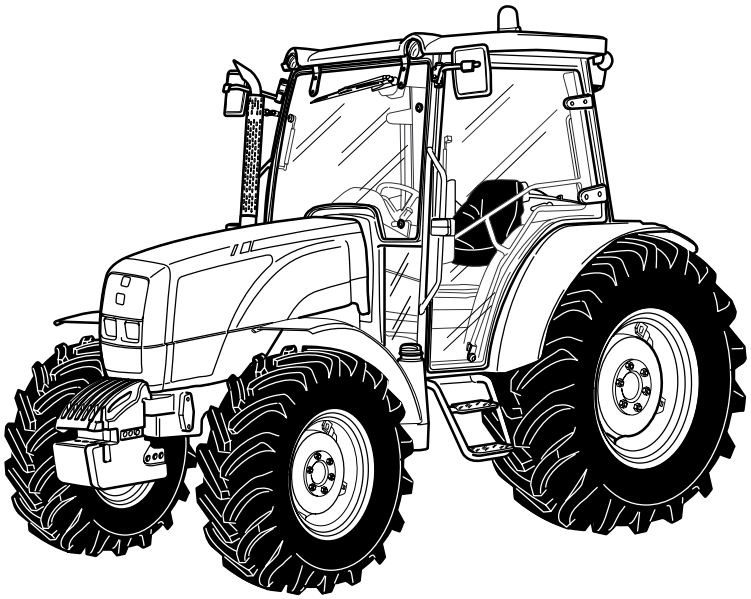


MF 2430 - 2435 - 2440

WORKSHOP MANUAL
P/N 3681774M1 - EDITION 01-2006

MASSEY FERGUSON

GENERAL INSTRUCTIONS

IMPORTANT WARNING

All the maintenance operations and repairs described in this manual must be carried out by the MF assistance network only, in strict compliance with the indications given and using special tools if necessary.
Anyone who carries out the described operations without strictly complying with the instructions becomes personally responsible for any consequent damage.

Battery

Before proceeding with any work, disconnect and insulate the negative battery cable unless other instructions are given for the specific operation required (for example: an operation where the engine must be running). After the operation has been terminated, detach this cable in order to finish the work.

Adjuster shims

Whenever adjustments are made, select the adjuster shims by measuring them one by one with a micrometre and then adding the values gauged: do not trust in the erroneous measurement of the complete pack or in the nominal value given for each ring.

Spinning shaft seals

Comply with the following instructions to correctly mount the spinning shaft seals:

- before they are mounted, allow the seals to soak for at least half an hour in a bath of the same type of oil as that they will be sealing;
- thoroughly clean the shaft and make sure that its operating surfaces are not damaged;
- position the sealing lip towards the fluid. If the lip is the hydrodynamic type, the direction in which the scoring points (considering the direction in which the shaft spins) must tend to make the fluid flow towards the internal part of the seal;
- spread a film of lubricant (oil is preferable to grease) on the sealing lip and fill the gap between the sealing lip and dust guard lip of double-lipped seals with grease;
- fit the seal into its housing by pressing or use a punch with a flat contact surface. Never hit the seal with a hammer or mallet;
- when a seal is mounted, make sure that it is inserted perpendicular to its housing. After mounting, make sure that it touches the supporting ridge (if applicable);
- to prevent the seal lip from being damaged by the shaft, fit an adequate guard whilst the two parts are being assembled.

O-ring toroid seals

Lubricate the o-ring seals before they are fitted into their housings to prevent them from rolling around themselves and becoming twisted as they are mounted, something that would compromise their sealing ability.

Bearings

It is advisable to proceed in the following way when mounting bearings:

- heat them to 80 – 90 °C before fitting them on to their respective shafts;
- cool them before externally fitting them into their housings.

Spring pins

When mounting split tube spring pins, make sure that their notches point in the direction of the force exercised on the pin itself.
Spiral spring pins do not need to be set in any direction when mounted

LUBRICANTS AND FUELS

Assembly to be filled	Quantity dm³ (litres)			Specifications	Ambient temperature	AGROLUBE
	2430	2435	2440			
Engine with filter	7.5	7.5	7.5	—	LOWER THAN 0 °C	—
				API CE/SG CCMC D4 MB 227.0	FROM 0 °C TO 27 °C	—
				—	HIGHER THAN 27 °C	KRONOS 30
				API CE/CF-4/SG ACEA E2-B2-A2 MB 228.1	ALL TEMPERATURES	KRONOS 15W40
Synch reverse shuttle gearbox, steering and hydraulic circuit (1)	35	35	35	API GL 4 MF 1135	ALL TEMPERATURES	SINCROS/B
Powershuttle gearbox, steering and hydraulic circuit (2)	35	35	35	MF CSM- MF 1135-1141	ALL TEMPERATURES	SINCROS/C
Rear final drives (each)	4	4	4	API GL 5 MIL-2105 D	ALL TEMPERATURES	KRIPTOS 80W-90
Front axle differential box	3.5	5.0	5.0	API GL 4 MF 1135	ALL TEMPERATURES	SINCROS/B
Front final drives (each)	1.5	1.5	1.5	API GL 5 MIL-2105 D	ALL TEMPERATURES	KRIPTOS 80W-90
Braking circuit	0.9	0.9	0.9	—	ALL TEMPERATURES	XERONS RED (3)
Greasing points	—	—	—	—	ALL TEMPERATURES	G.M.P. GREASE EP
Cooling circuit	10	10	10	AGROLUBE MANTOS antifreeze in the following proportions according to temperature:		
Fuel tank	90	90	90	Decanted and filtered diesel fuel		ISO 8217 DMA, SB2869 A1 or A2 (cetane N.: 45 min)

Ambient temperature	Degrees °C	-8°	-15°	-25°	-35°
Antifreeze percentage	%	20	30	40	50

(1) Use LANDINI M2 C 86 C, M-F 1135 compliant oils. LANDINI specifications require use of additives and anti-noise properties. The use of different types of oil, or mixing other types of oil into the oil supplied with the tractor can lead to increased noise.
(2) Powershuttle transmission with electrohydraulic reverse shuttle uses ONLY AGROLUBE SINCROS / C oil.
(3) LANDINI S/ENG/I 102 compliant brake circuit mineral based oil.

