



**EUROTRAKKER**

**EUROTECH**

**EUROSTAR**

**CURSOR 8/10/13**

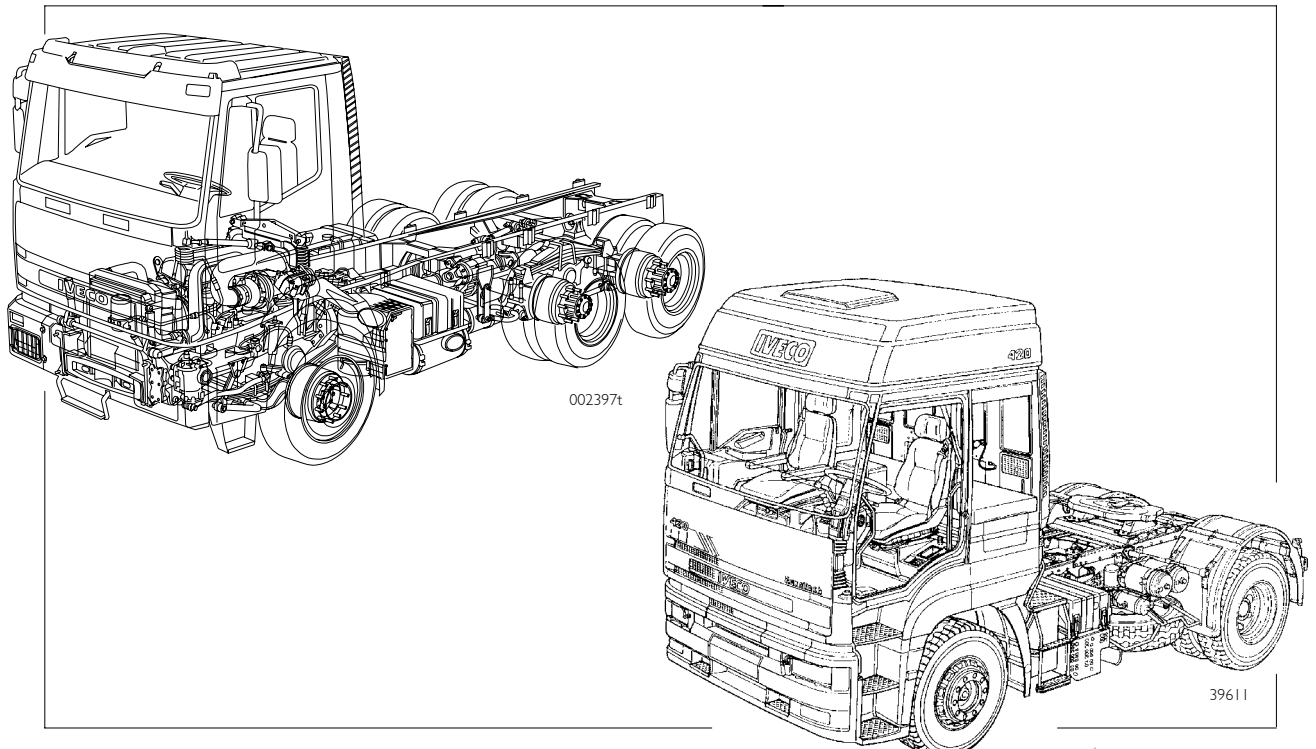
**REPAIR MANUAL**

**ELECTRIC/ELECTRONIC SYSTEM**

**IVECO**



## FOREWORD



This manual is part of the aids that the Technical Publications sector makes available to workshop technicians to allow the correct performance of maintenance and/or repair operations and it is also a good way to familiarise with the IVECO product.

The experience acquired over many years in servicing and in editing technical publications has led us to devote a special volume to the electric system fitted on the models in question, considering the particularity and complexity of the subject.

This manual is intended for people with professional preparation in the "Vehicle Electrician" sector and at the same time avail of adequate and indispensable testing and/or measurement equipment for the main electrical ratings.

In drafting the texts and representing the graphics we have taken account of the particular necessities of the operator technician in some cases stating references or repeating certain diagrams in different places that may be obvious to a design engineer.

The completeness of the information given in the wiring diagrams, the size chosen and the ease with which they can be taken allow the repair operator to avail of all the information exactly where it is needed most, namely, on board the actual vehicle.



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## Introduction

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## INTRODUCTION

This manual comprises 5 chapters, identified by roman numerals:

|             |                     |
|-------------|---------------------|
| Chapter I   | INTRODUCTION        |
| Chapter II  | GENERAL DESCRIPTION |
| Chapter III | SPECIFIC CIRCUITS   |
| Chapter IV  | CIRCUIT CHARTS      |

The subjects dealt with are updated at the date of drafting of the manual which practically corresponds to the date of going to press.

Each chapter has its own progressive page number to simplify updating.

The numbering of the figures is double. The first digit refers to the chapter number and the second is a progressive number; this makes it easy to find figures if they are given as references elsewhere.



The possibility exists that the information given in this manual may not be up to date as a result of modifications adopted by the Manufacturer at any time for reasons of a technical or commercial nature or to adjust to the laws in force in the different Countries.



### General cautions for electric/electronic components



**NEVER DISCONNECT THE BATTERIES OF THE SYSTEM OR OPEN THE KNIFE SWITCH WITH THE ENGINE RUNNING.**

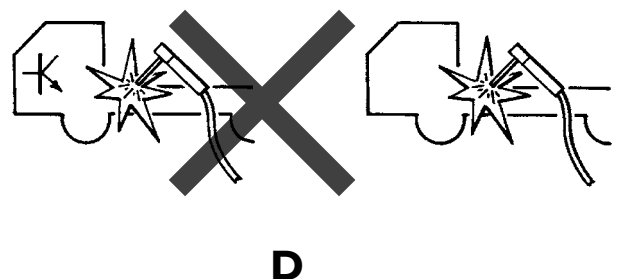
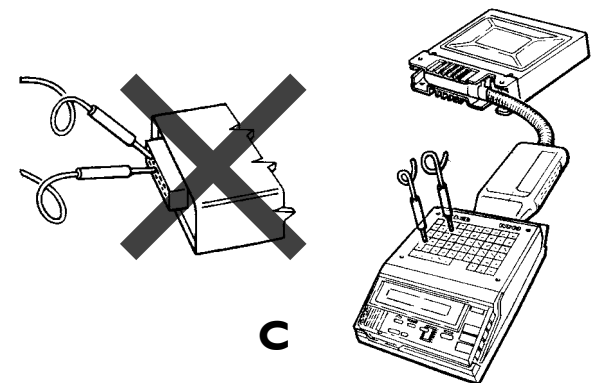
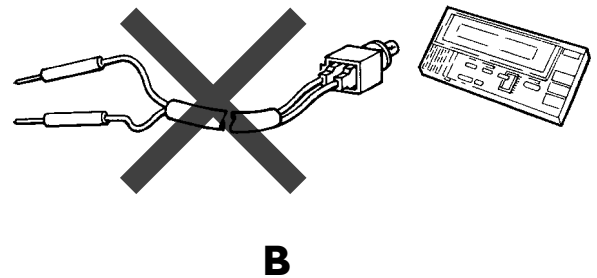
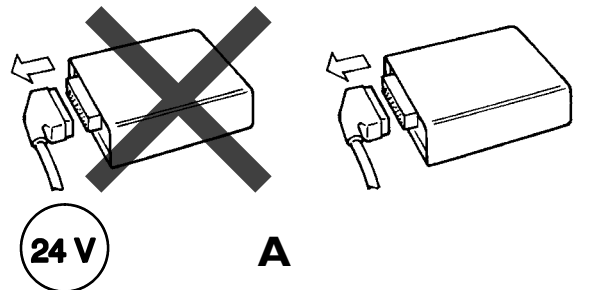
**DO NOT START THE ENGINE WITHOUT FIRSTLY CONNECTING THE BATTERIES PERMANENTLY.**

- Before doing any work on the vehicle chock the wheels appropriately.
- Starting from the engine compartment may only be carried out when the cab is firmly fastened on its maximum opening position with the handbrake engaged, gearbox in neutral and wheels chocked.
- Do not use quick chargers to start the engine. Starting must only be carried out with separate batteries or with the special trolley.
- Make sure that the bias of the battery terminals is correct when starting from an auxiliary trolley.
- The incorrect polarisation of the power voltage of electronic control units (for example incorrect polarisation of the batteries) may lead to their destruction.
- When needing to disconnect the batteries from the system, firstly always disconnect the frame earth cable from the negative terminal of the batteries.
- Before connecting the batteries to the system, make sure that it is well insulated.
- The incorrect bias of the supply voltage of electronic control modules (for example incorrect battery bias) may lead to their breakage.
- When seeking a circuit failure insert a wander fuse between the negative terminal of the battery and the frame earth cable (main current switch on).
- Before removing electric and/or electronic components disconnect the earth cable from the negative terminal of the battery.
- Electrical measurements on electronic components must only be carried out with appropriate measuring equipment.
- Disconnect the batteries from the system when charging them with external equipment.
- Disconnect the external charging equipment from the mains before removing its grippers from the terminals of the batteries.
- Do not insert or remove the connector of electronic control units with the power on.
- With temperatures above 80 °C (drying ovens) remove the electronic control units.
- During electric welding work, disconnect the connectors of electronic control units.
- During connection, tighten the nuts of the connectors (temperature, pressure sensors, etc.) only with the specified tightening torque.
- Carefully make sure that the battery terminal polarity is correct before starting from an auxiliary trolley.
- Do not direct jets of water on fuseboxes and electrical equipment.
- Do not direct jets of water on the batteries.



**Measurements in electronic control units, plug connections and electric connections to components may be carried out only on appropriate testing lines, with special plugs and sockets. Never use improper means such as metal wires, screwdrivers, clips or the like. In addition to the danger of a short circuit, damage to the plug connectors may also result and this would subsequently cause contact problems.**

- Before disconnecting the connector from an electronic control unit, isolate the system.(Figure opposite ref. A)
- Do not cause sparks to check whether a circuit is live.
- Do not touch the pins of the connectors of electronic control units with your fingers.
- Do not use a test bulb to check the continuity of a circuit. Only use the appropriate testing devices (ref. B)
- Do not directly power the components associated with electronic control units with the nominal power rating of the vehicle.
- Do not insert the prods of a measuring device in the pins of connectors of electronic control units. Any measurements are made using UNITESTER (ref. C).
- Make sure that the wirings of electronic devices (length, type of cable, location, grouping, connection of screen braiding, earthing, etc.) conform with the IVECO system and that they are carefully restored after repair or maintenance work. To avoid the possible malfunctioning of the electronic systems on board, the wirings of additional devices must follow a different path than that of the above-mentioned systems.
- Replace components only with original IVECO components.
- Do not install additional electrical and/or electronic equipment not provided for by IVECO or by local laws.
- Do not connect the negative terminals of additional systems to the negative terminals of electronic systems.
- In the event of electric welding on the vehicle, disconnect all the electronic control units and/or disconnect the power cable from the battery positive terminal and connect it to the frame earth (ref. D).



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## Concept of earth and electromagnetic compatibility

The electric system is traditionally a single-pole system. The body, the frame, the metal container of electromechanical components act as equipotential return conductor to the generator, as any point of their metal structure or any negative terminal not isolated is at the same reference potential or EARTH. This is why the earth has been chosen as reference to the whole system, conventionally giving it the value of zero.

Due to obvious reasons of construction, in the negative network of the system there are various earth points located on the vehicle in relation to the location of the components on the frame, engine or body.

On the other hand, ideally, all the equipment should be connected to only one earth point in order to provide them, particularly for electronic devices, a clearly defined earth reference.

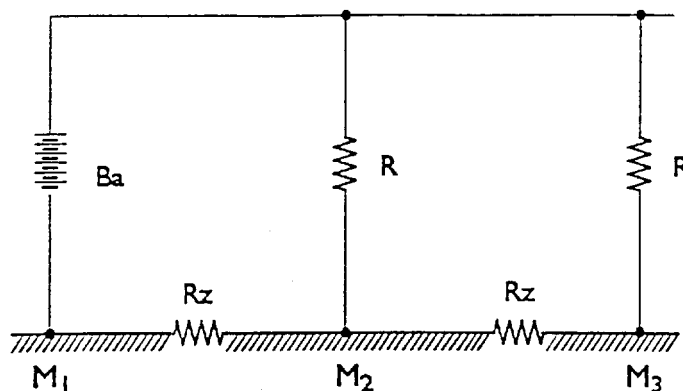
For the above-mentioned reasons it is necessary to distinguish the supply earth or system earth, characterised by strong direct current intensity ( $> 1\text{ A}$  for electromechanical components), from the analogue earth, characterised by wave shapes at determinate frequencies and very low current intensity (mA,  $\mu\text{A}$ ) of electronic systems.

The definition of signal earth or analogue earth depends on the sensitivity of the electronic systems to EMC (electromagnetic compatibility), as parasite signals emitted by the systems on board or outside the vehicle, induce failures and/or deterioration of the systems themselves.

In order to minimise both continuous and transient disturbance or interference generated by parasite radiations, it is of the utmost importance to always bear in mind that the satisfactory efficiency of the reference plane or system earth depends on the excellent conductivity characteristics (contact resistance tending towards zero) in each of its connection points.

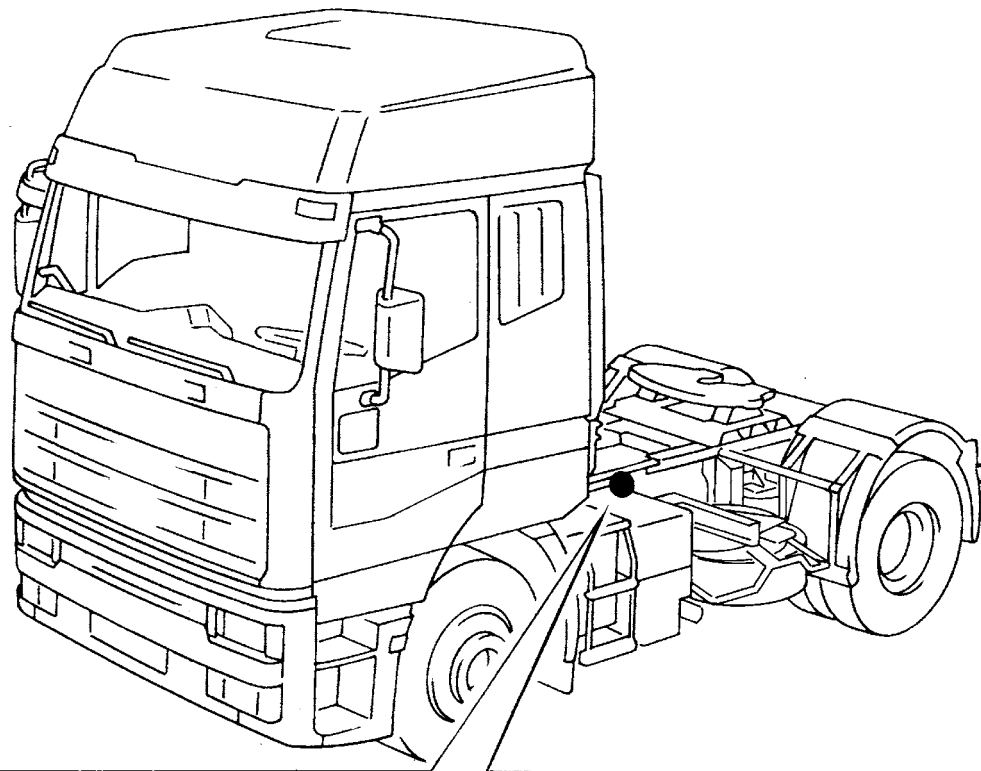
Briefly, we can say that the earth understood as equipotential electrical conductor, i.e. as potential reference for all the electric/electronic components on board, is subdivided into system earth and analogue earth.

The system earth points are those foreseen by the Manufacturer and must, of course, be free of paint, oxidation, grease, dust, etc.

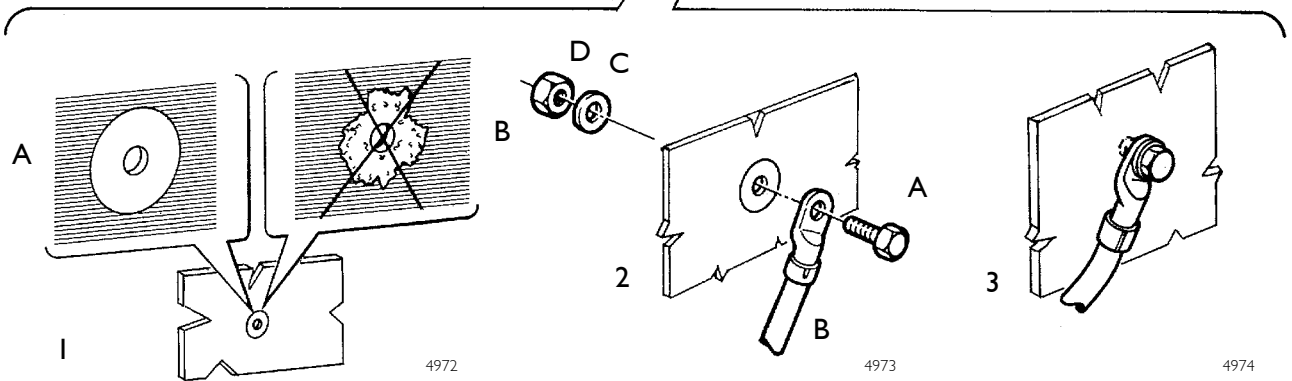


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The system earth points are those foreseen by the manufacturer and must of course be free of paint, oxidation, grease, dust, etc.



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- 1.3 1 - EARTH CONNECTIONS: A. EFFICIENT EARTH POINT - B. INEFFICIENT EARTH POINT  
 2 - FASTENING SEQUENCE: A. SCREW - B. TERMINAL - C. WASHER - D. NUT  
 3 - CABLE CONNECTED TO EARTH

Should it be necessary to disconnect the earth cables from the frame, when restoring the connection it is necessary to completely remove the old conduction paint and coat with an even layer of paint BH44D which meets IVECO Standard 18-1705, proceeding as follows:

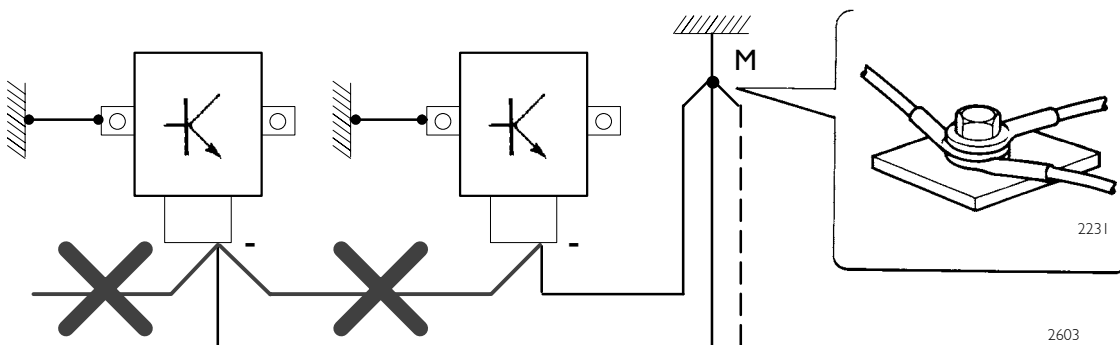
- 1° Remove the paint on both the frame and terminal side mechanically or using a suitable chemical product.
- 2° Brush on the paint, if in can, or spray.
- 3° Connect the earth cables within a maximum of 5 minutes from painting.
- 4° If a new earth contact is fitted, file around the terminal fastening hole to completely remove the anaphoretic paint of the frame creating a perfectly flat resting surface.

### Practical advice

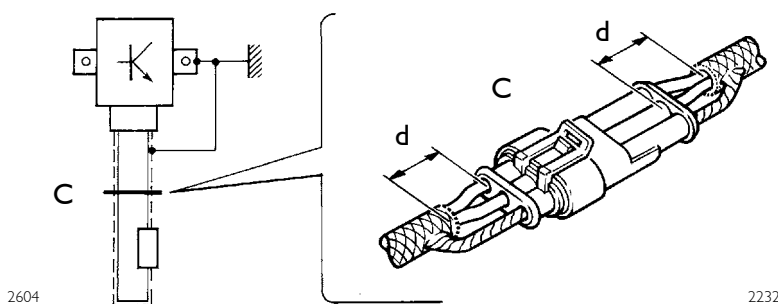
The negative cables connected to an earth point must be as short as possible and connected to one another in a "star" connection, trying to tighten them neatly and adequately (Fig. I.4 ref. M).

Additionally, for electronic components the following instructions should absolutely be followed:

- Electronic control units must be connected to the system earth when they have a metal container.
- The negative cables of control units must be connected to both a system earth point, for example the dashboard earth (avoiding "serial" or "chain" connections), and to the negative terminal of the battery/ies.
- Though they are not connected to the system earth/battery negative terminal, analogue earths (sensors) must be perfectly insulated. Therefore, particular care should be given to the parasite resistances of the terminals: oxidation, clinching defects, etc.
- The metal braiding of screened circuits must be in electrical contact in each of its ends with the components of the system.
- Only one end of the screening braid must be connected to the system earth.
- In the presence of connectors the unscreened section **d**, near them, should be as short as possible (Fig. I.5).
- The cables should be laid on parallel with the reference plane, i.e. as near as possible to the frame/body structure.
- Additional electromechanical systems should be carefully connected to the system earth and must not be set at the side of the cables of electronic components.



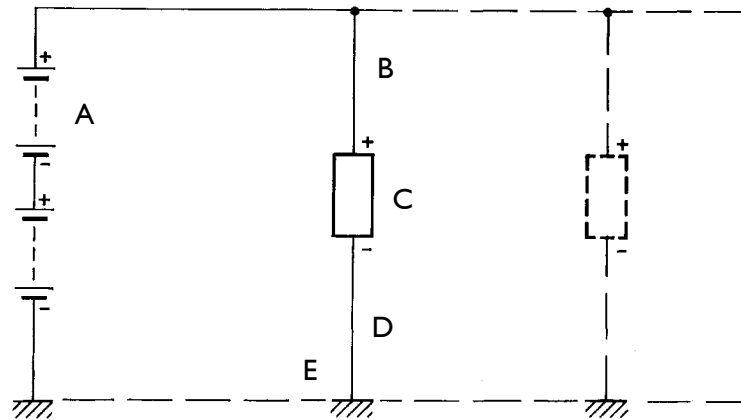
I.4 "STAR" CONNECTION OF NEGATIVE CABLES TO THE SYSTEM EARTH M



I.5 SCREENING BY METAL BRAID OF A CABLE TO AN ELECTRONIC COMPONENT - C. CONNECTOR - d. DISTANCE → 0

### Structure of the electric network

- Unipolar system: current return from user to source via negative network and metallic structure of the vehicle (earth).



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1.6 A. SOURCE - B. POSITIVE NETWORK - C. LOAD - D. NEGATIVE NETWORK - E. METALLIC STRUCTURE

**N.B.** The circuit of the tachograph and auxiliary heater (optional) are always live

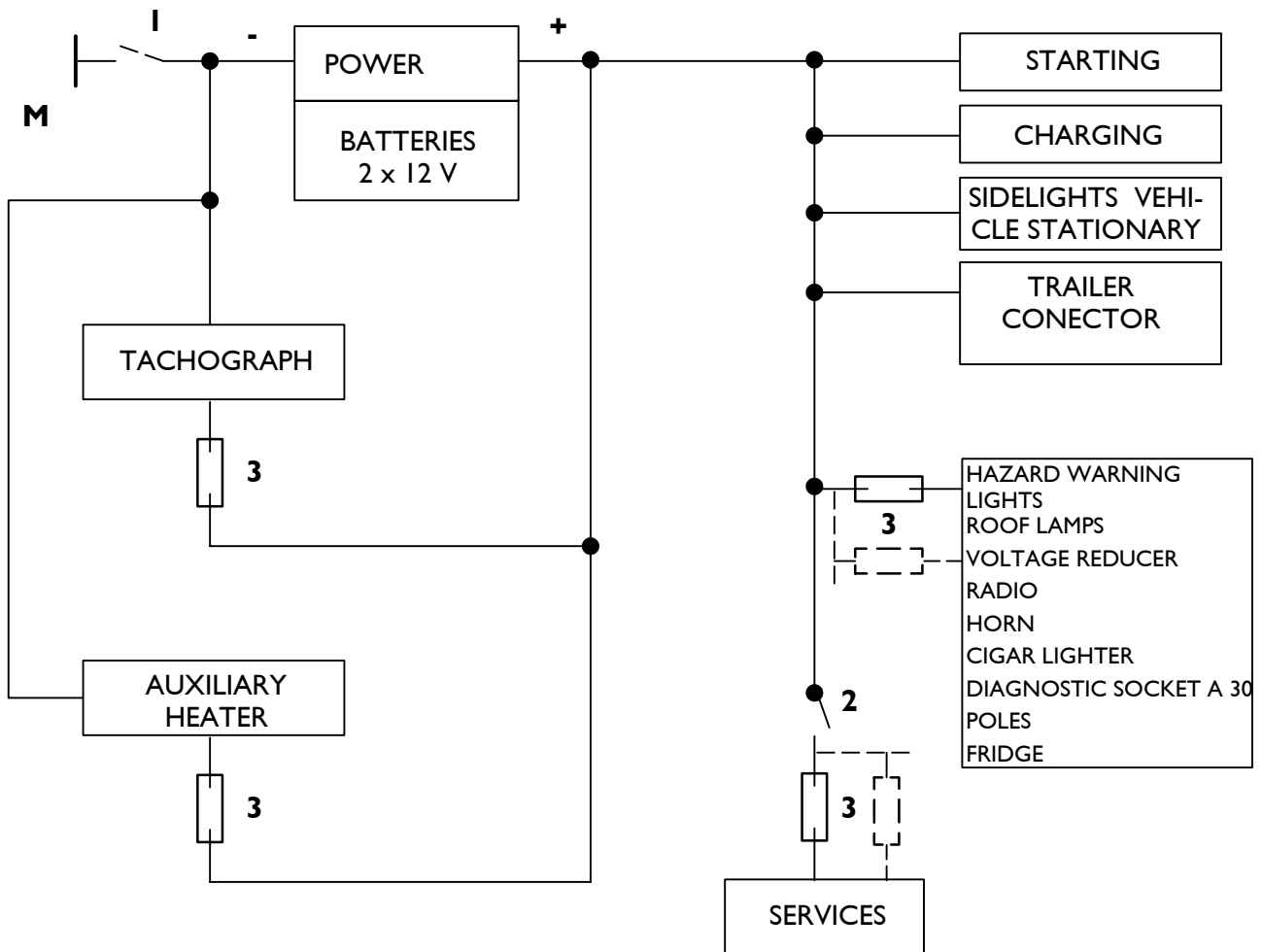
- Battery compartment (12 V x 2) located on the left sidemember
- System can be modulated through the main control box (UCI) located in the cab in the electric compartment and two wall connectors: one at the front and the other at the rear of the cab.  
The main cables are:
  - power cable
  - cab cable
  - roof cable
  - exterior lighting cable
  - engine cable
  - ABS/EBS wheel anti-lock cable
- Tiltable cab with cab uncoupled indicator.
- Safety circuit for starting and stopping the engine from the engine compartment.
- Engine stopping (from cab) by resetting the ignition switch.
- BASE SYSTEM ELECTRONIC COMPONENTS
  - Tachograph
  - ABS/EBS anti wheel lock system
  - Direction indicator flasher
  - Injection control by electronic EDC MS6.5 system
  - ECAS air suspensions
  - Immobilizer.

### Operating Synoptics

Briefly, we can say that the electric/electronic modularity comprises two main areas:

- AREA 1: commands, controls and protections
- AREA 2: power, batteries, starting, charging and system sectioning

The modularity of the two areas is ensured by 3 families of cables (cab, engine and frame) through the Main Interconnecting Control Box (UCI)



I.7 1. MANUAL BATTERY SECTIONER (OPTIONAL) - 2. IGNITION SWITCH - 3. PROTECTION AGAINST OVERLOADS - M. SYSTEM EARTH

## Concept of CAN LINE

Over the past few years electronic systems on industrial vehicles have developed rapidly and they determine satisfactory operation of the vehicle.

What before was a complementary science has now become a key sector of technology. Currently electronic systems make the vehicle work and determine the effectiveness with which the single components interact with one another. Increasingly often we meet the term CAN used in this context.

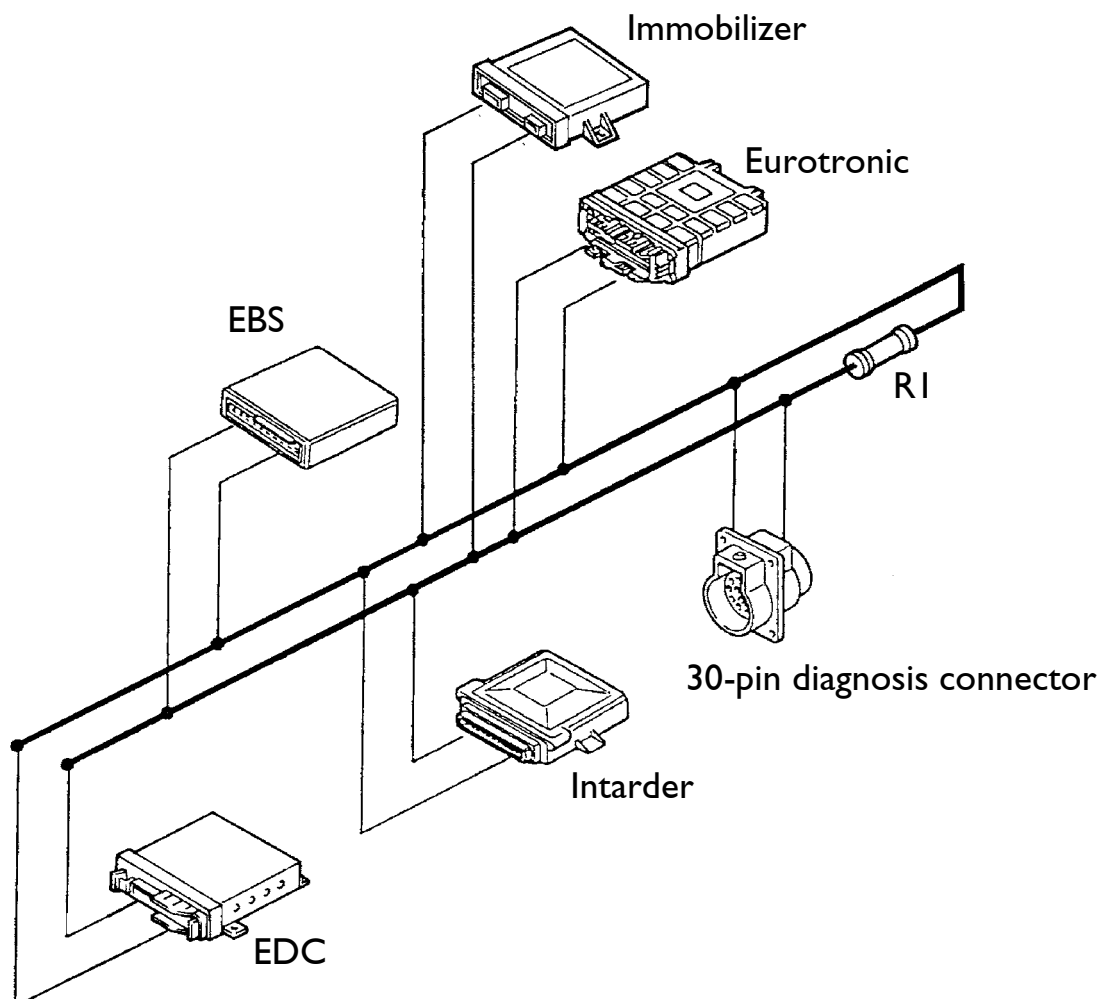
The term CAN means Controller Area Network. This is a dedicated wiring that connects the control units of a vehicle (ECU) to one another, thereby creating a structure similar to a nervous system.

This system enables the instantaneous exchange of large quantities of data between the various electronic systems on board the vehicle.

It is a TWO-WAY communication mode that is becoming increasingly widespread in the field of vehicles, owing to the reduction of the number of leads and interferences.

The information travels respecting a protocol which defines the conversation modes:

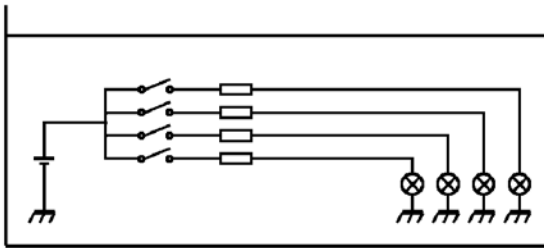
- Synchronisation of the information
- Call and answer mode between the various systems
- Identification and correction of any transmission errors
- Etc.



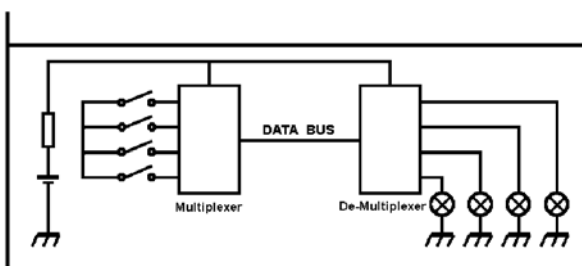
I.8 GRAPHIC REPRESENTATION OF THE CAN LINE

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I.9 STANDARD CHECK



I.10 VIA MULTIPLEX CHECK

## Operating features

To obtain new operating features it is important that the various electronic systems communicate with one another.

One of these operating features, for instance, is the reduction of torque during gearshifting, which is the result obtained from interaction of the engine and transmission control units.

The connection between the different control units may take place either grouping them in a single main unit (solution rejected due to the complexity of the management programme and because the system would be too rigid and expensive in the case of alterations and updates) or using a communication network capable of transferring the data quickly and reliably. Fast data transfer is fundamental for efficient management of vehicle driving, while reliability must be guaranteed for applications connected with safety (transmission, engine controls and control units) and there must not be any communication problems especially in the presence of electromagnetic influences.

About 60% of the problems concerning the electronics of a vehicle involve connection technology and can be identified in the corrosion of the contacts of a connector and in the connections of cables, wear of the insulating sheath or faulty assembly.

Another third of these problems is caused by operating faults in the sensors and actuators. Using a lower quantity of cables and reducing the number of sensors, the stoppage time due to vehicles out of service will be minimised, resulting in lower operating costs. A wiring with less components will make it possible to diagnose the electronic system more easily.

The total length of the cables can reach several kilometres and, as mentioned previously, the higher number of components increases the risk of faults. The Multiplex systems offer better communication between the systems and simplify trouble-shooting.

The Multiplexer unit receives the information about the status of the switches. A coded value which is different for every switch, is transmitted to the Databus. The De-Multiplexer decodes the values and activates the voltage to supply the appropriate lamp.

In Multiplexer systems various types of cables are used: the most cost-effective alternative is that of single cables. Further alternatives are: double or dual cable, twisted pair cables, optical fibres. The choice of the cable depends on the following requirements: signal speed, signal noise and interferences and this choice affects the overall cost of the system.

Different classes exist depending on the different data transmission speed on the Databus:

- class A: low speed (example: windscreen wiper and vehicle lights control).
- class B: medium speed (example: air conditioning and sound systems).
- class C: high speed (example: ABS and Traction Control systems).

All in all the advantages of a Multiplex system can be summarised in: lower costs due to the lower length of the cables, higher functionality, sharing of the signals of the sensors by the various systems and better diagnostic functions. Against this however, the overall number of connections increases, technical training requisites are higher, function reading is not possible through the wiring diagram and above all higher costs compared with a conventional system.

The different manufacturers use their own standards on their vehicles. In Germany BOSCH has developed the Bus CAN (Control Area Network).

All the nodes, i.e. electronic control units, are connected on the Databus.

The structure of the BusCAN is extremely flexible; one or more nodes may be added or removed easily and continue working in the event of a fault of one or more of them.

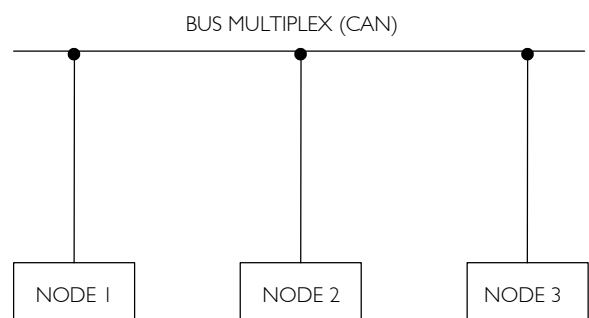
If node 2 sends a message, node 3 which is concerned accepts the message, while node 1 ignores it. It is important to know that the messages have been received correctly on the Databus; in the case of an error the message is sent again: the receiving node confirms reception of the message.

The units or nodes can share the information of many sensors.

As for any form of communication certain conditions must be met. CAN communication needs the right hardware, a task that was initially performed by a single microchip but which lately has been increasingly integrated in microcontrollers: the Can-Chip developed by Bosch makes the various control units communicate with one another with CAN protocol through the same "language" via bus; as transmitter it confers the messages to everyone and as receiver it is capable of identifying the messages addressed to it among many messages.

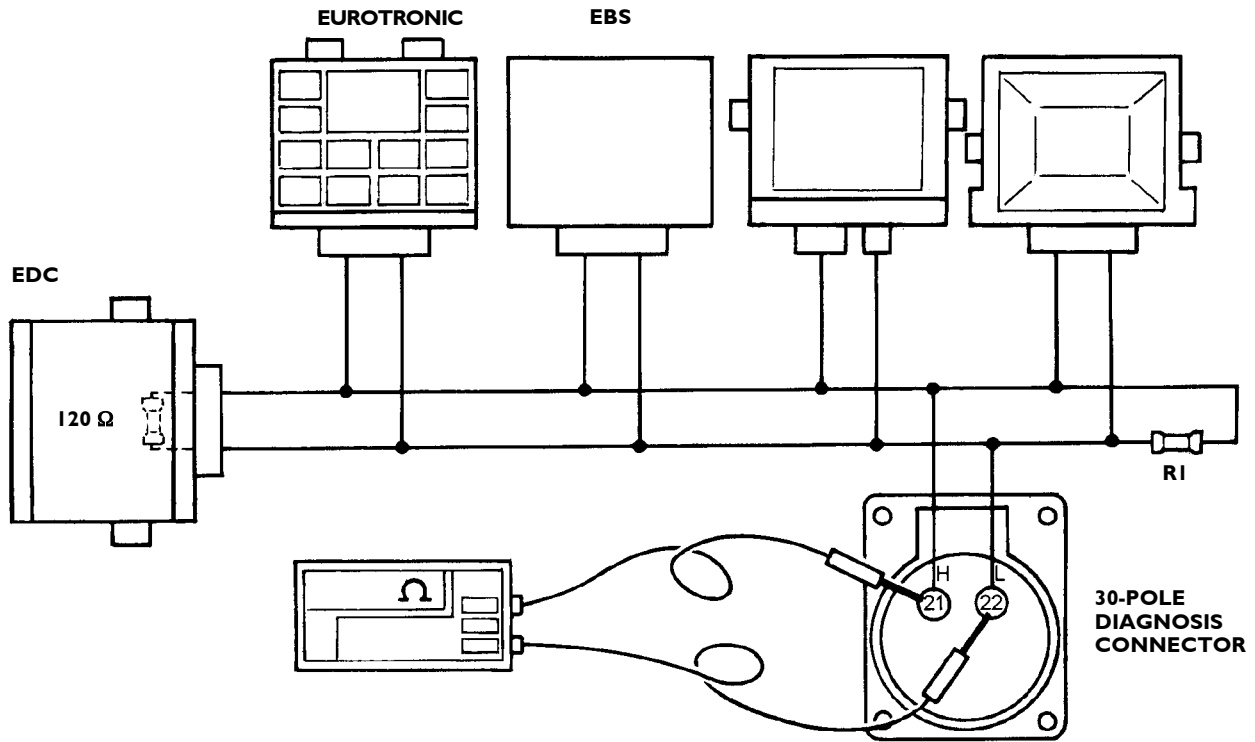
Since all the components that take part in communication can send messages simultaneously on the bus, the receiving component concerned will firstly receive the message with the highest priority while the others will return to the sender and be transmitted again: for example concerning vehicle driving are of primary importance and therefore the vehicle must react immediately to changes of the pedal position; it is also true that if important messages are transmitted constantly, the less important information will rarely or never reach its destination.

For this reason different buses are used.



I.11 CAN MULTIPLEX BUS

**EFFICIENCY TEST ON CAN LINE**



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| <b>0 Ω</b>             | <b>~ 60 Ω</b> | <b>~ 120 Ω</b>     | <b>o.L.</b>      |
|------------------------|---------------|--------------------|------------------|
| CAN line short circuit | CAN line OK   | Resistance cut off | CAN line cut off |

**N.B.**

Resistance R1 by 120 Ω is used to close the CAN line circuit.  
 THEREFORE, THE RESISTANCE MISSING OR CUT OFF MAY CAUSE DATA TRANSMISSION FAILURE.

## Technical Codes

|       |  |
|-------|--|
| 03000 | Self-rectifying alternator with built-in voltage regulator                         |
| 08000 | Starter motor  |
| 12015 | Motor for outside air intake door  |
| 20000 | Starting battery   |
| 22000 | Horn   |
| 22035 | Bell for trailer braking system failure  |
| 22036 | Bell for automatic transmission failure  |
| 25001 | Relay, rotary beacons  |
| 25003 | Relay, fog lights  |
| 25004 | Relay, flasher light   |
| 25006 | Relay for switching on stop lights   |
| 25009 | Relay for switching on high beam lights  |
| 25013 | Relay for switching off low beam lights with high beams on                         |
| 25030 | Relay for switching on external lights   |
| 25034 | Relay for switching on rear fog lights   |
| 25106 | Relay for switching on Tractor ABS failure warning lamp                            |
| 25123 | Relay for switching on stop lights with EBS duplex pedal depressed                 |
| 25127 | Relay for front and rear brake wear with EBS signal                                |
| 25200 | Starting relay   |
| 25204 | Relay, remote starting enablement, cab unlatched                                   |
| 25209 | Relay for cutting off various components during starting stage                     |
| 25210 | Relay, starting enablement with transmission in neutral                            |
| 25211 | Relay with delayed opening contact for keeping G.C.R energized                     |
| 25213 | Relay for supply of users connected to ignition switch through battery positive    |
| 25222 | Relay for allowing connection of thermal starter                                   |
| 25224 | Relay for inhibiting starter operation with engine running                         |
| 25226 | Relay, G.C.R. energizing from inside the cab                                       |
| 25227 | Relay, G.C.R. de-energizing with doors open  |
| 25300 | Relay, auxiliary heater  |
| 25310 | Relay for allowing connection of internal heating with power load inhibiting relay |
| 25321 | Relay for connection of auxiliary heater (1 <sup>st</sup> /2 <sup>nd</sup> speed)  |
| 25322 | Relay for connection of auxiliary heater (1 <sup>st</sup> speed)                   |
| 25323 | Relay for connection of auxiliary heater (2 <sup>nd</sup> speed)                   |
| 25324 | Relay for connection of auxiliary heater with G.C.R. on                            |
| 25325 | Relay for engine coolant recirculation (open with engine running)                  |
| 25326 | Relay for temporary connection of air-conditioning system                          |
| 25327 | Relay for connection of air-conditioning system                                    |
| 25332 | Relay for connection of air-conditioning system                                    |
| 25333 | Relay for connection of cab heating  |
| 25335 | Relay for water circulation pump cutoff with G.C.R. open                           |
| 25402 | Relay, hazard/turn signal lights   |
| 25624 | Relay for inverting signal for driver's door switch                                |
| 25625 | Relay for enabling driver's door open signal with terminal I5                      |
| 25702 | Relay for switching negative/positive signal for PTO                               |
| 25713 | Relay for ECO - POWER control  |
| 25714 | Relay for switching off EDC / electric battery disconnecter                        |
| 25718 | Relay for enabling fuel filter restriction signal                                  |
| 25805 | Relay, horns   |
| 25813 | Relay, heated rearview mirrors   |
| 25824 | Relay for raising 3 <sup>rd</sup> axle with associated air springs under pressure  |
| 25866 | Relay for terminal 58  |

|       |   |
|-------|---|
| 25874 | Relay for connection of power loads with engine running                       |
| 25893 | Relay for connection of total power takeoff                                   |
| 25894 | Relay for connection of power loads with key on                               |
| 25897 | Relay for connection of side transmission power takeoff                       |
| 25898 | Relay for connection of rear transmission power takeoff                       |
| 25900 | General Current Relay   |
| 25924 | Relay for tuning on EDC (main relay)  |
| 25945 | Delayed electronic relay when opening for lighting cab interior               |
| 25949 | Delayed relay for rear fog guard light system                                 |
| 30001 | High/low beam headlight with parking light                                    |
| 30010 | Low beam light  |
| 30011 | Fog headlight   |
| 30100 | Headlight alignment unit actuator   |
| 32002 | Front turn signal light   |
| 32010 | Rotary beacon   |
| 33001 | Turn signal side repeater   |
| 33004 | Side marker lamp  |
| 34000 | Rear headlight cluster  |
| 34011 | Fifth-wheel light   |
| 35000 | Number plate light  |
| 37001 | Front marker light  |
| 39000 | Cab interior ceiling lamp   |
| 39002 | Bunk ceiling lamp   |
| 39003 | Steps spotlight   |
| 39009 | Reading light   |
| 39017 | Cab interior swivel spotlight   |
| 39020 | Cigar lighter light   |
| 39030 | Lamp, cab side compartment lighting   |
| 40011 | Electronic tachograph   |
| 40032 | Tachometer/tachograph sender unit   |
| 40037 | Tachograph signal converter   |
| 40046 | Inductive type chassis height sensor (rear axle)                              |
| 40047 | Inductive type chassis height sensor (front axle)                             |
| 40060 | Voltage dropper unit, tachograph, TMP vehicles                                |
| 42001 | Pressure gauge with built-in w/lamp, engine oil pressure                      |
| 42008 | Pressure gauge, front/rear brake air pressure                                 |
| 42030 | Sender unit, engine oil pressure gauge  |
| 42045 | Sender unit for outdoor temperature gauge                                     |
| 42102 | Switch, parking brake signal  |
| 42111 | Switch for stop light check with EDC on                                       |
| 42200 | Switch, air suspension failure signal   |
| 42253 | Automatic transmission low air pressure signalling switch                     |
| 42351 | Switch, air cleaner restriction   |
| 42374 | EDC clutch switch   |
| 42379 | Switch for allowing connection of transmission power take-off                 |
| 42381 | Air pressure sensor on drive axle for third axle lifting/lowering change-over |
| 42382 | Air pressure sensor on third axle for third axle lifting/lowering change-over |
| 42389 | Air pressure sensor on third axle pneumatic lifting                           |
| 42550 | Switch, engine oil pressure signal  |
| 42608 | Coolant pressure signalling 3-switch assembly                                 |
| 42700 | Switch, fuel filter restriction signal  |
| 44001 | Fuel level indicator with built-in w/lamp                                     |
| 44002 | Engine oil level indicator  |

|       |  |
|-------|--|
| 44031 | Sender unit, fuel level indicator with w/lamp contact                          |
| 44035 | Windshield fluid level indicator control                                       |
| 44036 | Radiator waterlevel indicator control  |
| 44037 | Power steering fluid level indicator control                                   |
| 44043 | Engine oil level sender unit   |
| 47011 | Thermometer, engine coolant temperature with built-in w/lamp                   |
| 47030 | Sender unit, thermometer, engine coolant temperature                           |
| 47041 | Water temperature sender for retarder control unit                             |
| 47042 | Fuel temperature sensor  |
| 47100 | Switch, engine coolant high temperature signal                                 |
| 48001 | Electronic rev counter   |
| 48035 | Engine rpm sensor  |
| 48042 | Engine rpm sensor on timing gear   |
| 48043 | Turbocharger speed sensor  |
| 49005 | Voltmeter  |
| 50000 | IVECO Control display panel  |
| 52002 | Switch, auxiliary heater   |
| 52005 | Switch with built-in w/lamp, heated rearview mirrors                           |
| 52009 | Switch with built-in w/lamp, fifth-wheel light                                 |
| 52015 | Switch, rotary beacons   |
| 52020 | Switch with built-in w/lamp, power take-off                                    |
| 52024 | Switch with built-in w/lamp, auxiliary headlights                              |
| 52056 | Switch with built-in w/lamp for ASR cutout                                     |
| 52057 | Switch with built-in w/lamp for ABS cutout                                     |
| 52059 | Automatic transmission speed selector  |
| 52070 | Switch for engaging side power takeoff   |
| 52071 | Switch for engaging rear power takeoff   |
| 52072 | Automatic transmission speed selector during limp-home operation               |
| 52084 | Switch with built-in warning lamp for turning on rear differential lock device |
| 52092 | Switch for engine or cab heater  |
| 52093 | Switch for tail hatch locking safety   |
| 52094 | Switch for spot lights point   |
| 52200 | Air/electrical horn switch   |
| 52212 | Switch for horn (city/extra city bus use)                                      |
| 52218 | Switch, Cruise Control operation from cab inside/outside                       |
| 52300 | Interior lighting switch   |
| 52302 | Switch with built-in w/lamp, hazard lights                                     |
| 52304 | Switch, fog lights and rear fog lights enablement                              |
| 52307 | Switch, exterior lighting  |
| 52312 | Switch, headlight alignment control  |
| 52324 | Switch, exhaust brake prearrangement   |
| 52502 | Ignition key switch, starting-interlocked services                             |
| 52522 | Lever switch for engaging electric retarder                                    |
| 52601 | Air cutoff mechanical main current switch, TMP vehicles                        |
| 53000 | Switch, lamp test  |
| 53001 | Switch, headlight wiper/washer unit  |
| 53006 | Switch, starting from engine compartment                                       |
| 53007 | Switch, engine stopping from engine compartment                                |
| 53027 | Sun roof switch  |
| 53041 | Switch for checking EDC system   |
| 53055 | Unstable switch for interior lights  |
| 53300 | Switch, power window on driver's side  |
| 53302 | Switch, power window on passenger's side                                       |

|       |  |
|-------|--|
| 53309 | Switch, power window on passenger's side                                       |
| 53315 | Rear fog guard switch  |
| 53501 | Switch, stop signal  |
| 53503 | Switch, reversing lights   |
| 53505 | Switch for signalling rear differential lock                                   |
| 53507 | Switch for signalling splitter gears engaged                                   |
| 53508 | Switch for preventing engine starting with gear engaged and reversing light on |
| 53509 | Switch, interior lighting  |
| 53512 | Switch for preventing engine starting with parking brake off                   |
| 53517 | Switch, cross differential lock signal   |
| 53520 | Switch for engaging exhaust brake  |
| 53521 | Switch for signalling longitudinal differential lock                           |
| 53552 | Switch for signalling transfer case power takeoff engaged                      |
| 53565 | Switch, brake pedal fully depressed signal                                     |
| 53567 | Switch for signalling side power takeoff engaged                               |
| 53568 | Switch for signalling rear power takeoff engaged                               |
| 53593 | Tool compartment light switch  |
| 54031 | 5-function steering wheel switch   |
| 55100 | Electronic switch for cab released signal                                      |
| 58073 | Trailer brake system failure w/lamp  |
| 58114 | Warning lamp, battery isolator switch open                                     |
| 58165 | Auxiliary heater failure w/lamp  |
| 58420 | Warning lamp, water in fuel pre-filter   |
| 58460 | Rotating beacon w/lamp   |
| 58469 | Fuel oil filter restriction warning lamp                                       |
| 58902 | I0-optical indicator panel for light system                                    |
| 58903 | I0-optical indicator panel (Europe)  |
| 58905 | I0-optical indicator panel for optionals                                       |
| 59001 | Electronic flasher light, turn signal/hazard light - double load               |
| 59100 | Windshield wiper unit intermittent operation                                   |
| 61000 | 1A 3-diode holder container (2 with common cathode)                            |
| 61001 | 3A 3-diode holder container (2 with common cathode)                            |
| 61003 | 1A 4-diode holder container (with common anode)                                |
| 61004 | 1A 4-diode holder container (2 with common cathode)                            |
| 61005 | 1A 1-diode holder container  |
| 61121 | Resistance for engine preheating   |
| 61122 | 2-resistance holder container for exhaust brake                                |
| 61125 | 4-resistor holding container, ECONOMY-POWER and PTO                            |
| 61126 | Conclusion resistor for bus "CAN"  |
| 64000 | Windshield washer electric pump  |
| 65000 | Windshield wiper unit  |
| 66005 | Headlight washer pump  |
| 66010 | Headlight washer unit timer  |
| 68000 | Radioreceiver set  |
| 68001 | Loudspeaker  |
| 68005 | 24V/12V Power pack   |
| 68007 | City Band  |
| 70601 | 6-fuse holder  |
| 70602 | 6-fuse holder  |
| 70603 | 6-fuse holder  |
| 70604 | 6-fuse holder  |
| 70605 | 6-fuse holder  |
| 72000 | Standard 7-pole coupling for electrical connection to trailer                  |

|       |   |
|-------|---|
| 72001 | Auxiliary 7-pole coupling for electrical connection to trailer    |
| 72021 | Ground diagnostic equipment 30-pole electrical coupling connector |
| 72025 | Current outlet  |
| 72026 | Current outlet  |
| 75000 | Central interconnecting unit                                      |
| 78009 | Turbine circuit closing solenoid valve                            |
| 78050 | Exhaust brake control solenoid valve                              |
| 78052 | ABS/EBS system solenoid valve                                     |
| 78053 | ASR control solenoid valve  |
| 78054 | Solenoid valve for engaging retarder                              |
| 78055 | Solenoid valve for retarder oil accumulator                       |
| 78058 | Proportional valve for controlling EBS trailer air pressure       |
| 78059 | Duplex valve for EBS  |
| 78203 | Solenoid valve for horns  |
| 78208 | Transmission total power take-off solenoid valve                  |
| 78227 | Solenoid valve for radiator water recirculation                   |
| 78228 | Solenoid valve for heating system                                 |
| 78237 | Solenoid valve for water recirculation with engine off            |
| 78242 | Front axle electropneumatic distributor                           |
| 78243 | Electropneumatic distributor                                      |
| 78247 | Solenoid valve for electronic injection                           |
| 78248 | Solenoid valve for variable geometry turbine control              |
| 78251 | Solenoid valve for engaging transmission side power take-off      |
| 78252 | Solenoid valve for engaging transmission rear power takeoff       |
| 80000 | Power window motor on driver's opposite side                      |
| 82000 | Windshield defroster unit   |
| 82010 | Air-conditioning system electronic control unit                   |
| 84000 | Water boiler  |
| 84001 | Air boiler  |
| 84005 | Auxiliary heater electronic control unit                          |
| 84014 | Auxiliary fuel pump   |
| 84017 | Electronic timer  |
| 84019 | Electromagnetic pulley  |
| 85000 | Cigar lighter   |
| 85003 | Heated rearview mirror (trailer)                                  |
| 85004 | Heated rearview mirror (wheel)                                    |
| 85005 | Heated rearview mirror  |
| 85006 | Electrically-adjusted heated rearview mirror (main)               |
| 85007 | Electrically-adjusted heated rearview mirror (draw up)            |
| 85008 | Electrically-adjusted heated rearview mirror (wide angle)         |
| 85010 | Rearview mirror control   |
| 85023 | Electrical key lock   |
| 85150 | EDC control unit  |
| 85152 | Accelerator load sensor EDC                                       |
| 85153 | Coolant temperature sensor EDC                                    |
| 85154 | Turbofan air temperature sensor EDC                               |
| 85155 | Turbofan air temperature sensor, EDC                              |
| 85158 | Turbine prechamber air pressure sensor EDC                        |
| 86002 | Sensors, front brake shoe wear circuit                            |
| 86003 | Sensors, rear brake shoe wear circuit                             |
| 86004 | Electronic control unit, automatic transmission                   |
| 86013 | Sensor, water in fuel filter                                      |
| 86015 | Electronic control unit, retarder                                 |



|              |  |
|--------------|--|
| <b>86016</b> | Control unit, differential lock                          |
| <b>86023</b> | Vehicle raising/lowering control unit                    |
| <b>86028</b> | Electronic control unit, trip computer                   |
| <b>86029</b> | Electronic control unit, centralized door closign system |
| <b>86030</b> | Sensor, sun radiation                                    |
| <b>86038</b> | Control unit for automatic chassis lubrication system    |
| <b>88000</b> | Electronic control unit, ABS system                      |
| <b>88001</b> | Sensor, ABS system                                       |
| <b>88008</b> | Potentiometric sensor for rear wheel pad position signal |
| <b>89000</b> | Food heater  |

### Graphic symbols and abbreviations

In the pages that follow you will often find the symbols listed below. For your own safety and that of the vehicle, the instructions and cautions given below must absolutely be closely adhered to.



Indicates that the failure to follow the instructions may involve physical injury.







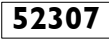
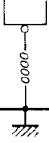




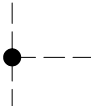
Indicates that the failure to follow the instructions may involve damage to the electric system and/or equipment and/or instruments.



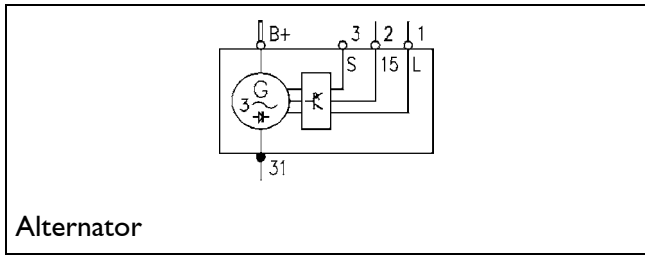
Indicates a general warning

### General conditions for laying electric circuits

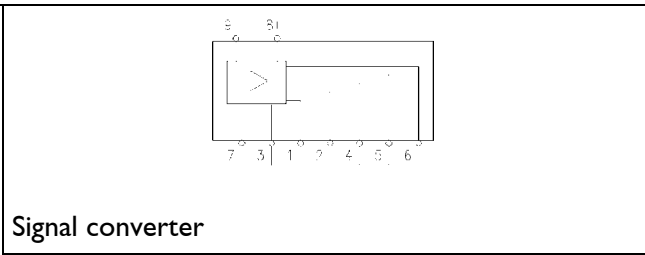
- Engine off
- Ignition switch off
- Handbrake engaged
- Neutral gear
- Cab coupled
- Fluids at normal level
- Air in tanks at operating pressure

|   |   |  |  |
|---|---|--|--|
| A   | Connector on interconnecting control box                      |  | Front wall connector:<br>A = identification reading<br>II = cell number        |
|  | Signal earth point  |  |  |
| S.U.  | Ultrasonic soldering  |  |  |
| Opt   | Optional  |  | Rear wall connector:<br>A = identification reading<br>II = cell number         |
| EI  | Seat for relay of diode holder on interconnecting control box |  |  |
| M   | Identification of an earth point                              |  | Connector between two cables:<br>04 = Identification number<br>2 = cell number |
| ST  | Connector   |  |  |
|  | Component code  |  | Connection to earth by cable   |
|  | Consult   |  |  |
|  | Earth connection to frame and/or body                         |  | Connection to earth by component   |
|  | Reed fuse on UCI:<br>I = identification number                |  | Optional electrical connection   |

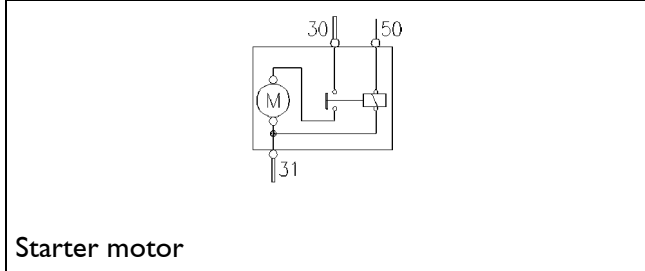
**Electric diagrams of components**



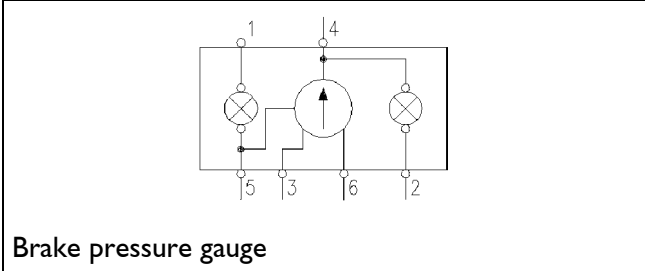
**Alternator**



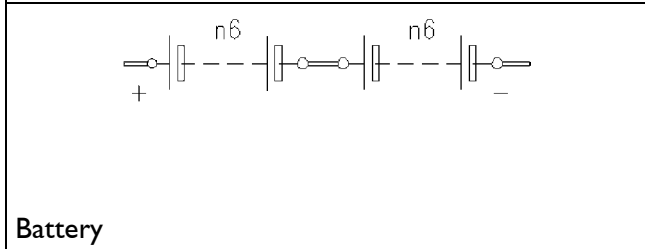
**Signal converter**



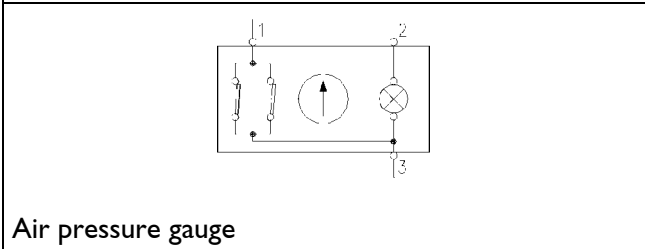
**Starter motor**



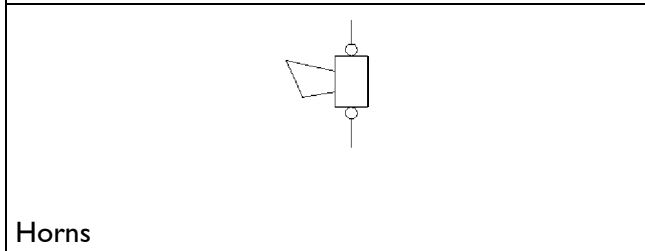
**Brake pressure gauge**



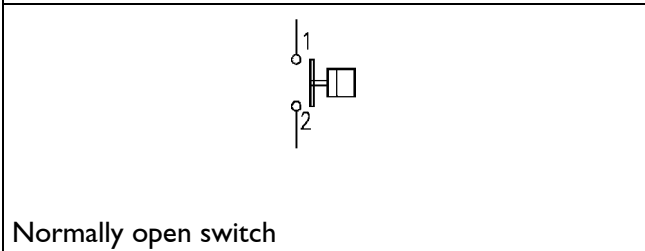
**Battery**



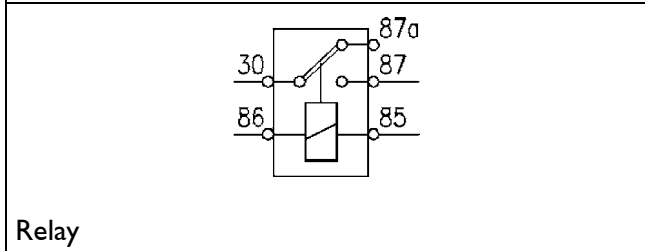
**Air pressure gauge**



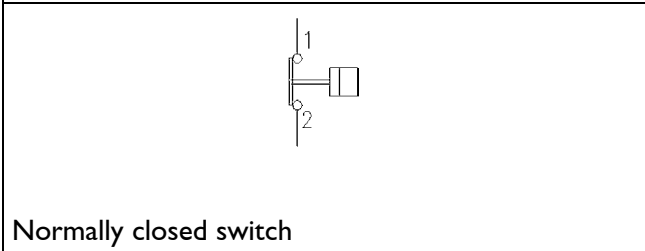
**Horns**



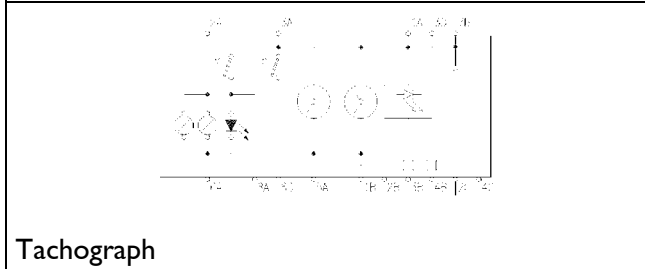
**Normally open switch**



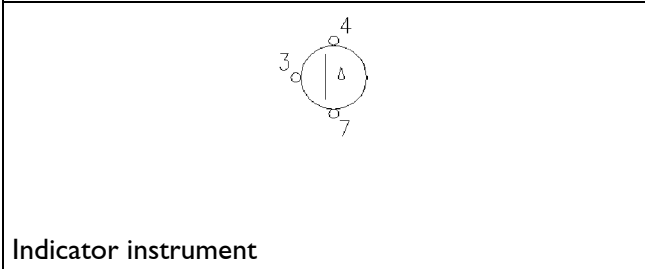
**Relay**



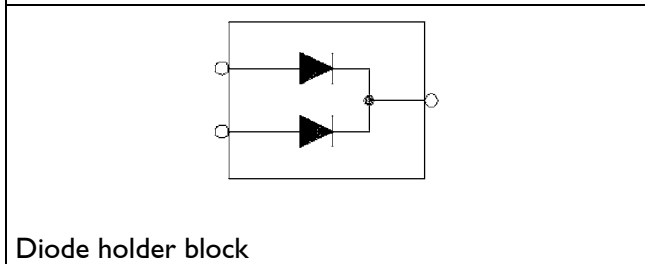
**Normally closed switch**



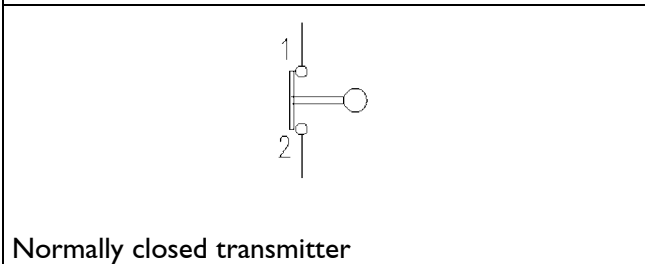
**Tachograph**



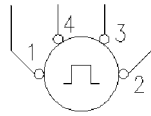
**Indicator instrument**



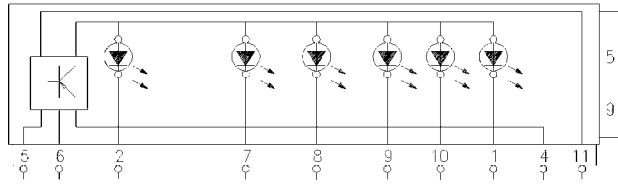
**Diode holder block**



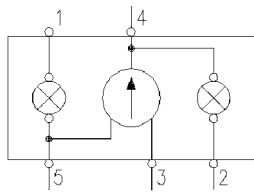
**Normally closed transmitter**



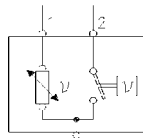
Pulse sender



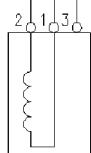
Iveco Control



Indicator instrument



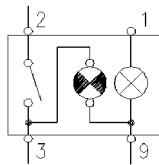
Sender unit



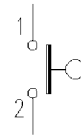
rpm sensor



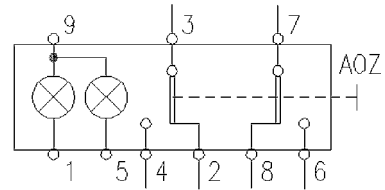
Voltmeter



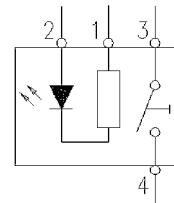
Switch



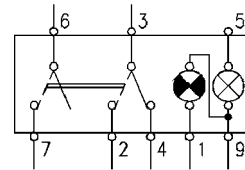
Normally open transmitter



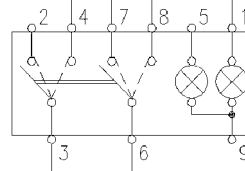
Switch



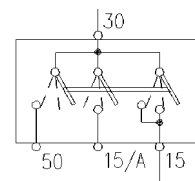
Switch



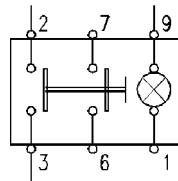
Selector switch



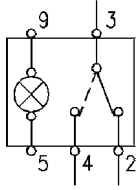
Selector switch



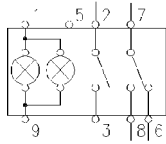
Selector switch



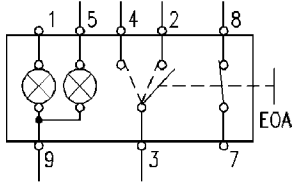
Switch



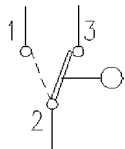
Switch



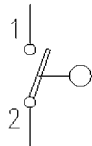
Switch



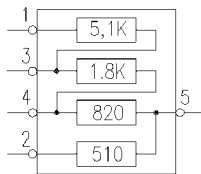
Selector switch



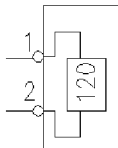
Switch



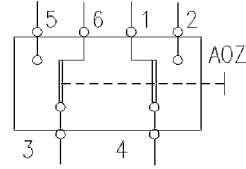
Switch



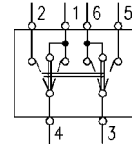
Resistance holder container



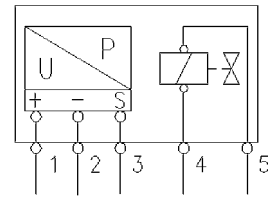
Resistance



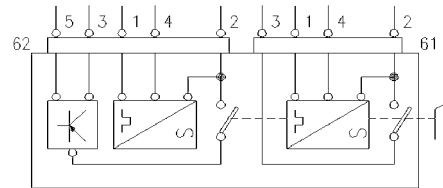
Switch



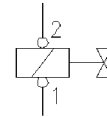
Switch



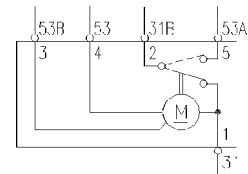
Solenoid valve



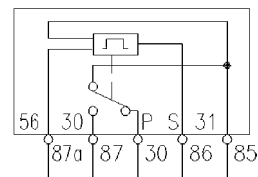
Solenoid valve



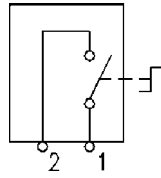
Solenoid valve



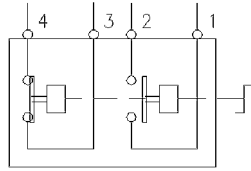
Windshield wiper



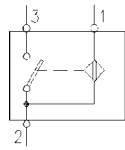
Timer



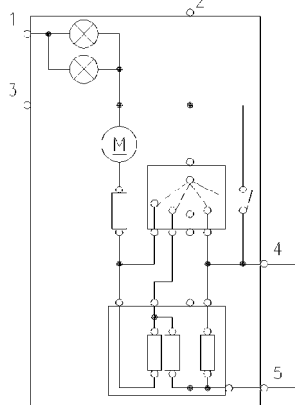
Switch



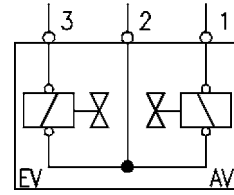
Switch



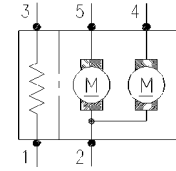
Electronic switch



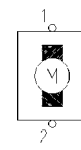
Windshield defroster unit



Solenoid valve



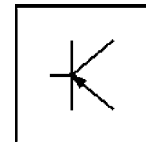
Electric rearview mirror



Electric motor



Temperature sensor



Electronic component



**General**

|  | Page |
|--|------|
| DESCRIPTION OF BASE SYSTEM .....                                     | 3    |
| <input type="checkbox"/> Technical and electric specifications ..... | 3    |
| <input type="checkbox"/> Cab structure .....                         | 3    |
| <input type="checkbox"/> Engine structure .....                      | 5    |
| <input type="checkbox"/> Frame structure .....                       | 9    |
| <input type="checkbox"/> Complete vehicle with cab tilted .....      | 10   |
| <input type="checkbox"/> Vehicle transparency .....                  | 11   |
| POWER NETWORK .....  | 13   |
| <input type="checkbox"/> Negative network .....                      | 13   |
| <input type="checkbox"/> Earth points on the vehicle .....           | 14   |
| <input type="checkbox"/> Positive network .....                      | 25   |
| <input type="checkbox"/> Starting .....                              | 29   |
| MAIN COMPONENTS .....  | 32   |
| <input type="checkbox"/> Main control unit (UCI) .....               | 32   |
| <input type="checkbox"/> Dashboard and instrument clusters .....     | 50   |
| <input type="checkbox"/> Starter motor .....                         | 58   |
| <input type="checkbox"/> Alternator .....                            | 62   |
| <input type="checkbox"/> Steering wheel stalk unit .....             | 64   |
| <input type="checkbox"/> Ignition switch .....                       | 70   |
| <input type="checkbox"/> Front wall connector .....                  | 71   |
| <input type="checkbox"/> Rear wall connector .....                   | 82   |
| <input type="checkbox"/> Cable connector codes (ST) .....            | 89   |



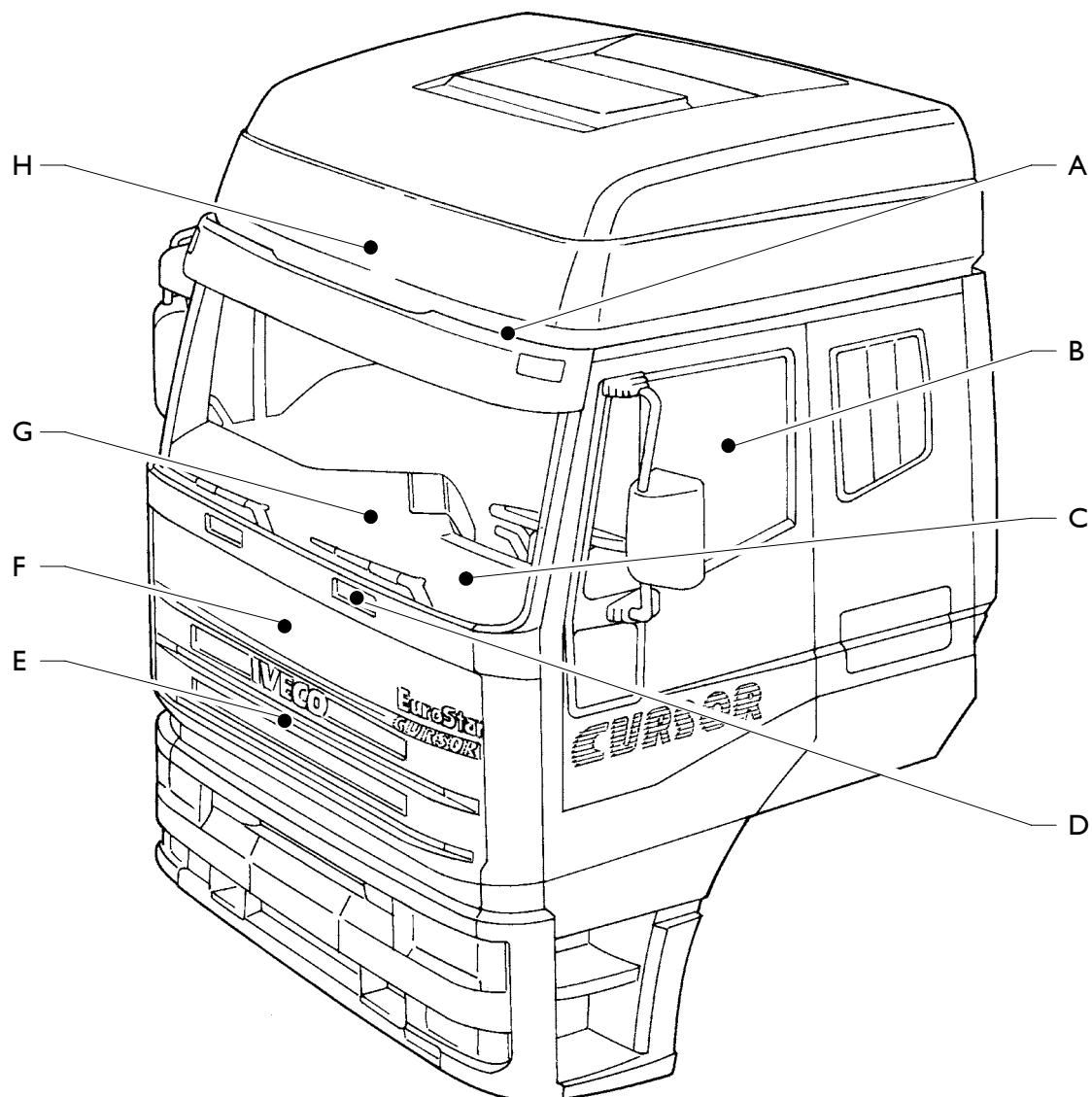


## DESCRIPTION OF BASE SYSTEM

### Technical and electric specifications

1. Unipolar system with negative terminal connected to the frame earth
2. Rated supply voltage 24V<sub>dc</sub>, connection in series of 2, 12 V / 100 Ah batteries (opt. 143 Ah- 170 Ah)
3. Electric system supply and battery charging with 24V / 65 A alternator (opt. 24 V - 90 A) with incorporated rectifier and voltage regulator.
4. Starting by 24 V / 5.5 kW starter motor Cursor 10/13 (4,5 kW - Cursor 8)

### Cab structure



- II.1 A. COMPONENTS ON ROOF PANEL (ADDITIONAL INSTRUMENTS) - B. REAR WALL - C. INSTRUMENT CLUSTER - D. ELECTRIC HEATER  
 E. ELECTRONIC CONTROL MODULES (WARMING ABS IVECO CONTROL) - F. FRONT WALL - G. INTERCONNECTING CONTROL BOX  
 - H. ELECTRONIC CONTROL MODULES FOR AUXILIARY HEATER

8366

**CURSOR ENGINE DESCRIPTION**

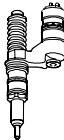
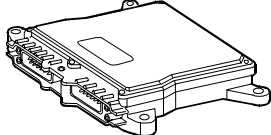
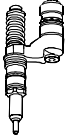
**Configuration of engines belonging to family 2 and family 3 (Cursor)**

The engines to be installed on medium-heavy and heavy vehicles, to replace traditional engines gradually, belong to "families" 2 and 3.

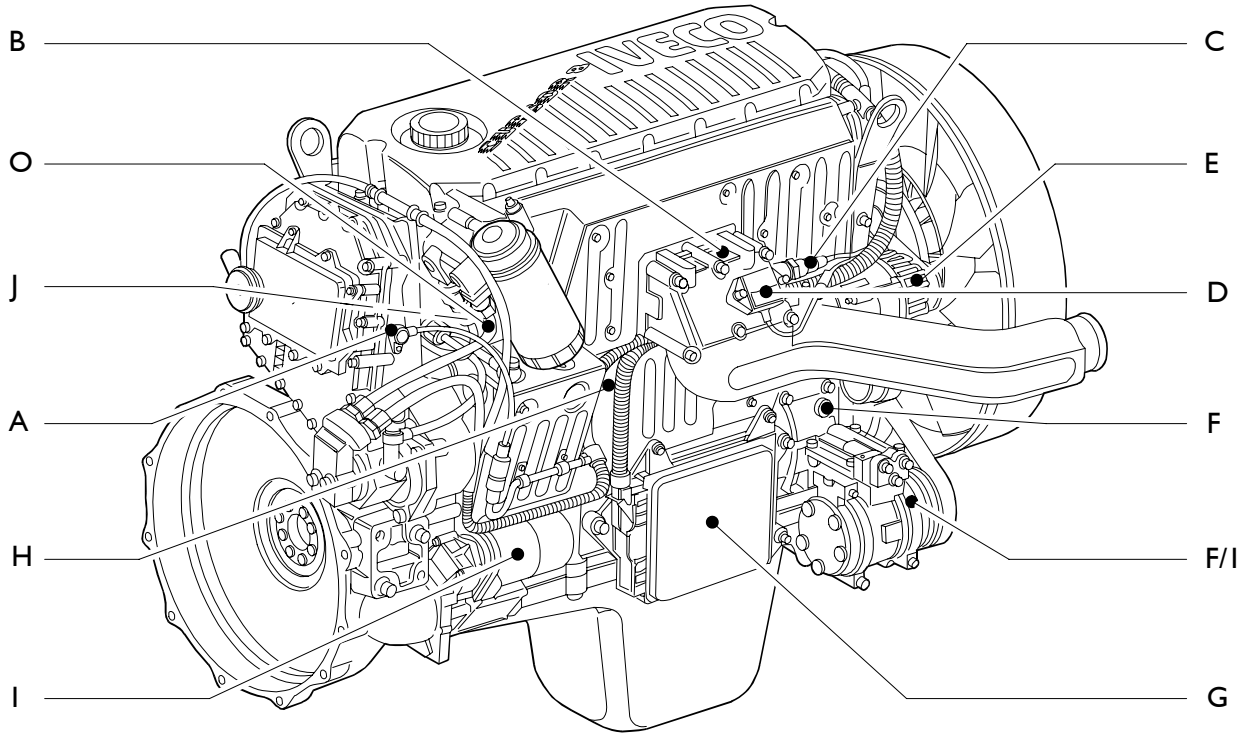
The cylinder displacements are different since they cover different power ranges.

The injection system of these engines is of high pressure type with pump - injector actuated by the head camshaft, with different dimensions and capacity between F2 and F3, but similar operation.

The electronic control unit is physically the same on all versions, but it contains a specific software for each engine family and, inside each family, for different power calibrations. During service operations it is not possible to work on each control unit software, save for entering certain configuration data, if required (e.g., to replace pump - injectors), through Modus.

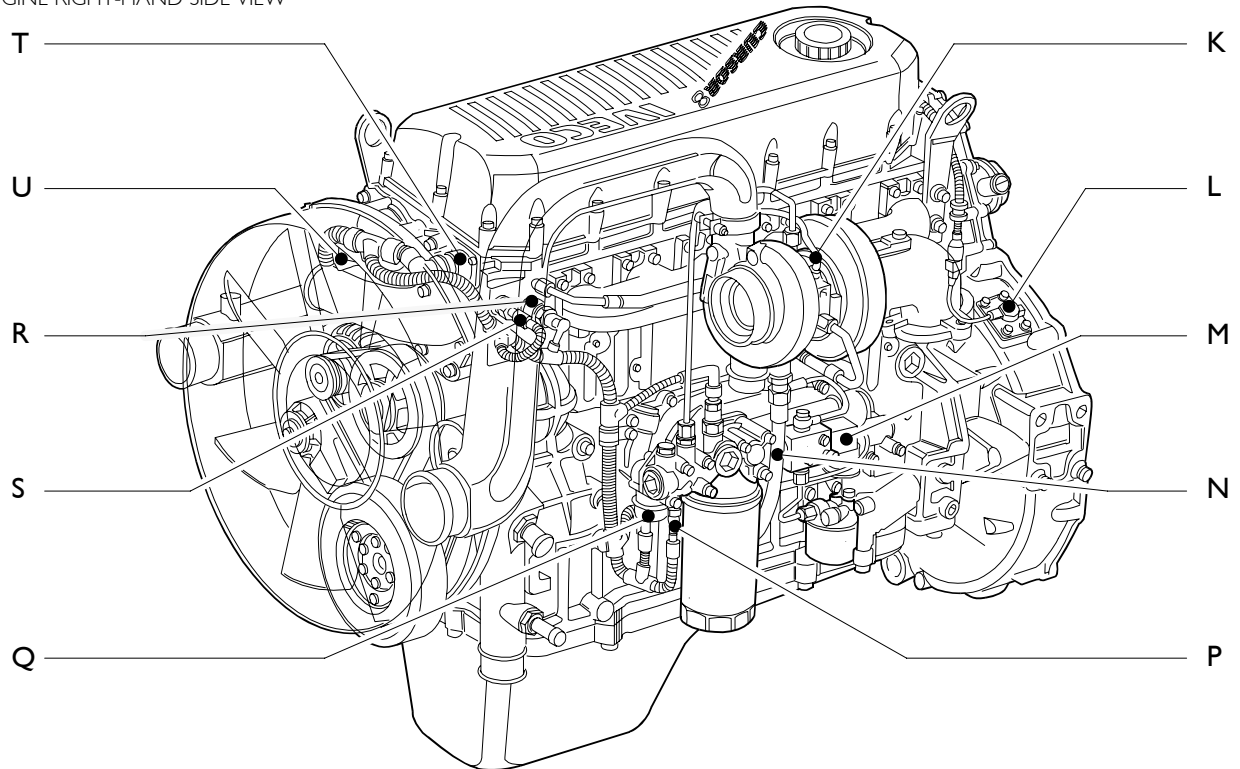
| <b>IVECO ENGINES</b>  |  |  |
|---|--|--|
| <b>MEDIUM – HEAVY / HEAVY RANGE</b>   |  |  |
| <b>ENGINE</b>   | <b>INJECTOR</b>  | <b>CONTROL UNIT</b>  |
| <p><b>(F2B)</b></p> <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p><i>Cursor 8</i></p> <p><b>7,8 L</b></p> </div>   | <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p><b>PDE 30</b></p>  <p>000415t</p> </div> | <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p><b>MS 6.2</b></p>  <p>000416t</p> </div> |
| <p><b>(F3A)</b></p> <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p><i>Cursor 10</i></p> <p><b>10,3 L</b></p> </div> | <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p><b>PDE 31</b></p>  <p>000415t</p> </div> |  |
| <p><b>(F3B)</b></p> <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p><i>Cursor 13</i></p> <p><b>12,9 L</b></p> </div> |  |  |

**Components on the engine F2B (Cursor 8)**



7871

ENGINE RIGHT-HAND SIDE VIEW

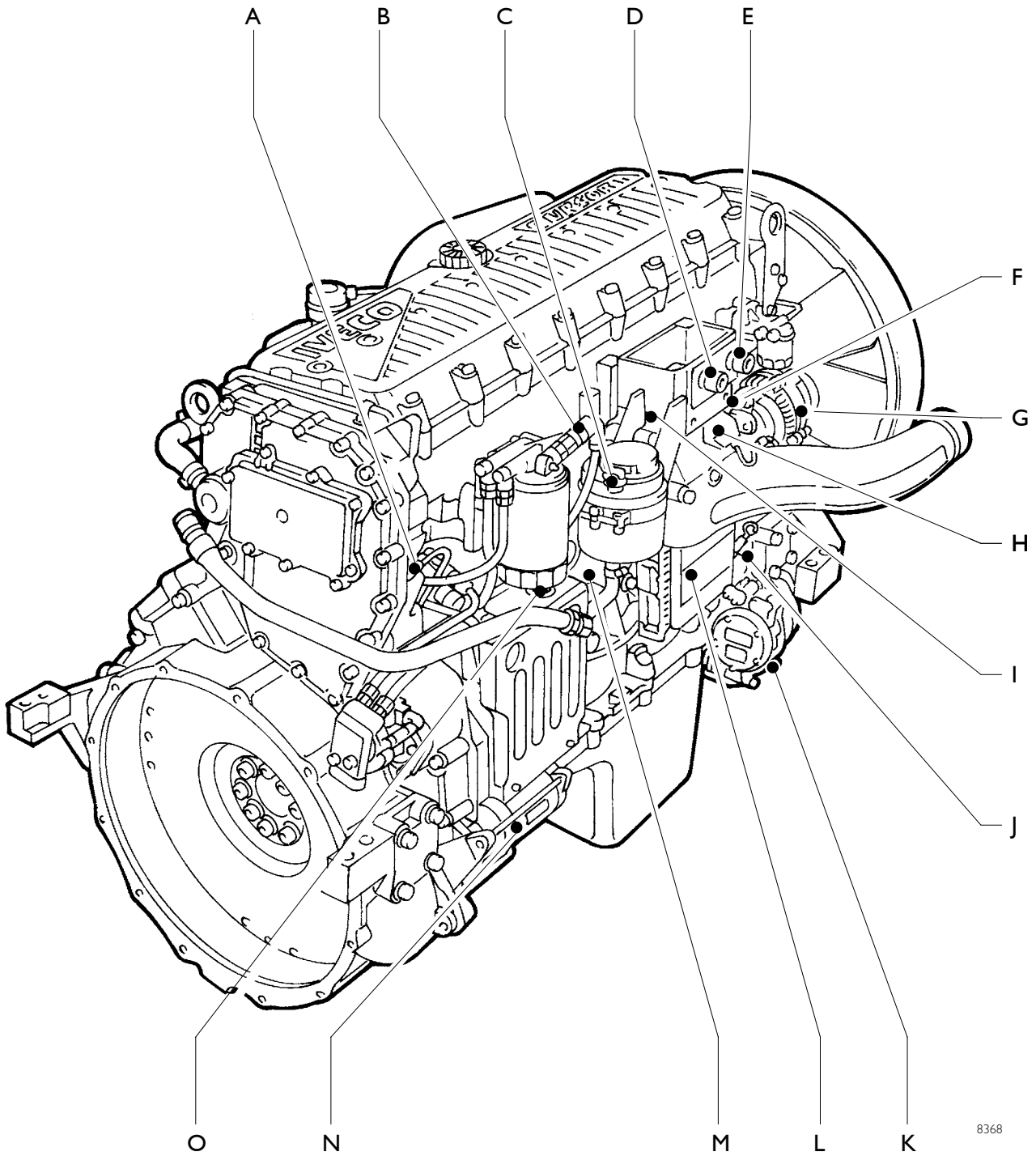


7872

ENGINE LEFT-HAND SIDE VIEW

- II.2** A. ENGINE RPM SENSOR ON CAMSHAFT - B. RESISTANCE FOR ENGINE WARMING - C. ENGINE INTAKE AIR TEMPERATURE SENSOR - D. BOOSTING PRESSURE SENSOR - E. ALTERNATOR - F. ENGINE OIL LEVEL SENSOR (OPTIONAL)- F/I. AIR CONDITIONER COMPRESSOR - G. EDC (MS6) CONTROL UNIT - H. EARTH POINT ON ENGINE - I. STARTER MOTOR - J. FUEL TEMPERATURE SENSOR - K. TURBINE SPEED SENSOR - L. ENGINE SPEED ON FLYWHEEL SENSOR - M. SOLENOID VALVE FOR VARIABLE GEOMETRY TURBINE CONTROL - N. TURBINE ACTUATOR PRESSURE SENSOR - O. FUEL FILTER CLOGGED SIGNALLING SWITCH - P. LOW OIL PRESSURE TRANSMITTER - Q. OIL PRESSURE TRANSMITTER - R. WATER TEMPERATURE FOR EDC - S. WATER TEMPERATURE SENSOR - T. CONNECTOR ON ENGINE HEAD FOR CONNECTION WITH INJECTOR SOLENOID VALVES - U. ENGINE BRAKE SOLENOID VALVE

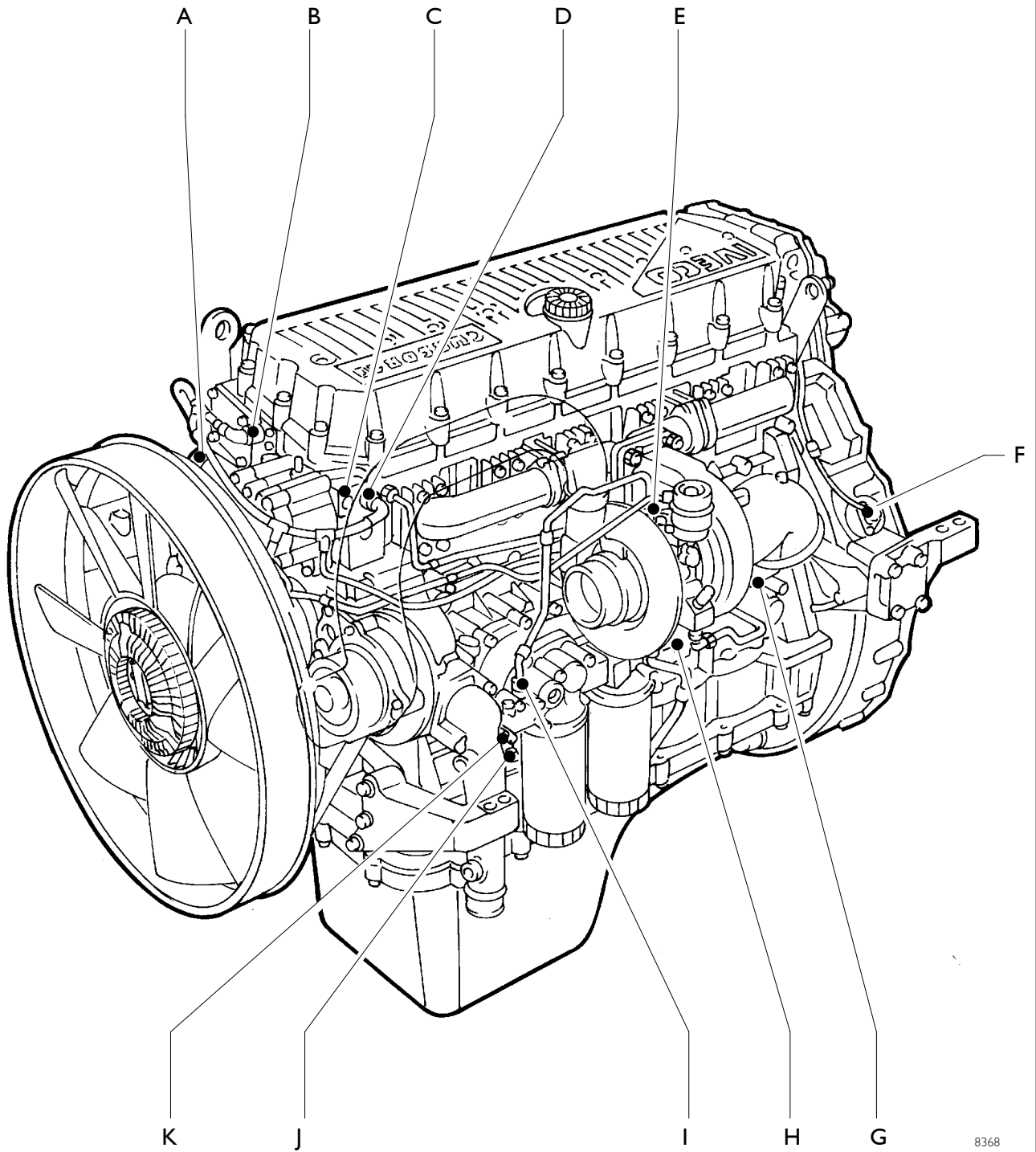
**Engine structure F3A (Cursor I0)**



8368

**II.3 ENGINE RIGHT-HAND SIDE VIEW**

- A. ENGINE RPM SENSOR ON CAMSHAFT - B. FUEL TEMPERATURE SENSOR - C. POWER STEERING OIL LEVEL - D. ENGINE STARTING BUTTON - E. ENGINE STOP BUTTON - F. ENGINE INTAKE AIR TEMPERATURE SENSOR - G. ALTERNATOR - H. BOOSTING PRESSURE SENSOR - I. RESISTANCE FOR ENGINE WARMING - J. ENGINE OIL LEVEL SENSOR (OPTIONAL) - K. AIR CONDITIONER COMPRESSOR - L. EDC (MS6) CONTROL UNIT - M. EARTH POINT ON ENGINE - N. STARTER MOTOR - O. WATER IN FUEL OIL FILTER SENSOR

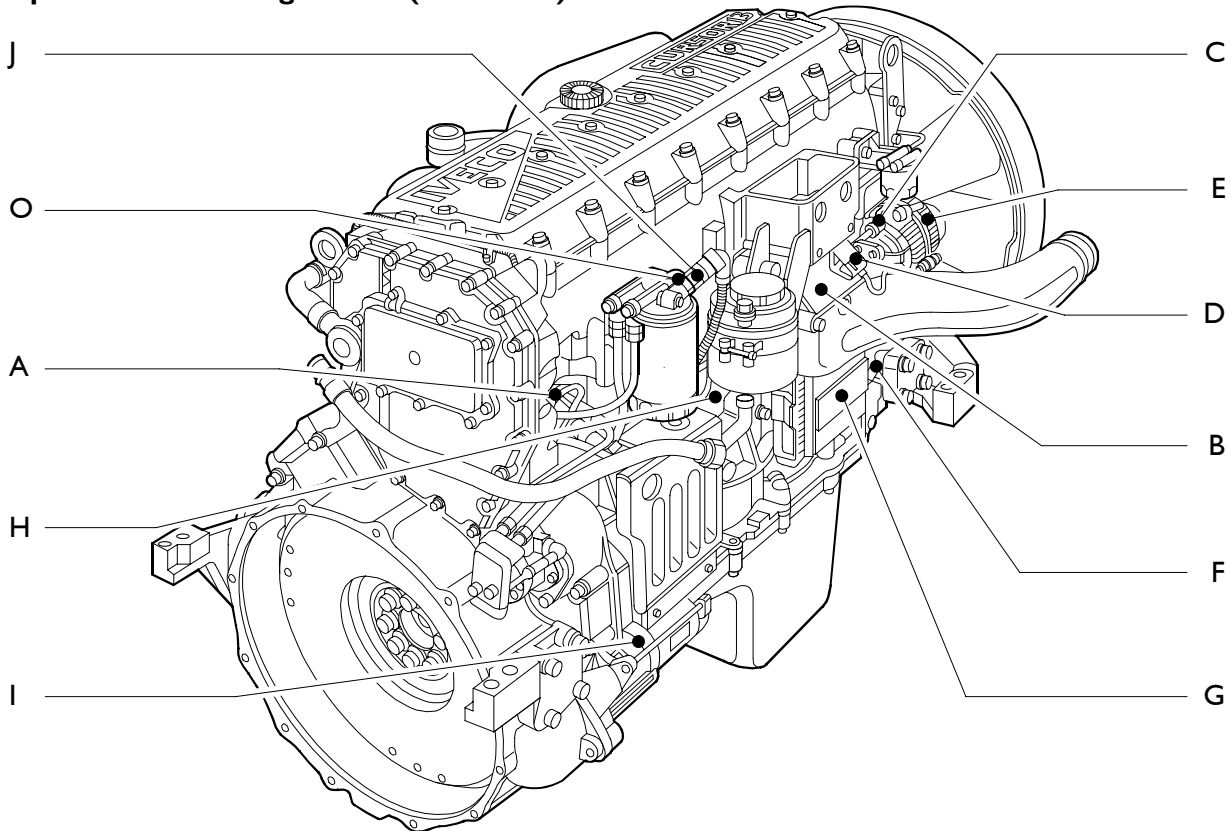


#### II.4 ENGINE LEFT-HAND SIDE VIEW

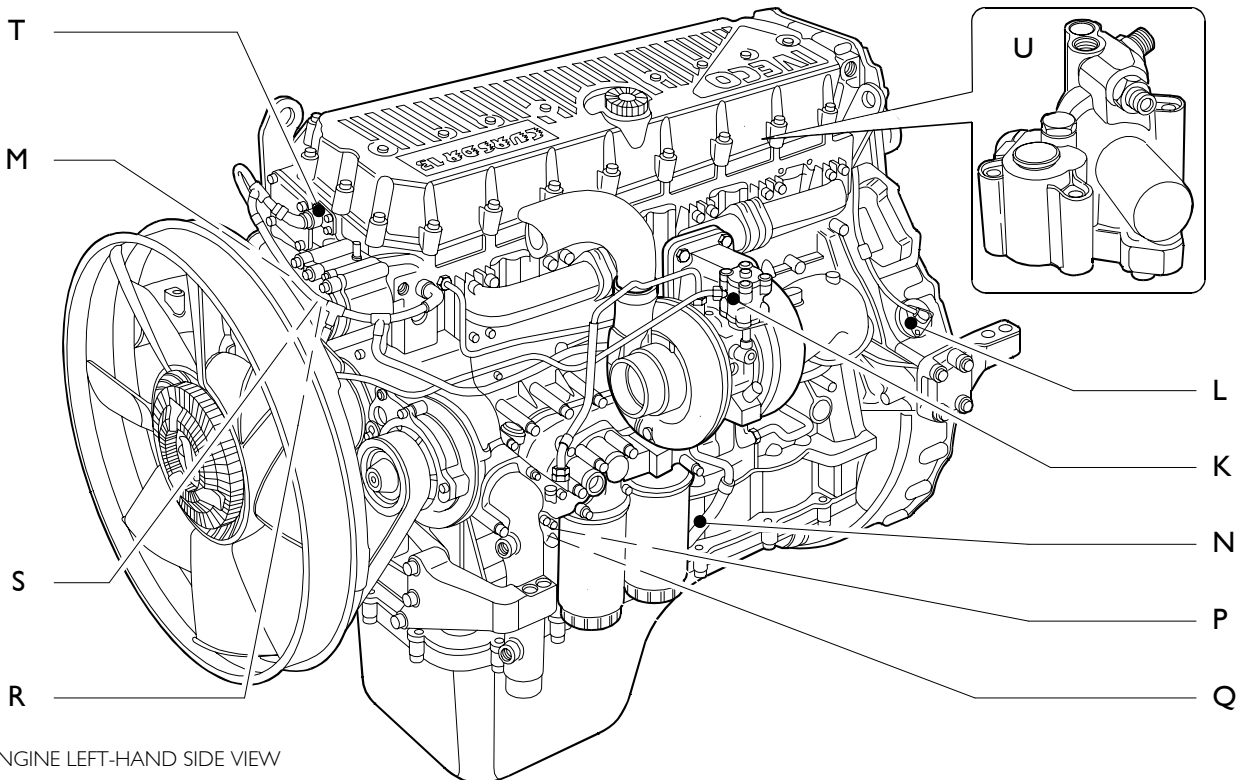
A. ENGINE BRAKE SOLENOID VALVE - B. CONNECTOR ON ENGINE HEAD FOR CONNECTION WITH INJECTOR SOLENOID VALVES - C. WATER TEMPERATURE SENSOR - D. WATER TEMPERATURE FOR EDC - E. TURBINE SPEED SENSOR - F. ENGINE SPEED ON FLYWHEEL SENSOR - G. SOLENOID VALVE FOR VARIABLE GEOMETRY TURBINE CONTROL - H. TURBINE ACTUATOR PRESSURE SENSOR - I. OIL FILTER CLOGGED SIGNALLING SWITCH - J. OIL PRESSURE TRANSMITTER - K. LOW OIL PRESSURE TRANSMITTER

8368

**Components on the engine F3B (Cursor I3)**



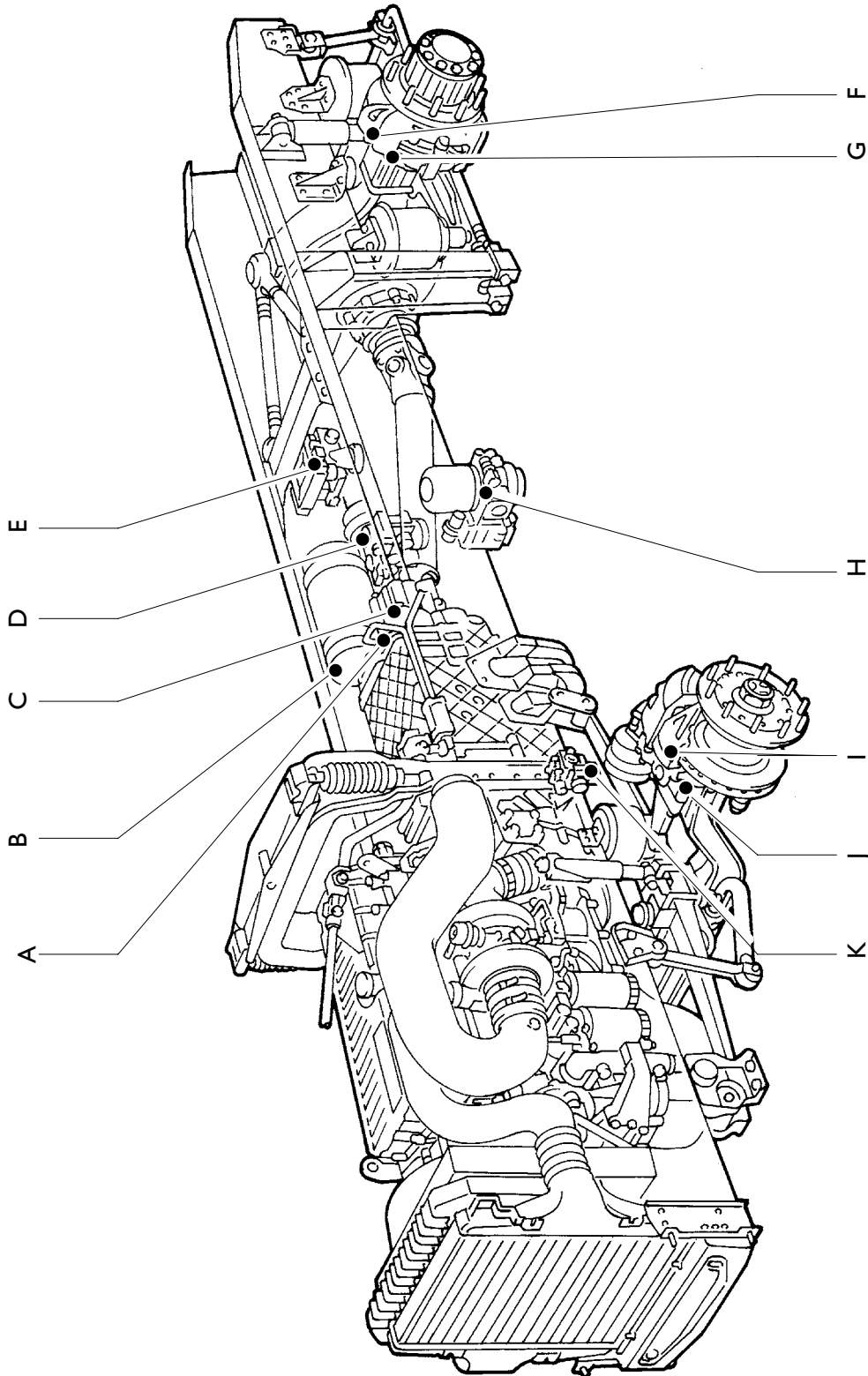
ENGINE RIGHT-HAND SIDE VIEW



ENGINE LEFT-HAND SIDE VIEW

- II.5** A. ENGINE RPM SENSOR ON CAMSHAFT - B. RESISTANCE FOR ENGINE WARMING - C. ENGINE INTAKE AIR TEMPERATURE SENSOR - D. BOOSTING PRESSURE SENSOR - E. ALTERNATOR - F. ENGINE OIL LEVEL SENSOR (OPTIONAL) - G. EDC (MS6) CONTROL UNIT - H. EARTH POINT ON ENGINE - I. STARTER MOTOR - J. FUEL TEMPERATURE SENSOR - K. TURBINE SPEED SENSOR - L. ENGINE SPEED ON FLYWHEEL SENSOR - M. SOLENOID VALVE FOR VARIABLE GEOMETRY TURBINE CONTROL - N. TURBINE ACTUATOR PRESSURE SENSOR - O. FUEL FILTER CLOGGED SIGNALLING SWITCH - P. LOW OIL PRESSURE TRANSMITTER - Q. OIL PRESSURE TRANSMITTER - R. WATER TEMPERATURE FOR EDC - S. WATER TEMPERATURE SENSOR - T. CONNECTOR ON ENGINE HEAD FOR CONNECTION WITH INJECTOR SOLENOID VALVES - U. ENGINE BRAKE SOLENOID VALVE

**Frame structure**

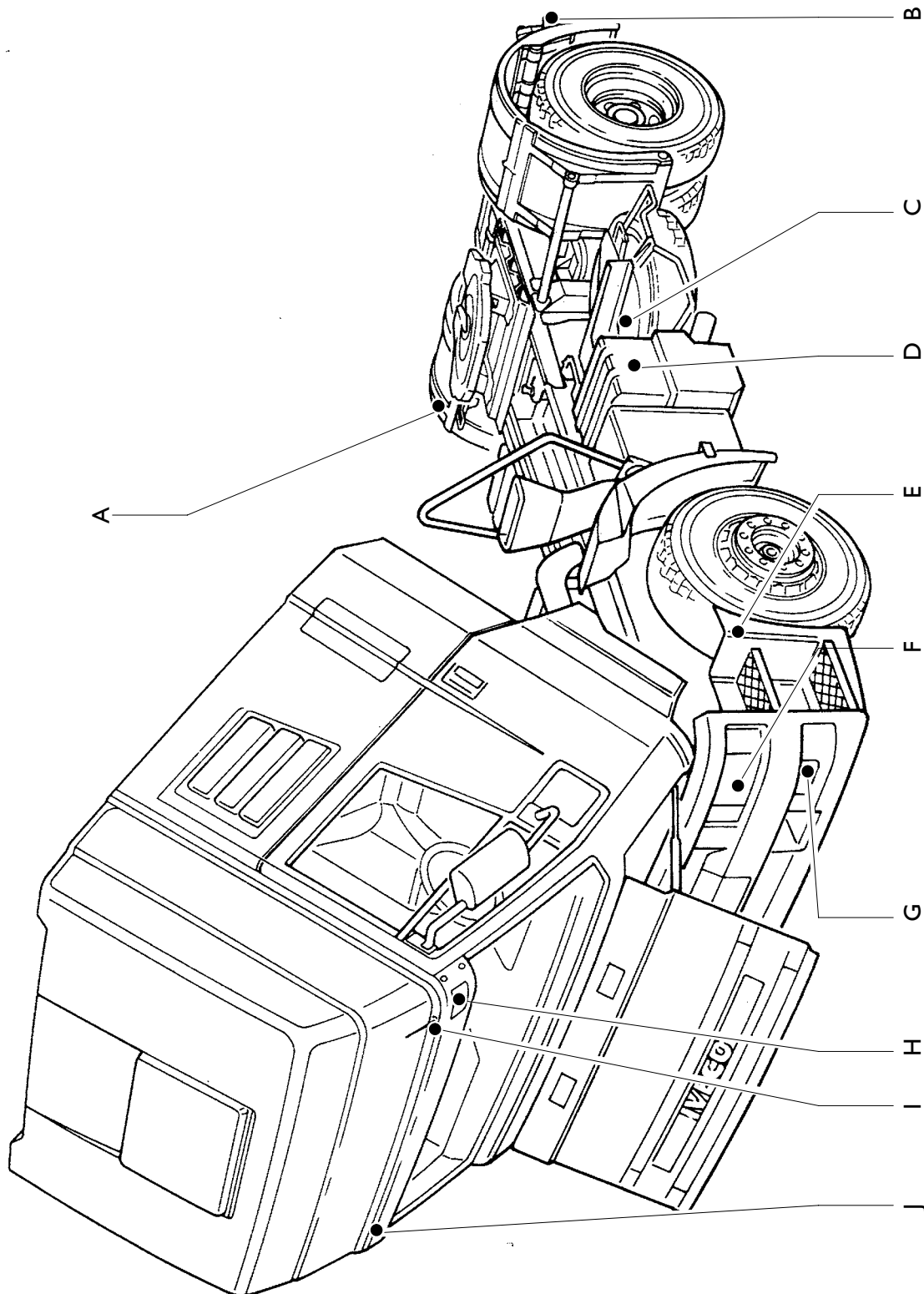


**II.6** A. SWITCH FOR TURNING ON REVERSING LIGHT - B. TAIL LAMP BRANCH BOX - C. TRANSMITTER FOR TACHOMETER AND TACHOGRAPH - D. SERVO-DISTRIBUTOR FOR TRAILER CONTROL - E. ELECTROPNEUMATIC MODULATOR AT REAR AXLE - F/I ABS SYSTEM SENSOR - G. SENSOR FOR REAR BRAKE SHOE WEAR INDICATOR CIRCUIT SENSOR - H. APU (AIR PROCESSING UNIT) - J. SENSOR FOR FRONT WHEEL BRAKE SHOE WEAR INDICATOR CIRCUIT SENSOR - K. SOLENOID VALVE FOR ABS/EB5

8370



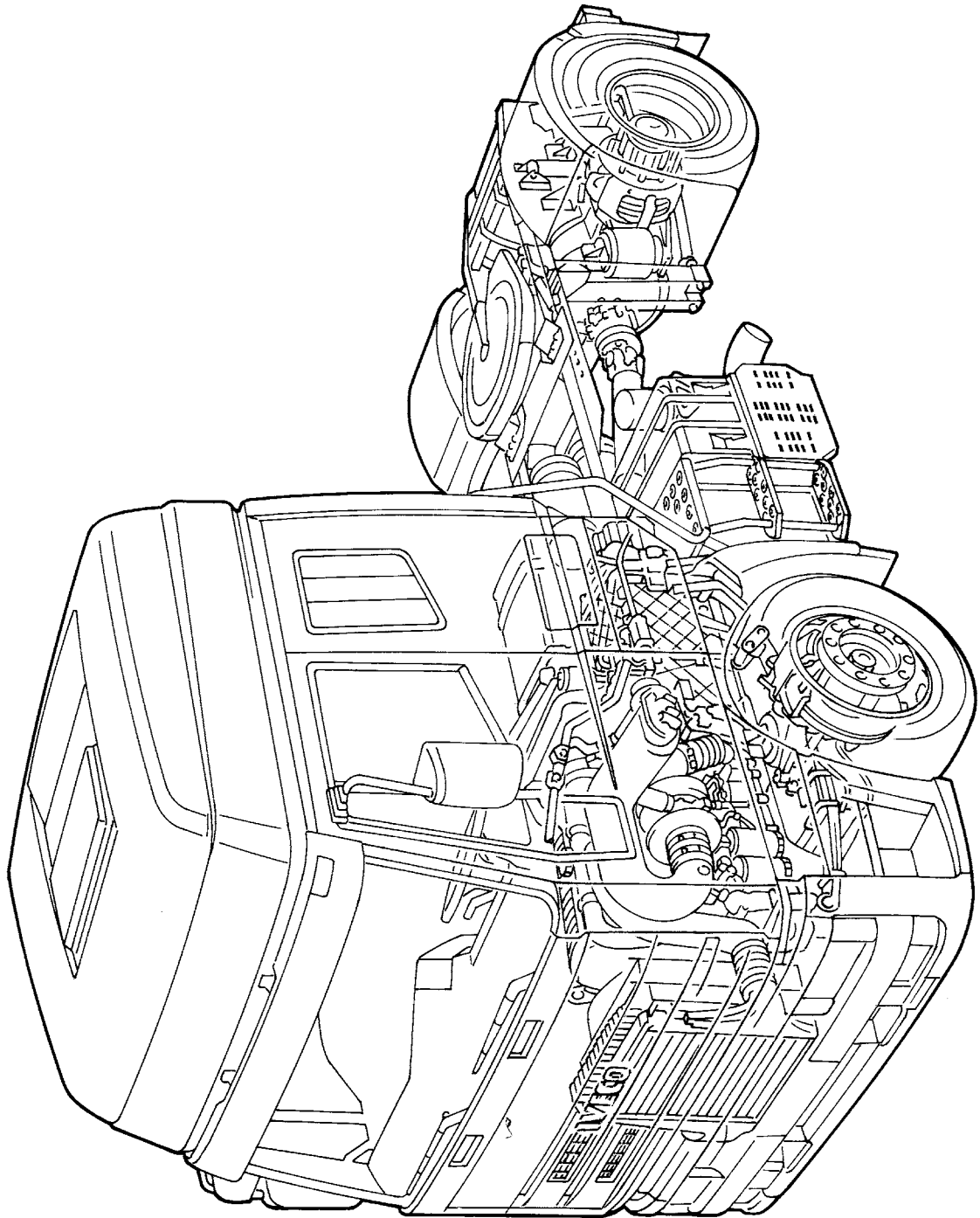
**Complete vehicle with cab tilted**



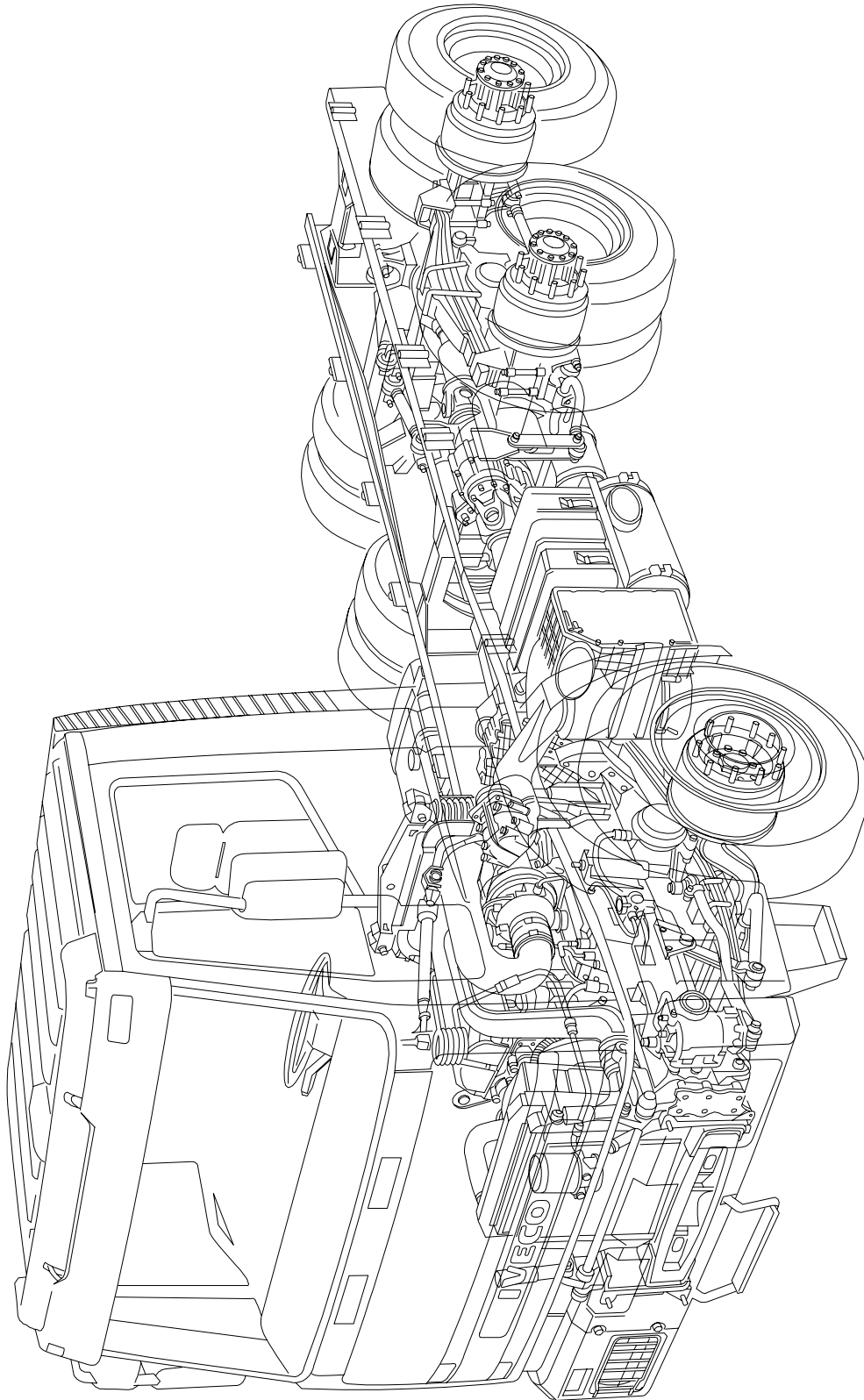
8371

**II.7** A. RIGHT TAIL LIGHT WITH CLEARANCE LIGHT - B. LEFT TAIL LIGHT WITH CLEARANCE LIGHT - C. BATTERY DISCONNECTOR D. BATTERIES E. SIDE DIRECTION INDICATORS - F. ADDITIONAL HEADLAMPS (MAIN BEAM AND FOG LAMPS) - G. HIGH BEAM/LOW BEAM HEADLAMPS H./J. FRONT CLEARANCE LIGHTS - I. RADIO AERIAL

**Vehicle transparency (EuroTech/EuroStar)**



**Vehicle transparency (EuroTrakker)**



002397t

**POWER NETWORK**



Never disconnect the batteries from the system with the engine running.

When needing to disconnect the batteries from the system, always firstly disconnect the frame earth cable from the negative terminal of the batteries.

Before connecting the batteries to the system, make sure that the system is well insulated.

Disconnect the batteries from the system when charging them.

The purpose of the electric system is to generate, regulate, store and distribute the energy needed to make the vehicle components work.

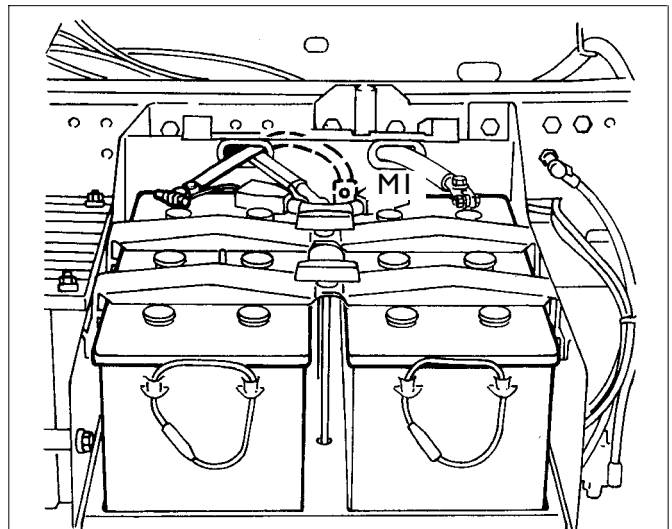
For this reason the supply of the base electric system is ensured by a generator (28V - 60A -90A alternator) and two batteries, each with 12 V | 10 Ah (143 Ah - 170 Ah) connected in series.

**Negative network**

The batteries are connected to the frame earth with a brown 70 mm<sup>2</sup> cable, at earth point M1 on the left sidemember (Fig. II.8).

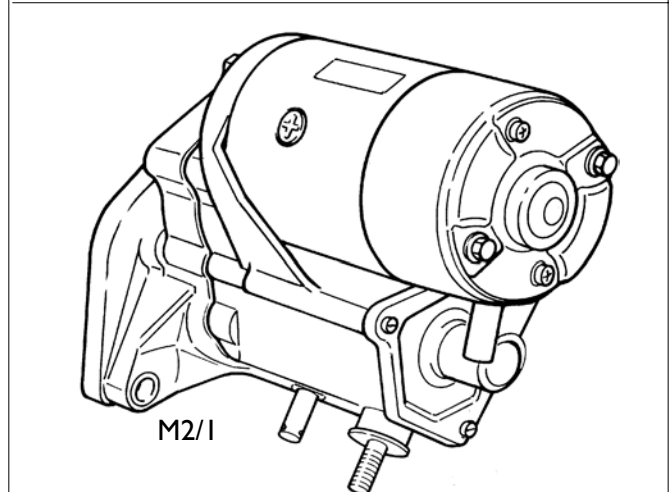
The starter motor is connected to the frame earth (M2/I) through a 70 mm<sup>2</sup> cable, fastened on the right sidemember (Fig. II.9), near the actual motor. The same cable serves for connecting the whole engine unit to the frame earth.

The vehicle cab is given the same negative electrical equipotential as the frame through a braid (Fig. II.10) connected to the cab front and on the right front sidemember.



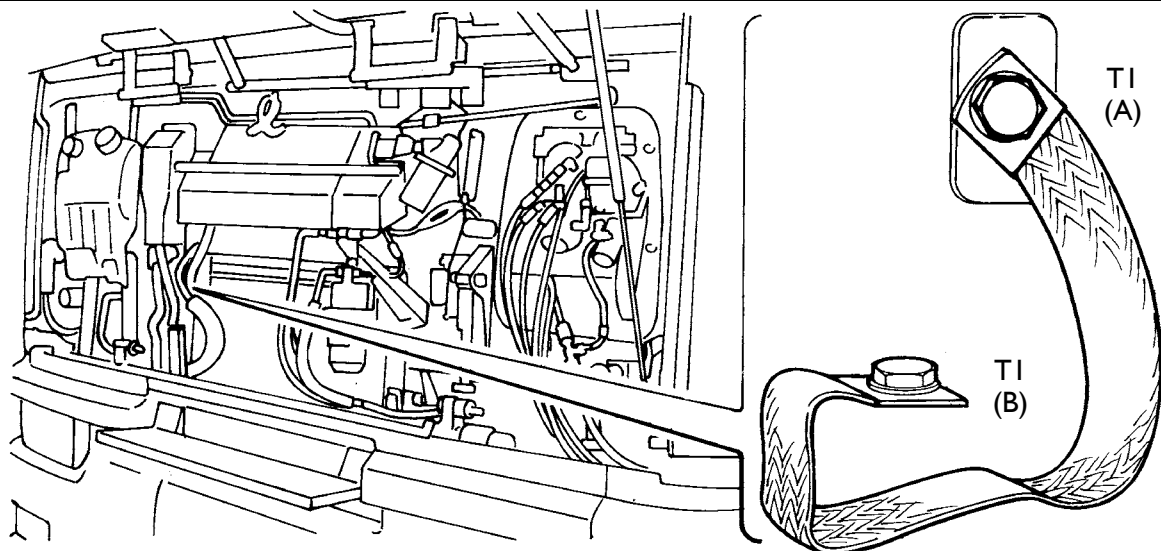
6633

II.8 EARTH POINT OF BATTERIES ON LEFT SIDEMEMBER



6632

II.9 STARTER MOTOR AND ENGINE EARTH POINT



6634

II.10 POSITION ON FRONT OF CAB OF CAB/FRAME EQUIPOTENTIAL BRAID  
A. BRAID FASTENING POINT ON CAB - B. BRAID FASTENING POINT ON FRAME

### Earth points on the vehicle (EuroTech - EuroStar)

The main causes of voltage drop in the electric system of a vehicle are chiefly due to two factors:

1. the negative network;
2. earth points

To minimise the above factors the following have been introduced on the vehicle:

- a. the length of the cab/frame negative lead has been reduced and an appropriate cross-section has been defined according to the load;
- b. the already existing earth points M1 and M2 have been confirmed;
- c. earth points M3-M4-M5 have been subdivided to create individual earth, signal and power nodes;
- d. an earth point (M11) has been provided on the frame (right side) for the tail lights;
- e. an earth point has been inserted on the engine (M10);

With equipment increasingly more consisting of analogue/digital components on vehicles, the above factors (Points 1 and 2) are tending to become more important.

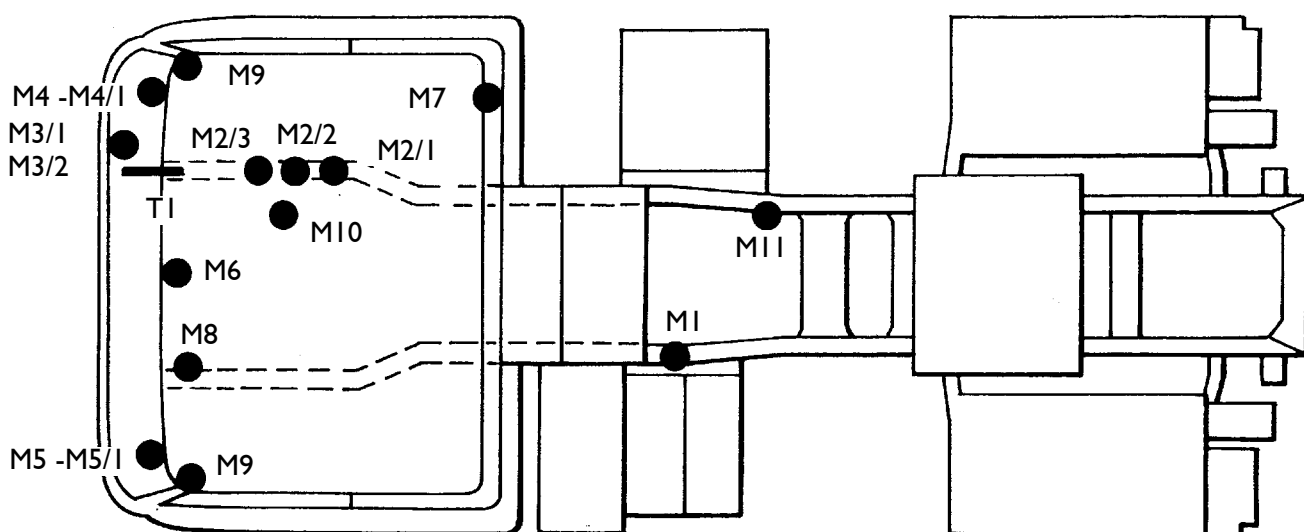
Though generally protected by the effect of the current of the services on board, electronic components still remain particularly sensitive to problems of electromagnetic compatibility.

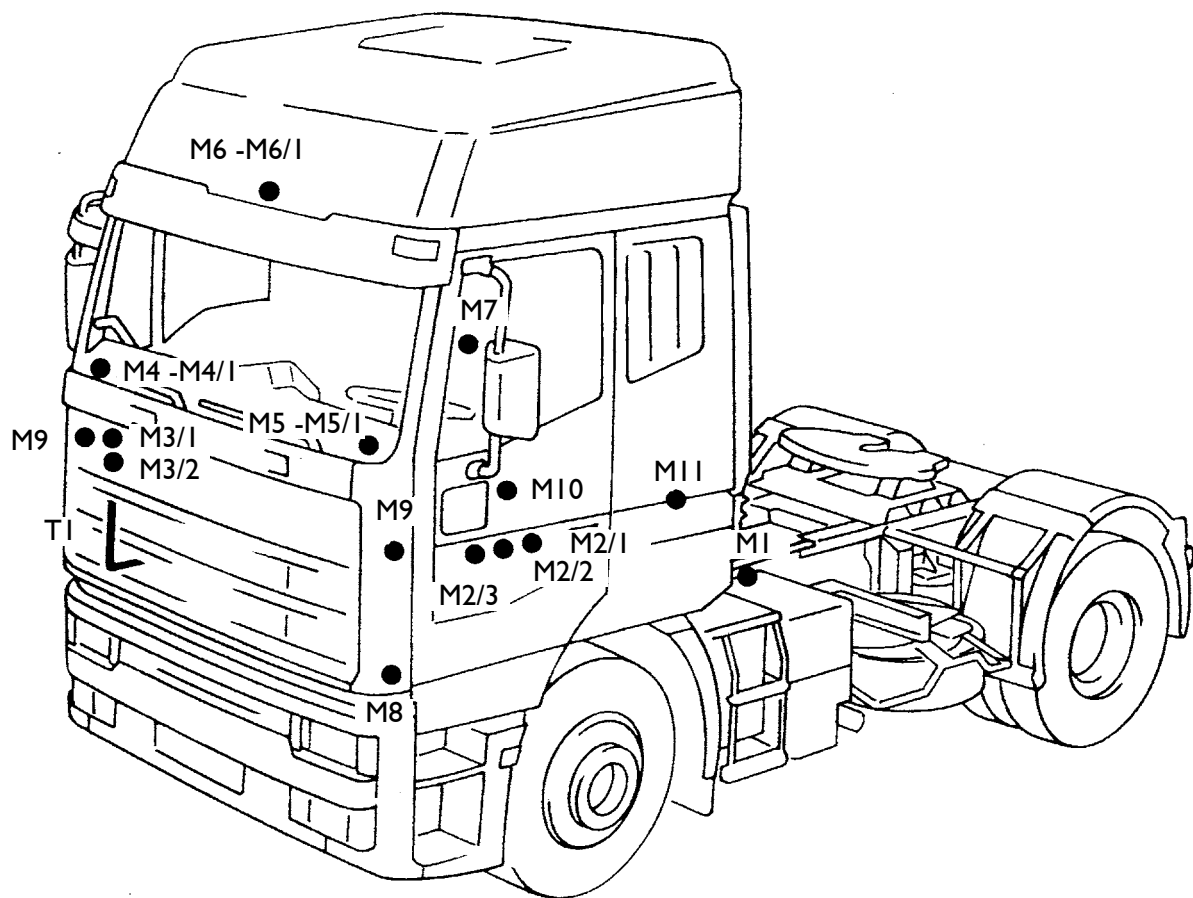
These problems may be of different nature.

1. generated by the vehicle;
2. of an outside source.

To minimise these phenomena a flexible electrolytic copper braid of appropriate size has been adopted on vehicles in order to re-conduct the main structures of the vehicle (cab - frame) to the equipotential state.

For this purpose, earth point "T1" has been introduced between the frame and cab.

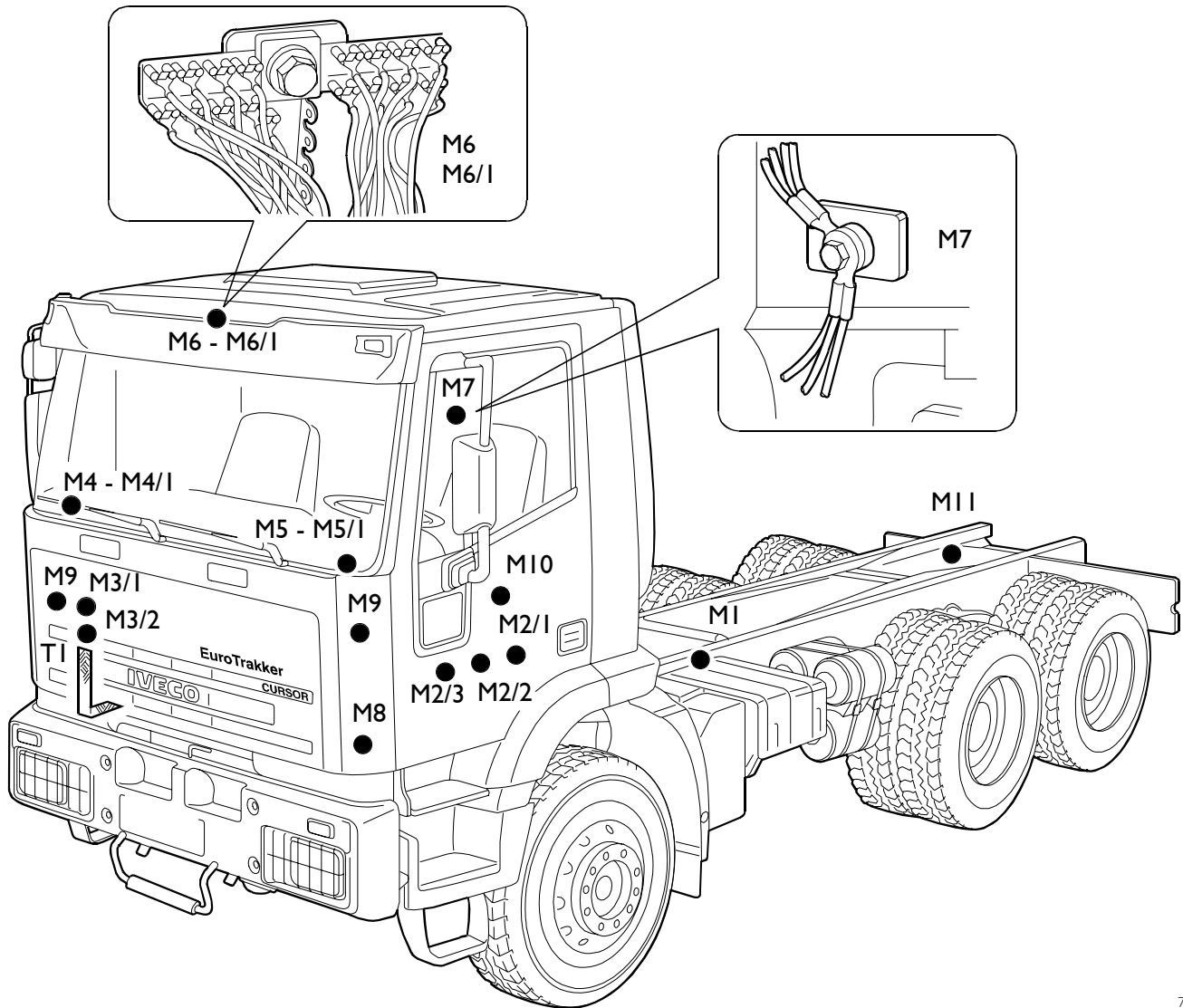




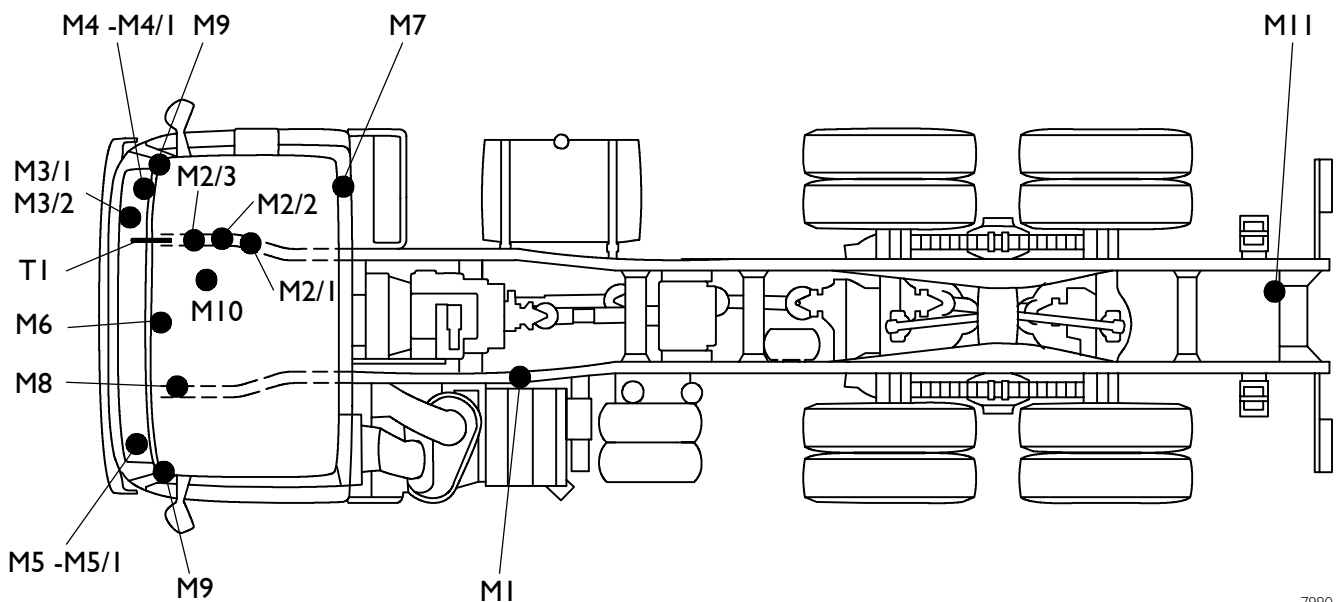
8357

II.11 M1. BATTERY EARTH - M2/1. STARTER MOTOR EARTH - M2/2-M2/3. EARTH ON RIGHT SIDE FRAME - M3/1-M3/2. CAB EARTH ON RIGHT SIDE CAB FRONT - M4-M4/1. RIGHT SIDE EARTH INSIDE CAB - M5/M5/1. LEFT SIDE EARTH INSIDE CAB - M6-M6/1. CAB EARTH (ROOF PANEL) - M7. RIGHT REAR EARTH INSIDE CAB - M8. FRONT EXTERIOR LIGHTING EARTH - M9. EARTH FOR ABS-ASR SYSTEM - M10. EARTH ON ENGINE - M11. EARTH FOR TAIL LIGHTS AND REAR OPTIONALS - T1. FRAME-CAB EQUIPOTENTIAL EARTH

Location of earth points on the vehicle (Eurotrakker)

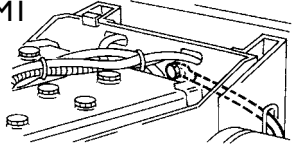
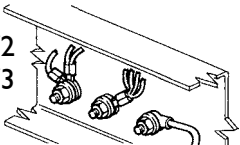
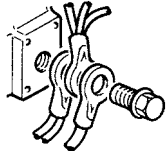
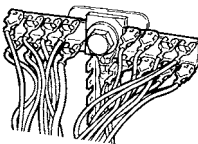
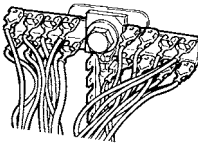
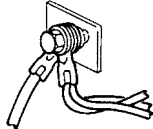
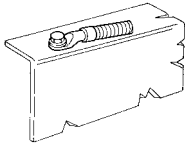
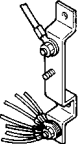
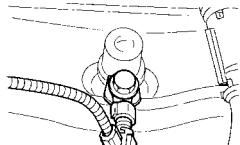
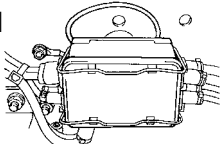


7991



7990

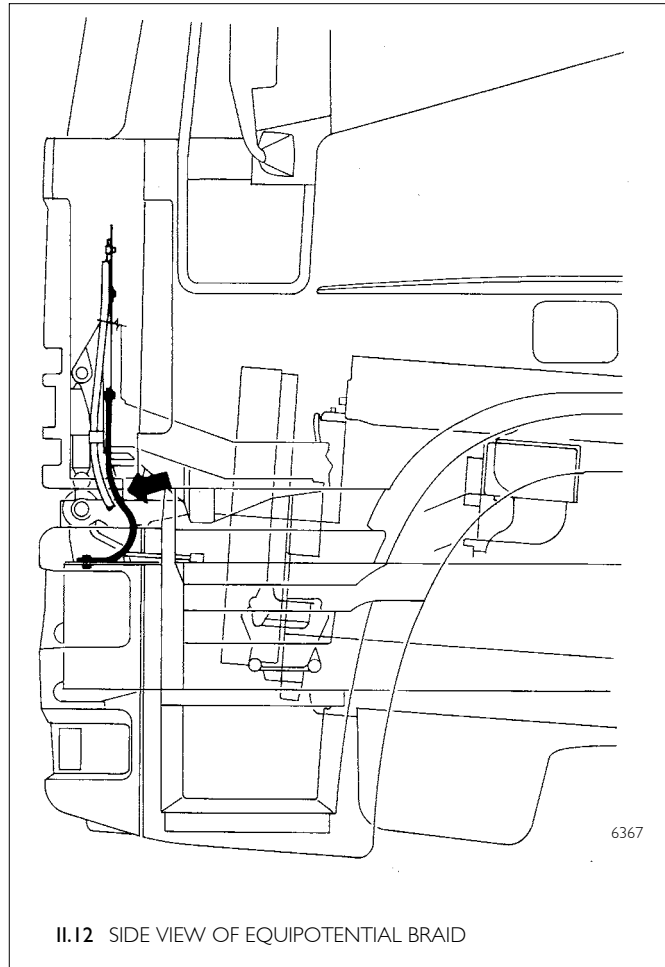
Summary of earth points on vehicle

| Earth connection  | Location                                      | Affected components  |
|---|---|--|
| <p>M1</p>  <p>2036</p>                           | Centre left sidemember                        | Battery negative terminal via main current switch  |
| <p>M2<br/>M2/2<br/>M2/3</p>  <p>6376</p>         | Front right side member under cab             | Starter motor - front headlight unit - chassis components                                      |
| <p>M3/1<br/>M3/2</p>  <p>2038</p>                | Right hand side of cab front (outside)        | Rear headlight unit - engine components - windscreen wipers                                    |
| <p>M4<br/>M4/1<br/>M5<br/>M5/1</p>  <p>6379</p> | Right hand side of cab front (inside/outside) | Instruments - optical indicators - windscreen defroster  |
| <p>M6</p>  <p>6379</p>                         | Roof front (inside, centre)                   | Interior lighting - radio receiver set - voltage dropper - rearview mirror control             |
| <p>M7</p>  <p>2040</p>                         | Right hand side of cab rear (inside)          | Injection pump electronic control module   |
| <p>M8</p>  <p>6645</p>                         | Left front sidemember under cab               | Earth for front outer lighting   |
| <p>M9</p>  <p>8359</p>                         | Lower right and left part of cab inner side   | Earth for ABS/EBS control unit and components  |
| <p>M10</p>  <p>8372</p>                        | Right side of engine block                    | Resistance for warming engine, MS6,2 control unit, switch for controlling EDC system functions |
| <p>M11</p>  <p>8360</p>                        | Right rear sidemember                         | Tail lamp branch box   |

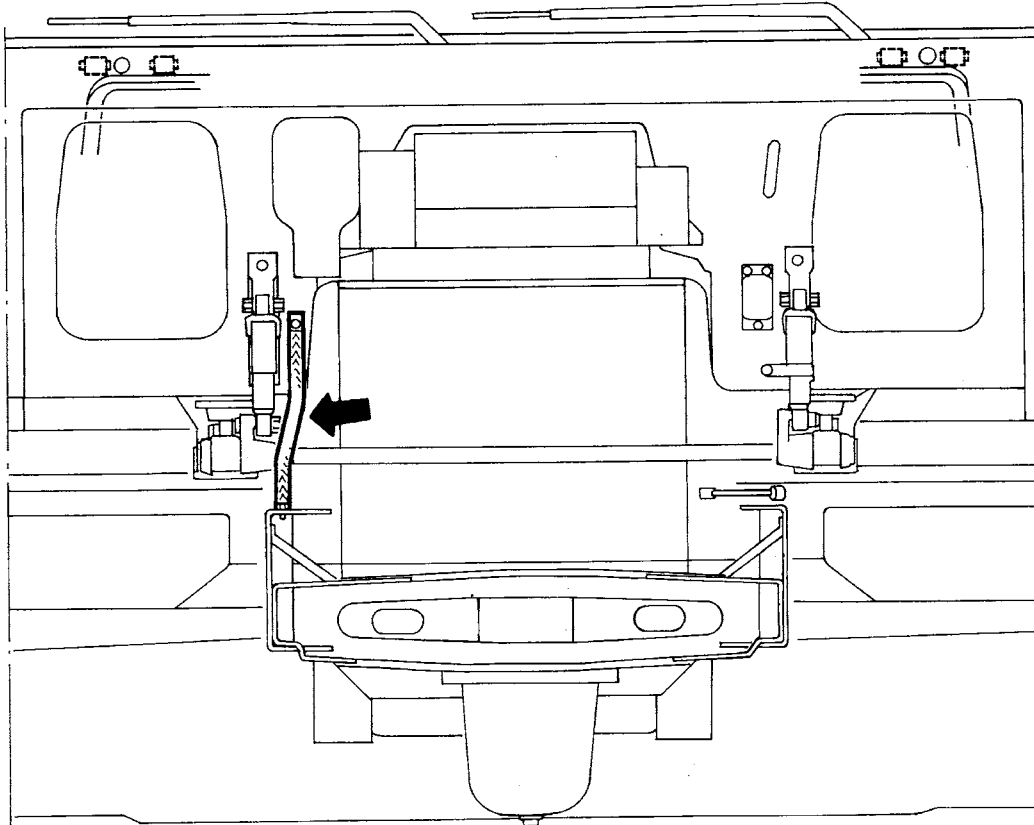


### Electric equipotential braid

An electric equipotential braid (TI) is fastened on the cab front between the frame and the cab itself. In the event of defective earth on the cab check that the braid is correctly fastened on the frame (right front) and on the cab (Fig. II.12 and II.13).

