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Coolant pump drive belts	99–100	06–08

CHAPTER 2 – Engine models T4030F and T4040F

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Engine removal–installation	4–5–6–7–8–9–10	06–08

18 – CLUTCH

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PTO clutch servo control

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21 – TRANSMISSION

CHAPTER 1 – Transmission and range gear (16x16)

Main Data	1–2	06–08
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Main Data	1–2	06–08
Torque specifications	2	06–08
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Splitter device and creeper unit casing, shafts and bearings disassembly	8–9–10	06–08

CHAPTER 3 – Power Shuttle transmission

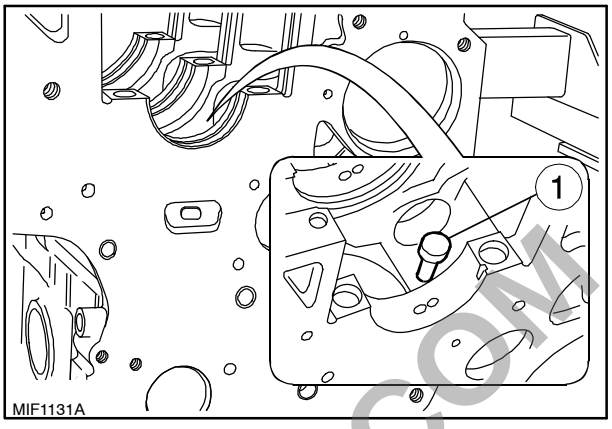
Main Data	1–2	06–08
Torque specifications	3	06–08
Tools	4–5	06–08
Sections	6–7–8–9–10	06–08

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FITTING THE TAPPETS
(Disassembly operation 66.)

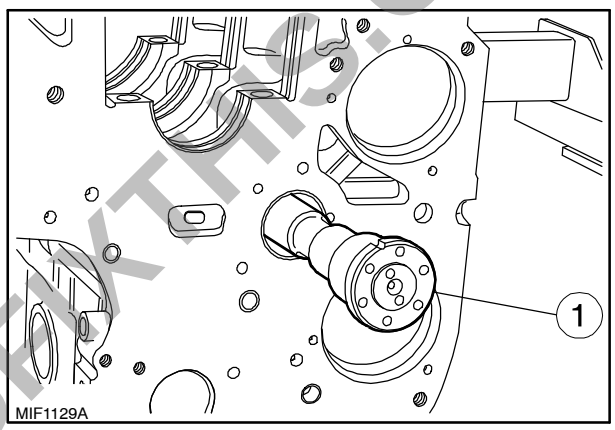
– Lubricate the tappets (1) and fit them in their seats in the crankcase.



69

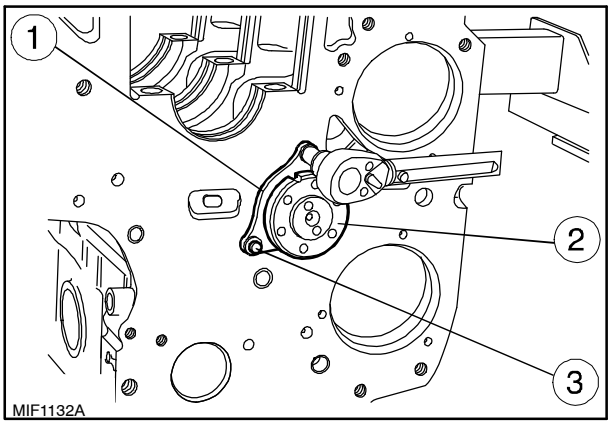
FITTING THE CAMSHAFT
(Disassembly operation 64. ÷ 65.)

– Lubricate the bushings supporting the camshaft and mount the camshaft (1) taking care that, during this process, the bushings or the supporting seats do not get damaged.



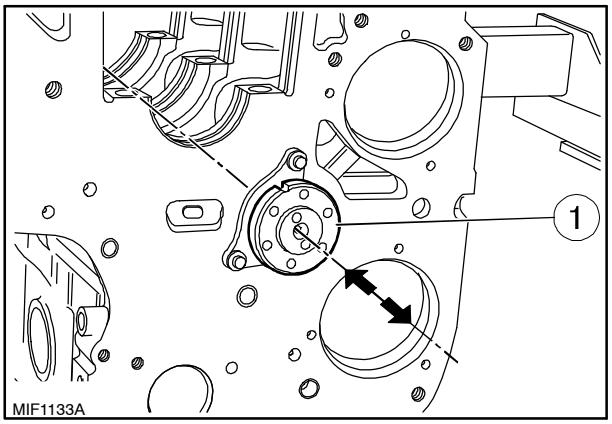
70

– Position the plate (1) retaining the camshaft (2) with the slot facing towards the top of the crankcase and the punchmark facing the operator. Tighten the screws (3) to the prescribed torque stated on page11.



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– Check that the end float of the camshaft (1) comes within the tolerance range prescribed in Main Data on page 4.



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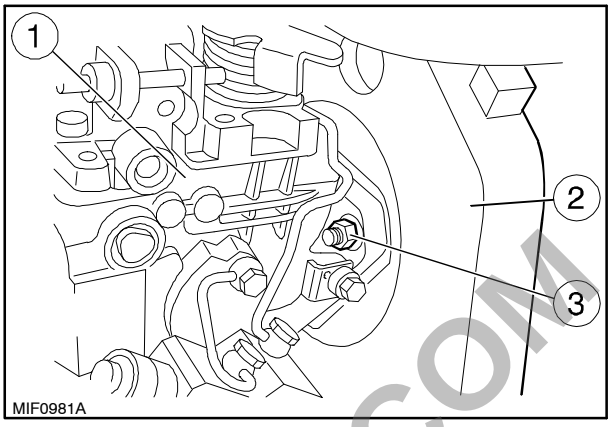
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8. When fitting the fuel pump on the engine, it is necessary to bring about the condition of T.D.C. on cylinder No. 1 as described on the previous page
9. Fit the injection pump casing (1), preset, in the seat of the gear box (2) and secure it, without tightening, with the screws (3).

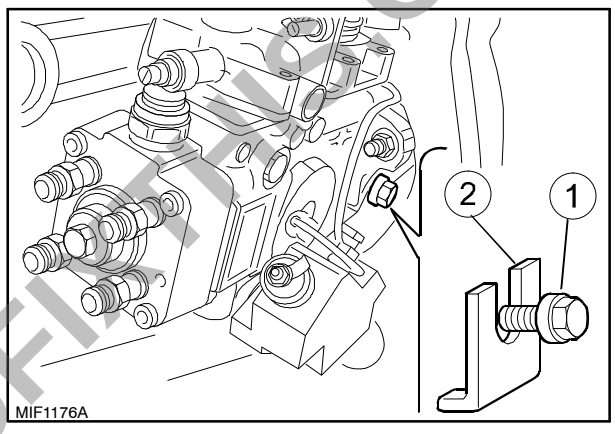
⚠ ATTENTION ⚠

The seal removed at the time of pump disassembly must not be reused. Always use genuine spare parts.



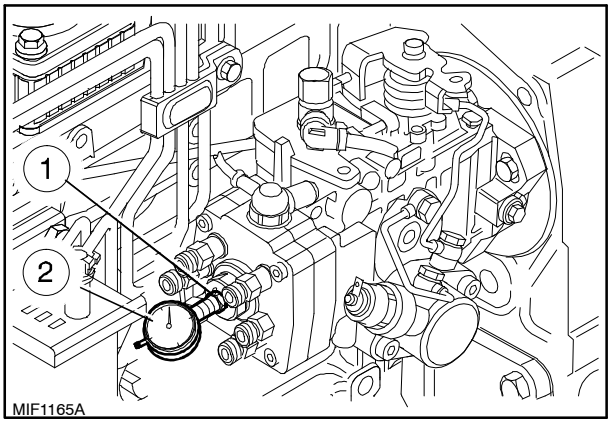
216

10. Partly unscrew the bolt (1) locking pump spindle rotation and insert the spacer washer (2). Tighten the screw locking the above–mentioned washer: in this way, the fuel pump spindle is free to turn.
11. Extract the pin of the engine flywheel locking tool.
12. Remove the tool **380000988** for locking/rotating the flywheel; place the starter motor in its seat.