(Continued)

GENERAL FEATURES	MF 2430	MF 2435	MF 2440
Lubrication			
Type	forced, by means of pump		
Oil cleaning	gauze filter (on pump intake) cartridge filter (on engine delivery)		
Oil pressure at 1500 rpm (bar)	3 ÷ 5		
Recommended oil	See section 100		
Cooling			
Type	water, with forced circulation by centrifugal pump operated by the gears of the timing system		
Capacity of cooling fluid reservoir (l)	5.5		
Cooling fan	vane fan		
Fan diameter and number of blades (mm)	7		
Recommended fluid	See section 100		

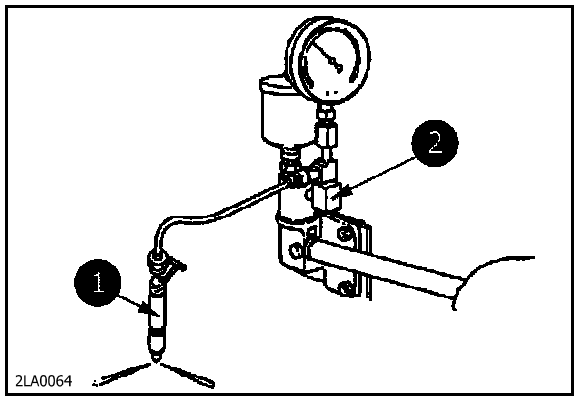
Faults	Possible causes	Remedies
The engine starts but then stops	**1.** Idling rate too low.	Adjust idling rate.
	2. Irregular fuel supply to injection pump	Check the flow rates on the test bench.
	3. Impurities or water accumulated in the fuel pipes.	Detach the pipes, the injection pump and thoroughly clean them. If necessary, clean and dry the fuel tank.
	4. Fuel filters clogged	Replace integral filter cartridges.
	5. Abnormal play between valves and rocker arms.	Adjust play between valves and rocker arms.
	6. Valves seized, burnt or cracked.	Replace the valves.
	7. Air in the fuel circuit.	Check the pipes, unions, fuel pump, filters and injection pump for air. Lastly, bleed the circuit.
	8. Injection pump controls damaged.	Replace the damaged parts.
	9. Damaged cylinder head seal.	Replace the seal.
	10. Piston ring seized or broken.	Replace piston ring.
	11. Cylinder and piston rings worn.	Lap and use larger size parts.
	12. Big end pin and bearings seized.	Repair or replace.
	13. Incorrect alignment of piston ring gap.	Correct gap alignment.
The engine overheats.	**1.** Centrifugal pump of engine cooling circuit inefficient.	Overhaul the pump and replace it if necessary.
	2. Thermostat inefficient.	Replace the thermostat.
	3. Radiator partially inefficient.	Remove any scaling by washing. Check and repair any leaks from the tubes.
	4. Scaling in the places where coolant passes in the cylinder head and crankcase.	Thoroughly wash.
	5. The belt that controls the centrifugal pump and fan is too slack.	Check and adjust the belt tension.
	6. Cooling fluid (quantity insufficient).	Top up the level in the expansion tank using the recommended fluid.

(Continued)

Injection pressure test

Carefully remove the carbon deposits from the injector before proceeding with the inspections.

1. Connect the injector (1) to the high pressure hose of the injector test instrument (2).
2. Slowly operate the lever of the instrument (2) and note down the value indicated by the pressure gauge when the injector (1) starts to spray.
   The correct injection pressure should be:
   181 - 191 bars
3. If the measured pressure is lower than specified, remove and carefully clean each component of the injector. Repeat the test.



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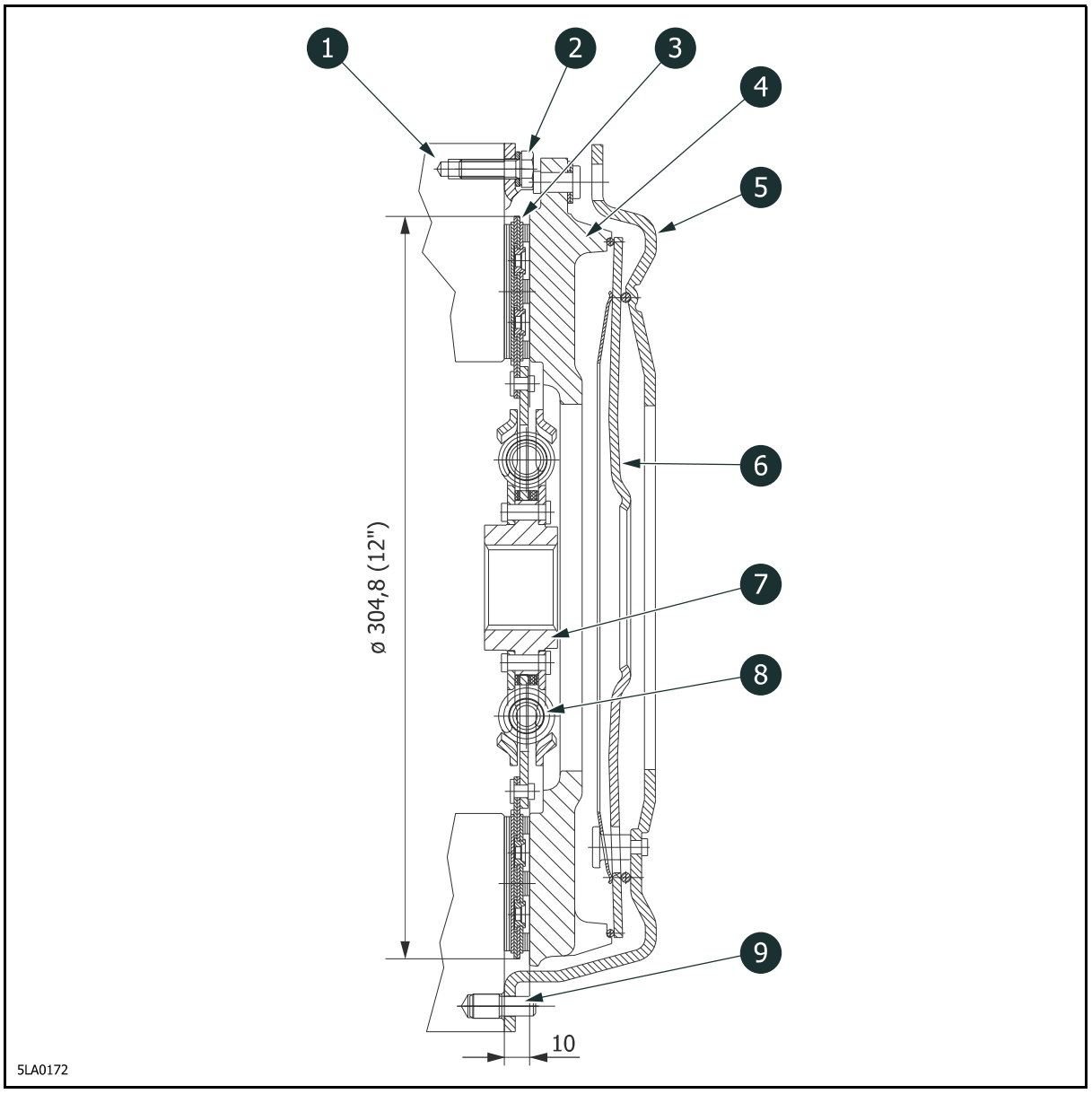
SECTIONS



