DEUTZ FAHR

SAME DEUTZ-FAHR DEUTSCHLAND GmbH

WORKSHOP MANUAL

AGROTRON 230 MK3
AGROTRON 260 MK3

HOW THE MANUAL IS STRUCTURED

Section 00 Contains the general safety rules, information on how to use and update the manual, the symbols used, the products required, the standard tightening torques and a conversion table for units of measurement.

Section 10 Contains technical descriptions and information regarding the mechanical and hydraulic operation of machine components, the designations of the various components, hydraulic diagrams and general technical data.

Section 20 Contains a guide to the use of the necessary software for machine and engine configuration and for diagnostic.

Section 30 Contains the methods, checks and adjustments regarding the external components; the operations dealt with in this section do not require removal of the various assemblies that form the tractor frame and cab.

Section 40 Contains information and diagrams regarding the machine's electrical and electronic systems.

ATTENTION!

This manual does not contain the engine and transmision sections.
For these sections refer to the follow manuals:

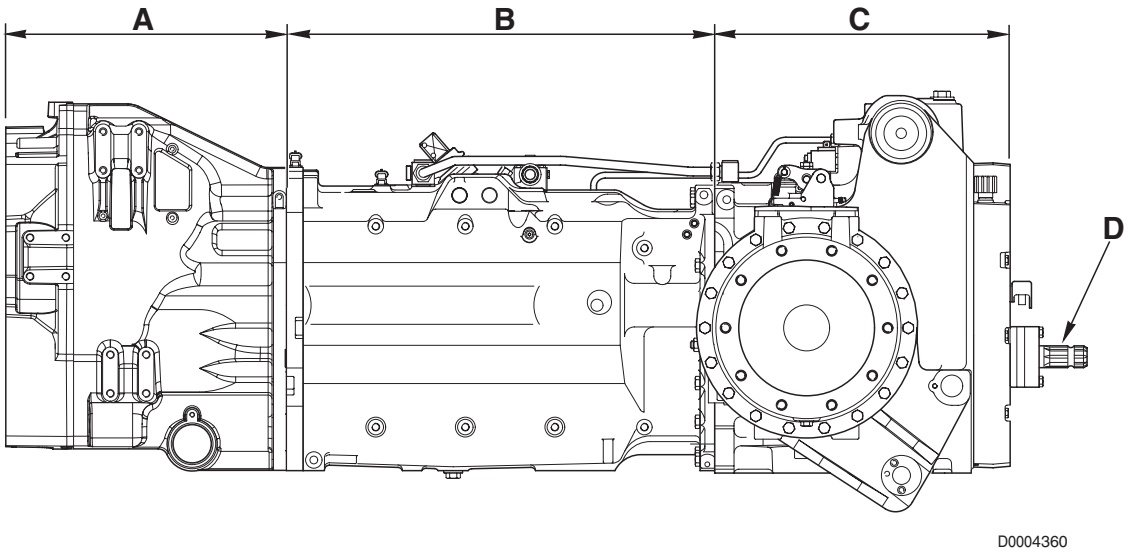
Engine DEUTZ 1012-1013 **230CV: BF6M 1013 ECP** **260CV: BF6M 1013 FC**	**0297 9771**	**Italian** **English** **French** **German**
Transmission	**5871 970 001 - 5872 966 001**	**German**
	5872 966 002	**English**
	5872 966 003	**French**
Rear axle	**5871 970 101**	**German**
	5871 970 102	**English**
Front axle ZF AS 2075	**5871 693 011**	**German**
	5871 693 012	**English**
	5871 693 013	**French**

1. TRANSMISSION

INTRODUCTION

- The AGROTON MK3 230-260 series is supplied to the customer with the POWER SHUTTLE transmission.
  In this transmission, reversal of the direction of travel is managed entirely by the electronic control unit without the operator having to depress the clutch pedal.
  This is achieved by way of a proportional solenoid valve that directly controls the main clutch.

- The transmission can be divided into the following sections:
  A. Fluid coupling
  B. Gearbox
  C. Rear axle
  D. Rear PTO



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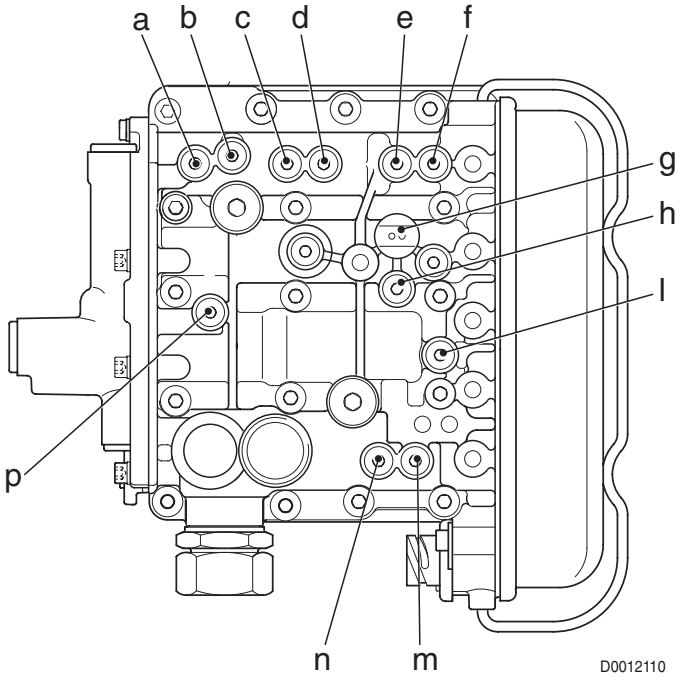
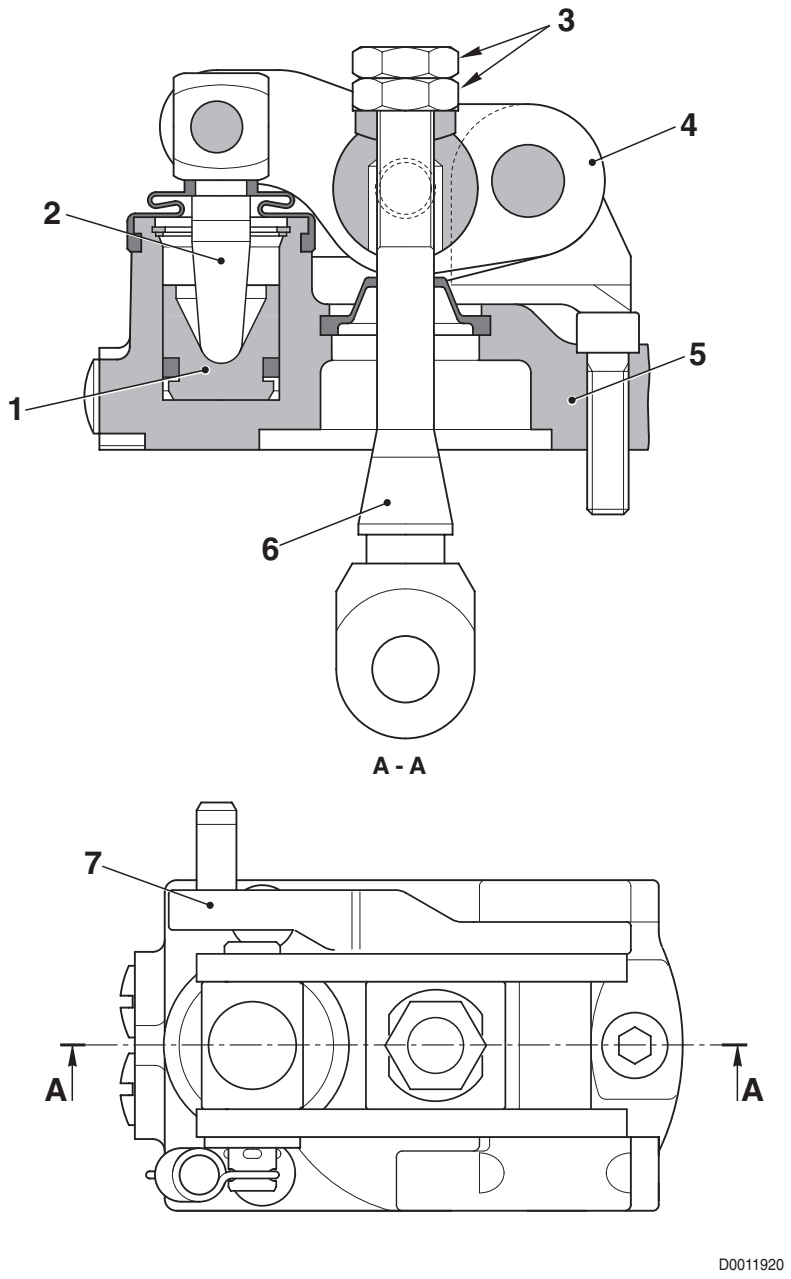
A. GEARBOX CONTROL VALVE

PRESSURE TEST POINTS



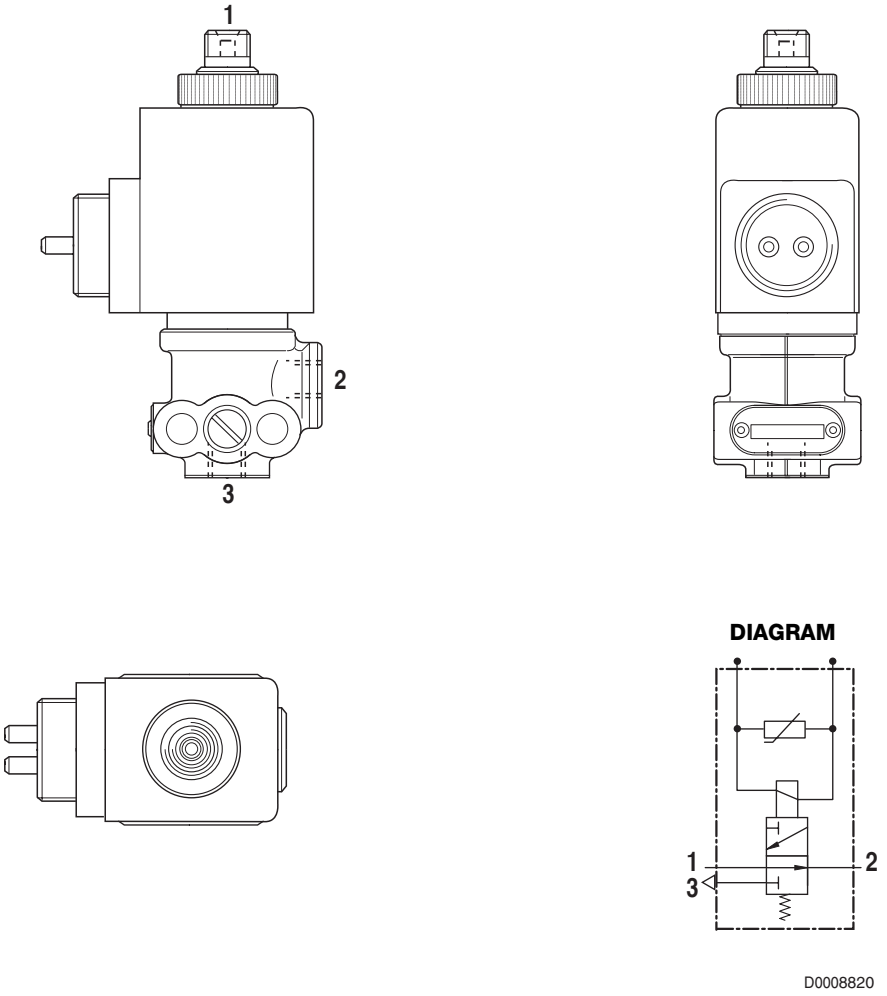
Pos.	Function	Thread size
a.	**A** or **F** clutch pressure	M10x1
b.	**B** or **G** clutch pressure	M10x1
c.	**Y3** or **Y4** solenoid valve pressure	M10x1
d.	Pressure **Pg** to relief valve	M10x1
e.	Pressure **Pr** from relief valve (18 bar)	M10x1
f.	Engagement pressure of clutch **C** or **D**	M10x1
g.	General pressure (18 bar)	M10x1
h.	Engagement pressure of clutch **A/B** or **F/G**	M10x1
l.	Pilot pressure (10 bar)	M10x1
m.	D clutch pressure	M10x1
n.	C clutch pressure	M10x1
p.	Modulated pressure	M10x1

1. Piston
2. Plunger
3. Adjustment nuts
4. Lever



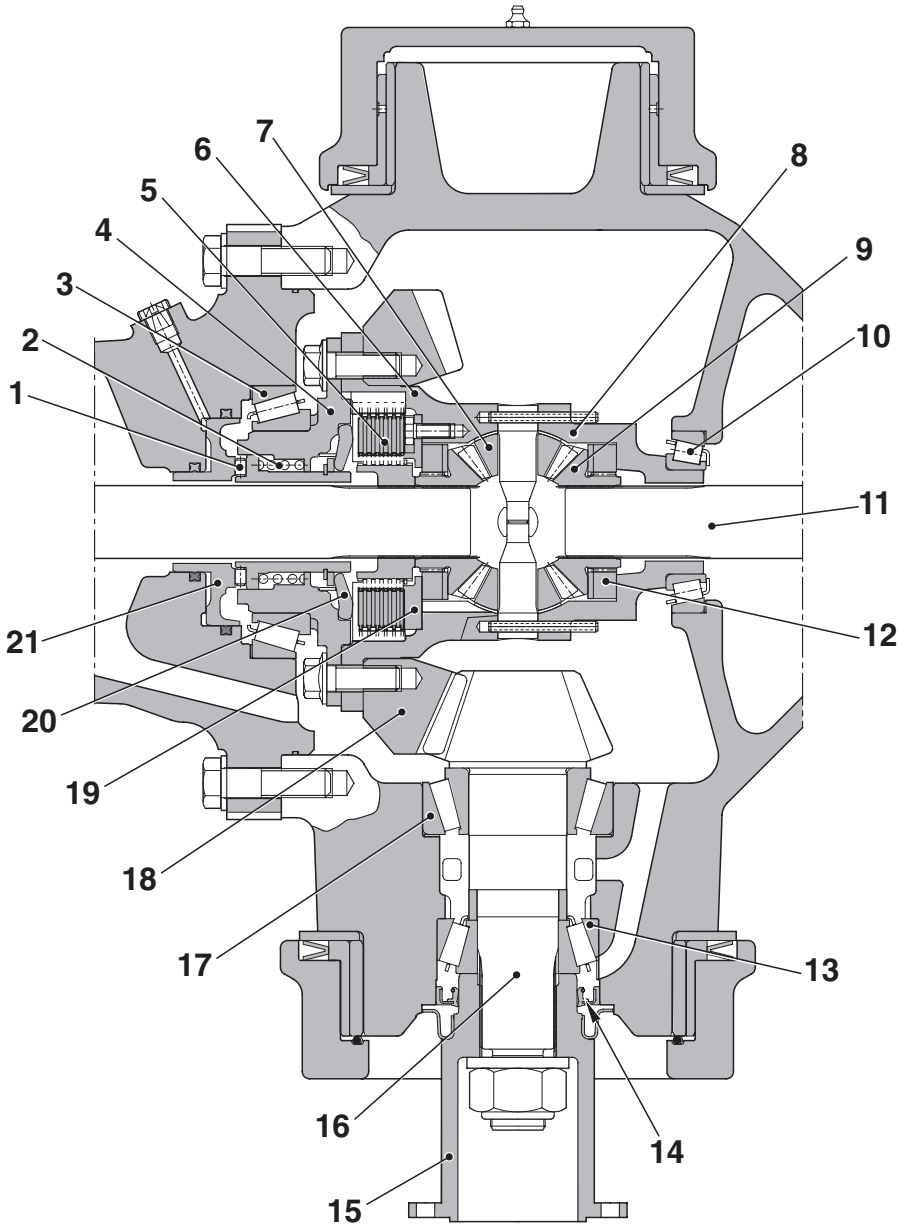
5. Support
6. Rod
7. Parking brake control lever

BRAKE APPLY SOLENOID VALVE



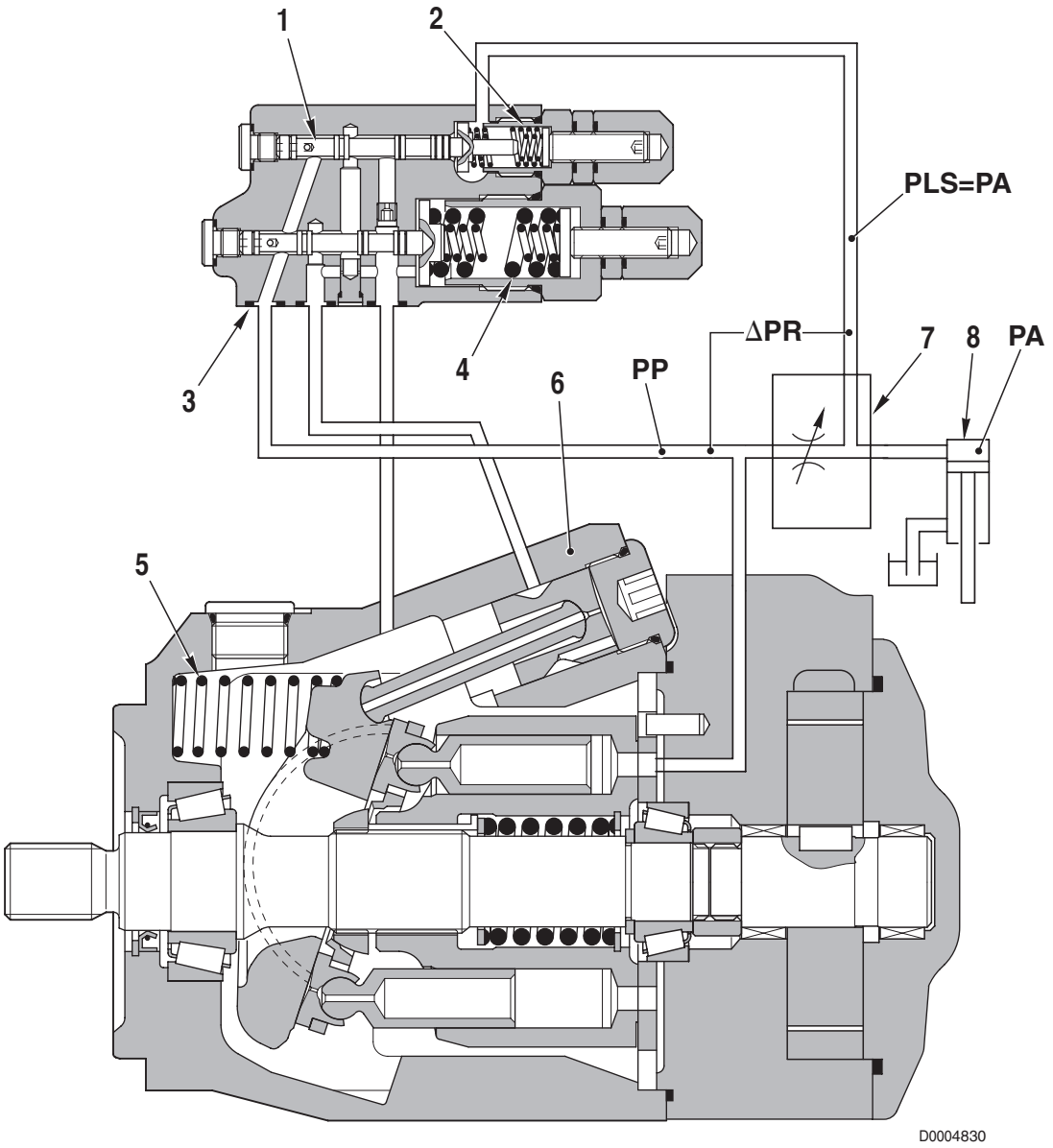
Port 1 - From compressed air reservoir
Port 2 - To trailer braking valve
Port 3 - Air exhaust

4.2 DIFFERENTIAL



1. Roller cage
2. Belleville springs
3. Bearing
4. Cover
5. Clutch plates
6. Differential cage
7. Planet pinion
8. Differential cage
9. Sun gear
10. Bearing
11. Half-shaft
12. Spacer
13. Bearing
14. Oil seal
15. Hub
16. Pinion shaft
17. Bearing
18. Crown wheel
19. Thrust plate
20. Thrust levers
21. Piston

5.1.3 LOAD SENSING VALVE, PRESSURE CUT-OFF VALVE



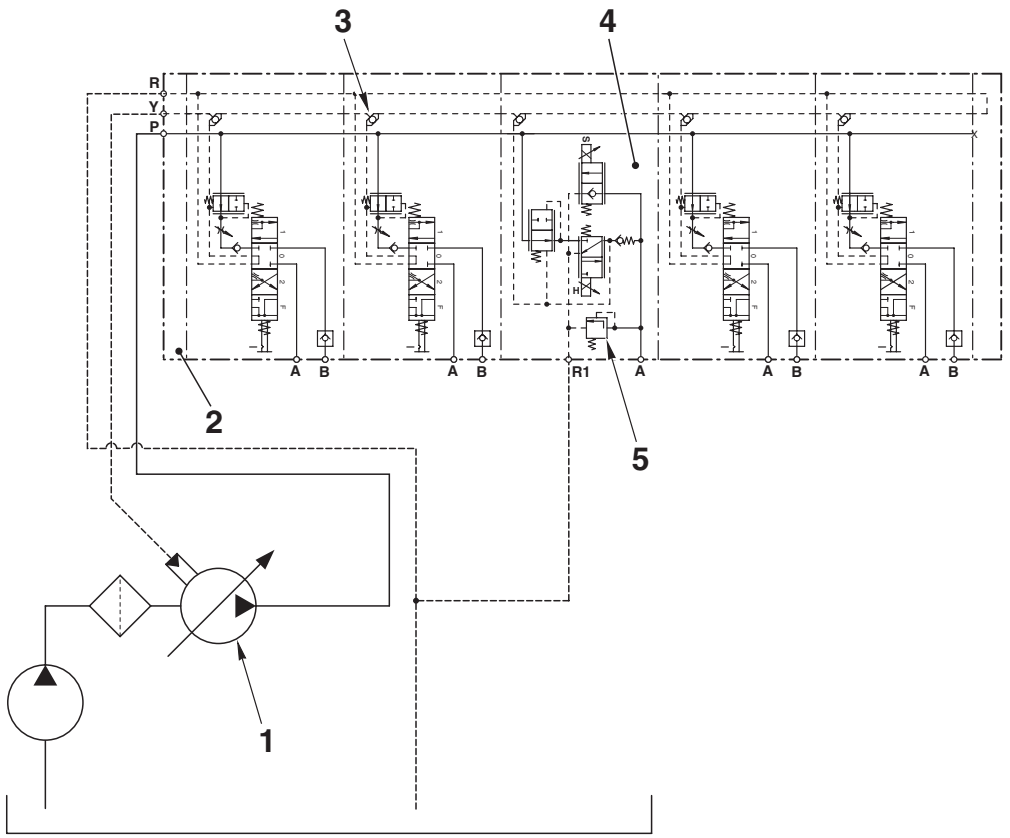
COMPONENTS

1. Load Sensing valve spool
2. Load sensing valve spring
3. Pressure cut-off valve spool
4. Pressure cut-off valve spring
5. Swash plate return spring
6. Control piston
7. Directional control valve
8. Load

5.4 AUXILIARY SERVICES CONTROL VALVE

FUNCTION

The function of the auxiliary services control valve is to control the flow of pressurised oil to the auxiliary services and the rear lift.
This control valve is of the parallel circuit Load Sensing type.