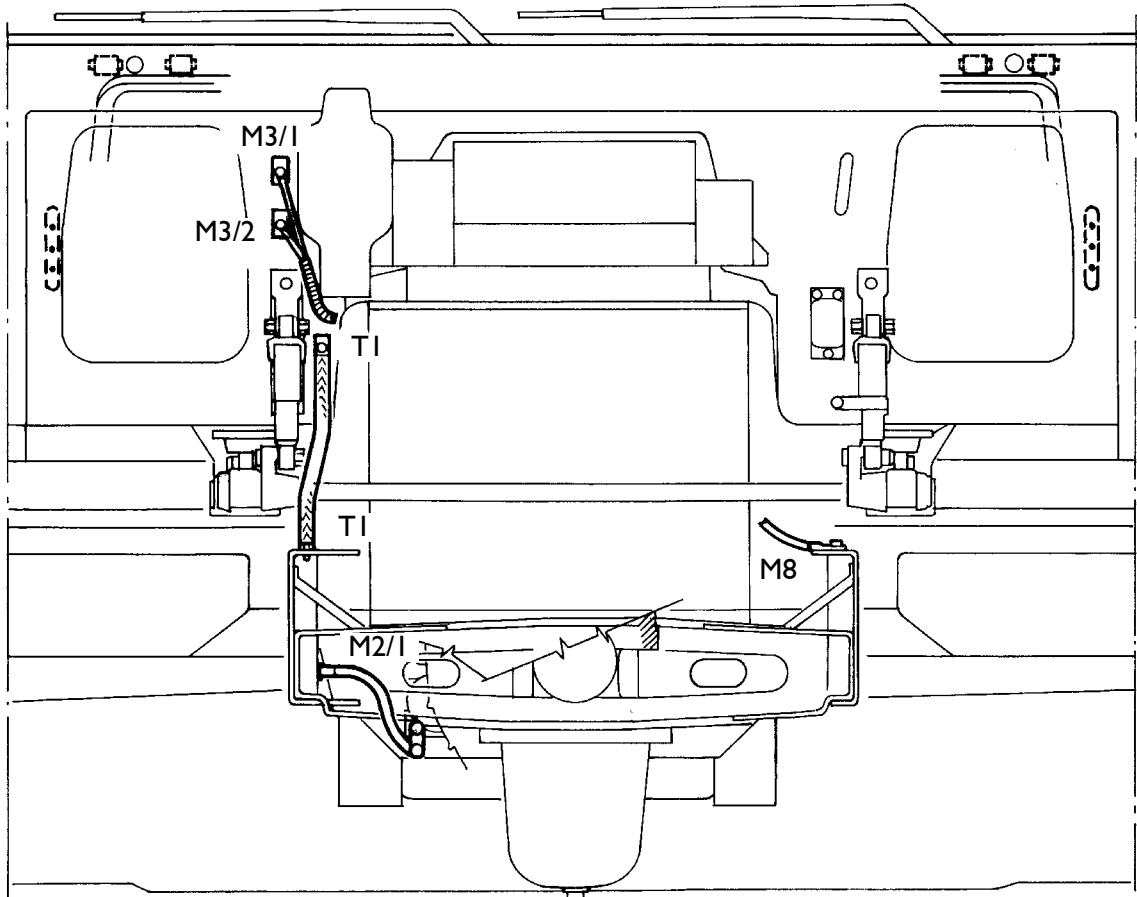


II.12 SIDE VIEW OF EQUIPOTENTIAL BRAID



II.13 FRONT VIEW OF EQUIPOTENTIAL BRAID

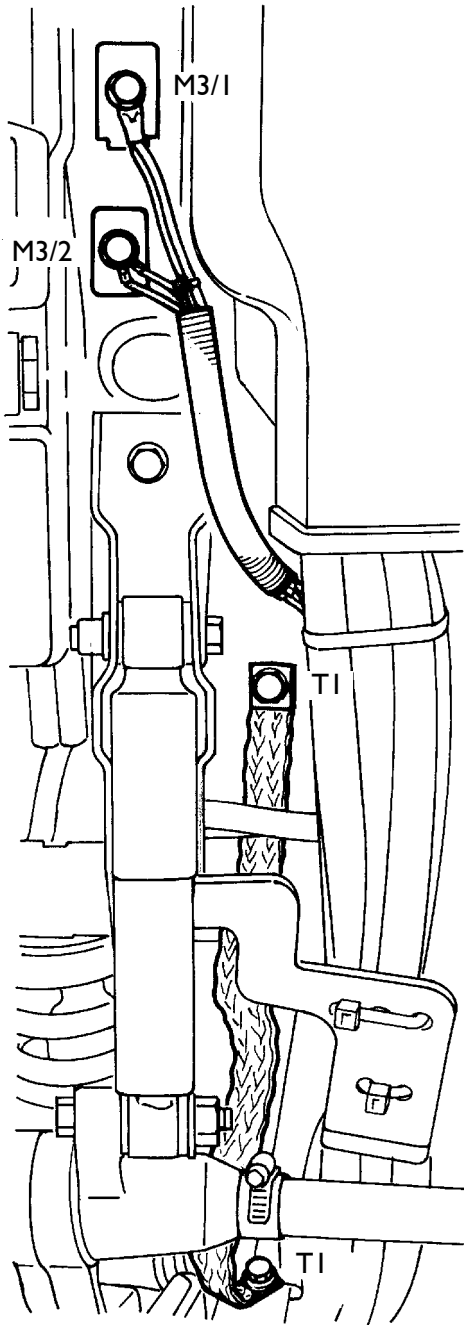
Earth points on cab outer front and on frame



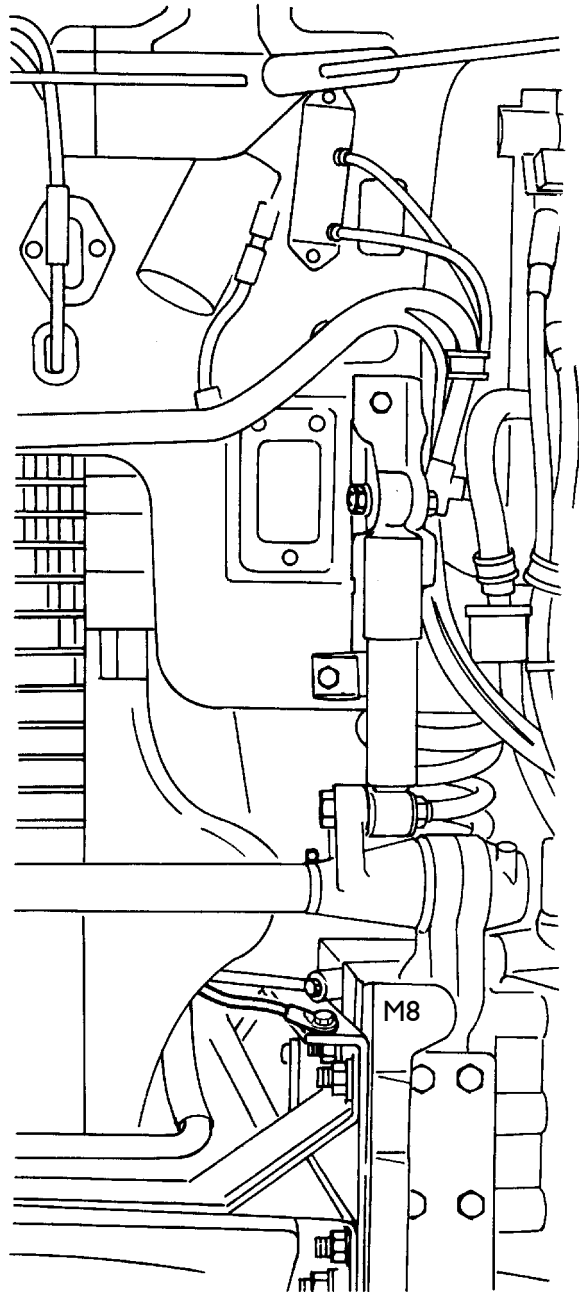
6637

| Earth connection | Location  |
|------------------|---|
| M2/1             | Earth point for starter motor and engine unit   |
| M3/1             | Earth point on cab front (signal earth)         |
| M3/2             | Earth point on cab front (signal power)         |
| M8               | Earth point on left sidemember for front lights |
| T1               | Right front frame / cab equipotential braid     |

Earth points on cab outer front and on frame



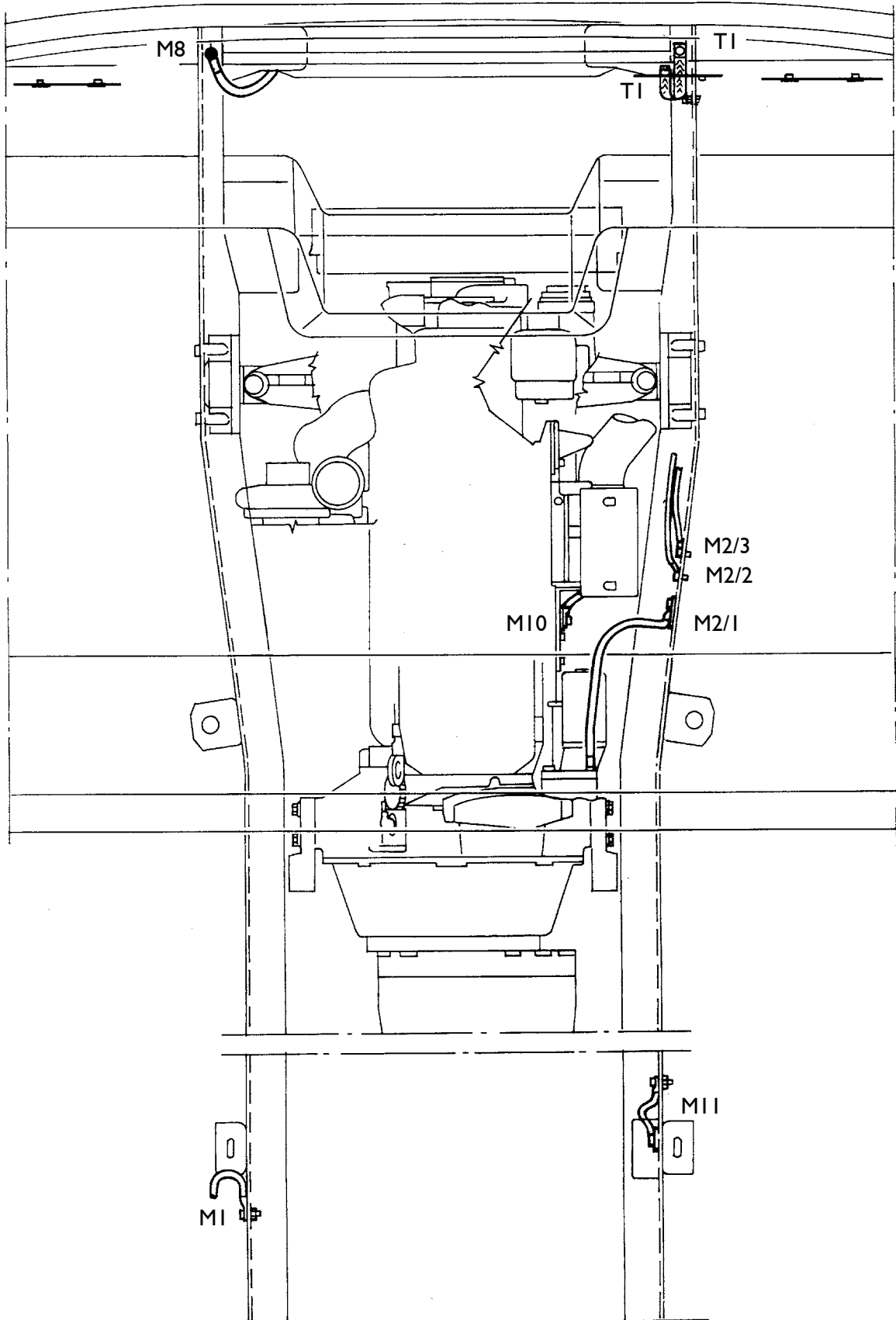
6638



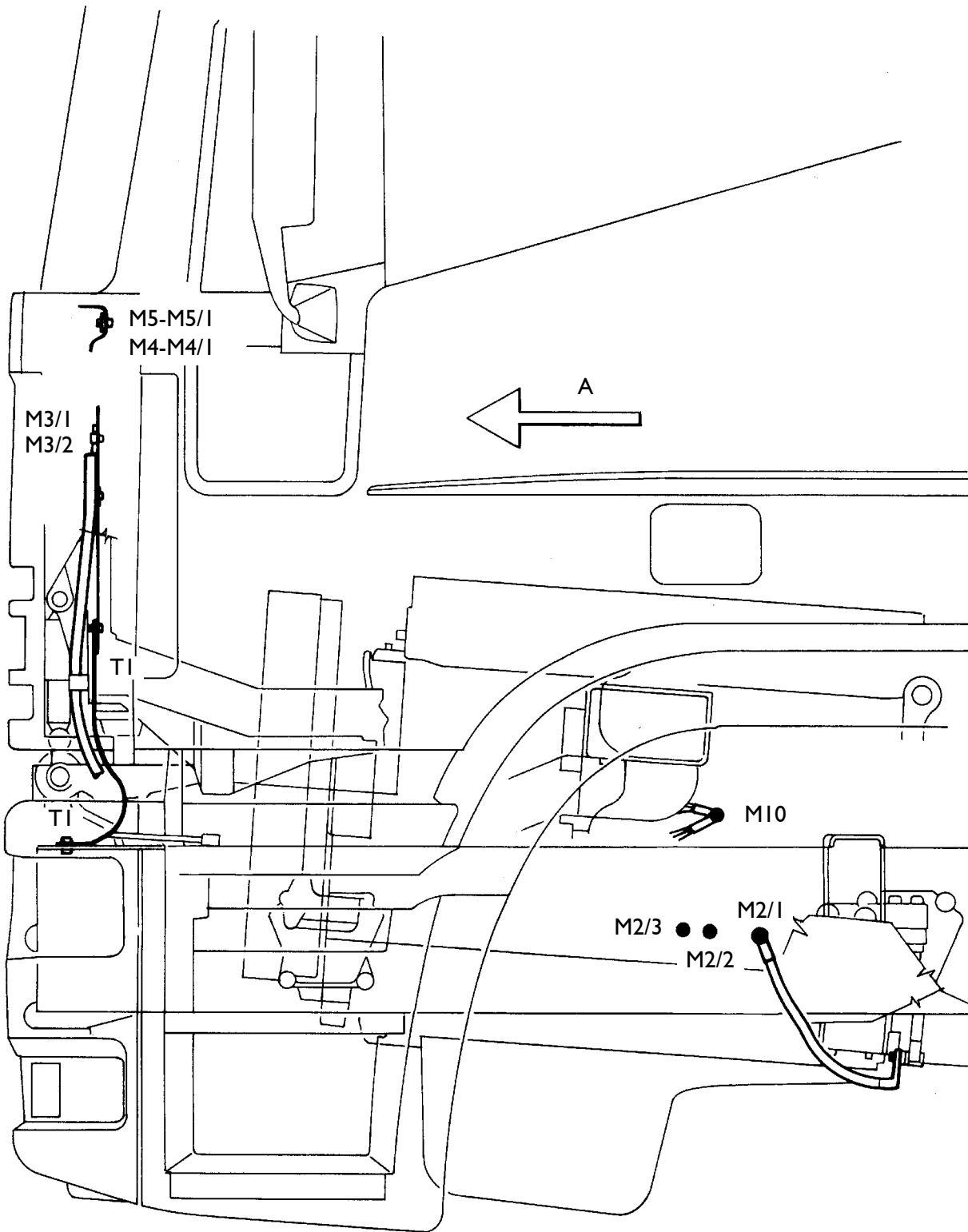
6639

| Earth connection | Location  |
|------------------|---|
| M3/1             | Earth point on cab front (signal earth)         |
| M3/2             | Earth point on cab front (signal power )        |
| M8               | Earth point on left sidemember for front lights |
| T1               | Right front frame / cab equipotential braid     |
| M10              | Earth point on right-hand side of engine block  |

Earth points on frame

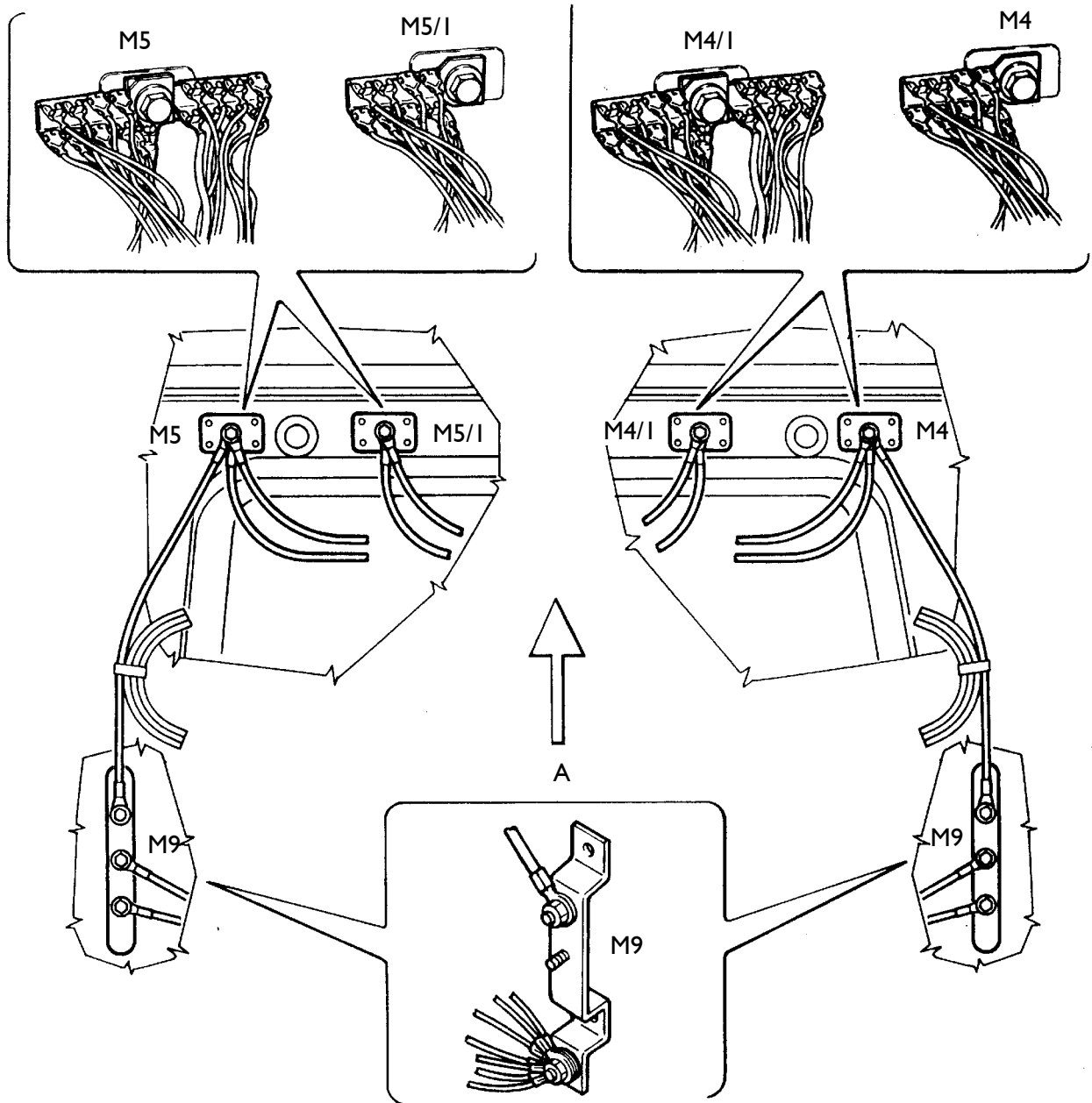


Earth points on frame and cab front



A = direction of travel

Earth points on right and left side cab inner front

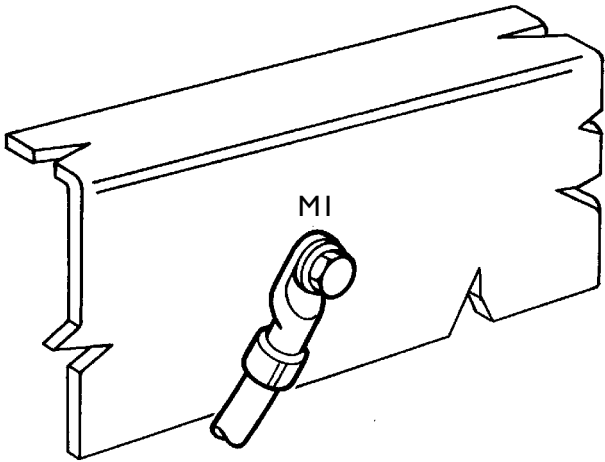


A = direction of travel

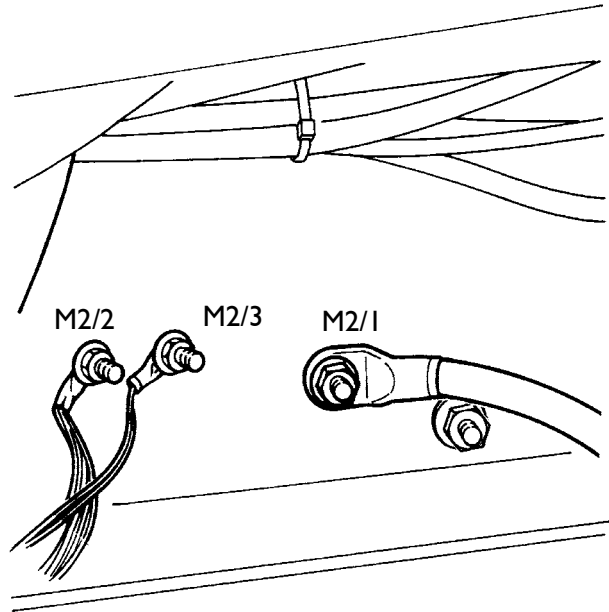
6642

| Earth connection | Location   |
|------------------|--|
| M4               | Front right side cab inner earth point (power earth)         |
| M4/I             | Front right side cab inner signal earth point (signal earth) |
| M5               | Front left side cab inner earth point (power earth)          |
| M5/I             | Front left side cab inner signal earth point (signal earth)  |
| M9               | Earth point for ABS/ASR system                               |

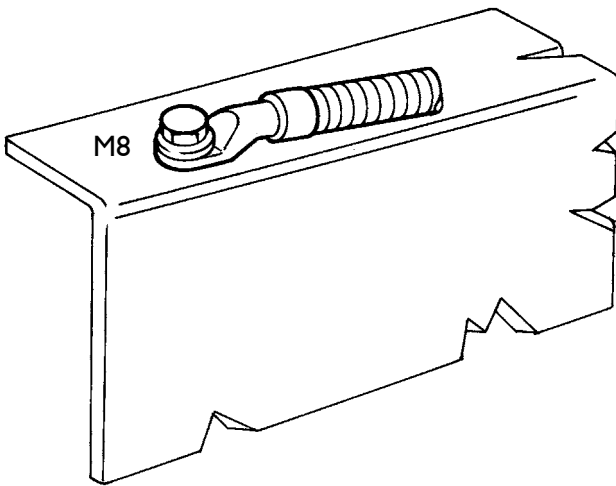
Earth points on frame



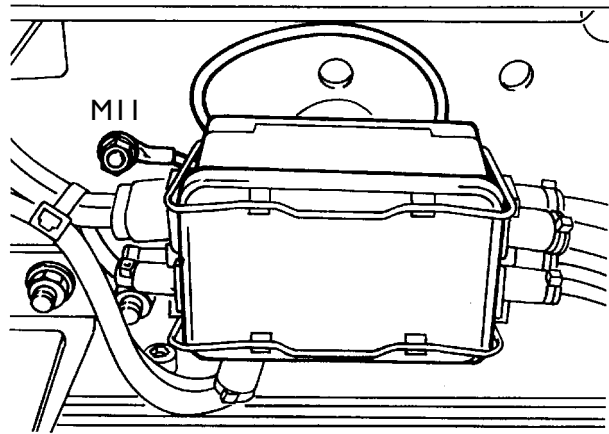
6643



6644

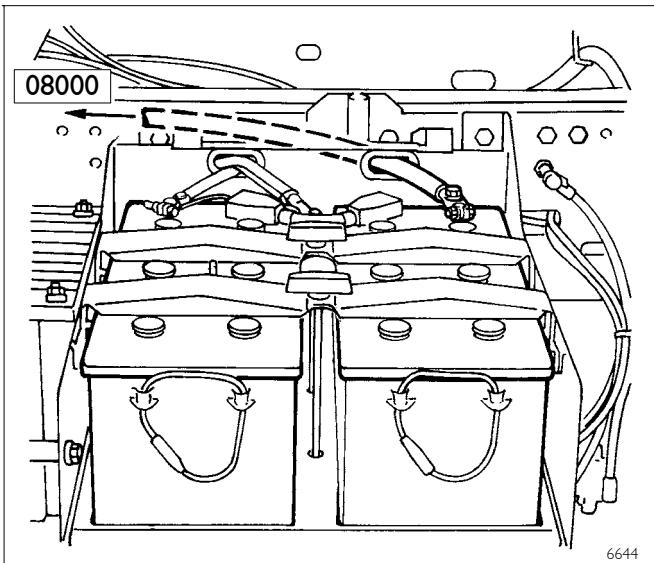


6645

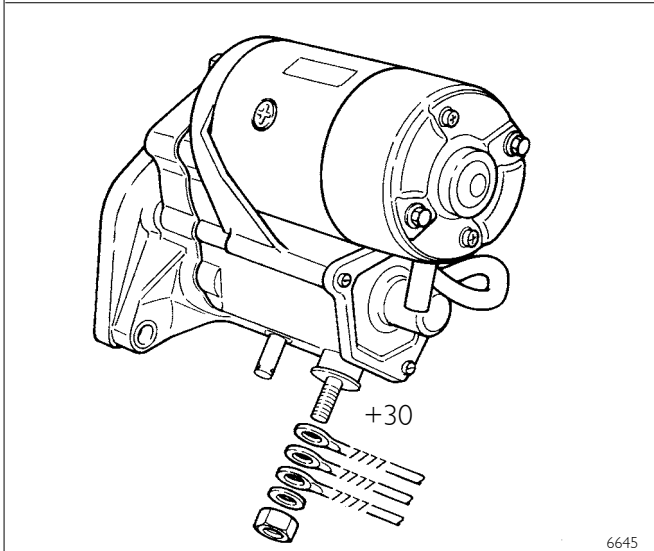


6646

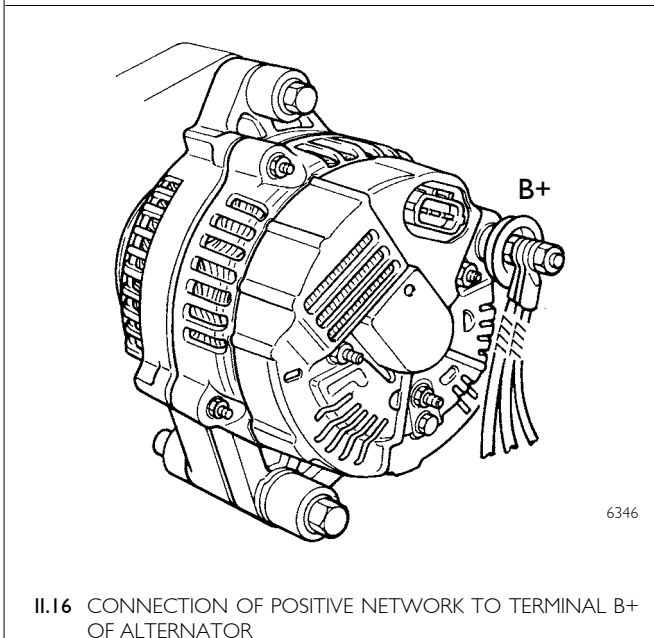
| Earth connection | Location  |
|------------------|---|
| M1               | Battery earth point                                       |
| M2/1             | Earth point for starter motor and engine unit             |
| M2/2             | Earth point on right side frame (power earth)             |
| M2/3             | Earth point on right side frame (signal earth)            |
| M8               | Earth point on left sidemember for front lights           |
| M11              | Earth point on frame right side for tail light branch box |



II.14 POSITIVE CONNECTION OF BATTERIES TO STARTER MOTOR



II.15 CONNECTION OF POSITIVE NETWORK TO TERMINAL 30 OF STARTER MOTOR



II.16 CONNECTION OF POSITIVE NETWORK TO TERMINAL B+ OF ALTERNATOR

**Positive network**

From the positive post of the set of batteries (Fig. II.14), a 70 mm<sup>2</sup> red cable directly supplies terminal 30 of the starter motor (Fig. II.15).

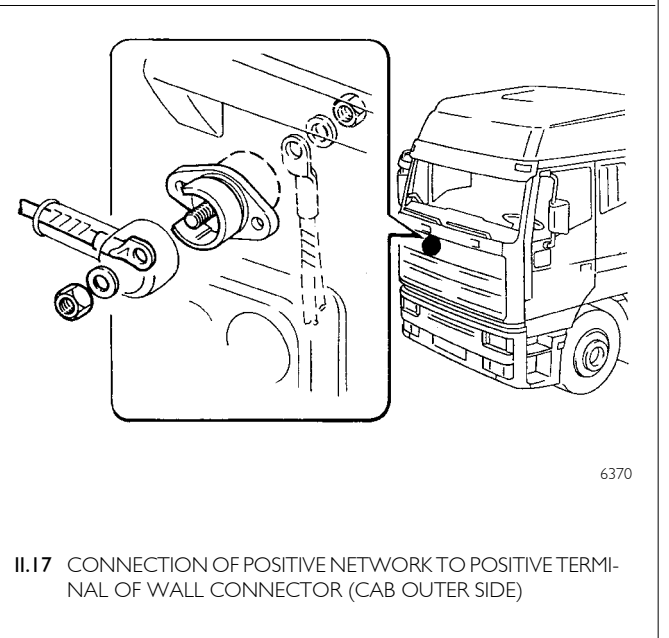
From the same terminal (30), a 16 mm<sup>2</sup> red cable connects to terminal B+ of the alternator (Fig. II.16) and from B+ a 16 mm<sup>2</sup> cable is connected to the positive terminal of the wall connector, on the right of the outer-cab wall above the wall connector (Fig. II.17). From the same terminal but from inside the cab, a 10 mm<sup>2</sup> red cable supplies the positive terminal of the UCI control unit (Fig. II.18).

**Starter motor**

30 positive cables are fastened on terminal 30 of the starter motor (Fig. II.15). One, 70 mm<sup>2</sup>, leads from the positive terminal of the batteries, one, 16 mm<sup>2</sup>, supplies terminal B+ of the alternator and one, 25 mm<sup>2</sup> supplies the relay for enable to engage the resistance for warming the engine.

**Alternator**

3 positive cables are fastened on terminal B+ of the alternator (Fig. II.16). One, 16 mm<sup>2</sup>, leads from the starter motor (terminal 30), one supplies terminal S of the alternator itself and one, 16 mm<sup>2</sup>, supplies the positive terminal of the wall connector on the cab front.



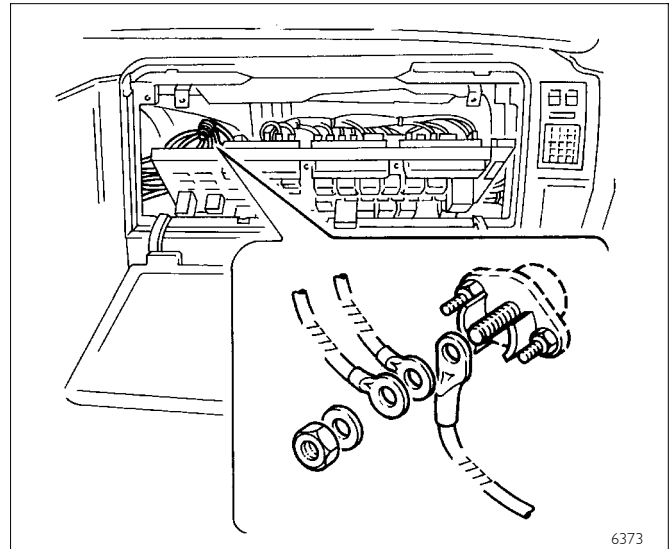
II.17 CONNECTION OF POSITIVE NETWORK TO POSITIVE TERMINAL OF WALL CONNECTOR (CAB OUTER SIDE)



The cables, all red, for supplying (in addition to the UCI mentioned previously) fuses A-B-C of fusebox 70604, fuse C of fusebox 70605, fuses E-F of fusebox 70603 are connected at the same positive terminal of the insulated wall connector (described previously), from the inner part of the cab.

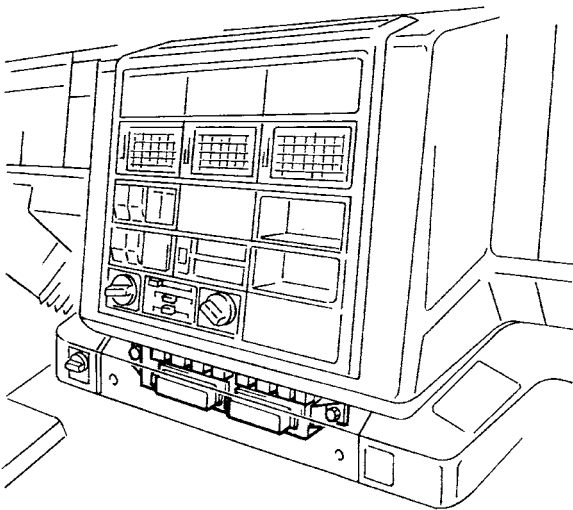
5 cables are fastened on the positive terminal (+) of the UCI (Fig. II.19). One, 10 mm<sup>2</sup>, receives the supply, the second, 6 mm<sup>2</sup>, supplies fuses B-C-D-E- of fusebox 70601, the third, 6 mm<sup>2</sup>, supplies fuses A-B-C-D of fusebox 70603 and fuse C of fusebox 70602, the fourth, 6 mm<sup>2</sup>, supplies relay 25213 A at terminal 30, the fifth, 6 mm<sup>2</sup>, supplies relay 25213 B at terminal 30.

The ignition switch is supplied from fuse C3 of fusebox 70602.



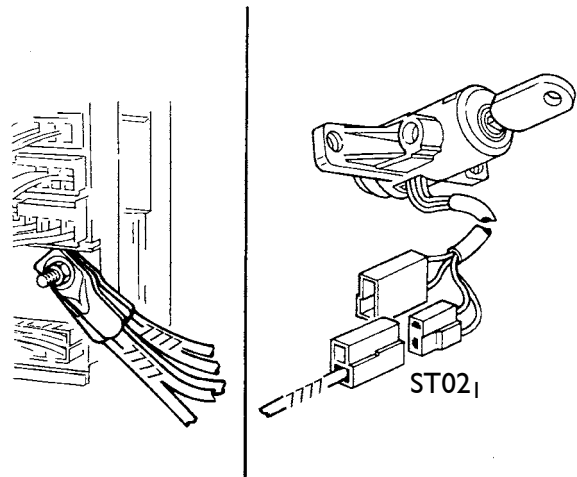
6373

II.18 CONNECTION OF POSITIVE NETWORK TO POSITIVE TERMINAL OF WALL CONNECTOR (CAB INNER SIDE)



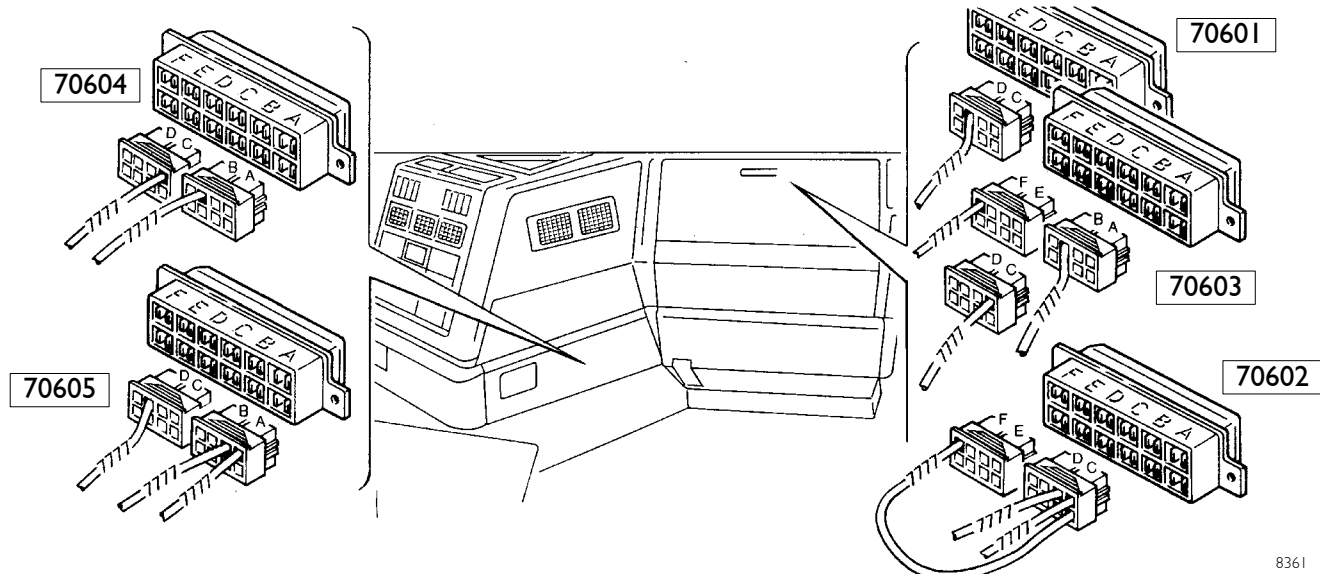
6648

II.19 CONNECTION OF POSITIVE NETWORK TO ADDITIONAL FUSEBOX



6649

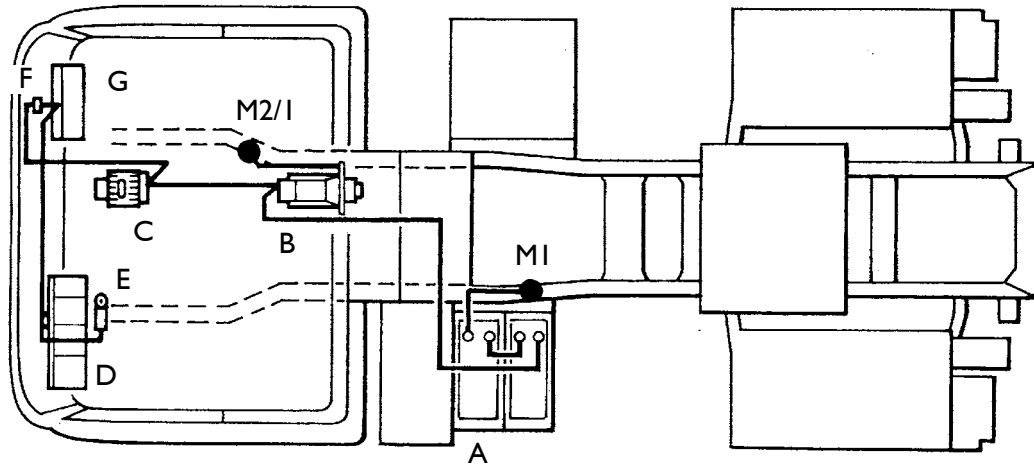
II.20 CONNECTION OF POSITIVE NETWORK TO POSITIVE TERMINAL OF WALL CONNECTOR



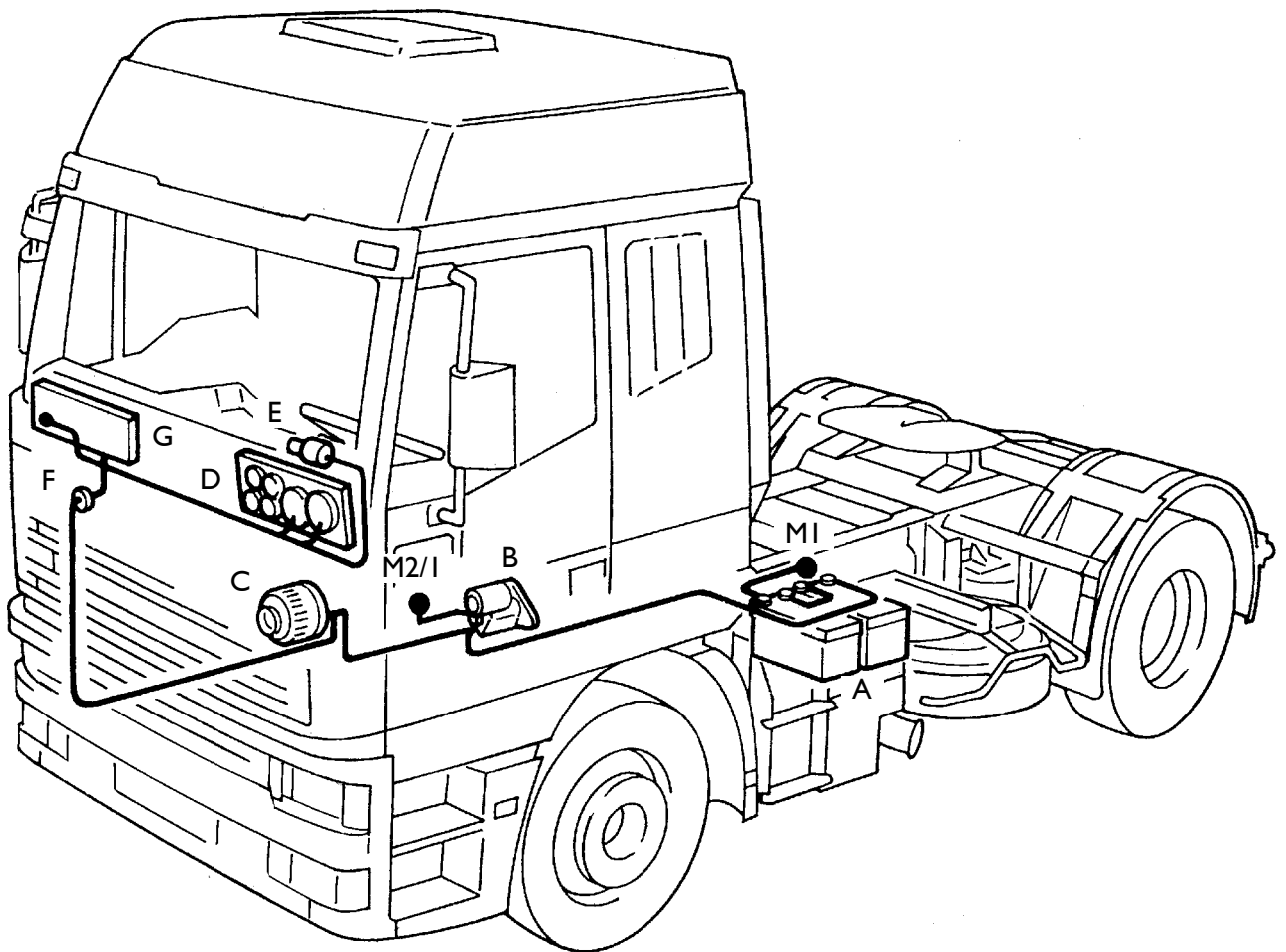
8361

II.21 CONNECTION OF POSITIVE NETWORK TO ADDITIONAL FUSEBOX EUROTCH-EUROSTAR

Base structure of positive network (EuroTech - Eurostar)



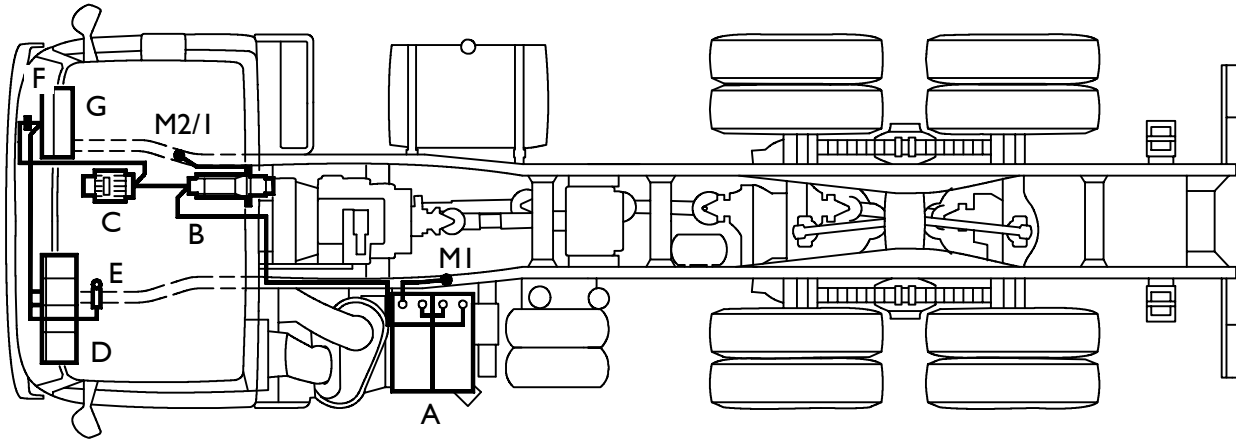
8374



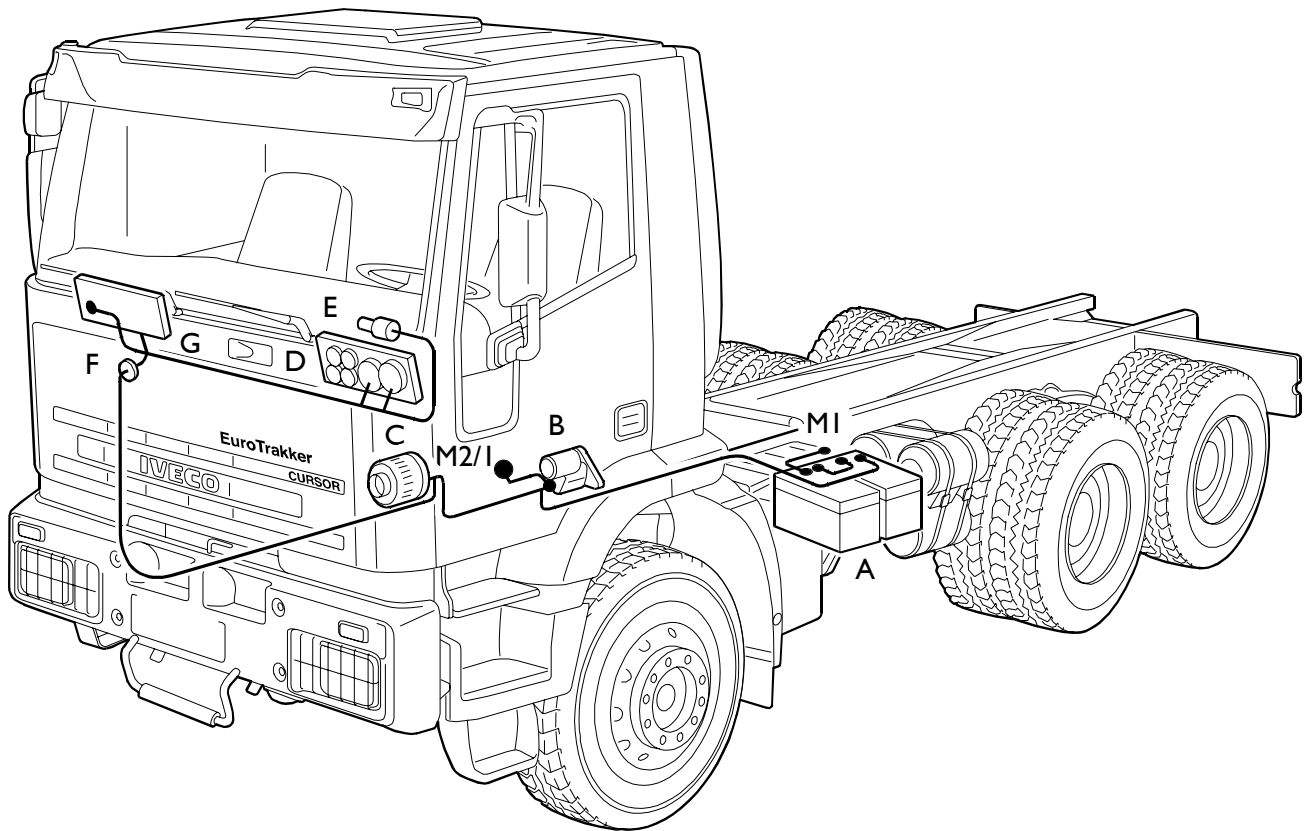
8362

II.22 A. BATTERIES - B. STARTER MOTOR - C. ALTERNATOR - D. DASHBOARD - E. IGNITION SWITCH - F. WALL CONNECTOR POSITIVE TERMINAL - G. MAIN INTERCONNECTING UNIT

Base structure of positive network (EuroTrakker)



7995



7996

- II.23 POWER NETWORK ASSEMBLY  
 A. BATTERIES - B. STARTER MOTOR - C. ALTERNATOR - D. DASHBOARD - E. IGNITION SWITCH - F. WALL CONNECTOR POSITIVE TERMINAL  
 - G. MAIN INTERCONNECTING UNIT (UCI)

**Starting**



During starting from the driver's seat, the safety devices (handbrake, gearbox in neutral) normally present, with the cab tilted, when starting from the engine compartment, are cut off.

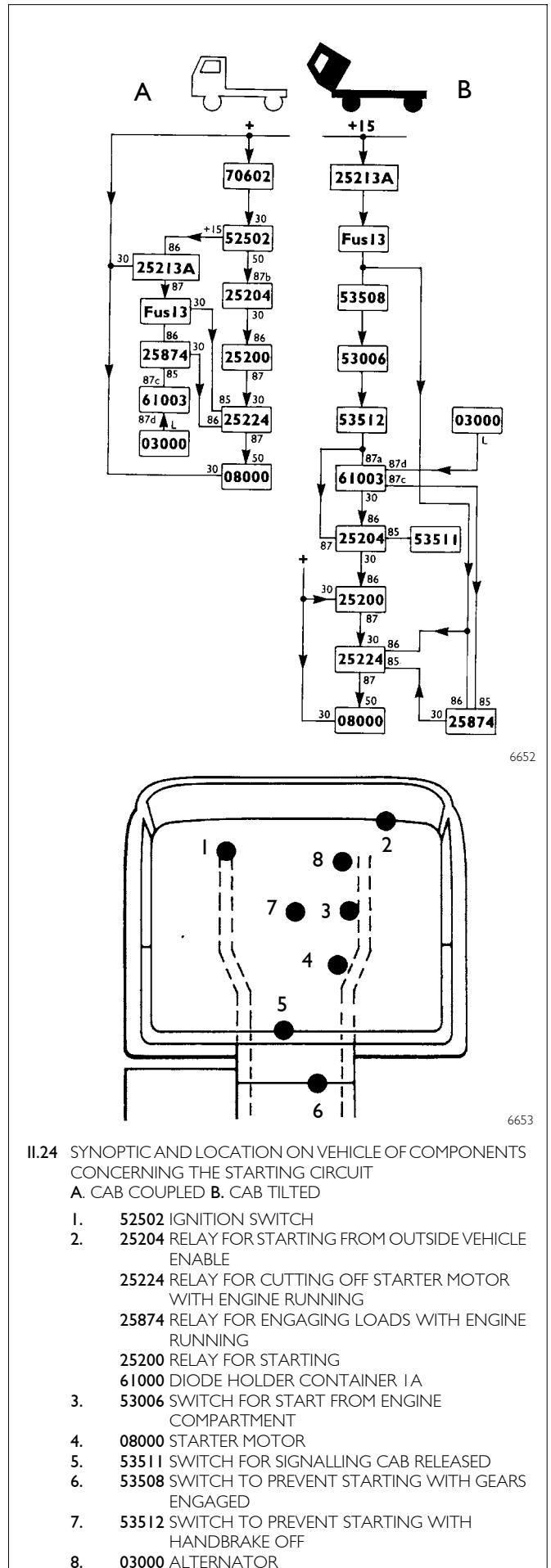
Before working on the vehicle, chock the wheels to prevent the vehicle from moving accidentally. Before tilting the cab, make sure that the space in front of the vehicle is sufficient. Starting from the engine compartment may only be carried out when the cab is firmly fastened on its maximum opening position, with the handbrake engaged and the gearbox in neutral.

As shown in fig. II.24, the two starting systems (from engine compartment with cab tilted and from the driver's seat with the cab coupled) cut one another out.

**Starting from the driver's seat  
(Cab coupled)**

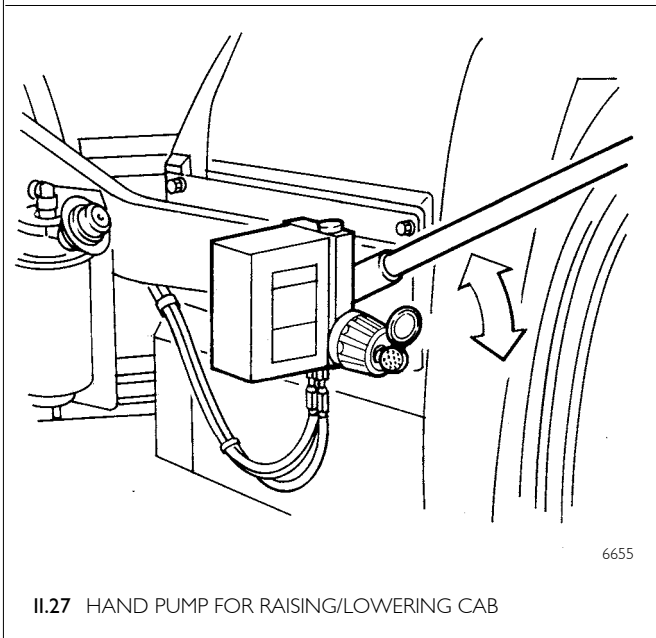
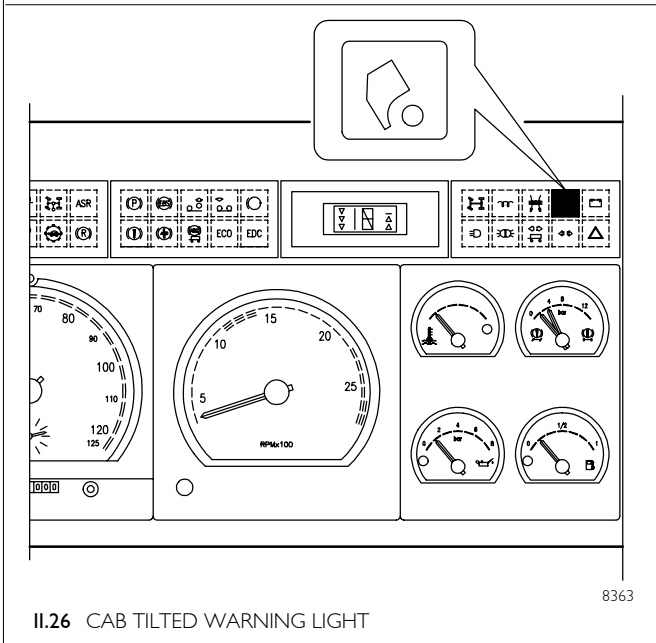
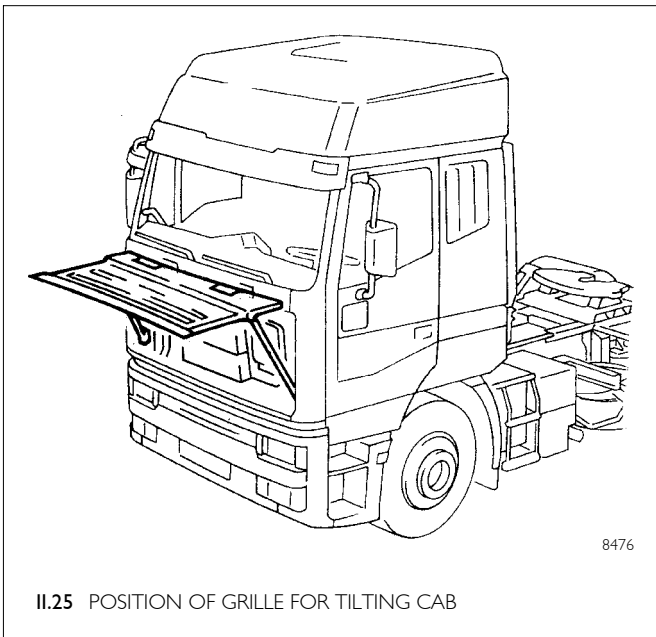
Starting from the driver's seat (synoptic of Fig. II.24 ref. A) is done by taking the ignition switch 52502 to position 50; this way, through the normally closed contact between terminal 30 and 87b of the enable relay for starting outside the vehicle 25204, the engagement is controlled of the relay for starting 25200 (terminal 86), which, by closing the contact between terminals 30 and 87, takes the supply (+30) to terminal 30 of relay 25224 which in turn supplies terminal 50 of the starter motor 08000 from terminal 87.

**NB** To make the working contacts 30 and 87 of relay 25224 close, relay 25874 must receive a negative signal from terminal L of the alternator at terminal 85, and a positive signal from fuse 13 of the UCI under 15 at positive terminal 86. At this point, closing the work contacts of the relay, terminal 85 of relay 25224 is supplied with a negative signal from terminal 30 and as terminal 86 is already supplied by fuse 13 (+15), the work contacts 30 and 87 close, thereby supplying terminal 50 of the starter motor.



II.24 SYNOPTIC AND LOCATION ON VEHICLE OF COMPONENTS CONCERNING THE STARTING CIRCUIT  
A. CAB COUPLED B. CAB TILTED

1. 52502 IGNITION SWITCH
2. 25204 RELAY FOR STARTING FROM OUTSIDE VEHICLE ENABLE  
25224 RELAY FOR CUTTING OFF STARTER MOTOR WITH ENGINE RUNNING  
25874 RELAY FOR ENGAGING LOADS WITH ENGINE RUNNING  
25200 RELAY FOR STARTING  
61000 DIODE HOLDER CONTAINER 1A
3. 53006 SWITCH FOR START FROM ENGINE COMPARTMENT
4. 08000 STARTER MOTOR
5. 53511 SWITCH FOR SIGNALLING CAB RELEASED
6. 53508 SWITCH TO PREVENT STARTING WITH GEARS ENGAGED
7. 53512 SWITCH TO PREVENT STARTING WITH HANDBRAKE OFF
8. 03000 ALTERNATOR



**Starting from the engine compartment**

**Cab tilting**

Cab tilting should only be carried out with the grille completely open (Fig. II.25).

Insert the special lever (located under the front grille in the hand pump shown in fig. II.26). Using the wrench provided, turn it counter-clockwise and then turn the knob clockwise as far as the mechanical stopper. Raise the cab operating the pump with the lever.

In the case of a hydraulic system failure, tilting may be carried out using mechanical means, after disconnecting the gearbox connection bar.

**Lowering the cab**

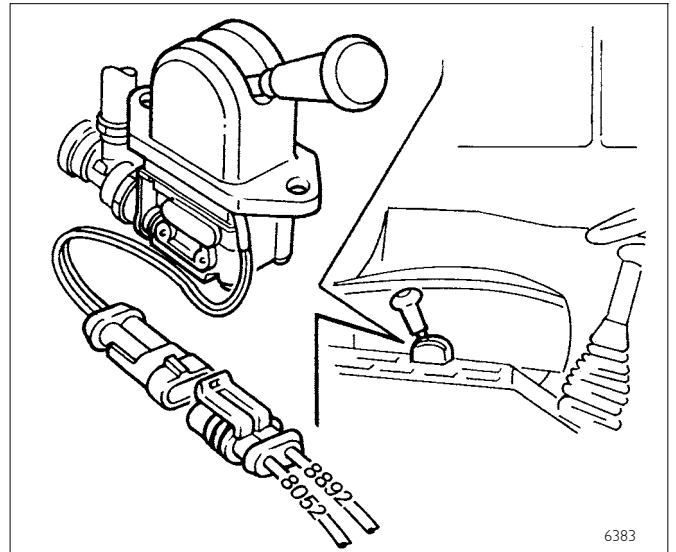
Turn the knob counter-clockwise as far as the mechanical stopper and then turn the key in the same direction. Remove the key. Operate the lever alternatively as for tilting, until the cab is fully lowered.

With the cab lowered completely make sure that the cab tilted warning light (Fig. II.27) is off.

Starting from the engine compartment is carried out (after setting the key in the ignition switch 52502 to position 15, in neutral gear, with the handbrake engaged and the cab tilted) pressing the black button (Fig. II.31) located in the right-hand part of the engine.

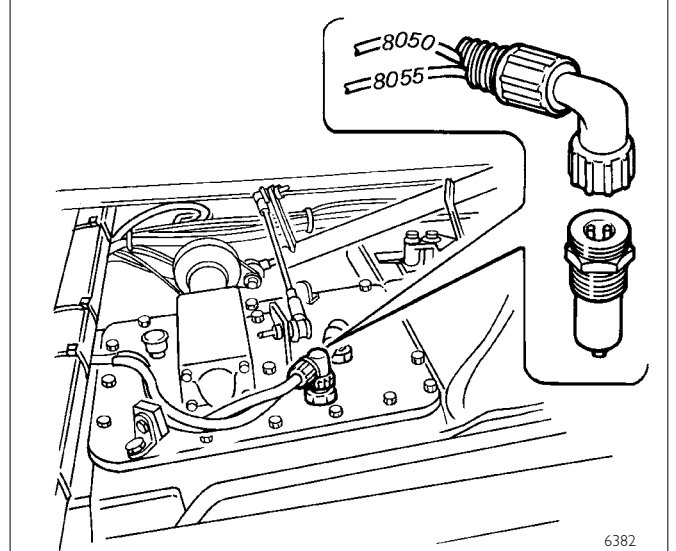
**Engine stopping from engine compartment**

To stop the engine from the engine compartment, press the red button located on the right-hand side of the engine at the side of the starting button (Fig. II.31) When the engine has stopped, keep the button pressed another 7 seconds so that the EDC control unit continues to be supplied to be able to check the electronic sensors.



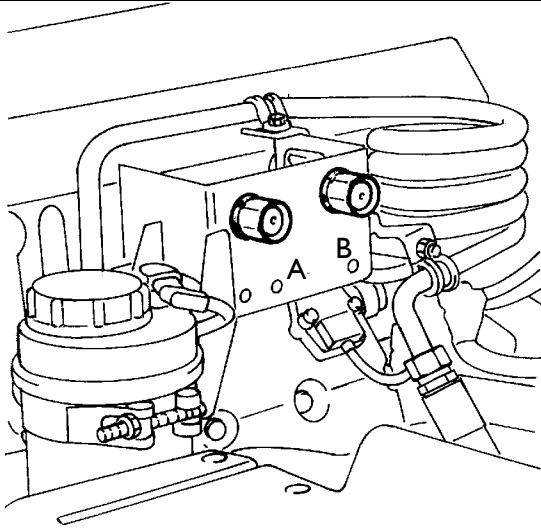
6383

II.28 SWITCH TO PREVENT STARTING WITH HANDBRAKE OFF (53512)



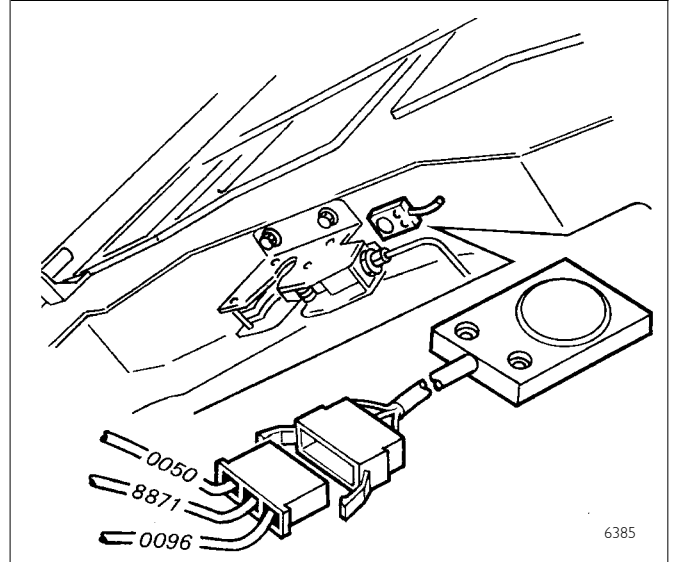
6382

II.29 SWITCH TO PREVENT STARTING WITH GEARS ENGAGED (53508)



6656

II.31 A. SWITCH FOR STARTING (53006) FROM ENGINE COMPARTMENT - B. SWITCH FOR STOOPING ENGINE (53007) FROM ENGINE COMPARTMENT



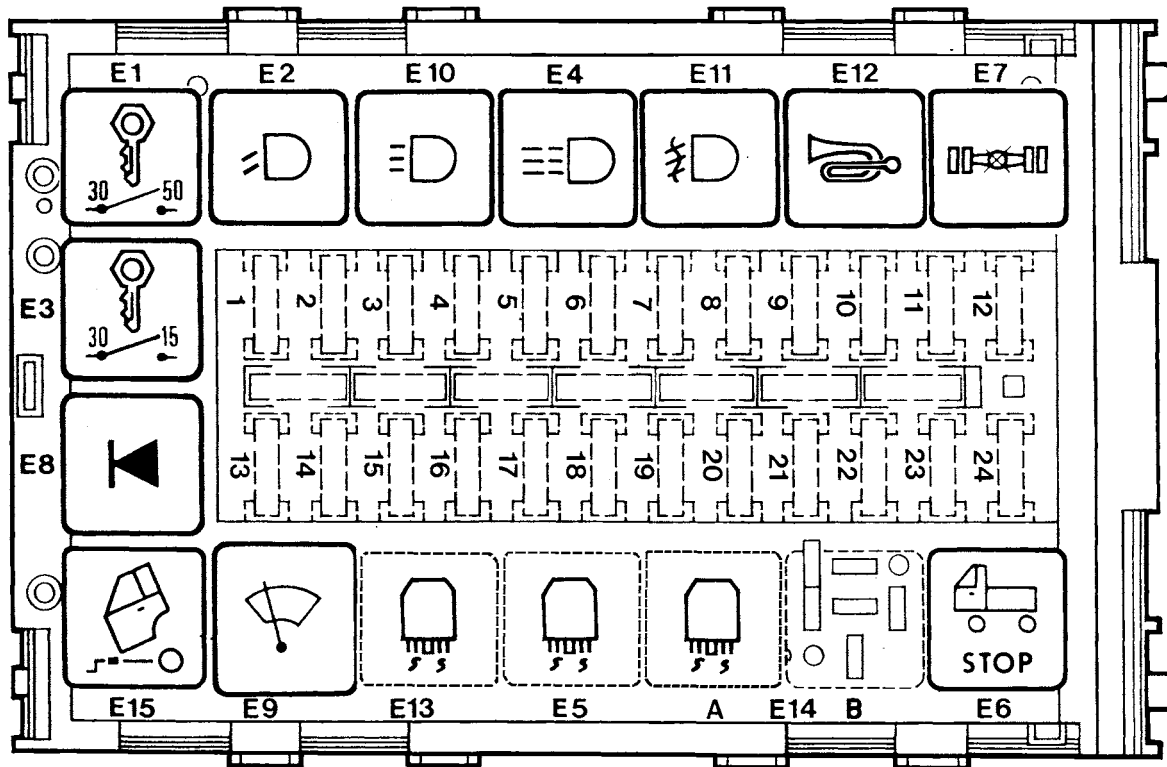
6385

II.30 SWITCH FOR SIGNALLING CAB RELEASED (53511)

**MAIN COMPONENTS**

**75000**

Interconnecting Control Unit (UCI) - Cursor 8 (Off Rad) - Cursor 10 - Cursor 13

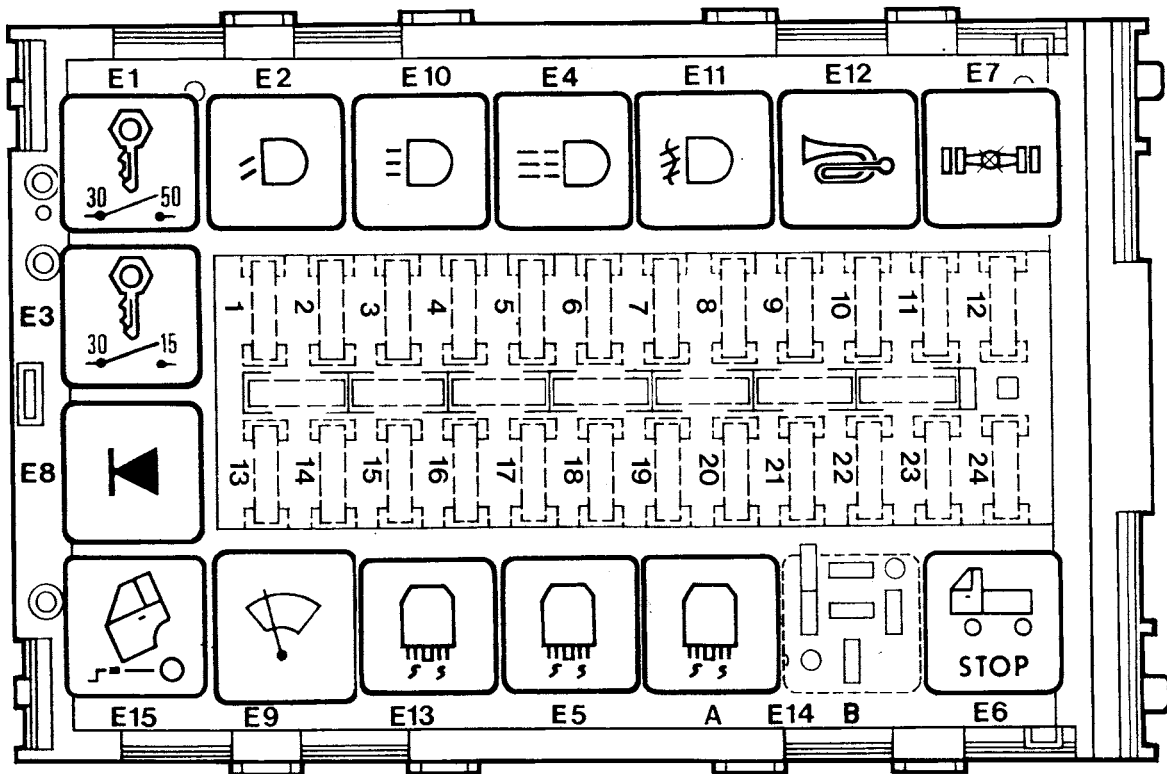


2681

| Number | Components code | Description   |
|--------|-----------------|---|
| E1     | 25200           | Relay for starting  |
| E2     | 25013           | Low beam relay  |
| E3     | 25209           | Relay for cutting off services during starting  |
| E4     | 25004           | Relay for beam flasher  |
| E5     | —               | Spare   |
| E6     | 25006           | Relay for braking lights  |
| E7     | 86016           | Differential lock signalling control unit   |
| E8     | 61000           | Diode holder container  |
| E9     | 59100           | Windscreen wiper intermittent speed device  |
| E10    | 25009           | High beam relay   |
| E11    | 25003           | Fog lamp relay  |
| E12    | 25805           | Horn relay  |
| E13    | —               | Spare   |
| E14A   | --              | Spare   |
| E14B   | —               | Spare   |
| E15    | 25204           | Relay for starting enable from engine compartment with cab uncoupled and from driver's seat with cab coupled - (starting prevention system) |

Interconnecting Control Unit (UCI) - Cursor 8 (On Rad)

75000

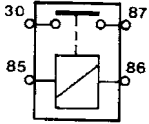





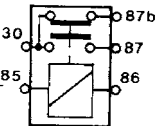




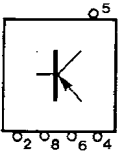

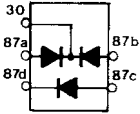

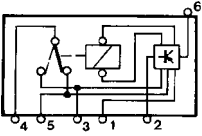



6674

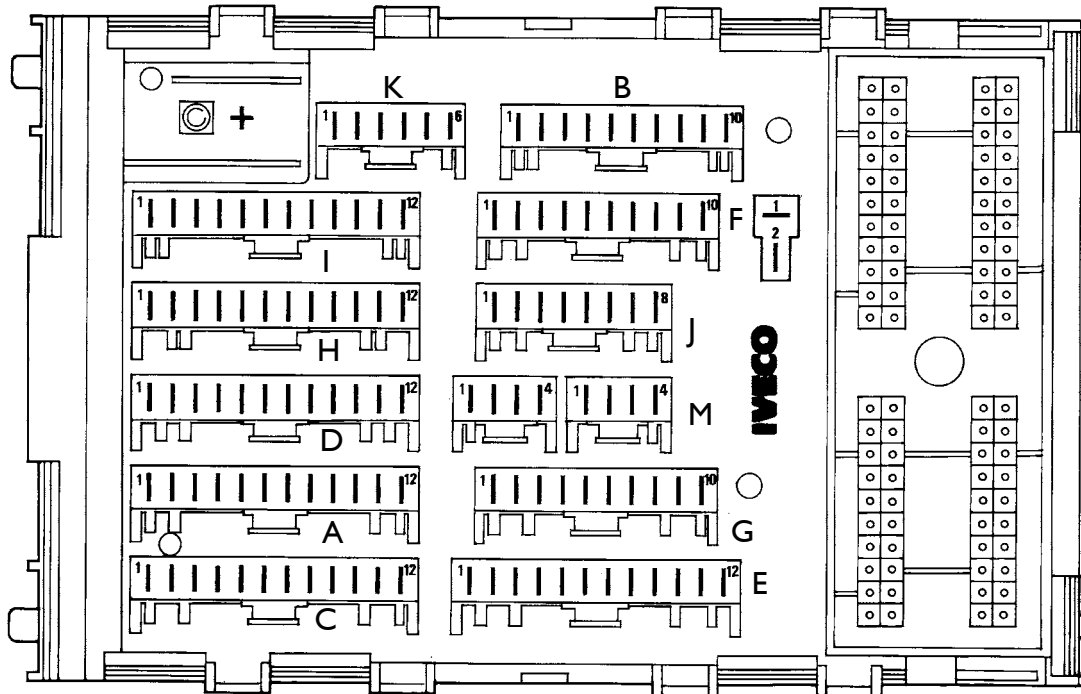
| Number | Components code | Description  |
|--------|-----------------|--|
| E1     | 25200           | Start-up remote control switch   |
| E2     | 25013           | Dipped beam headlight remote control switch  |
| E3     | 25209           | Remote control switch to cut off electric absorbers during start-up  |
| E4     | 25004           | Flash remote control switch  |
| E5     | 25105B          | ABS remote control switch  |
| E6     | 25006           | Stop light remote control switch   |
| E7     | 86016           | Differential lock indicator control unit   |
| E8     | 61003           | Diode-holder   |
| E9     | 59100           | Windscreen wiper flick   |
| E10    | 25009           | Main beam headlight remote control switch  |
| E11    | 25003           | Foglight remote control switch   |
| E12    | 25805           | Horn remote control switch   |
| E13    | 25105A          | ABS remote control switch  |
| E14A   | 25106           | ABS remote control switch  |
| E14B   | —               | Free   |
| E15    | 25204           | Remote control switch for start-up consensus from engine compartment with cabin released and from driver's seat with cabin fastened – (start-up prevention system) |



Relay and diode holder assembly

| Wiring Diagram  | Function pictogram  | Code on control unit  | Code No.   |
|---|---|---|--|
|    | <br><br><br><br> | <p>E 1</p> <p>E 2</p> <p>E 3</p> <p>E 4</p> <p>E 12</p>   | <p>25200</p> <p>25013</p> <p>25209</p> <p>25004</p> <p>25805</p>                         |
|  | <p>—</p> <br><br><br><p>—</p> <p>—</p> <p>—</p>   | <p>E 5</p> <p>E 6</p> <p>E 10</p> <p>E 11</p> <p>E 13</p> <p>E 14 A</p> <p>E 14 B</p> <p>E 15</p> | <p>—</p> <p>25006</p> <p>25009</p> <p>25003</p> <p>—</p> <p>--</p> <p>—</p> <p>25204</p> |
|  |    | <p>E 7</p>  | <p>86016</p>   |
|  |    | <p>E 8</p>  | <p>61000</p>   |
|  |    | <p>E 9</p>  | <p>59100</p>   |

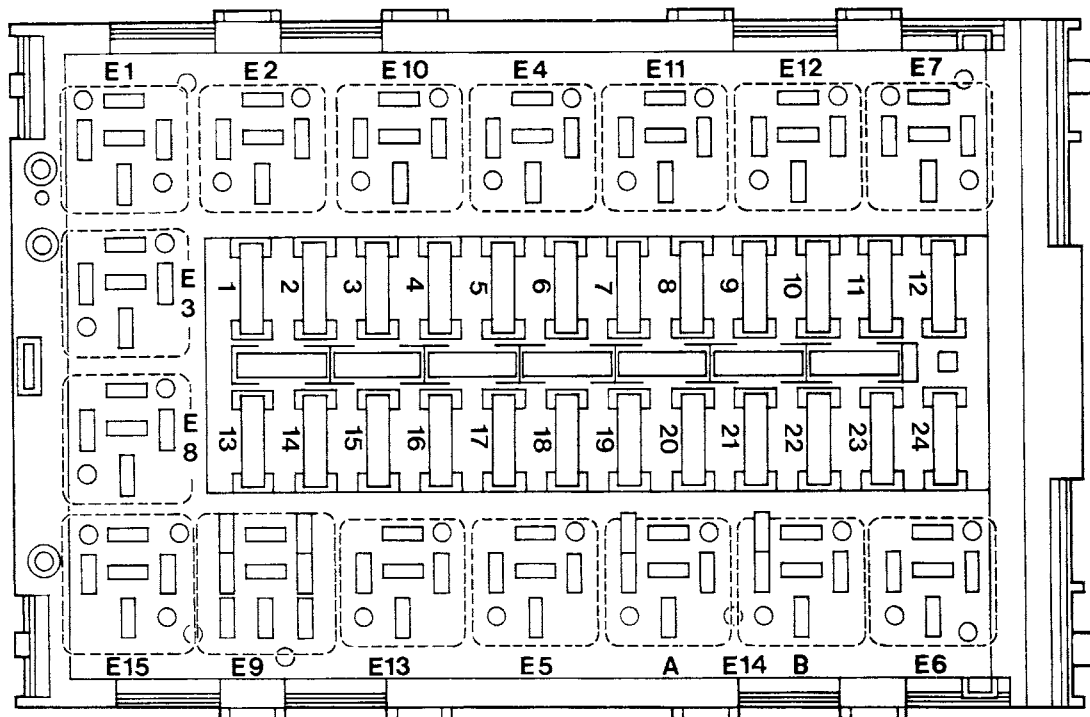
Connector assembly



6425

| Connector | Type   | Colour     | Interlock                        |
|-----------|--------|------------|----------------------------------|
| A         | 12 way | Black      | FRAME (BASE)                     |
| B         | 10 way | White      | CAB (STEERING COLUMN LEVER UNIT) |
| C         | 12 way | Grey       | CAB (VARIANTS)                   |
| D         | 12 way | Yellow     | ENGINE (BASE)                    |
| E         | 12 way | Brown      | CAB (BASE)                       |
| F         | 10 way | Black      | CAB (BASE)                       |
| G         | 10 way | Yellow     | CAB (VARIANTS)                   |
| H         | 12 way | Light blue | CAB/FRAME (BASE)                 |
| I         | 12 way | White      | CAB (BASE)                       |
| J         | 8 way  | Black      | CAB (BASE)                       |
| K         | 6 way  | White      | CAB (STEERING COLUMN LEVER UNIT) |
| L         | 4 way  | Black      | CAB (VARIANTS)                   |
| M         | 4 way  | White      | CAB (BASE)                       |
| N         | 2 way  | White      | CAB (BASE)                       |
| +         | 1 way  |            | ENGINE (BASE)                    |

Fuse assembly - Cursor 8 - Cursor 10 - Cursor 13

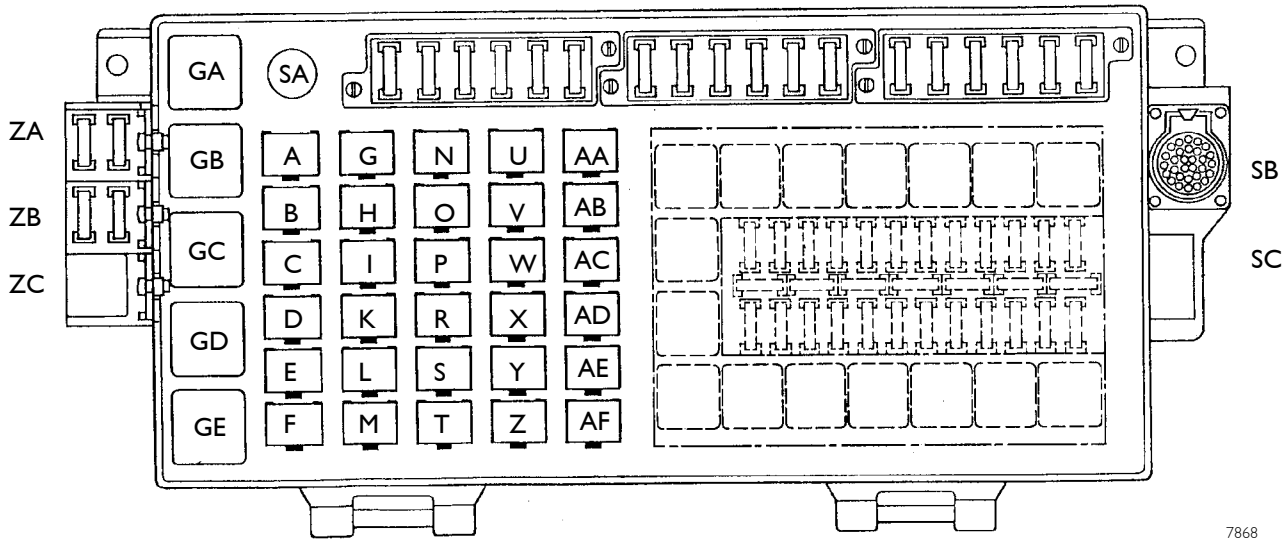


1345

| No. | Capacity | Function  |
|-----|----------|---|
| 1   | 7.5A     | Left front side light, no. plate light, right rear side lights, left front clearance light, dash-board lighting, fifth wheel lighting |
| 2   | 7.5A     | Right front side light, left rear side lights, right front clearance light, rear clearance lights, headlamp wiper/washer              |
| 3   | 3A       | Low and high beam control   |
| 4   | 5A       | Right low beam  |
| 5   | 5A       | Left low beam   |
| 6   | 7.5A     | Right high beam, high beam warning lamp on  |
| 7   | 7.5A     | Left high beam  |
| 8   | 7.5A     | Fog lights  |
| 9   | 5A       | Rear fog guards   |
| 10  | 7.5A     | Additional high beams   |
| 11  | 10A      | Voltage reducer, horns, central door locking  |
| 12  | 5A       | Brake air drier, tool compartment lights  |
| 13  | 3A       | Battery charge failure warning lamp   |
| 14  | 3A       | Heated windscreen, thermoline, bulb tester  |
| 15  | 7.5A     | Windscreen wiper, windscreen washer   |
| 16  | 10A      | Hazard warning lights   |
| 17  | 7.5A     | Left and right direction indicators   |
| 18  | 7.5A     | Braking lights  |
| 19  | 7.5A     | Reversing lights  |
| 20  | 5A       | Tachograph  |
| 21  | 10A      | Interior lighting, cigar lighter, footboard lighting, electric hatch, tool compartment  |
| 22  | 3A       | Cab uncoupled, IVECO Control  |
| 23  | 20A      | Power windows, trailer brakes, sun visor, multipower  |
| 24  | 15A      | Electric heater   |



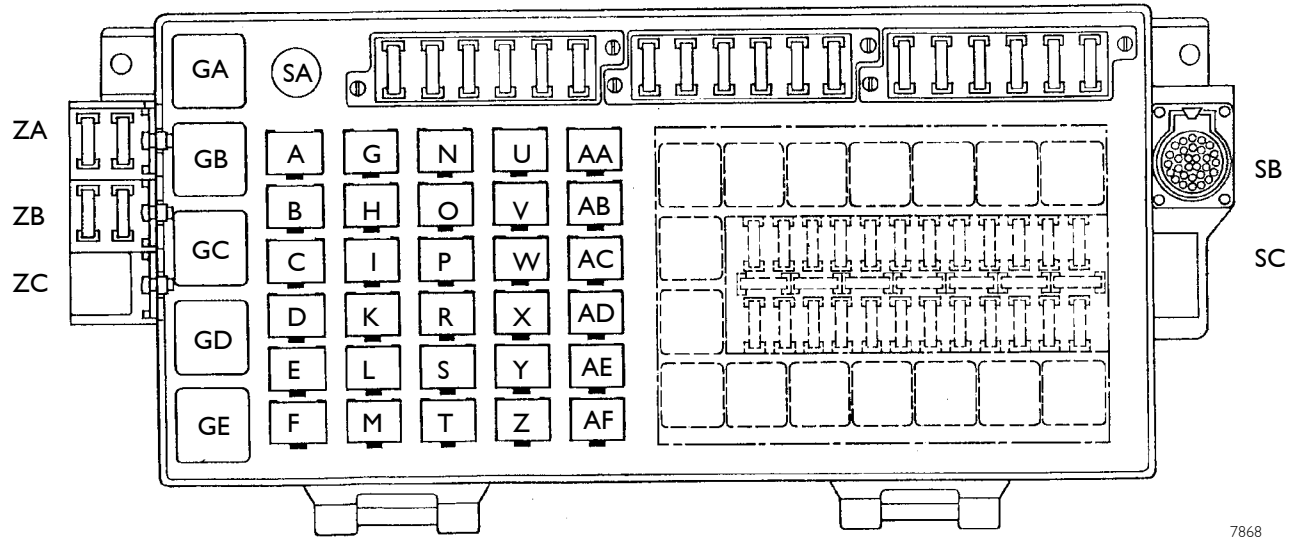
Additional remote control switches, diodes and fuses - Cursor 8 (Off Road) - Cursor 10 - Cursor 13



7868

| Acronym | Component code | Description   |
|---------|----------------|---|
| GA      | 66010          | Timer for headlight jet washer  |
| GB      | 25213A         | Remote control switch for 15/50A terminal   |
| GC      | 25224          | Remote control switch for start-up prevention system with engine running                              |
| GD      | 25213B         | Remote control switch for 15/50A terminal   |
| GE      | 25924          | Remote control switch for EDC activation (Main relay )  |
| A       | —              | —   |
| B       | 25874          | Remote control switch for D+  |
| C       | 25813          | Remote control switch for heated door mirror  |
| D       | —              | —   |
| E       | 25727          | Remote control switch for hydraulic power steering 1,5 circuits                                       |
| F       | 25721          | Remote control switch for hydraulic power steering 1,5 circuits                                       |
| G       | 25346          | Remote control switch for power supply main switch activation   |
| H       | —              | —   |
| I       | 25879          | Relay for total power takeoff   |
| K       | 25718          | Remote control switch for clogged gasoil filter warning light   |
| L       | 25034          | Remote control switch for rear foglight activation  |
| M       | 25714          | Remote control switch for EDC deactivation / electric battery disconnecter                            |
| N       | 25327          | Remote control switch for climate control system  |
| O       | 25326          | Remote control switch for climate control system  |
| P       | 25893          | Remote control switch for total power takeoff   |
| R       | 61002          | Diode-holder for total power takeoff  |
| S       | 61125          | ECO-POWER resistance  |
| T       | 25713          | Remote control switch for longitudinal differential unlocking   |
| U       | 61122          | Engine brake resistance   |
| V       | —              | —   |
| W       | 25726          | Remote control switch for cross differential locking, front axle                                      |
| X       | 25128          | Remote control switch for cross differential unlocking, front axle                                    |
| Y       | 25856          | Remote control switch for brake air drier   |
| Z       | 25703/25112    | Remote control switch for steering II / remote control switch for longitudinal differential unlocking |
| AA      | 61001          | Diode-holder for electric battery disconnecter  |
| AB      | 61004B         | Diode-holder for electric battery disconnecter  |
| AC      | 61004A         | Diode-holder for electric battery disconnecter / vehicles for dangerous goods transp.                 |
| AD      | 25402          | Remote control switch for electric battery disconnecter / vehicles for dangerous goods transp.        |
| AE      | 25227/25233    | Remote control switch for electric battery disconnecter / vehicles for dangerous goods transp.        |
| AF      | 25226          | Remote control switch for electric battery disconnecter   |
| SA      | 72025          | 12 V socket   |
| SB      | 72021          | Diagnosis   |
| SC      | 53041          | EDC system failure warning light through BLINK CODE with relevant button                              |

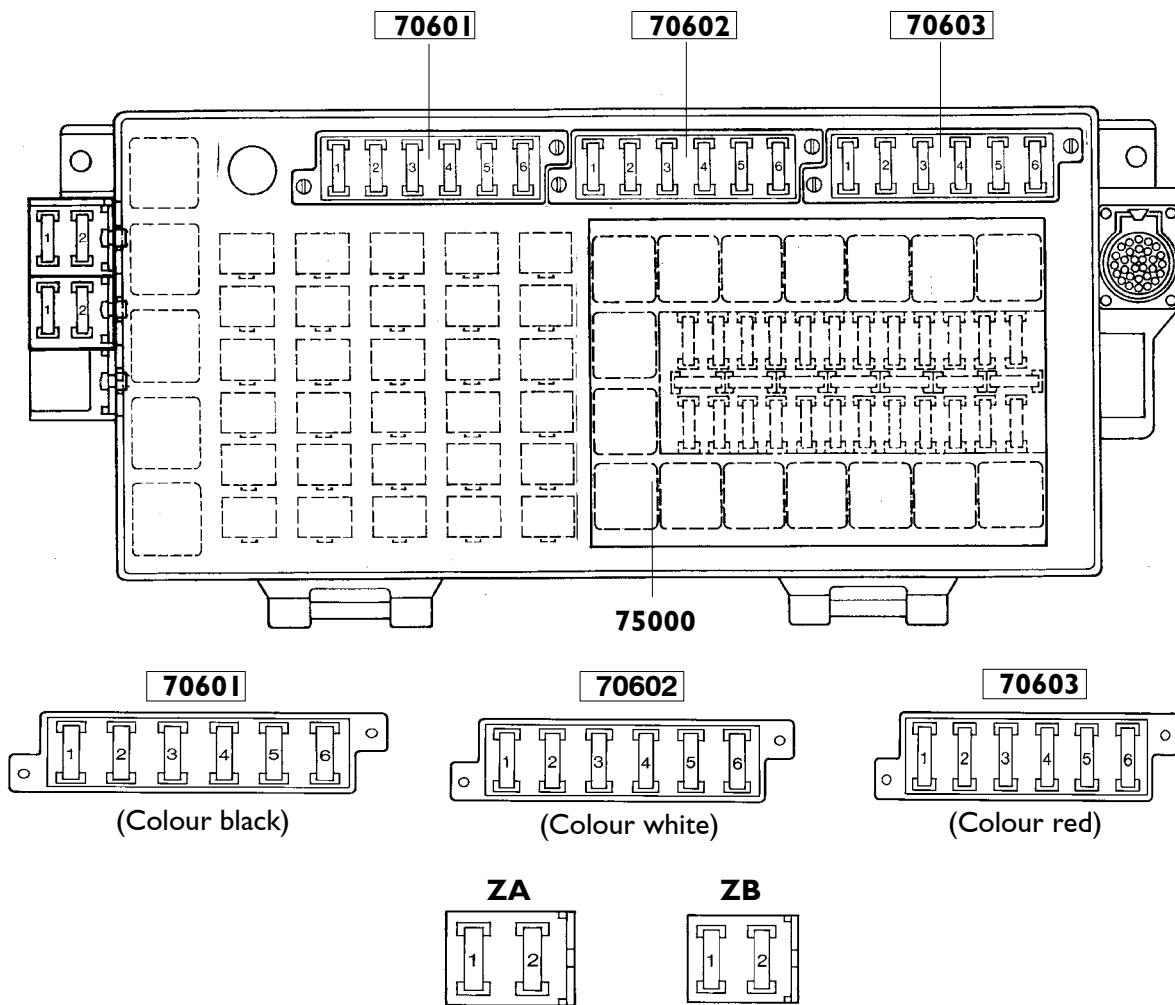
Additional remote control switches, diodes and fuses - Cursor 8 (On Road)



7868

| Acronym | Component code | Description   |
|---------|----------------|---|
| GA      | 66010          | Timer for headlight jet washer  |
| GB      | 25213A         | Remote control switch for 15/50A terminal   |
| GC      | 25224          | Remote control switch for start-up prevention system with engine running                              |
| GD      | 25213B         | Remote control switch for 15/50A terminal   |
| GE      | 25924          | Remote control switch for EDC activation (Main relay )  |
| A       | 25700          | Remote control switch for Cruise Control with ABS activated   |
| B       | 25874          | Remote control switch for D+  |
| C       | 25813          | Remote control switch for heated door mirror  |
| D       | 25116          | Remote control switch for engine brake control from brake pedal                                       |
| E       | 25104          | Remote control switch for engine brake disengagement with ABS activated                               |
| F       | 25721          | Remote control switch for hydraulic power steering 1,5 circuits                                       |
| G       | 25346          | Remote control switch for power supply main switch activation   |
| H       | —              | —   |
| I       | 25879          | Relay for total power takeoff   |
| K       | 25718          | Remote control switch for clogged gasoil filter warning light   |
| L       | 25034          | Remote control switch for rear foglight activation  |
| M       | 25714          | Remote control switch for EDC deactivation / electric battery disconnecter                            |
| N       | 25327          | Remote control switch for climate control system  |
| O       | 25326          | Remote control switch for climate control system  |
| P       | 25893          | Remote control switch for total power takeoff   |
| R       | 61002          | Diode-holder for total power takeoff  |
| S       | 61125          | ECO-POWER resistance  |
| T       | 25112          | Remote control switch for longitudinal differential unlocking   |
| U       | 61122          | Engine brake resistance   |
| V       | 61002          | Diode-holder for interior lights  |
| W       | 25883          | Remote control switch for Cruise Control deactivation with retarder engaged                           |
| X       | 61002          | Diode-holder for intarder   |
| Y       | 25856          | Remote control switch for brake air drier   |
| Z       | 25703/25125    | Remote control switch for steering II / remote control switch for longitudinal differential unlocking |
| AA      | 61001          | Diode-holder for electric battery disconnecter  |
| AB      | 61004B         | Diode-holder for electric battery disconnecter  |
| AC      | 61004A         | Diode-holder for electric battery disconnecter / vehicles for dangerous goods transportation          |
| AD      | 25402          | Remote control switch for electric battery disconnecter / vehicles for dangerous goods transp.        |
| AE      | 25227/25233    | Remote control switch for electric battery disconnecter / vehicles for dangerous goods transp.        |
| AF      | 25226          | Remote control switch for electric battery disconnecter   |
| SA      | 72025          | 12 V socket   |
| SB      | 72021          | Diagnosis   |
| SC      | 53041          | EDC system failure warning light through BLINK CODE with relevant button                              |

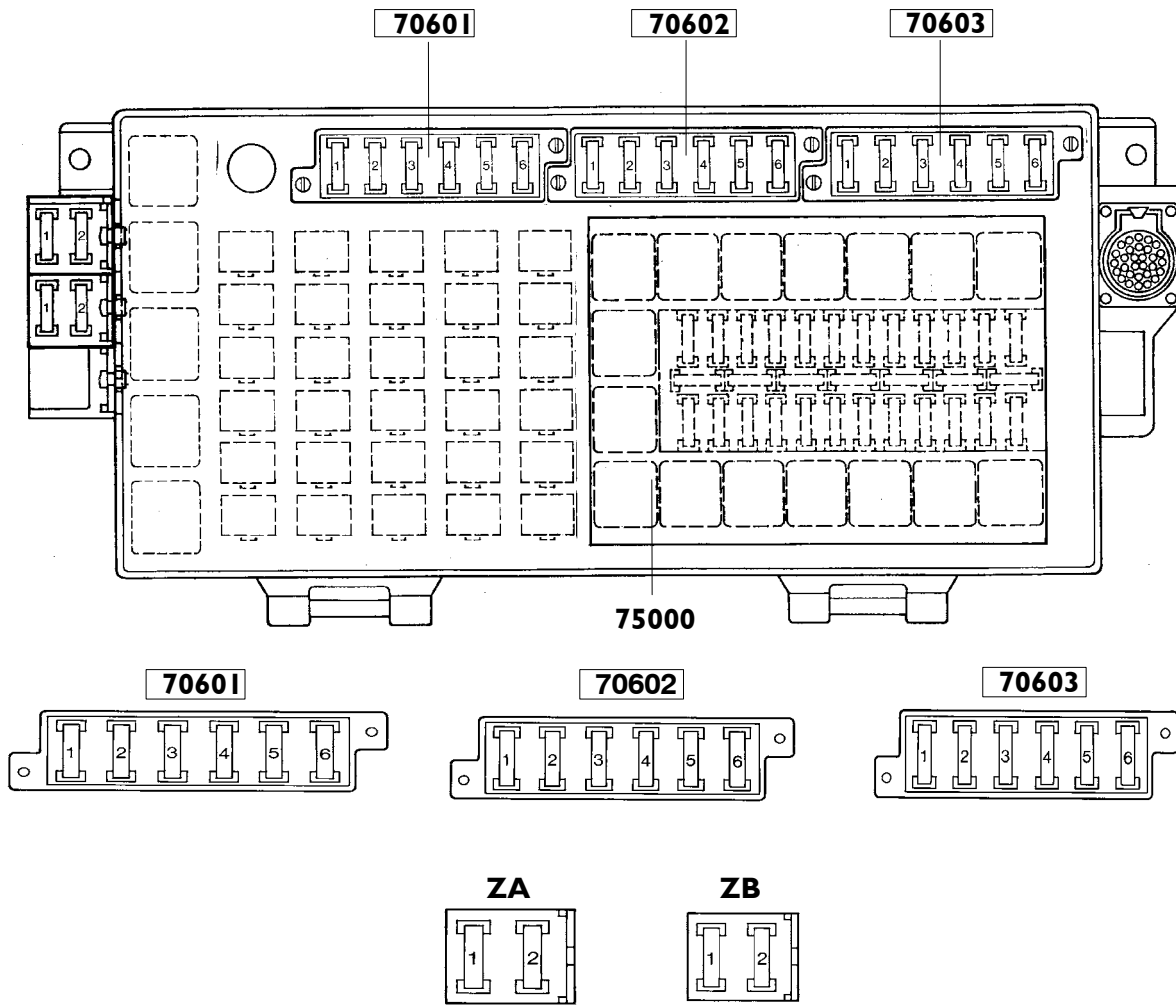
Additional fuse-boxes - Cursor 8 (On Road)



2340

| Code no. and position |   | Capacity | Function   |
|-----------------------|---|----------|--|
| 70601                 | 1 | 10A      | Retarder, engine brake, heated wing mirror               |
|                       | 2 | 10A      | Headlamp washer jet                                      |
|                       | 3 | 25A      | Trailer ABS/EBS  |
|                       | 4 | 7,5A     | ABS  |
|                       | 5 | 7,5A     | ABS  |
|                       | 6 | 5A       | ABS, speed limiting device                               |
| 70602                 | 1 | —        | —  |
|                       | 2 | —        | —  |
|                       | 3 | 5A       | + 30 positive (supply to terminal 30 of ignition switch) |
|                       | 4 | 15A      | EDC  |
|                       | 5 | 10A      | Gearbox  |
|                       | 6 | 10A      | Gearbox  |
| 70603                 | 1 | 5A       | Climate control system                                   |
|                       | 2 | 15A      | Fan  |
|                       | 3 | 15A      | Additional heating - Warming                             |
|                       | 4 | 5A       | Additional heating                                       |
|                       | 5 | —        | —  |
|                       | 6 | 20A      | EDC system (Main Relay)                                  |
| ZA                    | 1 | 30A      | Windscreen resistance                                    |
|                       | 2 | 30A      | Windscreen resistance                                    |
| ZB                    | 1 | 5A       | ADR  |
|                       | 2 | 7,5A     | ADR/Climate control system                               |

Additional fuse-boxes - Cursor 8 (Off Road) - Cursor 10 - Cursor 13



2340

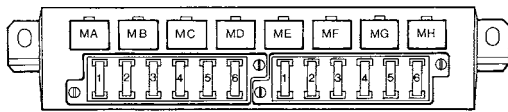
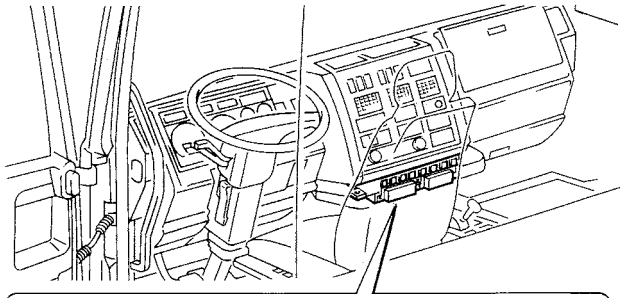
| Code no. and position | Capacity | Function   |
|-----------------------|----------|--|
| 70601                 | 1        | 10A<br>Retarder, engine brake, heated wing mirror              |
|                       | 2        | 10A<br>Headlamp washer jet                                     |
|                       | 3        | 25A<br>Trailer ABS/EBS   |
|                       | 4        | 15A<br>ABS/EBS   |
|                       | 5        | 5/15A<br>ABS/EBS   |
|                       | 6        | 5A<br>ABS, speed limiting device                               |
| 70602                 | 1        | 10A<br>Retarder  |
|                       | 2        | 10A<br>Retarder  |
|                       | 3        | 5A<br>+ 30 positive (supply to terminal 30 of ignition switch) |
|                       | 4        | 15A<br>EDC   |
|                       | 5        | 10A<br>Gearbox   |
|                       | 6        | 30/10A<br>Gearbox  |
| 70603                 | 1        | 5A<br>Climate control system                                   |
|                       | 2        | 15A<br>Fan   |
|                       | 3        | 15A<br>Additional heating - Warming                            |
|                       | 4        | 5A<br>Additional heating                                       |
|                       | 5        | —  |
|                       | 6        | 20A<br>EDC system (Main Relay)                                 |
| ZA                    | 1        | 30A<br>Windscreen resistance                                   |
|                       | 2        | 30A<br>Windscreen resistance                                   |
| ZB                    | 1        | 5A<br>ADR  |
|                       | 2        | —  |



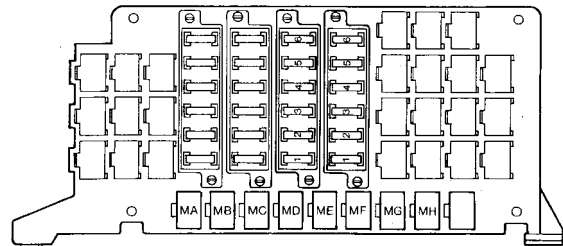
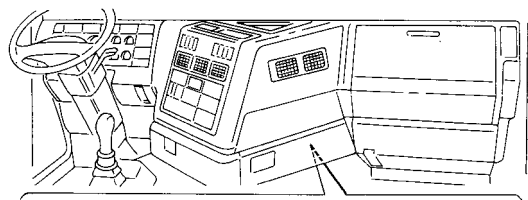


Additional relays and diodes for vehicles - Cursor 10 - Cursor 13

CURSOR 13



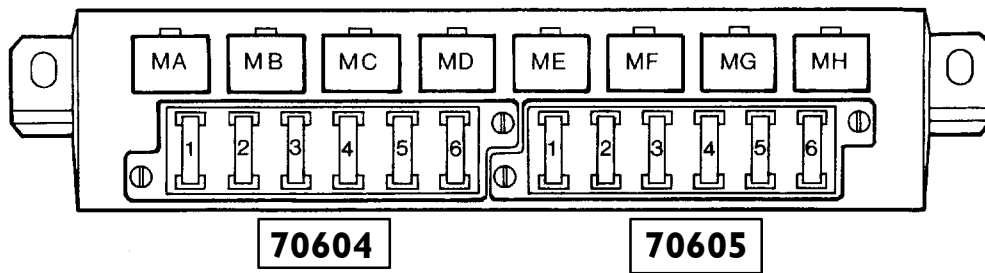
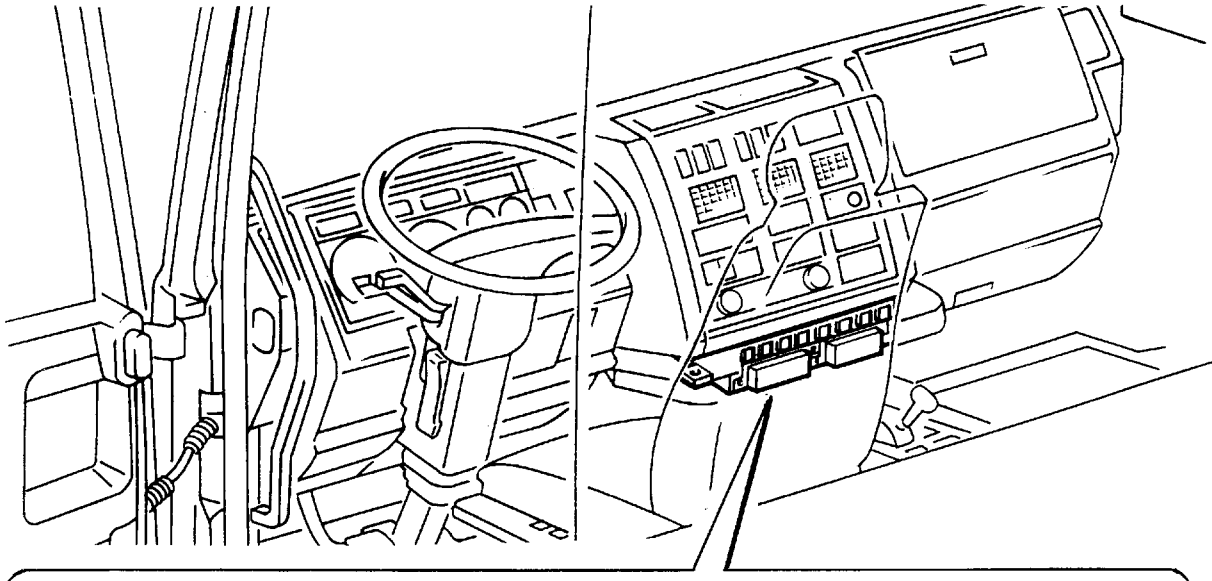
CURSOR 10



6444

| Code                  | Component code | Description relais    |   |
|-----------------------|----------------|-----------------------|---|
| MA                    | 6103           | Trailer brake         |   |
| MB                    | 9658           | Trailer brake         |   |
| MC                    | 25895          | Trip computer level I |   |
| MD                    | 25894          | Trip computer level I |   |
| ME                    | —              | Norway day lights     |   |
| MF                    | —              | Norway day lights     |   |
| MG                    | —              | Norway day lights     |   |
| MH                    | —              | Norway day lights     |   |
| Code no. and position | Capacity       | Function diodes       |   |
| 70604                 | 1              | 20A                   | Heated preliminary fuel filter                        |
|                       | 2              | 20A                   | Food warmer + fridge                                  |
|                       | 3              | 10A                   | For converters (+30)                                  |
|                       | 4              | 15A                   | For converters (+15)                                  |
|                       | 5              | 10A                   | For converters (+15)                                  |
|                       | 6              | 5A                    | For converters (positive under outer lighting switch) |
| 70605                 | 1              | 15A                   | Voltage reducer                                       |
|                       | 2              | 5A                    | Vehicle levelling                                     |
|                       | 3              | 7,5A                  | ECAS frame level adjustment                           |
|                       | 4              | 7,5A                  | Revolv beacon   |
|                       | 5              | 15A                   | Power windows   |
|                       | 6              | 7,5A                  | Central lubrication                                   |

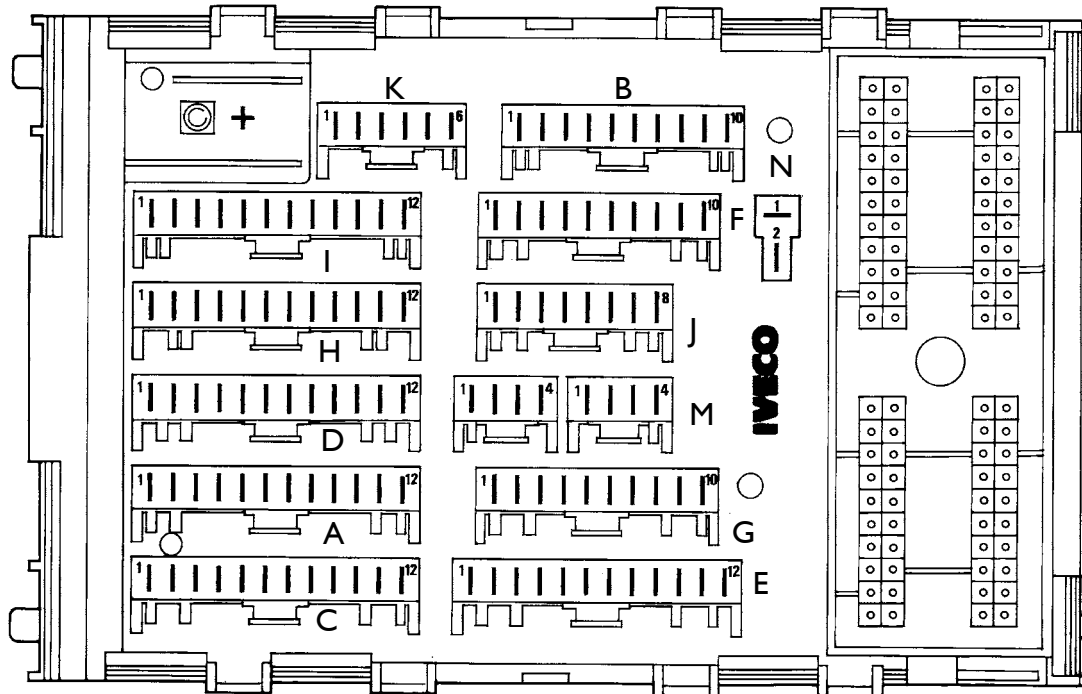
Additional remote control switches and fuse-boxes - Cursor 10 - Cursor 13



6443

| Acronym               | Code number | Remote control switch description |   |
|-----------------------|-------------|-----------------------------------|---|
| MA                    | 6103        | Trailer brake                     |   |
| MB                    | 9658        | Trailer brake                     |   |
| MC                    | 25895       | Trip computer level I             |   |
| MD                    | 25894       | Trip computer level I             |   |
| ME                    | -           | -                                 |   |
| MF                    | -           | -                                 |   |
| MG                    | -           | -                                 |   |
| MH                    | -           | -                                 |   |
| Code no. and position | Capacity    | Fuse-box function                 |   |
| 70604                 | 1           | 20A                               | Fuel heated pre-filter                                      |
|                       | 2           | 20A                               | Hotplate and fridge   |
|                       | 3           | 10A                               | For fittings (+30)  |
|                       | 4           | 15A                               | For fittings (+15)  |
|                       | 5           | 10A                               | For fittings (+15)  |
|                       | 6           | 5A                                | For fittings (positive under exterior light switch)         |
| 70605                 | 1           | 15A                               | Lifting axis / support during pickup                        |
|                       | 2           | 5A                                | Vehicle levelling   |
|                       | 3           | 7,5A                              | ECAS chassis level adjustment                               |
|                       | 4           | 7,5A                              | Beacon light  |
|                       | 5           | 15A                               | Thermoline for fuel heating                                 |
|                       | 6           | 7,5A                              | Central lubrication / driver's and passengers' heated seats |

Connector assembly

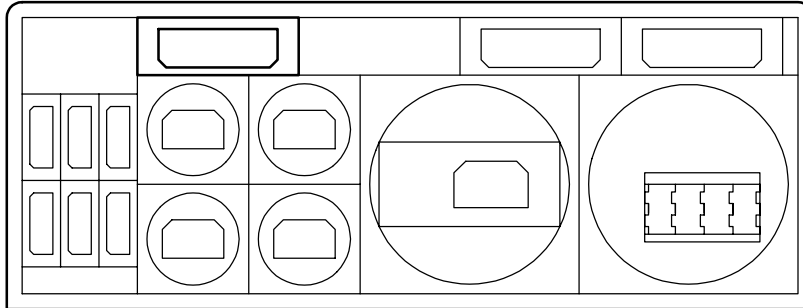


6425

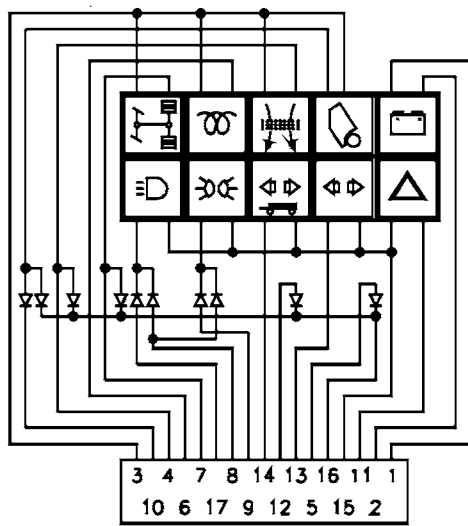
| Connector | Type   | Colour     | Interlock                      |
|-----------|--------|------------|--------------------------------|
| A         | 12 way | Black      | FRAME (BASE)                   |
| B         | 10 way | White      | CAB (STEER. COLUMN LEVER UNIT) |
| C         | 12 way | Grey       | CAB (VARIANTS)                 |
| D         | 12 way | Yellow     | ENGINE (BASE)                  |
| E         | 12 way | Brown      | CAB (BASE)                     |
| F         | 10 way | Black      | CAB (BASE)                     |
| G         | 10 way | Yellow     | CAB (VARIANTS)                 |
| H         | 12 way | Light blue | CAB/FRAME (BASE)               |
| I         | 12 way | White      | CAB (BASE)                     |
| J         | 8 way  | Black      | CAB (BASE)                     |
| K         | 6 way  | White      | CAB (STEER. COLUMN LEVER UNIT) |
| L         | 4 way  | Black      | CAB (VARIANTS)                 |
| M         | 4 way  | White      | CAB (BASE)                     |
| N         | 2 way  | White      | CAB (BASE)                     |
| +         | 1 way  |            | ENGINE (BASE)                  |

Cluster with 10 indicators

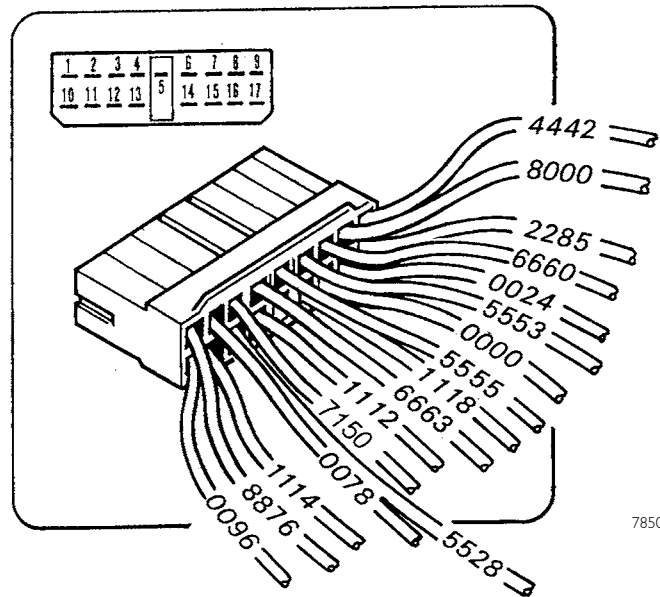
58902



8497



7849

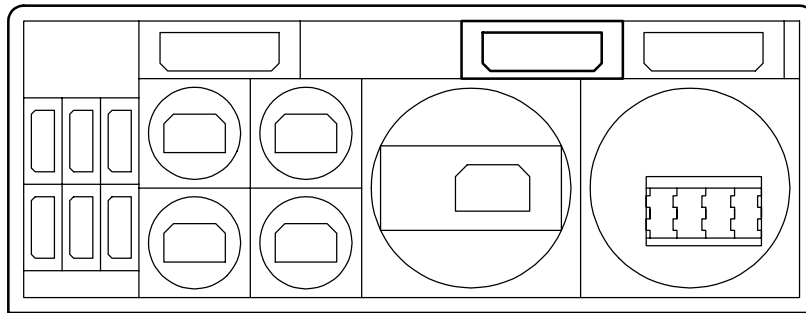


7850

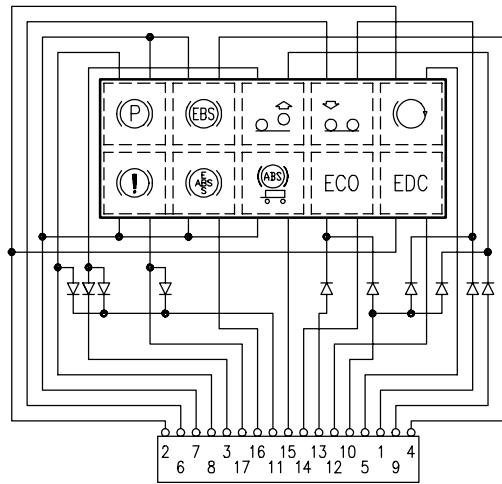
| Ref. | Function   | Cable colour code |
|------|--|-------------------|
| 1    | Positive (+15)                                     | 8876              |
| 2    | Alternator charge failure                          | 0078              |
| 3    | Positive under relay for engaging EDC (Main Relay) | 7150              |
| 4    | Air cleaner clogged                                | 6663              |
| 5    | Fuel reserve                                       | 5555              |
| 6    | Pre/after heating                                  | 5553              |
| 7    | Differential lock                                  | 6660              |
| 8    | Positive from bulb test button                     | 8000              |
| 9    | Exterior lights on                                 | 4442              |
| 10   | Can uncoupled                                      | 0096              |
| 11   | Hazard warning lights                              | 1114              |
| 12   | High engine water temperature indicating           | 5528              |
| 13   | Tractor direction indicators                       | 1112              |
| 14   | Trailer direction indicators                       | 1118              |
| 15   | Earth  | 0000              |
| 16   | Earth from bulb test button                        | 0024              |
| 17   | High beams   | 2285              |

Cluster with 10 indicators

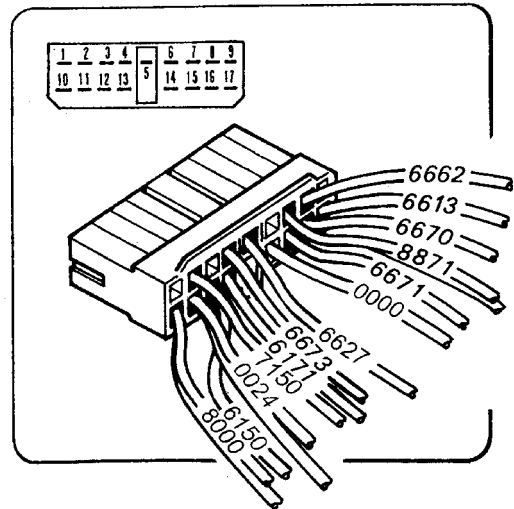
**58903**



8498



8500

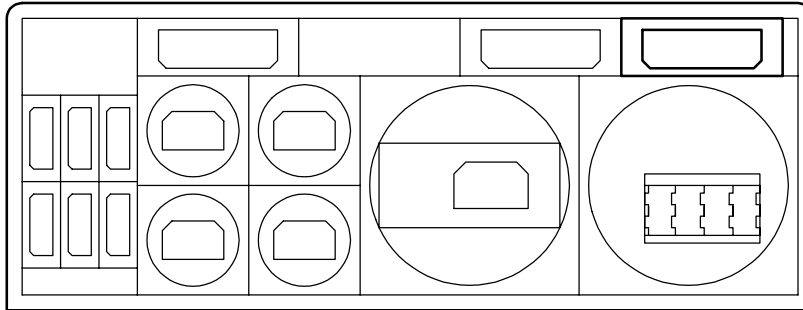


8501

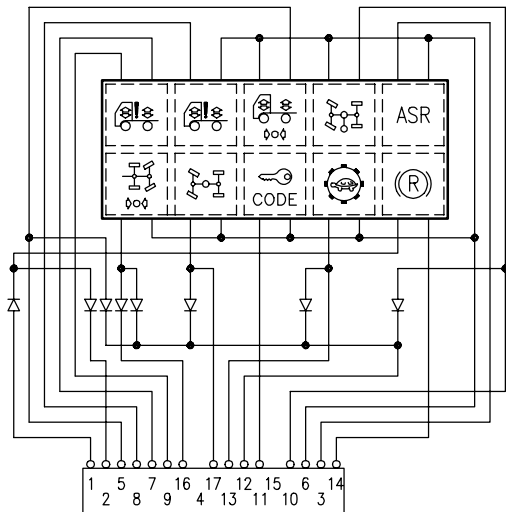
| Ref. | Function   | Cable colour code |
|------|--|-------------------|
| 1    | Spare  | —                 |
| 2    | Positive under relay for switching on EDC (Main relay) | 7150              |
| 3    | Spare  | —                 |
| 4    | Pin 18 of ABS control unit (for version with EBS)      | 6673              |
| 5    | Engine brake   | 6627              |
| 6    | Spare  | —                 |
| 7    | Supply (+15)   | 8871              |
| 8    | Handbrake engaged                                      | 6662              |
| 9    | Spare  | —                 |
| 10   | Supply (+15) from bulb test button                     | 8000              |
| 11   | Earth from bulb test button                            | 0024              |
| 12   | EDC  | 6150              |
| 13   | Lamp supply ECO  | 6171              |
| 14   | Earth  | 0000              |
| 15   | Trailer ABS  | 6671              |
| 16   | Tractor ABS  | 6670              |
| 17   | Brake system   | 6613              |

Cluster with 10 indicators

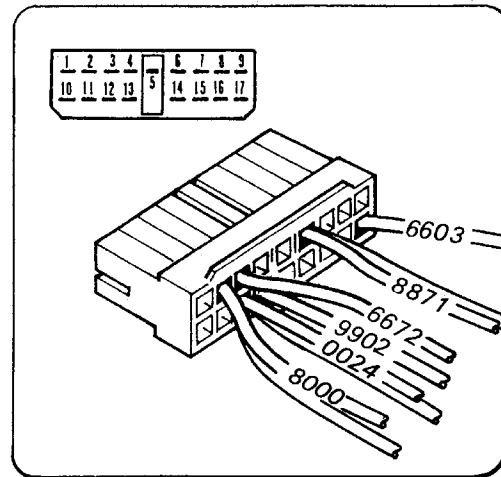
**58905**



8499



8502

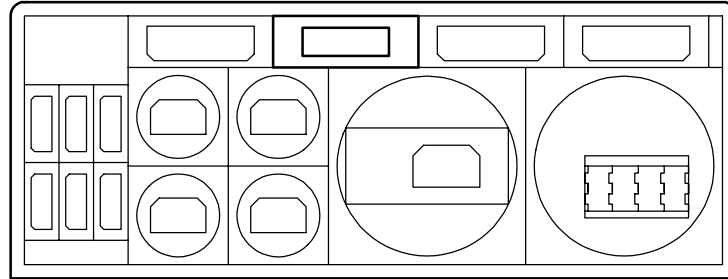


8503

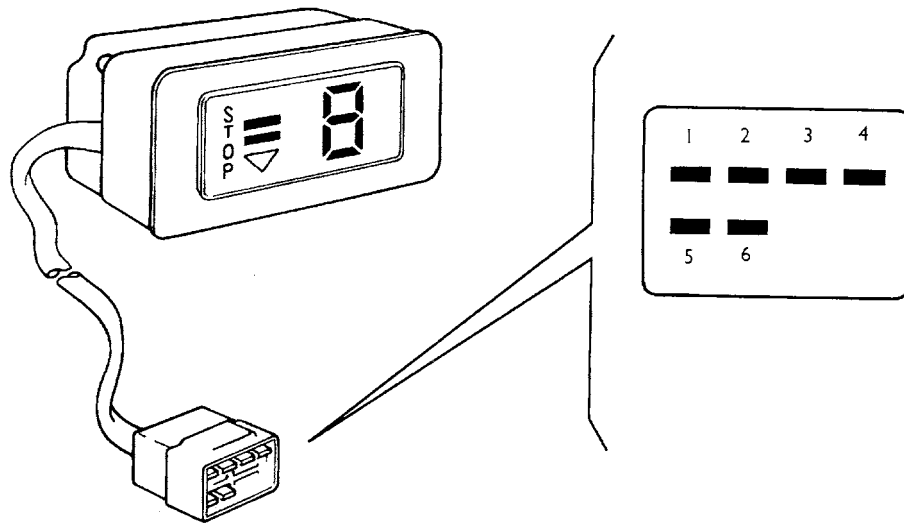
| Ref. | Function  | Cable colour code |
|------|---|-------------------|
| 1    | Spare   | —                 |
| 2    | Spare   | —                 |
| 3    | A.S.R. or speed limiter failure warning light       | 6672              |
| 4    | Spare   | —                 |
| 5    | Spare   | —                 |
| 6    | Positive (+15)                                      | 8871              |
| 7    | Spare   | —                 |
| 8    | Spare   | —                 |
| 9    | Spare   | —                 |
| 10   | Spare   | —                 |
| 11   | Immobilizer   | —                 |
| 12   | Earth from bulb test button                         | 0024              |
| 13   | Supply for reduction unit control on gearbox        | 9992              |
| 14   | Spare   | —                 |
| 15   | Spare   | —                 |
| 16   | Spare   | —                 |
| 17   | To Longitudinal differential lock indicating switch | 6603              |

Display for gears engaged for automatic transmission

**50002**



8538

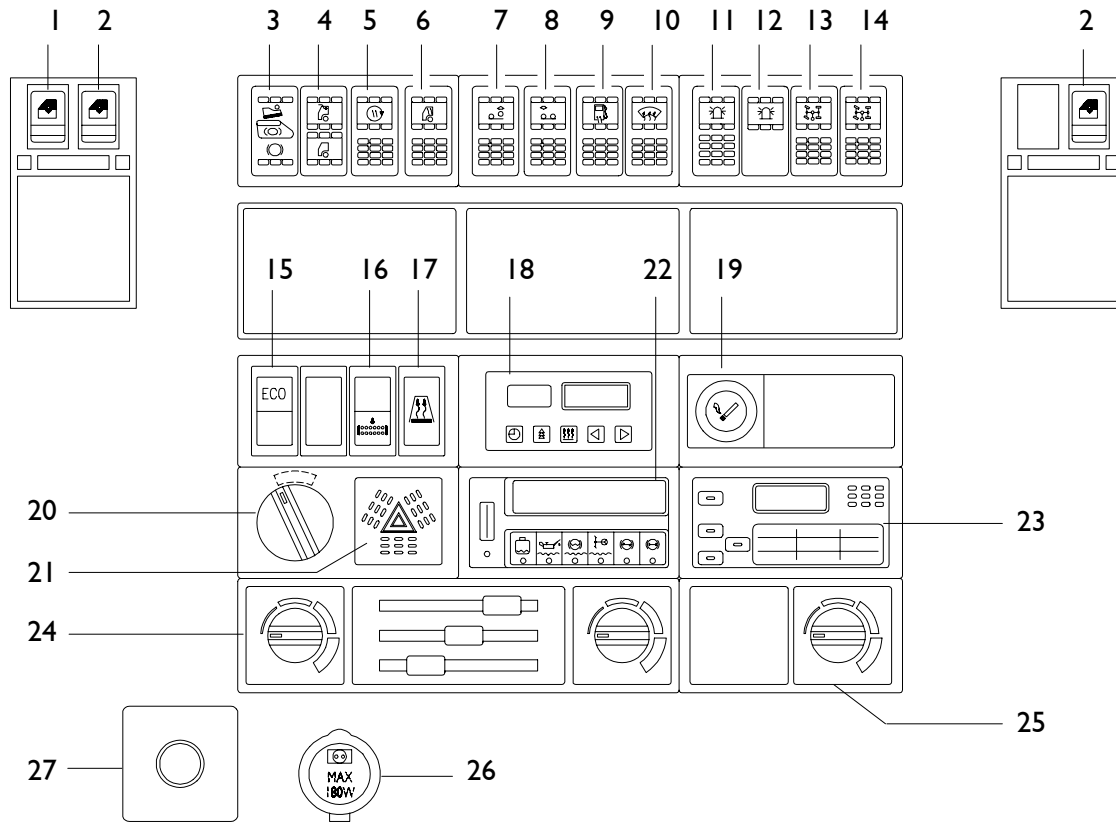


8511

| Ref. | Function   | Cable colour code |
|------|--|-------------------|
| 1    | Signal from terminal 36 ECU                      | 6101              |
| 2    | Spare  | —                 |
| 3    | Earth  | 0000              |
| 4    | Supply positive from ECU Connection X16          | 6100              |
| 5    | Connection ST24 terminal 4 for lighting          | 4444              |
| 6    | Connection ST24 terminal 15 for reduced lighting | 4442              |



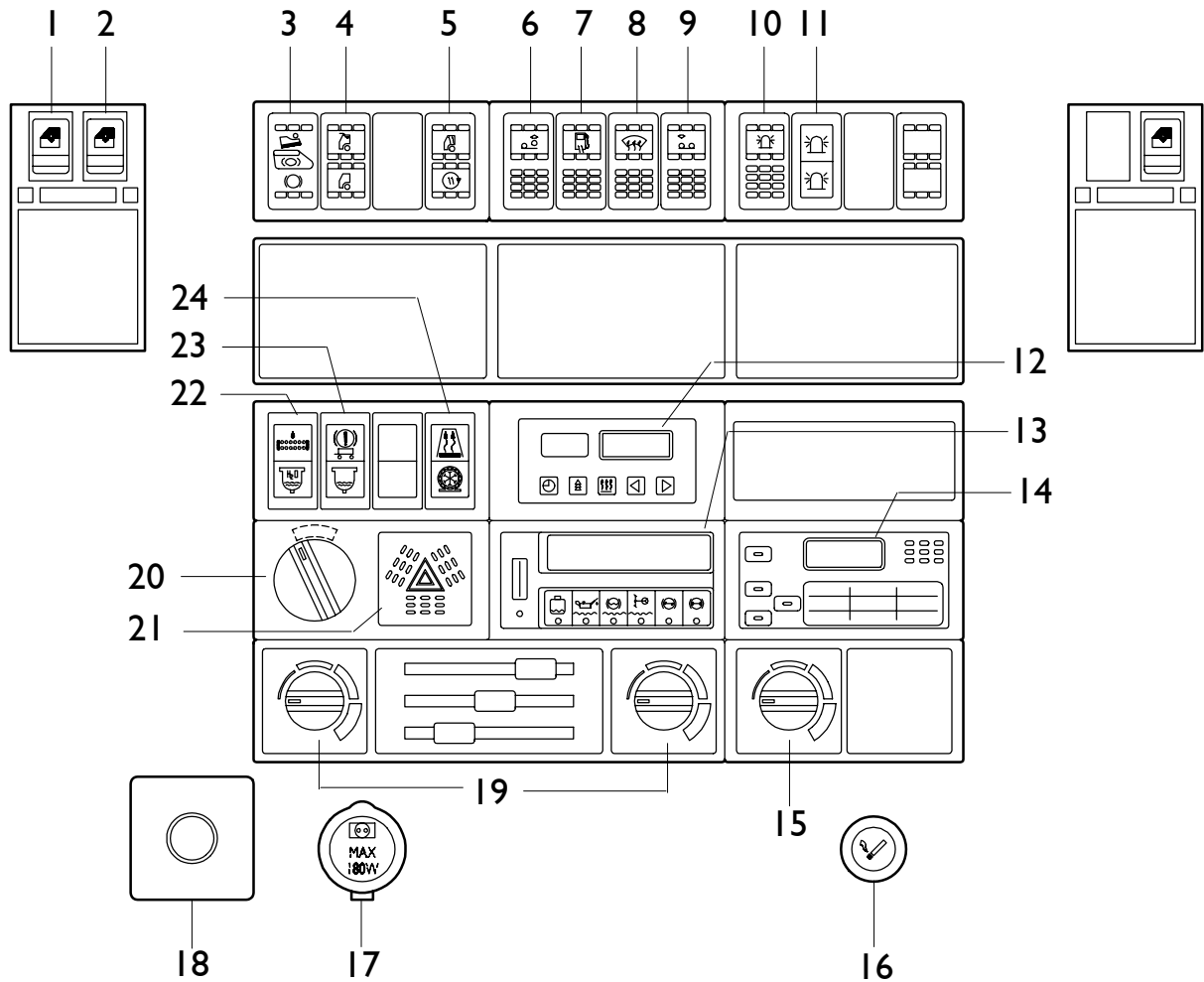
Central panel - Cursor 8 (On Road)



6674

| Ref. | Component code | Test  |
|------|----------------|---|
| 1    | 53300          | Driver's door window winder switch                |
| 2    | 53302          | Passenger's door window winder switch             |
| 3    | 52324          | Three-position switch for engine brake engagement |
| 4    | —              | Sunroof double-switch                             |
| 5    | —              | Switch for engine additional warming              |
| 6    | —              | Switch for cabin independent warming              |
| 7    | —              | 3 <sup>rd</sup> axis lifting switch               |
| 8    | —              | Switch for support during pickup                  |
| 9    | —              | Switch for gas oil warming                        |
| 10   | —              | Switch for heated windscreen                      |
| 11   | —              | Beacon light switch                               |
| 12   | —              | Beacon light warning lamp                         |
| 13   | —              | "Multipower" takeoff switch                       |
| 14   | —              | Switch for earth power takeoff                    |
| 15   | —              | "Economy" warning light                           |
| 16   | 58069          | Clogged gas oil filter warning light              |
| 17   | —              | Additional heater failure warning light           |
| 18   | —              | Pre-selection clock for additional heater         |
| 19   | 85000          | Cigar lighter                                     |
| 20   | 52307          | Exterior light switch                             |
| 21   | 52302          | Hazard light switch                               |
| 22   | 50000          | Display for IVECO Control                         |
| 23   | —              | Iveco Control                                     |
| 24   | 84016          | Heating and ventilation controls                  |
| 25   | —              | Air conditioner                                   |
| 26   | 72026          | Socket  |
| 27   | 52312          | Headlight beam slant compensation switch          |

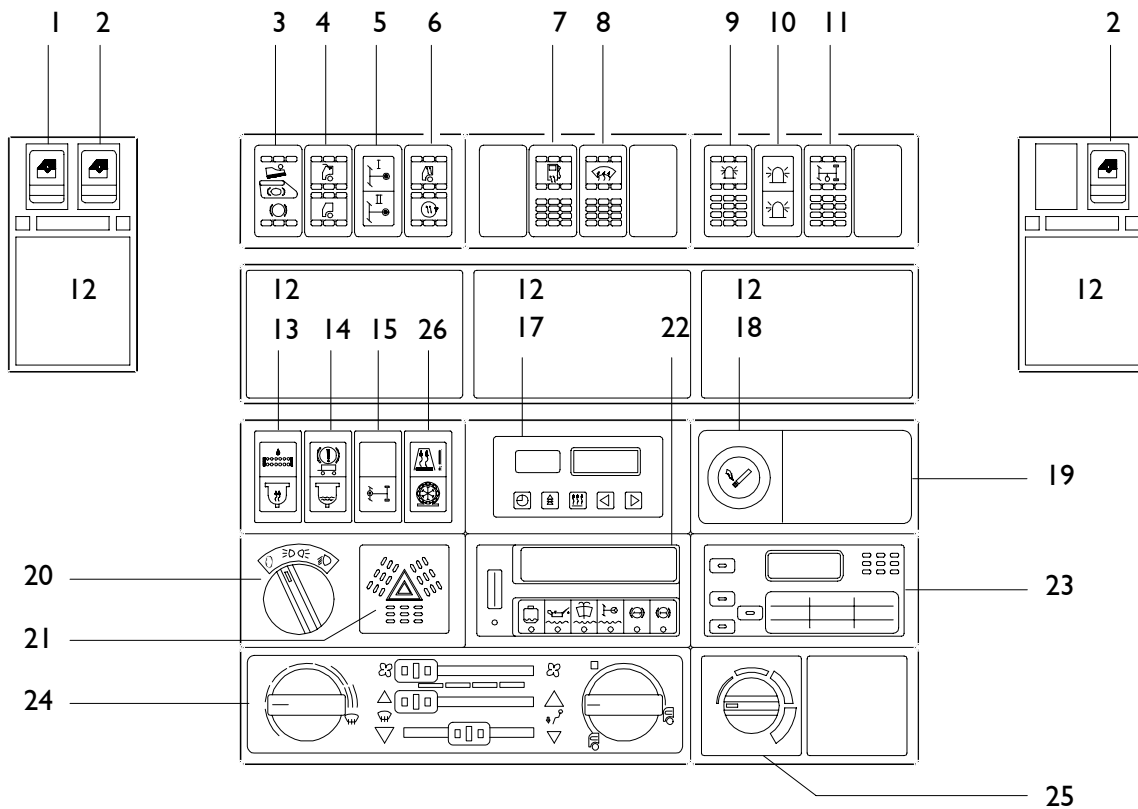
Central panel - Cursor 10



8504

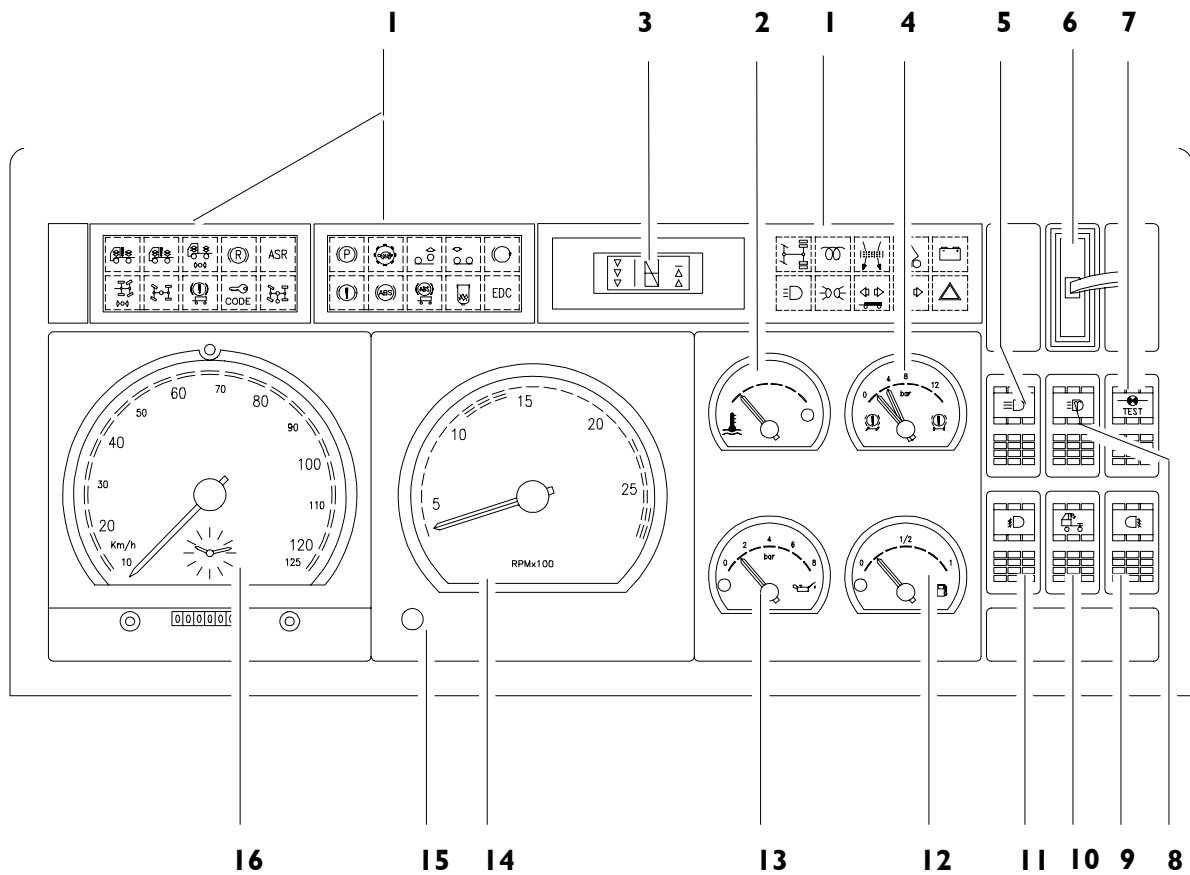
| Ref. | Component code | Description  |
|------|----------------|--|
| 1    | 53300          | Switch for driver's door power window                              |
| 2    | 53302          | Switch for passenger's door power window                           |
| 3    | 52324          | Three-position switch for engaging handbrake                       |
| 4    | —              | Electric hatch switch  |
| 5    | —              | Cab and engine heating switch                                      |
| 6    | —              | Phase lifting switch   |
| 7    | —              | Fuel oil warming switch (OPTIONAL)                                 |
| 8    | —              | Windscreen heating switch (OPTIONAL)                               |
| 9    | —              | Aid when moving off switch   |
| 10   | —              | Rotating beacon light switch                                       |
| 11   | —              | Rotating beacon light warning lamp                                 |
| 12   | —              | Distribution clock   |
| 13   | —              | IVECO control I  |
| 14   | —              | Board computer   |
| 15   | —              | Manual conditions  |
| 16   | 85000          | Cigar lighter  |
| 17   | —              | Socket for cell phone  |
| 18   | 52312          | Switch ECO POWER   |
| 19   | —              | Manual heating control part  |
| 20   | 52302          | Exterior light switch  |
| 21   | 52307          | Switch for hazard warning lights                                   |
| 22   | —              | Fuel oil filter clogged  |
| 23   | —              | Trailer brake circ. failure warning light: water in oil pre-filter |
| 24   | —              | Automatic heating failure warning light - snow chain warning light |

Central panel - Cursor 8 (Off Road) - Cursor 13



| Ref. | Component code | Description  |
|------|----------------|--|
| 1    | 53300          | Driver's door window winder switch   |
| 2    | 53302          | Passenger's door window winder switch  |
| 3    | 52324          | Three-position switch for engine brake engagement  |
| 4    | 53027          | Sunroof double-switch  |
| 5    | —              | Hydraulic power steering warning light circuits  |
| 6    | 52092          | Cabin / engine independent heating switch (only water heater)  |
| 7    | —              | Switch for gas oil warning   |
| 8    | 52001          | Switch for heated windscreen   |
| 9    | 52015          | Beacon light switch  |
| 10   | —              | Beacon light warning lamp  |
| 11   | 52020          | "Multipower" takeoff switch  |
| 12   | —              | Air intakes  |
| 13   | —              | Clogged gas oil filter warning light   |
| 14   | —              | Trailer brake circuit failure warning light / Warning light for water presence in the gas oil pre-filter |
| 15   | —              | Front differential block warning light   |
| 16   | —              | Independent heater failure warning light   |
| 17   | —              | Independent heater compartment   |
| 18   | 85000          | Cigar lighter  |
| 19   | —              | Glove compartment  |
| 20   | 52307          | Exterior light switch  |
| 21   | 52302          | Hazard light switch  |
| 22   | 50000          | Display for IVECO Control  |
| 23   | —              | Trip Computer  |
| 24   | 84016          | Heating and ventilation controls   |
| 25   | —              | Air conditioner  |

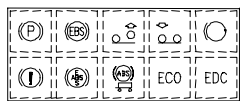
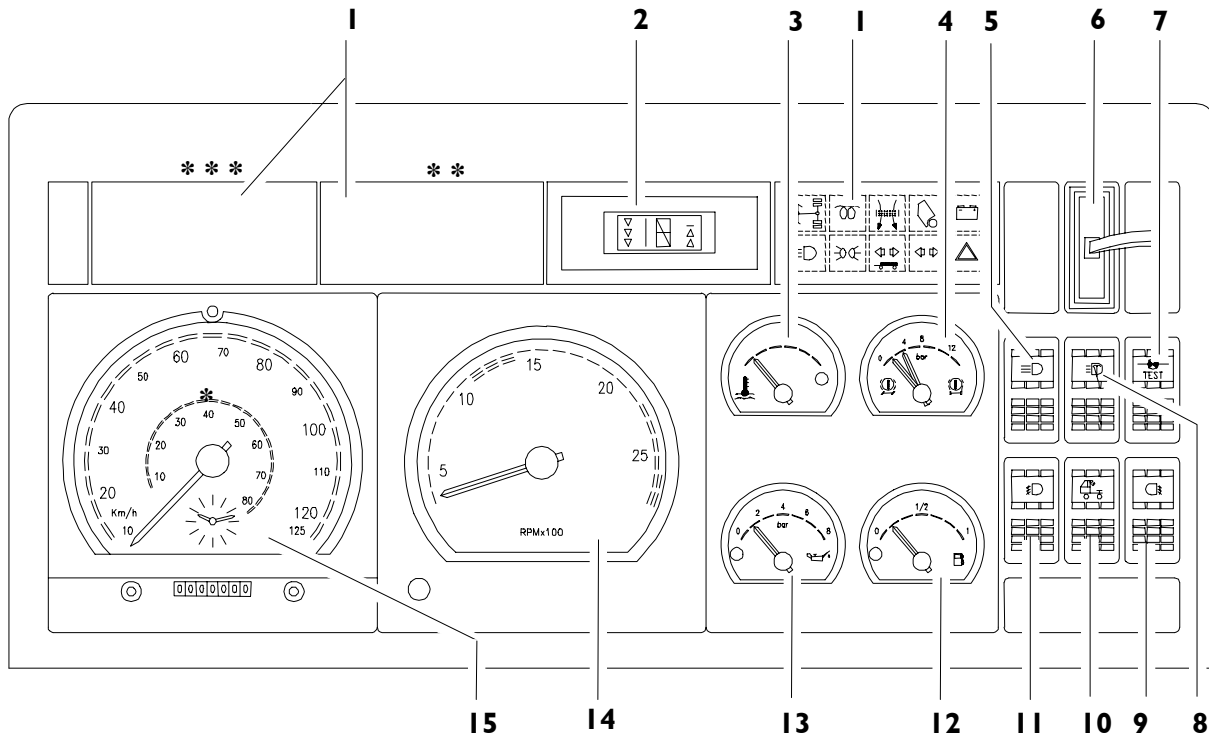
Instrument panel - Cursor 8