4

Clutch longitudinal section

1. Flywheel
2. Fixing screw
3. Friction plate
4. Pressure plate
5. Clutch cover
6. Diaphragm spring
7. Hub
8. Flexible coupling springs
9. Centring pin

Assembly

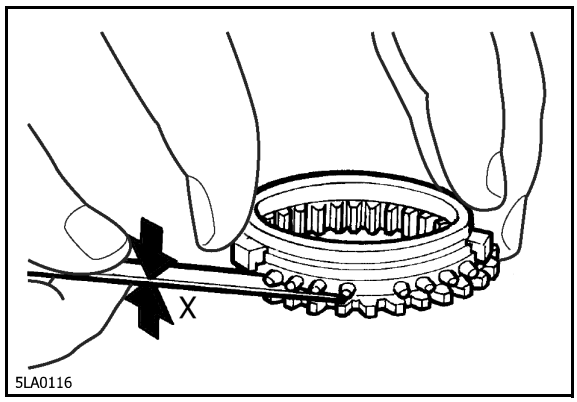
WARNING

Handle all parts with great care. Do not put your hands or fingers between one part and the next. Wear approved safety garments such as goggles, gloves and safety footwear.

Comply with the following recommendations when refitting the clutch housing:

- For orientation of parts, refer to the illustration on page 8.
- Before remounting the housings, supports and covers, thoroughly clean and degrease the coupling surfaces and apply a strip of sealant about 2 mm in diameter as indicated in the figure on page 10.
- Apply the tightening torques listed on page 100.
- Carefully clean all parts and inspect them.
- Replace all o-rings.
- Replace all damaged or worn components.
- Check rolling tracks of all bearings for anomalies while rolling.
- Lubricate with grease the bearing and o-ring seats.
- Check with a jet of air for obstructions of the channels and lubrication oil passage holes.
- Check synchroniser X height.

  X = 1.25 mm (minimum)



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6. Fit and fasten the collar support.

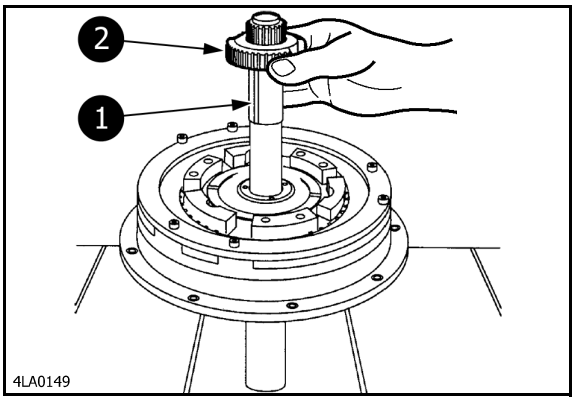
7. Position the internal HI-LO components:

- clutch command piston
- clutch single plate

Check the friction material thickness of the clutch plate.

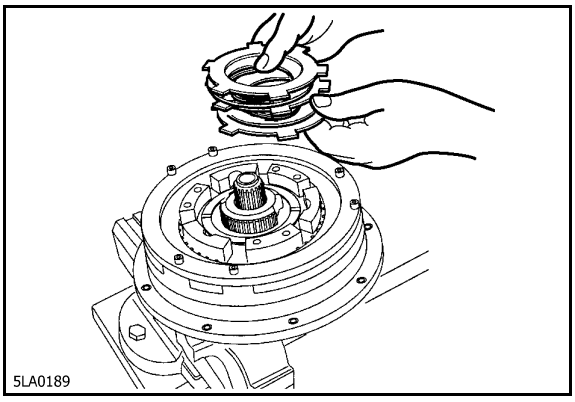
- pressure plate
- Belleville spring
- Belleville spring flange
- clutch cover
- clutch piston.

8. Fit the input shaft (1) with the plate holder hub (2).



48

9. Fit the complete clutch plate and input planetary assembly.



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DESCRIPTION AND OPERATION OF THE POWERFIVE GEARBOX

Gearbox and reverse shuttle

The gearbox is equipped with helical toothed infinitely meshed gears controlled by three synchro-mesh units. It provides 5 speeds.

The Powerfive module is a HI-LO electrohydraulic device consisting of a electro-hydraulically controlled wet multiple plate clutch fitted in front of the gearbox.

The Powerfive can engage a 20% step-down for each forward and reverse gear of the gearbox without using the clutch.

Engagement is controlled by a solenoid valve operated by the button on the gear lever.

The range reduction unit is the cascade type with infinitely meshed straight toothed gears.

The final drive offers three speed ranges: slow, normal and fast.

The reverse shuttle is a mechanical device providing 30 forward gears and 30 reverse gears.

The reverse shuttle is controlled by a specific lever arranged on the left of the steering wheel.

The reverse shuttle consists of a straight toothed gear. The reverse shuttle is engaged by means of a synchro-mesh.

The reverse shuttle is fitted inside the gearbox housing between the HI-LO and gearbox.

