
SECTION 10 - ENGINE

BOOK 1 - 87352280

Chapter 1 - Engine (Continued)

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6. Escaping diesel/hydraulic fluid under pressure can penetrate the skin causing serious injury.
 - **Do not** use your hand to check for leaks. Use a piece of cardboard or paper to search for leaks.
 - Stop the engine and relieve pressure before connecting or disconnecting lines.
 - Tighten all connections before starting the engine.
 - If fluid is injected into the skin obtain medical attention immediately.
7. Do not modify or alter or permit anyone else to modify or alter the tractor or any of its components or any tractor function without first consulting an authorized dealer.
8. The fuel oil in the injection system is under high pressure and can penetrate the skin. Unqualified persons should not remove or attempt to adjust a pump, injector, nozzle or any other part of the injection system. Failure to follow these instructions can result in serious injury.
9. Continuous long term contact with used engine oil may cause skin cancer. Avoid prolonged contact with used engine oil. Wash skin promptly with soap and water.
5. Do not fill the fuel tank to capacity. Allow room for expansion.
6. Wipe up spilled fuel immediately.
7. Always tighten the fuel tank cap securely.
8. If the original fuel tank cap is lost, replace it with an approved cap. A non-approved cap may not be safe.
9. Keep equipment clean and properly maintained.
10. Do not drive equipment near open fires.
11. Never use fuel for cleaning purposes.
12. Arrange fuel purchases so that summer grade fuels are not used in the winter.

ROPS

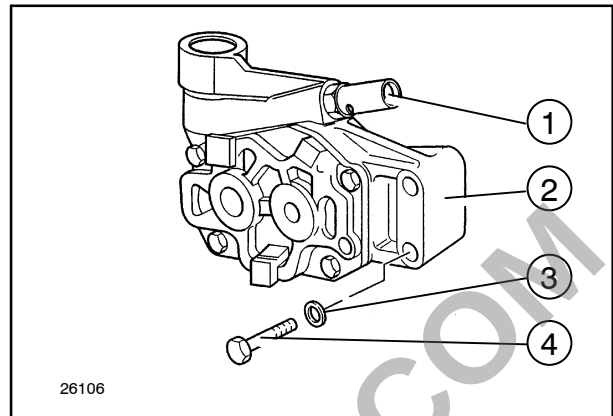
The tractor may be equipped with a safety frame (ROPS) which must be maintained in a serviceable condition. Be careful when driving through doorways or working in confined spaces with low headroom.

DIESEL FUEL

1. Under no circumstances should gasoline, alcohol or blended fuels be added to diesel fuel. These combinations can create an increased fire or explosive hazard. In a closed container such as a fuel tank these blends are more explosive than pure gasoline. Do not use these blends.
2. Never remove the fuel cap or refuel with the engine running or hot.
3. Do not smoke while refueling the tractor or when standing near fuel. Keep any type of open flame away. Wait for the engine to cool before refueling.
4. Maintain control of the fuel filter pipe nozzle when filling the tank.
1. Do not modify, drill, weld or alter the ROPS in any way.
2. Never attempt to straighten or weld the ROPS or retaining brackets, which have suffered damage. By doing so you may weaken the structure and endanger your safety.
3. Do not secure any parts on the ROPS or attach it with other than the special high tensile bolts and nuts specified.
4. Never attach chains or ropes to the safety frame or roll bar for pulling purposes.
5. Never take unnecessary risks even though your safety frame or roll bar affords you the maximum protection possible.
6. Whenever possible, operate with the ROPS in its fully upright and locked position.

NOTE: Oil pump TN75VA and TN95VA.

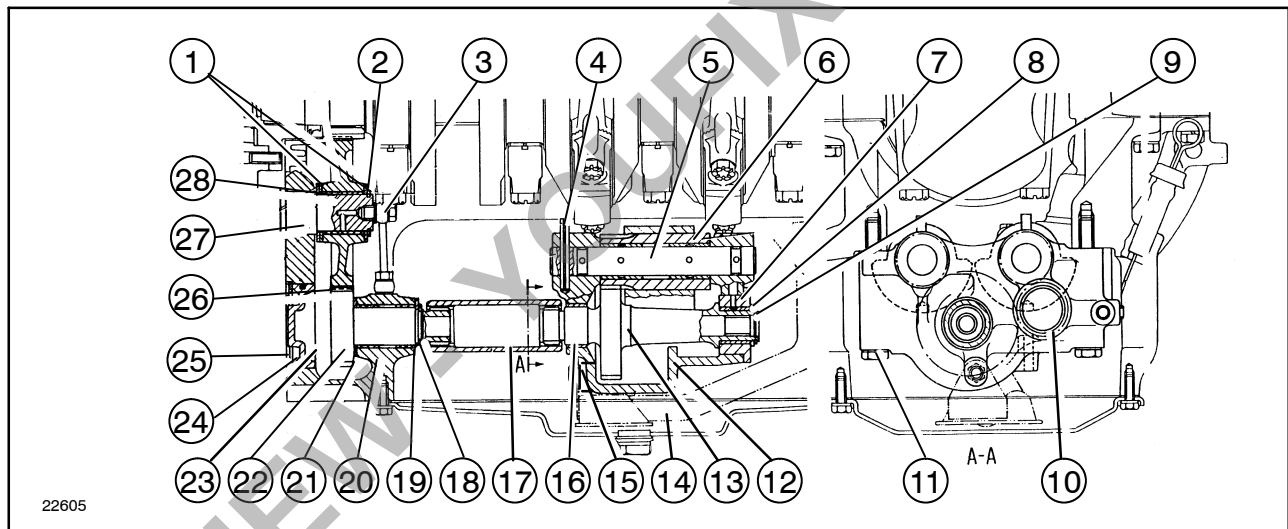
71. Remove the mounting bolts (4), and take off the washers (3) and the engine lubrication oil pump (2) complete with pressure relief valve (1).



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72. Remove the lubricating oil pipe (3).
 73. Remove circlip (18).
 74. Remove circlip (25) and cover (23) with relative O-ring seal (24).
 75. Withdraw gear (22) from sump.

76. Remove circlip (2), gear (26) and the thrust washers (1).
 77. Inspect the shaft (27). If signs of scoring or wear are evident, the shaft must be replaced.
 78. Withdraw the spring pins (4) and dismantle the counterweight shafts using a suitable drift.



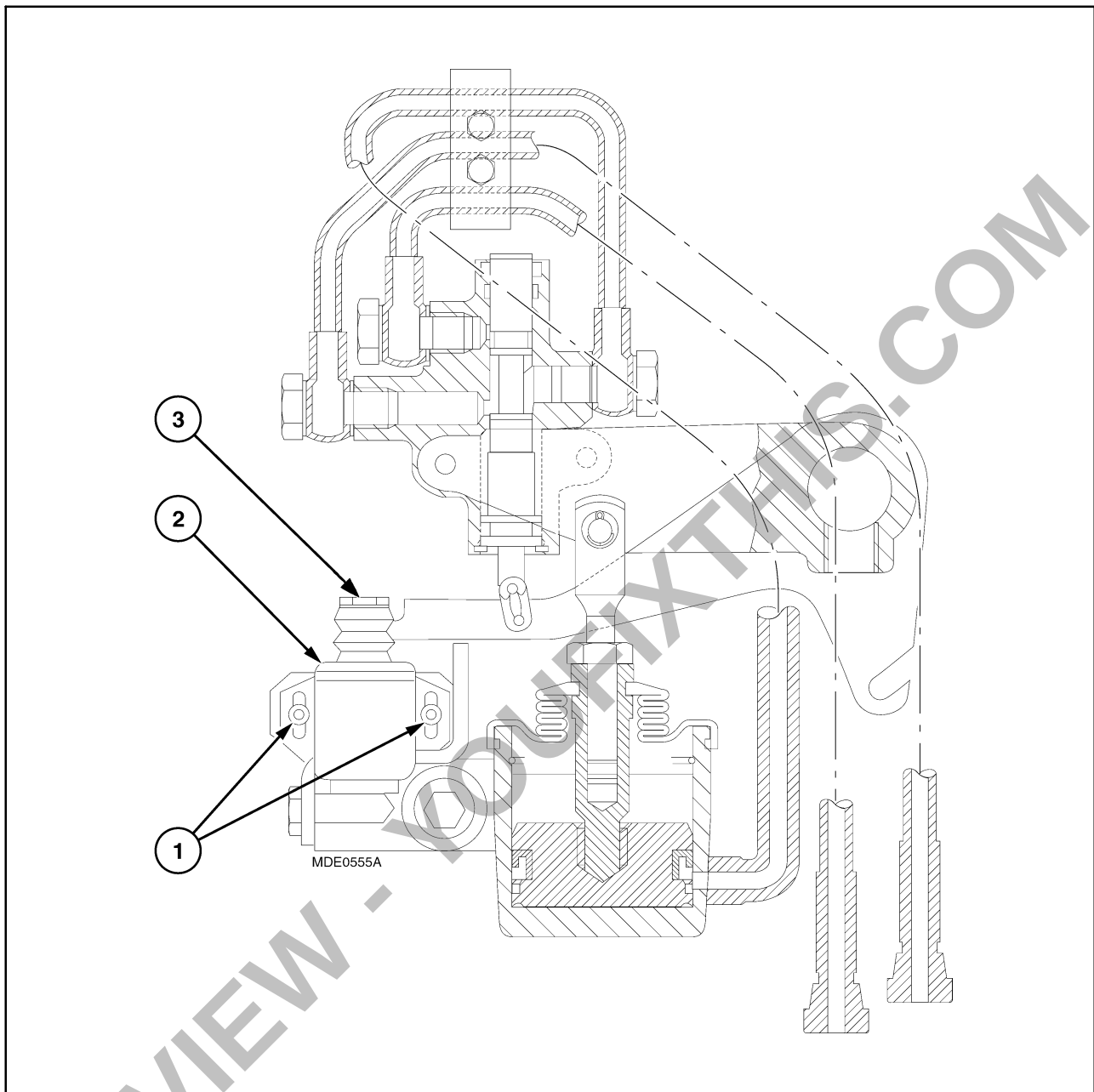
77

Balancing Device Section

- | | |
|---|-----------------------------------|
| 1. Thrust washers. | 15. Screen filter retaining bolt. |
| 2. Circlip. | 16. Bushing. |
| 3. Lubricating oil pipe for bushing (28). | 17. Rigid coupling sleeve. |
| 4. Shaft retaining spring pin (5). | 18. Circlip. |
| 5. Counterweight rotation shaft. | 19. Thrust washer. |
| 6. Counterweight. | 20. Carrier for gear (22). |
| 7. Carrier for counterweight drive gear (13). | 21. Thrust washer. |
| 8. Thrust washer. | 22. Counterweight drive gear. |
| 9. Circlip. | 23. Cover. |
| 10. Counterweight intermediate gear. | 24. O-ring seal. |
| 11. Bolts securing counterweight housing to sump. | 25. Circlip. |
| 12. Counterweight housing. | 26. Intermediate gear. |
| 13. Counterweight drive gear. | 27. Shaft for gear (26). |
| 14. Screen filter. | 28. Bushing. |

SPECIFICATIONS

Air cleaning	dual cartridge dry air filter, with clogged filter indicator with centrifugal pre-filter and automatic dust ejector
Fuel pump	with double diaphragm
Fuel filtering	through wire filter in fuel supply pump, and replaceable cartridge on delivery line to injection pump
Minimum fuel flow rate with pump shaft rotating at 1600 rpm ..	100 liters/hour
Cam operated	engine timing
BOSCH injection pump	rotating distributor type
All-speed governor, incorporated in pump:	
BOSCH	centrifugal counterweights
Automatic advance regulator, incorporated in pump:	
BOSCH	hydraulic
Turbocharger (Mod. TN75VA):	
- GARRETT type	T 25
Injection pump	rotating distributor with speed governor and advance regulator incorporated
BOSCH pump:	
- Mod. TN60VA	VE 3/11 F 1150... - 504041420
- Mod. TN75VA	VE 3/11 F 1150... - 504042213
- Mod. TN95VA	VE 4/11 F 1150... - 504054179
Direction of rotation	counterclockwise
Injection order	1-2-3



6

ADJUSTING THE PTO SWITCH**CAUTION**

Always use appropriate tools to align fixing holes.
NEVER USE FINGERS OR HANDS.

