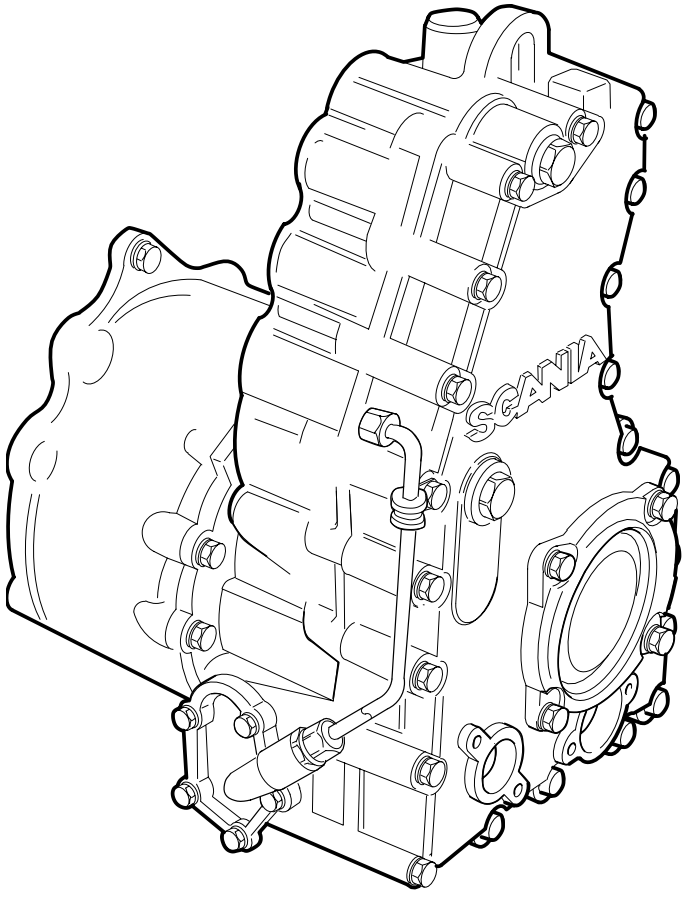
SCANIA

10:05-09

Issue 2 **en**

Scania Retarder

Trouble shooting using fault codes



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Contents

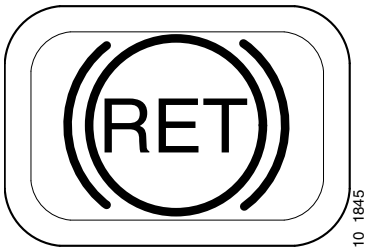
General

Preface

- This description applies to 4-series trucks and buses fitted with the Scania auxiliary brake system.
- The same integrated auxiliary brake system with the Scania retarder is used both in trucks and buses. The main difference lies in how the auxiliary brake is connected to the other electrical equipment in the vehicle.
- Connection to the rest of the vehicle's electrical systems is adapted to the specification of the vehicle in question. See under the heading Wiring diagrams for references to connection diagrams affected in Group 16.
- A new cable harness will be introduced from August 1999 for trucks and from October 1999 for buses. The main change is that the proportional valve for controlling the retarder, the solenoid valve for compressed air supply to the retarder and the solenoid valve for the retarder's oil accumulator are now located in a unit with the component name V97. See Main Group 10, Scania Retarder Function Description, Mechanics and Hydraulics, under the headings Hydraulic system, Overview, later type and under the heading Wiring diagrams.
- The retarder control unit will communicate by means of CAN communication with EBS control units from November 1999 (trucks only). For further information, see Main Group 10, Scania Retarder Function Description, under the headings Electrical systems, Interaction with other systems, CAN retarder, along with information under the relevant heading.
- The fault code messages have been taken directly from the SD program for PC and are reproduced in their original form here.

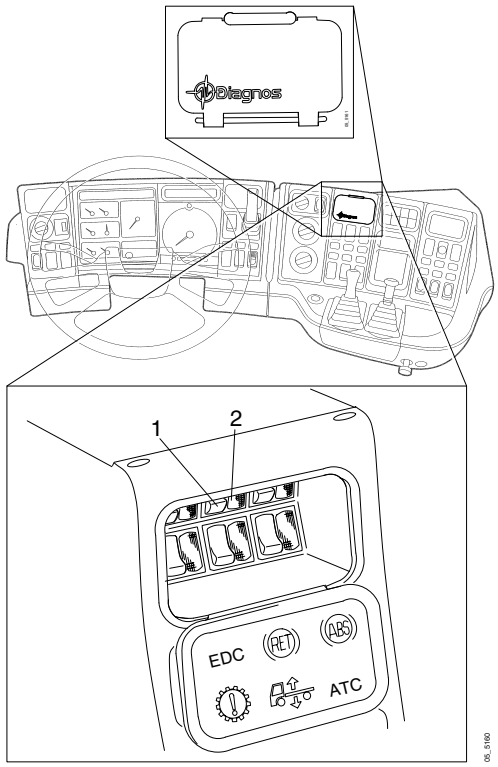
Warning system in the control unit

- The auxiliary brake control unit is microprocessor based. The control unit performs a number of functions simultaneously. One of its most important jobs is to continuously monitor the function of the entire auxiliary brake system.
- If any faults arise, the control unit will initiate a variety of measures. This is to prevent the fault causing expensive damage. If a fault arises, the control unit will also illuminate the RET warning lamp in the instrument cluster. For a description of how to reset the warning system, see under the heading Fault codes.



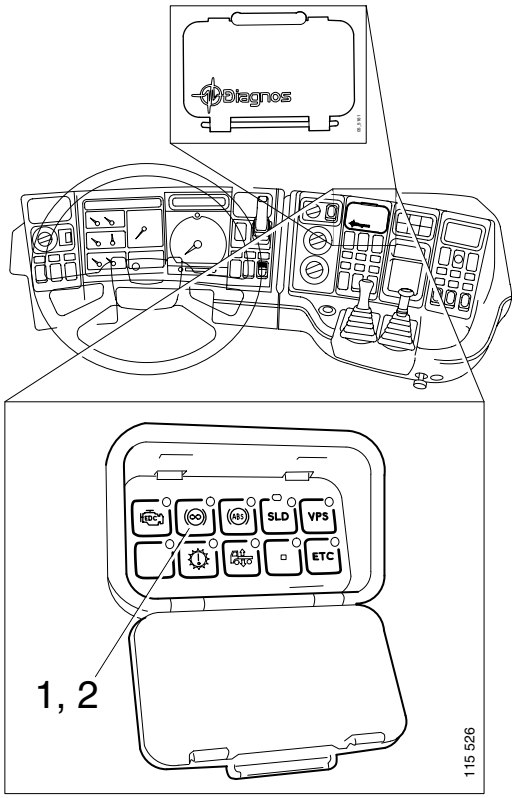
Diagnostics lamp

- The diagnostics lamp is hidden beneath a cover in the instrument panel. This lamp is used to show configuration (i.e. system variants) and fault codes.
- The diagnostics flashing should be read while the vehicle is stationary. It does not matter whether or not the engine is running.
- Proceed as follows: Set the starter key to the drive position and wait for a few seconds. Hold the diagnostics switch 1 depressed for at least 1 second and then release it.



The old type of diagnostics panel up to and including October 1999

- The diagnostics lamp 2 is then out for 2 seconds and then starts to flash. The series of flashes are separated by clear pauses.
- First of all, the control unit configuration, i.e. variant of the auxiliary brake system for which the control unit is set, is shown. Then any fault codes stored in the control unit's memory are shown. If there are no fault codes stored, only the configuration code is flashed out.
- The diagnostics flashing can be repeated any number of times. Simply press the diagnostics switch again.



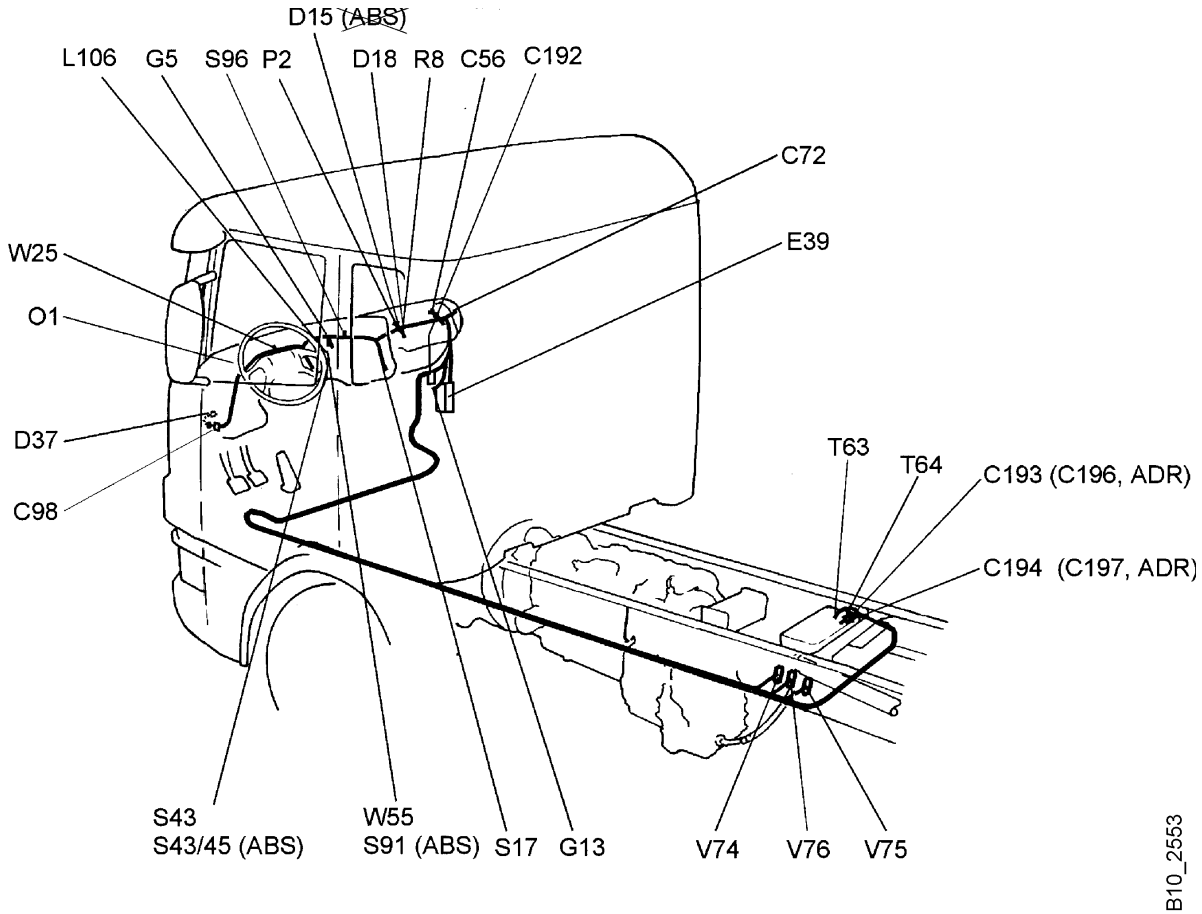
The new type of diagnostics panel from November 1999

Wiring diagrams

Location of electrical components in trucks

The location drawings for the electrical components of the auxiliary brake system in 4-series trucks are basic drawings and apply to all equipment variants and to both left-hand drive and right-hand drive vehicles.

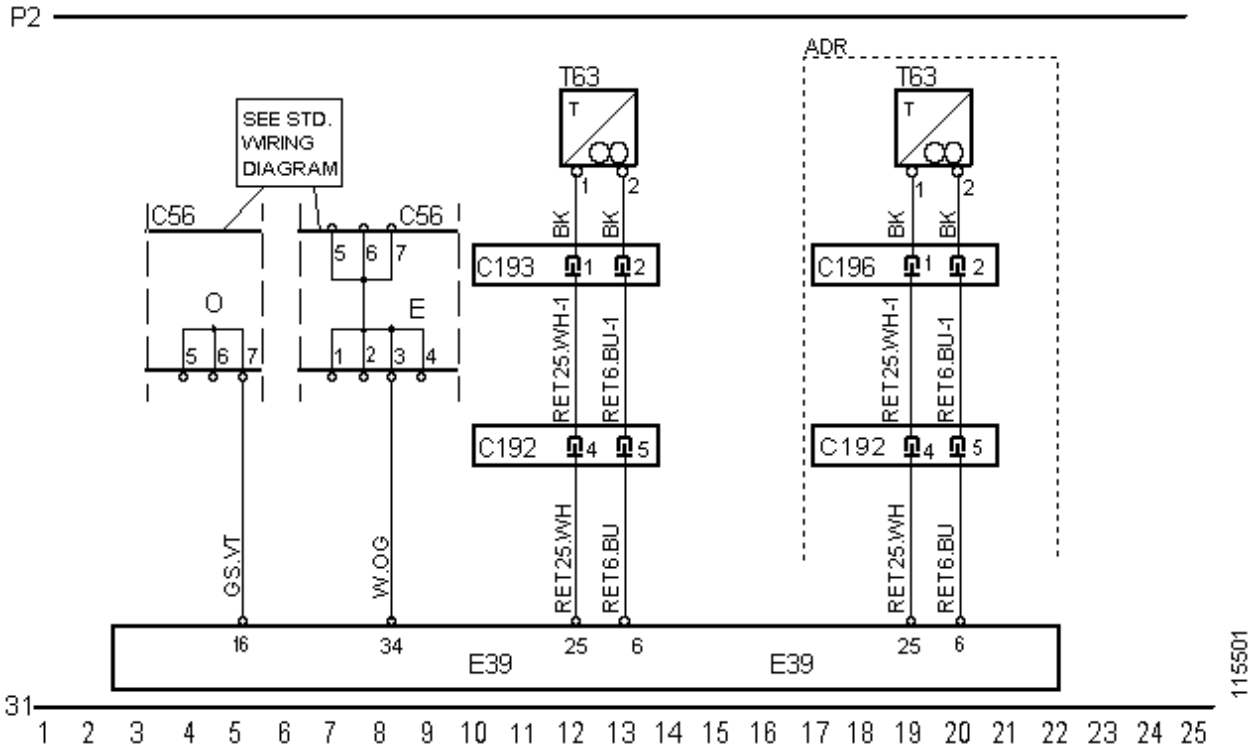
Wiring diagrams for 4-series trucks prior to August 1999

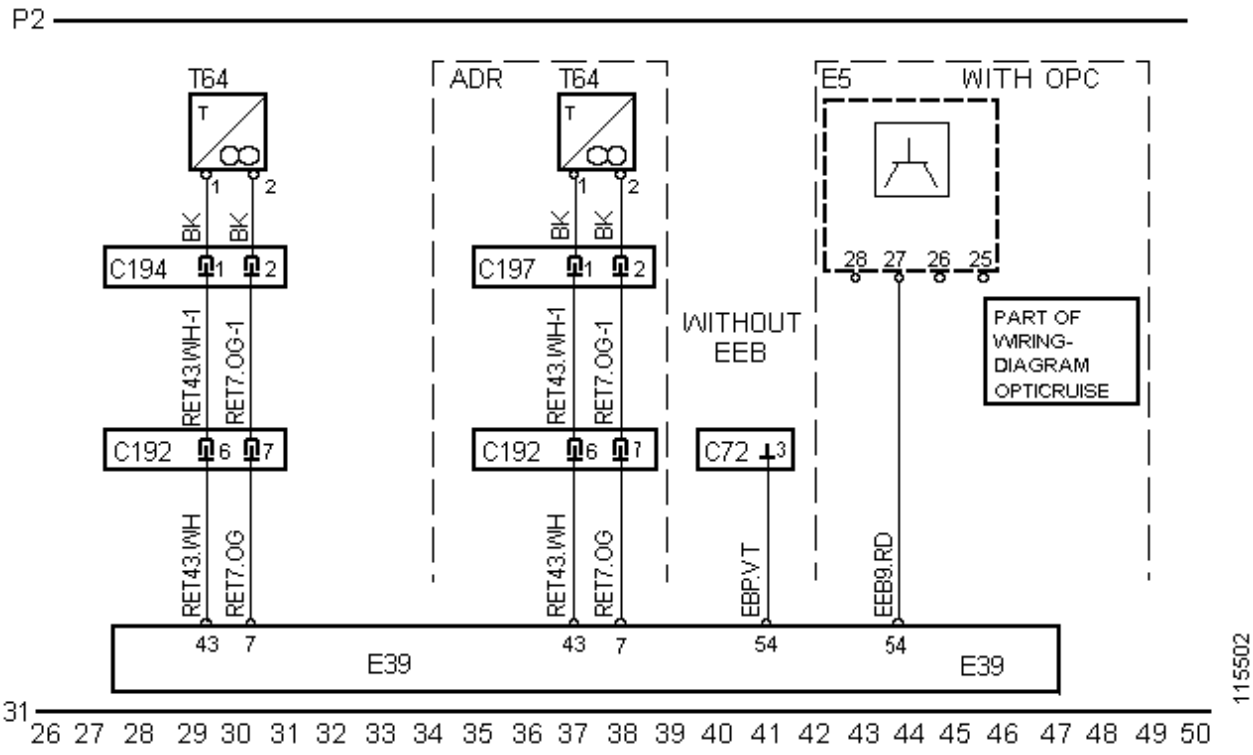


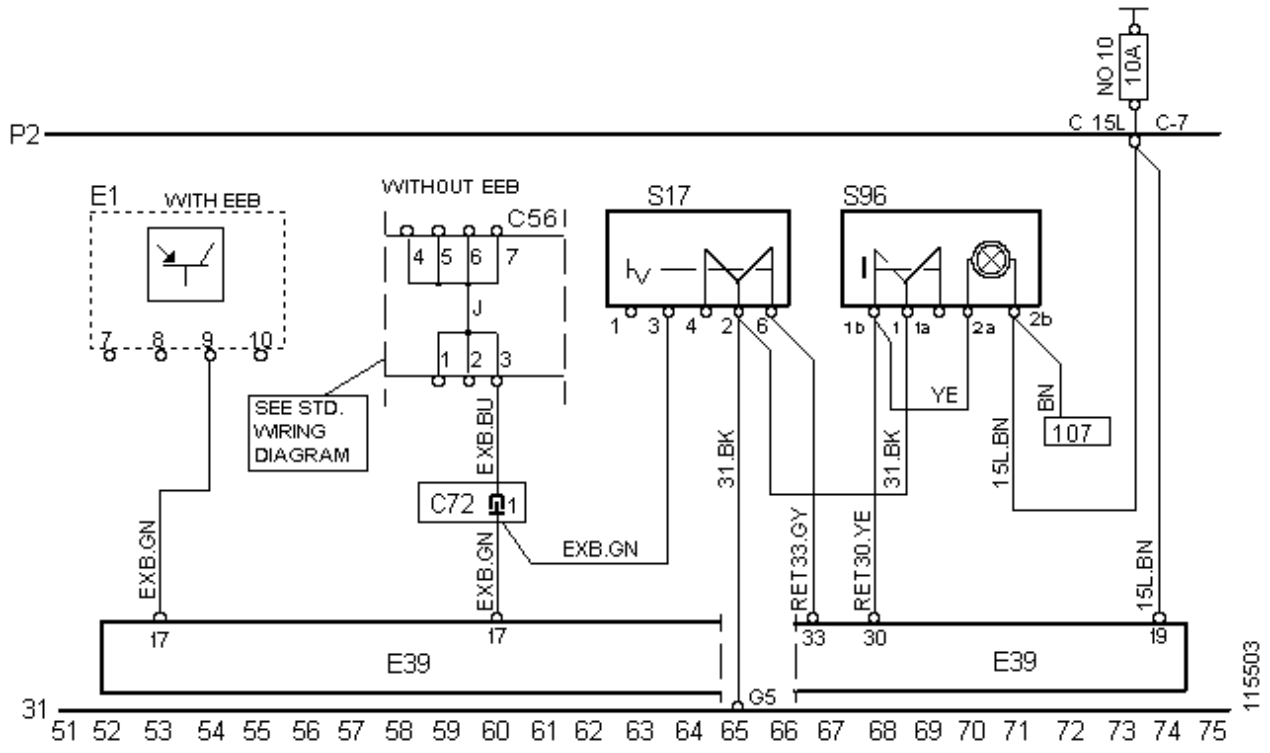
Location drawing for 4-series trucks prior to August 1999.

