SERVICE MANUAL

TD4020F / TD4030F / TD4040F

Tractors

Print No. 84285927

NEW HOLLAND AGRICULTURE

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NOTES FOR SPARE PARTS

Use exclusively **genuine NEW HOLLAND spare parts**, the only ones bearing this logo.



Only genuine parts guarantee same quality, life, safety as original components as they are the same as mounted in production.
Only the **NEW HOLLAND genuine spare parts** can offer this guarantee.
All spare parts orders should be complete with the following data:

- tractor model (commercial name) and frame number;
- engine type and number;
- part number of the ordered part, which can be found on the “Microfiches” or the “Spare Parts Catalogue”, which is the base for order processing.

NOTES FOR EQUIPMENT

Equipment which NEW HOLLAND proposes and shows in this manual are as follows:

- studied and designed expressly for use on NEW HOLLAND tractors;
- necessary to make a reliable repair;
- accurately built and strictly tested to offer efficient and long–lasting working means.

We also remind the Repair Personnel that having these equipment means:

- work in optimal technical conditions;
- obtain best results;
- save time and effort;
- work more safely.

NOTICES

Wear limits indicated for some details should be intended as advised, but not binding values. The words “front”, “rear”, “right hand”, and “left hand” referred to the different parts should be intended as seen from the operator’s seat oriented to the normal sense of movement of the tractor.

HOW TO MOVE THE TRACTOR WITH THE BATTERY REMOVED

Cables from the external power supply should be connected exclusively to the respective terminals of the tractor positive and negative cables using pliers in good condition which allow proper and steady contact.
Disconnect all services (lights, wind–shield wipers, etc.) before starting the tractor.
If it is necessary to check the tractor electrical system, check it only with the power supply connected. At check end, disconnect all services and switch the power supply off before disconnecting the cables.

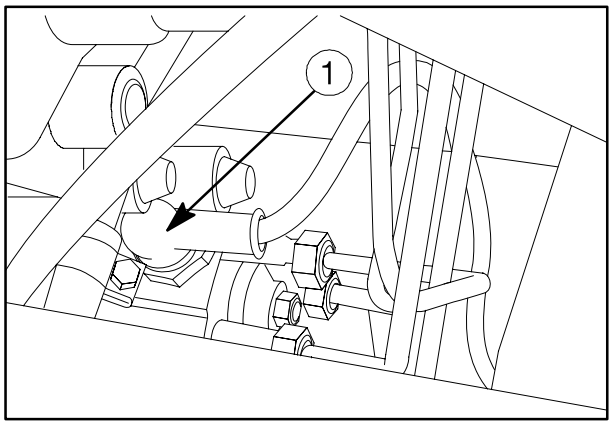
ENGINE TROUBLESHOOTING

(cont)

Problems	Possible Causes	Solutions
Engine overheating.	1. Coolant pump malfunction.	Overhaul pump and replace if necessary.
	2. Thermostat faulty.	Replace the thermostat.
	3. Radiator inefficient.	Remove internal deposits by flushing. Check for leaks and repair.
	4. Deposits in cylinder head and crankcase coolant passages.	Flush out coolant system.
	5. Coolant pump and fan drive belt slack.	Check and adjust belt tension.
	6. Coolant level low.	Top up expansion tank with specified coolant mixture.
	7. Incorrect engine timing.	Check and adjust engine timing.
	8. Injection pump calibration incorrect – delivering too much or too little fuel.	Calibrate pump on test bench to values specified in calibration tables.
	9. Air filter clogged.	Clean filter unit and replace filter element if necessary.
Engine lacks power and runs unevenly.	1. Injection pump timing incorrect.	Adjust injection pump timing.
	2. Auto advance regulator in injection pump damaged.	Overhaul injection pump and adjust on test bench to values specified in calibration table.
	3. Control valve journal worn.	Overhaul injection pump and adjust on test bench to values specified in calibration table.
	4. Injection pump delivery irregular.	Overhaul injection pump and adjust on test bench to values specified in calibration table.
	5. All–speed governor damaged.	Overhaul injection pump and adjust on test bench to values specified in calibration table.
	6. Injectors partially obstructed or damaged.	Clean and overhaul injectors and adjust pressure setting.
	7. Impurities or water in fuel lines.	Disconnect fuel lines from injection pump and clean thoroughly. If necessary clean and dry the fuel tank.

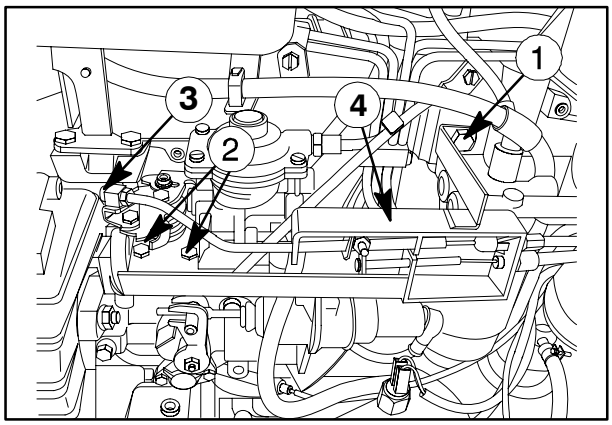
(continued)

30. Remove the electrical connection of pump cut–out solenoid sender (1).



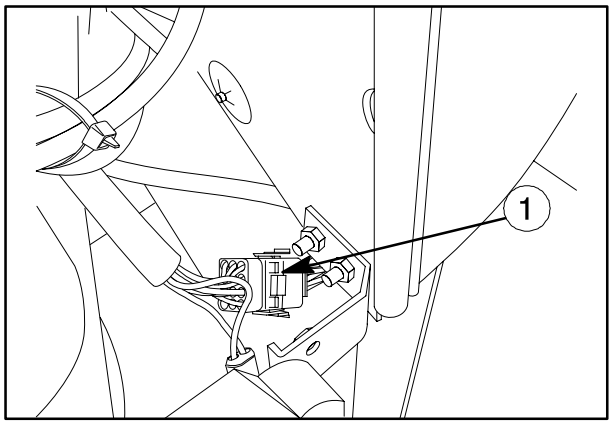
28

31. Remove the retaining bolts (1) and 2 for the support. Remove the retaining nut (3) and detach the throttle control tie–rod connected to the injection pump.
32. Remove the hand and foot throttle cables complete with their support (4).



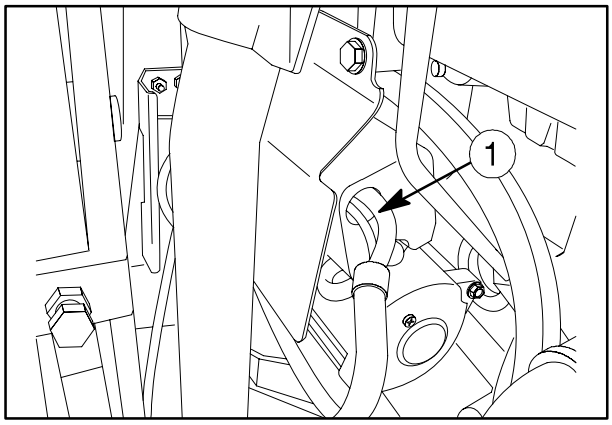
29

33. Disconnect the electrical connection (1) between the cab and the engine.



30

34. Disconnect the electrical connections from starter motor (1).



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BOLT TORQUES

PARTS TO BE TIGHTENED	Thread	Tightening torque	
		Nm	kgm
11”/11” clutch/flywheel retaining bolts	M 8 x 1.25	20 ÷ 25	2 ÷ 2.5
Release command fork securing bolt (7, fig. 1)	M 16 X 1.5	136 ÷ 165	13.9 ÷ 16.1
Clutch housing/engine retaining nuts	M 12 x 1.25	117 ÷ 129	11.6 ÷ 13.1
Nut for sleeve cover fixing stud (6, fig. 1)	M 8 x 1.25	20 ÷ 25	2 ÷ 2.5

SPECIAL TOOLS

Warning – The operations described in this section cannot be carried out without the **ESSENTIAL** tools marked with 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 Sect.

X 380001612 Pin for centering and adjustment of 11”/11” clutches.

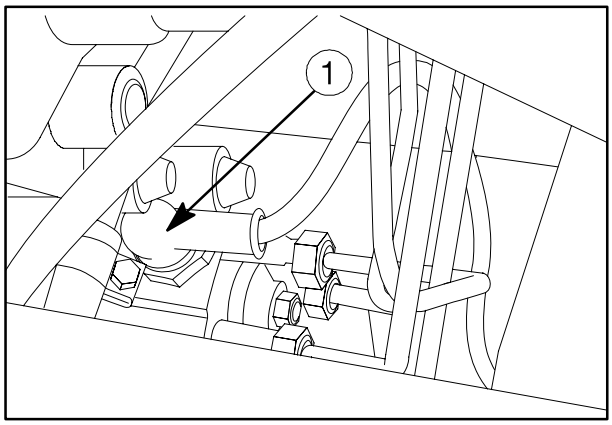
X 380000293 Clutch adjustment gauge (with **380001612**).

380000256 Set of wrenches for adjustment of levers in 11”/11” LUK clutches.

50169 Guide pin for fitting the engine to the clutch housing (see sect. 21).

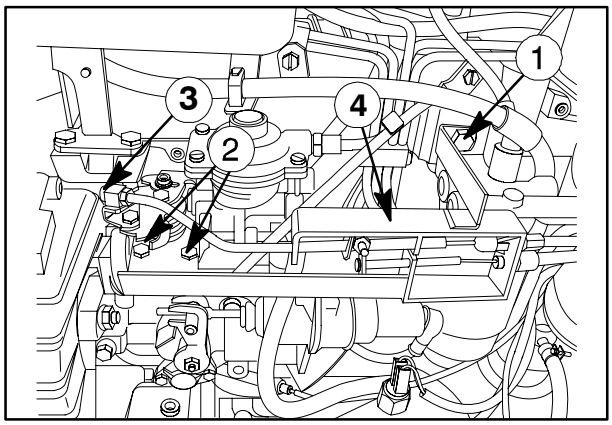
380000569 Movable tool for dismantling tractors with bracket **380000500** and adapter plate **380000844**.

30. Remove the electrical connection of pump cut–out solenoid sender (1).



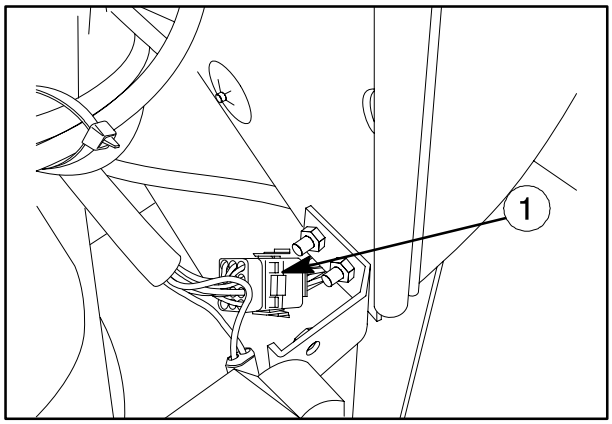
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31. Remove the retaining bolts (1) and 2 for the support. Remove the retaining nut (3) and detach the throttle control tie–rod connected to the injection pump.
32. Remove the hand and foot throttle cables complete with their support (4).



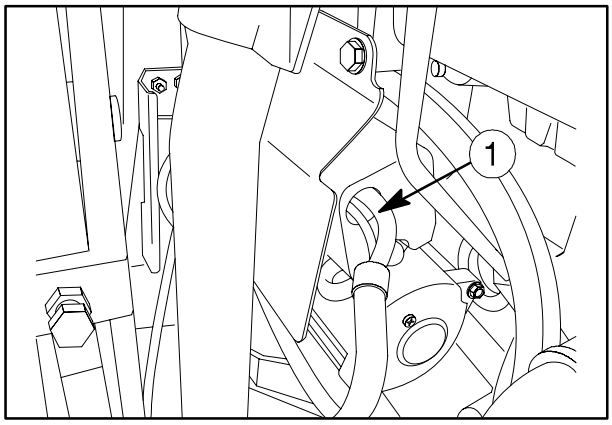
30

33. Disconnect the electrical connection (1) between the cab and the engine.



31

34. Disconnect the electrical connections from starter motor (1).



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CHECKS, MEASUREMENTS AND REPAIRS – DUAL DISK CLUTCH

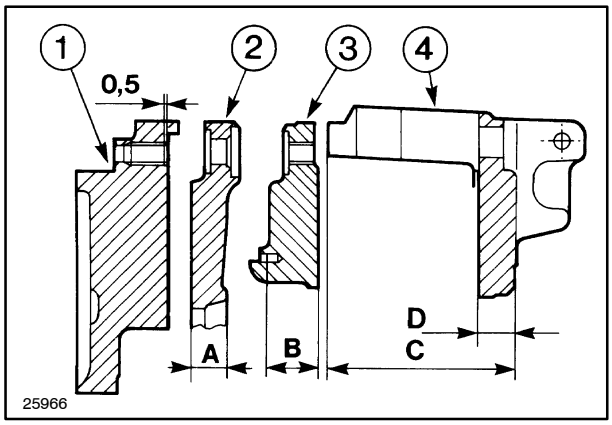
ATTENTION

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

Minimum permissible dimensions after refacing of parts subject to wear in the 11”/11” dual clutch

A ≥ 15.5 mm; B ≥ 22.7 mm; D ≥ 15.8 mm.

1. Flywheel.
2. PTO clutch pressure plate.
3. Main clutch pressure plate.
4. Clutch cover.

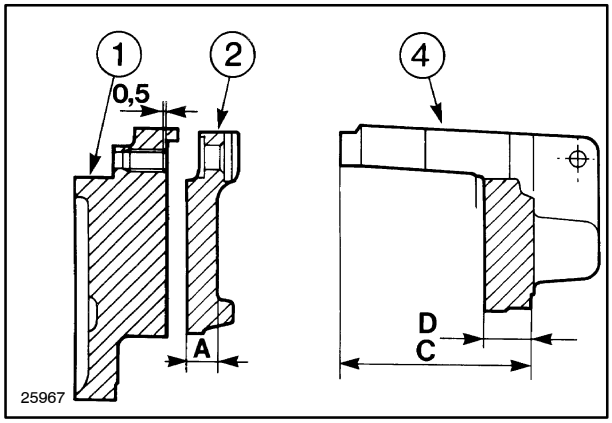


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Minimum permissible dimensions after refacing of parts subject to wear in the 11” single clutch

A ≥ 15.5 mm; C ≥ 15.8 mm.

