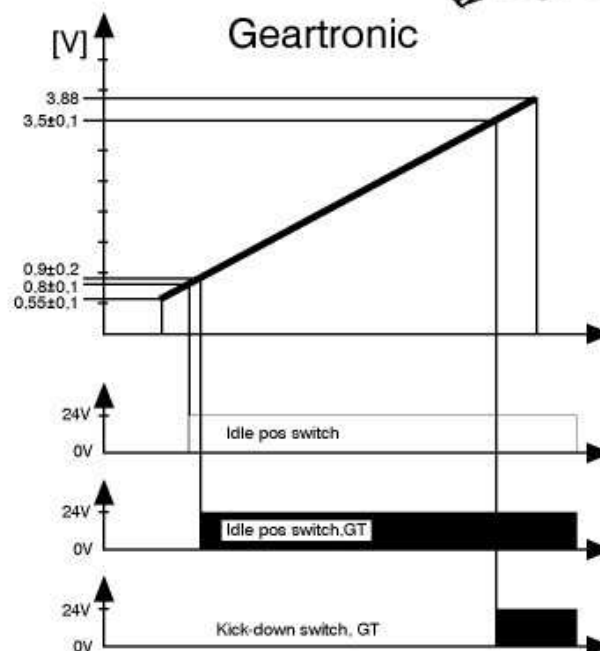
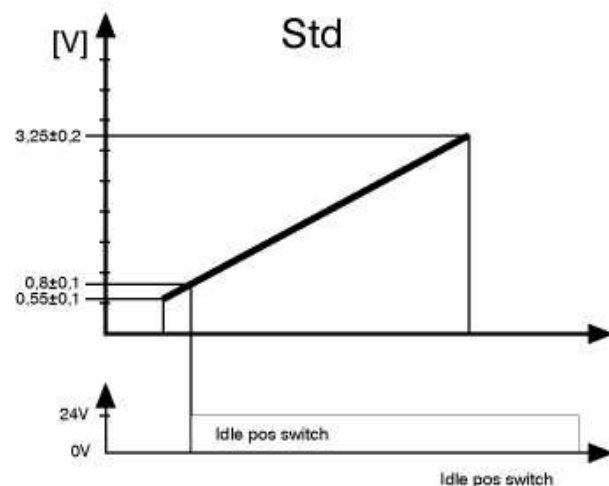


Fault Code 11 and 12 - Accelerator pedal sensor and idling contact



Idle pos switch.....	=	Idling contact, accelerator pedal
Idle pos switch GT.....	=	Idling contact accelerator pedal, Geartronic
Kick-down switch GT.....	=	Kick-down contact, Geartronic
Std.....	=	Manual gearbox

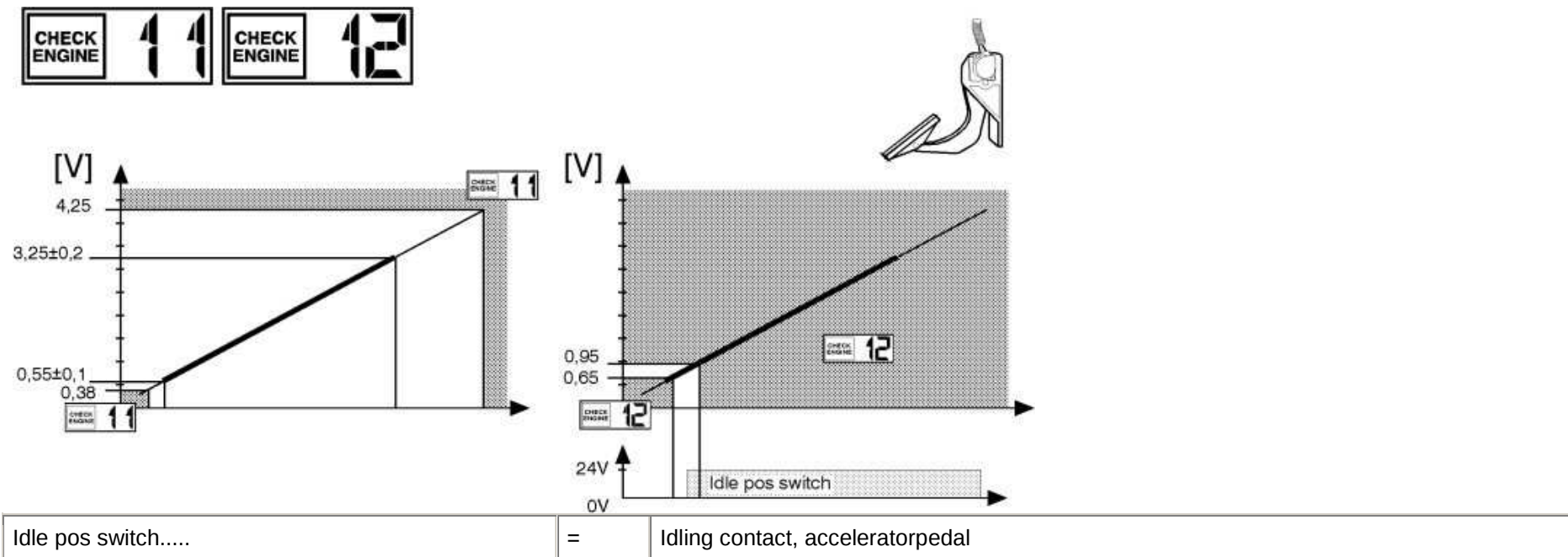
The diagram on the left shows the normal voltage range and the correct engagement position for the idling contact in a vehicle with a manual gearbox.

When the accelerator pedal is in the idling position, the voltage from the accelerator pedal sensor must not exceed 0.65 volt, so that the conditions for engine braking are met. Even at 0.66 volt there is a risk that the engine is not engaged.

The diagram on the right shows the normal voltage range and the correct engagement position for the idling contact on a vehicle equipped with a Geartronic gearbox. Vehicles with Geartronic gearboxes also have two extra contacts, an idling contact and a kick-down contact.

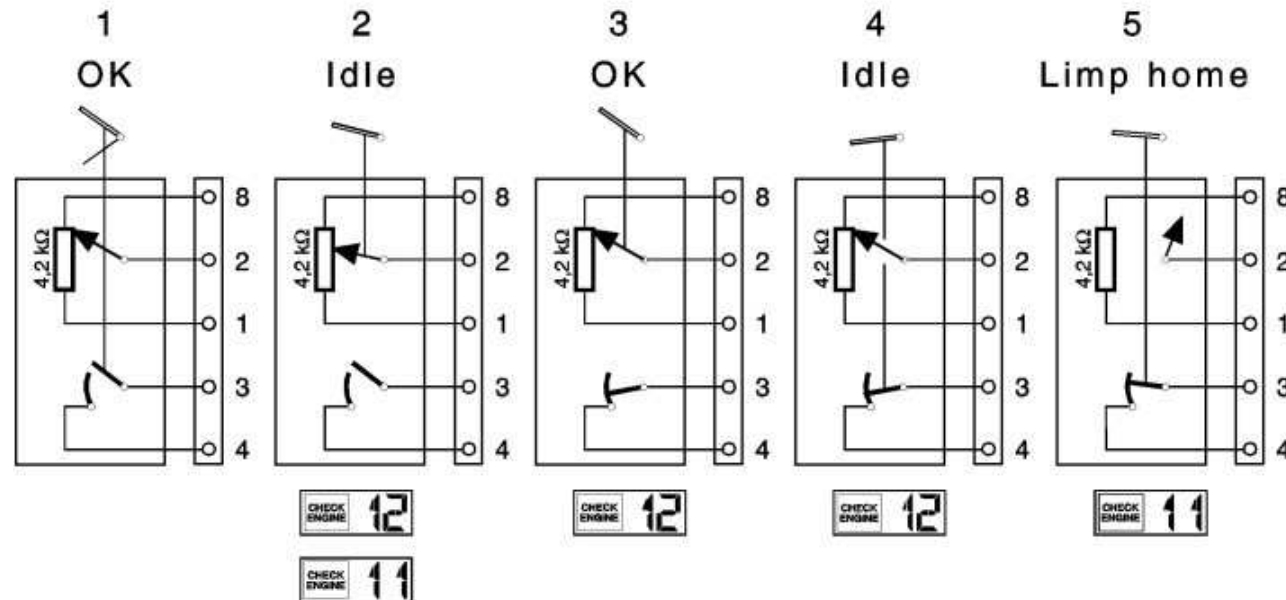
Comments on fault code 11, Accelerator pedal sensor

Note that the accelerator pedal controls other functions that may stop functioning even although the accelerator pedal does not produce a fault code. For example, the ATR and VEB functions, as well as the regulating of the power output regulator are disturbed if the accelerator pedal does not return to its proper idling position. The ATR and VEB functions can thus not work and the power output regulation can become unstable around idling speed. When the accelerator pedal does not return to its idling position, the control unit regards this that the acceleration and engine are controlled via the accelerator pedal diagram.



The diagram of the left shows the voltage levels that produce fault code **11**.
The fault code is produced for both too high and too low a voltage.

The diagram on the right shows the size of the *window* within which the idling contact will normally be activated.
If the contact is activated in the *low range* or not activated in the *high range* fault code **12** will be produced.
If the fault code has been set, the control unit will not carry out the component check unless the engine is re-started.



OK.....	=	Correct	Idle.....	=	Idling	Limp home.....	=	Emergency regulation
---------	---	---------	-----------	---	--------	----------------	---	----------------------

Diagrams 1-5 show some possible situations and what fault codes that are set.

Diagram 1.

The accelerator pedal and the idling contact function faultlessly.

No fault code is set since the prerequisites have been met and the engine runs normally both when idling and when using the accelerator.

Diagram 2.

The diagram shows the situation when the idling switch is always open and indicates the idling position independently of the accelerator pedal's position. The accelerator pedal functions properly and gives the correct value.

In this situation, where the idling switch and the accelerator pedal's sensor give different values, the control unit always selects the *lowest* value. In this case, the control unit selects the information from the idling switch, which means that the engine can only be run at idling speed.

Fault code **12** will be set since the idling switch misses its *window*.

Fault code **11** will also be set, since the control unit can not determine with certainty if the idling switch or the accelerator pedal's sensor is incorrect.

Diagram 3.

The diagram shows the situation where the idling switch is always closed. The engine runs normally, but the fault code **12** will be set since the idling switch misses its *window*.

Diagram 4.

This is the situation where the accelerator pedal's sensor has stopped functioning and indicates the idling position independently of the pedal's position.

The idling switch gives the correct values, but as with the situation in 2, the control unit will select the *lowest* value, that is the value from the accelerator pedal's sensor.

The engine can only be run at idling speed and fault code **12** is set, since the idling switch is closed below its *window*.

