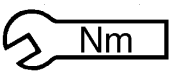
STANDARD TIGHTENING TORQUES FOR NUTS AND BOLTS



⚠ The tightening torques for certain specific components and special tightening methods are indicated in the relative assembly paragraphs.

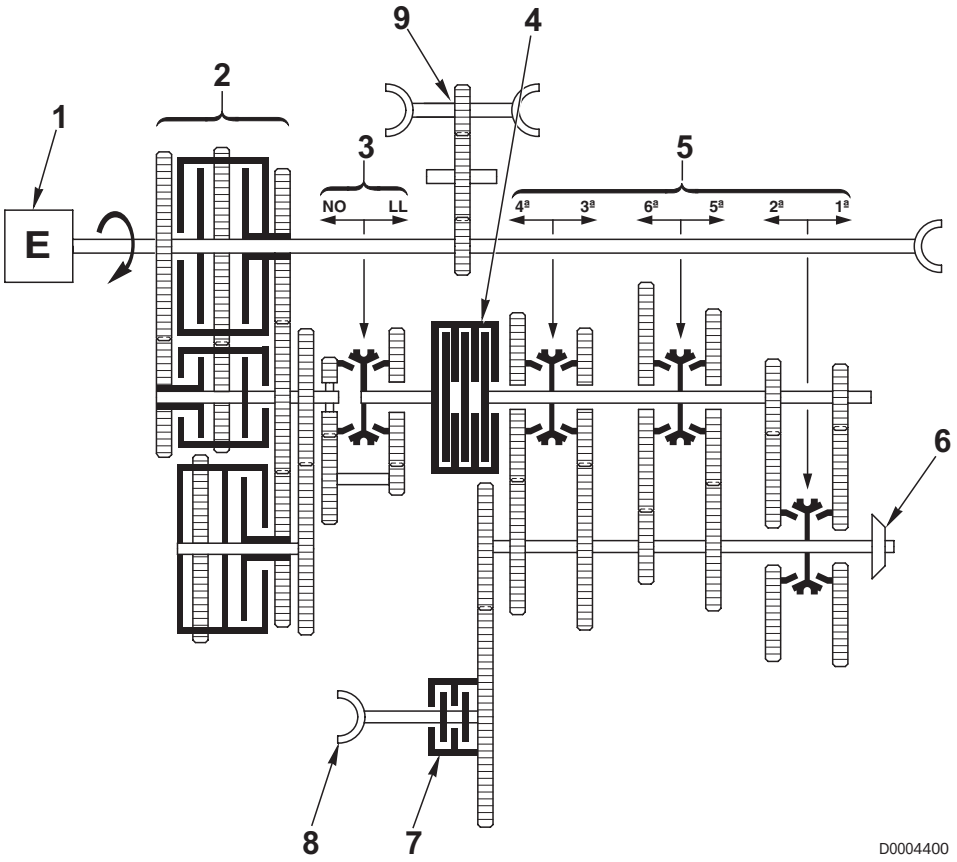
★ The tightening torques indicated below refer to bolts and nuts assembled without lubrication and, where applicable, with anaerobic threadlocking compound.
The values apply to tightening on steel or cast iron components; for soft materials such as aluminium, copper, plastic, sheet metal or panels, the indicated tightening torques must be reduced by 50%.

BOLT SIZE		BOLT CLASS					
		8.8		10.9		12.9	
		Nm	lb.ft.	Nm	lb.ft.	Nm	lb.ft.
COARSE THREAD	M6x1	8.0–8.8	5.9–6.5	11.8 – 13.0	8.7–9.6	13.8 – 15.2	10.2–11.2
	M8x1.25	19.4–21.4	14.3–15.8	28.5 – 31.5	21.0 – 23.2	33.3 – 36.9	24.5 – 27.2
	M10x1.5	38.4 – 42.4	28.3 – 31.2	56.4 – 62.4	41.6 – 46.0	67.4 – 74.4	49.7 – 54.8
	M12x1.75	66.5 – 73.5	49.0 – 54.2	96.9 – 107	71.4 – 78.9	115 – 128	84.8 – 94.3
	M14x2	106 – 117	78.1 – 86.2	156 – 172	115.0 – 126.8	184 – 204	135.6 – 150.3
	M16x2	164 – 182	120.9 – 134.1	241 – 267	117.6 – 196.8	282 – 312	207.8 – 229.9
	M18x2.5	228 – 252	168.0 – 185.7	334 – 370	246.2 – 272.7	391 – 432	288.2 – 318.4
	M20x2.5	321 – 355	236.6 – 261.6	472 – 522	347.9 – 384.7	553 – 611	407.6 – 450.3
	M22x2.5	441 – 487	325.0 – 358.9	647 – 715	476.8 – 527.0	751 – 830	553.5 – 611.7
	M24x3	553 – 611	407.6 – 450.3	812 – 898	598.4 – 661.8	950 – 1050	700.2 – 773.9
	M27x3	816 – 902	601.4 – 664.8	1198 – 1324	882.9 – 975.8	1419 – 1569	1045.8–1156.4
FINE THREAD	M8x1	20.8 – 23.0	15.3 – 17.0	30.6 – 33.8	22.6 – 24.9	35.8 – 39.6	26.4 – 29.2
	M10x1.25	40.6 – 44.8	29.9 – 33.0	59.7 – 65.9	44.0 – 48.6	71.2 – 78.6	52.5 – 57.9
	M12x1.25	72.2 – 79.8	53.2 – 58.8	106 – 118	78.1 – 87.0	126 – 140	92.9 – 103.2
	M12x1.5	69.4 – 76.7	51.1 – 56.5	102 – 112	75.2 – 82.5	121 – 134	89.2 – 98.8
	M14x1.5	114 – 126	84.0 – 92.9	168 – 186	123.8 – 137.1	199 – 220	146.7 – 162.1
	M16x1.5	175 – 194	129 – 143	257 – 285	189.4 – 210.0	301 – 333	221.8 – 245.4
	M18x1.5	256 – 282	188.7 – 207.8	375 – 415	276.4 – 305.9	439 – 485	323.5 – 357.4
	M20x1.5	355 – 393	261.6 – 289.6	523 – 578	385.5 – 426.0	611 – 676	450.3 – 498.2
	M22x1.5	482 – 532	355.2 – 392.1	708 – 782	521.8 – 576.3	821 – 908	605.1 – 669.2
	M24x2	602 – 666	443.7 – 490.8	884 – 978	651.5 – 720.8	1035 – 1143	762.8 – 842.4