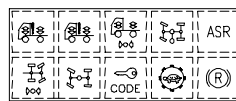
6673

| Ref. | Component code | Description   |
|------|----------------|---|
| 1    | 58902 - 3 - 5  | Panel with 10 warning lights  |
| 2    | 47011          | Thermometer for water temperature with warning light                            |
| 3    | —              | Display for Eurotronic transmission   |
| 4    | 42009          | Pressure gauge for front and rear brake air pressure                            |
| 5    | 52024          | Switch with incorporated warning light for additional main beam headlights      |
| 6    | —              | Phase switch for retarder   |
| 7    | 53000          | Switch for warning light test   |
| 8    | 53001          | Headlight washer switch   |
| 9    | 52007          | Switch with incorporated warning light for rear foglight                        |
| 10   | 52008          | Switch with incorporated warning light for fifth wheel lighting (only tractors) |
| 11   | 52304          | Front foglight and rear foglight switch   |
| 12   | 44001          | Fuel level indicator with incorporated warning light                            |
| 13   | 42001          | Pressure gauge for engine oil pressure with incorporated warning light          |
| 14   | 48001          | Electronic turn meter   |
| 15   | —              | Instrument light dimmer   |
| 16   | 40011          | Electronic tachograph   |

Instrument panel - Cursor 8 (Off Road) - Cursor 10 - Cursor 13

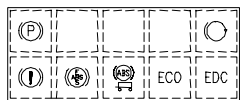


Cursor 10



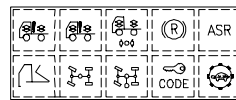
Cursor 10

\*\*



Cursor 8 (Off Road)  
Cursor 13

\*\*\*

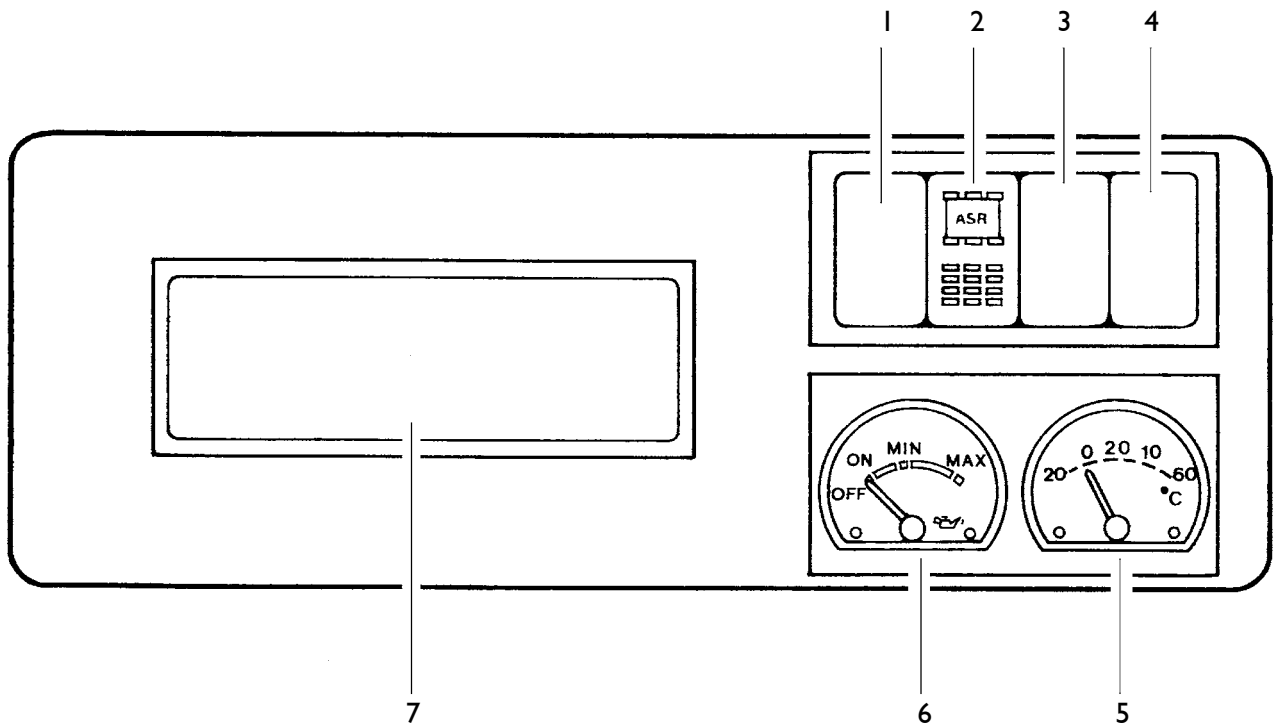


Cursor 8 (Off Road)  
Cursor 13

8487

| Ref. | Component code | Description   |
|------|----------------|---|
| 1    | 58902 - 3 - 5  | Panel with 10 warning lights  |
| 2    | 50002          | Display for Eurotronic transmission   |
| 3    | 47011          | Thermometer for water temperature with warning light                            |
| 4    | 42008          | Air pressure gauge (DOUBLE)   |
| 5    | 52024          | Switch with incorporated warning light for additional headlights                |
| 6    | 52552          | Phase switch for RETARDER   |
| 8    | 53001          | Headlight washer switch   |
| 7    | 53000          | Switch for warning light test   |
| 9    | 53315          | Rear foglight switch  |
| 10   | 52009          | Switch with incorporated warning light for fifth wheel lighting (only tractors) |
| 11   | 52304          | Front foglight and rear foglight switch   |
| 12   | 44001          | Fuel level indicator with incorporated warning light                            |
| 13   | 42001          | Pressure gauge for engine oil pressure with incorporated warning light          |
| 14   | 48001          | Electronic turn meter   |
| 15   | 40011          | Electronic tachograph   |

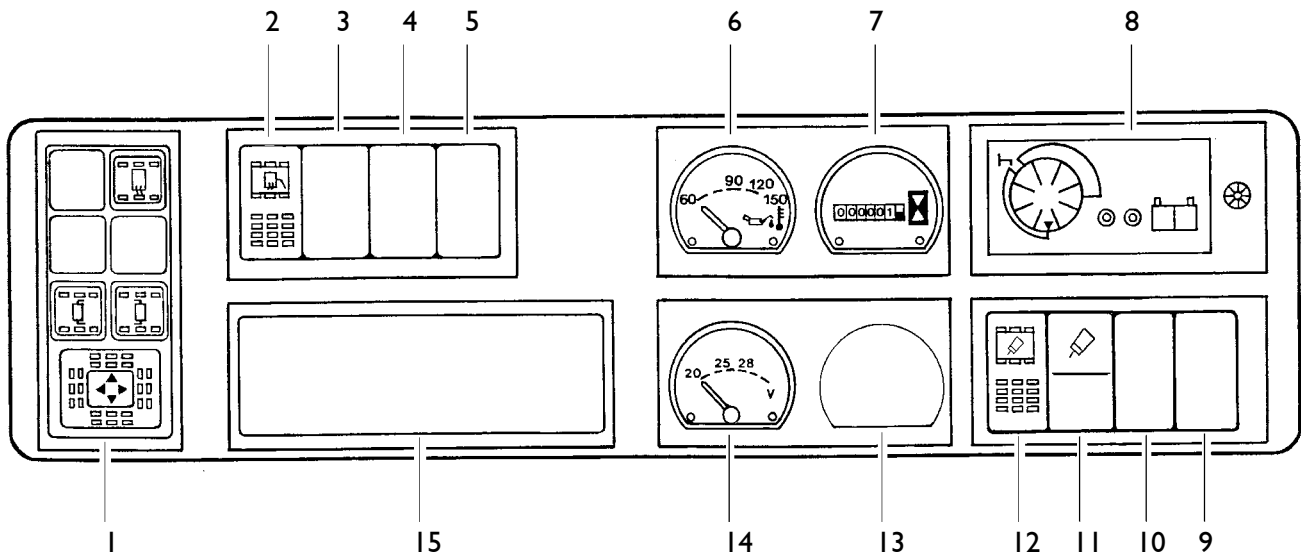
Under roof instrument - Cursor 8 - Cursor 10 - Cursor 13



6675

| Ref. | Component code | Description                     |
|------|----------------|---------------------------------|
| 1    | —              | At disposal                     |
| 2    | 52056          | ASR disengagement switch        |
| 3    | —              | At disposal                     |
| 4    | —              | At disposal                     |
| 5    | —              | Outside temperature thermometer |
| 6    | 44002          | Engine oil level indicator      |
| 7    | 68000          | Receiver compartment            |

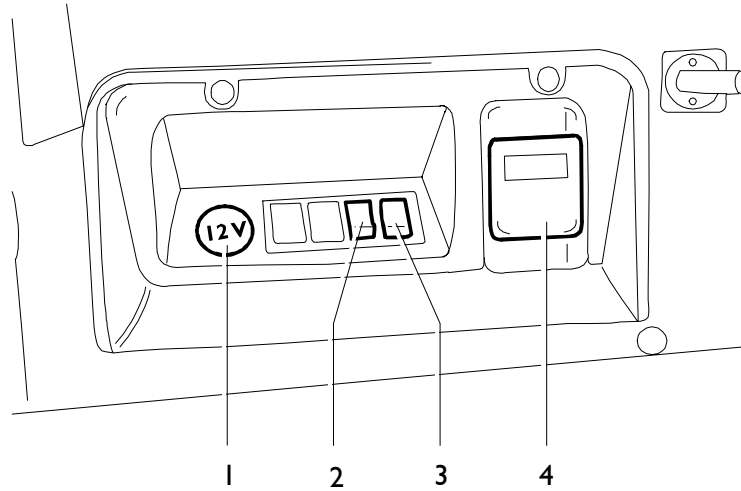
Upper central panel assembly - Cursor 8 - Cursor 10 - Cursor 13



6675

| Ref. | Component code | Description                                    |
|------|----------------|--|
| 1    | 8539           | Power heated door mirror button                |
| 2    | 85010          | Heated door mirror control switch              |
| 3    | —              | Free   |
| 4    | —              | Free   |
| 5    | —              | Free   |
| 6    | —              | Thermometer for transmission oil temperature   |
| 7    | —              | Hour counter                                   |
| 8    | —              | Environment thermostat with temperature sensor |
| 9    | —              | Free   |
| 10   | —              | Free   |
| 11   | —              | Central lubrication switch                     |
| 12   | —              | Central lubrication warning lamp               |
| 13   | —              | Free   |
| 14   | —              | Voltmeter                                      |
| 15   | 68007          | C.B. compartment                               |

Assembly on rear wall (only for long cabs)



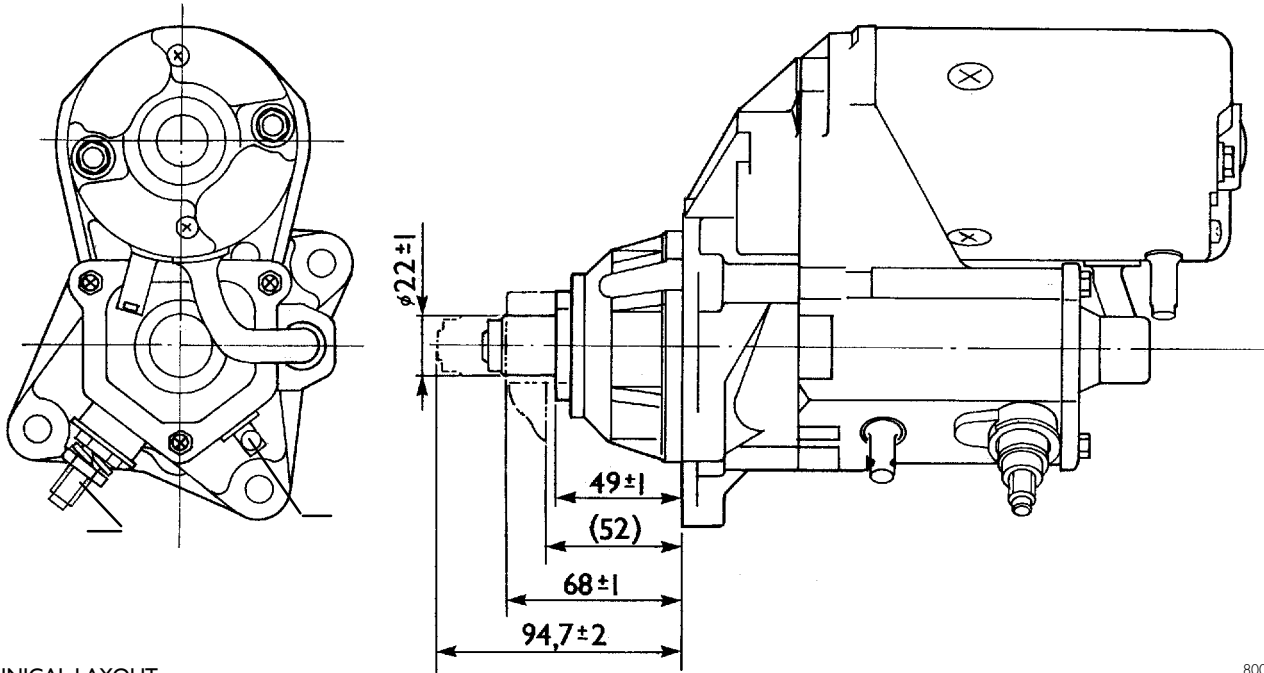
8506

| Ref. | Component code | Description           |
|------|----------------|-----------------------|
| 1    | 72026          | 12 V current socket   |
| 2    | 53027          | Electric hatch switch |
| 3    | 53509          | Interior light switch |
| 4    |                | Removable alarm clock |



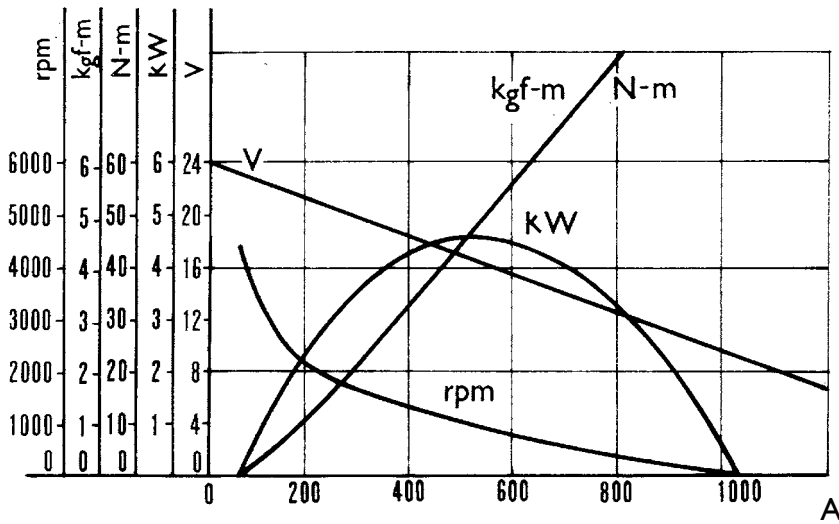
”Nippondenso” 24 V - 4.5 kW starter motor (Cursor 8)

08000

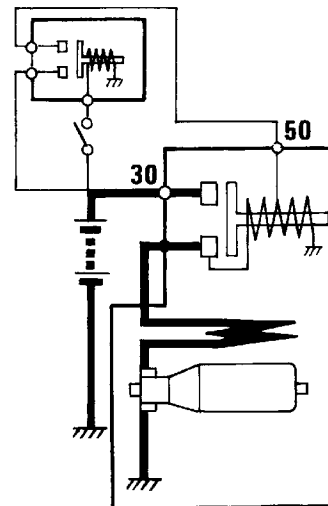


TECHNICAL LAYOUT

8006



4957



4958

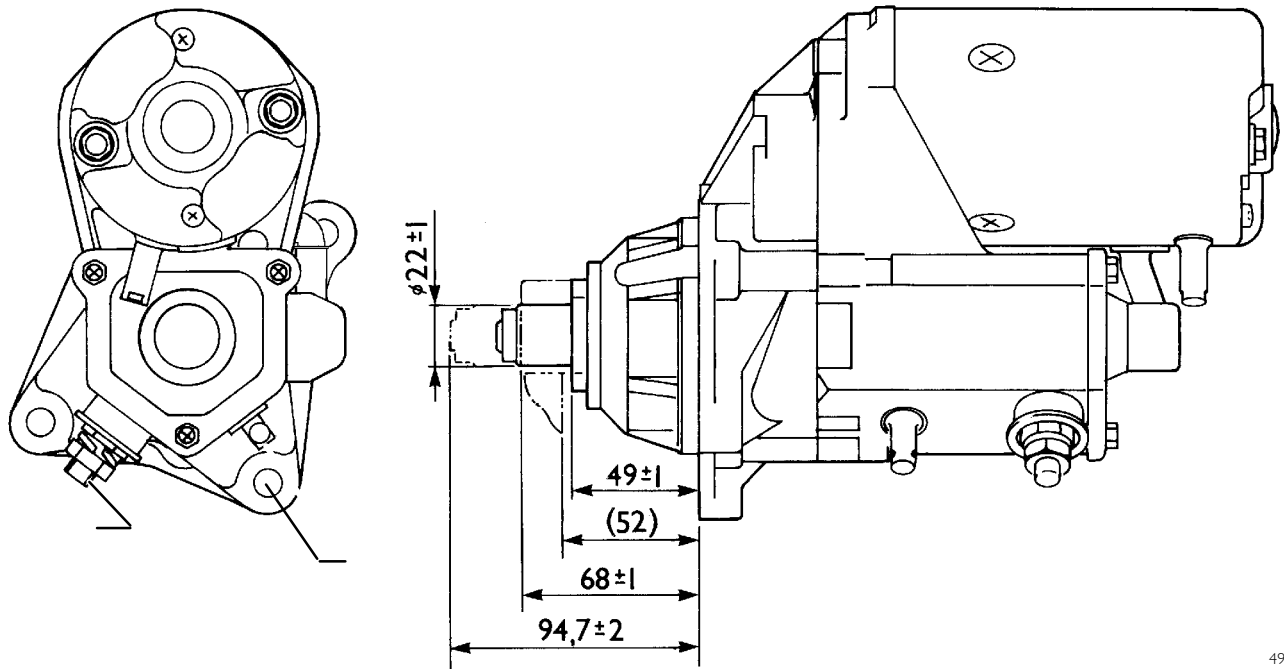
CHARACTERISTIC CURVES

WIRING DIAGRAM

| Characteristics       |                                    | Specific Power (20°C) | Test cond.     | Characteristics           |
|-----------------------|------------------------------------|-----------------------|----------------|---------------------------|
| Rated power           | 4,5 kW                             | Loadless              | 23V            | 90 A MAX.(3500rpm MIN.)   |
| System voltage        | 24 V                               | Load                  | 17V (39,2 N•m) | 530 A MAX.(950rpm MIN.)   |
| Engagement system     | Positive approach control          | Stall                 | 6V             | 900 A MAX.(49,0 N•m MIN.) |
| Adjusted time         | 30 sec.                            |                       |                |                           |
| Direction of rotation | clockwise, seen from end of pinion |                       |                |                           |
| Weight                | approx. 8.4 kg                     |                       |                |                           |
| Operating voltage     | 16V MAX. (20°C)                    |                       |                |                           |
| Water resistance      | Water spray test to JIS D0203' 5l' |                       |                |                           |

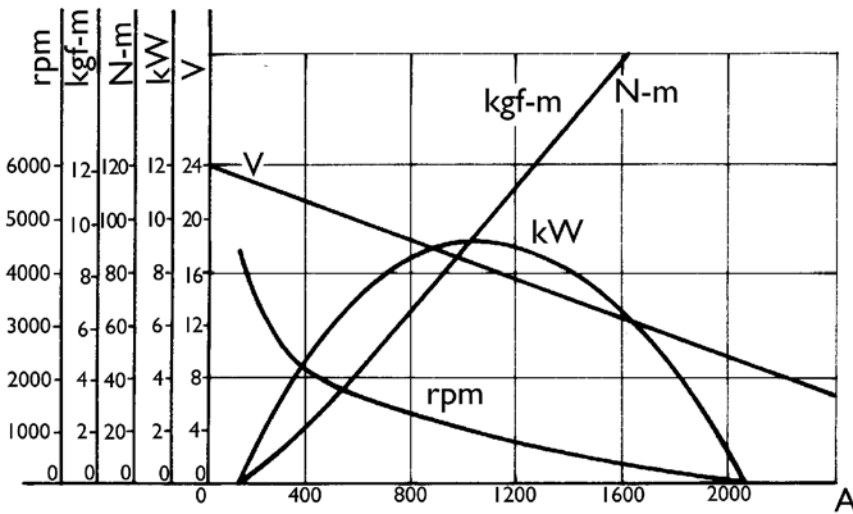
”Nippondenso” 24 V - 5.5 kW starter motor (Cursor 10 - 13)

08000



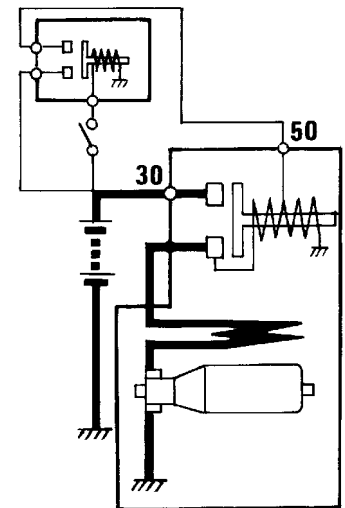
4956

TECHNICAL VIEW



4957

CHARACTERISTIC CURVES



4958

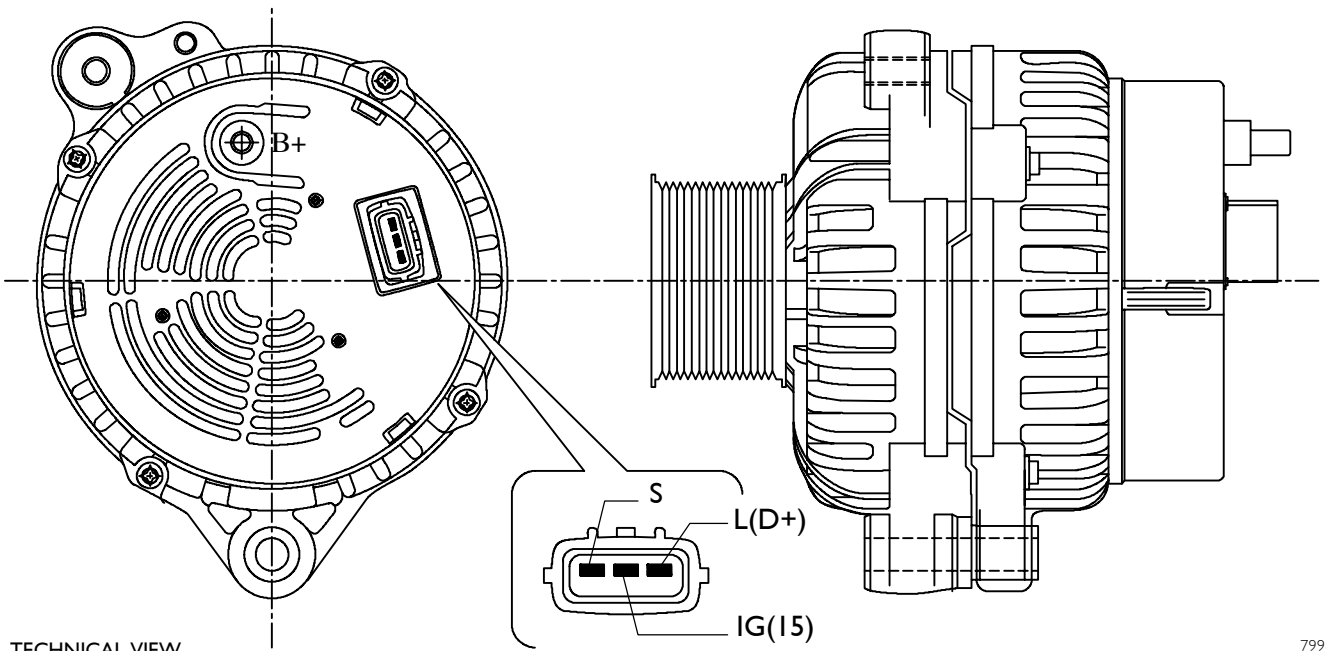
WIRING DIAGRAM

| Characteristics       |                                    | Specific Power (20°C) | Test cond.   | Characteristics            |
|-----------------------|------------------------------------|-----------------------|--------------|----------------------------|
| Rated power           | 5,5 kW                             | Loadless              | 23V          | 120A MAX. (3800rpm MIN.)   |
| System voltage        | 24V                                | Load                  | 16V (49 N•m) | 690A MAX. (900rpm MIN.)    |
| Engagement system     | Positive approach control          | Stall                 | 6V           | 1260A MAX. (73,5 N•m MIN.) |
| Adjusted time         | 30 sec.                            |                       |              |                            |
| Direction of rotation | clockwise, seen from end of pinion |                       |              |                            |
| Weight                | approx. 10,5 kg                    |                       |              |                            |
| Operating voltage     | 16V MAX. (20°C)                    |                       |              |                            |
| Water resistance      | Water spray test to JIS D0203 S1   |                       |              |                            |



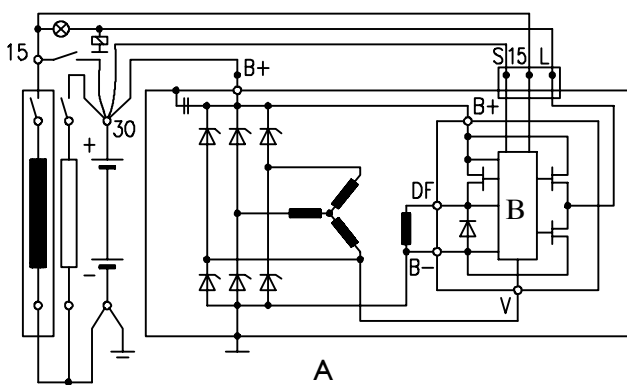
**SHARED COMPONENTS**  
**“Bosch” 28V - 65A alternator (Cursor 8)**

**03000**



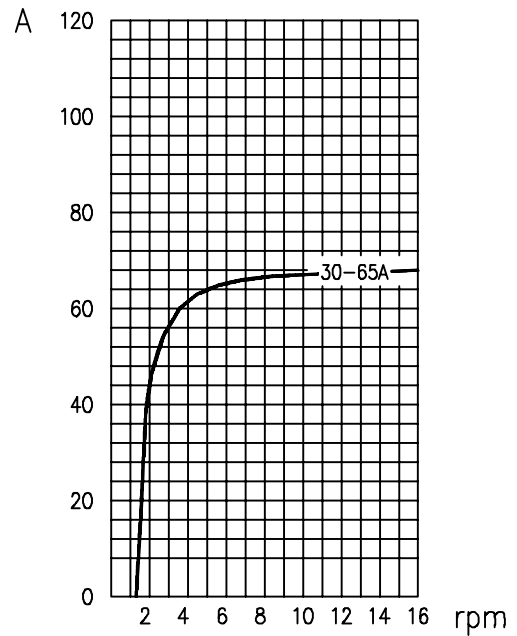
TECHNICAL VIEW

7998



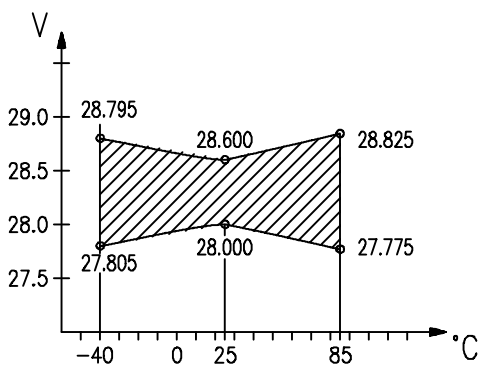
WIRING DIAGRAM  
 A. ALTERNATOR B. VOLTAGE REGULATOR

7999



ALTERNATOR CURRENT DELIVERY CURVE

8001



VOLTAGE REGULATOR TEMPERATURE  
 CHARACTERISTICS (6000 RPM)

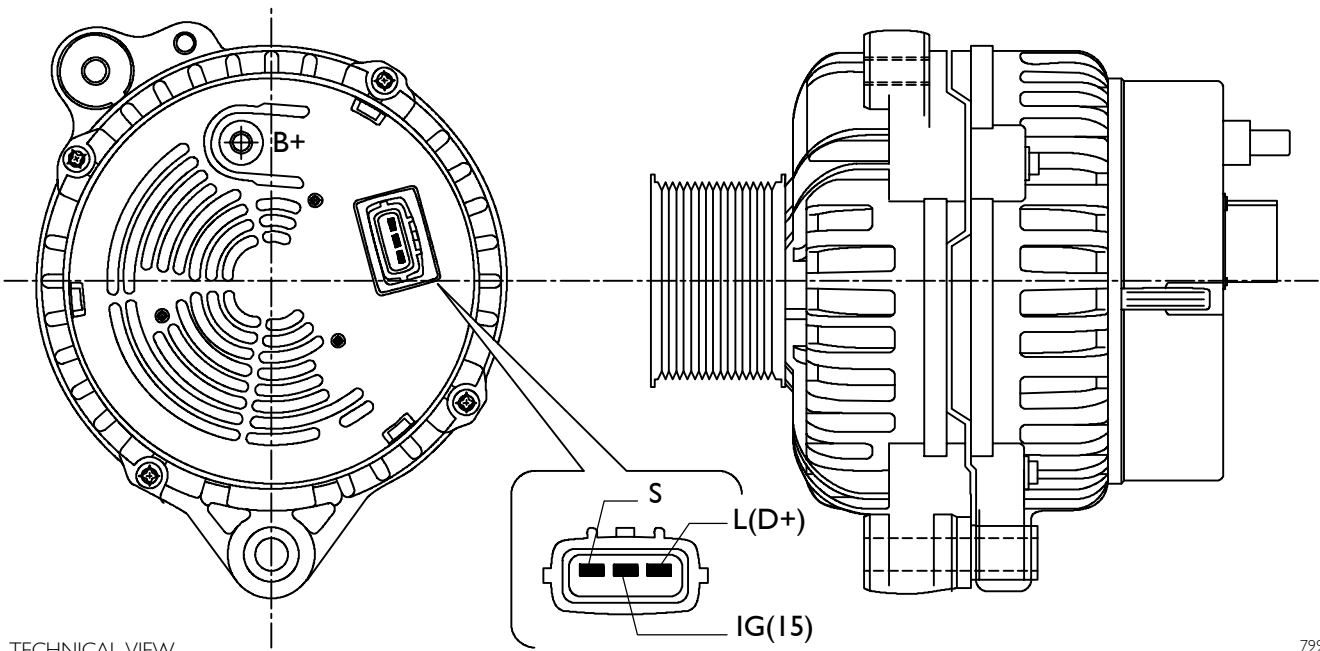
8000

**Characteristics**

|   |                             |
|---|-----------------------------|
| Rated voltage                                     | 28 V                        |
| Rated power                                       | 65 A                        |
| Current at environment temperature   800 RPM/30 A |                             |
| At 25 °C and rated voltage                        | 6000 RPM/65 A               |
| Direction of rotation                             | clockwise, seen from pulley |
| Weight  | 7.4 kg                      |

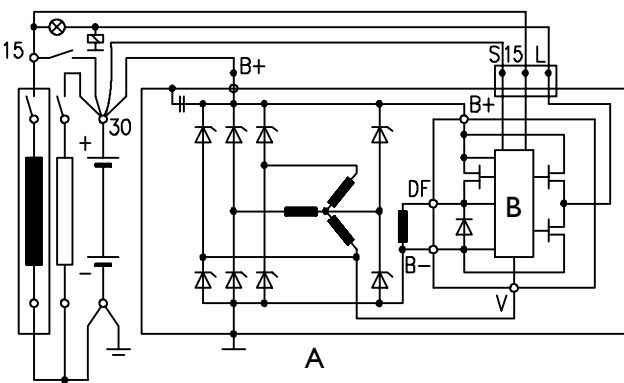
**"Bosch" 28V - 40A ÷ 90A alternator (Cursor 10 - 13)**

**03000**



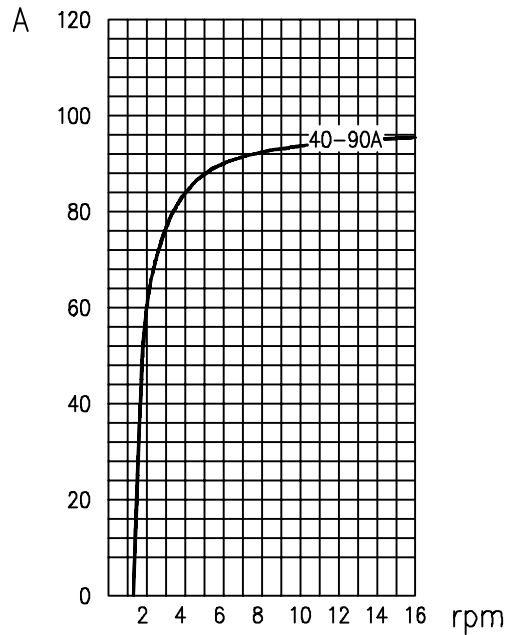
TECHNICAL VIEW

7998



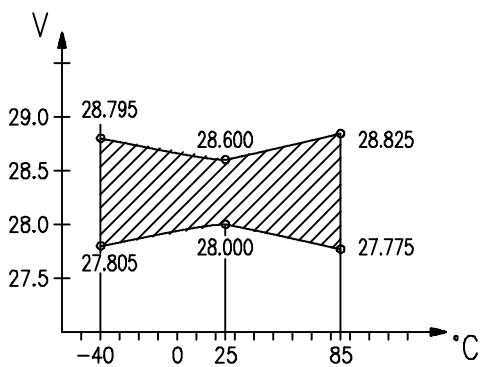
WIRING DIAGRAM  
A. ALTERNATOR B. VOLTAGE REGULATOR

8003



ALTERNATOR CURRENT DELIVERY CURVE

8002

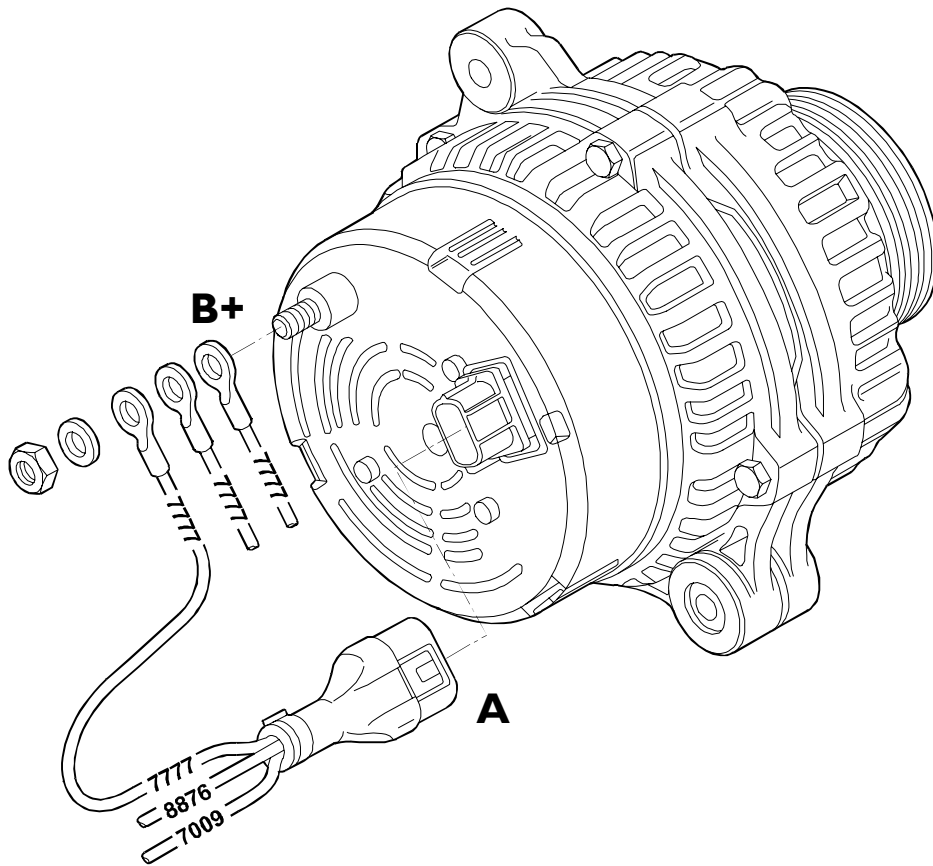


VOLTAGE REGULATOR TEMPERATURE CHARACTERISTICS (6000 RPM)

8000

**Characteristics**

|   |                             |
|---|-----------------------------|
| Rated voltage                                     | 28 V                        |
| Rated power                                       | 90 A                        |
| Current at environment temperature   800 RPM/40 A |                             |
| At 25 °C and rated voltage                        | 6000 RPM/10 A               |
| Direction of rotation                             | clockwise, seen from pulley |
| Weight  | 7.8 kg                      |



PERSPECTIVE VIEW WITH CORRESPONDING ELECTRICAL CONNECTIONS

8535

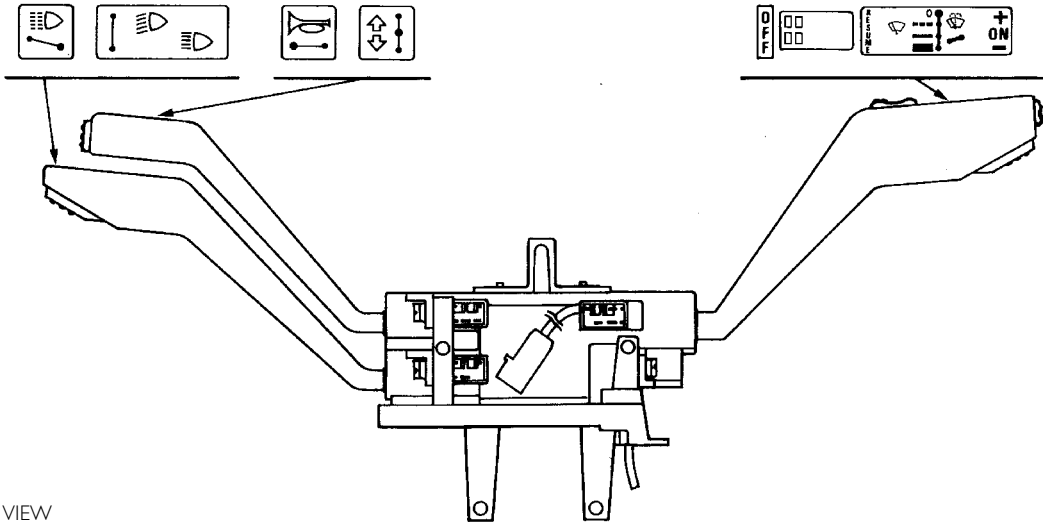
| Ref.                          | Function   | Cable colour code    |
|-------------------------------|--|----------------------|
| <b>A</b><br>L<br>15 (IG)<br>S | To terminal D12 of U.C.I. control unit (terminal 87d of diode 61000)<br>To terminal 13 of U.C.I. control unit (+15)<br>Positive (+30)  | 7009<br>8876<br>7777 |
| <b>B+</b>                     | Alternator supply (terminal 5) +30 positive<br>+ 30 positive to starter motor<br>+ 30 positive to positive wall connector on cab front | 7777<br>7777<br>7777 |

**Steering column lever unit**

Specifications  
 Supplier  
 Rated voltage

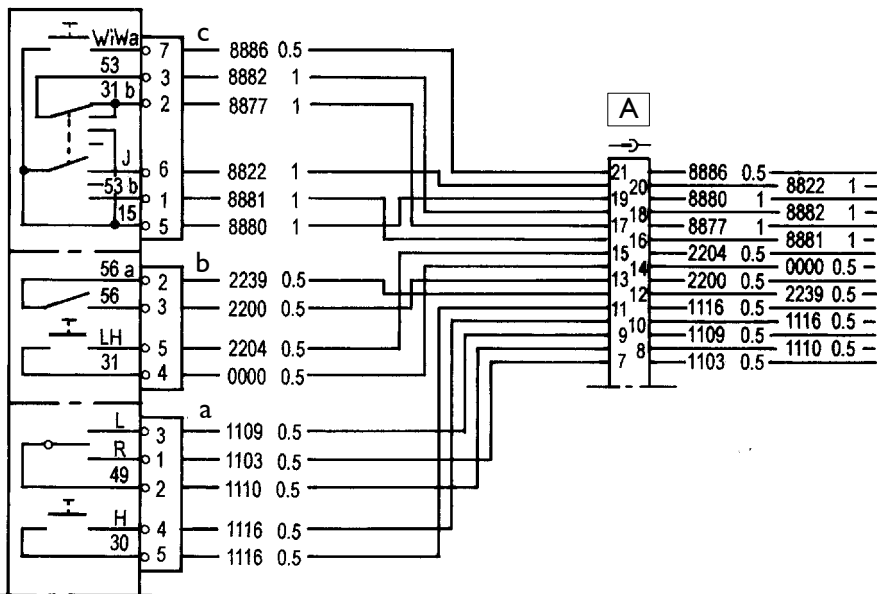
**5403 I**

CAVIS  
 24V



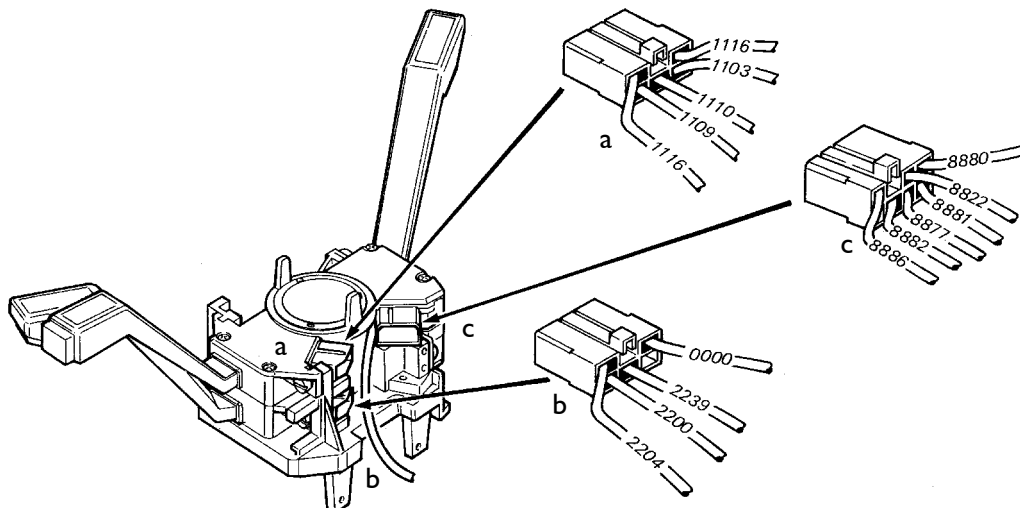
6659

TECHNICAL VIEW



6660

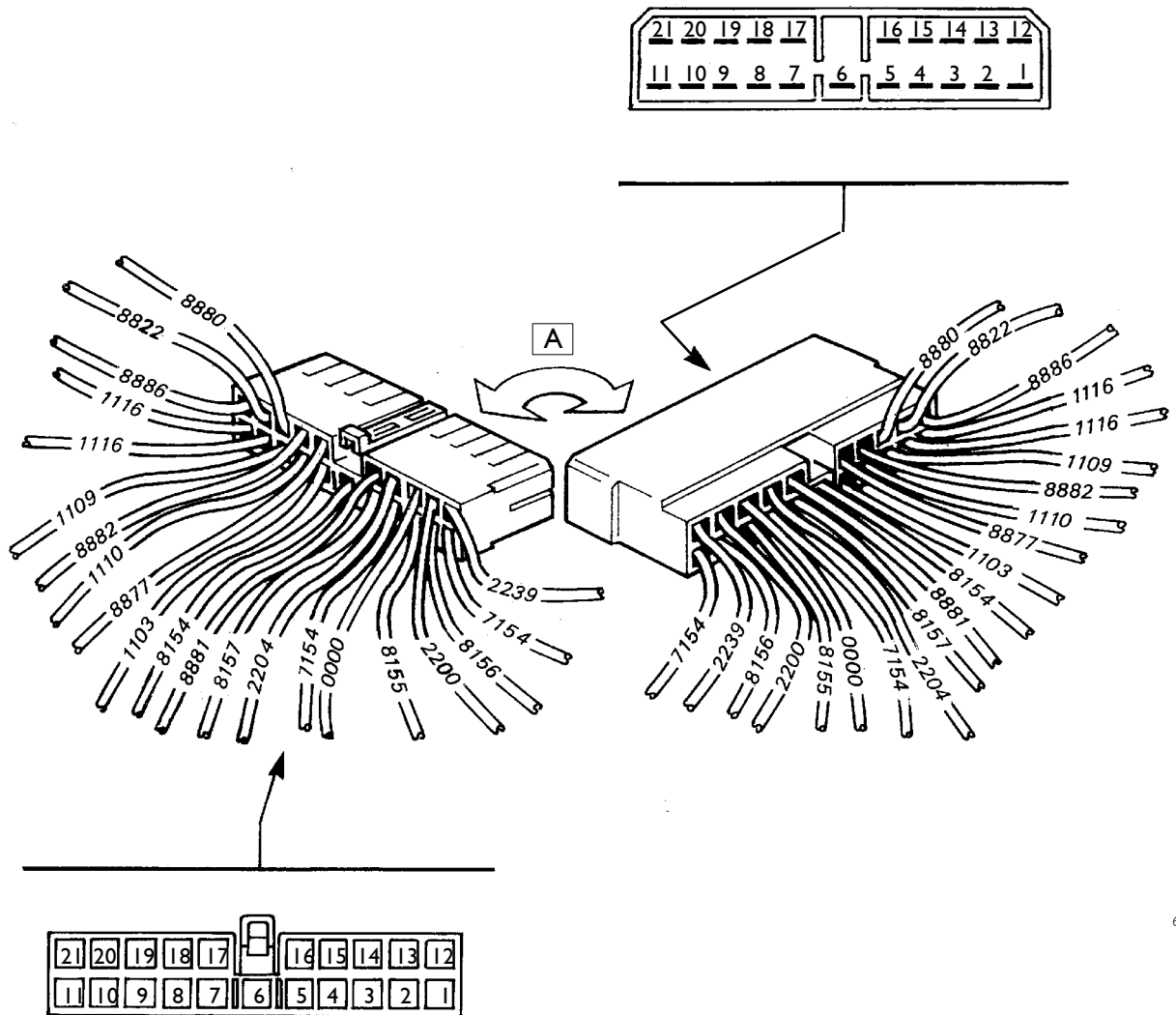
WIRING DIAGRAM



6672

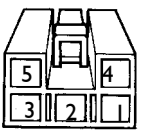
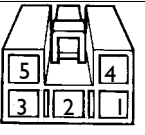
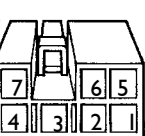
PERSPECTIVE VIEW

Connector to steering column lever unit



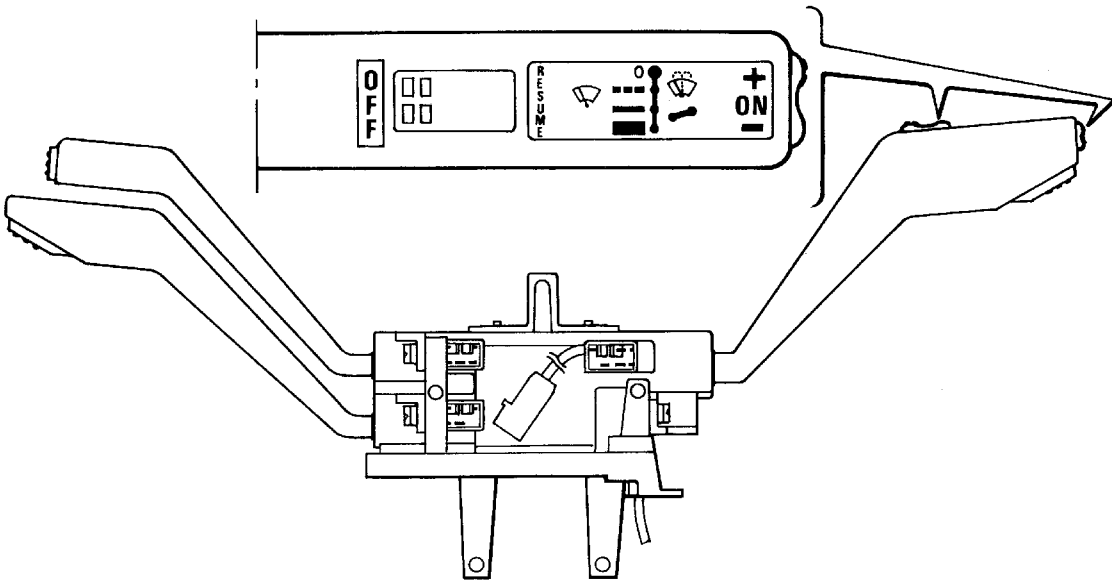
6661

PERSPECTIVE VIEW OF CABLE CONNECTOR

| Connector   | Terminal | Function  | Cable colour code |
|---|----------|---|-------------------|
|  <p>6666</p> | 1        | Right direction indicator                               | 1103              |
|   | 2        | Direction indicator positive                            | 1110              |
|   | 3        | Left direction indicator                                | 1109              |
|   | 4        | Horn control  | 1116              |
|   | 5        | Supply (+30) for horn                                   | 1116              |
|  <p>6666</p> | 1        | Spare   | —                 |
|   | 2        | High beams on control                                   | 2239              |
|   | 3        | Positive from exterior lights switch with high beams on | 2200              |
|   | 4        | Oil for beam flash                                      | 0000              |
|   | 5        | Beam flash control                                      | 2204              |
|  <p>6667</p> | 1        | Windscreen wiper (high speed)                           | 8881              |
|   | 2        | Windscreen wiper (low speed)                            | 8877              |
|   | 3        | Windscreen wiper (reset)                                | 8882              |
|   | 4        | Spare   | —                 |
|   | 5        | Positive for windscreen wiper and electric pump         | 8880              |
|   | 6        | Windscreen wiper (intermittent)                         | 8822              |
|   | 7        | Windscreen wiper (pump control)                         | 8886              |

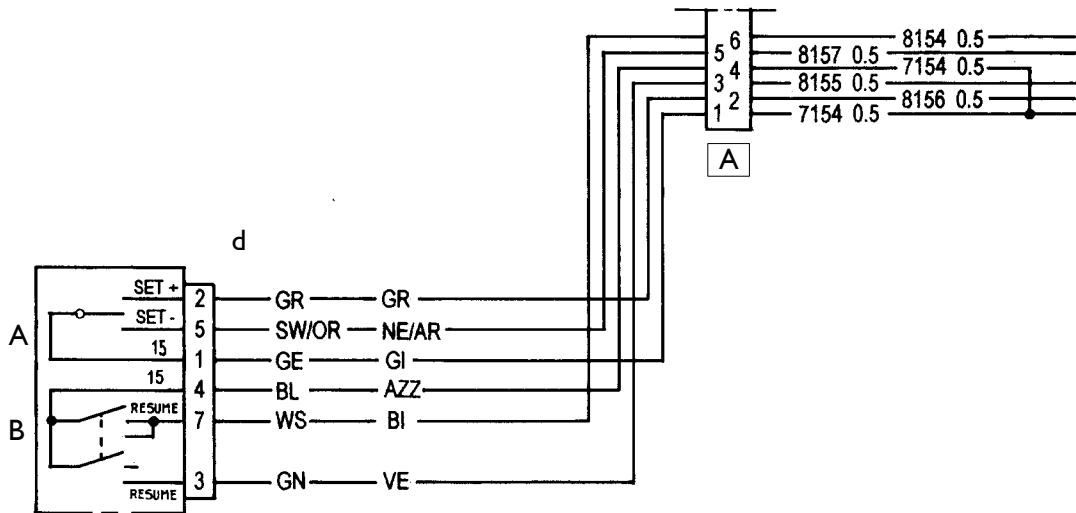


Steering column lever unit with Cruise Control



6662

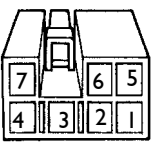
TECHNICAL VIEW



8540

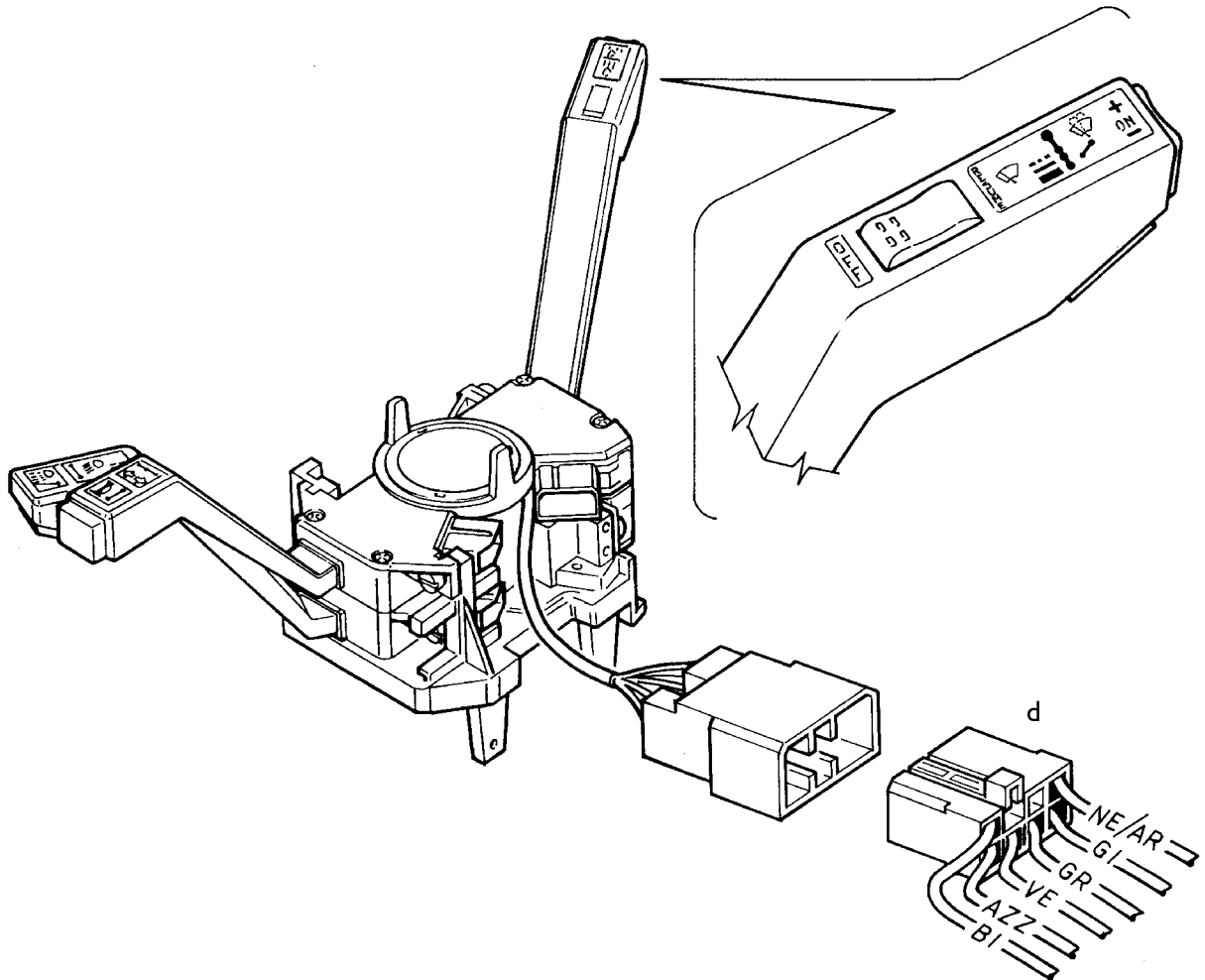
WIRING DIAGRAM

A.RESUME ON-OFF SWITCH - B. SET +/- SWITCH

| Connector   | Terminal | Function  |
|---|----------|---|
|  <p>6667</p> | 1        | Supply  |
|   | 2        | SET+  |
|   | 3        | Resume  |
|   | 4        | Supply under relay for switching off Cruise Control with ABS on |
|   | 5        | SET-  |
|   | 6        | Spare   |
|   | 7        | Resume  |

Steering column control lever with cruise Control

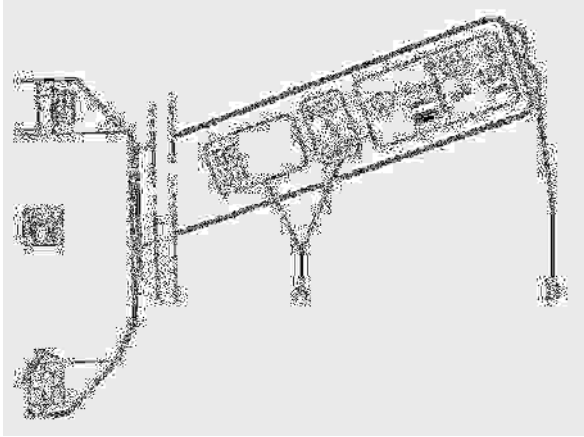
5403 I



PERSPECTIVE VIEW WITH ASSOCIATED ELECTRICAL CONNECTIONS

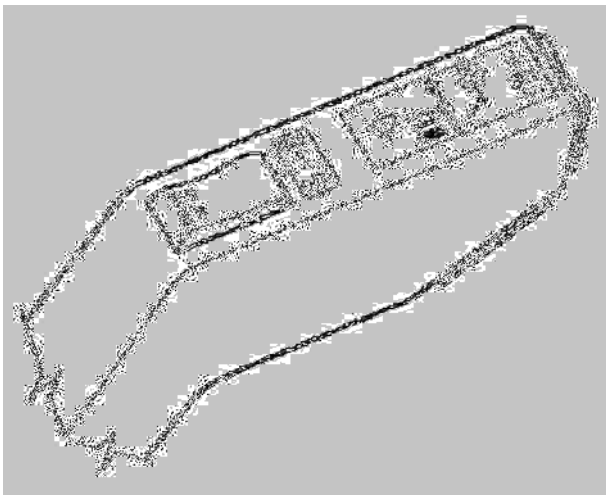
6664

| Ref. | Function                            | Cable colour        |
|------|-------------------------------------|---------------------|
| 1    | Unit supply for speed adjustment    | YELLOW (7154)       |
| 2    | To terminal 34B of EDC control unit | GREY (8156)         |
| 3    | To terminal 21B of EDC control unit | GREEN (8155)        |
| 4    | Unit supply for speed storage       | LIGHT BLUE (7154)   |
| d 5  | To terminal 32B of EDC control unit | BLACK/ORANGE (8157) |
| 6    | Spare                               | —                   |
| 7    | To terminal 33B of EDC control unit | WHITE (8154)        |



4917

- II.32** A. CRUISE CONTROL BUTTON  
 RES> SELECT LAST STORED SPEED  
 OFF< CANCEL SPEED ADJUSTMENT  
 B. SPEED ADJUSTING BUTTON  
 SET+ INCREASE SET- DECREASE



4918

- II.33** CRUISE CONTROL SWITCH DETAIL ON THE DRIVING SWITCH LEVER

## CRUISE CONTROL

To activate the Cruise Control functions press the brake pedal fully once.

### Engine idling (engine hot)

To prevent the cabin vibrations adjust the engine idling between 450 and 880 rpm.

Adjustment is made with the Cruise Control buttons and is possible only in the following conditions:

Vehicle stationary.

Cooling water temperature higher than 30 °C.

Engine idling between 450 and 880 rpm.

Brake pedal depressed during the whole operation.

### Adjusting procedure

Start the engine and keep it idle without accelerating.

Press and keep the brake pedal pressed during the whole procedure.

Press the A button on the Cruise Control right-hand side (RES) for about 3 seconds and make sure the engine idling reaches the minimum value (450 rpm.)

Adjust the engine idling as required by using SET + or SET - pulse adjustment. Each pulse will vary the engine idling by about 10 rpm.

Once the required engine idling is reached, press the A button on the right-hand side (RES) for about 3 seconds.

Release the brake pedal.

The new engine idling will be stored also when the engine is stopped and will be valid for future startups.

If the procedure is not carried out correctly and/or any malfunction occurs during its performance, the previously stored engine idling is maintained.

**Speed regulator (Cruise Control)**  
 (Function active starting from 20 km / h up to the vehicle maximum speed)

This system automatically maintains the vehicle travelling speed without using the accelerator pedal.

Should the vehicle speed raise by 2 km / h compared to the set speed (e.g. because driving on a slope) the engine brake is automatically activated to slow down the vehicle.

The Cruise Control must not be used in the traffic jam and on roads where it is difficult to keep the speed constant (e.g. on hills).

This function shall be activated only in the following conditions:

- Engine brake control off "when releasing the accelerator".
- Vehicle moving with gear engaged.
- Vehicle speed higher than 20 km / h.
- Brake pedal not depressed.
- Clutch pedal not depressed.
- Engine brake disengaged.

Should the brake, the engine brake or the clutch pedal be depressed, the Cruise Control is disengaged. The same happens if the set minimum speed is not reached. The speed maximum limit is stored by the programme inside the control electronic module and cannot be adjusted.

**Cruise – Control disengagement**

The system can be disengaged:

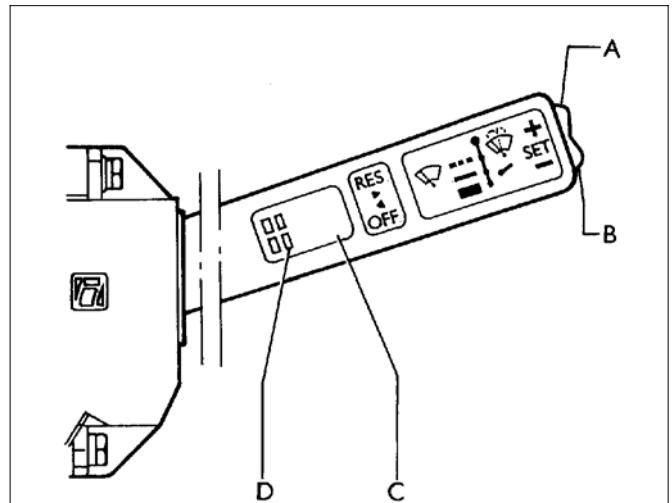
Manually and in a permanent way (by pressing the button to OFF).

Automatically and in a permanent way by pressing the brake, the engine brake and the clutch pedal. With automatic transmission, it is disengaged during gearshifting

Automatically and in a permanent way by pressing the accelerator pedal (thus requesting a speed higher than the set one) for more than 30 seconds.

After disengagement, it is possible to restore the previously set vehicle cruise speed by pressing the switch to RES.

The system is temporarily deactivated when a speed higher than the set one is requested with the accelerator pedal (for no more than 30 seconds). As soon as the accelerator pedal is released, the function is automatically restored with the last stored value.



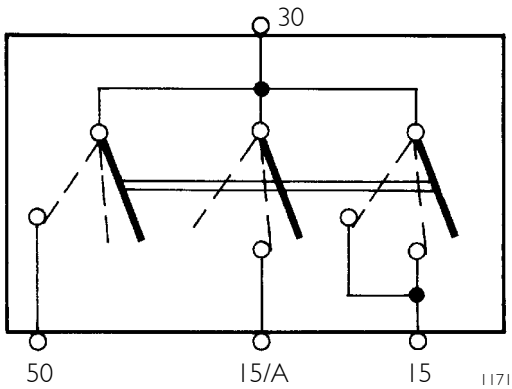
4919

| Switch | Vehicle speed adjustment |
|--------|--------------------------|
| SET +  | Speed increase           |
| SET -  | Speed reduction          |
| RES    | Select last stored speed |
| OFF    | Cancel speed adjustment  |

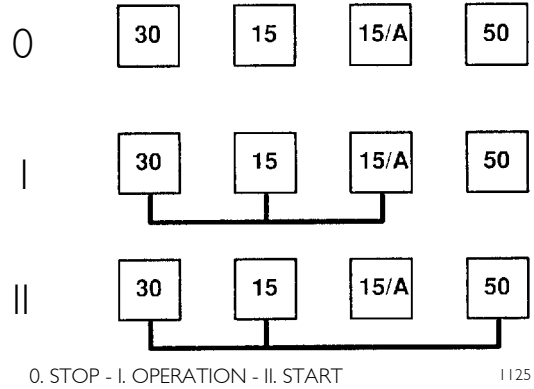
- A. The SET + switch has the following functions:
  - pressed only once, it activates the function and maintains the speed set by the accelerator pedal in that moment. From now on it is possible to release the accelerator pedal and the vehicle will maintain the set cruise speed;
  - when the speed has already been set, it is used to raise the vehicle speed without pressing the accelerator pedal.
- B. The SET – switch has the following function:
  - when the speed has already been set, it is used to reduce the vehicle speed without engaging the service brake.
- C. When the switch is pressed on the right (RES) it has the following function:
  - it activates the function and automatically adjusts the vehicle speed to the last value stored after starting the engine (last set value before disengagement), on the basis of the selected gear.
- D. When the switch is pressed on the left (OFF), it deactivates the function.

**Ignition switch**

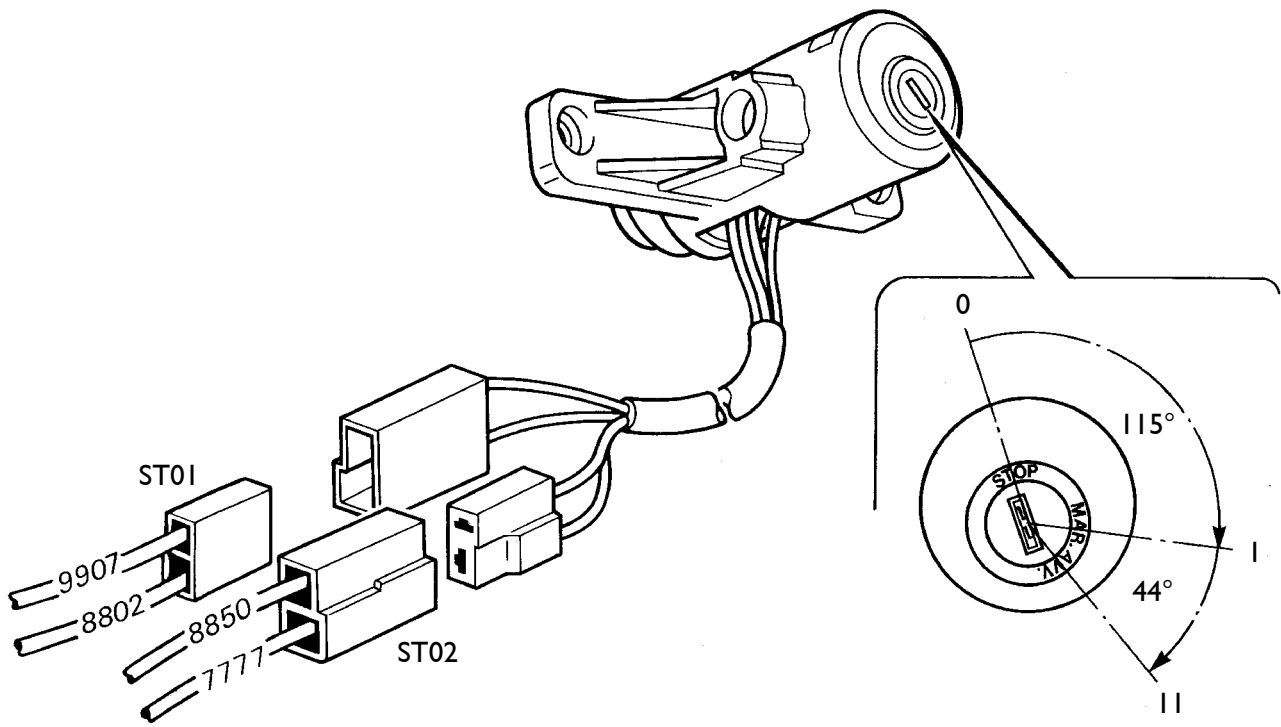
**52502**



WIRING DIAGRAM



SWITCHING SEQUENCE



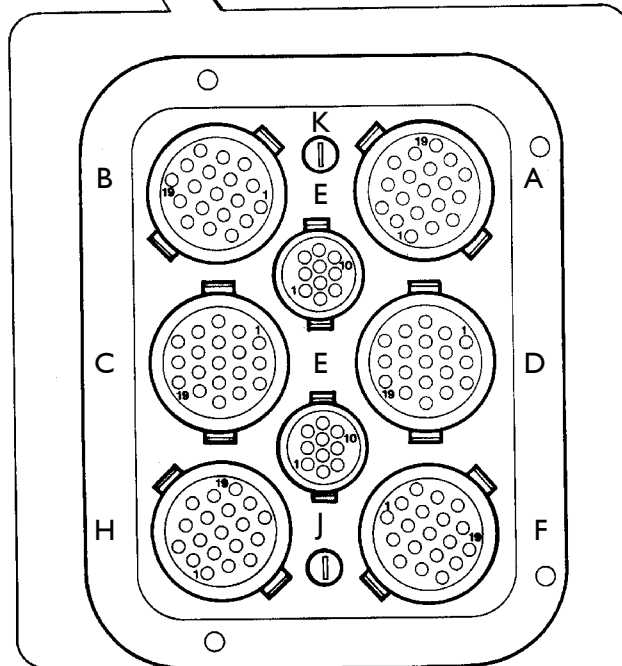
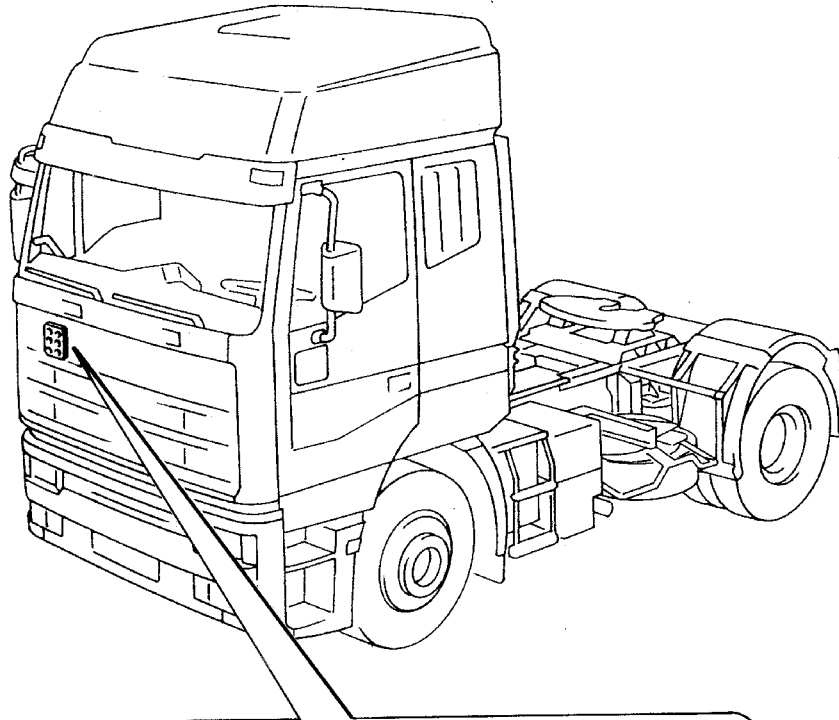
PERSPECTIVE VIEW WITH ASSOCIATED CONNECTIONS AND KEY ROTATION TECHNICAL DIAGRAM

6670

| Position | Under current        | Circuit under voltait | Terminal   | Function  | Cable colour code |
|----------|----------------------|-----------------------|------------|---|-------------------|
| 0        | 30                   | -                     | 30         | Supply  | 7777              |
| I        | 30 - 15<br>30 - 15/A | Services<br>Users     | 15<br>15/A | Services<br>Contactor supply with<br>exclusion of users during<br>start | 8802<br>8850      |
| II       | 30 - 15<br>30 - 50   | Services<br>Start     | 50         | Start   | 9907              |

**Front wall connectors (◀) (EuroTech - EuroStar)**

Location of wall connector



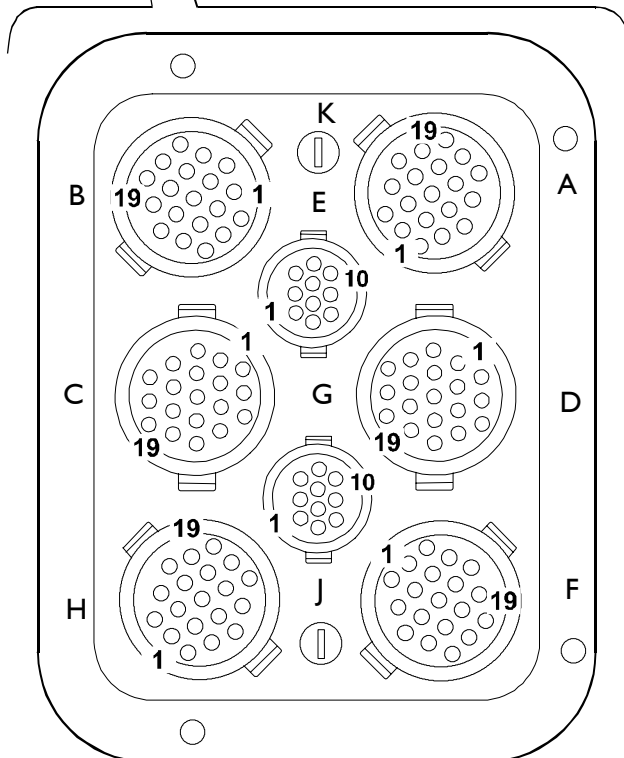
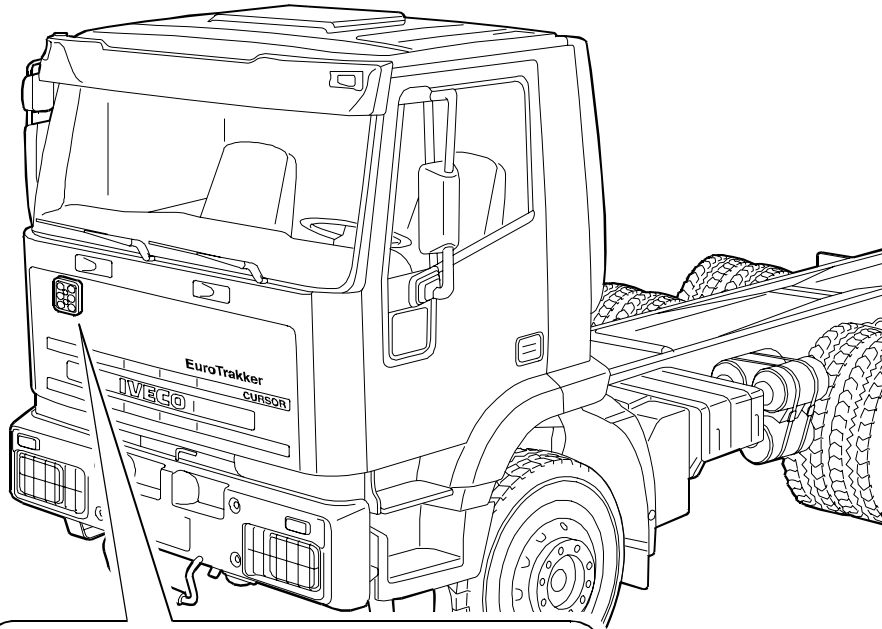
8509

**II.34 COLOURS OF WALL CONNECTOR**

A. BLACK - B. YELLOW - C. WHITE - D. GREEN - E. BLACK - F. BROWN - G. WHITE - H. LIGHT BLUE - K. BROWN - J. BROWN

**Front wall connectors (◀) (EuroTrakker)**

Location of wall connector

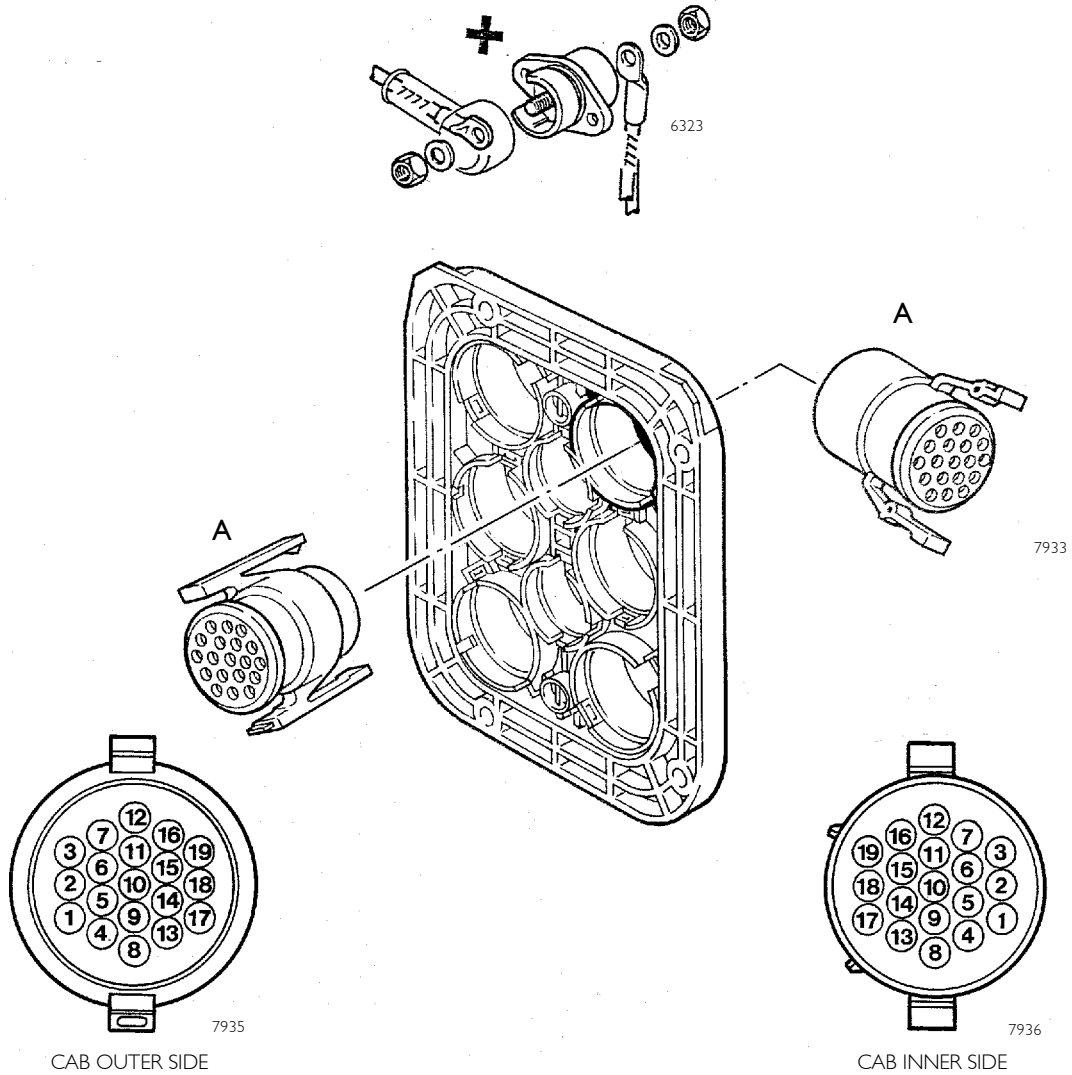


7932

**II.35 COLOURS OF WALL CONNECTOR**

A. BLACK - B. YELLOW - C. WHITE - D. GREEN - E. BLACK - F. BROWN - G. WHITE - H. LIGHT BLUE - K. BROWN - J. BROWN

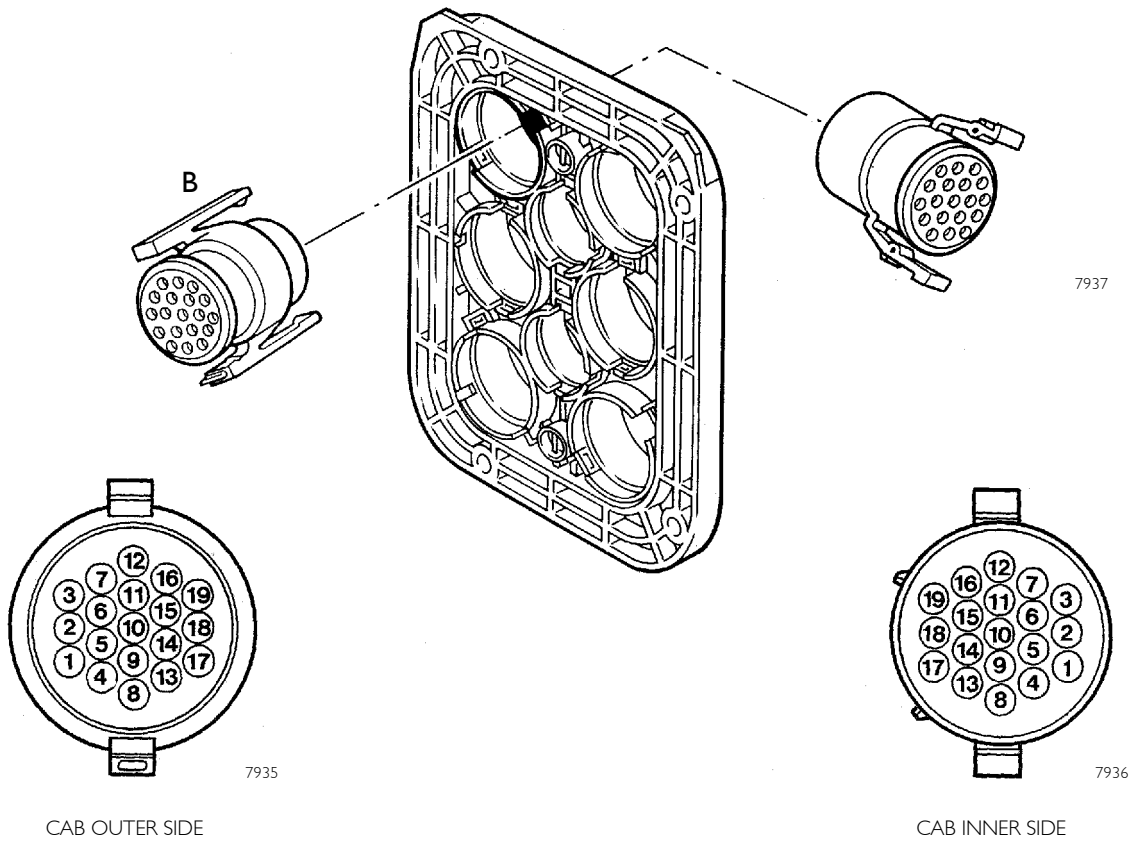
Front wall connectors A (◀) and positive terminal on cab front (Front frame)



| Ref. | Function   | Cable colour code |
|------|--|-------------------|
| +    | From battery to UCI control unit + and to additional fuseboxes 70604/70603 | 7777              |
| A    | 1 Left low beam headlamp supply  | 2231              |
|      | 2 Left low beam headlamp supply  | 2219              |
|      | 3 Left front sidelight   | 3339              |
|      | 4 Left front direction indicator   | 1129              |
|      | 5 Rh side direction indicator  | 2223              |
|      | 6 Rh high beam headlamp supply   | 2221              |
|      | 7 Right front sidelights   | 3330              |
|      | 8 Rh front direction indicator   | 1123              |
|      | 9 Rh side direction indicator  | 1124              |
|      | 10 Lh side direction indicator   | 1126              |
|      | 11 Fog lamp supply   | 2228              |
|      | 12 Supply provision for additional high beam headlamps                     | 2229              |
|      | 13 Windscreen washer pump supply   | 8886              |
|      | 14 Windscreen washer reservoir low level warning light                     | 5521              |
|      | 15 Horn supply   | 1116              |
|      | 16 Headlamp washer: pump supply  | 8820              |
|      | 17 Headlamp aiming device (position A)                                     | 9937              |
|      | 18 Headlamp aiming device (position B)                                     | 9936              |
|      | 19 Headlamp aiming device (position C)                                     | 9935              |

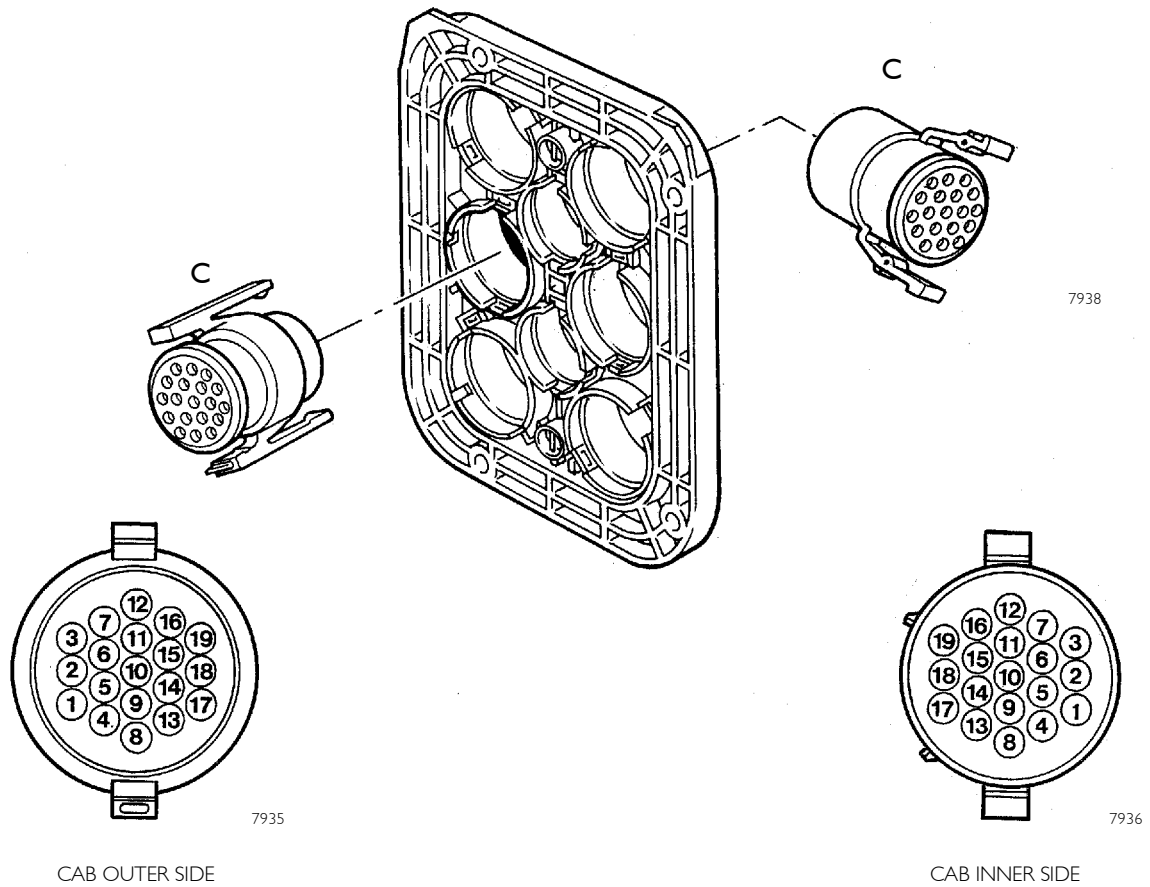


Front wall connector B (◀)  
Engine (Control unit MS6)



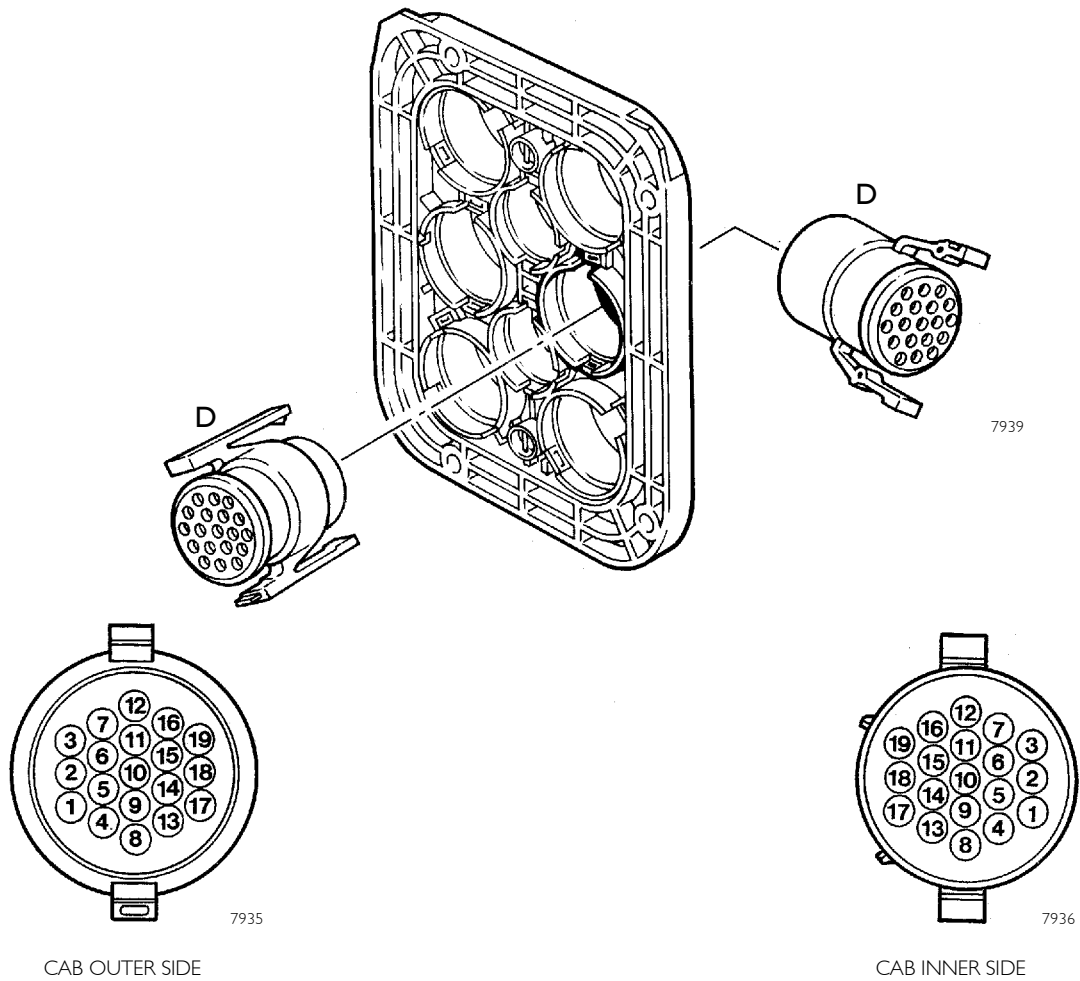
| Ref.     | Function   | Cable colour code |
|----------|--|-------------------|
| <b>B</b> | Terminal B21 control unit MS6 - Signal from Cruise Control call switch for EDC   | 8155              |
|          | Terminal B25 control unit MS6 - Accelerator pedal sensor earth   | 0158              |
|          | Terminal B23 control unit MS6 - Accelerator pedal sensor signal for EDC  | 5157              |
|          | Terminal B24 control unit MS6 - "MS6" control unit diagnostics line "L"  | 1198              |
|          | Terminal B5 control unit MS6 - Sensor I signal cable for engine rpm diagnostics (n=1/1) and engine rpm electronic sensor | 5584              |
|          | Terminal B6 control unit MS6 - EDC failure warning lamp  | 6150              |
|          | Terminal B7 control unit MS6 - EDC control unit interface signal with other electronic systems (MPS)                     | 8152              |
|          | Terminal B8 control unit MS6 - Exhaust brake   | 0019              |
|          | Terminal B29 control unit MS6 - Speed pulse for EDC (B7 tachograph)  | 5155              |
|          | Terminal B30 control unit MS6 - EDC control unit interface signal with other electronic systems (PBM)                    | 8151              |
|          | Terminal B21 control unit MS6 - "MS6" control unit diagnostics line "K"  | 2298              |
|          | Terminal B32 control unit MS6 - Signal from switch to increase Cruise Control speed for EDC                              | 8157              |
|          | Terminal B33 control unit MS6 - Signal from switch for cutting off Cruise Control for EDC                                | 8154              |
|          | Terminal B34 control unit MS6 - Signal from switch to decrease Cruise Control speed for EDC                              | 8156              |
|          | Terminal B15 control unit MS6 - "MS6" control unit +15 supply  | 8150              |
|          | Terminal B16 control unit MS6 - Accelerator pedal sensor supply for EDC  | 5158              |
|          | Terminal B17 control unit MS6 - Accelerator pedal minimum switch for EDC   | 0159              |
|          | Terminal B18 control unit MS6 - Warning ended warning lamp   | 5553              |
|          | Terminal B35 control unit MS6 - Earth from accelerator pedal to MS6 control unit   | 0157              |

Front wall connector C (◀) (Engine)



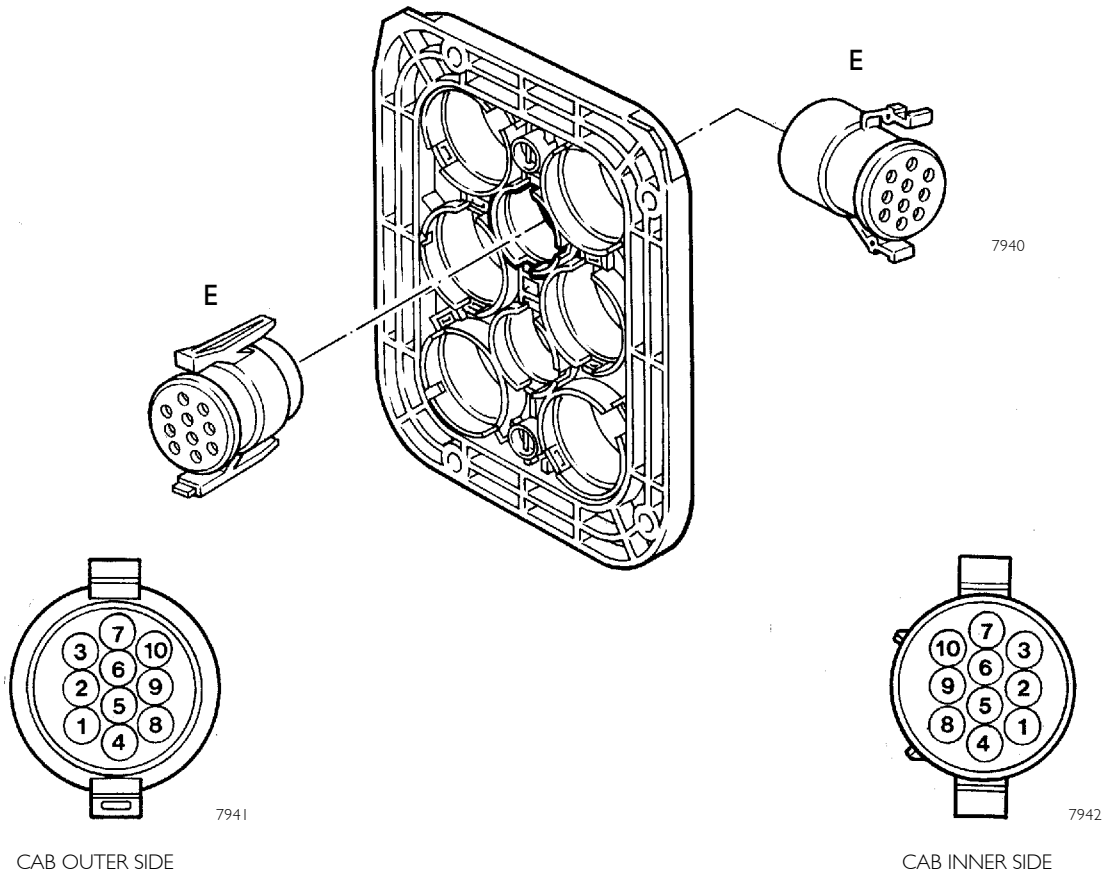
| Ref. | Function                                       | Cable colour code |
|------|--|-------------------|
| 1    | Engine stopping from engine compartment        | 0151              |
| 2    | Engine starting from engine compartment        | 8892              |
| 3    | Earth  | 0150              |
| 4    | Oil pressure transmitter                       | 5508              |
| 5    | Oil pressure transmitter                       | 5507              |
| 6    | Water temperature switch                       | 5528              |
| 7    | Water temperature transmitter                  | 5552              |
| 8    | Oil pressure switch                            | 5503              |
| 9    | Engine oil level                               | 5506              |
| 10   | Engine oil level                               | 5505              |
| 11   | Climate control                                | 9993              |
| 12   | Switch for starting from engine compartment    | 8050              |
| 13   | Low power steering fluid level indicator       | 5525              |
| 14   | Switch for clogged oil filter indicator        | —                 |
| 15   | Engine brake warning light                     | 6627              |
| 16   | Generator terminal IG (I5)                     | 8876              |
| 17   | Generator terminal L                           | 7009              |
| 18   | Supply for engine control equipment after fuse | 8876              |
| 19   | Starter motor relay or electromagnet           | 8888              |

Front wall connector D (◀)  
(Frame)



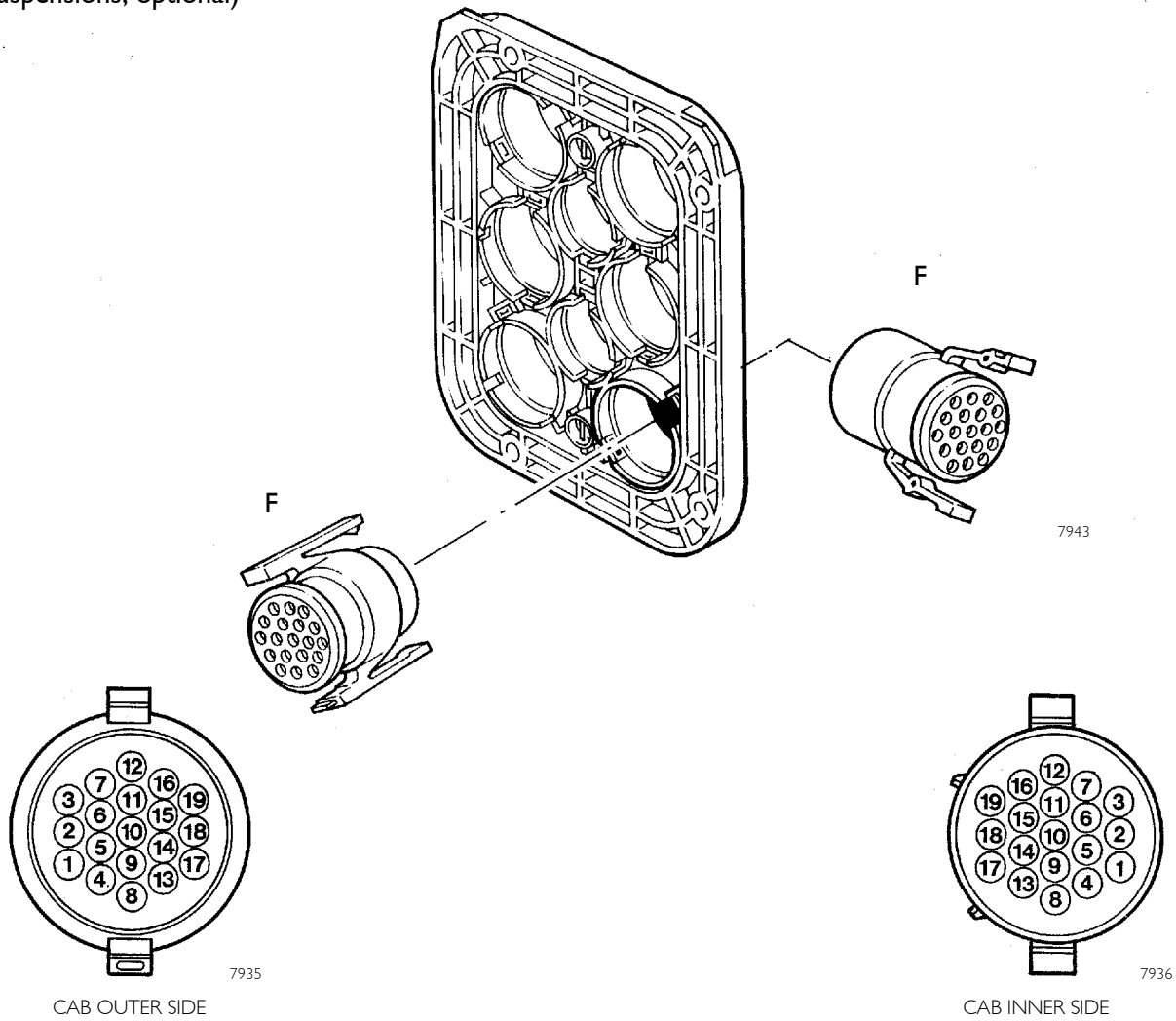
| Ref.        | Function  | Cable colour code |
|-------------|---|-------------------|
| 1           | Left side clearance lights                                      | 3330              |
| 2           | Right side clearance lights                                     | 3339              |
| 3           | Spare   | —                 |
| 4           | Fuel level gauge  | 5557              |
| 5           | Indicator for fuel reserve warning light                        | 5555              |
| 6           | Longitudinal differential lock on indicator                     | 6603              |
| 7           | Air cleaner clogged indicator switch                            | 6663              |
| 8           | Solenoid valve for closing circuit to turbine "VGT" (Air block) | 8360              |
| 9           | Supply for vehicle operation control equipment after fuse       | 8871              |
| <b>D</b> 10 | Presence of water in fuel filter (signal)                       | 5530              |
| 11          | Axle differential lock indicator                                | 0040              |
| 12          | Axle differential lock indicator                                | 0041              |
| 13          | Spare   | —                 |
| 14          | Low range gears engaged indicator switch                        | 9992              |
| 15          | Axle brake gasket wear optical indicator                        | 6664              |
| 16          | Self-ignition switch with gears engaged                         | 8055              |
| 17          | Switch for turning on reversing lights                          | 2226              |
| 18          | Switch for turning on reversing lights                          | 2268              |
| 19          | Ignition prevention switch with gears engaged                   | 8055              |

Front wall connector E  
(Engine)



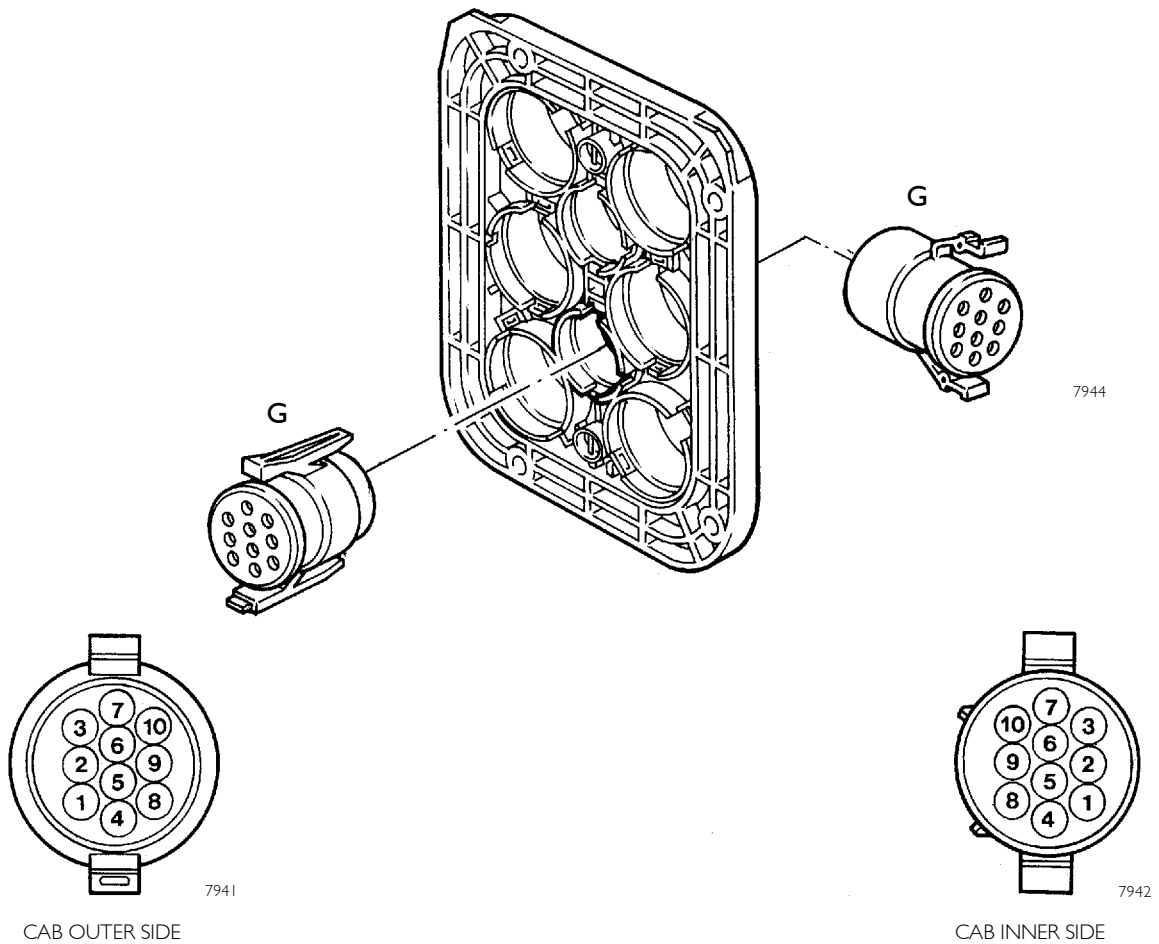
| Ref.     | Function   | Cable colour code |
|----------|--|-------------------|
| <b>E</b> | 1 Positive for: switch for secondary signal from brake pedal to EDC control unit; switch for signalling brake pedal pressed; switch on clutch for EDC; relay for enabling engagement of engine warming coil. | 7150              |
|          | 2 Control unit MS6 terminal B22  | 7172              |
|          | 3 Control unit MS6 terminal B28  | 0169              |
|          | 4 Control unit MS6 terminal B27  | 0155              |
|          | 5 Control unit MS6 terminal B3   | 7155              |
|          | 6 Control unit MS6 terminal B4   | 7155              |
|          | 7 Spare  | —                 |
|          | 8 Control unit MS6 terminal B9   | 5198              |
|          | 9 To engine brake control switch   | 0158              |
|          | 10 Switch for fuel filter clogged signalling   | 5531              |

Front wall connector F  
(Air suspensions, optional)



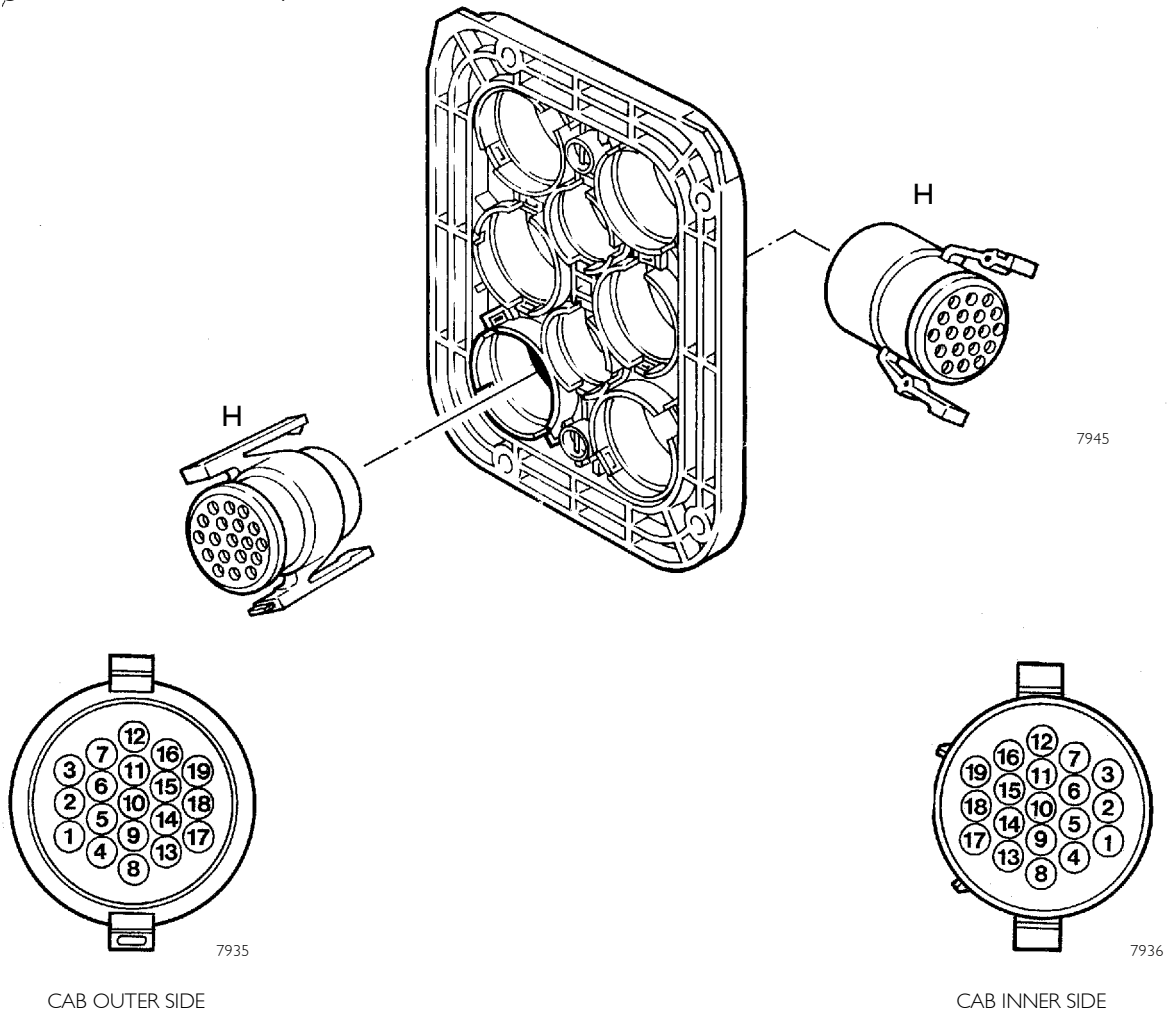
| Ref. | Function  | Cable colour code |
|------|---|-------------------|
| 1    | Earth   | 0000              |
| 2    | ECAS rear axle right frame level adjustment signal  | 5421              |
| 3    | ECAS rear axle left frame level adjustment signal   | 5422              |
| 4    | Electropneumatic distributor                        | 9442              |
| 5    | Front axle electropneumatic distributor             | 9413              |
| 6    | Front axle inductive frame height sensor            | 5410              |
| 7    | Front axle inductive frame height sensor            | 0400              |
| 8    | Switches for signalling air suspension system fault | 6401              |
| 9    | Electropneumatic distributor                        | 9423              |
| 10   | Electropneumatic distributor                        | 9425              |
| 11   | Electropneumatic distributor                        | 9424              |
| 12   | Electropneumatic distributor                        | 9447              |
| 13   | Electropneumatic distributor                        | 9446              |
| 14   | Right pressure sensor signal on axle for ECAS       | 5443              |
| 15   | Right pressure sensor signal on ECAS liftable axle  | 5441              |
| 16   | Left pressure sensor signal on ECAS liftable axle   | 5442              |
| 17   | Left pressure sensor signal on axle for ECAS        | 5444              |
| 18   | To sensor 42389                                     | 5445              |
| 19   | Supply for levelling adjustment system after fuse   | 8810              |

Front wall connector G (◀)  
(Electric equipment on front)



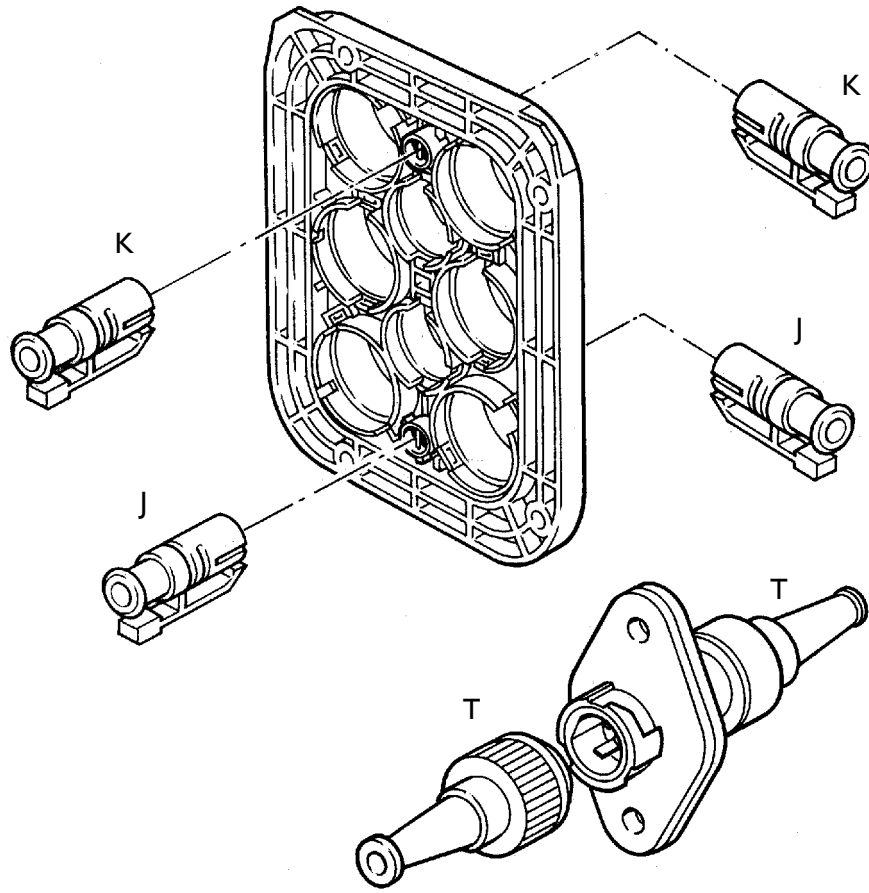
| Ref.     | Function | Cable colour code  |      |
|----------|----------|--|------|
| <b>G</b> | 1        | Cooling water minimum level warning lamp                           | 5520 |
|          | 2        | Fixed stop for windscreen wiper                                    | 8873 |
|          | 3        | Windscreen wiper motor supply - high speed                         | 8881 |
|          | 4        | Windscreen wiper motor supply - low speed                          | 8882 |
|          | 5        | Windscreen wiper motor supply - separate fuse                      | 8880 |
|          | 6        | Control unit connection in cab - stop signal switch                | 1117 |
|          | 7        | Braking lights relay control                                       | 1176 |
|          | 8        | Insulated earth on engine brake control circuit                    | 0043 |
|          | 9        | Supply for step light bulbs  | 4445 |
|          | 10       | Ceiling lamp switching on earth (switch on door pillar - diverter) | 0003 |

Front wall connector H (◀)  
(Rear lights - trailer connector)



| Ref. | Function   | Cable colour code |
|------|--|-------------------|
| H 1  | Additional trailer connector (terminal 6)                  | 7790              |
| 2    | Rear fog guard supply (after fuse or generic)              | 2283              |
| 3    | Reversing lamp supply                                      | 2226              |
| 4    | Rh rear direction indicator                                | 1125              |
| 5    | Lh rear direction indicator                                | 1120              |
| 6    | Rear rh direction indicator for trailer                    | 1185              |
| 7    | Rear lh direction indicator for trailer                    | 1180              |
| 8    | Indicator light signalling trailer axle lifted             | 6442              |
| 9    | Braking lamps supply                                       | 1175              |
| 10   | Hydraulic power steering circuit 1.5 optical indicator     | 6631              |
| 11   | Rear clearance lamps                                       | 3330              |
| 12   | Rear side lights and number plate lights                   | 3339              |
| 13   | Available for switch signalling transverse locking engaged | 6659              |
| 14   | Axle brake lining wear or generic warning lamp             | 6667              |
| 15   | Additional trailer connector (terminal 2)                  | 8890              |
| 16   | Spare  | —                 |
| 17   | Optical indicator, tilted body                             | 6607              |
| 18   | Hydraulic power steering circuit I signal contactor        | 6631              |
| 19   | Hydraulic power steering circuit II fault indicator light  | 6632              |

Front wall connectors J - K - T (◀◀)  
(Tachograph - Isolated earth)



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CAB OUTER SIDE

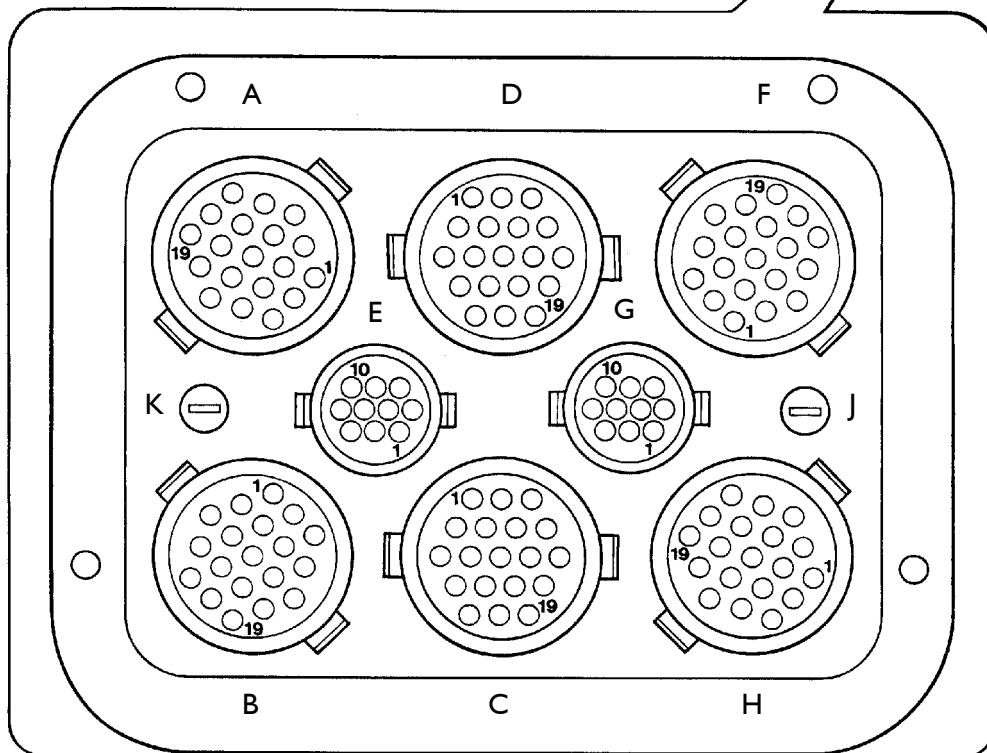
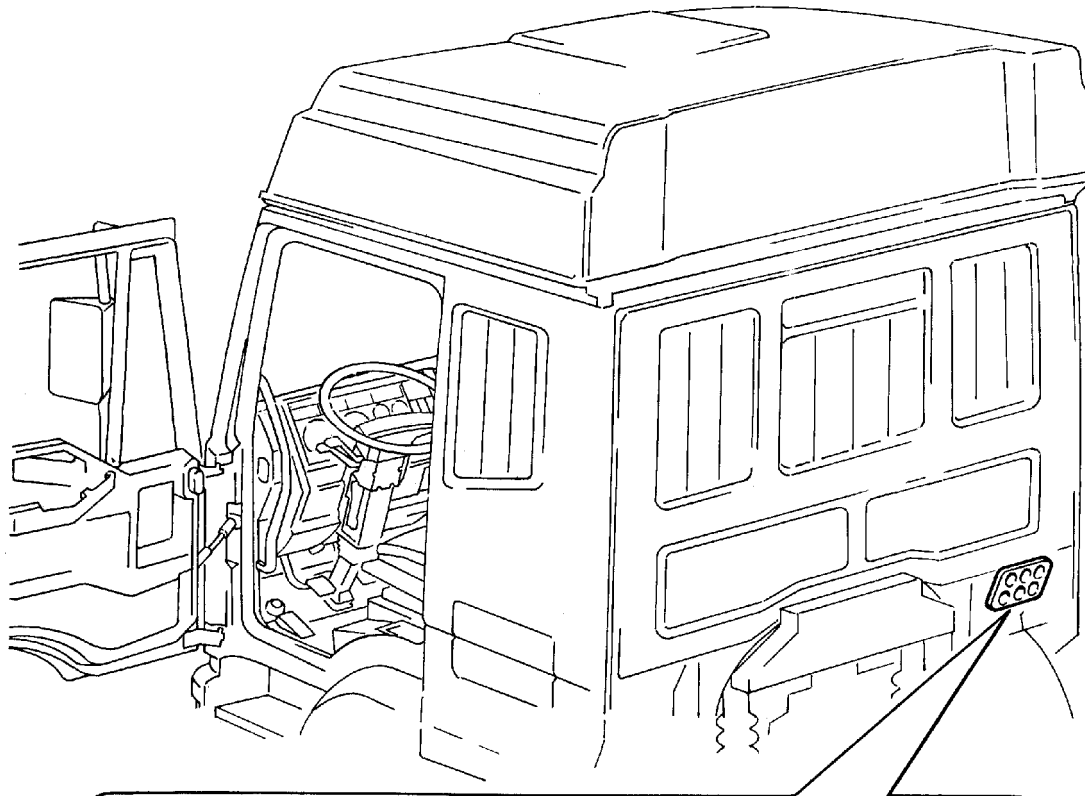
CAB INNER SIDE

| Ref. | Function   | Cable colour code            |
|------|--|------------------------------|
| J    | – Isolated earth on negative battery terminal  | 0066                         |
| K    | – Spare  | —                            |
| T    | 1 To transmitter for tachograph (terminal 4) +<br>2 To transmitter for tachograph (terminal 3)    ⌋<br>3 To transmitter for tachograph (terminal 2)    ⌋<br>4 To transmitter for tachograph (terminal 1) – | 5514<br>5516<br>5517<br>0058 |



**Rear wall connector (▶▶)**

Location of wall connector



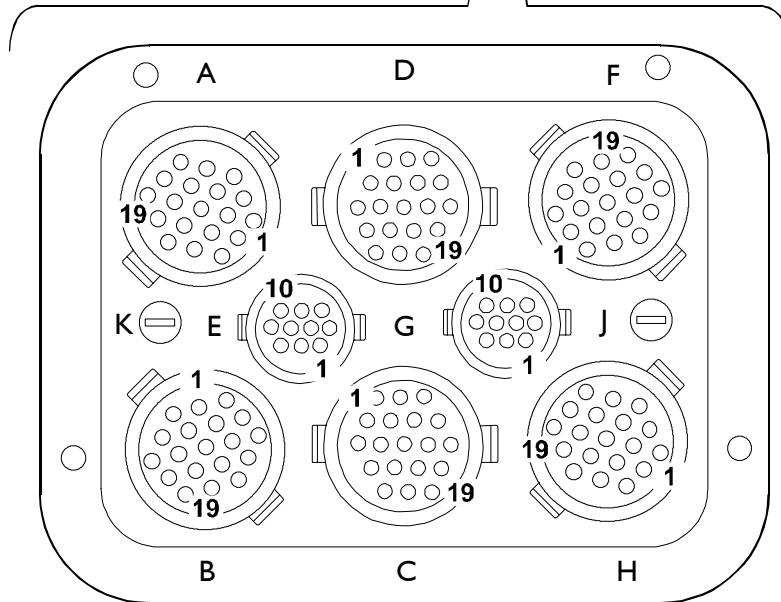
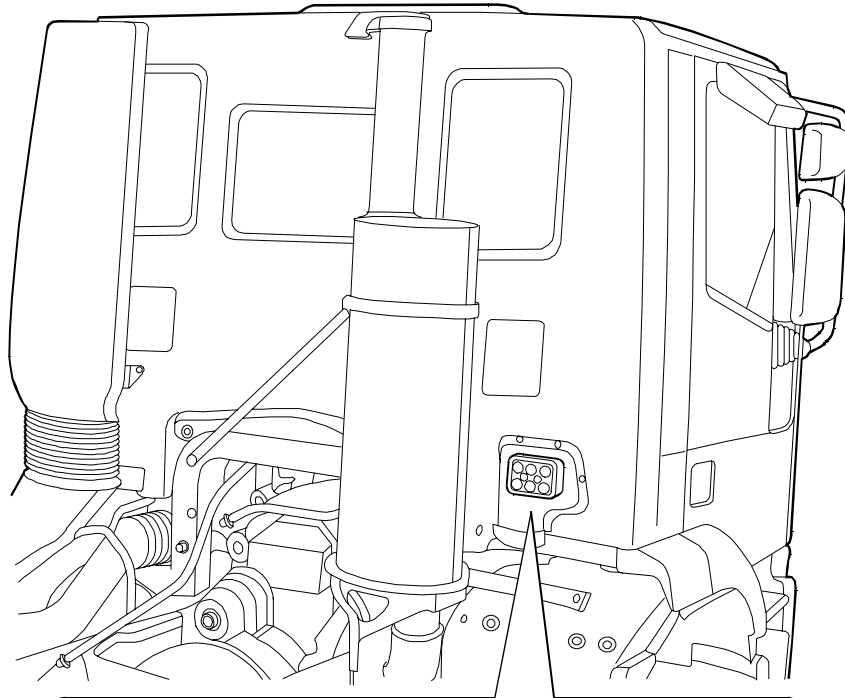
2261

**II.36 WALL CONNECTOR COLOURS**

A. BLACK - B. YELLOW - C. WHITE - D. GREEN - E. BLACK - F. BROWN - G. WHITE - H. LIGHT BLUE - J. BROWN - K. BROWN

**Rear wall connector (▶) (Eurotrakker)**

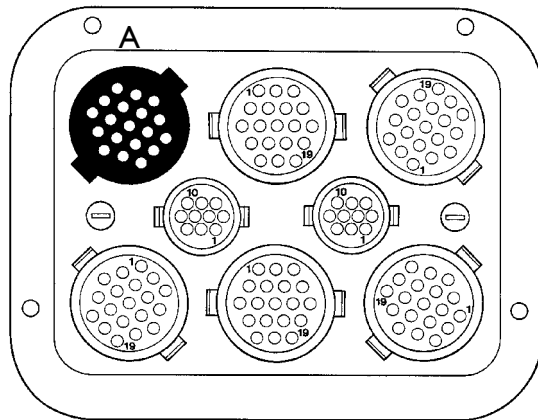
Location of wall connector



**II.37 WALL CONNECTOR COLOURS**

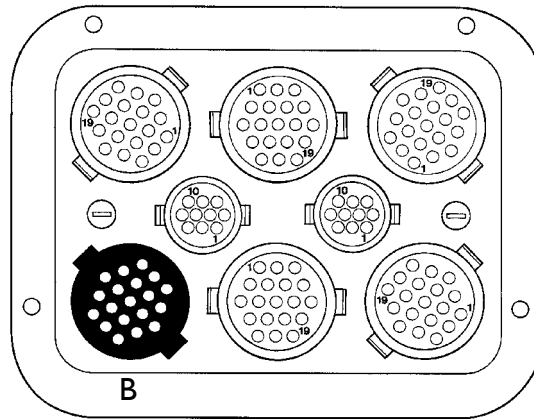
A. BLACK - B. YELLOW - C. WHITE - D. GREEN - E. BLACK - F. BROWN - G. WHITE - H. LIGHT BLUE - J. BROWN - K. BROWN

Connector for real walla A (▶)



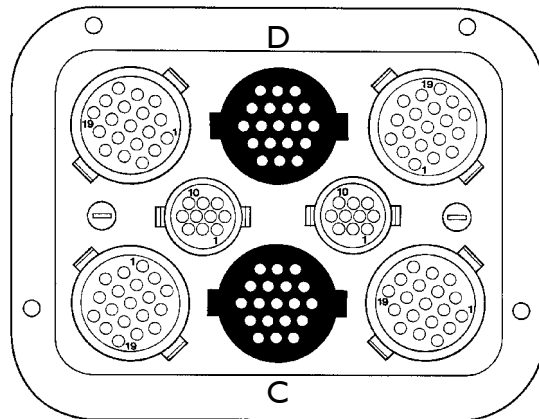
| Ref.     | Connector colour | Function                        | Cable colour code      |
|----------|------------------|---------------------------------|------------------------|
| <b>A</b> | Black            | 1 x-y Actuator on gearbox       | For gearbox            |
|          |                  | 2 x-y Actuator on gearbox       |                        |
|          |                  | 3 x-y Actuator on gearbox       |                        |
|          |                  | 4 x-y Actuator on gearbox       |                        |
|          |                  | 5 x-y Actuator on gearbox       |                        |
|          |                  | 6 x-y Actuator on gearbox       |                        |
|          |                  | 7 x-y Actuator on gearbox       |                        |
|          |                  | 8 Splitter                      |                        |
|          |                  | 9 Splitter                      |                        |
|          |                  | 10 Splitter                     |                        |
|          |                  | 11 Gearbox brake solenoid valve |                        |
|          |                  | 12 Gearbox brake solenoid valve |                        |
|          |                  | 13 Transmitter                  |                        |
|          |                  | 14 Electronic rev transmitter   |                        |
|          |                  | 15 Electronic rev transmitter   |                        |
|          |                  | 16 Electronic rev transmitter   |                        |
|          |                  | 17 Electronic rev transmitter   |                        |
|          |                  | 18 Electronic rev transmitter   |                        |
|          |                  | 19 Electronic rev transmitter   |                        |
| <b>A</b> | Black            | 1 Eurotronic gearbox            | For Eurotronic gearbox |
|          |                  | 2 Eurotronic gearbox            |                        |
|          |                  | 3 Eurotronic gearbox            |                        |
|          |                  | 4 Eurotronic gearbox            |                        |
|          |                  | 5 Eurotronic gearbox            |                        |
|          |                  | 6 Eurotronic gearbox            |                        |
|          |                  | 7 Eurotronic gearbox            |                        |
|          |                  | 8 Eurotronic gearbox / PTO      |                        |
|          |                  | 9 Eurotronic gearbox            |                        |
|          |                  | 10 Eurotronic gearbox           |                        |
|          |                  | 11 Eurotronic gearbox           |                        |
|          |                  | 12 Eurotronic gearbox           |                        |
|          |                  | 13 Eurotronic gearbox / PTO     |                        |
|          |                  | 14 Eurotronic gearbox / PTO     |                        |
|          |                  | 15 Eurotronic gearbox           |                        |
|          |                  | 16 Eurotronic gearbox           |                        |
|          |                  | 17 Eurotronic gearbox / PTO     |                        |
|          |                  | 18 Eurotronic gearbox           |                        |
|          |                  | 19 Eurotronic gearbox           |                        |

Rear wall connector B (▶▶)



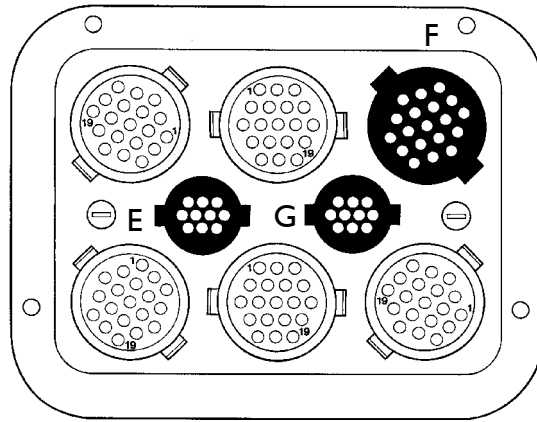
| Ref.     | Connector colour | Function  | Cable colour code  |                        |   |
|----------|------------------|---|--|------------------------|---|
| <b>B</b> | Jellow           | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>18<br>19 | Gearbox neutral switch<br>Gearbox neutral switch<br>Clutch solenoid valve<br>Clutch solenoid valve<br>Injection pump actuator<br>Injection pump actuator<br>Injection pump actuator<br>Injection pump actuator<br>Injection pump actuator<br>Injection pump actuator<br>Pressure switch<br>Pressure switch<br>Clutch switch<br>Clutch switch<br>Transmitter<br>Transmitter<br>Transmitter<br>Transmitter                       | For gearbox            |   |
|          |                  | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>18<br>19 | Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox<br>Eurotronic gearbox | For Eurotronic gearbox | 8101<br>2297<br>WS/BI<br>7101<br>7101<br>GN/VE<br>5103<br>—<br>6101<br>—<br>—<br>—<br>—<br>0050<br>0050<br>0050<br>5103<br>8101 |

Rear wall connector D - C (▶)



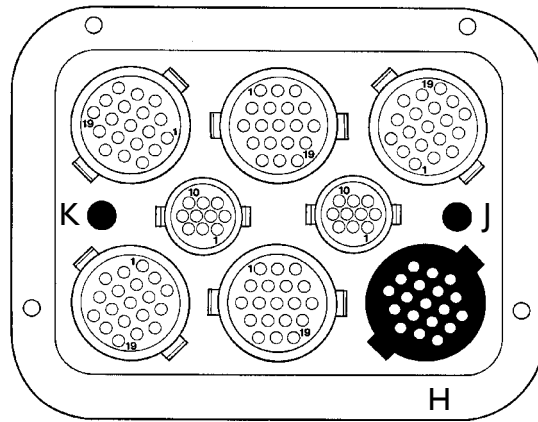
| Ref.     | Connector colour | Function  | Cable colour code |
|----------|------------------|---|-------------------|
| <b>D</b> | <b>Green</b>     | 1 Earth for power takeoff engagement switch on gearbox            | <b>0000</b>       |
|          |                  | 2 Movement takeoff engagement on gearbox warning lamp             | <b>6601</b>       |
|          |                  | 3 Movement takeoff solenoid control valve supply                  | <b>9954</b>       |
|          |                  | 4 Movement takeoff solenoid control valve supply                  | <b>9954</b>       |
|          |                  | 5 Spare   | —                 |
|          |                  | 6 Spare   | —                 |
|          |                  | 7 Hydraulic retarder engagement solenoid valve supply             | <b>9310</b>       |
|          |                  | 8 Return signal from hydraulic retarder engagement solenoid valve | <b>0310</b>       |
|          |                  | 9 Hydraulic retarder temperature sensor earth signal              | <b>0309</b>       |
|          |                  | 10 Hydraulic retarder temperature sensor supply                   | <b>5309</b>       |
|          |                  | 11 Hydraulic retarder oil accumulator solenoid valve supply       | <b>9311</b>       |
|          |                  | 12 Hydraulic retarder oil accumulator solenoid valve earth        | <b>0311</b>       |
|          |                  | 13 Spare  | —                 |
|          |                  | 14 ADM (electronic differential locking) system warning light     | <b>6601</b>       |
|          |                  | 15 Spare  | —                 |
|          |                  | 16 Spare  | —                 |
|          |                  | 17 Central lubrication system supply after fuse                   | <b>7798</b>       |
|          |                  | 18 Central lubrication system supply after fuse                   | <b>8898</b>       |
|          |                  | 19 Central lubrication system earth                               | <b>0000</b>       |
| <b>C</b> | <b>White</b>     | 1 Spare   |                   |
|          |                  | 2 Spare   |                   |
|          |                  | 3 Spare   |                   |
|          |                  | 4 Spare   |                   |
|          |                  | 5 Spare   |                   |
|          |                  | 6 Spare   |                   |
|          |                  | 7 Spare   |                   |
|          |                  | 8 Spare   |                   |
|          |                  | 9 Spare   |                   |
|          |                  | 10 Spare  |                   |
|          |                  | 11 Spare  |                   |
|          |                  | 12 Spare  |                   |
|          |                  | 13 Spare  |                   |
|          |                  | 14 Spare  |                   |
|          |                  | 15 Spare  |                   |
|          |                  | 16 Spare  |                   |
|          |                  | 17 Spare  |                   |
|          |                  | 18 Spare  |                   |
|          |                  | 19 Spare  |                   |

Rear wall connector E - F - G (▶)



| Ref.     | Connector colour | Function | Cable colour code  |      |
|----------|------------------|----------|--|------|
| <b>E</b> | <b>Black</b>     | 1        | Electromagnetic clutch control relay supply  | 9933 |
|          |                  | 2        | Electromagnetic clutch control relay supply  | 9933 |
|          |                  | 3        | Solenoid valve supply for radiator water recirculation                               | 7550 |
|          |                  | 4        | Outside temperature thermometer transmitter signal                                   | 7573 |
|          |                  | 5        | Outside temperature thermometer transmitter earth                                    | 0550 |
|          |                  | 6        | Solenoid valve earth for radiator water recirculation                                | 9551 |
|          |                  | 7        | Solenoid valve earth to cut in heating system  | 9552 |
|          |                  | 8        | Spare  | —    |
|          |                  | 9        | Spare  | —    |
|          |                  | 10       | Solenoid valve supply to cut in heating system                                       | 7550 |
| <b>F</b> | <b>Brown</b>     | 1        |  |      |
|          |                  | 2        |  |      |
|          |                  | 3        |  |      |
|          |                  | 4        |  |      |
|          |                  | 5        |  |      |
|          |                  | 6        |  |      |
|          |                  | 7        |  |      |
|          |                  | 8        |  |      |
|          |                  | 9        |  |      |
|          |                  | 10       |  |      |
|          |                  | 11       |  |      |
|          |                  | 12       |  |      |
|          |                  | 13       |  |      |
|          |                  | 14       |  |      |
|          |                  | 15       |  |      |
|          |                  | 16       |  |      |
|          |                  | 17       |  |      |
|          |                  | 18       |  |      |
|          |                  | 19       |  |      |
| <b>G</b> |                  | 1        | To terminal A5 of electronic tachograph  | 0079 |
|          |                  | 2        | To terminal A1 of electronic tachograph  | 5579 |
|          |                  | 3        | To safety control switch 52029   | 7077 |
|          |                  | 4        | To safety control switch 53008   | 7071 |
|          |                  | 5        | To safety control switch 52029   | 7070 |
|          |                  | 6        | TGC control electronic supply in conjunction with emergency disconnection after fuse | 7791 |
|          |                  | 7        | Alternator D+ after power diode  | 0078 |
|          |                  | 8        | Relay energising for maintaining T.G.C.  | 8035 |
|          |                  | 9        | Spare  | —    |
|          |                  | 10       | Spare  | —    |

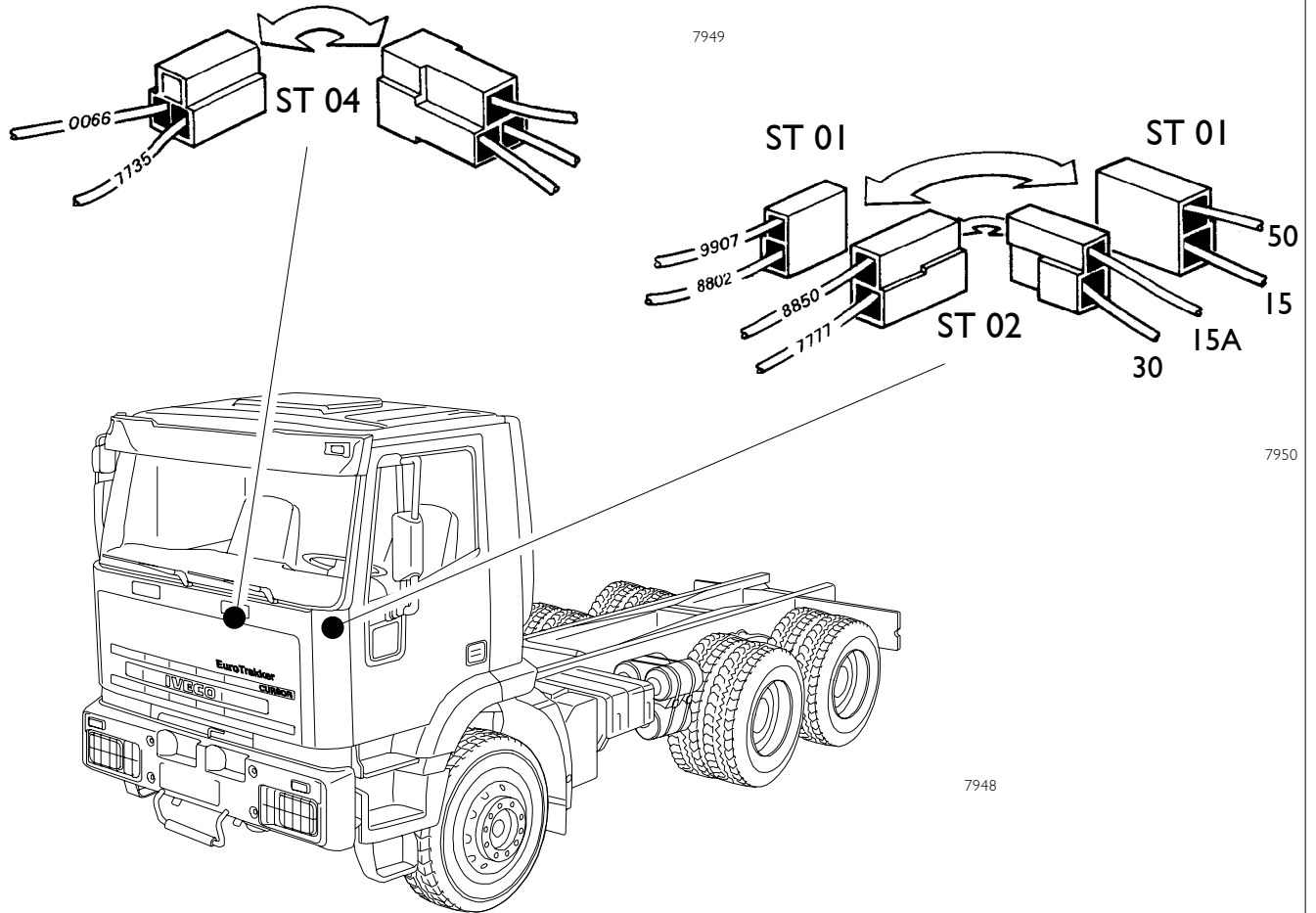
Rear wall connector H - J - K (▶)



| Ref. | Connector colour | Function      | Cable colour code |
|------|------------------|---------------|-------------------|
| H 1  | Light blue       | Water heating | 0066              |
| H 2  |                  | Water heating | 7510              |
| H 3  |                  | Water heating | 7514/6655         |
| H 4  |                  | Spare         | —                 |
| H 5  |                  | Water heating | 6601              |
| H 6  |                  | Water heating | 7778              |
| H 7  |                  | Water heating | 7786              |
| H 8  |                  | Spare         | —                 |
| H 9  |                  | Water heating | 2285/6500         |
| H 10 |                  | Water heating | 7708              |
| H 11 |                  | Water heating | 9506              |
| H 12 |                  | Water heating | 6655              |
| H 13 |                  |               |                   |
| H 14 |                  |               |                   |
| H 15 |                  |               |                   |
| H 16 |                  |               |                   |
| H 17 |                  |               |                   |
| H 18 |                  |               |                   |
| H 19 |                  |               |                   |
| J —  | Brown            |               |                   |
| K —  | Brown            |               |                   |

**Connectors between cables (Base vehicle) Cursor 8/10/13**

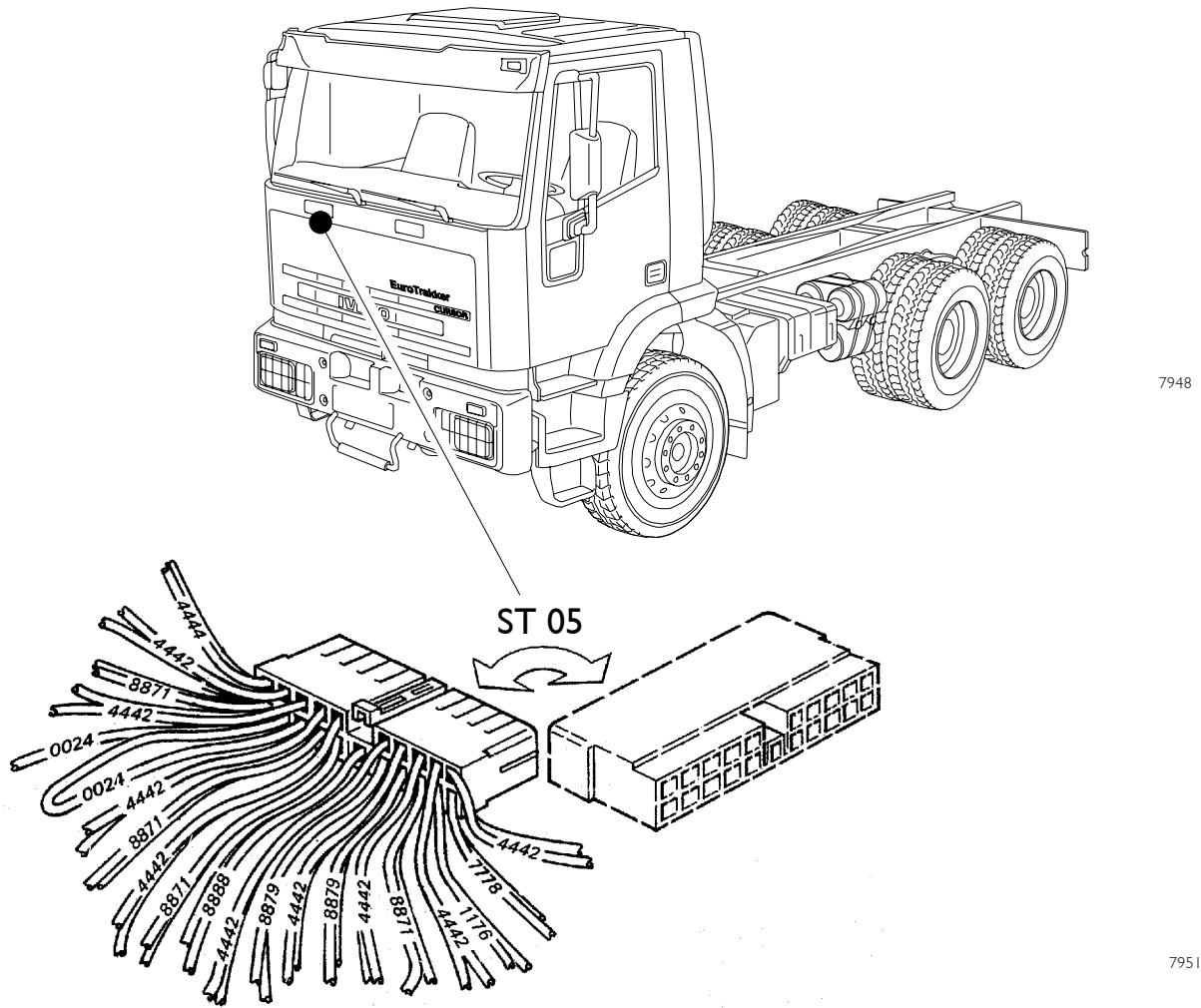
- ST 01 - For ignition switch I5/50
- ST 02 - For ignition switch I5A/30
- ST 04 - For fridge



| Ref.                 | Function  | Cable colour code |
|----------------------|---|-------------------|
| ST 01<br>1<br>2      | Relay energising for services with contact key<br>Starting enable switch                                | 8802<br>9907      |
| ST 02<br>1<br>2      | Direct positive on battery (not protected)<br>Relay energising for cutting off services during starting | 7777<br>8850      |
| ST 04<br>1<br>2<br>3 | Insulated negative for fridge<br>Fridge motor supply<br>Spare   | 0066<br>7735<br>— |