1. Check that the PTO clutch is disengaged.

2. Unscrew the PTO engaged switch (2) retaining screws (1) and move the switch away from the control valve lever (3).

3. Move the switch (2) towards control valve lever (3) until the switch clicks into position.

4. Lock the switch (2) in this position with the retaining screws (1).

SPECIAL TOOLS

Warning - The operations described in this section can only be carried out with **ESSENTIAL** tools indicated by an (X).

To work safely and efficiently and obtain the best results, it is also necessary to use the recommended specific tools listed below and certain other tools, which are to be made according to the drawings included in this manual.

List of specific tools required for the various operations described in this Section.

- 380000227** Clutch casing lift hook.
- 380000301** Rotating stand for overhaul operations.
- X 380001614** Tool for gearbox driving and driven shafts adjustment.
- 380001621** Driving shaft rod for lifting unit.
- 380001616** Driven shaft retaining tool.
- 380001610** Adjuster handle (with **380001620** and **380001609**).

380001620 Power take-off drive shaft seal splining tool (with **380001610**).

380001609 Power take-off drive shaft roller bearings splining tool (with **380001610**).

X 380001617 Pliers for gearbox shafts circlips.

380001618 Driving shaft assembly guide.

380001619 Driven shaft fitting guide.

X 380000171 Adaptor (with **380000291**).

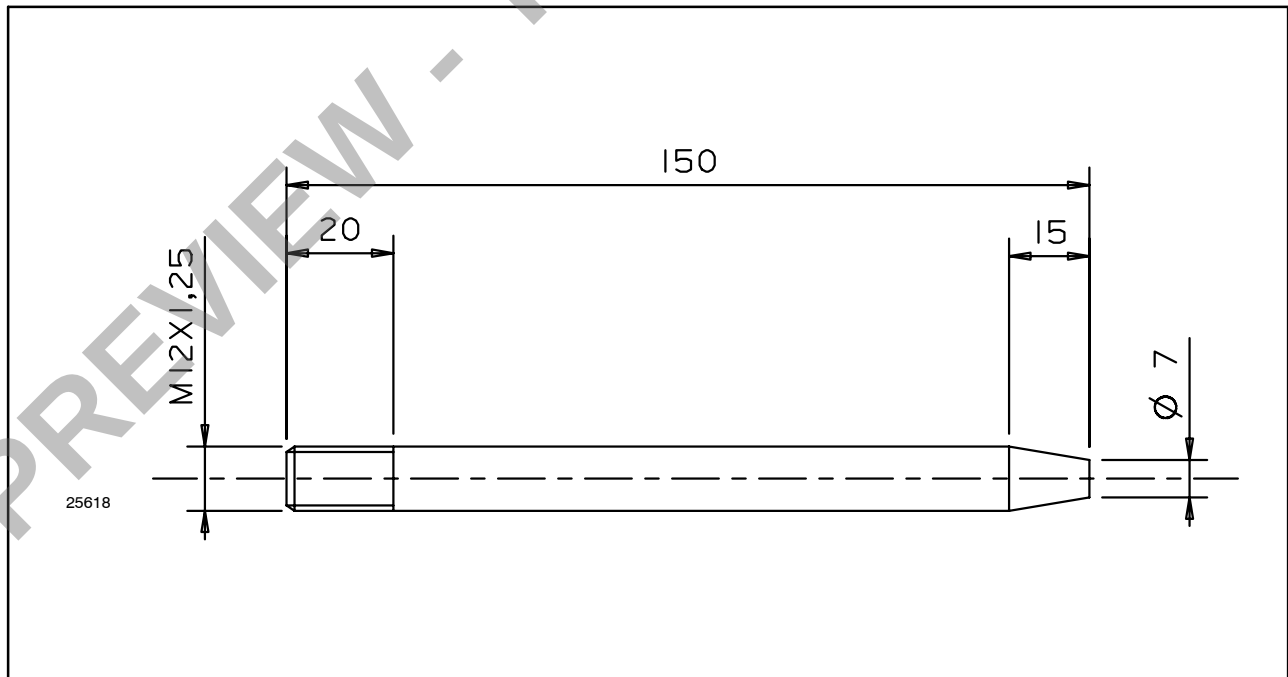
X 380000291 Tool for hydraulic clutch piston springs (with **380000171**).

380000240 Hydraulic pressure testing kit.

380000278 Hydraulic pressure testing kit.

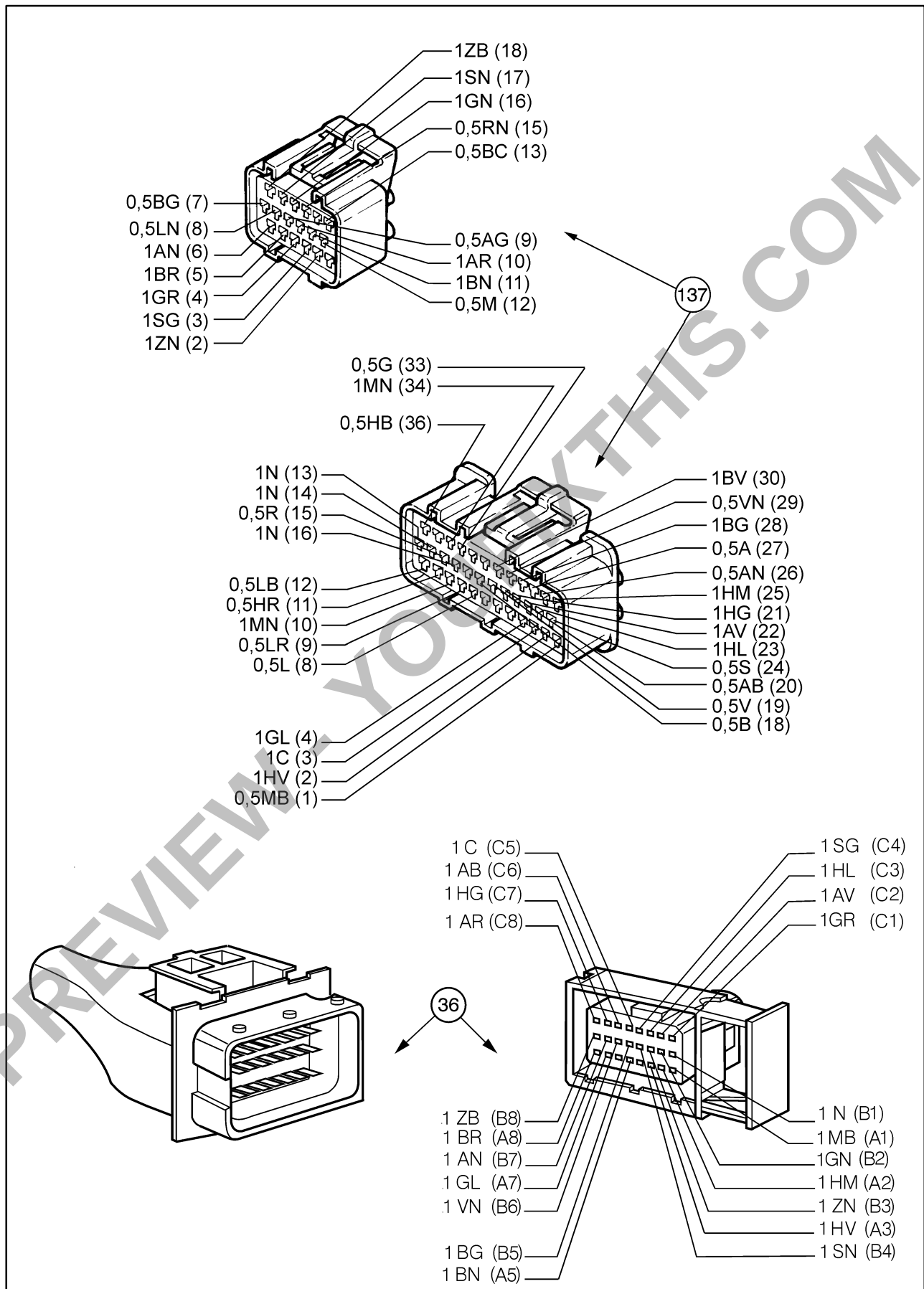
380000282 Calibration and diagnosis instrument.