1. Flywheel.
2. PTO clutch pressure plate.
3. Clutch cover.



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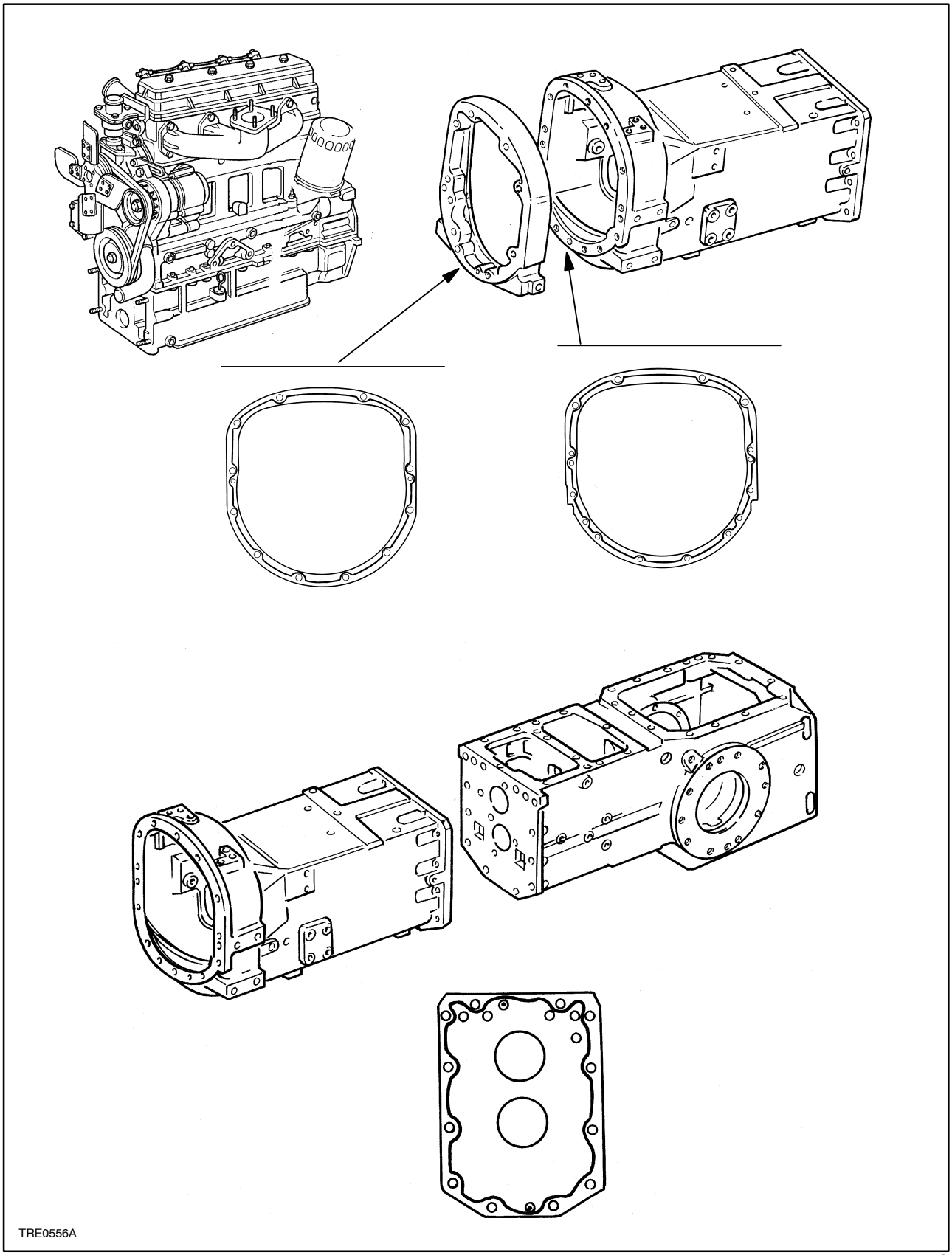
– Check for wear on the Power take–off (11, fig. 1 and 1, fig. 2) and main (9) clutch disks and replace if the retaining rivets are worn or approaching the friction material.

– Replace the disc when the oil has soaked into the organic agglomerate surfaces.

Minimum permissible dimensions after refacing of parts subject to wear in the 11”/11” dual clutch and 11” single clutch.

– Check the friction surface conditions of the pressure plates and the clutch casing.
Generally, by means of turning, up to 1 mm of material can be removed from the cast iron friction surfaces of the clutch cover (3), the pressure plate ring (2) and the flywheel (see section 10 chap. 1, page 56).

When parts (1), (2), (3) and (4) (figs. 54 and 55) are to be repaired by removing material, proceed as follows:

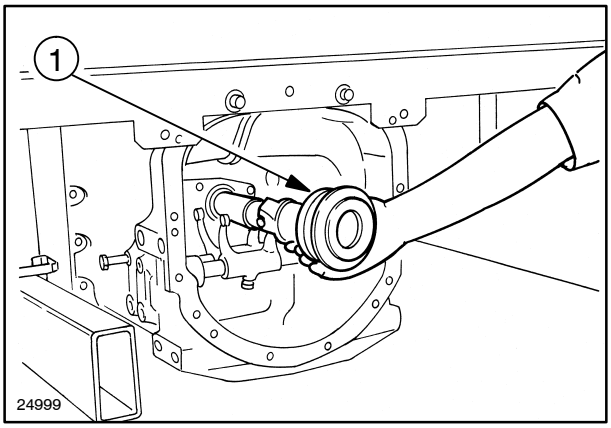


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Sealing compound application diagram for mating surfaces between engine, clutch casing and rear transmission–gearbox.

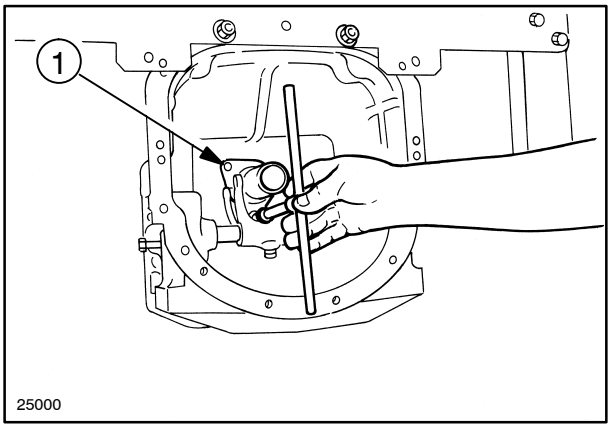
The types of sealing compound to use are indicated on page 1, Sect. 00.

8. Detach the retaining springs and withdraw the sliding sleeves (1).



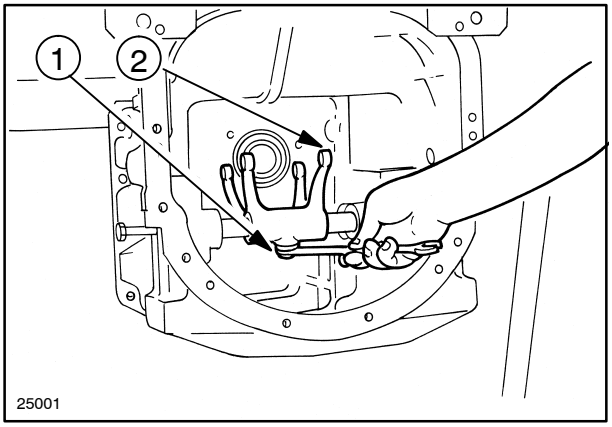
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9. Unscrew the retaining bolts and remove the sleeve cover / support (1).



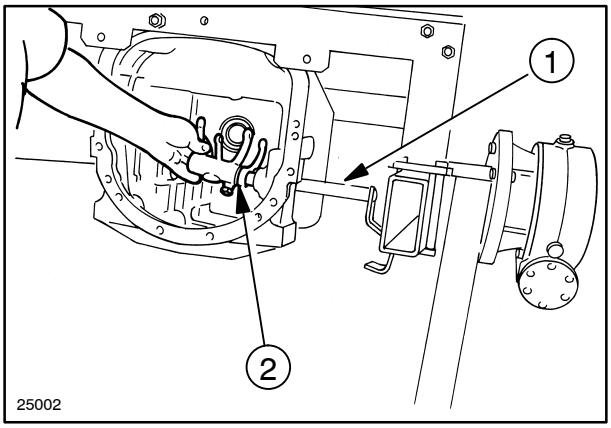
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10. Unscrew the two securing bolts (1) of the sliding sleeve control forks (2).



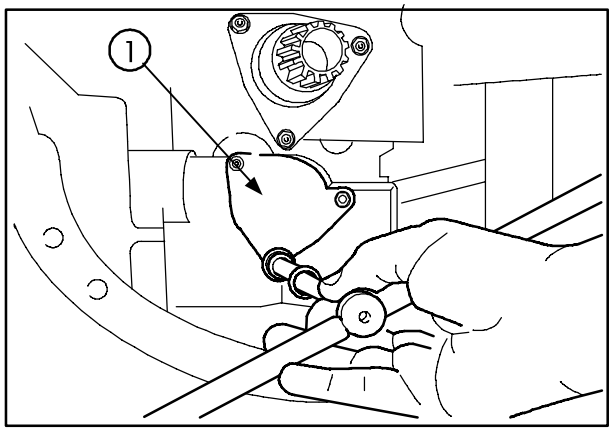
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11. Withdraw the external clutch control levers (1) and remove the forks (2).



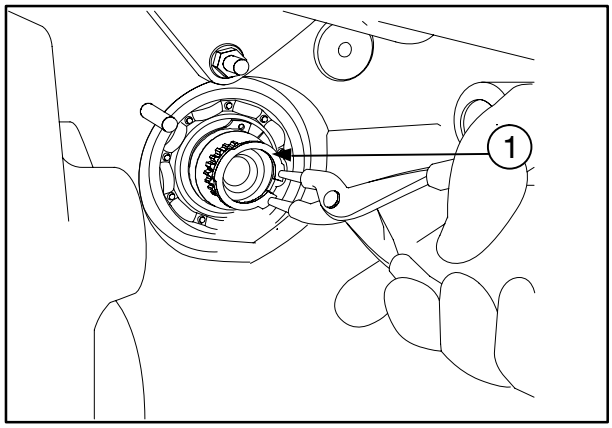
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4. Unscrew the retaining bolts and remove the cover (1).



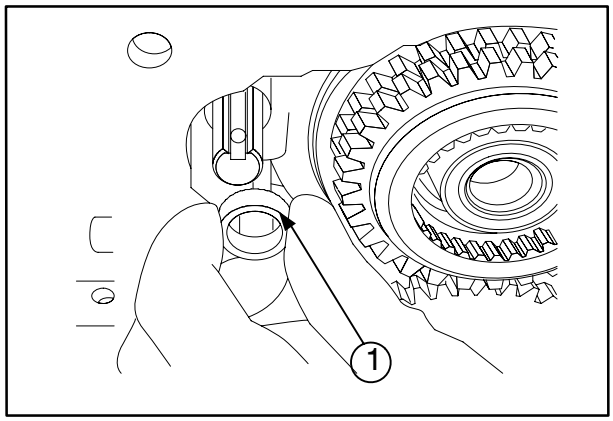
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5. Remove circlip (1).



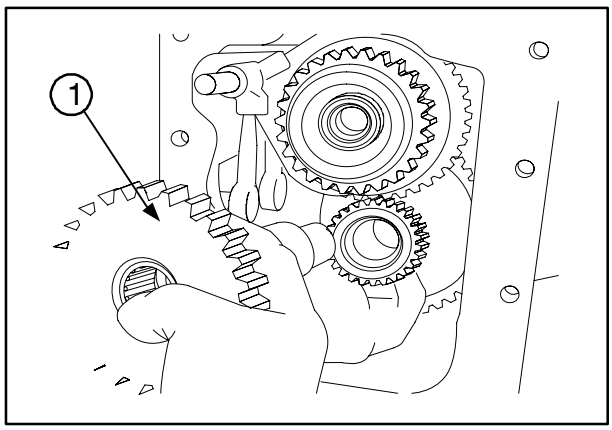
9

6. Remove the collet (1).



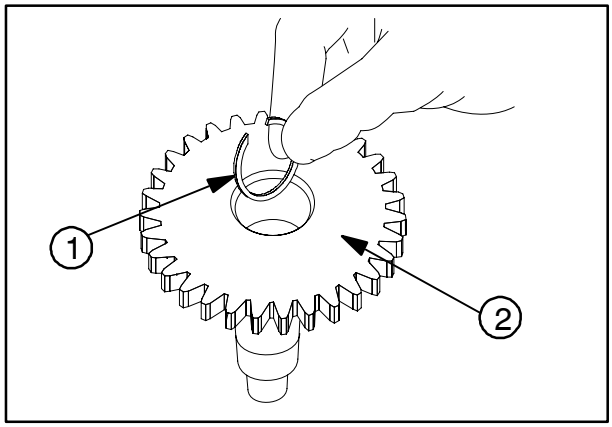
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7. Slide out constant mesh gear (1).



