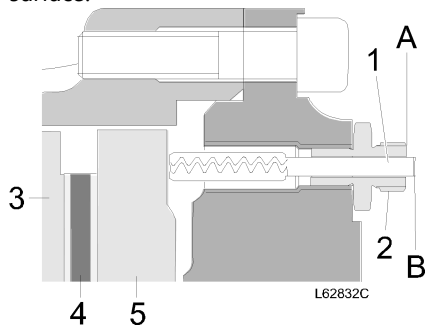


Figure 4
Checking brake disc wear

- A. Nipple, flat surface
- B. Indicator pin, flat surface

1. Wear indicator pin
2. Nipple
3. Back-pressure plate
4. Brake disc
5. Brake piston

5. The brake disc is worn and must be changed when the flat surface B of the wear indicator pin is flush with the flat

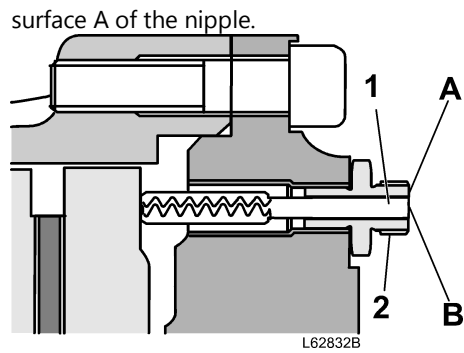


Figure 5
Brake disc is worn

- A. Nipple, flat surface
 - B. Indicator pin, flat surface
 - 1. Wear indicator pin
 - 2. Nipple
6. Refit the wear indicator cap.
Release the brake pedal.
 7. Check the remaining brake discs.
 8. Remove the support and lower the boom.

Document Title: Brake discs, replacing	Function Group: 510	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Brake discs, replacing

Op nbr 51704

[999 3802 Lifting sling](#)

[999 3875 Setting tool](#)

Removing

NOTE!

The brake disc is delivered as a spare part without impeller. Transfer and centre the impeller to the new disc. Use the new screws, lock nuts and spring pins which are delivered with the new disc.

1. Lift up the machine and place axle stands under the axle. Remove the wheels.
2. Drain the oil from hub reductions and axle housing.
Oil volume: **front axle approx. 46 litres (12.1 US gal), rear axle approx. 55 litres (14.5 US gal)**
3. Release the brake system pressure by depressing the brake pedal repeatedly (30-40 times).
4. Mark the hub reduction position in relation to the axle housing; connect lifting sling 999 3802 to the hub reduction. Remove the retaining bolts and the hub reduction.
Hub reduction weight: **approx. 350 kg (771.6 lbs)**

NOTE!

In certain cases, the half shaft and brake disc can remain in the hub reduction.

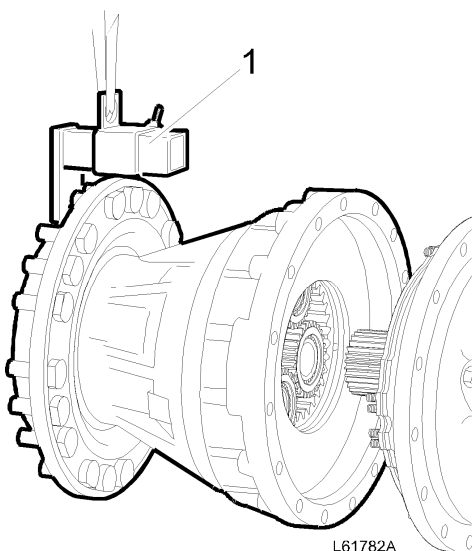


Figure 1
Removing hub reduction

1. 999 3802
5. Remove the brake disc.
Remove the brake plate and the guide pins.

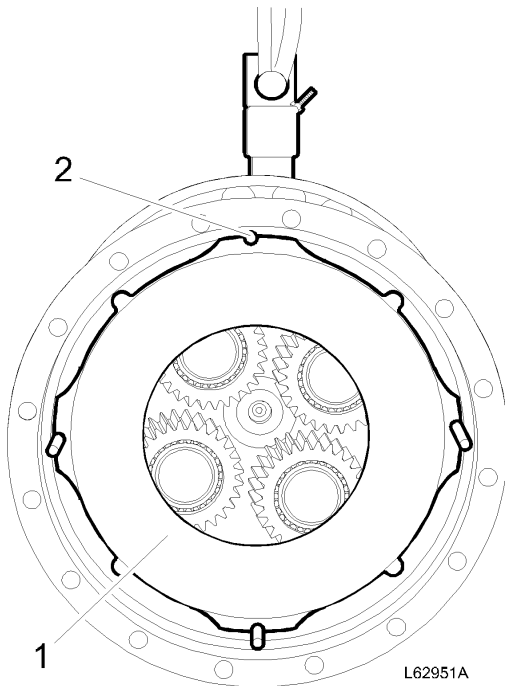


Figure 2
Brake plate and guide pins

1. Brake plate
2. Guide pin

6. Loosen the lock nuts. Unscrew the adjusting screws for the brake piston approx. 1 turn. Clean and check the parts for any wear or damage.

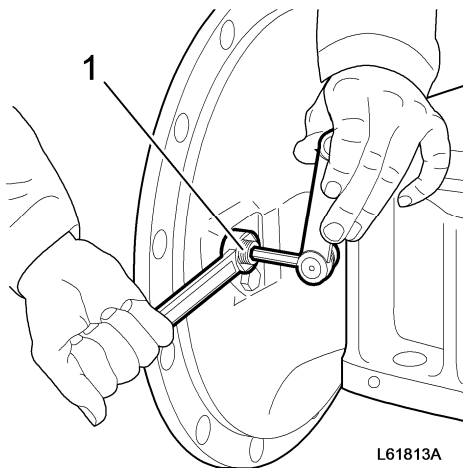


Figure 3

1. Adjusting screws with lock nuts

Centring impeller on brake disc

7. Remove the impeller from the old brake disc.
8. Centre the impeller on the new brake disc as follows:
 - Position the new brake disc on a level surface with the two impeller halves on either side. Centre the impeller halves on the brake disc by knocking spring pins 6.35 x 24 mm (0.25 x 0.945 in) into two opposing bolt holes.

- Fit the bolts in the two remaining holes.
Tightening torque: **12 Nm (8.9 lbf ft)**
- Knock out the spring pins and fit the bolts.
Tightening torque: **12 Nm (8.9 lbf ft)**

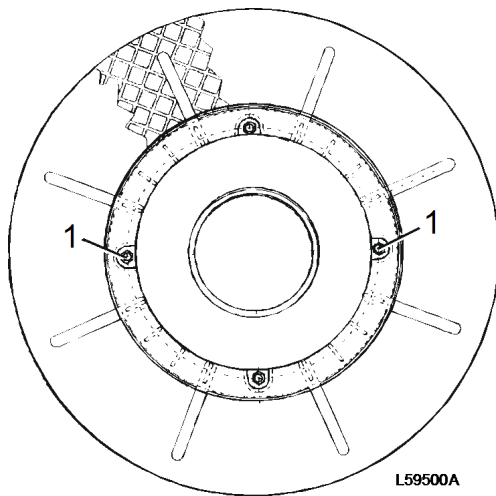


Figure 4
Centring impeller halves on brake disc

1. Spring pins for centring impeller halves

Installing

9. Fit the O-ring on the axle housing.
Fit the brake disc.

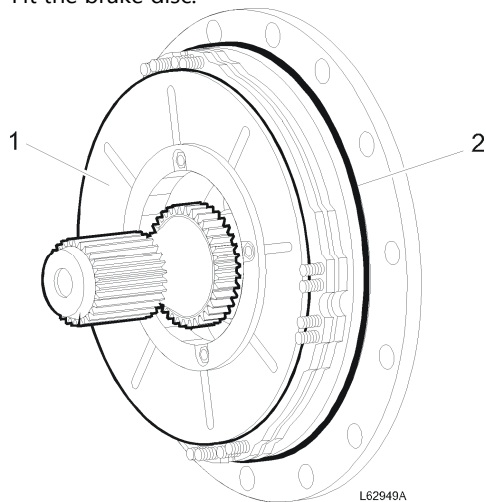


Figure 5
Installing brake disc (principle diagram)

1. Brake disc
2. O-ring

10. Fit the brake plate and guide pins.

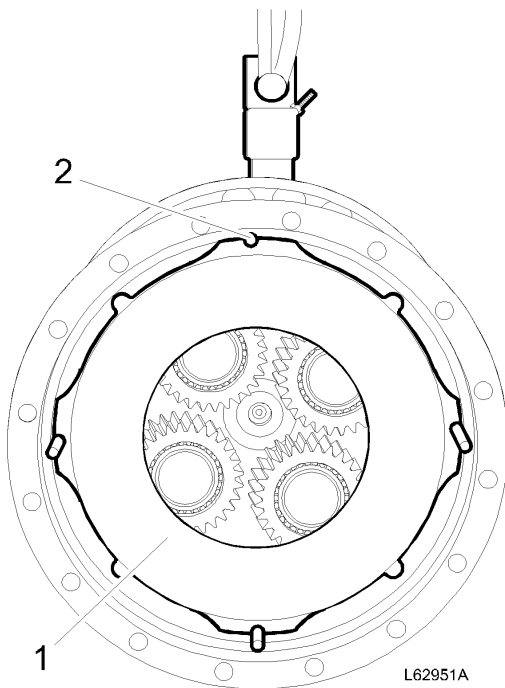


Figure 6

1. Brake plate
2. Guide pins 4 pcs

11. Connect lifting sling 999 3802 to the hub reduction.
Hub reduction weight: **approx. 350 kg (771.6 lbs)**
Fit the hub reduction.

NOTE!

Check that the guide pins in the hub reduction are aligned in the brake piston recess.

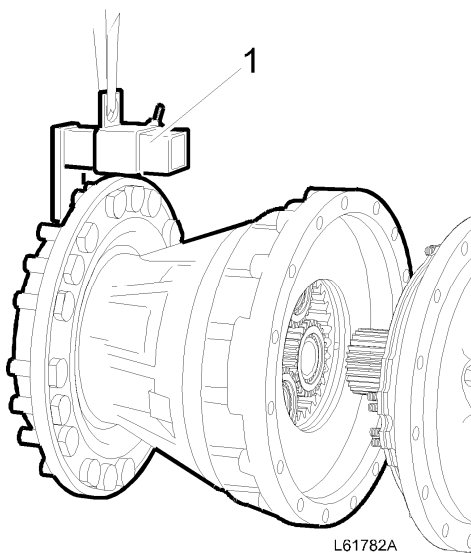


Figure 7
Installing hub reduction

1. 999 3802
12. Fit and tighten the hub reduction attaching bolts.
Tightening torque: **310 Nm (228.6 lbf ft)**



Oil under high pressure!

Brake piston, adjusting stroke

13. Start the engine and charge the brake pressure. Stop the engine and apply the foot brake.
14. Turn the adjusting screws against the applied brake piston.
Unscrew the adjusting screws 1/2 turn. Lock the adjusting screws with the lock nuts.

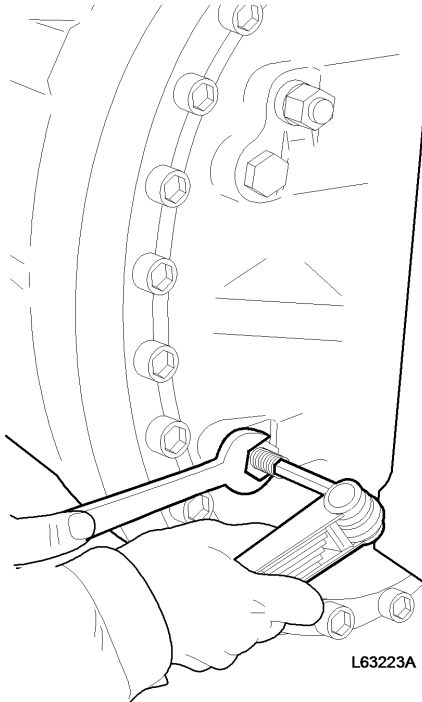


Figure 8

NOTE!

This procedure is performed only if a new brake disc is installed.

Setting of wear indicator

15. Remove the wear indicator if necessary.

NOTE!

The brakes should be applied until the wear indicator setting is completed and setting tool 999 3875 has been removed.

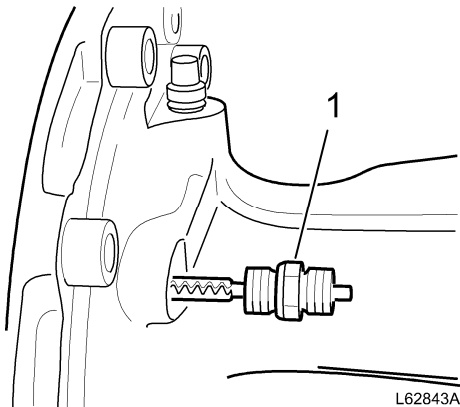


Figure 9
Removing wear indicator

1. Wear indicator

16. Adjust the length of the wear indicator pin to 89 mm (3.5 in) (basic setting).

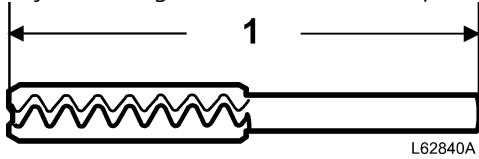


Figure 10
Basic adjustment of wear indicator

1. 89 mm (3.5 in)

17. Fit the wear indicator.
Fit the setting tool 999 3875 for the wear indicator and tighten until it bottoms.

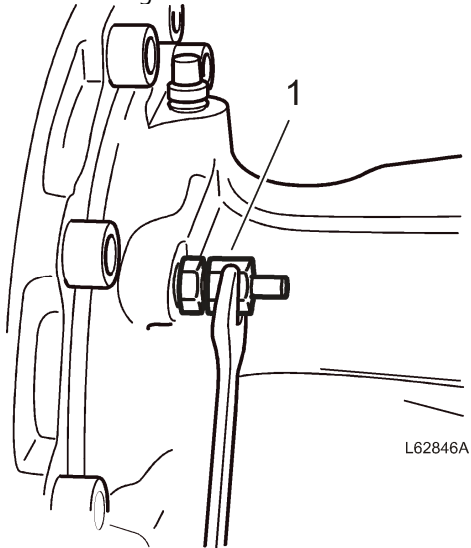


Figure 11
Setting of wear indicator

1. 999 3875

18. Remove the setting tool with brakes applied. Fit and tighten the cap over the wear indicator.
19. Release the brake.
20. Fill the axle with oil.
Oil volume: **front axle approx. 46 litres (12.1 US gal), rear axle approx. 55 litres (14.5 US gal)**
21. Fit the wheels and remove the supports.
22. Check function.

Document Title: Hydraulic brake system, description	Function Group: 520	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic brake system, description

The machine is equipped with an all-hydraulic brake system which is divided into two circuits; one circuit for the front axle and one circuit for the rear axle.

The system consists, among other things, of a foot brake valve, see separate description, and an accumulator block with three or five (L150E) accumulators. One accumulator (two accumulators, L150E) is for the front circuit, one accumulator (two accumulators, L150E) is for the rear circuit and there is one accumulator in common.

The accumulators, which are precharged with nitrogen gas, store pressure and provide safe braking within sufficiently safe limits with a good margin to spare.

The brake system is charged via the central valve with oil from Pump 3 (P3), Pump 1 (P1) or Pump 2 (P2). P3 and P2 are positioned on the left side of the transmission. P1 is positioned on the right side of the machine.

P3 supplies the cooling fan and ensures that brake charging takes place when transporting. P2 charges the brake system passively, while the working hydraulics is being used, when the pressure exceeds the cut-in pressure, see [525 Foot brake valve, specifications](#), [525 Foot brake valve, specifications](#). P1 charges the brake system passively, if the steering is being used and if the pressure exceeds the cut-in pressure.

The central valve distributes oil and pressure to the brakes, steering (prioritised) as well as the servo and working hydraulics.

If the brake pressure drops below the limit value, [525 Foot brake valve, specifications](#), [525 Foot brake valve, specifications](#), this is indicated on the display unit, and also in that the warning lamp and the central warning light up and the buzzer sounds.

Both the front and rear axles are equipped with wet disc brakes.

Brake cooling is achieved with an individual impeller for each disc which acts as an axle oil circulation pump.

The axles have built-in brake disc wear indicators.

The axles can be equipped with external oil cooling which consists of hydraulic motors, hydraulic pumps and heat exchangers (coolers).

External oil cooling circulates oil in the axle as soon as the engine is started; even when the machine is stationary.

This equipment is integrated in the cooling system for engine, transmission and hydraulics.

Description central valve, see [912 Central valve, description](#).

Hydraulic pumps

Hydraulic diagram, see [990 Hydraulic diagram, fan, brake system](#).

Pump 2, hydraulic brake pressure charging

Pump 2 (P2) supplies the central valve and through this valve primarily supplies the steering with oil. When the steering is fully supplied with oil, priority spool (4) shifts over to brake pressure charging, servo system and working hydraulics. Pressure-limiting valve (3) limits the maximum pressure of the steering via the priority spool. If the entire flow is not required for the steering, P2 will, via the priority spool, supply pressure-reducing valve (1), resulting in a brake pressure and pressure-reducing valve (2) resulting in a servo pressure. The surplus capacity may then be used by the working hydraulics via connection (PW).

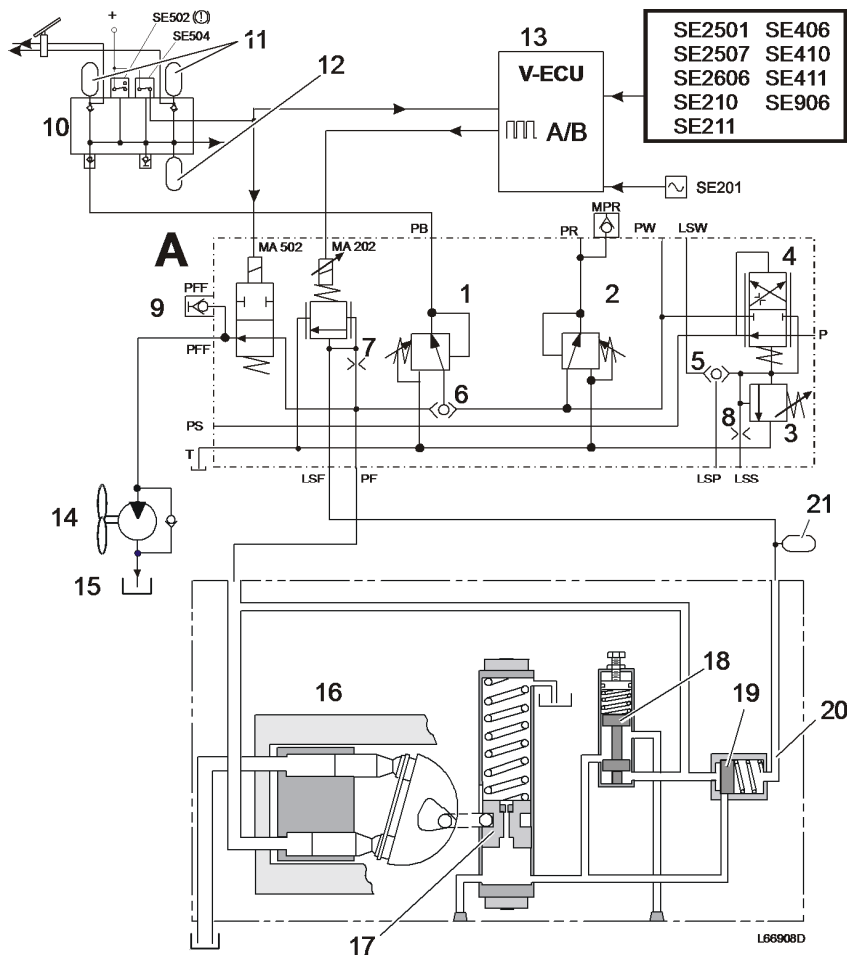


Figure 1

1	Pressure limiting valve, max. hydraulic brake charging pressure	21	Accumulator for LS-line pulse damping
2	Pressure limiting valve, max. servo pressure		
3	Pilot valve, max. steering pressure	A	Central valve
4	Priority spool, not used	B	Control valve
5	Shuttle valve, selects highest LS-pressure	C	Pump 2 (P2)
6	Shuttle valve, selects highest pressure to ensure brake charging	SE201	Sensor, engine speed
7	Restriction With effect from the following serial numbers this restriction has been moved to the collecting block for LS-pressure. L150E ser. No. 10001– L180E ser. No. 8001– L220E ser. No. 4001–	SE205	Sensor, engine coolant temperature
8	Restriction	SE210	Sensor, coolant temperature, radiator outlet
9	Pressure outlet, P3	SE211	Sensor, fan speed
10	Brake accumulator block	SE406	Sensor, transmission oil temperature
11	Diaphragm accumulator	SE502	Sensor, warning lamp, low brake pressure
12	Diaphragm accumulator, common	SE504	Sensor, electrically-controlled brake pressure charging
13	V-ECU, I-ECU, as a single unit	SE906	Sensor, hydraulic oil temperature/hydraulic oil

			level
14	Cooling fan motor	MA202	Proportional valve, controls operation of P3, LS-pressure
15	Hydraulic tank	MA502	Solenoid valve, shuts off fan during electrically-controlled brake pressure charging
16	Pump 3 (P3)	A/B	Brake/Fan position (PWM signal)
17	Control piston	SE2501	Sensor, intake air temperature
18	Pressure compensator	SE2502	Sensor, charge air temperature
19	Flow compensator		
20	LS-line		

Pump 3

When the pressure is not sufficiently high in the working hydraulics, the brake system is instead charged electrically and controlled by fan pump (P3). Pump 3 supplies oil to the central valve port (PF) and from there to the fan motor via port (PFF). The oil flow is controlled via proportional pressure limiting valve MA202, which creates a pressure to the LS-connection on the pump via port LSF.

When pressure monitor SE504 indicates that the brake pressure is below the limit value, MA202 creates a pump pressure. MA502 connects a restriction into the fan circuit, thus creating a pressure for charging the brake system via shuttle valve (6).

When signal from SE504 reaches the V-ECU, the V-ECU changes the signal, which controls proportional valve MA202, from fan position to brake charging position. MA202, in its turn, controls the operation of P3. The oil is now supplied at the correct pressure.

The signal that controls MA202 is of the PWM type. If the need of cooling is great, the fan motor receives high oil flow, which provides a high fan speed. If the pressure exceeds 12–12.5 MPa (1740–1813 psi), the brake accumulators will be charged automatically.

If the pressure in the brake accumulators is below the limit value for low brake pressure, sensor SE502 triggers a warning via the instruments.

Document Title: Brake system, retardation, checking function	Function Group: 520	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Brake system, retardation, checking function

Op nbr 52002

999 3721 Service display unit

The following applies when checking:

- The machine must not be loaded.
- Machine speed must be above 20 km/h (12.4 mph).
- The ground surface must be level and provide adequate friction; dry asphalt, dry concrete or similar surfaces.
- Brakes must be applied without locking up the wheels.
- Do not pump or release the brake pedal during braking.
- Together with a supervisor, select a location where the brake test can be performed without risk for accidents, rear-end collisions, etc.



WARNING

The brake test must only be performed in a place where there is no risk of accidents.

1. Start the engine.
2. Scroll to group "BRAKES".

BRAKES	
Br.press.in	
Br.press.out	xxxxxxx
	yy zzz

3. Scroll down to sub-menu "BRAKE TEST LOG".

BRAKE TEST LOG	
zz,z zz,z zz,z	m/s2
xxx xxx xxx	yyy

4. Turn the gear selector control to position A.
5. If the menu for the brake test is selected, the buzzer will emit a short signal when travel speed exceeds 20 km/h (12.4 mph), indicating that the brake test can be performed.
6. Brake the machine fully without releasing the pedal.
7. Read the retardation value.
8. The service display unit shows the four latest measured values with the most recent value placed furthest to the left.

BRAKE TEST LOG		
ZZ,Z ZZ,Z ZZ,Z		m/s2
XXX XXX XXX		yyy

9. If the latest measured retardation value is below 4.75 m/s² (0.48 grams), the test should be conducted again. If the re-test value is below 4.75 m/s², check the brake system according to [520 Brake system, checking hydraulic function](#) and [510 Brake discs, checking wear](#).

Document Title: Brake system, checking function, hydraulic	Function Group: 520	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Brake system, checking function, hydraulic

Op nbr 520-001

[14290266 Hose](#)

[11666051 Pressure gauge](#)

[9993721 Service display](#)

[14290262 Adapter](#)

NOTE!

Earlier and later type checking points occur. For checking points of earlier type, use adapter.

NOTE!

The brake system must be free from air.

1. Warm up the machine.
2. If required check and adjust the maximum pressure on the cooling fan pump, see [263 Fan motor, checking working pressure](#).

Max. brake pressure, checking

3. Release the pressure in the brake system by depressing the brake pedal fully approx. 40 times. Connect a pressure gauge to the checking point on the accumulator block.

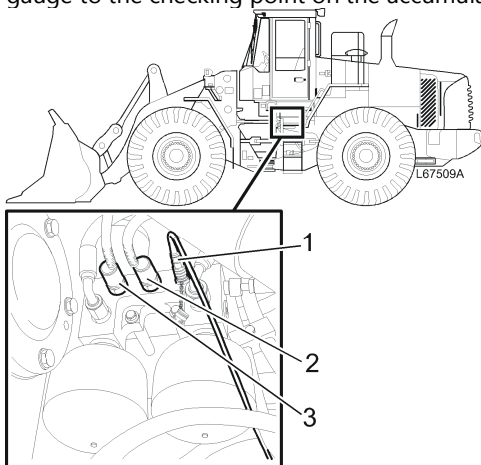


Figure 1

1. Checking point
 2. SE502
 3. SE504
4. Start the engine, charge the brake system. Make sure that the engine is running at low idling speed and that it has reached normal working temperature.

5. Check max. brake pressure by tilting in against end position and reading off the pressure on the pressure gauge.

Max. brake pressure, see [510 Wheel brake, specification](#)

Adjusting is carried out on the brake pressure valve on the central valve.

NOTICE

Adjustment should be carried out with the engine turned off.

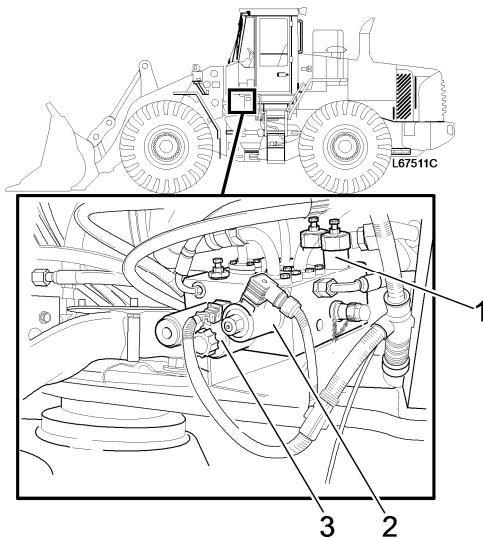


Figure 2

1. Adjusting brake pressure
2. MA502
3. MA202

Electrically controlled brake charging function, checking

6. Start the engine, charge the brake system.
At obtained unloading pressure, sensor SE504 should break the connection for the oil flow to the fan motor through MA502.
Check the brake charging by carefully depressing the brake pedal a few times so that the pressure drops. At the cut-in pressure, SE504 should close the circuit and the electrical brake charging should begin to charge up the pressure up to the unloading pressure.
Cut-in pressure, see [525 Foot brake valve, specifications](#). Unloading pressure (electrical), see [525 Foot brake valve, specifications](#).

Braking capacity, checking

7. Stop the engine, leave the ignition on, and carefully brake until the pressure has dropped to 13 MPa (1885 psi).
Read off the pressure gauge connected to the accumulator block.
Then check the level of the pressure drop after four full brake applications. The pedal should be trodden right down and fully released four times, before the pressure has dropped to below 9 MPa (1305 psi) (the control lamp for low brake pressure lights up on the instrument panel).
If the number of full brake applications is not achieved, the precharging pressure of the accumulators must be checked.

Common accumulator, checking

8. Start the engine and charge up the brake pressure. Stop the engine.
9. Depress the brake pedal several times to release the brake pressure while at the same time checking the pressure on the pressure gauge.
The pressure in the common accumulator then drops slowly down to the accumulator precharging pressure and then it drops rapidly.

NOTE!

If the precharging pressure in the accumulator is below 3.5 MPa (508 psi), it should be replaced

Front, rear (and common) accumulator, checking

10. Provided that the precharging pressure of the common accumulator is within the specified range, it is possible to check the front and rear accumulators.
11. Release the pressure in the brake system by depressing the brake pedal fully approx. 40 times.
Connect a pressure gauge to the brake accumulator block.

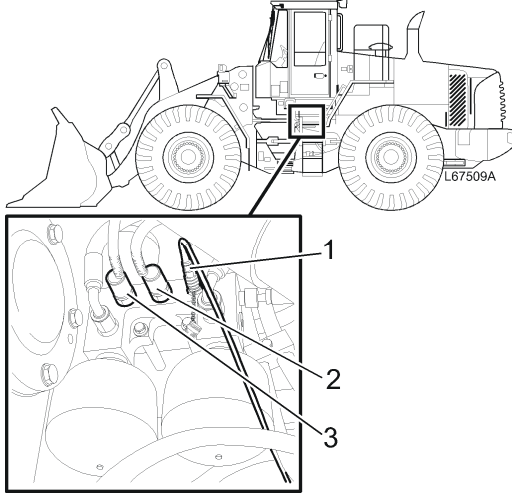


Figure 3

1. Checking point
2. SE502
3. SE504

12. Connect the service display unit to the outlet on the rear wall of the cab.

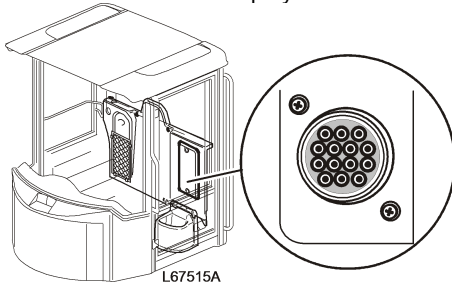


Figure 4

13. Start the engine and find the correct screen on the service display unit under the Brake menu.

BRAKES	
Br.press.in	xxxxxxx
Br.press.out	yy zzz

14. Connect a pressure gauge to the foot brake valve in order to check precharging pressure in the accumulator for the rear brake circuit.

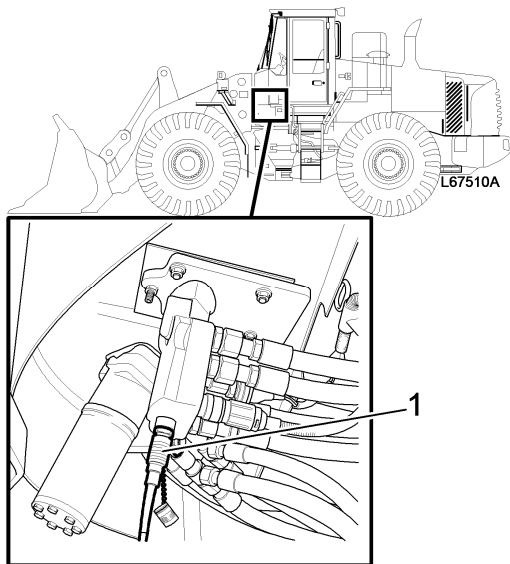


Figure 5

1. Checking point

15. Start the engine and wait until the brake system has been charged.

16. Stop the engine.

The pressure of the respective accumulators can be checked by depressing the brake pedal several times while at the same time noting the pressure before the pressure becomes 0 MPa on the service display unit and both pressure gauges.

On the display unit the **front** accumulator pressure is read off.

On the pressure gauge connected to the brake accumulator block the **common** accumulator pressure is read off.

On the pressure gauge connected to the foot brake valve the **rear** accumulator pressure is read off.



If the precharging pressure in the accumulator is below 3.5 MPa (508 psi), it should be replaced.

Document Title: Brake system, check and adjusting pressure in circuit	Function Group: 520	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Brake system, check and adjusting pressure in circuit

Op nbr 520-005

[14290266 Hose](#)

[11666051 Pressure gauge](#)

[9993721 Service display](#)

[14290262 Adapter](#)

NOTE!

Earlier and later type checking points occur. For checking points of earlier type, use adapter.

NOTE!

Before the check is carried out, the system must be free from air.

Checking

1. Warm up the machine.
2. Release the pressure in the brake system by depressing the brake pedal fully approx. 40 times.
Connect the pressure gauge to the checking point on the foot brake valve (rear brake circuit).

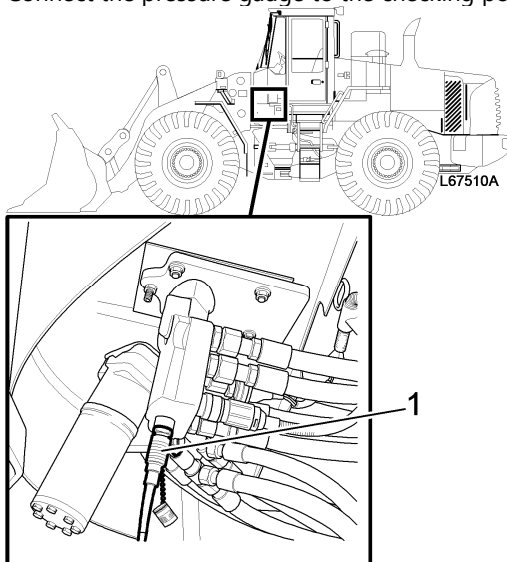


Figure 1

1. Checking point, brake pressure
3. Connect the service display unit to the socket on the rear wall.

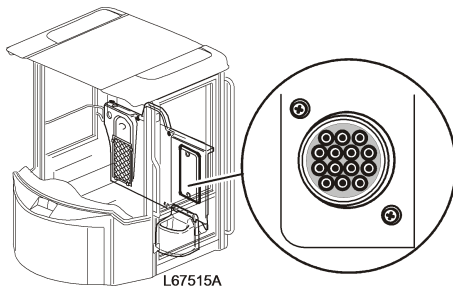


Figure 2

4. Start the engine and find the correct screen on the service display unit under the Brake menu.

BRAKES		
Br.press.in		xxxxxxx
Br.press.out		yy zzz

5. Depress the brake pedal so that it fits up against the adjusting screw. Read off the pressure on the pressure gauge and the service display unit.

Max. output brake pressure, see: [525 Foot brake valve, specifications](#).

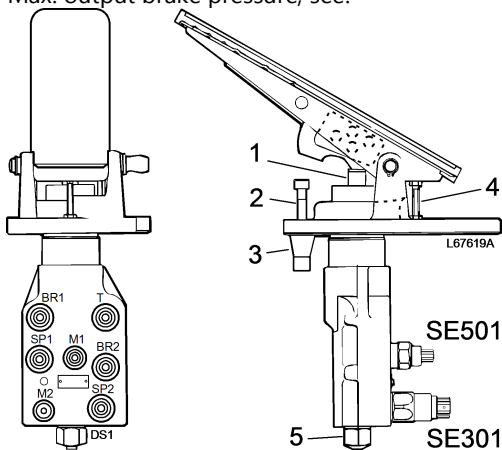


Figure 3
Foot brake valve

1	Piston
2	Adjusting screw for pressure in circuit
3	Security seal
4	Adjusting screw for pedal free travel
5	Checking point
SE301	Sensor, stop lights
SE501	Sensor, output brake pressure, log / Transmission declutch

Adjusting

6. Remove the security seal from the adjusting screw.
7. The pressure is adjusted with adjusting screw 2. The adjusting screw limits the brake pedal movement and when adjusting the piston stroke is thereby adjusted.
8. Depress the brake pedal so that it fits up against the adjusting screw. Read off the pressure on the pressure gauge.

9. If the pressure needs to be adjusted, let up the brake pedal and adjust on adjusting screw 2. Check again according to the previous points.
10. After adjusting a security seal is to be fitted on the adjusting screw.
11. Check that the clearance between brake pedal and piston are according to specifications.
Any adjustment is carried out on adjusting screw 4.
Clearance between brake pedal and piston: 0.4–±0.2 mm (0.016–0.008 in).
12. Remove the tools.

Document Title: Brake system, bleeding	Function Group: 520	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Brake system, bleeding

Op nbr 52037

Plastic hose, inside diameter approx. 6 mm (0.236 in), length approx. 1 m (3 ft)

The brake system is divided into two circuits which implies that if only one circuit has been opened (a line has been disconnected, etc.), only that circuit requires bleeding.



Oil under high pressure!

1. Check the oil level in the hydraulic oil tank.
2. Fully depress the brake pedal and hold it in position with a suitable tool.
3. Start the engine and run it at idling speed.
4. Make sure the parking brake is applied.
5. Connect the plastic hose and carefully open the bleeder screw. Close the bleeder screw when oil free from air flows out.

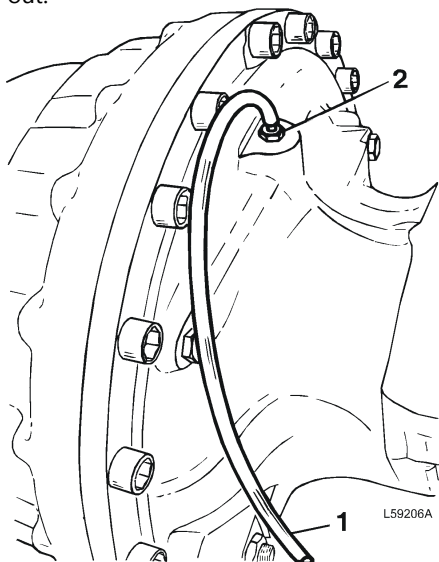


Figure 1
Bleeding brakes

1. Plastic hose
2. Bleeder screw

6. Turn off the engine. Adjust the oil level in the hydraulic oil tank.
7. Check function.

Document Title: Foot brake valve, description	Function Group: 525	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L150E, L120E, L180E, L60E, L110E, L70E, L330E, L90E, L50E, L220E [GB]			

Foot brake valve, description

The foot brake valve is of the proportional type, which means that the output brake pressure is proportional to the pedal angle. The valve is divided into two circuits, one for the brakes on the front axle and one for the brakes on the rear axle. The maximum brake pressure can be adjusted by altering the stroke on the pedal.

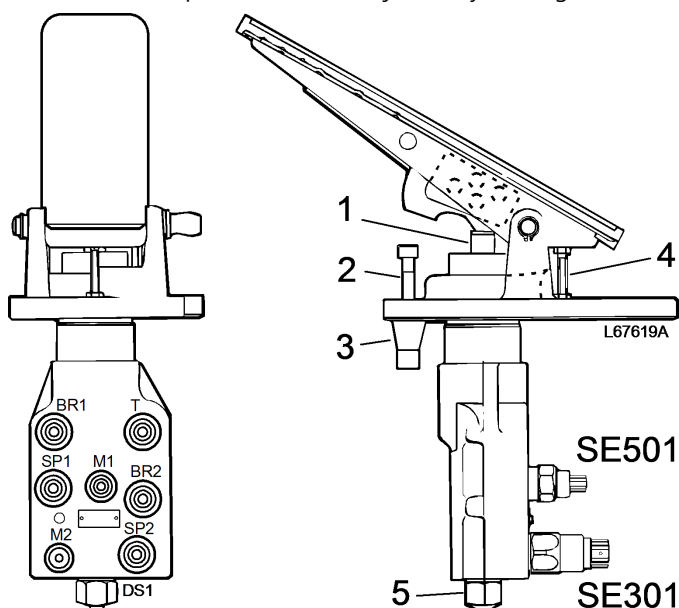


Figure 1

1	Piston
2	Adjusting screw, pressure
3	Security seal
4	Adjusting screw, pedal free travel
5	Checking point
SE310	Sensor, stop lights
SE501	Sensor, output brake pressure / transmission declutch

Brakes not applied

When the brake pedal is not actuated, return springs (3, 4) hold spools (1, 2) in position, so that BR1 and BR2 have connection to tank (T). The connection between pressure ducts (SP1, SP2) and the ducts for output brake pressure (BR1, BR2) is closed.

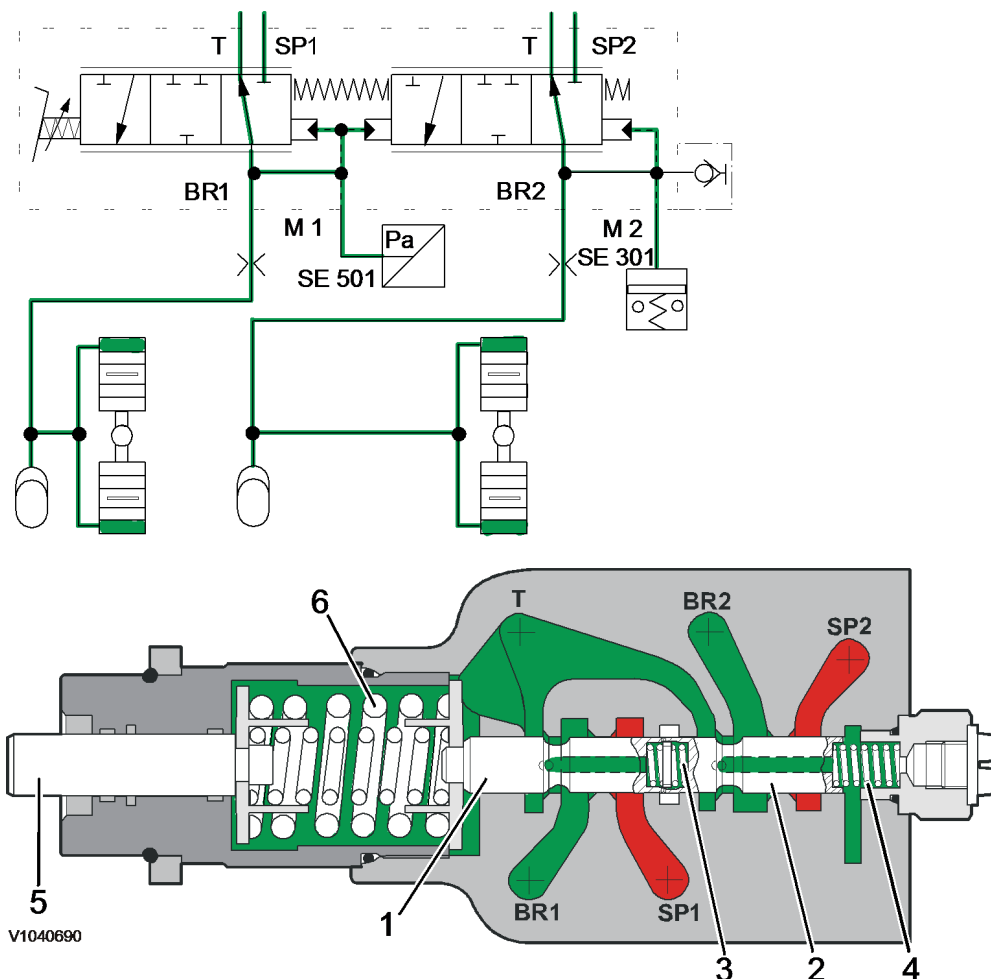


Figure 2
Brakes not applied

1	Spool, rear circuit (L50—L120E, L330E) front circuit (L150—L220E)	T	Connection to tank
2	Spool, front circuit (L50—L120E, L330E) rear circuit (L150—L220E)	BR1	Output brake pressure
3	Return spring, rear circuit (L50—L120E, L330E) front circuit (L150—L220E)	BR2	Output brake pressure
4	Return spring, front circuit (L50—L120E, L330E) rear circuit (L150—L220E)	SP1	Input brake pressure from accumulator block
5	Piston, actuated by the pedal	SP1	Input brake pressure from accumulator block
6	Return spring, pedal		

Brakes partly applied

If the brake pedal is pressed down slightly, piston (5) actuates the spring (6). The spring force presses spools (1, 2) down and close the connection to tank. Oil from pressure ducts (SP1, SP2) can flow to the brakes through the ducts for output brake pressure (BR1, BR2). The brakes are applied and the pressure increases in ducts BR1 and BR2. When the pressure corresponds to the power that the brake pedal exerts on spring (5) this helps return springs (3, 4) in actuating spools (1, 2). The flow to the brakes is interrupted and a brake pressure is obtained that corresponds to the distance the brake pedal was depressed (spring force).

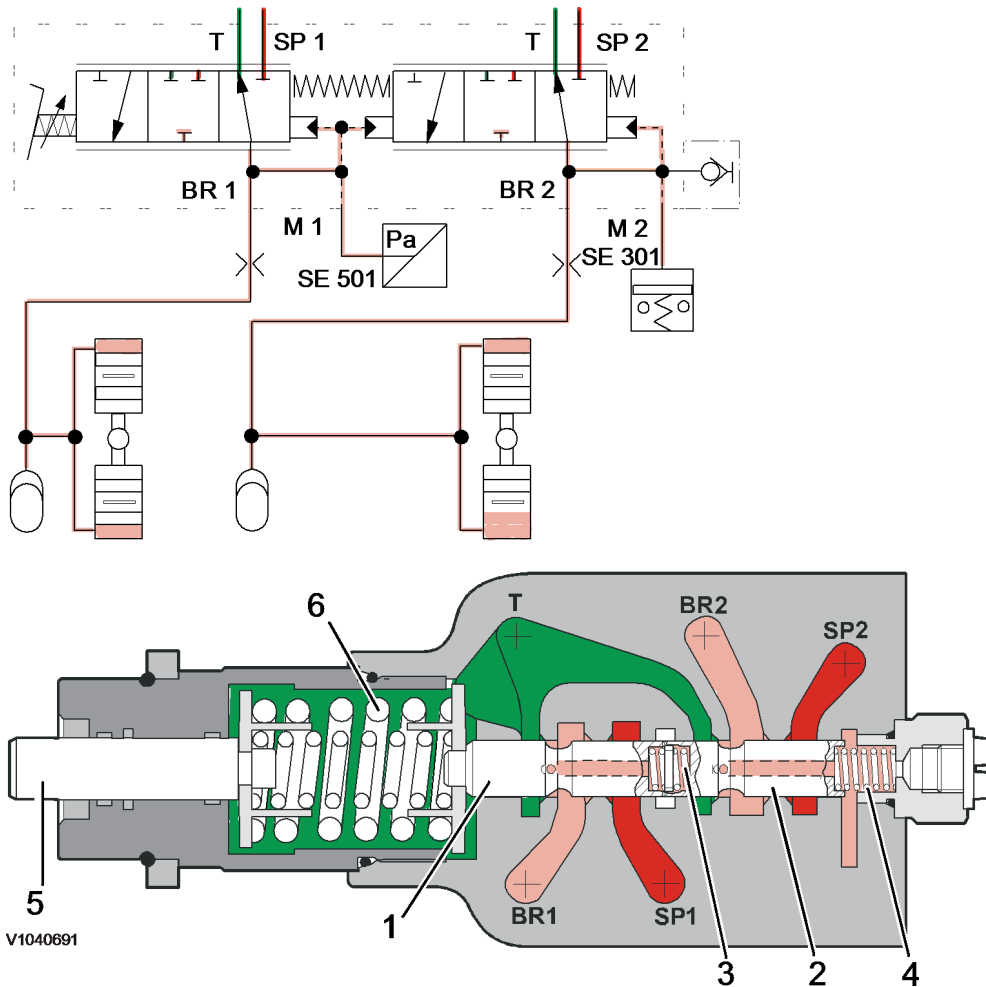
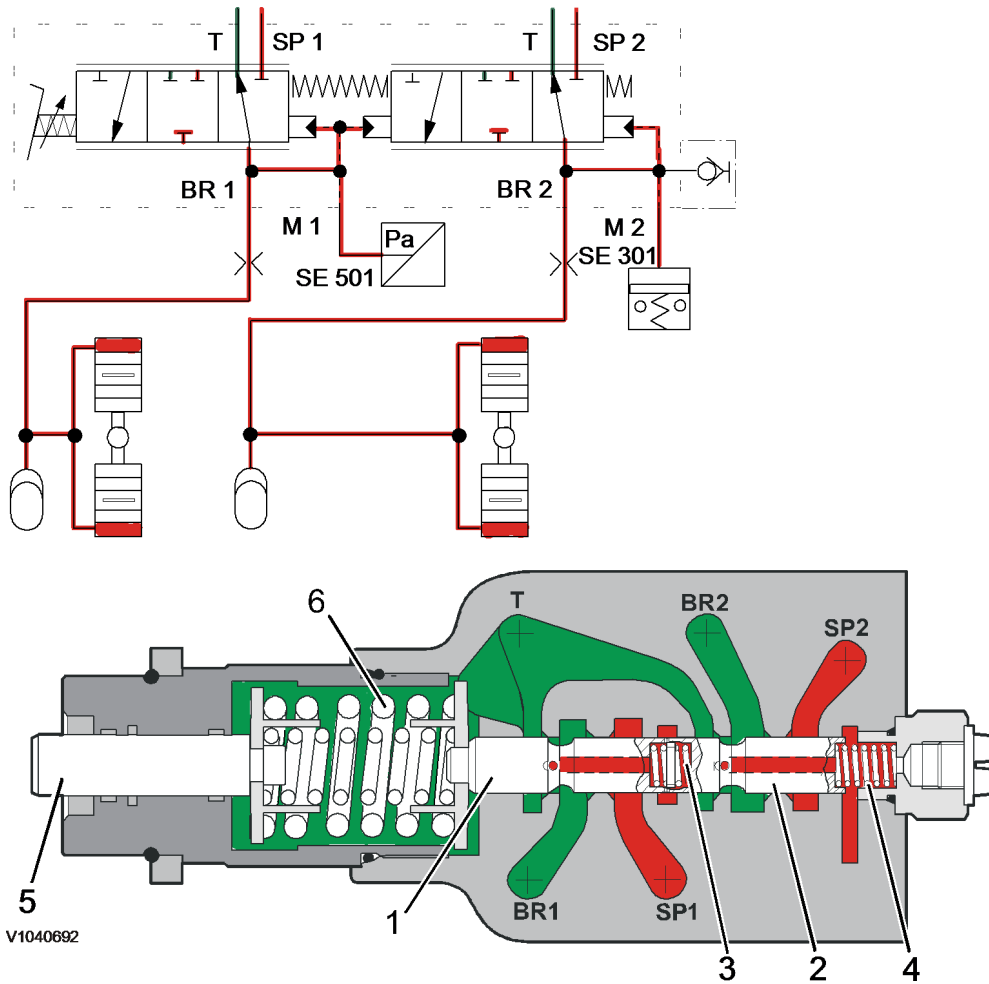


Figure 3
Brakes partly applied

Full brake application

The brake pedal movement is limited by the adjusting screw. This means that the maximum brake pressure is limited to a limit value for the respective machines, see [525 Brake valve, specifications](#). When the brake pedal is pressed right down the spring force from spring (6) increases and this actuates spools (1,2). The connection between pressure ducts (SP1,SP2) is opened and the oil is conducted to the brakes via the ducts for output brake pressure (BR1, BR2). The pressure in the ducts increases and when it corresponds to the maximum output brake pressure it, together with return springs (3, 4), actuates spools (1,2). Again the oil flow to the brakes is closed and maximum output brake pressure (limited by the adjusting screw) is obtained.



Document Title: Foot brake pedal, adjusting angle and pedal clearance	Function Group: 525	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Foot brake pedal, adjusting angle and pedal clearance

Op nbr

1. Remove the foot brake pedal in order to be adjust the pedal angle.
2. Move the bolt under the pedal in order to adjust the pedal to a 35°, 40°, 45° or 50° angle. Pos. A corresponds to a 45° pedal angle.

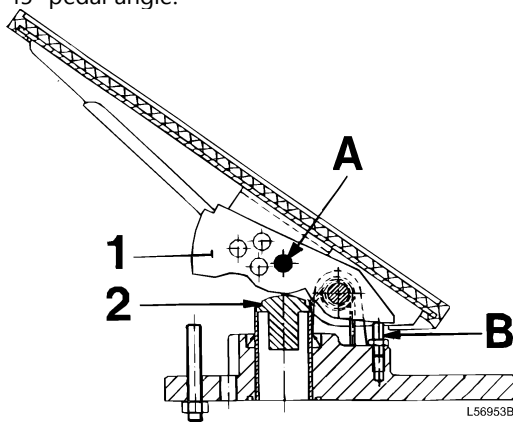


Figure 1
Adjusting foot brake pedal angle

3. Adjust the "free pedal travel" by turning the adjusting screw (B) until the clearance between the brake pedal (1) and the piston (2) is 0.4 ± 0.2 mm (0.0157 ± 0.0078 in).

Document Title: Foot brake valve removed, reconditioning	Function Group: 525	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L50E, L60E, L120E, L90E, L330E, L220E, L180E, L110E, L70E, L150E [GB]			

Foot brake valve removed, reconditioning

Op nbr 525-009

=

Dismantling

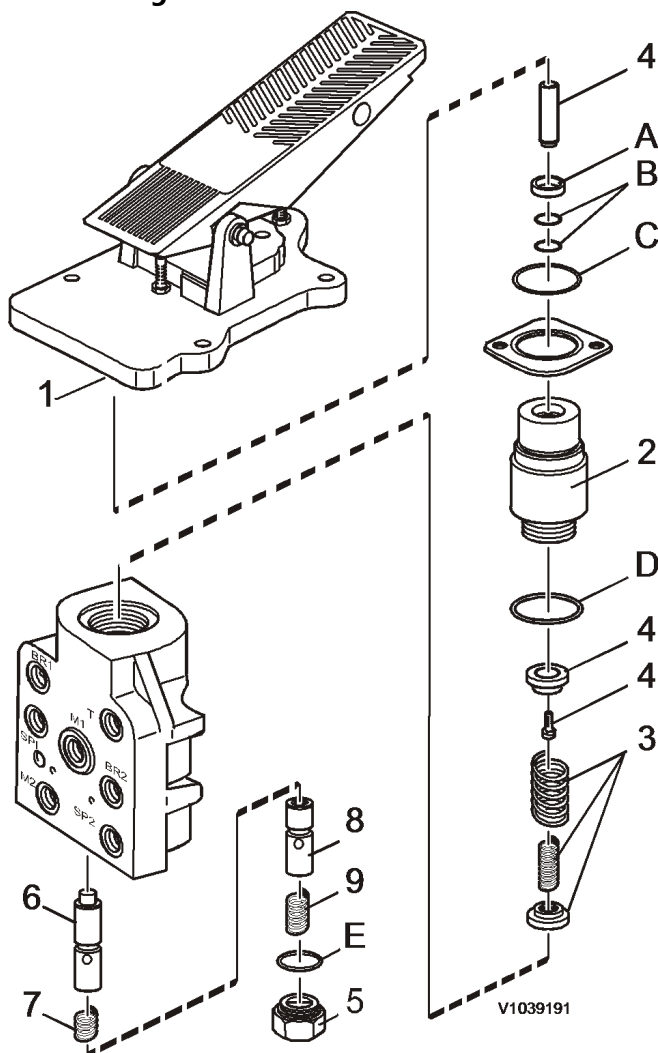


Figure 1

1. Remove the pedal rubber and remove the pedal together with the attaching plate as one unit (1).
2. Secure the valve housing in a vice. Remove sleeve (2).

NOTE!

Clamp the valve housing across the narrow sides.

3. Remove the springs and spring guide (3). Remove the valve housing from the vice.
4. Remove pushrod (4).
5. Remove plug (5) together with the testing nipple.
Remove spring (9), piston (8), spring (7) and piston (6).
6. Remove seal ring (A) and bushes (B) from sleeve (2).
Use a $\varnothing$ 2 mm (0.08 in) pointed steel wire as a tool when removing the bushes.
Remove O-rings (D) and (E).
7. Clean and inspect with regard to damage or wear. Replace damaged or worn parts.

Assembling

8. Secure sleeve (2) in a vice, with the threaded part upward.
 9. Install a new bush (B). Coat the bush with grease.
 10. Turn the sleeve in the vice. Install a new bush (B) and a new seal ring (A). Coat the seal ring and the bush with grease.
Install pushrod (4).
- NOTE!**
If the pushrod has been dismantled, coat the threads on the bolt with locking fluid medium before assembling.
11. Install a new O-ring on plug (5). Lubricate the O-ring with clean hydraulic oil.
 12. Secure the valve housing in the vice, with the hole for the sleeve facing upward. Install piston (6), the shorter spring (7), the piston (8), the longer spring (9) and plug (5), from underneath.
Tightening torque, plug: **60 N m (44 lbf ft)**.
 13. Install the spring guide and springs (3).
 14. Lubricate with oil and install a new O-ring on the sleeve. Coat the threads on the sleeve with locking fluid medium and install it in the valve housing.
Tightening torque: **60 N m (44 lbf ft)**.
 15. Check that it is possible to press down the pushrod a bit by hand, and that it springs back.
 16. Install the pedal on the valve.
Tightening torque, attaching bolts: **30 N m (22 lbf ft)**.
 17. When the foot brake valve has been installed in the machine, carry out [520 Brake system, bleeding](#), [520 Checking and adjusting pressure in circuit](#) and possibly [525 Brake pedal, adjusting angle](#)

Document Title: Discarded accumulators	Function Group: 527	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Discarded accumulators

Op nbr

WARNING

A discarded accumulator which is not punctured may still contain high pressure and must always be handled with great care.

-  **WARNING**
Use safety glasses.

Accumulators that are to be discarded must not constitute a hazard.
This is completed by carefully puncturing the accumulator with a Ø3 mm (0.118 in) drill.

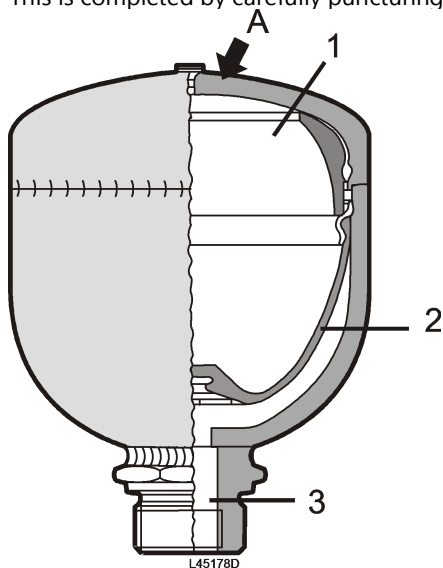


Figure 1
Accumulator

- Drill here with a Ø3 mm (0.118 in) drill
- Nitrogen gas space
 - Rubber diaphragm
 - Connection for oil

Document Title: Parking brake, description	Function Group: 550	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Parking brake, description

The parking brake is a hydraulically-operated multi-disc brake located on the output shaft in the transmission. Oil under pressure from the accumulator block is supplied to parking brake valve MA501 and the parking brake for release.

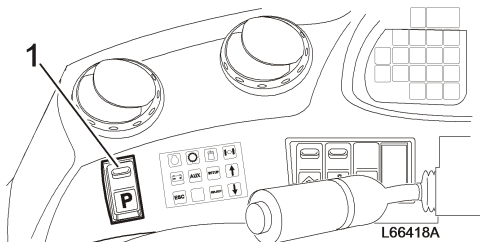


Figure 1

1. Switch SW501, parking brake

The parking brake is applied with spring tension each time the engine is stopped (ignition key in position 0) or when switch SW501, on the left-hand side of the instrument panel, is actuated.

When the engine is started once again, the parking brake must be released by moving switch SW501 from position 1 (applied parking brake) back to position 0 (released parking brake).

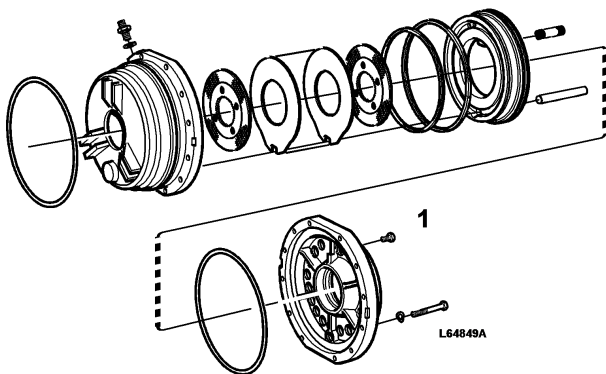


Figure 2
Parking brake (principle diagram)

1. Plug (3 pcs)

Parking brake, electrical system, description

See wiring diagram 15B. Released p-brake: SW501 (p-brake switch) supplies voltage to pin P2.15, I-ECU.

Solenoid valve MA501 receives voltage from V-ECU, pin EC4.

Pin EA9 in the V-ECU receives voltage if SE503 is pressurised (p-brake released), which shuts off the control lamp. When SE503 is pressurised, current to the lamp in SW501 is interrupted, and provides guide lights only aided with current via FU15 and the built-in resistance.

The parking brake is released if:

- The P-brake switch is moved to RELEASE P-brake position for at least 0.2 seconds with the diesel engine running and the gears in neutral.
- Diesel engine >1600 rpm and gear (F/R) engaged.

NOTE!

In all other cases, the parking brake is **applied**.

WARNING

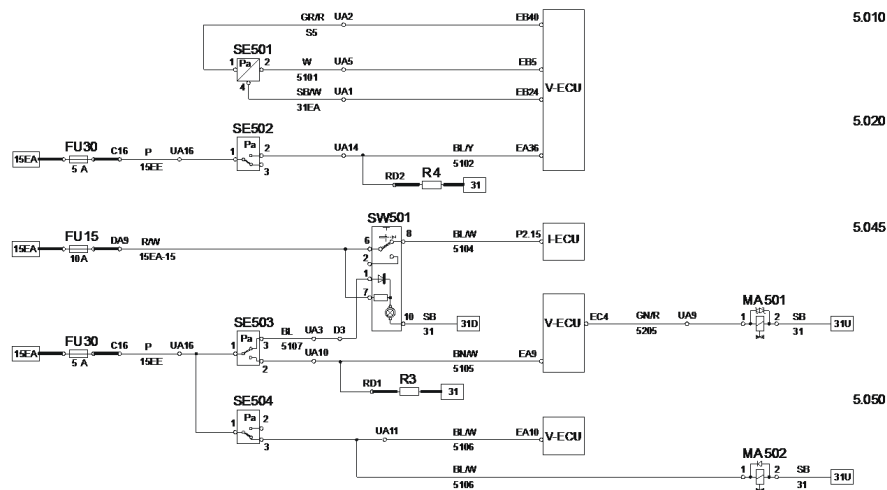
Applied

Parking brake

Applied parking brake, diesel engine running and direction gear engaged results in the following:

- - Control lamp parking brake lit
- - Red central warning lamp
- - Warning on the display panel
- - Buzzer sounds

SCH15B



11178752.P01
V1001564

Figure 3

Document Title: Parking brake, mechanical release	Function Group: 550	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Parking brake, mechanical release

If the engine cannot be started, or if it for any other reason is not possible to build up pressure for releasing the parking brake, it can be released mechanically.

Mechanical release is done by removing three plugs, see figure, and temporarily replacing these with three (M10 x 90 mm) bolts and washers, (the bolts are included in the machine's tool bag). These long bolts should be tightened alternately until they bottom in order to release the parking brake.

NOTE!

This must only be done to enable towing. Immediately after towing has been completed, the long bolts should be removed and the ordinary plugs be re-installed.

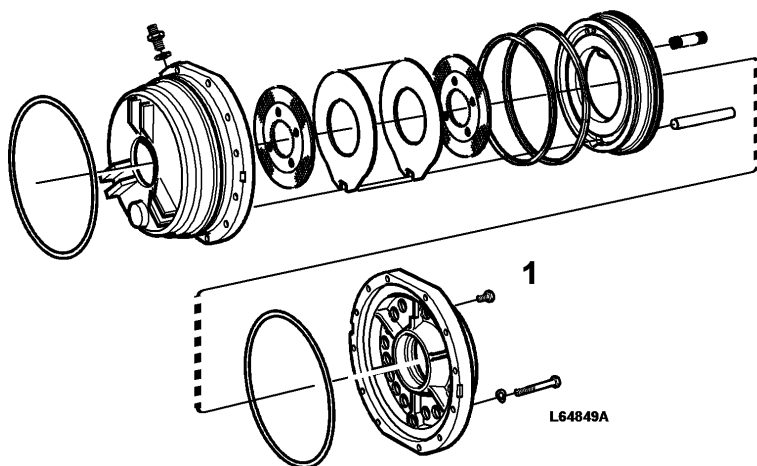


Figure 1
Parking brake (principle diagram)

1. Plug (3 pcs)

Thank you for your purchase.
Have a nice day.

Document Title: Steering, description	Function Group: 600	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Steering, description

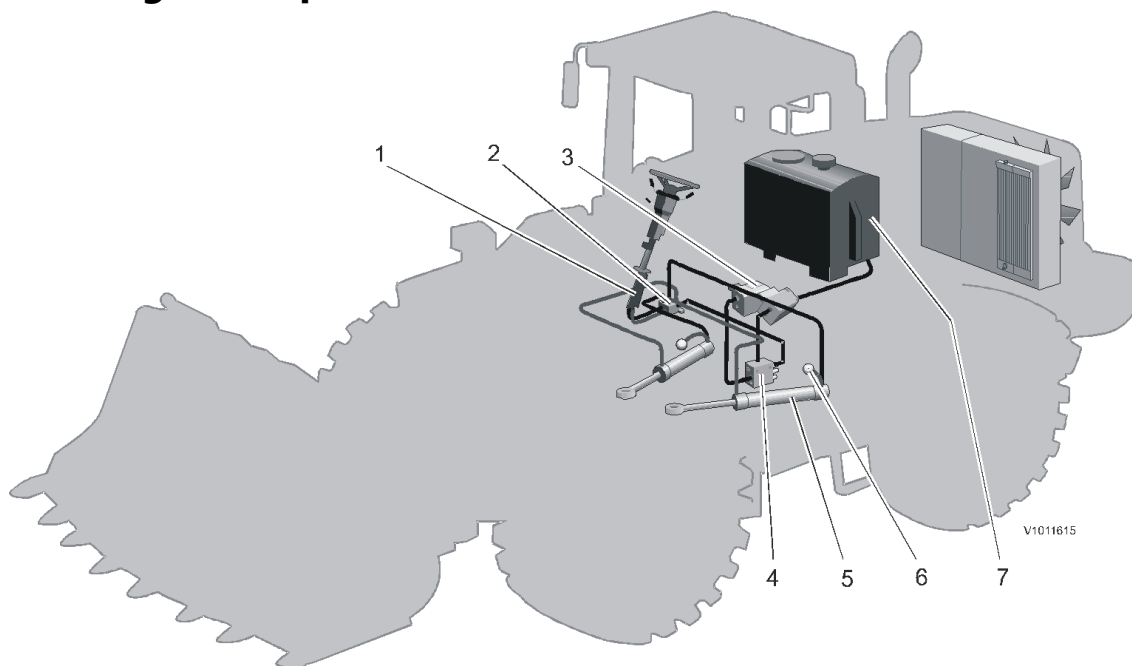


Figure 1
Steering system (principle illustration)

1. Steering valve
2. Shift valve
3. Hydraulic pump
4. Central valve
5. Steering cylinder (2 pcs.)
6. Accumulator (2 pcs.)
7. Hydraulic tank

The machine is equipped with hydrostatic load-sensing (LS) frame steering consisting of a hydraulic pump P2, steering valve, shift valve, two accumulators and two steering cylinders.

Pump 2 (P2) is a variable axial piston pump located on the transmission's power take-off. P2 supplies oil to the central block. The central valve distributes oil and pressure to the brakes, steering (prioritized for P2), servo and working hydraulics.

For a description of the central valve, see Section 9.

The function of the shift valve is to connect the steering cylinder's minus side in order to increase steering force when high pressure is required, approx. 20 MPa (2900 psi). Which cylinders' minus side is engaged depends on in which direction the machine is steered.

The accumulator allows smoother steering by damping pressure peaks in the steering cylinder piston.

Document Title: Steering, description	Function Group: 600	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Steering, function description

NOTICE

The descriptions cover components and conditions in Pump 2, but the description also applies to both Pump 1 and Pump 2 when steering.

Neutral position

Accumulators (1) even out pressure peaks at the piston ends and thus provide a smoother steering. Steering valve (3) is in neutral position.

Because of a certain inner leakage in steering valve (3) and in priority valve (8) in the central valve, there will be a slight pressure in LS-line (6).

Pressure is built up in outlet line (11) and in oil duct (13).

When the steering is not used, the spring force of priority valve (8) is overcome.

The spool closes the connection to the steering system and directs the oil over to the brake and servo systems and the working hydraulics.

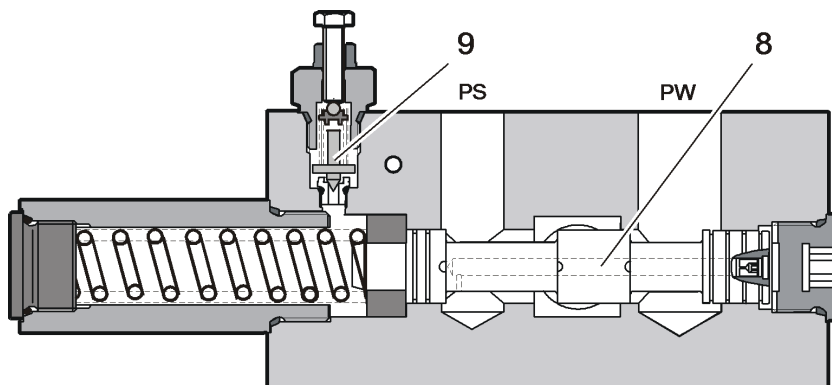
Because valve (8) does not close fully, the pressure at steering valve (3) will be as great as the stand-by pressure.

Valve (14) in the pressure compensator is kept in the lower position by spring (15).

Spring (17) balances flow compensator valve (18) so that oil can pass out to control piston (20), which causes the angle of the yoke to be reduced.

The pressure from the pump is regulated at a value dependent on the force of spring (21) plus the pressure in LS-line (6), which, in neutral, is the same as the pressure in the tank line from the steering valve. In that way a pressure difference is created between lines (13) and (22).

Adjustment is done with adjusting screw (19).



V1014742

Figure 1

Central valve, max. steering pressure and priority valve

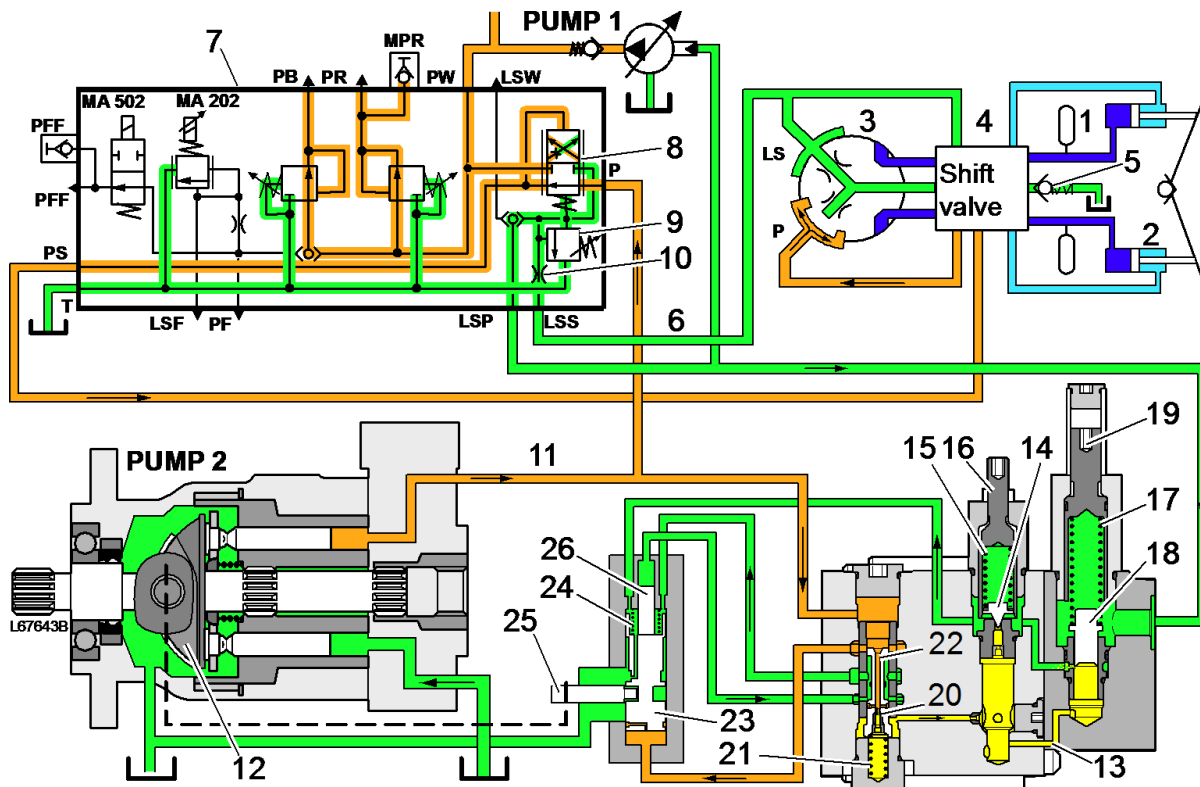


Figure 2
Neutral position

Blue	= Raised return pressure
Green	= Return, without pressure
Violet	= Oil closed in
Orange	= Stand-by pressure
Yellow	= Pressure drop after restriction

1. Accumulators
2. Steering cylinders
3. Steering valve
4. Shift valve
5. Pressure back-up valve, counteracts cavitation
6. Load-sensing line LS
7. Central valve
8. Priority valve
9. Pressure-limiting valve for max. steering pressure
10. Restriction
11. Outlet line, pump
12. Yoke, pump
13. Pressure duct in regulator housing
14. Pressure compensator, valve
15. Spring
16. Adjusting screw, maximum pressure working hydraulics
17. Spring
18. Flow compensator, valve
19. Adjusting screw, stand-by pressure
20. Restriction
21. Spring
22. Control spool
23. Control piston
24. Spring
25. Drive pin

26. Balancing piston

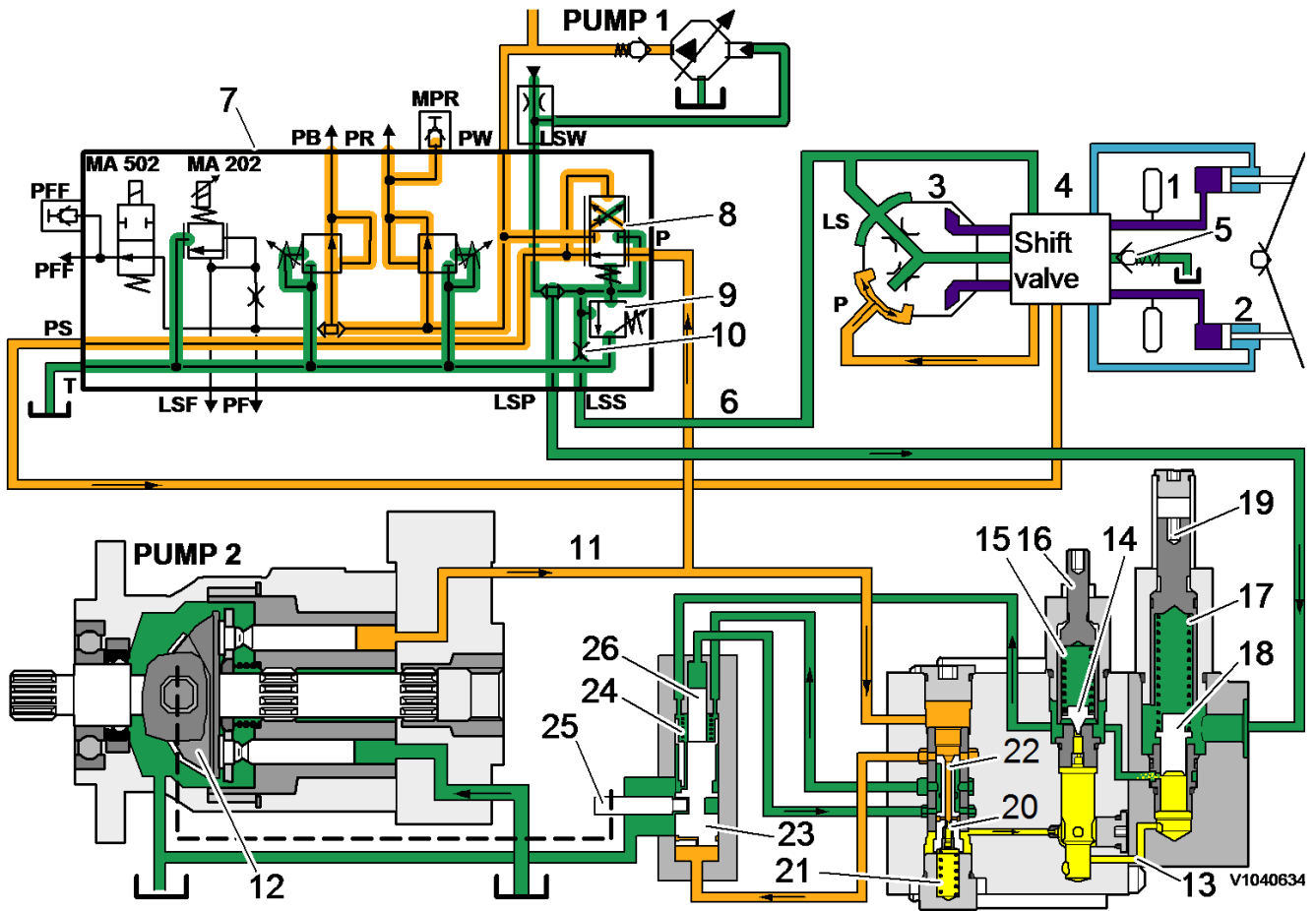


Figure 3
Neutral position with LS-separation

Blue	= Raised return pressure
Green	= Return, without pressure
Violet	= Oil closed in
Orange	= Stand-by pressure
Yellow	= Pressure drop after restriction

1. Accumulators
2. Steering cylinders
3. Steering valve
4. Shift valve
5. Pressure back-up valve, counteracts cavitation
6. Load-sensing line LS
7. Central valve
8. Priority valve
9. Pressure-limiting valve for max. steering pressure
10. Restriction
11. Outlet line, pump
12. Yoke, pump
13. Pressure duct in regulator housing
14. Pressure compensator, valve
15. Spring
16. Adjusting screw, maximum pressure working hydraulics
17. Spring
18. Flow compensator, valve

19. Adjusting screw, stand-by pressure
20. Restriction
21. Spring
22. Control spool
23. Control piston
24. Spring
25. Drive pin
26. Balancing piston

Steering, right (favourable conditions, below 20.0 MPa (2900 psi) steering pressure)

Steering valve (3) is turned and steering pressure is conducted out to one of the steering cylinders (2) via shift valve (4).

The LS-line becomes connected to one of the outlet ports on the steering valve.

The LS-pressure enters on the underside of priority valve (8) and forces, together with the spring force, the spool up and opens the connection to the steering valve.

Thereby the steering is prioritised above brake and servo systems and the working hydraulics. Pump 1 will now supply oil to the brake and servo systems and the working hydraulics when required.

The LS-pressure then passes on to the top of flow compensator spool (18) and together with spring force (17) the spool is forced into a balanced position against the pressure in duct (13).

The oil behind control piston (21) can now be drained via spools (14) and (18) back to the pump housing and the yoke is angled toward maximum flow with the aid of spring (20).

The pump supplies an amount of oil that is proportional to steering lock and steering speed.

When the pump supplies the correct flow, valve (18) is balanced by the pressure in LS-line (6) plus spring (17) against the pressure in duct (13).

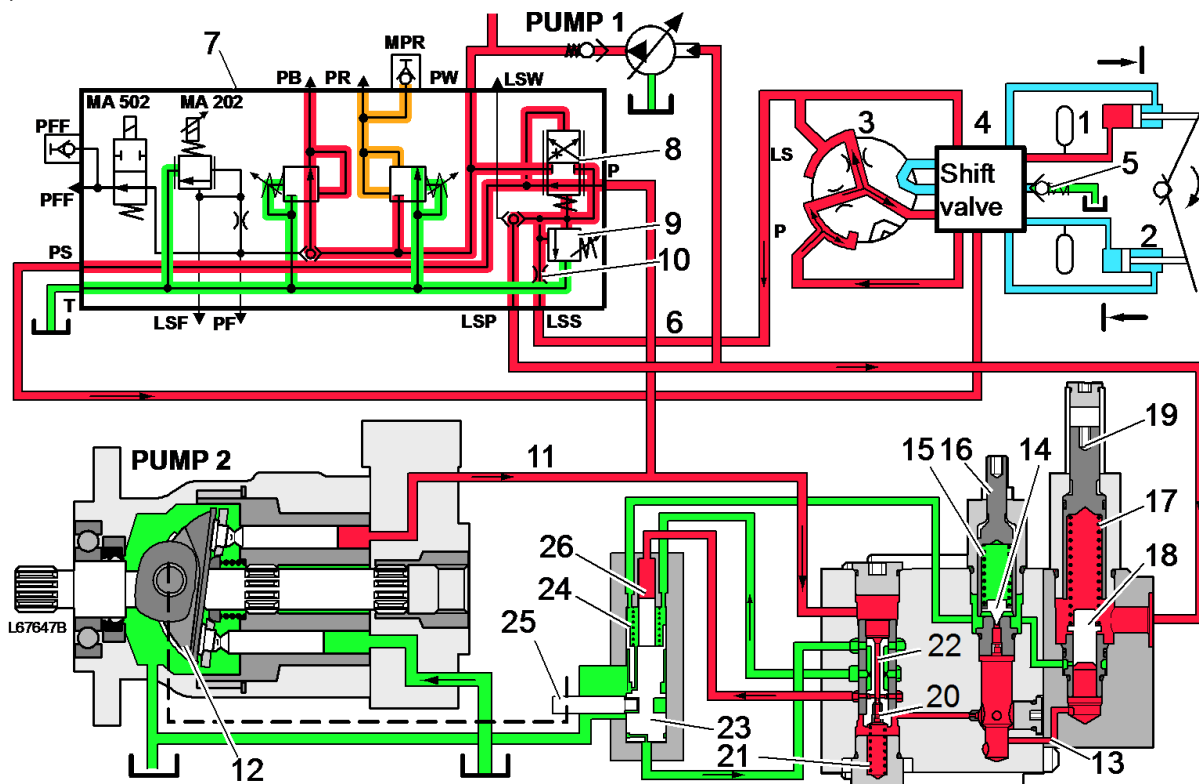


Figure 4
Steering, right (favourable conditions)

Red	= System pressure
Green	= Return, without pressure
Orange	= Stand-by pressure
Blue	= Raised return pressure

1. Accumulators

2. Steering cylinders
3. Steering valve
4. Shift valve
5. Pressure back-up valve, counteracts cavitation
6. Load-sensing line LS
7. Central valve
8. Priority valve
9. Pressure-limiting valve for max. steering pressure
10. Restriction
11. Outlet line, pump
12. Yoke, pump
13. Pressure duct in regulator housing- 14. Pressure compensator, valve
- 15. Spring
- 16. Adjusting screw, maximum pressure working hydraulics
- 17. Spring
- 18. Flow compensator, valve
- 19. Adjusting screw, stand-by pressure
- 20. Restriction
- 21. Spring
- 22. Control spool
- 23. Control piston
- 24. Spring
- 25. Drive pin
- 26. Balancing piston

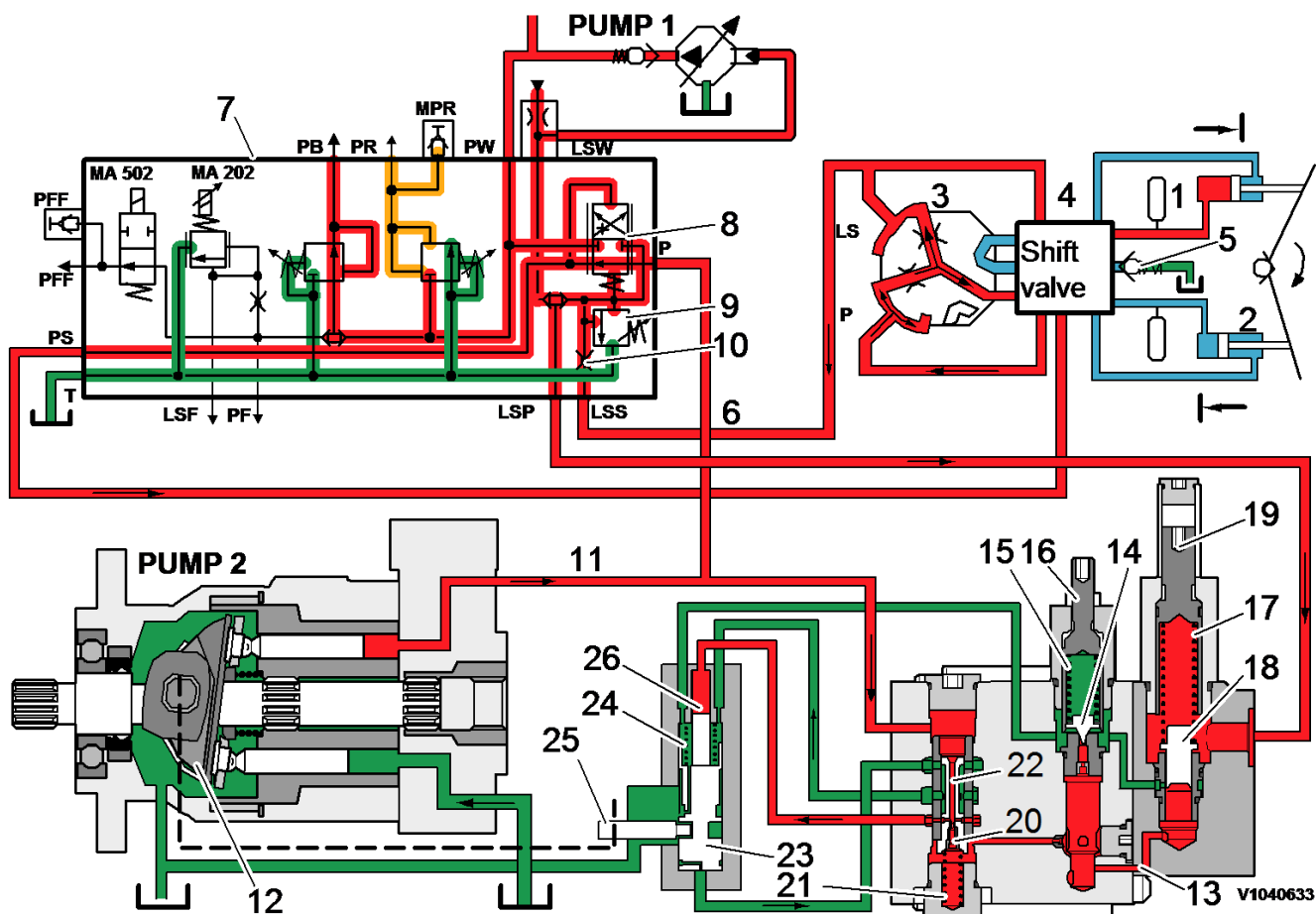


Figure 5
Steering, right (favourable conditions) with LS-separation

Red	= System pressure
-----	-------------------

Green	= Return, without pressure
Orange	= Stand-by pressure
Blue	= Raised return pressure

1. Accumulators
2. Steering cylinders
3. Steering valve
4. Shift valve
5. Pressure back-up valve, counteracts cavitation
6. Load-sensing line LS
7. Central valve
8. Priority valve
9. Pressure-limiting valve for max. steering pressure
10. Restriction
11. Outlet line, pump
12. Yoke, pump
13. Pressure duct in regulator housing
14. Pressure compensator, valve
15. Spring
16. Adjusting screw, maximum pressure working hydraulics
17. Spring
18. Flow compensator, valve
19. Adjusting screw, stand-by pressure
20. Restriction
21. Spring
22. Control spool
23. Control piston
24. Spring
25. Drive pin
26. Balancing piston

Steering, right (severe conditions)

When the pressure in LS-line (6) rises to max. steering pressure (21 MPa) (3046 psi) pressure-limiting valve (9) opens to tank. The LS-pressure drops after restriction (10) when a flow is obtained across the restriction.

The valve in the pressure compensator is kept in the lower position by spring (15).

Spring (17) balances flow compensator valve (18) so that oil can flow on to control piston (21).

The pressure from the pump is regulated to a value dependent on the force of spring (17) plus the pressure in the LS-line after restriction (10).

The pressure is the same as the max. steering pressure and is adjusted with the aid of pressure-limiting valve (9).

The angle of the yoke is reduced and thereby the flow, but max. steering pressure is maintained.

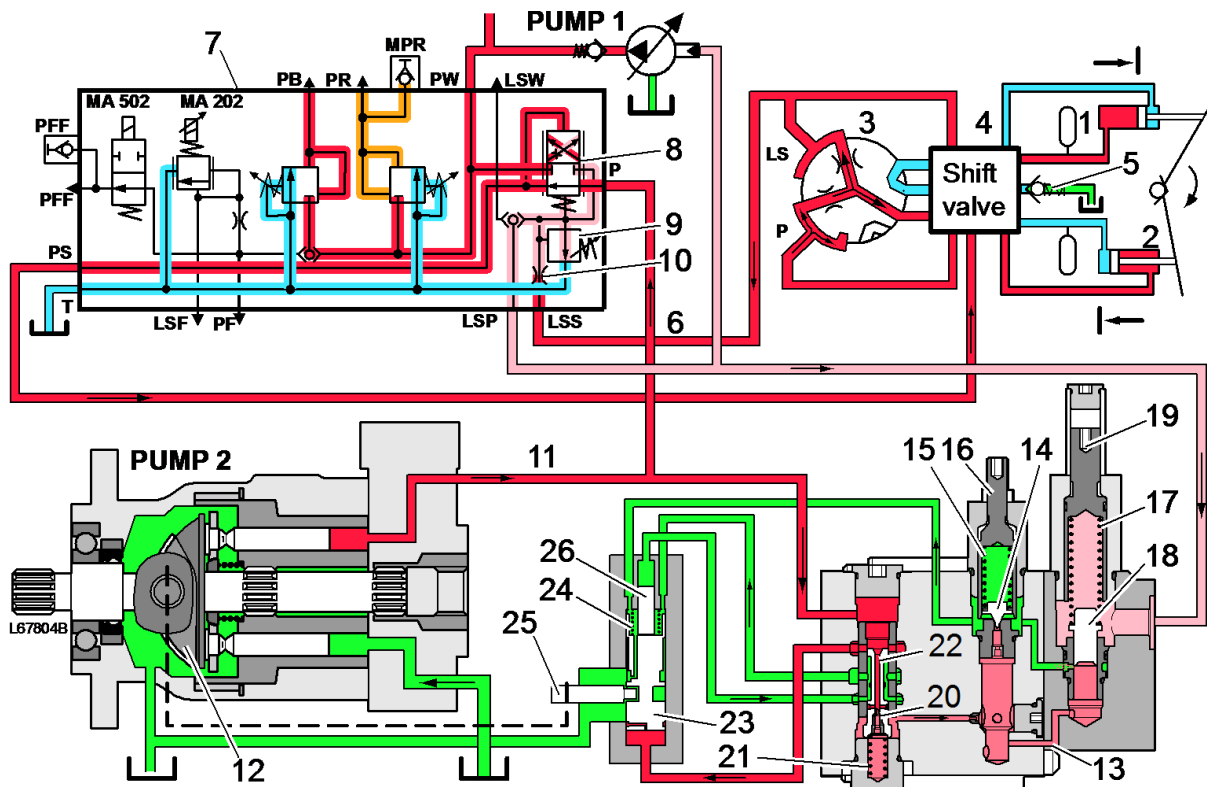


Figure 6
Steering, right (severe conditions)

Blue	= Raised return pressure
Green	= Return, without pressure
Orange	= Stand-by pressure
Red	= System pressure
Light red	= Pressure drop after restriction
Pink	= LS-pressure

1. Accumulators
2. Steering cylinders
3. Steering valve
4. Shift valve
5. Pressure back-up valve, counteracts cavitation
6. Load-sensing line LS
7. Central valve
8. Priority valve
9. Pressure-limiting valve for max. steering pressure
10. Restriction
11. Outlet line, pump
12. Yoke, pump
13. Pressure duct in regulator housing
14. Pressure compensator, valve
15. Spring
16. Adjusting screw, maximum pressure working hydraulics
17. Spring
18. Flow compensator, valve
19. Adjusting screw, stand-by pressure
20. Restriction
21. Spring
22. Control spool
23. Control piston

- 24. Spring
- 25. Drive pin
- 26. Balancing piston

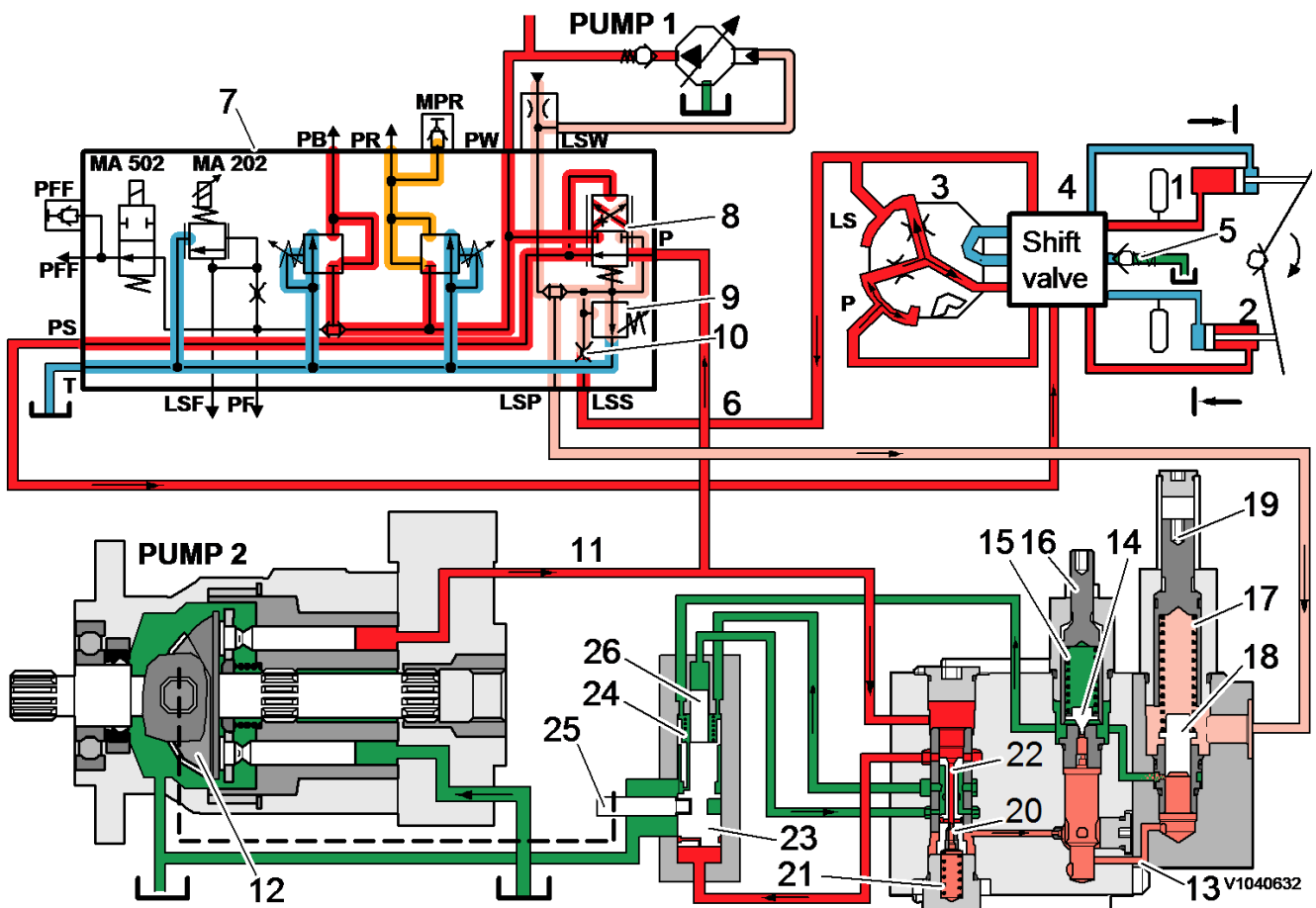


Figure 7
Steering, right (severe conditions) with LS-separation

Blue	= Raised return pressure
Green	= Return, without pressure
Orange	= Stand-by pressure
Red	= System pressure
Light red	= Pressure drop after restriction
Pink	= LS-pressure

- 1. Accumulators
- 2. Steering cylinders
- 3. Steering valve
- 4. Shift valve
- 5. Pressure back-up valve, counteracts cavitation
- 6. Load-sensing line LS
- 7. Central valve
- 8. Priority valve
- 9. Pressure-limiting valve for max. steering pressure
- 10. Restriction
- 11. Outlet line, pump
- 12. Yoke, pump
- 13. Pressure duct in regulator housing
- 14. Pressure compensator, valve
- 15. Spring

16. Adjusting screw, maximum pressure working hydraulics
17. Spring
18. Flow compensator, valve
19. Adjusting screw, stand-by pressure
20. Restriction
21. Spring
22. Control spool
23. Control piston
24. Spring
25. Drive pin
26. Balancing piston

Document Title: Hydraulic description	Function Group: pumps, 645	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic pumps, description

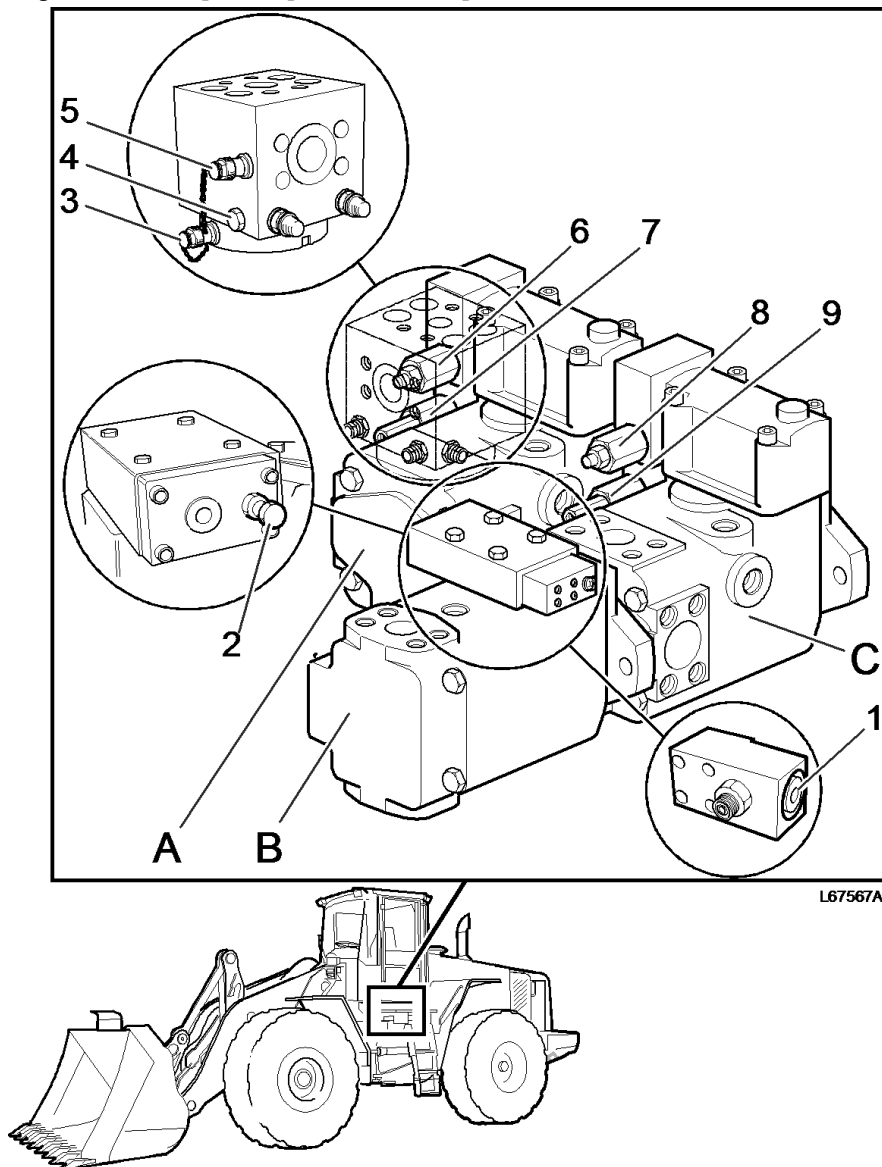


Figure 1

A	Pump 1 (P1)	4	Checking point, LS (load-sensing pressure)
B	Pump 3 (P3)	5	Checking point, P2 (Can be found on checking panel, later type)
C	Pump 2 (P2)	6	Pressure compensator, P1
1	Flow compensator, P3	7	Flow compensator, P1
2	Pressure compensator, P3	8	Pressure compensator, P2

3	Checking point, P1 (Can be found on checking panel, later type)	9	Flow compensator, P2
---	---	---	----------------------

P1 is located on the right side of the transmission and delivers oil to the servo system, brake system and working hydraulics.
P2 is located on the left side of the transmission and delivers oil to the brakes, steering (prioritised), servo system and working hydraulics.
Pump 3 (P3) for cooling fan and brake charging is connected in series with pump 2 (P2).

Document Title: Steering cylinder, cross section	Function Group: 645	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Steering cylinder, cross section

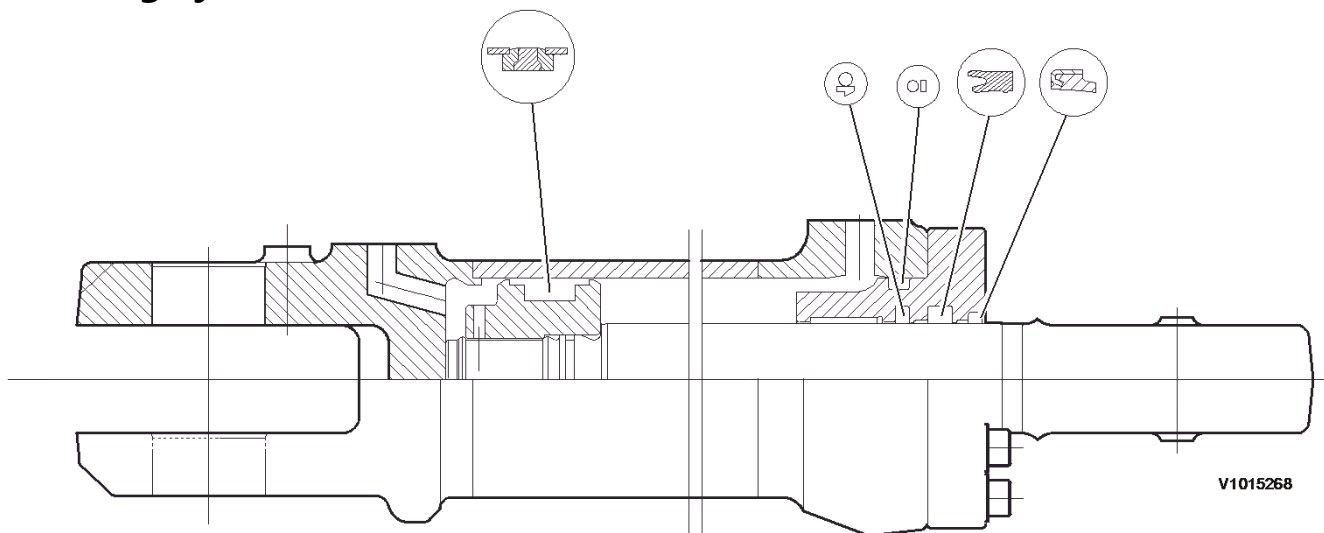


Figure 1
Steering cylinder

Document Title: Steering valve, description	Function Group: 645	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Steering valve, description

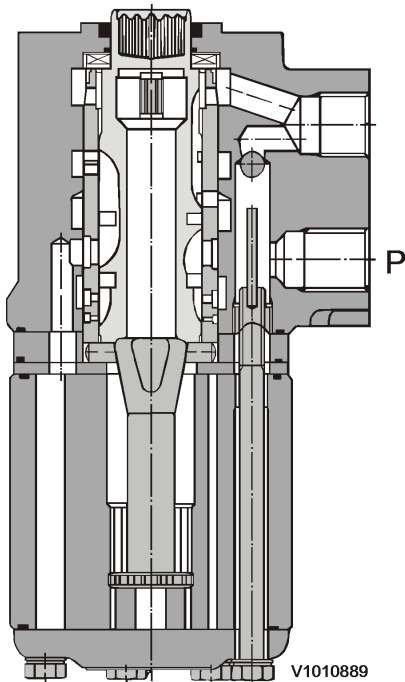


Figure 1
Steering valve

The steering valve is of the "non-reaction" type with closed centre. The steering valve has a load-sensing port (LS), from which a steering pressure goes to the central block's LSS-connection. From the central block's LS-connection the steering pressure goes to the flow compensator on P2 (as well as P1 if the machine is not equipped with LS-separation).

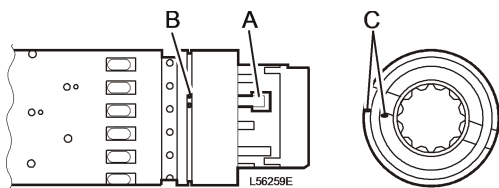


Figure 2

- A. T-shaped grooves (inner spool)
- B. Holes (outer spool)
- C. Punch marks, should line up when assembling

Function

When the steering wheel is kept still, the steering valve is in neutral, which means closed centre. The pump is in the non-angled position and only supplies a stand-by pressure.

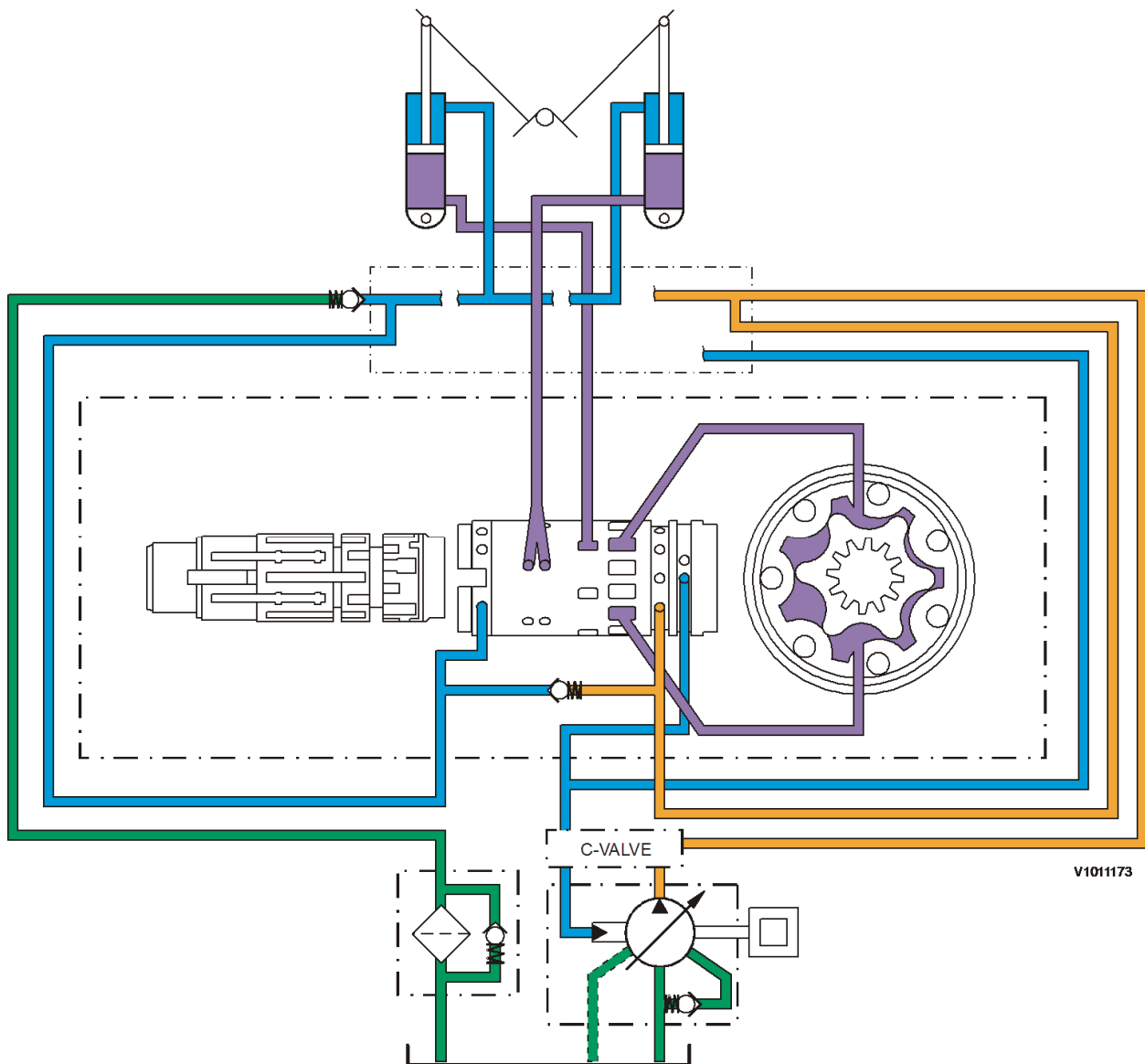


Figure 3
Steering valve, neutral position

Turning the steering wheel in either direction causes the inner and outer spools to turn relative to each other. When this turning (displacement) has amounted to 1.5° the ducts to the metering unit and the LS-port begin to open. The pressure from the steering pump is conducted directly to the load-sensing port, thus increasing the angle of the pump causing it to supply a flow. Via the metering unit oil is supplied to the steering cylinders in proportion to the movement of the steering wheel. When the steering wheel is released the inner and outer spools spring back to the closed position and the pump only supplies stand-by pressure.

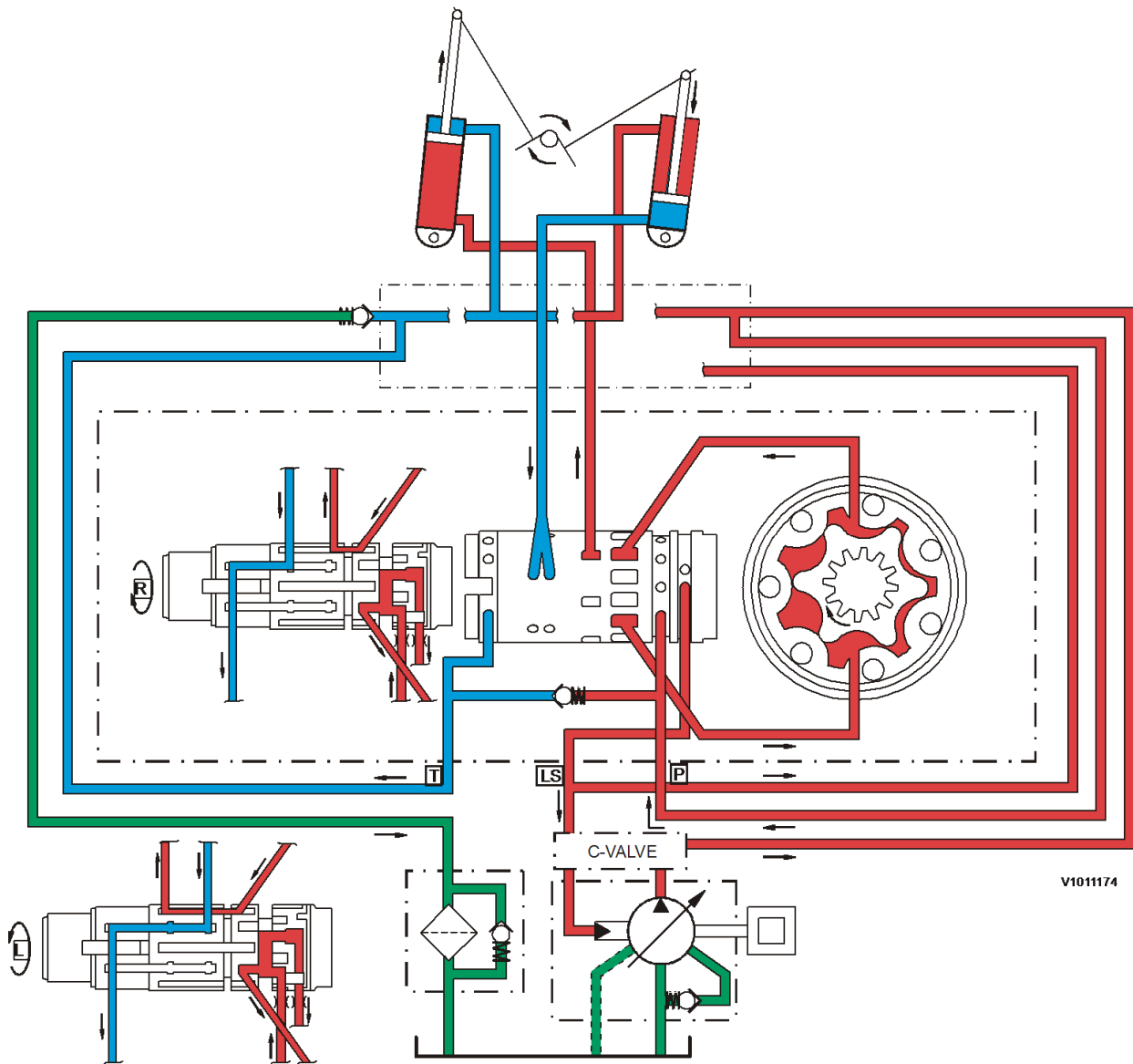


Figure 4
Steering, activation

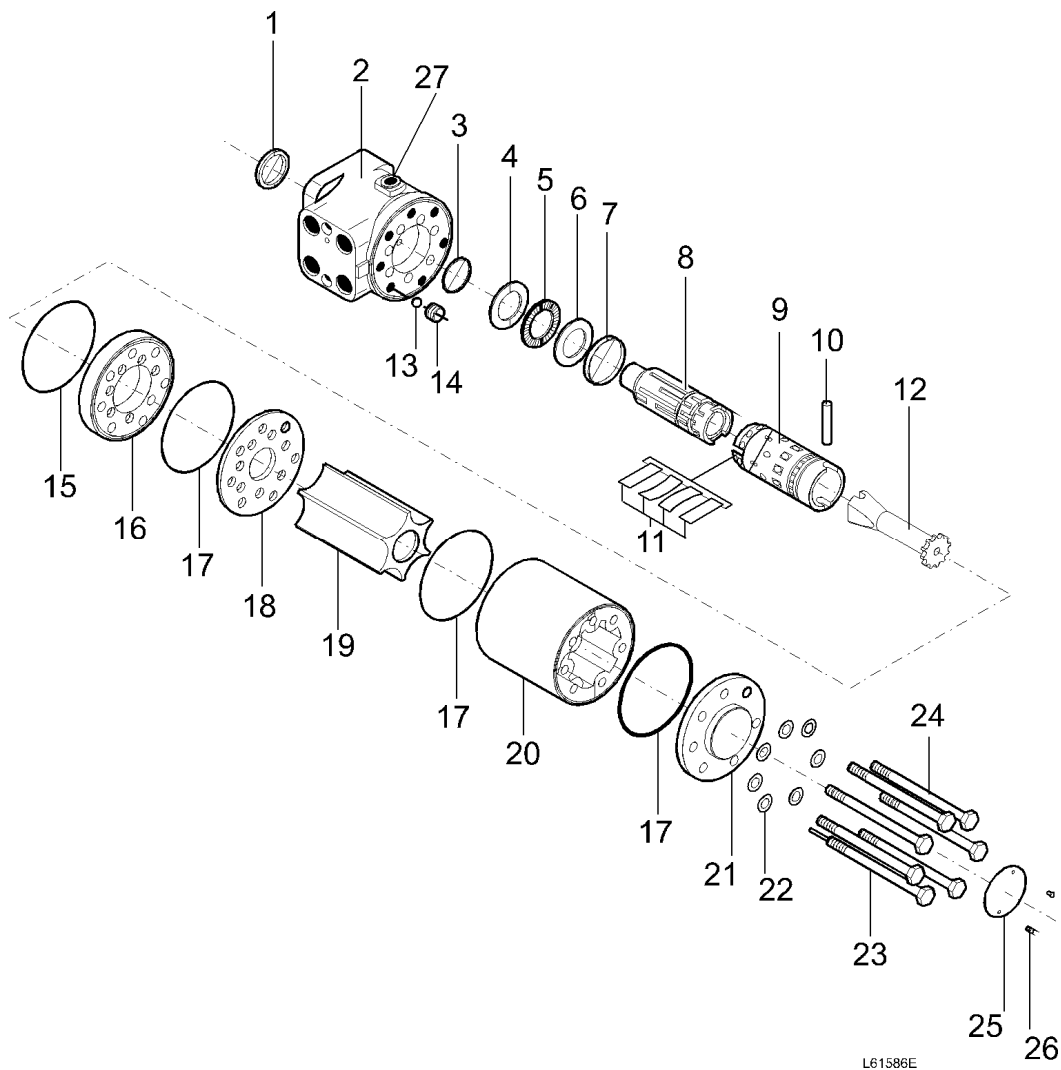


Figure 5

Steering valve

1	Seal	15	O-ring
2	Valve housing	16	Distribution plate
3	O-ring/back-up ring	17	O-ring
4	Axial disc	18	Distribution plate
5	Needle bearing	19	Rotor
6	Bearing race	20	Rotor ring
7	Ring (carrier)	21	Cap
8	Inner valve spool	22	Washer
9	Outer valve spool	23	Bolt with guide pin
10	Cross pin	24	Bolt (6 pcs)
11	Leaf springs (4 pcs)	25	Type plate
12	Rotor shaft	26	Blind rivet
13	Ball (non-return valve)	27	LS-connection (load-sensing connection)
14	Bushing		

No. 19 and 20 = metering unit

Document Title: Shift valve, description	Function Group: 645	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Shift valve, description

There are two versions of the shift valve. The function of both valves is similar, but for the later version a number of parts have been simplified.

Both shift valves are fully interchangeable.

Shift valve, later version

Machine type	Serial no.
L110E	
L120E	ARV 16523- ASH 64186- PED 70701-
L150E	ARV 6333-
L180E, HL	ARV 5278-
L220E	ARV 2433-

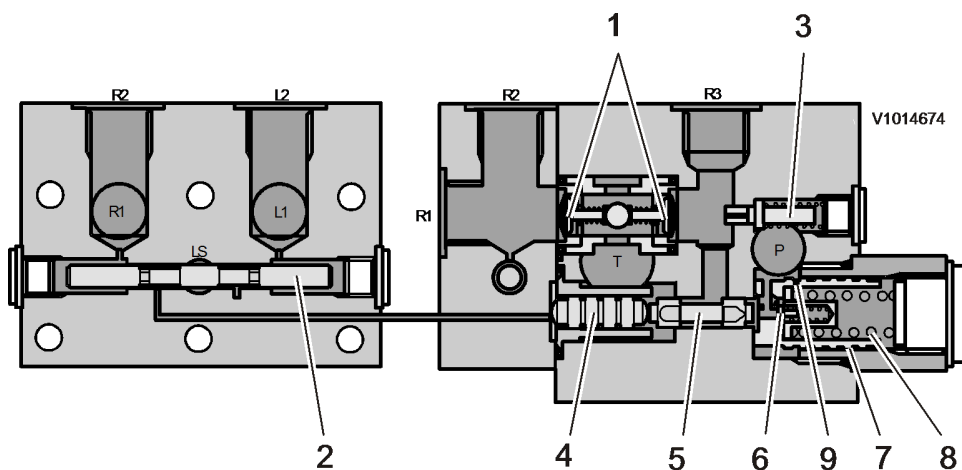


Figure 1
Shift valve (early version)

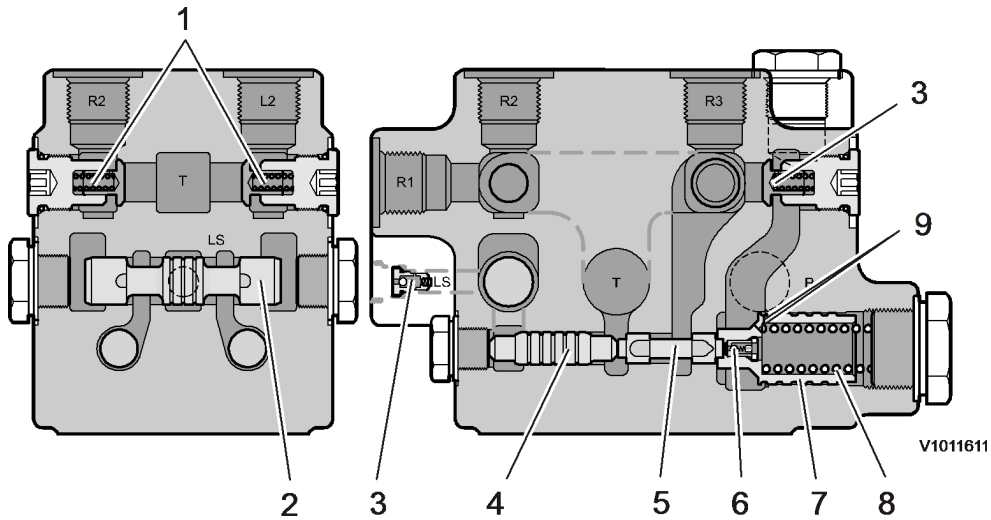


Figure 2
Shift valve (later version)

1. Anti-cavitation valve
2. Directional spool
3. Non-return valve
4. Piston
5. Control spool
6. Non-return valve
7. Damping piston
8. Spring
9. Restriction

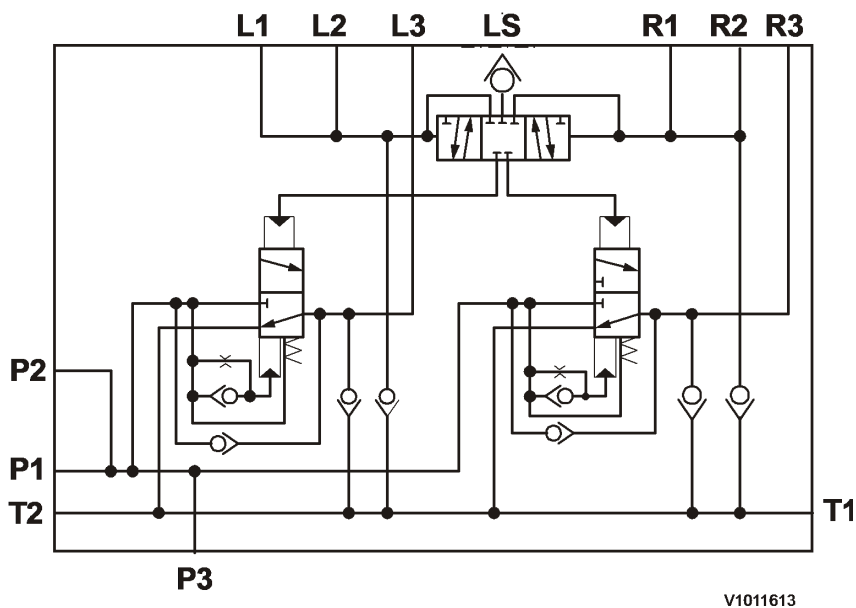


Figure 3
Hydraulic diagram

Document Title: Shift valve, function description	Function Group: 645	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Shift valve, function description

Neutral position

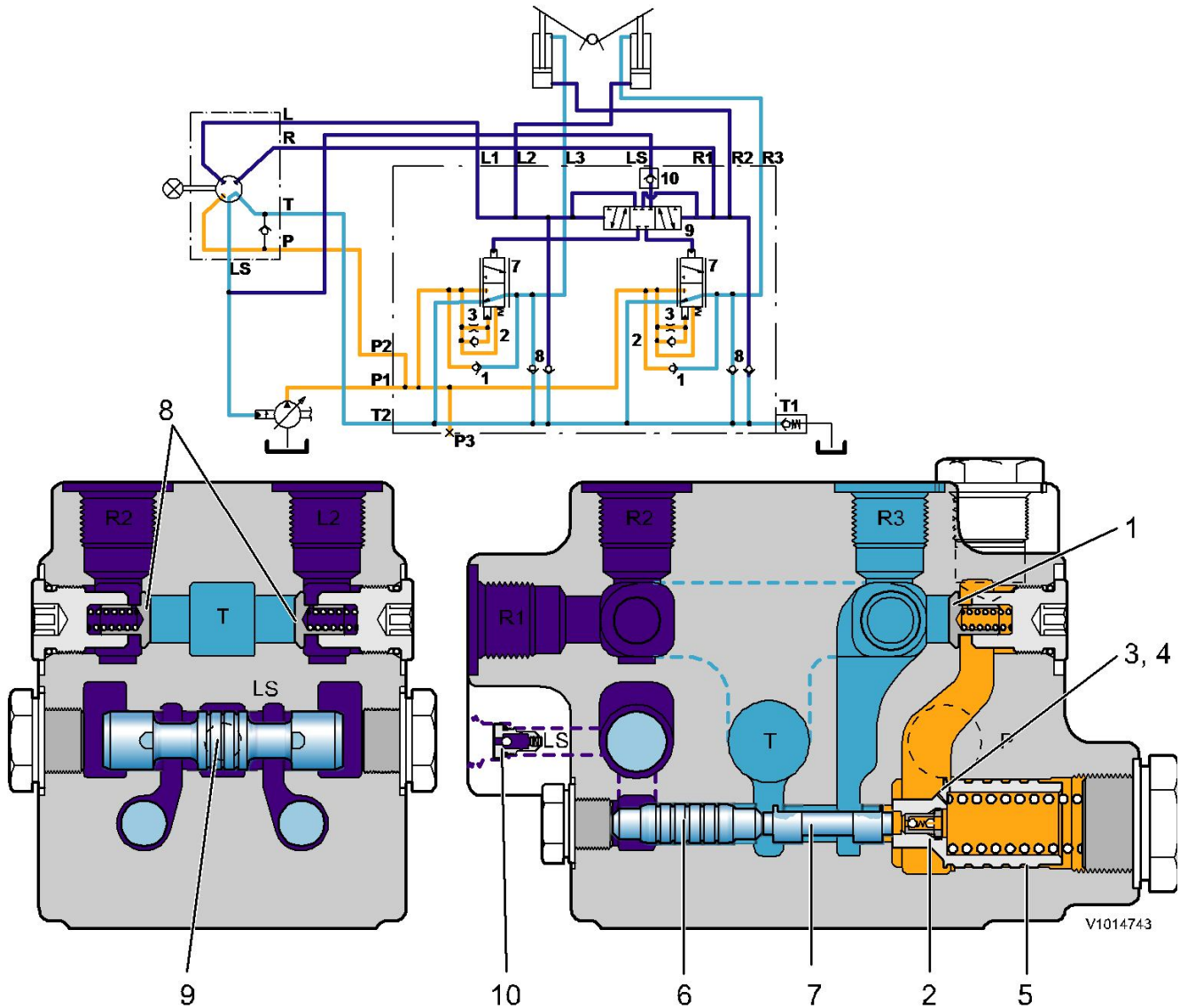


Figure 1
Neutral position

Blue	= Increased return pressure
Violet	= Trapped oil
Orange	= Stand-by pressure

1	Non-return valve	6	Piston
---	------------------	---	--------

2	Non-return valve	7	Control spool
3	Restriction	8	Anti-cavitation valve
4	Restriction	9	Directional spool
5	Damping piston	10	Non-return valve

Neutral position

Connection P1 is connected to the pump and connection P2 with the steering valve. The steering valve is in the neutral position and only stand-by pressure builds in the shift valve up to the control slides (7) and in the damping pistons (5) via the non-return valves (2) and restrictions (3) and (4). Via the control slides (7), the steering cylinders' minus sides are connected to tank. Oil at the steering cylinders' respective plus sides is trapped by the steering valve. The same trapped oil affects the directional slide (9). Oil in the LS-channel is trapped because of the non-return valve (10).