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13. With the injection pump in position but with the mounting bolts loose, remove the plug on the pump cover.
14. Fit the dial gauge **380001004** (2) and the related tool **380000229** (1), pre–loading the rod by 2.5 mm.
15. Turn the crankshaft to move from the condition of 1° cylinder at TDC.
    Reset the dial gauges and turn the crankshaft in the opposite direction to bring it back into the condition of the 1° cylinder at TDC in the phase of the end of compression.
    In this position the dial gauge on the pump must read off a value of 1.15 ± 0.05 mm.
16. Turn the pump anti–clockwise if the plunger has completed a shorter stroke, and clockwise if the stroke is longer, repeating the test until the correct stroke is obtained.
17. Verifying these conditions, lock the pump by tightening the relevant nuts to the torque shown on page11.

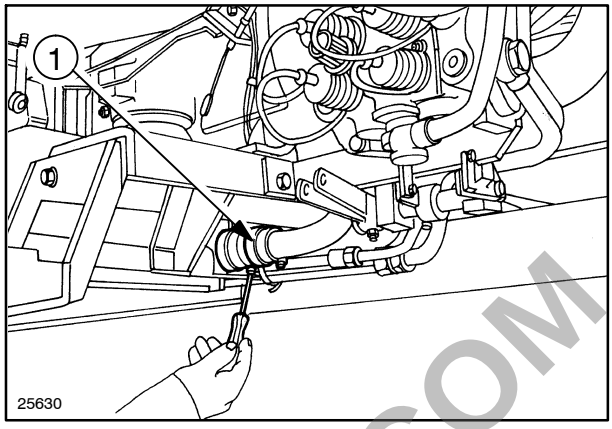


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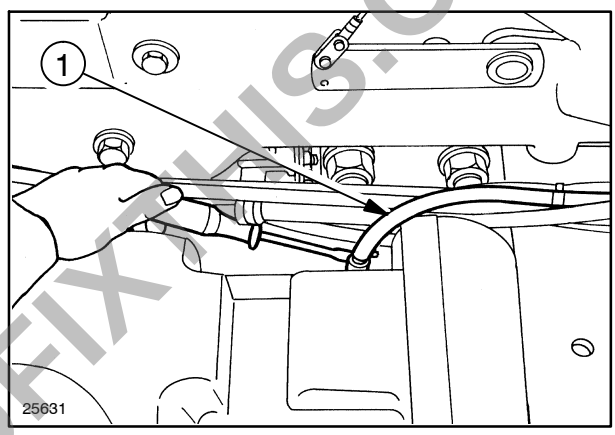
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14. Loosen the clamp and remove the sleeve (1) from the side tank.



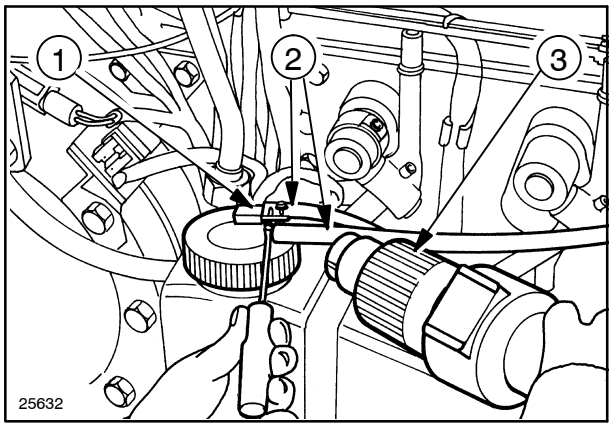
21

15. Unscrew the clamp and detach the diesel suction pipe (1).



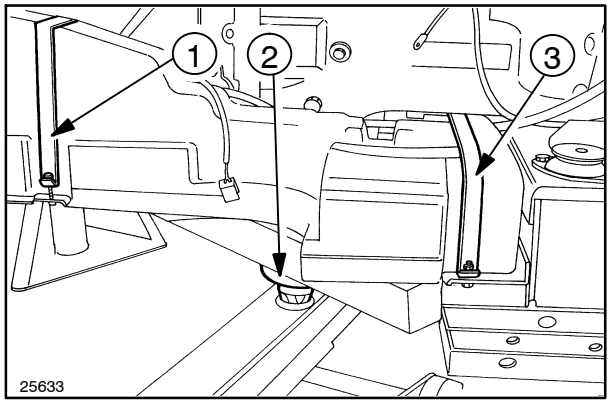
22

16. Disconnect the electrical connections (1), unscrew the clamps and, using a heater (3), heat the pipes (2) to make it easier to remove the unions.



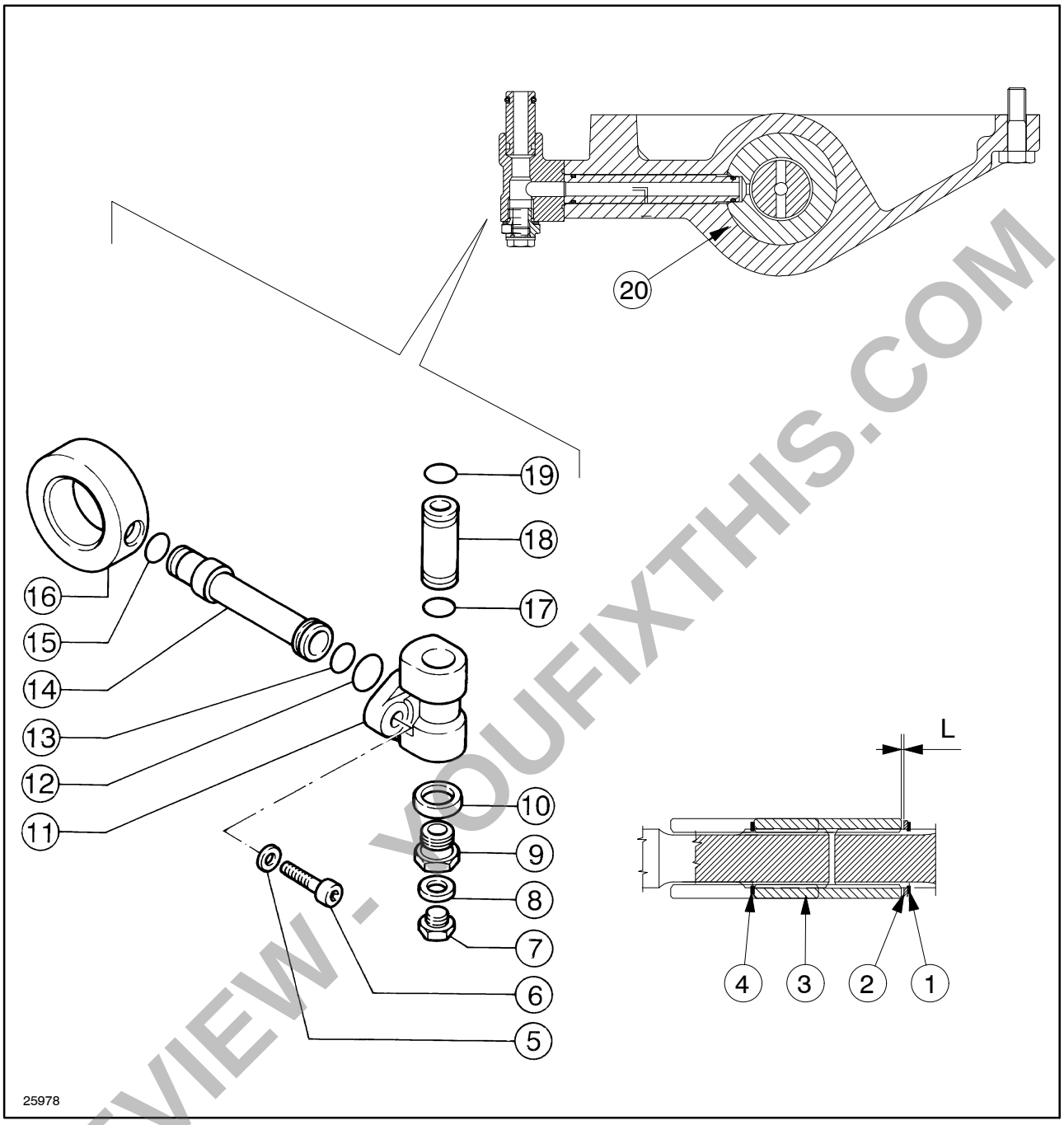
23

17. Position a hydraulic jack (2) under the side tank, unscrew the clamp retaining bolts (1 and 3) and remove the tank.



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3

Control cylinder oil delivery union and front grooved sleeve

L. Axial clearance of sleeve (3).
1. Snap ring.
2. Adjustment shim.
3. Sleeve.
4. Snap ring.
5. Flat washer.
6. Screw.
7. Plug.
8. Flat seal.
9. Union.
10. Flat seal.
11. Union.
12. Seal.
13. O–ring seal.
14. Rigid piping.
15. O–ring seal.
16. Manifold ring.
17. O–ring seal.
18. Rigid piping.
19. O–ring seal.
20. Drive gear housing.

