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Disassembly-Assembly - clutch casing with Power Shuttle and Dual Command (2 Speed Power Shift) units	30÷36	12-07
Disassembly-Assembly - driving shaft	37-38	12-07
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Disassembly-Assembly - clutch (A) and (B)	42÷47	12-07
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CHAPTER 5 - Power Shuttle transmission with creeper unit - 20X20 version

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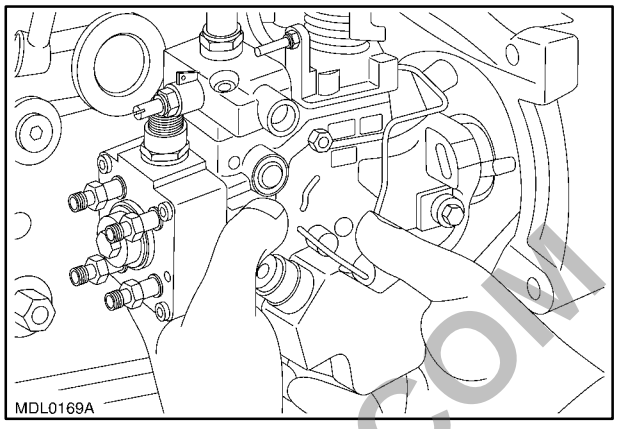
23 - DRIVE LINES

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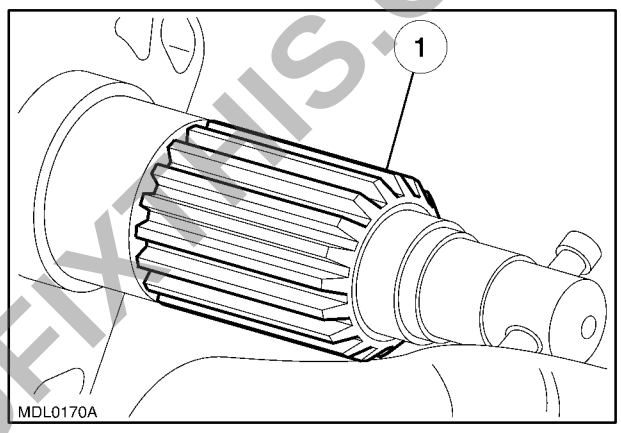
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Take the injection pump out of its seat.



106

Using a wrench, unscrew the ribbed driving gear (1) then take it out of the pump.



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Assembling

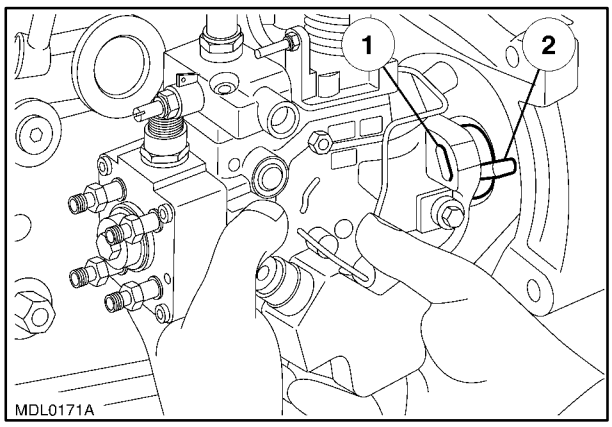
Proceed as follows:

Take a pump with the plunger on cylinder No. 1 already pre-set. Remove the splining key, insert the ribbed gear (1, fig. 107) onto the pump's tapered shaft, then slightly tighten the gear with a wrench.

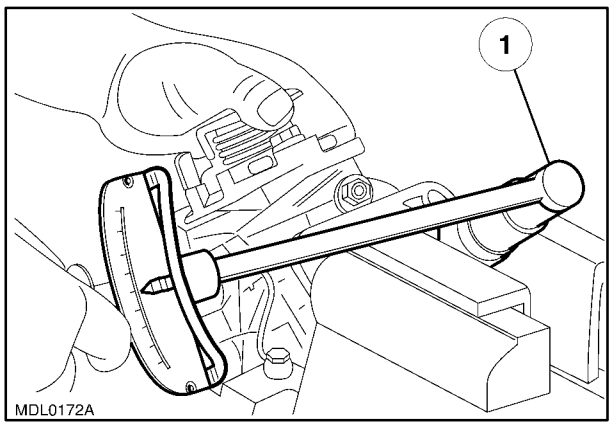
Insert the ribbed gear into the central seat of the timing gear by turning the tapered shaft, in the middle of the ribbed gear, so as to insert the stud bolts (2) in the middle of the slot (1).

Remove the pump from its seat.

Using a torque wrench (1) tighten the ribbed gear check nut to a torque of 95 Nm (9.69 kgm), after clamping the gear in a vice fitted with lead jaws.



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16. To refit all the shuttle and creeper parts in the casing proceed as follows:

ATTENTION

Use suitable tools to align the holes. NEVER USE FINGERS OR HANDS.

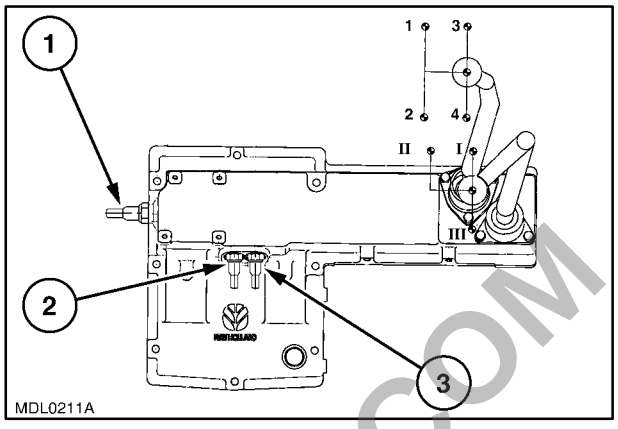
- Study the illustrations in figs. 5 and 6 for the positioning of the various parts.
- Respect the tightening torques prescribed on page 4.
- To fit the seal (1, fig. 21) observe the instructions of operations 17. ÷ 24.
- Assemble the drive shaft, complete with bearing and circlips.
- Fit the snap ring in the sleeves support, position the spacer then fit the clutch sleeves support cover.
- Assemble the reverser and creeper driven gear unit shaft.
- Fit the driven gear shaft cover and secure in position with the bolts.
- Assemble the reverser intermediate gear unit and secure with the relative bolt.
- Fit and secure the clutch forks to the relative levers.
- Assemble the pressure plate bearings and secure with relative clips.
- Assemble the driven gear unit, bearing and thrust washer.
- Assemble the synchroniser unit and all gears and forks then secure in position with the circlip.
- Fit the rod retaining bolt smearing the thread with one of the sealing compounds listed in Section 00.
- Assemble the gear on the shuttle driven shaft and secure with the snap ring.
- Remove the clutch-shuttle and creeper casing from stand **380000301**.

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RANGE AND GEAR POSITION SENSOR ADJUSTMENT

Define the process of adjustment of the range (2 and 3) and gear (1) position sensor on Power Shuttle transmissions.



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Gear lever status switch

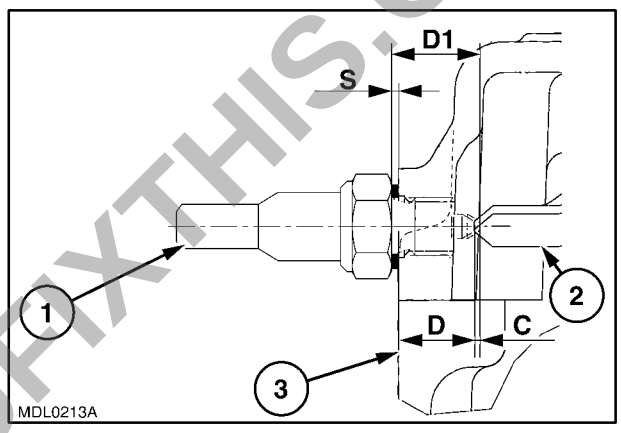
Put the gear lever into neutral, using a gauge measure the distance **D** between the end of the feeler (2) and the plane of the box (3). With the sensor (1) in your hand and the button at rest, measure the distance D_1, between the inner face of the hexagon and the end of the button.

