

**821G
921G
Tier 2**
Wheel Loader

SERVICE MANUAL

Part number 48083741

English

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SERVICE MANUAL

821G ZBAR - EH, NEW CAB TIER2
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INTRODUCTION

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Safety rules

Personal safety



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

Throughout this manual you will find the signal words DANGER, WARNING, and CAUTION followed by special instructions. These precautions are intended for the personal safety of you and those working with you.

Read and understand all the safety messages in this manual before you operate or service the machine.

 DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury.

 WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.

 CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

FAILURE TO FOLLOW DANGER, WARNING, AND CAUTION MESSAGES COULD RESULT IN DEATH OR SERIOUS INJURY.

Machine safety

NOTICE: Notice indicates a situation that, if not avoided, could result in machine or property damage.

Throughout this manual you will find the signal word Notice followed by special instructions to prevent machine or property damage. The word Notice is used to address practices not related to personal safety.

Information

NOTE: Note indicates additional information that clarifies steps, procedures, or other information in this manual.

Throughout this manual you will find the word Note followed by additional information about a step, procedure, or other information in the manual. The word Note is not intended to address personal safety or property damage.

Personal safety

Carefully read this Manual before proceeding with maintenance, repairs, refuelling or other machine operations.

Repairs have to be carried out only by authorized and instructed staff; specific precautions have to be taken when grinding, welding or when using mallets or heavy hammers.

Non-authorized persons are not allowed to repair or carry out maintenance on this machine. Do not carry out any work on the equipment without prior authorization.

Ask your employer about the safety instructions in force and safety equipment.

Nobody should be allowed in the cab during machine maintenance unless he is a qualified operator helping with the maintenance work.

If it is necessary to move the equipment to carry out repairs or maintenance, do not lift or lower the equipment from any other position than the operator's seat.

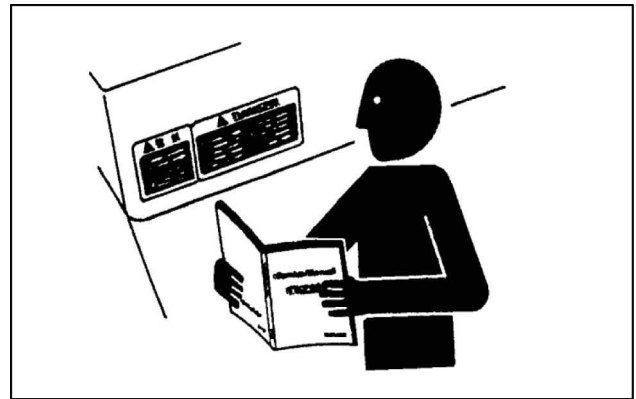
Never carry out any operation on the machine when the engine is running, except when specifically indicated.

Stop the engine and ensure that all pressure is relieved from hydraulic circuits before removing caps, covers, valves, etc.

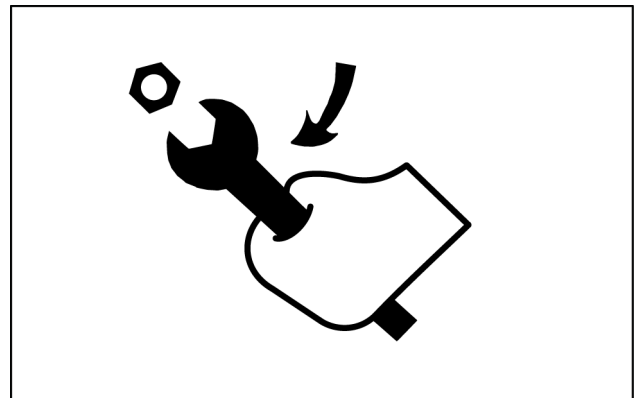
All repair and maintenance operations should be carried out with the greatest care and attention.

Service stairs and platforms used in a workshop or in the field should be built in compliance with the safety rules in force.

Any functional disorders, especially those affecting the safety of the machine, should therefore be rectified immediately.



TULI12WEX2004AA 1



TULI12WEX2005AA 2

⚠ DANGER

Unexpected movement!

Make sure parking brake is applied. Secure machine with wheel chocks.

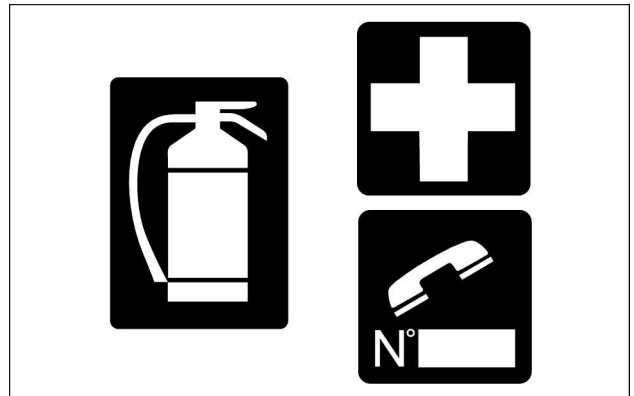
Failure to comply will result in death or serious injury.

D0013A

Before performing any work on the machine, attach a maintenance in progress tag. This tag can be applied on the left-hand control lever, safety lever or cab door.

Emergency

Be prepared for emergencies. Always keep a fire extinguisher and first aid kit readily available. Ensure that the fire extinguisher is serviced in accordance with the manufacturer's instructions.



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Equipment

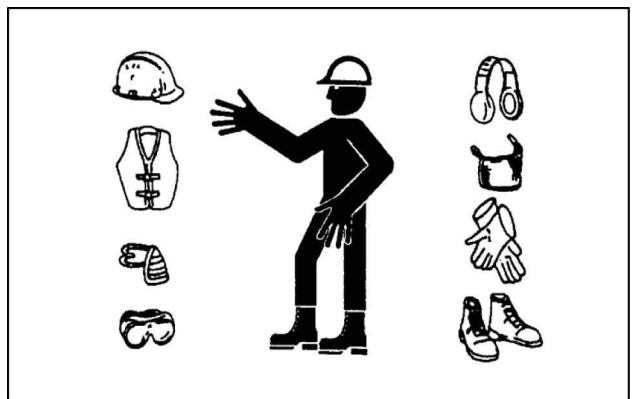
Wear close fitting clothing and safety equipment appropriate for the job:

- Safety helmet
- Safety shoes
- Heavy gloves
- Reflective clothing
- Wet weather clothing

If working conditions require, the following personal safety equipment should be on hand:

- Respirators (or dust proof masks)
- Ear plugs or acoustic ears protections
- Goggles with lateral shield or masks for eye protection

Do not wear rings, wristwatches, jewelry, unbuttoned or flapping clothing such as ties, torn clothes, scarves, open jackets or shirts with open zips which could get caught into moving parts.



TULI12WEX2008AA 4

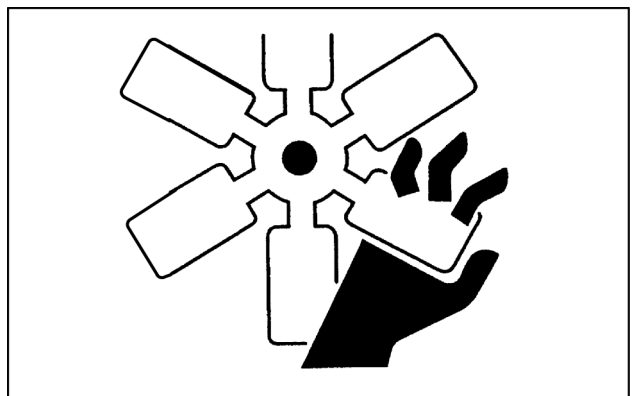
Engine - Radiator

Never leave the engine running in enclosed spaces without proper ventilation which is able to evacuate toxic exhaust gases- Keep the exhaust manifold and tube free from combustible materials.

Do not refuel with the engine running, especially if hot, as this increases fire hazard in case of fuel spillage.

Never attempt to check or adjust the belts when the engine is running.

Never lubricate the machine with the engine running.



TULI12WEX2009AA 5

Pay attention to rotating components and do not allow anyone to approach these areas to avoid becoming entangled.

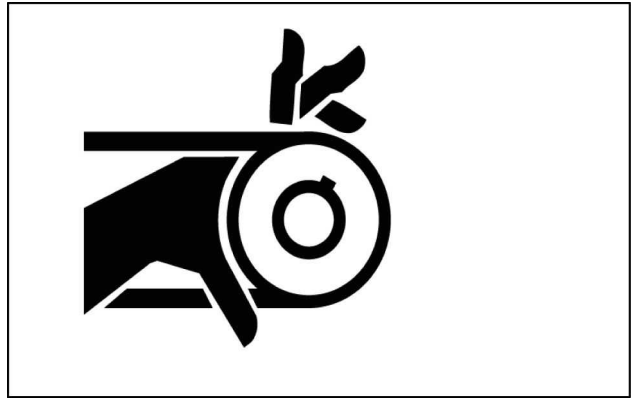
Hands, clothing or tools getting caught in the fan blades or engine belts, can cause amputations, violent hemorrhages and generate conditions of grave danger. For this reason avoid touching or approaching all rotating or moving parts.

A surging spray of the coolant from the radiator can cause serious burns and scalds.

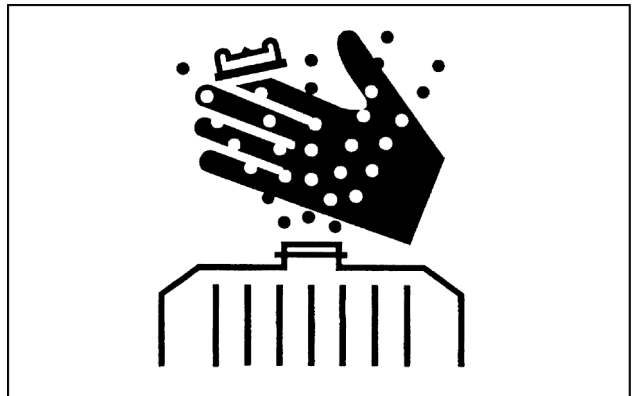
Before checking the coolant level, shut-off the engine and allow machine to cool down the radiator and hoses. Slowly unscrew the cap to release any residual pressure.

If it is necessary to remove the cap while engine is hot, wear safety clothes and equipment, then loosen the cap slowly to relieve the pressure gradually.

When checking the fuel, oil and coolant levels, use lights and lamps explicitly designated as explosion proof. If these types of lamps are not used, fires or explosions may occur.



TULI12WEX2010AA 6



TULI12WEX2011AA 7

Hydraulic systems

Jets of fluids under pressure can penetrate the skin causing serious injuries.

Avoid this hazard by relieving pressure before disconnecting hydraulic or other lines.

Relieve the residual pressure by moving the hydraulic control levers several times.

Tighten all connections before applying pressure.

To protect the eyes wear a facial shield or safety goggles.

Protect your hands and body from possible jets of fluids under pressure.

Swallowing hydraulic oil is a severe health hazard.



TULI12WEX2012AA 8

When hydraulic oil has been swallowed, avoid vomiting, but consult a doctor or go to a hospital.

If an accident occurs, see a doctor familiar with this type of injury immediately.

Any fluid penetrating the skin must be removed within a few hours to avoid serious infections.

Flammable splashes may originate because of heating near lines with fluids under pressure, resulting in serious burns. Do not weld or use torches near lines containing fluids or other flammable materials.

Lines under pressure can accidentally be pierced when the heat expands beyond the area immediately heated.

Arrange for temporary fire resistant shields to protect hoses or other components during welding or torch use.

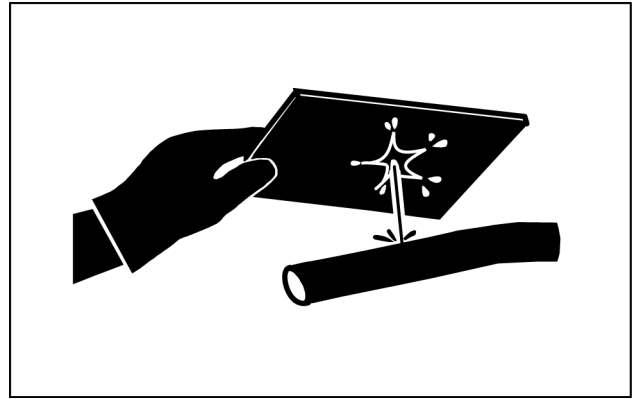
Have any visible leakage repaired immediately.

Discharged oil pollutes the environment. Soak up any oil that has spilled with a proper binding agent. Sweep up binding agent and dispose of it separately from other waste.

Never search for leakages with fingers; instead, use a piece of cardboard and always wear goggles.

Never repair a damaged line; always replace it. Replace hydraulic hoses immediately on detecting any damaged or moist areas.

Always store hydraulic oil in the original containers.



TULI12WEX2013AA 9

Hoses and tubes

Always replace hoses and tubes if the cone end or the end connections on the hose are damaged.

When installing a new hose, loosely connect each end and make sure the hose takes up the correct position before tightening the connections. Clamps should be tightened sufficiently to hold the hose without crushing and to prevent chafing.

After replacing a hose on a moving component, check that the hose does not fall by moving the component through the complete range of travel. Be sure any hose which has been installed is not kinked or twisted.

Hose connections which are damaged, dented, crushed or leaking, restrict oil flow and the productivity of the components being served. Connectors which show signs of movement from the original position have failed and will ultimately separate completely.

A hose with a frayed outer sheath will allow water penetration. Concealed corrosion of the wire reinforcement could subsequently occur along the hose length with resultant hose failure.

Ballooning of the hose indicates an internal leakage due to structural failure. This condition rapidly deteriorates and total hose failure soon occurs.

Kinked, crushed, stretched or deformed hoses generally suffer internal structural damage which can result in oil restriction, a reduction in the speed of operation and ultimate hose failure.

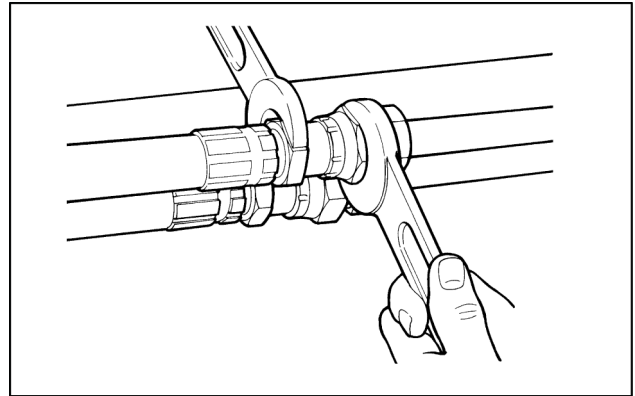
Free-moving, unsupported hoses must never be allowed to touch each other or related working surfaces. This causes chafing which reduces hose life.

O-rings

Replace O-rings, seal rings and gaskets whenever they are disassembled.

Never mix new and old seals or O-rings, regardless of condition. Always lubricate new seal rings and O-rings with hydraulic oil before installation to relevant seats.

This will prevent the O-rings from rolling over and twisting during mounting which will jeopardize sealing.



TULI12WEX2014AA 10

Battery

Batteries give off explosive gases.

Never handle open flames and unshielded light sources near batteries. (No smoking is addressed in the next instruction).

To prevent any risk of explosion, observe the following instructions:

- When disconnecting the battery cables, always disconnect the negative (-) cable first.
- To reconnect the battery cables, always connect the negative (-) cable last.
- Never short-circuit the battery terminals with metal objects.
- Do not weld, grind or smoke near a battery.

Battery electrolyte causes severe burns. The battery contains sulphuric acid. Avoid any contact with the skin, eyes or clothing.

Treatment:

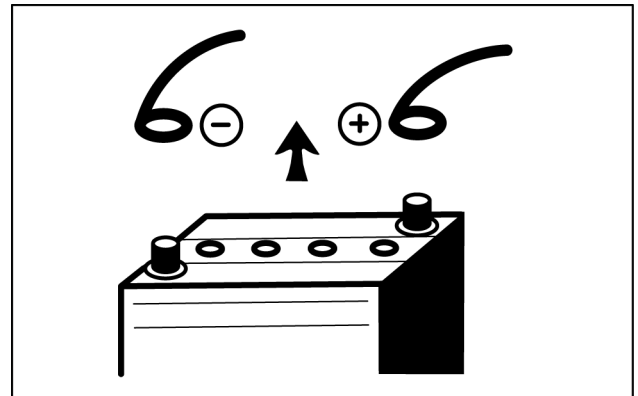
- EXTERNAL: Rinse well with water, removing any soiled clothing.
- INTERNAL: Avoid vomiting. Drink water to rinse your mouth. Consult a doctor.
- EYES: Rinse abundantly with water for **15 min** and consult a doctor.
- When the electrolyte of a battery is frozen, it can explode if you attempt to charge the battery or if you try to start the engine using a booster battery. Always keep the battery charged to prevent the electrolyte freezing.

Provide good ventilation when changing a battery or using a battery in an enclosed space. Always protect your eyes when working near a battery.

Never set tools down on the battery. They may induce a short circuit, causing irreparable damage to the battery and injuring persons.

Never wear metal necklaces, bracelets or watch straps when working on the battery. The metal parts may induce a short circuit resulting in burns.