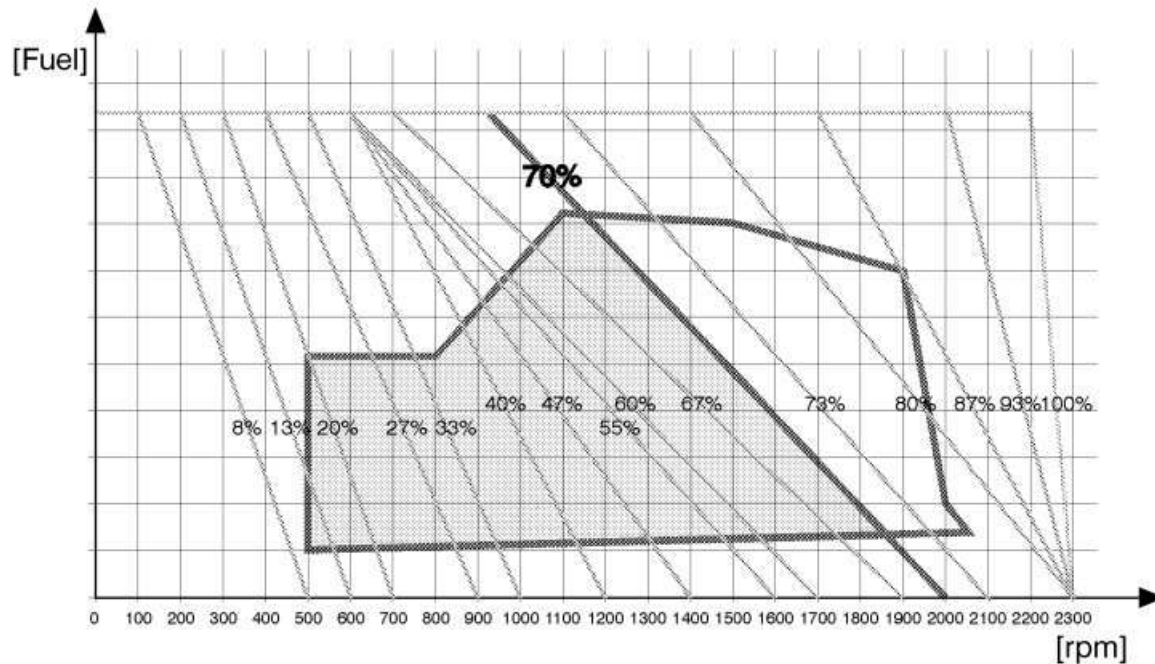
Diagram 5.

In this case, the accelerator pedal's sensor is damaged but the idling switch gives correct values.

The control unit, in this situation, allows the vehicle to be run using emergency regulation *limp home*.

By this is meant that when the control unit receives a signal from the idling switch that the accelerator pedal is being pressed down, it produces the same value as for 70% acceleration, until the pedal is completely released to the idling position.

Fault code **11** will be set since the outgoing signal from the accelerator pedal's sensor lies outside the permitted value.



Fuel

The diagram show the accelerator pedal graph.

The various % values show the electrical output signal from the sensor when the accelerator pedal is pressed down.

The angled lines in the diagram show how the engine reacts when the load is changed for a particular position of the accelerator pedal.

When the engine's load increases, the engine speed decreases. When the engine speed decreases, the control unit will increase the quantity of fuel so that it follows the angled line that corresponds to the accelerator pedal's output signal.

In the diagram, the following limits are set:

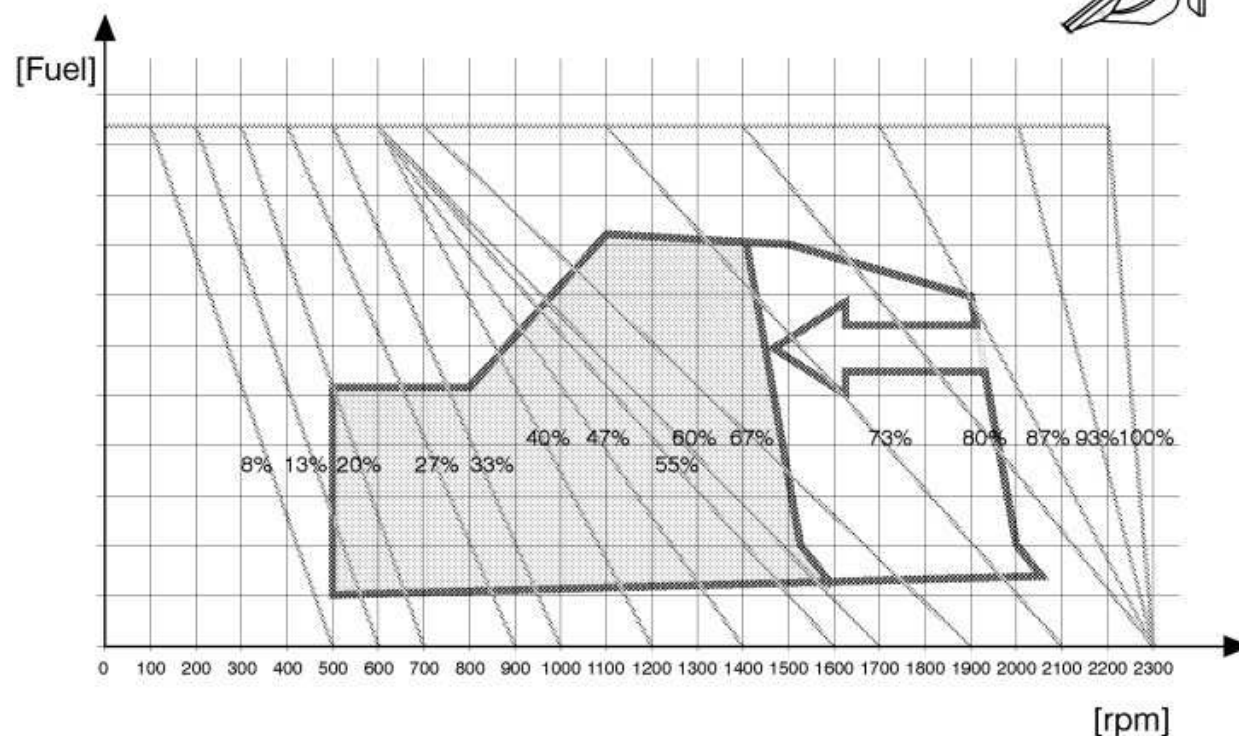
- Idling speed (left limit)
- Max. torque (upper limit)
- Max. engine speed (right limit)
- Min. engine speed (lower limit)

When the control unit uses emergency regulation, because the accelerator pedal is damaged, the same value as for 70% depression of the accelerator pedal. That is provided that the idling sensor is correct and that the accelerator pedal is pressed down.

Increasing the acceleration from 0% to 70% takes approximately 1 second.

The reason that 70% has been chosen is to ensure that the max. torque of the engine can be obtained.
When the accelerator pedal is released, the acceleration returns to 0%.

Note: Note that with the control unit in the emergency position (70% acceleration), the unloaded engine will reach approx. 1900 rpm when the accelerator pedal is pressed down.

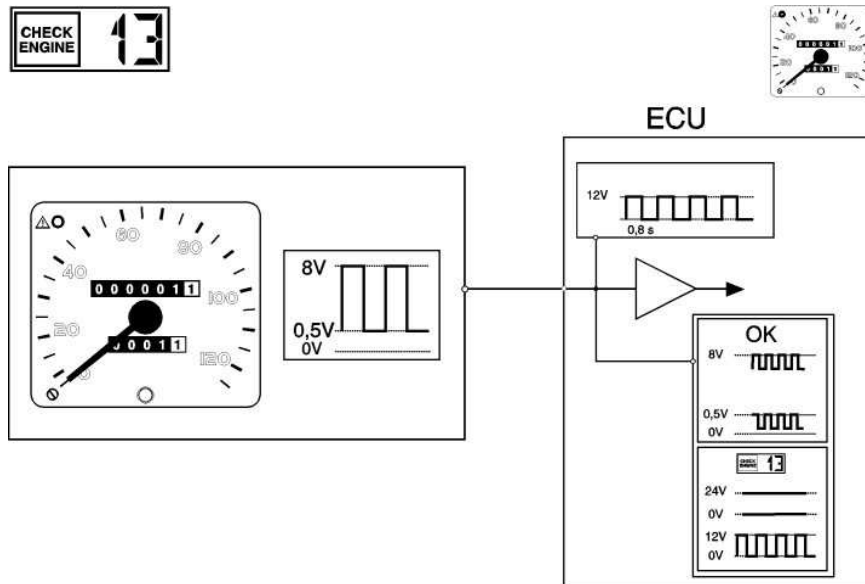


Fuel	
------	--

The diagram shows the accelerator pedal graph for control units from and including part number 8148335. The control unit was introduced during the Fall of 1994.

As can be seen from the diagram, the limit line for max. engine speed has been moved down to 1600 rpm when the control unit uses emergency regulation. The previously used 70% line is no longer used, and the control unit will attempt to give 100%, but will of course be stopped by the new max. engine speed limit.

Fault code 13 - Speed signal



The control unit can control the tachograph's speed signal in two different ways:

- Voltage level control
- Frequency control

Note: Even if the fault code has been set, the control unit will continuously check the speed signal. If the signal returns to normal, the control unit will use it again.

Voltage level control

The tachograph sends a signal to the control unit. The signal is in the form of a square wave (a pulse train), with a high level of approx. 8 volts and a low level of approx. 0.5 volts.

When the vehicle is stationary, the signal is either high or low depending on what the sensor position is on the cog wheel on the transmission's output axle.

At rest, the control unit begins to diagnose the voltage levels of the speed signal.

During this diagnosis the control unit can evaluate whether there is a break or shortcircuit to earth or B+.

The diagnosis provides two alternatives:

Alt. 1. Faultless signal

The signal varies around 8 volts or around 0.5 volts.

Regarding the form of the signal when measuring using an oscilloscope:

The intended speed's *normal* level; you will see a sample of the feed current of approx. 2 milliamps that the control unit injects into the cables.

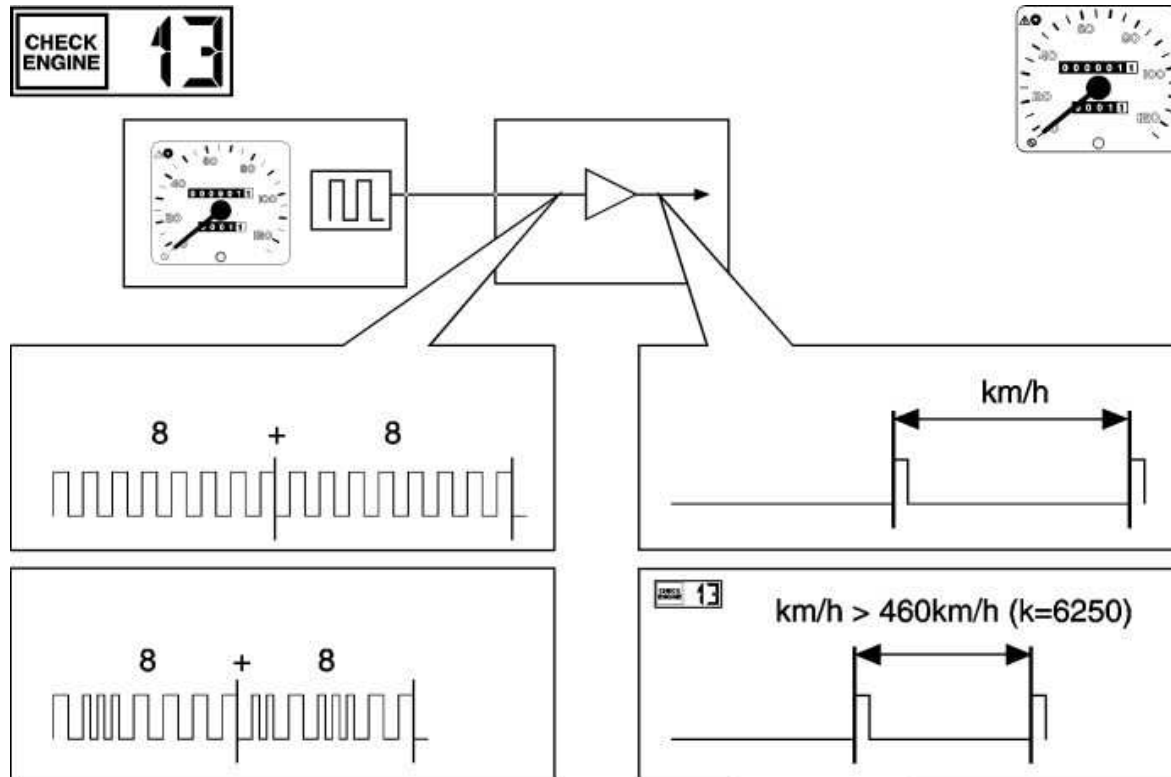
With a motometer tachograph this will be approx. 1.2 volts. The feed current is switched on for 400 millisecs every 800 millisecs.

