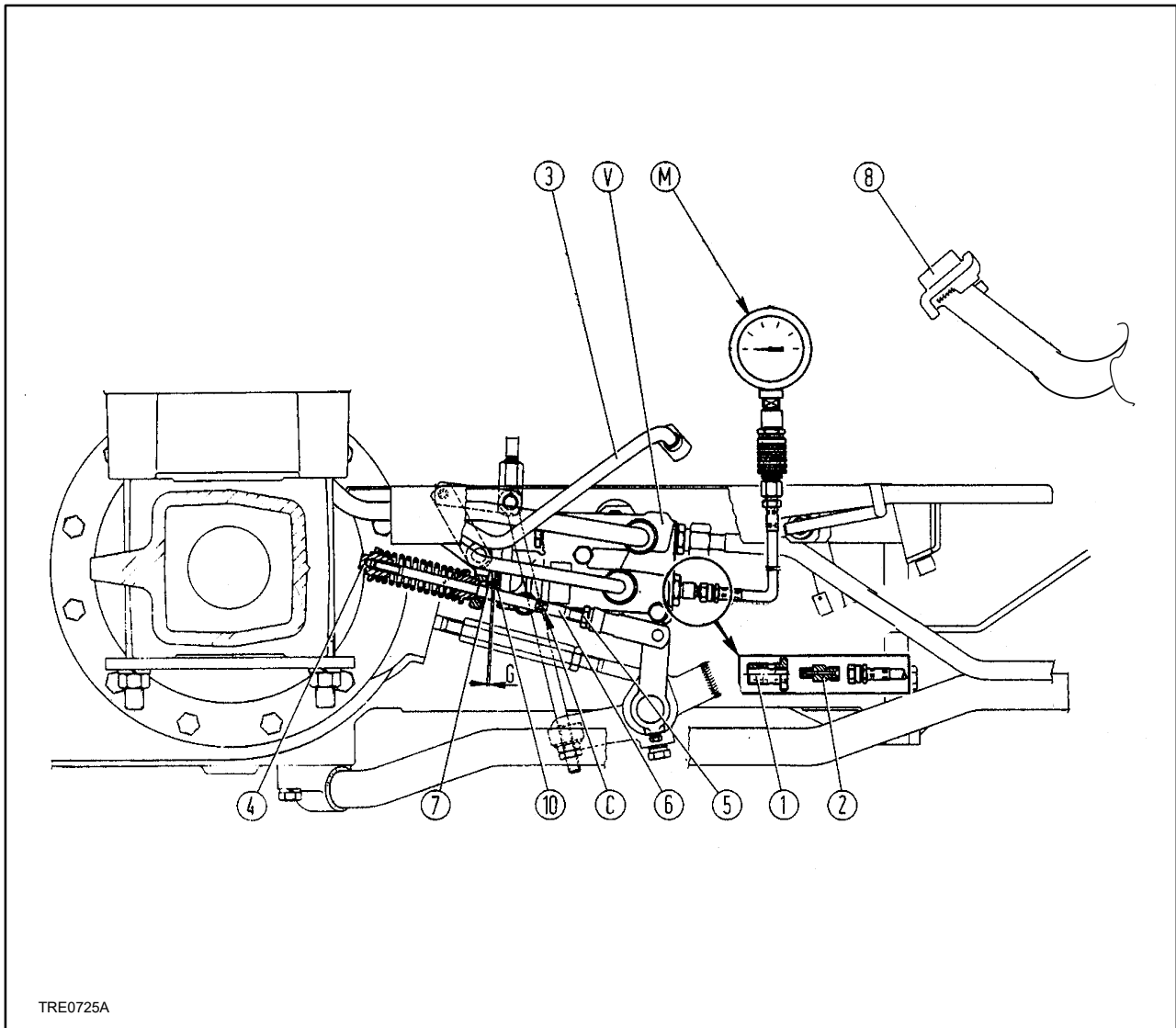


TRAILER BRAKE REMOTE CONTROL VALVE LINKAGE ADJUSTMENT

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 length 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 lock 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/cm² 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 °C (122 – 140 °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.

???.???.?? – ?? – ????



Trailer brake remote control valve linkage adjustment

C. Wrench flats on link (6)

G = 0,3–0,5mm. Clearance between fork (7) and piston (10)

M Pressure gauge with 0 to 250 kg/cm² scale of kit
380000240

V Trailer brake control valve

1- Connection 380000841 supplied in kit 380000240

2- Connection 380000840 supplied in kit 380000240

3— Delivery line to trailer brake

4- Cup

5– Locknut

6- Link

7- Fork

8- Brake pedals

10- Trailer brake control valve piston

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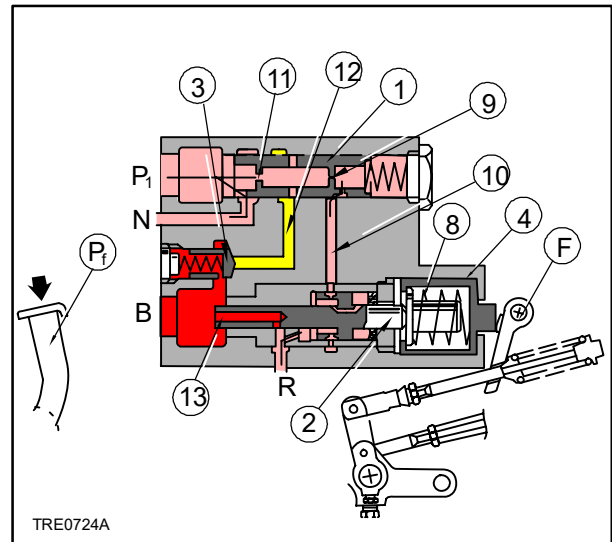
BRAKING – Continued brake pedal application causes an increase in oil pressure at trailer brake connection (B) which, acting on active surface (13) of slide piston (2), moves the latter to the right thereby overcoming the opposition of relief valve springs (8).

When the trailer brake circuit oil pressure is equal to spring (8) pressure, slide piston (2) stabilises as shown in fig 5 and establishes communication between oil from pump and lift drain through connection (P₁), diaphragm (11), restriction (9), port (10) and connection (R).

Diaphragm (11) and restriction (9) cause a pressure drop in flow control valve (1) which moves to the right to close line (12) and consequently, check valve (3).

Further pressure on the tractor brake pedals (P_f) causes a leftward movement of relief valve (4) and piston (2), with a consequent increase in trailer brake circuit oil pressure as the sequence described in paragraph **b START OF BRAKING** on page 3.

Upon releasing brake pedals, system returns to the conditions shown in fig 3 at page 3.



- Pressurised oil
- Oil in suction, delivery or return
- Static oil

5

Braking

- B. To trailer brake.
- N. To auxiliary control valves.
- P₁. Oil from the hydraulic pump to lift circuit.
- R. Discharge line.

TRAILER BRAKES OFF – When tractor brakes are inactive, pressure limiter (4) and slide piston (2) take up the positions shown in fig 3.

Oil from hydraulic pump (8, fig 2) is directed to fitting (P_1) through diaphragm (11) and restriction (9) which causes a pressure drop to move flow control valve (1) to the right.

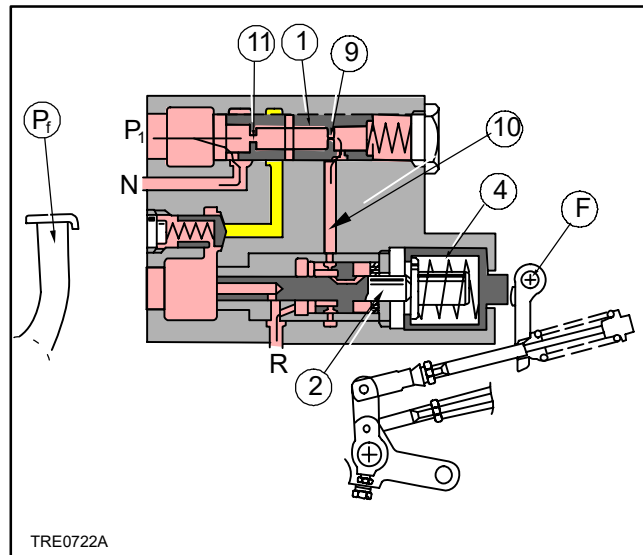
Most of the oil flows through connection (N) to the auxiliary control valves. The remaining output is drained into the hydraulic lift through port (10), piston (2) and union (R).

Trailer brakes off

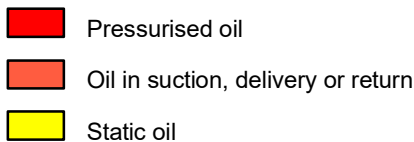
N. To auxiliary control valves.

P_1 . From hydraulic pump to lift circuit.

R. To lift return line.



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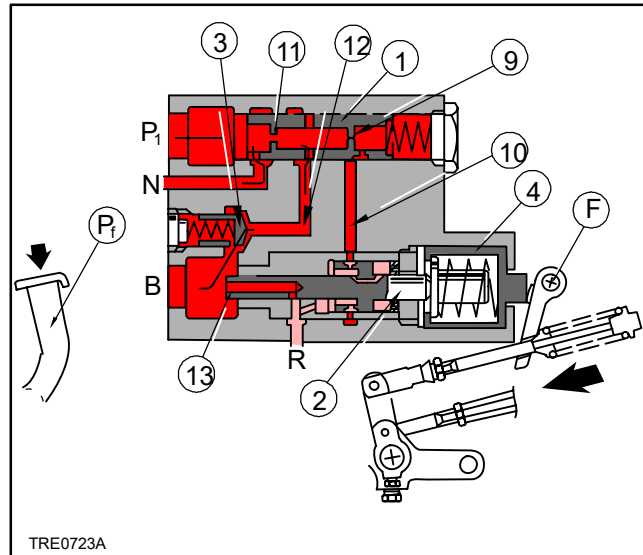


3

START OF BRAKING – On operating the tractor brake pedal (P_f), the fork (F) shifts the pressure relief valve (4) and the slide piston (2) to the left, which in its turn closes the passage between the oil return port (R), trailer brake port (B) and the line (10).

The oil inside the flow control valve (1) is maintained at a uniform pressure and so the valve element, under the action of the spring, shifts to the left to assume the position indicated in fig.4.

Part of the oil from the hydraulic pump in union (P_1) flows to the auxiliary control valves through union (N). while the remaining part arrives at the trailer braking element via the diaphragm (11), line (12), check valve (3) and port (B).



TRE0723A

4

As the pressure of the oil in the trailer brake union (B) increases, it acts on the active surface (13) of the spool (2), opposing the effect of control fork (F) on relief valve (4)

Start of braking

B. To trailer brake.

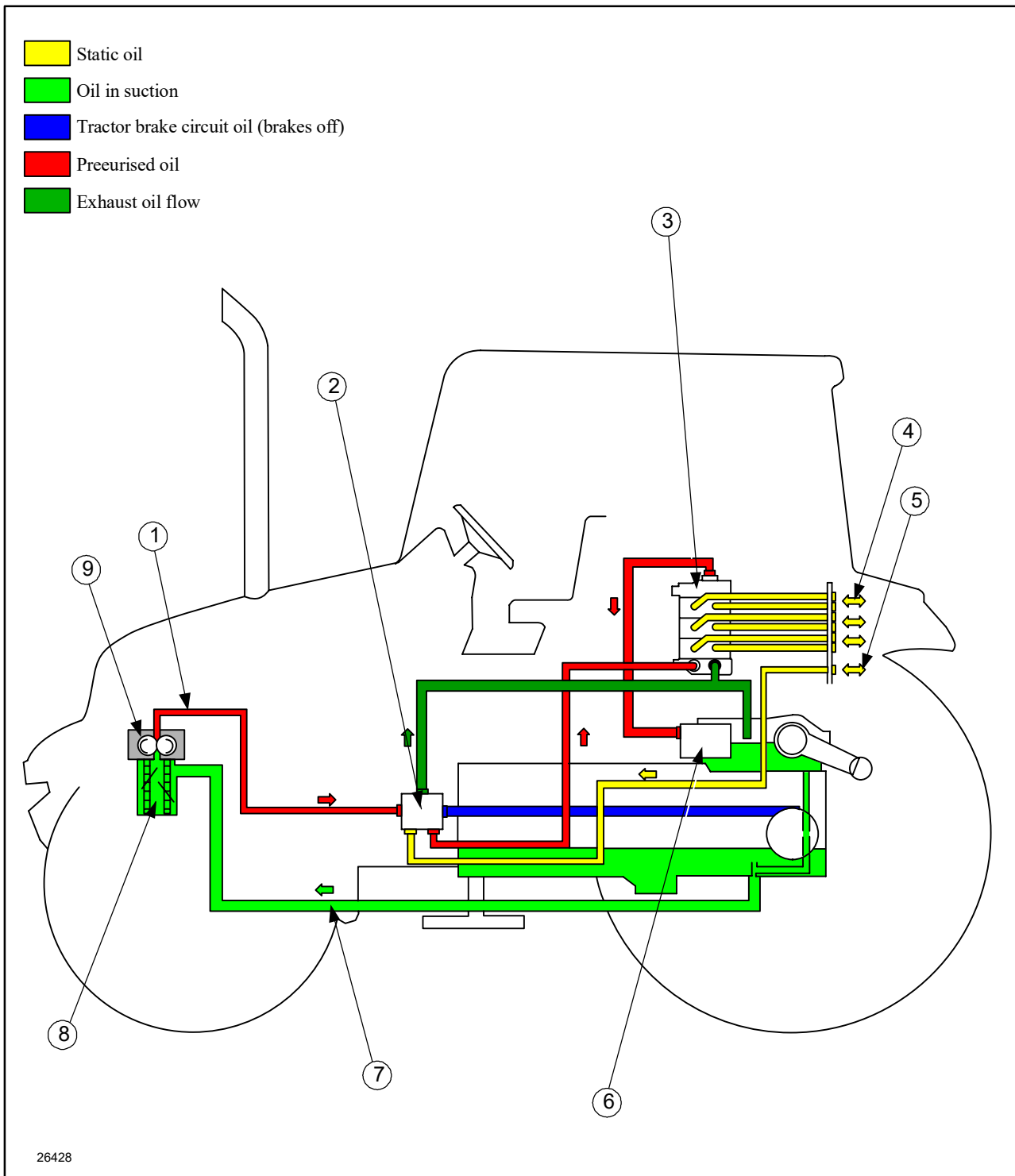
N. To auxiliary control valves.

P_1 . Oil from the hydraulic pump to lift circuit.

R. Discharge line.

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HYDRAULIC DIAGRAM OF TRAILER BRAKE AUXILIARY CONTROL VALVE



2

Diagram of the hydraulic trailer brake circuit

- | | |
|--|------------------------|
| 1. Delivery line to control valve (3). | 6. Lift control valve. |
| 2. Trailer brake control valve. | 7. Suction line. |
| 3. Auxiliary control valves. | 8. Oil filter. |
| 4. Auxiliary control valve lines. | 9. Hydraulic pump. |
| 5. Trailer brake control valve line. | |

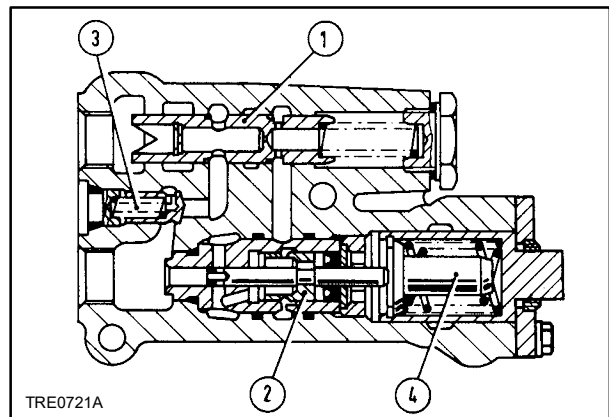
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SECTION 35 – HYDRAULIC SYSTEM**Chapter 3– Trailer brake auxiliary control valve****CONTENTS**

Section	Description	Page
35 000	Section views	1
	Description and operation	1
	Hydraulic diagram	2
	Description and operation of valve phases	3
	Trailer brake auxiliary control valve linkage adjustment	6

Section view of auxiliary control valve for trailer braking

1. Flow control valve.
2. Piston.
3. Check valve.
4. Relief valve.



1

DESCRIPTION AND OPERATION

The trailer brake valve is mounted on the rear transmission casing forward of the hydraulic lift. It is supplied by the same pump as the lift circuit.

The trailer brake valve has priority over the auxiliary control valves and the hydraulic lift.

The hydraulic operation of these valves is described on pages 3 and 4.

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[illegible]

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ADJUSTMENT OF THE AUTOMATIC DETENT RELEASE PRESSURE

After servicing the detent regulating valve or if the control levers and spool are returning to neutral prematurely, the detent regulating valve should be tested as follows:

NOTE: Detent release pressure is ONLY adjustable on one spool in the valve that is NOT fitted with float. The spools fitted with kick out and float have no visible means of adjustment.

- Install inlet hose of flowmeter (1) into lift coupler of valve to be tested.
- Install return hose from flowmeter into lift coupler of the same valve on tractor.
- Ensure load valve on flow meter is fully open;
- Start tractor and set engine speed to 1700 rev/min;
- Pull lever of remote control valve to be tested, fully rearwards, to extend position.
- Adjust load valve (2) on flowmeter until pressure is 80 bar (1161 lbf/in²) and run until hydraulic oil is at an operating temperature of 65°C ± 5°C.
- With lever of remote control valve to be tested in the cylinder extend position slowly close the flowmeter load valve while observing the flowmeter pressure gauge.
- The pressure should steadily rise until the detent regulating valve opens, at which point the needle

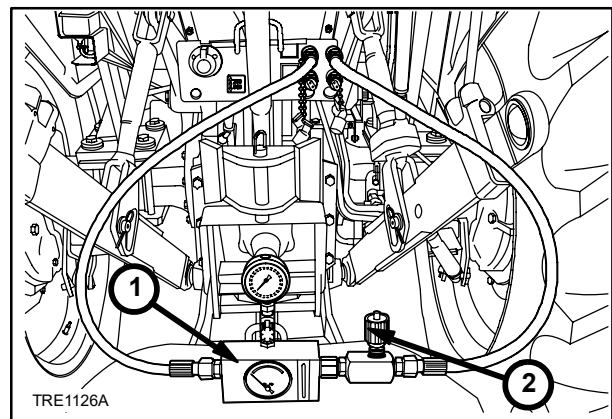
will fluctuate and the handle return to the neutral position. Note the gauge reading immediately prior to the needle fluctuation. The reading should be within the specified value (1741–1886 lbf/in²) 120 bar+10 bar–0 bar.

- If the reading is not to specification adjust the detent pressure as follows:

..... Remove the circlip (33) and the cover (25), (Fig.1. Page.2) of the valve .

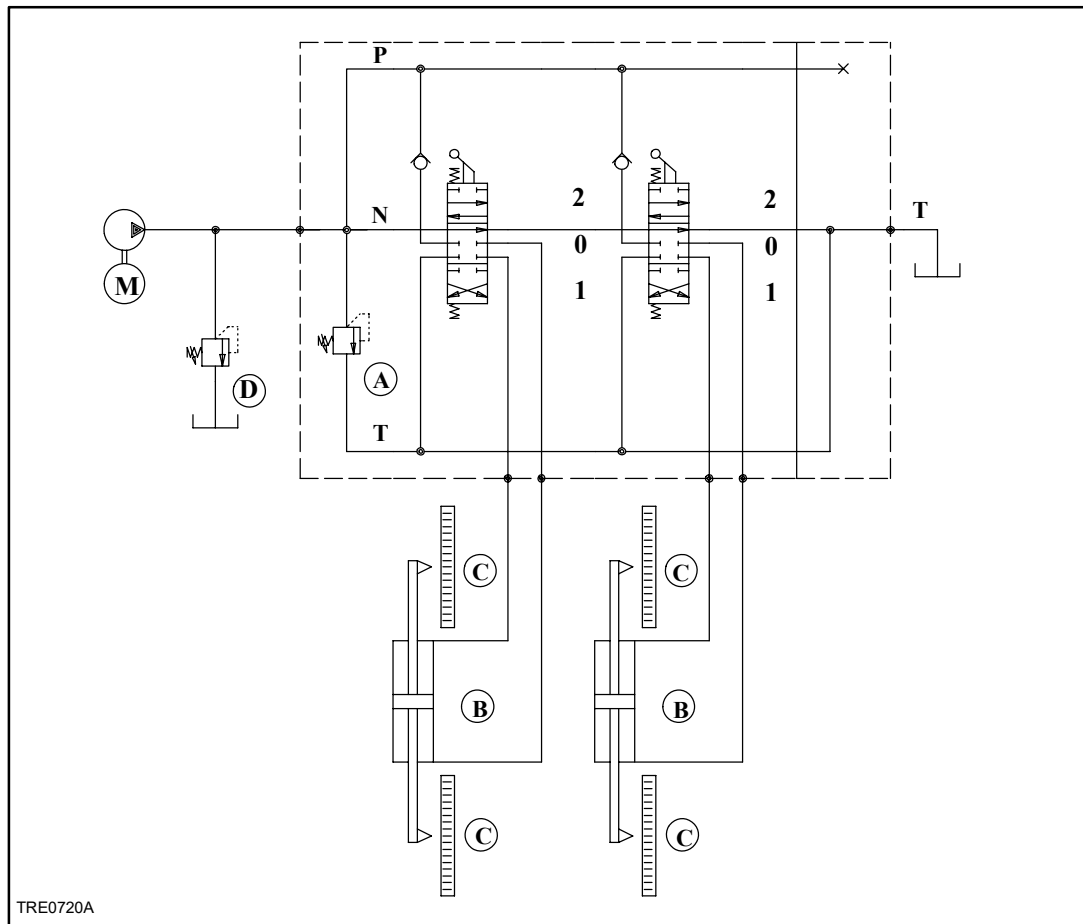
..... Loosen locknut (32) on detent regulating adjuster screw (26).

..... Turn detent regulating valve adjusting screw (26) to change pressure setting.



40

SPOOL LEAKAGE TEST



39

Valve leakage test

After the binding test (with hot oil and valve), measure the leakage rate for each section. It is important to do this with the system hot. Connect working ports A and B of each section to the cylinders (one for each section). Alongside each cylinder lay a ruler to measure the stroke.

Supply oil to the cylinder, moving the spool to the working position (oil flowing from A or B) until it reaches the end of its stroke and the main relief valve opens. Now that the oil column is pressurised from the working section to the cylinder allow the lever to return to the neutral position (called 0). The spool closes A and B ports. Now check the position of the cylinder observing the ruler beside it. As the cylinder moves, check the stroke in a fixed time (say 60

seconds). From this stroke, calculate the volume of oil per minute through that section of the cylinder. This check has to be carried out for each section (each spool).

After this check, with the pump disconnected, move the spool to its working position: now test the check valve (VU:Check Valve) of the distributor. This valve closes the connection from P to T (N), also the connection P with A or P when B is open (spool in working position). If the check valve is working correctly, the normal flow rate will be seen (the same value observed with spool in the neutral position). If it is seen that one or more sections operates more than in a previous check, it means that check valve is not working properly (does not close completely).

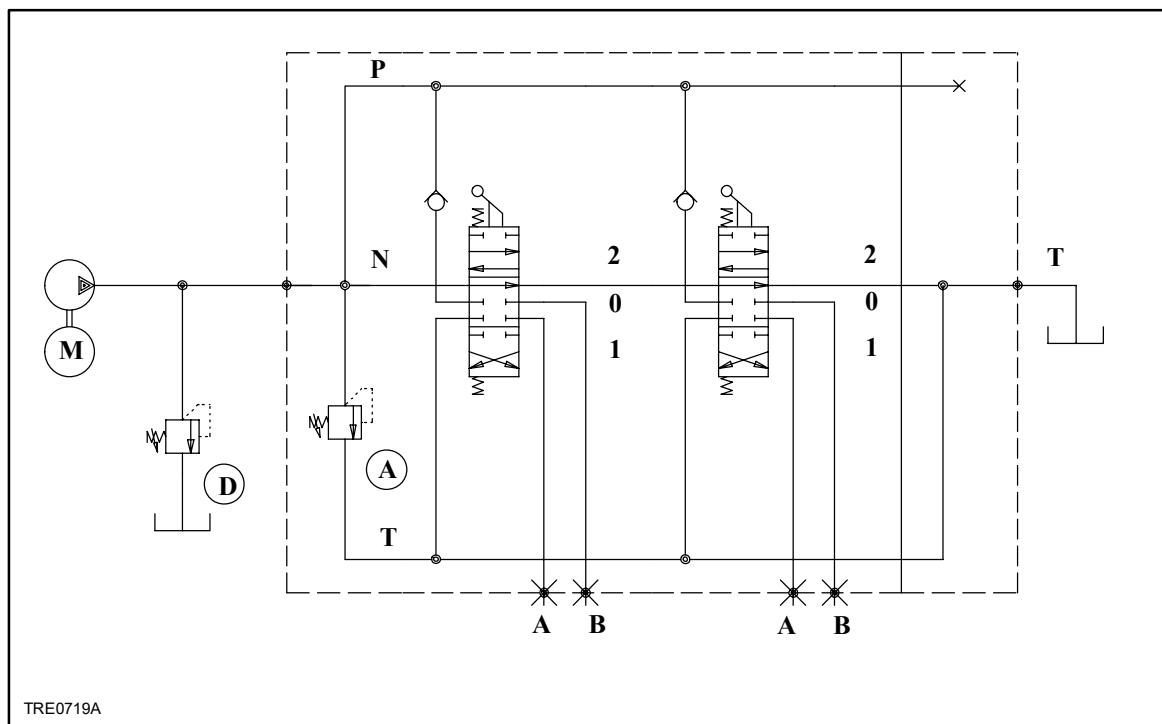
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Double-acting auxiliary control valve with float control and automatic detent release.

Disassemble the auxiliary control valve into its component parts referring to the sectional views (fig. 1) and the following instructions:

1. Unscrew the retaining screws and remove the cover (11) and the distance piece.
2. Unscrew the retaining screws and remove the control lever support (12) and related seal.
3. Withdraw the spool (10).
4. Remove the valve housing and extract the check valve and spring.
5. Check the condition of the seals before re-assembly.

SPOOL BINDING TEST



38

Control valve spool binding test (fig. 38).

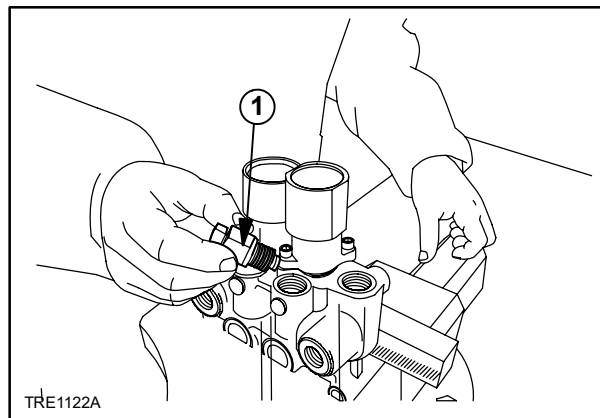
Install the auxiliary control valve assembly and the test apparatus as indicated in the diagrams (fig. 38) and referring to the following instructions:

- The test is carried out with mineral oil in accordance with DIN 32 norm. Flow rate is the nominal for the valve (for VDM07 it is 50 l/min). Connect line P (pump line) to the inlet port of the valve and close the working ports A and B of each section (see schematic) with plugs. Start the test, increasing the flow coming from the pump until nominal flow plus 25% is reached (in the case of VDM07 it is 75 l/min). With the control lever in the neutral position (mid-position)

tion) the flow goes through the valve from inlet to outlet (tank line) (P) to (T). Now regulate the maximum pressure of the VS (main relief valve) valve inside bank A (in the schematic). This pressure is the maximum pressure that can be obtained with the type of valve and spring used. Now move each single spool in each section. With the ports closed, the pressure will rise until the relief valve opens. In this situation check if spools move to the neutral (central) position without sticking, under the action of springs and flow forces only. The relief valve D, in line before the directional valve, has to substitute the VS in A in case of problems or in case of directional valve without VS.