Steering, right (light steering conditions)

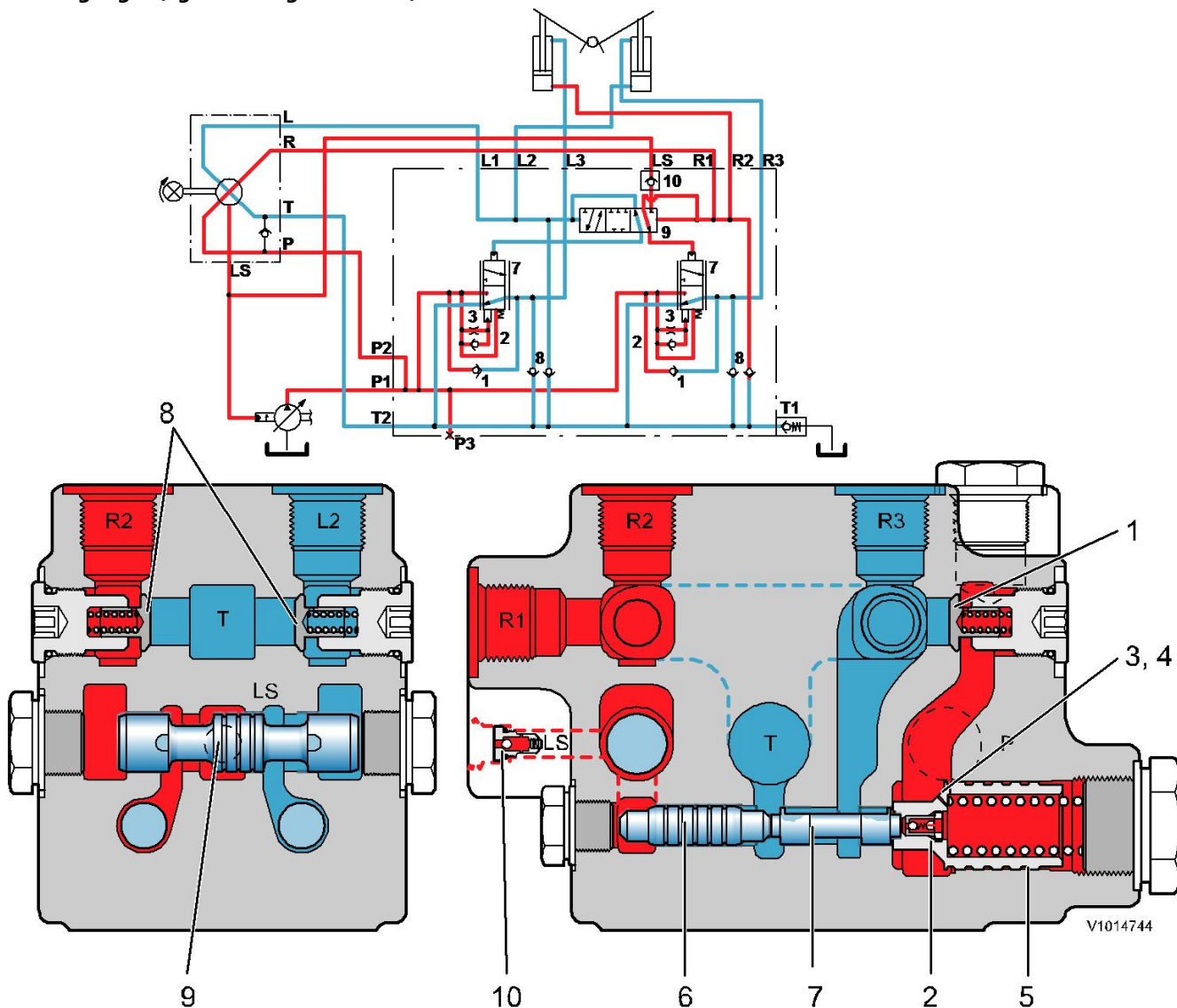


Figure 2
Steering, right (light steering conditions)

Blue	= Increased return pressure
Red	= System pressure

1	Non-return valve	6	Piston
---	------------------	---	--------

2	Non-return valve	7	Control spool
3	Restriction	8	Anti-cavitation valve
4	Restriction	9	Directional spool
5	Damping piston	10	Non-return valve

Light conditions, pump pressure below 20.0 MPa (2900 psi). LS-pressure below 17.5 MPa (2538 psi)

Oil from the steering valve enters at connector R1, travels further to the piston end of the left-hand steering cylinder from connector R2 and actuates the directional spool (9). A change occurs allowing the oil from the LS line to reach the piston (6). The LS pressure is too low to displace the control spool (7). The piston rod end of the right-hand steering cylinder is filled with oil from the return side via the control spool (7) and one of the anti-cavitation valves (8). The machine is steered with oil to the piston end of the left-hand steering cylinder only.

When steering left, the sequence of events is opposite of the above.

Steering, right (heavy steering conditions)

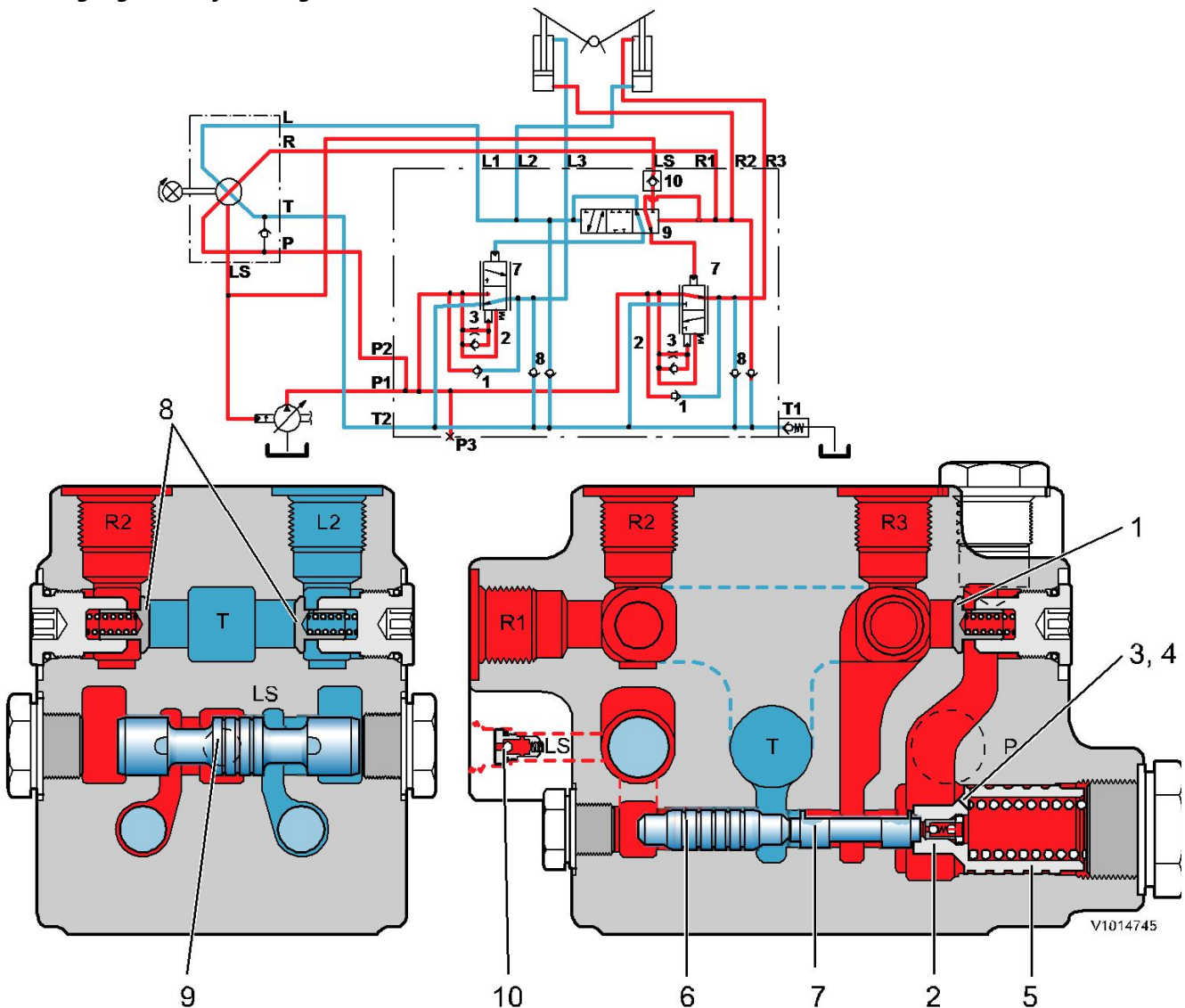


Figure 3
Steering, right (heavy steering conditions)

Blue	= Increased return pressure
Red	= System pressure

1	Non-return valve	6	Piston
---	------------------	---	--------

2	Non-return valve	7	Control spool
3	Restriction	8	Anti-cavitation valve
4	Restriction	9	Directional spool
5	Damping piston	10	Non-return valve

Heavy conditions, pump pressure above 20.0 MPa (2900 psi). LS-pressure above 17.5 MPa (2538 psi)

The initial position is identical to steering under light conditions.

Due to the difference in area between the piston and the control spool (7), the LS pressure acting on the piston (6) begins to impel displacement of the control spool pressing against the damping piston (5). First, the oil in the piston is drained through restrictions (3) and (4). Before the control spool (7) opens, the restriction (4) closes and the oil can then only drain through restriction (3), which provides a smooth pressure build-up out to the piston rod end of the right-hand steering cylinder.

The non-return valve (10) ensures connection even if the LS-pressure drops below 17.5 MPa (2538 psi) for a short period.

Consequently, the machine is steered with oil to the piston end of the left-hand steering cylinder and the piston rod end of the right-hand steering cylinder.

When steering left, the sequence of events is opposite of the above.

Document Title: Hydraulic pump, checking and adjusting standby pressure	Function Group: 645	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic pump, checking and adjusting standby pressure

Op nbr 913-003

[14290266 Hose](#)

[11666052 Pressure gauge](#)

[11666037 Hose](#)

[11666019 Pressure gauge](#)

NOTE!

Earlier and later type checking points occur. Different tools are used, see tool list.

Indications of a faulty stand-by pressure include "nervous hydraulics" (pump imbalance) or long lifting times.

The engine, transmission and hydraulic system should have reached normal working temperature (hydraulic oil temperature 60 °C (140 °F)) before checking.

1. Secure the frame joint with the frame joint lock. Place chocks in front of and behind the wheels.

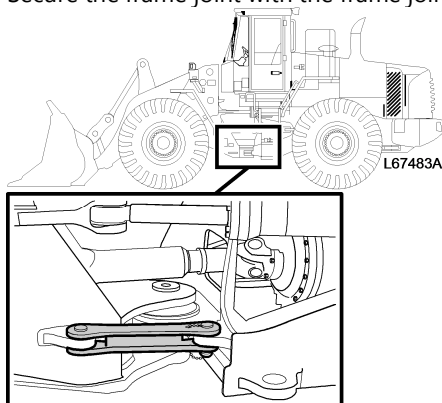


Figure 1

Checking

2. Connect the pressure gauge to the respective checking points for pump 1 (P1) and pump 2 (P2).

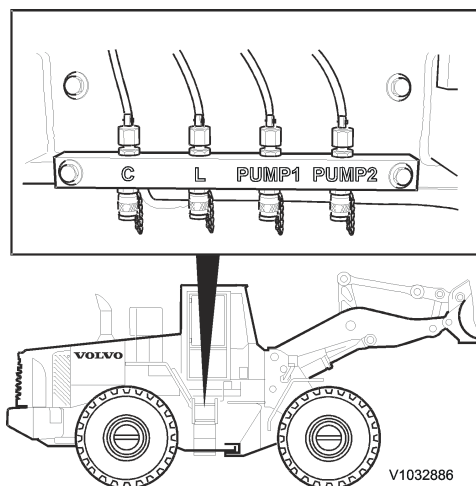


Figure 2
Later type

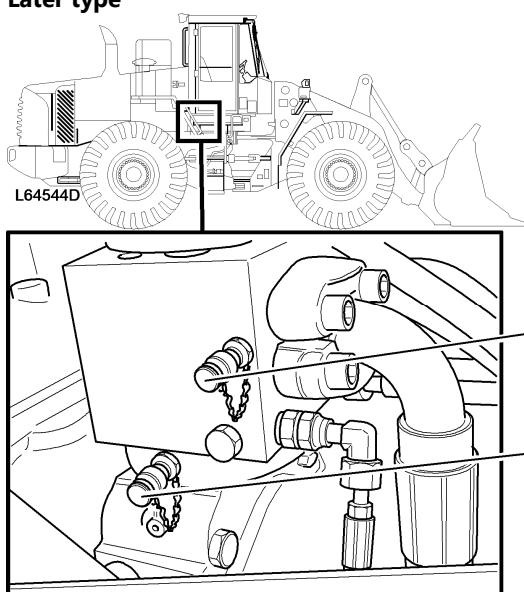


Figure 3
Earlier type

1. Checking point, P1
2. Checking point, P2

3. Start the engine and run it at low idling speed. Read the stand-by pressure for each pump.
Stand-by pressure, see [913 Pump 1 \(P1\) Working hydraulics, brake and servo system, specifications](#),
[913 Pump 1, \(P1\) Working hydraulics, brake system, servo system, specifications](#) respectively
[645 Pump 2 \(P2\) Steering and other hydraulics, specifications](#).

NOTICE

None of the hydraulic functions must be actuated.

NOTE!

The stand-by pressure for P1 must be somewhat lower than for P2 in order to produce a reliable P2 stand-by pressure reading.

In cases where the stand-by pressure for P1 is higher than that for P2, the stand-by pressure for P1 will be read off on both pressure gauges.

NOTE!

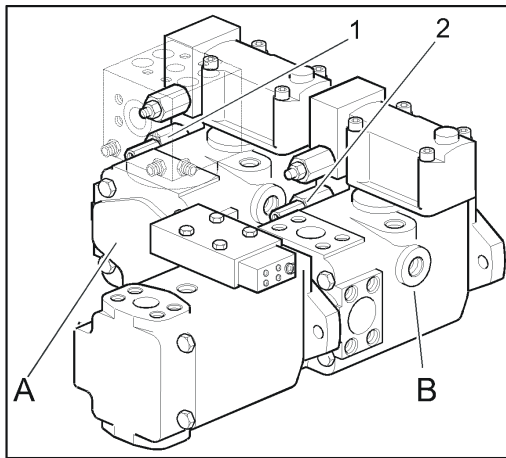
Flow compensator adjustment should be carried out with the engine off.

Adjustment

4. Adjust the respective flow compensators on the pumps until the correct stand-by pressure is obtained from P1 and P2.

Access to the P2 flow compensator is gained by removing the cab floor.

Access to the P1 flow compensator is gained by removing the side plate under the cab on the right side of the machine.



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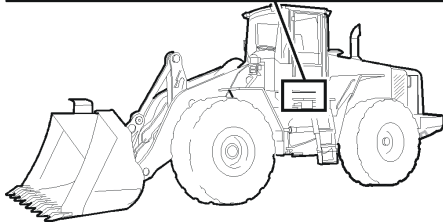


Figure 4

- A. P1
- B. P2

- 1. Flow compensator P1
- 2. Flow compensator P2

5. If it is not sufficient to adjust the stand-by pressure in order to obtain correct lifting time, check the pressure again, with the LS-line removed, see [913 Hydraulic pump, checking and adjusting stand-by pressure \(LS-line removed\)](#).



Construction Equipment

Service Information

Document Title: Steering system, checking and adjusting working pressure	Function Group: 645	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Steering system, checking and adjusting working pressure

Op nbr 645-028

[14290266 Hose](#)

[11666051 Pressure gauge](#)

[11666037 Hose](#)

[11666020 Pressure gauge](#)

NOTE!

Pressure check connections are available in earlier and later versions. Different tools are used, see tool list.



Do not remain under the machine when the engine is running.

Checking

1. Secure the frame joint with the frame joint lock. Chock the wheels (in front and behind).

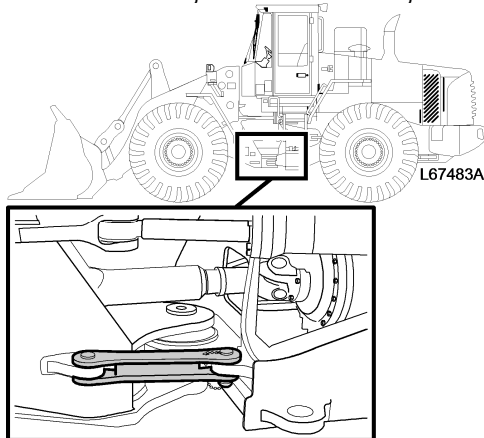


Figure 1

2. Connect the pressure gauge to the pressure outlet on the steering valve.

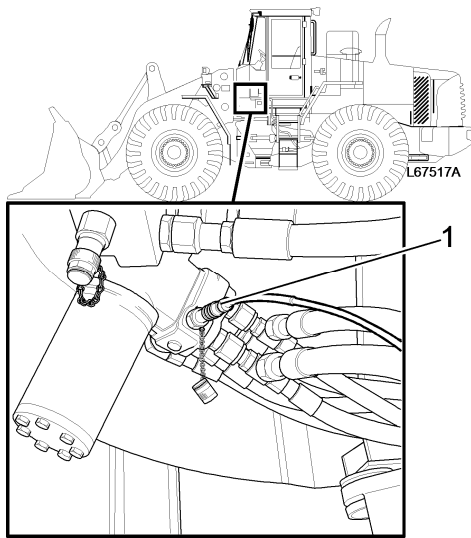


Figure 2

1. Pressure check connection, steering pressure
3. Start the engine and run at low idle speed. Make sure that the hydraulic system is at normal operating temperature approx. 60 °C.
4. Steer towards the frame joint lock's end position and check the steering pressure.
Steering pressure, see [645 Pump 2 \(P2\) Steering and other hydraulics. specifications.](#)

NOTE!

In neutral position, the pressure gauge normally displays approximately 2.5 MPa (25 bar 362.5 psi), which is the priority valve opening pressure in the central valve.

5. Stop the engine.

Adjustment

6. When needed: Adjust the steering pressure on the central block.

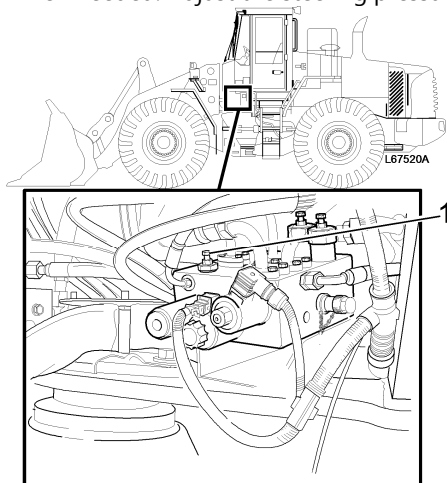


Figure 3

1. Adjusting screw for steering pressure

Document Title: Steering cylinder, link bearing, changing	Function Group: 645	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Steering cylinder, link bearing, changing

Op nbr 64554

[9993722 Support](#)

[9993725 Puller bolt](#)

[9993712 Sleeve](#)

[9993714 Puller bolt](#)

[9993717 Quick-nut](#)

[11667075 Drift plate](#)

Change of link bearing can be performed with the steering cylinder removed from the machine, or with the steering cylinder disconnected from its right or left rear attachment.

The front link bearing is located on the steering cylinder and the rear is located in the rear frame.

Removing

1. Disconnect the steering cylinder from its front or rear attachment, or remove the steering cylinder completely. See [645 Steering cylinder, replacement](#).
2. Remove the lock rings on both sides of the link bearing and pull out the link bearing.

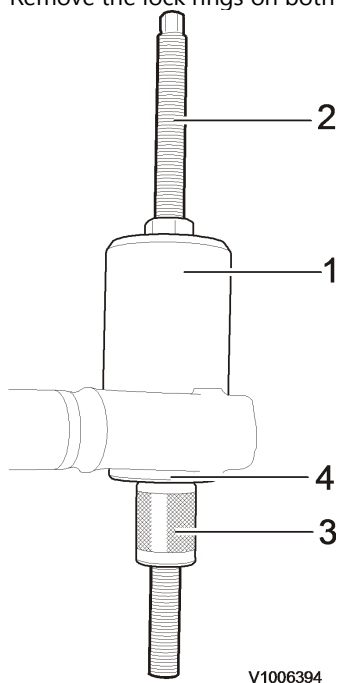


Figure 1

1. 9993712 Sleeve
2. 9993714 Puller bolt
3. 9993717 Quick-nut
4. 11667075 Drift plate

Installing

3. Fit the upper lock ring. Press up the link bearing against the upper lock ring and fit the lower lock ring.

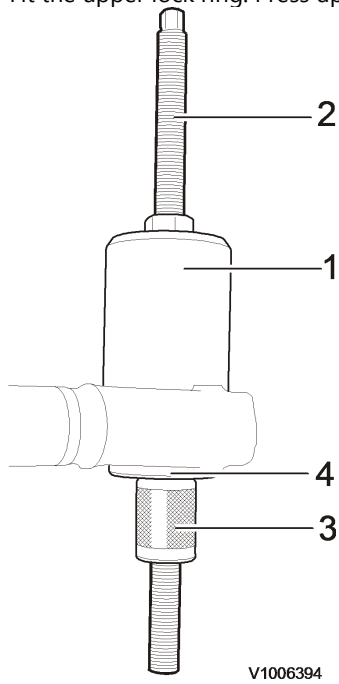


Figure 2

1. 9993712 Sleeve
2. 9993714 Puller bolt
3. 9993717 Quick-nut
4. 11667075 Drift plate

4. Restore the machine. See [645 Steering cylinder replacement](#).

Document Title: Steering cylinder, replacement	Function Group: cylinder, 645	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Steering cylinder, replacement

Op nbr 64506

[9993722 Support](#)

[9993725 Draw bolt](#)

1. Park the machine in the service position according to [191 Safety rules when servicing](#).
2. Disconnect the steps from the pressure checking ramp and then remove the ladder.
Ladder's weight: **approx. 60 kg (132 lbs)**

Removing rear steering cylinder pin

3. Remove the two lock bolts from the rear steering cylinder pin.
4. Remove the grease nipple.
5. Pull out the rear pin.

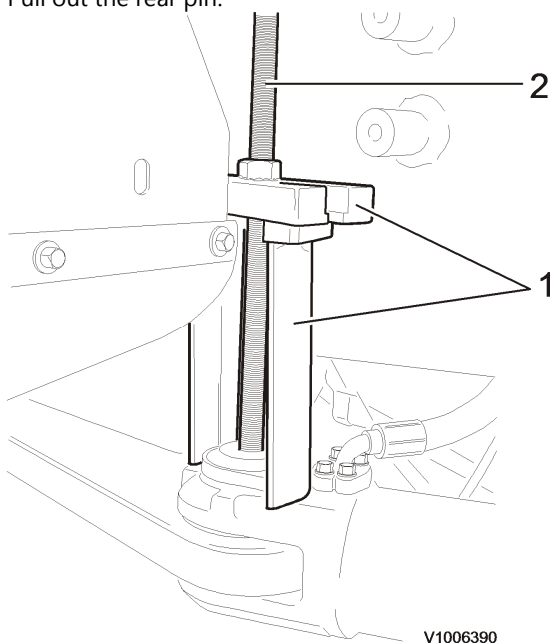


Figure 1

1. 9993722 Support
2. 9993725 Draw bolt

6. Remove the steering cylinder's hydraulic hoses. Collect the oil that drains in a suitable container. Plug the hoses.

Removing front steering cylinder pin

7. Remove the lock bolt from the front pin.
8. Remove the grease nipple.
9. Pull out the front pin.
First use the low support and then change to the high to pull out the whole pin.

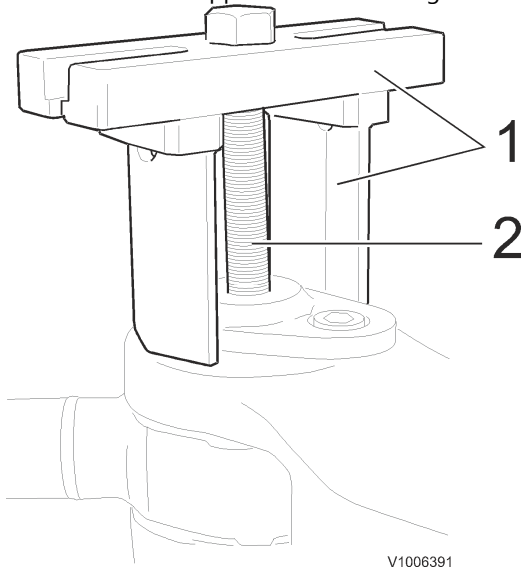


Figure 2

1. 9993722 Support
2. 9993725 Draw bolt

10. Lift away the cylinder.
Steering cylinder's weight: **approx. 40 kg (88 lbs)**
Lay the cylinder with the connection holes for the hydraulic hoses facing down and let the oil drain (collect in suitable container). Plug the connections when the cylinder is empty.

Installing rear steering cylinder pin

11. Clean and check the parts for any damage.

12. **WARNING**

Risk of crushing injuries

Fit the steering cylinder in the rear attachment together with the rubber seals.
Check that it is possible to freely drive the pin into the steering pin hole.

NOTE!

The rubber seals' smooth side shall face away from the bearing.

13. Screw in two guide screws in the threaded holes for the lock bolts.

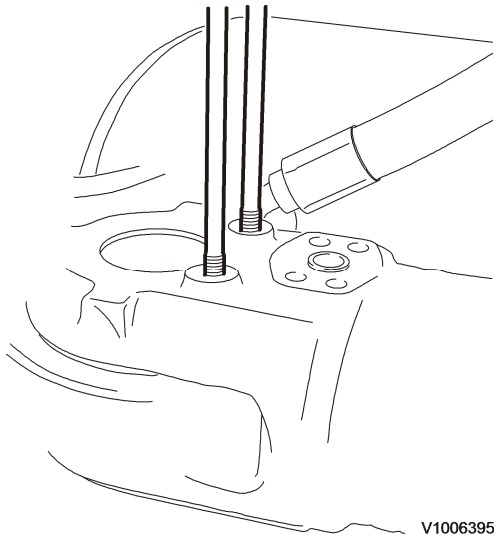


Figure 3

14. Cool down the rear steering cylinder pin 20 °C (36 °F) (or colder) below the ambient temperature.
15. Fit the steering cylinder pin in its position so that the guide screws are guided into the holes for the lock bolts. Knock in the pin.
16. Fit the lock bolts.
17. Fit the grease nipple.

Installing front steering cylinder pin

18. Clean and check the parts for any damage.

19.  **WARNING**
Risk of crushing injuries

Fit the steering cylinder in the front attachment together with the rubber seals.
Check that it is possible to freely drive the pin into the steering pin hole.

20. Screw a guide screw into the threaded hole for the lock bolt.

NOTE!

Do not forget the spacer.

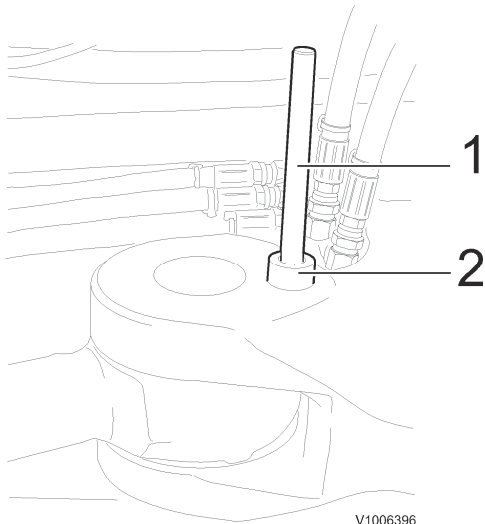


Figure 4

1. Guide screw
2. Spacer

21. Cool down the front steering cylinder pin 20 °C (36 °F) (or colder) below the ambient temperature.
22. Fit the steering cylinder pin in its position so that the guide screw is guided into the hole for the lock bolt. Knock in the pin.
23. Fit the lock bolt.
24. Fit the grease nipple.
25. Fit the steer cylinder's hydraulic hoses.
NOTE!
Remember to remove the plugs.
26. Fit the ladder.
27. Grease the steering cylinder pins.
NOTE!
Manual greasing of the pins is also needed on machines with central lubrication.
28. Restore the machine.
29. Bleed the hydraulic system by steering against end-position (both directions) a few times. See also [900 Hydraulic system, bleeding](#)
30. Test-run the machine and check for correct steering function. Check for any leaks.

Document Title: Steering cylinder, reconditioning	Function Group: cylinder, 645	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Steering cylinder, reconditioning

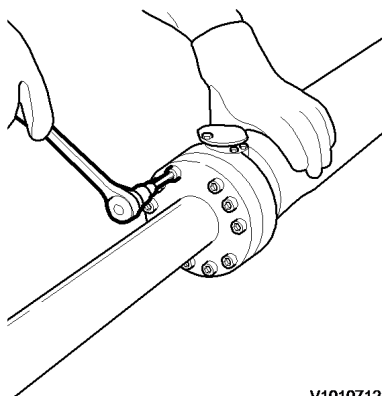
Op nbr 64552

9993724 Wrench



Maintain greatest possible cleanliness during all work on the hydraulic system.

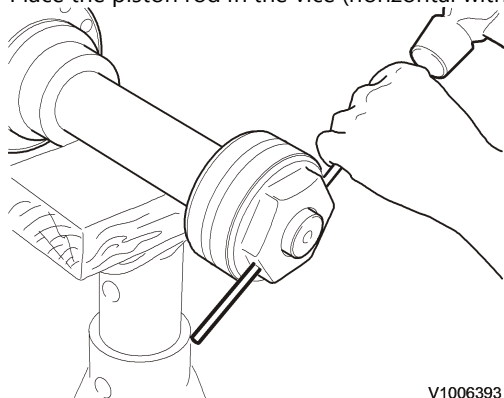
1. Loosen the piston rod guide (eight bolts) and pull out the piston rod from the cylinder. Collect the oil that drains from the cylinder in a suitable container.
Piston rod's weight (incl. piston and piston rod guide): **17 kg (37 lbs)**



V1010712

Figure 1

2. Place the piston rod in the vice (horizontal with support under the rod) and drive out the lock pin.



V1006393

Figure 2

3. Loosen and remove the piston and piston rod guide.

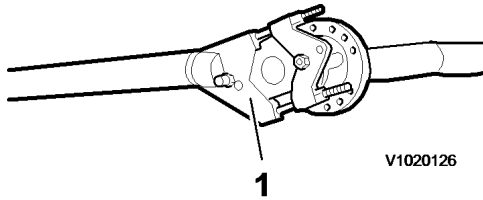


Figure 3

1. 9993724
4. Clean the piston and the piston rod guide with regards to damage and wear. Change seals acc. to [645 Steering cylinder, cross section](#)
5. If needed, change the link bearing, see [645 Steering cylinder, link bearing, changing](#).
6. Mark up the hole for the lock pin.

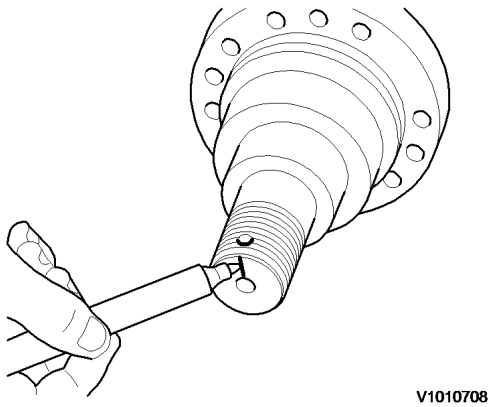


Figure 4

7. Fit the piston rod guide on the piston rod. Fit the piston and tighten down. Tightening torque: **850 ±100 Nm (627 ±74 lbf ft)**

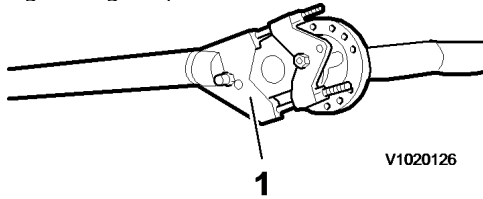


Figure 5

1. 9993724
8. Lock the piston with a spring pin.
NOTE!
If the earlier hole piston – piston rod does not line up after tightening, the piston may not be backed up. Instead, drill a new hole for locking with the spring pin.

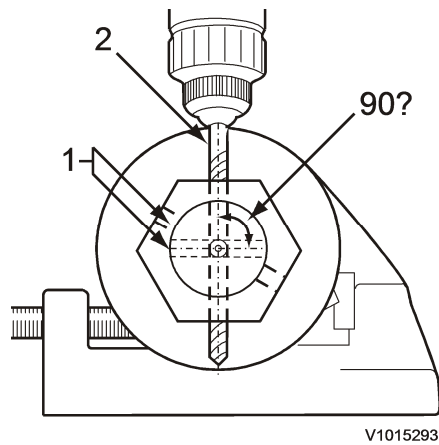


Figure 6

1. Existing hole in piston rod and piston, respectively.
 2. Long drill bit
9. Push in the piston rod in the cylinder.
10. Fit the bolts on the piston rod guide.
Tightening torque: **79 ± 5 Nm (58 ± 4 lbf ft)**

Document Title: Steering valve, replacing	Function Group: 645	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Steering valve, replacing

Op nbr 645-082

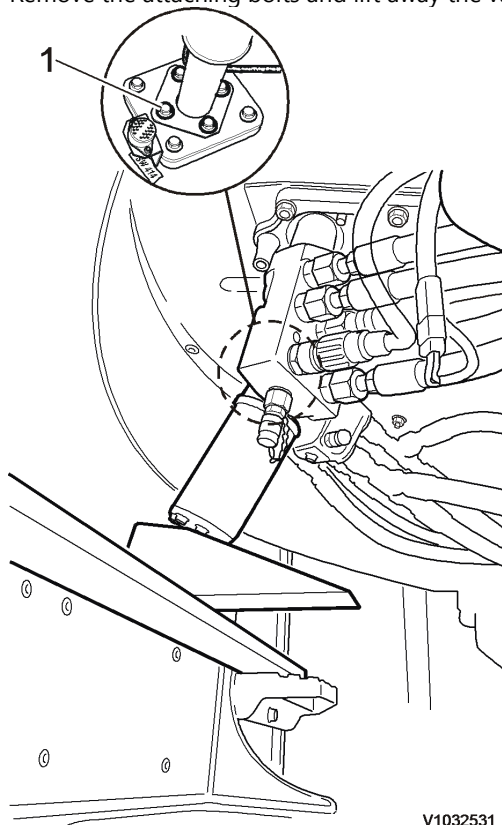
[14360000 Vacuum pump / 24V](#)

NOTICE

Plug all pipes, hoses and connections when removing.

Removing

1. Place the machine in service position.
2. Connect a vacuum pump to the hydraulic tank. See [911 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#)
3. Mark up and disconnect all hydraulic hoses from the valve. Fit protective plugs.
4. Fold aside the front floor mat and expose the steering column's lower end.
5. Support the steering valve with a wooden board and wedge.
Remove the attaching bolts and lift away the valve. Weight: **approx. 15 kg (33 lb)**



V1032531

Figure 1

1. Attaching bolts (4 pcs.)

Installing

6. Fit the attaching bolts and the valve.
7. Remove the protective plugs. Connect all marked hydraulic hoses to the valve. Replace damaged O-rings.

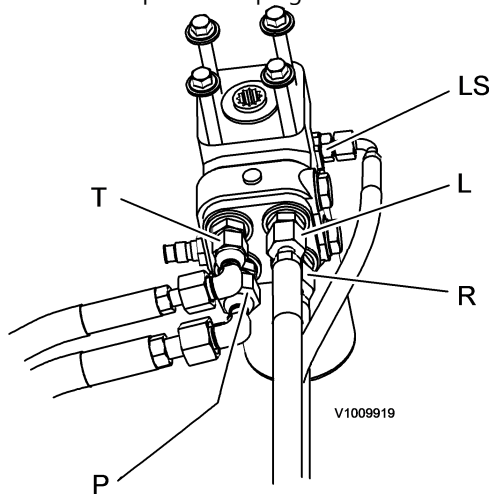


Figure 2
Steering valve

8. Fold the front floor mat back into place.
9. Disconnect the frame joint lock.
10. Bleed the hydraulic system by carefully alternating between steering right and left. Slowly increase the steering angle and finally steer to lock in both directions a few times.
11. Test-run the machine and check for correct steering function. Check for any leaks.
- 12.

Document Title: Steering valve, reconditioning (removed)	Function Group: 645	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Steering valve, reconditioning (removed)

Op nbr 64581

[6999 007 Handle](#)

[6999 025 Plate](#)

[6999 034 Plate](#)

Dismantling

1. Mark the steering valve parts in relation to each other in order to facilitate assembling.
Secure the steering valve in a vice. Use soft protective jaws.
Remove the cover.

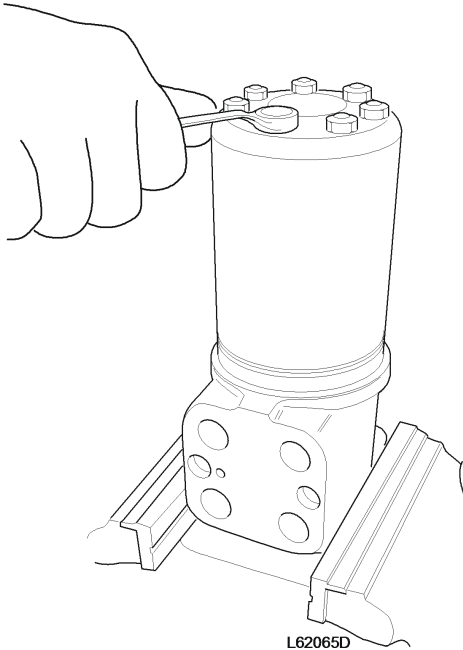


Figure 1

2. Remove the rotor unit (metering unit) as well as the rotor shaft and the distribution plates.
Remove the O-ring.

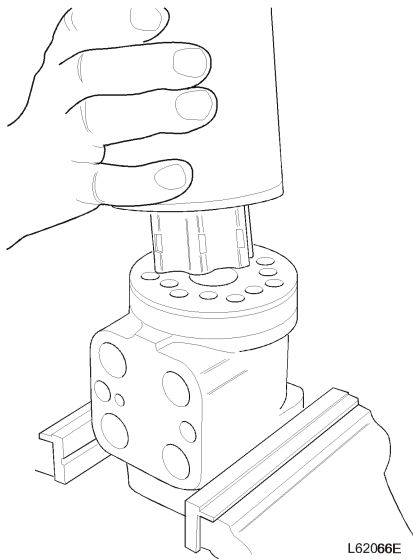


Figure 2
Removing rotor unit (metering unit)

3. Remove the cross-pin.
Remove the steering valve from the vice and remove the ball.

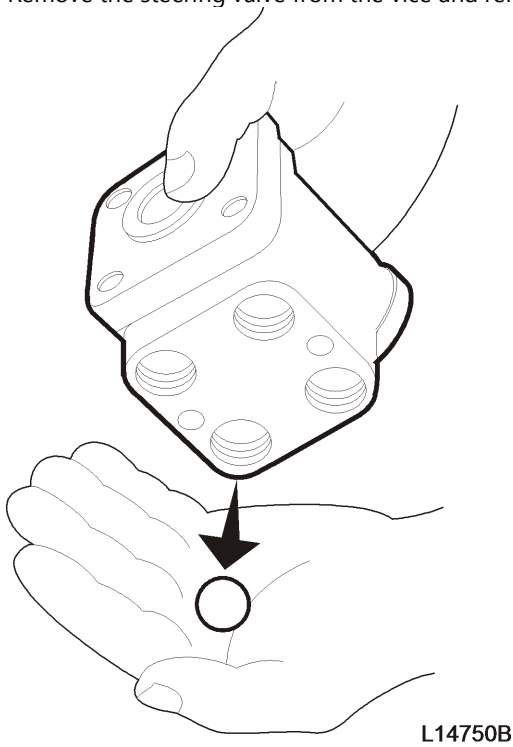


Figure 3
Removing ball

4. Remove the inner and outer spools.

NOTE!

Do not pull on the outer spool. This may cause the spools to come apart, which may cause the return springs to lock the inner spool in the housing.

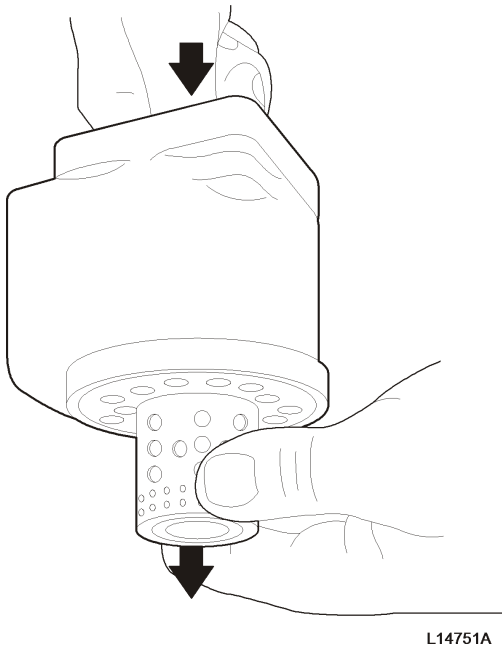


Figure 4
Removing inner and outer spools

5. Remove the axial disc, needle bearing, bearing race and the ring.

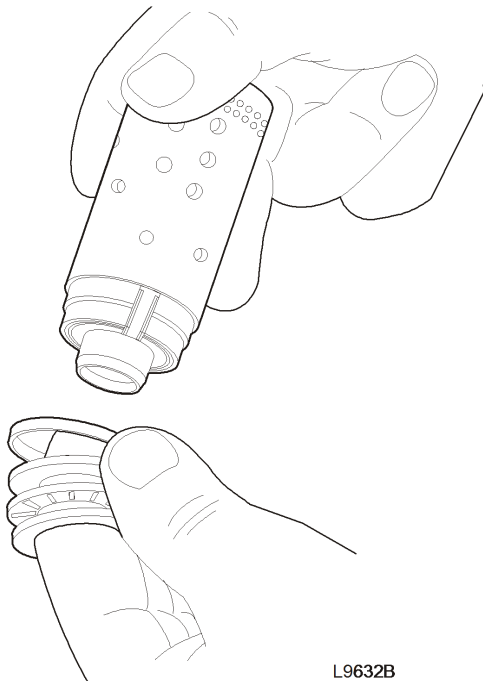


Figure 5
Removing needle bearing and ring

6. Remove the inner and outer seals.
7. Carefully press the inner spool out from the outer spool.
Remove the leaf springs.
Clean and check all parts for wear or damage.
Replace worn or damaged parts.
Replace all seals and washers.
Remove any small burrs with a fine-grain whetstone.
Lapping paste must **not** be used.
Lubricate all parts with hydraulic oil before assembling.

Assembling

8. Fit the outer seal ring.
Secure the valve housing in a vice. Use soft protective jaws.

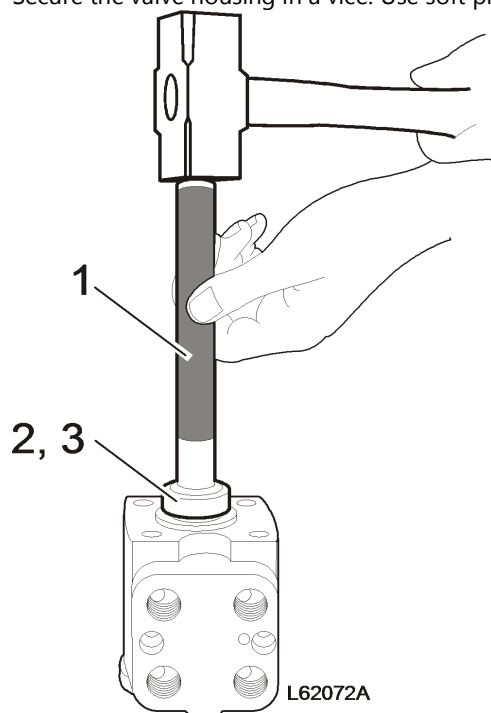


Figure 6
Installing seal ring

1. 6999 007
2. 6999 025
3. 6999 034

9. Place the assembled seal on the drift plate and press the seal into the housing.

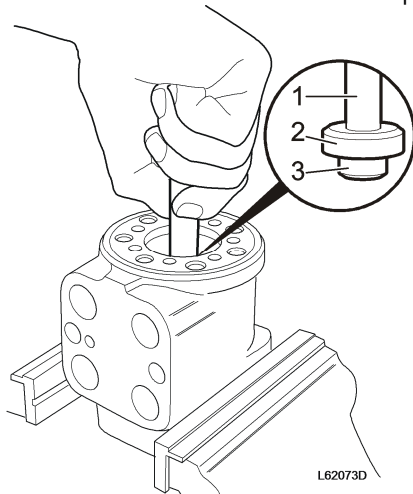


Figure 7
Installing seal ring

1. 6999 007
2. 6999 025
3. 6999 034

10. Assemble the inner and outer spools so that the grooves for the leaf springs are aligned and the T-shaped groove (A) in the inner spool is aligned with the small holes (B) in the outer spool. Check the alignment of the punch marks on the spool tops.

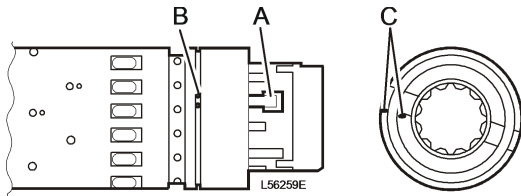


Figure 8

- A. T-shaped groove (inner spool)
- B. Hole (outer spool)
- C. Punch marks

11. Fit the leaf springs. Make sure that they are correctly positioned.

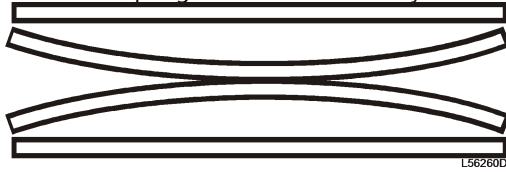


Figure 9

Position of leaf springs

12. Fit the axial disc, needle bearing, bearing race and the ring on the inner and outer spools.

NOTE!

Fit the bearing race with the bevelled edge towards the inner spool. Fit the cross pin on the inner and outer spool.



Figure 10

Positioning axial disc, needle bearing, bearing race and ring

- 1. Ring
- 2. Bearing race
- 3. Needle bearing
- 4. Axial disc

13. Fit the inner and outer spools in the valve housing. Rotate the inner and outer spools so the drive pin is positioned 90° in relation to surface A.

NOTICE

If the inner and outer slides have the incorrect position, the steering valve can function as a motor and the

machine will self-steer.

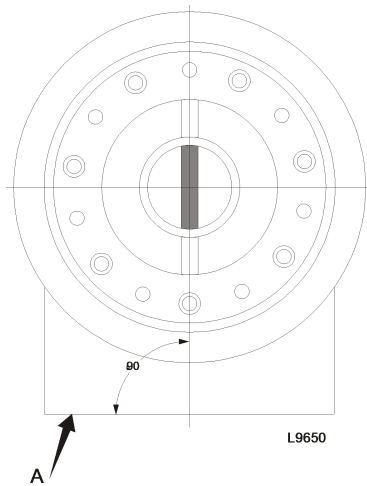


Figure 11

Position of inner and outer spools as well as drive pin in valve housing

14. Fit the O-ring. Fit the distributor plates so that the duct holes align with the corresponding holes in the valve housing.

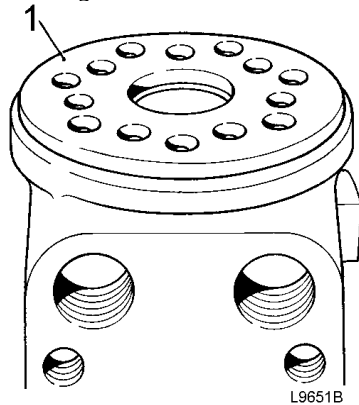


Figure 12

Distributor plate on valve housing

15. Fit the rotor shaft. Fit the O-ring and rotor unit (metering unit) so the tops of two rotor teeth are parallel with surface "A".

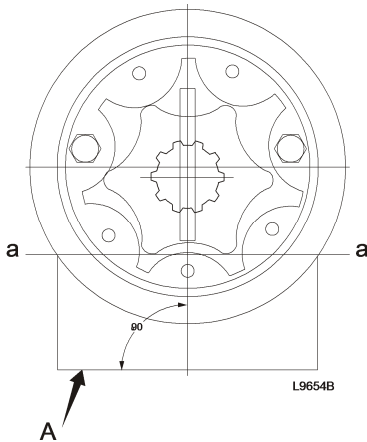


Figure 13

Position of rotor unit (metering unit) in relation to valve housing

16. Fit the cover and the screws.
Fit the ball through pressure connection (P) and fit the screw with the lock pin. Wiggle the valve and listen to hear if the ball moves freely.

Tighten the screws crosswise.

Tightening torque: **30–35 Nm (22–26 lbf ft)**

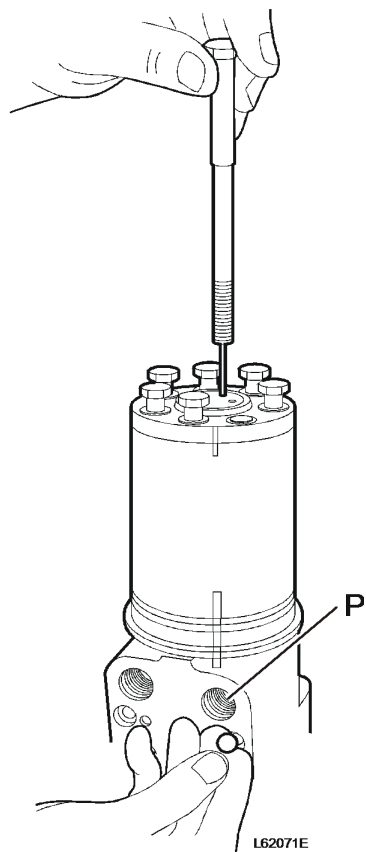


Figure 14
Ball position in valve housing

Document Title: Shift valve, reconditioning (removed)	Function Group: 645	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Shift valve, reconditioning (removed)

Op nbr 64578

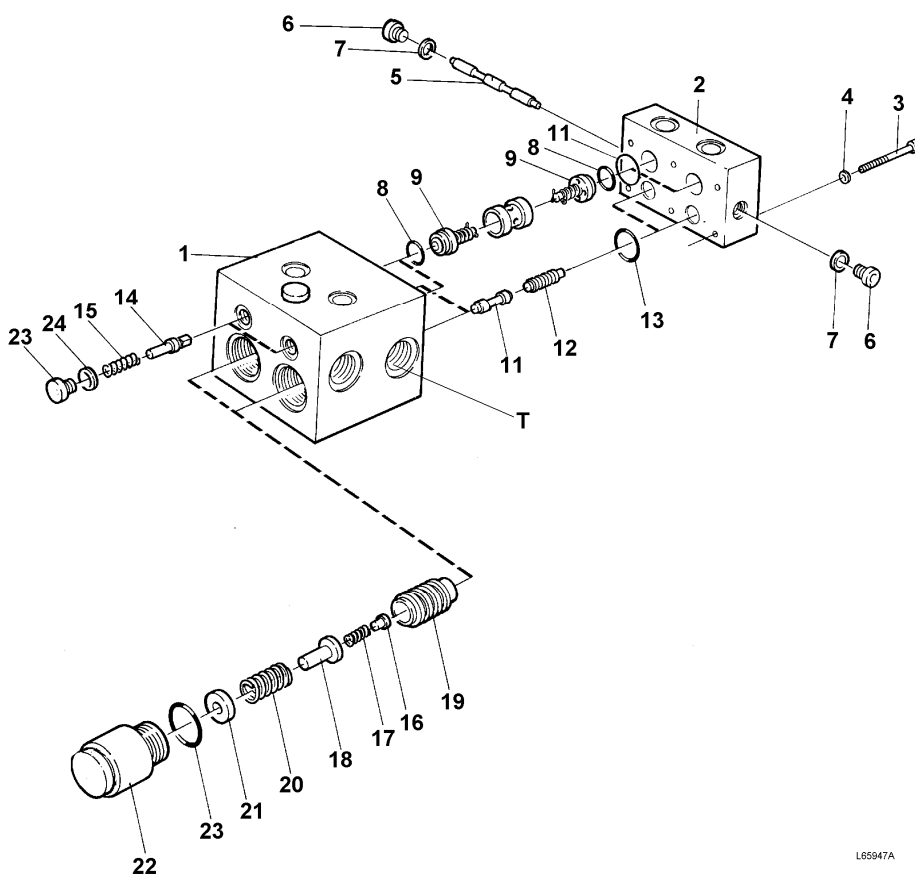


Figure 1
Shift valve

1	Valve housing	13	O-ring
2	End plate	14	Peg
3	Allen head screw	15	Spring
4	Washer	16	Non-return valve
5	Shuttle valve	17	Spring
6	Plug	18	Piston
7	Gasket	19	Piston
8	O-ring	20	Spring
9	Anti-cavitation valve	21	Adjusting shim

10	O-ring	22	Housing
11	Control spool	23	Plug
12	Piston	24	Gasket
T	Tank connection		

1. Remove the union fittings to the tank connections (marked T on the valve).

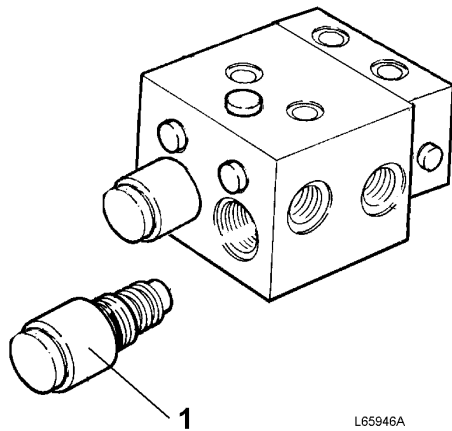


Figure 2

1. Damping valve with housing
2. Remove the damping valves with housings.
3. Dismantle the damping valves. Clean and check the parts for wear or damage. Replace O-rings and springs. Assemble the damping valves.

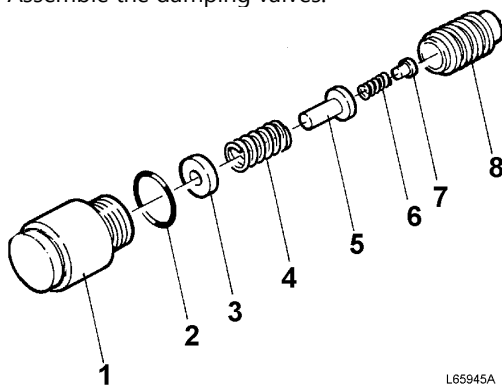


Figure 3

1. Housing
2. O-ring
3. Adjusting shim
4. Spring
5. Piston
6. Spring
7. Non-return valve
8. Piston

4. Remove the plugs and press out the shuttle valve. Clean and check the parts for damage or wear. Fit the shuttle valve, washers and plugs.

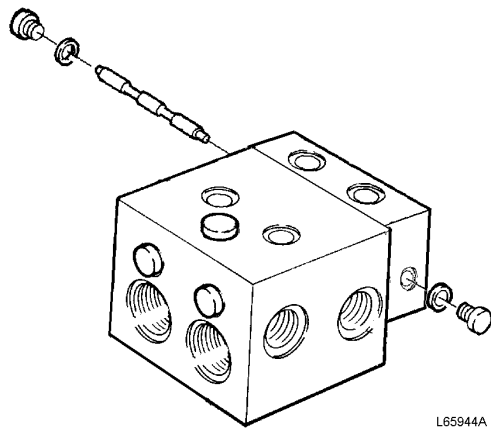


Figure 4
Shuttle valve

5. Remove the six Allen head screws and remove the end plate.
6. Use a bent screwdriver or an Allen key in the tank connection to press out the anti-cavitation valves. Clean and check the parts for damage or wear.

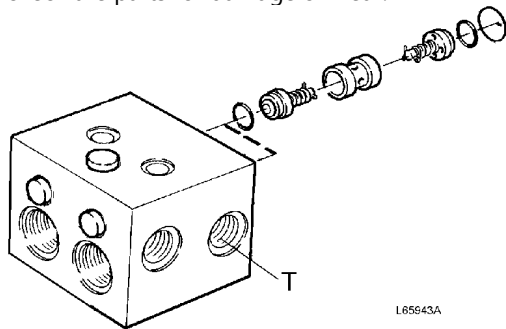


Figure 5

T Tank connection

7. Replace the anti-cavitation valves and the O-rings. Fit the valves, spacers and new O-rings.

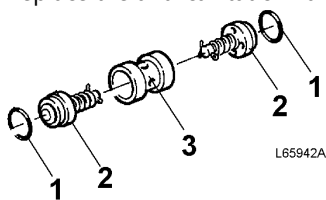


Figure 6

1. O-ring
2. Anti-cavitation valve
3. Spacer

8. Press out the control spools and pistons (press in the connections for the damping valves). Clean and check the parts for damage or wear. Replace the O-rings. Fit the spools, pistons and new O-rings.

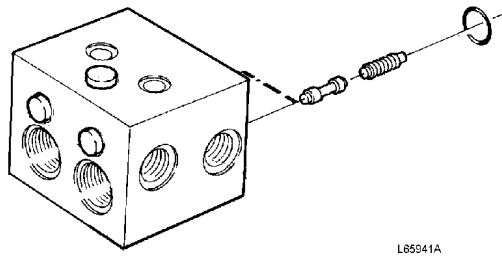


Figure 7

T Tank connection

9. Fit the damping valves with housings.
10. Remove the plugs and press out the non-return valves (from the end plate). Clean and check the parts for damage or wear. Fit the non-return valves, new springs and plugs.

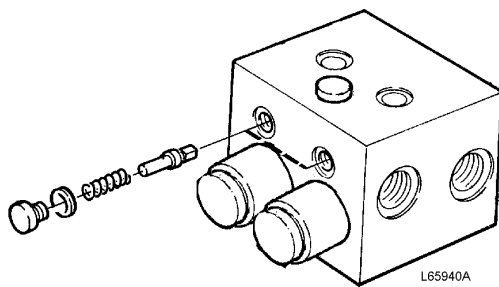


Figure 8

11. Fit the end plate and tighten with the six Allen head screws.
12. Fit the union fittings for the tank connections.

Document Title: Steering valve, reconditioning (removed)	Function Group: 645	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Steering valve, reconditioning (removed)

Op nbr 64581

[6999 007 Handle](#)

[6999 025 Plate](#)

[6999 034 Plate](#)

Dismantling

1. Mark the steering valve parts in relation to each other in order to facilitate assembling.
Secure the steering valve in a vice. Use soft protective jaws.
Remove the cover.

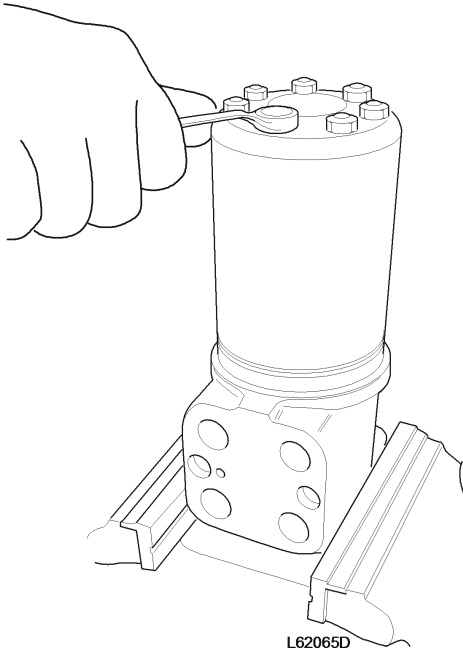


Figure 1

2. Remove the rotor unit (metering unit) as well as the rotor shaft and the distribution plates.
Remove the O-ring.

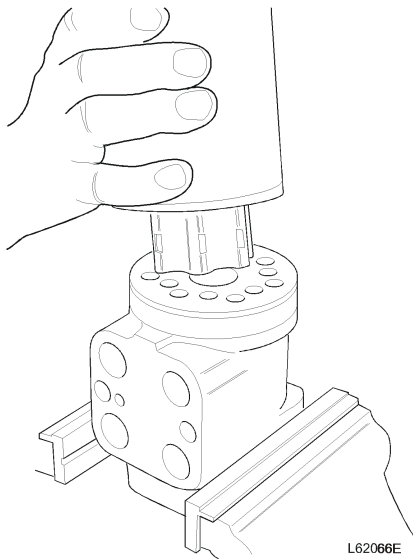


Figure 2
Removing rotor unit (metering unit)

3. Remove the cross-pin.
Remove the steering valve from the vice and remove the ball.

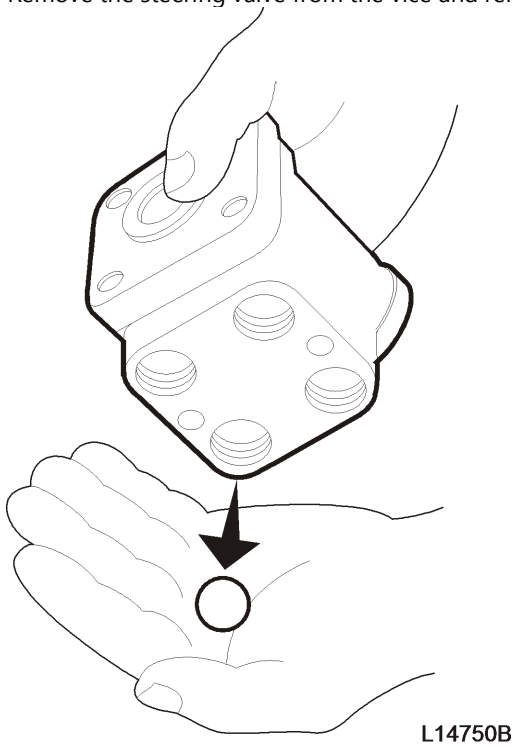
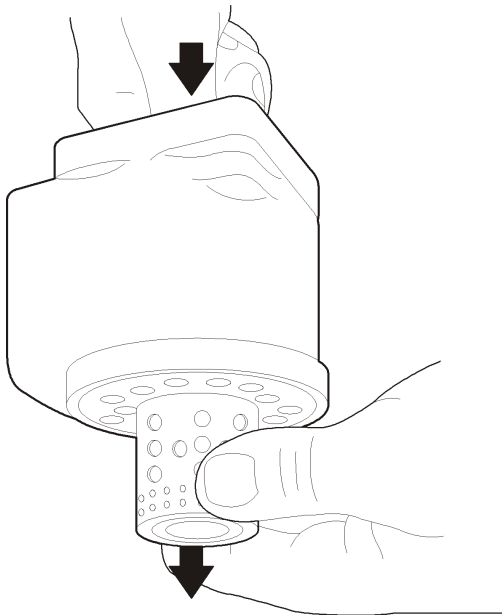


Figure 3
Removing ball

4. Remove the inner and outer spools.

NOTE!

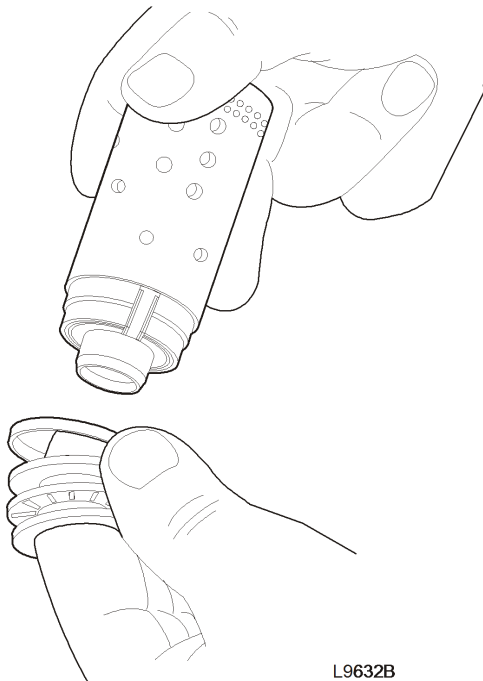
Do not pull on the outer spool. This may cause the spools to come apart, which may cause the return springs to lock the inner spool in the housing.



L14751A

Figure 4
Removing inner and outer spools

5. Remove the axial disc, needle bearing, bearing race and the ring.



L9632B

Figure 5
Removing needle bearing and ring

6. Remove the inner and outer seals.
7. Carefully press the inner spool out from the outer spool.
Remove the leaf springs.
Clean and check all parts for wear or damage.
Replace worn or damaged parts.
Replace all seals and washers.
Remove any small burrs with a fine-grain whetstone.
Lapping paste must **not** be used.
Lubricate all parts with hydraulic oil before assembling.

Assembling

8. Fit the outer seal ring.
Secure the valve housing in a vice. Use soft protective jaws.

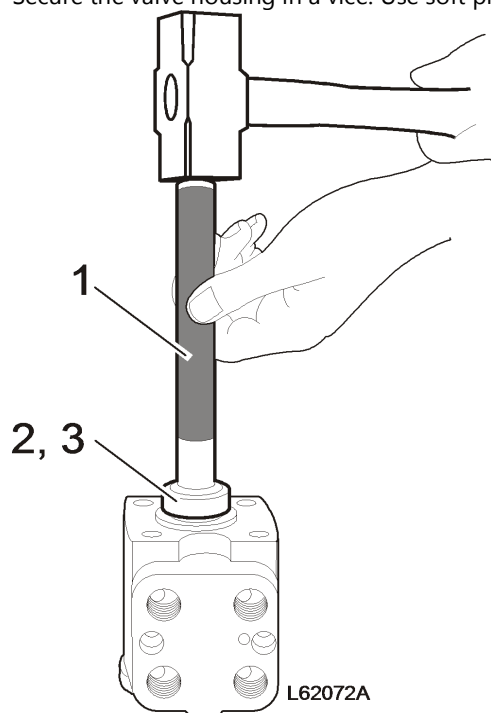


Figure 6
Installing seal ring

1. 6999 007
2. 6999 025
3. 6999 034

9. Place the assembled seal on the drift plate and press the seal into the housing.

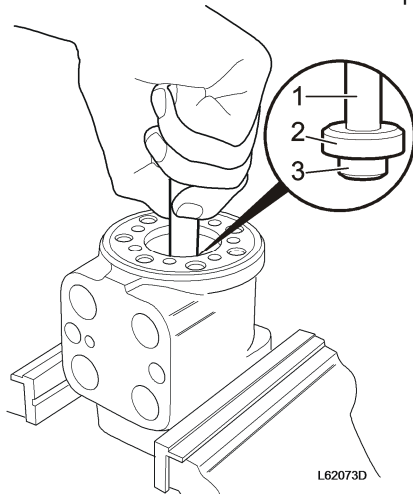


Figure 7
Installing seal ring

1. 6999 007
2. 6999 025
3. 6999 034

10. Assemble the inner and outer spools so that the grooves for the leaf springs are aligned and the T-shaped groove (A) in the inner spool is aligned with the small holes (B) in the outer spool. Check the alignment of the punch marks on the spool tops.

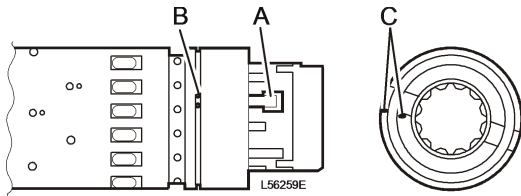


Figure 8

- A. T-shaped groove (inner spool)
- B. Hole (outer spool)
- C. Punch marks

11. Fit the leaf springs. Make sure that they are correctly positioned.

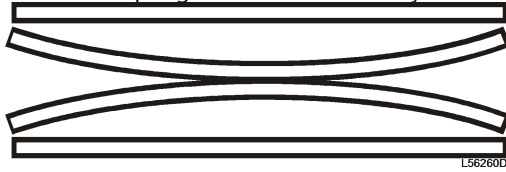


Figure 9

Position of leaf springs

12. Fit the axial disc, needle bearing, bearing race and the ring on the inner and outer spools.

NOTE!

Fit the bearing race with the bevelled edge towards the inner spool. Fit the cross pin on the inner and outer spool.

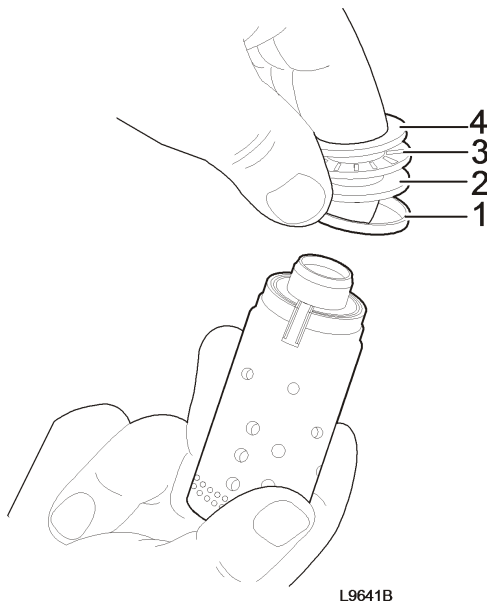


Figure 10

Positioning axial disc, needle bearing, bearing race and ring

- 1. Ring
- 2. Bearing race
- 3. Needle bearing
- 4. Axial disc

13. Fit the inner and outer spools in the valve housing. Rotate the inner and outer spools so the drive pin is positioned 90° in relation to surface A.

NOTICE

If the inner and outer slides have the incorrect position, the steering valve can function as a motor and the

machine will self-steer.

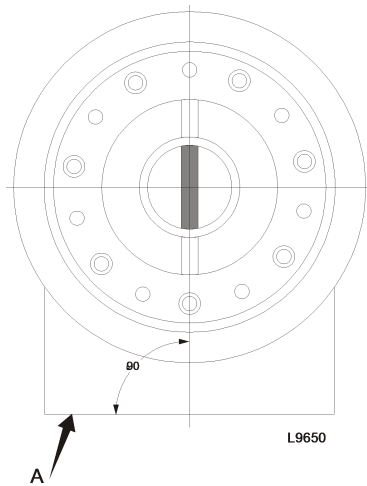


Figure 11

Position of inner and outer spools as well as drive pin in valve housing

14. Fit the O-ring. Fit the distributor plates so that the duct holes align with the corresponding holes in the valve housing.

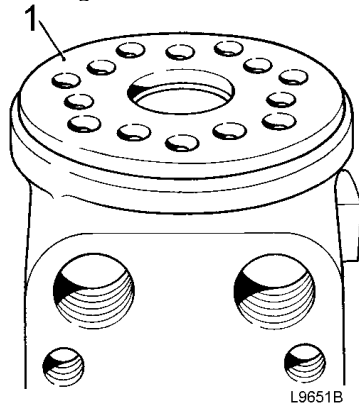


Figure 12

Distributor plate on valve housing

15. Fit the rotor shaft. Fit the O-ring and rotor unit (metering unit) so the tops of two rotor teeth are parallel with surface "A".

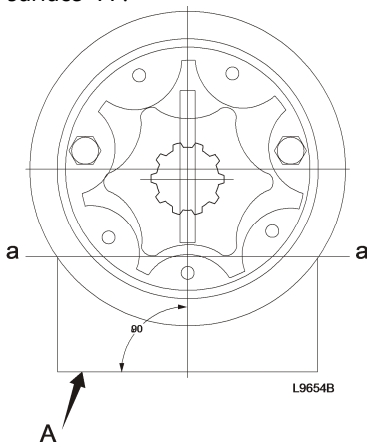


Figure 13

Position of rotor unit (metering unit) in relation to valve housing

16. Fit the cover and the screws.
Fit the ball through pressure connection (P) and fit the screw with the lock pin. Wiggle the valve and listen to hear if the ball moves freely.

Tighten the screws crosswise.

Tightening torque: **30–35 Nm (22–26 lbf ft)**

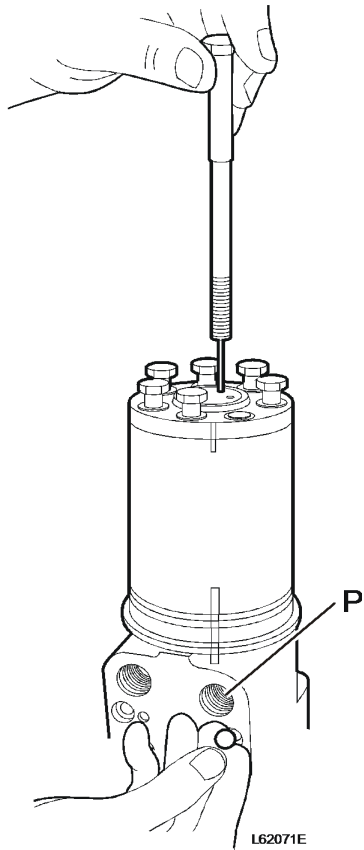


Figure 14
Ball position in valve housing

Document Title: Secondary steering, description	Function Group: steering, 647	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Secondary steering, description

The secondary steering [1] ⓘ allows the machine to be steered even if the primary steering pump stops functioning or if the primary steering pressure becomes too low, for example at low engine speed.

If pressure monitors SE601 and SE602 produce signals indicating that the primary steering pressure is too low and the travelling speed is above 3 km/h (2 mph), the secondary steering will be engaged and the electrically powered hydraulic pump (MO601) provides the steering system with oil.

When the secondary steering is engaged, control lamp LC16 (amber) on the instrument panel is alight. If the secondary steering is engaged because of a fault in the primary steering system, also the control lamp for low steering pressure (red) will be alight.

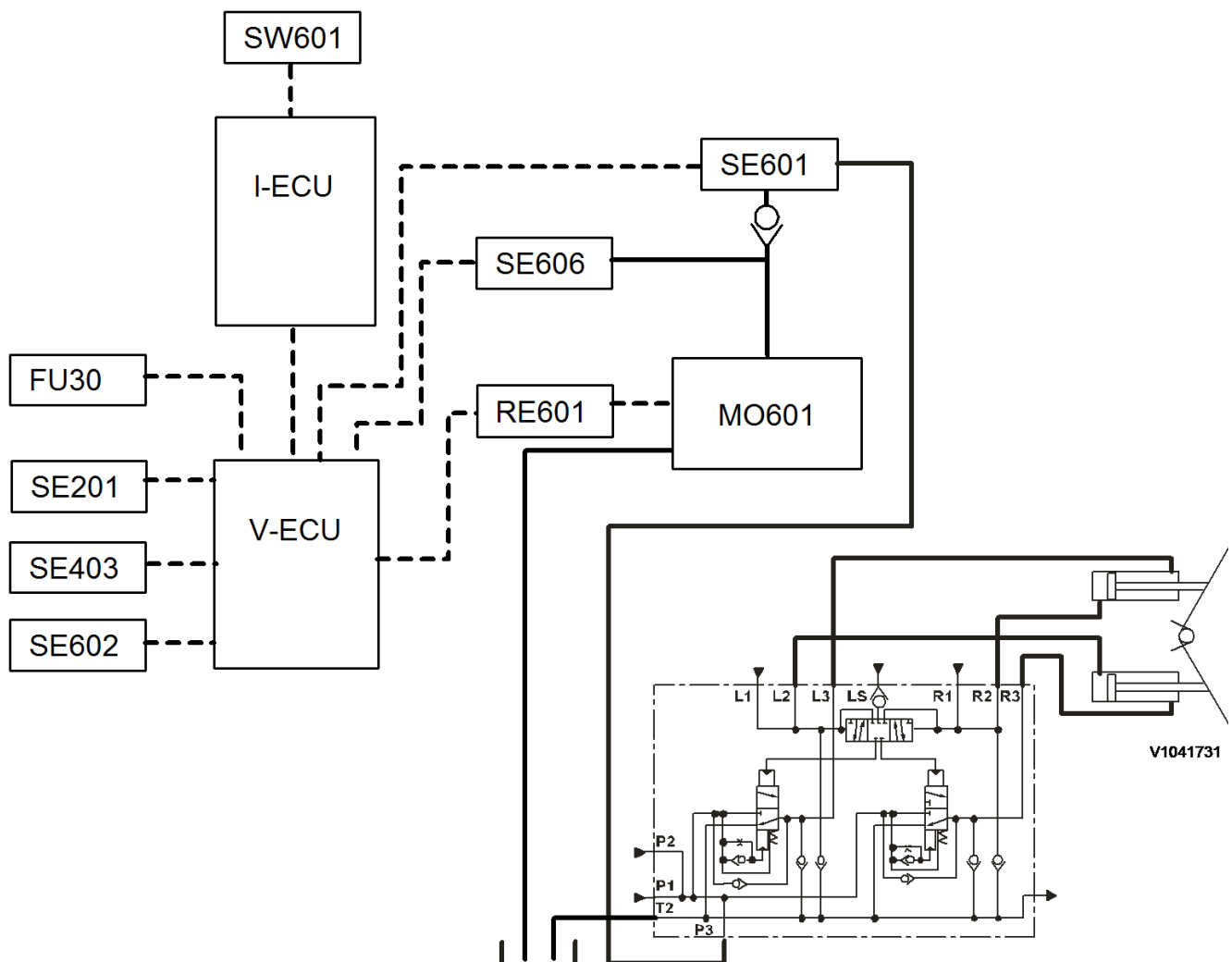


Figure 1
Secondary steering

I-ECU	Instrument control unit
V-ECU	Vehicle control unit

FU30	Fuse
SE201	Engine speed sensor
SE403	Travelling speed sensor
SE601	Differential pressure monitor (the difference between main pressure and LS-pressure)
SE602	Steering pressure monitor
SE606	Pressure sensor for automatic testing of secondary steering Is installed on machines, which do not have the SW601.
SW601	Switch for testing secondary steering Is not installed on machines, which have the SE606.
RE601	Relay, secondary steering
MO601	Electrically powered hydraulic pump for secondary steering

Before starting engine

If test switch SW601 or pressure monitor SE602 are connected), ECU considers that the equipment is installed.

V-ECU checks the circuits of SE601 and SE602 and relay RE601, see the following for more detailed descriptions:

[302 ERROR Monitoring Steering System Oil Pressure \(SE601\) \(MID 187 PPID 1046\)](#)

[302 ERROR Monitoring Steering System Oil Pressure \(SE602\) \(MID 187 PSID 1303\)](#)

[302 ERROR Secondary Steering Relay](#)

While operating (travelling)

In case of loss of primary steering pressure, differential pressure monitor SE601 and primary steering pressure monitor SE602 will close the circuit. The secondary steering pump starts, if the speed exceeds 3 km/h (2 mph). In this case the pump will be running as long as the speed exceeds 3 km/h (2 mph).

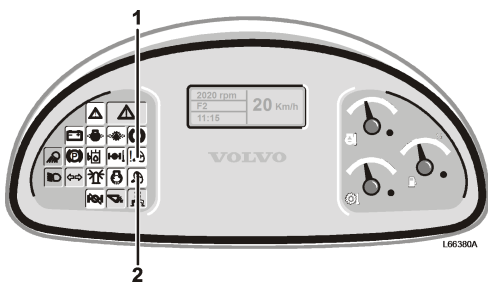


Figure 2

1. Control lamp, warns against fault in primary steering system
2. Control lamp, indicates that the secondary steering pump starts

The following will happen:

- The secondary steering pump starts up
- Warning is shown on the display unit
- Red warning lamp, low steering pressure, lights up
- Central warning flashes
- Buzzer sounds

If only differential pressure monitor SE601 breaks the circuit, the secondary steering pump will start, if the speed exceeds 3 km/h (2 mph). The following will happen:

1. The secondary steering pump starts up
2. Amber warning lamp LC16, secondary steering pump, lights up

See also [301 Secondary steering](#).

Valve with differential pressure monitor SE601

The figure shows the situation before start.

Before start the valve poppet is kept in place by the spring via the guide and the piston, which means that SE601 is closed.

SE602 is closed.

After start, SE602 is open as long as the steering pressure is higher than 0.95 MPa (138 psi).

When the engine is started, the valve poppet is pressed against the guide, the spring and the piston (against SE601).

The LS-pressure enters the valve via connection LS and attempts to press the piston in the opposite direction. When the difference between steering pressure and LS-pressure is greater than 0.7 MPa (102 psi), the spring is compressed and the piston opens SE601.

The LS-pressure also acts directly on the piston and when the LS-pressure exceeds 7 MPa (1015 psi) the piston, regardless of the steering pressure, will open SE601.

The secondary steering starts, if the travelling speed of the machine exceeds 3 km/h (2 mph) and the pressure difference between the steering pressure and the LS-pressure is smaller than 0.7 MPa (102 psi) **and** the LS-pressure is less than 7 MPa (1015 psi).

NOTE!

When the LS-pressure reduces, the need of differential pressure increases in order to prevent the secondary steering from starting.

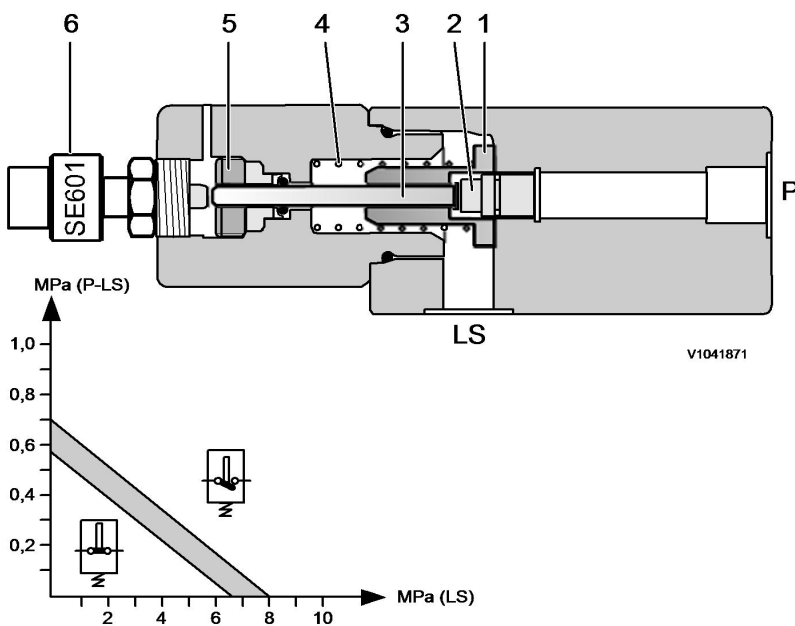


Figure 3
Differential pressure valve

1. Guide
2. Poppet
3. Piston
4. Spring
5. Nut
6. Differential pressure monitor SE601

[1]Optional equipment

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Function test, secondary steering](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 5001
Serial number stop: 7398

- [Function test, secondary steering](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

Document Title: Function test, secondary steering	Function Group: 647	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Function test, secondary steering

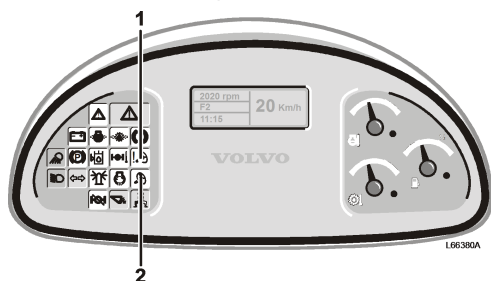
Function test of the secondary steering system is carried out with a stationary machine and the engine turned off. The ignition key should be in position 1.



L57141

Figure 1
SW601

When switch SW601 is pressed down the connection to the I-ECU is interrupted. When monitors SE602 and SE601 are closed, the following will happen:



L66380A

Figure 2

1. Warning lamp, warns against fault in primary steering system
 2. Control lamp, indicates that the secondary steering pump starts
-
1. The secondary steering pump starts up
 2. Amber warning lamp LC16, secondary steering pump, lights up

The pump will be running as long as the switch is kept pressed down.



Construction Equipment

Service Information

Document Title: Function test, secondary steering	Function Group: 647	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Function test, secondary steering

When starting the engine, a function test of the secondary steering takes place automatically. If the function test shows that the secondary steering is not functioning, red central warning lights up and the message Warning Secondary Steering No Function will be displayed.

Document Title: Comfort Drive Control, description	Function Group: 660	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Comfort Drive Control, description

The equipment allows steering, forward–reverse shifting, and Kick-down engagement to be handled with controls located on the left armrest.

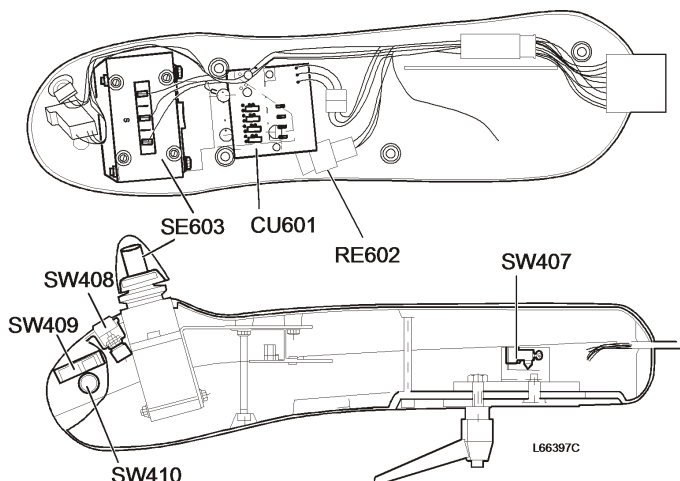


Figure 1
CDC armrest

SE603	Control lever with adjusting screws for steering speed, right and left
SW408	Activating CDC
SW409	Shifting, forward – reverse
SW410	Kick-down
SW407	Switch, CDC operates only when the armrest is lowered
CU601	Electronic unit

On most machines (depending on software) the machine speed can be limited to 30 km/h (19 mph) when lever steering CDC is engaged, see also [301 Speed limitation for lever steering \(CDC\)](#).

During transport operations on public roads, the steering wheel must be used and CDC must be disengaged.

The control lever has two adjusting screws for steering speed adjustment.

Electronic unit CU601 (Ramp alternator)

Electronic unit CU601 is not adjustable but has a fixed ramp/damping of approximately 0.2 seconds.

With help from electronic unit CU601, smoother steering is maintained by damping the signal to MA601 both at steering start and steering stop. Damping (ramp) setting is fixed at approx. 0.2 seconds:

Electronic unit CU601 is designed as a circuit board.

When CDC is engaged, a green control light is lit on the middle instrument panel.

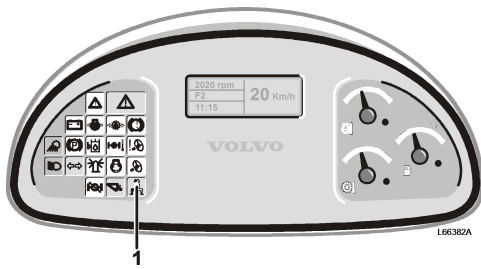


Figure 2
Centre instrument panel

1. Control light, CDC

The control valve, which is connected parallel to the primary steering valve, is located under the cab on the left side of the machine.

The shuttle valve for LS pressure is located under the cab on the left side of the machine.

The primary gear selector control SW402 is prioritized in relation to the forward–reverse switch SW409 on the armrest. This means that CDC is disengaged if the gear lever is moved forwards or backwards.

Function

Activating, operation and deactivating

To activate CDC, the armrest must be lowered, which closes SW407. Check that the primary gear control is in the neutral position while simultaneously rotating the handle to the desired gear position (position 4 is normally selected). Select the shifting mode with the Mode selector SW412.

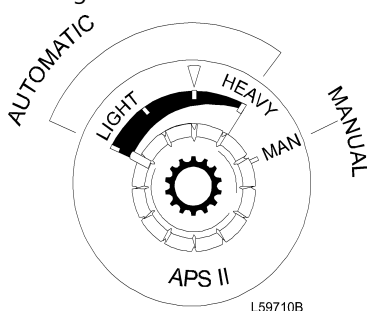


Figure 3
Mode selector SW412 is located on the front panel.

CDC is activated with switch SW408 on the armrest. The green control light on the instrument panel should be activated.

Move steering lever SE603 to the desired steering position. Steering speed increases proportionally to the lever deflection. Move the lever distinctly towards the neutral position when the steering movement is to be stopped.

Select forward, neutral and reverse gear with switch SW409. The Kick-down function is engaged with switch SW410 on the side of the armrest.

CDC is deactivated by lifting the armrest, opening SW407 or by moving the primary gear selector control SW402 to forward or reverse position.

Document Title: Electrical system, description	Function Group: 660	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Electrical system, description

The equipment is connected to connector CDC in the electrical distribution box.

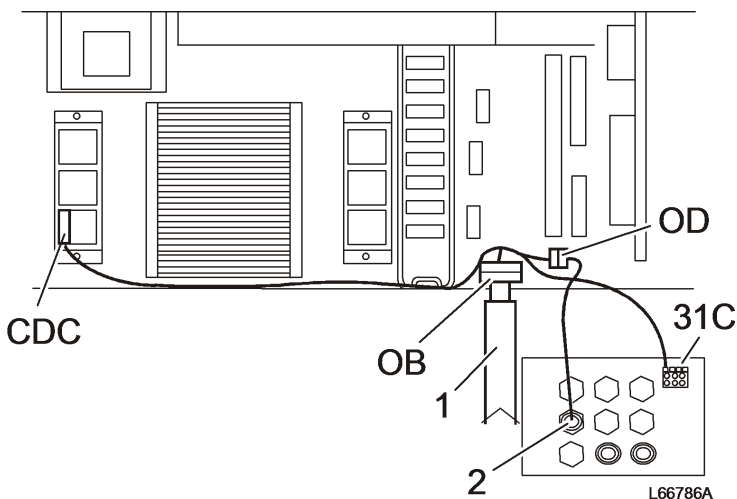


Figure 1
Cables in the electrical distribution box for lever steering.

CDC	Connector in the electrical distribution box
1	Cables to armrest
2	Cable run, rear cab wall
OB	Connector
OD	Connector
31C	Chassis connection

Gear shifting forward/reverse, description

See wiring diagram 17.

Feeds are obtained with a started engine.

SW407, SW408 and SW409 fed from FU30.

Relay RE602, connection 30 fed from FU30.

RE602 ensures that lever steering cannot be activated with a raised armrest.

When the armrest is lowered, SW407 closes and the V-ECU receives feed to EA18.

When switch SW408 is actuated and lever steering is activated, the V-ECU receives a voltage pulse to EA4.

The control lamp for lever steering comes on in the instrument panel.

When the engine is started, the V-ECU sends out a feed on EC6 which actuates RE602.

Through RE602 (30–87), the ramp alternators CU601 and MA601 obtain a feed.

Control lever SE603 receives feed via CU601. When the control lever is actuated, a signal (voltage) is sent to steering valve MA601 via CU601 and steering can be started.

Even 4th gear can be used when lever steering is activated.

If the armrest is raised, SW407 interrupts the feed to EA18 on the V-ECU. When this occurs, the V-ECU interrupts the feed out from EC6 to RE602 (86).

When RE602 is released, the feed to CU601 and MA601 is interrupted and lever steering is deactivated.

If the primary gear control SW402 is moved to forward or reverse position, the V-ECU will interrupt the feed to RE602 and the feed to CU601 and SE603.

In order to re-activate lever steering with switch SW408, the armrest must be lowered and the primary gear selector must be in neutral position.

Kick-down function obtained with SW410.

Document Title: Hydraulic description	Function Group: system, 660	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic system, description

The pressure is built up to the steering valve and CDC control valve K. The pressure to MA601 is reduced to approx. 12 MPa (1740 psi) by the pressure reducing valve 14, which is used as servo pressure for control of the valve slide 15.

The pressure limiting valves 18 are blocked in closed position and therefore have no function in the system.

When stand-by pressure is built up P1 and P2 angle down to "0 flow".

When the control lever is activated an electrical signal travels via the ramp generator CU601 to the control unit in the control valve. Oil is released in on the valve slide (15) which is moved and opens for a controlled oil flow to the steering cylinders.

The position sensor sends back signals to the control unit indicating the position of the spool. Oil is admitted until the valve spool has been moved a distance that corresponds to the lever stroke.

The pump's flow compensators are acted upon by the LS-pressure and adjust the flow to the prevailing requirement.

NOTE!

If steering isn't used, the oil passes from Pump 2 to the servo, brake or working hydraulics. However, steering has priority.

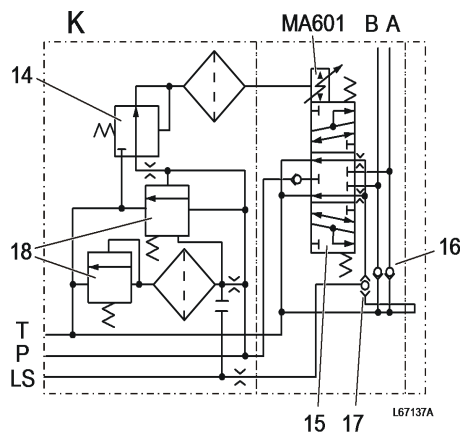


Figure 1
Diagram, CDC, control valve K

MA601	Lever steering CDC
A	Outlet port, left-hand steering
B	Outlet port, right-hand steering
T	Return to tank via shift valve
P	Pressure, inlet
LS	LS-pressure, inlet
14	Pressure-reducing valve
15	Valve spool
16	Anti-cavitation valves
17	Shuttle valve
18	Pressure-limiting valves, blocked

14	Pressure-reducing valve
15	Control spool
16	Anti-cavitation valve
17	Shuttle valve
18	Pressure-limiting valves, blocked
b	Non-return valve

Document Title: Control valve, description	Function Group: 660	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Control valve, description

When the steering lever SE603 is activated, an electric signal passes via the electronic unit CU601 to the control unit MA601 (25) on the control valve (11 volt or lower for steering to the left, 13 volt or higher for steering to the right).

Two of the solenoid valves (21–22 or 23–24) in the control unit are activated, which results in oil is let in on one side of the control slide (15) and it opens to a controlled oil flow to one steering cylinder. The position sensor (27) sends signals back to the control unit and indicates the slide's position. Oil is let in until the control slide (15) has been moved corresponding to the lever stroke and desired steering speed has been achieved.

When the slide has assumed the position that corresponds to the signal to the control unit, the control unit cuts off feed to the solenoid valve (21) or (23) depending on steering direction.

On the control valve's control unit, the light-emitting diode (28) is activated with a green light when steering. If the control slide jams in the activated position when the lever is returned to neutral position, the diode is activated with a red light. If such a malfunction occurs, the machine continues to steer even when the steering lever is unaffected.

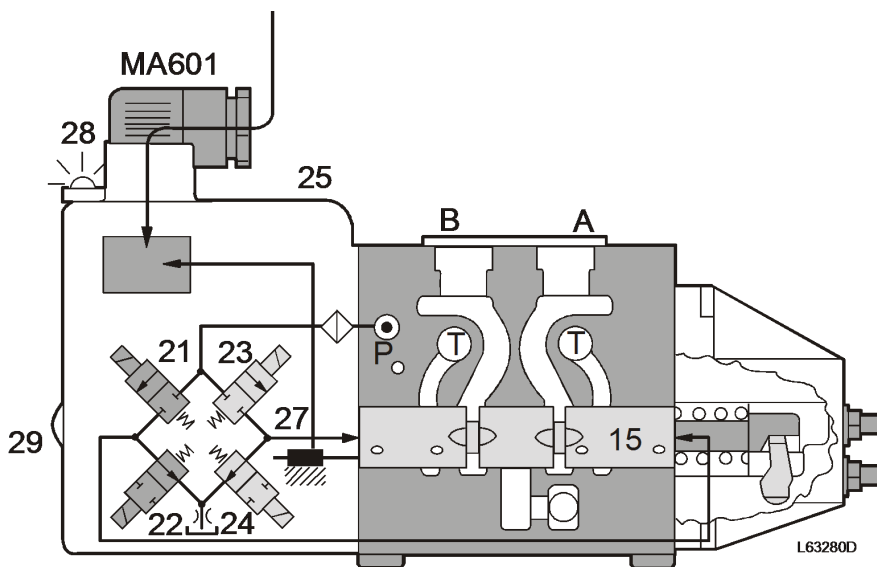


Figure 1
Control valve with control unit

15	Control slide
21–24	Solenoid valves
25	Control unit with MA601 lever steering CDC
27	Position sensor
28	Light-emitting diode
29	Adjusting screw for position sensor

Document Title: Lever steering, adjusting steering speed	Function Group: 660	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Lever steering, adjusting steering speed

Op nbr 66003

1. The steering lever has two adjusting screws for adjusting the steering speed. These can be reached by forcing (or drilling) a hole in the recess in the upholstery on either side of the steering lever.

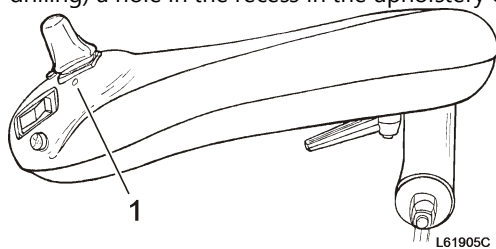


Figure 1
Arm rest

1. Recess in the upholstery can be found on either side of the steering lever

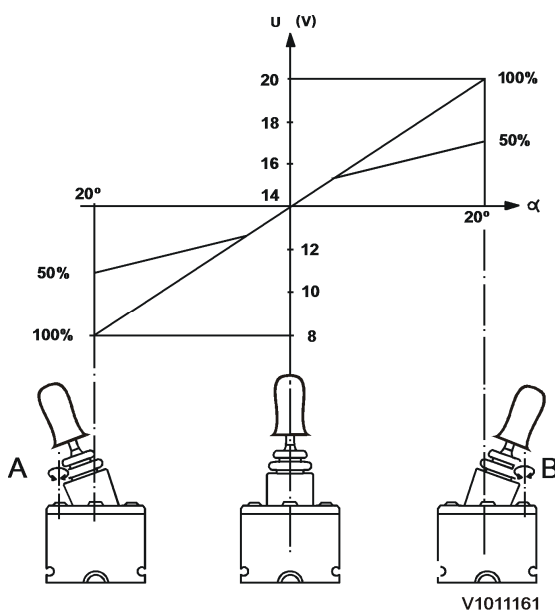


Figure 2
Adjusting screws for steering speed

- A. Steering, left
- B. Steering, right

2. Basic setting of steering speed:
4.0–5.0 seconds between full steering locks.

Speed: **1500 rpm**

Adjust the steering speed by screwing the adjusting screws clockwise (to increase the speed) or counter-clockwise (to decrease the speed).

The steering speed to the left and the right should be as equal as possible, and the steering lever must be fully deflected when carrying out the adjustment.

Document Title: Lever steering CDC, checking steering signals	Function Group: 660	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Lever steering CDC, checking steering signals

Op nbr 66005

1. Secure the frame joint with the frame joint lock. Block in front of and behind the wheels.

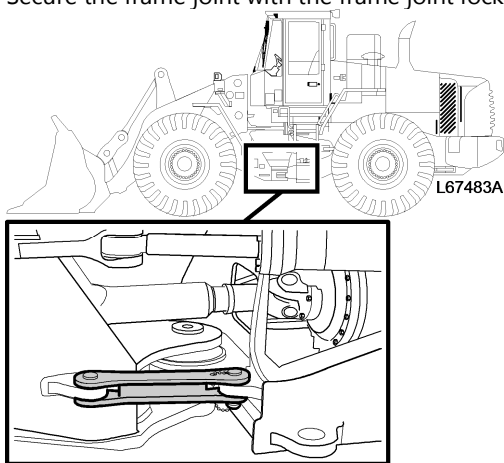


Figure 1

2. Remove the rear cab panel.
3. Start the engine.
4. Lower the armrest and activate lever steering with SW408.
NOTE!
The ordinary gear selector and gear selector on the armrest must be in neutral.
Check-measuring(Ref. [370 Wiring diagram 17](#))
5. Measure the voltage at connector OD (in cable harness under the circuit board). Leave the connector plugged in.
 - The voltage between pin OD4 - OD1 shall be 28 V (system voltage).
 - With the steering lever in neutral, the voltage between OD2 - OD1 shall be 13-14 V. **Note the value.**
6. If any of these values are incorrect, check that fuse FU 30 is intact, part the connector OD and repeat the measurement. If the values are still incorrect, proceed to step 12.
7. Steer full left with the steering lever and measure the voltage between OD2-OD1. The voltage shall now be between 6-10 V depending on how the steering lever is adjusted. **Note the value.**
8. Steer full right and repeat the measurement. The voltage shall now be between 17-21 V depending on how the steering lever is adjusted. **Note the value.**

9. Check how much the measured voltages at full steering deflection, left and right, deviate from the value in neutral position. The voltage between OD2-OD1Example:

- Neutral position = 14 V.
- Full steering deflection left = 7 V. Difference from neutral position: $14 - 7 = 7$ V
- Full steering deflection right = 20 V. Difference from neutral position $20 - 14 = 6$ V

Excessive voltage difference between right and left may result in different steering speed. Adjust only if the steering speed is experienced as different. Adjusting, see [660 Lever steering, adjusting steering speed](#)

10. Stop the engine.

Steering lever CU601, checking

11. Loosen the four Allen head bolts under the armrest and turn over the upper part. Do not let the upper part hang by the cable for the microswitch SW407.
12. Disconnect the black cable at the steering lever. Measure the resistance between black cable, at the steering lever, and connector OE pin 1. Resistance shall be 0-1 Ω . If not, there is probably an open circuit in CU 601.

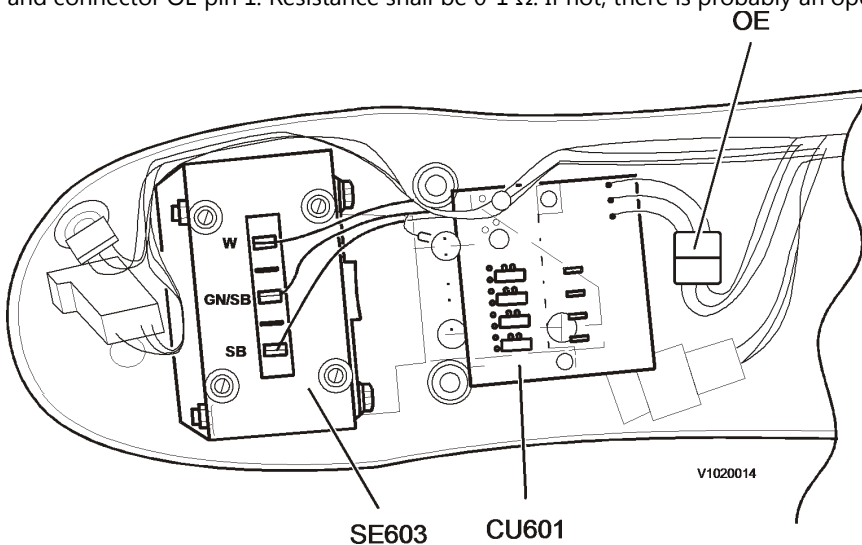


Figure 2

13. Start the engine and activate lever steering.

NOTE!

Check that the gear selectors are in neutral.

14. Disconnect white cable at the steering lever. Measure the voltage on the white cable. Voltage shall be 28 V (system voltage). If there is no voltage, instead measure on the connector OE pin 2. If there is voltage on OE2 but not on the white cable at the steering lever, there is an open circuit in CU 601.
15. Leave the lever steering activated. Refit the white cable on the steering lever and instead disconnect the green/black cable.
 - Measure the voltage on the middle pin on the steering lever. With the lever in neutral position, the voltage shall be 13-14 V.
 - Move the lever to the left. The voltage should drop to 6-10 V depending on how the steering speed is adjusted with adjusting screw A.
 - Move the lever to the right. The voltage should increase to 17-21 V depending on how the steering speed is adjusted with adjusting screw B. If the values are incorrect, the steering lever is probably defective.
16. Refit the casing on the armrest. This facilitates installation if the whole armrest is removed and is turned upside down. Remove the armrest at the joint E.

NOTE!

Do not part the armrest at the fore-aft adjustment D.

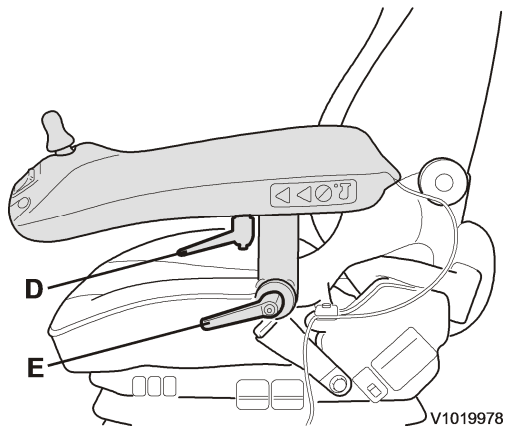


Figure 3

17. Refit the armrest and check that the steering works. Stop the engine.
18. Restore the machine.

Document Title: Lever steering, checking and adjusting control valve	Function Group: 660	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Lever steering, checking and adjusting control valve

Op nbr

Lever for mechanical activation of control valve spool or suitable wrench

Checking

1. Connect the frame joint lock.
Apply the parking brake.

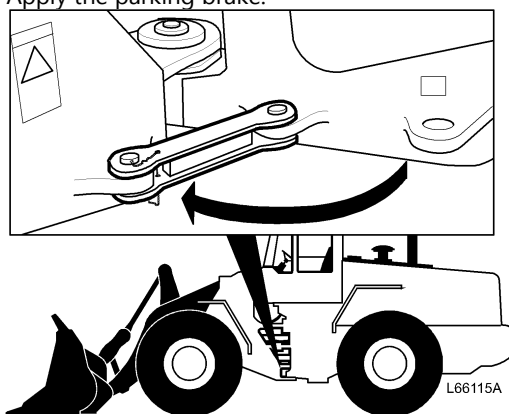


Figure 1

2. Fit the lever (wrench) for mechanical activation on the CDC valve, located under the cab on the right-hand side of the machine.
3. Start the engine and engage the lever steering with SW408.
4. Check to make sure that lever for mechanical activation does not move back and forth (oscillate).
If the lever moves in any direction, the electronic and the hydraulic neutral positions are not the same, and the lever will move back and forth.
Max. clearance: **2 mm** (0.08 in)

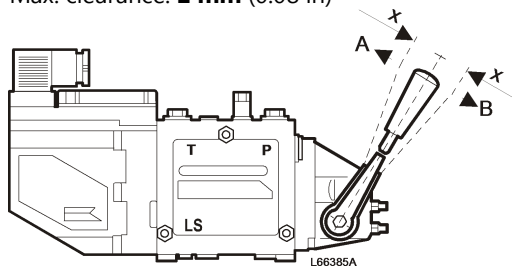


Figure 2

- x Max. 2 mm (0.08 in)
- A Steering, left

B Steering, right

Adjusting

- Any adjustment is performed on the adjusting screw (1). Turn the adjusting screw anticlockwise or clockwise depending on if the lever moves in direction A or B. 1/2 turn of the adjusting screw corresponds to a lever movement of 3 mm (0.12 in).

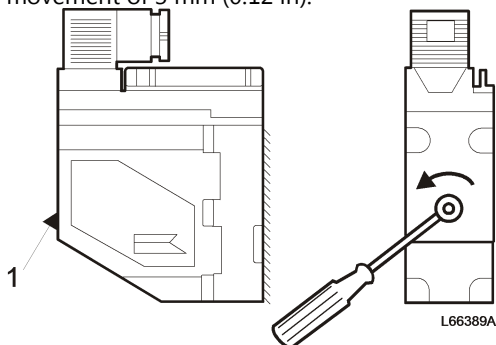


Figure 3
Adjusting lever movement in direction A

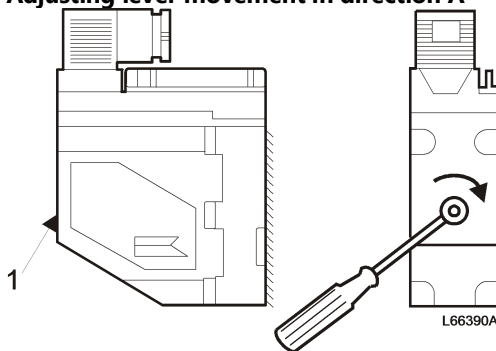


Figure 4
Adjusting lever movement in direction B

Thank you for your purchase.
Have a nice day.

Document Title: Frame, description	Function Group: 700	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Frame, description

The front frame is built as an open box section.

It carries the loader unit and is the attachment point for the front axle.

The rear frame is built of two frame members. Each frame member consists of an open box section.

The rear frame carries the cab, engine and transmission.

The counterweight and the rear axle are also attached to the rear frame.

The engine and transmission are rubber-mounted to the frame.

Important mounting surfaces between the frame and components are machined for exact positioning of components and strong joints.

The frame joint is dimensioned to handle great stresses.

The upper bearing arrangement consists of a link bearing and the lower bearing arrangement consists of two tapered roller bearings.

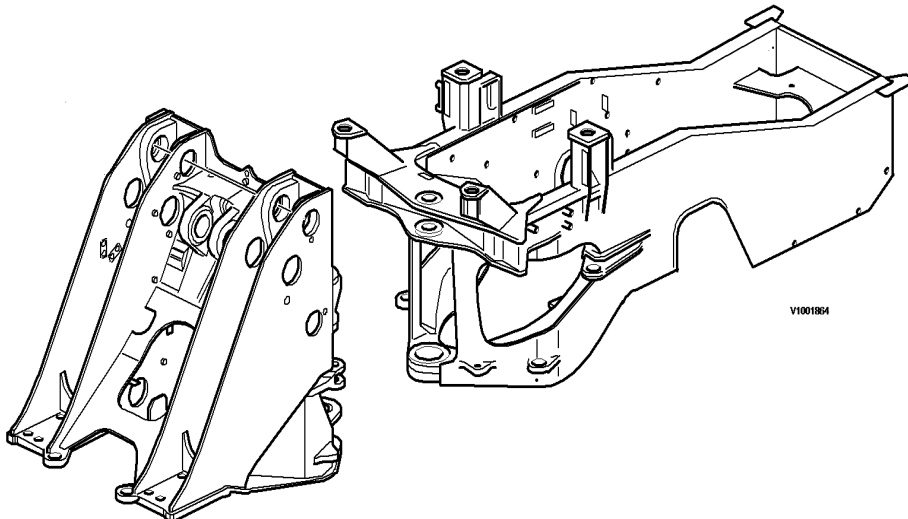


Figure 1

Document Title: Protective plate, removing	Function Group: 715	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Protective plate, removing

Op nbr

Ratchet block 750 kg (1654 lbs), 2 pcs.

Sling, 4 m (13 ft)

Sling, 6 m (20 ft), 2 pcs.

1. Attach the sling and ratchet block on the right-hand and left-hand sides to remove the lower protective plate.

NOTE!

Place the sling on the outside of the ladder and both sides of the protective plate.

Protective plate's weight **105 kg (232 lbs)**.

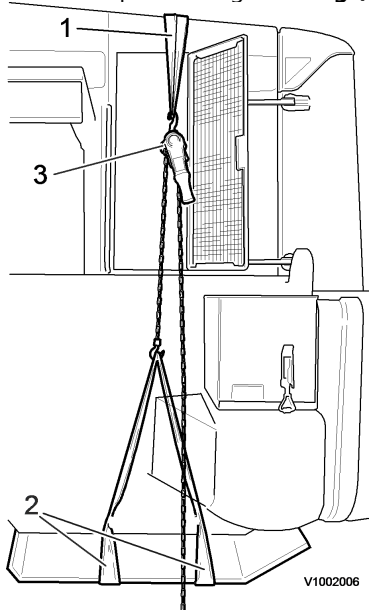


Figure 1
Removing, protective plate

1. Sling, 4 m (13 ft)
 2. Sling, 6 m (20 ft), 2 pcs.
 3. Ratchet block, 750 kg (1654 lbs)
2. Unscrew the protective plate retaining bolts (6 pcs).
 3. Lower the protective plate.

VOLVO

Construction Equipment

Service Information

Document Title: Extra counterweight, removing and installing	Function Group: 716	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Extra counterweight, removing and installing

Op nbr

9998547 Lifting tool

Lifting eye M16, 2 pcs.

Sling 6 m (20 ft), 2 pcs.

Shackle, 2 pcs.

Removing

1. Remove the plugs in the counterweight and fit the lifting eyes.

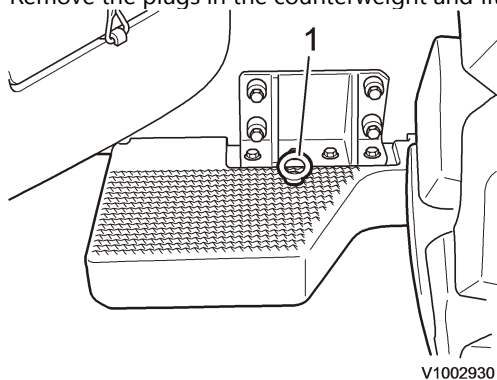


Figure 1
Lifting eye M16

2. Connect 9998547, sling and shackle to the lifting eyes.

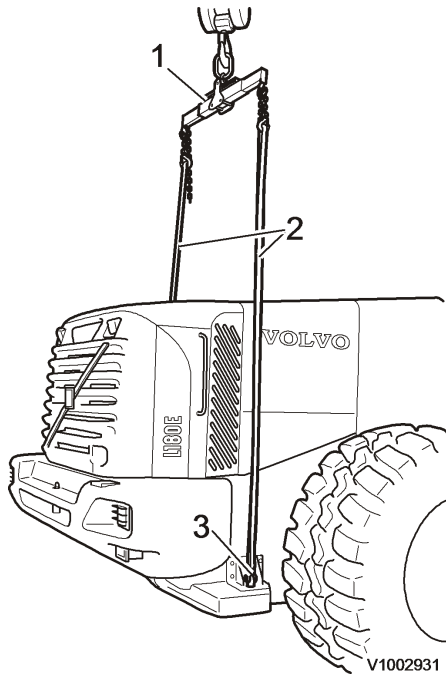


Figure 2

1. 9998547
2. Sling 6 m (20 ft)
3. Shackle

3. Loosen the bolts and lower the counterweight.

Weight: **1140 kg (2513 lbs)**

Installing

4. Connect 9998547, sling and shackle to the lifting eyes.
5. Lift up and align the counterweight with the bolt holes.
Weight: **1140 kg (2513 lbs)**
6. Tighten the bolts.

Document Title: Frame joint, description	Function Group: 740	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Frame joint, description

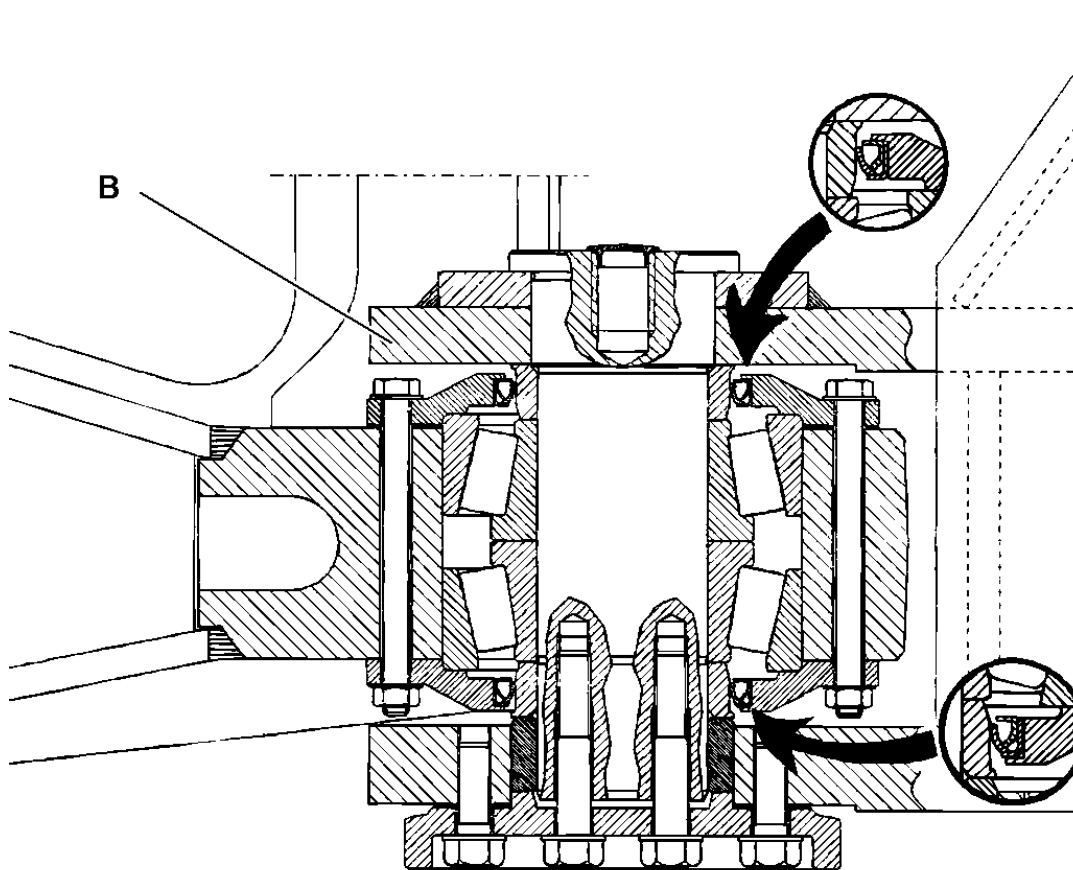
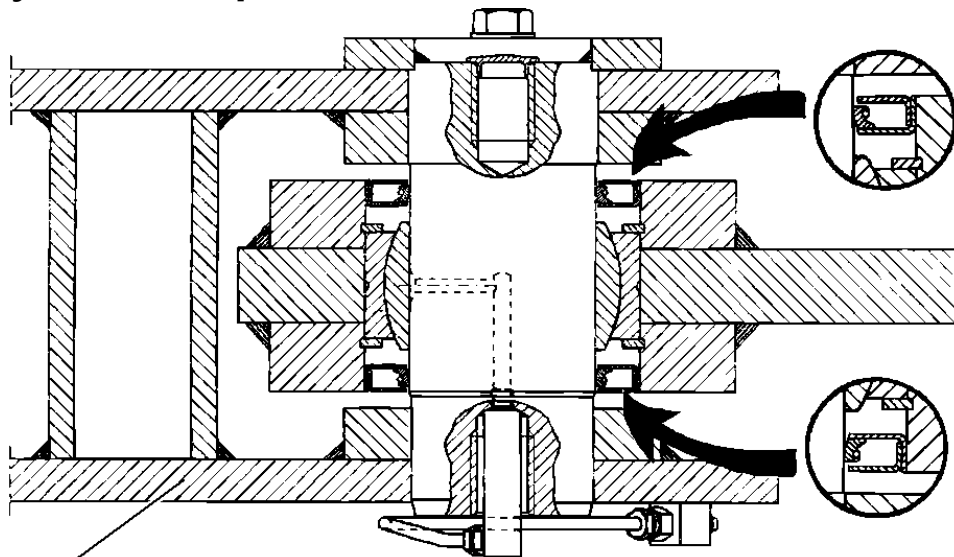


Figure 1

Frame joint bearing

- A. Upper frame joint bearing
- B. Lower frame joint bearing

Document Title: Frame joint, checking clearance	Function Group: 740	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Frame joint, checking clearance

Op nbr 741-005

Dial test indicator with magnetic base

Garage jack 16 tons

Radial clearance, upper frame joint

1. Park the machine on a level surface and lift the bucket so that it does not rest on the ground.
2. Place a dial gauge between the front and rear frame by the upper frame joint.
Zero the dial gauge.

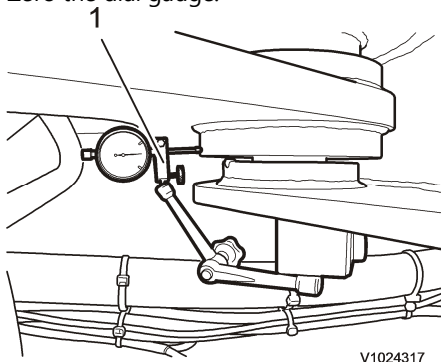


Figure 1
Measuring clearance

1. Dial test indicator with magnetic base
3. Lower the bucket against the ground and lift up the front wheels using the bucket, or with a garage jack under the bucket.
Read off the dial gauge.
Allowed clearance: **0.625 mm (24.6 thou).**
4. Restore the machine.



Construction Equipment

Service Information

Document Title: Frame joint, changing bearings and pins	Function Group: 741	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Frame joint, changing bearings and pins

Op nbr 74136

[9993651 Puller bolt M30 length 650 mm \(26 in\)](#)

[9993713 Puller bolt M20 length 700 mm \(28 in\)](#)

[9993715 Intermediate piece](#)

[9993722 Support](#)

[9993725 Puller bolt M20 length 155 mm \(6 in\)](#)

[9993739 Support](#)

[9993742 Socket](#)

[11666041 Pump](#)

[11668007 Jack 15 tons](#)

[11667001 Handle](#)

[11667100 Drift plate](#)

[11667110 Drift plate](#)

[11667120 Drift plate](#)

[11667130 Drift plate](#)

[11667170 Drift plate](#)

Pillar jack, 1.5 ton (3308 lbs)

Ratchet block 750 kg (1654 lbs), 2 pcs

Garage jack 16 tons, 3 pcs.

Stud bolt M16 x 260 mm M16 x 10 in), 2 pcs.

Dividing the machine

1. Remove the bucket. Lower the lift arms and tilt in fully. Relieve the hydraulic oil pressure by moving the servo levers back and forth repeatedly, with the ignition in position zero.
2. Release the brake system pressure by depressing the brake pedal repeatedly (30 – 40 times).
3. Turn off the current with the battery disconnect switch.
4. Drain the hydraulic oil.
Volume: **approx. 261 dm³ (69 US gal)**

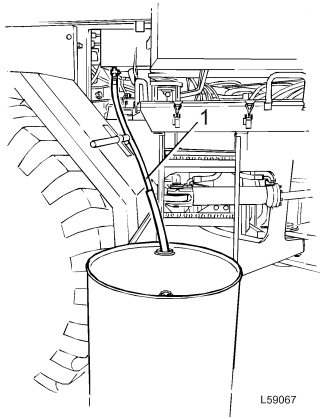


Figure 1
Draining hydraulic oil

1. Extended draining hose
5. Remove the middle propeller shaft.
Weight: **approx. 40 kg (88 lb)**.
6. Remove the grease nipple on the upper pin.
7. Remove the floor mat and the floor plates in the cab.
8. Remove the upholstery over the electrical distribution box and disconnect the front connector F and, where applicable, connector FA[1] ⓘ in the electrical distribution box and the connection to ground. Loosen the clamps and disconnect the cable harness from the rear frame part.
9. Detach the steering cylinder piston rods from the front frame section.
See [645 Steering cylinder replacement](#)
10. Connect a vacuum pump to the hydraulic oil tank.
See [910 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#)
11. Screw loose the knobs on the lever carrier and remove the plastic covers.
12. Disconnect the hydraulic hoses from components located in the front frame joint and plug the disconnected hose ends.
 - 6 pcs. on the servo valve.
 - 4 pcs. by the central block.
 - 1 pc. on the brake valve.
 - 1 pc. on the hydraulic oil tank.
 - 2 pcs. on the block on the right side machine.
 - 1 pc. on the bracket on the right side machine.
13. Where applicable, disconnect the hydraulic hoses for 3rd and 4th function[2] ⓘ.
14. Where applicable, disconnect the connector 7.8 between cab and frame belonging to 3rd and 4th function[3] ⓘ.
15. Detach to enable removal of the upper frame joint pin.
16. Place three jacks under the machine's rear part, one under the tank and two under the rear frame's front edge.
The rear part is heavy at the rear
Place two jacks under the front frame part. One in front of the frame joint and one under the boom.

NOTE!

Without bucket, the front frame part is heavy at the rear.

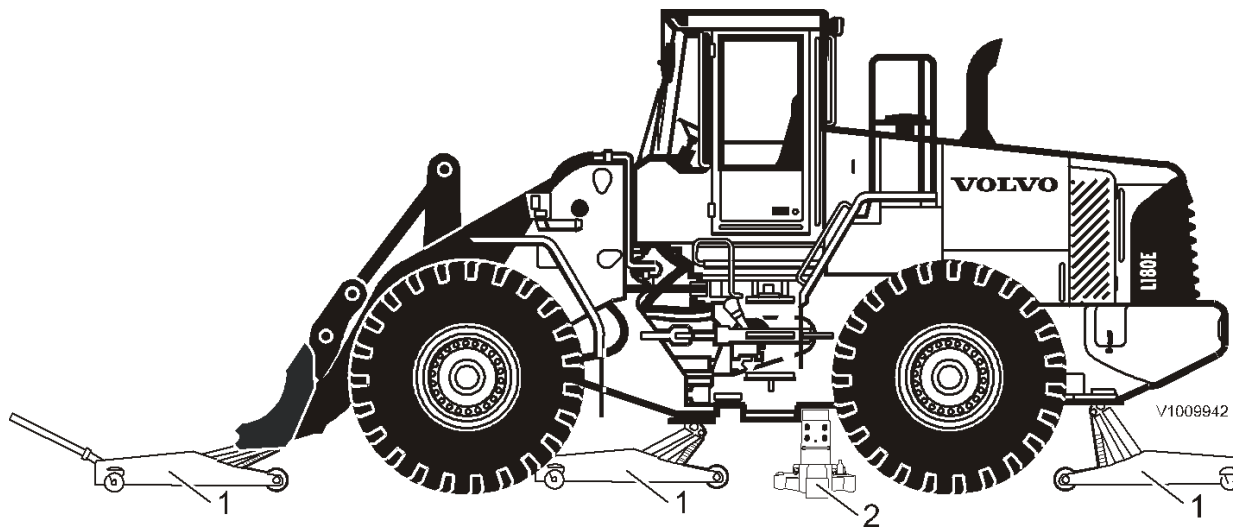


Figure 2
Securing machine with jacks

1. Garage jack
2. 11668007

Removing upper pin

17. Block the rear wheels.
18. Lock the rear axle to prevent swinging by placing jacks on both sides of the machine between the frame and rear axle.

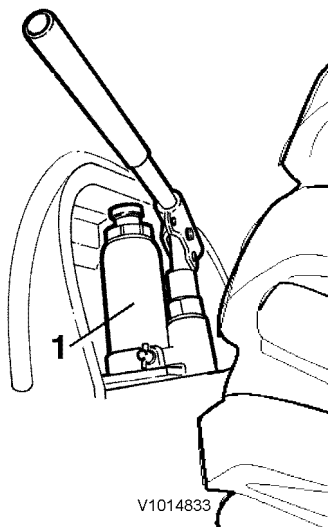


Figure 3

1. Pillar jack

19. Disconnect the hose bracket and move aside the hoses.

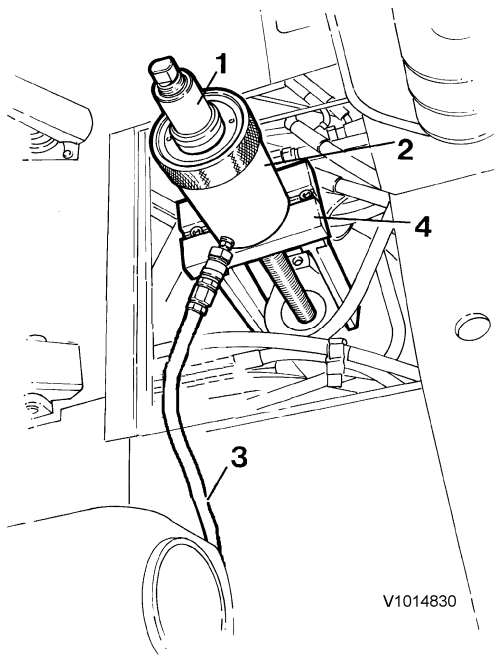


Figure 4
Pulling out upper pin

1. 9993651
2. 11666045
3. 11666041
4. 9993739

20. Remove the bolts for the upper pin.

21. Fit the tools on the upper pin and pull the pin out.

Removing lower pin

22. Remove the cover and adjusting shims under the pin.

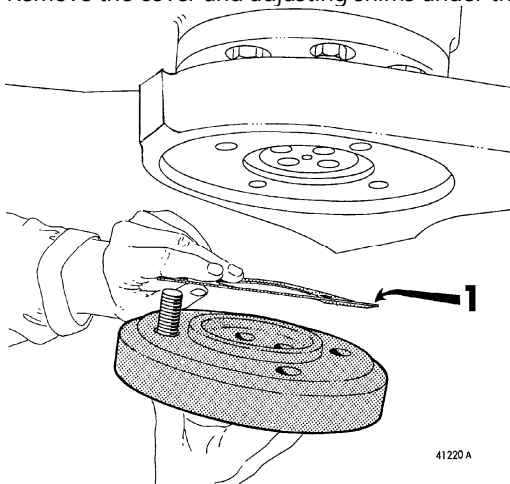


Figure 5
Removing cover

1. Adjusting shim

23. Fit the tools on the lower pin and pull the pin out.

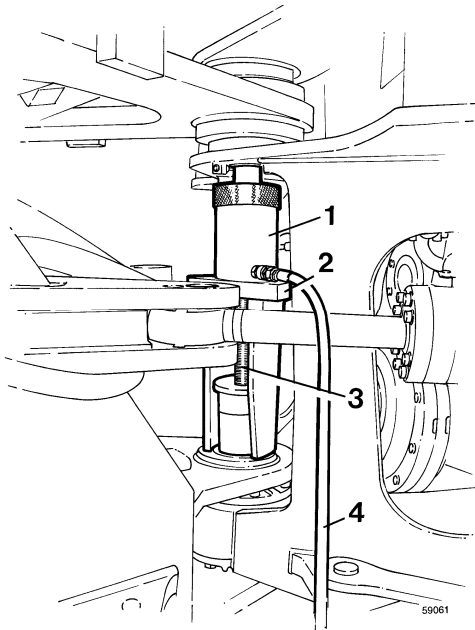


Figure 6
Pulling out lower pin

1. 11666045
2. 9993739
3. 9993651
4. 11666041

Dividing the machine

24. Make sure that the frame joint is relieved of all stress so that the frame sections move apart when separating.
25. Press the front frame part forward with a pillar jack.

NOTE!

Make sure that the jacks under the front frame part move with it.