This means that a superimposed square wave will be seen on the tachograph signal.

Alt. 2. Fault code 13

- The signal's voltage level is 24 volts.
Indicates a short circuit to B+.
- The signal's voltage level is 0 volt.
Indicates a short circuit to earth.
- The signal is identical to the feeder circuit's signal.
Indicates an open circuit.

Frequency check



The tachograph's speed signal is first used after it has been divided by 8, which means a safe filtration of the signal. If signal interference, in the form of one or two voltage spikes should occur, the calculated speed value will not be affected to any great degree.

In order to set fault code **13**, the speed must exceed 460km/h with a K factor of 6250, or exceed 230 km/h with a K factor of 12500.

Note: Even if the fault code has been set, the control unit will continuously check the speed signal. If the signal returns to normal, the control unit will use it again.

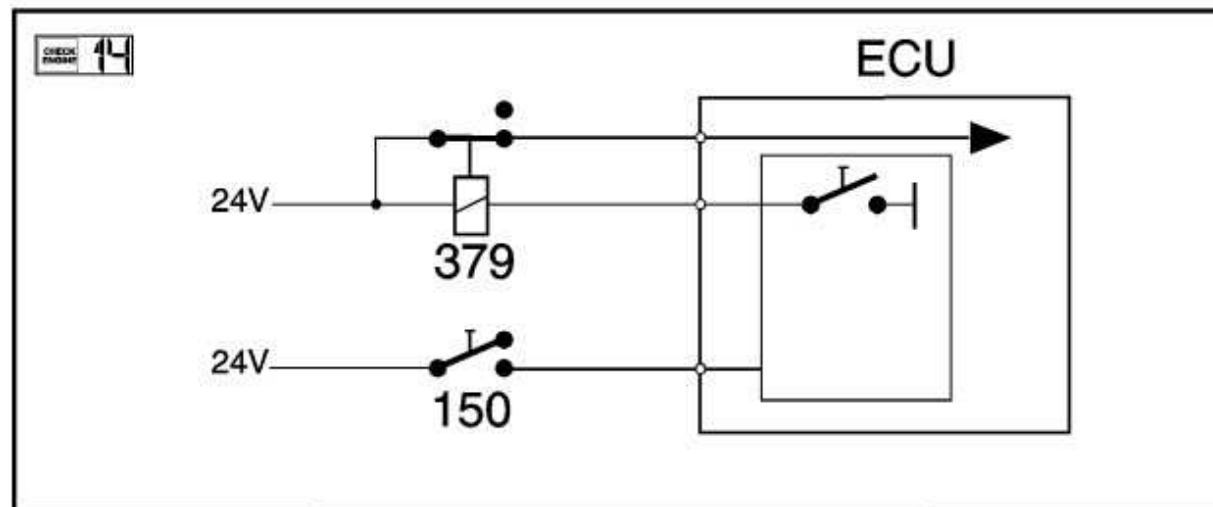
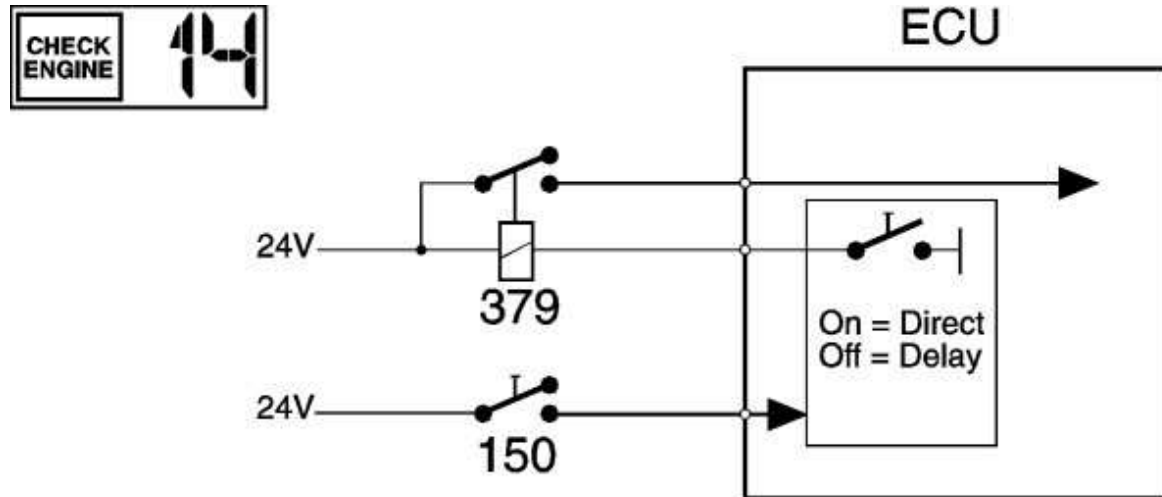
Comments to error code 13, Speed signal

Since the speed signal is obtained from the tachograph's *buffered* output, there could be a fault in the tachograph. A correct speedometer is **no guarantee** that the control unit receives the correct input signal.

If the speedometer does not give a reading, thecruise control should not function either.

Note: Make sure that the tachographsheets are not inserted wrongly!

Fault code 14 - Feeder relay, control unit



ECU (Electronic Control Unit).....

On = Direct.....

Off = Delay.....

When the starting key (150) is turned to the drive position the control unit earths the main feeder relay (379) in order to activate the current for the control unit. This occurs without delay.

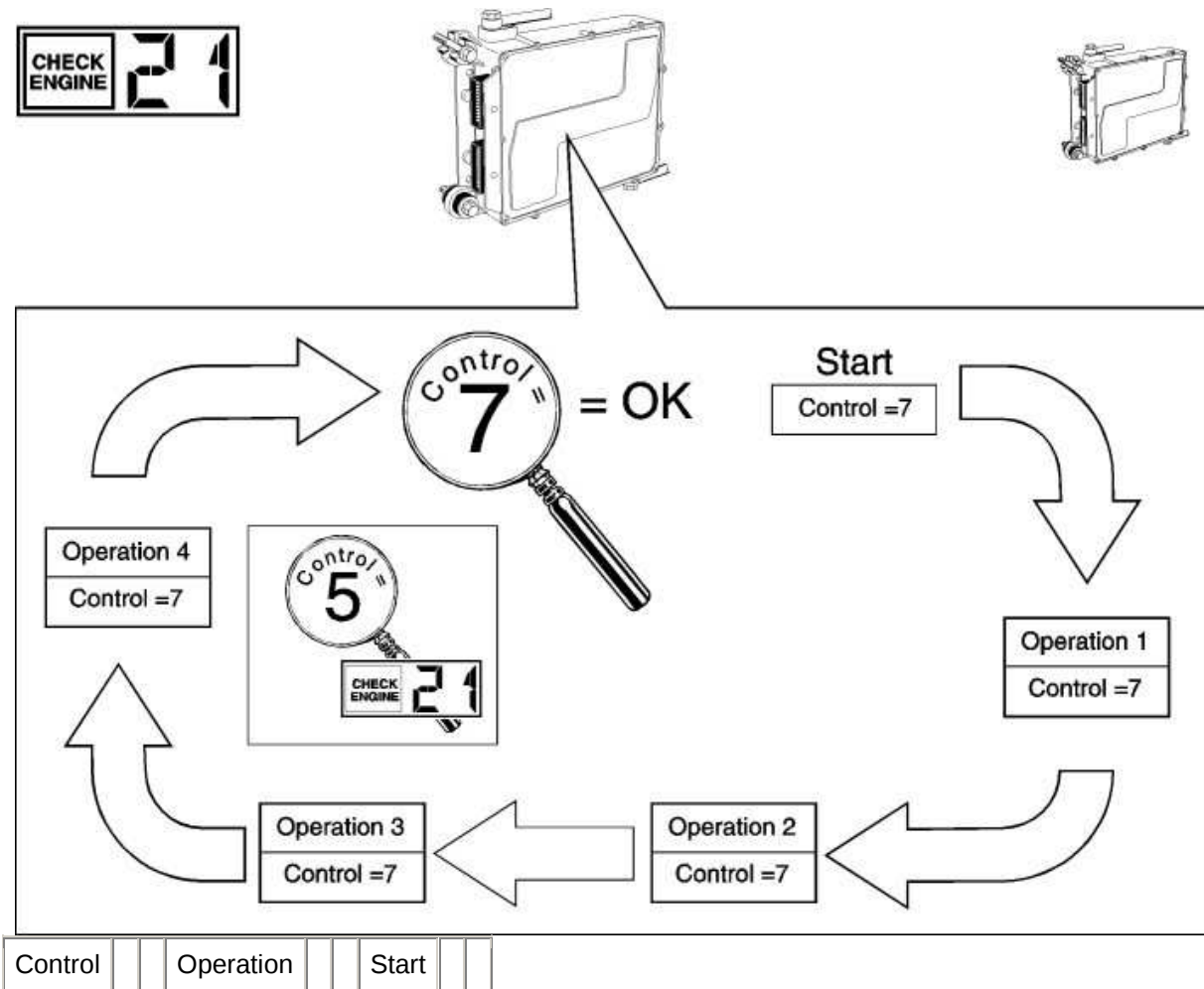
When the starting key is turned to the off position, the earthing circuit for the feeder relay in the control unit will break the earthing circuit for the main feeder relay, but with a short delay.

The delay is provided so that the control unit has time to carry out certain operations before it is switched off.

Fault code **14** is set if the control unit receives voltage from the main feeder relay even although the voltage from the ignition lock ceases. The engine will stop in spite of this, but the active code cannot be seen.

This can occur if the main feeder relay has *jammed* and cannot return to the rest position, or if there is a short circuit in the wiring between the relay and the control unit.

Fault code 21 - Control unit, internal fault



In the control unit's program, there are a number of different control functions that supervise the program's function. This can, for example, function in such a way that a control number is passed through the various program operations. When all the operations have been gone through, the number is checked. If the number has not been changed everything is in order.

If the number has been changed on its way through the program there is a fault in either the hardware or the software and the program operation is stopped.

The control unit tries to re-set itself and automatically re-starts the program operation.

Important: This is a serious fault and if fault code 21 is set the control unit must be replaced.

Fault code 22 - Control unit, programming fault



010101001001001010101010	= 10
011010011010010110100101	= 12
000001010011010011010010	= 9
010010111001101001011010	= 12
010000011111101001101001	= 12
010011011011011011111001	= 15
001001101101001011010010	= 11
	81

81 = OK

80 =

A numerical check is carried out when, for example, the VSP program is used to change certain customer parameters. This is a quick and simple way for the control unit to test if any number in the number programmed is incorrect.