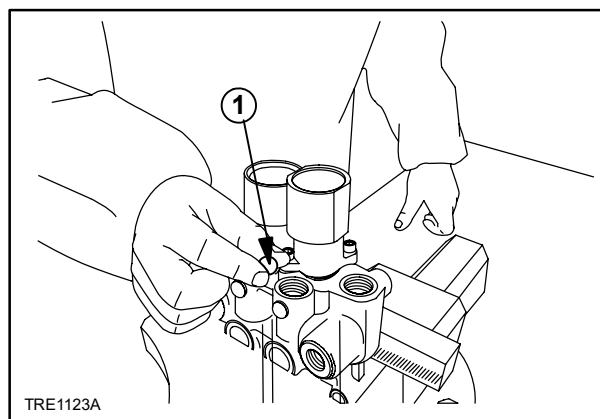
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21. Remove, single–double acting converting valve (1) Fig.34.



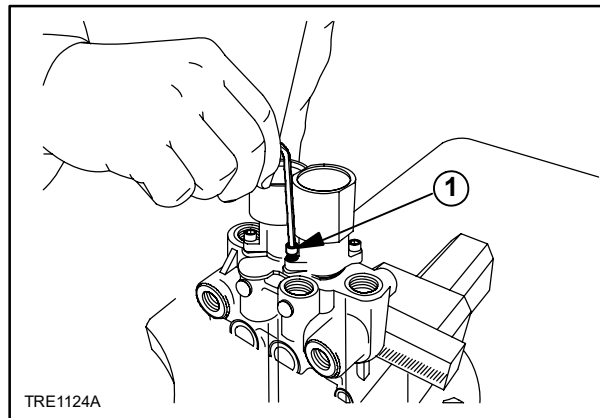
34

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



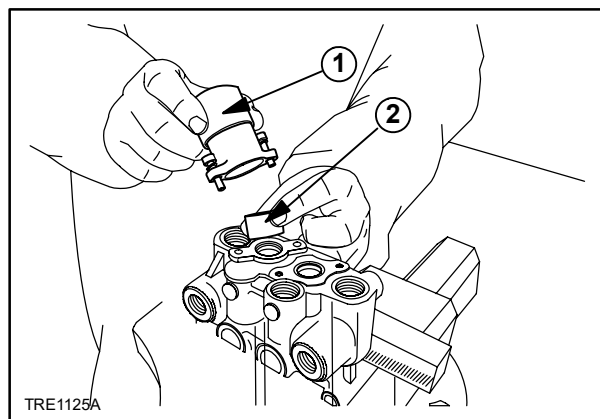
35

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



36

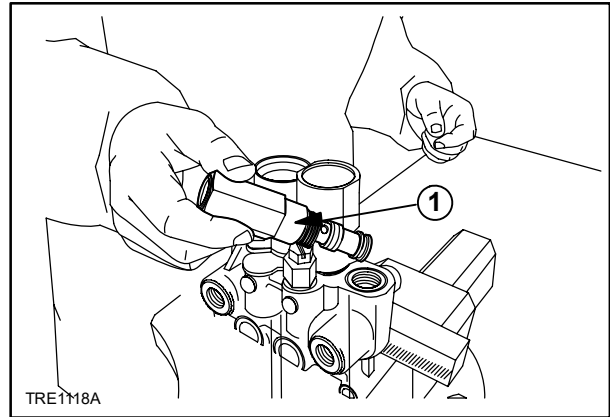
24. Withdraw the cover (1) and the spacer (2) Fig.37.
25. Check the condition of all seals before reassembly.



37

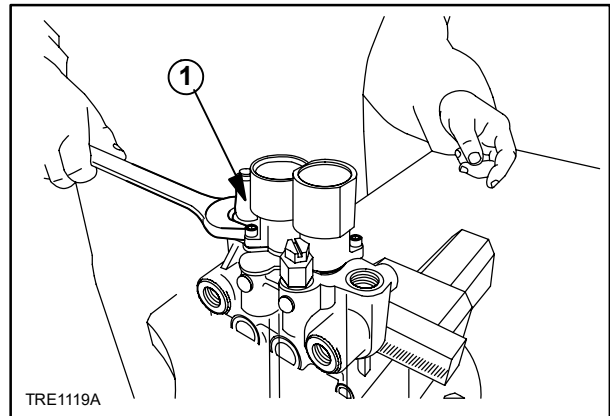
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17. Take off oil return valve (1) Fig.30



30

18. Remove relief valve (1) Fig.31.

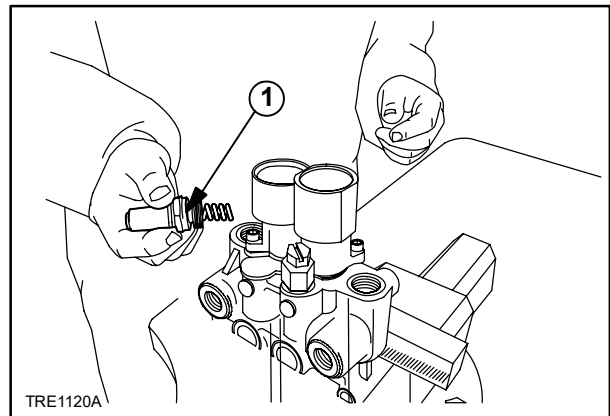


31

19. Withdraw relief valve (1) Fig.32.

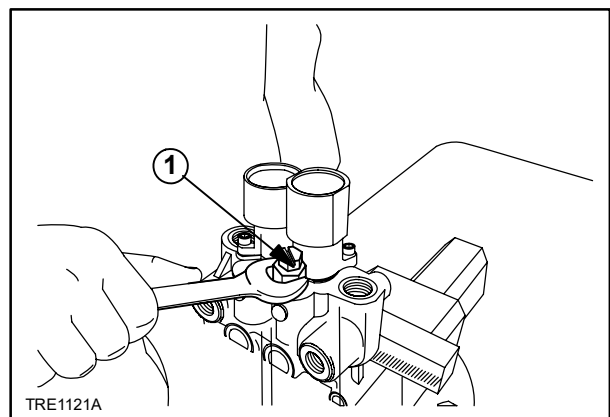
The relief valve can be checked when the engine is running. When the relief valve is tested as explained Section 35 Chapter 1 Page 35 the pressure gauge must show a pressure of 186–191 bar (2697.69 – 2828.22 psi).

If the valve does not correspond to the prescribed value, it is best to change it immediately.



32

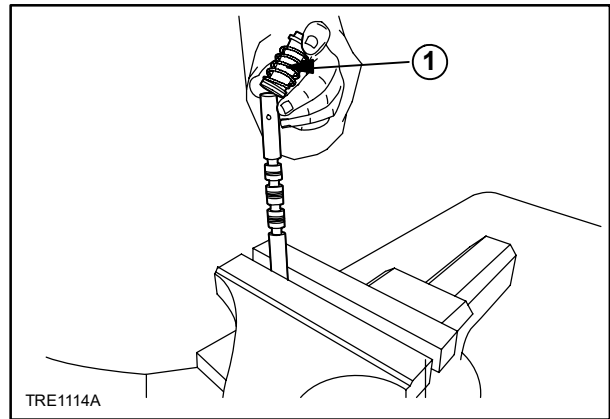
20. Slacken, single–double acting converting valve (1) Fig.33.



33

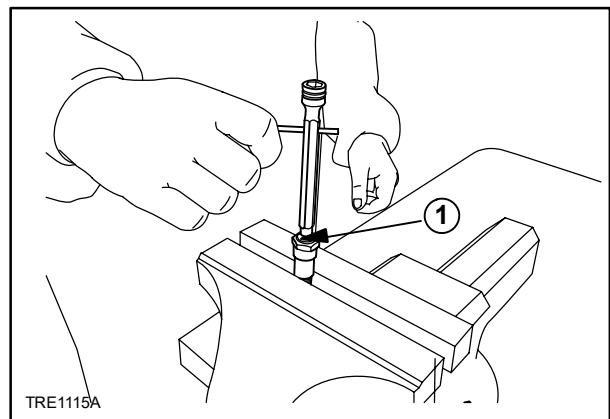
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13. Remove the spring and the detent body (1) Fig.26.



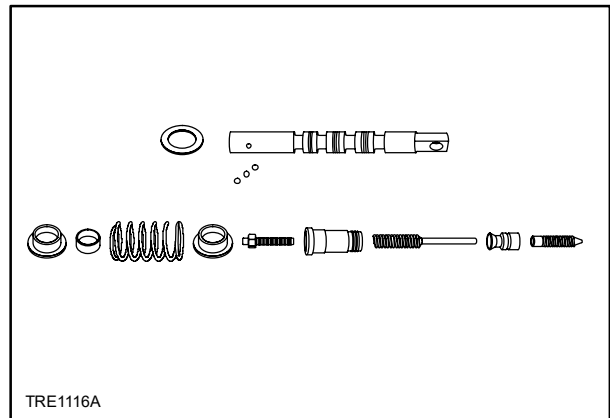
26

14. Remove the nut fixing the detent body (1) Fig.27



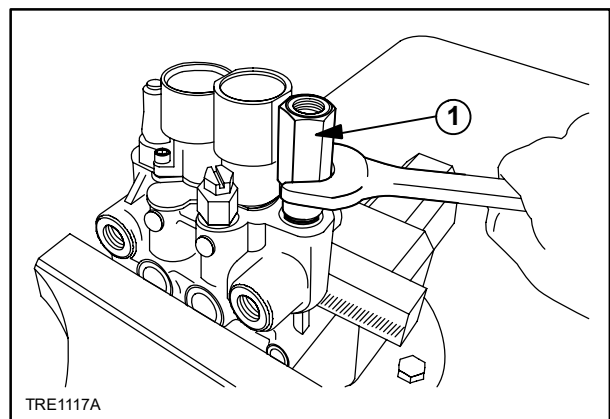
27

15. Complete spool assembly (Detent Release) is shown at Fig.28.



28

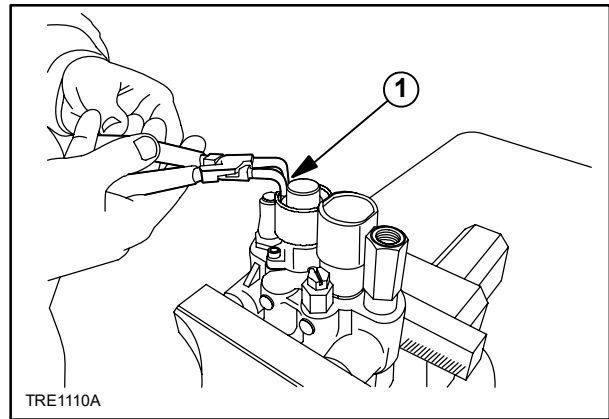
16. Remove oil return valve (1) Fig.29.



29

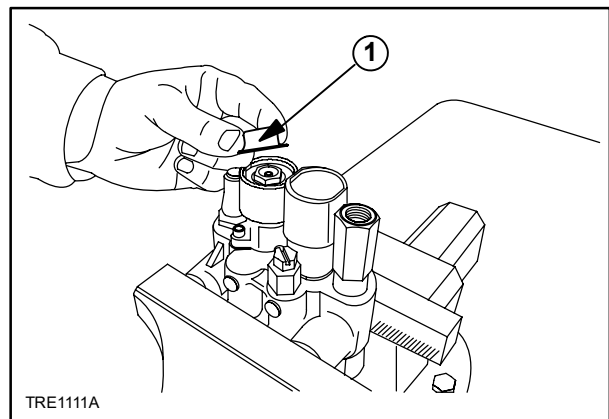
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9. Remove circlip (1) Fig.22.



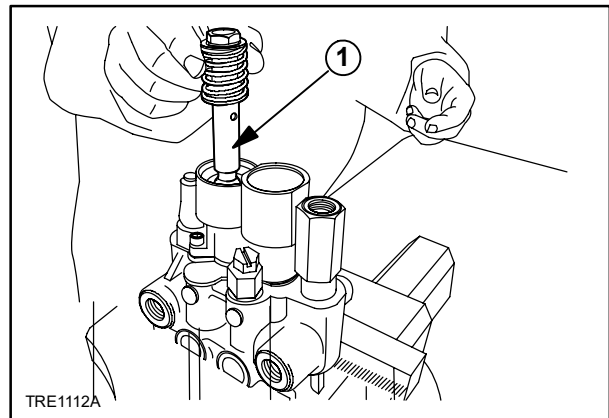
22

10. Take off the cover (1) Fig. 23.



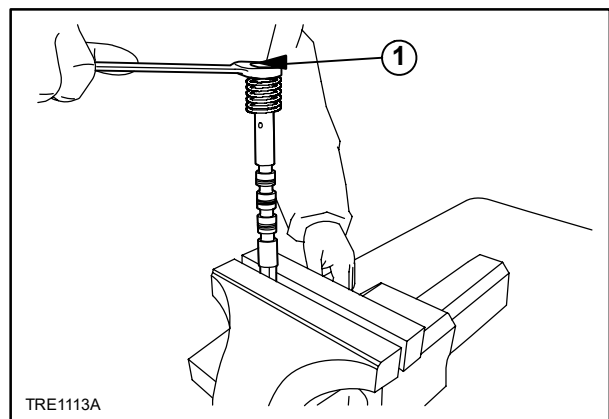
23

11. Remove the spool assembly (Detent release) (1) Fig.24.



24

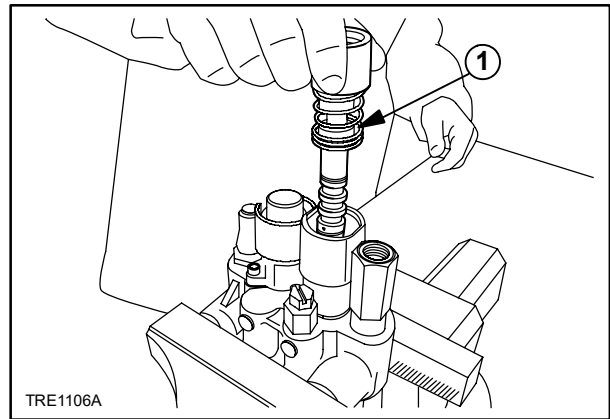
12. Remove the nut (1) Fig.25 fixing the assembly.



25

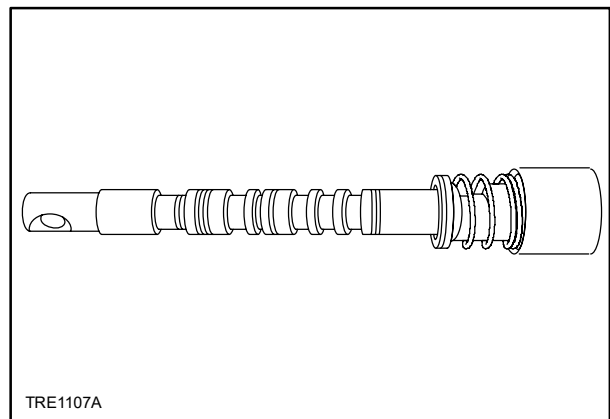
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5. Withdraw the spool assembly (1) Fig.18.



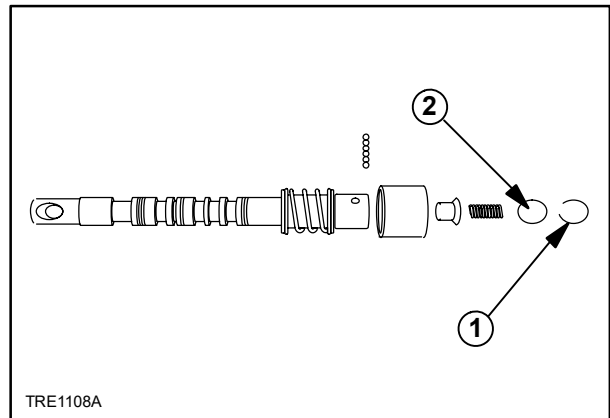
18

6. Complete spool assembly (Float & detent release) is shown at Fig.19.



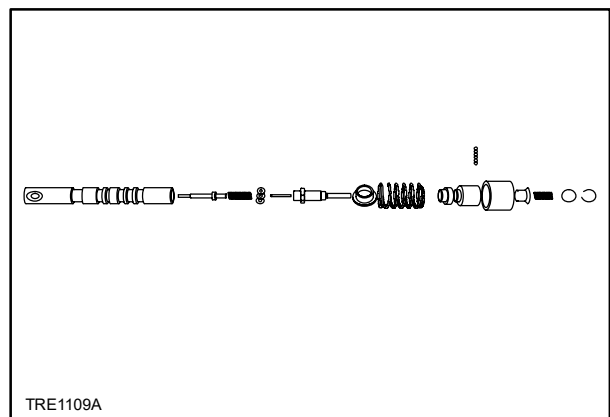
19

7. Remove circlip (1) and take off the washer (2) Fig. 20. Disassemble the unit to all its components.



20

8. Disassembled unit (Float & detent release) is shown at Fig.21.



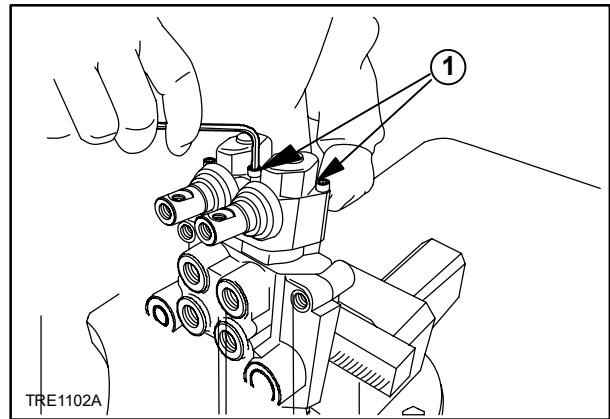
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**WARNING**

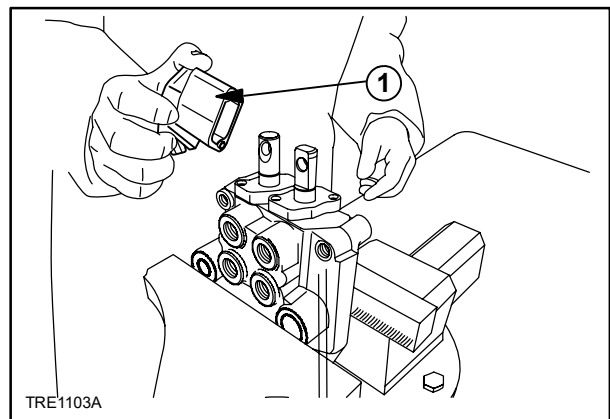
During the overhaul and disassembly–assembly of the units, put special protective devices between the bits of the vice, for preventing any damage to the valve components.

1. Remove Allen screws (1) Fig.14.



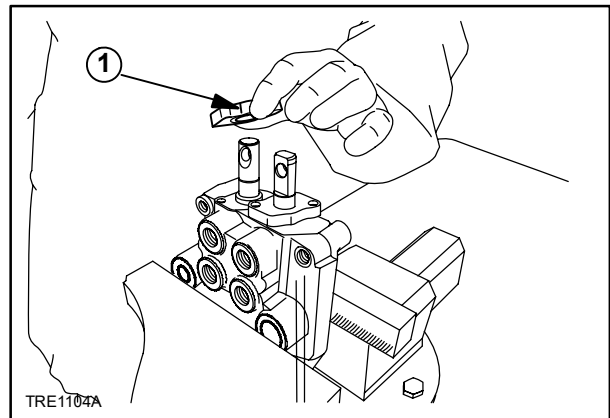
14

2. Remove both covers (1) Fig.15



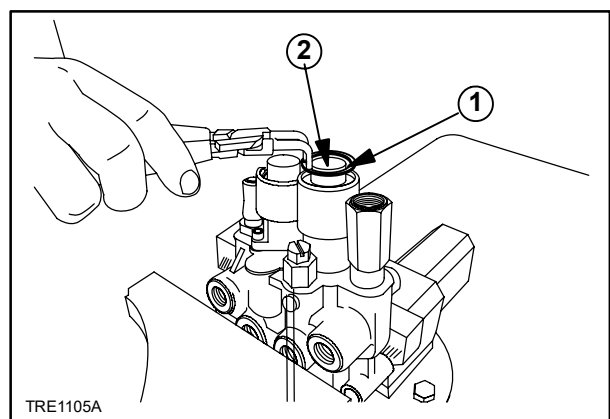
15

3. Remove both spacers (1) Fig.16



16

4. Remove the circlip (1) and take the cover (2) Fig.17 of the valve (Float & detent release)



17

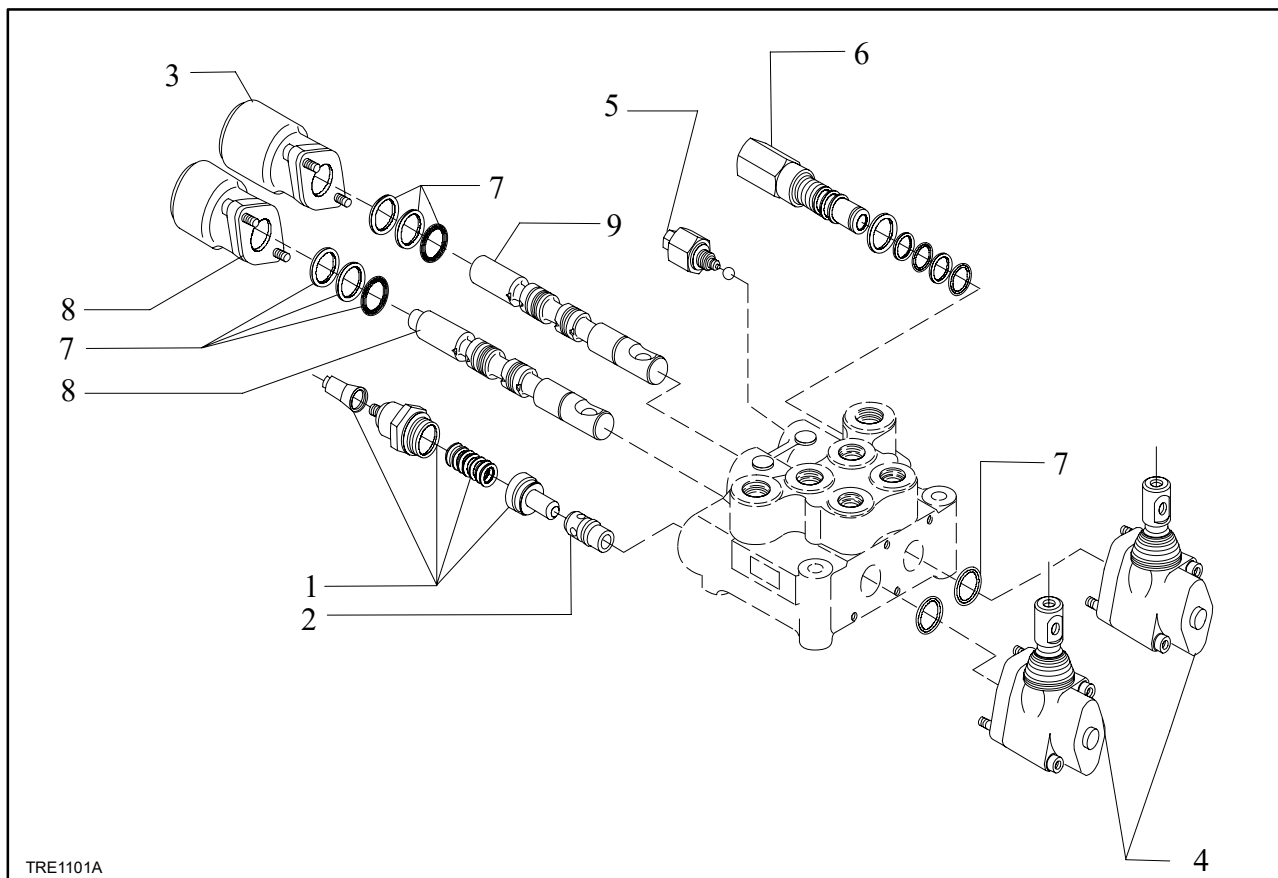
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Convertible single/double-acting auxiliary control valve with float control and detent release.**WARNING**

Handle all parts with care.
Do not insert fingers or hands between one part and another.
Wear suitable safety clothing, i.e., safety goggles, gloves and shoes.

**WARNING**

Always use suitable tools to align holes. NEVER USE YOUR FINGERS OR HANDS.



12

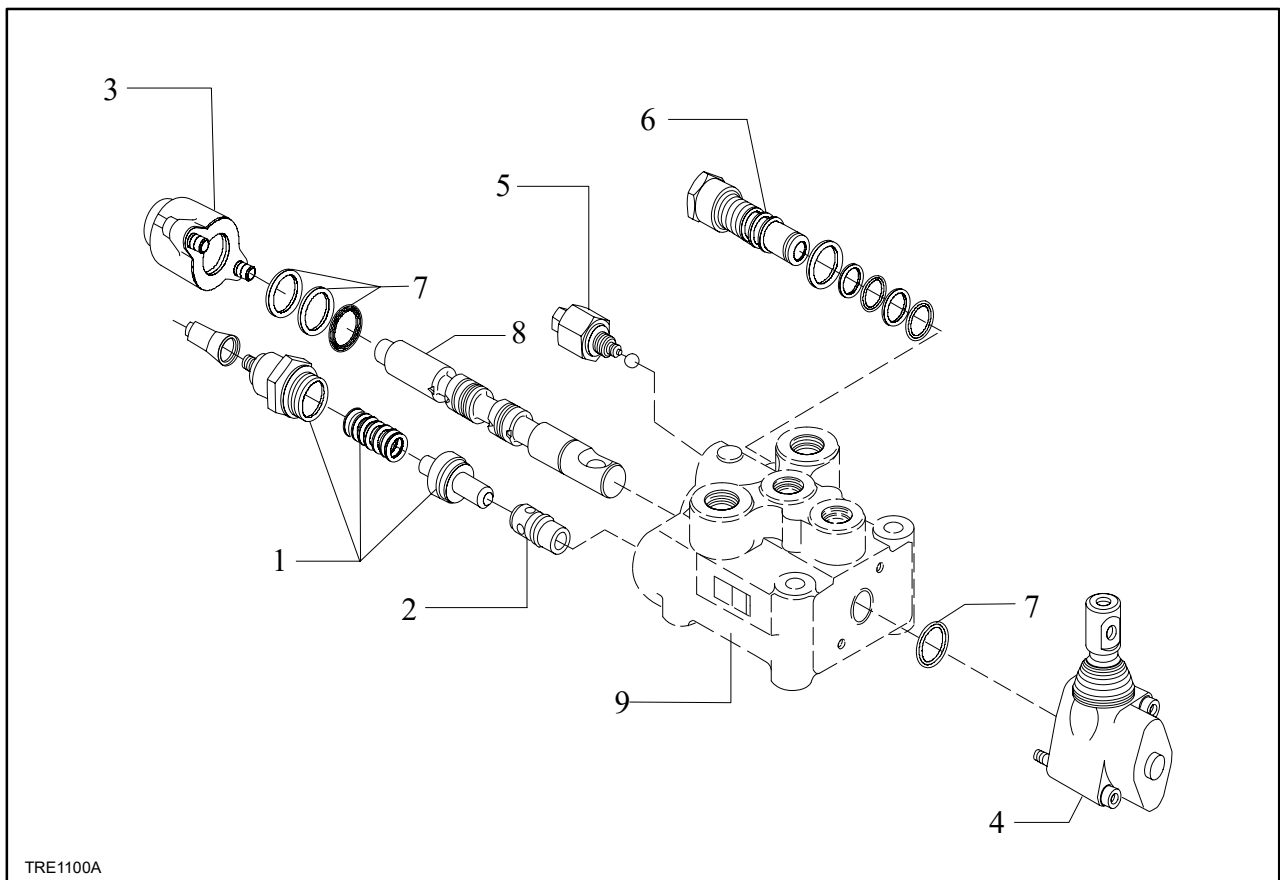
1. Pressure relief valve.
2. Check valve
3. Kick-out (detent) and float control assembly
4. Control lever support
5. Single double acting converting valve
6. Oil return valve
7. Spool O-ring kit
8. Kick-out control assembly.

