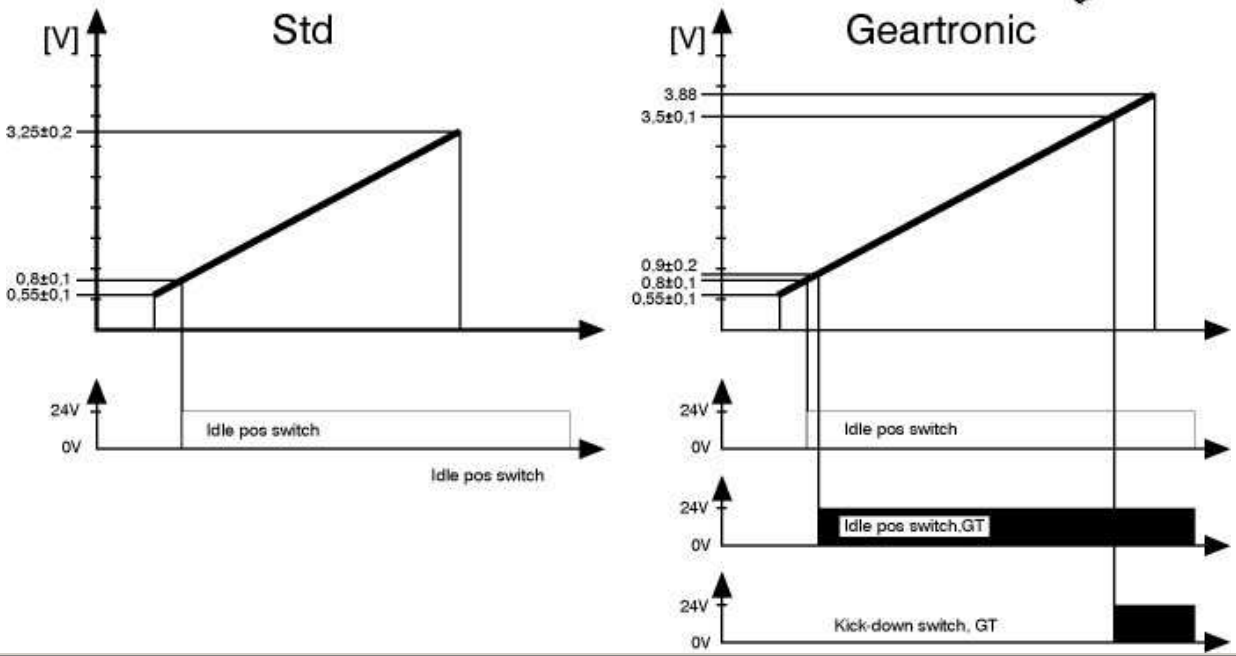
Fault Code 11 and 12 - Accelerator pedal sensor and idling contact



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

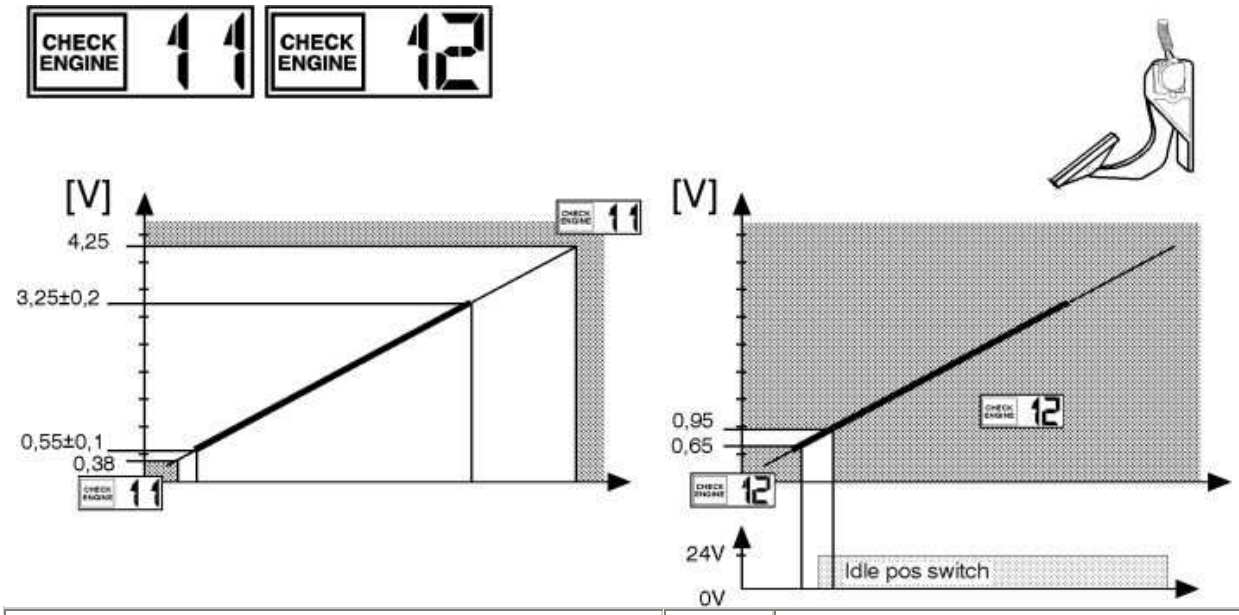
The diagram on the left shows the normal voltage rangeand the correct engagement position for the idling contact in a vehicle witha manual gearbox.

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

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

Comments on fault code 11, Accelerator pedal sensor

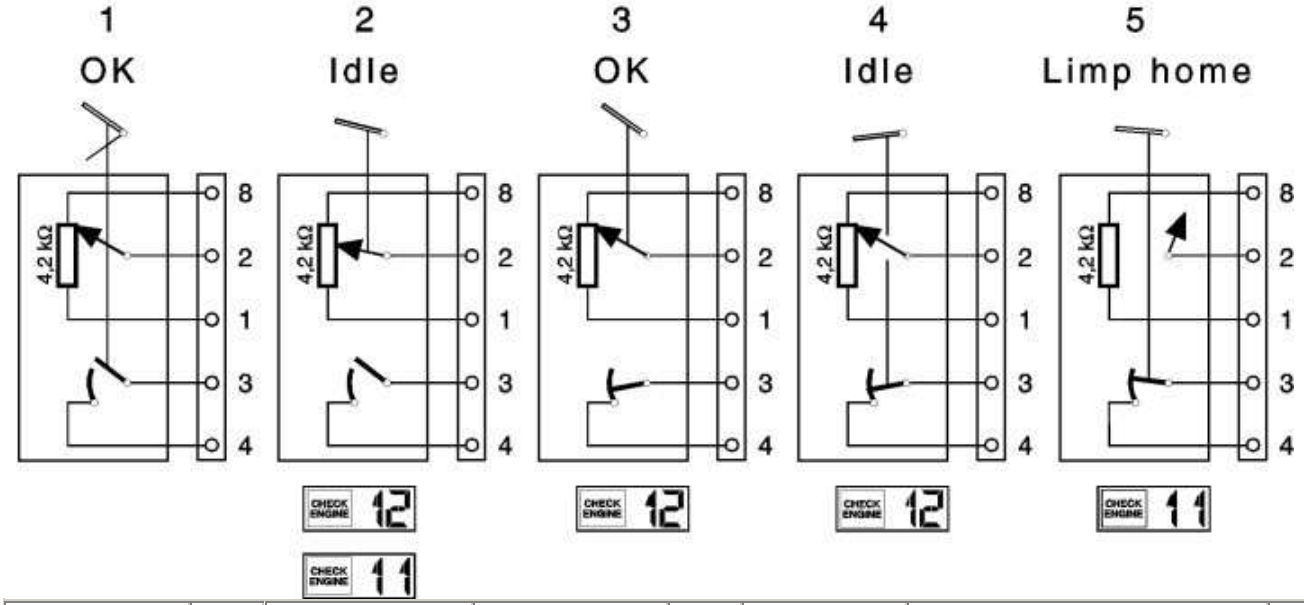
Note that the accelerator pedal controls other functionsthat may stop functioning even although the accelerator pedal does not producea fault code.
For example, the ATR and VEB functions, as well as the regulatingof the power output regulator are disturbed if the accelerator pedal doesnot return to its proper idling position. The ATR and VEB functions can thusnot work and the power output regulation can become unstable around idlingspeed.
When the accelerator pedal does not return to its idling position,the control unit regards this that the acceleration and engine are controlledvia the accelerator pedal diagram.



Idle pos switch.....	=	Idling contact, acceleratorpedal

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 whichthe idling contact will normally be activated.
If the contact is activatedin the *low range* or not activated in the *high range* fault code **12** will be produced.
If the fault code has been set, the controlunit 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 areset.

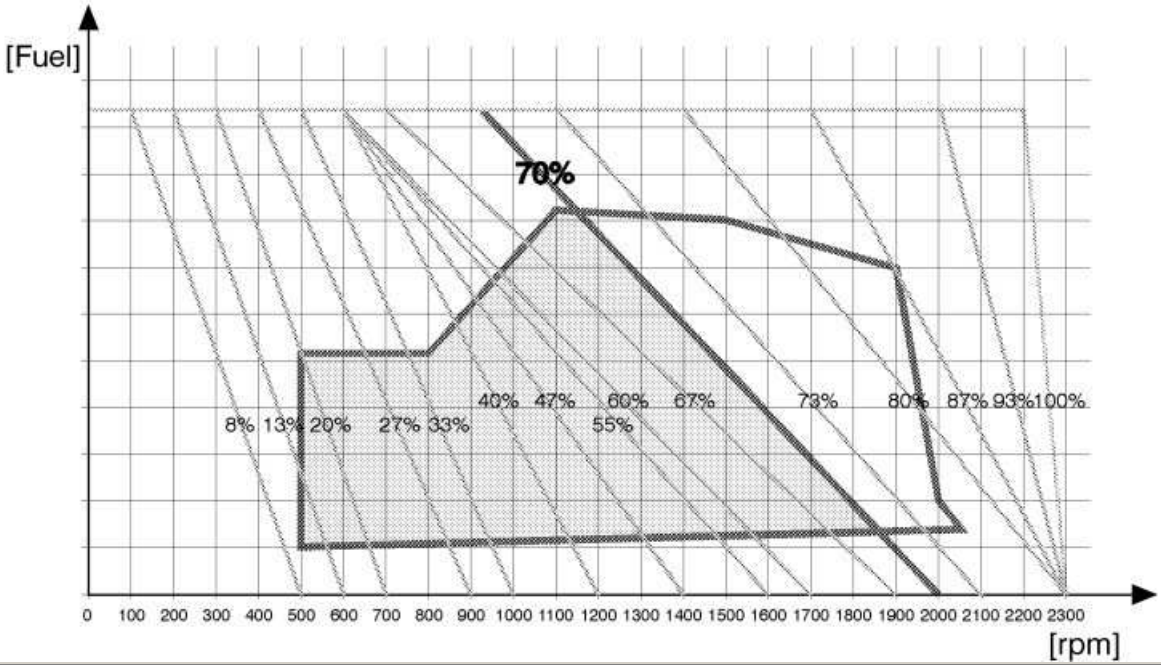
Diagram 1.
The accelerator pedal and the idling contact functionfaultlessly.
No fault code is set since the prerequisites have been metand the engine runs normally both when idling and when using the accelerator.

