SECTION 10 – ENGINE

reqqin

BOOK 1 - 87758575

Chapter 1 – Engine (Continued)

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PRECAUTIONARY STATEMENTS

PERSONAL SAFETY

Throughout this manual and on machine decals, you will find precautionary statements ("**DANGER**", "**WARNING**", and "**CAUTION**") followed by specific instructions. These precautions are intended for the personal safety of you and those working with you. Please take the time to read them.

⚠ DANGER ⚠

This word "DANGER" indicates an immediate hazardous situation that, if not avoided, will result in death or serious injury. The color associated with Danger is RED.

⚠ WARNING ⚠

This word "WARNING" indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury. The color associated with Warning is ORANGE.

⚠ CAUTION ⚠

This word "CAUTION" indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. The color associated with Caution is YELLOW.

FAILURE TO FOLLOW THE "DANGER", "WARNING", AND "CAUTION" INSTRUCTIONS MAY RESULT IN SERIOUS BODILY INJURY OR DEATH.

MACHINE SAFETY

The precautionary statement ("**IMPORTANT**") is followed by specific instructions. This statement is intended for machine safety.

IMPORTANT: *The word "IMPORTANT" is used to inform the reader of something he needs to know to prevent minor machine damage if a certain procedure is not followed.*

INFORMATION

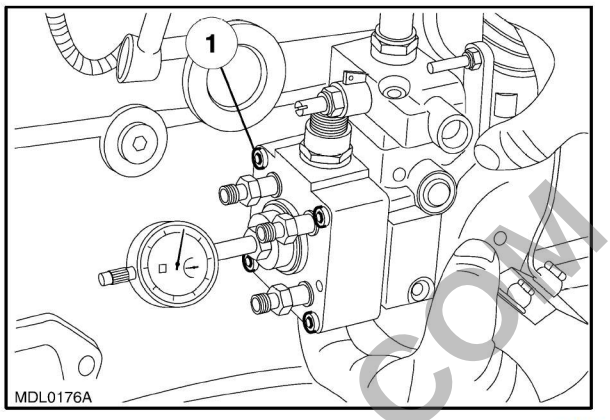
NOTE: *Instructions used to identify and present supplementary information.*

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15. Turn the pump (1) counter-clockwise if the stroke is any less, or clockwise if the stroke is any greater in order to obtain the prescribed stroke.

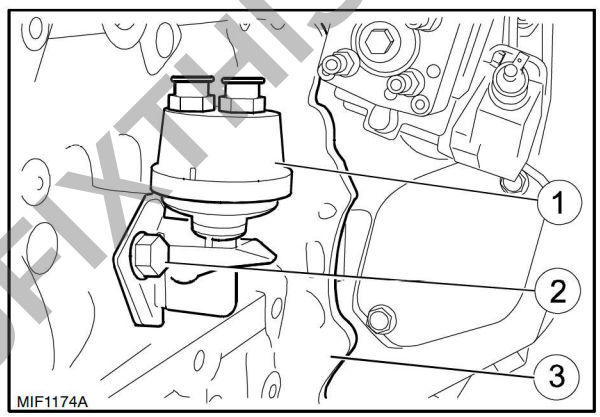
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16. Verifying these conditions, lock the pump by tightening the nuts to the torque shown on page 7.



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17. Install the priming pump (1) on the crankcase (3) and tighten the retaining bolts (2) to the prescribed torque.
18. Remove the tools **380000988** and **380000732** for retaining/rotating the flywheel and place the starter motor in its seat.

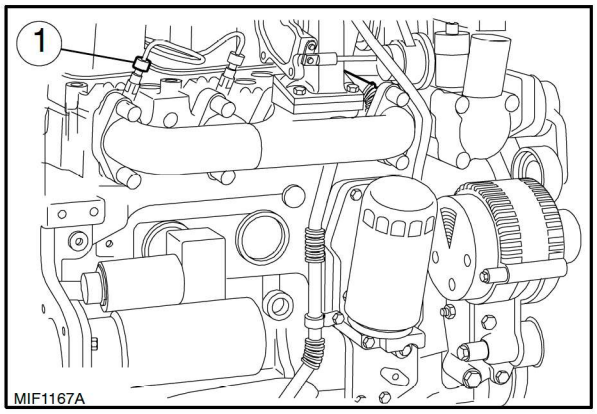


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BOSCH INJECTION PUMP

Fuel Circuit Air Bleeding

Loosen the injector delivery unions (1), make the engine turn with the starter motor and, after having checked that there are no air bubbles, tighten the unions (1).



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SPECIFICATIONS

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TRANSMISSION	
Gears	4 speed, constant-mesh, with synchronisers on all gears
Gearing type	helical
Reduction unit	ordinary gear train with 3 ranges providing a total of 12 gears
Gearing type	spur
Gearbox and reduction unit controls	independent, by means of two hand levers located on the right-hand side of the operator
Range and gear position sensor adjustment: available spacers ... mm (in)	0.5 - 1.0 - 1.5 (0.0196 - 0.0393 - 0.0590)

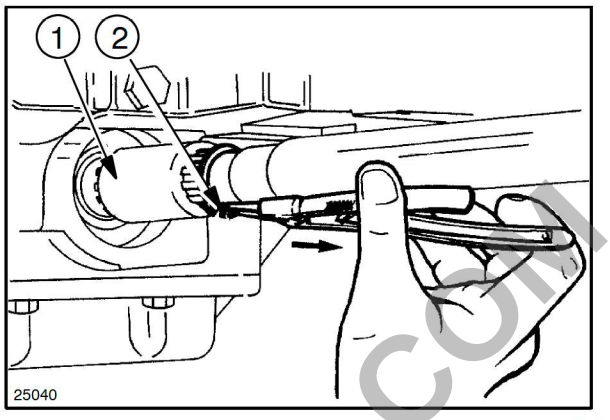
POWER SHUTTLE UNIT	
Hydraulic control valve	mounted on the outer left-hand side of the clutch casing, comprising: - no. 2 proportional solenoid valves controlling clutches A and B; - no. 1 discharge solenoid valve - one pressure regulating valve; - no. 2 unions for checking the pressure of the various clutches.
Power Shuttle gears and services working pressure ... bar (psi)	15.7 to 16.7 (227.70 to 242.21)
By-pass valve spring (11, fig. 7):	
- spring free length ... mm (in)	20.5 (0.807)
- spring length under load of 41.2 to 45.2 N (30 to 33 lb-f) ... mm (in)	16 (0.629)
Mating clearance between:	
- pressure control valve and relative seat on hydraulic control valve ... mm (in)	0.025 to 0.035 (0.00098 to 0.001377)
Pressure control valve spring (9, fig. 7):	
- spring free length ... mm (in)	127 (4.99)
- spring length under load of 279 to 304 N (206 to 224 lb-f) ... mm (in)	102.5 (4.035)
Power Shuttle transmission lubrication pressure ... bar (psi)	2.9 to 3.7 (42.060 to 53.663)
Lubrication pressure control valve spring (1, fig. 19):	
- spring free length ... mm (in)	38 (1.496)
- spring length under load of 29 to 31 N (21 to 23 lb-f) ... mm (in)	24.5 (0.964)

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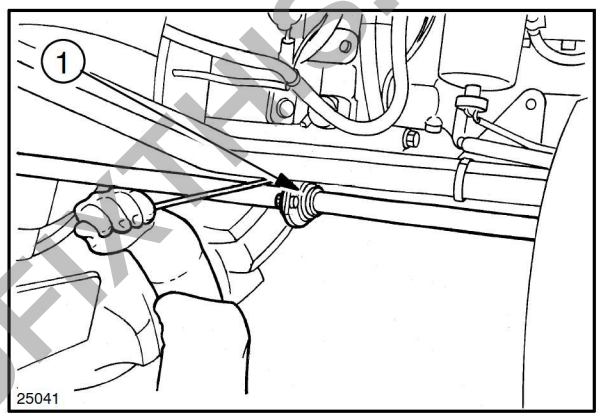
9. Take off the circlip (2) and extract the sleeve (1) from the drive.

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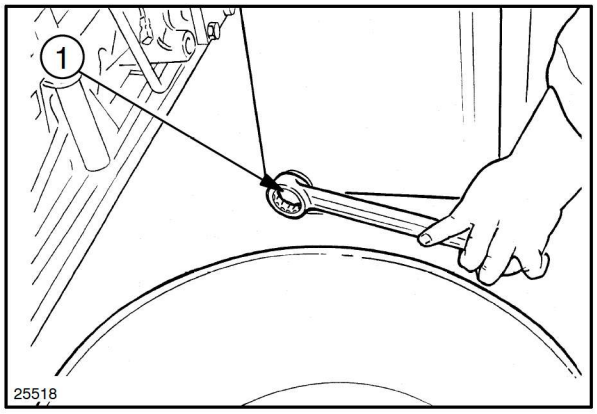
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10. Take out the retaining bolts of the propeller shaft central support (1) and remove the shaft together with its support.