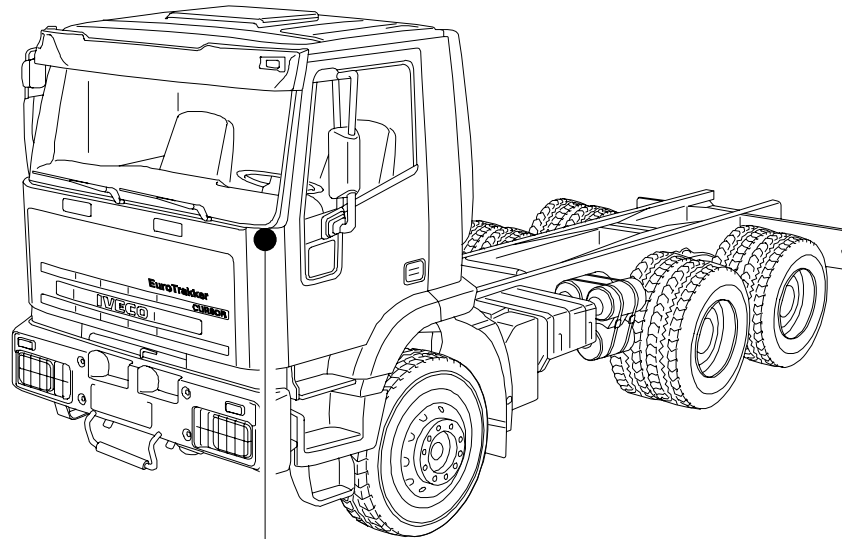


ST 05 - Provision for optional items I



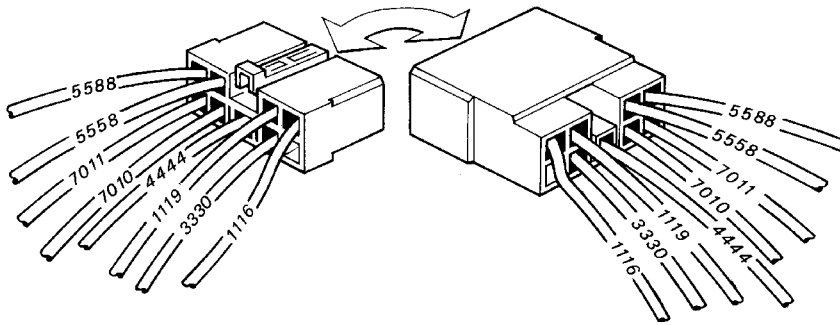
| Ref.  | Function   | Cable colour code |
|-------|--|-------------------|
| ST 05 | 1 Generator or alternator charge warning lamp            | 7778              |
|       | 2 Braking lights relay control                           | 1176              |
|       | 3 Vehicle operating control equipment supply after fuse  | 8871              |
|       | 4 General slaves supply after fuse                       | 8879              |
|       | 5 General slaves supply after fuse                       | 8879              |
|       | 6 Starter motor relay or electromagnet                   | 8888              |
|       | 7 Vehicle operating control equipment supply after fuse  | 8871              |
|       | 8 Vehicle operating control equipment supply after fuse  | 8871              |
|       | 9 Earth for warning lamps connected to bulb test button  | 0024              |
|       | 10 Earth for warning lamps connected to bulb test button | 0024              |
|       | 11 Vehicle operating control equipment supply after fuse | 8871              |
|       | 12 Dashboard pictogram light bulb supply                 | 4442              |
|       | 13 Dashboard pictogram light bulb supply                 | 4442              |
|       | 14 Dashboard pictogram light bulb supply                 | 4442              |
|       | 15 Dashboard pictogram light bulb supply                 | 4442              |
|       | 16 Dashboard pictogram light bulb supply                 | 4442              |
|       | 17 Dashboard pictogram light bulb supply                 | 4442              |
|       | 18 Dashboard pictogram light bulb supply                 | 4442              |
|       | 19 Dashboard pictogram light bulb supply                 | 4442              |
|       | 20 Dashboard pictogram light bulb supply                 | 4442              |
|       | 21 Instrument panel lighting after rheostat (or switch)  | 4444              |

ST 06 - For services on left upper cab



7948

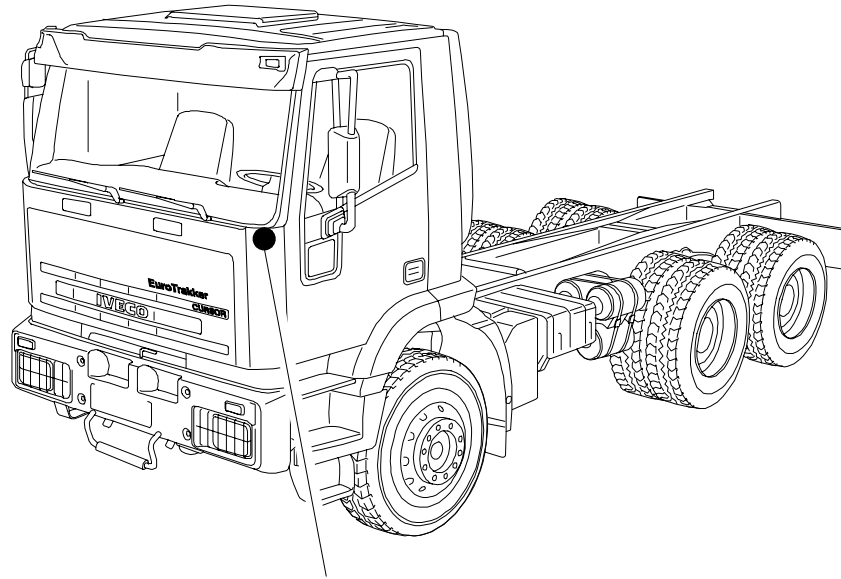
ST 06



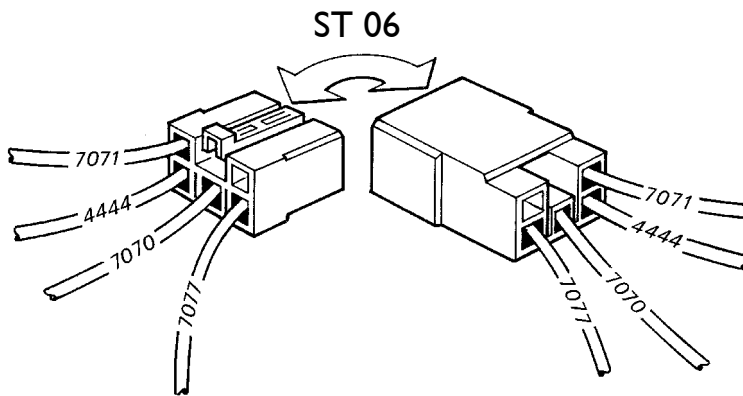
7952

| Ref.  | Function   | Cable colour code |
|-------|--|-------------------|
| ST 06 | 1 Spare  | —                 |
|       | 2 To front clearance lamp                              | 3330(3339)        |
|       | 3 Instrument panel lighting after rheostat (or switch) | 4444              |
|       | 4 Hatch opening control supply                         | 7010              |
|       | 5 Hatch closing control supply                         | 7011              |
|       | 6 Horn supply  | 1116              |
|       | 7 Electric or pneumatic horn switch supply             | 1119              |
|       | 8 Signal from control unit to engine oil level gauge   | 5558              |
|       | 9 Adjusted voltage to engine oil level gauge           | 5588              |

ST 06 - For ADR version



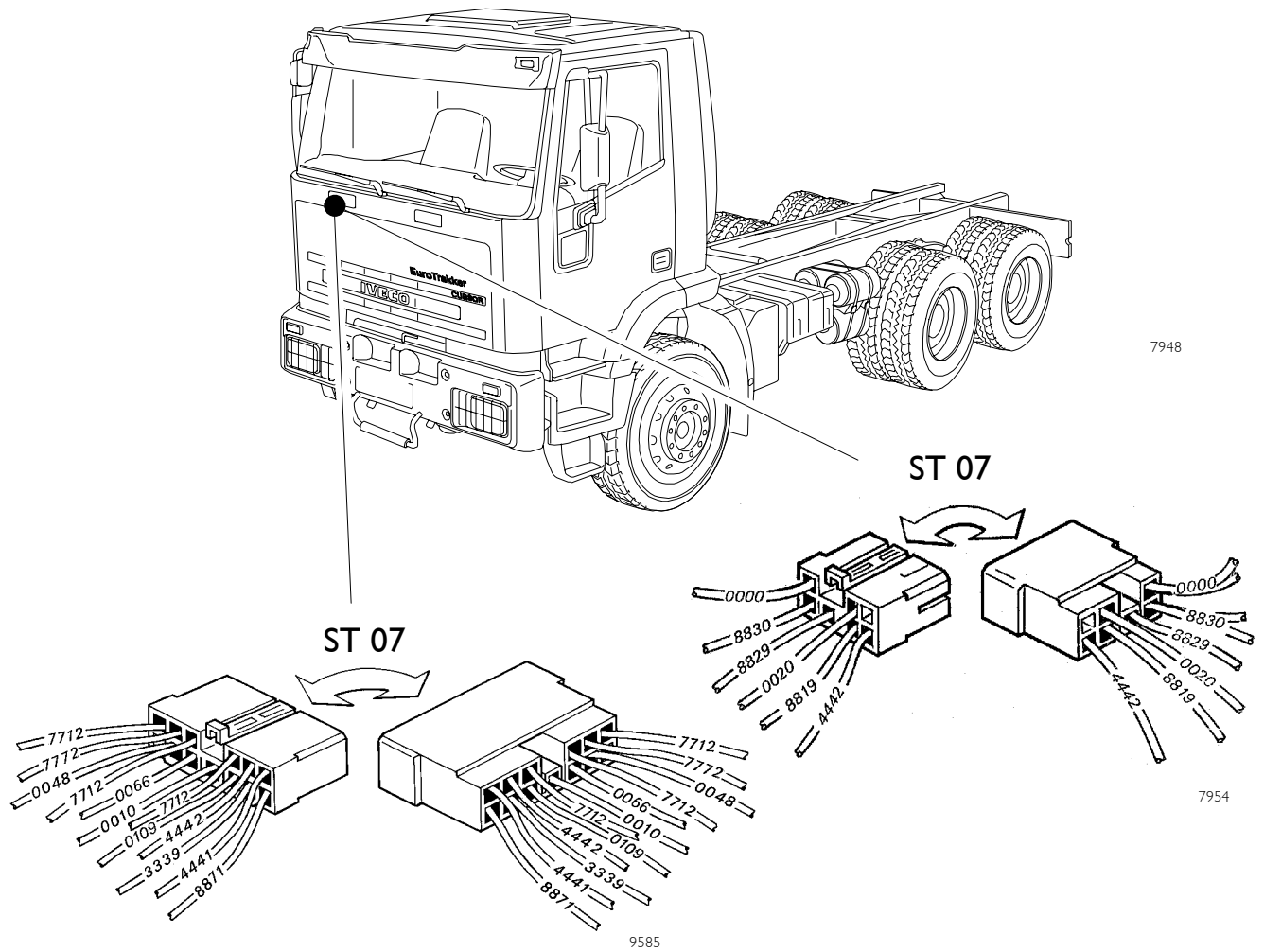
7948



9584

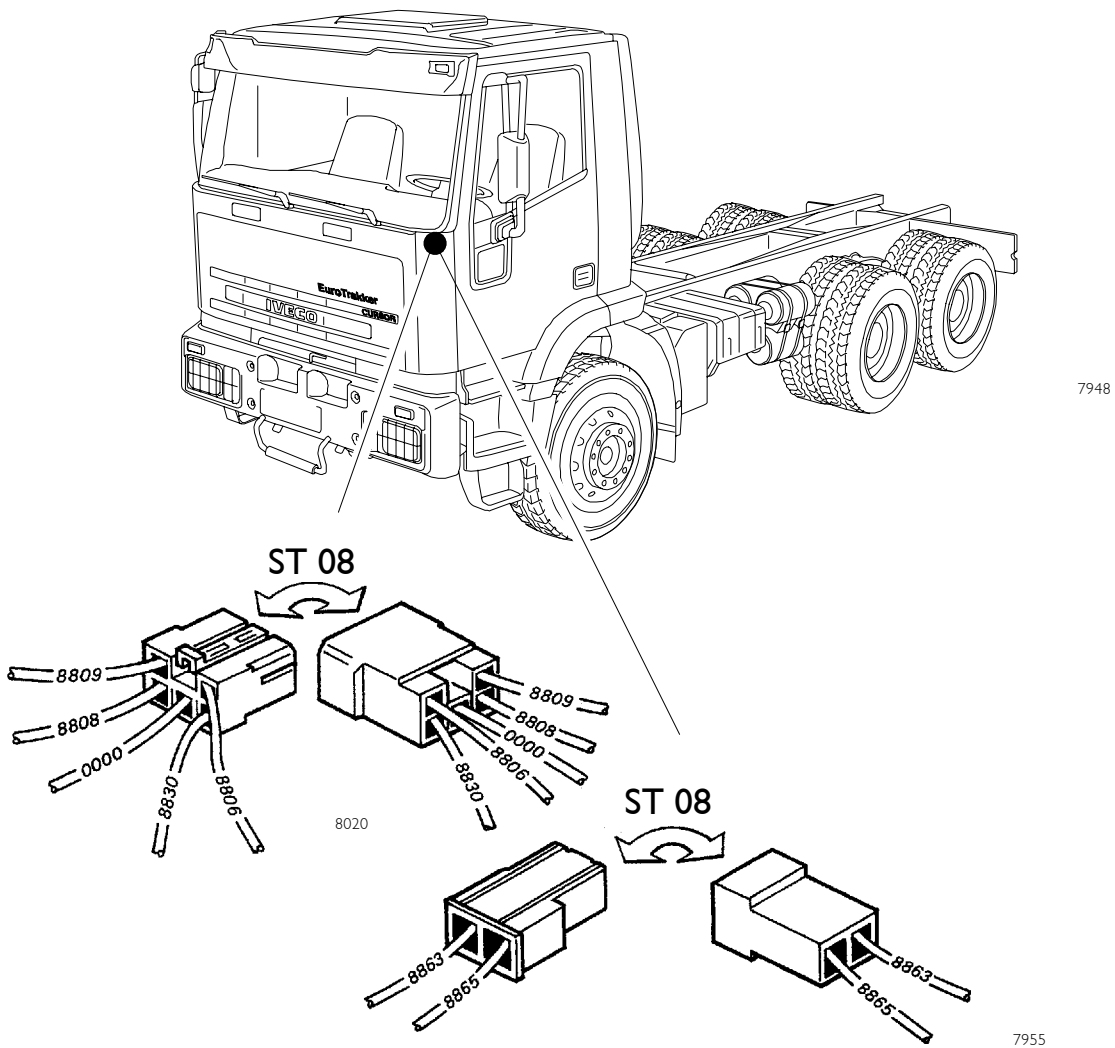
| Ref.         | Function                                | Cable colour code |
|--------------|---|-------------------|
| <b>ST 06</b> | 1 To safety control switch 52029        | <b>7077</b>       |
|              | 2 To safety control switch 52029        | <b>7070</b>       |
|              | 3 Dashboard pictogram light bulb supply | <b>4444</b>       |
|              | 4 Spare                                 | —                 |
|              | 5 To safety control switch 53008        | <b>7071</b>       |

**ST 07 - For services on right upper cab**



| Ref.         | Function   | Cable colour code |
|--------------|--|-------------------|
| <b>ST 07</b> | 1 Vehicle operating control equipment supply after fuse  | <b>8871</b>       |
|              | 2 To right upper clearance lamp                          | <b>3330/3339</b>  |
|              | 3 Unstable switch for internal lights                    | <b>0109</b>       |
|              | 4 Courtesy light switch-on earth (two-way switch / lamp) | <b>0010</b>       |
|              | 5 Unstable switch for internal lights                    | <b>0066</b>       |
|              | 6 ASR switch-off   | <b>0048</b>       |
|              | 7 Spare  | —                 |
|              | 8 Trucks: roof lamp with separate switch no. 1           | <b>4441</b>       |
|              | 9 Dashboard pictogram light bulb supply                  | <b>4442</b>       |
|              | 10 Positive from voltage reducer (terminal 8)            | <b>7712</b>       |
|              | 11 Positive from voltage reducer (terminal 8)            | <b>7712</b>       |
|              | 12 Positive after fuse                                   | <b>7772</b>       |
|              | 13 Positive from voltage reducer (terminal 8)            | <b>7712</b>       |
| <b>ST 07</b> | 1 Positive from exterior lighting switch                 | <b>4442</b>       |
|              | 2 Positive for rear-view mirror resistance off control   | <b>8819</b>       |
|              | 3 Positive (+15) for rear-view mirror control module     | <b>8829</b>       |
|              | 4 Positive for rear-view mirror resistances              | <b>8830</b>       |
|              | 5 Spare  | —                 |
|              | 6 Negative for rear-view mirror on relay                 | <b>0020</b>       |
|              | 7 Earth  | <b>0000</b>       |

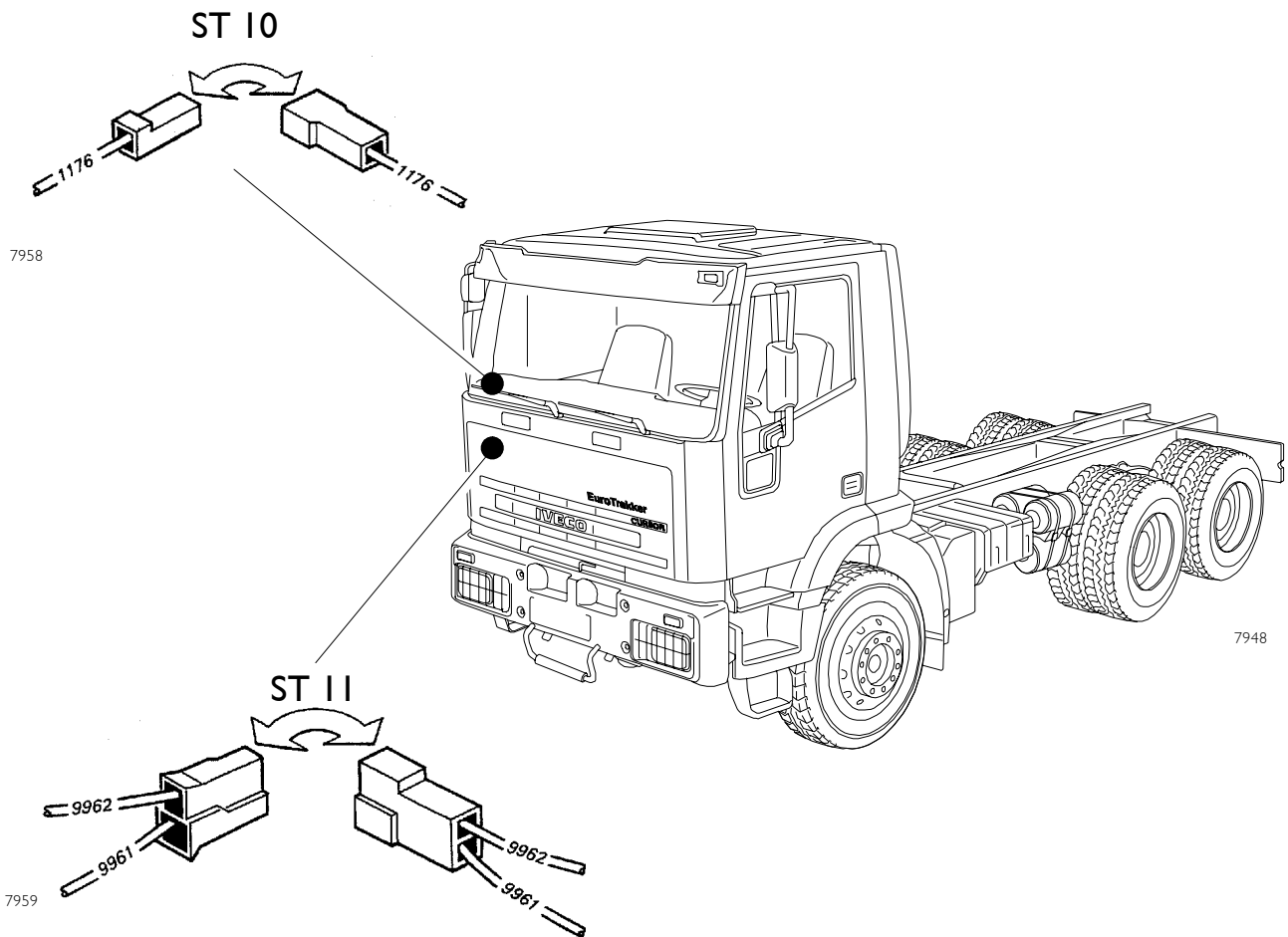
ST 08 - For driver's door



| Ref.  | Function  | Cable colour code |
|-------|---|-------------------|
| ST 08 | 1 Heated wing mirror resistance supply                          | 8830              |
|       | 2 Earth for left wing mirror resistance                         | 0000              |
|       | 3 Supply for vertical aiming motor of Lh main rearview mirror   | 8808              |
|       | 4 Supply for motor for aiming Lh main rearview mirror           | 8806              |
|       | 5 Supply for horizontal aiming motor of Lh main rearview mirror | 8809              |
| ST 08 | 1 Side power window motor supply                                | 8863              |
|       | 2 Return cable from side power window motor                     | 8865              |

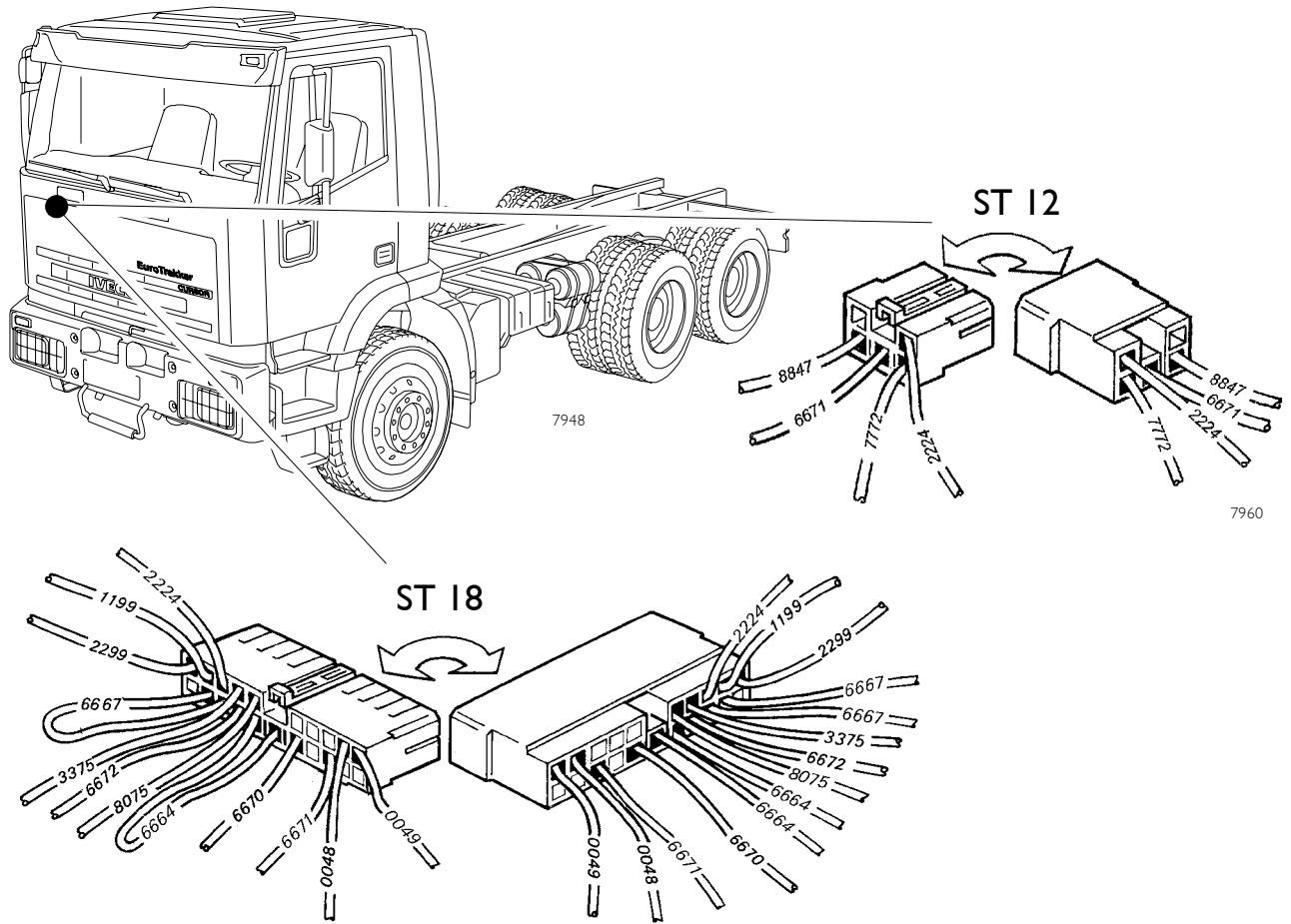


ST 10 - Provision for additional brake light circuit  
 ST 11 - For ABS/ASR



| Ref.        | Function   | Cable colour code |
|-------------|--|-------------------|
| ST10 2      | Braking lights relay control   | 1176              |
| ST11 1<br>2 | 1 Solenoid valve for Rh side ASR<br>2 Solenoid valve for Lh side ASR | 9961<br>9962      |

ST 12 - For ABS/ASR

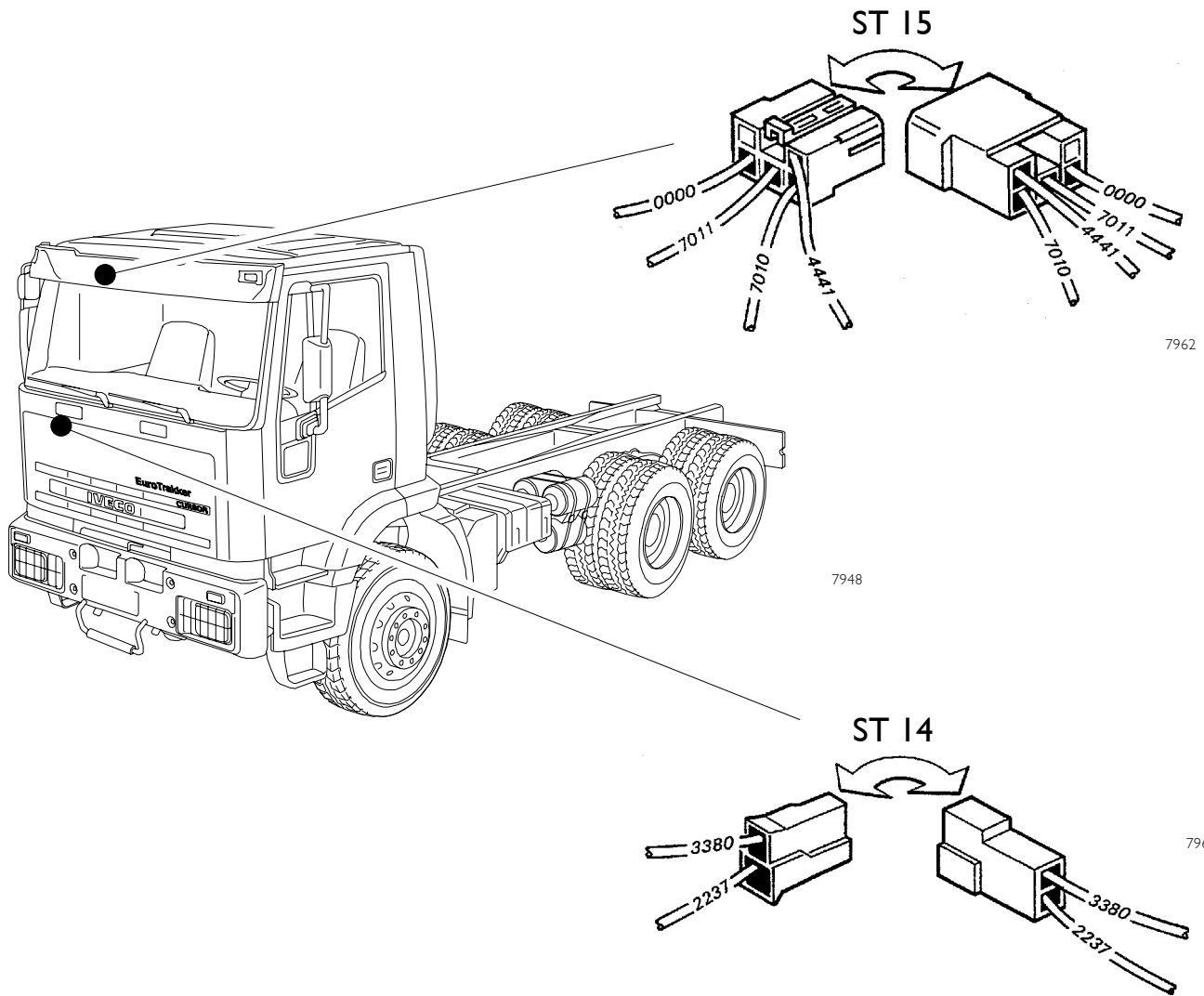


9581

| Ref.  | Function  | Cable colour code  |      |
|-------|---|--|------|
| 1     | Positive +30 for trailer ABS/ASR connector (terminal I 72006) | 7772   |      |
| 2     | Signal for trailer ABS warning lamp                           | 6671   |      |
| 3     | Travelling signal relay control for hydraulic braking         | 8847   |      |
| 4     | Loading deck lamp supply                                      | 2224   |      |
| ST 12 | 1   | Spare  | —    |
|       | 2   | Spare  | —    |
|       | 3   | To terminal 11 of the ABS/ASR electronic control unit    | 6671 |
|       | 4   | Spare  | —    |
|       | 5   | To terminal 15/XI of the ABS/ASR electronic control unit | 6670 |
|       | 6   | To the display panel for IVECO Control                   | 6664 |
|       | 7   | From rear brake block sensor (jumper with pin 6)         | 6664 |
|       | 8   | To terminal 13/XI of the ABS/ASR electronic control unit | 6672 |
|       | 9   | To the display panel for IVECO Control                   | 6667 |
| ST 18 | 10  | From rear brake block sensor (jumper with pin 9)         | 6667 |
|       | 11  | Available  | 6673 |
|       | 12  | To terminal 5/XI of the ABS/ASR electronic control unit  | 0049 |
|       | 13  | To terminal 6/XI of the ABS/ASR electronic control unit  | 0048 |
|       | 14  | Spare  | —    |
|       | 15  | Available  | 1116 |
|       | 16  | Available  | 1117 |
|       | 17  | Supply for bodybuilders (after the fuse)                 | 8075 |
|       | 18  | Supply for bodybuilders (after the fuse)                 | 3375 |
|       | 19  | Fifth wheel light supply                                 | 2224 |
|       | 20  | To terminal 11/XI of ABS/ASR electronic control unit     | 1199 |
|       | 21  | To terminal 10/XI of ABS/ASR electronic control unit     | 2299 |

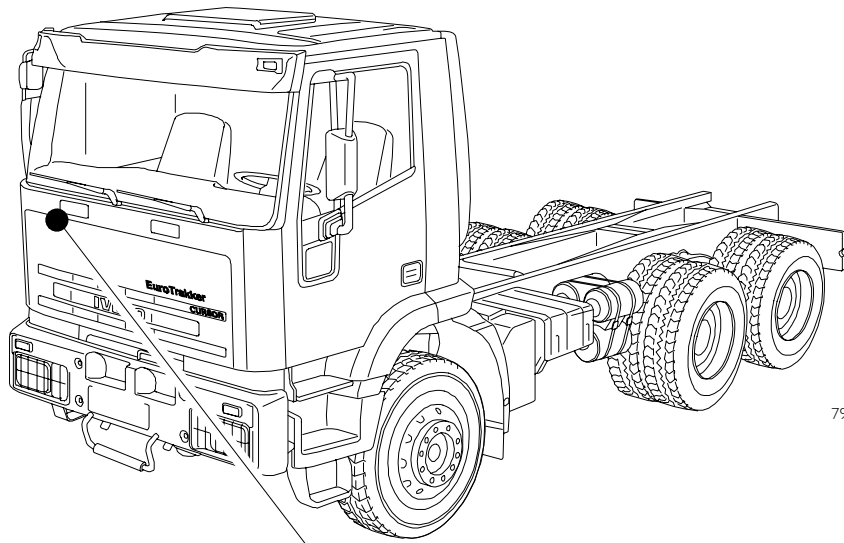


ST 15 - For high roof connections  
 ST 14 - Provision for Norway day lights

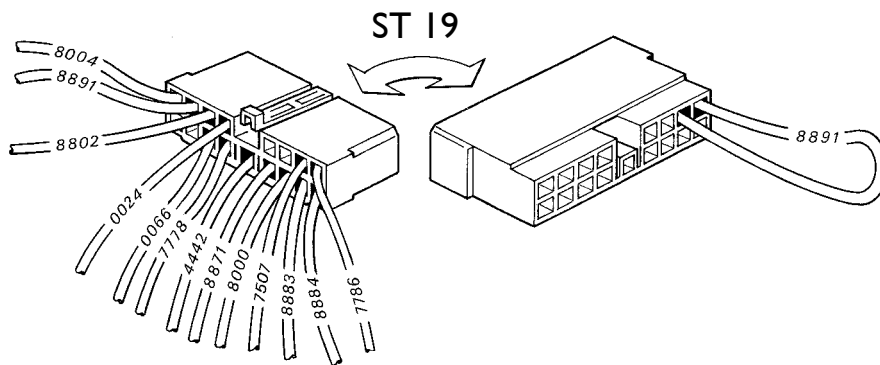


| Ref.    | Function  | Cable colour code |
|---------|---|-------------------|
| ST 14 1 | High and low beam headlamp supply; from outer lighting switch to control unit | 2237              |
| ST 14 2 | General side lights supply (control unit-switch)                              | 3380              |
| ST 15 1 | Hatch opening control supply  | 7010              |
| ST 15 2 | Hatch closing control supply  | 7011              |
| ST 15 3 | Earth   | 0000              |
| ST 15 4 | Trucks: roof lamp with separate switch no. 1                                  | 4441              |
| ST 15 5 | Spare   | —                 |

**ST 19 - For autonomous heating (optional)**



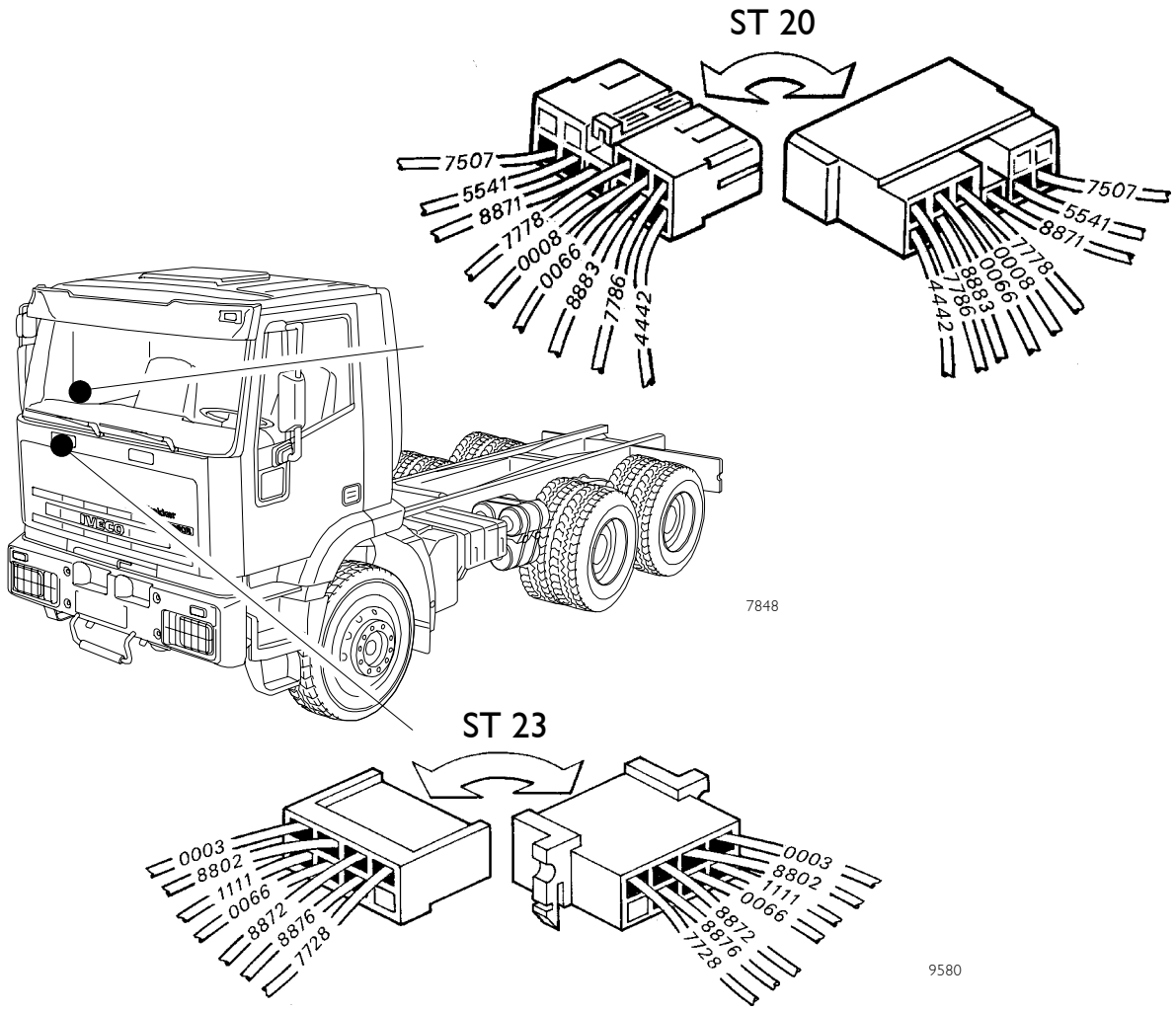
7948



9586

| Ref.         | Function   | Cable colour code |
|--------------|--|-------------------|
| <b>ST 19</b> | 1 Climate control motor supply - low speed               | <b>8884</b>       |
|              | 2 Climate control motor supply - high speed              | <b>8883</b>       |
|              | 3 Warning lamp control circuit supply                    | <b>8000</b>       |
|              | 4 Vehicle control equipment supply after fuse            | <b>8871</b>       |
|              | 5 Dashboard pictogram light bulb supply                  | <b>4442</b>       |
|              | 6 Generator or alternator charging warning lamp          | <b>7778</b>       |
|              | 7 Tachograph clock earth                                 | <b>0066</b>       |
|              | 8 Spare  | —                 |
|              | 9 Spare  | —                 |
|              | 10 Jumper with pin 7 ST20                                | <b>7786</b>       |
|              | 11 Jumper with pin 6 ST20                                | <b>7507</b>       |
|              | 12 Spare   | —                 |
|              | 13 Spare   | —                 |
|              | 14 Earth for warning lamps connected to bulb test button | <b>0024</b>       |
|              | 15 Relay energising for services with contact key        | <b>8802</b>       |
|              | 16 +15 positive from fuse 24 of UCI                      | <b>8891</b>       |
|              | 17 Positive to windscreen defroster control switch       | <b>8004</b>       |

ST 20 - For climate control system (optional)  
 ST 23 - For electric battery disconnecter / lights direction



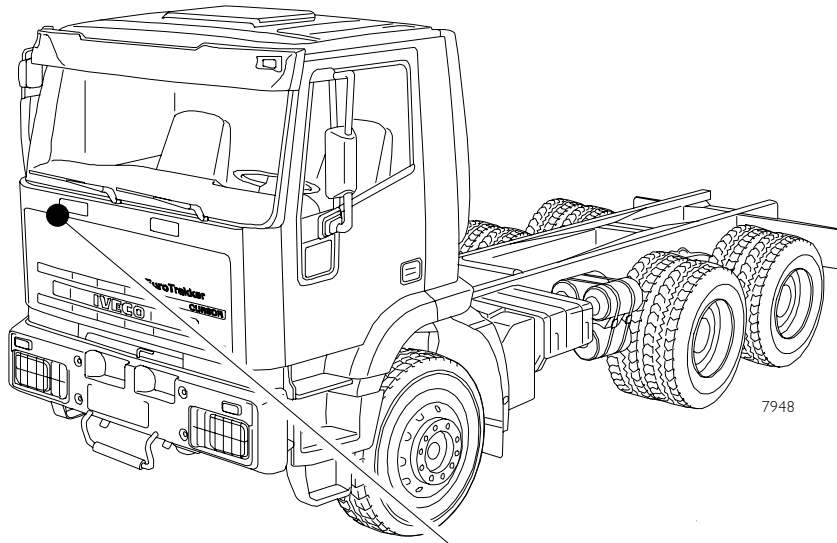
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7848

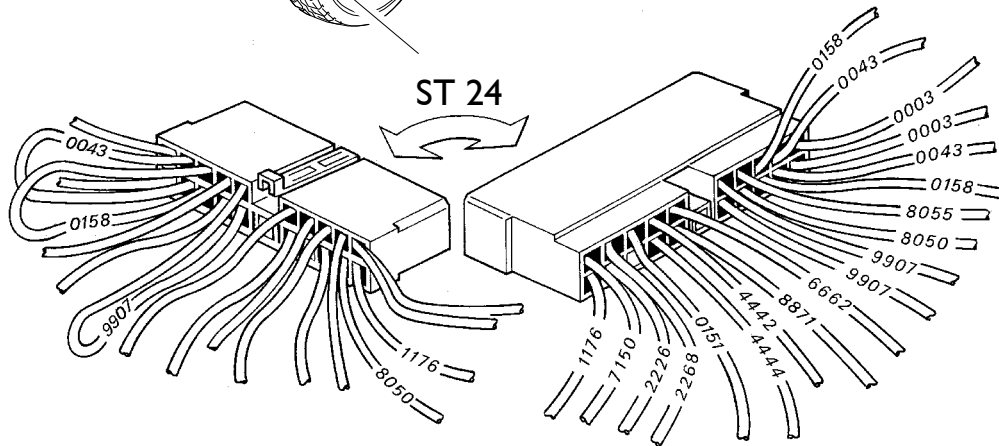
9580

| Ref.  | Function  | Cable colour code |
|-------|---|-------------------|
| ST 20 | 1 Dashboard pictogram light bulb supply                         | 4442              |
|       | 2 Climate control supply - high speed                           | 8883              |
|       | 3 Starter motor relay control earth                             | 0008              |
|       | 4 Vehicle control equipment supply after fuse                   | 8871              |
|       | 5 To tachograph signal amplifier                                | 5541              |
|       | 6 Jumper with pin 11 ST19                                       | 7507              |
|       | 7 Jumper with pin 10 ST19                                       | 7786              |
|       | 8 Earth   | 0066              |
|       | 9 Generator or alternator charge indicator light                | 7778              |
|       | 10 Spare  | —                 |
|       | 11 Spare  | —                 |
| ST 23 | 1 Roof lamp engagement earth (switch on door pillar - diverter) | 0003              |
|       | 2 Energising relay for services with contact key                | 8802              |
|       | 3 Flashing central supply after fuse                            | 8872              |
|       | 4 Flasher emergency supply                                      | 7728              |
|       | 5 Direction indicator flasher supply (shared circuits)          | 1111              |
|       | 6 Insulated earth on battery negative post                      | 0066              |
|       | 7 Vehicle control equipment supply after fuse                   | 8876              |
|       | 8 Spare   | —                 |

ST 24 - Provision for automatic gearbox



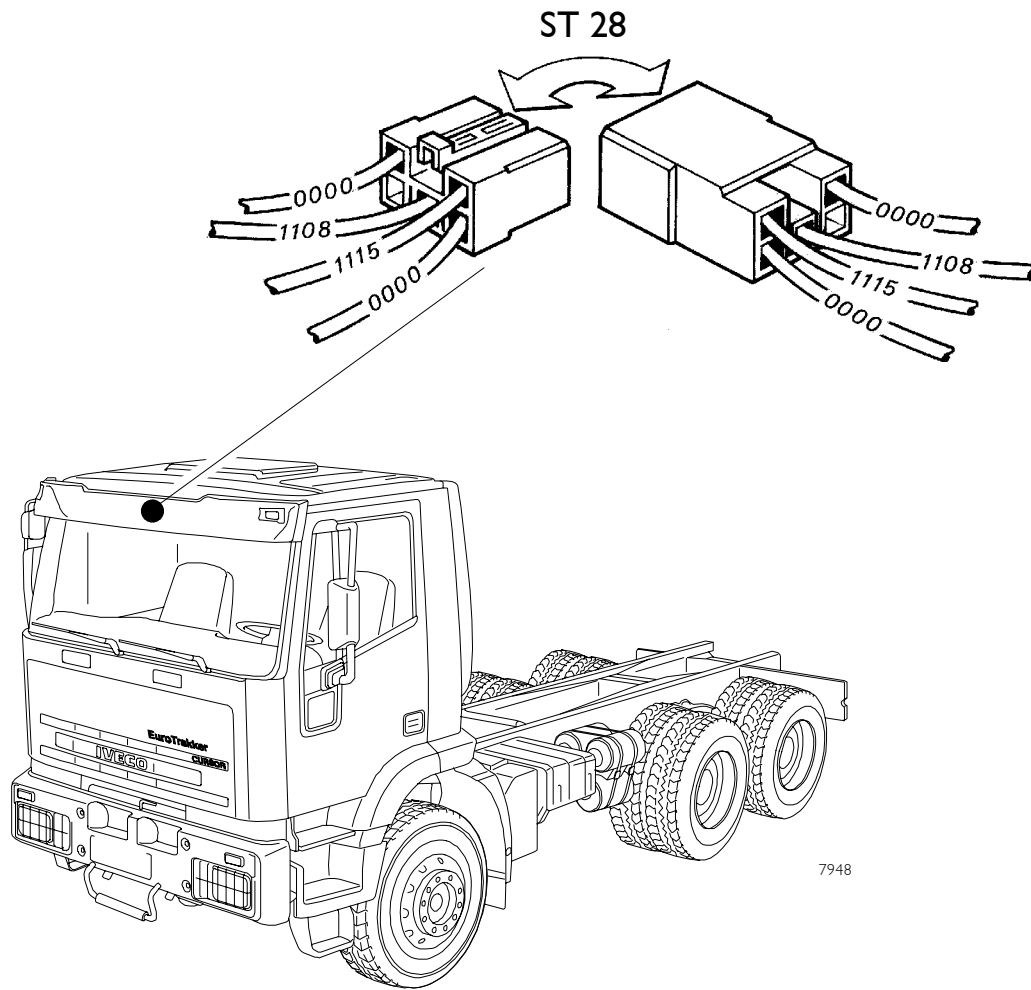
7948



9578

| Ref.  | Function   | Cable colour code |
|-------|--|-------------------|
| ST 24 | 1 Positive from braking indicator switch                         | 1176              |
|       | 2 Positive from reversing switch                                 | 2226              |
|       | 3 Spare  | —                 |
|       | 4 Instrument panel lighting after rheostat (or switch)           | 4444              |
|       | 5 Engine brake on warning lamp                                   | 6627              |
|       | 6 Spare  | —                 |
|       | 7 Starting enable switch   | 9907              |
|       | 8 Gearbox in neutral indicator switch                            | 8050              |
|       | 9 Bridge with pin 19   | 0158              |
|       | 10 Bridge with pin 20  | 0043              |
|       | 11 Roof lamp engagement earth (switch on door pillar - diverter) | 0003              |
|       | 12 EDC/MS6 system supply from main relay                         | 7150              |
|       | 13 Reversing lamp switch supply                                  | 2268              |
|       | 14 Supply for engine stop with EDC                               | 0151              |
|       | 15 Switch no. 1: first set of bulbs                              | 4442              |
|       | 16 Handbrake warning lamp  | 6662              |
|       | 17 Starting enable switch  | 9907              |
|       | 18 Positive to starting inhibitor switch with gear engaged       | 8055              |
|       | 19 Bridge with pin 9   | 0158              |
|       | 20 Bridge with pin 10  | 0043              |
|       | 21 Roof lamp engagement earth (switch on door pillar - diverter) | 0003              |

ST 28 - For right and left revolving beacon

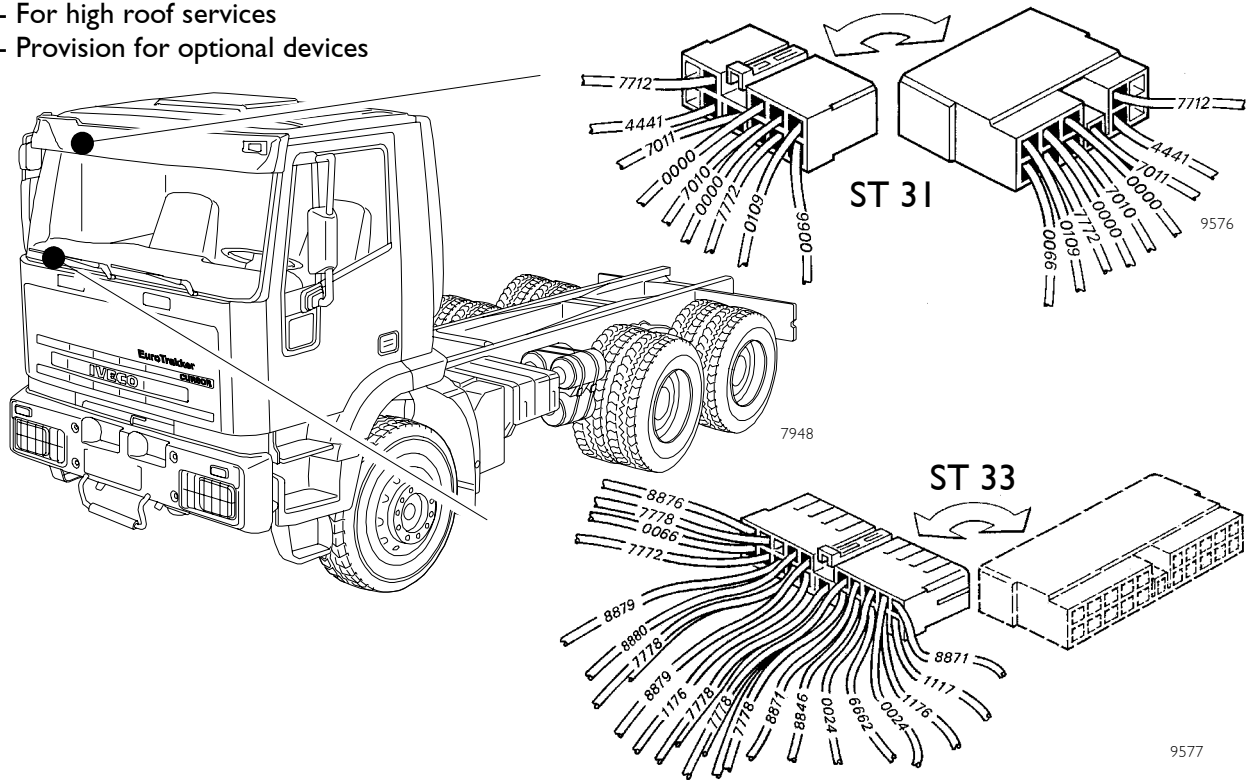


7969

7948

| Ref.  | Function                        | Cable colour code |
|-------|---------------------------------|-------------------|
| ST 28 | 1 Earth                         | 0000              |
|       | 2 Left revolving beacon supply  | 1108              |
|       | 3 Spare                         | —                 |
|       | 4 Right revolving beacon supply | 1115              |
|       | 5 Earth                         | 0000              |

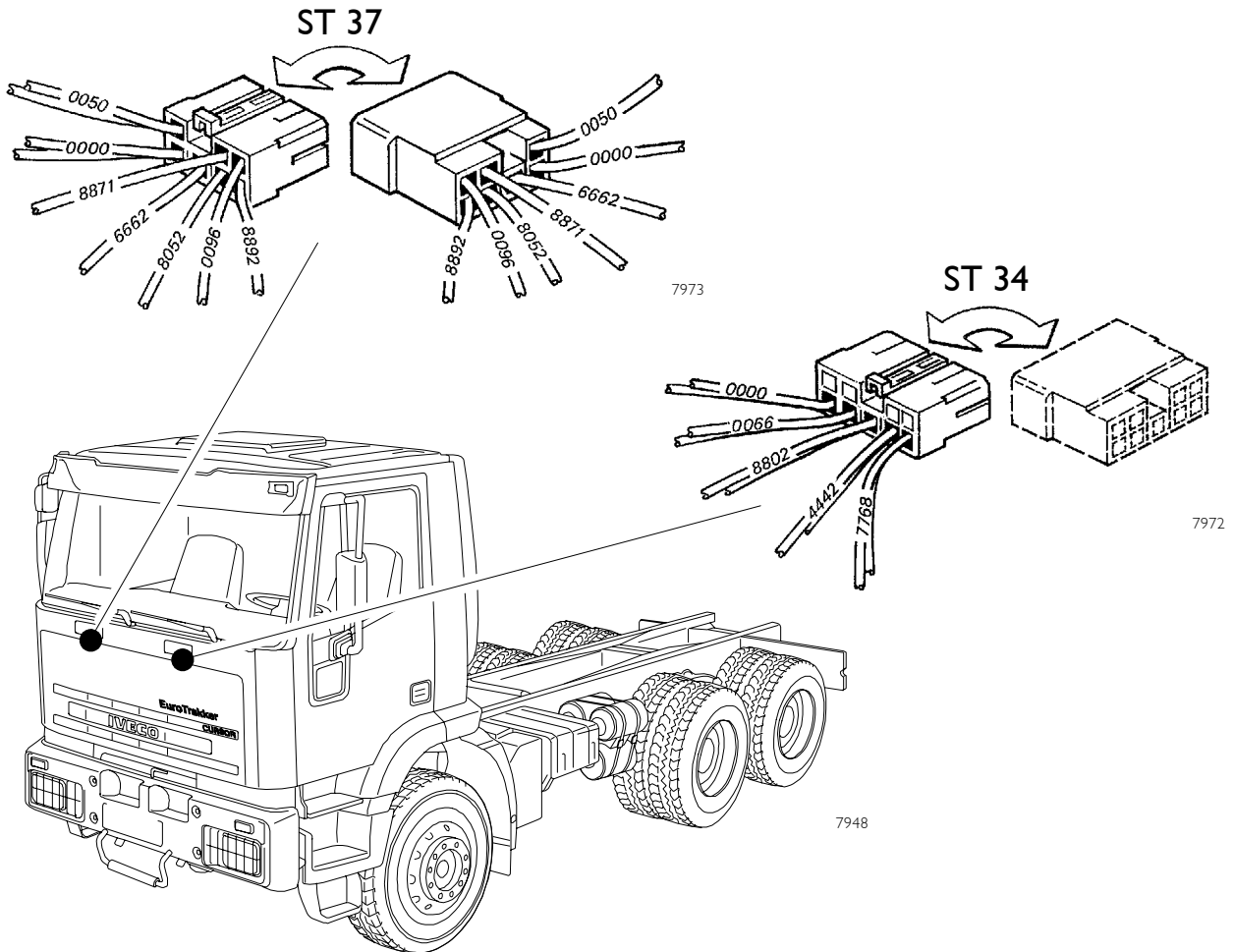
ST 31 - For high roof services  
 ST 33 - Provision for optional devices



| Ref.         | Function  | Cable colour code |
|--------------|---|-------------------|
| <b>ST 31</b> | 1 Internal light switch   | 0066              |
|              | 2 Sunroof control switch supply   | 7772              |
|              | 3 Sunroof opening control supply  | 7010              |
|              | 4 Sunroof closing control supply  | 7011              |
|              | 5 Positive supply for roof lamp   | 4441              |
|              | 6 Spare   | —                 |
|              | 7 Internal light switch control   | 0109              |
|              | 8 Earth   | 0000              |
|              | 9 Spare   | —                 |
|              | 10 Power socket supply  | 7712              |
|              | 11 Spare  | —                 |
| <b>ST 33</b> | 1 Control unit connection in cab - switch for stop indicator            | 1117              |
|              | 2 Braking lights relay control  | 1176              |
|              | 3 Handbrake warning lamp  | 6662              |
|              | 4 Pre-filter heating relay control                                      | 8846              |
|              | 5 Generator or alternator charging indicator                            | 7778              |
|              | 6 Generator or alternator charging indicator                            | 7778              |
|              | 7 Braking lights relay control  | 1176              |
|              | 8 Brake system air drier engagement switch control                      | 7778              |
|              | 9 General slaves supply after fuse                                      | 8879              |
|              | 10 Positive supply for electronic control unit for central door locking | 7772              |
|              | 11 Tachograph clock earth   | 0066              |
|              | 12 Vehicle control equipment supply after fuse                          | 8871              |
|              | 13 Earth for warning lamps connected to bulb test button                | 0024              |
|              | 14 Earth for warning lamps connected to bulb test button                | 0024              |
|              | 15 General interlock supply after fuse                                  | 8871              |
|              | 16 Positive for meter   | 7778              |
|              | 17 General interlock supply after fuse                                  | 8879              |
|              | 18 Windscreen wiper motor supply - separate fuse                        | 8880              |
|              | 19 Spare  | —                 |
|              | 20 Available (jumper with pin 6)  | 7778              |
|              | 21 Available  | 8876              |

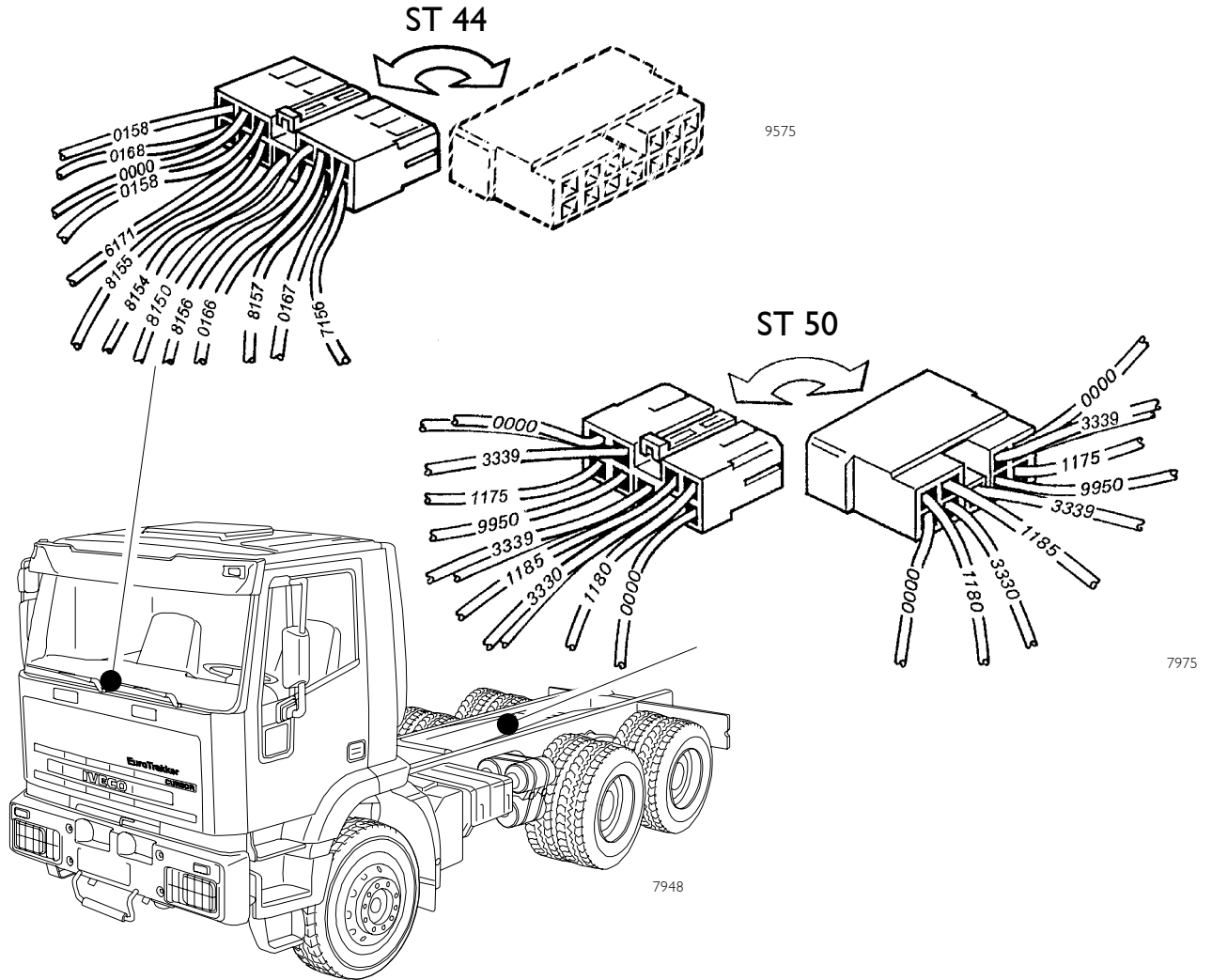
ST 34 - Provisions for tachograph

ST 37 - For cab coupling



| Ref.         | Function  | Cable colour code |
|--------------|---|-------------------|
| <b>ST 34</b> | 1 Tachograph continuous supply  | <b>7768</b>       |
|              | 2 Dashboard pictogram light bulb supply   | <b>4442</b>       |
|              | 3 Relay energising for services with contact key                                    | <b>8802</b>       |
|              | 4 Tachograph clock earth  | <b>0066</b>       |
|              | 5 General earth   | <b>0000</b>       |
|              | 6 Spare   | —                 |
|              | 7 Spare   | —                 |
|              | 8 Spare   | —                 |
|              | 9 Spare   | —                 |
| <b>ST 37</b> | 1 Engine starting under cab   | <b>8892</b>       |
|              | 2 Positive safety supply for starting from ground                                   | <b>8052</b>       |
|              | 3 Handbrake warning lamp  | <b>6662</b>       |
|              | 4 General earth   | <b>0000</b>       |
|              | 5 Cab lock warning lamp after diode   | <b>0096</b>       |
|              | 6 Positive (+15) from fuse 22 of UCI to cab released signalling switch shared comp. | <b>8871</b>       |
|              | 7 Analogue signal generic earth   | <b>0050</b>       |

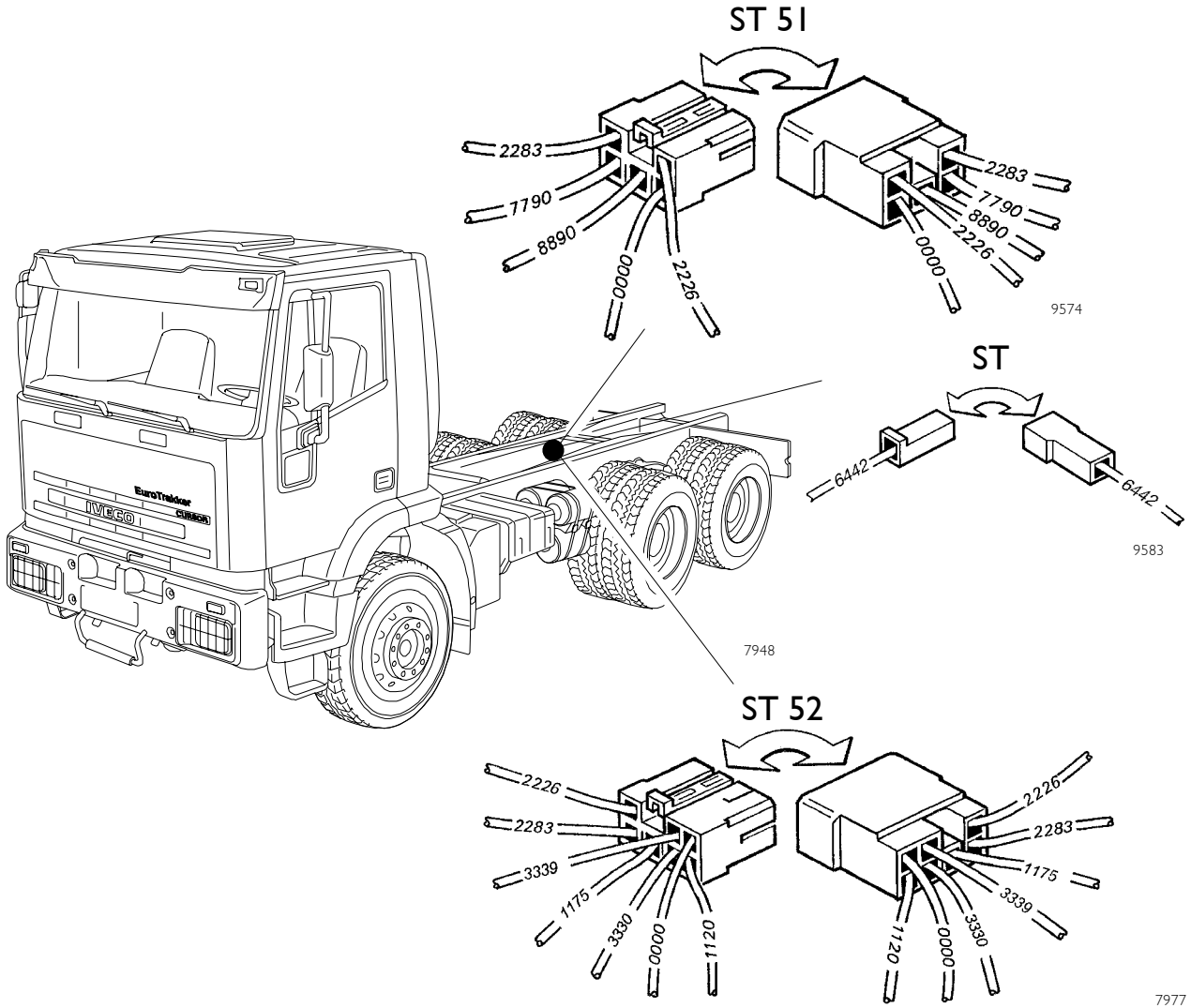
ST 44 - For additional axle with hydraulic steering  
 ST 50 - In branch box for normal trailer connector



| Ref.  | Function   | Cable colour code |
|-------|--|-------------------|
| ST 44 | 1 Positive under switch for Cruise Control service from inside or outside cab        | 7156              |
|       | 2 Signal from switch to increase Cruise Control speed for EDC                        | 8157              |
|       | 3 Signal from switch to decrease Cruise Control speed for EDC                        | 8156              |
|       | 4 Signal from switch to cut off Cruise Control for EDC                               | 8154              |
|       | 5 Cruise Control call signal from switch for EDC                                     | 8155              |
|       | 6 To port 4 container resistances for economy power to engine brake (terminal 1)     | 0158              |
|       | 7 To port 4 container resistances for economy power to engine brake (terminal 5)     | 0168              |
|       | 8 To port 4 container resistances for economy power to engine brake (terminal 4)     | 0167              |
|       | 9 To port 4 container resistances for economy power to engine brake (terminal 3)     | 0166              |
|       | 10 To EDC control unit terminal B15  | 8150              |
|       | 11 To economy power on warning led (terminal 4)                                      | 6171              |
|       | 12 Earth   | 0000              |
|       | 13 To port 4 container resistances for economy power to engine brake (terminal 1)    | 0158              |
| ST 50 | 1 Earth (to trailer connector terminal 4)  | 0000              |
|       | 2 Trailer side lights (to trailer connector terminal 6)                              | 3330              |
|       | 3 Trailer side lights (to trailer connector terminal 5)                              | 3339              |
|       | 4 Trailer brake lights with engine brake (to trailer connector terminal 7) provision | 9950              |
|       | 5 Trailer brake lights (to trailer connector terminal 7)                             | 1175              |
|       | 6 Trailer direction indicators lh (to trailer connector terminal 1)                  | 1180              |
|       | 7 Trailer direction indicators rh (to trailer connector terminal 2)                  | 1185              |
|       | 8 Tractor no. plate lights   | 3339              |
|       | 9 Earth  | 0000              |

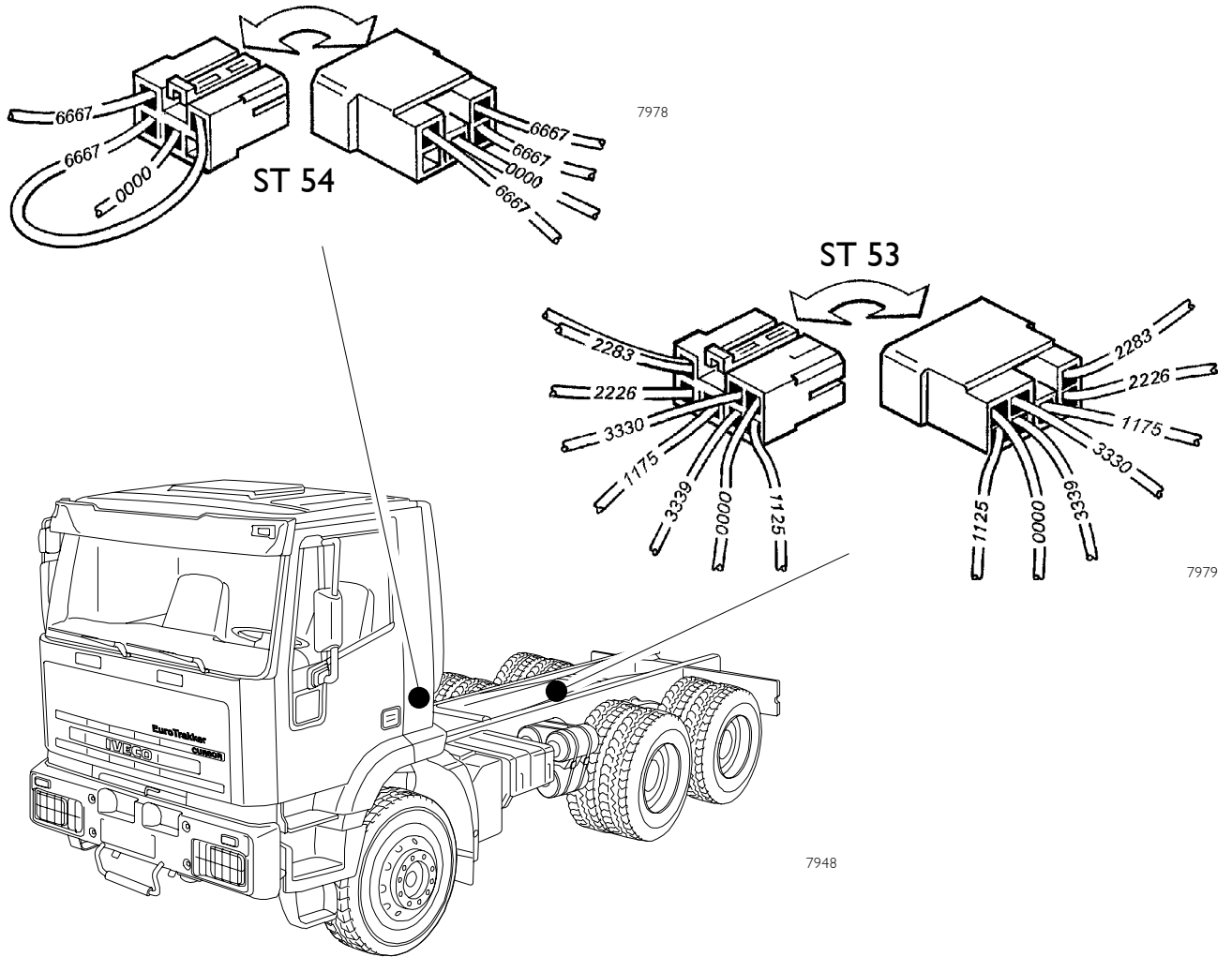


ST 51 - In branch box for additional trailer connector  
 ST 52 - In branch box for left tail lights



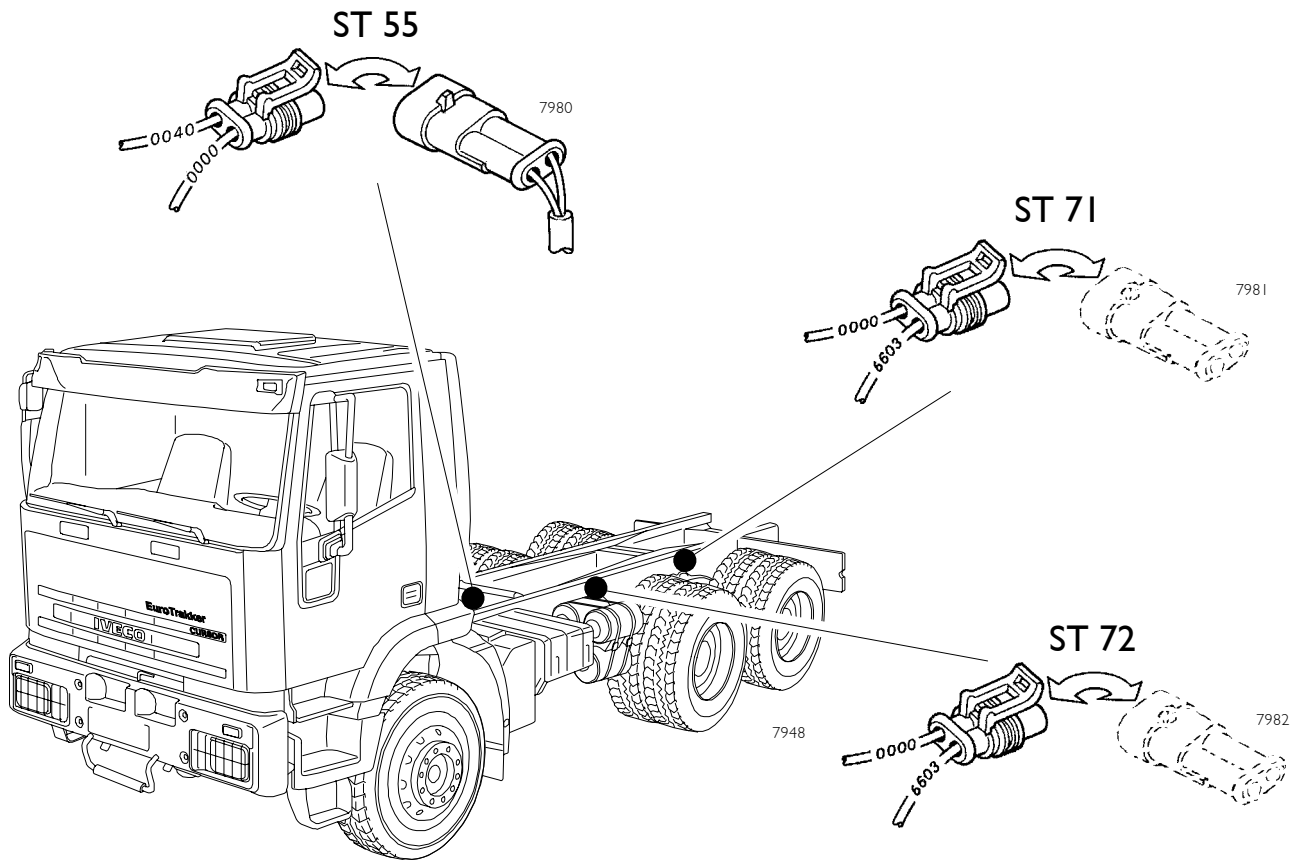
| Ref.  | Function  | Cable colour code |
|-------|---|-------------------|
| ST 51 | 1 Earth   | 0000              |
|       | 2 Positive (+15) (to additional connector for trailer terminal 11)          | 8890              |
|       | 3 To additional connector for trailer terminal 9                            | 7790              |
|       | 4 Trailer reversing lights (to additional connector for trailer terminal 8) | 2226              |
|       | 5 Trailer rear fog guard (to additional connector for trailer terminal 3)   | 2283              |
| ST    | 1 Indicator light signalling trailer axle lifted                            | 6442              |
| ST 52 | 1 Left rear direction indicator   | 1120              |
|       | 2 Left rear clearance lamp  | 3330              |
|       | 3 Left braking light  | 1175              |
|       | 4 Left rear fog guard   | 2283              |
|       | 5 Earth   | 0000              |
|       | 6 Left rear sidelight   | 3339              |
|       | 7 Left reversing light  | 2226              |

ST 53 - In branch box for right tail lights  
 ST 54 - For axle brake lining wear sensors



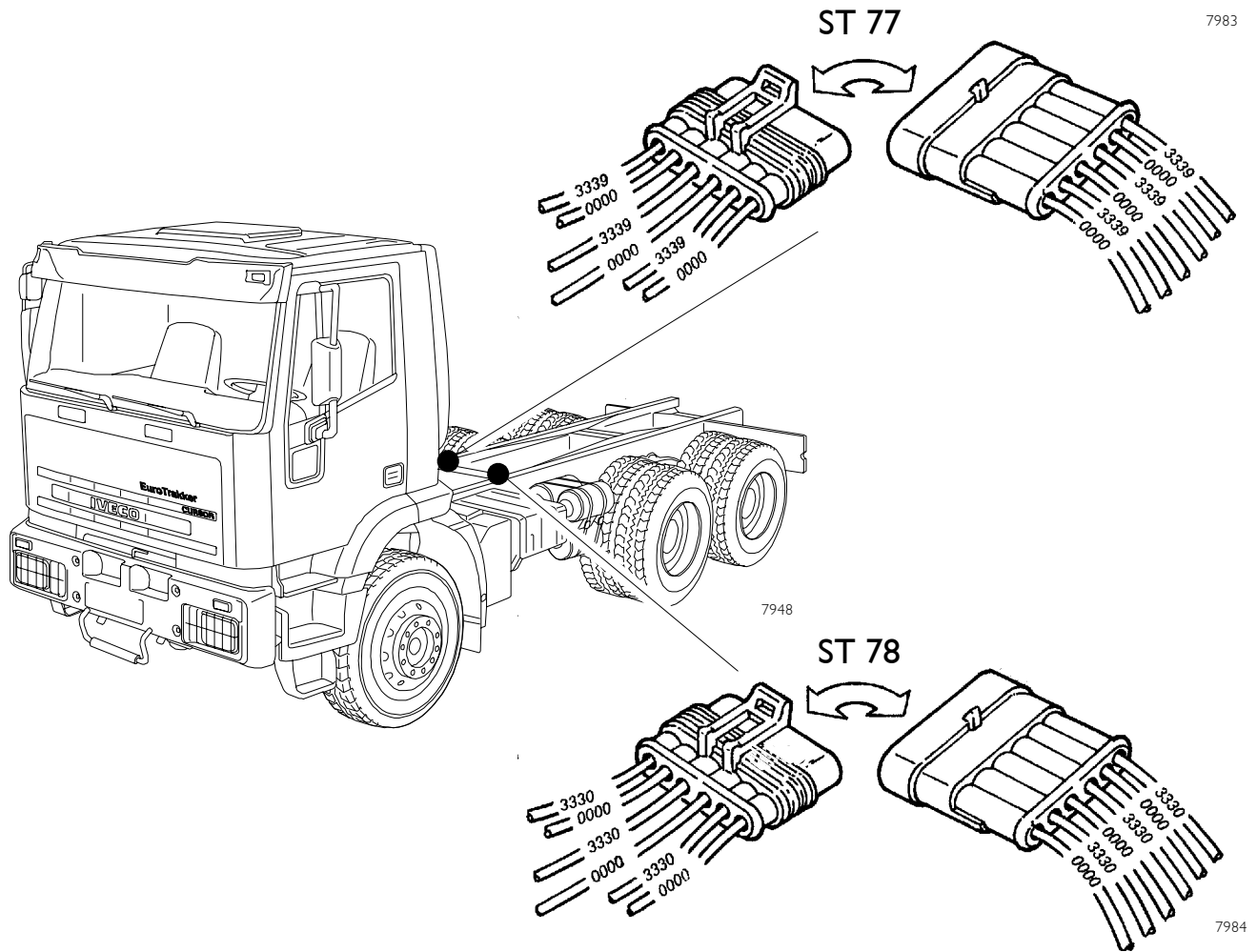
| Ref.         | Function  | Cable colour code |
|--------------|---|-------------------|
| <b>ST 53</b> | 1 Right rear direction indicator                | 1125              |
|              | 2 Right rear side light                         | 3339              |
|              | 3 Right brake light                             | 1175              |
|              | 4 Right rear reversing guard                    | 2226              |
|              | 5 Earth   | 0000              |
|              | 6 Right rear clearance lamp                     | 3330              |
|              | 7 Right rear fog guard                          | 2283              |
| <b>ST 54</b> | 1 Spare   | —                 |
|              | 2 Earth   | 0000              |
|              | 3 Bridge for rear wheel brake block wear sensor | 6667              |
|              | 4 Bridge for rear wheel brake block wear sensor | 6667              |
|              | 5 Rear brake block sensor                       | 6667              |

ST 55 - For differential lock switch  
 ST 71 - For longitudinal differential lock switch  
 ST 72 - For longitudinal differential lock switch



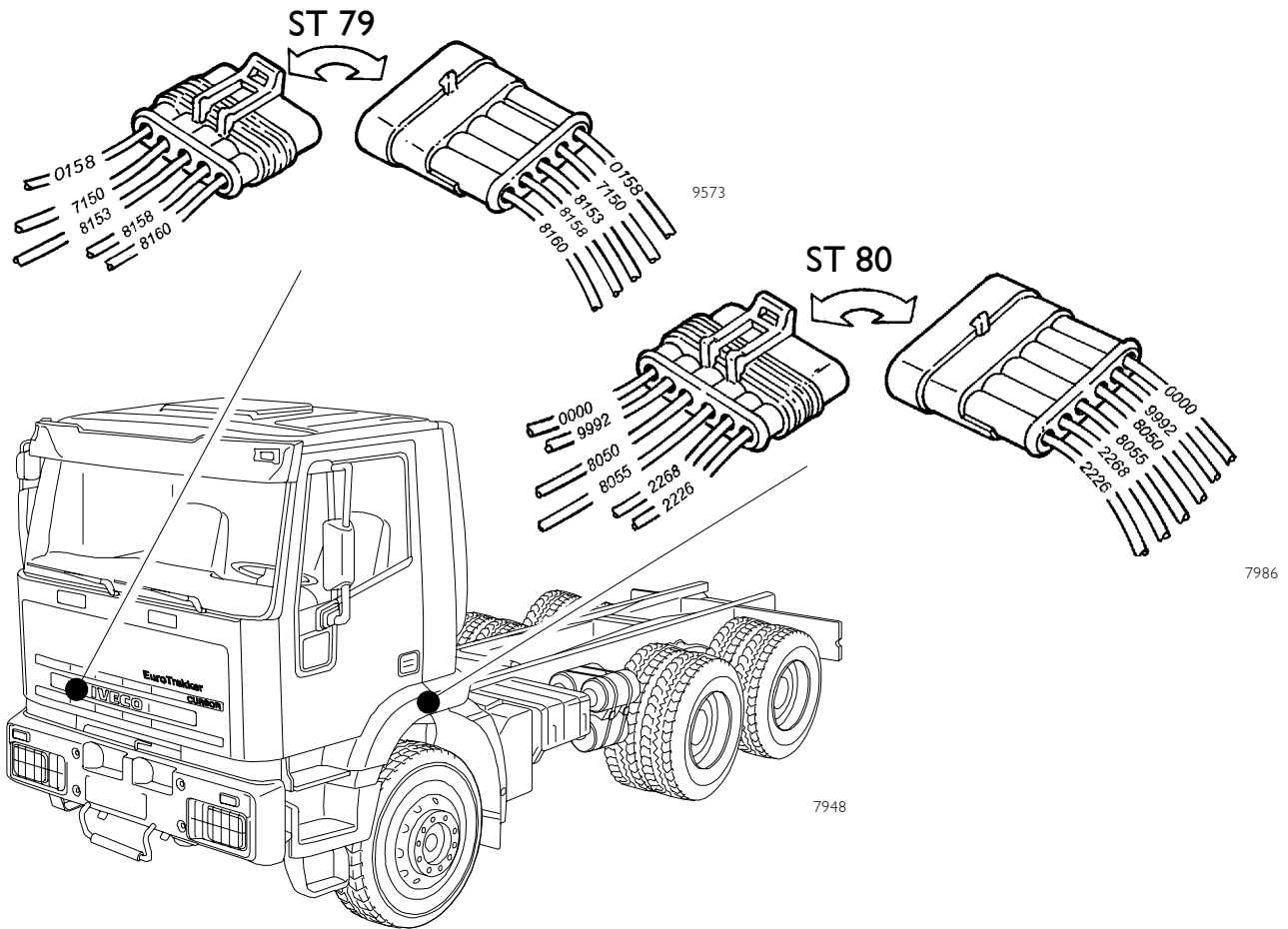
| Ref.            | Function   | Cable colour code |
|-----------------|--|-------------------|
| ST 55<br>1<br>2 | Differential lock on distributor warning lamp<br>Earth | 0040<br>0000      |
| ST 71<br>1<br>2 | Differential lock on distributor warning lamp<br>Earth | 6603<br>0000      |
| ST 72<br>1<br>2 | Differential lock on distributor warning lamp<br>Earth | 6603<br>0000      |

ST 77 - For side clearance lamps  
 ST 78 - For side clearance lamps



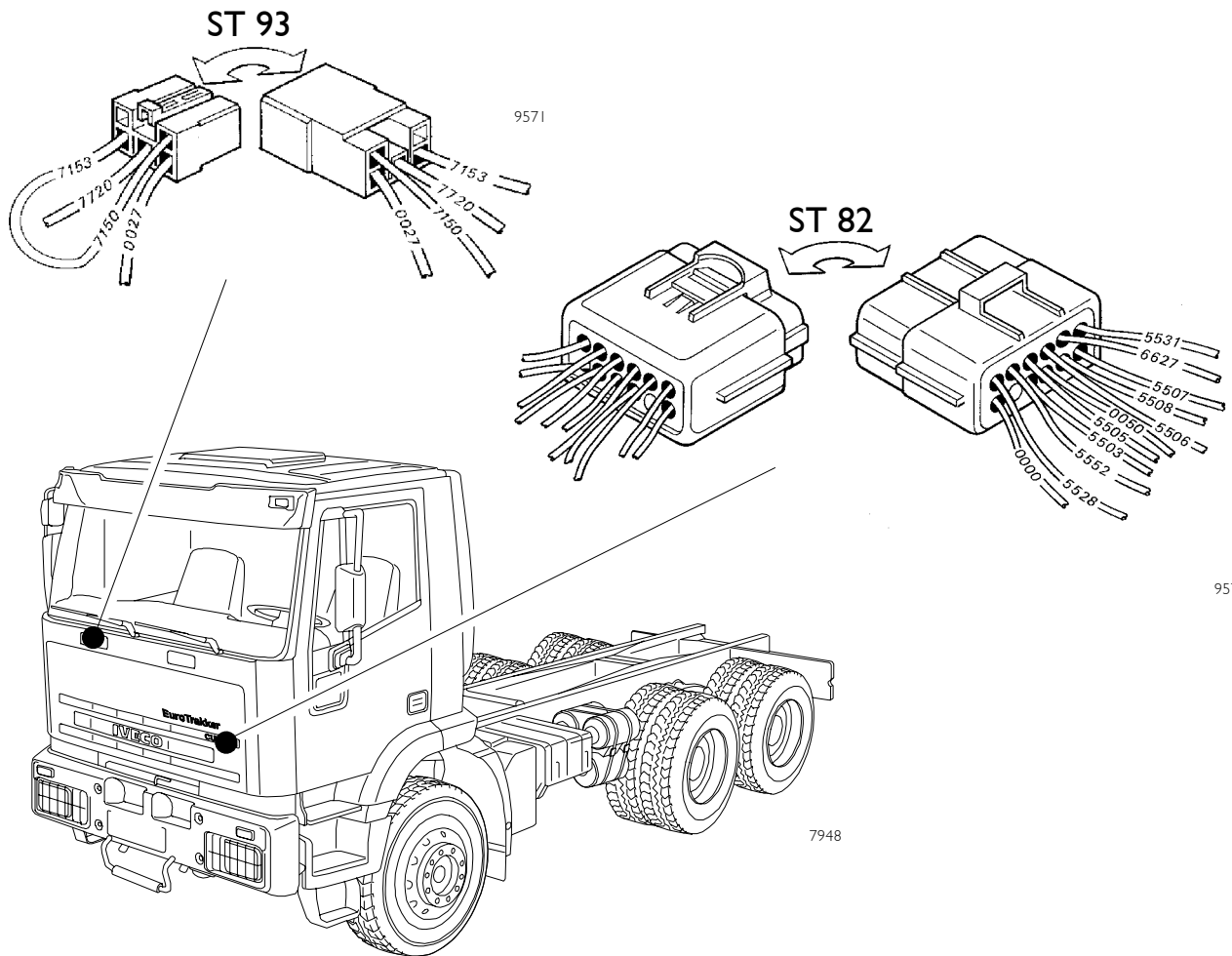
| Ref.         | Function   | Cable colour code |
|--------------|--|-------------------|
| <b>ST 77</b> | 1 Earth  | 0000              |
|              | 2 Positive (under fuse 1 of UCI) for side clearance lamps supply | 3339              |
|              | 3 Earth  | 0000              |
|              | 4 Positive (under fuse 1 of UCI) for side clearance lamps supply | 3339              |
|              | 5 Earth  | 0000              |
|              | 6 Positive (under fuse 1 of UCI) for side clearance lamps supply | 3339              |
| <b>ST 78</b> | 1 Earth  | 0000              |
|              | 2 Positive (under fuse 2 of UCI) for side clearance lamps supply | 3330              |
|              | 3 Earth  | 0000              |
|              | 4 Positive (under fuse 2 of UCI) for side clearance lamps supply | 3330              |
|              | 5 Earth  | 0000              |
|              | 6 Positive (under fuse 2 of UCI) for side clearance lamps supply | 3330              |

ST79 - For components on cab front  
 ST80 - For components on gearbox



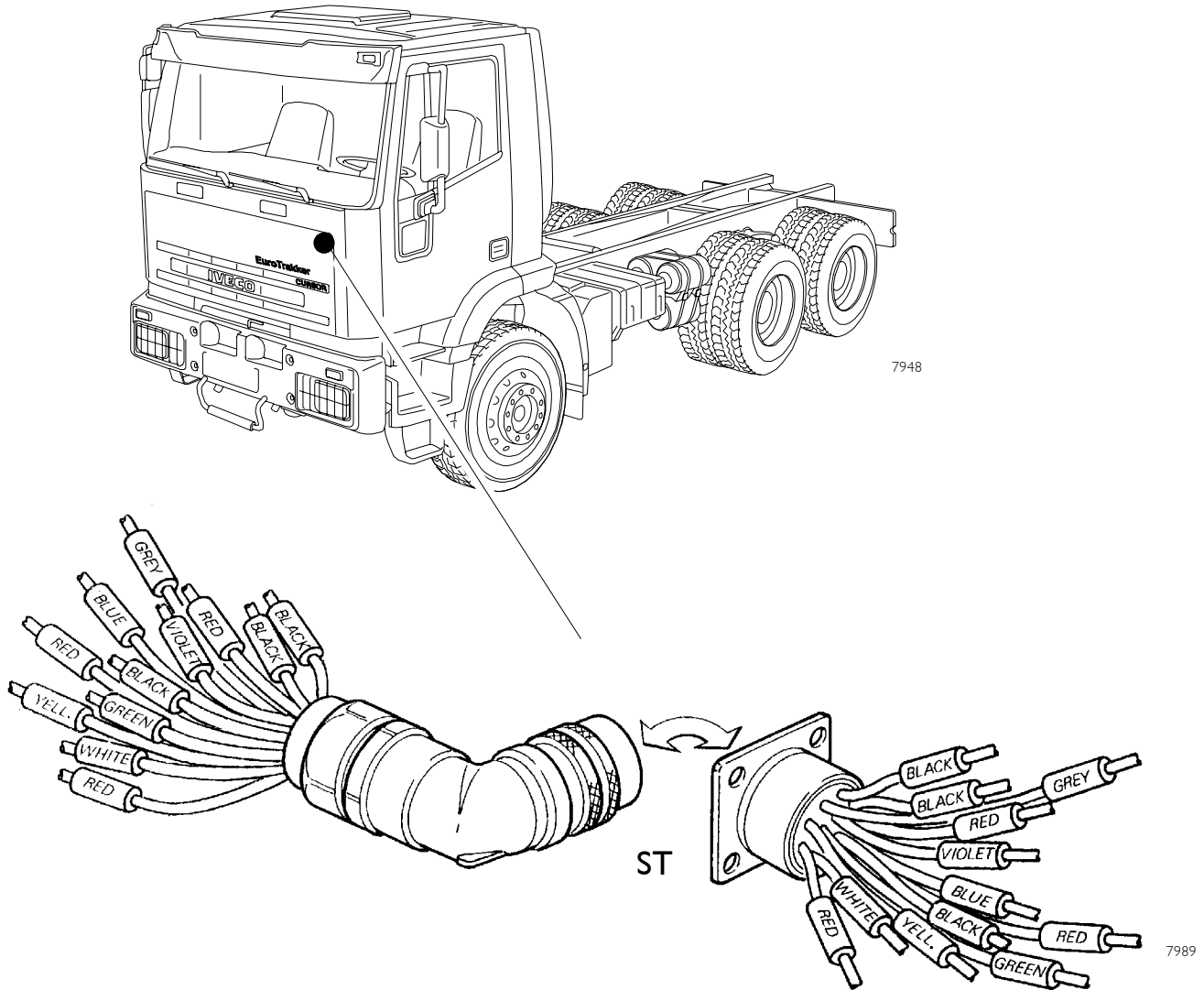
| Ref.         | Function  | Cable colour code |
|--------------|---|-------------------|
| <b>ST 79</b> | 1 Signal from switch on clutch for EDC                | <b>8160</b>       |
|              | 2 Signal from secondary braking lights switch for EDC | <b>8158</b>       |
|              | 3 Signal from primary braking lights switch for EDC   | <b>8153</b>       |
|              | 4 EDC/MS6 system supply from main relay               | <b>7150</b>       |
|              | 5 To engine brake control switch                      | <b>0158</b>       |
| <b>ST 80</b> | 1 Reversing light supply                              | <b>2226</b>       |
|              | 2 Reversing light switch supply                       | <b>2268</b>       |
|              | 3 Positive to anti-starting switch with gear engaged  | <b>8055</b>       |
|              | 4 Gearbox in neutral indicator switch                 | <b>8050</b>       |
|              | 5 Supply for reduction unit control on gearbox        | <b>9992</b>       |
|              | 6 Earth   | <b>0000</b>       |

ST 82 - Components on engine  
 ST 93 - Retarder cut out with ABS



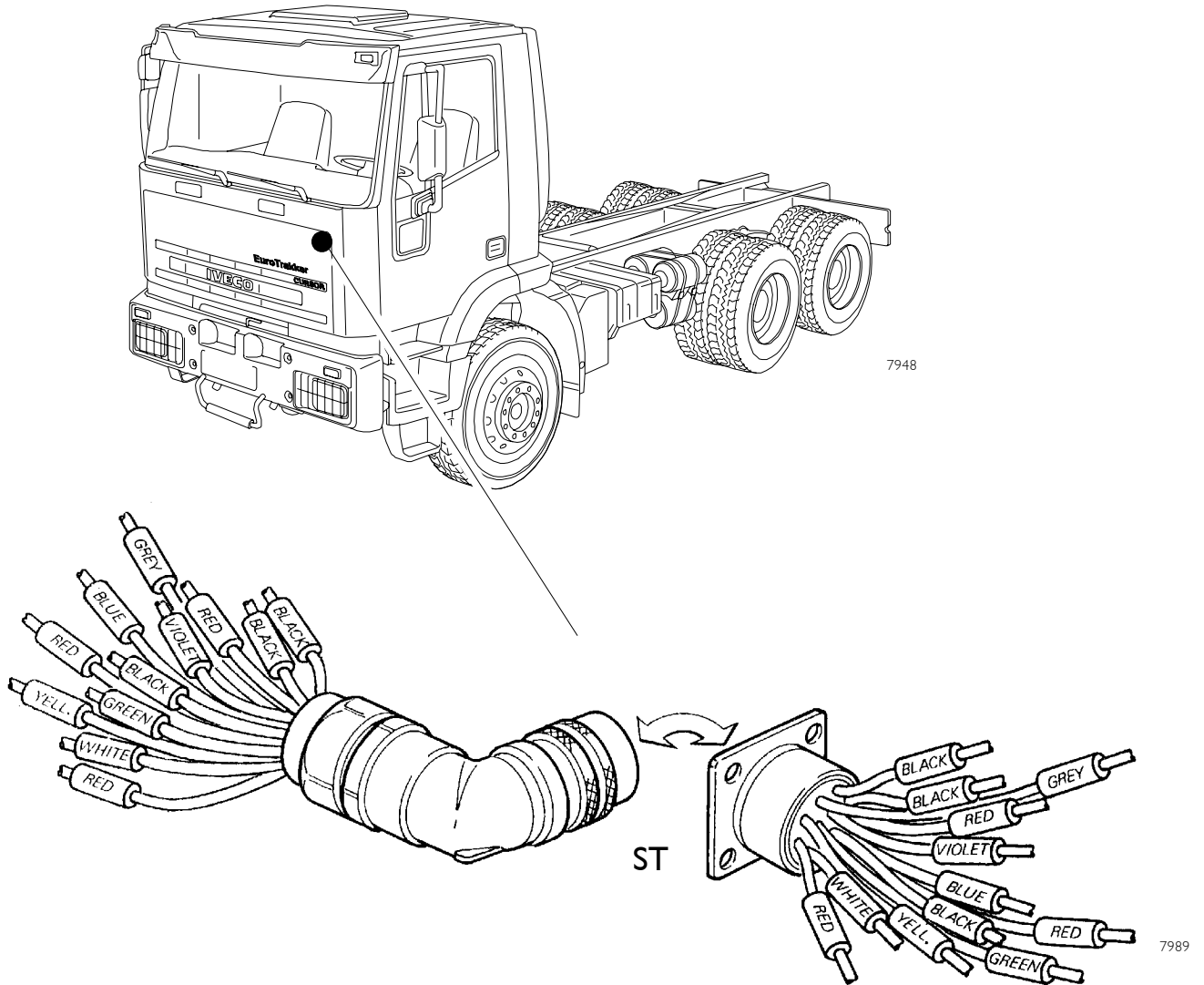
| Ref.  | Function   | Cable colour code |
|-------|--|-------------------|
| ST 82 | 1 Earth  | 0000              |
|       | 2 Spare  | —                 |
|       | 3 Minimum oil pressure warning lamp  | 5503              |
|       | 4 Earth for engine oil pressure gauge  | 0050              |
|       | 5 Positive fr engine oil pressure transmitter supply                           | 5508              |
|       | 6 Signal for engine oil pressure gauge   | 5507              |
|       | 7 Maximum water temperature indicator  | 5528              |
|       | 8 Engine water temperature signalling  | 5552              |
|       | 9 Engine oil level sensor  | 5505              |
|       | 10 Engine oil level sensor   | 5506              |
|       | 11 Engine brake on warning lamp  | 6627              |
|       | 12 Clogged fuel filter indicator light earth                                   | 5531              |
| ST 93 | 1 Terminal 85 retarder control relay - ABS                                     | 0027              |
|       | 2 Positive from ABS for switching off engine brake retarder and Cruise Control | 7720              |
|       | 3 To relay for switching off Cruise Control with ABS on                        | 7153              |
|       | 4 To EDC activation switch (jumper with pin3)                                  | 7150              |
|       | 5 Spare  | —                 |

ST - For electronic injection solenoid valve (F2B)



| Ref. | Function   | Cable colour code |
|------|--|-------------------|
| ST   | A To solenoid valve on cylinder 1 (from EDC control unit terminal 35A) | WHITE             |
|      | B To solenoid valve on cylinder 1 (from EDC control unit terminal 24A) | RED               |
|      | C To solenoid valve on cylinder 2 (from EDC control unit terminal 34A) | YELLOW            |
|      | D To solenoid valve on cylinder 2 (from EDC control unit terminal 24A) | RED               |
|      | E To solenoid valve on cylinder 3 (from EDC control unit terminal 33A) | GREEN             |
|      | F To solenoid valve on cylinder 3 (from EDC control unit terminal 24A) | RED               |
|      | G To solenoid valve on cylinder 4 (from EDC control unit terminal 26A) | BLUE              |
|      | H To solenoid valve on cylinder 4 (from EDC control unit terminal 25A) | BLACK             |
|      | I To solenoid valve on cylinder 5 (from EDC control unit terminal 28A) | VIOLET            |
|      | L To solenoid valve on cylinder 5 (from EDC control unit terminal 25A) | BLACK             |
|      | M To solenoid valve on cylinder 6 (from EDC control unit terminal 27A) | GREY              |
|      | N To solenoid valve on cylinder 6 (from EDC control unit terminal 25A) | BLACK             |

ST - For electronic injection solenoid valve (F3B)



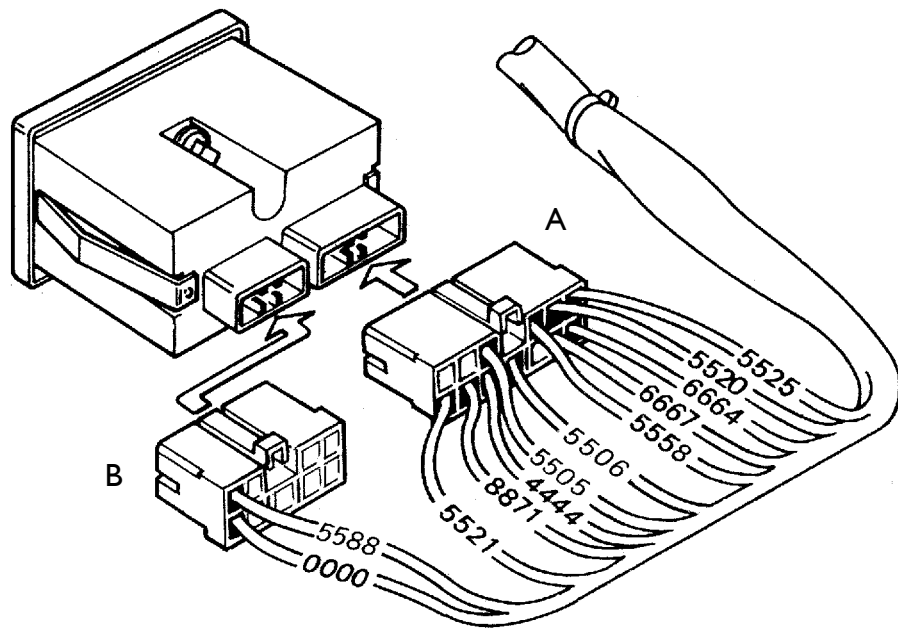
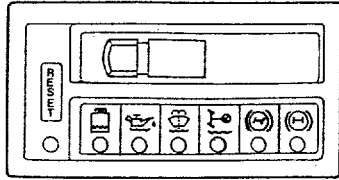
| Ref. | Function   | Cable colour code |
|------|--|-------------------|
| ST   | A To solenoid valve on cylinder 1 (from EDC control unit terminal 35A)       | WHITE             |
|      | B To solenoid valve on cylinder 1 (from EDC control unit terminal 24A)       | YELLOW            |
|      | C  |                   |
|      | D  |                   |
|      | E To solenoid valve on cylinder 3 (from EDC control unit terminal 33A)       | GREEN             |
|      | F To solenoid valve on cylinder 1,2,3 (from EDC control unit terminal 24A)   | RED               |
|      | G To solenoid valve on cylinder 4 (from EDC control unit terminal 26A)       | BLUE              |
|      | H To solenoid valve on cylinder 5 (from EDC control unit terminal 28A)       | VIOLET            |
|      | I To engine brake solenoid valve (from EDC control unit terminal 3A and 18A) | BROWN             |
|      | L To engine brake solenoid valve (from EDC control unit terminal 32A)        | ORANGE            |
|      | M To solenoid valve on cylinder 6 (from EDC control unit terminal 27A)       | GREY              |
|      | N To solenoid valve on cylinder 4,5,6 (from EDC control unit terminal 25A)   | BLACK             |



**IVECO Control**

IVECO Control connectors

**50000**

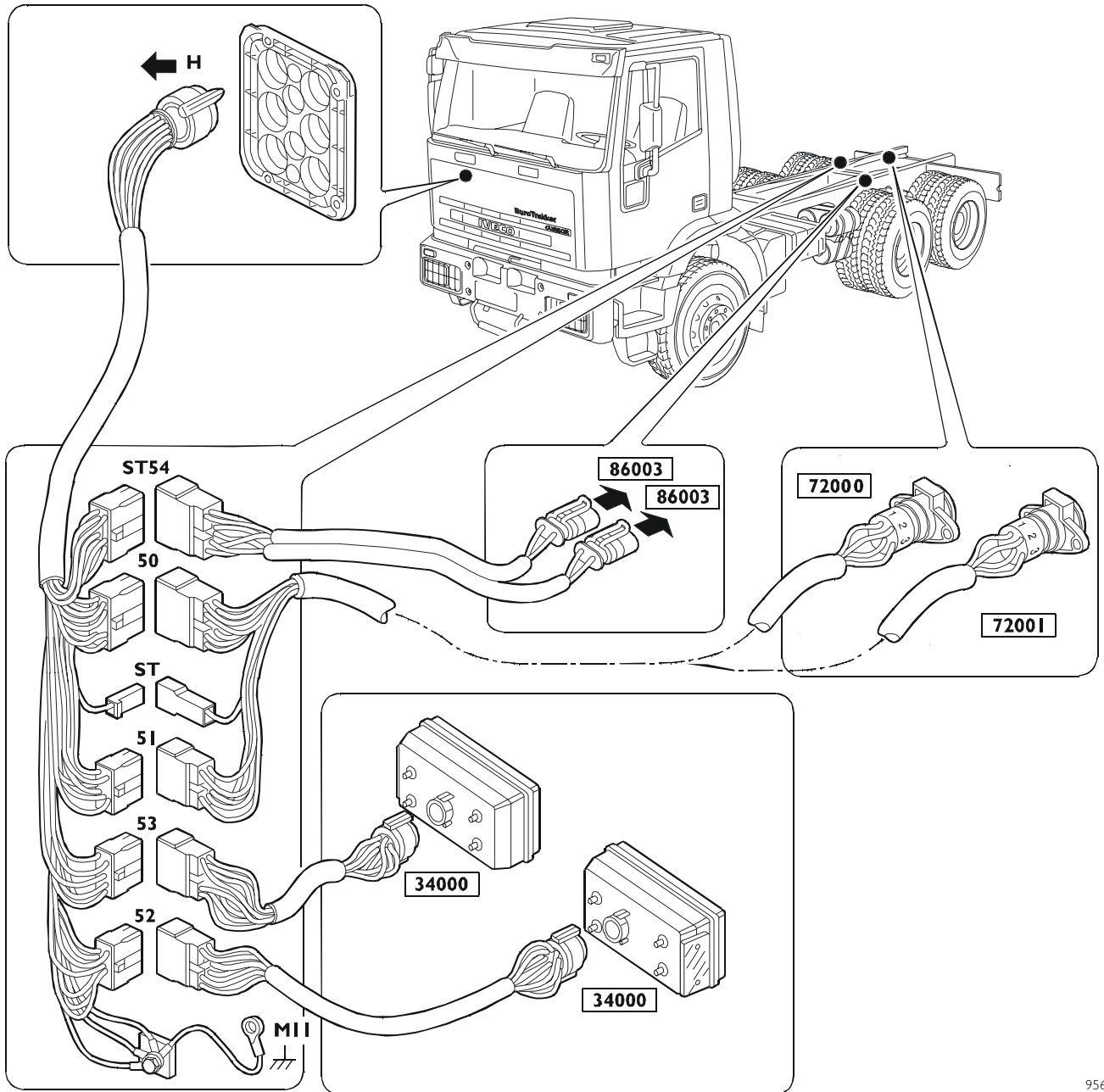


8017

| Ref.     | Function   | Cable colour code |
|----------|--|-------------------|
| <b>A</b> | 1 Front axle brake pad wear indicator                      | 6664              |
|          | 2 Rear axle brake pad wear or generic indicator            | 6667              |
|          | 3 Spare  | —                 |
|          | 4 Engine oil level sensor                                  | 5506              |
|          | 5 Instrument panel lighting after rheostat (or switch)     | 4444              |
|          | 6 Supply for engine operating control equipment after fuse | 8871              |
|          | 7 Low windscreen washer fluid level warning lamp           | 5521              |
|          | 8 Low power steering fluid warning lamp                    | 5525              |
|          | 9 Minimum cooling water level indicator                    | 5520              |
|          | 10 Signal from control unit to engine oil level gauge      | 5558              |
|          | 11 Engine oil level sensor                                 | 5505              |
|          | 12 Spare   | —                 |
|          | 13 Spare   | —                 |
| <b>B</b> | 1 Spare  | —                 |
|          | 2 Spare  | —                 |
|          | 3 Spare  | —                 |
|          | 4 Spare  | —                 |
|          | 5 Earth  | 0000              |
|          | 6 Spare  | —                 |
|          | 7 Spare  | —                 |
|          | 8 Spare  | —                 |
|          | 9 Adjusted voltage to engine oil level gauge               | 5588              |

**Rear light wiring**

Wiring from front wall to tail lights



9563

| Component code    | Description   |
|-------------------|---|
| 34000             | Right rear multi-function light                                 |
| 34000             | Left rear multi-function light                                  |
| 72000             | Normal 7 pin connector for electrical connection to trailer     |
| 72001             | Additional 7 pin connector for electrical connection to trailer |
| 86003             | Sensors for rear wheel brake show wear signalling               |
| ◀H                | Front wall connector for tail lights                            |
| ST 50/51/52/53/54 | Connectors in branch box for taillights                         |
| MII               | Earth point on right sidemember for tail light branch box       |

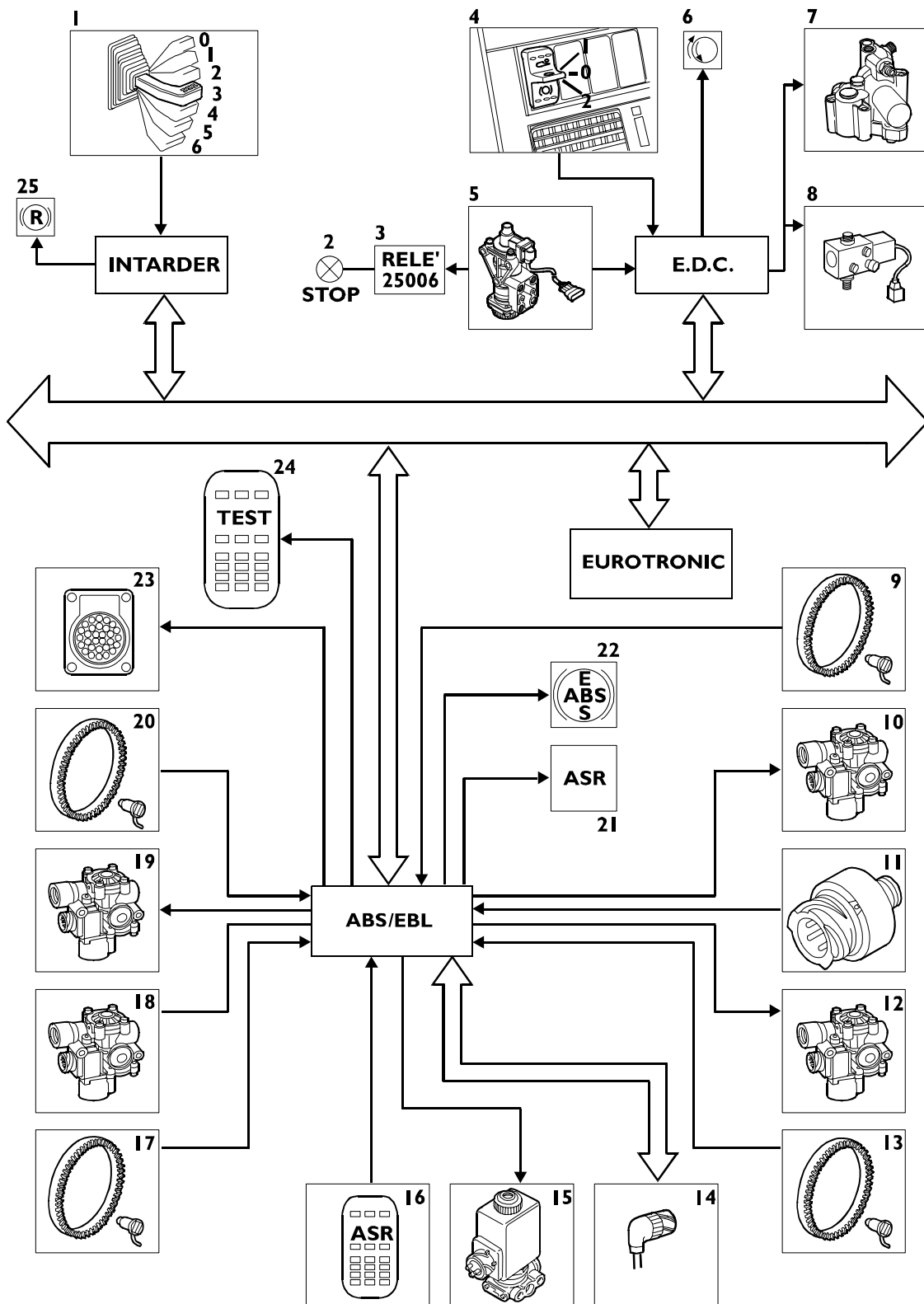


### Specific circuits

|                   | Page |
|-------------------|------|
| ABS/EBS .....     | 3    |
| EDC .....         | 64   |
| ECAS .....        | 95   |
| IMMOBILIZER ..... | 136  |



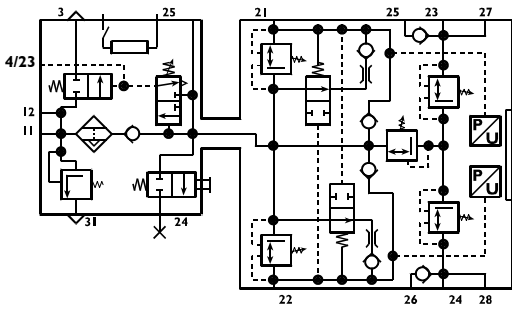
**ABS OPERATION DIAGRAM (CURSOR 8 - 10 - 13)**



**KEYS**

- 1. Intarder selector – 2. Stop indicator – 3. Stop light remote control switch – 4. Engine brake selector – 5. Duplex distributor – 6. Engine brake warning light – 7. Engine brake solenoid valve – 8. VGT solenoid valve – 9. Phonic wheel and rear right sensor – 10. ABS rear right solenoid valve – 11. EBL pressure sensor – 12. ABS rear left solenoid valve – 13. Phonic wheel and rear left sensor – 14. 7-pole joint for trailer connection – 15. ASR solenoid valve – 16. ASR limiting switch – 17. Phonic wheel and front left sensor – 18. ABS front left solenoid valve – 19. ABS front right solenoid valve – 20. Phonic wheel and front right sensor – 21. ASR warning light – 22. ABS failure warning light (yellow) – 23. 30-pole diagnosis connector – 24. Test button (Blink Code activation) – 25. Intarder warning light

74241



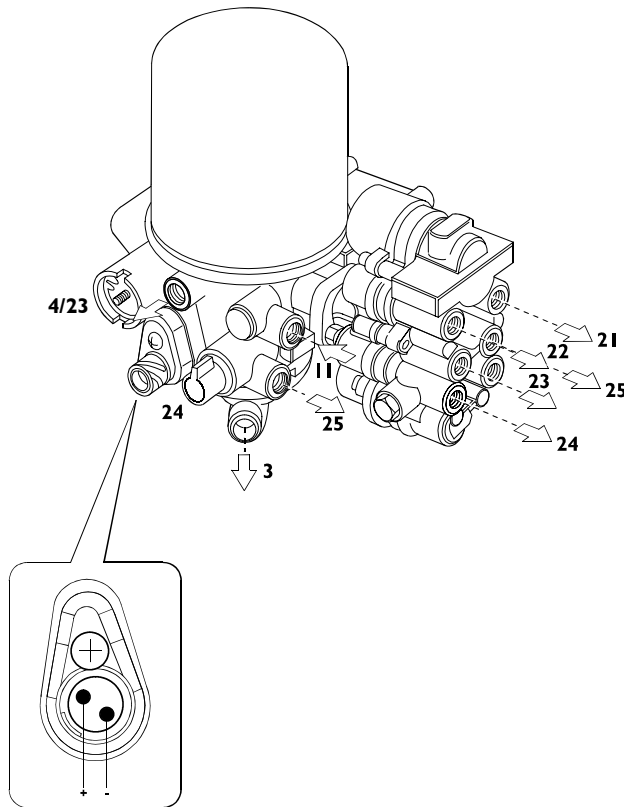
WIRING DIAGRAM

**COMPONENTS**

**APU (Air Processing Unit)**

This component integrates the functions of pressure regulator, drier, 4-way protection valve, pressure reducer for parking, services and trailer.

Compared with the previous systems, the cartridge regeneration tank is no longer fitted.



6171

TECHNICAL VIEW

**Air connections**

|   |   |
|---|---|
| 11 - From compressor                    | 21 - To rear axle air tank                  |
| 24 - To services                        | 22 - To front axle air tank                 |
| 25 - To air suspension                  | 23 - To parking brake plus trailer air tank |
| 4/23 - To compressor (Control for E.S.) | 24 - To services                            |
| 3 - Discharge                           | 25 - To parking brake distributor (lever)   |

## Operation

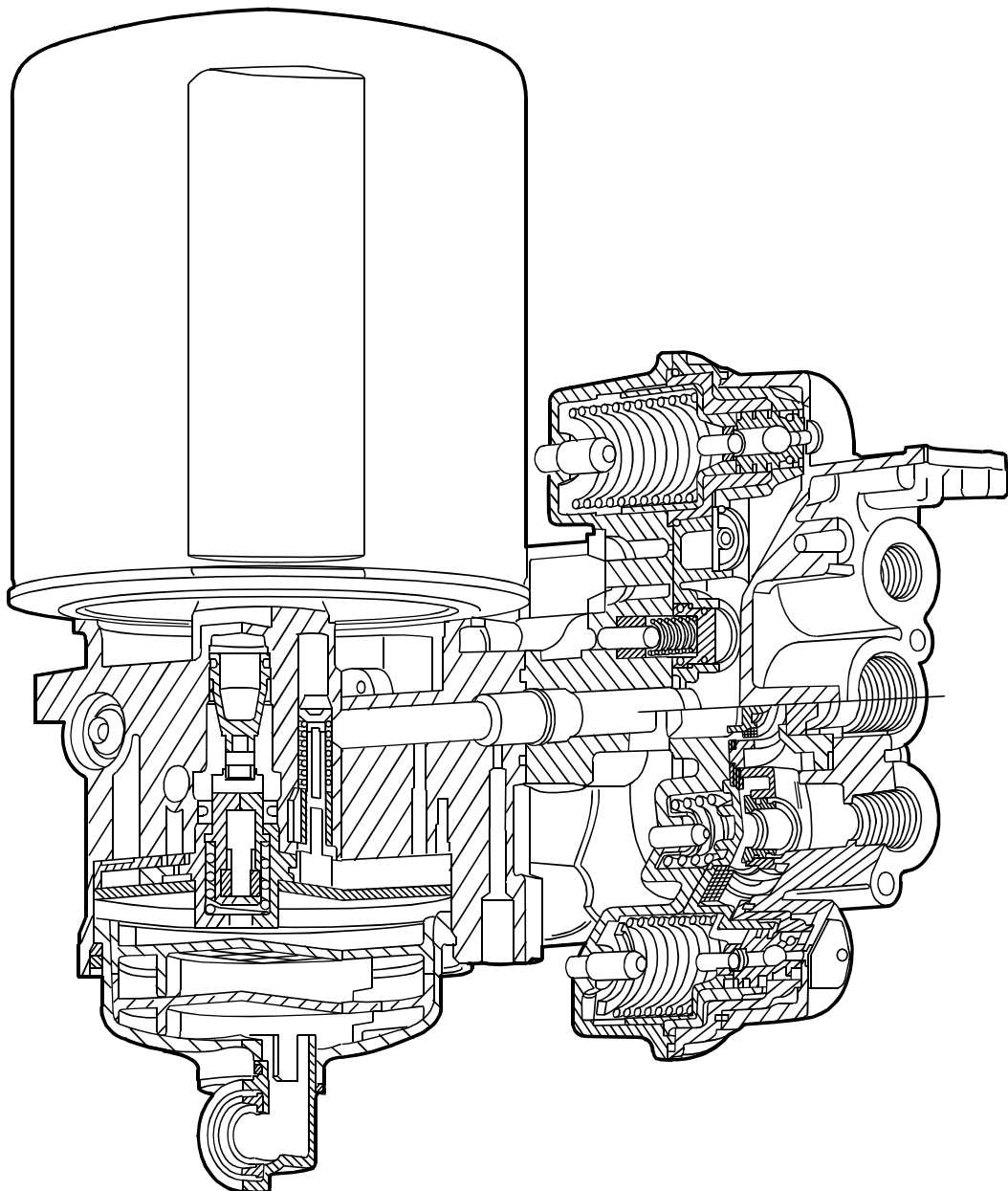
The component is formed of two parts: the first with the task of maintaining adequate cleanliness and humidity for the system and adjustment of the pressure at 10.5 bar (Drier); the second with the task of distributing the air to the various circuits of the pneumatic system at their operating pressure (Protection valve with built-in pressure reducer).

The incoming air from the duct 1 is filtered by the cartridge and sent to the vehicle's pneumatic system. When it reaches a pressure of 10.5 bar the pressure regulator is triggered, the outlet of the "drier" section is put into communication with the discharge 3.

In this phase there is a return of air from the system for about 20 seconds which flushes the cartridge.

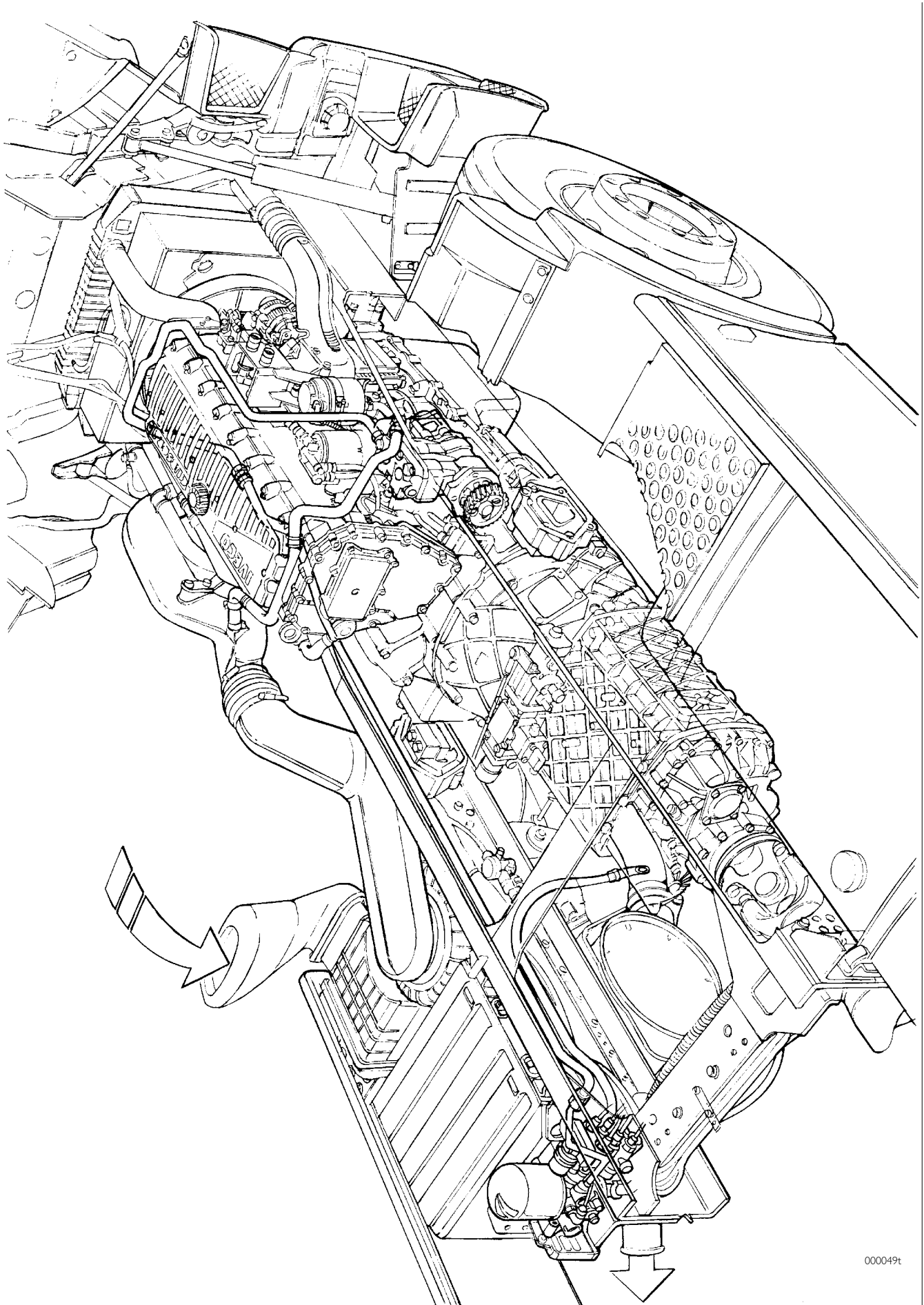
The air leading from the "Protection valve" section is distributed at 10.5 bar by ducts 21 and 22 while it is distributed from the other ducts at 8.5 bar because it passes through a single pressure reducer.

The following page shows installation on the vehicle of this component.



000014t





000049t

### **“ABS” System (Anti - Lock Brake System)**

The braking of a vehicle in motion and the consequent deceleration and stopping space mainly depend on the grip between the tyre surface and the type of road surface.

With a perfectly efficient braking system, further improvement of braking can be obtained only acting on the tyre friction characteristics or on the quality of the road surface.

Even in these optimum conditions, absolute braking safety is not however guaranteed when needing to cope with particular critical situations, such as low grip due to the conditions of the wet or icy road surface: this compels the driver to moderate the braking action to prevent one or more wheels from partially locking, with the possibility of dangerous skidding.

Thus the function of the “ABS” device is to ensure vehicle stability, (under all braking conditions) preventing the wheels from locking regardless of the conditions of the road surface, in order to ensure total use of the grip available.

Also in emergency braking, the system makes it possible to keep control, i.e. acting on the steering to avoid obstacles, without the danger of skidding.

Briefly, the wheel anti-lock system (ABS):

- Prevents all wheels from locking when braking the vehicle regardless of the conditions of the road surface.
- Reduces stopping distances.
- Offers safety to the driver who can maintain the stability and steerability of the vehicle.

### **“ASR” system (Anti Slip Regulator)**

The slipping of the driving wheels of a truck during acceleration causes harmful consequences, such as reduction of the traction force, loss of grip between the tyre and the road with dangerous skidding resulting in loss of control of the vehicle.

The function of the ASR is that of avoiding unwanted slipping during acceleration and on bends, particularly on icy or slippery roads or for “off-road” manoeuvres with water and mud.

Briefly, the ASR anti slip system:

- Prevents the driving wheels from slipping when moving off and during travel intervening in differential braking on the wheels and if necessary optimising the engine torque.
- Maintains the optimum traction rate when the vehicle is on roads with a low grip coefficient.
- Improves stability especially on bends with a low grip coefficient.
- Limits tyre consumption.

### **EBL (Electronic Brakes Limiter)**

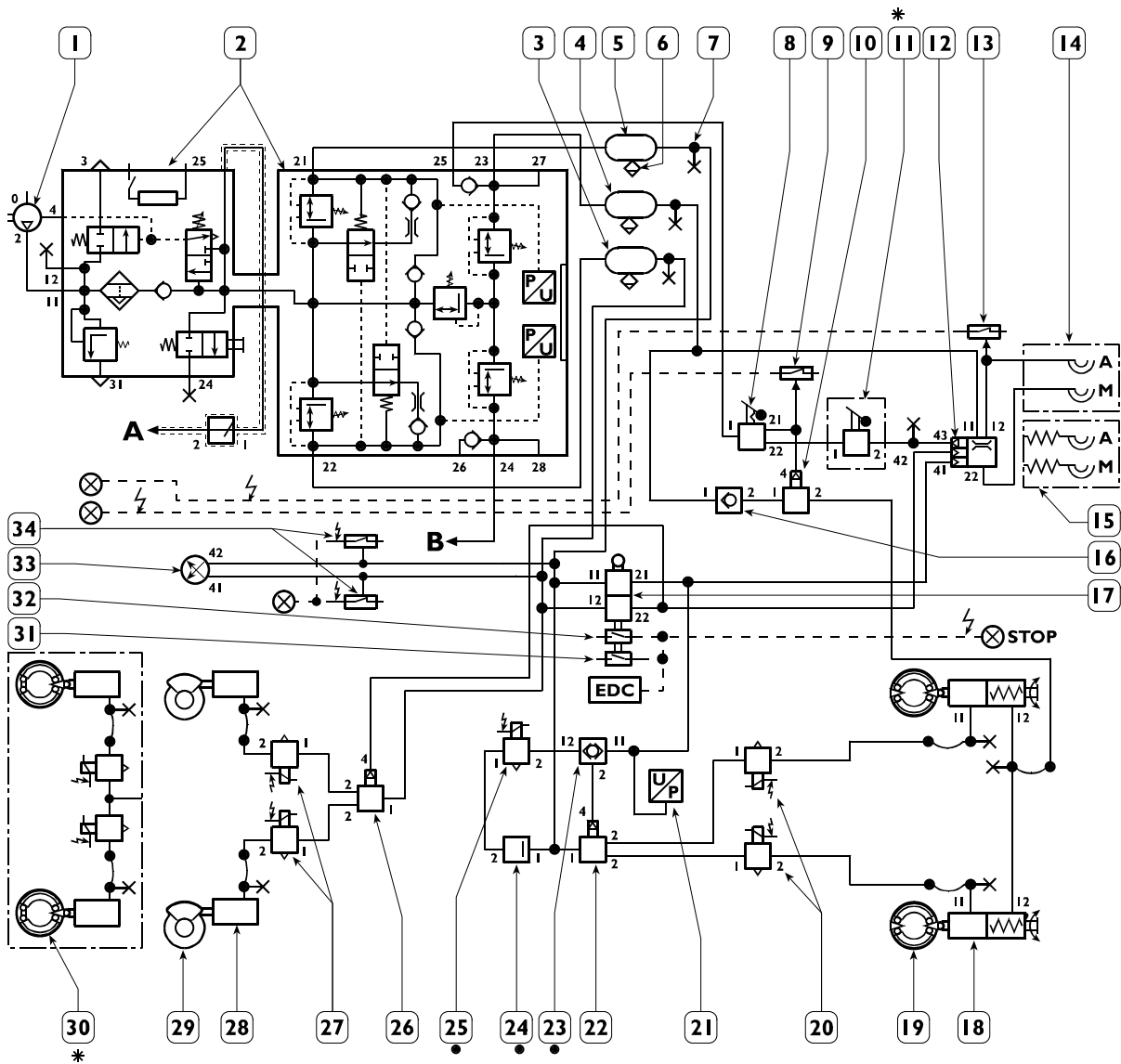
The EBL function controls “slipping” of the rear axle wheels comparing it with the speed of the front axle wheels.

The input data at the control unit are the revolutions of the wheels and the braking pressure detected by the pressure sensor installed upstream of the rear axle ABS modulators.

On the basis of these values, the control unit calculates the vehicle speed, vehicle deceleration, “slipping” of the rear axle wheels and the minimum deceleration foreseen.

The EBL function is activated (the rear axle ABS modulators maintain the pressure set) when the driver applies too much braking force in relation to the load conditions on the vehicle, namely, when the rear axle slipping and vehicle deceleration thresholds are exceeded.

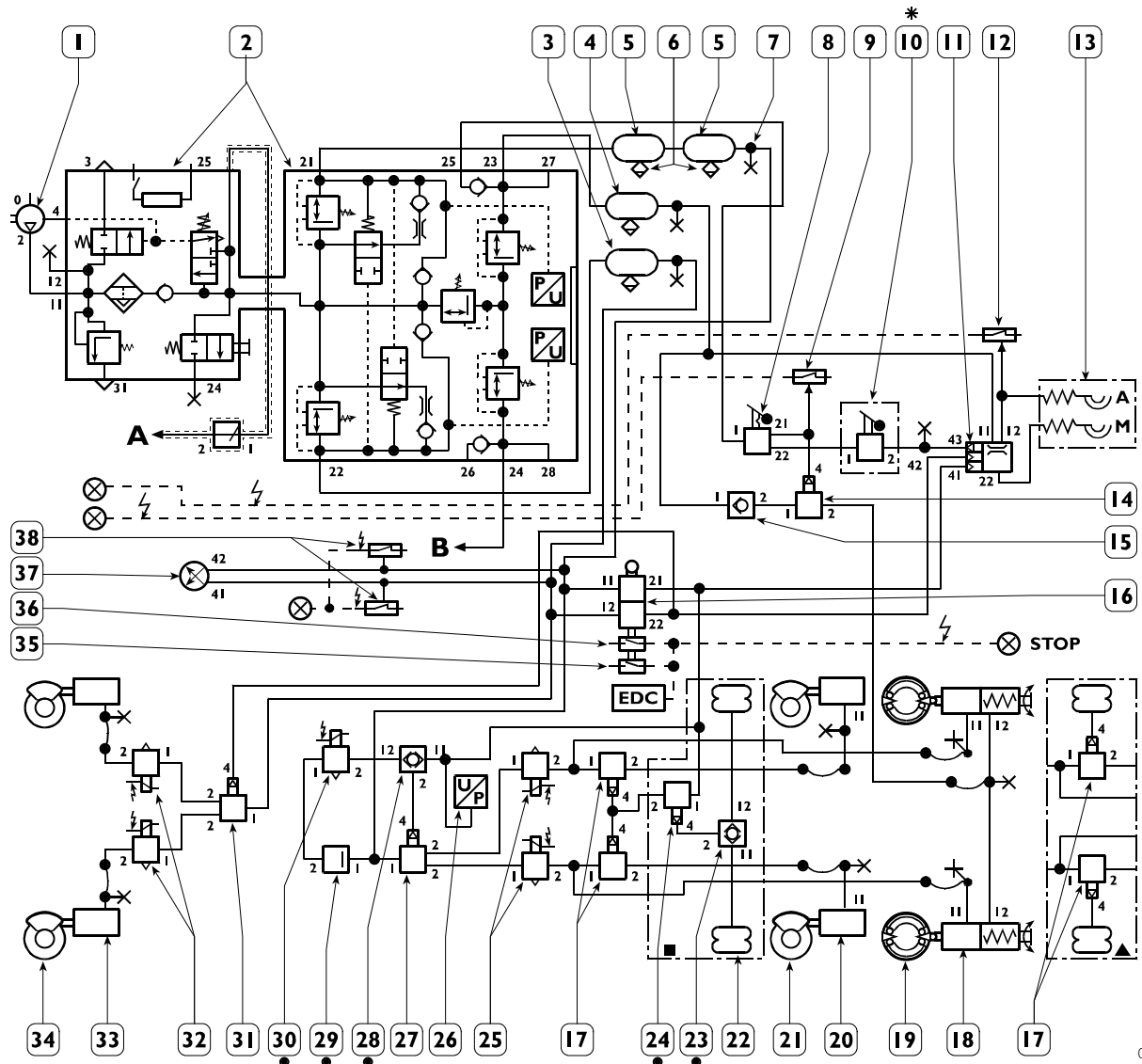
Principle layouts of air systems for I90E../P/FP vehicles



000015t

- III.1 1. ES COMPRESSOR - 2. APU UNIT (AIR PROCESSING UNIT) - 3. 20 L. FRONT AXLE AIR TANK - 4. 20 L. PARKING BRAKE AND TRAILER CHARGING AIR TANK - 5. 30 L. REAR AXLE AIR TANK - 6. MANUAL CONDENSATION DRAIN VALVE - 7. PNEUMATIC CONTROL SOCKET - 8. PARKING BRAKE MANUAL DISTRIBUTOR - 9. HANDBRAKE ON SIGNAL LOW PRESSURE SWITCH - 10. PARKING BRAKE CONTROL RELAY VALVE - 11. TRAILER BRAKING CONTROL MANUAL DISTRIBUTOR - 12. TRAILER CONTROL TRIPLE SERVODISTRIBUTOR - 13. TRAILER AUTOMATIC LOW PRESSURE SWITCH - 14. TRAILER COUPLING HALF JOINTS (TRUCK VERSION) - 15. SEMI-TRAILER COUPLING HALFJOINTS (TRACTOR VERSION)- 16. ONE-WAY VALVES - 17. DUPLEX DISTRIBUTOR - 18. DOUBLE BRAKE CYLINDER - 19. DUOSERVO DRUM BRAKES - 20. REAR AXLE ABS SOLENOID VALVES - 21. REAR AXLE REQUIRED BRAKING PRESSURE SENSOR - 22. REAR AXLE BRAKING CONTROL RELAY VALVE - 23. DOUBLE STOP VALVE - 24. NO RETURN CONTROLLED PRESSURE VALVE - 25. ASR SOLENOID CONTROL VALVE - 26. FRONT AXLE BRAKING CONTROL RELAY VALVE - 27. FRONT AXLE ABS CONTROL SOLENOID VALVE - 28. DIAPHRAGM BRAKE CYLINDER - 29. FRONT AXLE DISK BRAKE ASSEMBLY - 30. FRONT AXLE DUOSERVO DRUM BRAKE ASSEMBLY - 31. EDC INDICATOR SWITCH - 32. BRAKING LIGHTS CONTROL SWITCH - 33. FRONT/REAR AXLE PRESSURE GAUGE - 34. FRONT/REAR AXLE LOW PRESSURE SWITCH - A. TO AIR SUSPENSION - B. TO SERVICES SYSTEM  
 \* OPTIONAL  
 ● ONLY FOR VEHICLES WITH ASR

440E..TXP vehicles

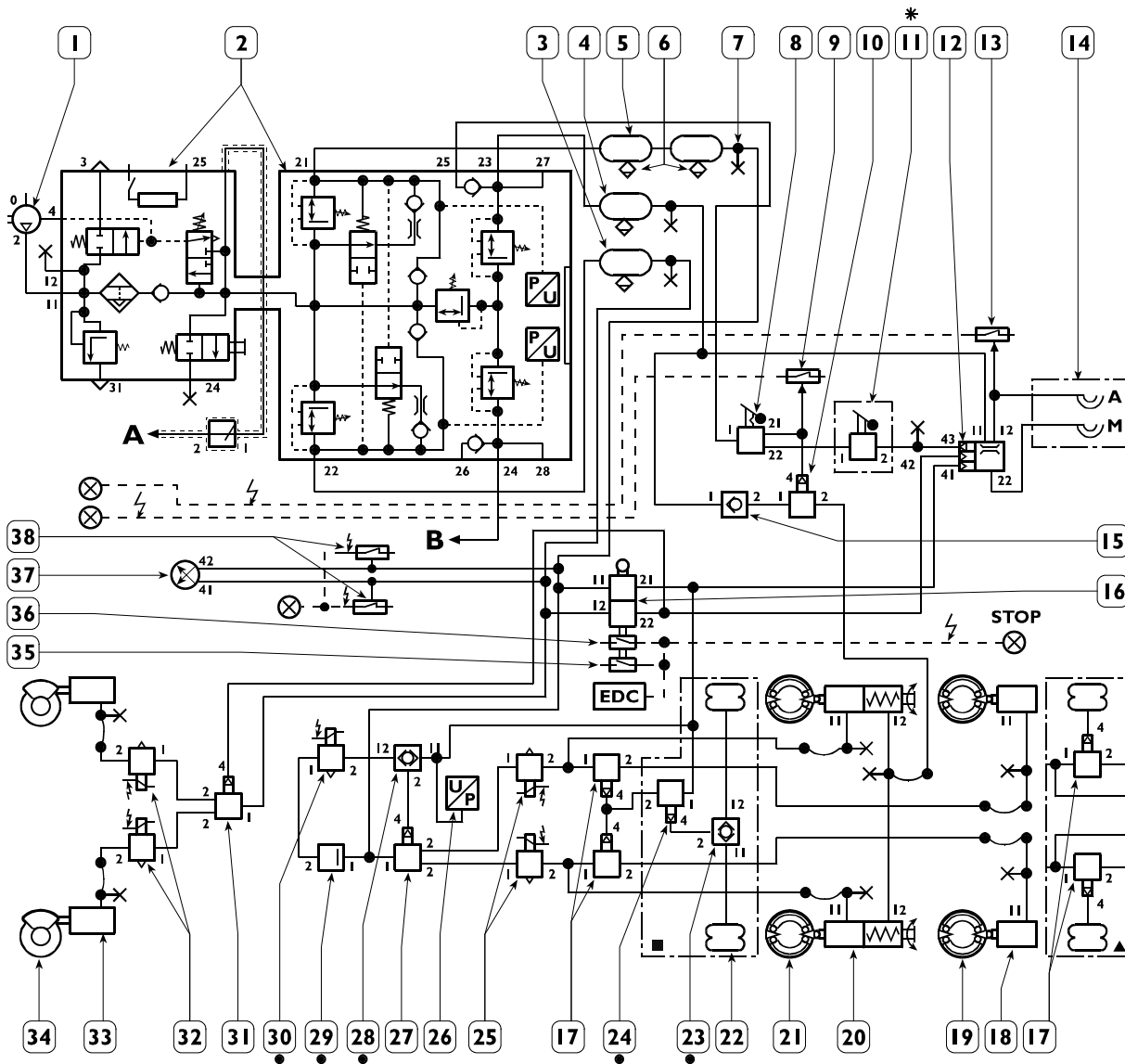


000016t

- III.2 1. ES COMPRESSOR - 2. APU UNIT (AIR PROCESSING UNIT) - 3. 20 L. FRONT AXLE AIR TANK - 4. 20 L. PARKING BRAKE AND TRAILER CHARGING AIR TANK - 5. 30 L. AND 15 L. REAR AXLE AIR TANKS - 6. MANUAL CONDENSATION DRAIN VALVE - 7. PNEUMATIC CONTROL SOCKET - 8. PARKING BRAKE DISTRIBUTOR - 9. HANDBRAKE ON SIGNAL LOW PRESSURE SWITCH - 10. TRAILER BRAKING CONTROL MANUAL DISTRIBUTOR - 11. TRIPLE SERVODISTRIBUTOR CONTROL - 12. TRAILER AUTOMATIC LOW PRESSURE SWITCH - 13. SEMI-TRAILER COUPLING HALFJOINTS - 14. PARKING CONTROL RELAY VALVE - 15. ONE-WAY VALVE - 16. DUPLEX DISTRIBUTOR - 17. ADDITIONAL AXLE BRAKING CONTROL RELAY VALVE - 18. DOUBLE BRAKE CYLINDER - 19. DUOSERVO DRUM BRAKES - 20. DIAPHRAGM BRAKE CYLINDER - 21. ADDITIONAL AXLE DISK BRAKE ASSEMBLY - 22. ADDITIONAL AXLE AIR SPRINGS - 23. DOUBLE STOP VALVE - 24. RELAY VALVE FOR ADDITIONAL AXLE LOAD RATIO - 25. REAR AXLE ABS SOLENOID VALVES - 26. REAR AXLE BRAKING PRESSURE SENSOR - 27. REAR AXLE BRAKING CONTROL RELAY VALVE - 28. DOUBLE STOP VALVE - 29. NO RETURN CONTROLLED PRESSURE VALVE - 30. ASR SOLENOID CONTROL VALVE - 31. FRONT AXLE BRAKING CONTROL RELAY VALVE - 32. FRONT AXLE ABS CONTROL SOLENOID VALVE - 33. DIAPHRAGM CYLINDER - 34. FRONT AXLE DISK BRAKE ASSEMBLY - 35. EDC INDICATOR SWITCH - 36. BRAKING LIGHTS CONTROL SWITCH - 37. FRONT/REAR AXLE PRESSURE GAUGE - 38. FRONT/REAR AXLE LOW PRESSURE SWITCHES - A. TO AIR SUSPENSION - B. TO SERVICES SYSTEM

- \* OPTIONAL
- ONLY FOR VEHICLES WITH ASR
- ▲ VERSION WITHOUT ASR
- VERSION WITH ASR

260E...Y/FP/PF/FT vehicles

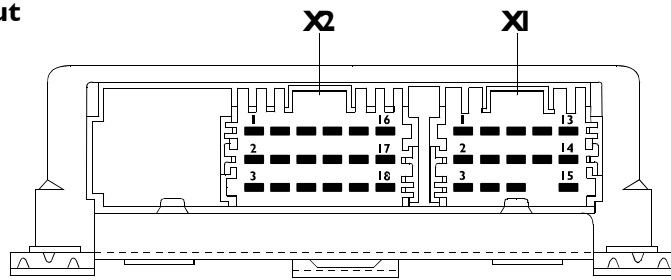


000017t

- III.3 1. ES COMPRESSOR - 2. APU UNIT (AIR PROCESSING UNIT) - 3. 20 L. FRONT AXLE AIR TANK - 4. 20 L. PARKING BRAKE AND TRAILER CHARGING AIR TANK - 5. 30 L. AND 20 L. REAR AXLE AIR TANKS - 6. MANUAL CONDENSATION DRAIN VALVE - 7. PNEUMATIC CONTROL SOCKET - 8. PARKING BRAKE DISTRIBUTOR - 9. HANDBRAKE ON SIGNAL LOW PRESSURE SWITCH - 10. PARKING CONTROL RELAY VALVE - 11. TRAILER BRAKING CONTROL MANUAL DISTRIBUTOR - 12. TRIPLE SERVODISTRIBUTOR CONTROL - 13. TRAILER AUTOMATIC LOW PRESSURE SWITCH - 14. TRAILER COUPLING HALF JOINTS - 15. ONE-WAY VALVE - 16. DUPLEX DISTRIBUTOR - 17. ADDITIONAL AXLE BRAKING CONTROL RELAY VALVE - 18. DIAPHRAGM BRAKE CYLINDER - 19. ADDITIONAL AXLE DUOSERVO DRUM BRAKES - 20. DOUBLE BRAKE CYLINDER - 21. REAR AXLE DUOSERVO DRUM BRAKE ASSEMBLY - 22. ADDITIONAL AXLE AIR SPRINGS - 23. DOUBLE STOP VALVE - 24. RELAY VALVE FOR ADDITIONAL AXLE LOAD DETECTION - 25. REAR AXLE ABS SOLENOID VALVES - 26. REAR AXLE BRAKING PRESSURE SENSOR - 27. REAR AXLE BRAKING CONTROL RELAY VALVE - 28. DOUBLE STOP VALVE - 29. NO RETURN CONTROLLED PRESSURE VALVE - 30. ASR SOLENOID CONTROL VALVE - 31. FRONT AXLE BRAKING CONTROL RELAY VALVE - 32. FRONT AXLE ABS CONTROL SOLENOID VALVE - 33. DIAPHRAGM CYLINDER - 34. FRONT AXLE DISK BRAKE ASSEMBLY - 35. EDC INDICATOR SWITCH - 36. BRAKING LIGHTS CONTROL SWITCH - 37. FRONT/REAR AXLE PRESSURE GAUGE - 38. FRONT/REAR AXLE LOW PRESSURE SWITCHES - A. TO AIR SUSPENSION - B. TO SERVICES SYSTEM

- \* OPTIONAL
- ONLY FOR VEHICLES WITH ASR
- ▲ VERSION WITHOUT ASR
- VERSION WITH ASR

**ABS control unit pin-out**



000018t

It controls the braking system establishing deceleration values according to the parameters detected by the system different components.