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DESCRIPTION

- The pressurised oil from the pump (1) enters the inlet section (2); from here it is distributed to the spool sections through internal passages.
- All the spools, when operated, generate a pressure signal (Load Sensing signal) that is equal to the pressure demand from each load.
  The highest of these pressure signals, selected by the bistable valves (3), is sent to the variable displacement pump through port **Y** of the control valve.
- On the lift spool section (4) there is an antishock valve (5) (on the UP control side) that serves to prevent excessive pressure caused by jolting of the implement.

SECTION 20

CONTENTS

1.8 WORKING WITH THE PROGRAM

Brief description:

1) Call SERDIA under Windows
2) Click on ECU selection in the SERDIA main screen
3) Select the ECU you require in the screen "ECU selection"
4) Select the menu point you require in the SERDIA main screen

1.8.1 MAIN SCREEN, MENU SELECTION

A predefined selection menu is displayed in the main screen. Brief description of the buttons:

Menu point	ECUs	Explanation
ECU selection	All	Selection of the required ECU. (Only one ECU can be selected at any time)
Aktuelle Actual measured values	All	Display of current actual values (also if engine not in operation, but in this case with U-Blatt)
RAM values		Only for level III
Data logger	EMS Only	Display recorder contents
Input/output assignment	All	Assignment of the signals used to the ECU pins
CAN-Status		
Parameters		
Configuration	All	Read and update configuration data
Overall programming	EMR, EMS	
Calibration	All	Calibration of measured value sensor, e.g. accelerator pedal sensor
Error memory		
Error memory	All	Copy, display and delete error memory
Function test	EMR Only	Operate actuator
Extras		
Maximum speed	EMR Only	Selection of three different maximum speeds
Logistic data	All	
Load spectrum	EMS Only	
Maintenance interval exceeded	EMS Only	
Override memory	EMS Only	
Help	All	General help for the main screen and the associated buttons

Bus Off: Counter that indicates how often the EMR has separated from the CAN bus because of constant errors (CanBusOffCounter 0 to 255, byte).toma

Status: CanOnline indicates whether the EMR is active on the CAN bus. Via the ISO 9141 interface a value 1 is sent for online and a value 0 for offline. The program SERDIA displays the text "online" (for value 1) or "offline" (for value 0).

Phase: The variable CanSetPointPhase (0 to 255, byte) is sent via the ISO 9141 interface. This variable displays the procedure with regard to time of the setpoint assignments:

Phase	Text
0	0: Engine standstill, Initialization
1	1: Engine standstill, phase! , no CAN error
2	2: Engine standstill, phase2, CAN timeout error
3	3: Engine start, ... until idling speed is recognized
4	4: Engine runs, wait for CAN setpoint
5	5: Engine runs, setpoint preset via CAN is allright
6	6: Engine runs, emergency op., setpoint preset via CAN failed
7	7: This phase doesn't exist

Error information: The EMR sends an error number CanErrorNumber (0 to 255, byte) specifically for CAN bus errors via the-ISO 9141 interface. A text is assigned in SERDIA to these numbers, which is displayed in the window of the CAN interface.

Code	Text
0	0: No fault existing
1	1: Message request not received bei controller object 15
2	2: Invalid controller object
3	3: controller object multi assignment
4	4: CAN active, but no message activated
5	5: Diagnosis object not activated
6	6: Scan rate 0 in diagnosis message
7	7: Scan rate 0 in measure value telegram
8	8: preset engine speed config.6 does not match TSC2 activation
9	9: TSC1 activated, but 'Setpoint eng. speed not set to 6’
10	10: ”GovernConf=6,neither TSC1 nor function shift is activated
11	11: GovernConf=6 & Setp.eng.speed=6', but TSC1 is not activated
12	12: TSC1 activated, but Governor config!=6
13	13: TSC1NotAct&FunctShiftAct& GovernConf.!=6 => ShiftMGovernMode!=0
14	14: TSC1Act&FunctShiftAct&GovernConf.=6'=--'ShiftMaskGovernMode!=0
100	100 Receipt message failed
101	101 Setpoint telegram failed w.eng.idle (repl, value)
102	102 Setpoint telegram missing w.eng.idle due to low battery voltage
103	103 Setpoint telegram missing after eng.start due to low battery
104	104 Setpoint telegram missing after eng,start, repl.value used
105	105 Setpoint telegram missing during eng.open, repl.value used

Time-Out errors of receipt messages require special handling. All of these are reported with an error number

To identify which message causes a Time-Out error, SERDIA proceeds as follows:

- CanRxObjActive indicates the active, i.e. actually received messages in bits.
- CanConf_bits contains the configured receipt messages in bits.

MK 3	TTG	Parameter	Unit	Min.	Max.	typ Wert	Description
Page 28: CAN: (7880)Priorities: Config. Telegr.							
		EMR: Controfler Config.		0	7	0	
		EMR: AnalogInput 1 Config.		0	7	0	
		EMR: AnalogInput 2 Config.		0	7	0	
		EMR: AnalogInput 2 Config.		0	7	0	
		EMR:PWM-Output Config.		0	7	0	
		EMR:Dig. Output Config.		0	7	0	
Page 29: CAN: (7888)Priorities: Meas. Values Telegr.							
		Fuel economy		0	7	6	
		EMR measured values		0	7	0	
Page 30: CAN: (7750)SendRepeatRate: ObjectTelegr.							
		engine temperature	ms	0	15000	0	
		Inlet/Exhaust conditions	ms	0	15000	0	
		engine fluid level/pressure	ms	0	15000	0	
		TSC1	ms	0	15000	80	
		EMR: Engine protection	ms	0	15000	100	
		EMR function shift	ms	0	15000	0	
		Request	ms	0	15000	0	
		Del. active errorsi	ms	0	15000	0	
		Del. error memory	ms	0	15000	0	
		free	ms	0	15000	0	
		EEC1	ms	0	15000	80	
		EEC2	ms	0	15000	200	
Page 31: CAN: (776S)SendRepeatRate: DiagnosisTelegr.							
		Active errors	ms	0	15000	1000	
		EMR status Dig Inputs	ms	0	15000	0	
		EMR status Dig Outputs	ms	0	15000	0	
		Engine temperature	ms	0	15000	1000	
		engine fluid level/pressure	ms	0	15000	500	
		Inlet/Exhaust conditions	ms	0	15000	500	
		engine configuration	ms	0	15000	0	
Page 32: CAN: (7788)SendRepeatRate: MeasValueTelegr.							
		Fuel economy	ms	0	15000	100	
		EMR measured values	ms	0	15000	0	
Page 33: CAN: (7900)PDU IdentPart Object Telegr.							
		engine temperature		0	65535	0	
		Inlet/Exhaust conditions		0	65535	0	
		engine fluid level/pressure		0	65535	0	
		TSC1		0	65535	0	
		EMR:Engine protection		0	65535	65283	
		EMR function shift		0	65535	0	
		Request		0	65535	59904	
		Del, active errors		0	65535	65235	
		Del, error memory		0	65535	65228	
		free		0	65535	0	
		EEC1		0	65535	61444	
		EEC2		0	65535	61443	

6. FUNCTION TEST

6.1 GENERAL

This menu item is only activated for users of access level III.
The actuator should only be operated with the engine switched off.

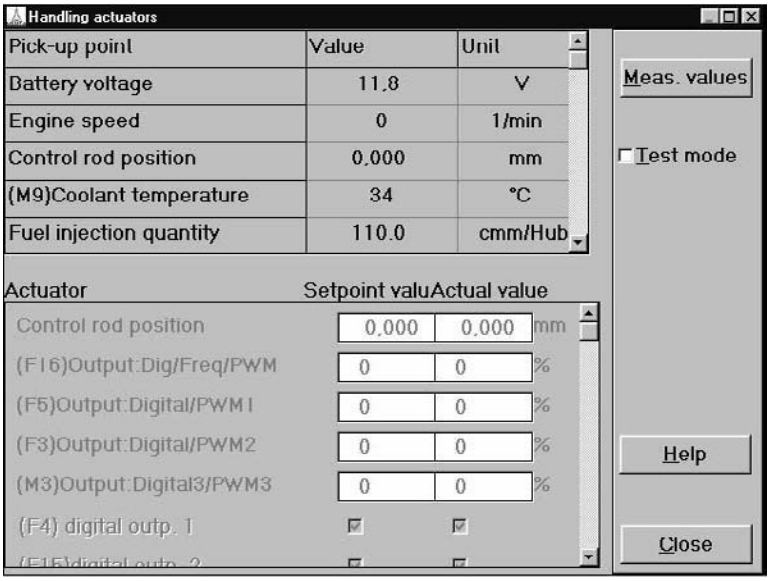


Figure: Menu for function test of EMR actuator

STRUCTURE OF THE DISPLAY WINDOW

- Measured values are displayed in the top window.
- You use the "Meas. values" switch to select those measured values you wish to display from all the measured values available (see Chapter 3 Measured values).
- In the bottom table, the setpoint values and actual values of the actuators are entered. You can only make entries in this table if the ECU has been switched to test mode.
- You switch to test mode by activating the field "Test mode". You deactivate this field in order to switch off test mode.
- You can specify values in the "Setpoint value" in test mode. The actual values are read consecutively and are displayed in the right-hand column.

CONFIGURATION:

- Call menu point "Parameters", "Configuration".
- Enter values in accordance with the table of examples shown below ("Configuration of pedal input", see below). Conversion: 5V=1023 digits.

Example: Configuration of the accelerator pedal input

Parameter	Factory setting		Actual value/ Measured value	Calibration	Configuration page 10
	[mV]	[digits]	[mV]	5V = 1023 digits	
				[mV]	[digits]
AccPedal(SWG1)up. err val.	4750	973		4357[1]	893
AccPedal(SWG1)up. ref)	4500	921	4150	4150	850
AccPedai(SWG1)lo. ref	500	102	670	670	137
AccPedal(SWG1)lo. err val.	250	51		463[2]	95

[1] Measured value "upper reference point" + 5 % (of the upper reference point)

[2] Measured value "lower reference point" - 5 % (of the lower reference point)

8.2.3 CALIBRATION OF HAND THROTTLE

The hand throttle (Pin 20 FS) is provided for vehicles and agricultural machinery. The driver has the possibility to preset a relevant engine operating speed during ploughing, for instance, and then remove his foot from the accelerator pedal. As with comparable mechanical control levers, the hand throttle control must be reset to zero (lowest engine speed) before starting.

The hand throttle control overrides the accelerator pedal and determines the minimum engine speed. Proportional to the setpoint value the speed is adjustable between low idling (LI) (e.g. 650 min"1) and rated speed (e.g. 2300 min"1). According to the hand throttle setpoint input, the engine responds analogous to the accelerator pedal. If a speed is preset, for instance, to 1500 min'1 with the hand throttle, the accelerator pedal can only increase the speed from this value.

The hand throttle control is not part of the DEUTZ scope of supply and must be programmed, however, in the EMR ex factory.

A potentiometer may be used as adjusting element and installed by the customer.

Requirement for hand throttle setpoint value (potentiometer) for installation by the customer:

- Input Pin 20 vehicle plug
- Supply of potentiometer as pedal sensor, 5V reference voltage Pin 25, and GND Pin 23.
- Load reference voltage together with accelerator pedal sensor < 25 mA.
- Protective system IP65
- Adjustment of end stops between 10% and 90% of potentiometer value.

E.g. potentiometer resistor = 5kW, the adjustment range between the mechanical stops may then be between 500W and 4500W. Such an adjustment range can be obtained by

a) Restriction of angle of rotation

b) Series resistors in the supply lines.

CALIBRATION OF HAND THROTTLE POTENTIOMETER:

ATTENTION!

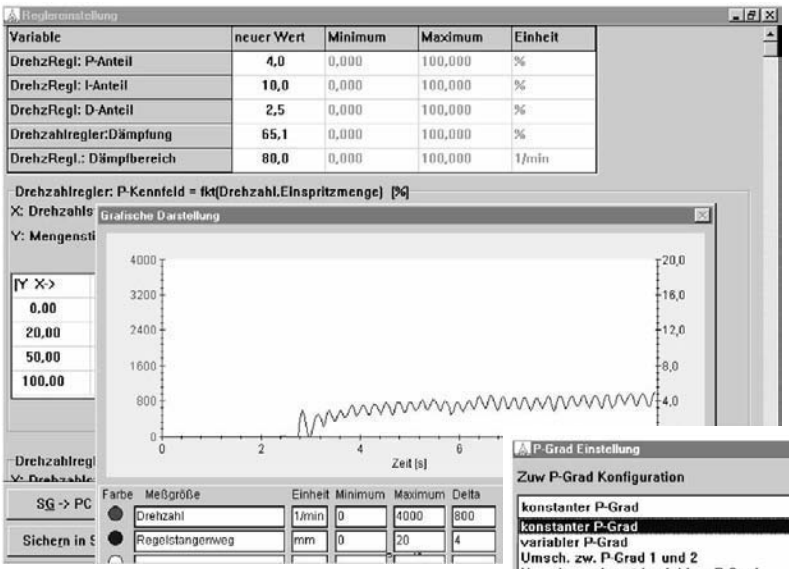
- **The two end stops of the potentiometers must be calibrated.**

It is the aim that the ECU be informed of the limit values of the two stops "Potentiometer stop LI speed" as lower reference point and "Potentiometer stop rated speed" as upper reference point. Depending on the two reference points, the "Upper error value" (+5% of the upper reference point) and the "Lower error value" (-5% of the upper reference point) must be additionally entered.

9.3 NEW SWITCH “JOBS“ FOR PERFORMING SELECTED SERVICING OPERATIONS, E.G. ADJUSTING CONTROLLER OR ADJUSTING OFFSET

The advantage of this added feature is that settings and views are visible and operator-accessible grouped together on a single screen page according to job (servicing operation), not spread over several pages as in SERDIA Vers. 2.5.

Example: “Adjusting controller“ (Reglereinstellung)



Example: "Adjusting offset“ (P-Grad Einstellung)

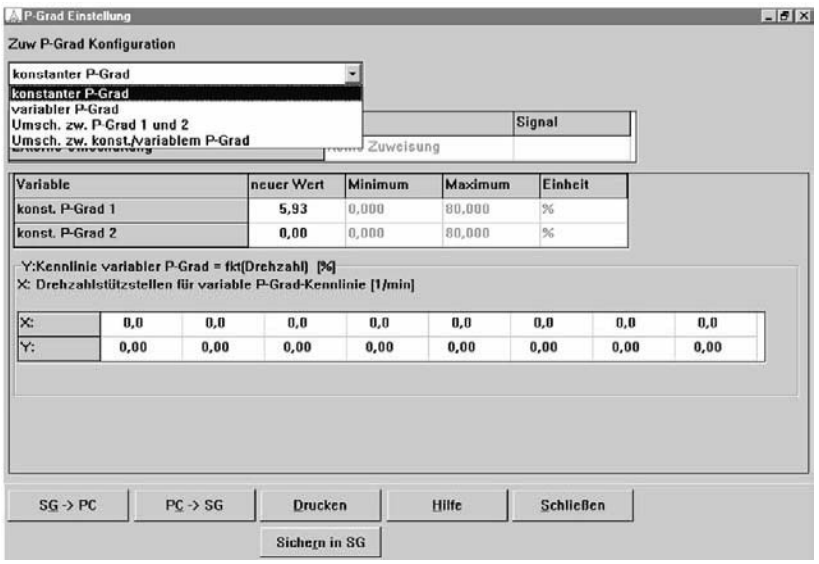


Fig. 4 - Menu Colour

- **Options > Language (Lingua)**
  Changes the communication language between user and program.

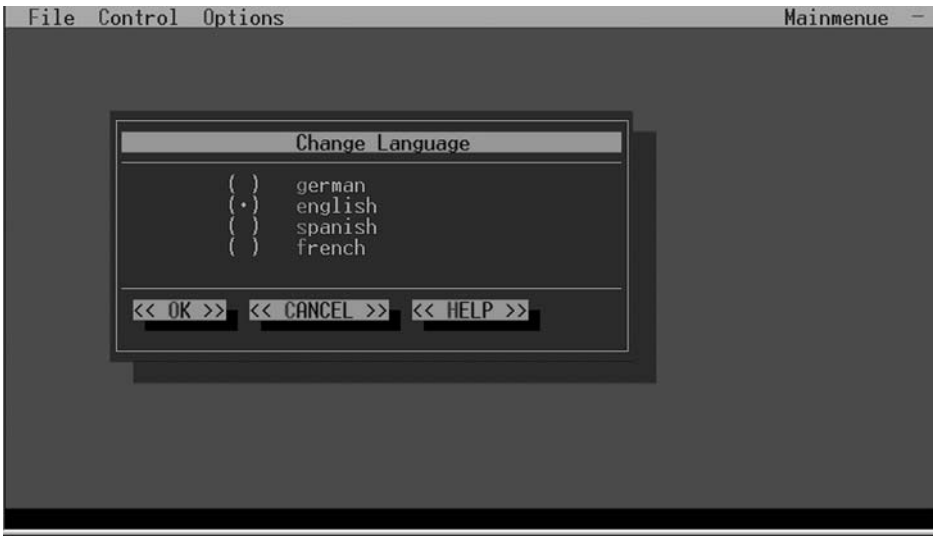


Fig. 5 - Menu Change language

- **Selection of the serial interface COM1** for the communication between control device and PC.
- **Options >Interface COM 2)**
  Selection of the serial interface COM2 for the communication between control device and PC.
- **Options > Simulated communication**
  This menu item is disabled due to safety reasons; the selection Simulation is not stored.

2.2 ONLINE HELP

The diagnosis program DEST offers the user help at any time about the current environment (context help) as well as help about the current key assignment. All help texts are stored as text files to be displayed at any time during the running program. Future supplements or changes of these texts can be carried out without problems by means of a text editor.

The user of the diagnosis program DEST has the opportunity to invoke an online help within the program context at any time:

- by means of pressing the F1 key
- by means of pressing ALT + H
- by means of clicking on the << HELP >> button with the mouse

The online help basically describes the operation of the currently active window. Further texts (e.g. a detailed description of specific control device data) can also be included.

The possible key combinations in the context are shown by means of pressing the F9 key.

- **Diagnosis > Operating-hours counter**
  This menu item enables the user to read and edit the contents of the electronic operating-hours counter. Subsequent to the initial input a window is opened in order to confirm the data. The input itself is to be carried out with decimal values in hours.