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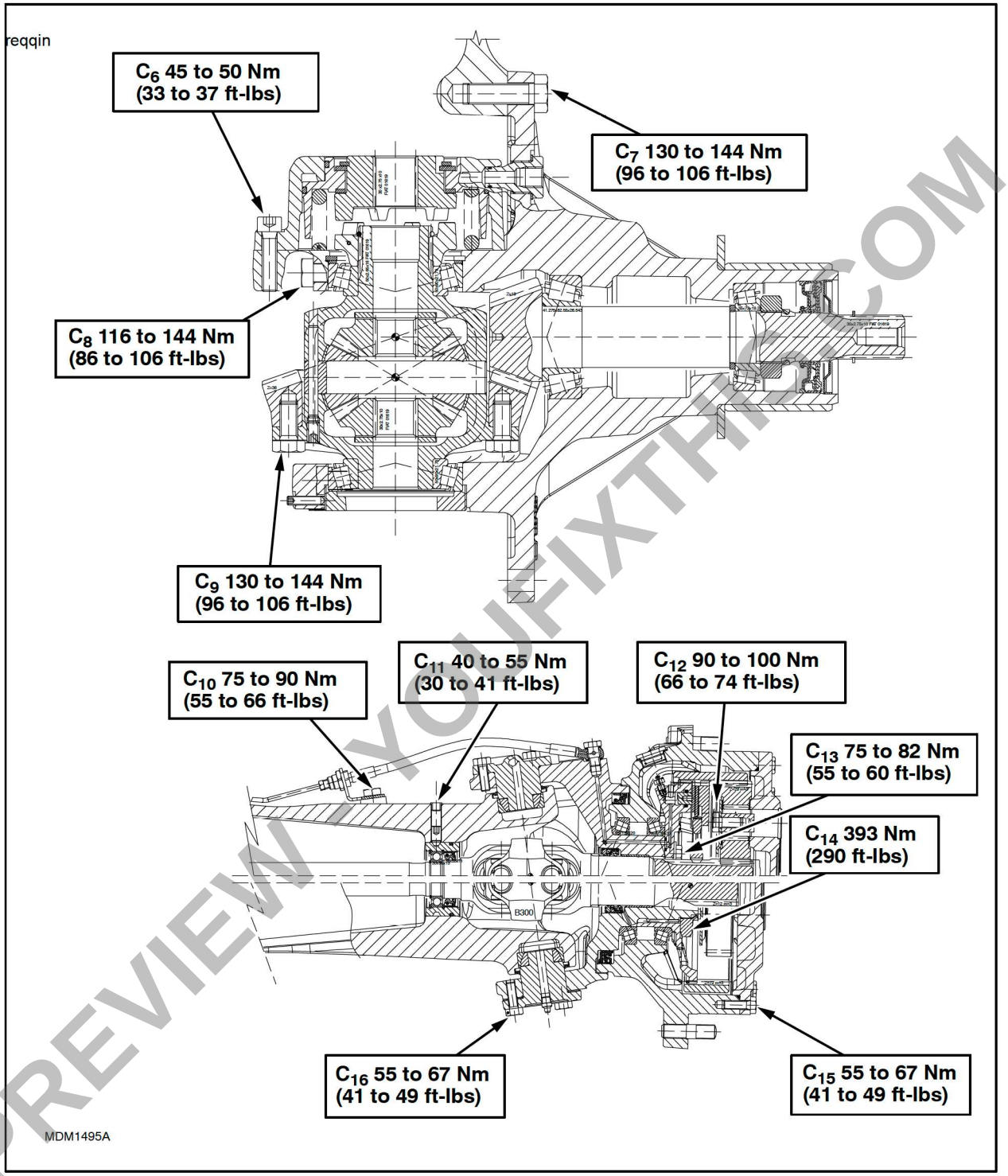
11. Remove the plug (1) and drain off the fuel into a suitable container (the tank capacity is 127 l).



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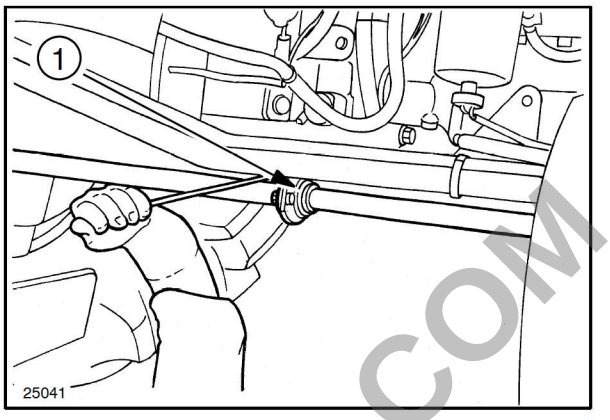
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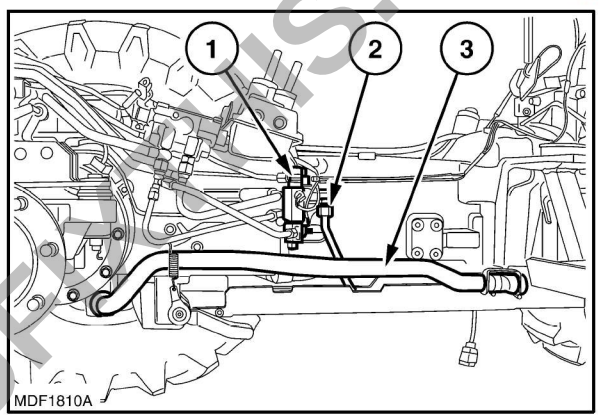
6. Remove the propeller shaft central support (1) retaining bolts and extract the shaft together with the support.

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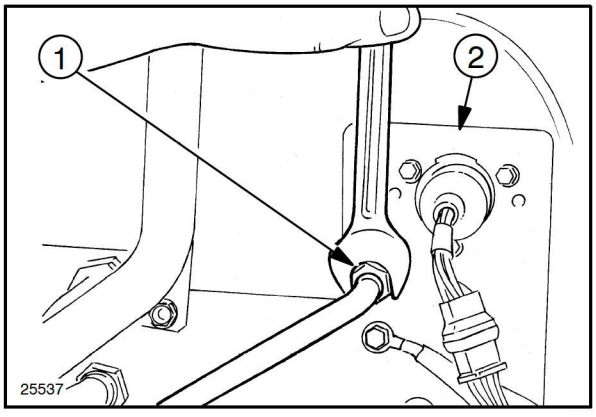
21

7. Detach the pump oil suction pipe (3) from the gearbox-transmission casing, loosen the union and detach the delivery pipe (2) from the pump to the trailer brake control valve (1).



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8. Disconnect: the trailer brake control piping (1) from the supporting plate (2).



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SPECIFICATIONS (continued)