50091 Tool for removal-installation final drives (see Sect. 27).



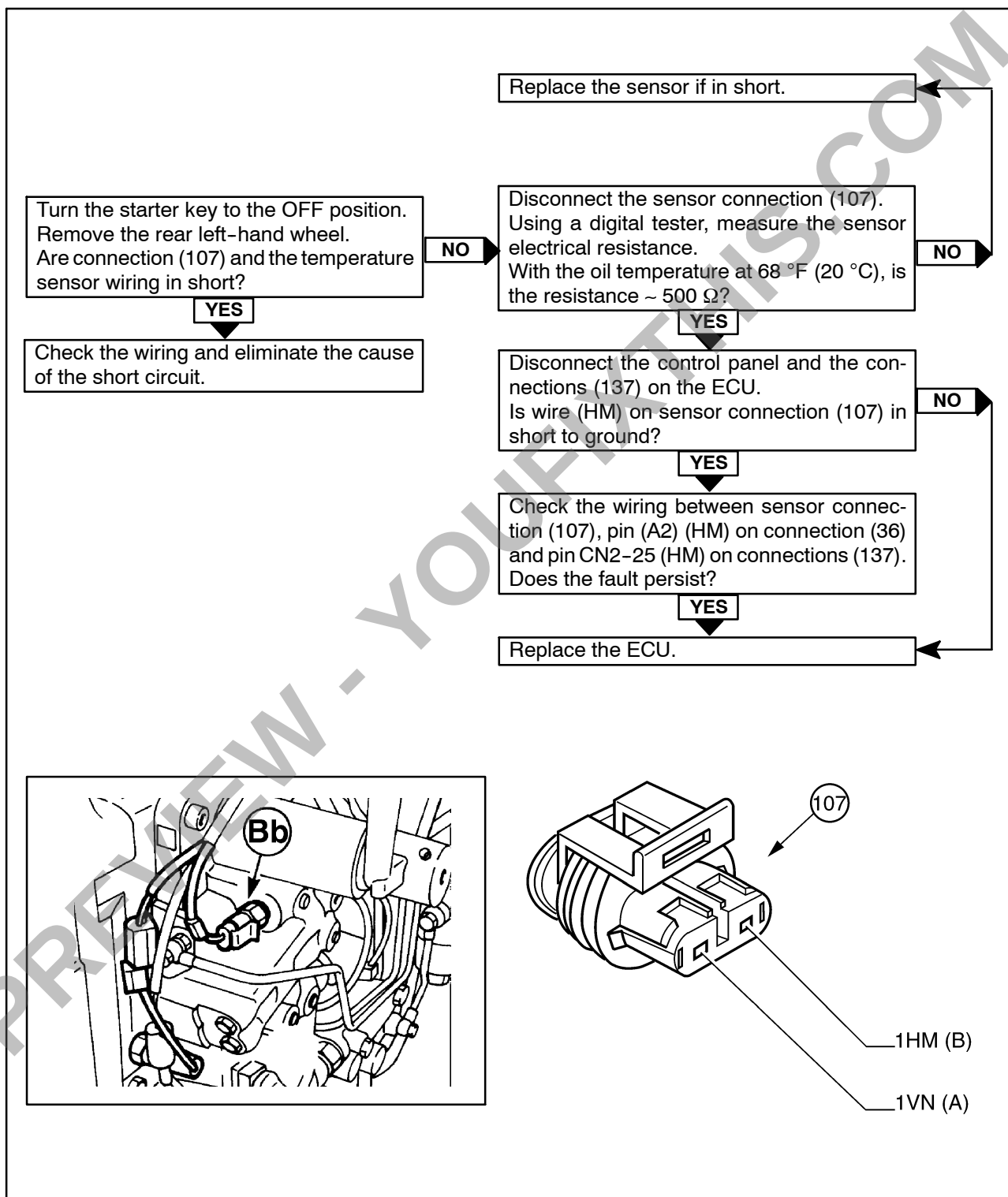
Guide pin for re-fitting the gearbox in the casing (Mark part with no. 50158 - Measurements in mm)
Make in C 40 material.

FAULT CODE 15



FAULT CODE 52

The wiring on the transmission oil temperature sensor (Bb) is in short or in short to ground.
The tractor runs but may react abruptly when the oil temperature varies.



SPECIAL TOOLS

Warning – The operations described in this section can only be carried out with **ESSENTIAL** tools indicated by an **(X)**.

To work safely and efficiently and obtain the best results, it is also necessary to use the recommended specific tools listed below and certain other tools, which are to be made according to the drawings included in this manual.

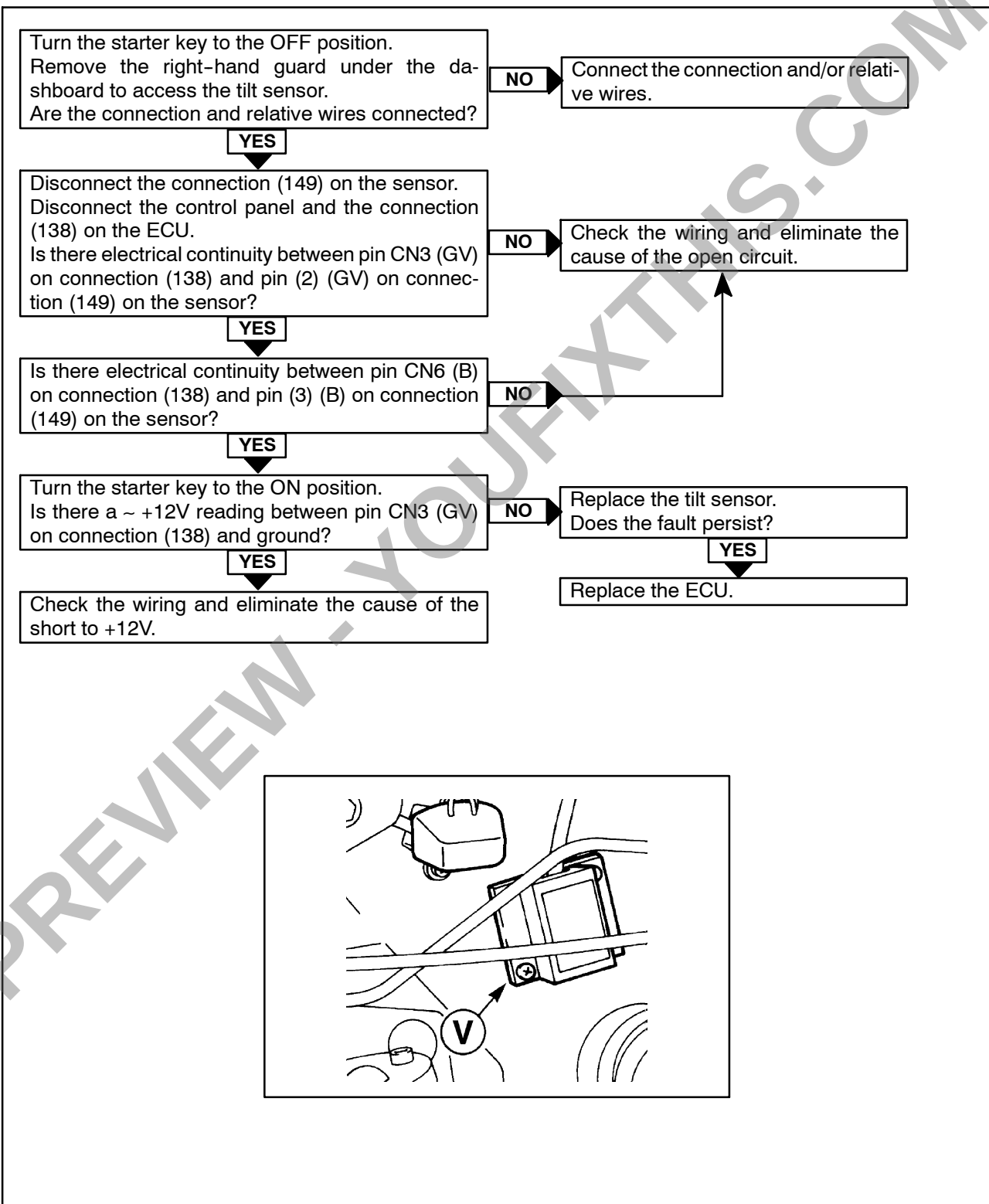
List of specific tools required for the various operations described in this Section.

- 380001622** Drive shaft seal key.
- 380000279** Key for Ø 1.9685 in. (50 mm) piston.
- 380000280** Key for Ø 1.3779 in. (35 mm) piston.
- 380000240** Hydraulic pressure control kit (use tool **380000560**).

FAULT CODE 33

The tilt sensor (V) is faulty or the relative wiring is disconnected.

Automatic Four-wheel drive, when driving downhill, does not operate either in forward or reverse gear.



OP. 25 108 38 WHEEL HUBS AND STEERING KNUCKLE

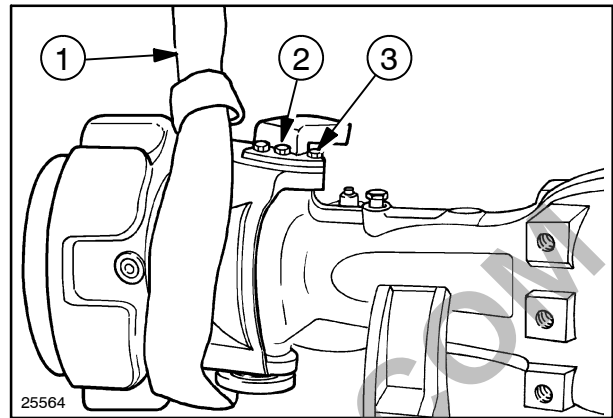
Disassembly

CAUTION

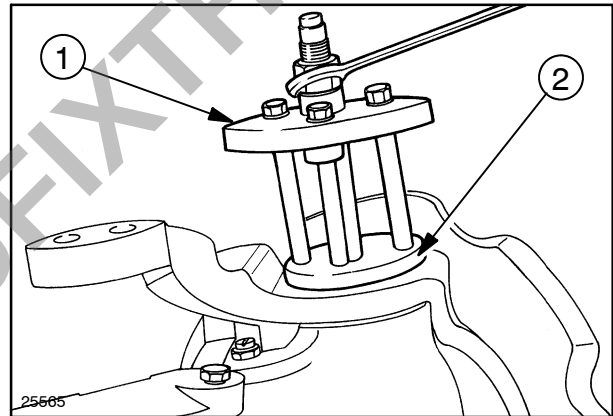
Handle all parts carefully. Do not put your hands or fingers between parts. Wear the prescribed safety clothing, including goggles, gloves and safety footwear.

Wheel hub removal can only be carried out after having disassembled the front epicyclic final drive, as indicated on pages 33 and 34, proceeding as follows.

1. Place the stub axle in a nylon sling (1), remove the pin and grease fittings (2) retaining bolts (3).
2. Install tool **380000265** (1) on the pin (2) and, using the screw on the tool, detach the pin. Repeat the operation on both pins and recover the adjustment shims.



74



75

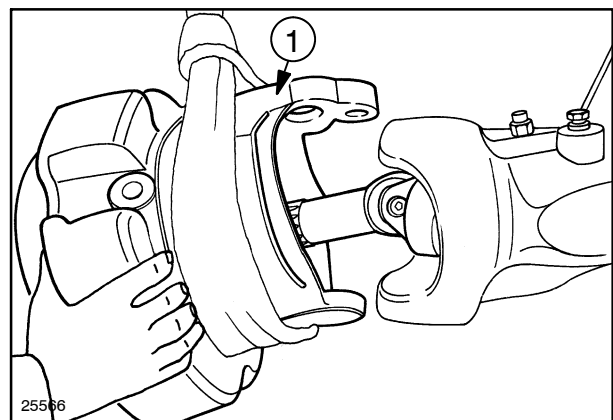
3. Detach the wheel hub and steering knuckle (1) and separate the two units.