Diagram 2.
The diagram shows the situation when the idlingswitch is always open and indicates the idling position independently of theaccelerator pedal's position. The accelerator pedal functions properly andgives the correct value.
In this situation, where the idling switch andthe accelerator pedal's sensor gives different, the control unit always selectsthe *lowest* value. In this case, the control unit selects the informationfrom the idling switch, which means that the engine can only be run at idlingspeed.
Fault code **12** will be set since the idling switch missesits *window*.
Fault code **11** will also be set, since thecontrol unit can not determine with certainty if the idling switch or theaccelerator pedal's sensor is incorrect.

Diagram 3.
The diagram shows the situationwhere the idling switch is always closed. The engine runs normally, but thefault code **12** will be set since the idling switch misses its *window*.

Diagram 4.
This is the situation where the accelerator pedal'ssensor has stopped functioning and indicates the idling position independentlyof the pedal's position.
The idling switch gives the correct values, butas with the situation in 2, the control unit will select the *lowest*value, that is the value from the accelerator pedal's sensor.
The enginecan only be run at idling speed and fault code **12** is set, sincethe idling switch is closed below its *window*.

Diagram 5.
In this case, the accelerator pedal's sensor isdamaged but the idling switch gives correct values.
The control unit, inthis situation, allows the vehicle to be run using emergency regulation *limp home*.
By this is meant that when the control unit receives asignal from the idling switch that the accelerator pedal is being presseddown, it produces the same value as for 70% acceleration, until the pedalis completely release to the idling position.
Fault code **11**will be set since the outgoing signal from the accelerator pedal's sensorlies outside the permitted value.



Fuel	

The diagram show the accelerator pedal graph.
The various % valuesshow the electrical output signal from the sensor when the accelerator pedalis pressed down.
The angled lines in the diagram show how the engine reactswhen the load is changed for a particular position of the accelerator pedal.

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

In the diagram, the following limits are set:

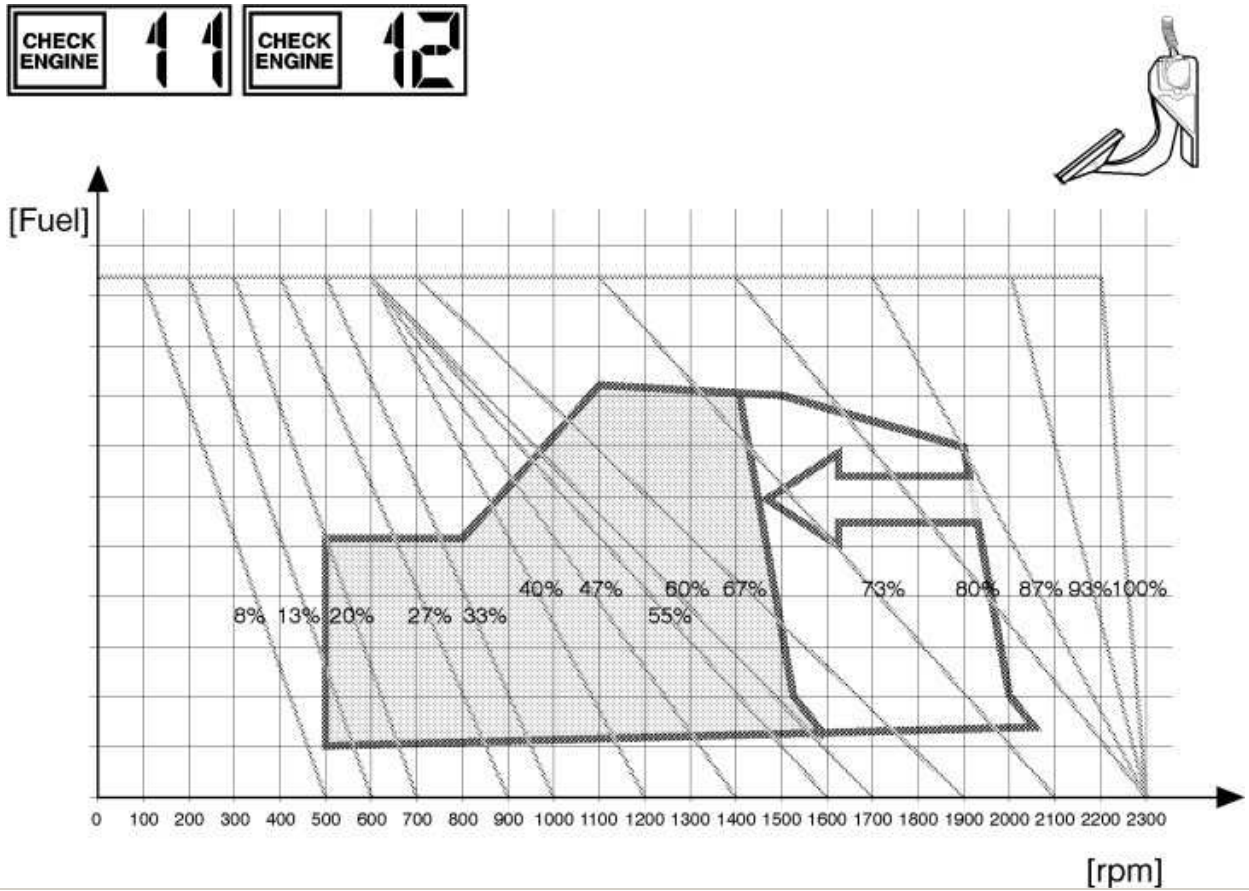
- Idling speed (left limit)
- Max. torque (upper limit)
- Max. engine speed (right limit)
- Min. engine speed (lower limit)

When the control unit uses emergency regulation, because the acceleratorpedal is damaged, the same value as for 70% depression of the acceleratorpedal. That is provided that the idling sensor is correct and that the acceleratorpedal 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 ofthe engine can be obtained.
When the accelerator pedal is released, theacceleration 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 pedalis pressed down.

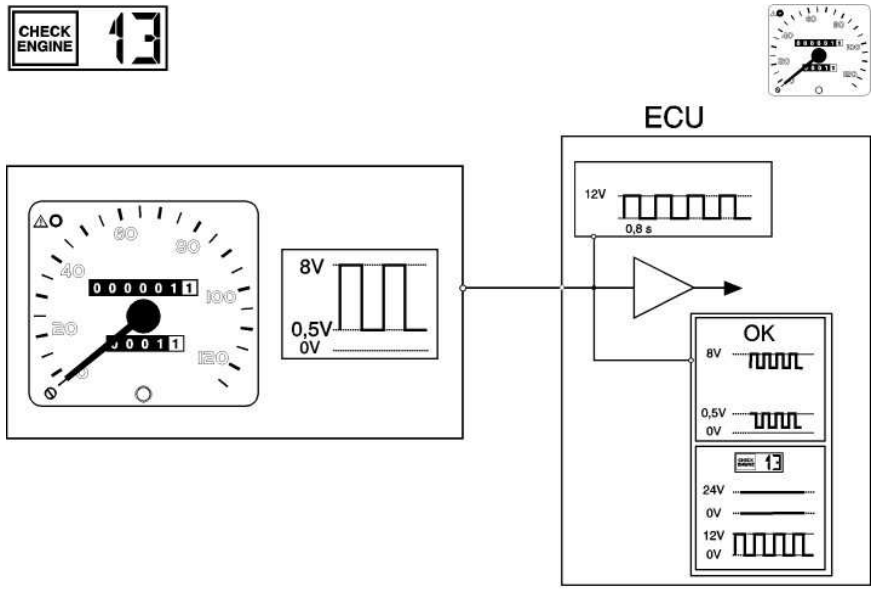


Fuel	

The diagram shows the accelerator pedal graph forcontrol units from and including part number 8148335.
The control unit was introduced during the Fall of1994.

As can be seen from the diagram, the limit line for max. enginespeed has been moved down to 1600 rpm when the control unit uses emergencyregulation.
The previously used 70% line is no longer used, and the controlunit 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 speedsignal 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 returnsto 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 levelof approx. 8 volts and a low level of approx. 0.5 volts.
When the vehicleis stationary, the signal is either high or low depending on what the sensorposition 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.
Duringthis 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

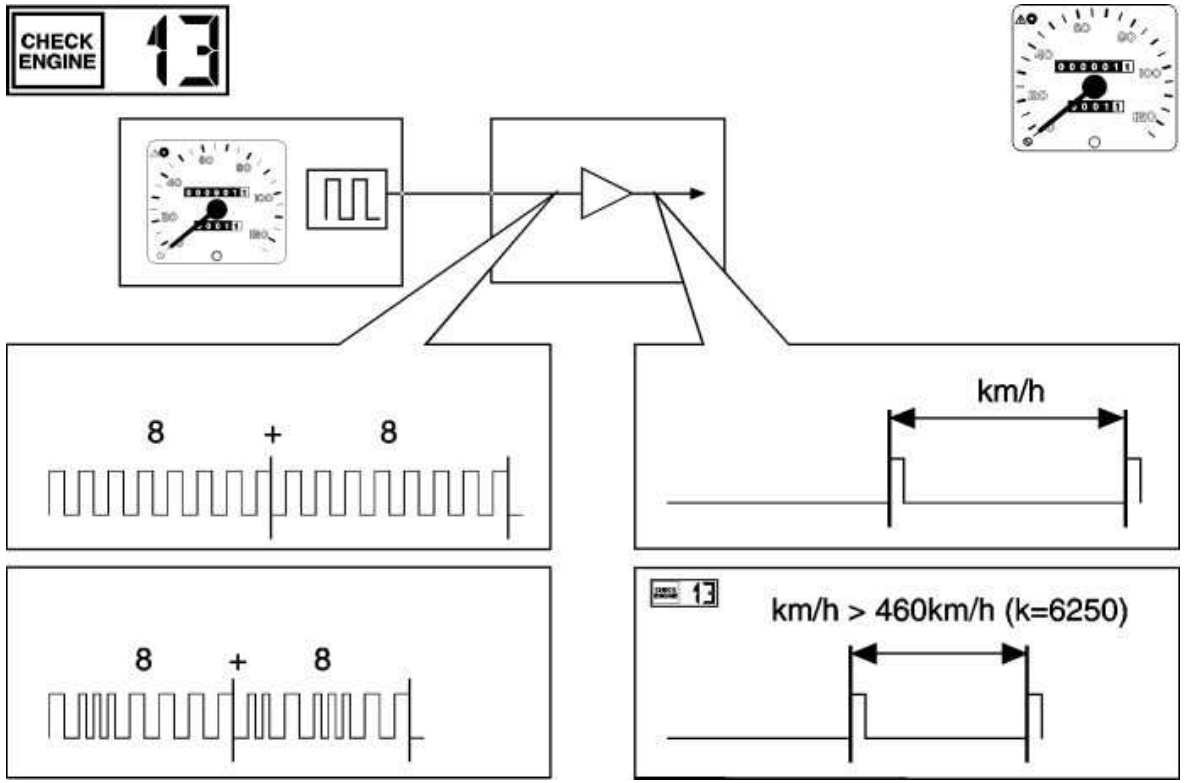
The signal varies around 8 volts or around 0.5 volts.
Regardingthe form of the signal when measuring using an oscilloscope:
The intendedspeed's *normal* level; you will see a sample of the feed current ofapprox. 2 milliamps that the control unit injects into the cables.

With a motometer tachograph this will be approx. 1.2 volts. The feed currentis switched on for 400 millisecs every 800 millisecs.
This means that asuperimposed 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 toB+.
- The signal's voltage level is 0 volt.
  Indicates a short circuit toearth.
- The signal is identical to the feeder circuit's signal.
  Indicates anopen circuit.

Frequency check



The tachograph's speed signal is first used afterit has been divided by 8, which means a safe filtration of the signal. Ifsignal interference, in the form of one or two voltage *spikes* shouldoccur, 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 continuouslycheck the speed signal. If the signal returns to normal, the control unitwill use it again.