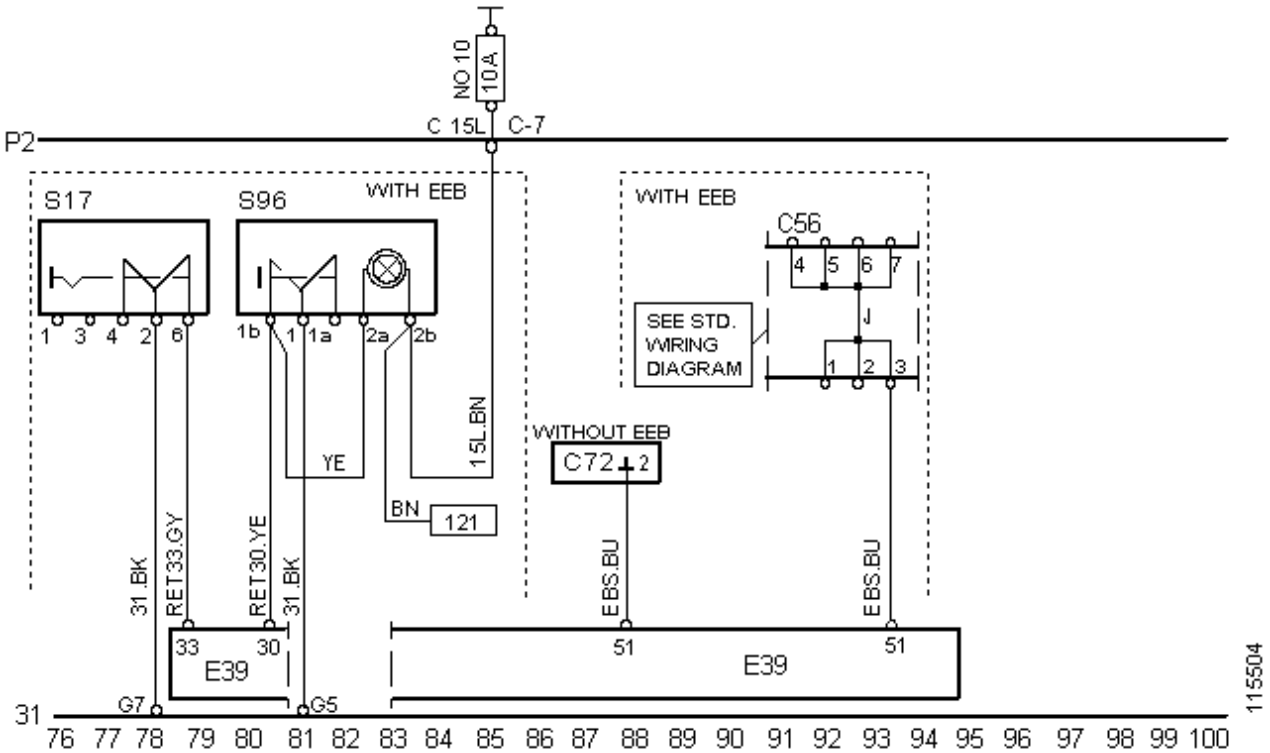
Reference to connection diagrams in Group 16

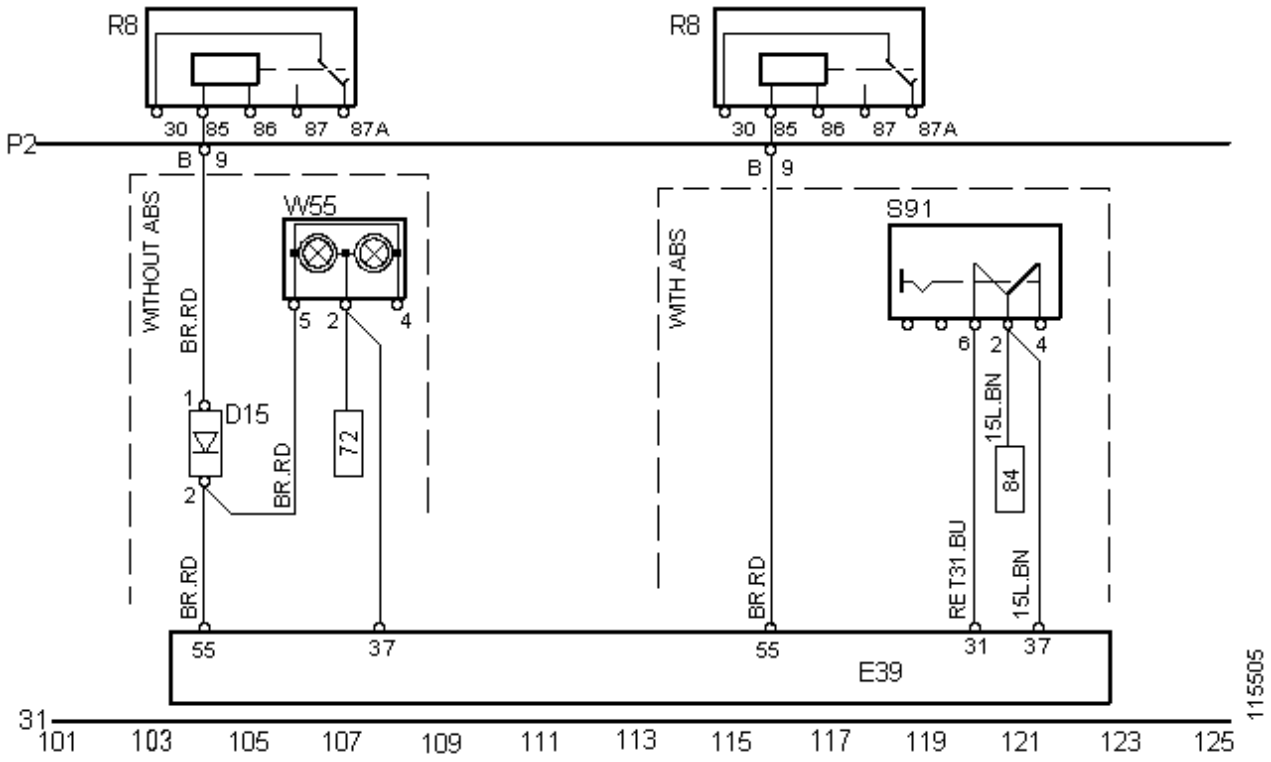
- Truck without electronic exhaust brake control: 16:04-33 (connection diagram).
- Truck with electronic exhaust brake control: 16:04-34 (connection diagram).

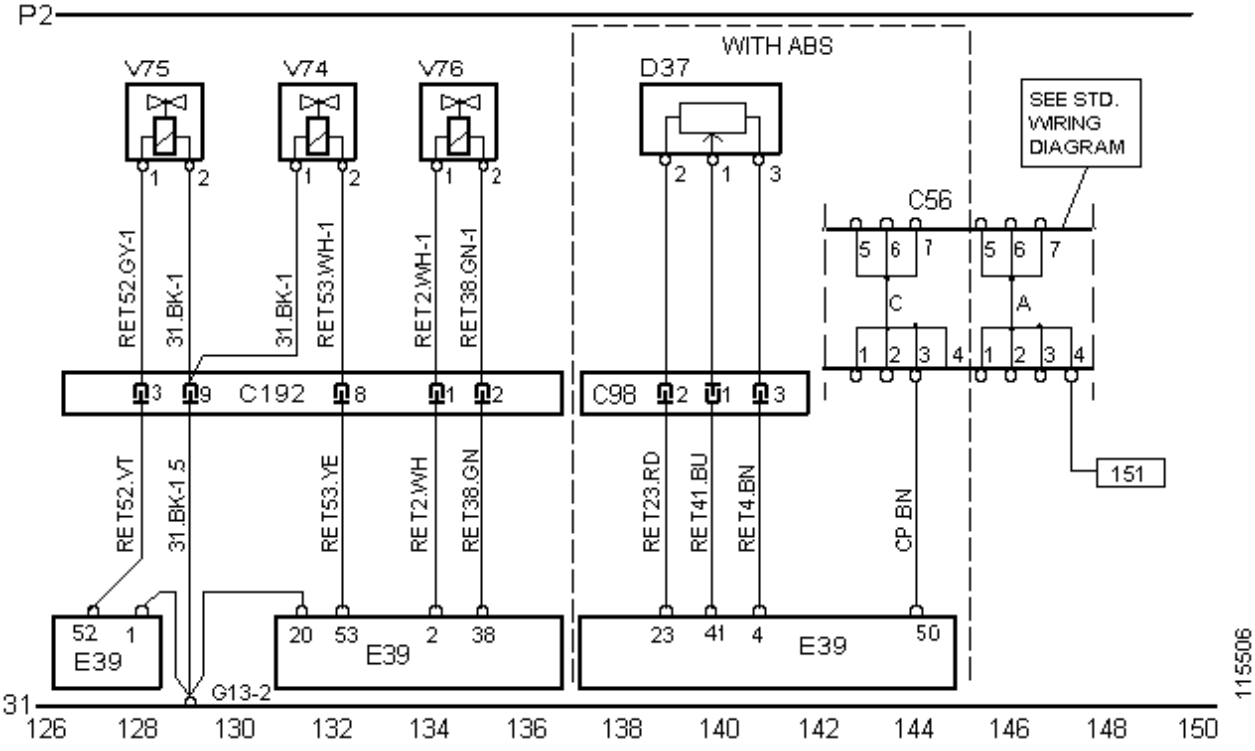


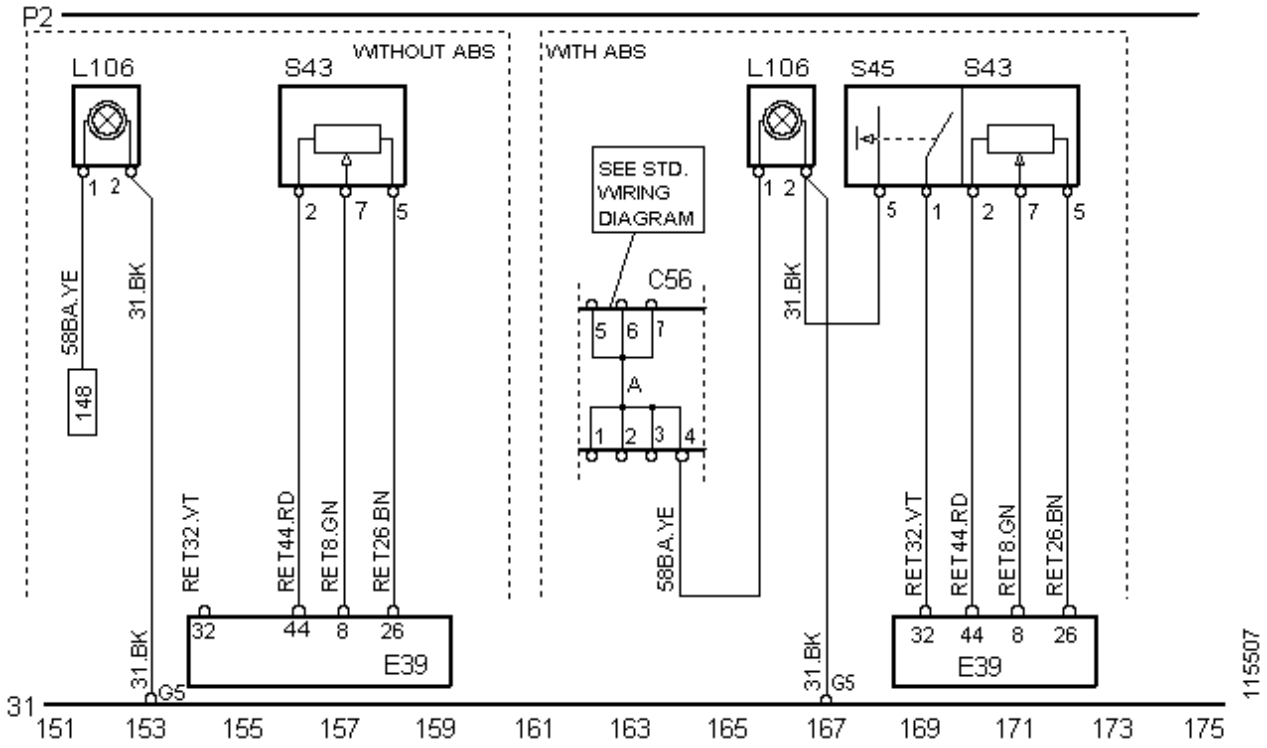


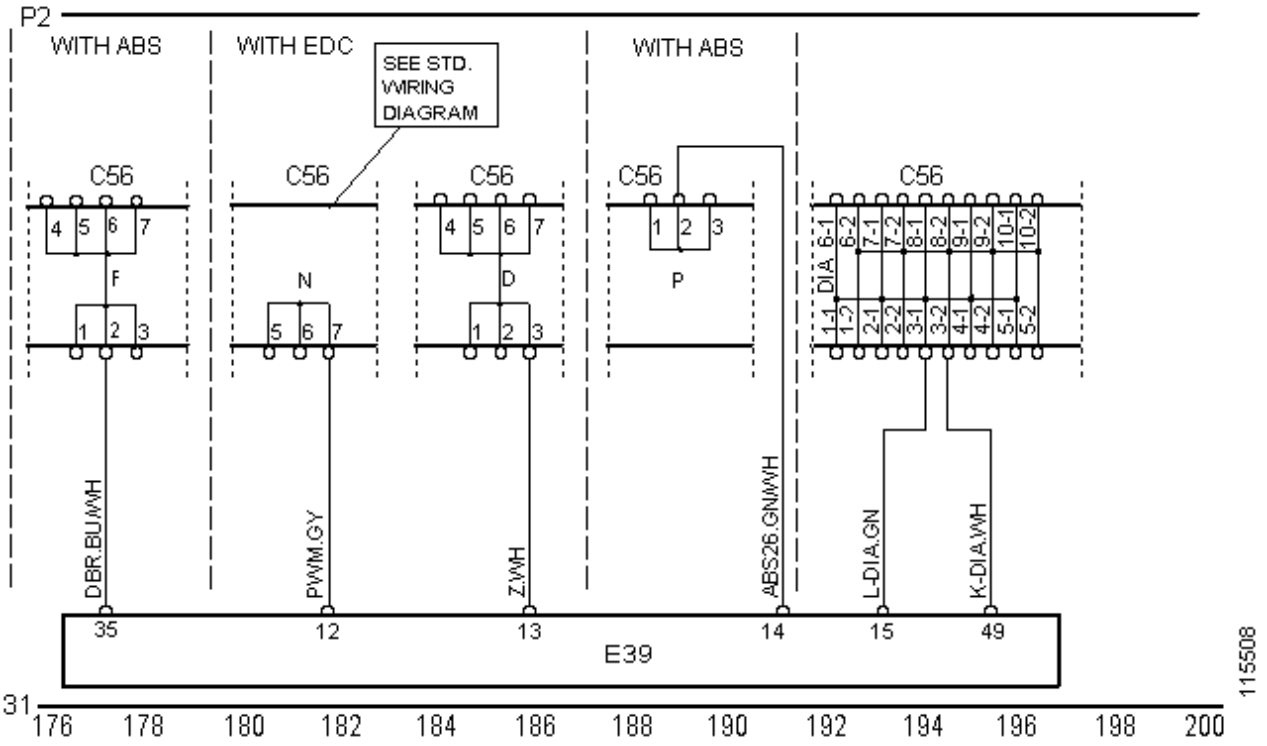


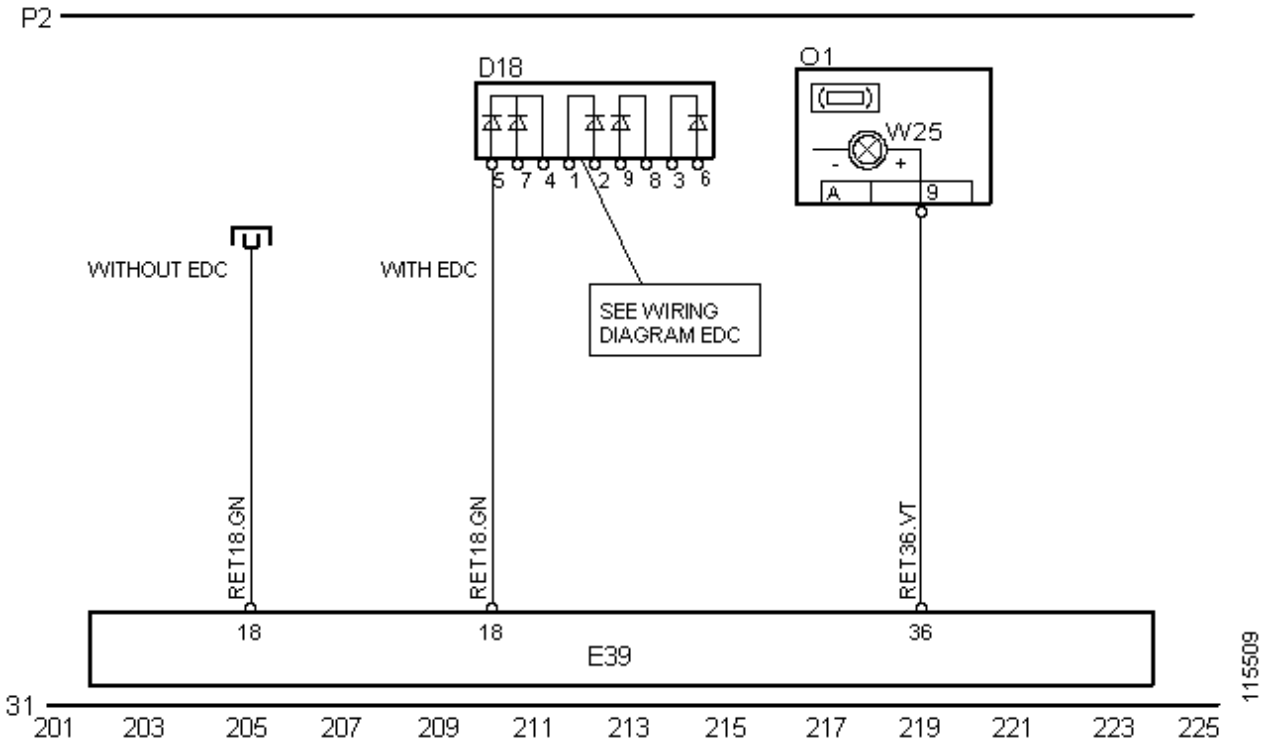




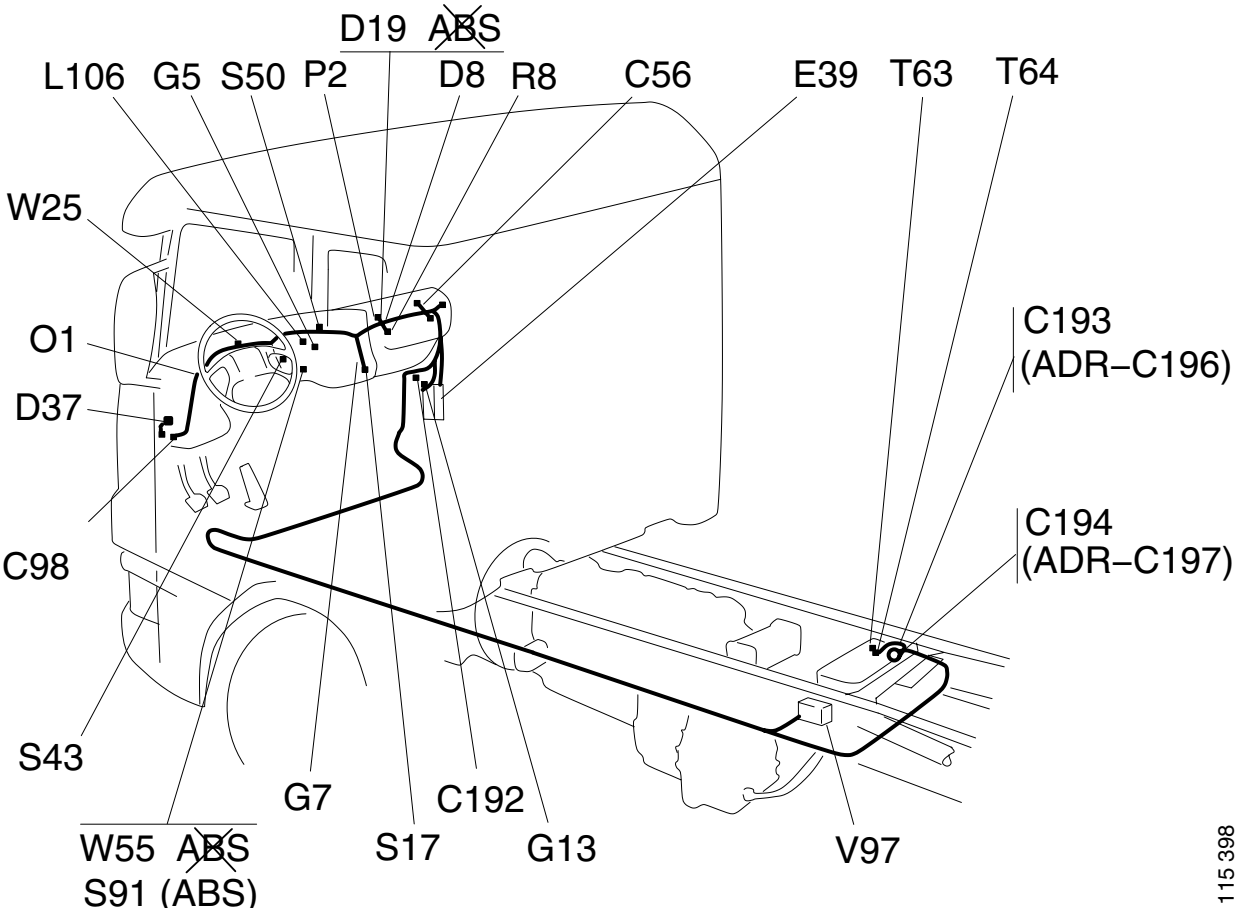








Wiring diagrams for 4-series trucks from August 1999



Location drawing for 4-series trucks from August 1999.