It communicates with the electronic systems onboard through the CAN line and is connected to the vehicle wiring by means of two polarized connectors.

The electronic control unit does not only allow to display a "blink code" through the "ASR" warning light for a preliminary diagnosis, but it is also fitted with an advanced self-diagnosis system for recognizing and storing, according to the environmental conditions, the possible failures (also intermittent) occurring in the system during its operation, thus making it possible to carry out correct and reliable repairs.

**CONNECTOR XI**

| Pin | Cable | Function   |
|-----|-------|--|
| 1   | GN/VE | CAN line "L"   |
| 2   | 6245  | Pressure sensor signal for detecting rear axle braking |
| 3   | WS/BI | CAN line "H"   |
| 4   | 0000  | Ground   |
| 5   | 0049  | Negative from ABS switch                               |
| 6   | 0048  | Negative from ASR switch                               |
| 7   | 8847  | Positive from key-operated supply                      |
| 8   | 7710  | Positive from direct battery supply                    |
| 9   | 0000  | Ground   |
| 10  | 2299  | Line K for diagnostic connector (pin 4)                |
| 11  | 1199  | Line L for diagnostic connector (pin 3)                |
| 12  | ---   | Safety bridge pin 9 / 15                               |
| 13  | 6672  | Negative for ASR warning light operating (Blink-Code)  |
| 14  | 0029  | Negative for cutting off third brake                   |
| 15  | 6670  | Negative for ABS failure warning light                 |

**CONNECTOR X2**

| Pin |      |  |
|-----|------|--|
| 1   | 9920 | Positive for RH front ABS supply solenoid valve    |
| 2   | 9931 | Positive for LH rear ABS supply solenoid valve     |
| 3   | 9921 | Positive for LH front ABS supply solenoid valve    |
| 4   | 9918 | Positive for RH front ABS discharge solenoid valve |
| 5   | 9929 | Positive for LH rear ABS discharge solenoid valve  |
| 6   | 9919 | Positive for LH front ABS discharge solenoid valve |
| 7   | 0260 | Negative for rear axle ASR solenoid valve          |
| 8   | 9930 | Positive for RH rear ABS supply solenoid valve     |
| 9   | 9928 | Positive for RH rear ABS discharge solenoid valve  |
| 10  | 5571 | RH front sensor                                    |
| 11  | 5572 | LH rear sensor                                     |
| 12  | 5570 | LH front sensor                                    |
| 13  | 5571 | RH front sensor                                    |
| 14  | 5572 | LH rear sensor                                     |
| 15  | 5570 | LH front sensor                                    |
| 16  | 9260 | Positive for rear axle ASR solenoid valve          |
| 17  | 5573 | RH rear sensor                                     |
| 18  | 5573 | RH rear sensor                                     |

### **EBS system (Electronic Brake System)**

The increased competition in the field of transport has among other effects had that of constantly increasing the essential requisites of braking systems.

The introduction of the electronic brake system EBS is the logical answer to these new requirements.

It is an integrated and permanent electronic control system of the tractor and trailer braking system.

It integrates the ABS, ASR, EBL functions.

The system comprises an air system and an electric system in which the following components are inserted:

duplex distributor with electric transmitter, proportional relay valve for front axle, ABS valve for front axle, rear axle electropneumatic modulator, trailer control servodistributor.

The EBS system converses with the control units of the other units:

engine, Ecas, retarder and gearbox through the CAN line.

### **Advantages of the EBS**

#### **Reduction of maintenance costs**

The EBS combines many functions. The objective is to reduce maintenance costs while maximising braking safety – i.e. minimising brake lining wear.

An individual control according to the wear parameters on both the linings on the front and rear axles harmonises lining wear. Distributing the load evenly among all the wheel brakes minimises total wear. In addition, the intervals between lining maintenance and replacement coincide. Inactivity costs are drastically reduced.

Depending on the service needed for a vehicle and other factors, the owner is able to save considerably. Comparison between the maintenance costs involving the brake system of a vehicle with EBS and a vehicle with a conventional braking system reveals heavy savings.

### **Compatibility between tractor and trailer at all times**

The harmonisation of the braking processes of the whole tractor-trailer combination, especially if the combinations are changed frequently, is often unsatisfactory with traditional means.

Inadequate balance, as in the case for instance of a trailer with braking that is not effective enough, will cause uneven wear of the brake linings.

The EBS will detect all incompatibilities between tractor and trailer, automatically harmonising braking. When the brakes work in the best condition, not only are the brake maintenance costs optimised, but also safety and comfort.

### **Complete diagnostic structures**

The EBS Offers the vehicle's owner constantly updated information about the conditions of the braking system and base brakes. This makes it possible to organise maintenance operations in advance. The EBS monitors all the essential components and functions of the braking system. Any fault is detected by the system and accurately highlighted. The maintenance specialist is therefore able to remedy the error in question.

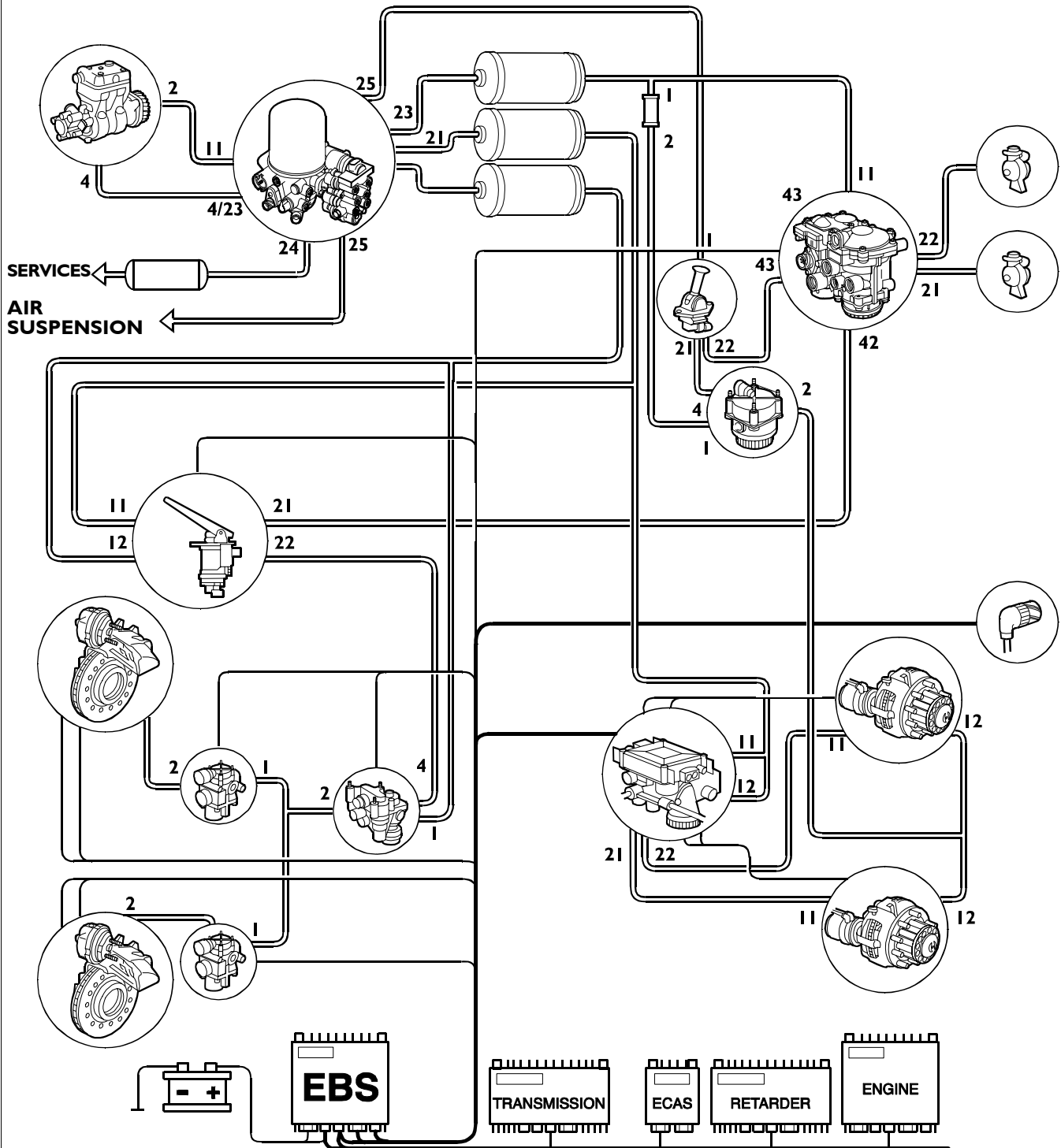
The high degree of safety guaranteed by the EBS is due to different factors:

- Lower response times and pressure accumulation for the brakes on the front and rear axle and trailer axles.
- Better ABS function.
- Tractor/trailer always balanced at all times.
- Constant monitoring of the service brake system. In the event of reduced performance of the brakes the EBS will be able to alert the driver.
- The integrated ASR function allows optimum vehicle stability and optimised drive.

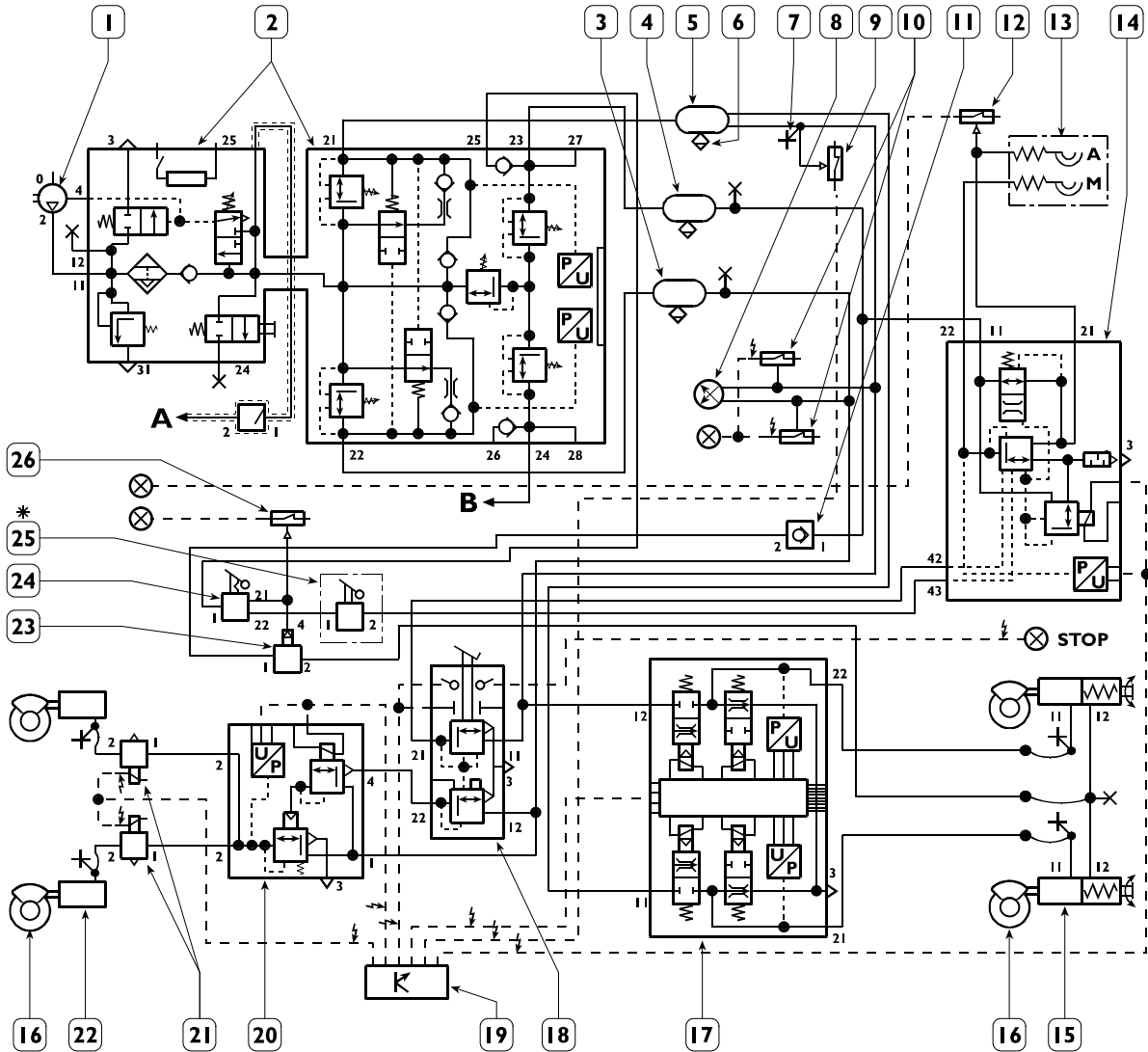




EBS Plan view



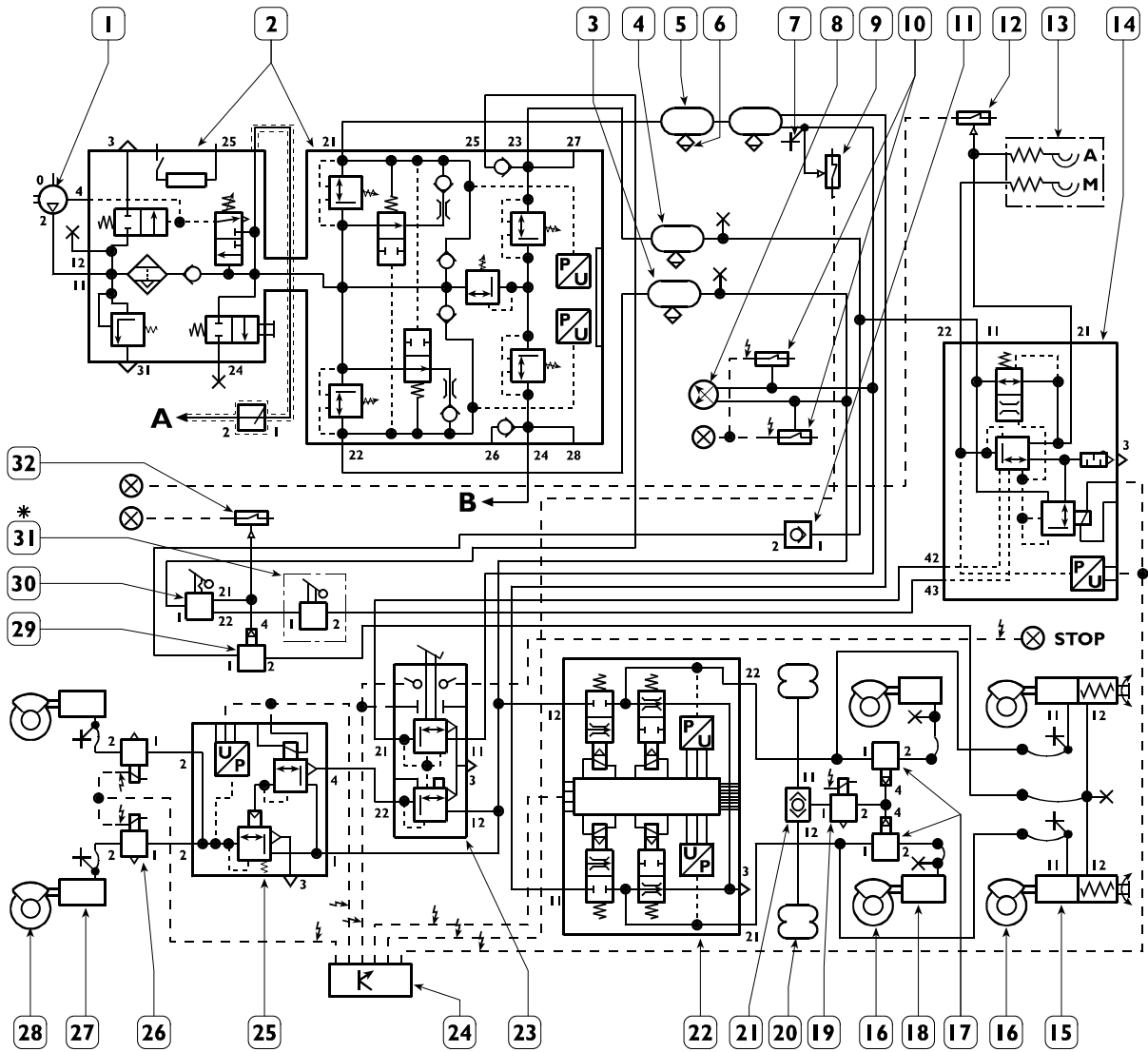
Principle layouts of air systems  
400/440 E...T/TP/TFP vehicles



- III.4 1. ES COMPRESSOR - 2. APU UNIT (AIR PROCESSING UNIT) - 3. 20 L. FRONT AXLE AIR TANK - 4. 20 L. PARKING BRAKE AND TRAILER CHARGING AIR TANK - 5. 30 L. REAR AXLE AIR TANK - 6. MANUAL CONDENSATION DRAIN VALVE - 7. PNEUMATIC CONTROL SOCKET - 8. FRONT/REAR AXLE PRESSURE GAUGE - 9. LOW PRESSURE SWITCH FOR ASR - 10. FRONT/REAR AXLE LOW PRESSURE SWITCHES - 11. ONE-WAY VALVE - 12. TRAILER AUTOMATIC LOW PRESSURE SWITCH - 13. SEMI-TRAILER COUPLING HALF JOINTS - 14. TRAILER CONTROL SERVO-DISTRIBUTOR - 15. DOUBLE BRAKE CYLINDER - 16. REAR FNAD FRONT AXLE DISK BRAKE ASSEMBLY - 17. EBS REAR AXLE ELECTRONPNEUMATIC MODULATOR - 18. DUPLEX DISTRIBUTOR WITH ELECTRIC TRANSMITTER - 19. EBS ELECTRONIC CONTROL UNIT - 20. FRONT AXLE PROPORTIONAL RELAY VALVE - 21. FRONT AXLE ABS SOLENOID VALVE - 22. DIAPHRAGM BRAKE CYLINDER - 23. PARKING CONTROL RELAY VALVE - 24. MANUAL DISTRIBUTOR FOR PARKING - 25. TRAILER BRAKING MANUAL CONTROL DISTRIBUTOR - 26. HANDBRAKE ON INDICATOR/LOW PRESSURE SWITCH - A. TO AIR SUSPENSION - B. TO SERVICES SYSTEM  
\* OPTIONAL

000022t

440E..TXP vehicles



000023t

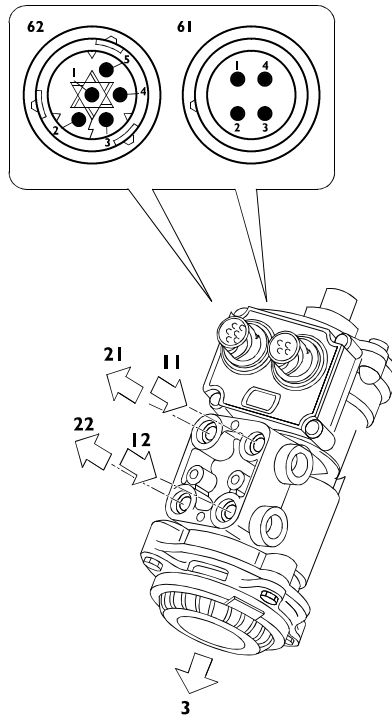
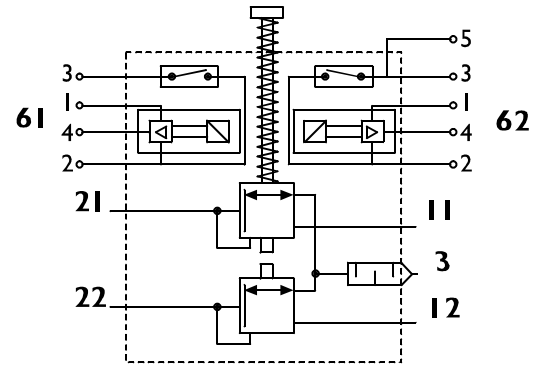
- III.5 1. ES COMPRESSOR - 2. APU UNIT (AIR PROCESSING UNIT) - 3. 20 L. FRONT AXLE AIR TANK - 4. 20 L. PARKING BRAKE AND TRAILER CHARGING AIR TANK - 5. 30 L. AND 15 L. REAR AXLE AIR TANK - 6. MANUAL CONDENSATION DRAIN VALVE - 7. PNEUMATIC CONTROL SOCKET - 8. FRONT/REAR AXLE PRESSURE GAUGE - 9. LOW PRESSURE SWITCH FOR ASR - 10. FRONT/REAR AXLE LOW PRESSURE SWITCHES - 11. ONE-WAY VALVE - 12. TRAILER AUTOMATIC LOW PRESSURE SWITCH - 13. SEMI-TRAILER COUPLING HALF JOINTS - 14. TRAILER CONTROL SERVODISTRIBUTOR - 15. DOUBLE BRAKE CYLINDER - 16. ADDITIONAL AXLE DISK BRAKE ASSEMBLY - 17. ADDITIONAL AXLE BRAKE CONTROL RELAY VALVE - 18. DIAPHRAGM BRAKE CYLINDER - 19. ADDITIONAL AXLE BRAKING CONTROL SOLENOID VALVE - 20. ADDITIONAL AXLE AIR SPRINGS - 21. DOUBLE STOP VALVE - 22. EBS REAR AXLE ELECTRONPNEUMATIC MODULATOR - 23. DUPLEX DISTRIBUTOR WITH ELECTRIC TRANSMITTER - 24. EBS ELECTRONIC CONTROL UNIT - 25. FRONT AXLE PROPORTIONAL RELAY VALVE - 26. FRONT AXLE ABS SOLENOID VALVE - 27. DIAPHRAGM BRAKE CYLINDER - 28. FRONT AXLE DISK BRAKE ASSEMBLY - 29. PARKING CONTROL RELAY VALVE - 30. MANUAL DISTRIBUTOR FOR PARKING - 31. TRAILER BRAKING MANUAL CONTROL DISTRIBUTOR - 32. HANDBRAKE ON INDICATOR LOW PRESSURE SWITCH - A. TO AIR SUSPENSION - B. TO SERVICES SYSTEM  
\* OPTIONAL

**Main components of EBS system**

**Duplex distributor with electric transmitter**

This component generates electric and pneumatic signals to charge or relieve the pressure of the electronically-controlled air braking system.

Under normal conditions, the component works in the electronic mode, whereas when there is a fault on the electric circuit it only works in the pneumatic mode acting on the braking of the front axle and trailer.



TECHNICAL VIEW

000176t

| Air connections   | Electric connections   |
|---|--|
| 11 - From rear axle air tank<br>12 - From front axle air tank<br>21 - To trailer control servodistributor<br>22 - To front axle control proportional relay valve<br>3 - Discharge | 61.1 - Positive<br>61.2 - Ground<br>61.3 - Main braking signal<br>61.4 - PWM Output to electronic control unit<br>62.1 - Positive<br>62.2 - Ground<br>62.3 - Main braking signal<br>62.4 - PWM Output to electronic control unit<br>62.5 - Brake warning light control |

**Operation**

**Braking under normal conditions**

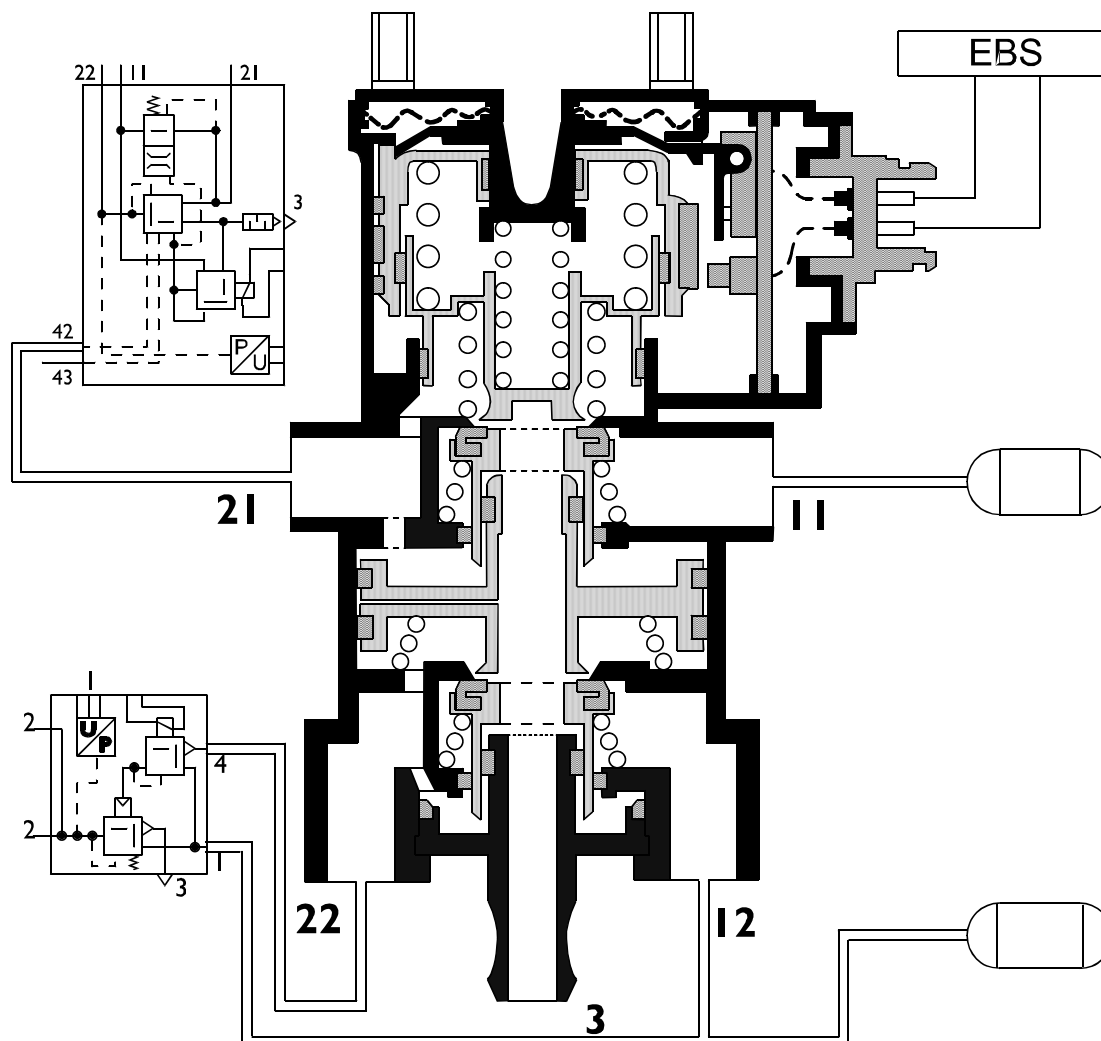
The component generates electric and pneumatic signals to charge or relieve the pressure in the electronic brake system (EBS). The unit is designed for two pneumatic and electric circuits where the electric one has priority.

A sensor reads the stroke of the operating pin and sends a signal to the electronic control unit.

All the electric signals leaving the component are doubled to ensure maximum operating safety.

Operation of the brake pedal also determines a pneumatic command with a slight delay at ducts 21 and 22.

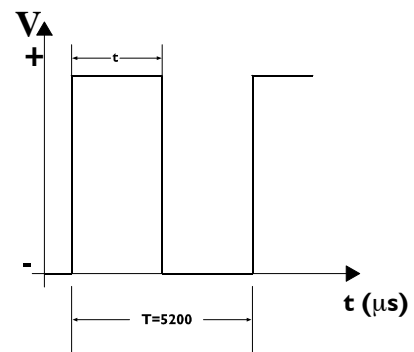
When the brake pedal is released the electric signals of the control unit and the return of the air pistons cease thereby relieving the pressure to the atmosphere.



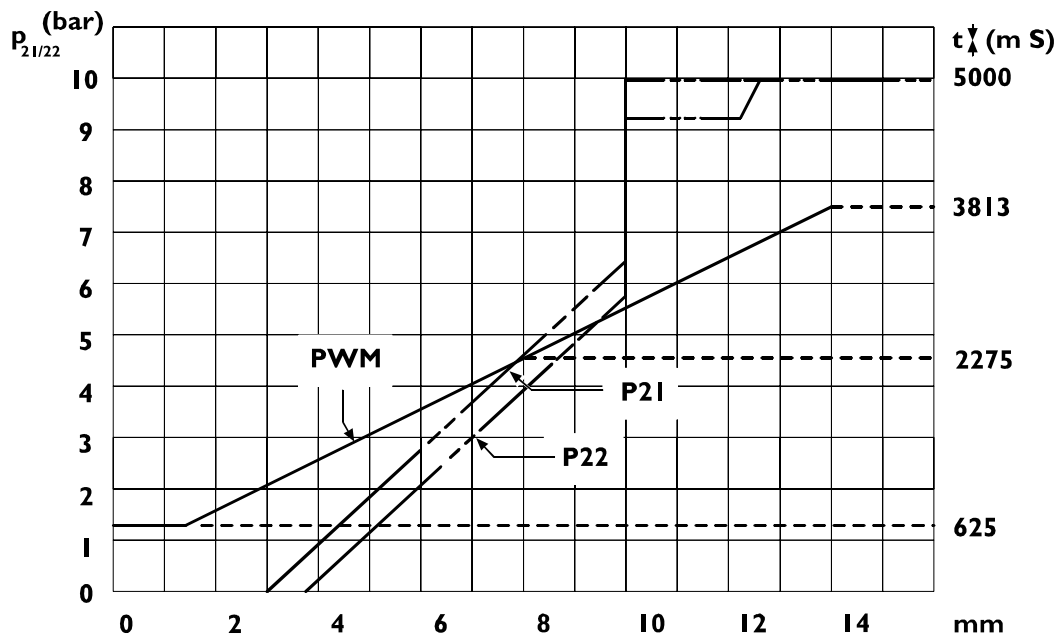
000026t

**Braking in the event of an electric failure**

In the event of an electric failure the component controls braking of the vehicle braking the front wheels through duct 22 and the trailer through duct 21.

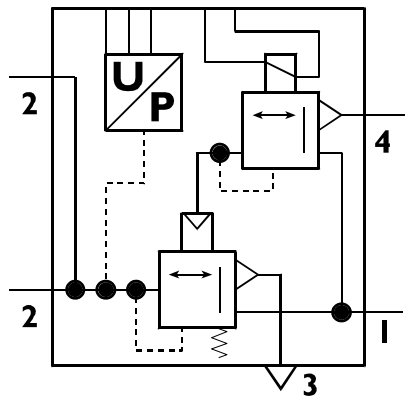


000177t



000024t

III.6 PERFORMANCE DIAGRAM

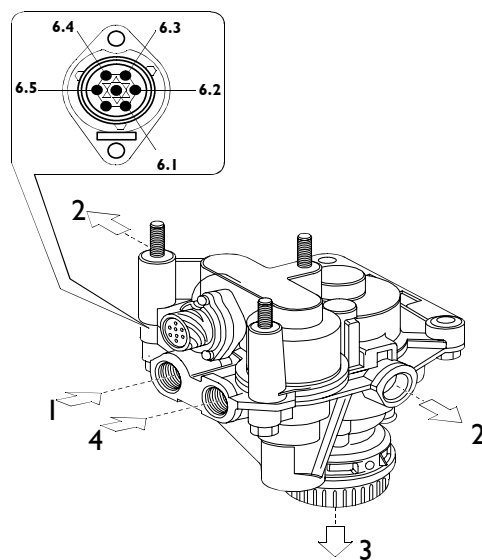


### Proportional relay valve for front axle

In the electronically-controlled brake system the proportional relay valve serves to modulate the pressure at the front axle.

It consists of a proportional solenoid valve, a pneumatic relay and a pressure sensor.

WIRING DIAGRAM



TECHNICAL VIEW

000030t

| Pneumatic connections |                           | Electric connections |  |
|-----------------------|---------------------------|----------------------|--|
| 1 -                   | From front axle air tanks | 6.1 -                | Positive                                 |
| 2 -                   | To ABS valve (rh)         | 6.2 -                | Ground                                   |
| 2 -                   | To ABS valve (lh)         | 6.3 -                | Output signal to electronic control unit |
| 3 -                   | Relief                    | 6.4 -                | Ground                                   |
| 4 -                   | From duplex distributor   | 6.5 -                | Positive                                 |

**Operation**

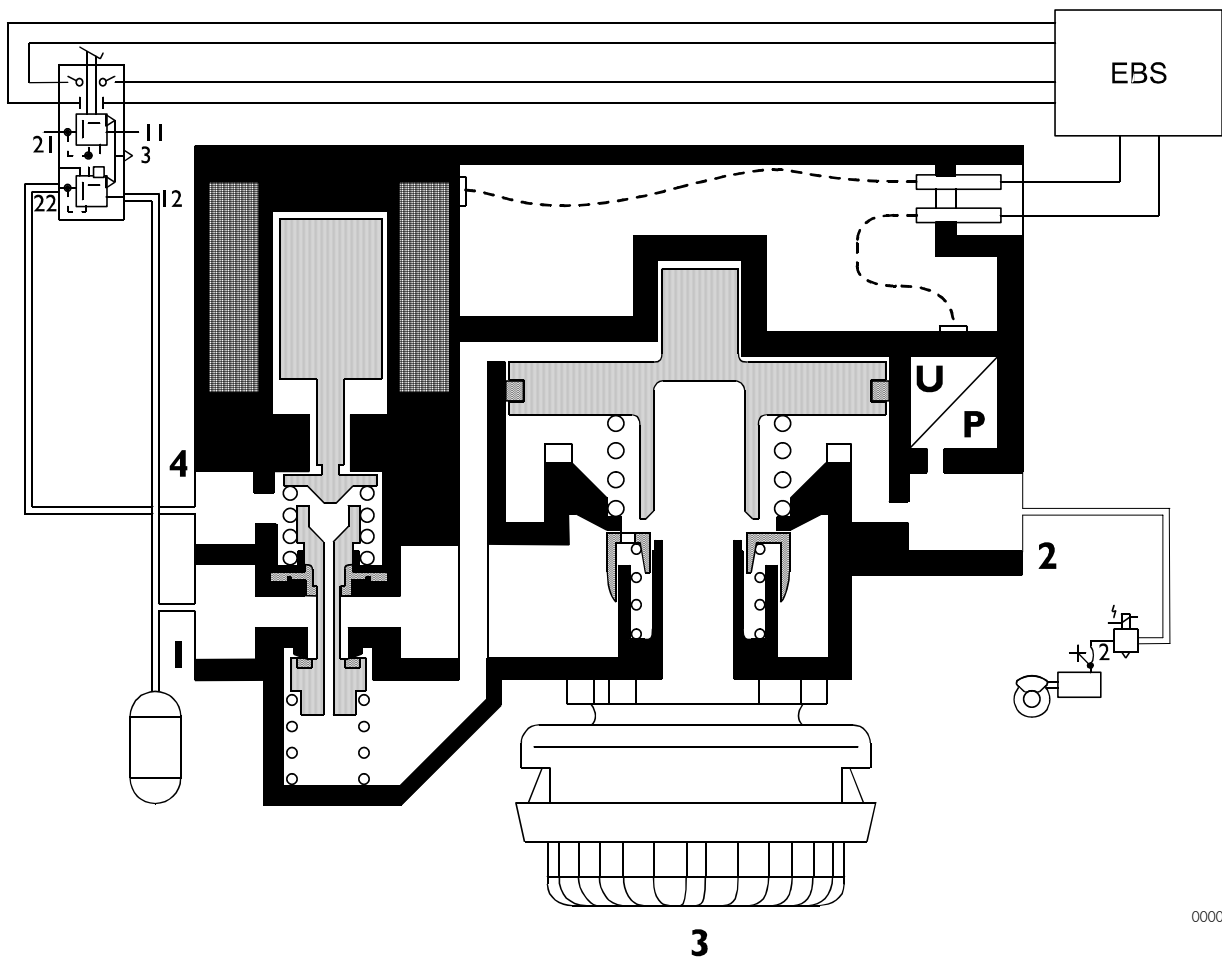
**Braking under normal conditions**

Acting on the pedal of the duplex distributor the electronic control unit is informed of braking through the electric transmitter contained inside it. The control unit sends a signal to the Solenoid which allows the air through the inlet.

The inlet pressure is proportionate with the outlet pressure which is controlled by a pressure sensor.

Simultaneously the sensor sends a signal to the electronic control unit which compares the output electric signal with the input signal and checks that deceleration corresponds to the pre-established rating. If not, the control unit repeats the above phase.

When the brake pedal is released the electronic control unit interrupts the electric signal to the solenoid which closes the supply and switches the braking air pressure to discharge.



000031t



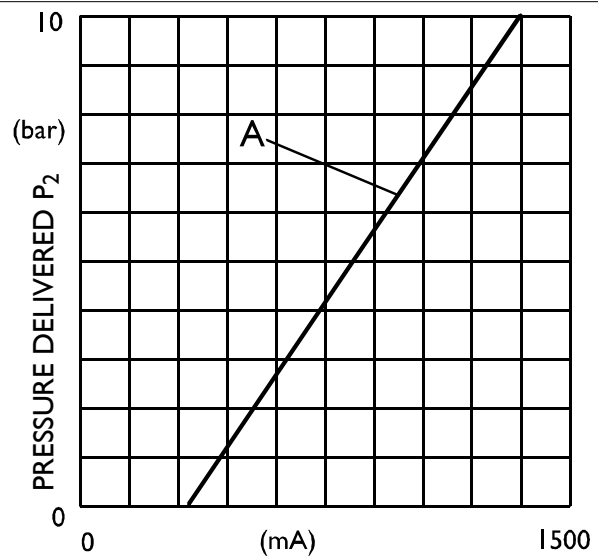
**Braking in the event of an electric failure**

In the event of an electric failure, the component is able to control braking of the axle as it is still controlled pneumatically through duct 4 from the duplex distributor.

**Performance diagrams**

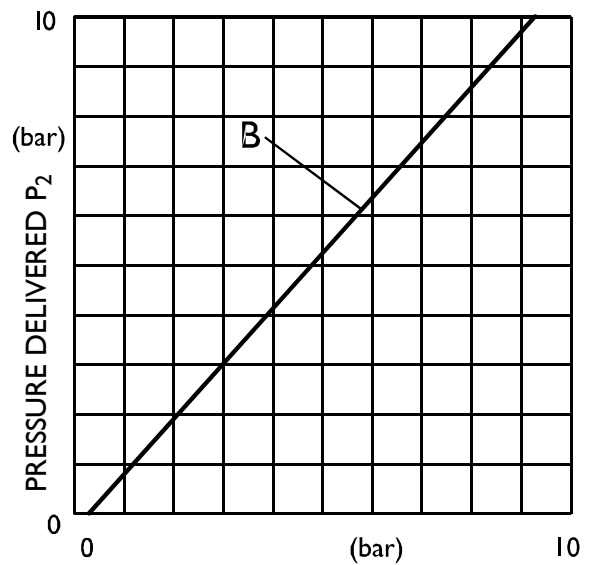
The opposite column shows the performance diagrams and the characteristic curve of the pressure sensor.

- A. Braking generated electrically
- B. Electric control failure



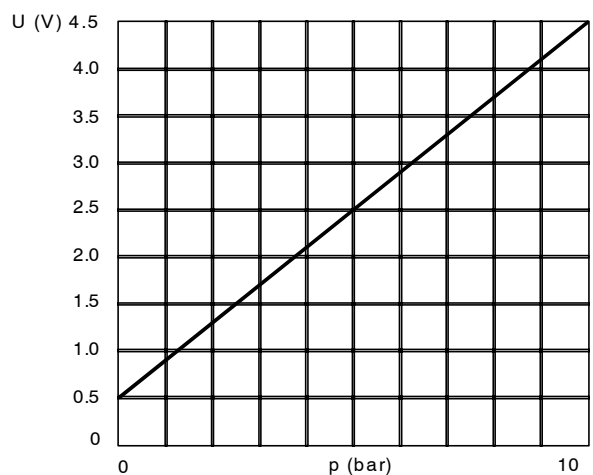
III.7 CURRENT THROUGH THE SOLENOID (i)

000027t



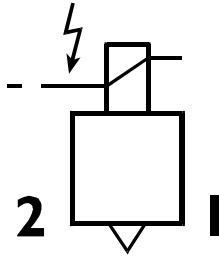
III.8 CONTROL PRESSURE (P4)

000028t



III.9 PRESSURE SENSOR CHARACTERISTIC CURVE

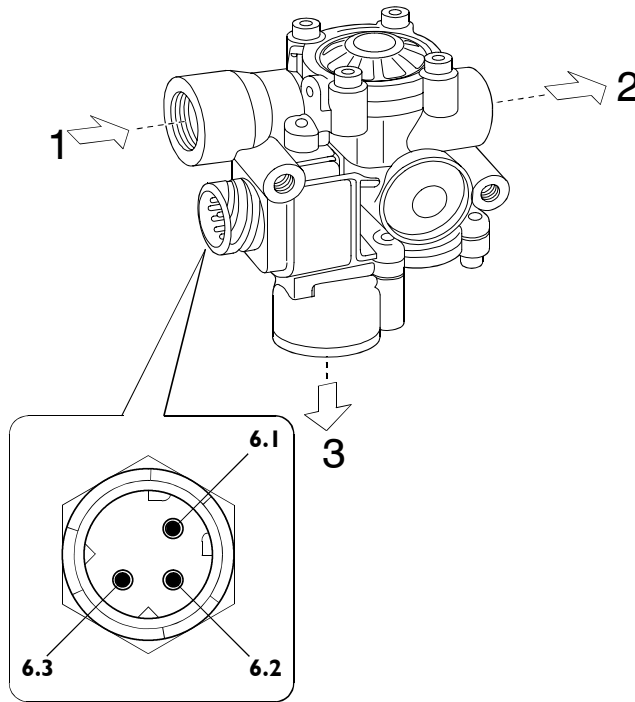
000029t



WIRING DIAGRAM

**Front axle ABS solenoid valves**

The component modulates the pressure to the braking elements every time the tendency to lock the front axle wheels is noted.

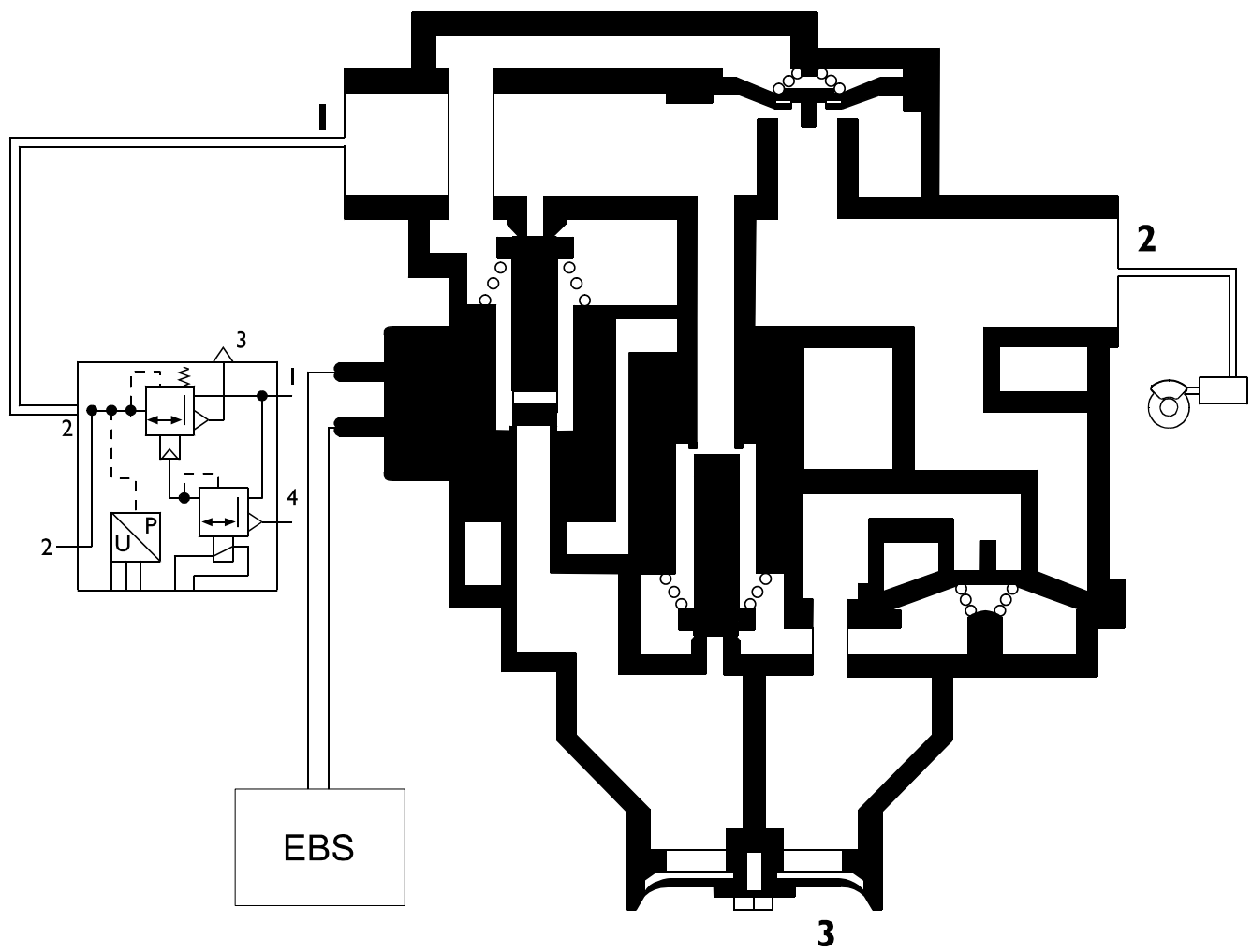


TECHNICAL VIEW

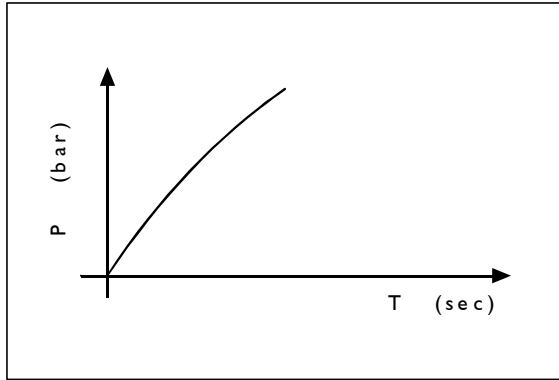
000032t

| Pneumatic connections   | Electric connections  |
|---|---|
| <p>1 - Supply from relay valve</p> <p>2 - Outlet</p> <p>3 - Discharge</p> | <p>6.1 - Positive, relief solenoid valve supply</p> <p>6.2 - Ground, Shared</p> <p>6.3 - Positive, Supply, Supply valve</p> |

Operation

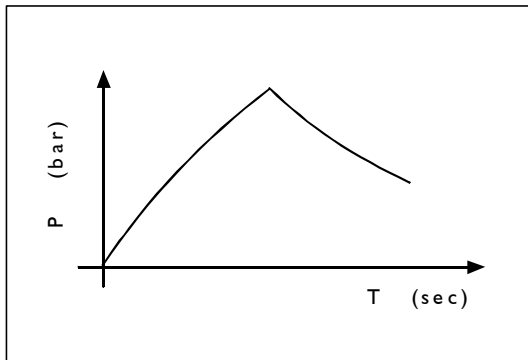


000033t



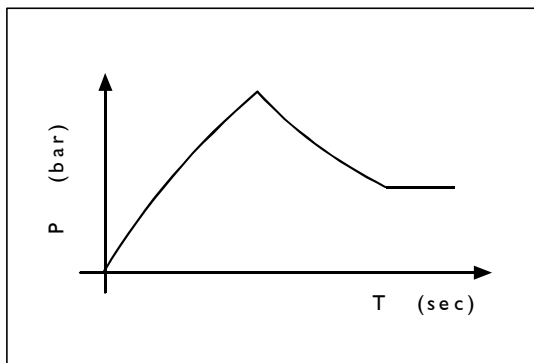
000034t

III.10 INCREASE IN PRESSURE



000035t

III.11 DECREASE IN PRESSURE



000036t

III.12 PRESSURE MAINTAINING

**Increase in pressure**

The pressure leading from the proportional relay valve for the front axle can reach outlet 2 as the two solenoids are not energised electrically and thus the solenoid valve is normally open (N.O.).

**Decrease in pressure**

When the control unit detects that the wheel is tending to lock through the wheel revolution sensors, it will control the solenoid valve solenoids to close the supply and open discharge 3, thereby lowering the front braking pressure.

**Pressure maintenance**

When the electronic control unit detects that the deceleration requested is correct, it controls the two solenoids of the solenoid valve to keep the supply and discharge closed, thereby maintaining the front wheel pressure constant.

**Electric failure**

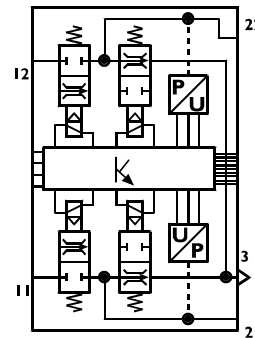
In the event of an electric failure, the pneumatic pressure still reaches the front axle brakes as the component is normally open (N.O.).

### Rear axle electropneumatic modulator

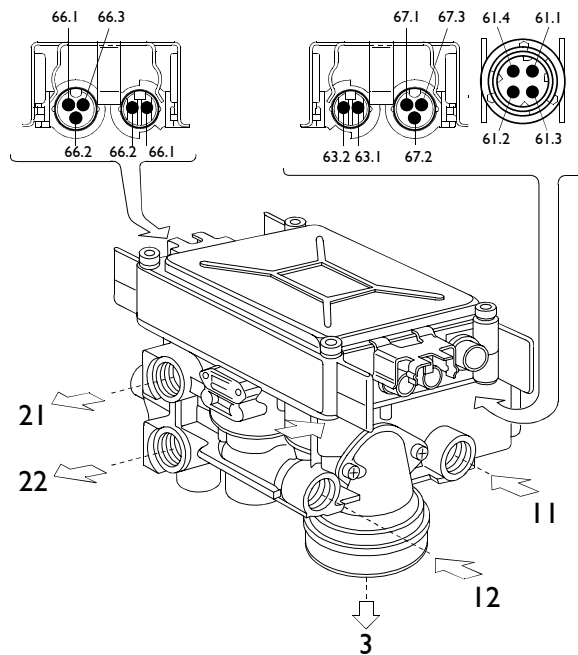
This has the task of modulating the pressure to the rear axle brake cylinders.

The component has an electronic control unit which controls rear axle braking, the rear revolution and rear axle brake lining wear sensors

This control unit communicates with the EBS electronic control unit via the CAN network.



WIRING DIAGRAM



TECHNICAL VIEW

000039t

| Pneumatic connections |                                  | Electric connections |              |
|-----------------------|----------------------------------|----------------------|--------------|
| 11 -                  | From rear axle air tank          | 61.1 -               | Positive     |
| 12 -                  | From rear axle air tank          | 61.2 -               | Ground       |
| 21 -                  | To rear axle brake cylinder (lh) | 61.3 -               | High CAN     |
| 22 -                  | To rear axle brake cylinder (rh) | 61.4 -               | Low CAN      |
| 3 -                   | Discharge                        | 62.1/63.1 -          | Speed signal |
|                       |                                  | 62.2/63.2 -          | Speed signal |
|                       |                                  | 66.1/67.1 -          | Output       |
|                       |                                  | 66.2/67.2 -          | Ground       |
|                       |                                  | 66.3/67.3 -          | Signal       |

**Operation**

**Braking under normal conditions**

When the duplex distributor is operated the EBS control unit is activated by the electric transmitters contained in the duplex, in addition to the braking action of the front axle it transmits the same information through the CAN line to the electronic control unit installed on the rear axle modulator.

This control unit suitably checks the signals leading from the speed sensors and will control the modulator solenoid valves allowing pressure through to the braking elements of the rear axle.

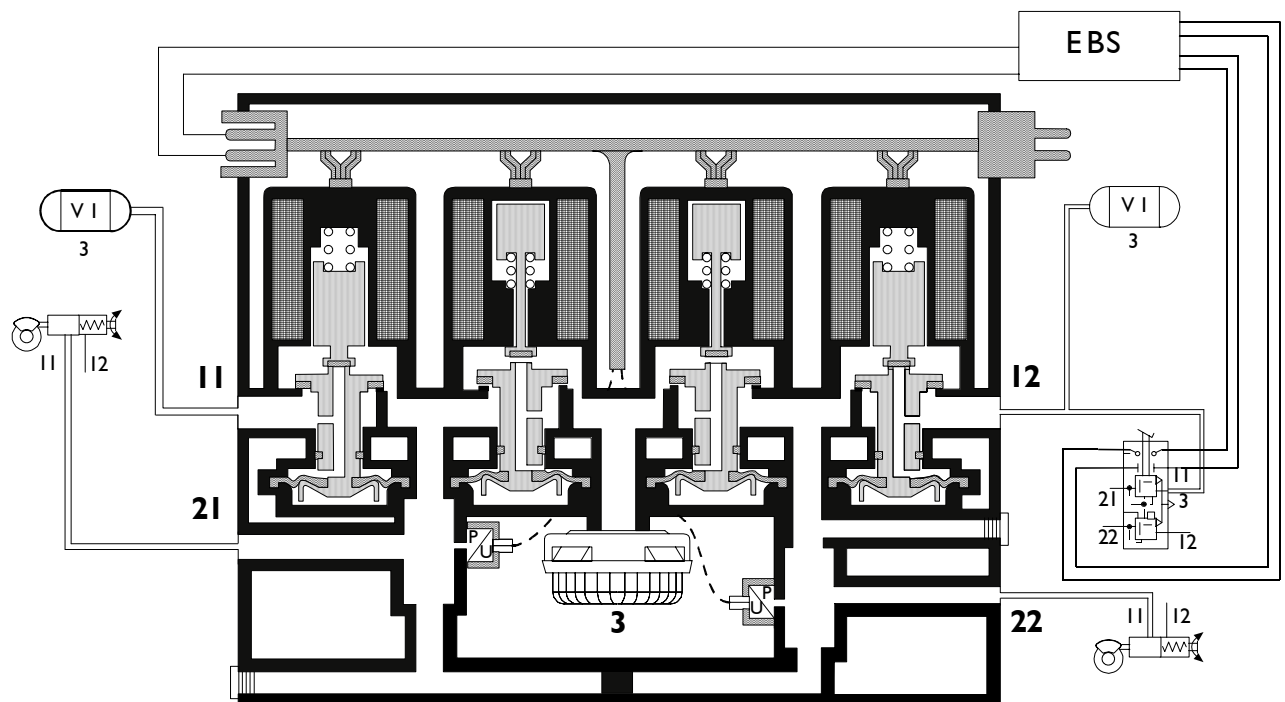
The outlet pressure will be proportionate with the control signal and constantly controlled by the built-in pressure sensors.

Through the speed sensors the control unit checks that the deceleration obtained corresponds to the pre-established rate, if not it will repeat the above-mentioned phase adapting the deceleration values.

Every action will be signalled through the CAN network to the EBS control unit in order to optimise the braking action of the vehicle.

When the brake pedal is released the electronic control unit interrupts the electric signal to the solenoids which close the supply and switch to discharge the pneumatic control pressure.

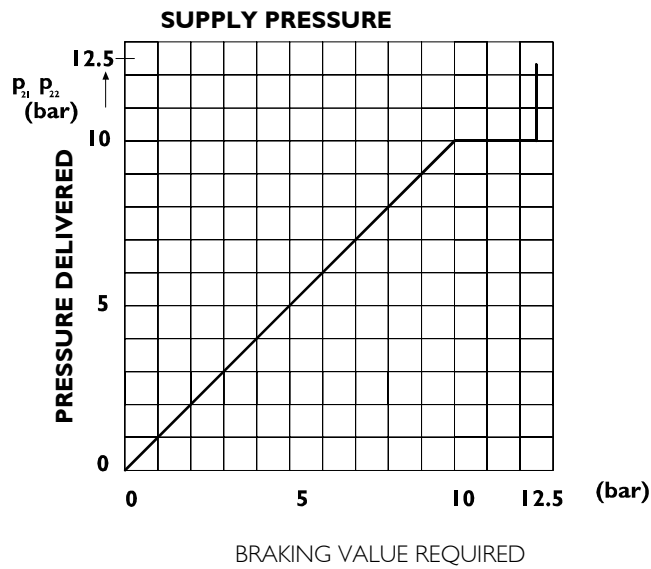
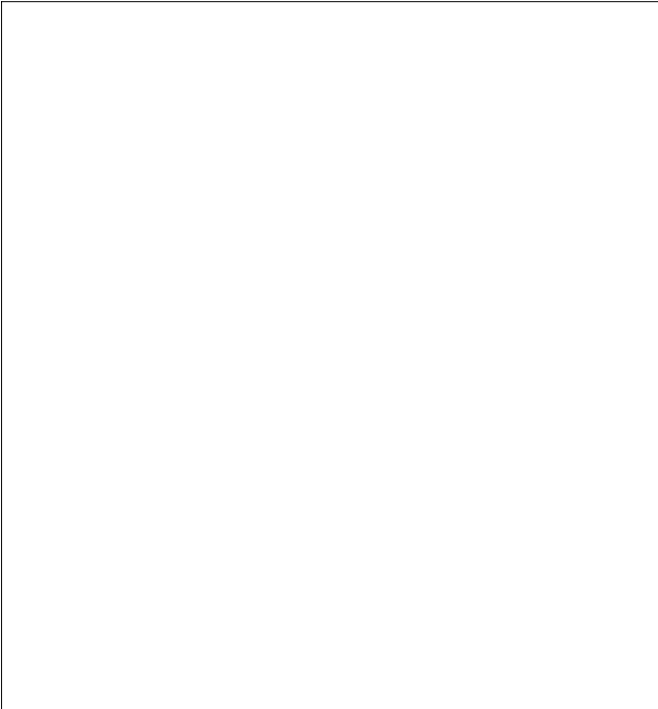
In addition the electronic control unit of the component checks the rear axle brake lining wear and informs the system electronic control unit via CAN network.



000037t

**Braking with an electric failure**

In the event of an electric failure the component will not send any pneumatic signal to the rear axle brakes, therefore vehicle braking is obtained acting on the front axle and on the trailer.

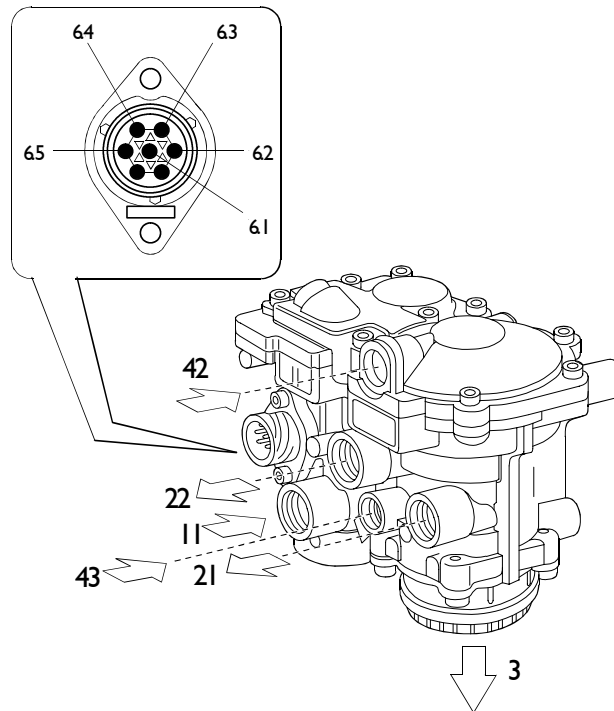
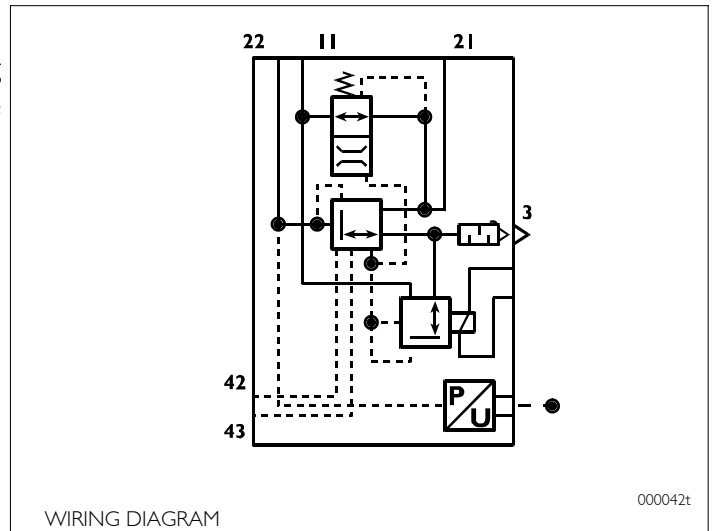


000038t

**III.13 PERFORMANCE DIAGRAM**

**Trailer control servodistributor**

The purpose of this valve is to ensure all the braking levels (service, parking, emergency) and adapting the predominance at the trailer.



| Pneumatic connections |                                     | Electric connections |                          |
|-----------------------|-------------------------------------|----------------------|--------------------------|
| 11 -                  | From trailer air tank               | 6.1 -                | Positive Pressure sensor |
| 21 -                  | To automatic coupling joint         | 6.2 -                | Ground Pressure sensor   |
| 22 -                  | To modulatable coupling joint       | 6.3 -                | Signal Pressure sensor   |
| 42 -                  | From duplex distributor (command)   | 6.4 -                | Ground Solenoid          |
| 43 -                  | From manual distributor for parking | 6.5 -                | Positive Solenoid        |
| 3 -                   | Discharge                           |                      |                          |



**Operation**

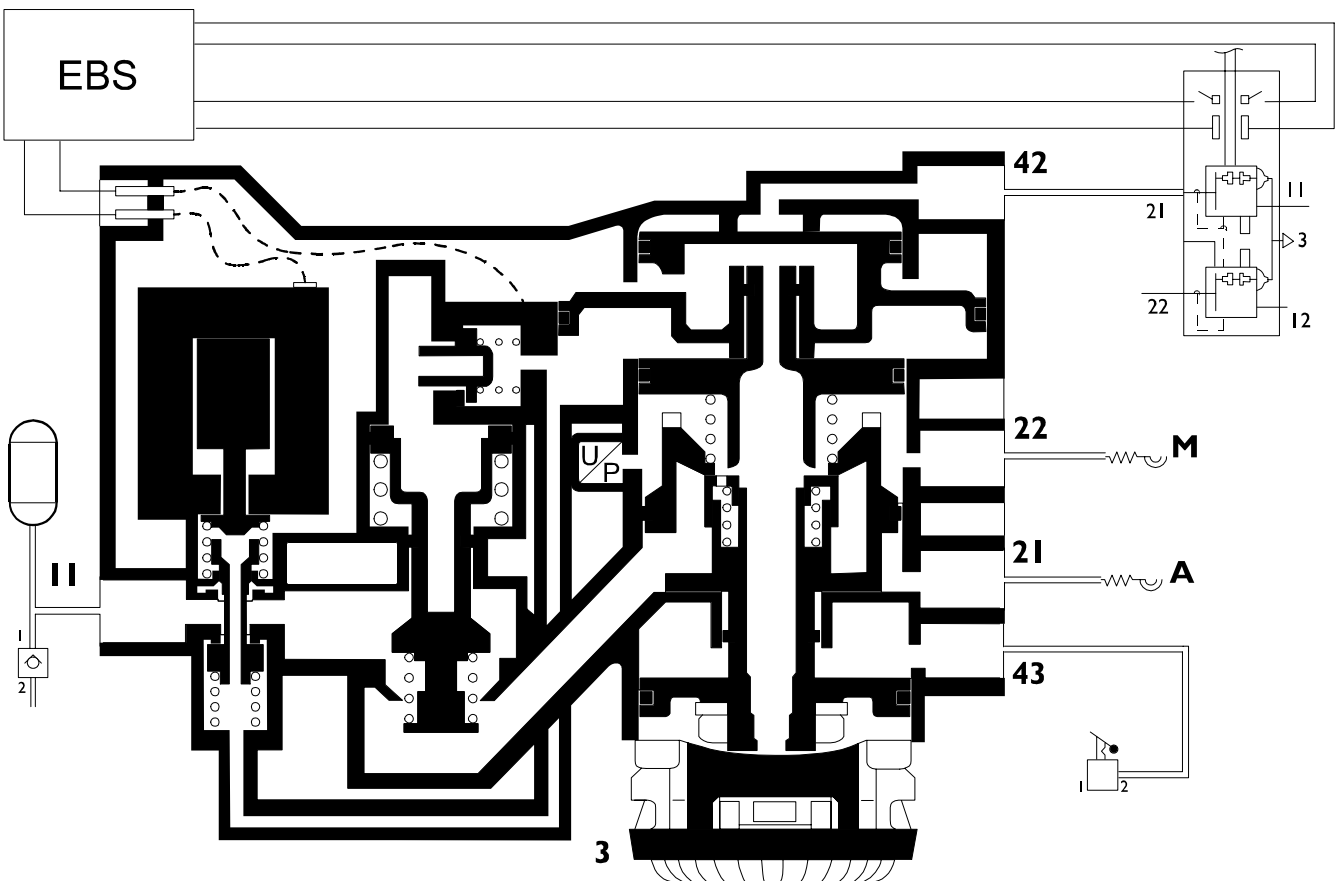
**Normal braking (service)**

Acting on the brake pedal the electronic control unit of the EBS system controls the solenoid which opens the supply, the pressurised air passes through the pneumatic relay and supply valve and then it opens outlet 22. Simultaneously the command reaches duct 42 from the duplex distributor.

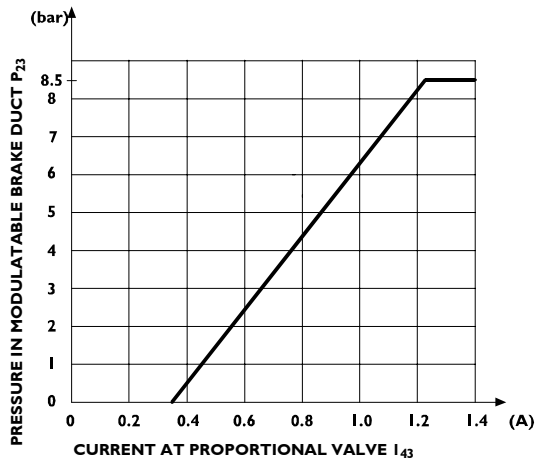
When the pressure signal from the sensor obtains the slowing down required, the electronic control unit maintains the pressure.

With the first braking action the control unit detects the type of braking of the trailer and adapts the necessary predominance (0.5 to 1.2 bar).

Releasing the brake pedal the solenoid valve is switched and the control pneumatic pressure is discharged.

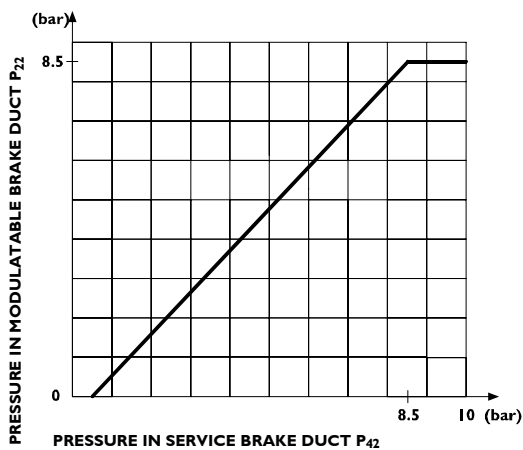


000043t



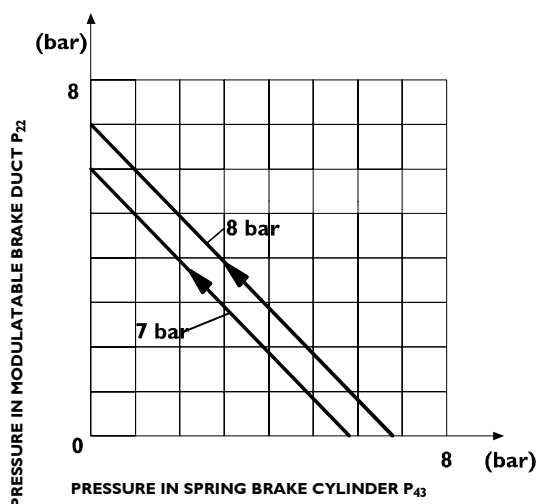
000041t

III.14 BRAKING WITH ELECTRIC CONTROL



000189t

III.15 BRAKING WITH ELECTRIC SIGNAL FAILURE



000079t

III.16 PERFORMANCE DIAGRAM

### Parking braking

Operating the parking brake distributor (lever) discharges the control pressure 43.

The supply valve raises and puts the modulatable duct into communication with the automatic duct, thereby obtaining braking of the trailer.

The electronic control unit detects parking braking through the pressure signal of the sensor contained inside the component.

Moving the lever back to drive conditions, duct 43 is supplied again and 22 is switched to discharge.

### Electric failure

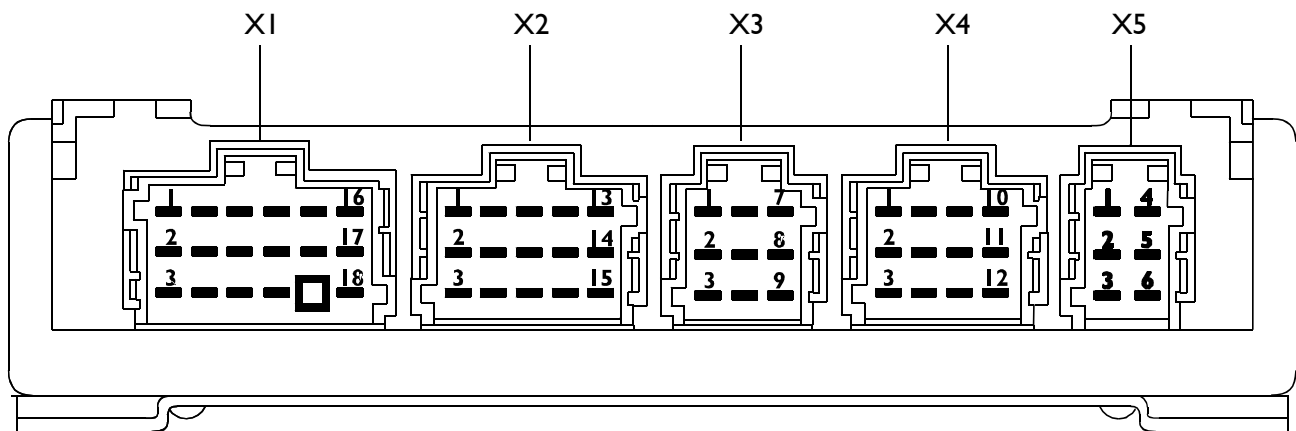
Acting on the brake pedal the component is also controlled pneumatically by the duplex distributor through duct 42 which controls the closing of the discharge and the opening of duct 22 of the modulatable brake.

When the brake pedal is released control 42 is lacking and duct 22 is set to discharge.

### Modulatable duct failure (duct 22)

Acting on the brake pedal, the component is supplied, but with a failure on duct 22 the control unit is informed of the fall in pressure by the pressure sensor. Duct 21 is pneumatically switched into communication with duct 22, thus also discharging the automatic duct and the trailer self-brakes.

Releasing the brake pedal, the component is switched pneumatically and duct 21 is supplied again.

**EBS-WABCO electronic control unit pin-out**

000044t

The electronic control unit controls the electronic braking system and determines the vehicle deceleration rates according to the signals received from the duplex distributor, wheel revolution sensors, rear axle electropneumatic modulator and values set in the actual control unit.

The EBS electronic control unit communicates via CAN network with the control unit of the rear axle electropneumatic modulator, with the trailers that have an EBS brake system (through the ISO joint) and with the electronic control units of the engine, retarder, gearbox, ECAS.

**Connector X1**

| Pin | Cable | Function  |
|-----|-------|---|
| 1   | GN/VE | CAN line "L"  |
| 2   | 6022  | Negative for brake wear warning light relay           |
| 3   | WS/BI | CAN line "H"  |
| 4   | —     | —   |
| 5   | —     | —   |
| 6   | 0048  | Negative from ASR switch                              |
| 7   | 8847  | Positive from key-operated supply                     |
| 8   | 7710  | Positive from battery direct supply                   |
| 9   | 7720  | Positive from battery direct supply                   |
| 10  | 6670  | Negative for ABS/EBS failure warning light (yellow)   |
| 11  | 0000  | Ground  |
| 12  | 0000  | Ground  |
| 13  | 2299  | Line K for diagnostic connector (pin 4)               |
| 14  | —     | —   |
| 15  | —     | Safety bridge pin 12 / 18                             |
| 16  | 6672  | Negative for ASR operating warning light (Blink Code) |
| 17  | 0027  | Negative for cutting out third brake                  |
| 18  | 6673  | Negative for EBS failure warning light (red)          |

**Connector X2**

| Pin | Cable | Function   |
|-----|-------|--|
| 1   | GN/VE | CAN line "L" rear axle modulator (pin 4)                 |
| 2   | —     | —  |
| 3   | GN/VE | CAN line "L" semi-trailer connector (pin 7)              |
| 4   | WS/BI | CAN line "H" rear axle modulator (pin 3)                 |
| 5   | —     | —  |
| 6   | WS/BI | CAN line "H" semi-trailer connector (pin 6)              |
| 7   | 7740  | Positive for rear axle modulator (pin 1)                 |
| 8   | 9217  | Positive for rear axle safety relay valve (trucks only)  |
| 9   | 0047  | Negative from system low pressure switch                 |
| 10  | 9046  | Positive for trailer proportional solenoid control valve |
| 11  | 0046  | Negative for trailer proportional solenoid control valve |
| 12  | 0217  | Negative for rear axle safety relay valve (trucks only)  |
| 13  | 6046  | Positive for trailer control valve pressure sensor       |
| 14  | 6047  | Signal from trailer control valve pressure sensor        |
| 15  | —     | —  |

**Connector X3**

| Pin | Cable | Function  |
|-----|-------|---|
| 1   | 9918  | Positive for front RH ABS discharge solenoid valve          |
| 2   | 9920  | Positive for front RH ABS supply solenoid valve             |
| 3   | 0118  | Negative for front RH ABS solenoid valve                    |
| 4   | 5571  | RH front sensor   |
| 5   | 5571  | RH front sensor   |
| 6   | 9262  | Positive for ASR cut-off solenoid valve (only 6x2 vehicles) |
| 7   | 6024  | Positive for RH front wheel wear sensor                     |
| 8   | 6025  | Signal from RH front wheel wear sensor                      |
| 9   | —     | —   |

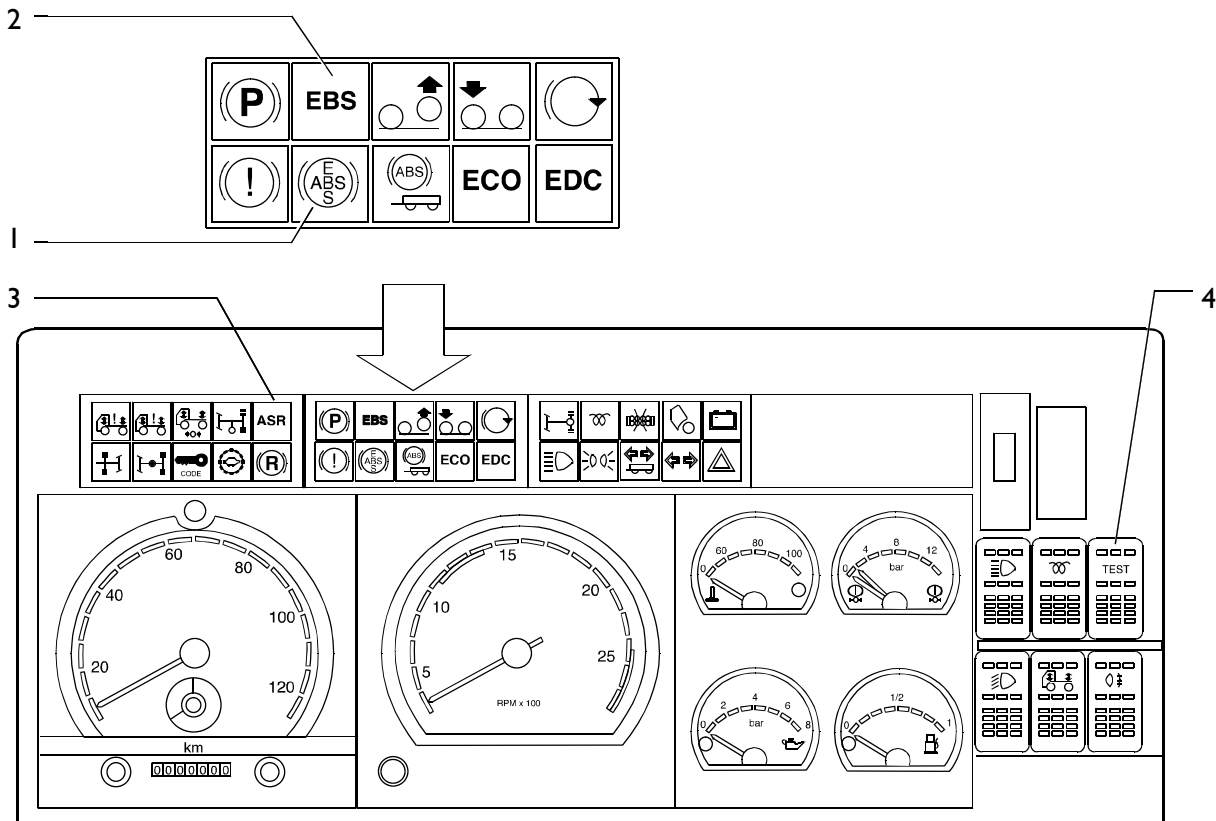
**Connector X4**

| Pin | Cable | Function  |
|-----|-------|---|
| 1   | 0099  | Negative for front axle proportional relay solenoid valve               |
| 2   | 9960  | Positive for front axle proportional relay solenoid valve               |
| 3   | 0026  | Negative for pressure and wear sensors                                  |
| 4   | 6026  | Positive for LH front wheel wear sensor                                 |
| 5   | 6027  | LH front wheel wear sensor signal                                       |
| 6   | 6697  | Front axle proportional relay valve pressure sensor signal              |
| 7   | 5570  | LH front sensor   |
| 8   | 5570  | LH front sensor   |
| 9   | 6696  | Positive for front axle proportional relay valve pressure sensor signal |
| 10  | 9919  | Positive for LH front ABS discharge solenoid valve                      |
| 11  | 9921  | Positive for LH front ABS supply solenoid valve                         |
| 12  | 0122  | Negative for LH front ABS solenoid valve                                |

**Connector X5**


| Pin | Cable | Function   |
|-----|-------|--|
| 1   | 6028  | Duplex distributor position 2 sensor positive          |
| 2   | 6018  | Signal from duplex distributor position 2 sensor       |
| 3   | 0088  | Braking on/off signal from duplex distributor switch 2 |
| 4   | 6029  | Duplex distributor position 1 sensor positive          |
| 5   | 6019  | Signal from duplex distributor position 1 sensor       |
| 6   | 0089  | Braking on/off signal from duplex distributor switch 1 |

Operation of warning lights



000046t

When the ignition key is inserted, the electronic control units carry out a test on the system and make the dashboard warning lights come on for about 2 seconds. If no failures are detected, the warning lights will go off, otherwise the following warning lights will stay on according to the seriousness of the failure detected:

|                               |  |
|-------------------------------|--|
| Warning light "1"<br>(yellow) |  <p>This indicates the presence of a minor failure in the system that does not compromise system operation.<br/>In this condition it is possible to continue the journey and the system will work at a lower performance rate.</p>      |
| Warning light "2"<br>(red)    | <p><b>EBS</b></p> <p>This indicates the presence of a serious failure in the system that compromises system operation.<br/>In this condition it is necessary to stop the vehicle or at least, in continuing the journey, adapt the speed because when braking only the front axle and semi-trailer will be controlled.</p> |
| Warn. light "3" (yellow)      | <p><b>ASR</b></p> <p>Displays operation of the ASR and the Blink Code</p>  |
| Button "4"                    | <p><b>TEST</b></p> <p>Blink Code activation button</p>   |

**N.B.**

It is important to check whether all the warning lights are lit when the ignition key is entered, since:

ABS System – Possible “1 and 3” warning light failures are not signalled to driver.

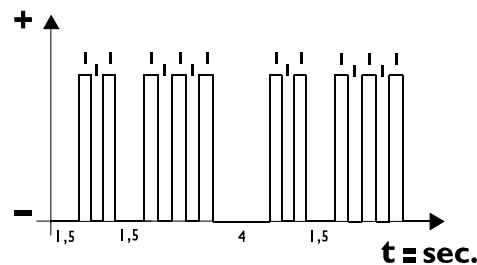
EBS System – Possible “3” warning light failure is signalled by turning on warning light “2”, while “2 and 3” warning light failures are not signalled to the driver.

#### Reading the Blink Code

Blink code for both systems is activated by operating on the TEST button “4” for a time of  $>0,5$  sec. and  $<3$  sec. and it is displayed through warning light ASR “3”.

For the ABS system the blink code comprises two figures and it is displayed as follows:

Es. 2 + 30



001003t

The activation of the blink code, with an error existing in the “warning light 1 on” system, will be signalled with a frequency of 4 seconds, while if there exists a greater number of errors, signalling will be performed with the same frequency as that of the more serious error.

The possible activation of the blink code, if there are no errors present on “warning light 1 off” will display any possible stored in memory intermittent failures always with a frequency of 4 seconds.

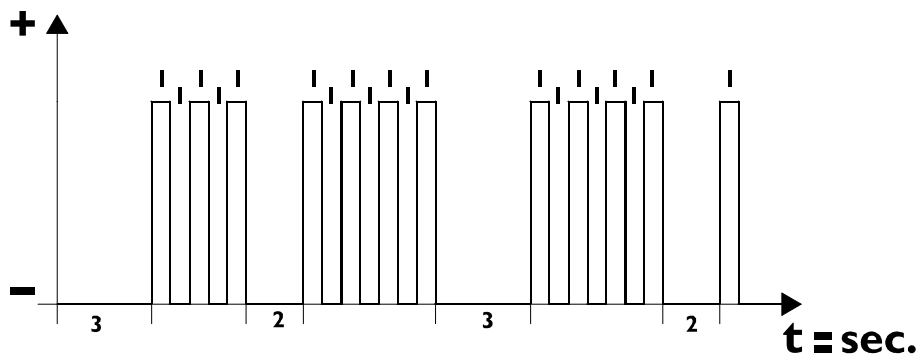
By operating on the TEST button “4” for a time  $>3$  sec. and  $<6,3$  sec. it will be passed to “**SYSTEM MODE**”, this particular function will allow performing the following activations:

Cancelling failure memory – this is possible only if there are no “warning light 1 off” failures following the previously described action with a delay of 1.5 seconds 8 quick flashes will be noted confirming failure memory cancellation and successively with a delay of four seconds system configuration will be signalled.

Verifying engine check – this is possible only if there are no “warning light 1 off” failures present following the previously described action with a delay of 2 seconds button TEST “4” must be activated twice for a time  $>0,5$  sec. with wait intervals  $<$  than 3 sec. After 3 seconds, system will set engine to idling for a time of 10 sec. and warning light “3” flashes with a frequency of 4 sec.

For the EBS system the blink code comprises two groups of two figures and it is displayed as follows:

Es. 34 410



00180t

Blink code activation, with an error present in the "warning light 2 or 3 on" system, the failure will be signalled with a delay of 3 sec. only once, while if there exists a greater number of errors, signalling will be performed with the same delay as that of the more serious error.

Any possible activation of the blink code in the absence of "warning light 2 or 3 off" errors present will not activate any signalling referring to possible intermittent errors stored in the failure memory, which can be displayed and cancelled exclusively by means of the special diagnostic tools.

**REPAIR OPERATIONS**  
**EBS Trouble-shooting**

| Blink Code | Type of error            | Failure warning light |        | Possible failures and system reactions   | Failure claimed by driver                              | Recommended repair operations  |
|------------|--------------------------|-----------------------|--------|--|--|--|
|            |                          | Red                   | Yellow |  |  |  |
| 11 18      | Low voltage at + 30 a.   |                       |        | RH front axle EBS disabled LH front axle EBS disabled.   | Tendency of front axle wheels to lock.                 | Check that the fuse on + 30a. is intact.<br>Check that the supply wiring is intact.<br>Change the EBS control unit.  |
|            |                          | X                     |        | Brake ASR control disabled.  | Rear axle wheels skidding when moving off.             |  |
|            |                          |                       |        | Electronic and pneumatic pressure control disabled on front and trailer axle.                    | Front axle and trailer retarder control deteriorated.  |  |
| 11 31      | Supply failure at + 30a. |                       |        | RH front axle EBS disabled LH front axle EBS disabled.   | Front axle wheels tend to lock.                        | Check that the fuse on + 30a. is intact.<br>Check that the supply wiring is intact.<br>Change the EBS control unit.  |
|            |                          | X                     |        | Brake ASR control disabled.  | Rear axle wheels skidding when moving off.             |  |
|            |                          |                       |        | Electronic and pneumatic pressure control disabled on front & trailer axle.                      | Front axle and trailer retarder control deteriorated.  |  |
| 12 18      | Low voltage at + 30b.    |                       |        | RH front axle EBS disabled LH front axle EBS disabled RH rear EBS disabled LH rear EBS disabled. | Front axle wheels tend to lock.                        | Check that the fuse on + 30b. wiring is intact. Check that the supply wiring is intact. Check that the rear axle modulator and second duplex brake circuit supply wiring is intact. Change the EBS control unit  |
|            |                          | X                     |        | Brake ASR control disabled.  | Rear axle wheels skidding and lack of engine limiting. |  |
|            |                          |                       |        | Engine ASR control disabled.   | Lack of rear axle braking.                             |  |
|            |                          |                       |        | Rear axle braking pressure electronic control disabled.  |  |  |
| 12 31      | Supply failure at 30 b.  |                       |        | RH front axle EBS disabled LH front axle EBS disabled RH rear EBS disabled LH rear EBS disabled. | Front axle wheels tend to lock.                        | Check that the fuse on + 30b. wiring is intact. Check that the supply wiring is intact. Check that the rear axle modulator and second duplex brake circuit supply wiring is intact. Change the EBS control unit. |
|            |                          | X                     |        | Brake ASR control disabled.  | Rear axle wheels skidding and lack of engine limiting. |  |
|            |                          |                       |        | Engine ASR control disabled.   | Lack of rear axle braking.                             |  |
| 13 18      | Low voltage at + 15      |                       | X      | No operating failure.  | Yellow warning light turns on.                         | Check that the supply wiring is intact.<br>Check that the ignition switch is intact and voltage stability. Change the EBS control unit.  |



| Blink Code   | Type of error   | Failure warning light |        |          | Possible failures and system reactions                           | Failure claimed by driver                               | Recommended repair operations  |
|--------------|---|-----------------------|--------|----------|--|---|--|
|              |   | Red                   | Yellow | Pad Wear |  |   |  |
| <b>14 32</b> | Short circuit at ground on pressure sensor supply line.                 |                       | X      |          | Rear axle braking pressure electronic control disabled.          | Imperfect front axle and trailer slowdown braking.      | Check that the wiring of the front axle and semi-trailer pressure sensors is intact. Check that the pressure sensors integrated in the valves are intact. Change the EBS control unit. |
| <b>14 33</b> | Short circuit at positive on pressure sensor supply line.               |                       | X      |          | Trailer and front axle electronic pressure control deteriorated. | Imperfect front axle and trailer slowdown braking.      | Check that the wiring of the front axle and semi-trailer pressure sensors are intact. Change the EBS control unit.   |
| <b>15 33</b> | Short circuit at positive on rear axle modulator supply reference line. |                       | X      |          | No operating failure.  | Yellow failure warning light turns on.                  | Check that the rear axle modulator and duplex brake transmitter supply wiring is intact. Change the EBS control unit.  |
| <b>16 11</b> | EBS control unit EE-PROM failure.                                       |                       |        |          | EBS completely disabled<br>ASR completely disabled               | EBS and ASR fail to cut in.                             | Check the control unit configuration. Change the EBS control unit.   |
|              |   | X                     |        |          | Front axle and trailer braking pressure control disabled.        | Lack of optimisation of front axle and trailer braking. |  |
|              |   |                       |        |          | Rear axle braking pressure control disabled.                     | Lack of rear axle braking.                              |  |
| <b>16 12</b> | Incorrect control unit configuration parameters.                        |                       |        |          | EBS completely disabled ASR completely disabled.                 | EBS and ASR fail to cut in.                             | Check the control unit configuration. Change the EBS control unit.   |
|              |   | X                     |        |          | Front axle and trailer braking pressure control disabled.        | Lack of optimisation of front axle and trailer braking. |  |
|              |   |                       |        |          | Rear axle braking pressure control disabled.                     | Lack of rear axle braking.                              |  |
| <b>16 15</b> | EBS control unit internal failure.                                      |                       |        |          | EBS completely disabled ASR completely disabled.                 | EBS and ASR fail to cut in.                             | Change the EBS control unit.   |
|              |   | X                     |        |          | Front axle and trailer braking pressure control disabled.        | Lack of optimisation of front axle and trailer braking. |  |
|              |   |                       |        |          | Rear axle braking pressure control disabled.                     | Lack of rear axle braking.                              |  |

| Blink Code | Type of error  | Failure warning light |        | Possible failures and system reactions                    | Failure claimed by driver                               | Recommended repair operations  |
|------------|--|-----------------------|--------|---|---|--|
|            |  | Red                   | Yellow |   |   |  |
| 16 17      | Supply overvoltage to EBS control unit.                  | X                     |        | EBS completely disabled ASR completely disabled.          | EBS and ASR fail to cut in.                             | Check the vehicle supply voltage.  |
|            |  |                       |        | Front axle and trailer braking pressure control disabled. | Lack of optimisation of front axle and trailer braking. |  |
|            |  |                       |        | Rear axle braking pressure control disabled.              | Lack of rear axle braking.                              |  |
| 16 18      | Low supply voltage to EBS control unit.                  | X                     |        | EBS completely disabled ASR completely disabled.          | EBS and ASR fail to cut in.                             | Check the vehicle supply voltage.  |
|            |  |                       |        | Front axle and trailer braking pressure control disabled. | Lack of optimisation of front axle and trailer braking. |  |
|            |  |                       |        | Rear axle braking pressure control disabled.              | Lack of rear axle braking.                              |  |
| 16 53      | Incorrect tyre size programming.                         |                       |        | EBS completely disabled.                                  | Front and/or rear axle wheels tend to lock.             | Check the control unit configuration and re-programme it with the correct tyre sizes.          |
|            |  |                       |        | ASR completely disabled.                                  | Rear axle wheels slipping and no engine limiting.       |  |
| 21 37      | RH front speed sensor wiring cut off.                    | X                     |        | RH front EBS disabled.                                    | RH front wheel tending to lock.                         | Check the wiring, connector and speed sensor: If they are intact, change the EBS control unit. |
|            |  |                       |        | ASR completely disabled.                                  | Rear axle wheels slipping and no engine limiting.       |  |
| 21 38      | Implausible vehicle speed detection.                     | X                     |        | EBS completely disabled ASR completely disabled.          | EBS and ASR fail to cut in.                             | Change the EBS control unit.   |
|            |  |                       |        | Front axle and trailer braking pressure control disabled. | Lack of optimisation of front axle and trailer braking. |  |
|            |  |                       |        | Rear axle braking pressure control disabled.              | Lack of rear axle braking.                              |  |
| 21 41      | Short circuit at ground of RH front speed sensor wiring. | X                     |        | RH front EBS disabled.                                    | RH front wheel tending to lock.                         | Check the wiring, connector and speed sensor: If they are intact, change the EBS control unit. |
|            |  |                       |        | ASR completely disabled.                                  | Rear axle wheels slipping and no engine limiting.       |  |

| Blink Code | Type of error   | Failure warning light |        |          | Possible failures and system reactions | Failure claimed by driver                         | Recommended repair operations   |
|------------|---|-----------------------|--------|----------|--|---|---|
|            |   | Red                   | Yellow | Pad Wear |  |   |   |
| 21 42      | Short circuit at positive of RH front speed sensor wiring.          |                       | X      |          | RH front EBS disabled.                 | RH front wheel tending to lock.                   | Check the wiring, connector and speed sensor. If they are intact, change the EBS control unit.                  |
|            |   |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |   |
| 21 44      | Short circuit inside RH front brake speed sensor.                   |                       | X      |          | RH front EBS disabled.                 | RH front wheel tending to lock.                   | Check the wiring, connector and speed sensor. If they are intact, change the EBS control unit.                  |
|            |   |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |   |
| 21 45      | RH front phonic wheel fault.  |                       | X      |          | RH front EBS disabled.                 | RH front wheel tending to lock.                   | Check the intactness and installation of the RH front phonic wheel.   |
|            |   |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |   |
| 21 46      | Implausible RH front wheel speed signal.                            |                       | X      |          | RH front EBS disabled.                 | RH front wheel tending to lock.                   | Check the RH front speed sensor fastening. Check that the RH front brake calipers are working properly.         |
|            |   |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |   |
| 21 47      | Abnormal RH front wheel sensor speed signal phonic wheel wobble.    |                       | X      |          | RH front EBS disabled.                 | RH front wheel tending to lock.                   | Check the intactness and installation of the RH front phonic wheel. Check the bearing of the wheel in question. |
|            |   |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |   |
| 21 48      | Excessive gap between phonic wheel and RH front wheel speed sensor. |                       | X      |          | RH front EBS disabled.                 | RH front wheel tending to lock.                   | Check and adjust the gap. Check that the sensor is intact. Change the EBS control unit.                         |
|            |   |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |   |
| 22 37      | LH front wheel speed sensor wiring cut off.                         |                       | X      |          | LH front EBS disabled.                 | LH front wheel tending to lock.                   | Check the wiring, connector and speed sensor. If they are intact, change the EBS control unit.                  |
|            |   |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |   |

| Blink Code | Type of error   | Failure warning light |        | Possible failures and system reactions                    | Failure claimed by driver   | Recommended repair operations   |
|------------|---|-----------------------|--------|---|---|---|
|            |   | Red                   | Yellow |   |   |   |
| 22 38      | Implausible vehicle speed detection.                                | X                     |        | EBS completely disabled. ASR completely disabled.         | EBS and ASR fail to cut in.   | Change the EBS control unit.  |
|            |   |                       |        | Front axle and trailer braking pressure control disabled. | Lack of optimisation of front axle and trailer braking.                           |   |
|            |   |                       |        | Rear axle braking pressure control disabled.              | Lack of rear axle braking.  |   |
| 22 41      | Short circuit at ground of LH front speed sensor wiring.            | X                     |        | LH front EBS disabled. ASR completely disabled.           | LH front wheel tending to lock. Rear axle wheels slipping and no engine limiting. | Check the wiring, connector and speed sensor. If they are intact, change the EBS control unit.                  |
|            |   |                       |        | LH front EBS disabled. ASR completely disabled.           | LH front wheel tending to lock. Rear axle wheels slipping and no engine limiting. |   |
| 22 42      | Short circuit at positive of LH front speed sensor wiring.          | X                     |        | LH front EBS disabled. ASR completely disabled.           | LH front wheel tending to lock. Rear axle wheels slipping and no engine limiting. | Check the wiring, connector and speed sensor. If they are intact, change the EBS control unit.                  |
|            |   |                       |        | LH front EBS disabled. ASR completely disabled.           | LH front wheel tending to lock. Rear axle wheels slipping and no engine limiting. |   |
| 22 44      | Short circuit inside LH front brake speed sensor.                   | X                     |        | LH front EBS disabled. ASR completely disabled.           | LH front wheel tending to lock. Rear axle wheels slipping and no engine limiting. | Check the wiring, connector and speed sensor. If they are intact, change the EBS control unit.                  |
|            |   |                       |        | LH front EBS disabled. ASR completely disabled.           | LH front wheel tending to lock. Rear axle wheels slipping and no engine limiting. |   |
| 22 45      | LH front phonic wheel fault.  | X                     |        | LH front EBS disabled. ASR completely disabled.           | LH front wheel tending to lock. Rear axle wheels slipping and no engine limiting. | Check the intactness and installation of the LH front phonic wheel.   |
|            |   |                       |        | LH front EBS disabled. ASR completely disabled.           | LH front wheel tending to lock. Rear axle wheels slipping and no engine limiting. |   |
| 22 46      | Implausible LH front wheel speed signal.                            | X                     |        | LH front EBS disabled. ASR completely disabled.           | LH front wheel tending to lock. Rear axle wheels slipping and no engine limiting. | Check the LH front speed sensor fastening. Check that the LH front brake calipers are working properly.         |
|            |   |                       |        | LH front EBS disabled. ASR completely disabled.           | LH front wheel tending to lock. Rear axle wheels slipping and no engine limiting. |   |
| 22 47      | Abnormal LH front wheel sensor speed signal phonic wheel wobble.    | X                     |        | LH front EBS disabled. ASR completely disabled.           | LH front wheel tending to lock. Rear axle wheels slipping and no engine limiting. | Check the intactness and installation of the LH front phonic wheel. Check the bearing of the wheel in question. |
|            |   |                       |        | LH front EBS disabled. ASR completely disabled.           | LH front wheel tending to lock. Rear axle wheels slipping and no engine limiting. |   |
| 22 48      | Excessive gap between phonic wheel and LH front wheel speed sensor. | X                     |        | LH front EBS disabled. ASR completely disabled.           | LH front wheel tending to lock. Rear axle wheels slipping and no engine limiting. | Check and adjust the gap. Check that the sensor is intact. Change the EBS control unit.                         |
|            |   |                       |        | LH front EBS disabled. ASR completely disabled.           | LH front wheel tending to lock. Rear axle wheels slipping and no engine limiting. |   |

| Blink Code | Type of error  | Failure warning light |        |          | Possible failures and system reactions | Failure claimed by driver                         | Recommended repair operations  |
|------------|--|-----------------------|--------|----------|--|---|--|
|            |  | Red                   | Yellow | Pad Wear |  |   |  |
| 23 37      | RH rear wheel speed sensor wiring cut off.                         |                       | X      |          | RH rear EBS disabled.                  | RH rear wheel tending to lock.                    | Check the wiring, connector and speed sensor. If they are intact, change the rear axle modulator.              |
|            |  |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |
| 23 41      | Short circuit at ground of RH rear speed sensor wiring.            |                       | X      |          | RH rear EBS disabled.                  | RH rear wheel tending to lock.                    | Check the wiring, connector and speed sensor. If they are intact, change the rear axle modulator.              |
|            |  |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |
| 23 42      | Short circuit at positive of RH rear speed sensor wiring.          |                       | X      |          | RH rear EBS disabled.                  | RH rear wheel tending to lock.                    | Check the wiring, connector and speed sensor. If they are intact, change the rear axle modulator.              |
|            |  |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |
| 23 44      | Short circuit inside RH rear brake speed sensor.                   |                       | X      |          | RH rear EBS disabled.                  | RH rear wheel tending to lock.                    | Check the wiring, connector and speed sensor. If they are intact, change the rear axle modulator.              |
|            |  |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |
| 23 45      | RH rear phonic wheel fault.  |                       | X      |          | RH rear EBS disabled.                  | RH rear wheel tending to lock.                    | Check the intactness and installation of the RH rear phonic wheel.   |
|            |  |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |
| 23 46      | Implausible RH rear wheel speed signal.                            |                       | X      |          | RH rear EBS disabled.                  | RH rear wheel tending to lock.                    | Check the RH rear speed sensor fastening. Check that the RH rear brake calipers are working properly.          |
|            |  |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |
| 23 47      | Abnormal RH rear wheel speed signal phonic wheel wobble.           |                       | X      |          | RH rear EBS disabled.                  | RH rear wheel tending to lock.                    | Check the intactness and installation of the RH rear phonic wheel. Check the bearing of the wheel in question. |
|            |  |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |
| 23 48      | Excessive gap between phonic wheel and RH rear wheel speed sensor. |                       | X      |          | RH rear EBS disabled.                  | RH rear wheel tending to lock.                    | Check and adjust the gap. Check that the sensor is intact. Change the rear axle modulator.                     |
|            |  |                       |        |          | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |

| Blink Code | Type of error  | Failure warning light |        | Possible failures and system reactions | Failure claimed by driver                         | Recommended repair operations  |
|------------|--|-----------------------|--------|--|---|--|
|            |  | Red                   | Yellow |  |   |  |
| 24 37      | LH rear wheel speed sensor wiring cut off.                         |                       | X      | LH rear EBS disabled.                  | RH rear wheel tending to lock.                    | Check the wiring, connector and speed sensor. If they are intact, change the rear axle modulator.              |
|            |  |                       |        | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |
| 24 41      | Short circuit at ground of LH rear speed sensor wiring.            |                       | X      | LH rear EBS disabled.                  | LH rear wheel tending to lock.                    | Check the wiring, connector and speed sensor. If they are intact, change the rear axle modulator.              |
|            |  |                       |        | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |
| 24 42      | Short circuit at positive of LH rear speed sensor wiring.          |                       | X      | LH rear EBS disabled.                  | LH rear wheel tending to lock.                    | Check the wiring, connector and speed sensor. If they are intact, change the rear axle modulator.              |
|            |  |                       |        | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |
| 24 44      | Short circuit inside LH rear brake speed sensor.                   |                       | X      | LH rear EBS disabled.                  | LH rear wheel tending to lock.                    | Check the wiring, connector and speed sensor. If they are intact, change the rear axle modulator.              |
|            |  |                       |        | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |
| 24 45      | LH rear phonic wheel fault.  |                       | X      | LH rear EBS disabled                   | LH rear wheel tending to lock.                    | Check the intactness and installation of the LH rear phonic wheel.   |
|            |  |                       |        | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |
| 24 46      | Implausible LH rear wheel speed signal.                            |                       | X      | LH rear EBS disabled                   | LH rear wheel tending to lock.                    | Check the LH rear speed sensor fastening. Check that the LH rear brake callipers are working properly.         |
|            |  |                       |        | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |
| 24 47      | Abnormal LH rear wheel speed signal phonic wheel wobble.           |                       | X      | LH rear EBS disabled                   | LH rear wheel tending to lock.                    | Check the intactness and installation of the LH rear phonic wheel. Check the bearing of the wheel in question. |
|            |  |                       |        | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |
| 24 48      | Excessive gap between phonic wheel and LH rear wheel speed sensor. |                       | X      | LH rear EBS disabled                   | LH rear wheel tending to lock.                    | Check and adjust the gap. Check that the sensor is intact. Change the rear axle modulator.                     |
|            |  |                       |        | ASR completely disabled.               | Rear axle wheels slipping and no engine limiting. |  |

| Blink Code | Type of error  | Failure warning light |        |          | Possible failures and system reactions                               | Failure claimed by driver  | Recommended repair operations   |
|------------|--|-----------------------|--------|----------|--|--|---|
|            |  | Red                   | Yellow | Pad Wear |  |  |   |
| 31 16      | No brake transmitter signal.   | X                     |        |          | ASR completely disabled ASR completely disabled.                     | Failure to cut in of EBS and ASR                                     | Check the intactness of the wiring and brake transmitter, if they are intact, change the EBS control unit.                  |
|            |  |                       |        |          | Front axle and trailer braking pressure electronic control disabled. | Lack of optimisation of front axle and trailer braking               |   |
|            |  |                       |        |          | Rear axle braking pressure electronic control disabled.              | Lack of rear axle braking  |   |
| 31 52      | Different brake transmitter signals.                                       |                       | X      |          | No operating failure   | Yellow warning light turns on  | Change the brake pedal transmitter  |
| 32 37      | Brake transmitter 1 <sup>st</sup> switch signal lacking (cable cut off).   |                       | X      |          | No operating failure   | Yellow warning light turns on  | Check the intactness of the wiring connectors and brake transmitter, if they are intact, change the EBS control unit        |
| 32 41      | Short circuit at earth of brake transmitter 1 <sup>st</sup> switch signal. |                       | X      |          | No operating failure   | Yellow warning light turns on  | Check the intactness of the wiring connectors and brake transmitter, if they are intact, change the EBS control unit        |
| 33 37      | Brake transmitter 2 <sup>nd</sup> switch signal lacking (cable cut off).   |                       | X      |          | No operating failure   | Yellow warning light turns on  | Check the intactness of the wiring connectors and brake transmitter, if they are intact, change the EBS control unit        |
| 33 41      | Short circuit at earth of brake transmitter 2 <sup>nd</sup> switch signal. |                       | X      |          | No operating failure   | Yellow warning light turns on  | Check the intactness of the wiring connectors and brake transmitter, if they are intact, change the EBS control unit        |
| 34 41      | Short circuit at earth of brake transmitter 1 <sup>st</sup> sensor signal. |                       | X      |          | No operating failure   | Yellow warning light turns on  | Check the intactness of the wiring connectors and brake transmitter, if they are intact, change the EBS control unit        |
| 34 43      | Brake transmitter 1 <sup>st</sup> sensor signal too low or lacking.        |                       | X      |          | No operating failure   | Yellow warning light turns on  | Check the intactness of the wiring connectors and brake transmitter, if they are intact, change the EBS control unit        |
| 35 41      | Short circuit at earth of brake transmitter 2 <sup>nd</sup> sensor signal. |                       | X      |          | No operating failure   | Yellow warning light turns on  | Check the intactness of the wiring connectors and brake transmitter, if they are intact, change the EBS control unit        |
| 35 43      | Brake transmitter 2 <sup>nd</sup> sensor signal too low or lacking.        |                       | X      |          | No operating failure   | Yellow warning light turns on  | Check the intactness of the wiring connectors and brake transmitter, if they are intact, change the EBS control unit        |
| 41 61      | CAN line connection inactive (SAE J 1939).                                 |                       | X      |          | ASR brake control disabled ASR engine control disabled.              | Rear axle wheels slipping and no engine limiting No retarder control | Check the intactness of the system and of the CAN line connections between the EBS control unit and the other control units |

| Blink Code | Type of error  | Failure warning light |        | Possible failures and system reactions                  | Failure claimed by driver  | Recommended repair operations  |
|------------|--|-----------------------|--------|---|--|--|
|            |  | Red                   | Yellow |   |  |  |
| 41 63      | CAN line communication cut off (SAE J 1939).   |                       | X      | ASR brake control disabled ASR engine control disabled. | Rear axle wheels slipping and no engine limiting No retarder control | Check the intactness of the system and of the CAN line connections between the EBS control unit and the other control units                |
| 41 65      | Communication time with retarder too long: CAN line (SAE J 1939).                        |                       | X      | ASR brake control disabled ASR engine control disabled. | Rear axle wheels slipping and no engine limiting No retarder control | Check the intactness of the system and of the CAN line connections between the EBS control unit and the other control units                |
| 41 66      | Communication time with engine too long: CAN line (SAE J 1939).                          |                       | X      | ASR brake control disabled ASR engine control disabled. | Rear axle wheels slipping and no engine limiting No retarder control | Check the intactness of the system and of the CAN line connections between the EBS control unit and the other control units                |
| 41 67      | Communication time with gearbox too long: CAN line (SAE J 1939).                         |                       | X      | ASR brake control disabled ASR engine control disabled. | Rear axle wheels slipping and no engine limiting No retarder control | Check the intactness of the system and of the CAN line connections between the EBS control unit and the other control units                |
| 41 68      | Communication time with Cruise Control too long: CAN line (SAE J 1939).                  |                       | X      | ASR brake control disabled ASR engine control disabled. | Rear axle wheels slipping and no engine limiting No retarder control | Check the intactness of the system and of the CAN line connections between the EBS control unit and the other control units                |
| 42 16      | Total CAN line failure between EBS control unit and rear axle modulator.                 |                       |        | EBS completely disabled ASR completely disabled         | Failure to cut in of EBS and ASR                                     | Change the EBS control unit. Change the rear axle modulator  |
|            |  | X                     |        | Rear axle braking pressure electronic control disabled  | Lack of rear axle braking  |  |
| 42 61      | Deactivation of CAN communication line between EBS control unit and rear axle modulator. |                       |        | EBS completely disabled ASR completely disabled         | Failure to cut in of EBS and ASR                                     | Check the intactness of the wiring between the EBS control unit and the rear axle modulator  |
|            |  | X                     |        | Rear axle braking pressure electronic control disabled  | Lack of rear axle braking  |  |
| 43 61      | Deactivation of communication with semi-trailer.   |                       | X      | No operating failure                                    | Yellow warning light turns on  | Check the intactness of the system between the EBS control unit and the trailer ISO connector, check the intactness of the trailer system. |
| 43 63      | Communication with semi-trailer cut off (ISO 11992).                                     |                       | X      | No operating failure                                    | Yellow warning light turns on  | Check the intactness of the system between the EBS control unit and the trailer ISO connector, check the intactness of the trailer system. |



| Blink Code | Type of error  | Failure warning light |        |          | Possible failures and system reactions                | Failure claimed by driver                              | Recommended repair operations  |
|------------|--|-----------------------|--------|----------|---|--|--|
|            |  | Red                   | Yellow | Pad Wear |   |  |  |
| 43 75      | Fault in communication with semi-trailer CAN line (H) (ISO 11992). |                       | X      |          | No operating failure                                  | Yellow warning light turns on                          | Check the intactness of the system between the EBS control unit and the trailer ISO connector, check the intactness of the trailer system. |
| 43 76      | Fault in communication with semi-trailer CAN line (L) (ISO 11992). |                       | X      |          | No operating failure                                  | Yellow warning light turns on                          | Check the intactness of the system between the EBS control unit and the trailer ISO connector, check the intactness of the trailer system. |
| 45 16      | Red failure warning light fault.                                   |                       | X      |          | No operating failure                                  | Yellow warning light turns on                          | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit.  |
| 46 16      | Yellow failure warning light fault.                                |                       |        |          | No operating failure                                  | Yellow warning light fails to turn on during bulb test | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit.  |
| 47 16      | ASR operating warning light failure.                               |                       |        |          | No operating failure                                  | Yellow warning light fails to turn on during bulb test | Check the intactness of the wiring, connectors and bulb.   |
| 48 16      | Brake pad wear indicator failure.                                  |                       | X      |          | No operating failure                                  | Yellow warning light turns on                          | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit.  |
| 51 21      | Short circuit at ground of LH front EBS supply solenoid valve.     |                       | X      |          | LH front axle EBS disabled                            | LH front axle wheel tends to lock                      | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit.  |
| 51 22      | Short circuit at positive of LH front EBS supply solenoid valve.   |                       | X      |          | RH front axle EBS disabled LH front axle EBS disabled | Front axle wheels tend to lock                         | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit.  |
| 51 23      | LH front EBS supply solenoid valve ground cable cut off.           |                       | X      |          | LH front axle EBS disabled                            | LH front axle wheel tends to lock                      | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit.  |
| 51 24      | LH front EBS supply solenoid valve supply cable cut off.           |                       | X      |          | LH front axle EBS disabled                            | LH front axle wheel tends to lock                      | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit.  |

| Blink Code | Type of error  | Failure warning light |        |          | Possible failures and system reactions                              | Failure claimed by driver                              | Recommended repair operations   |
|------------|--|-----------------------|--------|----------|---|--|---|
|            |  | Red                   | Yellow | Pad Wear |   |  |   |
| 51 25      | LH front EBS solenoid valve permanent current consumption.       | X                     |        |          | RH front axle EBS disabled LH front axle EBS disabled               | Front axle wheels tend to lock                         | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit. |
|            |  |                       |        |          | Front axle and trailer braking pressure electronic control disabled | Lack of optimisation of front axle and trailer braking |   |
| 51 26      | LH front EBS relief solenoid valve supply cable cut off.         |                       | X      |          | LH front EBS disabled   | LH front axle wheel tends to lock.                     | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit. |
| 51 27      | Short circuit at earth of LH front EBS relief solenoid valve.    |                       | X      |          | LH front EBS disabled   | LH front axle wheel tends to lock.                     | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit. |
| 51 28      | Short circuit at positive of LH front EBS relief solenoid valve. |                       | X      |          | RH front axle EBS disabled LH front EBS disabled                    | Front axle wheels tend to lock.                        | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit. |
| 52 21      | Short circuit at ground of RH front EBS supply solenoid valve.   |                       | X      |          | RH front axle EBS disabled  | RH front axle wheel tends to lock                      | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit. |
| 52 22      | Short circuit at positive of RH front EBS supply solenoid valve. |                       | X      |          | RH front axle EBS disabled LH front axle EBS disabled               | Front axle wheels tend to lock                         | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit. |
| 52 23      | RH front EBS supply solenoid valve ground cable cut off.         |                       | X      |          | RH front axle EBS disabled  | RH front axle wheel tends to lock                      | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit. |
| 52 24      | RH front EBS supply solenoid valve supply cable cut off.         |                       | X      |          | RH front axle EBS disabled  | RH front axle wheel tends to lock                      | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit. |
|            |  |                       |        |          | Front axle and trailer braking pressure electronic control disabled | Lack of optimisation of front axle and trailer braking |   |
| 52 25      | RH front EBS solenoid valve permanent current consumption.       | X                     |        |          | RH front axle EBS disabled LH front axle EBS disabled               | Front axle wheels tend to lock                         | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit. |
|            |  |                       |        |          | Front axle and trailer braking pressure electronic control disabled | Lack of optimisation of front axle and trailer braking |   |

| Blink Code | Type of error  | Failure warning light |        |          | Possible failures and system reactions   | Failure claimed by driver                              | Recommended repair operations   |
|------------|--|-----------------------|--------|----------|--|--|---|
|            |  | Red                   | Yellow | Pad Wear |  |  |   |
| 52 26      | RH front EBS relief solenoid valve supply cable cut off.         |                       | X      |          | RH front EBS disabled  | RH front axle wheel tends to lock.                     | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit.   |
| 52 27      | Short circuit at earth of RH front EBS relief solenoid valve.    |                       | X      |          | RH front EBS disabled  | RH front axle wheel tends to lock.                     | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit.   |
| 52 28      | Short circuit at positive of RH front EBS relief solenoid valve. |                       | X      |          | RH front axle EBS disabled LH front EBS disabled                                     | Front axle wheels tend to lock.                        | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit.   |
| 53 32      | Short circuit at earth of EBS solenoid valve return line.        |                       | X      |          | No operating failure   | Yellow failure warning light turns on                  | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit.   |
| 53 33      | Short circuit at positive of EBS solenoid valve return line.     |                       | X      |          | RH front axle EBS disabled LH front EBS disabled                                     | Front axle wheels tend to lock.                        | Check the intactness of the wiring, connectors and bulb, if intact change the EBS control unit.   |
| 54 12      | Engine brake relay failure parameter error.                      |                       |        |          | EBS completely disabled ASR completely disabled                                      | EBS and ASR fail to cut in                             | Check the control unit configuration.   |
|            |  | X                     |        |          | Front axle and trailer braking pressure electronic braking pressure control disabled | Lack of optimisation of front axle and trailer braking |   |
|            |  |                       |        |          | Rear axle electronic braking pressure control disabled                               | Lack of rear axle braking                              |   |
| 54 31      | Engine brake supply relay failure.                               |                       | X      |          | No operating failure   | Yellow failure warning light turns on                  | Check the control unit configuration.<br>Check the intactness of the wiring, connector and components, if intact change the EBS control unit. |
| 54 32      | Engine brake relay failure short circuit at ground.              |                       | X      |          | No operating failure   | Yellow failure warning light turns on                  | Check the intactness of the wiring, connector and components, if intact change the EBS control unit.  |
| 54 33      | Engine brake relay failure short circuit at positive.            |                       | X      |          | No operating failure   | Yellow failure warning light turns on                  | Check the intactness of the wiring, connector and components, if intact change the EBS control unit.  |

| Blink Code | Type of error  | Failure warning light |        | Possible failures and system reactions  | Failure claimed by driver                               | Recommended repair operations   |
|------------|--|-----------------------|--------|---|---|---|
|            |  | Red                   | Yellow |   |   |   |
| 55 12      | Backup valve failure parameter error.                    | X                     |        | EBS completely disabled ASR completely disabled   | EBS and ASR fail to cut in                              | Check the control unit configuration  |
|            |  |                       |        | Front axle and trailer electronic braking pressure control disabled   | Lack of optimisation of front axle and trailer braking  |   |
|            |  |                       |        | Rear axle electronic braking pressure control disabled  | Lack of rear axle braking                               |   |
| 55 31      | Back up valve supply wiring cut off.                     | X                     |        | EBS completely disabled ASR completely disabled   | EBS and ASR fail to cut in                              | Check the control unit configuration<br>Check the intactness of the wiring, connector and components, if intact change the EBS control unit.  |
|            |  |                       |        | Front axle and trailer braking pressure electronic braking pressure control disabled  | Lack of optimisation of front axle and trailer braking  |   |
| 55 32      | Backup valve supply line short circuit at earth.         | X                     |        | EBS completely disabled ASR completely disabled<br>Front axle and trailer braking pressure electronic braking pressure control disabled | EBS and ASR fail to cut in<br>Lack of rear axle braking | Check the intactness of the wiring, connector and components, if intact change the EBS control unit.  |
| 55 33      | Backup valve supply line short circuit at earth.         |                       | X      | RH front axle EBS disabled LH front axle EBS disabled   | Front axle wheels tend to lock                          | Check the intactness of the wiring, connector and components, if intact change the EBS control unit.  |
| 57 12      | ASR cut off valve failure parameter error.               | X                     |        | EBS completely disabled ASR completely disabled   | EBS and ASR fail to cut in                              | Check the control unit configuration.   |
|            |  |                       |        | Lack of optimisation of front axle and trailer braking  | Lack of optimisation of front axle and trailer braking  |   |
|            |  |                       |        | Lack of rear axle braking pressure electronic control   | Lack of rear axle braking                               |   |
| 57 31      | ASR cutoff valve supply wiring cut off.                  |                       | X      | ASR brake control disabled  | Rear axle wheels slipping when moving off               | Check the control unit configuration.<br>Check the intactness of the wiring, connector and components, if intact change the EBS control unit. |
| 57 32      | ASR cut off valve supply line short circuit at earth.    |                       | X      | ASR brake control disabled  | Rear axle wheels slipping when moving off               | Check the intactness of the wiring, connector and components, if intact change the EBS control unit.  |
| 57 33      | ASR cut off valve supply line short circuit at positive. | X                     |        | No operating failure  | Red failure warning light turns on                      | Check the intactness of the wiring, connector and components, if intact change the EBS control unit.  |

| Blink Code | Type of error  | Failure warning light |        |          | Possible failures and system reactions                    | Failure claimed by driver                     | Recommended repair operations  |
|------------|--|-----------------------|--------|----------|---|---|--|
|            |  | Red                   | Yellow | Pad Wear |   |   |  |
| 61 16      | Total failure of front axle proportional relay valve.                |                       | X      |          | Front axle electronic braking pressure control disabled   | Front axle slowdown delayed and not optimised | Check the intactness of the wiring, connector and components, if intact change the EBS control unit.   |
| 61 55      | Low or no air pressure for front axle.                               | X                     |        |          | Front axle electronic braking pressure control disabled   | Front axle slowdown delayed and not optimised | Check the intactness of the front axle air supply pipes and operating pressure. Change the proportional relay valve  |
| 62 42      | Short circuit at positive of front axle relay valve pressure signal. |                       | X      |          | Front axle electronic braking pressure control downgraded | Imperfect slowing down of front axle          | Check the intactness of the wiring, connector and components, if intact change the EBS control unit.   |
| 62 43      | Front axle relay valve pressure signal lacking or incorrect.         |                       | X      |          | Front axle electronic braking pressure control downgraded | Imperfect slowing down of front axle          | Check the operating pressure and operation of the front axle system.<br>Check the intactness of the wiring, connector and components, if intact change the EBS control unit. |
| 63 25      | Permanent activation of front axle relay valve solenoid.             | X                     |        |          | No operating failure                                      | The vehicle stays braked on the front axle    | Check the intactness of the wiring, connector and component, if intact change the EBS control unit.  |
| 63 32      | Short circuit at earth of front axle relay valve supply line.        |                       | X      |          | Front axle electronic braking pressure control downgraded | Front axle slowdown delayed and not optimised | Check the intactness of the wiring, connector and component, if intact change the EBS control unit.  |
| 63 33      | Short circuit at positive of front axle relay valve supply line.     |                       | X      |          | Front axle electronic braking pressure control downgraded | Front axle slowdown delayed and not optimised | Check the intactness of the wiring, connector and component, if intact change the EBS control unit.  |
| 63 34      | Short circuit at earth of front axle relay valve return line.        |                       | X      |          | Front axle electronic braking pressure control downgraded | Front axle slowdown delayed and not optimised | Check the intactness of the wiring, connector and component, if intact change the EBS control unit.  |
| 63 35      | Short circuit at positive of front axle relay valve return line.     |                       | X      |          | Front axle electronic braking pressure control downgraded | Front axle slowdown delayed and not optimised | Check the intactness of the wiring, connector and component, if intact change the EBS control unit.  |
| 63 36      | Front axle relay valve supply wiring cut off.                        |                       | X      |          | Front axle electronic braking pressure control downgraded | Front axle slowdown delayed and not optimised | Check the intactness of the wiring, connector and component, if intact change the EBS control unit.  |

| Blink Code | Type of error  | Failure warning light |        |  | Possible failures and system reactions   | Failure claimed by driver  | Recommended repair operations                                 |
|------------|--|-----------------------|--------|--|--|--|---|
|            |  | Red                   | Yellow | Pad Wear   |  |  |   |
| 64 13      | Incorrect rear axle modulator parameters.  | X                     |        |  | EBS completely disabled ASR completely disabled                                      | EBS and ASR fail to cut in   | Change the rear axle modulator<br>Change the EBS control unit |
|            |  |                       |        |  | Front axle and trailer braking pressure electronic braking pressure control disabled | Lack of optimisation of front axle and trailer braking   |   |
|            |  |                       |        |  | Rear axle electronic braking pressure control disabled                               | Lack of rear axle braking  |   |
| 64 16      | Total failure of rear axle modulator.  | X                     |        | EBS completely disabled ASR completely disabled<br>Rear axle electronic braking pressure control disabled  | EBS and ASR fail to cut in<br>Lack of rear axle braking                              | Change the rear axle modulator   |   |
|            |  |                       |        |  |  |  |   |
| 64 51      | High braking pressure at rear axle.  |                       | X      |  | Front wheels tend to lock  | Change the rear axle modulator<br>(Check the backup valve if present)                              |   |
| 64 52      | Too much difference between rear axle sensor pressure signals.                               | X                     |        | EBS completely disabled ASR completely disabled<br>Rear axle electronic braking pressure control disabled  | Rear axle slowing down not optimised   | Check the operating pressure and operation of the rear axle system. Change the rear axle modulator |   |
|            |  |                       |        |  | Lack of rear axle braking  |  |   |
| 64 54      | Rear axle modulator sensor pressure signal lacking or incorrect.                             |                       | X      | EBS completely disabled ASR completely disabled<br>Rear axle electronic braking pressure control downgraded  | EBS and ASR fail to cut in   | Check the operating pressure and operation of rear axle system. Replace the EBS control unit..     |   |
|            |  |                       |        |  | Rear axle slowdown not optimised   |  |   |
| 64 64      | Deactivation of braking system and CAN line between EBS control unit and rear axle modulator | X                     |        | EBS completely disabled ASR completely disabled<br>Rear axle electronic braking pressure control disabled.   | EBS and ASR fail to cut in   | Check the intactness of the wiring between the EBS control unit and the rear axle modulator        |   |
|            |  |                       |        |  | Lack of rear axle braking  |  |   |
| 66 12      | Incorrect trailer control valve parameters.  | X                     |        | EBS completely disabled ASR completely disabled.<br>Front axle and semi-trailer electronic braking pressure control disabled.<br>Rear axle electronic braking pressure control disabled. | EBS and ASR fail to cut in   | Check the control unit configuration   |   |
|            |  |                       |        |  | Lack of optimisation of front axle and trailer braking                               |  |   |
|            |  |                       |        |  | Lack of rear axle braking  |  |   |

| Blink Code | Type of error   | Failure warning light |        |          | Possible failures and system reactions                 | Failure claimed by driver                   | Recommended repair operations  |
|------------|---|-----------------------|--------|----------|--|---|--|
|            |   | Red                   | Yellow | Pad Wear |  |   |  |
| 66 16      | Total failure of trailer control valve.                             |                       | X      |          | Trailer electronic braking pressure control disabled.  | Trailer slowdown delayed and not optimised  | Check the intactness of the wiring, connector and component, if intact change the EBS control unit.  |
| 66 55      | Low braking pressure at trailer control valve.                      | X                     |        |          | Trailer electronic braking pressure control disabled   | Trailer slowdown delayed and not optimised  | Check the intactness of the trailer air supply pipes and operating pressure. Change the trailer control valve.   |
| 67 42      | Short circuit at positive of trailer control valve pressure signal. |                       | X      |          | Trailer electronic braking pressure control downgraded | Imperfect trailer slowdown                  | Check the intactness of the wiring, connector and component, if intact change the EBS control unit.  |
| 67 43      | Trailer control valve pressure sensor signal lacking or incorrect.  |                       | X      |          | Trailer electronic braking pressure control downgraded | Imperfect trailer slowdown                  | Check the control unit configuration. Check the intactness of the wiring, connector and components, if intact change the EBS control unit.                     |
| 67 51      | High braking pressure at trailer control valve.                     |                       | X      |          | Trailer electronic braking pressure control downgraded | Imperfect trailer slowdown                  | Check the trailer system operating pressure and operation. Check the intactness of the wiring, connector and component, if intact change the EBS control unit. |
| 68 25      | Permanent activation of trailer control valve solenoid.             | X                     |        |          | No operating failure                                   | The trailer remains braked                  | Check the intactness of the wiring, connector and component, if intact change the EBS control unit.  |
| 68 32      | Short circuit at earth of trailer control valve supply line.        |                       | X      |          | Trailer electronic braking pressure control disabled   | Trailer slowdown delayed and not optimised. | Check the intactness of the wiring, connector and component, if intact change the EBS control unit.  |
| 68 33      | Short circuit at positive of trailer control valve supply line.     |                       | X      |          | Trailer electronic braking pressure control disabled   | Trailer slowdown delayed and not optimised. | Check the intactness of the wiring, connector and component, if intact change the EBS control unit.  |
| 68 34      | Short circuit at earth of trailer control valve return line.        |                       | X      |          | Trailer electronic braking pressure control disabled   | Trailer slowdown delayed and not optimised. | Check the intactness of the wiring, connector and component, if intact change the EBS control unit.  |
| 68 35      | Short circuit at positive of trailer control valve return line.     |                       | X      |          | Trailer electronic braking pressure control disabled   | Trailer slowdown delayed and not optimised. | Check the intactness of the wiring, connector and component, if intact change the EBS control unit.  |

| Blink Code | Type of error   | Failure warning light |        | Possible failures and system reactions  | Failure claimed by driver   | Recommended repair operations   |
|------------|---|-----------------------|--------|---|---|---|
|            |   | Red                   | Yellow |   |   |   |
| 68 36      | Trailer control valve supply wiring cut of.                             |                       | X      | Trailer electronic braking pressure control downgraded  | Trailer slowdown delayed and not optimised.   | Check the intactness of the wiring, connector and component, if intact change the EBS control unit. |
| 71 12      | Incorrect rear axle load sensor configuration parameters.               |                       |        | EBS completely disabled ASR completely disabled   | EBS and ASR fail to cut in  | Check the control unit configuration.   |
|            |   | X                     |        | Front axle and trailer braking pressure electronic braking pressure control disabled<br>Rear axle electronic braking pressure control disabled. | Lack of optimisation of front axle and trailer braking<br>Lack of rear axle braking |   |
| 71 42      | Short circuit at positive of rear axle load sensor signal.              |                       | X      | No operating failure  | Yellow warning light turns on   | Check the intactness of the wiring, connector and component, if intact change the EBS control unit. |
| 73 15      | Trailer EBS system operating error.                                     | X                     |        | No operating failure  | Red warning light turns on  | Check the trailer EBS system  |
| 81 42      | Short circuit at positive of RH front brake pad wear sensor signal.     |                       | X      | No operating failure  | Yellow warning light turns on   | Check the intactness of the wiring, connector and component, if intact change the EBS control unit. |
| 81 43      | RH front brake pad wear sensor signal lacking or incorrect.             |                       | X      | No operating failure  | Yellow warning light turns on   | Check the intactness of the wiring, connector and component, if intact change the EBS control unit. |
| 81 57      | RH brake pads worn signal.  |                       |        | No operating failure  | Brake pad wear warning light turns on   | Check the brake pad and change if worn.   |
| 82 42      | Short circuit at positive of LH front brake pad wear sensor signal.     |                       | X      | No operating failure  | Yellow warning light turns on   | Check the intactness of the wiring, connector and component, if intact change the EBS control unit. |
| 82 43      | LH front brake pad wear sensor signal lacking or incorrect.             |                       | X      | No operating failure  | Yellow warning light turns on   | Check the intactness of the wiring, connector and component, if intact change the EBS control unit. |
| 82 57      | LH brake pads worn signal.  |                       |        | No operating failure  | Brake pad wear warning light turns on   | Check the brake pad and change if worn.   |
| 83 32      | Short circuit at earth of front axle brake pad wear sensor supply line. |                       | X      | No operating failure  | Yellow warning light turns on   | Check the intactness of the wiring, connector and component, if intact change the EBS control unit. |



| Blink Code   | Type of error  | Failure warning light |        |          | Possible failures and system reactions | Failure claimed by driver             | Recommended repair operations   |
|--------------|--|-----------------------|--------|----------|--|---------------------------------------|---|
|              |  | Red                   | Yellow | Pad Wear |  |                                       |   |
| <b>83 33</b> | Short circuit at positive of front axle brake pad wear sensor supply line. |                       | X      |          | No operating failure                   | Yellow warning light turns on         | Check the intactness of the wiring, connector and component, if intact change the EBS control unit. |
| <b>84 42</b> | Short circuit at positive of RH rear brake pad wear sensor signal.         |                       | X      |          | No operating failure                   | Yellow warning light turns on         | Check the intactness of the wiring, connector and component, if intact change the EBS control unit. |
| <b>84 43</b> | RH rear brake pad wear sensor signal lacking or incorrect.                 |                       | X      |          | No operating failure                   | Yellow warning light turns on         | Check the intactness of the wiring, connector and component, if intact change the EBS control unit. |
| <b>84 57</b> | RH rear brake pads worn signal.  |                       |        | X        | No operating failure                   | Brake pad wear warning light turns on | Check the brake pad and change if worn.   |
| <b>85 42</b> | Short circuit at positive of LH rear brake pad wear sensor signal.         |                       | X      |          | No operating failure                   | Yellow warning light turns on         | Check the intactness of the wiring, connector and component, if intact change the EBS control unit. |
| <b>85 43</b> | LH rear brake pad wear sensor signal lacking or incorrect.                 |                       | X      |          | No operating failure                   | Yellow warning light turns on         | Check the intactness of the wiring, connector and component, if intact change the EBS control unit. |
| <b>85 57</b> | LH rear brake pads worn signal.  |                       |        | X        | No operating failure                   | Brake pad wear warning light turns on | Check the brake pad and change if worn.   |
| <b>86 16</b> | Rear axle pad wear sensor supply line failure.                             |                       | X      |          | No operating failure                   | Yellow warning light turns on         | Check the intactness of the wiring, connector and component, if intact change the EBS control unit. |

**REPAIR OPERATIONS**  
**ABS Trouble-shooting**

| Blink code | Error type                                       | Lamp failure |            | System possible faults and responses | Fault reported by driver   | Repair interventions suggested   |
|------------|--|--------------|------------|--------------------------------------|--|--|
|            |  | Yellow ABS   | Yellow ASR |                                      |  |  |
| 2 + 1      | RH front modulator:<br>Positive short-circuited. | X            |            | ABS disabled.                        | Wheel lock on braking.<br>RH front wheel incorrect braking.              | Check wiring harness and connectors.   |
|            | Open circuit.                                    |              |            | RH front wheel modulator disabled.   | RH front wheel incorrect braking.  | Check RH front modulator efficiency.   |
|            | Negative short-circuited.                        |              |            |                                      | RH front wheel tends to get locked.                                      |  |
| 2 + 2      | LH front modulator:<br>Positive short-circuited. |              |            | ABS disabled.                        | Wheel lock on braking.<br>LH front wheel incorrect braking.              | Check wiring harness and connectors.   |
|            | Open circuit.                                    | X            |            | LH front wheel modulator disabled.   | LH front wheel incorrect braking.  | Check LH front modulator efficiency.   |
|            | Negative short-circuited.                        |              |            |                                      | LH front wheel tends to get locked.                                      |  |
| 2 + 3      | RH rear modulator:<br>Positive short-circuited.  |              |            | ABS disabled.                        | Wheel lock on braking.<br>RH rear wheel incorrect braking.               | Check wiring harness and connectors.   |
|            | Short-circuit opened.                            | X            |            | RH rear wheel modulator disabled.    | RH rear wheel incorrect braking.   | Check RH rear modulator efficiency.  |
|            | Negative short-circuited.                        |              |            |                                      | RH rear wheel tends to get locked.                                       |  |
| 2 + 4      | LH rear modulator:<br>Positive short-circuited.  |              |            | ABS disabled.                        | Wheel lock on braking<br>LH rear wheel incorrect braking.                | Check wiring harness and connectors.   |
|            | Open circuit.                                    | X            |            | LH rear wheel modulator disabled.    | LH rear wheel incorrect braking.   | Check LH rear modulator efficiency.  |
|            | Negative short-circuited.                        |              |            |                                      | LH rear wheel tends to get locked.                                       |  |
| 3 + 1      | RH front sensor excessive air gap.               | X            |            | RH front wheel modulator disabled.   | RH front wheel incorrect braking.<br>RH front wheel tends to get locked. | Check and restore clearance between sensor and phonic wheel.<br>Check phonic wheel wobbling. |
|            |  |              |            |                                      |  | Check bearing clearance.   |

| Blink code | Error type                                      | Lamp failure |            | System possible faults and responses | Fault reported by driver            | Repair interventions suggested  |
|------------|---|--------------|------------|--------------------------------------|-------------------------------------|---|
|            |   | Yellow ABS   | Yellow ASR |                                      |                                     |   |
|            | Excessive skidding detected by RH front sensor. |              |            |                                      |                                     | Check and restore clearance between sensor and phonic wheel.  |
|            | RH front sensor signal too low.                 |              |            |                                      |                                     | Check RH front modulator valve.<br>Check and restore clearance between sensor and phonic wheel.<br>Check wiring harness and connectors.<br>Check sensor signal for compatibility. |
| 3 + 2      | Excessive air gap.                              | X            |            | LH front wheel modulator disabled.   | LH front wheel incorrect braking.   | Check and restore clearance between sensor and phonic wheel.  |
|            | Excessive skidding detected by LH front sensor. |              |            |                                      | LH front wheel tends to get locked. | Check phonic wheel wobbling.<br>Check bearing clearance.  |
|            | LH front sensor signal too low.                 |              |            |                                      |                                     | Check and restore clearance between sensor and phonic wheel.  |
| 3 + 3      | RH front sensor excessive air gap.              | X            |            | RH rear wheel modulator disabled.    | RH rear wheel incorrect braking.    | Check LH front modulator valve.<br>Check and restore clearance between sensor and phonic wheel.<br>Check wiring harness and connectors.<br>Check sensor signal for compatibility. |
|            | Excessive skidding detected by RH rear sensor.  |              |            |                                      | RH rear wheel tends to get locked.  | Check and restore clearance between sensor and phonic wheel.<br>Check phonic wheel wobbling.<br>Check bearing clearance.  |
|            |   |              |            |                                      |                                     | Check and restore clearance between sensor and phonic wheel.  |

| Blink code | Error type  | Lamp failure |            | System possible faults and responses | Fault reported by driver   | Repair interventions suggested   |
|------------|---|--------------|------------|--------------------------------------|--|--|
|            |   | Yellow ABS   | Yellow ASR |                                      |  |  |
|            | RH rear sensor signal too low.  |              |            |                                      |  | Check RH rear modulator valve.<br>Check and restore clearance between sensor and phonic wheel.<br>Check wiring harness and connectors.<br>Check sensor signal for compatibility. |
| 3 + 4      | LH rear sensor excessive air gap.   | X            |            | LH rear wheel modulator disabled.    | LH rear wheel incorrect braking.   | Check and restore clearance between sensor and phonic wheel.<br>Check phonic wheel wobbling.<br>Check bearing clearance.   |
|            | Excessive skidding detected by LH rear sensor.  |              |            |                                      | RH rear wheel tends to get locked.                                       | Check and restore clearance between sensor and phonic wheel.   |
|            | LH rear sensor signal too low.  |              |            |                                      |  | Check LH rear modulator valve.<br>Check and restore clearance between sensor and phonic wheel.<br>Check wiring harness and connectors.<br>Check sensor signal for compatibility. |
| 4 + 1      | RH front sensor:<br>Positive short-circuited.<br>Negative short-circuited.<br>Open circuit.<br>Short-circuit between the two sensor cables. | X            |            | RH front wheel modulator disabled.   | RH front wheel incorrect braking.<br>RH front wheel tends to get locked. | Check sensor wiring harness.<br>Replace sensor if damaged.   |
|            | LH front sensor:<br>Positive short-circuited.<br>Negative short-circuited.<br>Open circuit.<br>Short-circuit between the two sensor cables. | X            |            | LH front wheel modulator disabled.   | LH front wheel incorrect braking.<br>LH front wheel tends to get locked. | Check sensor wiring harness.<br>Replace sensor if damaged.   |

| Blink code           | Error type                                   | Lamp failure |            | System possible faults and responses | Fault reported by driver   | Repair interventions suggested  |
|----------------------|--|--------------|------------|--------------------------------------|--|---|
|                      |  | Yellow ABS   | Yellow ASR |                                      |  |   |
| 4 + 3                | RH rear sensor:                              | X            |            | RH rear wheel modulator disabled.    | RH rear wheel incorrect braking.<br>RH rear wheel tends to get locked.   | Check sensor wiring harness.<br>Replace sensor if damaged.  |
|                      | Positive short-circuited.                    |              |            |                                      |  |   |
|                      | Negative short-circuited.                    |              |            |                                      |  |   |
|                      | Open circuit.                                |              |            |                                      |  |   |
| 4 + 4                | Short-circuit between the two sensor cables. |              |            |                                      |  |   |
|                      | LH rear sensor:                              | X            |            | LH rear wheel modulator disabled.    | LH rear wheel incorrect braking.<br>LH rear wheel tends to get locked.   | Check sensor wiring harness.<br>Replace sensor if damaged.  |
|                      | Positive short-circuited.                    |              |            |                                      |  |   |
|                      | Negative short-circuited.                    |              |            |                                      |  |   |
| Open circuit.        |  |              |            |                                      |  |   |
| 5 + 1                | Short-circuit between the two sensor cables. |              |            |                                      |  |   |
|                      | RH front sensor:                             | X            |            | RH front wheel modulator disabled.   | RH front wheel incorrect braking.<br>RH front wheel tends to get locked. | Check tyre correct circumference.<br>Check correct number of teeth of phonic wheel.<br>Check and restore sensor correct connection.<br>Check wiring harness and connectors.<br>Check sensor signal for compatibility.<br>Check wiring harness and connectors.   |
|                      | Wrong tyre dimensions.                       |              |            |                                      |  |   |
|                      | Wrong sensor connection.                     |              |            |                                      |  |   |
| Faulty speed signal. |  |              |            |                                      |  |   |
| 5 + 2                | Signal frequency too high.                   |              |            |                                      |  |   |
|                      | LH front sensor:                             | X            |            | LH front wheel modulator disabled.   | LH front wheel incorrect braking.<br>LH front wheel tends to get locked. | Check tyre correct circumference.<br>Check correct number of teeth of phonic wheel.<br>Check and restore sensor correct connection.<br>Check wiring harness and connectors.<br>Check sensor signal for compatibility.<br>Check wiring harness and connectors.<br>Replace electronic central unit if error persists. |
|                      | Wrong tyre dimensions.                       |              |            |                                      |  |   |
|                      | Wrong connection to sensor.                  |              |            |                                      |  |   |
| Faulty speed signal. |  |              |            |                                      |  |   |
|                      | Signal frequency too high.                   |              |            |                                      |  |   |

| Blink code   | Error type                                | Lamp failure |            | System possible faults and responses | Fault reported by driver   | Repair interventions suggested  |
|--------------|---|--------------|------------|--------------------------------------|--|---|
|              |   | Yellow ABS   | Yellow ASR |                                      |  |   |
| <b>5 + 3</b> | RH rear sensor:<br>Wrong tyre dimensions. | X            |            | RH rear wheel modulator disabled.    | RH rear wheel incorrect braking.<br>RH rear wheel tends to get locked.   | Check tyre correct circumference.<br>Check correct number of teeth of phonic wheel.<br>Check and restore sensor correct connection.<br>Check wiring harness and connectors.<br>Check sensor signal for compatibility.<br>Check wiring harness and connectors.<br>Replace electronic central unit if error persists. |
|              | Wrong sensor connection.                  |              |            |                                      |  |   |
|              | Faulty speed signal.                      |              |            |                                      |  |   |
|              | Signal frequency too high.                |              |            |                                      |  |   |
| <b>5 + 4</b> | LH rear sensor:<br>Wrong tyre dimensions. | X            |            | LH rear wheel modulator disabled.    | LH rear wheel incorrect braking.<br>LH rear wheel tends to get locked.   | Check tyre correct circumference.<br>Check correct number of teeth of phonic wheel.<br>Check and restore sensor correct connection.<br>Check wiring harness and connectors.<br>Check sensor signal for compatibility.<br>Check wiring harness and connectors.<br>Replace electronic central unit if error persists. |
|              | Wrong sensor connection.                  |              |            |                                      |  |   |
|              | Faulty speed signal.                      |              |            |                                      |  |   |
|              | Signal frequency too high.                |              |            |                                      |  |   |
| <b>6 + 1</b> | Wrong RH front phonic wheel.              | X            |            | RH front wheel modulator disabled.   | RH front wheel incorrect braking.<br>RH front wheel tends to get locked. | Check phonic wheel and replace it if damaged.<br>Check and restore clearance between sensor and phonic wheel.   |
|              |   |              |            |                                      |  |   |
| <b>6 + 2</b> | Wrong LH front phonic wheel.              | X            |            | LH front wheel modulator disabled.   | LH front wheel incorrect braking.<br>LH front wheel tends to get locked. | Check phonic wheel and replace it if damaged.<br>Check and restore clearance between sensor and phonic wheel.   |
|              |   |              |            |                                      |  |   |

| Blink code | Error type   | Lamp failure |            | System possible faults and responses  | Fault reported by driver  | Repair interventions suggested  |
|------------|--|--------------|------------|---|---|---|
|            |  | Yellow ABS   | Yellow ASR |   |   |   |
| 6 + 3      | Wrong RH rear phonic wheel.  | X            |            | RH rear wheel modulator disabled.   | RH rear wheel incorrect braking.<br>LH front wheel tends to get locked. | Check phonic wheel and replace it if damaged.<br>Check and restore clearance between sensor and phonic wheel. |
| 6 + 4      | Wrong LH rear phonic wheel.  | X            |            | LH rear wheel modulator disabled.   | LH rear wheel incorrect braking.<br>LH rear wheel tends to get locked.  | Check phonic wheel and replace it if damaged.<br>Check and restore clearance between sensor and phonic wheel. |
| 7 + 1      | CAN line communication missing.  |              | X          | Engine brake disengagement impossible.  | Rear axle tends to skid.  | Check CAN line wiring harness.  |
|            | CAN line open circuit.<br>CAN line short-circuit.  |              |            | ASR disabled.   |   | Check EDC central unit.   |
| 7 + 1      | Lack of communication with EDC central unit for an excessively long time.<br>(@ - Only if ASR not present)   | @            | X          |   |   |   |
|            | Lack of communication with central unit<br>Retarder for an excessively long time.<br>Lack of communication with EDC central unit for an excessively long time. | X            |            | Engine brake disengagement impossible.<br>Retarder disconnection impossible.<br>ASR disabled. | Rear axle tends to skid.  | Check CAN line wiring harness.<br>Check EDC central unit.<br>Check Retarder central unit.                     |

| Blink code   | Error type   | Lamp failure |            | System possible faults and responses | Fault reported by driver             | Repair interventions suggested                                     |
|--------------|--|--------------|------------|--------------------------------------|--------------------------------------|--|
|              |  | Yellow ABS   | Yellow ASR |                                      |                                      |  |
| <b>7 + 2</b> | ASR Valve:   |              |            |                                      |                                      |  |
|              | Positive short-circuited.                                  | X            |            | Rear axle ASR braking disabled.      | Rear axle tends to skid.             | Check ASR valve wiring harness.                                    |
| <b>7 + 3</b> | Open circuit.  |              | X          | Rear axle ASR braking disabled.      | Rear axle tends to skid.             | Check ASR valve wiring harness.                                    |
|              | Negative short-circuited.                                  |              |            |                                      |                                      |  |
|              | Retarder disconnection relay control:                      |              |            |                                      |                                      |  |
| <b>7 + 4</b> | Positive short-circuited.                                  | X            |            | Retarder disconnection impossible.   | Rear axle tends to get locked.       | Check disconnection relay wiring harness (pin 14 of connector XI). |
|              | Negative short-circuited.                                  |              |            |                                      |                                      |  |
|              | Open circuit.  |              |            |                                      |                                      |  |
| <b>7 + 4</b> | Lamp failure.  |              |            | Lamp failure warning missing.        | Lamp warning missing at start check. | Check wiring harness and lamp.                                     |
| <b>7 + 5</b> | Wrong ASR configuration.                                   |              | X          | ASR completely disabled.             | Rear axle tends to skid.             | Check central unit configuration.                                  |
| <b>7 + 7</b> | Pressure sensor:   |              |            |                                      |                                      |  |
|              | Positive short-circuited.                                  | X            |            | EBL disabled.                        | Rear axle tends to get locked.       | Check wiring harness for integrity and pressure sensor.            |
|              | Negative short-circuited.                                  |              |            |                                      |                                      |  |
| <b>8 + 1</b> | Open circuit.  |              |            |                                      |                                      |  |
|              | Either low supply voltage to central unit or open circuit. | X            |            | ABS disabled.                        | ABS control not present.             | Check power supply wiring harness and check fuse for integrity.    |
| <b>8 + 2</b> | Voltage too high.  | X            |            | ABS / ASR disabled.                  | ABS / ASR control not present.       | Check battery and alternator power supply.                         |



| Blink code   | Error type                    | Lamp failure |            | System possible faults and responses | Fault reported by driver       | Repair interventions suggested   |
|--------------|-------------------------------|--------------|------------|--------------------------------------|--------------------------------|--|
|              |                               | Yellow ABS   | Yellow ASR |                                      |                                |  |
| <b>8 + 3</b> | Central unit internal errors. | X            |            | ABS / ASR disabled.                  | ABS / ASR control not present. | Replace electronic central unit.   |
| <b>8 + 4</b> | Wrong tyre parameters.        | X            |            | ABS disabled.                        | ABS control not present.       | Check tyre dimension parameters.<br>Replace electronic central unit.                         |
| <b>8 + 5</b> | Negative connections missing. | X            |            | ABS disabled.                        | ABS control not present.       | Check signal at pins 4 and 9 of connector X1 for integrity.<br>Check for bonding efficiency. |

## INSTRUMENT DIAGNOSIS

### MODUS

Computerized diagnosis station for braking systems, air suspensions, engine and electronic-controlled systems. This station has auxiliary functions such as: electronic control unit programming, spare catalogue reference, timing...