For the sensor button to travel

C = 2.4 ÷ 2.8 mm

the adjustment thickness will be:

$S = D_1 - (D + C)$



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Range lever status switches

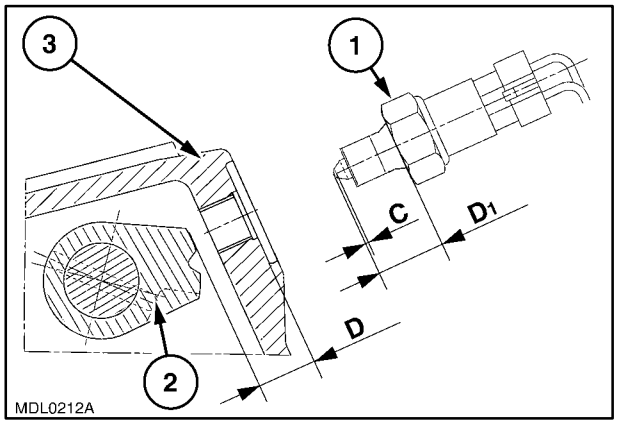
Put the range lever onto fast, on both range lever status switches (2 and 3, fig. 15) using a gauge measure the distance **D**, between the end of the feeler (2) and the inner face of the recess where the sensor will be housed in the supporting box (3). With the sensor (1) in your hand, measure the distance D_1, between the end of the button and the inner face of the hexagon.

For the sensor button to travel

C = 2.4 ÷ 2.8 mm

the adjustment thickness will be:

$S = D_1 - (D + C)$



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NOTE: *General Considerations:*
a) Check that the distance:

***D* + *S* = 19.8 ÷ 20.2mm**

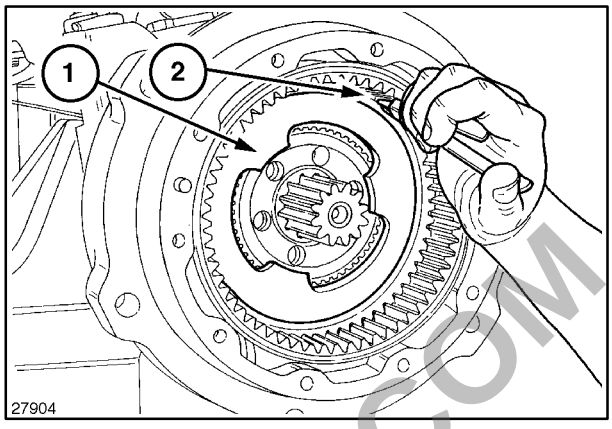
b) Round down the value

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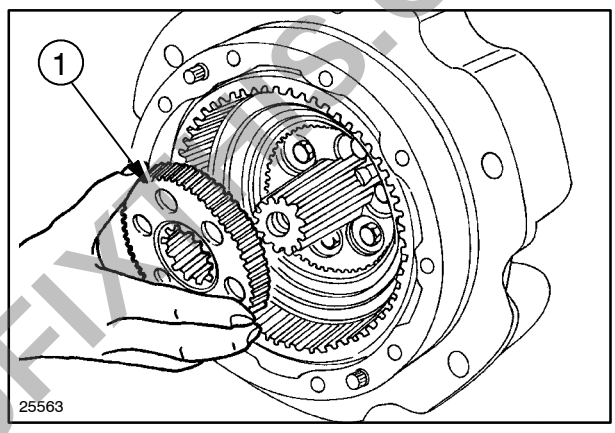
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5. Remove the circlip (1) and extract the external brake disk (2).



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6. Remove the hub (1) and associated brake friction disk.

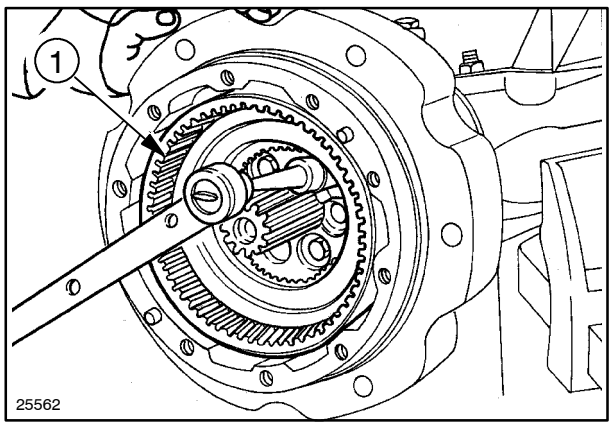


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7. Take out the retaining bolts and remove the final drive fixed gear (1) using two screws as an extractor.
8. To refit the front epicyclic final drive, proceed as follows.

⚠ ATTENTION ⚠

Use suitable tools to align the holes. NEVER USE FINGERS OR HANDS.



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- Study the illustrations in figs. 5, 6, 7 and 8 for the positioning of the various parts.
- Respect the tightening torques prescribed on page 5.
- Refit the drive fixed gear.
- Refit the brake disk hub.
- Fit the outer brake disk and secure in position.

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BEVEL DRIVE ADJUSTMENTS

Adjusting the preloading on the bevel drive bearings

NOTE: *When disassembling the transmission, if there is the bearing pre-load ring nut on the left-hand side only, use the ring nut on the left-hand side to pre-load the bearings only.*

ATTENTION

Handle all parts carefully.
Do not put your hands or fingers between parts.
Wear the prescribed safety clothing, including goggles, gloves and safety footwear.

ATTENTION

Use suitable tools to align the holes.
NEVER USE FINGERS OR HANDS.

Proceed as follows.

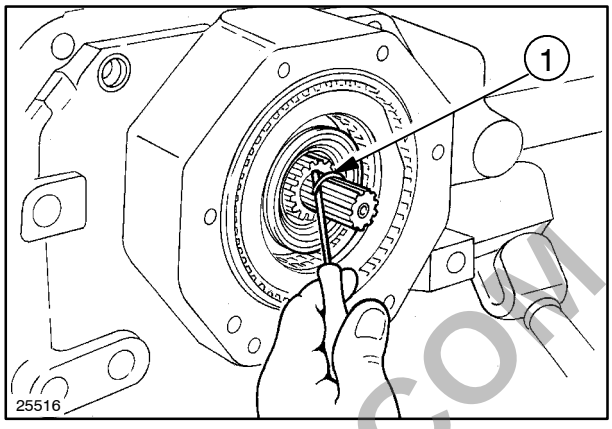
1. With the bevel pinion fitted, insert the differential assembly complete with the bevel crown wheel. On the gearbox-transmission casing, secure the right-hand bearing support (25, fig. 12 and 13 for mods. 56/76, 63/86, 71/97 and 83/113 KW/HP) or mount the bearing straight onto the transmission casing (for mod. 78/106 KW/HP) keeping it in position with the plate (24, fig. 14).
2. Assemble the left-hand support and tighten, using wrench **50027** (see fig. 9), the ring nut to the torque progressively, turning the differential unit a few times, to bed the bearings.
3. Check the rolling torque on the bevel crown wheel according to the values shown on the table below, and make sure that the gear shafts are not dragged during this operation.