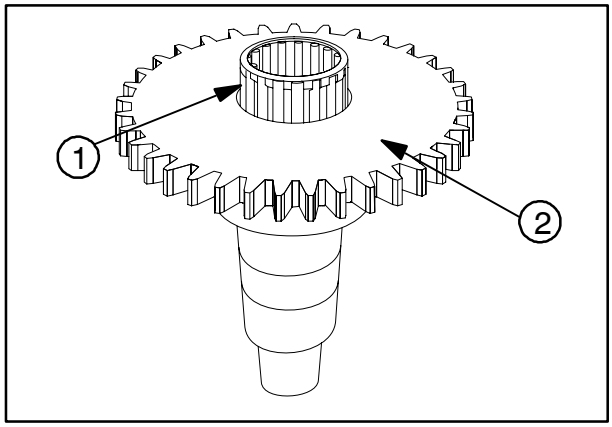
11

24. Install the circlip (1) inside of the constant mesh gear (2).



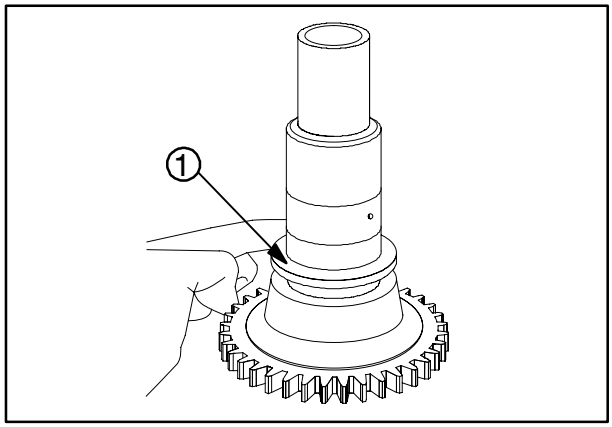
47

25. Install the roller bearing (1) inside of the constant mesh gear (2).



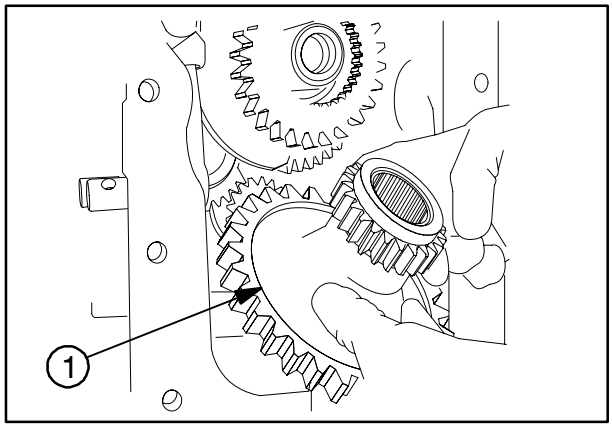
48

26. Install the thrust washer (1).

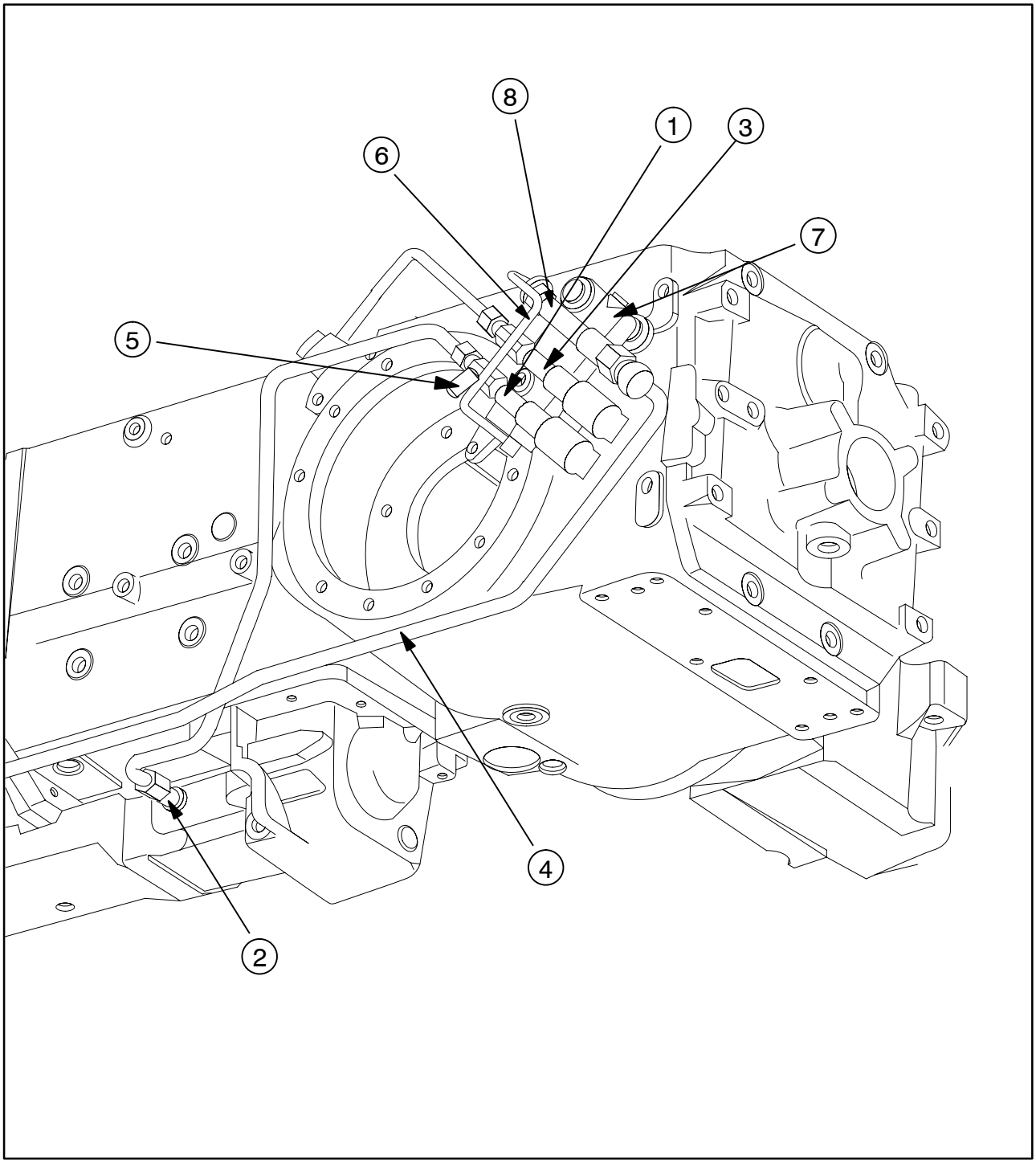


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27. Install the driven shaft gear (1) together with the roller bearings and install the thrust washer.



50

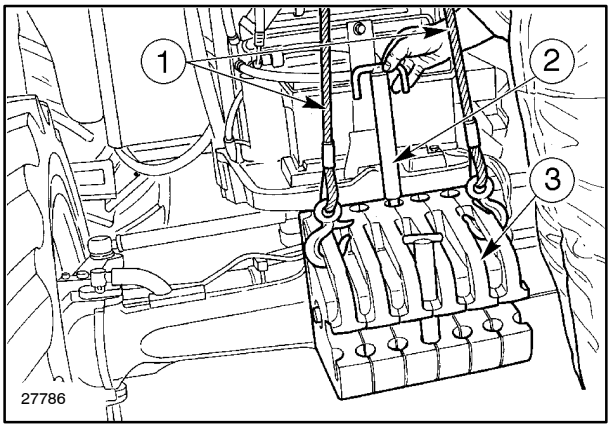


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Sectional view of drive gear with electrohydraulic coupling

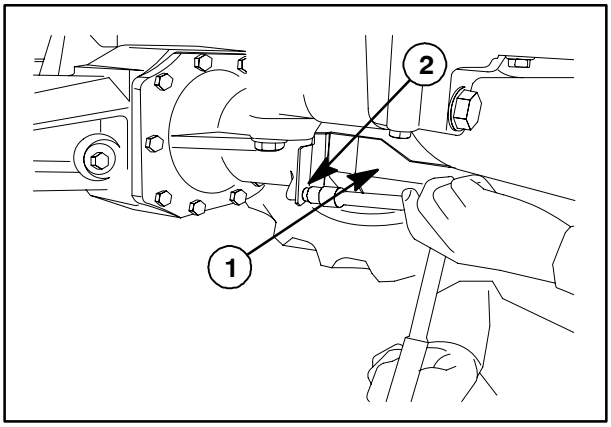
1. FWD control valve and it's solenoid.
2. FWD inlet union to transfer box.
3. Diff Lock control valve and it's solenoid.
4. Supply pressure pipe to valve block.
5. FWD engagement sensor.
6. Pressure control valve return line.
7. Return oil union to gearbox.
8. Pressure control valve

3. Attach nylon slings to the front weights (1). Loosen the locking screw from each weight, lift the weights clear of the tractor and place them in a safe position.



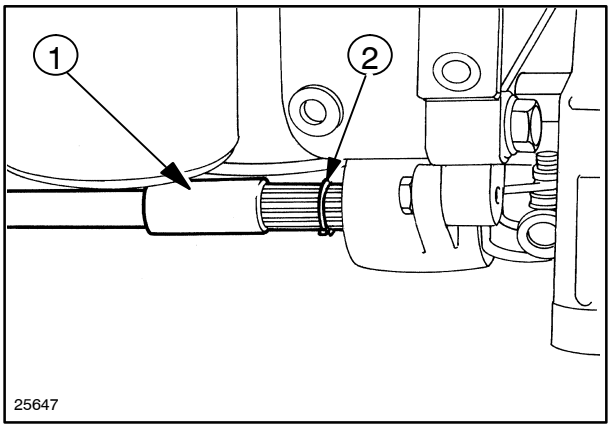
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4. Unscrew bolts (2) and remove the drive shaft guard (1).



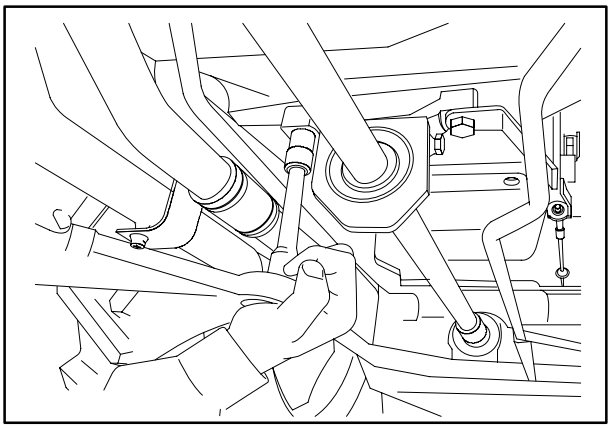
8

5. Remove the circlip (2) and move the front sleeve (1) backwards in order to free it from the groove on the front axle.



9

6. Remove the circlip (2) and move the front sleeve (1) backwards in order to free it from the groove on the front axle.



9

Reassemble the front axle adhering to the following instructions:

– Refer to the illustrations on pages 6, 7 and 8 to check the orientation of the various components.

– Respect the tightening torques prescribed on page 3.

– Carry out the adjustments described on pages 29 to 36.

– Install the rear bearing, the seal, the dust seal, the adjustment shims, the spacer and the bevel drive pinion shaft complete with front bearing.

– Position the detent ball, screw in the bevel drive pinion lock nut and secure in position by staking. Finally, replace the circlip.

– Install the crown wheel–differential assembly, the support caps and tighten the relative bolts.

– Install the bevel drive–differential housing on the front axle casing.

– Install the axle shaft and relative bolt.

– Fit the stub axle, the adjustment shims, the upper and lower pivot pins, the mudguard bracket and related bolts.

– Fit the wheel hub, the ring gear of the final drive unit and the lock ring. Tighten to the prescribed torque value, while simultaneously turning the wheel hub, to ensure that the bearings are correctly seated.

– Fit the securing and stop circlips, the sun gear and the cover of the final drive unit.

– Fit the pins, washers, spacers and steering cylinders.

– Install the track rod, the front and rear supports and the oil drain plugs.

S = Sp + {(0.18 – Gm) x 1.35}

where:

Sp = thickness of test shim installed in the bevel drive–differential housing.

Gm = average backlash measured between the sides of the teeth of the bevel drive.

15. Fit a shim of the calculated thickness and with a 1/100 scale dial gauge positioned perpendicular to the outside edge of one of the crown wheel teeth, check that the backlash between the pinion and the crown wheel is within the prescribed tolerance limits 0.15 ÷ 0.20 mm (0.0059 to 0.0079 in.).

16. Using wrench **380000252**, for TD4020, TD4030 or TD4040 models, turn the adjuster ring nut and, using torque wrench **380001633** fitted on wrench **380000257** (1, fig. 73), check that the rolling resistance torque of the crown wheel and pinion bearings, as measured in the same conditions used to check only the pinion, is:

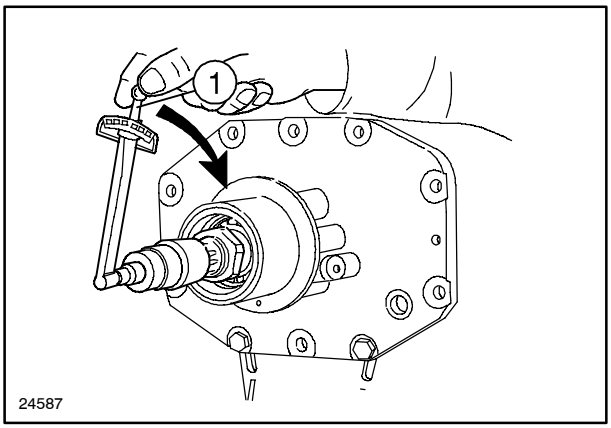
$A_2 = A_1 + 1 \div 1.5$ Nm (0.7376.5 to 1.1063 ft lb)

where:

A_2 = pinion–crown wheel rolling resistance torque;

A_1 = rolling torque of pinion only, 0.5 Nm (0.3688 lb) for TD4020, TD4030 and TD4040 , with the pinion fitted with the seal, measured previously;

1 ÷ 1.5 Nm (0.7376.5 to 1.1063 ft lb) = rolling resistance torque of crown wheel only measured at the end of the pinion, using wrench **380000257** and torque wrench **380001633**.

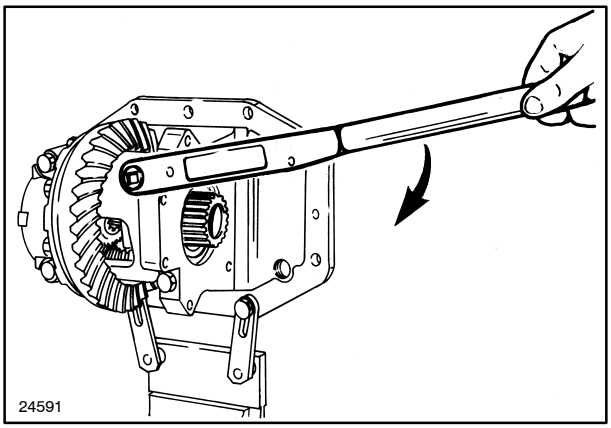


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17. Tighten the cap bolts (C1, page 3) to a torque of 143 Nm (105.475 ft lb).

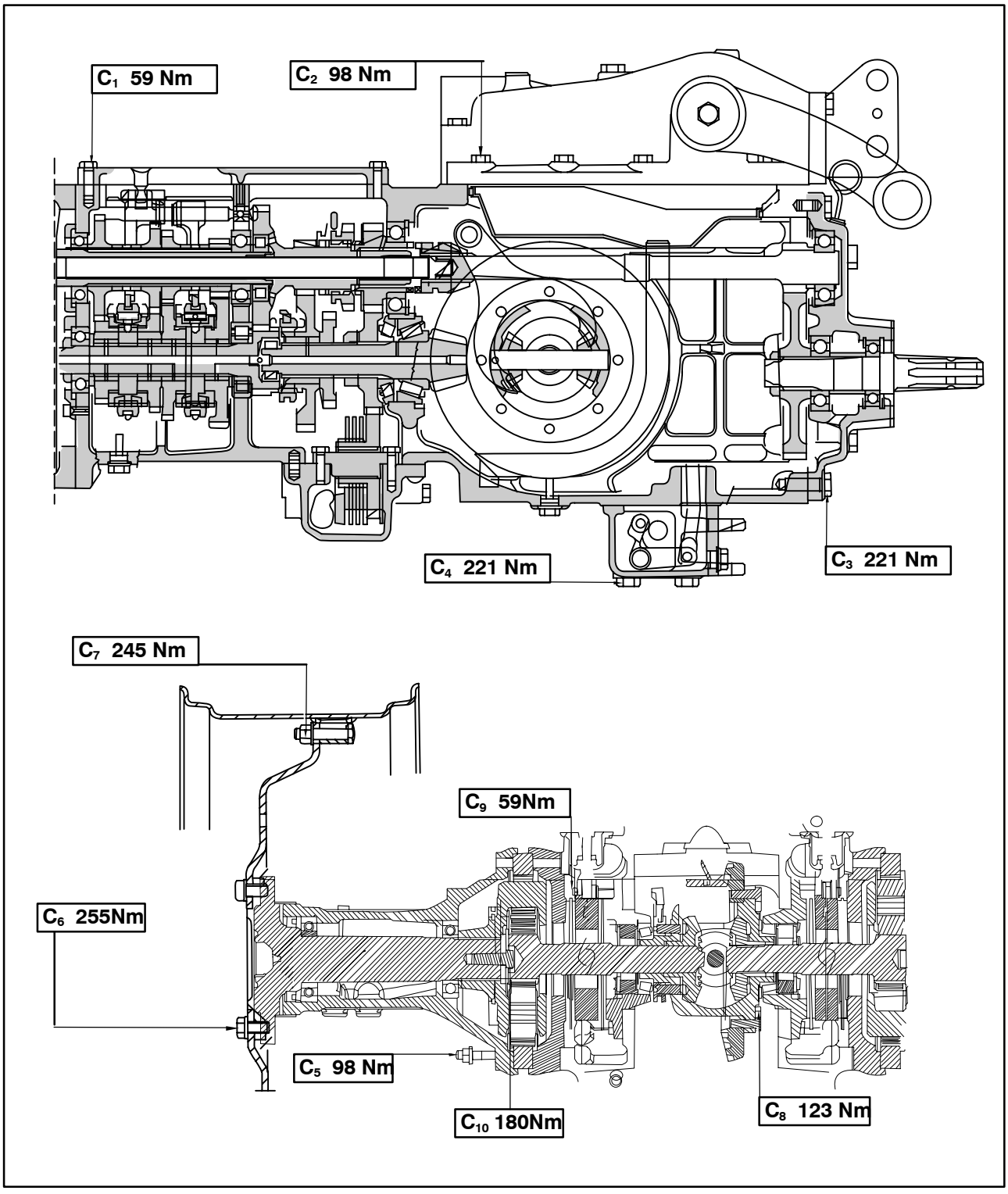
18. Fit the safety plates, screwing the adjustment ring nut in or out, to reach the nearest notch.