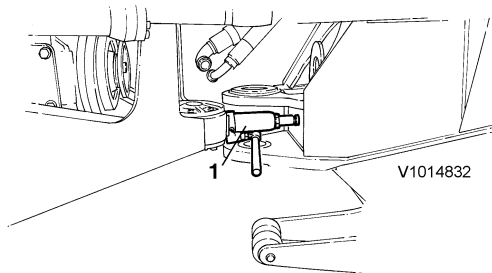


Figure 7
Separating frame parts

1. Pillar jack, 1.5 tons

26. Position support stands under the frame sections.
Place blocks in front of and behind the front wheels.

Removing upper bearing

27. Remove the seal rings, remove the lock rings and press out the link bearing.

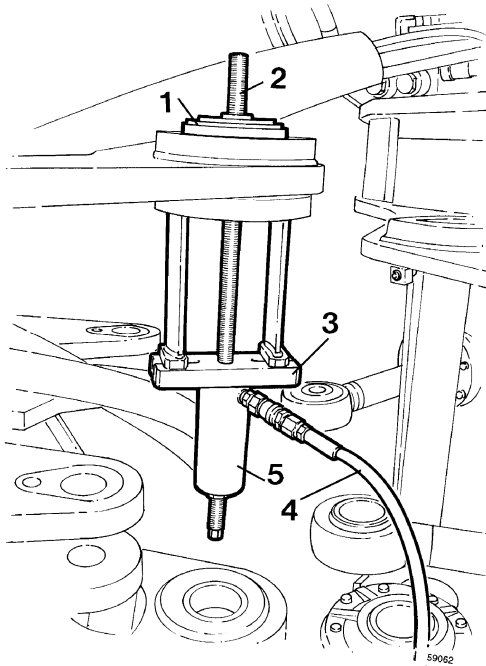


Figure 8
Pressing out link bearing

1. 11667130
2. 9993713
3. 9993722
4. 11666041
5. 11666044

Installing upper bearing

28. Install the lower lock ring.
Grease the glide surfaces on the bearing.
Slowly press down the bearing against the lock ring.
Install the upper lock ring.

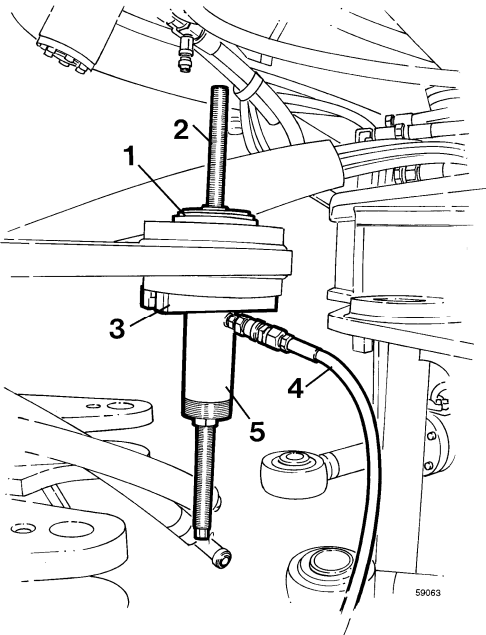


Figure 9
Pressing in link bearing

1. 11667130
2. 9993713
3. 9993722
4. 11666041
5. 11666044

29. Press the upper and lower seal rings into place.

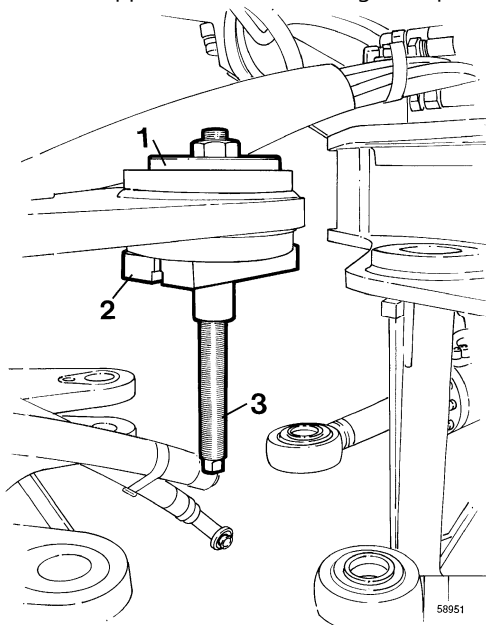


Figure 10
Pressing in seals

1. 11667170
2. 9993739
3. 9993651

Removing lower bearings

30. Press out the bushing from the front frame section.

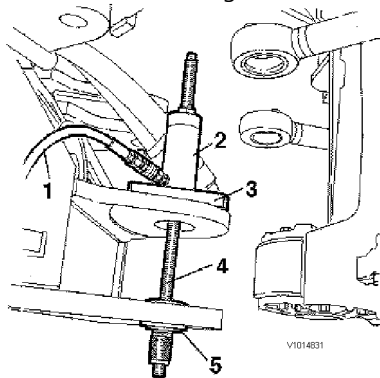


Figure 11
Pressing out bushing, front frame section

1. 11666041
2. 11666044
3. 9993722
4. 9993713
5. 11667100

31. Remove the upper bearing cover, adjusting shim and lower bearing cover.

32. Drive the lower bearing race together with the bearings by driving on the upper bearing, and drive out the upper bearing race upward using the handle and plate.

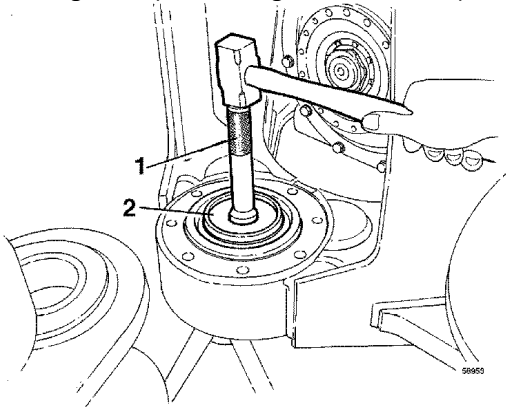


Figure 12
Driving out bearing race, lower

- 1. 11667001
- 2. 11667110

33. Remove the spacer rings and drive out the sealing rings from the upper and lower bearing covers.

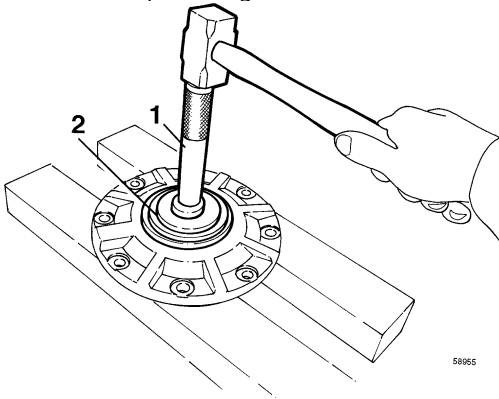


Figure 13
Driving out seal rings

- 1. 11667001
- 2. 11667110

Installing lower bearings

34. Drive new sealing rings into the bearing covers.
Turn the seal in the lower cover so that it seals from the inside out.
Turn the seal in the upper cover so that it seals from the outside in.
Fit the spacer rings.

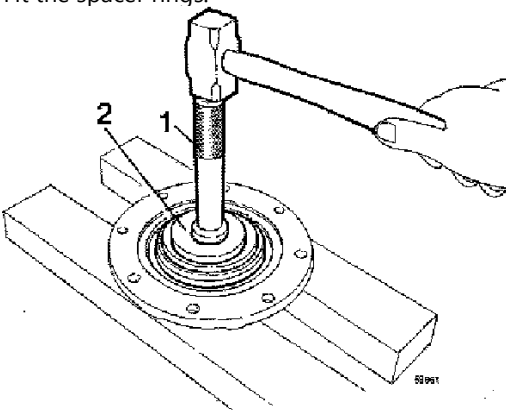


Figure 14
Driving in seal rings

1. 11667001
 2. 11667120
35. With a plastic mallet, drive in the lower bearing race from underneath until approx. 10 mm (0.4 in) remain to the plane.
Fit the lower cover and tighten with 4 bolts and nuts. Tighten the bolts alternately until the cover presses the bearing race into place.
36. Lubricate and fit the bearings.
Drive the upper bearing race into place until approx. 10 mm (0.4 in) remain.
Fit the upper cover and press down the bearing race by tightening the cover bolts alternately.

Setting bearing friction torque

37. Fit the pin and roll in the bearings.
Fit a torque wrench on the pin, tighten the bolts alternately while measuring the bearing friction torque.
Stop tightening when the torque is **13–17 Nm (10–13 lbf ft)**.
38. Measure the gap at several points with a feeler gauge.
- NOTE!**
Make sure that the lower bearing cover is secure.

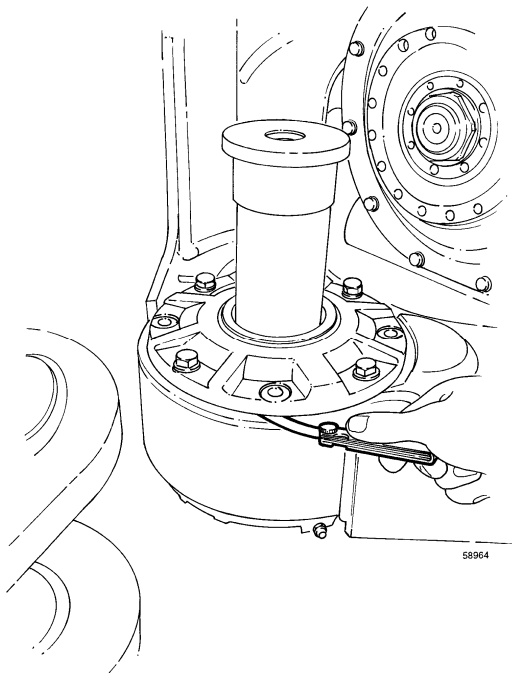


Figure 15
Measuring gap

39. Remove the upper cap and place adjusting shims, corresponding to the measured gap in the step above.
Refit the cover and tighten the bolts.
Tightening torque: **85 Nm (63 lbf ft)**.
Again, check the bearings' friction torque **13–17 Nm (10–13 lbf ft)**.
Remove the pin.
40. Apply oil to the bushing and press it into the front frame section, lower frame joint lug.

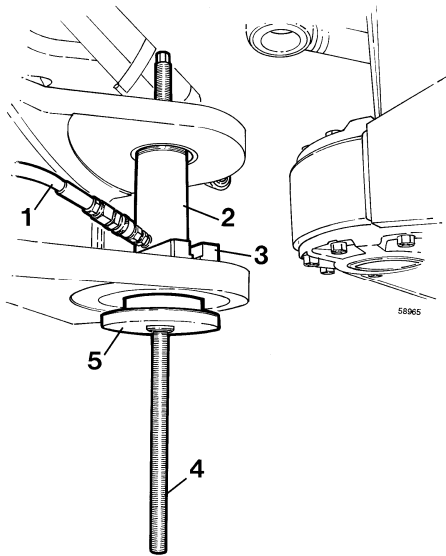


Figure 16
Pressing in bushing, front frame section

1. 11666041
2. 11666044
3. 9993722
4. 9993713
5. 11667170

41. Fit the cap, without adjusting shims, under the frame joint eye and press up the bushing with the cap so that the bushing ends up flush with the upper plane.

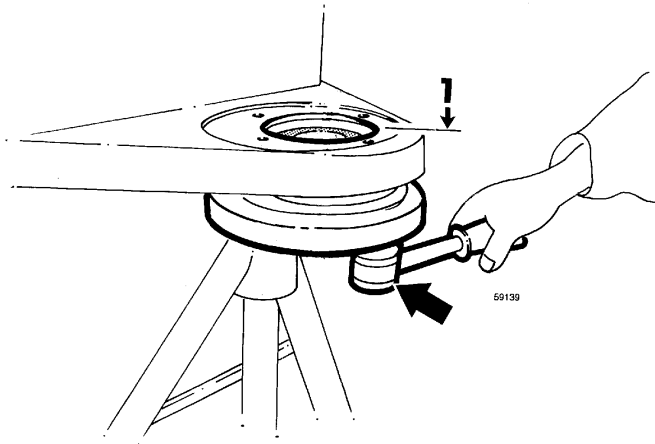


Figure 17
Pressing in bushing using cover

1. Press in the bushing until flush with the upper surface

Assembling frame joint

42. Connect two ratchet blocks between the frame sections.

NOTE!

Make sure that the machine's rear frame part is secured.

43. Pull the front frame part forward.
Carefully align the frame sections.

NOTE!

Make sure that the jacks under the front frame part move with it backward.

NOTE!

Make sure that the spacer rings in the seal rings do not bump against the front frame part as the seal rings may be damaged.

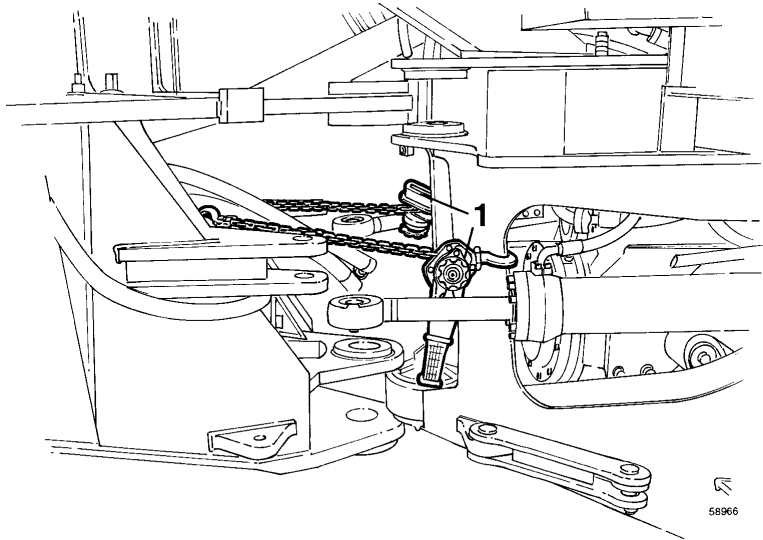


Figure 18
Joining the machine

1. Ratchet block connected on either side of the machine centre line.

NOTE!

Installation of the pivot pins is easier if the pins are cooled 20 °C (36 °F) (or colder) below the ambient temperature.

Installing upper pin

44. Carefully align both pin positions in relation to each other. Grease the pin and the bearing positions. Guide the pin using stud bolts and pull down the frozen pin. Press down the last approx. 5 mm (0.2 in) using the lock bolts for the pin.

Fit the grease nipple.

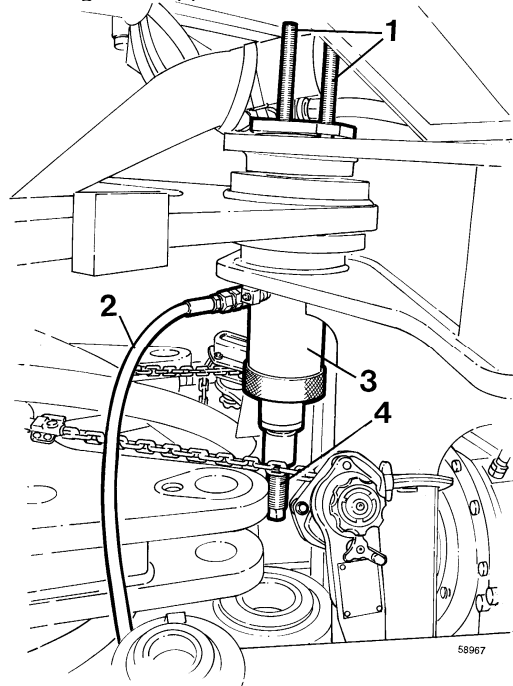


Figure 19
Pressing in upper pin

1. Stud bolt M16 x 260 mm (M16 x 10 in)

2. 11666041
3. 11666045
4. 9993651

Installing lower pin

45. Check and adjust the frame section height and bearing positions in relation to each other if necessary.

Press down the frozen pin as follows:

Bolt down the cap on the lower frame joint eye without adjusting shims.

Tighten the bolts loosely.

Fit the guide pins in the hinge pin. Grease the pin and the bearing position.

Position the hinge pin so that the guide pins guide in the cover.

Press down the pin.

If possible, replace the guide pins with the bolts and tighten them at the same time to help pull the hinge pin into position.

Tighten the bolts. Tightening torque: **220 Nm (162 lbf ft)**

NOTE!

The screws and cover press up the bushing which tightens spacers and bearings.

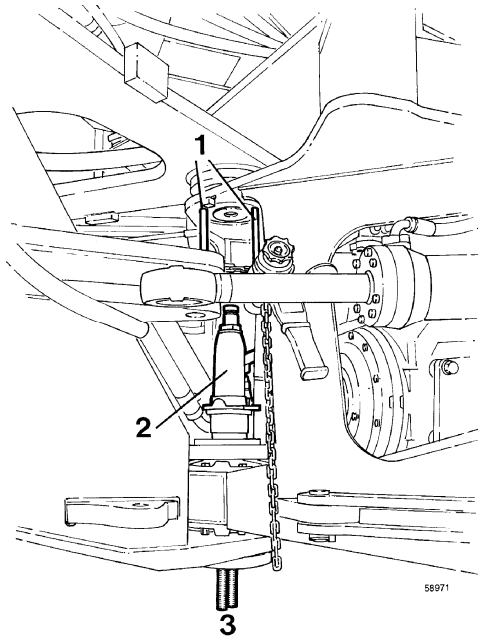


Figure 20
Pressing in lower pin

1. 9993722
2. Pillar jack, 1.5 ton (3308 lbs)
3. Guide pins M 16 x 260 mm (M16 x 10 in)

46. Measure the gap between the cover and the frame with a feeler gauge in at least four places (bolts between attaching washer and frame removed).

Remove the cover and fit the required adjusting shims according to the gap measured between the attaching washer and the frame.

Bolt down the attaching washer. Tightening torque: **220 Nm (162 lbf ft)**.

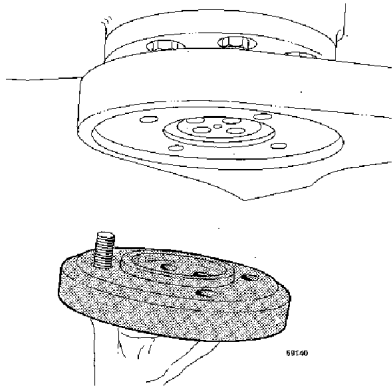


Figure 21
Installing cover

47. Tighten the servo hose holder in the upper pin lock screws and then secure the shift valve to the frame. Do not forget the spacers between the valve and the frame.

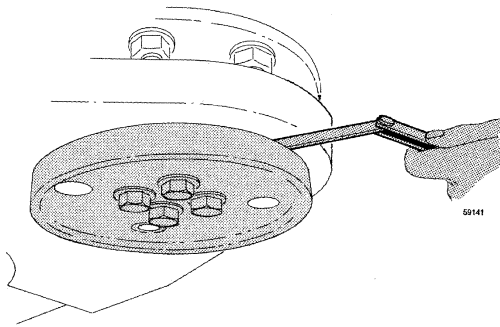


Figure 22
Measuring space

Cover tightened only in hinge pin and without adjusting shims

48. Connect the pressure (delivery) and return hoses.
- 6 pcs. by the servo valve.
 - 4 pcs. by the central block.
 - 1 pc. on the brake valve.
 - 1 pc. on the hydraulic oil tank.
 - 2 pcs. on the block on the right side machine.
 - 1 pc. on the bracket on the right side machine
49. Plug in the front frame cable harness to the electrical distribution box; connector F, connector FA (where applicable) and the ground connection.
Tie the cable harness to the rear frame section.
Refit the upholstery over the electrical distribution box.
50. Fit and tighten the floor plate and refit the floor mat.
51. Refit the propeller shaft.
First, fit the front flange and tighten with a torque wrench.
One front wheel must be lifted off the ground so that the propeller shaft can be rotated one half turn.
Tighten the bolted joint. Tightening torque: **190 Nm (140 lbf ft)**.
52. Fit the piston rods for the steering cylinders.
If the piston needs to be pressed in, loosen the hoses from the cylinder in order to release oil and press in the piston rod.
53. Grease the frame joint bearings and the piston rod pins for the steering cylinders.
54. Remove the jacks under the machine and the wedges by the wheels.

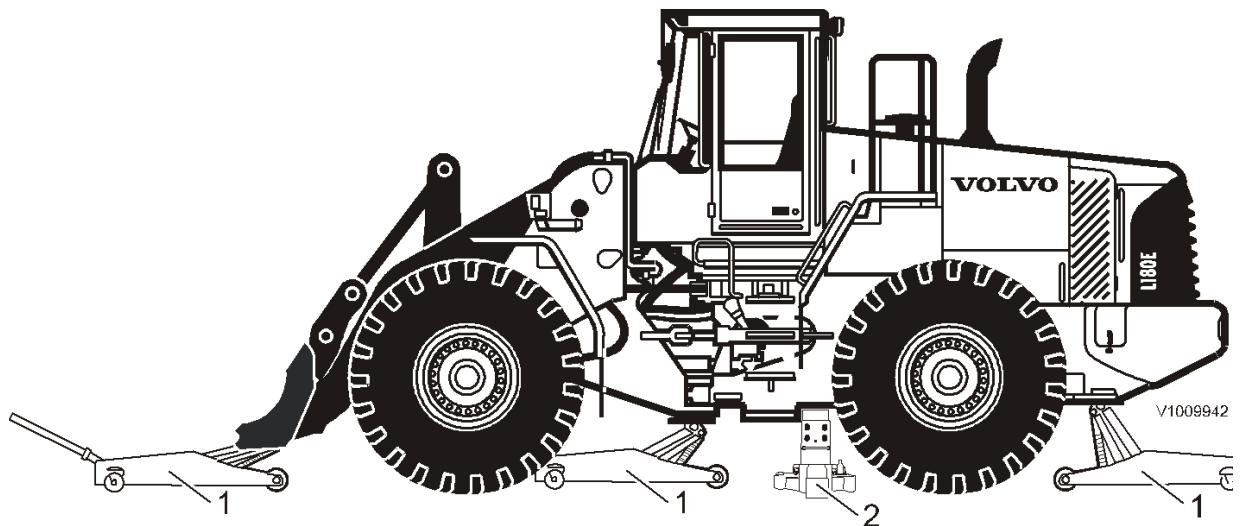


Figure 23
Securing machine with jacks

55. Connect the hydraulic hoses to components located in the front frame part.
56. Remove the vacuum pump.
See [910 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#)
Fill hydraulic oil. Volume **261 dm³ (69 US gal)**.
57. Restore the machine and start the engine, check for oil leaks.
58. Bleed the hydraulic system.
See [900 Hydraulic system, bleeding](#)

[1] Optional equipment

[2]Optional equipment

[3]Optional equipment

Document Title: Wheel, removing and installing	Function Group: 771	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Wheel, removing and installing

Op nbr 77101

[11668007 Hydraulic jack](#)

[11668010 Wheel trolley](#)

[Hexagon socket 32 mm \(1.3 in\)](#)

Removing

NOTE!

Read the safety instruction [191 Some simple rules regarding tyre handling](#) before beginning the procedure.

1. Remove the protective caps from the wheel nuts.
2. Loosen the wheel nuts with a 32 mm (1.3 in) hexagon socket.

NOTICE

Do not remove the wheel nuts before the axle is raised and the wheel has been secured with a wheel forklift or similar equipment.

3. Place two hydraulic jacks 11668007 under the frame. Raise the machine and secure the hydraulic jacks with safety pegs.

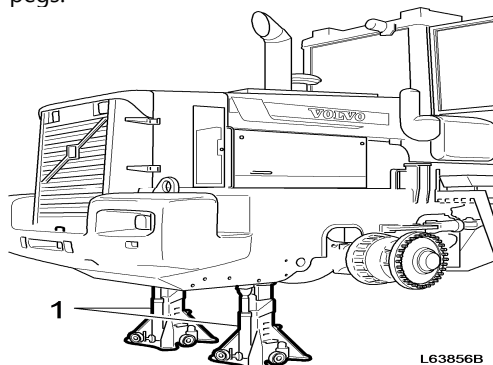


Figure 1

1. Hydraulic jack

4. Position a wheel trolley 11668010 and secure the wheel.

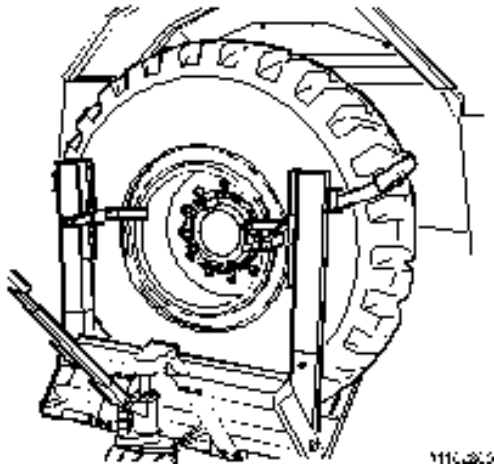


Figure 2

5. Remove the wheel nuts and remove the wheel. Wheel's weight approx.: **700 - 1000 kg (1543-2205 lbs)**

Installing

6. Clean the contact surfaces in the rim and hub. Make sure that the hub threads are clean and free from damage.
7. Install the wheel.

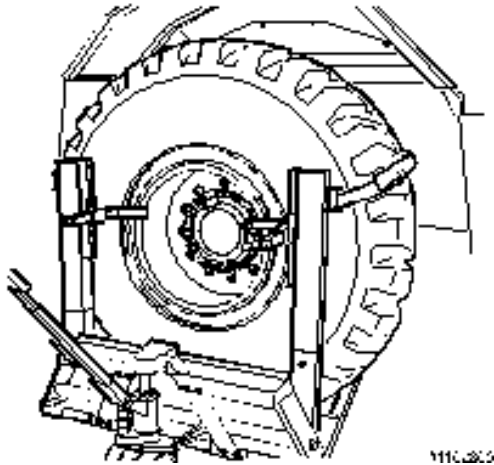


Figure 3

8. Fit the four wheel nuts evenly and tighten the wheel with the nuts.

NOTE!

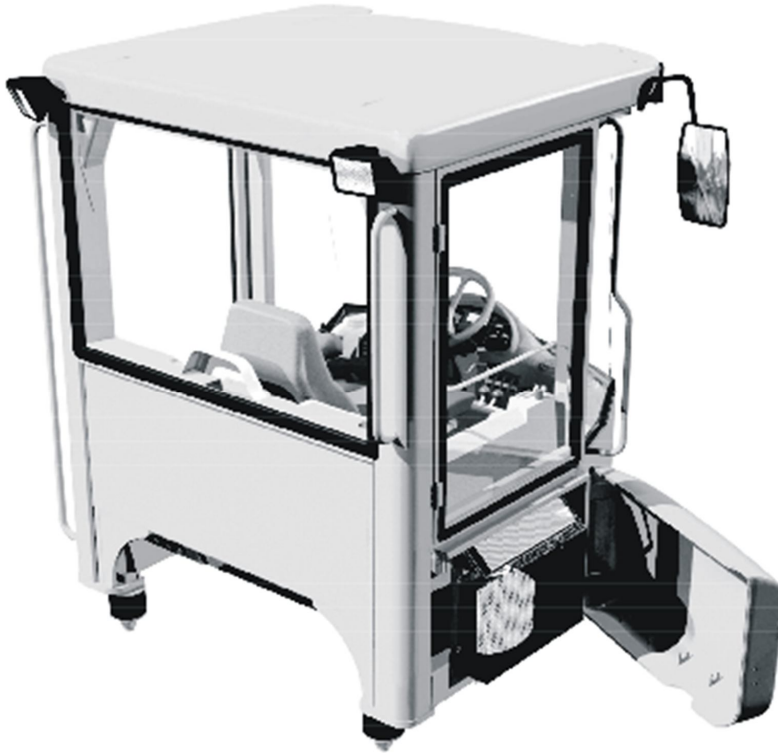
Tighten the nuts alternately a little at a time so the wheel is not crooked.

9. Fit and tighten the other wheel nuts.
Tightening torque: **600 Nm (443 lbf ft)**
10. Lower the machine.
11. Check the tyre pressure.

Thank you for your purchase.
Have a nice day.

Document Title: Cab, description	Function Group: 800	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Cab, description



V1035354

Figure 1

The cab is mounted to the frame via four vibration damping rubber pads. The rubber pads reduce noise and vibrations that otherwise would be transmitted to the cab. The cab consists of a frame that is designed to withstand compression in case the machine rolls over. This also applies to cabs without doors and windows (open rops).

In addition to frame strength, the cab is adapted to the operator's need for good visibility. Not only visibility of the attachment, but also all around the machine.

The inside of the cab is spacious and has several storage compartments. The instruments are located at the front and on the right side in the cab. An display unit provides continuous information about the different functions of the machine, for example, fuel consumption.

For operator comfort, there is a wide range of seats available as well as an adjustable steering wheel that can be adjusted both in height and longitudinally. Instead of using the steering wheel, the operator can select lever steering (CDC). In this way, the operator steers the machine with the left hand and the attachment with the right hand.

The air in the cab is filtered twice when drawn from outside and once when recirculated. The climate in the cab can be further improved with the aid of the optional accessories AC (Air Conditioning) or ATC (Automatic Temperature Control).

Document Title: Cab, removing	Function Group: 810	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Cab, removing

Op nbr 81001

Sling 4 m (13 ft), 4 pcs

NOTICE

When working on a machine equipped with air conditioning. Do not disconnect any hoses or connections on the air conditioning, thereby involuntary releasing refrigerant.

Steps 4–6 apply to machines equipped with air conditioning.

1. Place the machine in service position.
2. Turn off the electric power with the battery disconnect switch.

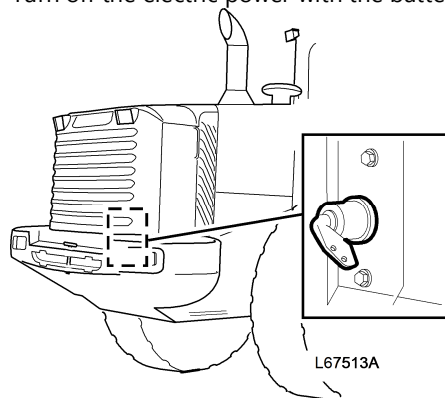


Figure 1
Battery disconnect switch, position (principle illustration)

3. Remove the filter cover together with the air filters.
Remove the plate together with the recirculation damper.

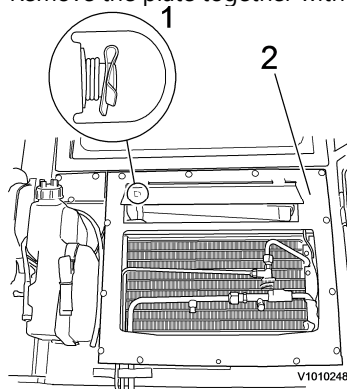


Figure 2

1. Striker plate, recirculation damper
2. Plate

4. Remove the support plate holding the evaporator.

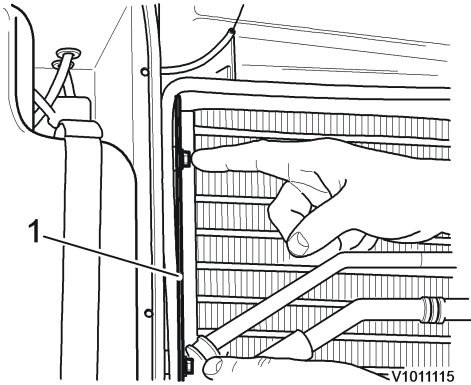


Figure 3
Support plate

1. Support plate

5. Remove the insulating compound. Carefully wind up and detach the capillary tube from the evaporator and filter cover.

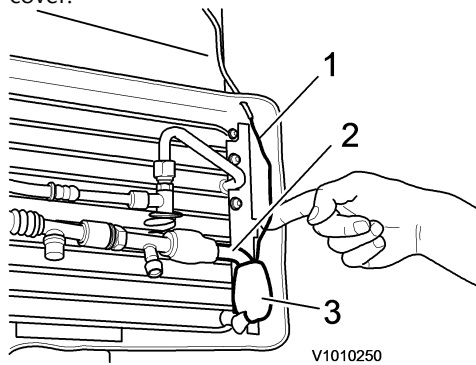


Figure 4
Capillary tube

1. Capillary tube
2. Evaporator pipe
3. Insulating compound

6. Carefully fold out the evaporator and suspend it to one side so that it is not damaged.

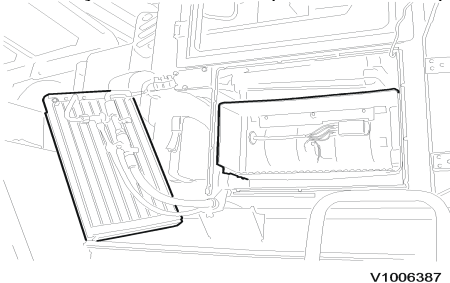


Figure 5
Evaporator

7. Use a pair of hose pliers on the coolant hoses or drain off the coolant. Disconnect the coolant hoses from the cab heater.
8. Loosen the throttle pedal and spacer from the floor. Remove the floor mat.

9. Remove the balls from the servo levers. Remove the cover from the servo levers.
Remove the plastic cover on the side of the control lever carrier and the lever for adjusting the angle of the control lever carrier.

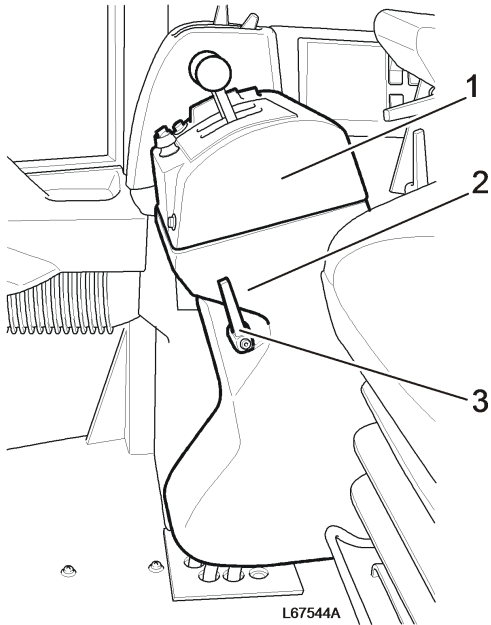


Figure 6

1. Upper cover
2. Side cover
3. Lever for adjusting angle

10. Remove the servo valve from the control lever carrier.
Unplug the connector on the servo valve.

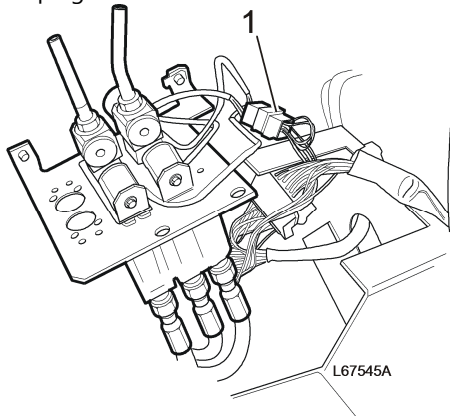


Figure 7

1. Connector

11. Remove the front floor plate.
Lower the servo valve through the hole in the floor and put it in a protected location.

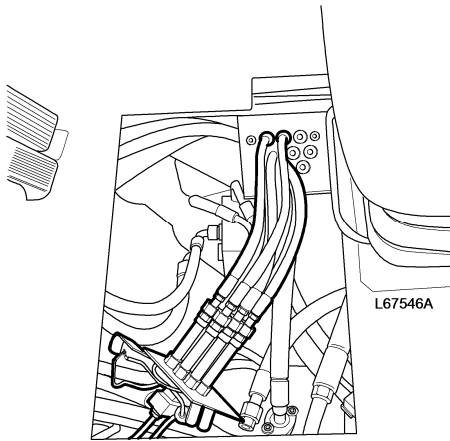


Figure 8

12. Remove the extra pedal for operating the foot brake.

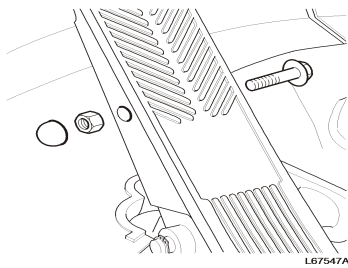


Figure 9

13. Remove the foot brake valve from the cab floor and place it on the frame.

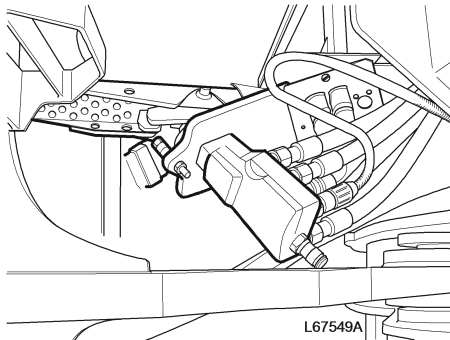


Figure 10

14. Remove the steering valve from the cab floor and place it on the frame.

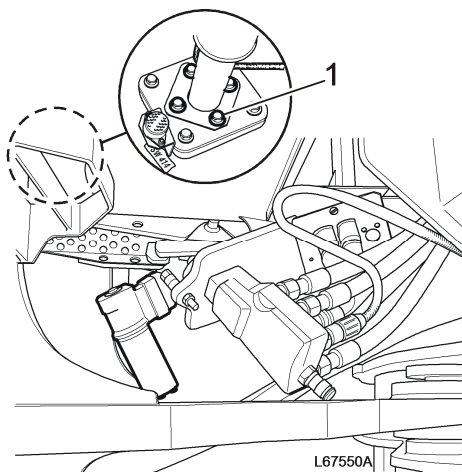


Figure 11

1. Attaching bolts (4 pcs)
15. Detach the cable harness from the electrical distribution box. Remove the lead-through plate from the rear cab wall and pull out the cable harness through the hole.

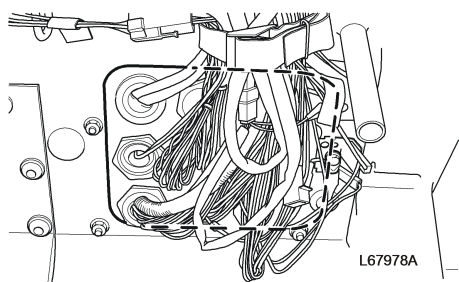


Figure 12

L60E - L180E

16. Remove the four cab attaching bolts and washers.

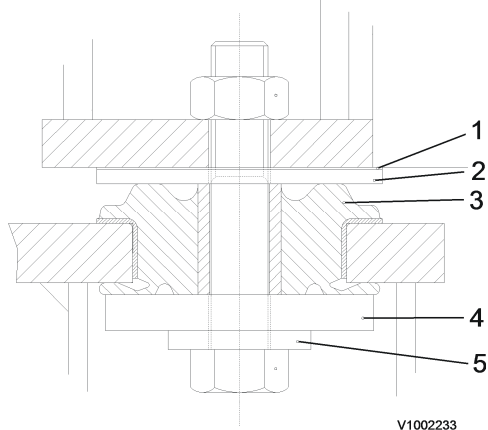


Figure 13

Cab rubber pad (principle illustration)

1. Adjusting shim
2. Thrust washer
3. Vibration damper
4. Thrust washer
5. Washer

L220E

17. Remove the cab's four attaching bolts, the washers, the plate and any adjusting shims.

NOTICE

The shims must be put on the same cab mounting element from which they were removed in order not to change its characteristics.

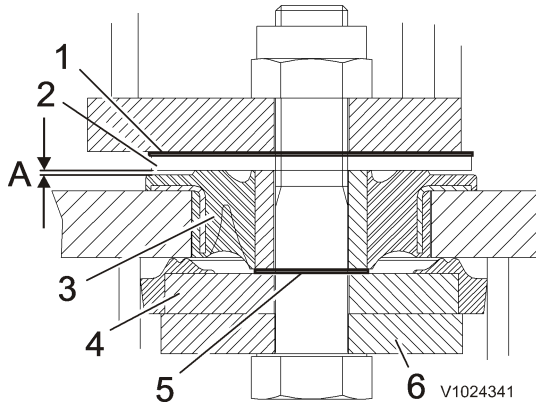


Figure 14
Cab rubber pad (principle illustration)

1. Adjusting shim, selected before rubber pad is in place, used to compensate for measurement deviations between the cab and cab mount
2. Washer
3. Mount
4. Plate
5. Adjusting shim, thickness approx. 1 mm (0.04 in) (only front cab member)
6. Washer
- A. Air gap

18. Connect the lifting device and sling as illustrated.

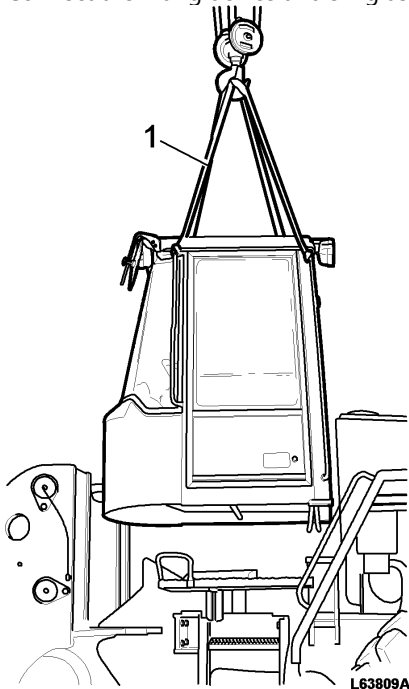


Figure 15

1. Sling 4 m (13 ft), 4 pcs

19. Lift off the cab.

Cab weight: **approx. 800 kg (1764 lb)**

20. Retain the washer from each cab rubber pad.

Document Title: Cab, installing	Function Group: 810	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Cab, installing

Op nbr 81002

Sling 4 m (13 ft), 4 pcs

1. Attach the lifting device.

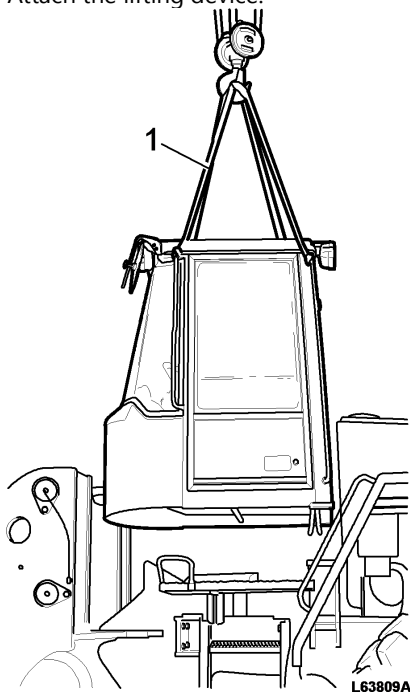


Figure 1

1. Sling 4 m (13 ft), 4 pcs

L60E - L180E

2. Place the thrust washer (2) and adjusting shim on each cab rubber pad.

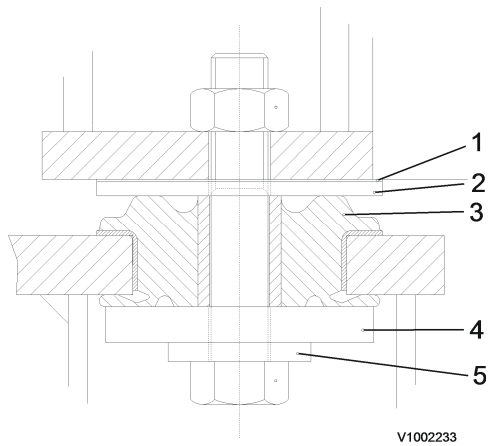


Figure 2
Cab rubber pad (principle illustration)

1. Adjusting shim
 2. Thrust washer
 3. Vibration damper
 4. Thrust washer
 5. Washer
3. Lift the cab into place. Cab's weight: **approx. 800 kg (1764 lbs)**.
Fit thrust washer (4) and washer together with each bolt.
 4. Tighten the bolts.
Tightening torque, rear mount-frame: **400-450 Nm (295-332 lbf ft)**

Tightening torque, front mount-frame: **400-450Nm (295-332 lbf ft)**
L220E
 5. Place a washer (2) and any adjusting shims (1) on each cab member.

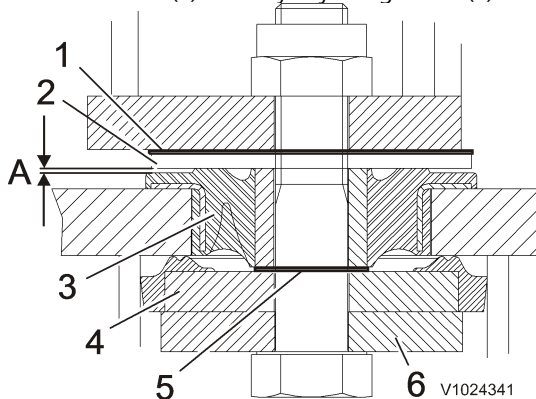


Figure 3
Cab rubber pad (principle illustration)

1. Adjusting shim
2. Washer
- A. Air gap
3. Mount
4. Plate
5. Adjusting shim. Thickness approx. 1 mm (0.040 in)

NOTICE

The shims must be put on the same cab mounting element from which they were removed in order not to

change its characteristics.

6. Lift the cab into place.
Cab's weight: **approx. 800 kg (1764 lbs)**
Fit the plate, washer (6) and any adjusting shims (5) together with each bolt.
7. Tighten the bolts.
Tightening torque, rear mount - frame: **580-650 Nm (428-480 lbf ft)**
Tightening torque, front mount - frame: **400-450 Nm (295-332 lbf ft)**
8. Check the air gap (A) on each cab rubber pad.
An air gap must be visible somewhere, completely or partly visible around the turn.
9. If there is no visible air gap, remove the bolt and add an extra adjusting shim (5).
Then, tighten the bolt with the correct tightening torque.
Max. 2 adjusting shims (5) are permitted on each cab rubber pad.
10. Remove the lifting device
11. Pull the cable harnesses through the hole in the cab wall.
Connect the cable harnesses' connectors to the electrical distribution box.
Bolt down the lead-through plate.

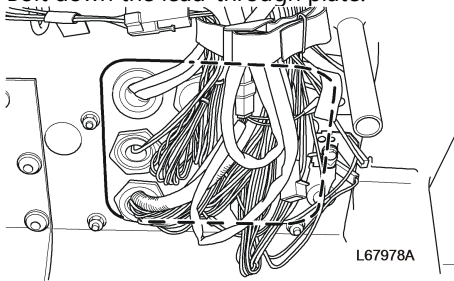


Figure 4

12. Fit the steering valve.

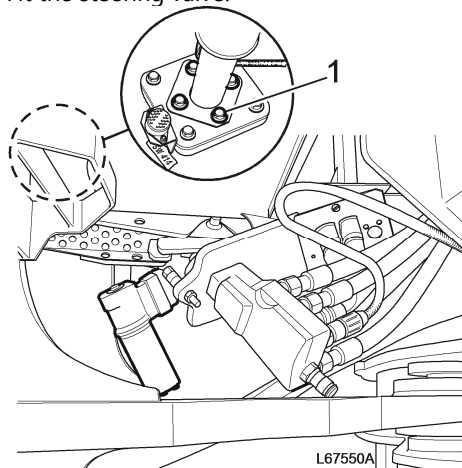


Figure 5

1. Attaching bolts (4 pcs)

13. Fit the foot brake valve.

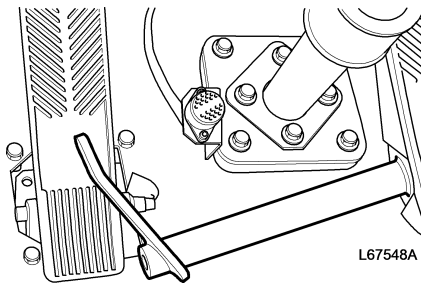


Figure 6

14. Fit the extra pedal for operating the foot brake.

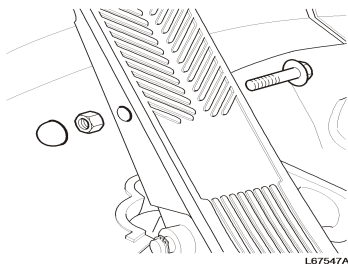


Figure 7

15. Plug in the connector on the servo valve.
Fit the servo valve on the lever carrier.
Fit the front floor plate.

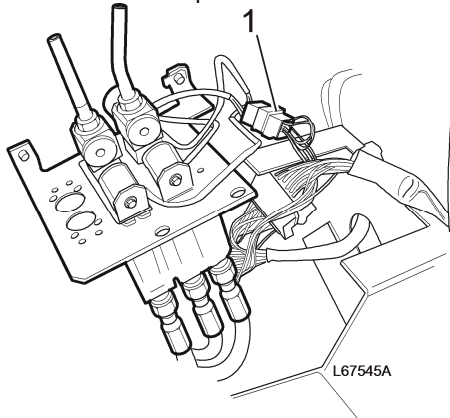


Figure 8

1. Connector

16. Fit the plastic casing on the side of the lever carrier and the control lever carrier angle adjustment lever.
Fit the casing over the servo levers. Fit the balls on the servo levers.

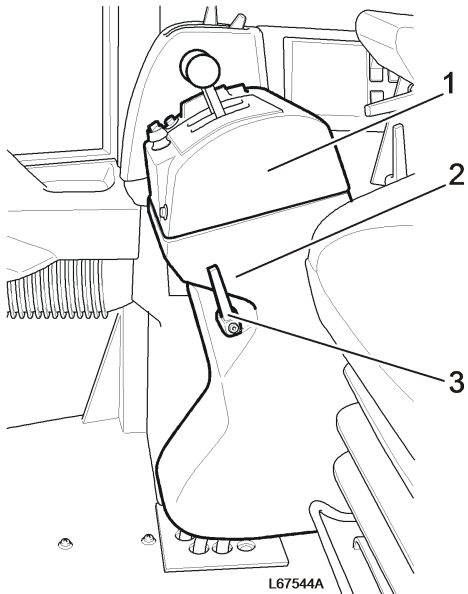


Figure 9

1. Upper cover
2. Side cover
3. Lever for adjusting angle

17. Fit the floor mat. If necessary, screw the accelerator pedal in place.
18. Connect the coolant hoses to the heater unit.
19. Steps (20) through (23) are for machines with air conditioning.
20. Fit the evaporator.

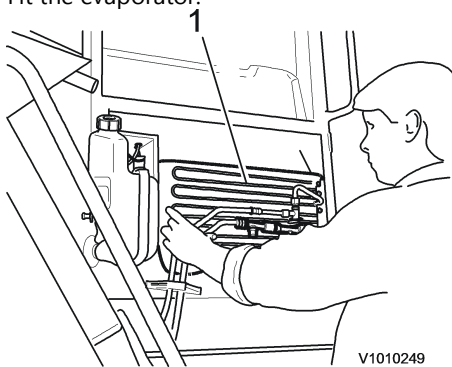


Figure 10
Evaporator

1. Evaporator

21. Fit the support plate holding the evaporator.

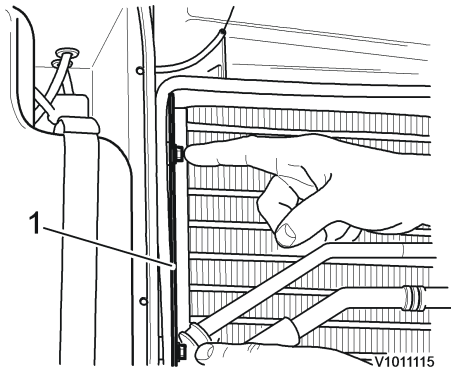


Figure 11
Support plate

1. Support plate

22. Carefully wind on the capillary tube approx. 8 turns around the evaporator pipe. Fit the insulating compound. If the insulating compound is dry, use new insulating compound.

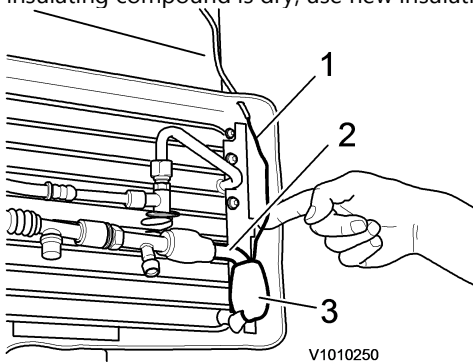


Figure 12
Capillary tube

1. Capillary tube
2. Evaporator pipe
3. Insulating compound

23. Fit the plate together with the recirculation damper.
Fit the control cable for the recirculation damper. Fit the filter casing together with the air filters.

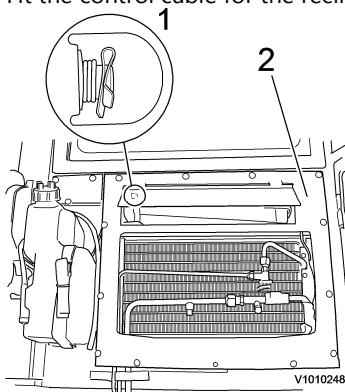


Figure 13

1. Striker plate, recirculation damper
2. Plate

24. Carry out a performance test of the air conditioning unit according to [874 Air conditioning. checking performance](#)

Document Title: Cab suspension, description	Function Group: 818	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Cab suspension, description

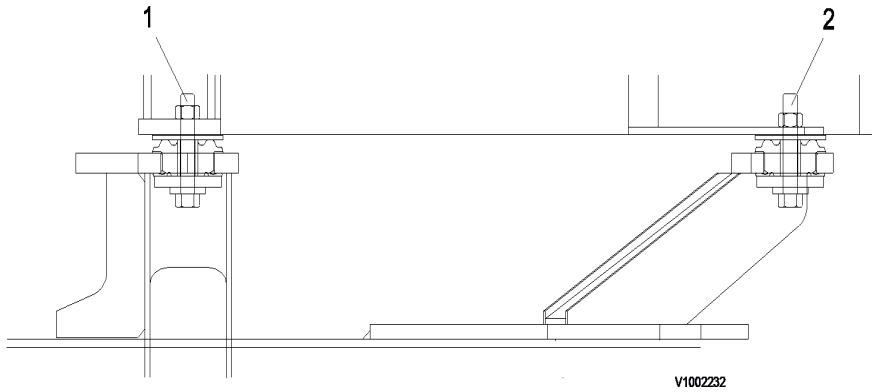


Figure 1
Cab suspension

1. Rear cab mounting element
2. Front cab mounting element

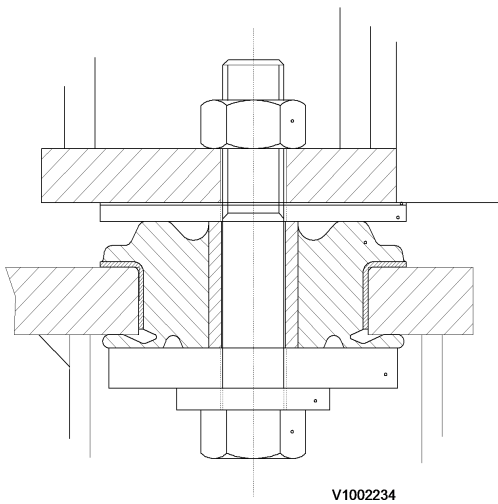


Figure 2
Rear cab mounting element

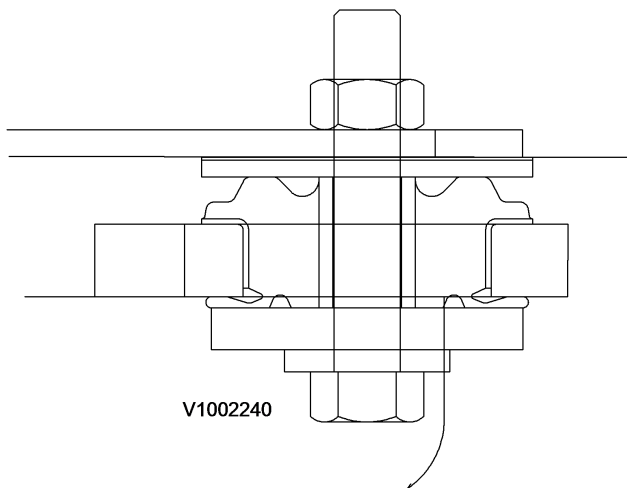


Figure 3
Front cab mounting element

Document Title: Viscous cab suspension, description	Function Group: 818	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Viscous cab suspension, description

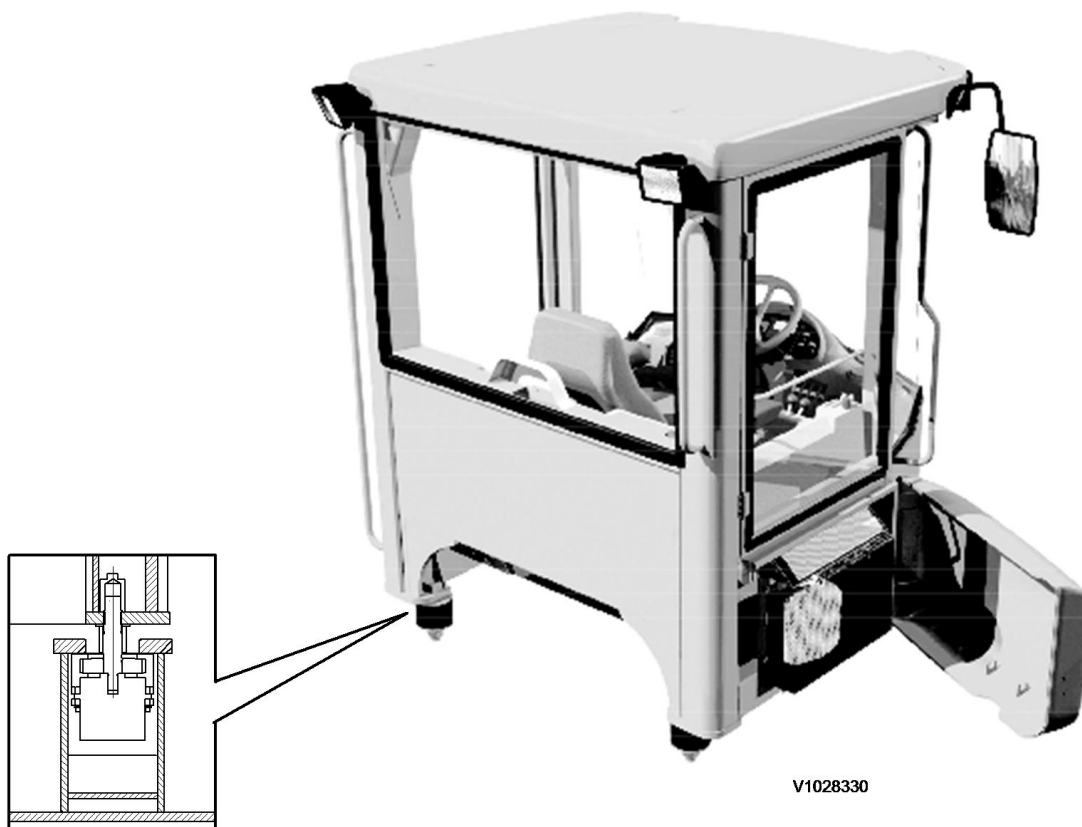


Figure 1
Cab suspension

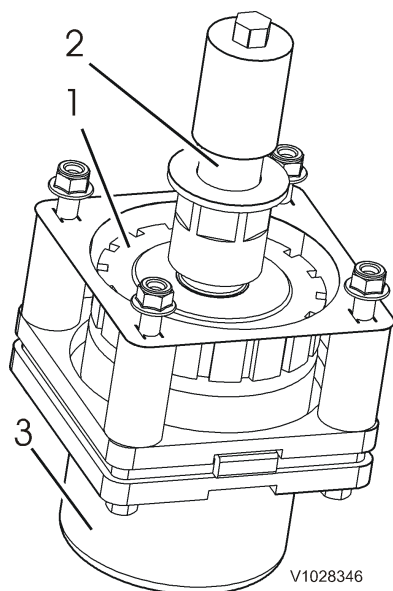


Figure 2
Cab suspension unit

1. ROPS-washer
2. ROPS-bolt
3. Vibration insulator / shock absorber

The cab suspension consists of four vibration shock absorbers, that are integrated with the necessary equipment for ROPS-protection. (ROPS= Roll Over Protection System)

The function of the insulators is to isolate the cab from the frame noise and the vibrations in the machine, as well as dampen the shocks that are generated during work with the machine.

The insulators are, like in a traditional design cab suspension, made up of a rubber body that absorb the cab's own weight as well as insulate from frame noise and vibrations. In addition, there is a vertical-action shock absorber unit consisting of a damping piston, that works in a chamber filled with high-viscosity fluid. This unit provides improved damping of shocks.

The ROPS-parts consist of a heavy-duty bolt (ROPS-bolt) with permanently installed washer, (ROPS-washer). These are mounted between the insulator and the cab, and act against the cab towers' upper plate. In case of an accident where the machine rolls over, the ROPS-parts prevent the cab from coming loose from the machine.

The viscous cab suspension is a comfort detail (similar to shock absorbers) and may have to be replaced during the machine's life.

The service life of the cab suspension depends on the application.

Document Title: Viscous cab suspension, changing one unit	Function Group: 818	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Viscous cab suspension, changing one unit

Op nbr 818-020

Removing

1. Remove the side panels under the cab.

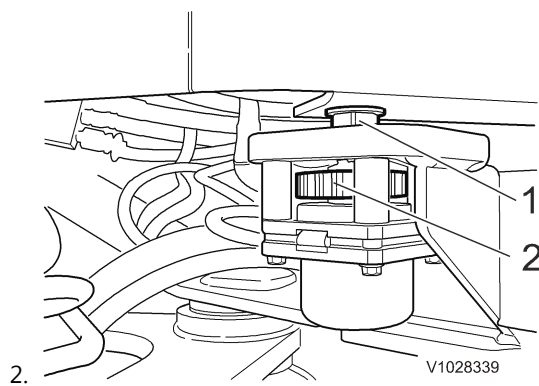


Figure 1
Viscous cab suspension

1. Nut
2. ROPS-washer

Loosen the nut under all four cab mounts.

NOTICE

Hold back the ROPS-washer with a pry bar to avoid damaging the damper unit.

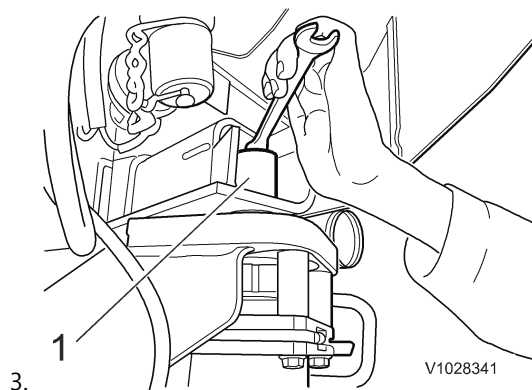


Figure 2
Loosening cap nuts

1. Cap nut

Remove the cap nuts from the bolts on all four cab mounts.

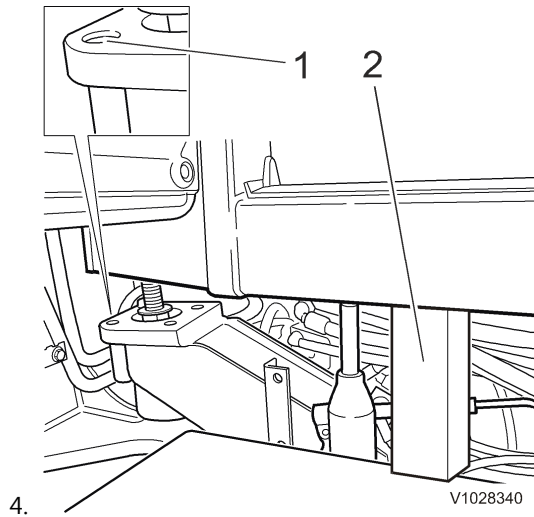


Figure 3

1. Nuts
2. Shim

Lift the cab on one side with a jack so that the nuts can be accessed.

! WARNING
Risk of crushing injuries

5. Secure the lift with a spacer.
6. Remove the cab suspension unit

NOTE!

When changing the rear cab suspension unit, the rear fender shall be loosened at the leading edge and forced backwards.

Installing

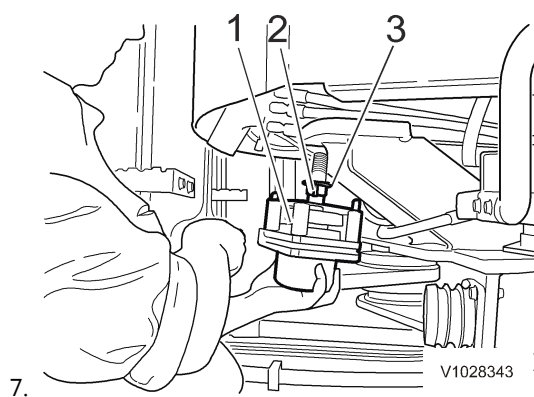


Figure 4

1. Cab suspension
2. Nut
3. washer

Install the cab suspension unit with nut and washer mounted on the ROPS-bolt before installing.

8. Torque the attaching bolts and the nuts.

Tightening torque: **48 Nm (35.4 lbf ft)**

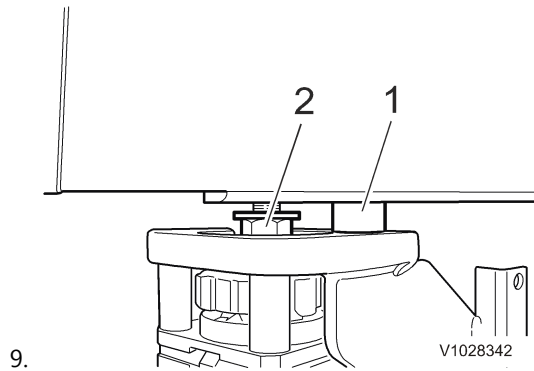


Figure 5

1. Spacer
2. Nut

Place a 25 mm spacer between cab mount and bracket on the frame.

10. Remove the shim, lower the cab on the spacer, make sure that the bolt enters the cab mount.
11. Screw on the nut together with the washer against the cab mount.

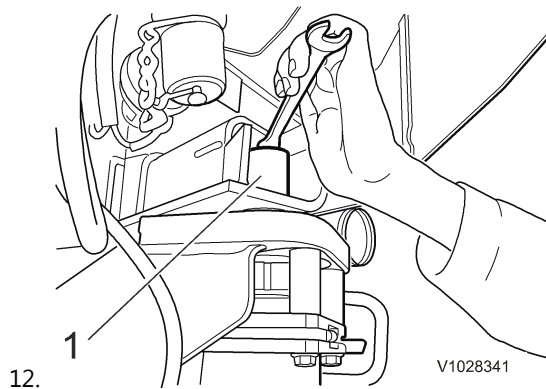


Figure 6

1. Cap nut

Install the cap nuts on the ROPS-bolts on all cab suspension units and tighten as much as possible with hand tools.

13. Torque the nut under the cab mount. For access, use an open-ended wrench.

Tightening torque: **600 Nm (443 lbf ft)**

NOTE!

Counterhold against the ROPS-washer with a pry bar so that the insulator / shock absorber does not turn during torquing.

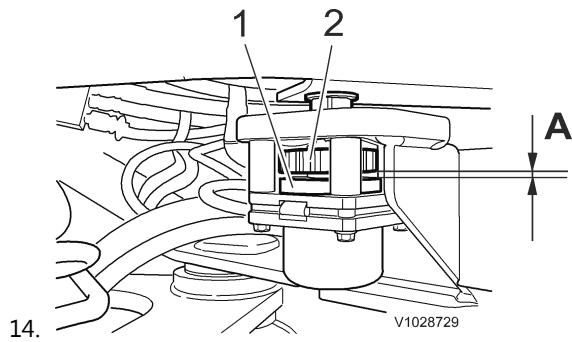


Figure 7

- 1. Rubber
- 2. ROPS-washer
- A. Distance between ROPS-washer and rubber

Check that the distance is the same between the ROPS-washer and the rubber on all four cab mounts. The distance shall be approx. 7 mm (0.28 in).

- 15. Lift the cab enough to enable removal of the spacers.
The distance between the ROPS-washer and the rubber shall be 2-3 mm (0.079-0.118 in) rear, and 4-5 mm (0.158-0.20 in) front. The values apply to standard-equipped cab.
- 16. Install the side panels under the cab.

Document Title: Engine hood, removing	Function Group: 821	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Engine hood, removing

Op nbr 821-001

Bolt M14x35, 2 pcs.

Lifting eye M16, 4 pcs.

1. Place the machine in service position. See [191 Safety rules when servicing](#).
2. Turn off the electric power with the battery disconnect switch.

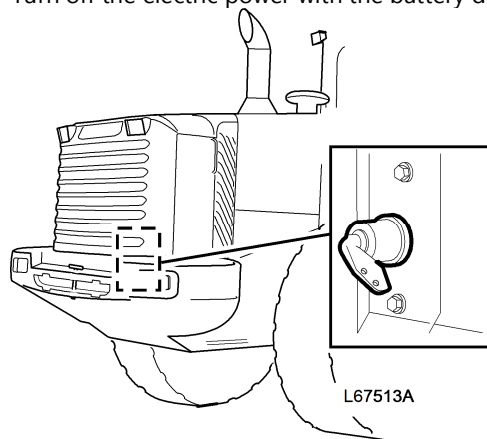


Figure 1
Battery disconnect switch location

3. Screw loose the hose clamp and disconnect the air hose.

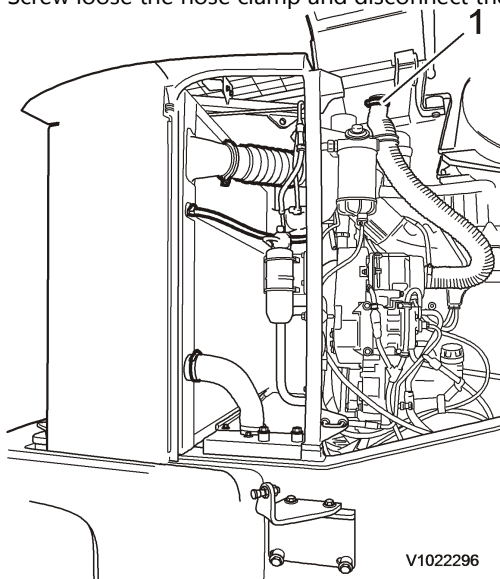


Figure 2

1. Hose clamp

L150E, Serial no. —8000

4. Disconnect the air hose between the turbocharger and air cleaner by the air cleaner. Place protection in the air hose.

Disconnect the pipe between the muffler and the exhaust turbine.

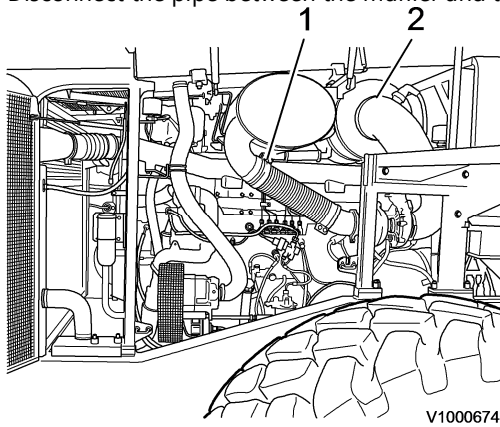


Figure 3

1. Exhaust clamp
2. Air hose

**L150E, Serial no. 8001—
L180E/L220E**

5. Disconnect the air hose between the turbo and air cleaner by the air cleaner. Place a protection in the air hose. Disconnect the clamp and the pipe from the muffler.

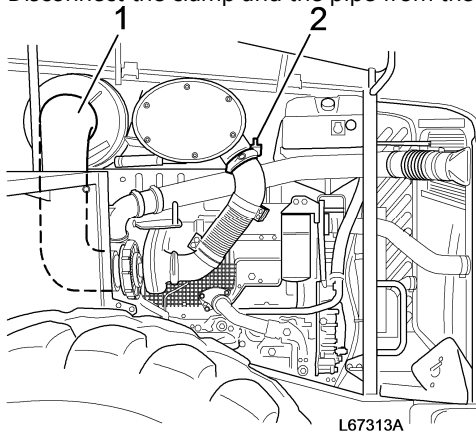


Figure 4

1. Air hose
2. Clamp

6. Remove the attaching bolts from the engine hood (4 pcs.). Fit lifting eyes (M16, 4 pcs.) in the bolt holes. Remove the pins and the lock washers from the hood's rear edge.

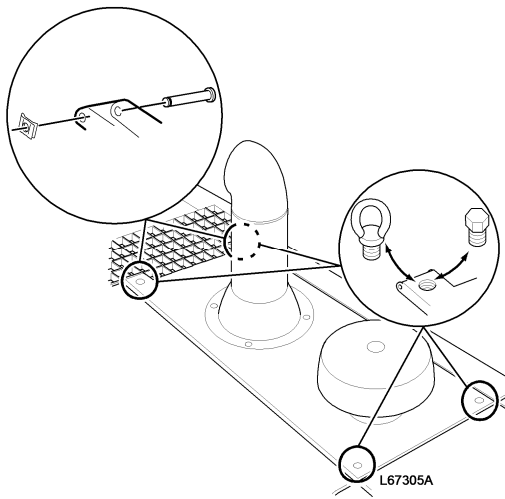


Figure 5

7. Remove the engine hood.
engine hood's weight: **approx. 250 kg (550 lbs)**

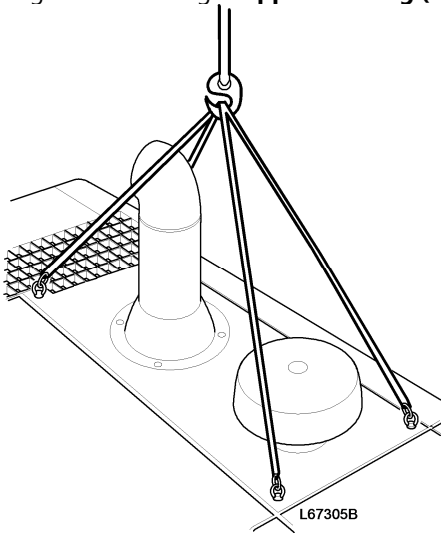


Figure 6

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Engine hood. removing](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

- [Engine hood. removing](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8002
Serial number stop: 10999

Document Title: Engine hood, removing	Function Group: 821	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Engine hood, removing

Op nbr 821-001

Shackle, 4 pcs.

Sling 3 m, 2 pcs

1. Place the machine in service position, see [191 Safety rules when servicing](#).
2. Turn off the current with the battery disconnect switch.
3. Remove the plastic casing (1) over the radiator.
4. Screw loose the hose clamp (2) and disconnect the air hose.

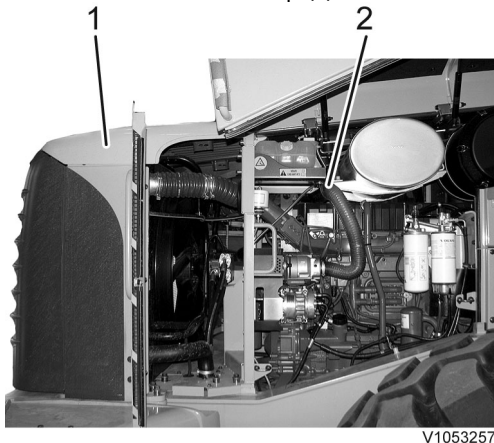


Figure 1

1. Casing
2. Hose clamp

5. Disconnect:
 - The air hose (2) between the turbocharger and the air cleaner by the turbo. Protect the turbocharger.
 - Connector for SE2502.
 - The pipe (1) between the muffler and exhaust turbine.

Remove the attaching bolts (3) for the intermediate wall against the hood.

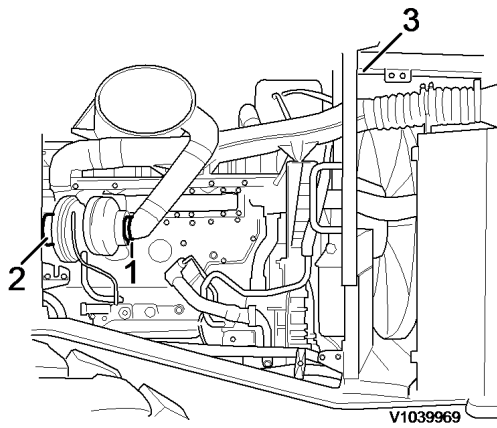


Figure 2

1. Exhaust clamp
 2. Air hose
 3. Attaching bolt for intermediate wall against hood (one on each side).
6. If the machine is equipped with oil-bath air cleaner. Remove the hose between the oil-bath air cleaner and the air filter.
7. Remove the attaching bolts for the engine hood (4 pcs.). Install shackle (4 pcs.) and sling in the lifting eyes. Remove the engine hood.
Engine hood's weight: **approx. 250 kg (550 lbs)**

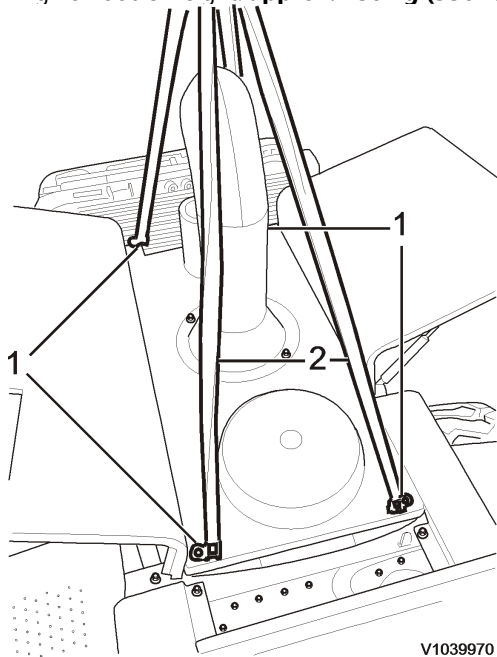


Figure 3

1. Shackle
2. Sling

Document Title: Engine hood, removing	Function Group: 821	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Engine hood, removing

Op nbr 821-001

Shackle, 4 pcs.

Sling 3 m, 2 pcs

1. Place the machine in service position, see [191 Safety rules when servicing](#).
2. Turn off the electric power with the battery disconnect switch.

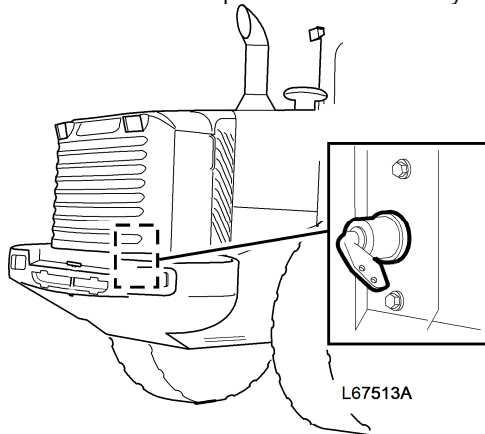


Figure 1
Battery disconnect switch location

3. Screw loose the hose clamp and disconnect the air hose.

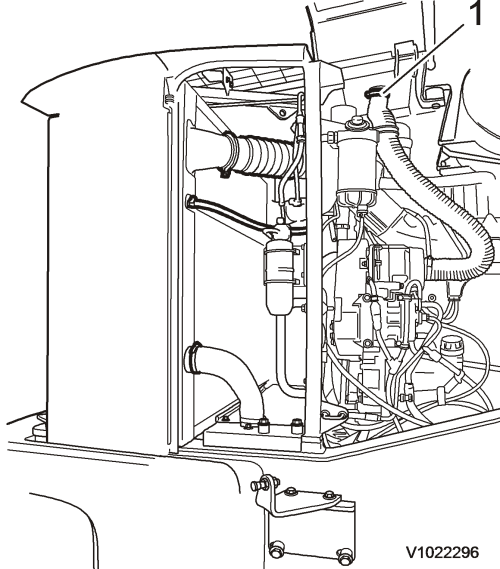


Figure 2

1. Hose clamp
4. Remove the plastic cover from the radiator.
5. Disconnect the air hose between the turbocharger and the air cleaner by the turbo. Protect the turbocharger.
Unplug the connector for SE2502.
Disconnect the pipe between the muffler and the exhaust turbine.
Remove the attaching bolts for the intermediate wall against the hood.

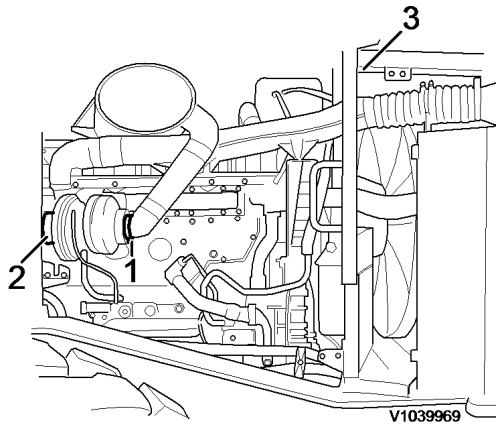


Figure 3

1. Exhaust clamp
2. Air hose
3. Attaching bolt for intermediate wall against hood (one on each side).
6. Remove the attaching bolts for the engine hood (4 pcs.). Install shackle (4 pcs.) and sling in the lifting eyes.

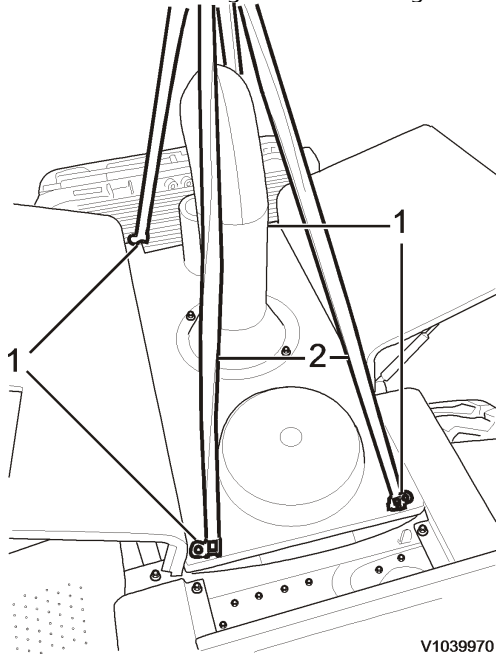


Figure 4

1. Shackle
2. Sling
7. Remove the engine hood.
engine hood's weight: **approx. 250 kg (550 lbs)**

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Engine hood, installing](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

- [Engine hood, installing](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika, Asheville
Serial number start: 5001, 62501
Serial number stop: 7398, 69999

Document Title: Engine hood, installing	Function Group: 821	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Engine hood, installing

Op nbr 821-002

Shackle, 4 pcs.

Sling 3 m, 2 pcs

1. Install the engine hood.

Engine hood's weight: **approx. 250 kg (550 lbs)**

Install the attaching bolts (4 pcs.), begin with the front bolts. Install the attaching bolts for the intermediate wall against the member. Remove the lifting device.

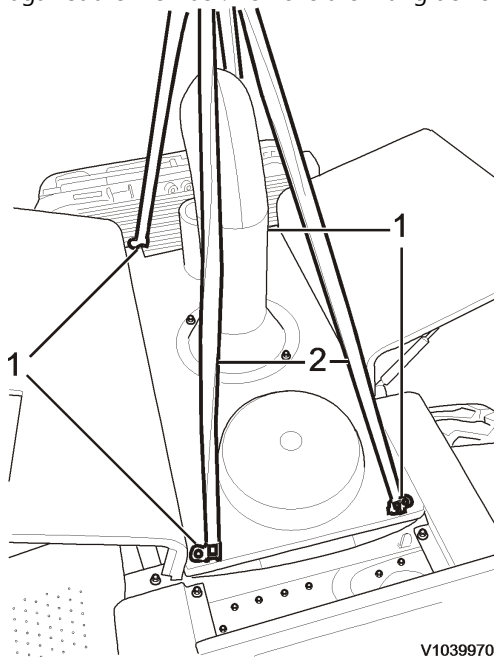


Figure 1

1. Shackle
2. Sling

2. Install the plastic casing (1) over the radiator.
Connect the air hose and install the hose clamp (2).

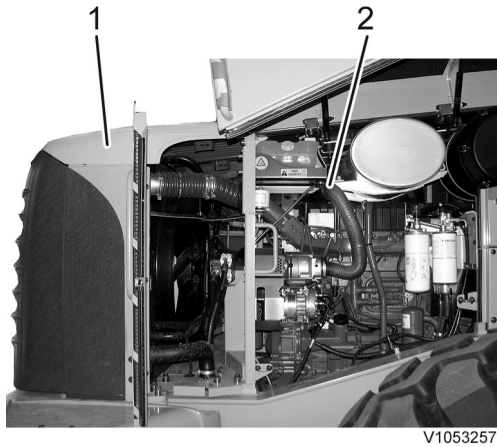


Figure 2

3. If the machine is equipped with oil-bath air cleaner. Install the hose between the oil-bath air cleaner and the air filter.
4. Remove any protection for the turbocharger. Connect the air hose between the turbocharger and the air cleaner. Plug in the connector SE2502 on the inlet hose to the air filter. Connect the pipe between the muffler and exhaust turbine. Install the air hose and tighten the hose clamp.

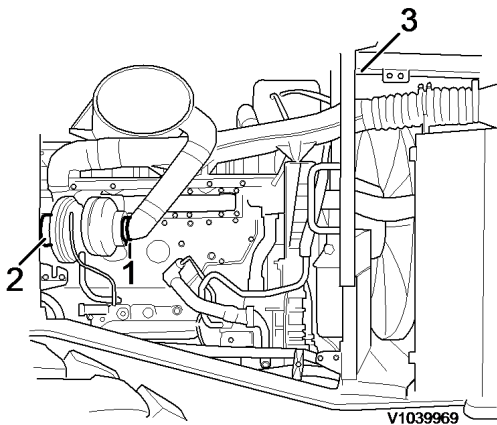


Figure 3

1. Exhaust clamp
 2. Air hose
 3. Attaching bolt for intermediate wall against hood (one on each side)
5. Restore the machine. Turn on the electric power with the battery disconnecter.

Document Title: Engine hood, installing	Function Group: 821	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Engine hood, installing

Op nbr 821-002

Bolt M14x35, 2 pcs.

Lifting eye M16, 4 pcs.

1. Fit the engine hood.
Engine hood's weight: **approx. 250 kg (550 lbs)**

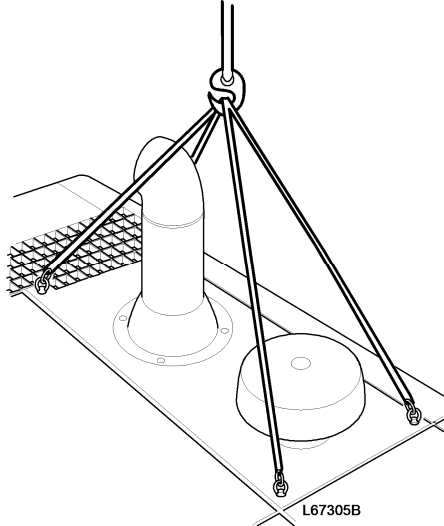


Figure 1

2. Remove the lifting eyes and fit attaching bolts (4 pcs.). Fit the pins and the lock washers at the hood's rear edge.

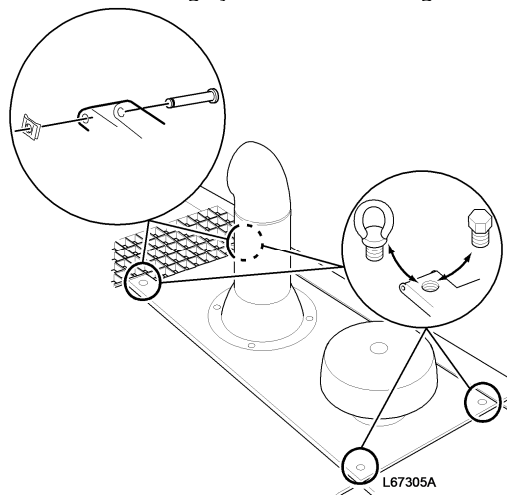


Figure 2

L150E, Serial no. —8000

3. Remove any protection in the air hose. Connect the air hose between the turbo and air cleaner. Fit the exhaust clamp and the pipe by the muffler.

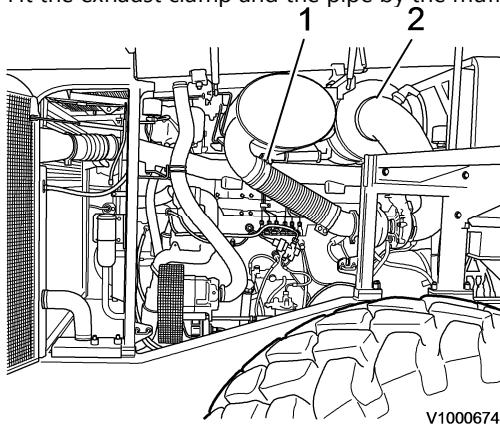


Figure 3

1. Exhaust clamp
2. Air hose

**L150E, Serial no. 8001—
L180E/L220E**

4. Remove any protection in the air hose. Connect the air hose between the turbo and air cleaner. Fit the exhaust clamp and the pipe by the muffler.

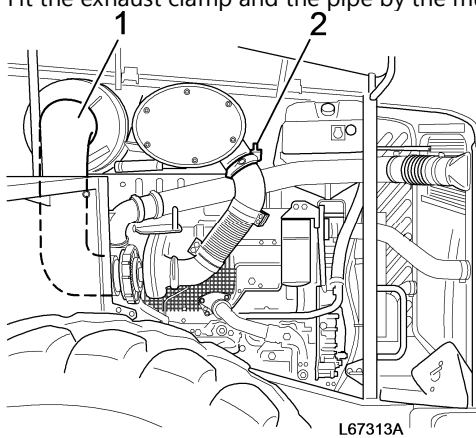


Figure 4

1. Air hose
2. Clamp

5. Fit the hose and tighten the hose clamp.

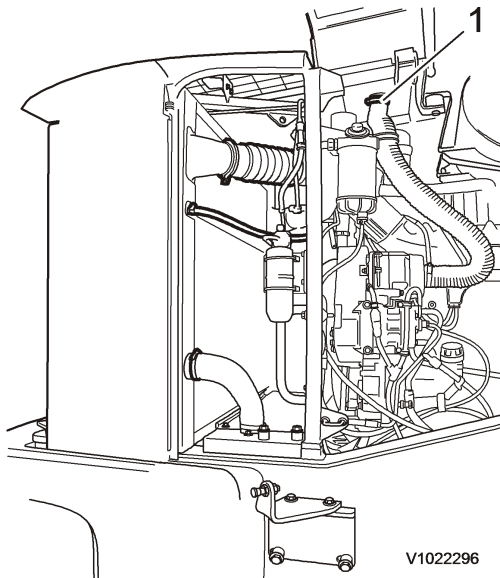


Figure 5

1. Hose clamp
6. Restore the machine. Turn on the electric power with the battery disconnect switch.

More than one document matches chosen profile

<https://truckmanualshub.com/>

- [Engine hood, installing](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999

- [Engine hood, installing](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8002
Serial number stop: 10999

Document Title: Engine hood, installing	Function Group: 821	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Engine hood, installing

Op nbr 821-002

Shackle, 4 pcs.

Sling 3 m, 2 pcs

1. Install the engine hood.

Engine hood's weight: **approx. 250 kg (550 lbs)**

Install the attaching bolts (4 pcs.), begin with the front bolts. Install the attaching bolts for the intermediate wall against the member. Remove the lifting device.

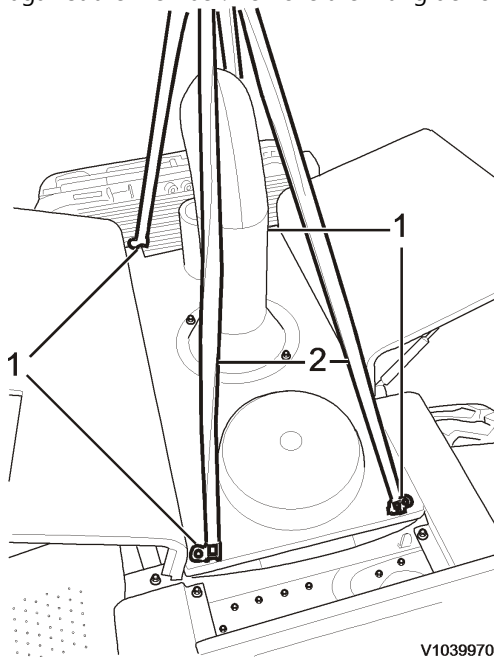


Figure 1

1. Shackle
2. Sling

2. Install the plastic casing (1) over the radiator.
Connect the air hose and install the hose clamp (2).

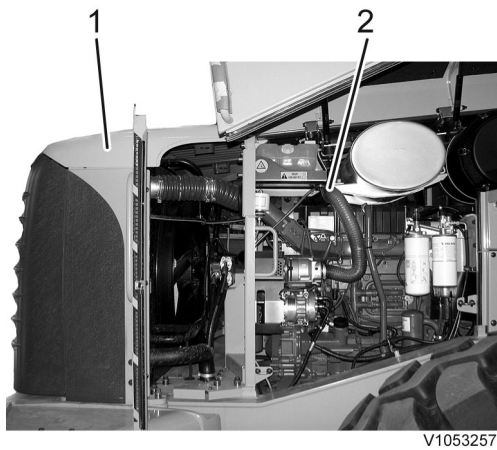


Figure 2

3. If the machine is equipped with oil-bath air cleaner. Install the hose between the oil-bath air cleaner and the air filter.
4. Remove any protection for the turbocharger. Connect the air hose between the turbocharger and the air cleaner. Plug in the connector SE2502 on the inlet hose to the air filter. Connect the pipe between the muffler and exhaust turbine. Install the air hose and tighten the hose clamp.

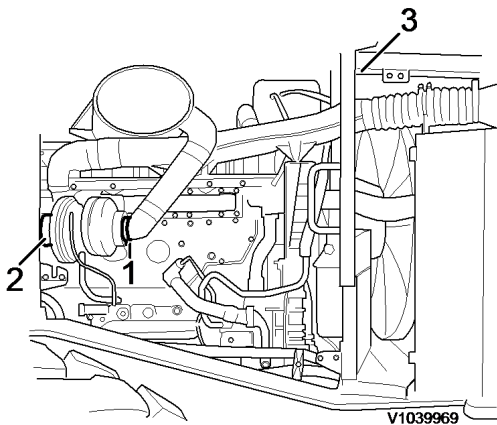


Figure 3

1. Exhaust clamp
 2. Air hose
 3. Attaching bolt for intermediate wall against hood (one on each side)
5. Restore the machine. Turn on the electric power with the battery disconnecter.

Document Title: Engine hood, installing	Function Group: 821	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Engine hood, installing

Op nbr 821-002

Shackle, 4 pcs.

Sling 3 m, 2 pcs

1. Fit the engine hood.
Engine hood's weight: **approx. 250 kg (550 lbs)**

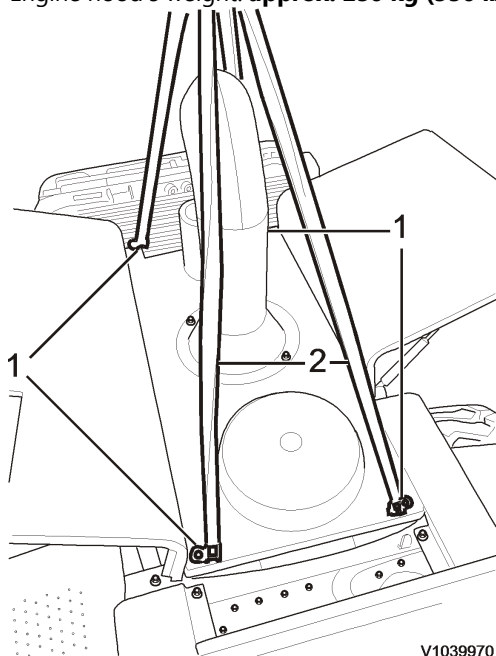


Figure 1

1. Shackle
 2. Sling
2. Install the attaching bolts (4 pcs.), begin with the front bolts. Install the attaching bolts for the intermediate wall against the member. Remove the lifting device.
 3. Install the plastic casing over the radiator.
 4. Remove any protection for the turbocharger. Connect the air hose between the turbocharger and the air cleaner. Plug in the connector SE2502 on the inlet hose to the air filter. Connect the pipe between the muffler and exhaust turbine. Install the air hose and tighten the hose clamp.

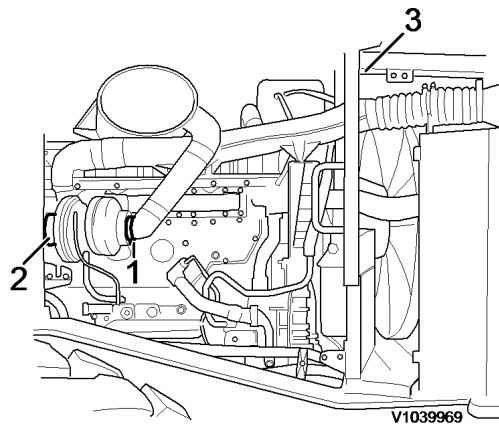


Figure 2

1. Exhaust clamp
 2. Air hose
 3. Attaching bolt for intermediate wall against hood (one on each side)
5. Restore the machine. Turn on the electric power with the battery disconnecter.

Document Title: Climate control system, description	Function Group: 870	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Climate control system, description

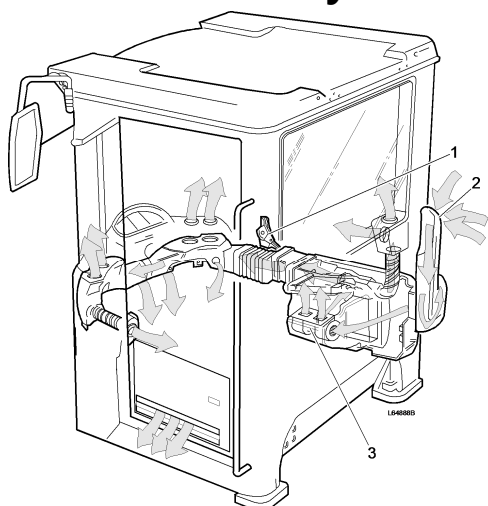


Figure 1
Climate control system / air duct system

1. Controls
2. Air intake
3. Fan motor

The machine is equipped with a climate control system where the cab fan is able to maintain a constant excess pressure in order to keep out pollutants. In addition all air is filtered even the so called recirculated air. As standard the cab is provided with a heater unit and as optionals Air Conditioning (AC) or Automatic Temperature Control (ATC) are available. All controls for the climate control system are positioned by the right side panel.

The cab fan has four speeds and is controlled with a switch (1).

The temperature is controlled with a sliding control (3) which, via a control cable, actuates a valve for controlling the flow of coolant through the heater unit. Sliding control (2) controls the amount of air which is to be recirculated. Button (4) is used for starting the air conditioning.

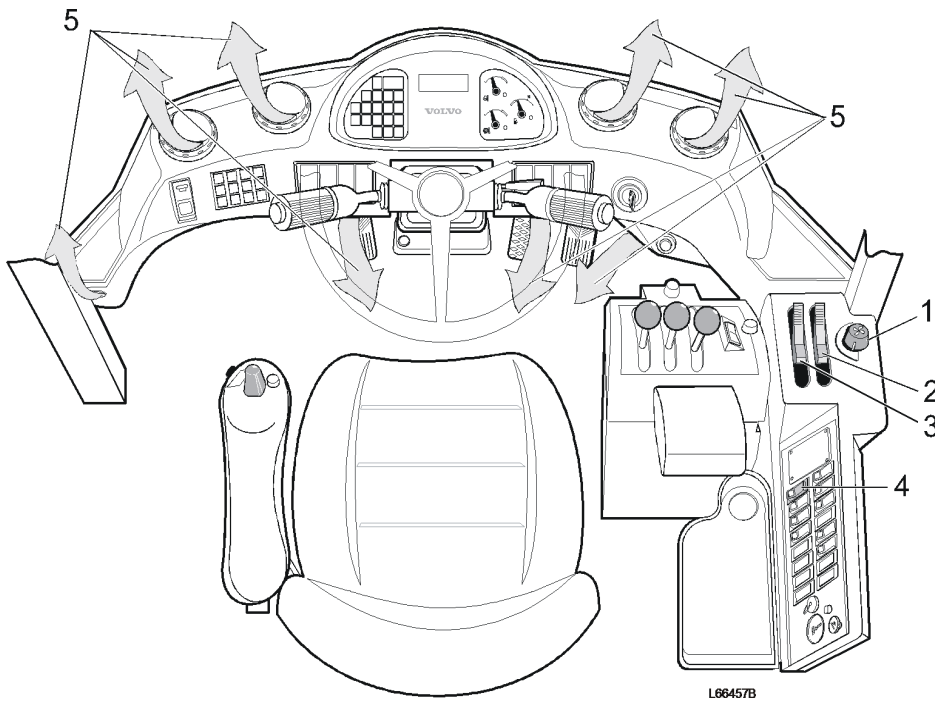


Figure 2

1. Switch, fan speed
2. Recirculation control
3. Temperature control
4. Switch for air conditioning
5. Air nozzles

The air, drawn into the cab, first passes the air intake (2). From there the air passes through a replaceable prefilter (8), which is accessible via a cover on the right side of the cab. This filter is complemented with a replaceable cab filter (9).

After the air has passed the cab filter it is sucked into fan (4) via evaporator (5) (optional equipment) and then blown further through heater unit (3) after which it is distributed inside the cab.

If recirculation is selected, most of the air will flow via recirculation damper (7) as shown by arrow C. With control (1) set at max. recirculation, about 90% of the air will be recirculated and only about 10% taken from outside to maintain excess pressure inside the cab.

The air is distributed through 10 air nozzles, which individually can be opened or closed and set to direct the air flow.

The air in the cab is discharged through a one-way outlet fitted with slats and placed in the cab door.

In order to open the slats a certain degree of excess pressure in the cab is required. The higher pressure inside the cab contributes to keeping the cab free of dust.

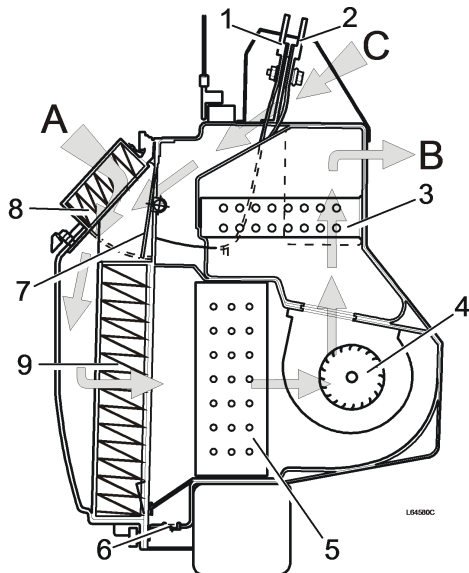


Figure 3
Air conditioning, cut-away view

1. Recirculation control
 2. Heat control
 3. Heater unit
 4. Cab fan
 5. Evaporator
 6. Drain valve for condensation
 7. Recirculation damper
 8. Prefilter
 9. Cab filter
-
- A. Air from outside
 - B. Air into cab
 - C. Recirculation air

Document Title: Fan motor, changing	Function Group: 873	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Fan motor, changing

Op nbr 87306

NOTICE

Refrigerant under pressure. Do not disconnect any hoses or connections on the air conditioning, thereby involuntary releasing refrigerant.

See also [191 Safety when working with air conditioning refrigerant](#)

Removing

1. Open the cab filter cover.
2. Remove the filters.

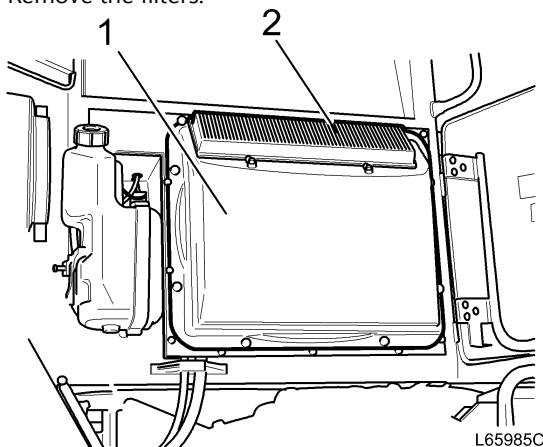


Figure 1
Filter cover

1. Main filter
 2. Pre-filter
3. Disconnect the control cable for the recirculation damper.
Remove the plate together with the recirculation damper.

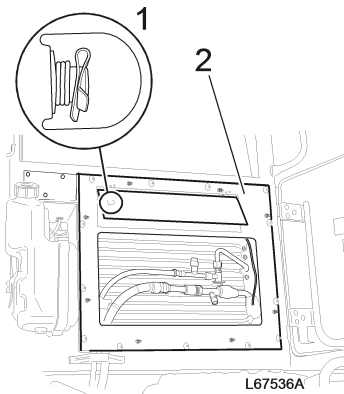


Figure 2

1. Striker plate, recirculation damper
2. Plate

4. Remove the support plate's two bolts and the plate on the left side that holds the evaporator.

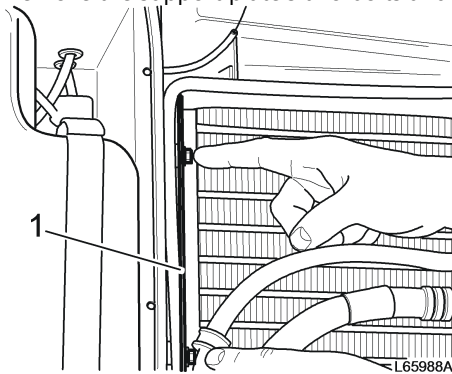


Figure 3

1. Support plate

5. Remove the capillary tube from the evaporator pipe by first removing the insulating compound and then carefully removing the capillary tube.

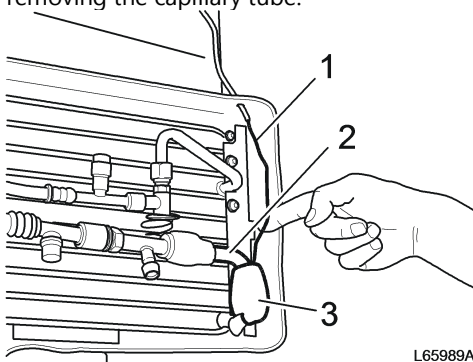


Figure 4
Capillary tube

1. Capillary tube
2. Evaporator pipe
3. Insulating compound

6. Carefully fold out the evaporator.

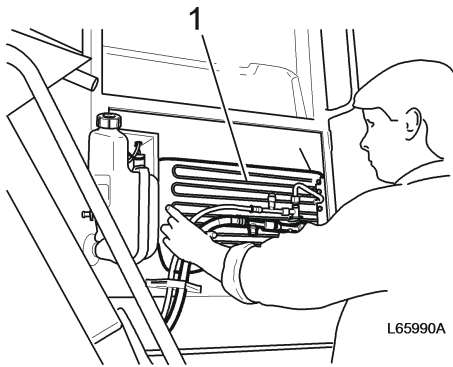


Figure 5

1. Evaporator
7. Carefully suspend the evaporator to the side so that it's not damaged.

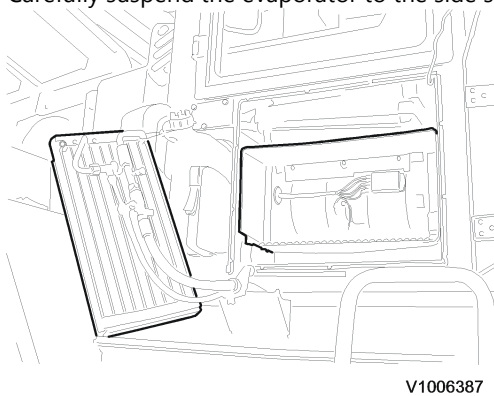


Figure 6
Evaporator

8. Remove the outer bolts for the fan motor's retainer plate and remove the plate.

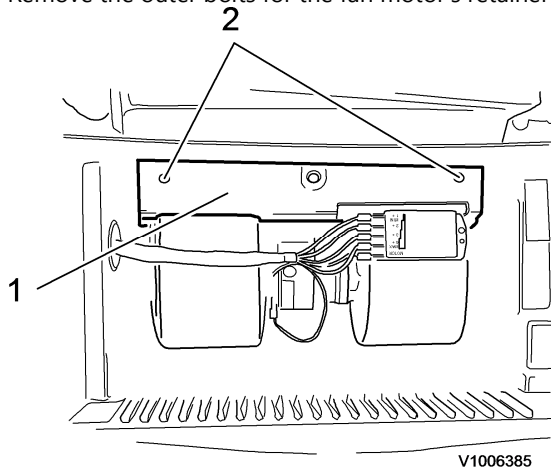


Figure 7
Fan motor

1. Retainer plate
2. Bolts
9. Remove the fan motor's electrical connections.
10. Remove the fan assembly.

Mounting

11. Fit the fan assembly.
12. Fit the fan motor's retainer plate and the two bolts.
13. Fit the fan motor's electrical connections.

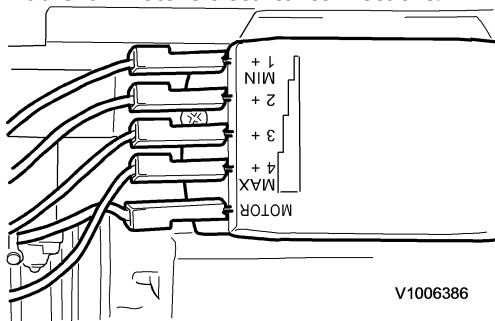


Figure 8
Fan's electrical connection

- 1+ (purple/white)
 - 2+ (orange/white)
 - 3+ (grey/yellow)
 - 4+ (yellow/black)
 - MOTOR (orange)
14. Test-run the fan at fan speeds (rpm).
 15. Refit the evaporator.
 16. Refit the support plate that holds the evaporator.

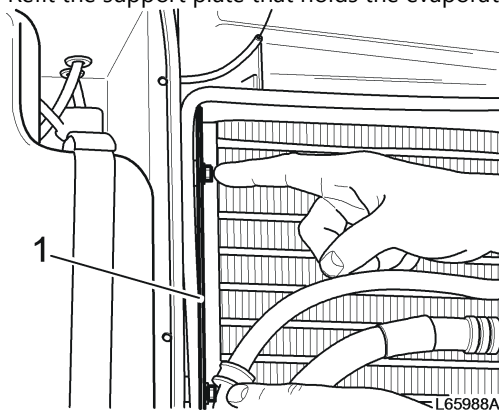


Figure 9

1. Support plate
17. Refit the rubber strip around the evaporator.
 18. Refit the capillary tube on the evaporator pipe and refit the insulating compound.

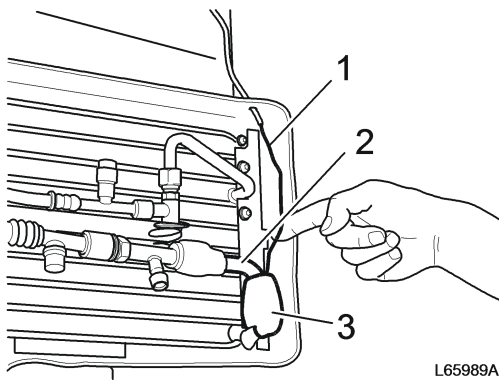


Figure 10
Evaporator

1. Capillary tube
2. Evaporator pipe
3. Insulating compound

19. Clamp the hoses for the evaporator.

20. Fit the plate for condensation water drainage and lock it in place with the sealing strip.

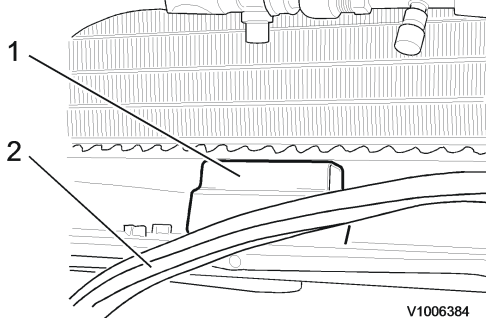


Figure 11

1. Condensation water drain
2. Sealing strip

21. Refit the plate with the recirculation damper.
Refit the control cable for the recirculation damper.

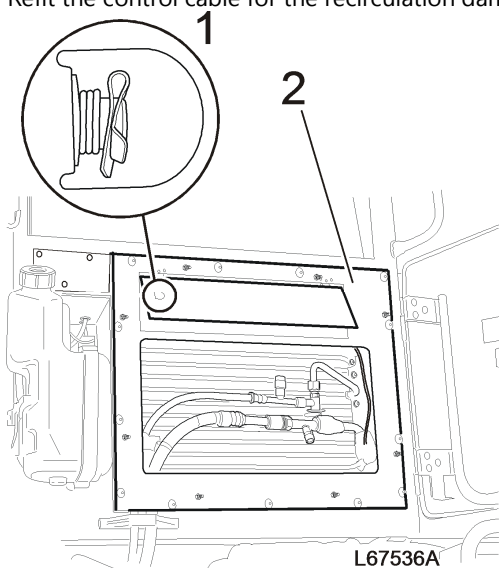


Figure 12

1. Striker plate, recirculation damper
 2. Plate
-
22. Refit the main filter (leave the two top bolts).
 23. Refit the pre-filter.
 24. Close the cab filter cover.

Document Title: Heater core, changing	Function Group: 873	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Heater core, changing

Op nbr 87304

1. Turn off the voltage with the battery disconnect switch.



WARNING

Risk of burns when removing the header tank cap because of excess pressure in the cooling system.

2. Remove the cap from the expansion tank.
3. Drain: 1/3 of the coolant or clamp the valve's hoses with hose pliers. Use the existing drain hose, located in the battery box or in the tool box on the machine.
Volume: See resp. machine's specification.

Removing

4. Remove the fan motor. See [873 Fan motor, changing](#)
5. Remove the bolts that hold the fan motor casing and lift it out.

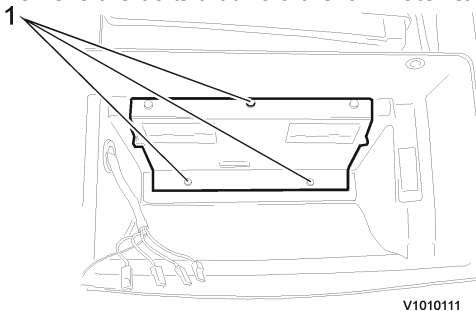


Figure 1

1. Fan casing bolts

6. Screw off the hose clamps and lift down the heater core assembly.

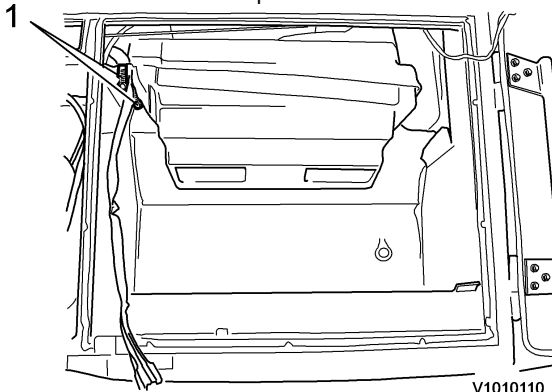


Figure 2

Heater core assembly

1. Hose clamps (2 pcs.)
7. Remove the heater core from the casing.

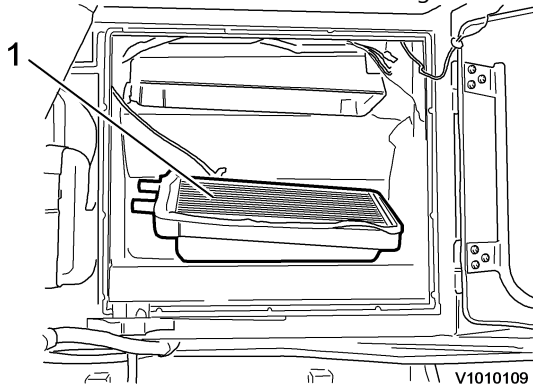


Figure 3
V1010109

1. Heater core

Mounting

8. Fit the heater core in the casing.
9. Fit the hose clamps on the core.
10. Hold up the heater core assembly and fit the casing for the fan motor.
11. Bolt down the fan motor casing.
12. Fit the fan motor. See [873 Fan motor, changing](#)
13. Refill the cooling system and turn on the battery disconnect switch.
14. Start the engine and let it idle until it's warm.
15. Start the fan and check that the heat can be adjusted.
16. Stop the engine and check the coolant level when the engine has cooled down.

Document Title: Heat control valve, changing	Function Group: 873	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Heat control valve, changing

Op nbr 87308

1. Turn off the voltage with the battery disconnect switch.



Risk of burns when removing the header tank cap because of excess pressure in the cooling system.

2. Remove the cap from the expansion tank.
3. Drain: 1/3 of the coolant or clamp the valve's hoses with hose pliers. Use the existing drain hose, located in the battery box or in the tool box on the machine.
Volume: See resp. machine's specification.

Removing

4. Remove the side panel in the cab.

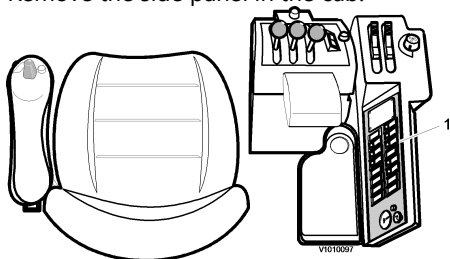


Figure 1

1. Side panel

5. Remove the plate by the washer fluid reservoir that conceals the heat valve.

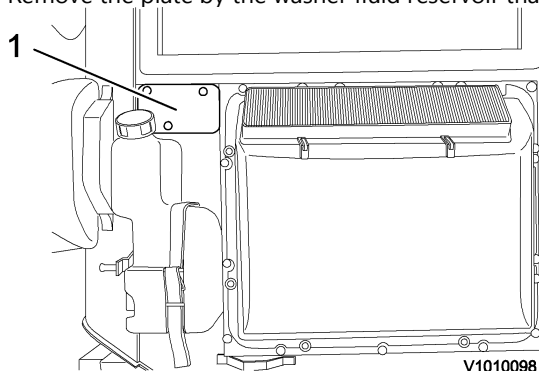


Figure 2

1. Cover plate

6. Remove the heat valve's cable bracket and control cable.

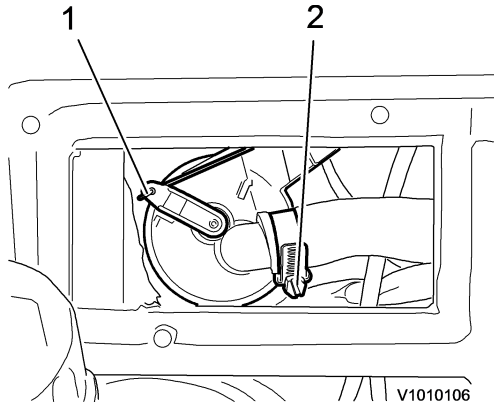


Figure 3
Heat valve

1. Control cable
2. Hose clamps (2 pcs.)

7. Remove the two hose clamps on the valve.
8. Remove the valve.

Mounting

9. Fit the heat valve and tighten down the hose clamps.
10. Fit the control cable and the bracket.
11. Fit the cover plate by the washer fluid reservoir.
12. Fit the side panel in the cab.
13. Refill the cooling system and turn on the battery disconnect switch.
14. Start the engine and let it idle until it's warm.
15. Start the fan and check that the heat can be adjusted.
16. Stop the engine and check the coolant level when the engine has cooled down.

Document Title: Air conditioning, description	Function Group: 874	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Air conditioning, description

The evaporator (5) is located between the cab filter (9) and the cab fan (4).

The evaporator becomes cold when the air conditioning is switched on and air passing over the evaporator fins is cooled. If the air becomes too cold, it can be controlled by choosing different speeds for the cab fan or with the heat control (2).

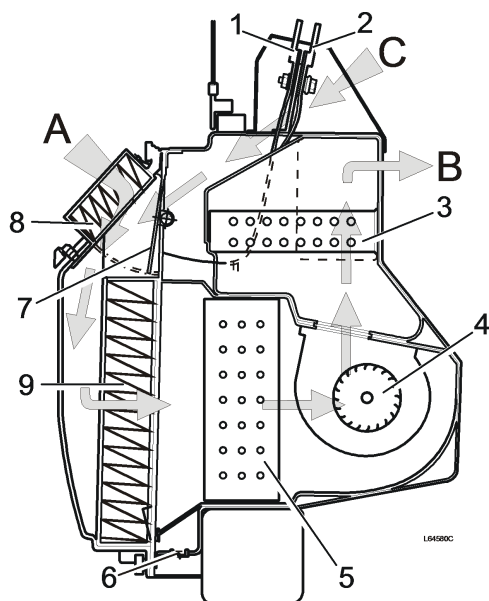


Figure 1
Air conditioning, cut-away view

1. Recirculation control
 2. Heat control
 3. Heater unit
 4. Cab fan
 5. Evaporator
 6. Drain valve for condensation
 7. Recirculation damper
 8. Pre-filter
 9. Cab filter
- A. Air from outside
B. Air into cab
C. Recirculation air

The air conditioning system is filled with refrigerant (R134a) which is pumped through the system by the compressor (D).

The compressor, which is driven by the diesel engine via a V-belt, has an electromagnetic clutch for engaging and disengaging the compressor. Safety valve H opens at 3.5 MPa (508 psi) and closes at 2.5 MPa (363 psi).

The compressor (D) pumps refrigerant to the condenser (E) and increases pressure so that the refrigerant is condensed (becomes liquid). Refrigerant compression generates heat, which is led from the condenser with diesel engine's cooling fan.

The receiver dryer F absorbs any moisture in the refrigerant and is also the storage for the refrigerant. The receiver dryer is

located in the space between the engine compartment and the cooling fan. The pressure monitor G cuts out at pressures that are both too high and too low. It cuts out at 0.1–0.2 MPa (14.5–29 psi) and 2.1–2.5 MPa (305–363 psi).

The amount of refrigerant that flows through the evaporator (B) is controlled by the expansion valve (A), which senses the temperature at the evaporator outlet with the capillary tube (I). The restriction in the expansion valve lowers the pressure so that the refrigerant converts from liquid to gas. The evaporator causes a significant drop in the refrigerant's temperature.

When the cold refrigerant passes through the evaporator, heat is taken from the air that passes into the cab through the evaporator's fins. This results in cold air being blown into the cab.

Evaporator temperature is adjusted by a thermostat (C) which senses evaporator temperature via the capillary tube (J) and prevents ice from forming on the evaporator. When there's a risk of freezing or ice formation, the thermostat disengages the compressor until the temperature has increased.

Condensation that forms on the evaporator is drained through a valve (6) below the evaporator, see fig.

In order to provide maximum cab cooling, a recirculation damper (7) can be opened, which draws approximately 90% of the air flow from the cab through the damper.

The recirculated air is filtered through the cab filter (9).

For more detailed descriptions of the components and repair instructions, see Service Manual "AIR CONDITIONING, R134a" and any service bulletins.

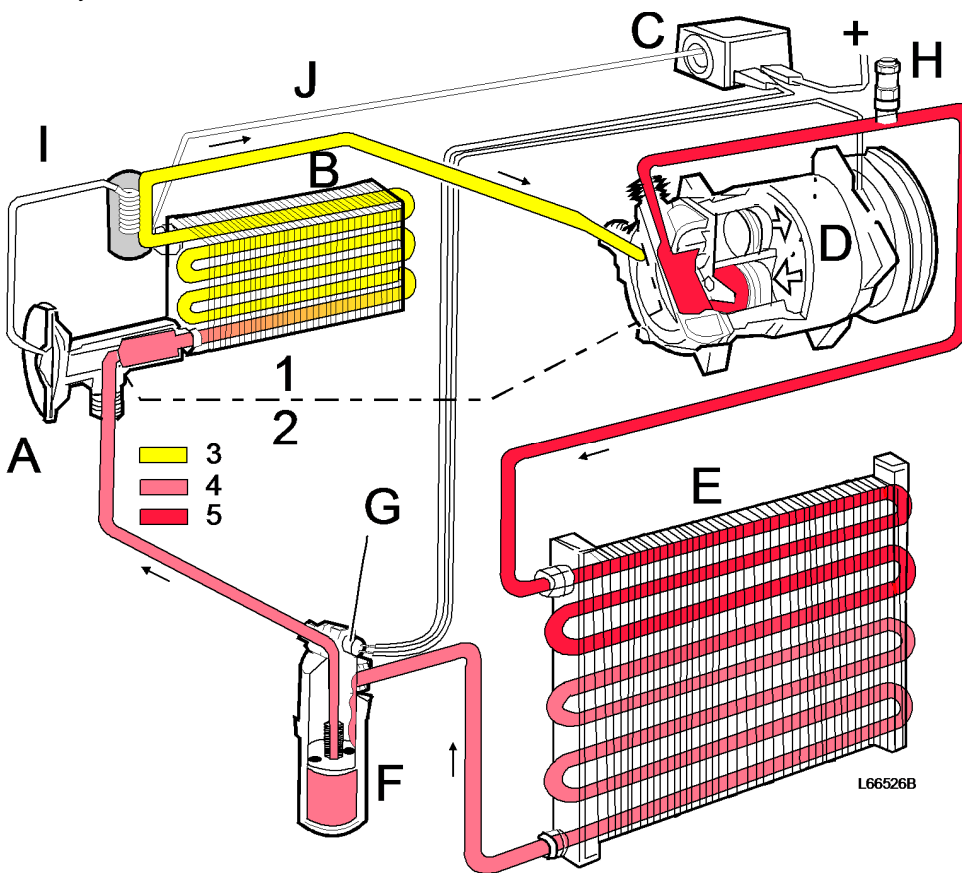


Figure 2
Air conditioning, principle diagram

1. Low pressure side, cold
2. High pressure side, warm
3. Gas
4. Liquid
5. Gas/liquid mixture

- A. Expansion valve
- B. Evaporator
- C. Thermostat (always adjusted to max. position, not adjustable by operator, located under side panel in the cab)
- D. Compressor

- E. Condenser
- F. Receiver dryer
- G. Pressure monitor
- H. Safety valve
- I. Capillary tube to expansion valve
- J. Capillary tube to thermostat

Document Title: Components	Function Group: 874	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Components

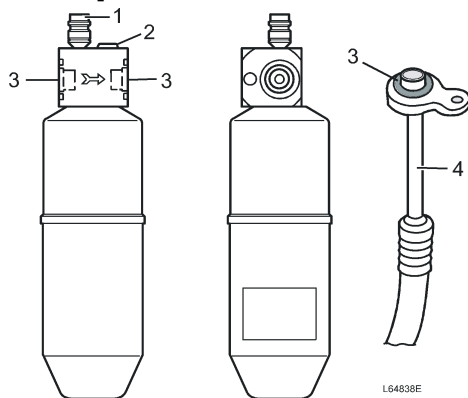


Figure 1
Some of the components in the air conditioning

1. Service connection, high-pressure side
2. Sight glass ("Bubble glass")
3. O-ring connections, (R134a standard)
4. Steel pipe connections on all AC hoses

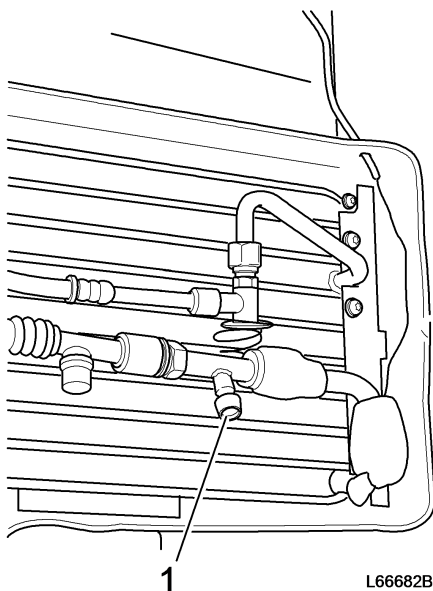


Figure 2
Air conditioning, service connections

1. Service connection, low-pressure side

Document Title: AC relay-controlled, description	Function Group: 874	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

AC relay-controlled, description

The cab fan MO805 is controlled with switch SW805.

The air conditioning unit is engaged and disengaged with switch SW806.

When SW806 is turned on, MO805 will receive power via connection 5–7 on SW805 and the cab fan will operate at its lowest speed. RE802 is activated via the pressure monitor SE804.

When RE802 is activated, the compressor solenoid MA801 will receive power from FU4 via SW806, RE801, RE802 and thermostat SE803, while RE801 receives power at connection 85. Since RE801 has already received power at connection 86, it will not be activated.

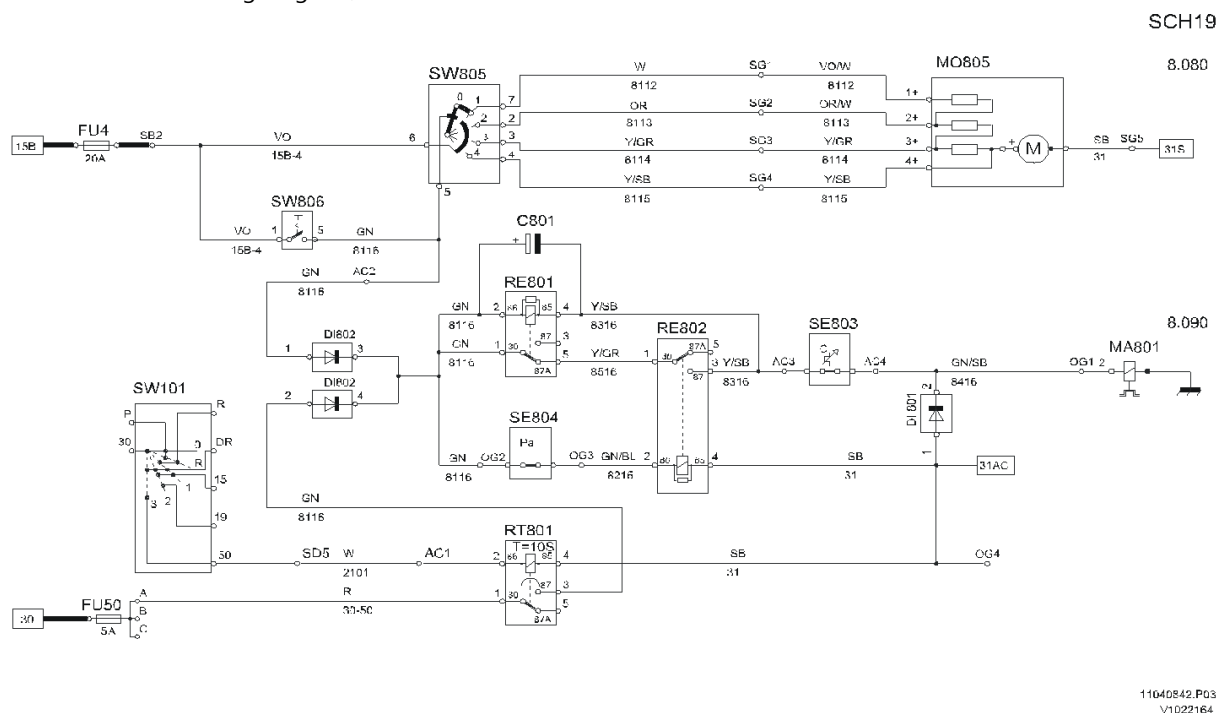
To ensure that RE802 is activated before RE801 a capacitor C801 is connected in parallel with RE801.