	10/44 bevel drive	
Pinion rolling torque	Pinion rolling torque on crown wheel	Total pinion and crown wheel rolling torque on crown wheel
kgm	kgm	kgm
0.075 ÷ 0.150	0.360 ÷ 0.720	pinion torque + (0.100 ÷ 0.200)

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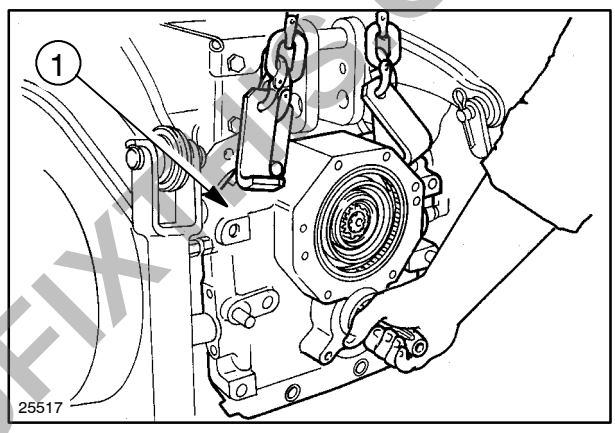
Remove the rear securing snap ring (1).



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Hitch the PTO unit (1) to the lifting hook with chain **380000227**, and allow the hoist to take the strain, unscrew the four bolts retaining the PTO unit to the transmission/gearbox casing and remove the PTO unit.

NOTE: *Before removing the PTO unit, insert the PTO synchronized with gearbox lever, from inside the cab.*



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ATTENTION

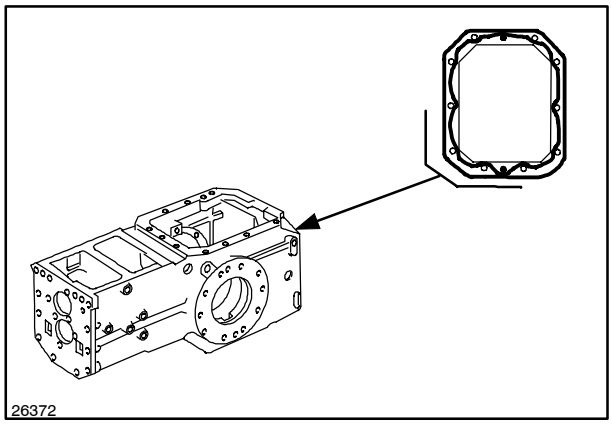
Handle all parts carefully.
Do not put your hands or fingers between parts. Wear the prescribed safety clothing, including goggles, gloves and safety footwear.

1. To reassemble the PTO unit, proceed as follows:

ATTENTION

Use suitable tools to align the holes. NEVER USE FINGERS OR HANDS.

- Clean the rear contact surface between the transmission/gearbox casing and the PTO casing.
- Re-tighten the two guide pins (used for disassembly) on the PTO unit.
- Clean the surface of the PTO casing and apply a 2 mm diameter bead of the sealing compound indicated on page 1, Sect. 00, following the indications in fig 43.
- Hitch the PTO unit to hook **380000227** with the chain.
- Place the PTO unit in front of the transmission casing, use a hoist to move the parts into position and insert on the centering pins.



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LIFT HYDRAULIC PUMP DATA 61L/MIN (*)

Filter	
Type	paper cartridge
Location	fixed to the pump housing on suction side
Pump Assembly	
Type	gear type with oil suction from transmission casing
Location	Flanged on the rear left-hand side of the engine
Construction	Bosch-Rexroth
Driving	by means of the engine gears
Direction of rotation (as seen from drive side)	left-hand side
Engine speed to pump speed ratio	1 : 1.088
Maximum speed of pump rotation (with engine at maximum power equivalent to 2300 rpm) rpm	2502
Rated output dm^3/turn	0.02545
Corresponding rated output for new pump dm^3/min (l/min)	63.68

(*) Standard equipment for all models with 4WD, compulsory for 2WD with power steering pump with supplementary control valve for ventral control valves.

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The main hydraulic components inside each of the auxiliary control valves are:

Flow control valve adjustment (1, fig. 3)

Flow control valve adjustment is carried out manually and controls the oil flow by means of the auxiliary control valve.

By turning the adjuster, the oil flow throttle clearance is varied by means of the flow control valve.

Flow control valve (2, fig. 3)

The flow control valve reads the throttle pressure differential with the relative adjuster, and controls the flow by means of the auxiliary control valve.

As each flow control valve individually reads the pressure differential of the operating auxiliary control valve, two or more circuits can be simultaneously controlled by working at different pressures.

Load check valve (3, fig. 3)

The check valve impedes pressure backflow from the auxiliary control valve circuit when the control pin is activated and the pump system pressure is less than the counterpressure in the circuit.

The following example explains operation:

When a cylinder is under a consistent load and the control valve pin is moved from the neutral position to the lifting position, the pump pressure could be less than the counterpressure in the auxiliary control valve circuit.

In this event, the counterpressure would force the oil back into the circuit, momentarily reducing the load, before the pressure in the system increases to maintain and further lift the load.

The load check valve prevents this from happening.

Lockout valve (5, fig. 3)

The lockout valve is located in the auxiliary control valve lifting duct and is closed when the valve is in neutral.

The valve prevents the implement from returning spontaneously, in the event of the pin grooves leaking when in the neutral position.

The lockout valve opens automatically when the control valve pin is moved from the neutral position.

Control valve pin (4, fig. 3)

The control valve pin is kept centred in neutral; when it moves, it sends the flow of oil to the control valve lifting or lowering orifices.

Pin centering and automatic release mechanism (6, fig. 3)

The spring centering mechanism holds the control valve pin in the neutral position.

When the pin is moved to the lifting, lowering or float mode position, the mechanism holds the pin in position by means of two ball bearings that engage in a groove inside the control retainer.

A pre-set release valve automatically releases the ball bearings, returning the pin to the neutral position each time the working pressure exceeds the predefined value.

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1063	EDC hydraulic valve lower solenoid open circuit	YES
1064	EDC hydraulic valve raise solenoid open circuit	YES
1065	EDC Hydraulic valve lower solenoid short circuit	YES
1066	EDC Hydraulic valve raise solenoid short circuit	YES
1067	EDC control valve supply voltage low	YES
1068	Height limit calibration error	YES
1069	Slip control configuration error	NO