Assembly

CAUTION

Always use appropriate tools to align fixing holes. NEVER USE FINGERS OR HANDS.

1. Refer to the illustrations on pages 12 and 13 for the positioning of the various parts.
2. Respect the tightening torque values prescribed on page 5.
3. Assemble the steering knuckle on the axle body and adjust the bearings as follows.



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Assembly

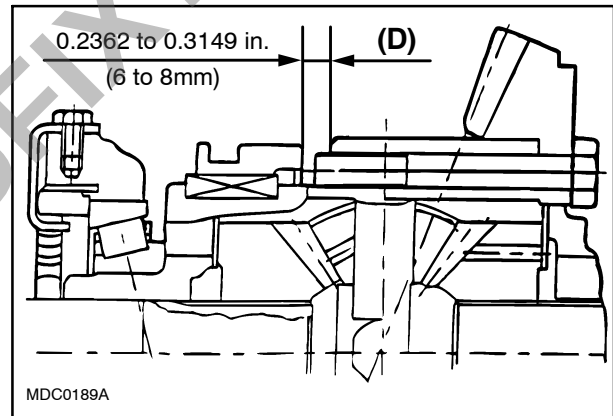
1. Reinstall the differential lock parts as shown in figure 74, fitting the cylinder (2) with the flat surface facing towards the drive shaft (11).

2. After completing the overhaul and assembly of the pinion as shown in operations on pages 39 to 43 and the differential lock as shown in operations 1 to 3 shown above, **check the correct operation of the differential lock engagement sleeve, proceed as follows:**

3. Insert a screwdriver in the support oil delivery hole (13, fig. 74) pressing the cylinder fully down (2).

At the end of the stroke, check that the distance (D) between the differential lock engagement sleeve and relative casing, measured as shown in the drawing, is between **0.2362 to 0.3149 in. (6 to 8 mm)**.

4. If the distance is greater, remove part (13, fig. 74), invert the position of the cylinder (2) so that the raised part is facing the drive shaft (11).

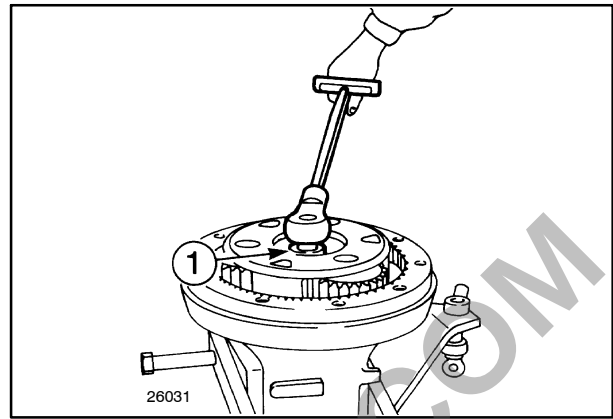


5. Reinstall the support (13) and check that the measurement (D) is between 0.2362 to 0.3149 in. (6 to 8 mm).

6. Once measurement (D) has been obtained, remove the cover (10, fig. 74), apply approx. 0.0787 in. (2 mm) of sealing compound, as indicated in Sect. 00, following the external perimeter of the cover flange.

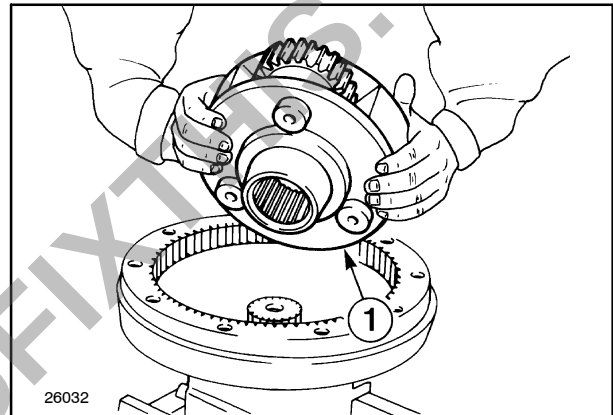
7. Reinstall the cover (10, fig. 74), tightening the bolts (9) to the torque values shown on page 5.

2. Unscrew the bolts securing the driven gear support (1) on the drive wheel shaft and remove the safety plate.



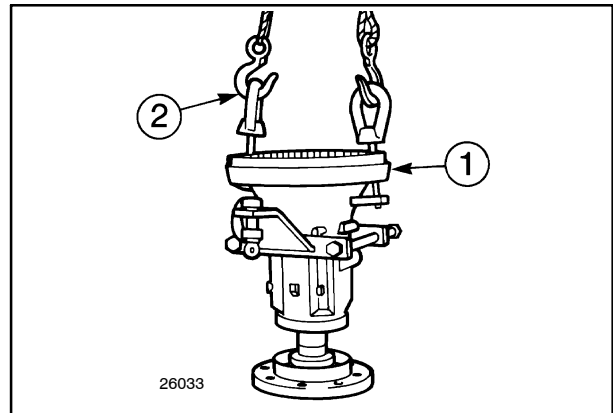
33

3. Extract the support (1) from the driven gears and remove the end float adjuster shim from the support.



34

4. Connect the lateral final drive (1) to a hoist (2) and raise, checking that the wheel axle leaves the housing (tap on the end of the driving gear axle with a rubber mallet to ease it out).



35

Assembly

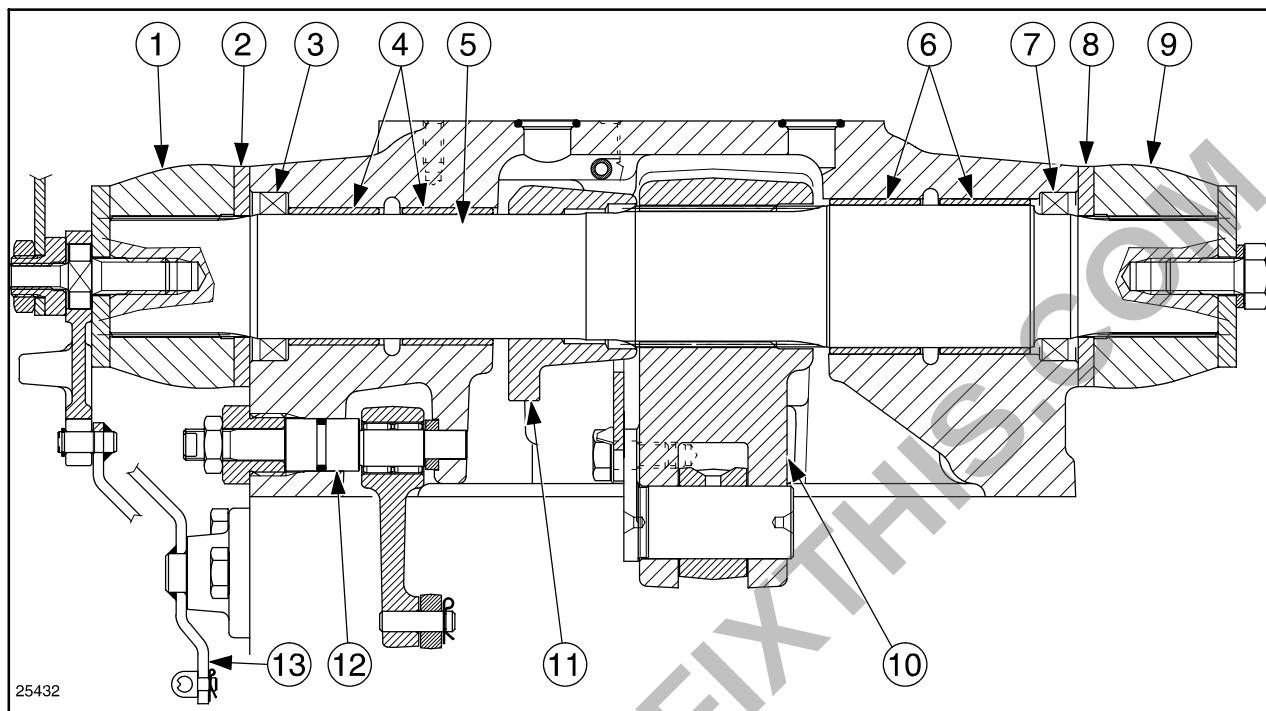

CAUTION


Always use appropriate tools to align fixing holes.
NEVER USE FINGERS OR HANDS.

1. For the positioning of the various parts refer to figures 8 and 9.
2. Respect the tightening torques prescribed on page 4.
3. Assemble the drive wheel shaft.
4. Install the driven gear support and the relative adjuster shim.
5. Insert the safety plate and tighten the bolt to the prescribed torque.
6. Adjust the end float of the gear support as follows.

DESCRIPTION AND OPERATION

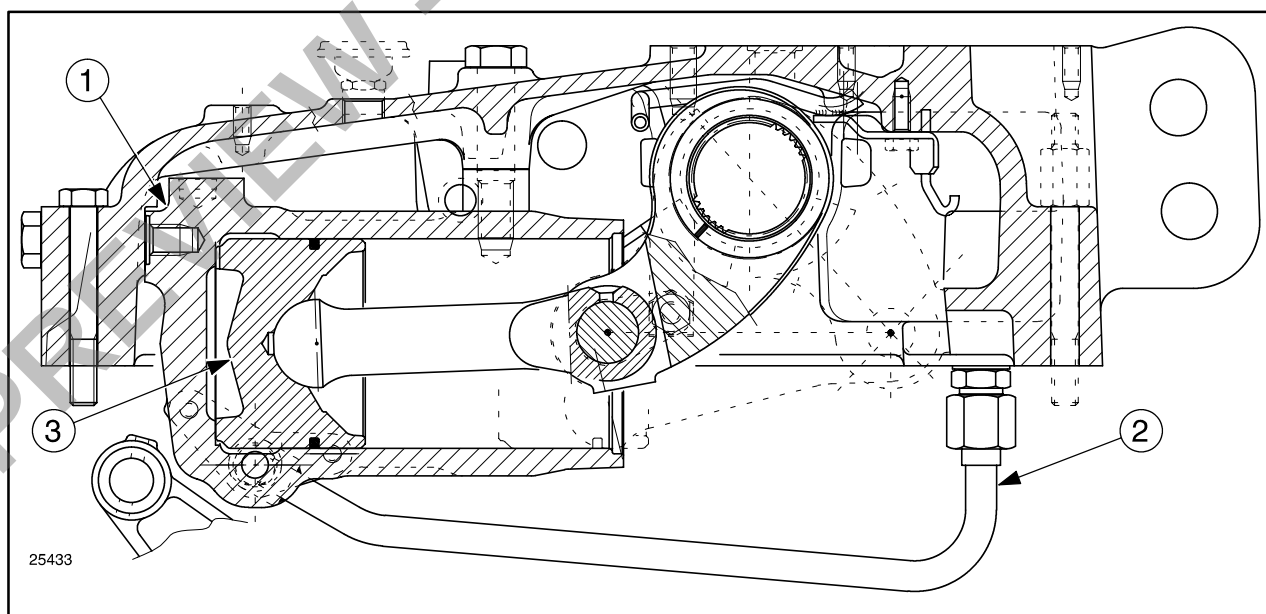
SECTIONAL VIEWS



3

Cross-sectional view of lift arms drive shaft

- | | |
|---------------------------------------|--|
| 1. Arm RH. | 8. Left-hand arm thrust washer. |
| 2. Right-hand arm thrust washer. | 9. Arm LH. |
| 3. Right-hand seal. | 10. Internal arm. |
| 4. Right-hand bush shaft support (5). | 11. Position control cam. |
| 5. Lift arm control shaft. | 12. LIFT-O-MATIC control pin. |
| 6. Left-hand bush shaft support (5). | 13. LIFT-O-MATIC control external lever. |
| 7. Left-hand seal. | |