Disassemble the auxiliary control valve into its component parts referring to the sectional views (fig. 1) and the following instructions:

???.???.?? - ?? - ????

AUXILIARY CONTROL VALVES (REMOVED FROM TRACTOR)

Disassembly – Assembly (Op. 35 204 46)
of valves removed from tractor



11

Convertible single/double-acting auxiliary control valve.

Disassemble the auxiliary control valve into its component parts referring to the sectional views (fig. 1) and the following instructions:

1. Remove cover (3) and O-rings (7).
2. Remove the control lever support (4) and take out the seal (7).
3. Withdraw the spool (8).
4. Remove plug (6) and extract the single/double acting switching valve (5).
5. Remove relief valve block (1) and check valve (2)
6. Remove the valve housing (9)
7. Check the condition of the seals before re-assembly.

**WARNING**

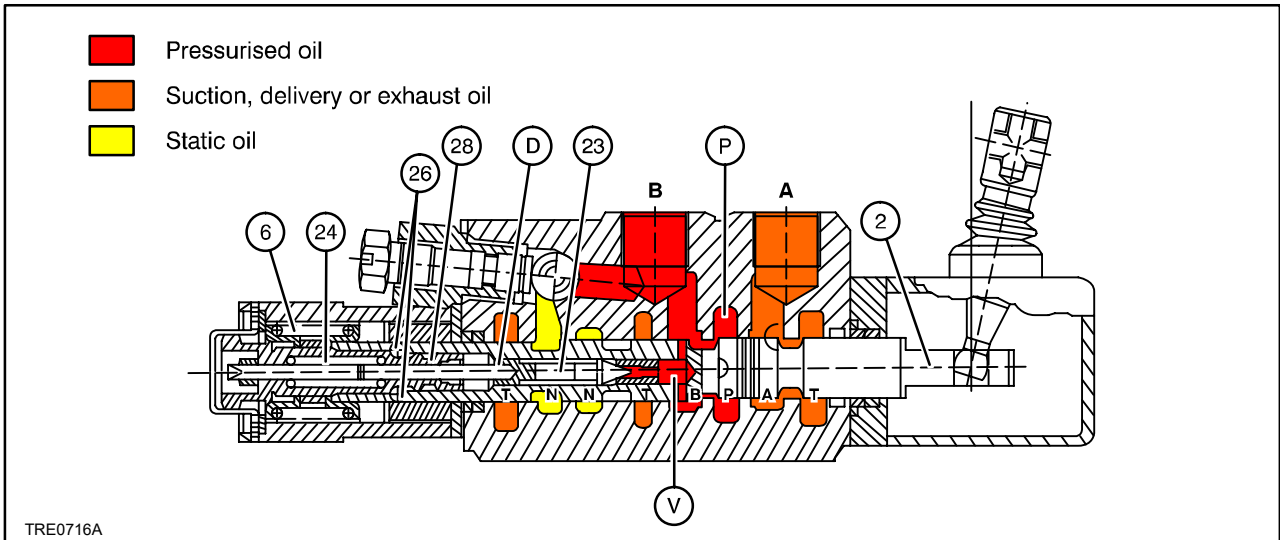
Handle all parts with care.
 Do not insert fingers or hands between one part and another.
 Wear suitable safety clothing, i.e., safety goggles, gloves and shoes.

**WARNING**

Always use suitable tools to align holes. NEVER USE YOUR FINGERS OR HANDS.

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OPERATING STAGES OF AUXILIARY CONTROL VALVE OPERATING A DOUBLE-ACTING CYLINDER WITH AUTOMATIC DETENT RELEASE



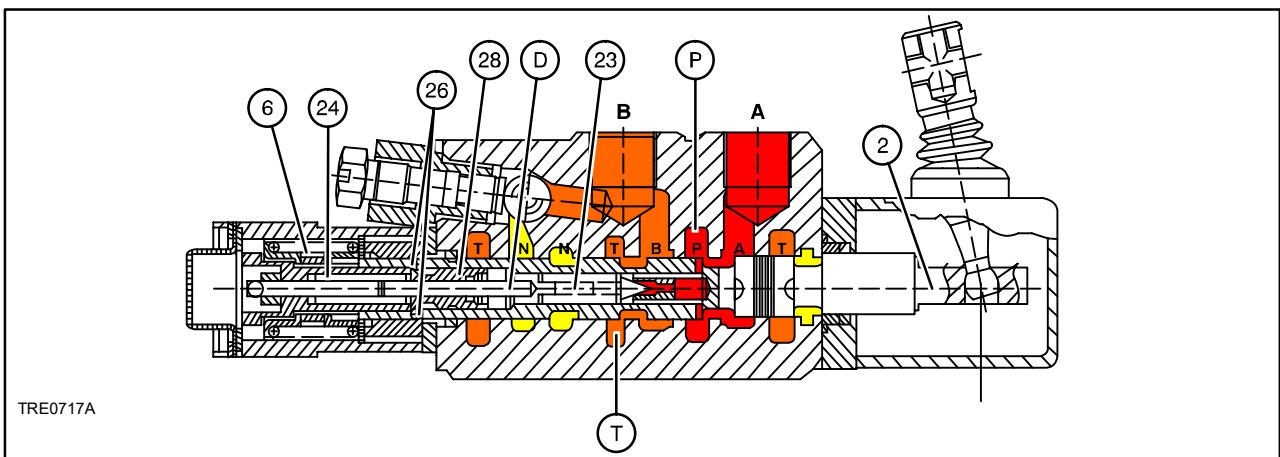
9

LIFTING

On pulling back the control lever, the spool (2) moves and the detent balls (26) engage the groove, 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.

On completion of the lifting movement, the oil pressure increases to 170–175 bar (173–178 kg/cm²). Acting

through port (V), it overcomes the resistance of the spring of the needle valve (23). Inside chamber (D), the oil pressure increases and, acting on the detent ball support (28), it overcomes the resistance of the spring, thus moving the support (28). In this condition the two detent balls (26) drop onto the support, releasing the spool (2) which, under the action of spring (6) returns to neutral position. Consequently the entire flow from the pump is conveyed to the lift control valve through lines (P).



10

LOWERING

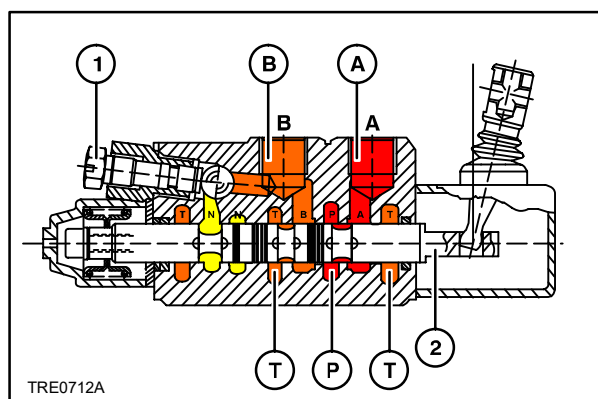
To lower the implement, push the control lever forward. The control valve spool (2) moves and the detent balls engage in the central groove where they are held in position by the support (28) and the spring (24). In this condition the oil contained in the lower chamber of the cylinder can flow to the exhaust (T)

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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 in the manner described previously.

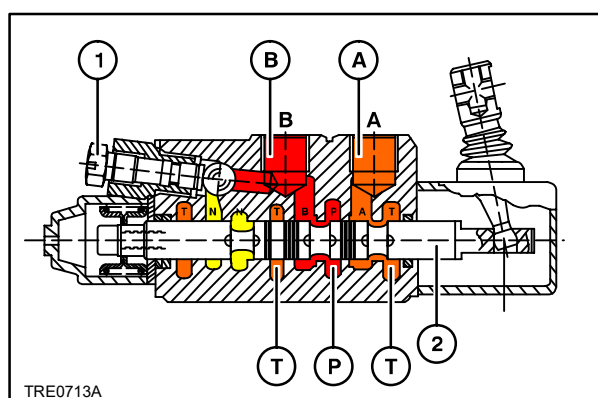
OPERATING STAGES OF AUXILIARY CONTROL VALVE FOR OPERATION OF A DOUBLE-ACTING CYLINDER (FIGS. 5 & 6) AND SINGLE-ACTING CYLINDER (FIGS. 7 & 8)

1. LIFTING – On pulling back the control lever, (located in the cab) the control valve spool (2) moves to connect: pressure line (P) with the lower chamber of the cylinder by way of line (A), and also exhaust line (T) by way of line (B), intercepting the supply of oil to the lift control valve. Keep the lever pulled back, to extend the cylinder to its full stroke. On releasing the lever it will automatically return to neutral position, under the action of the return spring, and the entire flow from the pump will be conveyed to the lift control valve by way of line (P).



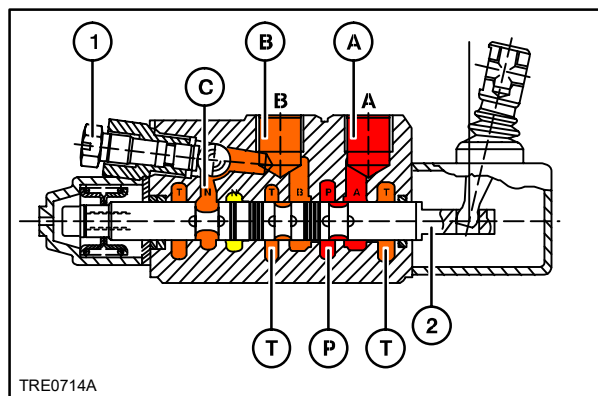
5

2. LOWERING – To lower the implement, push the control lever (located in the cab) forward. The control valve spool (2) will move to the position indicated in fig. 6, thus allowing the oil in the lower cylinder chamber to flow to the exhaust (T) through line (A), while the upper chamber is connected to the pressure line (P) through line (B).



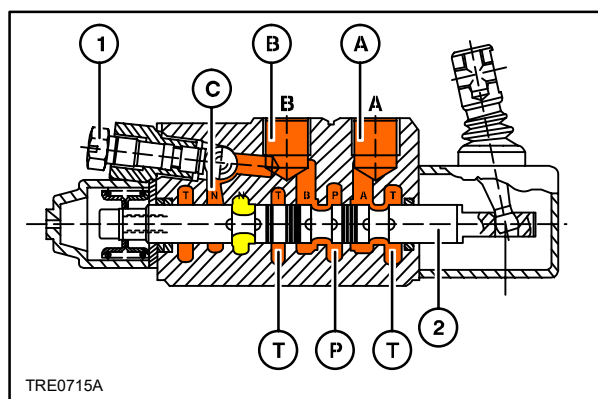
6

3. LIFTING – On pulling the control lever back, the control valve spool (2) fig. 7 moves to connect the cylinder with the pressure line (P) by way of line (A). Line (C), for the control of single-acting cylinders, is used in this stage as it is permanently connected to the exhaust (T) by the open position of the switching valve (1).



7

4. LOWERING – On pushing the control lever forward, the spool (2) will move to the position indicated in fig. 8. The oil contained in the cylinder, pressurised by the weight of the lifted implement, will flow to the exhaust (T) by way of line (A), while the entire flow from the pump is also conveyed to the exhaust (T) through the line (B).



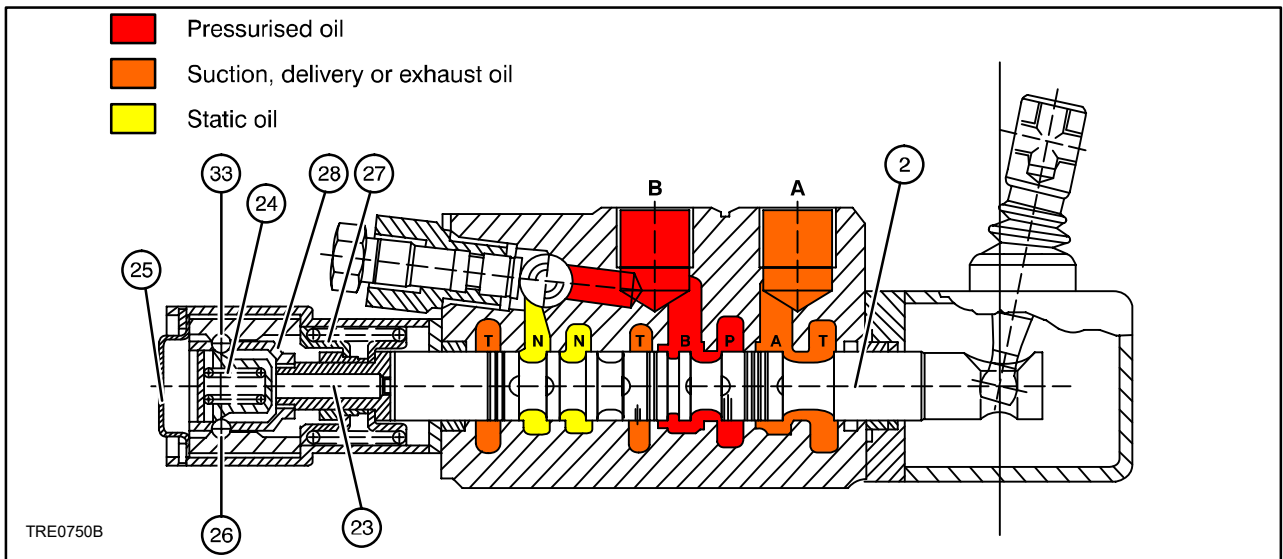
8

- Pressurised oil
- Suction, delivery or exhaust oil
- Static oil

NOTE: To operate a double-acting cylinder, tighten screw (1) fully home. To operate a single-acting cylinder, fully undo screw (1).

???-??-??-??-??-??-??-??-??-??

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

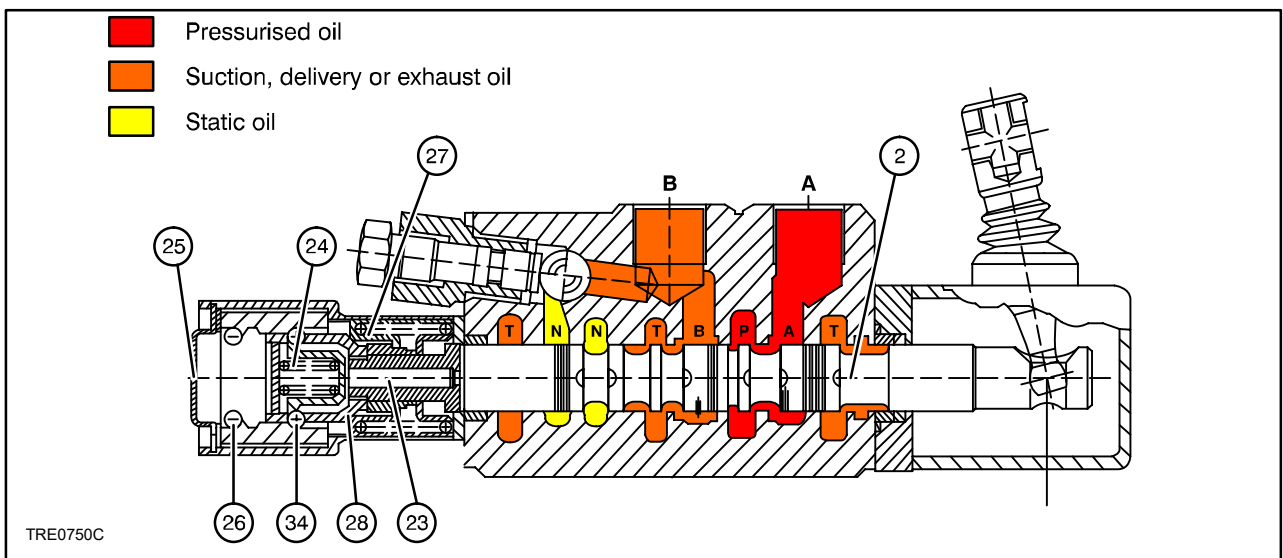


3

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.

???-??-??-??-??-??-??-??

DESCRIPTION AND OPERATION

The auxiliary control valves serve to control hydraulic loads external to the tractor.

Up to a maximum of **three** auxiliary control valves may be mounted at the rear of the centre housing.

The auxiliary control valves are operated by hand levers located to the right of the driving position.

Each control lever will have three or four positions depending on the type of control valve it operates.

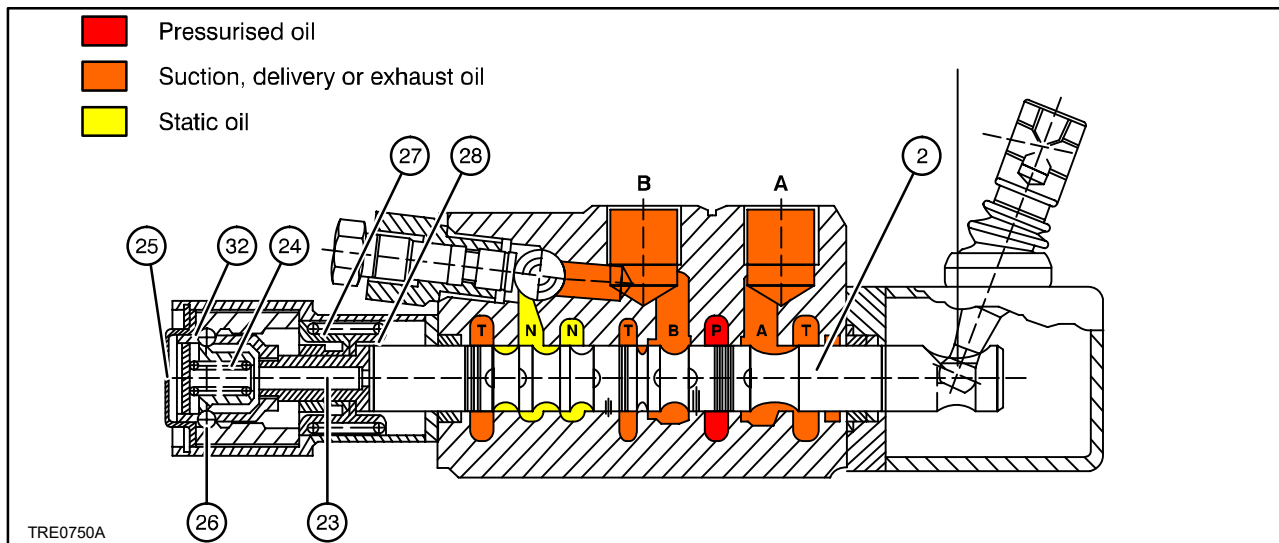
1. Lifting – Pull lever back to lift the implement.
2. Lowering – Push the lever forward to lower the implement.

3. Neutral – When the lever is released from the lifting and lowering positions it will automatically return to neutral position.

4. Float – Push the lever forward beyond the “lowering” position to select “float position”. In this position the only force exerted on the implement will be that created by its own weight, thus allowing the implement to follow the profile of the terrain.

The operation of the hydraulic control valves is described in the following pages.

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



2

Section view

2. Spool.
23. Internal plunger.
24. Spring.
25. Cover.
26. Detent balls.
27. Spool return spring.
28. Spring cup.
32. Float mode selection groove.

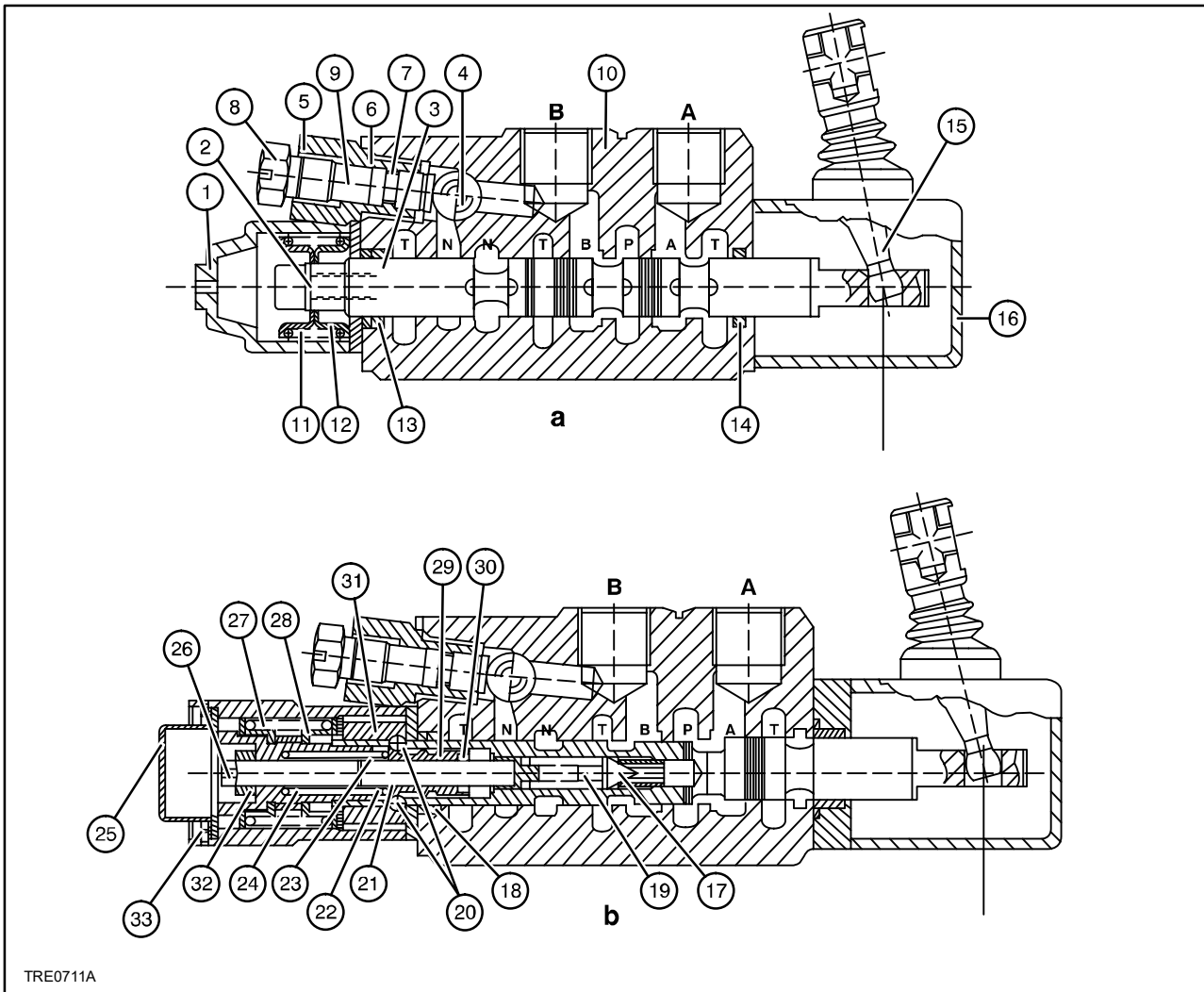
NOTE: Some parts related with automatic detent release are not shown in this view. Automatic detent release working principle of valve shown in Fig. 2 is same as the valve shown at Fig. 9 & Fig. 10.

FLOAT CONTROL OPERATION

To select float control operation, push the control lever (located in the cab) fully forward. The control valve spool (2) will move and detent balls (26) will engage in the grooves (32) where they will be held in position by the support and the spring (24). In this position the spool directs the oil at A and B ports to

exhaust lines T. No pressure applied to both ports. In this condition, the only force acting on the attached implement is that created by its own weight and the hydraulic lift may be operated. Automatic detent release does not occur during float control as there is no pressure inside the auxiliary control valve.

????.???.???.?? – ?? – ????



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1

Auxiliary control valves – Section views

- a. Auxiliary control valve for convertible single/double-acting cylinder.
- b. Auxiliary control valve for convertible single/double-acting cylinder with automatic hydraulic release.

NOTE: Section view of auxiliary control valve configured for operation of double-acting cylinder with float and automatic detent release was shown at page 3 .

1. Cover.
2. Spacer.
3. Spool.
4. Check valve.
5. Single/double-acting conversion valve body.
6. Seal.
7. Seal
8. Single/double-acting switchover screw.
9. Single/double-acting operation adjusting spool
10. Valve body.

????.???.?? - ?? - ????

11. Spool return spring.
12. Spring cup.
13. Seal.
14. Seal.
15. Control lever
16. Control lever support.
17. Tapered needle.
18. Seal.
19. Spring.
20. Detent balls.
21. Detent ball support.
22. Seal.
23. Internal plunger.
24. Spring.
25. Cover.
26. Detent release pressure adjuster screw.
27. Spool return spring.
28. Spring cup.
29. Seal.
30. Seal.
31. Detent notch body.
32. Detent screw locknut.
33. Circlip.

SECTION 35 – HYDRAULIC SYSTEM

Chapter 2 – Open centre system auxiliary control valves

CONTENTS

Section	Description	Page
35 000	Main data – Tools	1
	Auxiliary control valves – sectional views	2
	Description and operation	3
	Fault diagnosis	see chapter 1
35 204 46	Auxiliary control valves – Assembly–Disassembly	7
	Spool binding test	15
	Spool leakage test	16
	Adjustment of the automatic detent release pressure	17

**35 000 – MAIN DATA – TORQUE DATA – TOOLS – SECTIONAL VIEWS
– DESCRIPTION AND OPERATION**

MAIN DATA

Filter	full-flow filter, with paper cartridge, (common to the hydraulic lift circuit)
Pump	gear pump (common to the hydraulic lift circuit, see chapter 1)
Auxiliary control valves	
Location	valve stack (up to a maximum of 3 valves) attached to the rear of the centre housing
Operation	manually with hand lever
Pressure relief valve setting	186–191 (2697.70 – 2770.22)
Type	convertible for operation of single– or double–acting cylinders, convertible for operation of single– and double–acting cylinders and with automatic detent release, for operation of double–acting cylinders with float control and automatic detent release

TOOLS

WARNING: The operations described in this section must only be carried out using the **ESSENTIAL** tools marked below with an **(X)**.