When the diesel engine is started, the air conditioning is activated for 10 seconds, with the time relay RT801. From connection 50 on SW101 (start position), the time relay RT801 receives current from FU50 and is activated. Via DI802, the air conditioning is activated according to the above, with the exception that the cab fan isn't started.

Then the air conditioning is activated for 10 seconds. This is to prevent the fluid shocks in the compressor and thus extend its service life.

Air conditioning, air conditioning (AC), relay-controlled. Original version. From 1999

For more information on wiring diagram, see section 3.



high AC performance is desired, even if the machine otherwise does not request cooling, the pressure monitor (SE804, pin 3 - 4) at pressure > 1.8 MPa (18 bar) (261 psi) emits a request for increased fan speed to V-ECU and the fan speed increases to 1200 rpm. (800 rpm applies for "large platform" machines). With AC or ATC installed, the hydraulic cooling fan's base speed is also increased to 500 rpm. (only "medium platform" machines)

Summary

When the air conditioning operates, SW806, RE802 and the pressure monitor SE804 are activated. Temperature is controlled by the thermostat SE803.

RE801 is not activated and receives +feed at both 86 and 85.

Diode DI801 is a quench-diode that protects thermostat SE803, when it cuts off supply to the compressor solenoid MA801.

Air conditioning, air conditioning (AC), relay-controlled. Version from 1992

In this version rpm control of cooling fan was added.

For more information on wiring diagram, see section 3.

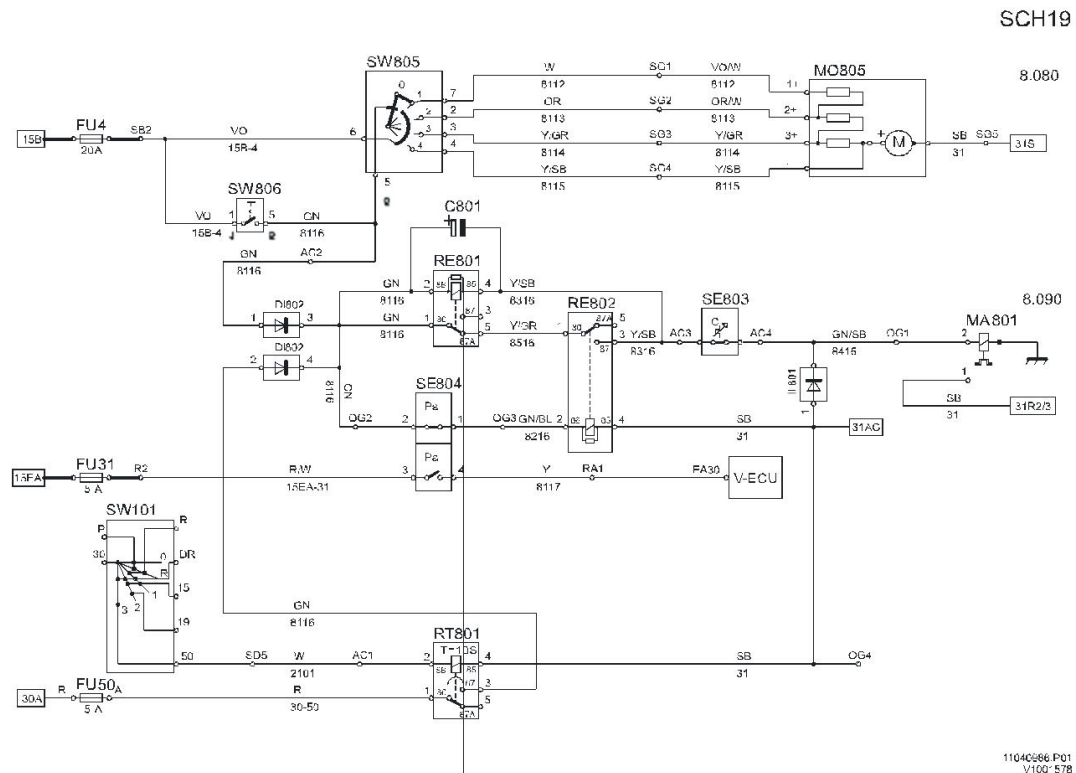


Figure 2
Principle illustration



Construction Equipment

Service Information

Document Title: AC software-controlled, description	Function Group: 874	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

AC software-controlled, description

Electric function

Engagement of the compressor's magnetic (solenoid) clutch is controlled by V-ECU via RE806. Between RE806 and the magnetic (solenoid) clutch, there's a thermostat (not on machines with ATC) that protects the evaporator against ice accumulation.

In order for the magnetic (solenoid) clutch to pull (compressor start), the following applies:

- ☐ Switch AC (SW806) must be on OR soft start sequence must be activated
- ☐ Pressure in system must be within limit values (SE804, pin 1 – 2, closed)
- ☐ Engine running
- ☐ Evaporator temperature above approx. 3 °C (37 °F) (SE803 closed)
- ☐ Reversing should NOT be requested (on machines with reversible fan).

Soft start

When the engine is started, the V-ECU will supply voltage to RE806 to start the compressor. The compressor will then rotate when the engine is started and, in this way, slow pressure build-up is obtained. Thus, fluid shocks in the compressor are prevented at the same time as the compressor's shaft seal is lubricated.

Soft start is NOT activated if:

- ☐ Less than four hours have passed since engine was turned off.
- ☐ Pressure monitor SE804 (pin 1 - 2) is open.
- ☐ Thermostat SE803 is open.

NOTE!

In cold weather conditions, the temperature and pressure in the AC drop. At $T < 3\text{ °C}$ (37 °F), the thermostat is open. At $T < \text{approx. } -5\text{ °C}$ (23 °F), the pressure in the system is so low that the pressure monitor (SE804 pin 1 - 2) opens.

Normal operation

The air conditioning is started with SW806. Even if the cab fan's control (SW805) is in position 0, the cab fan will start at its lowest speed. The fan speed can then be increased with the fan control.

If the engine is running, the pressure in the system is normal and SW806 is on, the V-ECU will supply RE806 with voltage. Then, RE806 activates the compressor clutch with voltage via the thermostat.

When the compressor is working, the evaporator becomes cold. The thermostat opens and the compressor stops if the evaporator gets colder than approx. 3 °C (37 °F). When the compressor stops, the temperature increases and, at approx. 7 °C (45 °F), the thermostat closes again.

During normal operation, cut-in and cut-out of the compressor is only controlled by the thermostat.

Monitoring

If the pressure monitor (SE804, pin 1 – 2) is open at machine start, and outside temperature is above +10 °C (50 °F), "ERROR AC system" is shown on the operator's information display. The problem may be that the AC system has no refrigerant, FU31 is defective or the pressure monitor is defective.

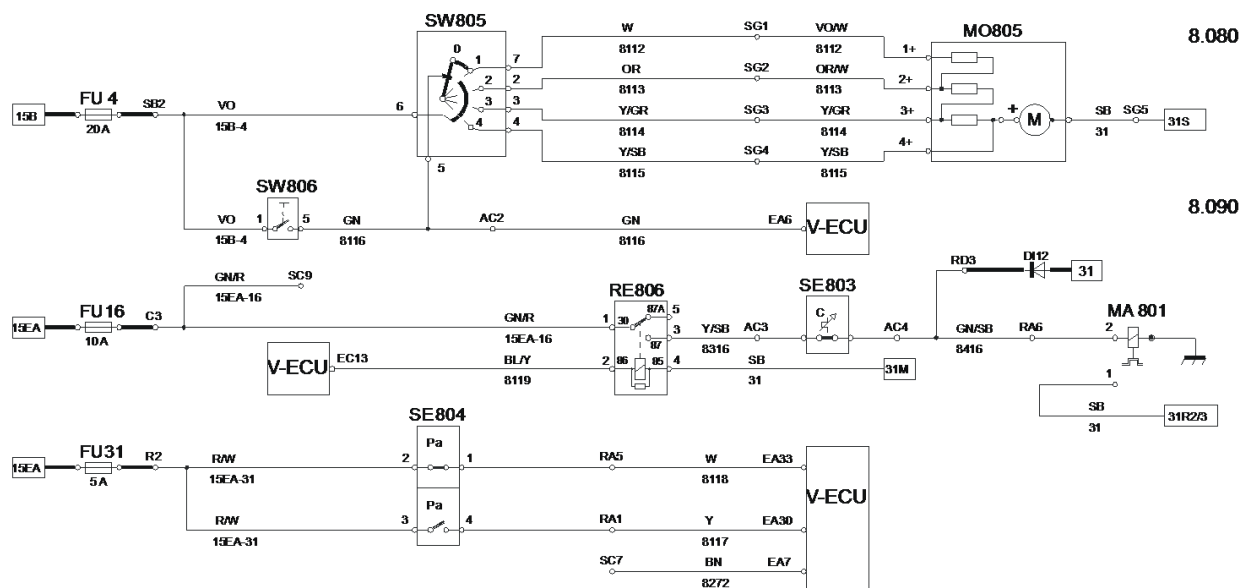
Increased fan rpm due to AC

The machine is equipped with a hydraulic cooling fan that also cools the condenser. When operating in warm weather and high cooling performance is desired for the AC unit, even if the machine otherwise does not request cooling, the pressure monitor (SE804, pin 3 - 4) at pressure $> 1.8\text{ MPa}$ (18 bar) (261 psi) emits a request for increased fan speed to V-ECU and the fan speed increases to 1200 rpm. (800 rpm applies for "large platform" machines). With AC or ATC installed, the hydraulic cooling fan's base speed is also increased to 500 rpm (only "medium platform" machines).

Air conditioning, air conditioning (AC), software-controlled.

For more information on wiring diagram, see section 3.

SCH19



11170771 P01
V1021760

Figure 1
Principle illustration

Safety, description

If the pressure in the system goes above 2.1–2.5 MPa (21–25 bar), (305–363 psi) or below 0.1–0.2 MPa (1–2 bar), (14.5–29 psi) during operation, the V-ECU cuts off voltage feed to RE806. At the same time, "Clean/check condenser" is shown on the operator's information display.

The compressor will not start again even if the pressure returns to normal value.

To restart the compressor, the AC switch must first be turned off and then on again. An incorrect pressure in the system indicates that there's a serious malfunction in the air conditioning system, for example, the condenser is clogged or there's a leak. This malfunction shall be repaired before the AC system is used again.

NOTICE

After an interruption caused by incorrect pressure, the air conditioning should always be checked by authorised personnel.



Construction Equipment

Service Information

Document Title: AC safety, relay-controlled, description	Function Group: 874	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

AC safety, relay-controlled, description

If the pressure in the system becomes too high, i.e. above 2.1–2.5 MPa (21–25 bar) (305–363 psi) or too low below 0.1–0.2 MPa (1–2 bar) (14.5–29 psi), SE804 interrupts the control current to RE802, which is activated and the feed to MA801 and RE801 (terminal 85) is interrupted. At 0.3 MPa (3 bar) (43.5 psi) and at 1.4–1.8 MPa (14–18 bar) (203–261 psi) respectively SE804 closes the circuit again.

The coil in RE801 (connection 85) is now connected to ground via SE803–MA801 and is activated.

RE801 will now remain activated until the supply is cut with SW806.

Even if the pressure becomes normal again and SE804 closes the circuit for the control current so that RE802 is activated, the system will not restart since RE801 is activated and not supplying current to MA801 via RE802 (connection 30).

If the pressure switch turns off the air conditioning unit due to high or low pressure in the system, the operator must turn off the air conditioning and then turn it on again before it will restart.

The purpose of this function is that the operator is made aware that the pressure has been abnormal.

NOTICE

After an interruption caused by incorrect pressure, the air conditioning should always be checked by authorised personnel.

Document Title: ATC, description	Function Group: 874	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

ATC, description

General

ATC (Automatic Temperature Control) consists of four temperature sensors and one control unit, which, with the aid of an electrically controlled hot water valve and the "ordinary" AC unit of the machine, control the temperature in the cab.

The temperature sensors sense:

- Evaporator temperature SE808
- Ambient temperature SE809
- Air temperature in air channel to front air vent SE810
- Air temperature in cab at right instrument panel SE811.

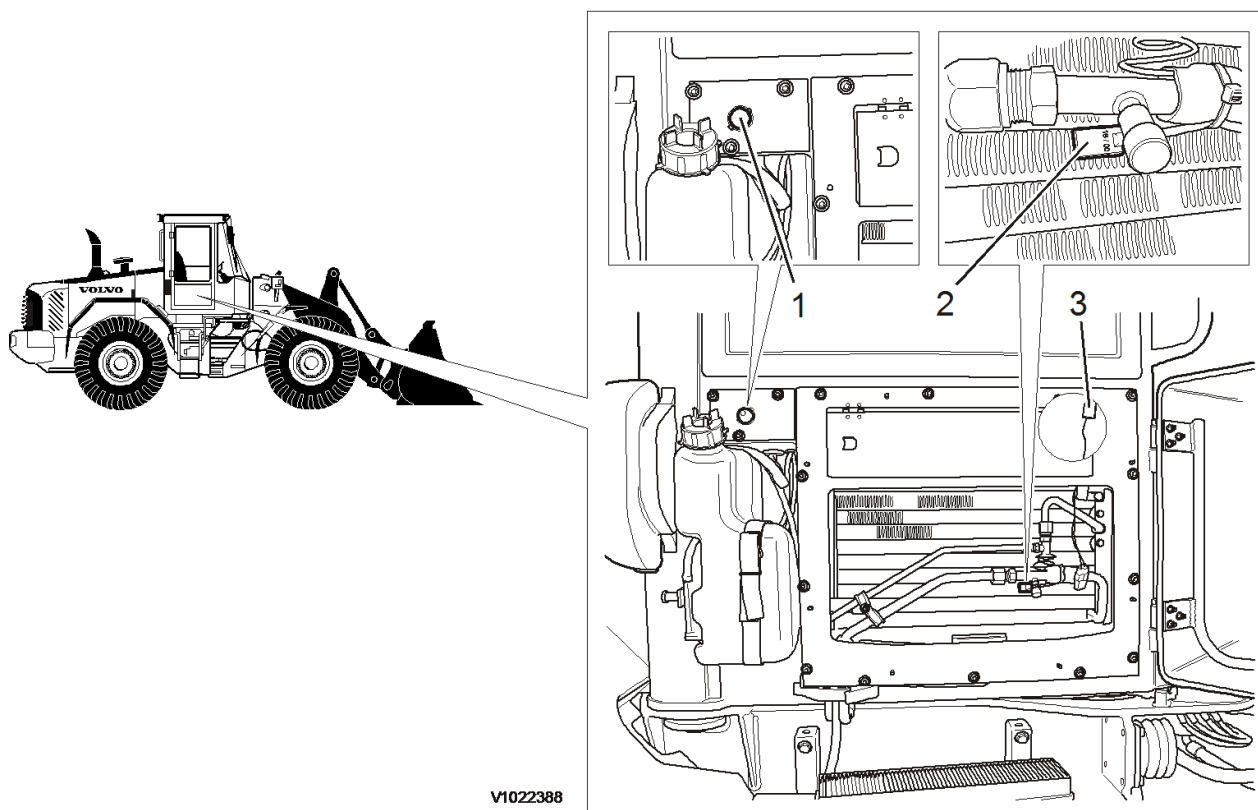


Figure 1

1. Sensor for ambient temperature, SE809
2. Sensor for evaporator temperature, SE808
3. Sensor for air channel to front air vent, SE810

SE808 makes sure that the evaporator doesn't ice up. The sensor that primarily checks temperature is SE811. The other two sensors are reference sensors, to give a temperature that's as even as possible.

The electric hot water valve is normally open and will give max. heat when not supplied with voltage.

Control description

Controls for ATC are located in the cab's right side panel.

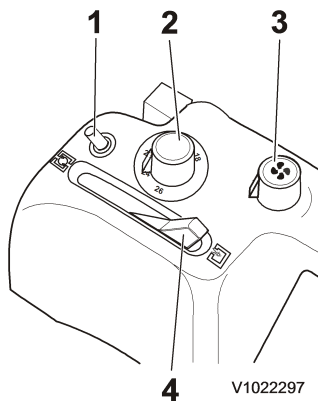


Figure 2

1. Rocker switch for defroster, SW810
2. Temperature control, CU803
3. Fan control, SW805
4. Recirculation control

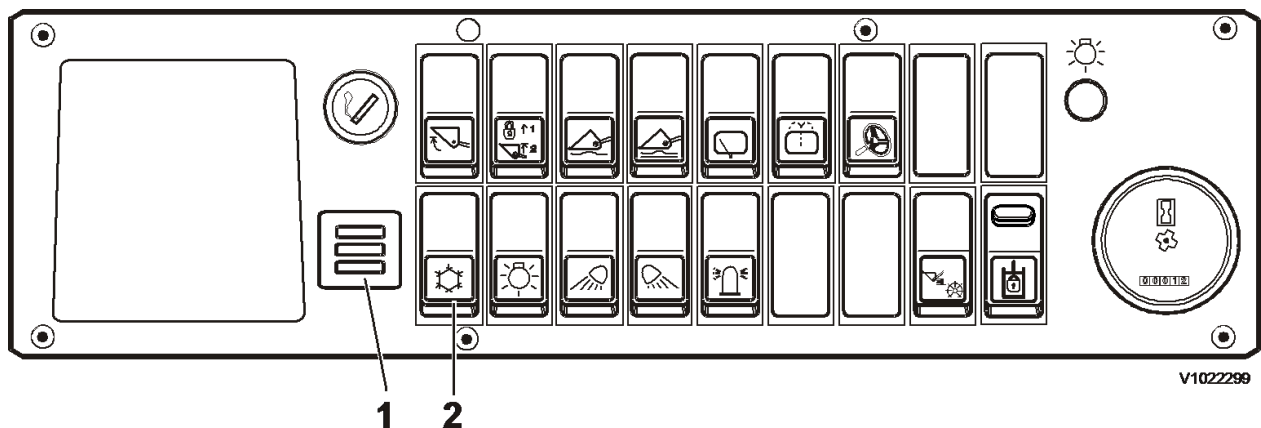


Figure 3

1. SE811
2. SW806

ATC, software-controlled

Electric power supply

The system is supplied with current across a total of 5 different fuses (see diagram 33). For the system to function, these have to be intact.

Normal operation

Control unit CU802 is fed with voltage via RE101 and fuse 59. The desired temperature is selected with a thermostat control on the heat control panel, and desired fan speed is selected with the fan control. For optimal performance and to obtain an even temperature in the cab, highest fan speed should be selected. For the AC system to function, the AC switch SW806 must also be on.

If there is to be a temperature increase, CU803 will cut off the ground connection to the hot water valve MA802, which then opens.

MA802 is either open or closed and, when max. heat is not desired, cut-in and cut-out of the hot water valve is pulsating.

If there is to be a temperature decrease, CU803 feeds voltage to the V-ECU on pin EA7. Then, the V-ECU handles cut-in and cut-out of the compressor via RE806.

On machines with ATC, there's no thermostat (SE803) that's installed in machines with a "normal" AC system. Instead, CU803

controls cut-in and cut-out of the compressor (via V-ECU). SE808 provides protection against ice accumulation.

Best defroster function is obtained with SW810 on. Then, the compressor can run at the same time as MA802 gives max. heat. With SW810 off, either heating or cooling is provided.

Resistance values temperature sensors

	at 20 °C (68 °F)	at 30 °C (86 °F)	at 40 °C (104 °F)
SE808	4.2 ±0.3 kΩ	≈2.5 - 3.0 kΩ	≈2.0 - 2.5 kΩ
SE809, SE810, SE811	12.8 ±0.8 kΩ	≈7.0 - 8.0 kΩ	≈4.0 - 5.0 kΩ

Air conditioning, automatic temperature control, software-controlled

For more information on wiring diagram, see section 3.

SCH33

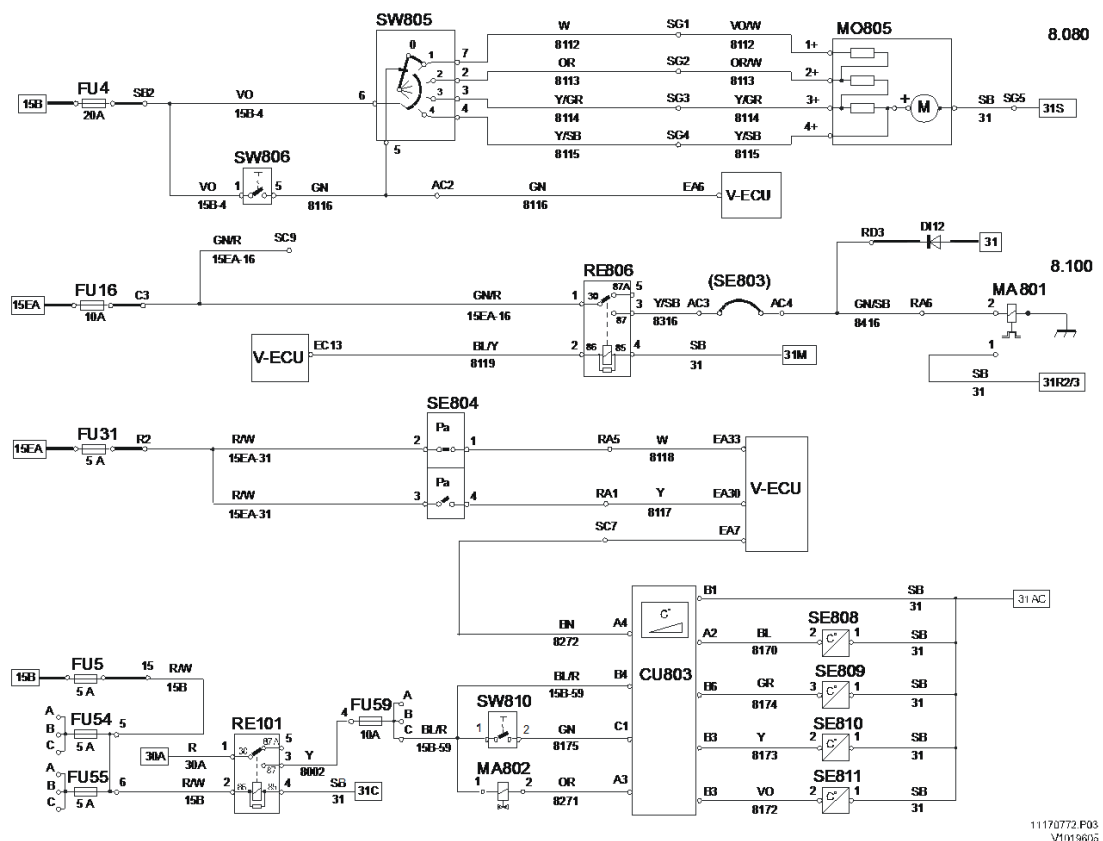


Figure 4
Principle illustration

ATC, relay-controlled

Electric power supply

The system is supplied with current across a total of 5 different fuses (see diagram 33). For the system to function, all these have to be intact. To enable use of the AC unit, the soft start function also has to work and that RT801, RE801 and RE802 are activated at start of the machine. Neither the pressure monitor SE804 may be open at engine start.

For continued operation of the AC unit (after start) switch SW806 must be on.

Soft start

At engine start, RT801 is supplied with voltage directly from the ignition. RT801 then remains activated for 10 seconds after the key has been turned to position 3.

- RT801 supplies the spool on RE801 with voltage via the pressure monitor SE804. During cold weather, the pressure in the AC unit is low, the pressure monitor is open and soft start does not take place.
- When RE801 is activated, voltage is supplied to the spool on RE802, which in turn is activated.
- The contact on RE802 receives voltage from RT801 via DI802. The compressor clutch receives voltage and is

activated.

- The compressor will then rotate when the engine is started and, in this way, slow pressure build-up is obtained. Thus fluid shocks in the compressor are avoided.
- After 10 seconds, RT801 cuts out and the AC compressor stops, unless SW806 is not on. However, RE801 and RE802 are still activated.

Normal operation

- Control unit CU803 is fed with voltage via RE101 and fuse 59. The desired temperature is selected with a thermostat control on the heat control panel, and desired fan speed is selected with the fan control.
- If there is to be a temperature increase, CU803 will cut off the ground connection to MA802.
- CU803 feeds, if there is to be a temperature reduction, SW806 with voltage. With SW806 on and RE802 activated, the compressor will start.
- Best defroster function is obtained with SW810 on. Then, the AC compressor can run at the same time as MA802 gives max. heat. With SW801 off, either heating or cooling is provided.

Air conditioning, automatic temperature control, (ATC) relay-controlled

For more information on wiring diagram, see section 3.

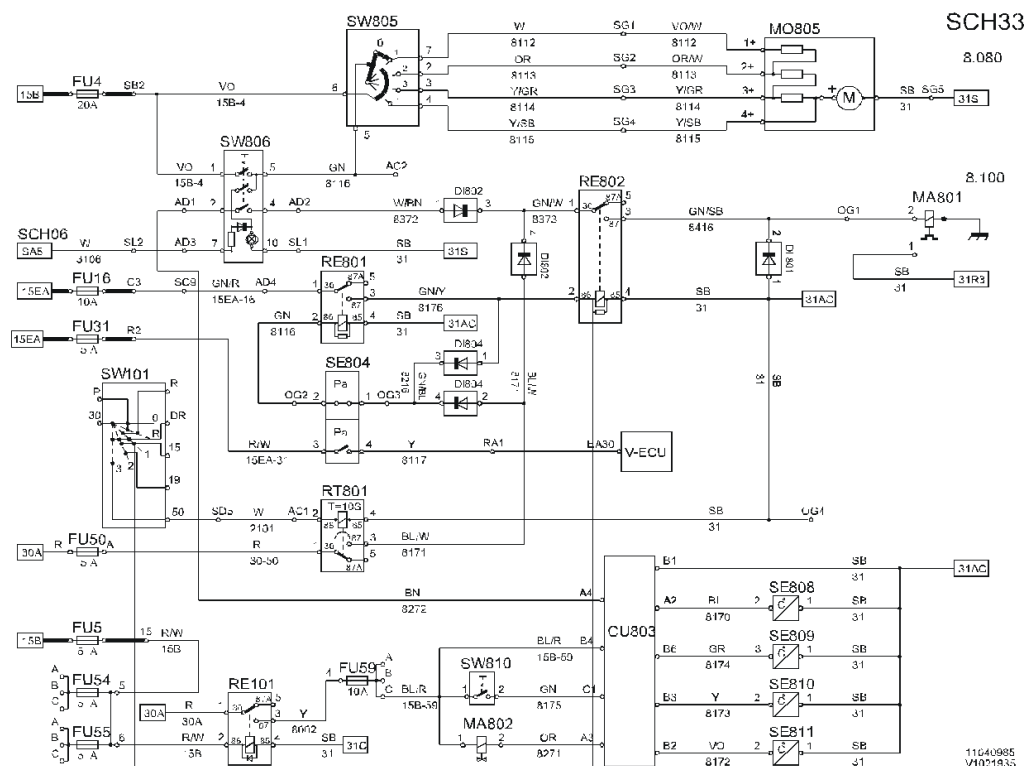


Figure 5
Principle illustration

AC, safety

In case of a malfunction in the AC unit; leakage with low pressure as a result of, e.g., clogged condenser with high pressure which then, as a result, opens the pressure monitor and the compressor stops. If the machine is turned off and is restarted, the AC unit can be started again on the condition that the pressure has returned to normal. However, the AC unit stopping indicates a malfunction on the system, which should be fixed before the unit is operated again.

Document Title: Electrical description	Function Group: system, 874	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Electrical system, description

The cab fan MO805 is controlled with switch SW805.

The air conditioning unit is engaged and disengaged with switch SW806.

When SW806 is turned on, MO805 will receive power via connection 5-7 on SW805 and the cab fan will operate at its lowest speed. RE802 is activated via the pressure monitor SE804.

When RE802 is activated, the compressor solenoid MA801 will receive power from FU4 via SW806, RE801, RE802 and thermostat SE803, while RE801 receives power at connection 85. Since RE801 has already received power at connection 86, it will not be activated.

To ensure that RE802 is activated before RE801 a capacitor C801 is connected in parallel with RE801.

When the diesel engine is started, the air conditioning is activated for 10 seconds, with the time relay RT801. From connection 50 on SW101 (start position), the time relay RT801 receives current from FU50 and is activated. Via DI802, the air conditioning is activated according to the above, with the exception that the cab fan isn't started.

Then the air conditioning is activated for 10 seconds. This is to prevent the fluid shocks in the compressor and thus extend its service life.

Summary

When the air conditioning operates, SW806, RE802 and the pressure monitor SE804 are activated. Temperature is controlled by the thermostat SE803.

RE801 is not activated and receives +feed at both 86 and 85.

Diode DI801 is a quench-diode that protects thermostat SE803, when it cuts off supply to the compressor solenoid MA801.

Wiring diagram 19, cab.

For more information on wiring diagram, see section 3.

SCH19

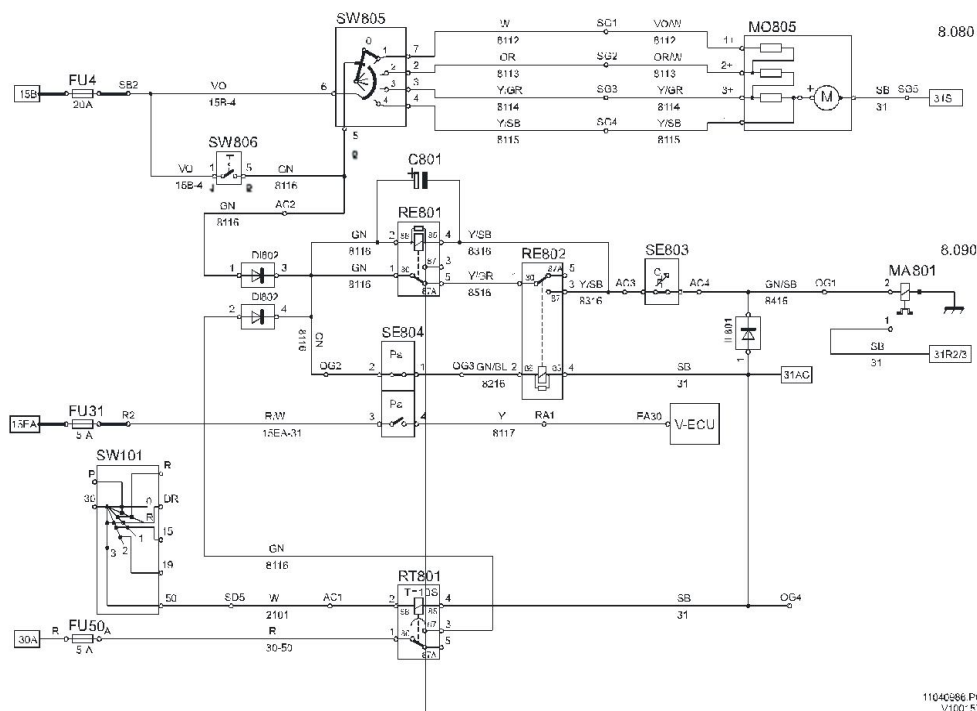


Figure 1
Principle illustration

Document Title: Evaporator in air conditioning system, cleaning	Function Group: 874	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Evaporator in air conditioning system, cleaning

Op nbr 87459

NOTICE

Refrigerant under pressure. Do not disconnect any hoses or connections on the air conditioning, thereby involuntary releasing refrigerant.

1. Open the cab filter cover.
2. Remove the filter casing

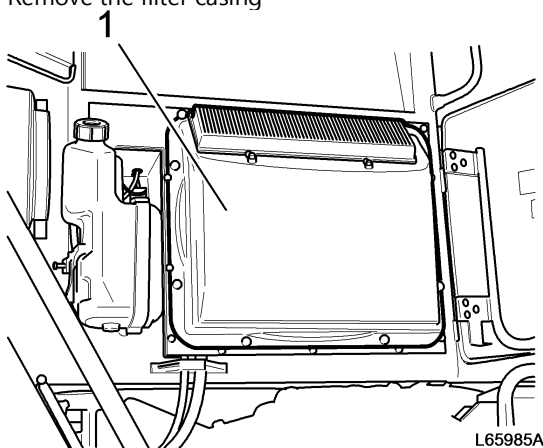


Figure 1
Filter cover

1. Filter cover
3. Disconnect the control cable for the recirculation damper. Remove the plate together with the recirculation damper.

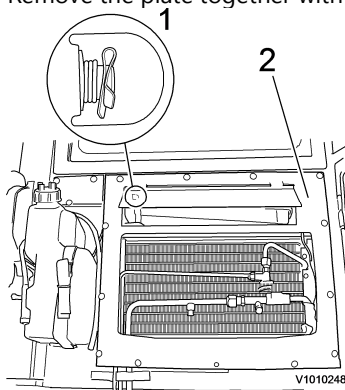


Figure 2

1. Striker plate, recirculation damper
 2. Plate
4. Remove the support plate holding the evaporator.

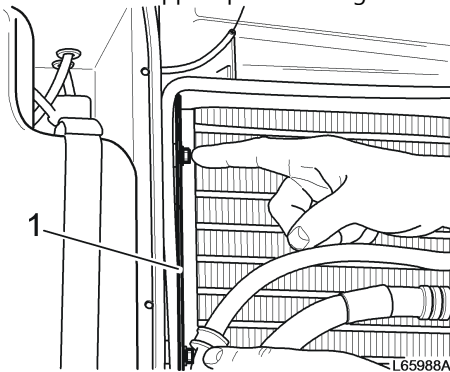


Figure 3
Support plate

1. Support plate
5. Make sure the capillary tube to the thermostat is not pinched when the evaporator is swung out. Alternatively, the capillary tube can be removed from the evaporator pipe by first removing the insulating compound and then carefully removing the capillary tube.

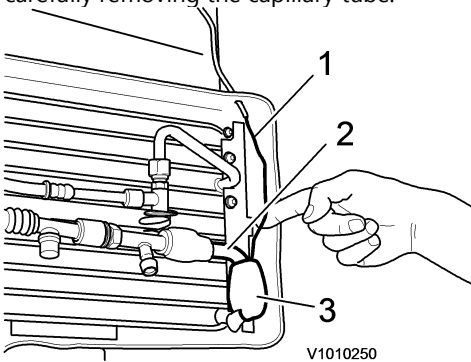


Figure 4
Capillary tube

1. Capillary tube
 2. Evaporator pipe
 3. Insulating compound
6. Carefully fold out the evaporator.

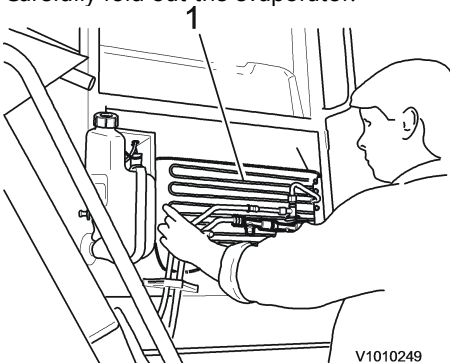


Figure 5
Evaporator

1. Evaporator

7. Clean the evaporator from both directions by blowing with compressed air or flushing with water. (Do not use high-pressure jets.)

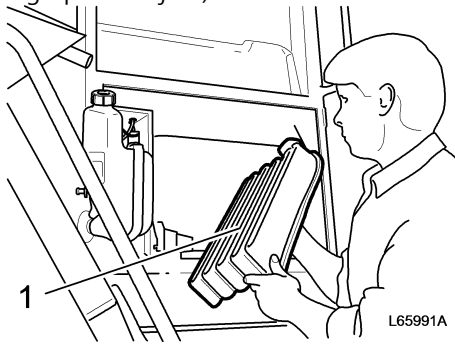


Figure 6
Cleaning evaporator

1. Evaporator

8. Re-install the evaporator.
9. Re-install the support plate that holds the evaporator.
10. If the capillary tube has been removed: carefully wind it on approx. 8 times around the evaporator pipe and cover with insulating compound. If the insulating compound is dry, use new insulating compound.
11. Re-install the plate with the recirculation damper.
Re-install the control cable for the recirculation damper.
12. Re-install the filter casing.
13. Close the cab filter cover.
14. Carry out a performance test of the air conditioning unit according to [874 Air conditioning. checking performance](#)

Document Title: Air conditioning, checking performance	Function Group: 874	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Air conditioning, checking performance

Op nbr 87403

[11666140 Multimeter](#)

[11 666 141 Temperature sensor](#)

NOTE!

Components such as the recirculation filter, evaporator and condenser must be clean

1. Run the machine to achieve normal working temperature and park it in the shade.
2. Measure the outdoor temperature and relative humidity while parked in the shade.
3. Close all windows and doors. All ventilation hatches should be closed and all cab air outlets fully open.

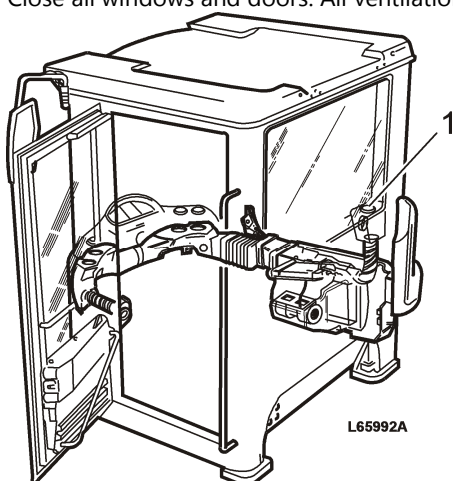


Figure 1
Cab

1. Rear wall, right-hand air nozzle
4. Let the engine reach 1500 rpm. Set the cab fan switch to position 4, set the recirculation control to the max. position and the heater control to the min. position.
5. Switch on the air conditioning.
6. Air conditioning performance is checked by measuring the temperature of the air coming out of the right-hand air nozzle on the rear wall.
7. Within a time period of 30 minutes (maximum), the temperature should reach or drop slightly below the temperature values indicated in the specifications.

NOTE!

If the temperature drops below +3 °C (37 °F), the function of the thermostat should be checked.

8. If the temperatures do not reach the specified performance test temperatures, see Service Manual "Climate control system R134a" under trouble-shooting.

Air conditioning temperature values during performance test									
Temperature values at different ambient temperatures in relation to relative air humidity are measured at the rear wall, right-hand air nozzle.									
	Ambient temperature °C					Ambient temperature°F			
	25	30	35	40		77	86	95	104
Relative air humidity	Air conditioning temperature values								
10%	7	7	7	7		44	44	44	44
20%	7	7	7	7		44	44	44	44
30%	7	7	7	7		44	44	44	44
40%	7	7	7	8		44	44	44	46
50%	7	7	8	11		44	44	46	52
60%	7	8	10	14		44	46	50	57
70%	7	10	13	17		44	50	55	63
80%	7	11	15	20		44	52	59	68
90%	7	12	18	23		44	54	64	73

Document Title: Air conditioning, troubleshooting, relay-controlled ATC	Function Group: 874	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Air conditioning, troubleshooting, relay-controlled ATC

Troubleshooting chart

Cab temperature falls	○ Check that air inlet to SE811 (on right instrument panel) isn't clogged and that the ejector hose from it hasn't worked loose or is folded ○ If the temperature increases slightly with full recirculation, this may be due clogging of the air filter.
Cab temperature increases (slightly)	○ Check that no connections to the temperature sensors have worked loose or have poor contact. ○ Check MA802 for internal leakage.
Cab temperature increases a lot (full heat)	○ Check FU5, FU59 and RE101 (easiest to measure voltage at FU59.) ○ Check MA802. If voltage is OK, the valve may also be stuck (jammed). Measure on the connector at the valve (loose connector). Resistance MA802: $45 \pm 5 \Omega$ Measure at CU803, connector A and B connected, measure pin A3 - B1. Voltage to MA802 ○ when thermostat control is at max. heat = 0 V ○ when thermostat control is at max. cool = 24 V If 0 is obtained in both cases, measure B4 — A3 instead, with the thermostat at max. cool. If 0 V is obtained, voltage feed or MA802 is defective. If 24 V is obtained, CU803 is defective.
Poor cooling performance	○ check compressor's belt tension ○ Check AC system (see SM R134a)
No cooling performance	1. Check FU50, FU16 and that SW806 is on. 2. Check that the pressure monitor isn't open. If not; check the AC unit (see SM R134a)

3. Loosen RE9 and turn the key to start position. Release the key to normal operating position. Wait for 20 seconds. Measure if the voltage reaches the compressor's magnet (solenoid) clutch.

If it does, check the AC unit (see SM R134a)

4. Check that RE801 is activated when the key is turned to position 3 and it is held

- ☐ if it is activated but doesn't hold. Check DI804 (pin 1-3).
- ☐ if it doesn't activate. Change relay.

5. Check that RE802 is activated.

6. Measure control unit.

- ☐ Measure on CU803 connection C1 to frame ground connection
With thermostat at max. cool = approx. 9.0 V
With thermostat at max. heat = approx. 0 V
- ☐ Measure voltage on A4 – B1 (connections connected)
With thermostat at max. cool = 24 V
With thermostat at max. heat = 0 V

Document Title: Air conditioning, troubleshooting, software-controlled ATC	Function Group: 874	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Air conditioning, troubleshooting, software-controlled ATC

Troubleshooting chart

Cab temperature falls	○ Check that air inlet to SE811 (on right instrument panel) isn't clogged and that the ejector hose from it hasn't worked loose or is folded ○ If the temperature increases slightly with full recirculation, this may be due clogging of the air filter.
Cab temperature increases (slightly)	○ Check that no connections to the temperature sensors have worked loose or have poor contact. ○ Check MA802 for internal leakage.
Cab temperature increases a lot (full heat)	○ Check FU5, FU59 and RE101 (easiest to measure voltage at FU59.) ○ Check MA802. If voltage is OK, the valve may also be stuck (jammed). Measure on the connector at the valve (loose connector). Resistance MA802: $45 \pm 5 \Omega$ Measure at CU803, connector A and B connected, measure pin A3 - B1. Voltage to MA802 when thermostat control is at max. heat=0 V when thermostat control is at max. cool=24 V If 0 is obtained in both cases, measure B4 — A3 instead, with the thermostat at max. cool. If 0 V is obtained, voltage feed or MA802 is defective. If 24 V is obtained, CU803 is defective.
Poor cooling performance	○ check compressor's belt tension ○ Check AC system (see SM R134a)
No cooling performance	1. Using service information display (E1-control), check that all input signals reach the V-ECU. Set the thermostat control to max. cooling and start the machine. ○ Pin EA6 (pos. V16) if status isn't "1", check primarily FU4 and that SW806 is on. ○ Pin EA33 (pos. V15) if status isn't "1", check that pressure monitor isn't open (pin 1- 2). If it is, check the AC system (see SM R134a). ○ Pin EA7 (pos. V19) if status isn't "1", measure control unit, see step 4.

2. Check VCADS Pro parameter settings that air conditioning system is selected **ATC**.
 3. Check RE806 if voltage reaches MA801.
 4. Measure control unit.
 - Measure on CU803 connection C1 to frame ground connection
With thermostat at max. cool ≈ **9.0 V**
With thermostat at max. heat ≈ **0 V**
 - Measure voltage on A4 - B1 (connections connected).
With thermostat at max. cool = **24 V**
With thermostat at max. heat = **0V**
-

Thank you for your purchase.
Have a nice day.

Document Title: Hydraulic description	system, 900	Function Group:	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]				

Hydraulic system, description

Working hydraulics

The working hydraulics is of the load-sensing (LS) type and its main parts are: hydraulic oil tank, hydraulic pumps with variable flow, central valve, control valve, servo valve, solenoid valves, hydraulic cylinders and hydraulic oil cooler.

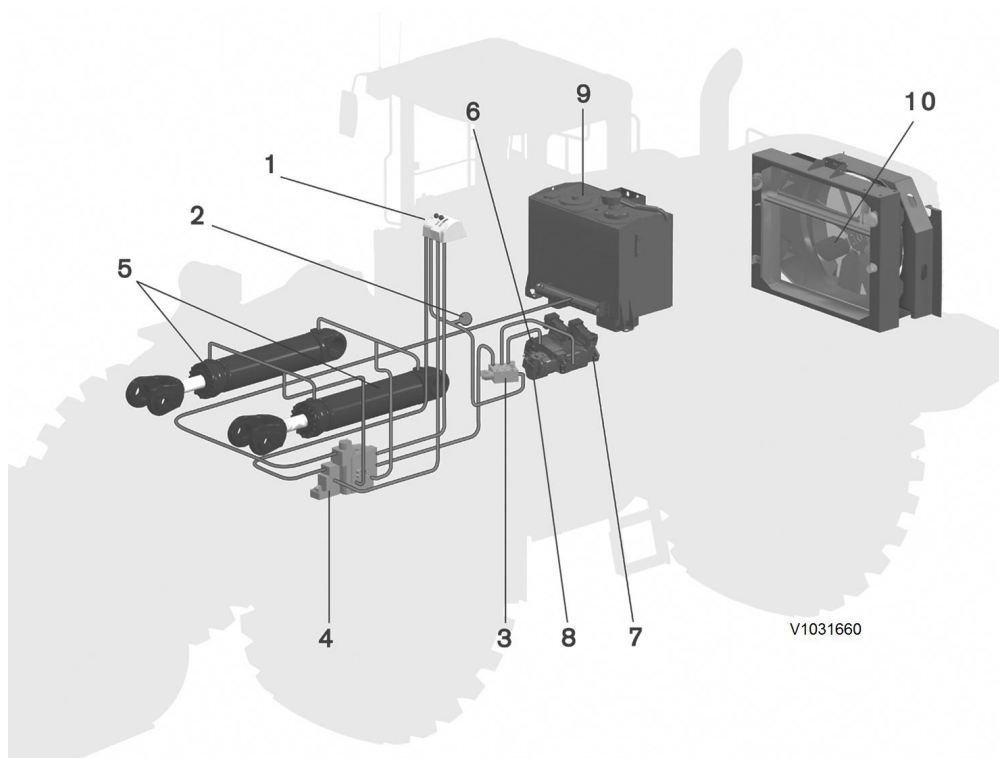


Figure 1
Working hydraulics, lifting function

1. Servo valve
2. Accumulator, servo
3. Central valve
4. Control valve
5. Lifting cylinders
6. Pump 1
7. Pump 2
8. Pump 3
9. Hydraulic oil tank
10. Fan

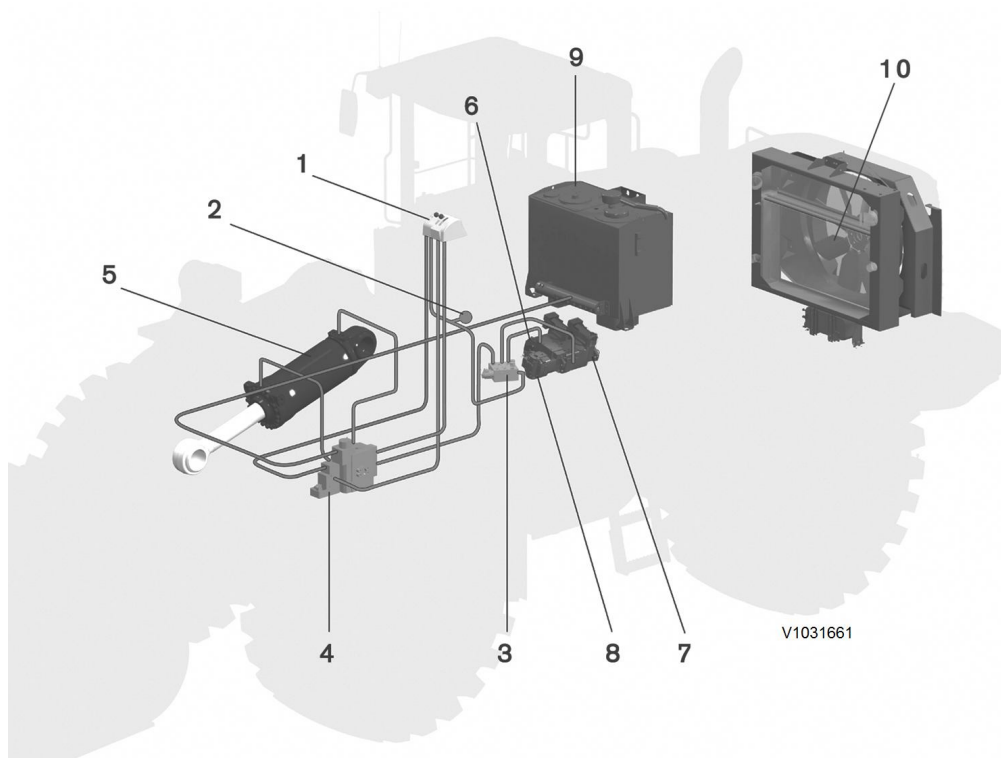


Figure 2
Working hydraulics, tilting function

1. Servo valve
2. Accumulator, servo
3. Central valve
4. Control valve
5. Tilting cylinder
6. Pump 1
7. Pump 2
8. Pump 3
9. Hydraulic oil tank
10. Fan

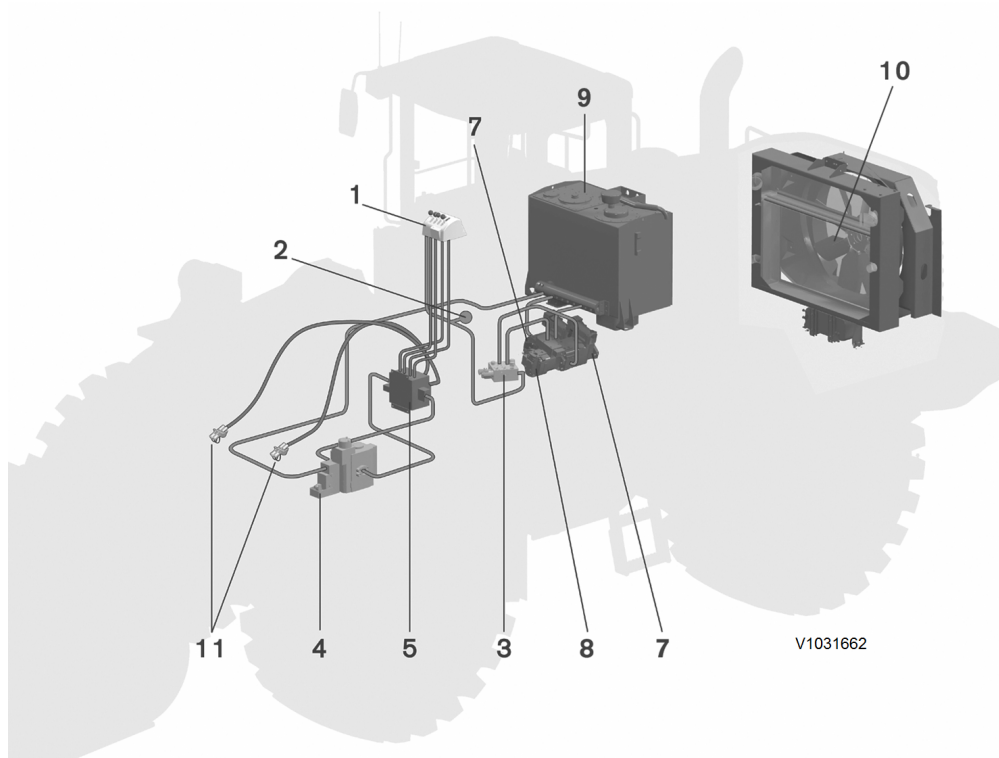


Figure 3
Working hydraulics, 3rd function

1. Servo valve
2. Accumulator, servo
3. Central valve
4. Control valve
5. Control valve for 3rd/4th function
6. Pump 1
7. Pump 2
8. Pump 3
9. Hydraulic oil tank
10. Fan

Hydraulic oil tank

The hydraulic oil tank is common to the working hydraulics, the servo system, brakes, steering system and the hydrostatic cooling fan. The hydraulic oil tank is provided with a return oil filter with magnetic rod. Ventilation takes place through a breather filter. There is a combined temperature and level sensor in the hydraulic oil tank.

Hydraulic pumps

Three variable piston pumps provide all hydraulic systems with oil. Pump 1 (P1) is located on the right power take-off on the transmission. P1 provides the working hydraulics with oil. When the steering is used, the pump also provides the brake and servo systems with oil.

Pump 2 (P2) is placed on the left power take-off on the transmission. P2 provides the central valve with oil. P2 is prioritised for the steering system. Excess oil can however always be supplied to the brake and servo systems or the working hydraulics, providing rapid lifting and tilting functions.

Pump 3 (P3) is connected in series with P2. P3 is a variable piston pump for cooling fan and brake charging.

For a more detailed description of the pumps, refer to Section 2 (P3) and Section 6 (P1 and P2).

Central valve

The purpose of the central valve is to distribute the oil and pressure to the cooling fan, brakes, steering, servo system and working hydraulics.

Control valve

The control valve has a closed centre. This means that no oil passes through the valve in neutral position. Two spools for lifting/lowering function and tilting function respectively are located in the control valve.

3rd function and 3rd/4th function

A 3rd function and 3rd/4th function can be achieved with a separate control valve. It is located on the front frame under the front edge of the cab.

Servo valve

The servo valve has a closed centre. It has one section for each function: one each for lift and tilt, and one each for 3rd and 4th functions if the machine has these.

The servo valve is equipped with detent solenoids (electromagnets) for the floating position, bucket positioner and boom kick-out.

Hydraulic cylinders

The hydraulic cylinders consist of two lifting cylinders, one tilting cylinder and one cylinder for the hydraulic locking of the attachment bracket [1] ⓘ.

Lifting frame

The lifting frame consists of two arms attached to the upper part of the front frame. The arms are connected to each other with a stiffening construction that also supports a linkage system that transfers the tilting movement.

Tilting is provided by a cylinder located between the lifting arms. The location of the tilting cylinder and the design of the linkage system means that parallel movement is provided as well as a high break-out torque throughout the lifting movement. These characteristics have given the arm system its name, TP linkage. T stands for torque and P for parallel. The bucket can be attached via a special attachment bracket or directly to the lifting frame.

Boom Suspension System, BSS400

The machine can be equipped with a suspension system, which is called Boom Suspension System BSS400. For further description, see [916 Boom Suspension System, component description](#).

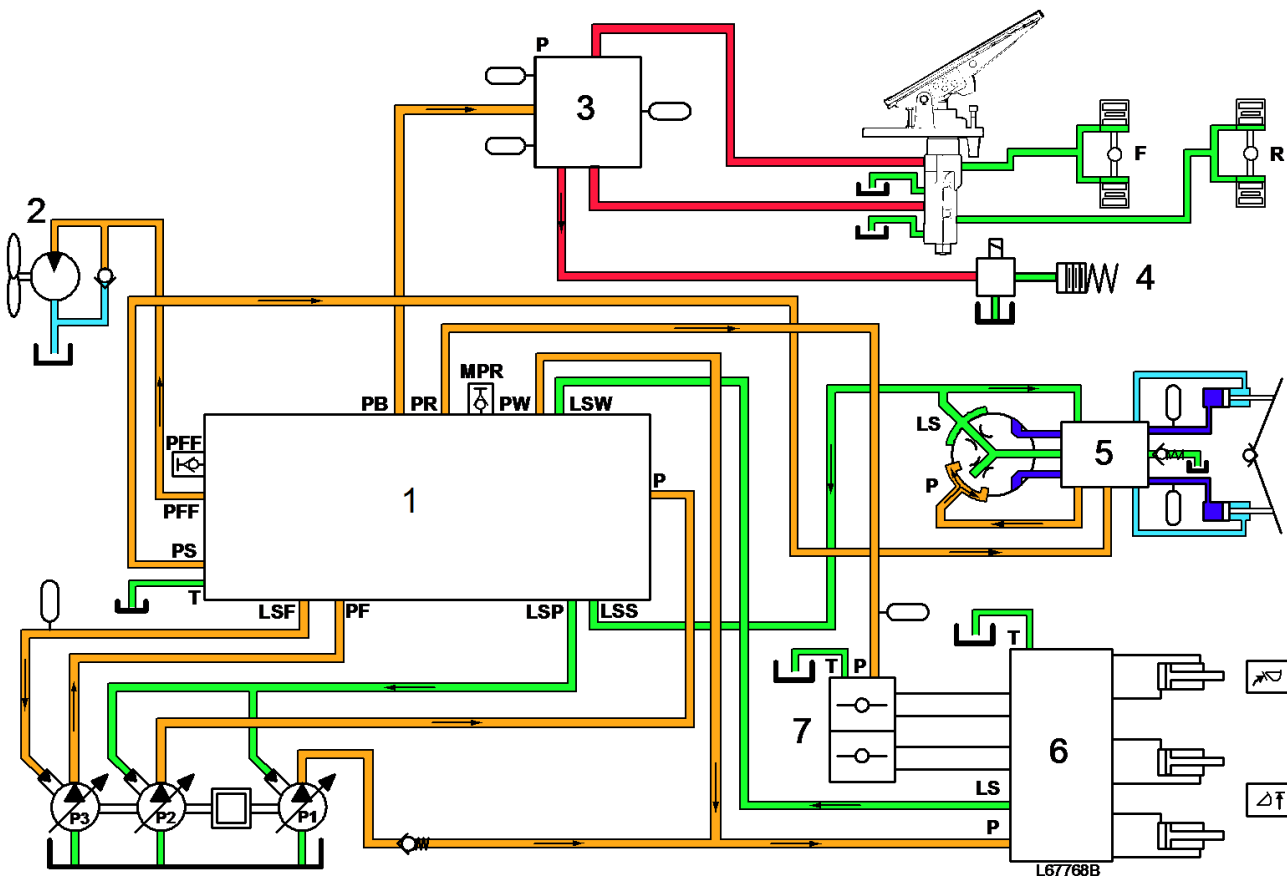


Figure 4
Hydraulic system, principle diagram

1. Central valve
2. Fan motor
3. Accumulator block, service brakes
4. Parking brake
5. Shift valve

- 6. Control valve
- 7. Servo valve

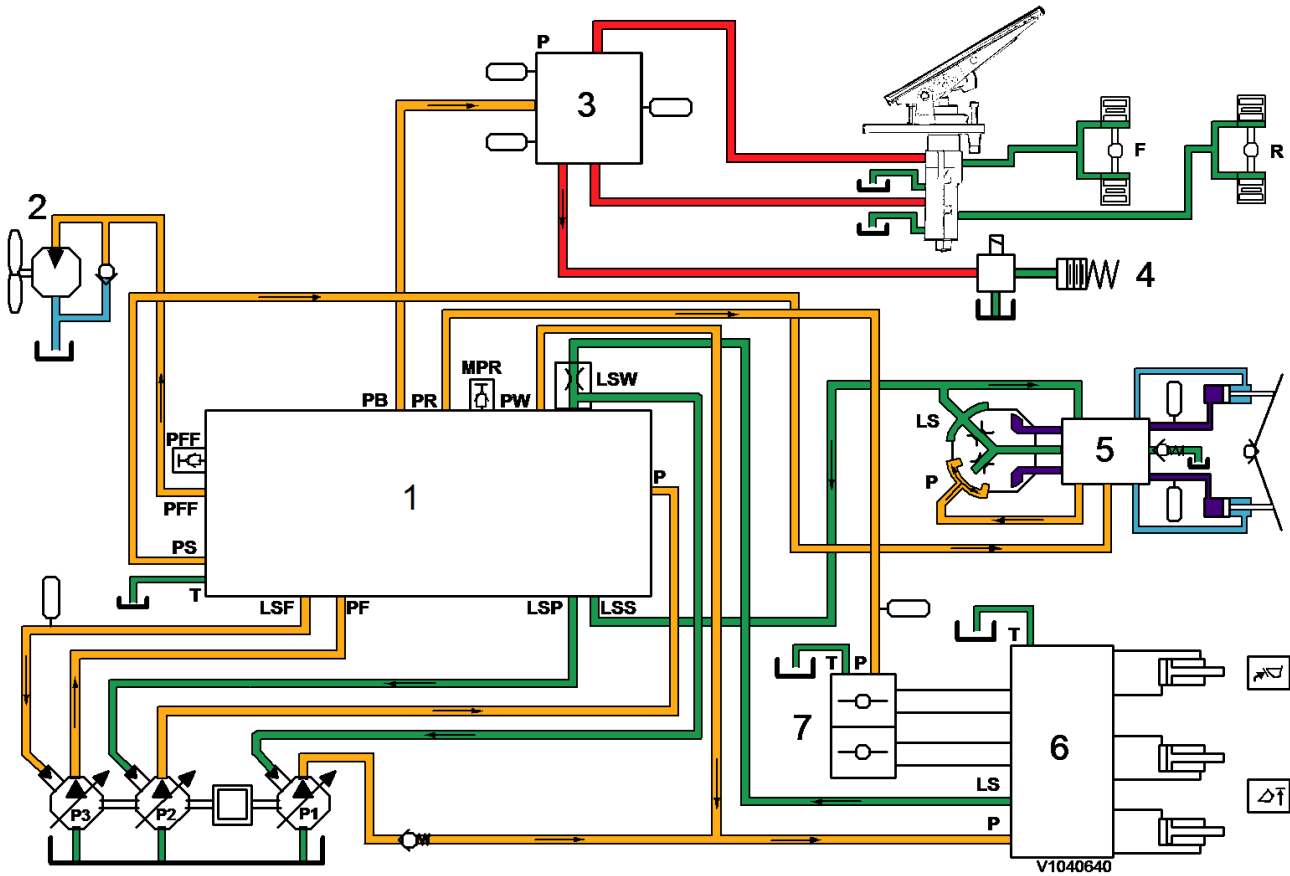


Figure 5
Hydraulic system layout, with LS-separation, principle diagram

- 1. Central valve
- 2. Fan motor
- 3. Accumulator block, service brakes
- 4. Parking brake
- 5. Shift valve
- 6. Control valve
- 7. Servo valve

[1]Optional equipment

Document Title: Hydraulic system, bleeding	Function Group: 900	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic system, bleeding

Op nbr 900-002

935537 Elbow nipple

944521 Hose

943471 Hose clip

To be considered after replacing hydraulic components:

1. The hydraulic oil tank must be inspected and cleaned from any contaminants.
2. Clean the return oil filter magnetic rod (if applicable).
3. The return oil filter should be inspected and changed if the filter has visible impurities. If the machine operating time is over 50% of the normal filter change interval, replace the filter.
4. All hydraulic oil, new and recycled, must be filled via the hydraulic oil tank return filter. In order to be able to re-use the oil, it must be entirely free from debris and contaminants.



WARNING

Hot hydraulic oil and hydraulic oil under pressure may result in severe personal injuries

1. Start the engine and run at **low idling speed** for approximately 15 minutes without activating hydraulic functions.
2. Carefully actuate all working-hydraulics functions a few times using small lever movements with the engine running at low idling speed.

NOTE!

The hydraulic cylinders should not be operated against their end-of-stroke positions.

3. Raise the lifting frame to its upper end position, without building up pressure.

NOTE!

It is very important that pressure is not built up even though the function is operated to its end position.

4. Lower the lifting frame.
5. Raise the lifting frame until the tilting cylinder is horizontal to the ground.
6. Carefully tilt fully inward without building up a pressure.
7. Stop the engine.
Fill hydraulic oil in the hydraulic oil tank, if required.
If air bubbles are visible in the reservoir, leave the engine turned off for approx ten minutes.
8. Bleed the brakes, see [520 Brake system, bleeding](#).

9. Raise the lifting frame fully and tilt fully outward.

NOTE!

If all oil has been emptied from the lifting cylinders or several components in the hydraulic system, the lifting cylinders must be bled, depending on machine type, with the aid of air bleeder nipples on the cylinders (1 nipple per cylinder). Use elbow nipple 935537, hose 944521 and possibly hose clip 943471 to avoid oil spillage.

10. Lower the lifting frame and stop the engine.
Leave the engine turned off for approx. ten minutes and fill oil in the hydraulic oil tank, if required.
11. Start the engine.
Bleed the steering valve by turning the steering wheel until the machine steers properly.
12. Turn the steering wheel fully to the right respectively the left several times.
13. Stop the engine and leave it turned off for at least 15 minutes.

Test-running

14. Start the engine and run it at **low idling speed**.
Tilt inward and outward until air bubbles are no longer visible in the hydraulic oil tank sight glass.
15. Raise and lower the lifting frame until air bubbles are no longer visible in the hydraulic oil tank sight glass.
16. Increase the engine speed to **high idling speed**.
Carefully test all hydraulic functions (lifting, tilting, steering and brakes) in order to slowly building up pressure in the hydraulic system.
17. When required, check and if necessary adjust stand-by pressure and working pressure for the hydraulic oil pumps, see [913 Hydraulic pump, checking and adjusting standby pressure](#),
[913 Hydraulic pump, checking and adjusting max working pressure](#),
[263 Pump 3 \(P3\) standby pressure, checking and adjusting \(LS-line removed\)](#) and
[263 Fan motor, checking working pressure](#)

Document Title: Working hydraulics and servo system, trouble-shooting	Function Group: 910	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Working hydraulics and servo system, trouble-shooting

NOTE!

The following is intended as an aid when carrying out trouble-shooting on the working hydraulics. The symptoms may vary depending on the scope of the faults.

Symptom	Possible cause	Check/Action
The working hydraulics works slowly or not at all.	Pressure-reducing valve (61) for servo pressure is faulty.	Check the servo pressure, see 914 Servo pressure, checking and adjusting .
	P2 (54) supplies low stand-by pressure.	Check the stand-by pressure, see 913 Hydraulic pump, checking and adjusting standby pressure .
	MA912[T1] ⓘ (70) does not work.	Check MA912, see also 370 Wiring diagram 21B .
	Flow regulator (26) has too large a leak to tank. The pump does not receive LS-signal.	Check the LS-pressure at the LSP-port on the central valve. The curve for the LS-pressure should follow the curve for the working pressure during the pressure build-up stage.
	The restriction (in the central valve) for the LS-line is clogged (port LSW)	Check the LS-pressure at the LSP-port on the central valve. The curve for the LS-pressure should follow the curve for the working pressure during the pressure build-up stage.
	Back-up valve (25) is clogged or is binding.	Check the back-up pressure, see 912 Back-up valve, checking and adjusting .
	Priority spool (64) has got stuck in position "steering".	Check the lifting time, see 913 Lifting time, checking .
The lifting/lowering function is difficult to check or does not work.	The spring for spool (12) is faulty.	
	Load-holding valve (7) is binding.	
	Load-holding valve (6) is binding.	
	Spool (12) is binding.	
	Pilot spool (5) has got stuck or is binding.	
	Pilot spool (15) has got stuck or is binding.	
The lowering function is difficult to check or does not work.	Valve for Return To Dig[T2] ⓘ (100) is draining the oil for the servo pressure to tank.	
	Floating position piston (14) is leaking or the spring has broken.	
	The spring in the servo valve lowering function (77) is faulty.	

The lifting function is difficult to control or does not work.	Load-holding valve (7) has got stuck or is binding.	
	Load-holding valve (6) has got stuck or is binding.	
	Pilot spool (13) for the floating position piston has got stuck in actuated position.	
	Pilot spool (15) has got stuck or is binding.	
	Lifting spool (12) has got stuck or is binding.	
	Pilot spool (5) has got stuck or is binding.	
	The spring in the servo valve lifting function (77) is faulty.	
	Load-holding valve (7) has got stuck or is binding.	
	Load-holding valve (6) has got stuck or is binding.	
The lifting function is slow, but the maximum pressure is achieved.	Spool (12) has got stuck or is binding.	
	Low flow from P1 (55) and P2 (54) (also affects the tilting function, but perhaps not so clearly)	Check the stand-by pressure, see 913 Hydraulic pump, checking and adjusting standby pressure .
		Check the lifting time, see 913 Lifting time, checking .
The lifting arms drop at the beginning of the lifting movement.	Load-holding valve (6) does not open fully.	
	Load-holding valve (7) does not open fully.	
The lifting function is slow and weak. The lifting arms lower in non-actuated position (With Boom Suspension System disengaged).	Load-holding valve (7) has got stuck in actuated position.	
	Pilot spool (15) has got stuck in actuated position.	
The lifting function is slow and weak. The lifting arms lower in non-actuated position (With Boom Suspension System disengaged).	The piston seals in lifting cylinders (2) are leaking.	
	Shock valve (8) is leaking.	Check the shock valve, see 912 Shock valve lift function, checking .
	CT1 (39) in V1 has got stuck in the open position.	Check CT1 in V1.
The lifting arms move upwards when the bucket is exposed to a load (e.g. during levelling operations). The machine cannot be raised with the aid of the lifting unit.	CT1 (46) in V2 has got stuck in the open position.	
	Anti-cavitation valve (9) is leaking.	
	Non-return valve (4) is leaking.	
The floating position cannot be activated	The servo pressure is too low.	Check the servo pressure, see 914 Servo pressure, checking and adjusting .
	The pilot valve for the floating position spool (13) is binding.	
	Floating position piston (14) has got stuck.	
Tilting out and tilting in are difficult to control or do not work.	The spring for spool (24) is faulty.	
	Pilot spool (16) has got stuck	

Tilting out is difficult to control or does not work.	or is binding.	
	Pilot spool (21) has got stuck or is binding.	
	Load-holding valve (18) is binding.	
	Load-holding valve (17) is binding.	
	Spool (24) is binding.	
	Pilot spool (21) has got stuck or is binding.	
	Load-holding valve (18) has got stuck or is binding.	
	Spool (24) has got stuck or is binding.	
	Pilot spool (16) has got stuck or is binding.	
	Load-holding valve (17) has got stuck or is binding.	
Tilting in is difficult to control or does not work.	Load-holding valve (18) has got stuck or is binding.	
	Spool (24) has got stuck or is binding.	
	Pilot spool (16) has got stuck or is binding.	
	Load-holding valve (17) has got stuck or is binding.	
Tilting in is slow and weak. The bucket tilts out in non-actuated position.	Shock valve (19) is leaking to tank.	Check the shock valve, see 912 Shock valve, tilt function, checking .
	Piston seal (1) does not seal.	
	Spool (24) is not centred (spring faulty).	
Tilting in is slow.	Load-holding valve (17) does not open fully.	
	Load-holding valve (18) does not open fully.	
The bucket tilts out at the beginning of the tilting in movement.	Pilot spool (16) has got stuck in the open position.	
	Load-holding valve (17) has got stuck in the open position.	
The bucket tilts in even though the servo lever is not actuated (when the tip of the bucket is exposed to a load).	Shock valve (20) is leaking to tank.	Check the shock valve, see 912 Shock valve, tilt function, checking .
The lifting function works and the lowering function works, but maximum pressure is not reached. Poor function or no function of tilting in and tilting out.	LS non-return valve (11) is leaking.	Check the maximum pressure when tilting in, tilting out, lifting and lowering, see 913 Hydraulic pump, checking and adjusting max working pressure . Check the LS-pressure at the LSP-port on the central valve. The curve for the LS-pressure should follow the curve for the working pressure during the pressure build-up stage.
	Spool (77) for lifting has broken and oil is leaking to tank.	Check the servo pressure, see 914 Servo pressure, checking and adjusting .
Poor function or no function of tilting in and tilting out and maximum pressure is not reached. The lifting function does not work, whereas the	LS non-return valve (10) is leaking.	Check the maximum pressure when tilting in, tilting out, lifting and lowering, see 913 Hydraulic pump, checking and adjusting max working pressure . Check the LS-pressure at the LSP-port on the central

lowering function does.		valve. The curve for the LS-pressure should follow the curve for the working pressure during the pressure build-up stage.
	Spool (77) for lifting has broken and oil is leaking to tank.	Check the servo pressure, see 914 Servo pressure, checking and adjusting .
The tilting out works, whereas the tilting in does not. The lifting function does not work, whereas the lowering function works, but maximum pressure is not achieved.	LS non-return valve (22) is leaking.	Check the maximum pressure when tilting in, tilting out, lifting and lowering, see 913 Hydraulic pump, checking and adjusting max working pressure . Check the LS-pressure at the LSP-port on the central valve. The curve for the LS-pressure should follow the curve for the working pressure during the pressure build-up stage.
	Spool (76) for tilting out in the servo valve has broken and oil is leaking to tank.	Check the servo pressure, see 914 Servo pressure, checking and adjusting .
Tilting in works and tilting out works, but maximum pressure is not achieved. The lifting function does not work. The lowering function works, but maximum pressure is not achieved.	LS non-return valve (23) is leaking.	Check the maximum pressure when tilting in, tilting out, lifting and lowering, see 913 Hydraulic pump, checking and adjusting max working pressure . Check the LS-pressure at the LSP-port on the central valve. The curve for the LS-pressure should follow the curve for the working pressure during the pressure build-up stage.
	Spool (77) for tilting in in the servo valve has broken and oil is leaking to tank.	Check the servo pressure, see 914 Servo pressure, checking and adjusting .
The lifting function does not work. The lowering function works, but maximum pressure is not achieved. Tilting in does not work. Tilting out works, but maximum pressure is not achieved. 3rd hydraulic function does not work, whereas 4th hydraulic function does.	Shuttle valve (88) is clogged or is leaking oil to tank.	
The lifting function does not work. The lowering function works, but maximum pressure is not achieved. Tilting in does not work. Tilting out works, but maximum pressure is not achieved. 3rd/4th hydraulic function works	Shuttle valve (90) is clogged or leaks oil to tank.	
The lifting function does not work. The lowering function works, but maximum pressure is not achieved. Tilting in does not work. Tilting out works, but maximum pressure is not achieved. 4th hydraulic function works. 3rd hydraulic function works at the minus side, but not at the plus side.	Spool (75) at the minus side has broken and oil is leaking to tank.	

The lifting function does not work. The lowering function works, but maximum pressure is not achieved. Tilting in does not work. Tilting out works, but maximum pressure is not achieved. 4th hydraulic function works. The plus side of the 3rd hydraulic function works, but not the minus side.	Spool (75) at the plus side has broken and oil is leaking to tank.	
The lifting function does not work. The lowering function works, but maximum pressure is not achieved. Tilting in does not work. Tilting out works, but maximum pressure is not achieved. 3rd hydraulic function works. 4th hydraulic function works at the minus side, but not at the plus side.	Spool (74) at the minus side has broken and oil is leaking to tank.	
The lifting function does not work. The lowering function works, but maximum pressure is not achieved. Tilting in does not work. Tilting out works, but maximum pressure is not achieved. 3rd hydraulic function works. 4th hydraulic function works at the plus side, but not at the minus side.	Spool (74) at the plus side has broken and oil is leaking to tank.	

[T1]Only if the machine is equipped with 4th hydraulic function.

[T2]Optional equipment

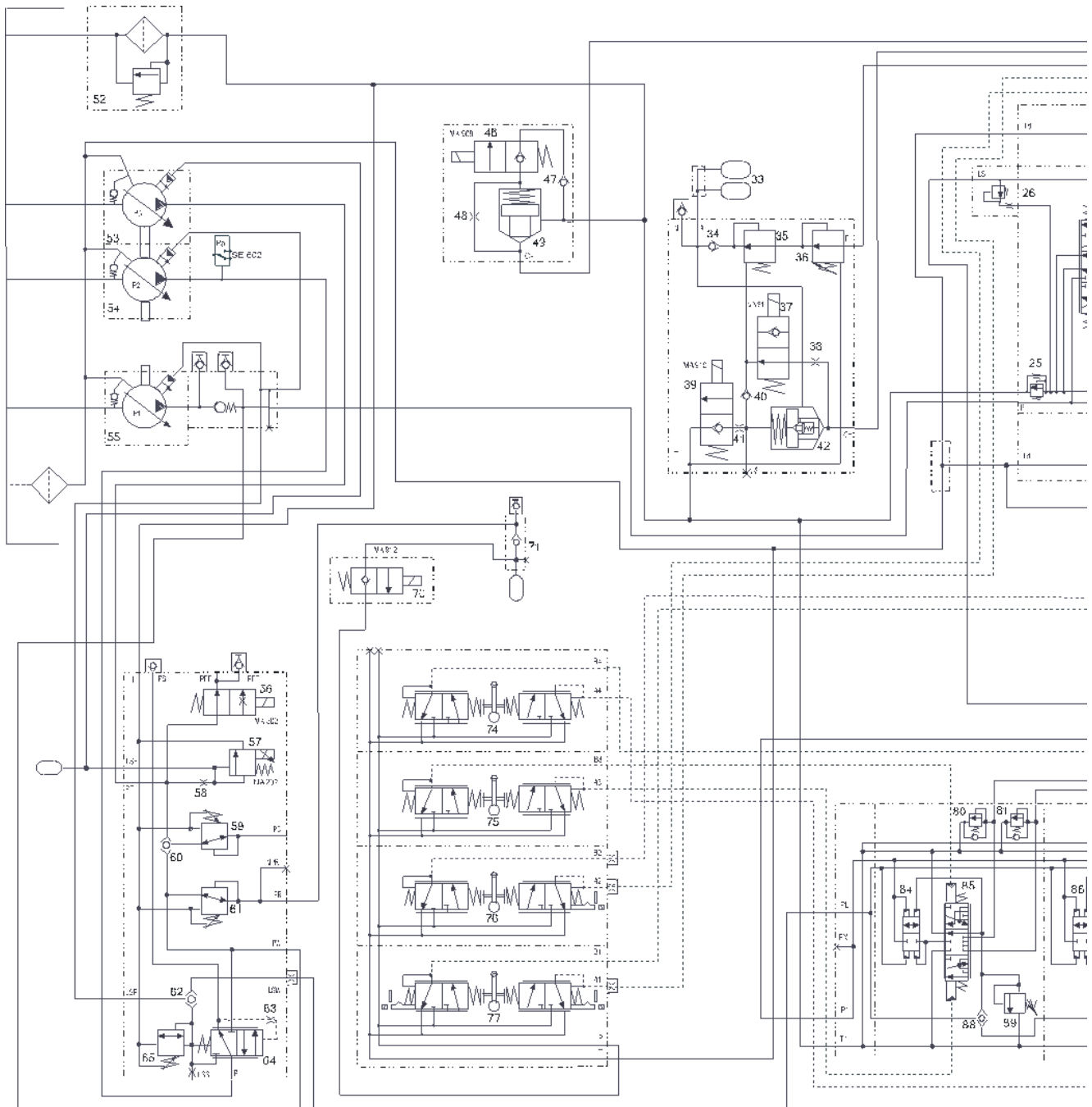


Figure 1
Components

1. Tilting cylinder
2. Lifting/lowering cylinder
3. Restriction
4. Non-return valve
5. Pilot valve, lowering function (minus side)
6. Load-holding valve, lowering function (minus side)
7. Load-holding valve, lifting function (plus side)
8. Shock valve, lifting function (plus side)
9. Anti-cavitation valve, lowering function (minus side)
10. LS-pressure, LS non-return valve, lowering function (minus side)
11. LS-pressure, LS non-return valve, lifting function (plus side)
12. Spool lifting/lowering function
13. Floating position spool
14. Floating position piston

15. Pilot valve, lifting function (plus side)
16. Pilot valve, tilting function, tilting out (minus side)
17. Load-holding valve, tilting function, tilting out (minus side)
18. Load-holding valve, tilting function, tilting in (plus side)
19. Shock/anti-cavitation valve, tilting function, tilting in (plus side)
20. Shock/anti-cavitation valve, tilting function, tilting out (minus side)
21. Pilot valve, tilting function, tilting in (plus side)
22. LS-pressure, LS non-return valve, tilting function, tilting out (minus side)
23. LS-pressure, LS non-return valve, tilting function, tilting in (plus side)
24. Spool, tilting function, tilting in / tilting out
25. Pressure back-up valve
26. Flow regulator. (Draining of LS-pressure, (Bleed off)).
27. ---
28. ---
29. ---
30. ---
31. ---
32. ---
33. Accumulators
34. Non-return valve (CT5)
35. Copying valve (CT7)
36. Pressure-limiting valve (CT8)
37. MA911 (CT4)
38. Restriction (CT10)
39. MA910 (CT1)
40. Non-return valve (CT6)
41. Restriction (CT3)
42. Logic element 1, logic element 2 (CT9)
43. ---
44. ---
45. ---
46. MA908
47. Non-return valve
48. Restriction
49. Logic element (LE3)
50. ---
51. ---
52. Return filter
53. Pump (P3), Cooling fan and brake charging
54. Pump (P2), Steering, servo and working hydraulics
55. Pump (P1) Working hydraulics and brake and servo hydraulics
56. MA502
57. MA202
58. Restriction
59. Pressure-reducing spool, brake pressure
60. Shuttle valve
61. Pressure-reducing spool, servo pressure
62. Shuttle valve
63. Restriction
64. Priority valve
65. Pressure-limiting valve, steering
66. ---
67. ---
68. ---
69. ---
70. MA912, safety valve, servo pressure
71. Accumulator block, servo pressure
72. ---
73. ---
74. Servo lever, 4th hydraulic function
75. Servo lever, 3rd hydraulic function

- 76. Servo lever, tilting function
- 77. Servo lever, lifting/lowering function
- 78. ---
- 79. ---
- 80. Shock/anti-cavitation valve, 3rd function
- 81. Shock/anti-cavitation valve, 3rd function
- 82. Shock/anti-cavitation valve, 4th function
- 83. Shock/anti-cavitation valve, 4th function
- 84. Load-holding valve, 3rd function
- 85. Spool, 3rd function
- 86. Load-holding valve, 4th function
- 87. Spool, 4th function
- 88. Shuttle valve, LS-pressure
- 89. Pressure-limiting valve 3rd function
- 90. Shuttle valve
- 91. Pressure-limiting valve 4th function
- 92. ---
- 93. ---
- 94. ---
- 95. ---
- 96. ---
- 97. ---
- 98. ---
- 99. ---
- 100. Return To Dig

3A	3rd hydraulic function (plus side)
3B	3rd hydraulic function (minus side)
4A	4th hydraulic function (plus side)
4B	4th hydraulic function (minus side)

Document Title: Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump	Function Group: 911	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump

Op nbr 911-040

[14360000 Vacuum pump](#)

[9809685 Cable \(if applicable\)](#)

Metal plugs

Connecting

1. Switch on the current with the battery disconnect switch on the machine.

NOTE!

If, for some reason, it is not suitable to switch on the current with the battery disconnect switch, us cable 9809685.

2. Remove the breather filter from the air vent pipe on the hydraulic oil tank. Install the vacuum pump connection.
3. Certain machines: Remove the breather hose from the transmission. Plug the hose and the pipe.

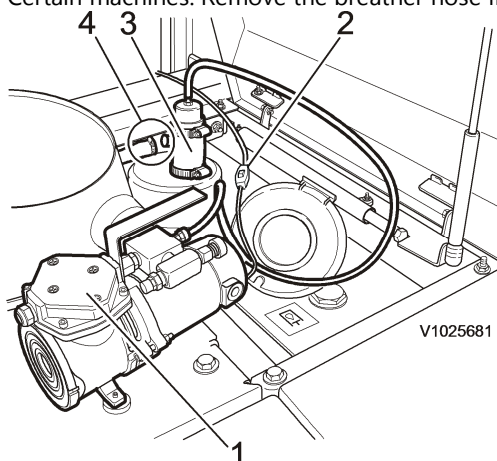


Figure 1
Connecting vacuum pump

1. Vacuum pump
 2. Switch
 3. Adapter
 4. Breather hose, pipe
4. Start the vacuum pump.
There is now a partial vacuum in the hydraulic oil tank and some work can now be carried out on the hydraulic system without having to drain off the hydraulic oil.

NOTE!

Never leave the vacuum pump unattended. A power failure may cause operating problems.

NOTE!

Plug all connections using metal plugs as soon as the connections have been exposed.

Disconnecting

5. Turn off the vacuum pump and remove it.
6. Install the breather hose on the transmission.
7. Install the breather filter on the hydraulic oil tank.
8. Test the function of the machine.

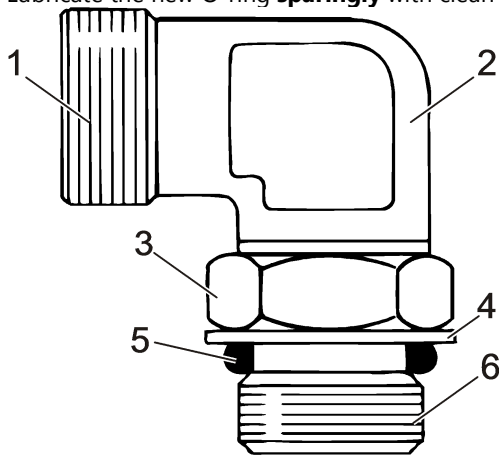
Document Title: Hydraulic couplings, installation instructions	Function Group: 911	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic couplings, installation instructions

Hydraulic couplings 90° coupling with male thread, installation instructions

Op nbr

1. Lubricate the new O-ring **sparingly** with clean hydraulic oil. Make sure that there is no oil on the threads.



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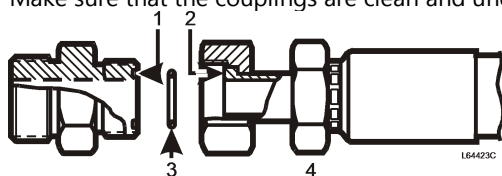
Figure 1

1. Pipe connection
 2. Coupling
 3. Lock nut
 4. Support washer
 5. O-ring
 6. Screwed into component
2. Back off the lock nut and move back the support washer and the O-ring as far as possible on the coupling.
 3. Screw the coupling into the component until the support washer comes into contact with the surface on the component.
 4. To tighten the coupling correctly and to get the coupling into the correct position, see [911 Hydraulic connections, tightening torques](#).

Hydraulic coupling, ORFS, installation instructions

Op nbr

1. Make sure that the couplings are clean and undamaged.



L64423C

Figure 2
Hydraulic coupling, ORFS

1. Groove for O-ring
 2. Flat sealing surface
 3. O-ring
 4. Retaining nut
2. Always use a new O-ring. Lubricate the O-ring **sparingly** with hydraulic oil.
 3. Tighten up the coupling by hand. Keep hose coupling (4) in position, so that it does not become twisted.
 4. Tighten the coupling according to [911 Hydraulic connections, tightening torques](#).
In case of a leak in an ORFS coupling, tightening the coupling harder will not help. Instead replace the O-ring.

Hydraulic coupling JIC, installation instructions.

Op nbr

1. For the correct installation of the coupling, see [911 Hydraulic connections, tightening torques](#).

Hydraulic coupling SAE flange, installation instructions

Op nbr

1. Make sure that the surfaces on the coupling are clean and undamaged.
2. Lubricate the O-ring with hydraulic oil.
3. Tighten the bolts in stages, evenly distributed.
4. Tighten the bolts according to [030 VOLVO standard tightening torques](#).

Document Title: Hydraulic oil tank, removing	Function Group: 911	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic oil tank, removing

Op nbr **911-036**

Sling, 5 m (16 ft)

Shackle, 2 pcs

1. Secure the frame joint with the frame joint lock. Place chocks in front of and behind the wheels.

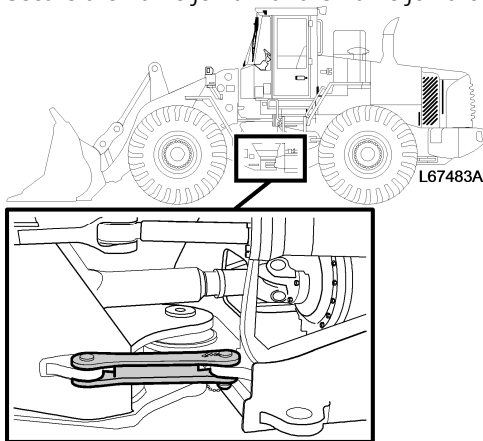


Figure 1

2. Release the pressure in the hydraulic system.
3. Turn off the current with the battery disconnect switch.

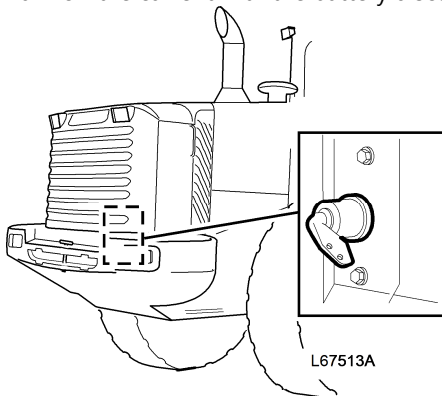


Figure 2

4. Remove the cover over the hydraulic tank and the plates on the sides of the hydraulic tank. Remove the side plates under the mudguards.
5. Drain the oil from the hydraulic tank using **both** draining points. (Otherwise oil will be left in the tank). The draining

connections are the same as on the hose supplied with the machine for draining engine oil. Replace or extend existing hose to approx. 3.5 metres (11.5 ft) to reach the collecting vessel. The hose should have an internal diameter measuring 19 mm (3/4 in).

Capacity, hydraulic tank, see [911 Hydraulic system, volume](#)

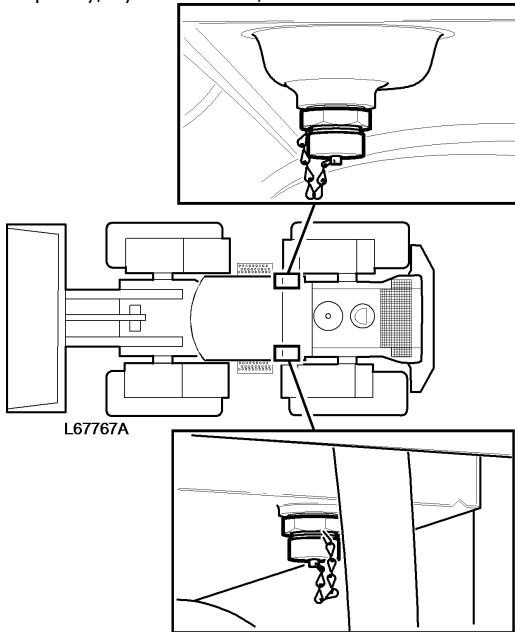


Figure 3
Draining connections

6. Remove the seat, the seat bracket, the floor mat and the rear floor plate from the cab.
7. Disconnect the cable harness, the breather hose and the connecting pipe (the manifold for return hoses) from the hydraulic tank.
Disconnect the hose connections and the clamps from the underside of the hydraulic tank. Plug the hose ends.

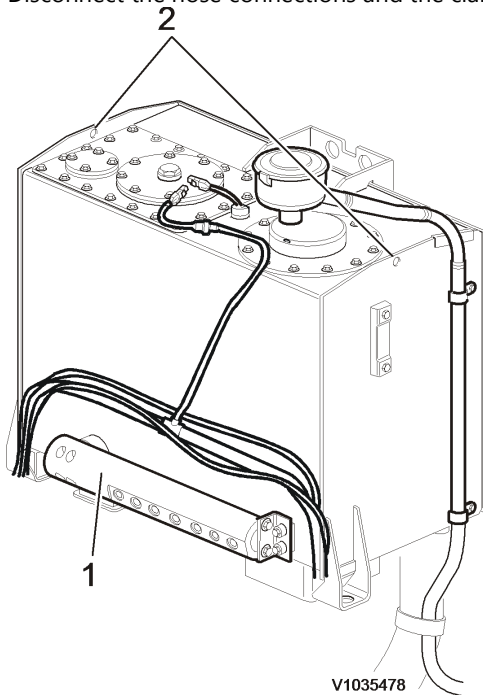


Figure 4

1. Manifold
2. Lifting points

8. Connect the two shackles and the slings to the lifting points. Remove the upper and lower attaching bolts (4 pcs).
Lift away the hydraulic tank.
Hydraulic tank weight: **approx. 150 kg (331 lb)**

Document Title: Hydraulic oil tank, installing	Function Group: 911	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic oil tank, installing

Op nbr **911-037**

Sling, 5 m (16 ft)

Shackle, 2 pcs

1. Connect the shackles and the slings to the lifting points on the hydraulic tank. Lift the hydraulic tank into position.
Hydraulic tank weight: **approx. 150 kg (331 lb)**

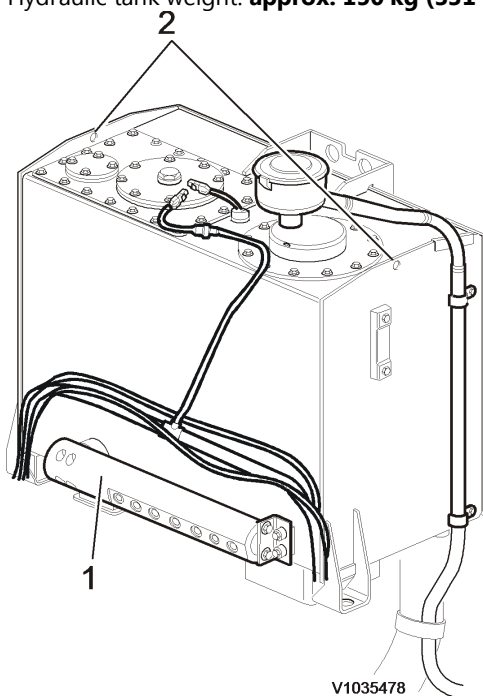


Figure 1

1. Manifold
 2. Lifting points
2. Install new O-rings in the hydraulic couplings. Connect the hoses under the tank, the manifold, the breather hose and the cable harness.
 3. Install the cover over the hydraulic tank. Install the plates.
 4. Fill with hydraulic oil. Capacity, see [911 Hydraulic system, volume](#)
 5. Install the floor plate, the floor mat, the seat bracket and the seat.
 6. Start the engine and test-run all hydraulic functions. Check that there are no leaks.
 7. Install the side plates. Restore the machine.

Document Title: Control valve, description	Function Group: 912	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Control valve, description

The control valve is a spool valve with closed centre. This means that no oil passes through the valve in neutral position. The control valve contains one spool for the lifting/lowering function and one spool for the tilting in/out function.

The valve consists of a section where the spools for the lifting/lowering and tilting functions are built-in.

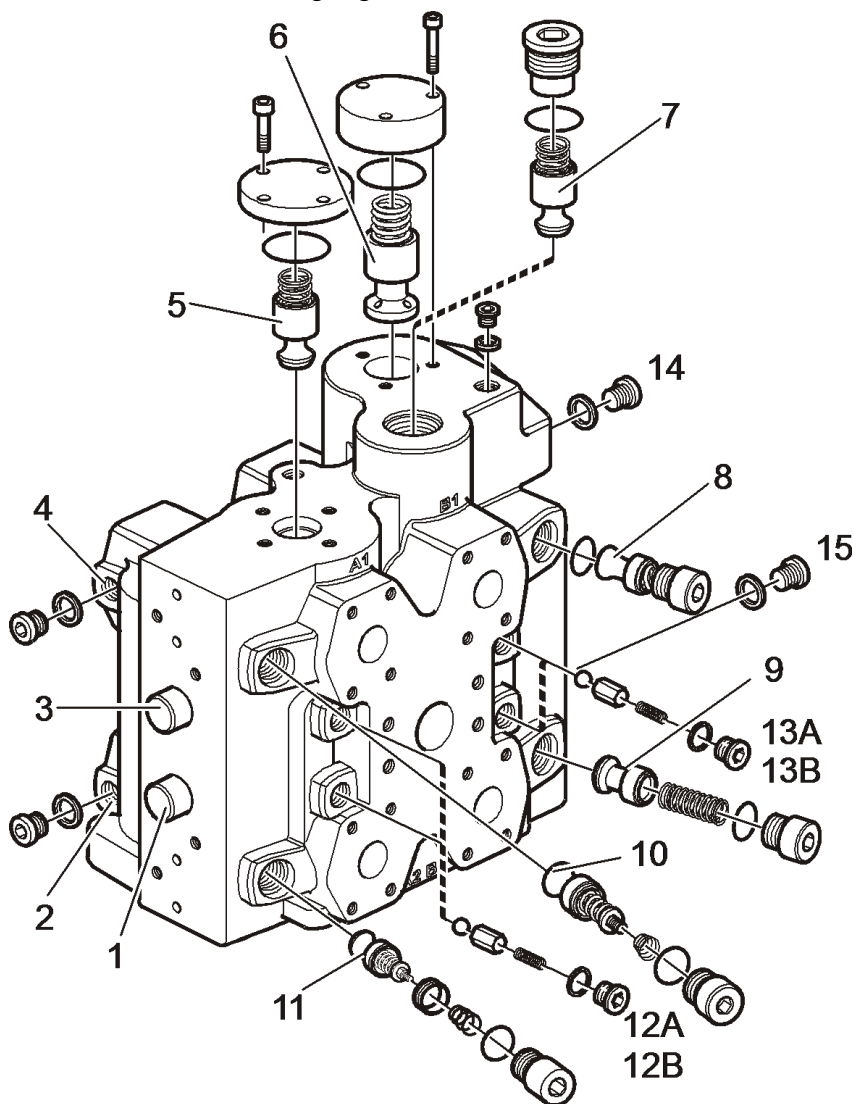
The load-holding valve pilot spools for each function are located in the control valve end plates.

The lifting/lowering function and the tilting function are connected in parallel, which means that these functions can be operated simultaneously.

The valve is provided with shock and anti-cavitation valves for the lifting/tilting function. These valves are not adjustable and are replaced as whole units.

The valve is also equipped with a back-up valve for return oil which ensures proper anti-cavitation.

Note: 3rd function or 3rd/4th function can be obtained, as optional equipment, in a separate valve, which is placed on the front frame below the leading edge of the cab.



V1002551

Figure 1

Control valve, seen from the right side of the machine, obliquely from the rear

1	Spool, lifting/lowering function	10	Shock and anti-cavitation valve, tilting function (tilting in) (tilting cylinder plus side)
2	Checking point, pressure at plus side of lifting cylinders	11	Shock valve, lifting function (plus side of lifting cylinders)
3	Spool, tilting function	12A	LS (load-sensing pressure) non-return valve (upper) tilting in
4	Checking point, pressure at plus side of tilting cylinder	12B	LS (load-sensing pressure) non-return valve (lower) lifting function
5	Load-holding valve, tilting function (tilting in)	13A	LS (load-sensing pressure) non-return valve (upper), tilting function (tilting out)
6	Back-up valve, return pressure	13B	LS (load-sensing pressure) non-return valve (lower) lowering function
7	Load-holding valve, tilting function (tilting out)	14	Checking point, pressure, minus side of tilting cylinder
8	Shock and anti-cavitation valve, tilting function (tilting out) (tilting cylinder minus side)	15	Checking point (plugged), pressure, minus side of lifting cylinders
9	Anti-cavitation valve, lowering function		

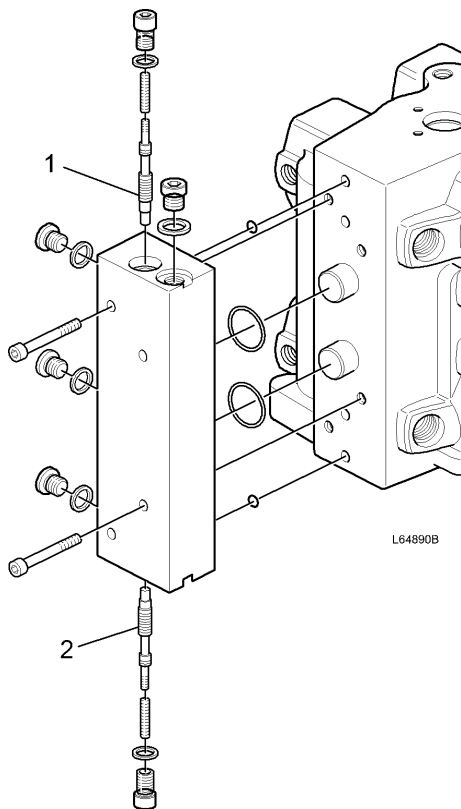


Figure 2
Control valve, rear end plate

1. Pilot spool, tilting function (tilting out)
2. Pilot spool, lowering function

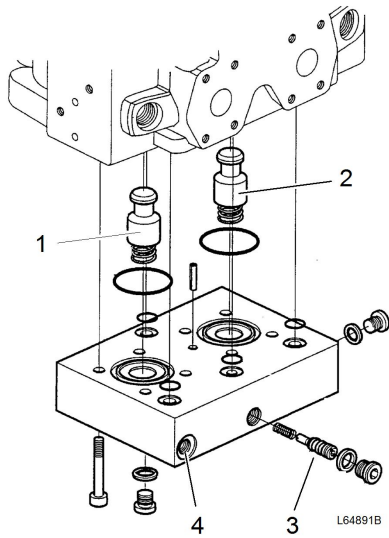


Figure 3
Control valve, lower block

1. Load-holding valve, lifting function
2. Load-holding valve, lowering function
3. Flow regulator (draining LS-pressure (load-sensing pressure), bleed off)
4. LS-connection (LSW)

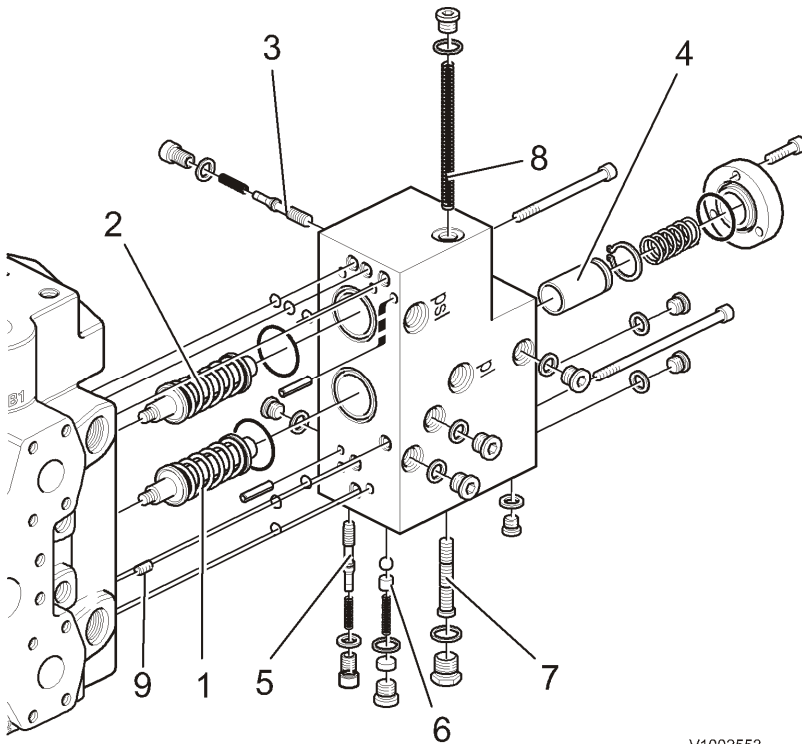


Figure 4
Control valve, front end plate

1. Centring spring for valve spool, lifting/lowering function
2. Centring spring for valve spool, tilting function

3. Pilot spool, tilting function (tilting in)
4. Floating position piston
5. Pilot spool, lifting function
6. Non-return valve for tilting function (tilting in), servo pressure for lowering function
7. Floating position spool
8. Floating position spring
9. Restriction for tilting function (tilting in) and lowering function

Shock valves, principle diagram

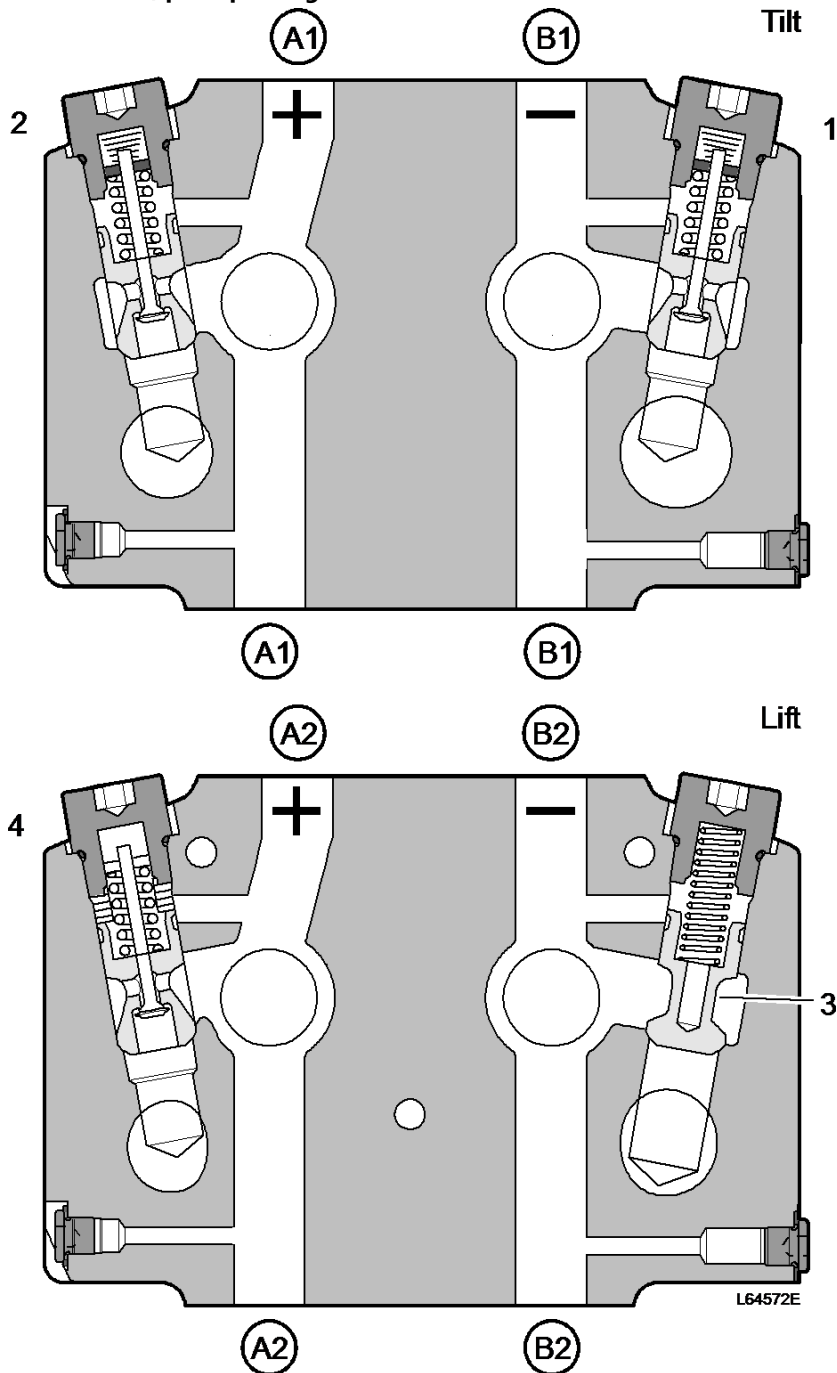


Figure 5

Shock valves, shock and anti-cavitation valves, anti-cavitation valve, principle diagram

1. Shock and anti-cavitation valve, tilting function (tilting out)
2. Shock and anti-cavitation valve, tilting function (tilting in)
3. Anti-cavitation valve, lowering function
4. Shock valve, lifting function

Control valve, neutral position

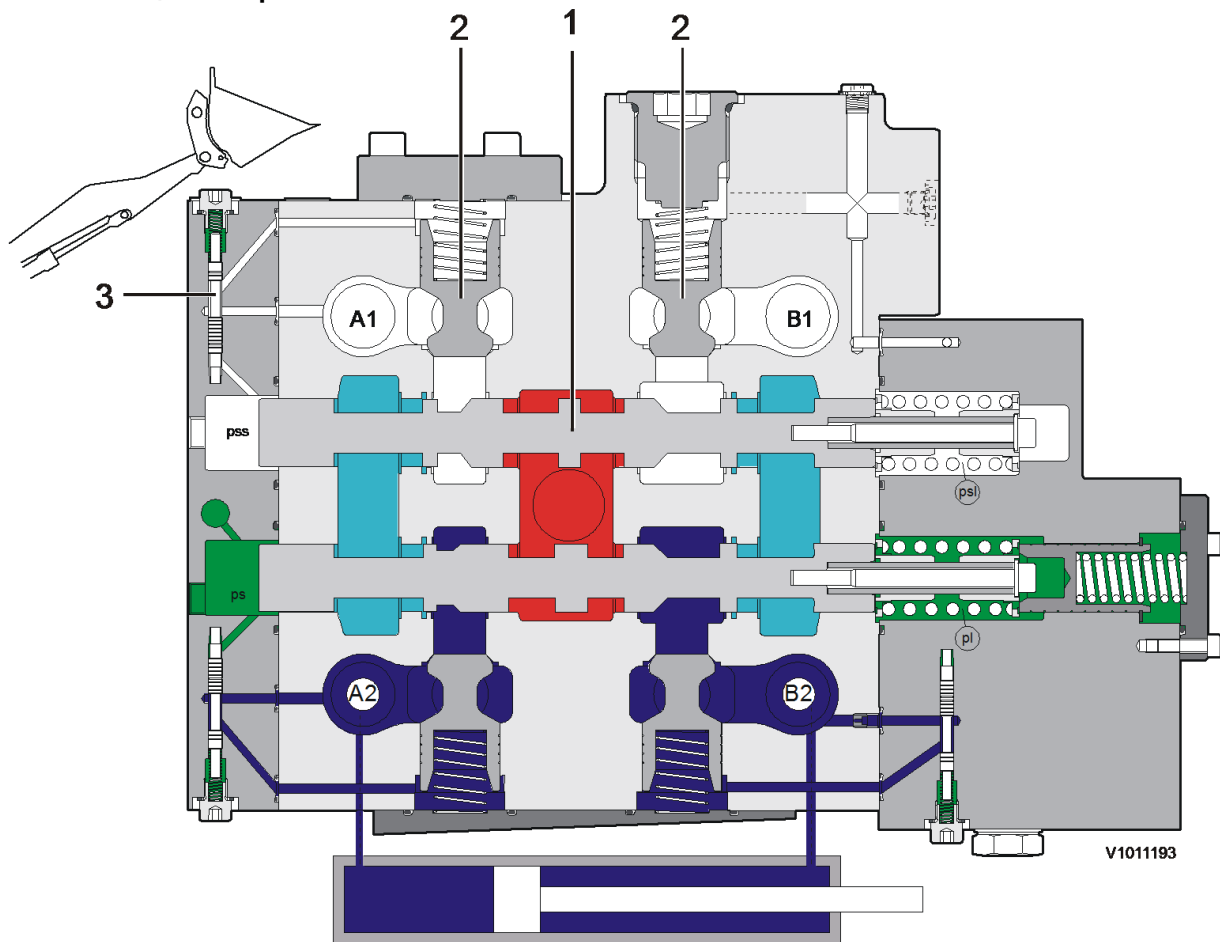


Figure 6
Control valve, neutral position

1. Spool
 2. Load-holding valve
 3. Pilot spool
- A1 Outlet to tilting cylinder, plus side
- B1 Outlet to tilting cylinder, minus side
- A2 Outlet to lifting cylinder, plus side
- B2 Outlet to lifting cylinder, minus side

Tilting section, neutral position

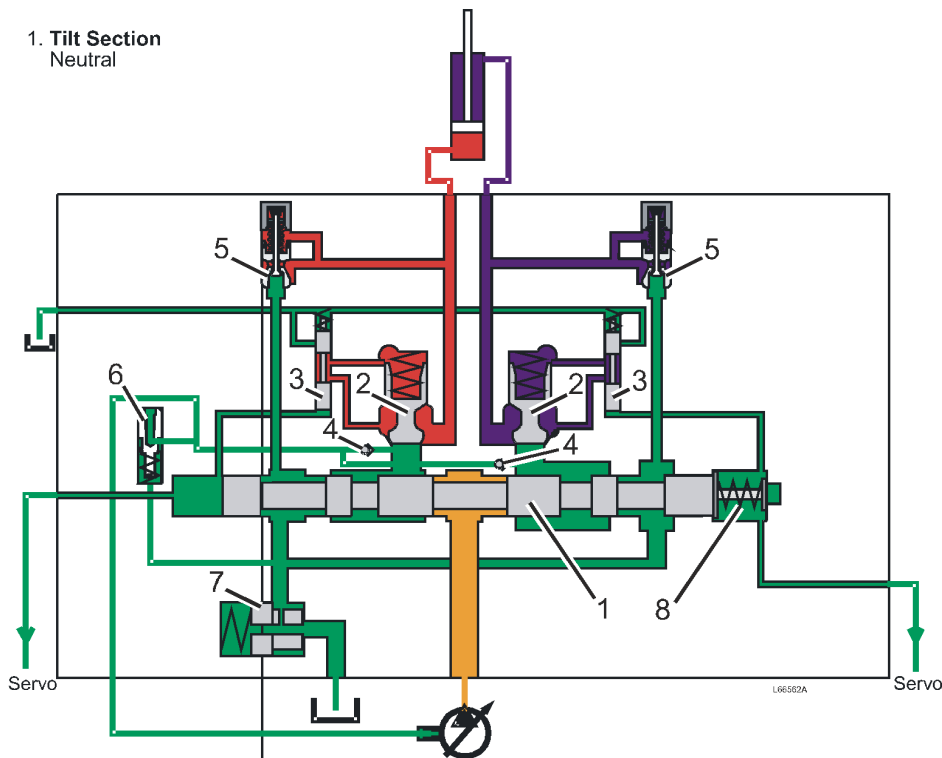


Figure 7
Tilting section, neutral (principle diagram)

Red	pressurised oil
Green	non pressurised return oil, tank connection
Violet	oil closed in
Orange	stand-by pressure
Blue	raised return pressure

Control valve, component parts (principle diagram of tilting section)

1. **Spool** actuated by servo pressure and centred in neutral position by a dual-action spring (8).
2. **Load-holding valves** prevent the load from sinking during lifting. On the side from which oil returns to the tank the load-holding valve is controlled by pilot spool (3) which is actuated by the servo pressure that controls spool (1).
3. **Pilot spools** which drain the spring side of load-holding valve (2) to the tank when the load-holding valve is to open for return oil.
4. **Non-return valves** for LS pressure (load-sensing pressure), which is conducted via flow regulator (6) to the flow compensator on pump 1 and the flow compensator on pump 2 in order to attain the required pressure and flow.
5. **Shock valves** with anti-cavitation valve, not adjustable.
6. **Flow regulator** which ensures a flow of approx. 1 litre (0.26 US gal)/min of LS pressure (load-sensing pressure) to tank regardless of pressure level. (Draining of LS pressure, bleed off). This is to ensure fixed flow compensation for pump 1 and pump 2.
7. **Back-up valve** for return oil, ensures good anti-cavitation.
8. **Double-acting spring** centres spool 1 in neutral position.

Control valve, tilting function (tilting in)

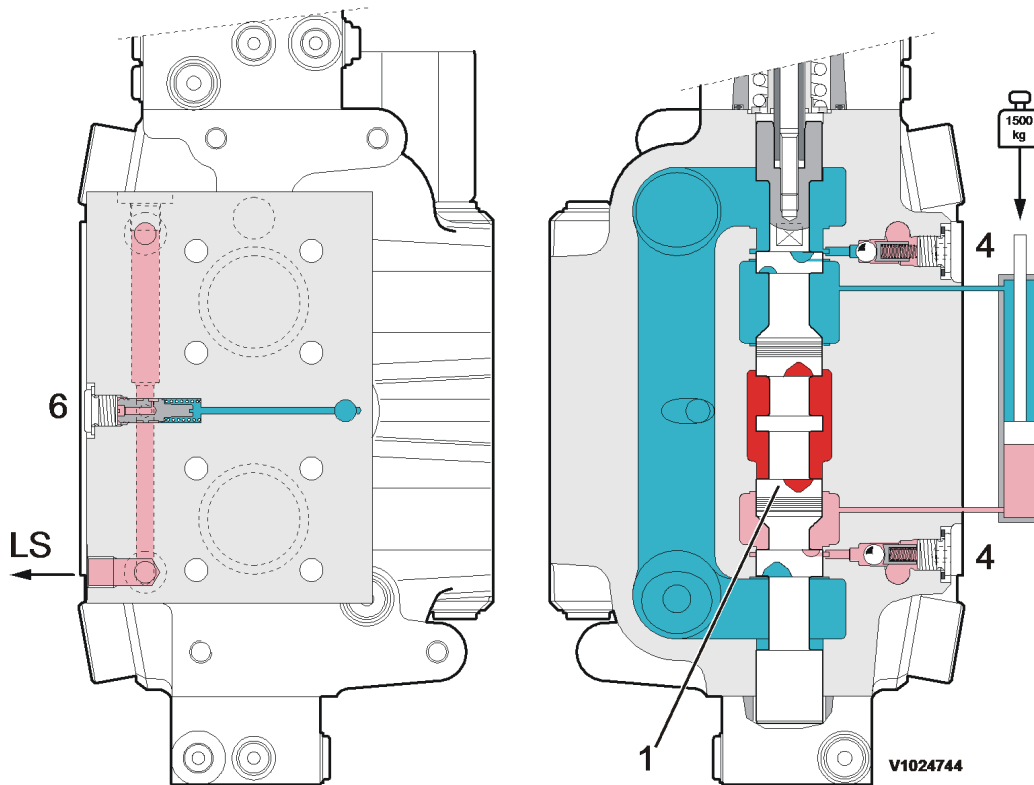


Figure 8
Control valve, tilting function (tilting in)

- 1 Tilting spool
- 4 Non-return valve, load-sensing pressure (LS)
- 6 Flow regulator (Bleed off)

Tilting section, tilting in

2. Tilt Section
Tilt in

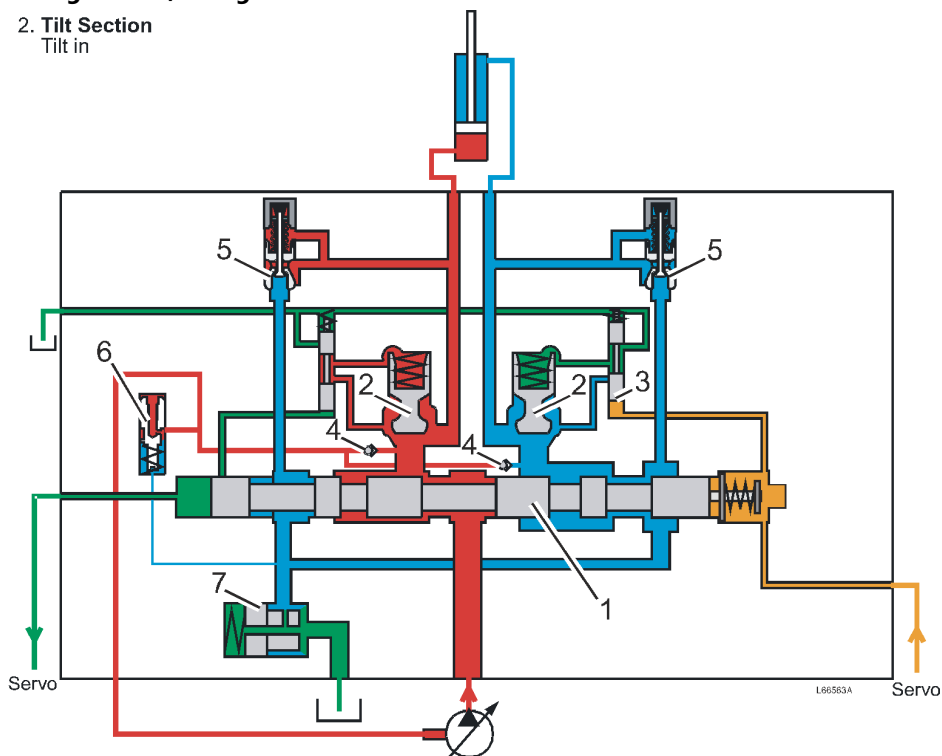


Figure 9

Tilting section, tilting in

Red	pressurised oil
Green	non pressurised return oil, tank connection
Orange	Servo pressure
Blue	raised return pressure

The servo pressure acts on the right side of spool (1) and the right pilot spool (3). When pilot spool (3) moves, the oil on the spring side of the right load-holding valve (2) is drained to tank.

The oil from the hydraulic pump opens the left load-holding valve (2) and continues to the plus side of the tilting cylinder.

The left non-return valve (4) opens and conducts the LS-pressure (load-sensing pressure) back to the flow compensators of the hydraulic pumps. A controlled draining (bleed off) of LS pressure via flow regulator (6) to the tank occurs.

The oil from the minus side of the tilting cylinder opens the right load-holding valve and is conducted to the back-up valve (7) via spool (1).

When back-up valve (7) is opened, the oil is conducted to the tank.

Control valve, back-up valve

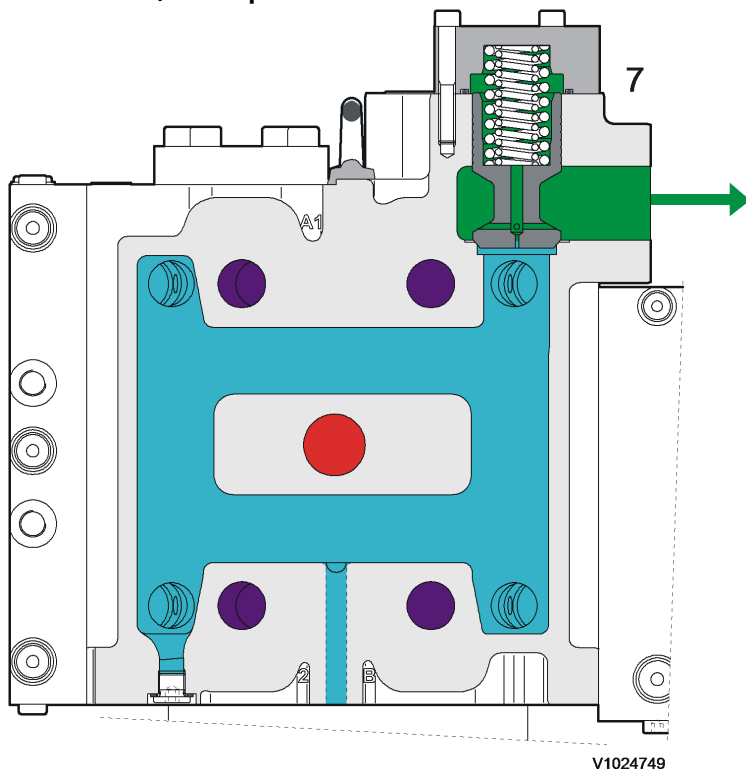


Figure 10

Control valve, back-up valve

7	Back-up valve
---	---------------

Tilting section, shock

3. Tilt Section Shock

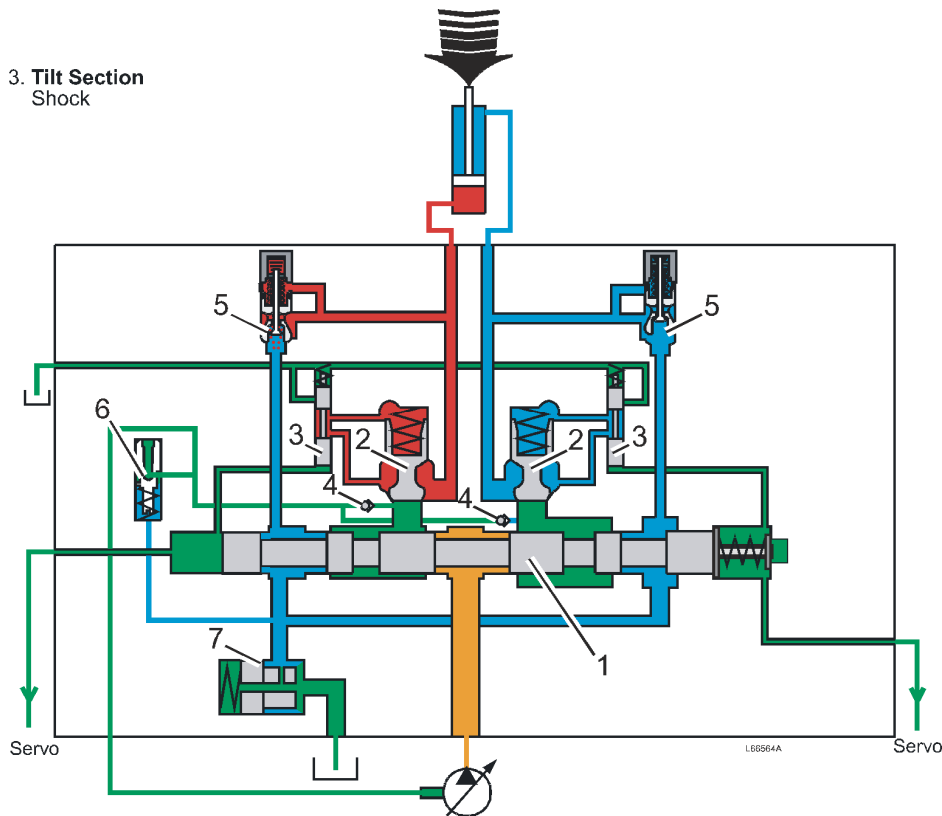


Figure 11
Tilting section, shock

Red	pressurised oil
Green	non pressurised return oil, tank connection
Orange	stand-by pressure
Blue	raised return pressure

In this example the shock pressure is reached on the plus side of the tilting cylinder if, for example, a large rock falls on the leading edge of the bucket.

The shock pressure opens the left shock valve (5).

The oil is conducted to back-up valve (7), which ensures that cavitation is avoided by raising the pressure up to anti-cavitation valve (5).

The anti-cavitation function in the right shock valve (5) opens and conducts the oil to the minus side of the tilting cylinder.

The surplus oil from the plus side of the tilting cylinder is conducted to the tank.

Control valve, lowering function

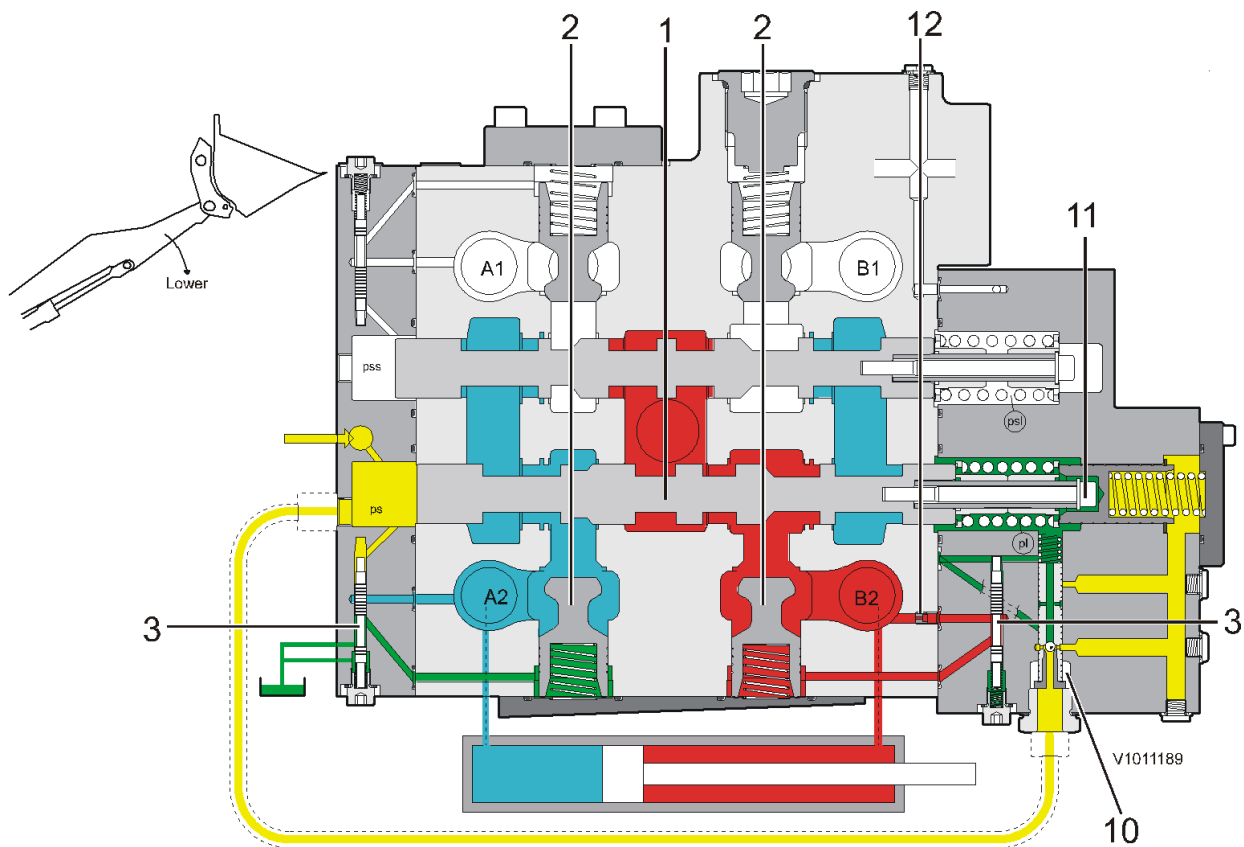


Figure 12
Control valve, lowering function

- | | | | |
|----|----------------------------------|----|--|
| 1 | Spool, lifting/lowering function | 11 | Floating position piston |
| 2 | Load-holding valve | 12 | Restriction, lowering/tilting function |
| 3 | Pilot spool | | |
| 10 | Floating position spool | | |

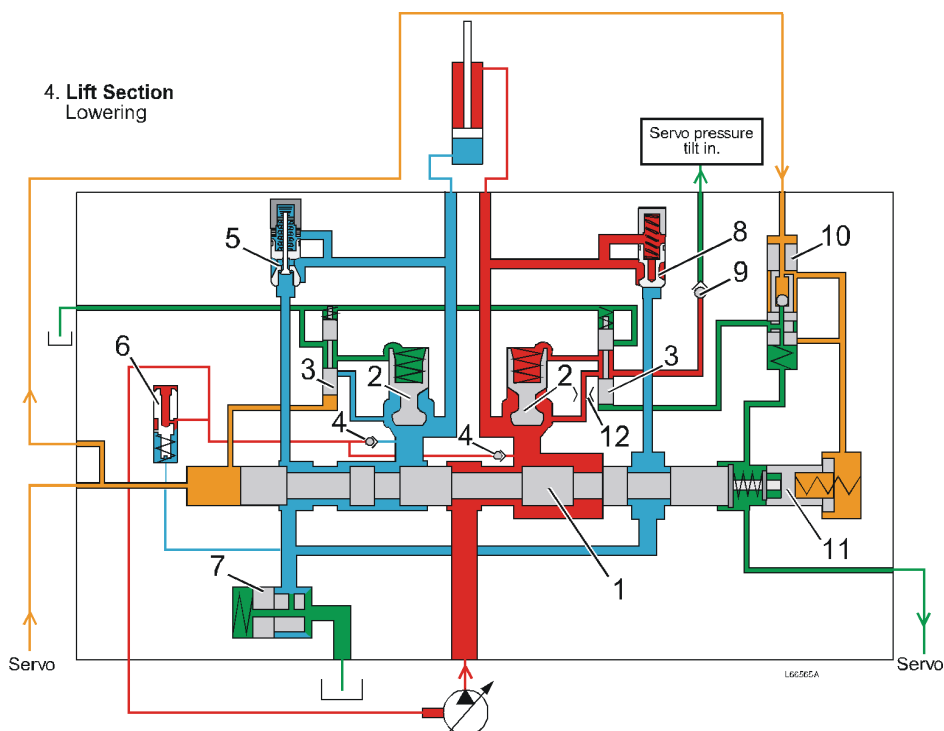


Figure 13
Lifting section when lowering

Red	pressurised oil
Green	non pressurised return oil, tank connection
Orange	stand-by pressure
Blue	raised return pressure

The servo pressure acts on the left side of spool (1) and the left pilot spool (3) as well as the floating position spool (10). (Floating position spool (10) is not moved until the sensing position of the lowering lever has been passed.)