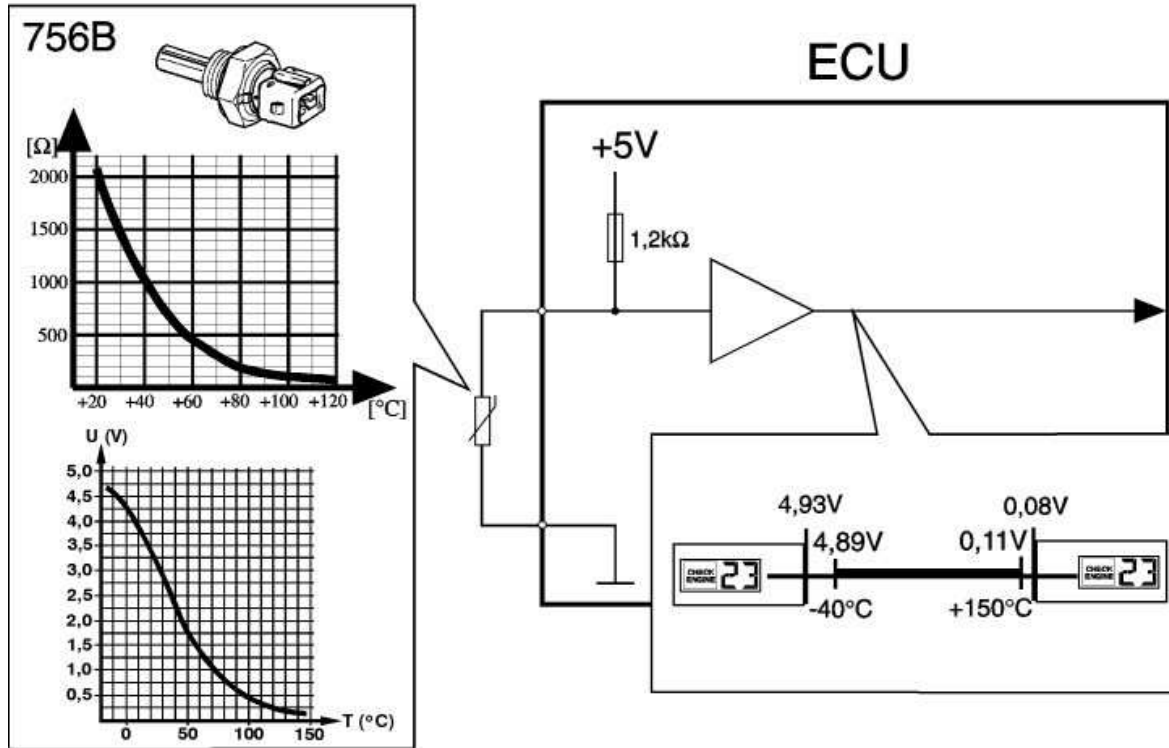
The example in the diagram shows the counting of the number 1, in each row is added together. Each row's sum is then totalled to make up a check sum, in this case 81.

This checksum is compared with the previously calculated checksum. If any figure in the programmed number is incorrect, this will be shown by the checksum for the programmed numbers not agreeing with the calculated checksum.

If the fault appears in the VPS programming, the reason for this may be a problem in communication between the PC and the control unit. Check the connections and try again.

Important: If fault code 22 is set without any programming being carried out, the fault is serious and the control unit must be replaced.

Fault code 23 - Temperature sensor, coolant fluid



The check of the sensor for the coolant fluid temperature is carried out to see if its values are outside its normal working range. If this is the case, fault code **23** will be set.

The normal working range for the sensor is between -40°C and $+150^{\circ}\text{C}$. The diagram shows what voltages fault code **23** sets.

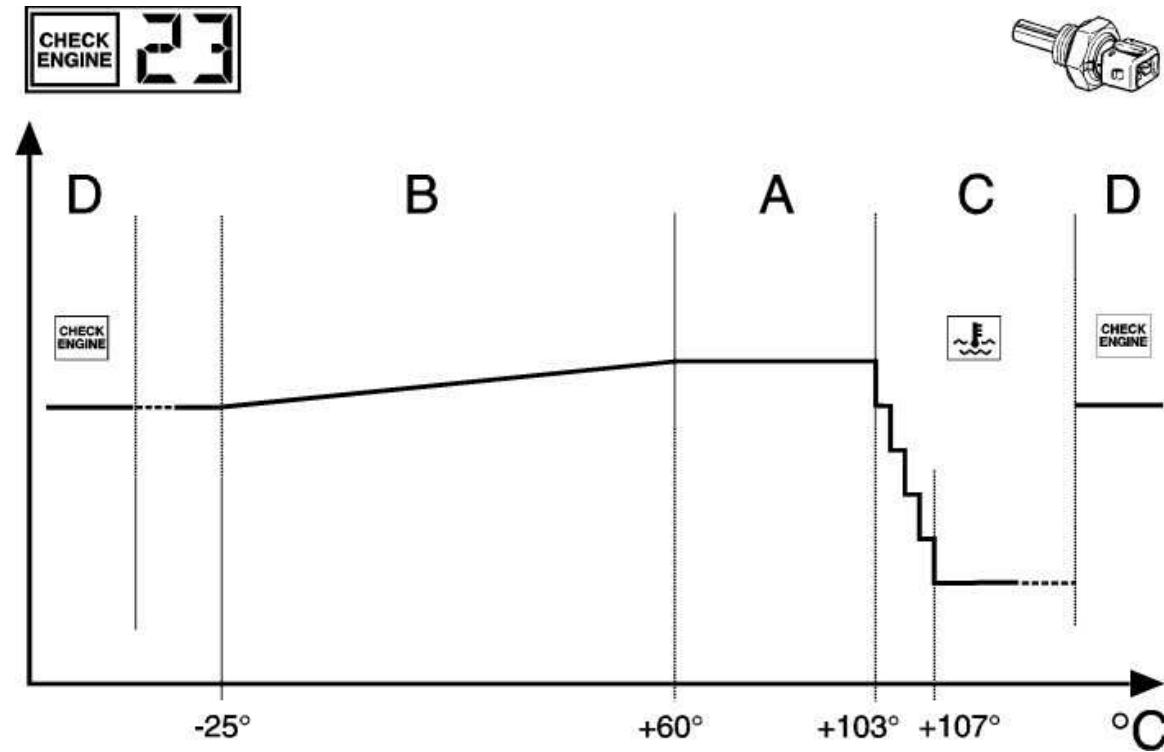
Note: Even if the fault code has been set, the control unit will continuously check the sensor's signal. If the signal returns to normal, the control unit uses it again.

Note: The engine has two sensors for coolant fluid temperatures.

Sensor (756B) which provides signals to the control unit is mounted on the left side of the cylinder head.

Sensor (756) for the temperature indicator on the instrument panel is located on the thermostat housing. Its only task is to provide signals for the temperature indicator.

The effect of the coolant fluid temperature



The coolant fluid temperature can, in some cases, affect the amount of fuel injected. In the diagram, four different cases are shown.

Normal temperatures.

A

For normal temperature no change occurs to the amount of fuel.

Low temperatures.

- B For very low temperatures a certain reduction of the amount of fuel occurs. The reduction is done to compensate for the cold fuel's higher energy content per unit volume.

High temperatures.

For temperatures over +103°C two things will happen:

1. The warning lamp for high coolant fluid temperature is activated.

- C *Note: The warning is only found on FH trucks since the lamp is controlled by the temperature sensor 756B via the control unit. On FL trucks the warning lamp is connected to the 756 temperature sensor and is not connected via the control unit.*

2. The control unit reduces the amount of fuel injected. This takes place step by step, until at +107°C it reaches its minimum of approx. 50%. This reduction is to protect the engine from overheating. This is saved as a fault code in the control unit but can only be read using a PC.

Unreasonable temperatures

- D If the temperature sensor gives values that lie well outside the normal working temperature fault code **23** will be set, at the same time the control unit will reduce the amount of fuel by approx. 10%.

Comments to fault code 23

Note that FL trucks do not have controls for the warning lamp for high coolant fluid temperature!

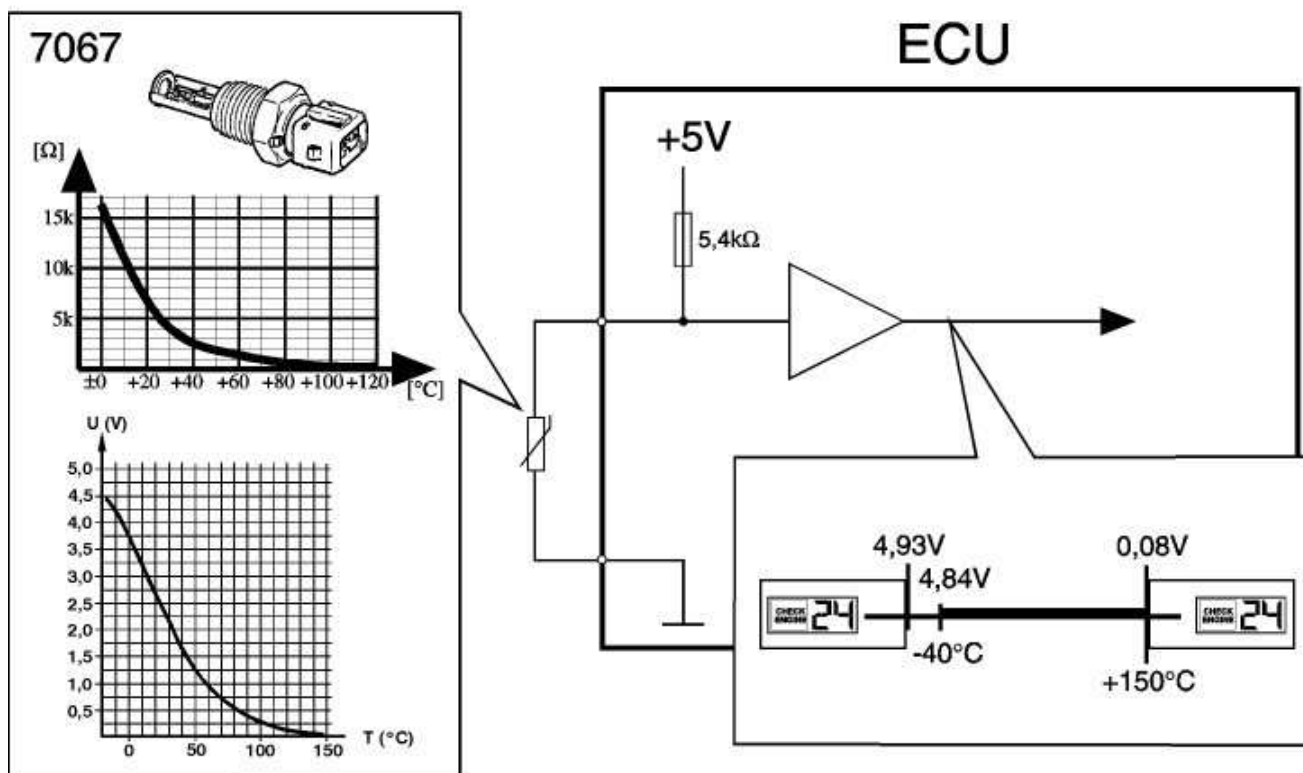
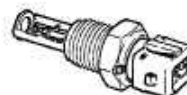
The lamp is not synchronised with the reduction of the amount of fuel via the control unit, which means that the engine can reduce the amount of fuel to approx. 50% without obtaining any indication.

Below is a list of examples that can cause high coolant fluid temperatures without a fault code:

- Incorrect sensor (but which still lies within the normal working range).
- Low coolant fluid level.
- Impure coolant fluid.
- Outer or inner blockage of the coolant system.
- Thermostat fault (or wrong thermostat).

- Insufficient fan capacity (damaged or incorrect fan).
- Fault in the coolant fluid pump.

Fault code 24 - Temperature sensor, charge air



Check of the sensor for charge air temperature is carried out to see if its values lie outside its normal working range. If this is the case, faultcode **24** will be set.

The normal working range for the sensor is between -40°C and +150°C. The diagram shows at what voltages fault code **24** is set.

Note: Even if the fault code has been set, the control unit will continuously check the sensor signal. If the signal returns to normal, the control unit will use it again.