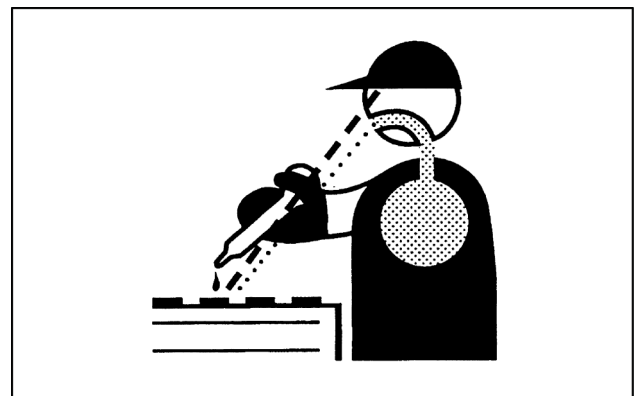
Dispose of used batteries separately from other waste in the interests of environmental protection.



TULI12WEX2015AA 11



TULI12WEX2016AA 12



TULI12WEX2017AA 13

Flammable liquids

When handling flammable liquids:

- Do not smoke.
- Keep away from unshielded light sources and open flames.

Fuels often have a low flash point and are readily ignited.

Never attempt to extinguish burning liquids with water. Use:

- Dry powder
- Carbon dioxide
- Foam

Water used for extinguishing purposes would vaporize instantaneously on contact with burning substances and spread burning oil, for example, over a wide area. Water generates short circuits in the electrical system, possibly producing new hazards.

Stay away from open flames during refilling of hydraulic oil or fuel.

Fuel or oil spills can cause slipping hazards; thoroughly contain and clean affected areas.

Always tighten the safety plugs of fuel tank and hydraulic oil tank firmly.

Never use fuel to clean machine parts that will be exposed to dirt or debris.

Use a non-flammable product for cleaning parts.

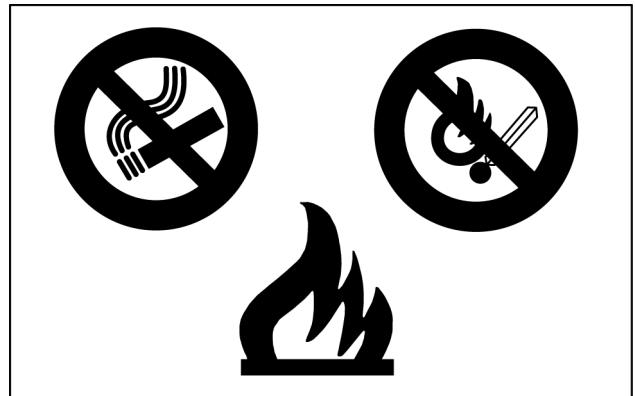
Always perform fuel or oil refilling in well aired and ventilated areas.

During refuelling hold the pistol firmly and always keep it in contact with the filler neck until the end of the refuelling, to avoid arcing due to static electricity.

Do not overfill the tank but leave a space for fuel expansion.

Never refuel when the engine is running.

Take all the necessary safety measures when welding, grinding or when working near an exposed flame.



TULI12WEX2016AA 14



TULI12WEX2018AA 15



TULI12WEX2019AA 16

Tires

Before inflating the tires, always check the condition of rims and the outer condition of tires for the presence of dents, cuts, tears of reinforcement plies or other faults. Before inflating a tire, make sure that there are no nearby persons, then position yourself at tread side.

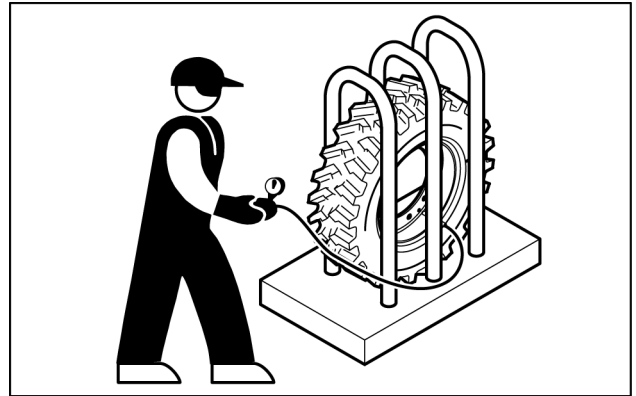
When inflating tires, ensure tire pressure does not exceed that prescribed by the tire manufacturer. Ensure that the pressure of the right tire corresponds to the pressure of the left tire.

NOTE: The front and rear tire pressures may be different.

Never use reconditioned rims because possible welds, heat treatments or brazings not performed correctly can weaken the wheels and cause damage or failure. Deflate the tires before their disassembly.

Before taking out possible jammed objects from the rims, it is necessary to deflate the tires. Inflate tires by means of an inflation pistol complete with extension and pressure control valve.

Use an inflation cage.



TUL12WEX2020AA 17

Cleaning

Clean the exterior of all components before carrying out any form of repair. Dirt and dust can reduce the efficient working life of a component and lead to costly replacement.

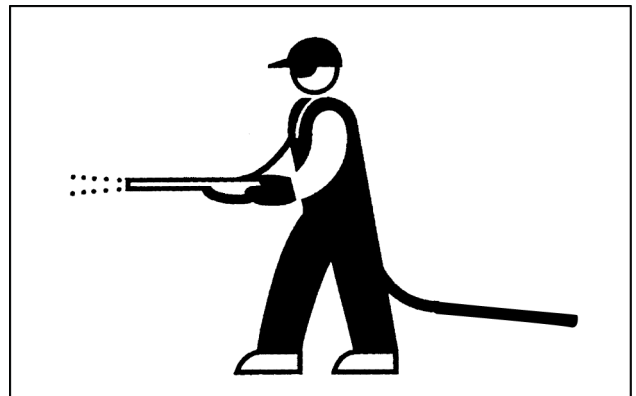
Solvents should be checked that they are suitable for the cleaning of components and also that they do not risk the personal safety of the user.

Dirt, oil, grease and scattered tools are dangerous for people, because they can create slipping or tripping hazards.

For machine cleaning, use a jet of warm water or steam under pressure and commercial detergents. Never use fuel, petroleum or solvents, because they can leave an oily residue that attracts dust, and solvents (even if weak) damage the paint and can lead to the formation of rust.

Never use water jets or steam on sensors, connectors or other electric components.

Avoid direct spray of seals and seams to prevent water penetration inside the cab.



TUL12WEX2021AA 18

Waste disposal

Improperly disposing of waste can threaten the environment.

Each country has its own Regulations on this subject. It is therefore advisable to prepare suitable containers to collect and store momentarily all solid and fluid materials that must not be scattered in the environment to avoid pollution.

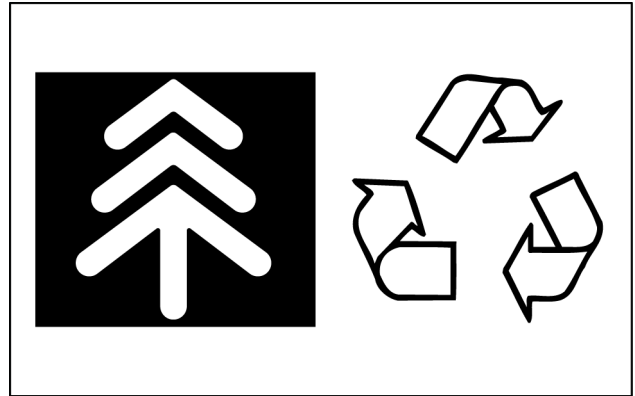
These products will be delivered at preset intervals following the forward environmental regulation.

Below are listed some products from the machine requiring disposal:

- Lubricating oil
- Brake system oil
- Coolant mixture, condensation rests and pure antifreeze
- Fuel
- Filter elements, oil and fuel filters
- Filter elements, air filters
- Battery

Also polluted rags, paper, sawdust and gloves must be disposed in compliance with the same procedures.

Do not use food or beverage containers that may mislead someone into drinking from them. Do not pour waste onto the ground, down a drain, or into any water source. Air conditioning refrigerants escaping into the air can damage the Earth's atmosphere. Government regulations may require a certified air conditioning service centre to recover and recycle used air conditioning refrigerants. Obtain information on the proper way to recycle or dispose of waste from your local environmental or recycling centre, or from your Dealer.



TULI12WEX2022AA 19

Basic instructions - Important notice regarding equipment servicing

All repair and maintenance work listed in this manual must be carried out only by qualified dealership personnel, strictly complying with the instructions given, and using, whenever possible, the special tools.

Anyone who performs repair and maintenance operations without complying with the procedures provided herein shall be responsible for any subsequent damages.

The manufacturer and all the organizations of its distribution chain, including - without limitation - national, regional, or local dealers, reject any responsibility for damages caused by parts and/or components not approved by the manufacturer, including those used for the servicing or repair of the product manufactured or marketed by the manufacturer. In any case, no warranty is given or attributed on the product manufactured or marketed by the manufacturer in case of damages caused by parts and/or components not approved by the manufacturer.

The information in this manual is up-to-date at the date of the publication. It is the policy of the manufacturer for continuous improvement. Some information could not be updated due to modifications of a technical or commercial type, or changes to the laws and regulations of different countries.

In case of questions, refer to your CASE CONSTRUCTION Sales and Service Networks.

Basic instructions - How to use the maintenance standard and precautions

Application

WHEN THE MACHINE IS NEW

Confirm that the performances are in accordance with standard specifications as compared to the performance standards.

AT SPECIFIC SELF INSPECTION (RULE BY COUNTRY)

Use the data for the criterion, for the purpose of correction, adjustment and replacement.

WHEN PERFORMANCES ARE DETERIORATED

Determine whether it is caused by a fault or end of service life after long hours of operation, to be used for safety and economical considerations.

WHEN MAIN COMPONENTS ARE REPLACED

For example, use data to restore performances of pumps and others.

Terminology

STANDARD VALUES

Values to be used to condition or assemble a new machine. Where special notes are not given, these values represent standard specifications (machine with standard attachments and standard tires).

REFERENCE VALUES FOR REMEDY

Values at which readjustment is required. In order to ensure performance and safety it is strictly prohibited to use the machine over the specified values.

SERVICE LIMIT

This is the limit value at which reconditioning is impossible without replacement of parts. If the value is expected to exceed the service limit before next inspection and correction are performed, replace the parts immediately. The operation over the specified values causes increase of damage and requires the down time of machine, and also causes safety problems.

Cautions to be exercised at judgment

EVALUATION OF MEASURED DATA

Disagreement of measuring conditions, variations of data peculiar to a new machine, and measuring errors are to be evaluated. Determine generally at what levels measured values are located, instead of determining whether or not values fall within or run out of the reference values.

DETERMINING CORRECTION, ADJUSTMENT OR REPLACEMENT

Machine performances deteriorate with time as parts wear and some deteriorated performances may be restored to new levels. Therefore, determine correction, adjustment or replacement, depending upon the operating hours, kind of work and circumstances in which the machine is placed, and condition the machine performances to its most desirable levels.

Other cautions to be exercised

PARTS LIABLE TO DEGRADE

Rubber products, such as, hydraulic hoses, O-rings, and oil seals deteriorate with time; replace them at regular intervals or at overhauls.

PARTS REQUIRING REGULAR REPLACEMENT

Critical hoses that are necessary to secure safety, we designate as Very Important Parts (V.I.P.) and recommend that they should be replaced regularly.

INSPECTION AND REPLACEMENT OF OILS AND GREASES

In performing maintenance, it is necessary for the user to familiarize themselves with the machine and handle safely. Use caution when inspecting and replacing oils and grease. Refer to the Operators Manuals as well.

Basic instructions - Precaution for disassembly and assembly

Preparations for disassembly

- Thoroughly wash the machine before bringing it into the shop. Bringing a dirty machine into the shop may cause machine components to be contaminated during disassembling/assembling, resulting in damage to machine components, as well as decreased efficiency in service work.
- Be sure to thoroughly understand all disassembling/assembling procedures beforehand, to help avoid incorrect disassembling of components as well as personal injury.
- Check and record the items listed below to prevent problems from occurring in the future.
 1. The machine model, machine serial number, and hour meter reading.
 2. Reason for disassembly (symptoms, failed parts, and causes).
 3. Clogging of filters and oil, water or air leaks, if any.
 4. Capacities and condition of lubricants.
 5. Loose or damaged parts.
- Prepare the necessary tools to be used and the area for disassembling work.
- Wear appropriate clothing, safety shoes, safety helmet, goggles, and clothes with long sleeves.
- Confirm ready access to a first-aid kit and fire extinguisher, as well as appropriate emergency personnel contacts in the case of a medical accident or fire.
- Before performing any work on the machine, follow lockout/tagout procedures by attaching a “maintenance in progress tag”. This tag can be applied on the left-hand control lever, safety lever or cab door. Notify those with access to the machine that you will be performing the maintenance.

Disassembling and assembling hydraulic equipment

- Before removing lines, release the pressure of hydraulic oil tank, or open the cover on the return side to tank, and take out the filter.
- Drain the oil in removed lines into an appropriate container to prevent oil contamination.
- Protect open connections with plugs or caps to prevent oil from leaking and debris from contaminating the system.
- Thoroughly clean the outside of components before disassembling, and drain hydraulic oil and gear oil before disassembly.

Disassembling hydraulic equipment

- Impaired performance and function of hydraulic equipment after unauthorized service may not be covered under warranty by the manufacturer. Consult your local dealer for service.
- If it is unavoidably necessary to disassemble and modify, it should be carried out by experts or personnel qualified through service training.
- Make match mark on parts for reassembling.
- Before disassembling, read instructions in advance, and determine if the service is required to be performed by an authorized dealer.
- Use appropriate specialty tools and jigs if required.
- If parts can not be removed as specified by the procedure, never force removal. Check for other failures that may be causing binding or interference.
- Inspect parts for wear and clearance; record the measured values. Replace components if the values fall outside of the recommended range.
- If an abnormality is detected, repair or replace the parts.
- When removing parts, use appropriate markings or labels to ensure they can be reinstalled in the correct order and location without confusion.
- For common parts, pay attention to the quantity and locations of each group of components.

Reassembling hydraulic equipment

- Clean parts in a well ventilated room.
- Remove residual oil with compressed air, and apply fresh hydraulic oil or gear oil to surfaces before reassembly.
- Replace removed o-rings, back-up rings and oil seals with new ones. Apply gear oil on them before reassembling.
- Thoroughly clean and dry surfaces on which liquid sealant must be reapplied.
- Before assembling, remove rust preventives on new parts.
- Use special tools to fit bearings, bushing and oil seal.
- Assemble parts matching to the marks.
- After completion, check that there is no omission of parts.

Basic instructions - Electrical equipment precautions

⚠ WARNING

Battery acid causes burns. Batteries contain sulfuric acid.

Avoid contact with skin, eyes or clothing. Antidote (external): Flush with water. Antidote (eyes): flush with water for 15 minutes and seek medical attention immediately. Antidote (internal): Drink large quantities of water or milk. Do not induce vomiting. Seek medical attention immediately.

Failure to comply could result in death or serious injury.

W0111A

- The disassembly of electrical equipment is not allowed.
- Handle equipment with care so as not to drop it or bump it.
- Connector should be removed by unlocking while holding the connector.
- Never disconnect electrical plugs by pulling on the wires. Always use only the electrical connectors to make the disconnection.
- Check that connector is connected and locked completely.
- Engine key off before removing and connecting connector.
- Engine key off before touching terminals of starter and alternator.
- Wash machine with care so as not to splash water on electrical equipment and connector.
- If water has entered a sealed connection, thoroughly dry both connectors before reconnecting
- Remove battery grounding terminal before beginning work close to battery and battery relay with tools.

Torque - Minimum tightening torques for normal assembly

Use the torques in this chart when special torques are not given. These torques apply to plain and zinc-dichromate fasteners as received from suppliers dry, or when lubricated with engine oil. Not applicable if special graphite lubricants, Molydisulfide greases, or other extreme pressure lubricants are used. A torque range of $\pm 10\%$ is acceptable.

Grade 8.8 bolts, nuts, and studs

Size	Nm	lb ft
4 mm	4 N·m	3 lb ft
5 mm	7 N·m	5 lb ft
6 mm	12 N·m	9 lb ft
8 mm	29 N·m	21 lb ft
10 mm	57 N·m	42 lb ft
12 mm	100 N·m	74 lb ft
14 mm	159 N·m	117 lb ft
16 mm	248 N·m	183 lb ft
18 mm	352 N·m	260 lb ft
20 mm	500 N·m	369 lb ft
22 mm	681 N·m	502 lb ft
24 mm	865 N·m	638 lb ft
27 mm	1262 N·m	931 lb ft
30 mm	1719 N·m	1268 lb ft
36 mm	2999 N·m	2212 lb ft

Markings for Grade 8.8 hardware



Grade 10.9 bolts, nuts and studs

Size	Nm	lb ft
4 mm	5 N·m	4 lb ft
5 mm	10 N·m	7 lb ft
6 mm	17 N·m	13 lb ft
8 mm	41 N·m	31 lb ft
10 mm	82 N·m	60 lb ft
12 mm	143 N·m	105 lb ft
14 mm	227 N·m	168 lb ft
16 mm	354 N·m	261 lb ft
18 mm	487 N·m	359 lb ft
20 mm	690 N·m	509 lb ft
22 mm	942 N·m	695 lb ft
24 mm	1195 N·m	882 lb ft
27 mm	1749 N·m	1290 lb ft
30 mm	2377 N·m	1753 lb ft
36 mm	4149 N·m	3061 lb ft

Markings for Grade 10.9 hardware



Grade 12.9 bolts, nuts, and studs

Torque values specified for grade 10.9 hardware can be used for grade 12.9 hardware.