1.1.3 GEARBOX

DESCRIPTION

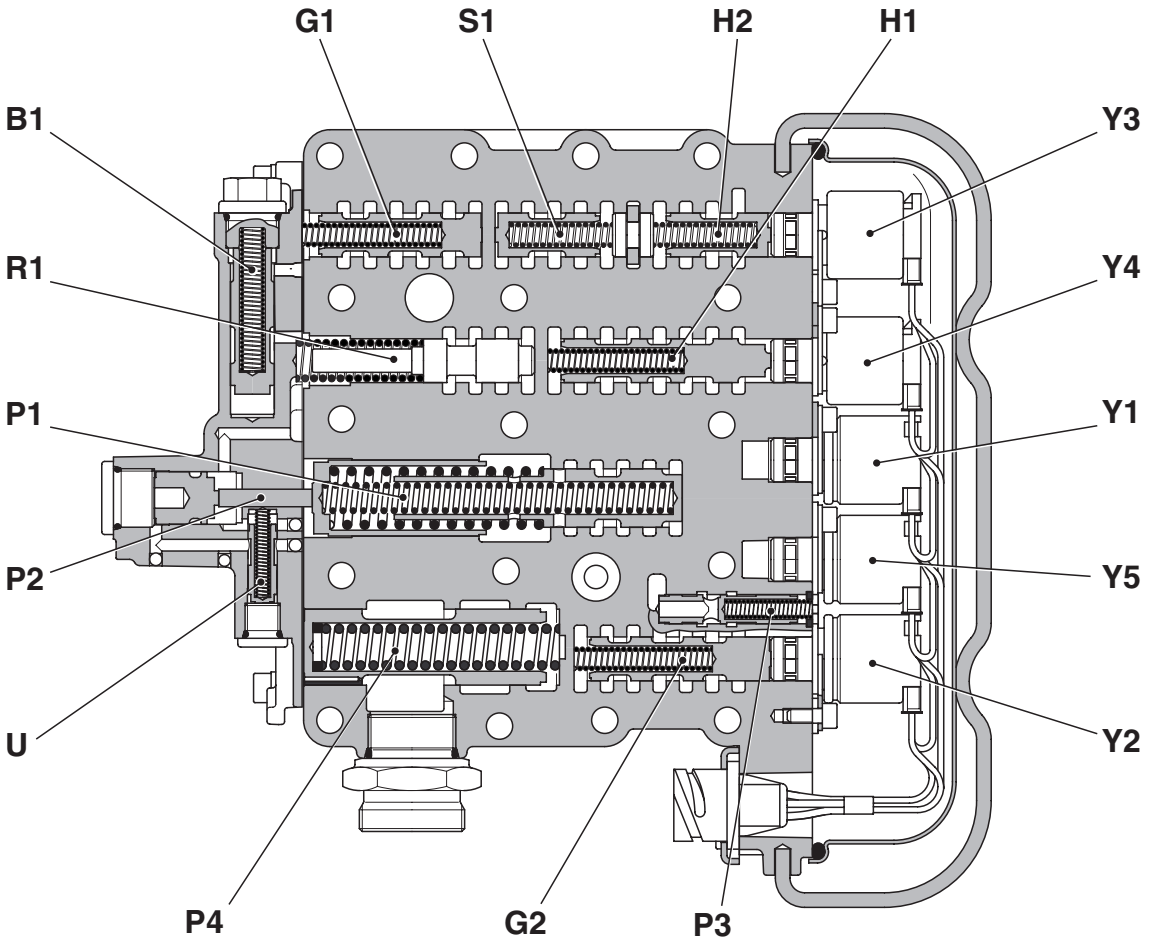
- The POWER SHIFT transmission receives drive from the engine (1) and transmits drive through the hydraulically-controlled gearbox (2), the creeper unit (3), the main clutch (4) and the 6-speed mechanical gearbox (5) to the pinion (6) and the power take-off (7) that provides the drive to the front axle .
  The POWER SHIFT transmission is equipped with a double-output power take-off (9) to drive the hydraulic system pumps.



COMPONENTS

1. Engine
2. Hydraulically-controlled 8-speed gearbox (4 forward and 4 reverse)
3. Creeper unit
4. Main clutch
5. 6-speed mechanical gearbox
6. Pinion
7. 4WD engagement clutch
8. Power take-off for front axle drive
9. Power take-off for hydraulic pumps