Fig. 34 - Operating-hours counter

3.5 ERROR CODE LIST WITH DESCRIPTION

Code	Error location/error cause	System reaction	possible remedy	Remarks
11	EEPROM end-of-line data invalid (contact pressure)	Operation mode NORMAL Default contact pressure	Carry out/repeat HK adjustment	• Generally upon ”new” electronic system • Self-preservation • Reserve value • Checks or plausibility invalid • Both EEPROM blocks defective no automatic restoration possible
12	Temperature sensor LU, K+	Default value: cold (HK pedal holding time, splitter holding time, slip times) No change of operation mode	Check cabling Check temperature sensor Check sensor supply Check vehicle electr. system voltage	• Possible sequence error from: • K+ HK sensor • K+ sensor supply AU1
13	Temperature sensor KM	Default value: cold (HK pedal holding time, splitter holding time, slip times) No change of operation mode	Check cabling Check temperature sensor Check sensor supply Check vehicle electr. system voltage	• Possible sequence error from: • K+ HK sensor • K+ sensor supply AU1
14	Synchronous neutral switch plausibility (Start interlock switch)	No change of operation mode	Check cabling Check neutral switch (Start interlock switch) Check speed sensor/cabling Nab, Nhk	• Self-preservation • Plausibility circuit • Nhk-SyncN-Nab
15	Warning light LU (Oil pressure/HK overspeed)	No change of operation mode	Check cabling Check lamp in disconnected state	• Diagnosis only if configured LU can only be diagnosed
16	Warning light KM (Oil pressure/HK overspeed)	No change of operation mode	Check cabling Check supply warning light	• Diagnosis only if configured • KM can only be diagnosed in disconnected state
17	Warning light K+ (Oil pressure/HK overspeed)	No change of operation mode	Check cabling Check supply warning light	•Diagnosis only if configured • KM can only bediagnosed in connected state

Code	Error location/error cause	System reaction	possible remedy	Remarks
98	Configuration error	Operation mode PERMANENT NEUTRAL	Ignition off/on Check/carry out end-of-line programming (customer, version)	• Customer programming (customer, version) invalid, not existing • Basic program not suitable for end-of-line programming - by customer
99	EEPROM end-of-line data defective (vehicle configuration)	Operation mode PERMANENT NEUTRAL	Ignition off/on Repeat end-of-line programming	• Self preservation • Checksum of the EEPROM configuration data defective. No vehicle version can be selected.

4.1.2 F1 – CONSTANTS CHANGE

By pressing the key F1 an additional window headlined “display and program constants” appears:

Fig. 53 - Display and program constants

It is possible to compare the stored constants in the Infocenter with the help of the constant list (see item 3, resp. vehicle workshop manual).

- **Procedure for changing constant values:**
  Select the desired constant value by means of the cursor keys (the corresponding line is highlighted)
  - Press the ENTER key. By doing so, another window appears in which the new value can be entered.
  - Press the ENTER key again to confirm the change and return to the constant values menu.
  When the proper values are assigned to all constants, the main menu is called again by selecting the bottom line “End constant values menu” (and pressing ENTER).

CAUTION!

The realized changes are only saved after terminating the diagnosis program and subsequently switching the ignition off and on again.

Table 1: Constant values K1 – K14

Agrotron						
Constant	**80-100 4.70 - 4095**	**105 6.01**	**106 - 135 6.00 - 6.30**	**150 6.45**	**160 - 200**	**230 - 260**
K1[1)]	3809	3675	2438	2826	1660/1440[2)]	2220/2078[3)]
K2	20				29/6[4)]	70
K3	0					
K4	210					
K5	Operating hours					
K6	1800 (mechanical engine speed controller)				4800 (electronic engine speed controller)	
K7	1000					
K8	see Table 2					
K9[1)]	3809	3675	2438	2826	1660/1440[2)]	2220/2078[3)]
K10	1000					
K11	0					
K12	6					
K13	0					
K14	0					

NOTA

1) In case of the Agrotron tractors 80 – 150 the data of K1 and K9 refer to the 30 / 40 km/h version. For the 50 km/h version these values need to be taken from **table 3** and are to be entered accordingly.
2) Until month of construction 01/99: 1660, from month of construction 01/99 on: 1440
3) The constant values K1 and K9 for Agrotron 230/260 need to be chosen according to the tyre size (group 1; group 2) as stated in **table 4**.
4) 29: with factory mounted sensor
   6: with upgraded sensor (assembly set 04426723)

				S	E	N	S	O	R	S					
=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
				P	O	S	I	T	I	O	N				
X	.	X	X	V						X	X	X	.	X	%
			D	R	A	F	T		R	H					
X	.	X	X	V						X	X	X	.	X	%
			D	R	A	F	T		L	H					
X	.	X	X	V						X	X	X	.	X	%
				E	X	T	E	R	N	A	L				
X	.	X	X	V						X	X	X	.	X	%
[	E	]	E	x	i	t									

1.5 SENSORS

This screen page displays the voltages (V) supplied to the position sensors, the right and left draft sensors and the external sensor.
It also displays the lift position (%) and the signals from the draft sensors and the external sensor.

The values displayed are:

POSITION: 0–5 V - 0–100%

RH DRAFT - LH DRAFT - EXTERNAL: 0–8 V - 0–100%

NOTE

With no implement attached, the percentage values for the left and right draft sensors should be approximately 50%.

Press **E** to exit this menu.

P	A	R	A	M	E	T	R	E	R	S		M	E	N	U
=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
1	-	S	p	e	e	d		c	o	n	s	t	a	n	t
2	-	O	p	t	i	o	n	s							
=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
[	E	]	E	x	i	t									

2. PARAMETERS

1 - **Speed constants:** in this menu you can configure the radar and tyre parameters.

2 - **Options:** this menu allows you to enable or disable the optional functions/devices on the tractor.

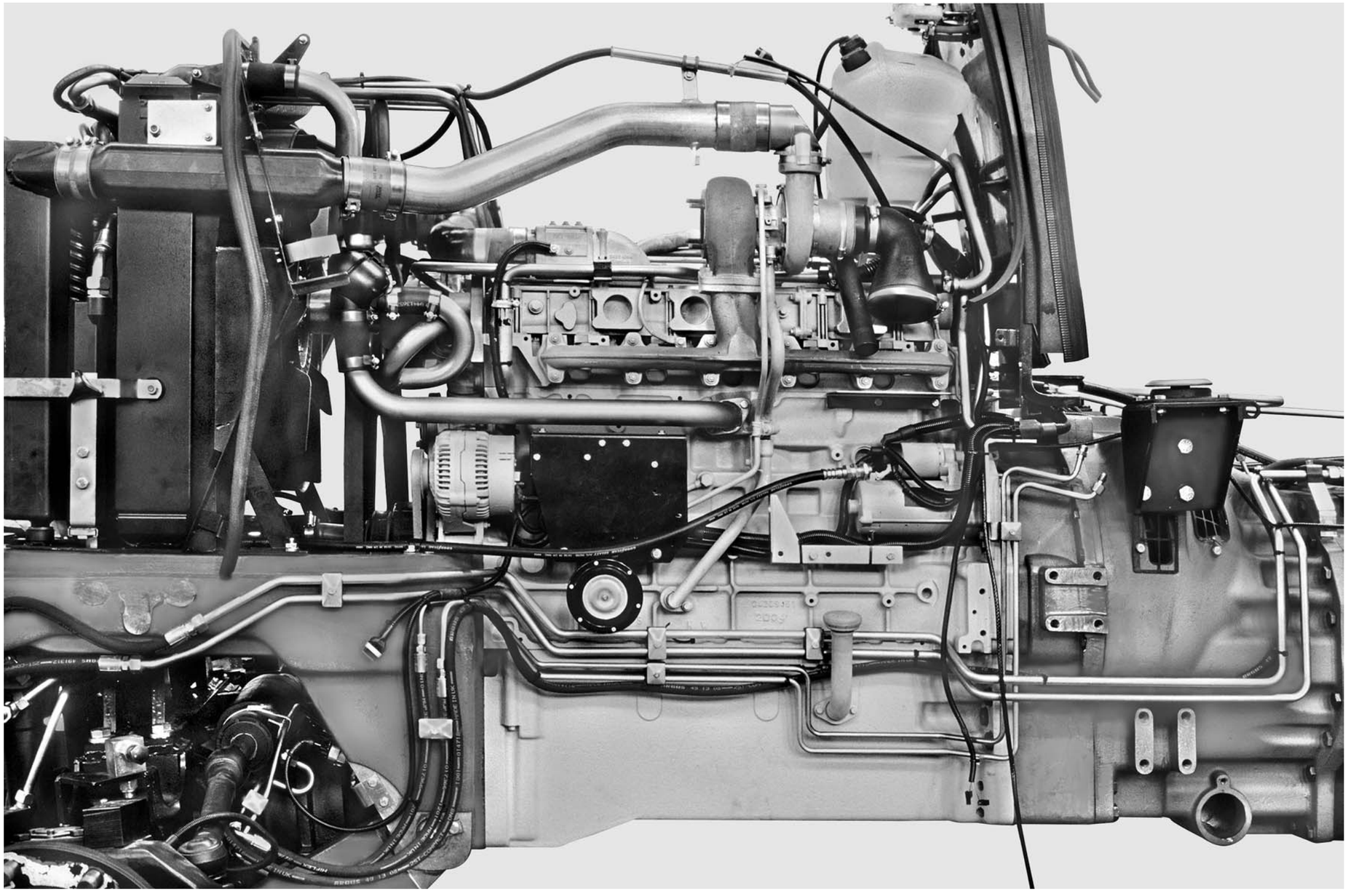
Press **E** to exit this menu.

SECTION 30

CONTENTS

IMPORTANT! Assemblies are arranged by subject and are listed in alphabetical order

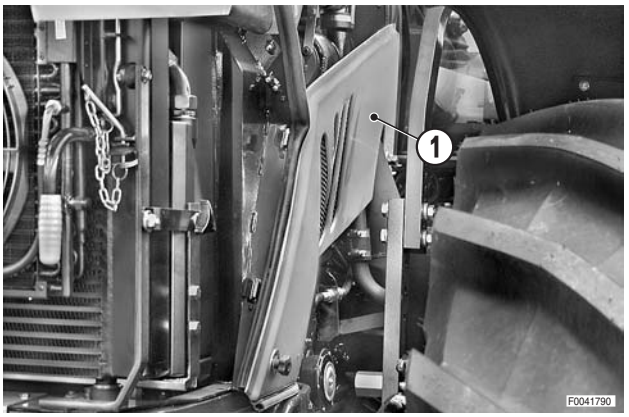
DETAIL OF FRONT LEFT-HAND SIDE



REMOVAL OF THE STARTER MOTOR

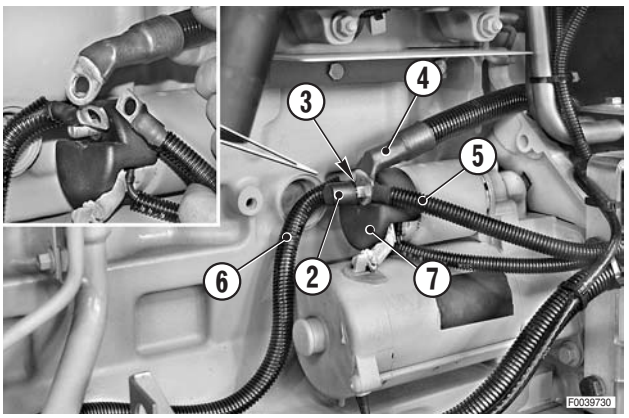
⚠ Disconnect the lead from the negative terminal (–) and apply the parking brake.

1 - Remove the left hood side panel (1).



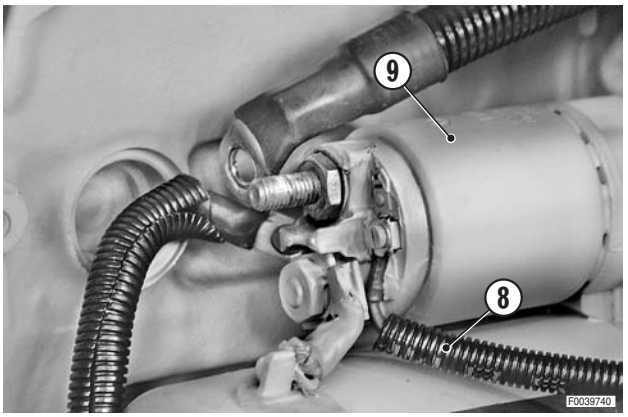
2 - Remover the cover (2) and the retaining nut (3) of leads (4), (5) and (6).

3 - Remove the cover (7).



4 - Disconnect the cable (8).

5 - Remove the starter motor (9).
For details, see the engine manual.

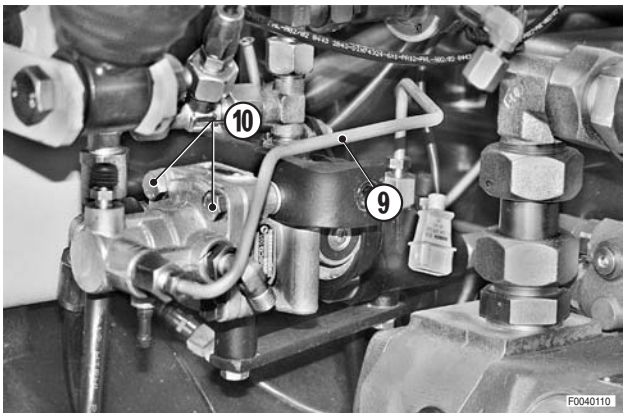


REFITTING THE STARTER MOTOR

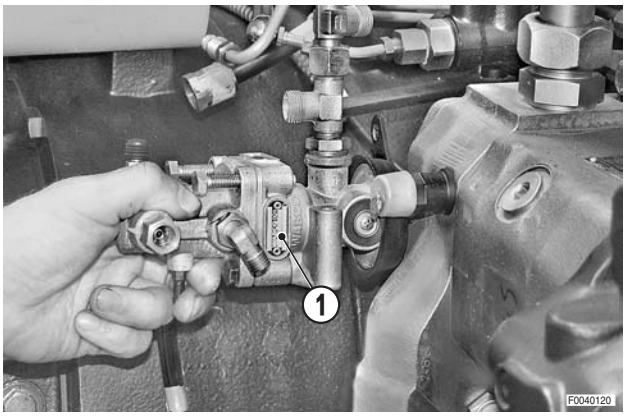
- Refitting is the reverse of removal.

4 - Disconnect the pipe (9) from the valve.

5 - Remove the bolts (10).

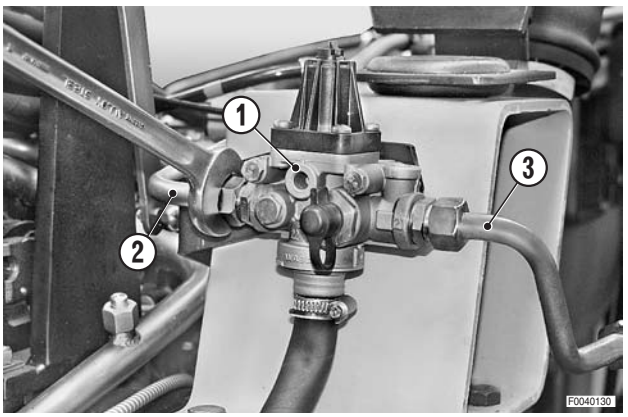


6 - Remove the complete 2-way valve (1).

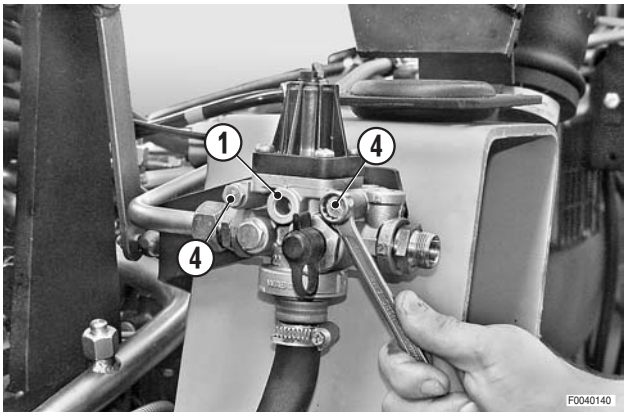


4. Pressure regulating valve

1 - Disconnect the pipe compressor connection pipe (2) and the delivery pipe (3) to the reservoir from the valve (1).



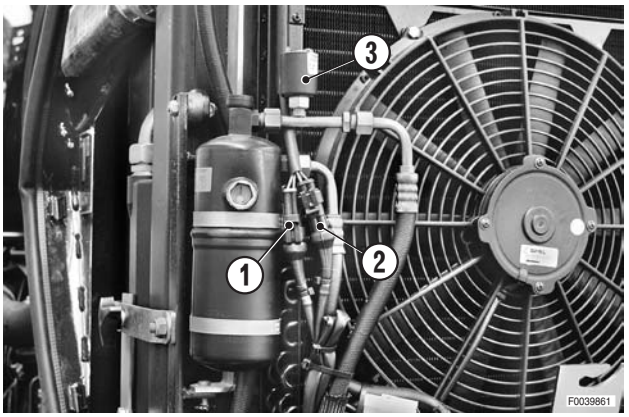
2 - Remove the bolts (4) and remove the valve (1).



REMOVAL OF THE RECEIVER-DRIER

1 - Recover the refrigerant from the system.
(For details, see «MAINTENANCE OF THE AIR CONDITIONING SYSTEM»).

2 - Disconnect the connectors (1) and (2) of the pressure switch (3).

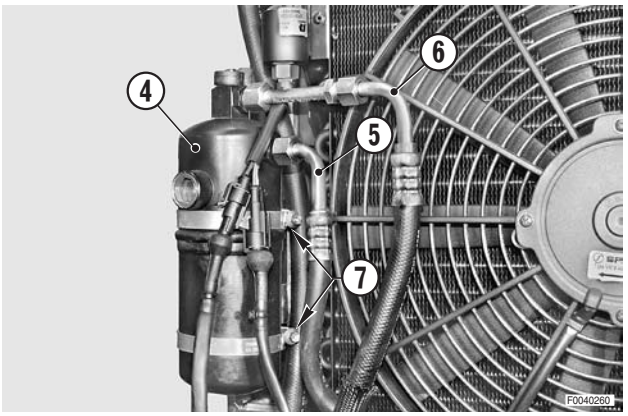


3 - Disconnect the inlet (5) and outlet (6) pipes from the receiver-drier (4).

★ Plug the ends of the pipes immediately to prevent moisture getting into the system. ※ 1

4 - Loosen the filter retaining clamp (7) and remove the unit.

⚠ If a new receiver-drier is to be installed, measure the quantity of oil contained in the old unit in order to determine the quantity of oil to be added to the system.



REFITTING THE RECEIVER-DRIER

• Refitting is the reverse of removal.

※ 1

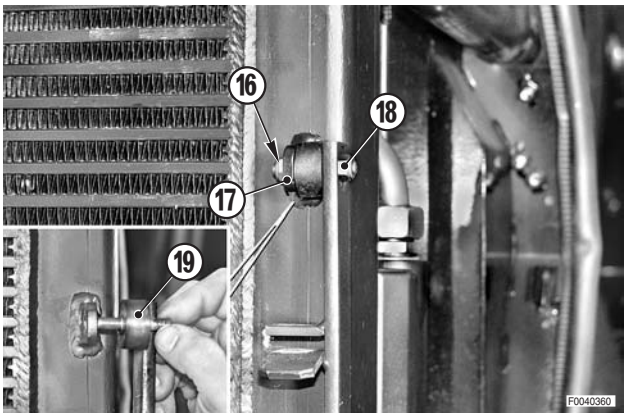
★ Remove the plugs and connect the pipes immediately, fully tightening the fittings, to prevent the entry of moisture.

★ Check the condition of the O-rings and replace them if damaged.

1 - Flush and recharge the system.
(For details see «DISCHARGING, FLUSHING AND RECHARGING THE AIR CONDITIONING SYSTEM»).

9 - Remove the nuts (16) securing the intercooler to the bracket (17).

10 - Remove the nuts (18) and the rubber vibration dampers (19).



11 - Remove the intercooler (20), withdrawing it in an upwards direction.

REFITTING OF THE INTERCOOLER

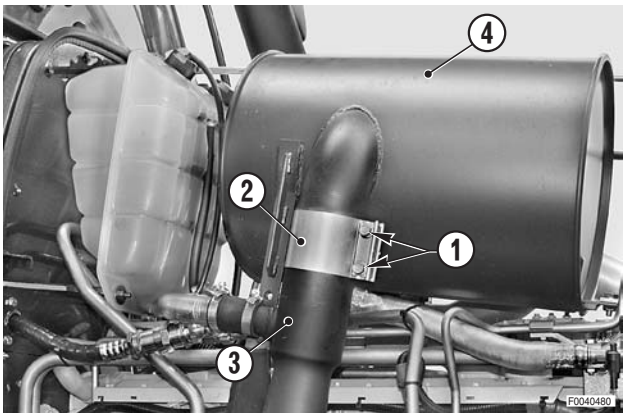
- Refitting is the reverse of removal.

REMOVAL OF THE SILENCER

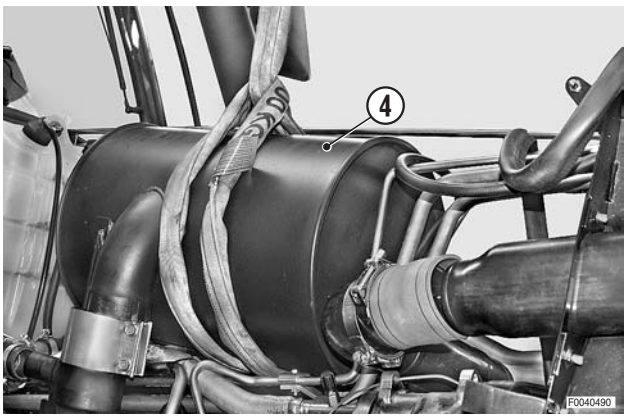
⚠ 1 - Allow the engine to cool to below 45 °C.