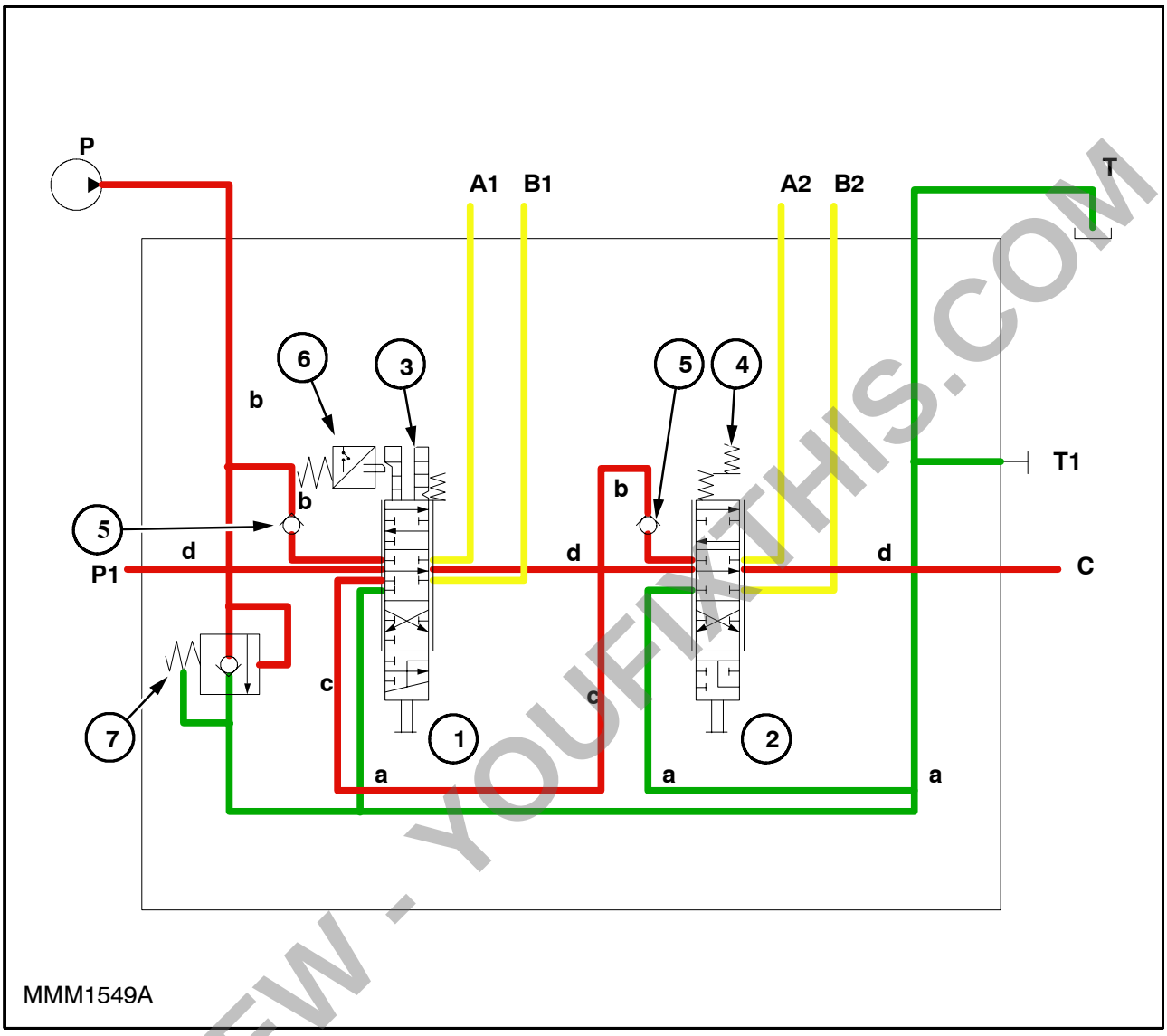
(*) Enter the **HH** programs of the **control panel** select the **H3** program, enter the **ECR**, then select the options:
E - show only severe codes,
F - show all codes for 6 minutes of power then pass to "**E**".
With option **E** selected, the word:
YES - means that the code will not be shown on the display but only kept in memory,
NO - means the code will not be shown on the display.

NOTE: *For resolution of the error codes, refer to Section 55, Chapter 9.*

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CONTROL VALVE HYDRAULIC DIAGRAM FOR 80 LITRE VARIANT



MMM1549A

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A_1 Oil delivery for lifting loader
B_1 Oil delivery for lowering loader
A_2 Oil delivery for lifting loader
B_2 Oil delivery for lowering loader
C Oil delivery to the other system components.
P Control valve supply.
P_1 Control valve supply (from the power steering pump).
T Oil discharge from the control valve.
T_1 Oil discharge from the control valve (not used).

a Discharge line.
b Supply line.
c Cylinder discharge oil recovery line to flow it into the second control valve supply line.
d Oil flow line, in the neutral phase, reaching the union (C) to pass on to the other circuit services.
1. 1st control valve pin (double acting + floating - with mechanical coupling in float).
2. 2nd control valve pin (double acting + regenerating).
3. Return springs for pin in double action and mechanical retainer with pin in float.
4. Return springs for pin in double action and additional spring with pin in regeneration.
5. Pin supply check valves.
6. Solenoid valve energizing switch on the additional control valve mounted on the power steering pump.
7. Overpressure valve (mounted only on this type of control valve, with the other control valve the valve is mounted on the pump..

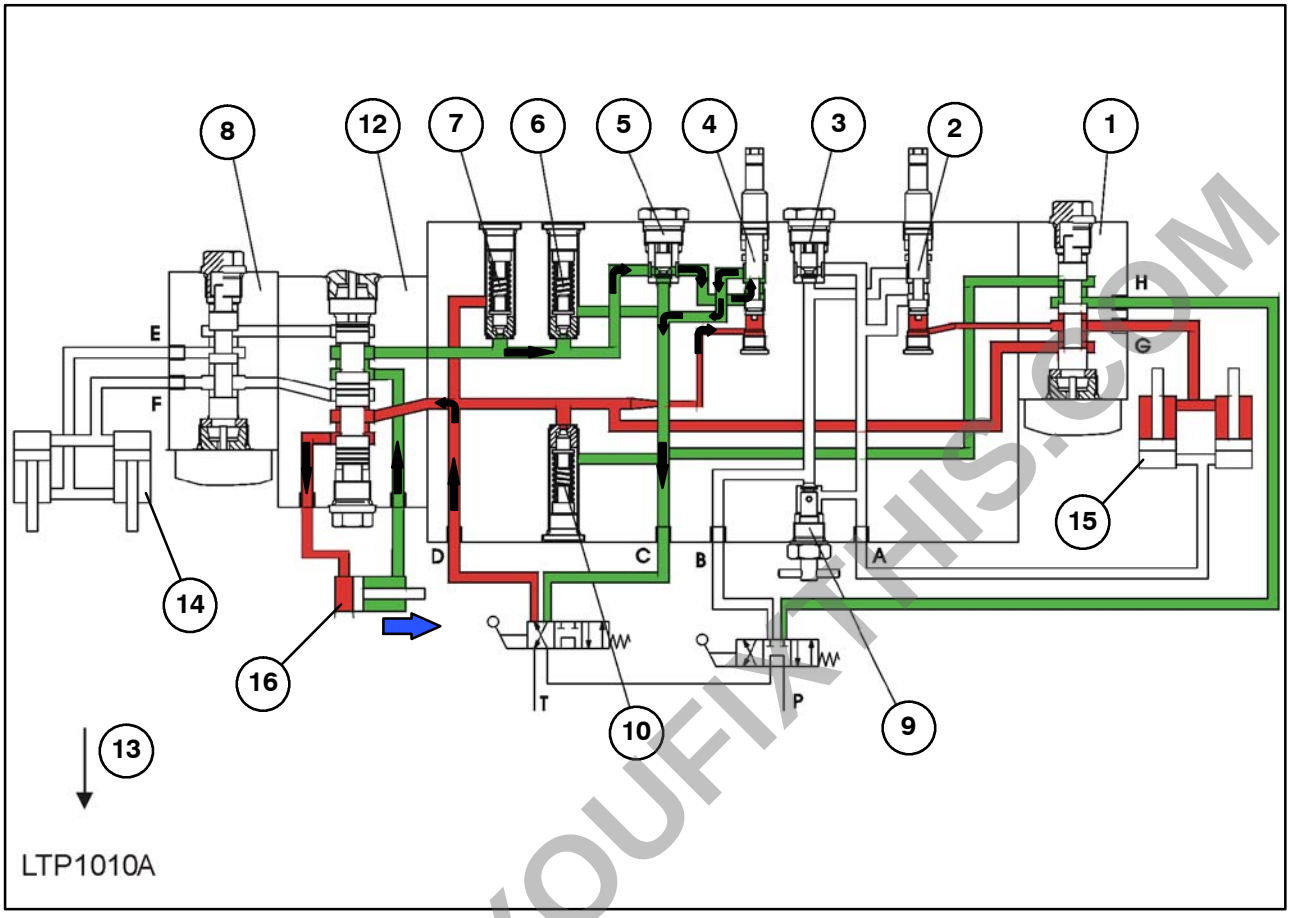
Oil at static rest.

Pressurised oil.

Discharge oil.