Markings for Grade 12.9 hardware



Consumables

821G Capacities and specifications

Engine		
	Type of oil	CASE AKCELA UNITEK NO. 1™ SBL CJ-4
	Technical specifications	SAE 10W-40 API CJ-4
	CASE CONSTRUCTION specifications	MAT3521
	Type of oil	CASE AKCELA UNITEK NO. 1™ SSL CJ-4 SAE 0W-40 (cold weather)
	Technical specifications	SAE 0W-40 API CJ-4
	CASE CONSTRUCTION specifications	MAT3521
	Capacity (with filter change)	13.25 L (14 US qt)
	Total capacity in system	15.1 L (16 US qt)
Cooling system		
	Type of coolant	CASE AKCELA ACTIFULL™ OT EXTENDED LIFE COOLANT
	CASE CONSTRUCTION specifications	MAT3624
	System capacity	30 L (32 US qt)
Fuel system		
	System capacity	288 L (76 US gal)
Hydraulic system		
	Type of fluid	CASE AKCELA HY-TRAN® ULTRACTION
	Technical specifications	ISO VG-46
	CASE CONSTRUCTION specifications	MAT 3540
	Type of fluid	CASE AKCELA HY-TRAN® ULTRACTION SSL (low temperature)
	CASE CONSTRUCTION specifications	MAT 3541
	Total system capacity	178 L (47 US gal)
	Reservoir capacity	90.8 L (24 US gal)
Transmission		
	Type of oil	CASE AKCELA NEXPLORE™ FLUID
	Technical specifications	SAE 10W - 30 API GL-4 ISO VG-32/46
	CASE CONSTRUCTION specifications	MAT 3525
	Service capacity - with filter change	34.1 L (36 US qt)
Axles		
	Type of oil	CASE AKCELA TRANSAXLE FLUID 80W-140
	Technical specifications	SAE 80W-140 API GL-4
	CASE CONSTRUCTION specifications	MAT 3510
	Front axle (Standard and Heavy Duty)	40 L (42.3 US qt)
	Rear axle (Standard and Heavy Duty)	40 L (42.3 US qt)
Grease fittings, as required		
	CASE CONSTRUCTION specifications	MAT3550 Grade C

921G Capacities and specifications

Engine		
Type of oil		CASE AKCELA UNITEK NO. 1™ SBL CJ-4
Technical specifications		SAE 10W40 API CJ-4
CASE CONSTRUCTION specifications		MAT3521
Type of oil		CASE AKCELA UNITEK NO. 1™ SSL CJ-4 SAE 0W-40 (cold weather)
Technical specifications		SAE 0W-40 API CJ-4
CASE CONSTRUCTION specifications		MAT3521
Capacity (with filter change)		13.25 L (14 US qt)
Total capacity in system		15.1 L (16 US qt)
Cooling system		
Type of coolant		CASE AKCELA ACTIFULL™ OT EXTENDED LIFE COOLANT
CASE CONSTRUCTION specifications		MAT3624
System capacity		30 L (32 US qt)
Fuel system		
System capacity		288 L (76 US gal)
Hydraulic system		
Type of fluid		CASE AKCELA HY-TRAN® ULTRACTION
Technical specifications		ISO VG-46
CASE CONSTRUCTION specifications		MAT 3540
Type of fluid		CASE AKCELA HY-TRAN® ULTRACTION SSL (low temperature)
CASE CONSTRUCTION specifications		MAT 3541
Total system capacity		200 L (53 US gal)
Reservoir capacity		110 L (29 US gal)
Transmission		
Type of oil		CASE AKCELA NEXPLORE™ FLUID
Technical specifications		SAE 10W - 30 API GL-4 ISO VG-32/46
CASE CONSTRUCTION specifications		MAT 3525
Service capacity - with filter change		34.1 L (36 US qt)
Axles		
Type of oil		CASE AKCELA TRANSAXLE FLUID 80W-140
Technical specifications		SAE 80W-140 API GL-4
CASE CONSTRUCTION specifications		MAT 3510
Front axle		42 L (44.4 US qt)
Rear axle		40 L (42.3 US qt)
Grease fittings, as required		
CASE CONSTRUCTION specifications		MAT3550 Grade C

Consumables - Biodiesel Fuel

Fatty Acid Methyl Ester Biodiesel (Biodiesel Fuel) consists of a family of fuels derived from vegetable oils treated with methyl esters.

NOTICE: Biodiesel fuel blends are approved for your engine only if they comply with Specification Standards EN 14214 or ASTM D6751.

NOTICE: verify with your local dealer which blends are approved for your engine. Use of biodiesel fuel that do not comply with the Standards EN14214 or ASTM D6751 could lead to severe damage to engine and fuel system. Use of non-approved biodiesel fuels may void warranty coverage.

Biodiesel Fuel Usage Conditions

Biodiesel fuels must be purchased from a trusted supplier that understands the product and maintains good fuel quality. Biodiesel fuels must be pre-blended by the supplier. Mixing biodiesel fuels on site can result in an incorrect mixture which can damage engine and fuel system.

Engine performance is effected by the use of biodiesel fuels. There may be up to 12 percent reduction in power or torque depending on the blend used.

NOTICE: DO NOT modify the engine and/or fuel injection pump settings to recover reduced performance.

The reduced power must be accepted if using any biodiesel fuel blends.

NOTICE: the use of high biodiesel fuel blends is not recommended in cold weather conditions.

Using biodiesel fuels may require changing engine oil, engine oil filters, and fuel filter elements more frequently. Biodiesel fuels can remove rust and other particles that adhere to the inside of the fuel tank. These particles are trapped by vehicle filters and may cause shortened filter life or filter blockages. Blockages are more common in cold weather conditions. Consult your dealer for information on cold weather operation and proper maintenance intervals when using any biodiesel fuel blend.

Biodiesel fuel may degrade natural rubber gaskets and hoses, as it is more solvent than petro-diesel. Frequently inspect hoses and other engine components when using biodiesel fuel.

DO NOT allow water to collect in the fuel or storage tanks. Biodiesel fuel attracts moisture from the atmosphere. Keep fuel tanks and storage tanks as full as possible to limit the amount of air and water vapors. It may be necessary to drain machine fuel filter more frequently. Potential oxidation and stability could create a problem with fuel stored in the machine.

Biodiesel Storage

NOTICE: DO NOT store machines for more than six months with biodiesel blends in the fuel system. DO NOT store biodiesel fuel in on-site storage tanks for more than six months.

If long periods of storage are required, run the machine for 20 hours using regular diesel fuel to flush the biodiesel fuel from the engine fuel system.

NOTICE: Biodiesel fuels must not be stored in on-site storage tanks for more than six months. Any spillage of biodiesel fuels must be cleaned up immediately before it can cause damage to the environment or the paint finish of the machine. Before using biodiesel fuel blends, you should consult with your dealer to receive full information about the approved blend for your machine and any detailed conditions of its usage. Failure to follow the requirements and conditions of biodiesel fuel usage will void your machine's warranty.

NOTE: B7 is the highest biodiesel (7% blend) that should be used in this machine.

Hydraulic contamination

Contamination in the hydraulic system is a major cause of the malfunction of hydraulic components. Contamination is any foreign material in the hydraulic oil.

Contamination can enter the hydraulic system in several ways:

- When you drain the oil or disconnect any line
- When you disassemble a component
- From normal wear of the hydraulic components
- From damaged seals or worn seals
- From a damaged component in the hydraulic system

All hydraulic systems operate with some contamination. The design of the components in this hydraulic system permits efficient operation with a small amount of contamination. An increase in this amount of contamination can cause problems in the hydraulic system.

The following list includes some of these problems:

- Cylinder rod seals that leak
- Control valve spools that do not return to neutral
- Movement of control valve spools is difficult
- Hydraulic oil that becomes too hot
- Pump gears, housing, and other parts that wear rapidly
- Relief valves or check valves held open by dirt
- Quick failure of components that have been repaired
- Slow cycle times or a lack of power.

If your machine has any of these problems, check the hydraulic oil for contamination.

There are two types of contamination: microscopic and visible.

Microscopic contamination occurs when very fine particles of foreign material are suspended in the hydraulic oil. These particles are too small to see or feel. Microscopic contamination can be found by identification of the following problems or by testing in a laboratory.

Examples of problems caused by microscopic contamination:

- Cylinder rod seals that leak
- Control valve spools that do not return to neutral
- The hydraulic system has a high operating temperature

Visible contamination is foreign material that can be found by sight, touch, or odor. Visible contamination can cause a sudden failure of components.

Examples of problems caused by visible contamination:

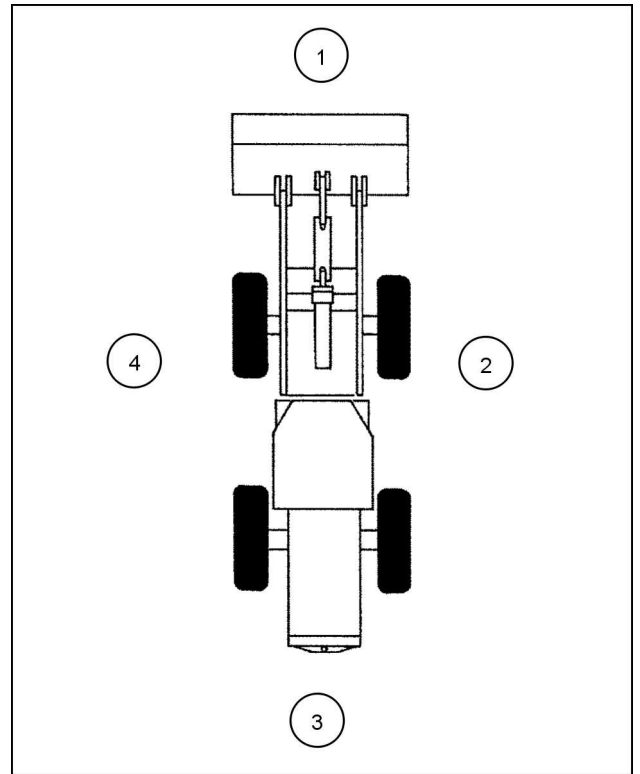
- Particles of metal or dirt in the oil
- Air in the oil
- Dark or thick oil
- Oil with an odor of burned oil
- Water in the oil

If you find contamination, use a portable filter to clean the hydraulic system.

Product identification

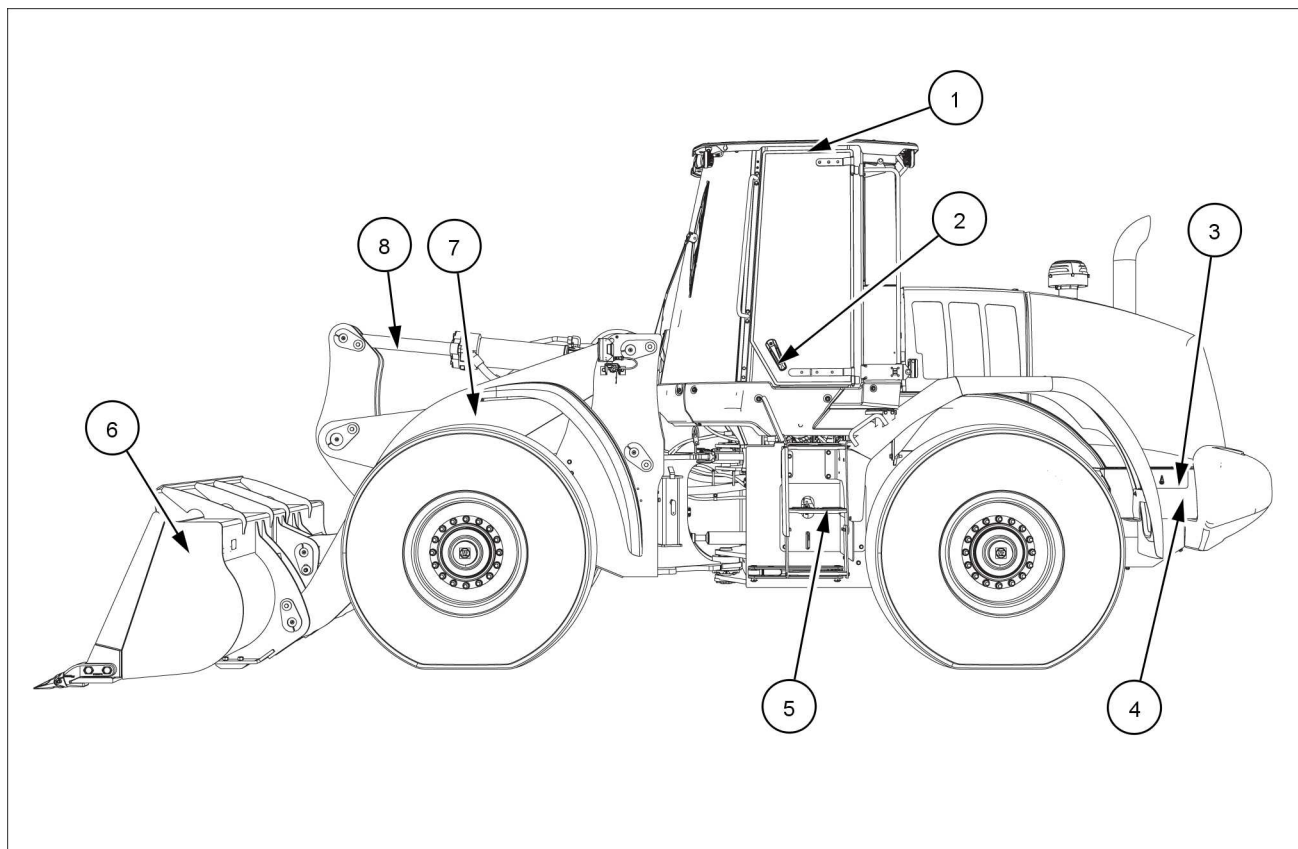
The terms right-hand, left-hand, front, and rear are used in this manual to indicate the sides as they are seen from the operator's seat.

1. Front
2. Right-hand
3. Rear
4. Left-hand



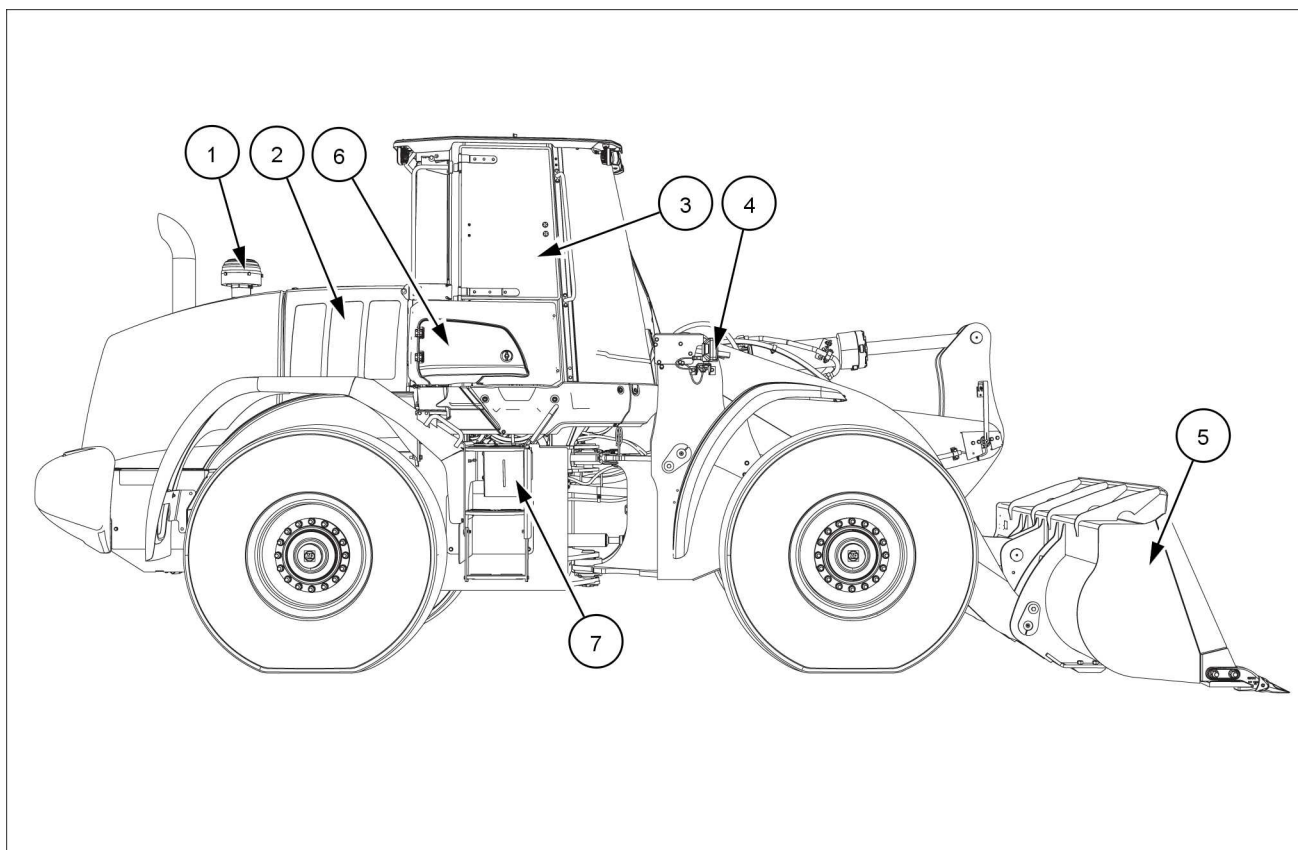
RCPH10WHL003BAH 1

Product identification



LEIL16WHL2487FA 1

- | | |
|---|---------------------------|
| 1. Roll Over Protection System (ROPS) cab | 5. Steps |
| 2. Cab door handle | 6. Bucket (Z-bar version) |
| 3. Timed disconnect switch and optional battery jump post | 7. Loader lift arms |
| 4. Battery access | 8. Bucket cylinder |