The servo pressure passes floating position spool (10) and pressurises floating position piston (11), which limits the movement of the spool to the right, i.e. prevents floating position engagement.

The oil from the hydraulic pumps opens the right load-holding valve (2) and continues to the minus side of the lifting cylinder.

The right non-return valve (4) opens and conducts the LS-pressure (load-sensing pressure) back to the flow compensators of the pumps (normally very low LS-pressure during lowering as gravity assists with the lowering).

The oil from the plus side of the lifting cylinders opens the left load-holding valve (2) and is conducted via spool (1) to back-up valve (7) and on to the tank.

Servo pressure when lifting

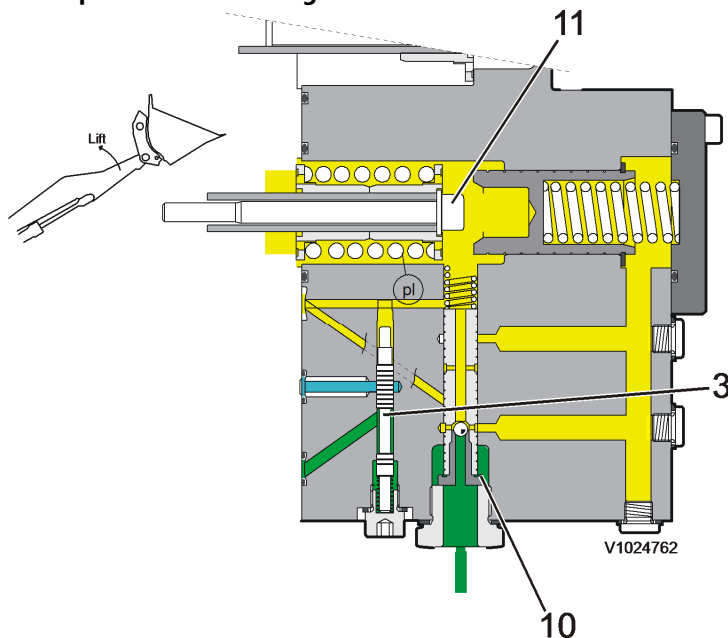


Figure 14
Servo pressure when lifting

3	Pilot spool
10	Floating position spool
11	Floating position piston

Control valve lowering/tilting function (tilting in)

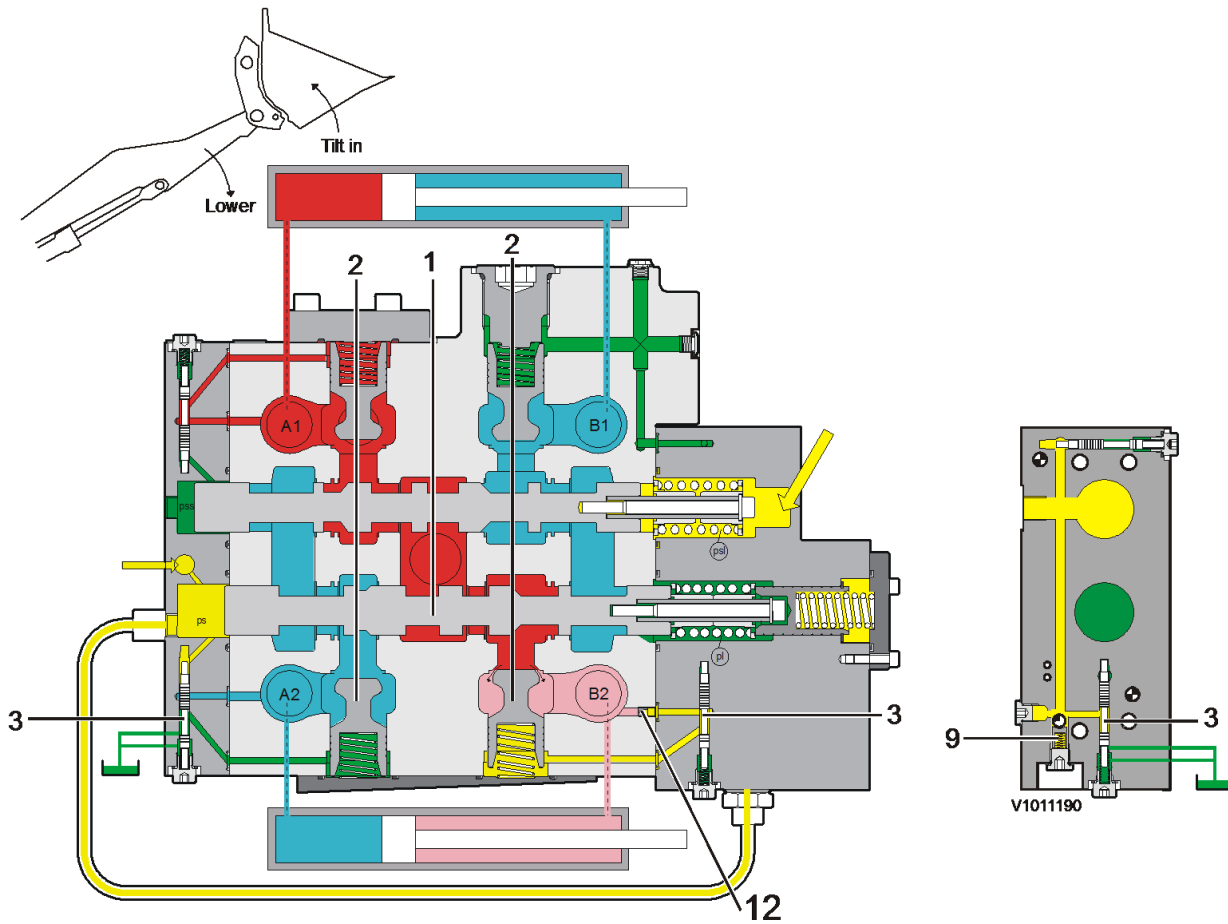


Figure 15
Control valve lowering/tilting function (tilting in)

- | | | | |
|---|--------------------|----|--|
| 1 | Spool | 12 | Restriction, lowering/tilting function |
| 2 | Load-holding valve | | |
| 3 | Pilot spool | | |
| 9 | Non-return valve | | |

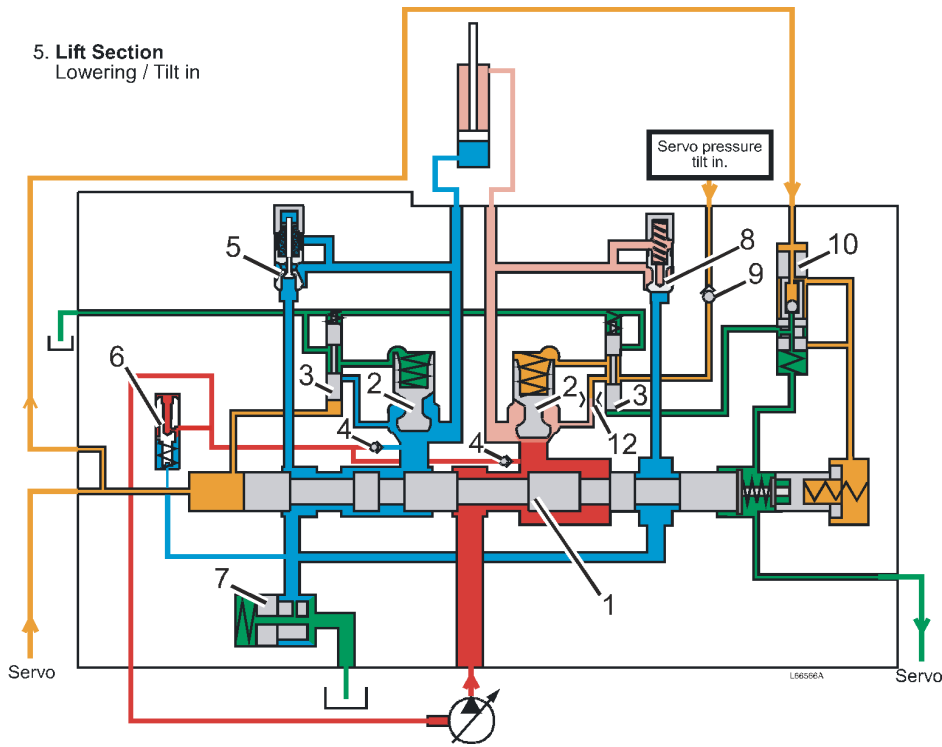


Figure 16
Lifting section, lowering/tilting function (tilting in)

Red	pressurised oil
Green	non pressurised return oil, tank connection
Pink	partial pressure
Orange	stand-by pressure
Blue	raised return pressure

The servo pressure is conducted from the tilting in section past non-return valve (9) in order to build up pressure to the flow compensators on the pumps, so that it is possible to simultaneously tilt the bucket in and lower it.

The servo pressure from tilting in passes the right pilot spool (3) and restriction (12), thus ensuring the pressure. The servo pressure is then conducted to the spring side on the right load-holding valve (2).

Load-holding valve (2) begins to close and thereby increasing the LS-pressure (load-sensing pressure) which is conducted via the right non-return valve (4) to the flow compensators on the hydraulic pumps.

The pressure level increase in this way allows simultaneous tilting in of the bucket while lowering it.

Control valve, floating position

Red	pressurised oil
Green	non pressurised return oil, tank connection
Orange	stand-by pressure

Blue

raised return pressure

The servo pressure acts on the left side of spool (1) and the left pilot spool (3) as well as the floating position spool (10). When passing through the sensing position of the lowering lever the servo pressure rises and presses down floating position spool (10). When this occurs, the spring side of floating position piston (11) is drained and spool (1) can now be moved to the right as far as possible to take up the floating position and close the connection to the pump. The servo pressure is conducted from floating position spool (10) to the right pilot spool (3). The spring sides of load-holding valves (2) are drained to the tank. When the spring sides of both load-holding valves are drained to tank, they can open for oil flow in either direction. Spool (1), which is now in floating position, allows the oil to flow freely between both sides of the cylinder. Back-up valve (7) ensures that no cavitation occurs during rapid changes in lifting arm height.

Document Title: Central valve, description	Function Group: 912	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Central valve, description

Central valve

The central valve is positioned to the left under the front end of the cab.

The pressure and flow from pump 2 is distributed via the central valve to the steering, brake charging (passive charging), the servo valve and the working hydraulics.

The pressure and flow from pump 3 is distributed via the central valve to the cooling fan and the electrically controlled brake charging.

Component parts

1. **Pressure-reducing spool** with adjusting device for maximum brake pressure.
2. **Pressure-reducing spool** with adjusting device for maximum servo pressure.
3. **Pressure-reducing valve** with adjusting device for maximum steering pressure.
4. **Priority valve**, which gives priority to the steering before the brakes, servo and working hydraulics. This is achieved by arranging for the LS-pressure from the steering valve to act on the back of the priority valve together with the spring. The priority valve opens the connection to the brake system, the servo system and the working hydraulics at max. steering pressure and with the steering in neutral.
5. **Shuttle valve** which selects the highest LS-pressure from the steering or the working hydraulics and conducts it to the flow compensator on pump 1 and the flow compensator on pump 2 respectively.
6. **Shuttle valve** which selects the highest pressure to safeguard the brake charging. During transport operation the brake charging takes place from pump 3. Cutting in and out is then done electrically via MA502 and the brake-charging sensor SE504. When using the working hydraulics, the brake charging is done passively from pump 2 when the pressure exceeds 12 MPa (120 bar) (1740 psi). When using the steering, the corresponding is done with the aid of P1.
7. **Restriction**
8. **Checking point, servo pressure (earlier type)**
9. **Restriction**
With effect from the following serial numbers, this restriction has been moved to the collecting block for LS-pressure.
L150E ser. No. 10001–
L180E ser. No. 8001–
L220E ser. No. 4001–
10. **Checking point, P3 (PFF)**

MA202, Proportional valve

- **Proportional valve** for cooling fan speed is controlled by the V-ECU.
When there is an increased need of cooling (a higher fan speed), the signal from the V-ECU to MA202 is increased.
- The V-ECU senses the temperature in the following systems:
Induction air temperature, SE2501
Charge air temperature, SE2507
Engine coolant temperature, SE2606.
Radiator coolant temperature, SE210
Transmission oil temperature, SE406
Axle oil temperature, front axle, SE410 (when axle oil cooling is installed)
Axle oil temperature, rear axle, SE411 (when axle oil cooling is installed)
Hydraulic oil temperature, SE906.
- The system which has the highest temperature determines the cooling fan speed.
See [263 Hydraulic cooling fan, description](#).

MA502, Brake charging valve

- **Brake charging valve** which ensures that brake charging takes place during transport operation. Charging the brake system then takes place from pump 3.
- MA502 is controlled by brake-charging sensor SE504 positioned on the accumulator block.
- See [520 Hydraulic brake system, description](#).

SE602, sensor steering pressure

- **Sensor** measures steering pressure for secondary steering.

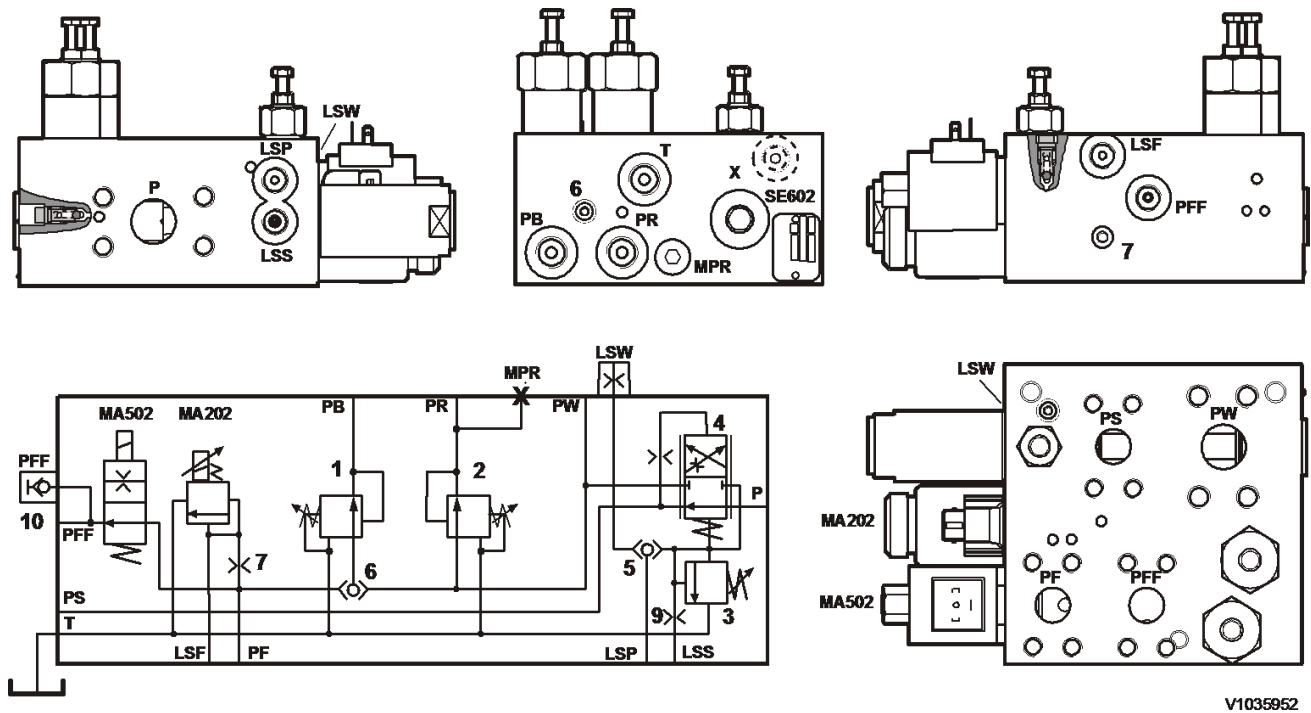


Figure 1
Central valve

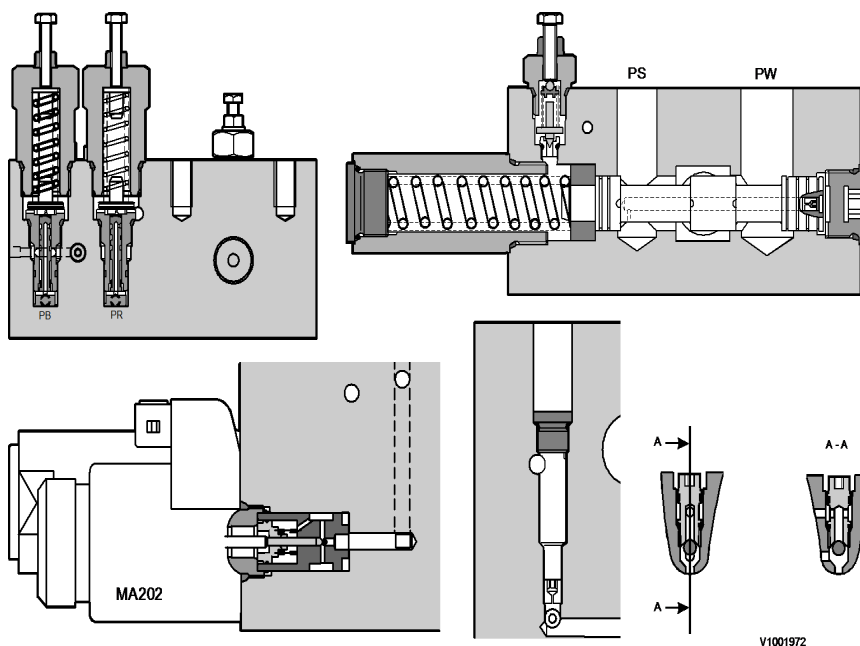


Figure 2
Central valve

Document Title: Back-up valve, checking and adjusting	Function Group: 912	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Back-up valve, checking and adjusting

Op nbr 912-018

[9993831 Support](#)

[11666019 Pressure gauge](#)

[11666037 Hose](#)

[11666052 Pressure gauge](#)

[14290266 Hose](#)

The engine, hydraulic transmission and hydraulic system must be at normal working temperature when checking.

1. Lift the boom and secure it with support 9993831.

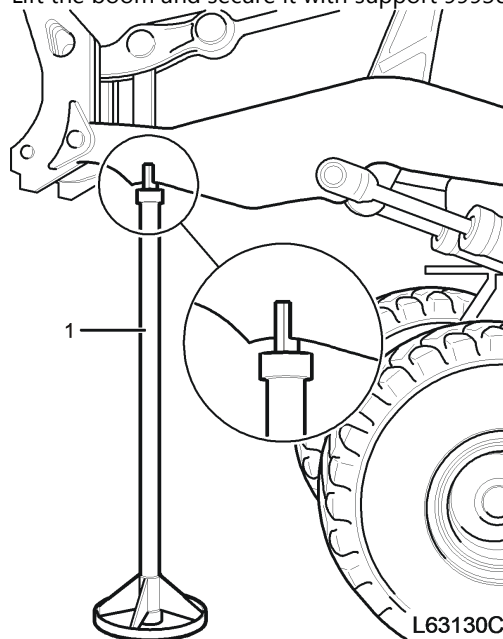


Figure 1
Securing the boom

1. 9993831 Support
2. Remove the front plate.
3. Connect the measuring equipment to the measuring connection, marked A1, on the back of the control valve.

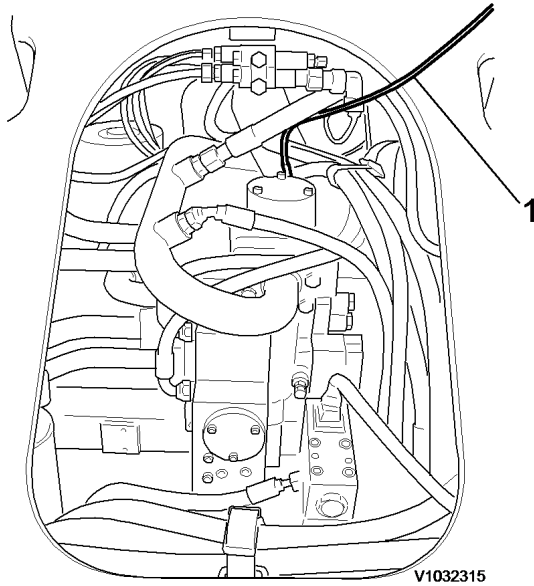


Figure 2

1. 11666037, 11666019 (14290266, 11666052, later version)
4. Start the engine. Remove the support and lower the boom so that the bucket rests flat on the ground.
If there's no bucket, use wooden blocks under the bucket attachment to be able to lift the machine off the ground.
5. Tilt forward slowly (so that the machine lifts off the ground).
Read off the pressure. Correct return pressure, see [912 Valves, working hydraulics, specifications](#).
6. Restore the machine to operating condition.

Document Title: Shock valve lift function, checking	Function Group: 912	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Shock valve lift function, checking

Op nbr 912-023

[9993723 Nipple](#)

[9993808 Check valve](#)

[9993831 Support](#)

[14290262 Adapter](#)

[14360000 Vacuum pump / 24V](#)

[14360064 Pressure checking set](#)

Shock valves for the tilting function, removed from the machine, may also be checked as described below.

1. Secure the frame joint with the frame joint lock. Place chocks in front of and behind the wheels.

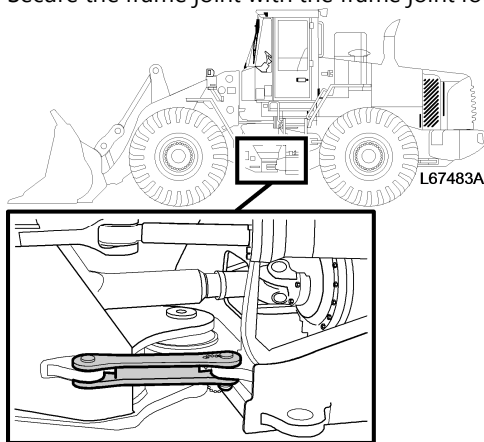


Figure 1

2. Position stand 9993831 under the lifting frame.

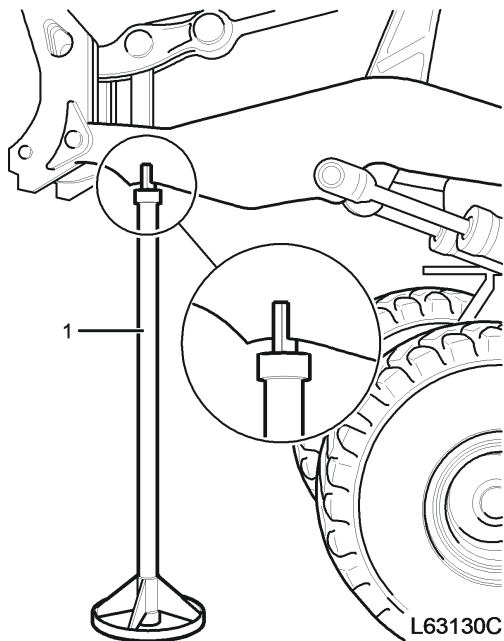


Figure 2

1. 9993831 Stand
3. Remove the cover plate on the front frame.
4. Connect the vacuum pump to the hydraulic oil tank, see [910 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#).
5. To gain access to the shock valve for the lifting function, remove the two the hoses and the nipple. (Applies to machines equipped with Boom Suspension System.) Plug the hoses. Remove the shock valve and plug the hole with the plug from 9993808.

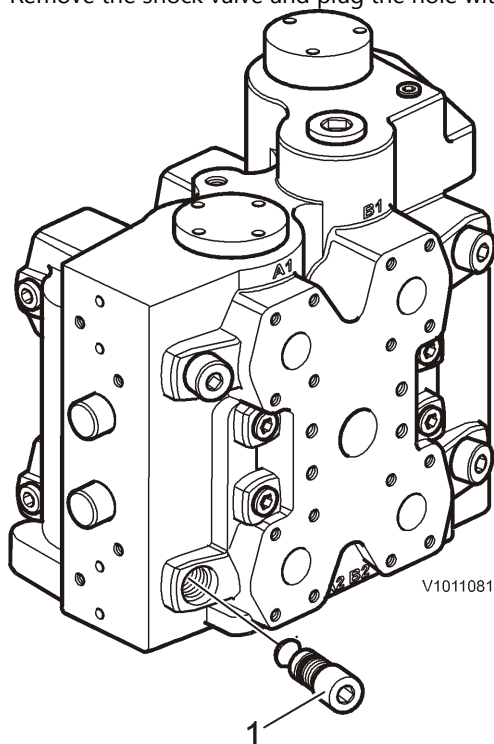


Figure 3

1. Shock valve, lifting
6. Screw down the shock valve into 9993808 and connect the remaining tools according to the figure.
Check the opening pressure of the shock valve, by pumping until the pressure no longer rises. The shock valve has then opened and the opening pressure can be read off.
Correct return pressure, see [912 Valves, working hydraulics, specifications](#). The shock valve is not adjustable.

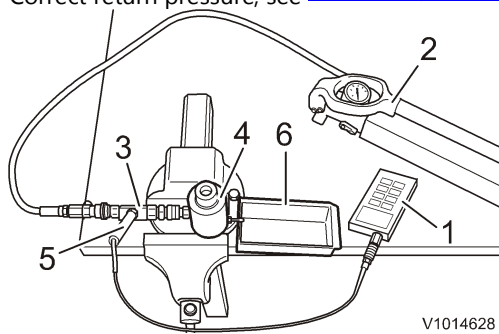


Figure 4
Checking shock valve

1. 14360064
 2. 11666041
 3. 9993723
 4. 9993808
 5. 14290262
 6. Vessel
7. Install the shock valve, the hoses and the nipple on the control valve. Remove the vacuum pump.

Document Title: Shock valve, tilt function, checking	Function Group: 912	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Shock valve, tilt function, checking

Op nbr 912-021

[11666003 Pressure gauge](#)

[11666003 Pressure gauge](#)

[11666051 Pressure gauge](#)

[11666037 Hose](#)

[11666037 Hose](#)

[14290266 Hose](#)

[14290266 Hose](#)

[9993831 Support](#)

The engine, transmission and hydraulic system must have reached normal working temperature before the check is carried out.

NOTE!

Shock valve on lifting function cannot be checked in this way, in stead see [912 Shock valve lift function, checking](#).

Tilting rearward, shock valve for tilting cylinder (plus side)

1. Secure the frame joint with the frame joint lock. Place chocks in front of and behind the wheels.

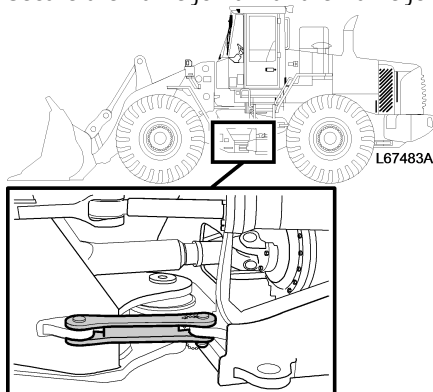


Figure 1

2. Position the support under the lifting frame.

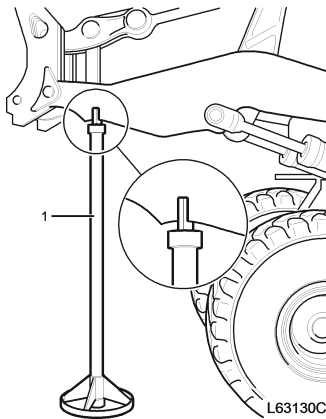


Figure 2

1. 9993831 Stand
3. Remove the cover plate on the front frame.
4. Connect the pressure gauges to the checking points for tilting rearward (1) and tilting forward (2).

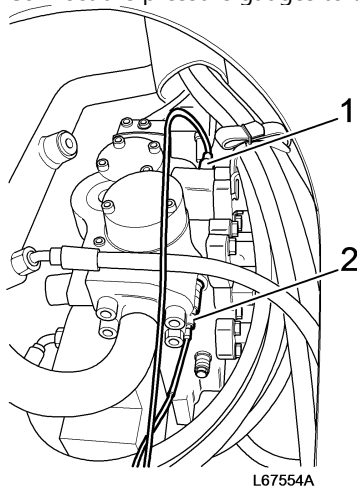


Figure 3

1. Checking point, plus side
2. Checking point, minus side
5. Run the engine at low idling speed.
Remove the stand, place the lifting arms approx. 1 metre from the ground and tilt rearward against end position.

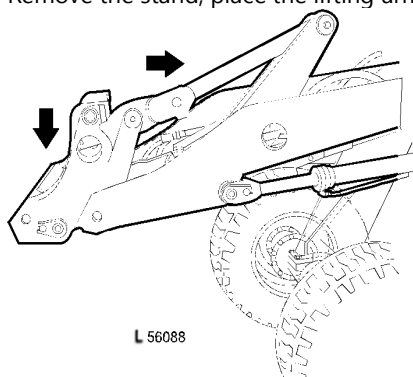


Figure 4
Checking shock pressure, tilting rearward (principle diagram)

6. Lower the lifting arms slowly. Read off the pressure when the stop lugs touch and the tilt cylinder is forced inward. If the correct pressure is not obtained, the shock valve must be replaced. (The shock valve is not adjustable).
Shock pressure, tilting rearward, see [912 Valves, working hydraulics, specifications](#).

Tilting forward, shock valve for tilting cylinder (minus side)

7. Run the engine at low idling speed.
Raise the lifting arms approximately 2 m (6 ft) from the ground and tilt forward towards the end position.

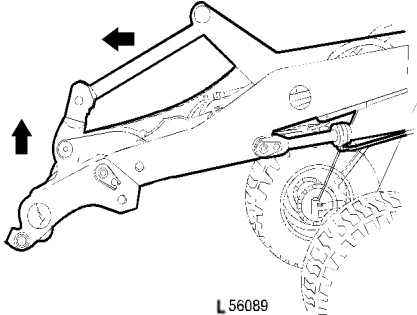


Figure 5
Checking shock pressure, tilting forward, (principle diagram)

8. Raise the lifting arms slowly. Read off the pressure when the stop lugs touch and the tilt cylinder is forced outward. If the correct pressure is not obtained, the shock valve must be replaced. (The shock valve is not adjustable).
Shock pressure, tilting forward, see [912 Valves, working hydraulics, specifications](#).



Construction Equipment

Service Information

Document Title: Control valve, replacing	Function Group: 912	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Control valve, replacing

Op nbr 912-001

[9993831 Support](#)

[9993831 Support](#)

[11666037 Hose](#)

[11666051 Pressure gauge](#)

[13933251 Testing nipple](#)

[14290266 Hose](#)

935537 Elbow nipple

944521 Hose

943471 Hose clip

Ratchet block 750 kg (1653 lb), 2 pcs

Sling 2 m (6.6 ft), 3 pcs

Shackle M12

Shackle M20

The operation also includes the required tools and the times for the following jobs:

- [916 Boom suspension system, hydraulic oil pressure in accumulators, depressurizing](#)
- [900 Hydraulic system, bleeding](#)

1. Raise the lifting frame and secure it with two stands 9993831.

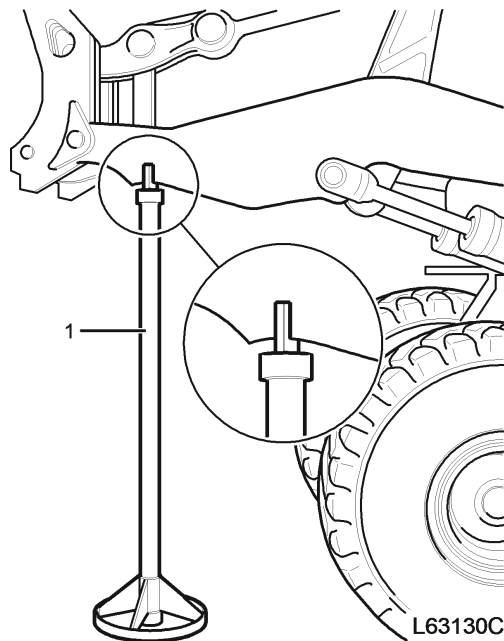


Figure 1

1. 9993831, 2 pcs
2. Release the hydraulic oil pressure for the Boom Suspension System [1] ⓘ, see [916 Boom suspension system, hydraulic oil pressure in accumulators, depressurizing](#).
3. Release the pressure in the servo system by moving the servo control levers back and forth approx. 15 times.

Removing

4. Remove the side plate under the left rear mudguard.
Drain the oil from the hydraulic tank. The draining connection is the same as on the hose for draining engine oil supplied with the machine. Replace or extend the existing hose to approx. 3.5 metre (11.5 ft). Hose size 19 mm (3/4") inside diameter.
Capacity: approx. **100–160 litre (26–43 US gal)** depending on machine type.

NOTE!

Approximately 50–70 litres (13–18 US gal) hydraulic oil remains in the tank. If the hydraulic oil is to be changed, also drain the oil from the right draining point. Capacity, see [911 Hydraulic system, volume](#)

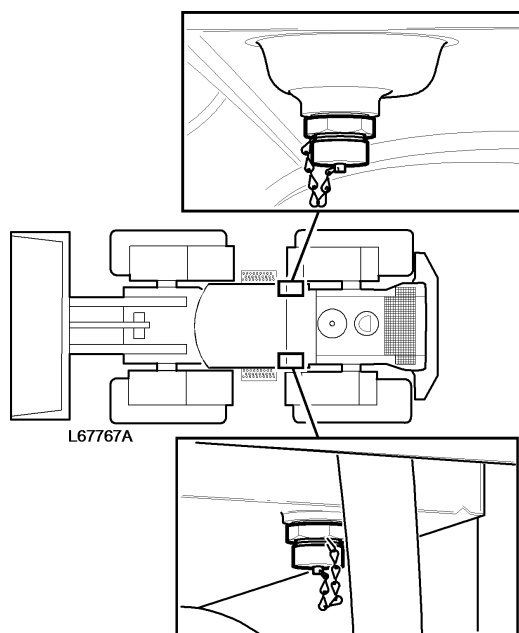


Figure 2

5. Oil will leak out. Collect the waste oil in a suitable vessel. Disconnect the return oil pipe from the return oil hose. Remove the clamp for the hydraulic hoses. Remove the clamp securing the return oil pipe.

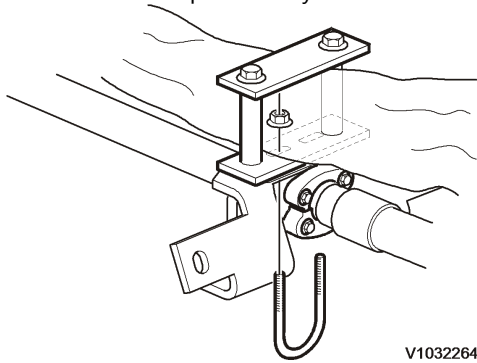


Figure 3

6. Remove the brackets for the bundling clamps for the hydraulic pipes.

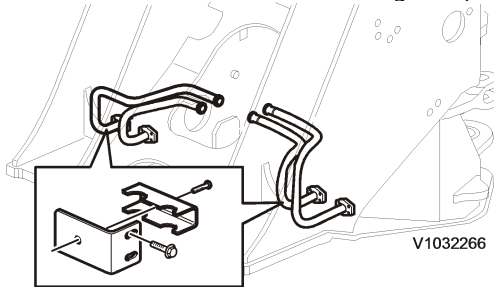


Figure 4

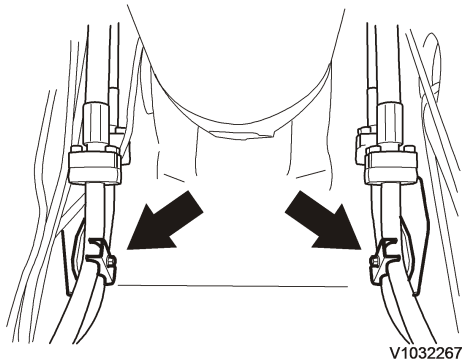


Figure 5

7. Remove the front plate.
8. Mark all hoses and pipes to facilitate later reconnection of the control valve.
9. Depending on machine version: Disconnect the connectors from MA946, MA947 and MA407. Disconnect hoses (3) and (4) from the block. Install protective plugs in the hoses and the block. Remove the attaching bolt from the block and move the block to one side, downward.
In order to avoid damage to the lower hoses, remove the strap keeping the hoses together and move the hoses downward.

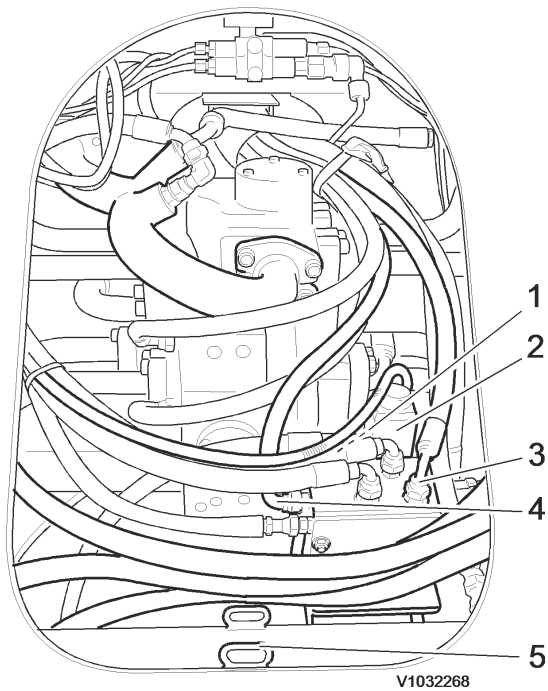


Figure 6

1. MA946, MA947
2. MA407
3. Hose
4. Hose
5. Bracket for strap, lower hoses

10. Disconnect the hoses from the return oil pipe. Plug the hoses and the connections on the pipe. Disconnect the return oil pipe from the control valve.
11. Disconnect all hoses from the control valve.
Install protective plugs in the hoses and their connections on the control valve.
12. Disconnect all pipes from the control valve. Install protective plugs.
Tie up the pipes to the tilting cylinder as far as possible using straps or similar.
13. Attach a sling around the tilting cylinder. Connect a ratchet block.

NOTE!

The sling should be as short as possible in order to "hug" the tilting cylinder.

Connect a shackle M12 to the eye on the control valve.

Attach slings in the lugs on the lifting cylinders. Connect a shackle M20 and a ratchet block to the slings.

Connect both ratchet blocks to the shackle on the control valve.

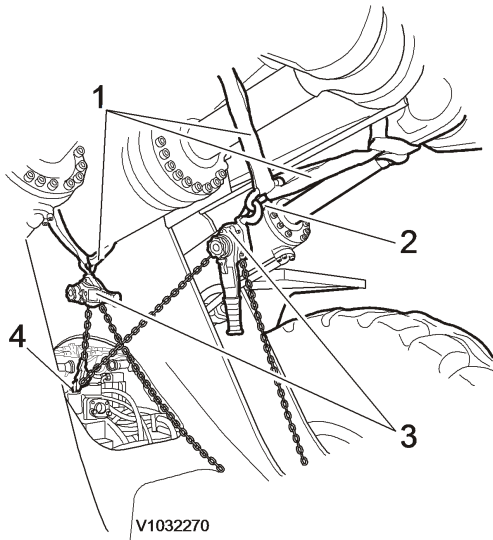


Figure 7

1. Sling, 2 m (6.6 ft)
2. Shackle M20
3. Ratchet block
4. Shackle M12

14. Remove the attaching bolts for the control valve (4 pcs).

15. Remove the control valve.

NOTE!

Take care not to damage the lower hoses.

Control valve weight: **approx. 110 kg (243 lb)**

Installing

16. Connect the lifting devices to the control valve and lift it into position.
Control valve weight: **approx. 110 kg (243 lb)**

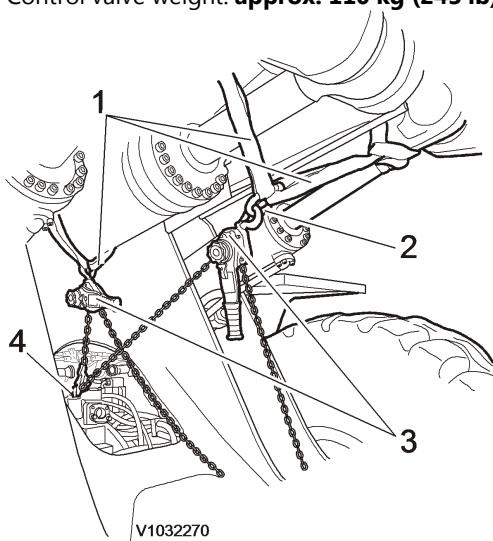


Figure 8

1. Sling, 2 m (6.6 ft), 3 pcs
 2. Shackle M20
 3. Ratchet block 750 kg (1653 lb), 2 pcs
 4. Shackle M12
17. Install the attaching bolts for the control valve (4 pcs).
Remove the shackles and the lifting device.
18. Replace all O-rings in hydraulic couplings. Connect all pipes and hoses to the control valve as follows.
- Connect the pipes to the lifting cylinders. Screw in the bolts by hand.
 - Loosely install the bundling clamps for the pipes to the lifting cylinders. Adjust the pipes so that they do not chafe against other parts. Tighten down the bolts for the pipes in the control valve. Tighten down the bundling clamps.

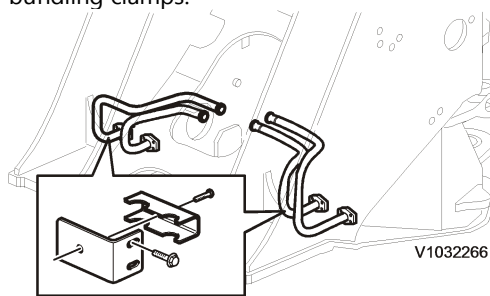


Figure 9

- 19.
- Remove the belts, which were used for tying the pipes up against the tilting cylinder.
 - Connect the pipes for the tilting cylinder to the control valve. Screw in the bolts by hand.
 - Loosely install the bundling clamps for the pipes to the tilting cylinder. Adjust the pipes so that they do not chafe against other parts. Tighten down the bolts for the pipes in the control valve. Tighten down the bundling clamps.

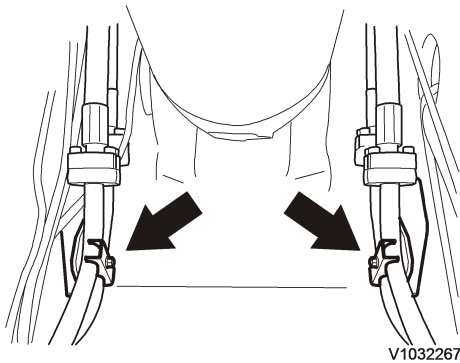


Figure 10

20. Install the return oil pipe on the control valve. Connect the return oil hose. Install the bolts loosely.
Install the hoses on the return oil pipe.
Loosely install the clamp that retains the return oil pipe.
Tighten down the bolts for the return oil pipe in the control valve and against the return oil hose.
Tighten down the clamp for the return oil pipe. Install the clamp for the hydraulic hoses.

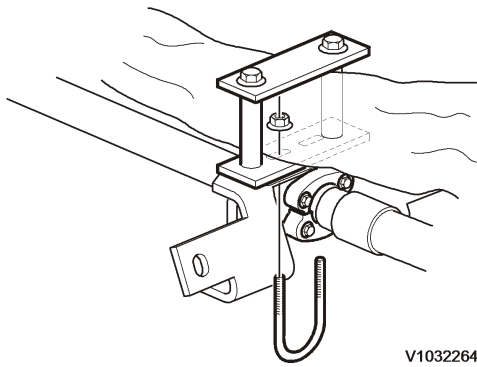


Figure 11

21.
 - Install the block on the bracket. Install the hoses.
 - Install MA407 and MA946, MA947. Connect the connectors.
 - Connect remaining hoses.
 - Install the bundling straps.

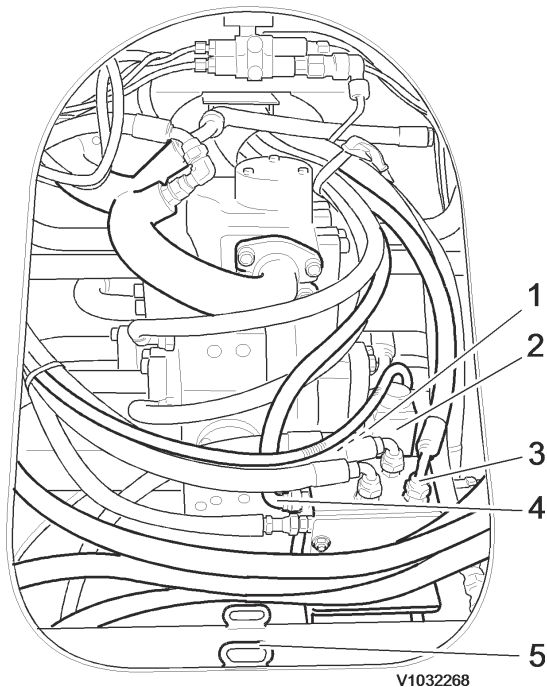


Figure 12

1. MA946, MA947
 2. MA407
 3. Hose
 4. Hose
 5. Bracket for bundling strap, lower hoses
22. Fill the hydraulic system with oil.
Capacity: **approx. 220 liter (58 US gal)**
 23. Install the left and right side plate.
 24. Bleed the hydraulic system, see [900 Hydraulic system, bleeding](#).
 25. Install the front plate.
 26. Test-run the machine. Check all functions and that there are no leaks.

[1]Optional equipment



Construction Equipment

Service Information

Document Title: Central valve, replacing	Function Group: 912	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Central valve, replacing

Op nbr 912-030

[14360000 Vacuum pump / 24V](#)

[9809685 Cable](#)

[11666019 Pressure gauge](#)

[11666020 Pressure gauge](#)

[11666020 Pressure gauge](#)

[11666051 Pressure gauge](#)

[11666052 Pressure gauge](#)

[11666037 Hose](#)

[11666037 Hose](#)

[14290266 Hose](#)

[9993721 Service display](#)

[9993831 Support](#)

Metal plugs

935537 Elbow nipple

944521 Hose

943471 Hose clip

NOTE!

Earlier and later type checking points occur. Different tools are used, see tool list.

The operation also includes the required tools and the times for the following jobs:

- [911 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#)
- [900 Hydraulic system, bleeding](#)
- [913 Hydraulic pump, checking and adjusting standby pressure](#)
- [645 Steering system, checking and adjusting working pressure](#)
- [263 Pump 3 \(P3\) standby pressure, checking and adjusting \(LS-line removed\)](#)
- [263 Fan motor, checking working pressure](#)
- [520 Brake system, checking hydraulic function](#)
- [914 Servo pressure, checking and adjusting](#)
- [914 Servo pressure, checking and adjusting](#)
- [913 Hydraulic pump, checking and adjusting max working pressure](#)

Removing

1. Release the pressure in the hydraulic system by:

- turning the ignition key to position 1 (applies to machines equipped with 4th function)
- moving the servo control levers to and fro 10–15 times
- applying the brake 40–50 times

2. Draining the hydraulic oil as shown below or connecting the vacuum pump, see

[911 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump.](#)

3. Remove the side plate under the left rear mudguard.
Drain the oil from the hydraulic tank. The draining connection is the same as on the hose for draining engine oil supplied with the machine. Replace or extend the existing hose to approx. 3.5 metre (11.5 ft). Hose size 19 mm (3/4") inside diameter.

Capacity: **approx. 100–160 litre (26–43 US gal) depending on machine type.**

NOTE!

Approximately 50–70 litres (13–18 US gal) hydraulic oil remains in the tank. If the hydraulic oil is to be changed, also drain the oil from the right draining point. Capacity, see [911 Hydraulic system, volume](#)

4. Remove the side plate from the left side under the cab.
5. Disconnect the connectors for MA202 and MA502 from the central valve (positioned under the leading edge of the cab on the left side of the machine).
Part the connector halves for SE602.

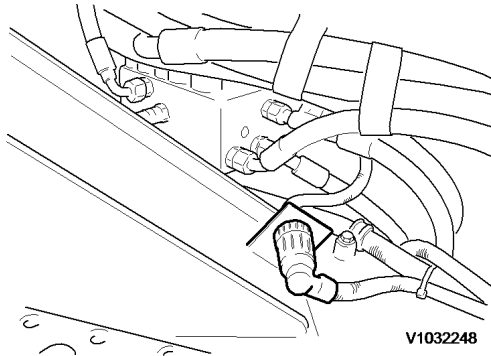


Figure 1
Connector for SE602

6. Mark the hoses to the central valve to facilitate installation.

NOTE!

To be able to disconnect the hose from the hydraulic pump (P2) to the central valve, the hose bracket for the hoses from the shift valve on the left steering cylinder and accumulator must be detached from the frame.

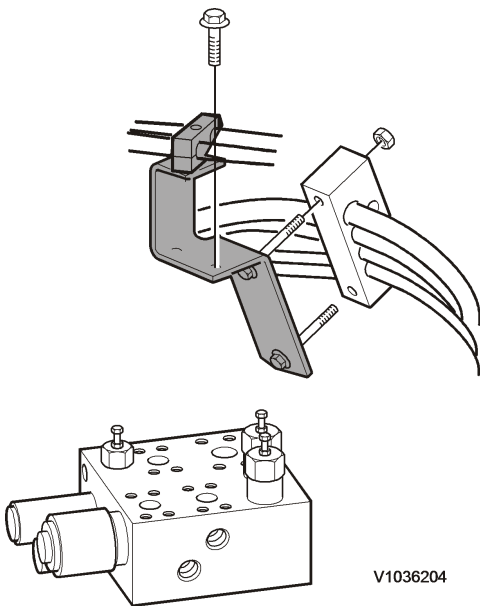


Figure 2
Hose bracket

Disconnect the hoses from the central valve.
Plug the hose ends and the connections on the central valve.

7. Remove the attaching bolts (3 pcs).
8. Remove the central valve.
Weight: **approx. 20 kg (44 lb)**

Installing

9. When replacing central valve, transfer nipples, checking points and sensors from the removed central valve to the new one.
10. Install the central valve (3 bolts).
Weight: **approx. 20 kg (44 lb)**
11. Connect the hoses to the central valve.
NOTE!
Do not forget to remove the plugs. Replace all O-rings.
12. Install the hose bracket.

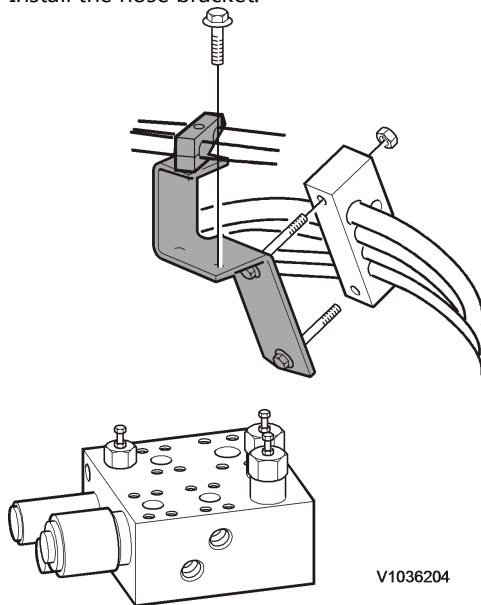


Figure 3

13. Connect the connectors to MA202 and MA502.
Join the connector halves for the cable harness to SE602.

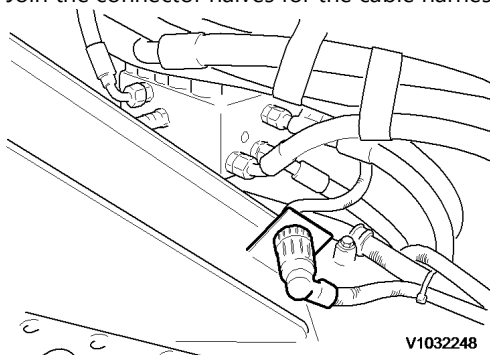


Figure 4
Connector for SE602

14. Fill the tank with hydraulic oil or remove the vacuum pump, see [911 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#).
Capacity: see [911 Hydraulic system, volume](#)

15. Start the engine and check that there are no leaks.

Bleed the hydraulic system, see [900 Hydraulic system, bleeding](#).

16. Carry out the following checks:

- [913 Hydraulic pump, checking and adjusting standby pressure](#)
- [645 Steering system, checking and adjusting working pressure](#)
- [263 Pump 3 \(P3\) standby pressure, checking and adjusting \(LS-line removed\)](#)
- [263 Pump 3 \(P3\) standby pressure, checking and adjusting \(LS-line removed\)](#)
- [263 Fan motor, checking working pressure](#)
- [520 Brake system, checking hydraulic function](#)
- [914 Servo pressure, checking and adjusting](#)
- [914 Servo pressure, checking and adjusting](#)
- [913 Hydraulic pump, checking and adjusting max working pressure](#)



Construction Equipment

Service Information

Document Title: Central valve, replacing	Function Group: 912	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Central valve, replacing

Op nbr 912-030

[14360000 Vacuum pump / 24V](#)

[9809685 Cable](#)

[11666019 Pressure gauge](#)

[11666020 Pressure gauge](#)

[11666020 Pressure gauge](#)

[11666051 Pressure gauge](#)

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[14290266 Hose](#)

[9993721 Service display](#)

[9993831 Support](#)

Metal plugs

935537 Elbow nipple

944521 Hose

943471 Hose clip

NOTE!

Earlier and later type checking points occur. Different tools are used, see tool list.

The operation also includes the required tools and the times for the following jobs:

- [911 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#)
- [900 Hydraulic system, bleeding](#)
- [913 Hydraulic pump, checking and adjusting standby pressure](#)
- [645 Steering system, checking and adjusting working pressure](#)
- [263 Pump 3 \(P3\) standby pressure, checking and adjusting \(LS-line removed\)](#)
- [263 Fan motor, checking working pressure](#)
- [520 Brake system, checking hydraulic function](#)
- [914 Servo pressure, checking and adjusting](#)
- [914 Servo pressure, checking and adjusting](#)
- [913 Hydraulic pump, checking and adjusting max working pressure](#)

Removing

1. Release the pressure in the hydraulic system by:

- turning the ignition key to position 1 (applies to machines equipped with 4th function)
- moving the servo control levers to and fro 10–15 times
- applying the brake 40–50 times

2. Draining the hydraulic oil as shown below or connecting the vacuum pump, see

[911 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump.](#)

3. Remove the side plate under the left rear mudguard.
Drain the oil from the hydraulic tank. The draining connection is the same as on the hose for draining engine oil supplied with the machine. Replace or extend the existing hose to approx. 3.5 metre (11.5 ft). Hose size 19 mm (3/4") inside diameter.

Capacity: **approx. 100–160 litre (26–43 US gal) depending on machine type.**

NOTE!

Approximately 50–70 litres (13–18 US gal) hydraulic oil remains in the tank. If the hydraulic oil is to be changed, also drain the oil from the right draining point. Capacity, see [911 Hydraulic system, volume](#)

4. Remove the side plate from the left side under the cab.
5. Disconnect the connectors for MA202 and MA502 from the central valve (positioned under the leading edge of the cab on the left side of the machine).
Part the connector halves for SE602.

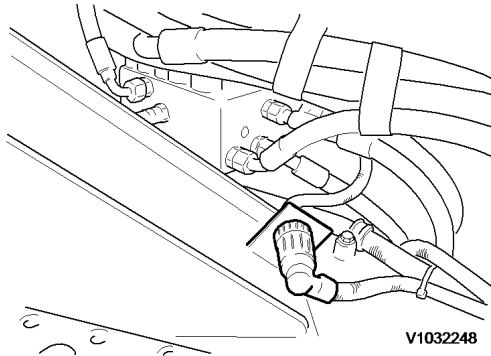


Figure 1
Connector for SE602

6. Mark the hoses to the central valve to facilitate installation.

NOTE!

To be able to disconnect the hose from the hydraulic pump (P2) to the central valve, the hose bracket for the hoses from the shift valve on the left steering cylinder and accumulator must be detached from the frame.

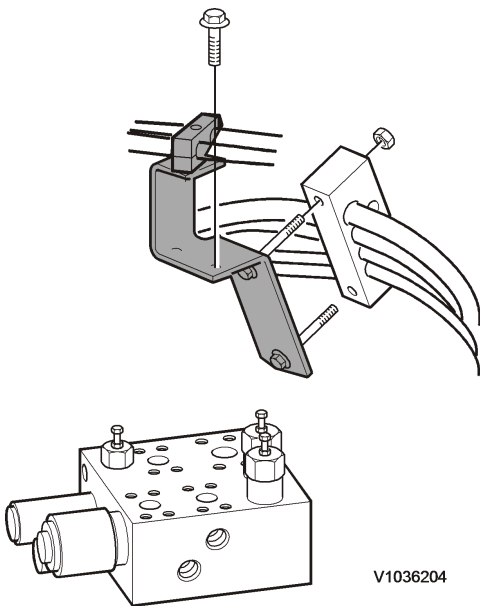


Figure 2
Hose bracket

Disconnect the hoses from the central valve.
Plug the hose ends and the connections on the central valve.

7. Remove the attaching bolts (3 pcs).
8. Remove the central valve.
Weight: **approx. 20 kg (44 lb)**

Installing

9. When replacing central valve, transfer nipples, checking points and sensors from the removed central valve to the new one.
10. Install the central valve (3 bolts).
Weight: **approx. 20 kg (44 lb)**
11. Connect the hoses to the central valve.
NOTE!
Do not forget to remove the plugs. Replace all O-rings.
12. Install the hose bracket.

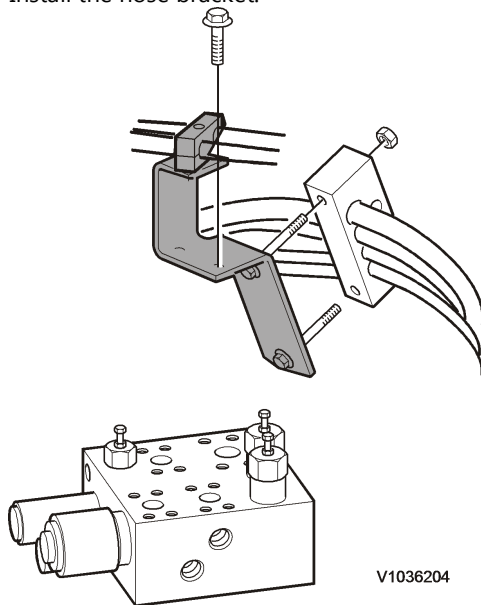


Figure 3

13. Connect the connectors to MA202 and MA502.
Join the connector halves for the cable harness to SE602.

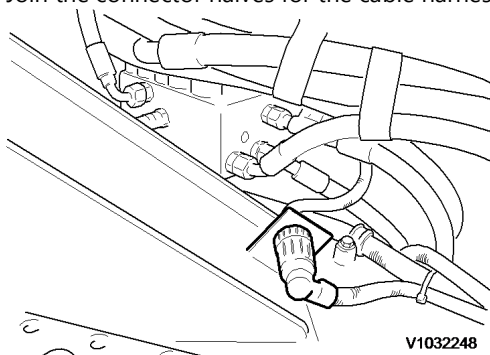


Figure 4
Connector for SE602

14. Fill the tank with hydraulic oil or remove the vacuum pump, see [911 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#).
Capacity: see [911 Hydraulic system, volume](#)

15. Start the engine and check that there are no leaks.

Bleed the hydraulic system, see [900 Hydraulic system, bleeding](#).

16. Carry out the following checks:

- [913 Hydraulic pump, checking and adjusting standby pressure](#)
- [645 Steering system, checking and adjusting working pressure](#)
- [263 Pump 3 \(P3\) standby pressure, checking and adjusting \(LS-line removed\)](#)
- [263 Pump 3 \(P3\) standby pressure, checking and adjusting \(LS-line removed\)](#)
- [263 Fan motor, checking working pressure](#)
- [520 Brake system, checking hydraulic function](#)
- [914 Servo pressure, checking and adjusting](#)
- [914 Servo pressure, checking and adjusting](#)
- [913 Hydraulic pump, checking and adjusting max working pressure](#)

Document Title: Central valve, reconditioning (removed)	Function Group: 912	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Central valve, reconditioning (removed)

Op nbr

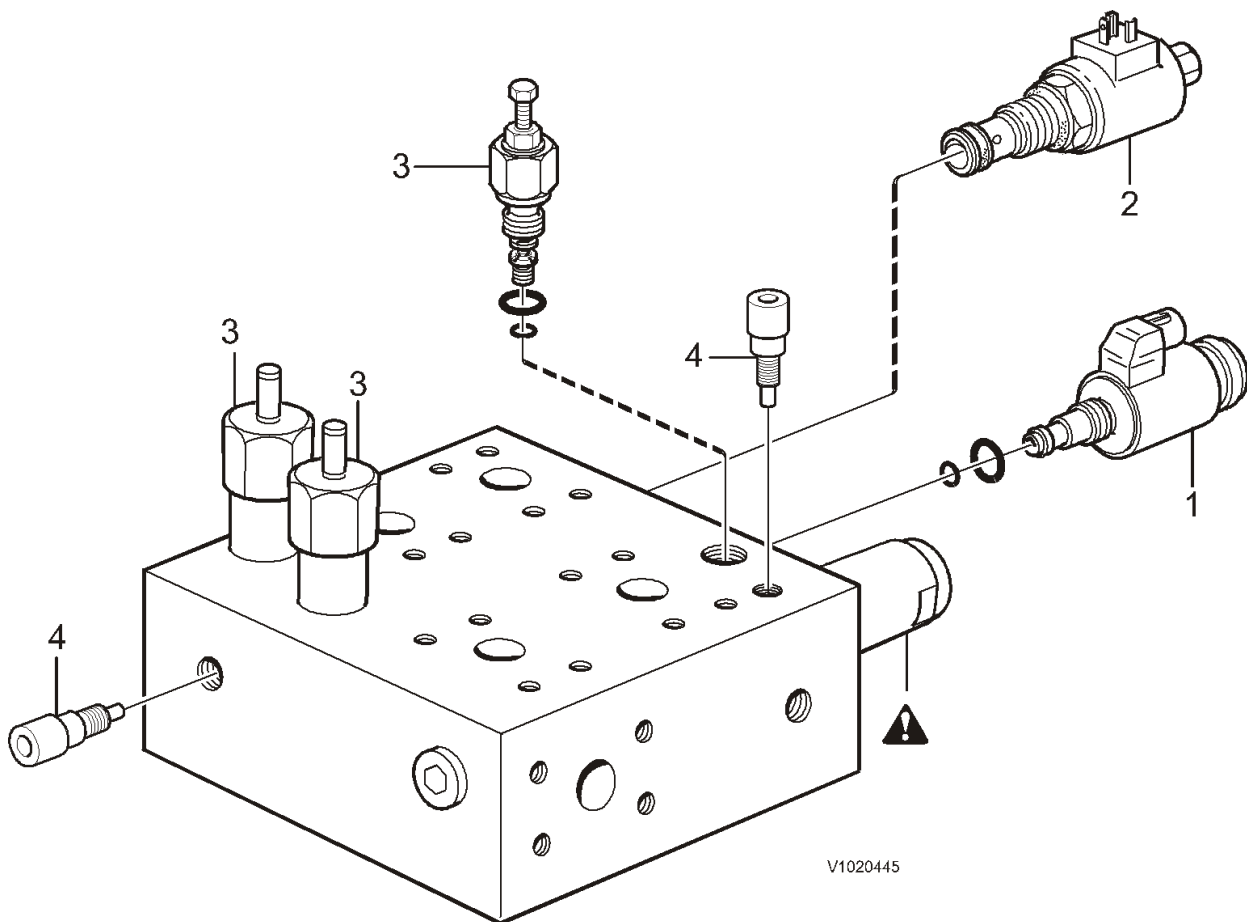


Figure 1
Central valve

1. Proportional valve
2. Brake charging valve
3. Pressure-limiting valve
4. Shuttle valve



WARNING

Spring tension.

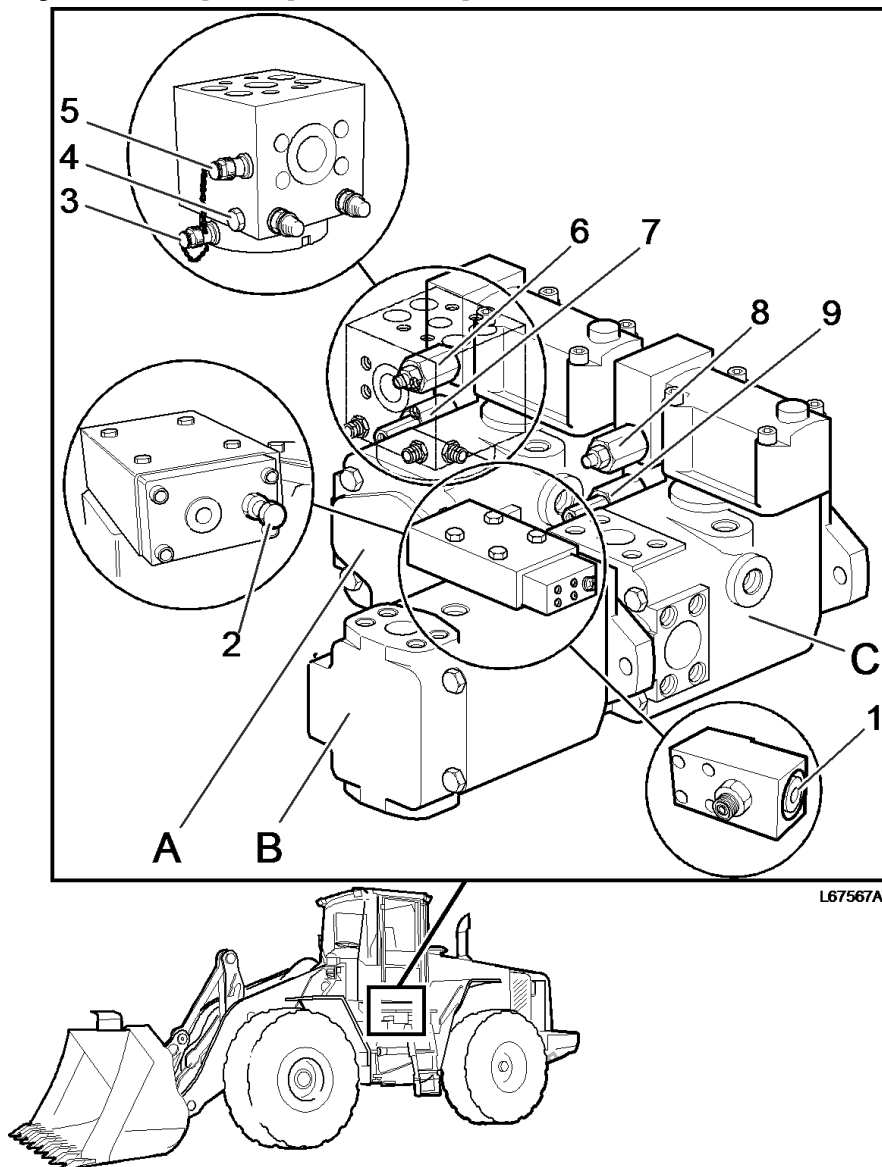
The priority valve is not to be removed.

1. Mark the parts to facilitate assembling.

2. Remove the proportional valve by first removing the black plastic nut and lifting away the solenoid and then unscrewing the valve.
3. Remove the brake charging valve by first removing the black plastic nut and lifting away the solenoid and then unscrewing the valve.
4. Unscrew the three pressure-limiting valves.
5. Unscrew the two shuttle valves.
6. Check all parts as regards wear or other damage. Replace any damaged parts.
7. Install the shuttle valves.
8. Install the pressure-limiting valves.
9. Install the brake charging valve and the proportional valve.

Document Title: Hydraulic description	Function Group: pumps, 913	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic pumps, description



L67567A

Figure 1

A	Pump 1 (P1)	4	Checking point, LS (load-sensing pressure)
B	Pump 3 (P3)	5	Checking point, P2 (Can be found on checking panel, later type)
C	Pump 2 (P2)	6	Pressure compensator, P1
1	Flow compensator, P3	7	Flow compensator, P1
2	Pressure compensator, P3	8	Pressure compensator, P2

3	Checking point, P1 (Can be found on checking panel, later type)	9	Flow compensator, P2
---	---	---	----------------------

P1 is located on the right side of the transmission and delivers oil to the servo system, brake system and working hydraulics.
P2 is located on the left side of the transmission and delivers oil to the brakes, steering (prioritised), servo system and working hydraulics.
Pump 3 (P3) for cooling fan and brake charging is connected in series with pump 2 (P2).

Document Title: Compensator block, description	Function Group: 913	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Compensator block, description

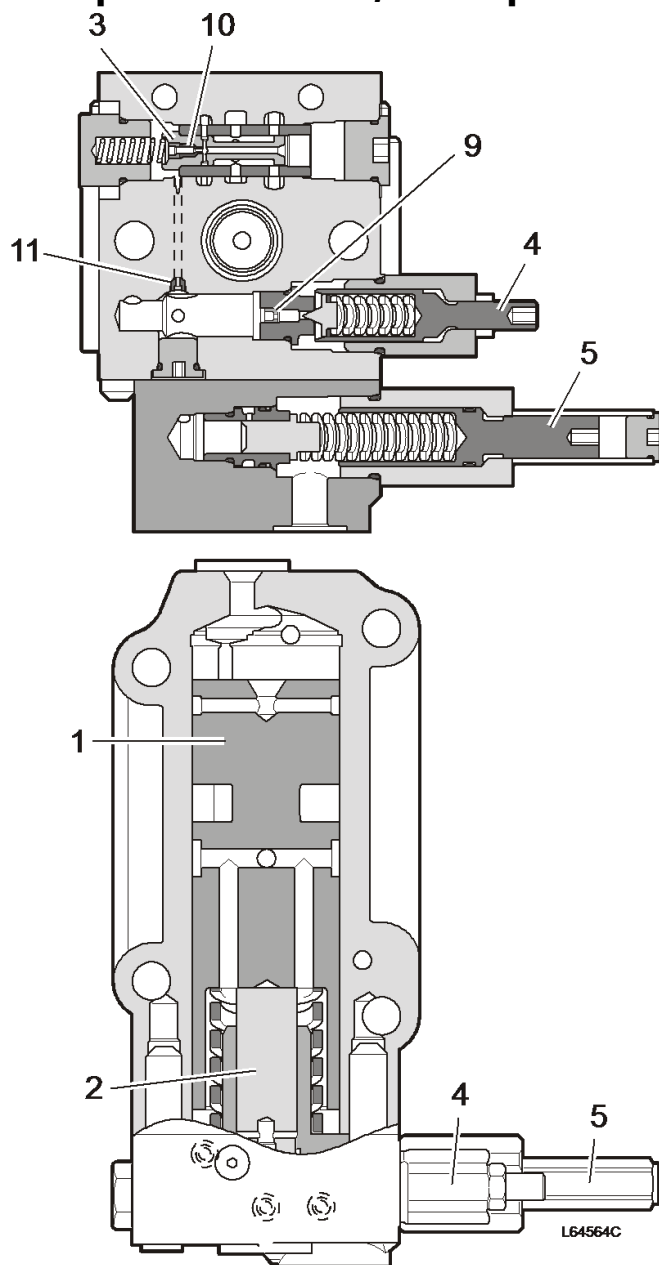


Figure 1
Compensator block, sectional view

- 1 Control piston
- 2 Balancing piston
- 3 Control spool
- 4 Pressure compensator

- 5 Flow compensator
- 9 Restriction
- 10 Restriction
- 11 Restriction

Pressure compensator

The purpose of the pressure compensator is to limit the maximum pressure from the respective pumps via the control piston and the spring.

Flow compensator

The purpose of the flow compensator on the respective pumps is always to control the pump via the control piston and the spring so that it supplies an oil flow. The pressure drop of the oil flow in the system corresponds to a set pressure difference (the force of the spring in the flow compensator) between the outlet on the pump and the load-sensing port (LS) on the flow compensator.

This pressure difference constitutes the stand-by pressure of the pumps in neutral position.

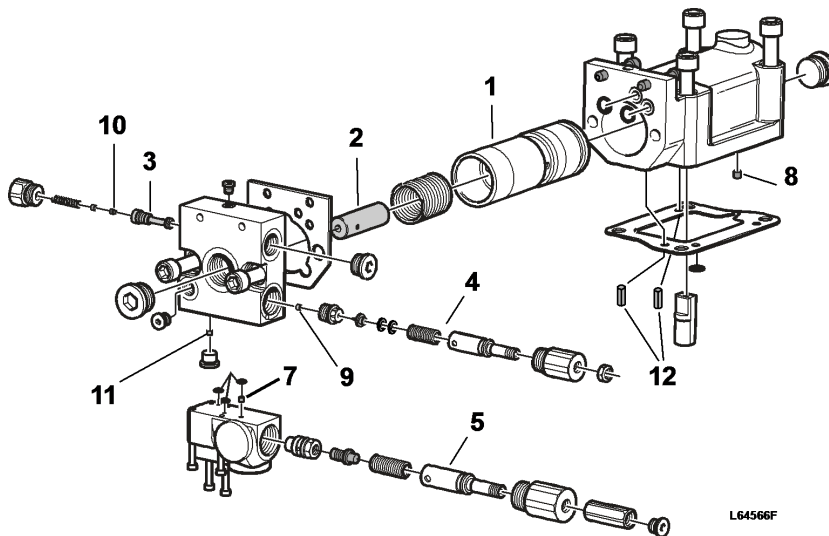
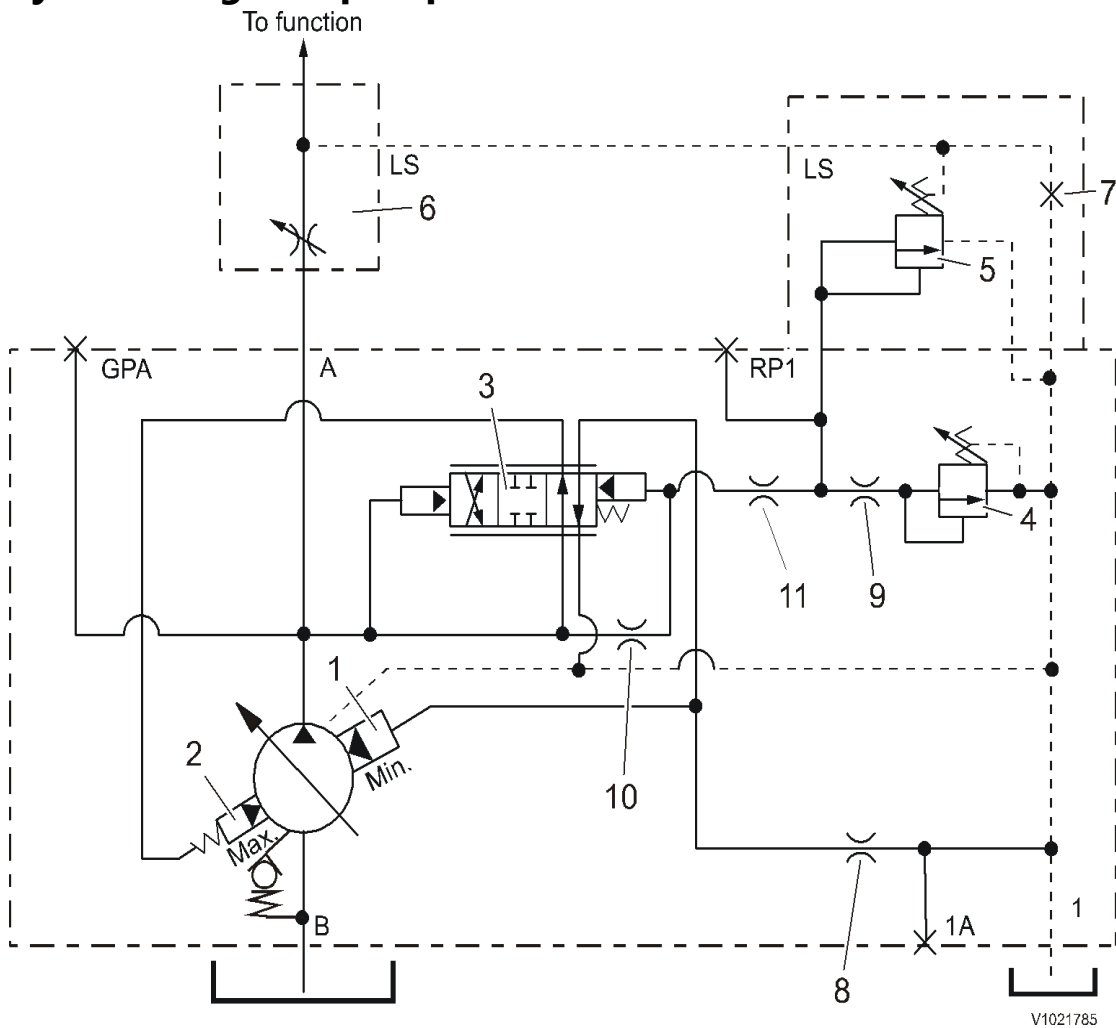


Figure 2
Regulator block

- | | | | |
|---|----------------------|----|-------------|
| 1 | Control piston | 8A | Restriction |
| 2 | Balancing piston | 9 | Restriction |
| 3 | Control spool | 10 | Restriction |
| 4 | Pressure compensator | 11 | Restriction |
| 5 | Flow compensator | 12 | Spring pin |
| 7 | Plug | | |

Document Title: Symbol diagram, pump control	Function Group: 913	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Symbol diagram, pump control



V1021785

Figure 1
Symbol diagram, pump control

- 1 Control piston
- 2 Balancing piston
- 3 Control spool
- 4 Pressure compensator
- 5 Flow compensator
- 6 Control valve
- 7 Plug
- 8 Restriction (Pump 1)
- 9 Restriction
- 10 Restriction

- 11 Restriction
- 12 Spring pin

Document Title: Pump 1 (P1) and Pump 2 (P2), principle diagram	Function Group: 913	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Pump 1 (P1) and Pump 2 (P2), principle diagram

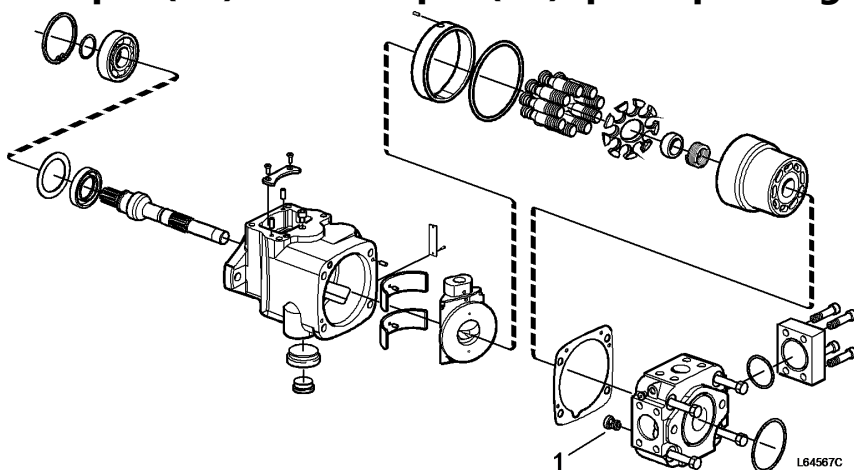


Figure 1

Pump 1 (P1) and Pump 2 (P2), principle diagram

1. Non-return valve for draining pump housing

Document Title: Lifting time, checking	Function Group: 913	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Lifting time, checking

Op nbr 913-034

The engine, transmission and hydraulic system should have reached normal working temperature (hydraulic oil temperature $\geq 60^{\circ}\text{C}$ (140 °F)) before checking.

1. Warm up the machine until engine, transmission and hydraulic system have reached normal working temperature.
2. Secure the frame joint with the frame joint lock. Place chocks in front of and behind the wheels.

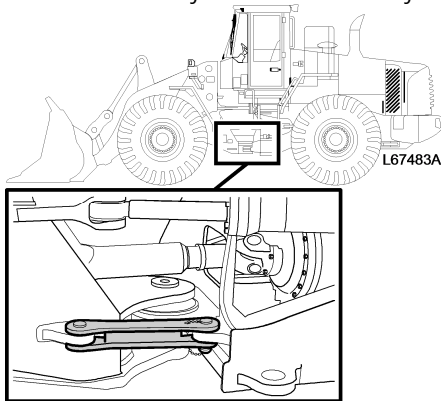


Figure 1

3. Use the boom kick-out to reduce the strain on the lifting arm system by adjusting the sensor (SE902) to stop the lifting movement just before mechanical stop.

NOTE!

The lifting arms must, from full speed, stop before mechanical end position.

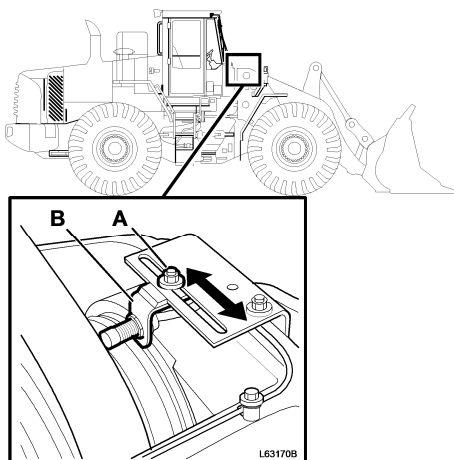


Figure 2

- A. Lock nut
- B. SE902

4. Activate the boom kick-out function.
5. Check lifting times at an engine speed of **1900 rpm** (approx. 1950 rpm before lifting movement has begun) and with empty bucket flat against the ground as the initial position.
The lifting time should be between **6 and 7 seconds**.
6. If the engine does not manage to maintain the speed, its performance is most likely reduced.
If the lifting time is longer at maintained speed, continue the trouble-shooting according to [913 Hydraulic pump, checking and adjusting standby pressure](#).

NOTE!

For machines equipped with power limitation, a long lifting time may to a certain extent depend on that the measured atmospheric pressure has caused the available hydraulic power to be limited.

Document Title: Hydraulic pump, checking and adjusting standby pressure	Function Group: 913	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic pump, checking and adjusting standby pressure

Op nbr 913-003

[14290266 Hose](#)

[11666052 Pressure gauge](#)

[11666037 Hose](#)

[11666019 Pressure gauge](#)

NOTE!

Earlier and later type checking points occur. Different tools are used, see tool list.

Indications of a faulty stand-by pressure include "nervous hydraulics" (pump imbalance) or long lifting times.

The engine, transmission and hydraulic system should have reached normal working temperature (hydraulic oil temperature 60 °C (140 °F)) before checking.

1. Secure the frame joint with the frame joint lock. Place chocks in front of and behind the wheels.

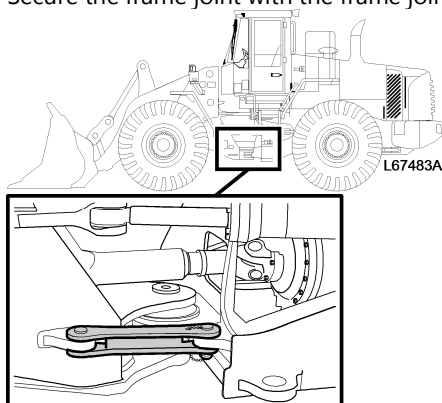


Figure 1

Checking

2. Connect the pressure gauge to the respective checking points for pump 1 (P1) and pump 2 (P2).

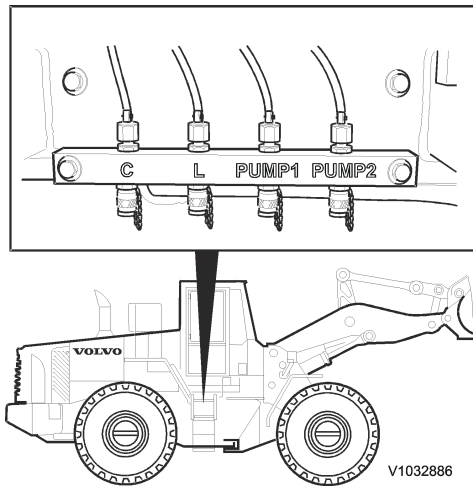


Figure 2
Later type

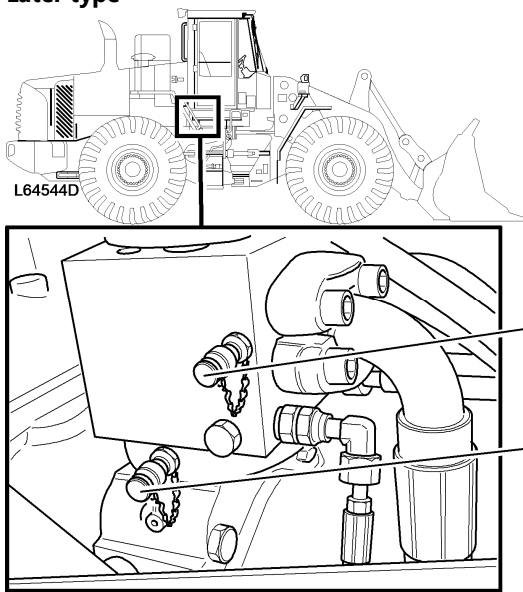


Figure 3
Earlier type

1. Checking point, P1
2. Checking point, P2

3. Start the engine and run it at low idling speed. Read the stand-by pressure for each pump.
Stand-by pressure, see [913 Pump 1 \(P1\) Working hydraulics, brake and servo system, specifications](#),
[913 Pump 1 \(P1\) Working hydraulics, brake and servo system, specifications](#) respectively
[913 Pump 2 \(P2\) Steering and other hydraulics, specifications](#).

NOTICE

None of the hydraulic functions must be actuated.

NOTE!

The stand-by pressure for P1 must be somewhat lower than for P2 in order to produce a reliable P2 stand-by pressure reading.

In cases where the stand-by pressure for P1 is higher than that for P2, the stand-by pressure for P1 will be read off on both pressure gauges.

NOTE!

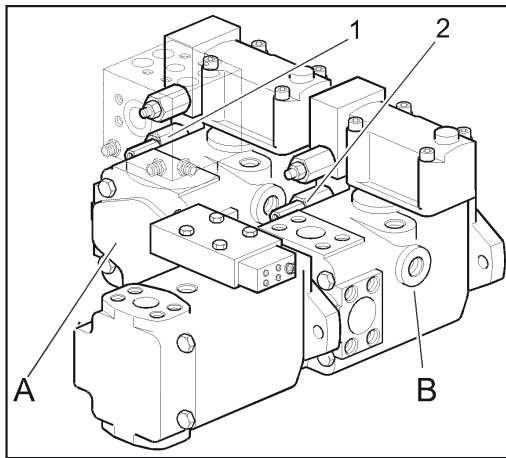
Flow compensator adjustment should be carried out with the engine off.

Adjustment

4. Adjust the respective flow compensators on the pumps until the correct stand-by pressure is obtained from P1 and P2.

Access to the P2 flow compensator is gained by removing the cab floor.

Access to the P1 flow compensator is gained by removing the side plate under the cab on the right side of the machine.



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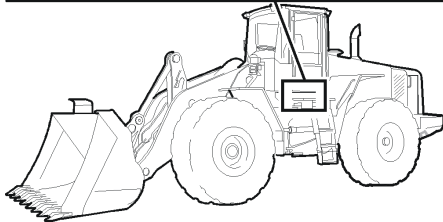


Figure 4

- A. P1
- B. P2

- 1. Flow compensator P1
- 2. Flow compensator P2

5. If it is not sufficient to adjust the stand-by pressure in order to obtain correct lifting time, check the pressure again, with the LS-line removed, see [913 Hydraulic pump, checking and adjusting stand-by pressure \(LS-line removed\)](#).

Document Title: Hydraulic pump, checking and adjusting stand-by pressure (LS-line removed)	Function Group: 913	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic pump, checking and adjusting stand-by pressure (LS-line removed)

Op nbr 913-033

[14290266 Hose](#)

[11666052 Pressure gauge](#)

[11666037 Hose](#)

[11666019 Pressure gauge](#)

Part no. 935756 Plug

NOTE!

Earlier and later type checking points occur. Different tools are used, see tool list.

Indications of a faulty stand-by pressure include "nervous hydraulics" (pump imbalance) or long lifting times.

The engine, transmission and hydraulic system should have reached normal working temperature (hydraulic oil temperature 60 °C (140 °F)) before checking.

1. Secure the frame joint with the frame joint lock. Place chocks in front of and behind the wheels.

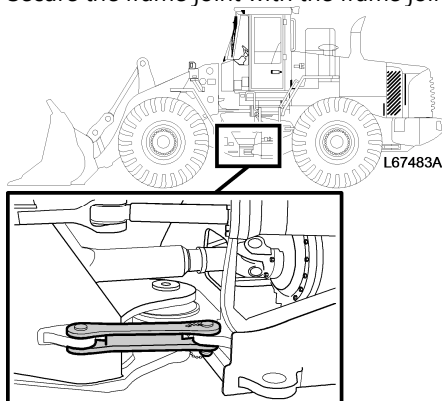


Figure 1

2. Detach the LS line from the LSP port on the central valve. (This is done so that LS pressure from the steering valve and control valve do not affect the reading)

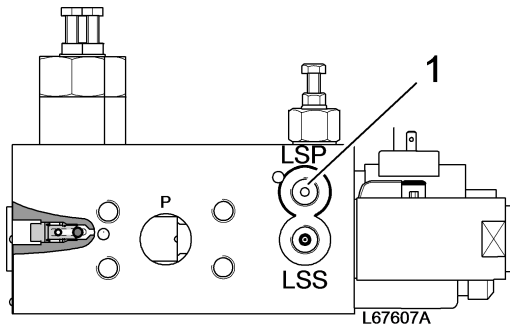


Figure 2

1. Port LSP, to be plugged
3. There is no need to plug the LS-line. Position a vessel under the LS-line to take care of any waste oil.
4. Plug the connection in the central valve with the plug.
5. Connect the pressure gauge to the respective checking points for pump 1 (P1) and pump 2 (P2).

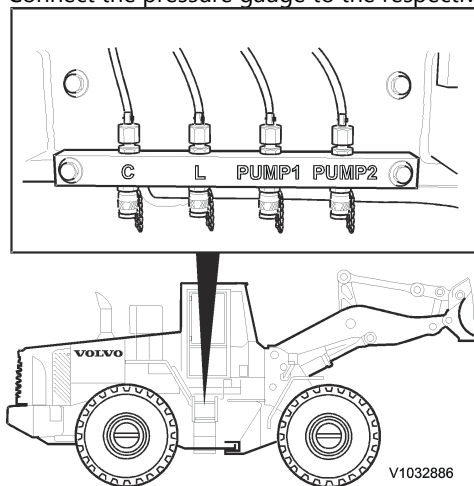


Figure 3
Later type

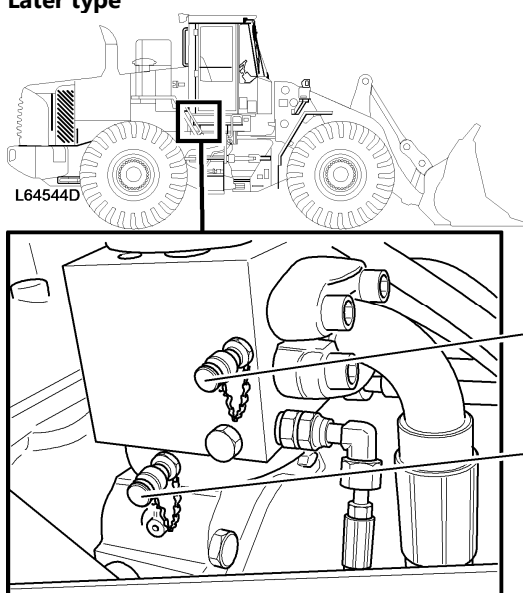


Figure 4
Earlier type

1. Checking point, P1
 2. Checking point, P2
6. Start the engine and run it at low idling speed. Read off the stand-by pressure for each pump.
Stand-by pressure, see [913 Pump 1 \(P1\) Working hydraulics, brake and servo system, specifications](#),
[913 Pump 1 \(P1\) Working hydraulics, brake and servo system, specifications](#) respectively
[913 Pump 2 \(P2\) Steering and other hydraulics, specifications](#).

NOTICE

None of the hydraulic functions must be actuated.

NOTE!

The stand-by pressure for P1 must be somewhat lower than for P2 in order to produce a reliable P2 stand-by pressure reading.

In cases where the stand-by pressure for P1 is higher than that for P2, the stand-by pressure for P1 will be read off on both pressure gauges.

NOTE!

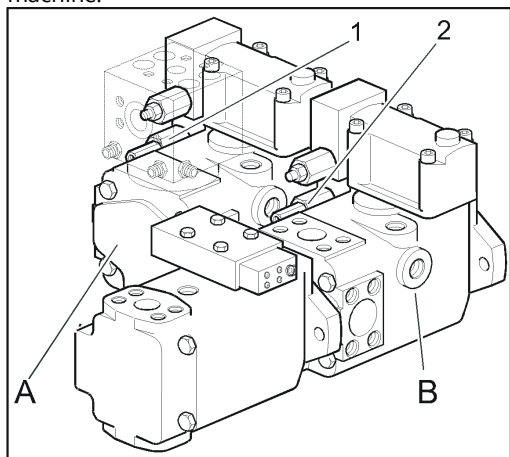
Flow compensator adjustment should be carried out with the engine turned off.

Adjusting

7. Adjust the respective flow compensators on the pumps until the correct stand-by pressure is obtained from P1 and P2.

Access to the P2 flow compensator is gained by removing the cab floor.

Access to the P1 flow compensator is gained by removing the side plate under the cab on the right side of the machine.



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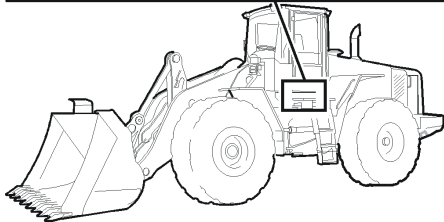


Figure 5

- | | |
|----|---------------------|
| A. | P1 |
| B. | P2 |
| | |
| 1. | Flow compensator P1 |
| 2. | Flow compensator P2 |

Document Title: Hydraulic pump, checking and adjusting max working pressure	Function Group: 913	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic pump, checking and adjusting max working pressure

Pump 1, pump 2

Op nbr 913-004

[11666051 Pressure gauge](#)

[14290266 Hose](#)

[14290266 Hose](#)

[14290262 Adapter](#)

[14290262 Adapter](#)

NOTE!

Earlier and later type checking points occur. For checking points of earlier type, use adapter.

The engine, transmission and hydraulic system should have reached normal working temperature (hydraulic oil temperature $\geq 60^{\circ}\text{C}$ (140°F)) before checking.

Checking

1. Secure the frame joint with the frame joint lock. Place chocks in front of and behind the wheels.

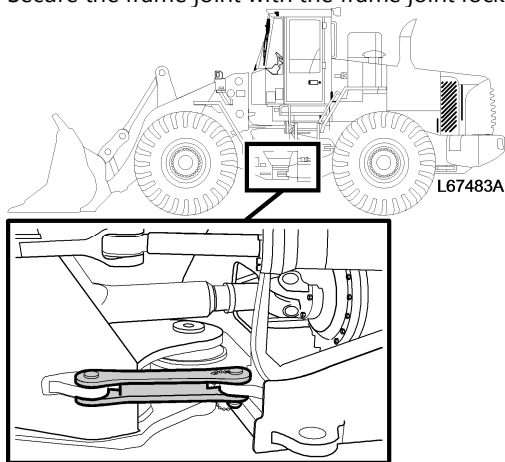


Figure 1

2. Connect the pressure gauge to the respective checking points for pump 1 (P1) and pump 2 (P2).

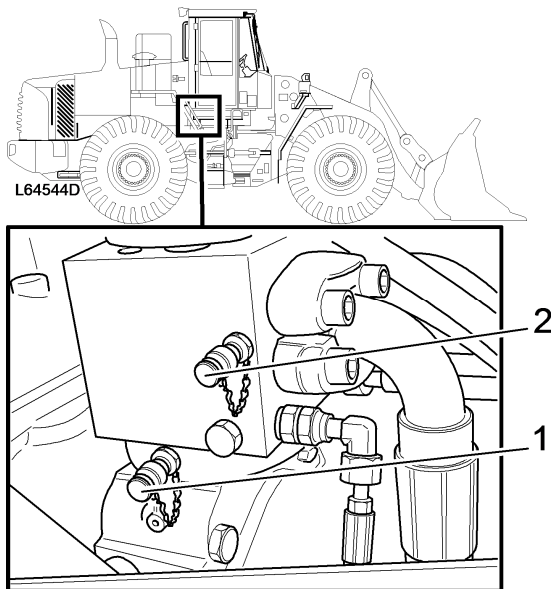


Figure 2
Earlier type

1. Checking point, P1
2. Checking point, P2

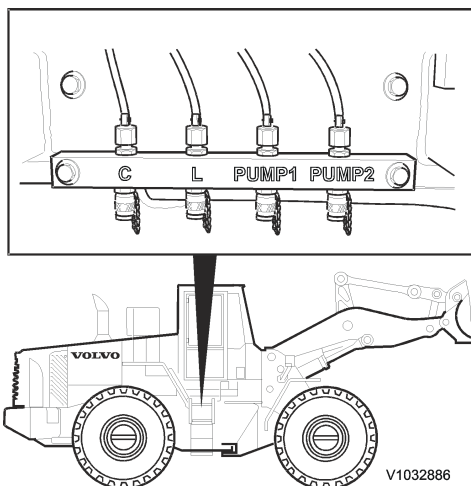


Figure 3
Later type

3. Start the engine and run it at low idling speed. Lower the lifting arms slowly towards stop. Read off the working pressure for the respective pumps.
Working pressure, see [913 Pump 1 \(P1\) Working hydraulics, brake and servo system, specifications](#),
[913 Pump 1 \(P1\) Working hydraulics, brake and servo system, specifications](#) respectively
[913 Pump 2 \(P2\) Steering and other hydraulics, specifications](#).

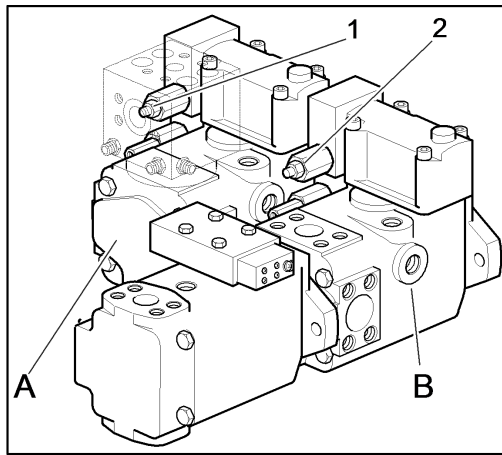
NOTE!

The lever must not pass the sensing position during lowering. If this occurs, the floating position will be activated.

NOTE!

For machines equipped with power limitation, too low pressure may to a certain extent depend on that the measured atmospheric pressure has caused the available hydraulic power to be limited.

4. Release the lever and shut off the engine.
5. Maximum pressure is adjusted on the pressure compensator for each pump.



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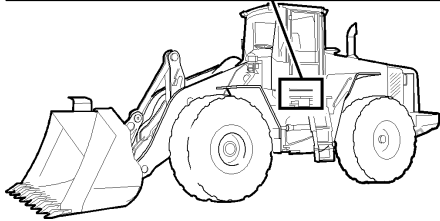


Figure 4

- A. P1
- B. P2

- 1. Pressure compensator, P1
- 2. Pressure compensator, P2

NOTE!

For machines equipped with power limitation it is important to check that correct atmospheric pressure has been measured before the pump is adjusted. Check according to 28407-8 (VCADS Pro).



Construction Equipment

Service Information

Document Title: Hydraulic pump P1, replacing	Function Group: 913	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic pump P1, replacing

Op nbr 913-037

[11666051 Pressure gauge](#)[11666052 Pressure gauge](#)[14290266 Hose](#)[11666003 Pressure gauge](#)[11666019 Pressure gauge](#)[11666037 Hose](#)

Ratchet block, 750 kg (1650 lb)

Sling 6 m (20 ft)

Sling 2 m (6.5 ft)

Sling 1 m (3 ft)

935537 Elbow nipple

944521 Hose

943471 Hose clip

NOTE!

Earlier and later type checking points occur. Various tools are used, see tool list.

The operation also includes the required tools and the times for the following jobs:

- [900 Hydraulic system, bleeding](#)
 - [913 Hydraulic pump, checking and adjusting standby pressure](#)
 - [913 Hydraulic pump, checking and adjusting max working pressure](#)
1. Place the machine in the service position according to [191 Safety rules when servicing](#)

Removing

2. Remove the seat, the seat bracket, the floor mat and rear floor plate from the cab. Seat weight: **approx. 60 kg (132 lb)**
3. Remove the side plates under the rear mudguards. Drain the oil from the hydraulic tank using both draining points. The draining connections are the same as on the hose for draining engine oil supplied with the machine. Extend the existing hose or replace it with a hose approximately 3.5 m (11.5 ft) in length in order to reach the collecting vessel. Hose size 19 mm (3/4") inside diameter. Capacity, hydraulic tank, see [911 Hydraulic system, volume](#). If one suspects that the hydraulic system is contaminated, remove the return oil filter and inspect the hydraulic tank. Clean when necessary.
4. Plug all hoses and pump connections as the connections are exposed.

Disconnect the pressure and return hoses from P1.
Disconnect the leak-off oil hose and the LS-hoses.

5. Connect a sling over the cab roof and connect a ratchet block.

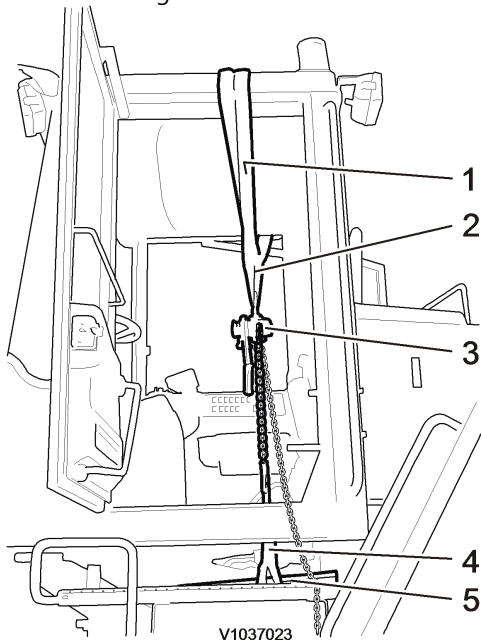


Figure 1

1. Sling 6 m (20 ft)
2. Sling 1 m (3 ft)
3. Ratchet block 750 kg (1650 lb)
4. Sling, 2 m (6.6 ft)
5. Hydraulic pump

6. Remove the two attaching bolts between pump and transmission. A cut-off socket may be suitable.
7. Place a sling around the pump and connect to the ratchet block.

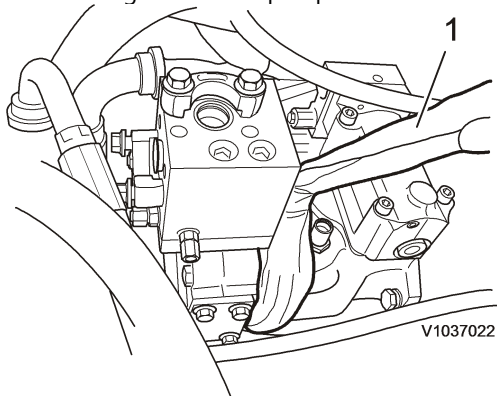


Figure 2

1. Sling 2 m (6.5 ft), Ratchet block 750 kg (1653 lb)
8. Lift the pump up through the cab floor. Make sure that the intermediate shaft is not damaged.
Pump weight: **approx. 80 kg (176 lb)**
9. Check the splines on the shaft with regard to damage and wear.

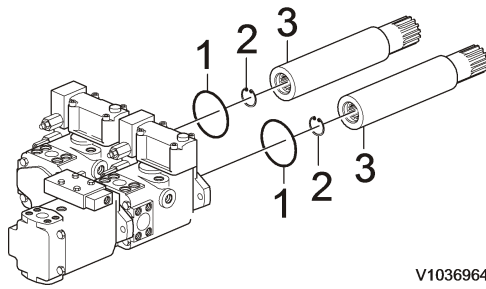


Figure 3

1. O-ring
2. Lock ring
3. Axle

Installing

10. Install a new O-ring on the flange on the pump.
11. Install the pump on the transmission making sure that the splines engage the splines on the intermediate shaft.
Pump weight: **approx. 80 kg (176 lb)**
12. Install the attaching bolts.
Tightening torque: **275 ±45 Nm (204 ±33 lbf ft)**
13. Remove the lifting equipment.
14. Connect the LS-hoses, the suction and pressure hoses and the leak-off oil hose to the pump.

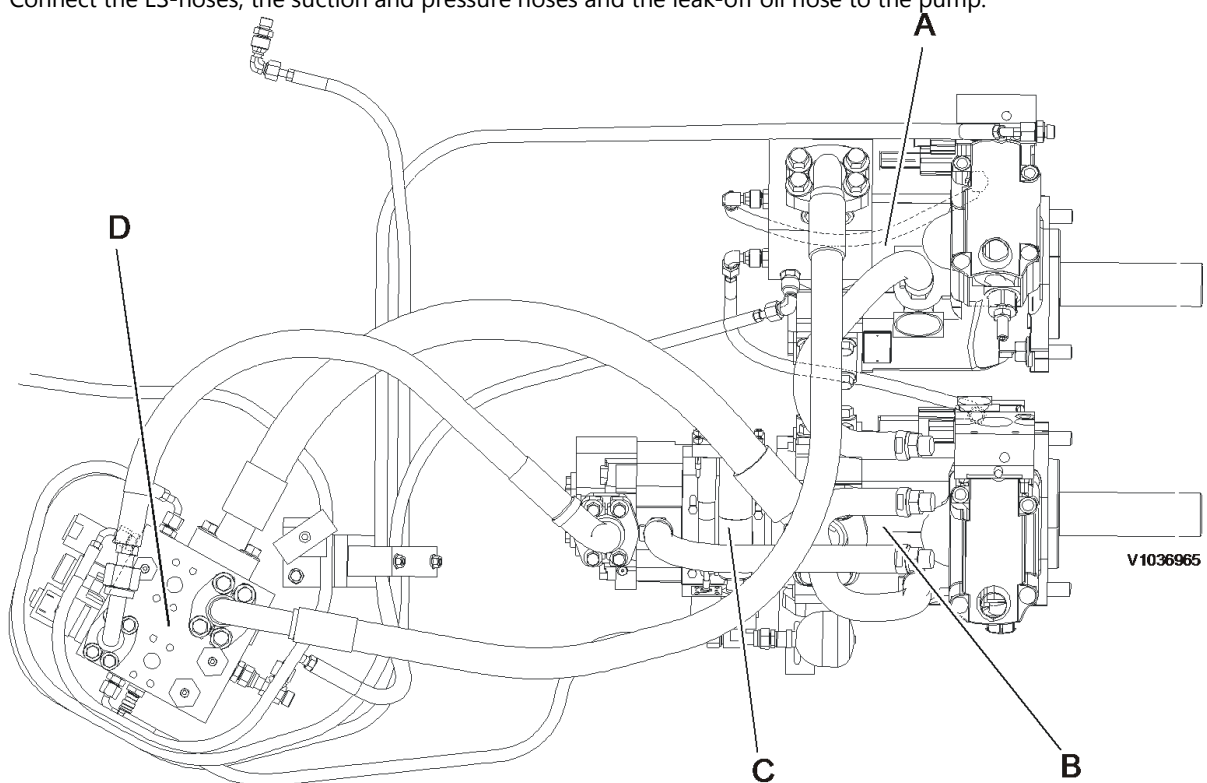


Figure 4

- A. Pump 1
- B. Pump 2
- C. Pump 3

D. Central valve

15. Fill with hydraulic oil.

Capacity: see [911 Hydraulic system, volume](#)

16. Start the engine and check that there are no leaks.

Bleed the hydraulic system according to steps 1—7, 9, 10 and 14—16, see [900 Hydraulic system, bleeding](#)

17. Install the side plates under the rear mudguards, the floor plate, the floor mat, the seat bracket and the seat. Seat weight: **approx. 60 kg (132 lb)**

18. Operate the machine until warm and carry out the following checks:
[913 Hydraulic pump, checking and adjusting standby pressure](#)
[913 Hydraulic pump, checking and adjusting max working pressure](#) and



Construction Equipment

Service Information

Document Title: Hydraulic pump P1, replacing	Function Group: 913	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic pump P1, replacing

Op nbr 913-037

[11666051 Pressure gauge](#)[11666052 Pressure gauge](#)[14290266 Hose](#)[11666003 Pressure gauge](#)[11666019 Pressure gauge](#)[11666037 Hose](#)

Ratchet block, 750 kg (1650 lb)

Sling 6 m (20 ft)

Sling 2 m (6.5 ft)

Sling 1 m (3 ft)

935537 Elbow nipple

944521 Hose

943471 Hose clip

NOTE!

Earlier and later type checking points occur. Various tools are used, see tool list.

The operation also includes the required tools and the times for the following jobs:

- [900 Hydraulic system, bleeding](#)
 - [913 Hydraulic pump, checking and adjusting standby pressure](#)
 - [913 Hydraulic pump, checking and adjusting max working pressure](#)
1. Place the machine in the service position according to [191 Safety rules when servicing](#)

Removing

2. Remove the seat, the seat bracket, the floor mat and rear floor plate from the cab. Seat weight: **approx. 60 kg (132 lb)**
3. Remove the side plates under the rear mudguards. Drain the oil from the hydraulic tank using both draining points. The draining connections are the same as on the hose for draining engine oil supplied with the machine. Extend the existing hose or replace it with a hose approximately 3.5 m (11.5 ft) in length in order to reach the collecting vessel. Hose size 19 mm (3/4") inside diameter. Capacity, hydraulic tank, see [911 Hydraulic system, volume](#). If one suspects that the hydraulic system is contaminated, remove the return oil filter and inspect the hydraulic tank. Clean when necessary.
4. Plug all hoses and pump connections as the connections are exposed.

Disconnect the pressure and return hoses from P1.
Disconnect the leak-off oil hose and the LS-hoses.

5. Connect a sling over the cab roof and connect a ratchet block.

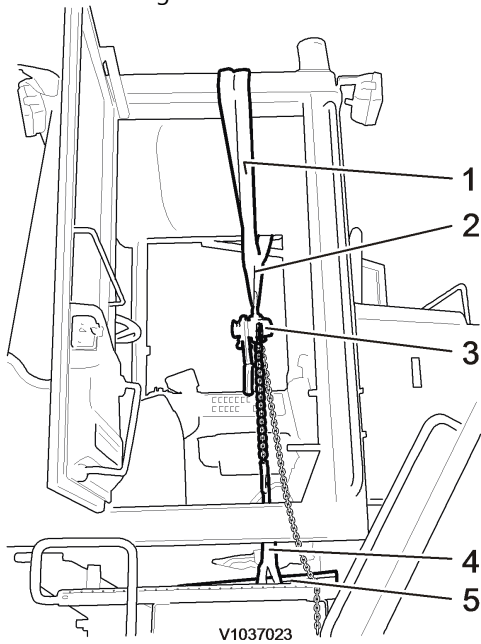


Figure 1

1. Sling 6 m (20 ft)
2. Sling 1 m (3 ft)
3. Ratchet block 750 kg (1650 lb)
4. Sling, 2 m (6.6 ft)
5. Hydraulic pump

6. Remove the two attaching bolts between pump and transmission. A cut-off socket may be suitable.
7. Place a sling around the pump and connect to the ratchet block.

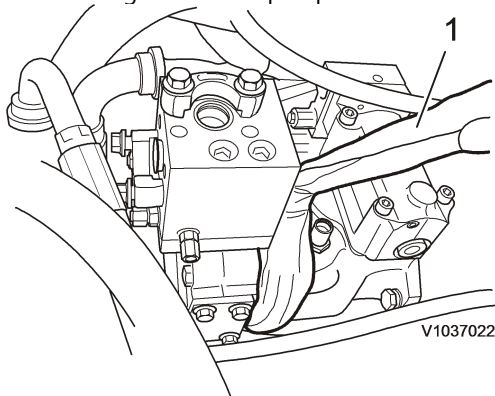


Figure 2

1. Sling 2 m (6.5 ft), Ratchet block 750 kg (1653 lb)
8. Lift the pump up through the cab floor. Make sure that the intermediate shaft is not damaged.
Pump weight: **approx. 80 kg (176 lb)**
9. Check the splines on the shaft with regard to damage and wear.

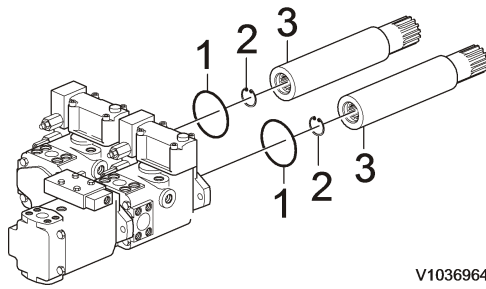


Figure 3

- 1. O-ring
- 2. Lock ring
- 3. Axle

Installing

- 10. Install a new O-ring on the flange on the pump.
- 11. Install the pump on the transmission making sure that the splines engage the splines on the intermediate shaft.
Pump weight: **approx. 80 kg (176 lb)**
- 12. Install the attaching bolts.
Tightening torque: **275 ±45 Nm (204 ±33 lbf ft)**
- 13. Remove the lifting equipment.
- 14. Connect the LS-hoses, the suction and pressure hoses and the leak-off oil hose to the pump.

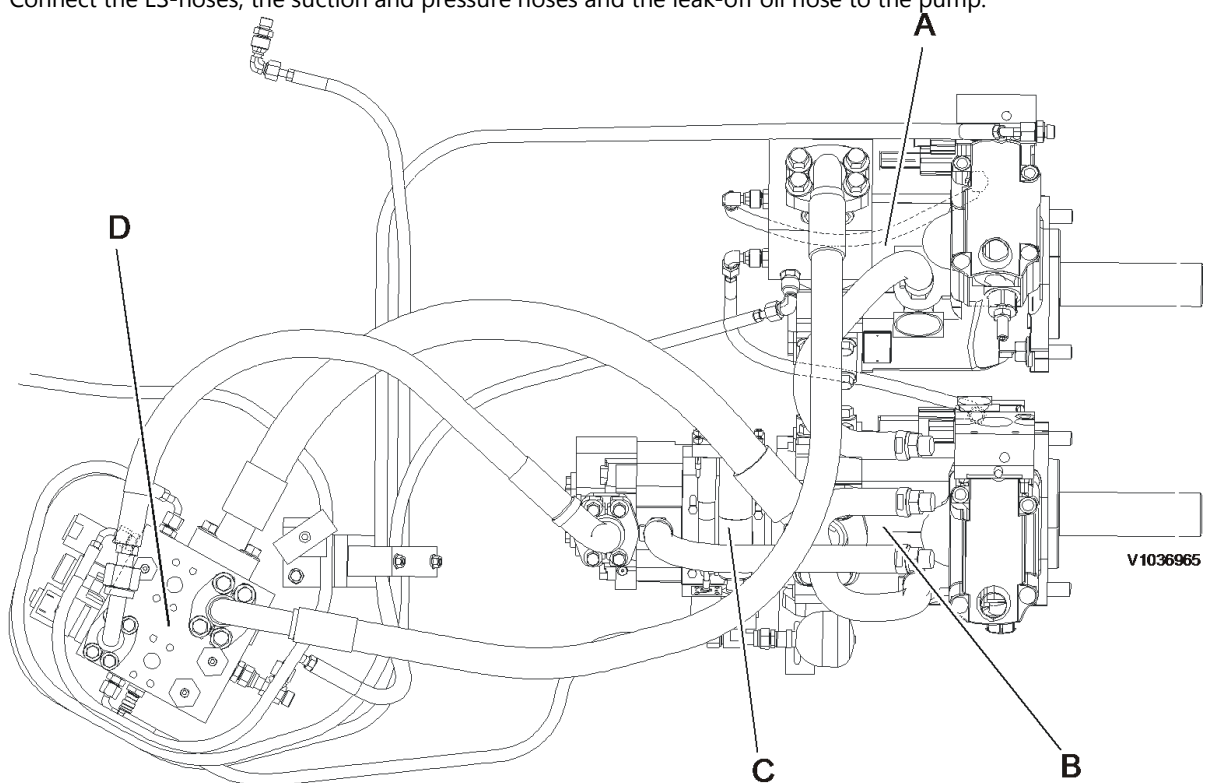


Figure 4

- A. Pump 1
- B. Pump 2
- C. Pump 3

D. Central valve

15. Fill with hydraulic oil.

Capacity: see [911 Hydraulic system, volume](#)

16. Start the engine and check that there are no leaks.

Bleed the hydraulic system according to steps 1—7, 9, 10 and 14—16, see [900 Hydraulic system, bleeding](#)

17. Install the side plates under the rear mudguards, the floor plate, the floor mat, the seat bracket and the seat. Seat weight: **approx. 60 kg (132 lb)**

18. Operate the machine until warm and carry out the following checks:
[913 Hydraulic pump, checking and adjusting standby pressure](#)
[913 Hydraulic pump, checking and adjusting max working pressure](#) and



Construction Equipment

Service Information

Document Title: Hydraulic pumps P2 and P3, replacing	Function Group: 913	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic pumps P2 and P3, replacing

Op nbr 913-040

[11666052 Pressure gauge](#)[14290266 Hose](#)[11666020 Pressure gauge](#)[11666037 Hose](#)[9993721 Service display](#)

Ratchet block, 750 kg (1650 lb)

Sling 6 m (20 ft)

Sling 2 m (6 ft)

Sling 1 m (3 ft)

935537 Elbow nipple

944521 Hose

943471 Hose clip

NOTE!

Earlier and later type checking points occur. Various tools are used, see tool list.

The operation also includes the required tools and the times for the following jobs:

- [900 Hydraulic system, bleeding](#)
- [913 Hydraulic pump, checking and adjusting standby pressure](#)
- [913 Hydraulic pump, checking and adjusting max working pressure](#)
- [263 Pump 3 \(P3\) standby pressure, checking and adjusting \(LS-line removed\)](#)
- [263 Fan motor, checking working pressure](#)

1. Place the machine in the service position according to [191 Safety rules when servicing](#)

Removing

2. Remove the seat, the seat bracket, the floor mat and the rear floor plate from the cab. Seat weight: **approx. 60 kg (132 lb)**
3. Drain the oil from the hydraulic tank using both draining points. The draining connections are the same as on the hose for draining engine oil supplied with the machine. Extend the existing hose or replace it with a hose approximately 3.5 m (11.5 ft) in length in order to reach the collecting vessel. Hose size 19 mm (3/4") inside diameter. Capacity, hydraulic tank, see [911 Hydraulic system, volume](#) If one suspects that the hydraulic system has become contaminated, remove the return oil filter and inspect the hydraulic tank. Clean when necessary.
4. Plug all hoses and pump connections as the connections are exposed.

Disconnect the leak-off oil hose, the pressure hose and the return hose from P3.
Disconnect the pressure hose from P1.
Disconnect the pressure hose, the leak-off oil hose and the suction hose from P2.
Disconnect the LS-hoses from P2 and P3.

5. Connect a sling over the cab roof and connect a ratchet block.

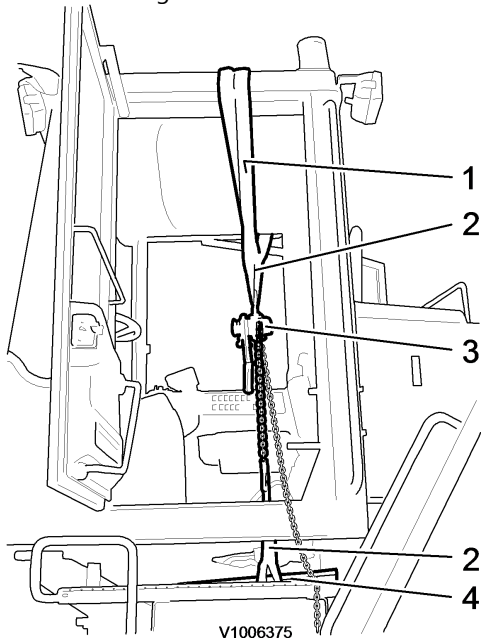


Figure 1

1. Sling 6 m (20 ft)
2. Sling 1 m (3 ft)
3. Ratchet block 750 kg (1650 lb)
4. Hydraulic pump

6. Disconnect the LS-hose from P3. Remove the bolt for the accumulator bracket and move the bracket to one side.

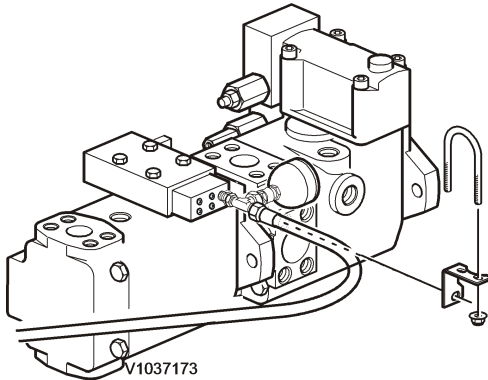


Figure 2

7. Remove the two attaching bolts between pumps and transmission.

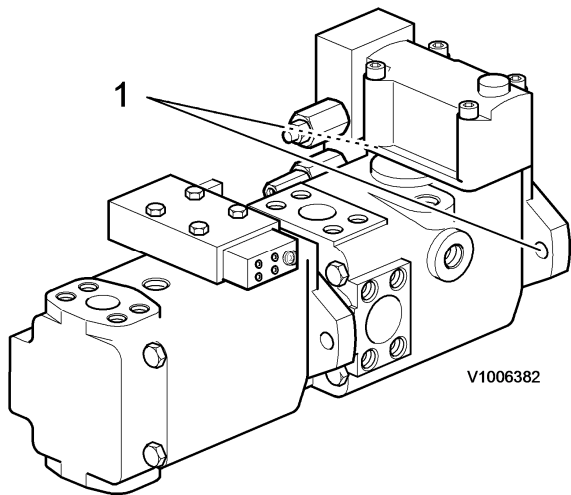


Figure 3

1. Attaching bolts

8. Place a sling around the pumps and connect to the ratchet block.

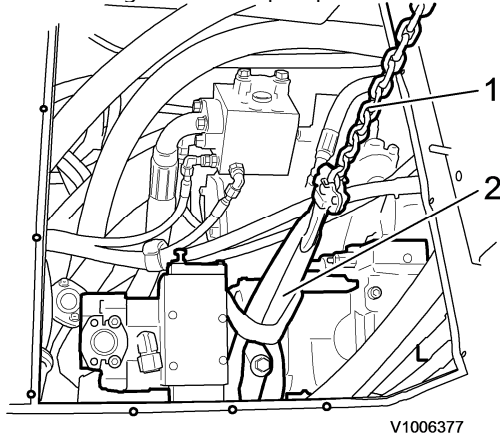


Figure 4
Lifting pumps

1. Ratchet block 750 kg (1650 lb)
2. Sling 1 m (3 ft)

9. Lift the pumps with the ratchet block up through the cab floor. Make sure that the intermediate shaft remains in the transmission. Weight of pumps: **100 kg (220 lb)**
10. Check the splines on the intermediate shaft with regard to damage and wear.

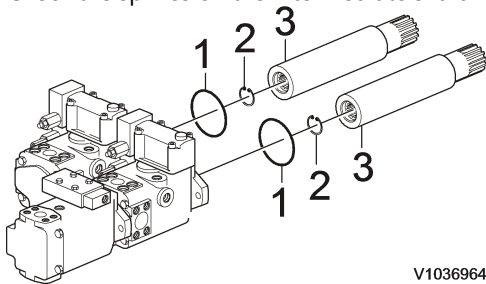


Figure 5

1. O-ring
2. Lock ring

3. Intermediate shaft

Installing

11. Install a new O-ring on the flange on the pump.
12. Install the pumps on the transmission turning the splines to engage the splines on the intermediate shaft.
13. Install the attaching bolts.
Tightening torque: **275 ±45 Nm (204 ±33 lbf ft)**

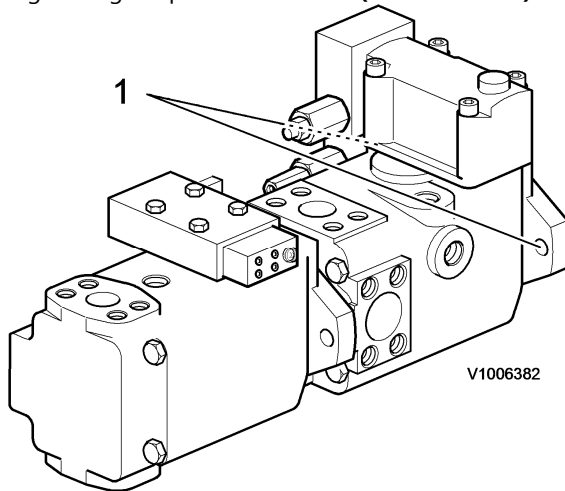


Figure 6

1. Attaching bolts
14. Remove the lifting equipment.
15. Connect the LS-hoses and the suction, pressure and leak-off oil hoses to the pumps.
Install the accumulator bracket.