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Third auxiliary service: cylinder extension



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1. Hydraulic self levelling
2. Lowering brake valve
3. Load check valve
4. Lowering brake valve - attachment
5. Load check valve
6. Pressure relief valve A
7. Pressure relief valve B
8. Fast Tip valve
9. Adjusting toggle
10. Pressure relief valve C
11. No reference
12. Third auxiliary control valve
13. Driving direction
14. Attachment cylinder
15. Liftarm cylinder
16. Third auxiliary service cylinder

Operating:

- Press button S_3
- Move Joystick to tip

Valve functions:

Pressurized oil (red):

- Third auxiliary control valve (12) in “on” position
- Pressure relief valve A/B/C (6/7/10) neutral position

⇒ Third auxiliary service cylinder (16) in extended position

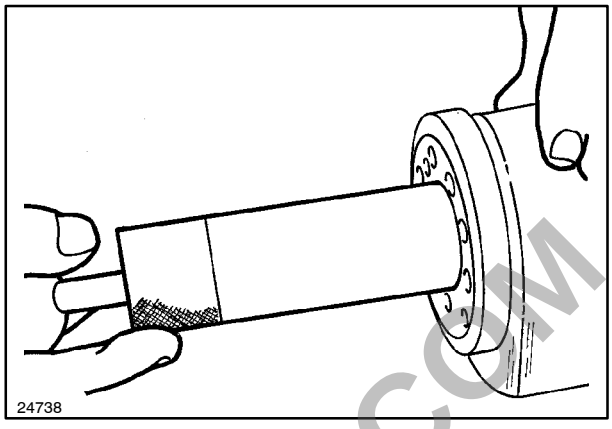
Return flow (green):

- Load check valve (5) in closed position
- Attachment lowering brake valve (4) in on position

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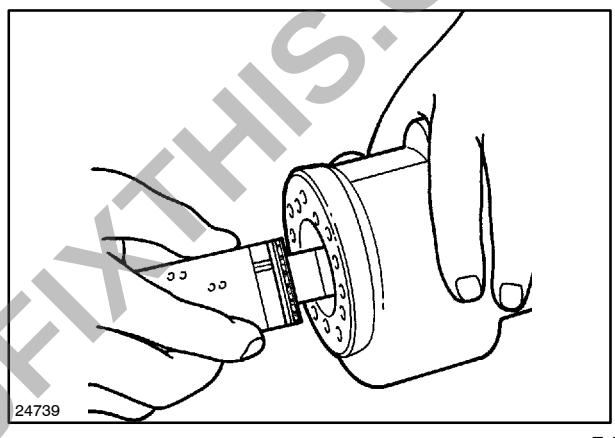
34. Extract the parts on tool **380000305**, or **380000281** (external bushing and punch).

    NOTE: *The support and seal ring support head remains on the control valve body (see fig. 50).*



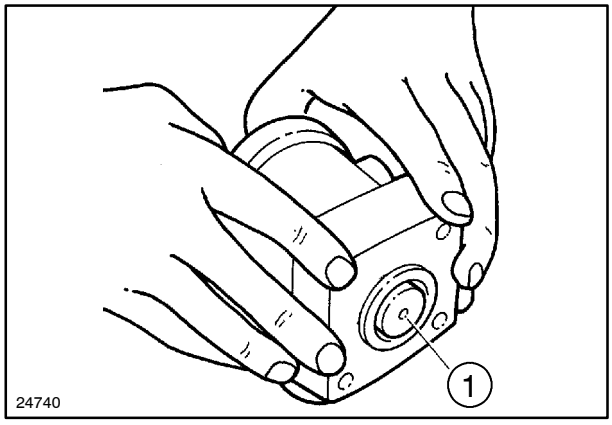
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35. Insert the parts that were previously fitted in operations 24÷29, on the control valve body, holding the sleeve-rotor drive shaft trim pin in a horizontal position, to prevent it from slipping out and jamming in the slots inside the control valve body.



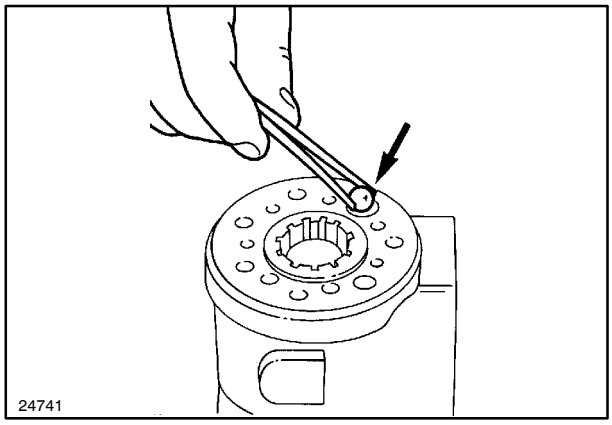
54

36. Press the rotating valve so as to bring the thrust bearing into contact with the control valve body; this will simultaneously expel the head (1) of tool **380000305** or **380000281** (see fig. 50) and insert the rings (1) and (2) on the control valve body seat (see operation 31).



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37. Rotate the control valve body and insert the non-return valve ball into the seat indicated by the arrow.



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AIR CONDITIONING PIPES
Renew

DANGER

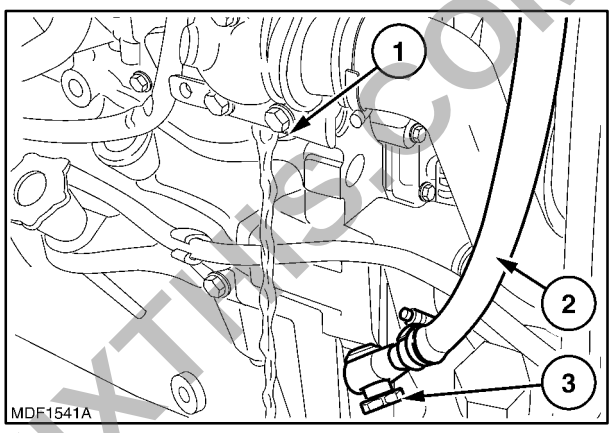
Lift and handle all heavy parts using suitable lifting equipment.
Make sure that assemblies or parts are supported by means of suitable slings and hooks. Ensure that no-one is in the vicinity of the load to be lifted.

DANGER

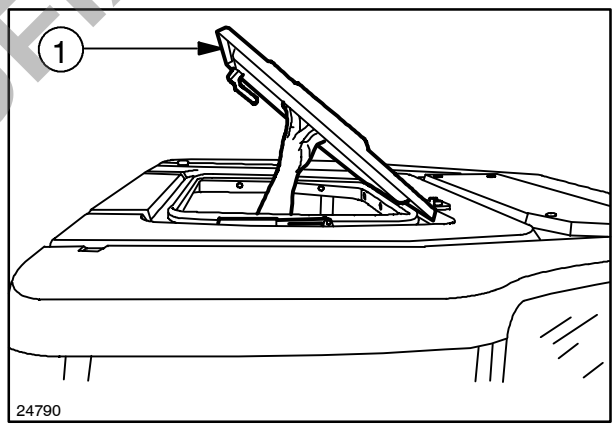
Recover the refrigerant closely following the safety regulations described on page 2.

1. Recover the refrigerant using control unit **380000315**.

2. Detach the fitting (3) of the return pipe (2) for the coolant from the cab heater radiator connected to the underside of the coolant pump (1) and drain off the engine coolant.
3. Open the roof hatch (1) extracting the pneumatic pistons.

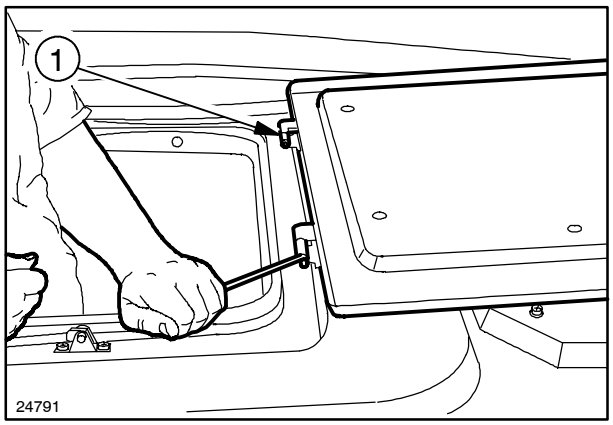


30



31

4. Remove the pivot pins (1) and remove the hatch.



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DESCRIPTION AND OPERATION

The type of starting system installed depends on the type of gearbox fitted on the tractor. All systems consist of an ignition key-switch, heavy-duty wiring, a starter motor with an electromagnet, a starter relay and clutch pedal switch. These are the basic circuit components used on versions with mechanical gearbox. More sophisticated systems include other components, which ensure the engine can be started only under the proper conditions.