A new cable harness is introduced for Scania Retarder from August 1999. The main change is that the proportional valve for retarder control, the solenoid valve for retarder compressed air supply and the solenoid valve for the retarder's oil accumulator are now located in a unit with the component name V97. Previously, these three components were all separate and designated V74, V75 and V76.

The proportional valve is connected between V97-1 and E39-2 and also between V97-2 and E39-38.

The solenoid valve for retarder compressed air supply is connected between V97-3 and E39-53 and also between V97-4 and G13-2.

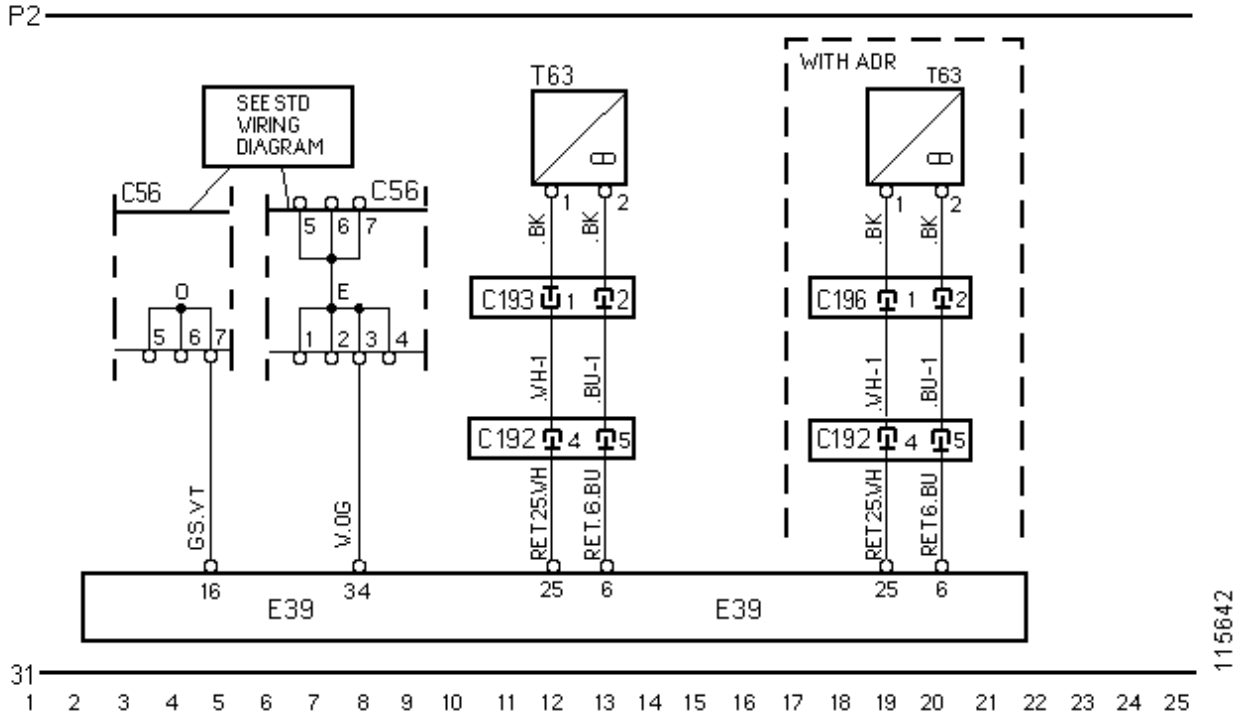
The solenoid valve for the retarder's oil accumulator is connected between V97-5 and E39-52 and also between V97-6 and G13-2.

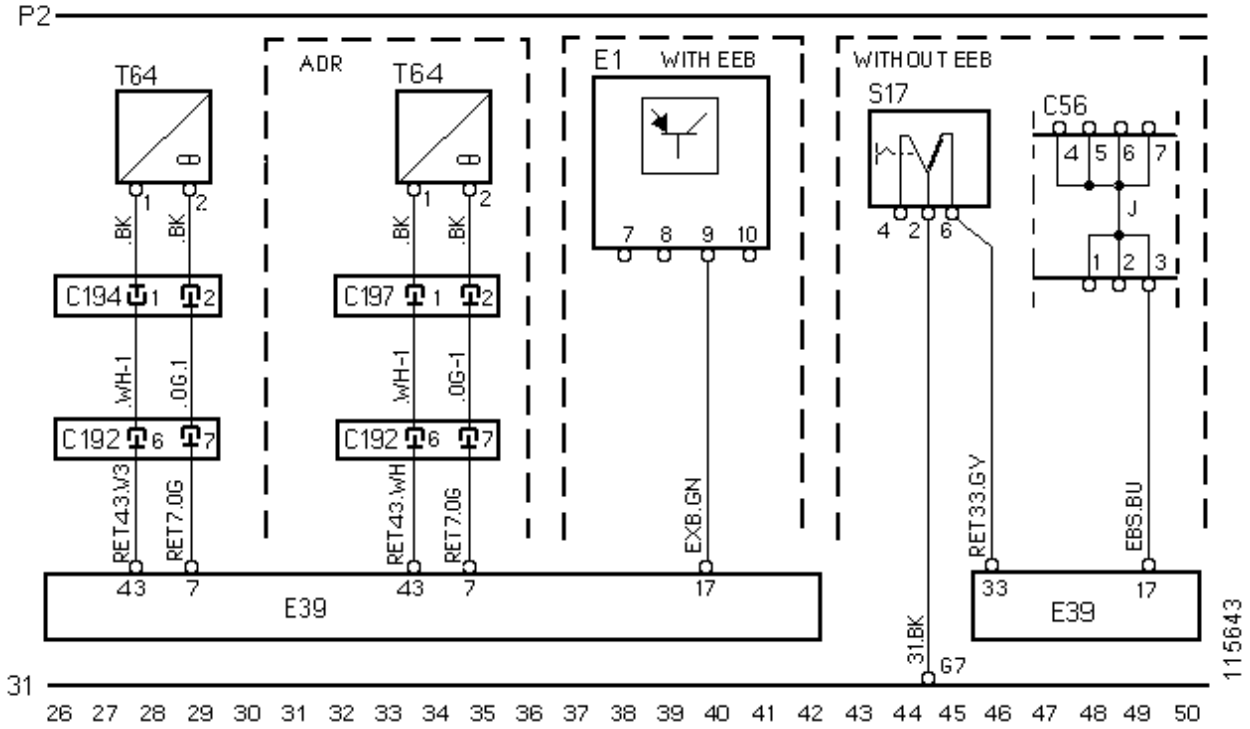
The following are other components which have new designations or been modified in the new cable harness:

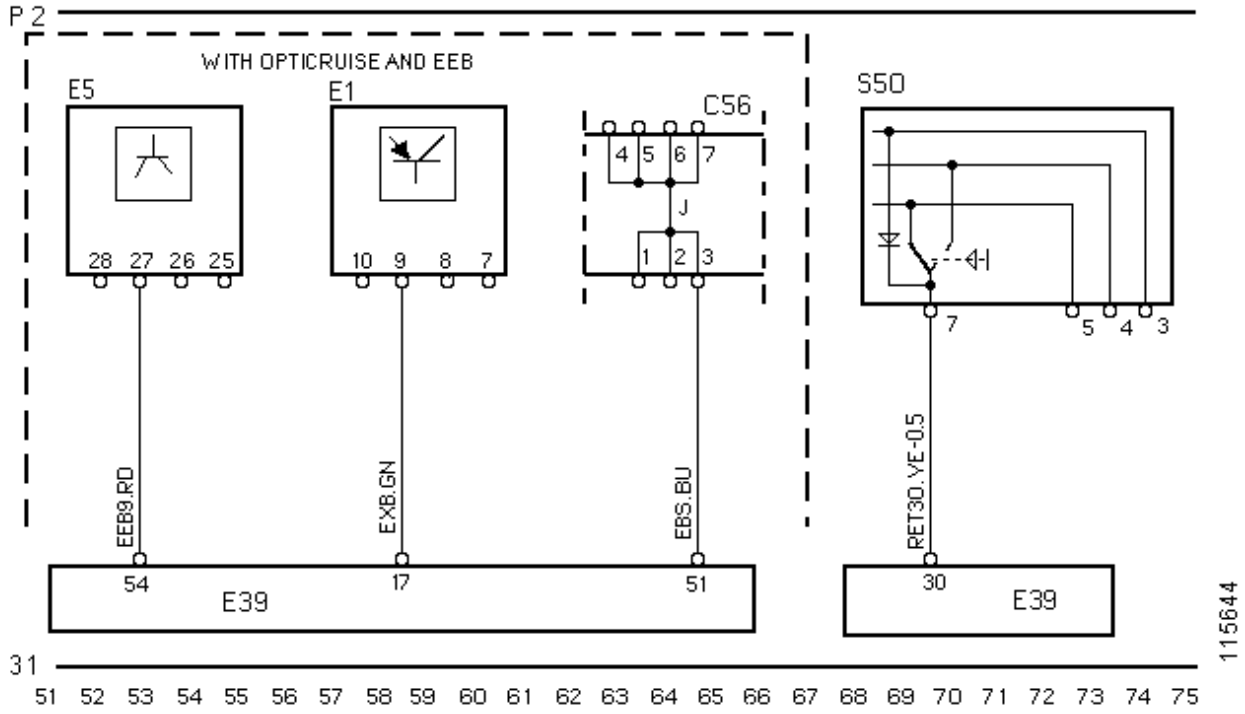
- Diagnostics switch S96 has changed designation to S50.
- Hand lever for retarder with ABS/EBS S43/45 has changed designation to just S43.
- Connector C72 has been removed.
- Ground connection G7 has been added.

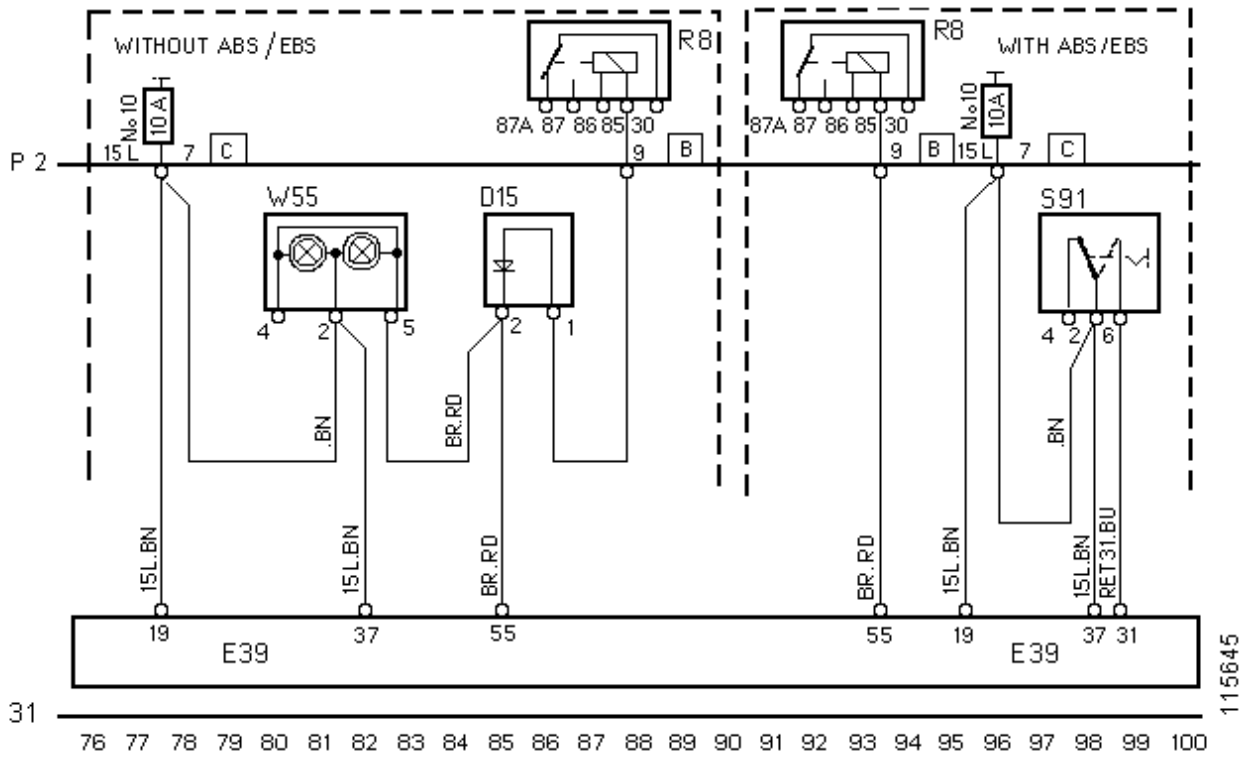
Refer to connection diagrams in Group 16

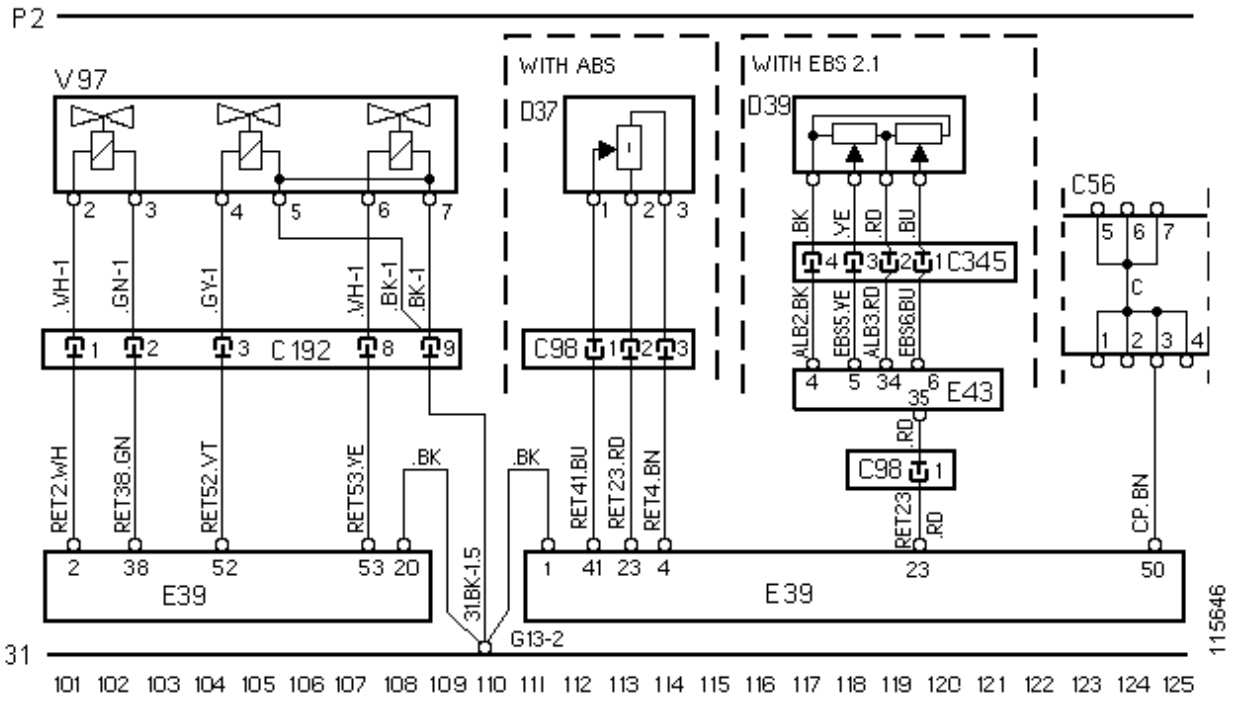
- Trucks from August 1999: 16:14-34 (connection diagram).
- The wiring diagram for the automatic exhaust brake EEB has been given the publication number 16:04-54.
- The wiring diagram for the exhaust brake EXB with automatic retarder unit has been given the publication number 16:14-53.