MAIN COMPONENTS



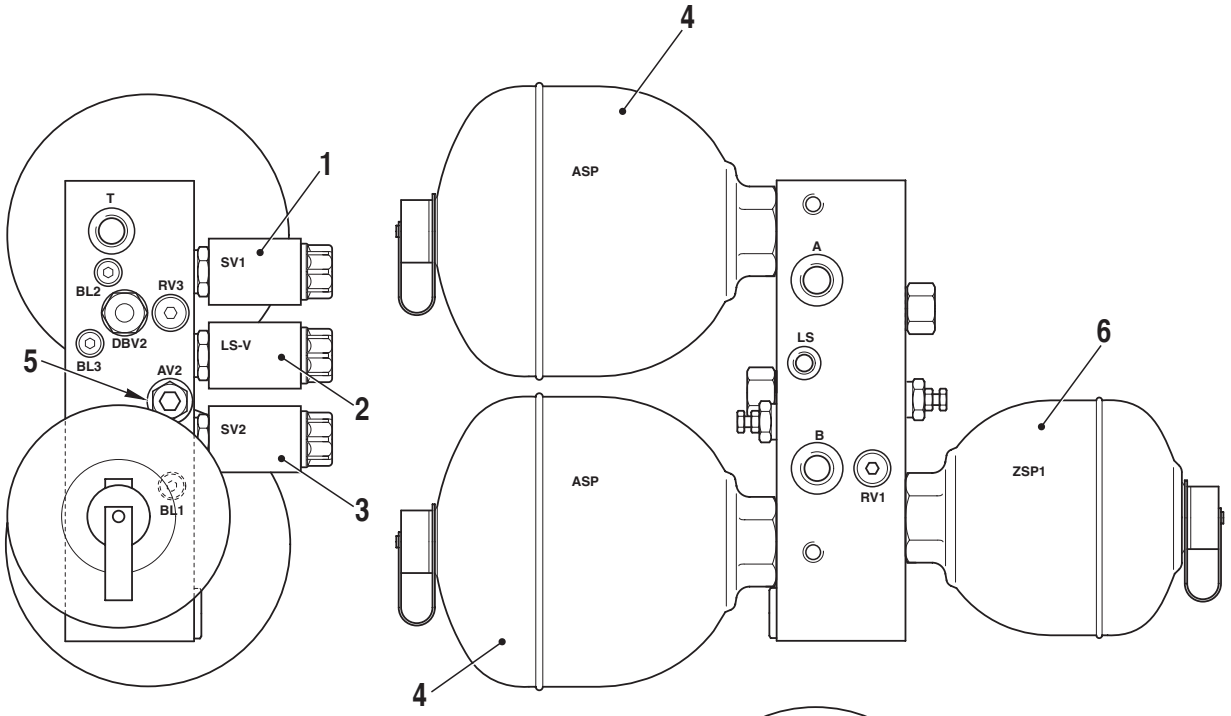
D0005320

B1 Breather valve
G1 Clutch selection valve for **A/B** or **F/G** clutches
S1 Relief valve
H2 Clutch engagement valve for **C/D** clutches
H1 Clutch engagement valve for **A/B** or **F/G** clutches
Y3 Pilot solenoid valve for engagement valve **H2**
Y4 Pilot solenoid valve for engagement valve **H1**
Y1 Pilot solenoid valve for clutch selection valve **G1**
Y5 Pilot solenoid valve for road/field selection valve
Y2 Pilot solenoid valve for **C** or **D** clutch selection valve **G2**
P3 Pilot pressure regulating valve
G2 Clutch selection valve for**C** or **D** clutches
P4 General pressure regulating valve
U Road/field operating mode selection valve
P1 Pressure modulating valve
P2 2-stage valve
R1 Null shift valve

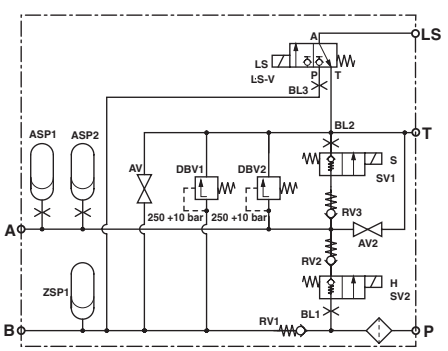
3.1 FRONT SUSPENSION CONTROL VALVE

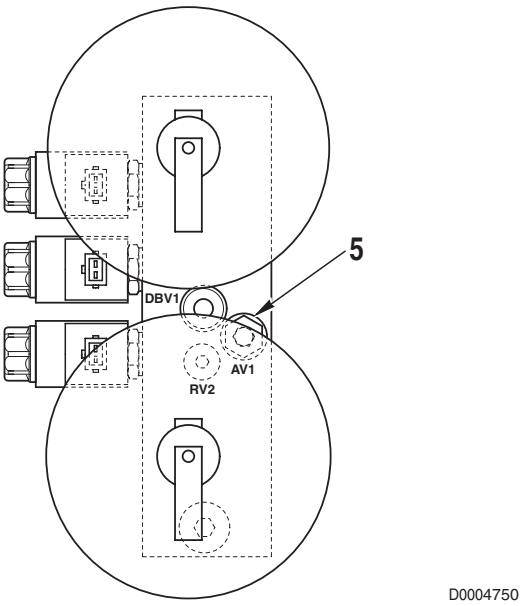
FUNCTION

In addition to the primary function of enabling front axle suspension by charging the hydraulic-pneumatic accumulators that constitute the elastic elements of the system, the front suspension control valve also serves to control the raising and lowering of the front axle.



DIAGRAM





D0004750

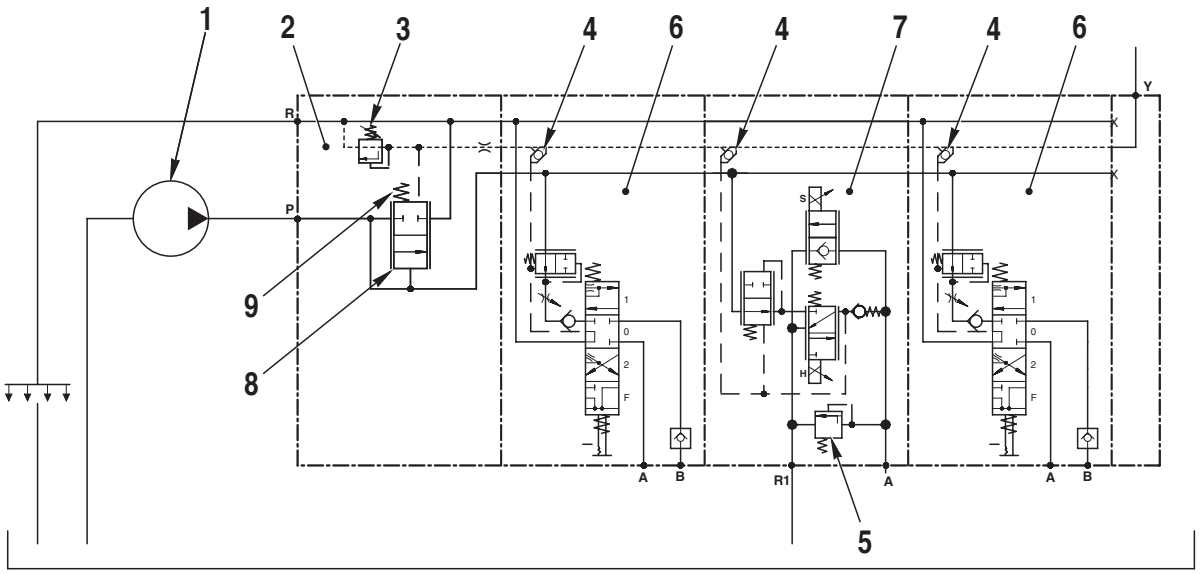
1. Cylinder retraction control solenoid valve
2. LS signal control solenoid valve
3. Cylinder extension control solenoid valve
4. Accumulator (setting: 65 bar)
5. Pressure discharge valve
6. Accumulator (setting: 140 bar)
7. Use A relief valve (setting: 250 bar)
8. Use B relief valve (setting: 250 bar)

5.6 AUXILIARY SERVICES CONTROL VALVE

VERSION WITH FIXED DISPLACEMENT PUMP

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 a parallel circuit valve, which means that all the services receive oil flow simultaneously .