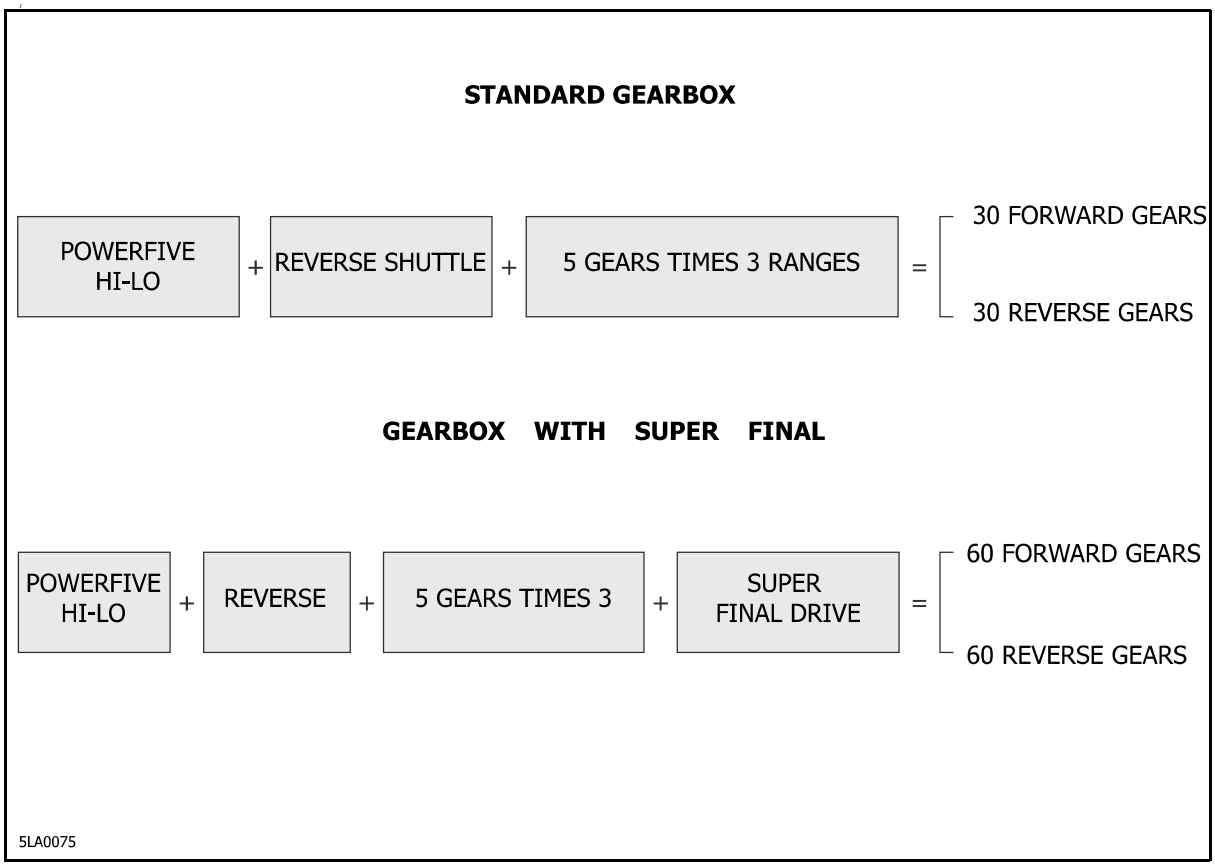
The assembly is lubricated by the oil in the gearbox housing.

Super final drive

The super final drive is a mechanical device providing 60 forward gears and 60 reverse gears.

The super final drive is installed prior to the gearbox and is controlled by a dedicated lever to the operator's left.

The super final drive can be used in low and normal ranges only.

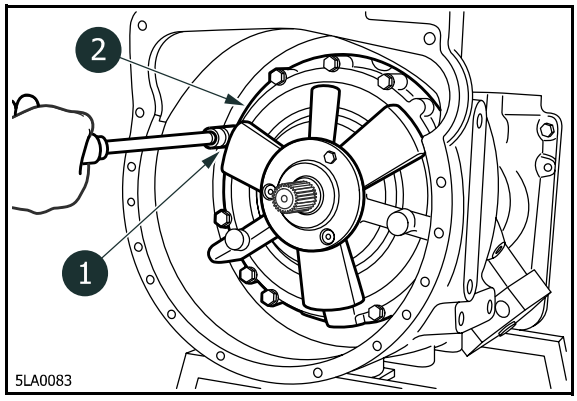


3

Powerfive gearbox configuration

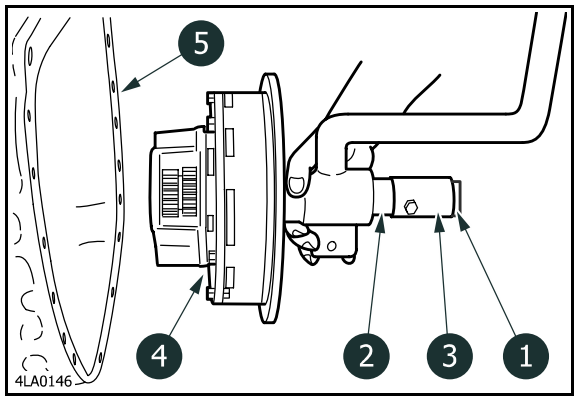
17. POWERFIVE GEARBOX

- Remove the shaft and the clutch fork.
- Remove the collar and the thrust bearing.
- Remove the PTO shaft.
- Loosen the screws (1) fastening the HI-LO assembly (2).



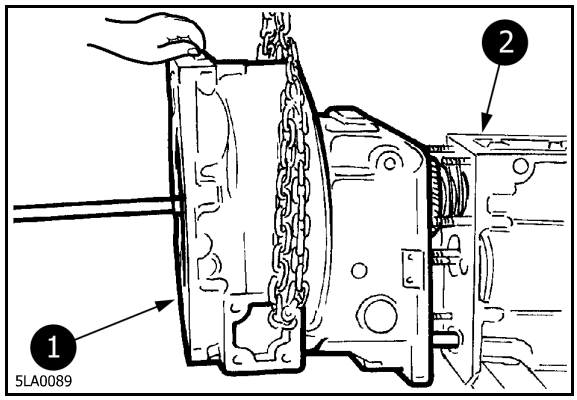
17

- Remove the HI-LO assembly (4) from the clutch housing (5) keeping the shaft (1) connected to the collar support (2). For this operation, fit tool (3) 137 PNT GL on the shaft (1) making it attach to the collar support (2) and fasten the screw.



18

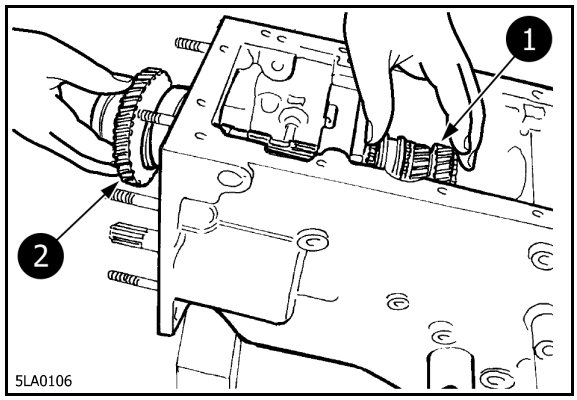
18. Remove the clutch housing (1) from the gearbox housing (2) keeping correct alignment.