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STEERING KNUCKLE PINS AND BEARINGS

Replacement (Op. 25 108 46 or 25 108 47)

Proceed as follows.

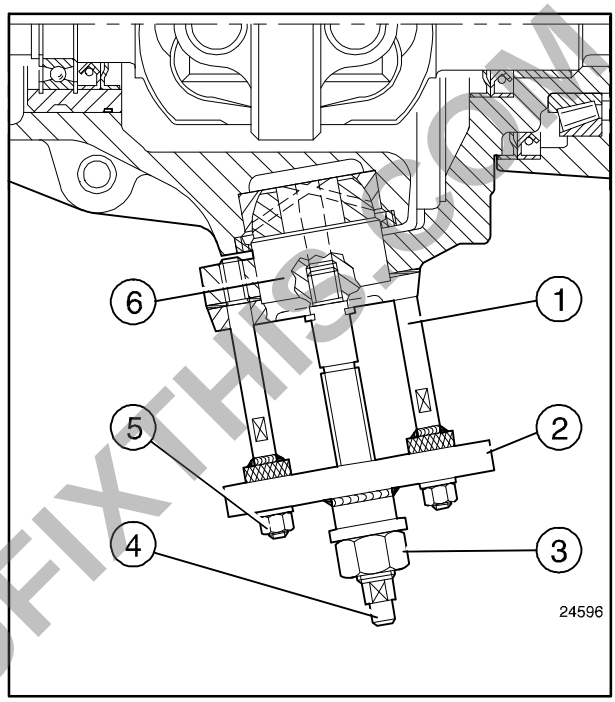
1. Remove the grease nipples and the steering knuckle pin retaining bolts.

2. Fit the bolts (1) of tool **380000265**.

3. Fit the plate (2) of the tool and fix it to the three bolts with nuts (5).

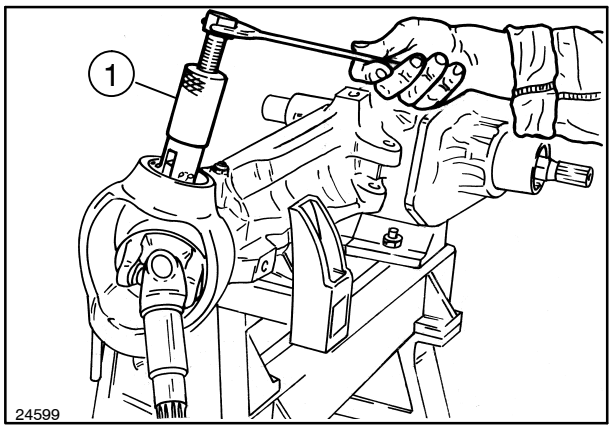
4. Fit the central tie bolt (4) screwing it fully into the grease nipple bore on the pin (6).

5. Screw in the nut (3) to drive the pin out of its bore.



6. Using extractor tool **380000234** (1) remove the steering knuckle bearings.

7. Re–install the steering knuckle bearings using a suitable drift.



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RIGHT OR LEFT–HAND BRAKE

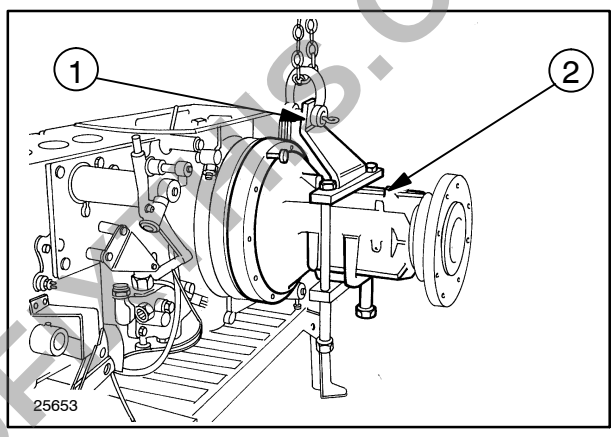
Removal–Installation (Op. 33 202 60)

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. Check that no one is in the vicinity of the load to be lifted.

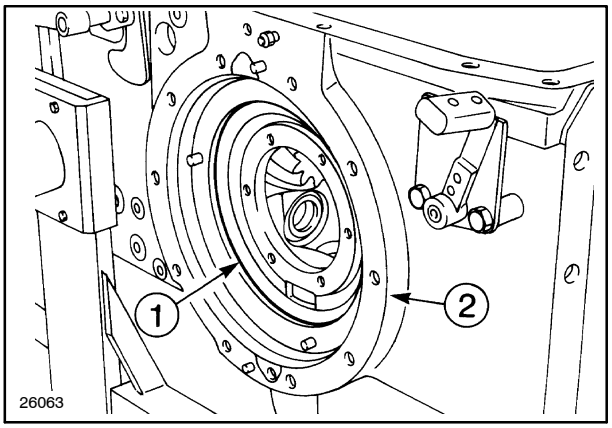
To remove the right– or left–hand brake, proceed as follows.

1. Remove the right– or left–hand final drive casing, following the instructions in Section 27, Chapter 1.



7

2. Remove the brake disk (1) from its seat in the transmission casing (2).

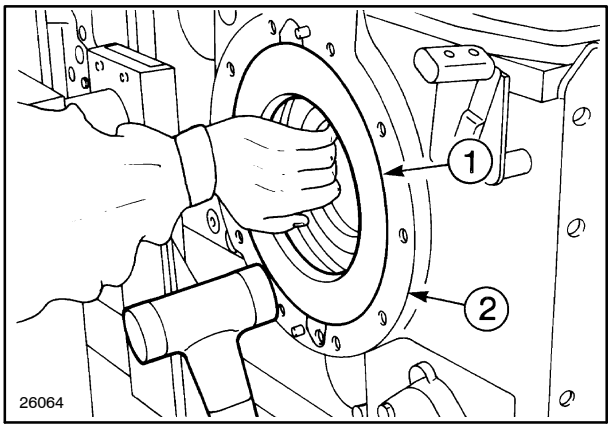


8

3. To refit the right– or left–hand brake, proceed as follows:

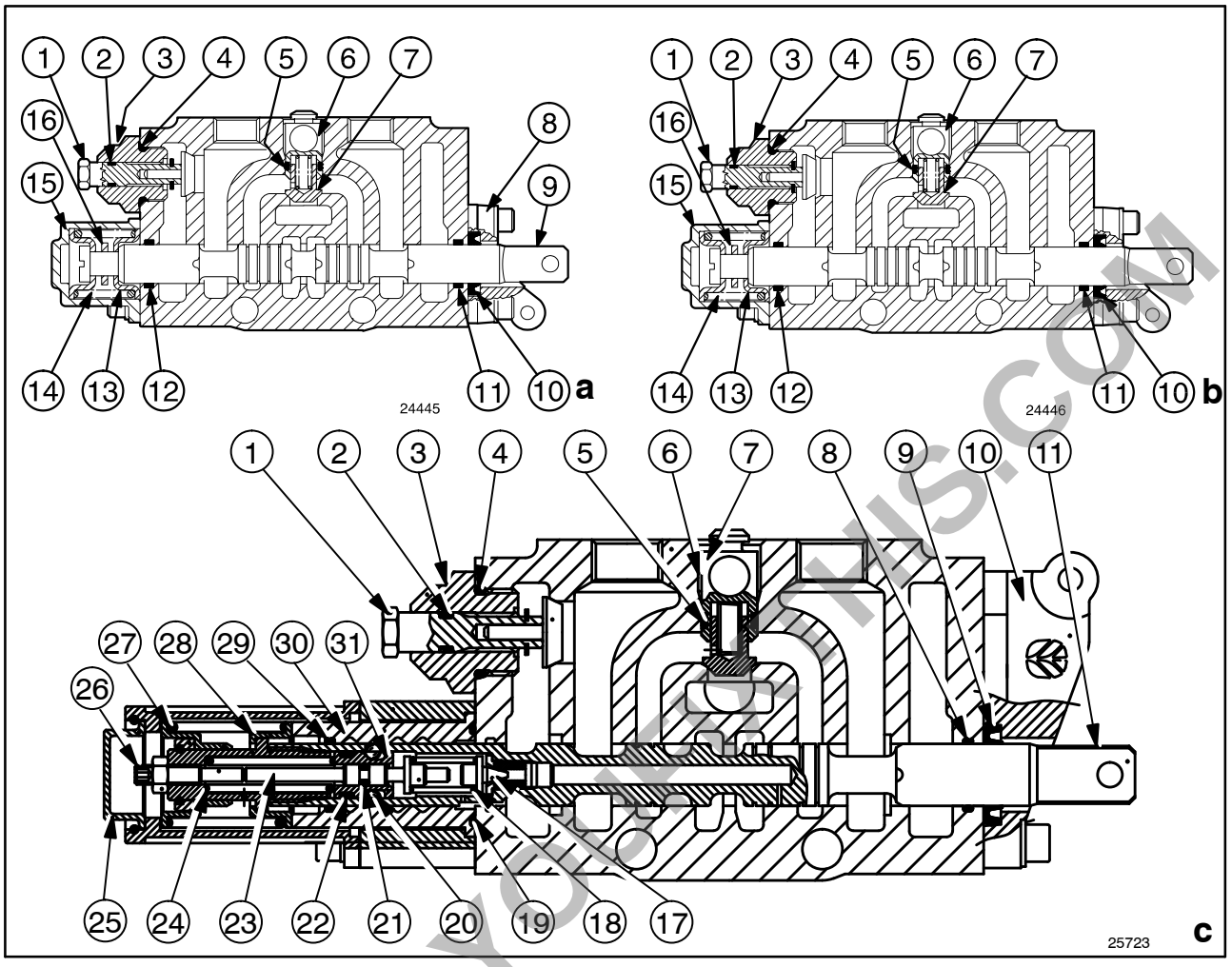
— Install the brake disk (1) in its seat in the transmission casing (2) using a plastic mallet.