REAR GEARBOX

D0004990

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.
- In the inlet section (2) we find an input gauge (8) and a relief valve (3) for LS-signal.
- The input gauge adjusts the pressure to supply the auxiliary valves (6) in this way, that it is always corresponding to the spring force (9) higher than the pressure of the LS-signal.
- The pressure limitation is provided by limitation of the LS-signal pressure, done by valve (3).
- 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 (4), is directed to the pressure relief valve (3).
- On the lift spool section there is an antishock valve (5) (on the UP control side) that serves to prevent excessive pressure caused by jolting of the implement.

4.2 OVERALL PROGRAMMING

ATTENTION!

- **Complete programming (i.e. access to all parameters) is only possible on level III.**

Saving data contained in the ECU:

- With "ECU -> file" read data from ECU. The "Save file under" window is shown.
- Save data under any name as Hex-File (file name.hex).

Complete programming of ECU:

- Click on key "Programming" and the "Open" window is shown.
- Select desired Hex file and open.
- " Click on key "Save in ECU".

Of the configuration data only that operating data is shown which was read from the ECU (2nd column) or from a file (3rd column. Prior to uploading of the configuration data to the ECU, the operating data can be edited in the 4th column. This data is also uploaded when uploading the configuration data to the ECU.

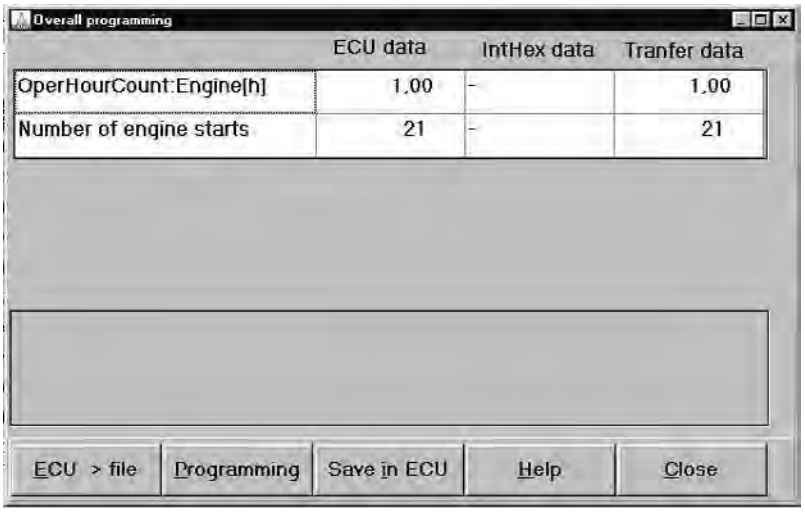


Figure: Menu complete programming (“Overal programming”)

EXPLANATION OF FUNCTION[SWITCH:

ECU->fi!e: The configuration data is read from the ECU, displayed and can be saved as HEX file.

Programming: Updated configuration data is uploaded to the ECU, In order for the upload to be permanent, you must operate the "Save in ECU" switch on the ECU.

Save in ECU (only applies for EMR): The configuration data are permanently saved in the ECU

Restriction: Only applies for EMR and EMS.

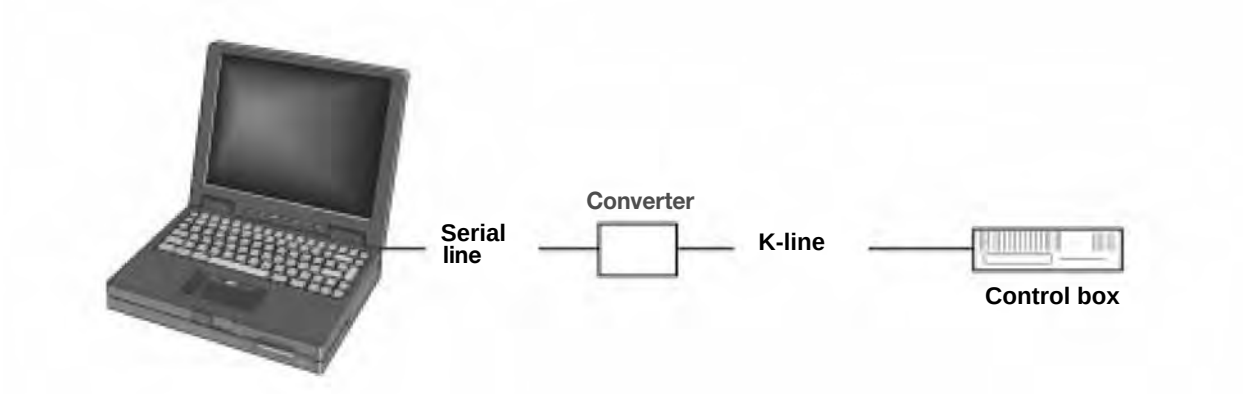
4.3 CALIBRATION

The accelerator pedal and the hand throttle potentiometer (if any) must be calibra-ted in combination with the EMR (not applicable for gensets).

Important prerequisites:

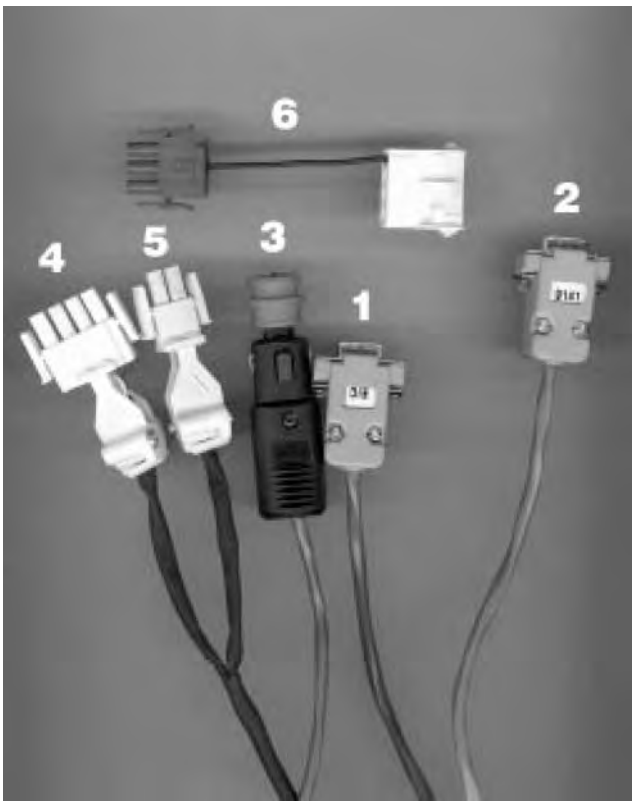
- Engine shut off
- Supply voltage (ignition/terminal 15) switched on
- Accelerator in frame

1.2 HARDWARE REQUIREMENTS



Hardware Setup

1.2.1 INTERFACE CABLE (SERIAL)



The depicted interface cable is plugged into the serial interface (COM 1 or COM 2) of the computer and connected with the corresponding connectors of the adapter cable.