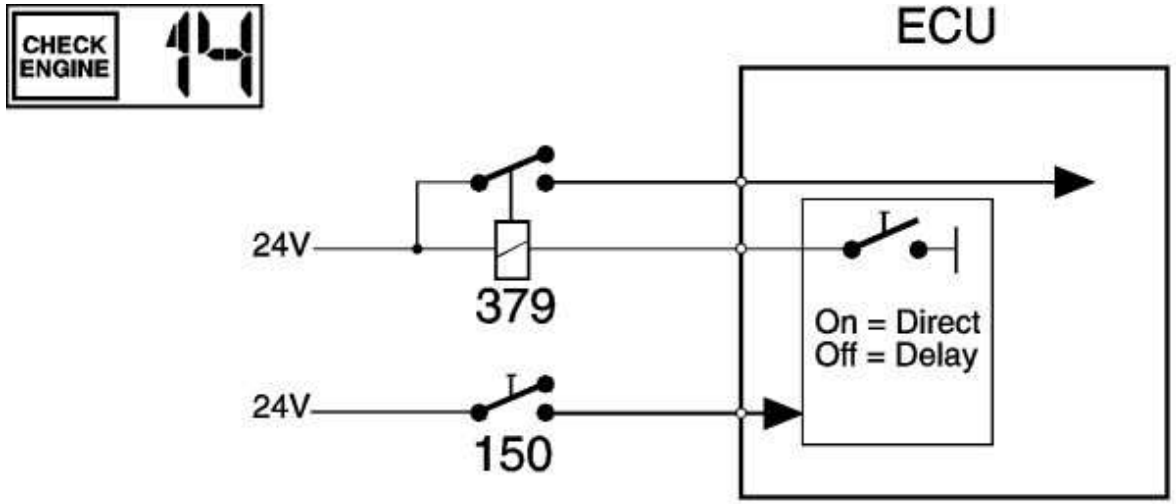
Comments to error code 13, Speed signal

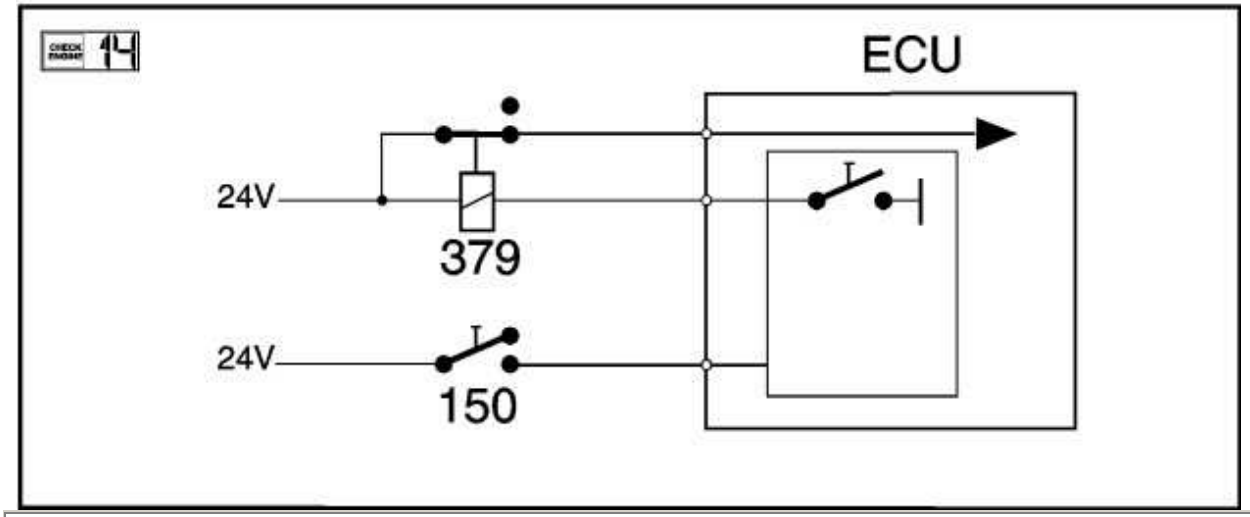
Since the speed signal is obtained from the tachograph's *buffered* output, there could be a fault in the tachograph.
A correctspeedometer is **no guarantee** that the control unit receives thecorrect input signal.

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.....

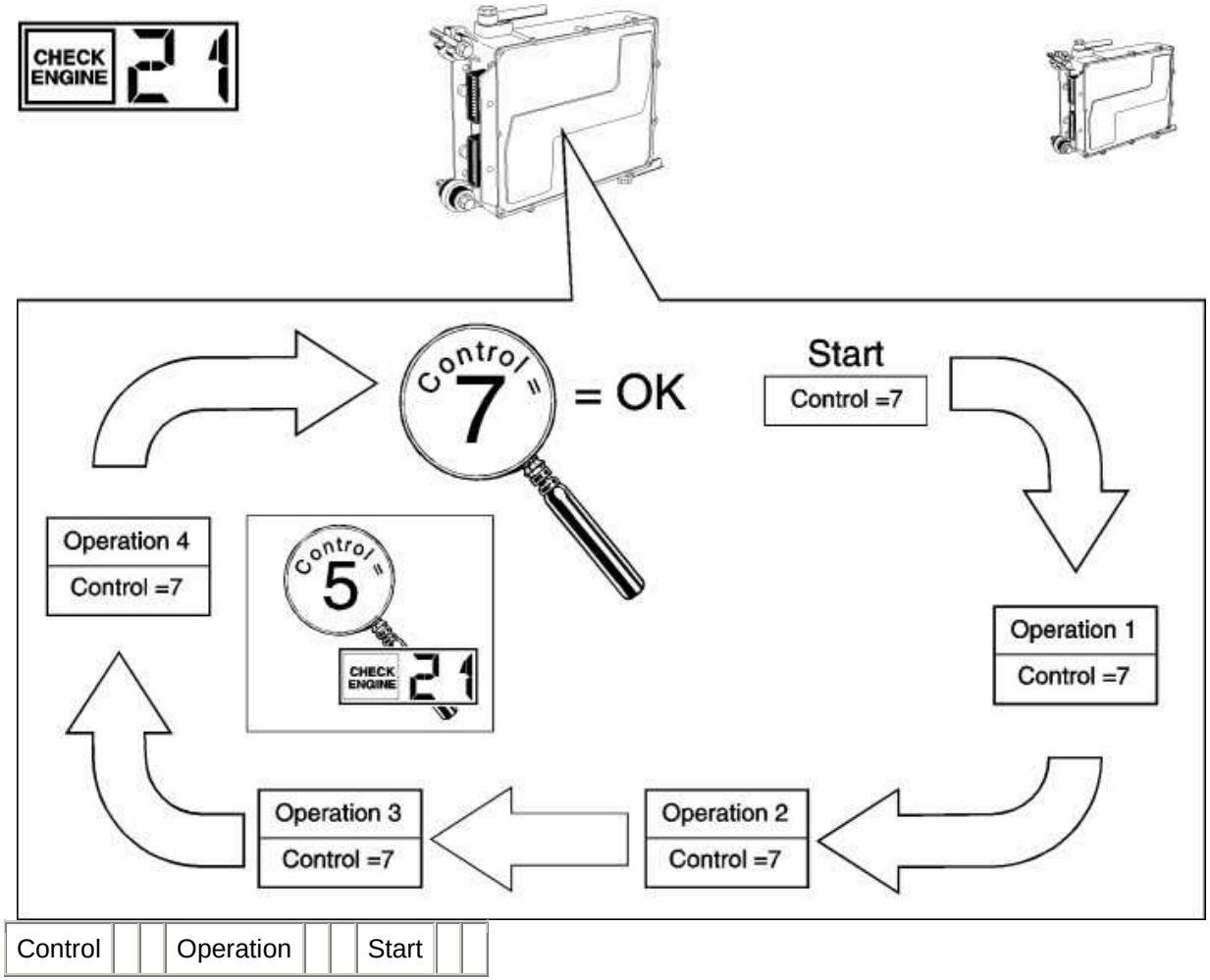
When the starting key (150) is turned to the drive position the controlunit earths the main feeder relay (379) in order to activate the current forthe control unit. This occurs without delay.

When the starting key is turned to the off position, the earthing circuitfor the feeder relay in the control unit will break the earthing circuit forthe main feeder relay, but with a short delay.
The delay is provided sothat the control unit has time to carry out certain operations before it isswitched off.

Fault code **14** is set if the control unit receives voltage fromthe main feeder relay even although the voltage from the ignition lock ceases.
Theengine 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 returnto the rest position, or if there is a short circuit in the wiring betweenthe relay and the control unit.

Fault code 21 - Control unit, internal fault



Control			Operation			Start		

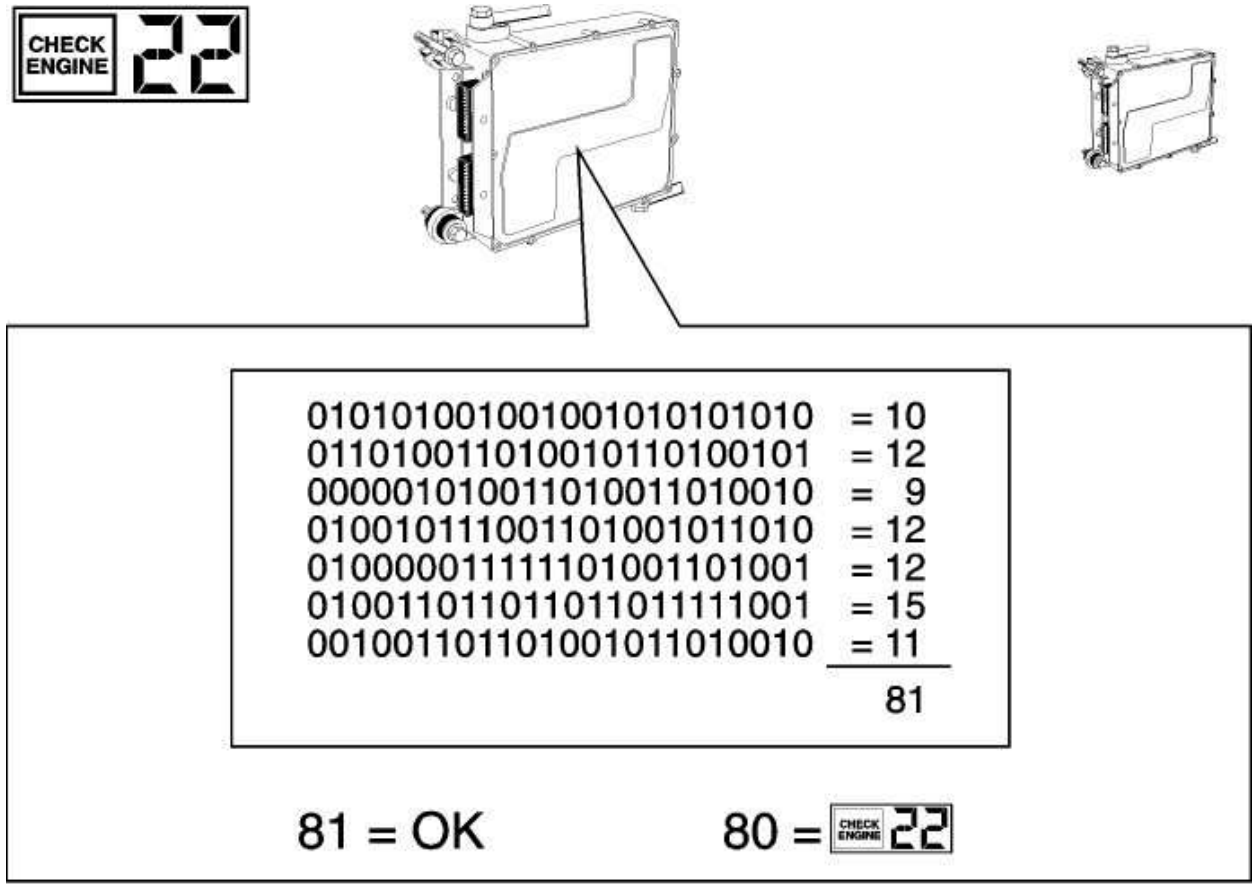
In the control unit's program, there are a number of different controlfunctions that supervise the program's function.
This can, for example,function in such a way that a control number is passed through the variousprogram operations.
When all the operations have been gone through, thenumber is checked.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