For greater safety and to obtain the best results while saving both time and effort, we recommend that these essential tools are used in conjunction with the specific tools listed below, and with certain tools which are to be made following the constructional drawings in this manual.

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

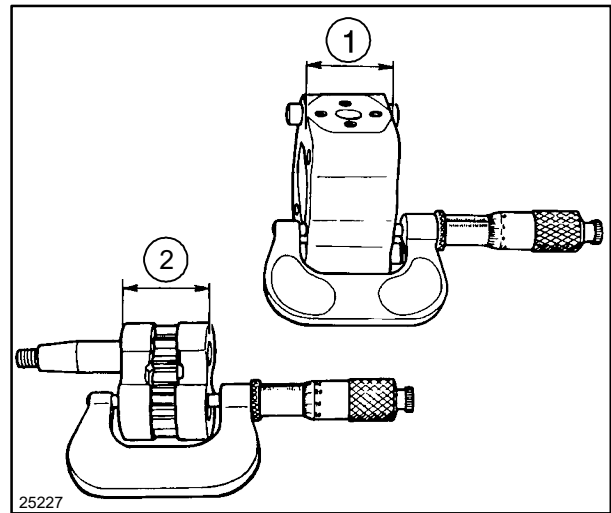
380000240 Universal pressure testing kit.

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Once the parts are removed, proceed as follows:

7. Check that the gear contact surfaces are flat and perpendicular to their supports. Insert a thin layer of carbon black. Small rough spots can be removed using extremely fine and well lubricated abrasive paper.
8. Check that the axial play of the gear–support unit in the pump body is 0.090 – 0.160 mm (0.0035 – 0.0063 in.). The distance (2) must be 0.090 – 0.160 mm (0.0035 – 0.0063 in.) smaller than the distance (1).

If necessary, true the flat surfaces involved using lubricated abrasive paper to remove extremely small quantities of material. Ensure that axial play is still within the limits of 0.090 – 0.160 mm (0.0035 – 0.0063 in.).



135

9. Clean all constituent parts thoroughly.
10. Replace the seals (2, 9 and 11).
11. Lubricate the parts with the same oil as the system. Refit the pump, referring to fig. 134 and proceed as follows:
12. refit, performing operations 6 to 1 in reverse order;

always ensure maximum cleanliness to prevent foreign matter from entering, as this could damage the pump;

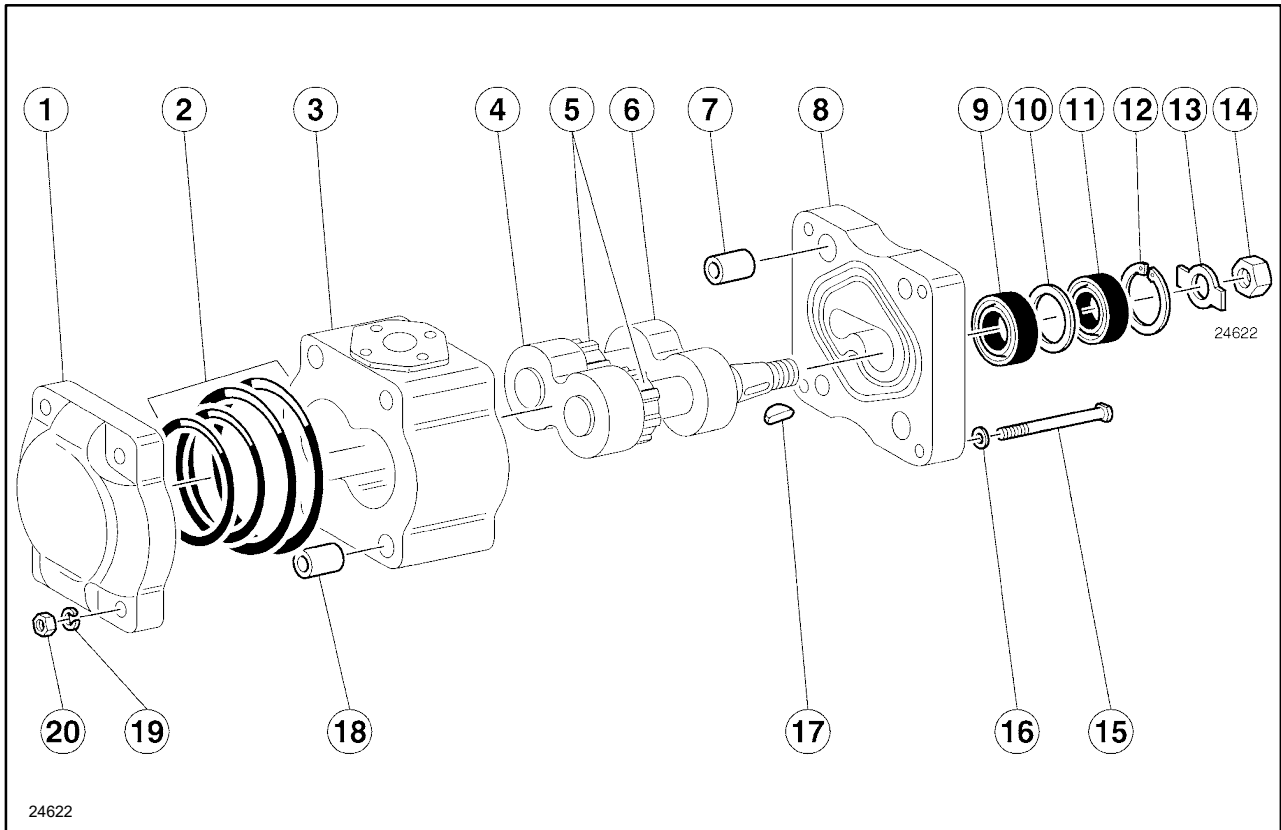
fit together previously marked parts (3), (4), (5) and (6) fig.134; see procedure on page 41 to refit them in their original position;

mount the gear supports (4) and (6) fig. 134, in the pump body. Mount them with the fittings on the external circumference matched up with the discharge pipes and the front faces with lubrication millings in contact with the gears;

fit the plastic anti-extrusion rings on the seals (2) fig. 134:

mount the seals (9) and (11) fig. 134, on the control side cover (8), complete with spacer (10). Mount them so that the cavity is between the seal lips on the opposite side from this spacer. Finally fill the cavity with **AKCELA MULTI-PURPOSE GREASE 251H EP** grease.

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Hydraulic lift control pump components

- | | |
|------------------------------------|-------------------------|
| 1. Front cover. | 11. Driving shaft seal. |
| 2. Cover seals. | 12. Snap ring. |
| 3. Pump body. | 13. Safety washer. |
| 4. Gear support. | 14. Nut. |
| 5. Driven and driving gear shafts. | 15. Bolt. |
| 6. Gear support. | 16. Washer. |
| 7. Bushing. | 17. Key. |
| 8. Control side cover. | 18. Bushing. |
| 9. Driving shaft seal. | 19. Safety washer. |
| 10. Spacer. | 20. Nut. |

HYDRAULIC LIFT CONTROL OIL PUMP

Removal – refitting with pump removed (Op. 35 0101 10)

Proceed as follows:

1. Remove the cover fastening nuts (20), then the bolts (15) and the safety washers.
2. Remove the nut (14) that fastens the sleeve to the pump driving shaft and the safety washer.
3. Remove the front cover (8), the snap ring (12) and the seals (9 and 11).
4. Mark parts 3, 4, 5 and 6 to enable them to be remounted in the same position if they are in good condition.
5. Remove the supports (4 and 6) and the gears (5) from the rear cover (8) and the pump body (3).
6. Remove the seals (2) and the anti-extrusion rings.

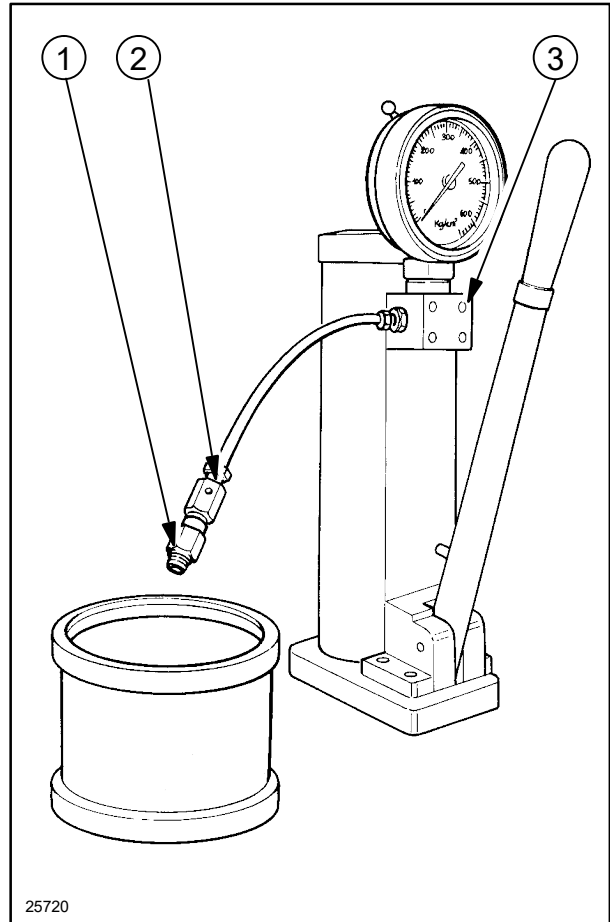
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16. Fit the cylinder safety valve (1) on the valve union **380000218**(2) and connect it to the hand pump **380000215** (3).
17. Operate the hand pump (3) and check that the cylinder safety valve opens at a pressure of 210 – 215 bar (3045.78 – 3118.30 psi). If the valve setting does not correspond to the specified value, it is best to replace the valve straight away. If necessary, however, it can be adjusted by turning the threaded cap using spanner **380000230**. Tighten to increase the valve setting value, or slacken to decrease the value.
18. Fit the hydraulic control valve block as follows:

**WARNING**

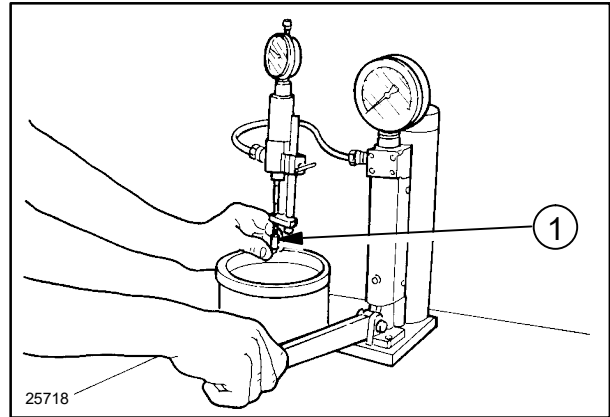
Always use appropriate tools to align fixing holes.
NEVER USE YOUR FINGERS OR HANDS.

Refer to the illustrations on page 8 for the orientation of the various components:
Apply the torque settings listed on page 5.
Fit the complete control valve block pin.
Fit the check valve.
Fit the cylinder safety valve.
Fit the control valve.
Fit the complete pressure control valve.
Fit the cover on the control valve block.



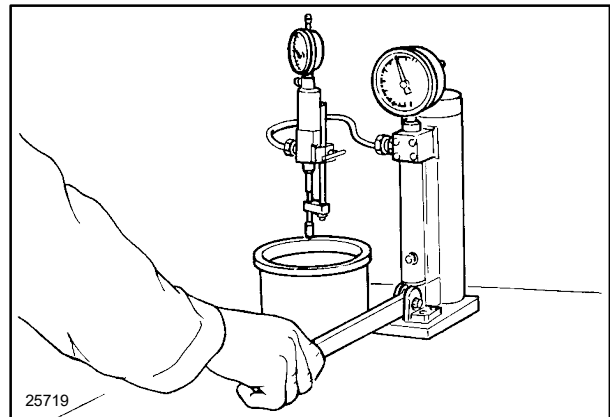
25720

12. Operate the hand pump and at the same time tighten screw (1) on the tool until oil stops flowing out through the control valve block pin seat outlet.
13. Now zero the dial gauge.
14. Tighten the screw (1) on the tool further to move the control valve block pin by 1.8 – 2 mm (0.0709 – 0.0787 in.), using the dial gauge to read this distance.



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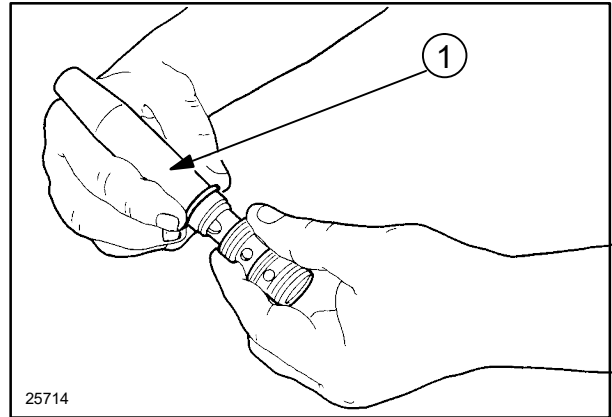
15. Operate the hand pump until the oil in the system is at an initial pressure of 245 bar – 3553.41 psi. Using the pressure gauge, check that it takes more than six seconds for the pressure to fall from 196 bar – 2842.73 psi to 98 bar – 1421.36 psi. If it takes less than this, replace the control valve block pin. Bear in mind that this part is supplied together with its seat.



132

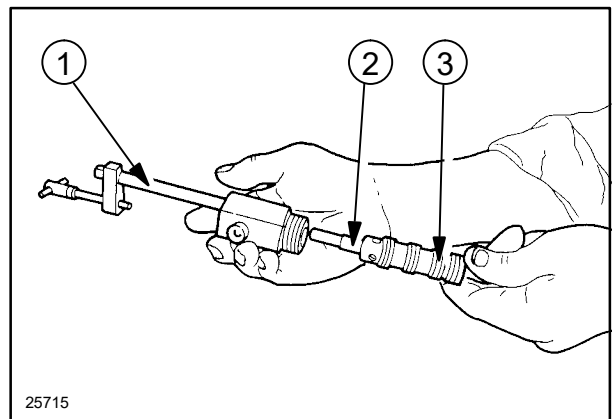
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7. Check the wear of the seals on the control valve block pin seat. If damaged, replace them using protection device **380000275** (1), following the instructions given on page 9.
8. Check the efficiency of the control valve block pin as follows.



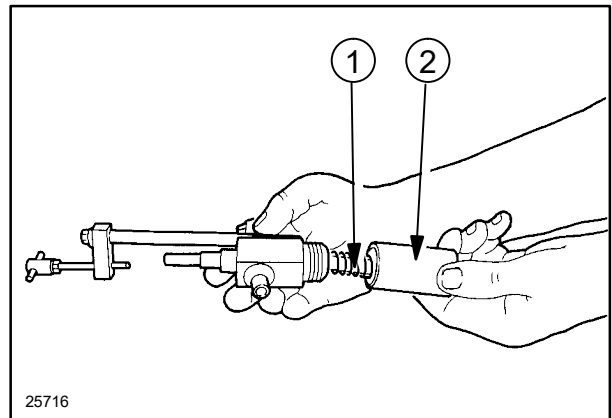
127

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



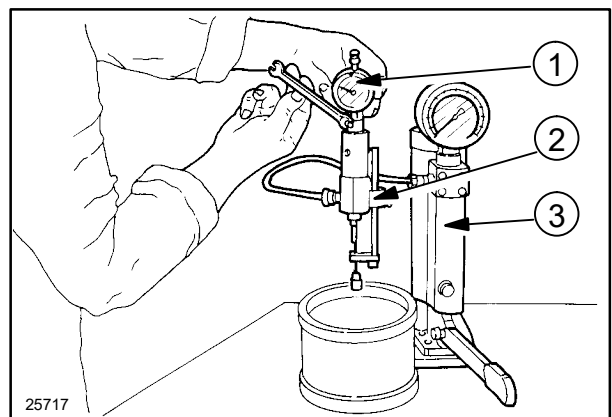
128

10. 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.



129

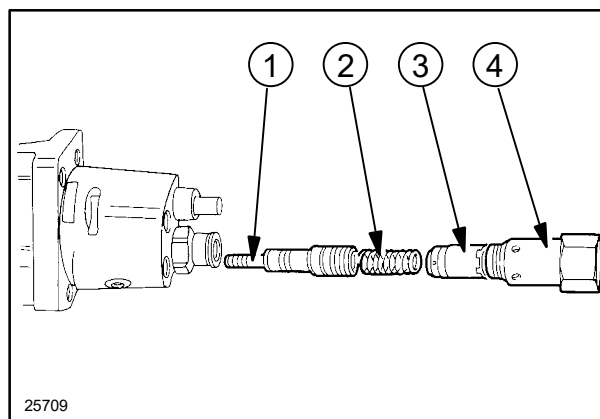
11. Fit tool **380000274** (2) on the hand pump **380000215** (3), supplied with **HYDROSYSTEM 68** oil. Connect a dial gauge (1) and secure it with its screw.



130

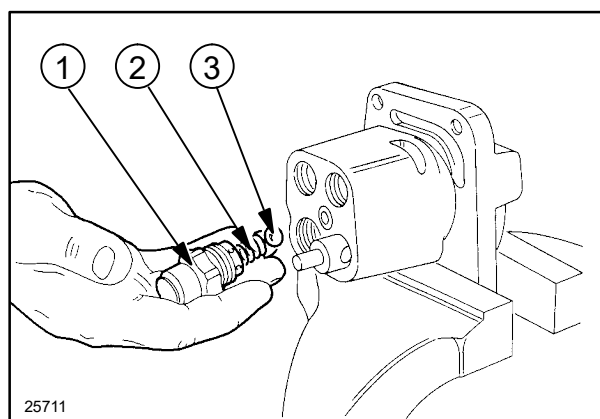
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4. Take off the cylinder safety valve (4) and remove the arm lowering speed adjustment valve (3), the spring (2) and the pin (1).



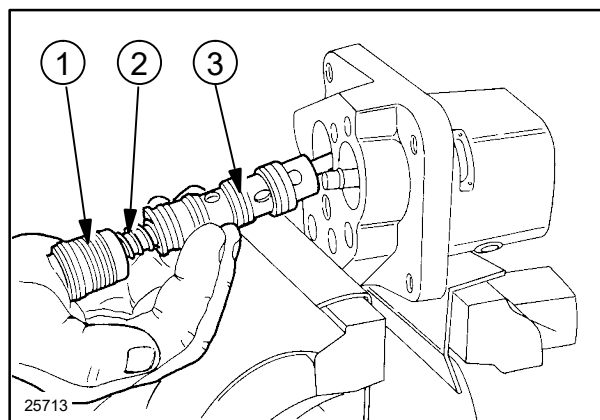
124

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



125

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



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LIFT CONTROL VALVE BLOCK, DETACHED**Disassembly–Assembly (Op. 35 110 14)**

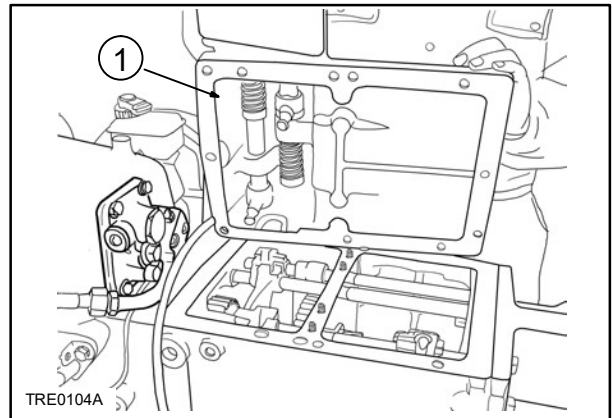
Proceed as follows.

**WARNING**

Handle all parts with the utmost care.

Do not place your hands or fingers between one part and another. Wear the prescribed safety clothing, including glasses, gloves and protective footwear.

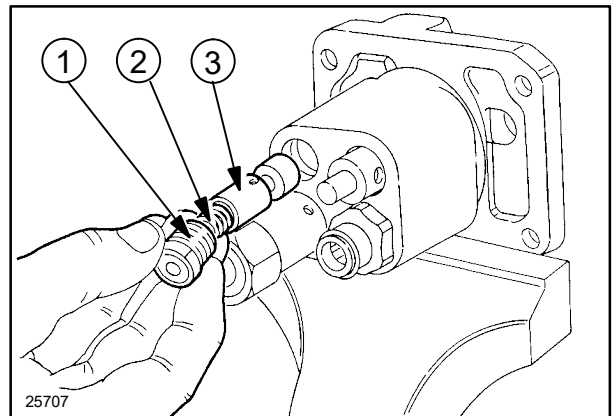
1. Before removing the control valve, first remove the transmission cover (1).



122

2. Before disassembly, thoroughly clean the surfaces of the control valve block. Lock the control valve block in a vice.

3. Unscrew the cap (1) and remove the spring (2) and the control valve (3).



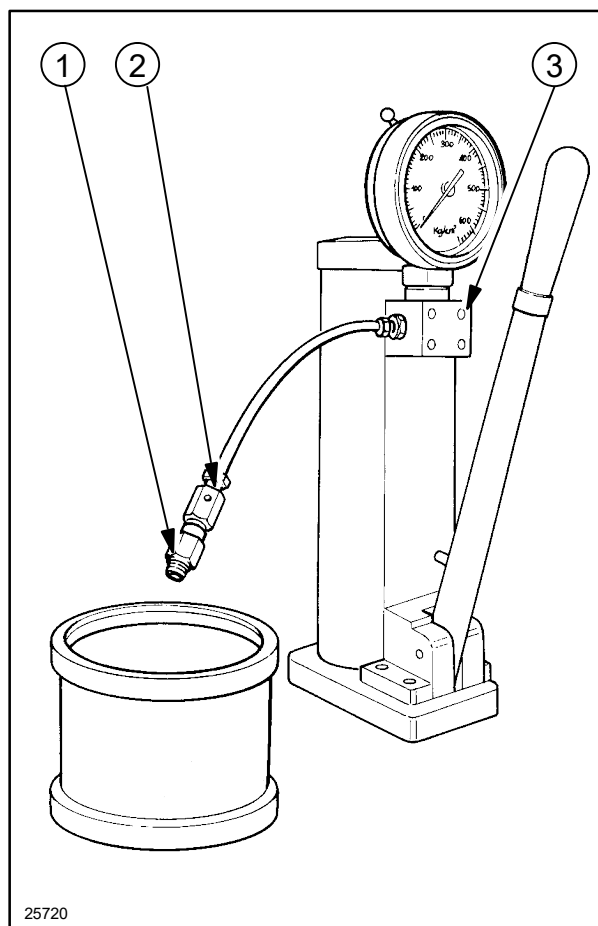
123

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NOTE – The pressure relief valve setting can be bench tested as follows:

8. Fit the pressure relief valve (1) on the valve union **380000217** (2) and connect the union to the hand pump **380000215** (3).
9. Operate the hand pump (3) and check that the pressure relief valve opens at a pressure of about 186 – 191 bar (2697.69 – 2828.22 psi).

Warning – During assembly, the pressure relief valve is calibrated using oil flow and the check using hand pump **380000215** is to be considered only approximate. It is therefore advisable to check the pressure relief valve setting with the valve fitted on the tractor as described above.



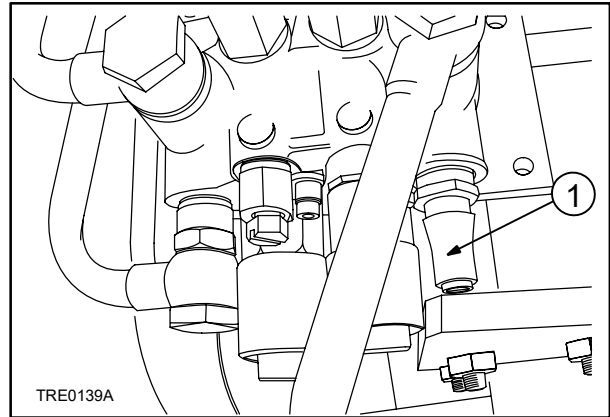
121

LIFT PRESSURE RELIEF VALVE

Removing–Refitting (Op. 35 110 30)

Auxiliary control valve blocks. The lift pressure relief valve (1) is located as shown in fig.118)

If defective, remove and change the valve.



118

LIFT PRESSURE RELIEF VALVE

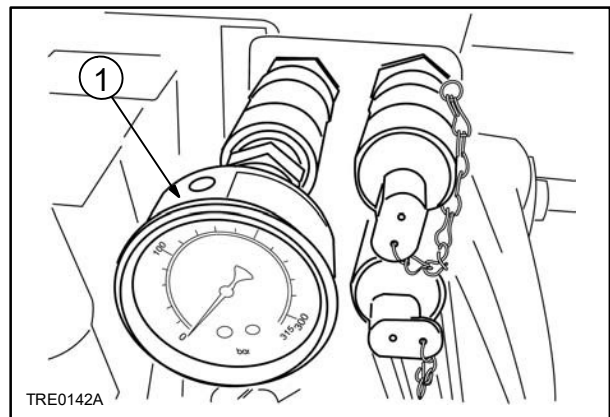
Calibration (Op. 35 110 32)

Proceed as follows.

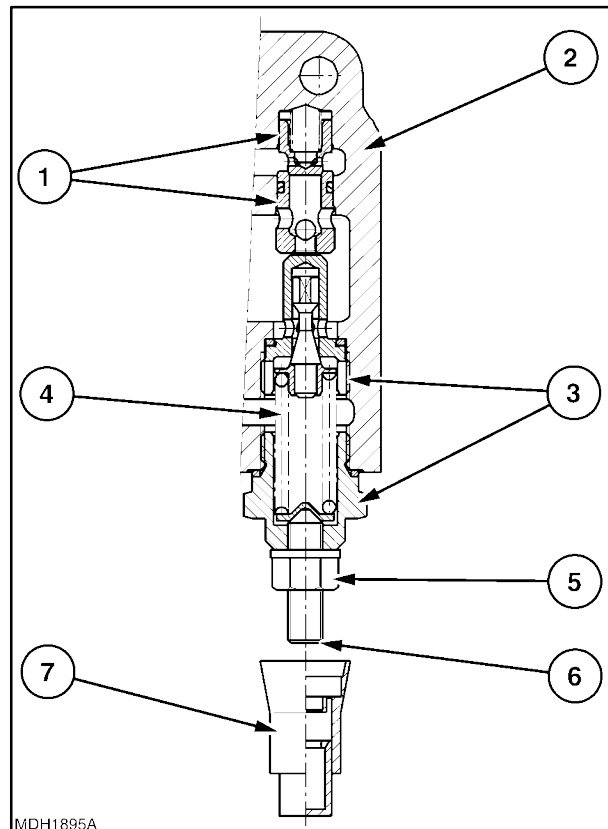
1. Run the engine until the oil reaches a temperature of about 50°C (122 °F).
2. Insert the fitting **380000554** (1) in a quick-fit female half-coupling and connect it to the 0 – 3555.84 psi scale pressure gauge supplied with kit **380000240**.
3. Activate the half-coupling control valve block lever until the pressure relief valve cuts in.
4. With the engine running at medium speed the pressure gauge must show a pressure of about 186 – 191 bar (2697.69 – 2828.22 psi). If the valve setting does not correspond to the prescribed value, it is best to change it immediately. If necessary it can be adjusted by turning the cap, after removing the plastic sealing and unscrewing the locknut, with a 4mm hex wrench. Tighten it to increase the valve setting, unscrew it to decrease the setting.