1 - Plug (designation ”EIC”) for connection to the serial interface (RS 232) at the computer for diagnosis INFOCENTER.
2 - Plug (designation ”9141”) for connection to the serial interface (RS 232) at the computer for diagnosis POWERSHIFT- and POWERSHUTTLE-transmission, AGROTRONIC-hD and spring-suspended front axle.
3 - Plug for 12 V supply of the interface cable for connection to the cigar lighter.
4 - Diagnosis plug for AGROTRONIC-hD, gear box control and spring-suspended front axle, 4-pole.
5 - Diagnosis plug for INFOCENTER, 2-pole.
6 - Adapter for diagnosis POWERSHIFT transmission, old version.

4.6 OTHER INFORMATIONS

Error consequence/System reaction	possible error cause	possible remedy
no display activation resp. display ”EE”	EST45 is not running up Communication line defective Power supply defective	Check supply paths LU, KM Check fuse (term15, term30) Check communication line (LU)
Diagnosis tool cannot establish connection	EST45 is not running up Communication line defective Power supply defective	Ignition off/on, repeat Check supply paths LU, KM Check fuse (term15, term30) Check communication line (LU)
Upon starting/reversing powershift gear shifts over to neutral (jerk can be observed). display: ”N”, FR-arrows flashing, no error code, permanent beep	Wrong vehicle version selected upon end-of-line programming vehicle version Speed sensor Nmot and Nlsa defective Fault in hydraulic system (neutral by reversing monitoring)	Check/correct end-of-line programmed in programmazione fine linea Check cabling speed sensor Nmot and Nlsa Check speed sensors Nmot and Nlsa Check hydraulic system
Automatic shifting upward/downward in the splitter, shifting noise every 1-2 sec.	Wrong vehicle version selected upon end-of-line programming Speed sensor Nmot and Nlsa defective, interchanged Transfer valves GV1/GV2 interchanged Fault in hydraulic system (pressure modulation by GV toggling)	Check/correct end-of-line programmed vehicle version Check cabling speed sensors Nmot and Nlsa Check cabling transfer valves GV1/GV2 Check speed sensors Nmot and Nlsa Check hydraulic system
Short traction force interruption during driving with Closed drive train (LS pressure modulation)	Wrong vehicle version selected upo end-of-line programming Speed sensor Nmot and Nlsa defective Fault in hydraulic system (pressure modulation by GV toggling)	Check/correct end-of-line programmed vehicle version Check cabling speed sensors Nmot and Nlsa Check speed sensors Nmot and Nlsa Check hydraulic system
Automatic starting not possible, vehicle remains in neutral	Starting block signal not existing	Check starting block signal (LU, KM, K+)

REMOVAL OF THE RADIATOR (Mod. 165 CV)

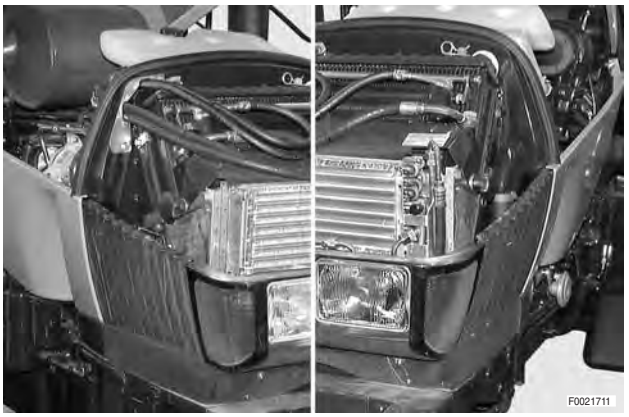
⚠ Remove the battery cover and disconnect the negative battery lead (–).

1 - Remove the side panels.

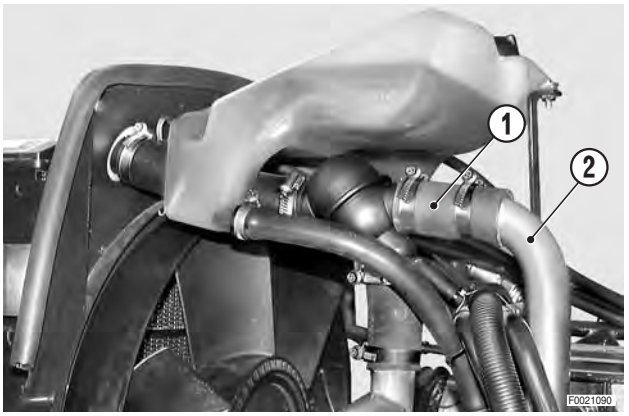
2 - Drain off the engine coolant.

Coolant: 23 ℓ (6.07 US.gall.)

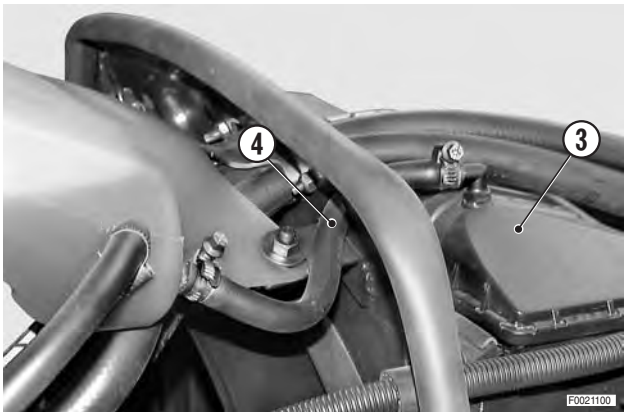
3 - Remove the gearbox oil/ fuel coolers.
(For details, see «REMOVAL OF THE GEARBOX OIL/ FUEL COOLERS»).