Comments to fault code 24

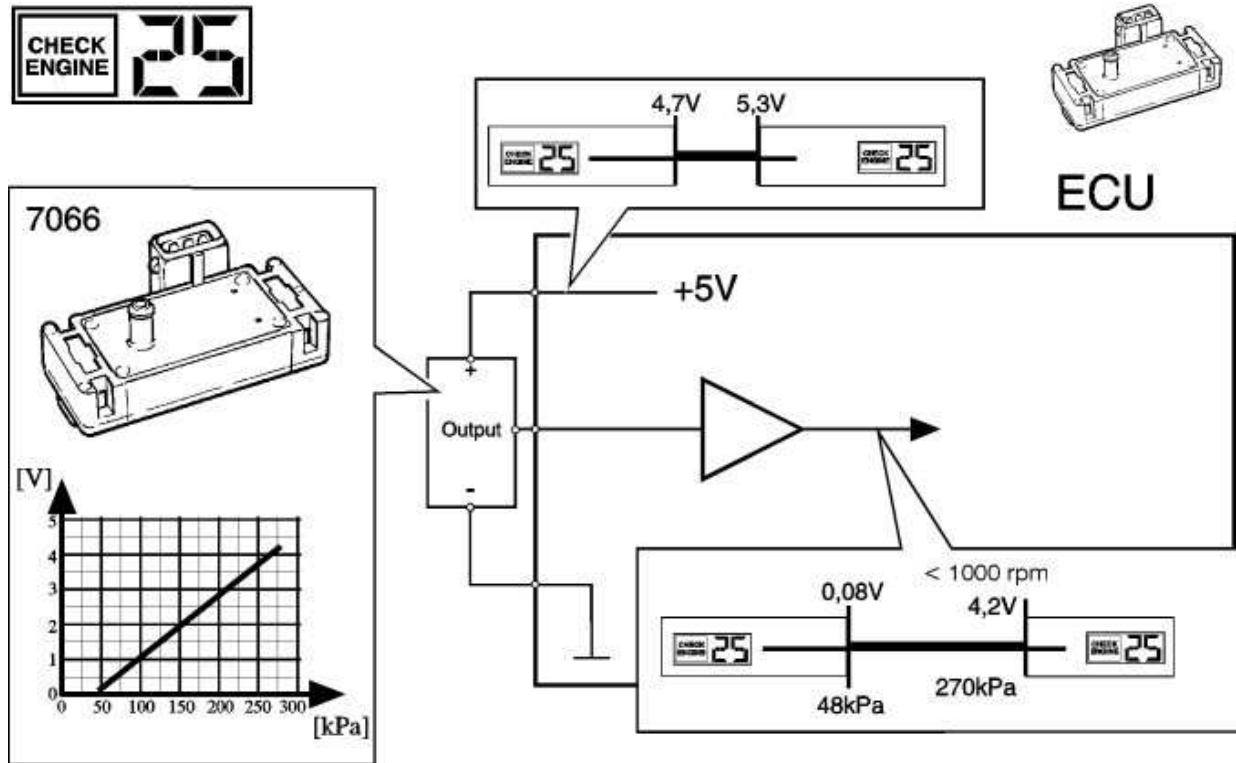
Note that the CHECK ENGINE lamp does not light up at 91°C, as is incorrectly stated in the Service Information Engine Control System D12A.

Charge air temperatures under +150°C do not produce any indication, even if it is abnormally high.

Below is a list of examples of causes that can give high charge air temperatures:

- Blocked charge air cooler.
- Jamming AT regulator.
- Exhaust gas pressure too high when braking using engine.

Fault code 25 - Pressure sensor, charge air



The control unit can check the charge air pressuresensor's signal in two different ways:

- Signal voltage check
- feeder signal check

*Note: If fault code **25** is set, the engine output will be reduced by approx. 40%.*

Even if the fault code has been set, the control unit will continuously check the sensor signal. If the signal returns to normal, the control unit will use it again.

Signal voltage check

Check of the sensor's signal is carried out to see if its values lie outside its normal working range. If this is the case, fault code **25** will be set.

The normal working range for the sensor is between 48 kPa and 270 kPa. The diagram shows at what voltages fault code **25** is set.

The control unit carries out this check provided that the engine speed is under 1000 rpm.

Feeder voltage check

The control unit can even check the feeder voltage to the charge air pressure sensor. If the voltage lies outside the limiting values as shown in the diagram, fault code **25** is set.

Comments to fault code 25

With the exception of purely electrical faults, problems without fault codes could be:

- Corrosion in the wiring connections to the sensor.
- Component faults that can not be identified by any other method than by comparison with current, reasonable values.
- Defective output signal from the pressure sensor, (but which still lies within the normal working range).
The output signal from the sensor produces too low a value at higher charge air pressures.

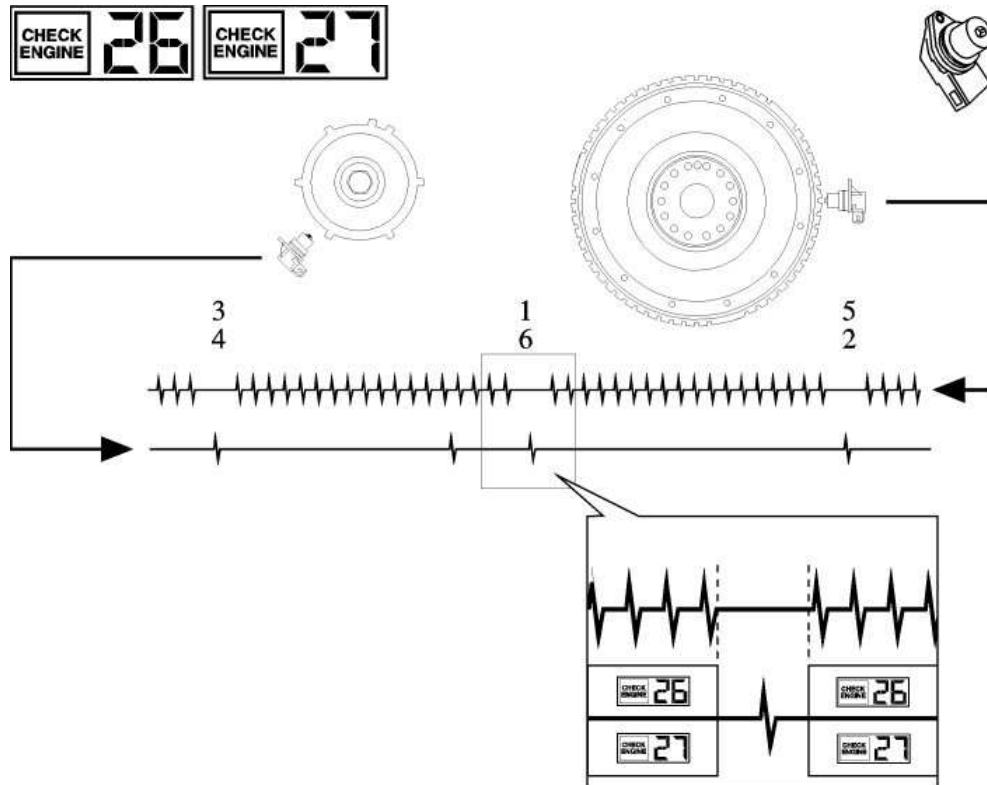
Fault code 26 - Cam axle sensor

The control unit can check the cam axle sensor's signal in three different ways:

- Synchronisation
- Signal strength
- Frequency interference

When fault code **26** is set, the control unit tries to use the cam axle sensor's signal four times. If this does not succeed, the control unit will not use or check the signal until after the next time the engine is started.

Synchronisation



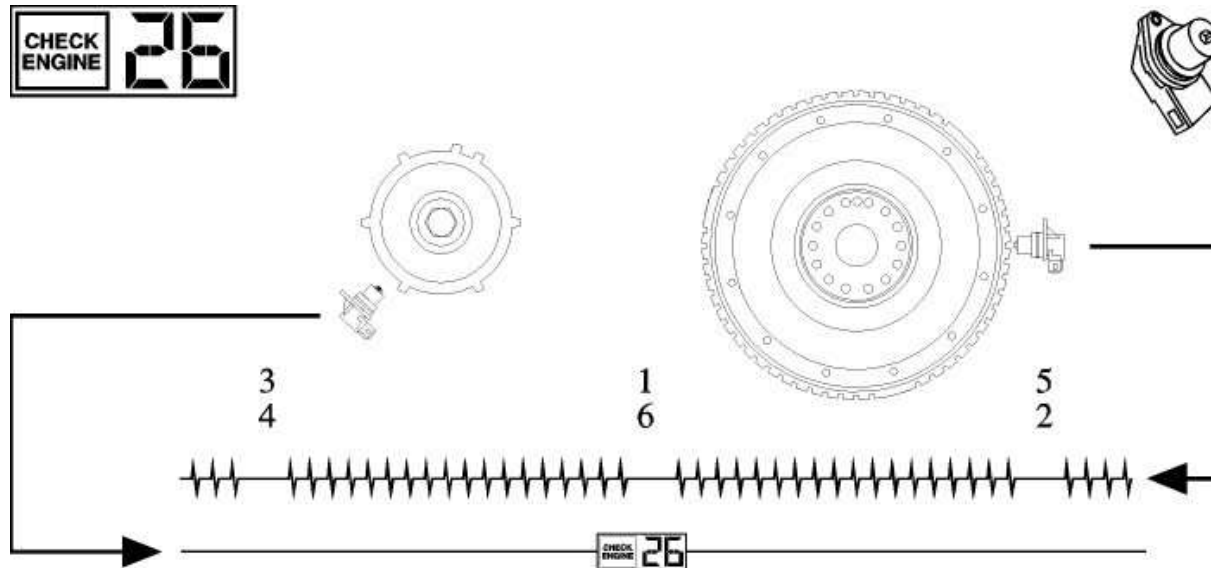
The control unit checks that the synchronisation pulses which represent the six cylinders are always within the *window* that is created by the sensor signal from the flywheel's teeth.

If a cam axle signal lies outside the *window*, Fault Codes **26** and **27** are set.

Both fault code **26** for the cam axle sensor's signal and fault code **27** for the flywheel sensor's signal are set since the control unit cannot determine with certainty which of the signals are unsynchronised.

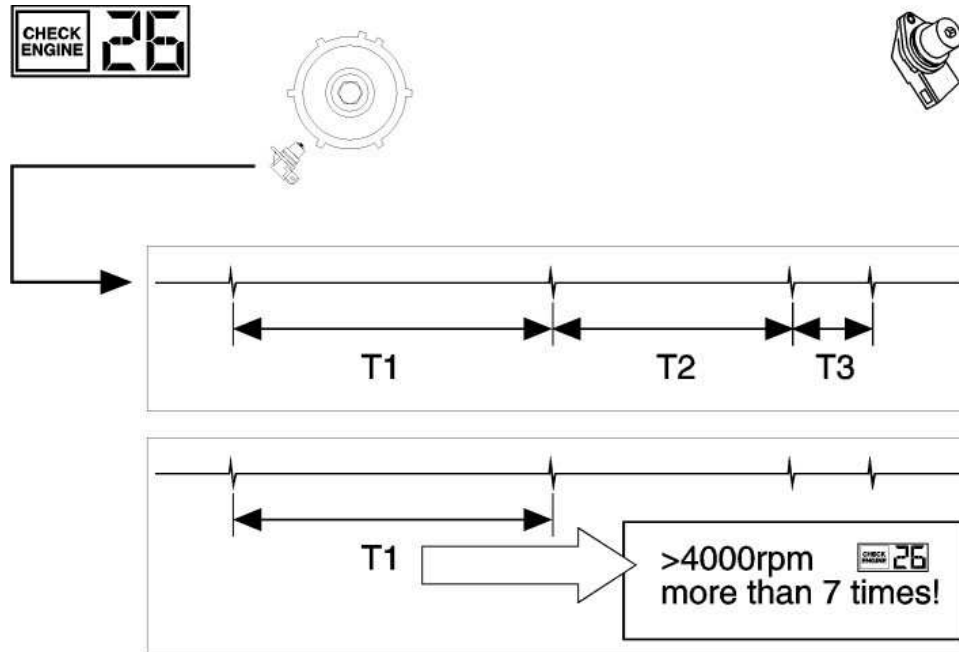
In order to prevent the identification pulse for cylinder 1 being interpreted as a synchronisation fault, any possible synchronisation fault must occur more than 12 times in a row before fault codes **26** and **27** are set.