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

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

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

Fault code 22 - Control unit, programming fault



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

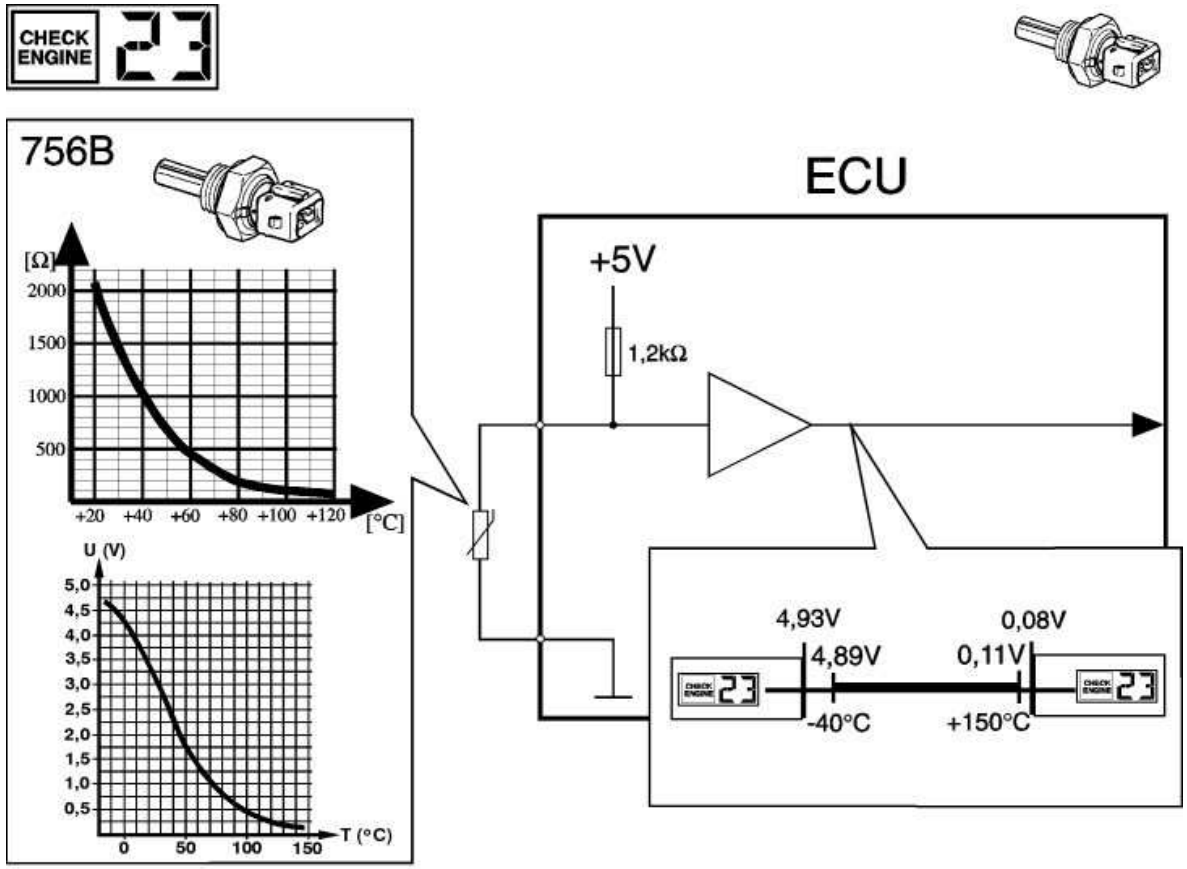
The example in the diagram shows the counting of the number *1*, ineach row is added together.
Each row's sum is then totalled to make upa check sum, in this case 81.

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

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

Important: If fault code 22 is set without any programming being carriedout, 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 outto see if its values are outside its normal working range. If this is thecase, fault code **23** will be set.

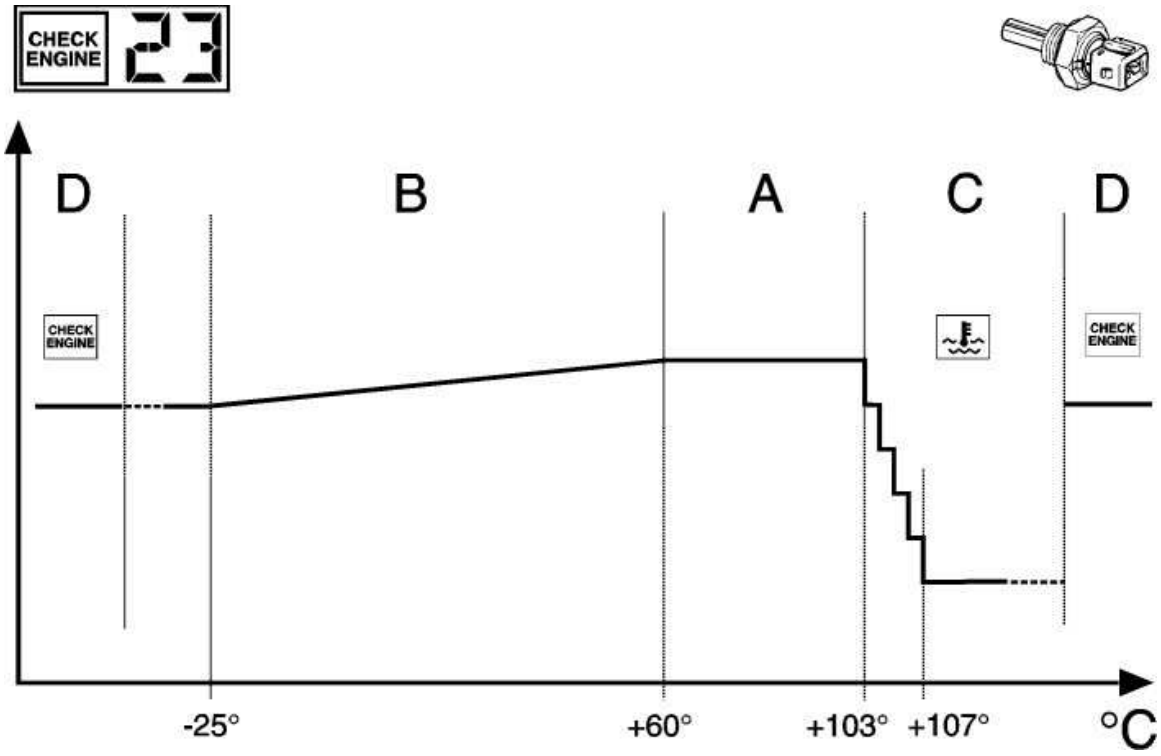
The normal working range for the sensor is between -40℃ and +150℃.The diagram shows what voltages fa ult code **23** sets.

Note: Even if the fault code has been set, the control unit will continuouslycheck the sensor's signal. If the signal returns to normal, the control unituse 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 sideof the cylinder head.

Sensor (756) for the temperature indicator on theinstrument panel is located on the thermostat housing. It's only task is toprovide signals for the temperature indicator.

The effect of the coolant fluid temperaure



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

Normal temperatures.

A

For normal temperature no change occurs to theamount of fuel.

Low temperatures.

B

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

High temperatures.

For temperaturesover +103℃ 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 thetemperature sensor 756B via the control unit.
On FL trucks the warninglamp is connected to the 756 temperature sensor and is not connected via thecontrol unit.

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

Unreasonable temperatures

D

If the temperature sensor givesvalues that lie well outside the normal working temperatur fault code **23** will be set, at the same time the control unit will reduce the amountof fuel by approx. 10%.

Comments to fault code 23

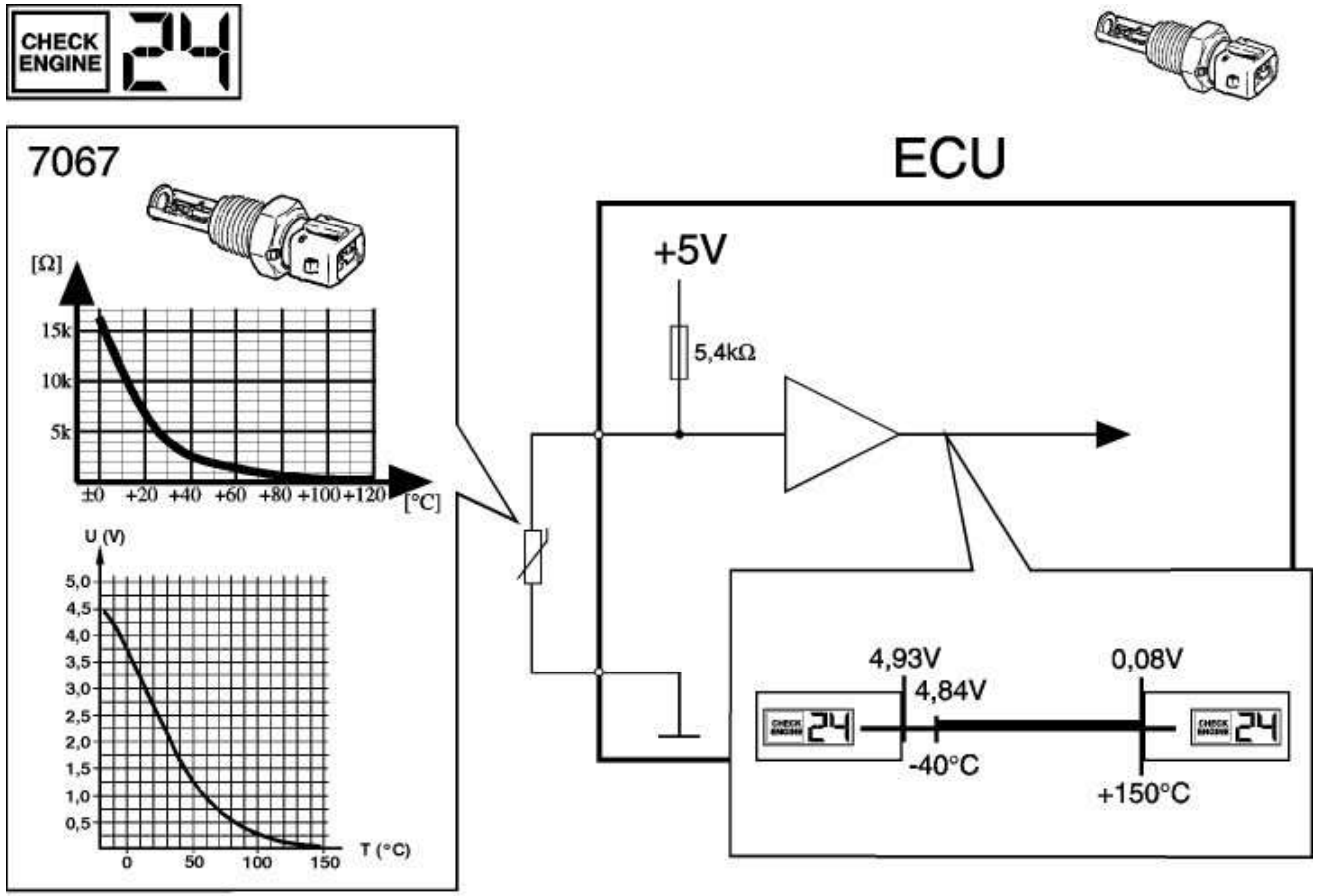
Note that FL trucks do not have controls for the warninglamp for high coolant fluid temperature!
The lamp is not synchronised withthe reduction of the amount of fuel via the control unit, which means thatthe engine can reduce the amount of fuel to approx. 50% without obtainingany indication.