— Refit the right– or left–hand gear casing following the instructions in Section 27 Chapter 1 (preparing the mating surfaces and applying a bead of sealing compound of approximately 0.0787 in. (2 mm) in diameter as shown in figure 10).



9

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2

Auxiliary control valve cross–sectional views

a. Auxiliary control valve configured for operation of a double–acting cylinder.
b. Auxiliary control valve configured for operation of a single–acting cylinder.
c. Single/double–acting auxiliary control valve with float control and automatic detent release.
d. Single/double–acting auxiliary control valve with automatic detent release.
e. Single/double–acting auxiliary control valve with switching float control.
17. Single/double–acting switching valve.
18. Seal.
19. Valve retaining plug.
20. Seal.
21. Seal.
22. Check valve seat.
23. Non–return valve.
24. Seal.
25. Seal.
26. Control support.
27. Control valve stem.
28. Seal.
29. Cup.
30. Control valve stem return spring.
31. Cover.
32. Spacer.
33. Tapered needle.
34. Spring.
35. Seal.
36. Detent balls.
37. Seal.
38. Seal.
39. Internal plunger.
40. Spring.
41. Cover.
42. Detent release pressure adjuster screw.
43. Control valve stem return spring.
44. Cup.
45. Seal.
46. Detent notch body.
47. Detent ball support.
48. Seal.
49. Seal.

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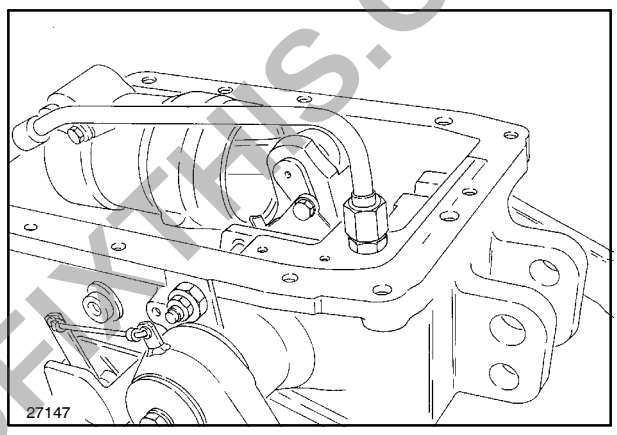
Op. 35 134 42
ELECTRONICALLY CONTROLLED HYDRAULIC LIFT Disassembly – Assembly

⚠ CAUTION ⚠

Handle all parts carefully.
Do not put your hands or fingers between parts.
Wear suitable safety clothing – safety goggles, gloves and shoes.

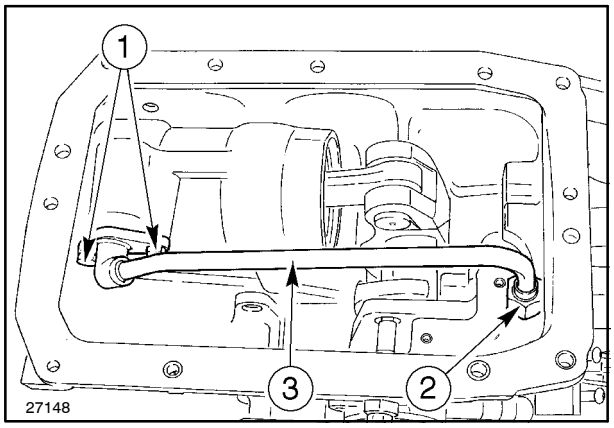
To disassemble the lift, proceed as follows.

1. Position the lift on a rotating stand **380000301** using the bracket **50155** to be made in the workshop (see page 5).
Remove the control valves support, with the relative oil delivery to the hydraulic cylinder and the cylinder safety valve.



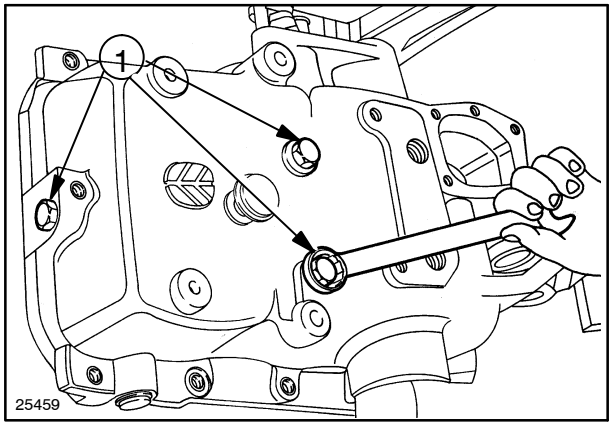
39

2. Unscrew the front bolts (1), the rear union (2) and separate the oil delivery pipe (3) from the lift cylinder.



40

3. Unscrew the three lift cylinder retaining bolts.



41

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DATA

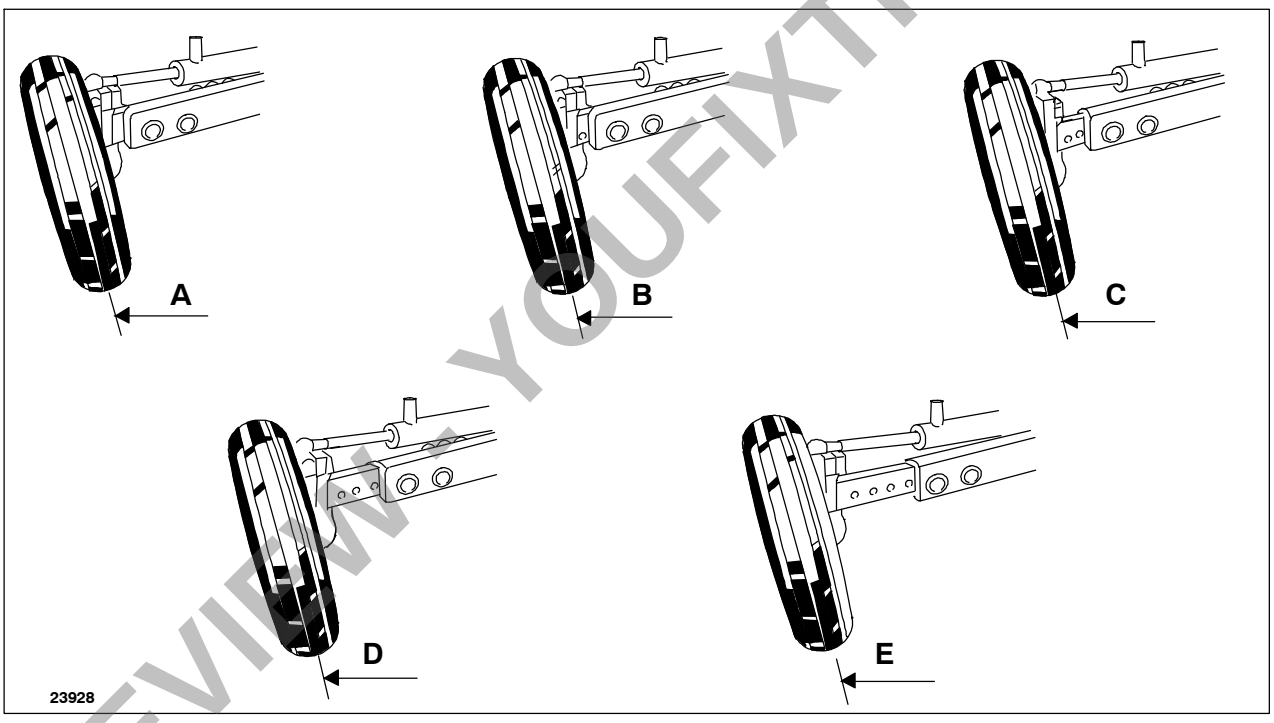
(cont)