Pressure relief valve section.

1. One-way valve.
2. Additional control valve body.
3. Pressure relief valve body.
4. Valve spring.
5. Locknut.
6. Adjustable needle (4 mm wrench).
7. Plastic sealing.



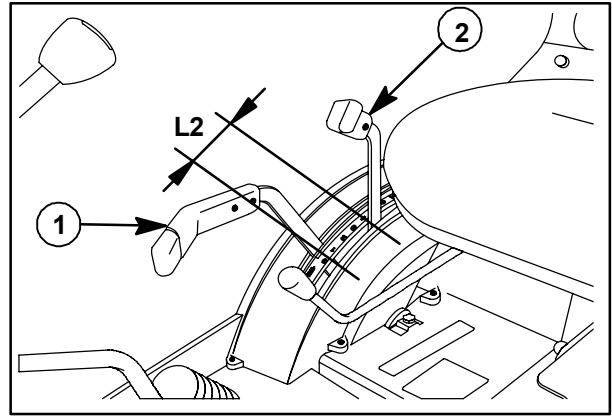
119



120

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8. Move the draft control lever (2) to a distance (L_2) of 95 – 105 mm (3.7402 – 4.1338 in.) from the beginning of the slot and check that at this position the arms start to rise.
9. If they do not, adjust the eccentric pin (1) fig. 105, to restore this distance.
10. Fasten the eccentric pin using the securing bolt (1) fig. 106.

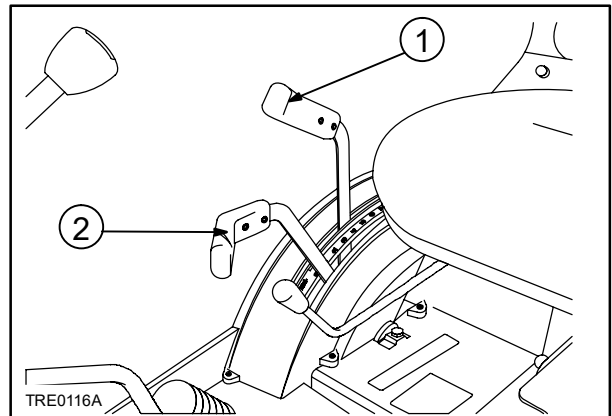


114

Adjusting LIFT-O-MATIC device

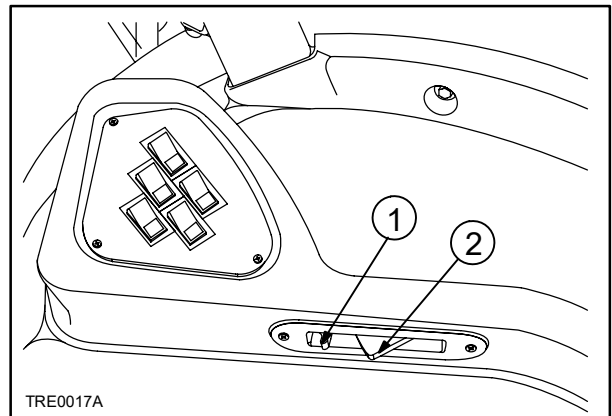
Proceed as follows:

11. Move the position control lever (1) and the draft control lever (2) fully forward in the sector.



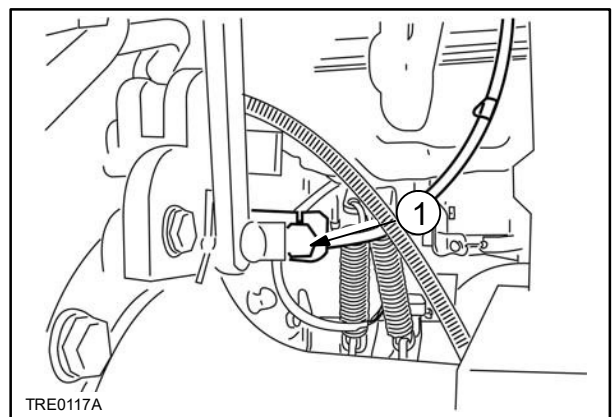
115

12. Raise the lift arms by means of the lever (1).



116

13. Tighten the nut (1) fig. 117, until the arms lower.
14. With the lever (1) fig. 116, still in the same position, unscrew the nut (1) fig. 117, until the arms begin to rise.
15. Unscrew the nut (1) by another 1.5 turns.
16. Using the levers (1) and (2) fig. 116, lower and raise the arms a few times to ensure that the system is operating correctly.



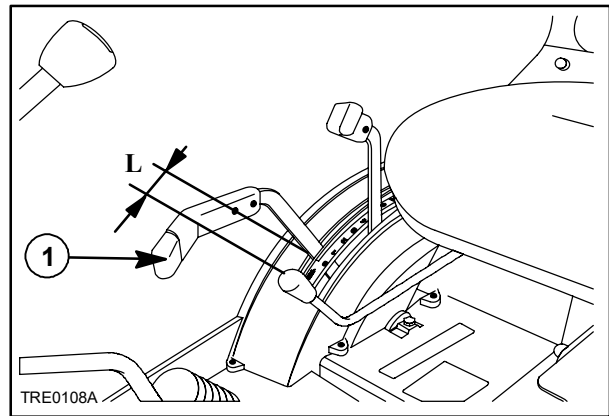
117

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ADJUSTING LINKAGES (Op. 35 110 08)**Adjusting position control linkage.**

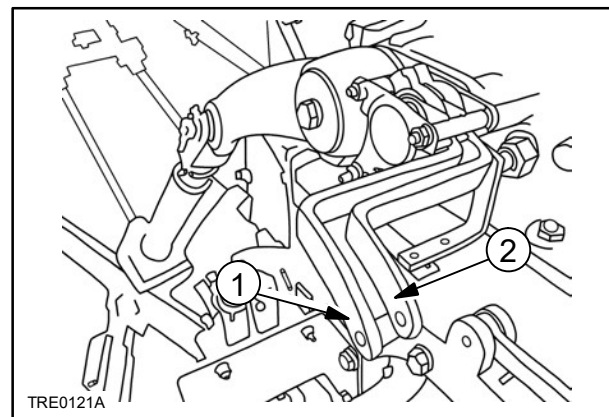
Proceed as follows.

1. Move the position control lever (1) fully forward on the quadrant and check that the distance (L) is between 15 and 20 mm (0.5906 and 0.7874 in.).



110

2. Move the external position control lever (1) fully rearward, against the spacer.
3. Connect the control linkage and adjust its length, if necessary.
4. Fasten the linkage using the lock nuts.



111

Adjusting draft control linkage

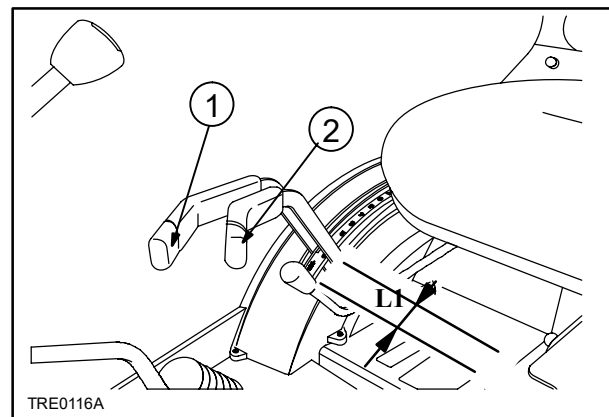
Test conditions:

engine running at medium speed;

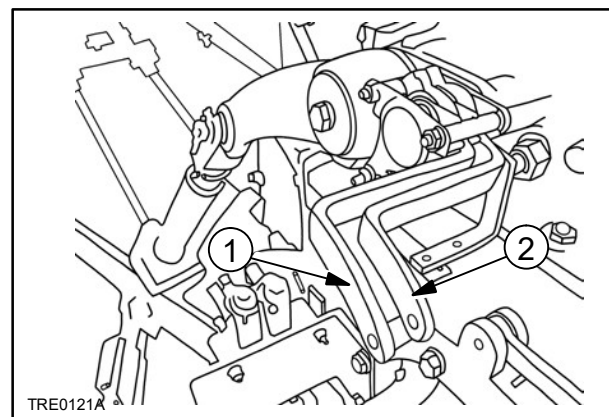
allow the oil in the system to reach a temperature of 30 – 40 °C (86 – 104 °F).

Then proceed as follows:

5. Move the position control lever (1) fully forward on the quadrant and the draft control lever (2) to a distance (L_1) of 15 – 20 mm (0.5906 – 0.7874 in.) from the beginning of the slot.
6. Move the draft control lever (2) fully back against the spacer.
7. Connect the control linkage and adjust its length if necessary.



112



113

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27. Fit the draft measuring device complete with transmission lever (3) and draft control lever (2), but without the flex bar, onto the rear transmission casing.
28. Rest the transmission lever (3) on the draft measuring device box and fit tool **380000263**. Fasten it to two holes on the box so that the draft control rod (2) fits exactly inside the tool hole as shown in figure 109
29. Using a micrometer depth gauge (2) fig.109, measure the distance (L_8) fig.109, between the top end of the rod (3) fig.109 and the micrometer gauge resting surface on the tool.

NOTE – The distance (L_6) the top end of rod (2) protrudes with respect to the transmission casing (with flex bar removed) is given by:

$$L_6 = L_5 - L_8$$

where:

L_5 and L_8 = distance measured with tool **380000263** fitted on the surface plate (L_5) fig. 107 or on the transmission casing (L_8) fig. 109.

30. Fit the flex bar and measure the new distance (L_9) between the top end of the rod (3) and the micrometer gauge resting surface on the tool.

NOTE – The distance (L_7) fig. 108, that the top end of the rod (2) fig. 108, protrudes with respect to the transmission casing (with flex bar fitted) is given by:

$$L_7 = L_5 - L_9$$

where:

L_5 and L_9 = distance measured with tool **380000263** mounted on surface plate (L_5) fig. 107 or on the transmission casing (L_9).

31. Check that the distance (L_7) is at least 5 mm (0.1969 in.) greater than the distance (L_6).
32. Slacken the lock nut (1) fig. 108 and adjust the length of the draft control rod until it protrudes by a new distance ($L_7 = 18.3 - 18.5$ mm (0.7205 - 0.7283 in.)).
33. This distance (L_7) can be calculated by subtraction using tool **380000263**:

$$L_{10} = L_5 - L_7$$

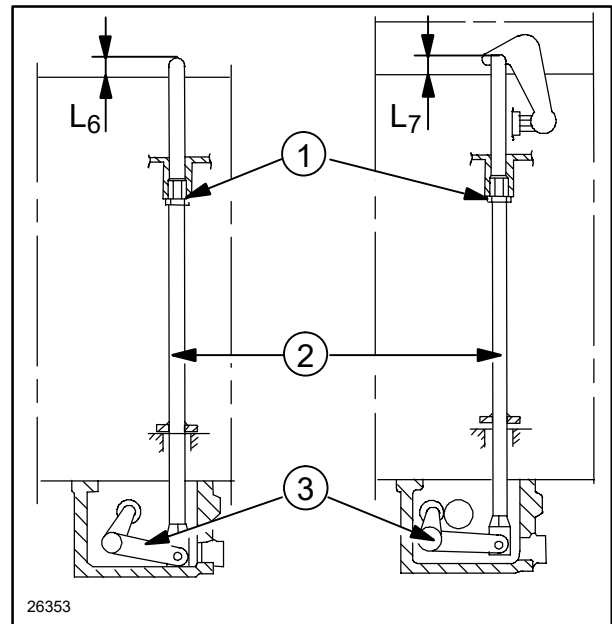
where:

$L_7 = 18.3 - 18.5$ mm (0.7205 - 0.7283 in.). Distance the end of the rod (2) fig. 108, protrudes with respect to the transmission casing during operation.

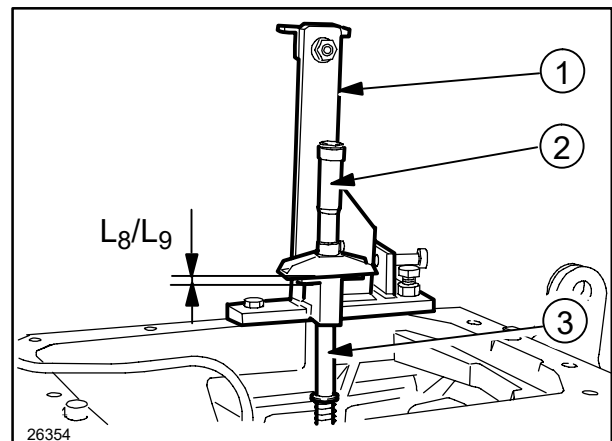
L_5 = distance measured with tool **380000263** mounted on the surface plate.

L_{10} = distance to be measured with the micrometer gauge on tool **380000263**.

34. Tighten the lock nut (1) fig. 108, and mount the lift on the tractor.



108



109

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24. The distance (L_2 , page 29) must be:

$$L_2 = L_3 + L_4$$

where:

L_3 = distance measured with tool **380000263** mounted on a surface plate:

L_4 = 22.9 – 23.1 mm (0.9016 – 0.9094 in.). Operating distance between the lift box bearing surface on the transmission casing and the rod resting surface on the lever (3, fig. 104).

NOTE – This corresponds to a distance (L_1 , fig. 93) of 82.0 – 82.1 mm (3.2283 – 3.2323 in.) between the end of the lever and the front surface of the lift body, measured with a force (F_1) of 4 – 4.5 da N (25.40 – 39.82 in. lb) applied to the end of the lever.

WARNING – Always make sure that when the plunger of tool **380000264** is flush with the outer reference surface (2) the distance (L_2 , fig. 104) is:

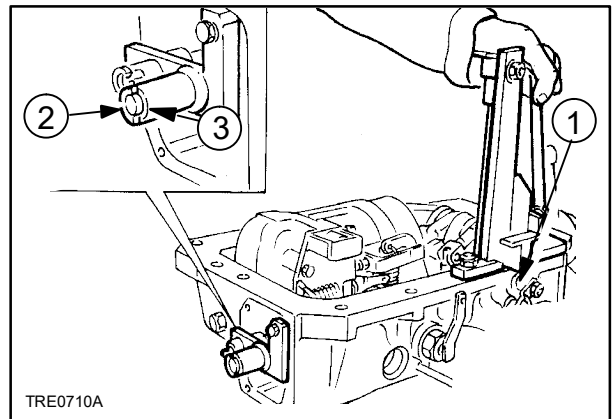
$$L_2 = L_3 + L_4$$

where:

L_3 = distance measured with the tool **380000263** mounted on the reference surface;

L_4 = 22.9 – 23.1 mm (0.9016 – 0.9094 in.). Operating distance between the lift box bearing surface on the transmission casing and the rod bearing surface on the lever (3) fig. 104.

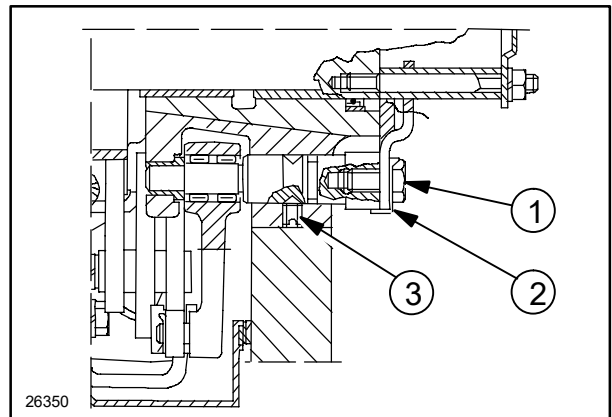
If these conditions are not met, adjust the eccentric pin (1) and the knurled screw (2) fig. 104 of tool **380000263** until they are.



105

25. Fit the threaded dowel (3) and tighten the screw (1) without bending over the safety washer (2).

26. Remove the tools **380000264** and **380000263** and fit the hydraulic control valve block on the lift body.

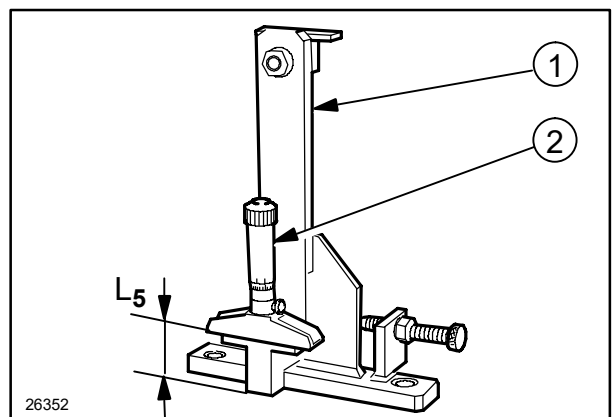


106

Proceed to mount the lift assembly onto the tractor as follows.

WARNING – First position tool **380000263** (1) on a surface plate and use a micrometer depth gauge (2) to measure the distance (L_5) between the surface plate and the point where the micrometer gauge rests on the tool.

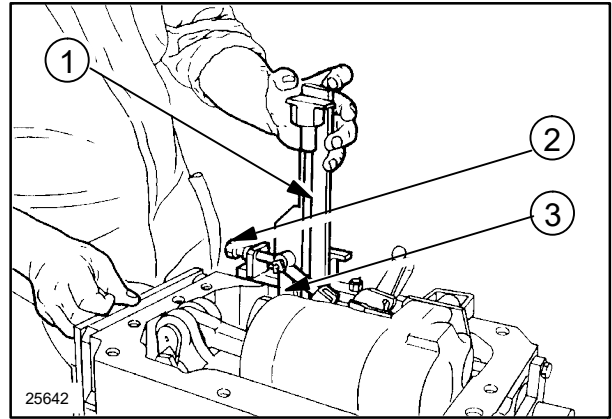
Make a note of the measured distance (L_5).



107

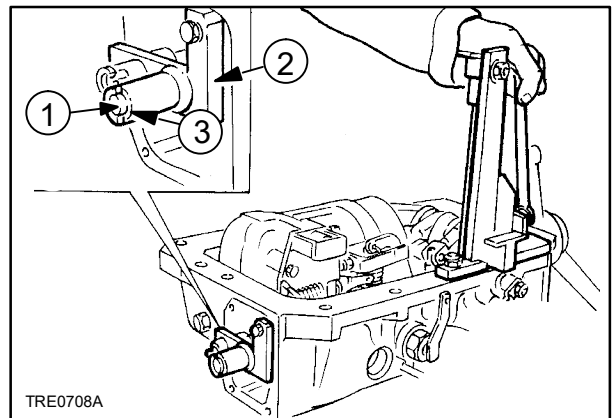
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17. Fit tool **380000263** (1) to the lift body and fasten it to the two holes in the box as shown in figure 101.



101

18. Turn the screw (2) fig. 101 on the internal draft control lever (3) fig. 101 until the end of the plunger (1) fig. 102 is flush with the inner reference surface (3) of tool **380000264** (2).

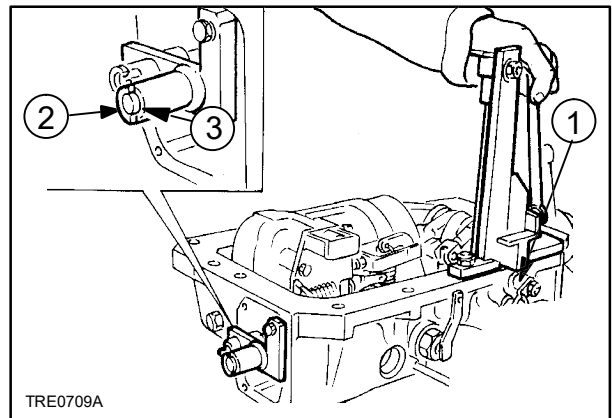


102

19. Turn the eccentric pin (1) slightly to withdraw the end of the plunger of tool **380000264** as far as possible.

20. Again turn the screw (2) fig. 101 to adjust the internal draft control lever (3) until the end of the plunger fig. 103 is flush with the inner reference surface (3) of the tool **380000264**.

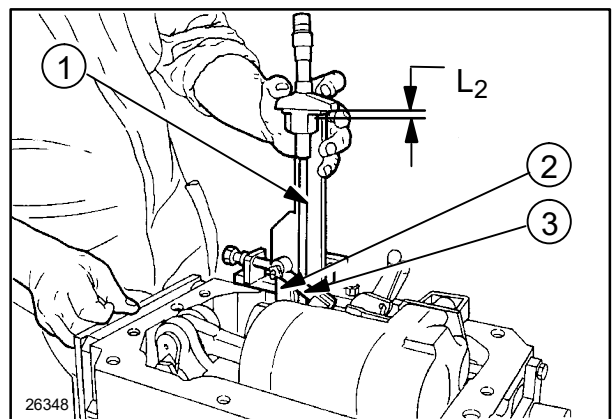
21. Finally turn the eccentric pin (1) fig. 103 until the end of the plunger is flush with the outer register surface (2) of the tool **380000264**.



103

22. Insert rod of tool **380000263** (1) into the internal draft control lever seat (2).

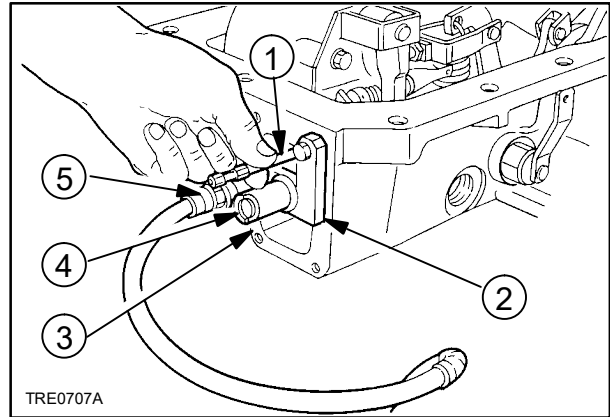
23. With the end of the plunger of tool **380000264** flush with the outer reference surface (2) fig. 103, set the adjustable linkage (3) fig. 104 and use a micrometer depth gauge to measure the distance (L_2) between the upper surface of the rod and the micrometer gauge bearing surface on the tool **380000264** (1).



104

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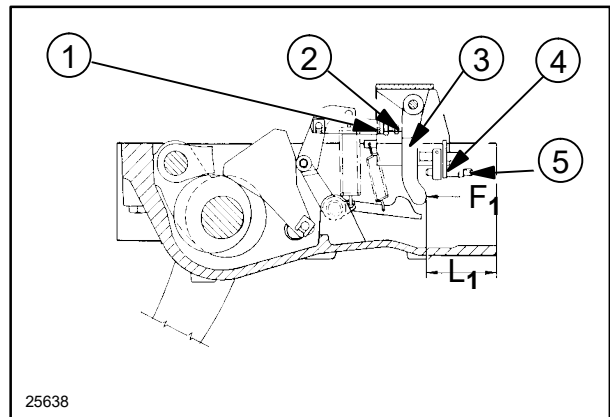
10. Connect the fitting (5) of tool (2) to the workshop compressed air system. Feed air into the cylinder barrel to make the piston perform its complete lifting stroke and use the air pressure to keep it in this position.
11. Using tool **380000267** (1), tighten the screw (5) fig. 93, until the end of the plunger (4) is flush with the inner reference surface (3) of the tool (2) or up to 0.5 mm (0.0197 in.) further in.



97

NOTE – This corresponds to a distance (L_1) of 86.3–86.7 mm (3.3976–3.4134 in.) between the end of the lever (3) and the front surface of the lift body.

12. Tighten the lock nut (4) to a torque of 15 Nm (11.0624 ft lb).

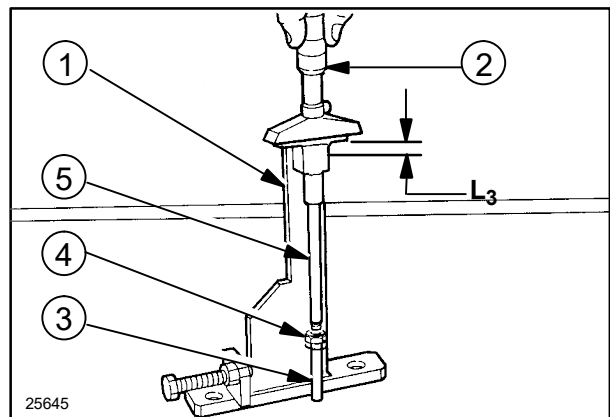


98

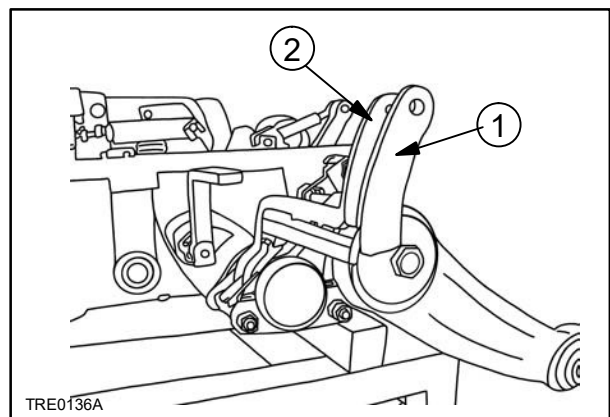
Adjusting draft control

Proceed as follows:

13. Remove the end section of the draft control rod (3) and mount it on the rod (5) of tool **380000263** (1). Fasten it using lock nut (4).
14. Place the tool **380000263** (1) complete with its rod (5) and the end section of the draft control rod (3) on a surface plate. Using a micrometer depth gauge (2), measure the distance (L_3) between the upper surface of the rod and the micrometer gauge bearing surface on the tool (be sure to tighten rod (3) onto rod (5) so that the surface of rod (5) is a few mm lower than the micrometer bearing surface on the tool).
15. With tool **380000264** (2) fig. 97 mounted on the lift body and disconnected from the compressed air system, move the position control lever (1) fig. 100 and the draft control lever (2) fully back against the spacer.
16. Move the eccentric pin (1) fig. 105, connected to the internal draft control lever, to the horizontal position with the eccentric cam pointed towards the rear of the lift assembly.



99

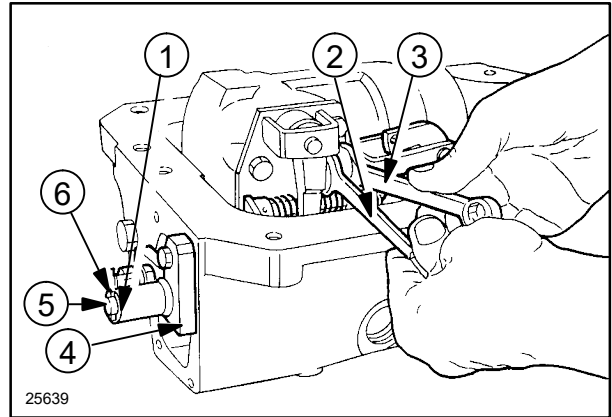


100

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4. Fit tool **380000264** (4) fig 94, 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. 93 and tighten or loosen the adjustable push rod (2) fig. 93, so that the end of the plunger (5) fig 94, is flush with the outer register surface (6) of the tool.