2 - Remove the key from the ignition and apply the parking brake.

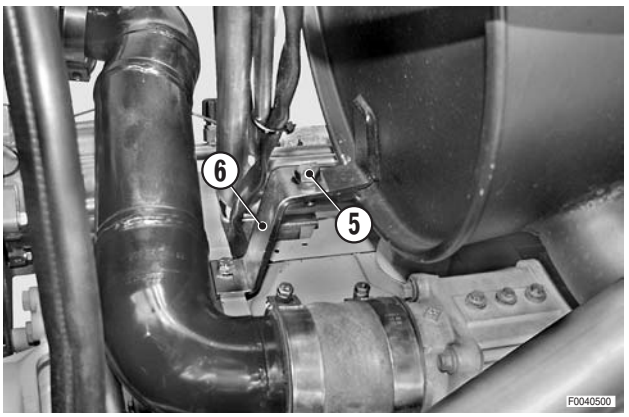
1 - Loosen the screws (1) and move the clamp (2) between the exhaust (3) and the silencer (4).



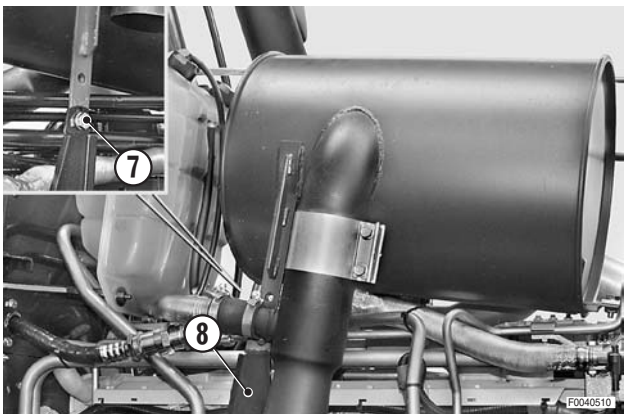
2 - Attach a hoist to the silencer (4) and put the lifting sling under slight tension.



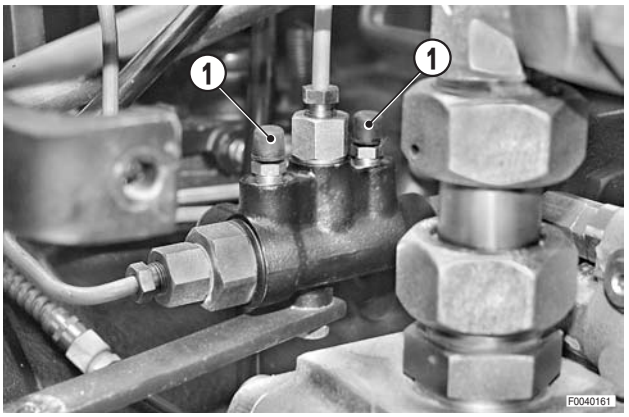
3 - Remove the bolt (5) and detach the silencer from the left-hand bracket (6).



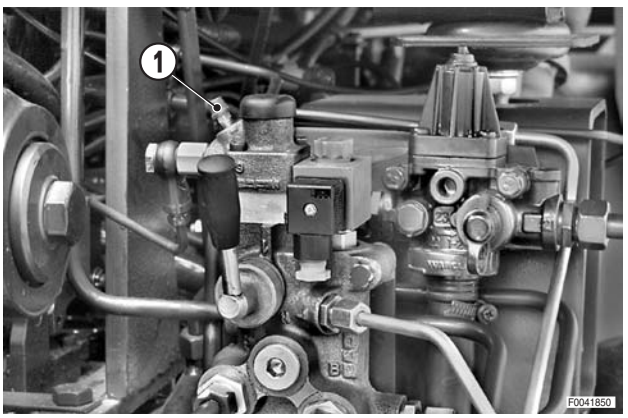
4 - Remove the bolt (7) securing the silencer to the front bracket (8).



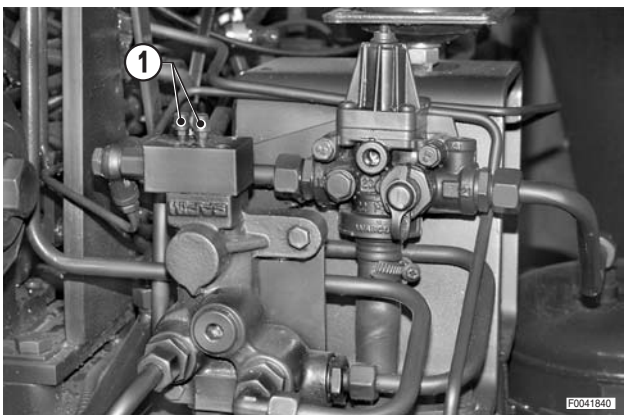
B - Pilot valve.



C - Hydraulic braking valve (CUNA).



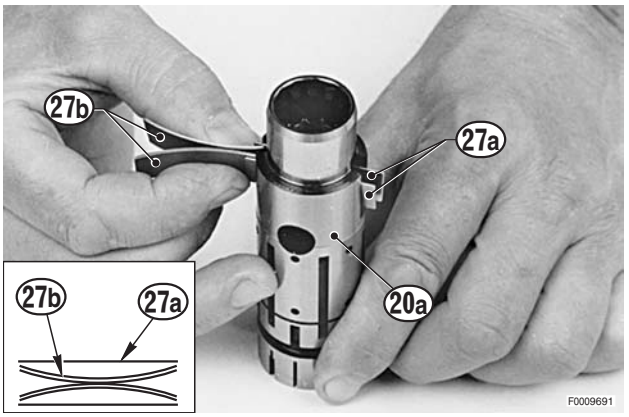
D - Hydraulic braking valve (EXPORT).



ASSEMBLY OF THE POWER STEERING UNIT

★ Before assembly, lubricate all components with gearbox oil.

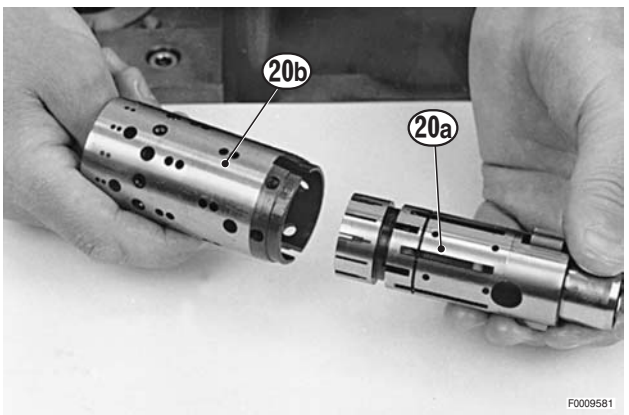
1 - Insert the two flat springs (27a) and position them centrally relative to the diameter of inner sleeve of the spool (20a). Insert the four curved springs (27b), arranged in pairs, between the two flat springs (27a) and push them in fully.



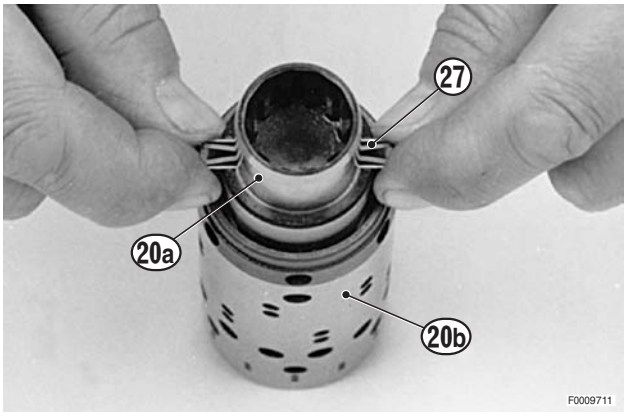
2 - Align the springs (27).

3 - Insert the inner sleeve (20a) in outer sleeve (20b).

★ Check that the relative positions of the inner and outer sleeve are as described in stage 1.



4 - Simultaneously push the springs (27) and the inner sleeve (20a) so that the springs locate in the outer sleeve (20b).

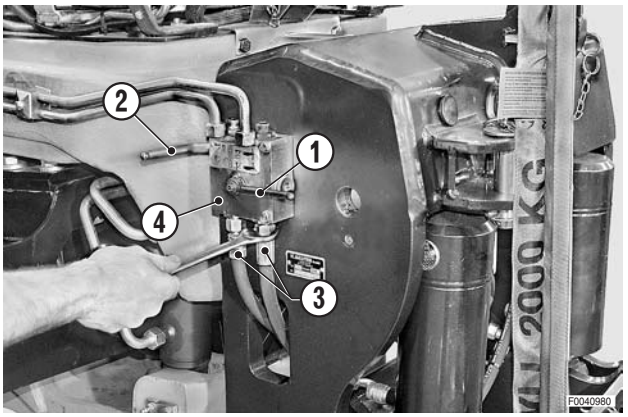


REMOVAL OF THE FRONT LIFT VALVE BLOCK

⚠ Fully lower the lift and switch off the engine.

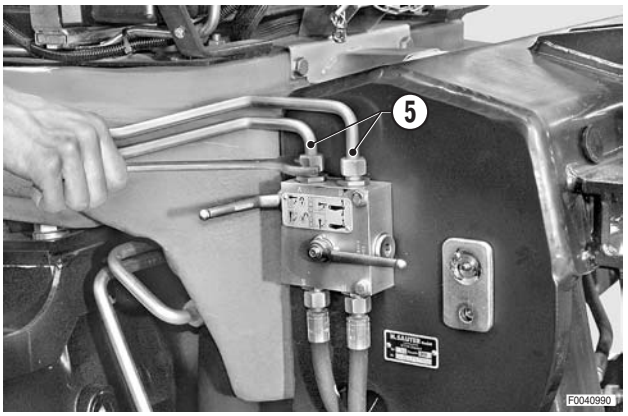
1 - With the control levers (1), (2) in the horizontal position, label the lower pipes (3) and disconnect them from the valve block (4).

★ Label the pipes to avoid confusion on reconnection.

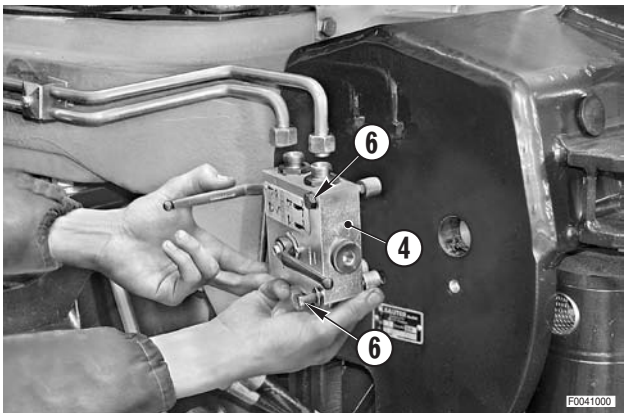


2 - Disconnect the rigid upper pipes (5).

★ Plug the ends of the pipes to prevent the entry of contaminants.



3 - Unscrew the bolts (6) and remove the valve block (4).

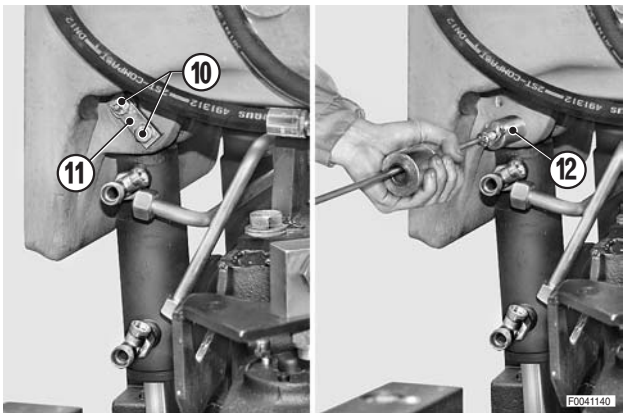


REFITTING THE LIFT VALVE BLOCK

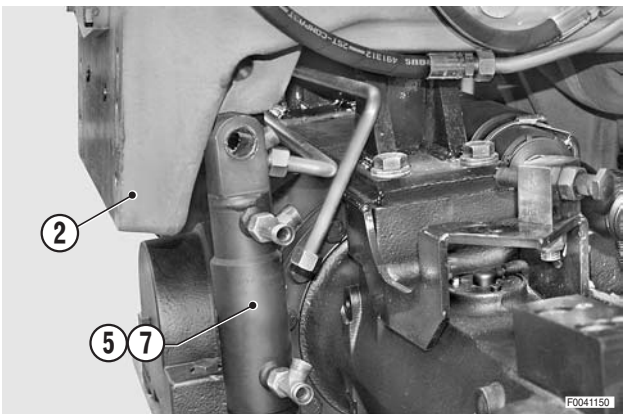
- Refitting is the reverse of removal.

8 - Remove the bolts (10) and the retaining bars (11) of the upper pivot pins.

9 - Using a slide hammer puller, remove the upper pivot pins (12).

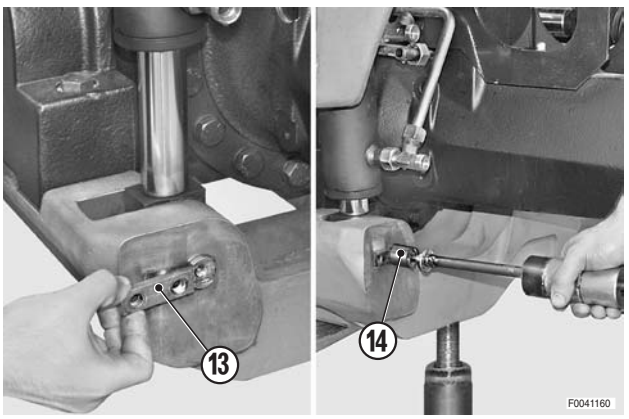


10 - Lower the swinging support (2) to release the upper mountings of the cylinders (5) and (7).

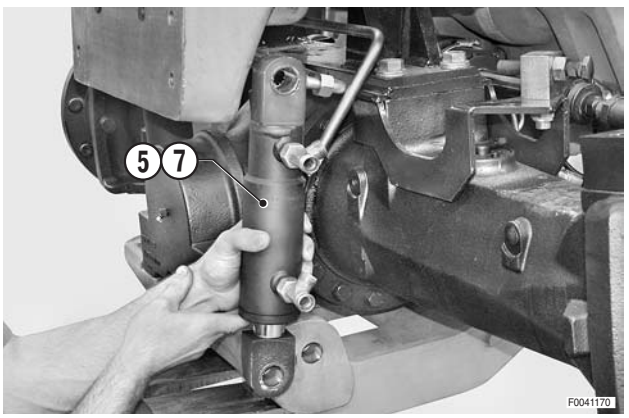


11 - Remove the retaining bars (13) of the lower pivot pins.

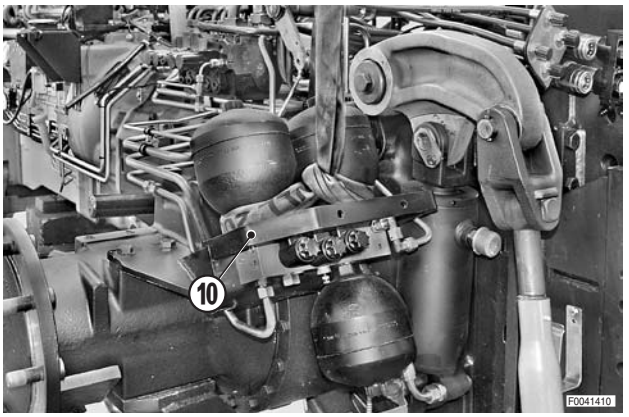
12 - Using a slide hammer puller, remove the lower pivot pins (14)



13 - Partially retract the pistons and remove the cylinders (5) and (7).

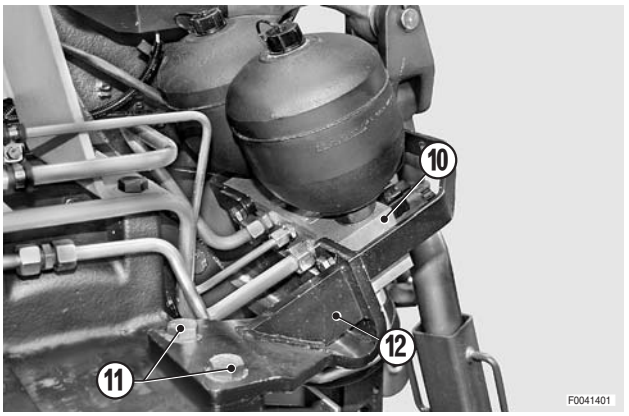


4 - Attach the assembly (10) to a hoist and take up the slack in the lifting sling.



5 - Unscrew and remove the bolts (11); remove the solenoid valve assembly (10) complete with the support (12).

kg Complete assembly: 25 kg (55 lb.)



REFITTING THE FRONT SUSPENSION SOLENOID VALVES

- Refitting is the reverse of removal.

1 - Start the engine and repeatedly activate and deactivate the front suspension using the pushbutton in the cab in order to expel any air from the system and check for leaks.

2 - Stop the engine, check the gearbox oil level and top up if necessary.

REMOVAL OF THE PRIORITY VALVE

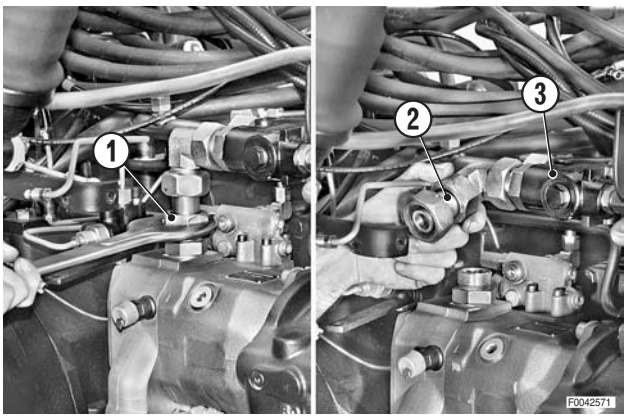
⚠ Remove the key from the ignition and apply the parking brake.

★ Immediately plug the ends of the pipes to prevent contaminants from entering the system

1 - Remove the right rear wheel.
(For details, see "REMOVAL OF THE REAR WHEELS").

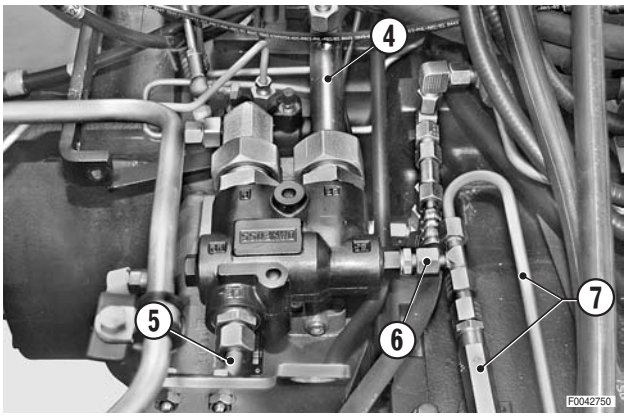
2 - Thoroughly clean the area around the priority valve before commencing removal.

3 - Loosen the fitting (1) of the pump delivery pipe (2) and disconnect the pipe from the priority valve (3).



4 - Disconnect from the valve (3):
- a - the delivery pipe (4) to the remote services control valve.
- b - the delivery pipe (5) to the power steering.
- c - the fitting (6) of the LS signal pipes (7).

5 - Remove the priority valve (3).



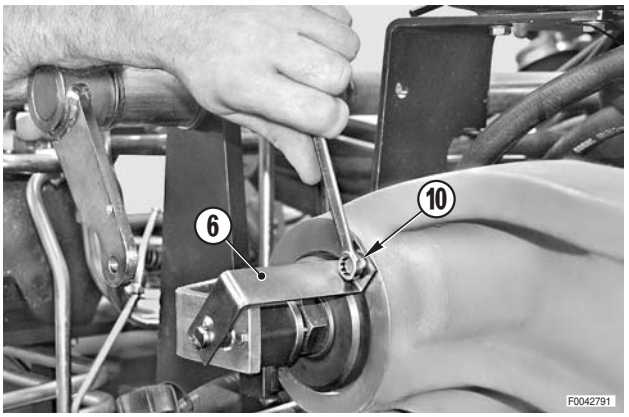
REFITTING THE PRIORITY VALVE

• Refitting is the reverse of removal.