Signal strength



If the signal from the cam axle sensor is omitted, fault code **26** is set.

High frequency interference



The control unit's check of high frequency interference is carried out by measuring the distance between the teeth of the cam axle's cog wheel.

T1 is the distance between the teeth of two cylinders.

T2 is the distance between the tooth of one cylinder and the identification tooth for cylinder 1.

T3 is the distance between the identification tooth for cylinder 1 and an *ordinary* tooth for cylinder 1.

Distance **T1** is used to calculate the engine's speed.

(In normal operation, the flywheel sensor's signal is used as the engine speed signal, but the cam axle sensor's signal can be used as a reserve if the flywheel signal is omitted.)

If distance **T1** indicates that the engine speed is over 4000 rpm, fault code **26** is set.

Note that it requires at least 7 indications in a row before the fault code is set.

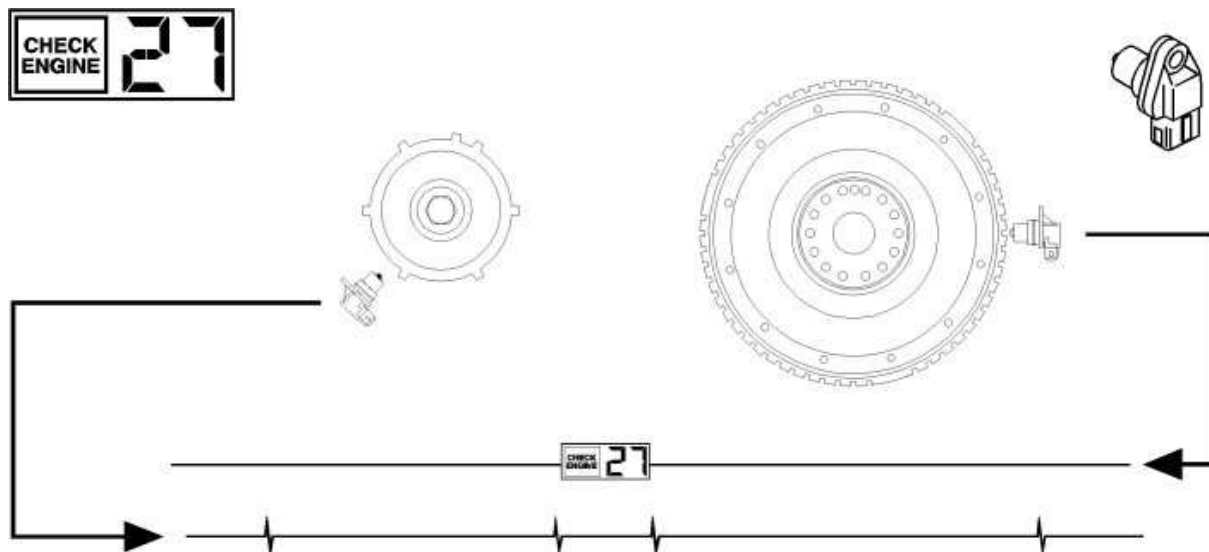
Comments to fault code 26

When Fault Codes **26** and **27** are set due to a synchronisation fault, this is probably caused by the cam axle sensor's signal is not within its *cog gap* of the flywheel signal or that the signal strength is too great or too weak.

Below is a list of some probable causes:

- Incorrectly adjusted distance between the cam axle sensor and the cam axle's cog wheel.
- Incorrectly adjusted distance between the flywheel sensor and the flywheel.
- Incorrectly adjusted intermediate drive in the engine's transmission.
- Incorrectly cogged cam axle.
- The cam axle's cog wheel has been fitted with *the hole play in the wrong direction*.
- Damage to the flywheel's periphery can in unfavourable cases produce signals that the control unit considers to be an extra tooth.

Fault code 27 - Flywheel sensor



The control unit can check the flywheel sensor's signal by measuring the signal's strength.

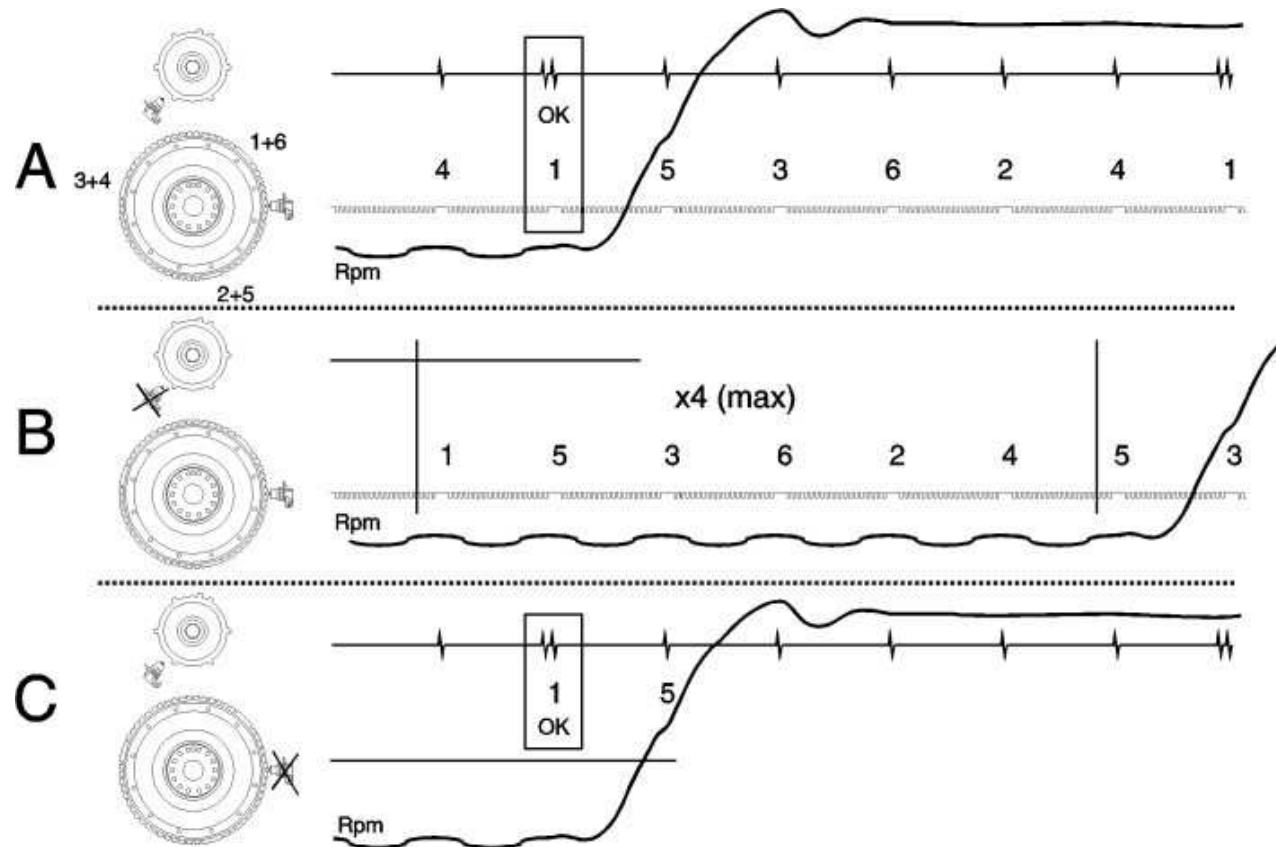
If the signal is omitted, fault code **27** is set.

When fault code **27** is set, the control unit tries to use the flywheel sensor's signal several times. If this does not succeed, the control unit will not use or check the signal until after the next time the engine is started.

The reason why fault code **26** is also set when the flywheel sensor's signal is interrupted or interfered with is that the control unit considers that the cam axle sensor's signal is unsynchronised, since the cam axle's synchronisation pulse comes before the pulses from all of the flywheel's 18 teeth have had time to pass.

See [Comments to fault code 26](#).

Starting the engine



The diagrams show the various course of events when the engine is started.

Normal start

- A Both the cam axle's and the flywheel's sensors function and give correct signals.
The start cycle takes place as in Diagram A.
The starter motor rotates the crankshaft until the control unit identifies cylinder 1.
Fuel injection occurs and the engine starts.

Start without signal from the cam axle sensor

When the control unit notices that the cam axle sensor's signal is missing, it tries to start the engine without the sensor signal.

- B The control unit *guesses* the injection sequence and at the same time as fuel injection takes place it checks to see if the engine speed increases.
The engine will use the same injection sequence for a maximum of 8 revolutions of the engine. If the engine speed is unchanged *the guess* was wrong and the control unit tries again with a new injection sequence.
After a number of guesses, the control unit finds the right sequence and the engine starts.

Start without signal from the flywheel sensor

- C When the control unit notices that the flywheel sensor's signal is missing, it tries to start the engine without the sensor signal.
The fuel injection will be checked via the cam axle sensor's signal.
The injection timing is not as precise as is normally the case.

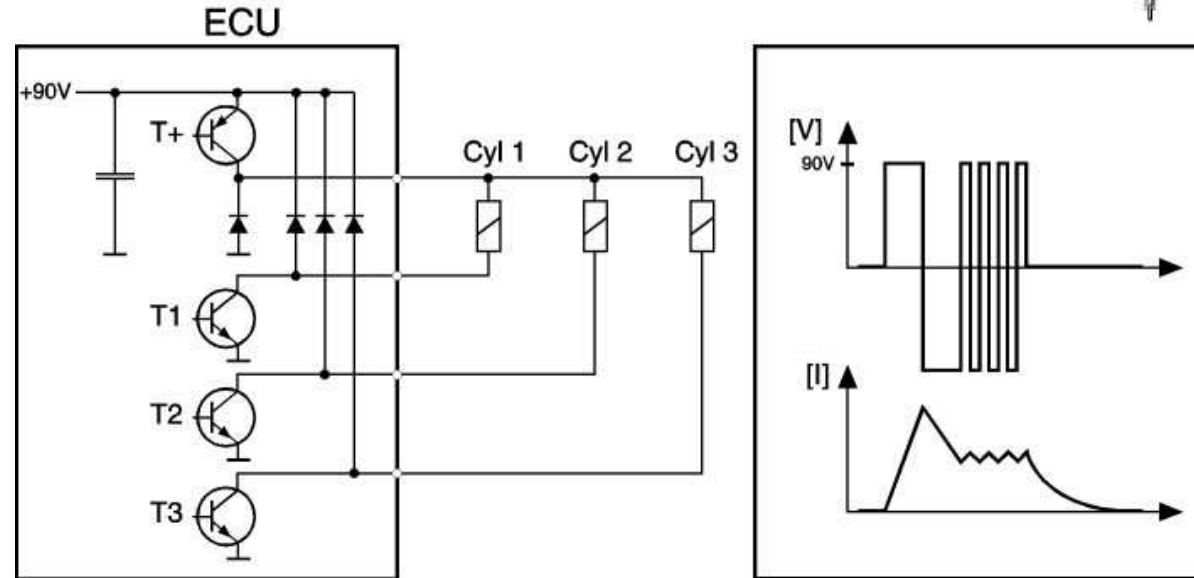
*Note: The control unit will, for alternatives **B** and **C** once again try to regulate the engine as in alternative **A**, in certain cases this can seem as if the engine misfires.*

Fault code 31-36 Injection unit

The control unit can check the injection unit in two different ways:

- Electronic check
- Cylinder balancing

Electronic check



ECU (Electronic Control Unit).....