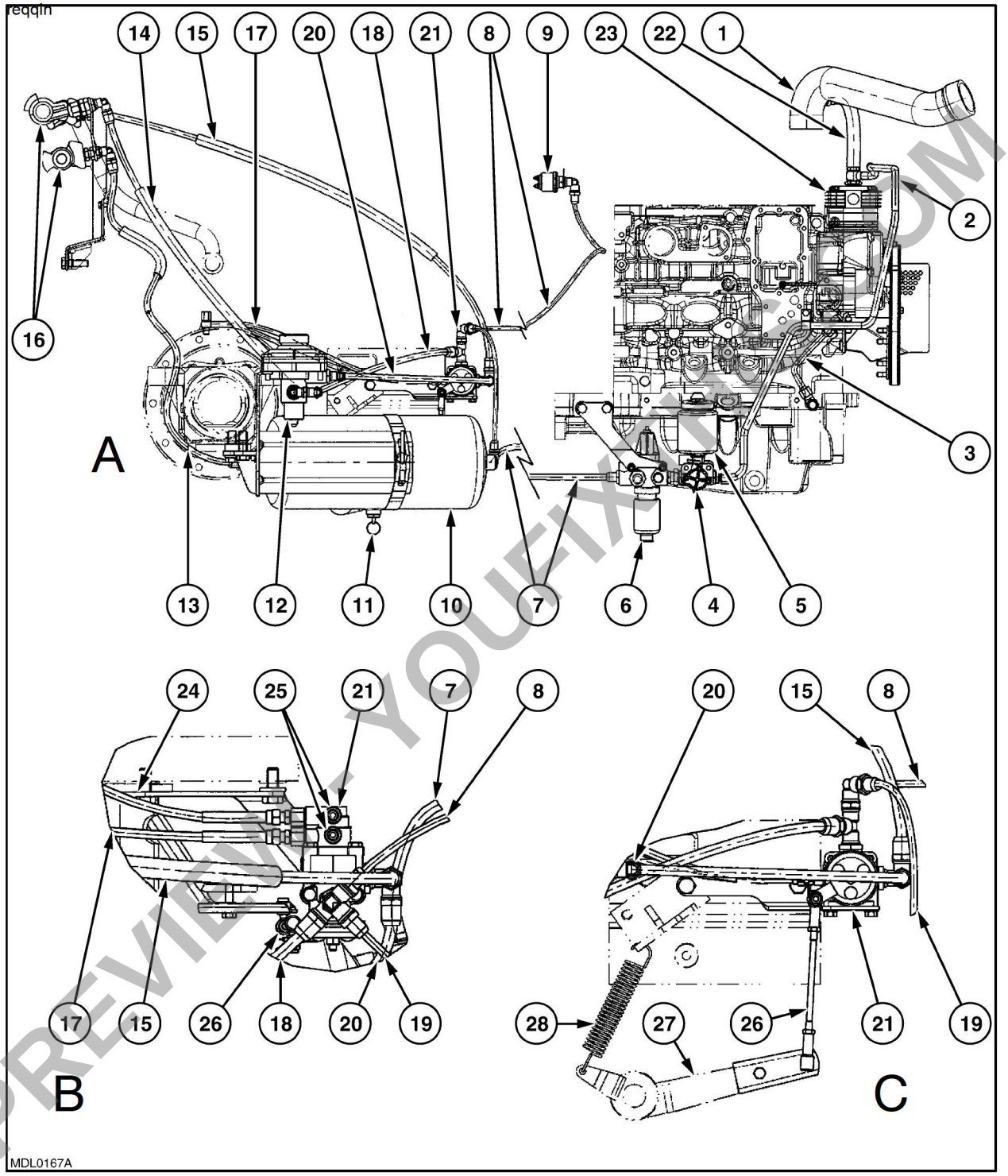
ELECTRO-HYDRAULIC PTO CLUTCH UNIT	
	T5040/5050/5060/5070
Clutch driving disk (11) ..... qty	5
Clutch driven disk (12) ..... qty	5
Reaction plate ..... qty	1
Clutch driving disk thickness (11):	
- supplier Welmann ..... mm (in)	2 ± 0.05 (0.0787 ± 0.0019)
- supplier Hoerbiger ..... mm (in)	2.00 to 2.08 (0.0787 to 0.0818)
Clutch driven disk thickness (12) ..... mm (in)	2.3 ± 0.05 (0.0905 ± 0.0019)
Reaction plate thickness ..... mm (in)	9 (0.3543)
Piston return spring (10) (length with spring free) ..... mm (in)	61 (2.4015)
Piston return spring (10) (spring length under load of 102.3 ± 5 kg)(225.5326 ± 11.0231 lbs) ..... mm (in)	34 (1.3385)
Pressure relief valve lubrication spring (12, fig. 6) (length with spring free) ..... mm (in)	29 (1.1417)
Pressure relief valve lubrication spring (12) (length under load of 8.1 ± 0.4 kg) (17.8574 ± 0.8818 lbs) ..... mm (in)	22 (0.8661)
Pressure relief valve lubrication calibration ..... mm (in)	4.4 to 5.9 (63.8166 to 85.5722)
Spring free length (5), for valve (4) locking disks (11 and 12, fig. 4) and rear bearing lubrication (13) ..... mm (in)	57 (2.2440)
Spring length (5, fig. 6) under load of 2.48 ± 0.1 kg (5.4674 ± 0.2204 lbs) ..... mm (in)	36 (1.4173)
Valve diameter (4) ..... mm (in)	11.988 to 11.996 (0.4719 to 0.4722)
Valve seat diameter (4) on relative support ..... mm (in)	12.016 to 12.030 (0.4730 to 0.4736)
Clearance between valve (4) and relative seat on support . mm (in)	0.020 to 0.042 (0.0007 to 0.0016)
Accumulator spring (14) (spring free) ..... mm (in)	122 (4.8031)
Accumulator spring (14) (spring under load of 34.9 ± 1.7 kg) (76.9412 ± 3.7478 lbs) ..... mm (in)	100 (3.9369)

DATA ON CONTROL VALVE WITH SOLENOID VALVES	
	T5040/5050/5060/5070
Coupling clearance between control valve rod (11, fig. 7) and seat ..... mm (in)	0.025 to 0.035 (0.0009 to 0.0013)
Coupling clearance between pressure relief valve (20) and seat ..... mm (in)	0.025 (0.0009)
Pressure relief valve spring (18) (with spring free) ..... mm (in)	127 (4.9999)
Pressure relief valve spring (18) (spring length under load of 29.7 ± 1.30 kg) (65.4772 ± 2.8660 lbs) ..... mm (in)	102.5 (4.0354)
Pressure relief valve (20) setting ..... bar (psi)	15.7 to 16.7 (227.7092 to 242.213)

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SECTIONAL VIEWS



2

VIEW OF AIR BRAKE COMPONENTS

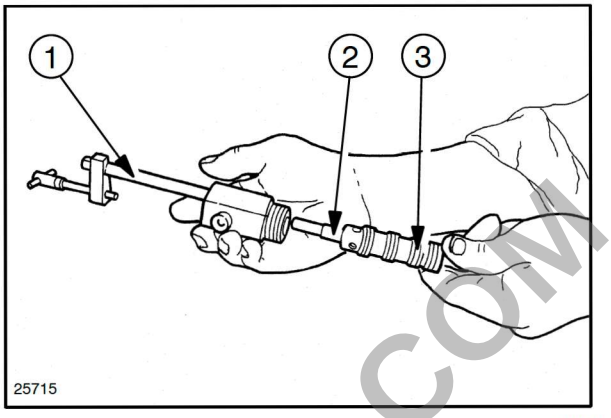
NOTE: *For the key see page 7.*

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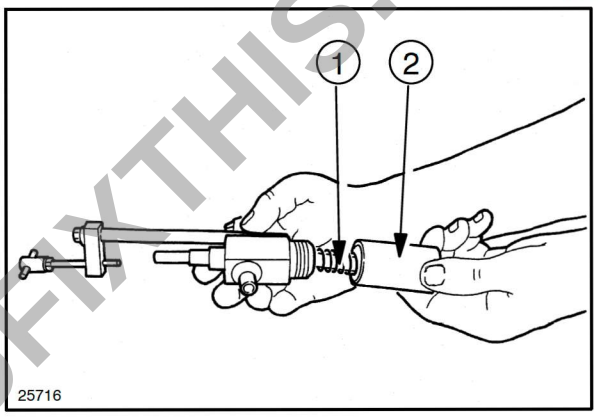
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11. Fit the control valve block pin (2) complete with reqqin seat (3) on tool **380000274** (1).



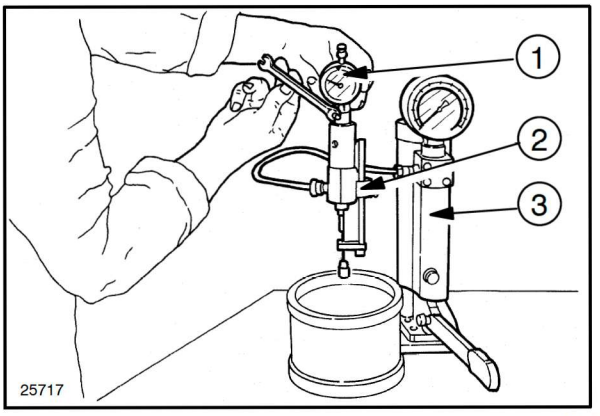
101

12. Fit the control valve block pin spring (1) and the cap (2) of tool **380000274**. Tighten the cap as far as it will go and check that the control valve block-pin slides in its seat.



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13. Fit tool **380000274** (2) on the hand pump **380000275** (3), supplied with **ISO VG 68**, **DIN 51524** / **51525 oil** for outside temperatures of 0 °C to 50 °C (32 to 122 °F). Connect a dial gauge (1), securing in position with the screw.