LEIL16WHL2486FA 2

- | | |
|-------------------------|--------------------------------|
| 1. Pre-cleaner | 5. Bucket (Z-bar version) |
| 2. Sliding access panel | 6. Cab air filter door |
| 3. Cab side window | 7. Windshield washer reservoir |
| 4. Driving lights | |



SERVICE MANUAL

Engine

**821G ZBAR - EH, NEW CAB TIER2
921G ZBAR - EH, NEW CAB TIER2**

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[10.202] Air cleaners and lines	10.2
[10.400] Engine cooling system	10.3
[10.414] Fan and drive	10.4
[10.310] Aftercooler.....	10.5
[10.304] Engine lubrication system.....	10.6



Engine - 10

Engine and crankcase - 001

821G ZBAR - EH, NEW CAB TIER2
921G ZBAR - EH, NEW CAB TIER2

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Engine - 10

Engine and crankcase - 001

TECHNICAL DATA

Engine

General specification (*)	3
General specification (*)	3

SERVICE

Engine

Remove	5
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(*) See content for specific models

Engine - General specification

821G ZBAR - EH, NEW CAB TIER2	ANZ --- APAC --- LA --- MEA
-------------------------------	-----------------------------

Engine with 4 Speed Transmission	
A. Low idle	870 RPM to 930 RPM
Alternate low idle	670 RPM to 730 RPM
Alternate accelerated idle	1270 RPM to 1330 RPM
Working idle (setting from factory)	920 RPM to 980 RPM
B. Maximum No Load RPM	2065 RPM to 2185 RPM
C. Converter Stall	1775 RPM to 1975 RPM
D. Hydraulic Stall	1915 RPM to 2115 RPM
E. Converter & Hydraulic Stall	1410 RPM to 1610 RPM
Temperature of the torque converter oil	82 – 104 °C (180 – 219 °F)
Temperature of the hydraulic oil	54 – 57 °C (129 – 135 °F)

Engine with 5 Speed Transmission	
A. Low idle	870 RPM to 930 RPM
Alternate low idle	670 RPM to 730 RPM
Alternate accelerated idle	1270 RPM to 1330 RPM
Working idle (setting from factory)	920 RPM to 980 RPM
B. Maximum No Load RPM	2065 RPM to 2185 RPM
C. Converter Stall	1832 RPM to 2032 RPM
D. Hydraulic Stall	1920 RPM to 2120 RPM
E. Converter & Hydraulic Stall	1450 RPM to 1650 RPM
Temperature of the torque converter oil	82 – 104 °C (180 – 219 °F)
Temperature of the hydraulic oil	54 – 57 °C (129 – 135 °F)

NOTE: hydraulic Stall and Converter and Hydraulic Stall RPM values are read while the lift arms are rising with the bucket held rolled back and the engine at Wide Open Throttle (WOT) in max power mode with transmission in manual mode and in 3rd gear.

Engine - General specification

921G ZBAR - EH, NEW CAB TIER2	ANZ --- APAC --- LA --- MEA
-------------------------------	-----------------------------

Engine with 4 Speed Transmission	
A. Low idle	870 RPM to 930 RPM
Alternate low idle	670 RPM to 730 RPM
Alternate accelerated idle	1270 RPM to 1330 RPM
Working idle (setting from factory)	970 RPM to 1030 RPM
B. Maximum No Load RPM	2115 RPM to 2200 RPM
C. Converter Stall	1865 RPM to 2065 RPM
D. Hydraulic Stall	1905 RPM to 2105 RPM
E. Converter & Hydraulic Stall	1450 RPM to 1650 RPM
Temperature of the torque converter oil	82 – 104 °C (180 – 219 °F)
Temperature of the hydraulic oil	54 – 57 °C (129 – 135 °F)

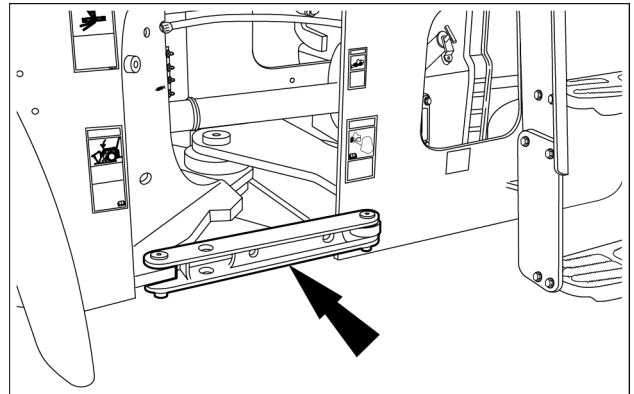
Engine with 5 Speed Transmission	
A. Low idle	870 RPM to 930 RPM
Alternate low idle	670 RPM to 730 RPM
Alternate accelerated idle	1270 RPM to 1330 RPM
Working idle (setting from factory)	970 RPM to 1030 RPM
B. Maximum No Load RPM	2115 RPM to 2200 RPM
C. Converter Stall	1867 RPM to 2067 RPM
D. Hydraulic Stall	1957 RPM to 2157 RPM
E. Converter & Hydraulic Stall	1450 RPM to 1650 RPM
Temperature of the torque converter oil	82 – 104 °C (180 – 219 °F)

Temperature of the hydraulic oil	54 – 57 °C (129 – 135 °F)
----------------------------------	---------------------------

NOTE: hydraulic Stall and Converter and Hydraulic Stall RPM values are read while the lift arms are rising with the bucket held rolled back and the engine at Wide Open Throttle (WOT) in max power mode with transmission in manual mode and in 3rd gear.

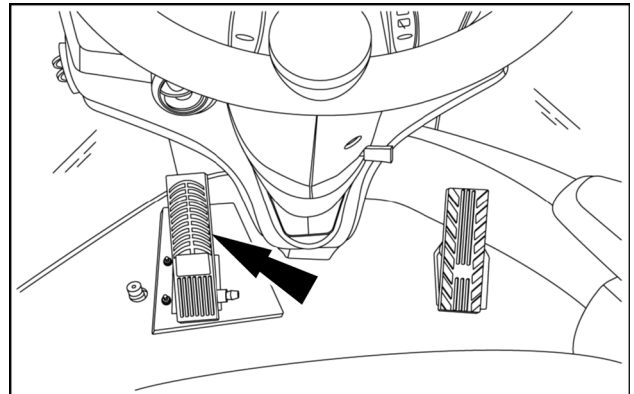
Engine - Remove

1. Park the machine on a level surface and lower the bucket to the ground. Put the articulation lock in LOCKED position and stop the engine.



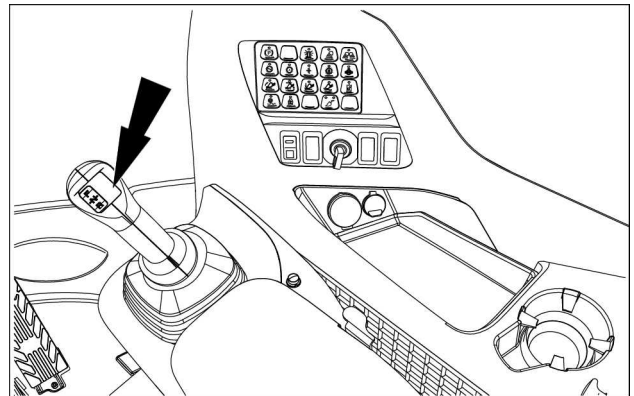
LEIL16WHL0048AB 1

2. Actuate the brake pedal several times to discharge the brake accumulators.



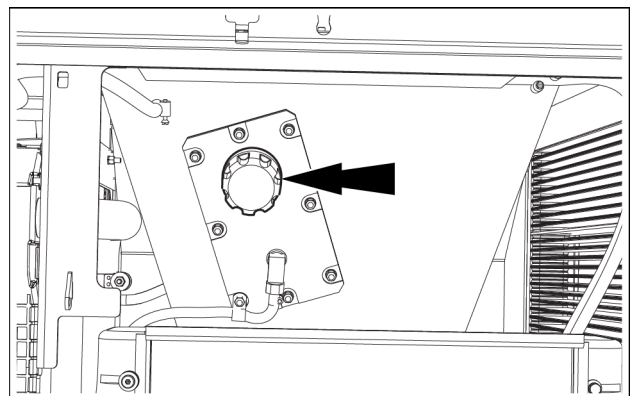
LEIL15WHL0564AA 2

3. Put the key switch to ON position. Press the hydraulic functions lock-out button to unlock all hydraulic functions. Move the control lever(s) back and forth at least 30 times to release any pressure from the hydraulic circuit. Put the key switch to OFF position.



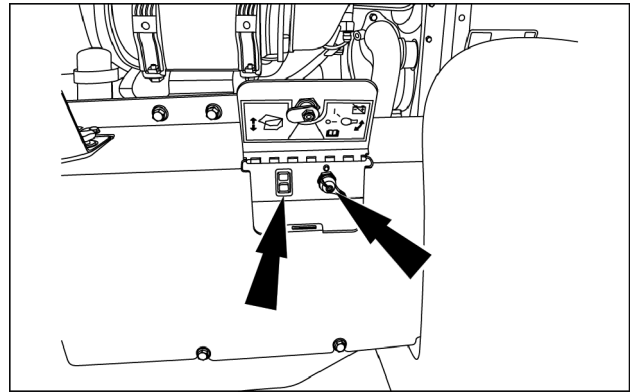
LEIL16WHL1286AA 3

4. Raise the grill located above the cooler box just behind the cab. Then slowly loosen the hydraulic reservoir filler cap to release pressure in the reservoir.



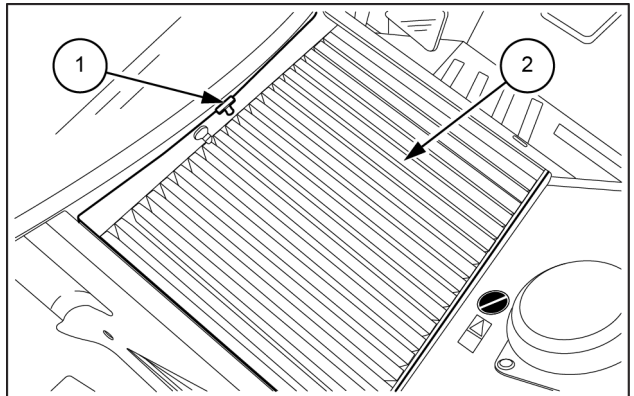
LEIL17WHL0028AB 4

5. Locate the timed disconnect switch and hood raise switch in the battery box. Raise the engine hood and put the timed disconnect switch to OFF position.



RCPH10WHL106AAH 5

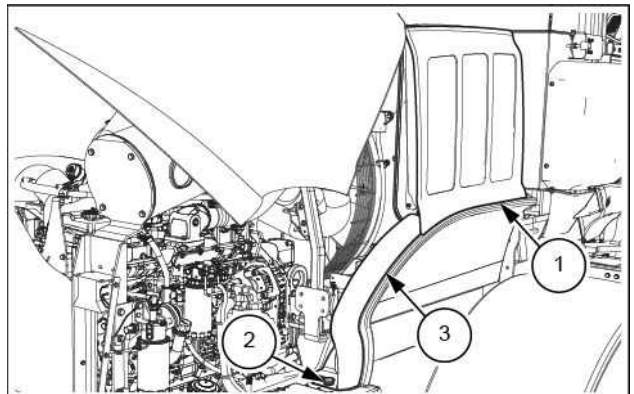
6. Unhook the rubber T-handle (1) and raise the upper panel (2). Make sure that the security levers are blocked.



LEIL13WHL0137AB 6

7. Raise the right-hand and left-hand side panels (1). Then remove the thumb screws (2) and inner fender panels (3).

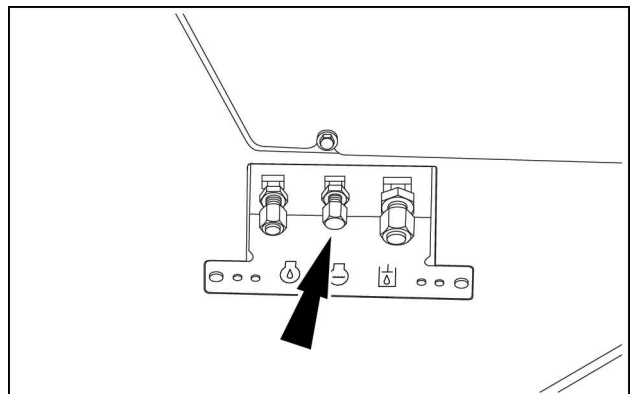
NOTE: right-hand side of the machine is shown. The operation is similar for the left-hand side.



LEIL17WHL0027AB 7

8. Place a suitable container below the radiator drain plug, remove the radiator cap and the radiator drain plug to drain the engine coolant. Then reinstall the radiator drain plug and the radiator cap after coolant has drained.

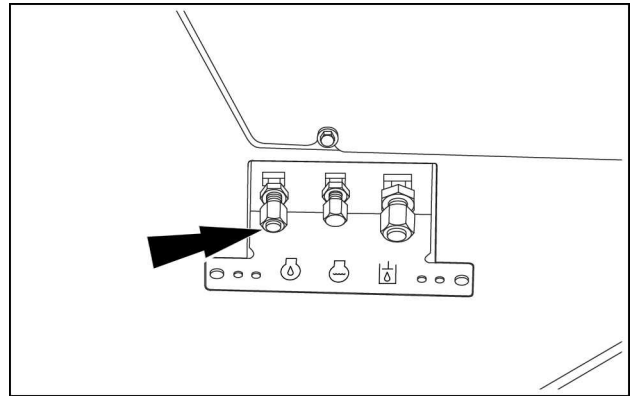
NOTE: see machine specifications for cooling system volume.



LEIL16WHL0198AA 8

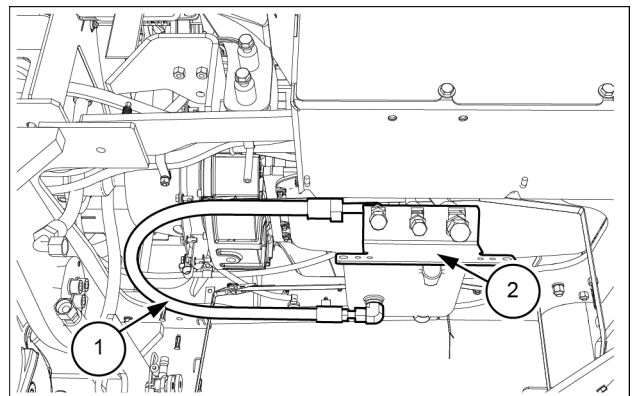
9. Place a suitable container below the engine oil drain plug. Remove the engine oil drain plug and drain oil into container. Then reinstall the engine oil drain plug.

NOTE: see machine specifications for engine oil sump volume.