19

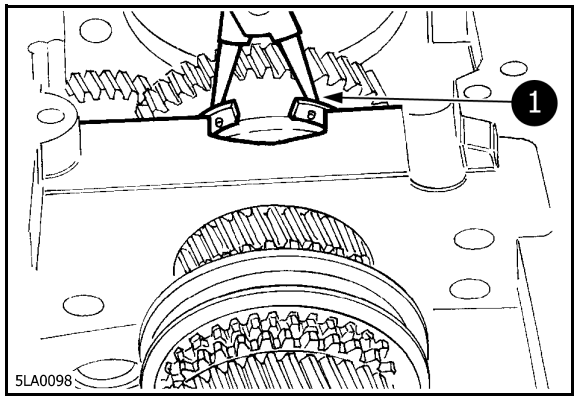
19. Remove the gearbox housing from the differential housing (see section 500).

5. Position the gears and four gear synchronisers (1) and insert the primary shaft from the top (2).



46

6. Fit from the front the snap ring (1) of the primary shaft.
(Also see detail 2 in fig. 48).



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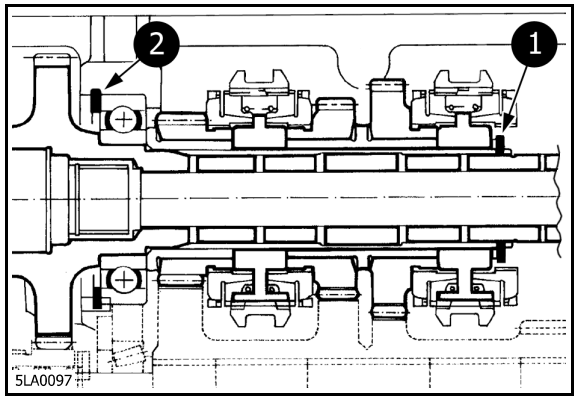
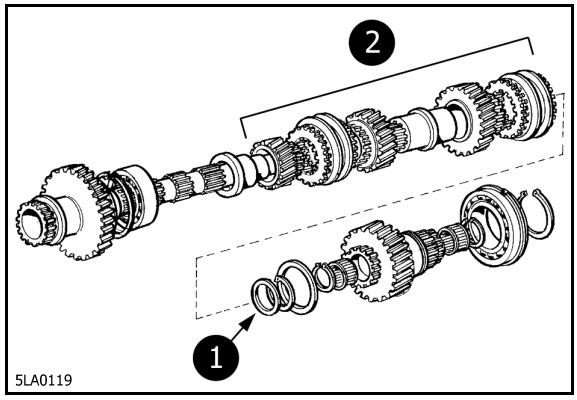


48

7. Position the shim (1) limiting the four gear pack (2) float.
(For selecting the shim, see procedure on page 31)



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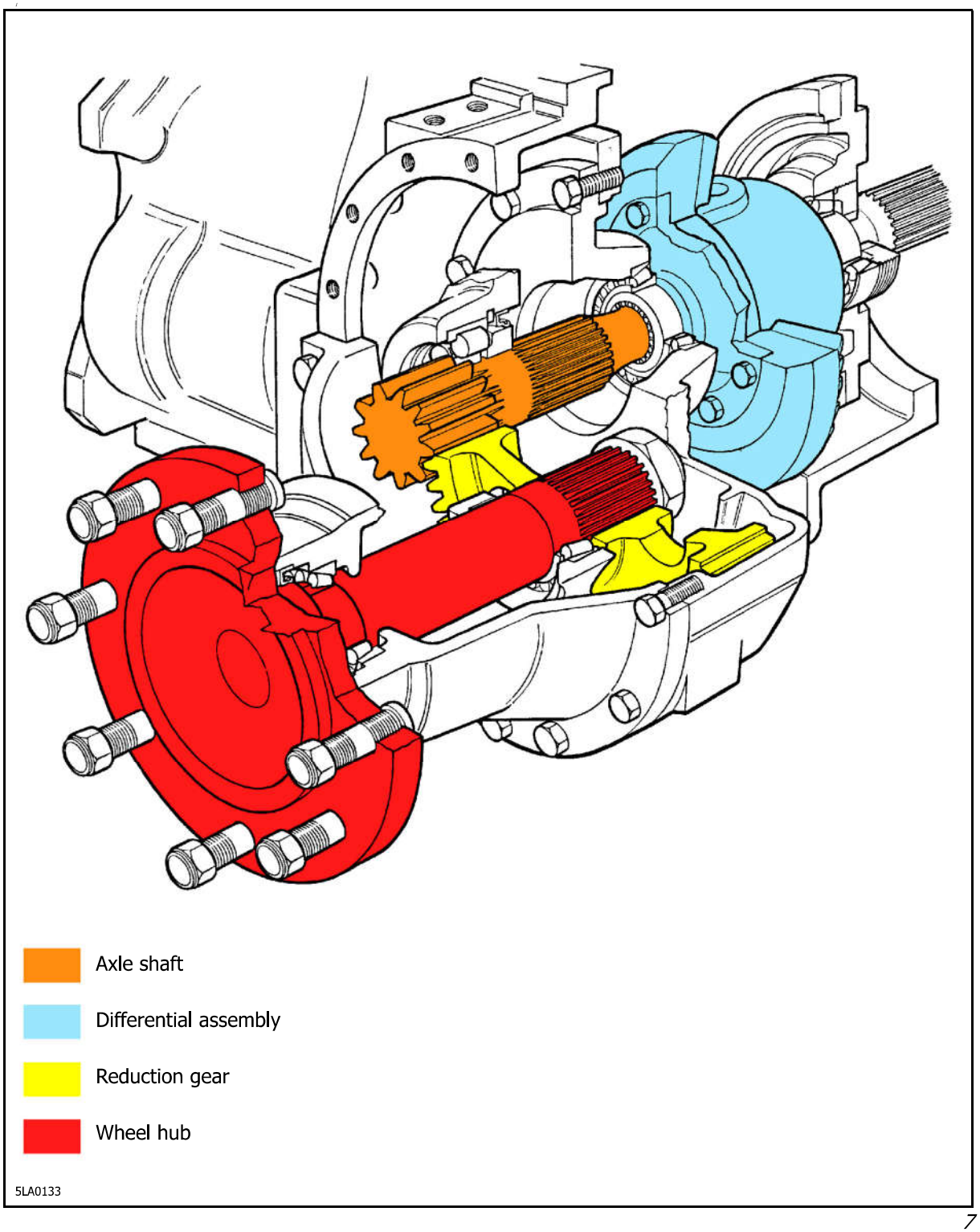
SECTION 500