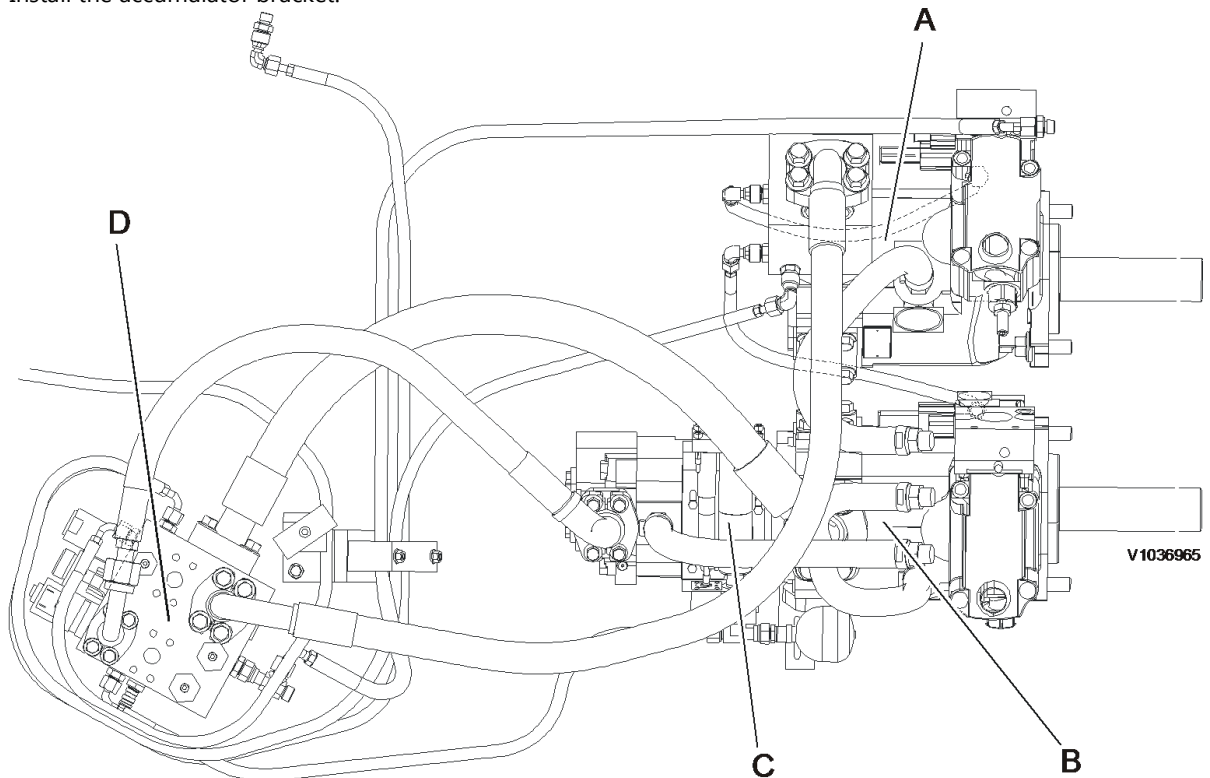


Figure 7

- A. Pump 1
- B. Pump 2
- C. Pump 3
- D. Central valve

16. Fill with hydraulic oil. Capacity, see [911 Hydraulic system, volume](#).
17. Start the engine and check that there are no leaks.
Bleed the hydraulic system according to [900 Hydraulic system, bleeding](#)
18. Install the floor plate, the floor mat, the seat bracket and the seat. Seat weight: **approx. 60 kg (132 lb)**
19. Operate the machine until warm and check the hydraulic pressures. For adjusting, see
[913 Hydraulic pump, checking and adjusting standby pressure](#),
[913 Hydraulic pump, checking and adjusting max working pressure](#),
[263 Pump 3 \(P3\) standby pressure, checking and adjusting \(LS-line removed\)](#) and
[263 Fan motor, checking working pressure](#).



Construction Equipment

Service Information

Document Title: Hydraulic pump P3, replacing	Function Group: 913	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic pump P3, replacing

Op nbr 913-039

[11666052 Pressure gauge](#)

[14290266 Hose](#)

[11666020 Pressure gauge](#)

[11666037 Hose](#)

[9993721 Service display](#)

Ratchet block, 750 kg (1650 lb)

Sling 6 m (20 ft)

Sling 2 m (6 ft)

Sling 1 m (3 ft)

NOTE!

Earlier and later type checking points occur. Various tools are used, see tool list.

The operation also includes tools and the times for the following jobs:

- [520 Brake system, bleeding](#)
- [263 Pump 3 \(P3\) standby pressure, checking and adjusting \(LS-line removed\)](#)
- [263 Fan motor, checking working pressure](#)

1. Place the machine in the service position according to [191 Safety rules when servicing](#)

Removing

2. Remove the seat, the seat bracket, the floor mat and the rear floor plate from the cab. Seat weight: **approx. 60 kg (132 lb)**
3. Remove the side plates under the rear mudguards.
Drain the oil from the hydraulic tank using both draining points. The draining connections are the same as on the hose for draining engine oil supplied with the machine. Extend the existing hose or replace it with a hose approximately 3.5 m (11.5 ft) in length in order to reach the collecting vessel. Hose size 19 mm (3/4") inside diameter. Capacity, hydraulic tank, see [911 Hydraulic system, volume](#)
Remove the return oil filter and inspect the hydraulic tank. Clean when necessary.
4. Plug all hoses and pump connections as the connections are exposed.
Disconnect the pressure hose and the return hose from P3.
5. Connect a sling over the cab roof and connect a ratchet block.

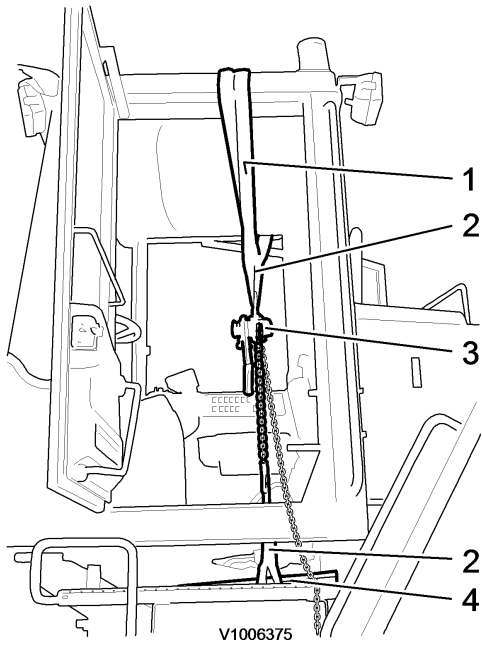


Figure 1

1. Sling 6 m (20 ft)
 2. Sling 1 m (3 ft)
 3. Ratchet block 750 kg (1650 lb)
 4. Hydraulic pump
6. Remove the two attaching bolts from pump. Disconnect the LS-hose from the pump. Remove the attaching bolt for the accumulator bracket and move the bracket to one side.

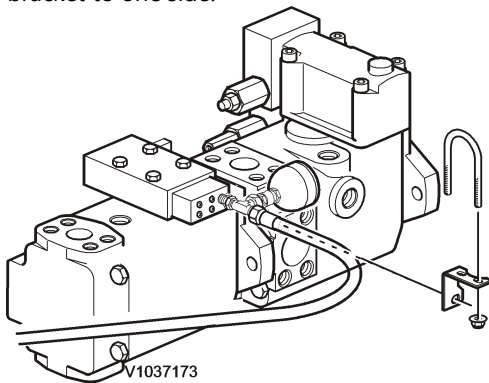


Figure 2

7. Place a sling around the pump and connect to the ratchet block.

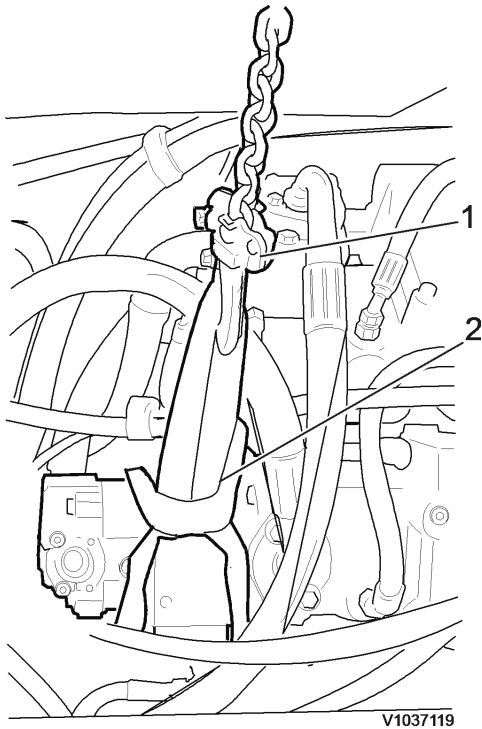


Figure 3

1. Ratchet block 750 kg (1650 lb)
 2. Sling 1 m (3 ft)
8. Lift the pump up through the cab floor. Pump weight: **approx. 40 kg (220 lb)**
 9. Check the intermediate shaft as regards damage and wear.

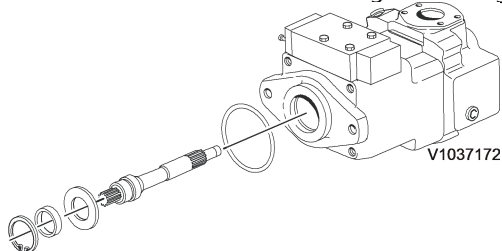


Figure 4
Pump 3 with parts

Installing

10. Install a new O-ring on the flange on the pump.
11. Install the pump. Install the attaching bolts.
12. Remove the lifting equipment.
13. Connect the LS-hose and the suction and pressure hoses to the pump.
Install the accumulator bracket.

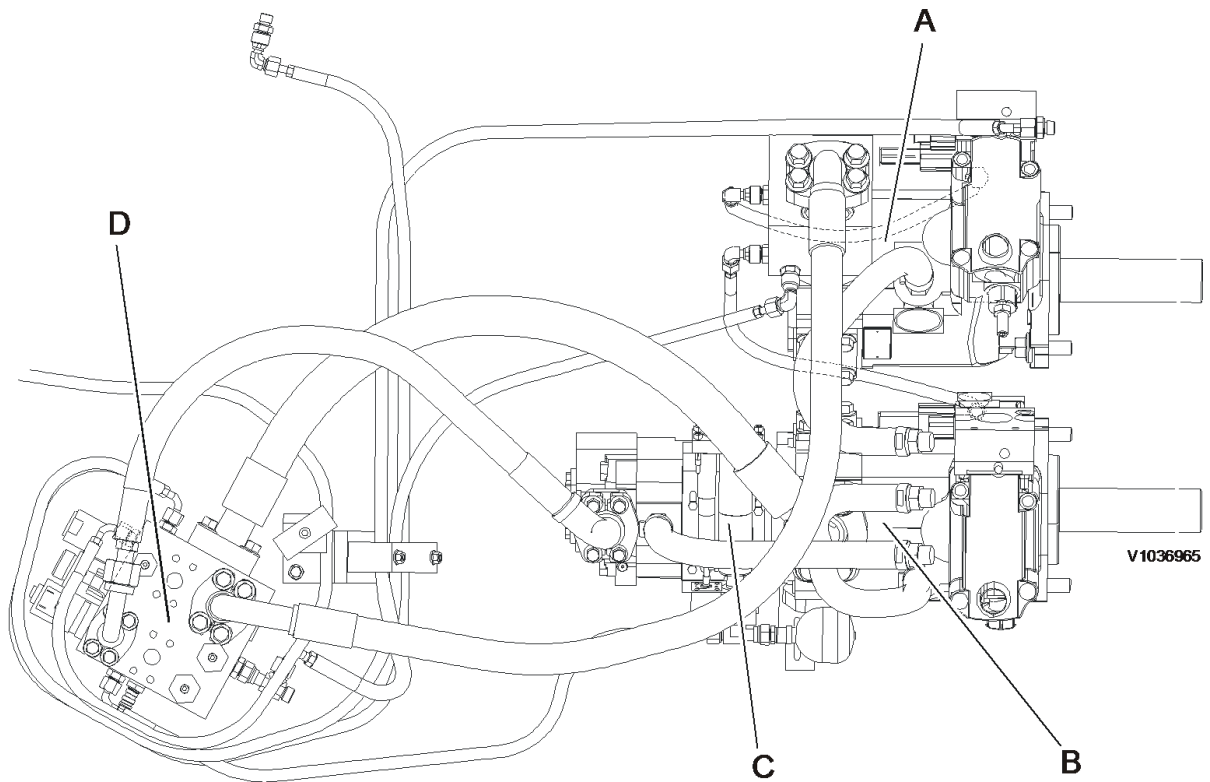


Figure 5

- A. Pump 1
- B. Pump 2
- C. Pump 3
- D. Central valve

14. Fill with hydraulic oil.
Capacity: see [911 Hydraulic system, volume](#)
15. Start the engine and check that there are no leaks.
Bleed the brake system according to [520 Brake system, bleeding](#)
16. Install the floor plate, the floor mat, the seat bracket and the seat. Seat weight: **approx. 60 kg (132 lb)**
17. Fill with hydraulic oil. Capacity, see [911 Hydraulic system, volume](#).
18. Run the machine until warm and carry out the following checks:
[263 Pump 3 \(P3\) standby pressure, checking and adjusting \(LS-line removed\)](#),
[263 Fan motor, checking working pressure](#)



Construction Equipment

Service Information

Document Title: Hydraulic pump P3, replacing	Function Group: 913	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic pump P3, replacing

Op nbr 913-039

[11666052 Pressure gauge](#)

[14290266 Hose](#)

[11666020 Pressure gauge](#)

[11666037 Hose](#)

[9993721 Service display](#)

Ratchet block, 750 kg (1650 lb)

Sling 6 m (20 ft)

Sling 2 m (6 ft)

Sling 1 m (3 ft)

NOTE!

Earlier and later type checking points occur. Various tools are used, see tool list.

The operation also includes tools and the times for the following jobs:

- [520 Brake system, bleeding](#)
- [263 Pump 3 \(P3\) standby pressure, checking and adjusting \(LS-line removed\)](#)
- [263 Fan motor, checking working pressure](#)

1. Place the machine in the service position according to [191 Safety rules when servicing](#)

Removing

2. Remove the seat, the seat bracket, the floor mat and the rear floor plate from the cab. Seat weight: **approx. 60 kg (132 lb)**
3. Remove the side plates under the rear mudguards.
Drain the oil from the hydraulic tank using both draining points. The draining connections are the same as on the hose for draining engine oil supplied with the machine. Extend the existing hose or replace it with a hose approximately 3.5 m (11.5 ft) in length in order to reach the collecting vessel. Hose size 19 mm (3/4") inside diameter. Capacity, hydraulic tank, see [911 Hydraulic system, volume](#)
Remove the return oil filter and inspect the hydraulic tank. Clean when necessary.
4. Plug all hoses and pump connections as the connections are exposed.
Disconnect the pressure hose and the return hose from P3.
5. Connect a sling over the cab roof and connect a ratchet block.

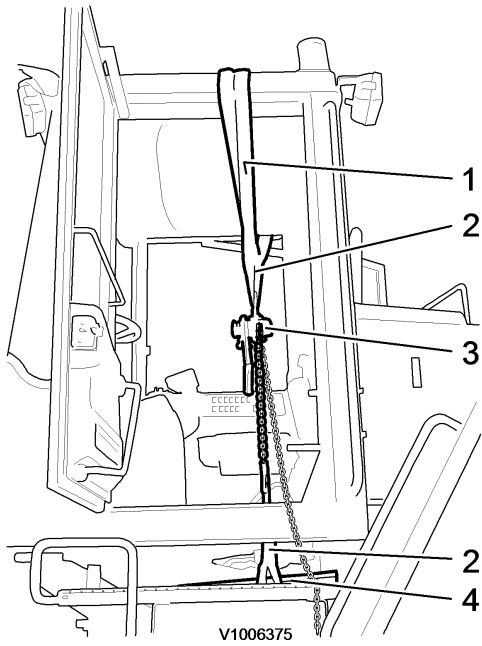


Figure 1

1. Sling 6 m (20 ft)
 2. Sling 1 m (3 ft)
 3. Ratchet block 750 kg (1650 lb)
 4. Hydraulic pump
6. Remove the two attaching bolts from pump. Disconnect the LS-hose from the pump. Remove the attaching bolt for the accumulator bracket and move the bracket to one side.

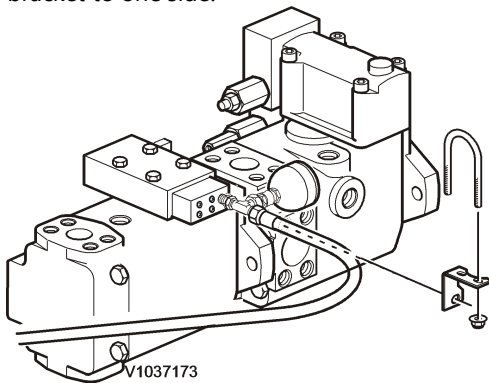


Figure 2

7. Place a sling around the pump and connect to the ratchet block.

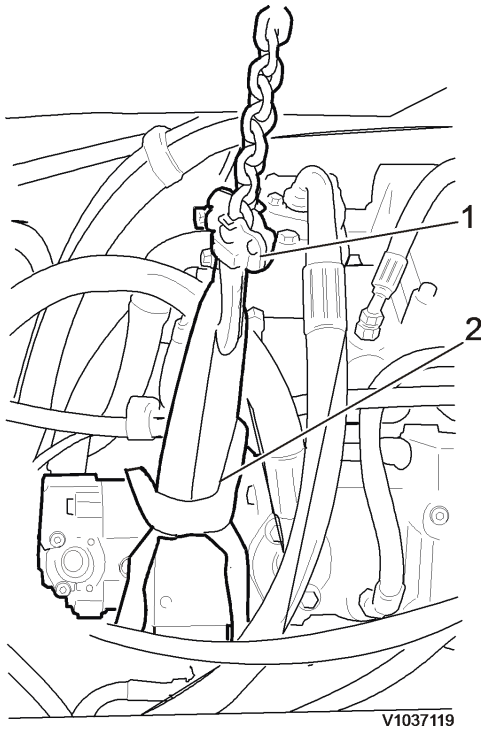


Figure 3

1. Ratchet block 750 kg (1650 lb)
 2. Sling 1 m (3 ft)
8. Lift the pump up through the cab floor. Pump weight: **approx. 40 kg (220 lb)**
 9. Check the intermediate shaft as regards damage and wear.

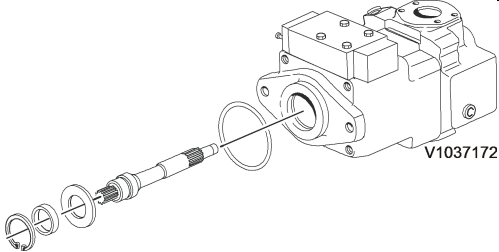


Figure 4
Pump 3 with parts

Installing

10. Install a new O-ring on the flange on the pump.
11. Install the pump. Install the attaching bolts.
12. Remove the lifting equipment.
13. Connect the LS-hose and the suction and pressure hoses to the pump.
Install the accumulator bracket.

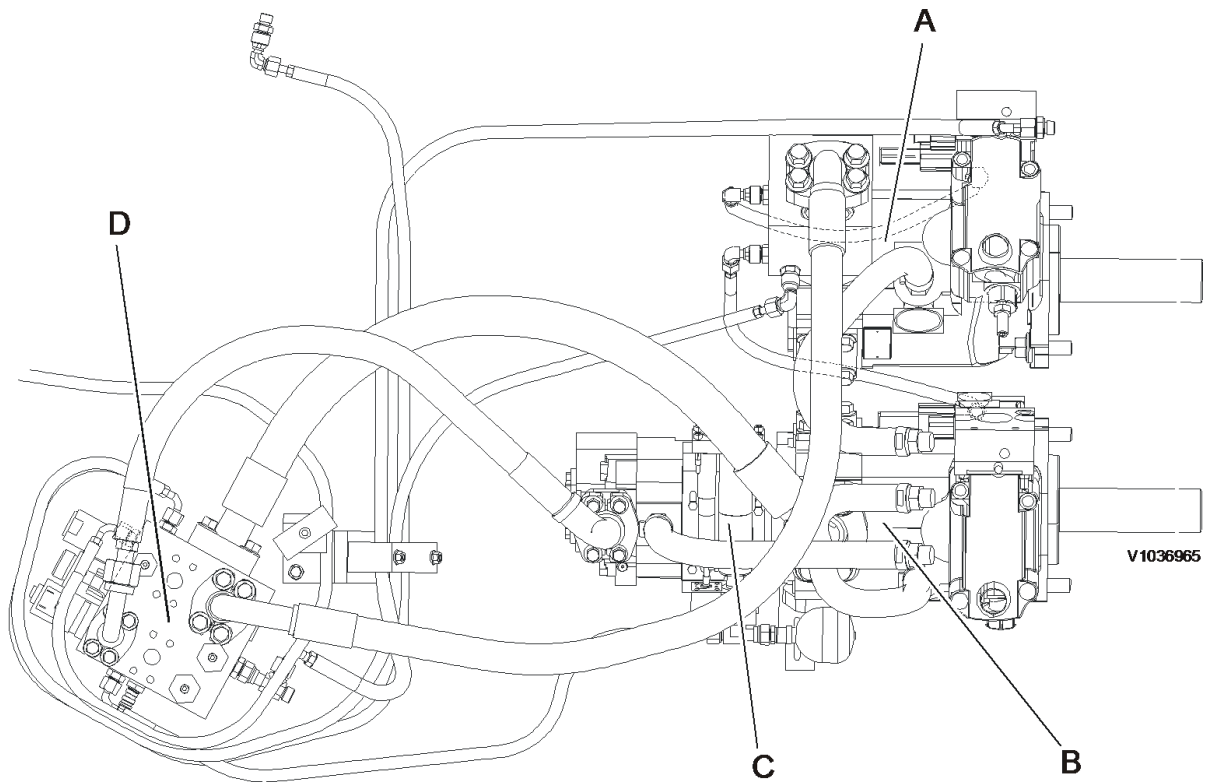


Figure 5

- A. Pump 1
- B. Pump 2
- C. Pump 3
- D. Central valve

14. Fill with hydraulic oil.
Capacity: see [911 Hydraulic system, volume](#)
15. Start the engine and check that there are no leaks.
Bleed the brake system according to [520 Brake system, bleeding](#)
16. Install the floor plate, the floor mat, the seat bracket and the seat. Seat weight: **approx. 60 kg (132 lb)**
17. Fill with hydraulic oil. Capacity, see [911 Hydraulic system, volume](#).
18. Run the machine until warm and carry out the following checks:
[263 Pump 3 \(P3\) standby pressure, checking and adjusting \(LS-line removed\)](#),
[263 Fan motor, checking working pressure](#)

Document Title: Servo system, description	Function Group: 914	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Servo system, description

The servo valve consists of two sections with two valve spools; one section for each hydraulic function.

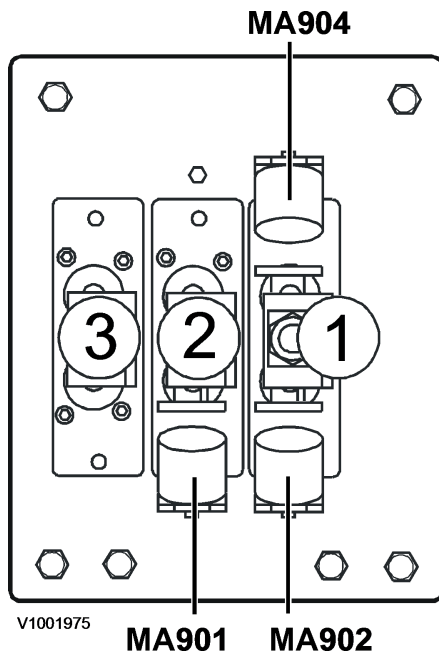


Figure 1

Servo valve, 3 sections

NOTE!

If the machine is equipped with 3rd or 3rd/4th functions, the servo valve will consist of three or four sections.

The basic servo valve function resembles that of a pressure limiting valve.

In neutral position the valve spool closes off the servo pressure (the control pressure). The connection for the control valve is connected to the hydraulic oil tank.

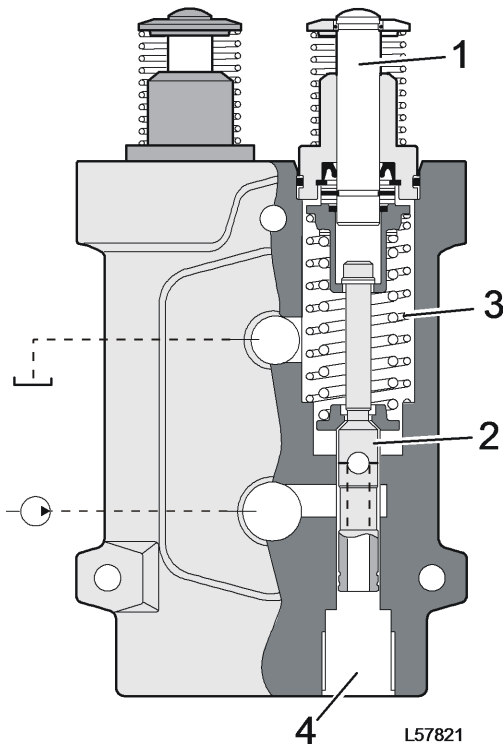


Figure 2
Servo valve

1. Thrust pin
2. Valve spool
3. Spring
4. Connection to control valve

When the thrust pin is actuated via the lever (function is activated) the spring presses down the valve spool and first closes the connection to the tank.

As the movement continues, the valve spool opens for the servo pressure (the control pressure) to the control valve.

The output servo pressure (the control pressure) acts on the end of the valve spool, which is forced up against the spring. When the output pressure reaches a value corresponding to the lever deflection and spring force, the valve closes. This results in a controlled oil pressure, which actuates the control valve spool.

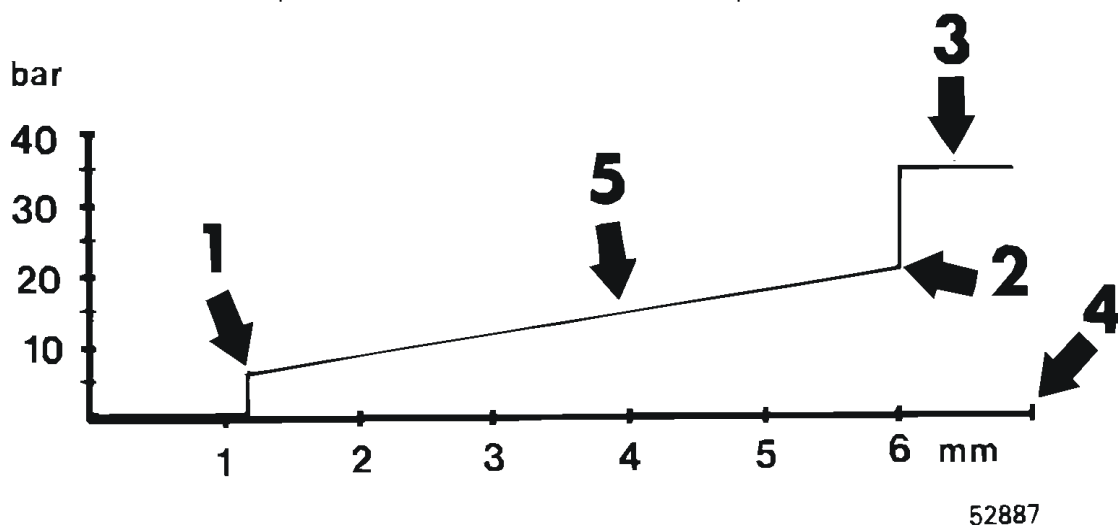


Figure 3
Pressure diagram, output servo pressure as a function of lever deflection.

1. Starting pressure



When the valve spool in the servo valve opens, a so called starting pressure is obtained immediately. The starting pressure causes each control valve spool to move to a certain position before the connection to the hydraulic cylinder is opened.

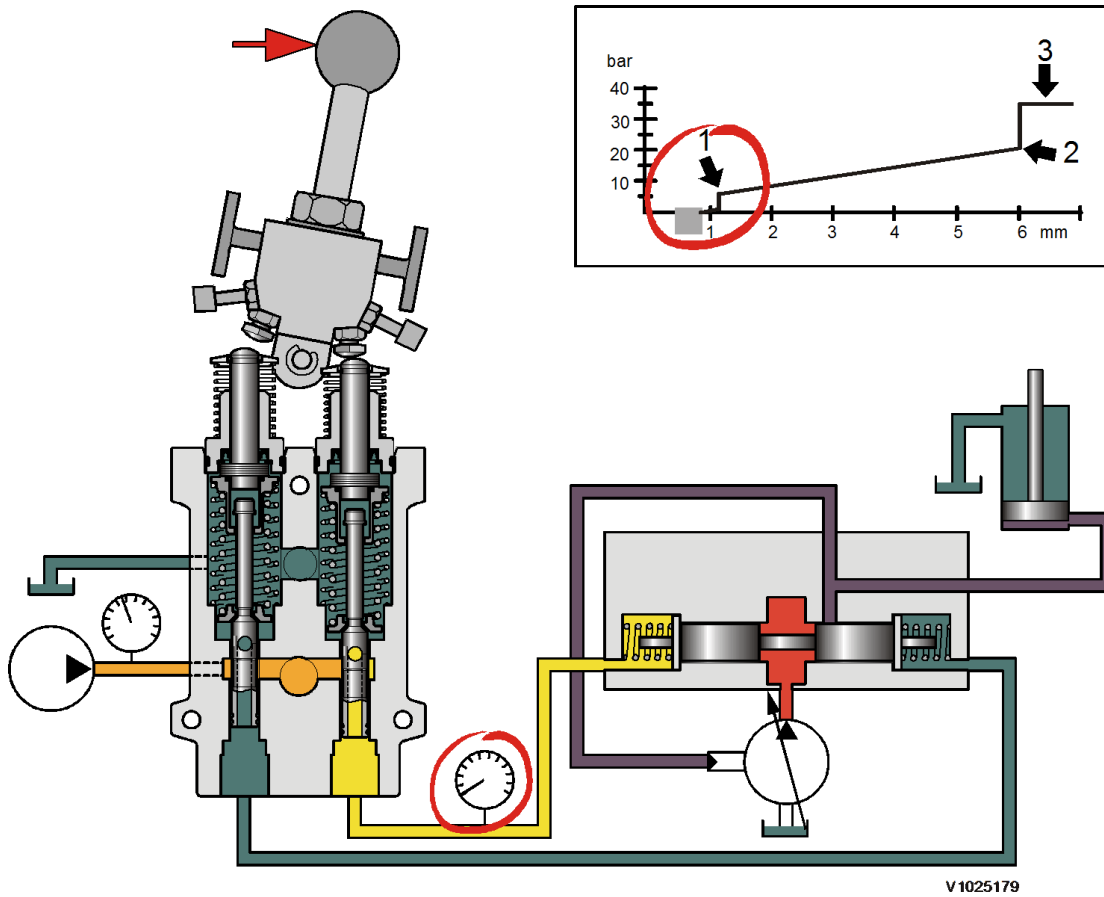


Figure 5
Starting pressure

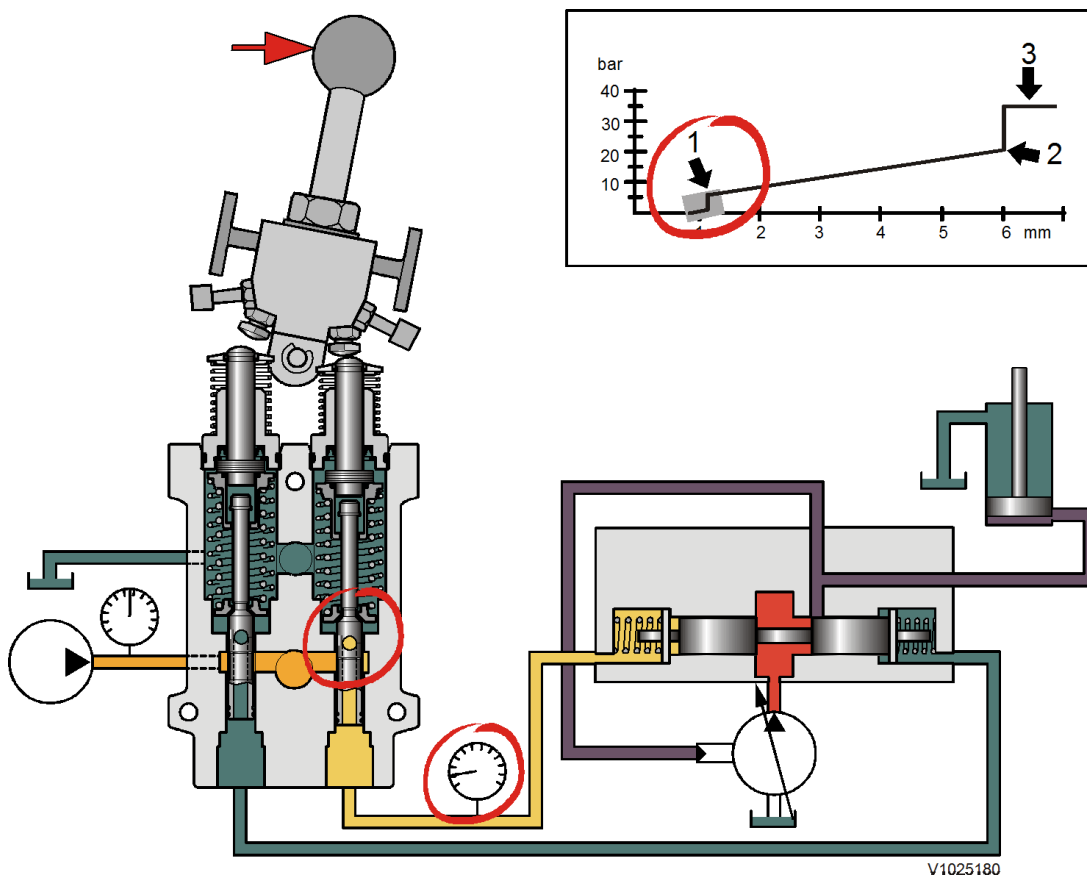


Figure 6
Starting pressure, increasing

Between the starting position and the sensing position in the servo valve the output pressure is controlled in proportion to the lever deflection. The servo valve is in sensing position when an additional resistance is felt in the lever. The output servo pressure (the control pressure) in sensing position is the pressure that is required to press the spool in the control valve to its end position.

As the sensing position is passed a so called forced opening is obtained and the output servo pressure (the control pressure) rises to the same level as the input servo pressure. Sensing position is available for functions with a detent solenoid, that is lowering function (floating position), lifting function and tilting function (tilting in).

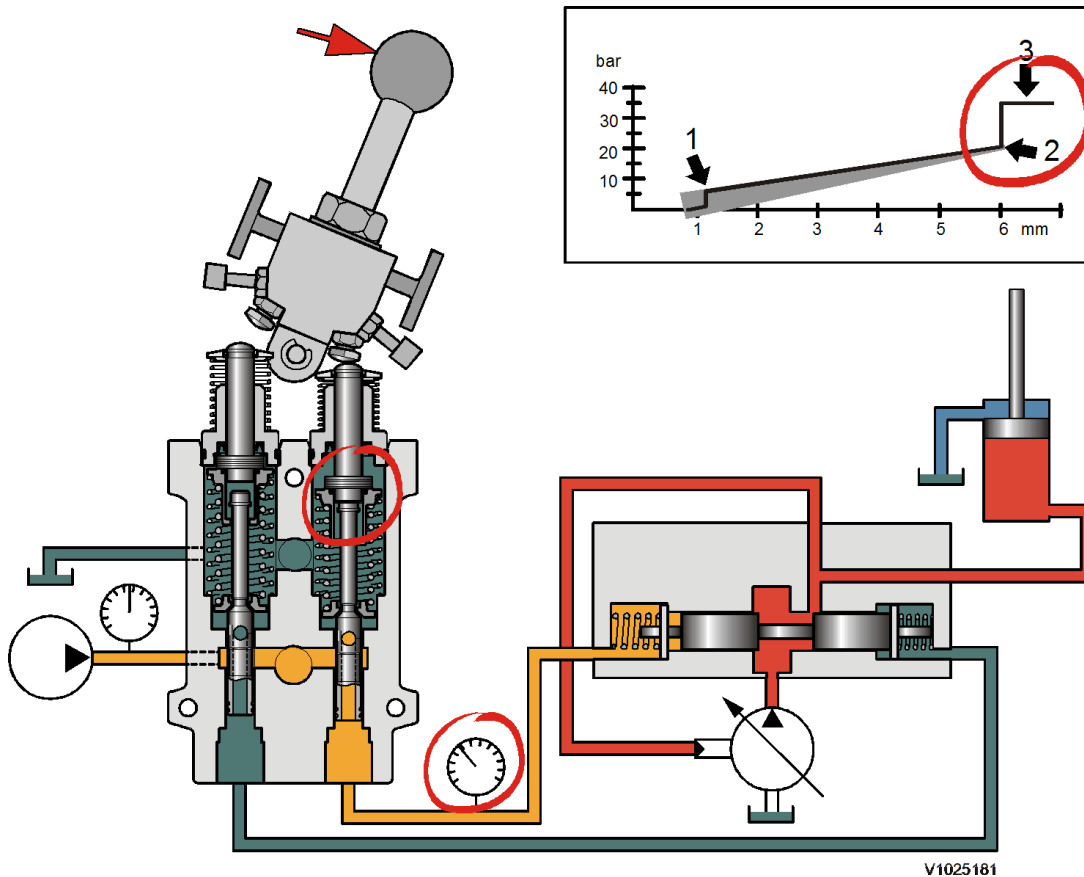


Figure 7
Servo pressure up to control valve

Document Title: Automatic lift arm lowering (Return-To-Dig), description	Function Group: 914	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Automatic lift arm lowering (Return-To-Dig), description

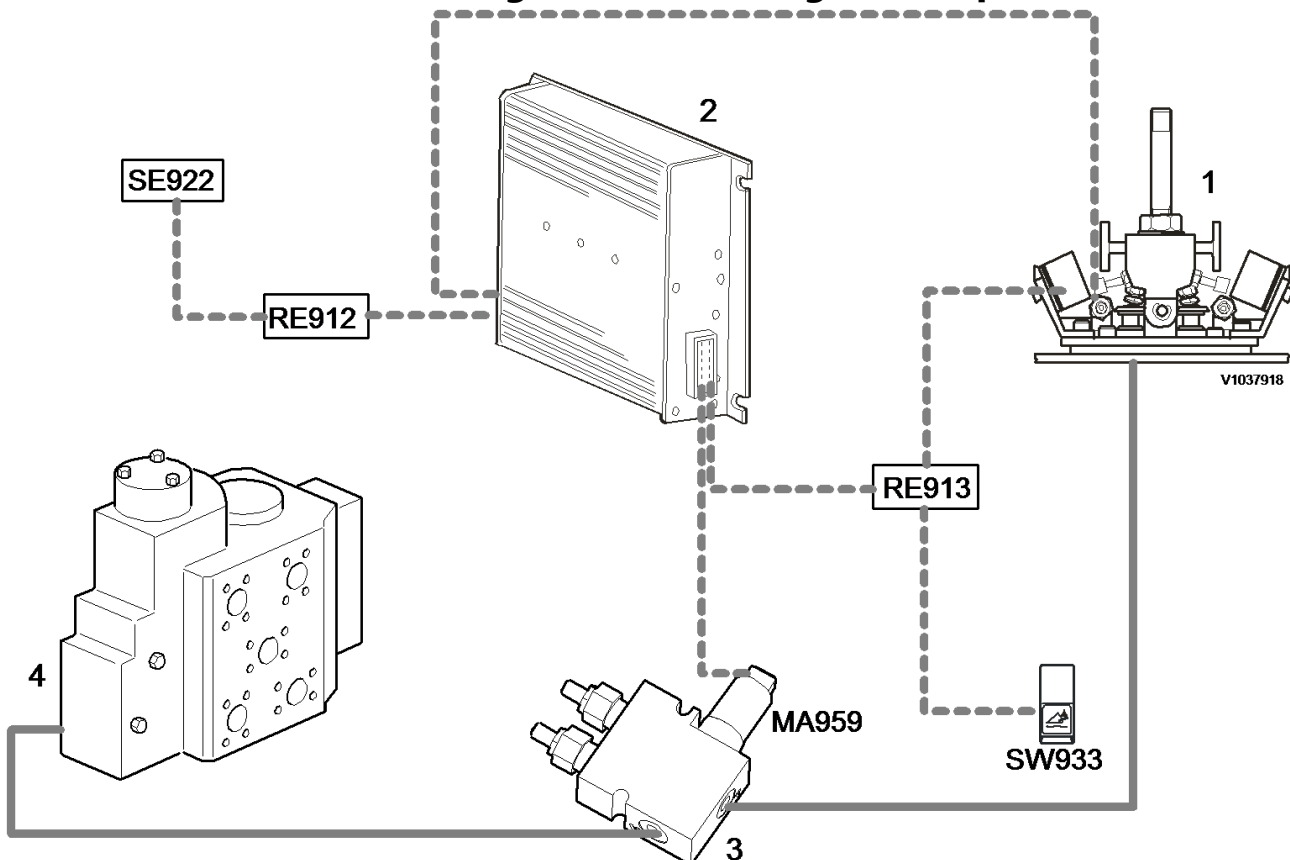


Figure 1
Return To Dig, principle diagram

1. Servo lever for lifting/lowering incl. sensor SE932 (microswitch) and detent position solenoid MA904.
2. V-ECU
3. Valve block (proportional valve), restricts output servo pressure to the lowering function.
4. Control valve

MA904	Detent position solenoid for floating position / Return To Dig.
MA959	Proportional valve for Return To Dig.
RE912	Relay for Return To Dig.
RE913	Relay for Return To Dig and floating position.
SE922	Sensor for lifting arm position.
SE932	Sensor (microswitch) for lever in detent position.
SW933	Switches for Return To Dig and floating position.

Return To Dig will be activated if the following criteria are met:

- The travelling speed of the machine is below 15 km/h (9 mph).
- Lower end of switch for Return To Dig / floating position (SW933) is pressed in.
- The lifting arms are positioned above position sensor (SE922) indicating level.
- The servo lever for lifting/lowering is moved to the detent position for lowering.

When Return To Dig is activated, the lifting unit (lifting arms) lowers to so called low position. This takes place because proportional valve (3) reduces the output servo pressure down to approx. 1.8 MPa (18 bar) (261 psi), i.e. the floating position does not become activated. The lifting unit lowers to a set position on position sensor SE922, so called low position. When this takes place, the current is reduced to MA959, which in a controlled way slows down the lowering movement of the lifting unit by restricting the connection between the servo valve and the control valve.

One second after that the V-ECU has reduced the current to MA959 the signal to detent solenoid MA904 is interrupted and the servo lever returns to neutral position while the lifting unit stops in the so called low position.

To activate the floating position the servo lever for lowering must again be moved to the detent position.

Proportional valve (3) is controlled with the aid of solenoid valve MA959, which in its turn is controlled via the V-ECU. Control signals for the function are supplied to the V-ECU from SE932, MA904 and SW933 via RE913 and SE922 via RE912.

Document Title: Valve block for Return To Dig, description	Function Group: 914	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Valve block for Return To Dig, description

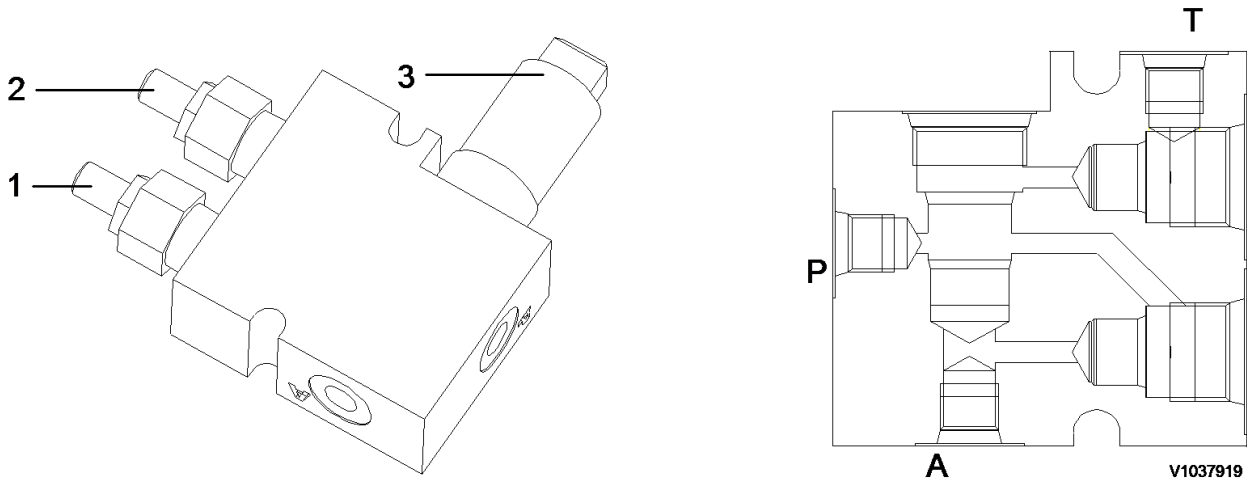


Figure 1
Valve block

1. Reducing valve, is only used for forced opening of the valve block.
2. Reducing valve, is only used for forced opening of the valve block.
3. Proportional valve MA959

A	Connection to control valve
P	Connection to servo valve
T	Tank connection (via central valve)

The valve block for Return To Dig is a pressure-reducing valve, which can be forced open by screwing out reducing valve (1) (it is normally screwed in) and screwing in reducing valve (2) (it is normally screwed out).

Forced opening of the valve block provides a connection between the servo valve and the control valve, so that the working hydraulics can be used even if the Return To Dig function is not functioning.

Document Title: Return To Dig, component position	Function Group: 914	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Return To Dig, component position

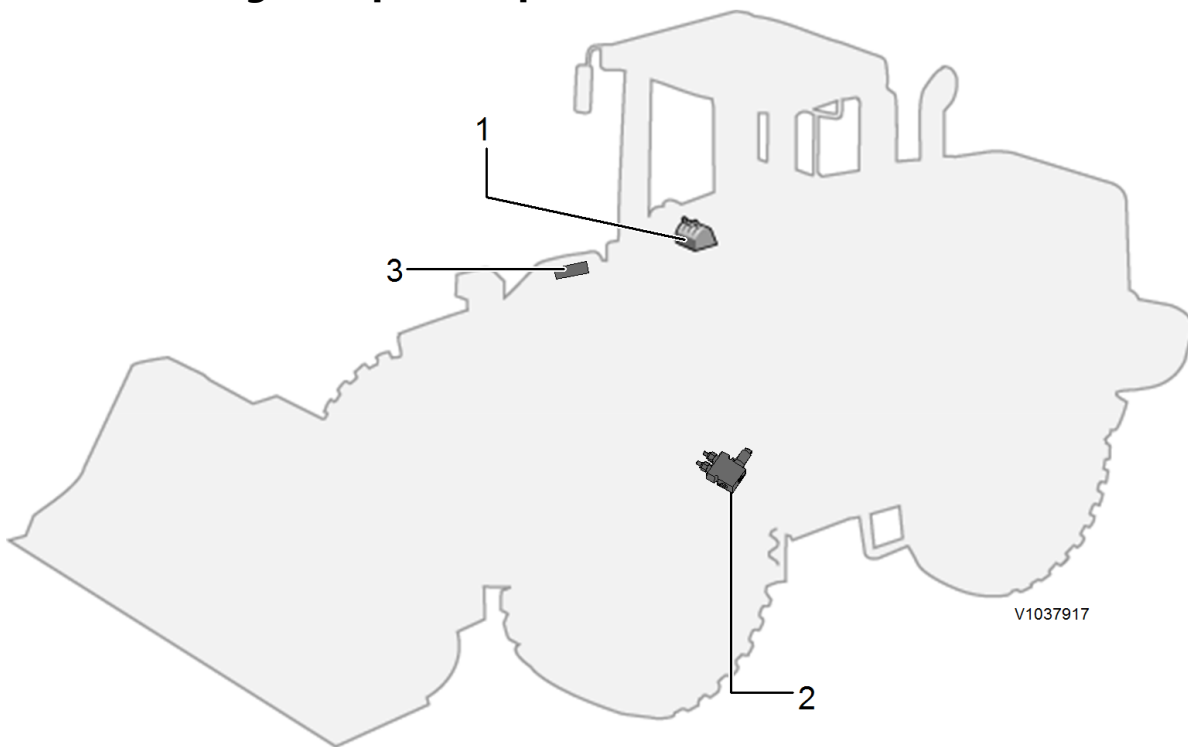


Figure 1
Return To Dig

1. Servo valve incl. solenoid for floating position (MA904) and microswitch (SE932).
2. Valve block for Return To Dig incl. MA959, positioned on the front frame.
3. Position sensor, SE922 (positioned on the left or right side of the front frame depending on machine size).



Construction Equipment

Service Information

Document Title: Servo pressure, checking and adjusting	Function Group: 914	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Servo pressure, checking and adjusting

Op nbr 914-055

[9993831 Support](#)

[11666019 Pressure gauge](#)

[11666037 Hose](#)

The engine, transmission and hydraulic system must have reached normal working temperature before the check is carried out.

Checking

1. Secure the frame joint with the frame joint lock. Place chocks in front of and behind the wheels.

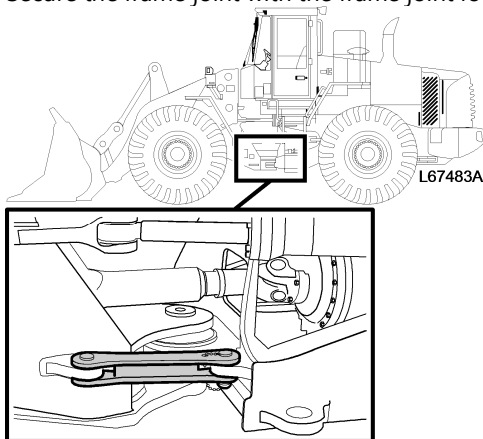


Figure 1

2. Raise the lifting frame and position stand 9993831 under the lifting frame.

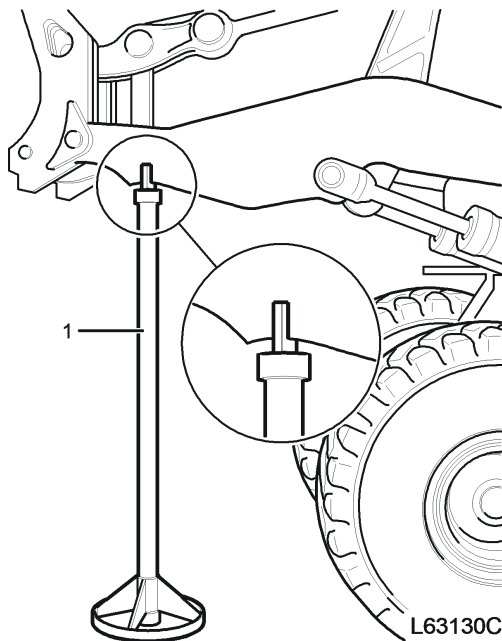


Figure 2
Stand

1. 9993831 Stand
3. Release the pressure in the hydraulic system. Remove the cover plate on the front frame.
4. Connect the pressure gauge to the checking point on the solenoid valve.

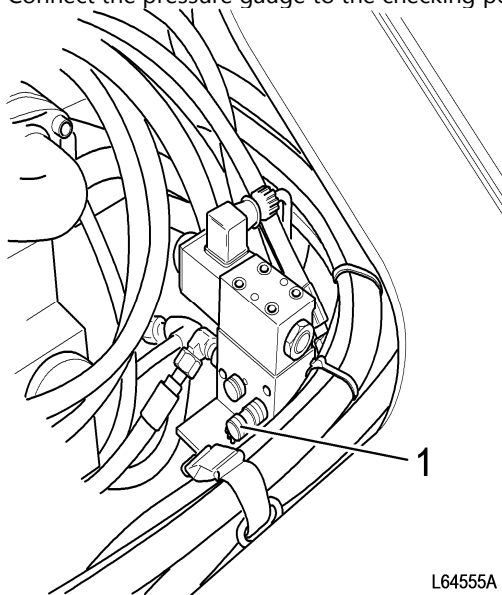


Figure 3
Solenoid valve

1. Checking point
5. Start the engine. Run it at low idling speed.
6. Tilt in towards end position.
Servo pressure, see [914 Servo system specifications](#)

Adjusting

7. Adjust the servo pressure on the pressure-reducing valve on the central valve.

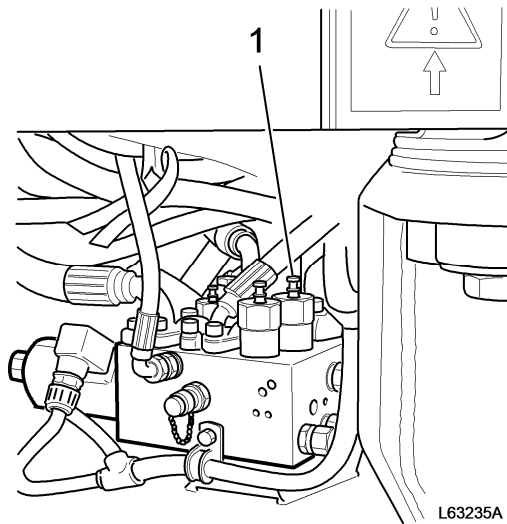


Figure 4
Central valve

1. Pressure-reducing valve for adjusting servo pressure

Document Title: Servo pressure, checking and adjusting	Function Group: 914	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Servo pressure, checking and adjusting

Op nbr 914-055

[14290266 Hose](#)

[11666052 Pressure gauge](#)

The engine, hydraulic transmission and hydraulic system must be at normal working temperature when checking.

Checking

1. Secure the frame joint with the frame joint lock. Place blocks in front of and behind the wheels.

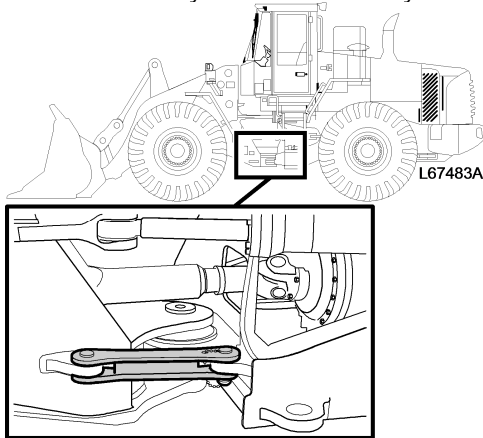


Figure 1

2. Depressurize the servo hydraulic system by moving the servo levers back and forth repeatedly.
3. Connect the pressure gauge to the measuring connection on the load lowering block.

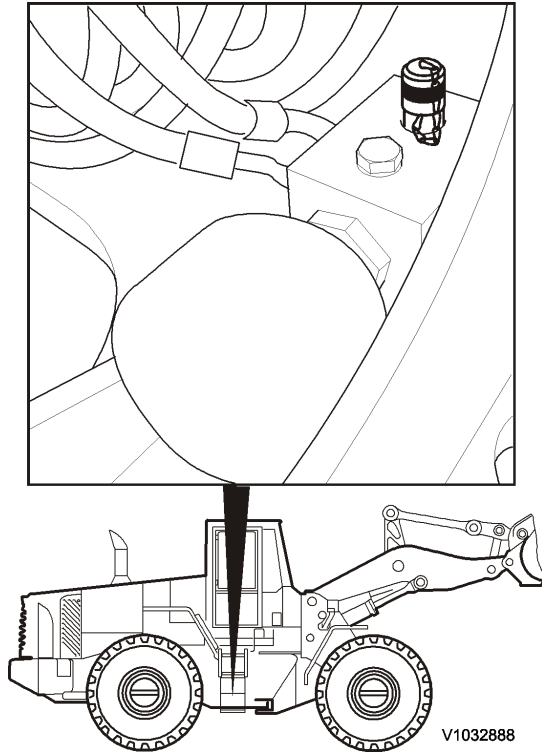


Figure 2
Pressure check connection for servo pressure

4. Start the engine and run it at low idling speed.
5. Tilt in towards the end position.
Servo pressure, see [914 Servo system, specifications](#)

Adjustment

6. Adjust the servo pressure on the central block's pressure reducing valve.

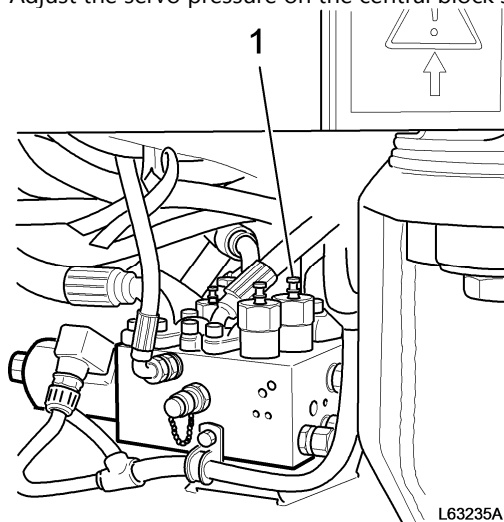


Figure 3
Central block

1. Pressure limiting valve for adjusting servo pressure

Document Title: Servo valve, operating controls, adjusting	Function Group: 914	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Servo valve, operating controls, adjusting

Op nbr 91454

1. Remove the cover and the switch.

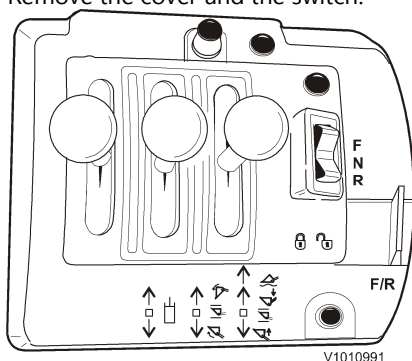


Figure 1

1. Cover with switch
2. Adjust the distance between the lever's adjusting screw and thrust pin.

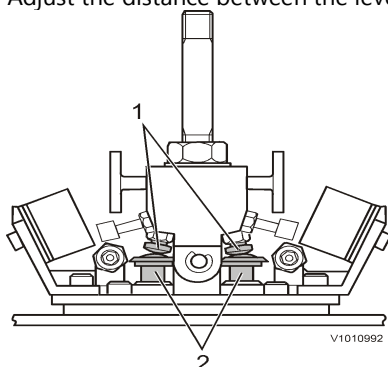


Figure 2

1. Adjusting screw
 2. Thrust pin
3. Adjustment of sensing position is performed with the adjusting screws (1).
The sensing position is the position that the lever should pass before the hold (detent) solenoid is activated, as well as the transition between lower and float position.

NOTE!

The adjusting screw may only be rotated complete revolutions.

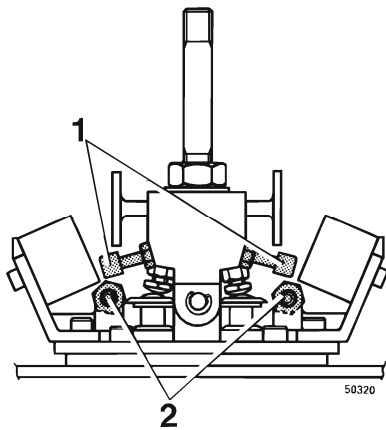


Figure 3
Sensing position

1. Adjusting screw
2. Thrust pin

4. The force that is required to pass the sensing position is adjusted with the thrust pin (2) (2 mm Allen key). The sensing position should be obtained at a distance of 2-3 mm between the solenoid and stop washer, see pos. A.

NOTE!

This is on the condition that the hold solenoid is correctly adjusted.

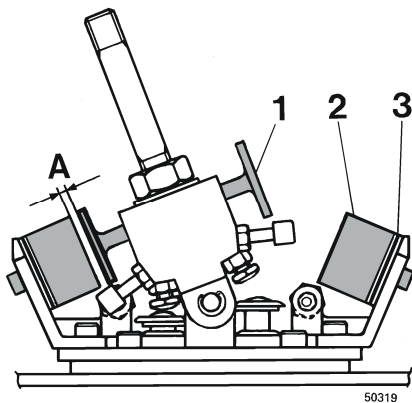


Figure 4

- A. 2-3 mm
1. Stop washer
2. Hold solenoid
3. Spacer washers

Hold solenoid, bucket positioner, boom kickout and float position

5. Move the lever to the sensing position. Adjust the clearance between the hold solenoid and the stop washer to 2-3 mm. Adjust with spacers behind the hold solenoids.
6. Fit the cover and the switch.

Document Title: Servo valve, replacing	Function Group: 914	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Servo valve, replacing

Op nbr 914-058

[14360000 Vacuum pump / 24V](#)

Removing

1. Drain the hydraulic oil or connect the vacuum pump, see [911 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#).
Volume, see [911 Hydraulic system, volume](#).
2. Screw off the balls on the servo levers.

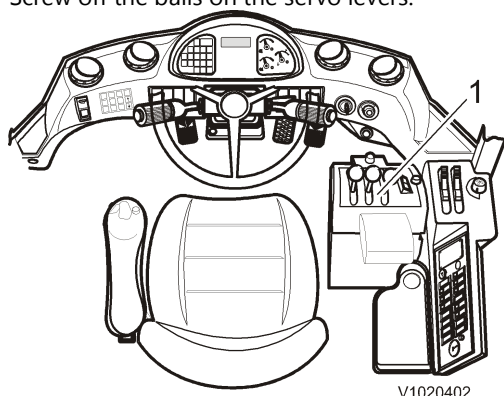


Figure 1

1. Servo valve's position in machine
3. Remove the plastic casings above and below the servo valve.
4. Mark the hydraulic hoses for the servo valve to facilitate installation.
Disconnect the servo valve from the hoses. Plug the hoses as well as their connections in the servo valve.
5. Disconnect the servo valve from electric connections.
6. Remove the servo valve.

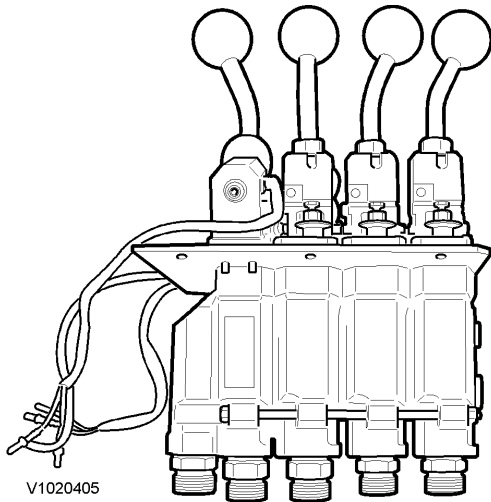


Figure 2
Removed servo valve

Installing

7. Install the servo valve in the machine.
8. Connect the electric connections on the servo valves.
9. Remove the plugs from the servo valve and hydraulic hoses and connect the hydraulic hoses to the servo valve.
10. Install the plastic casings above and below the servo valve.
11. Install the balls on the servo levers.
12. Fill hydraulic oil in the hydraulic oil tank or remove the vacuum pump, see [911 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#), Volume, see [911 Hydraulic system, volume](#).
13. Start the engine and check that there aren't any leaks.
Bleed the hydraulic system, see [900 Hydraulic system, bleeding](#), and check machine function.



Construction Equipment

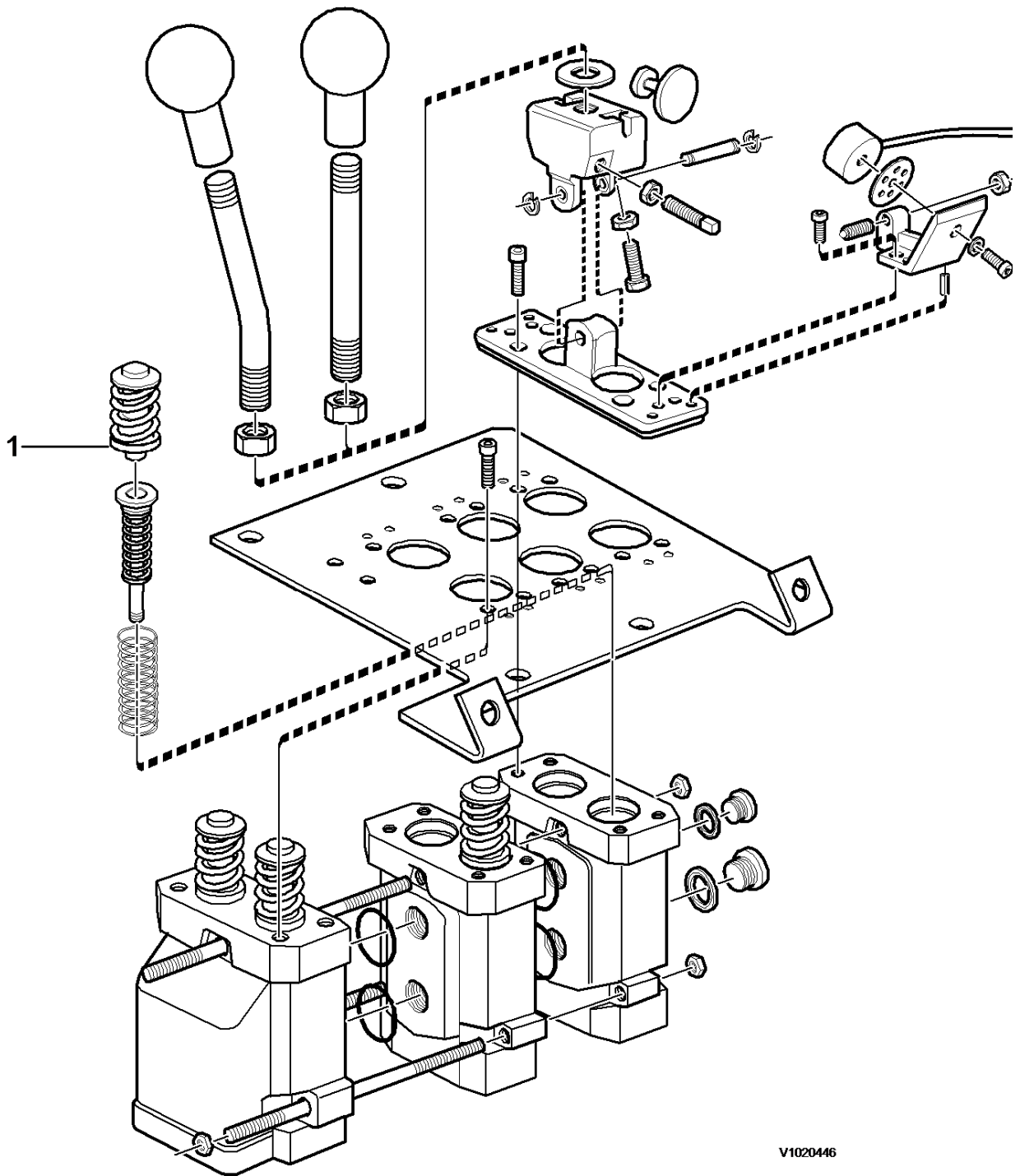
Service Information

Document Title: Servo valve, reconditioning (removed)	Function Group: 914	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Servo valve, reconditioning (removed)

Op nbr 91475

1. Mark all parts to facilitate assembling.
2. Take apart the servo valve according to the figure.



V1020446

Figure 1
Servo valve

1. Spacer washer
3. Check all parts as regards wear or other damage. Replace any damaged parts.
NOTE!
The spacer washer (1) is available in three different sizes.
4. Assemble the valve according to the figure.

Document Title: Boom Suspension System, description	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Boom Suspension System, description

In order to increase operator comfort and reduce mechanical stress on the frame, drivetrain and lifting frame, the lifting frame on the machine is equipped with a Boom Suspension System as optional equipment.

The equipment, called Boom Suspension System (BSS), allows smooth and even operation with or without a load at any speed while minimising any bouncing tendencies of the machine.

The system consists of one or two piston accumulators, depending on machine type, which are connected to the lifting cylinders on the machine via a valve system. In cases where there are two accumulators, precharging pressure is different in the accumulators in order to provide good suspension at varying weights of the load. The pressures correspond approximately to the pressure build-up caused by an empty and a full bucket respectively, but may have to be modified depending on what is being handled and other operating conditions.

The accumulators are precharged with nitrogen gas. Precharging pressure, see [916 Boom Suspension System, specifications](#).

The springing action is achieved by connecting the plus side of the lifting cylinders so that the cylinder pressure "rests" against the accumulators while at the same time the minus side of the lifting cylinders is connected to the hydraulic oil tank. When operating across uneven ground and the lifting arms are actuated by a "bouncing load", the lifting arms move vertically but the pressure variations are taken up (absorbed) by the accumulators.

Boom Suspension System, activating

Switch (SW925) for the Boom Suspension System has three positions. When the engine is started, the function resumes the previously selected position.

The control lamp on the centre instrument panel, I-ECU, is continuously lit as long as the system is activated.

The hydraulics menu on the display unit shows whether the Boom Suspension System is engaged or temporarily disengaged.

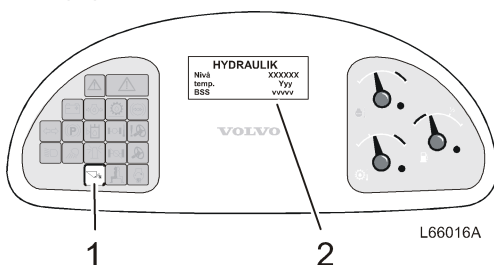


Figure 1
Centre instrument panel

1. Control lamp
2. Display unit

When the system is activated and engaged, a connection is opened between the plus side of the lifting cylinders and the accumulators, and also between the minus side of the lifting cylinders and the tank, which means that the oil can pass freely in both directions.

In order for the system to operate efficiently, it is important that the lifting arms can move freely up and down. For example, the bucket must not rest against a mechanical stop.

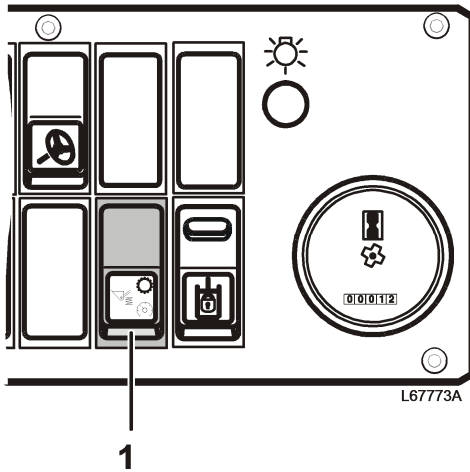


Figure 2

1. SW925

Accumulators, charging

Accumulators can only be charged when the Boom Suspension System is disengaged. MA908, MA910 and MA911 do not receive any current.

In this way, unwanted movements are avoided when another hydraulic function is used (i.e. tilt or 3rd/4th function) while the system is activated and engaged.

Document Title: Boom Suspension System, description of function	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Boom Suspension System, description of function

Charging accumulator(s)

When the system is not activated, the pressure in the lifting cylinders and accumulator(s) is different. Charging of the accumulator(s) takes place via pressure-reducing valve CT8, which controls the maximum charging pressure, which is to correspond to a fully loaded bucket. Copying valve CT7, which, via CT4, is connected to the plus side of the lifting cylinders, is open as long as the pressure at the plus side of the lifting cylinders does not exceed the pressure from the pump. Consequently, the pressure is copied to the accumulators, when any of the hydraulic functions is operated, i.e. the accumulators can only be charged by using one of the hydraulic functions. When the pressure in the accumulator(s) becomes the same as the pressure at the plus side of the lifting cylinders, CT7 will close.

Engagement of Boom Suspension System

Earlier type

The engagement of the Boom Suspension System, i.e. when MA908, MA910 and MA911 become energised, is controlled by the V-ECU, which receives signals from SW925, whether gear-dependent or speed-dependent function is selected.

Gear-dependent function (SW925 in centre position) means that the system will be engaged when either of gears 2, 3 or 4 is selected. When 1st gear is selected, the system will be disengaged.

Speed-dependent function (SW925, lower end pressed in) means that the system becomes engaged when the speed exceeds 6 km/h (4 mph). When the speed is below 5 km/h (3 mph) in forward drive or 2 km/h (1 mph) in neutral or reverse, the system will be disengaged.

When both Full Automatic Power Shift (FAPS) (SW417 in ON position) and speed-dependent function (lower end of SW925 pressed in) are selected, the engagement of the Boom Suspension System is determined by a combination of speed and gear positions. The disengagement speed is set with the VCADS Pro, parameter CWP within the range 8–20 km/h (5–12 mph). The basic setting is 8 km/h (5 mph).

Later type

The engagement of the Boom Suspension System, i.e. when MA908, MA910 and MA911 become energised, is controlled by the V-ECU, which receives signals from SW925, whether gear-dependent or speed-dependent function is selected.

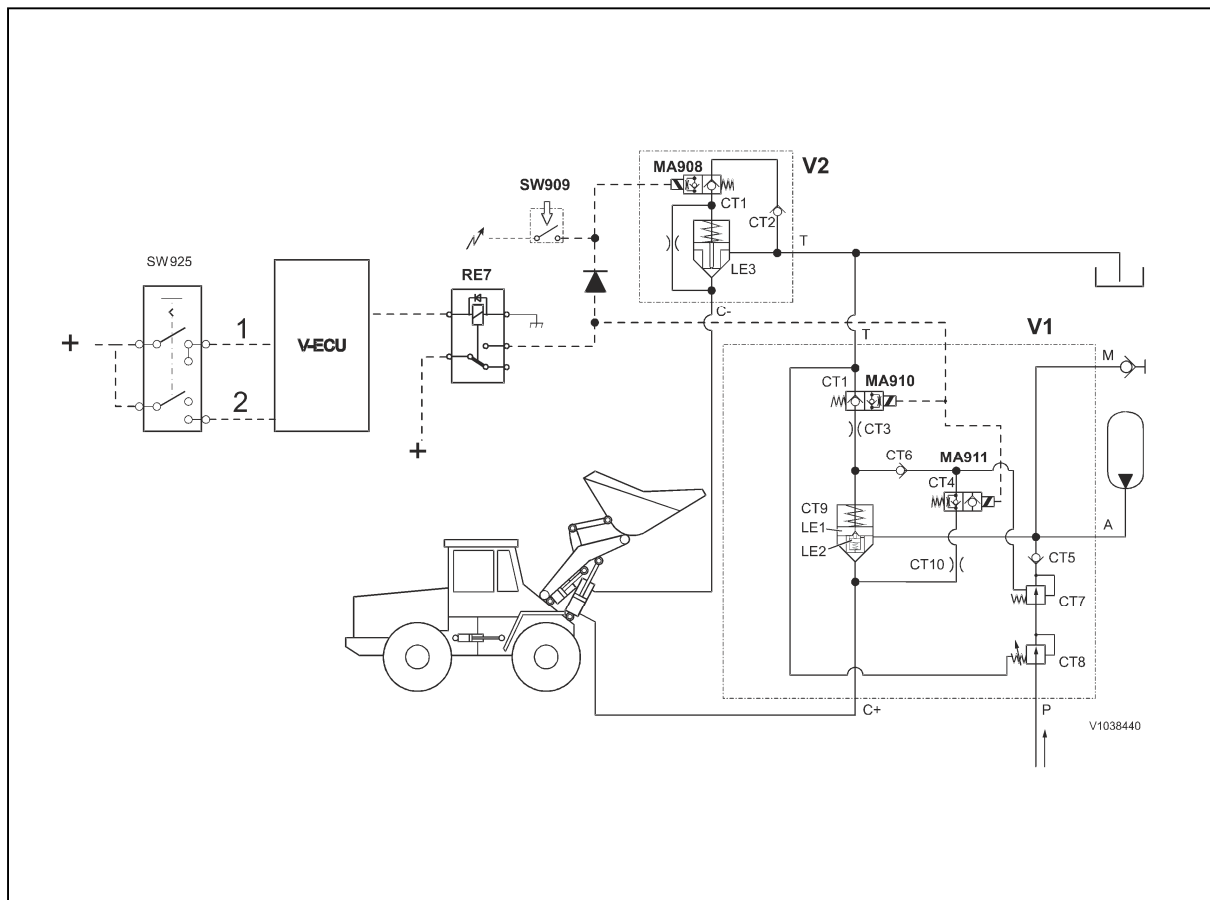
When Boom Suspension System is activated and gear-dependent mode is selected (SW925 in centre position) the Boom Suspension System is always engaged apart from in the lowest gears F1 and R1 and kick-down. The gear-dependent Boom Suspension System is not affected by the Full Automatic Power Shift (FAPS). See [301 Boom Suspension System \(BSS\)](#).

Limit values for engagement and disengagement of speed-dependent Boom Suspension System (SW925, lower end pressed in) is set with VCADS Pro, parameters HBN, HBO, HFD and HBM for the directional gears forward and reverse with and without Full Automatic Power Shift (FAPS) (SW417).

In the case of speed-dependent Boom Suspension System the system will be engaged when forward drive is selected and the speed exceeds the VCADS Pro parameter HBN + 1 km/h (1 mph). The range is 5–20 km/h (3–12 mph) and the basic setting is 5 km/h (3 mph). With reverse gear selected the system will be engaged when the speed exceeds the VCADS Pro parameter HBO. The range is 5–20 km/h (3–12 mph) and the basic setting is 6 km/h (4 mph).

During Full Automatic Power Shift (FAPS) the system will be engaged when forward drive is selected and the speed exceeds the VCADS Pro parameter HFD + 1 km/h (1 mph). The range is 8–20 km/h (5–12 mph) and the basic setting is 8 km/h (5 mph). With reverse gear selected the system will be engaged when the speed exceeds the VCADS Pro parameter HBM + 1 km/h (1 mph). The range is 0–20 km/h (0–12 mph) and the basic setting is 0 km/h (0 mph).

Earlier type



1. Gear-dependent function
2. Speed-dependent function

CT9 opens the connection between the plus side of the lifting cylinders and the accumulator(s).

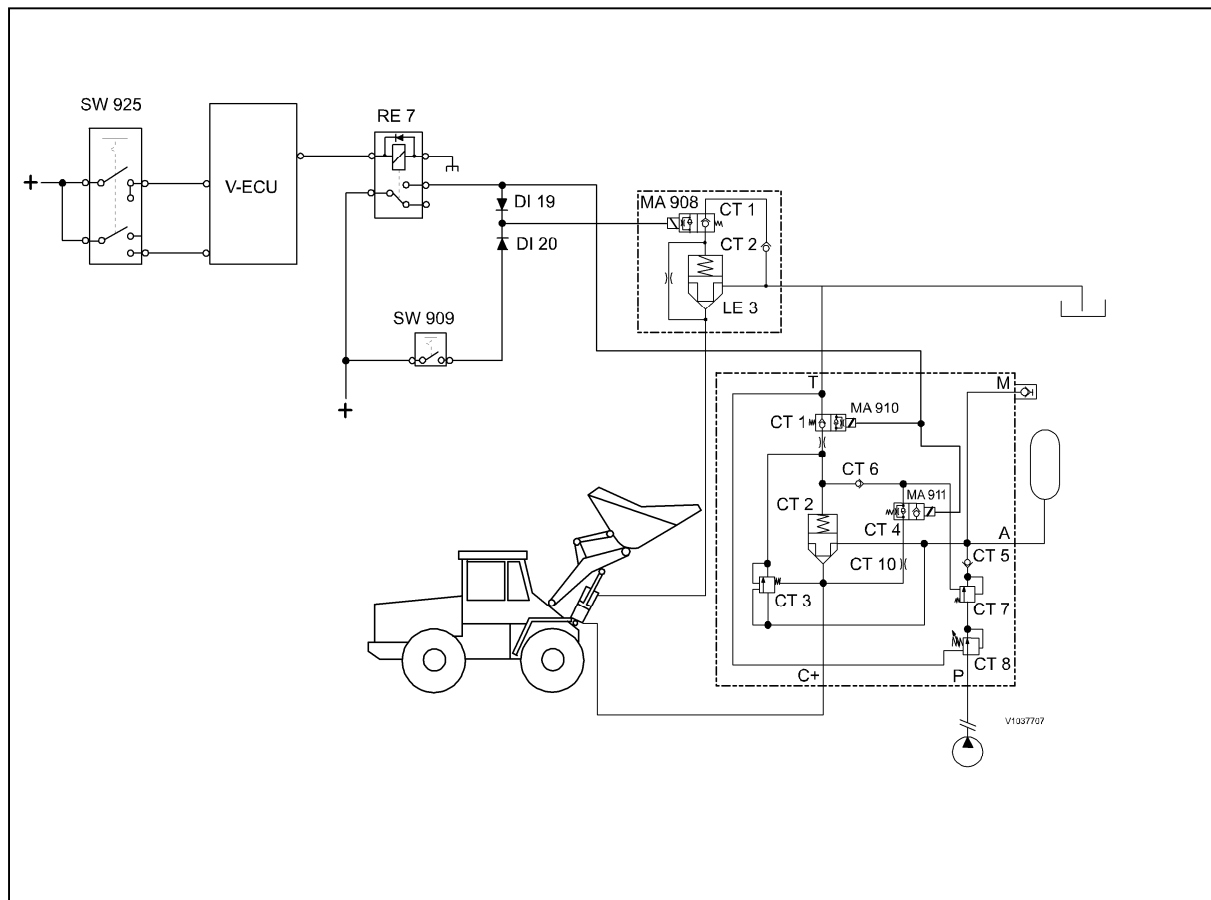
When the pressure between the accumulator(s) and the plus side of the lifting cylinders has been equalised, LE1 will open and a connection is obtained between the plus side of the lifting cylinders and the accumulator(s).

Without pressure-equalising, the oil from the accumulators would flow into the lifting cylinders and cause an inadvertent raising of the lifting unit.

CT1 (MA908) opens the top of LE3 to tank. When the top of LE3 has been drained, a connection is opened between the minus side of the lifting cylinders and tank. The restrictions in LE3 and CT1 (MA908) slow down the flow from the minus side of the lifting cylinders and dampen oscillations in the lifting arms.

If single-acting lifting is required, without topping up of the plus side of the lifting cylinders, it is only possible to energise MA908 with switch SW909.

Later type



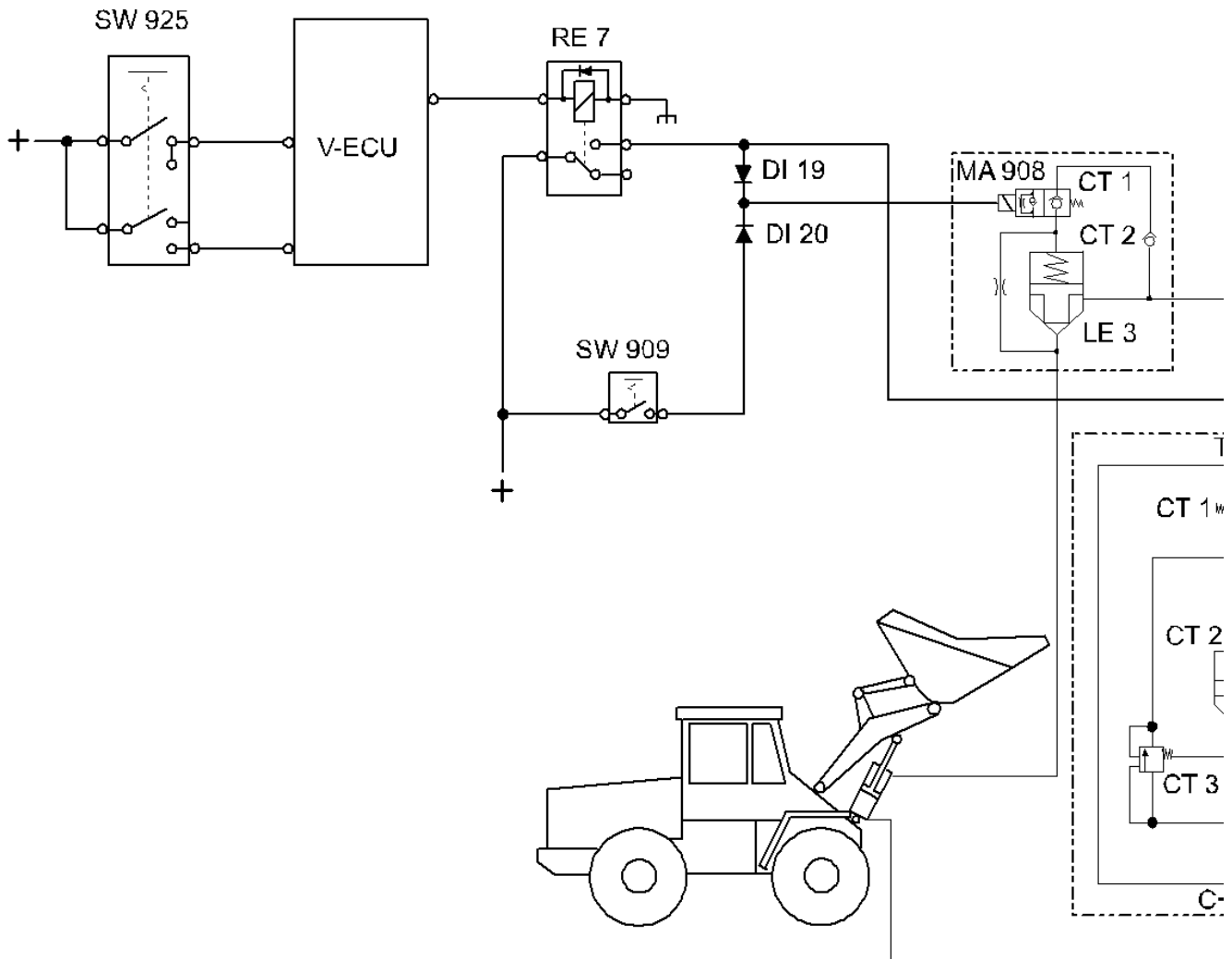


Figure 2
Later type

When the Boom Suspension System becomes engaged, CT1 (MA910) opens the connection to tank and drains the space at the top of CT2.

CT4 (MA911) closes the connection between the plus side of the lifting cylinders and copying valve CT7.

CT2 opens the connection between the plus side of the lifting cylinders and the accumulator(s).

If the pressure in the accumulator(s) is higher than the pressure in the lifting cylinders, when the Boom Suspension System is engaged, CT3 will be connected to the top of CT2 by the higher pressure from the accumulator(s). The connection is closed at CT6. The surplus pressure in the accumulator(s) is drained via the restriction and CT1, which at the same time keeps CT2 closed. When the pressure in the accumulator(s) and the lifting cylinders has been equalised, CT3 closes and CT2 opens the connection between the lifting cylinders and the accumulator(s).

When the pressure between the accumulator(s) and the plus side of the lifting cylinders has been equalised, CT3 will open and a connection is obtained between the plus side of the lifting cylinders and the accumulator(s).

Without pressure balancing, the oil from the accumulators would flow into the lifting cylinders and cause an inadvertent raising of the lifting unit.

CT1 (MA908) opens the top of LE3 to tank. When the top of LE3 has been drained, a connection is opened between the minus side of the lifting cylinders and tank. The restrictions in LE3 and CT1 (MA908) slow down the flow from the minus side of the lifting cylinders and dampen oscillations in the lifting arms.

If single-acting lifting is required, without topping up of the plus side of the lifting cylinders, it is only possible to energise MA908 with switch SW909.

Document Title: 3rd, or 3rd/4th hydraulic function, description	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

3rd, or 3rd/4th hydraulic function, description

The loader can be equipped with a servo-controlled, one-section spool valve or a two-section spool valve for operating the 3rd or 3rd/4th function in addition to the ordinary control valve.

The valve is load-sensing (LS) and is of the "closed centre" type. It is located on the front frame under the front edge of the cab.

The valve is fed by ordinary hydraulic pumps P1 and P2 via a connection on the ordinary control valve.

Maximum pressure of the input oil is the same as the maximum working pressure from P1 and P2, see

[913 Pump 1 \(P1\) Working hydraulics, brake and servo system, specifications](#),

[913 Pump 1 \(P1\) Working hydraulics, brake and servo system, specifications](#),

[913 Pump 2 \(P2\) Steering and other hydraulics, specifications](#). The output pressure may be altered, but must not exceed the

maximum pressure according to the specifications, see [916 3rd/4th hydraulic function, specifications](#). Output pressure may

differ between 3rd function and 4th function since each section has a separate pressure-reducing valve. Maximum flow, see

[916 3rd/4th hydraulic function, specifications](#).

The dual-acting hydraulic outlets are routed out to the attachment bracket.

The 3rd and 4th function are operated from the ordinary servo valve, which then is equipped with up to four sections (levers).

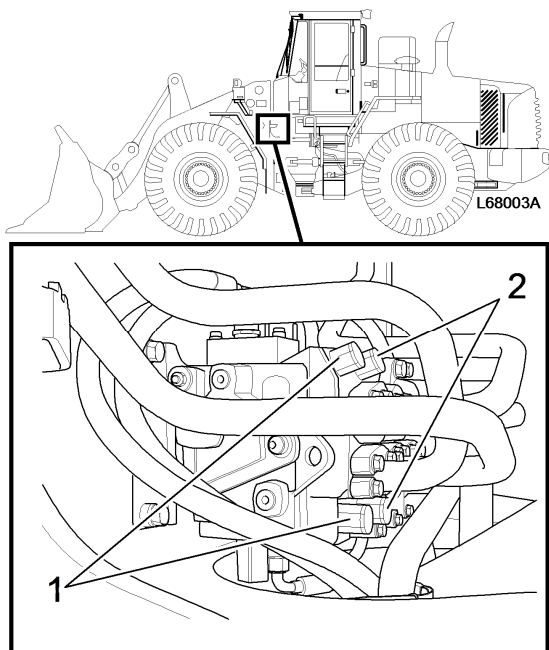


Figure 1

Control valve, 3rd, or 3rd/4th function

1. 4th function
2. 3rd function

Document Title: Boom Suspension System, component description	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Boom Suspension System, component description

Valve block V1

Earlier type

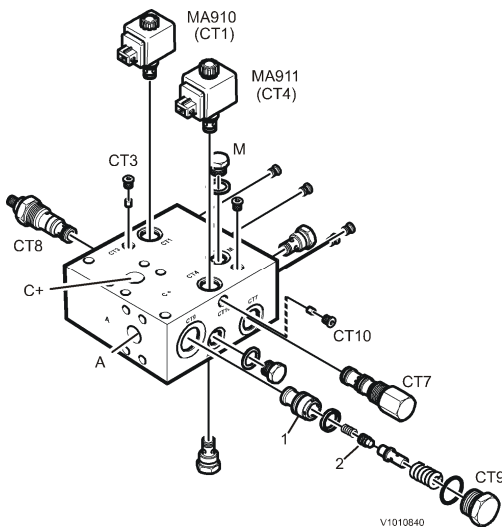


Figure 1

V1, earlier type

1. Logic element 1
2. Logic element 2

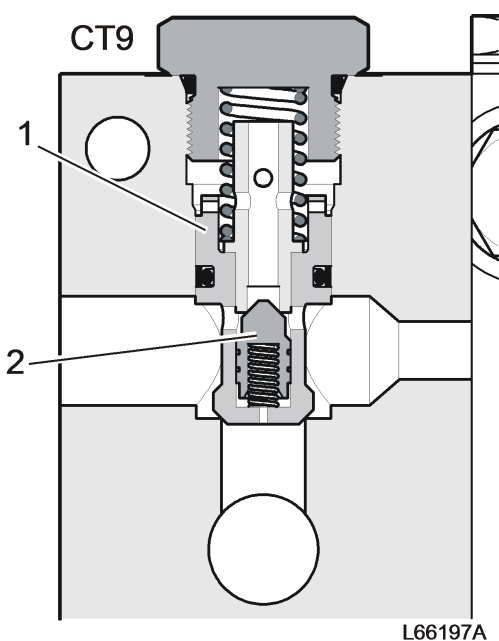


Figure 2

CT9, earlier type

1. Logic element 1
2. Logic element 2

Later type

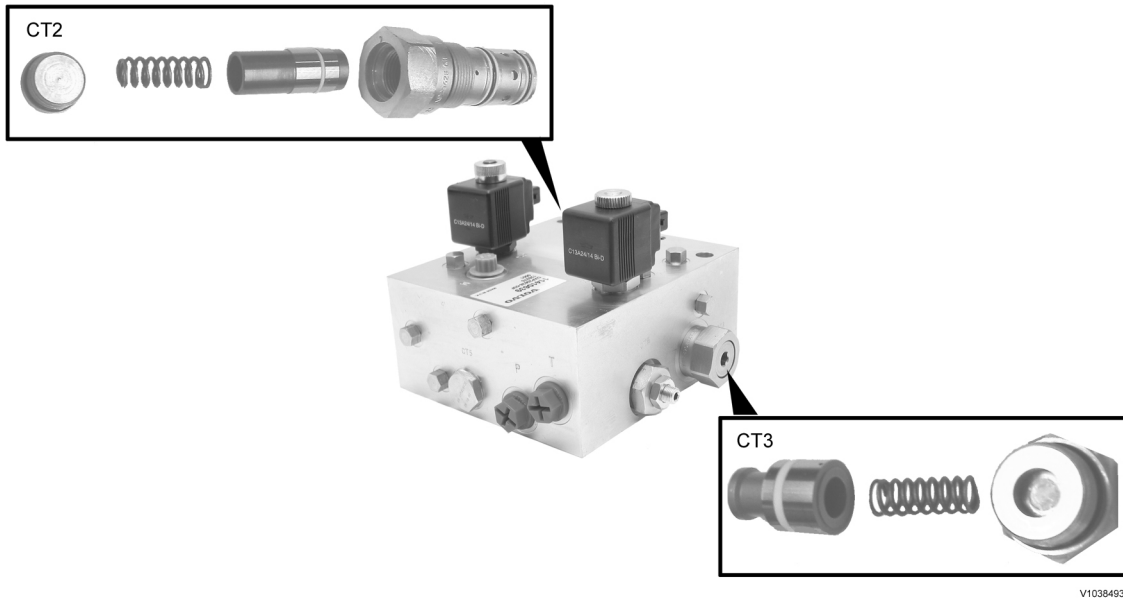


Figure 3
V1, later type

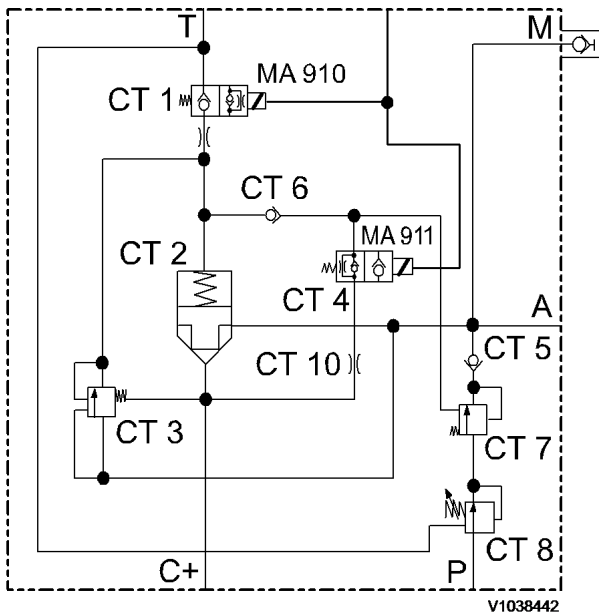


Figure 4
V1, later type

Valve block V2

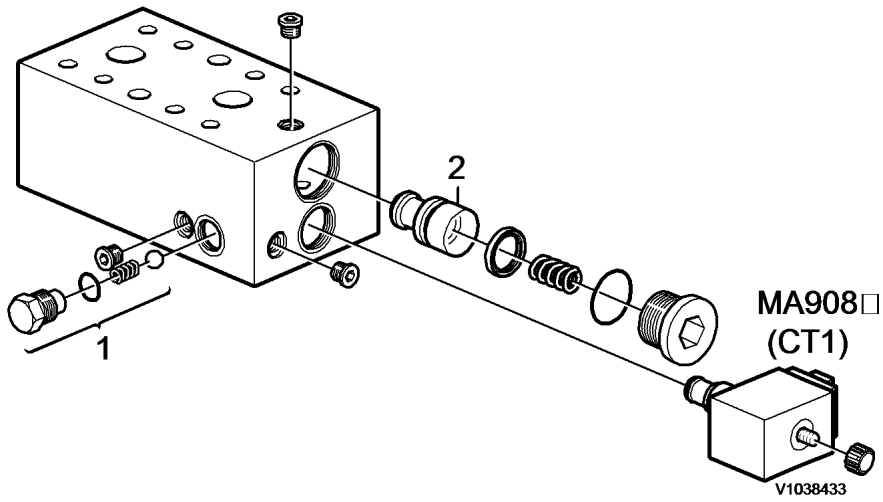


Figure 5
V2

1. CT2, non-return valve
2. Logic element 3

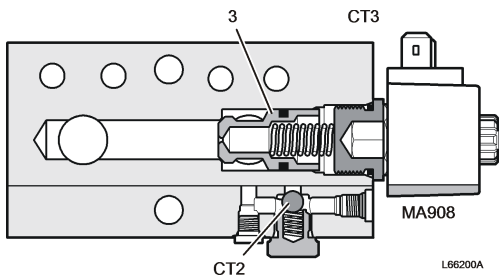


Figure 6
V2

3	Logic element 3
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More than one document matches chosen profile. <https://truckmanualshub.com/>

- [Boom Suspension System, troubleshooting](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 5001
Serial number stop: 6449

- [Boom Suspension System, troubleshooting](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 6450
Serial number stop: 10999



Construction Equipment

Service Information

Document Title: Boom Suspension System, troubleshooting	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Boom Suspension System, troubleshooting

Symptom	Possible cause	Action
Operator's information display shows "ERROR Relay BSS"	Open circuit in spool RE7	Check RE7
	Short-circuit in spool RE7	Check RE7
Poor or no function of boom suspension system.	CT1 closed in engaged position. Restriction CT3 clogged.	Check the function by loosening the connection to CT4 and then engaging boom suspension system. If the lift arms don't drop, check CT1 (should be closed in disengaged position). If the lift arms drop, the malfunction is located elsewhere.
Poor or no function of boom suspension system, and single-acting lift not functioning.	CT3 closed in engaged position.	Check CT3 (should be closed in disengaged position), mechanical function (cleanliness, damage). Check the electric circuit acc. to wiring diagram 23.
The machine cannot be lifted with the boom even when the boom suspension system is disengaged.	CT3 has jammed in open position and no pressure builds up on the cylinders' minus sides.	Check CT3 (should be closed in disengaged position), mechanical function (cleanliness, damage). Check the electric circuit acc. to wiring diagram 23. The malfunction may be due to other causes. Plug the hose to the BSS block V2 to decide if it's there that there's a leak.
Lift arms drop with disengaged boom suspension system.	CT1 has jammed in open position and accumulator cannot be charged.	Check CT1 (should be closed in disengaged position).
Lift arms drop with engaged boom suspension system.	CT4 is open in engaged position or LE2 doesn't close.	Check CT4 (should be open in disengaged position).
Lift arms drop at the point when the boom suspension system is engaged.	CT4 has jammed in closed position.	Check CT4 (should be closed in disengaged position). Check LE1/LE2.
	Copy valve CT7 has jammed in closed position or LE1/LE2 (CT9) binds.	Check CT7/CT9.



Construction Equipment

Service Information

Document Title: Boom Suspension System, troubleshooting	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Boom Suspension System, troubleshooting

Symptom	Possible cause	Action
The operator display unit shows "ERROR Relay BSS"	Open circuit in coil RE7	Check RE7
	Short circuit in coil RE7	Check RE7
Poor or no function of the Boom Suspension System.	CT1 closed in engaged position. The restriction is clogged.	Check the function by loosening the connection at CT4 and then engaging the Boom Suspension System. If the lifting arms do not lower, check CT1 (should be closed in disengaged position). If the lifting arms lower, the fault lies somewhere else.
Poor or no function of the Boom Suspension System and the single-acting lifting does not work.	CT3 closed in engaged position.	Check CT3 (should be closed in disengaged position), with regard to mechanical function (cleanness, damage). Check the electrical circuit according to wiring diagram 23.
The machine cannot be lifted with the boom even when the boom suspension system is disengaged.	CT3 has jammed in open position and no pressure builds up at the minus side of the cylinders.	Check CT3 (should be closed in disengaged position), mechanical function (cleanliness, damage). Check the electric circuit acc. to wiring diagram 23. The fault may have other causes. Plug the hose to the BSS block V2 in order to determine if the leakage is just there.
The lifting arms lower with Boom Suspension System disengaged.	CT1 has got stuck in open position and the accumulators cannot be precharged.	Check CT1 (should be closed in disengaged position).
The lifting arms lower with Boom Suspension System engaged.	CT4 is open in engaged position or CT2 does not close.	Check CT4 (should be open in disengaged position).
The lifting arms lower just as the Boom Suspension System is engaged.	CT4 has got stuck in closed position.	Check CT4 (should be closed in disengaged position). Check LE1/LE2.
	Copying valve CT7 has got stuck in closed position or CT2 is binding.	Check CT2.



Construction Equipment

Service Information

Document Title: Precharge pressure in accumulators, checking and adjusting	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Precharge pressure in accumulators, checking and adjusting

Op nbr 91602

[11666135 Gas filling kit](#)

[9993831 Support, 2 pcs.](#)

[13933251 Pressure check connection](#)

[11666037 Hose](#)

NOTE!

The hydraulic pressure must be fully released before the nitrogen pressure in the accumulators is adjusted.

1. Depressurize the hydraulic oil pressure, see [916 Boom suspension system, hydraulic oil pressure in accumulators, depressurizing](#).

Checking precharge pressure

2. When checking and reducing the accumulator precharge pressure, there is no need for the gas cylinder to be connected.
3. Remove the cap nut from the accumulator valve
4. Loosen the Allen head bolt on the accumulator valve approx. 1/4 turn counter-clockwise. Use a 6 mm Allen key.
5. Screw the gas filling kit 11 666 135 onto the accumulator by hand. Make sure that there is an O-ring in position in the tool.
In some cases it may be necessary to loosen the accumulator brackets and move the accumulator in order to fit the gas filling kit in place.

NOTE!

Put the accumulator back in its original position after adjusting. Otherwise, there is a risk that the hose will chafe.

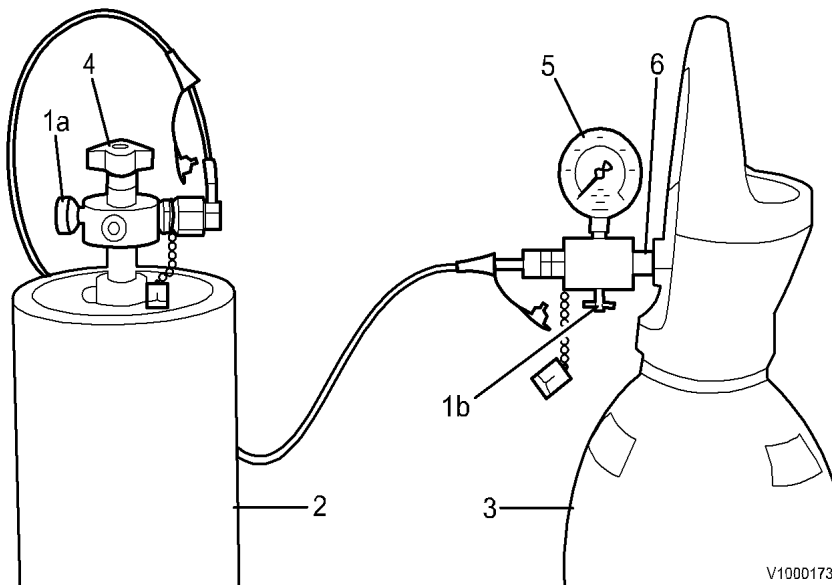


Figure 1
Gas filling kit

1. a, Unloading valve
b, Unloading valve
2. Accumulator
3. Nitrogen gas cylinder
4. Gas valve
5. Pressure gauge
6. Non-return valve

6. Close the unloading valves (1a and 1b).
7. Open the valve (4) counter-clockwise. When the pressure gauge (5) begins to indicate, the valve should be opened one more turn. The pressure gauge shows the filling pressure in the accumulator. The non-return valve (6) prevents the gas from flowing out.

Reducing precharge pressure

8. Open the unloading valves (1a and 1b) carefully.
Gas will flow out of the tool.

Increasing precharge pressure

9. Connect the tool to the nitrogen cylinder (3).
10. Open the gas valve (4) on the accumulator.
11. Carefully open the nitrogen cylinder's valve.
NOTE!
Adjust the pressure slowly, so that the gas valve (4) is not overloaded.
12. Close the nitrogen gas cylinder valve and read off the pressure on the pressure gauge.
13. Repeat this procedure until the correct precharge pressure is reached. Wait about 5 minutes to allow temperature differences to level out, then check the pressure again.

Restoring system

14. When the desired pressure is reached accumulator gas valve (4) must be closed, clockwise.
15. Remove the gas filling kit from the accumulator. Retighten the Allen head screw in the gas valve.

Tightening torque: **25 Nm (18.4 lbf ft)**

16. Check that the gas valve does not leak. Use a soap and water solution.
17. Fit an O-ring in the cap nut, then fit the cap nut.

Document Title: Boom suspension system, hydraulic oil pressure in accumulators, depressurizing	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Boom suspension system, hydraulic oil pressure in accumulators, depressurizing

Op nbr 916-070

[9993831 Support](#)

[9993831 Support](#)

[11666037 Hose](#)

[13933251 Testing nipple](#)

[14290266 Hose](#)

[11666051 Pressure gauge](#)

NOTE!

Earlier and later type checking points occur. Various tools are used, see tool list.

1. Secure the lifting frame with two stands 9993831. Place the supports on a level and firm surface. Use one stand on either side.

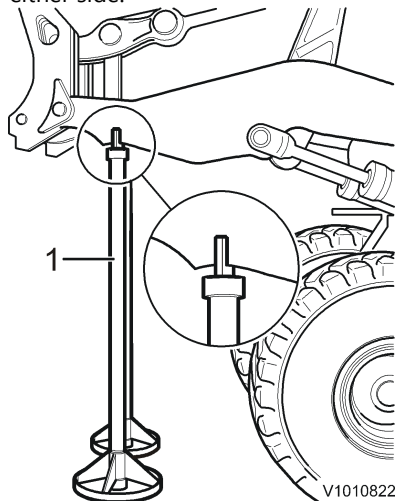


Figure 1

1. 9993831

2. Start the engine and engage floating position with switch SW903/SW933 on the instrument panel.

NOTE!

If the machine is equipped with Return To Dig[1] , the valve block for Return To Dig must be forced open by screwing the reducing valves on the valve block in and out respectively, see also [914 Valve block for Return To Dig, description](#).

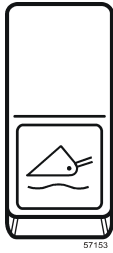


Figure 2
SW903

3. Activate the Boom Suspension System in gear-dependent position (centre position of the switch).

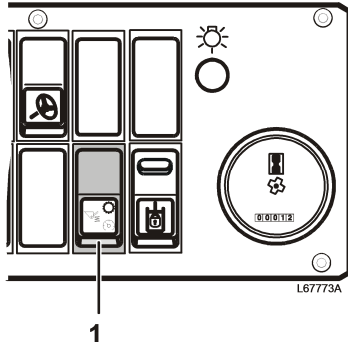


Figure 3

1. SW925

4. Move the control lever for lifting/lowering function quickly forward to the floating position and wait for 30 seconds.

NOTE!

The engine must run at low idle as there is a risk that the machine will be raised off the ground if the floating position is not active. Since the lever must pass the lowering position to get to the floating position, the lever should be moved quickly to minimise the lowering function.

5. Hold the control lever in floating position while turning off the engine.

The accumulator(s) should now have been drained and the Boom Suspension System should be without pressure. Only a residual pressure of approx. 0.3 MPa (3 bar) (44 psi) should exist in the system. To ensure that the system is without pressure before service work is begun, perform the following:

6. Connect the measuring nipple to hose 11666037.

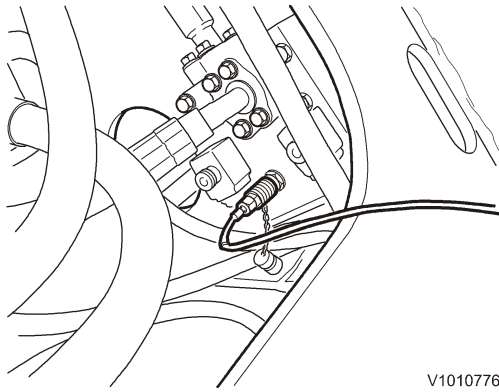
Or:

Connect the pressure gauge to hose 14290266.

7. Place the end with the measuring nipple in a suitable receptacle and connect the other end of the hose to the Boom Suspension System valve block V1. In case the hose cannot be connected to the Boom Suspension System valve block, this may be caused by excessive residual pressure in the system. If this is the case, repeat points 1–5.

Or:

Connect hose 14290266 to the checking point on the Boom Suspension System valve block V1. If the pressure reading is higher than 0.3 MPa (44 psi), points 1–5 should be repeated.



V1010776

Figure 4

8. Any residual pressure in the system is drained through hose 11666037.
Or:
Disconnect the pressure gauge, so that any residual pressure is drained through hose 14290266.

[1]Optional equipment

Document Title: Boom Suspension System, pressure limiting valve, setting	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Boom Suspension System, pressure limiting valve, setting

Op nbr 91606

11666003 Pressure gauge 0–40 MPa (0–5800 psi)

11666037 Hose

The engine, transmission and hydraulic system must have reached normal working temperature before the check is carried out.

1. Connect the pressure gauge to the pressure outlet, port M on the valve block, (snap-on coupling).

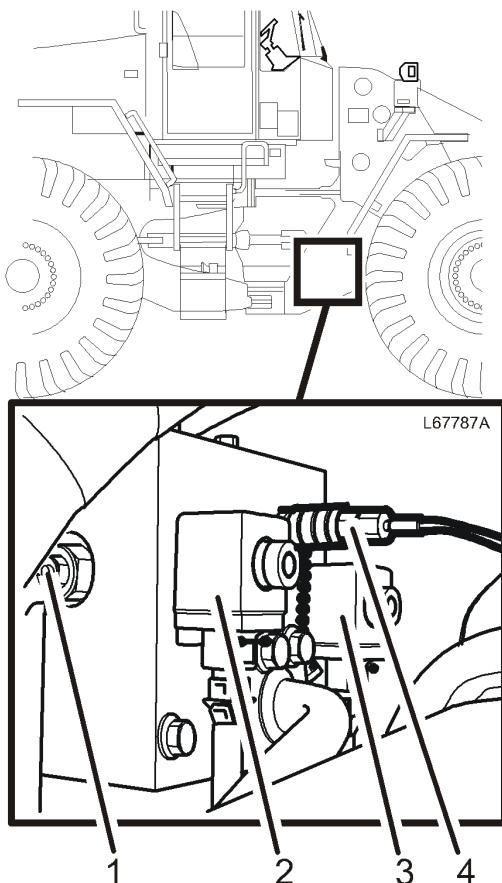


Figure 1

1. Pressure-reducing valve CT8
2. MA910
3. MA911
4. Pressure outlet, port M 11666037, 11666003

2. Start the engine and raise the lifting arms to end position.
3. Keep the lifting function working against its end position and at the same time read off the pressure gauge. The pressure should rapidly rise to **15 MPa (2176 psi)**. If the correct pressure is not obtained, adjust on the pressure-reducing valve CT8, with engine turned off. Carry out a new check after adjusting.
4. Stop the engine, release the pressure in the accumulators, remove the pressure gauge and restore the machine.

Document Title: Boom suspension system, test drive with load	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Boom suspension system, test drive with load

Op nbr 916-074

The engine, transmission and hydraulic system must have reached normal working temperature before the check is carried out.

Gear-dependent function

1. Start the engine.
2. Fill the bucket with a full load. Tilt the bucket backwards towards stop. Raise the bucket approximately 1 metre (3 ft) above the ground.
3. Engage gear F2 and drive the machine at a speed between 0–10 km/h (0–6.2 mph).
The lifting arms should not be springy.
4. Engage the Boom Suspension System by placing switch SW925 in the centre position (gear-dependent function).

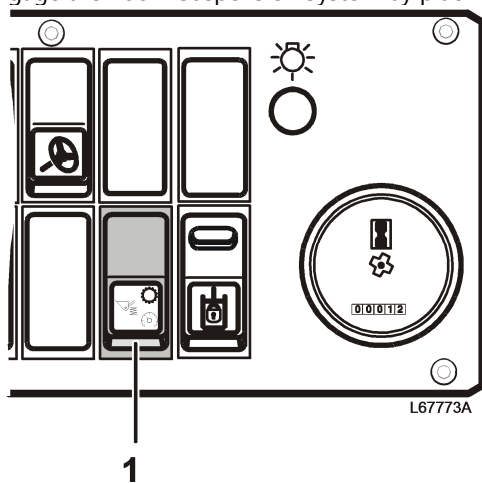


Figure 1

1. SW925
5. The control lamp lights up.
The "Hydraulics" menu on the display unit shows BSS (on) when gears F2–F4 are selected.
The lifting arms should be springy.

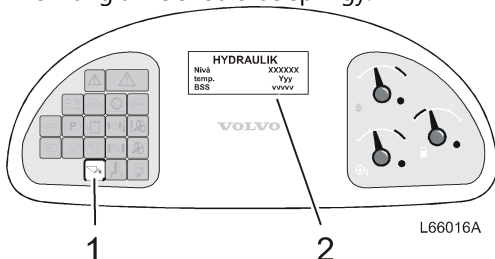


Figure 2
Centre instrument panel

1. Control lamp
 2. Display unit
6. Engage gear F1 or use kick-down.
The "Hydraulics" menu on the display unit shows BSS (off).
The lifting arms should not be springy.

Speed-dependent function starting from basic settings

7. First proceed according to steps 1–5, gear-dependent function.
8. Depress the lower end of switch SW925 (speed-dependent).
The control lamp lights up.
9. Select a gear and drive the machine.
Check the following:
Speed below 6 km/h (4 mph) in a forward gear and below 2 km/h (1.2 mph) in neutral or a reverse gear. The lifting arms should not be springy.
The "Hydraulics" menu on the display unit shows BSS (off).
Speed above 6 km/h (4 mph). The lifting arms should be springy.
The "Hydraulics" menu on the display unit shows BSS (on).

Speed-dependent function in combination with Full Automatic Power Shift (FAPS) starting from basic settings

10. First proceed according to steps 1–5, gear-dependent function
11. Press in switch SW417 (Full Automatic Power Shift (FAPS)).
The control lamp lights up.
12. Select a gear and drive the machine.
Check the following:
Speed below 8 km/h (5 mph) in a forward gear and below 1 km/h (1 mph) in neutral or a reverse gear. The lifting arms should not be springy.
The "Hydraulics" menu on the display unit shows BSS (off).
Speed above 8 km/h (5 mph). The lifting arms should be springy.
The "Hydraulics" menu on the display unit shows BSS (on).

Document Title: Boom suspension system, reconditioning accumulator	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Boom suspension system, reconditioning accumulator

Op nbr 91603

Dismantling



Gas under high pressure!

If the accumulator's precharge pressure (gas pressure) hasn't been released, there's high-pressure gas in the accumulator.

1. Before starting to work with the accumulator, the precharge pressure (gas pressure) must be released, see [916 Precharge pressure in accumulators, checking and adjusting](#).
2. Secure the accumulator in a vice.
3. Screw off the caps on both sides of the accumulator. Use two screws or studs (Ø 8 mm) in the caps' holes and a pry bar.
4. Press out the piston from the accumulator. Press from the accumulator's gas side so that the piston is pressed out on the oil side.

Checking and cleaning

5. Clean and check all parts for damage.
Make sure that no cleaning agent or lint from rags remain on any parts.
6. Fit new O-rings on both caps.
7. Fit a new back-up ring on the piston and then pull the new seal over the back-up ring.

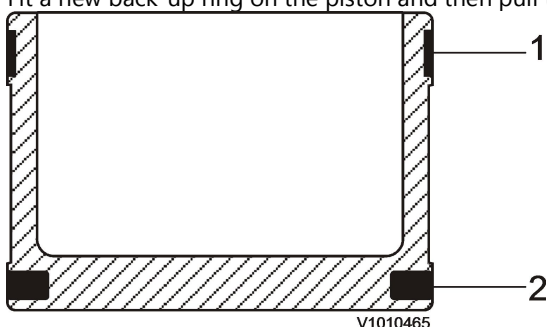


Figure 1

1. Back-up ring
2. Seal

Assembling

8. Lube the piston and the accumulator's oil side with hydraulic oil.

9. Press in the piston into the accumulator.

NOTE!

The plane side of the piston should face the accumulator's oil side.

10. Lube the caps' threads and O-rings, screw in the caps so they're flush with the accumulator's ends.
11. Fill the accumulator with gas, see [916 Precharge pressure in accumulators, checking and adjusting](#).
12. Check for any gas leaks using leak fluid, soapy water or oil.

Document Title: Boom Suspension System, valve block V1, removing	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Boom Suspension System, valve block V1, removing

Op nbr 916-075

[9993831 Support](#)

[9993831 Support](#)

[14290266 Hose](#)

[11666051 Pressure gauge](#)

[13933251 Testing nipple](#)

[11666037 Hose](#)

[9809685 Cable](#)

[14360000 Vacuum pump / 24V](#)

Crowfoot spanner, 22 mm

NOTE!

Earlier and later type checking points occur. Various tools are used, see tool list.

The operation also includes the required tools and the times for the following jobs:

- [916 Boom suspension system, hydraulic oil pressure in accumulators, depressurizing](#)
 - [910 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#)
1. Release the hydraulic oil pressure in the accumulators, see [916 Boom suspension system, hydraulic oil pressure in accumulators, depressurizing](#).
 2. Connect the vacuum pump, see [910 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#).
 3. Loosen the attaching bolts so that it is possible to move the valve block slightly.
 4. Mark hoses and connectors to facilitate installation.
 5. Disconnect the connectors (2 pcs) and the hoses (4 pcs) from the valve block. Plug the hose ends and the connections on the valve block.

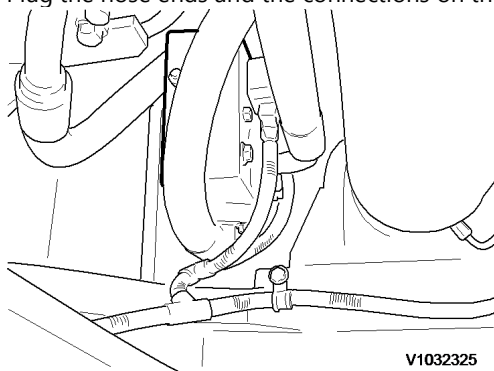


Figure 1
Valve block, V1

6. Remove the attaching bolts and remove the valve block.
Valve block weight: **approx. 15 kg (33 lb)**

Document Title: Boom Suspension System, valve block V1, installing	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Boom Suspension System, valve block V1, installing

Op nbr 916-076

[9993831 Support](#)

[9993831 Support](#)

[9809685 Cable](#)

[14360000 Vacuum pump / 24V](#)

Hook spanner, 22 mm

935537 Elbow nipple

944521 Hose

943471 Hose clip

The operation also includes the required tools and the times for the following jobs:

- [910 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#)
- [900 Hydraulic system, bleeding](#)
- [916 Boom suspension system, test drive with load](#)

1. Install the valve block and install the attaching bolts loosely. It should be possible to move the valve block slightly.
2. Connect connectors and hoses to the valve block, using new O-rings.

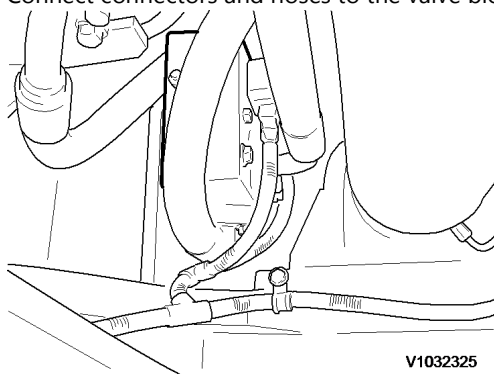


Figure 1
Valve block, V1

3. Tighten the attaching bolts.
4. Disconnect the vacuum pump, see [910 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#).
5. Restore the machine.
6. Start the engine. Bleed the working hydraulics, see [900 Hydraulic system, bleeding](#). Check that there are no leaks.

7. Check that the Boom Suspension System works, see [916 Boom suspension system, test drive with load](#).

Document Title: Boom Suspension System, valve block V2, removing	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Boom Suspension System, valve block V2, removing

Op nbr 916-077

[9993831 Support](#)

[9993831 Support](#)

[14290266 Hose](#)

[11666051 Pressure gauge](#)

[13933251 Testing nipple](#)

[11666037 Hose](#)

[9809685 Cable](#)

[14360000 Vacuum pump / 24V](#)

NOTE!

Earlier and later type checking points occur. Various tools are used, see tool list.

The operation also includes the required tools and the times for the following jobs:

- [916 Boom suspension system, hydraulic oil pressure in accumulators, depressurizing](#)
 - [910 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#)
1. Release the hydraulic oil pressure in the accumulators, see [916 Boom suspension system, hydraulic oil pressure in accumulators, depressurizing](#).
 2. Connect the vacuum pump, see [910 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#).
 3. Cut away the cable clamps for the lines (pipes and hoses) to the automatic greasing.
 4. Mark the hoses to facilitate installation.
 5. Disconnect the connector and the hoses from the valve block:
Plug the hose ends and the connections on the valve block.

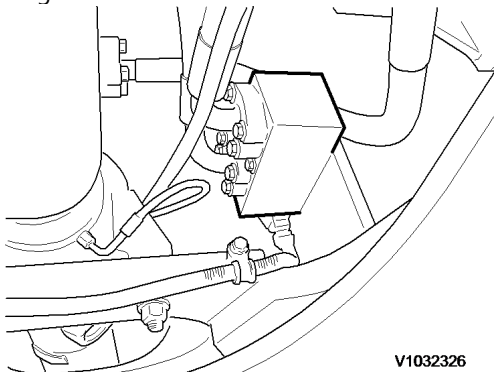


Figure 1
Valve block, V2

6. Remove the attaching bolts and remove the valve block.

Document Title: Boom Suspension System, valve block V2, installing	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Boom Suspension System, valve block V2, installing

Op nbr 916-078

[9993831 Support](#)

[9993831 Support](#)

[9809685 Cable](#)

[14360000 Vacuum pump / 24V](#)

935537 Elbow nipple

944521 Hose

943471 Hose clip

1. Install the valve block.
2. Connect the connector and hoses to the valve block, using new O-rings.

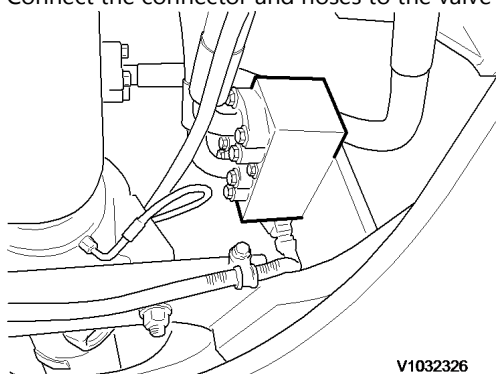


Figure 1
Valve block, V2

3. Clamp the lines (pipes and hoses) to the automatic greasing.
4. Disconnect the vacuum pump, see [910 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#).
- 5.
6. Start the engine. Bleed the working hydraulics, see [900 Hydraulic system, bleeding](#). Check that there are no leaks.
7. Check that the Boom Suspension System works, see [916 Boom suspension system, test drive with load](#).

Document Title: 3rd/4th hydraulic function, checking and adjusting pressure	Function Group: 916	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

3rd/4th hydraulic function, checking and adjusting pressure

Op nbr 916-020

[11666020 Pressure gauge](#)

[11666037 Hose](#)

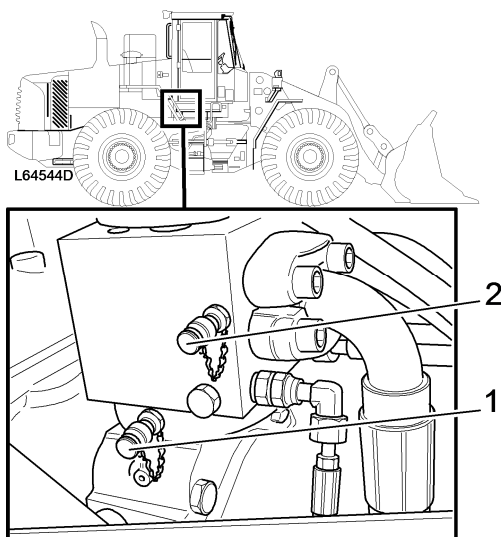


Figure 1

1. Checking point P1
2. Checking point P2

The engine, transmission and hydraulic system must have reached normal working temperature before the check is carried out.

NOTE!

Pressure adjustment should take place with the engine off.

3rd function, maximum pressure, checking

1. Remove the right side panel under the cab.
Connect the pressure gauge to the block, P2.
2. Start the engine. Operate the 3rd function against end position and read off the pressure gauge.
Maximum pressure: **21 MPa (210 bar) (3046 psi)**

Adjusting

3. Adjust on pressure-reducing valve 1, on the 3rd function.

4th function, maximum pressure, checking

4. Remove the right side panel under the cab.
Connect the pressure gauge to the block, P2.
Start the engine. Operate the 4th function against end position and read off the pressure gauge.
Maximum pressure: **21 MPa (210 bar) (3046 psi)**

Adjusting

5. Adjust on pressure-reducing valve 1, on the 4th function.

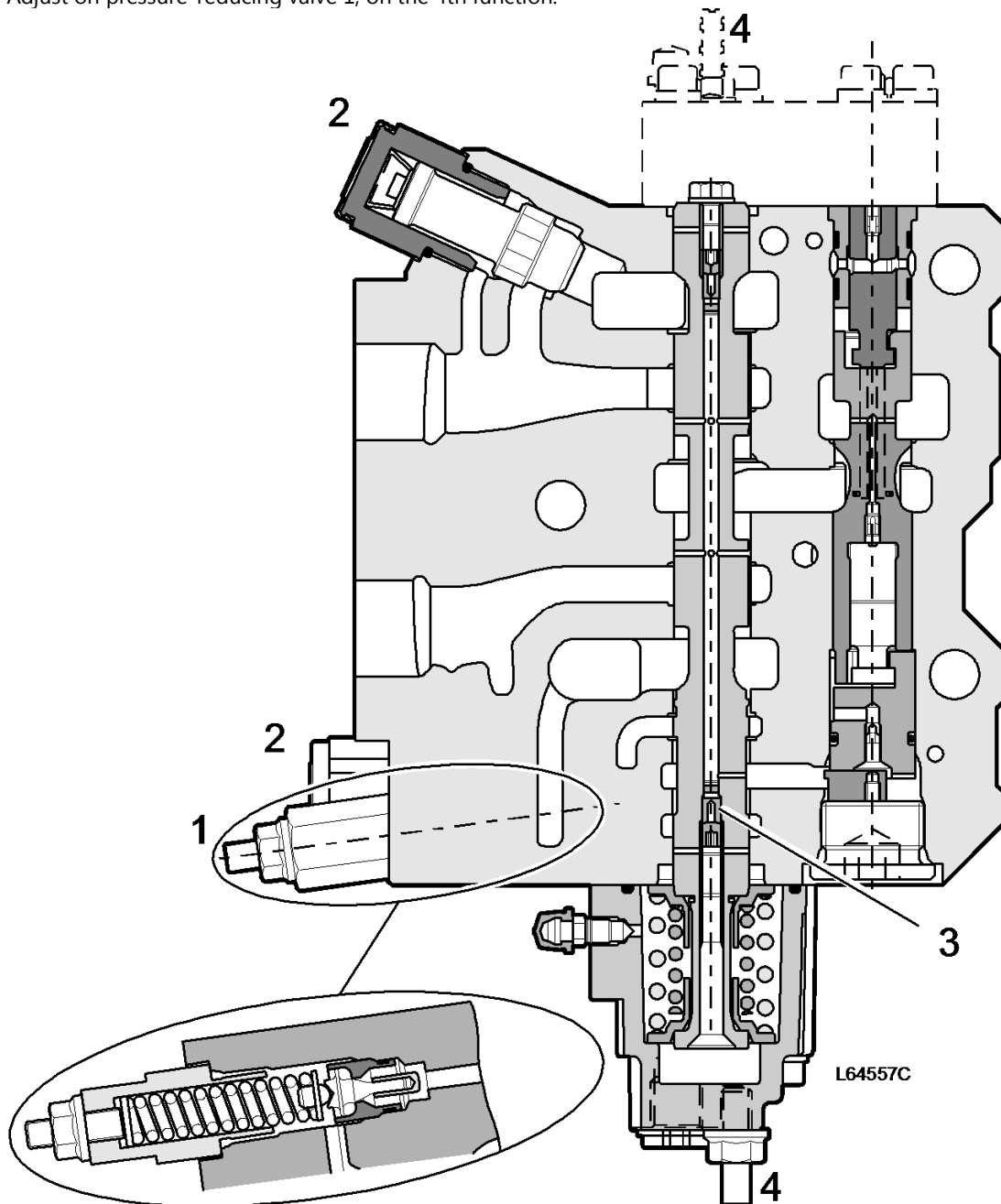


Figure 2
3rd, or 3rd/4th function, (sectional view of 3rd function)

1. Pressure-reducing valve
2. Anti-cavitation function
3. Spool actuated by servo pressure
4. Bolts limiting the stroke (not used)

Document Title: Hydraulic attachment lock with raised servo pressure, description	Function Group: 924	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic attachment lock with raised servo pressure, description

The machine can be equipped with hydraulic attachment bracket, where the attachment is locked with the aid of hydraulic cylinders (attachment lock). The attachment locking is opened and closed by actuating switch SW904 for the attachment locking. If a higher hydraulic pressure is required, switch, SW910, for raised servo pressure should be actuated.