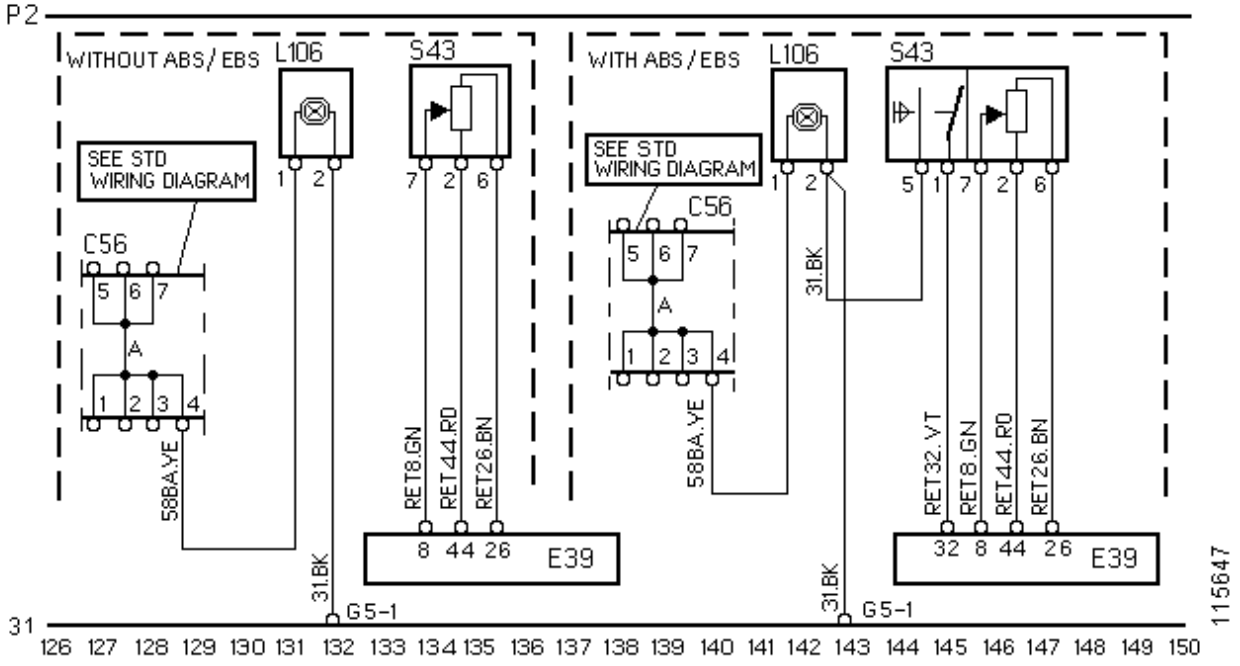


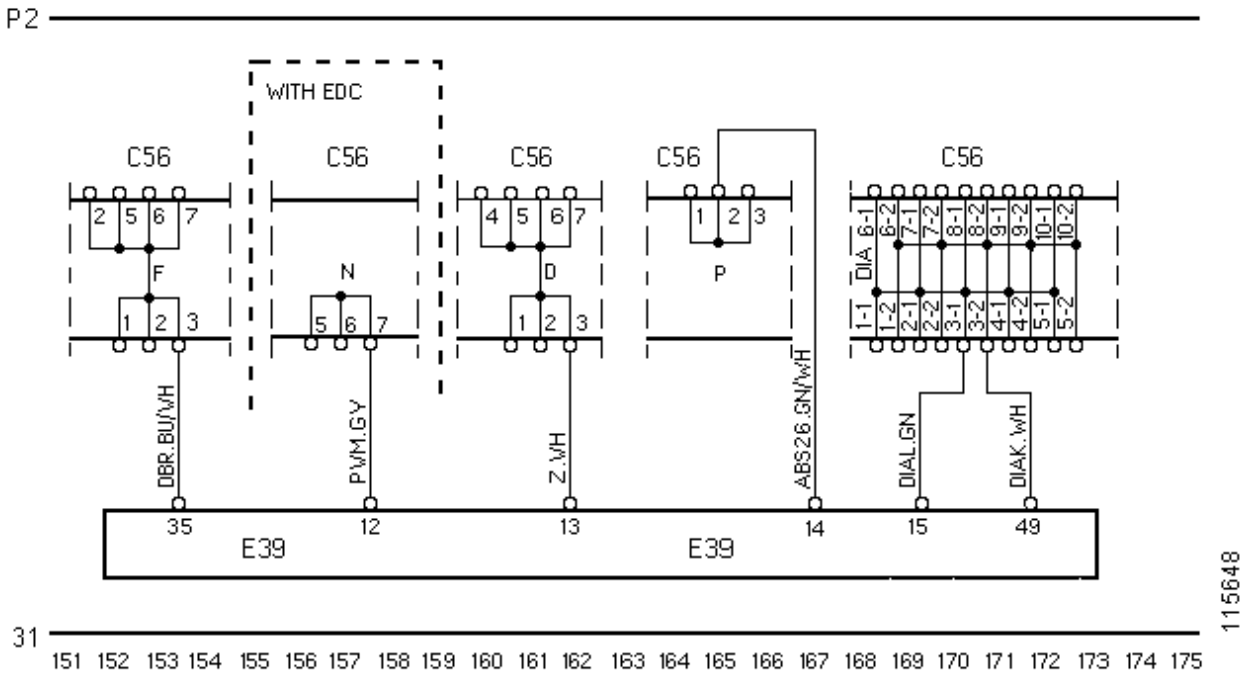


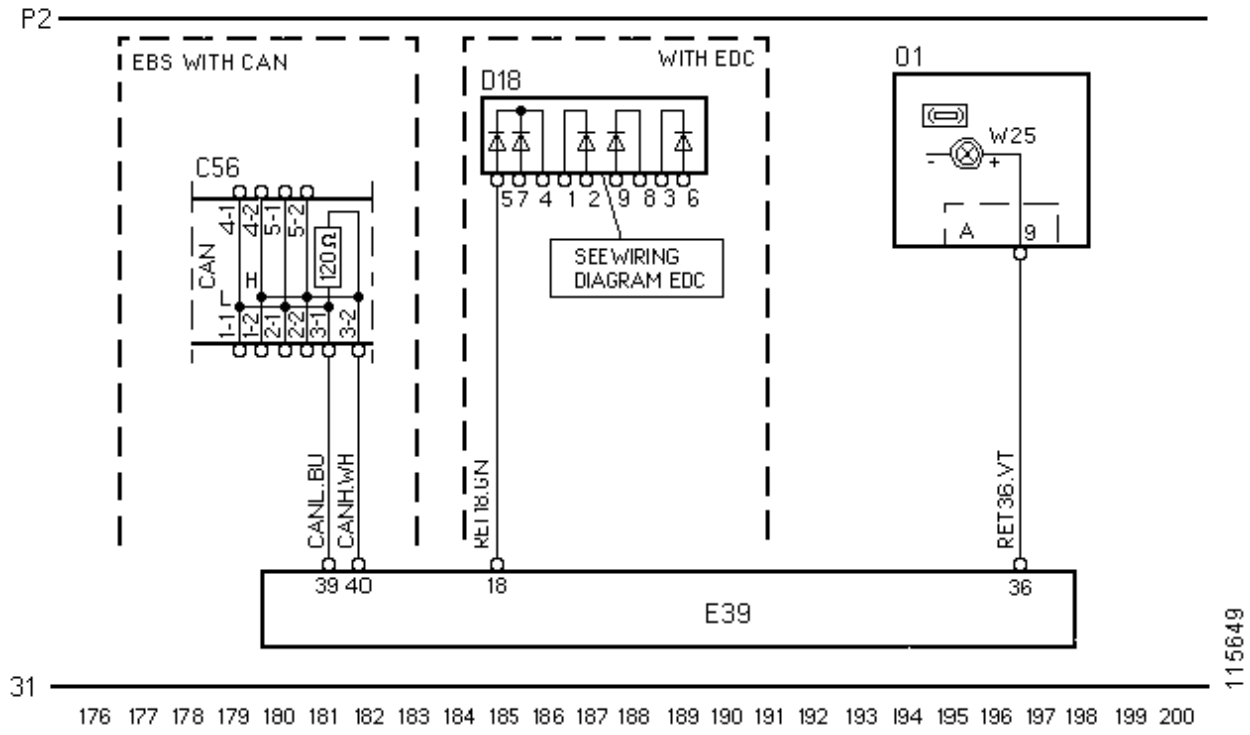








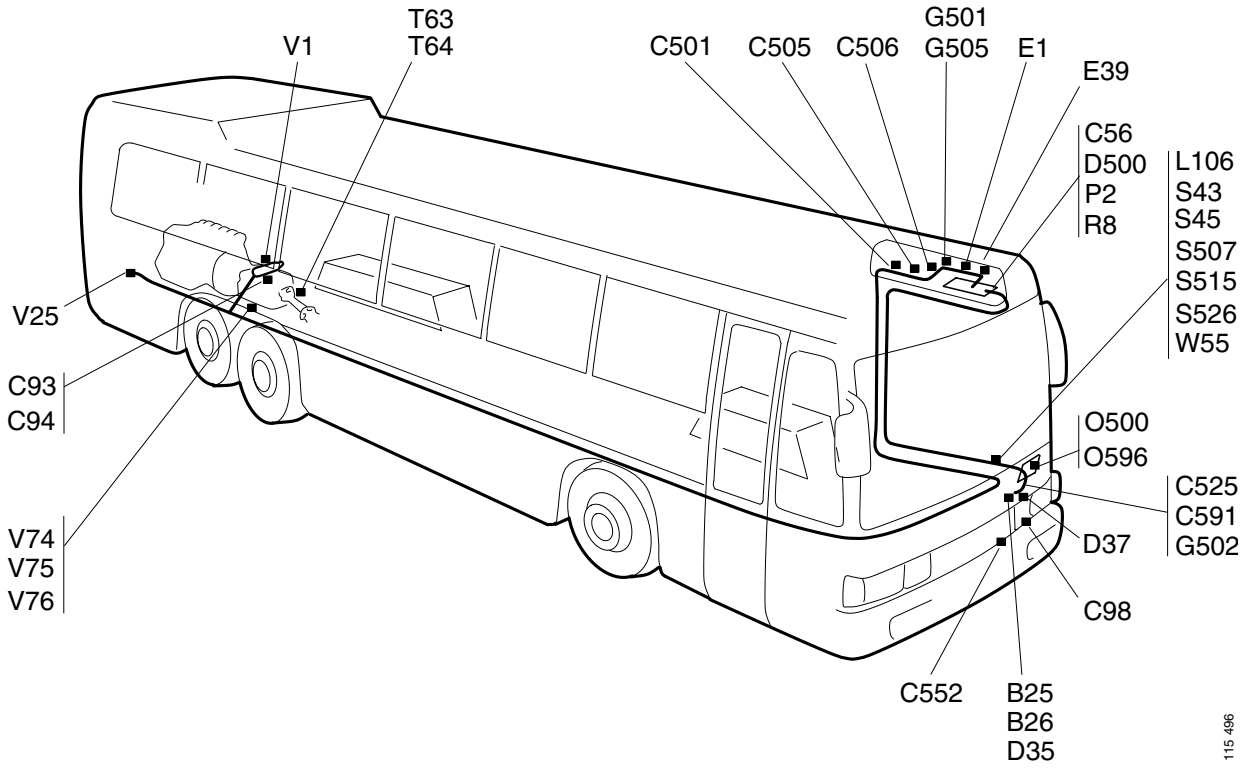




Location of electrical components in buses

The location drawings for the electrical components of the auxiliary brake system in 4-series buses are basic drawings and apply to all equipment variants and to both left-hand drive and right-hand drive vehicles.

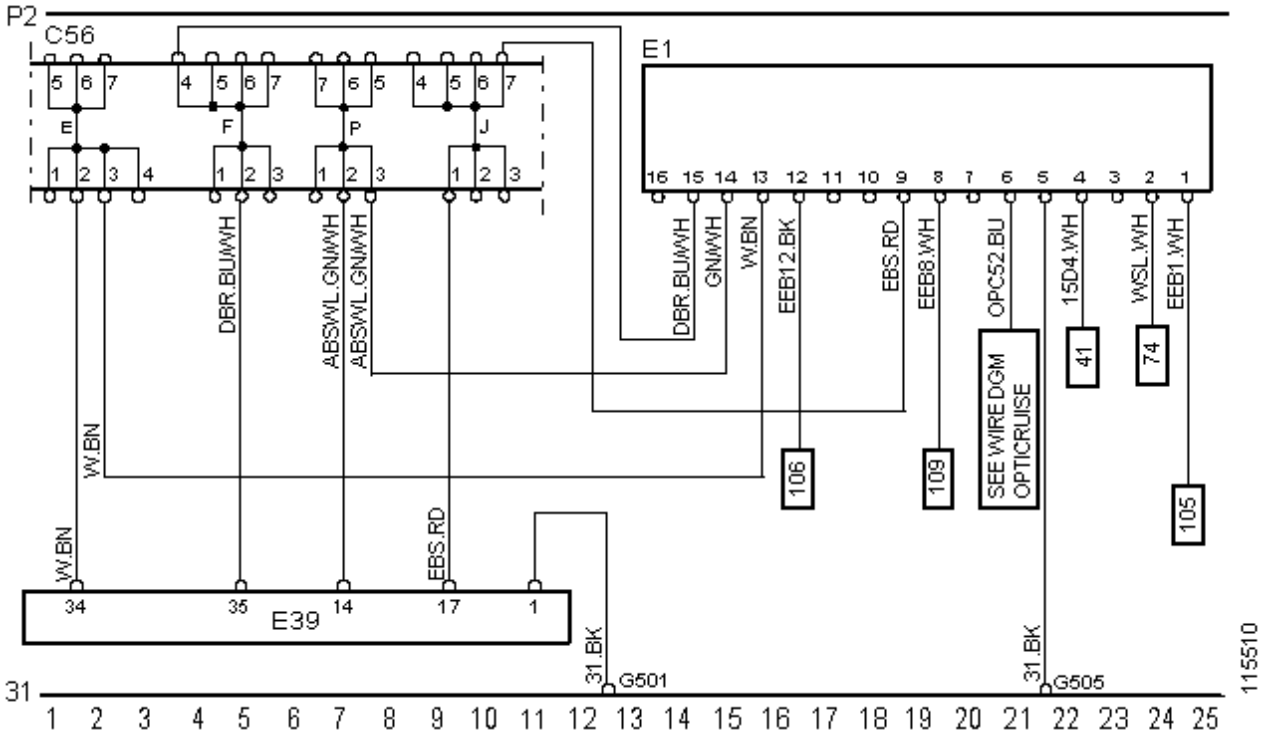
Wiring diagrams for 4-series buses prior to October 1999

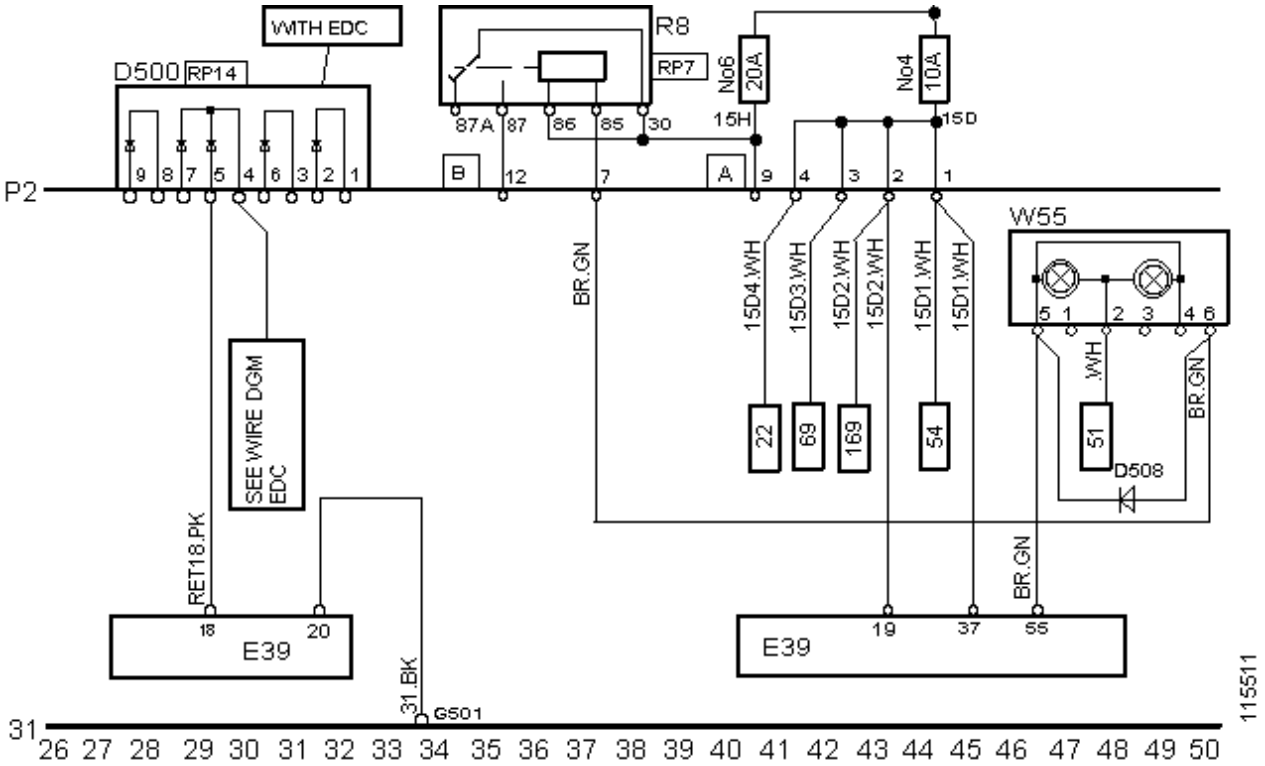


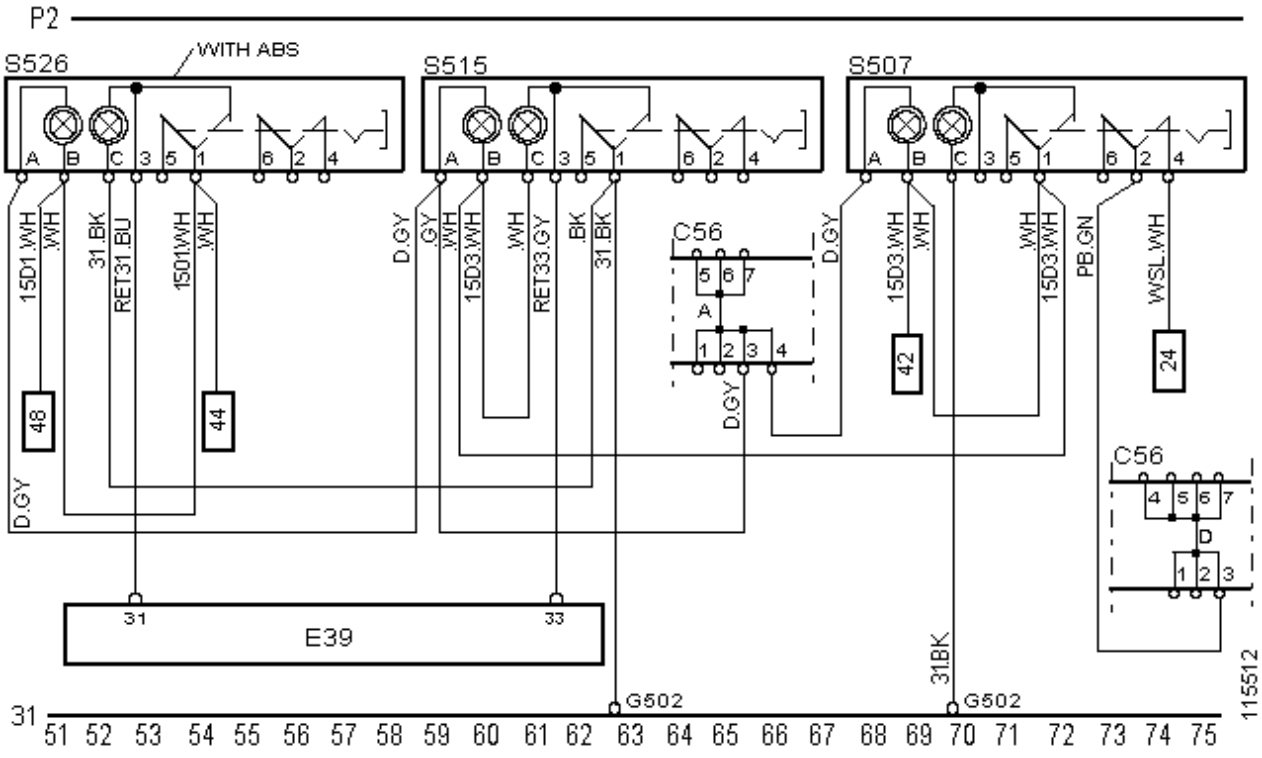
Location drawing for 4-series buses prior to October 1999.