Tyres	Track settings				
	A	B	C	D	E
7.00–12	1172	1272 (1)	1372	1472	1572
6.50–16	1146	1246 (1)	1346	1446	1546
7.50–16	1165	1265 (1)	1365	1465	1565
11L–15/1	1212	1312 (1)	1412	1512 (*)	1612 (*)

(1) Rated wheel track

(*) Track settings to be made only on the field or on road with the maximum clearance lights extended.

2WD front wheel track diagram



1

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25. Remove the screw and the conditioner pipe (1) clamp (2).

26. Unscrew the bracket (8) and filter (6) retaining bolts.

27. Unscrew the four retaining bolts (4), remove the fan–filter support cover (5) and the condenser radiator (7).

28. Unscrew the fan retaining bolts and the fan (3).

29. Refit the fan (3) on the cover (5).

30. Refit the condenser radiator (7) on the supports, fit the cover (5) and retaining bolts (4).

31. Assemble the filter (6) and secure the bracket (8) with the relative retaining bolts.

32. Fit the piping (1) clamp (2) with the relevant screws.

33. From inside the cab, refit the heating/air conditioning unit (1, fig. 35) tightening with the four retaining bolts (2).

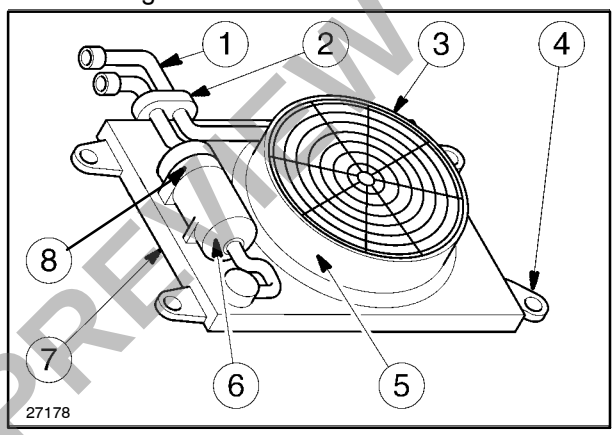
34. Connect the four condenser drain pipes and the two pipes connected to the heater radiator.

35. Connect the two compressor – conditioner pipes.

36. On the cab roof, connect the electrical connections connected to the condenser fan.

37. Fit the front bracket and the two hoses to the rigid pipes (1, fig. 36).

38. Refit the cover (1, fig. 33) and secure with the six retaining bolts.



35

39. Fit the cab inside temperature control unit, connecting the heater cock control cable (2, fig. 32) and the electrical connections (3).

40. Attach the temperature control unit to the fan screw, using the relative bolts.

41. Assemble the roof fitting (3, fig. 31) inserting the plastic screws (1) and the two retaining bolts (2).

42. Attach the light fitting (1, fig. 30) with the screws (3) and insert the glass (2).

43. Assemble the cab temperature control unit fitting (2, fig. 29) securing with the screws (1).

44. Fit the sunshade (1, fig. 28), complete with the plastic side supports.

45. Fit the right and left–hand central upright covers (2, fig. 27) inserting the plastic screws (1).

46. Fit the refrigerant drain plug (1, fig. 26), fill the engine cooling system with coolant and refit the engine's left–hand side guard.

47. Reconnect the battery negative lead (1, fig. 25).

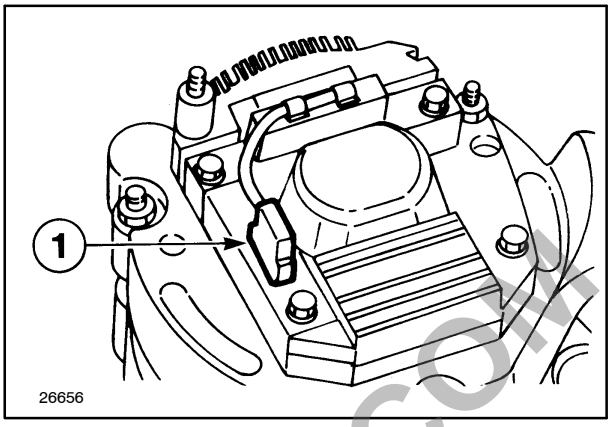
48. Charge the system with the evacuation/charging station **380000315** and search for leaks as indicated on page 20.

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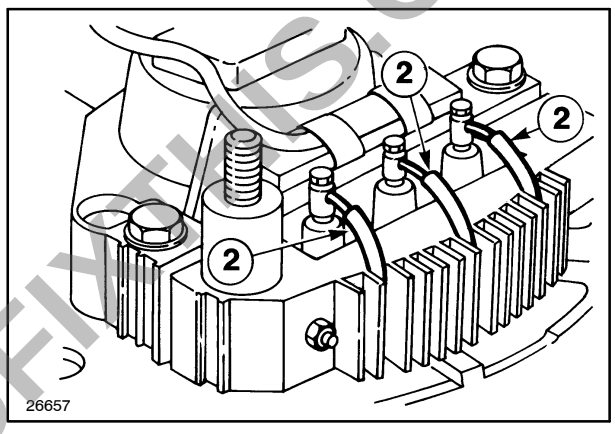
CHECKING THE DIODES

Disconnect the terminal wire connector (1) of the excitation diodes from the positive brush pin (Fig. 19).



19

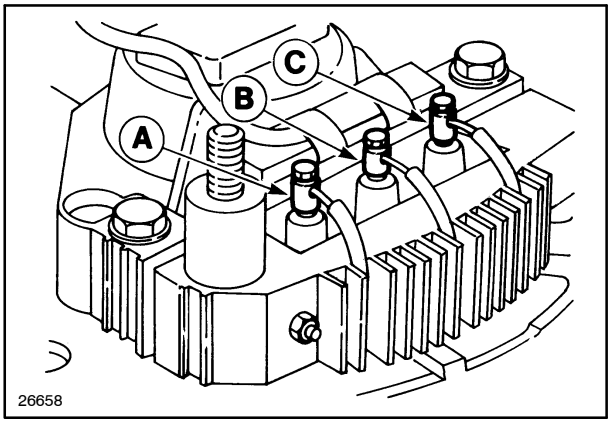
Unweld stator winding terminals (2) from the rectifier bridge (Fig. 20).



20

EXCITATION DIODES TEST

Insert an ohmmeter point in the connector (1) mentioned above (Fig. 19).
The second point must be placed in contact with each of the three terminals (A–B–C). Repeat the three measurements after inverting the instrument points (Fig. 21).

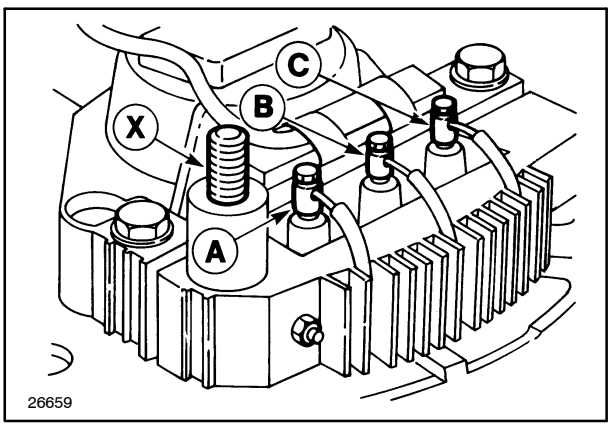


21

POSITIVE POWER DIODE TESTS

Place an ohmmeter point in contact with the positive (X) alternator terminal and the other successively with each of the three terminals (A–B–C) (Fig. 22).