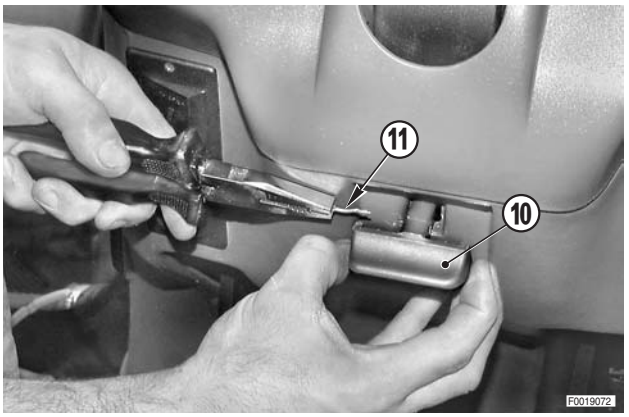
1 - Start the engine and turn the steering wheel back and forth between the full lock positions to expel all air from the steering system and the LS circuit and check for leaks.

5 - Tighten the bolt (10) to secure the bracket (6) and check the adjustment by raising the lift in automatic mode; if necessary, move the bracket again following the procedure described above.

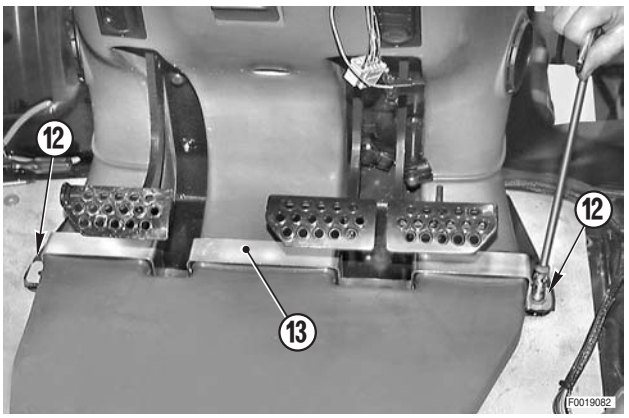
6 - Complete the reassembly by refitting cover and attaching the parking brake lever return spring.



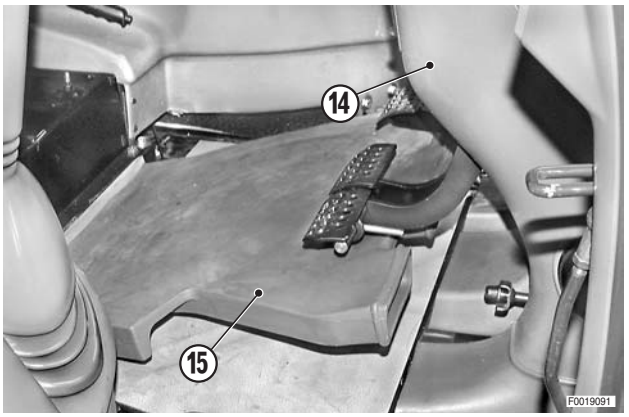
9 - Fully lower the steering column.
Pull outwards the lock handle (10) of the steering tilt adjustment; remove the cotter pin (11) and remove the handle.
★ Renew the cotter pin at each reassembly.



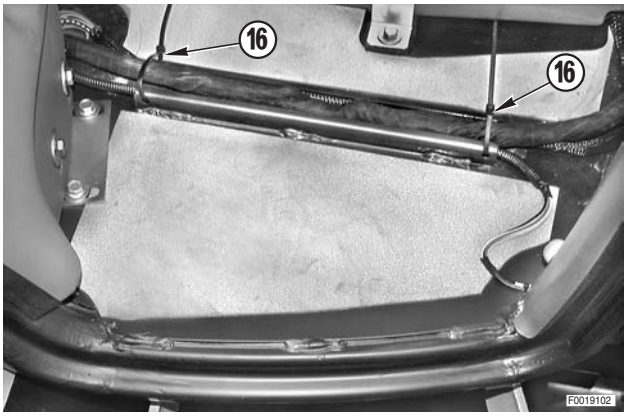
10 - Unscrew and remove the retaining screws (12) of the air duct fascia (13). ※1



11 - Detach the air duct (15) from the centre shroud (14) and remove it.



12 - Remove the cable ties (16) to release the wiring from the guide fixed to the footplate.
★ Note that the cable ties are located in grooves.

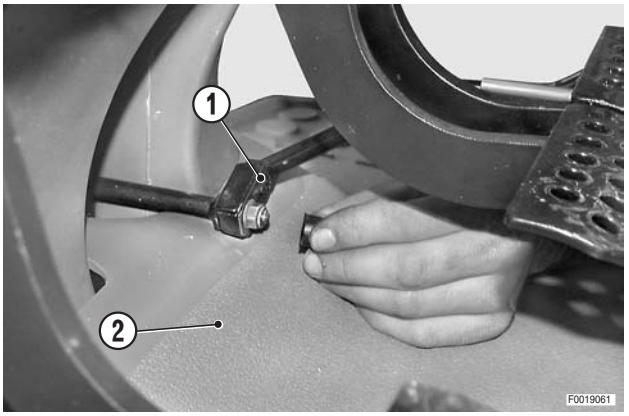


REMOVAL OF THE LEFT-HAND CONSOLE

⚠ Remove the battery cover and disconnect the negative battery lead (–).

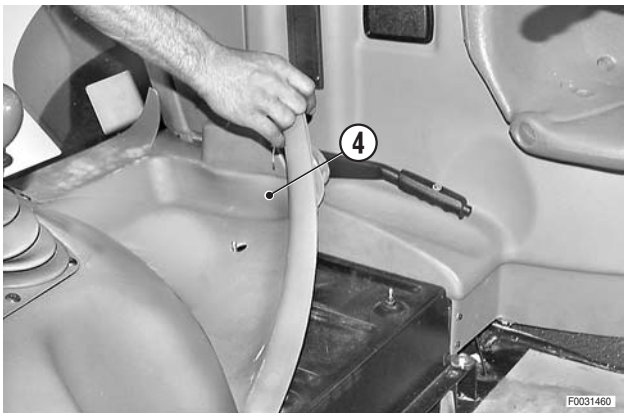
1 - Remove the seat. (For details, see «REMOVAL OF THE DRIVER'S SEAT»).

2 - Remove the accelerator pedal (1) and remove the front floor mat (2).



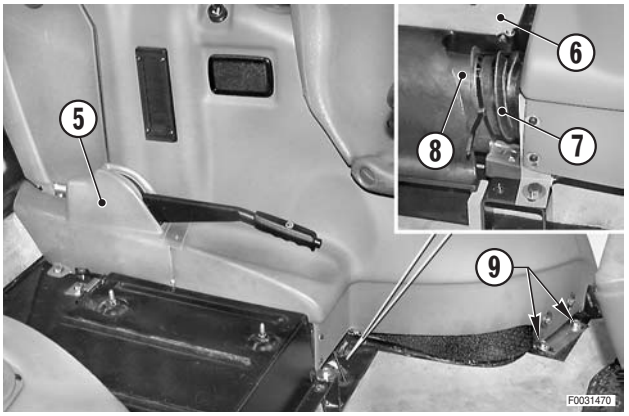
3 - **Only where fitted.**
Remove the passenger seat (3).

4 - Remove the rear floor mat (4).



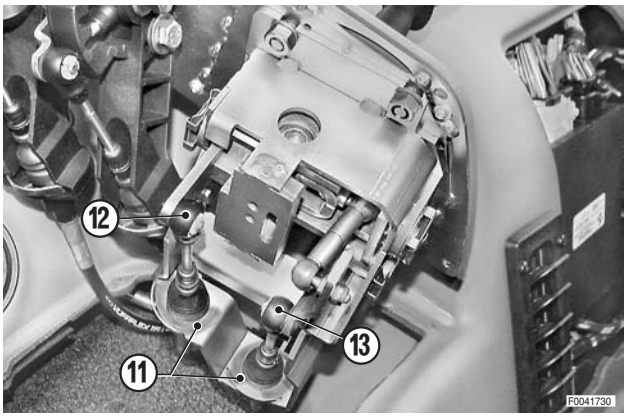
5 - Remove the parking brake cover (5).

6 - Remove the seat support (6) and remove the strap (7) to disconnect the hose (8).
Remove the screw (9).

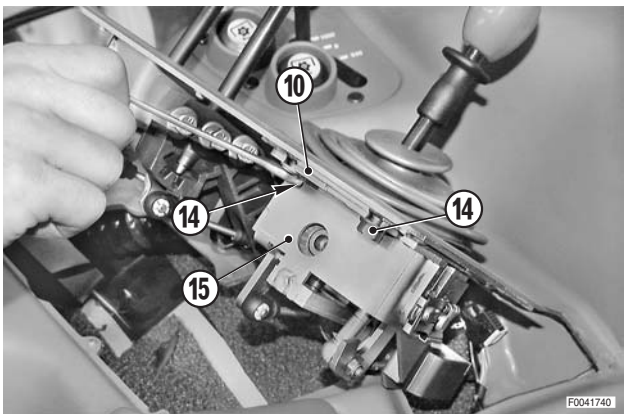


3. Removal of the cross-gate control levers assembly

1 - Remove the yokes (11) securing the outer cables and disconnect the cables (12) and (13). ⁘ 1
★ Label the control cables to avoid confusion on reconnection.

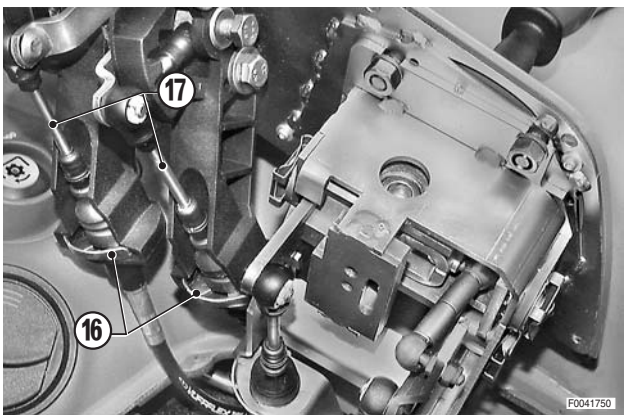


2 - Unscrew and remove the retaining nuts (14) and washers; withdraw the control assembly (15) from the panel (10).

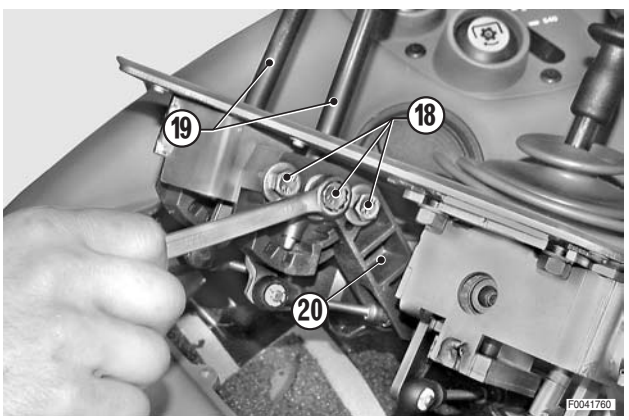


4. Removal of the individual control levers

1 - Remove the yokes (16) securing the outer cables and disconnect the cables (17). ⁘ 1
★ Label the control cables to avoid confusion on reconnection.



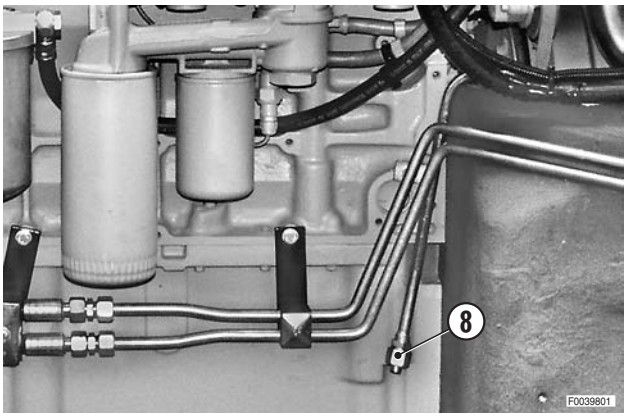
2 - Unscrew and remove the bolts (18) and their washers and remove the levers (19) and the lever pivot supports (20).



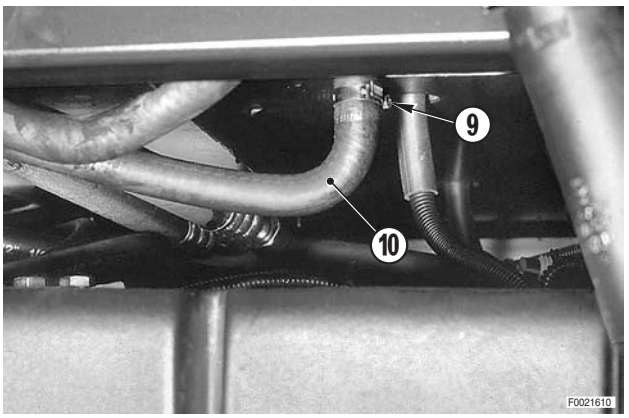
7 - Turn the heater control knob fully to the MAX position (red section). Drain the coolant from the engine cooling system and from the heater matrix by unscrewing the drain plug (8).

Coolant: approx. 34 ℓ (9 US.gall.)

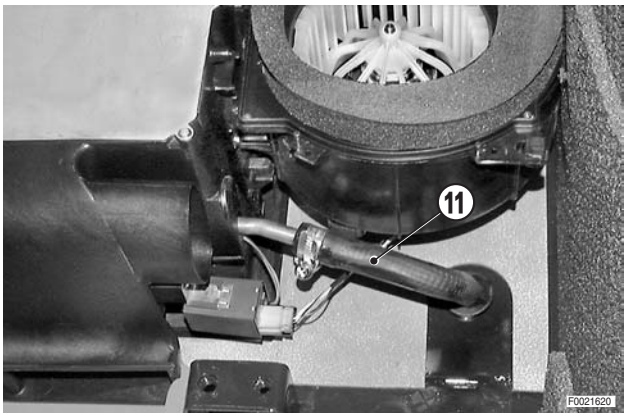
8 - Remove the evaporator.
(For details, see «REMOVAL OF THE AIR CONDITIONING EVAPORATOR»).



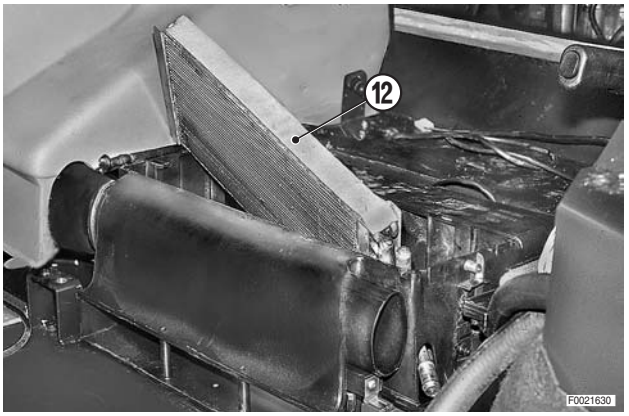
9 - Remove the hose clamp (9) and disconnect the vertical return hose (10) from the matrix.



10 - Remove the hose clamp and disconnect the horizontal delivery pipe (11) from the matrix.



11 - Remove the matrix (12) by lifting the right side vertically and then rotating it towards the rear of the tractor.

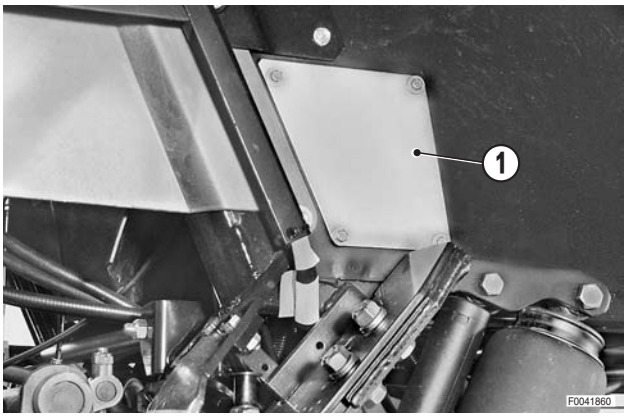


REMOVAL OF THE CAB

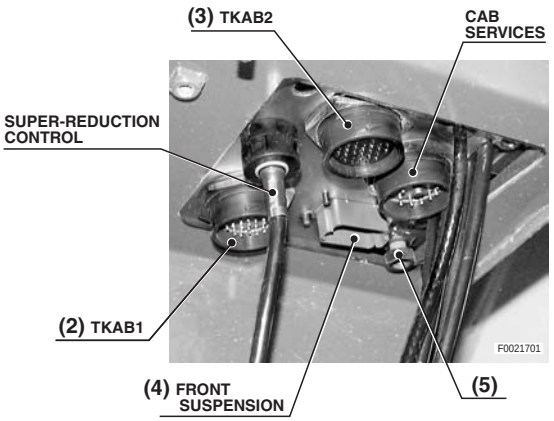
Disconnect the lead from the negative (–) terminal of the battery.

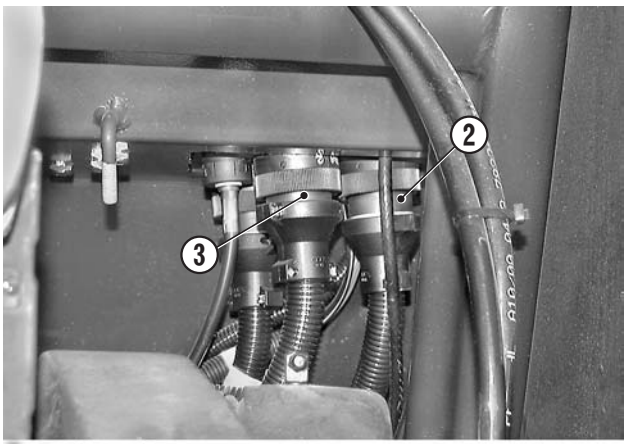
Discharge any residual pressure from the trailer braking air reservoir and the cab suspension system.

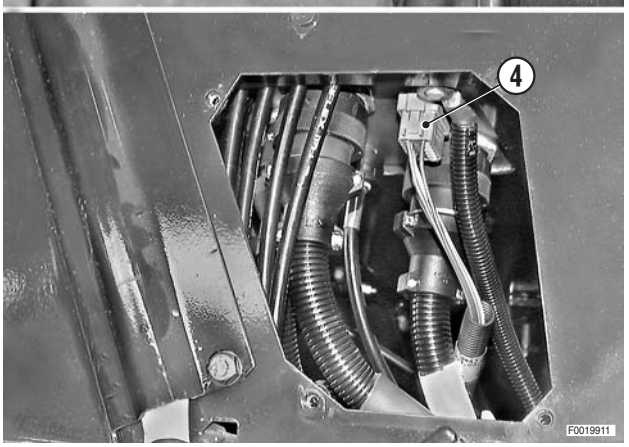
1 - Remove the rear wheels. (For details, see «REMOVAL OF THE REAR WHEELS»).



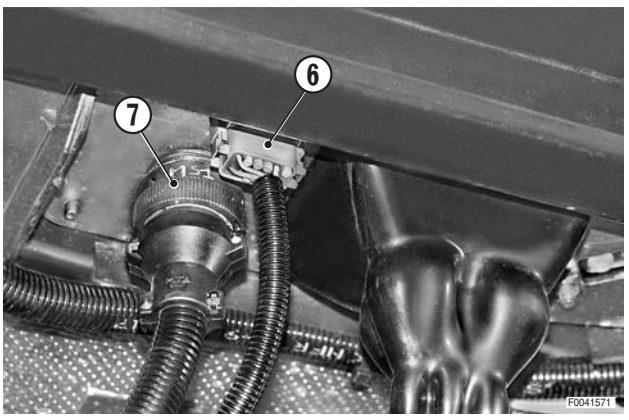
2 - Remove the cover plate (1) and disconnect from the bulkhead fitting the connectors of the electrical leads of the transmission (2) (**TKAB1**), the lift (3) (**TKAB2**) and the connector (4) and power supply lead (5) for the front axle (if present).







3 - Disconnect from the front bulkhead plate the connector (6) and the connector (7) of the engine wiring.



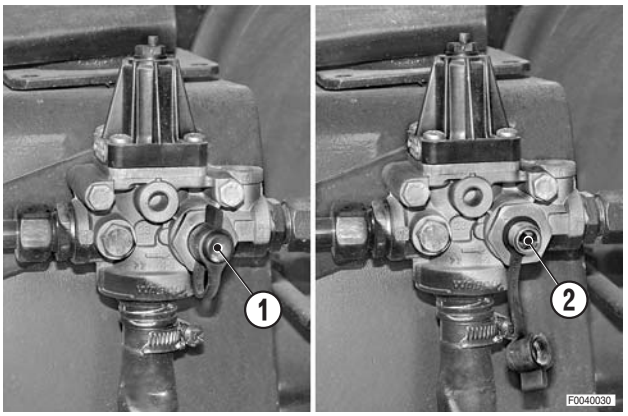
RENEWAL OF THE CAB AIR SPRINGS AND HYDRAULIC DAMPERS

NOTE This procedure refers to repairs to be undertaken following perforation or an air leak from the collar of an air spring, damage to the compressed air fitting or a malfunction of the hydraulic dampers.

⚠ Remove the key from the ignition and apply the parking brake.