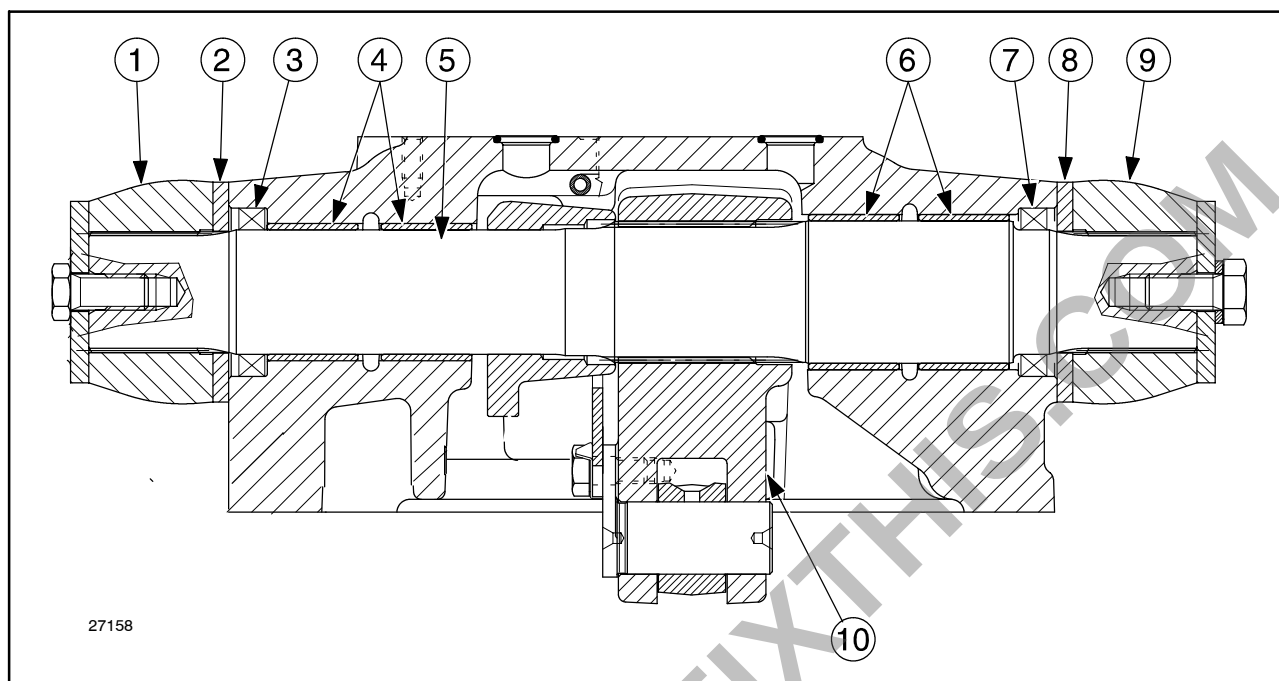
4

Longitudinal cross-sectional view of lift

- | | |
|---|--------------------|
| 1. Cylinder liner. | 3. Lifting piston. |
| 2. Control valve block/cylinder connecting pipes. | |

DESCRIPTION AND OPERATION

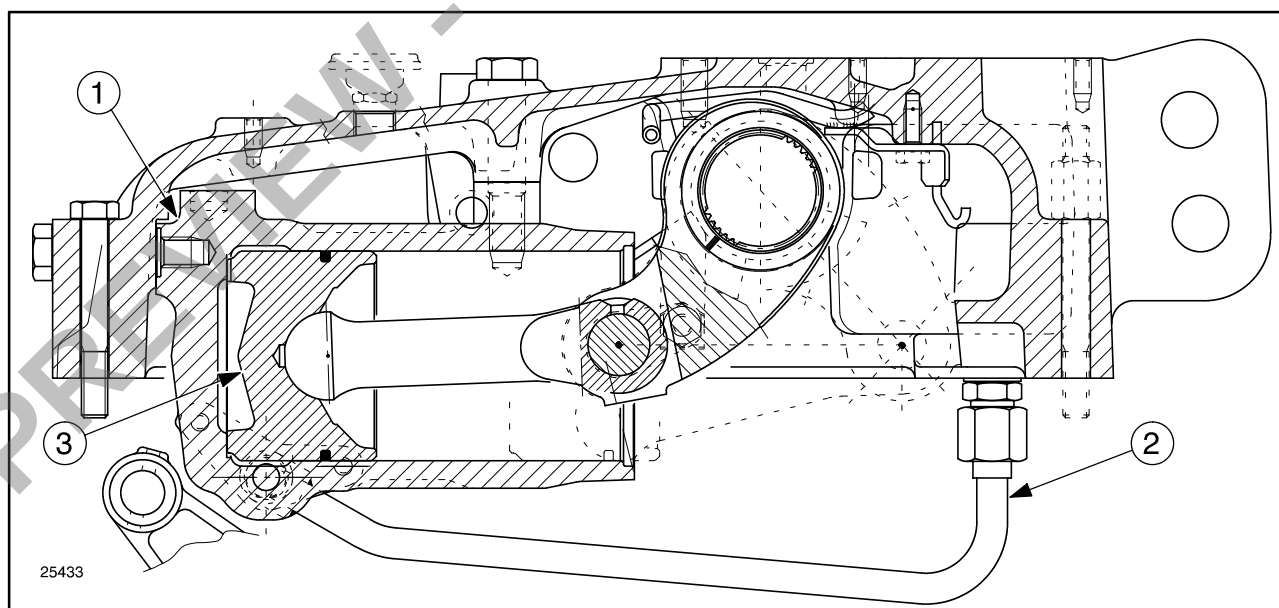
SECTIONAL VIEWS



4

Cross-sectional view of lift arms drive shaft

- | | |
|---------------------------------------|--------------------------------------|
| 1. Arm RH. | 6. Left-hand bush shaft support (5). |
| 2. Right-hand arm thrust washer. | 7. Left-hand seal. |
| 3. Right-hand seal. | 8. Left-hand arm thrust washer. |
| 4. Right-hand bush shaft support (5). | 9. Arm LH. |
| 5. Lift arm control shaft. | 10. Internal arm. |



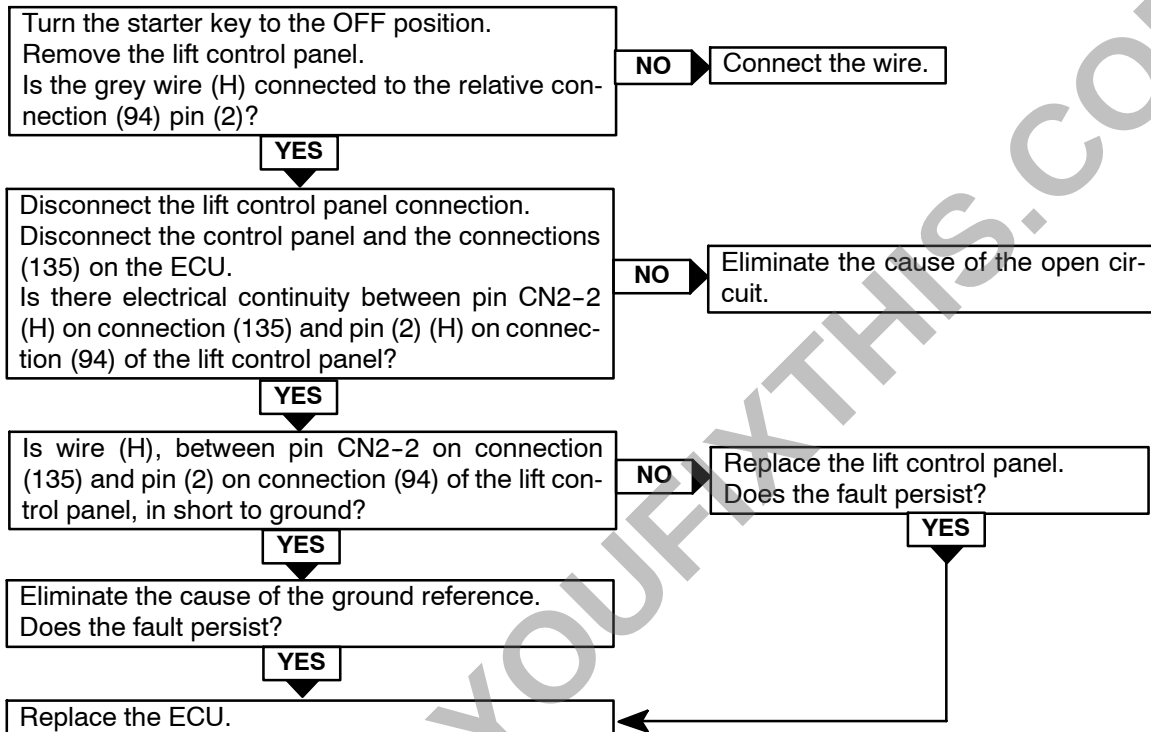
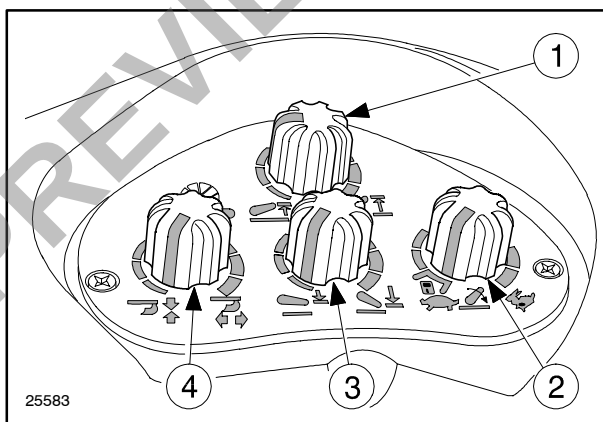
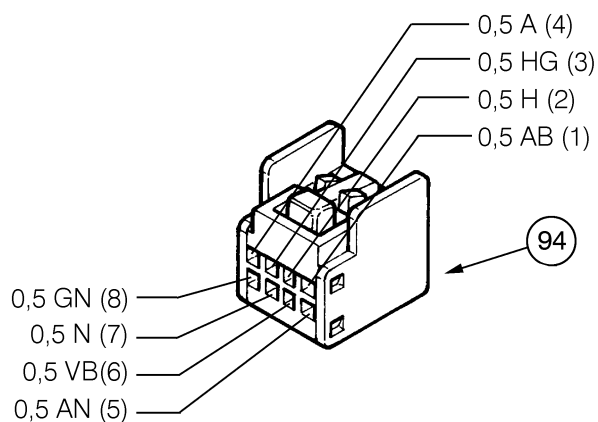
5