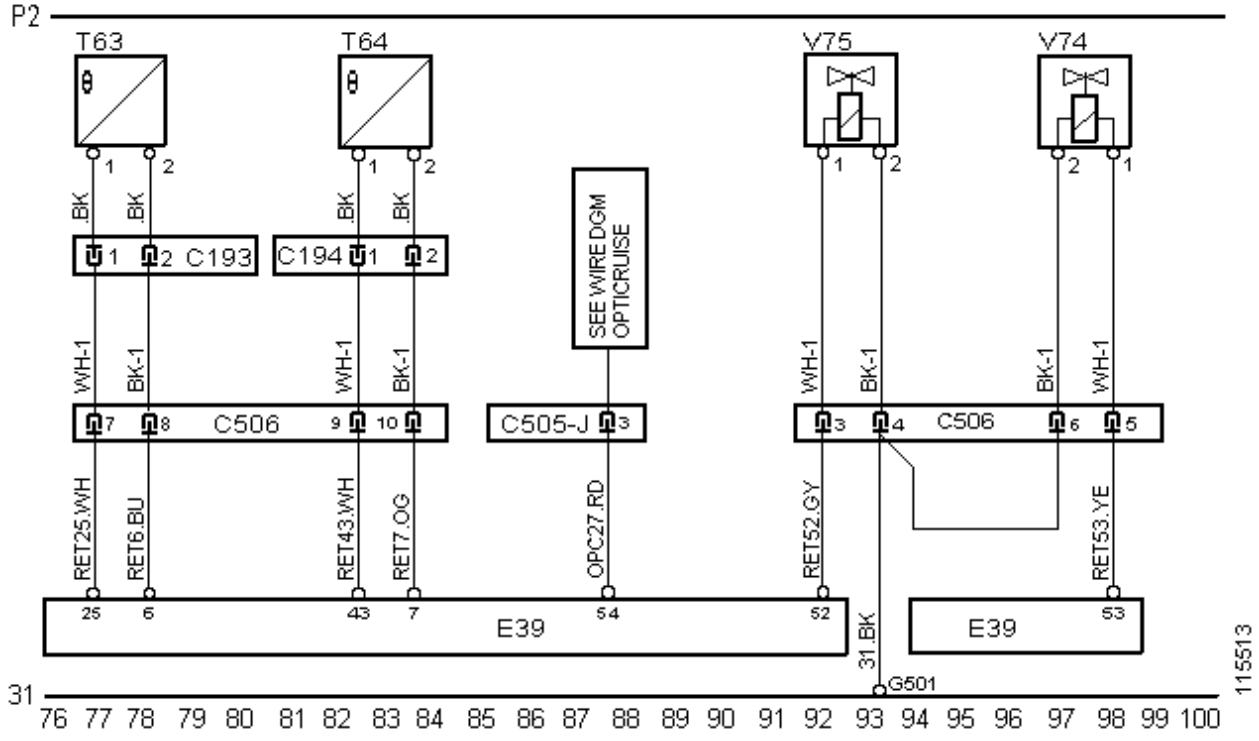
Refer to connection diagrams in Group 16

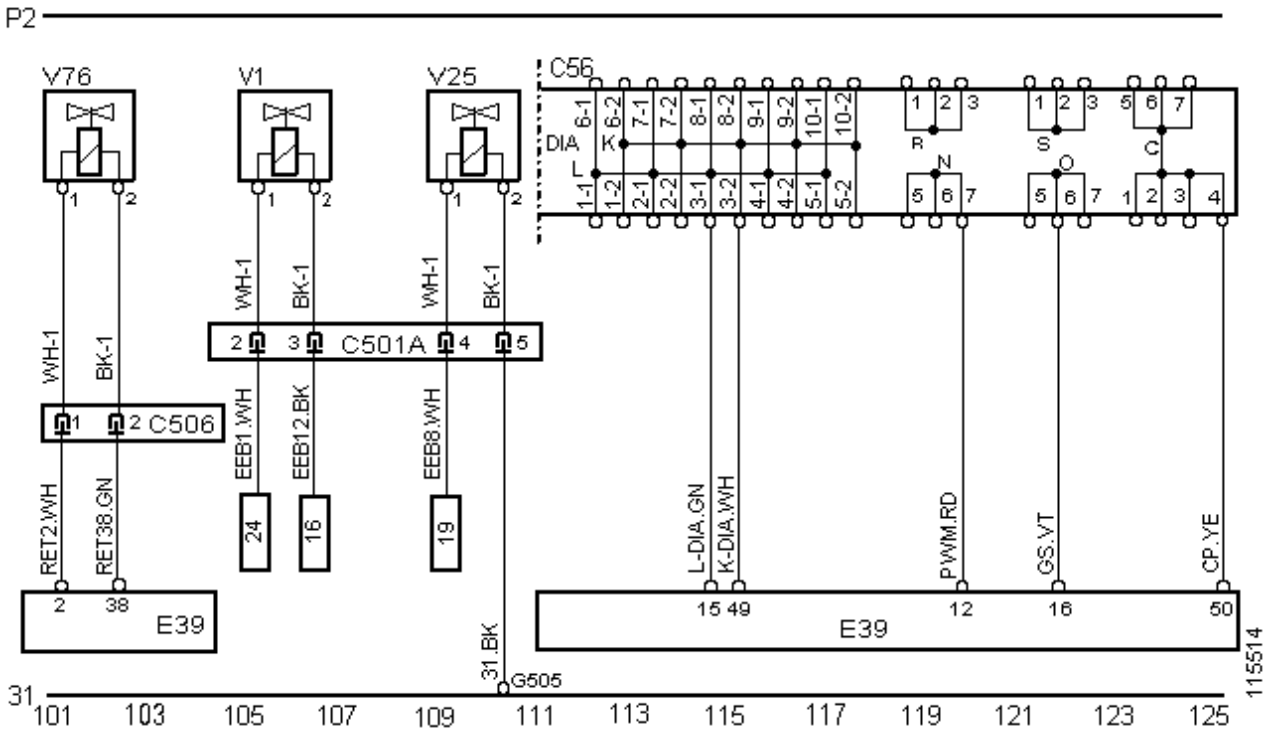
- Bus with Scania Retarder: 16:54-33.
- Bus with electronic exhaust brake control: 16:54-30.

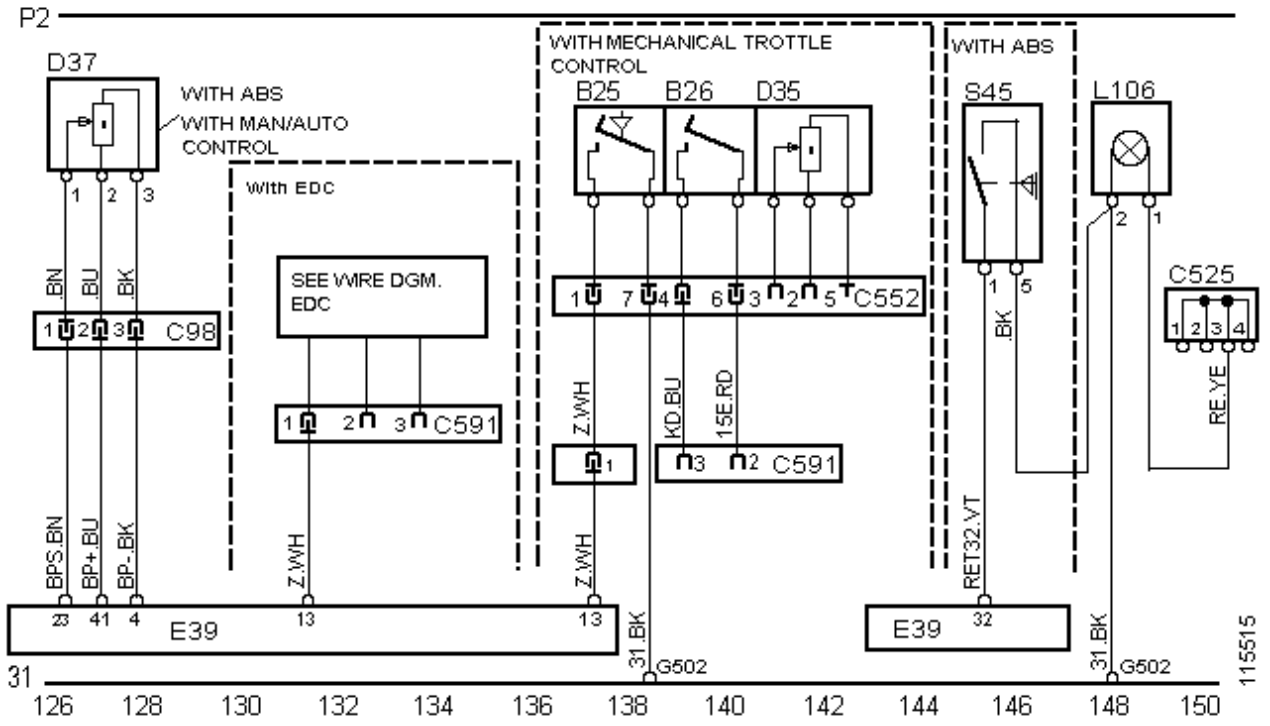


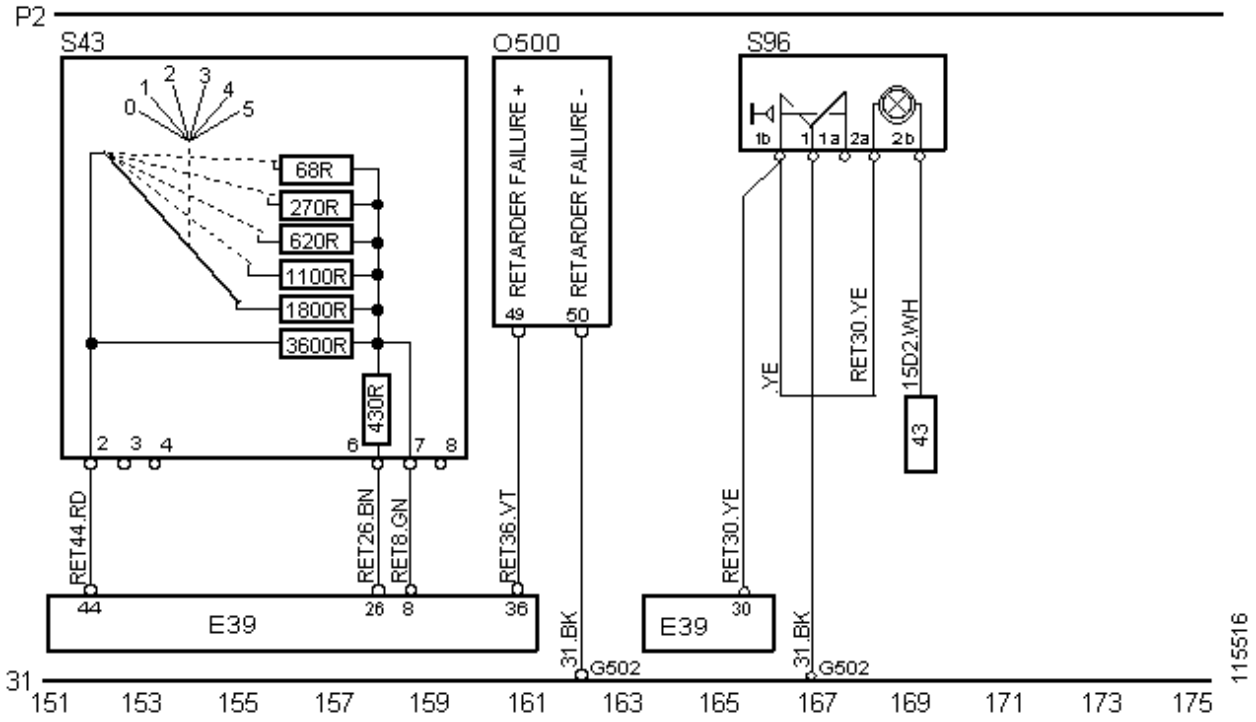




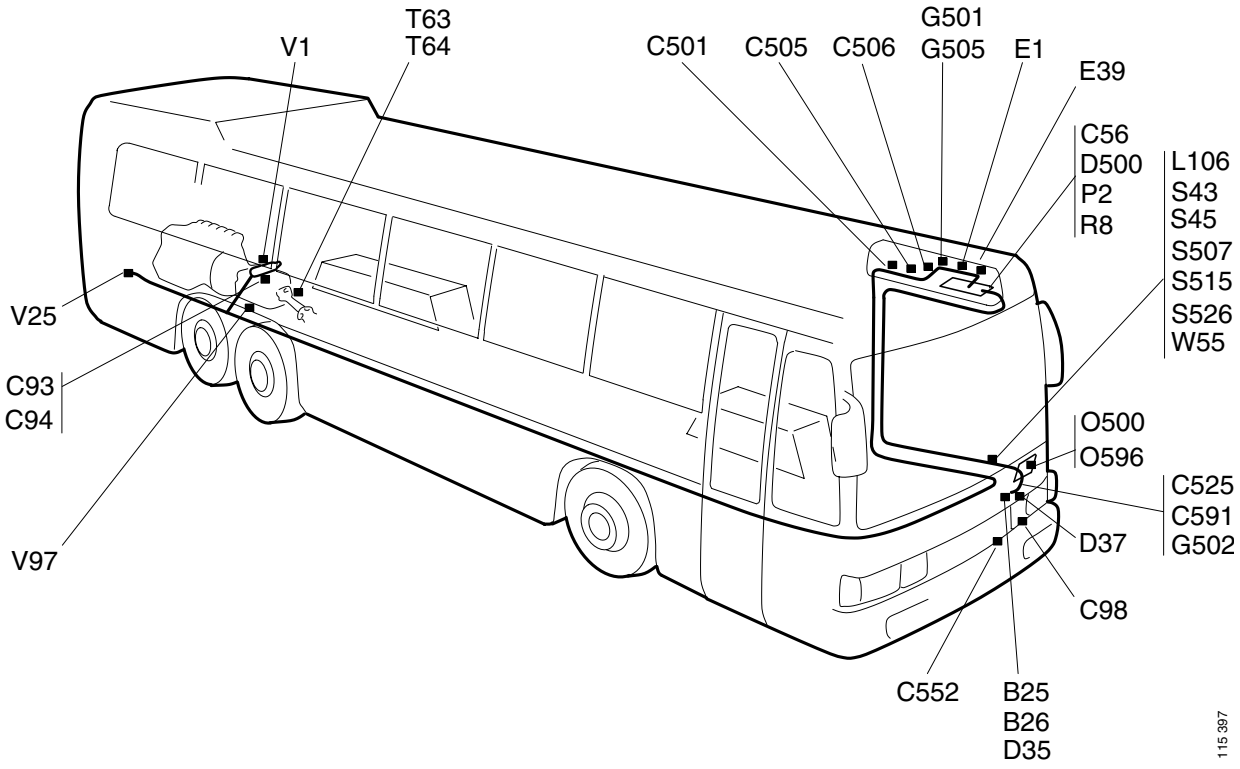








Wiring diagrams for 4-series buses from October 1999



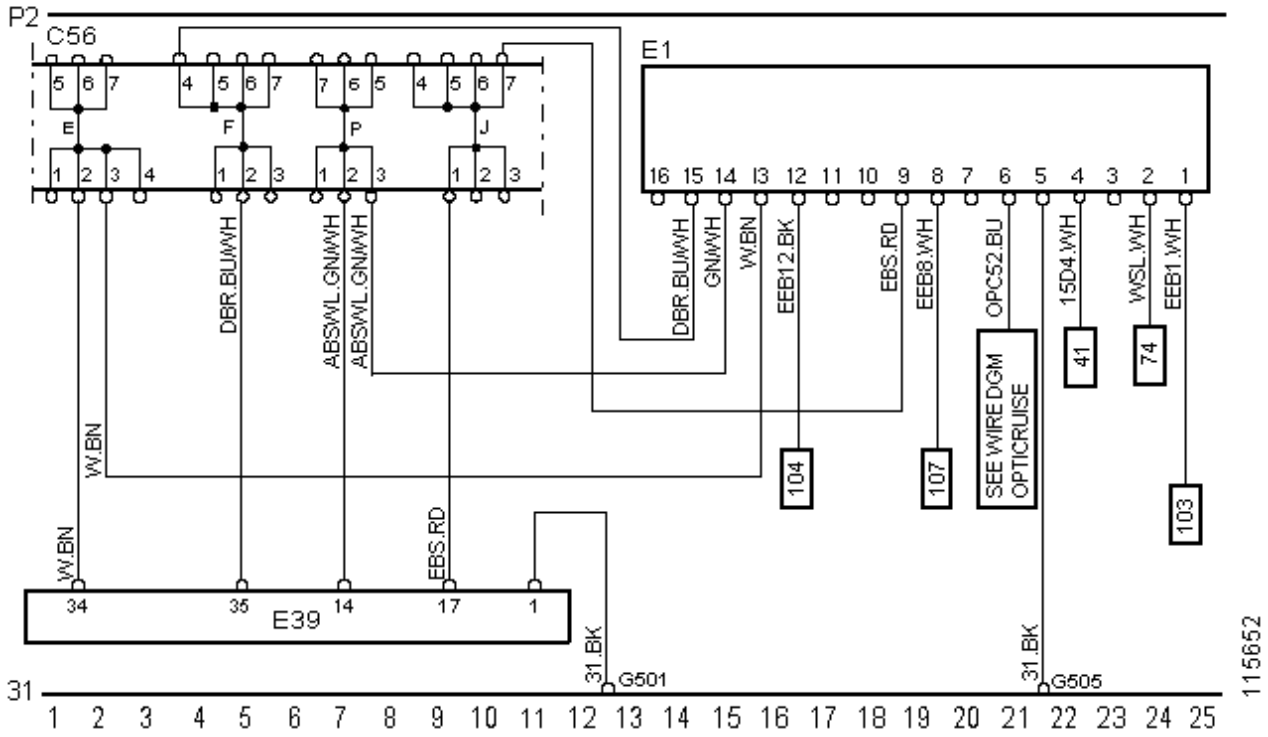
Location drawing for 4-series buses from October 1999.

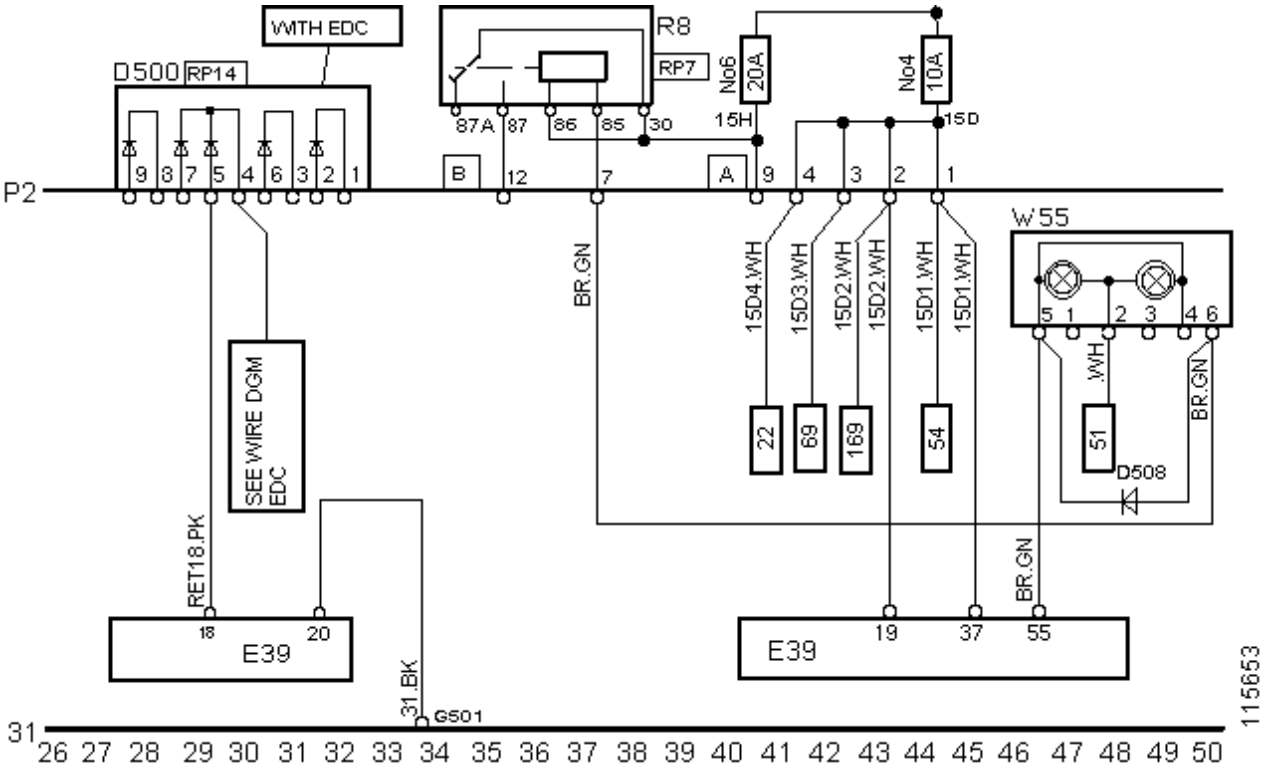
The cable harness for Scania Retarder has been modified from October 1999. The proportional valve and solenoid valves V74, V75 and V76 are now located in a unit V97, as is the case with trucks.