REAR AXLE AND SIDE FINAL DRIVES



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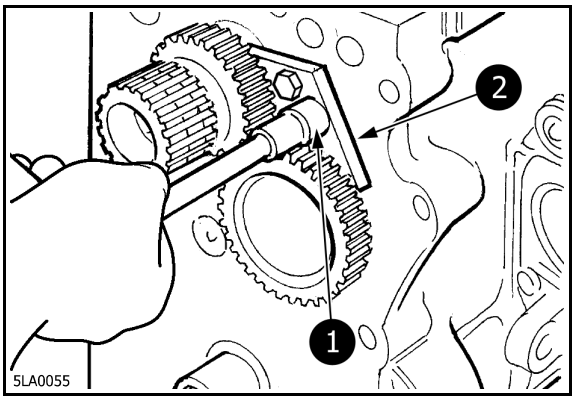
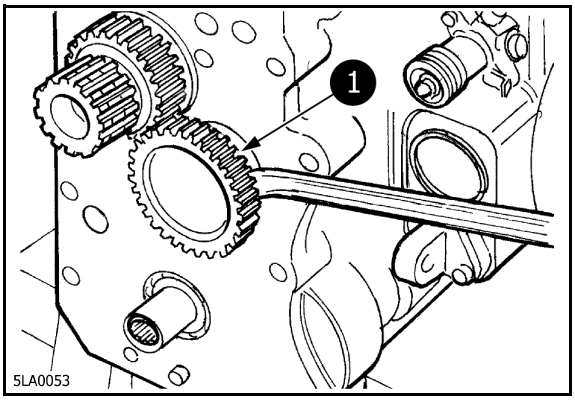
GT side final drive perspective view

5. Loosen the fixing screws (1) and remove the plate (2).



23

6. With the help of a lever, remove the shaft (1) from the slow /R range.



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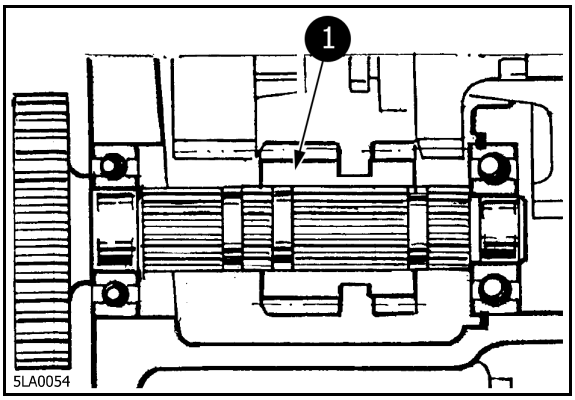
Remember that the double gear (1) is not easy to remove because it is obstructed by the fast range shaft.



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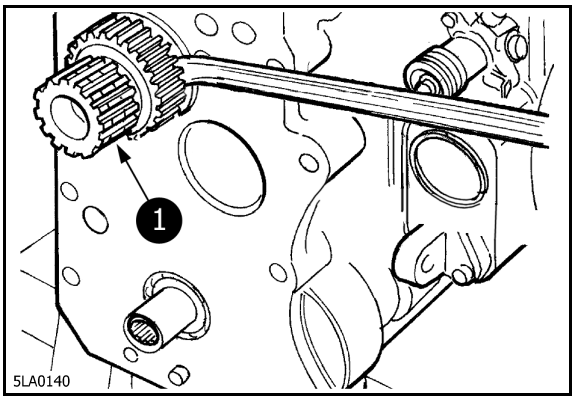
7. With the help of a lever, move the upper shaft (1) slightly forward to allow access to the snap ring.



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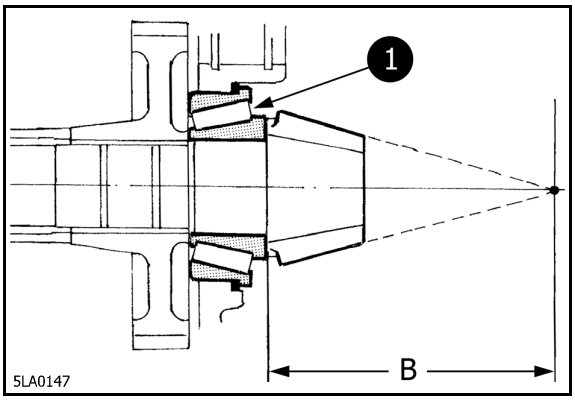
Pinion position adjustment

WARNING

Handle all parts with great care. Do not put your hands or fingers between one part and the next. Wear approved safety garments such as goggles, gloves and safety footwear.

This adjustment procedure is required whenever the rear pinion tapered bearing (1), bevel pair or differential housing is replaced.

Make sure that after being fitted the pinion is positioned with respect to the ring at a minimum dimension of B = 120 mm to ensure the correct operation of the bevel pair.
Dimension B may vary according to the correction shown on the pinion.



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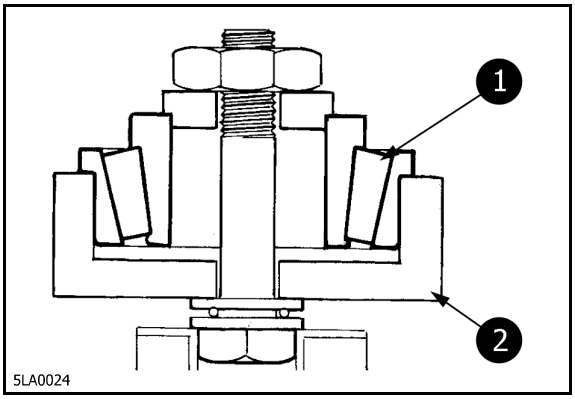
Proceed as follows:

1. Fit the rear tapered bearing (1) on the tool (2) **45 DIF GL**.



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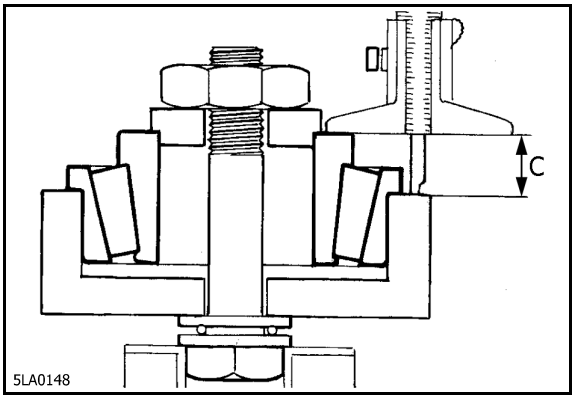
2. Measure dimension **C** with a micrometer thickness gauge.
This is the distance between the tapered bearing abutment on the guard and the bevel pinion supporting surface.