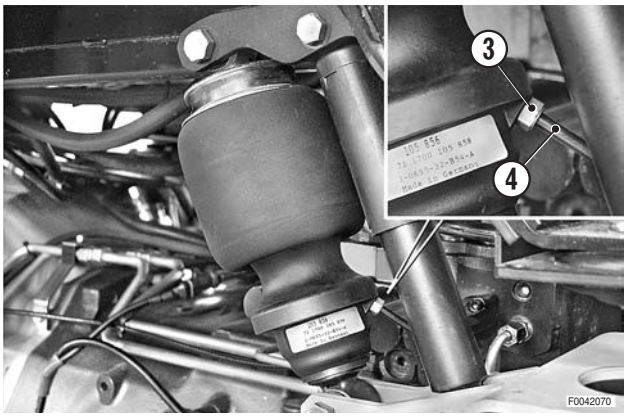
1 - Remove the rear wheel on the appropriate side. (For details, see "REMOVAL OF REAR WHEELS").

2 - Remove the cover (1) and discharge all compressed air from the pneumatic circuit by pressing the push-button (2) on the pressure control valve.

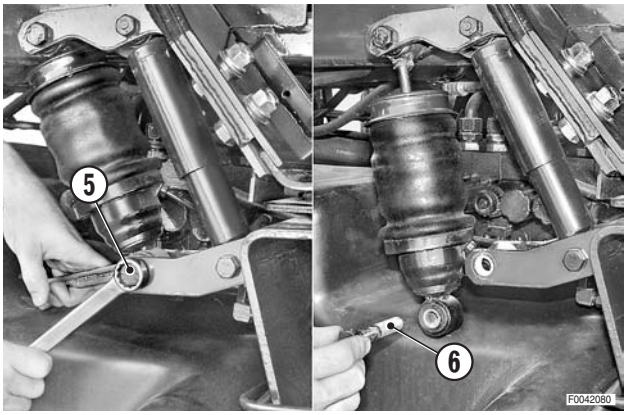


1. Remove the cab air spring

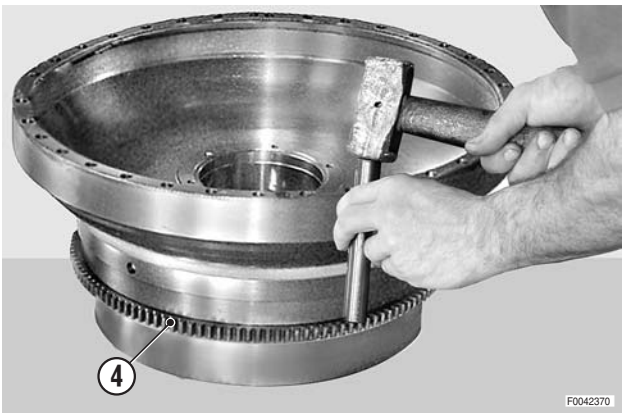
1 - Loosen the fitting (3) and disconnect the delivery pipe (4). ※1



2 - Unscrew and remove the self-locking nut (5) and the lower bolt (6).



4 - **Only if the flywheel is to be renewed:** rest the central part of the flywheel on a block of soft material, and using a mallet and drift, remove the ring gear (4).
  ★ Tap the ring gear evenly around the entire circumference until it comes free of the flywheel.
  ★ Note which way round the ring gear is fitted; the chamfered side of the teeth should be oriented away from the engine block.

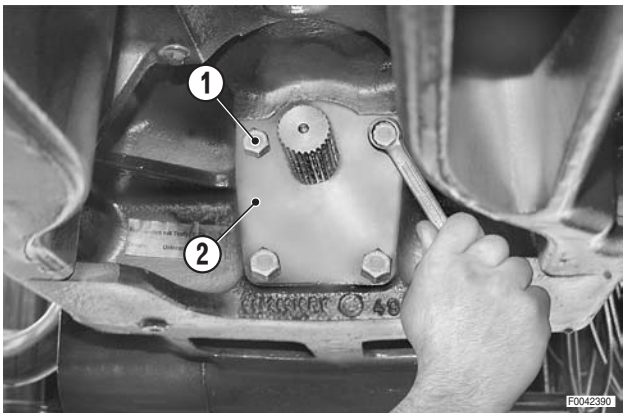


5 - Clean the ring gear seat carefully.
Heat the new ring gear (4) on a thermostatic hotplate to approx. 100°C and then fit it to the flywheel; make sure that it is fully inserted on its seat.

※ 6 ※ 7

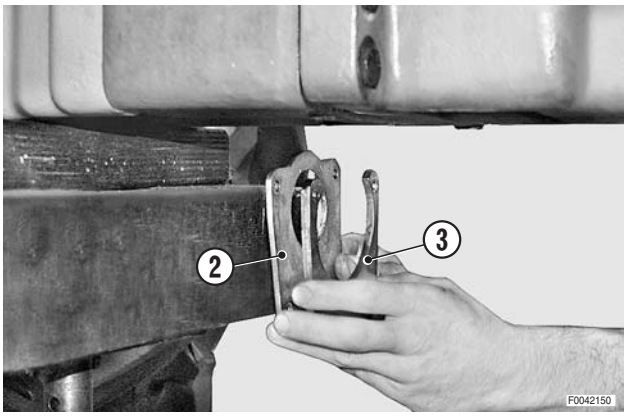
4. Renewal of the 4WD shaft bearings

1 - Unscrew and remove the retaining bolts (1) of the flange (2).



2 - Remove the flange (2) and the spacer (3).

※ 7



THE STRUCTURE OF THE UNIT

For easier consultation, this unit has been divided into the following chapters:

1. Introduction

Contains a brief description of the terminology used, the procedures to follow for troubleshooting and repairs, and the instruments required for troubleshooting.

2. Indices

Contains the indices arranged by connector name, by component code and by component description.

3. Components

Contains the layouts of the connectors used in the electrical system, descriptions of the components installed on the tractor,the technical data necessary for functional testing and the pinouts of the electronic control units.

4. Systems

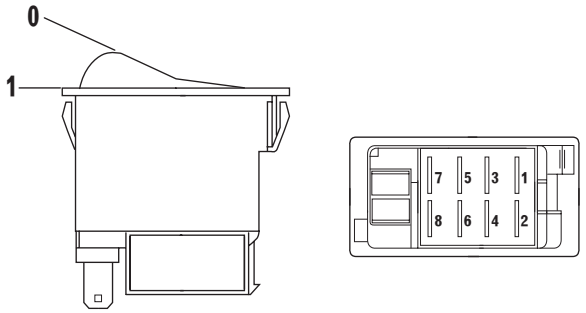
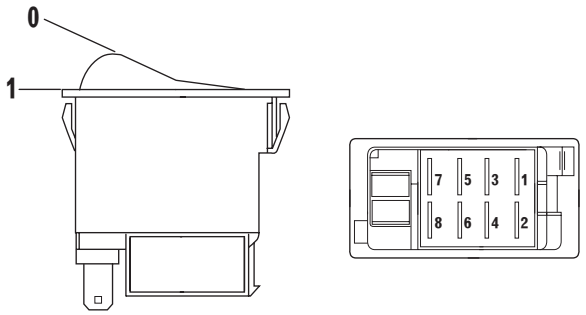
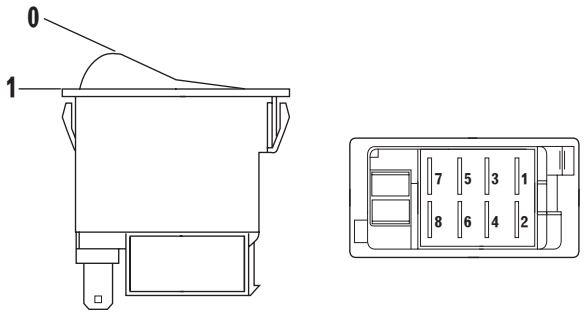
Contains the electrical diagrams of the tractor's systems.

5. Wiring harnesses

Contains the layouts, the wiring diagrams and the positioning of connectors on the tractor.

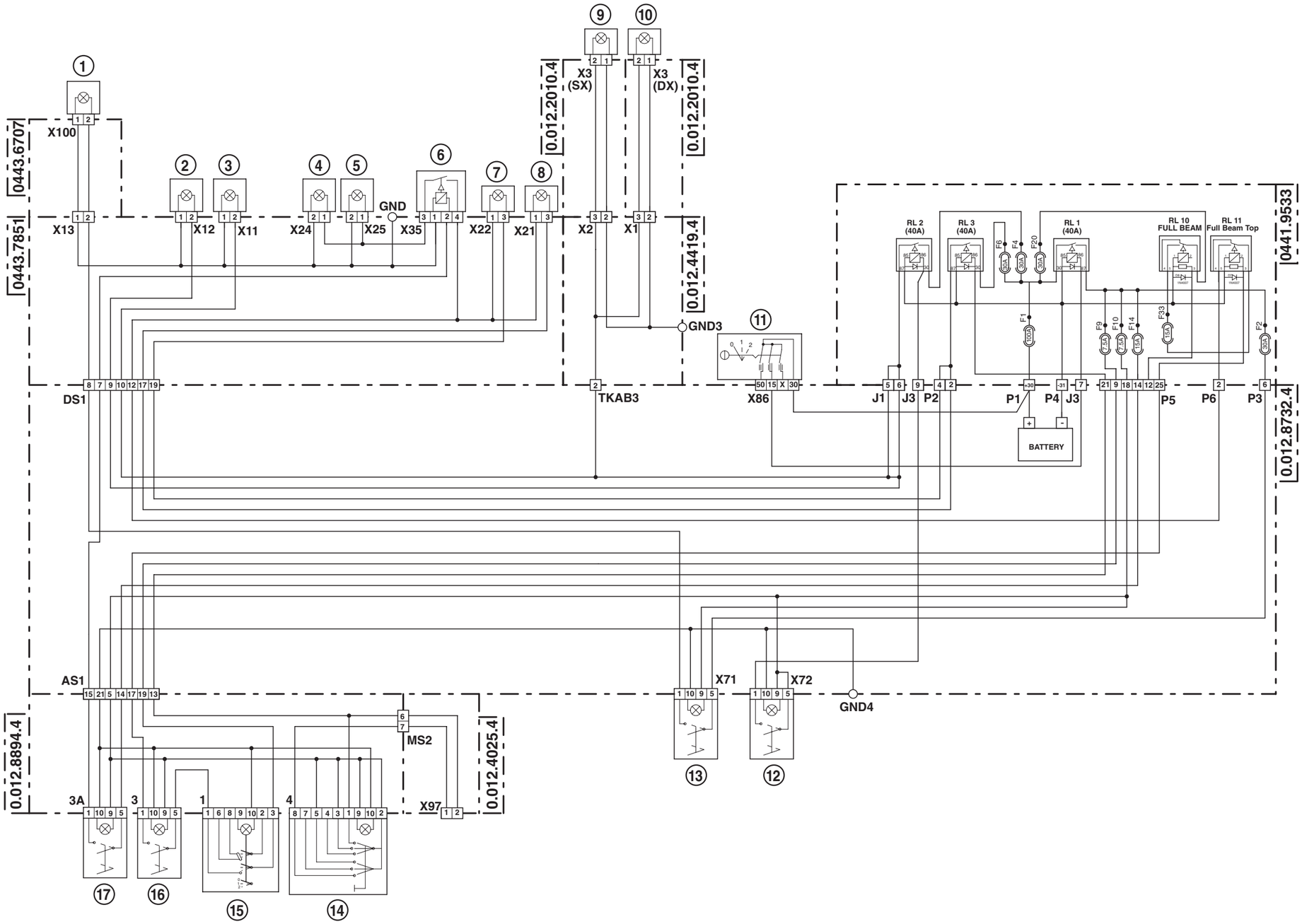
Description	Code	Technical (para. 3.2.xx)	Connector	System (para. 4.xx)	Notes
Supplementary power (in cab)			X80	10	
Thermostarter	0425.5241	3	X63	3	
Trailer braking air pressure sensor pressure sensor	0.011.9428.0	1	X8	14	
Trailer braking low pressure switch			X10	14	
Trailer socket (lights and auxiliary power)	0442.4116		X38	2-10-13	
Transmission display	0442.2054		X93	16	
Transmission ECU	0443.8083/10		ECU PS	16	
Transmission oil temperature sensor	0441.6649	10	TEMP	16	
Transmission speed sensor	0443.8438		NHK	16	
Windscreen wiper motor	0441.3192		X26	8	

Connector	Type	Wiring code	Connection wiring or component code	Component description
X74b	1	0.012.8732.4		Not utilised
X75	12	0.012.8732.4	0443.6527	Super-reduction engagement switch
X76	3	0.012.8732.4	0441.1533	Front PTO pushbutton (in cab)
X77	3	0.012.8732.4	0441.1533	Rear PTO pushbutton (in cab)
X78	26	0.012.8732.4	0442.9597.4	Lift control panel
X79		0.012.8732.4		Fuse F50 (30 Amp)
X80	1	0.012.8732.4		Auxiliary power supply connector (in cab)
X81	8	0.012.8732.4		Diagnostics connector
X82		0.012.8732.4		Brake lights fuse (15 Amp)
X83		0.012.8732.4		Direction indicators flasher unit (Red)
X84		0.012.8732.4		Direction indicators flasher unit (Black)
X85		0.012.8732.4		Direction indicators flasher unit
X86	7	0.012.8732.4	0441.1512.4	Starter switch
X87	1	0.012.8732.4		Driver's seat air suspension compressor
X88	32	0.012.8732.4	0.010.2562.2	
X89		0.012.8732.4	0.010.2562.2	
X90		0.012.8732.4	0439.1395	Handbrake switch
X91	1	0.012.8732.4	0441.2338	Cigar lighter
X92		0.012.2018.4	0441.4115	Number plate light
X93		0443.7875	0442.2054	Transmission display
X94		0443.7875	0442.5709	Compressed air pressure gauge
X95		0443.7875		Compressed air pressure gauge light
X96		0.012.8894.4	0443.8656	Steering column switch unit
X97	2	0.012.4025.4		Front worklights (50S)
X98	28	0.012.8732.4		PTO AUTO switch
X100		0443.6707		Rotating beacon
X102		0.010.2562.2		Relay for 3rd heater fan speed
X103		0.010.2562.2		Relay for 4th heater fan speed
X104		0.010.2562.2	0.010.2535.1	Left heater fan resistor
X105		0.010.2562.2	0.010.2537.0	Left heater fan
X106		0.010.2562.2	0.010.2535.0	Right heater fan
X107		0.010.2562.2	0.010.2535.1	Right heater fan resistor
X108		0.010.2562.2	0.010.2528.1	Fan speed selector switch
X109		0.010.2562.2		Relay for 1st fan speed and air conditioning on
X110		0.010.2562.2	0.010.2532.0	Air conditioning on/off switch

N°	Description	Code	Characteristics	Notes
35	Cab roof worklights switch	0441.1496.4	 Pin / Pos: 1 2 3 4 5 6 7 8 0 1 ● — — — ●	3
36	Lower worklights switch	0441.1496.4	 Pin / Pos: 1 2 3 4 5 6 7 8 0 1 ● — — — ●	3A
37	50S lights switch	0441.1496.4	 Pin / Pos: 1 2 3 4 5 6 7 8 0 1 ● — — — ●	4

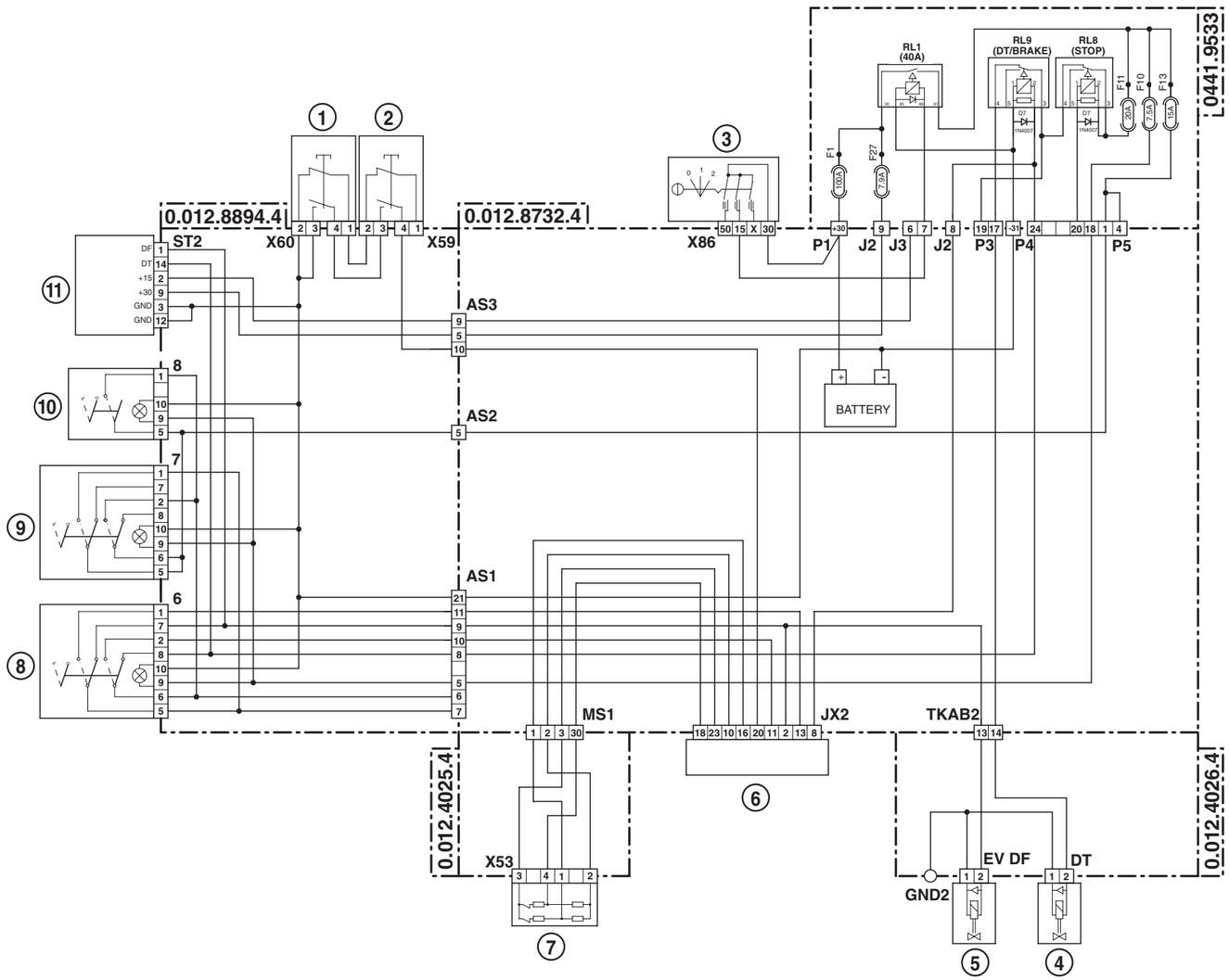
Pin	Volts.	Abbreviation	Description
17		HYDRA	Hydraulic system oil filter clogged
18			Not utilised
19		VORGL	Glowplugs test
20		RPTO	Rear PTO rpm
21		GROUND	Input, actual ground speed (radar)
22		WHEEL	Input, theoretical vehicle speed
23		TRAILER	Input, trailer braking indicator light (Italy)
24			Not utilised
25		EMR	Input, engine indicator light
26			Not utilised

4.7 WORKLIGHTS



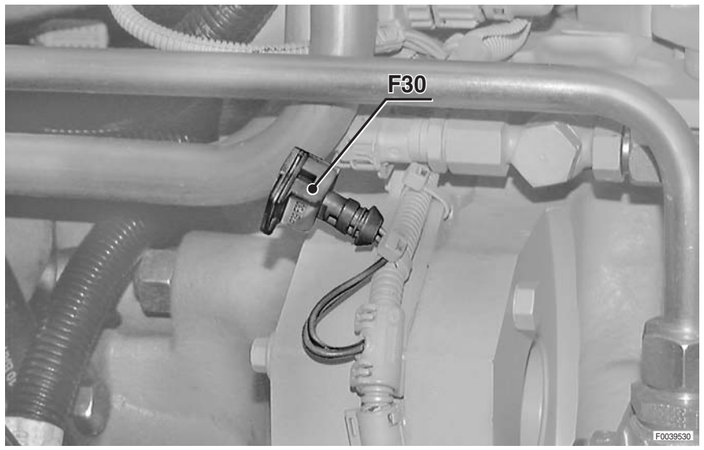
1 Rotating beacon
2 Rear upper left worklights
3 Rear upper right worklights
4 Front right sidelight and direction indicator
5 Front left sidelight and direction indicator
6 Relay for front upper worklights
7 Front left worklight
8 Front right worklight
9 Rear lower left worklights
10 Rear lower right worklights
11 Starter switch
12 Rear worklights switch
13 Rotating beacon control switch
14 50S lights switch
15 Sidelights switch
16 Cab roof worklights switch
17 Lower worklights switch

4.17 ASM - 4WD – DIFFERENTIAL



1 Left brake pedal switch
2 Right brake pedal switch
3 Starter switch
4 Solenoid valve for four-wheel drive control
5 Diff lock solenoid valve
6 Rear lift control unit
7 Steering angle sensor
8 ASM switch
9 Diff lock switch
10 4WD switch
11 Infocenter