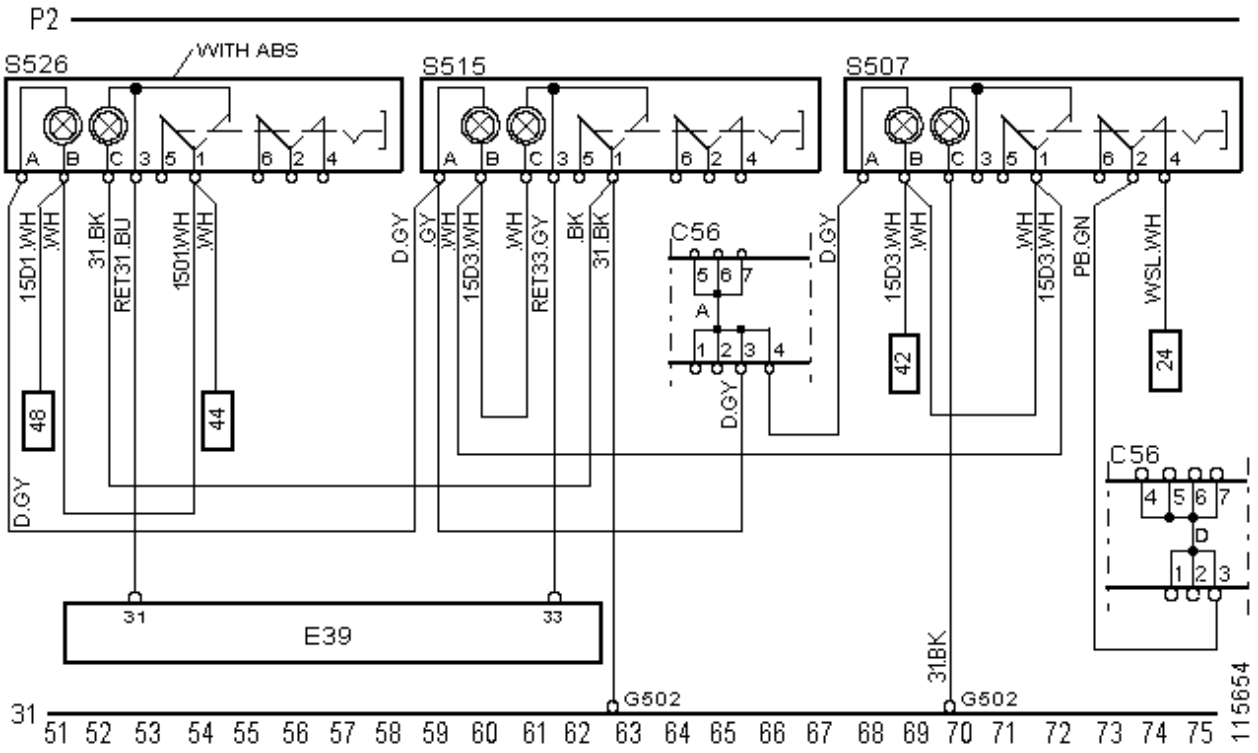
No further changes have been made in the cable harness.

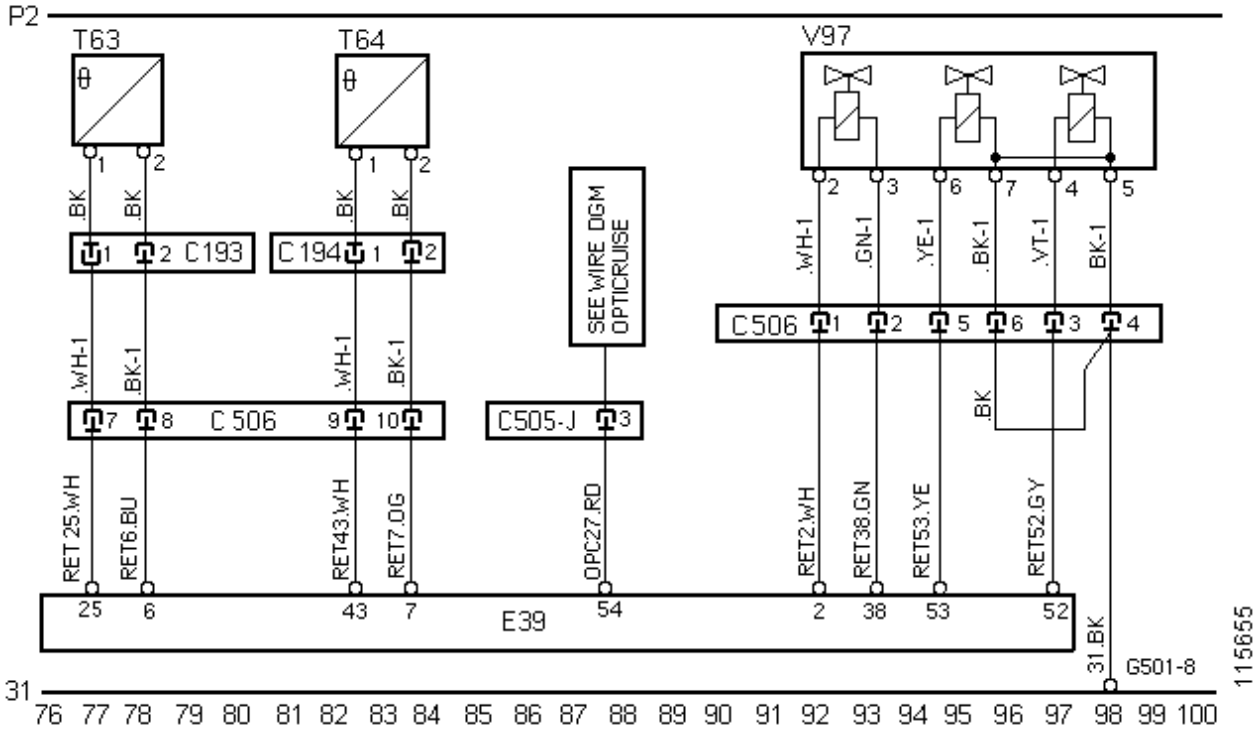
Refer to connection diagrams in Group 16

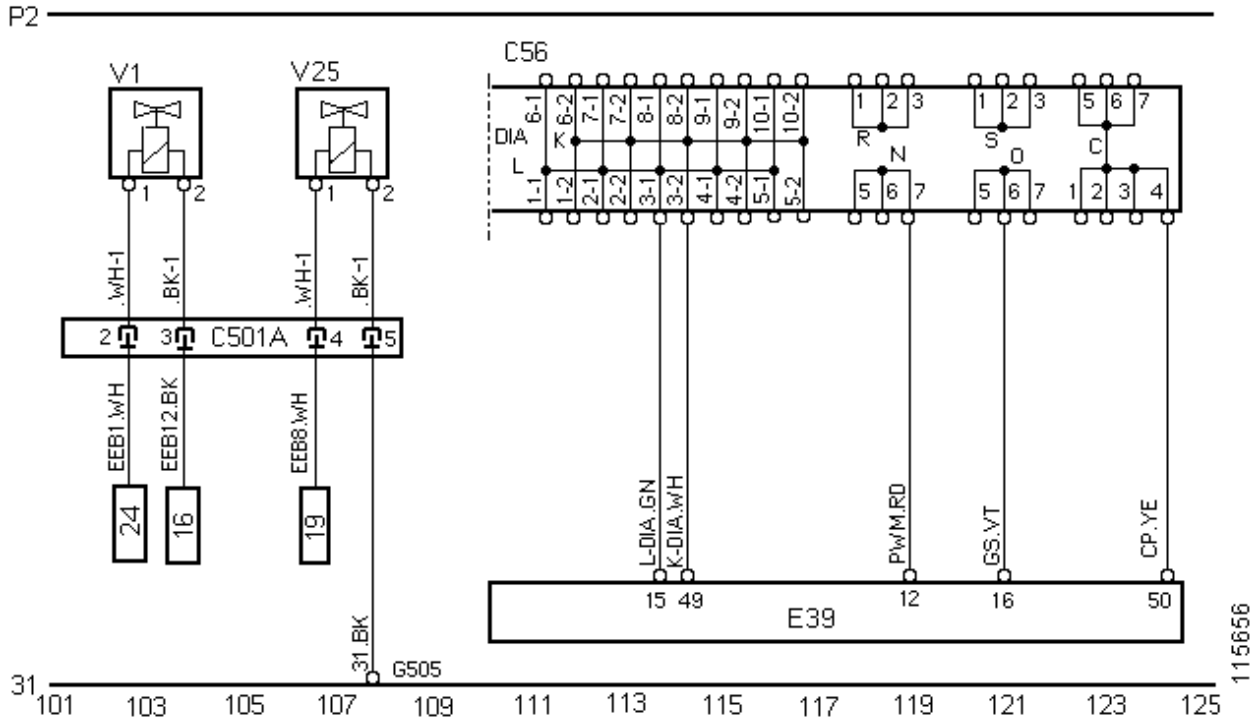
- Bus with Scania Retarder 16:54-33.
- Bus with electronic exhaust brake control 16:54-30.

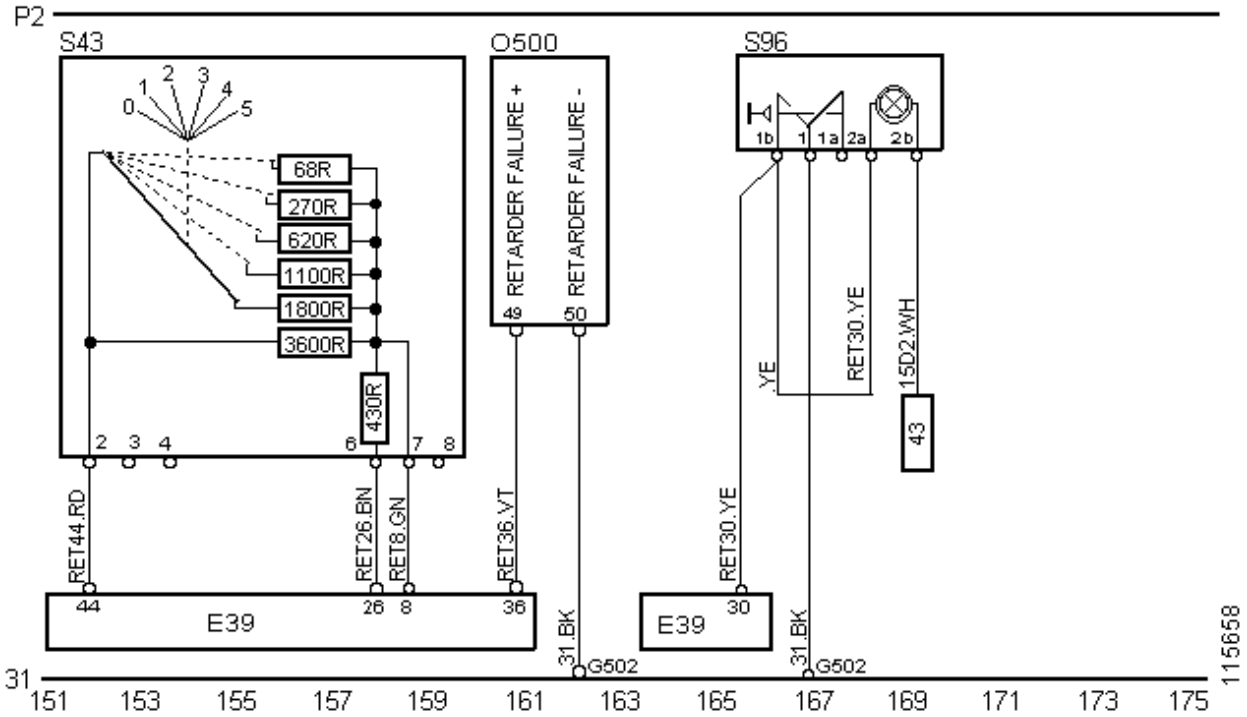


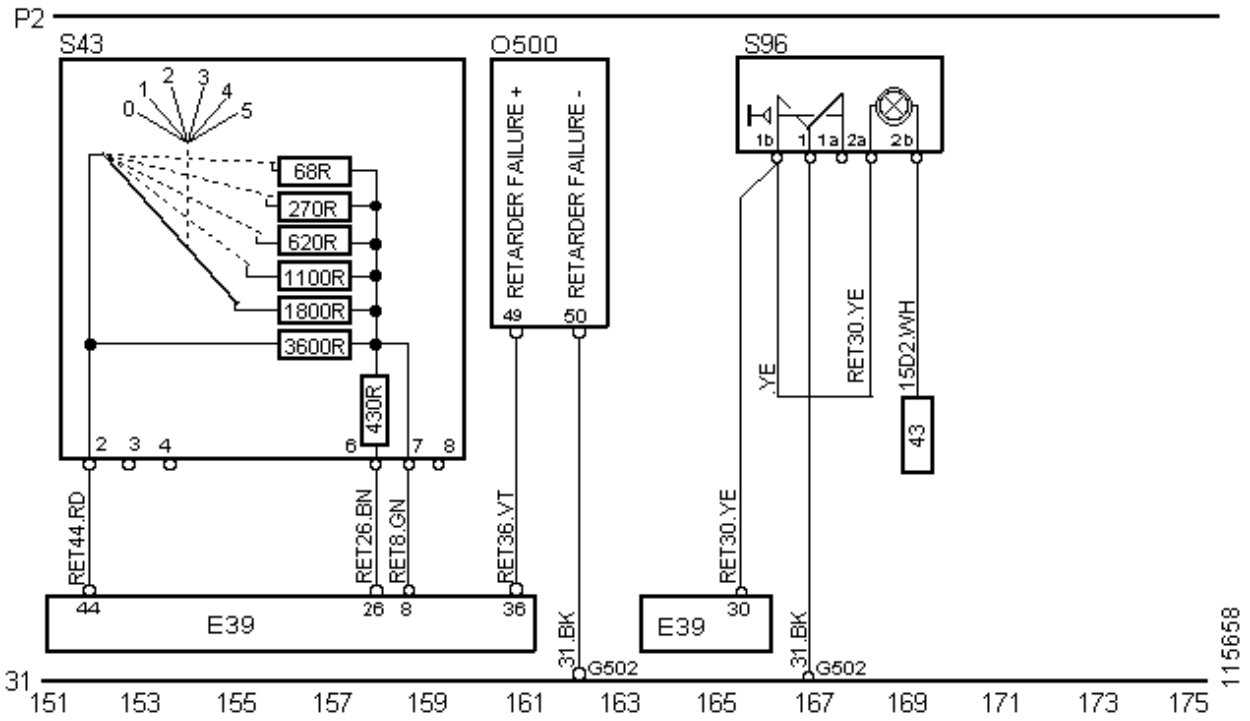












Retarder

Configuration codes

Control units prior to November 1999

The configuration codes consist of 3 digits. The digits are flashed out as follows:

1st digit — 1.5 s pause — 2nd digit — 1.5 s pause — 3rd digit — 4.5 s pause (end). After that follow any fault codes.

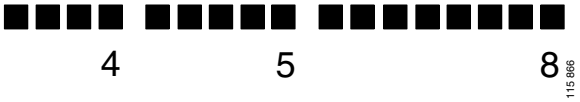
Note: Incorrect configuration will always result in reduced performance and/or service life!

Standard versions

Trucks equipped with ABS have configuration code 468.

Trucks without ABS have configuration code 453.

Buses with ABS have configuration code 458 (438 for early versions).



Buses without ABS have configuration code 453.

Control units from November 1999

Vehicles manufactured from November 1999 have a new retarder control unit with an extra configuration digit. The following can be configured using this fourth digit:

- Brake torque via CAN, (from EBS version 2.2 onwards).
- Engine fan control.

Note: This type of control unit is introduced as a spare part for both trucks and buses from November 1999. However, buses must not be configured with EBS CAN. If a bus is configured using "Brake torque via CAN (from EBS version 2.2 onwards)", troubleshooting must be carried out immediately and the control unit reprogrammed using Scania Programmer.

The digits are flashed out as follows:
1st digit-1.5 s pause - 2nd digit - 1.5 s pause - 3rd digit - 1.5 s pause - 4th digit - 4.5 s pause, (end). After that follow any fault codes.

Standard versions:

Trucks equipped with ABS have configuration code 4681.

Trucks with EBS via CAN have configuration code 4682.

Trucks without ABS/EBS have 4531.

Buses with ABS have 4581.

Buses without ABS have 4531.

Significance of configuration codes

First digit[a]	
1	Max. retarder torque 2400 Nm, of which 1500 Nm before the wheel brakes are applied
2	Max. retarder torque 3000 Nm, of which 1500 Nm before the wheel brakes are applied
3	Max. retarder torque 2400 Nm, of which 2000 Nm before the wheel brakes are applied
4	Max. retarder torque 3000 Nm, of which 2000 Nm before the wheel brakes are applied

Second digit	
1	Without automatic downhill speed control, 300 kW retarder power
2	With automatic downhill speed control, 300 kW retarder power
3	Without automatic downhill speed control, 400 kW retarder power
4	With automatic downhill speed control, 400 kW retarder power
5	Without automatic downhill speed control, 500 kW retarder power
6	With automatic downhill speed control, 500 kW retarder power
7	Without automatic downhill speed control, the retarder power is controlled automatically
8	With automatic downhill speed control, the retarder power is controlled automatically

Third digit	
1	Without hand lever operation, without brake pedal operation, without manual downhill speed control
2	Without hand lever operation, with brake pedal operation, without manual downhill speed control
3	With hand lever operation, without brake pedal operation, without manual downhill speed control
4	With hand lever operation, with brake pedal operation, without manual downhill speed control
5	Without hand lever operation, without brake pedal operation, with manual downhill speed control

Third digit	
6	Without hand lever operation, with brake pedal operation, with manual downhill speed control
7	With hand lever operation, without brake pedal operation, with manual downhill speed control
8	With hand lever operation, with brake pedal operation, with manual downhill speed control

Fourth digit[b]	
1	Without Brake torque via CAN, from EBS version 2.2, without Engine fan control.
2	With brake torque via CAN from EBS version 2.2, without Engine fan control.
3	-
4	-
5	With Engine fan control, without Brake torque via CAN.
6	With Engine fan control, with Brake torque via CAN, from EBS version 2.2.

a: Control units on trucks manufactured from 9911 may have configuration Brake torque via CAN (from EBS version 2.2 onwards). The application of wheel brakes and retarder is then controlled entirely by EBS when the brake pedal is activated, and therefore no brake pedal characteristics are configured for these vehicles. Note that this type of control unit is introduced as a spare part for both trucks and buses from 9911.

b: Vehicles manufactured from 9911 and onwards have a new retarder control unit with one more configuration digit. This type of control unit is introduced as a spare part for both trucks and buses from 9911. The control unit should only be configured according to the table, if other configurations are present this must be changed using Scania Programmer.

Fault codes

General

The control unit acts according to specific instructions. When it detects a fault, or anything it interprets as abnormal, it reacts and generates fault codes.

It is not only genuine faults that lead to the generation of fault codes. It is sufficient for someone to have disconnected a cable while the power was switched on. The control unit would then think that a fault had arisen and generate a fault code.

In cases of loose connections the fault may no longer be present; but the fault code is stored in the control unit memory until it is erased. It is then possible to see in which circuit the fault occurred and look for its cause there, even if the fault is not present at that time.

The control unit also stores information on how many times the fault has occurred, but SD (PC with troubleshooting software) is needed to read this information.

Note: Faults occur most commonly outside the control unit.

Misleading fault codes are rare and are not normally attributable to the control unit itself.

It should not be possible for misleading fault codes to occur in a non-faulty control unit which is protected against external interference.

One would imagine that inductive sensors, for example, would react to external sources of interference such as radio signals or strong magnetic fields. However, measurements taken indicate that it is not possible for external sources to have such a strong influence on control units.

However, earth faults, corrosion and loose connections can always occur, regardless of how well made a conversion, addition or bus body otherwise seems to be.

Examples of faults which do not trigger fault codes

The table shows examples of faults which do not trigger fault codes.