Longitudinal cross-sectional view of lift

- | | |
|---------------------------------|--------------------|
| 1. Cylinder sleeve. | 3. Lifting piston. |
| 2. Cylinder oil delivery pipes. | |

FAULT CODE 12

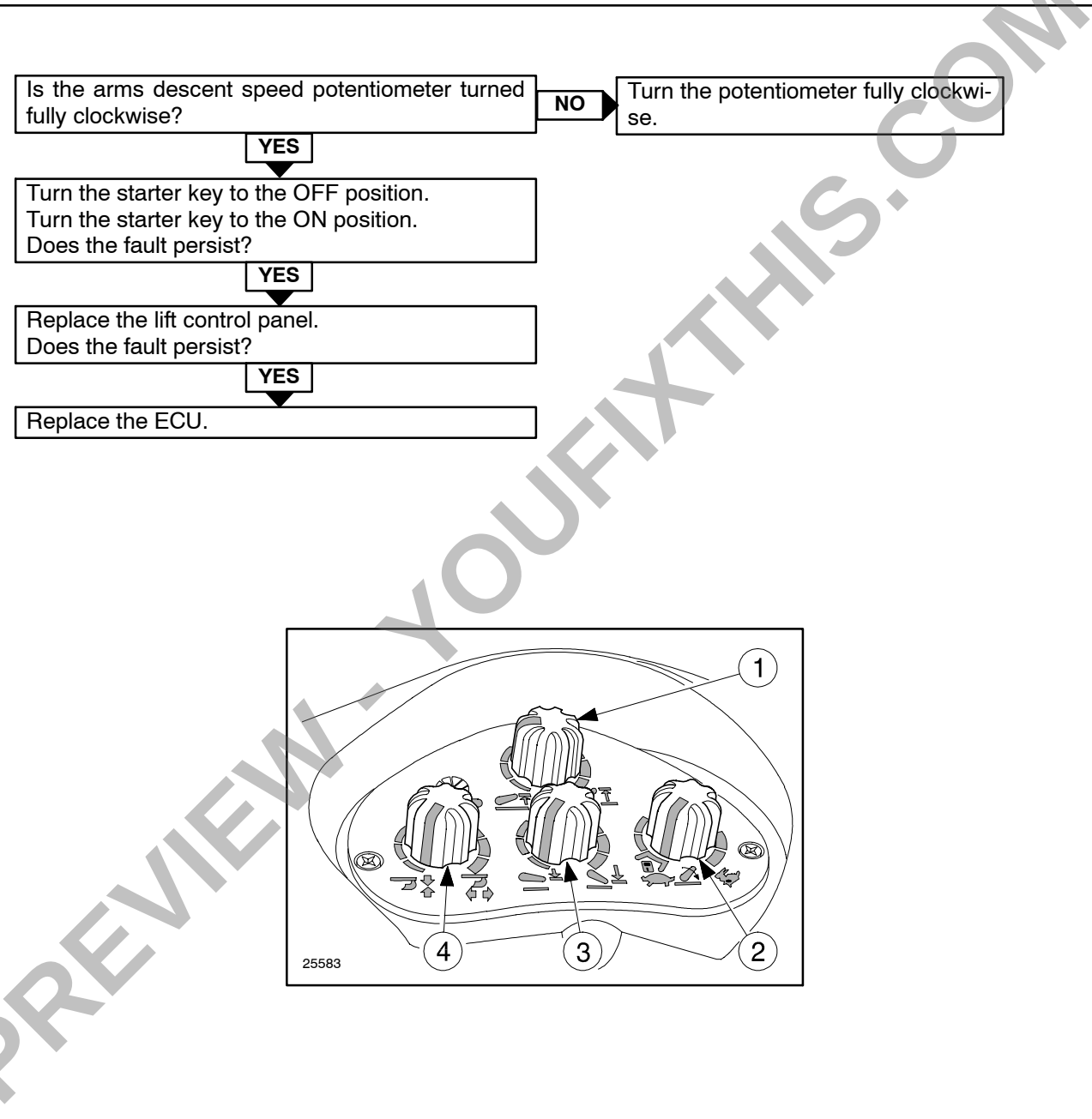
The wiring on the arms descent speed potentiometer (2) is disconnected or in short to ground.
The rear lift (EDC) works but the arms descent speed is always set at the maximum value.



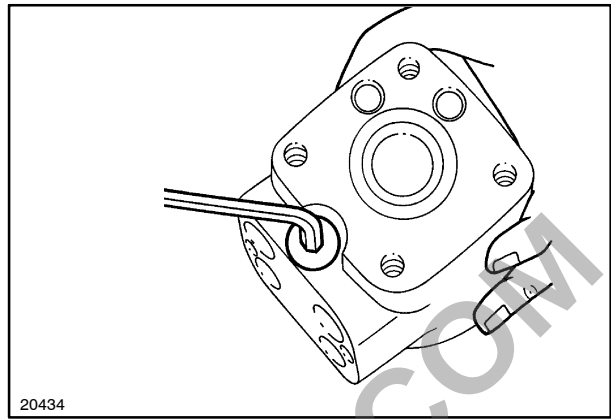
FAULT CODE 47

The arms descent speed potentiometer (2) is not turned fully clockwise. This fault can be displayed during lift arms calibration (FAULT 24).

The rear lift (EDC) does not work, therefore the lift arms mechanical stroke cannot be calibrated.

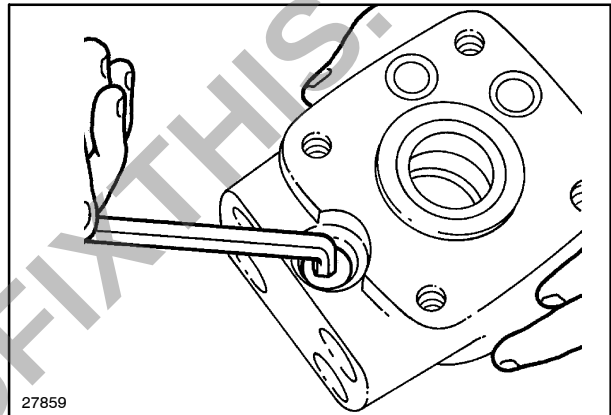


21. Using a 0.2362 in. (6 mm) Allen wrench, remove the threaded plug on the pressure relief valve and extract the washer.



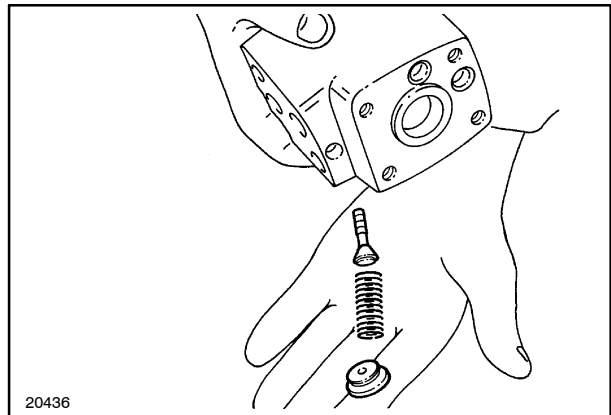
34

22. Remove the pressure relief valve adjuster screw.



35

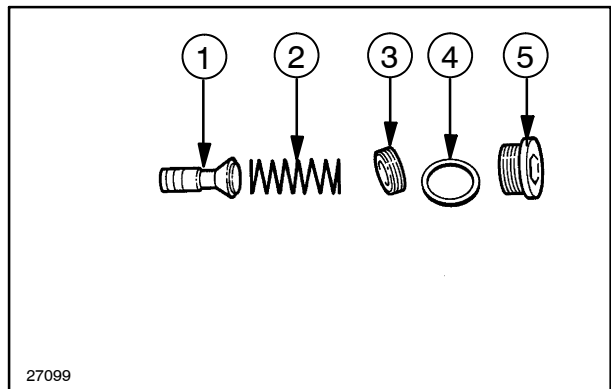
23. Turn the control valve body over and complete disassembly by extracting the spring and the pressure relief valve piston.



36

**Pressure relief valve components
(order of disassembly-assembly)**

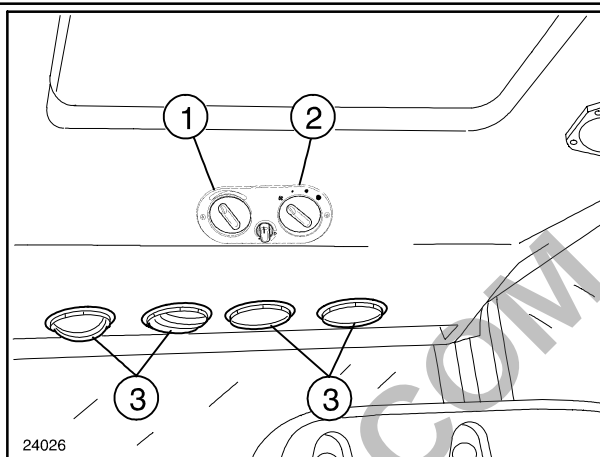
1. Pressure relief valve.
2. Pressure spring.
3. Calibration adjuster screw.
4. Seal.
5. Blanking plug.



37

Temperature Control Knob

The heating control knob (1, fig. 10) allows the operator to regulate the air temperature, by increasing or decreasing the coolant circulation from the engine.