19. Attach the differential bevel drive carrier to the axle casing after having carefully cleaned and degreased the mating surfaces and apply sealing compound (approx. 2 mm (0.0787) along the marked line shown in the drawing below.



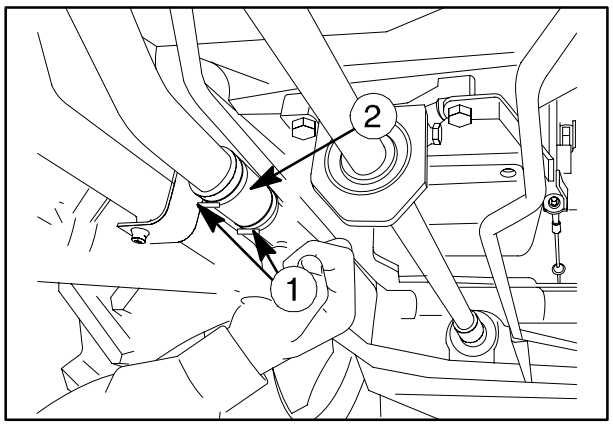
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SECTIONAL VIEWS



1

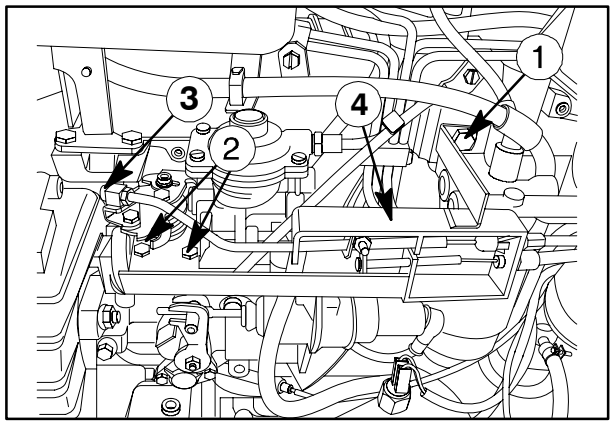
18. Remove two metal clamps (1) and the rigid pipe (2) of drawing oil from the transmission housing via lift pump.



22

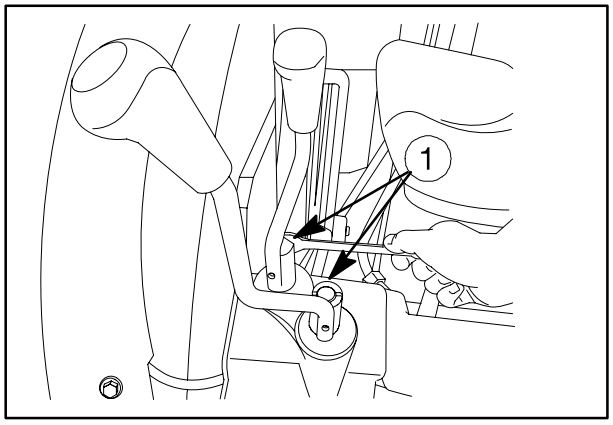
19. Remove the retaining bolts (1) and 2 for the support. Remove the retaining nut (3) and detach the throttle control tie–rod connected to the injection pump.

20. Remove the hand and foot throttle cables complete with their support (4).



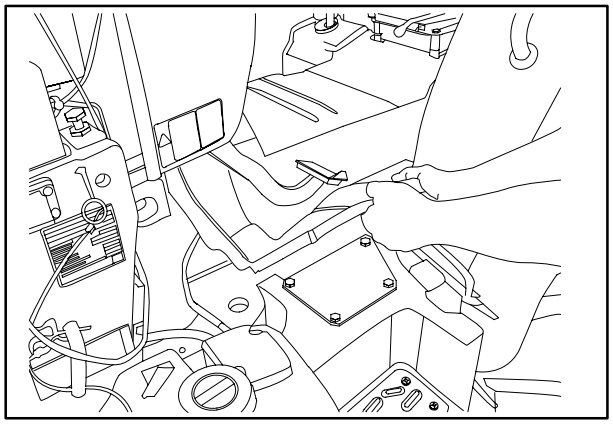
23

21. Unscrew the retaining bolts (1) and remove the main and range gear selector levers.



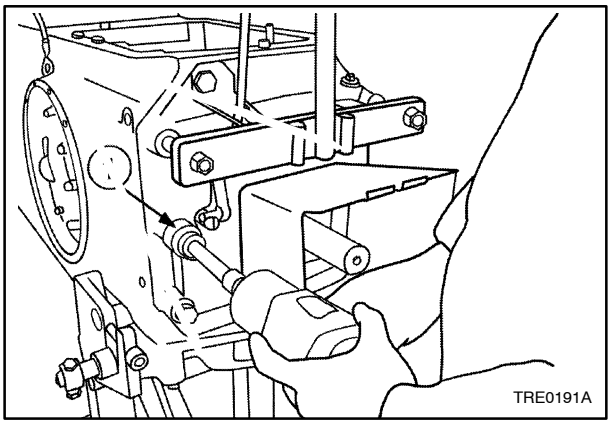
24

22. Remove the floor mat



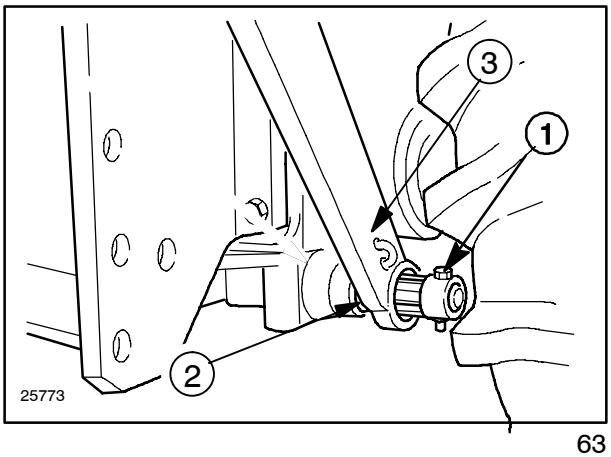
25

63. Use a chain to attach the tow hook and PTO to the hoist. Remove the three retaining bolts (1) from both sides and remove the unit from the rear transmission–gearbox case.



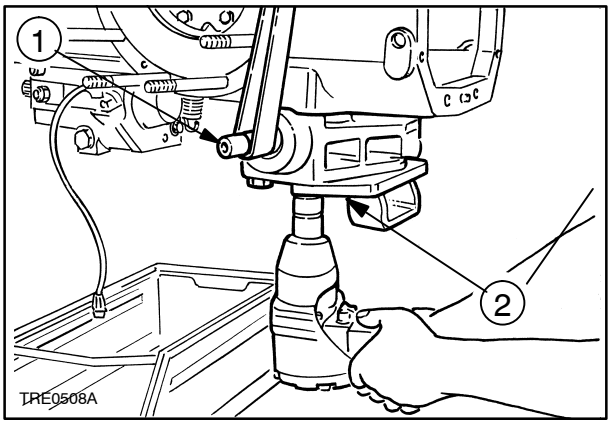
62

64. Unscrew the nut (1) and remove the bolt. Remove the right–hand lower link (3) and its spacer (2). Repeat on the left–hand lower link.



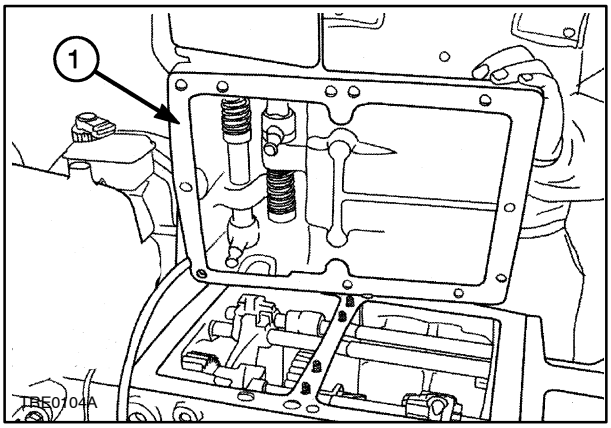
63

65. Attach a belt to both the ends of the torsion bar (1). Ensure that belt is strong enough to lift the assembly. Remove the retaining bolts (2) and take off the assembly.



64

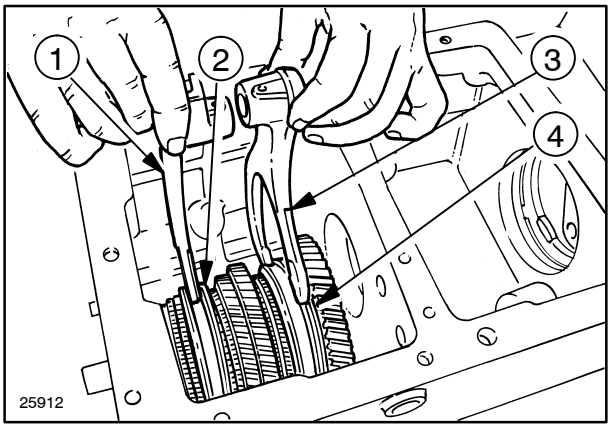
66. Remove the bolts securing the gearbox cover (1). Remove the cover.



65

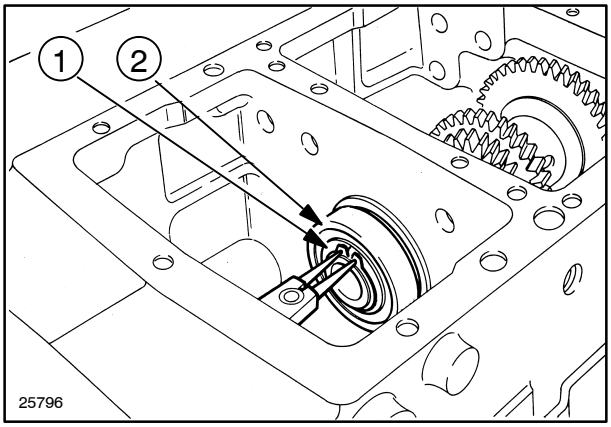
27. Insert the gear shift forks (1) and (3) on the sliding rings (2) and (4) of the synchronisers.

28. Fit the bevel pinion complete with all the parts and carry out the adjustments given on pages 38 to 40.



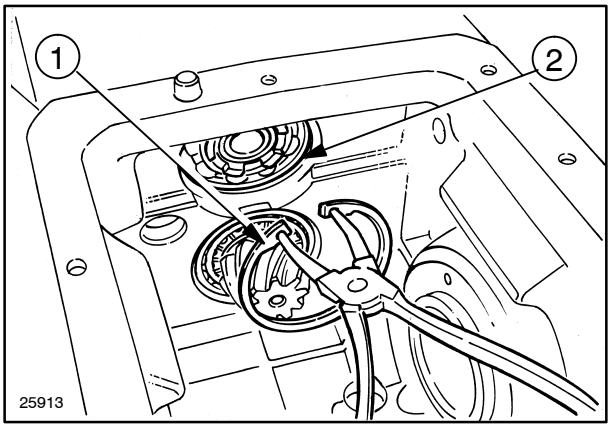
24

29. Fit the gearbox drive shaft complete with all parts and the adjuster shim, then position the bearing (2) and secure it using the snap ring (1).



25

30. Insert the final drive driving shaft from the rear end, fit the bearing (2) into its seat and secure with the snap ring (1).



26

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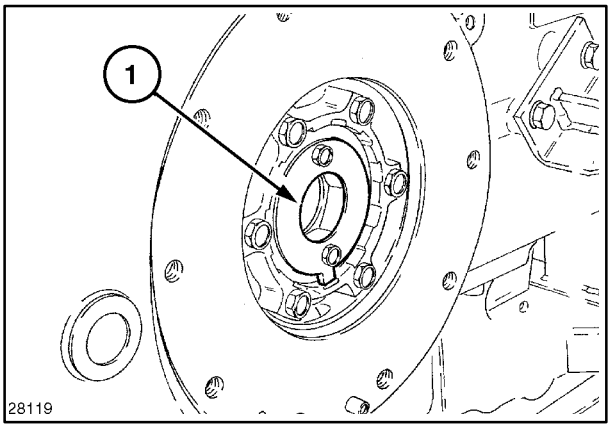
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- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

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10. Lock the right and left–hand ring nuts in position with the lock ring (1).