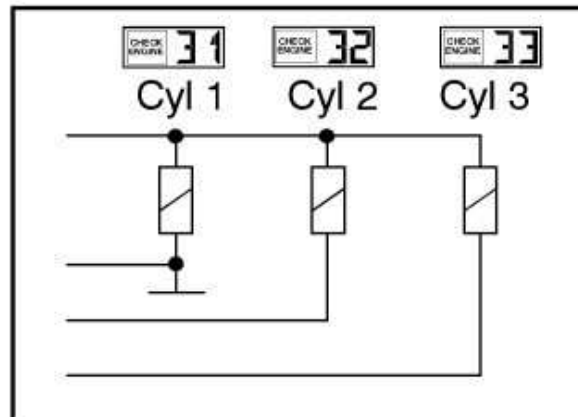
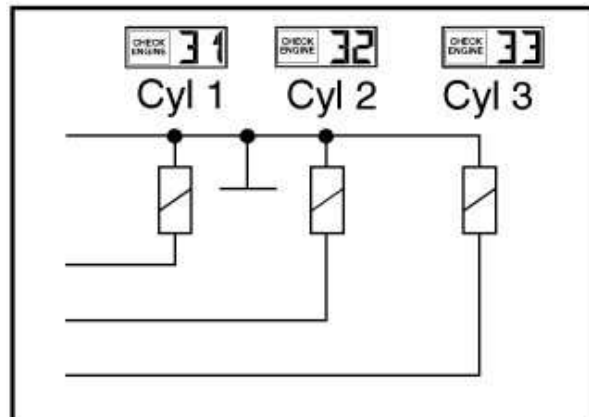
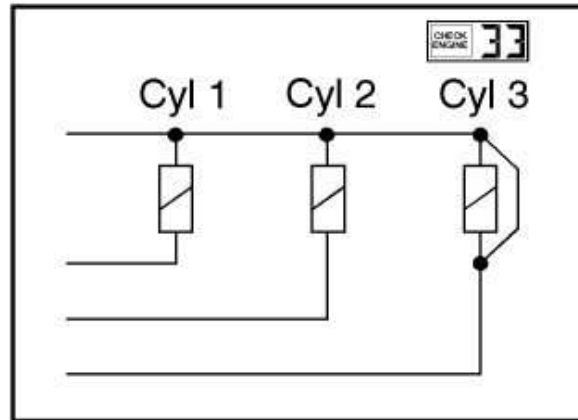
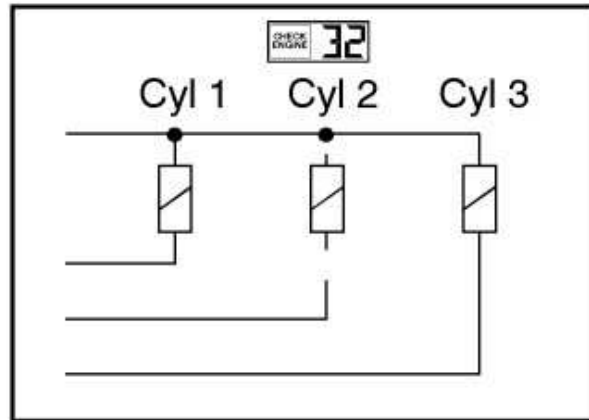
Cyl.....

= Cylinder

The control unit checks the injection unit with the help of eight transistors. Two transistors check the feeder voltage each for a group of three injection units. Six transistors are responsible for the earthing connection of each respective injection unit. The left diagram shows the circuit diagram for the first three cylinders.

When the control unit activates the injection unit's fuel valve on cylinder 1, T+ and T1 are activated at the same time and the circuit is then connected to earth via T1. The upper graph in the right hand diagram shows the voltage and the lower graph, the strength of current through the fuel valve coil.

The variation in voltage to -90 volts is due to self induction in the fuel valve's coil. At -90 volts, the diodes will limit the voltage by returning current to T+.



The control unit can measure the injection units current consumption while in operation and thereby see if any fuel valve or wiring circuit has an electrical fault. This check can only be carried out with the engine running.

Example 1 Upper left diagram

(Current consumption too low)

For an interruption in any of the fuel valves the control unit will set the fault code for the cylinder. In this case, fault code **32**. The control unit will not try to use cylinder 2 when the fault code has been set.

The other two cylinders in the same block will continue to work normally.

Example 2 Lower left diagram

(Current consumption too high)

If the feeder wiring to the three injection units in a block have been short-circuited to earth, the control unit will set fault codes on all three cylinders. In this case, fault codes **31**, **32** and **33**. The control unit will not try to use the cylinders when the fault codes have been set.

Example 3 Upper right diagram

(Current consumption too high)

For a short circuit in any of the fuel valves' coils the control unit will set the fault code for the cylinder.

In this case, fault code **33**. The control unit will not try to use cylinder 3 once the fault code has been set.

The other two cylinders in the same block will continue to work normally.

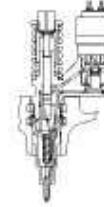
Example 4 Lower right diagram

(Current consumption too high)

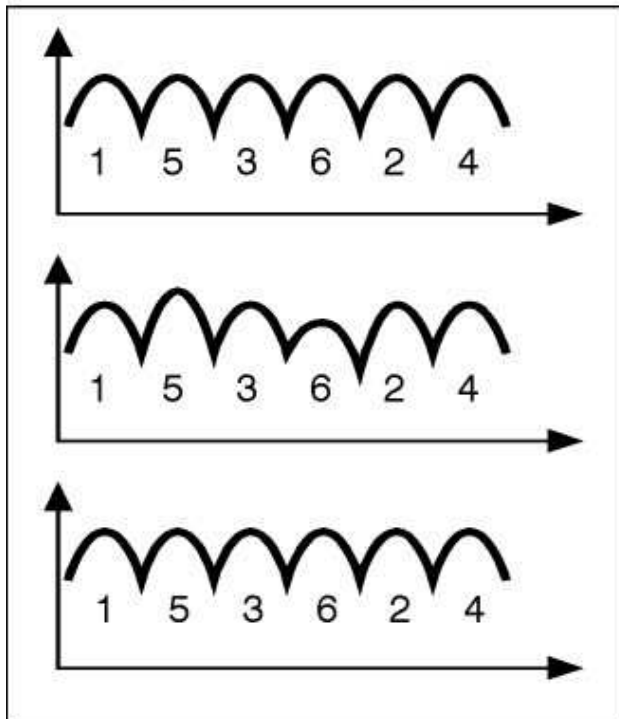
If any of the wiring to the earthing transistors (T1, T2, T3) are short-circuited to earth, the control unit will set fault codes on all three cylinders. In this case fault codes **31**, **32** and **33**. The control unit will not try to use the cylinders when the fault codes have been set.

When fault codes have been set, the control unit will not check the injection units until after the engine has been re-started.

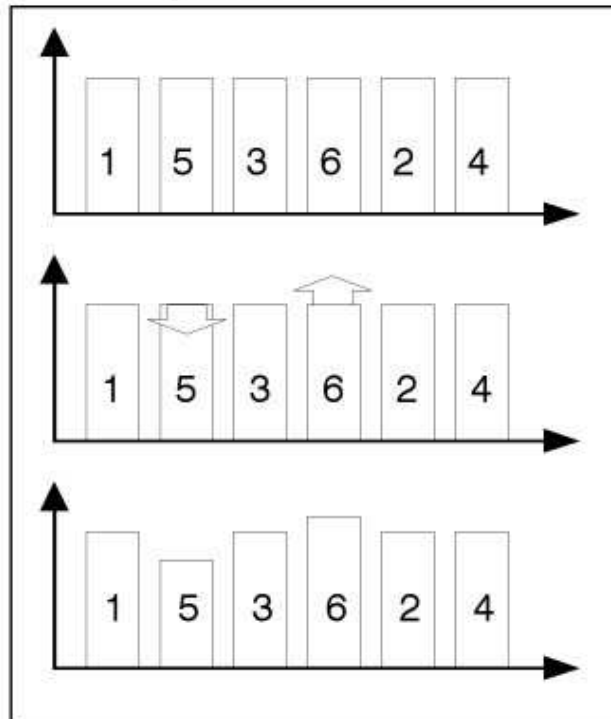
Cylinder balancing



Flywheel speed



Injection time



Flywheel speed

Injection time

Cylinder balancing is a method the control unit uses to give the engine a smooth idling speed.

In cylinder balancing the control unit measures the flywheel speed to see if all cylinders give the same acceleration to the flywheel.

If the acceleration is uneven the control unit will compensate each respective cylinder, either by increasing or decreasing the amount of fuel to the cylinder. **This is**

done by increasing or decreasing the length of time for the injection. By balancing the amount of fuel so that all the cylinders produce the same acceleration, a smooth and even idling speed is obtained.

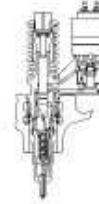
Cylinder balancing can only be carried out when the engine is at operational temperature and is running at idling speed.

When the engine speed is increased above idling speed, all of the cylinders are given the *unbalanced* fuel amount. When the engine returns to idling speed, the *balanced* fuel amount is injected.

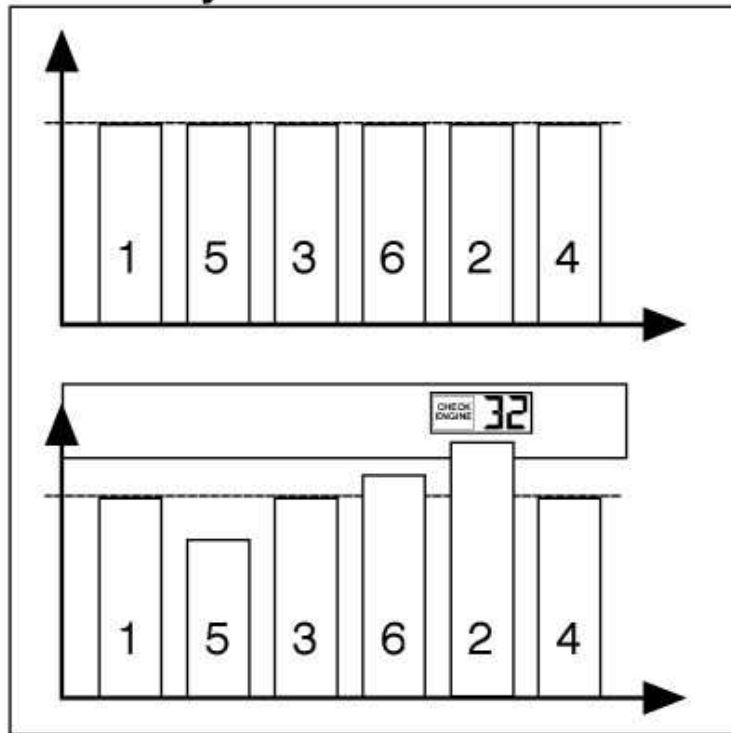
The values of the cylinder balancing are saved, but are adjusted each time the engine is at operational temperature and is running at idling speed.

Note the values of the cylinder balancing are set to zero when the control unit's fault codes are cleared.

A new cylinder balancing requires between 4 and 10 minutes running at idling speed with the engine at operational temperature.



Injection time



The amount of fuel for cylinder balancing has an upper limit.
When the fuel amount for any cylinder is no longer sufficient to compensate the cylinder the fault code is set.

In the lower staple diagram, cylinder 2 has reached its upper limit and fault code **32** is set.

*Note: Remember that it is the **injection time** that gives the values when balancing the cylinders.*

If all injection units are faultless, the time in relation to the fuel amount, is almost exactly the same for all six cylinders.