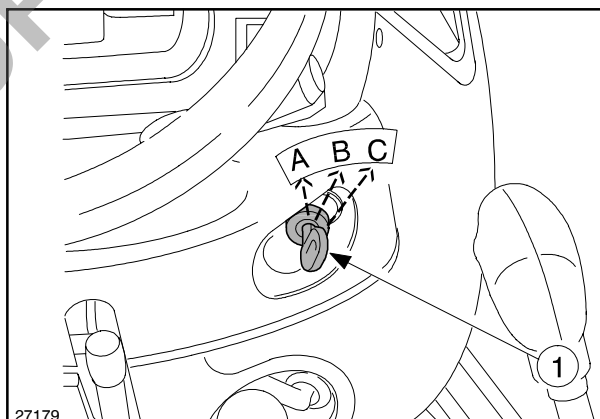
10

- Turned fully to the left in an counterclockwise direction = minimum temperature (hot water circulation off).
- Turned fully to the right in a clockwise direction = maximum temperature (hot water circulation fully open).

Ignition Switch

To operate the four switch functions, turn the key (1) through the following positions:

- A. No power supply to any of the circuits (key can be removed). Engine stopped: automatic activation of fuel injection cut-off.
- B. Standby for engine start up. Operation of panel lights and instruments, various circuits powered up.
- C. Engine start up: if released, the key returns automatically to position (B).

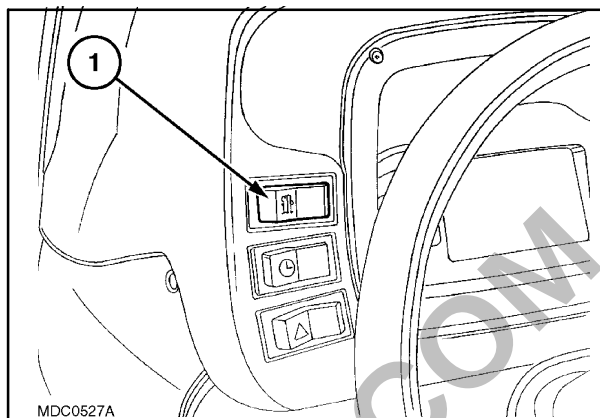


11

FUNCTION SELECT PUSHBUTTON (only with digital control panel)

Pressing this button (1, fig. 12) selects the various functions of the digital instrument.

NOTE: For further details, see Chap. 1.

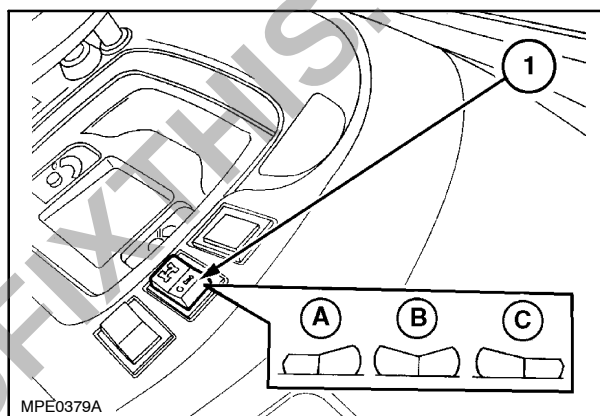


12

FOUR-WHEEL DRIVE SWITCH

The switch (1, fig. 13) allows two FWD functions to be selected:

1. Automatic engagement function.
2. Permanent disengagement function.
3. Permanent engagement function.



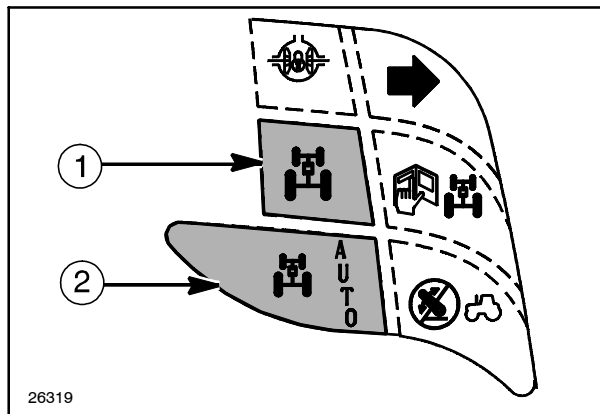
13

Automatic operation

By pressing the push-button (1, in fig. 13) to position (C), light (2) will illuminate, to indicate that automatic FWD has been selected. Four-wheel drive engagement will be indicated by the illumination of the lamp (1) on the instrument panel. This system will automatically engage four-wheel drive if the wheels slip in the following conditions:

- during traction, (e.g. when working) on slippery ground;
- on downward slopes, (e.g. when towing a heavy trailer) on slippery ground.

Four-wheel drive is automatically disengaged when the wheels stop slipping and/or when a pre-set steering angle is exceeded and with speed above 9.32/25 mph (15/25 km/h) when travelling downhill. To disengage automatic operation, press push-button (1, in fig. 13) to position C again. The indicator lamp will switch off (2).



14

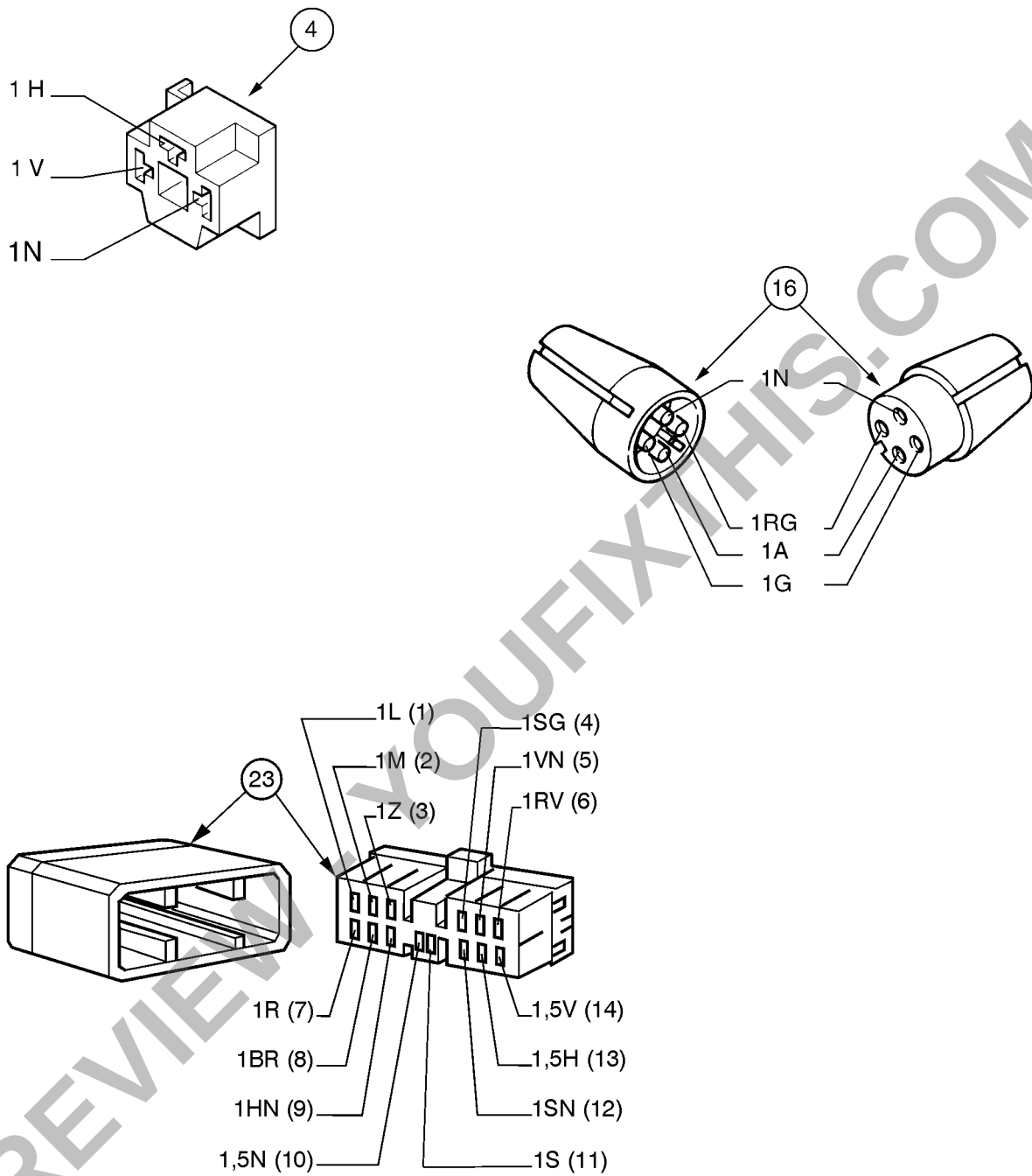
Permanent four-wheel drive.

FWD engagement is obtained by pressing pushbutton (1, fig. 13) to position A. In this position, front-wheel drive will be permanently engaged.

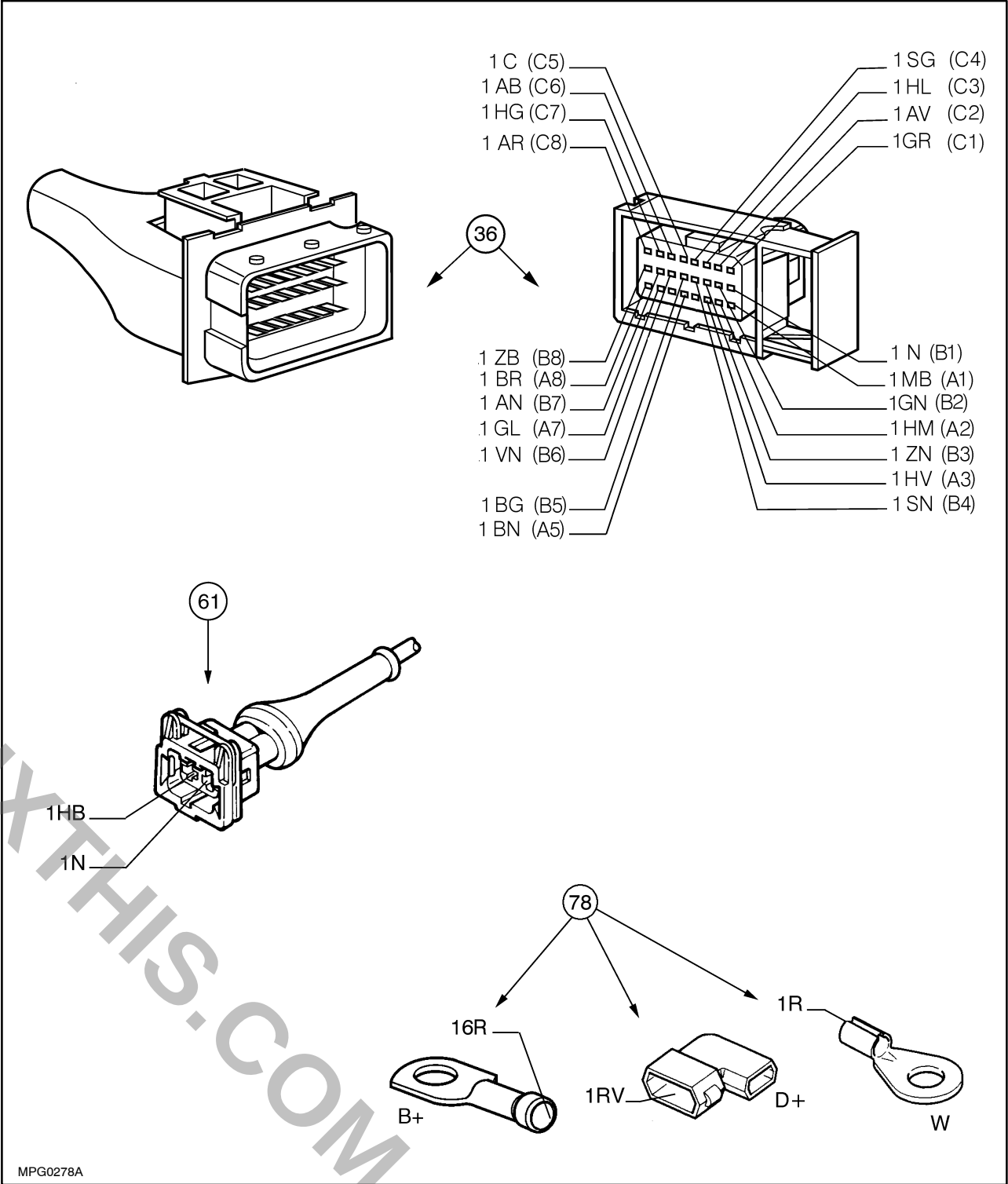
To disengage, press the switch to position A once more.