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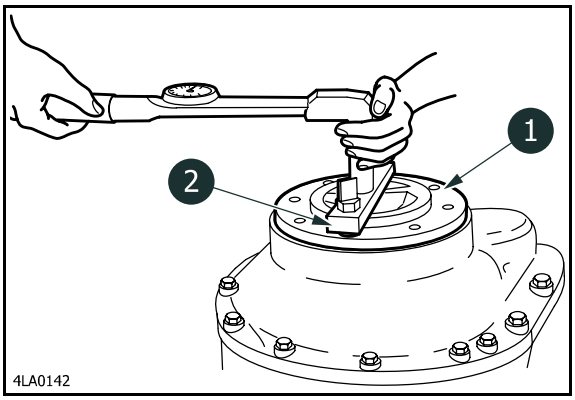
4. Fit on the wheel hub (1) the tool (2) **131 RID GL** and check that the rolling torque is:
15 - 35 Nm



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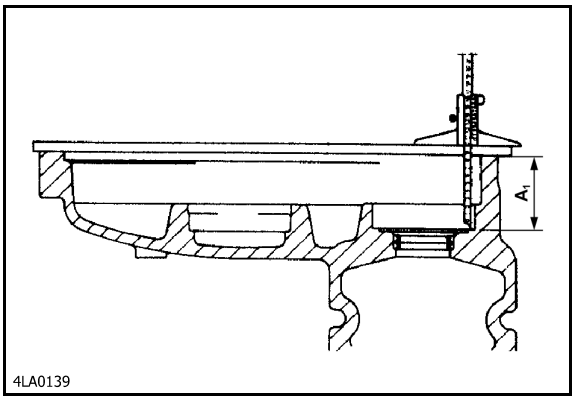
Axle shaft taper bearing preload adjustment

WARNING
Handle all parts with great care. Do not put your hands or fingers between one part and the next. Wear approved safety garments such as goggles, gloves and safety footwear.

Make sure that the drive axle taper bearings after fitting have a preload of 0 - 0.05 mm to ensure correct operation of the final drive.

Proceed as follows:

1. Measure with a micrometer thickness gauge the distance $\mathbf{A_1}$ between the reducer resting surface and the axle shaft taper bearing seat.



71

MAIN SPECIFICATIONS OF FRONT AXLE

Axle 710/515

Type	Spheroid cast iron construction, pivoting, with central mount
Differential	Hydrolock
Final drive	Axle epicyclical
DT engagement/disengagement	Mechanical, electro-hydraulically disengaged
Control	By switch on the operator's right.
Bevel torque	13/51
Bevel pair ratio	1 : 3.923
Final drive ratio	1 : 4.6
Total ratio	1 : 18.046
Brakes	Oil bath

Axle 716/513

Type	Spheroid cast iron construction, pivoting, with central mount
Differential	Hydrolock
Final drive	Axle epicyclical
DT engagement/disengagement	Mechanical, electro-hydraulically disengaged
Control	By switch on the operator's right.
Bevel torque	13/53
Bevel pair ratio	1 : 4.076
Final drive ratio	1 : 4.6
Total ratio	1 : 18.753
Brakes	Oil bath

Pinion taper bearing preload adjustment

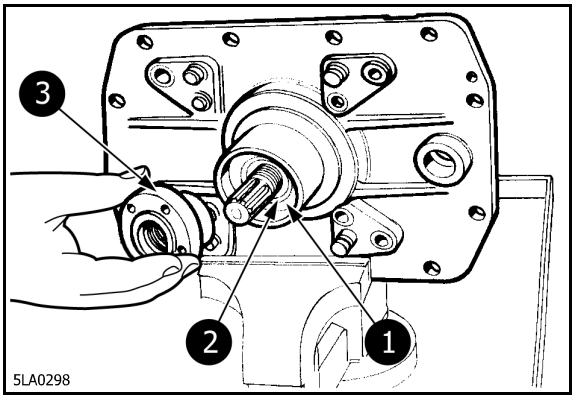
WARNING

Handle all parts with great care. Do not put your hands or fingers between one part and the next. Wear approved safety garments such as goggles, gloves and safety footwear.

Make sure that the rolling torque of the bevel pinion after fitting is 1.4 - 1.8 Nm to ensure correct operation of the bevel pair.

Proceed as follows:

1. Fit the bearing (1), the o-ring (2) and the ring nut (3).
Preliminarily tighten the bevel pinion lock nut.

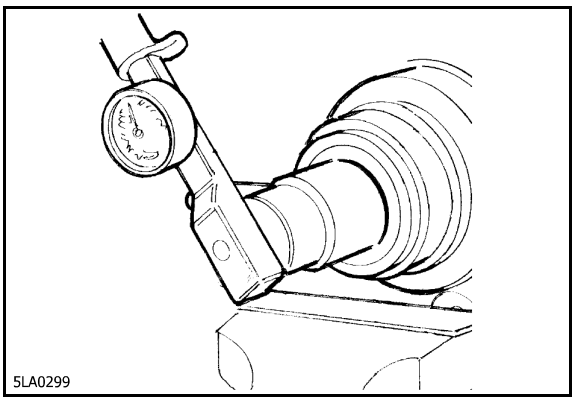


19

2. Use a plastic hammer to settle the pinion on the bearings.

3. Tighten the ring nut to reach a pinion rolling torque of:

1.4 - 1.8 Nm



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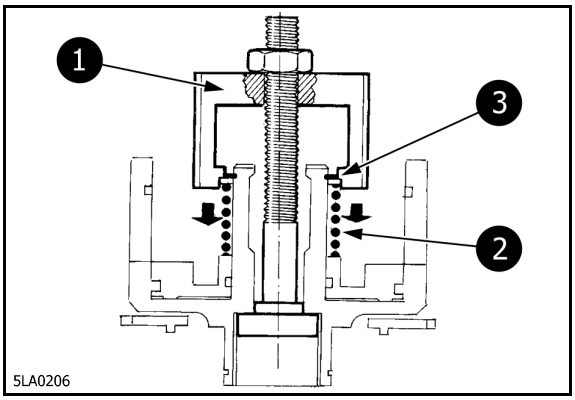
4. Use a plastic hammer to settle the pinion on the bearings again.