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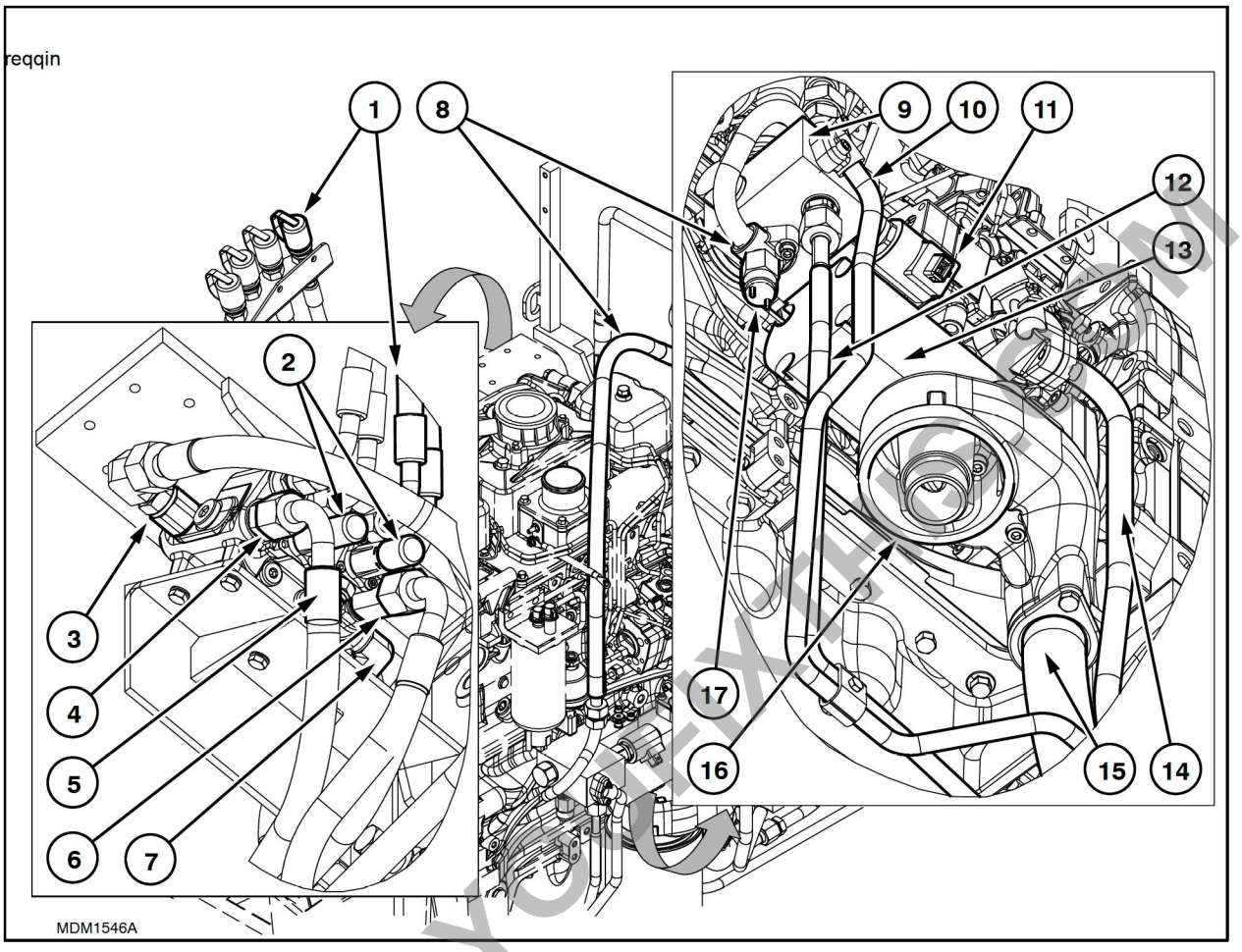
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Assembly of ventral control valve and flow increase control valve

- **Ventral control valve.**

1. Pressure/discharge oil delivery to the front loader.

2. 1st control valve (right in the drawing) and 2nd control valve.

3. Oil delivery to the additional control valves.

4. Oil drainage.

5. Solenoid valve energizing switch (11).

6. Oil delivery from the high-pressure pump or from the trailer brake valve (if fitted).

7. Oil delivery from the power steering pump.

- **Flow increase control valve.**

8. Oil delivery to the power steering.

9. Control valve body.

10. Oil to lubrication.

11. Solenoid valve.

12. Delivery to the ventral control valve (see 7).

13. Low (left of the drawing) and high pressure pumps fitted in tandem.

14. Oil delivery from the high pressure pump to the trailer brake valve (if fitted) or to the ventral control valve (see 6).

15. Pumps inlet.

16. Filter support.

17. Power steering oil pressure switch (only on 2WD with completely mechanical transmission, on the other machines it is mounted on the power steering outlet).

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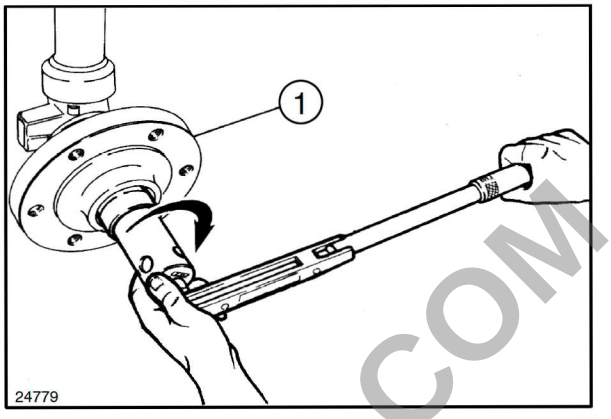
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4. Using a torque wrench, tighten the nut to a torque of 98 N·m (72 ft-lbs), whilst rotating the wheel hub (1) to correctly seat the bearings.

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5. Loosen the nut, then tighten again to a torque of 24 to 29 Nm (18 to 21 ft-lbs) whilst continuing to rotate the wheel hub.

NOTE: *The nut must be replaced each time the wheel hub is fitted.*

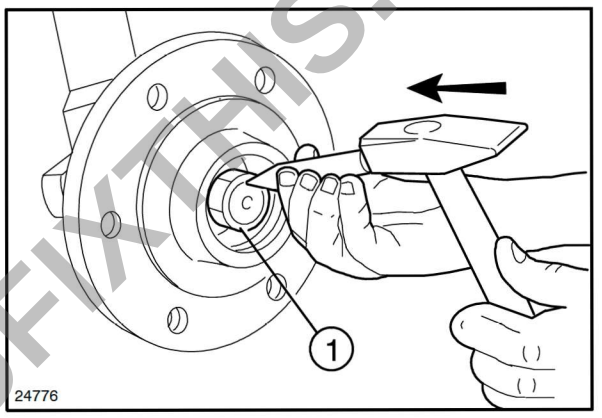


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6. Check the rolling torque R, bearing in mind that:

   R ≤ 7.84 N·m (64 ft-lbs)

7. Secure the nut (1) by notching.
8. Refit the cover for wheel hub bearing greasing.



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FRONT AXLE

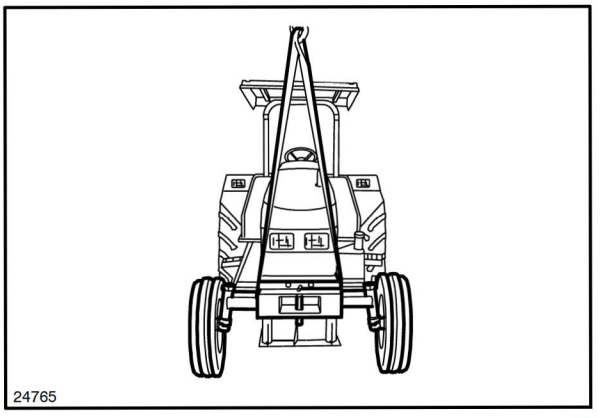
Removal

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.

To remove the front axle assembly from the tractor, proceed as follows:

1. Lock the front wheels using chocks.
2. Lift the front of the tractor.



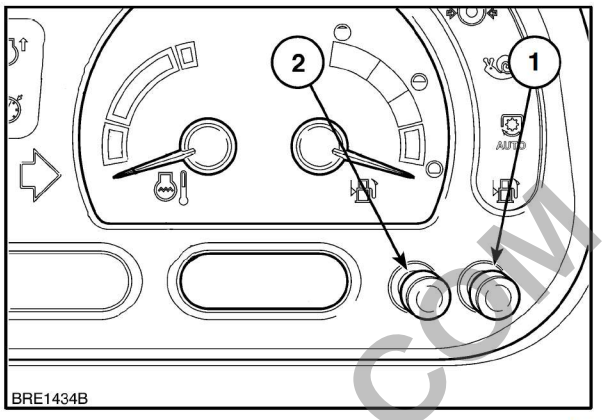
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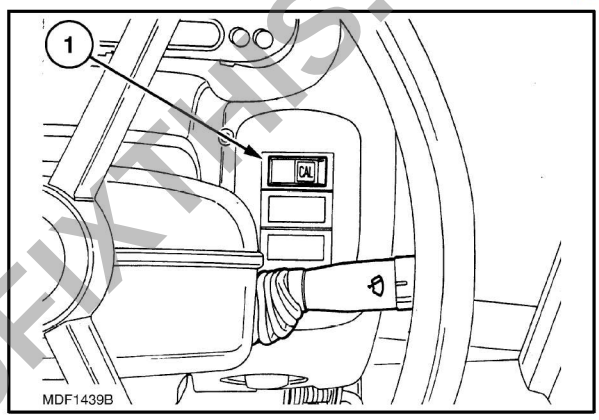
- Now use the push-button to set the hours (2, fig. 14) or the up button on the keypad (2, fig. 13) to increase the hours worked. If they have been increased too much, use push-button (1, fig. 14) or push-button (3, fig. 13) to decrease them.
  Pressing once increases or decreases the value by one unit. Pressing continuously increases or decreases the value continuously.