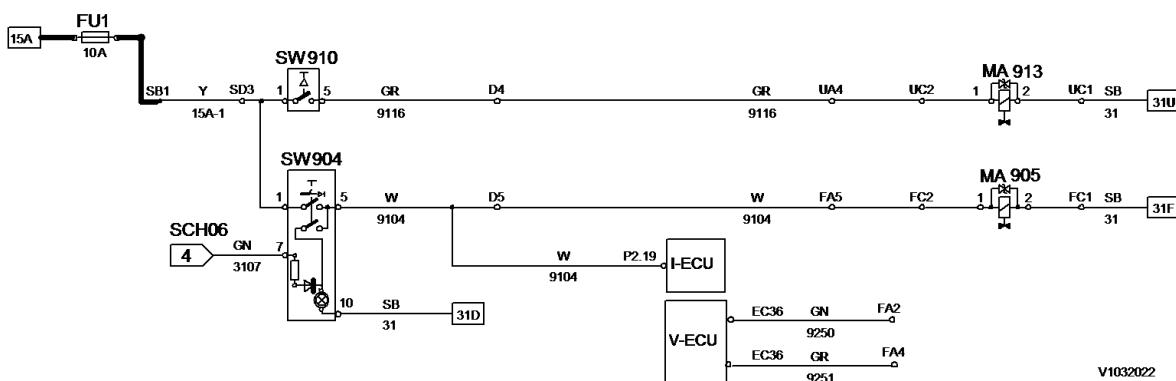
L57149

Figure 1
SW904



L57138

Figure 2
SW910



V1032022

Figure 3
Wiring diagram

Disconnecting

When switch SW904 is actuated, a signal is sent to MA905 causing it to be energised. This in turn causes the valve spool to be displaced and hydraulic oil from the servo system is conducted out to the minus sides of the locking cylinder. The oil from the locking cylinder plus sides is drained to tank. When required, switch SW910 can be actuated, which causes MA913 to be energised and a raised pressure is provided for the parking brake via solenoid valve MA501. See also complete hydraulic diagram in Section 990.

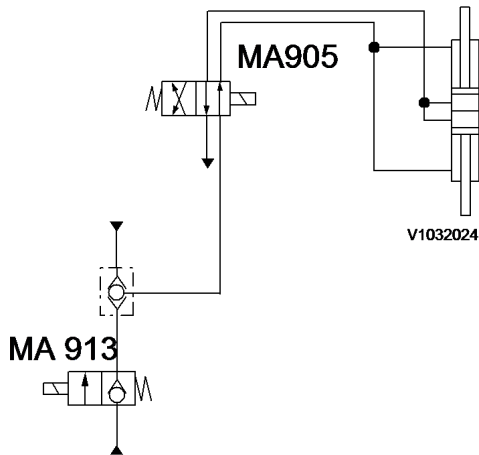


Figure 4
Disconnecting

Connecting

When switch SW904 is actuated, MA905 will be de-energised. The valve spool is displaced and hydraulic oil from the servo system is conducted out to the plus sides of the locking cylinder. The oil from the locking cylinder minus sides is drained to the tank. When required, switch SW910 can be actuated, which causes MA913 to be energised and a raised pressure is provided for the parking brake via solenoid valve MA501. See also complete hydraulic diagram in Section 990.

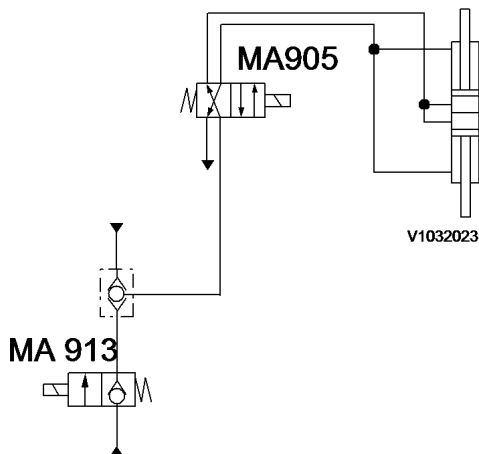


Figure 5
Connecting

Document Title: Hydraulic attachment lock (software-controlled), description	Function Group: 924	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic attachment lock (software-controlled), description

Software-controlled attachment lock has been introduced in production with effect from the following serial numbers:

Machine	ARV	ASH	PED
L60E	1462	60262	70100
L70E	21421	60373	71028
L90E	20641	66441	70861
L110E	1292	60185	70210
L120E	17565	64419	70788
L150E	7192	-	-
L180E	5932	-	-
L220E	2781	-	-

The machine can be equipped with hydraulic attachment bracket, where the attachments are locked with the aid of hydraulic cylinders (attachment lock). The attachment lock is opened and closed by actuating switch SW904 for the attachment locking. When closing the attachment lock, locking must be acknowledged with the SELECT button on the keyboard. The operator display unit shows information if the attachment lock is open.



Figure 1
SW904

When the engine is started and the switch SW904 for the attachment lock is in the "close" position, MA947 will be activated (energised) for 60 seconds. During this period it is not possible to open the attachment lock with SW904.

MA947 and MA946 respectively cause the attachment lock to close and open with the aid of oil from the brake circuit. If raised pressure is required, the V-ECU will request brake pressure charging via MA502 and MA202 in the central valve.

See also complete hydraulic diagram in Section 990 and software functions, [301 Attachment locking](#).

Opening the attachment lock

When the catch on switch SW904 is released and switch SW904 is actuated, a signal is sent to the I-ECU and MA946, which is energised. The I-ECU sends a signal to the V-ECU which requests brake charging, thus providing raised hydraulic pressure for ten seconds. If the charge air temperature is higher than 90 °C (194 °F), no brake pressure charging takes place until the temperature has dropped to below 90 °C (194 °F). The valve spool is displaced and hydraulic oil is conducted out to the minus sides of the locking cylinder. The oil from the locking cylinder plus sides is drained to the hydraulic oil tank.

When the attachment lock is open, red central warning is shown together with information "WARNING Attachment Lock Open"

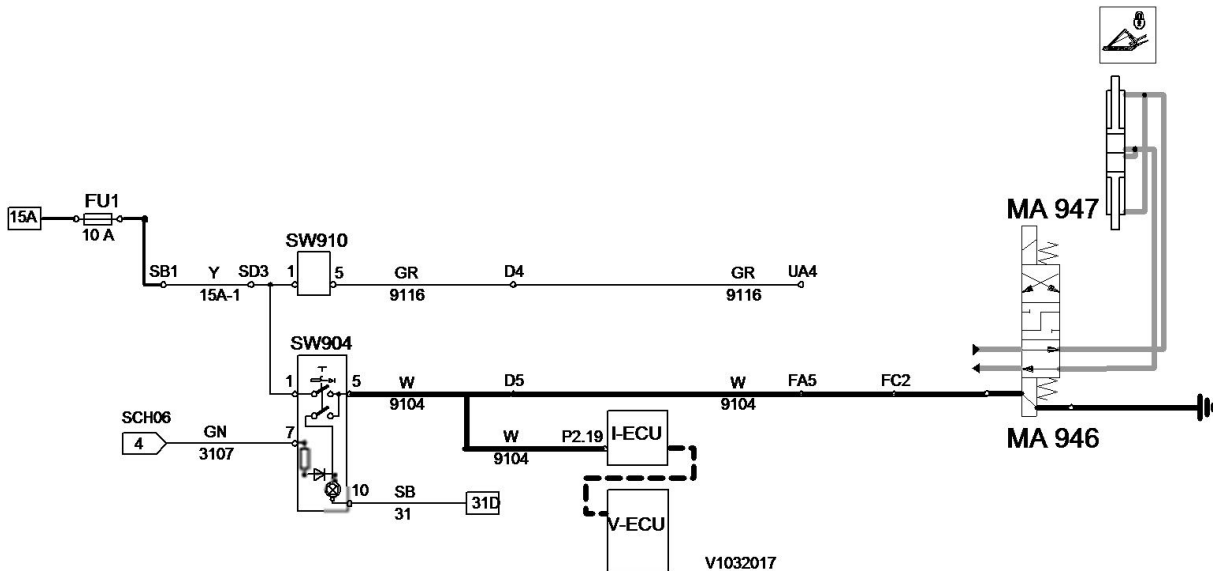


Figure 2
Opening

Closing attachment lock

When switch SW904 is moved to the "Close" position, a signal is sent to the V-ECU (via the I-ECU). The V-ECU sends a signal to MA947, which is energised. At the same time the V-ECU requests brake charging, which provides raised hydraulic pressure for ten seconds. If the charge air temperature is higher than 90 °C (194 °F), no brake pressure charging takes place until the temperature has dropped to below 90 °C (194 °F). The valve spool is displaced and hydraulic oil is conducted out to the plus sides of the locking cylinder. The oil from the locking cylinder minus sides is drained to the hydraulic oil tank.

When request for closing the attachment lock reaches the I-ECU, red central warning is shown together with information "WARNING Attachment Lock Check Lock! Acknowledge: Sel.". After checking the locking, it must be acknowledged with the SELECT button on the keyboard.

When the current to MA947 is interrupted, the valve spool is displaced to neutral position.

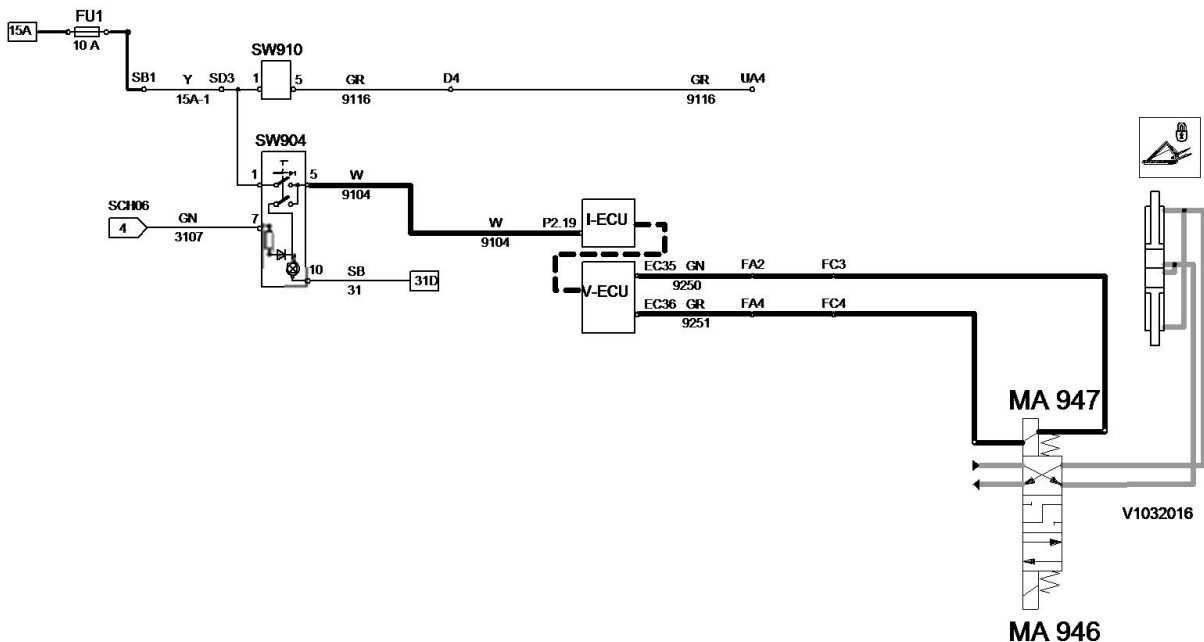


Figure 3
Closing

Document Title: Implemental attachment hydraulic replacing	Function Group: 924	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Implemental attachment hydraulic cylinder, replacing

Op nbr 924-031

[14360000 Vacuum pump / 24V](#)

Metal plugs

1. Place the machine in service position.

NOTE!

Bucket or other attachment must be disconnected.

2. Remove the protecting plate for the attachment locking hydraulic cylinder.
3. Turn the hydraulic cylinder forward with the aid of the indicator pins. Remove the cotter pins (4 pcs).

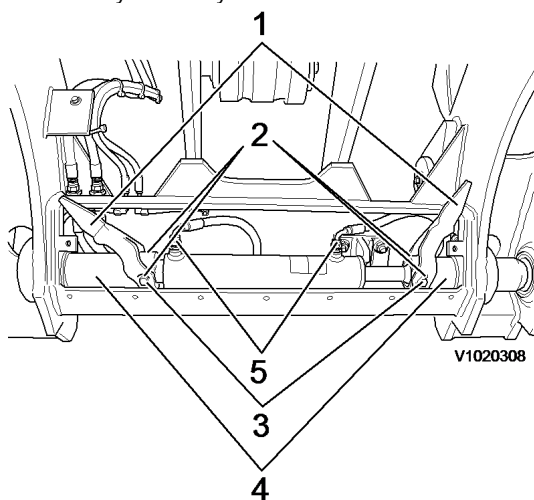


Figure 1

1. Indicator pins
2. Cotter pin (4 pcs)
3. Lock pin
4. Lock stud
5. Hydraulic hoses

4. Turn the hydraulic cylinder rearward and pull out the lock pins for the attachment bracket lock studs.

5. Move the lock studs outward so that the hydraulic cylinder becomes detached.

6. Connect the vacuum pump to the hydraulic oil tank, see [911 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#).

7. Detach the hydraulic cylinder from the hydraulic hoses and plug the connections.
8. Replace the hydraulic cylinder.
9. Remove the plugs from the connections and connect the hydraulic hoses to the hydraulic cylinder.
10. Disconnect the vacuum pump, see [911 Hydraulic oil tank, vacuum-pumping, connecting and disconnecting pump](#).
11. Move the attachment bracket lock studs inward and secure them to the hydraulic cylinder with the aid of the lock pins.
12. Lock the lock pins with cotter pins (4 pcs).
13. Start the engine and check that the attachment locking works and that there are no leaks.
14. Re-install the protecting plate for the attachment locking hydraulic cylinder.

NOTE!

The upper bolts are longer than the lower bolts.

VOLVO

Construction Equipment

Service Information

Document Title: Tilting cylinder	Function Group: 945	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Tilting cylinder

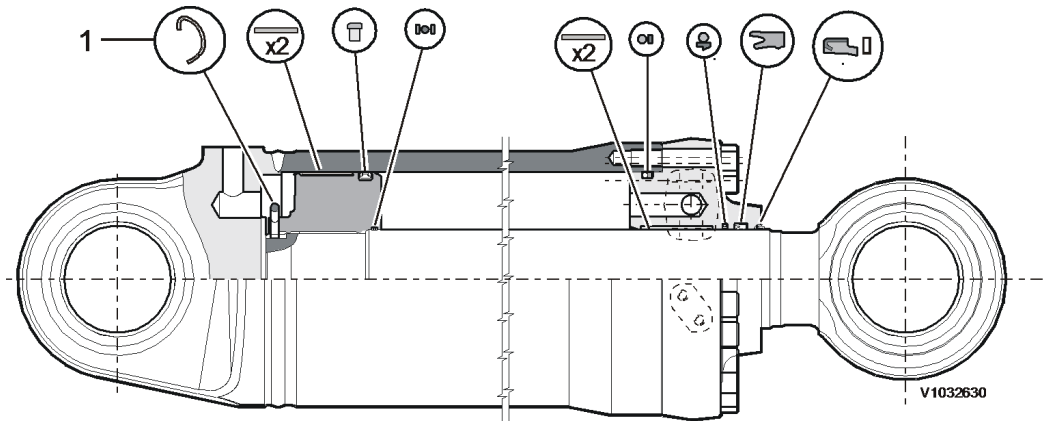


Figure 1
Tilting cylinder, sectional view

1 Clamp for locking piston

Document Title: TP linkage bearing points	Function Group: 945	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

TP linkage bearing points

TP linkage links and bearing points have been given individual letter designations in order to simplify and co-ordinate descriptions.

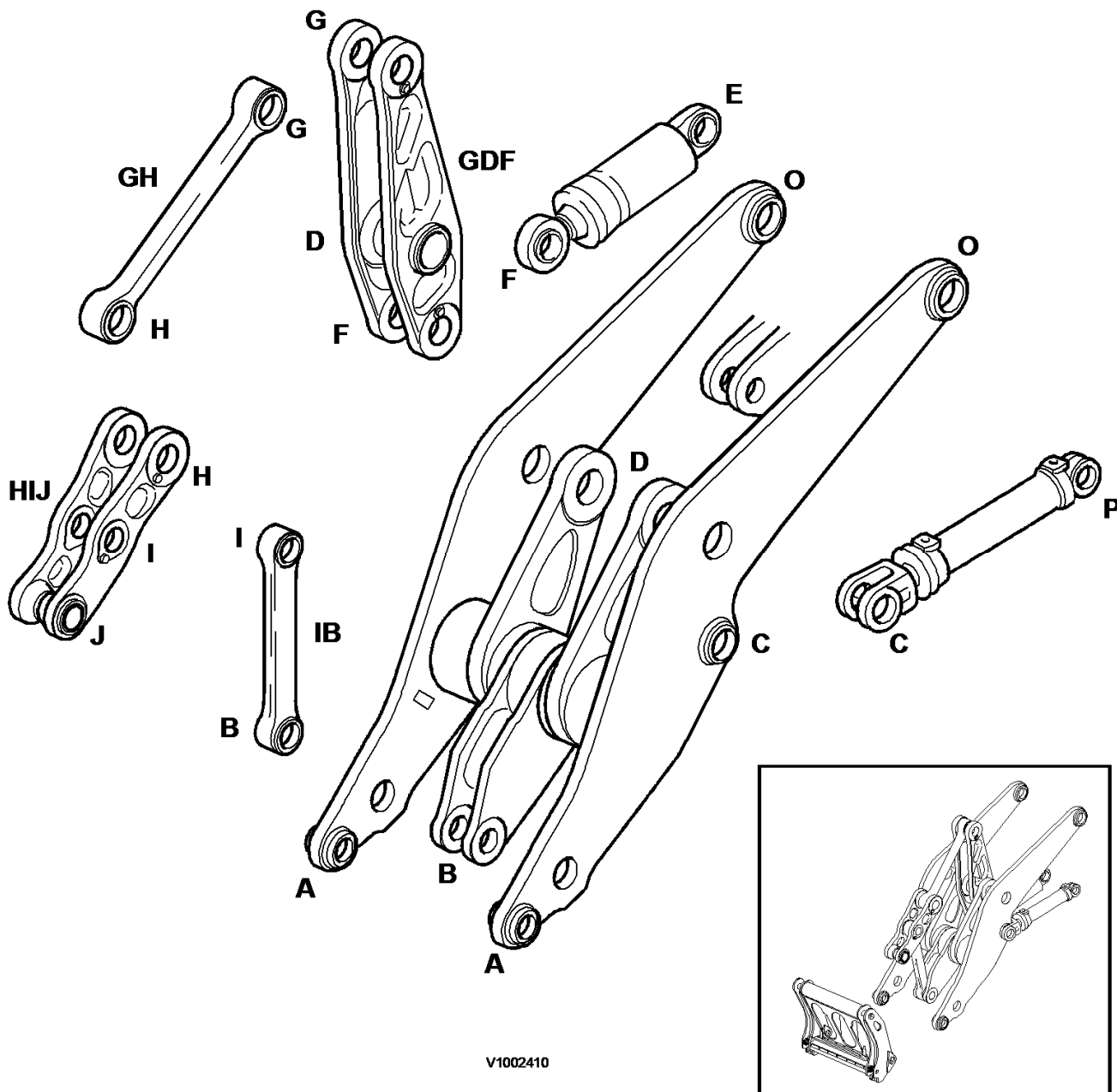


Figure 1
Designations for TP linkage bearing points

The letter designation is used for defining a specific bearing point and a combination of letters form the name of the respective links, for example, GDF - and HIJ - link respectively.

Document Title: Hydraulic cylinder, installing piston's lock brace	Function Group: 945	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic cylinder, installing piston's lock brace

Op nbr 945-030

1. Install the piston against the piston rod stop.
2. If the angle (A) is $> 45^\circ$, the piston should be rotated so that the lock brace fits into groove 1.
3. If the angle (A) is $< 45^\circ$, the piston should be rotated so that the lock brace fits into groove 2.

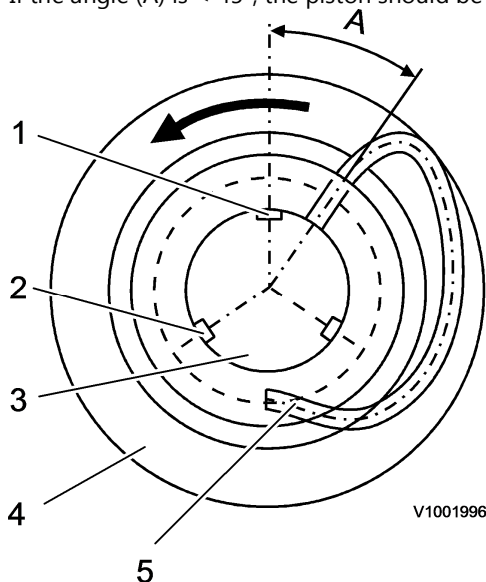


Figure 1
View from piston side

1. Groove
2. Groove
3. Piston rod
4. Piston
5. Lock brace

4. Lock the piston with the lock brace.

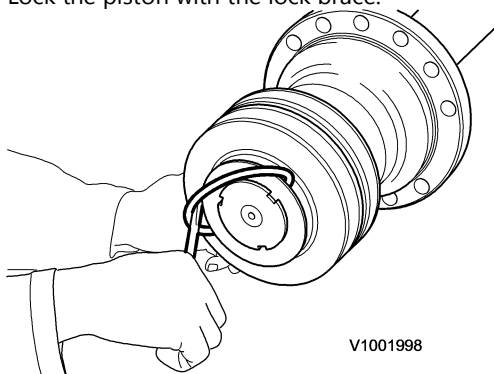


Figure 2
Locking piston

Document Title: Lift cylinder, repacking in machine	Function Group: 945	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Lift cylinder, repacking in machine

Op nbr 945-005

[9993651 Puller bolt](#)

[9993739 Support](#)

[11666013 Pump](#)

[11666055 Jack](#)

Ratchet block 750 kg (1653 lb), 3 pcs

Sling 2 m (6.6 ft), 2 pcs

Sling 4 m (13 ft), 1 pc

Sling 1 m (3 ft), 3 pcs

Axle stand, 15 tons (33069 lb), 2 pcs



Maintain greatest possible cleanliness during all work on the hydraulic system.

1. Raise the lifting frame high enough to allow removal of the piston rod pivot pin. Secure the lifting frame in this position with axle stands.

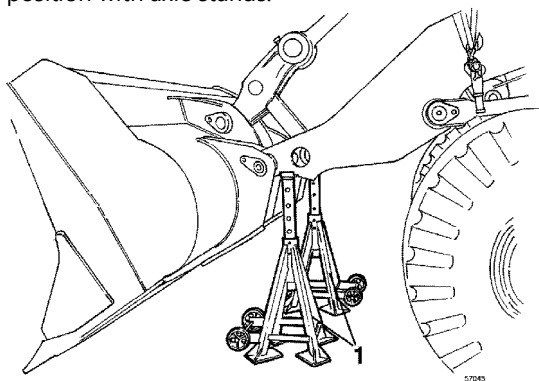


Figure 1
Supporting the lifting frame

1. Axle stand
2. Release the hydraulic oil pressure for the Boom Suspension System [1] ⓘ, see [916 Boom suspension system, hydraulic oil pressure in accumulators, depressurizing](#). Release the pressure in the hydraulic system by moving the servo control levers several times back and forth.

NOTE!

If the machine is equipped with a 4th hydraulic function, the ignition switch must be in position 1, when the pressure in the hydraulic system is released. This is so that the electrical lever-lockout does not have to be

activated.

3. Detach the hydraulic pipes from the lifting cylinder. Conduct the oil, which runs out of the cylinder, down into a suitable vessel. Install protective plugs in the lifting cylinder and the pipes.
4. Remove the piston rod pin grease nipple and lock screw.
5. Connect a ratchet block and a sling to the piston rod end. Make use of the hole in the lifting frame to prevent the ratchet block from slipping out of position. Remove the piston rod pin.

Pin weight: **approx. 28 kg (62 lb)**

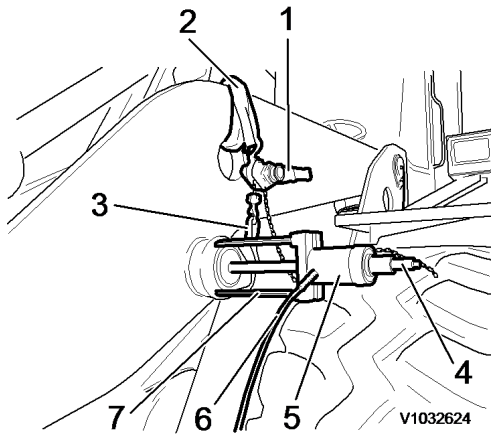


Figure 2
Removing piston rod pin

1. Ratchet block, 750 kg (1653 lb)
 2. Lifting sling, 2 m (6.6 ft)
 3. Lifting sling, 1 m (3 ft)
 4. 9993651
 5. 11666045
 6. 11666013
 7. 9993739
6. Use a wooden block to support the lifting cylinder in the frame. Place a piece of cardboard or the like under the cylinder and guide the oil, which runs out, into a vessel.

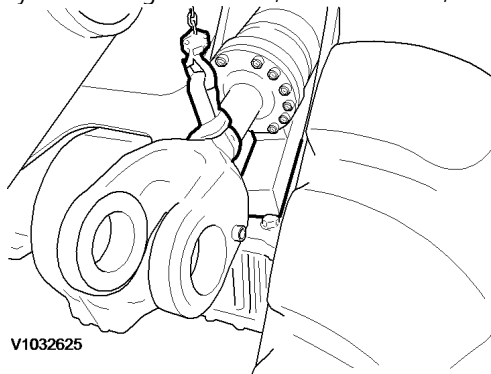


Figure 3
Supporting the lifting cylinder

7. Attach a lifting device to the piston rod. Take care not to damage or score the piston rod. Pull out the piston rod to stop.

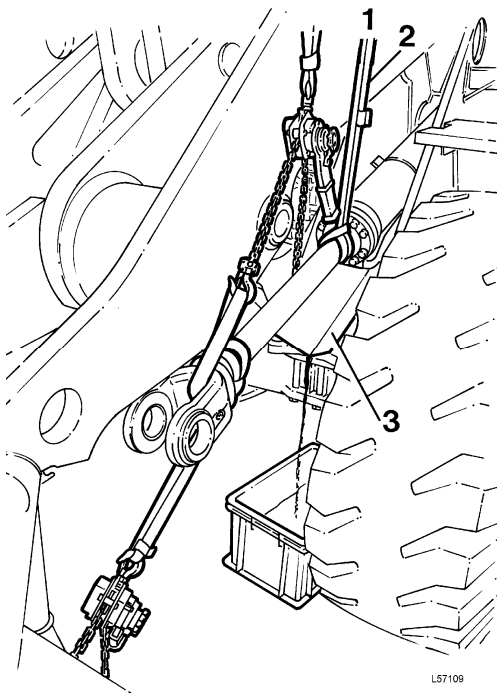


Figure 4
Draining lifting cylinder

1. Lifting device
 2. Lifting sling, 4 m (13 ft)
 3. Corrugated cardboard or similar
8. Remove the piston rod attaching bolts.
 9. Carefully pull out the piston rod.
Piston rod weight: **approx. 140 kg (309 lb)**

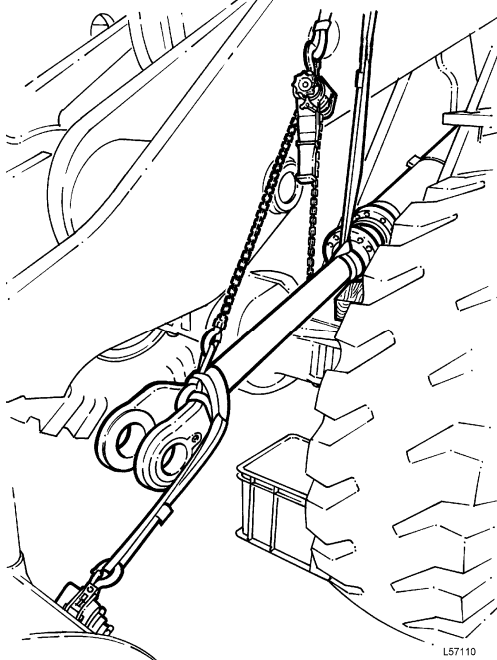


Figure 5
Removing piston rod

Dismantling

10. Remove the lock brace from the piston.

11. Remove the piston from the piston rod.
12. Carefully remove the piston rod guide so that the bushes and the seals are not damaged.
13. Replace the internal and external seals on the piston rod guide. For the location and position of the seals, see [945 Lifting cylinder](#).

NOTE!

The external seal back-up ring should be turned with the concave side towards the O-ring.

14. Check the bushes in the piston rod guide for damage. Replace if necessary.



Figure 6
Installing bushes in piston rod guide

15. Replace seals on piston, see [945 Lifting cylinder](#).

Assembling

16. Oil the piston rod guide internal bushes and seals. Carefully install the piston rod guide on the piston rod so as not to damage the bushes and the seals. Install the piston according to [945 Hydraulic cylinder, installing piston's lock brace](#).

Installing

17. Attach a lifting device and ratchet block to the piston rod. Take care not to damage or score the piston rod. Oil the seals on the piston. Also connect a ratchet block between the piston rod lug and the cylinder. Check that the bushes on the piston are not damaged. Replace if necessary. Oil the bushes and pull the piston into the cylinder.

Piston rod weight: **approx. 140 kg (309 lb)**

Install the piston rod guide bolts.

Tightening torque: see [945 Hydraulic cylinders, tightening torques](#)

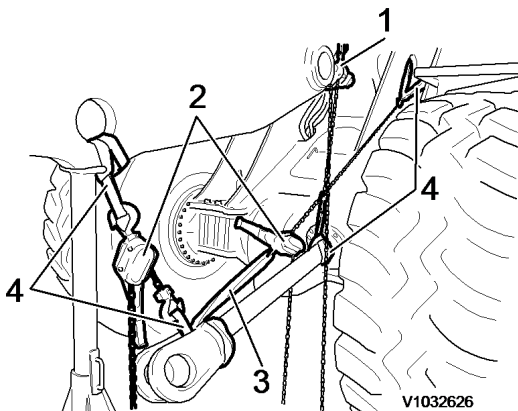


Figure 7

1. Lifting device

2. Ratchet block 750 kg (1653 lb), 2 pcs
3. Lifting sling, 4 m (13 ft)
4. Lifting sling, 2 m (6.6 ft), 4 pcs

18. Connect the hydraulic pipes under the lifting cylinder. Install new O-rings.

19. Install the piston rod pin dust seals. Force them over the bush location in the lifting frame. Check that the sealing rings at the bush are not damaged.

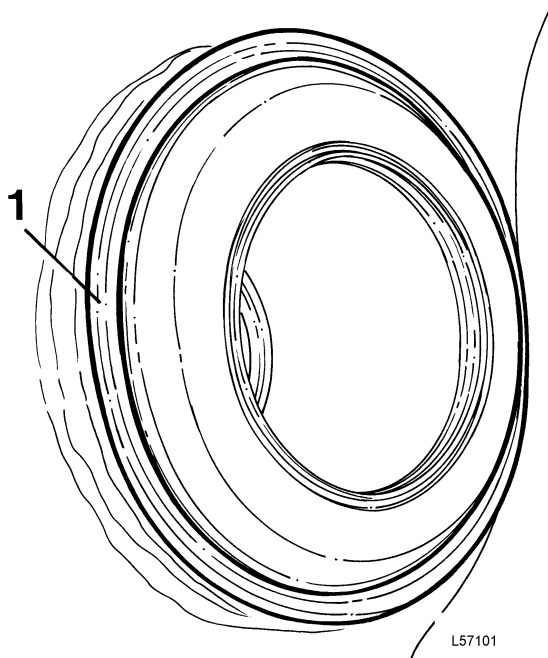


Figure 8
Pre-assembling dust seal

1. Dust seal (forced over edge)
20. Lift up and install the piston rod lug in the lifting frame. Clean and grease the pin. Tap in the pin with a rubber mallet. Poke the dust seals down into position so that they seal against the piston rod lug. Install the lock screw and the grease nipple. Lubricate the pin until grease is pressed out through the dust seal.
21. Check the oil level in the hydraulic oil tank. Top up when required.
22. Start the engine. Bleed the cylinder, see [900 Hydraulic system, bleeding](#). Check for leakage.

[1]Optional equipment

Document Title: Lift cylinder, replacing	Function Group: 945	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Lift cylinder, replacing

Op nbr 945-004

[9993651 Puller bolt](#)

[9993739 Support](#)

[11666013 Pump](#)

[11666055 Jack](#)

Axle stand, 15 tons (33069 lb), 2 pcs

Ratchet block, 750 kg (1653 lb)

Sling 2 m (6.6 ft), 3 pcs

Sling, 5 m (16 ft)



Maintain greatest possible cleanliness during all work on the hydraulic system.

1. Raise the lifting frame high enough to allow removal of the piston rod pin. Secure the lifting frame in this position with axle stands.

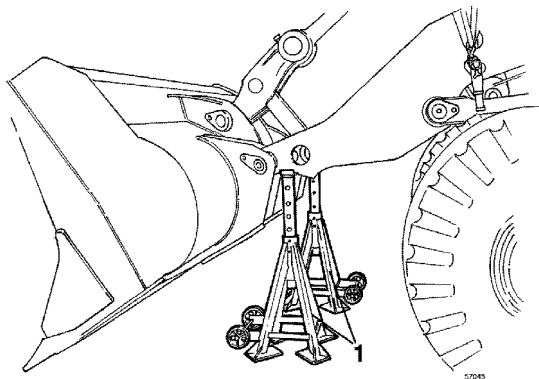


Figure 1
Supporting lifting frame

1. Axle stand, 15 tons (33069 lb)
2. Release the hydraulic oil pressure for the Boom Suspension System [1] ⓘ, see [916 Boom suspension system, hydraulic oil pressure in accumulators, depressurizing](#). Release the pressure in the hydraulic system by moving the servo control levers several times back and forth.

NOTE!

If the machine is equipped with a 4th hydraulic function, the ignition switch must be in position 1, when the pressure in the hydraulic system is released. This is so that the electrical lever-lockout does not have to be activated.

3. Disconnect the hydraulic pipes from the lifting cylinder. Conduct the oil, which runs out of the cylinder, down into a

suitable vessel. Install protective plugs in the lifting cylinder and the pipes.

4. Remove the piston rod pin grease nipple and lock screw.
5. Connect a ratchet block and a sling to the piston rod end. Make use of the hole in the lifting frame to prevent the ratchet block from slipping out of position. Remove the piston rod pin.

Pin weight: **approx. 28 kg (62 lb)**

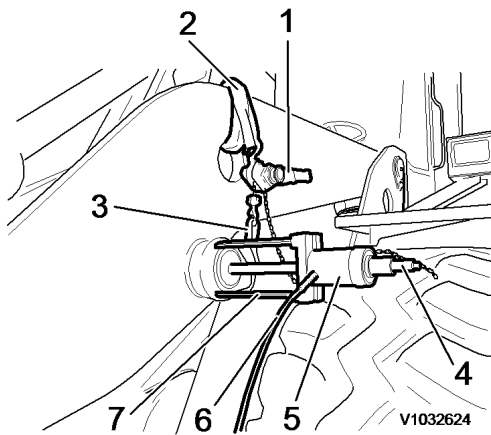


Figure 2
Removing piston rod pin

1. Ratchet block, 750 kg (1653 lb)
2. Lifting sling, 2 m (6.6 ft)
3. Lifting sling, 1 m (3 ft)
4. 9993651
5. 11666045
6. 11666013
7. 9993739

6. Attach a lifting device to the centre of the hydraulic cylinder.

Cylinder weight: **approx. 280 kg (620 lb)**

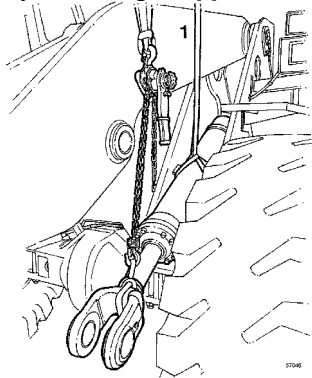


Figure 3
Removing lifting cylinder

1. Lifting sling, 5 m (16.4 ft)
7. Remove the grease nipple and the lock screw from the lifting cylinder pin.
 8. Connect a lifting device to the lifting cylinder pin. Pull out the pin.
Pin weight incl. tools: **Approx. 55 kg (121 lb)**

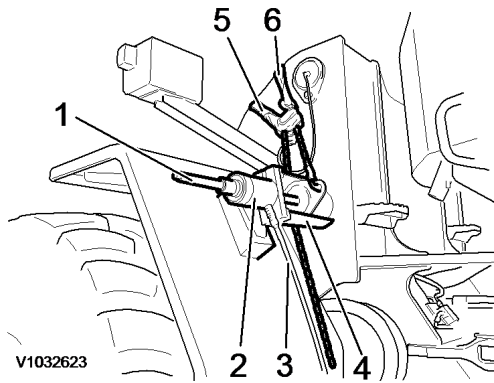


Figure 4
Removing lifting cylinder pivot pin

1. 9993651
2. 11666045
3. 11666013
4. 9993739
5. Ratchet block, 750 kg (1653 lb)
6. Lifting sling, 2 m (6.6 ft)

9. Move the cylinder forward and lower it. At the same time lower the piston rod end using the ratchet block.

Installing lifting cylinder

10. Attach a lifting device to the lifting cylinder.

Cylinder weight: **approx. 280 kg (620 lb)**

Connect a ratchet block and a sling between the lifting frame and the piston rod end. Make use of the hole in the lifting frame to prevent the ratchet block from slipping out of position.

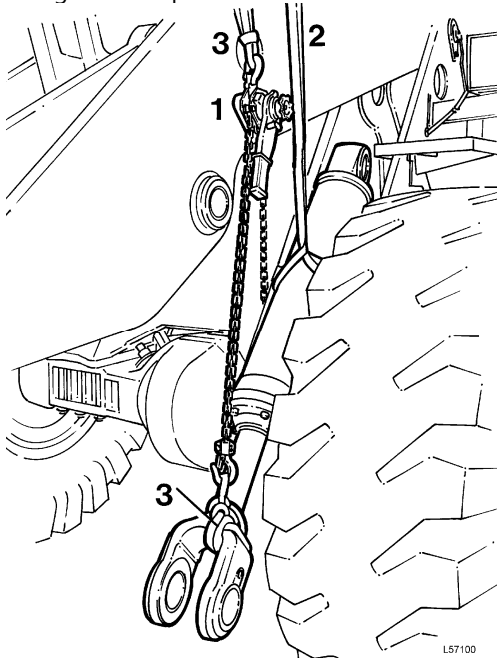


Figure 5
Installing lifting cylinder

1. Ratchet block, 750 kg (1653 lb)
2. Lifting sling, 5 m (16.4 ft)
3. Lifting sling, 2 m (6.6 ft)

11. Align the lifting cylinder with the location in the front frame so that the bush is centred in the location for the pin.

Install a cleaned and greased pin. Tap in the pin with a rubber mallet.

12. Install the lock screw and the grease nipple. Lubricate the pin until grease is pressed out through the dust seal.
13. Connect the hydraulic pipes under the lifting cylinder. Install new O-rings.
14. Install the piston rod pin dust seals. Force them over the bush location in the lifting frame. Check that the sealing rings at the bush are not damaged.

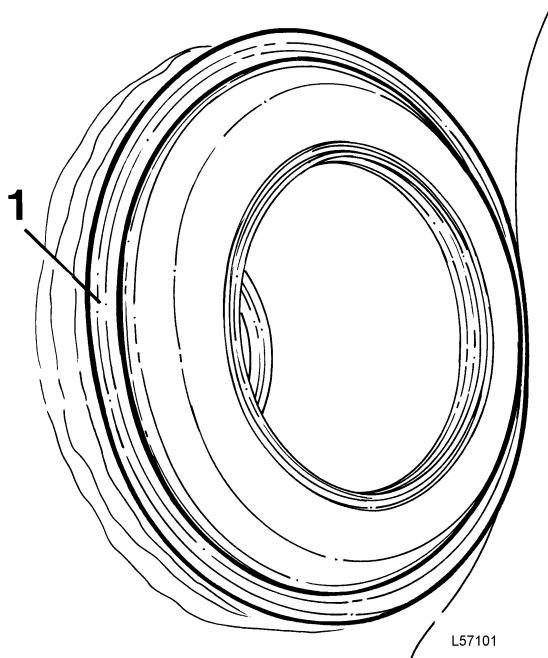


Figure 6
Pre-assembling seal

1. Dust seal (forced over edge)
15. Lift up and install the piston rod lug in the lifting frame. Clean and grease the pin. Tap in the pin with a rubber mallet. Poke the dust seals down into position so that they seal against the piston rod lug. Install the lock screw and the grease nipple.
Lubricate the pin until grease is pressed out through the dust seal.
16. Check the oil level in the hydraulic oil tank. Top up with oil when required.
17. Start the engine. Bleed the cylinder, see [900 Hydraulic system, bleeding](#). Check that there are no leaks.

[1]Optional equipment

Document Title: Lift cylinder removed, replacing bearings "C-P"	Function Group: 945	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Lift cylinder removed, replacing bearings "C-P"

Op nbr 945-012

[9993652 Puller bolt](#)

[9993739 Support](#)

[11666013 Pump](#)

[11666055 Jack](#)

[11667130 Drift plate](#)



Maintain greatest possible cleanliness during all work on the hydraulic system.

Replacing cylinder pin bushes

1. Remove one scraper ring.
2. Press in the bush while simultaneously pushing the worn bush out. Make sure that the lubrication grooves in the bush are correctly lined up. Place the bush in the centre so the scraper rings can be installed on either side.

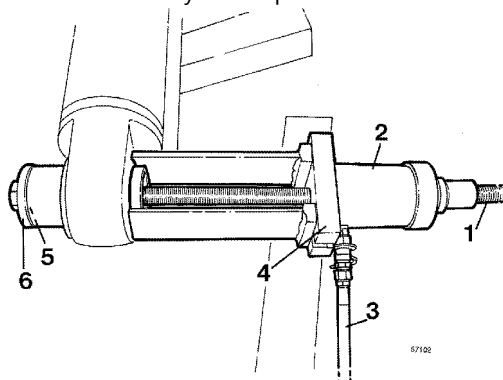


Figure 1
Pressing cylinder pin bush in and out

1. 9993652
2. 11666045
3. 11666013
4. 9993739
5. 11667130

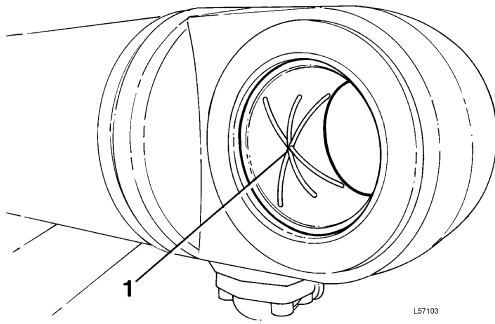


Figure 2
Bush location in lifting cylinder

1. Lubrication groove
3. Knock away the worn bush from the scraper ring location. Install scraper rings on both sides of the bush.

Replacing piston rod pin bushes

4. Remove the inner scraper ring.
5. Press in the bush while simultaneously pushing the worn bush out. Make sure that the lubrication grooves are lined up according to the figure. Place the bush in the centre so the scraper rings can be installed on either side.

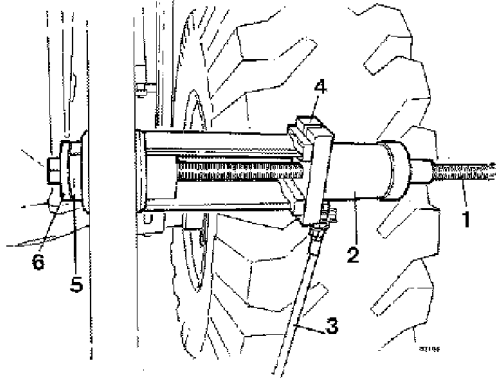


Figure 3
Pressing cylinder pin bush in and out

1. 9993652
2. 11666045
3. 11666013
4. 9993739
5. 11667130

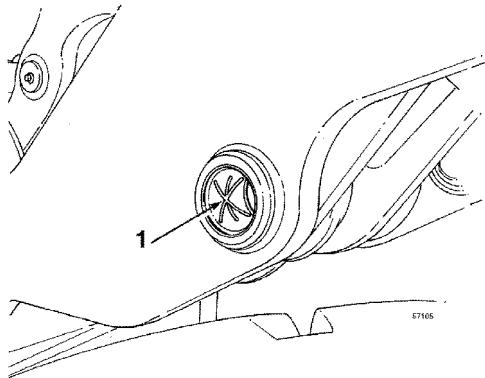


Figure 4
Bush location in lifting frame

1. Lubrication groove
6. Knock away the worn bush from the scraper ring location. Install scraper rings on both sides of the bush.

Document Title: Tilting cylinder, replacing bearing 'E' in machine	Function Group: 945	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Tilting cylinder, replacing bearing 'E' in machine

Op nbr 945-023

[9993652 Puller bolt](#)

[9993739 Support](#)

[11666013 Pump](#)

[11666055 Jack](#)

[11667130 Drift plate](#)

Sling, 6 m (20 ft)

Axle stand, 15 tons (33069 lb), 2 pcs

1. Raise the lifting frame and secure it with axle stands. Tilt down the bucket so that it lies flat on the ground.

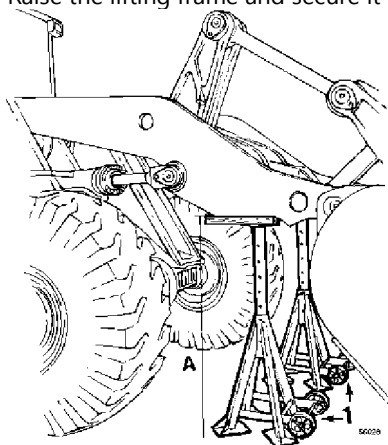


Figure 1
Supporting lifting frame

1	Axle stand, 15 tons (33069 lb)
A	145–150 cm (57–59 in)

2. Release the hydraulic oil pressure for the Boom Suspension System [1] ①, see [916 Boom suspension system, hydraulic oil pressure in accumulators, depressurizing](#). Release the pressure in the hydraulic system by moving the servo control levers several times back and forth.

NOTE!

If the machine is equipped with a 4th hydraulic function, the ignition switch must be in position 1, when the pressure in the hydraulic system is released. This is so that the electrical lever-lockout does not have to be activated.

3. Attach a lifting device to the tilting cylinder. Take care not to damage or score the piston rod.

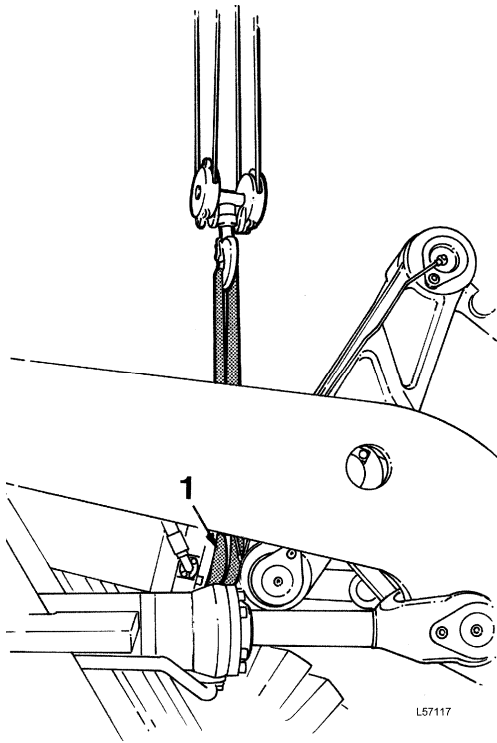


Figure 2

1. Lifting sling, 6 m (20 ft)
4. Remove the lubrication pipe, lock screw and position indicator from the pin.
5. Pull out the tilting cylinder piston rod pin (without removing it from the outer lug), so that the cylinder lug can be lowered.

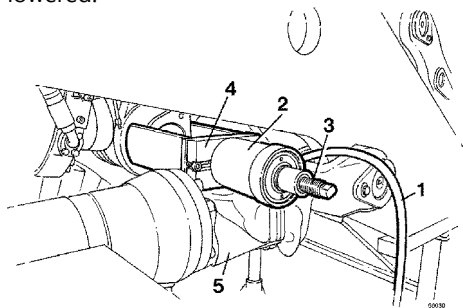


Figure 3

1. 11666013
2. 11666045
3. 9993652
4. 9993739
5. Protection for lifting cylinder piston rod.

Support the cylinder against the frame with a block of wood.

6. Remove the scraper ring from one of the sides. Press out the bush from the cylinder lug at the same time as pressing in a new bush. Knock out the old bush from the scraper ring location. Install new scraper rings.

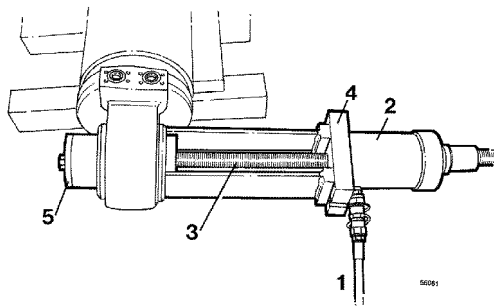


Figure 4
Pressing bush in and out of cylinder lug

1. 11666013
2. 11666045
3. 9993652
4. 9993739
5. 11667130

7. Lift and align the cylinder lug. At the same time install the dust seals on the lug.
8. Clean and grease the pin and knock it in. Allow the dust seals to slide into position.
9. Install the lock screw, the lubrication pipe and the position indicator.
Make sure that the dust seals are positioned correctly. Lubricate the pin until grease is pressed out through the dust seal.

[1]Optional equipment

Document Title: Tilt cylinder, repacking in machine	Function Group: 945	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Tilt cylinder, repacking in machine

Op nbr 945-009

[9993651 Puller bolt](#)

[9993739 Support](#)

[11666013 Pump](#)

[11666055 Jack](#)

[9993579 Installation tool](#)

Ratchet block 750 kg (1653 lb), 2 pcs

Sling, 6 m (20 ft)

Sling 2 m (6.6 ft), 2 pcs

Torque multiplier 4x



Maintain greatest possible cleanliness during all work on the hydraulic system.

1. Raise the lifting frame and secure it with axle stands. Tilt down the bucket so that it lies flat on the ground.

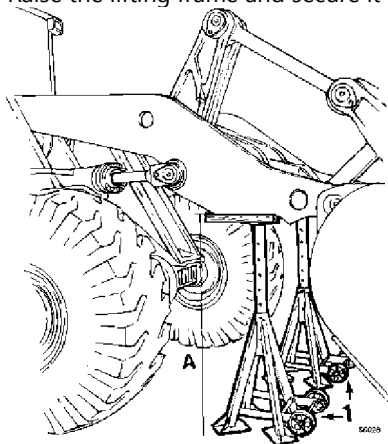


Figure 1
Supporting lifting frame

1. Axle stand, 15 tons (33069 lb)
- A. 145–150 cm (57–59 in)
2. Release the hydraulic oil pressure for the Boom Suspension System [1] ①, see [916 Boom suspension system, hydraulic oil pressure in accumulators, depressurizing](#). Release the pressure in the hydraulic system by moving the servo control levers several times back and forth.

NOTE!

If the machine is equipped with a 4th hydraulic function, the ignition switch must be in position 1, when the pressure in the hydraulic system is released. This is so that the electrical lever-lockout does not have to be activated.

3. Connect a lifting device to the tilting cylinder. Take care not to damage or score the piston rod.

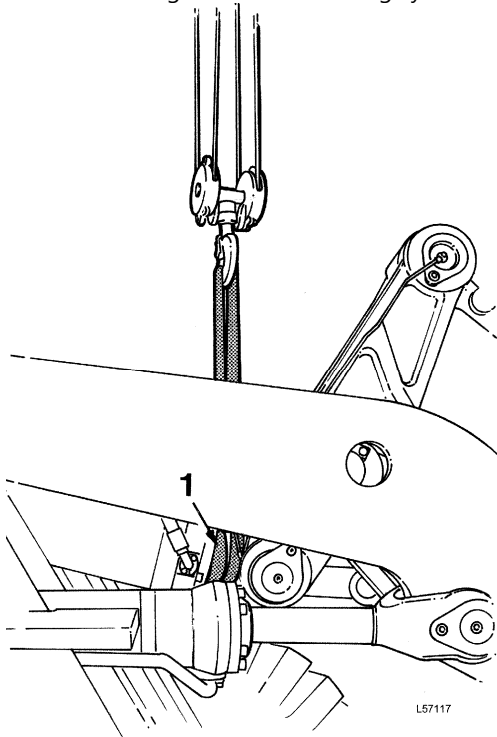


Figure 2

1. Lifting sling, 6 m (20 ft)
4. Remove the lubrication pipe, lock screw and position indicator from the pin.
5. Pull out the tilting cylinder piston rod pin (without removing it from the outer lug), so that the cylinder lug can be lowered.
Pin weight: **approx. 28 kg (62 lb)**

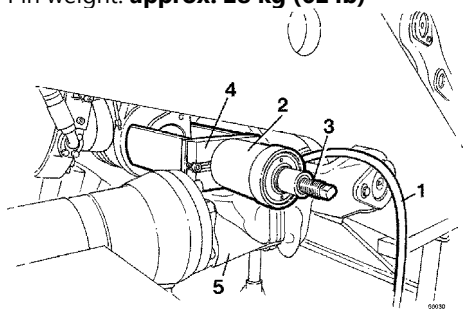


Figure 3

Removing the tilting cylinder piston rod pin

1. 11666013
2. 11666045
3. 9993651
4. 9993739
5. Piston rod guard

Use a wooden block to support the tilting cylinder against the frame.

6. Disconnect the hydraulic hoses from the plus and minus sides of the piston rod guide. Conduct the oil, which runs

out of the cylinder, down into a suitable vessel.

Amount of oil: **approx. 20 litres (5.3 US gal)**

7. Attach a lifting device to the piston rod. Take care not to damage or score the piston rod. Remove the piston rod guide bolts. Remove the piston rod. Collect the oil in a suitable vessel.
Piston rod weight: **approx. 165 kg (364 lb)** including piston and guide

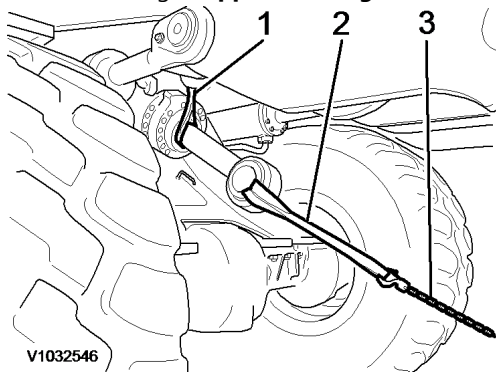


Figure 4
Removing piston rod

1. Lifting device and lifting sling, 6 m (20 ft)
 2. Lifting sling, 2 m (6.6 ft)
 3. Ratchet block, 750 kg (1653 lb)
8. Remove the lock brace from the piston. Remove the piston and piston rod guide from the piston rod.
Piston weight: **approx. 27 kg (60 lb)**
Piston rod guide weight: **approx. 50 kg (110 lb)**
 9. Replace the internal and external seals on the piston and the piston rod guides. For the location and position of the seals, see [945 Tilting cylinder](#)

NOTE!

The back-up rings of the internal seals should be turned with the concave side towards the O-ring.

Assembling

10. Oil the piston rod guide internal bushes and seals. Carefully install the piston rod guide on the piston rod so as not to damage the bushes and the seals. Install the piston according to [945 Hydraulic cylinder, installing piston's lock brace](#).

Installing

11. Attach a lifting device to the piston rod. Take care not to damage or score the piston rod. Oil the seals on the piston. Check that the bushes on the piston are not damaged. Replace if necessary. Oil the bushes and pull the piston into the tilting cylinder.
Piston rod weight: **approx. 165 kg (364 lb)** including piston and guide
Install the piston rod guide bolts.
Tightening torque: see [945 Hydraulic cylinders, tightening torques](#)

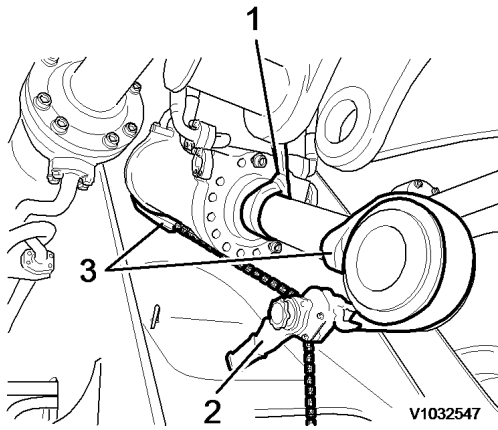


Figure 5
Installing piston rod

1. Lifting device and lifting sling, 6 m (20 ft)
 2. Ratchet block, 750 kg (1653 lb)
 3. Lifting sling, 2 m (6.6 ft), 2 pcs
12. Replace the O-rings and connect the hoses to the plus and minus sides of the tilting cylinder.
13. Check that the scraper rings and the bushes are not damaged. Replace if necessary. Lift and align the piston rod end in the "GDF-link". At the same time install the dust seals.

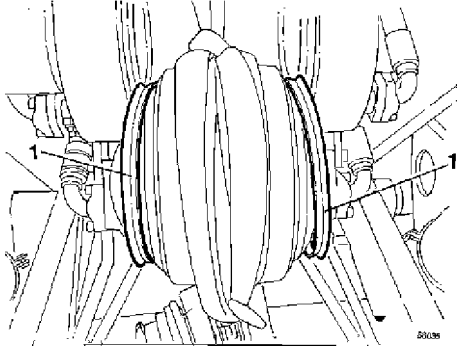


Figure 6
Installing dust seals

1. Dust seals
14. Install a cleaned and greased pin. Tap in the pin with a soft mallet. Allow the dust seals to slide into correct position.
15. Install the lock screw, the lubrication pipe and the position indicator. Make sure that the dust seals are positioned correctly. Lubricate the pin until grease is pressed out through the dust seal.
16. Adjust the oil level in the hydraulic oil tank.
17. Start the engine. Bleed the cylinder, see [900 Hydraulic system, bleeding](#). Check for leakage.

[1]Optional equipment

Document Title: Tilt cylinder, replacing	Function Group: 945	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Tilt cylinder, replacing

Op nbr 945-008

[9993651 Puller bolt](#)

[9993652 Puller bolt](#)

[9993739 Support](#)

[11666013 Pump](#)

[11666055 Jack](#)

Ratchet block, 750 kg (1653 lb)

Shackle

Sling, 4 m (13 ft)

Sling, 2 m (6.6 ft)



Maintain greatest possible cleanliness during all work on the hydraulic system.

Removing

1. Raise the lifting frame and secure it with axle stands. Tilt down the bucket so that it lies flat on the ground.

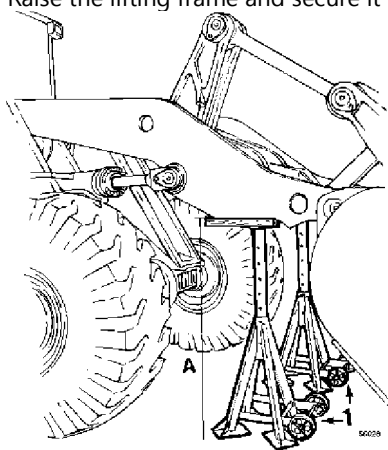


Figure 1
Supporting lifting frame

1. Axle stands, 15 tons (33069 lb)
- A. 145–150 cm (57–59 in)
2. Release the hydraulic oil pressure for the Boom Suspension System [1] ⓘ, see [916 Boom suspension system, hydraulic oil pressure in accumulators, depressurizing](#). Release the pressure in the hydraulic system by moving the servo control levers several times back and forth.

NOTE!

If the machine is equipped with a 4th hydraulic function, the ignition switch must be in position 1, when the pressure in the hydraulic system is released. This is so that the electrical lever-lockout does not have to be activated.

3. Remove the hydraulic hoses from the piston rod guide and the hydraulic pipes from the top of the cylinder jacket. Use protective plugs.
4. Connect a lifting device to the tilting cylinder. Take care not to damage or score the piston rod.

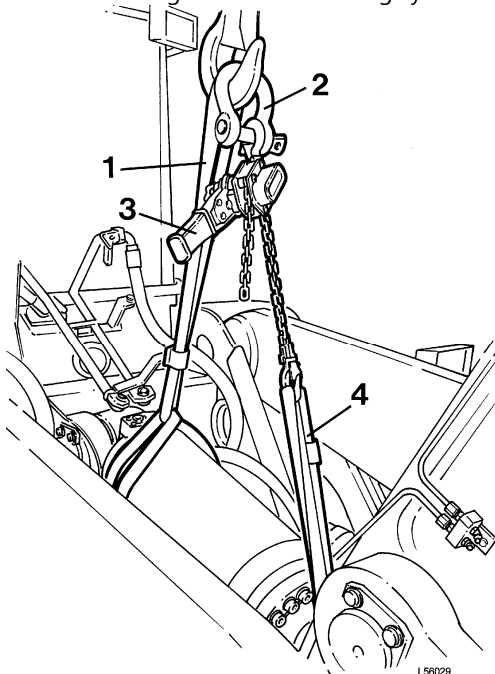


Figure 2
Removing tilting cylinder

1. Lifting sling, 4 m (13 ft)
2. Shackle
3. Ratchet block, 750 kg (1653 lb)
4. Lifting sling, 2 m (6.6 ft)

5. Remove the lubrication pipe, lock screw and position indicator from the pin.
6. Pull out the tilting cylinder piston rod pin (without removing it from the outer lug), so that the cylinder lug can be lowered.

Pin weight: **approx. 26 kg (57 lb)**

NOTE: Protect the lifting cylinder piston rod.

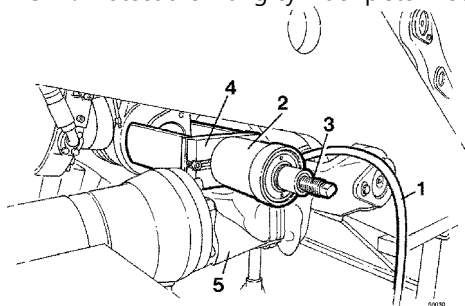


Figure 3
Removing tilting cylinder piston rod pin

1. 11666013
2. 11666045
3. 9993651

4. 9993739
 5. Protection for piston rod
7. Remove the lubrication pipe and the lock screw from the pivot pin at the cylinder attachment in the front frame.
 8. Remove the pivot pin from the cylinder attachment in the front frame.

Pin weight: **approx. 30 kg (66 lb)**

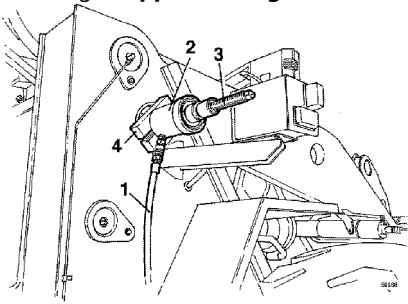


Figure 4

Removing pivot pin, tilting cylinder attachment in front frame

1. 11666013
 2. 11666045
 3. 9993652
 4. 9993739
9. Lift away the tilting cylinder.
Cylinder weight: **approx. 400 kg (880 lb)**

Installing

10. Attach a lifting device to the tilting cylinder and lift it up. Take care not to damage or score the piston rod.
Cylinder weight: **approx. 400 kg (880 lb)**
11. Install dust seals and align the cylinder with the attachment in the frame. Centre the bush with the pin location in the frame. Check that the scraper rings at the bushes are not damaged. Replace when required, see [945 Tilt cylinder removed, replacing bearings "E-F"](#).
12. Clean and grease the pin and location. Install the pivot pin. Lock the pin with the lock screw. Connect the lubrication pipe to the pin.
13. Align the piston rod lug in the GDF-link. At the same time, install the dust seals and allow them to slide into position. Check that the scraper rings by the bushes are not damaged.

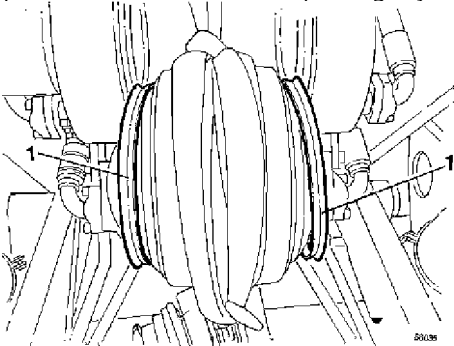


Figure 5

Installing dust seals

1. Dust seals
14. Install the cleaned and greased pivot pin. Install the lock screw and attach the lubrication pipe.

15. Replace the O-rings. Connect the hoses and pipes to the plus and minus sides of the tilting cylinder. Install the position indicator.
16. Lubricate the tilting cylinder pivot pins. Lubricate the pins until grease is pressed out through the dust seal.
17. Adjust the oil level in the hydraulic oil tank.
18. Start the engine. Bleed the cylinder, see [900 Hydraulic system, bleeding](#).
Check for leakage.

[1]Optional equipment

Document Title: Tilt cylinder removed, replacing bearings "E-F"	Function Group: 945	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Tilt cylinder removed, replacing bearings "E-F"

Op nbr 945-007

[9993652 Puller bolt](#)

[9993739 Support](#)

[11666013 Pump](#)

[11666055 Jack](#)

[11667130 Drift plate](#)



Maintain greatest possible cleanliness during all work on the hydraulic system.

1. Remove one scraper ring from the cylinder lug.
2. Press in the bush (greased) in the cylinder lug while simultaneously pushing the worn bush out. Place the bush in the centre so the scraper rings can be installed on either side. Knock out the old bush from the scraper ring location. Install new scraper rings.

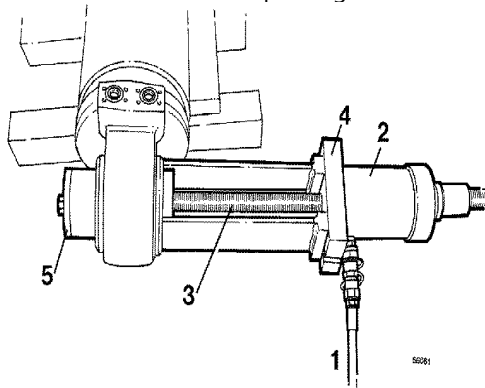


Figure 1
Pressing bush in and out of the cylinder lug

1. 11666013
2. 11666045
3. 9993652
4. 9993739
5. 11667130

3. Remove one scraper ring from the piston rod lug.
4. Press in the bush (greased) in the piston rod lug while simultaneously pushing the worn bush out. Place the bush in the centre so the scraper rings can be installed on either side. Knock out the old bush from the scraper ring location. Install new scraper rings.

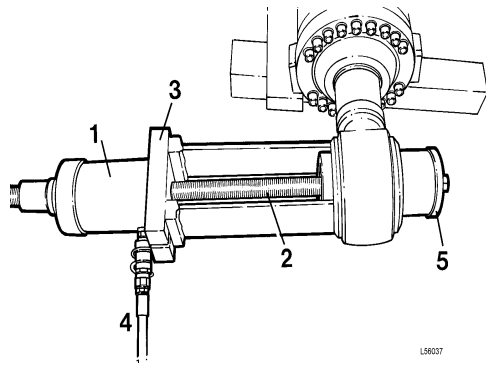


Figure 2
Pressing bush in and out of piston rod lug

1. 11666045
2. 9993652
3. 9993739
4. 11666013
5. 11667130

Document Title: Lift frame, replacing bearing in lower bucket- or implement attachment	Function Group: 945	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Lift frame, replacing bearing in lower bucket- or implement attachment

Op nbr 945-002

[9993652 Puller bolt](#)

[9993739 Support](#)

[11666013 Pump](#)

[11666055 Jack](#)

[11667100 Drift plate](#)

Pin removal

1. Lower the bucket / attachment bracket flat against the ground in order to release tension on the pin.
2. Remove the lock screw and grease nipple from the pin. Remove the pin.
3. Remove the pin on the other side.
4. Unscrew the stop lug that sits on top of the centre tilting arm joint.
5. Reverse the machine while tilting forward so that the bucket /attachment bracket is left behind.
6. Remove the dust seals.

Replacing bush

7. Remove the sealing rings from both sides of the bushes in the lifting arm.
8. Pull out the bushes.

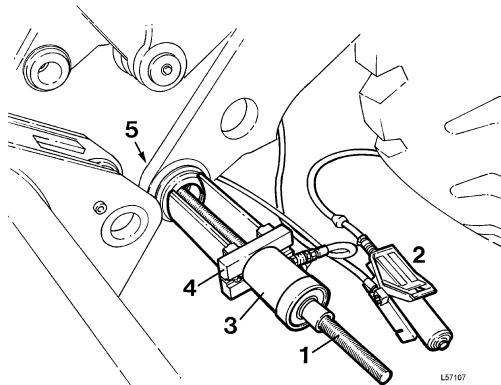


Figure 1
Removing bush

1. 9993652

2. 11666013
3. 11666045
4. 9993739
5. 11667100

9. Remove the bush on the other side.

10. Grease the bush and press it in until it is positioned centrally in the location in the lifting arm.

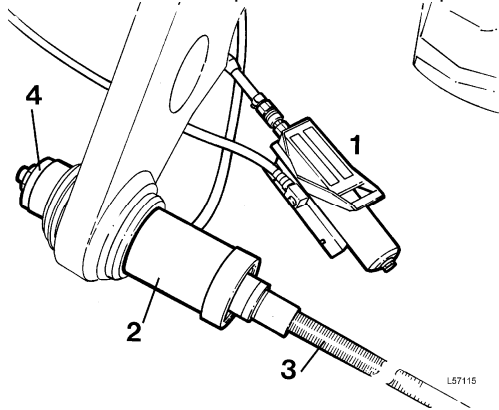


Figure 2
Pressing in bush

1. 11666013
2. 11666045
3. 9993652
4. 11667100

11. Install sealing rings on both sides of the bush in the lifting arm.

12. Install the bush and sealing rings on the other side.

Installing pin

13. Position the dust seals by forcing them over the bush location on the lifting arm. Turn the lip towards the attaching lugs on the bucket/attachment bracket.

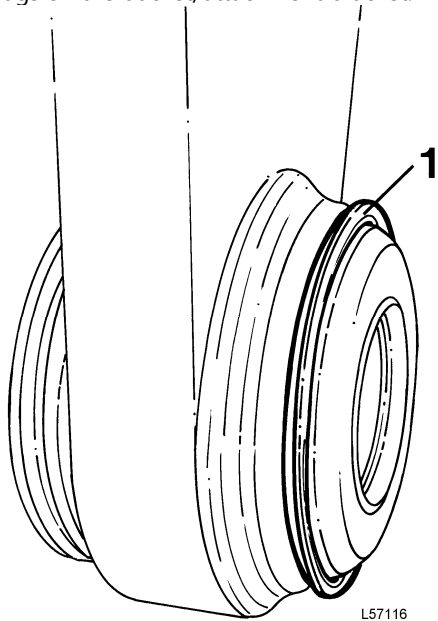


Figure 3
Installing seals

1. Seal

14. Align the lifting arm with the attaching lugs on the bucket / attachment bracket and centre the holes in the attaching lugs with the hole in the bush so that the pin can be installed.
15. Install a cleaned and greased pin. Tap in the pin with a rubber mallet and lock it. Poke the dust seals down into position against the attaching lugs of the bucket / attachment bracket.
Install the grease nipple. Lubricate the pin until grease is pressed out through the dust seal.



Construction Equipment

Service Information

Document Title: Hydraulic diagram, fan, brake system	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic diagram, fan, brake system

- A Hydraulic oil pump, P1, brake, servo and working hydraulics
- B Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
- C Hydraulic oil pump, P3, cooling fan, brake charging
- D Central block
- E Hydraulic oil filter
- F Leak-oil filter
- G Fan motor
- L Foot brake valve
- M Accumulator block, brake
- N Solenoid valve, parking brake
- O Parking brake
- Q Hydraulic oil cooler

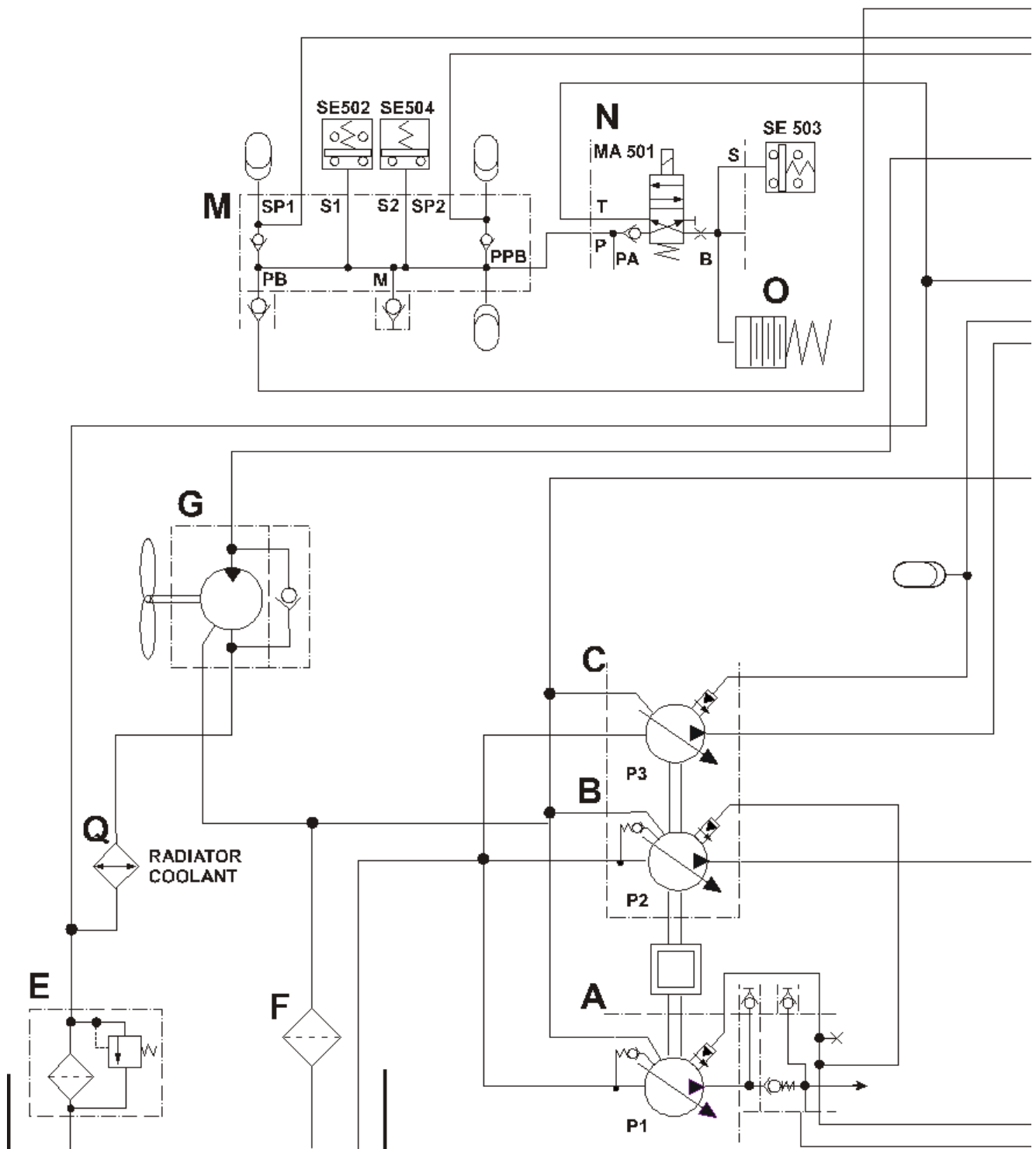
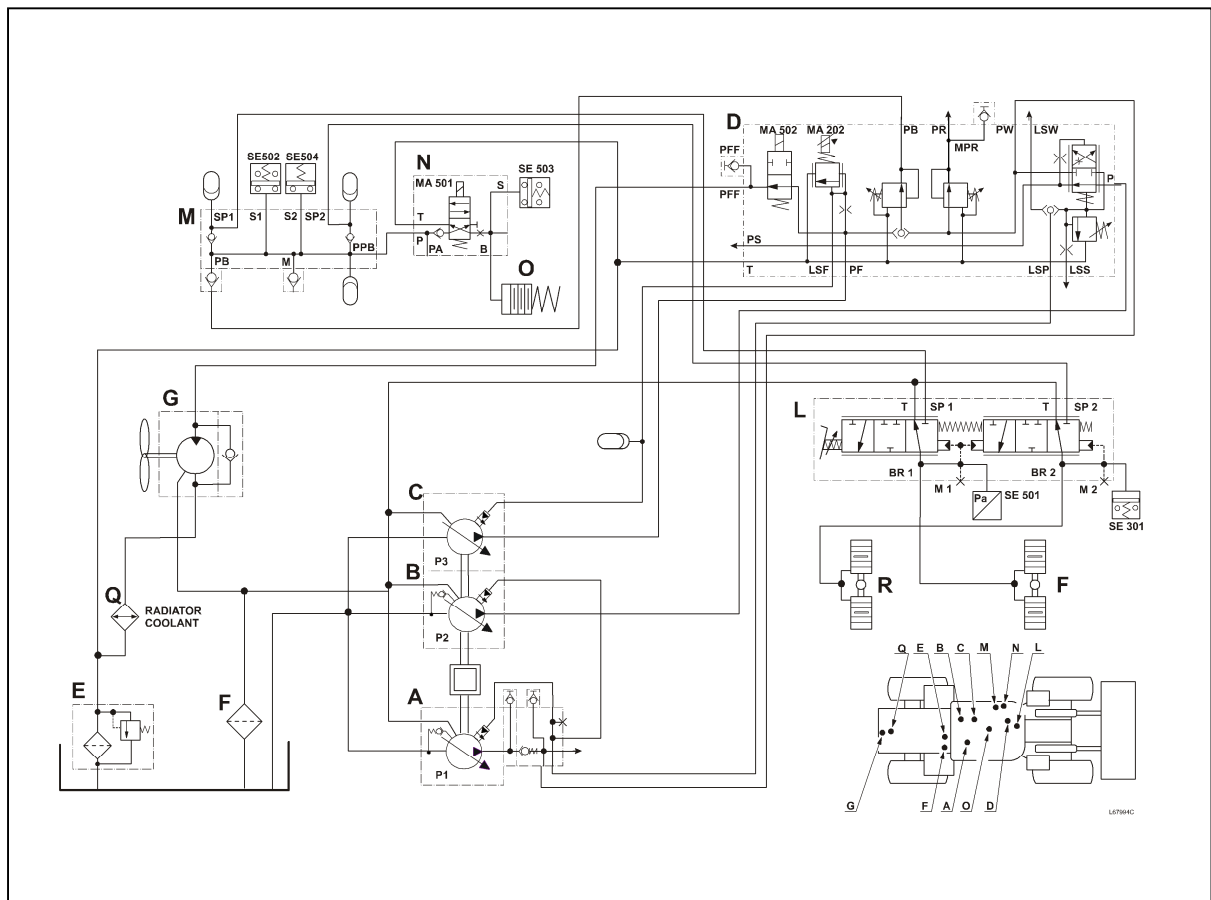


Figure 1





Construction Equipment

Service Information

Document Title: Hydraulic diagram, fan, axle oil cooling	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic diagram, fan, axle oil cooling

- A Hydraulic oil pump, P1, brakes, servo and working hydraulics
- B Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
- C Hydraulic oil pump, P3, cooling fan, brake charging
- D Central block
- E Hydraulic oil filter
- F Leak-oil filter
- G Fan motor
- O Hydraulic oil/transmission oil cooler
- P Motor, pump, axle oil cooling, front axle
- Q Hydraulic oil filter, front axle
- R Hydraulic oil cooler, front axle
- S Motor, pump, axle oil cooling, rear axle
- T Hydraulic oil filter, rear axle
- U Hydraulic oil cooler, rear axle

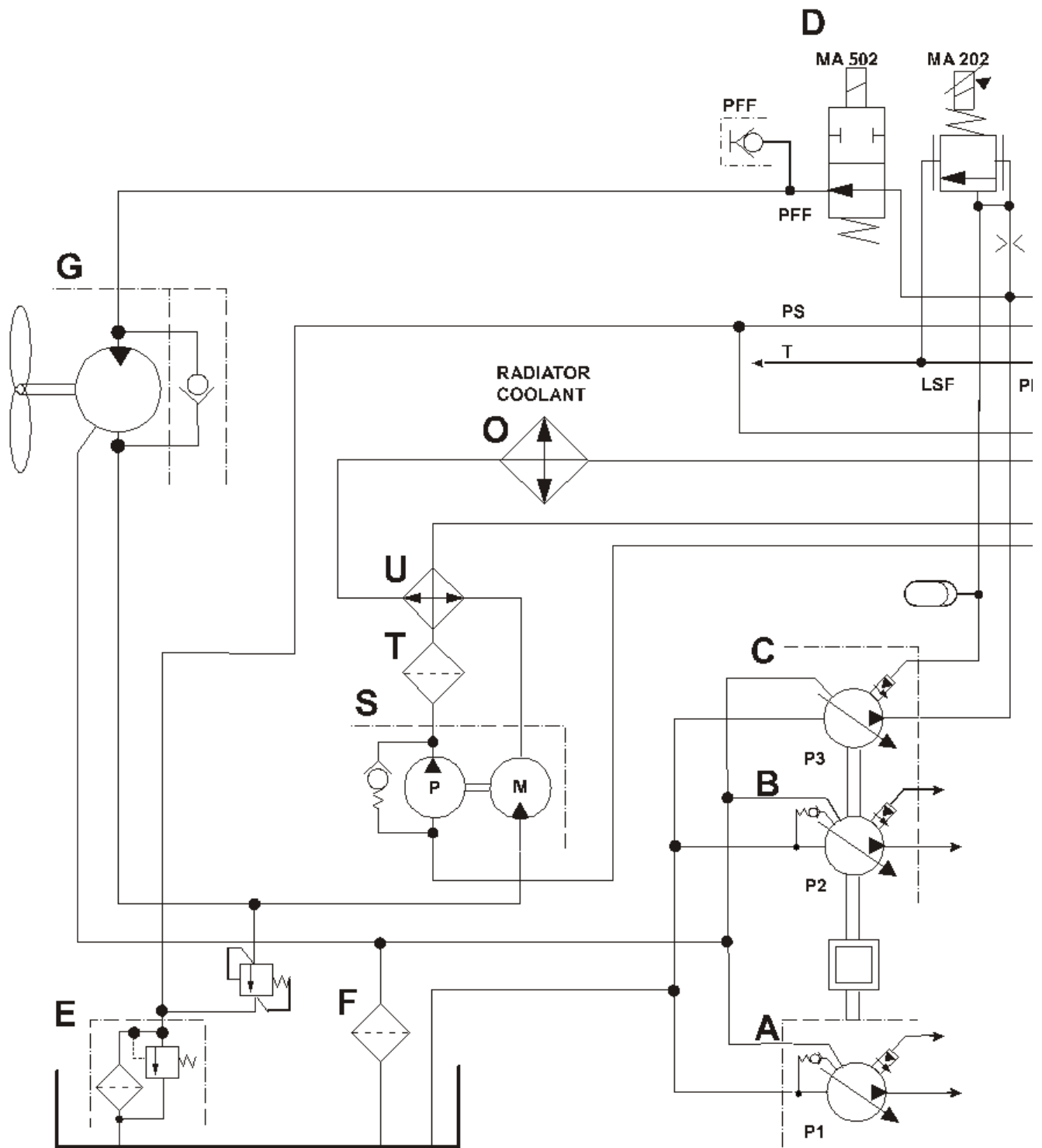
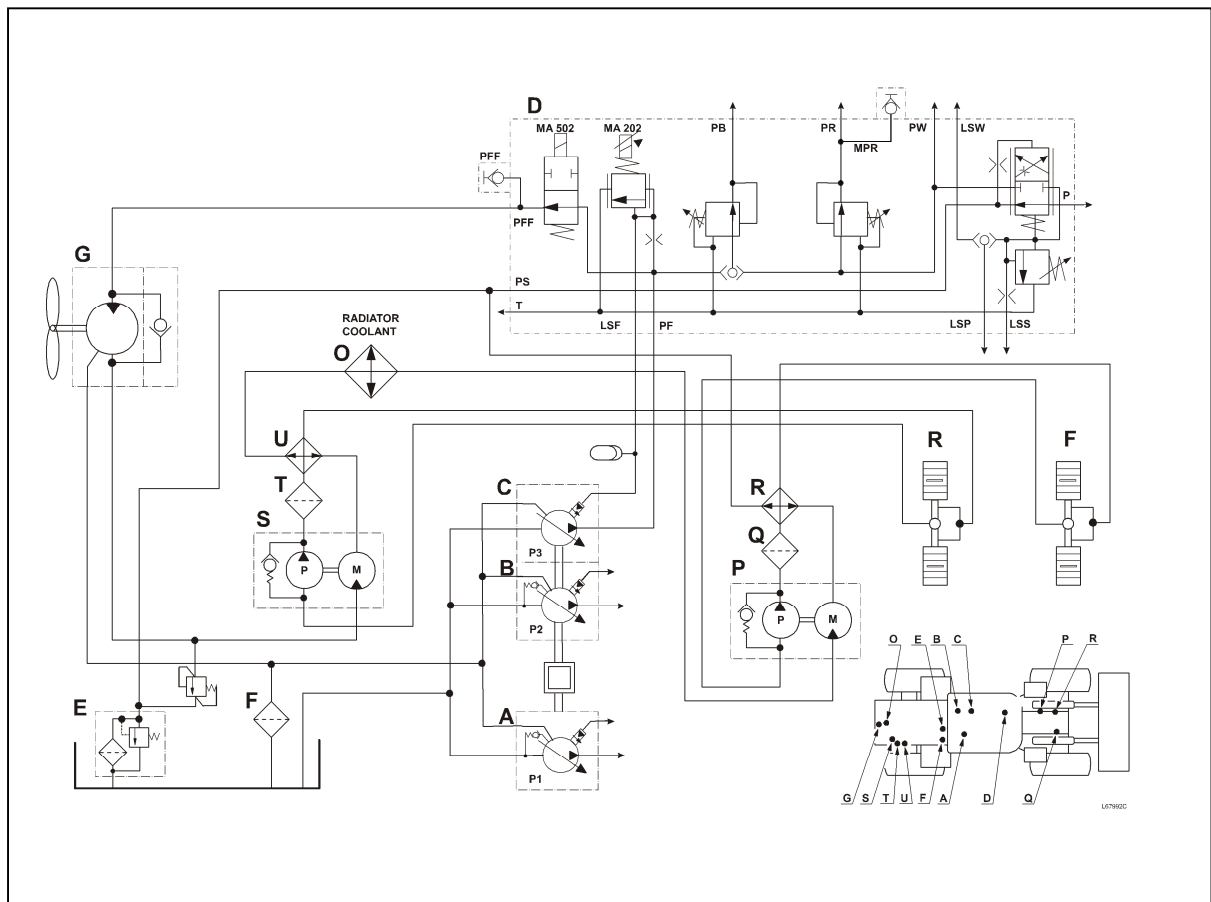


Figure 1





Construction Equipment

Service Information

Document Title: Hydraulic diagram, reversible fan, axle oil cooling	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic diagram, reversible fan, axle oil cooling

- A Hydraulic oil pump, P1, brake, servo and working hydraulics
- B Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
- C Hydraulic oil pump, P3, cooling fan, brake charging
- D Central block
- E Hydraulic oil filter
- F Leak-oil filter
- G Fan motor
- O Hydraulic oil/transmission oil cooler
- P Motor, pump, axle oil cooling, front axle
- Q Hydraulic oil filter, front axle
- R Hydraulic oil cooler, front axle
- S Motor, pump, axle oil cooling, rear axle
- T Hydraulic oil filter, rear axle
- U Hydraulic oil cooler, rear axle

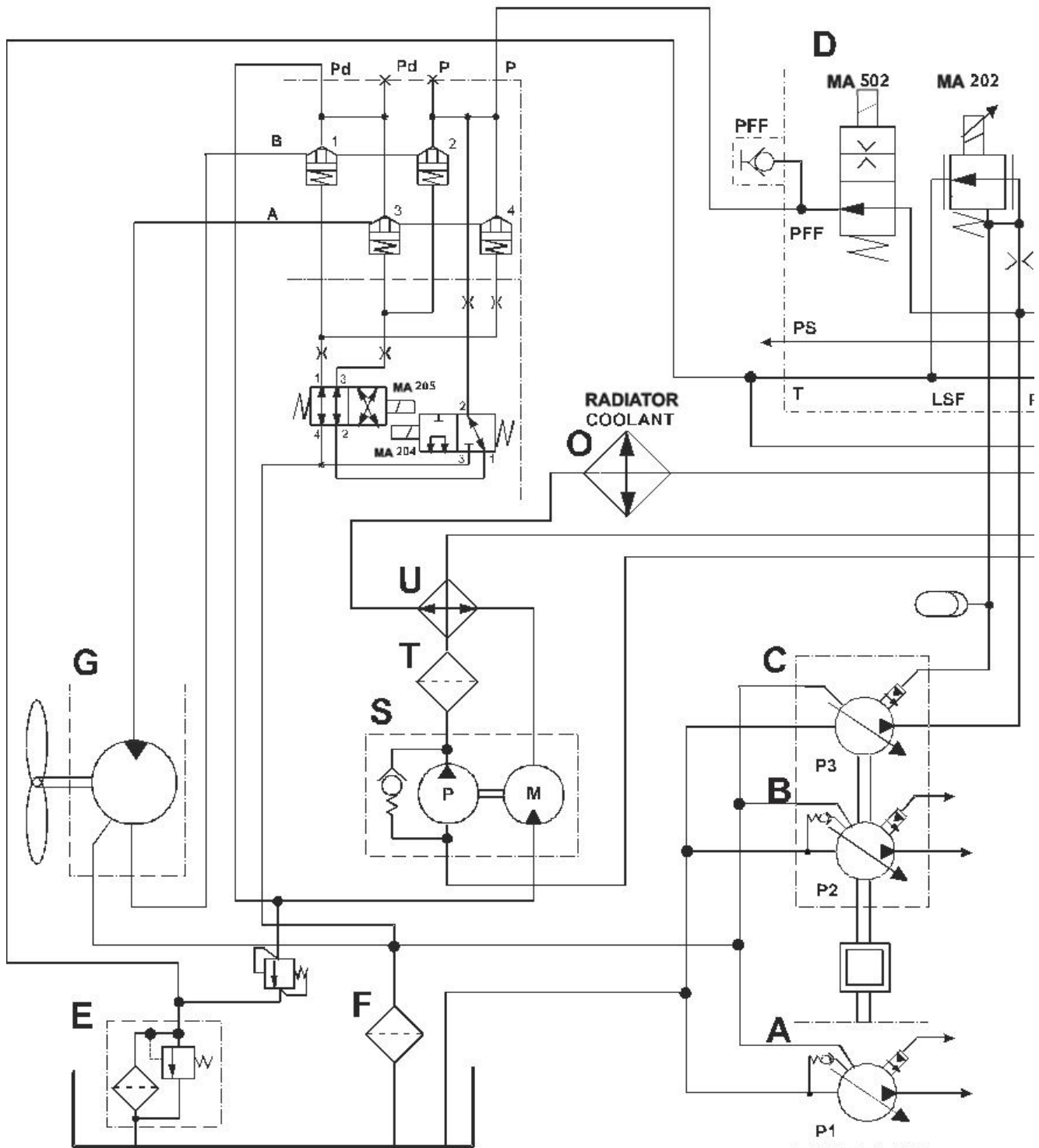
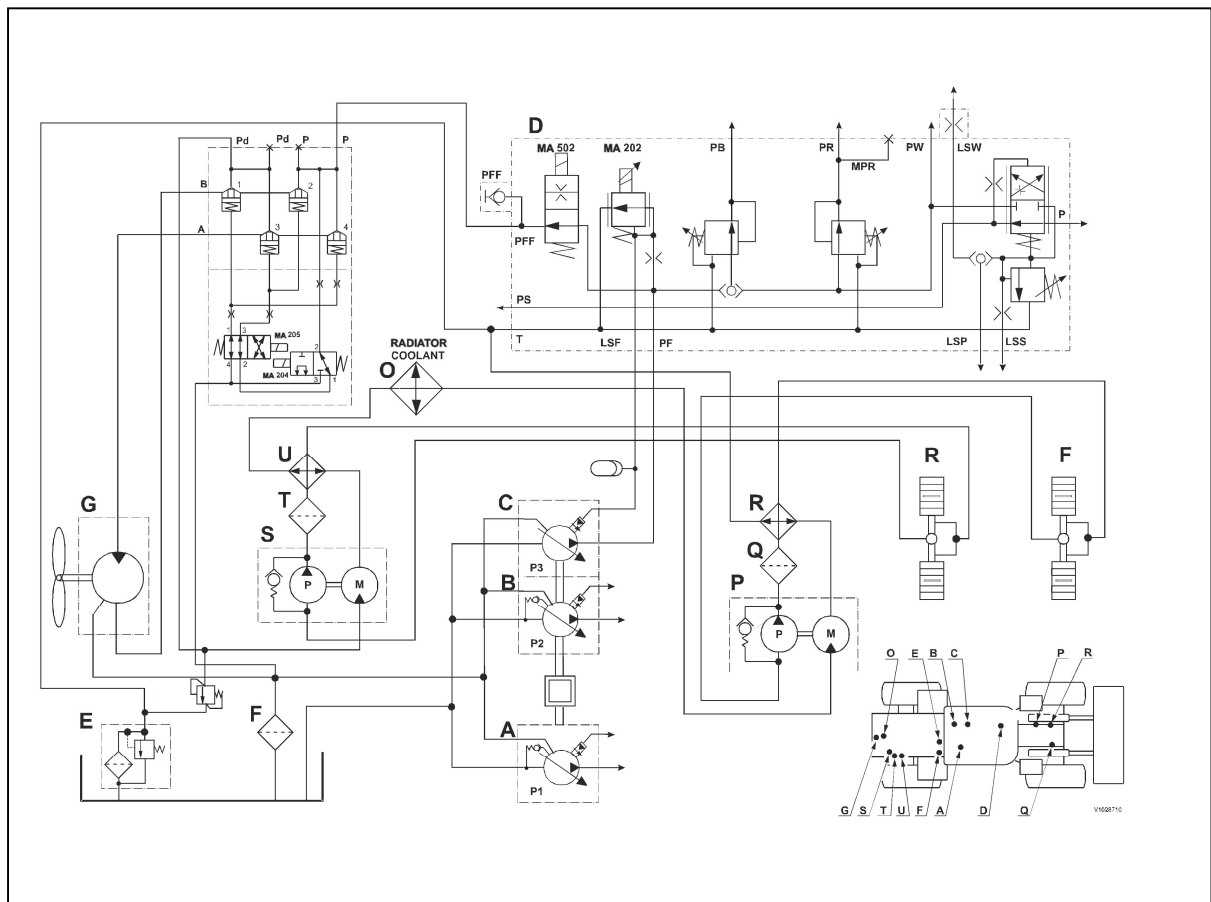


Figure 1





Construction Equipment

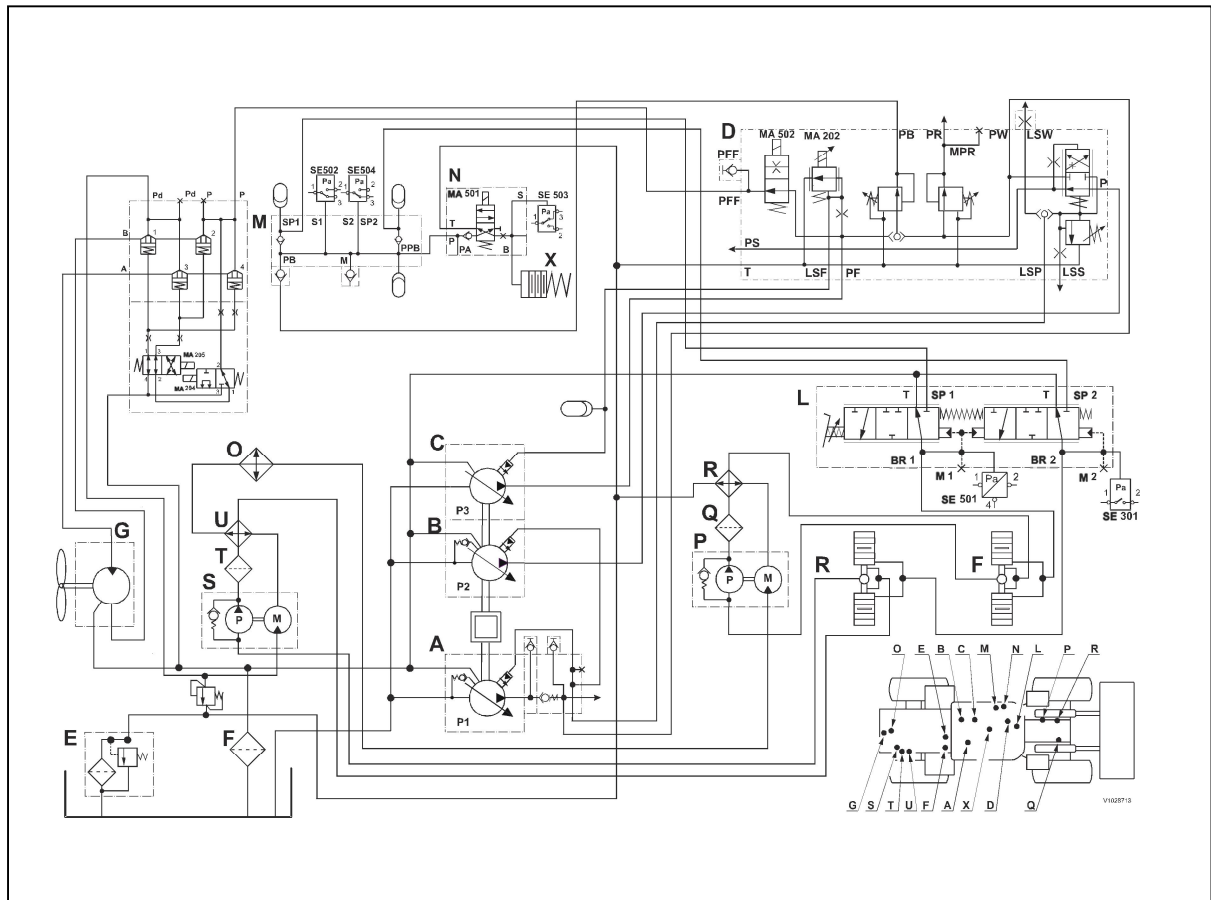
Service Information

Document Title: Hydraulic diagram, reversible fan, brake system, axle oil cooling	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic diagram, reversible fan, brake system, axle oil cooling

- A Hydraulic oil pump, P1, brake, servo and working hydraulics
- B Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
- C Hydraulic oil pump, P3, cooling fan, brake charging
- D Central block
- E Hydraulic oil filter
- F Leak-oil filter
- G Fan motor
- J Solenoid valves MA913, pressure increase attachment lock, MA912, safety valve servo pressure (together with 4th hydraulic function)
- L Foot brake valve
- M Accumulator block, brake
- N Solenoid valves, parking brake and attachment lock
- O Hydraulic oil/transmission oil cooler
- P Motor, pump, axle oil cooling, front axle
- Q Hydraulic oil filter, front axle
- R Hydraulic oil cooler, front axle
- S Motor, pump, axle oil cooling, rear axle
- T Hydraulic oil filter, rear axle
- U Hydraulic oil cooler, rear axle
- X Parking brake

Figure 1





Construction Equipment

Service Information

Document Title: Hydraulic diagram, steering with CDC	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic diagram, steering with CDC

- A Hydraulic oil pump, P1, brake, servo and working hydraulics
- B Hydraulic oil pump, P2, brake, steering, servo and working hydraulics
- C Hydraulic oil pump, P3, cooling fan, brake charging
- D Central valve
- E Hydraulic oil filter
- F Leak oil filter
- G Collecting block, LS-pressure
- H Steering valve
- II Steering cylinders
- J1 Sensor block, secondary steering
- J2 Electric motor, pump, secondary steering
- K CDC
- L Shift valve

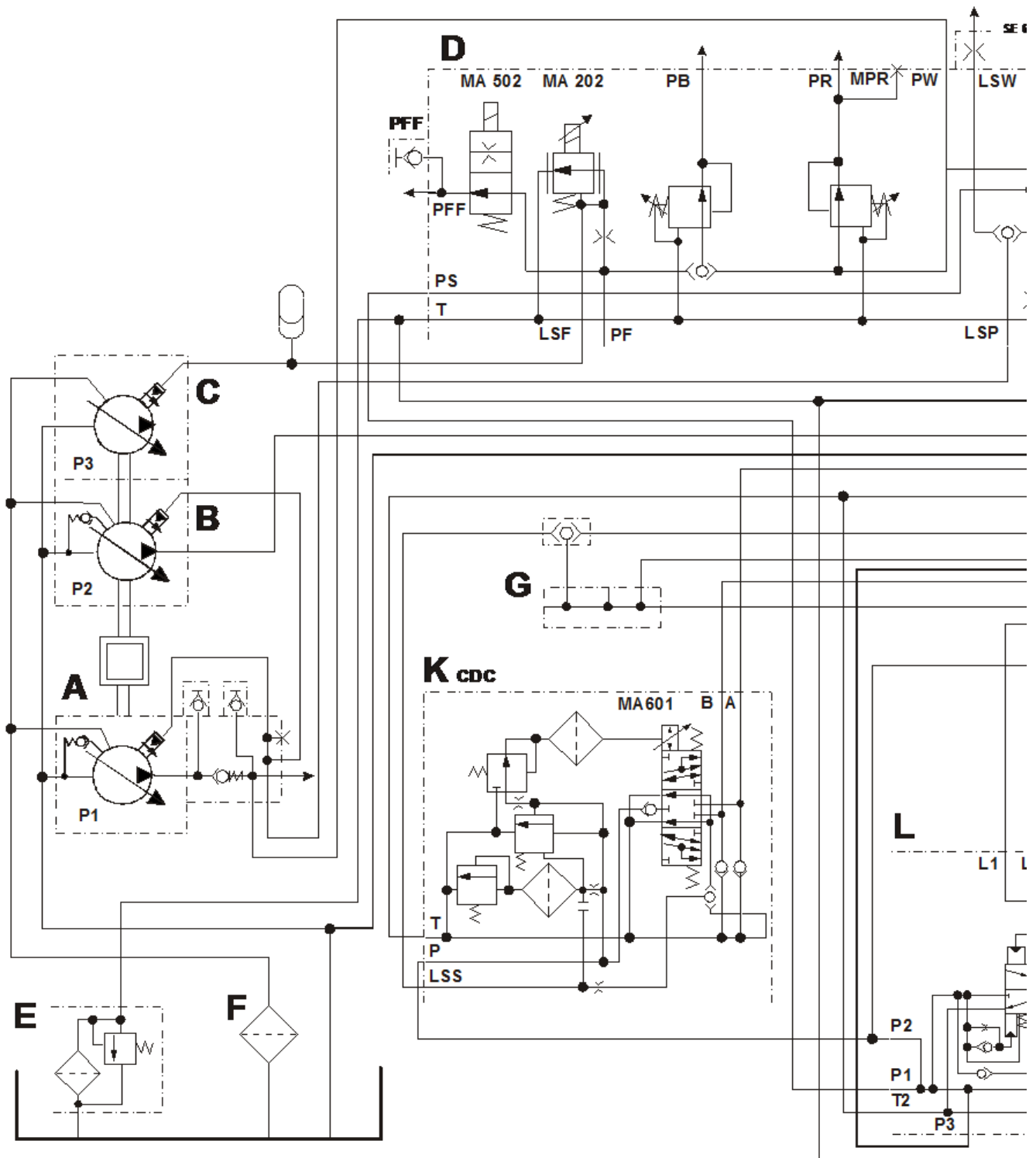
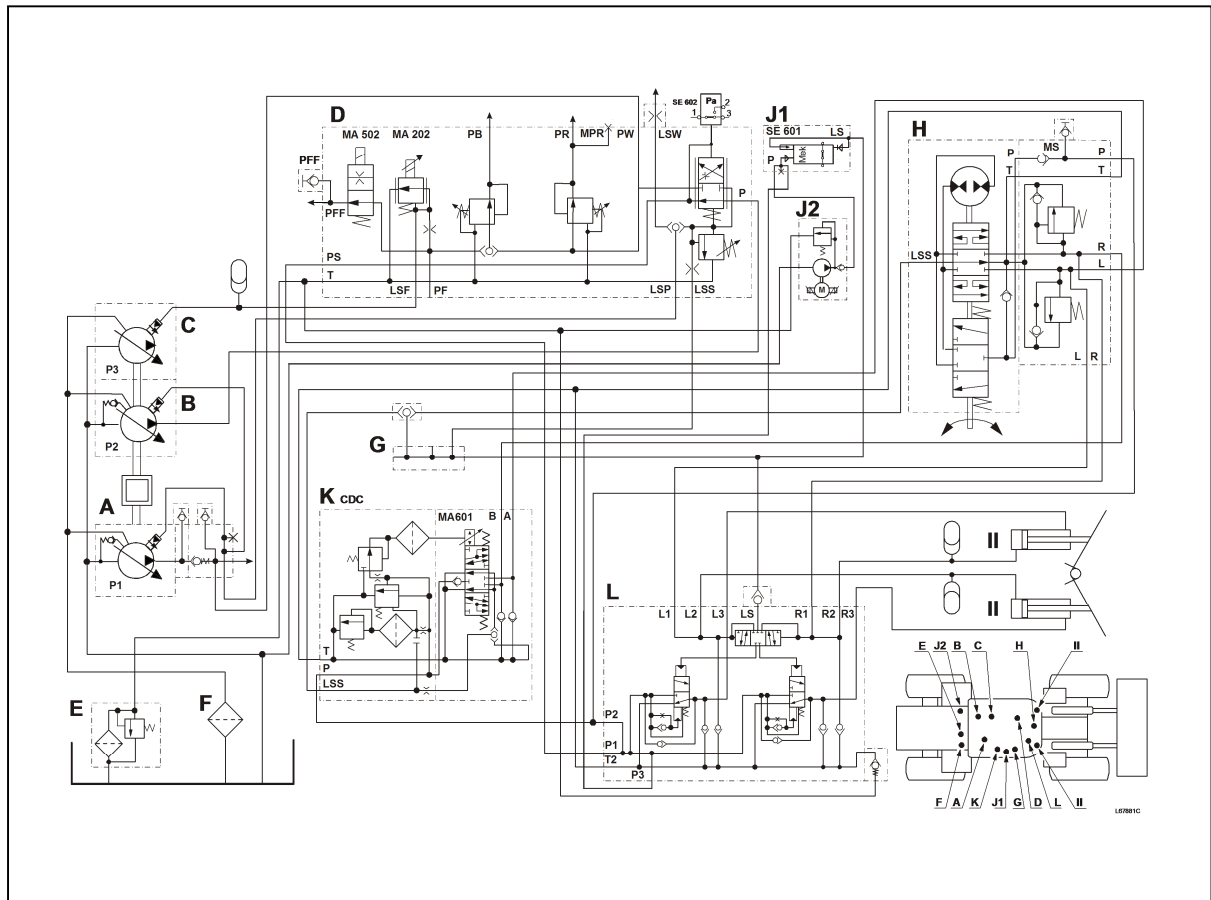


Figure 1





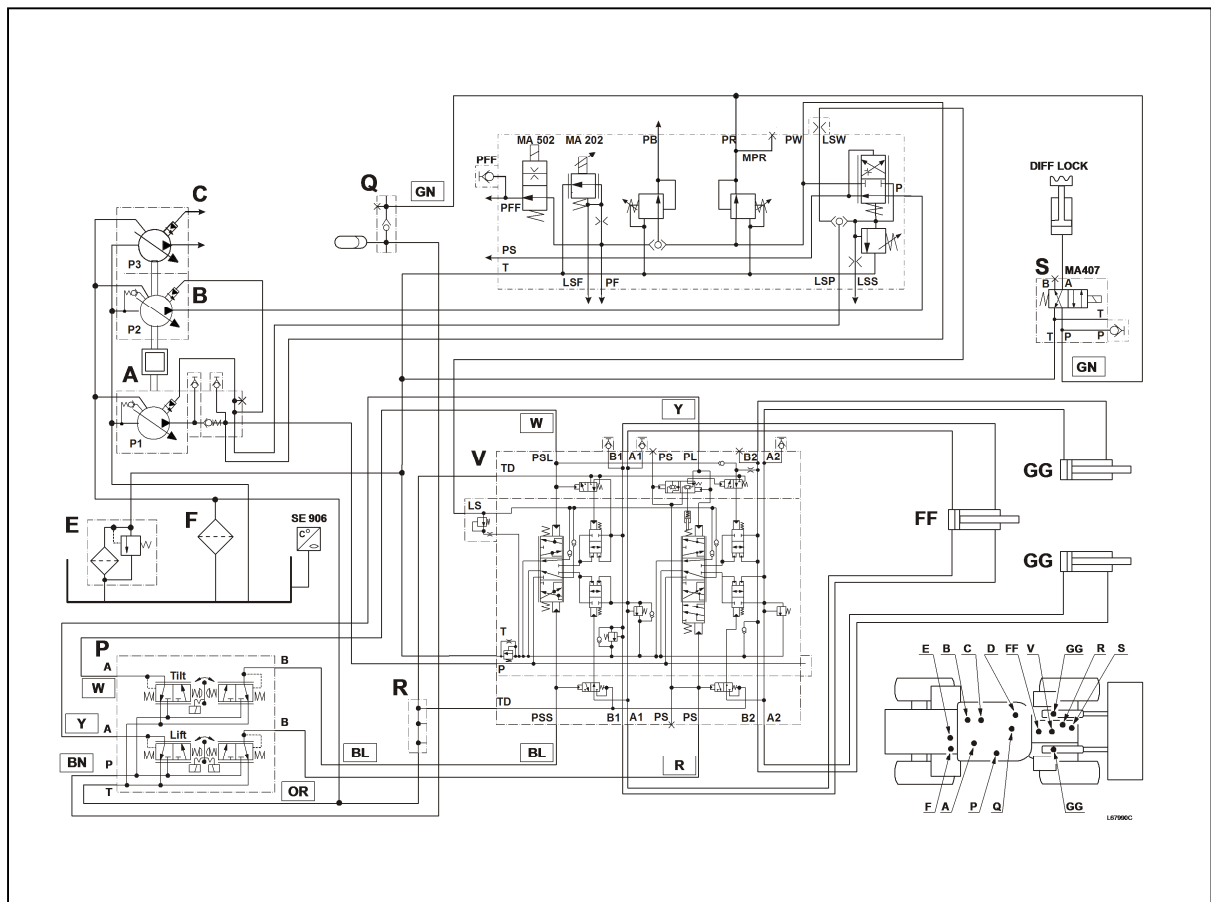
Construction Equipment

Service Information

Document Title: Hydraulic diagram, working hydraulics, differential lock	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic diagram, working hydraulics, differential lock

- A Hydraulic oil pump, P1, brakes, servo and working hydraulics
- B Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
- C Hydraulic oil pump, P3, cooling fan, brake charging
- E Hydraulic oil filter
- F Leak-off oil filter
- FF Tilting cylinder
- GG Lifting cylinders
- P Servo valve
- P2 Return To Dig
- Q Accumulator, servo
- R Collecting block
- S Solenoid valve, differential lock
- V Control valve



L150E Ser. No. —7418

L180E Ser. No. —6095

L220E Ser. No. —2888

- | | |
|---|--|
| A | Hydraulic oil pump, P1, brakes, servo and working hydraulics |
| B | Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics |

C	Hydraulic oil pump, P3, cooling fan, brake charging
E	Hydraulic oil filter
F	Leak-off oil filter
FF	Tilting cylinder
GG	Lifting cylinders
P	Servo valve
P2	Return To Dig
Q	Accumulator, servo
R	Collecting block
S	Solenoid valve, differential lock
V	Control valve

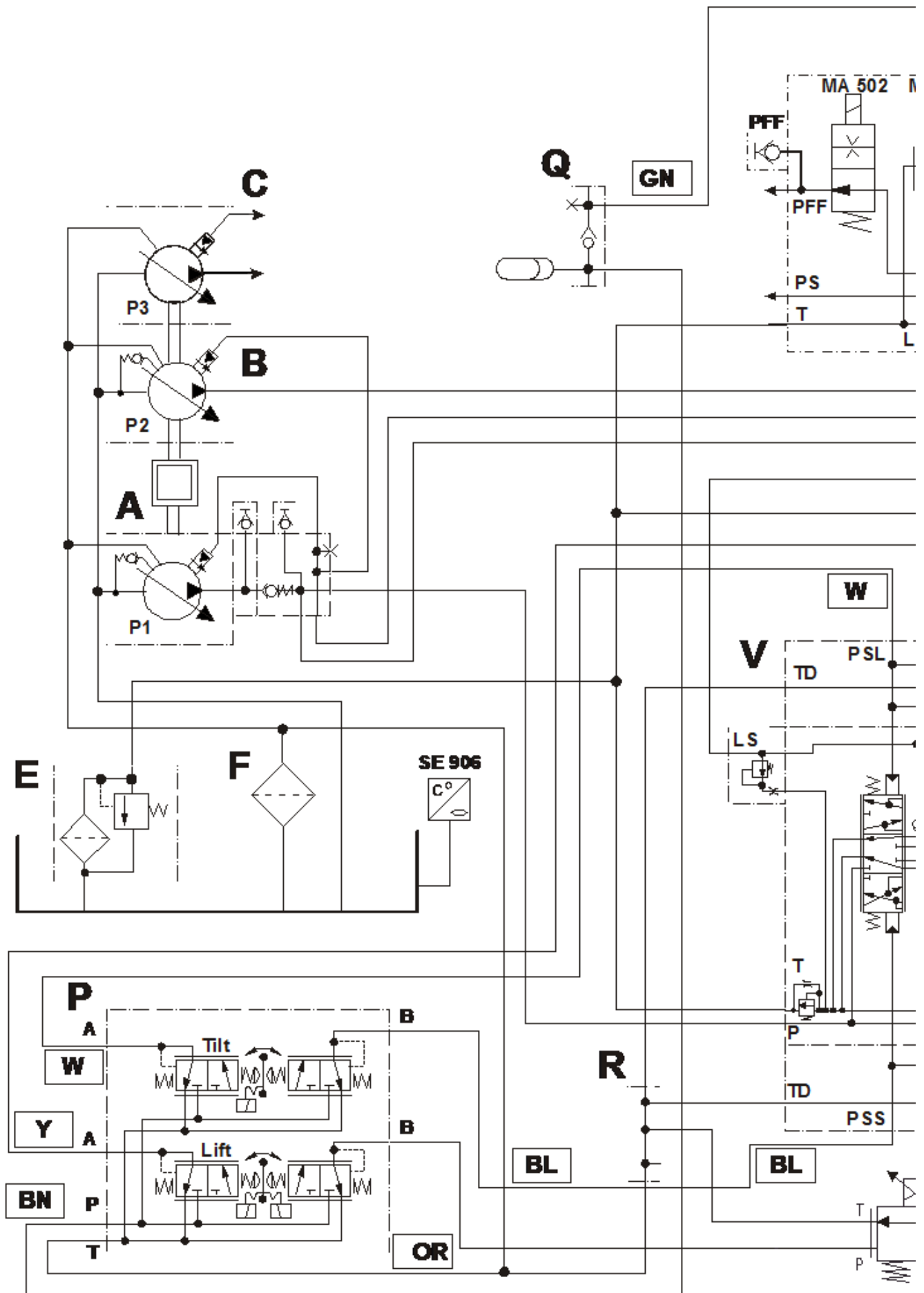


Figure 2

L150E Ser. No. 7419—

L180E Ser. No. 6096—

L220E Ser. No. 2889—



Construction Equipment

Service Information

Document Title: Hydraulic diagram, working hydraulics, differential lock, BSS	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic diagram, working hydraulics, differential lock, BSS

- A Hydraulic oil pump, P1, brakes, servo and working hydraulics
- B Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
- C Hydraulic oil pump, P3, cooling fan, brake charging
- D Central valve
- E Hydraulic oil filter
- F Leak-off oil filter
- FF Tilting cylinder
- GG Lifting cylinders
- P Servo valve
- P2 Return To Dig[T1] ⓘ
- Q Accumulator, servo
- R Collecting block
- S Solenoid valve, differential lock
- T Valve block V1, BSS
- U Valve block, V2, BSS, single-acting lifting
- V Control valve

[T1]Optional equipment

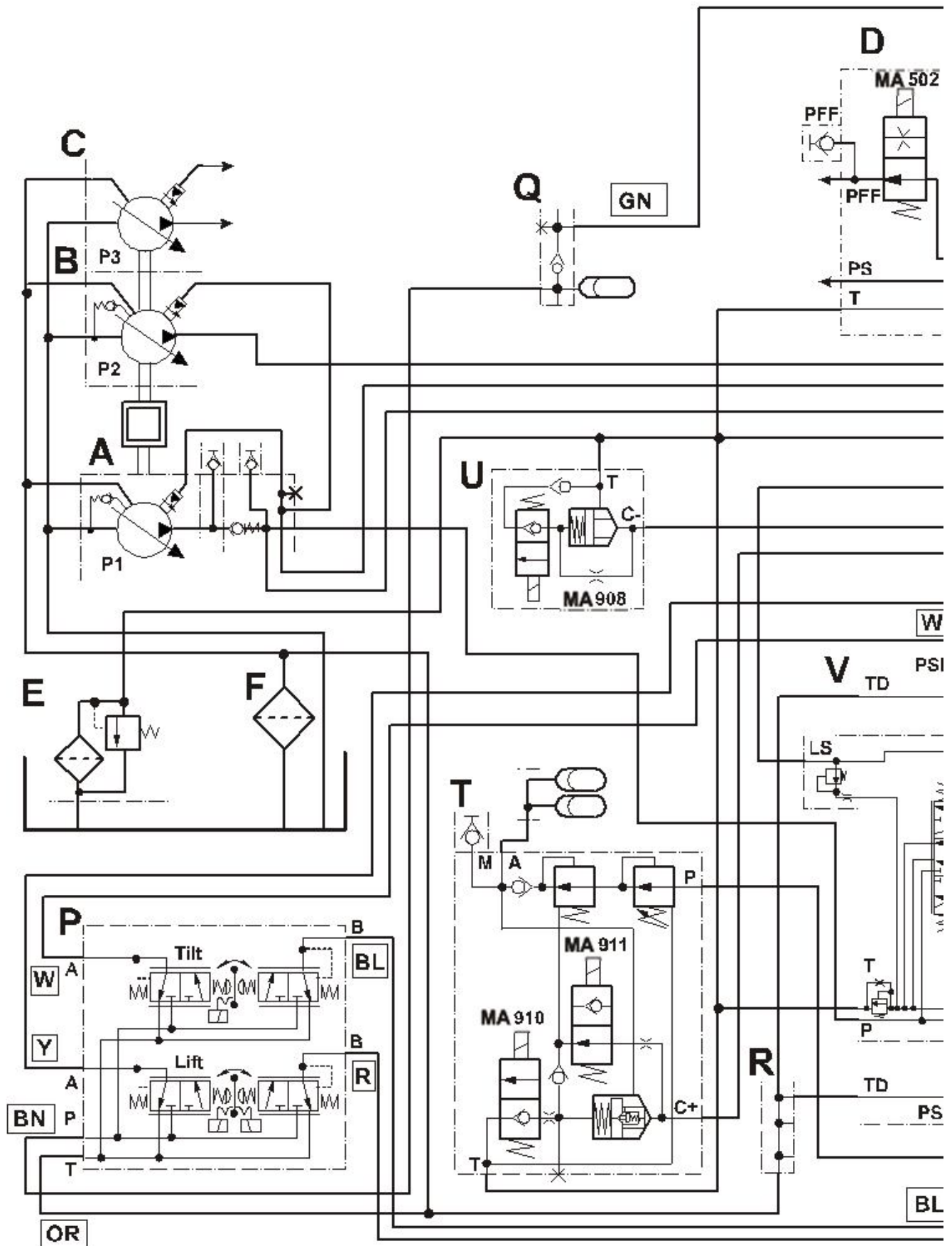
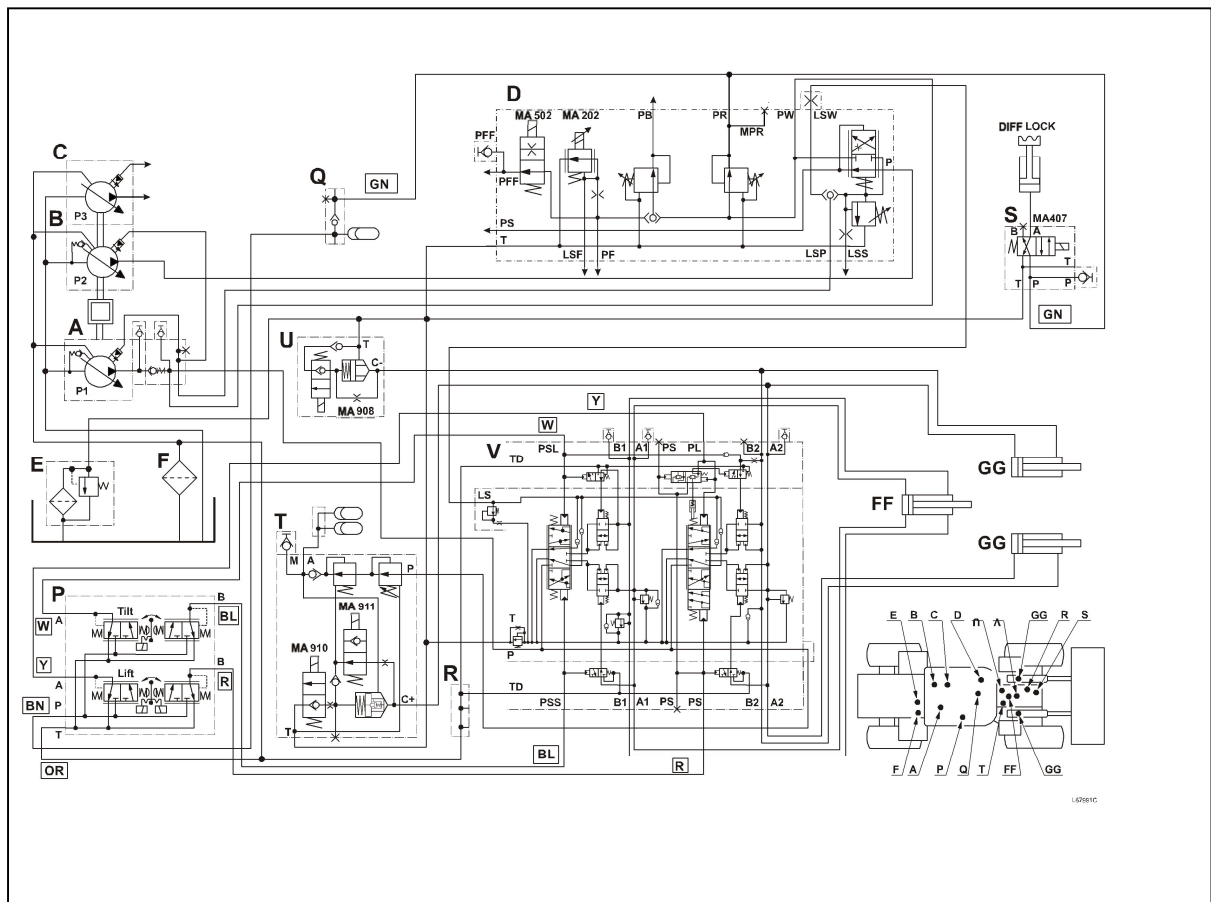


Figure 1



L150E Ser. No. —7418

L180E Ser. No. —6095

L220E Ser. No. —2888

A	Hydraulic oil pump, P1, brakes, servo and working hydraulics
B	Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
C	Hydraulic oil pump, P3, cooling fan, brake charging
D	Central valve
E	Hydraulic oil filter
F	Leak-off oil filter
FF	Tilting cylinder
GG	Lifting cylinders
P	Servo valve
P2	Return To Dig[T1] ⓘ
Q	Accumulator, servo
R	Collecting block
S	Solenoid valve, differential lock
T	Valve block V1, BSS
U	Valve block, V2, BSS, single-acting lifting
V	Control valve

[T1]Optional equipment

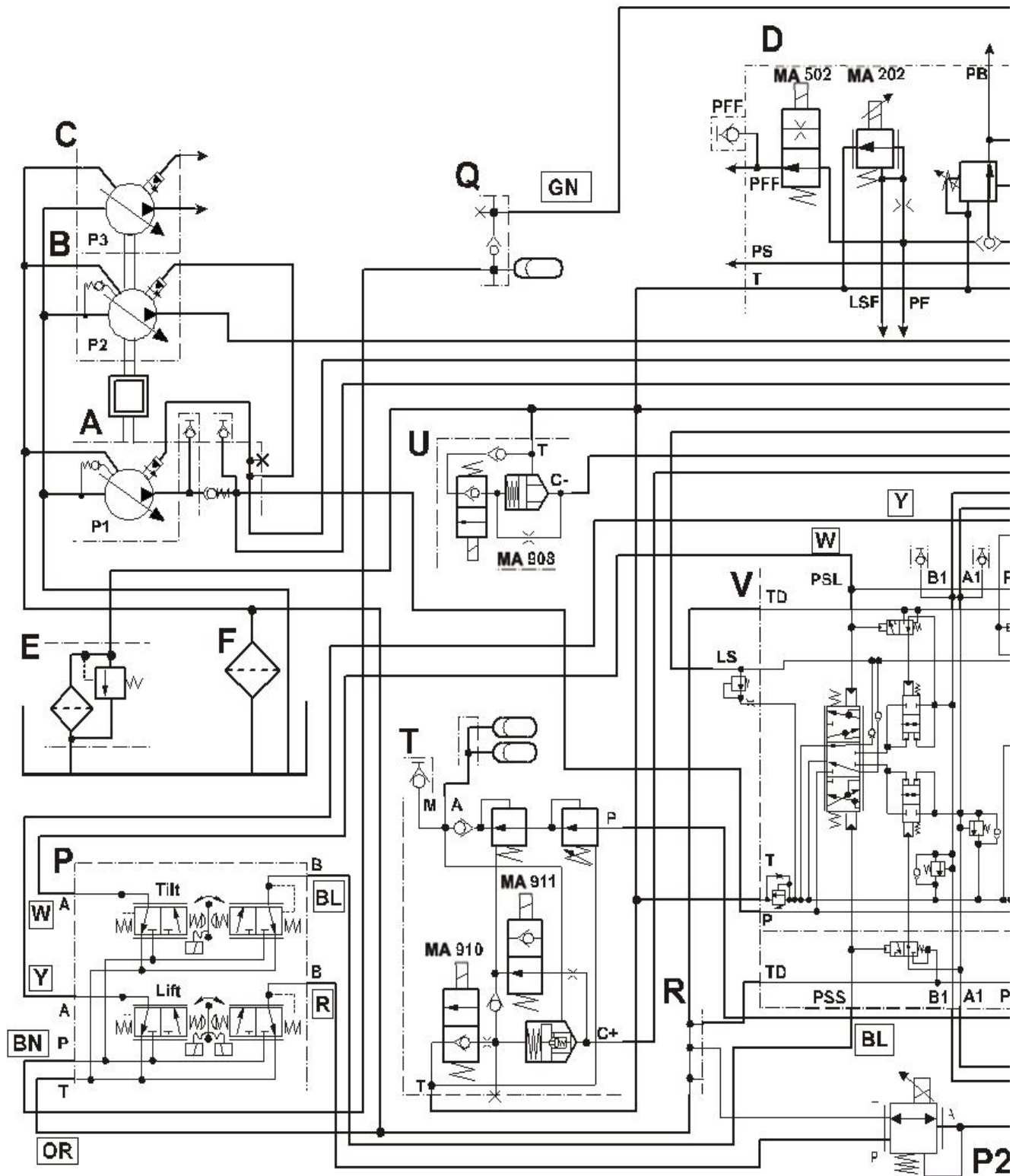


Figure 2

L150E Ser. No. 7419— (Return To Dig) Ser. No. 8006— (Valve block V1 altered)

L180E Ser. No. 6096— (Return To Dig) Ser. No. 6202— (Valve block V1 altered)

L220E Ser. No. 2889— (Return To Dig) Ser. No. 2962— (Valve block V1 altered)



Construction Equipment

Service Information

Document Title: Hydraulic diagram, working hydraulics, differential lock, BSS, attachment lock, 3rd, 4th function	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic diagram, working hydraulics, differential lock, BSS, attachment lock, 3rd, 4th function

- A Hydraulic oil pump, P1, brakes, servo and working hydraulics
- B Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
- C Hydraulic oil pump, P3, cooling fan, brake charging
- D Central valve
- E Hydraulic oil filter
- F Leak-off oil filter
- FF Tilting cylinder
- GG Lifting cylinders
- P Servo valve
- P2 Automatic load lowering
- Q Accumulator, servo
- R Collecting block
- S Solenoid valve, differential lock
- T Valve block V2, BSS
- U Valve block, V2, BSS, single-acting lifting
- V Control valve
- X Attachment locking
- Y 3rd/4th hydraulic function
- 3A 3rd hydraulic function
- 3B 3rd hydraulic function
- 4A 4th hydraulic function
- 4B 4th hydraulic function