There are four types of gearbox: two manual ones, base with mechanical reverser (12X12), base with creeper (20X12); The starter circuit (with mechanical power take-off) is illustrated on pages 3. Three electro-hydraulic ones with control via electronic modules, one with electro-hydraulic reverser (12X12), one with electro-hydraulic reverser and creeper unit (20X20) and one with Hi Lo functions (Dual Command/Two-Speed Power Shift) (24X24), the starter circuit is illustrated on pages 6.

Only one starter motor available with rated power 4.2 kW. This motor has four poles, four brushes with integrated electromagnet and positive mesh engagement control.

The electromagnet consists of two parallel-connected windings. The low resistance intake winding is grounded via the engine, whilst the high resistance hold winding is grounded via the electromagnet body.

When the key-switch contact is turned on with the clutch pedal pressed and the mechanical power take-off disengaged (version with manual gearbox) or the Shuttle lever in neutral (version with electro-hydraulic gearbox) the electromagnet coils are energized and the plunger is magnetically drawn into the electromagnet. This movement, transmitted by an adjustable joint mechanism, makes the driving pinion engage the flywheel rim gear. When the pinion makes contact with the rim gear, the plunger closes a series of contacts in order to directly power-up all four field coils, thereby supplying full power to the starter motor.

At this stage, one end of the intake coil is connected to the positive battery pole through the starter switch, whilst the other end is connected to the positive battery pole through the solenoid valve contacts. In this manner the intake coil is bypassed, without absorbing power, and the hold coil exclusively maintains the electromagnet plunger in position.

The starter motor includes a series of contacts and a two-part electromagnet plunger that totally closes the contacts, even if the pinion teeth are not perfectly in line with those of the crown wheel. When this happens, a clutch spring compresses the pinion, forcing it to engage completely as soon as the starter motor begins to turn over.

When the key-switch is released, power to the electromagnet and motor is cut off. The electromagnet return spring, acting on the adjustable joint mechanism, frees the driving pinion from the gear and re-opens the solenoid valve contacts.

A roller-type clutch mechanism is incorporated in the driving pinion unit. This prevents the pinion from overspeeding if it remains engaged in the flywheel crown wheel after the engine has started.

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STANDARD VERSION - (NORTH AMERICA)		
Valves	**Amps.**	**PROTECTED CIRCUITS**
F29	5	(+12V R2) - Side lights, controls lighting
F30	10	(+12V R2) - Front left-hand and rear right-hand side lights, controls and instruments lighting
F31	-	Not used
F32	-	Not used
F33	15	(+12V MF2 - 70A) - Full beam headlights
F34	15	(+12V MF2 - 70A) - Dipped beam headlights
F35	10	(+12V 58 Key) - Brake lights, seat0
F36	15	(+12V MF2 - 70A) - Front swivel work lights
F37	-	Not used
F38	-	Not used
F39	-	Not used
F40	-	Not used

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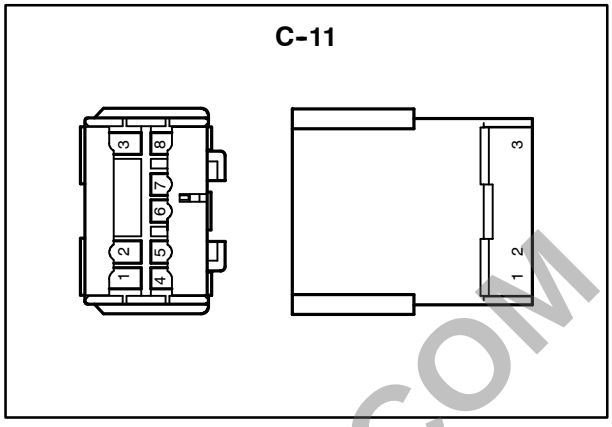
CODE	DESCRIPTION
C-81	Connector with 3 additional electro-hydraulic functions
C-84	Connector with 6 additional electro-hydraulic functions*
C-89	Connection of fitting for 80 litre pump variant
C-117	Diagnostic Socket
C-143	Right-hand rotating beacon socket
C-144	Left-hand rotating beacon socket
C-148	Turn indicators and rear LH work lights connector
C-319	Control unit memory connector
C-320	Fuse box protecting memory and safety systems*
C-351	Battery cut-off module cable connector*
JUMPERS	
CB-8A	Jumper on front loader connection
CB-50A	Jumper on front loader arrangement connector*
DIODE	
D-47	Starter circuit diode*
D-50B	Loader arrangement connector jumper diode*
FUSES	
F-30/31	Mega-fuse box
F-160	Grid Heater mega-fuse
F-320	Fuse protecting memory and safety systems
GROUND	
GND-92	Cab right upright top ground
GND-136	Transmission ground
GND-146	Ground on left mudguard
GND-151	Ground on right mudguard
GND-159	Dashboard ground
GND-325	Battery ground
LAMPS	
LMP-17	Front LH light
LMP-26	Work light on right handrail
LMP-28	Work light on left handrail
LMP-41	Rear left direction indicator on cab roof
LMP-42	Rear right direction indicator on cab roof
LMP-66B	Right rear work light

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Pin	Col.	Sect.	Pin	Col.	Sect.
1	-	-	**5**	AR	1.0
2	-	-	**6**	SB	1.0
3	Z	1.0	**7**	N	1.0
4	HR	1.0	**8**	-	-

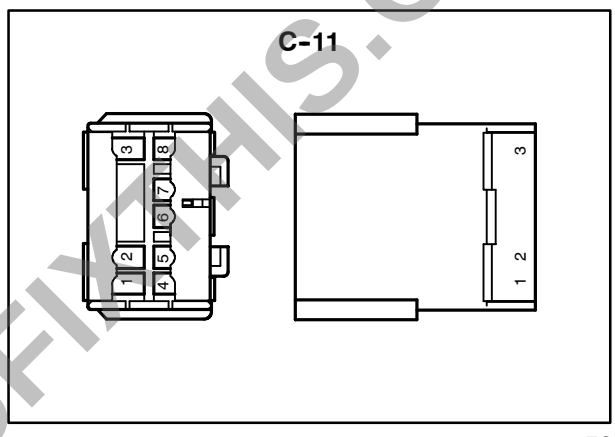
For model with Italian trailer brake
TRAILER CABLE SIDE



58

Pin	Col.	Sect.	Pin	Col.	Sect.
1	NG	1.0	**5**	-	-
2	HL	1.0	**6**	-	-
3	-	-	**7**	-	-
4	-	-	**8**	-	-

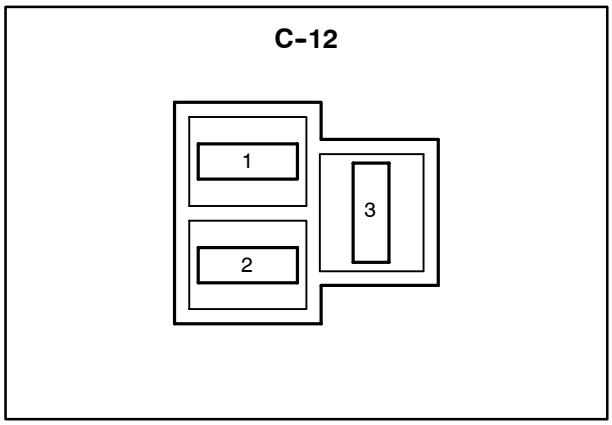
For model with pneumatic trailer brake
TRAILER CABLE SIDE