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- To conclude setting, press and hold down push-button (1, fig. 12) or (1, fig. 13) for 15 seconds, or if you do not want to exit setting the hours worked press push-button (1, fig. 15) or push-button (3, fig. 13) without making any changes.



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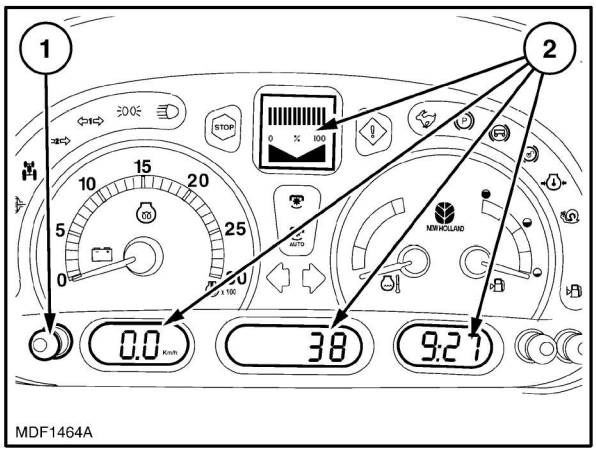
Brightness Control

With the control button (1) it is possible to vary the brightness of the displays (2). Momentarily pressing the button will modify the backlighting by degrees.

Keep the button pressed to pass the backlighting through its full range of brightness, from minimum to maximum.

Release the button when you obtain the required setting.

The performance monitor will show a bar histogram representing the backlighting of the displays.



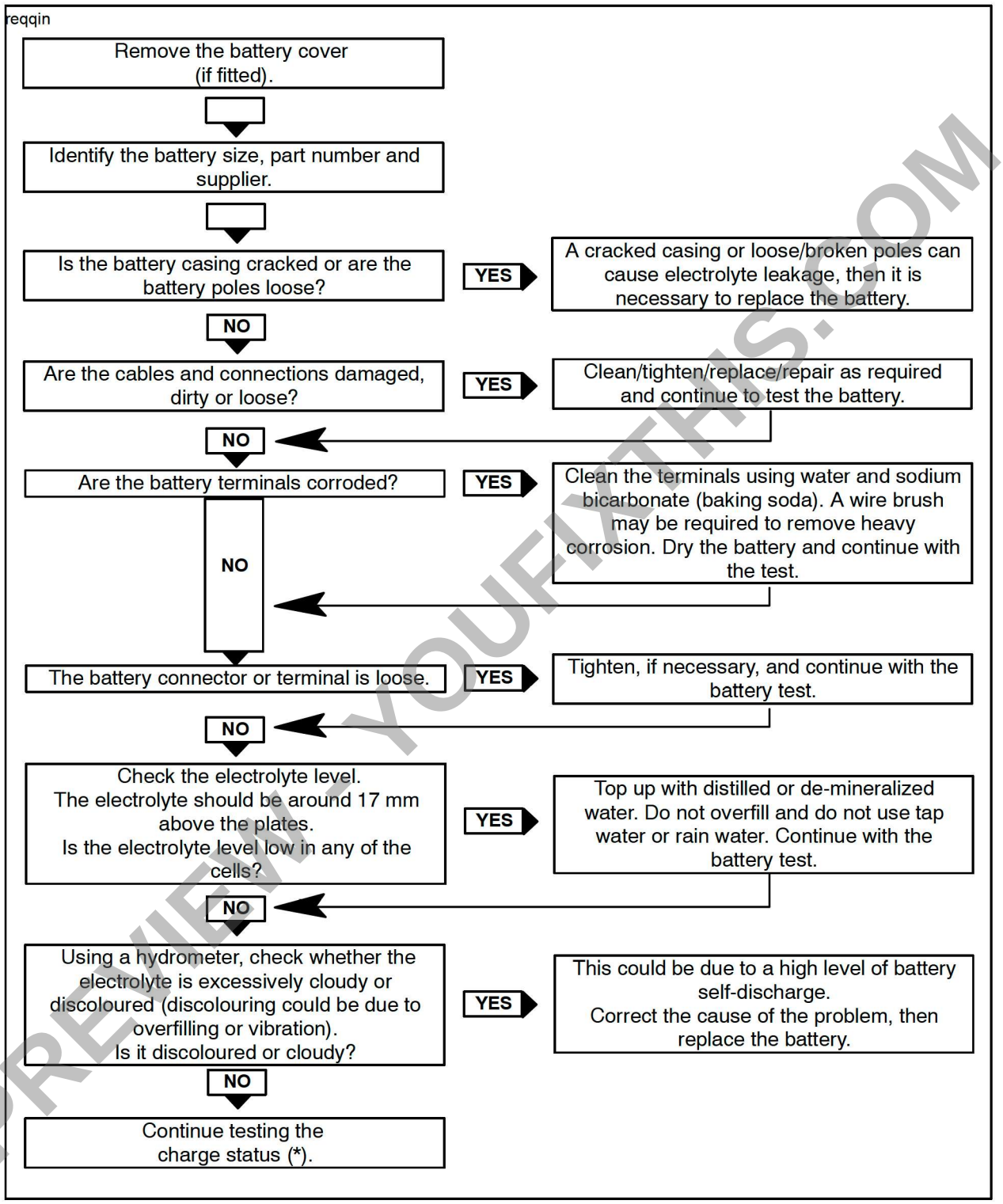
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Visual Check

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Flow Chart No. 2

(*) The charge status can be tested using a hydrometer and a voltmeter. The most effective method to determine the battery charge status consists in measuring the specific gravity of the electrolyte in the battery and, where possible, this is preferable to the open circuit voltage method.

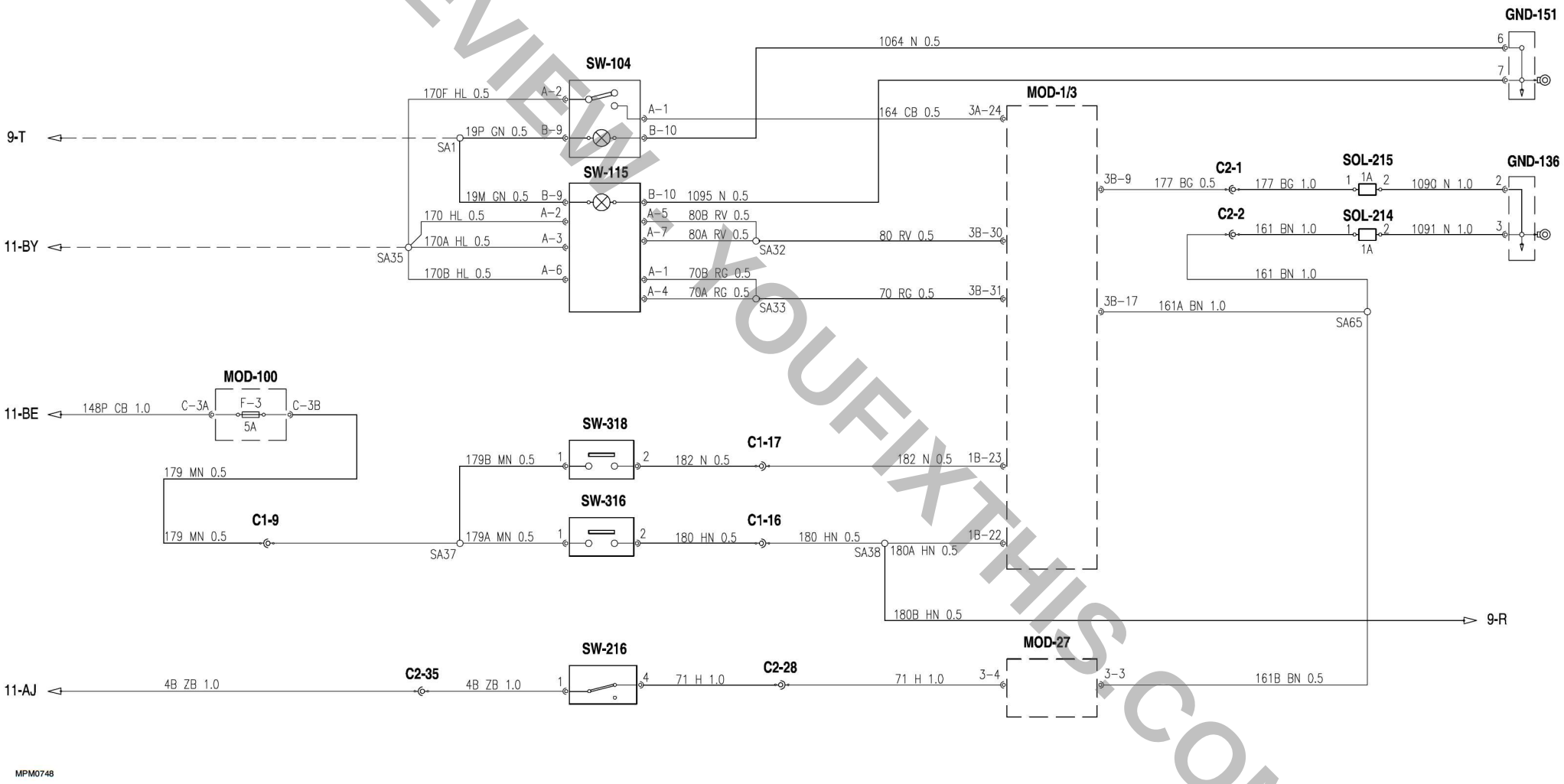
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BRAKES AND DIFFERENTIAL LOCK CIRCUIT - DIAGRAM 4