48

MECHANICAL POWER TAKE–OFF

(continued)

		TD4020F – TD4030F – TD4040F
2–speed 540/750 rev/min PTO (option – all models)		
Type		as for single–speed PTO
Engagement and control		as for single–speed PTO
Direction of rotation (viewed from rear of tractor)		as for single–speed PTO
Speed selection		by means of hand lever located to rear RH side of driver's seat
Engine speed with PTO shaft rotating at 540 rev/min	rev/min	2196
Engine speed with PTO shaft rotating at 750 rev/min	rev/min	2132
PTO speed with engine at maximum power speed (2500 rev/min:		
– for 540 rev/min PTO	rev/min	566
– for 750 rev/min PTO	rev/min	809
Ground speed PTO. Rear wheel speed with PTO shaft rotating at 540 rev/min	wheel speed rev/min	see 540 rev/min PTO
Ground speed PTO. Rear wheel speed with PTO shaft rotating at 750 rev/min	wheel speed rev/min	10.14
Diameter of driven shaft at grooved terminal		$1\frac{3}{8}$ in. (6–spline)

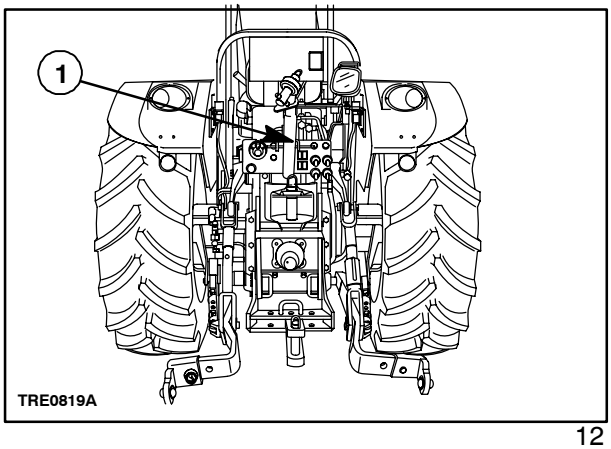
540/750 MECHANICAL PTO
Removal – Refitting (Op. 31 112 20)

WARNING

Lift and handle all heavy parts using lifting tackle of sufficient capacity.
Make sure that the units or parts are supported by suitable harnesses and hooks. Check that no one is in the vicinity of the load to be lifted.

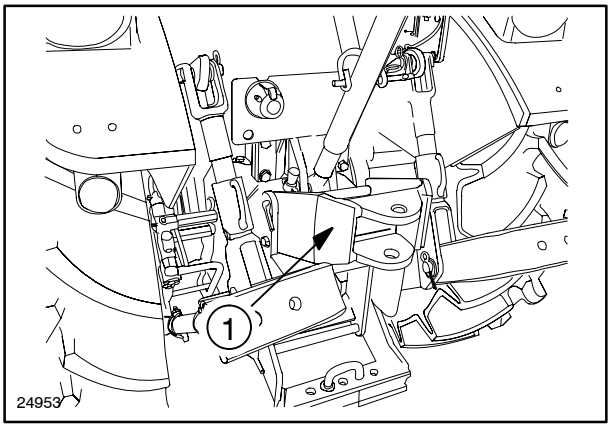
1. Disconnect the negative cable from the battery.

2. Remove the top link (1) of the three–point linkage.



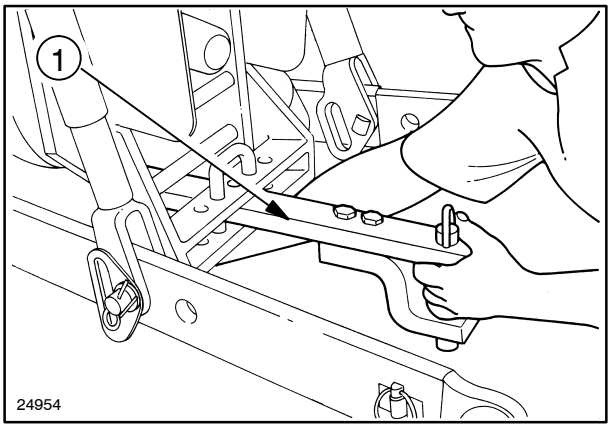
12

3. Remove the tow hook (1), if fitted.



13

4. Remove the tow bar (1), if fitted.



14

DESCRIPTION AND OPERATION

SERVICE BRAKES

The service brakes are hydraulic with oil bath discs.

The two control pumps (one for each pedal) are housed in the front section of the cab and are connected to their respective pedals by means of two rods.

These pumps can be actuated either independently or together. If actuated together, the pedals are connected by a pin.

A connecting pipe between the two pumps ensures balanced braking even when the brake discs are not equally worn.

The two control pumps are fed from a single tank located above the pumps.

The service brakes are slave cylinder operated. When the left–hand brake pedal (fig. a) is depressed, the master cylinder (MS) sends the oil to the slave cylinder (SL). The brake links (1) move as indicated by the arrows, by the help of slave cylinder (SL) this causing actuator discs to turn, ball (3) in the tapered seats to force the discs apart as shown in detail (c).

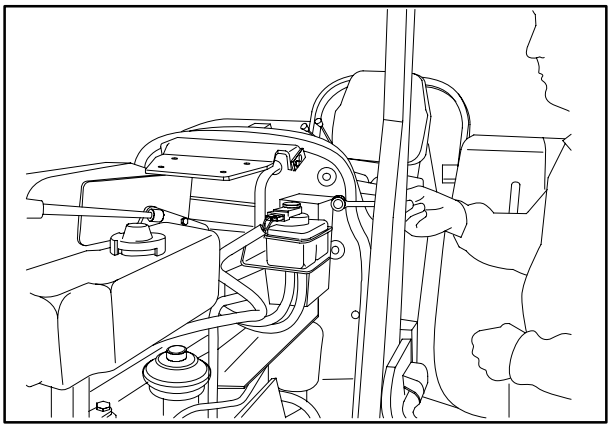
As a result, two simultaneous actions compress the brake discs against the differential support (8) and the back up discs, immediately upon releasing the pedal spring (7), pull the actuator (4) back into the rest position (figure b and detail d) and as a result the discs are released. The action is similar when the right–hand brake pedal is pressed (Rd).

The brake discs (one for each rear wheel) are positioned between the rear transmission box and the lateral final drive box and are splined onto the differential output half–shafts.

PARKING BRAKE

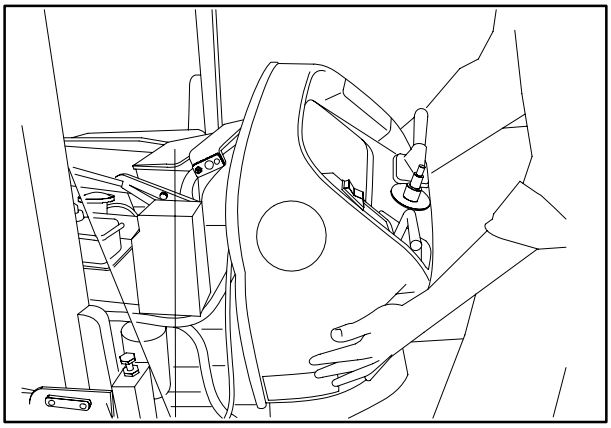
When the hand brake lever (L_m) is pulled, the control cable (14) pulls the control lever (13), at the direction of arrow. Then the brake links (1) acts on the brake discs.

9. Remove rear hood retaining nuts.



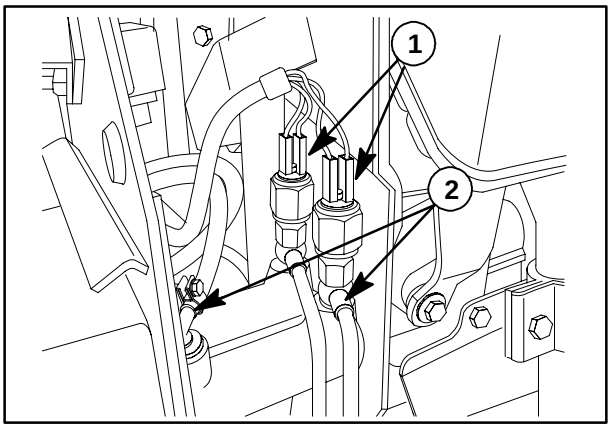
27

10. Remove rear hood.



28

11. Remove the electrical connections:from the pressure sensor (1) and remove the service brake control pipes (2).



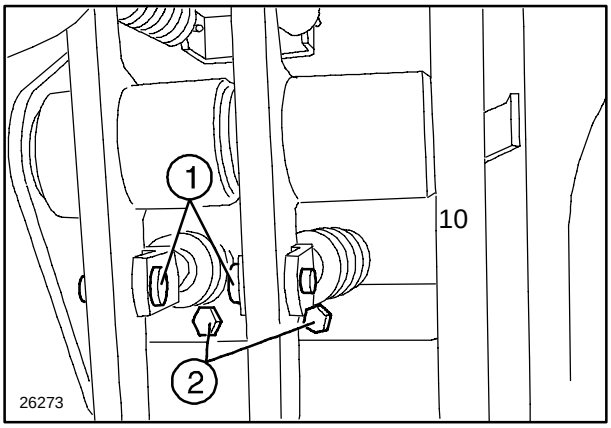
29

12. Remove the retaining pins and withdraw the brake pump control fork articulation dowels (1).

13. Undo the bolts (2) that secure the brake control pumps to the cab and withdraw the pumps from the engine side.

⚠ WARNING ⚠

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



30

MAIN SPECIFICATION OF HYDRAULIC PUMP (All models)

(continued)

Driven and driving gear shaft diameter	mm (in.)	17.400 – 17.418 (0.6850 – 0.6857)
Internal diameter of seats in supports	mm (in.)	17.450 – 17.470 (0.6870 – 0.6878)
Clearance between gear shafts and their seats	mm (in.)	0.032 – 0.070 (0.0013 – 0.0025)
– maximum clearance due to wear	mm in.)	0.1 (0.0039)
Radial clearance of gears in pump body	mm (in.)	0.020 – 0.064 (0.0008 – 0.0025)
Maximum wear on pump body, suction side, at position of gears	mm(in.)	0.1 (0.0039)
Width of gears (5, fig. 104)	mm (in.)	24.000 – 24.015 (0.9449 – 0.9455)
Width of supports (4 and 6)	mm (in.)	24.490 – 24.510 (0.9642 – 0.9650)
Width of pump body (3) for gear seats and supports	mm (in.)	73.135 – 73.160 (2.8793 – 2.8803)
Axial clearance of gears complete with supports in pump body (recondition if necessary)	mm (in.)	0.100 – 0.180 (2.8793 – 2.8803)

TORQUE SETTINGS

	Thread	Torque setting	
		Nm	ft lb
Lift			
Capscrew, lift to rear transmission case (C_1, Fig.1)	M 12 x 1.25	98	72.28
Capscrew, control valve body to lift (C_3, Fig.28)	M 8 x 1.25	26	19.18
Capscrew, lift arm plates (C_2, Fig.1)	M 14 x 1.5	147	108.42
Plug, max. arm raising adjustment (3, Fig.28)	M 12 x 1.25	103	75.97
Nut, position control shaft	M 10 x 1.25	59	43.52
Nuts for lever quadrant bracket securing stud bolts (2, Fig.32)	M8x1.25	25	18.44
Lift cylinder securing bolts:	M14x1,5 M16x1.5	211 260	155.63 191.77
Securing bolts for top link attachment bracket	M14x1.5	147	108.42
Inner lift arm securing bolts	M 10 x 1.25	61	44.99
Capscrew, suction connection	M 12 x 1.25	98	72.28
Capscrew, delivery connection on lift control valve	M 10 x 1.25	59	43.52
Capscrew, lift pump (Fig.86)	M 6 x 1	8	5.90
Nut, pump cover	M 10 x 1.25	41	30.24
Capscrew, flexion bar support	M 16 x 1.5	221	163.00
Capscrew, chain support	M 16 x 1.5	221	163.00
Capscrew, check link support	M 16 x 1.5	221	163.00
Nut, tow bar	M 18 x 1.5	343	252.98
Control valves			
Nut, control valve links	–	20	14.75
Connection, outlet to fit	–	20	14.75
Plug, relief bar spring	–	20	14.75

REMOVAL – REFITTING – OVERHAUL OF REAR MECHANICAL HYDRAULIC LIFT ASSEMBLY

REAR HYDRAULIC LIFT ASSEMBLY

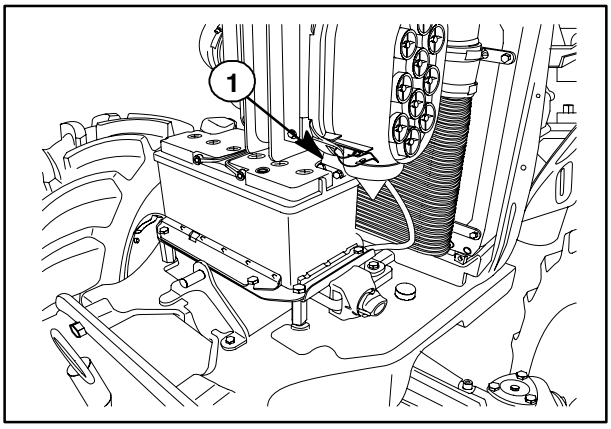
Removal–Refitting (Op. 35 110 30)

⚠ DANGER ⚠

Lift and handle all heavy parts using suitable lifting equipment with sufficient hoisting capacity.
Check that the assemblies or parts are held firmly and supported by suitable slings and hooks. Make sure nobody is standing near to the load.

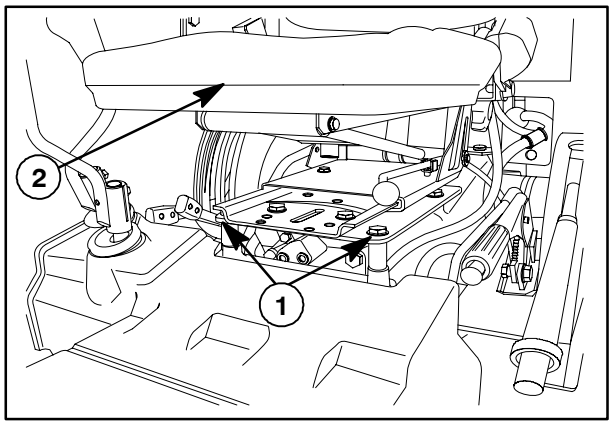
To remove the hydraulic lift assembly from the rear transmission casing, proceed as follows.

1. Disconnect the negative cable (1) from the battery.



7

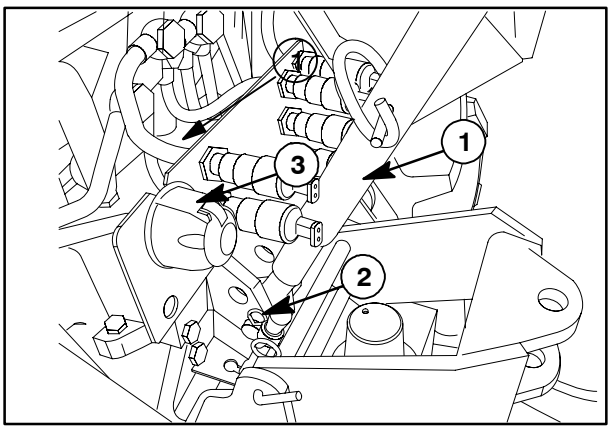
2. Undo the seat bolts (1) and remove the seat (2).