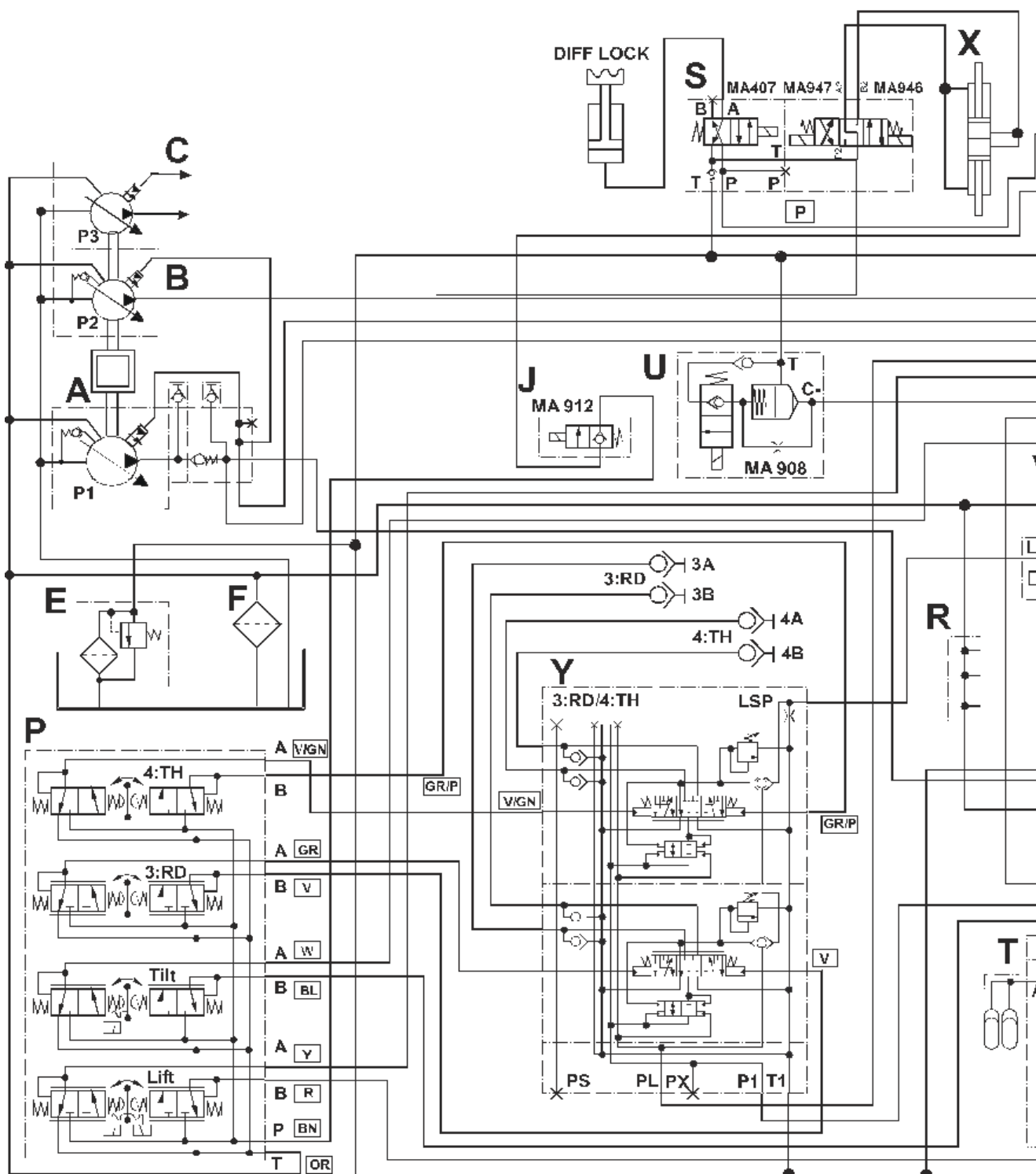


Figure 1

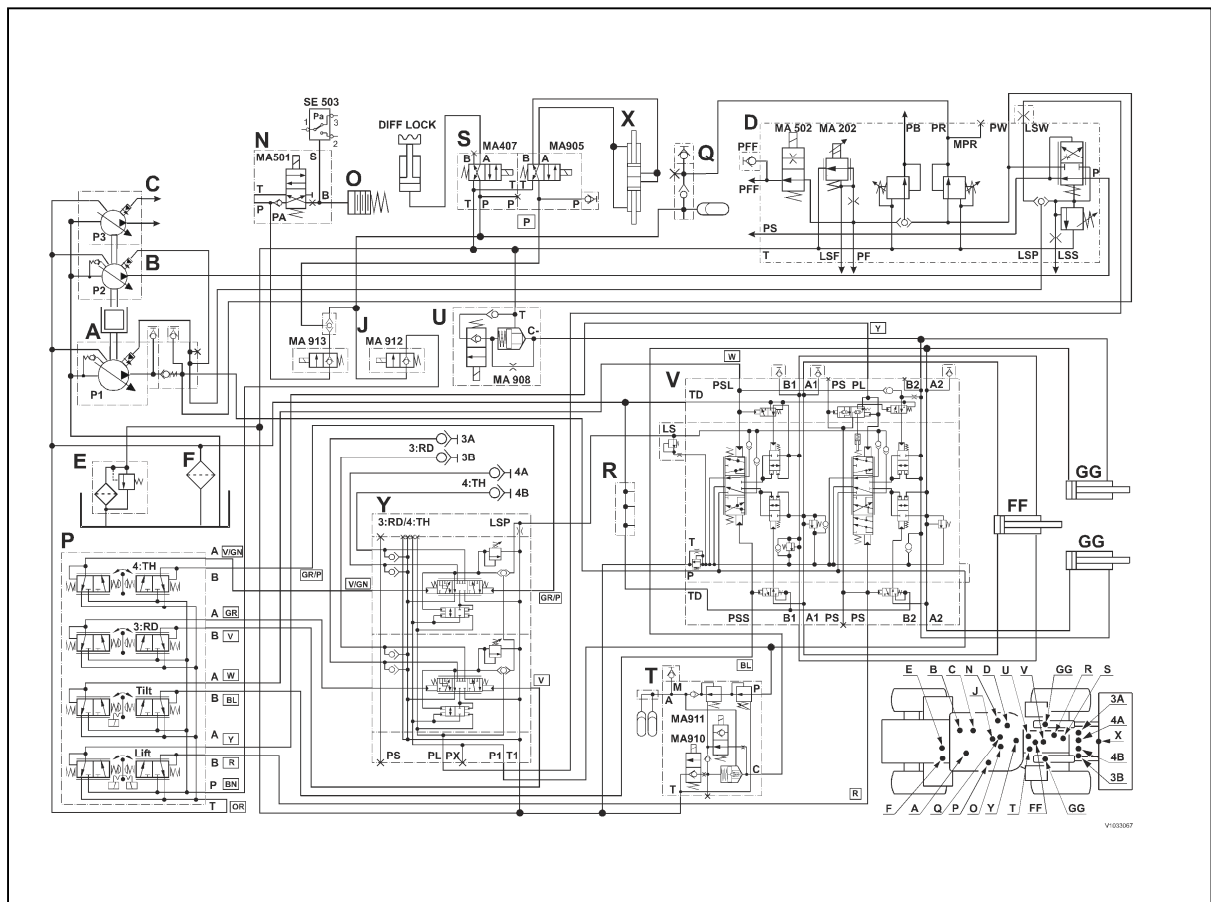
L150E Ser. No. —7191

L180E Ser. No. —5931

L220E Ser. No. —2780

A Hydraulic oil pump, P1, brakes, servo and working hydraulics

B	Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
C	Hydraulic oil pump, P3, cooling fan, brake charging
D	Central valve
E	Hydraulic oil filter
F	Leak-off oil filter
FF	Tilting cylinder
GG	Lifting cylinders
P	Servo valve
P2	Automatic load lowering
Q	Accumulator, servo
R	Collecting block
S	Solenoid valve, differential lock
T	Valve block V2, BSS
U	Valve block, V2, BSS, single-acting lifting
V	Control valve
X	Attachment locking
Y	3rd/4th hydraulic function
3A	3rd hydraulic function
3B	3rd hydraulic function
4A	4th hydraulic function
4B	4th hydraulic function



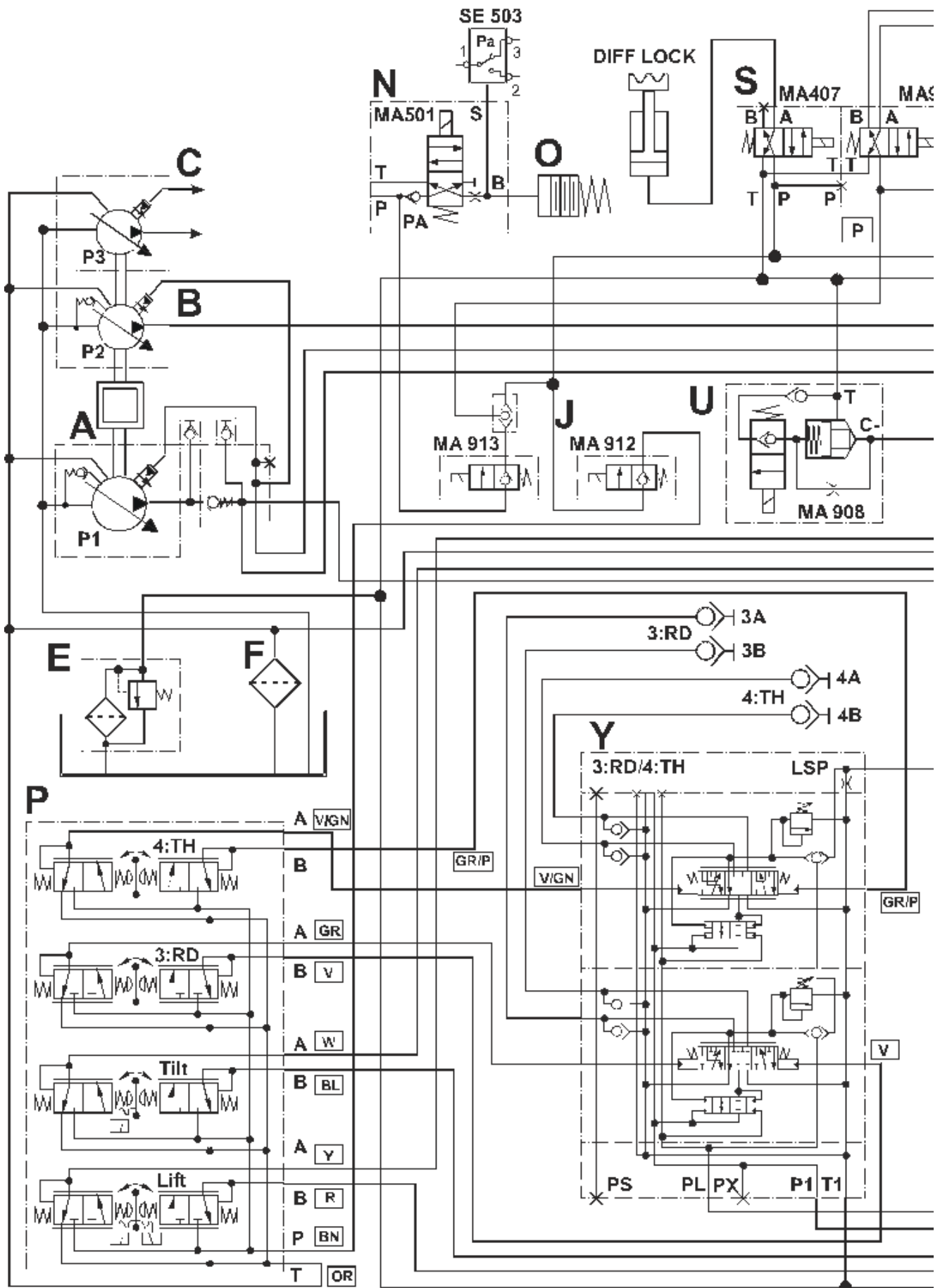


Figure 2

L150E Ser. No. 7192—7418

L180E Ser. No. 5932—6095

L220E Ser. No. 2781—2888

A	Hydraulic oil pump, P1, brakes, servo and working hydraulics
B	Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
C	Hydraulic oil pump, P3, cooling fan, brake charging
D	Central valve
E	Hydraulic oil filter
F	Leak-off oil filter
FF	Tilting cylinder
GG	Lifting cylinders
P	Servo valve
P2	Automatic load lowering
Q	Accumulator, servo
R	Collecting block
S	Solenoid valve, differential lock
T	Valve block V2, BSS
U	Valve block, V2, BSS, single-acting lifting
V	Control valve
X	Attachment locking
Y	3rd/4th hydraulic function
3A	3rd hydraulic function
3B	3rd hydraulic function
4A	4th hydraulic function
4B	4th hydraulic function

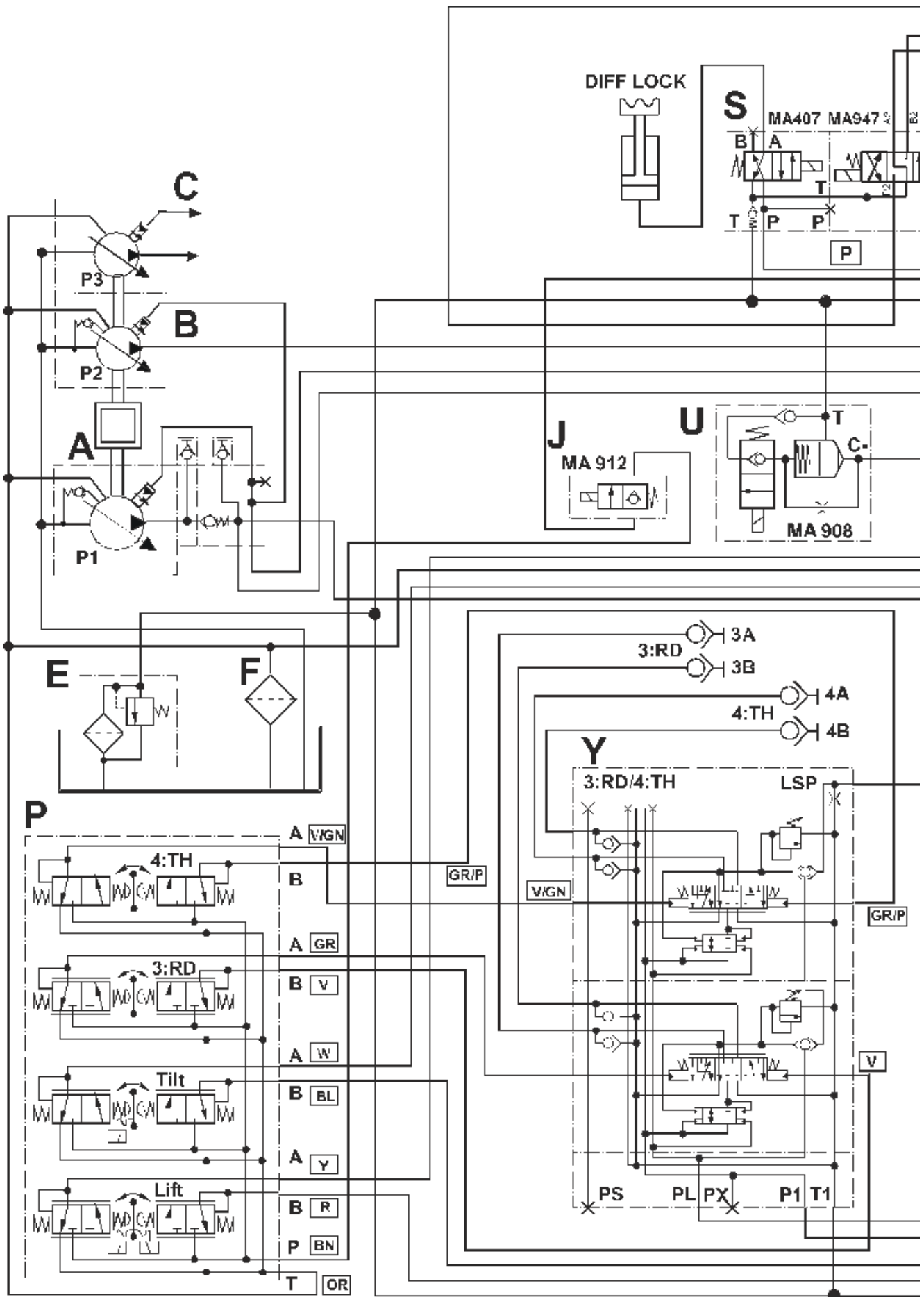


Figure 3

L150E Ser. No. 7419—

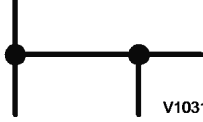
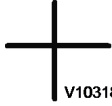
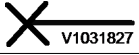
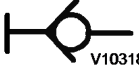
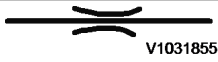
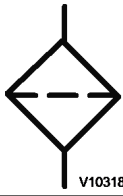
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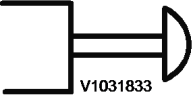
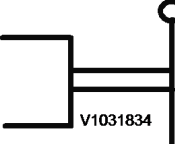
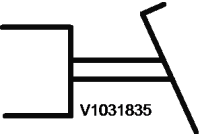
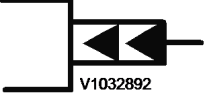
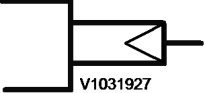
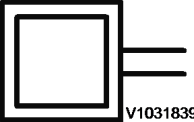
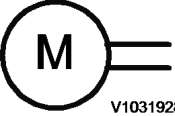
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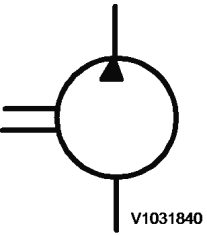
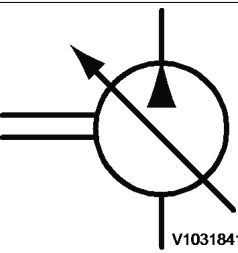
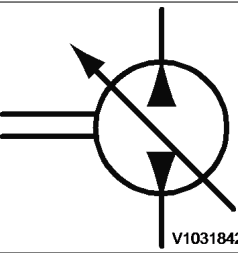
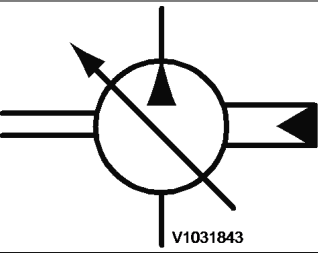
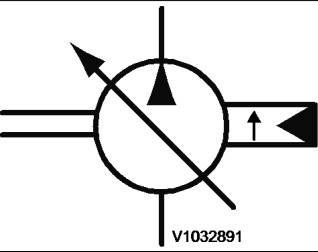
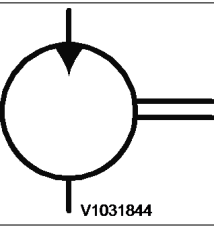
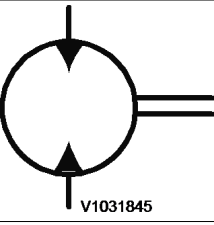
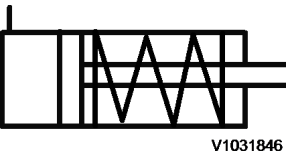
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Profile: WLO, L180E [GB]			

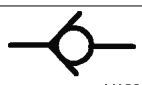
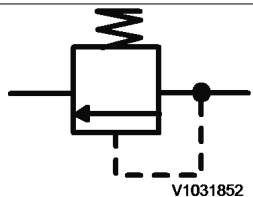
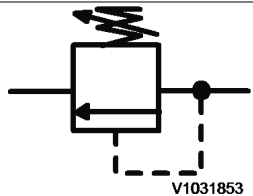
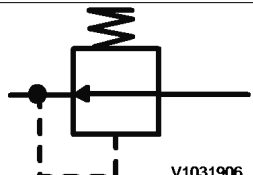
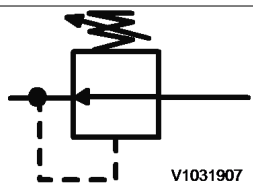
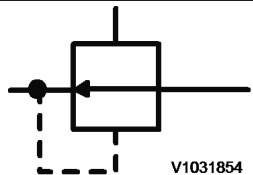
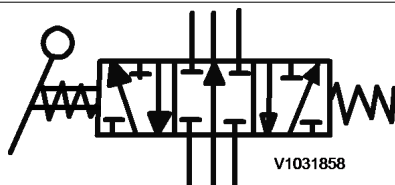
Explanations to hydraulic diagram

Symbols

Symbol	Explanation
 V1031824	Line
 V1031926	Servo line / Pilot line
 V1031825	Line junction
 V1031826	Crossing lines not connecting
 V1031827	Outlet, plugged
 V1031828	Quick-action coupling (e.g. checking point)
 V1031855	Restriction
 V1031856	Restriction, insignificantly viscosity-dependent
 V1031857	Adjustable restriction
Reservoirs and accumulators	
 V1031829	Atmospheric (open) reservoir
 V1031830	Accumulator
Filter	
 V1031831	Filter, strainer
 V1032821	Filter with magnetic element
Heat exchanger	

 V1031832	Cooler without representation of lines for the coolant
Control devices	
 V1031833	Manual control by push button
 V1031834	Manual control by lever
 V1031835	Manual control by pedal
 V1031836	Mechanical control by spring, neutral position spring, return spring
 V1031837	Electromagnetic control (one winding)
 V1031838	Hydraulic pressure control
 V1032892	Hydraulic pressure control, two pressure levels
 V1032822	Control via hydraulic pressure drop
 V1031927	Pneumatic control
 V1032823	Control via pneumatic pressure drop
Sources of energy	
 V1031839	Combustion engine
 V1031928	Electric motor
Pumps	

 V1031840	Hydraulic pump with fixed displacement and one direction of flow
 V1031841	Hydraulic pump with variable displacement and one direction of flow
 V1031842	Hydraulic pump with variable displacement and two directions of flow
 V1031843	Hydraulic pump with variable displacement, pressure controlled
 V1032891	Hydraulic pump with variable displacement, pressure controlled with pressure-compensated control
Motors	
 V1031844	Hydraulic motor with fixed displacement and one direction of flow
 V1031845	Hydraulic motor with fixed displacement and two directions of flow
Cylinders	
 V1031846	Single-acting cylinder with return stroke by spring

 V1031847	Double-acting cylinder with single piston rod (The piston end is called plus side and the piston rod end is called minus side)
Valves	
 V1031849	Non-return valve which requires very low opening pressure
 V1031850	Non-return valve which requires a certain opening pressure
 V1031851	Shuttle valve
 V1031852	Pressure-limiting valve
 V1031853	Pressure-limiting valve with adjustable opening pressure
 V1031906	Pressure-reducing valve
 V1031907	Pressure-reducing valve with adjustable closing pressure
 V1031854	Pressure-reducing valve, pressure controlled
 V1031858	Three-position valve, lever-controlled and spring-centred
 V1031848	Lines parallel with the long sides of the valve symbol show that the valve can take up any position between its end positions (stepless movement)
 V1031929	Shut-off valve / Breather valve

Application

The symbols in a diagram show connections, flow paths and function of the components in the system, but does not show

the design of the components.

NOTE!

In a hydraulic diagram the valve symbols are always drawn in neutral position.

Valve symbols

The basic element of a valve symbol is a square box. One box is shown for each position that the moving part of a valve (spool or similar) can take up.

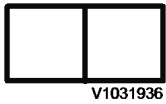


Figure 1

Valve symbol

If the valve does not have fixed positions, but can be operated steplessly, this is shown with parallel lines along the valve symbol.

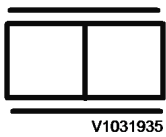


Figure 2

Valve symbol, steplessly controlled valve

Internal flow paths and flow directions are drawn in the boxes. Line connections to the valve are drawn to the box that shows the valve position when other components are actuated according to the diagram.

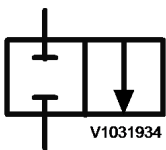


Figure 3

Closed valve

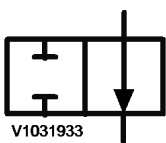


Figure 4

Open valve

Interpretation of valve symbols

In a three-position valve the spool can be placed in three positions, which in the symbol are represented by one box for each position. The box that represents the intended position is drawn between the line connections, which means that the appropriate connecting paths in the valve are shown in the diagram.

The position in the diagram

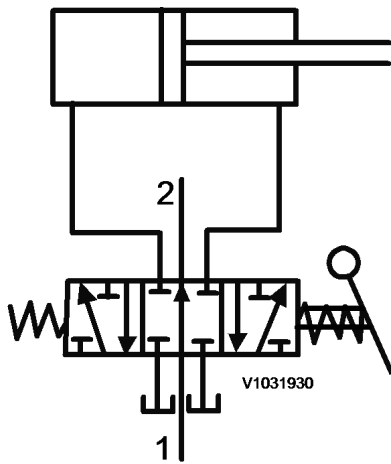


Figure 5
Neutral position

1. Inlet
2. Outlet

The spool is centred in neutral position by the springs. The inlet is connected to the outlet through the spool.

Imagined position for piston movement outwards

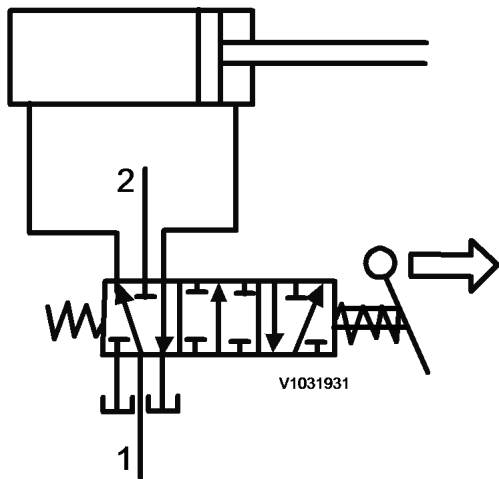


Figure 6
The piston rod is pressed out

1. Inlet
2. Outlet

The spool is actuated with the lever so that the plus side of the cylinder is connected to the inlet at the same time as the minus side is connected to the tank.

Imagined position for piston movement inwards

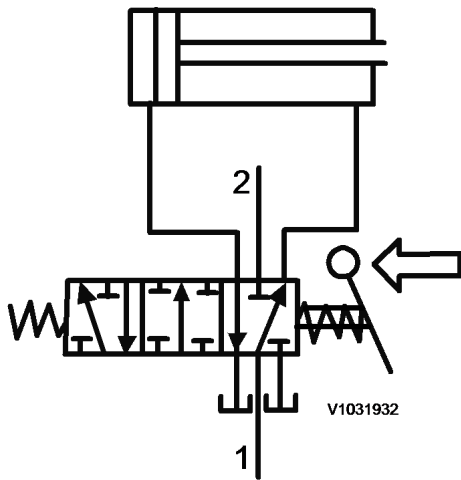


Figure 7
The piston rod is pressed in

1. Inlet
2. Outlet

The spool is actuated with the lever so that the minus side of the cylinder is connected to the inlet at the same time as the plus side is connected to the tank.



Construction Equipment

Service Information

Document Title: Hydraulic diagram, fan, brake system	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic diagram, fan, brake system

A	Hydraulic oil pump, P1
B	Hydraulic oil pump, P2
C	Hydraulic oil pump, P3
D	Central valve
E	Hydraulic oil filter
F	Leak-off oil filter
G	Fan motor
L	Foot brake valve
M	Accumulator block, brakes
N	Solenoid valve, parking brake
O	Hydraulic oil / transmission oil cooler
X	Parking brake

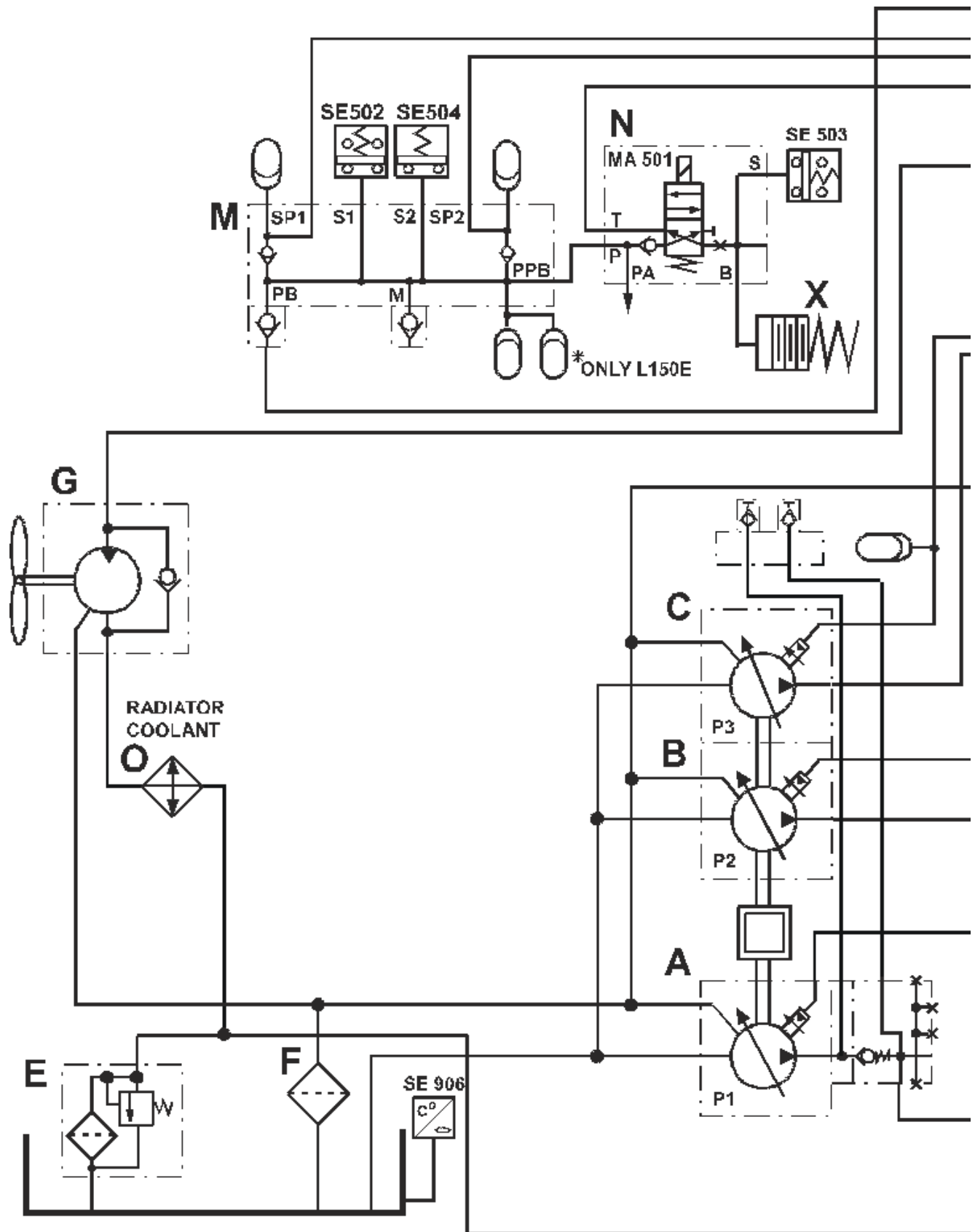
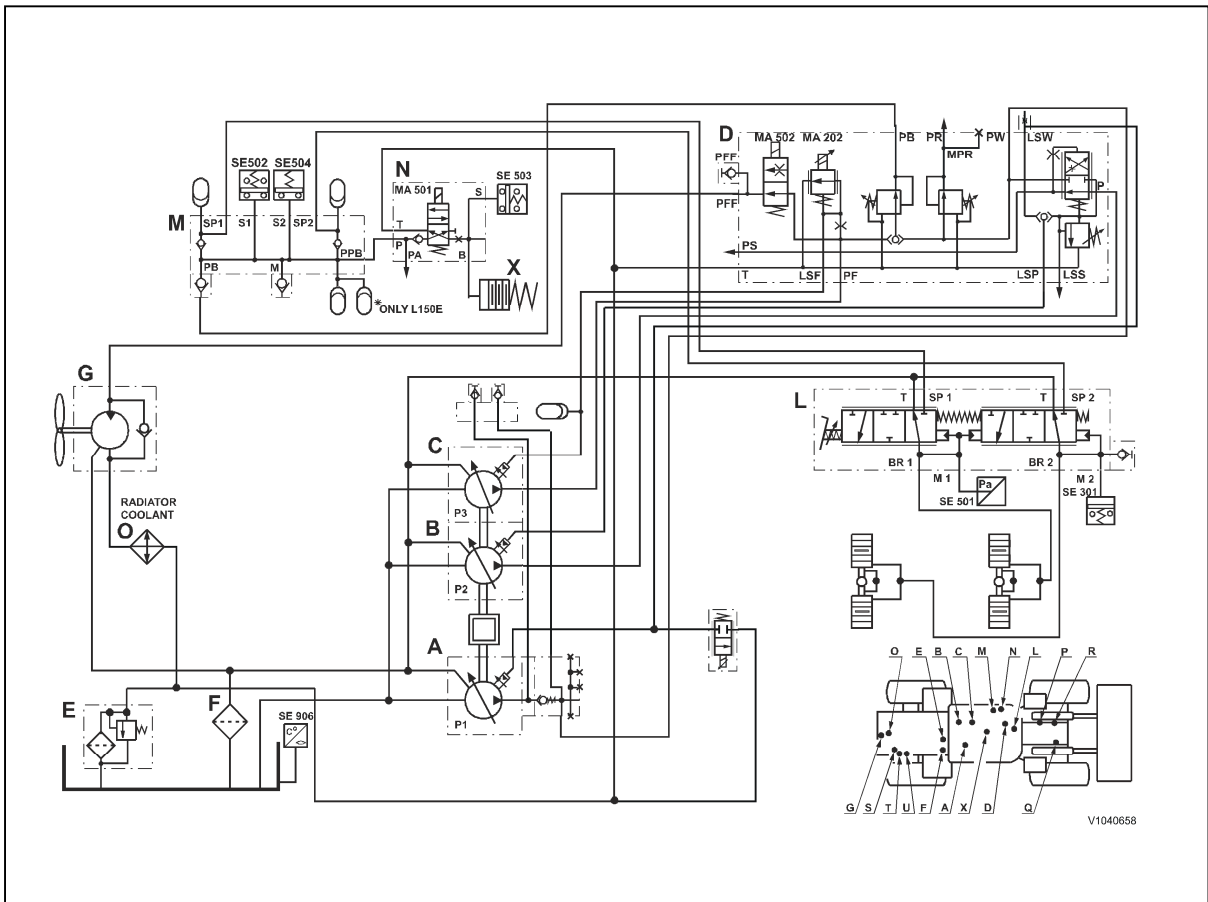


Figure 1





Construction Equipment

Service Information

Document Title: Hydraulic diagram, reversible fan, brake system	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic diagram, reversible fan, brake system

- A Hydraulic oil pump, P3, cooling fan and brake charging
- B Hydraulic oil pumps, P1 and P2, brake, servo hydraulics and working hydraulics, and steering, brake, servo hydraulics and working hydraulics.
- C Hydraulic oil filter
- D Central block
- G Fan motor
- L Foot brake valve
- M Accumulator block, brake
- N Parking brake
- O Hydraulic oil cooler

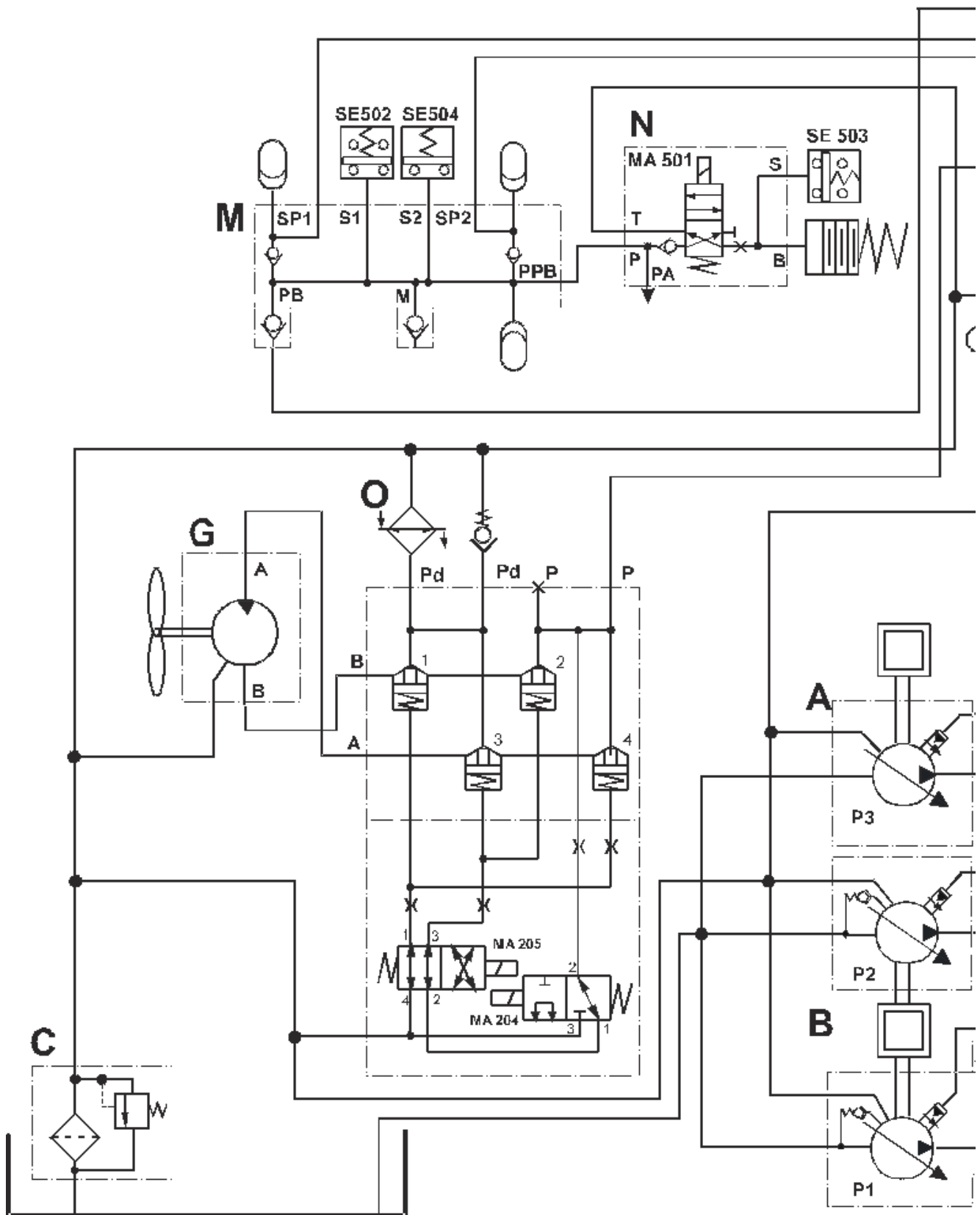
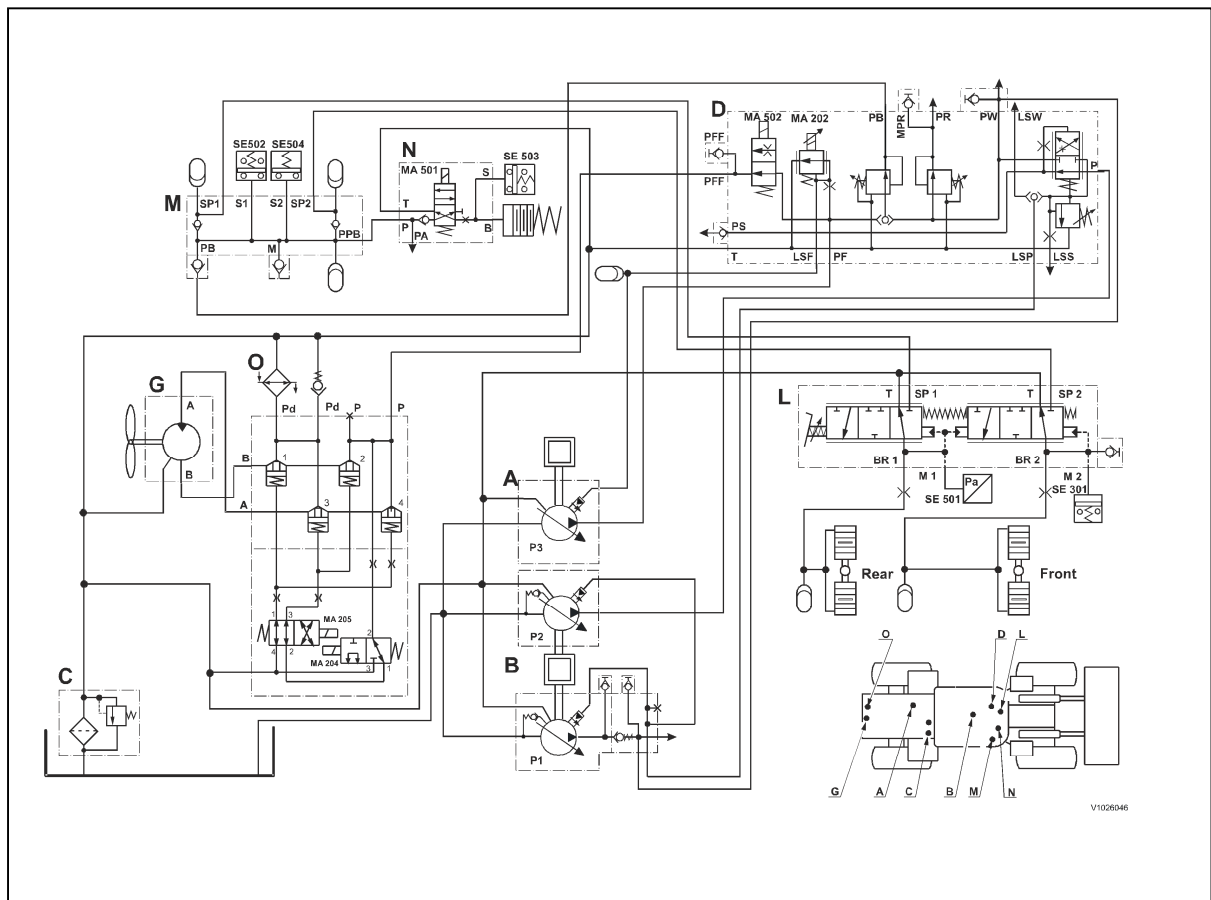


Figure 1
Hydraulic diagram, fan and brake



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<https://truckmanualshub.com/>

- [Hydraulic diagram, fan, axle oil cooling](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8001

Serial number stop: 10999

- [Hydraulic diagram, fan, axle oil cooling](#)

Product Line: WLO

Model Variant: L180E (Volvo)

Site: Arvika

Serial number start: 8001

Serial number stop: 10999



Construction Equipment

Service Information

Document Title: Hydraulic diagram, fan, axle oil cooling	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Hydraulic diagram, fan, axle oil cooling

A	Hydraulic oil pump, P1
B	Hydraulic oil pump, P2
C	Hydraulic oil pump, P3
D	Central valve
E	Hydraulic oil filter
F	Leak-off oil filter
G	Fan motor
O	Hydraulic oil / transmission oil cooler
P	Motor, pump, axle oil cooling, front axle
Q	Hydraulic oil filter, front axle
R	Hydraulic oil cooler, front axle
S	Motor, pump, axle oil cooling, rear axle
T	Hydraulic oil filter, rear axle
U	Hydraulic oil cooler, rear axle
X	Parking brake

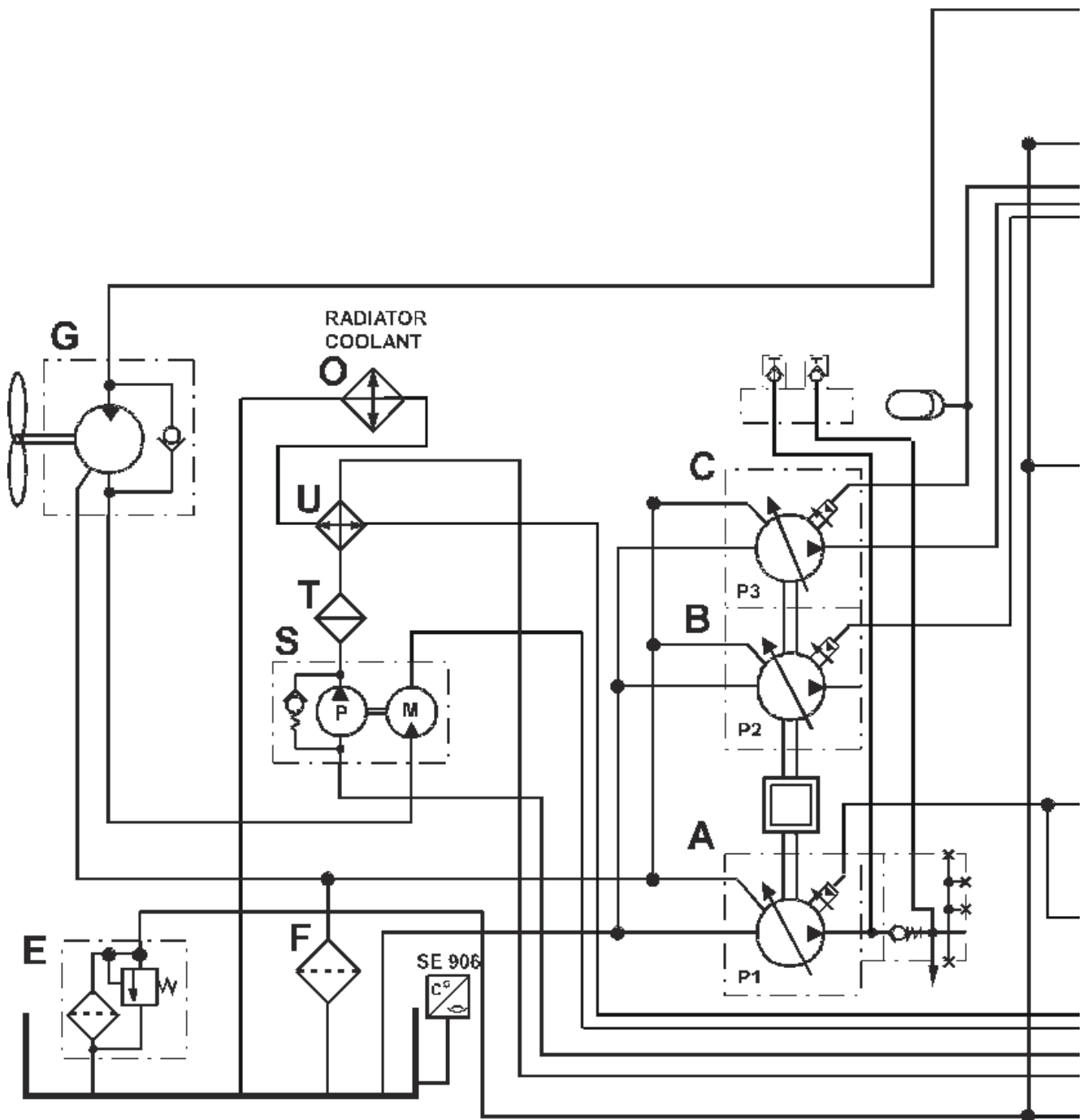
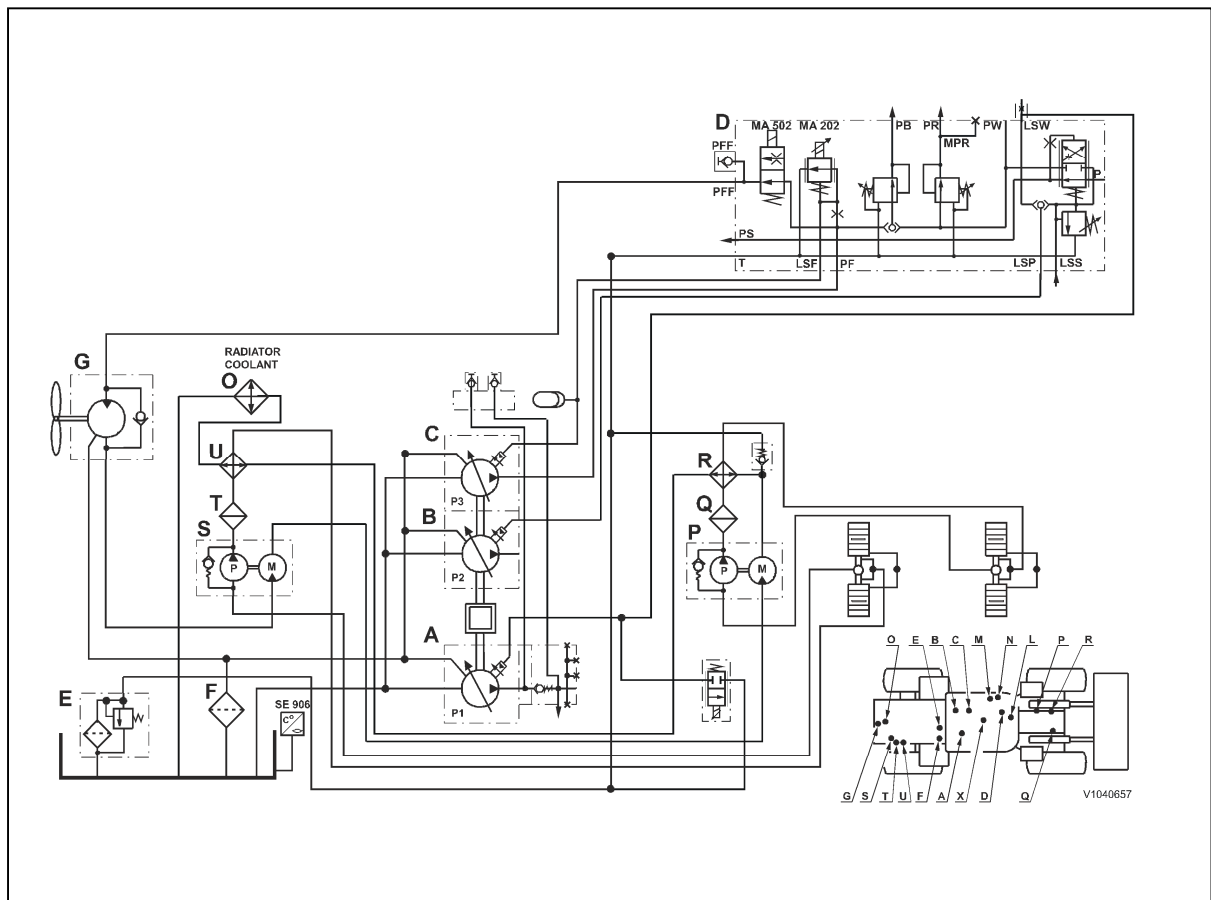


Figure 1





Construction Equipment

Service Information

Document Title: Hydraulic diagram, fan, axle oil cooling	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Hydraulic diagram, fan, axle oil cooling

A	Hydraulic oil pump, P1
B	Hydraulic oil pump, P2
C	Hydraulic oil pump, P3
D	Central valve
E	Hydraulic oil filter
F	Leak-off oil filter
G	Fan motor
L	Foot brake valve
M	Accumulator block, brakes
N	Solenoid valve, parking brake
O	Hydraulic oil / transmission oil cooler
P	Motor, pump, axle oil cooling, front axle
Q	Hydraulic oil filter, front axle
R	Hydraulic oil cooler, front axle
S	Motor, pump, axle oil cooling, rear axle
T	Hydraulic oil filter, rear axle
U	Hydraulic oil cooler, rear axle
X	Parking brake

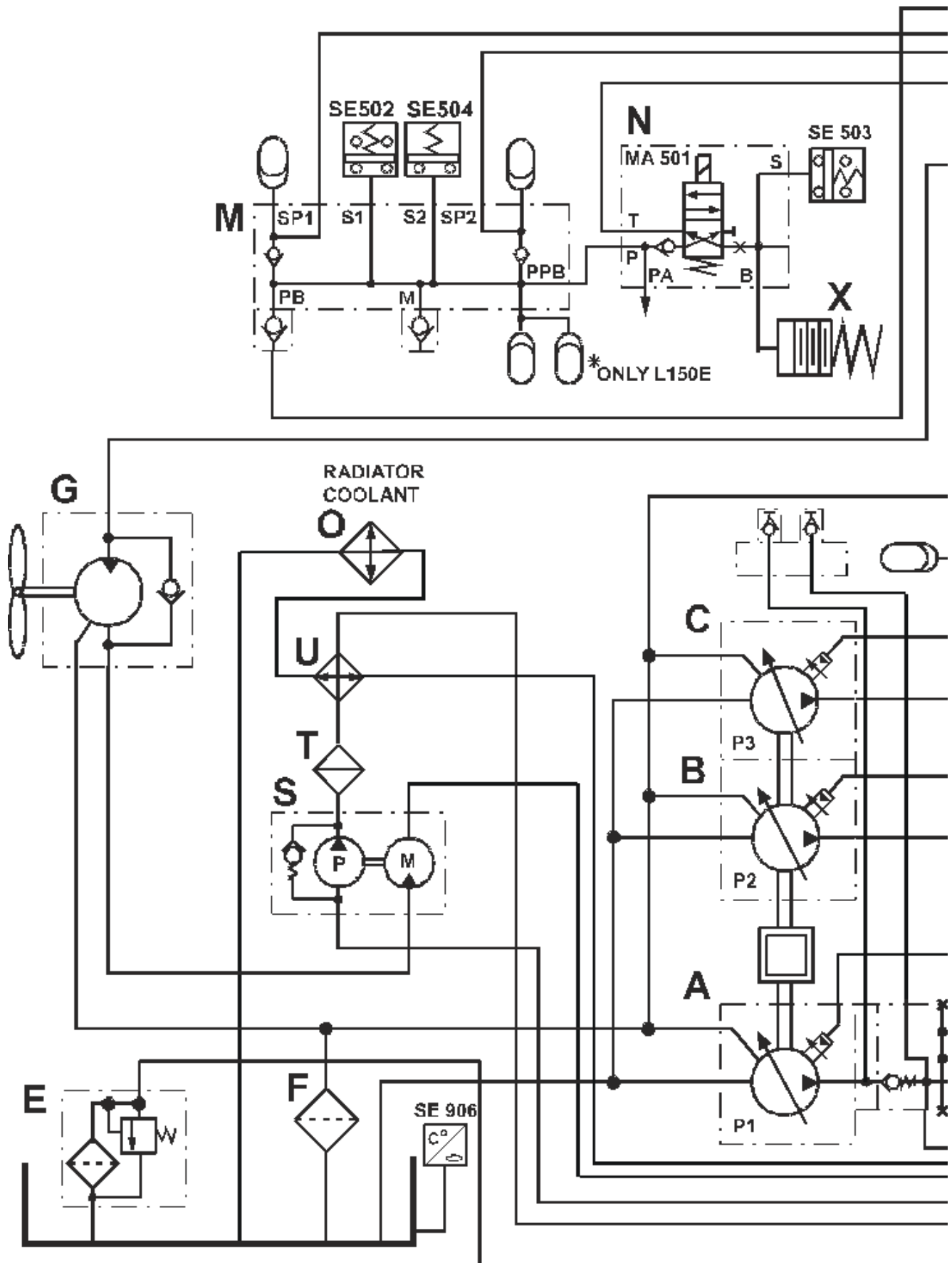


Figure 1

More than one document matches chosen profile

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- [Hydraulic diagram, steering](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 5001
Serial number stop: 7398

- [Hydraulic diagram, steering](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8001
Serial number stop: 10999



Construction Equipment

Service Information

Document Title: Hydraulic diagram, steering	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Hydraulic diagram, steering

- A Hydraulic oil pump, P1, brake, servo and working hydraulics
- B Hydraulic oil pump, P2, brake, steering, servo and working hydraulics
- C Hydraulic oil pump, P3, cooling fan, brake charging
- D Central valve
- E Hydraulic oil filter
- F Leak oil filter
- G Collecting block, LS-pressure
- H Steering valve
- II Steering cylinders
- K Shift valve

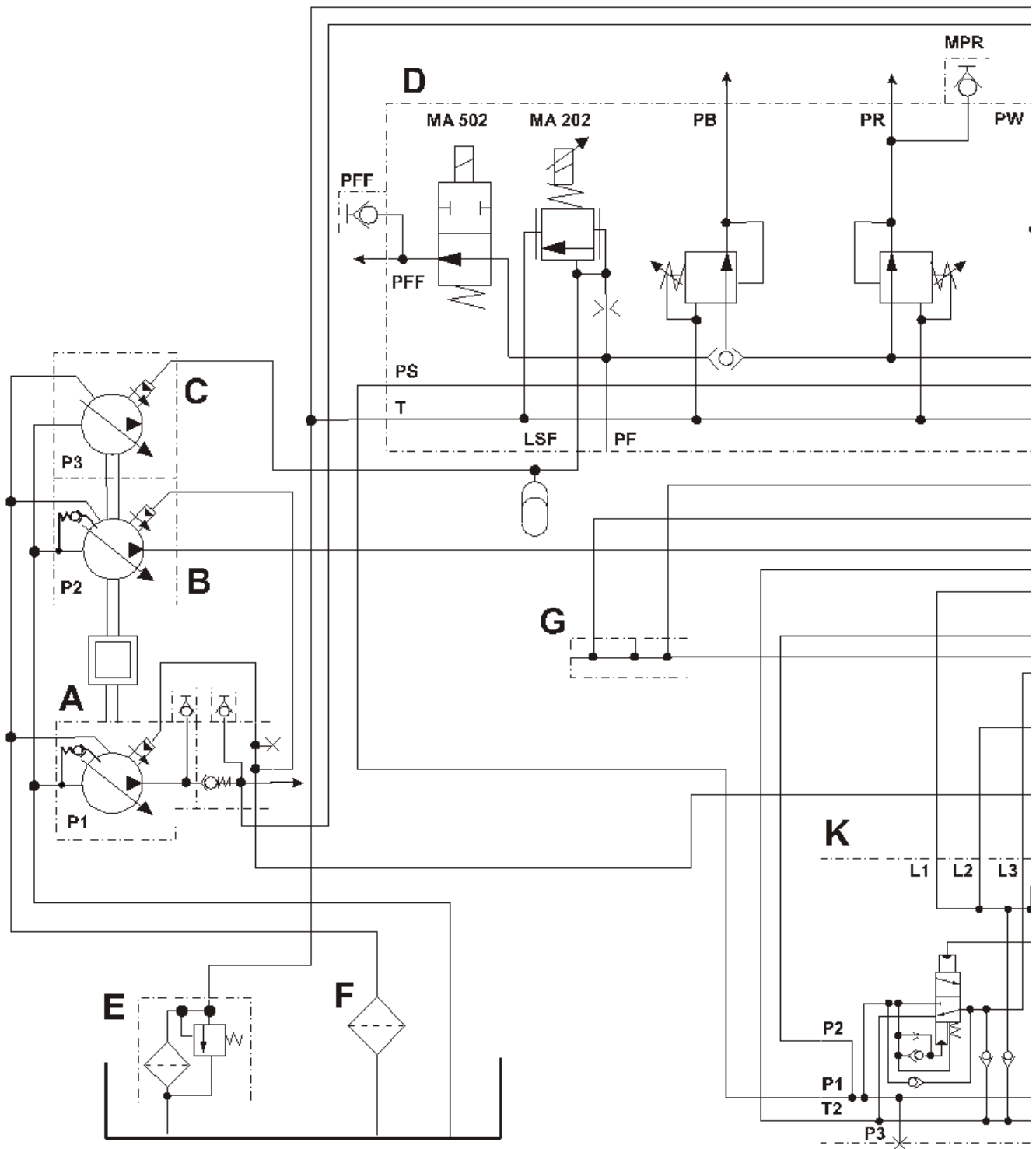
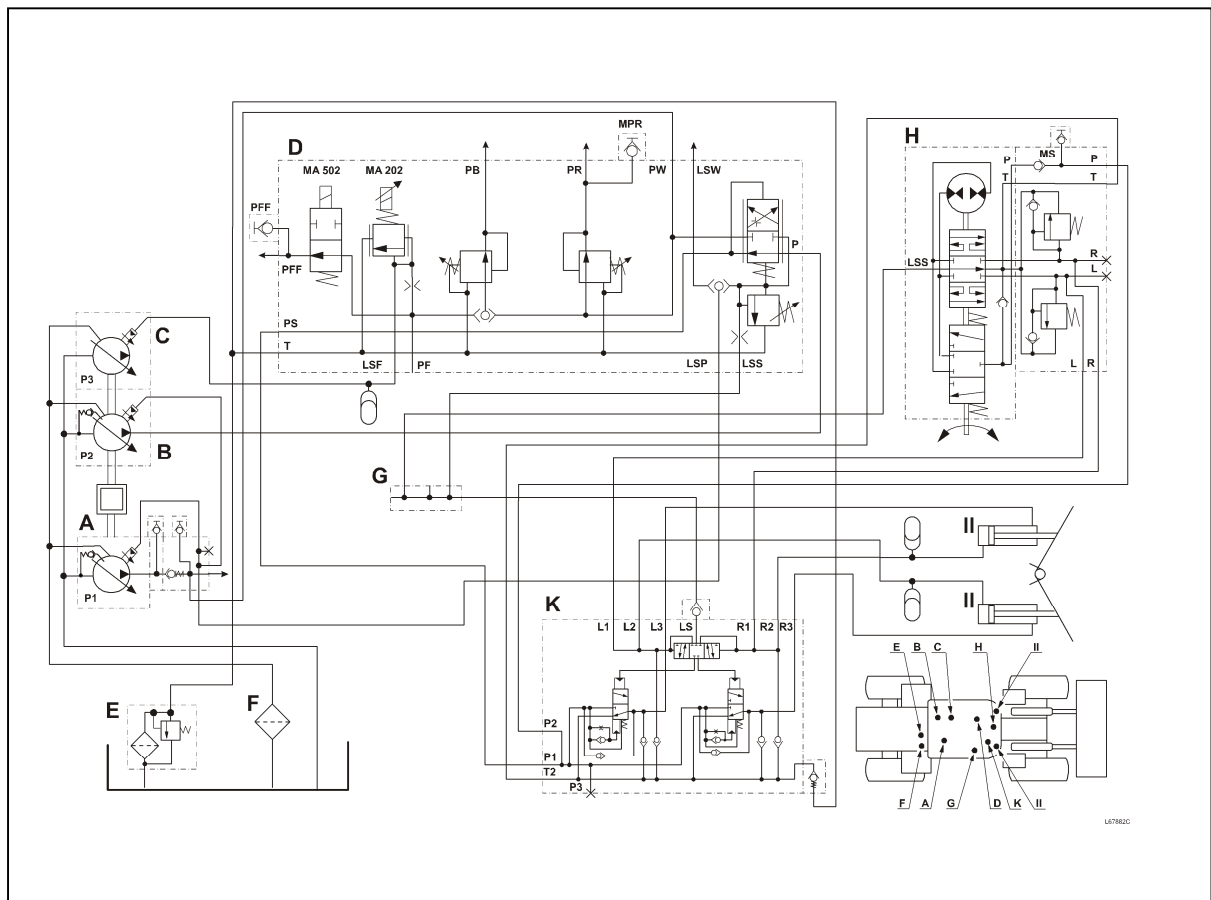


Figure 1





Construction Equipment

Service Information

Document Title: Hydraulic diagram, steering	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Hydraulic diagram, steering

A	Hydraulic oil pump, P1
B	Hydraulic oil pump, P2
C	Hydraulic oil pump, P3
D	Central valve
E	Hydraulic oil filter
F	Leak-off oil filter
G	Collecting block, LS-pressure
H	Steering valve
II	Steering cylinders
K	Shift valve
Z	Checking point panel
W	Valve for power limitation

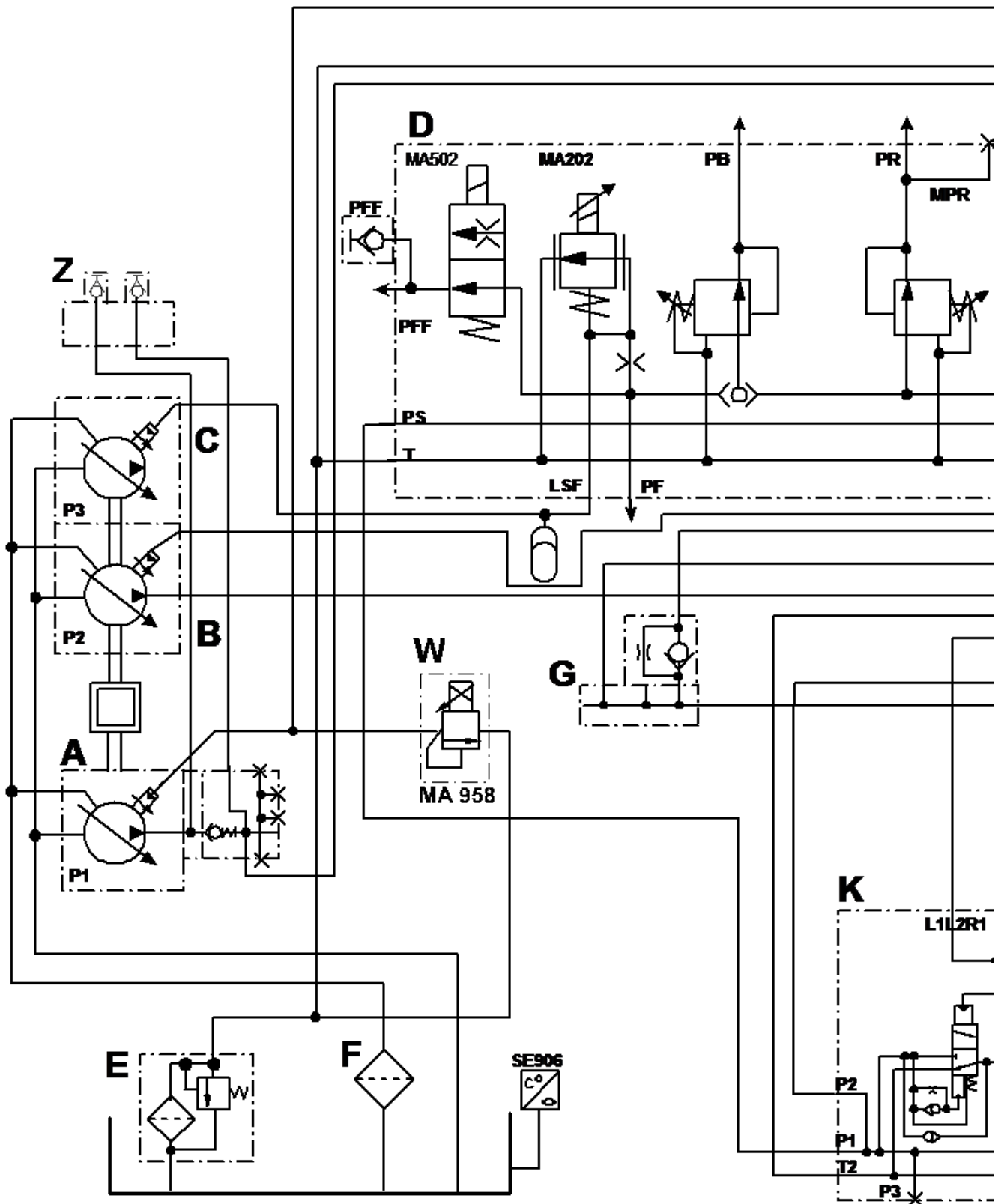
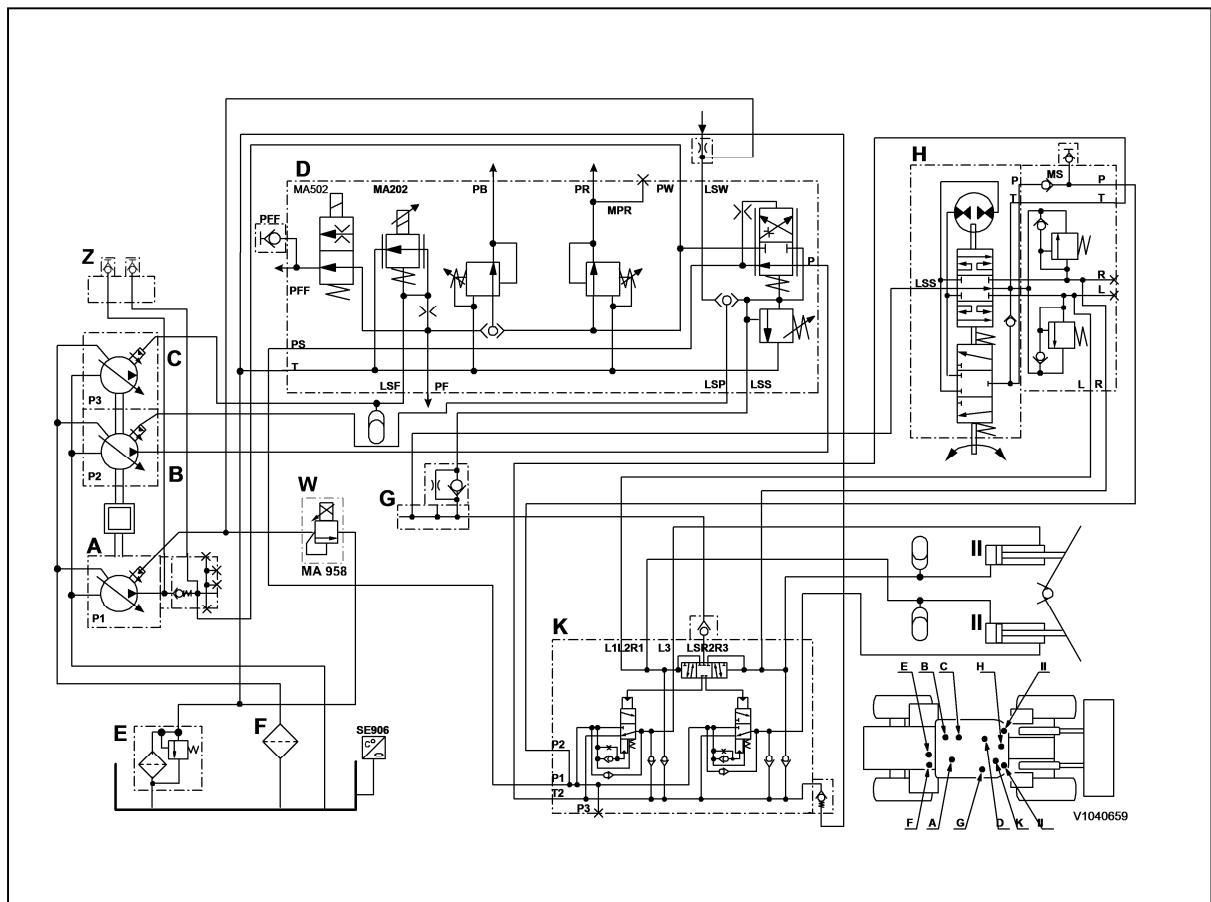


Figure 1





Construction Equipment

Service Information

Document Title: Hydraulic diagram, working hydraulics, differential lock	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Hydraulic diagram, working hydraulics, differential lock

A	Hydraulic oil pump, P1
B	Hydraulic oil pump, P2
C	Hydraulic oil pump, P3
E	Hydraulic oil filter
F	Leak-off oil filter
P	Servo valve
Q	Accumulator, servo
R	Collecting block, LS-pressure
S	Solenoid valve, differential lock
V	Control valve
W	Power limitation valve
FF	Tilting cylinder
GG	Lifting cylinders

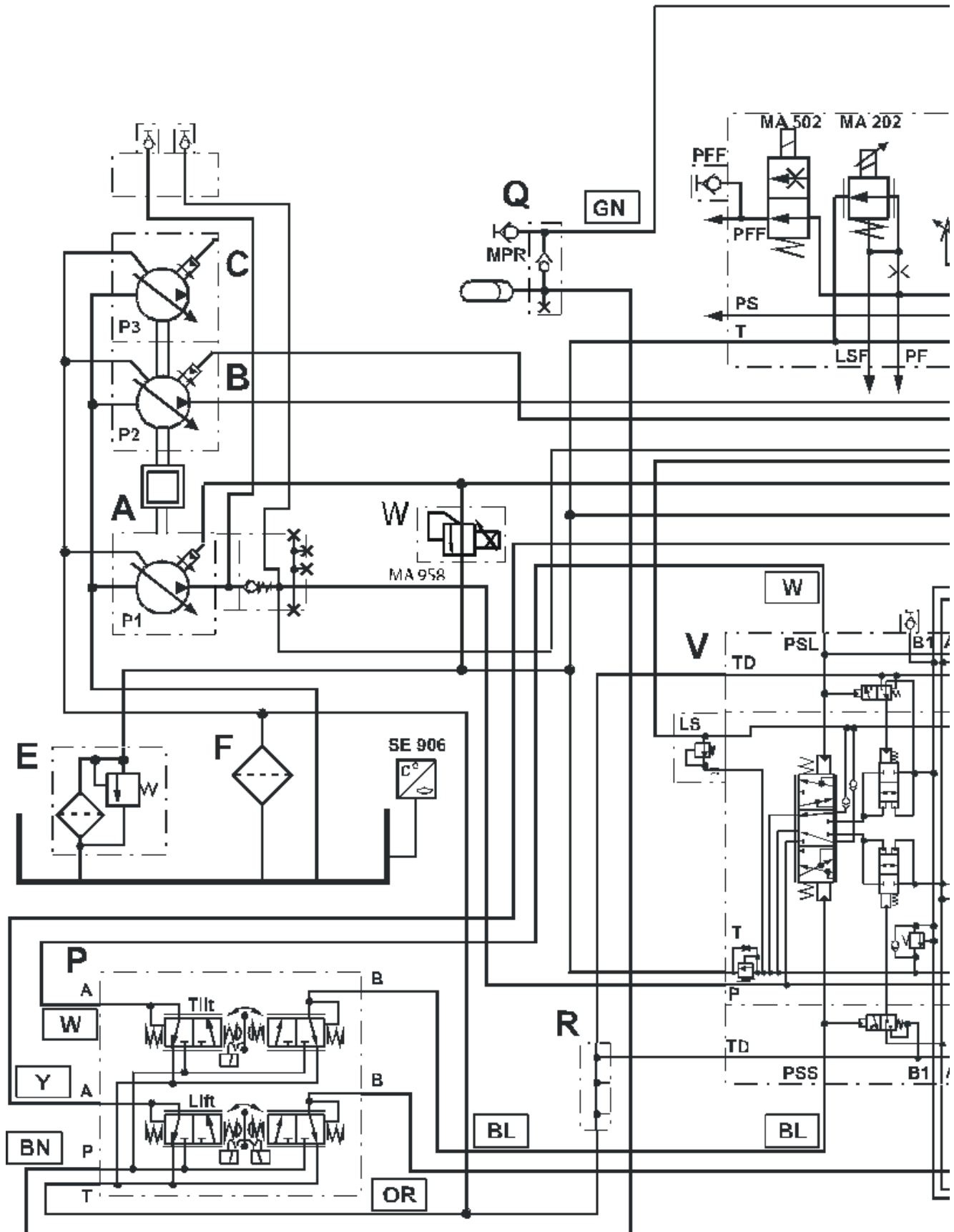
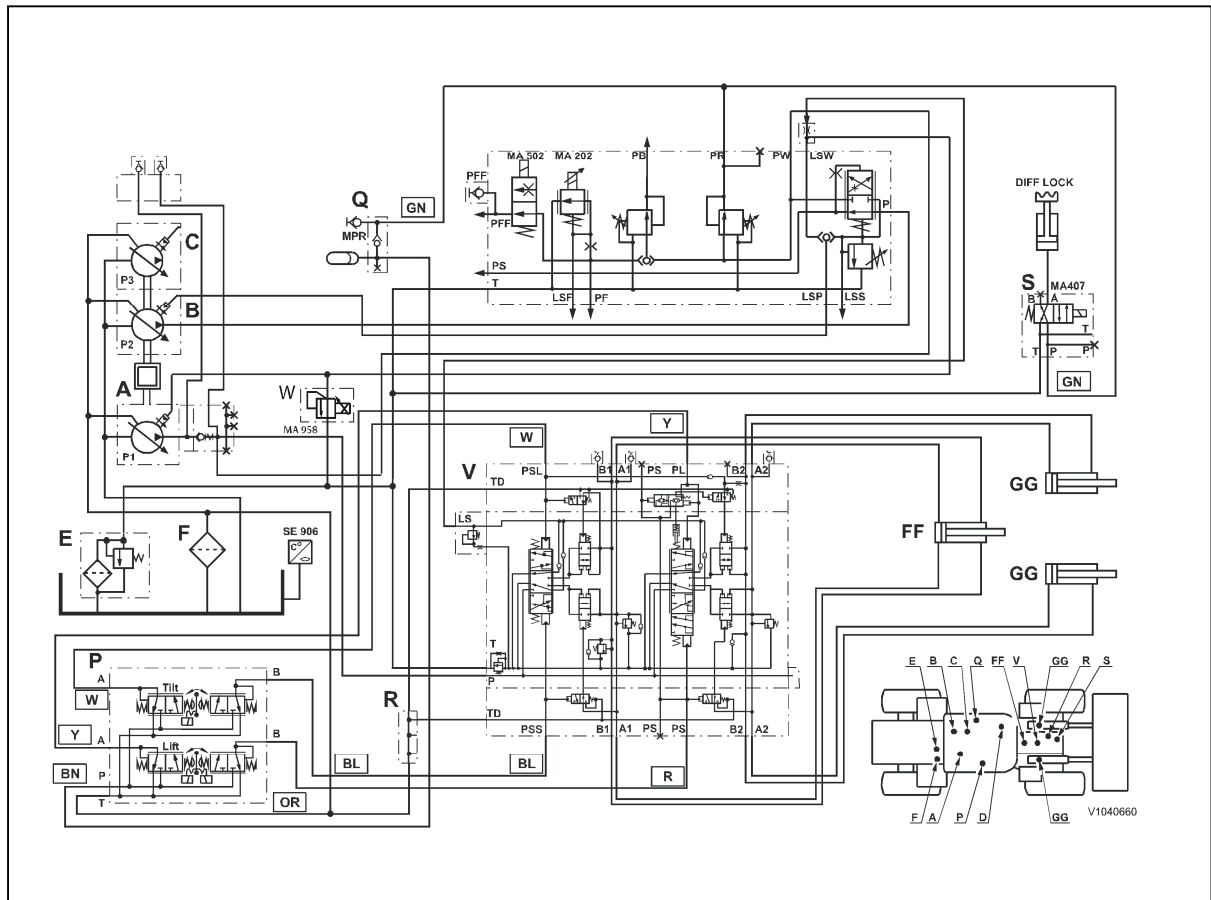


Figure 1



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- [Hydraulic diagram, complete](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 5001
Serial number stop: 7398

- [Hydraulic diagram, complete](#)

Product Line: WLO
Model Variant: L180E (Volvo)
Site: Arvika
Serial number start: 8002
Serial number stop: 10999



Construction Equipment

Service Information

Document Title: Hydraulic diagram, complete	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

[Go back to Index Page](#)

Hydraulic diagram, complete

A	Hydraulic oil pump, P1, brakes, servo and working hydraulics
A1	Hydraulic oil filter
B	Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
B1	Valve block, V", BSS, single-acting lifting
C	Hydraulic oil pump, P3, cooling fan, brake charging
C1	Solenoid valves, differential lock and attachment lock
D	Central valve
D1	Hydraulic oil / transmission oil cooler
E	Collecting block, LS-pressure
EE	Attachment locking
F	Leak-off oil filter
FF	Tilting cylinder
G	Fan motor
GG	Lifting cylinders
H	Steering valve
I	Collecting block
II	Steering cylinders
J	Solenoid valves, MA913 raised pressure attachment lock, MA912 safety valve servo pressure (together with 4th hydraulic function)
J1	Sensor block, secondary steering
J2	Electrical motor, pump, secondary steering
K	CDC
L	Foot brake valve
M	Accumulator block, brakes
N	Solenoid valve, parking brake
O	Parking brake
P	Motor, pump, axle oil cooling, front axle
P1	Servo valve
Q	Hydraulic oil filter, front axle
R	Hydraulic oil cooler, front axle
S	Motor, pump, axle oil cooling, rear axle
T	Hydraulic oil filter, rear axle
U	Hydraulic oil cooler, rear axle
V	Control valve
X	Shift valve
Y	3rd/4th hydraulic function
Z	Valve block, V2, Bss

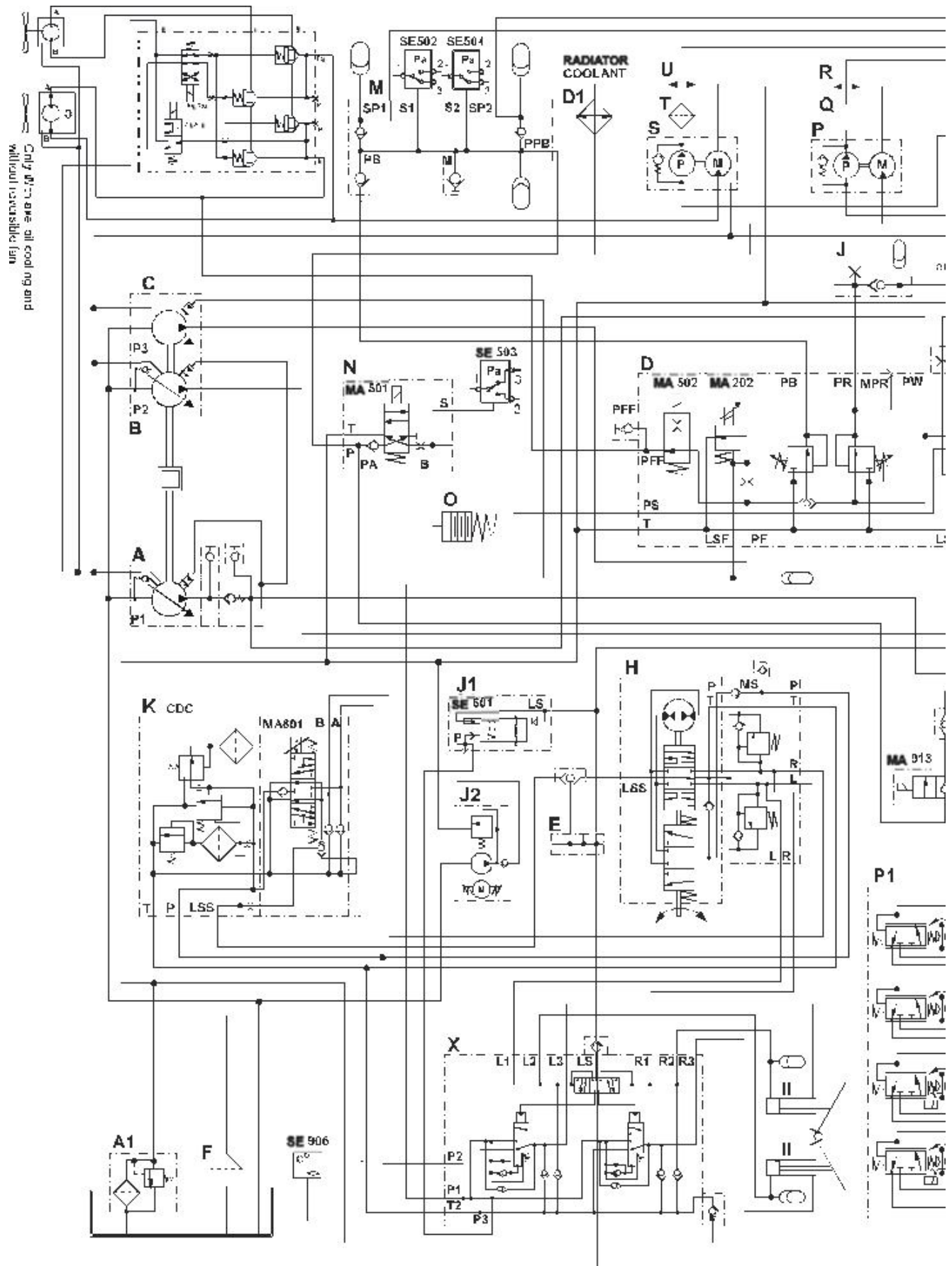


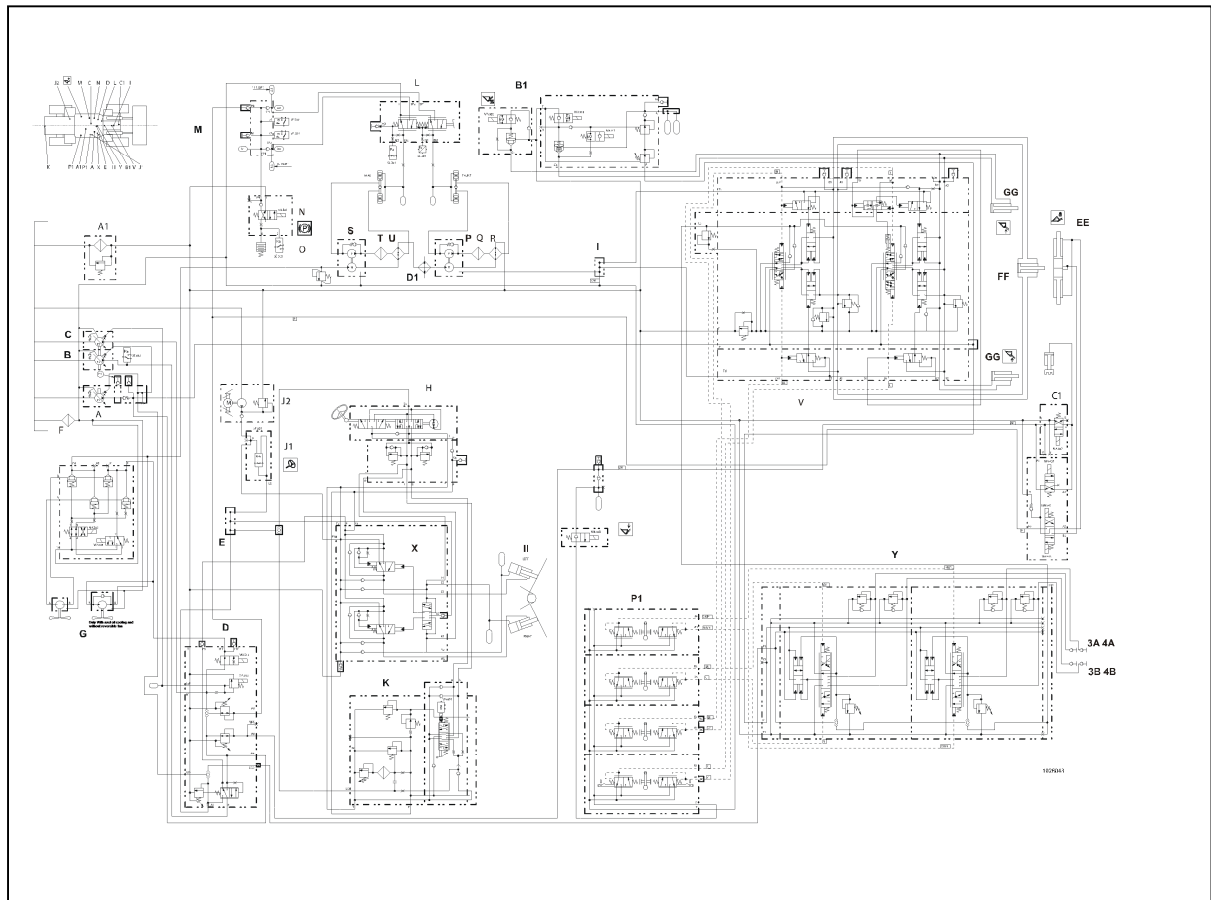
Figure 1

L150E Ser. No. —7191

L180E Ser. No. —5931

L220E Ser. No. 2191—2780

A	Hydraulic oil pump, P1, brakes, servo and working hydraulics
A1	Hydraulic oil filter
B	Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
B1	Valve block, V", BSS, single-acting lifting
C	Hydraulic oil pump, P3, cooling fan, brake charging
C1	Solenoid valves, differential lock and attachment lock
D	Central valve
D1	Hydraulic oil / transmission oil cooler
E	Collecting block, LS-pressure
EE	Attachment locking
F	Leak-off oil filter
FF	Tilting cylinder
G	Fan motor
GG	Lifting cylinders
H	Steering valve
I	Collecting block
II	Steering cylinders
J	Solenoid valves, MA913 raised pressure attachment lock, MA912 safety valve servo pressure (together with 4th hydraulic function)
J1	Sensor block, secondary steering
J2	Electrical motor, pump, secondary steering
K	CDC
L	Foot brake valve
M	Accumulator block, brakes
N	Solenoid valve, parking brake
O	Parking brake
P	Motor, pump, axle oil cooling, front axle
P1	Servo valve
Q	Hydraulic oil filter, front axle
R	Hydraulic oil cooler, front axle
S	Motor, pump, axle oil cooling, rear axle
T	Hydraulic oil filter, rear axle
U	Hydraulic oil cooler, rear axle
V	Control valve
X	Shift valve
Y	3rd/4th hydraulic function
Z	Valve block, V2, Bss
3A	3rd hydraulic function
3B	3rd hydraulic function
4A	4th hydraulic function
4B	4th hydraulic function



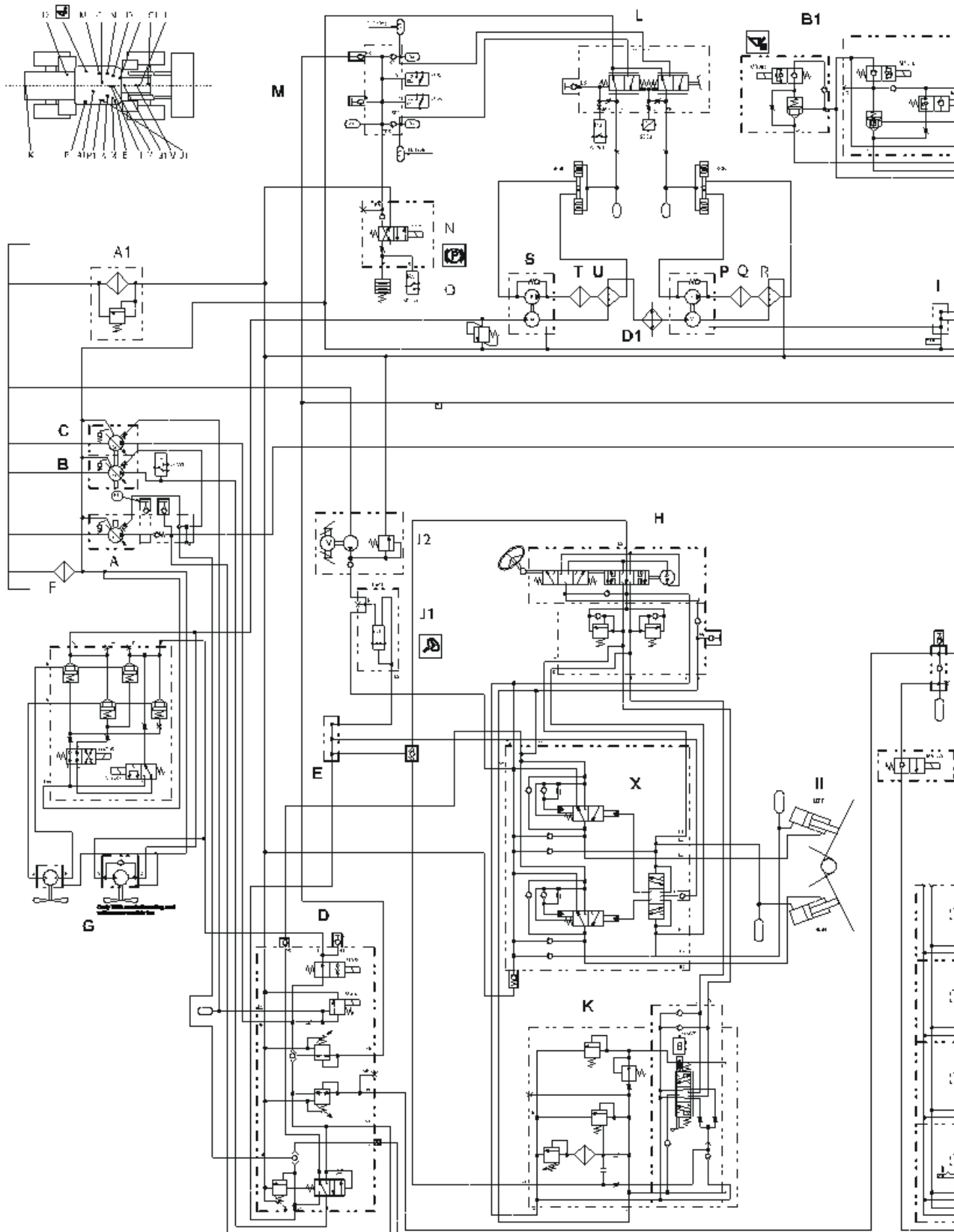


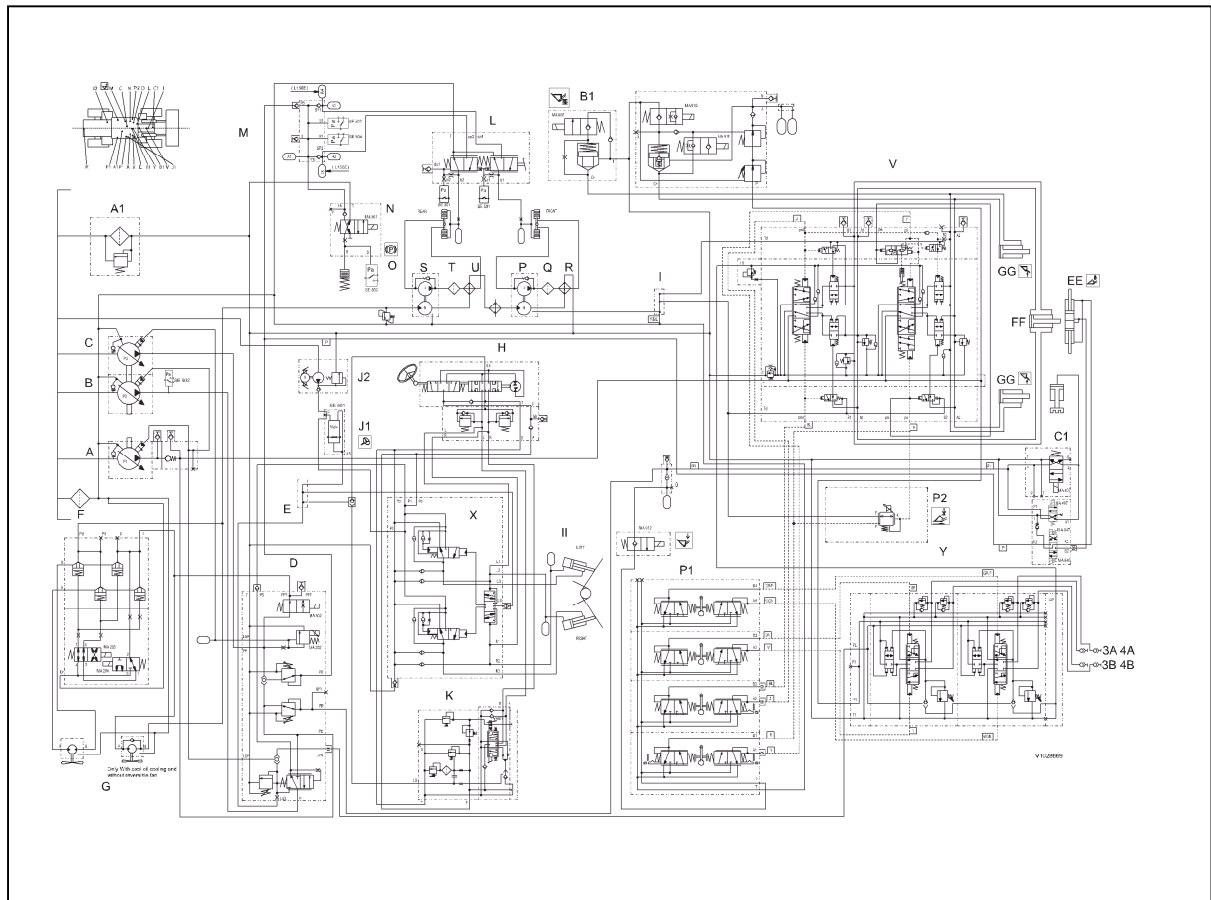
Figure 2

L150E Ser. No. 7192—7418

L180E Ser. No. 5932—6095

L220E Ser. No. 2781—2888

A	Hydraulic oil pump, P1, brakes, servo and working hydraulics
A1	Hydraulic oil filter
B	Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
B1	Valve block, V", BSS, single-acting lifting
C	Hydraulic oil pump, P3, cooling fan, brake charging
C1	Solenoid valves, differential lock and attachment lock
D	Central valve
D1	Hydraulic oil / transmission oil cooler
E	Collecting block, LS-pressure
EE	Attachment locking
F	Leak-off oil filter
FF	Tilting cylinder
G	Fan motor
GG	Lifting cylinders
H	Steering valve
I	Collecting block
II	Steering cylinders
J	Solenoid valves, MA913 raised pressure attachment lock, MA912 safety valve servo pressure (together with 4th hydraulic function)
J1	Sensor block, secondary steering
J2	Electrical motor, pump, secondary steering
K	CDC
L	Foot brake valve
M	Accumulator block, brakes
N	Solenoid valve, parking brake
O	Parking brake
P	Motor, pump, axle oil cooling, front axle
P1	Servo valve
Q	Hydraulic oil filter, front axle
R	Hydraulic oil cooler, front axle
S	Motor, pump, axle oil cooling, rear axle
T	Hydraulic oil filter, rear axle
U	Hydraulic oil cooler, rear axle
V	Control valve
X	Shift valve
Y	3rd/4th hydraulic function
Z	Valve block, V2, Bss
3A	3rd hydraulic function
3B	3rd hydraulic function
4A	4th hydraulic function
4B	4th hydraulic function



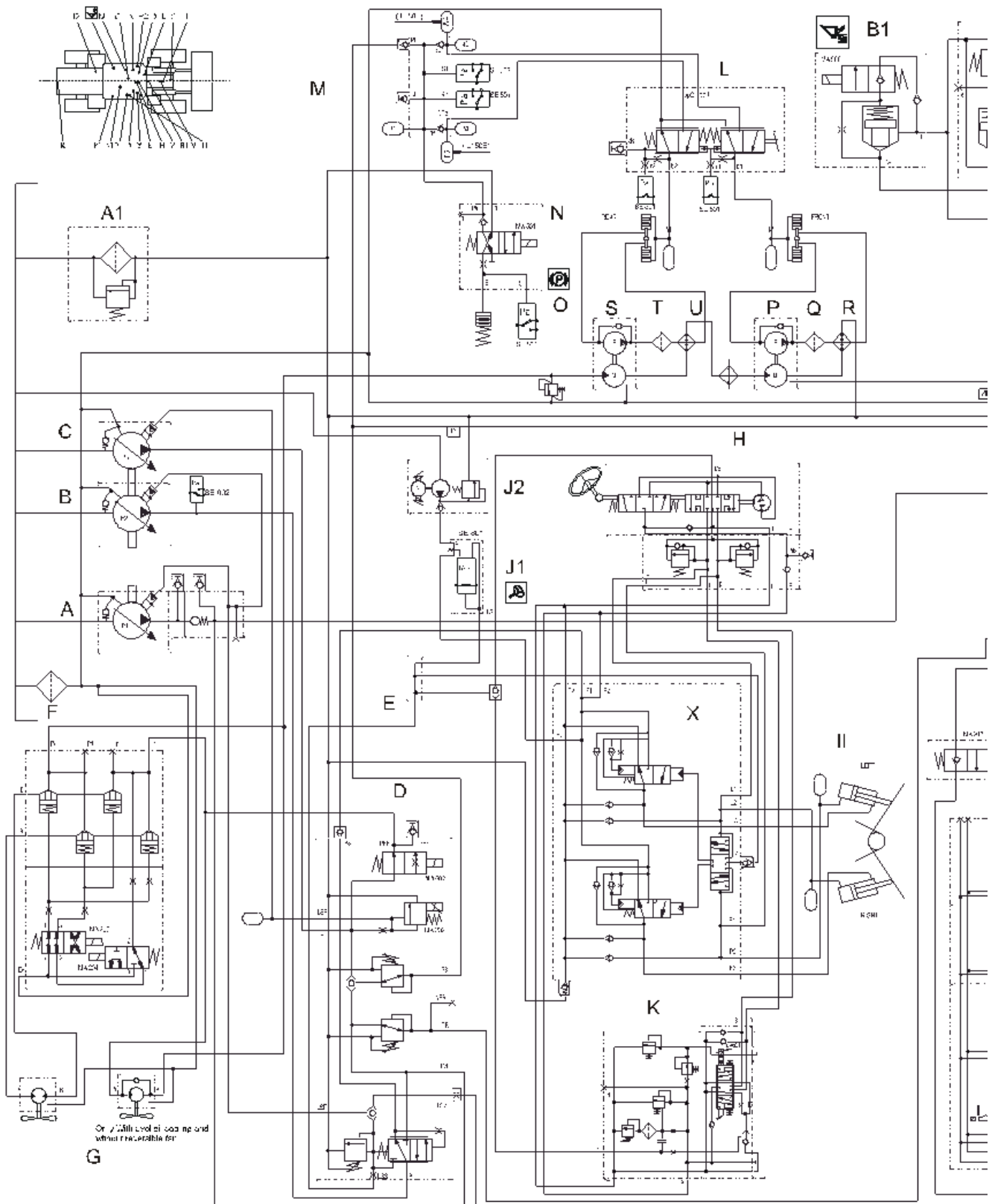


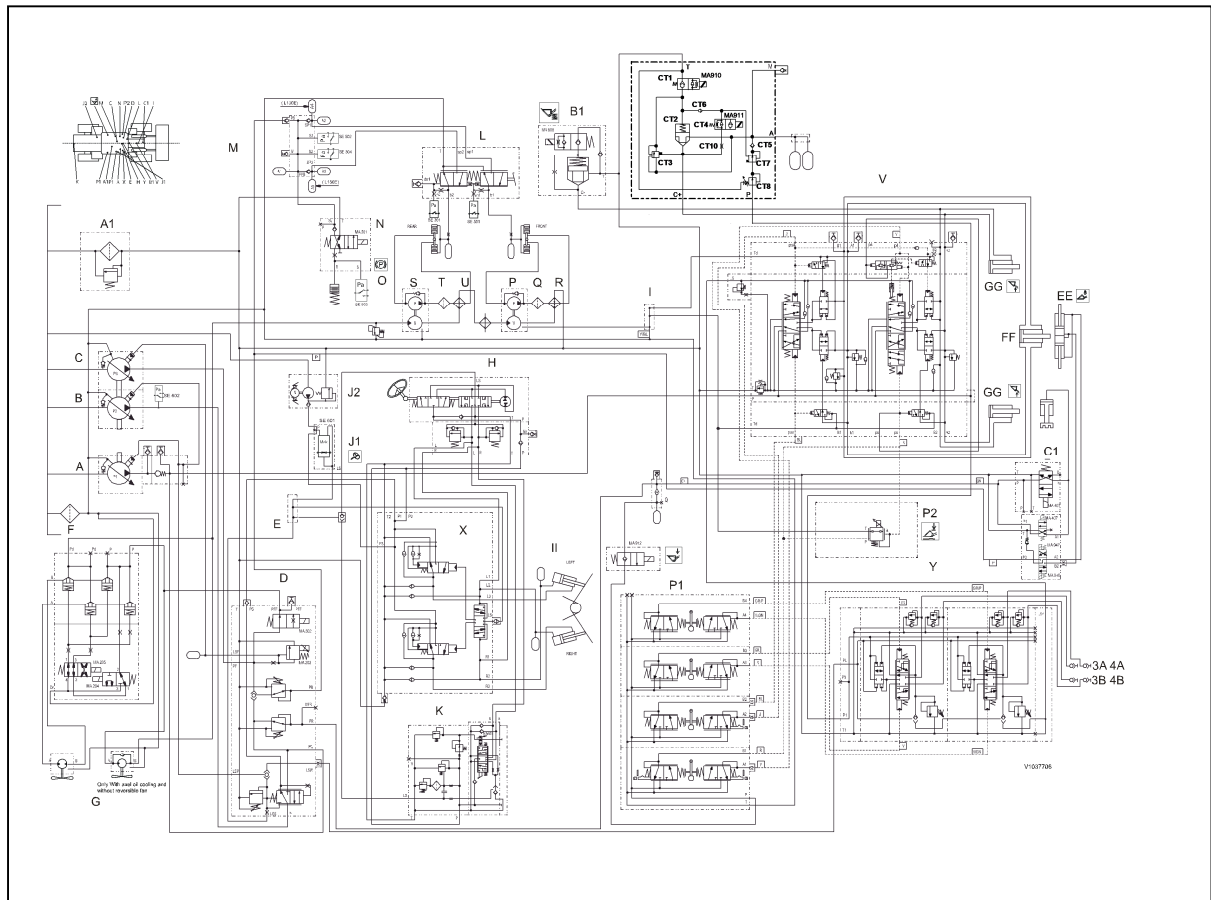
Figure 3

L150E Ser. No. 7419—8005

L180E Ser. No. 6096—6201

L220E Ser. No. 2889—2961

A	Hydraulic oil pump, P1, brakes, servo and working hydraulics
A1	Hydraulic oil filter
B	Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
B1	Valve block, V", BSS, single-acting lifting
C	Hydraulic oil pump, P3, cooling fan, brake charging
C1	Solenoid valves, differential lock and attachment lock
D	Central valve
D1	Hydraulic oil / transmission oil cooler
E	Collecting block, LS-pressure
EE	Attachment locking
F	Leak-off oil filter
FF	Tilting cylinder
G	Fan motor
GG	Lifting cylinders
H	Steering valve
I	Collecting block
II	Steering cylinders
J	Solenoid valves, MA913 raised pressure attachment lock, MA912 safety valve servo pressure (together with 4th hydraulic function)
J1	Sensor block, secondary steering
J2	Electrical motor, pump, secondary steering
K	CDC
L	Foot brake valve
M	Accumulator block, brakes
N	Solenoid valve, parking brake
O	Parking brake
P	Motor, pump, axle oil cooling, front axle
P1	Servo valve
Q	Hydraulic oil filter, front axle
R	Hydraulic oil cooler, front axle
S	Motor, pump, axle oil cooling, rear axle
T	Hydraulic oil filter, rear axle
U	Hydraulic oil cooler, rear axle
V	Control valve
X	Shift valve
Y	3rd/4th hydraulic function
Z	Valve block, V2, Bss
3A	3rd hydraulic function
3B	3rd hydraulic function
4A	4th hydraulic function
4B	4th hydraulic function



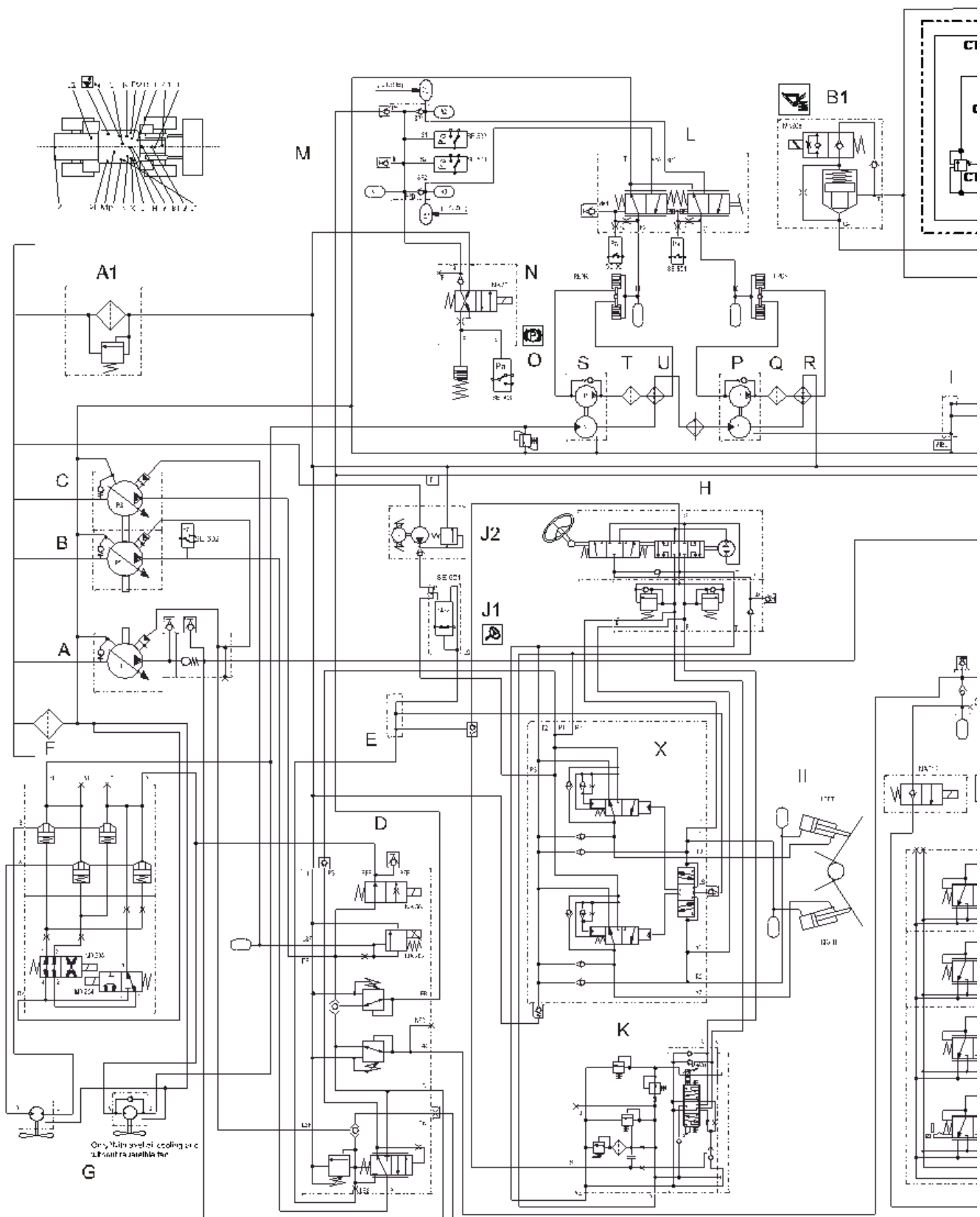


Figure 4

L150E Ser. No. 8006—9455

L180E Ser. No. 6202—7398

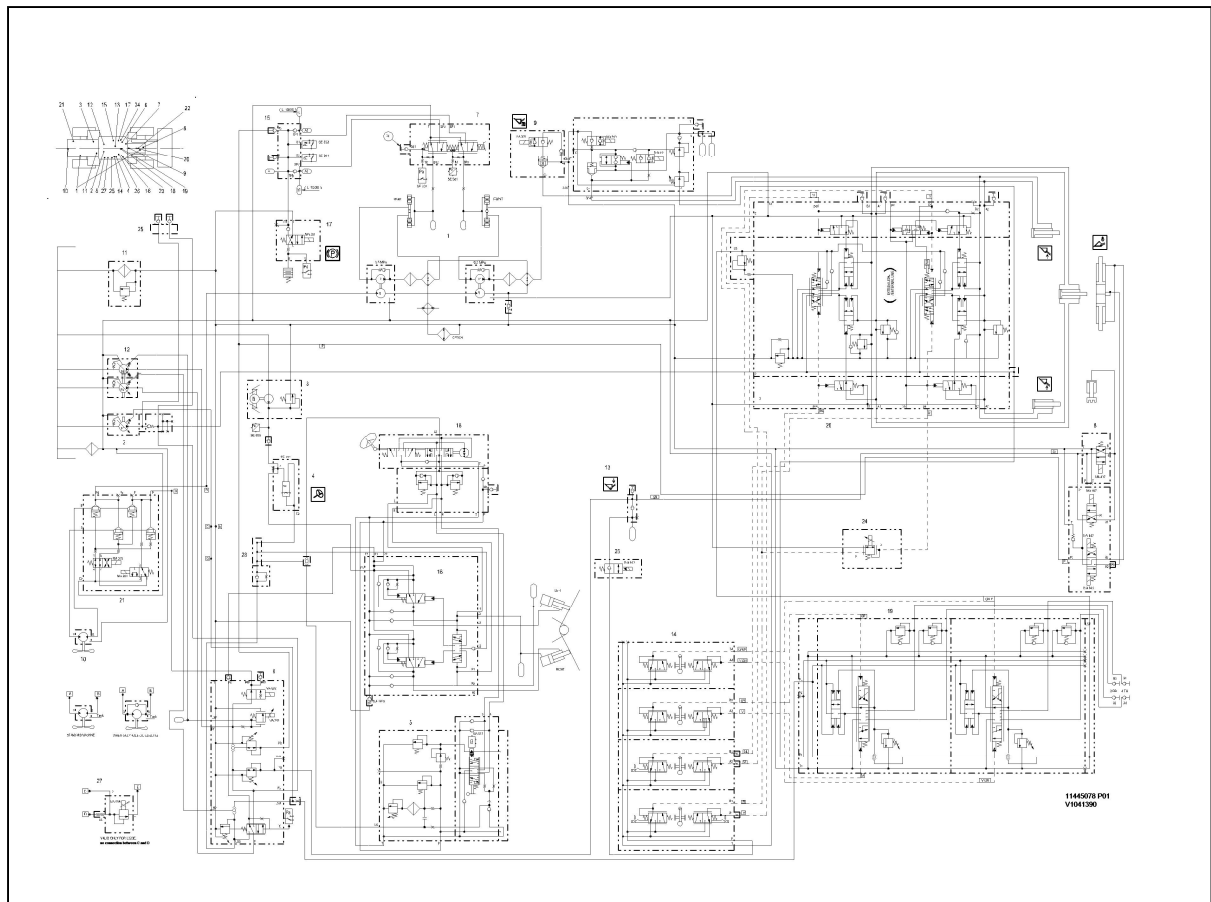
L220E Ser. No. 2962—3566

Document Title: Hydraulic diagram, complete	Function Group: 990	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

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Hydraulic diagram, complete

- 1 Axle oil cooling
- 2 Hydraulic oil pump, P1, brakes, servo and working hydraulics
- 3 Electrical motor, pump, secondary steering
- 4 Sensor block, secondary steering
- 5 CDC
- 6 Central valve
- 7 Foot brake valve
- 8 Solenoid valves, differential lock and attachment lock
- 9 Valve block, BSS, single-acting lifting
- 10 Fan motor
- 11 Hydraulic oil filter
- 12 Hydraulic oil pump, P2, brakes, steering, servo and working hydraulics
Hydraulic oil pump, P3, cooling fan, brake charging
- 13 Load lowering
- 14 Servo valve
- 15 Accumulator block, brakes
- 16 Shift valve
- 17 Parking brake
- 18 Steering valve
- 19 3rd/4th hydraulic function
- 20 Control valve
- 21 Reversible cooling fan
- 23 Collecting block, LS-pressure
- 24 Return To Dig
- 25 Checking points positioned on panel
- 26 MA912 Safety valve servo pressure (together with 4th hydraulic function)
- 27 Hydraulic power limitation





Construction Equipment

Service Information

Document Title: Lubrication description	Function Group: cycle, 993	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L60E, L120E, L90E, L180E HL, L330E, L220E, L110E, L180E, L70E, L150E [GB]			

Lubrication cycle, description

A complete lubrication cycle consists of cycle A or cycle B.

The cycles consist of four phases each, the following describes the phases in cycle A.

1. Pump phase
2. Lubrication phase
3. Pressure reduction phase
4. Pause

The pump phase and lubrication phase are equal in duration. The duration of the pause depends on which lubrication interval was selected. The total duration of the lubrication cycle is determined by which lubrication cycle was selected.

If the lubrication cycle is interrupted because i.e. the operator turns off the machine, the lubrication cycle continues at the same point where it was interrupted when the machine is started again. Thus, the lubrication cycle does not start over from the beginning after an interruption.

Cycle A

Pump phase (1)

The pump motor starts, the shift valve is in resting position. Lubricant is pumped from the reservoir to the main line's channel A, at the same time as the lubricant in channel B is drained back to the reservoir. When full pressure is reached, the lubrication pressure sensor is affected so that the pump motor is turned off, the pump phase ends. The duration of this phase may vary depending on i.e. temperature, type of lubricant.

Maximum pumping time is determined by the parameter "maximum pump time".

Lubrication phase (2)

The main line's channel is pressurized for as long as the duration of the pump phase, the shift valve is still in resting position, and lubricant is thus forced out into the main line's channel A and then onto the dosage valves.

Pressure reduction phase (3)

The shift valve moves over to affected position, channel A is depressurized, lubricant from channel A is thus drained back to the reservoir.

The time for this phase is dependent on the time for the pump phase. It is possible to adapt the multiplication factor in the control unit's program to special conditions with the separate diagnostic unit.

Pause (4)

The pump motor is stationary, the shift valve is in resting position. The time for the phase is dependent on the pre-set time for cycle A, and the time that was required for the three previous phases. In most cases, the pause is longer than the other three phases together.

Under conditions when it takes a long time to build the pressure to the required value, the time for the first three phases may become as long or longer than all of cycle A. Under such conditions, the pause is omitted, then cycle B will be initiated immediately following the pressure reduction phase. The first three phases are always performed.

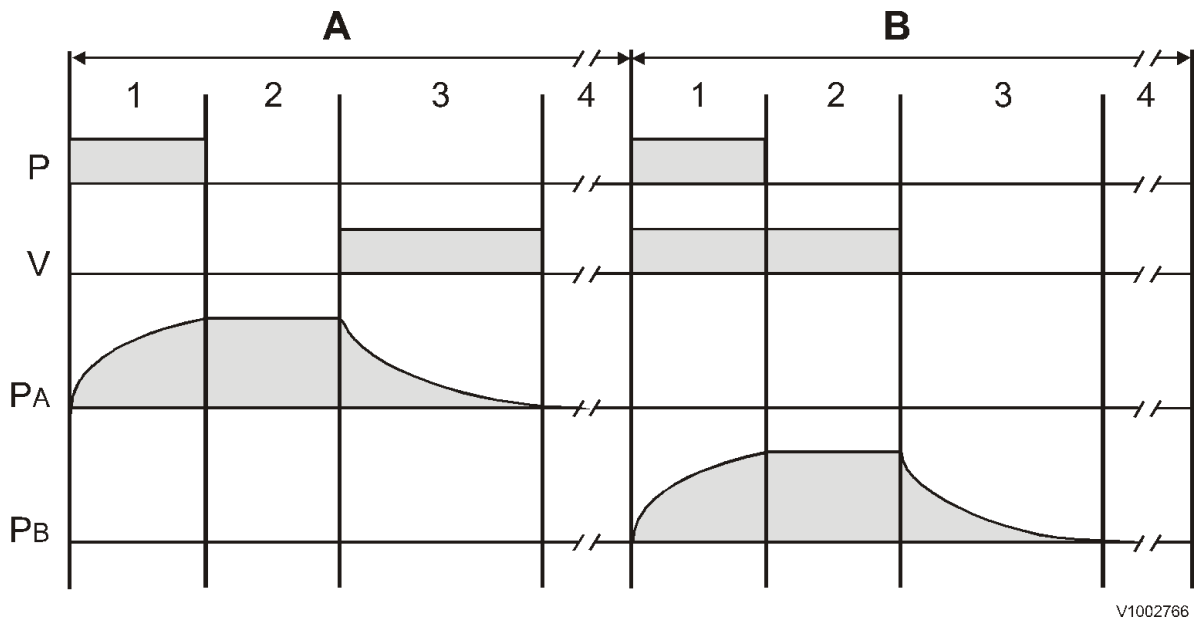


Figure 1
Pressure during the different phases

A	Lubrication cycle channel A	P	Pressure from pump
B	Lubrication cycle channel B	V	Pressure to shift valve
1	Pump phase	P_A	Pressure in channel A
2	Lubrication phase	P_B	Pressure in channel B
3	Pressure reduction phase		
4	Pause		

Cycle B

The pause after cycle A is followed by cycle B with the same build-up as cycle A. The shift valve is affected, lubricant is pumped out to channel B, at the same time as lubricant in channel A is drained back to the reservoir. During the pressure reduction phase in cycle B, the shift valve returns to resting position, channel B is depressurized, thus the lubricant from channel B is drained back to the reservoir.

Document Title: Pressure monitor, description	Function Group: 993	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L60E, L120E, L90E, L180E HL, L330E, L220E, L110E, L180E, L70E, L150E [GB]			

Pressure monitor, description

The pressure monitor, which is located in one of the distribution blocks, ensures that connection is made with the channel that has the highest pressure, the main line's channel A or channel B. The pressure monitor is not adjustable, therefore the pressure monitor may have two different part numbers, since different placement in the system results in the pressure having to be different. The pressure monitor is available in two versions.

Earlier version

Cycle A

The pressure in channel A is higher than in channel B. The balls (2) will be pressed against the seat (1). Channel B closes at the same time as the connection between channel A and channel 4 opens up. The pressure against the piston (5) then becomes the same as the pressure in channel A.

The pressure on the piston (5) overcomes the force of the spring (6), the piston will be pressed against the contact plate (7), the contact plate is pressed up and connects between the electrical connections (8 and 9), the pump motor turns off, the pump phase in cycle A ends.

During the pressure reduction phase channel A is depressurized, the spring presses back the contact plate and piston, the connection between the electrical connections (8 and 9) is opened.

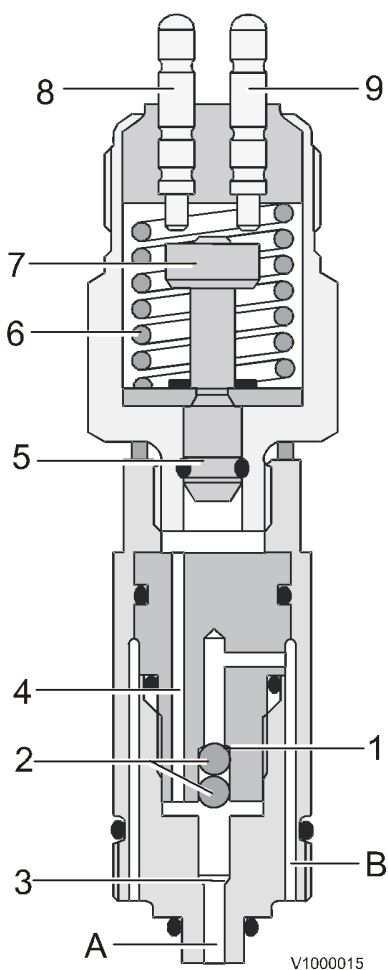


Figure 1
Pressure monitor, earlier version

- A. Connection, channel A
- B. Connection, channel B

- 1. Seat
- 2. Balls, 2 pcs.
- 3. Seat
- 4. Channel
- 5. Piston
- 6. Spring
- 7. Contact plate
- 8. Electrical connection
- 9. Electrical connection

Cycle B

The pressure in channel B is higher than in channel A. The balls (2) will be pressed against the seat (3). Channel B opens at the same time as channel A closes, at the same time as the connection between channel B and channel 4 opens up. The pressure against the piston (5) then becomes the same as the pressure in channel B.

The pressure on the piston (5) overcomes the force of the spring (6), the piston will be pressed against the contact plate (7), the contact plate is pressed up and connects between the electrical connections (8 and 9), the pump motor turns off, the pump phase in cycle B ends.

During the pressure reduction phase channel B is depressurized, the spring presses back the contact plate and piston, the connection between the electrical connections (8 and 9) is opened.

Later version

Cycle A

The pressure in channel A is higher than in channel B. The slide (2) moves up until it stops, channel B closes at the same time as the connection between channel A and channel 4 opens up. The pressure against the piston (5) then becomes the same as the pressure in channel A.

The pressure on the piston (5) overcomes the force of the spring (6), the piston will be pressed against the contact plate (7), the contact plate is pressed up and connects between the electrical connections (8 and 9), the pump motor turns off, the pump phase in cycle A ends.

During the pressure reduction phase channel A is depressurized, the spring presses back the contact plate and piston, the connection between the electrical connections (8 and 9) is opened.

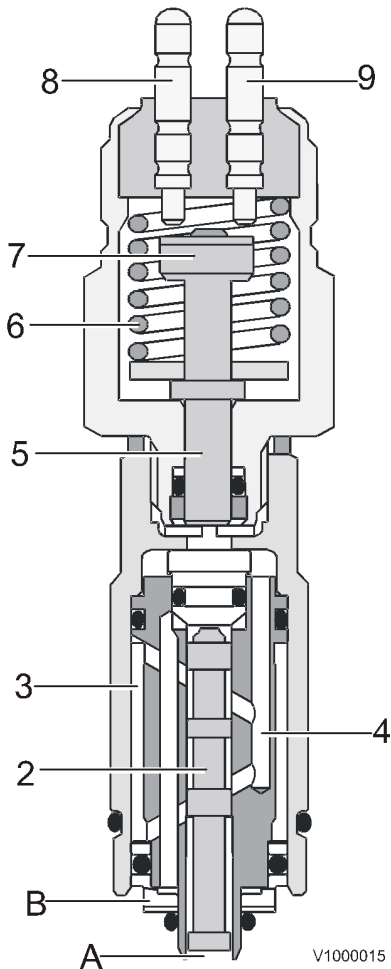


Figure 2
Pressure monitor, later version

- A. Connection, channel A
- B. Connection, channel B

- 1.
- 2. Slide
- 3. Channel
- 4. Channel
- 5. Piston
- 6. Spring
- 7. Contact plate
- 8. Electrical connection
- 9. Electrical connection

Cycle B

The pressure in channel B is higher than in channel A. The slide (2) moves down until it stops, channel B opens at the same time as channel A closes, at the same time as the connection between channel B and channel 3 opens up. The pressure against the piston (5) then becomes the same as the pressure in channel B.

The pressure on the piston (5) overcomes the force of the spring (6), the piston will be pressed against the contact plate (7), the contact plate is pressed up and connects between the electrical connections (8 and 9), the pump motor turns off, the pump phase in cycle B ends.

During the pressure reduction phase channel B is depressurized, the spring presses back the contact plate and piston, the connection between the electrical connections (8 and 9) is opened.

Document Title: Central lubrication system, description	Function Group: 993	Information Type: Service Information	Date: 2014/5/14
Profile: WLO, L180E [GB]			

Central lubrication system, description

The automatic greasing system (TWIN) consists of pump unit, two main lines (duct A and duct B), distribution block with metering valves, secondary lines and lubrication pressure sensor.

A control unit, which is integrated with the pump, actuates the pump according to a preselected lubrication cycle. The control unit in the pump senses whether a gear is engaged, this is in order for lubrication to take place only when required. The signal from V-ECU, pin EC7, is +24 V with the gear selector in neutral position and 0 V when a gear is engaged, see diagram 26.

Lubricant is pumped out via the main lines (duct A and duct B), which lead to the distribution blocks.

The supplied amount of lubricant is determined by the size of the metering valves, and is not affected by back pressure, temperature or the distance between the pump unit and the lubrication point.

In order to obtain the correct lubrication relative to existing working and loading conditions three different preprogrammed greasing cycles may be selected. The switch, SW808, which is used for selecting lubrication cycle, is located on the instrument panel, to the left of the steering wheel.

The switch contains a control lamp, which has the following functions:

- shows which lubrication cycle has been selected
- test lamp for trouble-shooting
- fault indicator

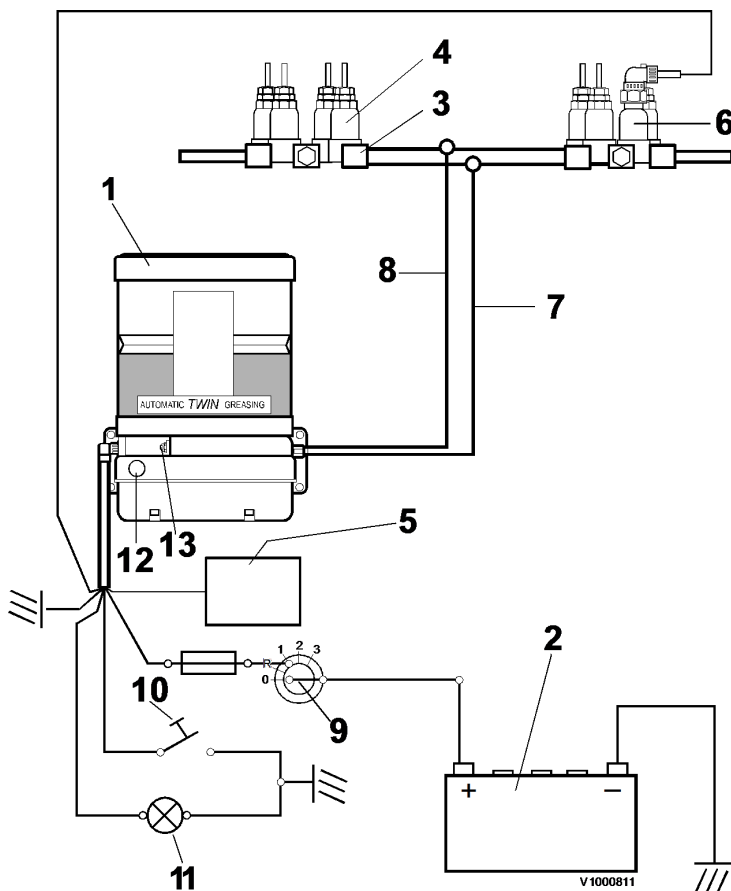


Figure 1

1. Pump unit
2. Battery
3. Distribution block
4. Metering valve
5. V-ECU
6. Lubrication pressure sensor, PS
7. Main line duct A
8. Main line duct B
9. Ignition switch
10. Switch SW808
11. Control lamp
12. Test button
13. Filling point

Thank you for your purchase.
Have a nice day.