Repeat the three measurements after inverting the instrument point connections.

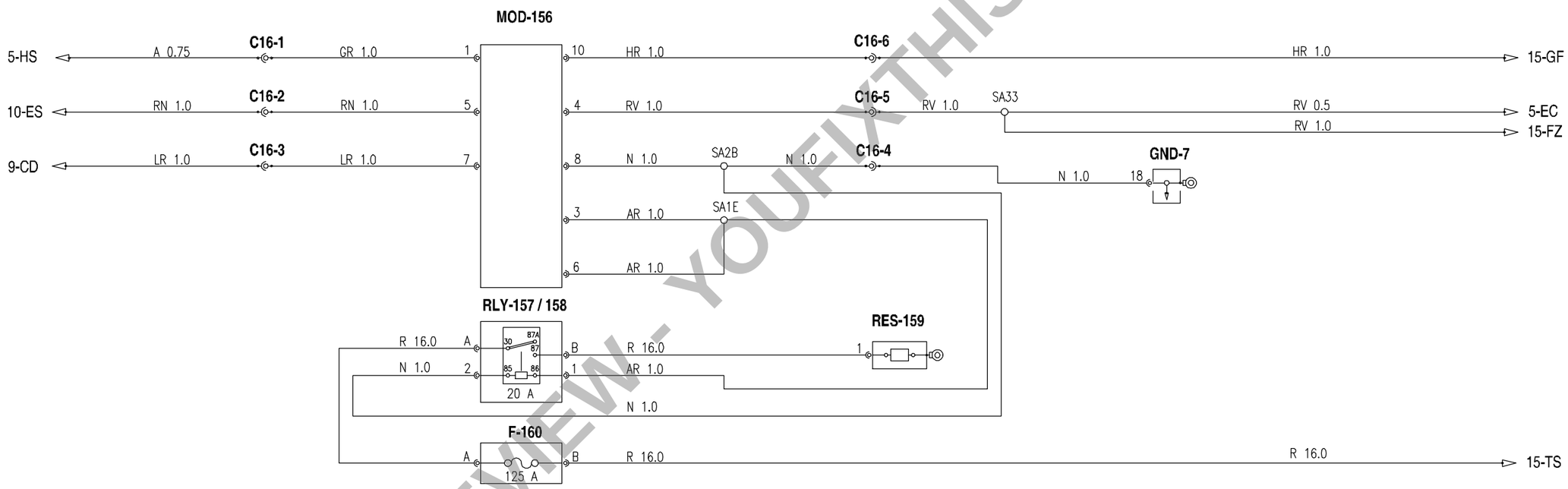


22

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GRID HEATER CIRCUIT – SDIAGRAM 4

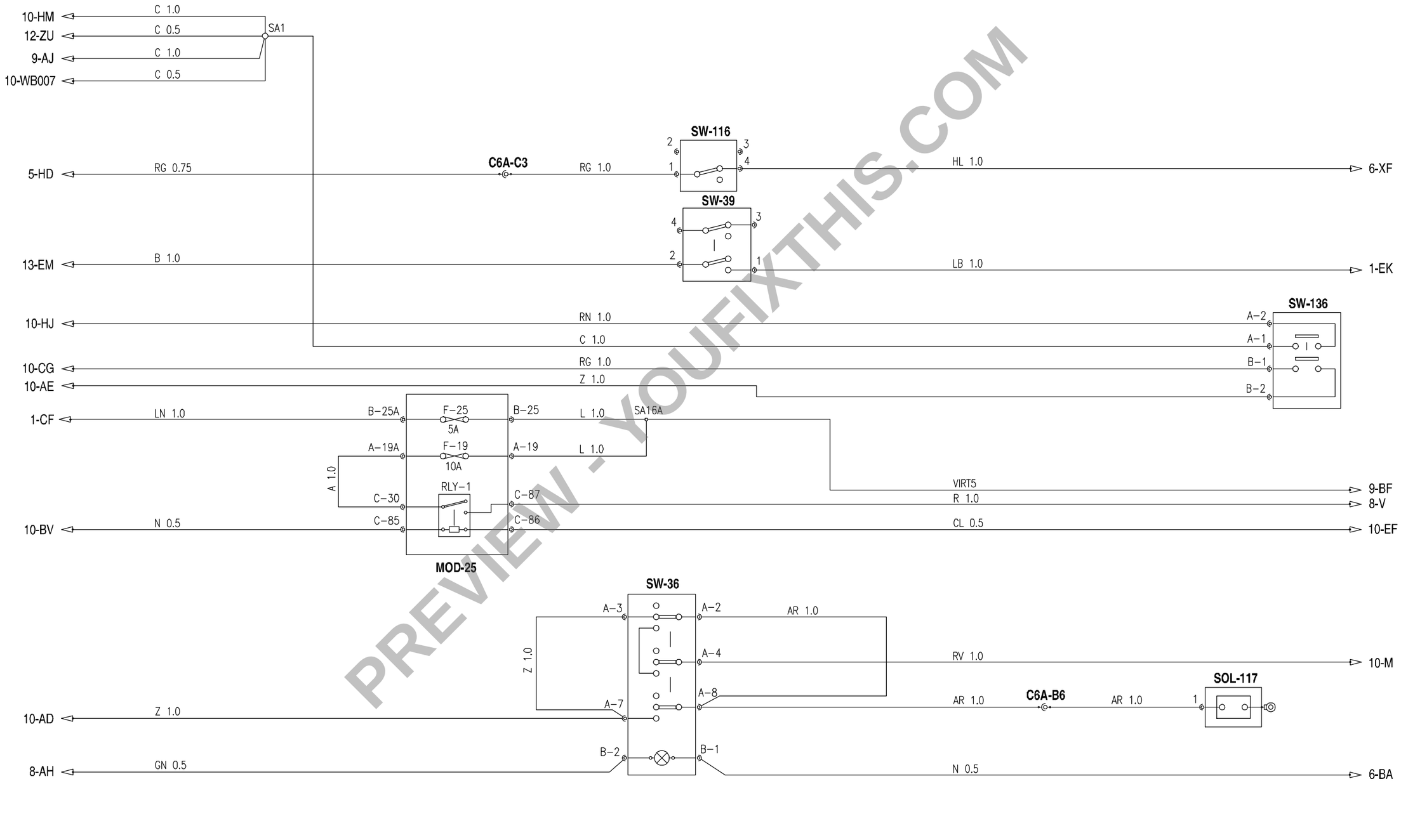


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BRAKES, BRAKE LIGHTS, DIFFERENTIAL LOCK CIRCUIT – SDIAGRAM 3



MPM1268A

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POWER SHUTTLE 44+16 CIRCUIT (transmission side)
(Diagram 25)

C–9	Power–Shuttle transmission system connection (24 PIN)
SOL–138	Dual Command (2 Speed Power Shift) mode solenoid valve
SOL–139	Shuttle mode solenoid valve
SOL–140	Dump solenoid valve
SW–141	G1 ranges switch
SW–142	C1 gears switch
SW–143	Creeper switch
SOL–146	Lo clutch solenoid valve
SOL–147	Hi clutch solenoid valve
SEN–148	Transmission oil temperature sensor
SW–183	Dual Command (2 Speed Power Shift) and Dump Clutch buttons
SEN–203	Shuttle position sensor

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CAB POWER SUPPLIES CIRCUIT
(Diagram 20)

C–2 Cab system connection (8 PIN)

MOD–75 Fuse box and cab relays

- **RLY–1** Key–locked cab users circuit
- **RLY–2** Rear work lights circuit
- **RLY–3** Air–conditioner compressor circuit
- **RLY–4** Front work lights circuit
- **F–1** Windscreen wiper/washer
- **F–2** Rear auxiliary lights
- **F–3** Air conditioning fan unit
- **F–4** Rotating beacon, cigar lighter
- **F–5** Rear window wiper/washer
- **F–6** Front worklamps

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DIAGNOSTICS CONNECTION CIRCUIT
(Diagram 14)

GND–7 Dashboard ground

C–28 Diagnostics connection

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Main fusebox

Version 1 tractors, page 8		
Valves	***Amp.***	***PROTECTED CIRCUITS***
1	10	Horn, full beam flasher.
2	15	Direction indicator and hazard lights.
3	10	8A power socket.
4	10	Differential lock circuit.
5	5	+ Instrument common.
6	15	Dipped beam headlights.
7	15	Full beam headlights.
8	15	ISO side lights, or 7–pin work light (North America).
9	5	Front left–hand and rear right–hand side lights, control instrument panel light.
10	5	Front right–hand and rear left–hand side lights, side lights indicator.
11	5	Starter safety circuit.
12	5	Engine cut–out electromagnet.
13	10	Stabilizer lock circuit.
14	–	Not used.
15	–	Not used.
16	10	Trailer brake and hydraulic adjustment circuit.
17	–	Not used.
18	–	Not used.
19	10	Stop Lights.
20	7,5	Grid–heater control unit circuit.
21	–	Not used.
22	10	Control valves II/III circuit and hydraulic variant.
23	10	Circuit for adjusting front right–hand tie rod and hydraulic circuit motor.
24	–	Not used.
25	5	Electronic control unit power supply, (+battery), seat safety circuit.
26	–	Not used.
27	5	Rear work light circuit.
28	–	Not used.
29	–	Not used.
30	10	Key pad supply (+ key).