59

Pin	Col.	Sect.	Pin	Col.	Sect.
1	L	2.5	**3**	N	2.5
2	L	0.5	**-**	-	-

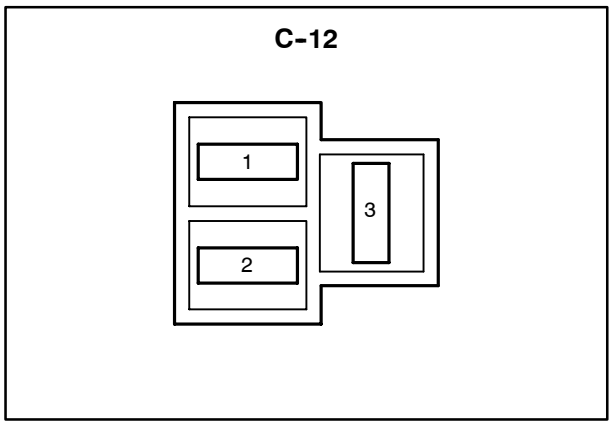
MAIN CABLE SIDE



60

Pin	Col.	Sect.	Pin	Col.	Sect.
1	G	4.0	**3**	N	1.5
2	-	-	**3**	N	1.5

For model without air-conditioner
CAB CABLE SIDE



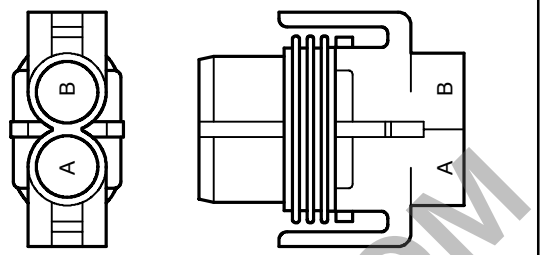
61

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Pin	Col.	Sect.	Pin	Col.	Sect.
A	B	1.0			
B	N	1.0			

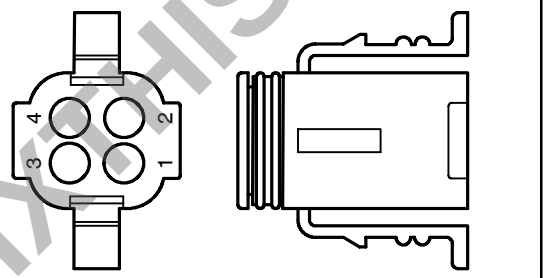
LMP-171



230

Pin	Col.	Sect.	Pin	Col.	Sect.
1	N	1.0	**3**	V	1.0
2	-	-	**4**	H	1.0

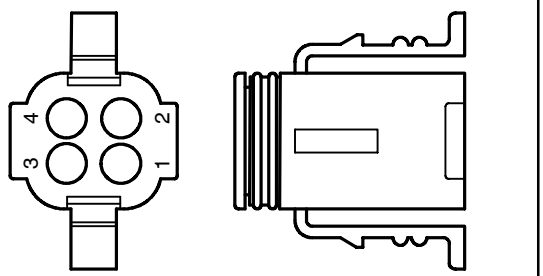
LMP-172



231

Pin	Col.	Sect.	Pin	Col.	Sect.
1	N	1.0	**3**	V	1.0
2	-	-	**4**	H	1.0

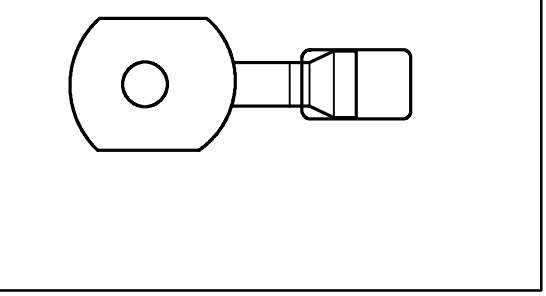
LMP-173



232

Pin	Col.	Sect.	Pin	Col.	Sect.
1	R	16.0			

RES-174



233

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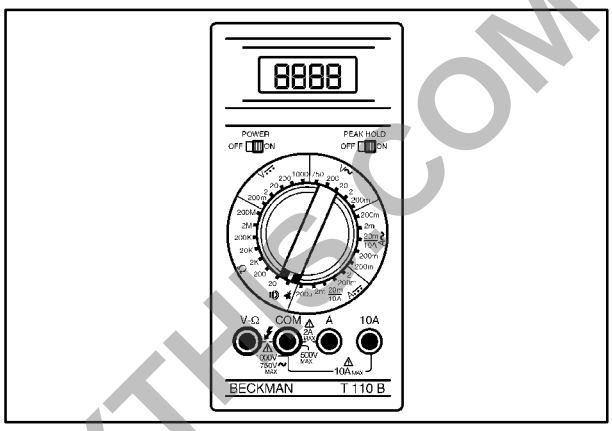
DIGITAL MULTIMETER

NOTE: *This section is only intended as a general guide to using a digital multimeter.*
Always refer to the manufactures operators manual for correct operation.

A multimeter is an electronic measuring device. The different types of measurement that can be made depend upon the make and model of the multi-meter. Most types of multimeter have the capacity to measure:

- Current (A) ac or dc
- Resistance (Ω)
- Voltage (V) ac or dc
- Continuity (Buzz test)

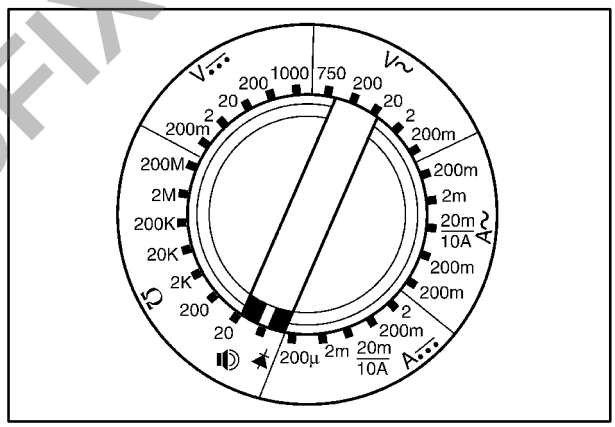
More expensive multimeters have other functions, such as the capacity to measure frequency (Hz) and test diodes.



7

General Operation:

Before proceeding with a test, decide on what is going to be measured (Voltage, Current etc.). Rotate the dial until the pointer is within the relevant zone. Within each zone there are different scales. The scale that is selected will represent the maximum value that the multimeter will read. Always select a scale which is greater than the value that you intend to measure. If you are unsure of the value to be measured, always select the highest scale and then reduce the scale once you have an idea of the measured value.



8

Why are there different scales ?

The closer that the scale is to the measured value, the more accurate the reading will be
e.g. If measuring the voltage of a battery with the scale set at 200V, the display may read 12V. However, if the scale was set to 20V the display may read a more accurate reading of 12.27V.

Giga	G	1,000,000,000	10^{9}
Mega	M	1,000,000	10^{6}
Kilo	K	1,000	10^{3}
milli	m	0.001	10^{-3}
micro	µ	0.000 001	10^{-6}
nano	n	0.000 000 001	10^{-9}
pico	p	0.000 000 000 001	10^{-12}

9

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ERROR CODE 1053 - CONTROLLER 5 VOLT REFERENCE SHORTED TO POSITIVE VOLTAGE

Possible fault modes:

1. Wiring fault
2. Control unit (XCM) trouble

Remedies:

NOTE: *When the cause of the fault code has been rectified, clear the fault code and test the system for normal operation.*

1. Check for other fault codes being displayed.

   A. If any other error code is displayed, continue to these tests.

   B. If no other error code is displayed, continue to step 2.

2. Check the +5 volt sensor supply reference in **H9**, ch **21**.

   A. If the value displayed is not approximately 49, continue to step 3.

   B. If the value displayed is approximately 49, while still in H9, ch 5 wiggle the harness, the EDC control unit connectors **MOD-1/3 (1B)** and **MOD-1/3 (3A)**, the EDC control panel connector **MOD-54** and **MOD-53**, the connector **SEN-224** of the arm lift potentiometer **C-2** of the transmission-cab main wiring, the shuttle lever connector **SW-79**, the range and gear lever position sensing button connectors **SW-209**, **SW-210** and **SW-211**, the clutch pedal potentiometer connector **RES-156** to check for an intermittent circuit. Channel 5 values will change if an intermittent circuit is detected; Repair or replace as necessary.