8

3. Romove the pin (2), and take out the top link (1).

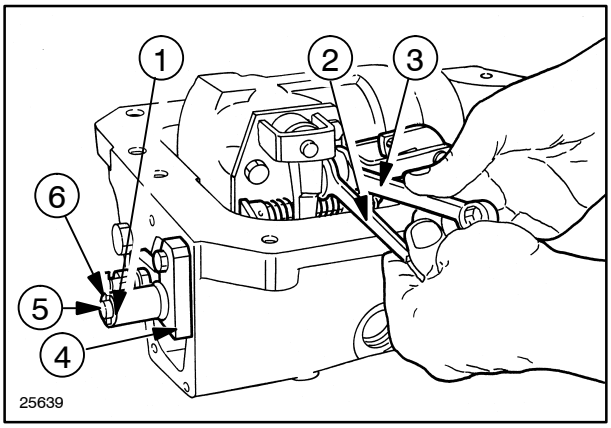
4. Undo the two bolts that secure the seven–pole socket (3) and remove the socket.



9

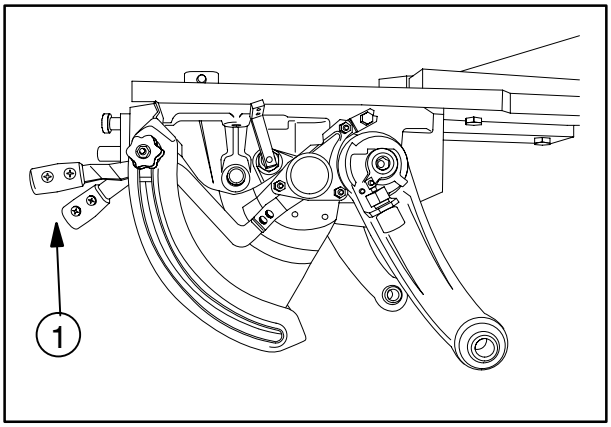
4. Fit tool **380000264** (4) fig 38, to the lift body. The tool has a plunger operating in a tube, the outer end of which has two reference surfaces (1) and (5).
5. Using two spanners (2) and (3), unscrew the lock nut (1) fig. 37 and tighten or loosen the adjustable push rod (2) fig. 37, so that the end of the plunger (5) fig 38, is flush with the outer register surface (6) of the tool.

NOTE – This corresponds to a distance (L_1 fig. 37) of 82.0 – 82.1 mm (3.2283–3.2323 in.) between the end of the lever (3) fig. 37 and the front surface of the lift body when a force (F_1 fig. 37) of 4 – 4.5 da N (25.40 – 39.82 in.lb) is applied to the end of the lever.



38

6. Tighten the lock nut (1) fig. 37.
7. Move the external position control lever (1) fully upwards against the stud bolt spacer. Turn the lift arm control shaft so that the piston is fully forward and check that the plunger (5) fig. 38 is flush with or slightly inside the inner reference surface (1) of the tool (4).

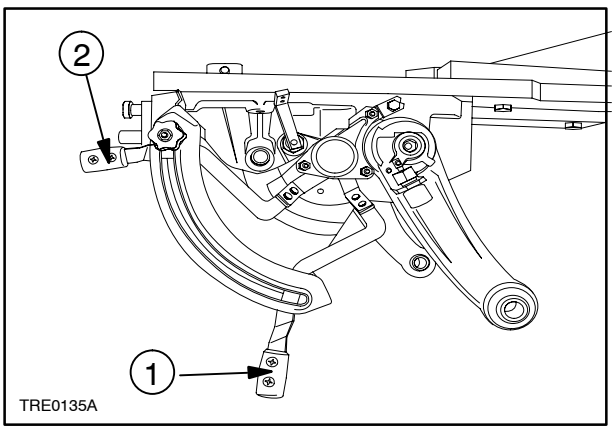


39

NOTE – This corresponds to a distance ($L_{1)}$ fig. 37, of greater than 86.5 mm (3.4055 in.) between the end of the lever (3) and the front surface of the lift body when a force ($F_{1)}$ of 4 – 4.5 da N (25.40 – 39.82 in.lb) is applied to the end of the lever.

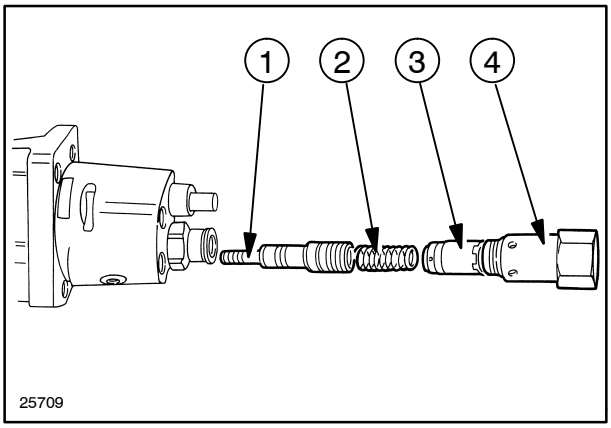
Adjusting the maximum height of the lift arms
Proceed as follows.

8. With tool **380000264** (4) fig. 38 fitted on the lift body, move the external draft control lever (2) fully upward, against the spacer. Move the external position control lever (1) fully downward against the spacer.
9. Turn the lift arm control shaft until the internal arm touches the lift body.



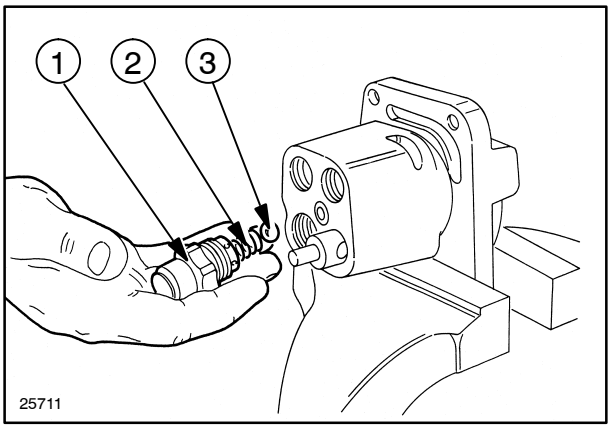
40

4. Take off the cylinder safety valve (4) and remove the arm lowering speed adjustment valve (3), the spring (2) and the pin (1).



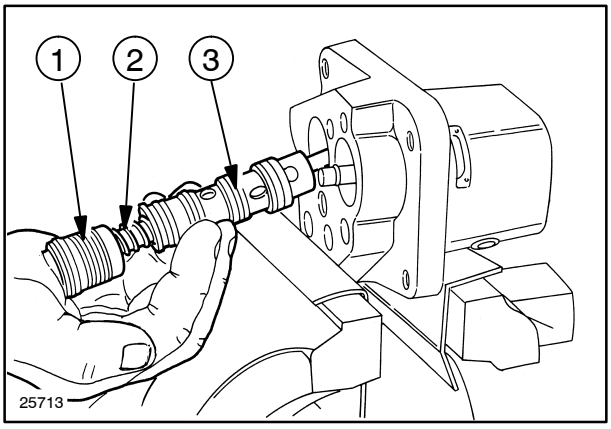
68

5. Remove the check valve union (1), spring (2) and ball (3).



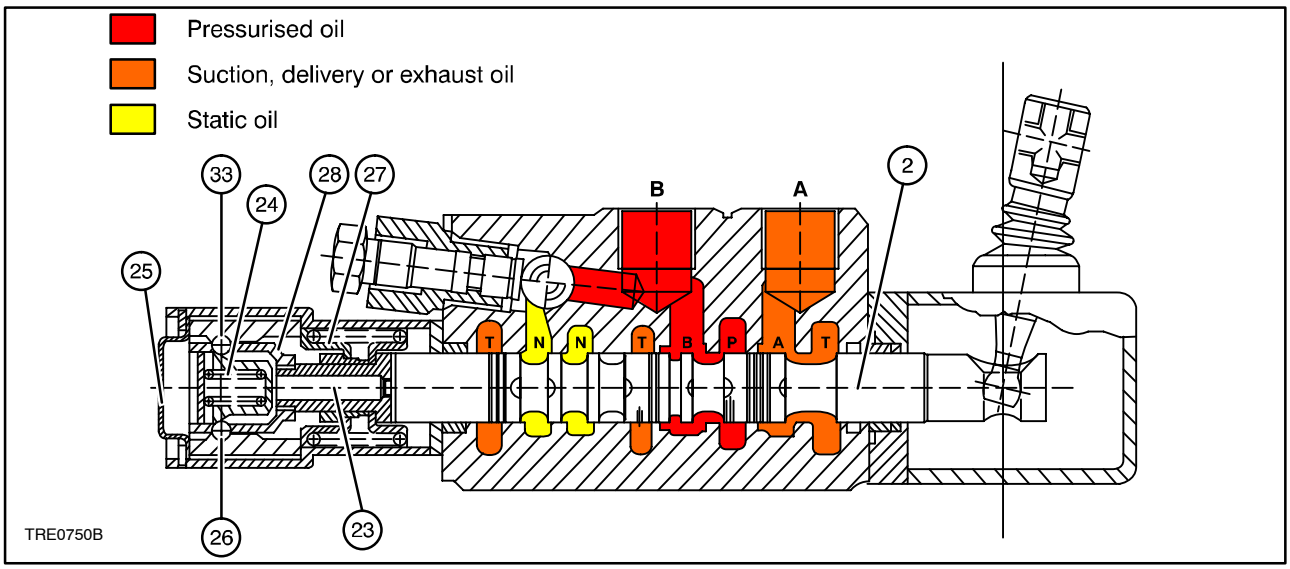
69

6. Take off the control valve block pin (1) and remove the seat (3) and the spring (2).



70

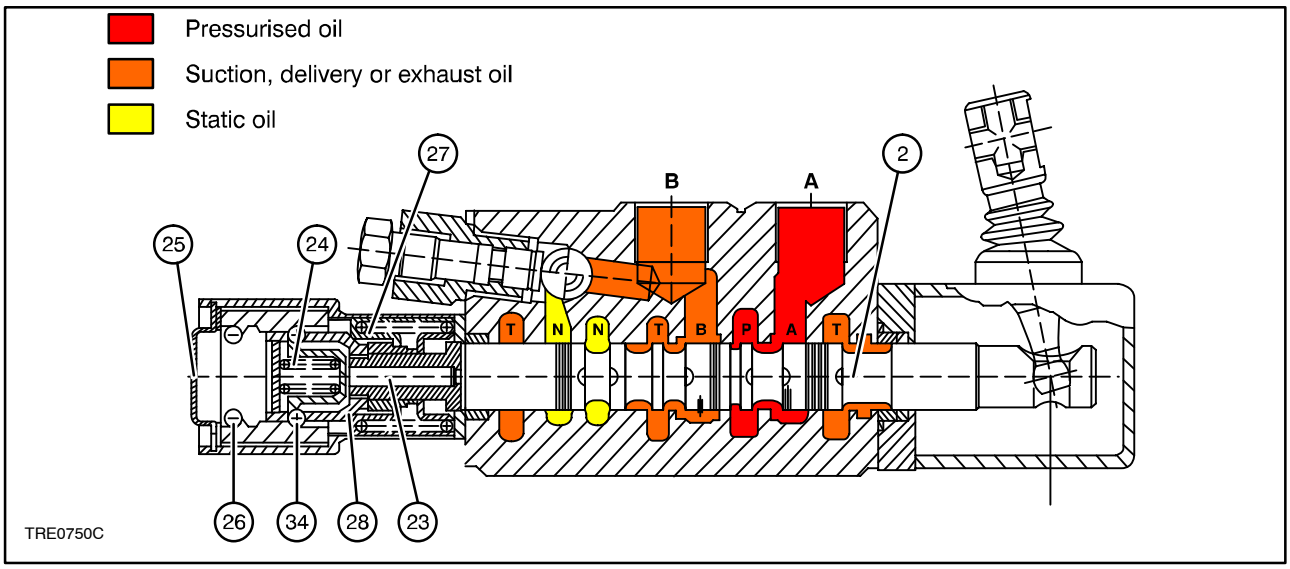
OPERATING STAGES OF AUXILIARY CONTROL VALVE FOR OPERATION A DOUBLE– ACTING CYLINDER AUTOMATIC DETENT RELEASE AND FLOAT POSITION



3

LIFTING

When the spool (2) moves to left, the detent balls (26) engage the groove (33), where they are held in place by the support (28) and spring (24). The movement of the spool (2) connects: the pressure line (P) with the line (B), and also the upper cylinder chamber with the exhaust line (T) by way of line (A), intercepting the supply of oil to the hydraulic lift control valve. Automatic detent release working principle is explained at page 6.

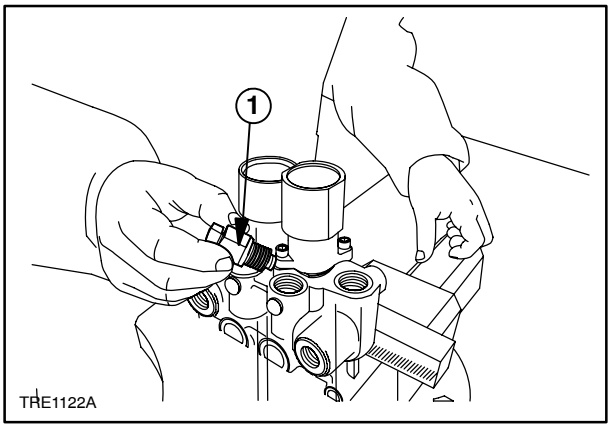


4

LOWERING

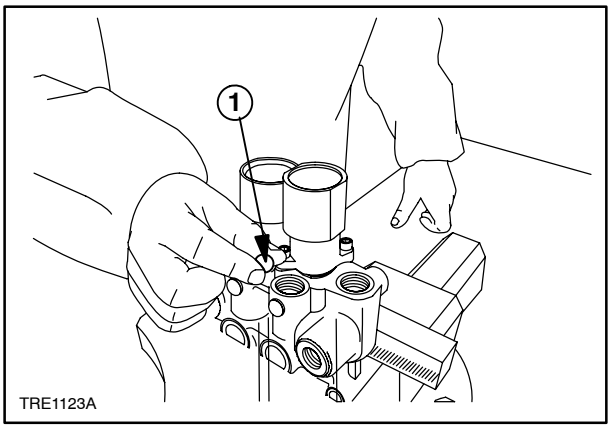
When the spool (2) moves to right, the detent balls engage in the groove (34) where they are held in position by the support (28) and the spring (24). In this condition the oil contained in the lower chamber of the cylinder can flow to the exhaust (T) by way of line (B), while the upper chamber is connected with the pressure line (P) by way of line (A). On completion of the lowering operation, the detent will be automatically released as explained at Page 6.