ELECTRICAL CIRCUIT COMPONENTS (Continued)

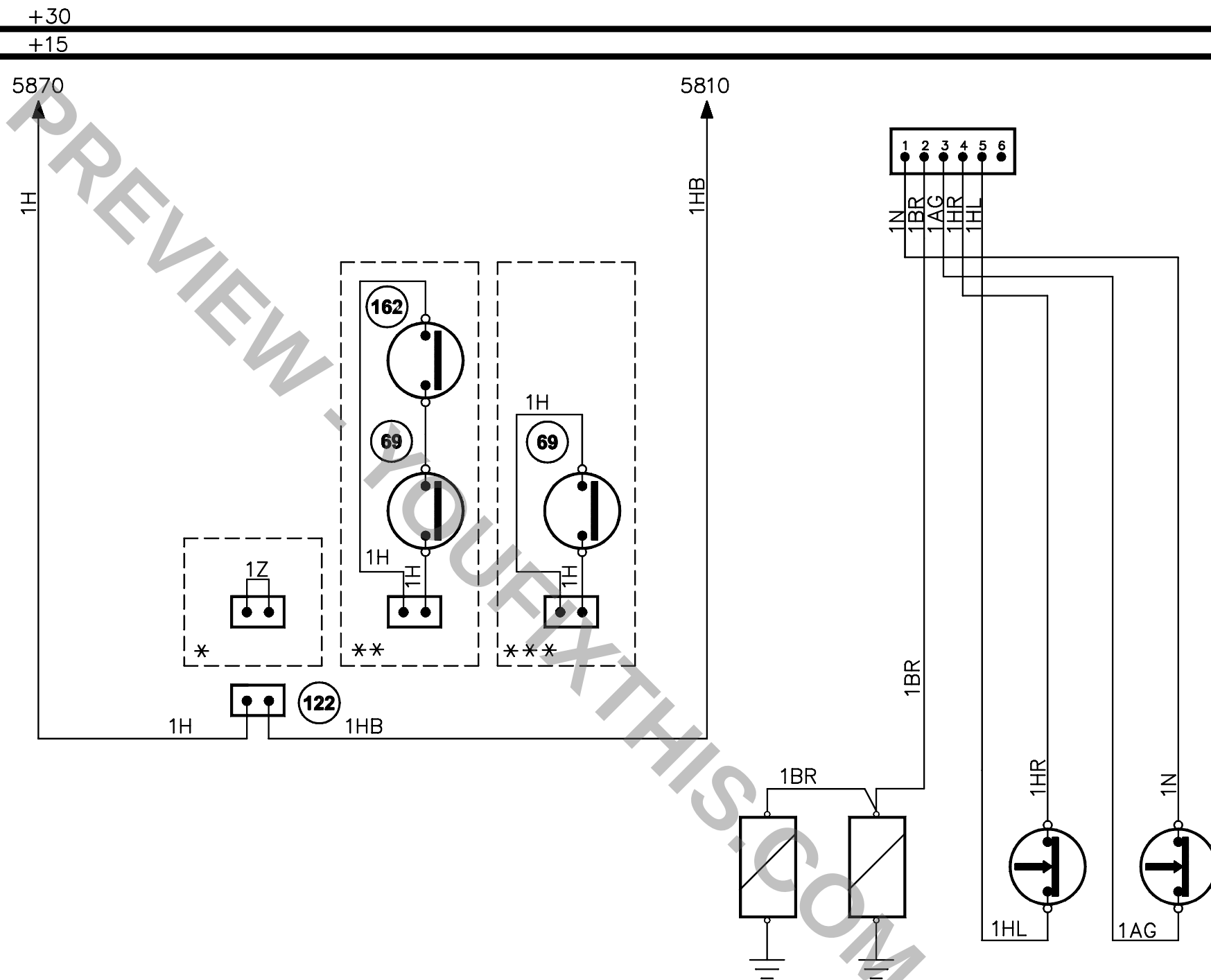
- 40 RH rear auxiliary work light
- 41 Rear window wiper motor
- 42 LH front auxiliary work light
- 43 LH speaker
- 44 LH rear auxiliary work light
- 45 Rotating beacon
- 46 Reverser lever switch
- 47 Seven-pole socket
- 48 LH number plate light
- 49 Air-conditioner compressor relay (on cab upright)
- 50 LH tail light
- 51 Electronic lift raise/lower switch on LH mudguard
- 52 Rear window washer electric pump
- 53 Windscreen washer electric pump
- 54 Seven pole power socket connection (6 PIN)
- 55 Handbrake indicator switch
- 56 LH front direction indicator and side light
- 59 Fuel level transmitter
- 60 Shuttle mode position sensor
- 61 Speed sensor
- 62 Differential lock solenoid valve
- 63 FWD solenoid valve
- 64 FWD indicator pressure switch
- 65 Shuttle mode solenoid valve
- 66 HIGH clutch control solenoid valve
- 67 Dump solenoid valve
- 68 Dual Command (2 Speed Power Shift) control solenoid valve
- 69 Neutral gear switch
- 70 C1 gear switch
- 71 G1 range switch
- 72 Front axle speed sensor
- 73 Rear axle speed sensor
- 75 II control valve solenoid valve
- 76 Engine oil pressure sensor
- 78 Alternator

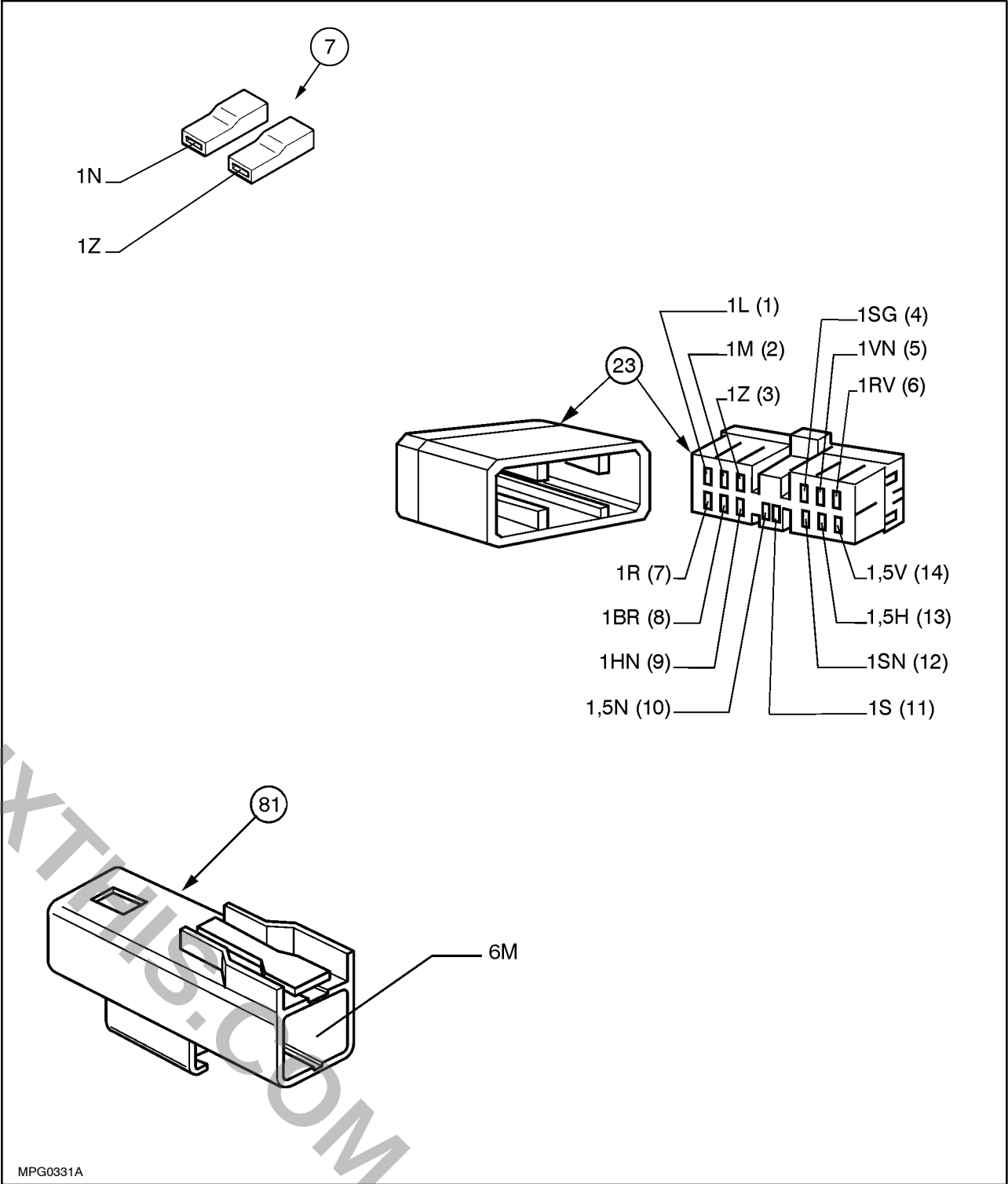


MPG0243A



TRANSMISSION CIRCUIT (VERSION WITH PERMANENT FWD AND MECHANICAL LIFT) - DIAGRAM Q/2





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