The IVECO WIRING TESTER further expands and integrates MODUS.

Such instrument is manufactured by IVECO to improve diagnosis of the vehicle electric and electronic systems. It makes it possible to test the vehicle wiring and to measure the system itself.

### IVECO WIRING TESTER

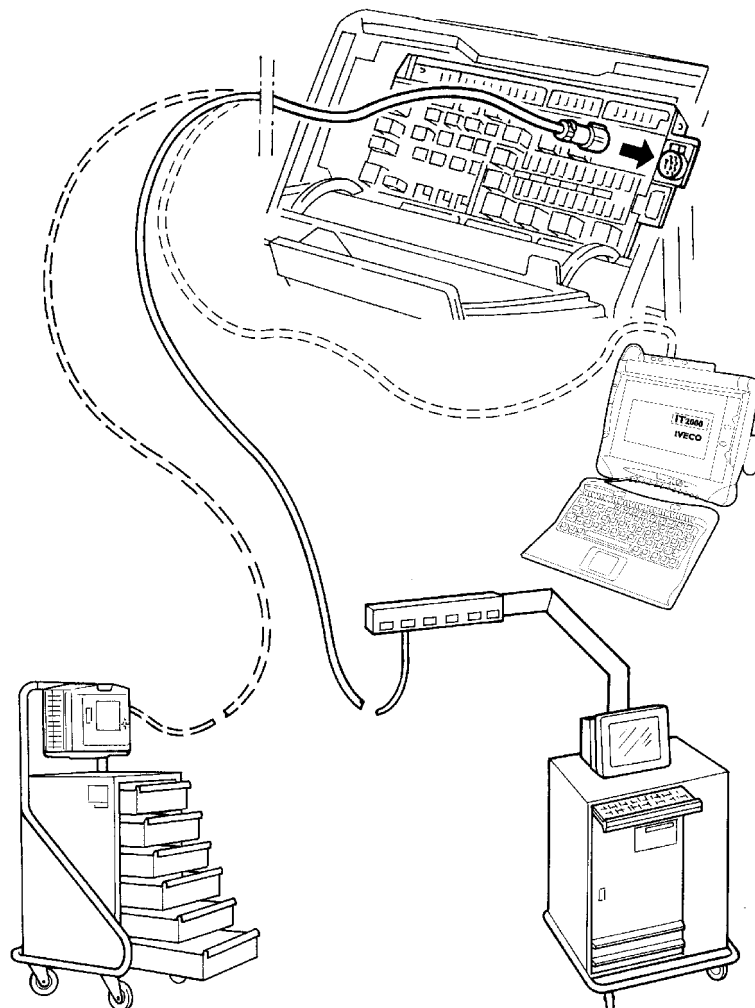
Further expands and integrates MODUS.

Such instrument is manufactured by IVECO to improve diagnosis of the vehicle electric and electronic systems.

It makes it possible to test the vehicle wiring and to measure the system itself.

### IT 2000

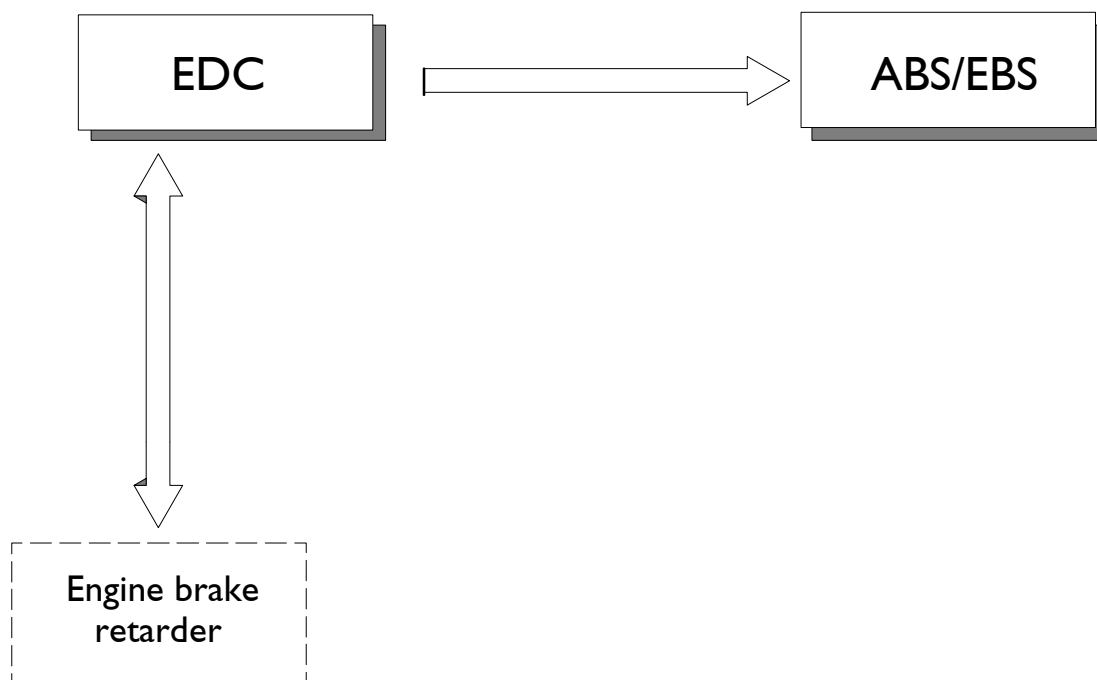
IT 2000 is a diagnosis instrument for every IVECO vehicle electronic system. It makes it possible to take prompt action recognizing the chassis number. It stores the results of previously carried out diagnosis actions. It can also be used as a portable Personal Computer for remote diagnosis. If MODUS is used as a mother station, it is possible to update and configure IT 2000. All instruments are interfaced with the vehicle through a 30-pole diagnosis socket.



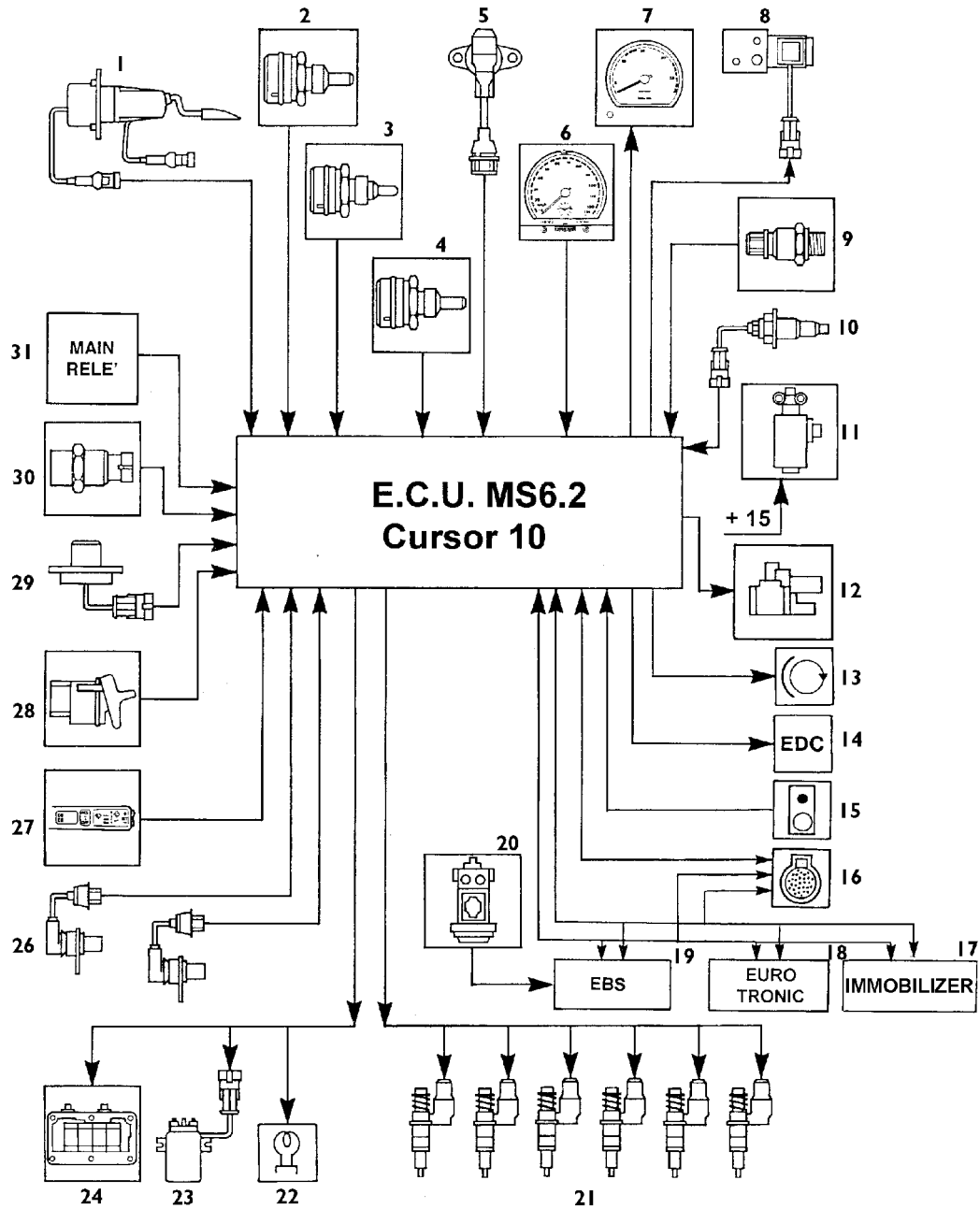
**EDC MS6.2 (Cursor 8 - 10 - 13)****Description and operation**

The EDC system installed on the new family of F3A engines is capable of controlling the capacity, through its control unit, the CAPACITY and ADVANCE, making it possible to improve performance and consumption levels, dramatically reducing the emission of pollutants, under all vehicle operating conditions.

The control unit is fitted directly on the engine (right-hand side) thereby minimising the length of the connection cables to the injectors and consequently disturbances of the signal transmitted and it is connected to the vehicle wiring by two 35-pin connectors. Connector A for components on the engine, connector B for components in the cab. Inside the control unit there is an environment pressure sensor used to further improve injection system management. The EDC electronic control unit directly manages the following systems: - Pre-after heating; turbine geometry; engine brake; speed limiting device; alter run (data storage each time the engine is turned off); cylinder balancing (capacity conversion on each single cylinder)

**III.17 OPERATING SYNOPTIC WITH OTHER SYSTEMS ON BOARD**

CURSOR 8 EuroTrakker - CURSOR 10 - 13 WITH EBS

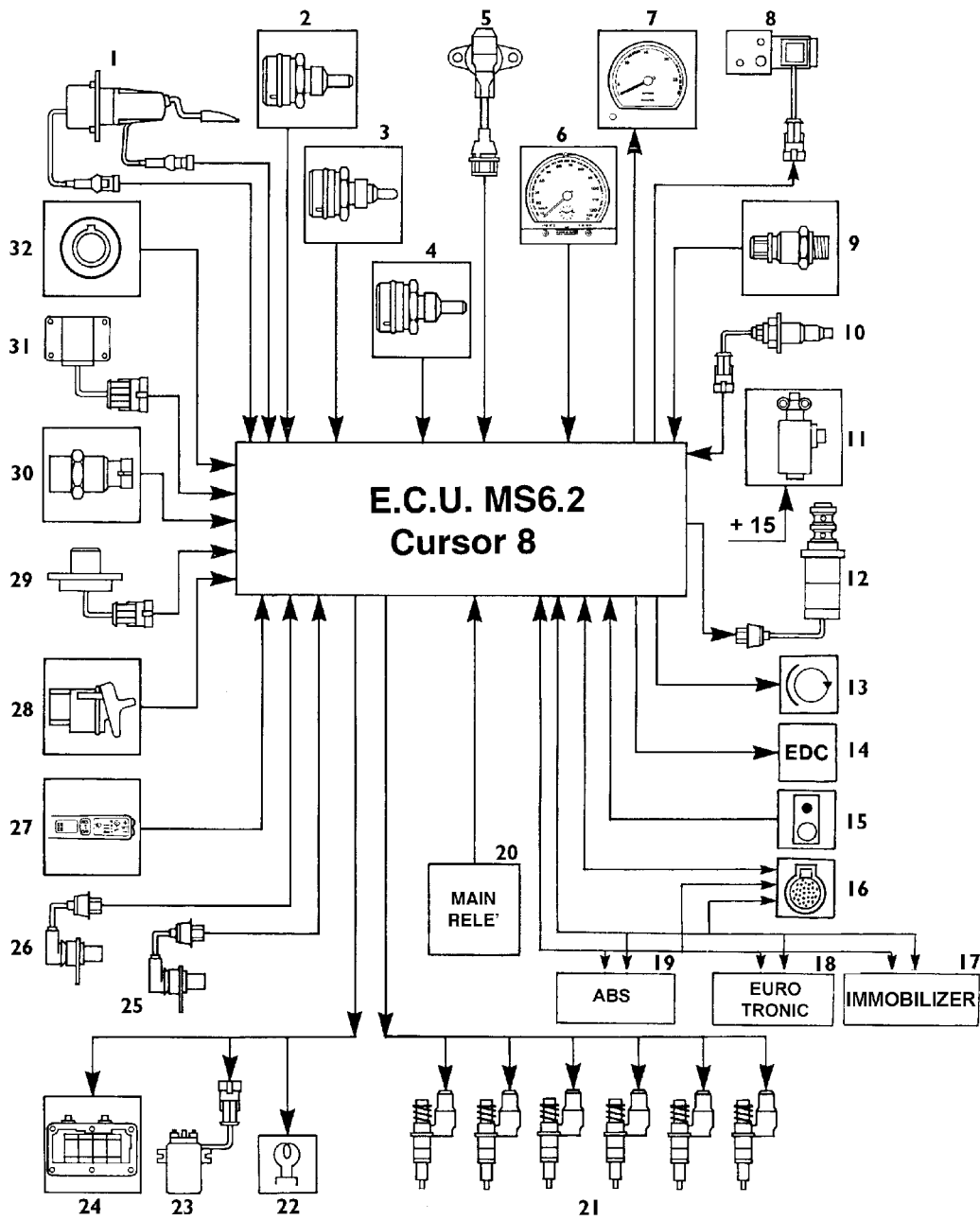


001255t

KEYS

1. 85152 Accelerator pedal position sensor – 2. 85153 Engine coolant temperature sensor – 3. 85155 Oversupply air temperature sensor – 4. 47042 Fuel temperature sensor – 5. 85154 Oversupply pressure sensor – 6. 40011 Electronic tachograph – 7. 48001 Electronic rev counter – 8. 78248 VGT control solenoid valve – 9.----- Turbine actuator position sensor – 10. 48043 Variable geometry turbine rev sensor – 11. 78009 Shut-off solenoid valve – 12. 78050 Engine brake control solenoid valve – 13. 58055 Warning light for engine brake engaged – 14. 58435 E.D.C. system failure warning light – 15. 53041 Blink-code button – 16. 72021 30-pole diagnosis connector – 17. Immobilizer control unit – 18. 86004 EUROTRONIC transmission electronic control unit – 19. 88005 EBS electronic control unit – 88000 ABS electronic control unit – 20. 78059 EBS duplex distributor with primary / secondary brake switches – 21. 78247 Pump-injectors – 22. 58110 Warning light for pre/post-heating activated – 23. 25222 Remote control switch for pre/post-heating activation – 24. 61121 Pre/post-heating resistance – 25. 48035 Flywheel sensor – 26. 48042 Distribution sensor – 27. 53803 / 53804 Cruise Control buttons – 28. 52324 Engine brake pre-arrangement switch – 29. 53520 Engine brake control switch – 30. 42374 Clutch switch (without Eurotronic) – 31. 75007 Main remote control switch

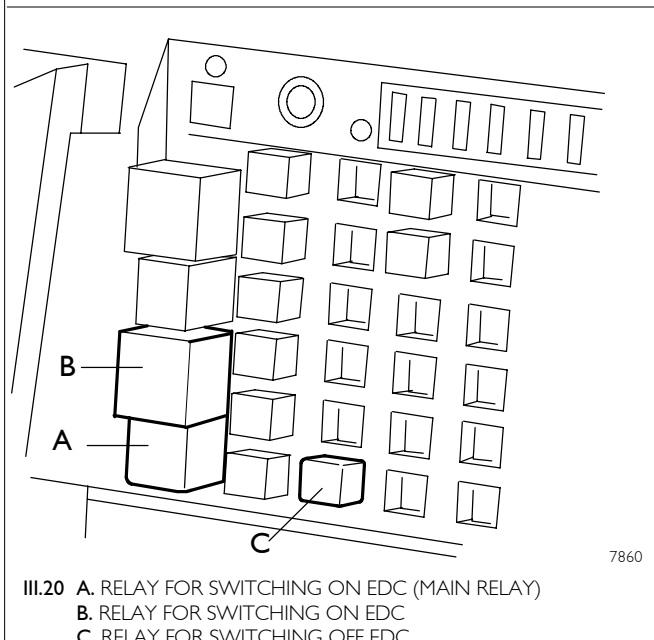
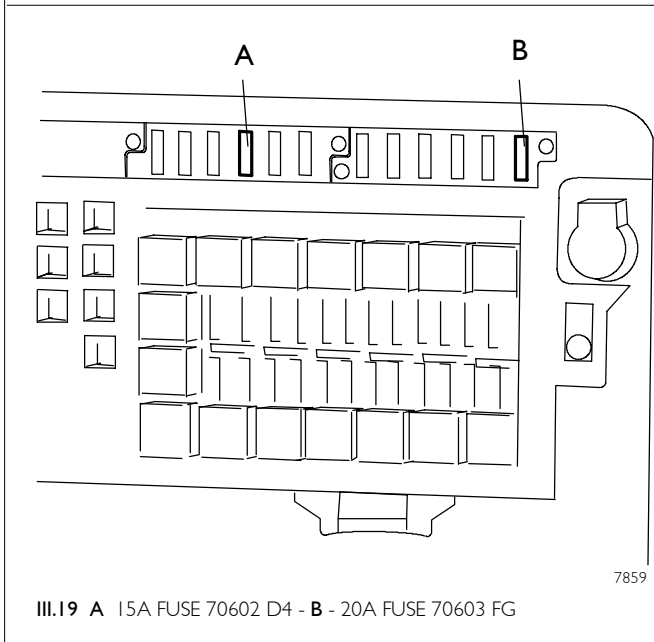
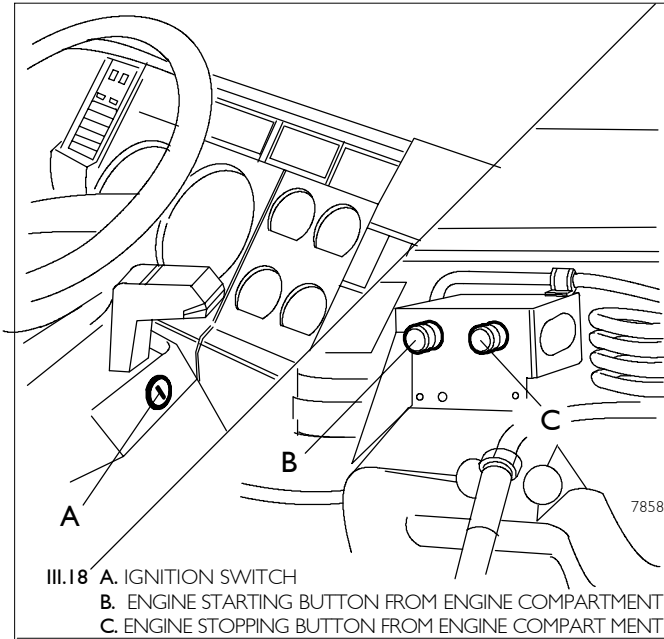
**CURSOR 8 EuroTech**



001254t

**KEYS**

1. **85152 / 53566** Accelerator pedal position sensor / switch accelerator depressed – 2. **85153** Engine coolant temperature sensor – 3. **85155** Oversupply air temperature sensor – 4. **47042** Fuel temperature sensor – 5. **85154** Oversupply air pressure sensor – 6. **40011** Electronic tachograph – 7. **48001** Electronic rev counter – 8. **78248** VGT control solenoid valve – 9.---- Turbine actuator position sensor– 10. **48043** Variable geometry turbine rev sensor – 11. **78009** Shut-off solenoid valve – 12. **78050** Engine brake control solenoid valve – 13. **58055** Warning light for engine brake engaged – 14. **58435** E.D.C. system failure warning light – 15. **53041** Blink-code button – 16. **72021** 30-pole diagnosis connector – 17. Immobilizer control unit – 18. **86004** EUROTRONIC transmission electronic control unit – 19. **88000** ABS electronic control unit – 20. **75007** Main remote control switch – 21. **78247** Pump-injectors – 22. **58110** Warning light for pre/post-heating activated – 23. **25222** Remote control switch for pre/post-heating activation – 24. **61121** Pre/post-heating resistance – 25. **48035** Flywheel sensor – 26. **48042** Distribution sensor – 27. **53803 / 53804** Cruise Control buttons – 28. **52324** Engine brake pre-arrangement switch – 29. **53520** Engine brake control switch – 30. **42374** Clutch switch (without Eurotronic) – 31. **53501 / 53565** Primary / secondary brake switch – 32. **52077** Economy Power control



**EDC system power supply**

To power the EDC system it is necessary to turn the ignition key to "Drive" (+15). Positive electrical supply network. Turning the ignition key to position +15 supplies 15 A fuse 70602 D4 (fig. III.16 ref. A), which carries voltage to the relay for switching on EDC 25858 (ref. B) at terminals 30 and 85, which in turn, from terminal 87 supplies the EDC control unit at terminal 15B.

The 20A fuse 70603 F6 (fig. III.18 ref. B) (direct positive from battery) supplies terminal 30 of relay 25924 (Main relay) Fig.V.6 ref. A. This relay is energised by the closing of the contacts of terminal 27B of the EDC control unit.

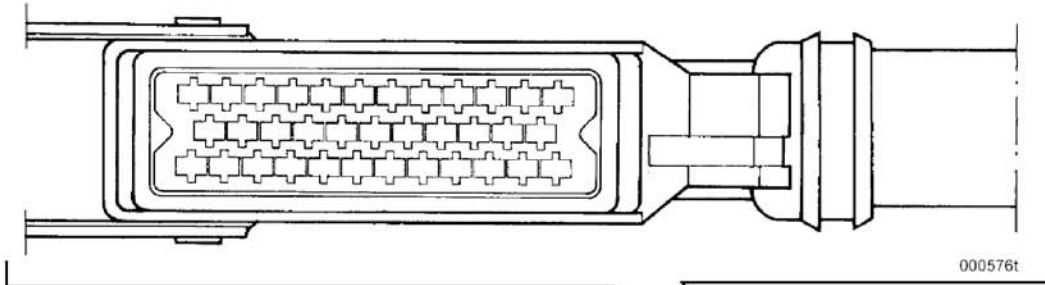
Terminal 87 of relay 25924 supplies:

- the EDC control unit at terminals 3B and 4B;
- relay 25222 (turning on warming resistance);
- switch 53547 (secondary signal from brake pedal to EDC control unit);
- switch 53565 (for signalling brake pedal pressed);
- switch 42374 (on clutch for EDC);
- switch 53041 (for EDC system functions control)
- led 58466 (for indicating Economy power on);
- relay 25700 at terminal 30 (for switching off Cruise Control with ABS on);
- warning lamp module 58903 (EDC warning lamp)
- warning lamp module 58902.

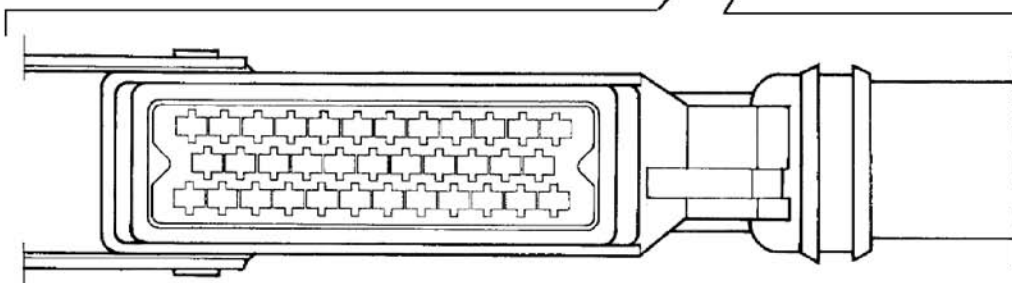
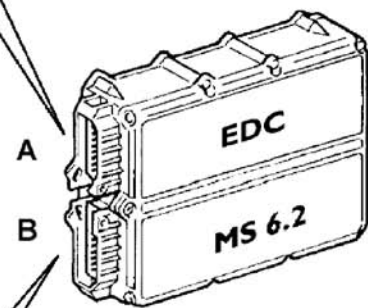
**Switching off the EDC**

To switch off the EDC it is necessary to turn the ignition key to "stop" to cut off the +15 supply at terminal 86 of relay 25213B and thus the voltage at fuse 70602 D4.

**EDC MS 6.2 electronic control unit**



Connector "A" engine

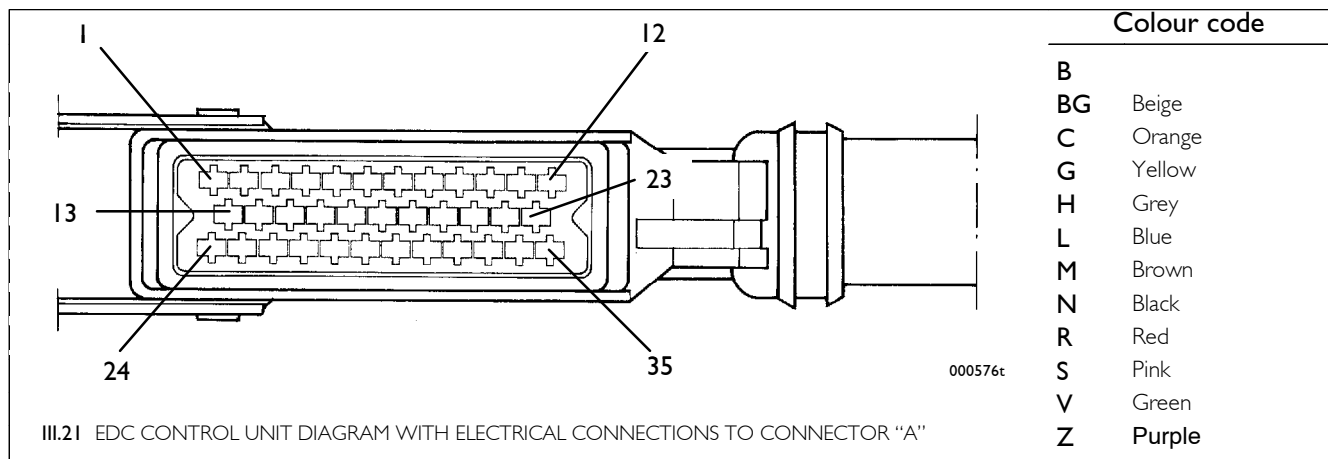


Connector "B" chassis/cabin

**EDC control unit PIN-OUT for vehicles CURSOR 8 - 10  
(EuroTech - EuroTrakker - EuroStar)**

**Connector "A" (Engine)**

| Pin  | Cable colour | Function  |
|------|--------------|---|
| 1 -  | B            | Engine rev sensor   |
| 2 -  | B            | Distribution rev sensor                                     |
| 3 -  | B / M        | Power supply solenoid valve / engine brake warning light    |
| 4 -  | B            | Air temperature sensor mass                                 |
| 5 -  | B            | Engine coolant temperature sensor mass                      |
| 6 -  | B            | Fuel temperature sensor mass                                |
| 7 -  | B            | Turbine rev sensor  |
| 8 -  | ---          | ---   |
| 9 -  | ---          | ---   |
| 10 - | ---          | ---   |
| 11 - | B            | Fuel temperature sensor signal                              |
| 12 - | B            | Oversupply pressure sensor signal                           |
| 13 - | N            | Engine rev sensor   |
| 14 - | N            | Distribution rev sensor                                     |
| 15 - | B            | Turbine actuator position sensor power supply               |
| 16 - | N            | Turbine rev sensor  |
| 17 - | B / R        | Oversupply pressure sensor mass / turbine actuator position |
| 18 - | N / M        | Power supply for variable geometry turbine solenoid valve   |
| 19 - | N            | Turbine actuator position sensor signal                     |
| 20 - | ---          | ---   |
| 21 - | B            | Air temperature sensor signal                               |
| 22 - | B            | Engine coolant temperature sensor signal                    |
| 23 - | B            | Oversupply pressure sensor power supply                     |
| 24 - | R            | Injector power supply for cylinders 1 / 2 / 3               |
| 25 - | N            | Injector power supply for cylinders 4 / 5 / 6               |
| 26 - | L            | Cylinder 4 injector control                                 |
| 27 - | H            | Cylinder 6 injector control                                 |
| 28 - | Z            | Cylinder 5 injector control                                 |
| 29 - | ---          | ---   |
| 30 - | ---          | ---   |
| 31 - | L            | Variable geometry turbine solenoid valve negative           |
| 32 - | G / L        | Solenoid valve negative / engine brake warning light        |
| 33 - | V            | Cylinder 3 injector control                                 |
| 34 - | G            | Cylinder 2 injector control                                 |
| 35 - | B            | Cylinder 1 injector control                                 |

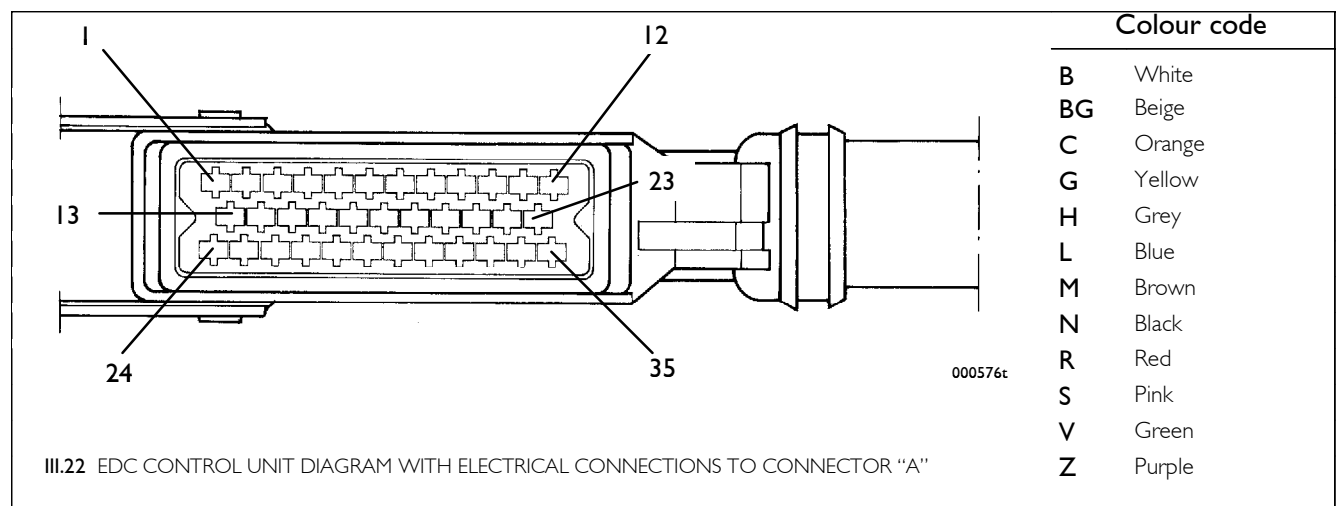




**EDC control unit PIN-OUT for vehicles I3 (EuroTech - EuroStar)**

**Connector "A" (Engine)**

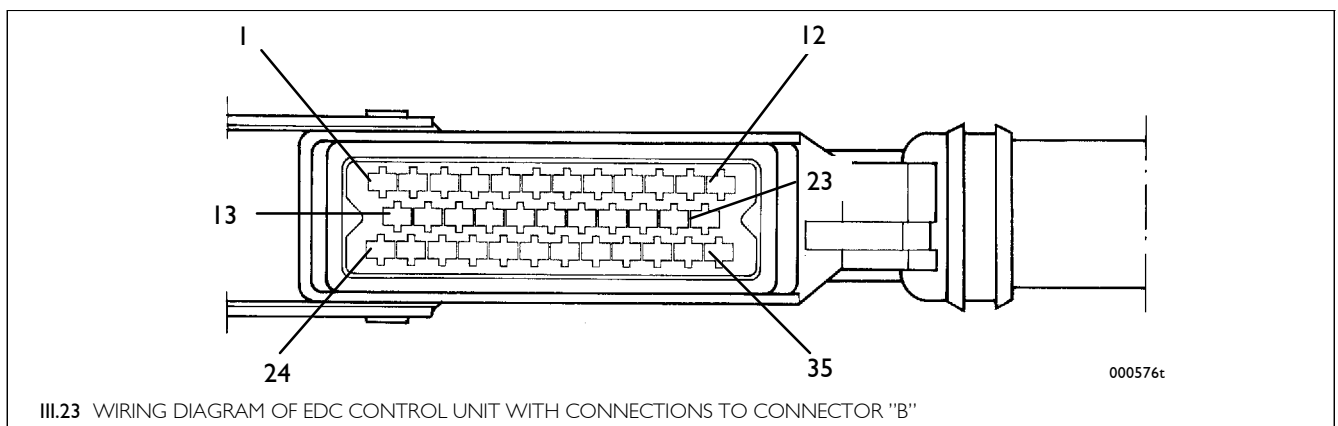
| Pin  | Cable colours | Functions  |
|------|---------------|--|
| 1 -  | B             | Engine Rpm sensor                                |
| 2 -  | B             | Timing rpm sensor                                |
| 3 -  | M             | Exhaust brake control solenoid valve             |
| 4 -  | N             | Turboblower air temperature sensor for EDC       |
| 5 -  | S             | Coolant fluid temperature sensor for EDC         |
| 6 -  | B / R         | Fuel temperature sensor                          |
| 7 -  | B             | Turbocharger speed sensor                        |
| 8 -  | ---           | Free   |
| 9 -  | ---           | Free   |
| 10 - | ---           | Free   |
| 11 - | C / N         | Fuel temperature sensor                          |
| 12 - | V             | Turboblower air pressure sensor for EDC          |
| 13 - | M             | Rpm sensor                                       |
| 14 - | M             | Timing rpm sensor                                |
| 15 - | Z             | Turbine pre-chamber air pressure sensor for EDC  |
| 16 - | M             | Turbocharger speed sensor                        |
| 17 - | B             | Turboblower air pressure sensor for EDC          |
| 18 - | M             | Exhaust brake control solenoid valve             |
| 19 - | H             | Turbine pre-chamber air pressure sensor for EDC  |
| 20 - | ---           | Free   |
| 21 - | C             | Turboblower air temperature sensor for EDC       |
| 22 - | G             | Coolant fluid temperature sensor for EDC         |
| 23 - | R             | Turbo blower air pressure sensor for EDC         |
| 24 - | R             | Electronic injection solenoid valve              |
| 25 - | N             | Electronic injection solenoid valve              |
| 26 - | L             | Electronic injection solenoid valve              |
| 27 - | H             | Electronic injection solenoid valve              |
| 28 - | Z             | Electronic injection solenoid valve              |
| 29 - | ---           | Free   |
| 30 - | ---           | Free   |
| 31 - | B             | Variable geometry turbine control solenoid valve |
| 32 - | L             | Exhaust brake control solenoid valve             |
| 33 - | V             | Electronic injection solenoid valve              |
| 34 - | G             | Electronic injection solenoid valve              |
| 35 - | B             | Electronic injection solenoid valve              |



**EDC control unit PIN-OUT for vehicles CURSOR 8 - 10 (EuroTech - EuroTrakker - EuroStar)**

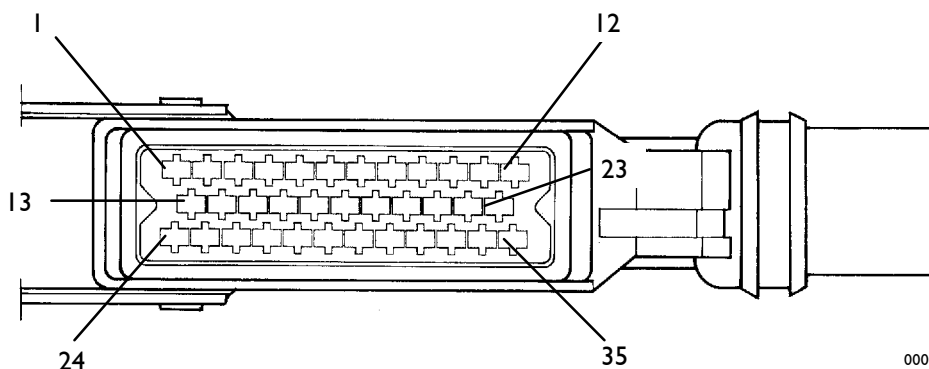
**Connector "B" (Cab/frame area)**

| Pin  | Cable colours | Bulk-head | Functions  |
|------|---------------|-----------|--|
| 1 -  | 0150          |           | Negative direct from battery / blink button – code               |
| 2 -  | 0150          |           | Negative direct from battery / blink button – code               |
| 3 -  | 7155          | E5        | Positive from main remote switch                                 |
| 4 -  | 7155          | E6        | Positive from main remote switch                                 |
| 5 -  | 5584          | B5        | Signal for electronic rev. counter                               |
| 6 -  | 6150          | B6        | Negative for EDC / blink button – code warning light             |
| 7 -  | 8152          | B7        | CAN line for control unit ABS / ASR Pin 28                       |
| 8 -  | 0019          | B8        | Negative from exhaust brake switch / depressed accelerator pedal |
| 9 -  | 5198          | E8        | Engine stroke signal for 30-pole (pin 23) diagnosis connector    |
| 10 - | 0096          | ---       | Negative for pre-post heating remote switch engagement           |
| 11 - | GN / VE       | ---       | CAN Line   |
| 12 - | WS / BI       | ---       | CAN Line   |
| 13 - | 2298          | B11       | K line for 30-pole (pin 2) diagnosis connector                   |
| 14 - | ---           | ---       | ---  |
| 15 - | 8150          | B15       | Key controlled supply positive                                   |
| 16 - | 5158          | B16       | Accelerator pedal position sensor supply                         |
| 17 - | 0159          | B17       | Negative from idler switch                                       |
| 18 - | 5553          | B18       | Negative for warning light pre – post heating                    |
| 19 - | ---           | ---       | ---  |
| 20 - | 8160          | ---       | Positive from N.C. (ST79 / 1) clutch switch                      |
| 21 - | 8155          | B1        | Function "RESUME" Cruise Control                                 |
| 22 - | 0172          | E2        | Positive from switch for RSU                                     |
| 23 - | 5157          | B3        | Accelerator pedal position signal sensor                         |
| 24 - | 1198          | B4        | L Line for 30-pole (pin 1) diagnosis connector                   |
| 25 - | 0158          | B2        | Negative for brake switch / idling switch resistances            |
| 26 - | 8153          | ---       | Positive from primary 53565 N.C. (ST79 /3) brake switch          |
| 27 - | 0155          | E4        | Negative for main remote switch                                  |
| 28 - | 0169          | E3        | Signal for ECO – POWER   |
| 29 - | 5155          | B9        | Vehicle speed (D3 tachograph) signal                             |
| 30 - | 8151          | B10       | PWM line from control unit ABS / ASR Pin 29                      |
| 31 - | 8158          |           | Positive from N.O. (ST79 / 2) primary brake switch               |
| 32 - | 8157          | B12       | Function "SET –" Cruise Control                                  |
| 33 - | 8154          | B13       | Function "OFF +" Cruise Control                                  |
| 34 - | 8156          | B14       | Function "SET +" Cruise Control                                  |
| 35 - | 0157          | B19       | Negative for accelerator pedal position sensor                   |



**EDC control unit PIN-OUT for vehicles I3 (EuroTech - EuroStar)****Connector "B" (Cab/frame area)**

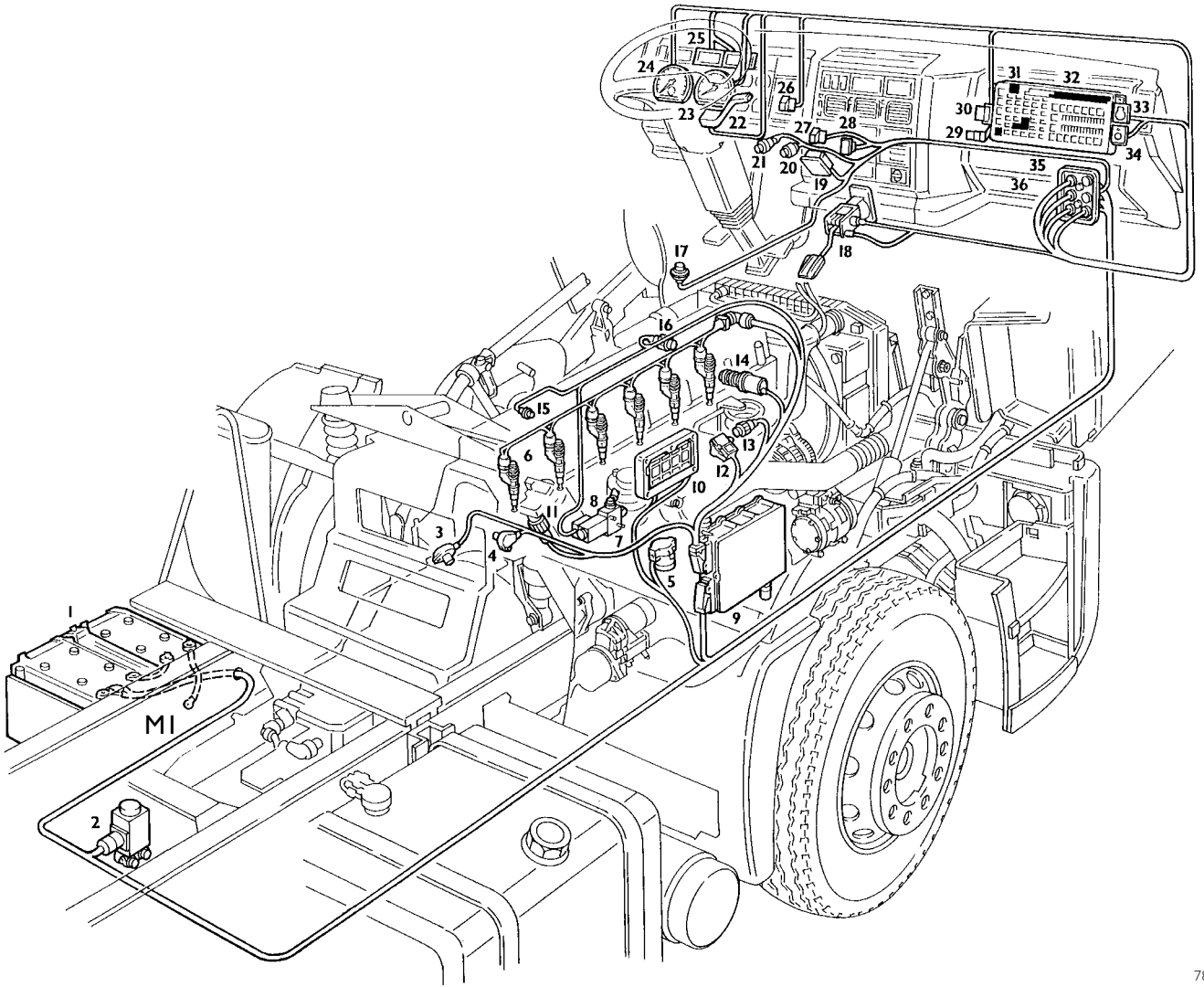
| Pin  | Cable colours | Function   |
|------|---------------|--|
| 1 -  | 0150          | Ground   |
| 2 -  | 0150          | Ground   |
| 3 -  | 7155          | Positive (under Main relay)  |
| 4 -  | 7155          | Positive (under Main relay)  |
| 5 -  | 5584          | To tachograph, to rev. counter and to connector for connection with diagnostics  |
| 6 -  | 6150          | To the EDC function check switch, and to the EDC warning light   |
| 7 -  | 8152          | To the ABS check unit  |
| 8 -  | 0019          | Exhaust brake control switch, resistances for exhaust brake. depressed accelerator pedal signalling switch, remote switch for exhaust brake control by service brake |
| 9 -  | 5198          | To connector for connection with diagnostics   |
| 10 - | 0096          | Remote switch (terminal 87) for pre-heating resistance engagement consent  |
| 11 - | GN/VE         | Connection with "CAN line"   |
| 12 - | WS/BI         | Connection with "CAN line"   |
| 13 - | 2298          | AI connector for connection with diagnostics (terminal 2)  |
| 14 - | -             | Free   |
| 15 - | 8050          | Positive under remote switch for EDC engagement  |
| 16 - | 5158          | Load sensor on accelerator for EDC   |
| 17 - | 0159          | Load sensor on accelerator for EDC   |
| 18 - | 5553          | Pre-heating ON warning light   |
| 19 - | -             | Free   |
| 20 - | 8160          | Switch on clutch for EDC   |
| 21 - | 8155          | Cruise control, connector STT44 (Terminal 5)   |
| 22 - | 7172          | Bulkhead E (pin 2) RSU switch  |
| 23 - | 5157          | Load sensor on accelerator for EDC   |
| 24 - | 1198          | Connector for connection with diagnostics (terminal 1)   |
| 25 - | 0158          | Resistance for exhaust brake, load sensor on accelerator, connector ST44 (terminal 13)   |
| 26 - | 8153          | Depressed brake pedal signal switch  |
| 27 - | 0155          | Remote switch for engaging EDC (Main relay)  |
| 28 - | 0169          | Connector ST44 (terminal 6), power take-off / Eco-Power  |
| 29 - | 5155          | Tachograph (terminal D3)   |
| 30 - | 8151          | To ABS control unit (terminal 29)  |
| 31 - | 8158          | Switch for secondary signal from brake pedal to EDC control unit   |
| 32 - | 8157          | Cruise control, connector ST44 (terminal 2) "SET-"   |
| 33 - | 8154          | Cruise control, connector ST44 (terminal 4) "OFF +"  |
| 34 - | 8156          | Cruise control, connector ST44 (terminal 3) "SET +"  |
| 35 - | 0157          | Load sensor on accelerator for EDC   |



000576c

III.24 WIRING DIAGRAM OF EDC CONTROL UNIT WITH CONNECTIONS TO CONNECTOR "B"

**Location and identification of components of the EDC MS6.2 system**



7869

|    |          |  |
|----|----------|--|
| 1  | 20000    | Starting battery   |
| 2  | 78009    | Solenoid valve for closing circuit to turbine (shut-off)                           |
| 3  | 48035    | Engine rpm sensor  |
| 4  | 48042    | Pulse sensor on timing gear  |
| 5  | 25222    | Relay to enable thermal starter engagement   |
| 6  | 78247    | Solenoid valve for electronic injection  |
| 7  | 78248    | Solenoid valve for variable geometry turbine control                               |
| 8  | 85158    | Air pressure sensor in turbine preliminary chamber for EDC                         |
| 9  | 85150    | EDC control unit   |
| 10 | 61121    | Resistance for engine warming  |
| 11 | 47042    | Fuel temperature sensor  |
| 12 | 85154    | Turbo-blower air pressure sensor for EDC   |
| 13 | 85155    | Turbo-blower air pressure sensor for EDC   |
| 14 | 78050    | Engine brake solenoid control valve  |
| 15 | 48043    | Turbocharger speed sensor  |
| 16 | 85153    | Coolant fluid temperature sensor for EDC   |
| 17 | 53520    | Engine brake control switch  |
| 18 | 53566    | Switch for signalling accelerator pedal pressed                                    |
| 18 | 85152    | Load sensor on accelerator for EDC   |
| 19 | 53565    | Switch for signalling brake pedal pressed  |
| 20 | 53547    | Switch for secondary signal from brake pedal to EDC control unit                   |
| 21 | 42374    | Switch on clutch for EDC   |
| 22 | 53803/04 | Switch for EDC control (speed adjustment and speed storage)                        |
| 23 | 48001    | Electronic gyrometer   |
| 24 | 40011    | Electronic tachograph  |
| 25 | 58903/2  | Cluster with 10 indicators for Europe vehicles                                     |
| 26 | 52324    | Switch for engine brake setting  |
| 27 | 52218    | Switch for Cruise Control service from inside and outside cab                      |
| 28 | 58466    | Warning lamp module for Economy Power  |
| 29 | 61123    | Container with 4 resistances for Economy Power and power takeoff                   |
| 30 | 61112    | Container with 2 resistances for engine brake                                      |
| 31 | 75000    | Interconnecting Control Unit   |
| 32 | 70602/3  | EDC supply fuses   |
| 33 | 72021    | 30-pin connector for electrical connection with IVECO Tester/Modus/IWT diagnostics |
| 34 | 53041    | Switch for checking EDC system functions (blink code button)                       |
| 35 | 25858    | Relay for switching on EDC (Main Relè)   |
| 36 | 25903    | Relay for switching off EDC  |

**CURSOR 8 - 10 - 13****PUMP INJECTOR**

It consists mainly of:

- A) Solenoid valve
- B) Pumping element
- C) Nozzle

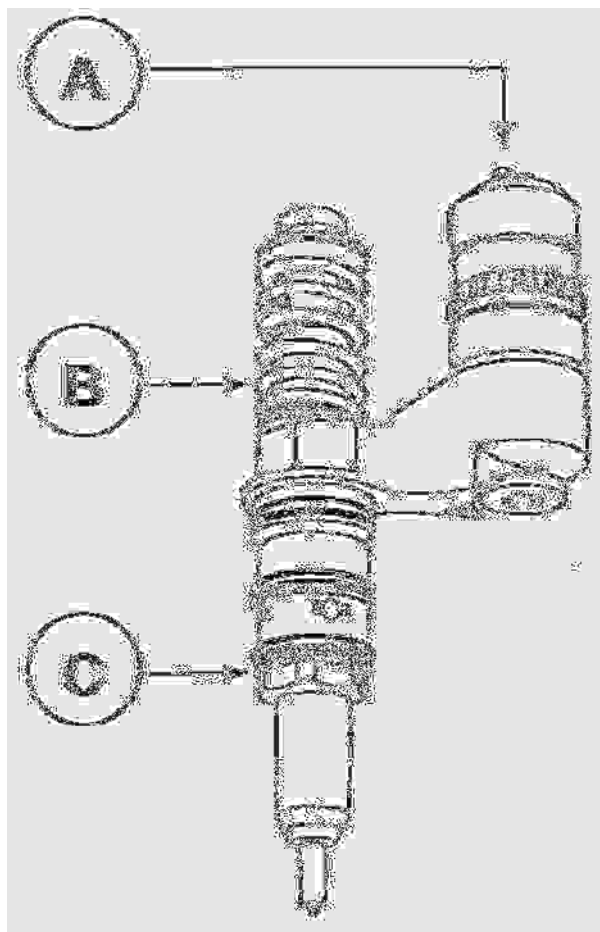
These three parts **CANNOT be replaced individually and CANNOT be overhauled.**

The pumping element, mechanically actuated at every rocker arm cycle, compresses the fuel container in the delivery chamber.

The nozzle, whose composition and operation are similar to those of traditional injectors, is opened by the fuel under pressure and sprays it into the combustion chamber.

A solenoid valve, directly controlled by the electronic control unit, determines delivery according to the control signal.

A casing houses the lower part of the pump injector in the cylinder head.



000578t

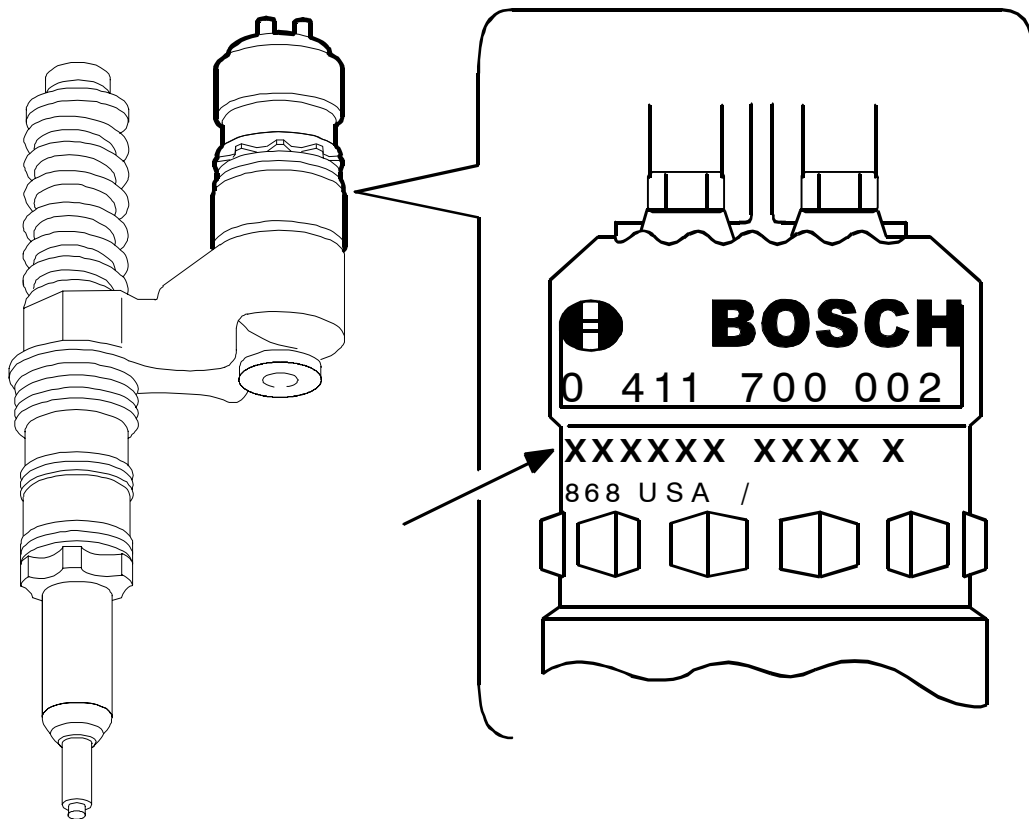
**CURSOR 8 - 10 - 13****Pump-injector replacement**

If the operation is carried out when the engine is on the vehicle, before removing the pump-injectors drain the fuel in the cylinder head pipes by releasing the delivery and return pipe unions on the cylinder head.

Connect to the MODUS station for each replaced injector and, when required by the programme, enter the control unit re-programming code stamped on the injector



In an emergency, when the Modus is not available, it is possible to replace 1 injector without the control unit recognition.



61487

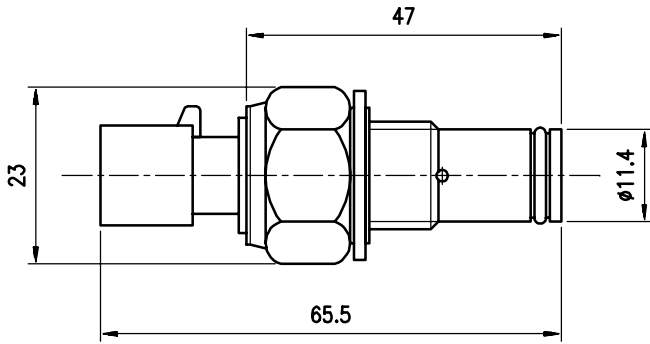


When inspecting the rocker arm clearance, check also the pump-injector preload.

**Pressure sensor**

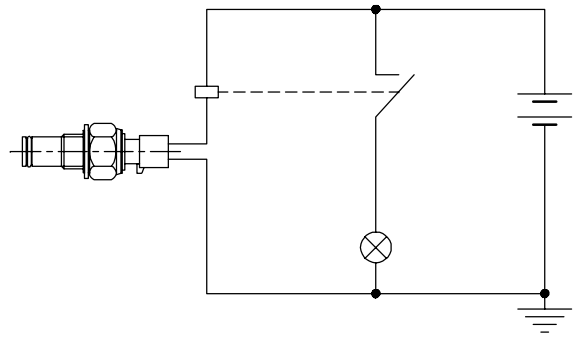
Specifications  
 Tightening torque  
 Temperature range

60 Nm  
 -20°C ÷ +120°C



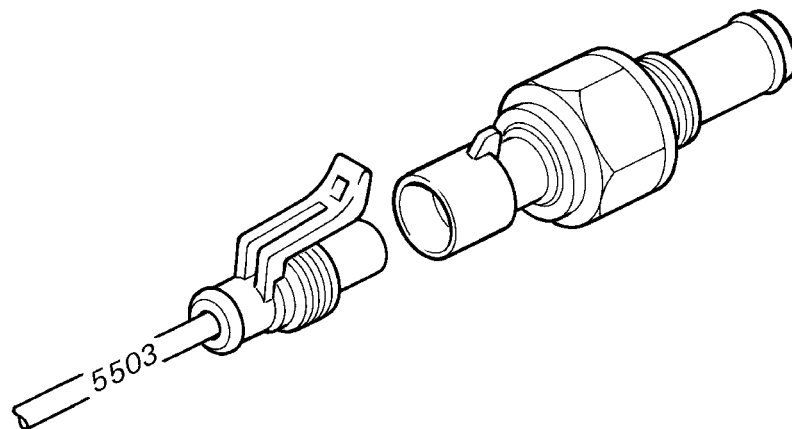
8512

TECHNICAL VIEW



8513

SIMPLIFIED WIRING DIAGRAM



8514

PERSPECTIVE VIEW WITH CORRESPONDING ELECTRIC CONNECTIONS

| Pin | Function                                  | Cable colour |
|-----|---|--------------|
| —   | Ground for minimum oil pressure indicator | <b>5503</b>  |



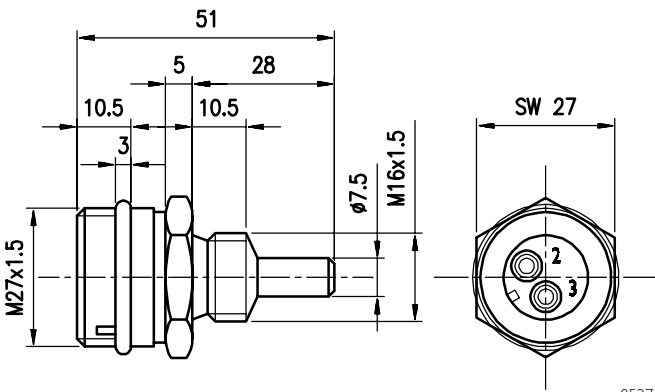
**Fuel temperature sensor**

Specifications

Supplier

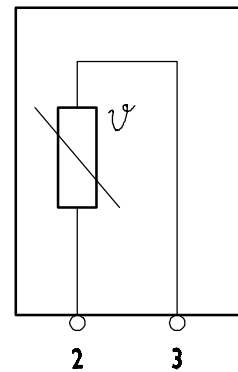
Max. tightening torque

BOSCH  
35 Nm



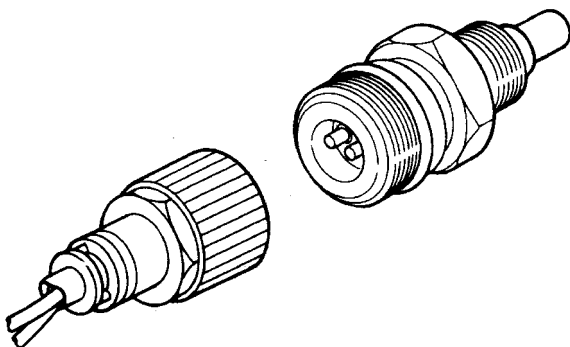
TECNICAL VIEW

8527



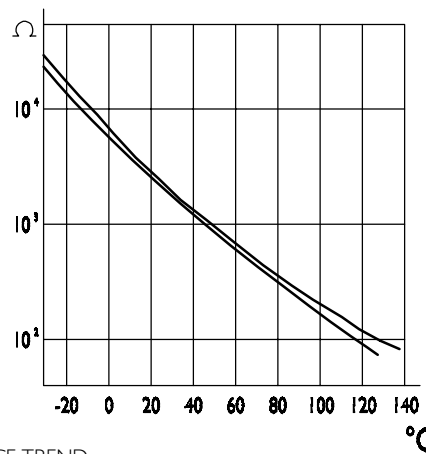
WIRING DIAGRAM

8528



PERSPECTIVE VIEW

8529



RESISTANCE TREND

8530

| Pin | Function                      | Cable colour |
|-----|-------------------------------|--------------|
| 2   | To pin 6 of EDC control unit  | —            |
| 3   | To pin 11 of EDC control unit | —            |

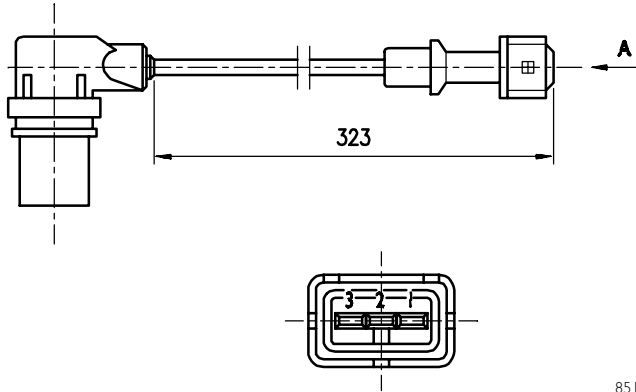
**Pulse transmitter**

Specifications

Supplier

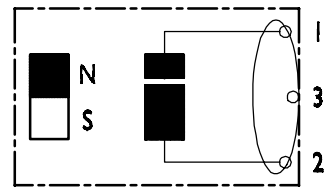
Max. tightening torque

BOSCH  
8 ± 2 Nm



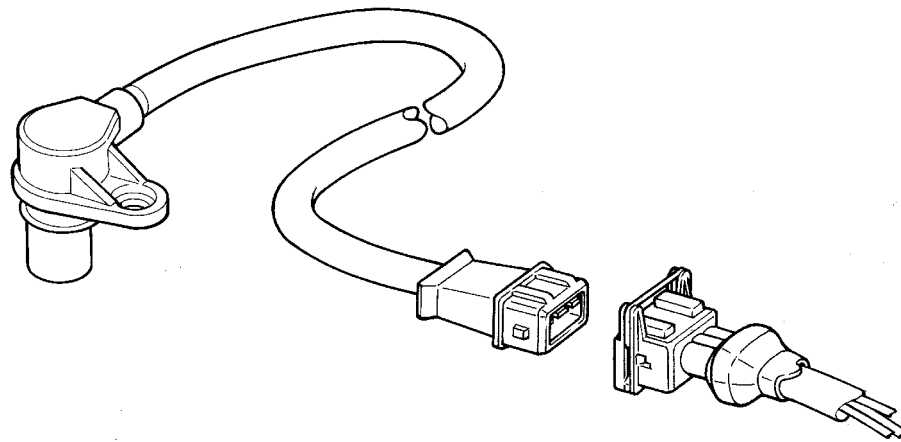
TECNICAL VIEW

8518



WIRING DIAGRAM

8519



PERSPECTIVE VIEW

8520

| Pin | Function                      | Cable colour |
|-----|-------------------------------|--------------|
| 1   | To pin 1 of EDC control unit  | —            |
| 2   | To pin 13 of EDC control unit | —            |
| 3   | Screens                       | —            |

### Boosting pressure transmitter

Specifications

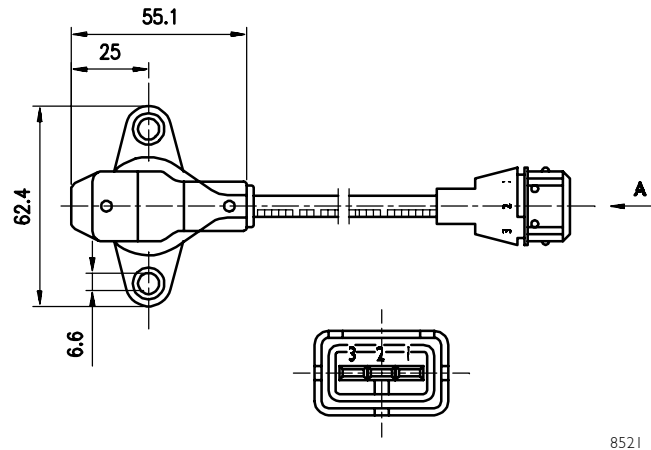
Supplier

Code

Operating pressure field

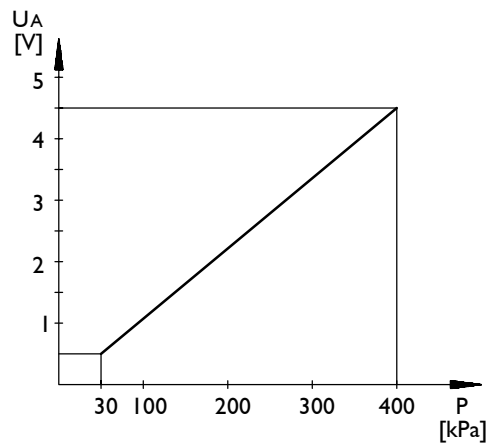
Max. tightening torque

BOSCH  
 B 281022 018  
 50 ÷ 400 kPa  
 10 Nm



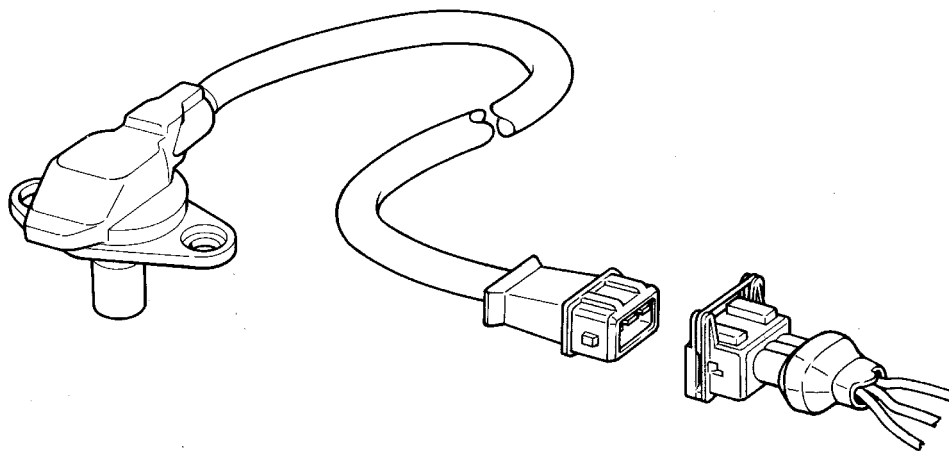
8521

TECNICAL VIEW



8522

MAX ABSOLUTE PRESSURE SPECIFICATIONS 600 KPA



8523

PERSPECTIVE VIEW

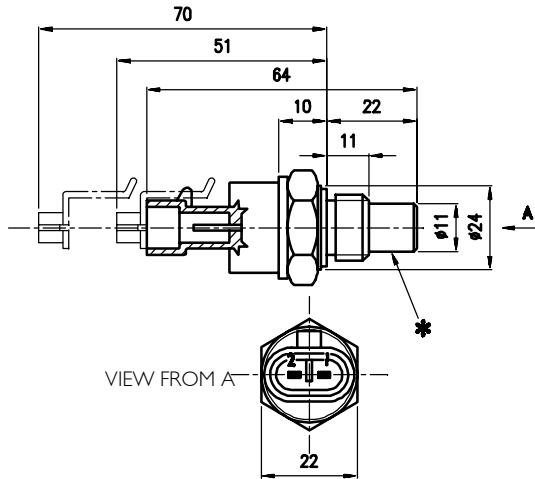
| Pin | Function                      | Cable colour |
|-----|-------------------------------|--------------|
| 1   | To pin 12 of EDC control unit | —            |
| 2   | To pin 23 of EDC control unit | —            |
| 3   | To pin 17 of EDC control unit | —            |

### Engine water temperature transmitter

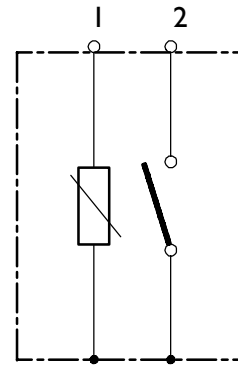
Specifications  
Electric system voltage

connected to specific electronic control units  
it can be fitted on 12V and 24V systems  
25 Nm  
ELTH.

Tightening torque  
Supplier



8524



8525

WIRING DIAGRAM

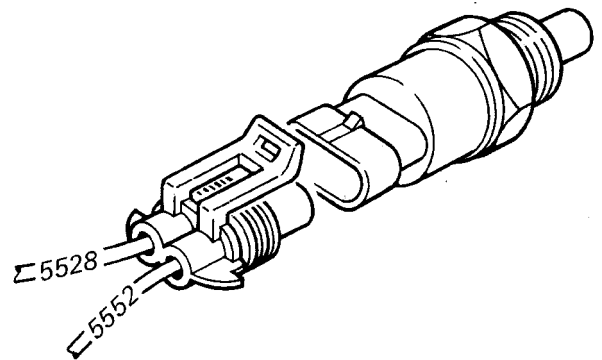
Suitable for detecting the engine coolant fluid temperature

The area marked with (\*) must be completely wet with the fluid of which the temperature is to be measured.

The transmitter should have the supplier's identification, catalogue number and date of manufacture on the notches of the hexagon

| Temperature °C | Settings (Ω) |
|----------------|--------------|
| 60             | 565 ± 40     |
| 90             | 205 ± 10     |
| 120            | 88 ± 6       |

| IVECO Number | SUPPLIER'S Number | Switch Closes | Switch Opens |
|--------------|-------------------|---------------|--------------|
| 500386057EZ  |                   | 111° ± 3°     | > 88°C       |
| 483795IEZ    | 2690017           | 107° ± 3°     | > 88°C       |



8526

PERSPECTIVE VIEW

| Pin | Function                            | Cable colour |
|-----|-------------------------------------|--------------|
| 1   | Water temperature transmitter       | 5552         |
| 2   | Maximum water temperature indicator | 5528         |

**Air temperature transmitter on manifold**

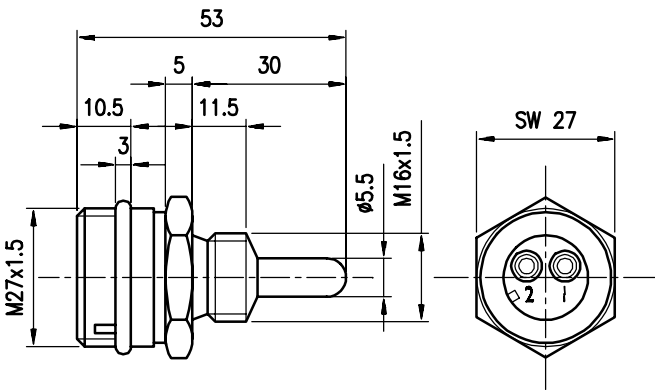
Specifications

Supplier

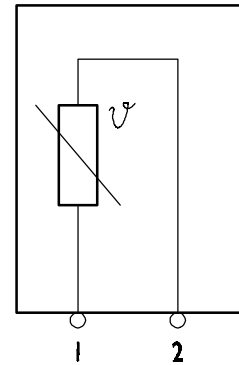
**BOSCH**  
35 Nm

Max. tightening torque

The device should be marked with the supplier's identification, catalogue number and date of manufacture



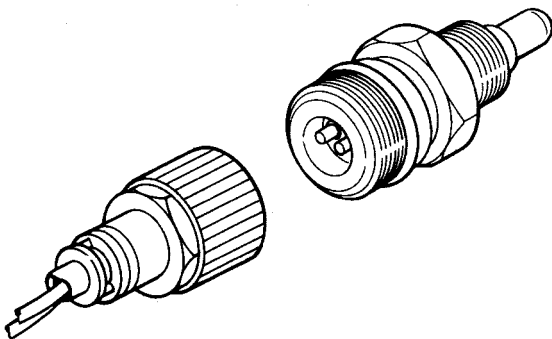
8531



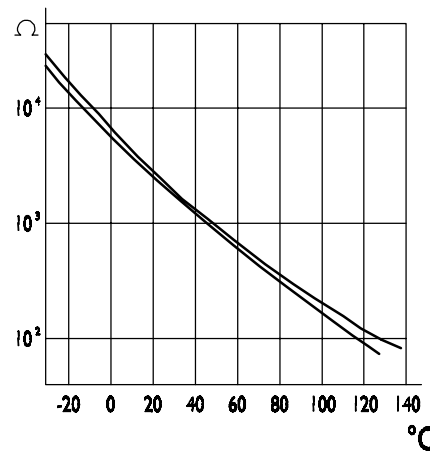
8532

TECHNICAL VIEW

WIRING DIAGRAM



8533



8530

PERSPECTIVE VIEW

RESISTANCE TREND

| Pin | Function                      | Cable colour |
|-----|-------------------------------|--------------|
| 1   | To pin 21 of EDC control unit | —            |
| 2   | To pin 4 of EDC control unit  | —            |

**CURSOR 8 - 10 - 13**

**VGT SOLENOID VALVE**

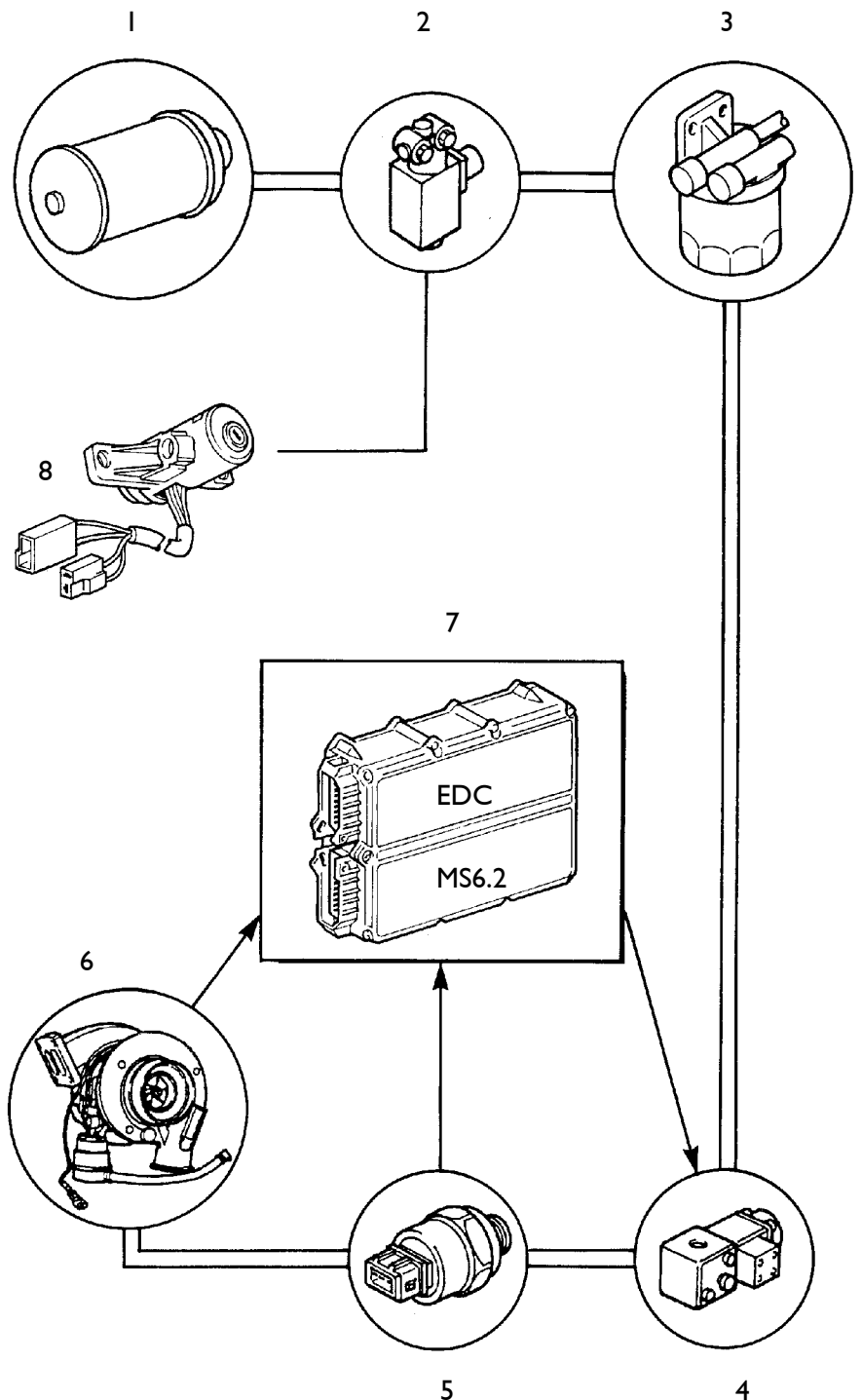
It is an N.C. proportional solenoid valve placed on the engine basement left-hand side below the turbine (Cursor 8) or on the engine front side (Cursor 10 and Cursor 13).

The electronic control unit, through a PWM signal, manages this solenoid valve and adjusts the turbine actuator pressure. The latter changes its position and thus changes the exhaust gas inflow section on the rotor blades and the speed itself.

**VGT CONTROL DIAGRAM**

**KEYS**

- 1) Service reservoir
- 2) Shut-off solenoid valve
- 3) Air filter
- 4) VGT solenoid valve
- 5) Actuator position sensor
- 6) Turbine actuator
- 7) EDC control unit
- 8) Ignition key



## PRE/POST-HEATING RESISTANCE

The resistance is ~ 0,7 Ohm.

Such resistance is placed between the cylinder head and the suction manifold. It is used to heat up air during pre/post-heating operations.

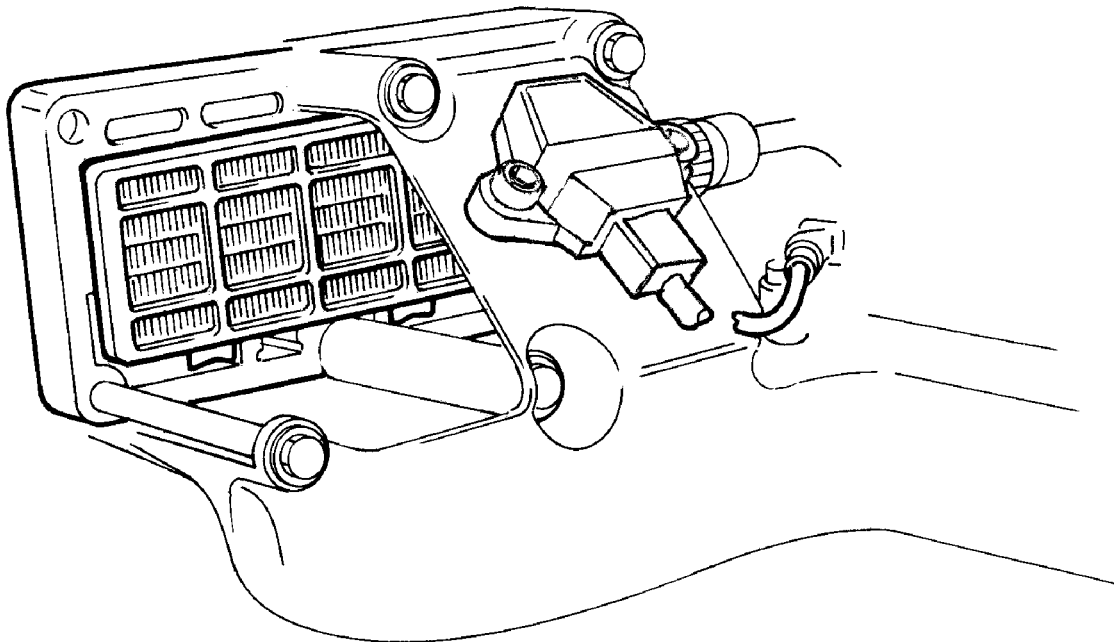
When the ignition key is inserted, should any one of the temperature sensors – water, air, gas oil – detect a value below 10°C, the electronic control unit will activate pre/post-heating and turn on the relevant dashboard warning light for a variable time depending on the temperature.

After that time, the warning light starts blinking thus informing the driver that the engine can be started.

When the engine is running the warning light goes off, while the resistance is being fed for a certain time as a result of post-heating.

If the engine is not started, with the warning light flashing, in 20 / 25 seconds, the operation is cancelled to prevent draining the battery.

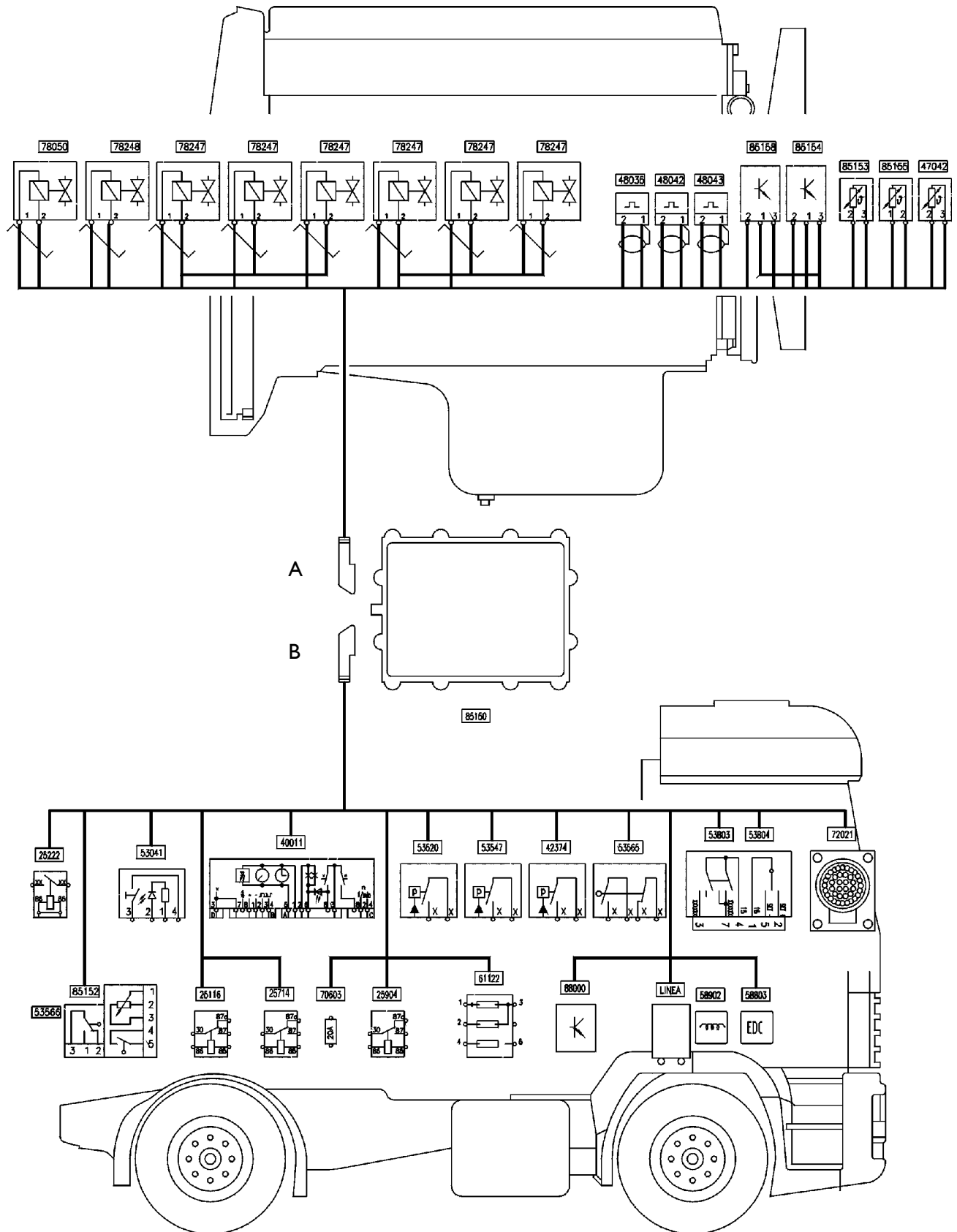
On the contrary, if reference temperatures are over 10°C, when the ignition key is inserted the warning light comes on for about 2 seconds and carries out the test and then goes out to signal that the engine can be started.



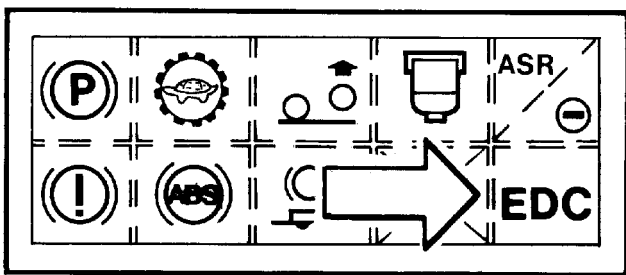
001256t

### DIAGNOSIS

#### Connections of engine (A) and cab/frame (B) wiring looms to EDC control unit

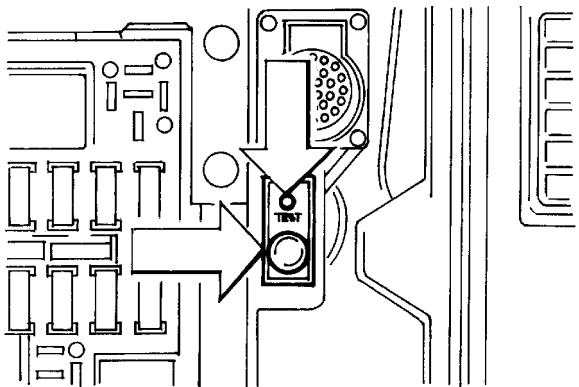






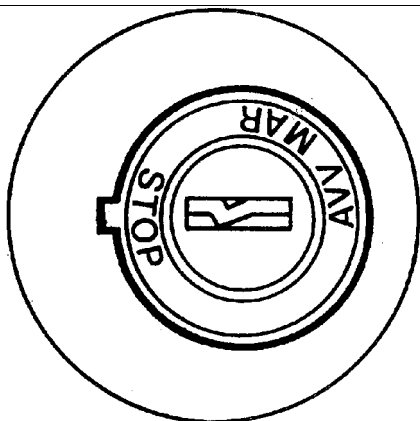
4915

III.25 WARNING LAMP MODULE ON DASHBOARD IN FRONT OF DRIVER



6679

III.26 EDC DIAGNOSTIC BUTTON



4913

III.27 IGNITION SWITCH

**Checking faults through the EDC warning lamp (diagnostics)**

Through the EDC warning lamp it is possible to receive information about engine faults

If the warning lamp turns on during normal operation of the vehicle, it means that a fault has occurred which may be:

|                                      |  |
|--------------------------------------|--|
| <b>Warning lamp glowing steadily</b> | <b>Serious fault</b><br>System not working properly  |
| <b>Warning light flashing</b>        | <b>Very serious problem</b><br>System not working properly<br>Loss of 1 or more safety functions, and possible engine STOP |

Information about the type of fault is given in code form by the EDC warning lamp through a sequence of long and short flashes (blink code).

For the check procedure, the diagnostic button under the UCI compartment lid is used which also incorporates another EDC warning lamp in parallel with the one on the dashboard.

**Fault checking/identification procedure**

- Stop the vehicle and turn the engine off (STOP)
- set the ignition key to **MAR** (cluster on and engine stopped);
- press the diagnostic button and check that the EDC warning lamp flashes once;
- after a brief period in which the warning lamp is off, it starts to flash with a sequence of long and then short flashes.

The fault code is given in the table in the next page. For example, code 1.4 means that the warning lamp has given one long flash and four short ones. The procedure should be repeated up to when the first fault code appears again.

## INSTRUMENT DIAGNOSIS

### MODUS

Computerized diagnosis station for braking systems, air suspensions, engine and electronic-controlled systems. This station has auxiliary functions such as: electronic control unit programming, spare catalogue reference, timing...

The IVECO WIRING TESTER further expands and integrates MODUS.

Such instrument is manufactured by IVECO to improve diagnosis of the vehicle electric and electronic systems. It makes it possible to test the vehicle wiring and to measure the system itself.

### IVECO WIRING TESTER

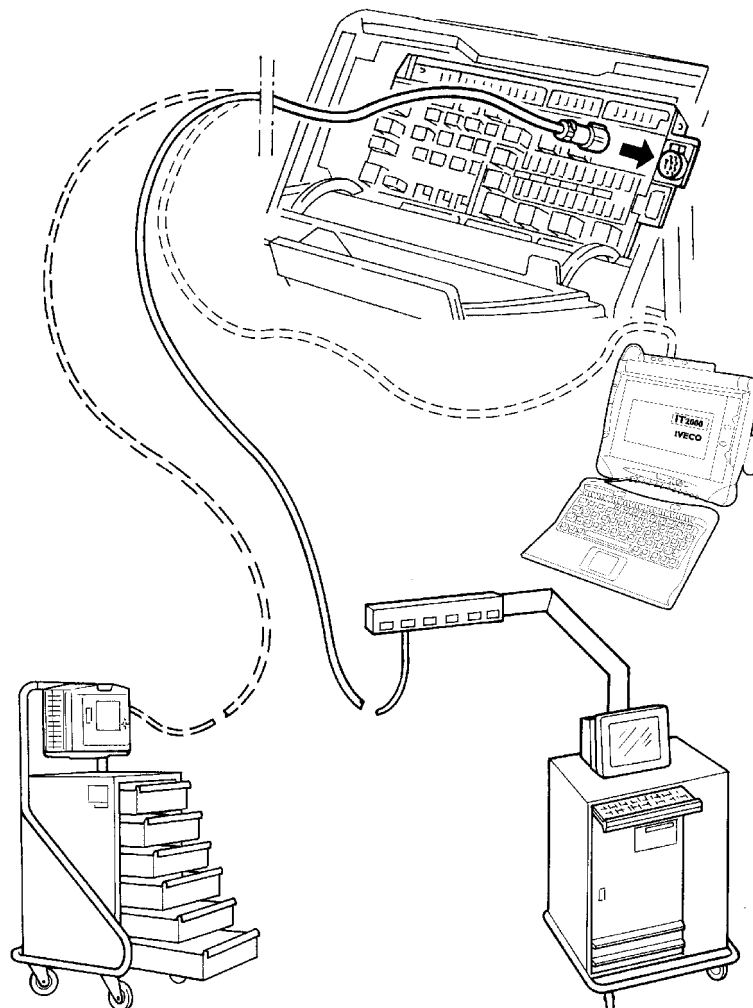
Further expands and integrates MODUS.

Such instrument is manufactured by IVECO to improve diagnosis of the vehicle electric and electronic systems.

It makes it possible to test the vehicle wiring and to measure the system itself.

### IT 2000

IT 2000 is a diagnosis instrument for every IVECO vehicle electronic system. It makes it possible to take prompt action recognizing the chassis number. It stores the results of previously carried out diagnosis actions. It can also be used as a portable Personal Computer for remote diagnosis. If MODUS is used as a mother station, it is possible to update and configure IT 2000. All instruments are interfaced with the vehicle through a 30-pole diagnosis socket.



## EDC MS6.2 SW 5.X control unit Blink Table

| Blink code                                 | EDC warning lamp * | Fault  |
|--|--------------------|--|
| <b>VEHICLE AREA</b>                        |                    |  |
| 1.1  | GLOWING STEADILY   | Vehicle speed signal                           |
| 1.2  | GLOWING STEADILY   | Torque selector                                |
| 1.3  | OFF                | Cruise Control                                 |
| 1.4  | GLOWING STEADILY   | Accelerator pedal                              |
| 1.5  | OFF                | Clutch pressure switch                         |
| 1.6  | GLOWING STEADILY   | Plausibility of brake pedal signal switches    |
| 1.7  | OFF                | Plausibility between accelerator / brake pedal |
| <b>ENGINE AREA</b>                         |                    |  |
| 2.1  | OFF                | Water temperature sensor                       |
| 2.2  | OFF                | Air temperature sensor                         |
| 2.3  | OFF                | Fuel temperature sensor                        |
| 2.4  | GLOWING STEADILY   | Supercharging pressure sensor                  |
| 2.5  | OFF                | Ambient pressure sensor (inside control unit)  |
| 2.6  | GLOWING STEADILY   | Engine brake switch signal                     |
| 3.5  | OFF                | Battery voltage                                |
| <b>TURBINE AREA</b>                        |                    |  |
| 4.1  | OFF                | Turbine actuator pressure sensor               |
| 4.2  | GLOWING STEADILY   | Turbine rpm sensor                             |
| 4.3  | GLOWING STEADILY   | Turbine over revving                           |
| 4.4  | GLOWING STEADILY   | Turbine control (mechanical fault)             |
| 4.5  | GLOWING STEADILY   | VGT solenoid valve                             |
| 4.6  | FLASHING           | Engine brake solenoid valve                    |
| <b>INJECTORS</b>                           |                    |  |
| 5.1  | GLOWING STEADILY   | Fault on injector cylinder 1                   |
| 5.2  | GLOWING STEADILY   | Fault on injector cylinder 4                   |
| 5.3  | GLOWING STEADILY   | Fault on injector cylinder 2                   |
| 5.4  | GLOWING STEADILY   | Fault on injector cylinder 6                   |
| 5.5  | GLOWING STEADILY   | Fault on injector cylinder 3                   |
| 5.6  | GLOWING STEADILY   | Fault on injector cylinder 5                   |
| <b>ENGINE RPM SENSORS</b>                  |                    |  |
| 6.1  | GLOWING STEADILY   | Flywheel sensor                                |
| 6.2  | GLOWING STEADILY   | Timing gear sensor                             |
| 6.4  | FLASHING           | Engine over revving                            |
| <b>INTERFACES WITH OTHER CONTROL UNITS</b> |                    |  |
| 7.2  | OFF                | CAN line                                       |
| 7.3  | OFF                | CAN line (ASR control)                         |
| 7.4  | OFF                | CAN line (gearbox data control)                |
| 7.5  | OFF                | CAN line                                       |
| 7.6  | OFF                | CAN line (ASR control)                         |
| 7.7  | OFF                | CAN line (gearbox data control)                |
| <b>CONTROL UNIT</b>                        |                    |  |
| 9.1  | FLASHING           | Faulty control unit                            |
| 9.2  | GLOWING STEADILY   | Incorrect data in EPROM                        |
| 9.3  | FLASHING           | Immobilizer                                    |
| 9.4  | GLOWING STEADILY   | Main relay                                     |
| 9.5  | GLOWING STEADILY   | Incorrect engine stopping procedure            |
| 9.6  | GLOWING STEADILY   | Incorrect data recording in control unit       |

\* Blink code warning lamp off = slight error  
 Blink code warning lamp glowing steadily = significant error  
 Blink code warning lamp flashing = serious error

## Engine Brake

### Simplified system operation

The “engine brake” system is controlled by the EDC control unit.

There are three engine brake control modes which can be selected using the special switch on the centre dashboard, to be used in the different types of situations/routes (Fig. III.28).

With the selector in the rest position, the button on the cab floor is always operational, (for intermittent use on hills and on snow or ice).

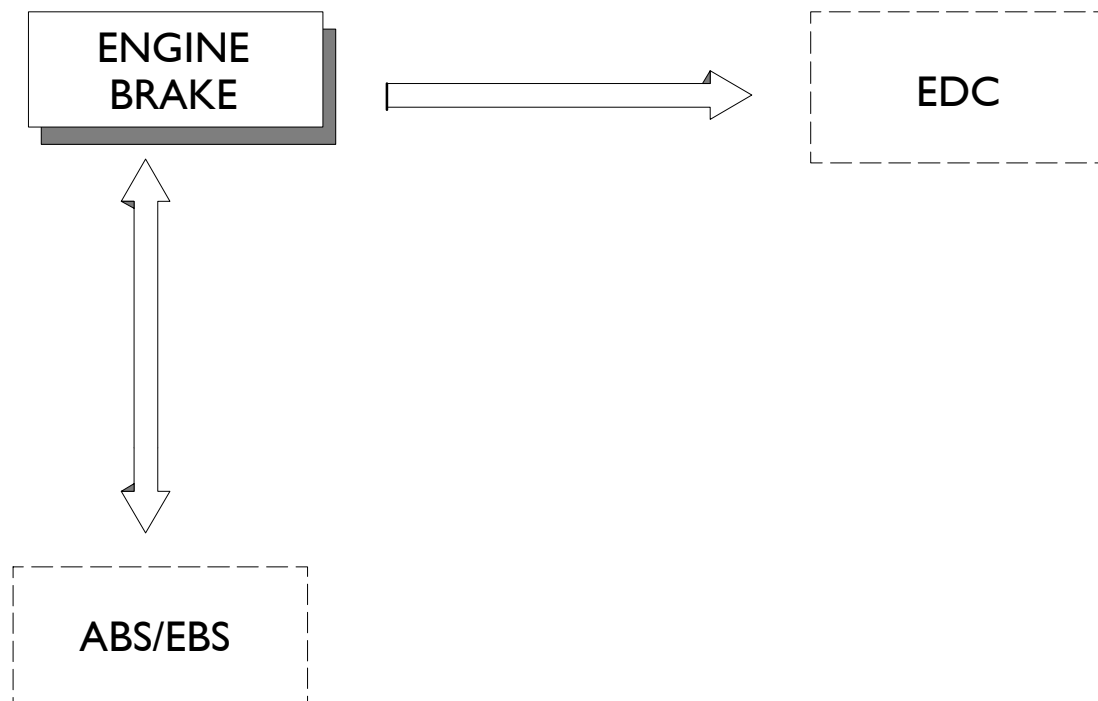
With the selector in position 1 the engine brake is combined with the accelerator pedal, coming into action when the pedal is released (to be used on long downhill roads with steady gradient).

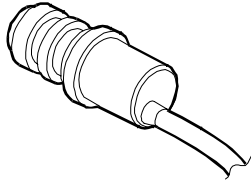
With the selector in position 2 the engine brake is combined with the service brake, functioning starting from the first section of pedal stroke and maintaining the position (essentially to be used to reduce service brake wear for routes where much use of it is needed).

Every time the engine brake is engaged a warning lamp on the cluster turns on.

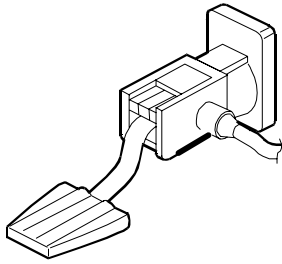


Engagement of the engine brake in combination with the accelerator pedal disables all the adjustment operations connected with the Cruise Control.

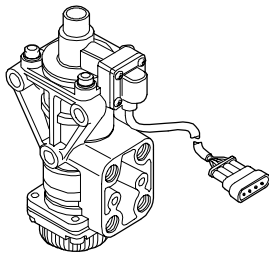




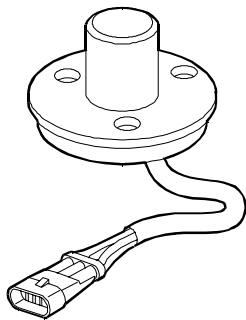
III.29 ENGINE BRAKE SOLENOID VALVE (78050)



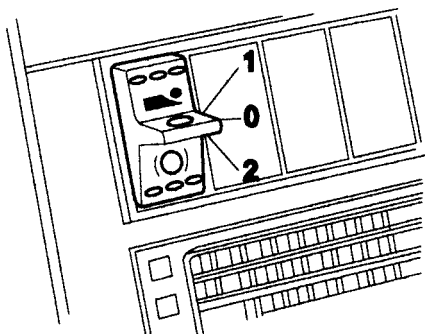
III.30 ACCELERATOR PEDAL PRESSED SWITCH (85152)



III.31 BRAKE PEDAL SWITCH (53565)



III.32 ENGINE BRAKE SWITCH (53520)



III.33 ENGINE BRAKE SETTING SWITCH (52324)

7865

### Engine brake solenoid valve (78050)

This is an on/off N.C. solenoid valve located in the front part of the engine on the head.

The electronic control unit drives this valve to open the flow of engine oil to operate the engine brake hydraulic cylinders.

A warning lamp on the dashboard is connected in parallel to this solenoid valve to alert the driver that it has cut in.

Powering this solenoid valve, the control unit also activates the VGT.

The engine brake can only be activated if the rpm is > 1000 rpm and, if the water temperature exceeds 30°C the electronic control unit disables this function.

The coil resistance is 37 - 47 Ohm

### Accelerator pedal pressed switch (85152)

This switch is used by the electronic control unit to engage the engine brake when the accelerator pedal is released if the engine brake setting switch has been selected at this function.

### Brake pedal switch (53565)

This switch is used by the electronic control unit to switch on the exhaust brake when the brake pedal is pressed as of the first section of the stroke if the exhaust brake fitting switch has been selected on this function.

### Engine brake switch (53520)

This is an N.O. switch fitted on the cab floor.

It supplies the electronic control unit a negative signal for engaging the engine brake.

### Engine brake setting switch (52324)

The function of this switch is to combine the engine brake with the accelerator or service brake. In the former case the engine brake cuts in when the accelerator is released, while in the latter it cuts in starting from the first section of pedal stroke. With the switch in the neutral position the engine brake control on the cab floor can be used.

## ENGINE BRAKE SOLENOID VALVE

It is an N.C. on/off solenoid valve.

In Cursor 8 it is placed on the engine front side (head).

In Cursor 10 - 13 it is placed under the tappet cover.

The electronic control unit manages this solenoid valve and lets the oil flow to the engine to actuate the engine brake hydraulic cylinders.

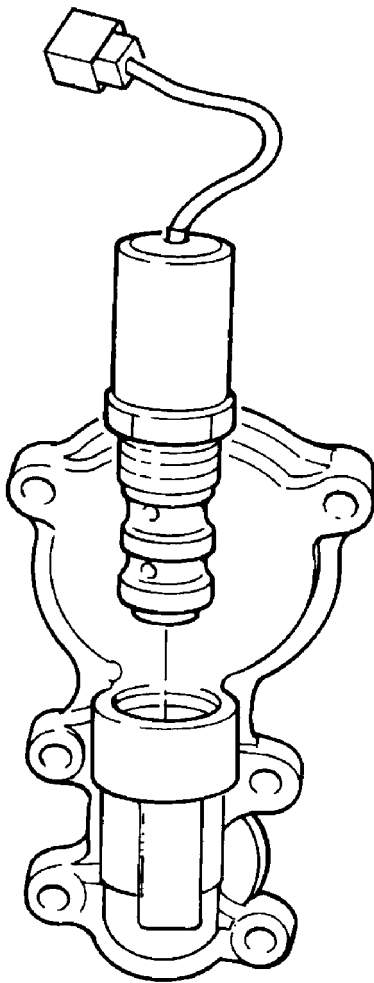
This solenoid valve is connected in parallel to a warning light on the dashboard to inform the driver that the operation has been carried out.

By feeding this solenoid valve the control units activates also the VGT solenoid valve.

The engine brake can be activated ONLY when the engine revs are > 1000 rpm.

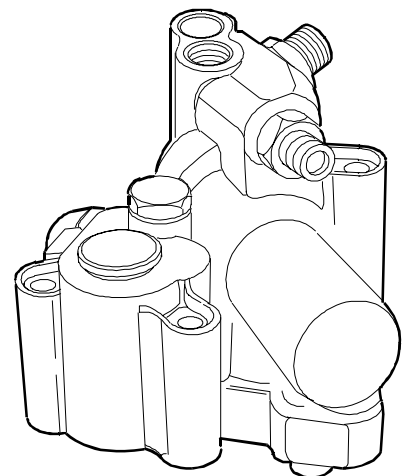
It is connected to the electronic control unit by pins A3 / A32.

The coil resistance is  $\sim 37 \div \text{Ohm}$ .



CURSOR 8

000595t



CURSOR 10 - 13

000596t

**ACCELERATOR PEDAL POSITION SENSOR ACCELERATOR PRESSED SWITCH**

The accelerator pedal position sensor (85152) is fitted with a potentiometer and an incorporated N.A. minimum switch. It provides the control unit with a value proportional to the pedal activation angle, thus defining the fuel delivery. The control unit power supplies such sensor with a tension of 5 Volt.

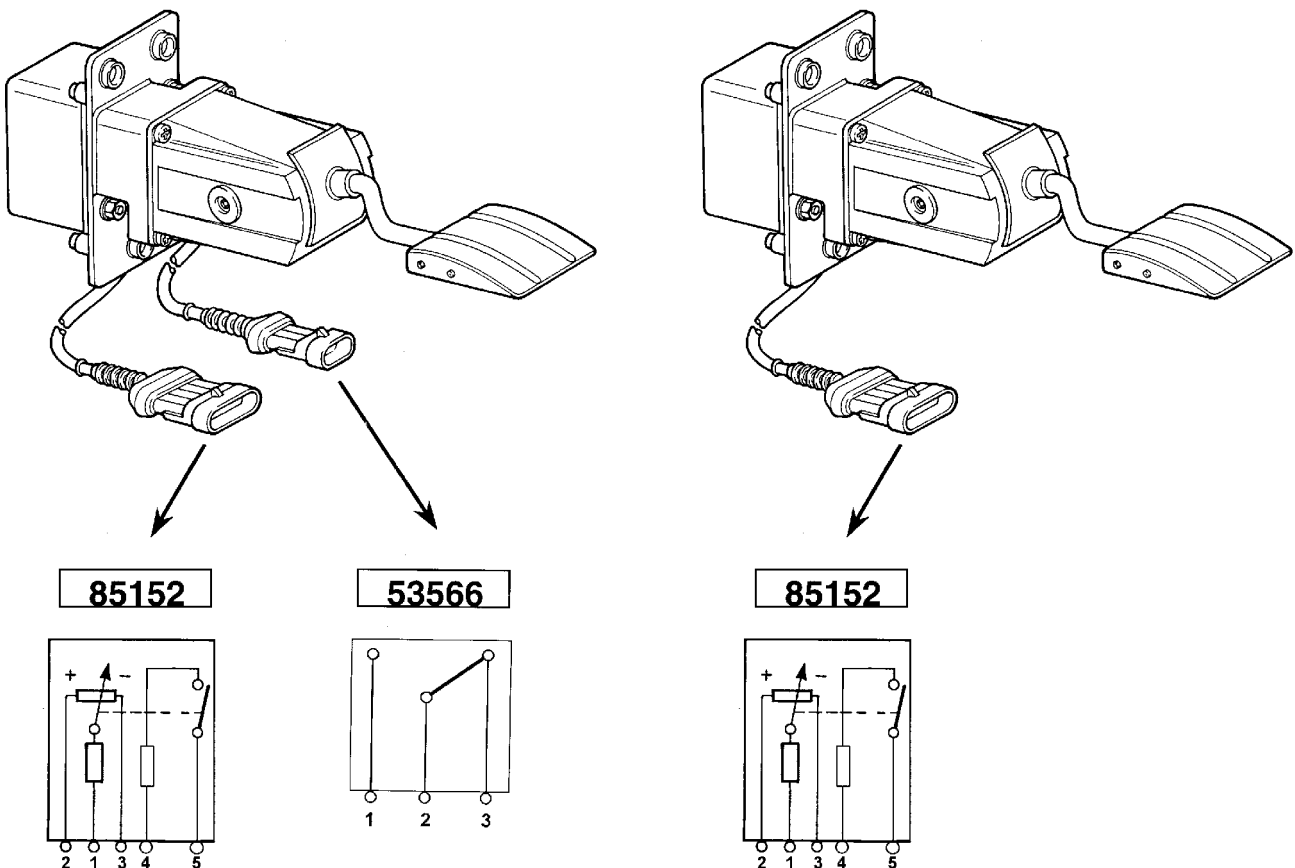
The potentiometer resistance is  $\sim 0,9 \pm 1 \text{ k}\Omega$ .

It is connected to the electronic control unit with pins B16 / B17 / B23 / B25 / B35.

**ONLY CURSOR 8**

Also the accelerator pressed switch (53566) N.C. with pedal released is an integral part of the same component. This switch is used by the electronic control unit to engage the engine brake when the accelerator pedal is released and the engine brake pre-arrangement switch has been selected.

In Cursor 10 this switch is NOT used since such signal is detected by the switch incorporated in the potentiometer (pin 4 and 5).

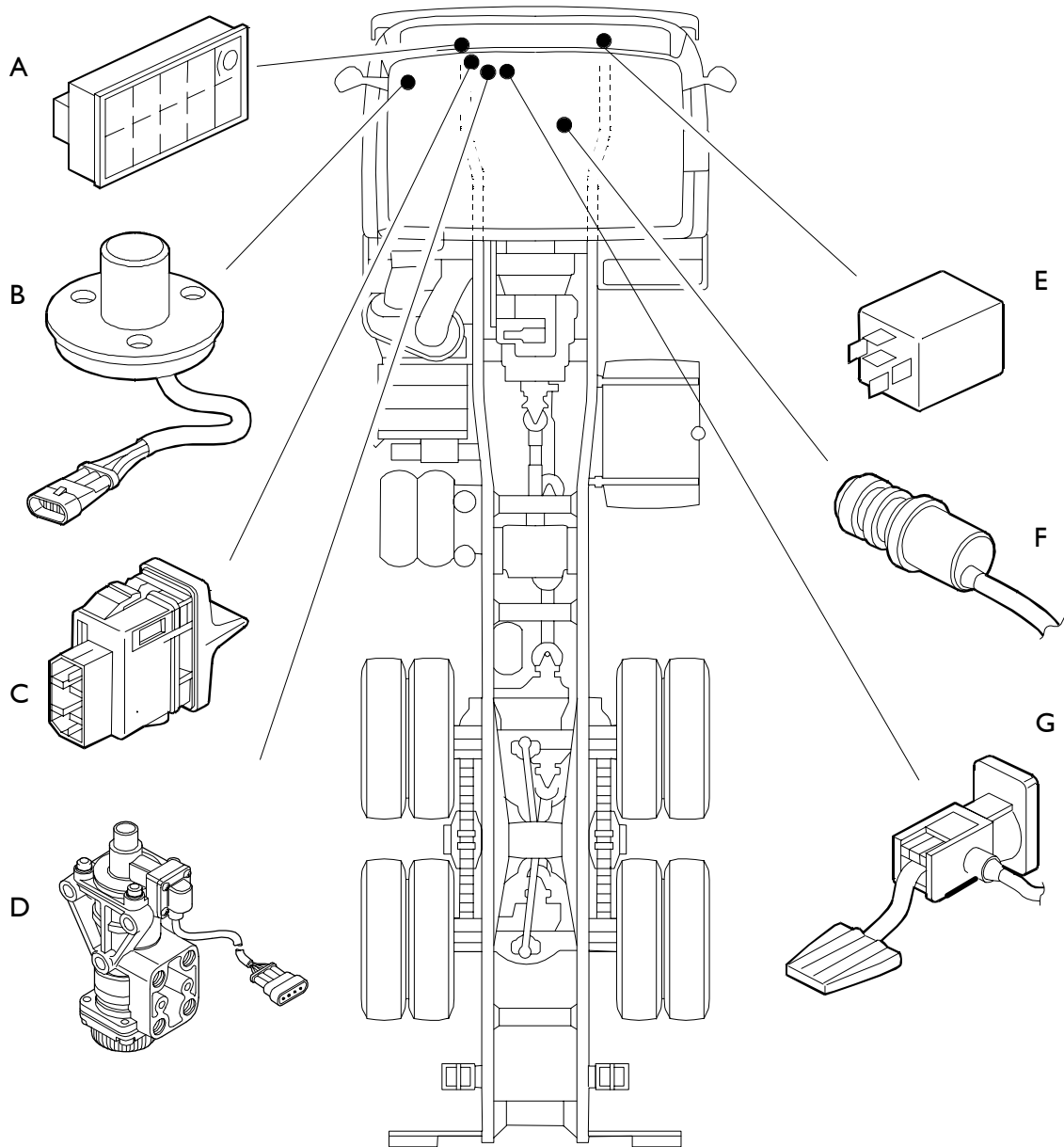


CURSOR 8 (ON ROAD)

CURSOR (8 - 10 - 13)

00600t

Location and identification of main components of engine brake system

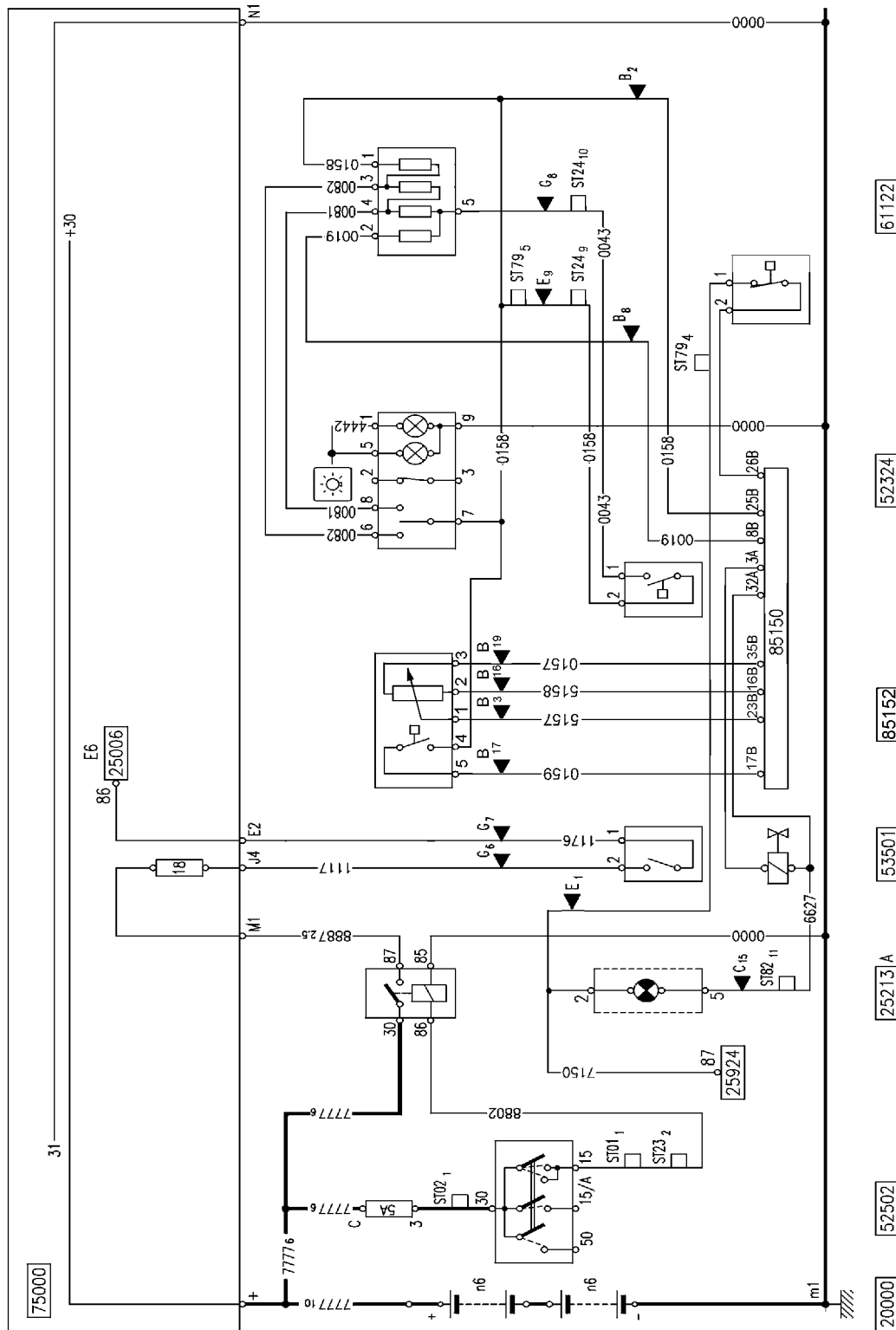


8030

| Ref. | Component code | Description                                   |
|------|----------------|---|
| A    | 58903          | Cluster with 10 indicators                    |
| B    | 53520          | Switch for engine brake control               |
| C    | 52324          | Switch for setting engine brake               |
| D    | 53565          | Switch for signalling brake pedal pressed     |
| E    | 61122          | Container with 4 resistances for engine brake |
| F    | 78050          | Engine brake solenoid control valve           |
| G    | 85152          | Load sensor on throttle for EDC               |



Engine brake principle wiring diagram



[61122]

[52324]

[85152]

[53501]

[25213 A]

[52502]

[20000]

[53565]

[53520]

[78050]

[58903]

## **ECAS**

### **Introduction**

The advantages of traditional air suspension are:

- Greater riding comfort thanks to reduced stiffness and natural frequency.
- Constant height of the loading floor, regardless of the load.
- Better adjustment of the braking system as a function of the load.

### **Description and operation**

The E.C.A.S. (Electronically Controlled Air Suspension) system offers several additional advantages:

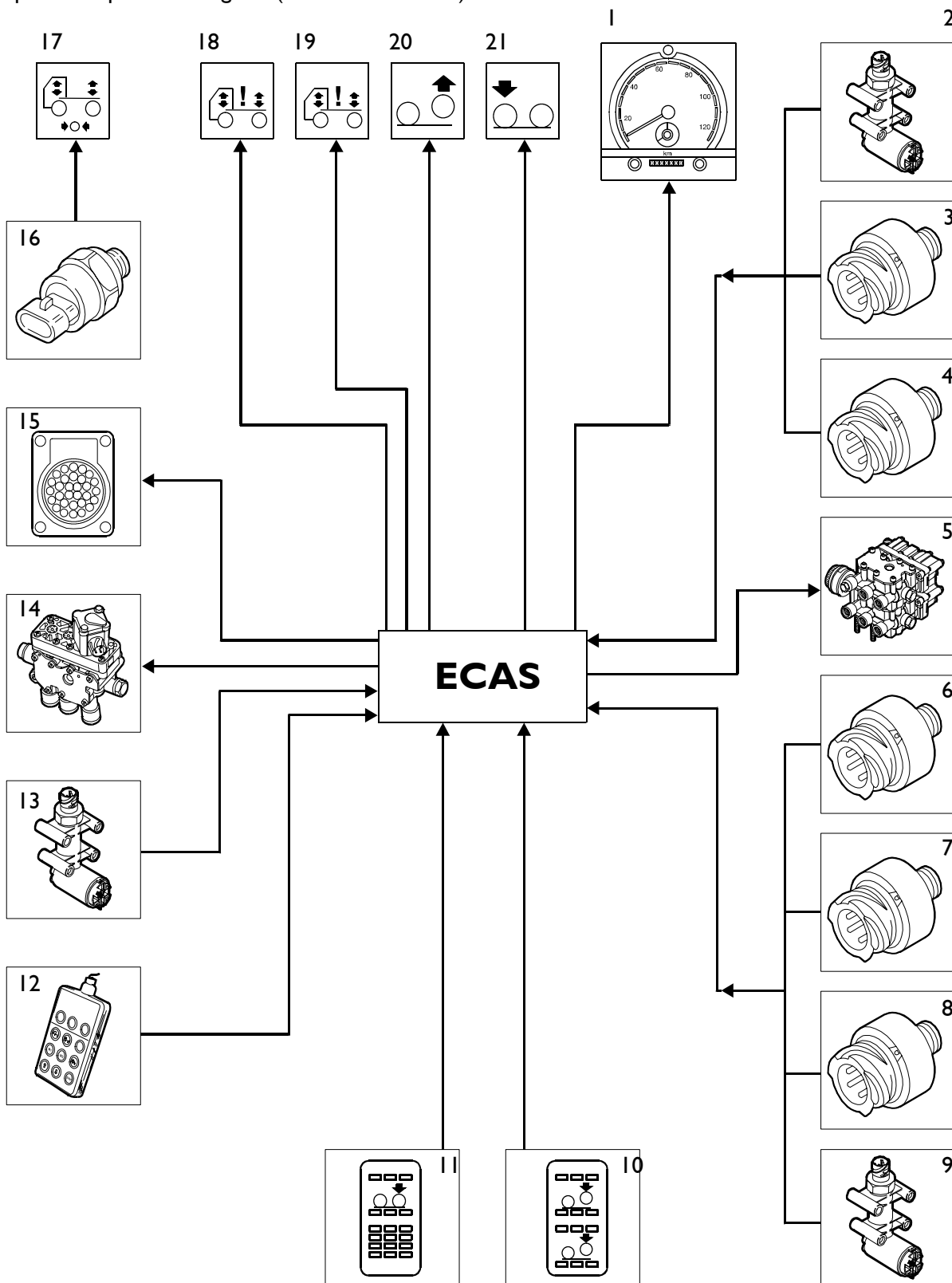
- Appreciable reduction in air consumption.
- Very fast adjustment processes.
- Simplified system layout.
- High degree of built-in safety.
- Possibility of exhaustive system testing.

The ECAS system automatically controls the nominal level of the vehicle's air suspension, enabling the additional rear axle of the vehicle to be lifted when this is required by the vehicle's operating conditions, and make it possible to transfer the load onto the drive axle at take-off, if adherence is low (aid at take-off).

By means of the provisions pre-wired in the vehicles electrical network, the system can be combined with hydraulic steering of the additional rear axle.

All the foregoing operations can be performed in given operating conditions and are governed by the safety devices of the systems involved.

Air suspension operation diagram (Cursor 8 - 10 - 13)



KEYS

1. TACHOGRAPH - 2. REAR RH LEVEL SENSOR - 3. RH REAR AXLE PRESSURE SENSOR - 4. RH 3<sup>RD</sup> AXIS PRESSURE SENSOR - 5. REAR AXLE ELECTRIC AIR DISTRIBUTOR - 6. LIFTER PRESSURE SENSOR - 7. LH 3<sup>RD</sup> AXIS PRESSURE SENSOR - 8. LH REAR AXLE PRESSURE SENSOR - 9. REAR LH LEVEL SENSOR - 10. 3<sup>RD</sup> AXIS RAISING/LOWERING BUTTON - 11. PICKUP AID BUTTON - 12. REMOTE CONTROL - 13. AXLE LEVEL SENSOR - 14. AXLE ELECTRIC AIR DISTRIBUTOR - 15. 30-POLE DIAGNOSIS CONNECTOR - 16. SYSTEM LOW PRESSURE SENSOR - 17. SYSTEM LOW PRESSURE WARNING LIGHT - 18. ECAS FAILURE WARNING LIGHT - 19. OFF TRIM WARNING LIGHT - 20. 3<sup>RD</sup> AXIS RAISING WARNING LIGHT - 21. PICKUP AID WARNING LIGHT

74242

## Air suspension

The ECAS control unit automatically controls the level (distance from the road surface) of the frame on the basis of the actual values supplied by sensors, which are compared with the rated values stored in the memory of the system.

In the event of a deviation or change in attitude, the control unit activates the electro-pneumatic assemblies so as to correct the actual level with respect to the rated value set or memorised previously by the driver.

The system has a remote control device for the lifting/lowering and frame levelling operations, which can be used both when the vehicle is standing and while it moves.

In addition to the lifting, lowering and self-levelling operations, this remote control device makes it possible to memorise other frame attitude levels and recall them as necessary as a function of the operating conditions.

For a correct use of the remote control feature, see the vehicle's "USE AND MAINTENANCE" booklet.

For 4x2 and 6x4 version vehicles, it is necessary, with the vehicle stationary, to set the key-operated selector on +I5 to be able to modify the vehicle's attitude by means of the remote control unit.

For 6x2 versions (STAND-BY function), set the key-operated selector on +I5. Press the remote control STOP button and at the same time set the key-operated selector back on STOP.

In either case, the air reservoirs must be full.

All the operations on the stabiliser bars (e.g. replacement of bushes, hangers, the bars themselves) must be performed with the control panel off!

If the stabiliser bars are disconnected, if the ignition key is turned on "ON", the ECAS is unable to control the frame level in a stable manner, due to the low stiffness of the frame: this will result in the vehicle bending on one of the sides, in a random manner, only limited by the interference with the ground and by the tank brackets or spare wheel.



**Before opening the main breaker, set the key-operated selector on STOP, if the latter has been turned on, so as to prevent the electronic control unit from losing the data concerning optimised traction.**

When the key-operated selector is set on +I5, the electronic control unit performs a system check, as borne out by the lighting up of a red telltale for about 2 seconds (ref. 2, page 15).

When the vehicle is moving, the manners and times of vehicle attitude adjustment mainly depend on vehicle speed and are determined by given operating and safety conditions.

The driver can change the attitude if the speed of the vehicle is lower than 30 km/h.

When this limit is passed, the system inhibits any request for attitude variations on the part of the driver. The latter is still able to request the frame self-levelling function, which can be activated at any speed.

When the brakes are being applied, any intervention on the part of the control unit, to vary/adjust the attitude of the frame, is ignored by the system, or interrupted if already underway. At the end of the braking process, as the brake pedal is released, the electronic control unit resumes its normal operating conditions.

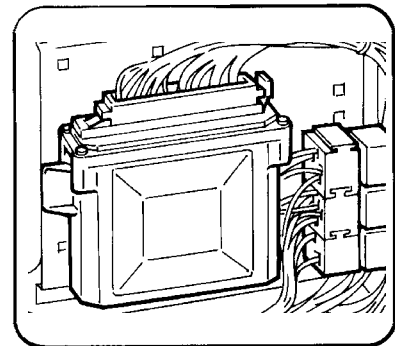
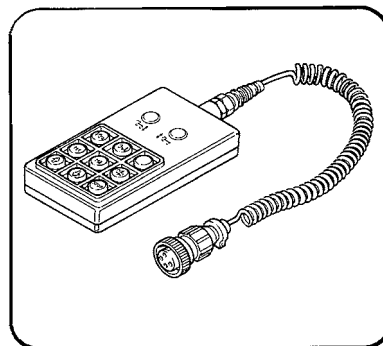
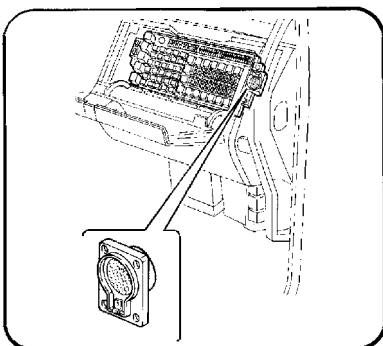
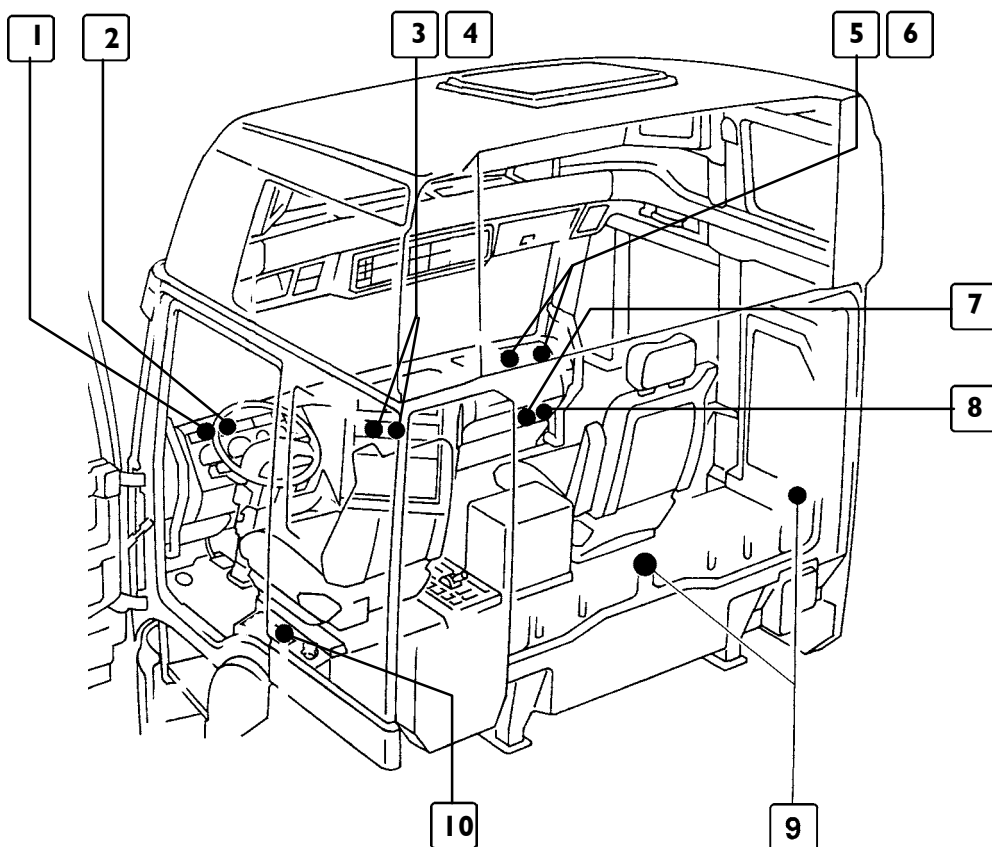
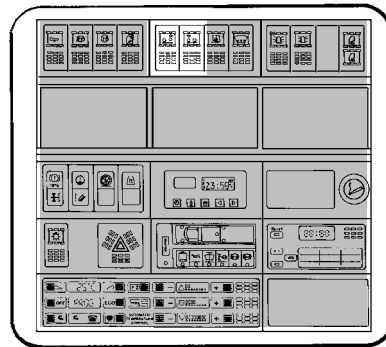
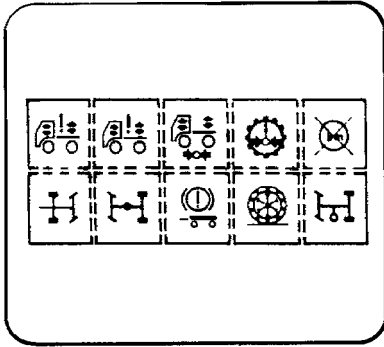
As mentioned before, the level sensors inform the control unit as to the actual conditions of the frame.

If these sensors detect displacements of the frame outside their operating range, the electronic control unit waits 60 seconds before stepping in, to make sure that the new condition is stable.

This condition may occur when the vehicle is negotiating a bend.

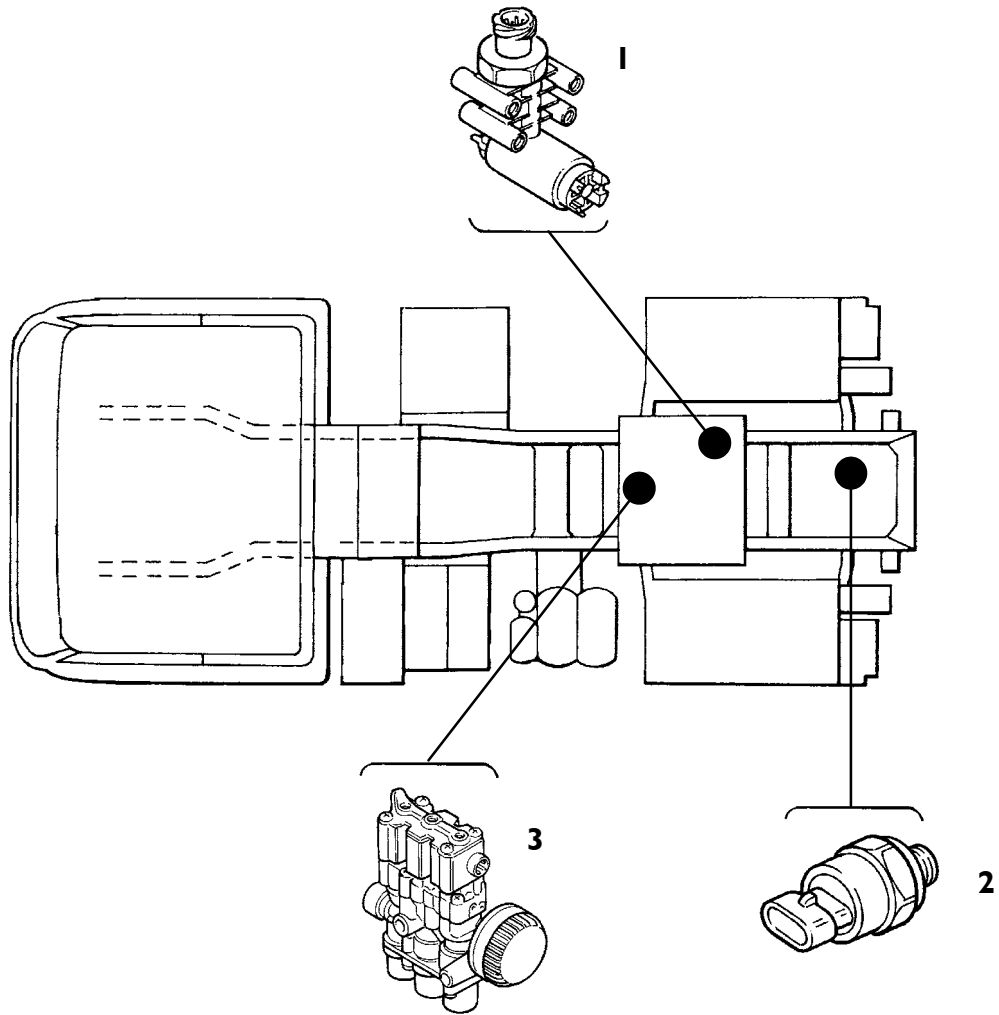
In such conditions, in fact, the vehicle's attitude undergoes variations which are naturally counteracted at the end of the bend.