Below is a list of examples that can cause high coolantfluid 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 ifits 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℃ and +150℃.The diagram shows at what voltages fault code **24** is set.

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

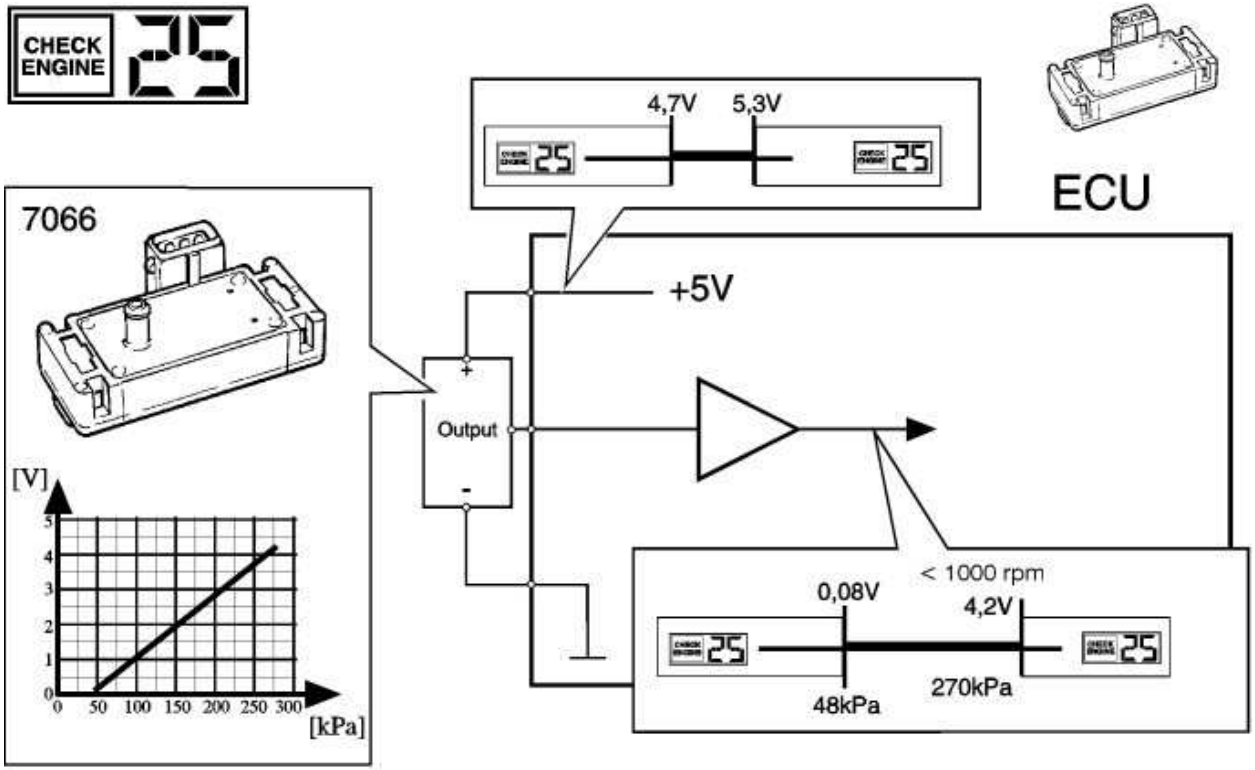
Comments to fault code 24

Note that the CHECK ENGINE lamp does not light upat 91℃, as is incorrectly stated in the Service Info rmation
EngineControl System D12A.
Charge air temperatures under +150℃ do not produce any indication, even if it is abnormally high.

Below is a list of examplesof 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 codehas 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 outsideits normal working range. If this is the case, fault code **25** willbe 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 speedis under 1000 rpm.

Feeder voltage check

The control unit can even check the feeder voltage to the charge air pressuresensor. 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 faultcodes could be:

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

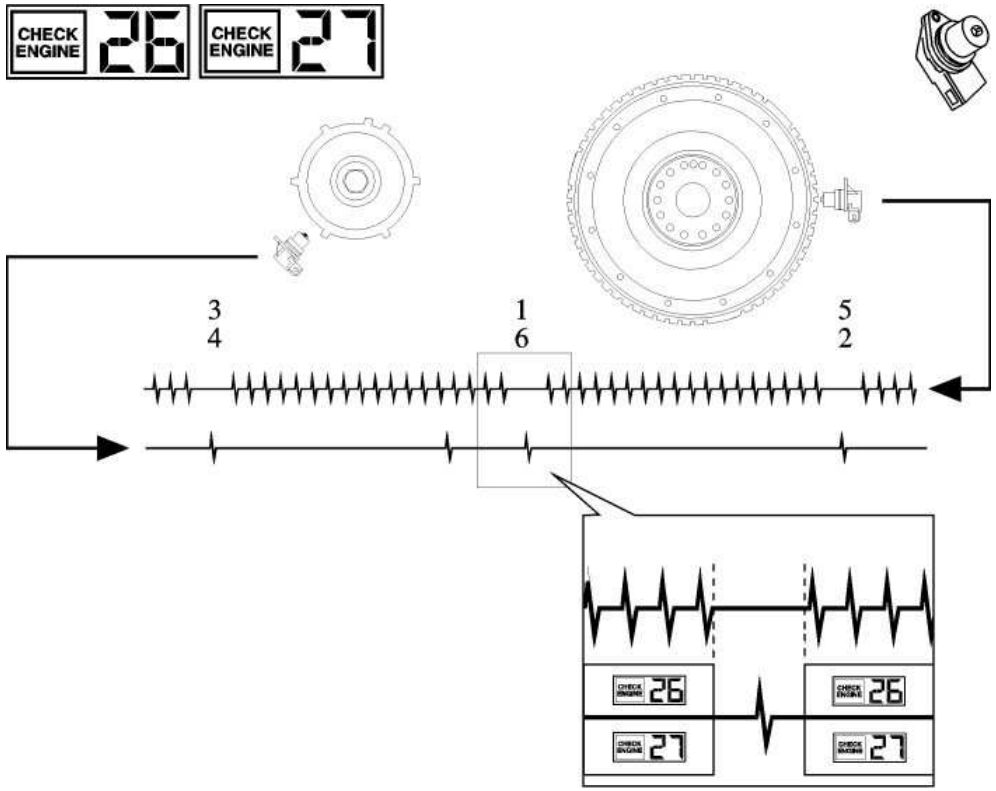
Fault code 26 - Cam axle sensor

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

- Synchronisation
- Signal strength
- Frequency interference

When fault code **26** isset, 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 signaluntil after the next time the engine is started.

Synchronisation

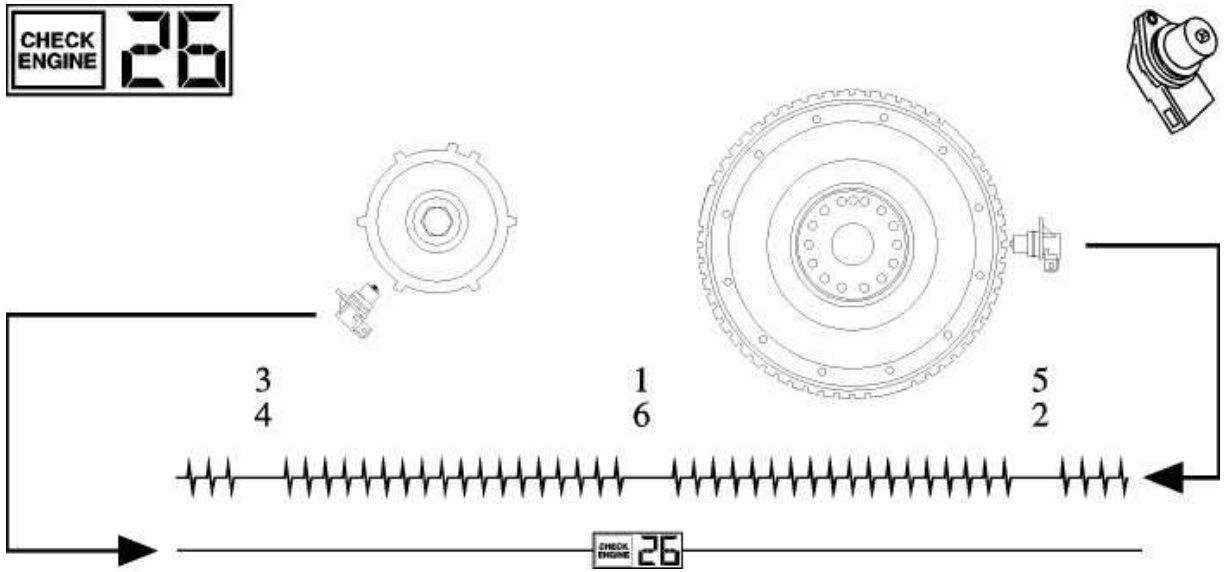


The control unit checks that the synchronisation pulses which representthe six cylinders are always within the *window* that is created by thesensor signal from the flywheel's teeth.

If a cam axle signal lies outside the *window*, Fault Codes **26** and **27** are set.
Both fault code **26** for thecam axle sensor's signal and fault code **27** for the flywheel sensor'ssignal are set since the control unit cannot determine with certainty whichof the signals are unsynchronised.

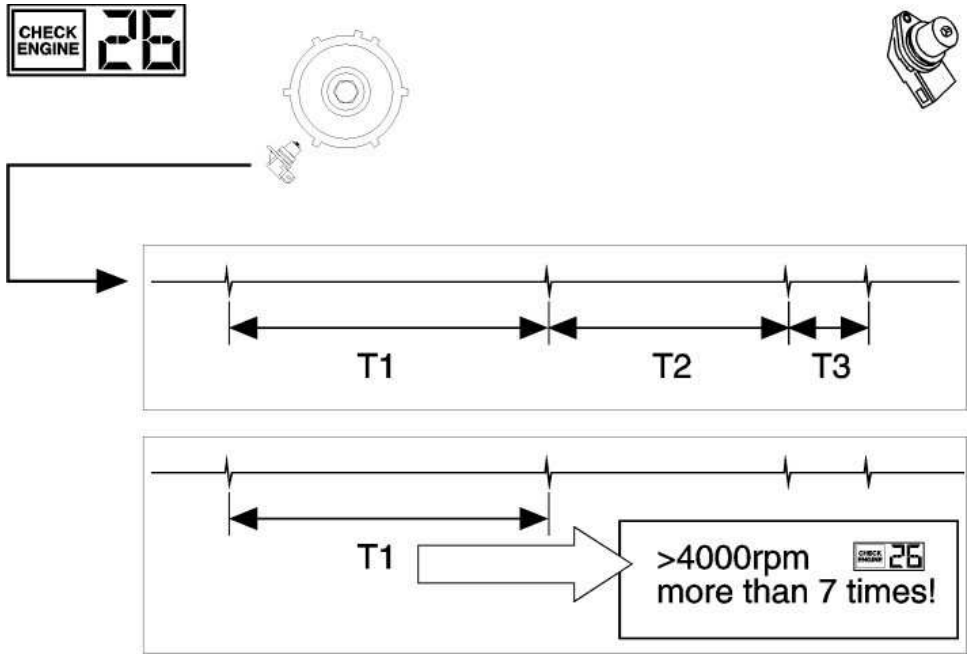
In order to prevent the identification pulse for cylinder 1 being interpretedas a synchronisation fault, any possible synchronisation fault must occurmore than 12 times in a row before fault codes **26** and **27**are set.