In this way the values of the cylinder balancing can give the impression that if a particular cylinder has a drop in output it can thus be compensated by a greater amount of fuel.

If, on the other hand, an injection unit has a mechanical fault or abnormal wear, which results in the time being longer than *normal* to give a certain amount of fuel, this indicates that it is the injection unit and not the cylinder that is compensated.

An injection unit can set fault codes for two reasons:

1. The injection unit cannot inject a sufficient amount of fuel.
2. The energy of the amount of fuel is not utilised in the cylinder.

Comments to fault codes 31 - 36

Fault Codes can be set both for electrical faults and when the upper compensation limit for the cylinder balancing for any cylinder has been exceeded.

In order to ascertain if a fault code has been set because of an electrical fault or by cylinder balancing, the fault code can be cleared and the engine started again.

Note: Always note current fault codes before they are cleared!

If the fault code is set once again within a few seconds, the fault is in all probability electrical since a fault code caused by cylinder balancing requires between 4 and 10 minutes to be set.

Note: Remember that a defective contact for example in a joint or connection to one of the injection unit's fuel valves can produce a fault code that does not occur right after starting.

The fault code is set when interference occurs and can therefore be misinterpreted as being set by cylinder balancing.

When fault codes are set by cylinder balancing, it means that a cylinder gives lower output than the others. The cause of the loss of output can never be obtained by reading the fault code.

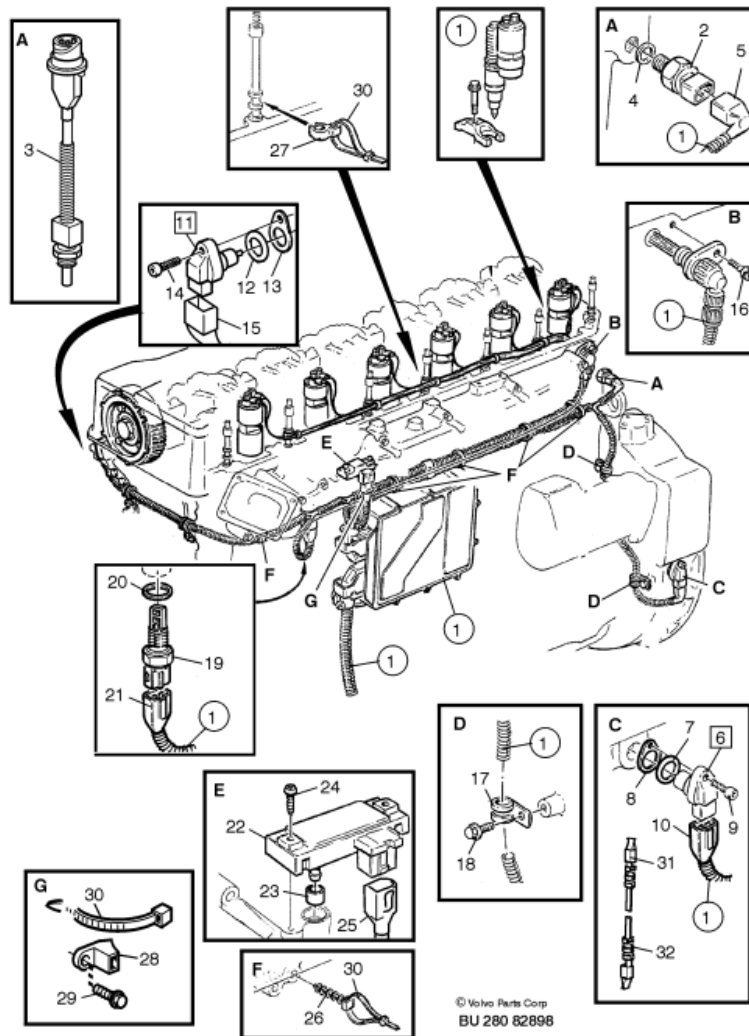
Below is a list of some possible causes:

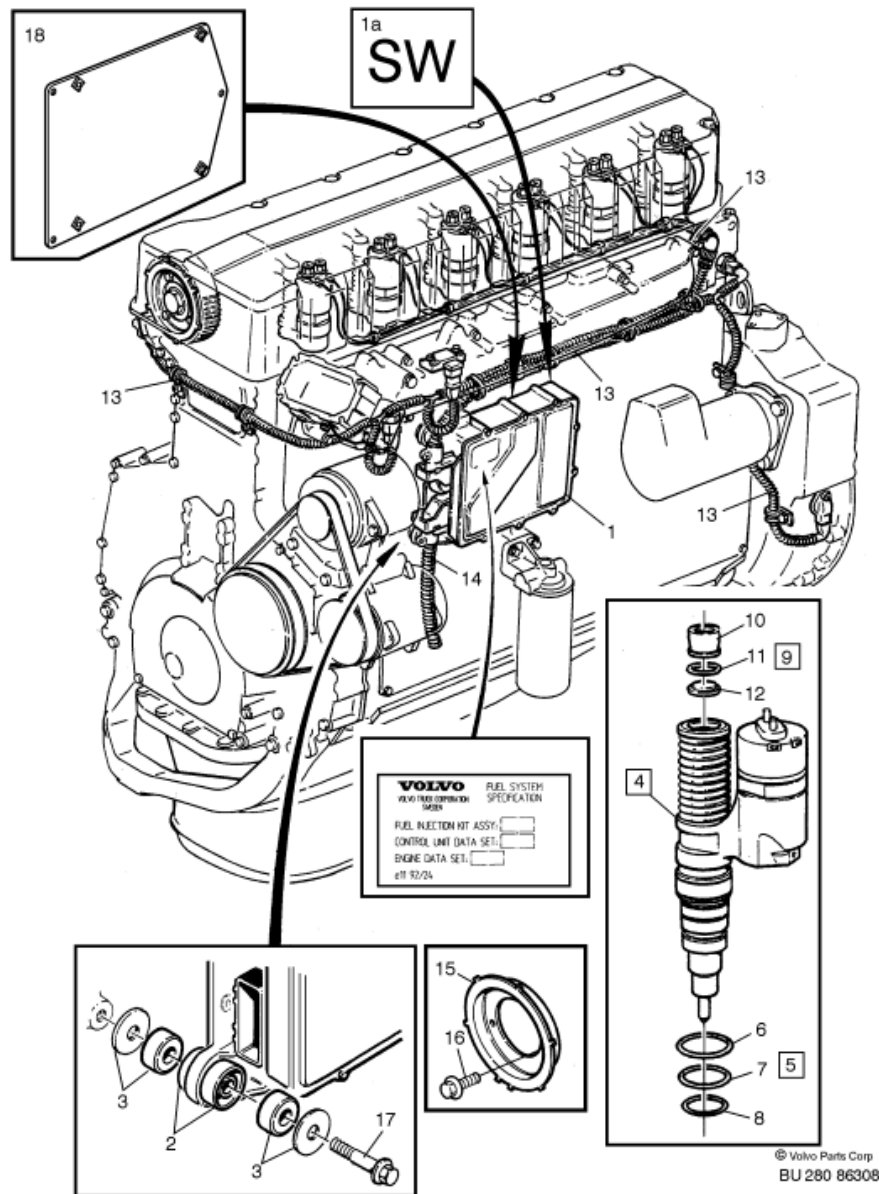
- Air in the fuel system.
- No or too little pre-voltage of the injection unit.
- Abnormal wear or damaged injection unit.

- Incorrectly adjusted and/or leaking valves.
- Damaged rocker arm for the VEB.
- Piston ring break.
- Slight cylinder seizure.
- Combustion gases enter into the cylinder head's fuel channel.

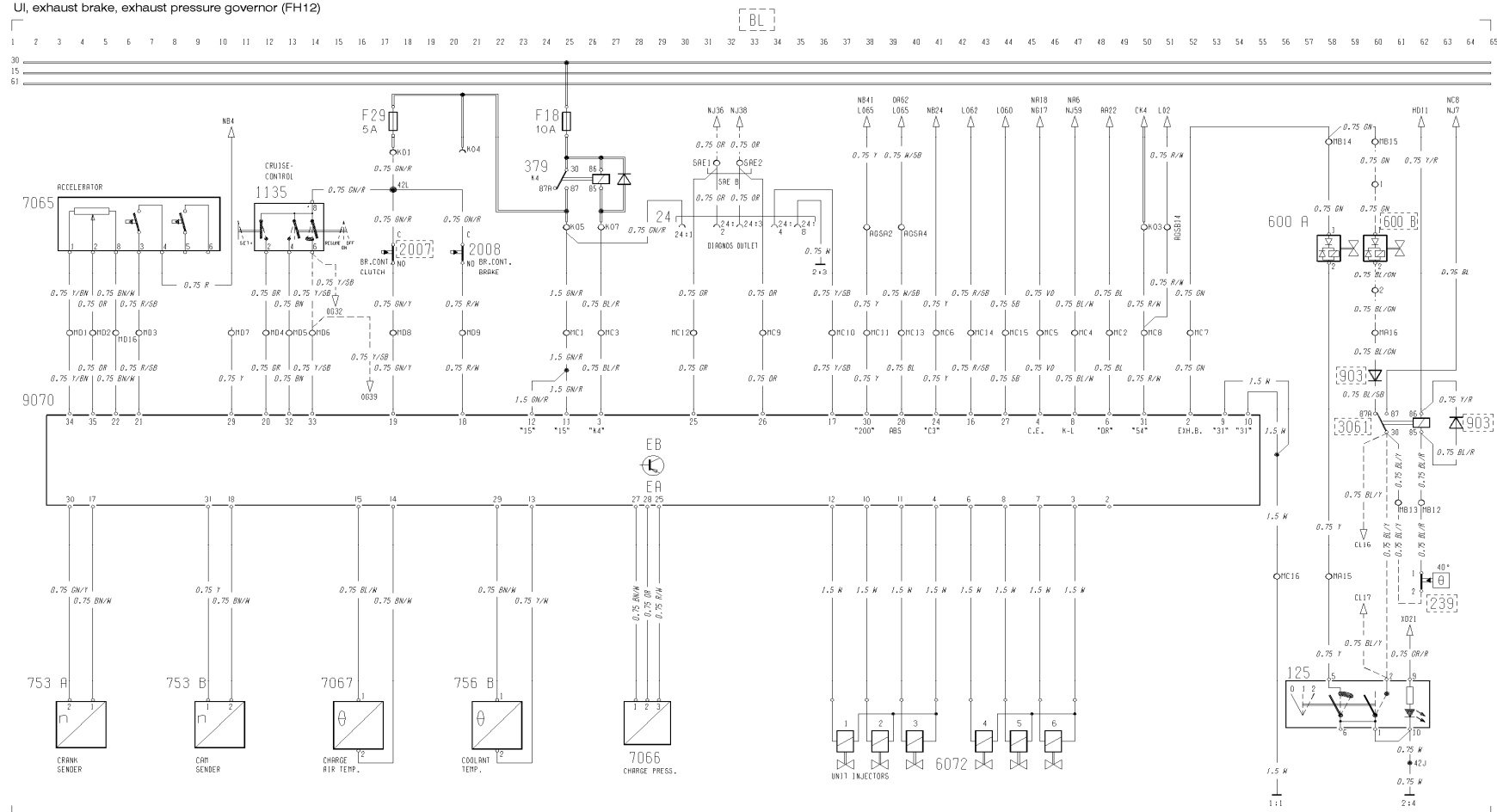
Damage to the flywheel can in certain cases cause fault codes **31- 36**. Damages could be damaged tooth gaps, in which the edges are not at an angle of 90° to the periphery.

Too great a play in the engine's transmission (incorrectly adjusted intermediate drive) may cause any of the fault codes **31-36** to be set.





UI, exhaust brake, exhaust pressure governor (FH12)



Система регулирования работы двигателя, D12A