**Location of components in the cab of EuroTech - EuroStar vehicles**



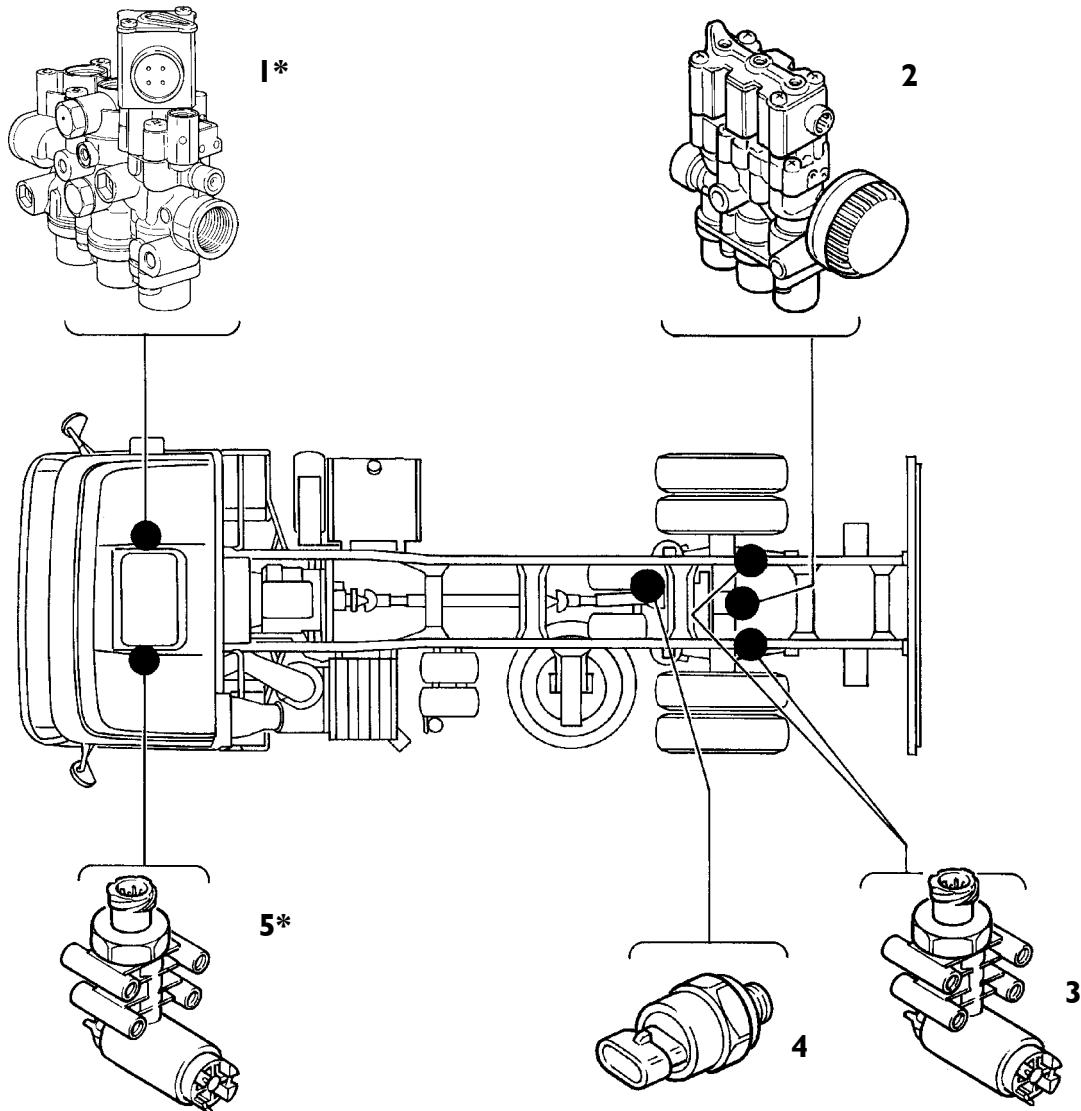
**III.34** VISUAL INDICATOR MODULE (ECAS) - 2. VISUAL INDICATOR MODULE - 3. THIRD AXLE LIFTING/LOWERING MODULE - 4. AID AT TAKE-OFF BUTTON - 5. CENTRAL INTERCONNECTION UNIT - 6. (30-PIN) DIAGNOSTIC CONNECTOR - 7. SIGNAL AMPLIFIER - 8. SPEEDOMETER CONTROL UNIT (ONLY FOR PS - FS - EUROTECH "MP" - EUROSTAR "LD" VEHICLES - 9. ELECTRONIC CONTROL UNIT - 10. REMOTE CONTROL

4x2P versions - tractors with air suspension on rear axle only



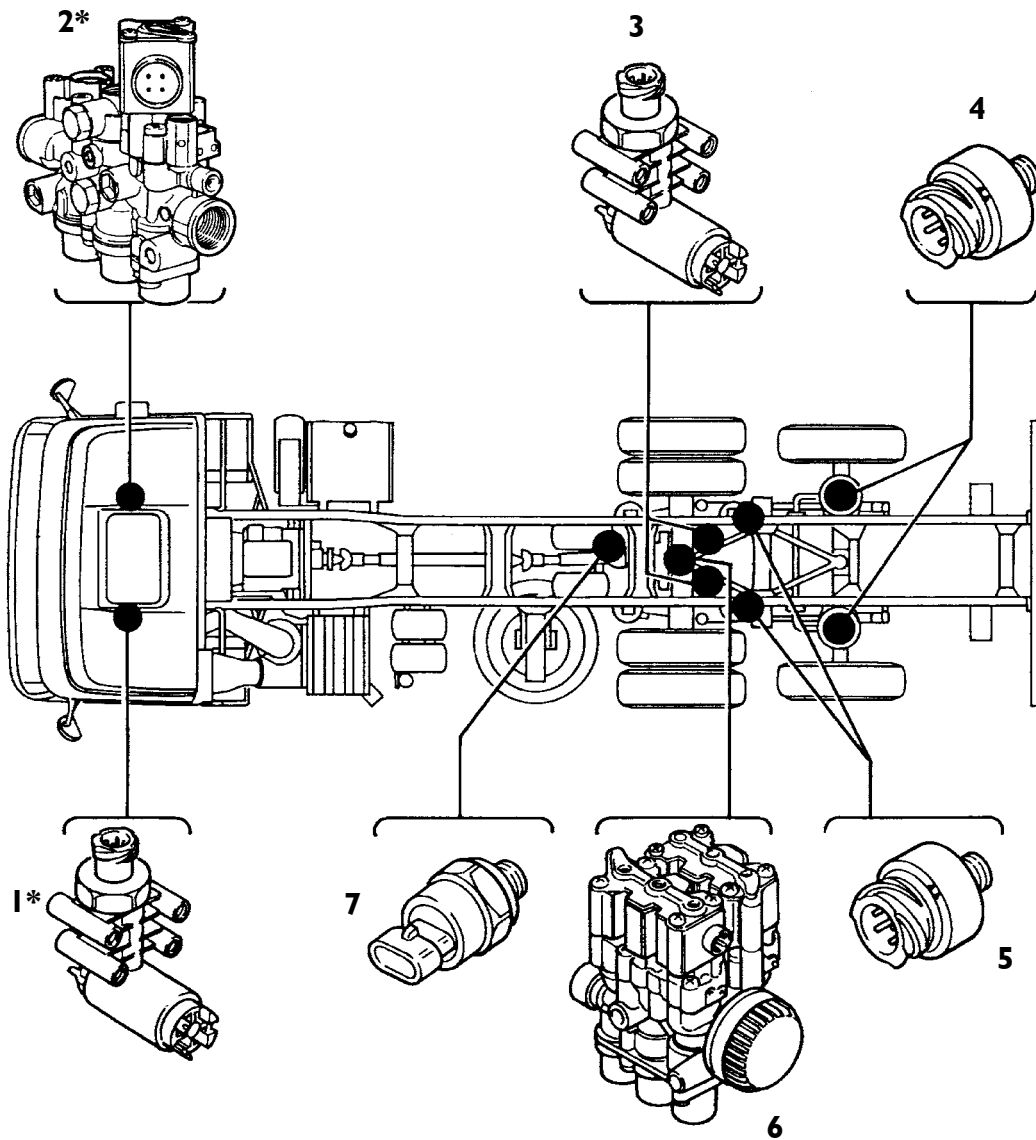
III.35 1. REAR LEVEL SENSOR - 2. SUSPENSION AIR PRESSURE LOW MANOMETER INDICATOR SWITCH - 3. REAR ELECTROPNEUMATIC ASSEMBLY

Version 4x2P (Trucks) - Rear suspension  
 4x2FP (Trucks - Tractors) - Front and rear suspension



III.36 1. FRONT PNEUMATIC ASSEMBLY - 2. REAR PNEUMATIC ASSEMBLY - 3. REAR LEVEL SENSORS - 4. SUSPENSION AIR PRESSURE LOW MANOMETER INDICATOR SWITCH - 5. FRONT LEVEL SENSORS  
 \* ONLY FP (FULLPNEUMATIC) VERSION

6x2 P/FP/PT/FT/PS/FS versions

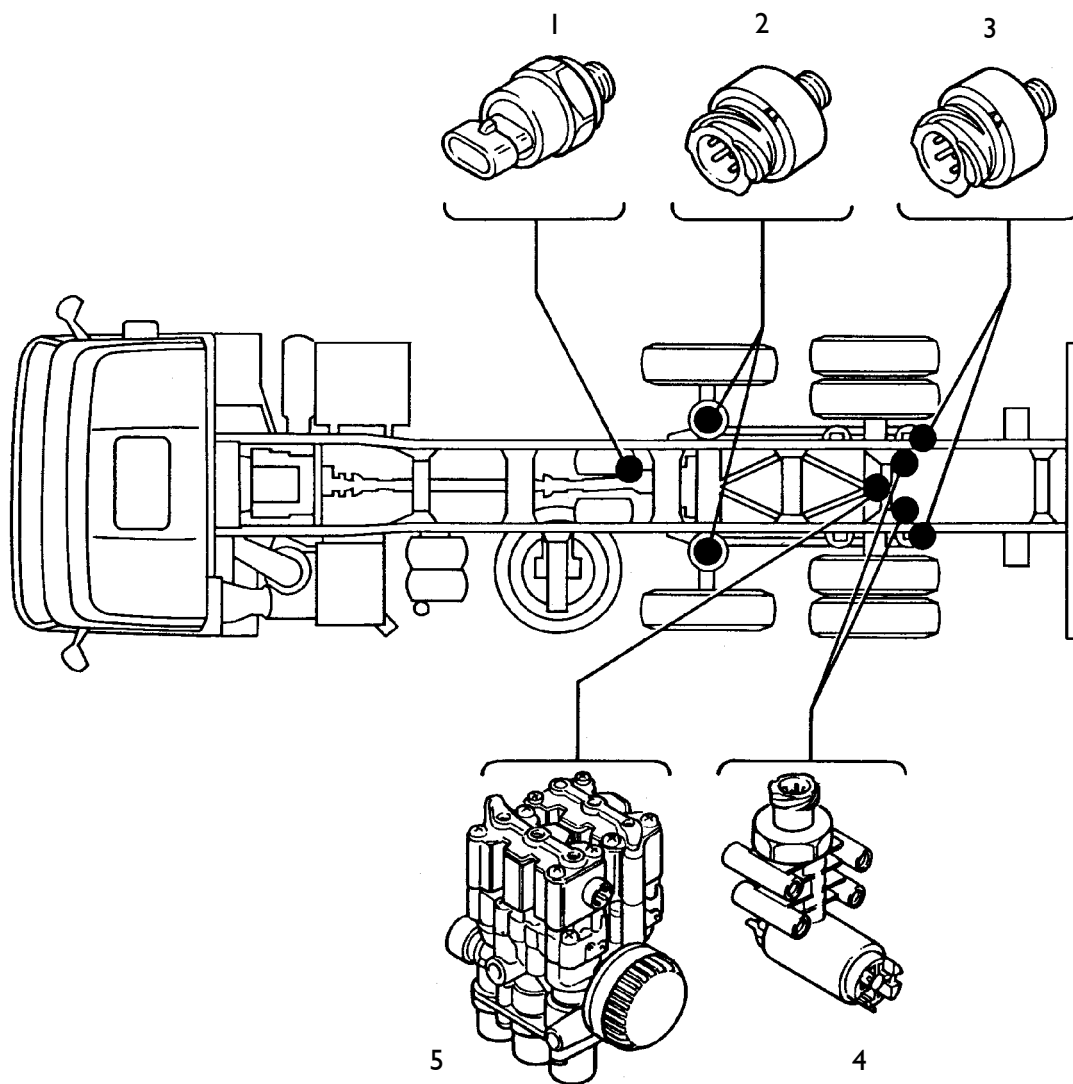


III.37 1. FRONT LEVEL SENSORS - 2. FRONT PNEUMATIC ASSEMBLY - 3. HYDRAULIC SOLENOID VALVE (COMPLETE WITH POWER REMOTE CONTROL UNIT) - 4. REAR LEVEL SENSORS - 5. PRESSURE SENSORS ON 3RD AXLE - 6. PRESSURE SENSORS ON DRIVE AXLE - 7. REAR PNEUMATIC ASSEMBLY 8. SUSPENSION AIR PRESSURE LOW MANOMETER INDICATOR SWITCH  
 \* ONLY FP (FULLPNEUMATIC) VERSION

8541



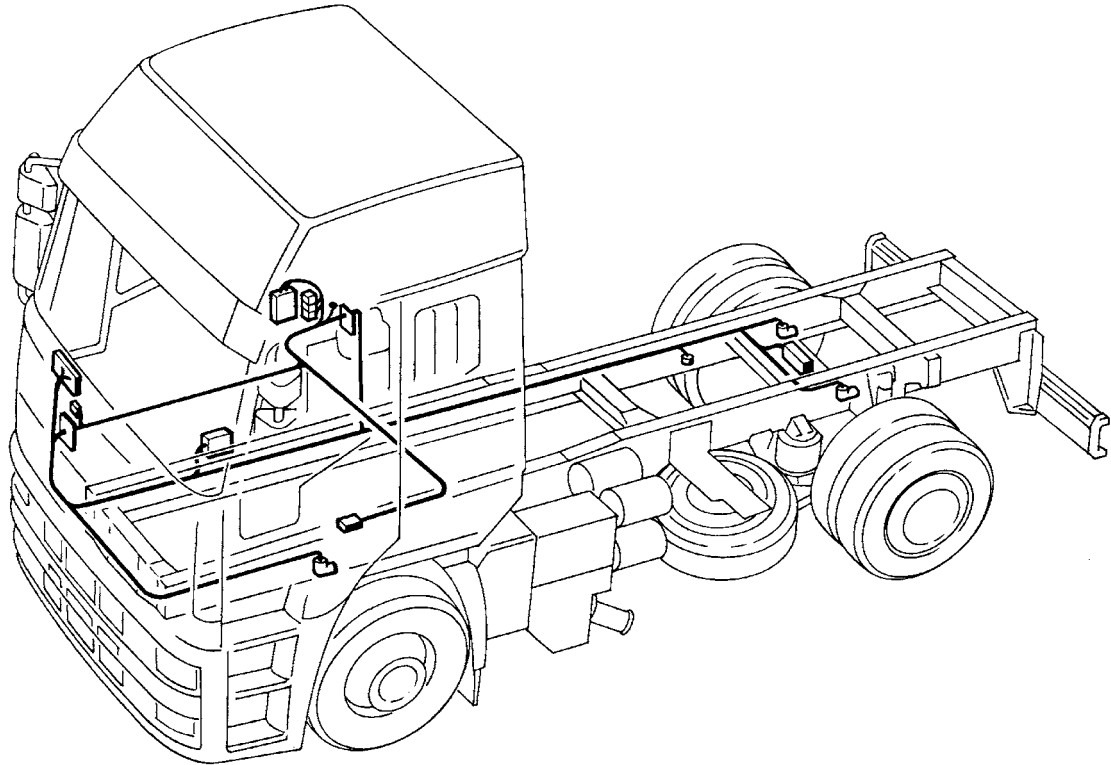
6x2 C Version



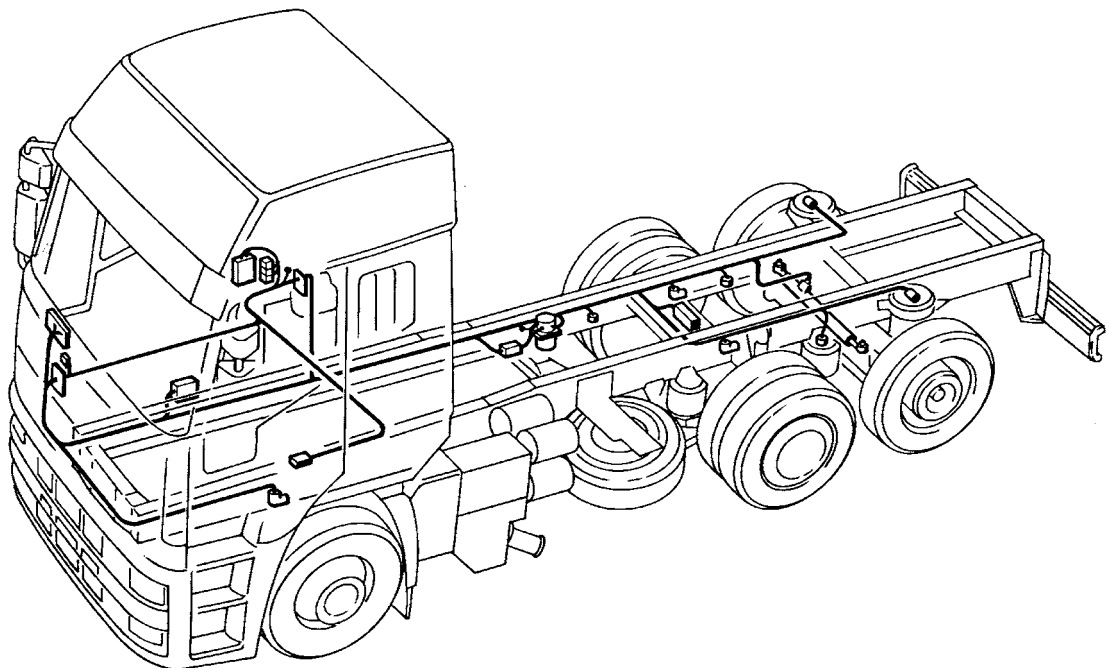
III.38 1. SUSPENSION AIR PRESSURE LOW MANOMETER INDICATOR SWITCH - 2. PRESSURE SENSOR ON ADDED AXLE - 3. PRESSURE SENSORS ON DRIVE AXLE - 4 REAR LEVEL SENSORS - 5. REAR ELECTROPNEUMATIC ASSEMBLY

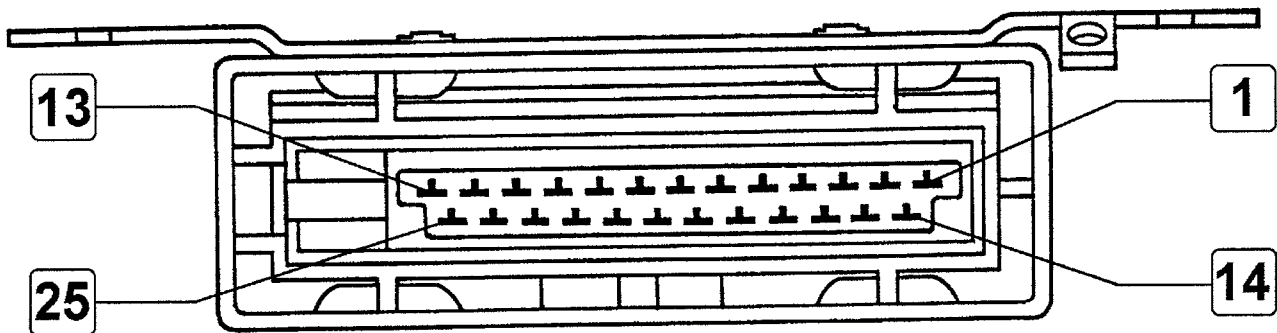
### Cables on the vehicle

4x2 version



6x2 version





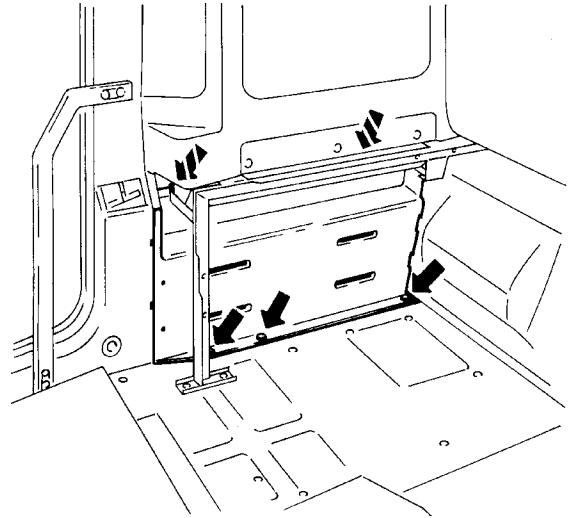
| PIN | CABLE | FUNCTION   |
|-----|-------|--|
| 1   | 8810  | Keyed power supply positive                      |
| 2   | 6402  | Communication line with remote control Pin 3     |
| 3   | 1199  | Line L for diagnosis connector                   |
| 4   | 2299  | Line K for diagnosis connector                   |
| 5   | ----- | ---  |
| 6   | ----- | ---  |
| 7   | ----- | ---  |
| 8   | ----- | ---  |
| 9   | ----- | ---  |
| 10  | ----- | ---  |
| 11  | 6403  | Communication line with remote control Pin 4     |
| 12  | 5540  | Vehicle speed signal ( B 7 tachograph )          |
| 13  | 6008  | Negative for E.C.A.S. failure warning light      |
| 14  | 0000  | Negative   |
| 15  | ----- | ---  |
| 16  | ----- | ---  |
| 17  | ----- | ---  |
| 18  | 0400  | Negative for rear level sensor                   |
| 19  | 5422  | Positive for rear level sensor                   |
| 20  | 9424  | Positive for rear chassis control solenoid valve |
| 21  | 9423  | Positive for power supply solenoid valve         |
| 22  | ----- | ---  |
| 23  | ----- | ---  |
| 24  | 1176  | Positive for stop light switch                   |
| 25  | 6007  | Negative for off trim chassis warning light      |

## MAIN SYSTEM COMPONENTS

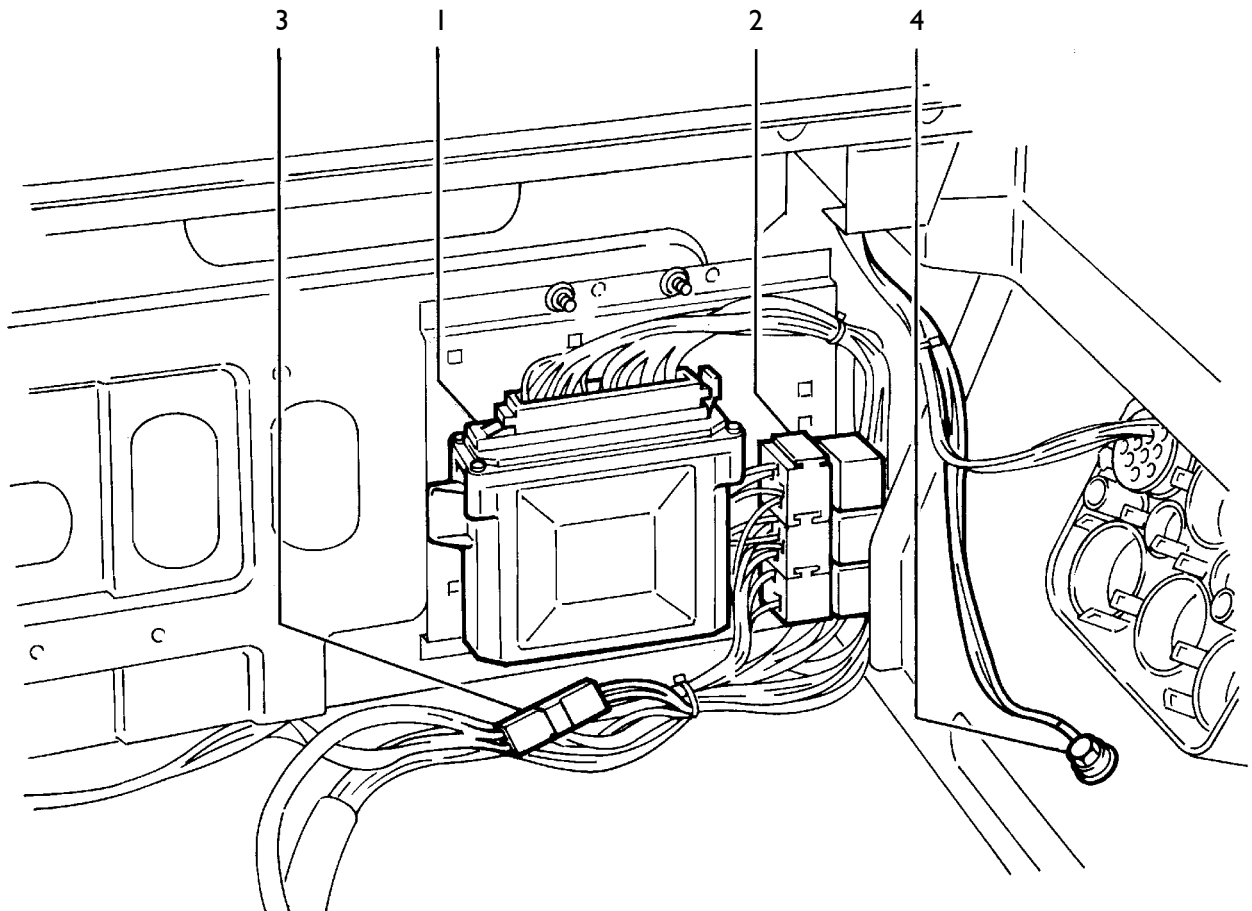
### ECAS electronic control unit (ECU)

The electronic control unit is situated on the right rear lateral support on the passenger side.

To have access to the electronic control unit it is necessary to take down the guard, as shown in the figure.



TAKING DOWN THE SIDE GUARD



III.39 1. ELECTRONIC CONTROL UNIT - 2. REMOTE CONTROL SWITCH ASSEMBLY - 3. - JOINT FOR REAR ADDED AXLE HYDRAULIC STEERING SYSTEM (ST36) - 4. SYSTEM GROUNDING POINT

**“ 8550 ” / “ 86023 ” electronic control unit**

The electronic control unit makes it possible to manage the different frame positions as a function of the driver's requests expressed with the aid of the remote control switch.

When the key-operated selector is turned on, the electronic control unit performs a system test by powering the yellow and red telltales on the dashboard for about 2 sec.

If an anomaly is detected, depending on its severity, the red light will stay on permanently or blink, whilst the yellow light can stay on only if the vehicle is not at normal level or a plausibility error is detected.

Having to keep the travelling levels requested by the driver constant and at the same time reduce the consumption of air, the electronic control unit checks cyclically the signals coming from the level sensors, and steps in for a correction ONLY in the presence of a deviation of over 5 counts.

The correction is applied with a delay of:

- ca 1 sec. if the vehicle is stationary
- ca 60 sec. if the vehicle is moving.

If the level is not restored within a maximum time period of 30 sec. since the start of the correction, the electrical control unit memorises a plausibility error.

**N.B. All this applies ONLY if the vehicle has been moving for at least 5 min., as the system delays all checks to enable the compressed air system to be recharged.**

If the brakes are applied, upon receiving a signal from the stop light switch, the electronic control unit stops all automatic level adjustment operations.

Though it features a "blink code" displayed by means of a red failure warning light for a preliminary diagnosis, the electronic control unit is equipped with a highly advanced self-testing facility, and it is able to recognise and memorise any fault, as a function of environmental conditions, including intermittent system faults as may occur during system operation, so as ensure more reliable and effective repairs.

All testing, programming, fault memory clearance interventions, etc. can be executed by means of the computerised testing station "MODUS".

All system components, other than the steering system, are connected to the electronic control unit by means of a comb-type connector.

Pin numbering varies depending on the version, and so does the type of control unit.

**Characteristic data:**

|                      |                      |
|----------------------|----------------------|
| Supply               | WABCO                |
| Power supply voltage | from 18 to 32 V      |
| Temperature range    | from - 40° to + 70°C |

**Level sensor**

The level sensor, which is the same on all systems, consists of a coil fastened to the frame and a small piston.

By means of a cam and a lever connected to the axle, with each change in height, the small piston is moved inside the coil and changes the inductance of the latter.

These variations help the electronic control unit to intervene in the different system operating stages.

The measure of sensor's connecting lever IS FIXED AND CANNOT BE ADJUSTED.

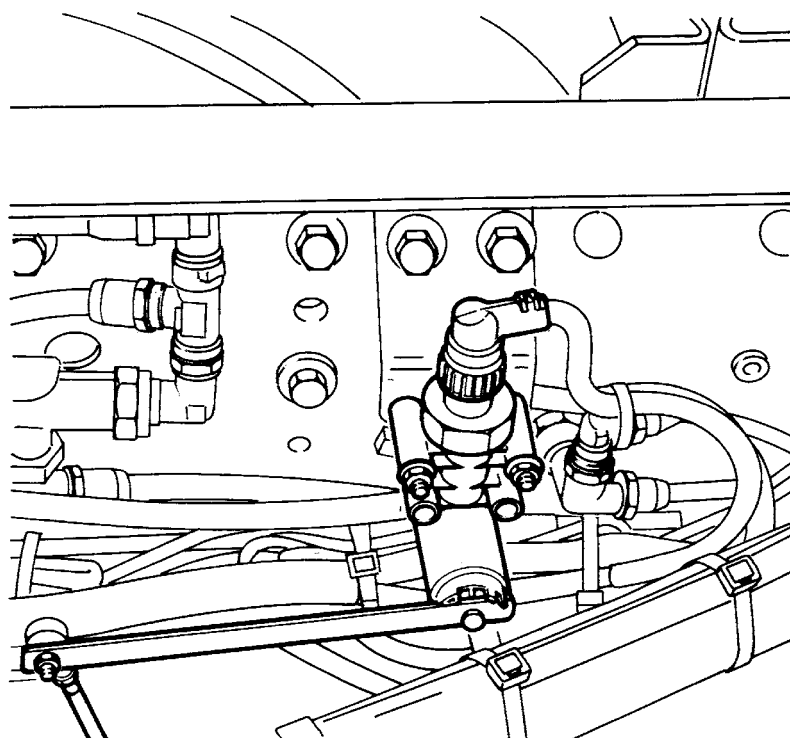
The following measurements are available depending on the type of vehicle:

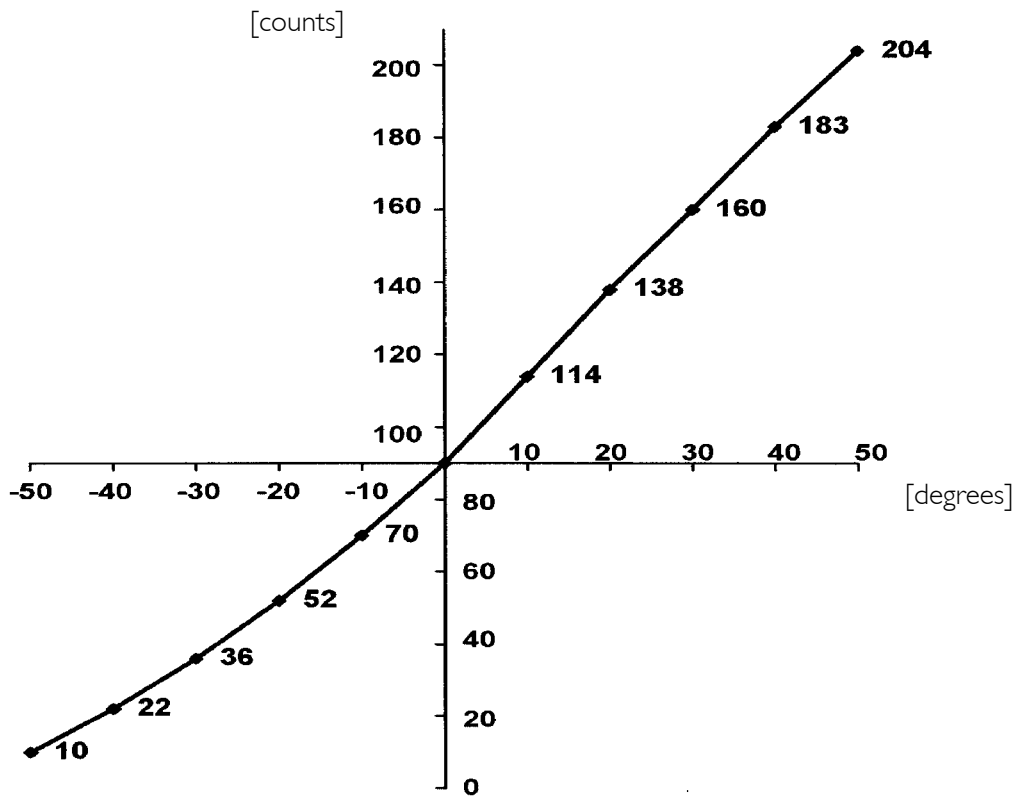
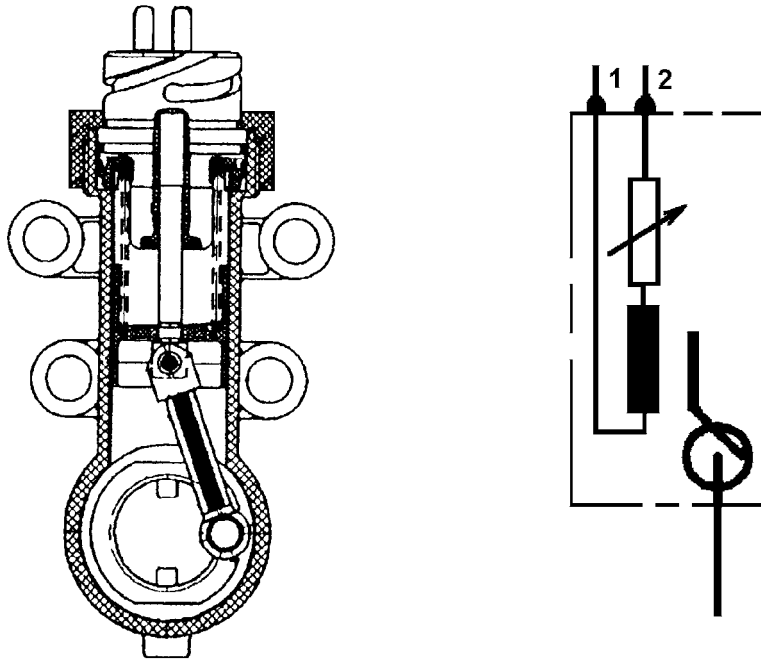
**CHARACTERISTIC DATA**

|                        |                |
|------------------------|----------------|
| Power supply voltage   | Pulse 5 to 15V |
| Measuring principle    | Inductive      |
| Current drained        | Max. 100 mA    |
| Working range of lever | Max. 100°      |



DO NOT EVER WORK ON THE LINKAGE TO ADJUST THE ATTITUDE!





Rated characteristic curve of the sensor as a function of the angular displacement of the lever

## Load sensing valve

The load sensing valve, which is the same on all systems, is installed solely in vehicles 6x2 in the air springs of the rear axle and the added axle, and in vehicles equipped with the aid at take-off device.

These load sensing valves are used by the control unit to evaluate the distribution of the load between the axles and decide whether or not to enable the management of the added axle, and aid at take-off.

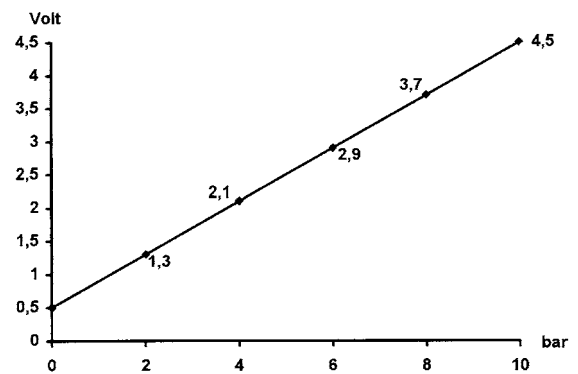
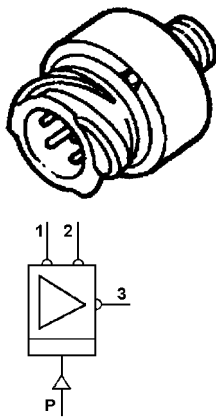
The component being considered is connected to the system via a 3-pin connector:

Pin 1 Power supply positive

Pin 2 Negative

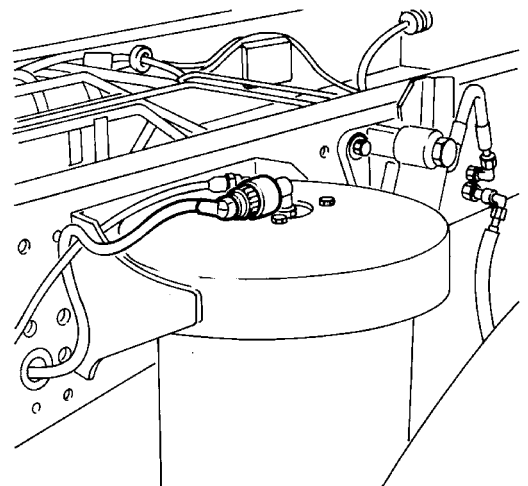
Pin 3 Signal

The characteristic curve of the load sensing valve as a function of the pressure in the air spring is illustrated below.



### Characteristic data

|                         |             |
|-------------------------|-------------|
| Power supply voltage    | 8 to 32 V   |
| Current drained         | 30 mA max   |
| Measuring range         | 0 to 10 bar |
| Admissible overpressure | 16 bar      |

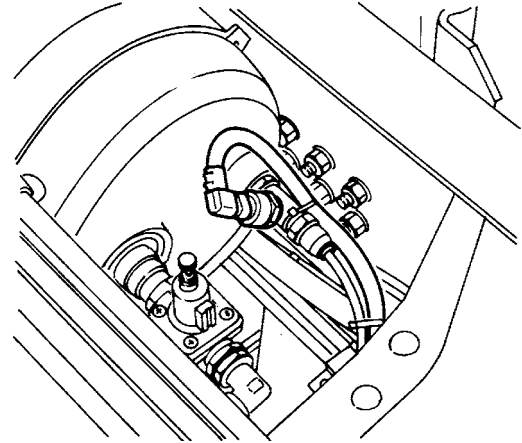




### Air suspension pressure low manometer switch

The manometer switch is situated in the proximity of the auxiliary unit air reservoir, on the air suspension delivery pipe.

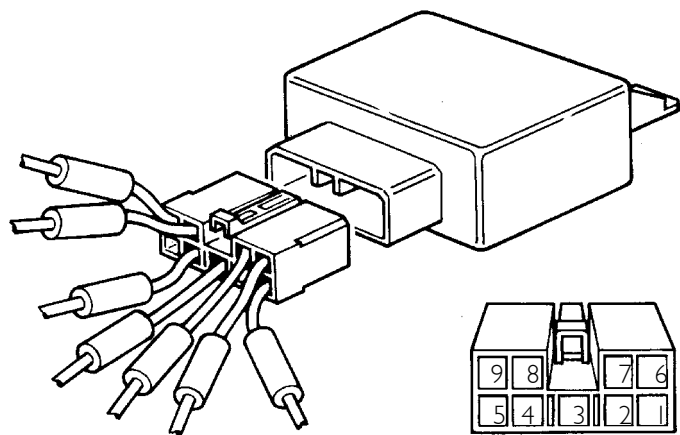
Its function is to warn the driver that the supply pressure is low (<8 bar) through a visual indicator on the facia.



### Signal amplifier

The speedometer signal amplifier transmits a pulse to the ECAS control unit.

To have access to the component it is necessary to take down the lower right side guards of the facia.



III.40 1. TO THE AIR CONDITIONING SYSTEM - 2. FREE - 3. CAB GROUND - 4. TO THE ECAS SYSTEM - 5. FREE - 6. SIGNAL FROM THE ELECTRONIC TACHOGRAPH - 7. TO THE THIRD ADDED AXLE HYDRAULIC STEERING SYSTEM - 8. POWER SUPPLY + 15 - 9. TO THE ABS/ASR SYSTEM

### Electropneumatic distributor

5 basic types of distributor are used, depending on type of vehicle.

One of these, the one fitted to the front axle is always the same model for all-air suspension vehicles, whilst the type of distributor equipping the rear axle changes depending on vehicle type.

| * | Function                   | Cable colour |
|---|----------------------------|--------------|
| 1 |                            | 5540         |
| 2 | Signal for RETARDER system | -            |
| 3 | Earth                      | 0000         |
| 4 | Signal for ECAS system     | -            |
| 5 | Signal for TEC system      | -            |
| 6 | Spare                      | -            |
| 7 | To EDC control unit        | 5155         |
| 8 | Power supply               | 8871         |
| 9 | Signal from tachograph B7  | 5540         |

**“ 9820 ” / “ 78242 ” axle electropneumatic distributor**

This component is used on all the vehicles featuring all-air suspension.

It consists of a control solenoid valve and two pneumatic distributors for the management of both sides of the axle.

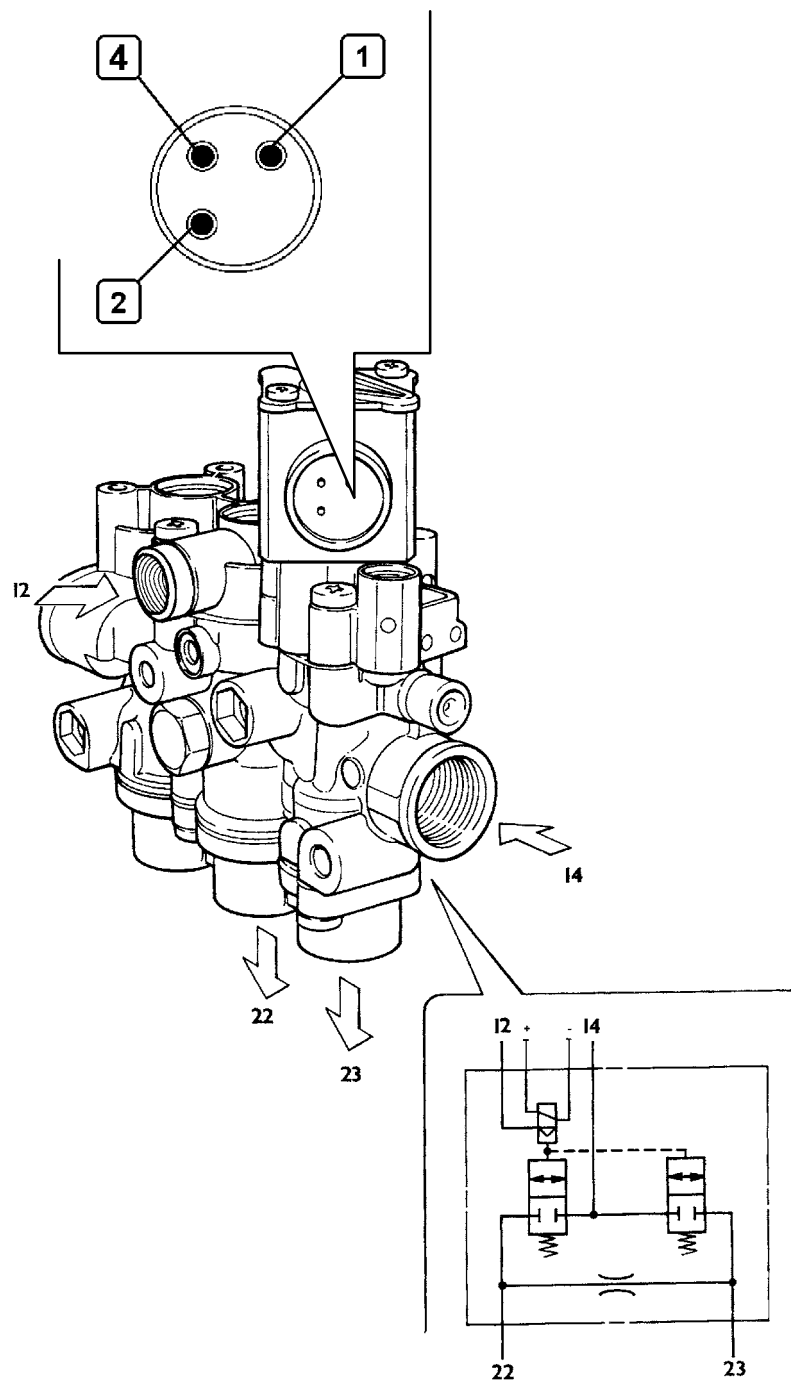
To prevent pressure transfers between the air-springs and hence stabilise the axle, a calibrated hole is provided on the interior connection between the two outlets.

The electropneumatic distributor is connected to the system via a 3-pin connector:

Pin 1 Solenoid valve power supply positive

Pin 2 Negative

Pin 4 ---



### “ 9838 ” / “ 78243 ” electropneumatic distributor

This component is adopted solely in 4 x 2 TP vehicles.

It is made up of two control solenoid valves, “A” and “B”, and three pneumatic distributors.

Solenoid valve “A” is responsible for managing the charging / discharge distributor.

Solenoid valve “B” has the task of managing the frame attitude distributors.

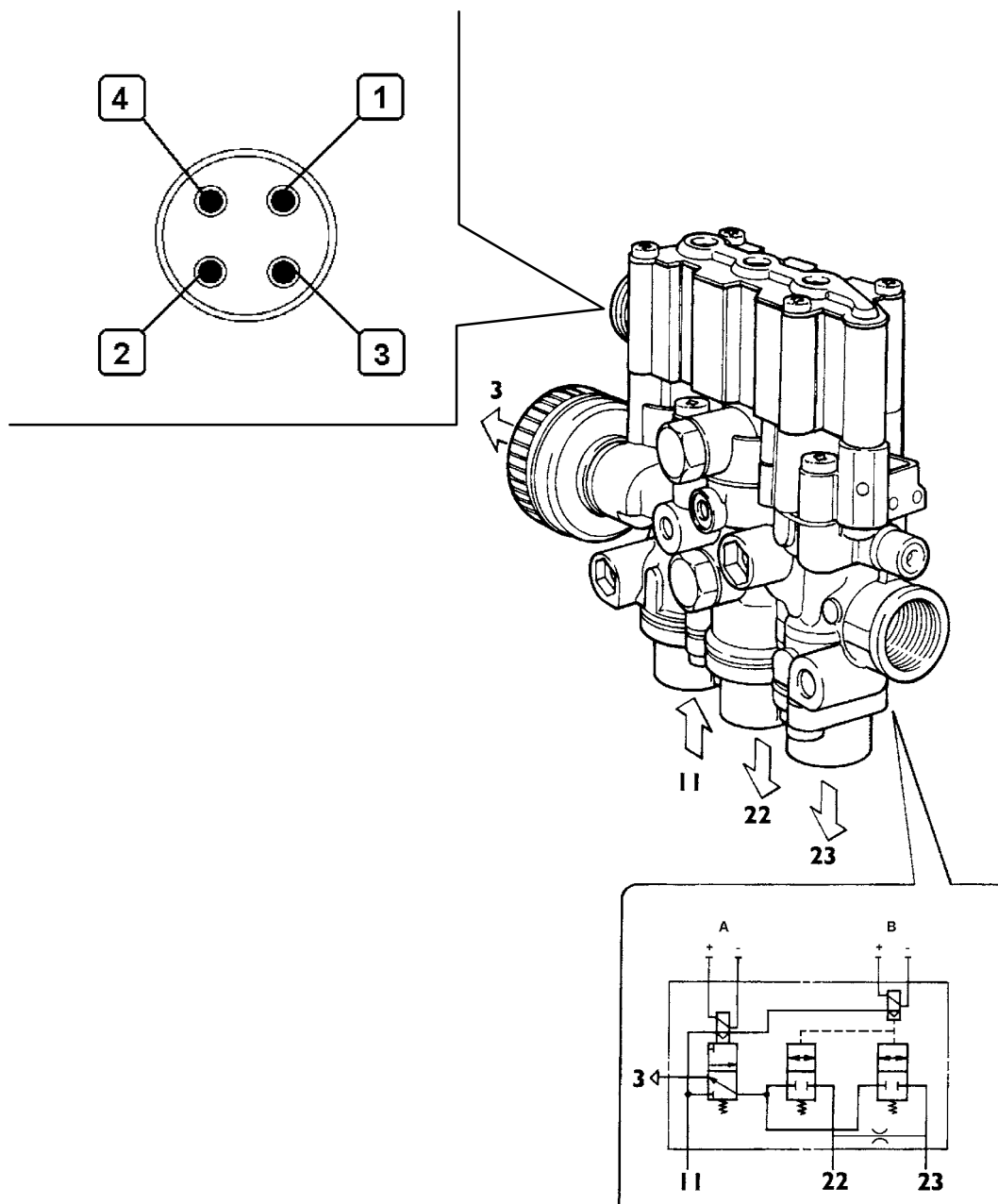
The electropneumatic distributor is connected to the system via a 4-pin connector:

Pin 1 “A” solenoid valve power supply positive

Pin 2 Common negative

Pin 3 “B” solenoid valve power supply positive

Pin 4 ---



**“ 9838 ” / “ 78243 ” rear axle electropneumatic distributor**

This component is adopted in both 4 x 2 P - FP - TFP and 6x4 vehicles.

It is made up of three control solenoid valves, “A”, “B” and “C”, and as many pneumatic distributors.

Solenoid valve “A” is responsible for managing the charging / discharge distributor.

Solenoid valve “B” has the task of managing the right hand side frame attitude distributor.

Solenoid valve “C” has the task of managing the left hand side frame attitude distributor.

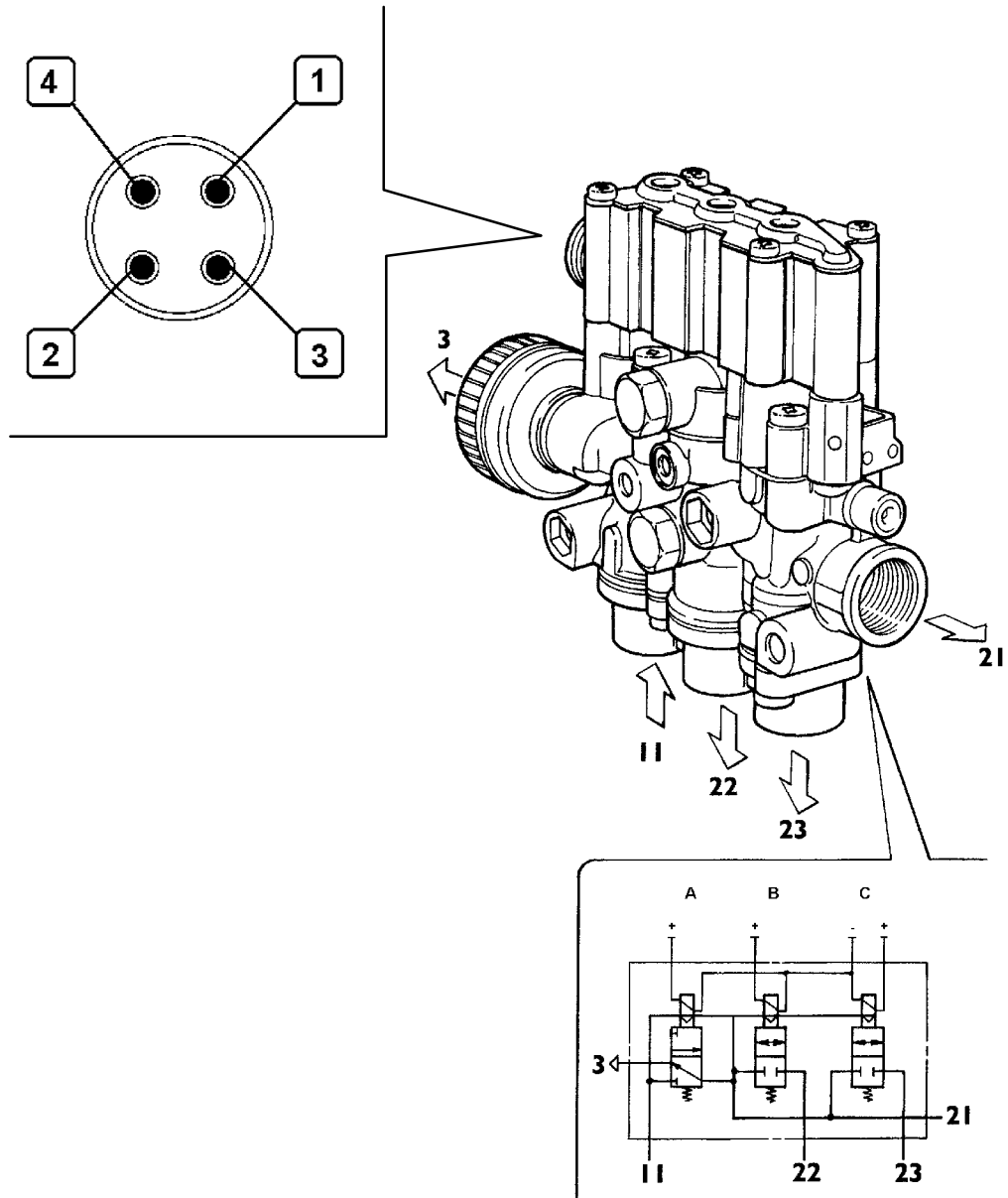
The electropneumatic distributor is connected to the system via a 4-pin connector:

Pin 1 “A” solenoid valve power supply positive

Pin 3 “B” solenoid valve power supply positive

Pin 3 “C” solenoid valve power supply positive

Pin 4 Common negative



**“ 9838 ” / “ 78243 ” rear axle electropneumatic distributor**

This component is adopted in 6 x 2 vehicles.

It is made up of five control solenoid valves, “A”, “B”, “C”, “E” and “F”, and as many pneumatic distributors.

Solenoid valve “A” is responsible for managing the charging / discharge distributor.

Solenoid valve “B” has the task of managing the right hand side rear axle attitude distributor.

Solenoid valve “C” has the task of managing the left hand side rear axle attitude distributor.

Solenoid valve “E” has the task of managing the right hand side added axle attitude distributor.

Solenoid valve “F” has the task of managing the left hand side added axle attitude distributor.

The electropneumatic distributor is connected to the system via a 4-pin connector:

**“I”**

Pin 1 “A” solenoid valve power supply positive

Pin 2 “B” solenoid valve power supply positive

Pin 3 “C” solenoid valve power supply positive

Pin 4 Common negative

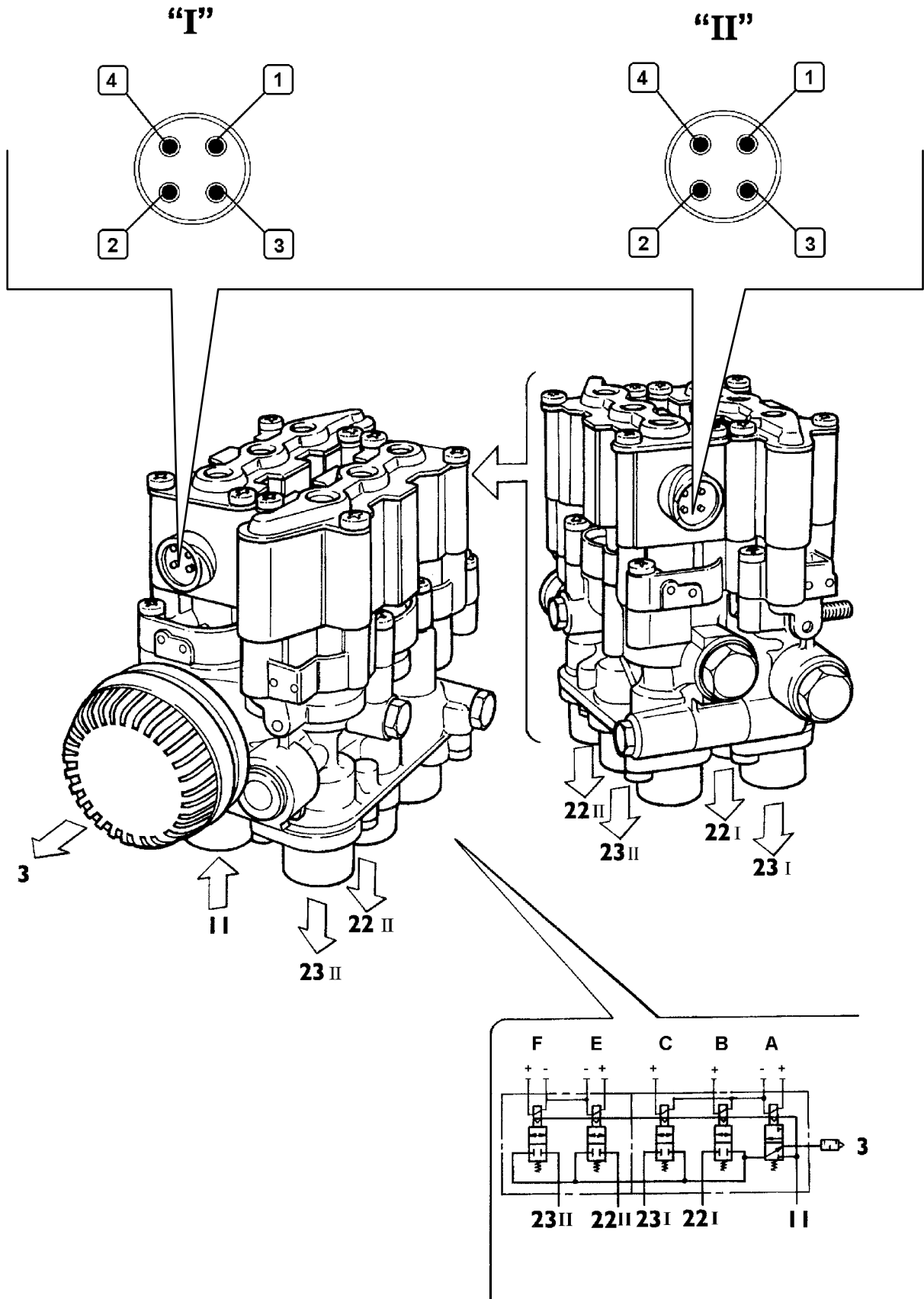
**“II”**

Pin 1 “E” solenoid valve power supply positive

Pin 2 Common negative

Pin 3 “F” solenoid valve power supply positive

Pin 4 Common negative



**“9838” / “78243” rear axle electropneumatic distributor**

This component is adopted in 6 × 2 P vehicles with pneumatic lifting system and it is made up of six control solenoid valves, “A”, “B”, “C”, “D”, “E”, “F”, and as many pneumatic distributors.

Solenoid valve “A” is responsible for managing the charging/discharge distributor.

Solenoid valve “B” is responsible for managing the right hand side rear axle attitude distributor.

Solenoid valve “C” is responsible for managing the left hand side rear axle attitude distributor.

Solenoid valve “D” is responsible for managing the right hand side added axle attitude distributor.

Solenoid valve “E” is responsible for managing the left hand side added axle attitude distributor.

Solenoid valve “F” is responsible for managing the lifting system management distributor.

The electropneumatic distributor is connected to the system via a 4-pin connector:

**“I”**

Pin 1 “A” solenoid valve power supply positive

Pin 2 “B” solenoid valve power supply positive

Pin 3 “C” solenoid valve power supply positive

Pin 4 Common negative

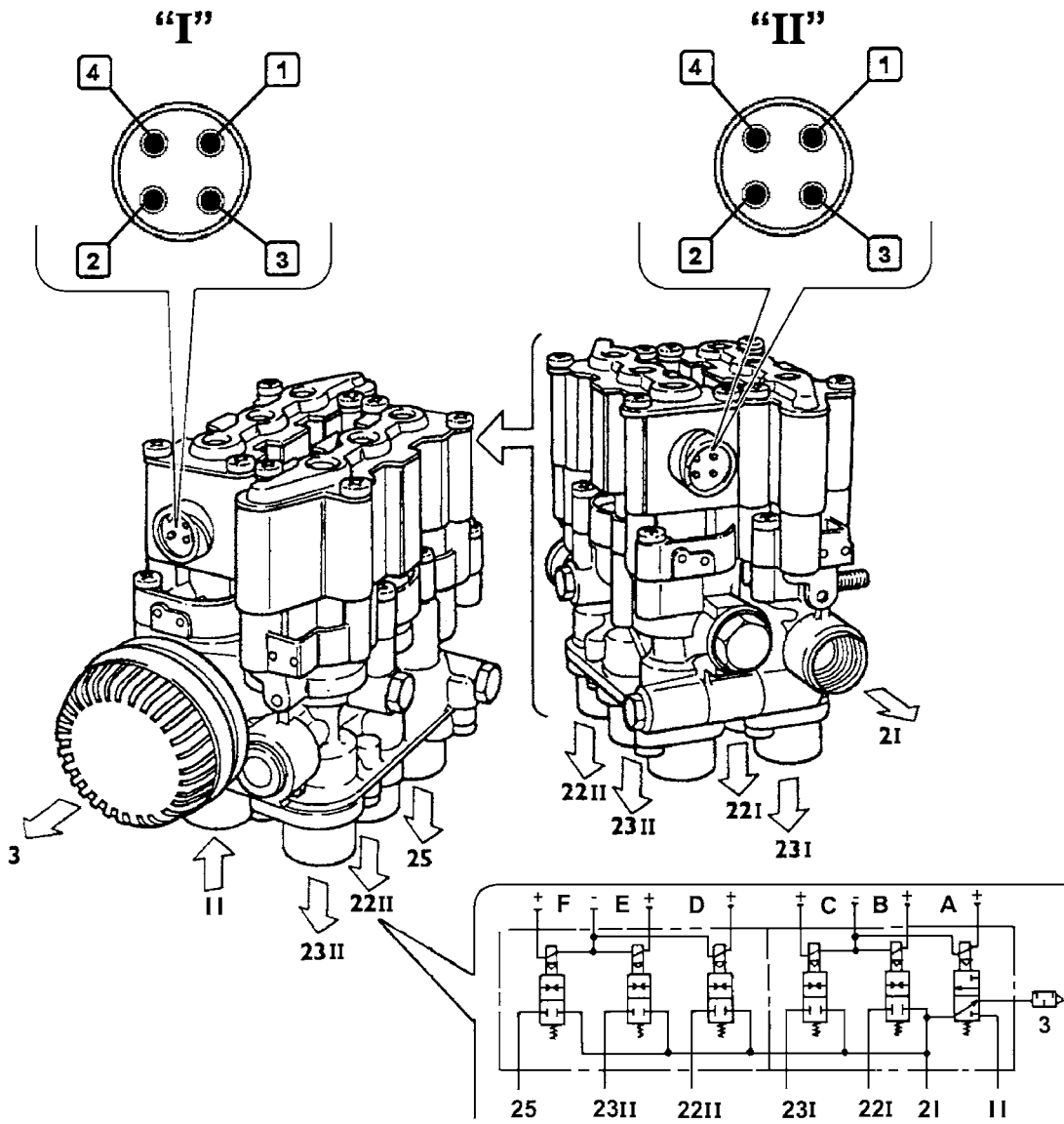
**“II”**

Pin 1 “F” solenoid valve power supply positive

Pin 2 “D” solenoid valve power supply positive

Pin 3 “E” solenoid valve power supply positive

Pin 4 Common negative





**“ 8568 ” / “ 85065 ” remote control unit**

The traditional controls to the side of the driver's seat have been replaced with a remote control unit located on the left of the driver's seat.

This device makes it possible to manage the different frame attitude functions.

It can be pulled out and therefore can be used both from the cab and from the ground.

It has two sets of selection buttons and two indicator lights, and namely:

- A) Green telltale for front axle selection \*
- B) Green telltale for rear axle selection
- 1) Front axle selection \*
- 2) Rear axle selection
- 3) Level “ 1 ” memory
- 4) Level “ 2 ” memory
- 5) Frame levelling
- 6) Frame lifting
- 7) Frame lowering
- 8) STOP

The remote control unit is connected to the system via a 4-pin connector:

Pin 1 Power supply positive

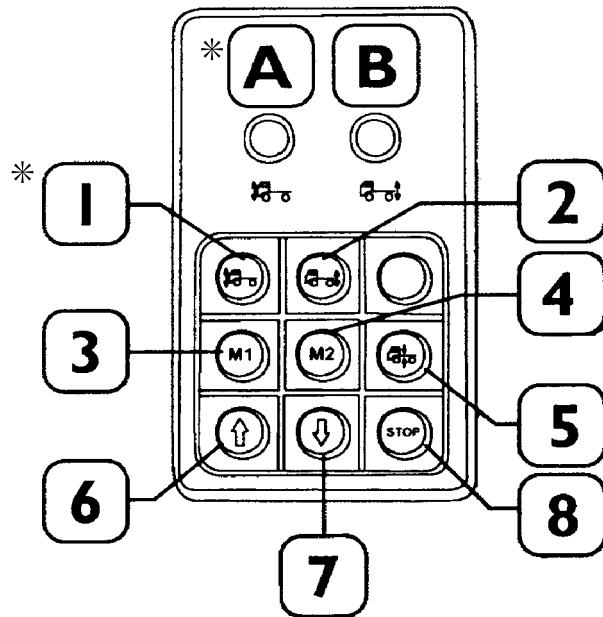
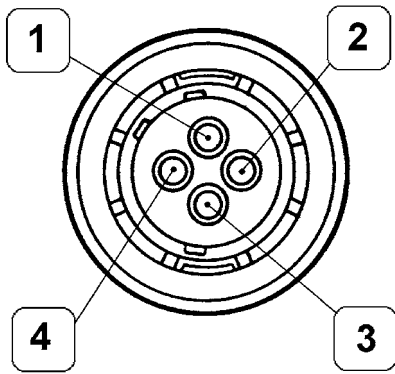
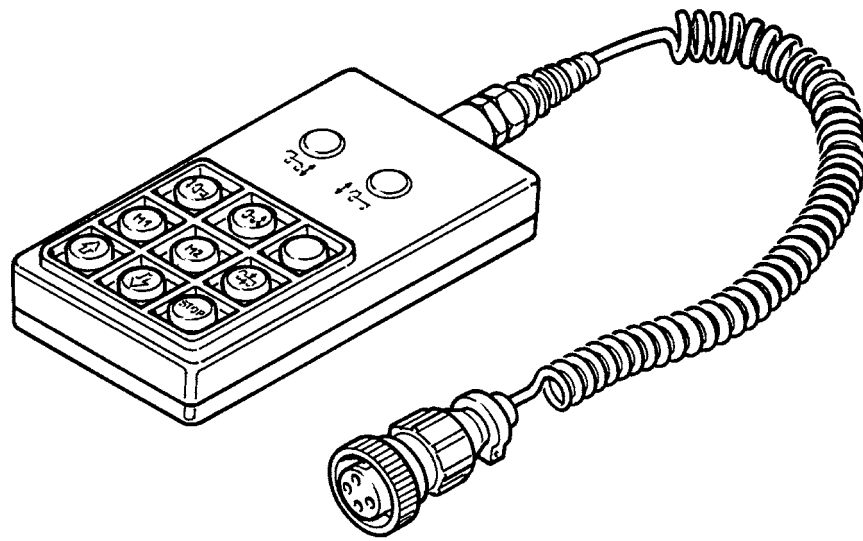
Pin 2 Negative

Pin 3 Communication line to ECU

Pin 4 Communication line to ECU

As for the use of this remote control unit, see the chapter entitled “Operation”

\* only in full pneumatic vehicles



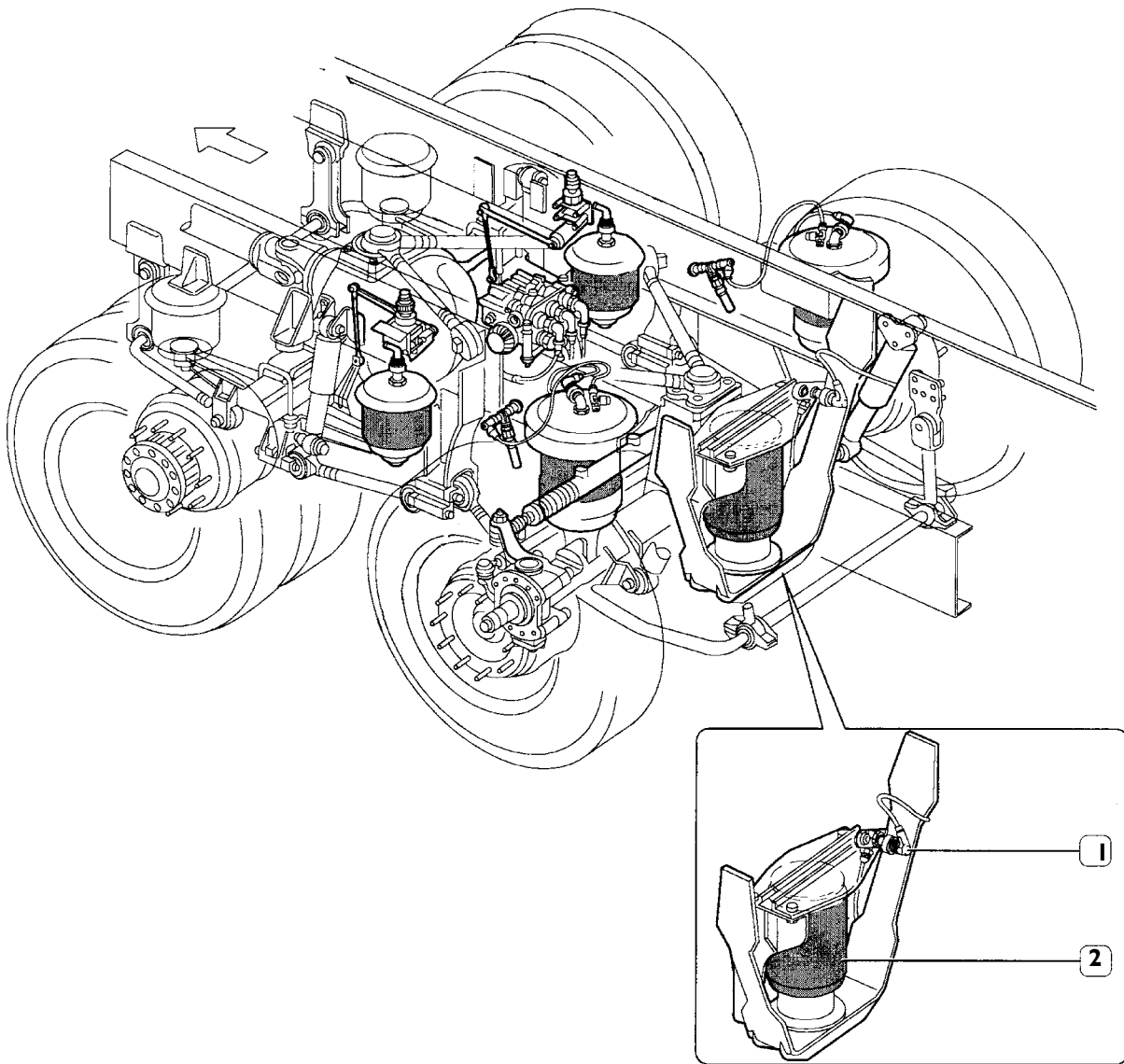
\* only in full pneumatic vehicles

### Added axle lifting system

As an alternative to the electrically operated pump described before, it is possible to lift the added axle by means of an air-spring (part "2" in the figure).

To this end, a solenoid valve has been added to the "9838"/"78243" rear axle distributor which manages the lifting process (see page 46).

All operating conditions and the relative safety devices are again managed by the ECAS electronic control unit.



1. Lifting system air-spring pressure detector - 2. Lifting system air-spring

**Description and operation**

**Frame lifting**

This operation can be activated ONLY at vehicle speeds < 30 km/h.

When this speed is exceeded, the chosen attitude remains constant.

To lift the frame, proceed as follows:

- press button “1” to select the axle; the relative telltale(s) “A” and/or “B” will light up
- press button “6” to obtain the desired level.

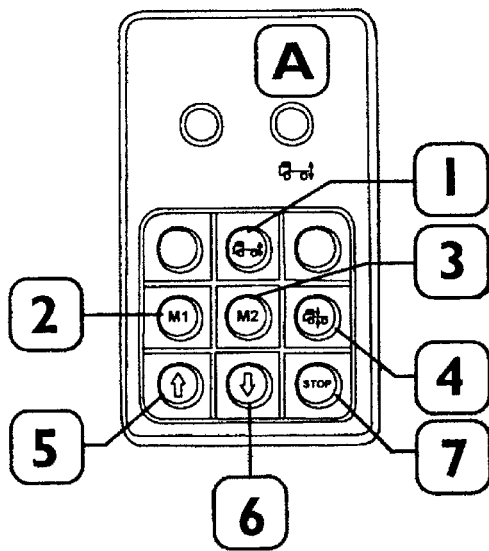
As button “6” is released, all the solenoid valves are deenergised and restored to their resting / constant level conditions.

During this operation, a yellow telltale lights up on the dash indicating the out-of-attitude condition.

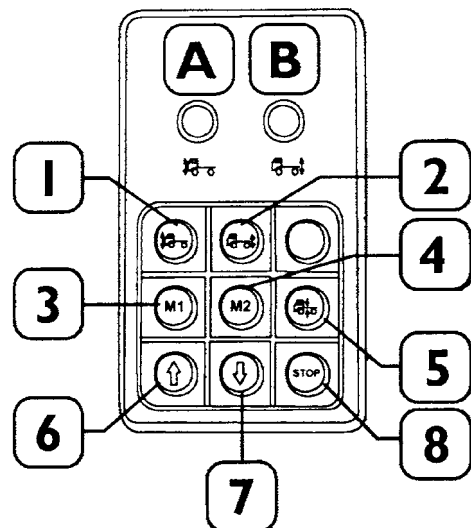
This condition and the relative indication will be maintained, even if the key-operated selector is turned off and on.

The maximum lifting limit is governed by the level sensors as a function of the values set in the control unit.

**N.B.** The description of the buttons refers to the numbering of the FP remote control unit.



REMOTE CONTROL UNIT, P VERSION



REMOTE CONTROL UNIT, FP VERSION

## Frame lowering

This operation can be activated ONLY at vehicle speeds < 30 km/h.

When this speed is exceeded, the chosen attitude remains constant.

To lower the frame, proceed as follows:

- press button(s) "1" and/or "2" to select the axle; at this point, the relative telltale(s) "A" and/or "B" will light up
- press button(s) "6" or "7" until the desired level is reached.

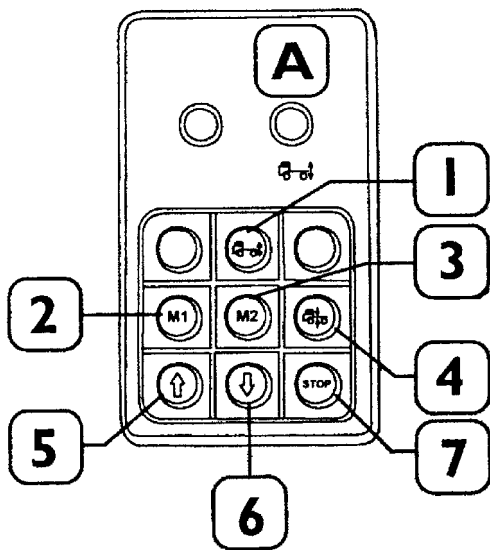
As button "6" or "7" is released, all the solenoid valves are deenergised and restored to their resting / constant level conditions.

During this operation, a yellow telltale lights up on the dash indicating the out-of-attitude condition.

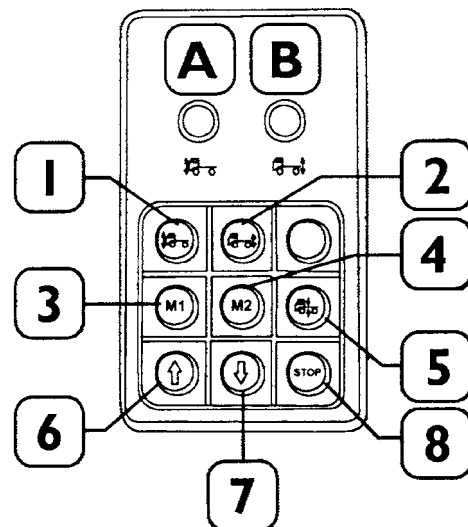
This condition and the relative indication will be maintained even if the key-operated selector is turned off and on.

The maximum lowering limit is governed by the level sensors as a function of the values set in the control unit.

**N.B.** The description of the buttons refers to the numbering of the FP remote control unit.



REMOTE CONTROL UNIT, P VERSION



REMOTE CONTROL UNIT, FP VERSION

**Frame levelling**

This operation can be activated at any speed.

To level the frame, proceed as follows:

- press button(s) "1" or "2" to select the desired axle; at this point, the relative telltale "A" or "B" will light up
- press button "5".

By recalling this operation, the yellow telltale on the dash will go out to tell the driver that the frame has been levelled. This condition and the relative indication will be maintained even if the key-operated selector is turned off and on. At a speed of over 20 km/h, if the self-levelling key has not been pressed, the control unit will automatically re-establish the frame level.

To know the height reached by the frame, see the chapter concerning vehicle attitude.

**Levels "M 1" - "M 2"**

The system makes it possible to memorise two additional attitude levels, "M1" and "M2", as a function of operating needs.

These two positions can be recalled ONLY at a speed lower than 30 km/h.

To activate them, proceed as follows:

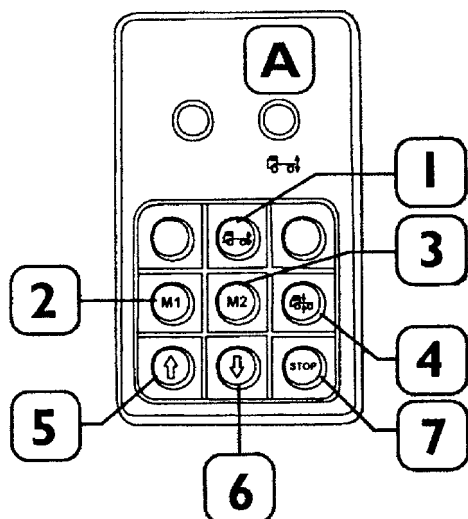
- press button(s) "1" or "2" to select an axle; at this point, the relative telltale "A" or "B" will light up
- press button "3" or "4".

By recalling this operation, the yellow telltale on the dash will light up to tell the driver that the frame is out-of-attitude. To memorise levels "M1" or "M2" proceed as follows:

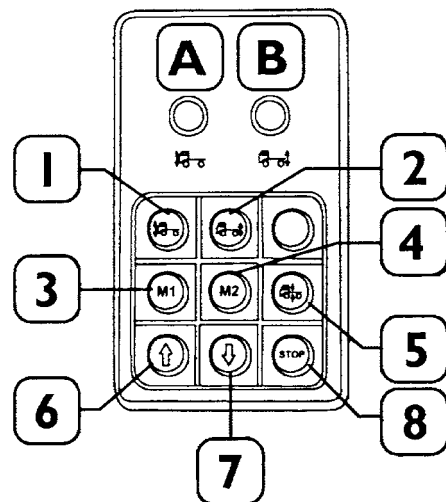
- press button "1" to select the front axle; at the same time, the relative telltale ("A") will light up
- press button "6" or "7" until the desired level is reached
- REPEAT THE SAME OPERATIONS FOR THE REAR AXLE
- press button "8" and keep it pressed
- press button "3" or "4"
- release button "3" or "4" and then button "8"

**N.B.** In an emergency, press button "8" to stop the levelling process.

The description of the buttons refers to the numbering of remote control unit FP.



REMOTE CONTROL UNIT, P VERSION



REMOTE CONTROL UNIT, FP VERSION

**Management of added axle (pneumatic lifting system)**

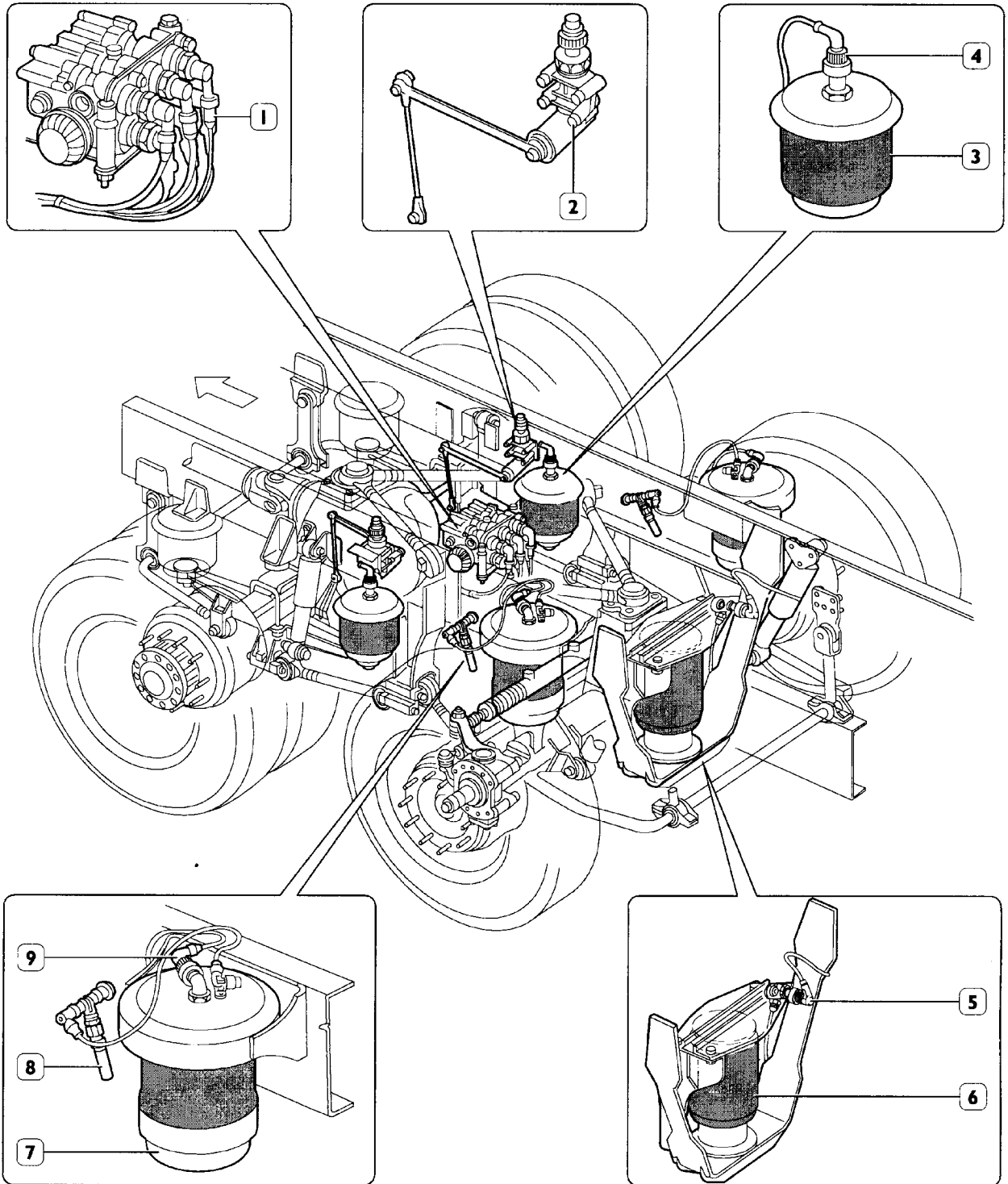
This solution, adopted on 240 P and 260 P vehicles, enables the driver to lift the added axle when this is required by the vehicle's operating conditions.

Furthermore, the system has a speed limited device which makes it possible to transfer the load onto the drive axle at the take-off stage in poor adherence conditions.

All operating conditions and the relative safety devices are managed by the E.C.A.S. control unit.

**LEGEND**

1. Electropneumatic distributor
2. Level sensor
3. Rear axle air-spring
4. Rear axle load sensing valve
5. Lifting system air-spring pressure detector
6. Lifting system air-spring
7. Added axle air-spring
8. Added axle air intake one-directional valve
9. Added axle load sensing valve





**Added axle lifting**

This operation can be activated ONLY at vehicle speeds < 30 km/h, regardless of the position of the frame, with a load on the drive axle < 11.5 t.

If already underway, the lifting stage will be completed even if the limit speed is exceeded.

To lift the added axle, press the special button in the central control panel on the dash, in position "1".

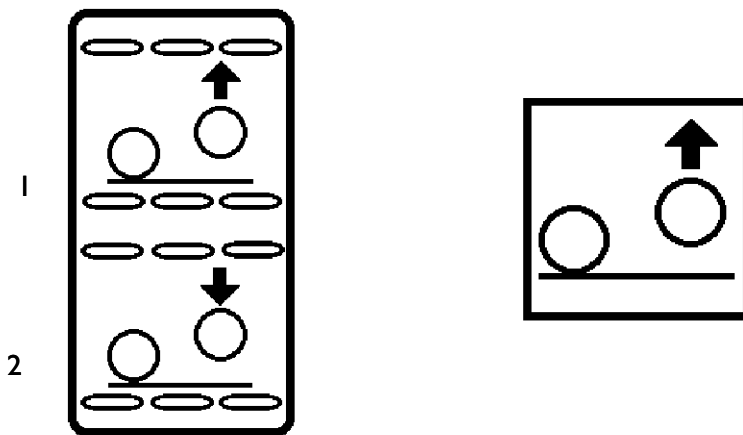
When this button is pressed, the electronic control unit evaluates the feasibility of this operation by checking the axle loading conditions.

If the load on the drive axle at the end of this check is > 11.5 t, the operation WILL NOT be performed.

If the vehicle is at the levelling stage, the out-of-attitude warning light will light up until the level is restored.

The axle will be lowered automatically with a delay of 5 sec. if the load exceeds 11.5 t and the vehicle is stationary, while it will stay lifted even if this limit is exceeded at any speed.

**N.B.** With the axle lifted, the position of the frame will always be higher than the initial position by ca 15 mm.



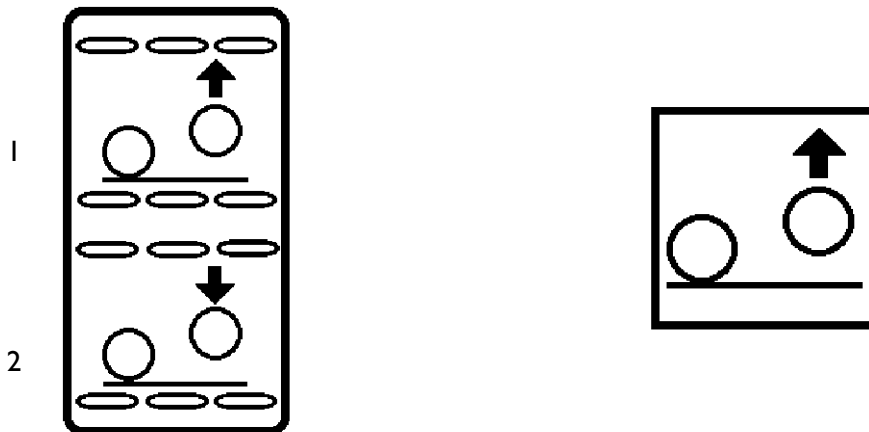
**Added axle lowering**

This operation can be activated ONLY at vehicle speeds < 30 km/h, regardless of the position of the frame. If already underway, the lowering process will be concluded even if the limit speed is exceeded.

To lower the added axle, press the special button located on the central panel of the dash, in position "2".

If the vehicle is at the levelling stage, the out-of-attitude warning light will light up until the level is restored.

The axle will be lowered automatically with a delay of 5 sec. if the load exceeds 11.5 t and the vehicle is stationary.



### Aid at take-off (Air Suspension Vehicles)

This operation can be activated regardless of the position of the frame with any load up to the maximum admissible rear axle load, and up to a speed of 30 km/h.

If the max. admissible load or the speed of 30 km/h are exceeded, the system automatically disables this function and restores the normal frame attitude.

Aid at take-off is obtained by pressing a specific button located in the central panel on the facia, and setting it on "1". When this button is pressed, the electronic control unit evaluates the feasibility of this operation by checking the axle loading conditions.

If the load on the drive axle at the end of this check is greater than the maximum admissible value, the operation WILL NOT be performed.

Otherwise, the control unit will activate solenoid valves "D" and "E" to discharge the air from the added axle air-springs, then it will activate solenoid valve "A" and will release solenoid valves "D" and "E", and, at the same time, will activate solenoid valve "F" enabling the compressed air to reach the lifting system air-spring, and will light up the aid at take-off and the axle lifted telltales.

The lifting of the added axle is limited mechanically by the buffers equipping the axle which are rested on the frame.

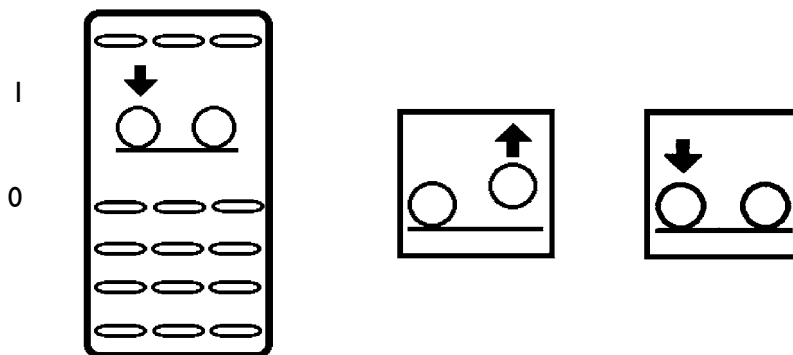
**N.B.** With the axle lifted, the control unit will adjust the pressure inside the lifting system air-spring to between 7 and 8 bar.

This pressure is controlled by the control unit by means of the pneumatic lifting system pressure detector and as a function of the settings.

If the vehicle is at the levelling stage, the out-of-attitude warning light will also light up and it will stay on until the level is restored.

This function can also be halted manually by keeping the activation button pressed for over 3 sec.

**N.B.** With the axle lifted, the position of the frame will always be higher than the initial position by ca 15 mm.



### Management of steering added axle

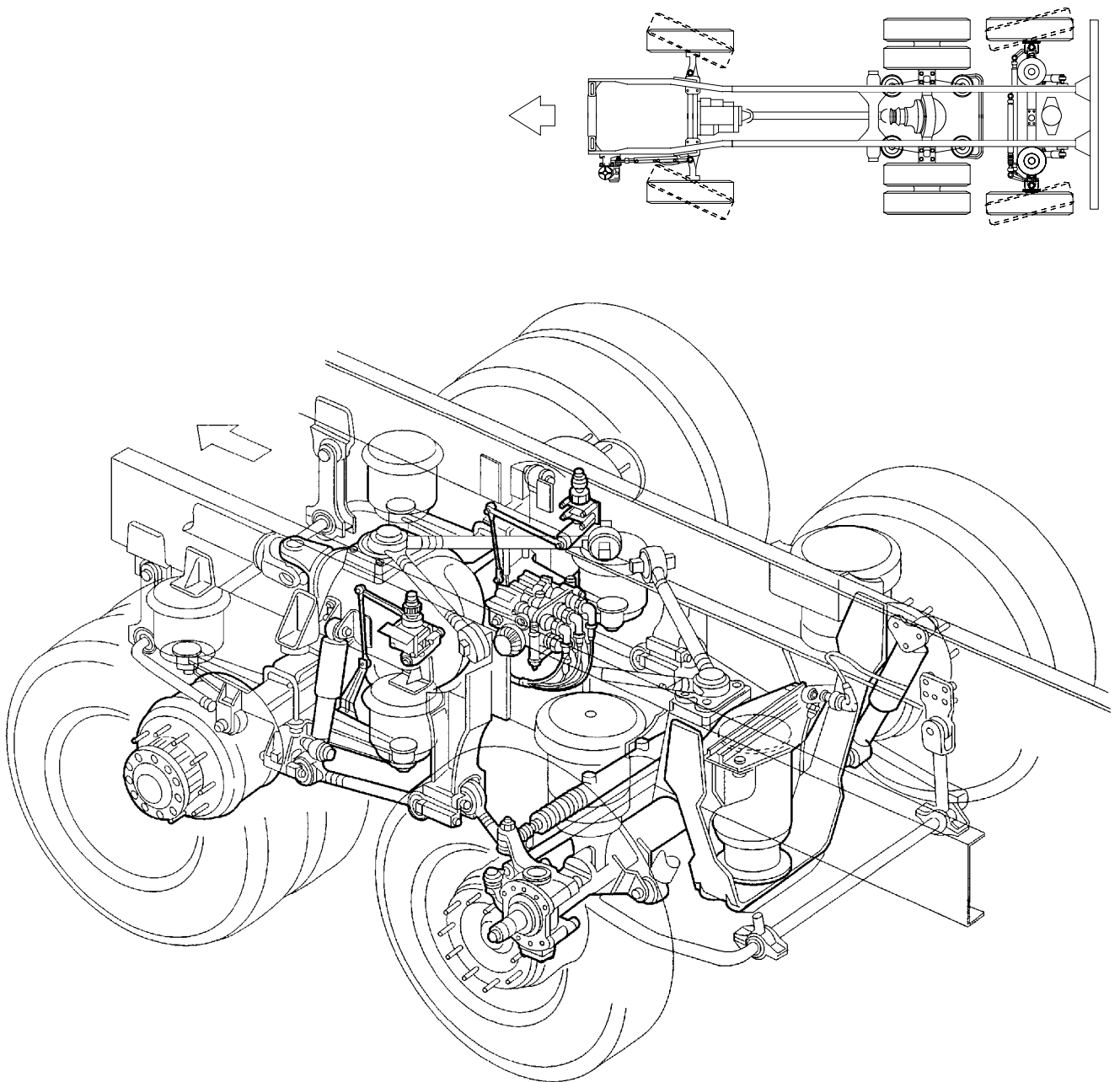
To ensure greater safety to the vehicles with steering added rear axle when running on a straight, rear axle steering is activated when the axle wheels have completed a steering angle of  $5^\circ$  at a speed lower than 45 km/h.

The transmission of the front axle steering energy to the rear added axle takes place hydrostatically by means of an operator cylinder fitted at front and a centring cylinder fitted to the rear added axle.

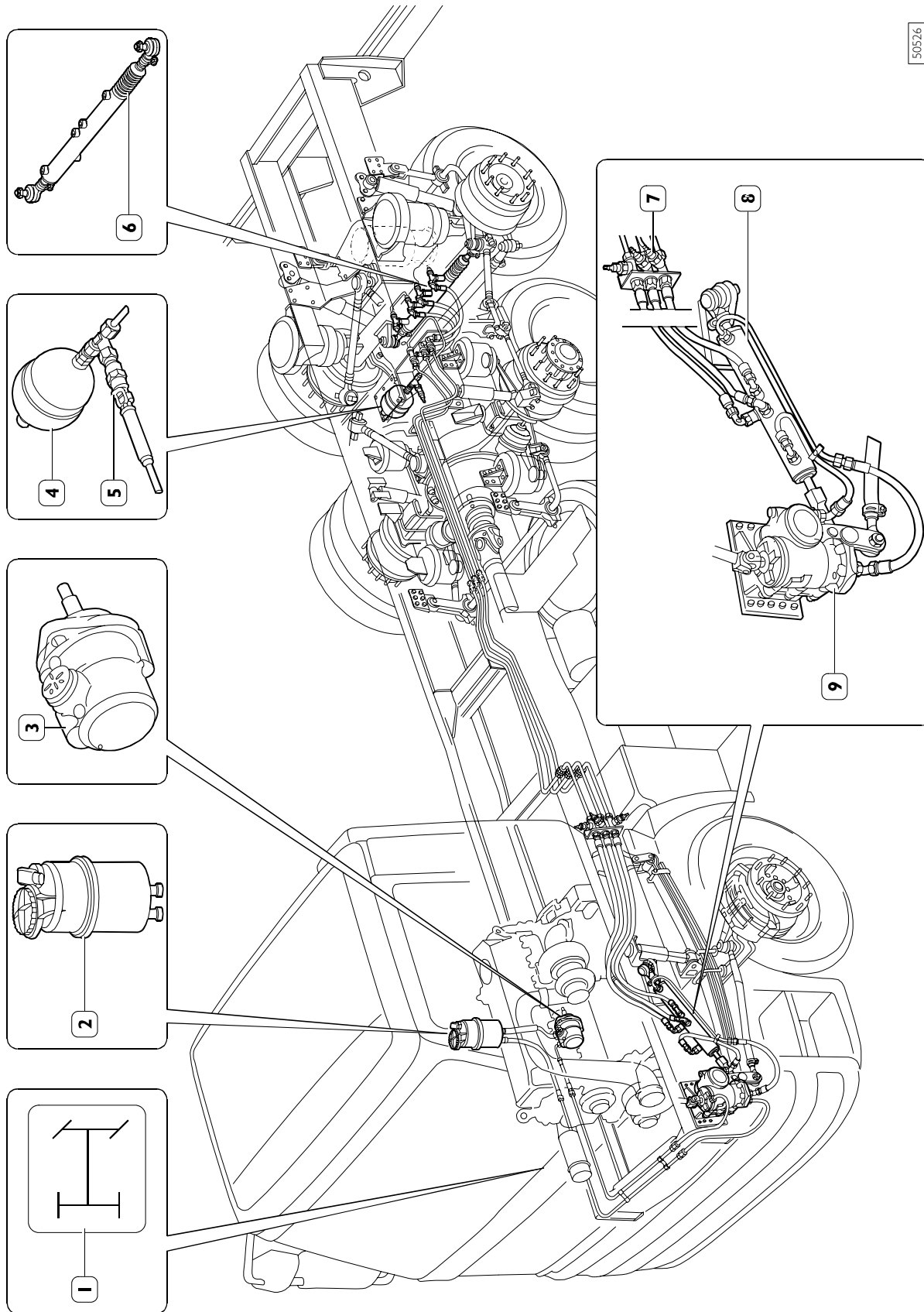
A hydraulic accumulator stores and maintains the oil in the system as a function of the displacements of the centring cylinder, with no volume losses.

Whenever the speed limits are exceeded or the added axle lifting mechanism is started, the wheels of the added axle are realigned.

To enable the steering function again, the front axle wheels have to go through the central driving position, the speed has to be lower than 45 km/h and, needless to say, the rear added axle has to be down.



**Positions of the main components of the hydraulic system on the vehicle**



50526

**III.41** 1. TELLTALE - 2. OIL RESERVOIR - 3. OIL PUMP - 4. HYDRAULIC ACCUMULATOR - 5. PRESSURE SWITCH - 6. CENTRING CYLINDER - 7. PRESSURE CONTROL SOCKETS - 8. OPERATOR CYLINDER - 9. POWER STEERING.

## DIAGNOSIS

### System diagnosis

ECAS system fault-finding can be performed by means of the following tools:

A - Modus 99327000

As a function of system faults, the RED failure warning light behaves as follows:

- FIXED light: tells the driver that there is minor fault
- BLINKING light: reflects the presence of a severe fault

## REPAIR OPERATIONS

### Blink code activation and reading

The Blink Code system "displays" one fault at a time, and therefore, in order to identify all the faults memorised by the ECU it is necessary to perform the code activation procedure several times.

The Blink Code system can be activated by connecting the L line of the Diagnostic socket (ISO) in the ECU to the ground for at least two seconds.

The code is made up of luminous indications, and namely:

Tens ..... 2 sec (Slow blinking)

Units ..... 0.5 sec (Fast blinking)

## INSTRUMENT DIAGNOSIS

### MODUS

Computerized diagnosis station for braking systems, air suspensions, engine and electronic-controlled systems. This station has auxiliary functions such as: electronic control unit programming, spare catalogue reference, timing,...

The IVECO WIRING TESTER further expands and integrates MODUS.

Such instrument is manufactured by IVECO to improve diagnosis of the vehicle electric and electronic systems. It makes it possible to test the vehicle wiring and to measure the system itself.

### IVECO WIRING TESTER

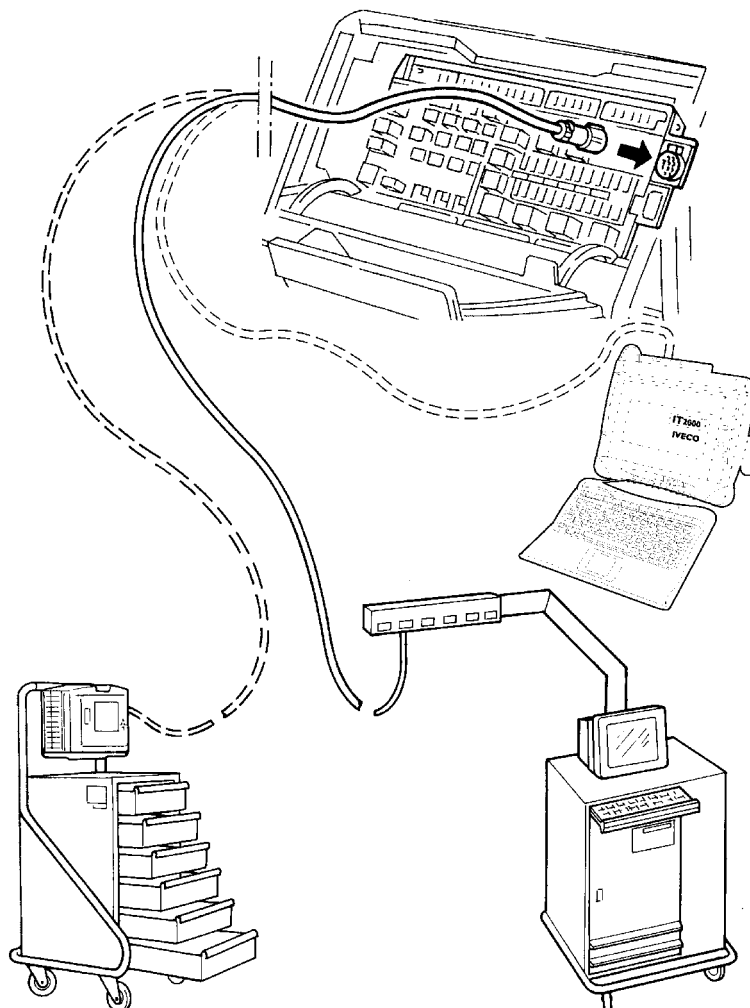
Further expands and integrates MODUS.

Such instrument is manufactured by IVECO to improve diagnosis of the vehicle electric and electronic systems.

It makes it possible to test the vehicle wiring and to measure the system itself.

### IT 2000

IT 2000 is a diagnosis instrument for every IVECO vehicle electronic system. It makes it possible to take prompt action recognizing the chassis number. It stores the results of previously carried out diagnosis actions. It can also be used as a portable Personal Computer for remote diagnosis. If MODUS is used as a mother station, it is possible to update and configure IT 2000. All instruments are interfaced with the vehicle through a 30-pole diagnosis socket.



0001068t

**Blink code table for ECAS control unit****“4 X 2”**

| <b>Fault</b>                             | <b>Fault code</b> |
|--|-------------------|
| <b>Control unit</b>                      |                   |
| Error in ECU configuration parameters    | 01                |
| Error in calibration parameters          | 02                |
| Fault in internal memory                 | 03 / 04           |
| Sampling of level sensor values          | 06                |
| <b>Right rear level sensor</b>           |                   |
| Break / short circuit on positive side   | 10                |
| Short circuit on ground side             | 14                |
| Plausibility failure at lifting stage    | 40                |
| Plausibility failure at lowering stage   | 44                |
| <b>Left rear level sensor</b>            |                   |
| Break / short circuit on positive side   | 11                |
| Short circuit on ground side             | 15                |
| Plausibility failure at lifting stage    | 41                |
| Plausibility failure at lowering stage   | 45                |
| <b>Front level sensor</b>                |                   |
| Break / short circuit on positive side   | 12                |
| Short circuit on ground side             | 16                |
| Plausibility failure at lifting stage    | 42                |
| Plausibility failure at lowering stage   | 46                |
| <b>Charge / discharge solenoid valve</b> |                   |
| Break / short circuit on positive side   | 20                |
| Short circuit on ground side             | 30                |
| <b>Front solenoid valve</b>              |                   |
| Break / short circuit on positive side   | 23                |
| Short circuit on ground side             | 33                |
| <b>Right rear solenoid valve</b>         |                   |
| Break / short circuit on positive side   | 22                |
| Short circuit on ground side             | 32                |
| <b>Left rear solenoid valve</b>          |                   |
| Break / short circuit on positive side   | 21                |
| Short circuit on ground side             | 31                |



**Blink code table for ECAS control unit  
"6 X 2 WITH PNEUMATIC LIFTING SYSTEM"**

| Fault   | Fault code |
|---|------------|
| <b>Control unit</b>   |            |
| ROM   | 01         |
| Distance sensor calibration data  | 02         |
| Parameter   | 03         |
| Pressure sensor calibration data  | 07         |
| WABCO data  | 08         |
| Distance sensor evaluation circuit for value standardisation            | 09         |
| Specific WABCO data   | 80         |
| RAM cell defective  | 04         |
| Interior valve relay or break on pin 1                                  | 06         |
| Speed signal (break or short circuit on positive side)                  | 81         |
| <b>Sensor error: break/short circuit on positive side</b>               |            |
| RH rear axle distance sensor (pin 8)                                    | 10         |
| LH rear axle distance sensor (pin 25)                                   | 11         |
| Front axle distance sensor (pin 26)                                     | 12         |
| <b>Sensor error: short circuit on positive side</b>                     |            |
| Lifting bellows pressure error (pin 24)                                 | 13         |
| Right rear axle pressure sensor (pin 23)                                | 14         |
| Left rear axle pressure sensor (pin 7)                                  | 15         |
| Right lifting axle pressure sensor (pin 5)                              | 16         |
| Left lifting axle pressure sensor (pin 6)                               | 17         |
| <b>Sensor error: short circuit on grounding side</b>                    |            |
| RH rear axle distance sensor (pin 8)                                    | 20         |
| LH rear axle distance sensor (pin 25)                                   | 21         |
| Front axle distance sensor (pin 26)                                     | 22         |
| <b>Sensor error: break/short circuit on grounding side</b>              |            |
| Lifting bellows pressure error (pin 24)                                 | 23         |
| Right rear axle pressure sensor (pin 23)                                | 24         |
| Left rear axle pressure sensor (pin 7)                                  | 25         |
| Right lifting axle pressure sensor (pin 5)                              | 26         |
| Left lifting axle pressure sensor (pin 6)                               | 27         |
| <b>Valve error: break/short circuit on positive side</b>                |            |
| Central 3/2 solenoid valve (pin 15)                                     | 30         |
| Left rear axle solenoid valve (pin 13)                                  | 31         |
| Right rear axle solenoid valve (pin 31)                                 | 32         |
| Left lifting axle solenoid valve (pin 12)                               | 33         |
| Right lifting axle solenoid valve (pin 30)                              | 34         |
| Front axle solenoid valve (pin 11)                                      | 36         |
| Lifting bellows solenoid valve/ lifting cyl. relay hydr. valve (pin 14) | 37         |
| Hydraulic pump relay (pin 32)   | 38         |
| <b>Valve error: break/short circuit on</b>                              |            |
| Central 3/2 solenoid valve (pin 15)                                     | 40         |
| Left rear axle solenoid valve (pin 13)                                  | 41         |
| Right rear axle solenoid valve (pin 31)                                 | 42         |
| Left lifting axle solenoid valve (pin 12)                               | 43         |
| Right lifting axle solenoid valve (pin 30)                              | 44         |
| Front axle solenoid valve (pin 11)                                      | 46         |
| Lifting bellows solenoid valve/ lifting cyl. relay hydr. valve (pin 14) | 47         |
| Hydraulic pump relay (pin 32)   | 48         |
| <b>Acceptability warning during lifting/charging</b>                    |            |
| RH rear axle distance sensor (pin 8)                                    | 50         |
| LH rear axle distance sensor (pin 25)                                   | 51         |
| Front axle distance sensor (pin 26)                                     | 52         |
| Lifting bellows pressure sensor (pin 24)                                | 53         |
| Right lifting axle pressure sensor (pin 5)                              | 56         |
| Left lifting axle pressure sensor (pin 6)                               | 57         |

| Fault  | Fault code |
|--|------------|
| <b>Acceptability warning during lowering/discharge</b> |            |
| RH rear axle distance sensor (pin 8)                   | 60         |
| LH rear axle distance sensor (pin 25)                  | 61         |
| Front axle distance sensor (pin 26)                    | 62         |
| Lifting bellows pressure sensor (pin 24)               | 63         |
| Right rear axle pressure sensor (pin 23)               | 64         |
| Left rear axle pressure sensor (pin 7)                 | 65         |
| Right lifting axle pressure sensor (pin 5)             | 66         |
| Left lifting axle pressure sensor (pin 6)              | 67         |

## IMMOBILIZER

To increase protection against theft, vehicles have been equipped with an electronic system that blocks the engine, called **"Immobilizer"**, that is activated automatically when the ignition key is taken out. The keys are actually equipped with an electronic device called **"Transponder"** that transmits a coded signal to a specific electronic control unit **"ICU"** that will allow the engine to be started only if it recognizes the code sent.

### General characteristics

#### System components

The system can be summarized as comprising the following main components:

- Immobilizer control unit (ICU)
- Steering lock + no. 2 keys with the "Transponder" electronic device (non separable)
- Antenna (on the ignition switch)
- Fuel flow actuator (ACT) EDC type
- Code\_card (specific card with electronic PIN code and mechanical code)

#### Installation.

In order to function correctly, the system requires an installation process that comprises the following stages:

- Key learning
- Actuator learning

At the end of installation, Immobilizer's control unit will be able to recognize any tampering by recognizing the components that are univocally connected to it (non separable).

#### How it works.

With the key in the "on" position the Transponder contained in the key generates a code that is received by the Immobilizer control unit through the antenna.

The control unit sends a request to the actuator for a validation process communicating the code received.

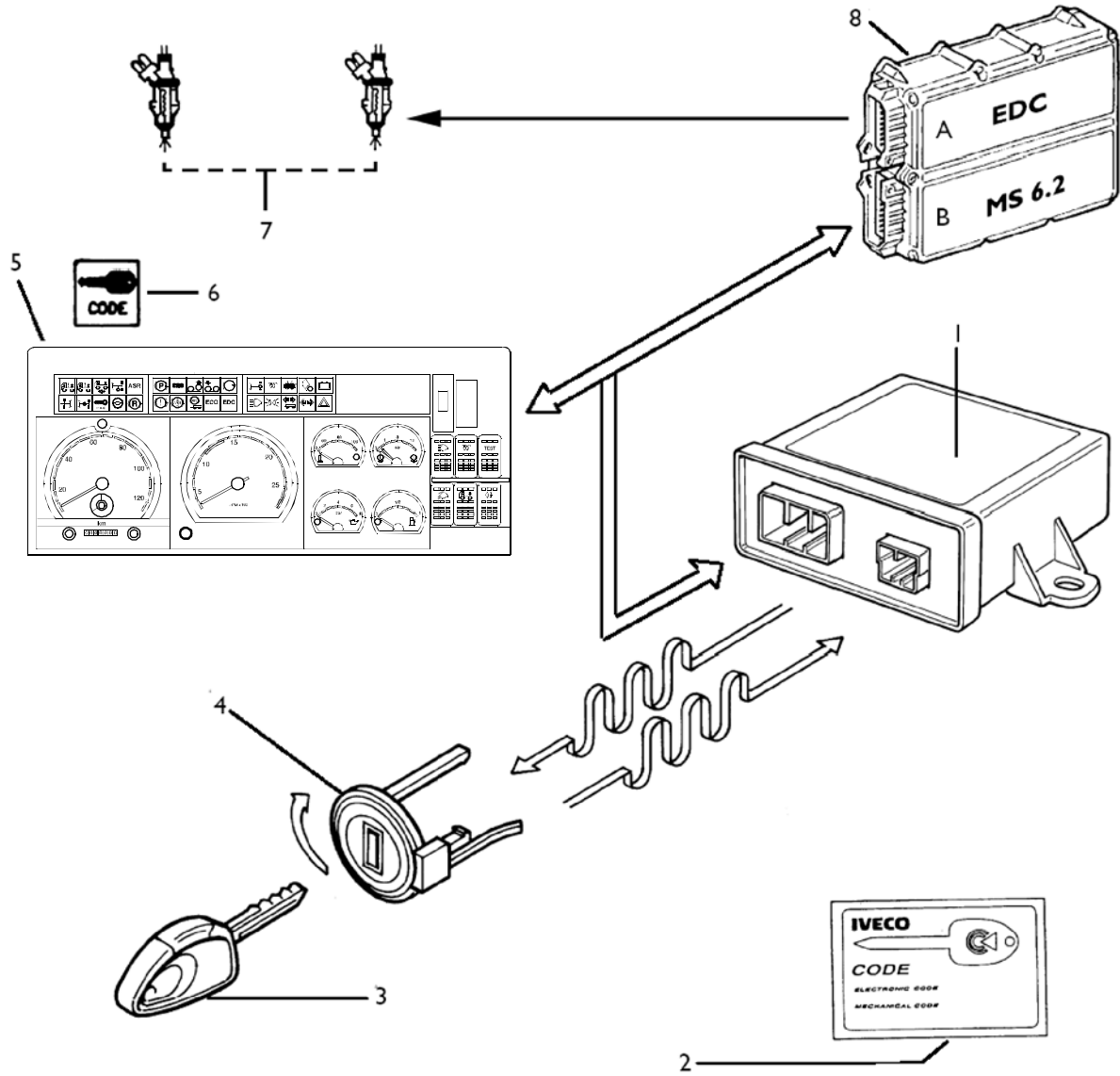
The actuator decodes the code and compares it to data memorized during the installation process.

If the comparison is correct, the actuator sends the control unit a request to enable the fuel flow.

The control unit processes the request and if everything is in order sends the command to release fuel to the actuator.

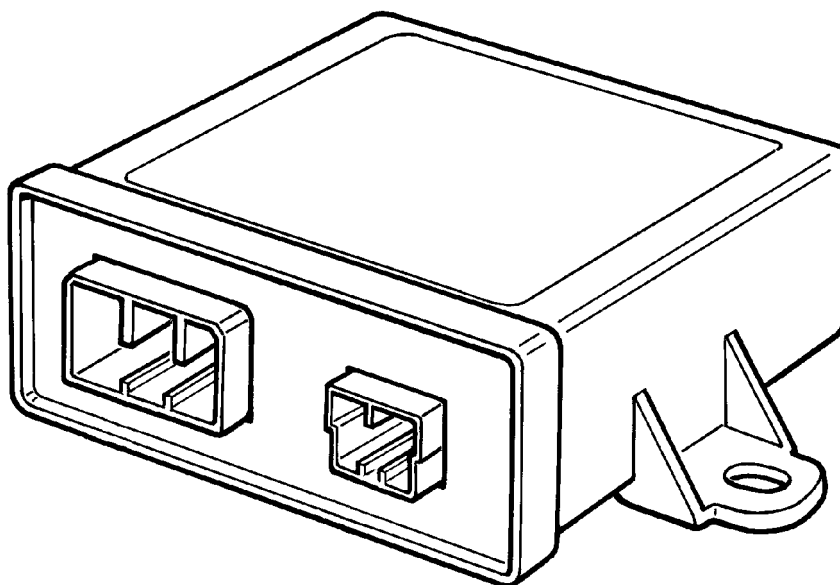
The vehicle can now be started.

**Components**



**KEYS**

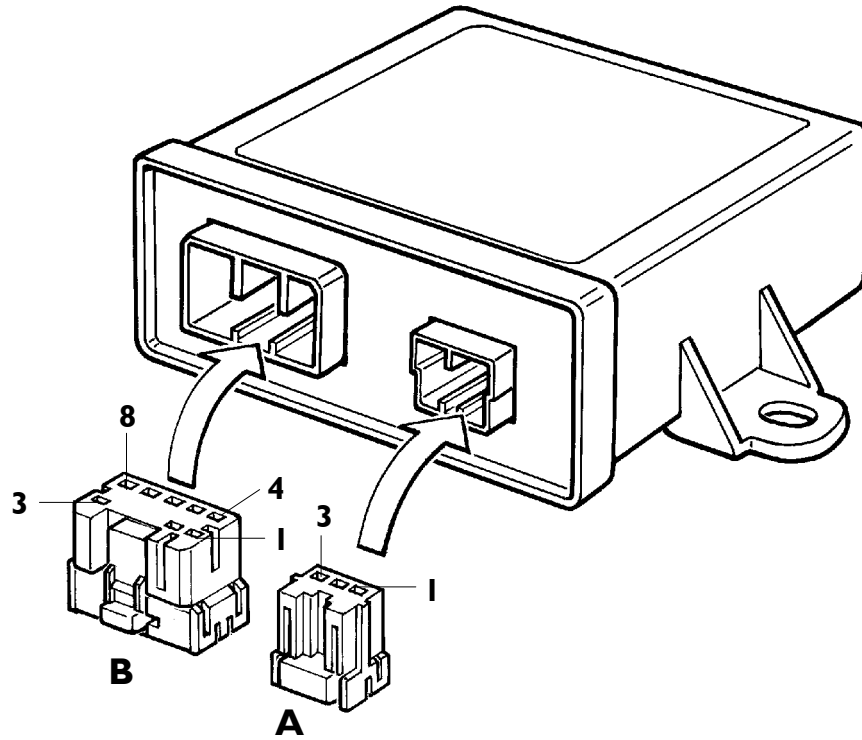
1. "Immobilizer" control unit - 2. Code Card - 3. Electronic key - 4. Antenna - 5. Instrument panel - 6. Immobilizer failure warning light - 7. Electric injectors - 8. EDC 6.2 control unit

**"Immobilizer" electronic control unit**

The main functions of the control unit are:

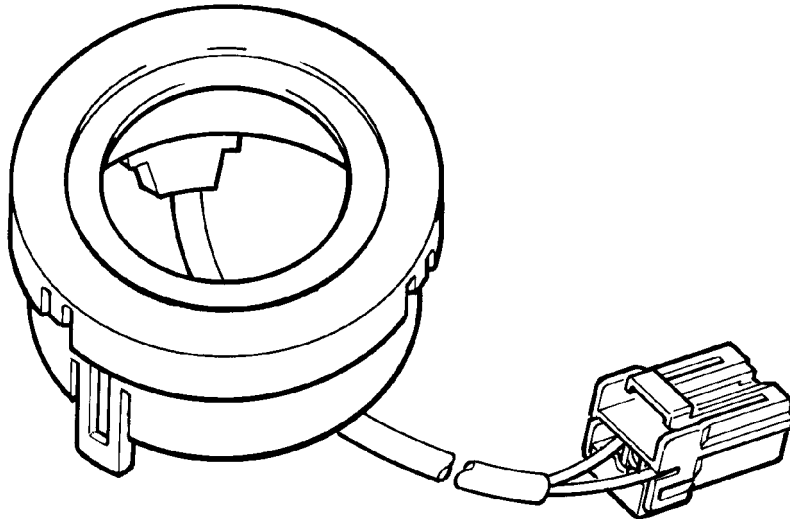
- to recognize the introduction and rotation of the key in the switch;
- to activate and read the secret code emitted by the "Transponder";
- to manage and control the processing of the codes;
- to communicate with the "EDC" control unit;
- to memorize any failures;
- to diagnose the system.

**Immobilizer electronic control unit**



| Ref.                                      | Description   |
|---|---|
| A<br>1<br>2<br>3                          | Antenna<br>Antenna<br>-   |
| B<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8 | CAN_L line for EDC control unit (Pin 1)<br>K line for 30 pin diagnosis connector (pin 12)<br>Negative for Immobilizer failure warning indicator<br>CAN_H line for EDC control unit (Pin 12)<br>-<br>Earth<br>Positive lead for power supply when key is in "on" position (+15)<br>- |

## Antenna



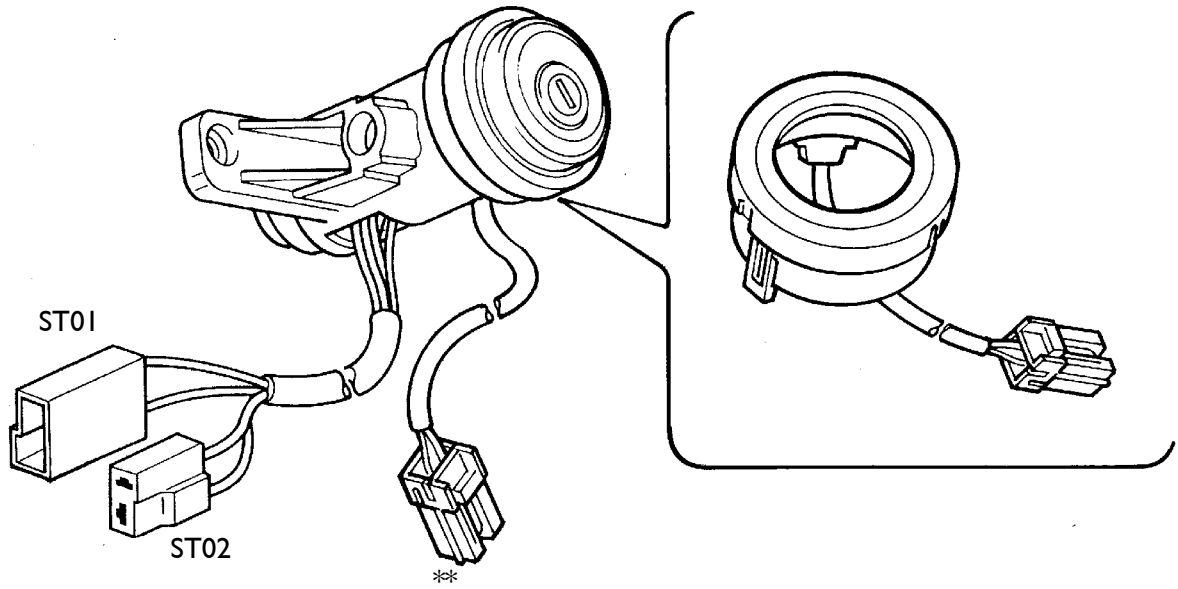
The antenna is assembled coaxially to the key switch.

Its function is to:

- Provide energy to the "Transponder" of the key to send the secret code
- Receive the signal from the "Transponder" and send it to the control unit

The antenna is connected to the control unit at PINs A1-A2

**Key switch**



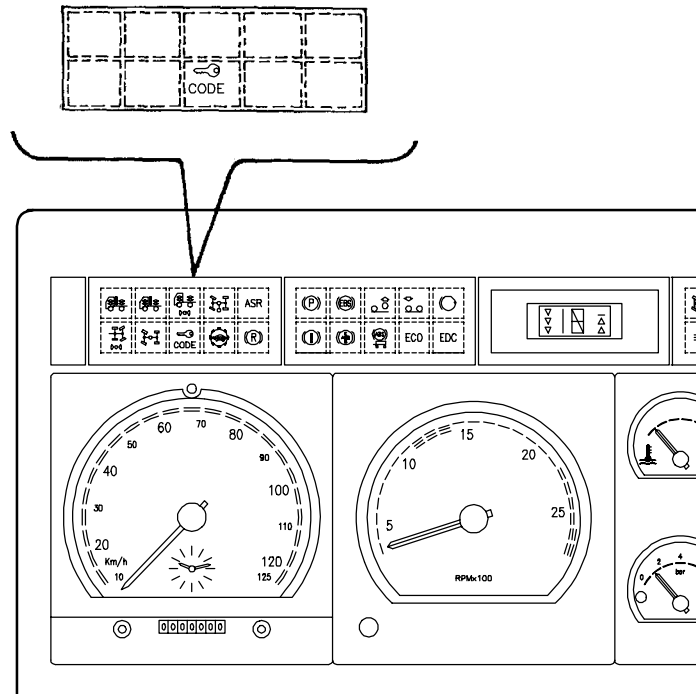
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PERSPECTIVE VIEW OF KEY SWITCH

| Ref.                        | Description  |
|-----------------------------|--|
| <b>ST01</b><br>9907<br>8802 | Ignition<br>Relay excitation for services with contact key |
| <b>ST02</b><br>8850<br>7777 | Exclusion relay used during starting<br>Supply (+30)       |
| **                          | Immobilizer antenna  |



## Optical failure indicator

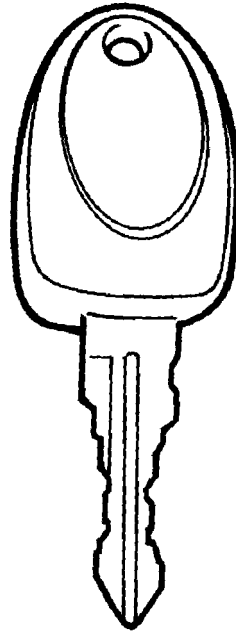


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Located on the vehicle dashboard it informs the driver that the system is functioning correctly, or of any possible failures.

By inserting the ignition key in the "on" position, the control unit carries out a system test and the light comes on for approximately **"4 seconds"**.

If after said time it goes off, this means that the key has been recognized and the system is functioning correctly, and any other behavior indicates possible system failures.

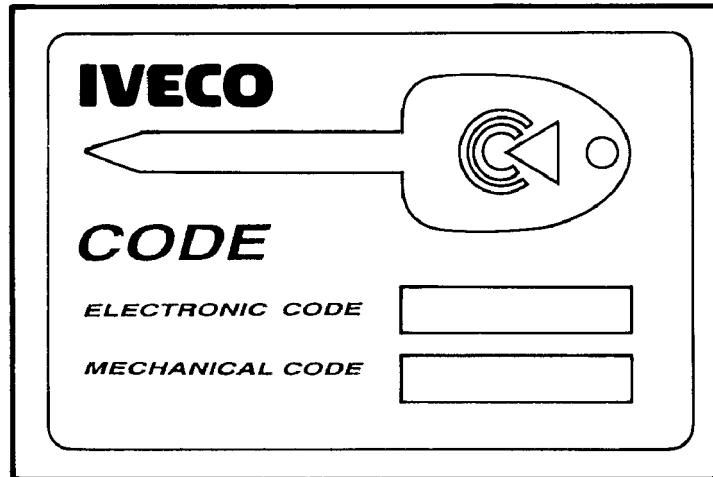
**Electronic keys (no.2)**

The handle of the key contains an electronic device called a **"Transponder"** that is **NOT** powered by any battery, this device contains and transmits the secret code.

By inserting the key, the **"Transponder"** is activated and therefore energized by the radio waves emitted by the antenna (assembled on the lock of the key switch) and automatically replies by emitting the secret code. If the two codes match, the control unit enables the vehicle to be started, if they don't match it blocks the flow of fuel and therefore the vehicle cannot be started.

- Two keys are supplied.
- Each key contains a "Transponder" with the relative secret code.
- It is **VERY IMPORTANT** to follow the correct procedure for key learning.

The "Transponders" in the keys cannot be removed.  
There is no master key.

**Code Card**

A card that shows two types of code:

- Electronic code
- Mechanical code

**Electronic code**

This code is essential to start the engine in an emergency situation (key is not recognized, or control unit is not functioning).

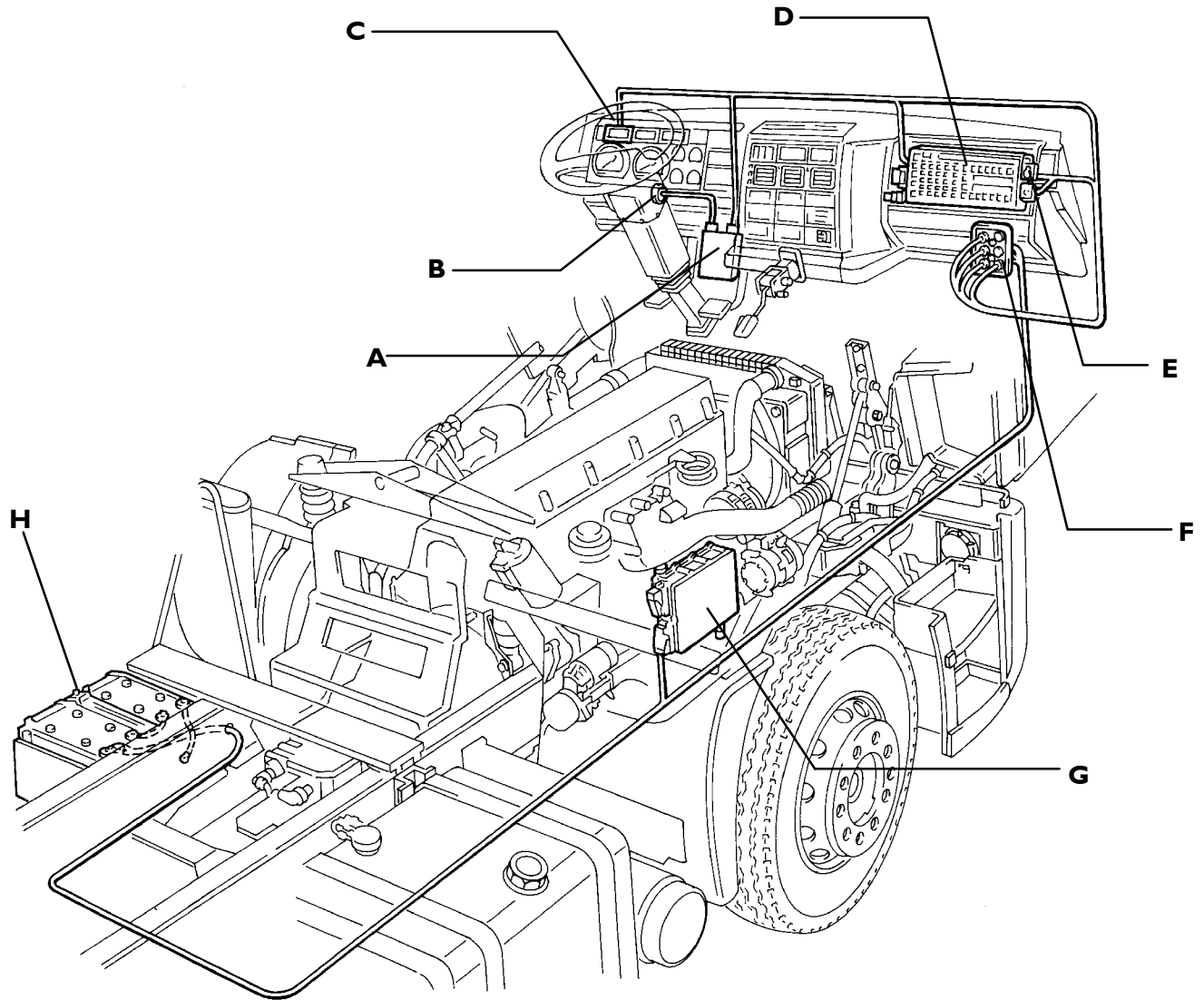
The code can be inserted by depressing the accelerator pedal.

**Mechanical code**

This code is necessary in the event of a request for a duplicate key (mechanical part).

Keep the Code card in a safe easily accessible place

**Location of components - passage of cables**



49526

| Ref. | Description                  |
|------|------------------------------|
| A    | Immobilizer control unit     |
| B    | Antenna on key switch        |
| C    | Failure indicator- diagnosis |
| D    | UCI                          |
| E    | Diagnosis connector          |
| F    | Front housing                |
| G    | EDC control unit             |
| H    | Power supply batteries       |

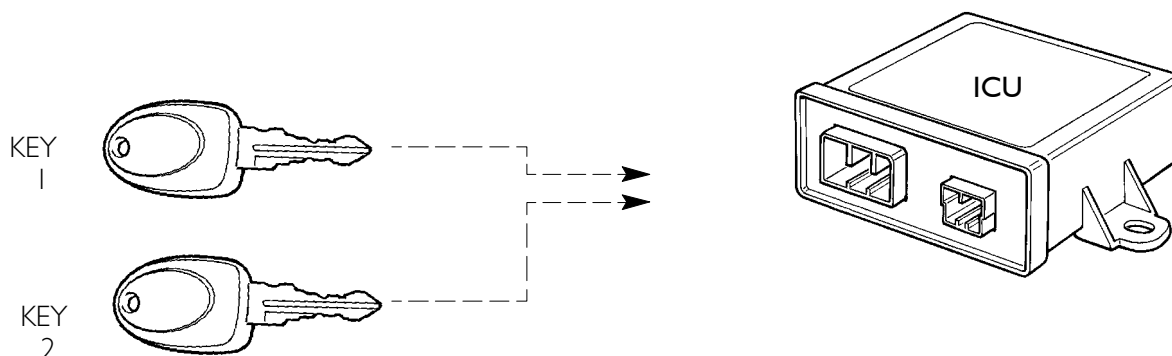
**Emergency procedure (starting)**

If the vehicle does not start because the key is not recognized, or the immobilizer control unit is broken, etc. a **specific** starting procedure needs to be followed.

It is essential to insert the **"Electronic code"**, shown on the **"Code Card"**, **ONLY** by depressing on the accelerator pedal as described below:

9. Insert the key in the ignition and turn to the "on" position
10. The EDC indicator will start to flash rapidly after approx. 2 seconds.
11. Depress the accelerator pedal and keep it depressed for around approx. 10 seconds.
12. The EDC indicator will begin to flash slowly, release the pedal.
13. When the number of flashes corresponds to the first number of the **"Electronic code"**, depress the accelerator pedal right down to the floor and then release it. (During this depression, the EDC indicator should remain off).
14. Continue in this way with the accelerator pedal for the remaining four numbers of the **"Electronic code"**.
15. At the end of the sequence, if the code introduced is correct, and there are no failures in the system, the EDC indicator will stop flashing. This means that the operation has been concluded correctly.
16. Start the vehicle.

## Key memorization



In the event that the key is lost or for its replacement, a specific procedure must be followed using **only the specific diagnostic devices**.

This procedure can only be carried out with the assistance of the Modus, IWT

The key memorization procedure can be carried out even if the EDC control unit is not connected.

- The keys have already undergone a learning procedure, and therefore belong to that ICU.
- It is possible to "teach" new and old keys.
- In each case the keys used (enabled on ignition) can never be more than three in number and can only be those used during the last learning process.
- A key that has been previously memorized but not inserted in the last learning process will not be able to start the vehicle.

The memorization procedure can only be carried out after having correctly inserted the **Electronic Code** shown on the Code Card supplied.

There are two different procedures, depending on the following situations:

- Replacement or addition of one or more keys.
- Installation of a new Immobilizer control unit.

The two procedures are described in the "Diagnosis" chapter.

### Problems during memorization of keys

In the event that the procedure fails, the indicator does not go out.

- 1) The same key has been inserted twice non-consecutively.
- 2) The key has not been turned to the stop position quickly enough.
- 3) More than three keys have been attempted to be memorized.
- 4) Learning process carried out with keys that are not part of the same kit (only in installation procedure).
- 5) Learning procedure carried out with keys that have already been used in other ICU.
- 6) Problems with learning procedure not being carried out correctly.

## Possible failures

On MH vehicles the immobilizer is installed as an OPT.

The system comprises:

- 1) Steering lock with keys
- 2) Antenna (on ignition switch)
- 3) Immobilizer control unit(ICU)
- 4) EDC actuator

Listed below are possible causes of failure, and the spare parts that can be supplied with a brief description of how to repair/replace the various components.

Possible failures:

- 1) Steering lock is broken
- 2) Broken door locks
- 3) Mechanical/electronic (transponder) breaking of a key
- 4) Immobilizer control unit is broken
- 5) E.D.C. control unit is broken.
- 6) Antenna is broken
- 7) Loss of code\_card

### 1) STEERING LOCK IS BROKEN/DAMAGED

**Parts to be ordered:** Kit comprising:

- steering lock with 2 keys with the word "PARTS" on the body
- set of 2 door locks
- handle for cab lock lifting pump (lock)
- 1 key (mechanical - for the door locks and the handle, with the same mechanical code as the steering lock),
- 2 adhesive labels with the new mechanical code of the set of keys (to stick on the old code\_card).

**Repair procedure:**

When the components have been replaced, proceed with the memorization of the new keys and stick the label on the Code Card supplied.

### 2) BROKEN DOOR LOCK OR BROKEN HANDLE FOR CAB LIFTING PUMP

**Parts to be ordered:** there are two options:

- 1) customers who wish to continue with the original conditions of the vehicle, i.e. to have **one single key**; should order the **kit referred to in p.to 1)** and follow the repair procedure indicated.
- 2) customers who would accept using two keys should order the **pre-prepared Spare Parts Kit** comprising:
  - handle for Cab lifting pump with assembled lock
  - set of 2 locks (for the doors)
  - set of 2 keys (mechanical for the 3 locks) and 2 mechanical code labels (which are valid but do not replace that on the Code card supplied).

In the event that the pump handle is broken, the customer may choose either solution 1) or 2).

## Possible failures

### 3) MECHANICAL BREAKING OF AN ELECTRONIC KEY OR ADDITION OF ONE

**Parts to be ordered:** New single key to be cut in accordance with old mechanical code (with the word "PARTS").

**Repair procedure:**

Once the key has been cut, the new key can then be memorized.

### 4) BREAKAGE OF IMMOBILIZER CONTROL UNIT (I.C.U.)

**Parts to be ordered:** New immobilizer control unit + Kit of 2 blank keys, new Code-card showing the new ELECTRONIC CODE.

**Repair procedure:**

Replace the control unit, following the instructions provided by the Modus diagnostic station (See "Diagnosis" chapter).

Once the immobilizer has been replaced, and appears to be functioning correctly, fill in the form for "Installation of new Immobilizer control unit" produced by the Modus and send it to the pre-printed address. (This guarantees registration of the new ELECTRONIC CODE in case of a request for a duplicate).

### 5) LOSS BREAKAGE OF EDC CONTROL UNIT

**Parts to be ordered:** New EDC control unit

### 6) Antenna is broken

**Parts to be ordered:** New antenna.

Replace.

### 7) Loss of the code-card

**Parts to be ordered:** New Code-Card.

**Repair procedure:**

The vehicle owner:

Should go to an authorized Dealer.

Bring with him the vehicle and keys still in his possession.

Demonstrate that the vehicle is his, by showing registration documents and identity card.

The dealer:

Through the use of the Modus station should select the procedure for a form requesting a duplicate Code Card. (See "Diagnosis" chapter)

**fill in all parts of the form and send it to the pre-printed address.**

Iveco Spare Parts:

Will issue a new Code Card and send it to the dealer who in turn will pass it on to the customer.



## Diagnosis

### Diagnosis tools

#### OPTICAL INDICATOR

First level diagnosis that consents coded display of some system faults and automatic diagnosis when the system is turned on.

#### IT 2000

Intermediate level diagnosis carried out using a portable tester equipped with a microprocessor. The tester must have a memory cassette inserted that corresponds to the system to be diagnosed. This device clearly provides all the information contained in the electronic control unit, enables components to be activated and allows system parameters to be read.

#### MODUS

High level diagnosis carried out by a computerized work station that allows a diagnosis to be carried out by following different operations proposed by the monitor.

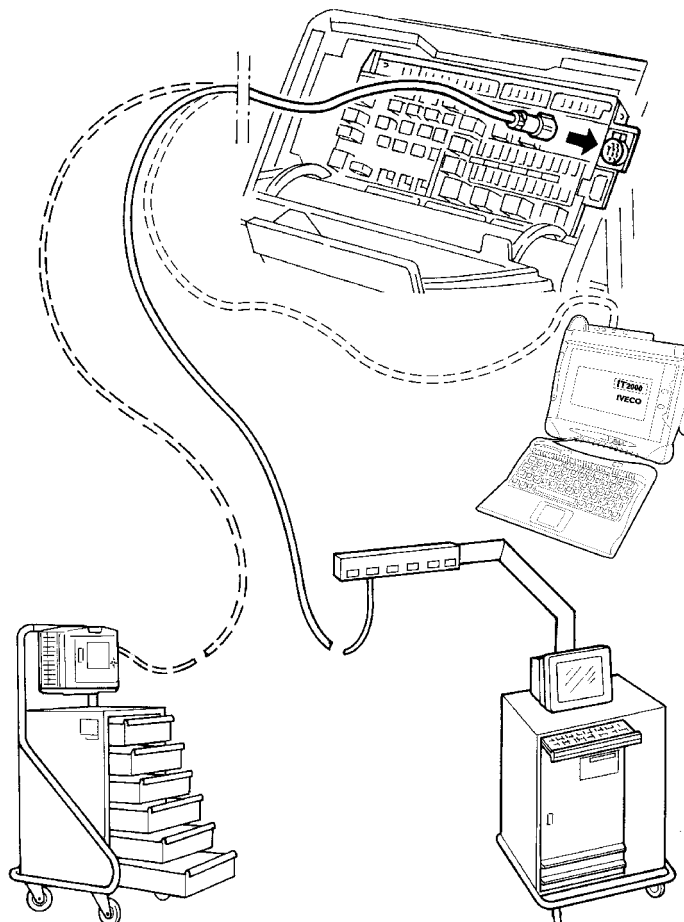
It is an open system that permits a real strategic intervention to be made.

It supports data processing functions; each operation carried out leaves a trace on the station and allows electronic control units to be programmed.

#### IWT

New generation portable device that integrates the MODUS.

Enables a powerful and complete identification of faults as it is able to carry out a wide range of measurements.



001068

Iveco instrumentation is able to provide the following diagnostic procedures:

| Diagnostic procedure  | Instruments |            |            |
|---|-------------|------------|------------|
|   | IWT         | MODUS      | IT         |
| Emergency starting  | <b>YES</b>  | <b>YES</b> | <b>YES</b> |
| Key teaching  | <b>YES</b>  | <b>YES</b> | NO         |
| Identification of control unit                                    | <b>YES</b>  | <b>YES</b> | <b>YES</b> |
| Recognition of failures   | <b>YES</b>  | <b>YES</b> | <b>YES</b> |
| Description of repair procedures                                  | <b>YES+</b> | <b>YES</b> | NO         |
| Pre-set commands for replacement of EDC/Immobilizer control units | <b>YES+</b> | <b>YES</b> | NO         |

**IWT** = IVECO wiring tester

**MODUS** = Maintenance and diagnostic system

**IT 2000**

**No** = Procedure does not exist

**YES** = Procedure does exist

**YES+** = Procedure with enhanced features (allows user to have information, measurements, selection, communication with edc/Immobilizer is easily accessible)

### System self-diagnosis

After the initial test, depending on the behavior of the "code" indicator, the system is able to inform the operator of possible system faults, namely:

- Indicator "**flashes continuously**" with a frequency of "**0.3sec. ON**" and "**3 sec. OFF**" indicates that there is a fault or that the emergency starting procedure has not been carried out correctly;
- Indicator "**flashes continuously**" with a frequency of "**0.3 sec. ON**" and "**0,3 sec. OFF**" means that no key learning procedure has been carried out.
- Indicator "**always on**" means that the key learning procedure has not been carried out correctly.
- **For preliminary information**, any faults can be display on the indicator unit on the dashboard by activating the Blink code.
- **For a more detailed and complete** diagnosis the diagnostic tools that are used by the customer service network, such as MODUS must be utilized.

### Diagnosis through BLINK CODE

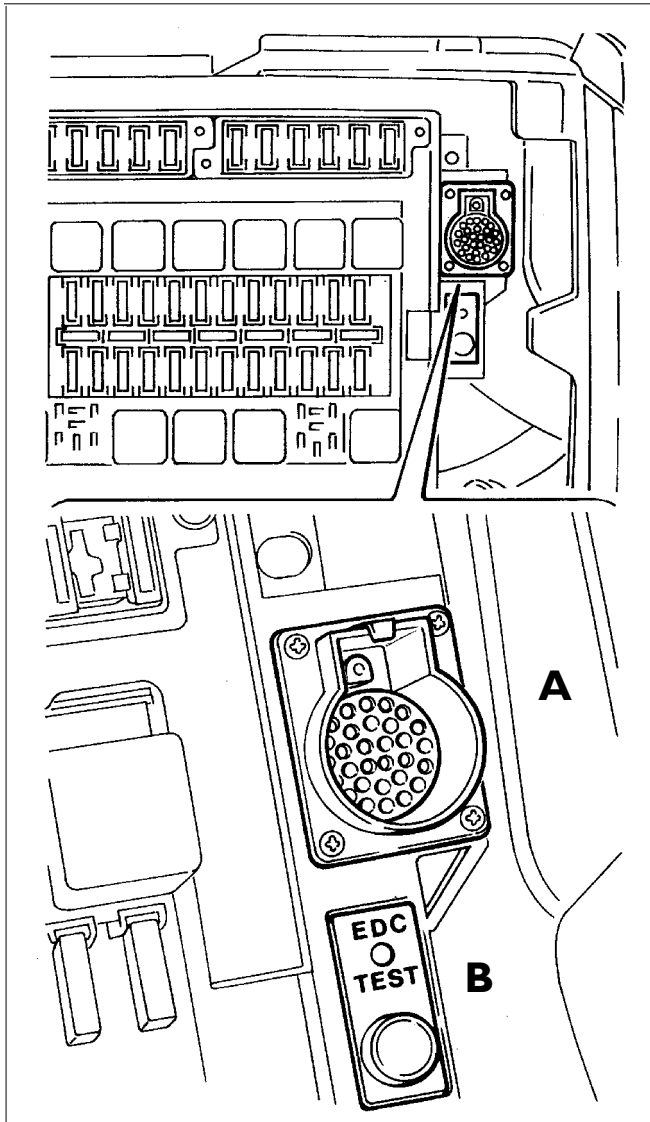
To activate the Blink code, with the key in the "on" position, put the K line to earth for at least two seconds so that the first fault can be displayed.

Repeat this operation (K line to earth) to display any other faults.

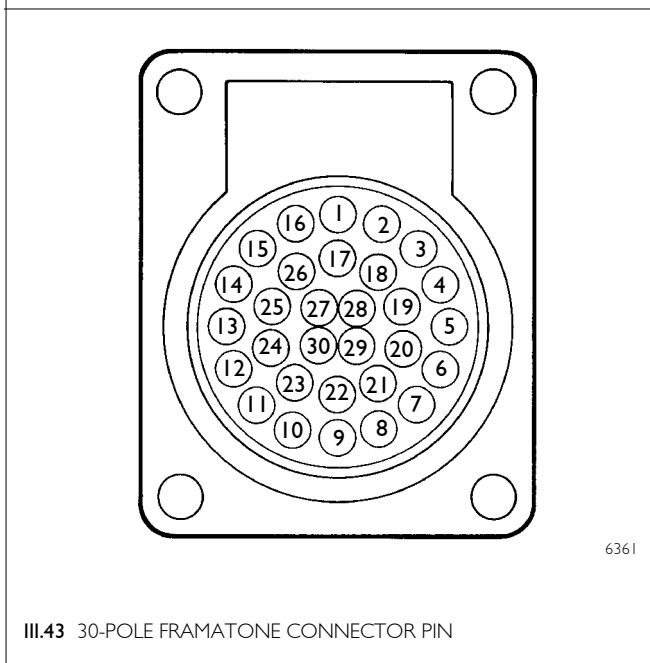
| Number of flashes | TYPE OF FAULT   |
|-------------------|---|
| 1                 | The "EDC" control unit is not connected or not configured                           |
| 2                 | The "EDC" control unit is not enabled   |
| 2                 | The "EDC" control unit is not communicating during installation                     |
| 3                 | The "EDC" control unit has not been installed                                       |
| 4                 | Short circuit/disturbances on the communication line between control unit and "EDC" |
| 5                 | Code key not recognized   |
| 6                 | Key with code not detected  |
| 7                 | Antenna not connected   |
| 8                 | Internal fault in control unit  |
| 9                 | Short circuit on alarm cut off line   |
| -                 | "Code" indicator short circuit  |
| -                 | "Code" indicator open circuit   |



**If after accurate diagnosis it is necessary to replace one or more components, proceed as described below**



III.42 A. CONNECTOR FOR ELECTRONIC SYSTEMS DIAGNOSIS  
 B. PUSHBUTTON FOR EDC TEST (BLINK-CODE) -



III.43 30-POLE FRAMATONE CONNECTOR PIN

**Diagnosis connector**

The U.C.I control unit contains a 30-pin diagnosis connector for the diagnosis of the electrical system.

| 30-pole framatone connector pin |     |        |                   |
|---------------------------------|-----|--------|-------------------|
| System                          | Pin | Func.  | Cable Colour code |
| EDC                             | 1   | L      | 1198              |
|                                 | 2   | K      | 2298              |
| ABS - ASR - EBS                 | 3   | L      | 1199              |
|                                 | 4   | K      | 2299              |
| Retarder                        | 5   | L      | 1193              |
|                                 | 6   | K      | 2293              |
| SIB                             | 7   | L      |                   |
|                                 | 8   | K      |                   |
| Eberspaecher / Wabco            | 9   | L      | 1195              |
|                                 | 10  | K      | 2295              |
| Aux. units ON key on "start"    | 11  | KL 15  | 8802              |
| Immobilizer                     | 12  | K      | 2292              |
|                                 | 13  | L      | 1196              |
| Clim. VALEO                     | 14  | K      | 2296              |
|                                 | 15  | L      | 1194              |
| ECAS suspension                 | 16  | K      | 2294              |
|                                 | 17  | L      | 1197              |
| EUROTRONIC / ALLISON            | 18  | K      | 2297              |
|                                 | 19  | Enable | 7079              |
| EOL INTARDER/EDC M7             | 20  | Enable | 3397              |
| CAN H                           | 21  | H      | 2222              |
| CAN L                           | 22  | L      | 8888              |
| Motor phase signal              | 23  | Fase   | 5198              |
| Screen                          | 24  | Molla  |                   |
| Engine starting signal          | 25  |        | 8050              |
| Engine starting signal          | 26  |        | 8892              |
| Positive                        | 27  | + 30   | 7797              |
| Engine rpm                      | 28  | n      | 5584              |
| Vehicle speed                   | 29  | (B7)   | 8840              |
| Vehicle earth                   | 30  | 31     | 0050              |

The instrument diagnosis is carried out with:

- MODUS
- IWT
- IT 2000

Attain to the following screens.