7



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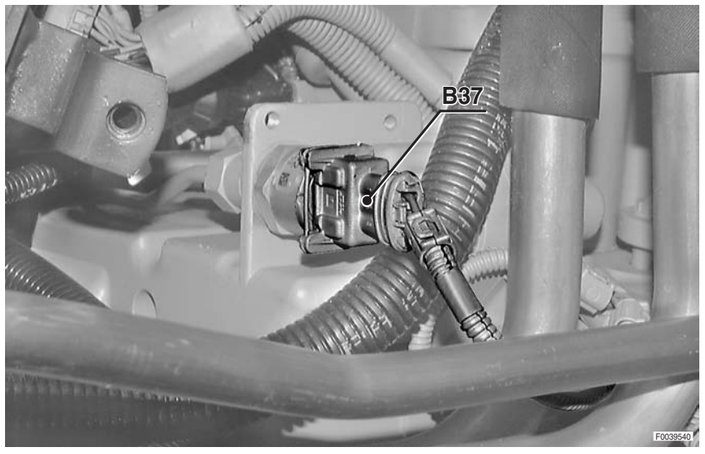
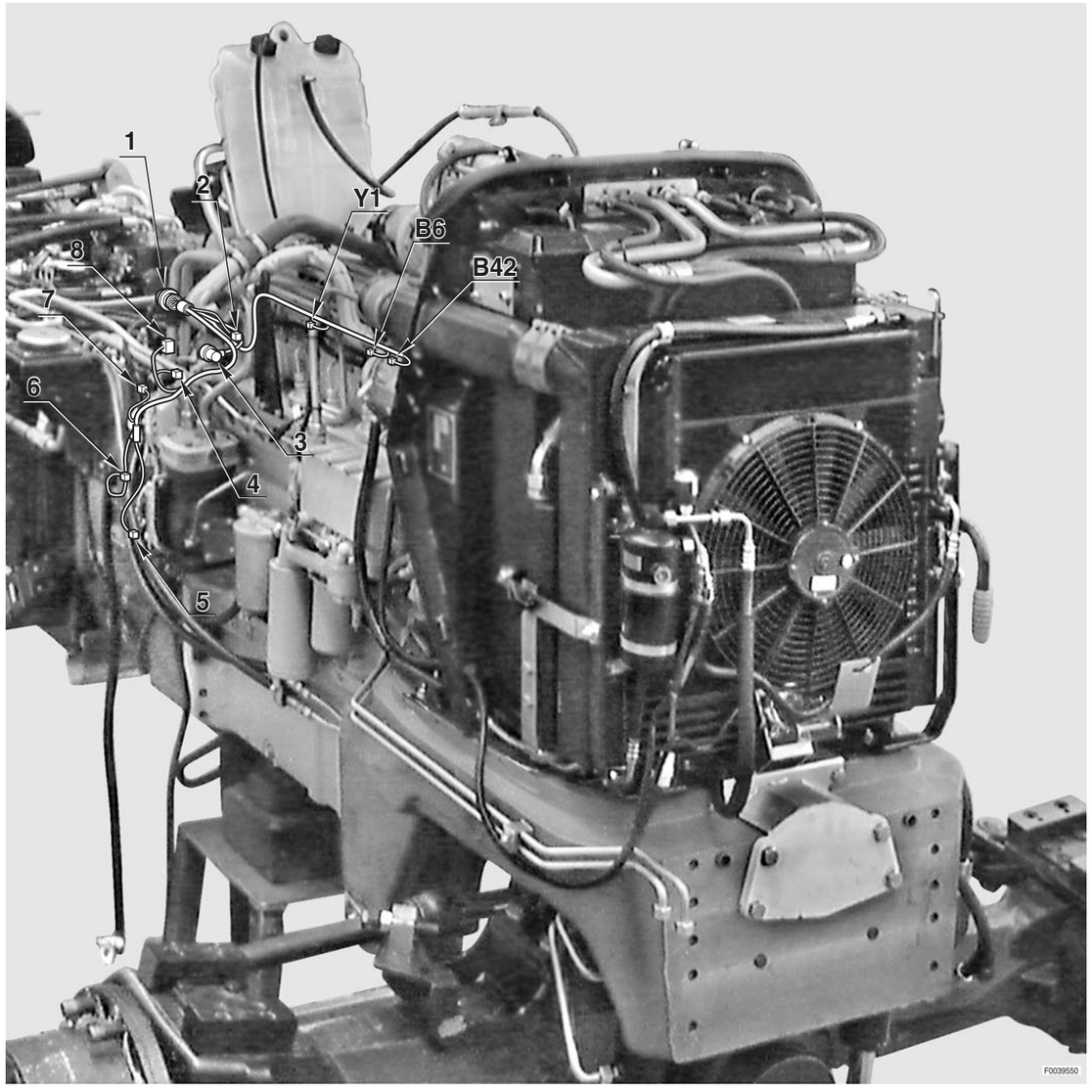


ENGINE WIRING (KHD)



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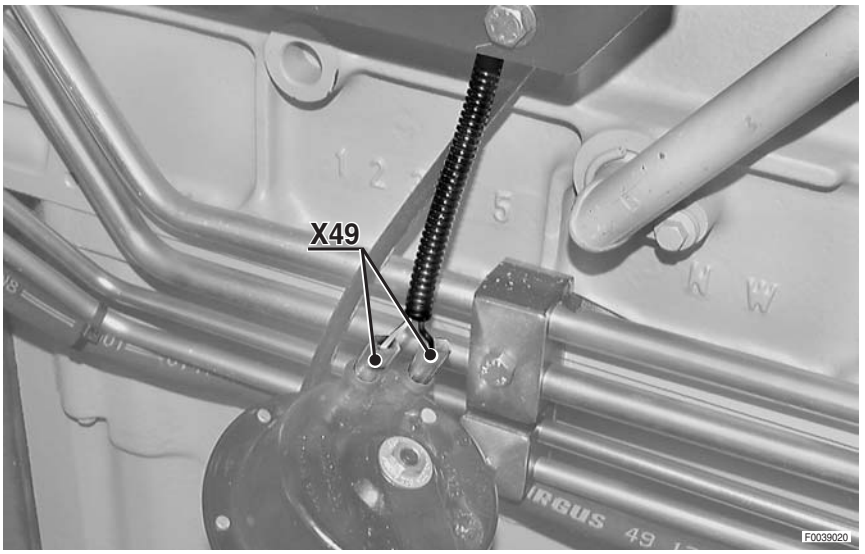

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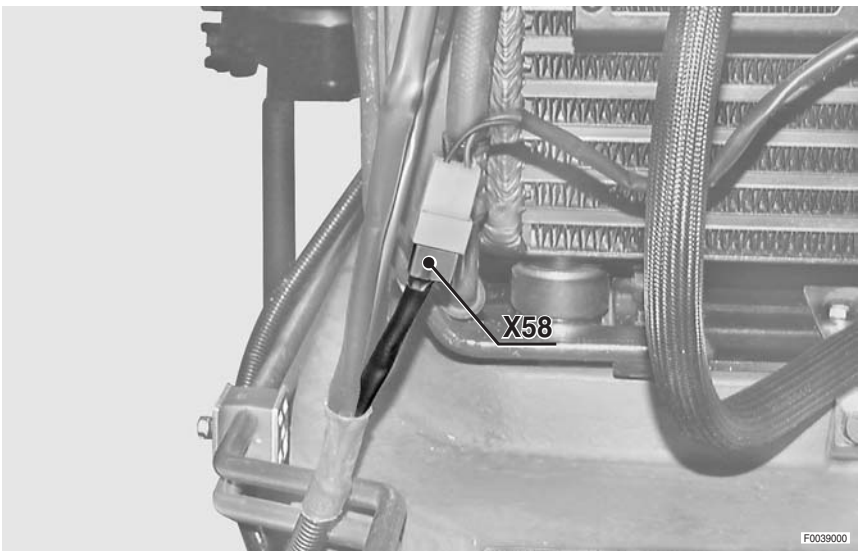

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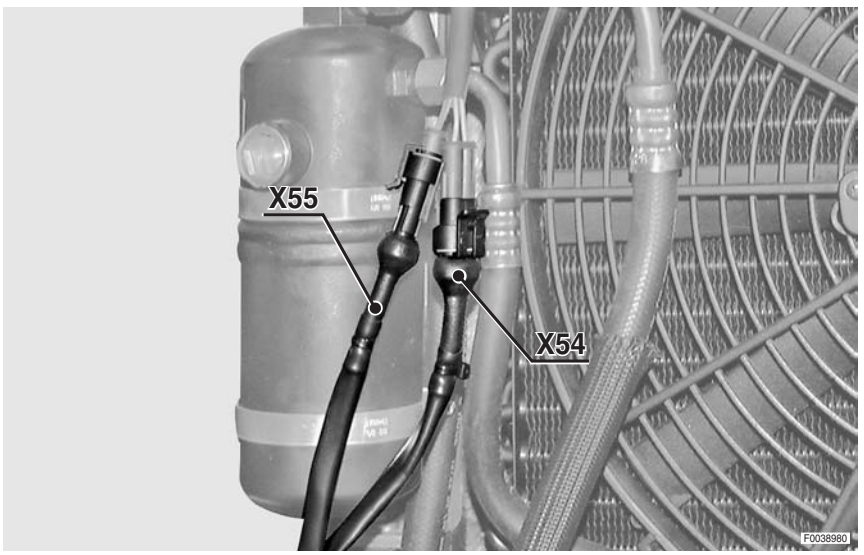

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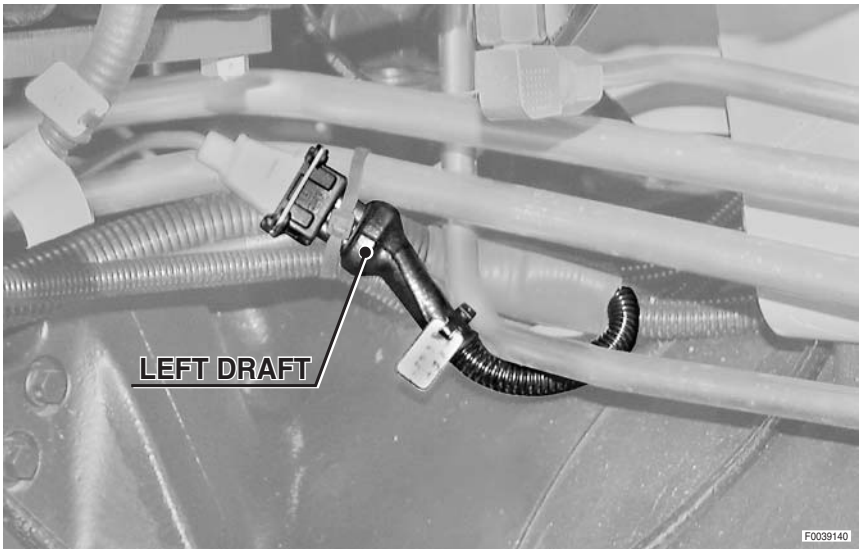

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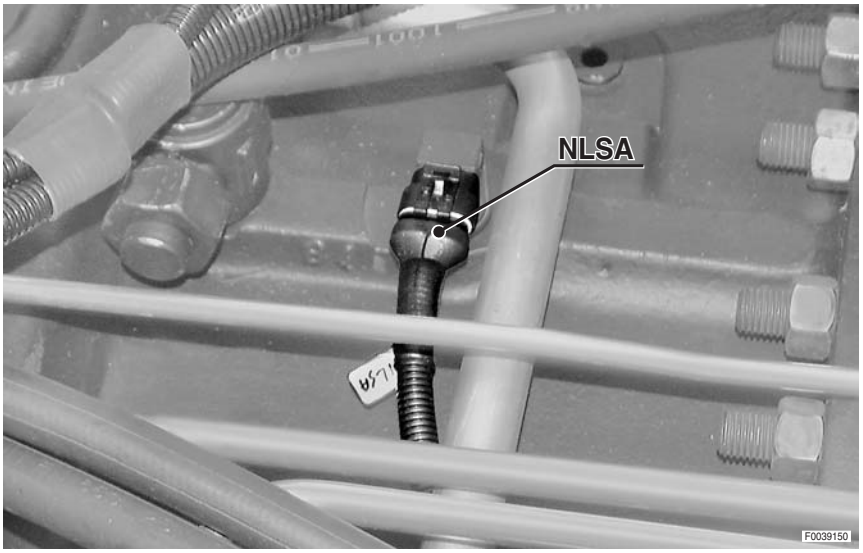

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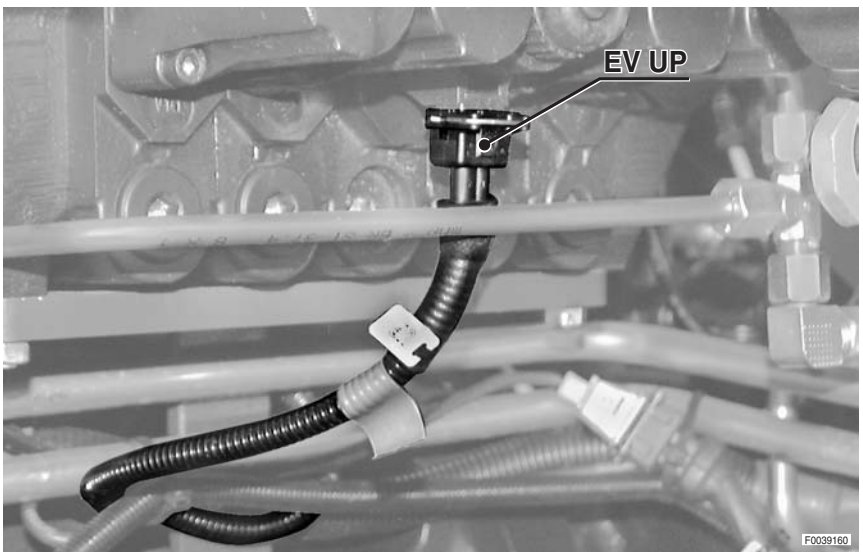
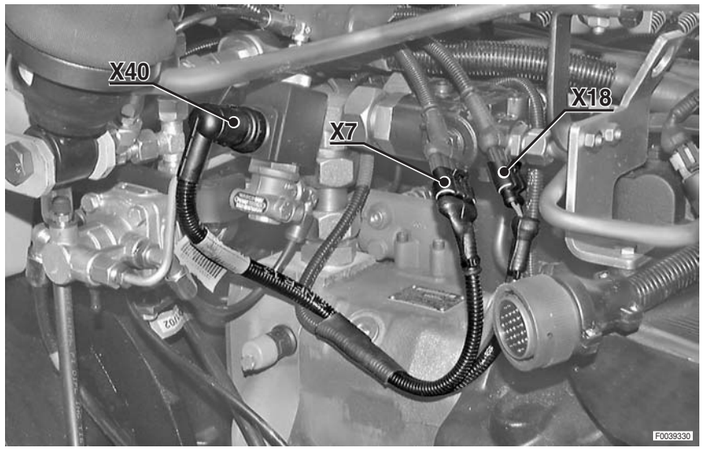


CONNECTORS LOCATION

1



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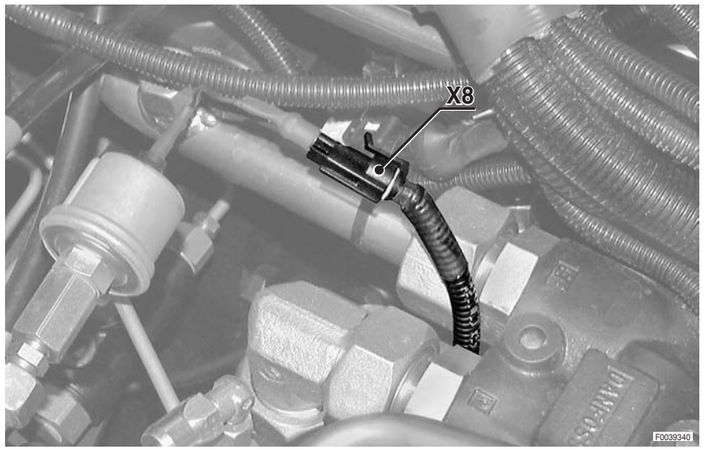
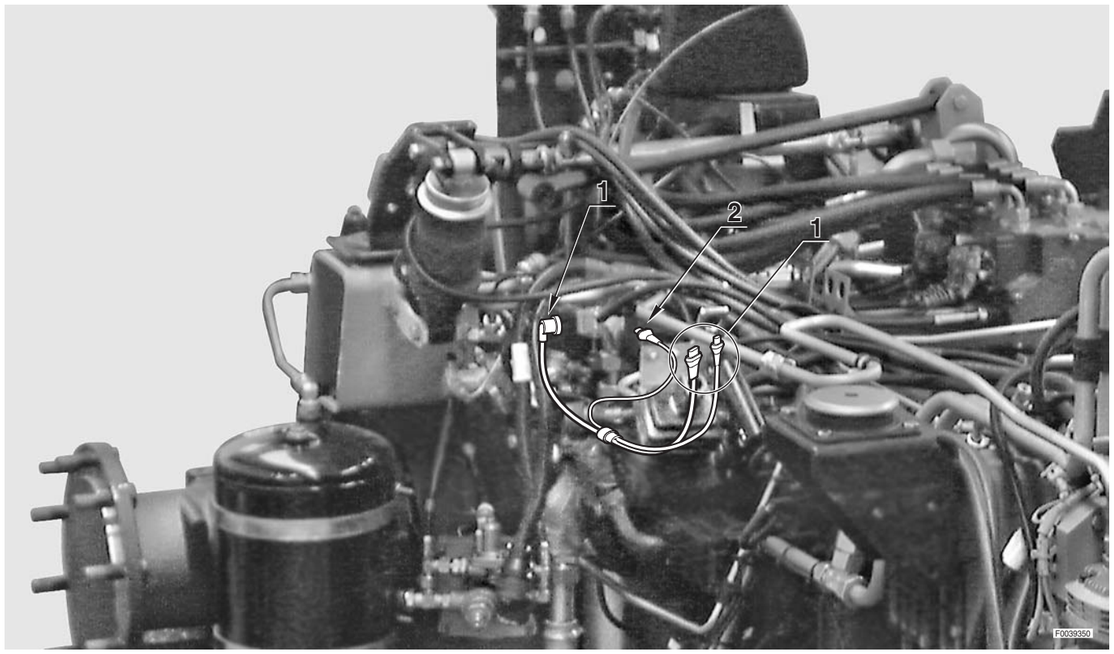
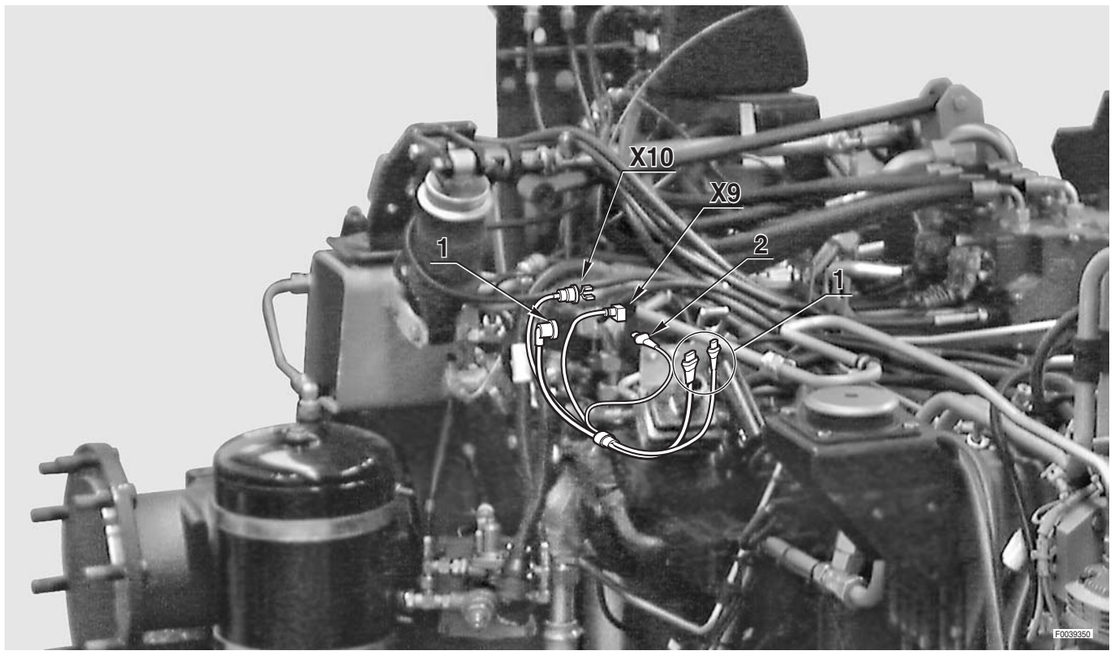