21. Remove, single–double acting converting valve (1) Fig.34.



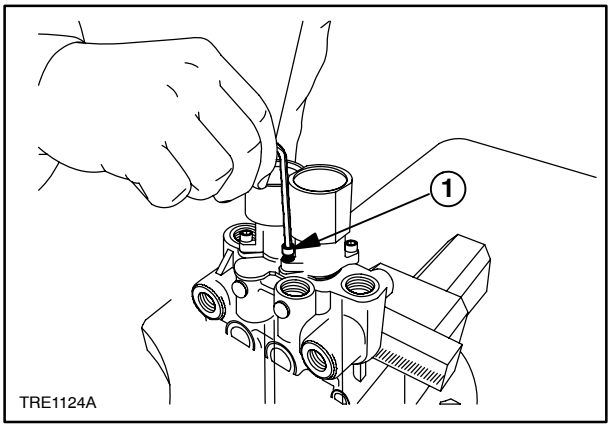
34

22. Take off the ball of, single–double acting converting valve (1) Fig.35.



35

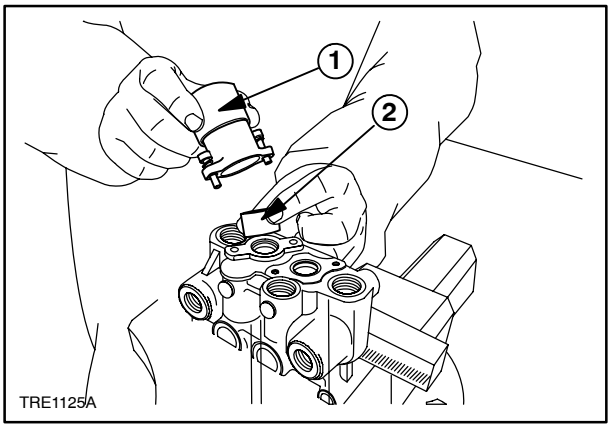
23. Slacken the allen screws (1) fixing the cover the cover (2) Fig.36.



36

24. Withdraw the cover (1) and the spacer (2) Fig.37.

25. Check the condition of all seals before reassembly.



37

TRAILER BRAKE REMOTE CONTROL VALVE LINKAGE ADJUSTMENT

Proceed as follows:

1. Adjust the brake pedal (8) free travel as indicated before in Section 33.
2. Adjust parking brake lever as indicated before in Section 33.
3. Fully tighten cup (4), slacken lock nut (5) and adjust lenght of link (6), using wrench flats (C) to obtain a clearance (G) of 0,3 to 0,5 mm (0.0118 to 0.0197 in.) between fork (7) and piston (10).
4. Tighten loc nut (5).
5. Disconnect trailer brake oil delivery line (3) from brake control valve body (V).
6. Connect pressure gauge (M) with 0 to 250 kg/ cm^2 scale of kit **380000240** to control valve body, using connections **380000841** (1) and **380000840** (2) (Both connections belong to kit **380000240**)
7. Start the engine and take the oil up to a temperature to 50 – 60 ^{0}C (122 – 140 ^{o}F).
8. Run engine at around 2000 rpm.
9. Check that pressure gauge (M) reading is zero when brake pedals (8) are not applied.
10. Depress brake pedals until pedal free travel is taken up and check on pressure gauge (M) that pressure is 100 bar (1450.37 psi)
11. Repeat this operation at least three times, checking that system pressure reading drops to zero when pedals (8) are released.
12. Apply parking brake (9) a few times without depressing brake pedals and check that pressure reading on pressure gauge (M) remains at zero.

HYDROSTATIC STEERING FAULT DIAGNOSIS

Refer to fig. 2 for component identification

(continuation)

Problem	Possible causes	Corrective action
Steering wheel jolts, steering uncontrollable, wheels steering in the opposite direction to the desired direction.	**1.** Incorrect synchronization of hydrostatic steering. **2.** Hoses to cylinder reversed.	Synchronize correctly. Correct the connections.
The wheels do not maintain the desired alignment and continual correction with the steering wheel is necessary.	**1.** Hydraulic cylinder piston seal worn. **2.** Reflux valve (2) damaged or held open by foreign bodies. **3.** Mechanical wear of control valve.	Renew the seal. Eliminate the foreign bodies and clean the filter or renew the control valve. Renew the control valve.
Neutral phase of hydrostatic steering unobtainable. During manual control, operation is normal. When stopping manual control, the steering wheel moves on its own or remains stationary, but steering continues slowly in the direction first turned (motoring), so the steering wheel must be continually corrected.	**1.** Leaf springs (11) for returning sleeve (4) to neutral position broken or fatigued. **2.** Sleeve and rotary valve (4) blocked in delivery position by foreign bodies. **3.** Crushing of sleeve (4) on rotary valve due to excessive pressure.	Renew the pack of leaf springs. Eliminate the foreign bodies and clean the filter. Check the setting of the pressure relief valve (22).
Front wheel vibration (shimmy).	**1.** Air pockets in the hydraulic cylinder. **2.** Wear of mechanical joints of steering tie rods. **3.** Reflux valve (2) damaged or held open by foreign bodies.	Bleed the air and eliminate the causes of possible infiltration. Renew the worn parts. Remove the foreign bodies and clean the filter or renew the control valve.
Difficulty in steering in general, or in one direction.	**1.** Insufficient pressure. **2.** Excessive leakage inside the control valve.	Check the hydraulic pump and the setting of the pressure relief valve (22). Renew the control valve.

TOOLS

WARNING: The operations described in this section must be performed only with the **ESSENTIAL** equipment marked with **(X)**.
To operate safely and achieve best results, while saving time and effort, essential equipment must be used in conjunction with the special tools recommended below, and tools which you must make yourself and for which you will find the design in this manual.

List of special tools necessary for the various operations described in this section.

X 380000307 Hyd. steering rotor retaining lever.

X 380000223 Steering wheel extractor.

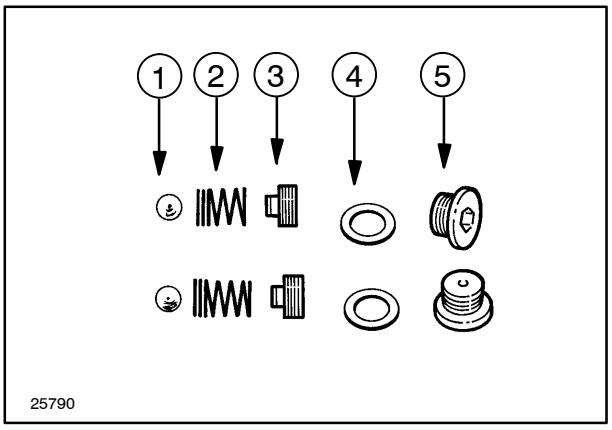
X 380000240 Universal pressure checking kit.

X 380000305 Tool for fitting hydrostatic steering toroidal seal.

380000306 Plug for fitting hydrostatic steering rotary valve return springs.

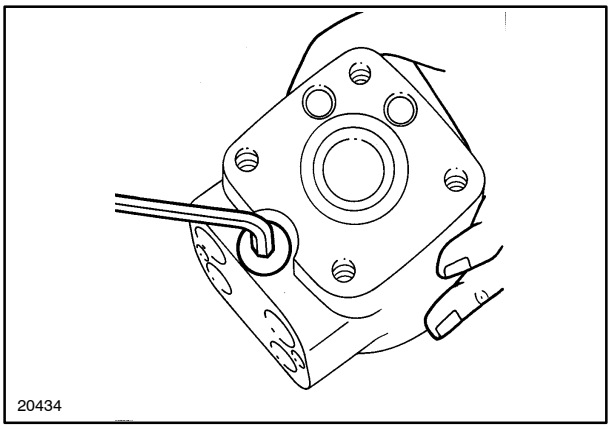
Cylinder safety valves components (order of disassembly–assembly).

1. Cylinder safety valve ball.
2. Pressure spring.
3. Setting adjuster screw.
4. Seal.
5. Plug.



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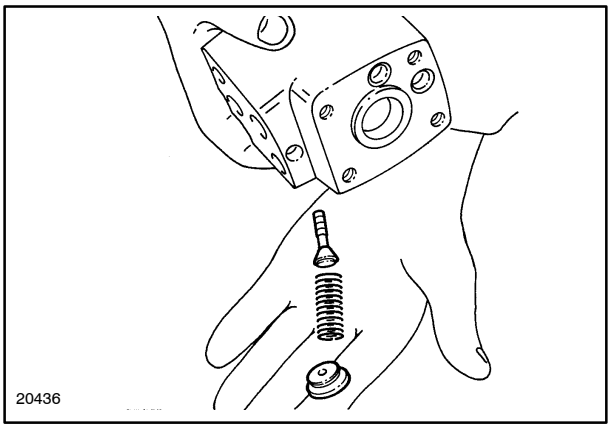
19. Using a 6 mm Allen wrench, remove the threaded plug on the pressure relief valve and extract the seal.



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20. Remove the pressure relief valve adjuster screw.

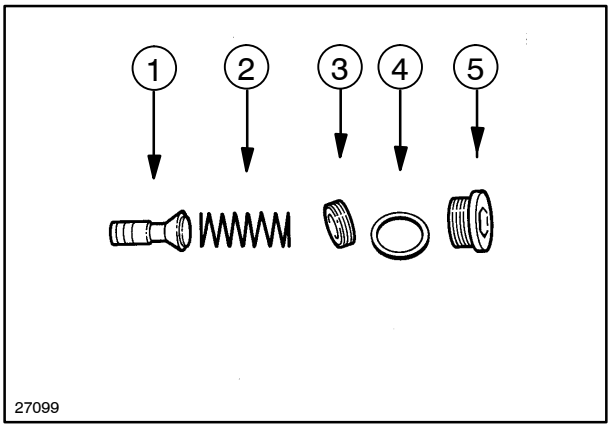
21. Turn the control valve body over and complete disassembly by extracting the spring and the pressure relief valve piston.



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Pressure relief valve components (order of assembly).

1. Pressure relief valve.
2. Pressure spring.
3. Setting adjuster screw.
4. Seal.
5. Plug.

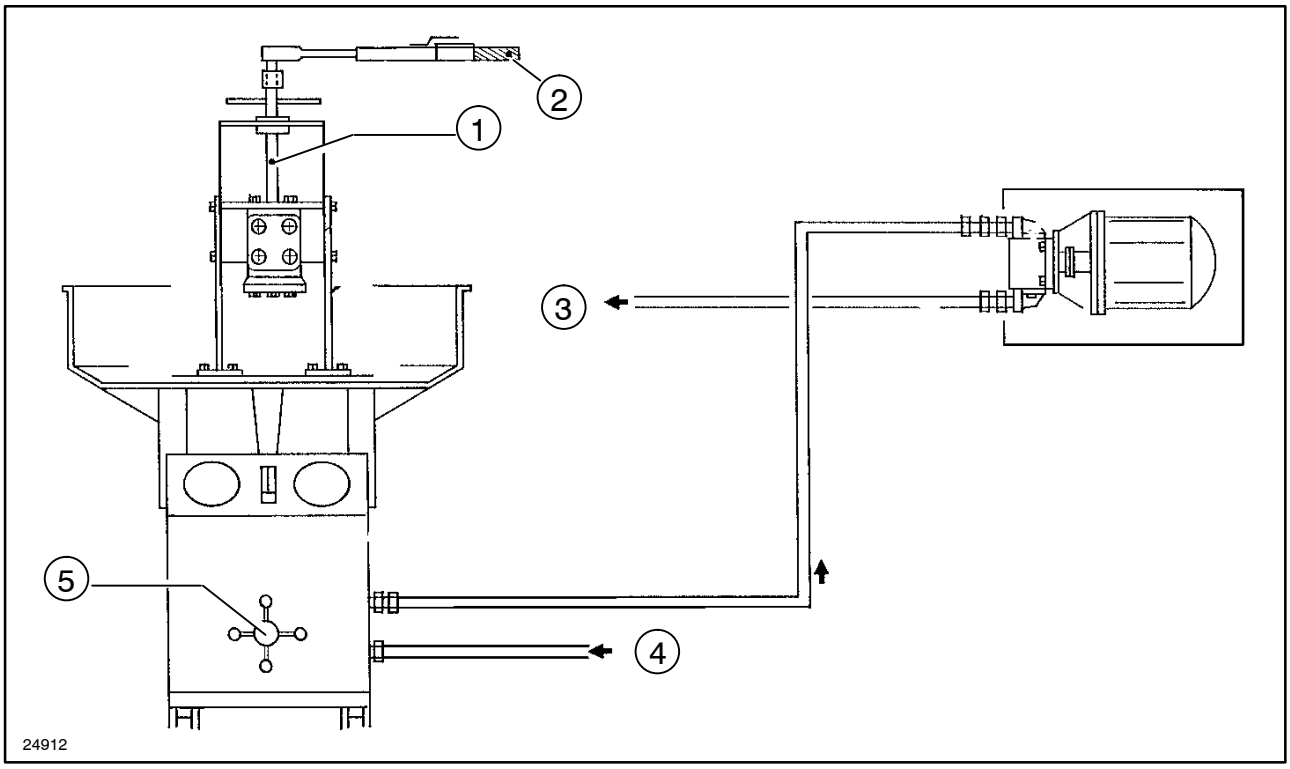


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HYDROSTATIC STEERING CONTROL VALVE
Bench testing (Op. 41 204 38)

Test conditions.