Example

Symptom	Cause
No retarder braking at all.	Oil level too low or no speed signal at all. The control unit then believes that the vehicle is stationary.
The retarder can brake without hindrance although the EDC's cruise control is activated.	No PWM or CAN signal was present when the driver switched on the power. The retarder control unit believes that the vehicle has no EDC and acts accordingly.
The retarder can sometimes brake through automatic downhill speed control although the EDC's cruise control is activated.	Incorrectly adjusted clutch pedal switch which indicates depressed pedal even though it is in the released position.
The retarder can sometimes brake in spite of throttle actuation (not to be confused with the warming-up function).	Unreliable operation of the idling relay or incorrectly adjusted clutch switch.
Boiling in the cooling system at the same time as retarder power is weak.	Both temperature sensors are disconnected when power is turned on. The temperature sensors show 40°C in the rest position. Permissible braking power is halved below 50°C but boiling may occur all the same.
Retarder power too weak.	Oil level too low, incorrectly configured alternator frequency, wrong type of alternator or wrong pulley.
Retarder power excessive and boiling in the cooling system.	Incorrectly configured alternator frequency, wrong type of alternator or wrong pulley.
The fan control does not work.	The CAN message "request for fan control" is never sent by the retarder control unit to the EDC control unit. It is possible to check that the control unit is correctly programmed.

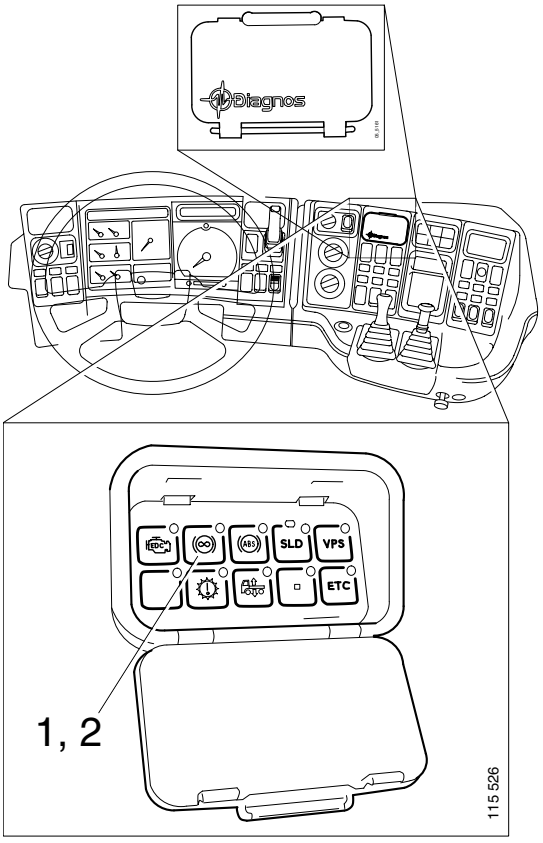
Reading fault codes

Diagnostic flash codes should be read whilst the vehicle is stationary. It does not matter if the engine is running or not.

Proceed as follows: Turn the starter key into the drive position and wait for a few seconds. Hold the diagnostic switch 1 depressed for at least 1 second and then release it.

The diagnostic lamp 2 then is out for 2 seconds and then starts to flash. The series of flashes are separated by distinct pauses.

The control unit configuration is shown first - refer to the heading Configuration codes - and this is followed by the fault codes. If no fault codes are stored, only the configuration code will be flashed.



The 3 or 4 digit configuration code is flashed out first - refer to the heading Configuration codes, for more information, followed by a pause of 4.5 seconds. The fault codes, each one consisting of 2 digits will then follow. The ten digit is flashed first, followed by the unit digit. The example on the right shows fault code 32 (with a 4-digit configuration code).

The fault codes are flashed out as follows:

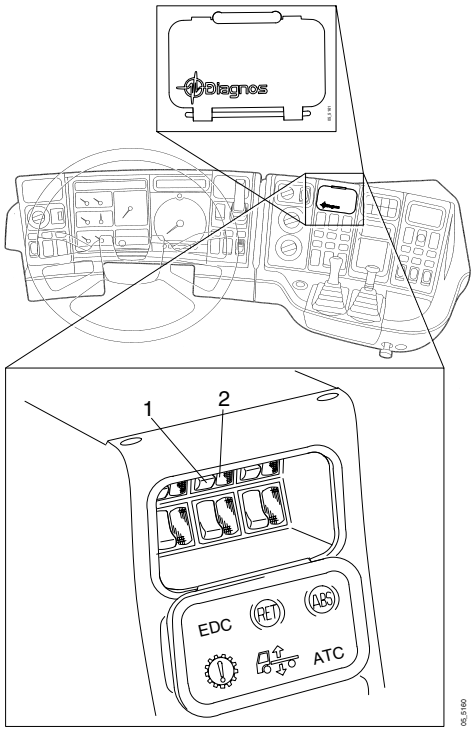
1st digit — 1.5 s pause — 2nd digit — 4.5 s pause — next fault code — next fault code and so on. The fault codes are flashed out in the order the faults occurred.

Diagnostic flashes may be repeated any number of times. Simply depress the diagnostic switch again. The fault codes remain in the control unit until deliberately erased.

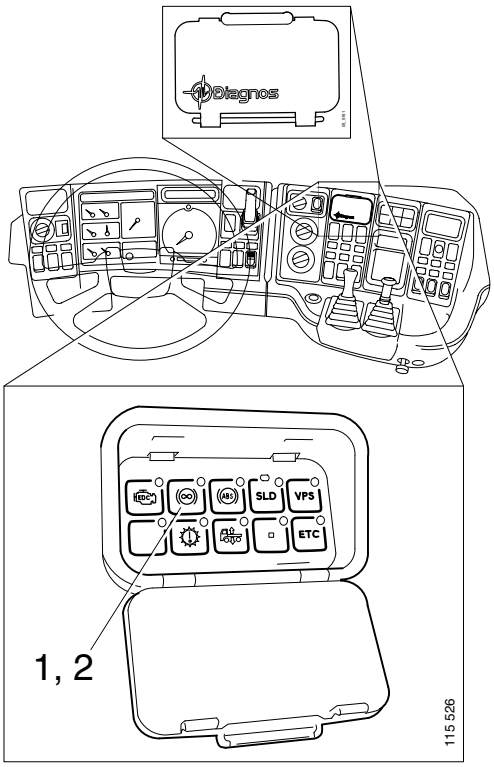
Erasing fault codes

When you have located and repaired the fault, the warning system must be reset. This also allows you to check the results before returning the vehicle to its owner.

Note: The vehicle may have to be driven for up to half an hour for certain fault codes to be generated.



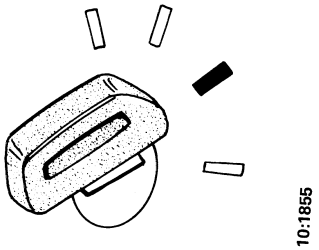
Old type of diagnostics panel up to 9910



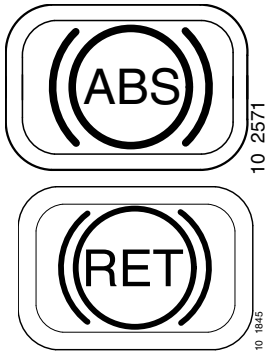
New type of diagnostics panel from 9911

Switch off the power using the starter key. Press in the diagnostic switch 1 and keep it depressed.

Turn the starter key to the drive position and wait for at least 3 seconds. The erasing is now complete.



Drive the vehicle and check that the ABS and RET lamps go out. If they don't, or if the RET lamp comes on again, despite repeated resetting, then a fault remains. The fault code indicates where to search for the fault.



Final erasure of fault codes using a PC.

Fault codes are stored in the order they are registered. It is also possible to see how many times a fault has occurred. This can be of use, for instance in the event of intermittent problems[1].

After completion of troubleshooting the fault codes should be finally erased using a PC and the command Erase fault codes.

1. That the flashing codes of the diagnostic lamp have been erased makes no difference.

List of fault codes

Scope and origin of the list

The following list of fault codes applies primarily to 4-series trucks with Scania Retarder. This list also applies to trucks and buses which — in addition to the retarder — are fitted with Opticruise or CS, EDC, ABS, ABS/TC and EBS.

These messages have been taken from the SD program for PC. For this reason, some references are made to the diagnostics computer and its options for rapid, correct troubleshooting.

For buses, it should not be possible to create the fault codes for CAN (61, 62 and 63), but if this happens for some reason, see also fault codes 61, 62 and 63 bus.

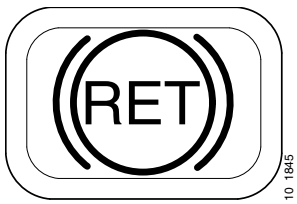
Numbering of fault codes

Fault codes 01-10, 20, 30, 40, 50 and 60 do not exist (the digit 0 cannot be flashed out using the diagnostics lamp).

Fault codes 23, 24, 38 and 45 are not used at present.

Warning lamp for the retarder

If a fault ceases, the warning lamp will often go out automatically. This may seem coincidental to some drivers, but has of course functional or safety reasons.



The fault code texts describe what happens with the warning lamp if the fault - which triggers the fault code in question - clears itself.

Remarks

The phrase "Switched off temporarily, otherwise erasure" in the following texts means that the warning lamp stays on as long as the fault is present, and it goes out if the fault clears. If the fault occurs again, the warning lamp is switched on more quickly. When the fault has been detected a sufficient number of times, the warning lamp does not go out until the fault code has been erased using a PC.

Erasing the fault codes also resets the original, longer, time limits for the alarms for the fault codes in question. See also under the heading Final erasure of fault codes using a PC.

Troubleshooting using fault codes

Fault code 11

Fault:

The signal for vehicle speed was present when the vehicle was being driven but disappeared so suddenly that braking cannot have been the cause.

Cause:

Information about vehicle speed can no longer reach control unit pin 16, i.e. at first, the speed signal is present but later it is discontinued.

Remarks:

The retarder cannot brake as long as the fault is active. Should the signal return and show that the vehicle is in motion again, the warning lamp will go out and the retarder will start braking. The fault code will be retained in the control unit's memory, however. As long as the fault code remains in the control unit, the lamp will come on when the vehicle is stationary and not go out until the control unit receives the necessary speed signal.

Note: The fault code must be erased using a PC to prevent the lamp from lighting when driving.

Note: Fault code 11 is generated only if the signal is present at first and is then discontinued. If no signal is present when the vehicle first starts moving, fault code 11 will not be generated.

The warning lamp for the retarder goes out if the fault disappears.

Action

It is simplest to use the computer. Go to the input signal test. Drive the vehicle slowly and check that a propeller shaft speed greater than 0 is shown.

If this is not the case, and if the vehicle has Opticruise, the following may help: if Opticruise is working, the fault is somewhere between the Opticruise and the retarder control units. If the Opticruise is not working, the fault is between the Opticruise control unit and the actual gearbox.

Proceed as follows: check the engine speed sensor at the gearbox output shaft, connectors and wiring. If the vehicle does not have Opticruise, also check the engine speed monitor for overspeed protection.

Fault code 12

Fault:

No engine speed signal although the vehicle has come up to speed.

Cause:

Information on engine speed is not reaching control unit pin 34.

Remarks:

The full power of the retarder is limited as long as the fault persists. There is also a danger of the coolant boiling if the engine is run at low revs, as the coolant pump will then pump slowly.

Should the signal return and show that the engine is running, the retarder will start working at full power again. The fault code will be retained in the control unit's memory, however.

Note: Fault code 12 can be generated only when the control unit knows that the vehicle has come up to speed, otherwise the fault code would be generated every time the driver switches on the power.

The warning lamp goes out as soon as the signal returns while the vehicle is being driven. Conversely, when the engine is switched off the lamp will stay on until the fault code is erased. The signal W is obtained from the alternator and also used for the vehicle's tachometer. The signal is used here to judge the capacity of the cooling system at all times. For this reason, the alternator and pulleys must be of the correct type. Otherwise the braking power of the retarder may be reduced - without any fault codes being generated.

In any case it is not possible to fool the control unit into increasing available braking power by using the incorrect alternator or pulleys of the incorrect type. Changing the type of alternator or changing the pulleys to give a different ratio would necessitate changing the frequency of the W signal at 500 rpm in the control unit. This can only be done using Scania Programmer.

The warning lamp for the retarder goes out if the fault disappears.

Action

Check whether the vehicle's tachometer gives normal readings. If it does not, check the alternator's connections, drive belts and the alternator itself. Check the connectors and wiring up to the control unit. The engine speed signal goes to pin 34.

Fault code 13

Fault:

The control unit has detected a temperature difference of more than 10°C in the values from the two temperature sensors, and the highest value is greater than 75°C.

Cause:

One of the coolant temperature sensors, or its wiring up to control unit pin 25 or 43, is at fault.

Remarks:

The control unit chooses to believe the sensor showing the highest temperature, unless the sensor is short-circuited. If, however, the sensor is shorted, the control unit will choose the other sensor instead. The warning lamp goes out as soon as the difference in temperature is less than 10°C, or if the maximum value from either of the sensors is lower than 75°C. The fault code will be retained in the control unit's memory, however.

The warning lamp for the retarder goes out if the fault disappears.

Action

Check the sensors, connectors and wiring. If any of the sensors are shorted, fault code 14 or 15 should be present If so, rectify the shorted sensor before examining the wiring.

Fault code 14

Fault:

Short circuit in the circuit to temperature sensor 1.

Cause:

The voltage from temperature sensor 1 to the control unit (pin 25) is below 0.3 V. This is probably caused by a short circuit to earth in the sensor or its wiring.

Remarks:

The control unit ignores temperature sensor 1 as long as the fault persists and uses temperature sensor 2 instead. The warning lamp goes out if the fault clears up by itself. The fault code will be retained in the control unit's memory, however.

The warning lamp for the retarder goes out if the fault disappears.

Action

Check temperature sensor 1, the connectors and wiring.

Fault code 15

Fault:

Short circuit in the circuit to temperature sensor 2.

Cause:

The voltage from temperature sensor 2 to the control unit (pin 43) is below 0.3 V. This is probably caused by a short circuit to earth in the sensor or its wiring.

Remarks:

The control unit ignores temperature sensor 2 as long as the fault persists and uses temperature sensor 1 instead. The warning lamp goes out if the fault clears up by itself. The fault code will be retained in the control unit's memory, however.

The warning lamp for the retarder goes out if the fault disappears.

Action

Check temperature sensor 2, the connectors and wiring.

Fault code 16

Fault:

Short circuit in the circuit for the so-called MBP connection.

Cause:

Shorting at pin 54 or somewhere else in an external circuit which may be connected to pin 54.

Remarks:

This output on the control unit is used for requesting the Opticruise to switch to the engine brake program. The reason for this is to increase the flow of coolant in order to ensure full braking power. If no wiring is connected to pin 54, the fault is probably in the control unit.

The fault as such does not actually disturb the retarder itself but reduction of its braking power takes place unnecessarily often because the coolant then circulates too slowly. Automatic downshifting via Opticruise does not work.

The warning lamp stays on, even if the fault is no longer present, until the fault code is erased with the diagnostics switch.

The warning lamp for the retarder goes out only after erasure.

Action

If no wiring is connected to pin 54 but fault code 16 continues to be generated as soon as power is switched on, the control unit should be changed.

If wiring is connected to pin 54: check the Opticruise connectors, wiring and control unit. Finally, check the retarder control unit.

Fault code 17

Fault:

Short circuit in the exhaust brake circuit.

Cause:

Short circuit in the circuit for the exhaust brake, its solenoid valve, or in the control unit's driver stage (pin 17).

Remarks:

The warning lamp stays on, even if the fault is no longer present, until the fault code is erased with the diagnostics switch.

Some truck drivers have asked that a standard foot-operated switch be installed for controlling the exhaust brake. Incorrect connection of such a switch could lead to the generation of fault code 17, as current would then be supplied to the control unit "from behind". Correct connection is described in Group 10 Scania Retarder, Work description, Installing a foot-operated switch. Foot-operated switches can be installed only in trucks.

The warning lamp for the retarder goes out only after erasure.

Action

Check the exhaust brake's solenoid valve, connectors and wiring. If a separate foot-operated switch is installed, check that it has been connected correctly: check that +24 V supply voltage is connected to the foot-operated switch input, and that the foot-operated switch output is connected to control unit pin 51. Finally, check the control unit.

Fault code 18

Fault:

The control unit detected a short circuit to +24 V when it attempted to turn on the brake lamps.

Cause:

Short circuit in the brake lamp's circuit or in the control unit's driver stage (pin 55),

Remarks:

The warning lamp stays on, even if the fault is no longer present, until the fault code is erased with the diagnostics switch.

The control unit output for the brake lamp (pin 55) is used to control the brake lamp relay. The output is earthing. The output must not be used for directly earthing the brake lamp bulbs; the brake lamp relay must be used. The indicator lamp which shows when the retarder or exhaust brake are braking is only available in standard version if the vehicle does not have ABS.

Some drivers have asked for such an indicator lamp to be installed also in vehicles equipped with ABS brakes. If such an indicator lamp is retrofitted it should be supplied with +24 V and connected to control unit pin 55. The lamp comes on when it is earthed via pin 55. Use an ordinary 1.2 W bulb.

In order to prevent the indicator lamp lighting when the brake lamp is lit by the brake pedal switch, a diode can, in certain cases, be connected in the circuit.

The warning lamp for the retarder goes out only after erasure.

Action

Check the brake lamp relay, connectors, wiring and brake lamp fittings. If an additional indicator lamp is retrofitted, check this and its wiring. Finally, check the control unit.

Fault code 19

Fault:

Short circuit making it impossible to use the accumulator.

Cause:

Short circuit in the circuit for the accumulator's solenoid valve or in the control unit's driver stage (pin 52).

Remarks:

If this fault occurs the retarder will not start working as promptly as it usually does. The warning lamp stays on, even if the fault is no longer present, until the fault code is erased with the diagnostics switch.

The warning lamp for the retarder goes out only after erasure.

Action

Check the accumulator solenoid valve, connectors and wiring. Finally, check the control unit.

Fault code 21

Fault:

The solenoid valve for compressed air supply to the proportional valve remains closed due to a short circuit.

Cause:

Short circuit in the circuit to the solenoid valve for supplying compressed air, its wiring or the control unit's driver stage (pin 53).

Remarks:

The retarder is not working. The warning lamp stays on, even if the fault is no longer present, until the fault code is erased with the diagnostics switch.

The warning lamp for the retarder goes out only after erasure.

Action

Check the compressed air supply solenoid valve, the connectors and wiring. Finally, check the control unit.

Fault code 22

Fault:

It is not possible to regulate the braking force due to a short circuit in the circuit.

Cause:

Short circuit in the proportional valve circuit, the wiring or the control unit's driver stage (pin 2).

Remarks:

The retarder is not working. Because of the short circuit, the proportional valve does not react when the control unit wants retarder braking to a certain requested extent.

The warning lamp stays on, even if the fault is no longer present, until the fault code is erased with the diagnostics switch.

The warning lamp for the retarder goes out only after erasure.

Action

Check the proportional valve, connectors and wiring. Finally, check the control unit.

Fault code 25

Fault:

It is not possible to use the accumulator due to a break in a circuit.

Cause:

Break in the circuit for the accumulator solenoid valve, its wiring or the control unit's driver stage (pin 51).

Remarks:

If this fault occurs the retarder will not start working as promptly as it usually does. The warning lamp stays on, even if the fault is no longer present, until the fault code is erased with the diagnostics switch.

The warning lamp for the retarder goes out only after erasure.

Action

Check the accumulator solenoid valve, connectors and wiring. Finally, check the control unit.

Fault code 26

Fault:

Impossible to allow compressed air to the retarder due to a break in a circuit.

Cause:

Break in the circuit to the solenoid valve for compressed air supply, the wiring or the control unit's driver stage (pin 53).

Remarks:

The warning lamp stays on, even if the fault is no longer present, until the fault code is erased with the diagnostics switch.

The warning lamp for the retarder goes out only after erasure.

Action

Check the compressed air supply solenoid valve, the connectors and wiring. Finally, check the control unit.

Fault code 27

Fault:

It is not possible to regulate the braking force due to a break or short circuit in the circuit.