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| ● = For truck only   |      |

Keys

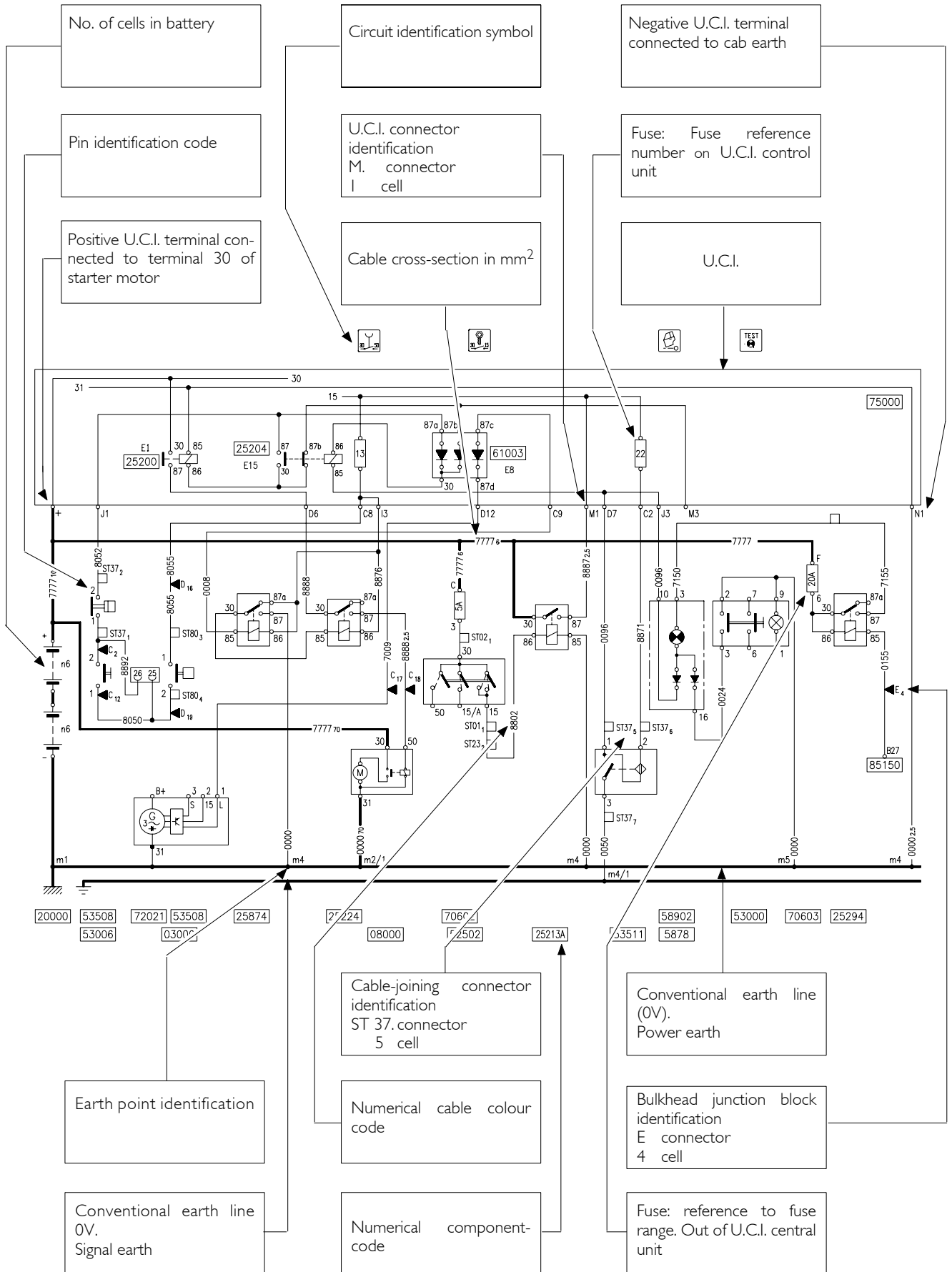
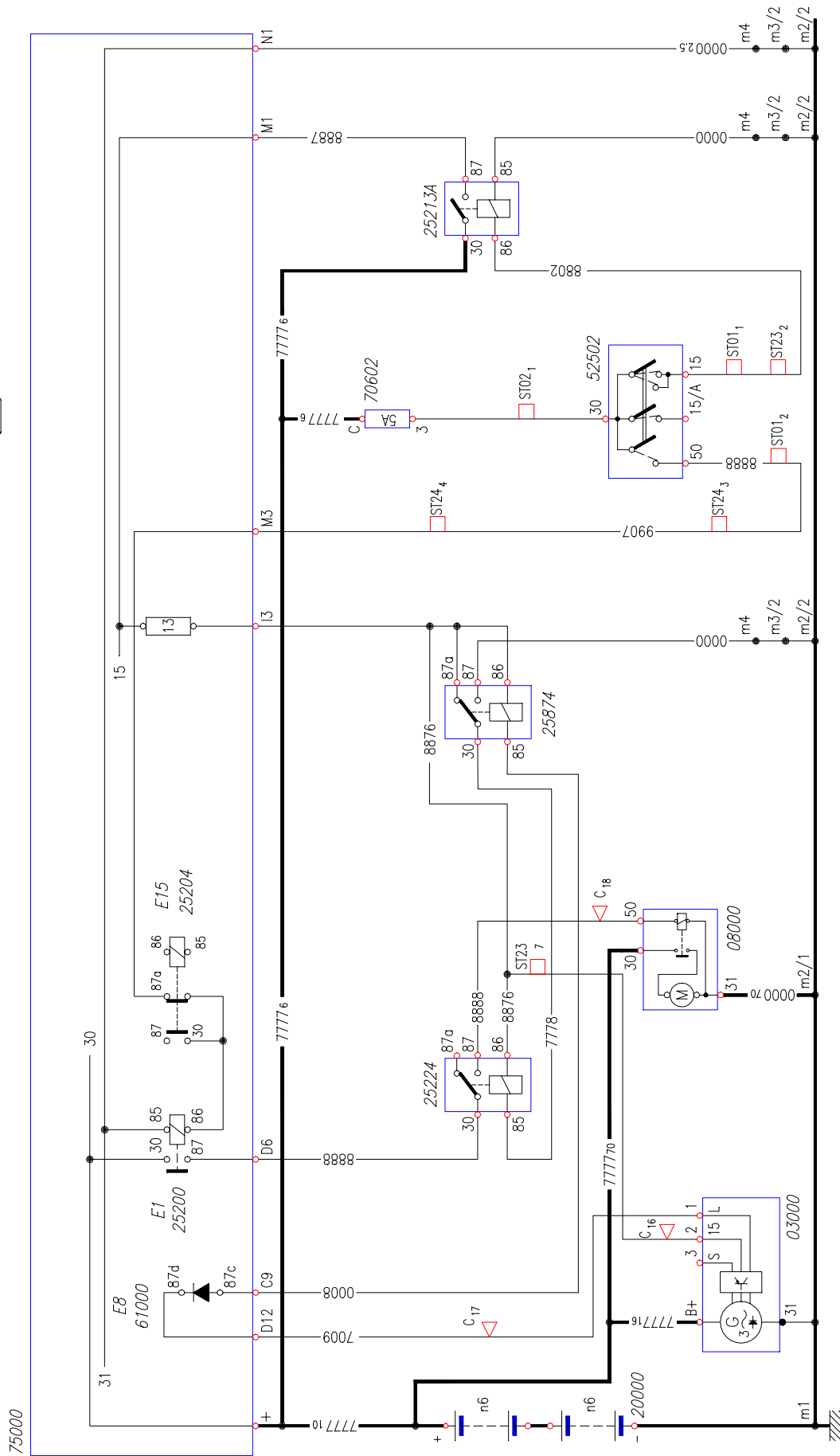




Chart No. 1 : Start up from driver's seat



### Chart No. 2: Start up from engine compartment

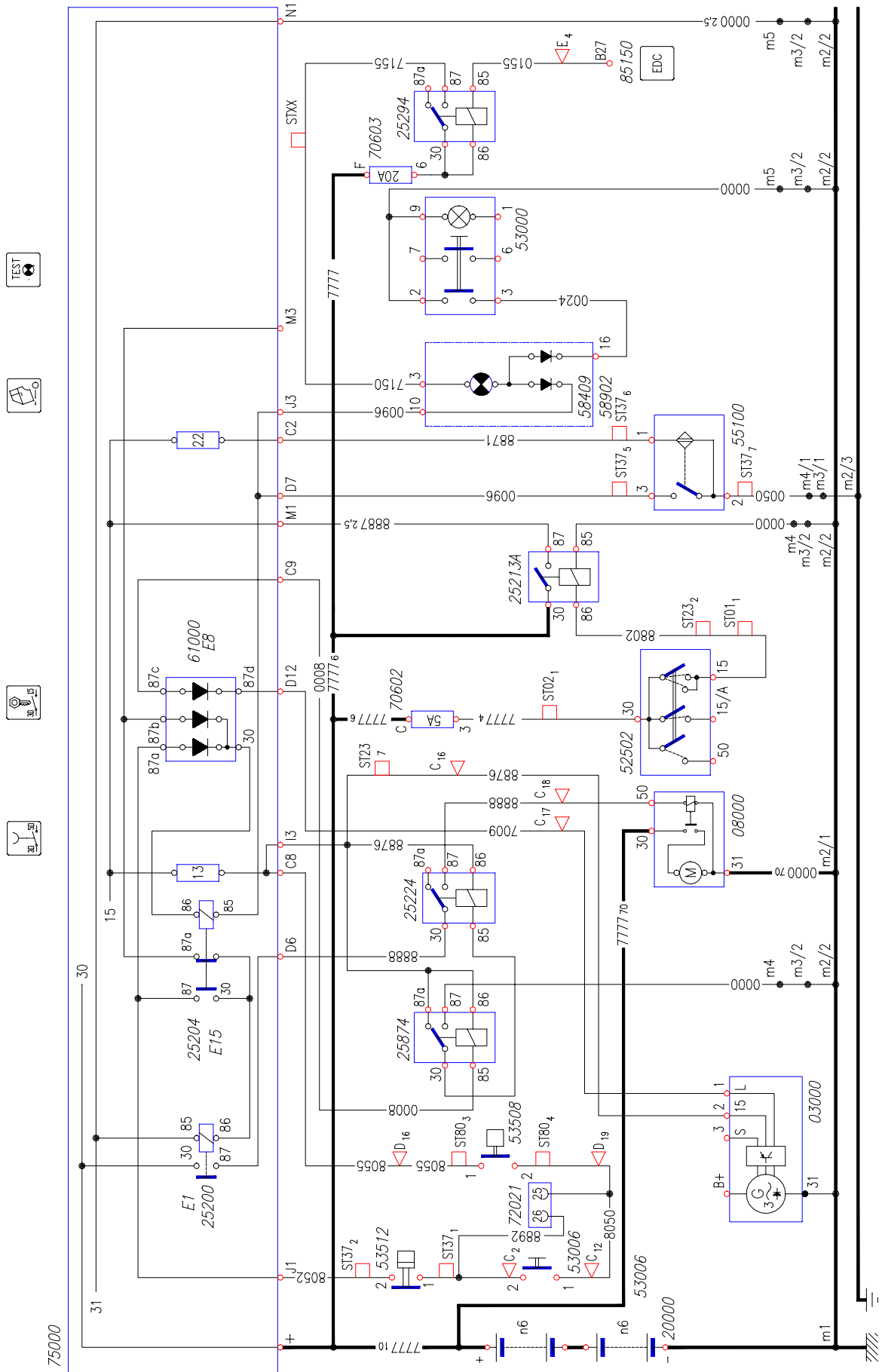
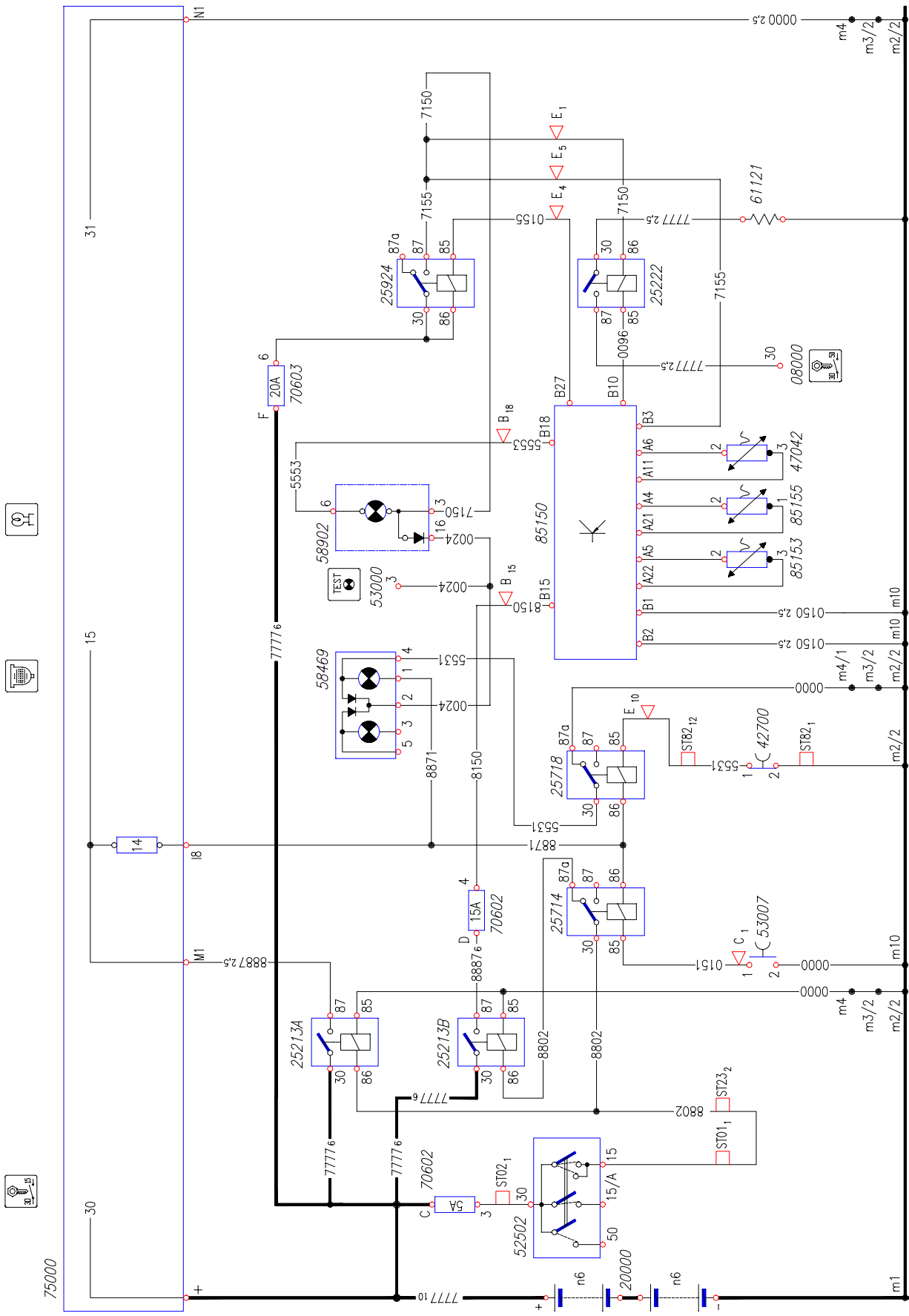


Chart No. 3: Pre-heating



### Chart No. 4: Recharge

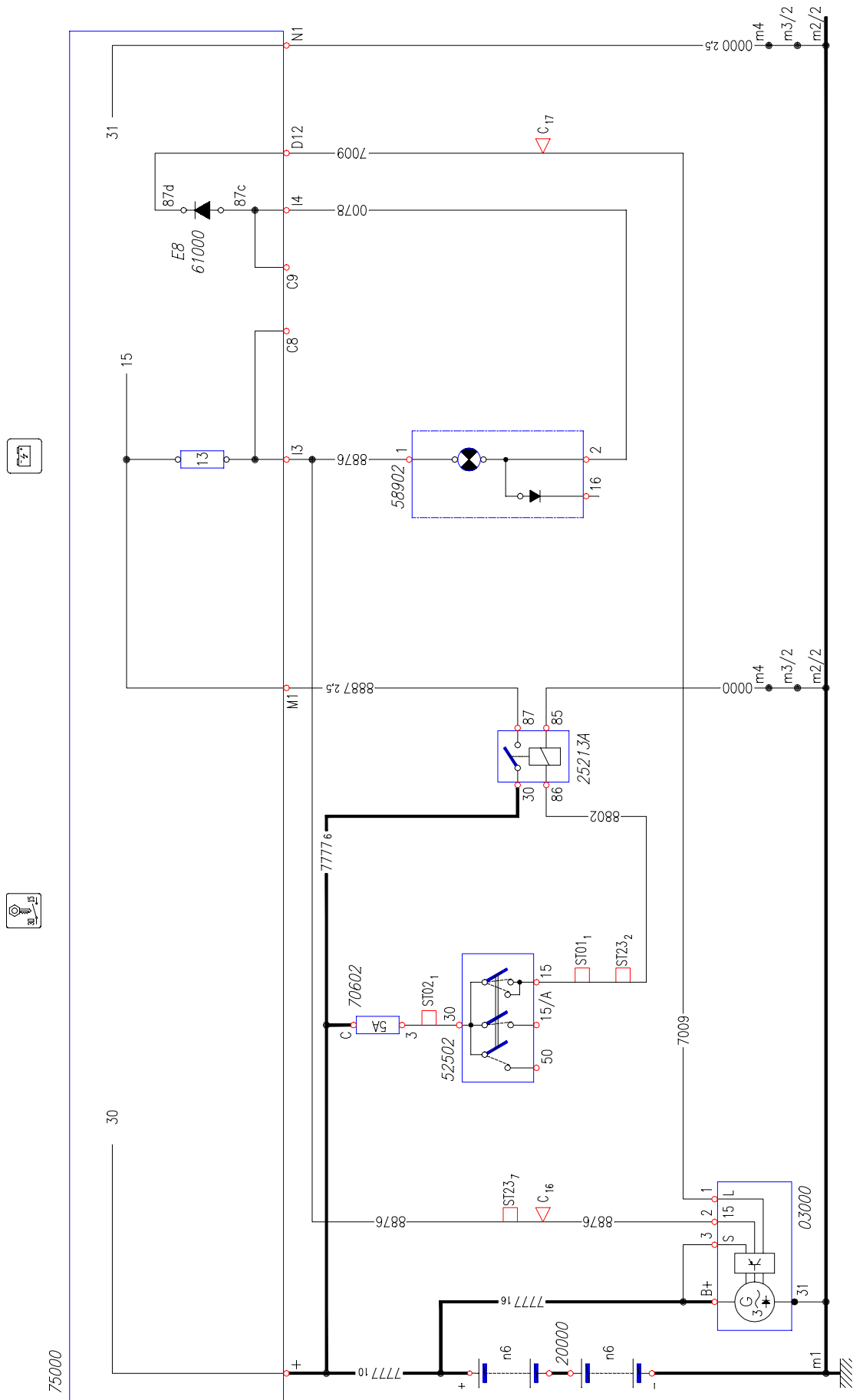
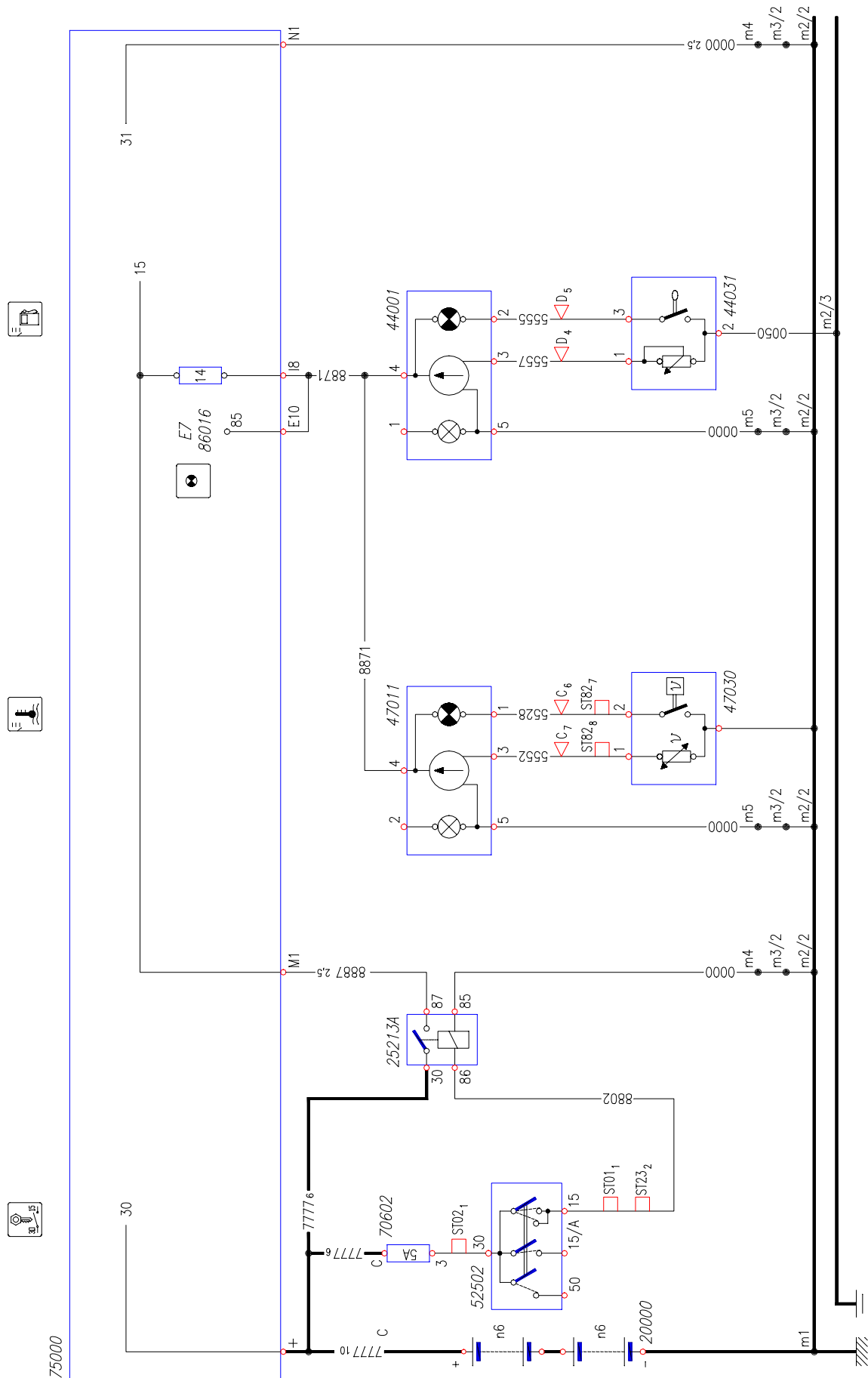
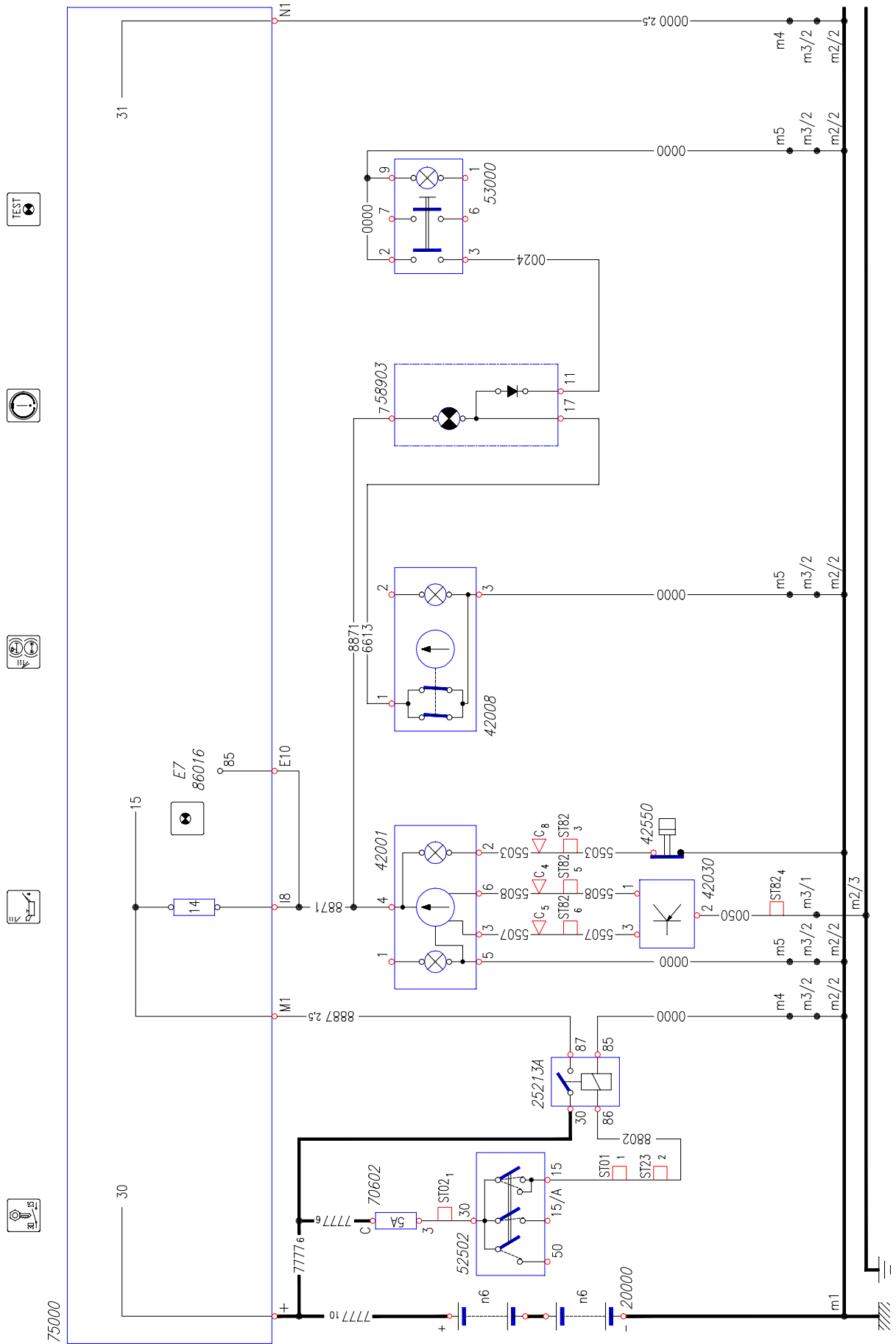


Chart No. 5: Instruments (fuel level - water temperature)



### Chart No. 6: Instruments (engine oil and brake air pressure)



### Chart No. 7a: Instruments (tachograph – rev counter) F2B (on)

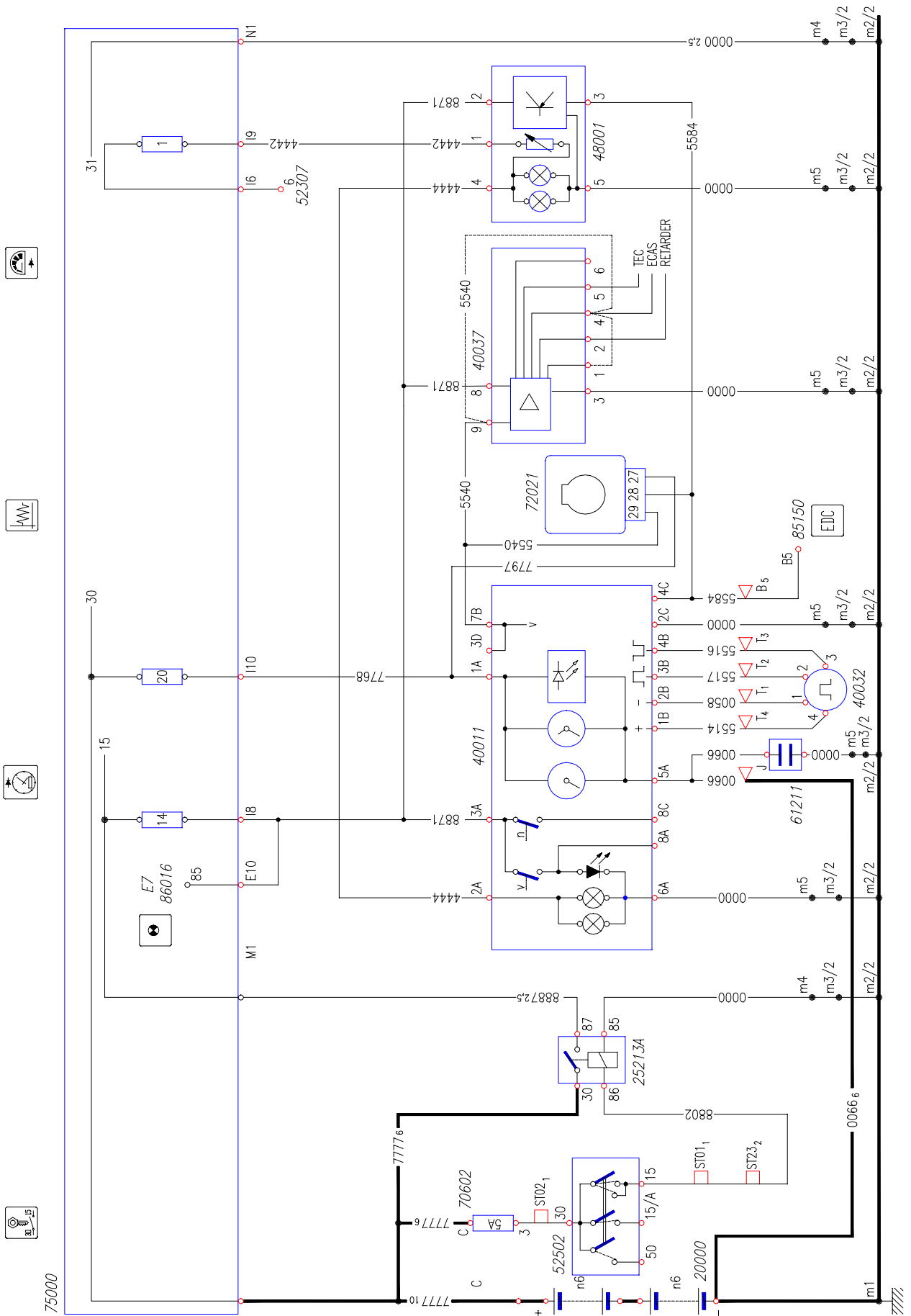
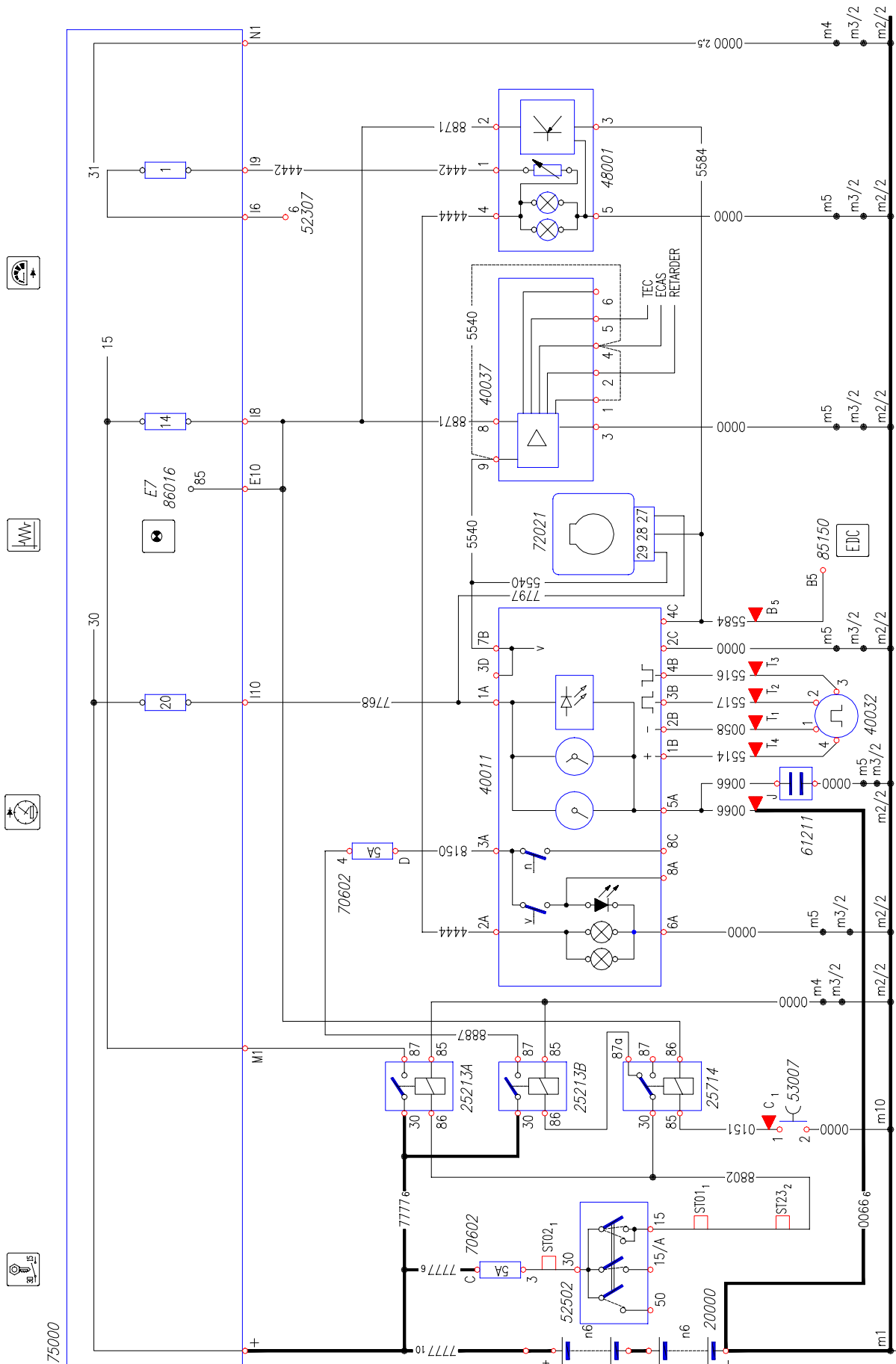


Chart No. 7b: Instruments (tachograph – rev counter) F3A/F3B (on) - F2B/F3B (off)





**Chart No. 8a: Warning lights (iveco control)**

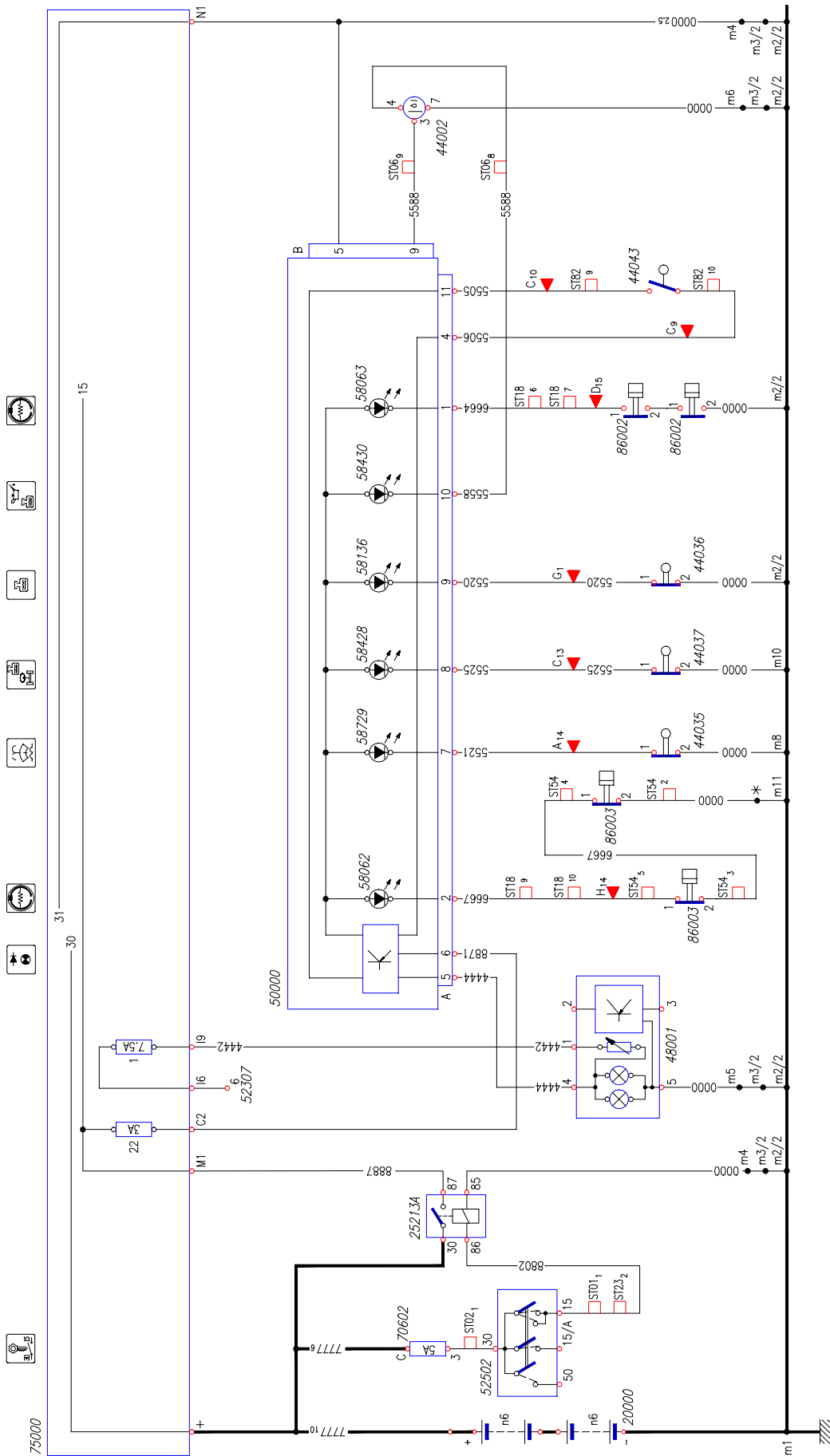
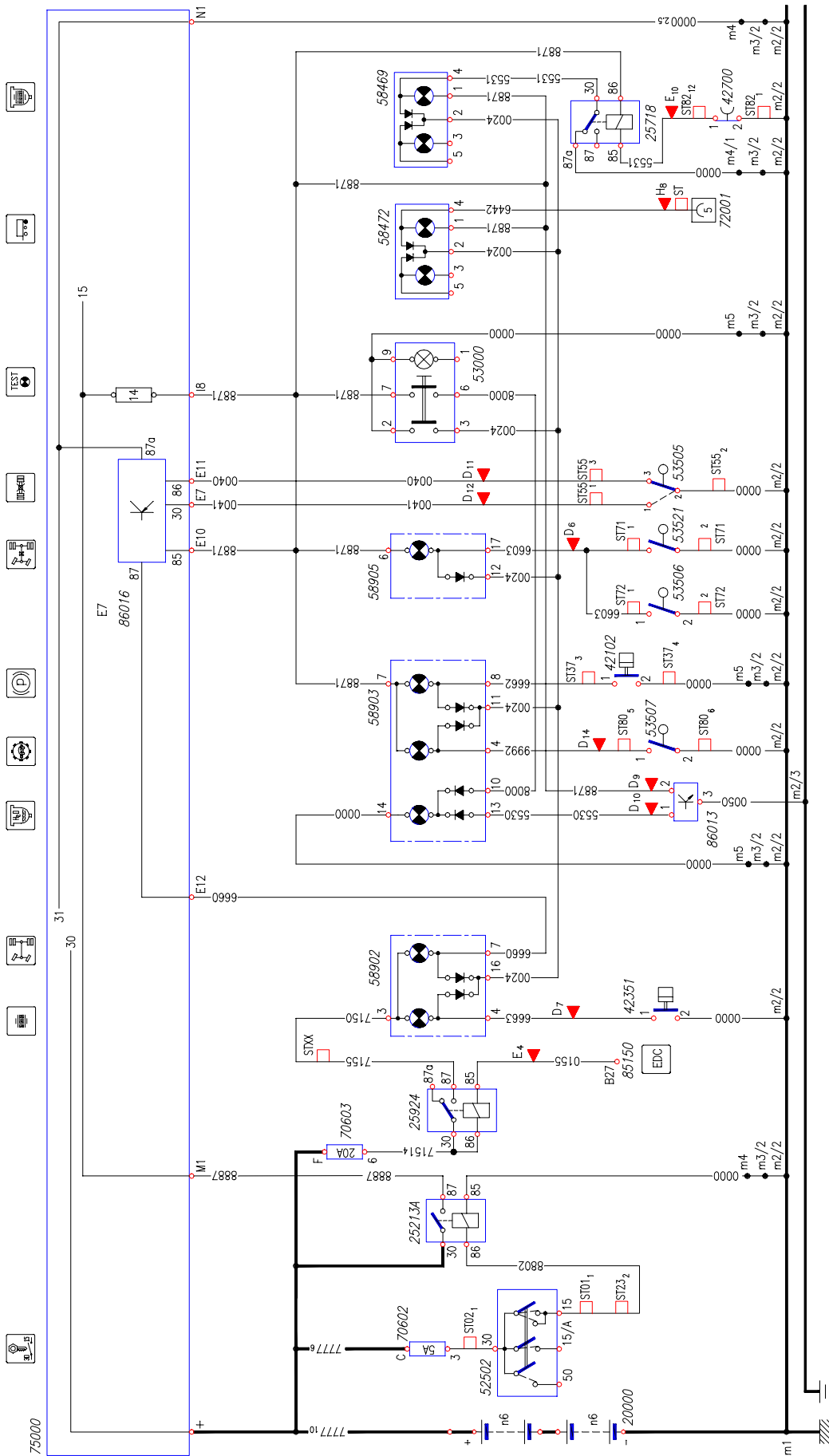
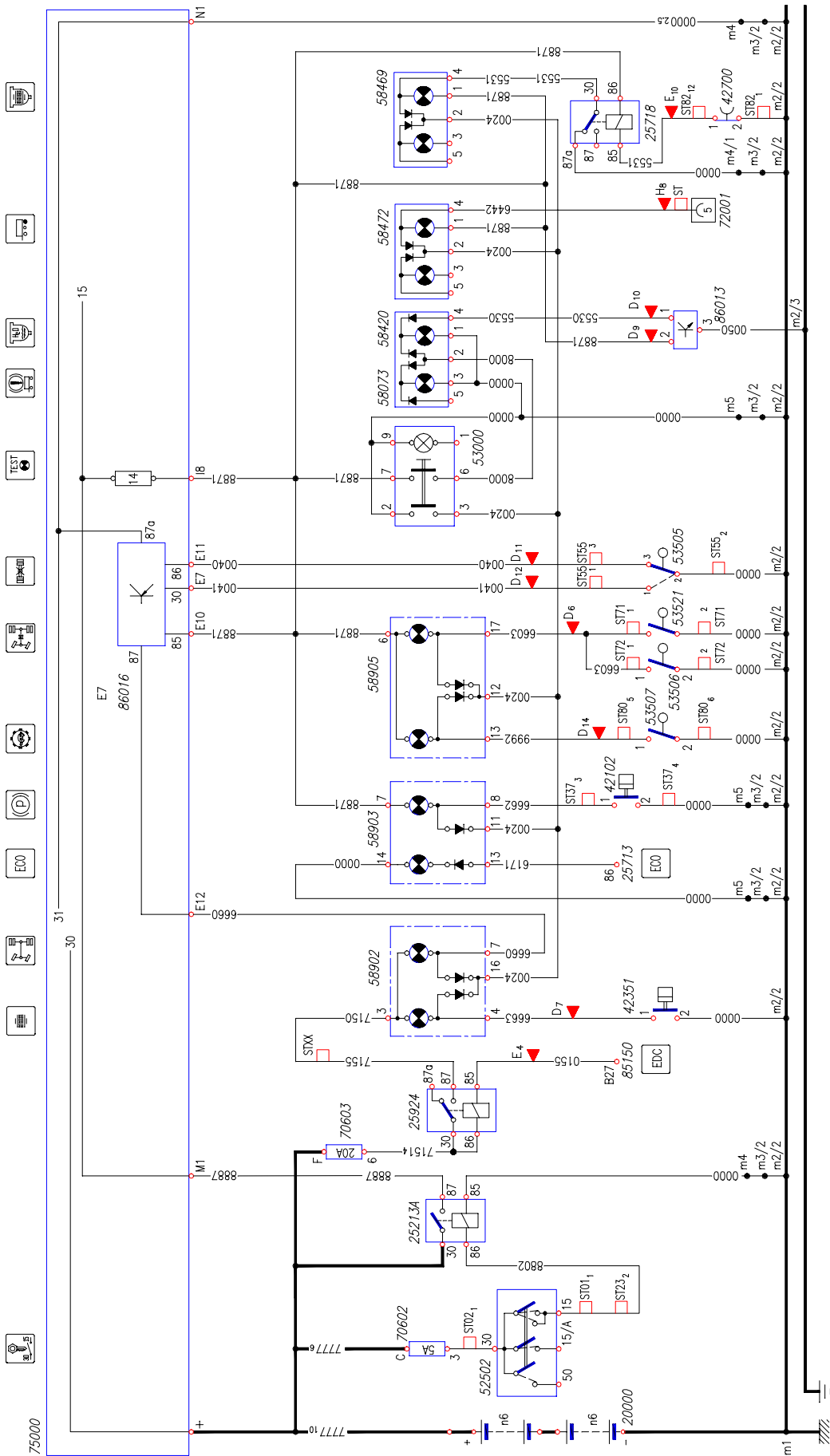


Chart No. 8b: Warning lights F2B (on)



### Chart No. 8c: Warning lights F3A/F3B (on)

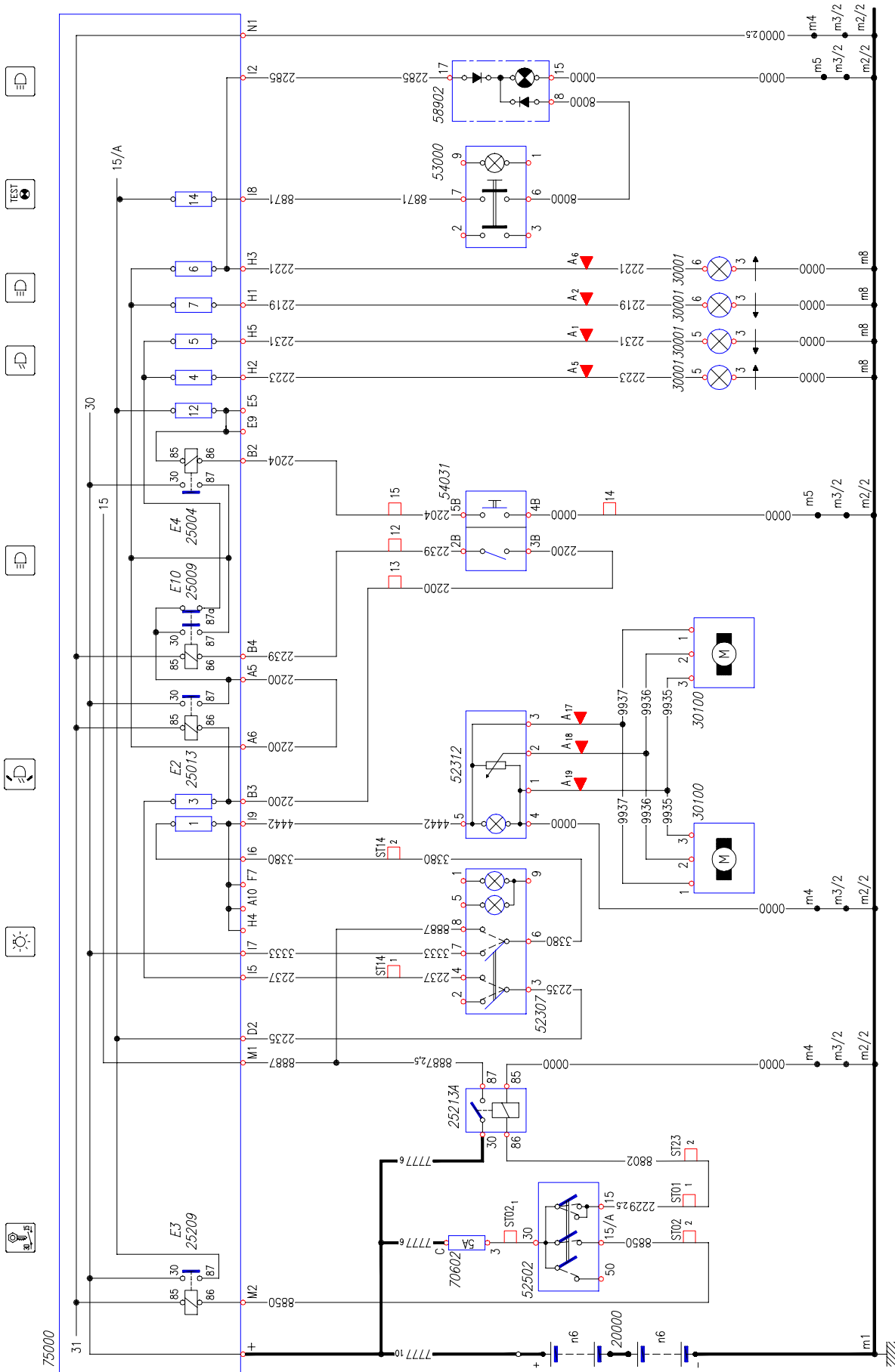








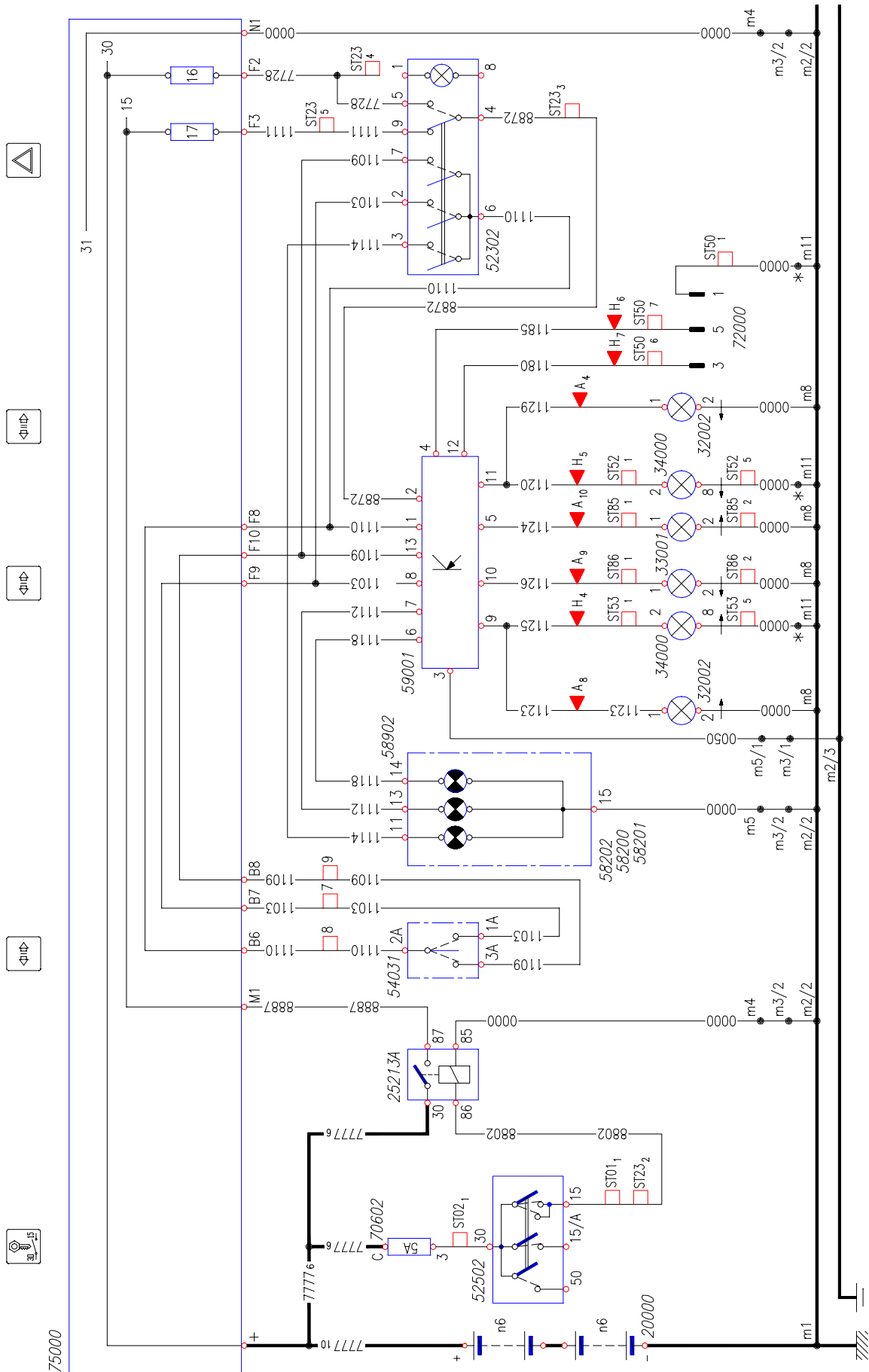
**Chart No. 11: Main/dipped beam headlights**



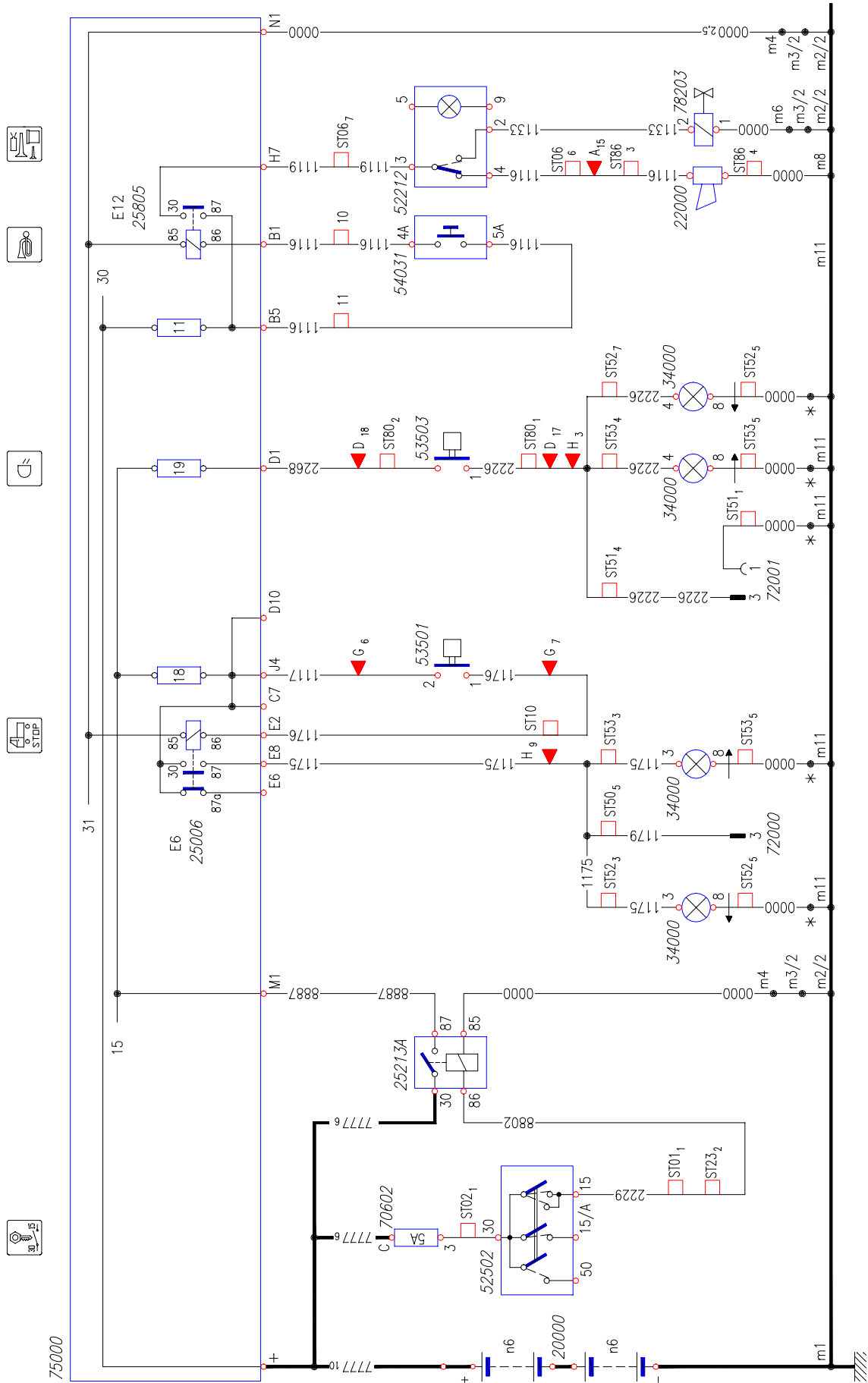




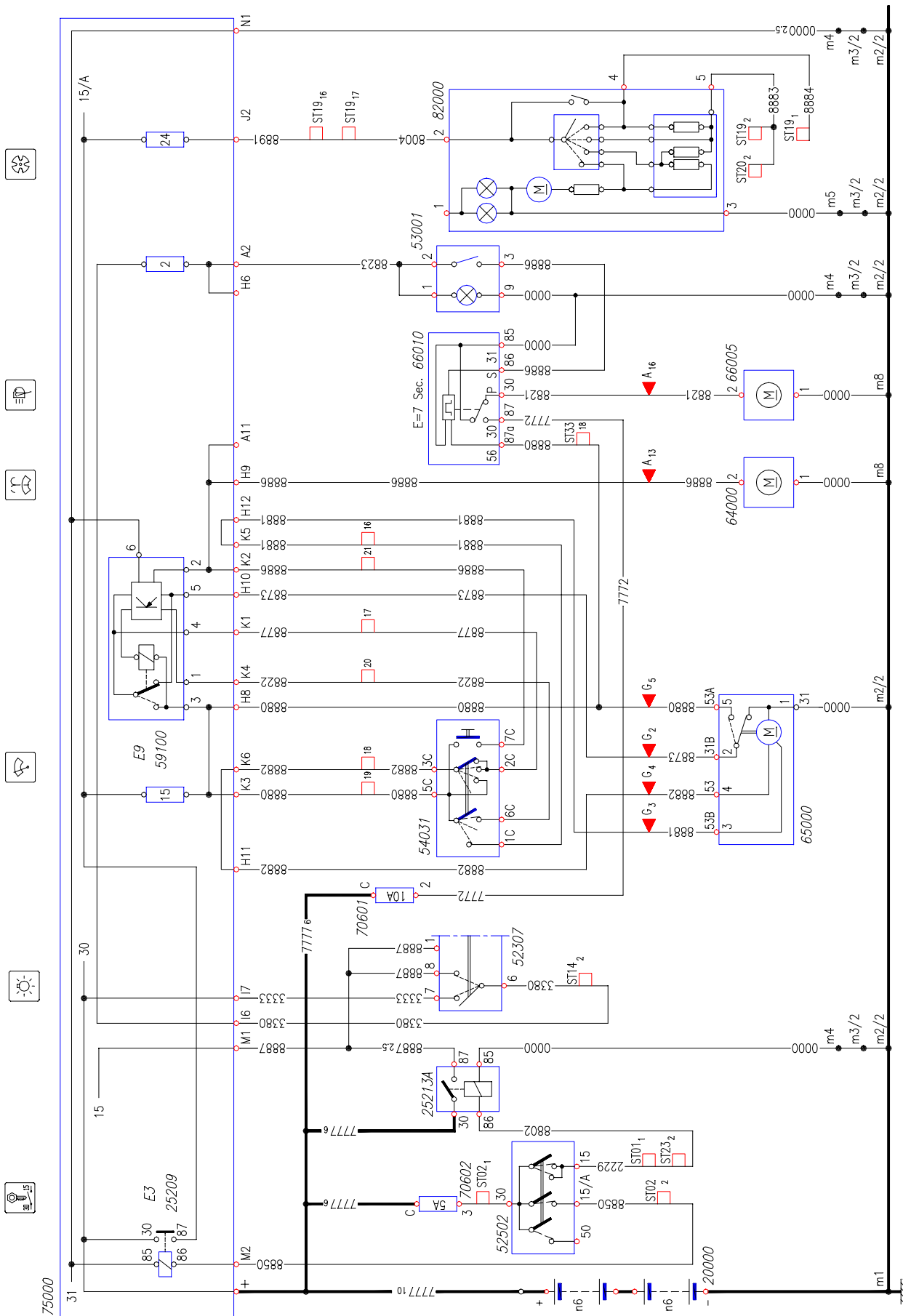
### Chart No. 13: Direction indicators – hazard lights



### Chart No. I4: Brake lights – Reverse light – Horn



**Chart No. 15: Windscreen wiper**





### Chart No. I6b Interior lighting and service F3A/F3B (on)

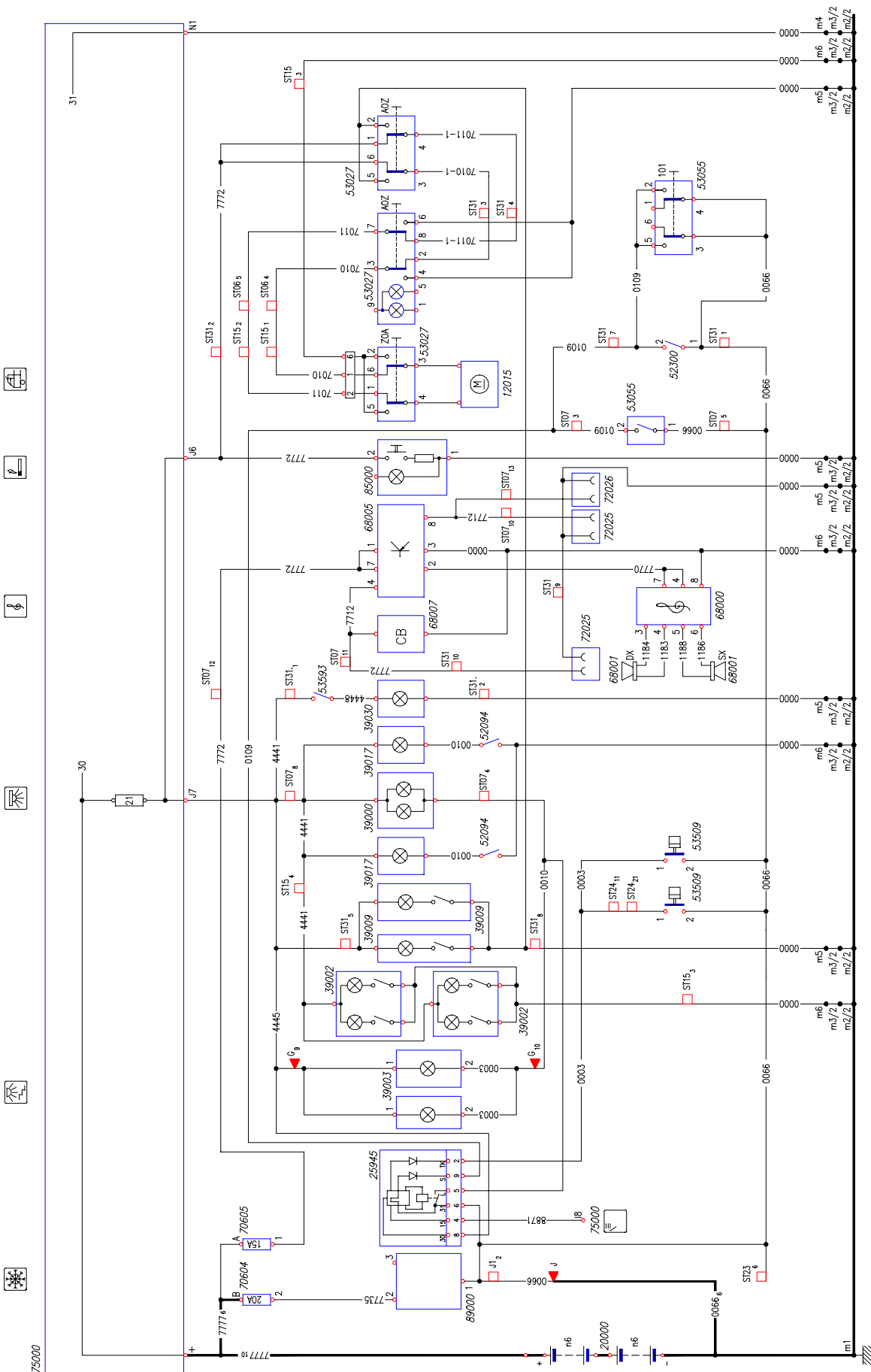
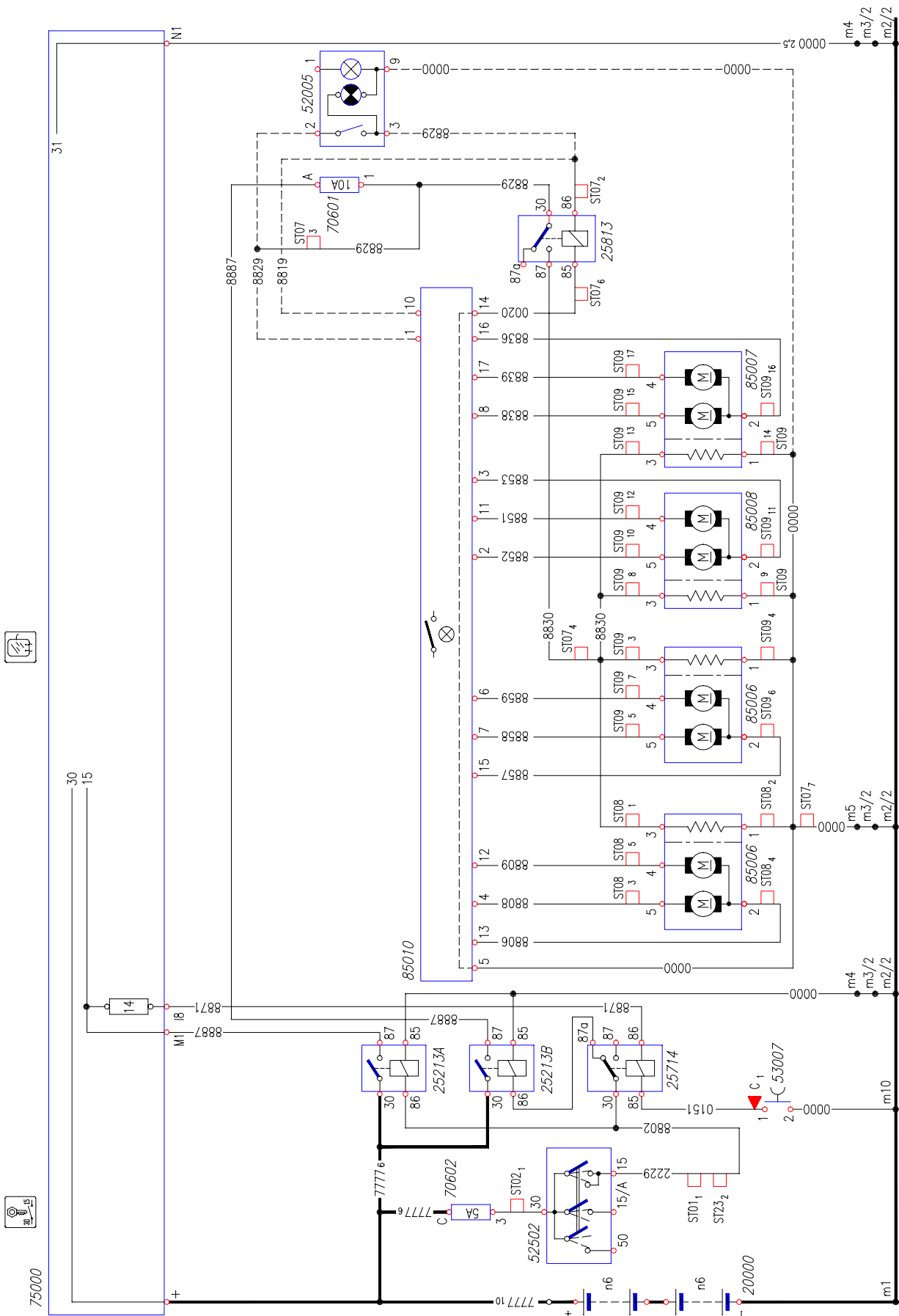




Chart No. 17: Rearview mirrors



### Chart No. I8a: Window winders F2B (on) F2B/F3B (off)

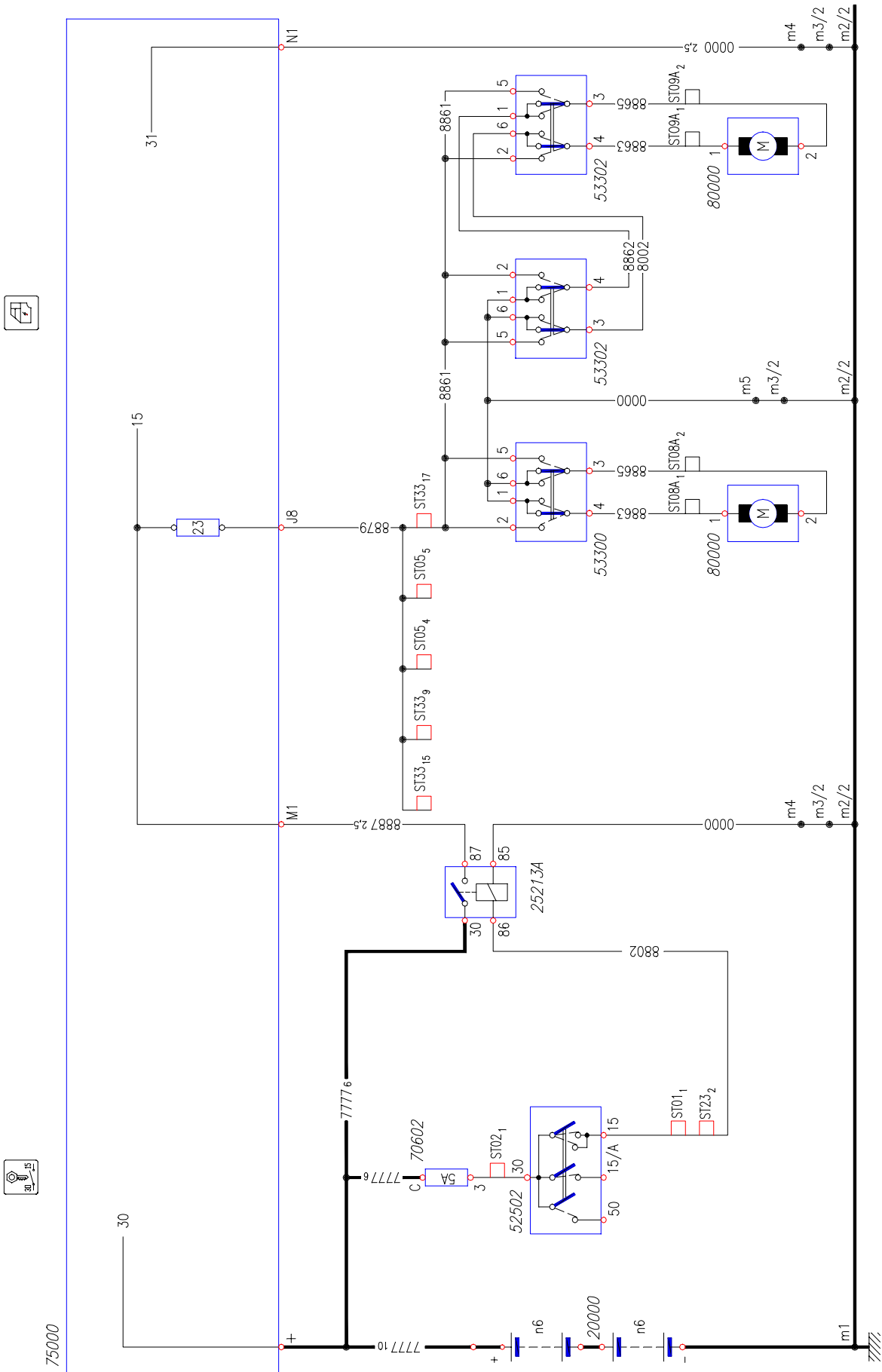
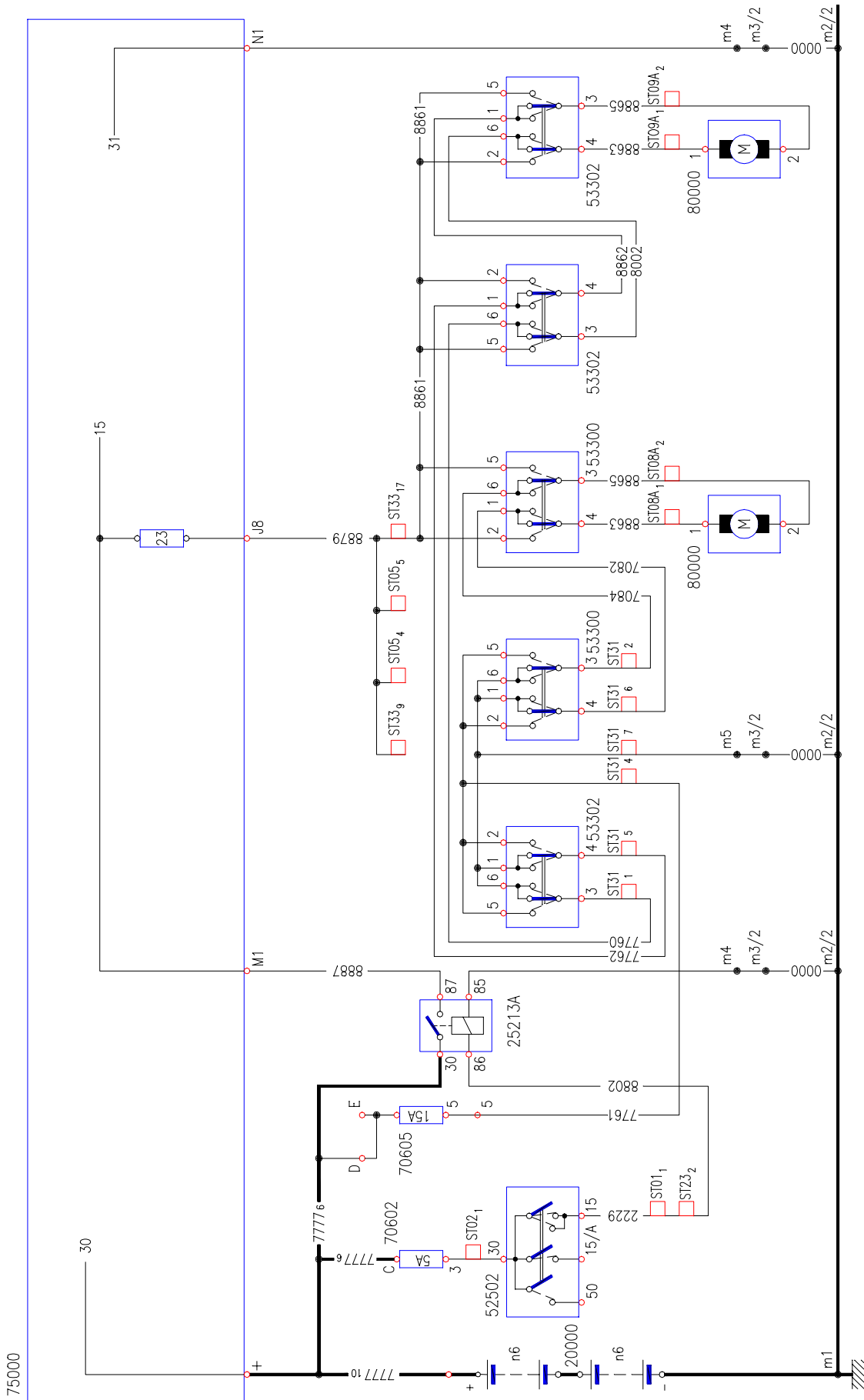
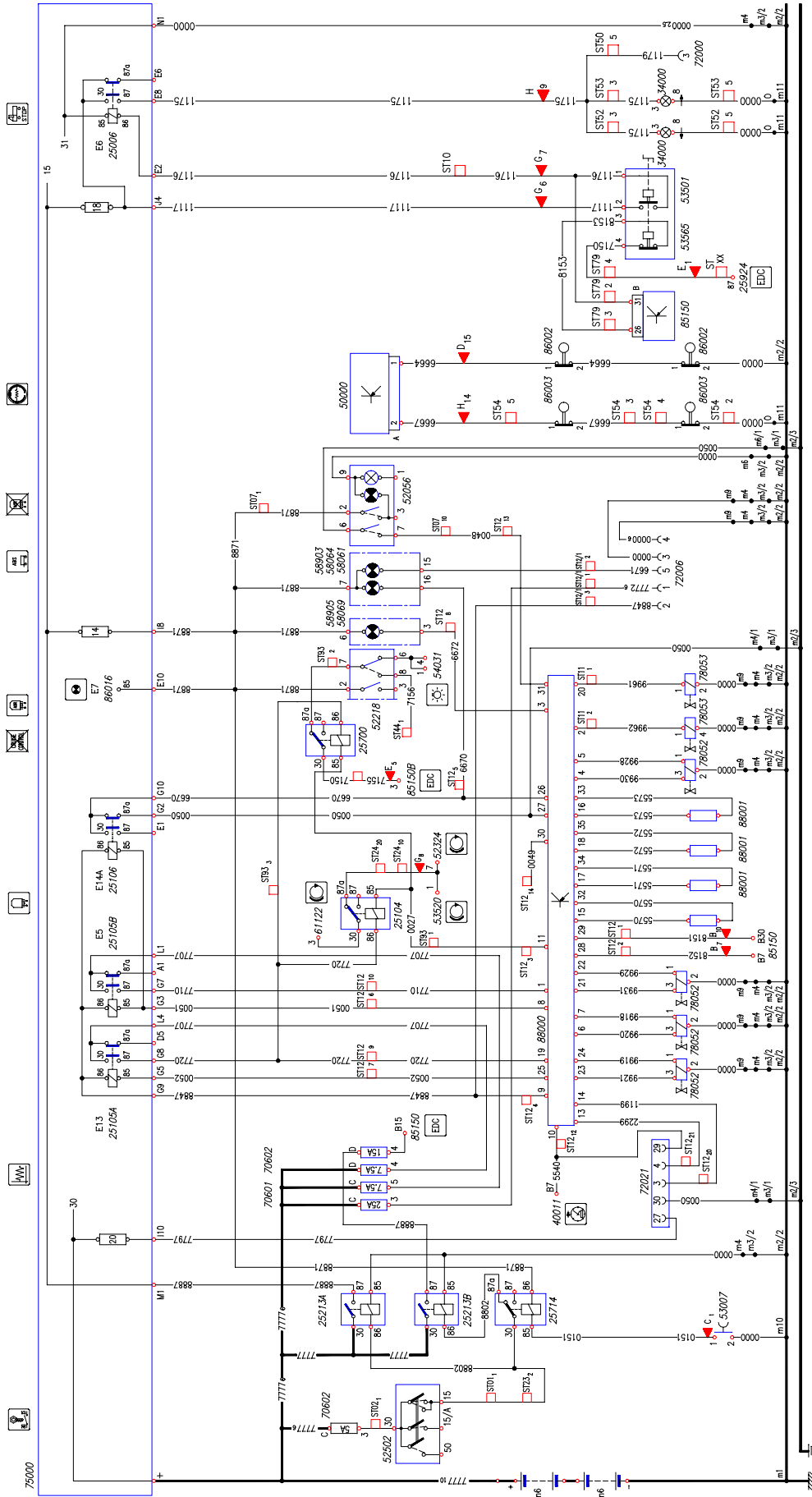




Chart No. I8b: Window winders F3A/F3B (on)



### Chart No. I9a: ABS / ASR F2B (on)





### Chart No. I9c: ABS / ASR F2BF3B (off)

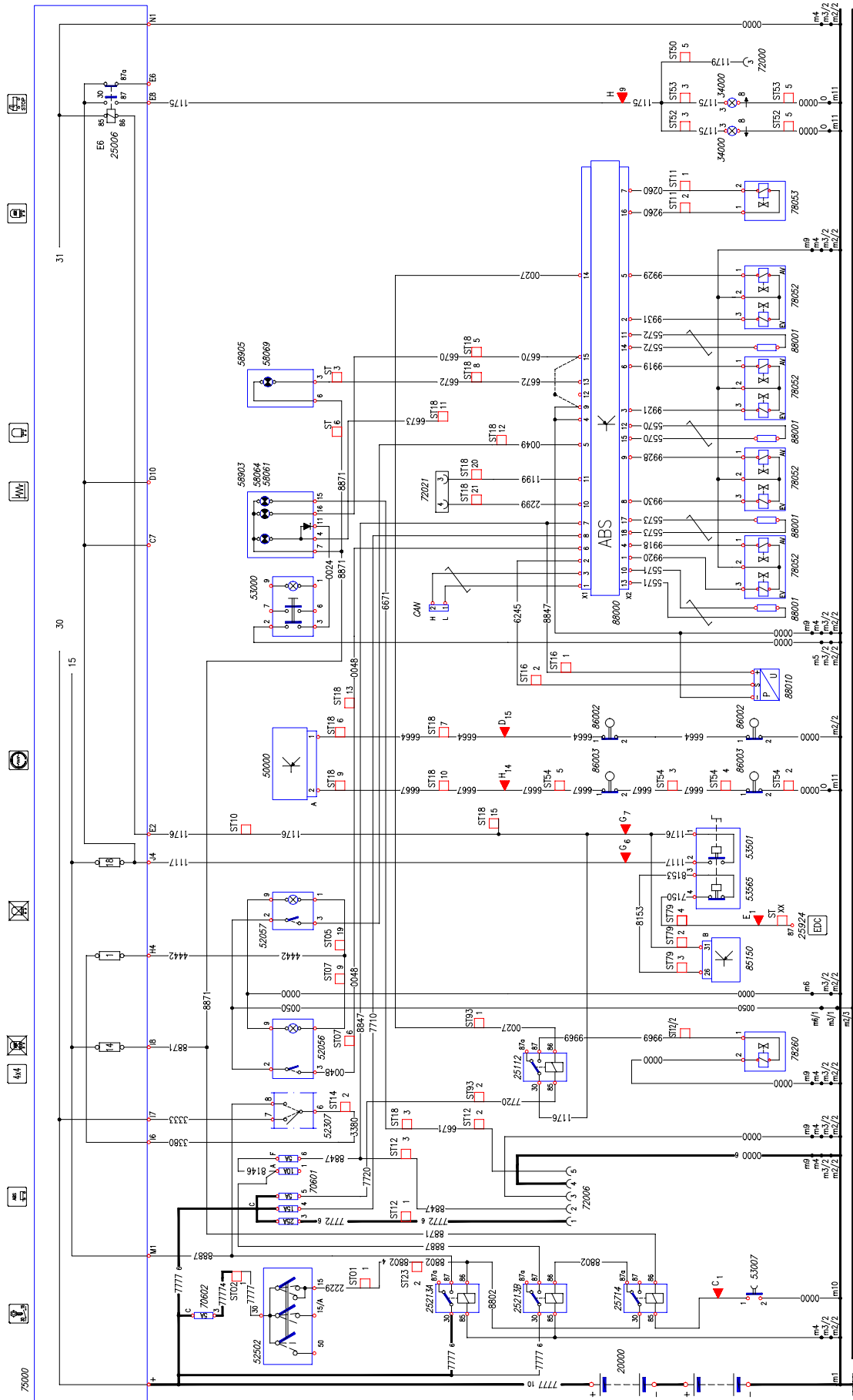


Chart No. 20: EBS F3A/F3B (on)

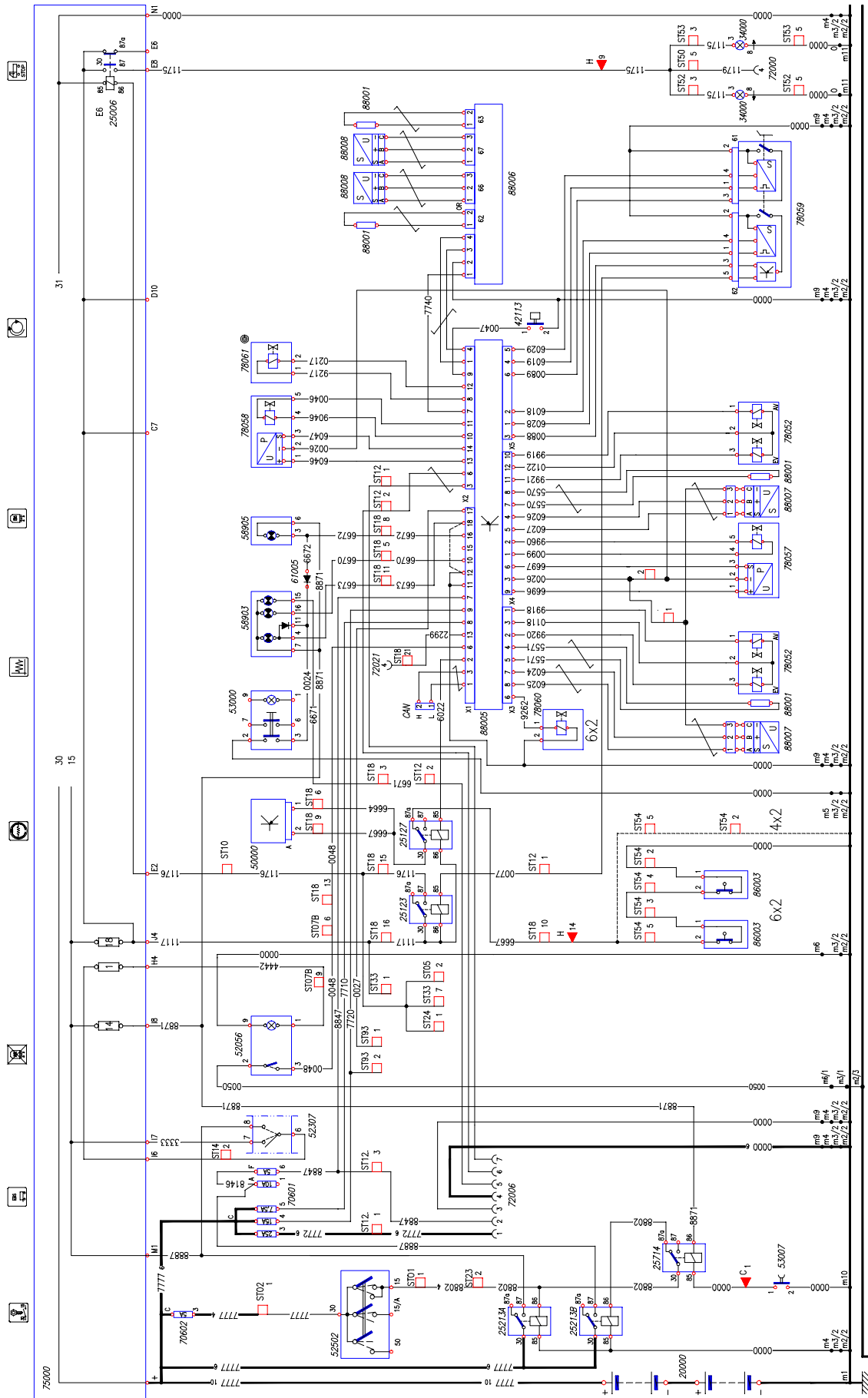
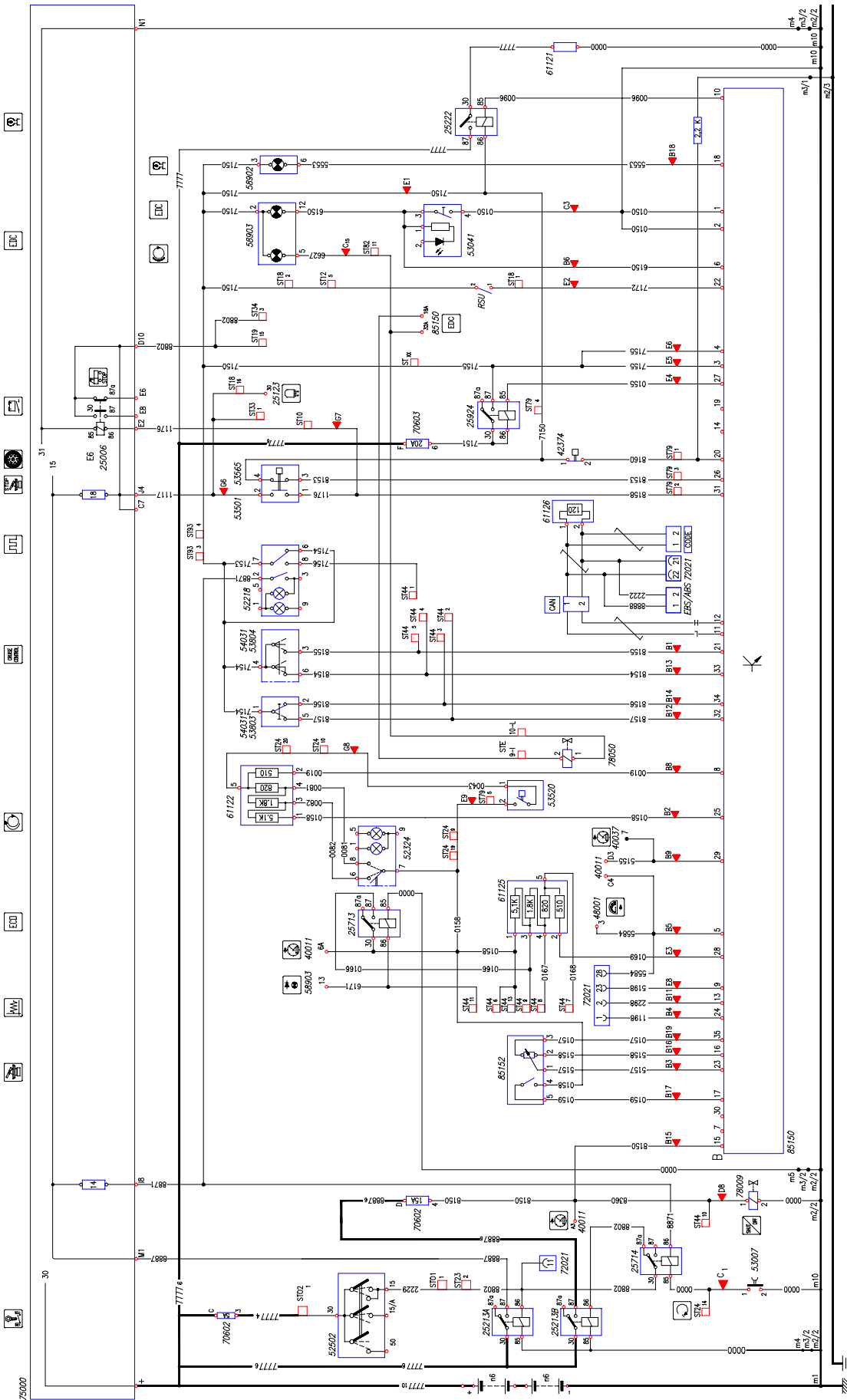




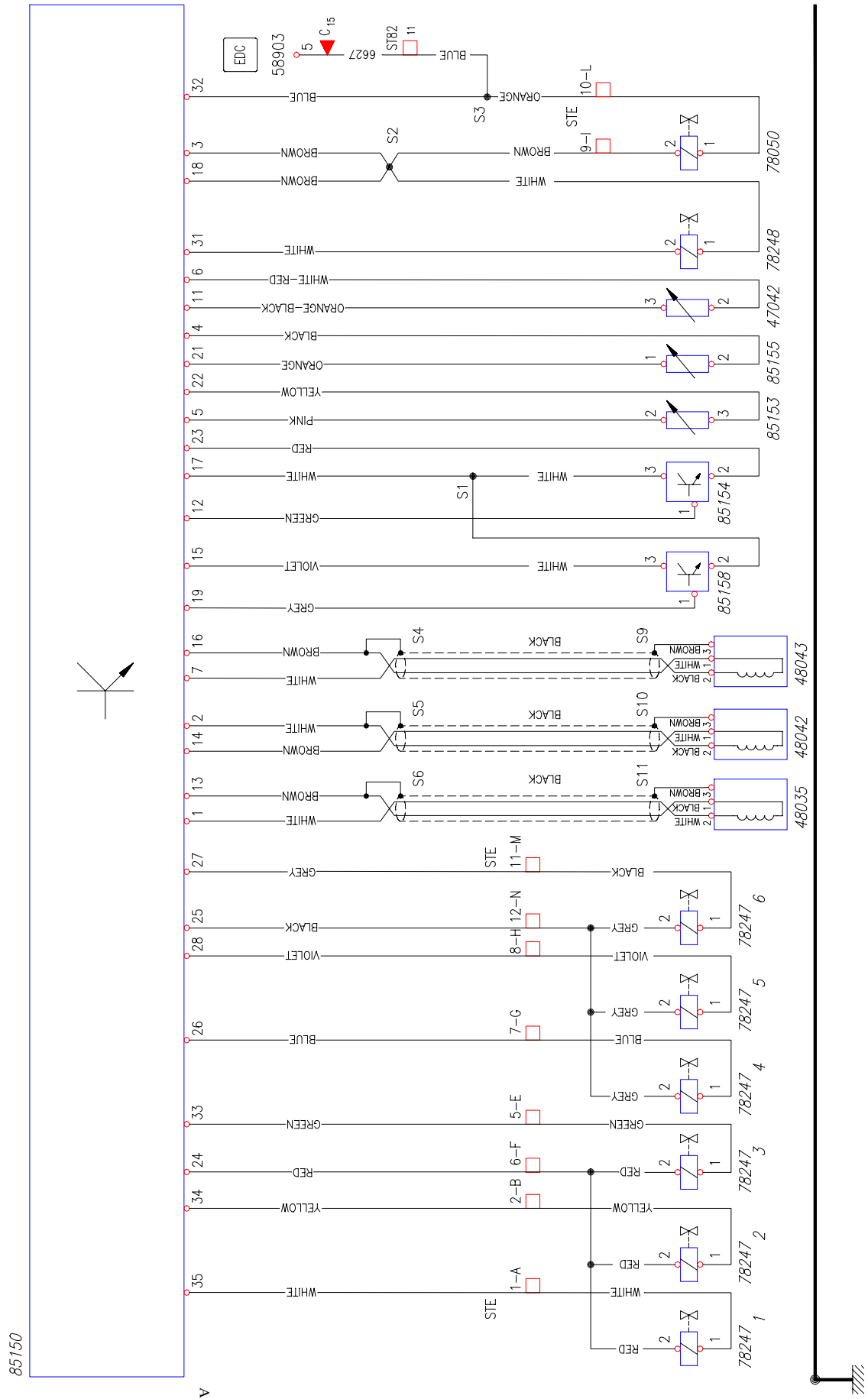
Chart No. 21b: EDC (connector B) F3A/F3B (on) F2B/F3B (off)







### Chart No. 22b: EDC (connector A - F3B)



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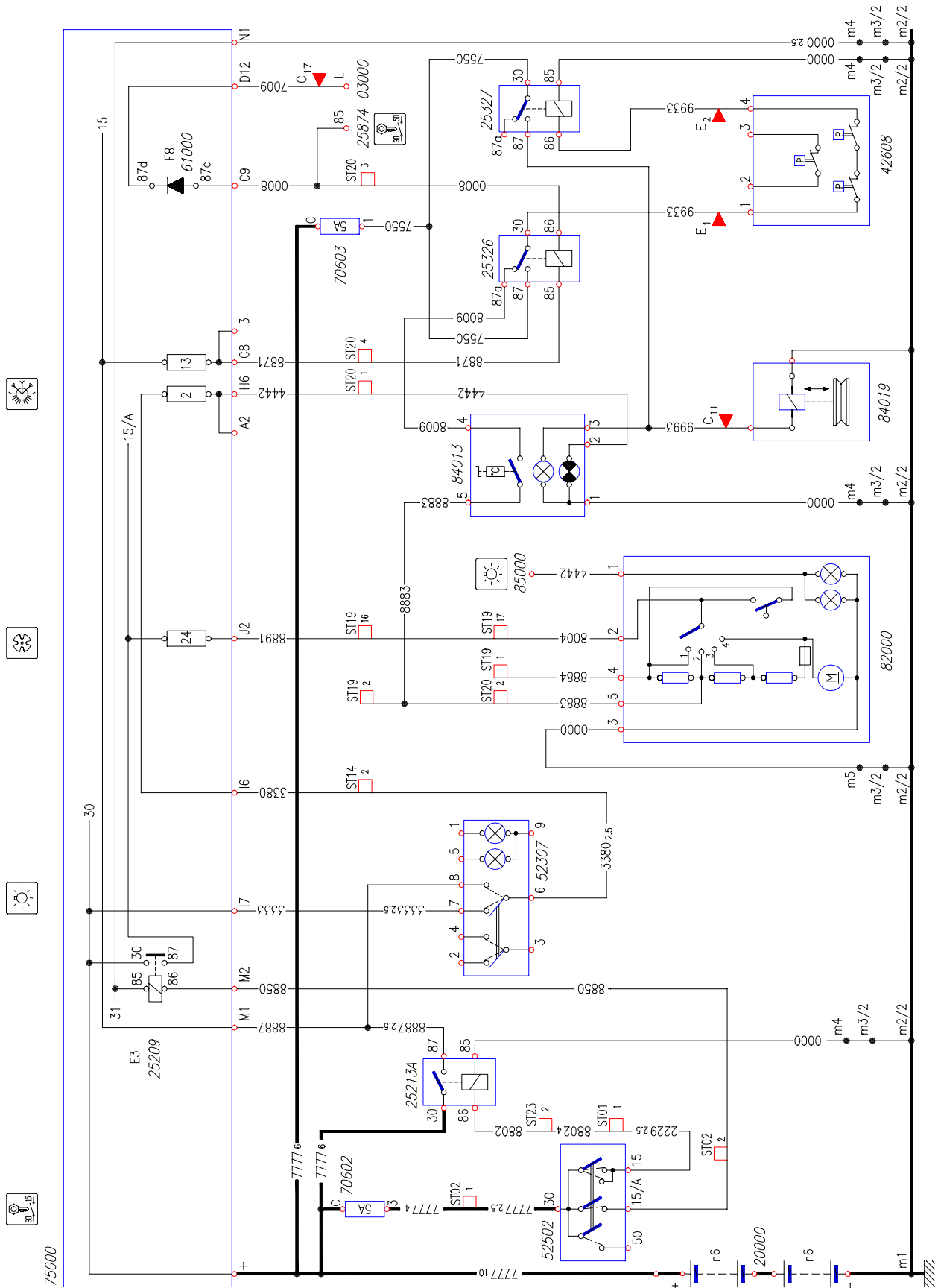
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### Chart No. 24: Manual climate control system



### Chart No. 25: Automatic climate control system

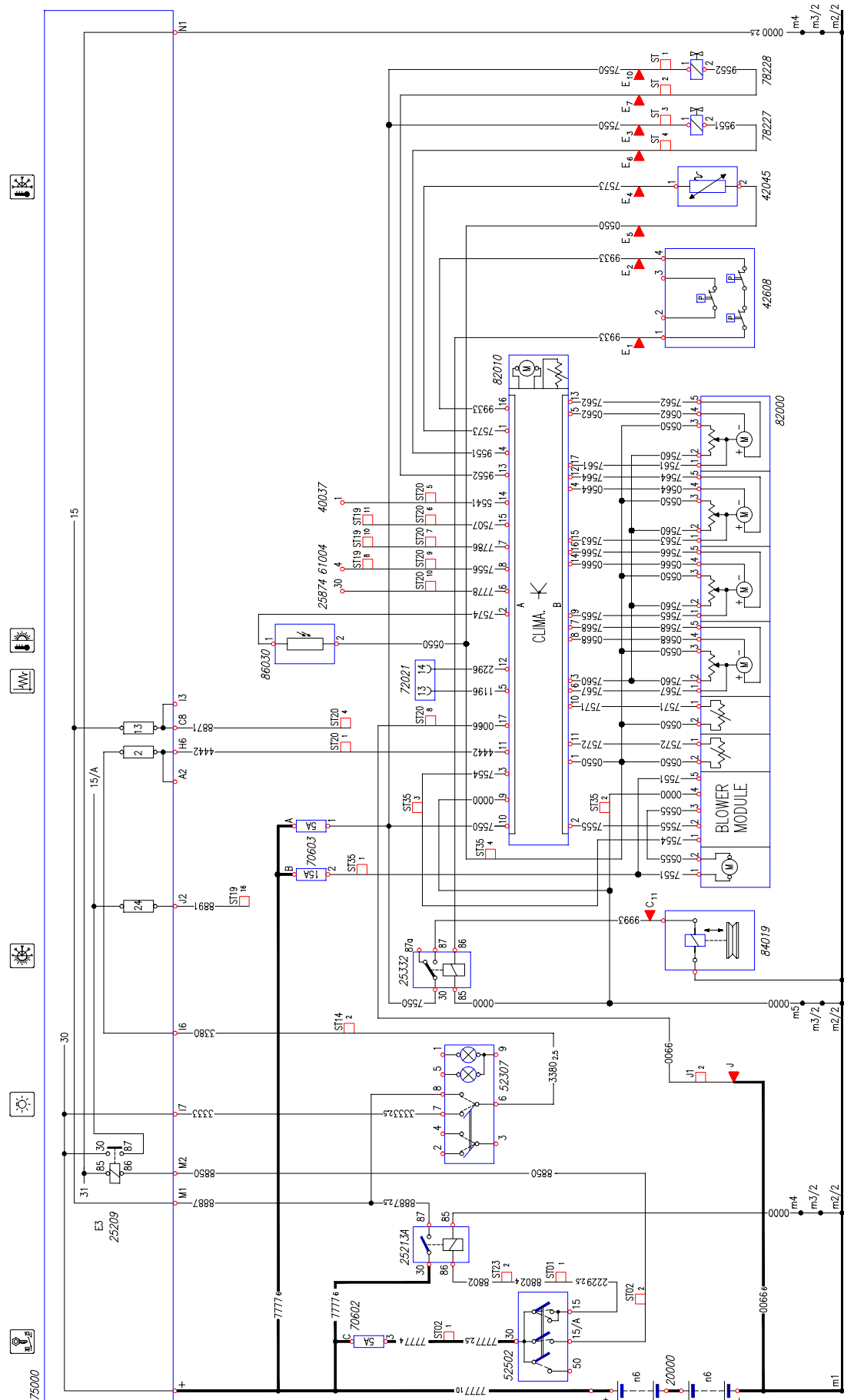




Chart No. 27: Additional air heating manual mode (GGVS)

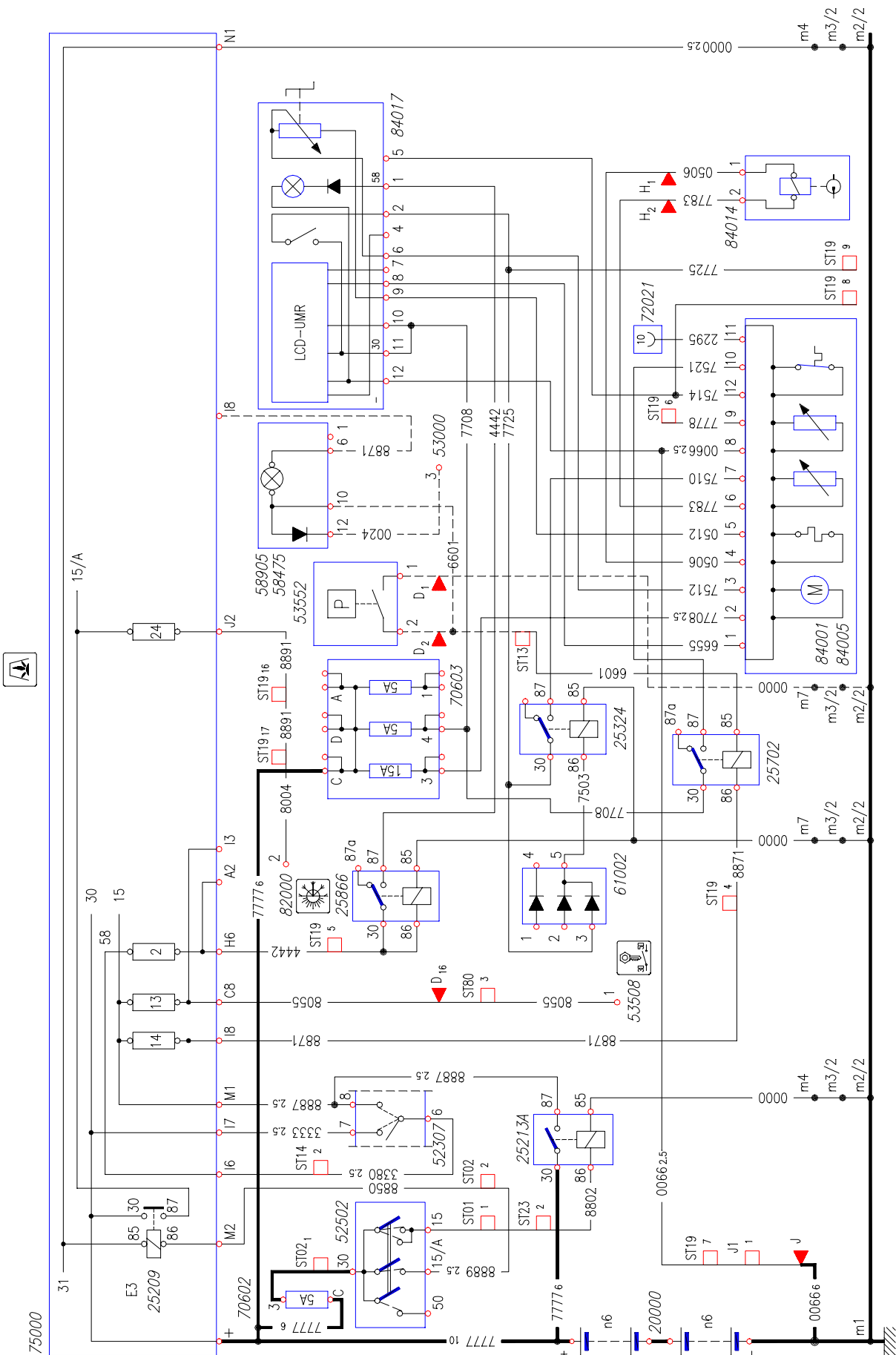
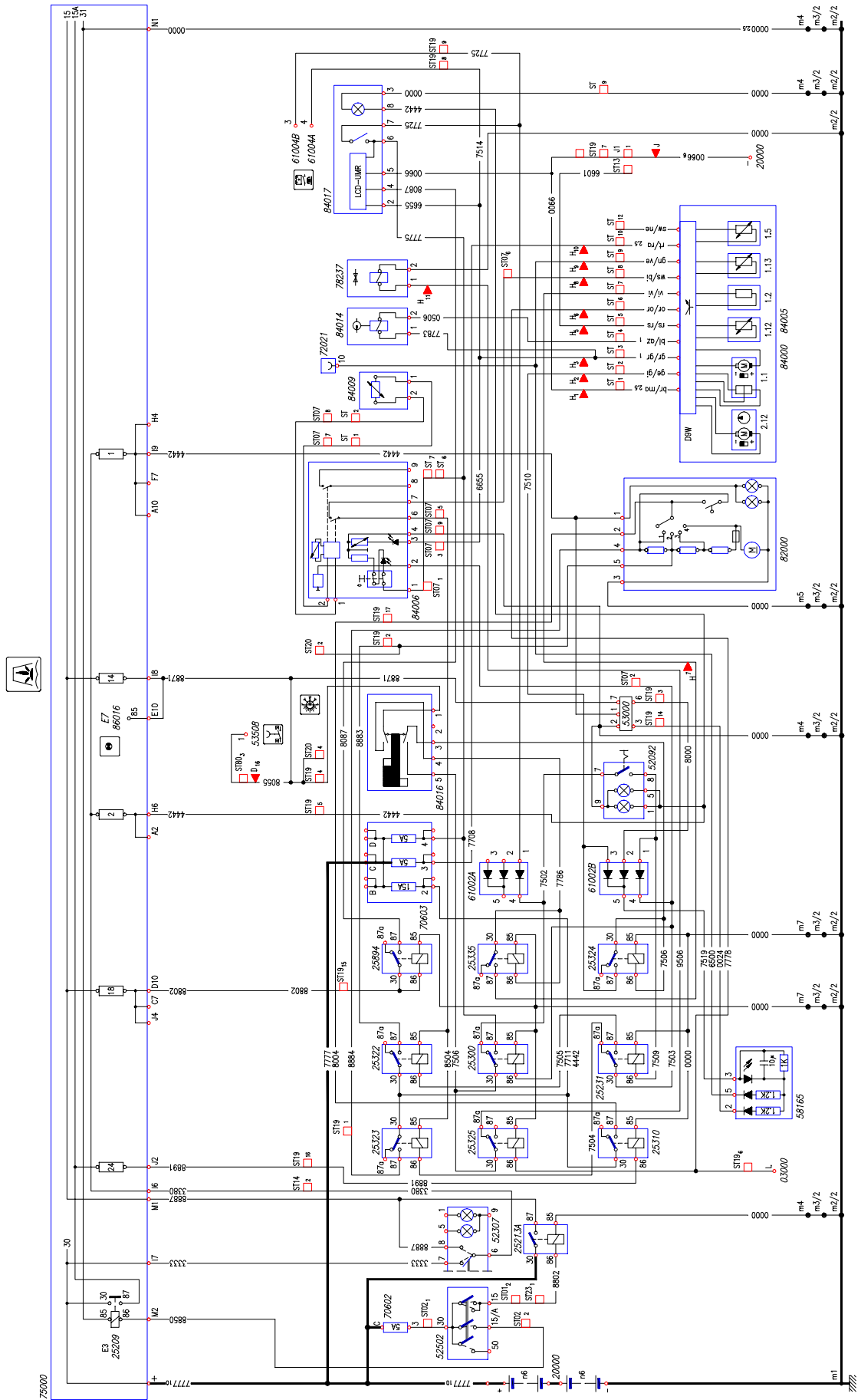


Chart No. 28: Independent heating unit manual control for cabin and engine











### Chart No. 32: Air TMP emergency switch

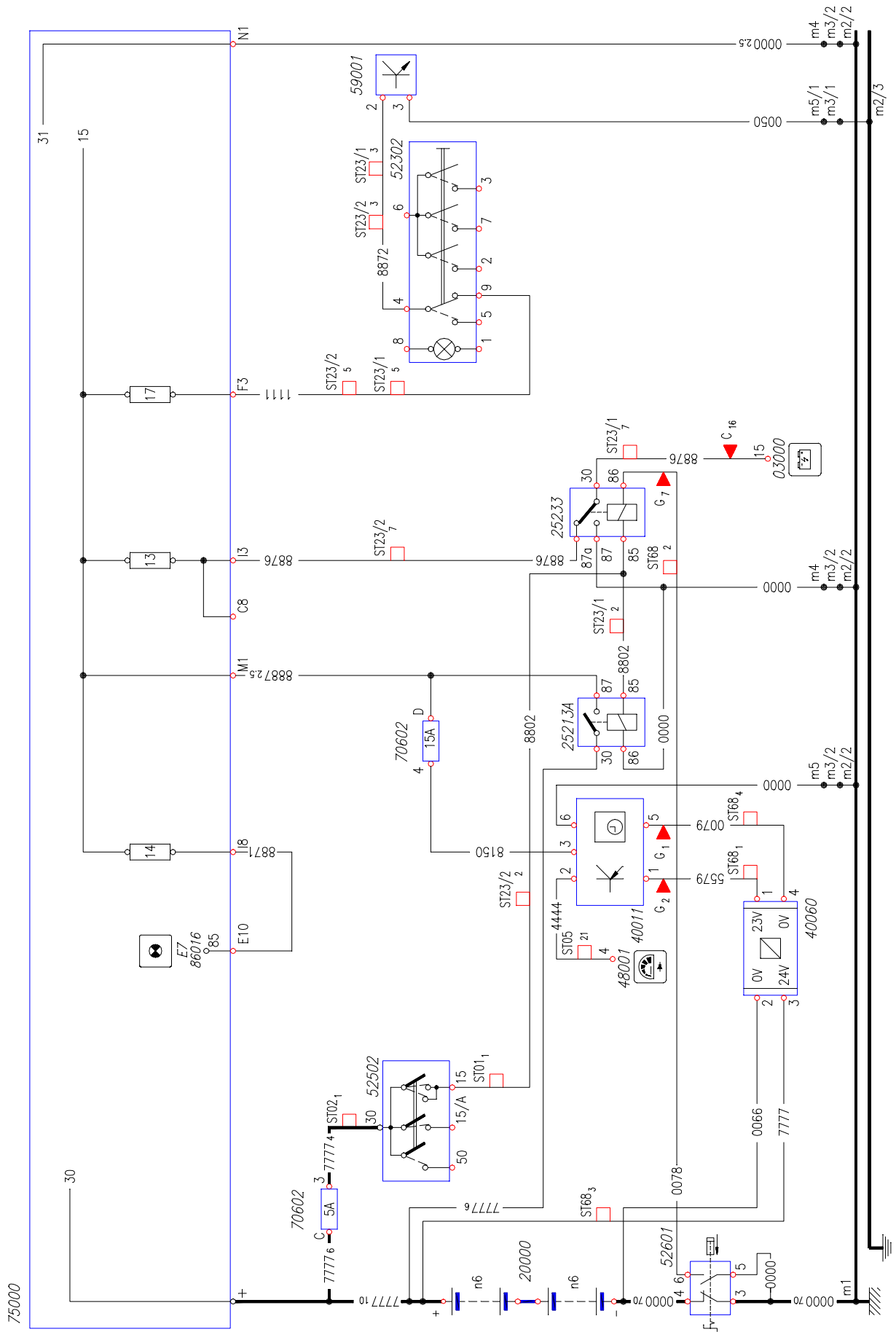
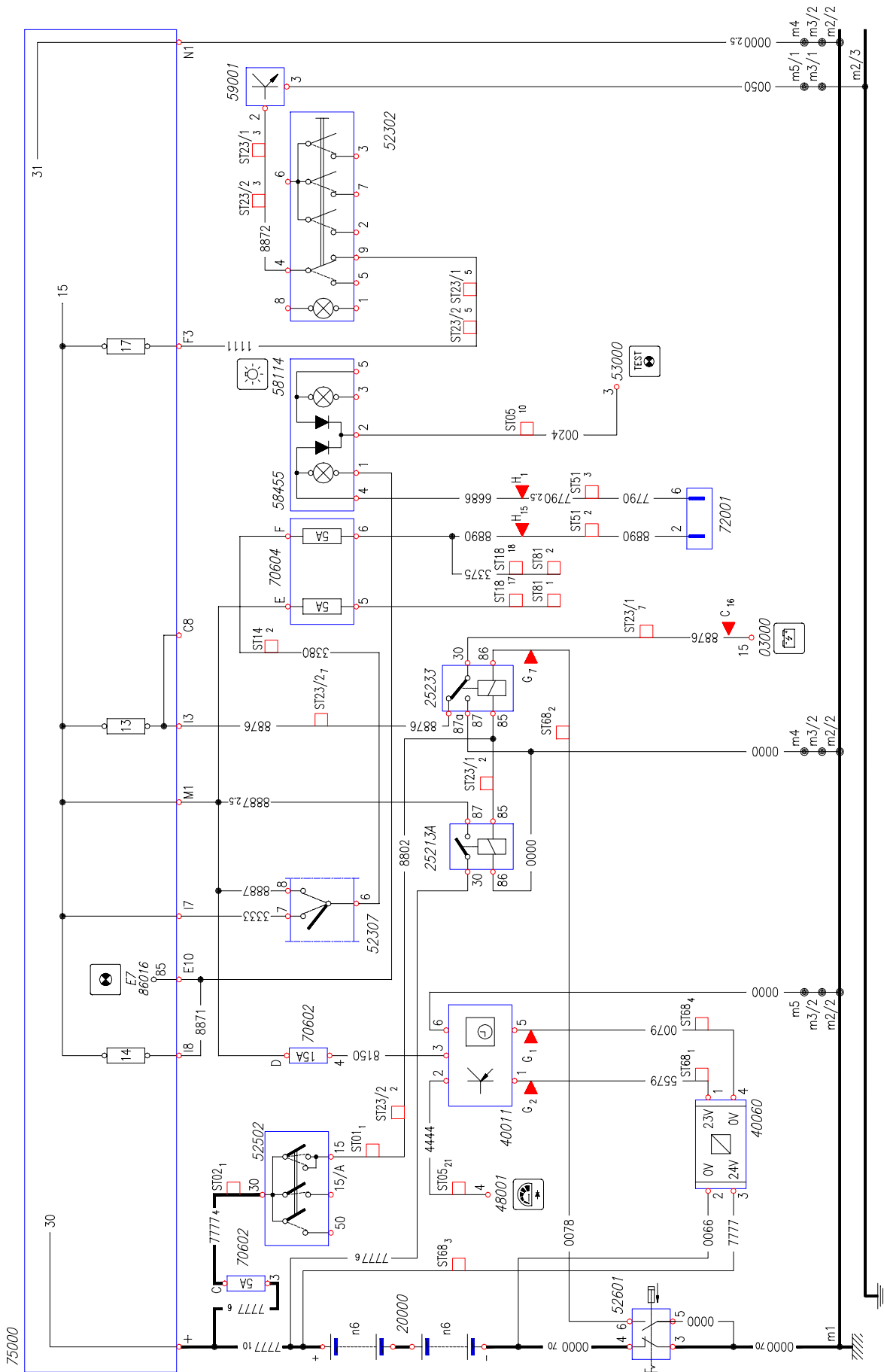


Chart No. 33: Air TMP emergency switch (French)



### Chart No. 34: Ground startup and recharge

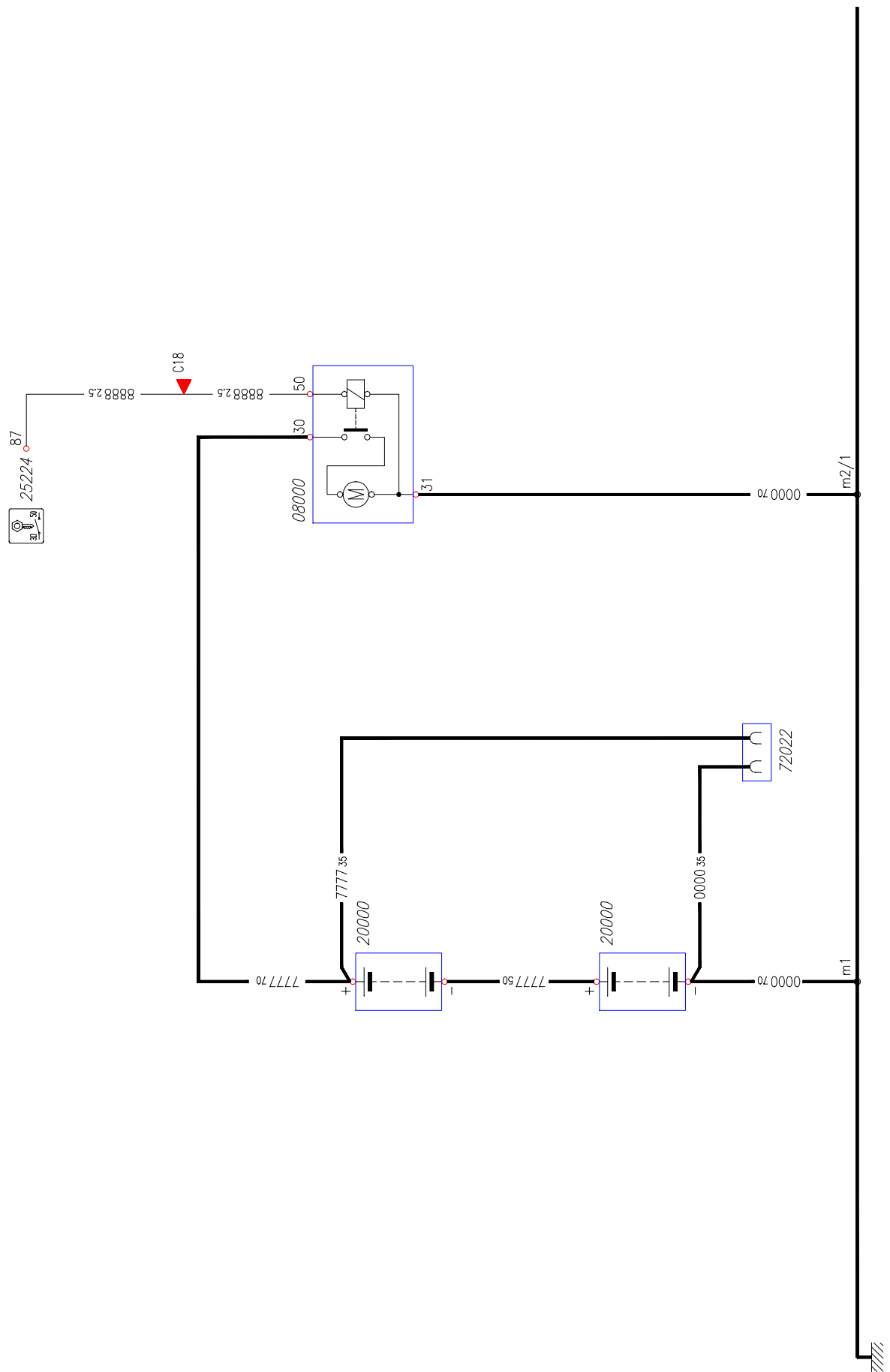
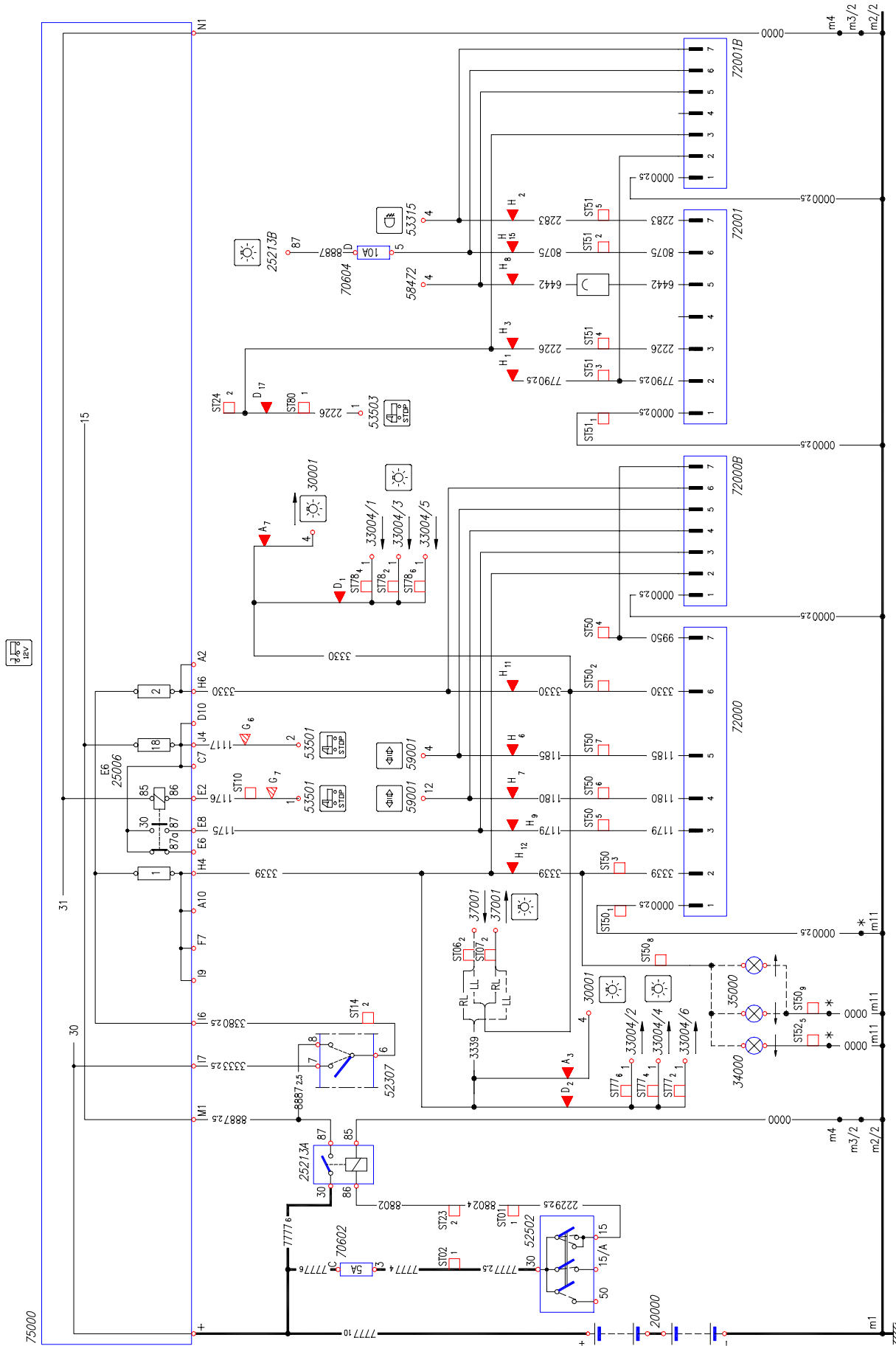




Chart No. 36: 2X7 Pole socket (only tractor)























### Chart No. 44: Central door lock

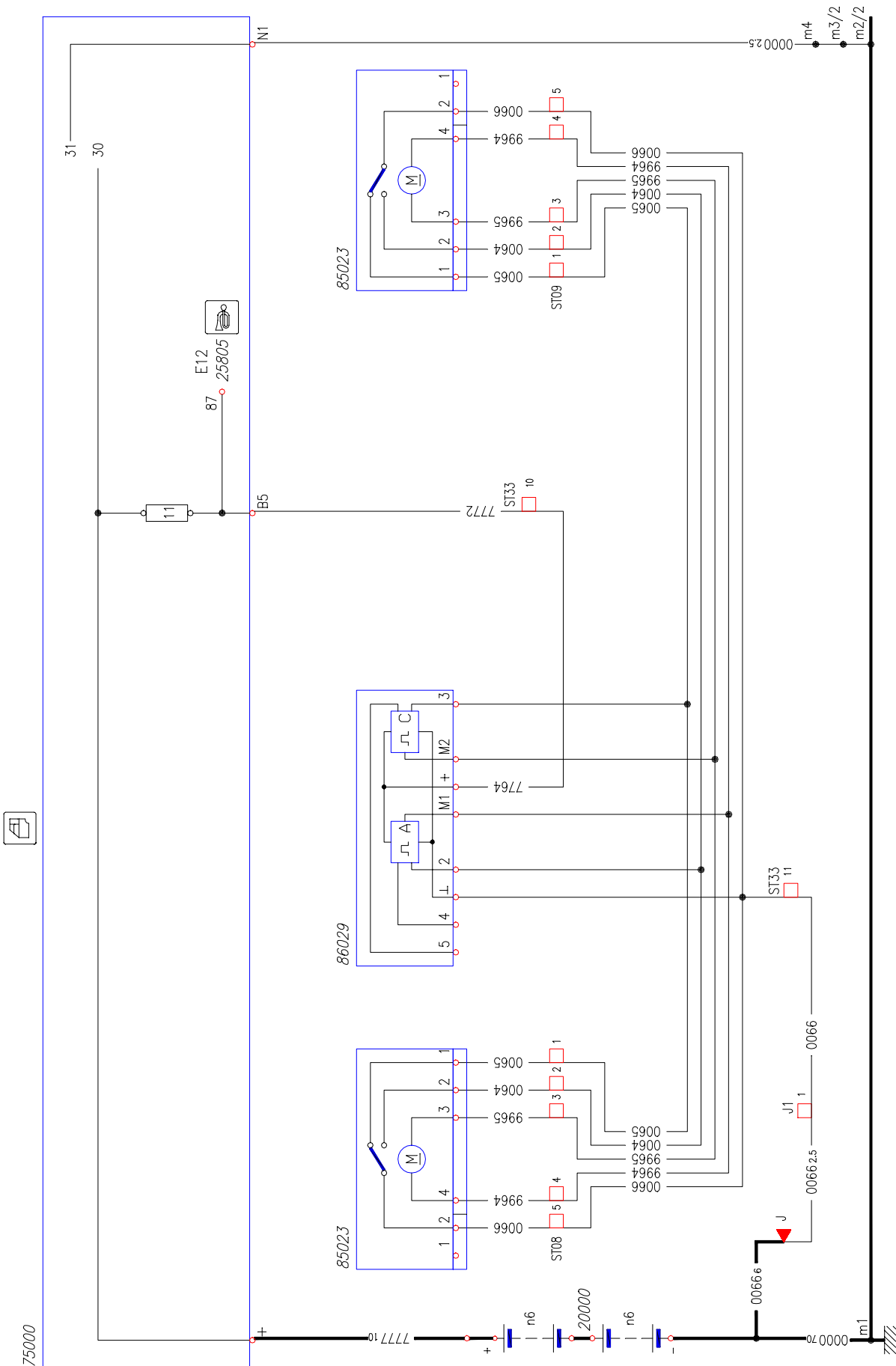










Chart No. 49: Hydraulic power steering circuit

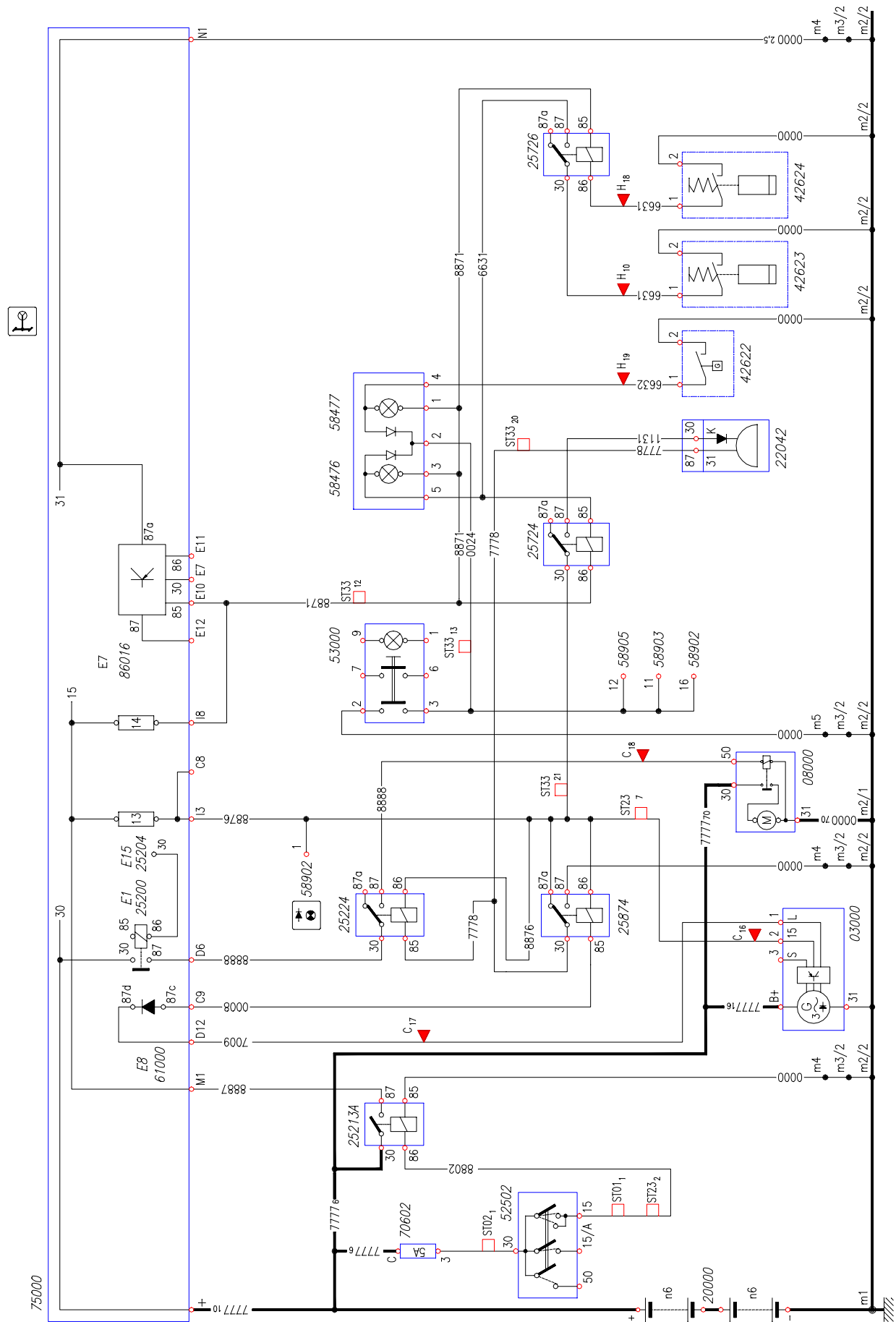
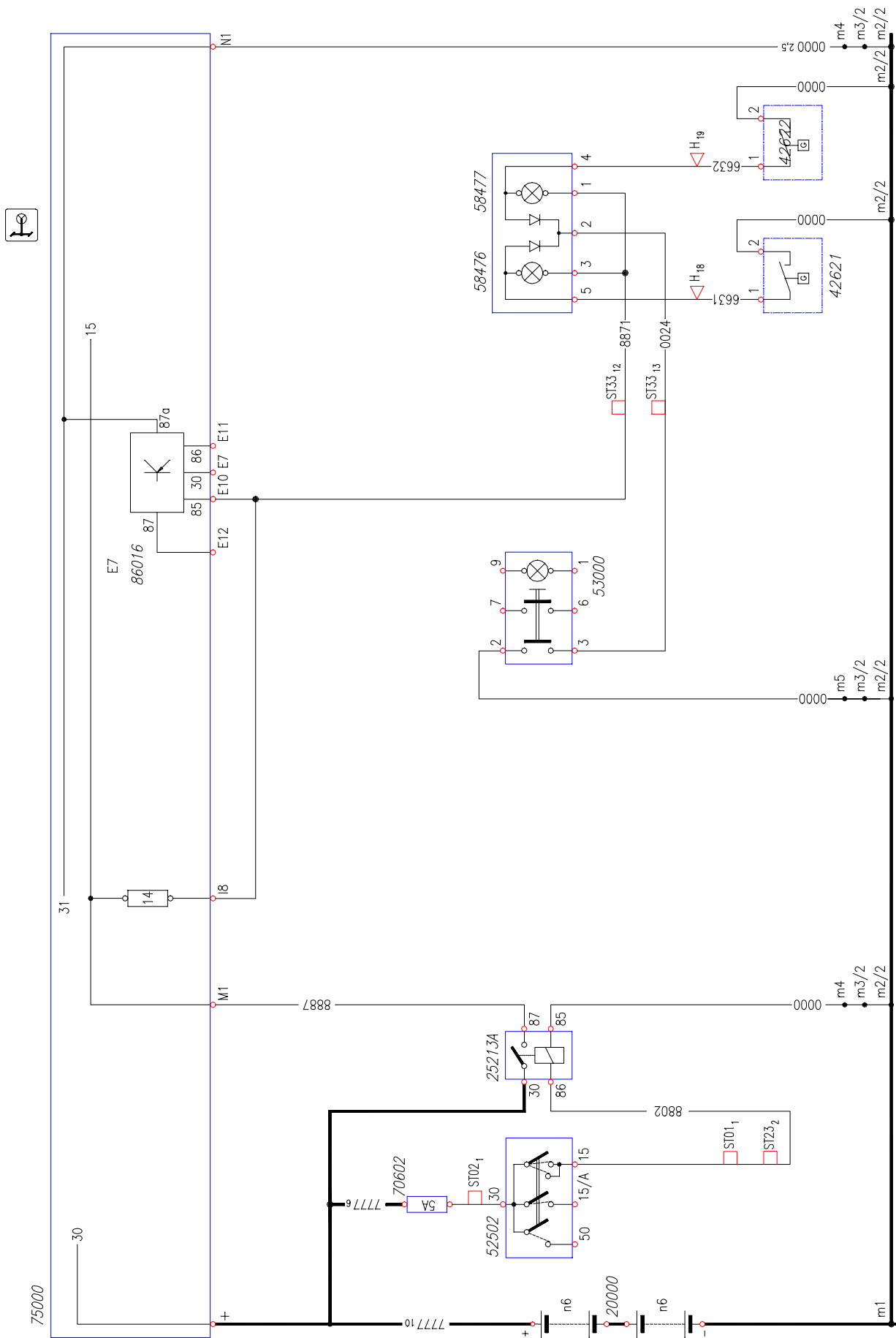


Chart No. 50: Hydraulic power steering circuit (northern countries)



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Chart No. 51: Headlight washer and windscreen wiper

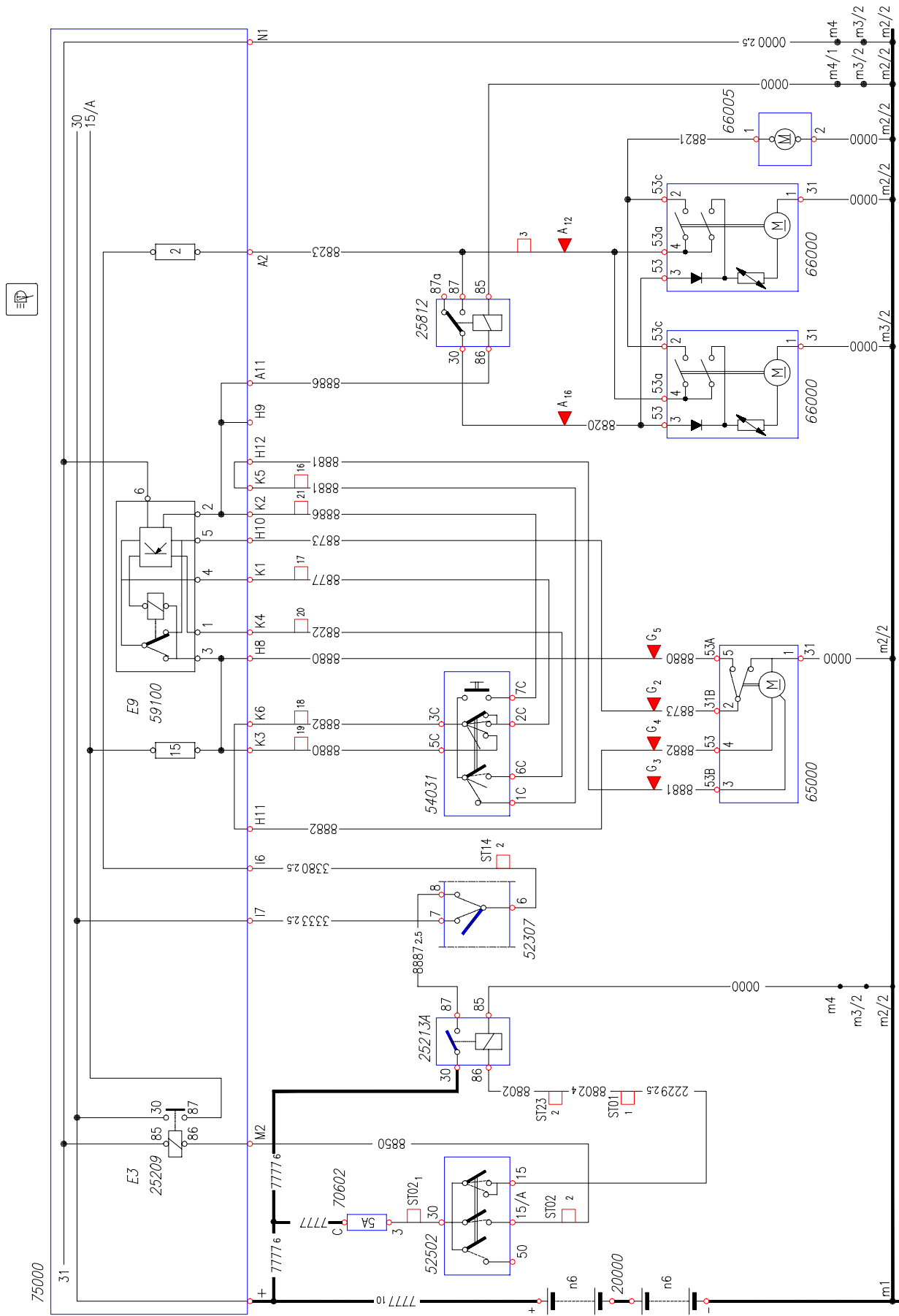




Chart No. 52: Trailer braking system

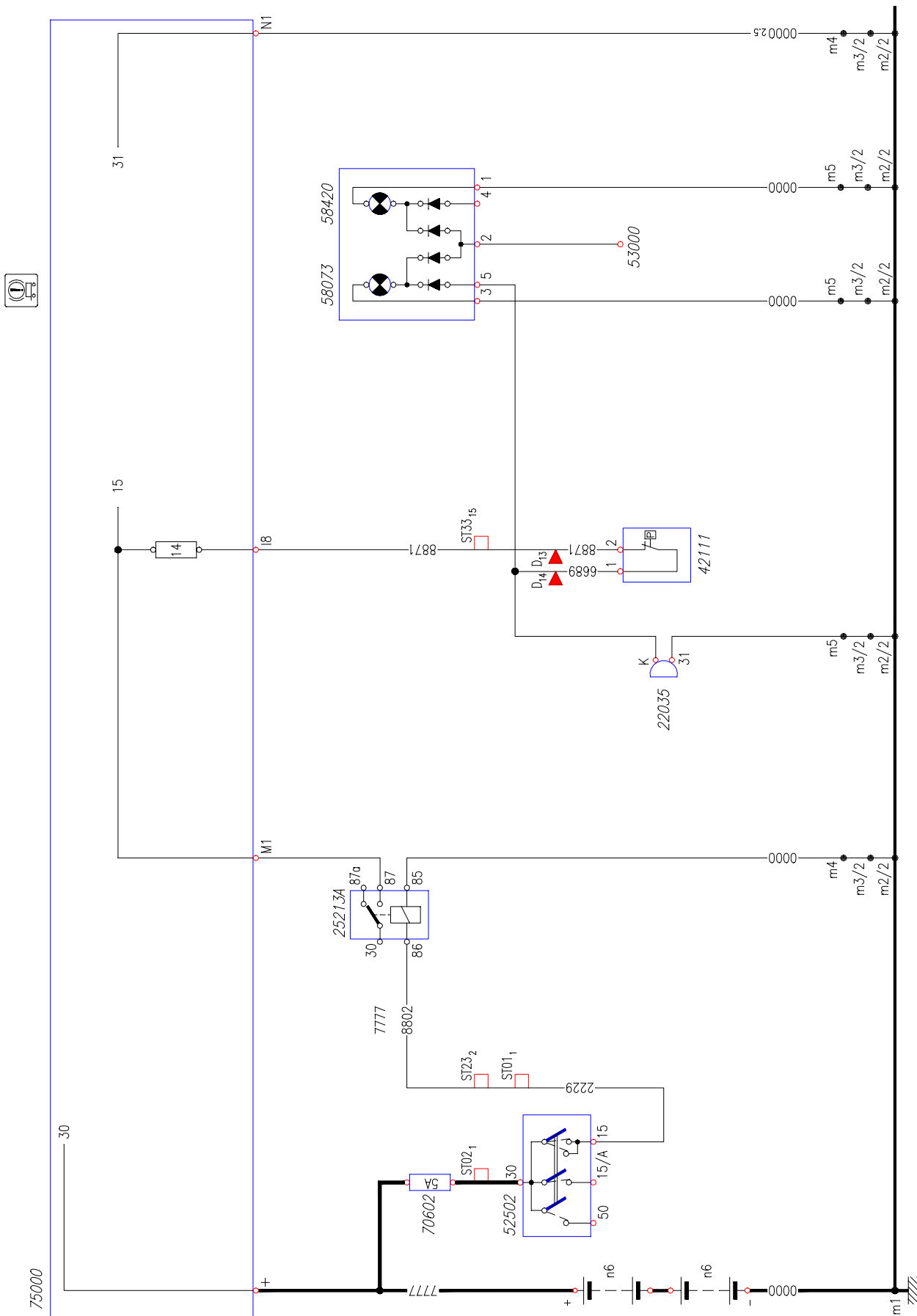
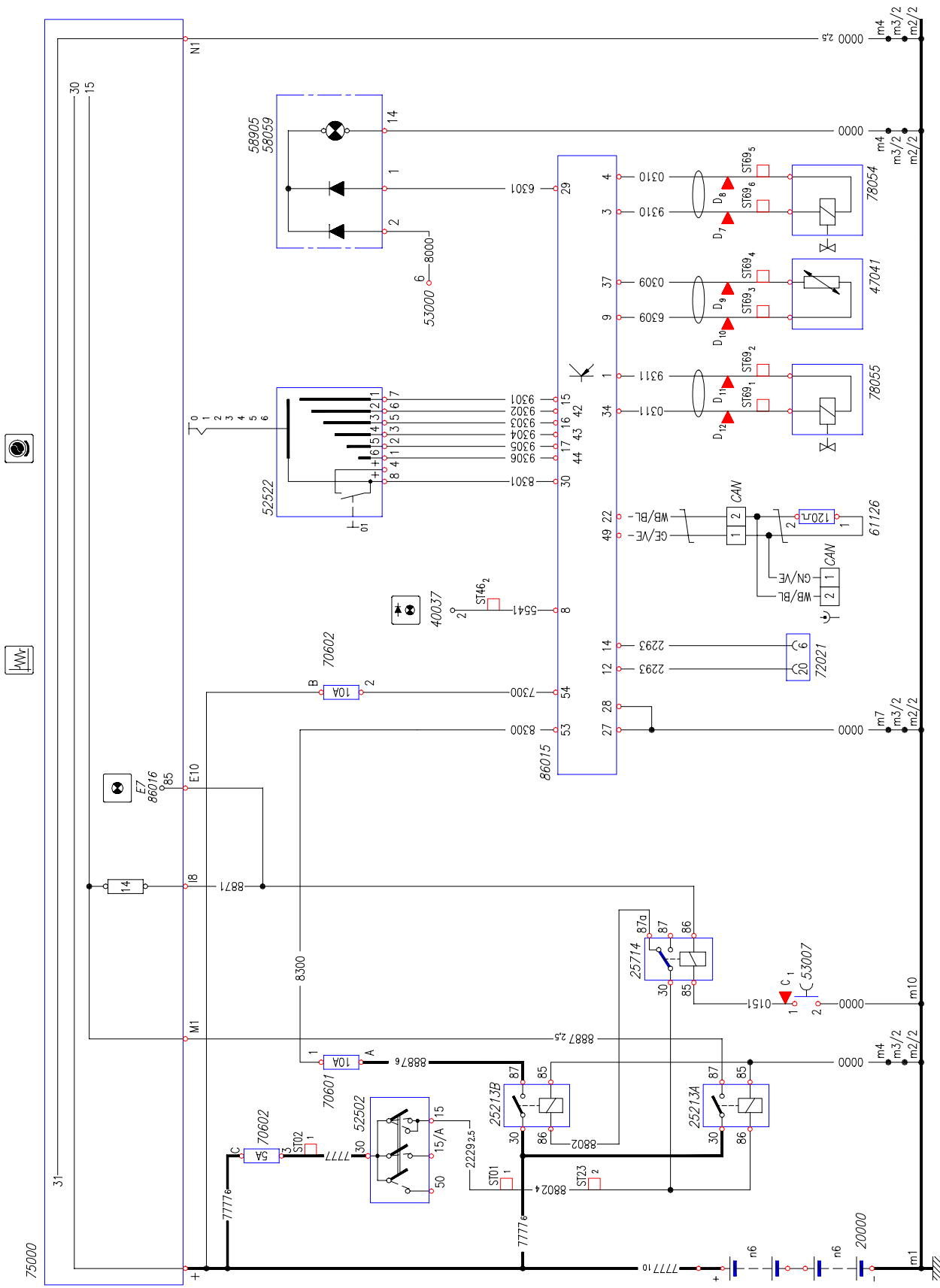




Chart No. 54: Intarder ZF



### Chart No. 55: ECAS for 4X2 and 6X2 (ON)

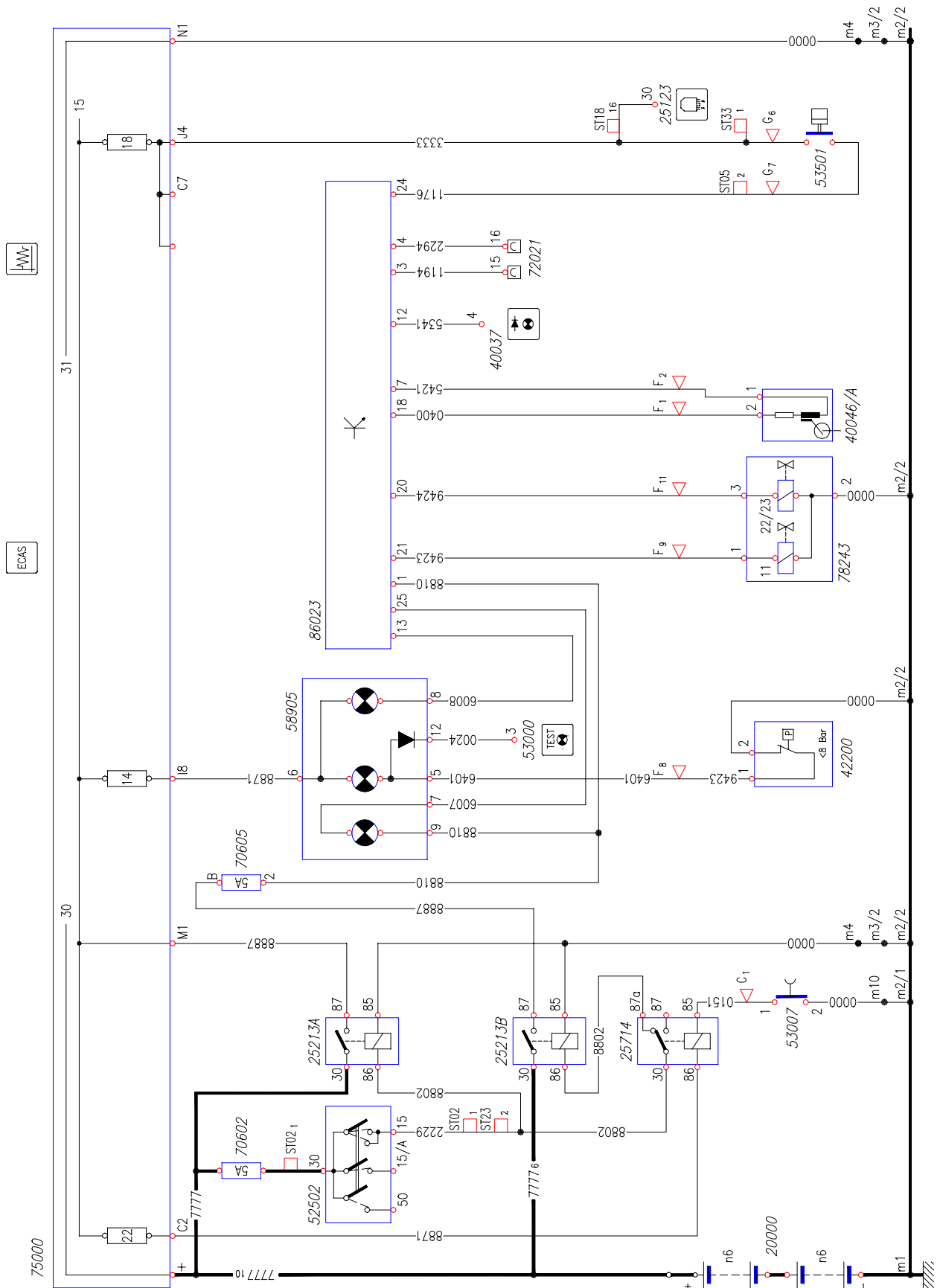


Chart No. 56: ECAS for 4X2 and tractor (ON)

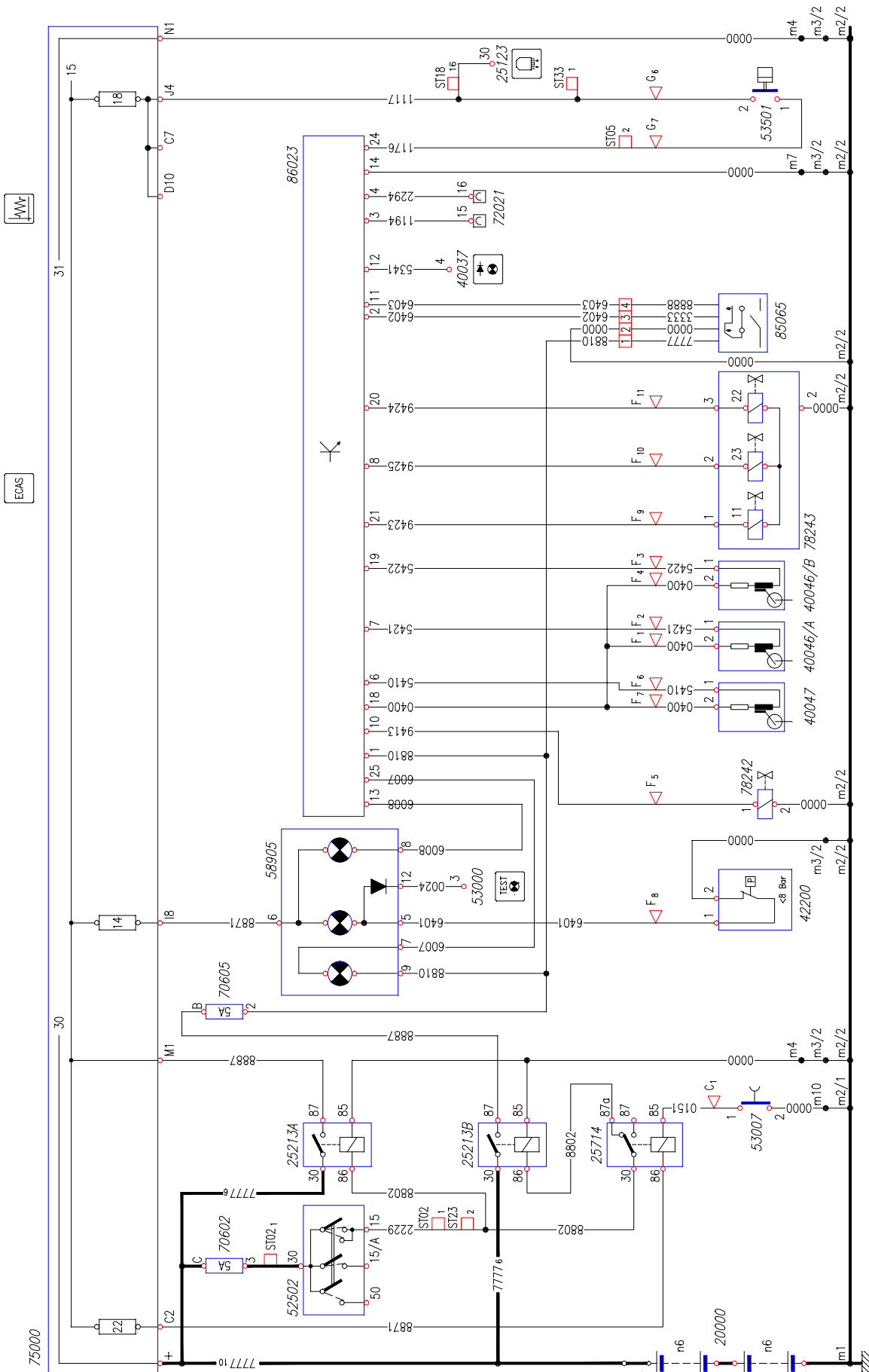


Chart No. 57: ECAS for 6X2 P/FP and PT/FT with additional hydraulic steering axis (ON)