Oil type ..... IDRAULICAR AP51
Oil viscosity ..... SAE 20 W
Oil temperature ..... 60°C (140°F)
Hydraulic pump capacity ..... litres/min 12
..... (gall. imp/min 2.64)
Speed of electric motor ..... rpm 1450



Installation diagram of equipment for testing the rotary valve, seals and for setting the pressure relief valve. 68

1. Splined control shaft
2. Torque wrench
3. Delivery line
4. Restriction
5. Pressure adjustment handwheel

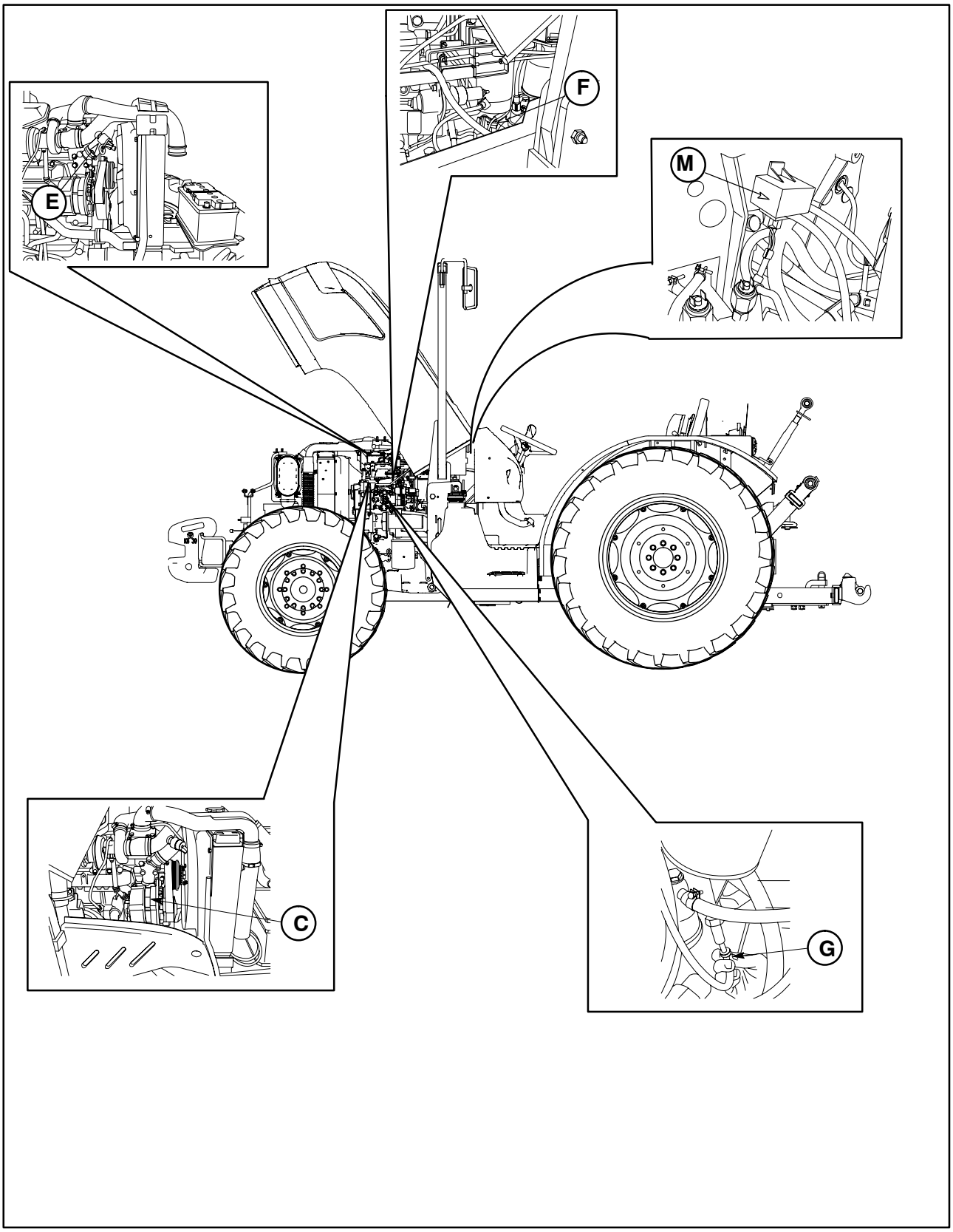
A – CHECKING ROTARY VALVE WEAR

1. Make the connections shown in fig. 68 and complete the circuit as in fig. 69. Using the splined control shaft (1), hold the steering control valve in steering position (right or left).

2. Using the handwheel (5), increase the circuit pressure to as near as possible the pressure relief valve cracking pressure (page 1) without the valve actually opening.

3. Using a torque wrench (2), apply a torque of approx. 34 Nm (25.8147 ft lb) to the control shaft (1), and check that the rotary valve takes more than 10 seconds to complete one full rotation. If it takes less than 10 seconds, change the rotary valve (4, fig. 2) and the sleeve .

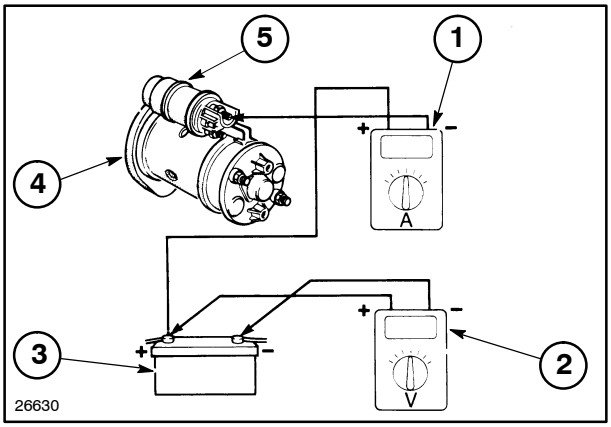
TRANSMITTERS AND SWITCHES



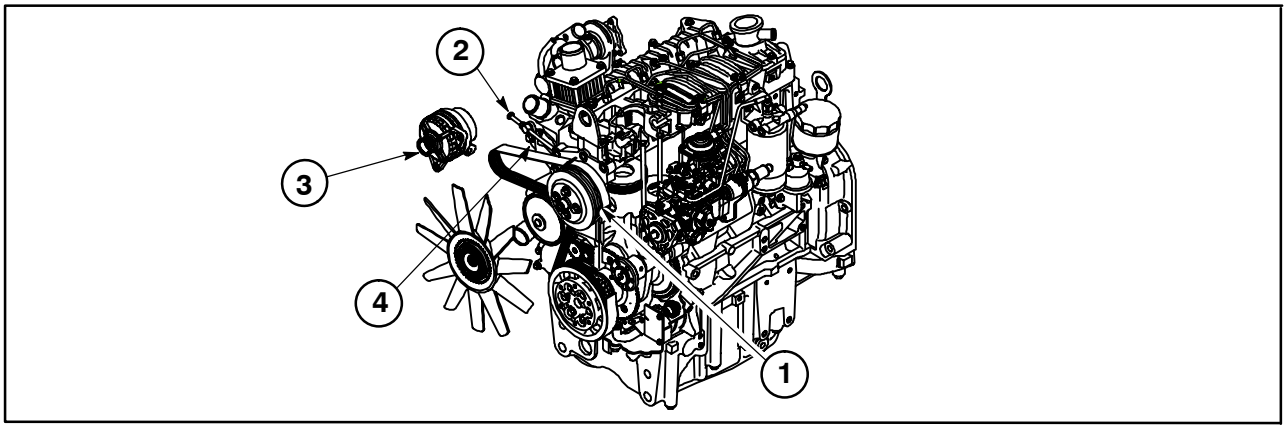
POWER ABSORPTION IN STARTER MOTOR CIRCUIT (Fig. 6)

1. Disconnect earth (ground) (negative) battery cable (3).
2. Disconnect positive battery cable from starter solenoid. Connect the positive ammeter point (1) to the positive battery terminal clamp and the negative point to the solenoid input terminal.
3. Reconnect earth (ground) (negative) cable to negative battery terminal clamp (3).
4. Connect the positive voltmeter point (2) to the positive battery terminal clamp and the negative to the negative battery terminal clamp.
5. Disconnect the wire from the injection pump shut–off solenoid.
6. Run the engine and note voltmeter and ammeter readings. Voltage must be constantly about 12V and absorption in the range of 250–300 A.

- If absorption corresponds to the readings above, then the starter motor (4) fig. 6, is working correctly. If voltage drops during the test, follow “Resistance in starting system circuit” procedure (see relative paragraph).
- If absorption is higher than the readings above, check the circuit as follows. If the starting system circuits are in good condition, then the starter motor is malfunctioning and must be removed for further examination.
- If absorption is lower than the readings above, the starter motor is malfunctioning and must be removed for further examination.



6



3

Fan belt tensioner

1. Belt
2. Belt tensioner
3. Alternator
4. Belt tensioner securing nut

SYSTEM TESTING AND TROUBLE–SHOOTING

PRECAUTIONS

To avoid damaging alternator charging system components, take the following precautions:

- **DO NOT MAKE OR INTERRUPT** any charging circuit connection, including the battery, while the engine is running.
- **NEVER SHORT–CIRCUIT** the alternator positive terminal to check if it is working.
- **ALWAYS DISCONNECT** battery cables when recharging the battery in the tractor with a battery charger.
- **ALWAYS CHECK** battery polarity when installing a battery or using a supplementary battery to start the engine.
- **DO NOT SHORT–CIRCUIT** regulator input/ output terminals when the alternator is working.
- **CONNECT POSITIVE TO POSITIVE AND NEGATIVE TO NEGATIVE.**

PRELIMINARY CHECKS

Before carrying out these electrical tests, carefully inspect the charging system and the electrical system in general.

Check continuity in all conductors and connections. Check they are all clean and well fastened.

1. CHECKING THE BATTERY

Check all battery elements with a densimeter. The battery must be at least 70% charged and efficient.

2. CHECKING THE DRIVING BELT

Inspect the alternator driving belt and pulley, checking that they are both clean, with no traces of oil or lubricant and in good condition.

Check the alternator driving belt tension regularly. If you suspect the belt is not tight, check the tensioner as follows:

Belt for versions without air conditioning (Fig. 3)

– slacken the nut (3) which secures the alternator to the tensioner bracket (2).
– with a lever, move the alternator (1) on the tensioner bracket (2) to reach correct belt tension and tighten the securing nut (3) to 55 Nm (40.5659ft lb).

Belt for versions with air conditioning (Fig. 4)

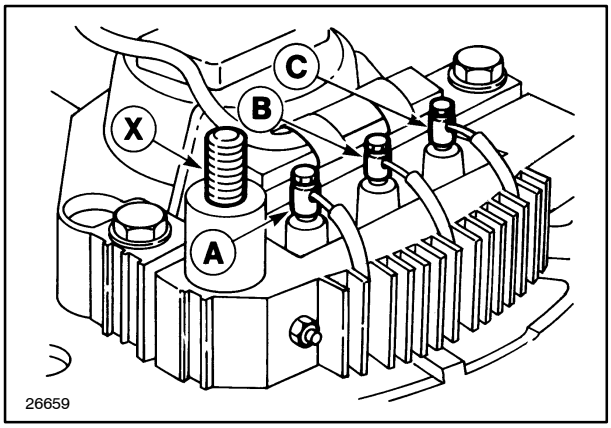
– slacken the belt tensioner securing nuts (3)
– hold the belt tensioner arm (2) and move it on the bracket to reach the correct belt tension, then tighten the securing nuts (3) to 55 Nm (40.5659ft lb).

Correct deflection values, measured by applying the following loads to the middle of the belt:

POSITIVE POWER DIODES TEST

Put 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. 21).

Repeat the three measurements after reversing the instrument point connections.

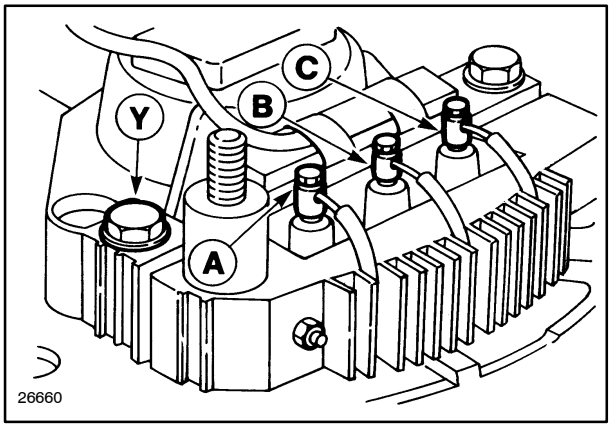


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NEGATIVE POWER DIODES TEST

Put an ohmmeter point in contact with the negative (Y) diodes plate and the other successively with each of the three terminals (A–B–C) (Fig. 22).

Repeat the three measurements after reversing the instrument point connections.



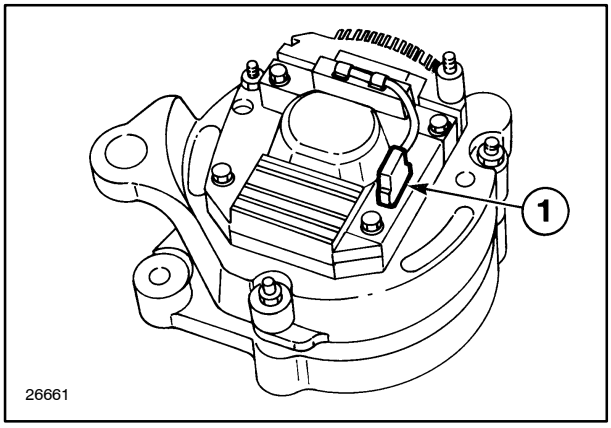
22

In the three tests described above, the instrument should show resistance at each terminal (A–B–C). Reversing the instrument point connection, there should be no resistance (Fig. 22). If there is resistance in both cases, this means short–circuited diodes. Otherwise, with a R=0 value (interrupted diode), change the whole rectifier bridge.

ROTOR

CHECK ON ROTOR WINDING RESISTANCE MEASURED BETWEEN PINS CONNECTED TO BRUSHES

Disconnect the excitation diode terminal wire connector (1) from the pin connected to the positive brush. Put both points of an ohmmeter (regulated on Ω x 1 scale) in contact with the two voltage regulator–brush holder pins. If resistance reading is different from the indicated value or if it shows infinity (interrupted circuit), check and, if necessary, change the rotor (Fig. 23).



23

Performance tests

Performance tests help to understand if a battery can adequately run the engine. Voltage readings show battery condition. Before carrying out the test, check the battery electrolyte level is correct and the open circuit voltage is 12.5V or more. The battery can be tested in the tractor or removed.

1. Switch the battery start tester current control to "off" (high amperage discharge tester). Calibrate the voltage selection switch to the nominal battery voltage or slightly higher. Connect the positive tester conductors to the positive battery terminal and the negative conductors to the negative battery terminal.

2. Turn the current control knob until the ammeter reading reaches half the cold start battery amperage and note the voltage reading.

- If the reading shows 9.6 V. or higher after 15 seconds, the battery has adequate power output and can easily be charged following the normal procedure.
- If the reading is lower than 9.6 V., battery is not satisfactory for use and the charge must be tested as follows.

WARNING: *Do not leave a high discharge tester on the battery for more than 15 seconds.*

Test charging: This test is only for those batteries which have not passed the performance test above.

1. Connect the positive battery charger tester conductors (high amperage discharge tester) to the positive battery terminal and the negative conductors to the negative battery terminal.

2. Connect the positive battery charger conductor to the positive battery terminal and the negative conductor to the negative battery terminal.

3. Turn the battery charger timer to more than a 3 minute charge and then back to a 3 minute charge.

4. Set the charging amperage as close as possible to 40 A.

5. After a 3 minute fast charge, read the voltmeter.

- If the total voltage is higher than 15.5 V., the battery is not satisfactory. It is probably sulphated or worn and must be changed.

NOTE: *A slightly sulphated battery can be renewed using a multiple type battery charger, with upper open circuit voltage limit of 50V. A sulphated battery has high resistance and for this reason it will be necessary to set a high voltage at the beginning to overcome resistance. At the beginning there may be no visible sign of charging. After some minutes of inactivity, a low charge will show. This is followed by a fast rise in amperage. Amperage must not exceed 14.0 A. and the battery electrolyte temperature must not exceed 50°C (122°F). When amperage stabilizes, set the voltage until amperage corresponds to 5 A. Continue this amperage until the relative density of the battery electrolyte stabilises (1.275 – 1.280 at 20°C (68°F)). This could take approximately 48 hours. Let the battery rest for 24 hours and then carry out the previously described performance test.*

- If the total voltage is less than 15.5 V., check the relative density of each element and recharge the battery according to the following scale:

Relative density	Fast charge up to:
1.150 or less	60 minutes
from 1.151 to 1.175	45 minutes
from 1.176 to 1.200	30 minutes
from 1,200 to 1.225	15 minutes (slow charge only)

NOTE: *When there are problems with a battery, check fan belt tension and the complete charging system.*

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