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ELECTRICAL CIRCUITS COMPONENTS VERSION 3

COMPONENT	NUMBER DIAGRAM	DESCRIPTION
C-1	2, 3, 4, 6, 7, 8, 11	Cab/engine main connection
MOD-1/3	1, 2, 4, 10, 12	TCM transmission control unit
C-2	2, 3, 9, 10, 12	Cab/transmission main connection
C-8	11	Cab/front loader main connection (b)
C-11	9	Cab/trailer brake main connection
SW-13	12	Gear lever switch
LMP-17	5	Front LH light
SW-18	5	Emergency switch
C-21	9	Transmission/seven-pin socket connection
C-21A	9	ISO seven-pin socket
C-21B	9	North American seven-pin socket
MOD-27	1, 2, 3, 4, 5, 6, 8, 9, 10, 11	Instrument
F-30/31	7	Mega-fuse box
C-33	6, 11	Engine/front lights connector
C-34	7	ISO rear power socket connector
SW-35	12	Clutch pedal switch
C-57	7	Pneumatic seat supply connector
SW-59	4	Operator present switch
MOD-61	8	Grid heater control unit
SW-64	4	Fast Raise/Lower switch
C-69	8	Grid heater relay connector (coil)
RLY-70A	5	Flasher relay
SW-71	5	Lights switch
SW-73	9	Hand brake switch
C-75	7	Ignition switch connection
C-76	7	Ignition switch connection
C-77	7	Ignition switch connection
C-78	7	Ignition switch connection
SW-75/76/77/78	7	Key-start ignition switch
SW-79	12	Shuttle lever switch
SW-80	10	Hydraulic power take-off switch
C-89	11	Connection of fitting for 80 liter (21.1337 gallon) pump variant
SW-97	8	Mechanical battery cut-out switch

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DIRECTION INDICATOR AND HAZARD LIGHTS CIRCUIT - DIAGRAM 5

SW-18 Emergency switch

MOD-27 Instrument

MOD-70 Flasher

SW-71 Lights switch

LMP-72 LH two-faced headlight

LMP-74 RH two-faced headlight

MOD-100 Fuse box and main relay

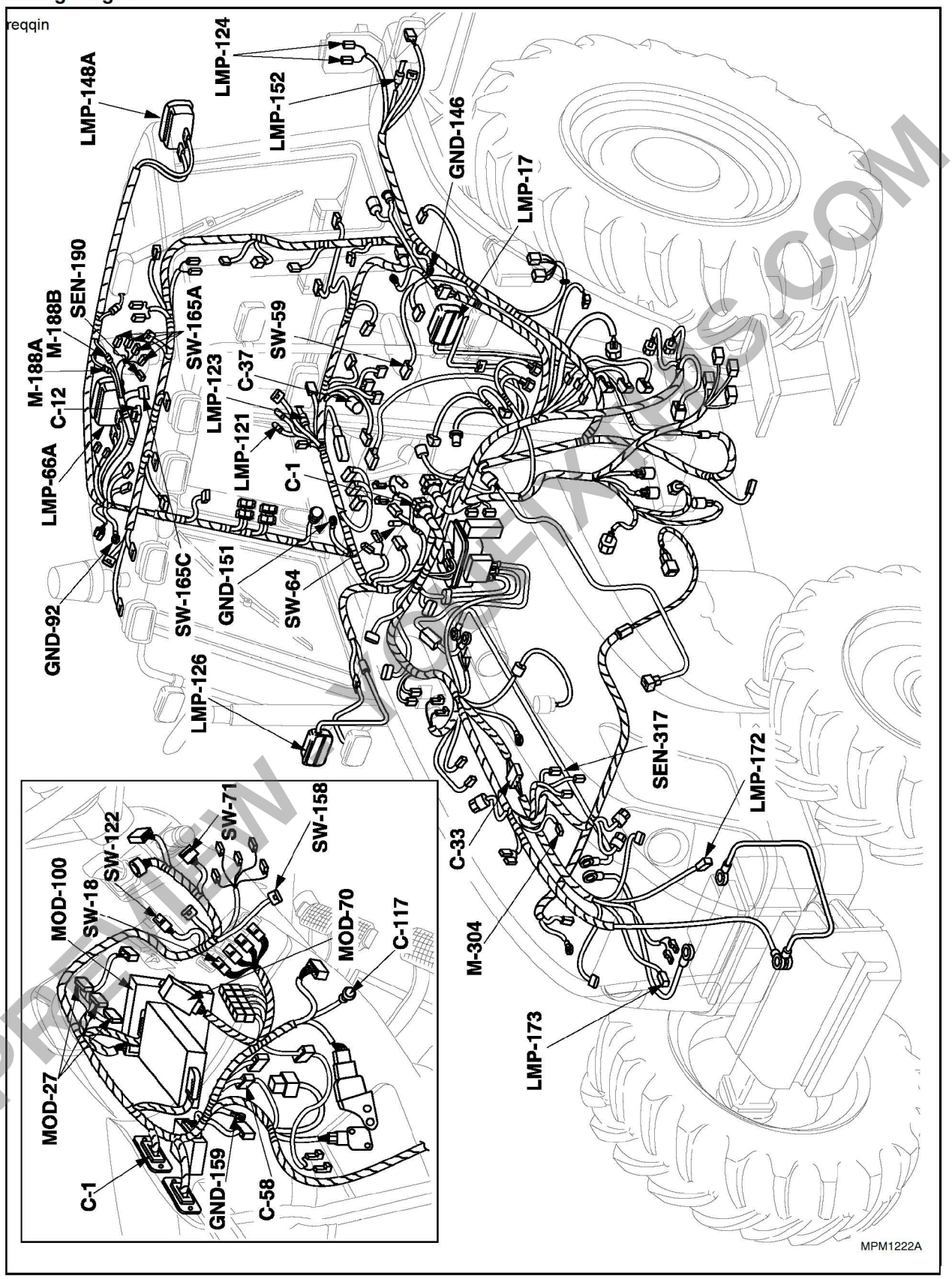
- **F-7** (+12V MF2 - 70A) - Direction indicator and hazard lights
- **F-16** (+12V MF2 - 70A) - Front right-hand and rear left-hand side lights, cigar lighter indicator light
- **F-29** (+12V MF2 - 70A) - Side lights, controls lighting
- **F-30** (+12V MF2 - 70A) - Front left-hand and rear right-hand side lights, controls and instruments lighting
- **RLY-2** Side lights circuit
- **RLY-5** Brake lights circuit

GND-159 Dashboard ground

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Wiring Diagram 7 - 8 - 9 - 10

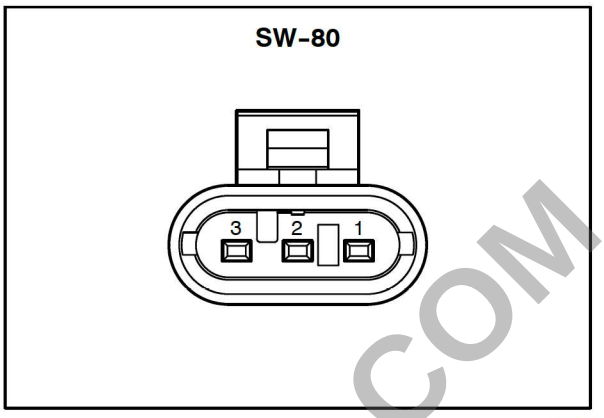


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Pin	Col.	Sect.	Pin	Col.	Sect.
reqqih	GN	1.0	3	H	1.0
2	AG	0.5	-	-	-