4 - Disconnect the hose (1) of the engine connection pipe (2).



5 - Disconnect the expansion tank connection pipe (4) from the radiator (3).



6 - Disconnect the lower hose (5) from the radiator.

REMOVAL OF THE 4WD PROPELLER SHAFT
(Version with front suspension)

⚠ Before switching off the engine, disengage the front axle suspension by pressing the relative button in the cab.

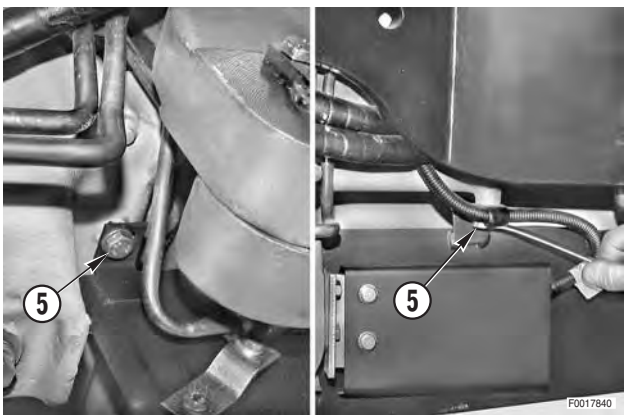
⚠ Remove the battery cover and disconnect the negative battery lead (–).

Discharge the residual pressure from the suspension system by unscrewing the valve (1) two full turns.

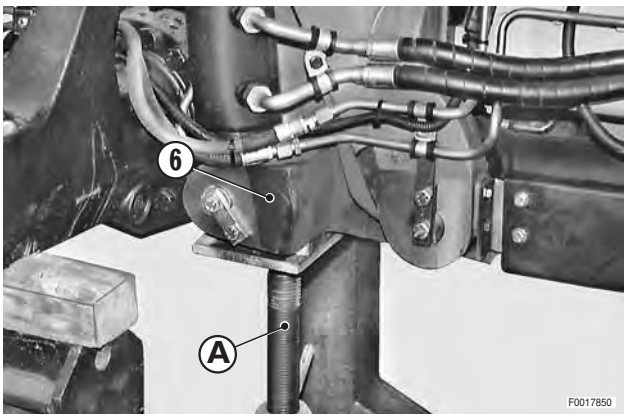
★ Reclose the valve after having discharged the pressure.

1 - While supporting the lower guard (2), remove the nut (3), the rear washer on the right and the rear bolt (4)on the left.

2 - Remove the front bolts (5) and remove the lower guard (2).



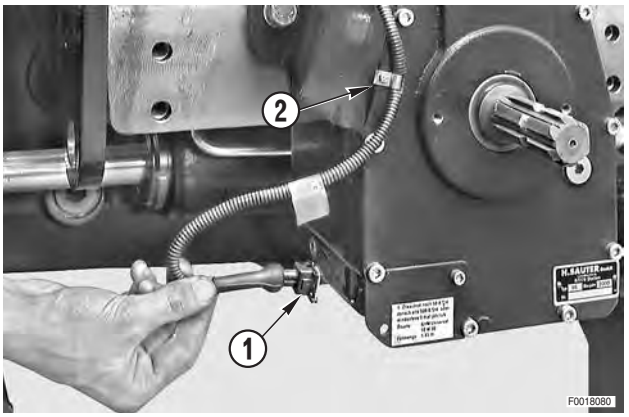
3 - Force an adjustable jack "**A**" under the suspension (6); it must be possible to lower the jack by approx. 10 cm (4 in.).



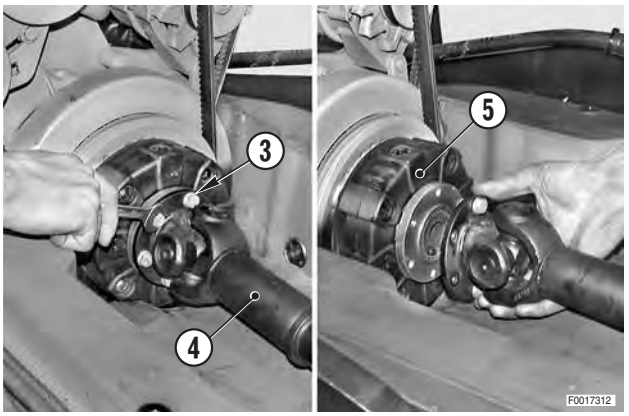
REMOVAL OF THE FRONT PTO ASSEMBLY

1 - Remove the front lift assembly.
(For details, see «REMOVAL OF THE FRONT LIFT ASSEMBLY»)

2 - Unplug the connector (1) and release the wiring from the clip (2).



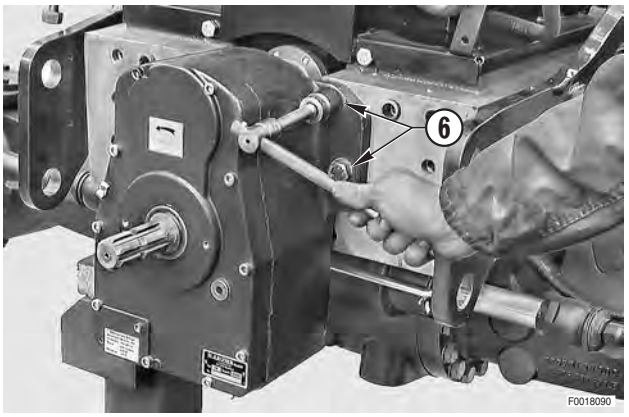
3 - Fully unscrew the bolts (3) securing the cardan shaft (4) to the flexible coupling (5) and detach the flange.



4 - Unscrew the four bolts (6) but only remove the two lower bolts.

★ Leave the two upper bolts in position for safety.

※ 1

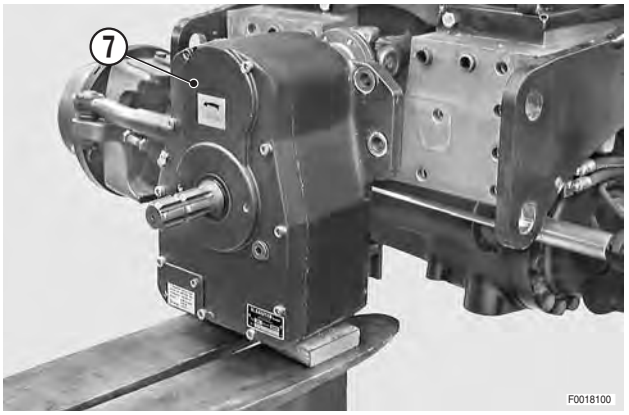


5 - Fit a non-slip block to a trolley jack; position the non-slip block under the PTO assembly.