3. Check for a short to +8 or +12 Volts.

   A. Disconnect the connector of the control unit (XCM) **MOD-1/3 (1B)**. Turn the ignition key switch 'ON'. Measure the voltage between the connector**:**
   MOD-1/3 (1B) pin **17**, wire 0.5 **(S)** and **ground**
   If a voltage is indicated, repair or replace the harness as required.

   B. If no voltage is indicated, download the correct level of software. If the error is repeated, remove and replace the control unit (XCM).

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ERROR CODE 2067 - CLUTCH D SOLENOID VALVE SHORT TO +12 VOLTS

Cause:

Short circuit to + 12 Volt between the solenoid valve of clutch D and the control unit (XCM), or the control unit (XCM) is faulty.

Effects:

Transmission is disabled. The tractor is not operative.

Possible fault modes:

1. Faulty connectors
2. Wiring fault
3. Control unit (XCM) trouble

Remedies:

NOTE: *When the cause of the fault code has been rectified, clear the fault code and test the system for normal operation.*

1. Check the clutch solenoid valve connector D **SOL-205**, the transmission - cab main connector **C-2**, and the connectors of the control unit (XCM) **MOD-1/3 (1A)** and **MOD-1/3 (3B)**.

   A. Ensure that the connectors are connected, not damaged, the pins are in the correct position and that the fit is tight. Repair or replace as necessary.

   B. If the connectors are okay, continue to step 2.

2. Check for a short to +12 volts.

   A. Disconnect **SOL-205**. Turn the ignition key switch 'ON'. Measure the voltage between connector:
   SOL-205 pin **1**, wire 1.0 **(GV)** and **ground**
   SOL-205 pin **2**, wire 1.0 **(GR)** and **ground**
   If voltage is indicated, turn OFF the ignition key switch. Disconnect the connectors of the control unit (XCM) **MOD-1/3 (1A)** and **MOD-1/3 (3B)**. Turn the ignition key switch 'ON'. If a voltage is still indicated, repair or replace the harness as required.

   B. If no voltage is indicated, download the correct level of software. If the error is repeated, remove and replace the control unit (XCM).

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ERROR CODE 14092 - WHEEL SPEED SENSOR SHORT TO GROUND

Possible fault modes:

1. Faulty connectors
2. Wheel speed sensor faulty
3. Wiring fault
4. Faulty analog-digital instrument cluster (ADIC)

Remedies:

NOTE: *When the cause of the fault code has been rectified, clear the fault code and test the system for normal operation.*

1. Check the speed sensor connector **SEN-217**, instrument cluster (ADIC) connector **MOD-27 (1)** and the transmission - cab main connector **C-2**.

   A. Ensure that the connectors are connected, not damaged, the pins are in the correct position and that the fit is tight. Repair or replace as necessary.

   B. If the connectors are okay, continue to step 2.
2. Check the wheel speed sensor for a short circuit.

   A. Disconnect the connector **SEN-217**. Check the connector between:
   SEN-217 pins **1** and **2**
   If a short circuit is indicated, remove and replace the wheel speed sensor.

   B. If a short circuit is not indicated, continue to step 3.
3. Check the wheel speed sensor for a short to ground.

   A. Check between the component side of connector:

   SEN-217 pin **1** and **ground**

   SEN-217 pin **2** and **ground**

   If short to ground is indicated, remove and replace the wheel speed sensor.

   B. If the temperature sensor is okay, continue to step 4.
4. Check for a short to ground.

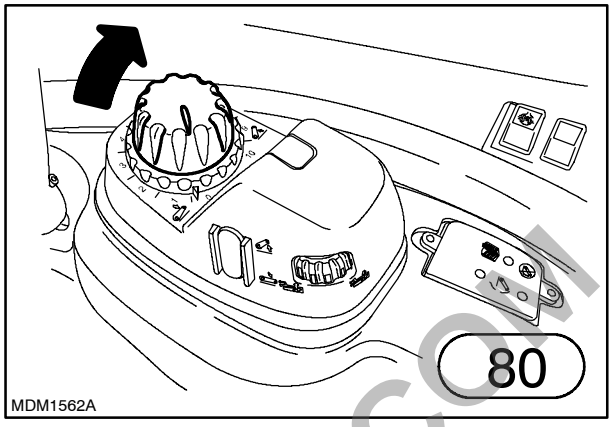
   A.Disconnect the connector **MOD-27 (1)**. Check between the connector:
   SEN-217 pin **1**, wire 1.0 **(HB)** and **ground**
   If a short to ground is indicated, repair or replace the harness as required.

   B. If the harness is okay, download the correct level software. If the fault occurs again, remove and replace the control panel (ADIC).

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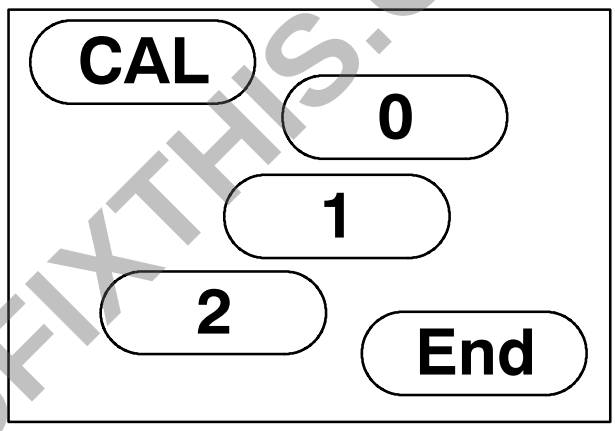
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6. Using the position control knob, capture the lift arms then turn it fully clockwise so that the arms reach a height of between 70% and 90% of the travel.



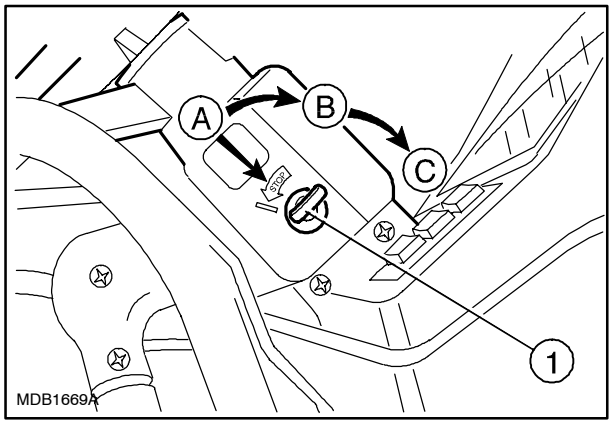
60

7. On the central display **CAL** will show **0** to indicate the start of calibration.
   During calibration the lift is automatically raised and lowered by a small amount 3 times, which takes 2–3 minutes.
   Each lifting and lowering is counted **0** - **1** - **2** on the central display.
   When the display shows **End** calibration is over.



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8. After calibrating turn the switch (1) to **A** (OFF) to save the calibrations.



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NOTE: *For the to calibrations of the lift it is advisable to calibrate the* ***arms position control potentiometer*** *and afterwards, without exiting calibration, calibrate the* ***solenoid valves****.*
Enter calibration either with program H1 of menu HH, or with button (1, fig. 63) pressed on rapid ground entry (fully down), then calibrate the lift by following the operations:
- 5, the one that appears on the central display,
- 1, 2, 3 and 4 to calibrate the arms lift potentiometer,
- 6, 7 and 8 to calibrate the solenoid valves.

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