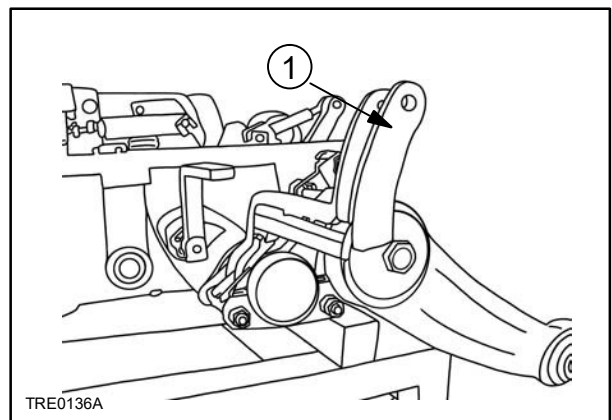
NOTE – This corresponds to a distance (L_1 fig. 93) of 82.0 – 82.1 mm (3.2283–3.2323 in.) between the end of the lever (3) fig. 93 and the front surface of the lift body when a force (F_1 fig. 93) of 4 – 4.5 da N (25.40 – 39.82 in.lb) is applied to the end of the lever.



94

6. Tighten the lock nut (1) fig. 93.
7. Move the external position control lever (1) fully rearwards 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. 94 is flush with or slightly inside the inner reference surface (1) of the tool (4).

NOTE – This corresponds to a distance (L_1) fig. 93, 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.

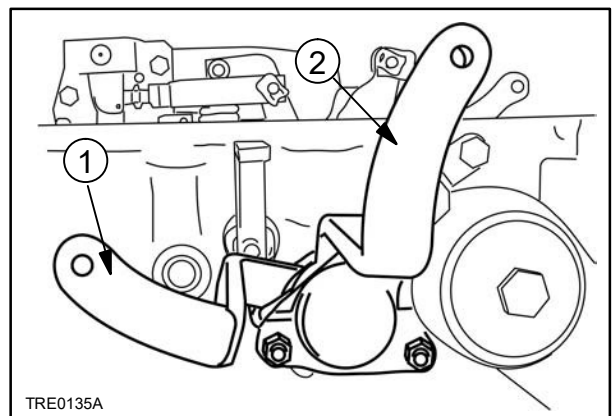


95

Adjusting the maximum height of the lift arms

Proceed as follows.

8. With tool **380000264** (4) fig. 94 fitted on the lift body, move the external draft control lever (2) fully rearward, against the spacer. Move the external position control lever (1) fully forward against the spacer.
9. Turn the lift arm control shaft until the internal arm touches the lift body.



96

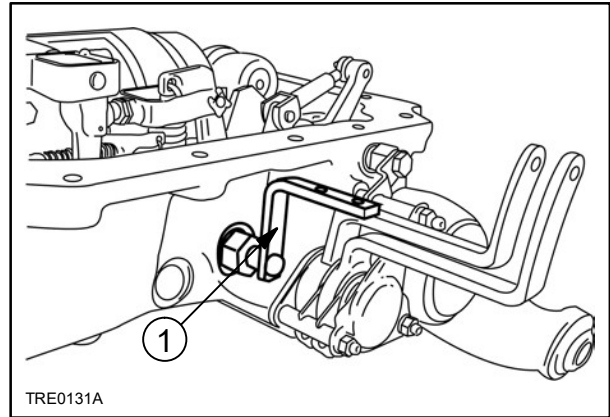
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ADJUSTING THE LIFT

The following adjustments refer to a lift assembly without hydraulic control valve block and mounted on a rotary stand.

These adjustments must be made in the order specified.

The LIFT-O-MATIC device must be kept turned off (external control lever (1) locked in the vertical position) until otherwise specified.

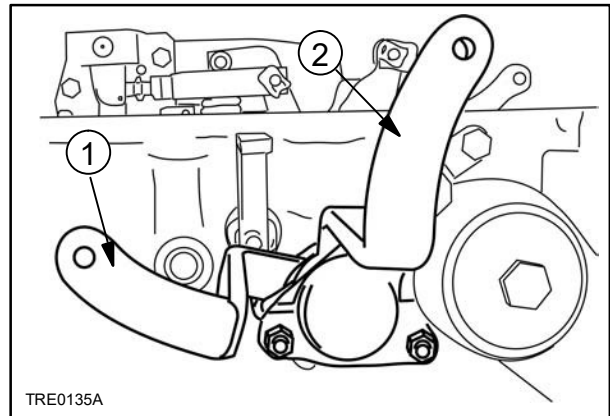


90

Adjusting position control

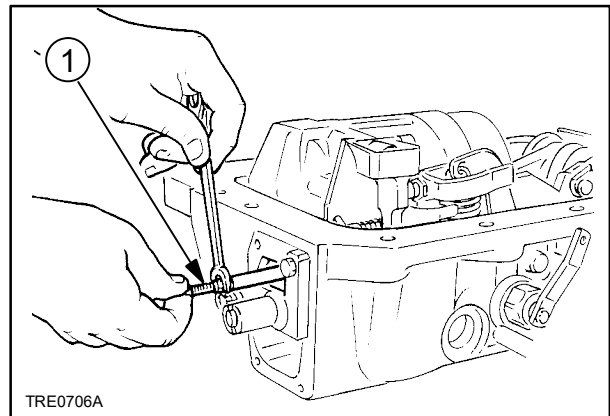
Proceed as follows:

1. Move the external position control lever (1) fully forward, against the spacer for the stud bolt securing the spring retaining bracket. Move the external draft control lever (2) fully rearward against the spacer.
2. Turn the lift arm control shaft until the internal arm is in contact with the lift body.

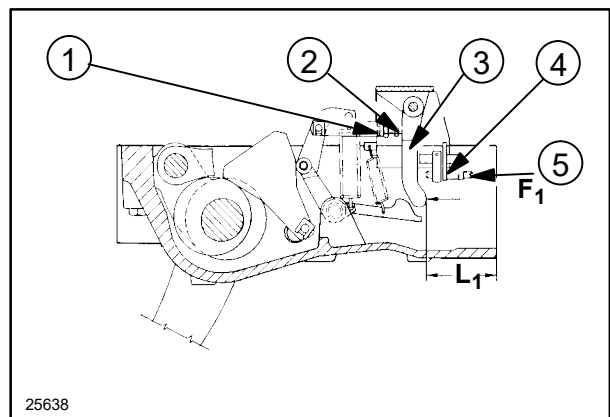


91

3. Use tool **380000267** (1) figure 92, to slacken the lock nut (4) figure 93. Loosen the end stop adjusting screw (5) until it is no longer in contact with the control valve block control lever (3).



92

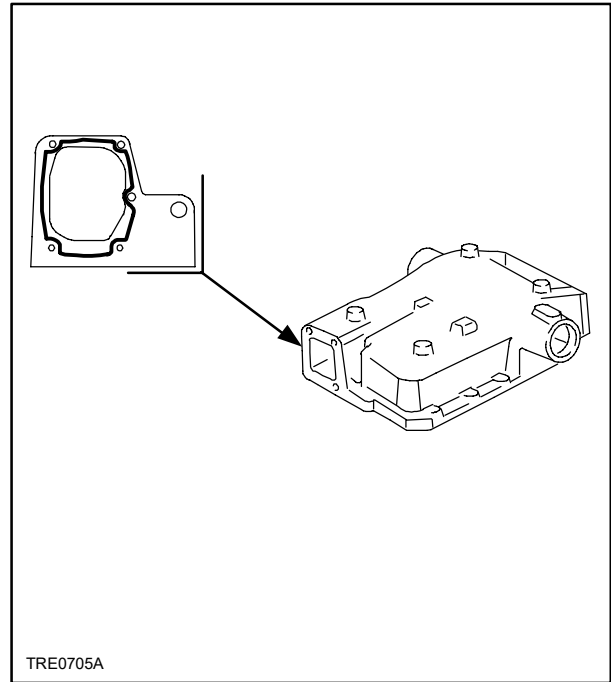


93

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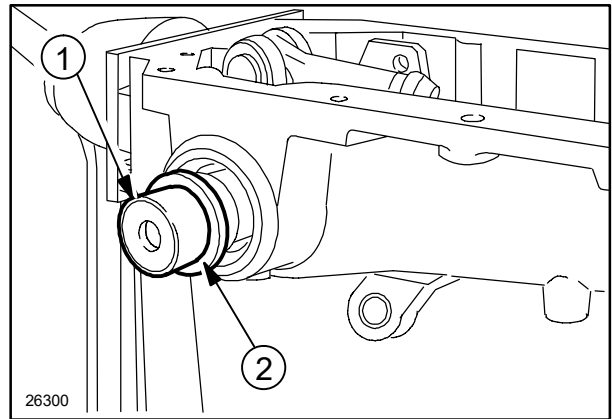
21. Fit the internal linkages and the corresponding eccentric pin. Fasten the eccentric pin by tightening the securing bolts.
22. Fit the control levers complete with friction discs, snap rings and stud bolts.
23. Fit the spring and use the bracket to secure the lever unit.
24. Fit the internal position control lever.
25. Fit the internal linkages and the Lift-o-Matic control lever.
26. Fit the cylinder complete with piston and secure it.
27. Fit the internal linkages and fasten them to the cylinder.
28. Clean the mating surfaces thoroughly and apply a 2 mm (0.0787 in.) diameter strip of sealing compound to the lift box, as shown in fig. 89.
The types of sealing compound to be used are shown on page 1, section 00.
Fit the hydraulic control valve block on the lift box and secure it using the screws.
Make the following adjustments.

NOTE – The adjustments must be made in the order specified.



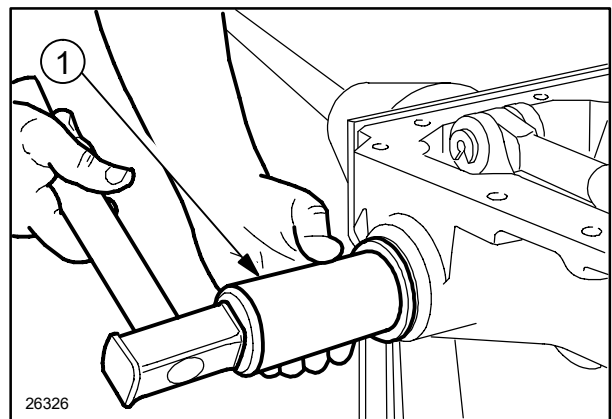
89

18. To avoid damaging the internal seal lips, use a flexible brass sheet (1) of size 200 x 90 mm (7.8740 x 3.5433 in.) and thickness 0.05 – 0.1 mm (0.0020 – 0.0039 in.). Roll the sheet up and insert the seal inside. Position the unit on the spline and push the seal manually into its seat. Then remove the sheet.



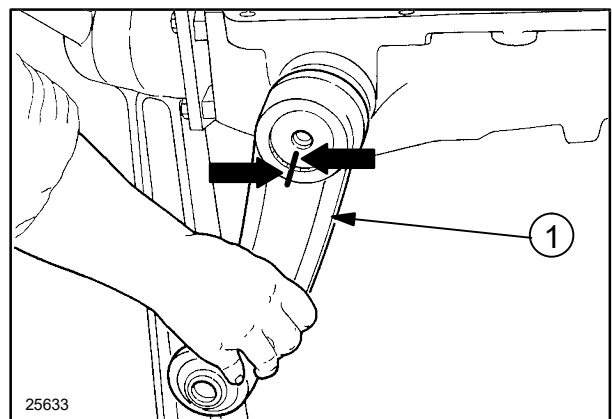
86

19. Use striker tool **380000262** (1) to complete the fitting of the seals into their seats on the lift arm shaft.



87

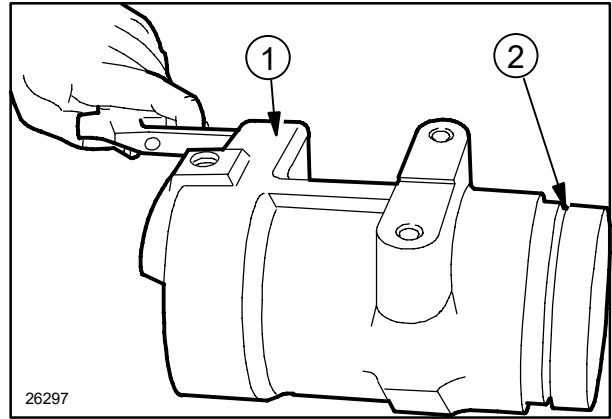
20. Fit the lift arms (1) on the shaft, matching up the reference marks, as shown. Secure them by tightening the bolts.



88

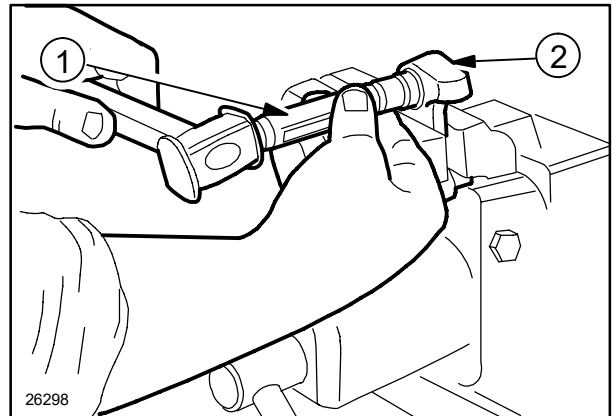
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12. Use compressed air to remove the piston (2) from its cylinder (1).



82

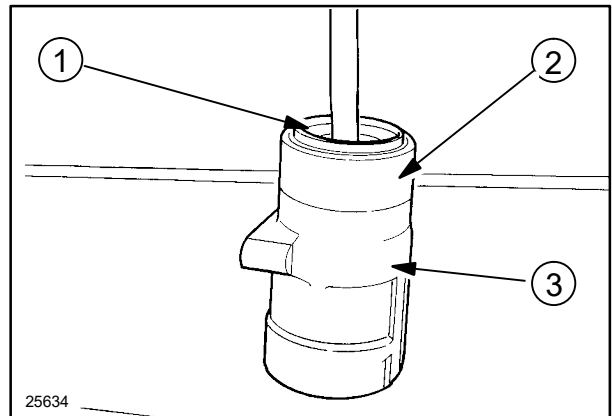
13. Use striker tool **380000260** (1) to replace the bearings in the internal draft control lever (2).
14. Use striker tool **380000261** to replace the control valve block control lever bearings.
15. Fit the hydraulic lift as follows.



83

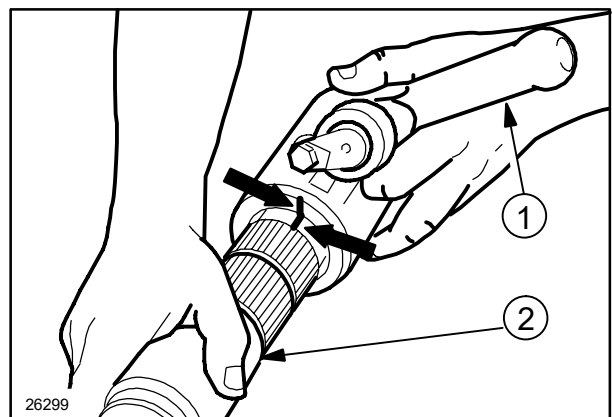
⚠ WARNING ⚠
 Always use appropriate tools to align fixing holes.
 NEVER USE YOUR FINGERS OR HANDS.

16. Insert the piston (1) into its cylinder (3), using tool **380000225** (2).



84

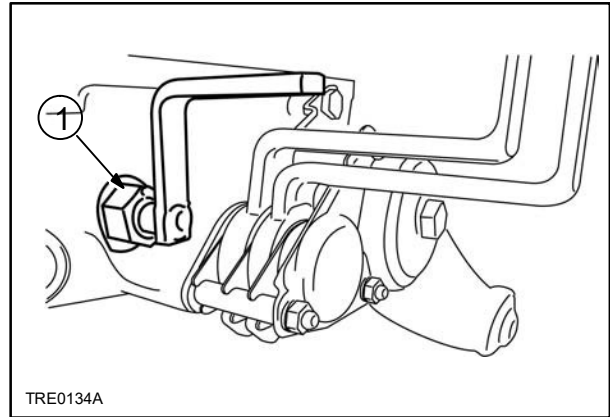
17. Fit the lift arm shaft (2) and the internal arm (1) inside the lift box, matching up the reference marks, as shown. Tighten the securing bolt.



85

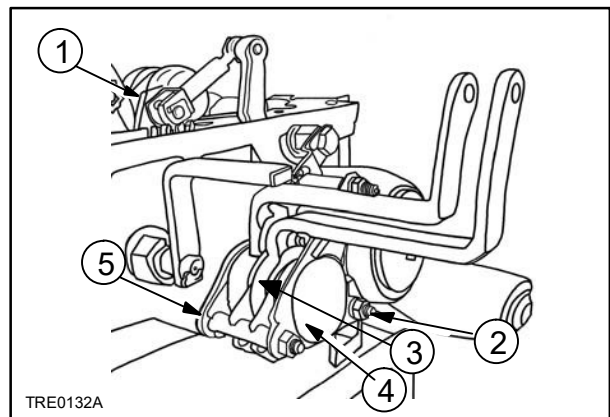
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6. Remove the retaining pin from the internal draft lever, unscrew the nut (1), then remove the unit complete with internal linkages and the LIFT-O-MATIC control lever.



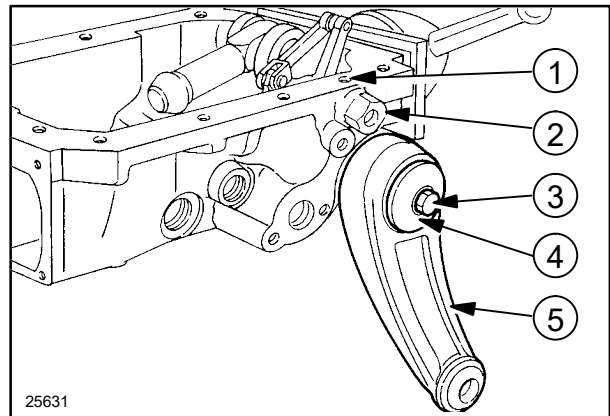
78

7. Take off the snap ring and remove the internal position control lever (1). Unscrew the nuts (2) and remove the spring and fixing bracket (4).
8. Take off the snap ring and remove lever (3), the friction discs, lever (5) and the stud bolts.



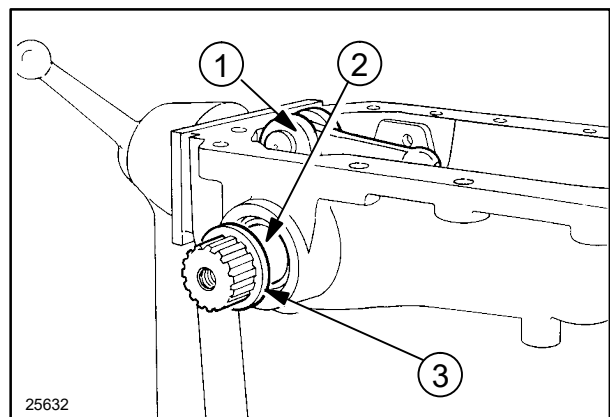
79

9. Slacken the eccentric pin (2) retaining bolt (1), withdraw the eccentric pin and remove the internal linkage.
10. Unscrew the bolt (3), remove the washer (4), withdraw the lift arm (5) and remove the thrust washer. Repeat on the other lift arm.



80

11. Remove the crimping on the internal arm locking bolt (1) and unscrew the bolt. Withdraw the shaft (2) and remove the seals (3).



81

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REAR HYDRAULIC LIFT ASSEMBLY**Disassembly–Assembly**

(Op. 35 110 40 – 35 110 42 – 35 110 46)

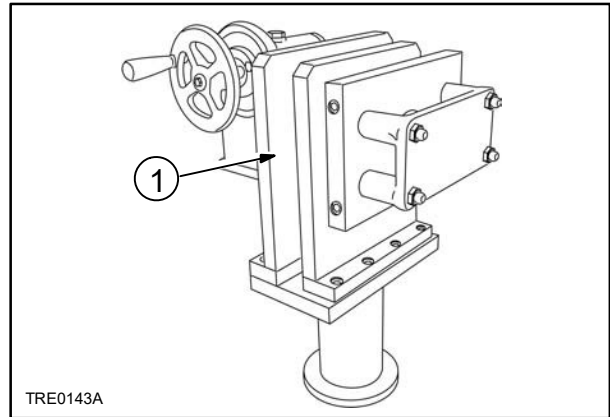
**DANGER**

Handle all parts with the utmost care.

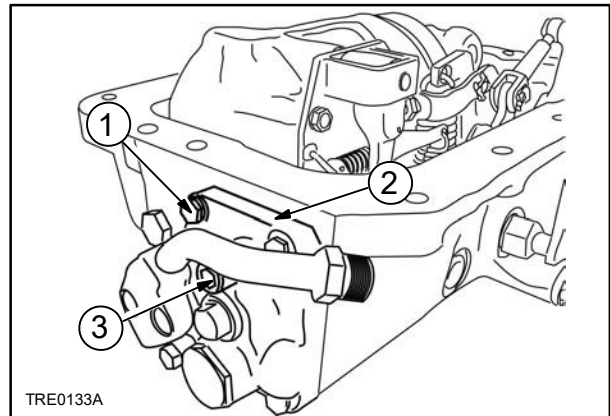
Do not place your hands or fingers between one part and another. Wear the prescribed safety clothing, including glasses, gloves and protective footwear.

To disassemble the hydraulic lift, proceed as follows.

1. Position the hydraulic lift on a stand (1) fig. 74, that will allow the assembly to be rotated.
2. Unscrew the securing bolts (1) and remove the control valve block (2) fig. 75.

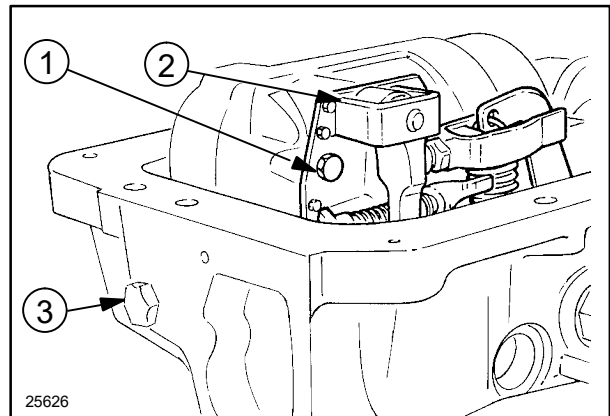


74



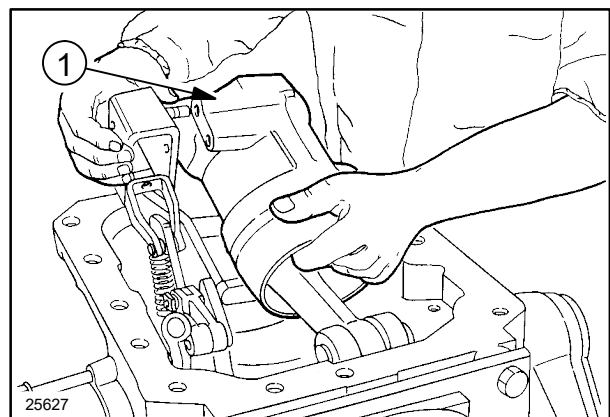
75

3. Unscrew the two cylinder securing bolts positioned outside the cylinder body. Turn the lift assembly and unscrew the lateral bolt (3).
4. Undo the bolts (1) that secures the internal linkage (2) to the lift cylinder.



76

5. Remove the cylinder (1) complete with piston.



77

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20. Refit the hydraulic lift assembly to the transmission casing as follows.

**WARNING**

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

Before refitting the hydraulic lift assembly to the rear transmission casing, clean and degrease the mating surfaces thoroughly and apply a strip of sealing compound of about 2 mm (0.0787 in.) diameter as shown in fig. 73.

Apply the torque settings listed on page 5.

Use tools **380000224** and **380000238** to fit the hydraulic lift assembly to the transmission casing and tighten the bolts securely.

Insert the electric leads into their clips on the lift body.

Fit the lift control pipe.

Raise the cab by a few millimetres, remove the wooden blocks and tighten the bolts to secure the cab.

Fit the trailer brake control pipe (if fitted) and the oil filler pipe.

Connect the Lift-o-Matic control rod.

Connect the lift control levers to their linkages.

Fit the windscreen washer tank and transmission breather pipes onto the cab upright.

Fit the top link attachment bracket and the quick-fitting support plate for auxiliary control valves.

Fit the seven-pole socket, the earth leads, the quick-fittings and the trailer brake control pipe to their corresponding support brackets.

Fit the additional control valve rods and the PTO operating mode rod.

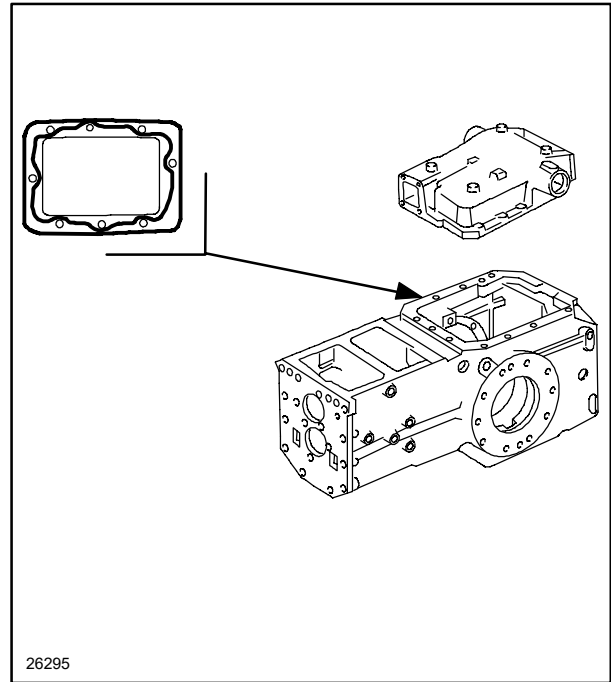
Fit the ground lift control lever.

Fit the lift rods and the lateral stabiliser struts.

Fit the pick-up hitch hook and the top link.

Connect the negative cable to the battery.

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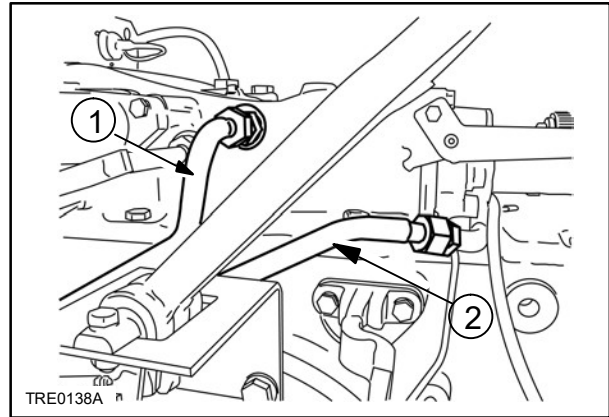


73

Diagram showing application of sealing compound when fitting the hydraulic lift assembly to transmission casing.