6 - Remove the two upper bolts previously left for safety and remove the PTO assembly (7) while supporting the cardan shaft (4).

★ If neccessary, use a lever to help separate the assembly from the tractor.

kg PTO: 70 kg (154 lb.)



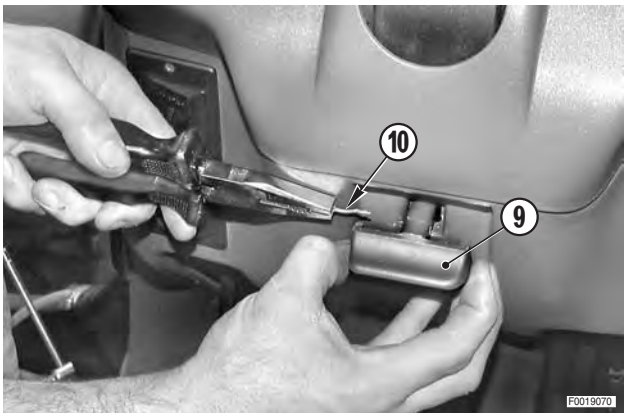
REFITTING THE FRONT PTO ASSEMBLY

- Refitting is the reverse of removal.

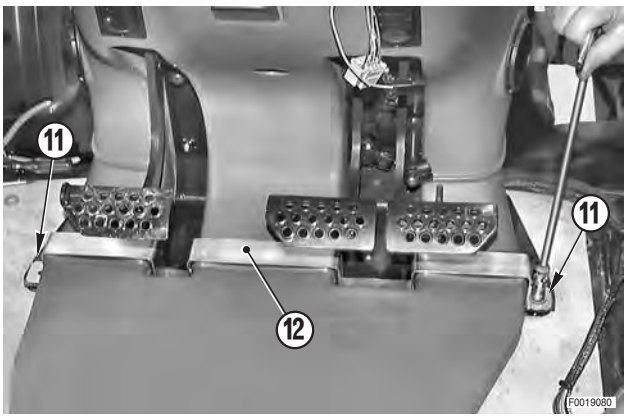
※ 1

Nm Screw: 214 Nm (157.7 lb.ft.)

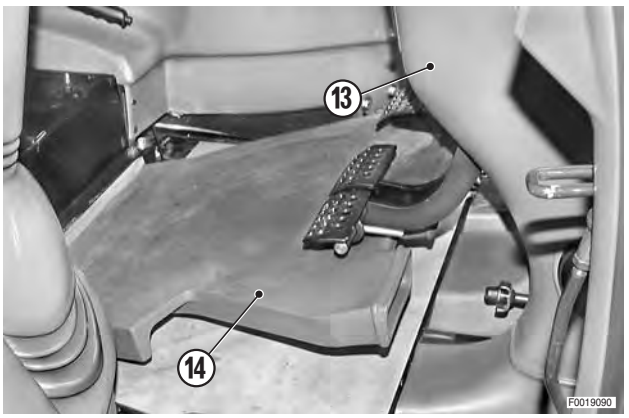
8 - Fully lower the steering column.
Pull outwards the lock handle (9) of the steering tilt adjustment; remove the cotter pin (10) and remove the handle.
★ Renew the cotter pin at each reassembly.



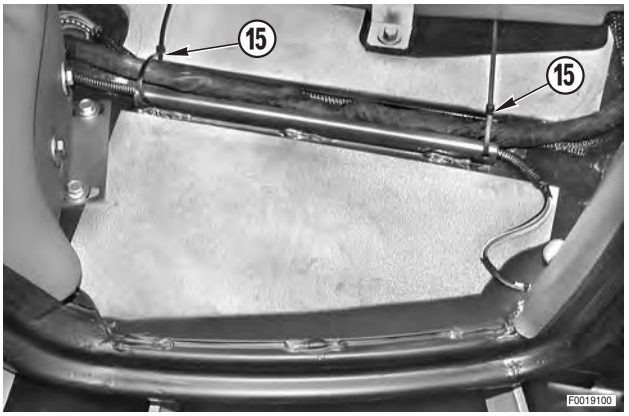
9 - Unscrew and remove the retaining screws (11) of the air duct fascia (12).



10 - Detach the air duct (14) from the centre shroud (13) and remove it.



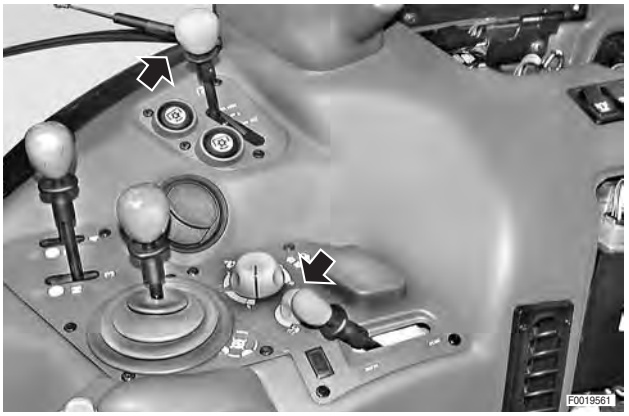
11 - Remove the cable ties (15) to release the wiring from the guide fixed to the footplate.
★ Note that the cable ties are located in grooves.