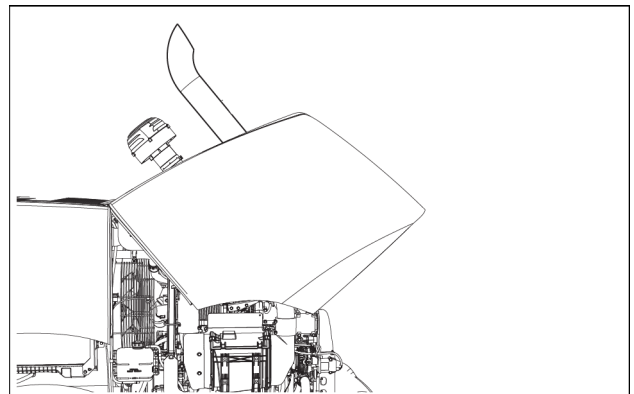
LEIL16WHL0198AA 9

10. Remove the drain hose (1) from the frame bracket (2).



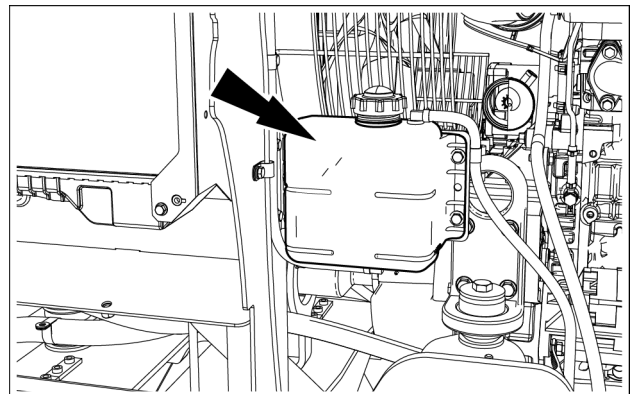
LEIL16WHL1250AB 10

11. Remove the engine hood (refer to **Engine hood - Remove (90.105)**).



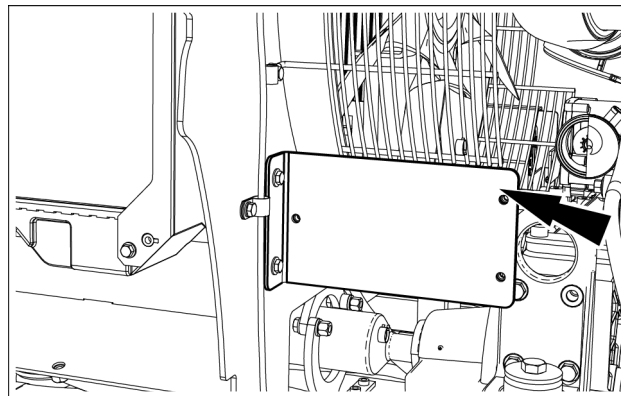
LEIL17WHL0026AB 11

12. Remove the overflow tank of the engine coolant.



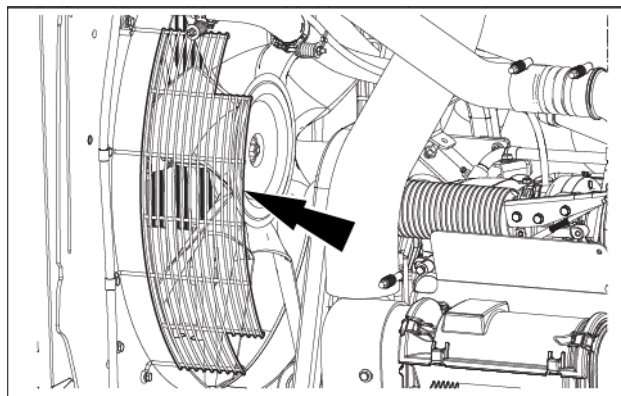
LEIL16WHL0574AB 12

13. Remove the support bracket of the engine coolant overflow tank.



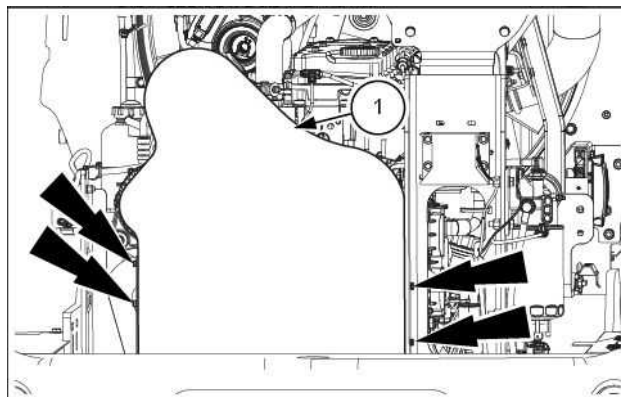
LEIL16WHL0575AB 13

14. Remove the cooling fan guard.



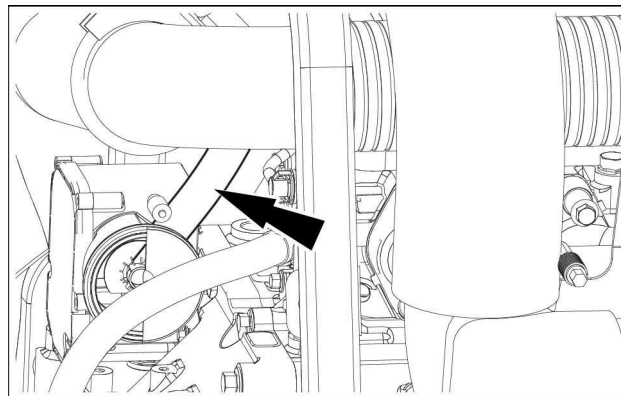
LEIL17WHL0137AB 14

15. Loosen the four bolts to remove the engine guard (1).



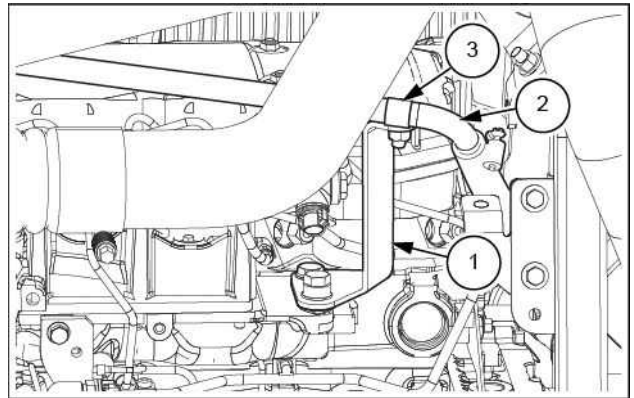
LEIL17WHL0118AB 15

16. Disconnect the crankcase vent hose from the engine.

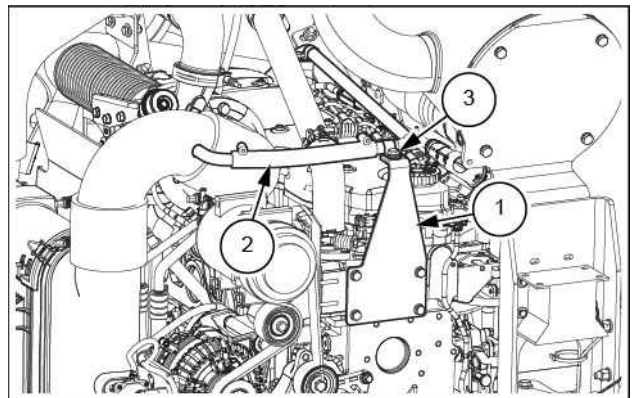


LEIL17WHL0136AB 16

17. Remove the clamps **(3)** that secure the crankcase vent hose **(2)** to the brackets **(1)**. Remove the brackets **(1)** from the engine.

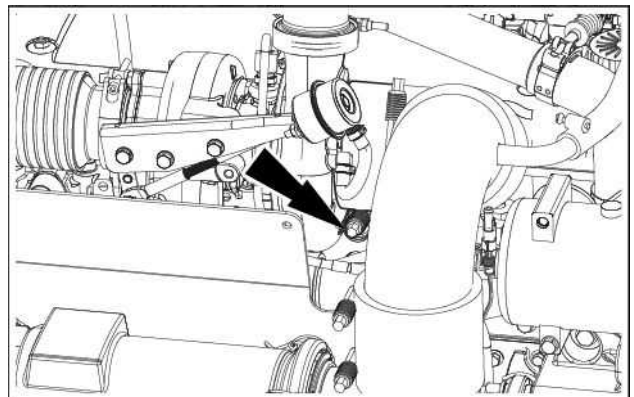


LEIL17WHL0133AB 17



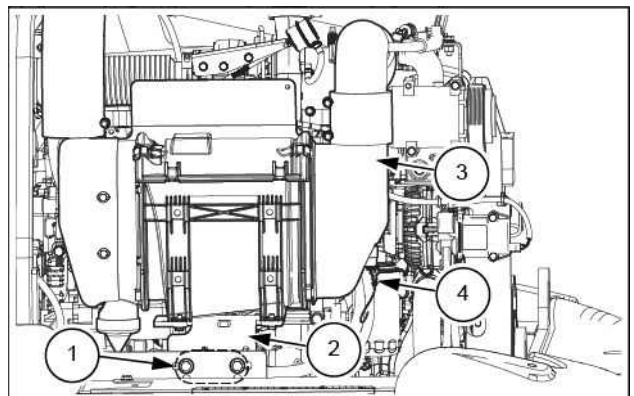
LEIL17WHL0119AB 18

18. Remove the clamp to disconnect the air cleaner from the engine.



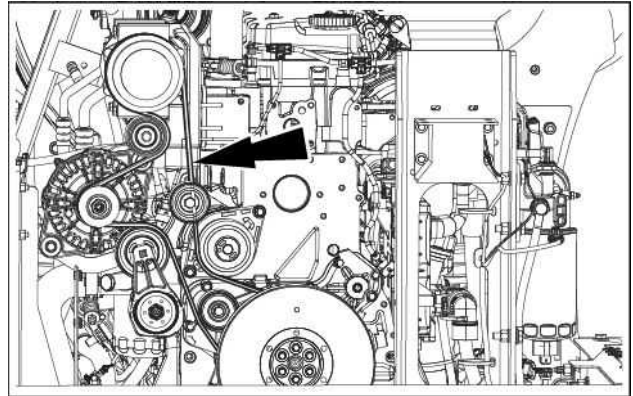
LEIL17WHL0135AB 19

19. Tag and disconnect the AFS2 connector **(4)** from the air cleaner **(3)**.
Remove the hardware **(1)** to unfix the air cleaner support bracket **(2)** from the rear chassis.
Remove the air cleaner assembly from the machine.



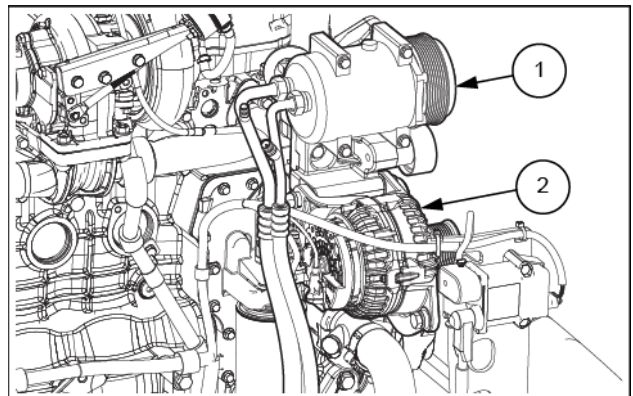
LEIL17WHL0120AB 20

20. Remove the drive belt from the engine.



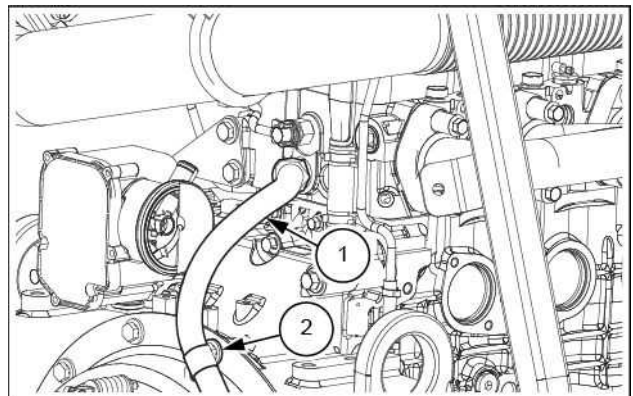
LEIL17WHL0117AB 21

21. Tag and disconnect the ACT connector from the air-conditioning compressor clutch and ALT_5, ALT_B connectors from the alternator. Remove the alternator (2) and air-conditioning compressor (1).



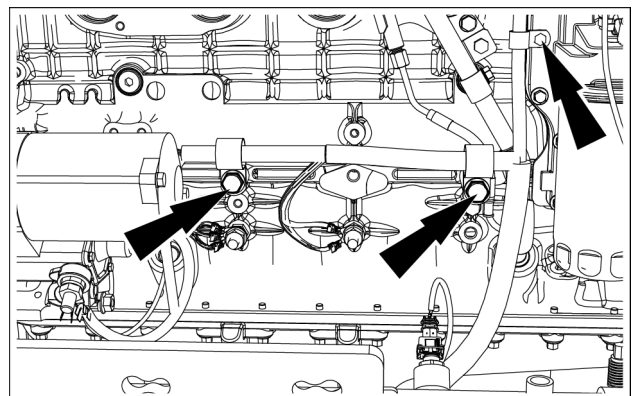
LEIL17WHL0116AB 22

22. Remove the clamp (2) that secures the heater supply hose (1) to the flywheel cover. Tag and disconnect the heater supply hose (1) from the engine.



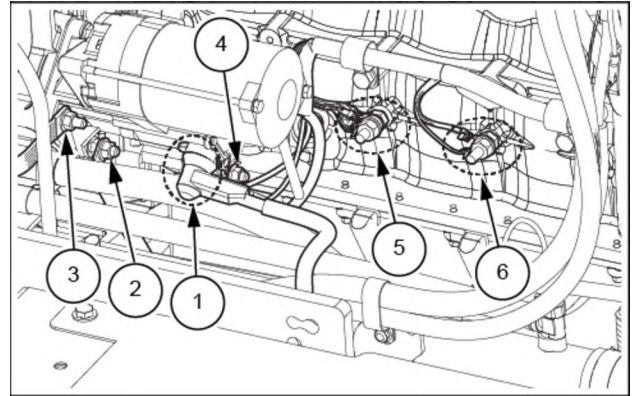
LEIL17WHL0115AB 23

23. Remove the clamps that secure the cables to the engine.



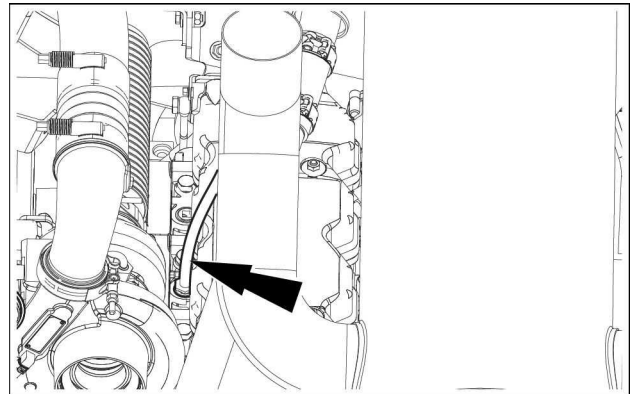
LEIL16WHL0570AB 24

24. Tag and disconnect the ST, CPWR and battery positive cables **(1)** from the engine starter.
Tag and disconnect the negative battery cable **(2)**, ground strap **(3)** and XM1C cable **(4)** from the engine starter.
Tag and disconnect the GND_ENG1, GND_ENG3, GND_ENG4 cables **(5)** and GND_CENG1, GND_CENG2 cables **(6)** from the engine.



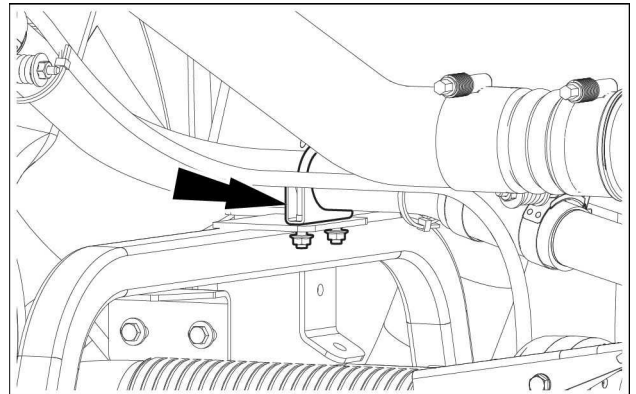
LEIL17WHL0114AB 25

25. Tag and disconnect the breather line (hose and venting check valve) from the engine.



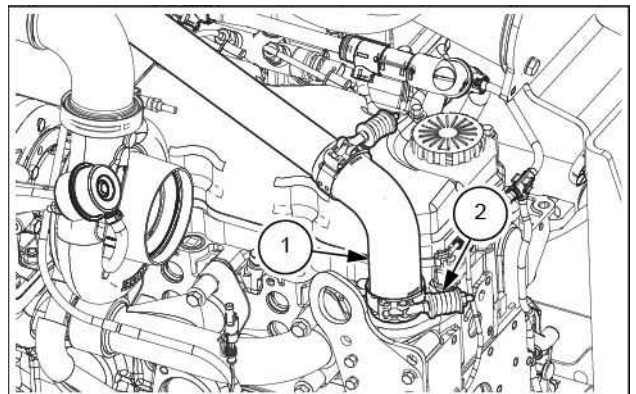
LEIL17WHL0094AB 26

26. Remove the U-bolt clamp to unfix the top cooling line from the muffler support structure.



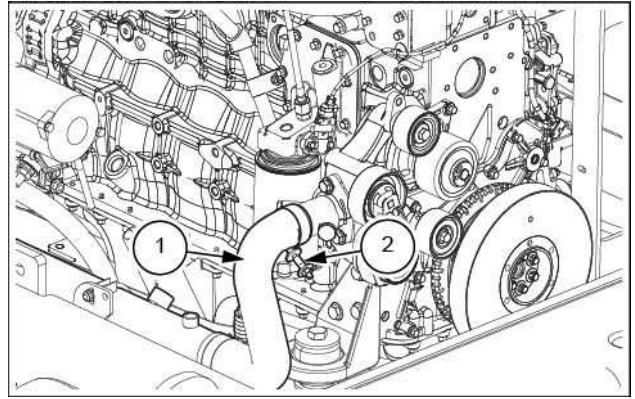
LEIL17WHL0095AB 27

27. Remove the clamps **(2)** to disconnect the top cooling line **(1)** from the elbow hose and engine. Tag the hose.



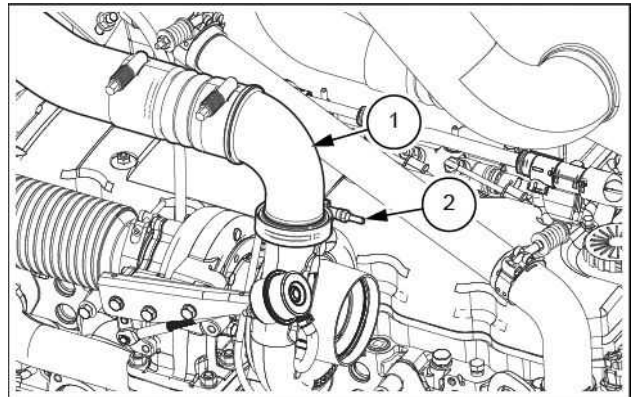
LEIL17WHL0093AB 28

28. Remove the clamp **(2)** to disconnect the bottom engine coolant line **(1)** from the engine. Tag the hose.



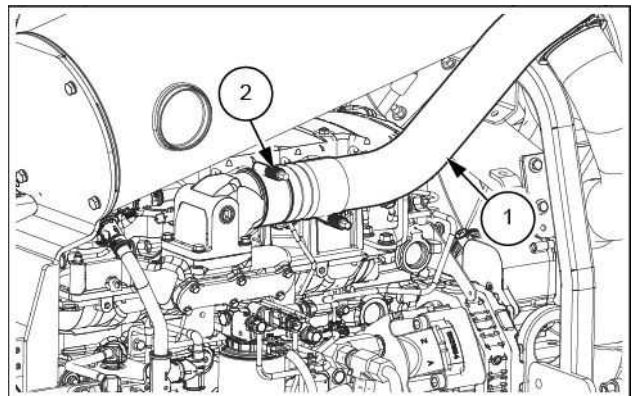
LEIL17WHL0092AB 29

29. Remove the clamps **(2)** to disconnect the turbo outlet air cooling line **(1)** from the charge air cooler and engine. Tag the hose.