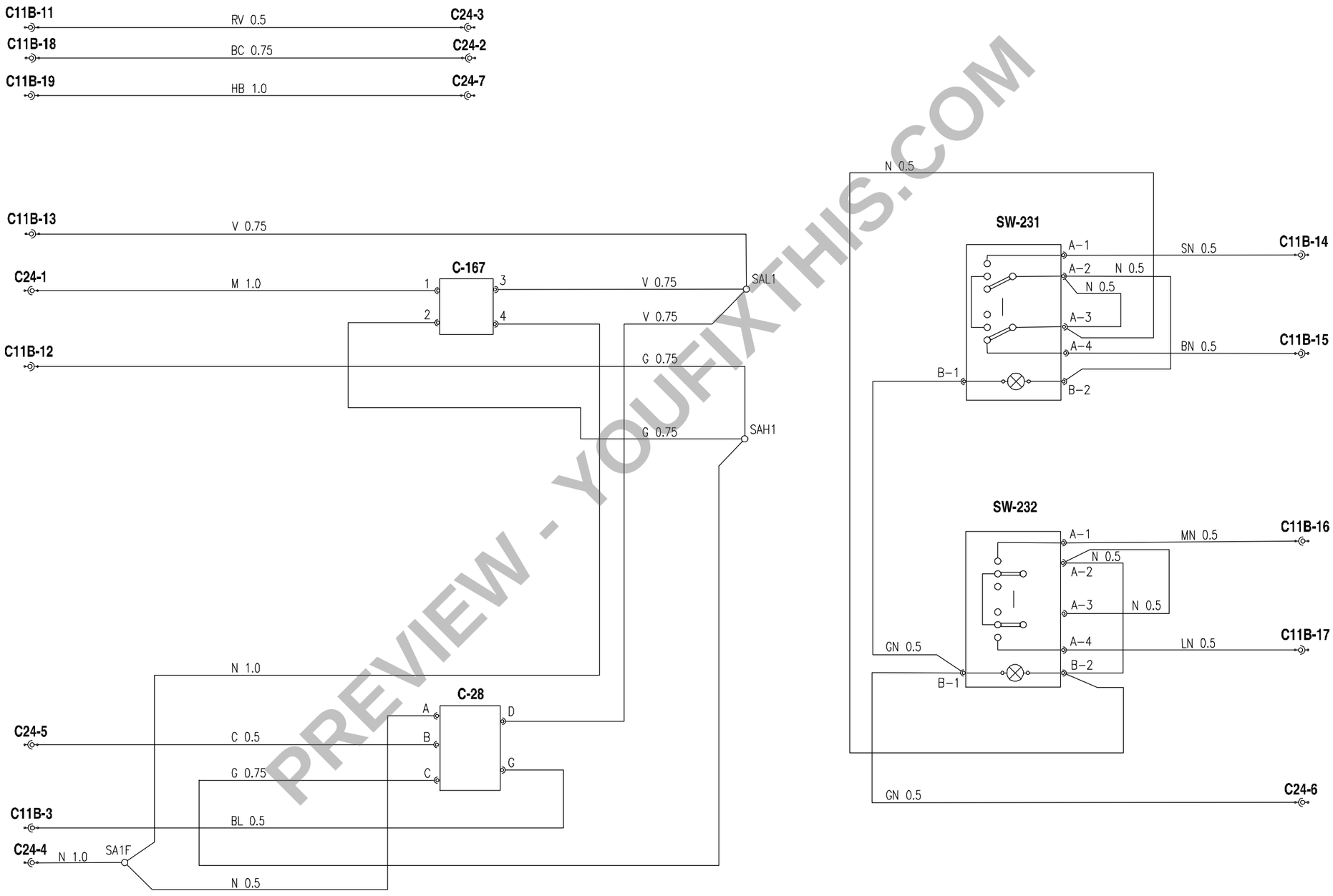
Maxi–fuses

30A ISO power socket
40A North America power socket

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DIGITAL INSTRUMENT CIRCUIT, DIAGNOSTICS CONNECTION AND CAN LINE CIRCUIT – DIAGRAM 13



MPM0774A

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VERSION 3

PERMANENT FOUR–WHEEL DRIVE, ELECTROHYDRAULIC DIFFERENTIAL LOCK, REAR MECHANICAL LIFT

Meaning	Wiring diagram circuits	Page
Circuit 1	4WD circuit	120
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Circuit 15	Engine, sensors and transmitters circuit	154
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Circuit 18	Power Shuttle 44+16 circuit (dashboard side)	162
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Circuit 20	Circuit for stabilizer lock and right–hand tie rod	166

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ELECTRICAL CIRCUIT COMPONENTS

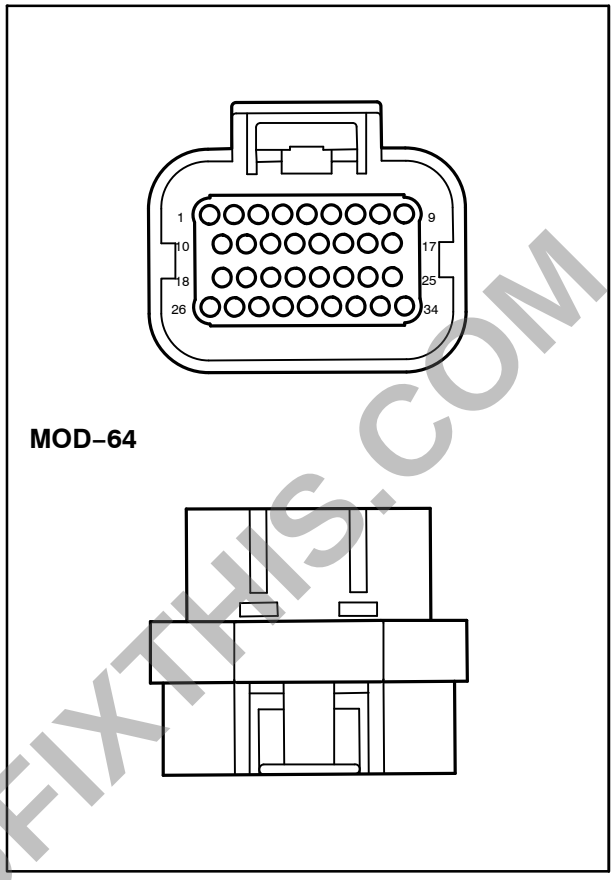
C–1	Front side connection – engine (24 PIN)
C–2	Cab system connection (8 PIN)
C–3	Trailer brake circuit intermediate connection (4 PIN)
C–5	Front lights connection
C–6	Transmission system connection (24 PIN)
GND–7	Dashboard ground
C–8	Trailer brake circuit main connection (4 PIN)
C–9	Power–Shuttle transmission system connection (24 PIN)
SW–10	Hazard lights switch
MOD–11	Instrument
C–13	Front PTO and lift system connection (13 PIN)
C–14	Seven–pin socket connection
C–14A	ISO seven–pin socket
C–14B	North American seven–pin socket
C–15	Gearbox neutral connection
C–16	Electronic thermostarter connection (6 PIN)
C–18	Rear electronic lift connection (8 PIN)
SW–19	Start switch
LMP–20	RH front direction indicator and side light
C–21	Power–Shuttle system connection (6 PIN)
LMP–22	LH front direction indicator and side light
MOD–23	Electronic flasher
C–24	Digital instrument connection
MOD–25	Fuse box and main relay
F–26	25A maxi–fuse (40A for North America)
MOD–27	Rear lift electronic control unit
C–28	Diagnostics connection
C–29	Rotating beacon power socket
SW–30	Battery cut–out circuit switch
C–31	Connection for battery cut–out circuit on engine
CB–31	Battery cut–out circuit jumper
SW–32	Operator present switch
SEN–33	Tilt sensor
SW–34	Rear electronic lift up/down switch
SW–35	4WD control switch
SW–36	Differential lock switch
SW–37	LH rear external electronic lift up/down switch
GND–38	Rear ground
SW–39	Parking brake switch