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 outby 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 identificationtooth for cylinder 1.

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

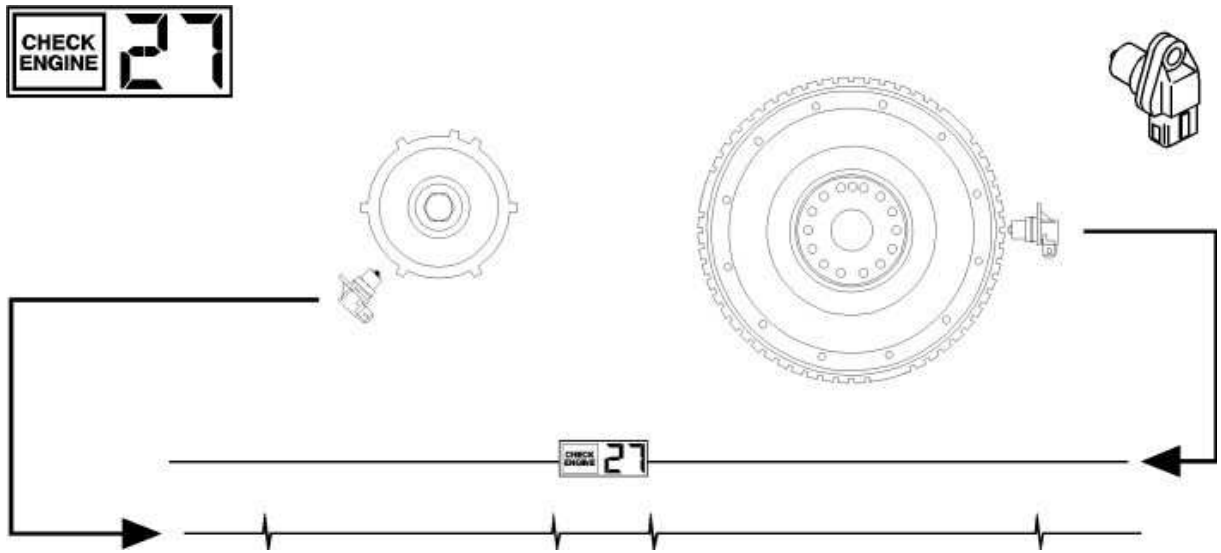
Distance **T1** is used to calculate the engine's speed.
(Innormal operation, the flywheel sensor's signal is used as the engine speedsignal, but the cam axle sensor's signal can be used as a reserve if the flywheelsignal is omitted.)
If distance **T1** indicates that the enginespeed is over 4000 rpm, fault code **26** is set.
Note that it requiresat 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 synchronisationfault, this is probably caused by the cam axle sensor's signal is not withinits *cog gap* of the flywheel signal or that the signal strength is togreat or too weak.
Below is a list of some probable causes:

- Incorrectly adjusted distance between the cam axle sensor and the camaxle'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 thewrong direction*.
- Damage to the flywheel's periphery can in unfavourable cases produce signalsthat 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 thesignal's strength.

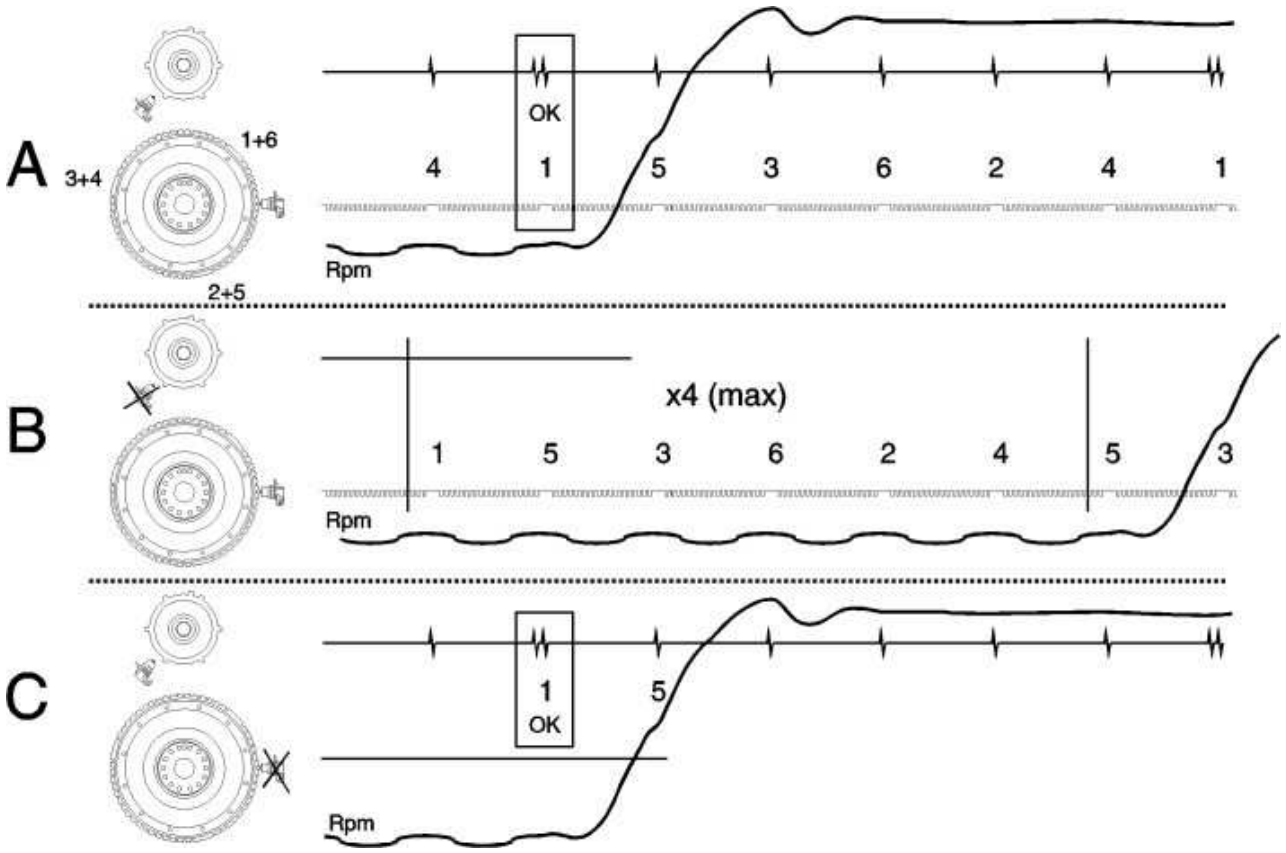
If the signal is omitted, fault code **27** is set.

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

The reason why fault code **26** is also set when the flywheel sensor'ssignal is interrupted or interfered with is that the control unit considersthat the cam axle sensor's signal is unsynchronised, since the cam axle'ssynchronisation pulse comes before the pulses from all of the flywheel's 18teeth 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 Boththe cam axle's and the flywheel's sensors function and give correct signals.
Thestart cycle takes place as in Diagram A.
The starter motor rotates thecrankshaft until the control unit identifies cylinder 1.
Fuel injectionoccurs and the engine starts.

Start without signal fromthe cam axle sensor

When the control unit notices that the cam axle sensor'ssignal is missing, it tries to start the engine without the sensor signal.
B Thecontrol unit *guesses* the injection sequence and at the same time asfuel injection takes place it checks to see if the engine speed increases.
Theengine will use the same injection sequence for a maximum of 8 revolutionsof the engine. If the engine speed is unchanged *the guess* was wrongand the control unit tries again with a new injection sequence.
After anumber of guesses, the control unit finds the right sequence and the enginestarts.

Start without signal from the flywheel sensor

C When the control unitnotices that the flywheel sensor's signal is missing, it tries to start theengine without the sensor signal.
The fuel injection will be checked viathe cam axle sensor's signal.
The injection timing is not as precise asis normally the case.

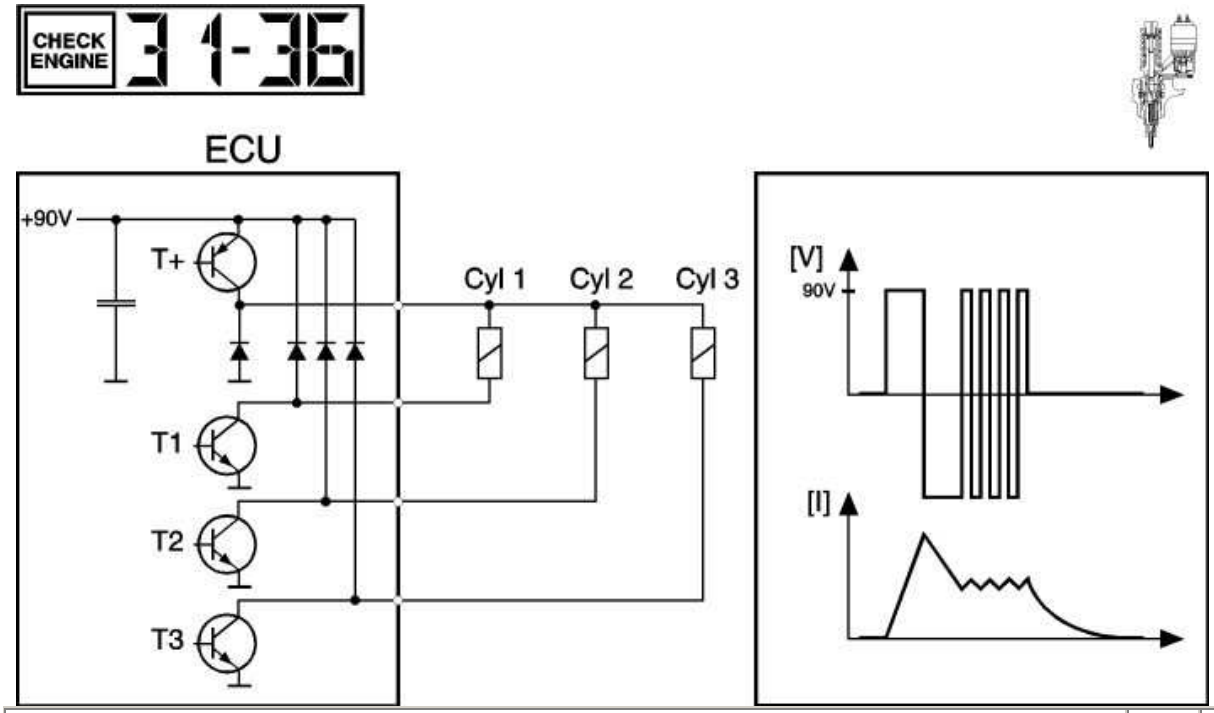
*Note: The control unit will, for alternatives **B** and **C**once again try to regulate the engine as in alternative **A**, in certaincases this can seem as if the engine misfires.*