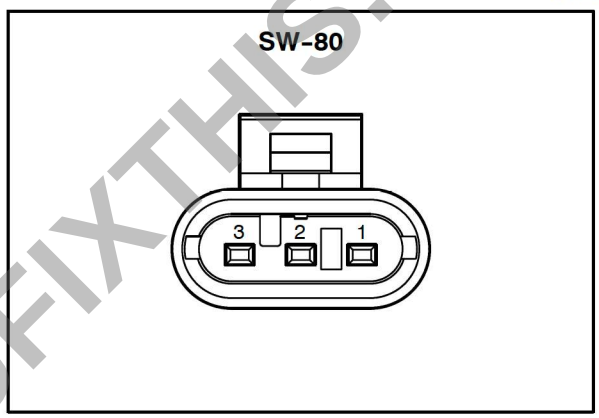
For Model With Cab, Standard Version



129

Pin	Col.	Sect.	Pin	Col.	Sect.
1	HL	0.5	3	MZ	0.5
2	H	0.5	-	-	-

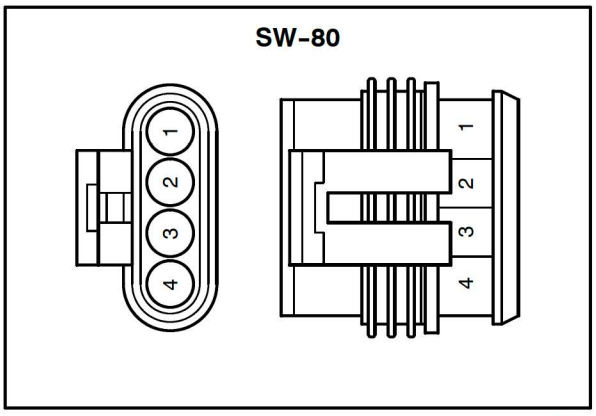
For Model With Cab, Version With Power Shuttle And Electronic Lift



130

Pin	Col.	Sect.	Pin	Col.	Sect.
1	GV	1.0	3	AG	1.0
2	H	1.0	4	-	-

For Model Without Cab, Standard Version

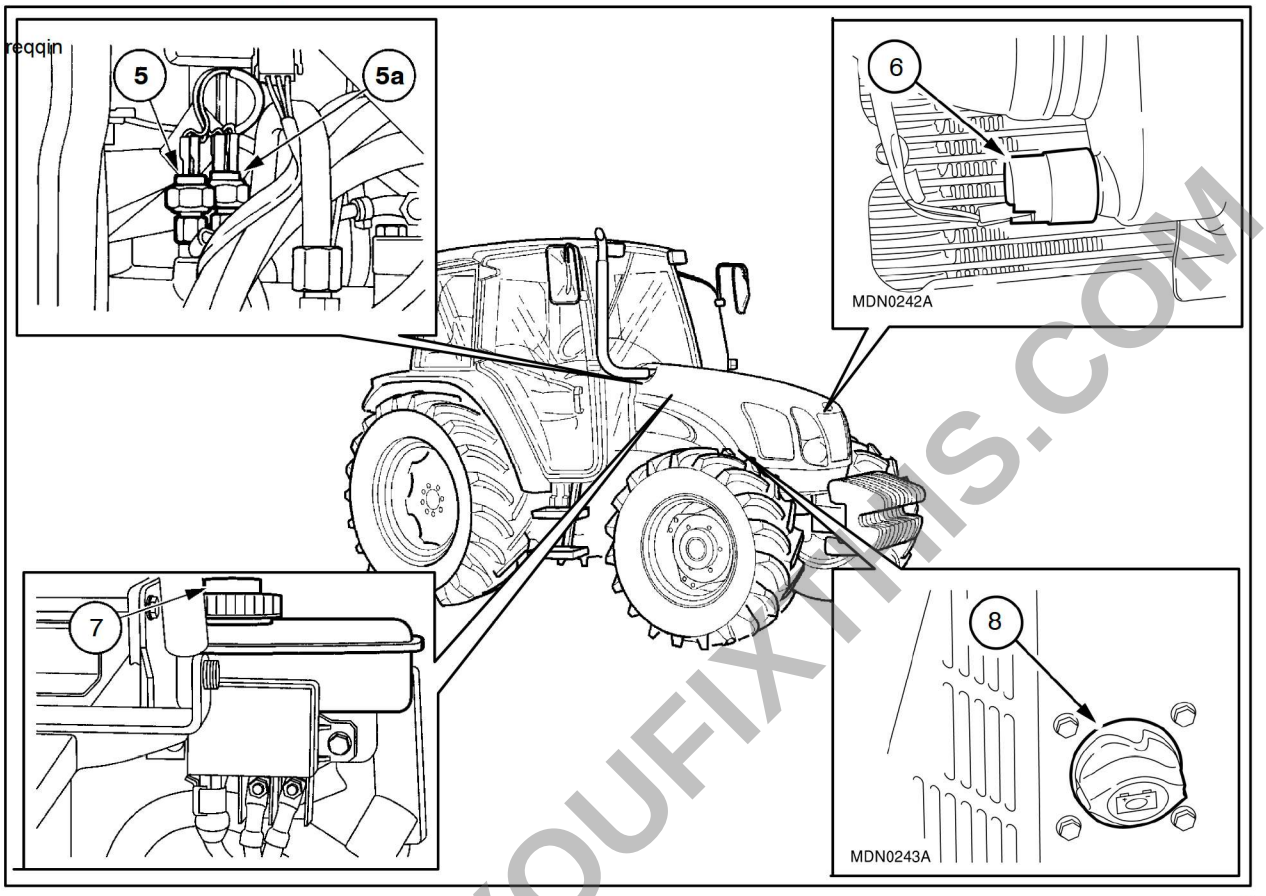


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COMPONENTS 5 THROUGH 8



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5. Brake switches
6. Air filter clogged switch
7. Brake fluid level switch.
8. Mechanical battery cut-out switch

5a Left brake switch (SW-316) and 5 Right brake switch (SW-318)

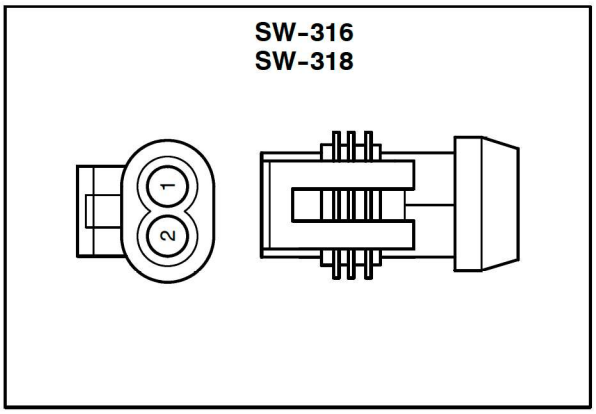
Pin	Col.	Sect.	Pin	Col.	Sect.
1	MN	1.0	1	L	1.0
2	HN	1.0	2	LB	1.0
SW-316			SW-318		

Pressure switches normally on, they turn off when braking.

Supplied from fuse **F 3 (5A)** via the main engine - driving module connector **C1** pin **9** to pin **1** wire **1 (MN)**.

Standard version

On the left **SW-316** the pin **2** is connected to pin **86** of the differential lock/four-wheel drive relay **RLY-17** wire **0.5 (Z)** via the main engine - driving module connector **C1** pin**16**.
On the right **SW-318** the pin **2** is connected to pin **86** of the differential lock relay **RLY-19** wire **0.5 (N)** via the main engine - driving module connector **C1** pin **17**.



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Error Code 1009 - Both External Switches Operated at Same Time

reggin

Possible fault modes:

1. Faulty connector
2. HPL fender switch(es) sticking
3. Faulty HPL fender switch
4. Wiring harness faulty
5. Faulty controller

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 HPL fender switches are not sticking in the raise or lower position.

   A. If the switches are sticking, clean, repair or replace as required.

   B. If the fender switches are not sticking, continue to step 2.
2. Check the HPL fender switches have not been operated simultaneously.

   A. Clear the error codes. Test the system for normal operation. If error code 1009 is still displayed, continue to step 3.
3. Check the connector **SW-187** of the HPL switch mounted on the LH fender, the connector **SW-184** of the HPL switch mounted on the RH fender and the connector **MOD-1/3 (1B)** of the controller.