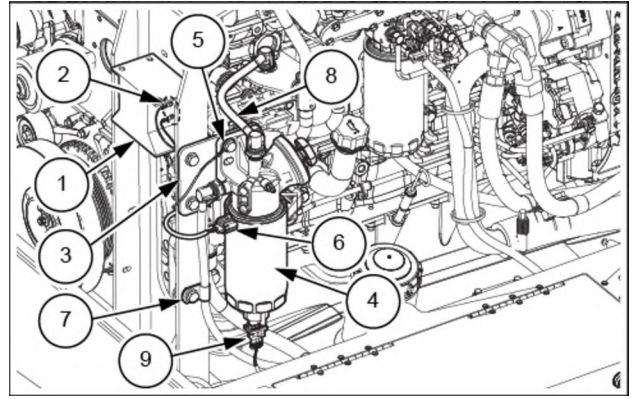
LEIL17WHL0091AB 30

30. Remove the clamps **(2)** to disconnect the air intake cooling line **(1)** from the charge air cooler and engine. Tag the hose.

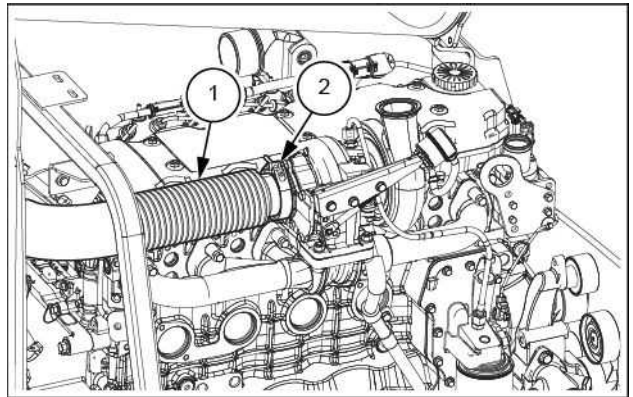


LEIL17WHL0090AB 31

31. Tag and disconnect the fuel pre-filter to engine hose **(8)** from the engine.
32. Remove the clamp **(7)** that secures the fuel tank suction hose to the rear muffler support.
33. Tag and disconnect the WIF connector **(9)** and WSH connector **(6)** from the fuel pre-filter **(4)**.
34. Tag and disconnect the fuel pre-filter **(4)** from the support bracket.
Tag the GRD_WIF wire **(5)**.
35. Remove the fuel pre-filter support bracket **(3)** from the rear muffler support.
36. Remove the cable ties that secure the wires to the rear muffler support.
Tag and disconnect the wires **(2)** from the alarm back-up **(1)**.
Remove the alarm back-up **(1)** from the rear muffler support.
37. Remove the clamp **(2)** to disconnect the end of the exhaust system pipe **(1)** from the engine.



LEIL17WHL0055AB 32



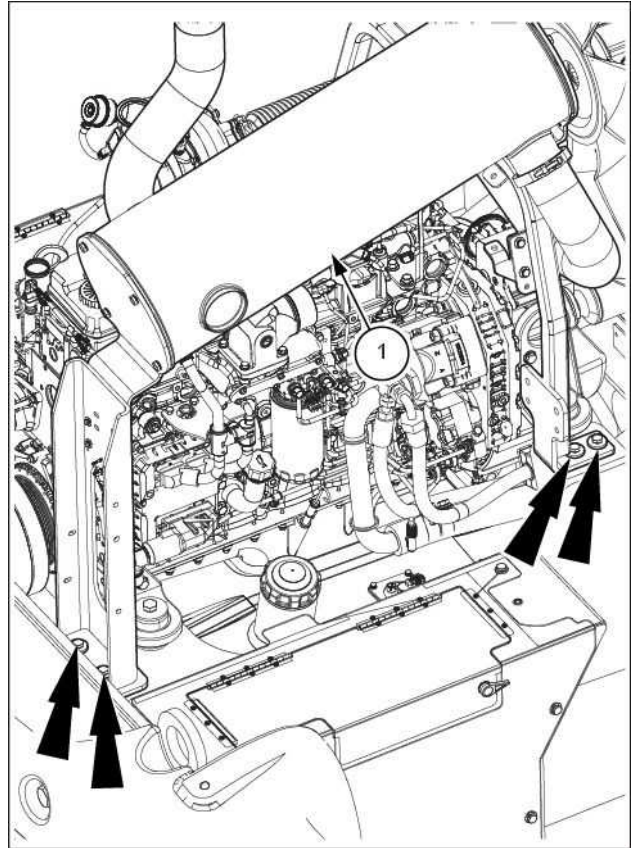
LEIL17WHL0054AB 33

38. Attach a suitable lifting device to the exhaust system assembly (1) (including muffler, pipe, support brackets).

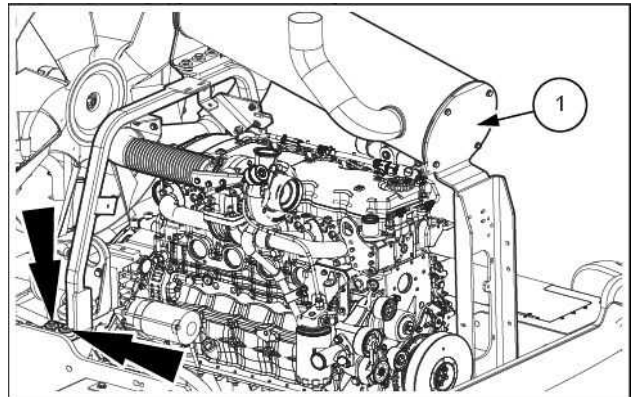
Remove the hardware at the noted six locations to unfix the exhaust system assembly (1) from the rear chassis.

Lift and remove the exhaust system assembly (1) from the machine.

NOTE: be sure all wire harness connections and hoses are out of the way.

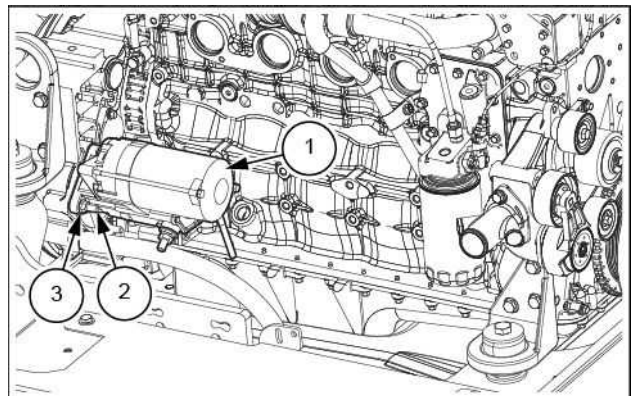


LEIL17WHL0053BB 34



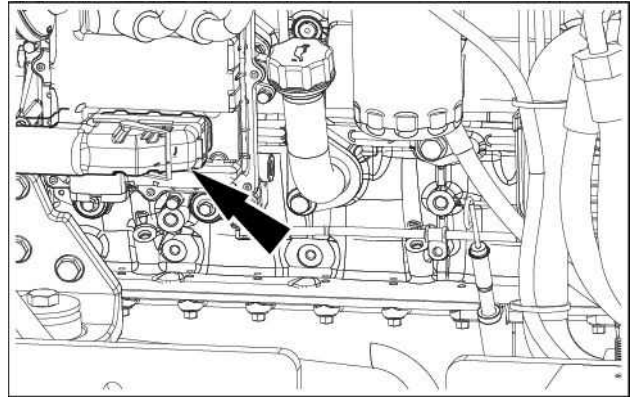
LEIL17WHL0051AB 35

39. Remove the nuts (3) and studs (2) to disconnect the engine starter (1) from the engine.



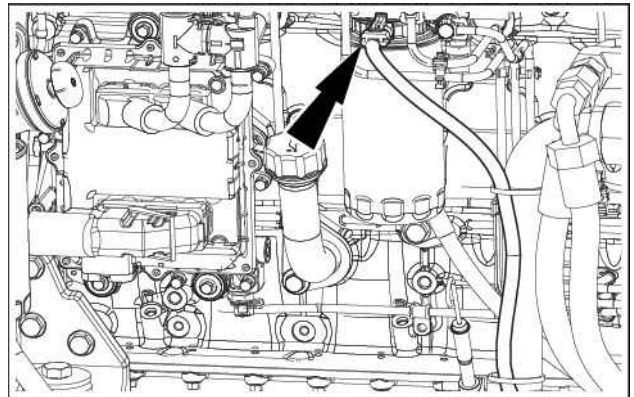
LEIL17WHL0052AB 36

40. Tag and disconnect the EDC7 connector from the Engine Controller Unit (ECU).



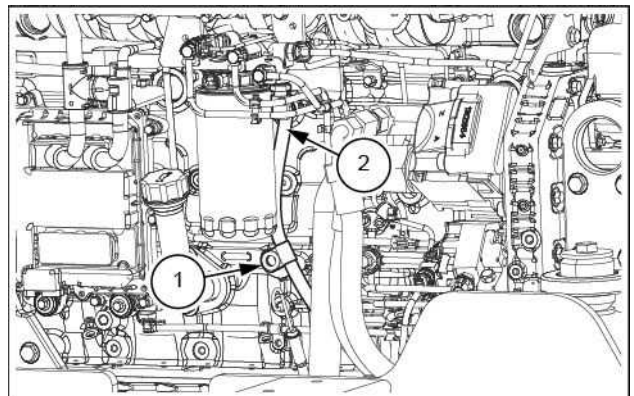
LEIL17WHL0050AB 37

41. Tag and disconnect the FFH connector from the fuel filter.



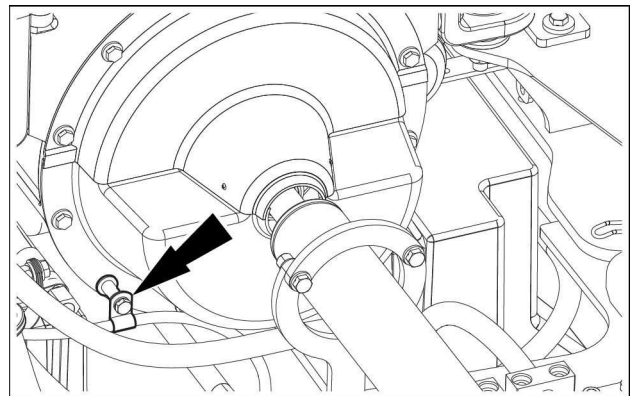
LEIL17WHL0049AB 38

42. Remove the clamp (1) to release the fuel return hose (2). Tag and disconnect the fuel return hose (2) from the fuel filter.



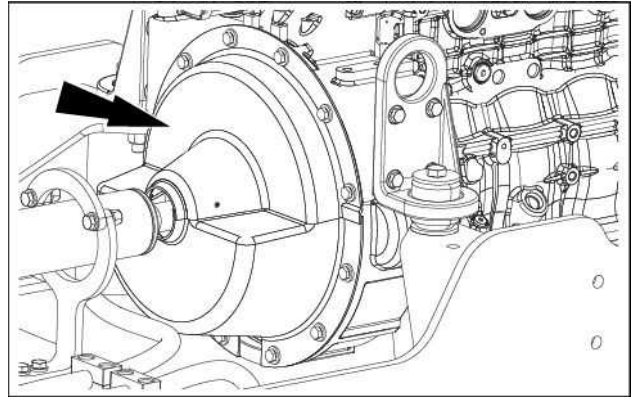
LEIL17WHL0046AB 39

43. At the noted location remove the clamp to release the fuel tank suction hose.



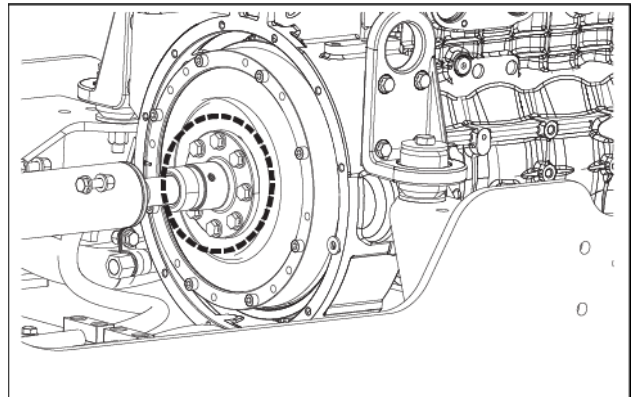
LEIL17WHL0086AB 40

44. Remove the upper and lower drive shaft dust covers.



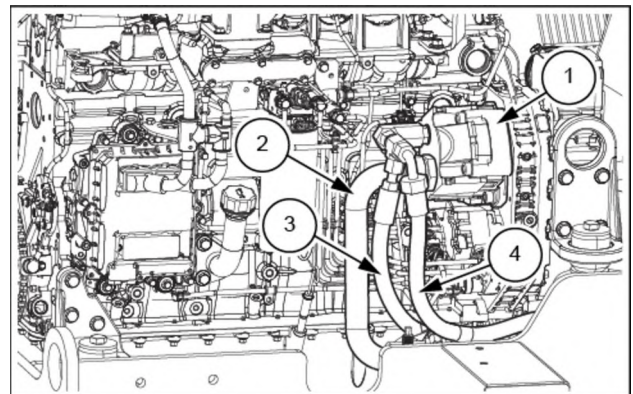
LEIL17WHL0048AB 41

45. Remove the bolts to disengage the drive shaft from the engine coupling.



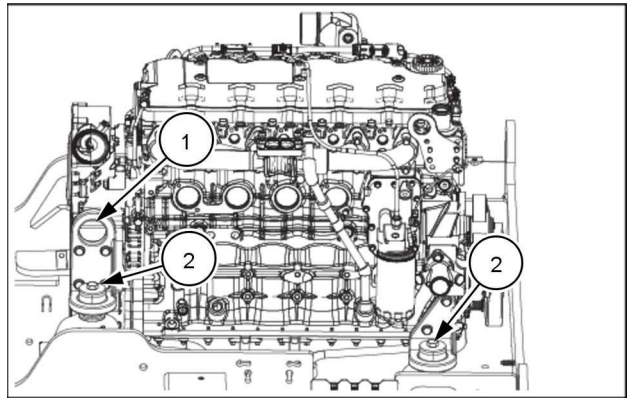
LEIL17WHL0047AB 42

46. Connect a vacuum pump to the hydraulic reservoir and turn it on. Tag and disconnect the suction hose (2), pressure hose (4) and attenuator hose (3) from the brake pump (1). Remove the brake pump (1) (refer to **Brake pump - Remove (33.202)**). Turn off and disconnect the vacuum pump from the hydraulic reservoir.

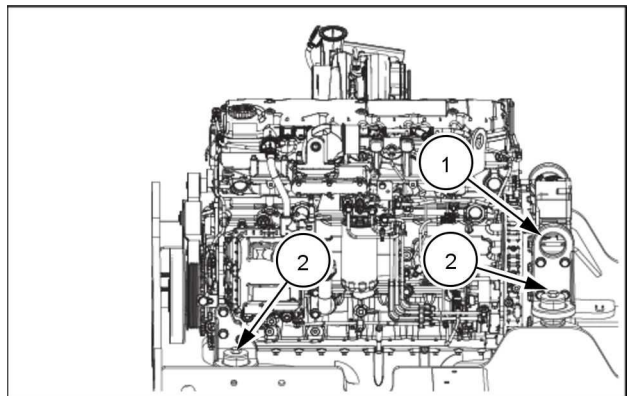


LEIL17WHL0045AB 43

47. Connect a suitable lifting equipment to the engine mounts **(1)**. Take up all slack in lifting equipment. Remove the engine mount bolts **(2)**.
48. Slowly raise the engine from the rear chassis. Make sure all wire harness connections and hoses have been disconnected and are clear of the engine. Guide the oil drain hose from the frame as the engine is lifted. Remove the engine from machine.