Cause:

There are three causes of this:

- open circuit in the proportional valve or its wiring (between pins 2 and 38 on the control unit)
- short circuit between the negative side of the proportional valve (pin 38 on the control unit) and chassis ground
- fault in the control unit's driver stage.

Remarks:

The retarder is not working. Because of the open circuit, the proportional valve does not react when the control unit wants retarder braking to a certain requested extent.

The warning lamp stays on, even if the fault is no longer present, until the fault code is erased with the diagnostics switch.

The warning lamp for the retarder goes out only after erasure.

Action

Check the proportional valve, connectors and wiring. Finally, check the control unit.

Fault code 28

Fault:

Over a period of 30 minutes the control unit has not once received confirmation that the brake pedal has been released. This is highly implausible and indicates a fault.

Cause:

Either the brake pedal sensor is incorrectly adjusted or the brake pedal is sticking so that it does not always return to the correct position of rest when released. Otherwise there is an electrical fault giving rise to excessively high voltage on control unit pin 23 when the pedal is released. If the fault is a short circuit to +24 V, fault codes which point to the hand lever and the two temperature sensors may also be generated.

Also consider the possibility that the driver has had his foot resting on the brake pedal while driving.

Remarks:

Downhill speed control and the retarder cannot be activated with the brake pedal as long as the fault persists. Only applicable to systems that should be capable of activation with the pedal.

The warning lamp goes out as soon as the sensor informs the control unit that the brake pedal has been released but comes on again if the pedal - according to the sensor - is held in the depressed position again for at least 2 minutes.

The warning lamp for the retarder is switched off temporarily, otherwise erasure.

Action

It is simplest to use the computer. Go to the input signal test. Check that the voltage from the brake pedal sensor is about 0.5 V when the pedal is released.

The control unit will accept voltages between 0.15 V and 0.85 V to pin 23 when the brake pedal is released. The earthing point with which the control unit compares voltage is pin 4. The voltage supply to the brake pedal sensor (+5 V) is taken from pin 41 on the control unit.

Fault code 28 is generated if the value has exceeded 0.85 V or if the voltage suddenly changes by a large amount. The latter can happen without the permitted limits being exceeded.

Then check the connectors and wiring.

Fault code 29

Fault:

Over a period of 30 minutes the control unit has not once received confirmation that the clutch pedal has been released. This is highly implausible and indicates a fault.

Cause:

Probably a fault in the clutch pedal switch or the wiring up to pin 50, or in the relay which may be connected between them.

Also consider the possibility that the driver has been resting his foot on the clutch pedal while driving.

Remarks:

Downhill speed control does not work until the switch informs the control unit that the clutch pedal has been released. Applies only to vehicles with downhill speed control and in which the retarder can be controlled using the brake pedal.

The warning lamp goes out as soon as the switch informs the control unit that the clutch pedal has been released but comes on again if the pedal - according to the switch - is held in the depressed position again for at least 2 minutes.

The warning lamp for the retarder is switched off temporarily, otherwise erasure.

Action

Check the clutch pedal switch, the relay if used, connectors and wiring.

Fault code 31

Fault:

The control unit receives information telling it that the control lever's switch for downhill speed control has been pressed uninterruptedly for 30 minutes. This is highly implausible and indicates a fault.

Cause:

Probably a fault in the switch or the wiring up to control unit pin 32. It is highly unlikely that the driver has been holding the switch in the depressed position for half an hour while driving, but ask him if the switch has given trouble at any time.

Remarks:

The warning lamp goes out as soon as the switch has returned to the rest position but will come on again if the switch is once more held depressed for at least 2 minutes.

It should only be possible for this fault code to arise in vehicles equipped with downhill speed control which is operated with the switch on the lever. Vehicles without this switch do not have complete wiring from the lever to pin 32 on the control unit.

Note that a break in this circuit does not give any fault code. Use the computer and go to the input signal test. This will allow you to quickly see if the switch and the complete wiring are working.

The warning lamp for the retarder is switched off temporarily, otherwise erasure.

Action

Check the lever switch, connectors and wiring.

Fault code 32

Fault:

The ABS has informed the control unit that wheel locking has occurred for at least 5 minutes continuously. This is highly implausible and indicates a fault.

Cause:

Probably a fault in the wiring, most likely a short circuit to earth between control unit pin 35 and the ABS control unit's pin. A fault may also be present in the anti-lock braking system itself. Fault codes will in such a case be stored in the ABS control unit.

Remarks:

Retarder braking must not take place while ABS braking is in progress. If this fault occurs the control unit cannot distinguish between the fault symptoms and regular ABS control. The retarder is therefore also disabled as long as the fault persists. The warning lamp goes out as soon as the fault is not present.

The warning lamp for the retarder goes out if the fault disappears.

Action

Preferably use the computer. Go to the input signal test and check whether the signal from the anti-lock brake system (ABS) reaches control unit pin 35. Note that this signal has an inverse function so that the retarder can brake only if the signal voltage is high (around +24 V). When ABS control is in progress the circuit is earthed from inside the ABS control unit, and the voltage then drops towards zero.

Then check the connectors and wiring between the control units for the retarder and ABS. If the fault cannot be located here either, there is a fault in one of the two control units.

Fault code 33

Fault:

The control unit receives information telling it that the switch for the diagnostics lamp in the vehicle's instrument panel has been pressed uninterruptedly for 30 minutes. This is highly implausible and indicates a fault.

Cause:

Probably a fault in the wiring to pin 30 of the control unit or the switch, which should always return to the rest position when it is released.

Remarks:

When this fault occurs, all lamp-flash codes with the diagnostics lamp will be erased when the power is switched on. However, the fault codes are retained in the control unit's memory and can be retrieved using a PC where they can be seen as usual.

Action

Check the connectors, wiring and switch.

Fault code 34

Fault:

The PWM signal, which shows throttle actuation on an EDC engine, has indicated 93% or more. This is unreasonable, because even 90% corresponds to maximum throttle actuation.

Cause:

Probably a fault in one of the input signals to the EDC system, perhaps because some other system, such as the ASR system, "fools" the EDC.

Remarks:

Downhill speed control does not work as long as the fault persists. Neither does the EDC system's cruise control disengage the retarder and exhaust brake. The warning lamp goes out as soon as the fault is not present.

The warning lamp for the retarder goes out if the fault disappears.

Action

Check the EDC system by obtaining readouts of the fault codes, if any. Check connectors and wiring between the control units for the EDC system and retarder.

If the vehicle is not equipped with EDC, and does not therefore have complete wiring to pin 12 on the control unit, the fault is in the control unit itself.

Fault code 35

Fault:

The PWM signal, which shows throttle actuation on an EDC engine, was present when the starter voltage was switched on but then suddenly disappeared.

Cause:

Probably a fault in the wiring between the control units for the EDC and retarder so that the signal which should have reached pin 12 failed to materialise.

Remarks:

The EDC system's cruise control does not disengage the retarder and exhaust brake. The warning lamp goes out as soon as the fault is not present. Note that fault code 35 applies only to loss of the PWM signal. Fault code 35 is not generated if no PWM signal is present when the power is switched on.

The warning lamp for the retarder goes out if the fault disappears.

Action

Check connectors and wiring between the control units for the EDC system and retarder. If the vehicle is not equipped with EDC, and does not therefore have wiring to pin 12 on the control unit, the fault is in the control unit.

Fault code 36

Fault:

The control unit has not once received confirmation that the throttle pedal has been depressed although the vehicle has been driven for 30 minutes and attained a speed of 50 km/h. This is highly implausible and indicates a fault.

Cause:

Confirmation that the throttle pedal is held in the depressed position does not reach control unit pin 13.

Remarks:

Downhill speed control does not work as long as the fault persists. The warning lamp goes out as soon as the fault is no longer present, i.e. when the control unit is informed that the throttle pedal is depressed.

The warning lamp for the retarder goes out if the fault disappears.

Action

Check the connectors, the wiring and the throttle switch integrated in the throttle pedal sensor.

Fault code 37

Fault:

Over a period of 30 minutes the control unit has not once received confirmation that the clutch pedal has been depressed, although the vehicle has attained a speed of 50 km/h. This is highly implausible and indicates a fault.

Cause:

Information on the position of the clutch pedal does not reach pin 50 of the control unit.

Remarks:

As long as the fault persists, throttle actuation will disengage the retarder and exhaust brake even if the clutch pedal is depressed. This also applies to downhill speed control. The warning lamp goes out as soon as the control unit is informed that the clutch pedal is depressed.

The warning lamp for the retarder goes out if the fault disappears.

Action

Check the clutch pedal switch, connectors and wiring.

Fault code 39

Fault:

The control unit has not received a test signal from the ABS control unit. Applies only to vehicles with ABS.

Cause:

Probably a fault in the ABS system, a faulty ABS warning lamp on the instrument panel or a fault in the wiring between the ABS control unit and the retarder control unit.

Remarks:

The test signal should come when the power is switched on and then disappear when the ABS lamp goes out. The control unit generated fault code 39 when it noticed that the vehicle had come up to speed but that the test signal was still absent.

Note that for EBS (from version 2.2) the ABS/ EBS warning lamp goes out when the CAN message "ABS fully operational" is sent to the retarder from EBS.

Activation of the retarder with the brake pedal does not work as long as the fault persists. Downhill speed control also stops working but on the other hand the lever works as usual in other respects.

The warning lamp for the retarder goes out if the fault disappears.

Action

Check connectors, wiring, the anti-lock brake system (ABS) warning lamp and then the rest of the anti-lock brake system.

If the vehicle is not equipped with ABS, and therefore does not have complete wiring to pin 14 on the control unit, the fault is probably due to the control unit being incorrectly informed about how the vehicle is equipped. In this case, give the control unit the correct information using a PC[1].

1.Use Scania Programmer, which is available on CD-ROM.

Fault code 41

Fault:

The control unit's integrated ABS relay was not approved during the relay test which was conducted when the driver switched on the power.

Cause:

Probably a fault in the integrated ABS relay. External wiring has nothing to do with this test.

Fault code 41 can also be generated if the control unit power supply is less than 14.5 V at any time.

Remarks:

The warning lamp goes out as soon as a new relay test has produced a satisfactory result.

The warning lamp for the retarder is switched off temporarily, otherwise erasure.

Action

Erase the fault code. Repeatedly interrupt and switch on starter power. Check whether fault code 41 has been regenerated. If this is the case, the control unit must be changed.

Fault codes 42, 43, 44

Fault:

The control unit is not working properly or not working at all.

Note: Fault codes 42, 43 and 44 are identical and can occur individually.

Cause:

A fault in one of the control unit's integrated memories.

Remarks:

It is usually impossible to carry out trouble-shooting with a PC if the control unit is suffering from such a serious fault as this.

The warning lamp for the retarder goes out only after erasure.

Action

Erase the fault code. Repeatedly interrupt and switch on starter power. Check whether fault code 42 has been regenerated. If this is the case, the control unit must be changed.

Fault code 46

Fault:

The retarder is not working entirely satisfactorily.

Cause:

A memory fault in the control unit which prevents fine adjustment of the output current on pin 2. The control unit has therefore been forced to use average values for controlling the proportional valve's driver current.

Remarks:

The control unit will use fixed average values if the fault arises. The retarder then works nearly as efficiently as usual, so it is unlikely that the driver has discovered any fault. Incidentally, fault code 46 does not cause the driver's warning lamp to come on.

The warning lamp for the retarder does not come on at all.

Action

Only change the control unit if the driver complains that the retarder provides poor control of brake torque. Otherwise, it is unnecessary. The fixed values in the control unit generally give a comfort level which is fully acceptable.

Fault code 47

Fault:

Incorrect voltage level from the control lever. Applies only to systems that should be capable of activation with a lever.

Cause:

The lever's potentiometer or wiring from there to control unit pin 8 has developed a short circuit or open circuit.

Remarks:

The retarder and exhaust brake cannot be activated with the lever as long as the fault persists.

The control unit accepts an input voltage of between 0.25 V and 4.75 V on pin 8. Pin 26 is the earthing point here with which the control unit compares the voltage. Fault code 47 will be generated if the voltage is outside these limits. The voltage supply (+5 V) to the lever's potentiometer is taken from control unit pin 44. The warning lamp goes out as soon as voltage level changes to an acceptable value.

Fault code 47 can also, under exceptional circumstances, be generated when there is a short circuit in certain components in the brake pedal sensor or its wiring. This is because both the potentiometers for the brake pedal and lever receive their power supply from the same point in the control unit.

The warning lamp for the retarder goes out if the fault disappears.

Action

Check connectors, wiring and control lever.

Fault code 48

Fault:

The control unit has detected a faulty voltage from the brake pedal sensor. Only applicable to systems that should be capable of activation with the brake pedal.

Cause:

The brake pedal's potentiometer or wiring from there to control unit pin 23 has developed a short circuit or open circuit. An incorrectly adjusted pedal or foot brake valve are other conceivable causes.

Remarks:

Downhill speed control and the retarder cannot be activated with the pedal as long as the fault persists.

The control unit will accept input voltages between 0.15 V and 0.85 V to pin 23 when the brake pedal is released. Pin 4 is the earthing point here with which the control unit compares the voltage. The voltage supply (+5 V) to the brake pedal sensor is taken from control unit pin 41. Fault code 48 is only generated if the voltage drops below 0.15 V when the pedal is released. If the voltage is greater than 0.85 V, fault code 28 is generated instead. The warning lamp goes out as soon as voltage level changes to an acceptable value.

Fault code 48 can also, under exceptional circumstances, be generated when there is a short circuit in certain components in the control lever potentiometer or its wiring. This is because both the potentiometers for the brake pedal and lever receive their power supply from the same point in the control unit.

The warning lamp for the retarder goes out if the fault disappears.

Action

Check connectors, wiring and brake pedal sensor potentiometer.

Fault code 49

Fault:

The control unit has received an alarm from the ABS system. Applies only to vehicles with ABS.

Cause:

Probably a fault in the anti-lock brake system (ABS), a faulty ABS warning lamp on the instrument panel, or a fault in the wiring between the ABS control unit and pin 14 of the retarder control unit.

Remarks:

Activation of the retarder with the brake pedal does not work as long as the fault persists. Downhill speed control also stops working but on the other hand the lever works as usual in other respects. If fault code 49 is stored, the warning lamp will not go out until the ABS warning lamp goes out. In some cases, this requires a certain speed, no less than 7 km/h.

Note that for EBS (from version 2.2), the ABS/EBS warning lamp may be on without the brake pedal control for the retarder being disconnected. For these systems the brake pedal control is disconnected when the CAN message "ABS fully operational" to the retarder from EBS is discontinued.

The warning lamp for the retarder goes out after the ABS/EBS lamp.

Action

Start by checking the ABS system. Then check connectors and wiring.

If the vehicle is not equipped with ABS, and does not therefore have complete wiring to pin 14 on the control unit, the fault is in the retarder control unit.

Fault code 51

Fault:

The control unit is not correctly matched to the retarder.

Cause:

The control unit is set up for a retarder variant which it cannot handle with available computer programs. There may be two reasons for this. One is that the control unit may be of the right type but with the incorrect configuration so that it behaves as though the retarder were different to the one on the vehicle in question. The other is that the control unit is too outdated for the retarder.

Remarks:

It is not possible to configure the control unit for special versions which require modified computer programs.

The warning lamp for the retarder goes out only after erasure.

Action

Configure the control unit correctly using a PC[1]. If this does not alleviate the problem, and fault code 51 is regenerated when starter power is repeatedly switched on, the control unit must be changed for a later version.

Fault code 52

Fault:

Over a period of 30 minutes the control unit has not once received confirmation that the foot-operated exhaust brake switch has been released. This is highly implausible and indicates a fault.(Foot-operated switches are not fitted as standard.)

Cause:

Probably a fault in the foot-operated switch or wiring to pin 51. Also consider the possibility that the driver has been resting his foot on the foot-operated switch while driving.

Remarks:

The foot-operated switch cannot be used for exhaust braking until the control unit has been informed that the foot-operated switch has been released.

The warning lamp goes out as soon as the control unit has been informed that the foot-operated switch is released but comes on again if the switch is once more kept in the depressed position for at least 2 minutes.

The warning lamp for the retarder is switched off temporarily, otherwise erasure.

Action

Check the foot-operated switch, connectors and wiring to pin 51 on the control unit.

1.Use Scania Programmer, which is available on CD-ROM.

Fault code 61 truck

Fault:

The control unit is not working properly or not working at all.

Cause:

Fault in the control unit integrated memory for the CAN circuit.

Remarks:

It is usually impossible to carry out trouble-shooting with a PC if the control unit is suffering from such a serious fault as this.

The warning lamp for the retarder goes out only after erasure.

Action

Erase the fault code. Repeatedly interrupt and switch on starter power. Check whether fault code 61 has been regenerated. If this is the case, the control unit must be changed.

Fault code 61 bus

Fault:

The control unit is not working properly or not working at all.

Cause:

Fault in the control unit integrated memory for the CAN circuit.

Remarks:

It should not normally be possible for this fault code to be generated, because buses with this type of retarder control unit do not use CAN communication.

The warning lamp for the retarder goes out only after erasure.

Action

Erase the fault code. Repeatedly interrupt and switch on starter power. Check whether fault code 61 has been regenerated. Check the CAN configuration of the control unit. The control unit should not communicate via CAN. If this is the case, the control unit must be reconfigured using Scania Programmer. If none of the above helps, the control unit must be replaced.

Fault code 62 truck

Fault:

No communication signal from the EDC control unit.

Cause:

There is an unusually long delay before the expected signal comes from the EDC via the communication circuit "CAN LOW" and "CAN HIGH", pins 39 and 40 on the retarder control unit.

Remarks:

It should not normally be possible for this fault code to be generated, because trucks with this type of retarder control unit do not use CAN communication between the EDC control unit and the retarder control unit.

The warning lamp for the retarder goes out if the fault disappears.

Action

Erase the fault code. Repeatedly interrupt and switch on starter power. Check whether fault code 62 has been regenerated. Check the CAN configuration of the control unit. The control unit should not communicate via CAN. If this is the case, the control unit must be reconfigured using Scania Programmer. If none of the above helps, the control unit must be replaced.

Fault code 62 bus

Fault:

No communication signal from the EDC control unit.

Cause:

There is an unusually long delay before the expected signal comes from the EDC via the communication circuit "CAN LOW" and "CAN HIGH", pins 39 and 40 on the retarder control unit.

Remarks:

It should not normally be possible for this fault code to be generated, because buses with this type of retarder control unit do not use CAN communication.

The warning lamp for the retarder goes out if the fault disappears.

Action

Erase the fault code. Repeatedly interrupt and switch on starter power. Check whether fault code 62 has been regenerated. Check the CAN configuration of the control unit. The control unit should not communicate via CAN. If this is the case, the control unit must be reconfigured using Scania Programmer. If none of the above helps, the control unit must be replaced.

Fault code 63 truck

Fault:

No communication signal from the EBS control unit.

Cause:

There is an unusually long delay before the expected signal comes from EBS via the communication circuit "CAN LOW" and "CAN HIGH", pins 39 and 40 on the retarder control unit.

Remarks:

The retarder control unit receives messages continuously from the EBS control unit and then "understands" that communication is in normal working order. If these messages are not present, fault code 63 is generated and the retarder warning lamp comes on.

The warning lamp for the retarder goes out if the fault disappears.

Action

Check if any fault codes are stored in the EBS control unit. Check the communication circuit connectors and wiring.

Fault code 63 bus

Fault:

No communication signal from the EBS control unit.

Cause:

There is an unusually long delay before the expected signal comes from EBS via the communication circuit "CAN LOW" and "CAN HIGH", pins 39 and 40 on the retarder control unit.

Remarks:

It should not normally be possible for this fault code to be generated, because buses with this type of retarder control unit do not use CAN communication.

The warning lamp for the retarder goes out if the fault is no longer present.

Action

Erase the fault code. Repeatedly interrupt and switch on starter power. Check whether fault code 63 has been regenerated. Check the CAN configuration of the control unit. The control unit should not communicate via CAN. If this is the case, the control unit must be reconfigured using Scania Programmer. If none of the above helps, the control unit must be replaced.