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

   B. If the connectors are okay, continue to step 4.
4. Check for a short circuit with positive voltage.

   A. Disconnect the connectors **SW-184** and **SW-187**. Turn the key start ON. Measure the voltage between connector:
   SW-184 pin **4** wire 0.5 **(RB)** and **ground**
   SW-184 pin **5** wire 0.5 **(RL)** and **ground**
   SW-187 pin **4** wire 0.5 **(RB)** and **ground**
   SW-187 pin **5** wire 0.5 **(RL)** and **ground**
   If a voltage is indicated, repair or replace the harness as required.

   B. If a voltage is not indicated continue to step 5.
5. Check the L/H HPL fender switch for a short circuit.

   A. While operating the HPL fender switch mounted on the LH fender in the raise and then lower position, check between the connector:
   SW-187 pin **5** wire 0.5 **(RL)** and **SW-187** pin **4** wire 0.5 **(RB)**
   If a short circuit is indicated, replace the HPL switch mounted on the LH fender.

   B. If the switch is okay, continue to step 6.
6. Check the R/H HPL fender switch for a short circuit.

   A. While operating the HPL fender switch mounted on the RH fender in the raise and then lower position, check between the connector:
   SW-184 pin **5** wire 0.5 **(RL)** and **SW-184** pin **4** wire 0.5 **(RB)**.
   If a short circuit is indicated, replace the R/H HPL fender switch.

   B. If the switch is okay, download the correct level of software. If the fault re-occurs, remove and replace the controller.

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Error Code 2042 - Clutch a Solenoid Valve Short to +12 Volts

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Cause:

Short circuit to + 12 Volt between the solenoid valve of clutch A 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 A solenoid valve connector **SOL-202**, 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-202**. Turn the ignition key switch 'ON'. Measure the voltage between connector:
   SOL-202 pin **1**, wire 1.0 **(AN)** and **ground**
   SOL-202 pin **2**, wire 1.0 **(AG)** and **ground**
   If voltage is indicated, turn OFF the ignition key switch. Disconnect the connectors **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).

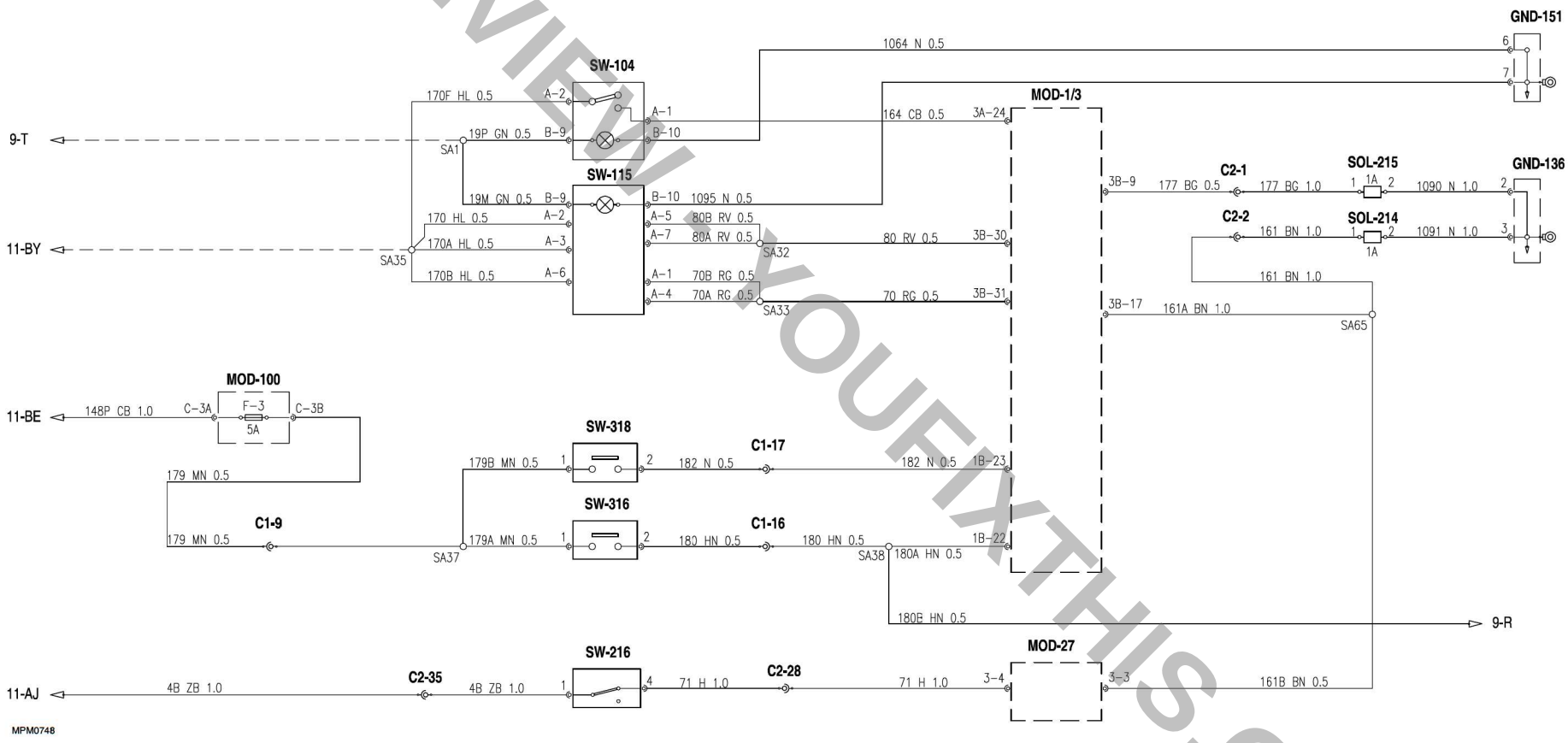
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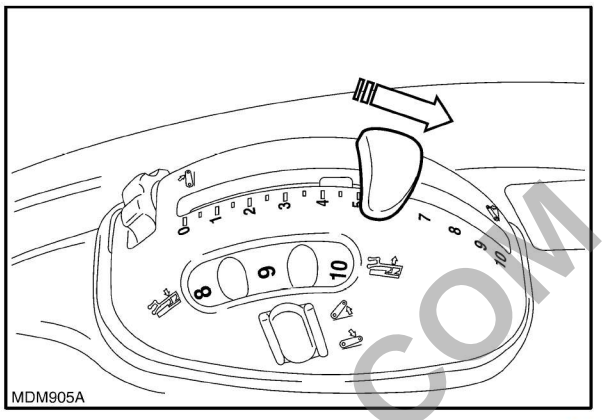
BRAKES AND DIFFERENTIAL LOCK CIRCUIT - DIAGRAM 4



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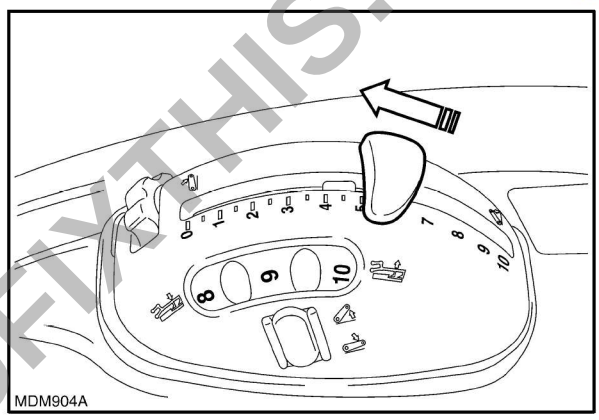
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2. Using the position lever, capture the lift arms then move it fully backwards.
reqqin
When the lift arms stop rising (you will hear the pressure relief valve trip for a moment) the value of the potentiometer is taken as the top calibration limit.
The arms will lower slightly by approximately 4% to protect the casing from mechanical damage. This position will be 96% of the travel, but it is considered to be 100%.



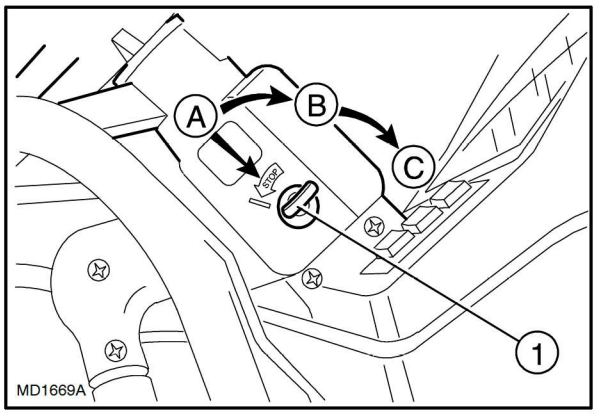
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3. Move the position lever fully forwards, when the arms stop lowering the value of the arms control potentiometer is taken as the lower value.



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



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