Fault code 31-36 Injection unit

The control unit can check the injection unit in twodifferent ways:

- Electronic check
- Cylinder balancing

Electronic check

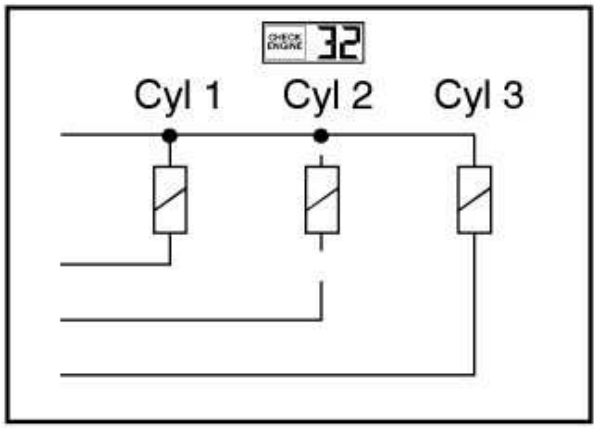


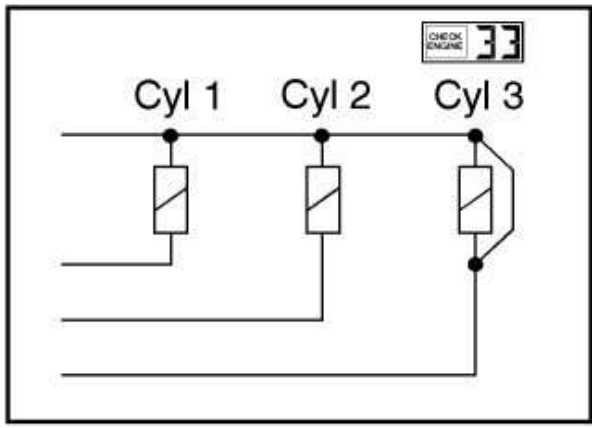
ECU (Electronic Control Unit).....		Cyl.....	= Cylinder

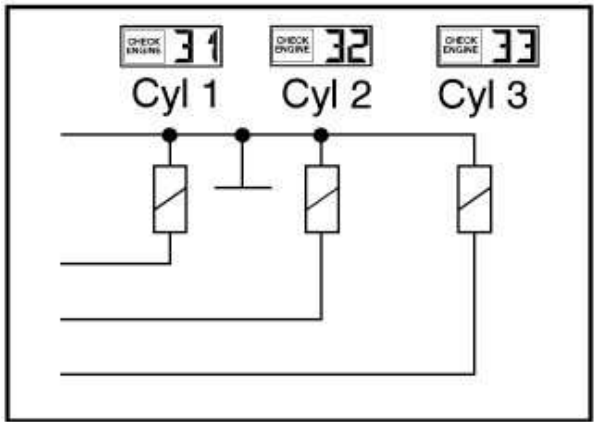
The control unit checks the injection unit with the help of eight transistors.
Twotransistors check the feeder voltage each for a group of three injection units.
Sixtransistors are responsible for the earthing connection of each respectiveinjection unit.
The left diagram shows the circuit diagram for the firstthree cylinders.

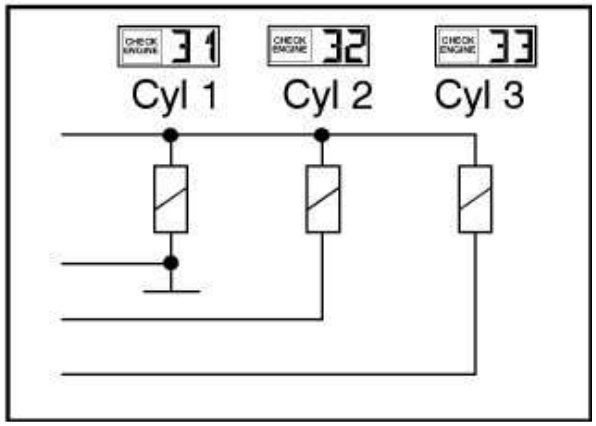
When the control unit activates the injection unit's fuel valve on cylinder1, T+ and T1 are activated at the same time and the circuit is then connectedto earth via T1.
The upper graph in the right hand diagram shows the voltageand the lower graph, the strength of current through the fuel valve coil.

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









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

Example 1 Upper left diagram
(Current consumption too low)
Foran interruption in any of the fuel valves the control unit will set the faultcode for the cylinder. In this case, fault code **32**. The controlunit will not try to use cylinder 2 when the fault code has been set.
Theother two cylinders in the same block will continue to work normally.

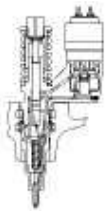
Example 2 Lower left diagram
(Current consumption too high)
Ifthe feeder wiring to the three injection units in a block have been short-circuitedto earth, the control unit will set fault codes on all three cylinders. Inthis case, fault codes **31**, **32** and **33**. Thecontrol unit will not try to use the cylinders when the fault codes have beenset.

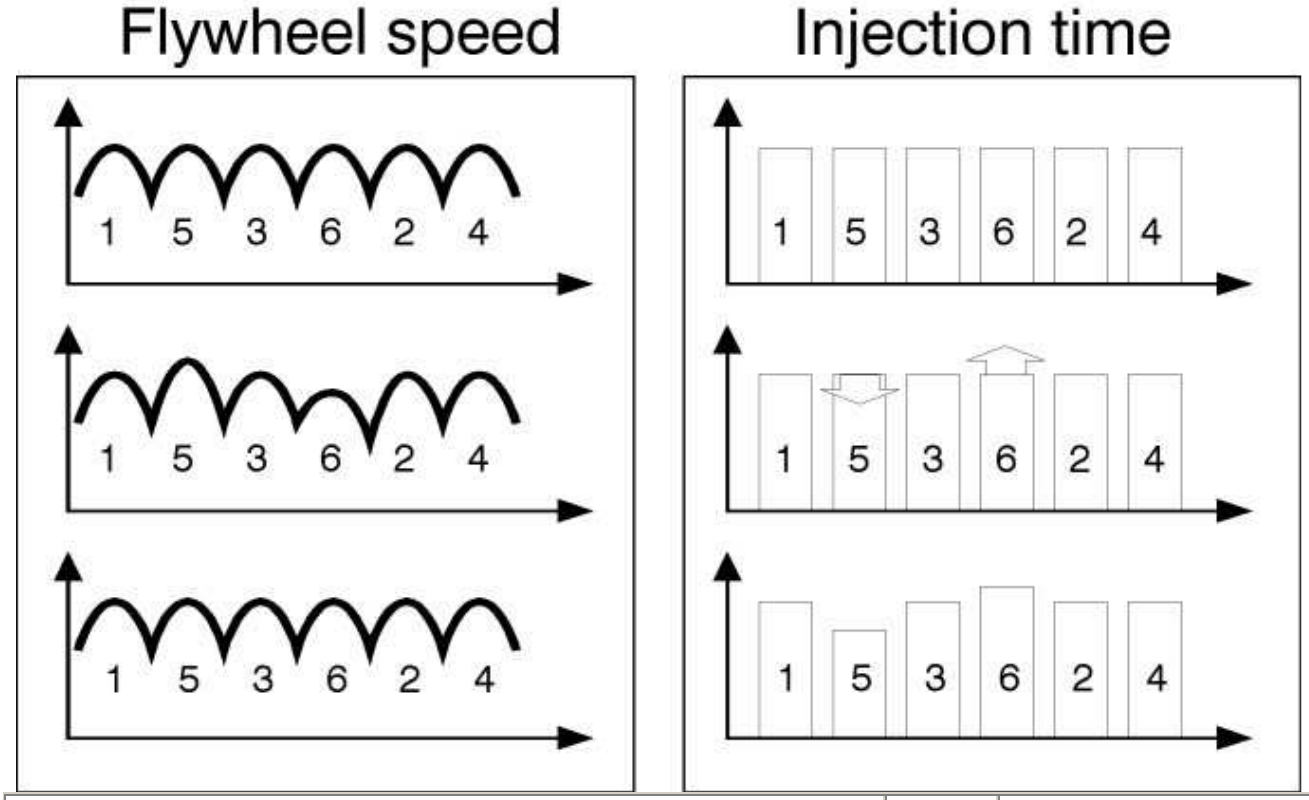
Example 3 Upper right diagram
(Current consumption toohigh)
For a short circuit in any of the fuel valves' coils the controlunit will set the for the cylinder.
In this case, fault code **33**. The control unit will not try to use cylinder 3 once the fault codehas been set.
The other two cylinders in the same block will continueto work normally.

Example 4 Lower right diagram
(Current consumption toohigh)
If any of the wiring to the earthing transistors (T1, T2, T3) areshort-circuited to earth, the control unit will set fault codes on all threecylinders. In this case fault codes **31**, **32** and **33**. The control unit will not try to use the cylinders when the faultcodes have been set.

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

Cylinder balancing





Flywheel speed		Injection time	

Cylinder balancing is a method the control unit uses to give the enginea smooth idling speed.
In cylinder balancing the control unit measuresthe flywheel speed to see if all cylinders give the same acceleration to theflywheel.
If the acceleration is uneven the control unit will compensateeach respective cylinder, either by increasing or decreasing the amount offuel to the cylinder. **This is**

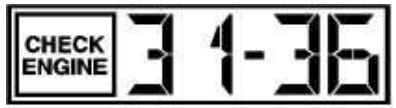
done by increasing or decreasing the lengthof time for the injection. By balancing the amount of fuel so that allthe cylinders produce the same acceleration, a smooth and even idling speedis obtained.

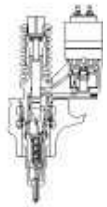
Cylinder balancing can only be carried out when the engine is at operationaltemperature and is running at idling speed.

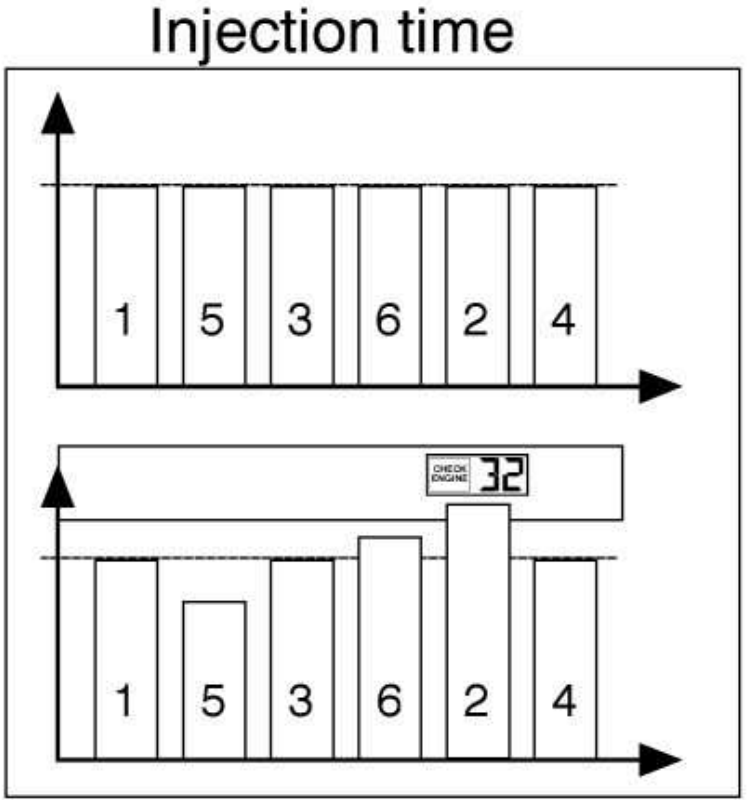
When the engine speed is increased above idling speed, all of the cylindersare given the *unbalanced* fuel amount. When the engine returns to idlingspeed, the *balanced* fuel amount is injected.