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Pin	Col.	Sect.	Pin	Col.	Sect.
1	B	0.5	18	–	–
2	–	–	19	–	–
3	MN	1.0	20	–	–
4	LB	0.5	21	BN	0.5
5	CB	1.0	22	V	1.0
6	–	–	23	–	–
7	–	–	24	H	0.5
8	MV	1.0	25	GV	0.5
9	SB	1.0	26	–	–
10	–	–	27	CL	1.0
11	–	–	28	–	–
12	G	0.75	29	N	1.0
13	V	0.75	30	VN	1.0
14	–	–	31	–	–
15	C	0.5	32	–	–
16	RN	0.5	33	CN	0.5
17	RG	0.5	34	CL	0.5

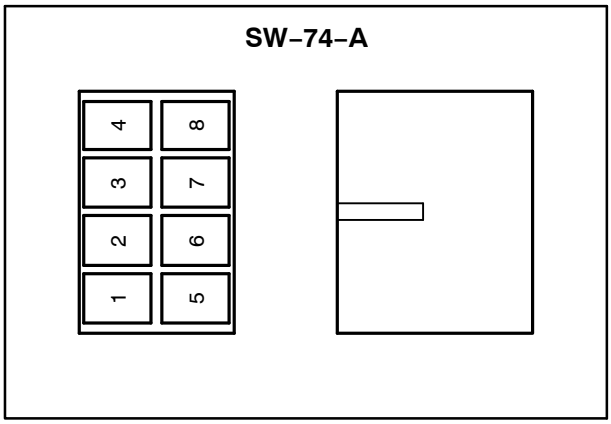
For model with cab, version 3 and 4.
For model without cab, version 3.



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Pin	Col.	Sect.	Pin	Col.	Sect.
1	–	–	5	–	–
2	–	–	6	GN	0.5
3	V	0.5	7	BG	0.5
4	GN	0.5	8	GN	0.5

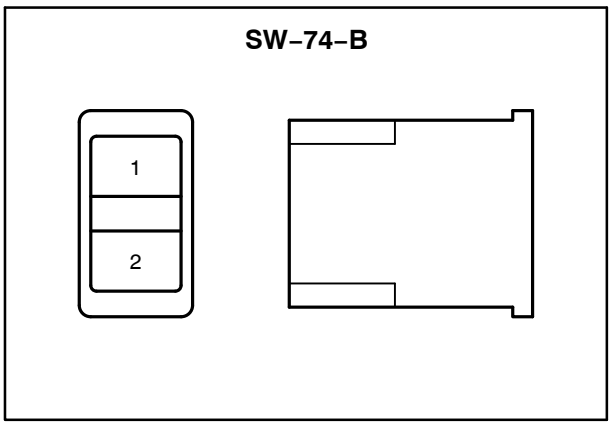
For model with cab.



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Pin	Col.	Sect.	Pin	Col.	Sect.
1	GN	0.5	2	N	0,5

For model with cab.



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1027 – VOLTAGE TOO LOW ON THE LIFT ARMS POSITION POTENTIOMETER.

Rear electronic lift control unit.

NOTE: *Lift controls disabled, it is possible to move the arms only with the external buttons.*

Possible fault modes:

1. Faulty connector
2. Arms position control potentiometer faulty.
3. Wiring harness faulty
4. 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 arms position control potentiometer in **H9**, **ch 32**.

   A. Move the lift arms to their full travel. If the values displayed are not between 900 and 100, continue to step 2.

   B. If the values displayed are okay, while still in H9, ch. 32 wiggle the harness and the connector **SEN–132** of the arms position control potentiometer, the main connector **C–18** and the connector **MOD–27** of the wiring harness of the controller to check for an intermittent circuit. The values of ch 32 will change if an intermittent circuit is indicated; repair or replace as necessary.

2. Check the connector **SEN–132** of the arms position control potentiometer, the main connector **C–18** and the connector **MOD–27** 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 required.

   B. If the connectors are okay, continue to step 3.

3. Check the arms position control potentiometer.

   A. Remove the arms position control potentiometer and disconnect the connector **SEN–132**. While turning the arms position control potentiometer fully clockwise and then fully counter clockwise, measure the resistance on the potentiometer panel side between:
   SEN–132 pin **1** and **SEN–132** pin **2**
   SEN–132 pin **3** and **SEN–132** pin **2**
   If the resistances indicated are not between approximately 0.4 and 3.7 kΩ, replace the working depth control panel.

   B. If the arms position control potentiometer is okay, continue to step 4.

4. Check for a short to ground.

   A. Check between:
   SEN–132 pin **1** wire **(AB)** and **ground**
   SEN–132 pin **2** wire **(VG)** and **ground**
   If a short a short to ground is indicated, repair or replace the harness as required.

   B. If a short to ground is not indicated, continue to step 5.

5. Check for an open circuit.
   A. Disconnect connector **MOD–27** of the controller. Check between:

   SEN–132 pin **1** wire **(AB)** and **MOD–27** pin **11** wire **(AB)**
   SEN–132 pin **2** wire **(VG)** and **MOD–27** pin **25** wire **(VG)**
   SEN–132 pin **3** wire **(VB)** and **MOD–27** pin **1** wire **(VB)**
   If an open circuit is indicated, repair or replace the harness as required.

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

For the connectors, components and wiring diagrams affected, see (Connectors C–18, MOD–27, SEN–132 sect. 55, chap. 8, fig. 53, fig. 89, fig. 207), (Components, diagram 5÷8. sect 55, chap. 6, page 233), (Diagram 5, sect. 55, chap. 6, page 235).

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2411 – SYNCHRONIZER DOES NOT MOVE DURING START–UP PROCEDURE.

Power Shuttle control unit

NOTE: *In the starting phase the control unit moves the synchro into the opposite position to the one where it is. The movement of the machine depends on the position where the synchro is coupled.*

Possible failure mode:

1. Mechanical trouble with the synchro.
2. Solenoid valves disconnected..
3. Trouble with the synchronizer movement solenoid valves.

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 whether the code is accompanied by other codes related to trouble with the potentiometer **SEN–203**, to the HI–LO mode solenoid valves. **SOL–138** and shuttle mode **SOL–139**.

   A. Make the due repairs related to the other fault codes.

   B. If there are no other error codes, continue to step 2.

2. Check all the pressures of the synchronizer movement assembly.

   A. If the pressures indicated are approximately 16 bar, possible mechanical fault (synchronizer sticking) within the transmission.
   If the pressures of all the clutches are low, continue to hydraulic troubleshooting procedures.

   B. If the pressures are okay, continue to step 3.

3. Attempting movement of the synchronizer via the diagnostics program **H7**.

   A. Enter the program **H7** of the control unit **SB**, with the engine running and the gear lever in neutral, select the channel **ch2**.
   Press the push–button **HI**, on the gear lever, the synchronizer is moved in **Dual Command (2 Speed Power Shift) mode** .
   Press the push–button **LO**, on the gear lever, the synchronizer is moved in **shuttle mode**.
   The display will show the status of the synchro.

   B. If the synchronizer does not move and the error is repeated, there should be a mechanical fault so open the gearbox and make the mechanical repairs.

For the connectors, components and wiring diagrams affected, see (Connectors SOL–138, SOL–139 and SEN–203 sect. 55, chap. 8, fig. 215, fig. 216 and fig. 251), (Components, diagram 24÷28. sect. 55, chap. 6, page 279), (Diagram 27, sect. 55, chap. 6, page 287).

NOTE: *for a description of the HH menus, refer to section 55 chapter 10.*

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14106 – FRONT PTO FITTED BUT NOT CONFIGURED.

Control panel control unit (ADIC)

NOTE: *The control unit receives the signal from the front PTO but it has not been configured in H3.*

Possible failure mode:

1. Configuration error.
2. 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 machine configuration.

   A. Using tool 380000843 enter the HH menu select on control unit **ZA** menu **H3** at option "**Front PTO**" select the option **MECH**, in the case of the PTO with servoassisted engagement or **ELEC** in the case of the PTO managed by the control unit of the automatic four–wheel drive.

NOTE: *for a description of the HH menus, refer to section 55 chapter 10.*

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