TRAILER BRAKING WIRING

ITALY

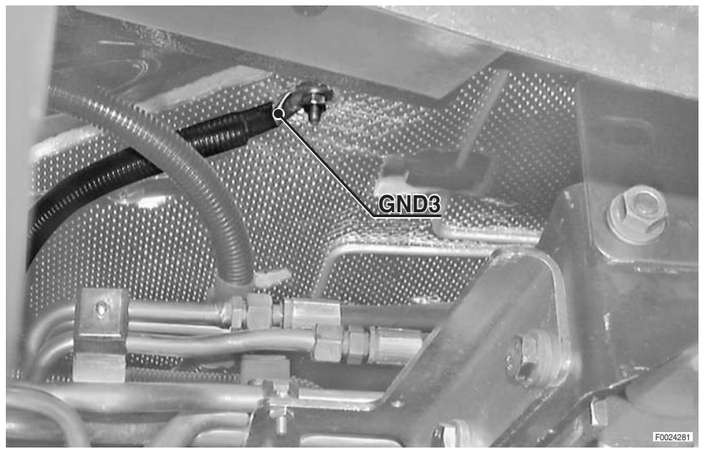


EXPORT



CAB POWER SUPPLY WIRING

4



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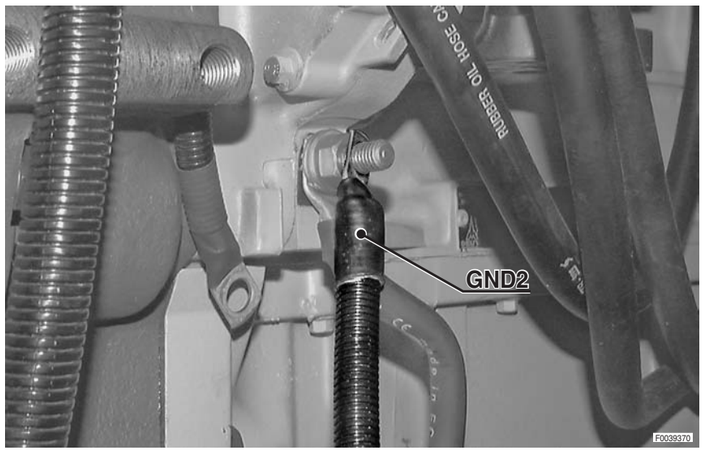

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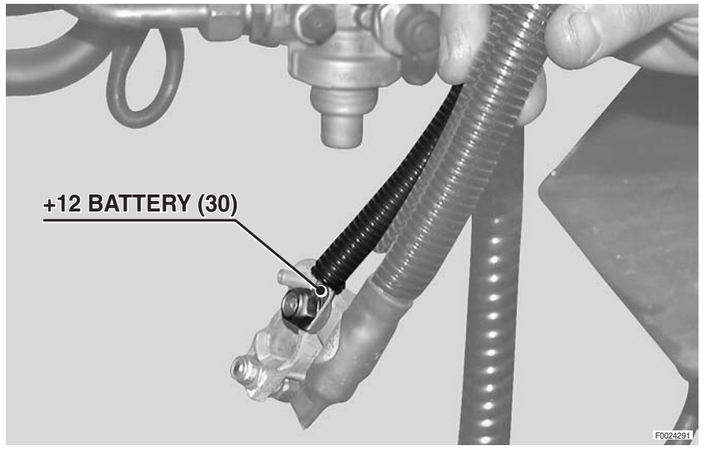
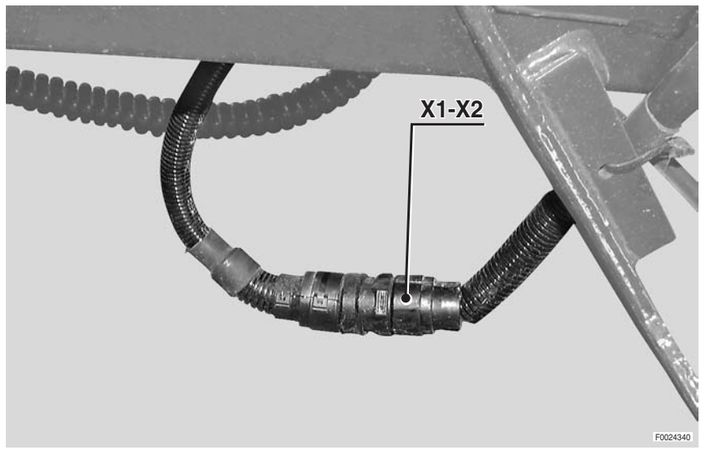


FENDER WIRING - NUMBER PLATE LIGHT

4



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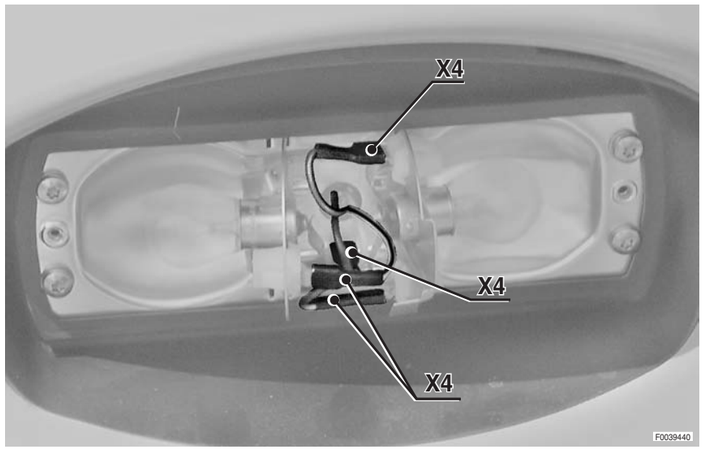

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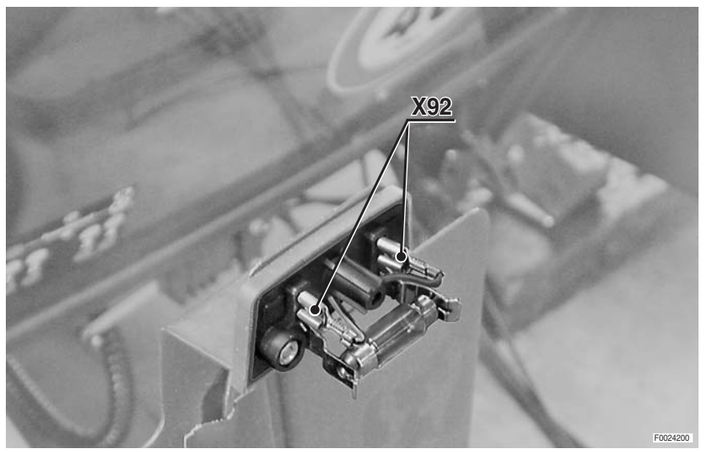
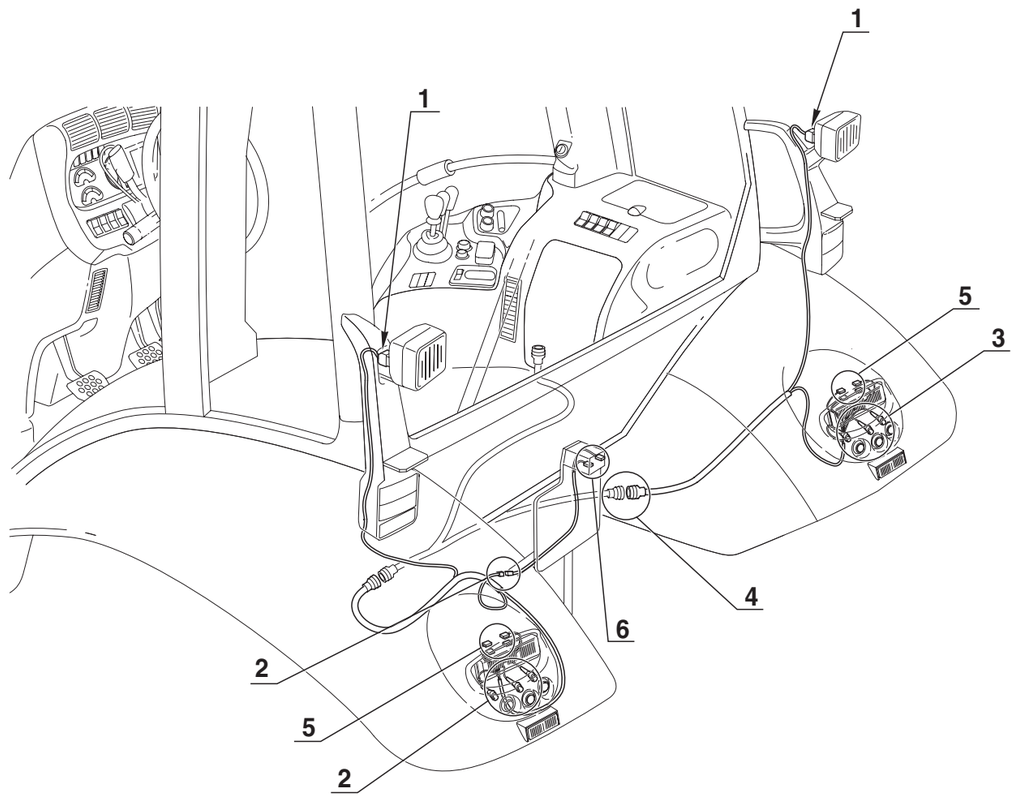




SIDE CONSOLE WIRING (3/3)

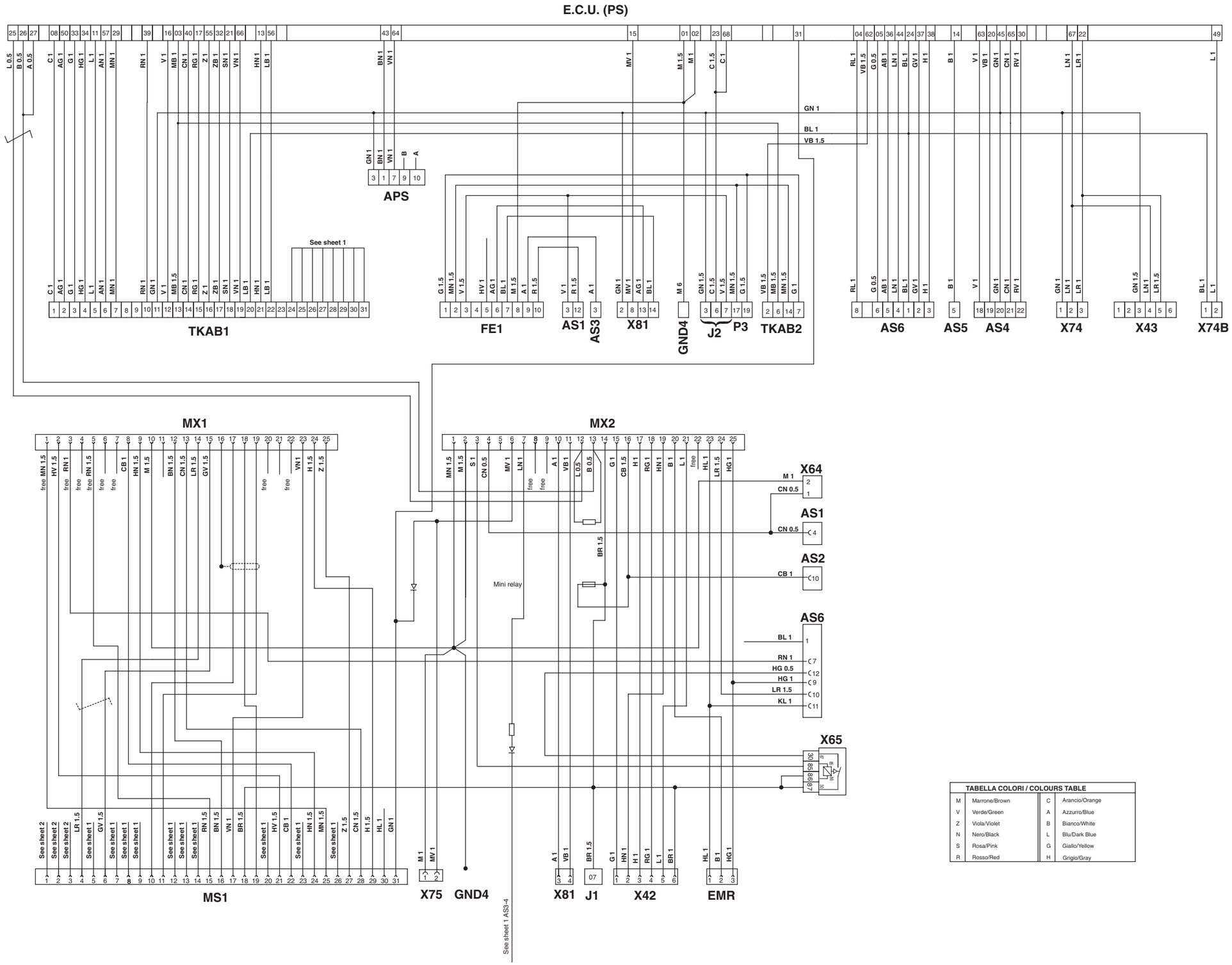
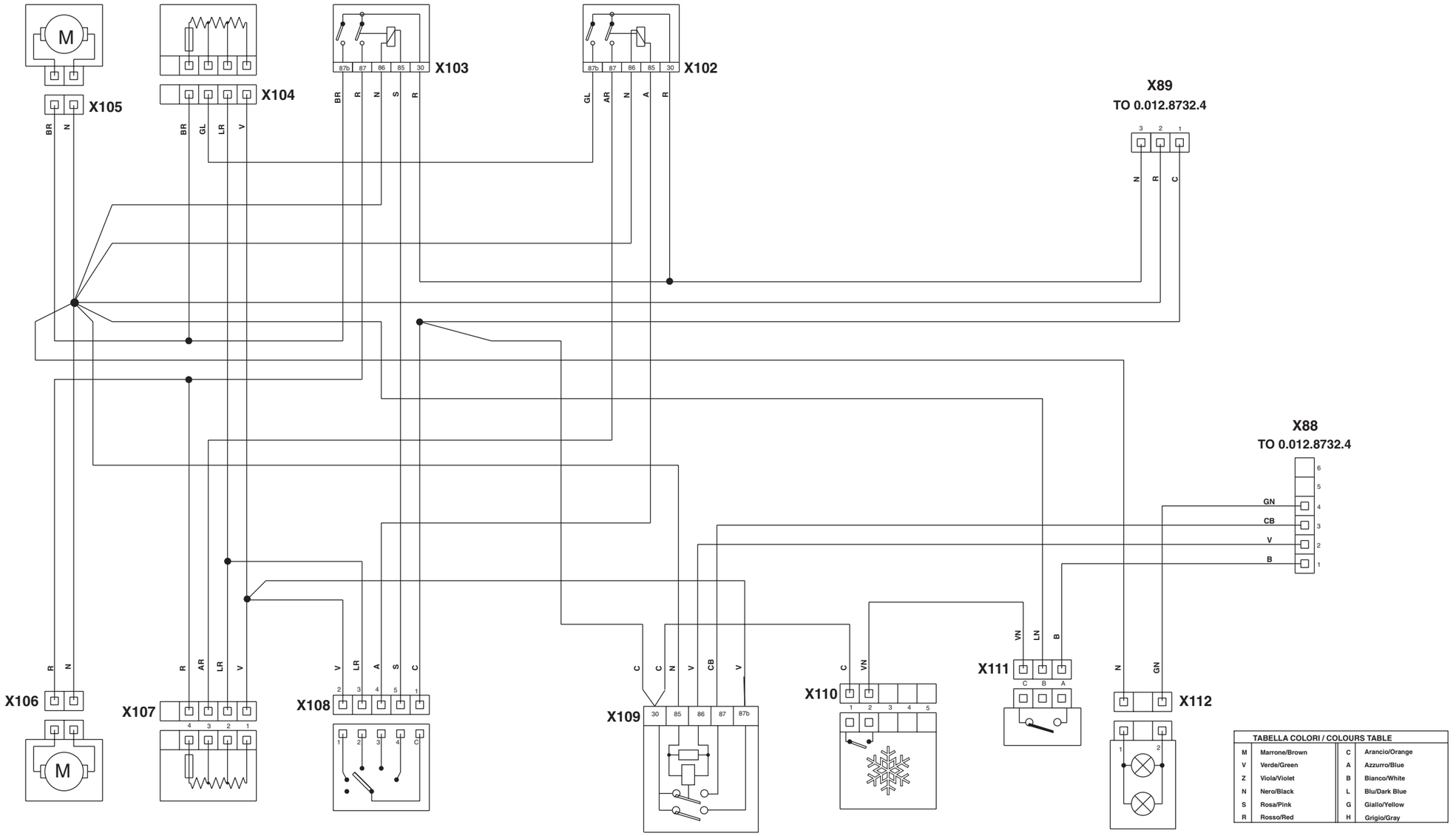


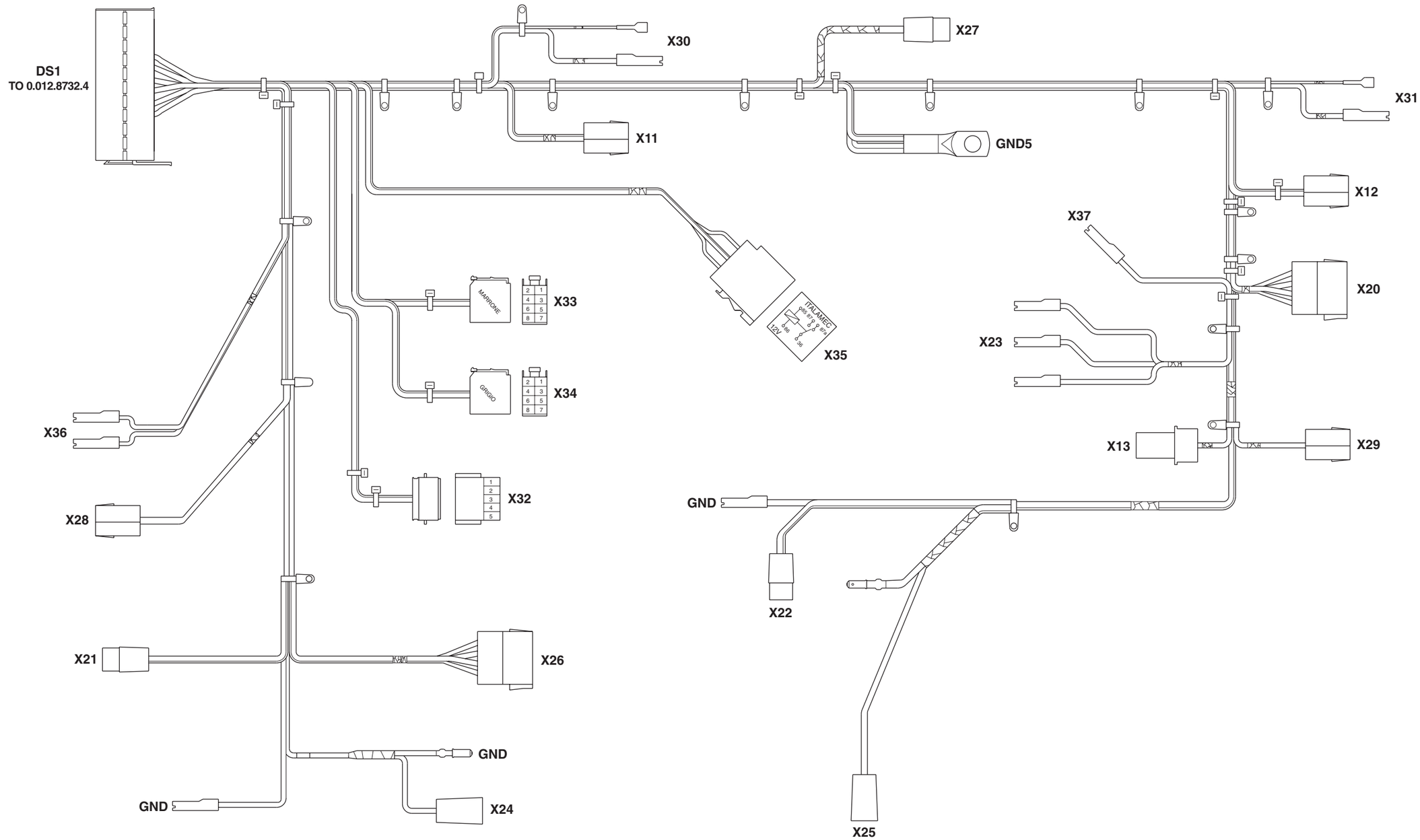
TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

AIR CONDITIONING SYSTEM WIRING



X88 To side console wiring
X89 To side console wiring
X102 Relay for 3rd heater fan speed
X103 Relay for 4th heater fan speed
X104 Resistor for left heater fan
X105 Left heater fan
X106 Right heater fan
X107 Resistor for right heater fan
X108 Fan speed selector switch
X109 Relay for 1st fan speed and air conditioning on
X110 Air conditioning on/off switch
X111 Air conditioning thermostat
X112 Air conditioning control panel illumination connector

ROOF WIRING (1/2)



DS1 To side console wiring
X11 Front right upper worklights
X12 Front left upper worklights
X13 To rotating beacon wiring
X20 CB power connector
X21 Front right worklight
X22 Front left worklight
X23 Interior roof light
X24 Front right sidelight and direction indicator
X25 Front left sidelight and direction indicator
X26 Windscreen wiper motor
X27 Rear screen wiper motor
X28 Right front loudspeaker
X29 Left front loudspeaker
X30 Right rear loudspeaker
X31 Left rear loudspeaker
X32 Clock
X33 Radio (brown)
X34 Radio (grey)
X35 Front upper work lights relay
X36 Side console courtesy light
X37 Door open warning signal switch