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

Note the values of the cylinder balancing are set to zero when the controlunit's fault codes are cleared.
A new cylinder balancing requires between4 and 10 minutes running at idling speed with the engine at operational temperature.







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

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

*Note: Remember that it is the **injection time** that gives the valueswhen balancing the cylinders.*
If all injection units are faultless, thetime in relation to the fuel amount, is almost exactly the same for all sixcylinders.
In this way the values of the cylinder balancing can give theimpression that if a particular cylinder has a drop in output it can thusbe compensated by a greater amount of fuel.

If, on the other hand, an injection unit has a mechanical fault or abnormalwear, which results in the time being longer than *normal* to give acertain amount of fuel, this indicates that it is the injection unit and notthe 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 faultsand when the upper compensation limit for the cylinder balancing for any cylinderhas been exceeded.

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

Note: Always note current faultcodes before they are cleared!

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

Note: Remember that a defective contact for example in a joint orconnection to one of the injection unit's fuel valves can produce a faultcode that does not occur right after starting.
The fault code is set wheninterference occurs and can therefore be misinterpreted as being set by cylinderbalancing.

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

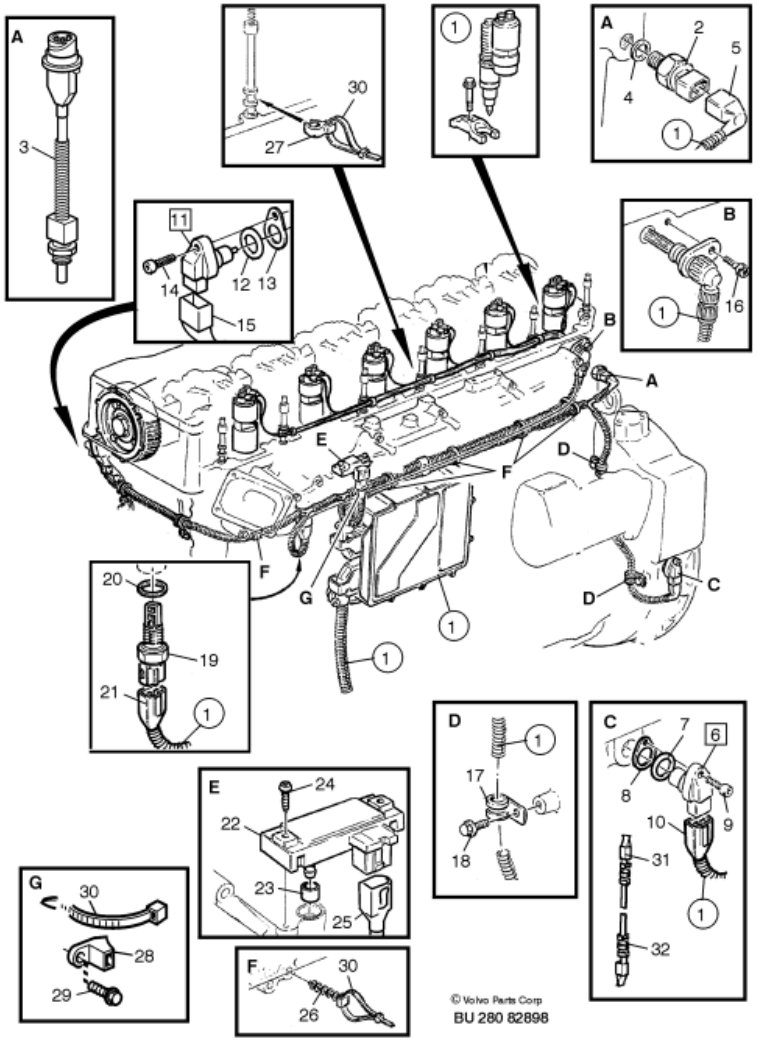
Below isa list of some possible causes:

- 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 notat an angle of 90°to the periphery.

Too great a play in the engine'stransmission (incorrectly adjusted intermediate drive) may cause any of thefault codes **31**-**36** to be set.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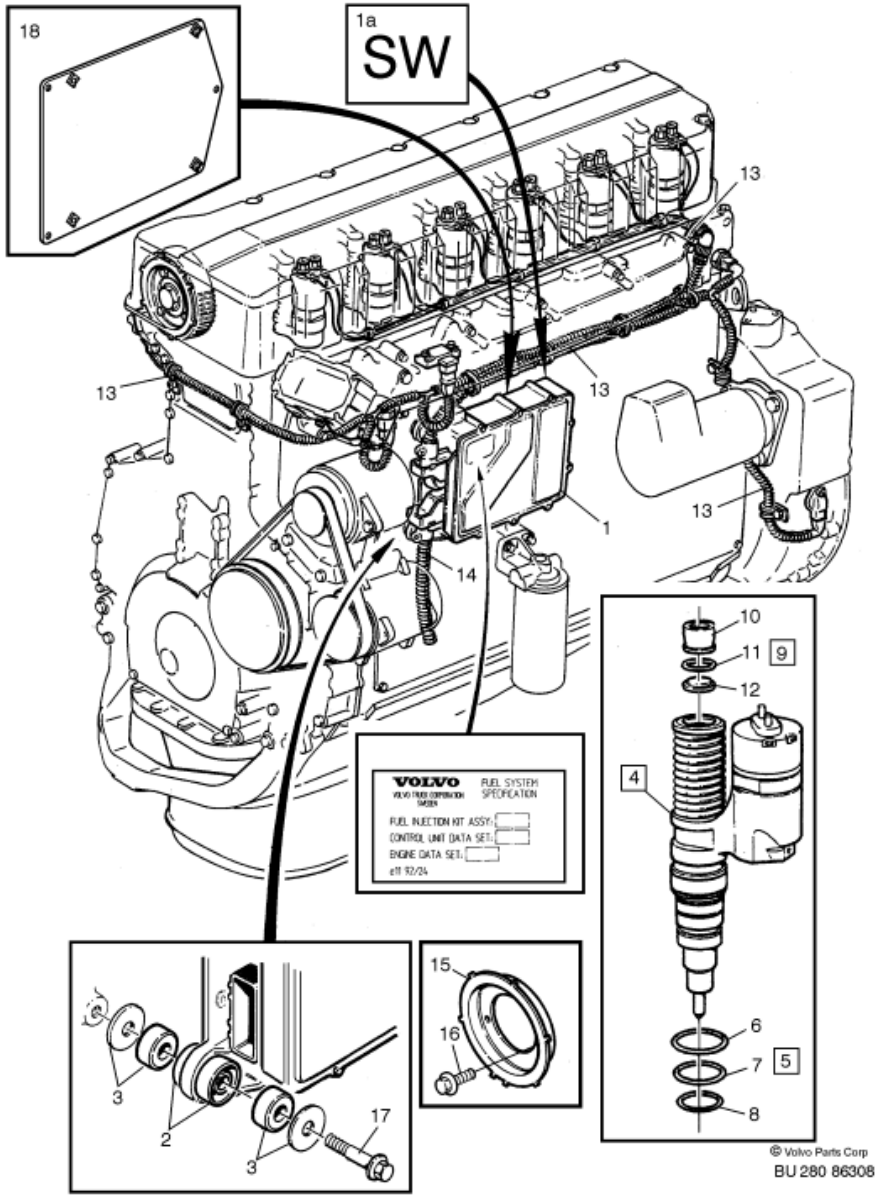
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VOLVO
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ENGINE DATA SET:
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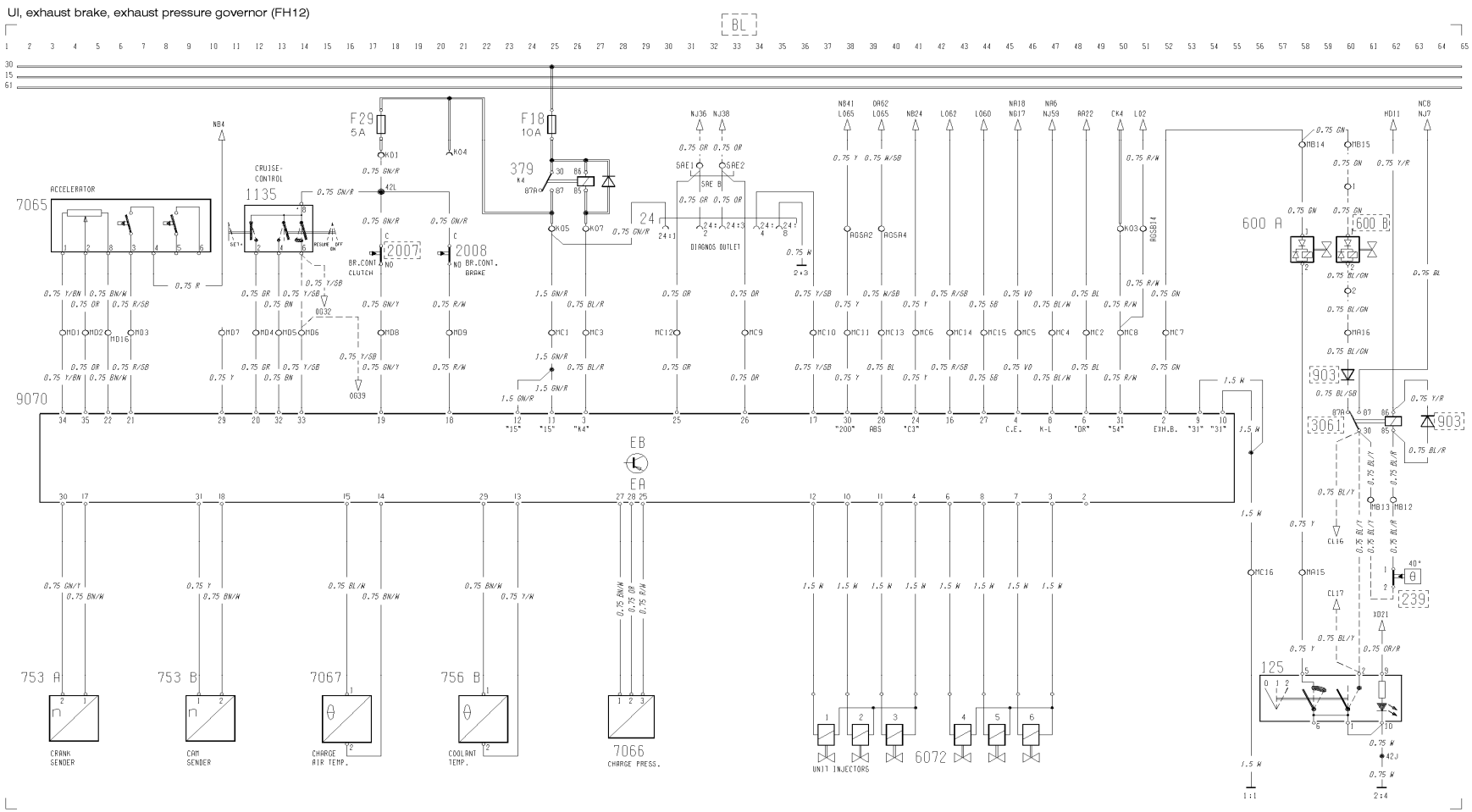

Система регулирования работы двигателя, D12A