LEIL17WHL0034AA 44



LEIL17WHL0035AA 45

Engine - Install

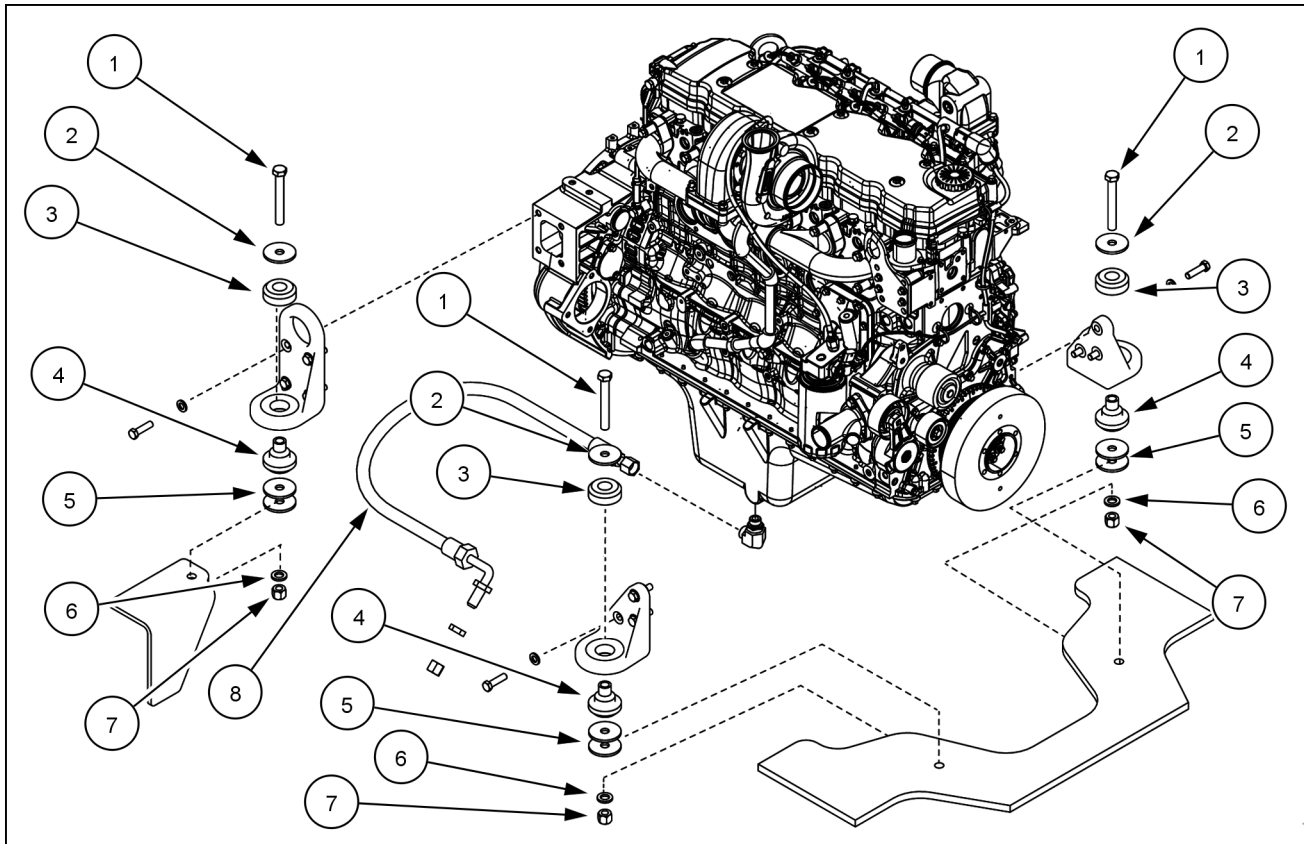
⚠ WARNING

Hot liquid under pressure!

Never remove the filler cap or the recovery tank cap while the engine is running or the coolant is hot. Let the system cool. Turn the filler cap to the first notch and allow any pressure to escape, and then remove the filler cap. Loosen the recovery tank cap slowly to allow any pressure to escape.

Failure to comply could result in death or serious injury.

W0296A

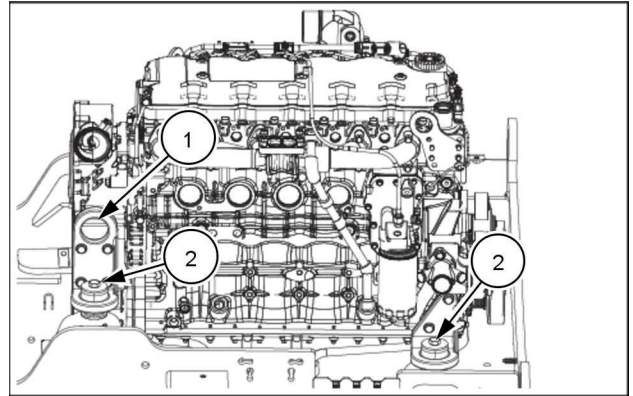


RAIL12WEL0130FA 1

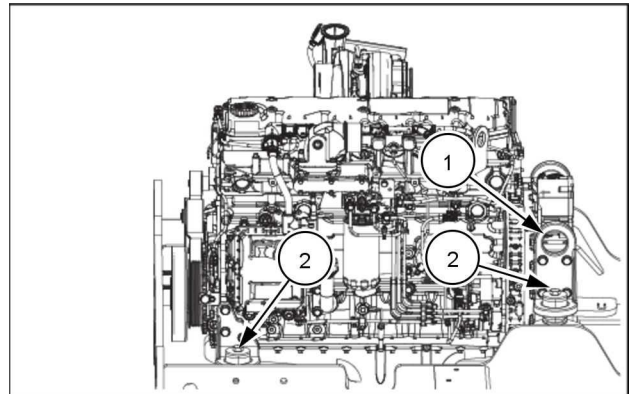
- | | |
|----------------------|--------------------------|
| 1. Engine mount bolt | 5. Washers |
| 2. Washer | 6. Washer |
| 3. Upper isolator | 7. Nut |
| 4. Lower isolator | 8. Remote oil drain hose |

1. Inspect the engine mounts. If the engine rubber isolators require replacement, remove and discard the upper isolators (3) and lower isolators (4). Install new upper isolators (3) and new lower isolators (4).

2. Attach a suitable lifting device to the engine mounts (1) and slowly move the engine into position over the rear chassis. Make sure all harness connections and hoses are out of the way or positioned correctly for reconnecting, before lowering the engine.
3. Fix the engine to the rear chassis. Torque the engine mount bolts (2) to **244 – 298 N·m (180 – 220 lb ft)**.
4. Disconnect the lifting equipment from the engine mounts.

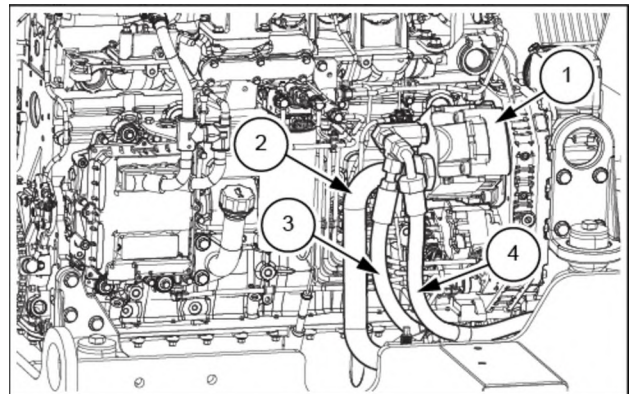


LEIL17WHL0034AA 2



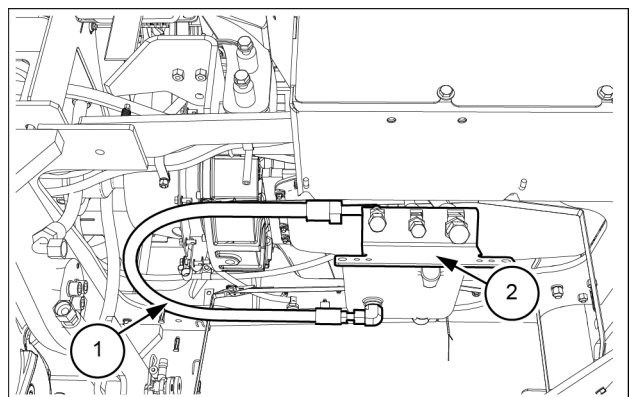
LEIL17WHL0035AA 3

5. Connect a vacuum pump to the hydraulic reservoir and turn it on. Install the brake pump (1). Connect the suction hose (2), pressure hose (4) and attenuator hose (3) to the brake pump following the tags applied during removal (refer to **Brake pump - Install (33.202)**). Turn off and disconnect the vacuum pump from the hydraulic reservoir.



LEIL17WHL0045AB 4

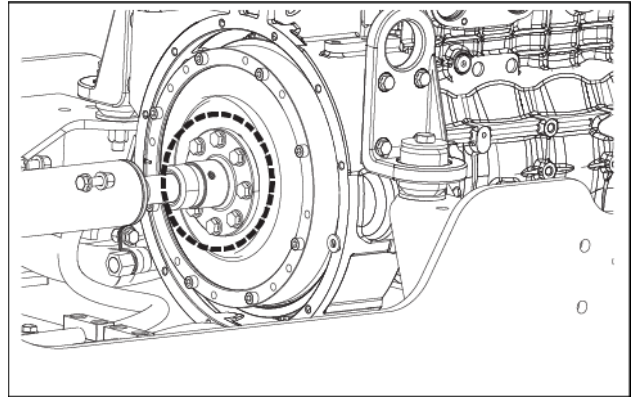
6. Connect the engine oil drain hose (1) to the frame bracket (2).



LEIL16WHL1250AB 5

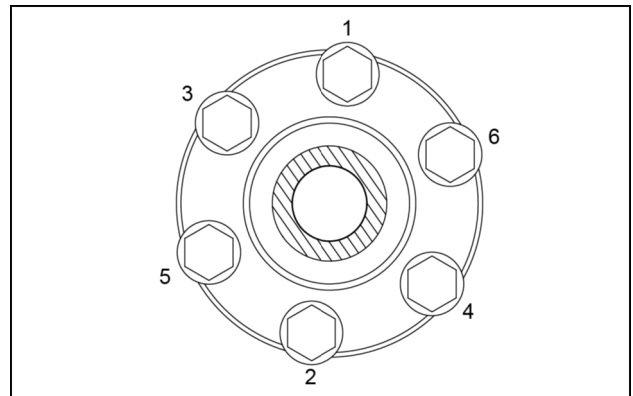
7. Position the drive shaft on the engine coupling. Install the six bolts (4-speed transmission) or eight bolts (5-speed transmission) to secure the drive shaft to the engine coupling.

NOTE: the figure shows the machine with 5-speed transmission.



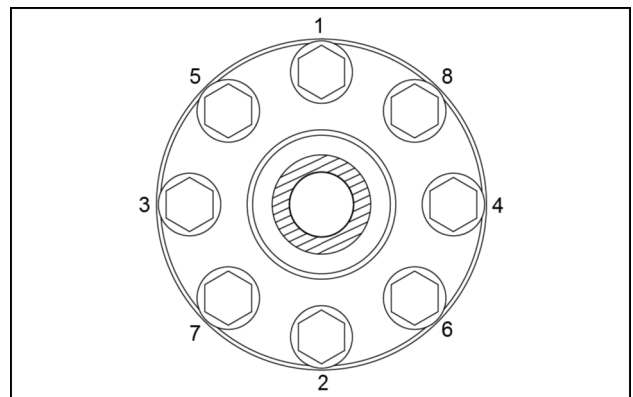
LEIL17WHL0047AB 6

8. Tighten to **86 – 94 N·m (63 – 69 lb ft)** (821G, 4-speed transmission).
Tighten to **85 – 94 N·m (63 – 69 lb ft)** (621G, 721G, 921G, 4-speed transmission and 721G 5-speed transmission).
Follow the bolt installation pattern in figure.



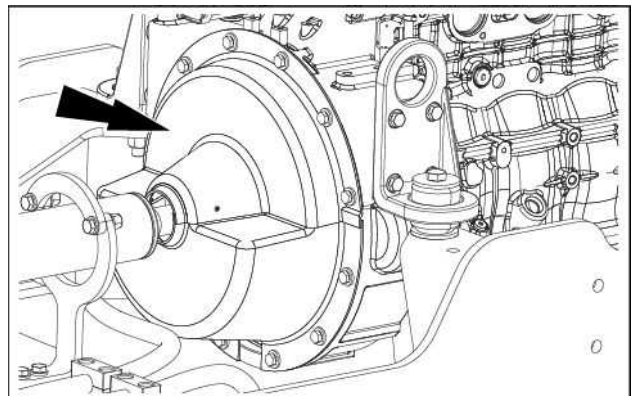
LEIL17WHL1383AA 7

9. Tighten to **130 – 140 N·m (96 – 103 lb ft)** (621G, 821G, 921G, 5-speed transmission).
Follow the bolt installation pattern in figure.



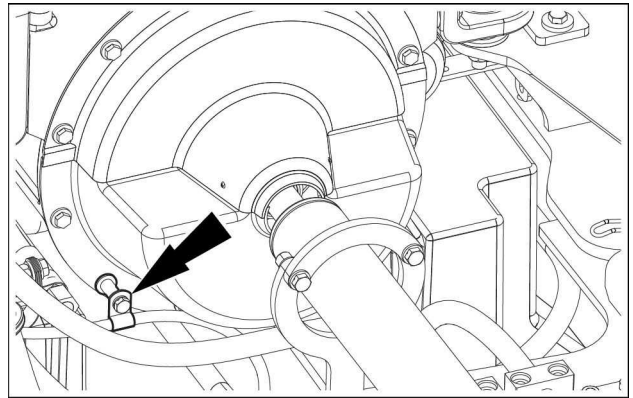
LEIL17WHL1382AA 8

10. Install the upper and lower drive shaft dust covers.
Torque to **20 – 27 N·m (15 – 20 lb ft)**.



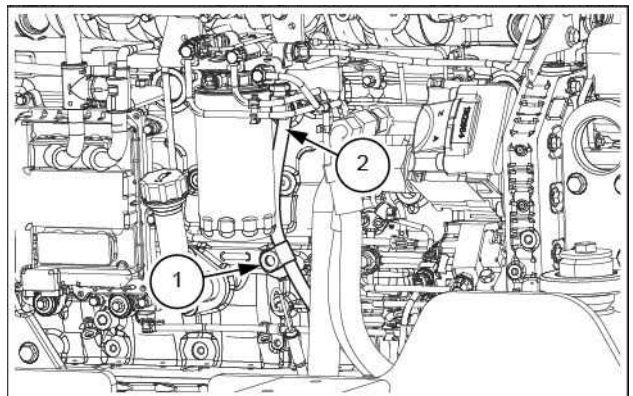
LEIL17WHL0048AB 9

11. At the noted location install additional spacer and clamp to route the fuel tank suction hose.



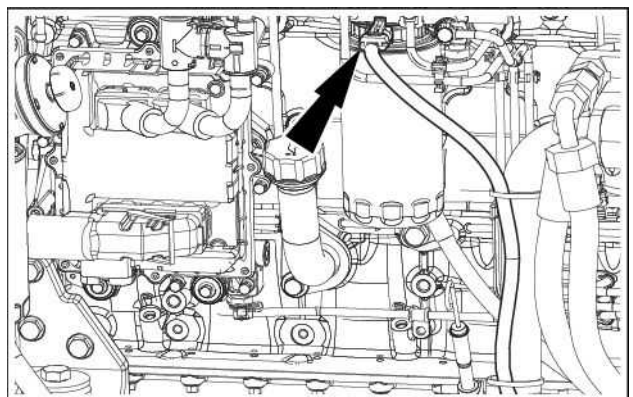
LEIL17WHL0086AB 10

12. Install the clamp (1) to secure the fuel return hose (2).
13. Connect the fuel line (2) to the top of the fuel filter.



LEIL17WHL0046AB 11

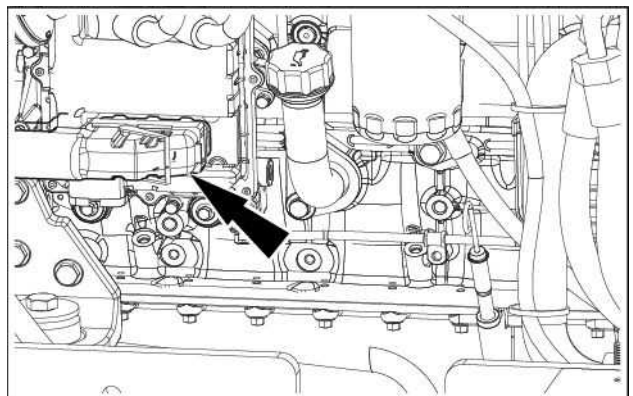
14. Connect the FFH connector to the fuel filter.