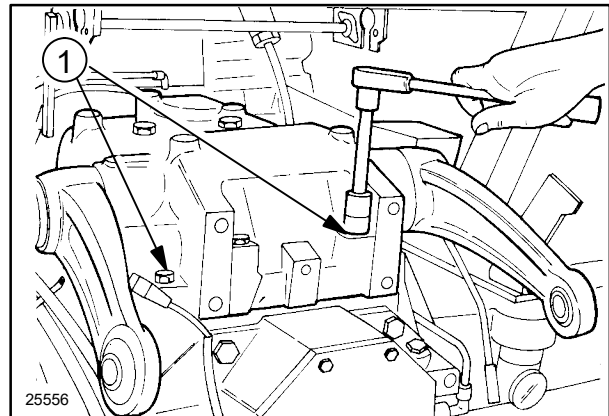
The types of sealing compounds to be applied are specified on page 1, section 00.

16. Remove the pipes on the lift (1) and the control valve body (2).



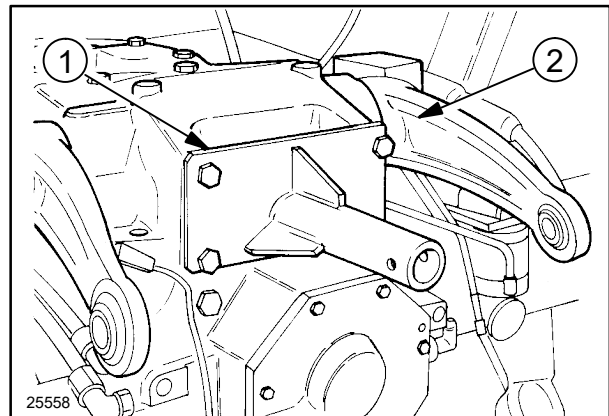
69

17. Unscrew the bolts (1) that secure the hydraulic lift assembly to the transmission casing.



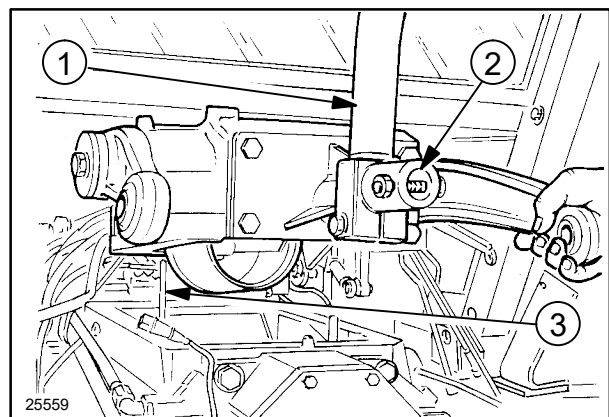
70

18. Fit tool **380000237** (1) on the lift and tighten the four bolts (2).



71

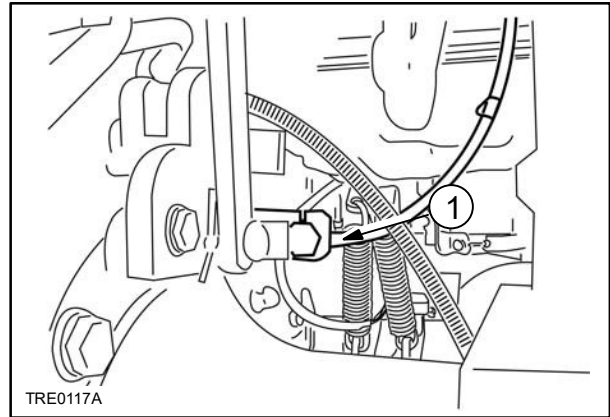
19. Fit tool **380000224** (1) onto tool **380000238** (2). Attach the hoist to tool **380000224**, raise the hydraulic lift by a few centimetres and pull it backwards, tilting it so that it clears the breather pipe (3) without damaging it.



72

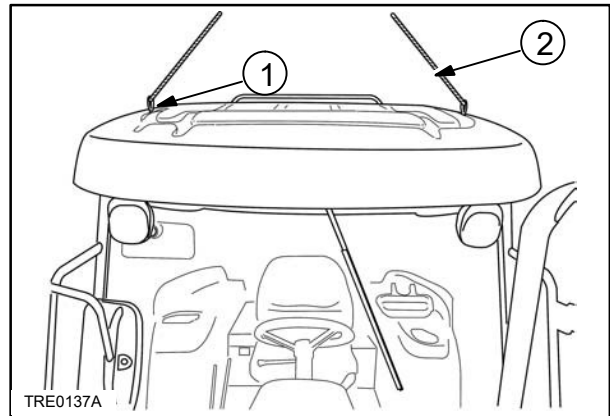
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12. Remove the LIFT-O-MATIC control rod (1).



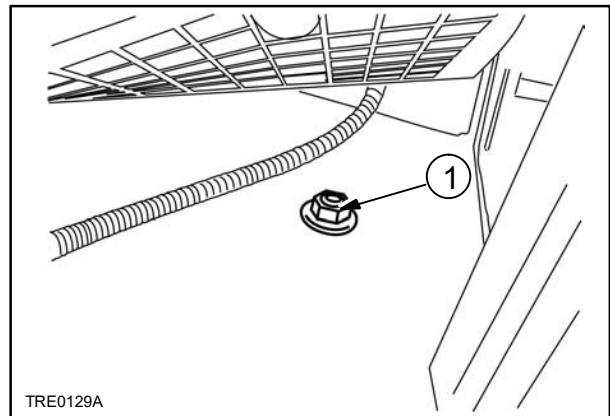
65

13. Connect a suitable hoist (2) to the cab lifting hooks (1) and tension the hoist.



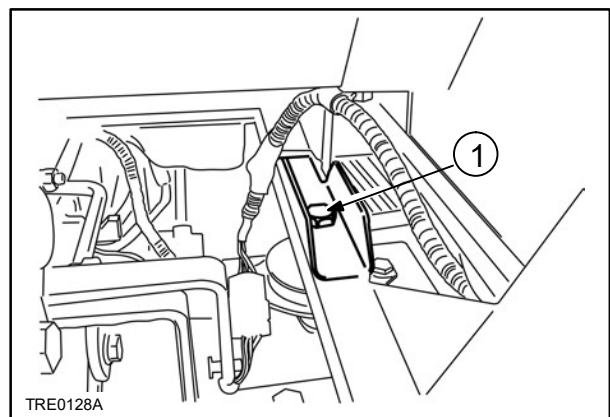
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14. Unscrew the two cab front securing bolts (1).



67

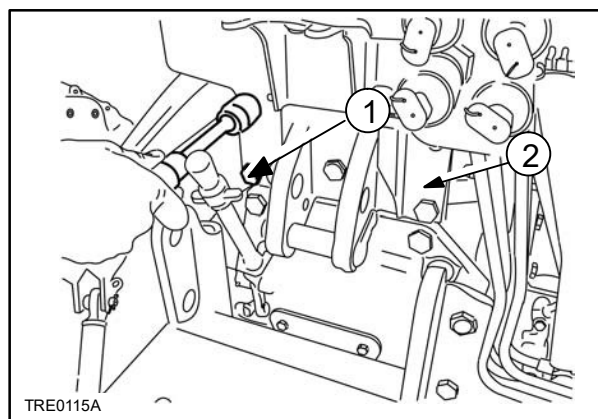
15. Unscrew the two cab rear securing bolts (1). Raise the cab approximately 5–6 cm (0.1969–0.2362 in.) and place wooden blocks (1) between the cab upright and the housing. Lower the hoist so that the cab rests securely on the wooden block.



68

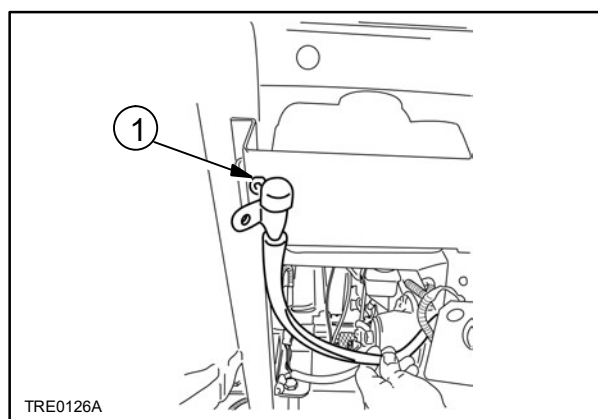
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8. Undo the bolts (1) and remove the support (2).



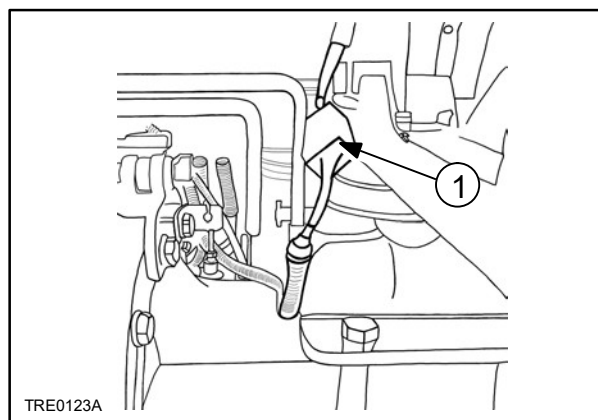
61

9. Undo the bolt (1) and disconnect the breather pipe connection.



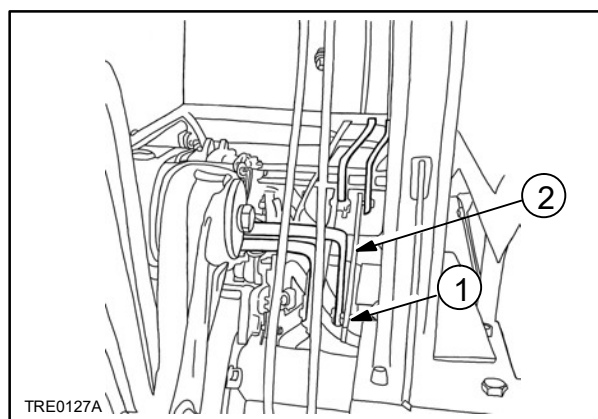
62

10. Remove the electric socket (1).



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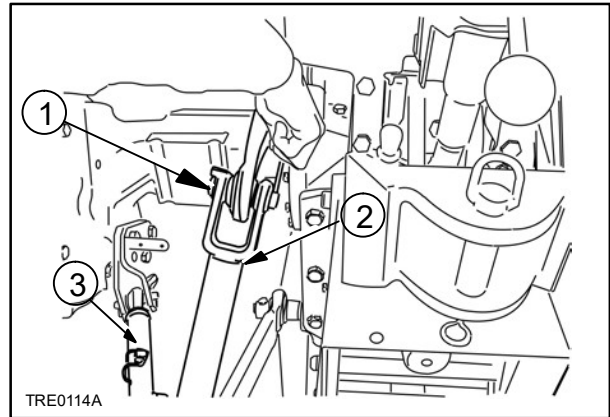
11. Remove the retaining springs (1) and detach the two control rods (2) from the lift levers.



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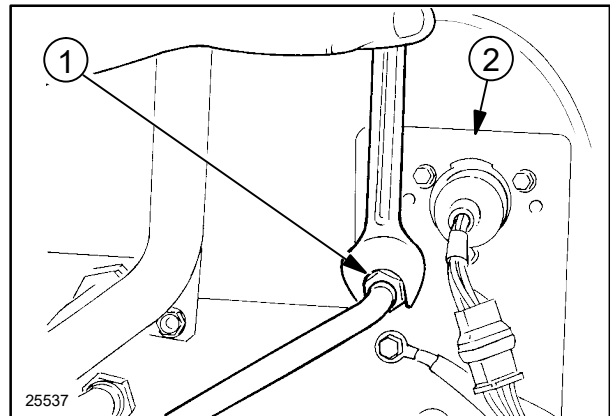
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4. Remove the split pins and withdraw the shafts (1). Remove the lift rods (2) and the lateral stabiliser struts (3).



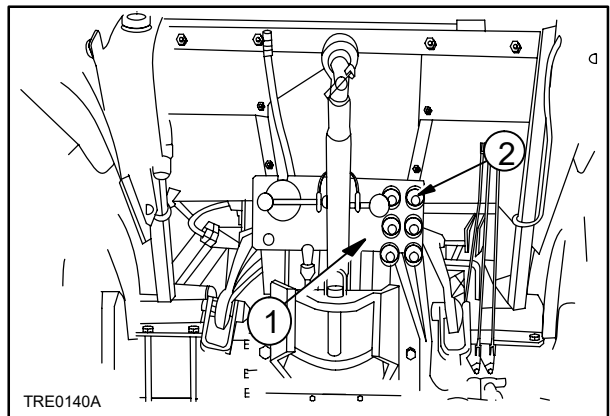
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5. Unscrew: the trailer brake control pipe (1) and the auxiliary control valve pipes from the support plate (2).



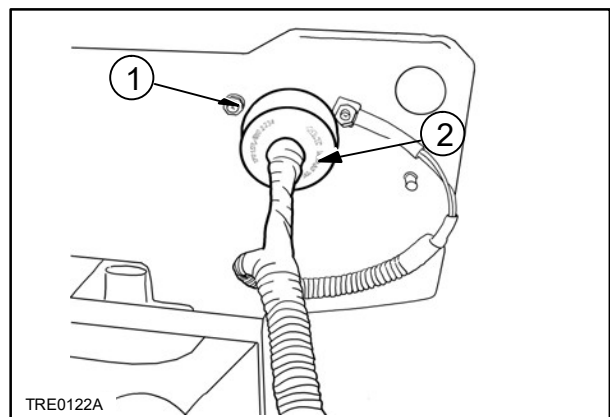
58

6. Remove auxiliary control valve pipes (2) from their support (1).



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7. Undo the two bolts (1) that secure the seven-pole socket (2) and remove the socket.



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REMOVAL – REFITTING – OVERHAUL OF REAR MECHANICAL HYDRAULIC LIFT ASSEMBLY
REAR HYDRAULIC LIFT ASSEMBLY
 Removal–Refitting (Op. 35 110 30)



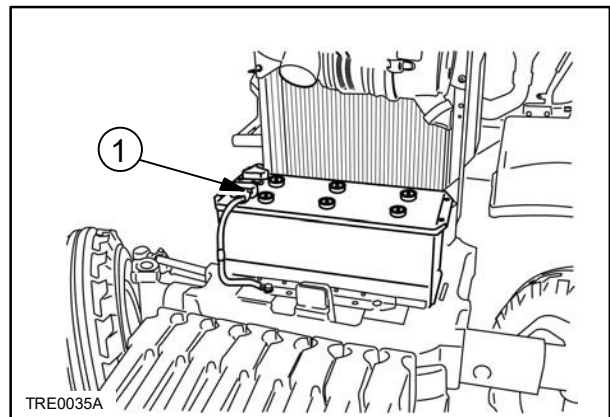
DANGER



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.

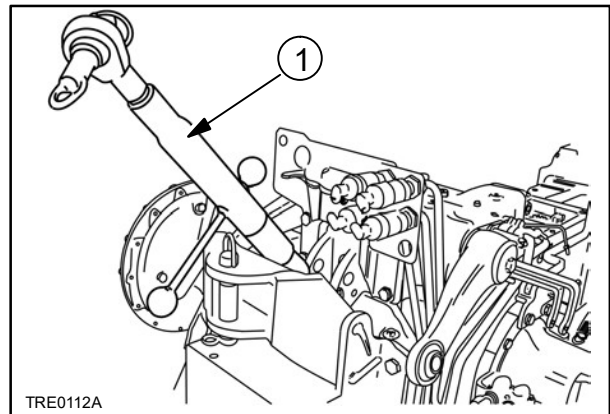
To remove the hydraulic lift assembly from the rear transmission casing, proceed as follows.

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



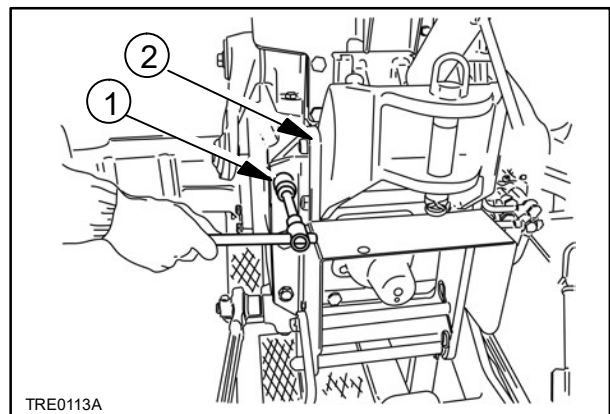
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2. Remove the top link (1).



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3. Undo the bolts (1) and use a chain and hoist to remove the pick-up hitch hook (2) from the PTO box.



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HYDRAULIC LIFT DIAGNOSTICS

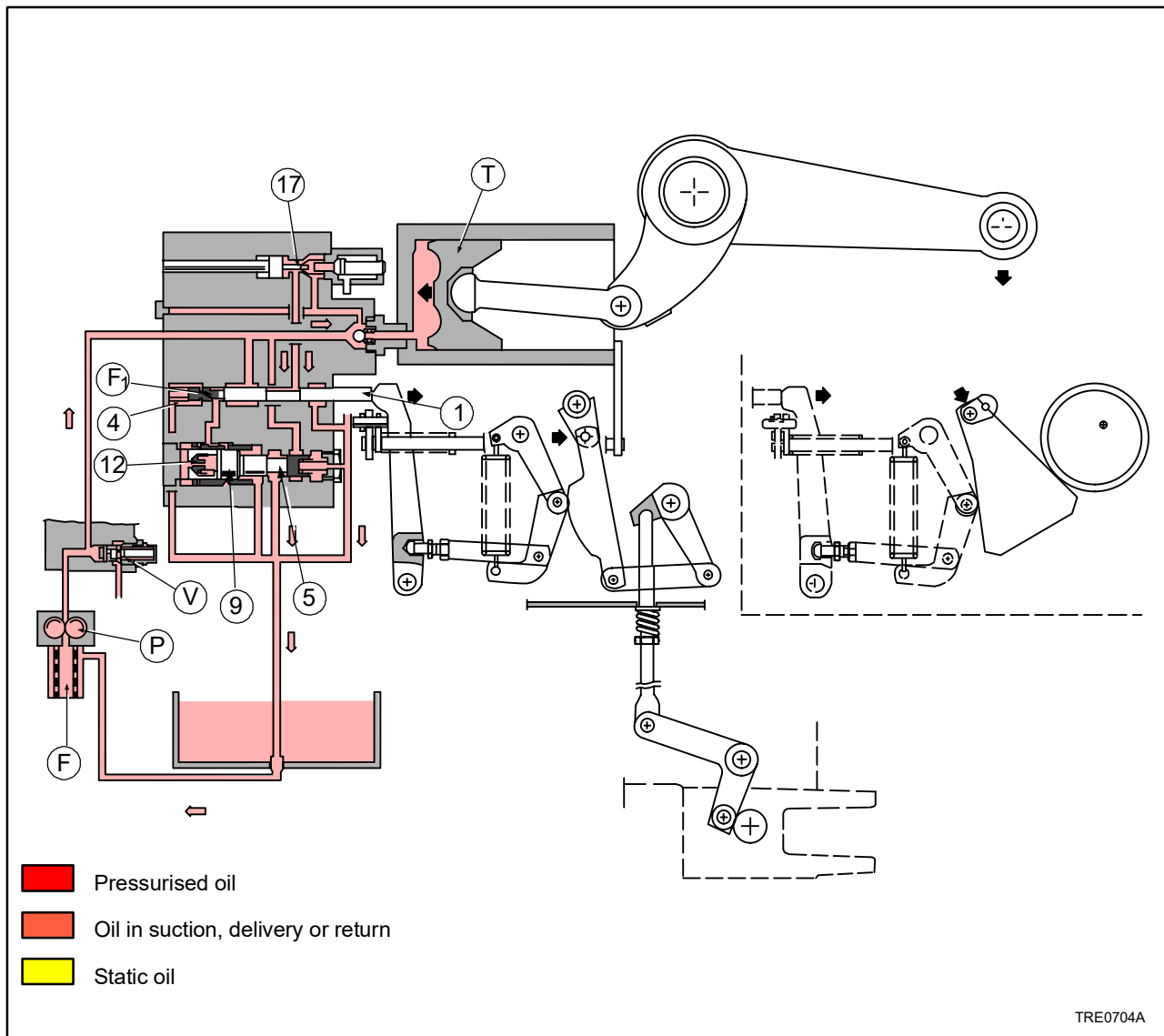
(continued)

Problems	Possible causes	Remedies
The lift is unable to keep the load raised (with the engine running, the load moves up and down rhythmically; with the engine turned off, the load lowers).	1. Defective seal on check valve. 2. Oil leaking past the seals on the control valve block pin seat. 3. Control valve block pin seal defective. 4. Oil leaking past the lift piston seal or the seals on the cylinder oil discharge fitting. 5. Defective seal or cylinder safety valve set to very low value.	Take off, check, clean and if necessary replace the parts concerned. Replace seals. Take off and clean the seal and replace the control valve block pin and its seat if defective. Replace the seals. Replace the valve.
The pressure relief valve cuts in when the lift arms reach their completely raised position.	1. Lift arm travel set incorrectly.	Set correctly.
Lift has poor lifting capacity.	1. Pressure relief valve set incorrectly. 2. Cylinder safety valve set incorrectly. 3. Poor pump efficiency (generally accompanied by a considerable increase in lift time).	Replace the valve. Replace the valve. Overhaul or replace the pump.

HYDRAULIC LIFT DIAGNOSTICS

Problems	Possible causes	Remedies
The lift does not raise.	1. Oil filter clogged. 2. Control valve jammed in discharge position. 3. Hydraulic pump defective.	Replace filter. Release control valve. Overhaul or replace pump.
The lift operates jerkily.	1. Oil filter clogged. 2. Air has got into the pump suction line.	Replace filter. Check that the couplings are airtight and the seals are effective.
The lift raises too slowly.	1. Oil filter clogged. 2. Oil leaking past piston seals or seals on discharge fitting to cylinder, with consequent loss of pressure. 3. Hydraulic pump defective.	Replace filter. Replace all defective seals. Overhaul or replace pump.
The lift operates too quickly.	1. Foreign matter between the ball and its seat on the discharge control valve. 2. Discharge control valve ball seal defective. 3. Discharge control valve piston jammed.	Take off the valve, remove the foreign matter and inspect the oil filter. Replace discharge control valve. Take off the valve and free the piston.
The lift operates too slowly.	1. Discharge ports on the discharge control valve blocked. 2. Discharge control valve piston jammed.	Take off the valve, unblock the holes and inspect the oil filter. Take off the valve and free the piston.

(continued overleaf)



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ARM LOWERING PHASE

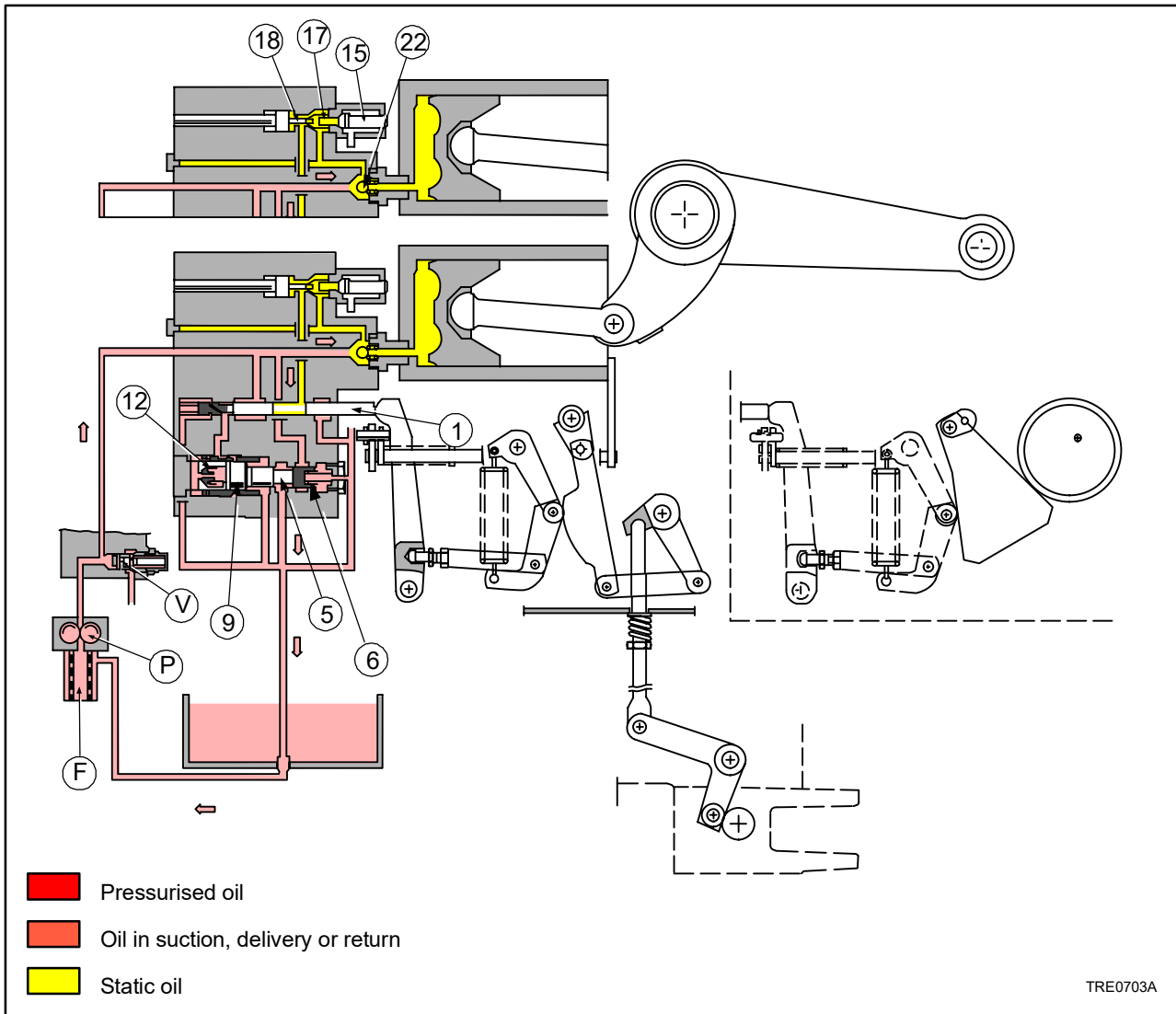
- | | |
|-------------------------|---------------------------------------|
| F. Filter. | 5. Plunger. |
| P. Hydraulic pump. | 9. Plunger spring. |
| T. Lift arm piston. | 12. Draft sensitivity valve. |
| V. Relief valve. | 17. Arm lowering speed control valve. |
| 1. Valve spool. | F1. Spool port |
| 4. Spool return spring. | |

When the operator lowers the position control lever on his right, the return spring (4) pulls spool (1) to the right. Cylinder oil is exhausted under piston pressure (T) through lowering speed adjustment valve (17) and the port uncovered by spool.

Through spool port (F1) and draft sensitivity valve (12) oil flows to piston (9), which holds plunger (5) in the position shown, thus allowing pump delivery to be exhausted past plunger (5).