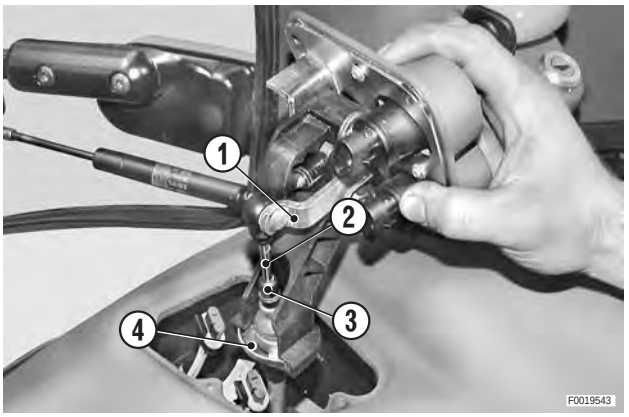
RENEWAL OF THE PTO ENGAGEMENT AND SELECTION CONTROL CABLES

REMOVAL
(Figures refer to the speed selector)

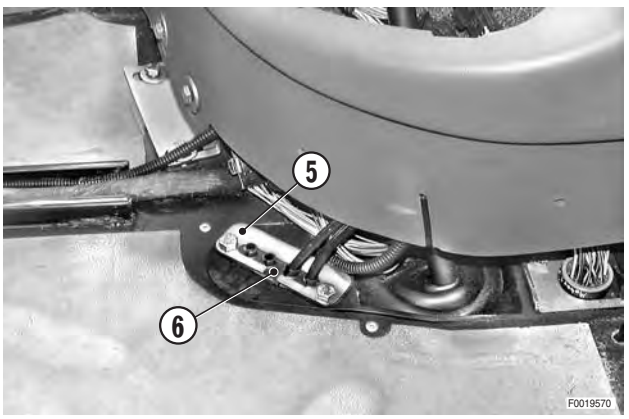
1 - Remove the lever assembly relative to the cable to be renewed.
(For details, see «REMOVAL OF LEVERS OF THE AUXILIARY SERVICE VALVES AND THE PTO»).



2 - Disconnect the control cable (1) from the control lever (2) and remove the yoke (3) to remove the outer cable (4).

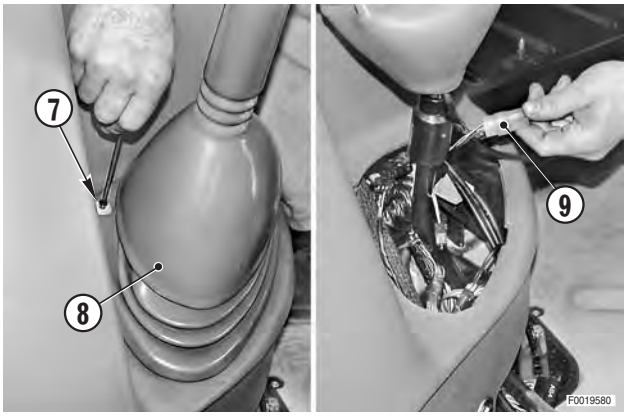


3 - Remove the front floor mat and remove the plate (5) of the cab guide (6) in order to release the outer cable to be renewed.



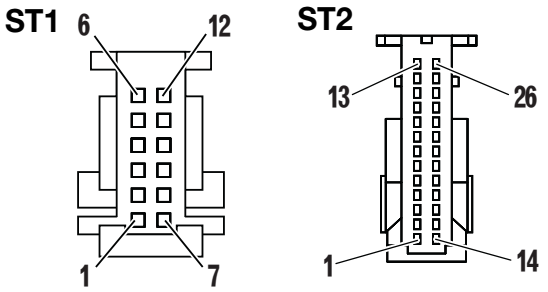
4 - Loosen the fixing screw (7) of the gear lever gaiter (8).

5 - Raise the gaiter (8), unplug the connector (9) and withdraw the control cable to be renewed.



Code	Description	Technical (para. 3.2.xx)	Connector	System (para. 4.xx)	Notes
0439.1530	Front axle suspension position sensor	29	X14	15	
0440.2772	Relay - supplementary air conditioning fan		X17	12	
0441.1109	Fuel level sensor	24	FUEL	9	106-115CV
0441.1112	Fuel level sensor	23	FUEL	9	120-150CV
0441.1496.4	Rotating beacon control switch		X71	7	
0441.1496.4	Rear worklights switch		X72	7	
0441.1496.4	4WD switch		8	18	
0441.1496.4	Lower worklights switch		3A	5-7	
0441.1496.4	Cab roof worklights switch		3	5-7	
0441.1497	Side lights switch		1	7	
0441.1498	ASM switch		6	18	
0441.1498	Diff lock switch		7	18	
0441.1512.4	Starter switch		X86		
0441.1533	Front PTO control pushbutton (in cab)		X76	20	
0441.1533	Rear PTO control pushbutton (in cab)		X77	20	
0441.1533	Rear PTO control pushbutton (on fender)		PTO	20	
0441.2337	Clock		X32	6	
0441.2338	Cigar lighter		X91	6	
0441.2616	Side console courtesy light		X36	6	
0441.2688	Rear lift "lower" control pushbutton	19	DW	19	
0441.2688	Rear lift "raise" control pushbutton	19	UP	19	
0441.3192	Windscreen wiper motor		X26	8	
0441.3192	Rear screen wiper motor		X27	8	
0441.3195	Pressure switch, clutch pedal depressed	18	X101	17	Powershift
0441.3198	Rear PTO speed sensor	39	PTO SEN	20	
0441.4105	Front windscreen washer pump		FP	8	
0441.4105	Rear screen washer pump		RP	8	
0441.4584	Radar control switch		X73	19	
0441.5266	Steering angle sensor		X53	18	
0441.5586.4	Lift draft sensor	32	RIGHT DRAFT LEFT DRAFT	19	

3.3.4 INFOCENTER 2 AND 3



CONNECTOR ST1			
Pin	**Volts**	**Code**	**Description**
1		TXD	Diagnostics interface transmission
2	+12V	KL15-ST	+15 key
3		KL31	Lamps earth
4	+12V	KL58	+58 lights
5		GROUT	Actual vehicle speed output (radar)
6		RPOUT	Rear PTO speed output
7		GETOEL	Transmission oil pressure
8		HANDBR	Handbrake on warning light
9	0V	KL30-ST	Vehicle earth
10		RXD	Diagnostic interface reception
11		VHOUT	Theoretical vehicle speed output (wheels)
12	0V	KL31E	Electronics earth

CONNECTOR ST2			
Pin	**Volts**	**Code**	**Description**
1		DIFF	Diff lock indicator lamp
2		BLINK2	2nd trailer flasher warning light
3		BLINK1	1st trailer flasher warning light
4		BLINK	Tractor flasher warning light
5		FELD	FIELD indication
6		STRAS	ROAD indication
7		LADEK	Battery charging indicator light
8		LUFTF	Air cleaner clogged
9		MOTOEL	Engine oil pressure warning light
10		FRONTZ	Front PTO indicator light
11		HECKZ	Rear PTO indicator light
12		MOTOR	Engine rpm
13		TANK	Fuel gauge
14		ALLRAD	4WD indicator lamp
15		KUEHLT	Engine coolant temperature