LEIL17WHL0049AB 12

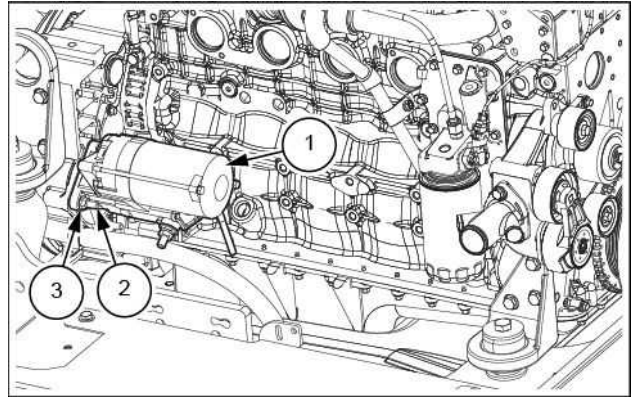
15. Connect the EDC7 connector to the Engine Controller Unit (ECU).

NOTE: start the connector on the ECU with lever straight out from ECU. Use a lever to pull connector into position.



LEIL17WHL0050AB 13

16. Mount the engine starter (1). Firstly install the short threaded portion of the three studs (2) into the flywheel housing. Apply Loctite 747 primer to the studs and holes. Apply two drops of **LOCTITE® 271™** to each hole and stud assembly and torque immediately to **19 – 29 N·m (14 – 21 lb ft)**. Allow Loctite adhesive to cure **20 min** before installing the starter. Install the engine starter (1). Torque the three starter mounting nuts (3) to **40 – 50 N·m (29 – 37 lb ft)**.

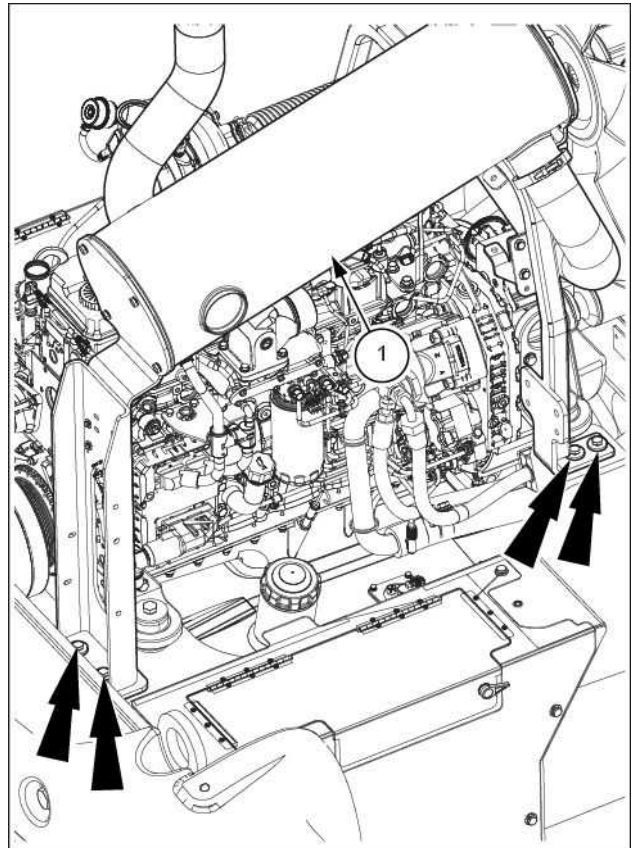


LEIL17WHL0052AB 14

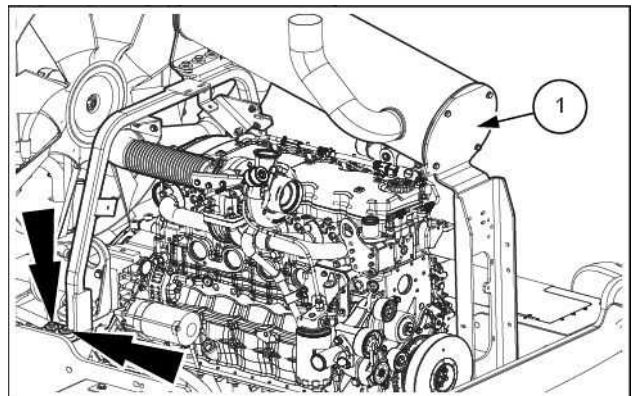
17. Connect a suitable lifting device to the exhaust system assembly (1) (including muffler, pipe, support brackets) and carefully lift it. Position and lower the exhaust system assembly (1) over the rear chassis of the machine.

NOTE: be sure all wire harness connections and hoses are out of the way.

18. Install the muffler support brackets to the rear chassis with six bolts and washers (arrows).

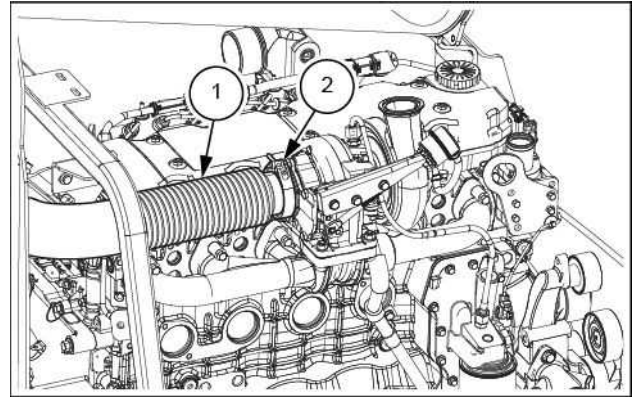


LEIL17WHL0053BB 15



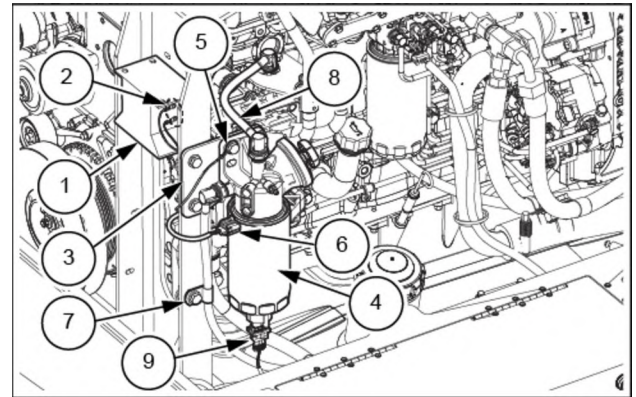
LEIL17WHL0051AB 16

19. Fix the end of the exhaust system pipe (1) to the engine with a new clamp (2). Tighten the clamp to **5.7 – 6.3 N·m (4.2 – 4.6 lb ft)**.



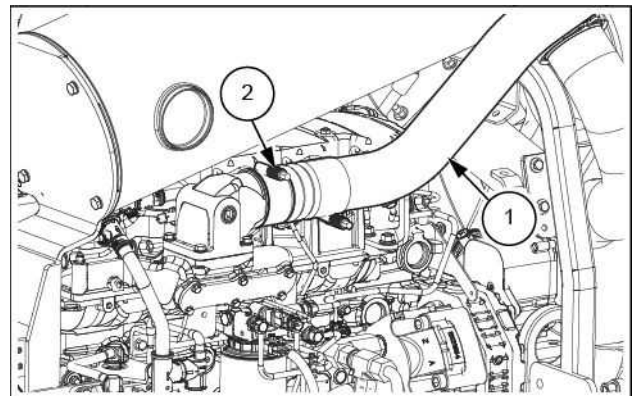
LEIL17WHL0054AB 17

20. Install the alarm back-up (1) to the rear muffler support with four bolts, washers (under bolt head and nut) and nuts. Connect wire O_JB of connector BU1 to "NEG" and **35 A** of connector BU2 to "H1" (2) of alarm back-up. Secure the wire to the rear muffler support with cable ties.
21. Install the fuel pre-filter support bracket (3) to the rear muffler support with two bolts, washers (under bolt head and nut) and nuts.
22. Install the fuel pre-filter (4) to the support bracket with two bolts, washers (under bolt head and nut) and nuts. At this time connect the GRD_WIF wire (5) by using the same hardware.
23. Connect the WIF connector (9) and WSH connector (6) to the fuel pre-filter.
24. Use the clamp (7) to secure the fuel tank suction hose to the rear muffler support.
25. Connect the fuel pre-filter to engine hose (8) to the engine.
26. Install the air intake cooling line (1) with clamps. Torque the clamps (2) at the ends mating the charge air cooler and engine to **10.1 – 11.3 N·m (7.4 – 8.3 lb ft)**.



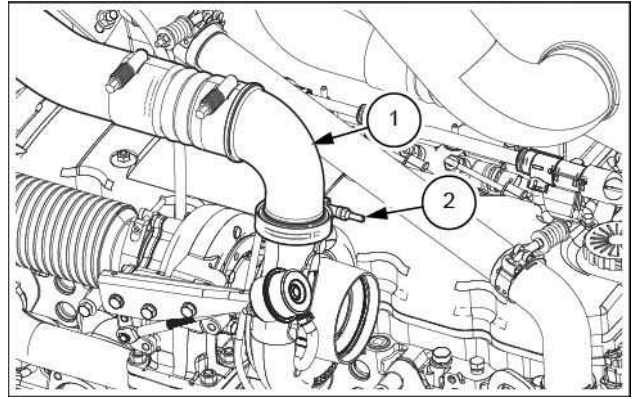
LEIL17WHL0055AB 18

NOTE: ensure clearance of **16.5 – 26.5 mm** between the charge air intake tube and the muffler.



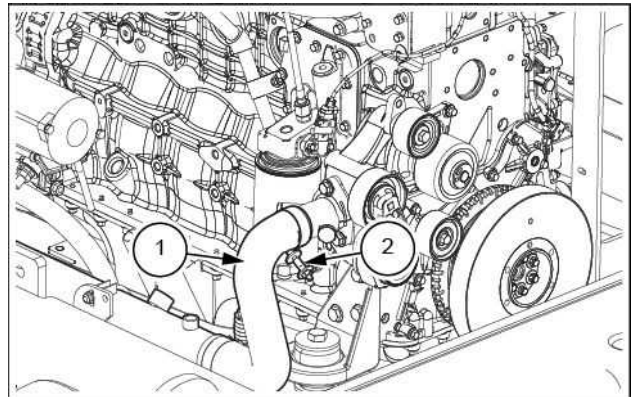
LEIL17WHL0090AB 19

27. Install the turbo outlet air cooling line (1) with clamps. Torque the clamp at the end mating the charge air cooler to **10.1 – 11.3 N·m (7.4 – 8.3 lb ft)**. Install a new O-ring at the end mating the engine and torque the clamp (2) to **5.8 – 7.8 N·m (4.3 – 5.8 lb ft)**.



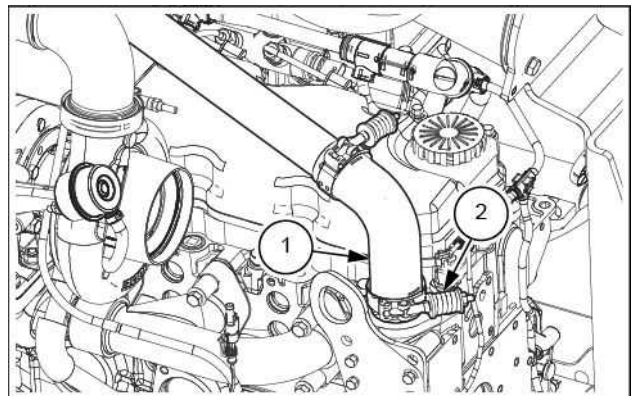
LEIL17WHL0091AB 20

28. Connect the bottom engine coolant line (1) to the engine with the clamp (2). Torque the clamp to **10.1 – 11.3 N·m (7.4 – 8.3 lb ft)**.



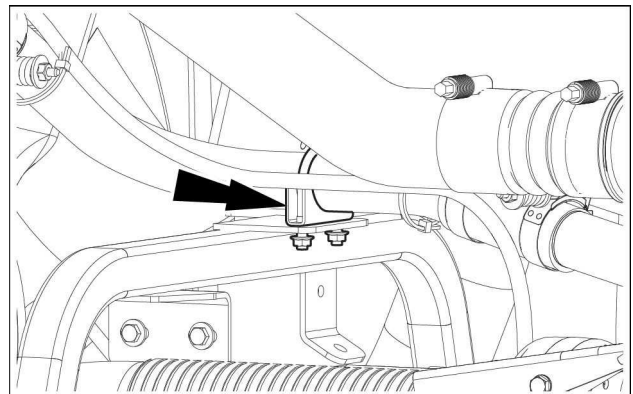
LEIL17WHL0092AB 21

29. Install the top cooling line (1) with clamps (2). Torque the clamps at the ends mating the elbow hose and engine to **10.1 – 11.3 N·m (7.4 – 8.3 lb ft)**.



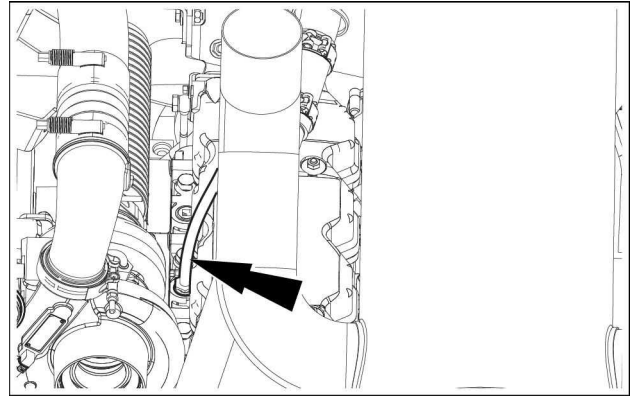
LEIL17WHL0093AB 22

30. Fix the top cooling line to the muffler support structure with U-bolt clamp.



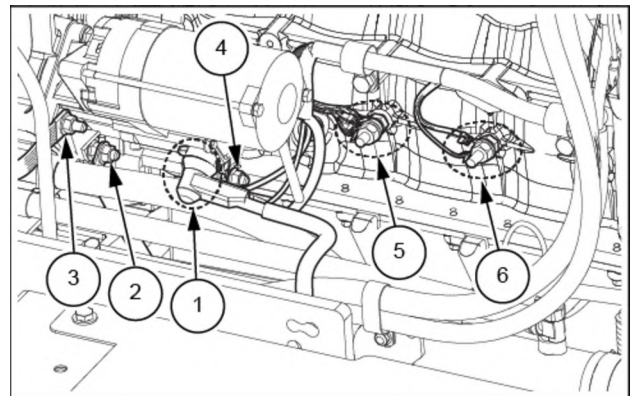
LEIL17WHL0095AB 23

31. Install the breather line (hose and venting check valve) to the engine. Tighten the clamp to **3.4 N·m (2.5 lb ft)**



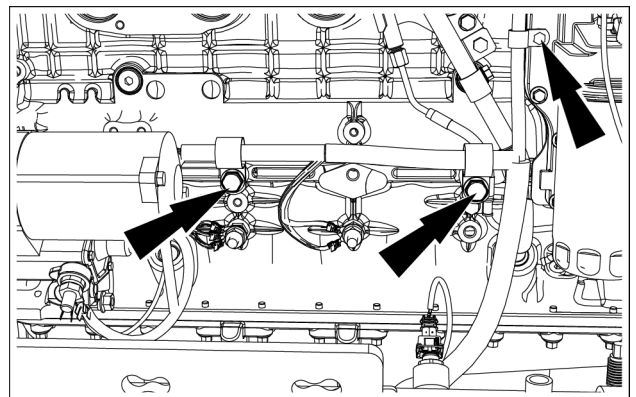
LEIL17WHL0094AB 24

32. Install the ST, CPWR and battery positive cables **(1)** to the engine starter. Torque the nut to **22.5 – 29.4 N·m (16.6 – 21.7 lb ft)**.
Install the negative battery cable **(2)**, ground strap **(3)** and XM1C cable **(4)** to the engine starter.
Install the GND_ENG1, GND_ENG3, GND_ENG4 cables **(5)** and GND_CENG1, GND_CENG2 cables **(6)** to the engine. Torque the nuts to **22 – 24 N·m (16.2 – 17.7 lb ft)**.



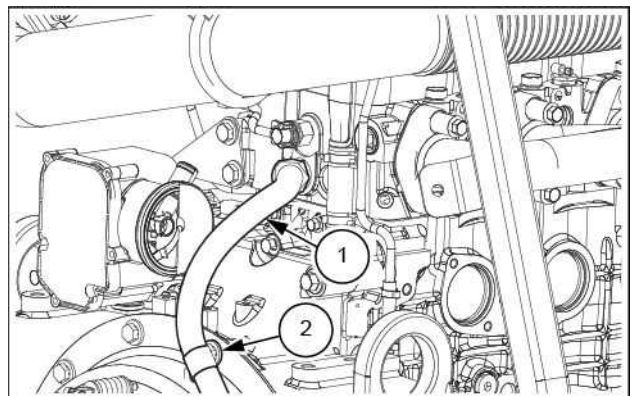
LEIL17WHL0114AB 25

33. Secure the cables to the engine with clamps.



LEIL16WHL0570AB 26

34. Install the heater supply hose **(1)** to the engine. Secure the hose to the flywheel cover with clamp **(2)** and existing hardware.



LEIL17WHL0115AB 27

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