Unscrewing the screw (16) decreases the load on the spring (15), therefore the valve (14) can vibrate faster, slowing down the descent speed. **Tightening** the screw (16) slows down the vibration of the valve (14) that increases the descent speed of the arms since the valve (14) can remain in position in correspondence with the larger orifice where the oil flows out from the cylinder. After adjusting the arm descent speed it will not depend on the weight bearing on the arms but will be virtually constant.

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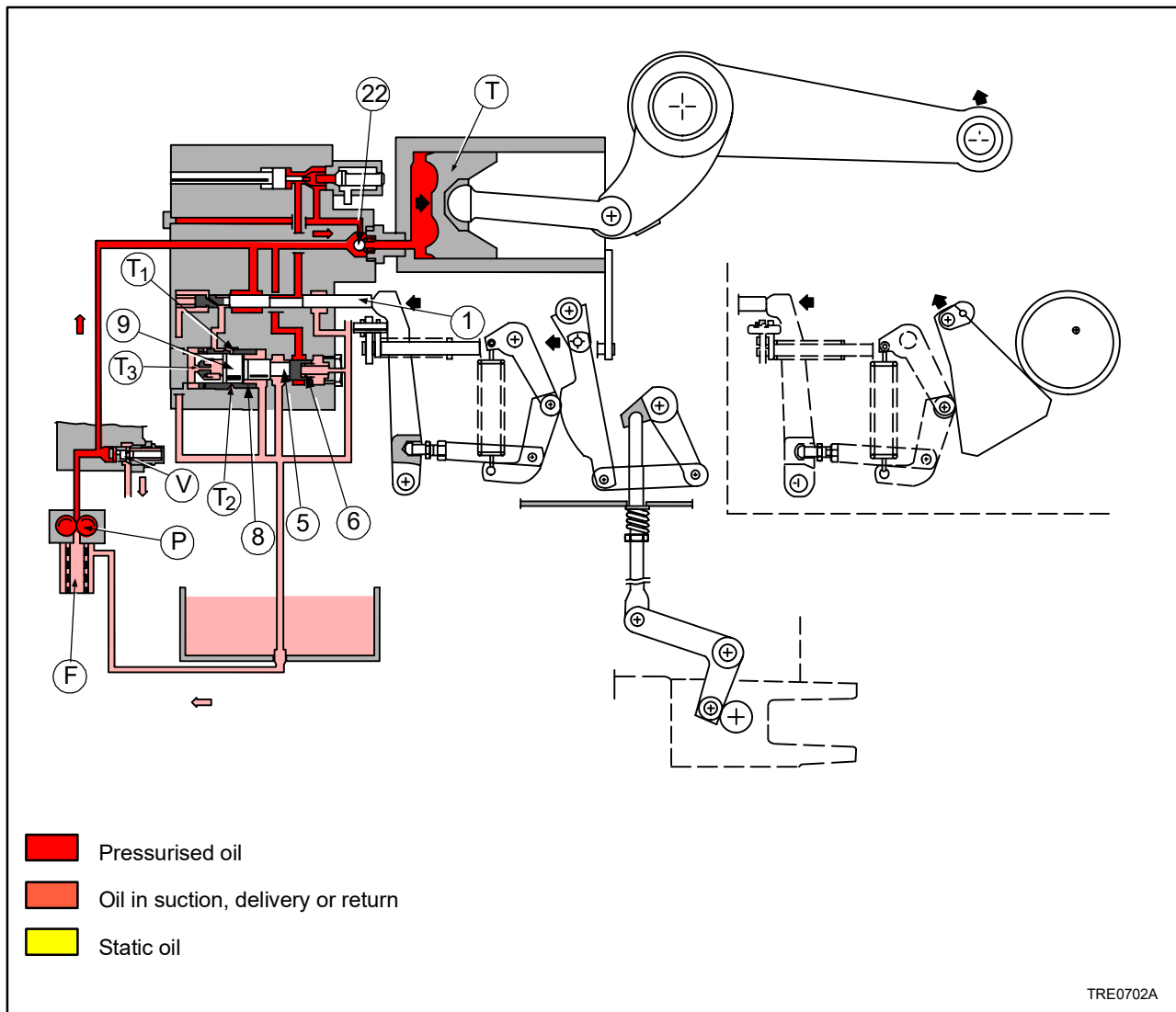
NEUTRAL PHASE

- | | |
|--------------------|---------------------------------------|
| F. Filter. | 9. Piston. |
| P. Hydraulic pump. | 12. Draft sensitivity valve. |
| V. Relief valve. | 15. Cylinder safety valve. |
| 1. Valve spool. | 17. Arm lowering speed control valve. |
| 5. Plunger. | 18. Ball. |
| 6. Plunger spring. | 22. Check valve. |

With spool (1) in the neutral position, oil is delivered through the response adjusting valve (12) to piston (9), which overcomes spring reaction (6) and moves plunger (5) to the right. This opens the exhaust port

and directs oil flow to the tank in the rear transmission housing rather than to the cylinder.

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ARM LIFT PHASE

- | | |
|---------------------|--------------------|
| F. Filter. | 5. Plunger. |
| P. Hydraulic pump. | 6. Plunger spring. |
| T. Lift arm piston. | 8. Piston seat. |
| V. Reliefvalve. | 9. Piston. |
| 1. Valve spool. | 22. Check valve. |

When the position control lever (located on the operator's right-hand side) is used to raise the arms, the movement shown by the arrows is transmitted by the internal lever mechanisms to the control valve block pin (1).

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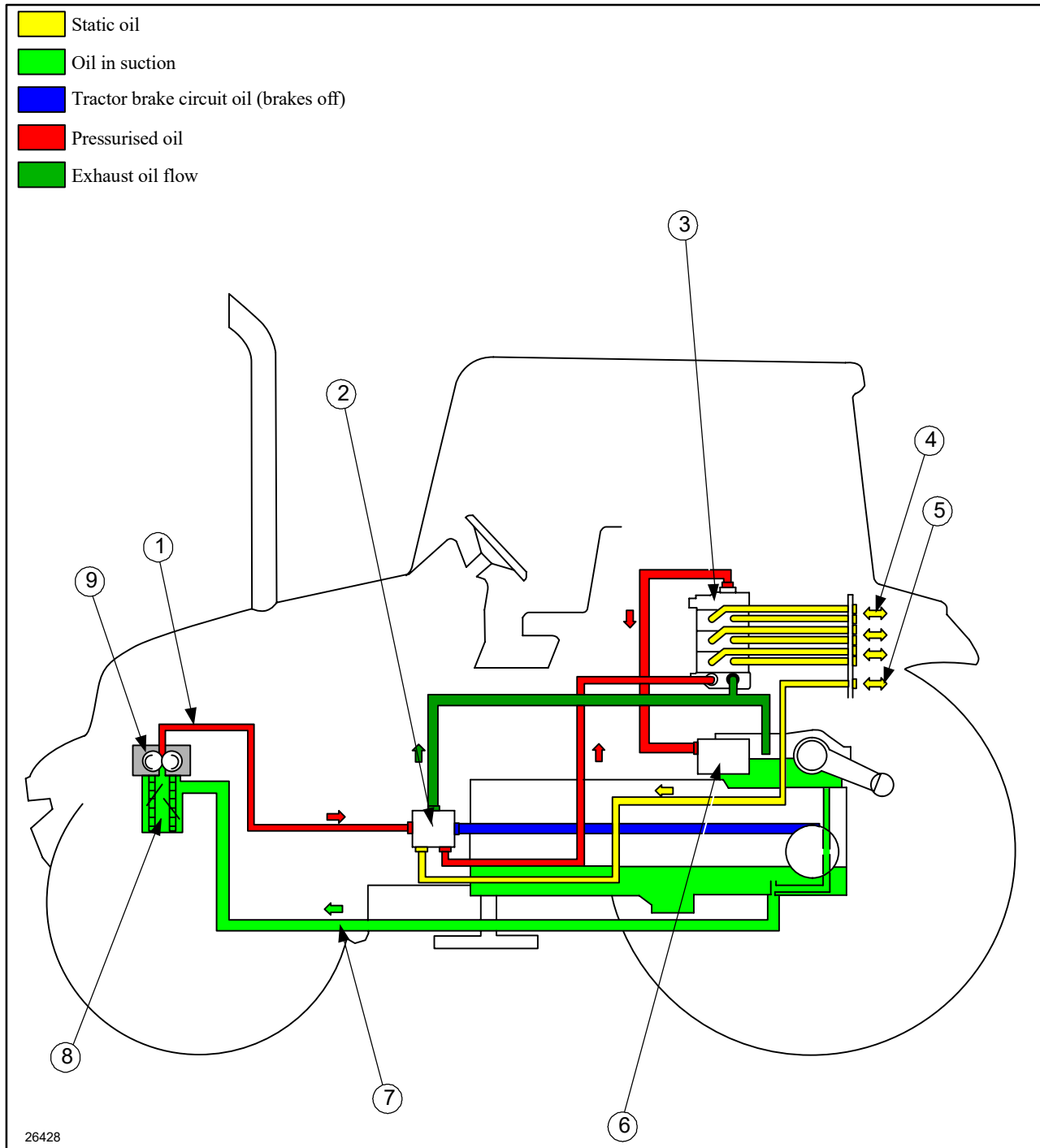
Oil flow to piston (9) is cut off and plunger (5) is forced to the left by spring (6), thus closing the exhaust port. Pressure oil opens check valve (22) and operates piston (T) to raise the arms.

DESCRIPTION AND OPERATION

The mechanical lift can operate with controlled position or draft control and with a combination of the two. The lift is controlled by two levers located on the operator's right. It also features the Lift-O-Matic device which raises and lowers the implement without the need to use the position and draft control levers.

Draft control is actuated by the flex bar positioned in the special box mounted under the rear transmission.

The lower lift arms and corresponding control rods are connected to the flex bar.



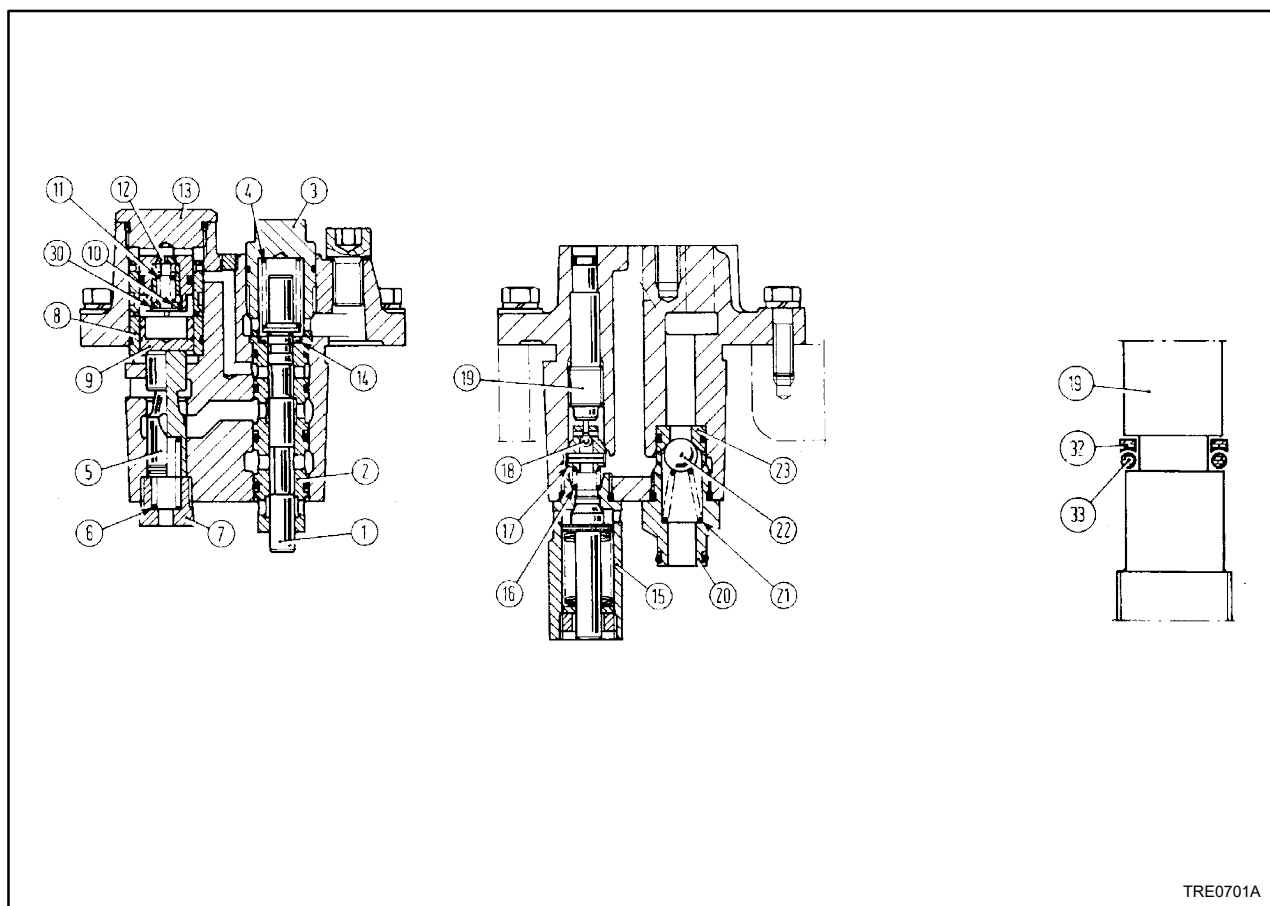
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HYDRAULIC LIFT CIRCUIT

- | | |
|--|------------------------|
| 1. Delivery line to control valve (3). | 6. Lift control valve. |
| 2. Trailer brake control valve. | 7. Suction line. |
| 3. Auxiliary control valves. | 8. Oil filter. |
| 4. Auxiliary control valve lines. | 9. Hydraulic pump. |
| 5. Trailer brake control valve line. | |

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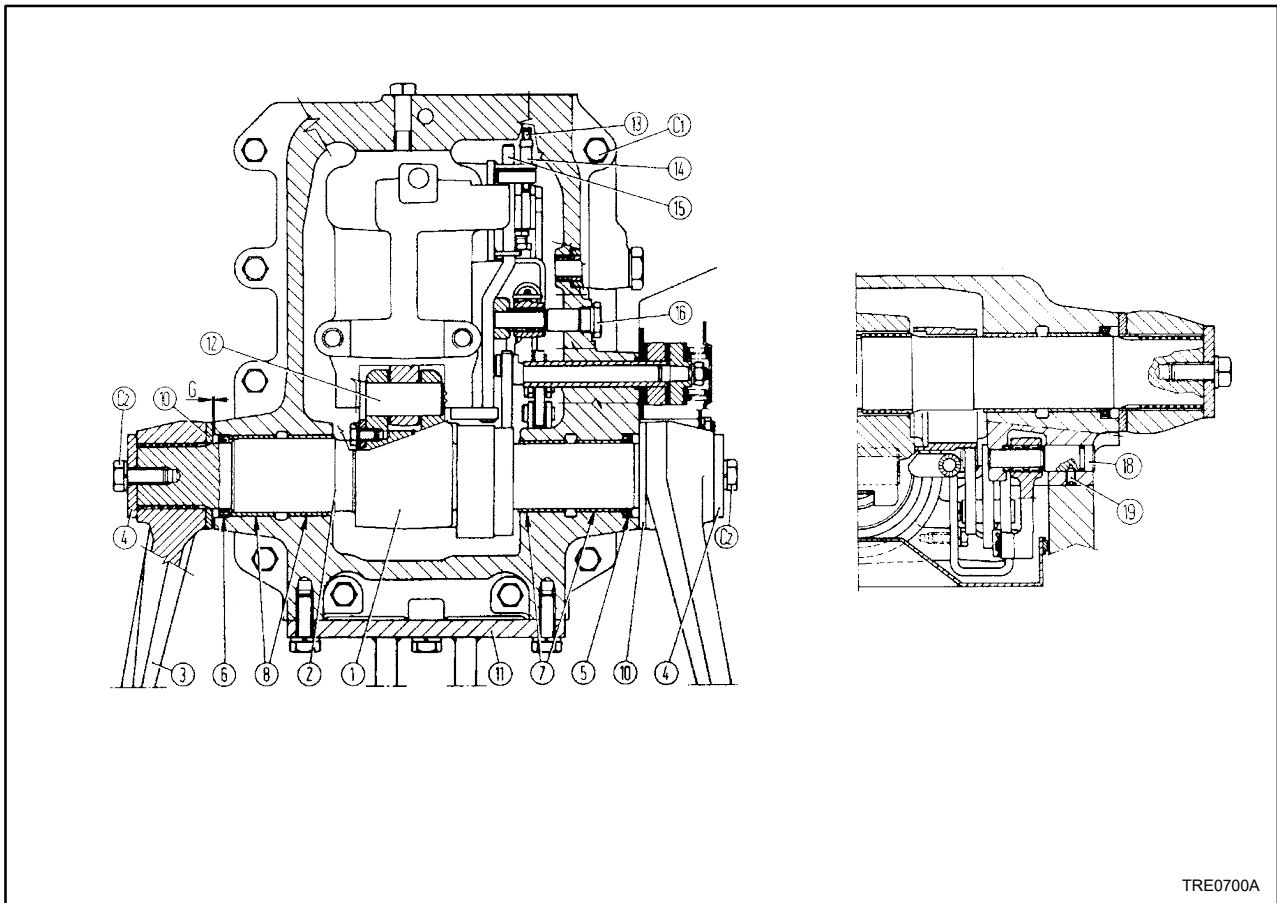
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Sectional drawing of hydraulic lift control valve block

- | | |
|--|---|
| a. Detail of O-ring and arm lowering adjuster valve anti-extrusion ring. | 14. Ring. |
| 1. Spool valve. | 15. Cylinder safety valve. |
| 2. Spool valve seat. | 16. Response control valve. |
| 3. Plug. | 17. Arm lowering speed control valve. |
| 4. Spool return spring. | 18. Ball. |
| 5. Valve plunger. | 19. Response control valve adjusting pin. |
| 6. Plunger spring. | 20. Delivery connection. |
| 7. Plug. | 21. Check valve spring. |
| 8. Piston seat. | 22. Check valve. |
| 9. Piston. | 23. Check valve seat. |
| 10. Spring cup. | 30. Retaining ring. |
| 11. Draft sensitivity adjustment valve spring. | 31. Roll pin. |
| 12. Draft sensitivity adjustment valve. | 32. Back-up ring. |
| 13. Plug. | 33. O-ring. |

Note – Install the O-ring 33 and anti-extrusion ring 32 as illustrated in the drawing (a) using the protection device **380000266** and heating the ring 32 in oil at 50 °C. Take care to install ring 32 with the flat surface facing upwards and concave surface facing O-ring 20. Take necessary precautions not to damage them.

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TRE0700A

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Sectional drawing of lift

C₁. .Lift capscrews.

C₂ .Thrust plate capscrews.

G = 0.2 to 1.4 mm (0.0079 to 0.551 in.)
Shaft end float.

1. Inner arm.

2. Cross shaft.

3. Link arm.

4. Arm thrust plates.

5. R.H.Seal.

6. L.H.Seal.

7. R.H.Bushing.

8. L.H.Bushing.

10. Thrust washers.

11. Top link support.

12. Piston rod pin.

13. Travel limit adjusting screw.

14. Travel limit adjusting screw locknut.

15. Travel limit control rod.

16. Control valve link pin.

18. Draft control inner lever pivot.

19. Set screw.

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TOOLS

HYDRAULIC LIFT EQUIPMENT

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

However, to ensure greater safety and obtain the best results while saving time and effort, we recommend that these essential tools are used in conjunction with the specific tools listed below as well as certain tools which are to be made following the construction drawings given in this manual.

380000215 Hand pump for valve calibration.

380000224 Lifting hook.

380000238 Hook adapter **380000224**.

- X 380000225** Ring for fitting piston with lift seals.
- X 380000274** Union for checking control valve seal.
- X 380000262** Punch for fitting lift arm shaft seals.
- X 380000261** Punch for fitting needle bearings on control valve block control lever bushing.
- X 380000260** Punch for fitting needle bearings to upper/lower draft control levers and to draft control link rod.
- X 380000230** Wrench for cylinder safety valve setting ring nut.
- X 380000217** Union for lift pressure relief valve calibration.
- X 380000218** Union for cylinder safety valve calibration.
- X 380000267** Wrench for maximum lift screw lock-nut.
- X 380000263** Draft control setting tool.
- X 380000264** Position control setting tool.

– test oil temperature	°F (°C)	131 to 149 (55 to 65)
– test oil viscosity		16 CST

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

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)

LIFT HYDRAULIC PUMP (OPTIONAL) DATA

Filter	
Type	paper cartridge
Location	fixed to the pump housing on suction side
Pump	
Type	gear type with oil suction from transmission casing
Location	Flanged on the rear left-hand side of the engine
Construction	Bosch
Model	Rexroth
Operation	by means of the engine gears
Direction of rotation (as seen from drive side)	left (counter clockwise)
Engine speed to pump speed ratio	1 : 1.080
Maximum speed of pump rotation (with engine at maximum power equivalent to 2500 rpm)	rpm 2700
Nominal flow rate	dm ³ /turn (in. ³ /turn) 0.01950 (1.1930)
Corresponding rated output for new pump	dm ³ /min (in. ³ /min) 48 (2929.14)
Corresponding rated output for pump with 300 hours of work	dm ³ /min (in. ³ /min) 43 (2624.02)
Bench output at 1500 rpm and a pressure of 2175 psi (150 bar):	
– for new pump	dm ³ /min (in. ³ /min) 24.8 (1513.39)
– for pump with 300 hours of work	dm ³ /min (in. ³ /min) 22.3 (1360.83)

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MAIN SPECIFICATION OF IMPLEMENT HITCHING DEVICE

Type	three-point linkage
Category: – All Models	2
Draft control	by means of lower arms with flex bar
Maximum liftable load with centre of gravity 610 mm from the lower arm link ends: with arms horizontal (with top link connected to hole on upper support):	
– JX60, JX70 Models kg	2260
(lb)	(4982.45)
– JX80, JX90 and JX95 Models kg	2700
(lb)	(5952.48)
Maximum liftable load: with arms horizontal (with top link connected to upper support pin):	
– JX60, JX70 Models kg	3000
(lb)	(6613.87)
– JX80, JX90 and JX95 Models kg	3565
(lb)	(7859.48)
Flex bar diameter:	
– JX60, JX70, JX80, JX90, JX95 Models mm	24.867 – 24.900
(in.)	(0.9790 – 0.9803)
Axial clearance of flex bar	1.2 – 4.1
(in.)	(0.0472 – 0.1614)

MAIN SPECIFICATION OF HYDRAULIC PUMP (All models)

Filter	
Type	paper cartridge
Location	fixed to the pump housing on suction side
Pump	
Type	gear type with oil suction from transmission casing
Location	Flanged on the rear left-hand side of the engine
Construction	BOSCH
Model	A31
Operation	by means of the engine gears
Direction of rotation (as seen from drive side)	left (counter clockwise)
Engine speed to pump speed ratio	1 : 0.931
Maximum speed of pump rotation (with engine at maximum power equivalent to 2500 rpm) rpm	2328
Bench output at 1450 rpm and pressure of 172 bar (175 kg/cm ²):	
– for new or reconditioned pump dm ³ /min (in. ³ /min)	19 (1159.5)
– for worn pump dm ³ /min (in. ³ /min)	13.3 (811.6)
– test oil temperature C°(F°)	55 – 65 (131 – 149)
– test oil viscosity	SAE 20

(continued overleaf)

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– All models	mm (in.)	100.036 – 100.071 (3.9384 – 3.9398)
Clearance between piston and liner	mm (in.)	0.036 – 0.091 (0.0014 – 0.0036)
Diameter of lift arm shaft (11, fig. 3) at position of bushings:		
– right-hand side	mm (in.)	54.970 – 55.000 (2.1642 – 2.1654)
– left-hand side	mm (in.)	62.670 – 62.700 (2.4673 – 2.4685)
Internal diameter of bushings fitted on lift body:		
– right-hand side (8, fig. 3)	mm (in.)	55.100 – 55.184 ⁽¹⁾ (2.1693 – 2.1726)
– left-hand side (12)	mm (in.)	62.800 – 62.884 ⁽¹⁾ (2.4724 – 2.4757)
Clearance between lift arm shaft and bushings	mm (in.)	0.100 – 0.214 (0.0039 – 0.0084)
Interference between bushings and their seats	mm (in.)	0.065 – 0.185 (0.0026 – 0.0073)
Axial clearance of shaft complete with lift arms	mm (in.)	0.2 – 1.4 (0.0079 – 0.0551)
External diameter of draft control idler shaft	mm (in.)	21.967 – 22.000 (0.8648 – 0.8661)
Internal diameter of seats in support	mm (in.)	22.020 – 22.072 (0.8669 – 0.8690)
Clearance between draft control idler shaft and position control idler shaft	mm (in.)	0.020 – 0.105 (0.0008 – 0.0041)
Diameter of position control idler shaft	mm (in.)	13.973 – 14.000 (0.5501 – 0.5512)
Internal diameter of position control idler shaft	mm (in.)	14.016 – 14.059 (0.5518 – 0.5535)
Clearance between draft control idler shaft and position control idler shaft	mm (in.)	0.016 – 0.086 (0.0006 – 0.0034)
Clearance between control valve block pin (8, fig. 4) and its seat on the control valve block body	mm (in.)	0.008 – 0.012 ⁽²⁾ (0.0003 – 0.0005)
Clearance between lift control valve (10) and its seat on the control valve block body	mm (in.)	0.008 – 0.012 ⁽²⁾ (0.0003 – 0.0005)
Control valve block pin return spring (5, fig. 4):		
– free spring length	mm (in.)	50.5 (1.9882)
– spring length under load of 31.7 – 35 N (7.1242 – 7.8741 lb)	mm (in.)	34 (1.3386)
Control valve return spring (9, fig. 4)		
– free spring length	mm (in.)	44 (1.7323)
– spring length under load of 103 – 114.7 N	mm (in.)	29 (1.1417)

SECTION 35 – HYDRAULIC SYSTEM

Chapter 1 – Rear mechanical hydraulic lift

CONTENTS

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**35 000 – MAIN SPECIFICATION – TORQUE SETTINGS – TOOLS – SECTIONAL DRAWINGS –
DESCRIPTION AND OPERATION – TROUBLESHOOTING**

MAIN SPECIFICATION OF REAR MECHANICAL HYDRAULIC LIFT

Type		position or draft control with a combination of the two
Operating system		two independent levers
LIFT-O-MATIC		provides fast lifting/lowering operations using pushbuttons, without using the position or draft control levers
Single-acting cylinder:		
– rated diameter and stroke:		
All models	mm (in.)	100x128 (3.9370x5.0394)
– capacity:		
All models	cm ³ (in. ³)	1005 (61.33)
Pressure relief valve setting	bar psi	186 – 191 (12697.69 – 2770.21)
Cylinder safety valve setting	bar psi	210 – 215 (3045.78 – 3118.30)

(continued overleaf)

MAIN SPECIFICATION OF REAR MECHANICAL HYDRAULIC LIFT

(continued)

Lift piston diameter:		
– All models	mm (in.)	99.980 – 100.000 (3.9362 – 3.9370)
Internal diameter of cylinder liner:		

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