5. Measure the rolling torque again and when the correct value is reached, rivet the edge of the ring nut into the pinion shaft grooves.

MAIN SPECIFICATIONS OF REAR POWER TAKE-OFF

Type (with two functions)		1) independent in relation to the tractor's ground speed or: 2) synchronised with the gearbox
Engagement		electrohydraulic with hydraulic, electro-hydraulically controlled clutch
Control		by switch on the operator's right.
Speed selection		by means of a lever position on the operator's left
Spinning direction (tractor viewed from the rear)		clockwise
Engine rate with PTO at 540 rpm	(rpm)	2363
Engine rate with PTO at 540E rpm	(rpm)	1697
Diameter of the driven shaft on output spline shaft		$1^3/_8$" (6 spines)
Rotation rate with 540E rpm PTO synchronized with the gearbox	(rpm/ wheel turn)	10.769 (STD) 12.119 (GT)

2. Using tool (1) **95 PTO GL**, refit the spring (2) and the snap ring (3).



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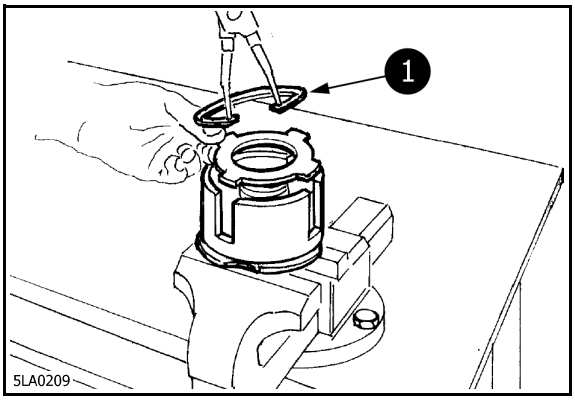
3. Insert in the bell the clutch plates and fasten with the snap ring (1).
Firstly insert a steel plate in contact with the piston and then a sintered plate and a steel plate.



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4. Fit the brake steel plate and the input shaft fastening with the snap ring.

5. Position the proportional PTO shaft fastening it with the snap ring.

6. Fit the PTO output shaft and respective gear fastening it with a snap ring.

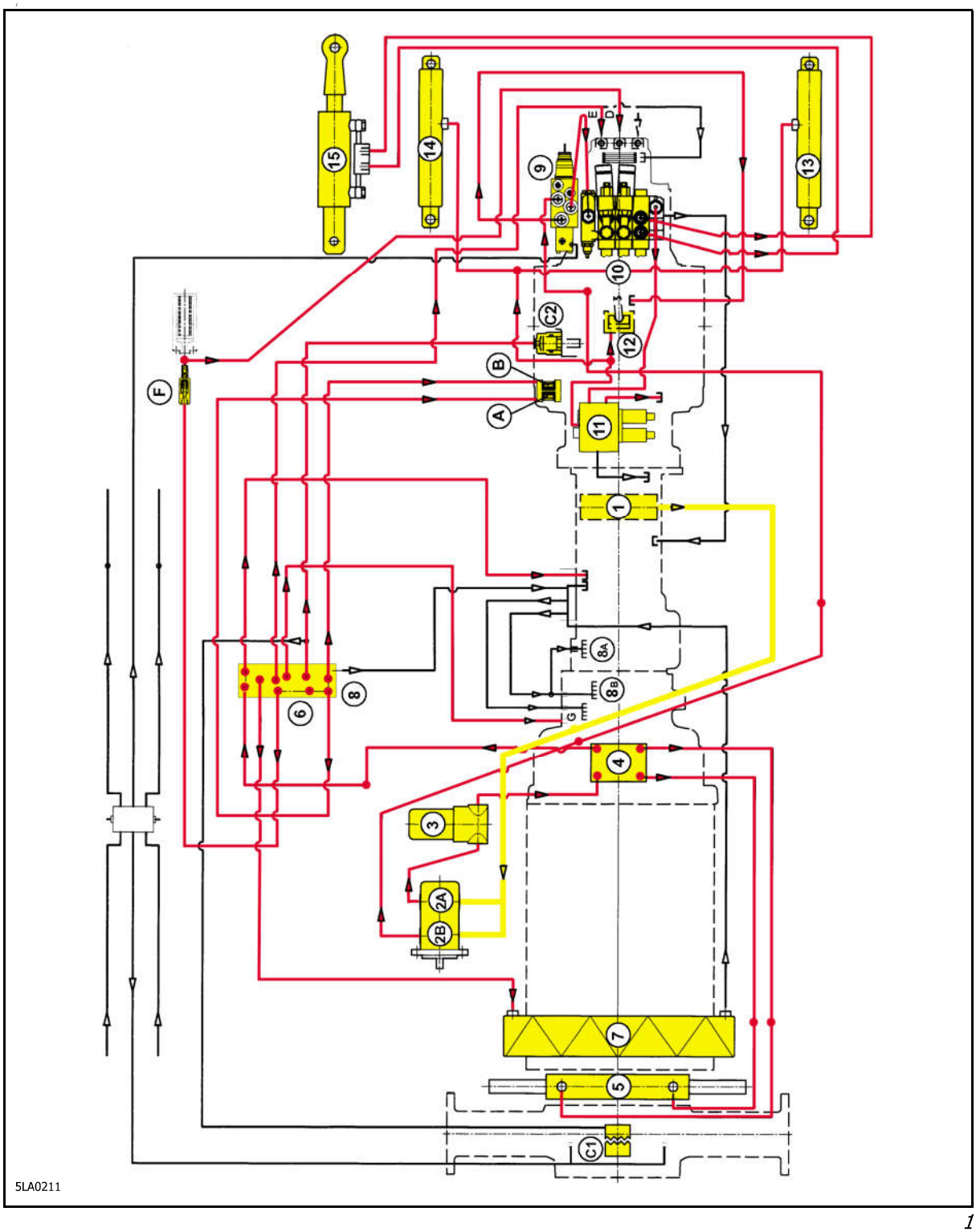
7. Position and fasten the shaft and the dual speed selection fork.

8. Fit the upper PTO shaft and fasten it with the respective snap ring.
Tighten the nut ring to obtain a specified torque of:

215 - 250 Nm

9. Fit the clutch assembly and cover.

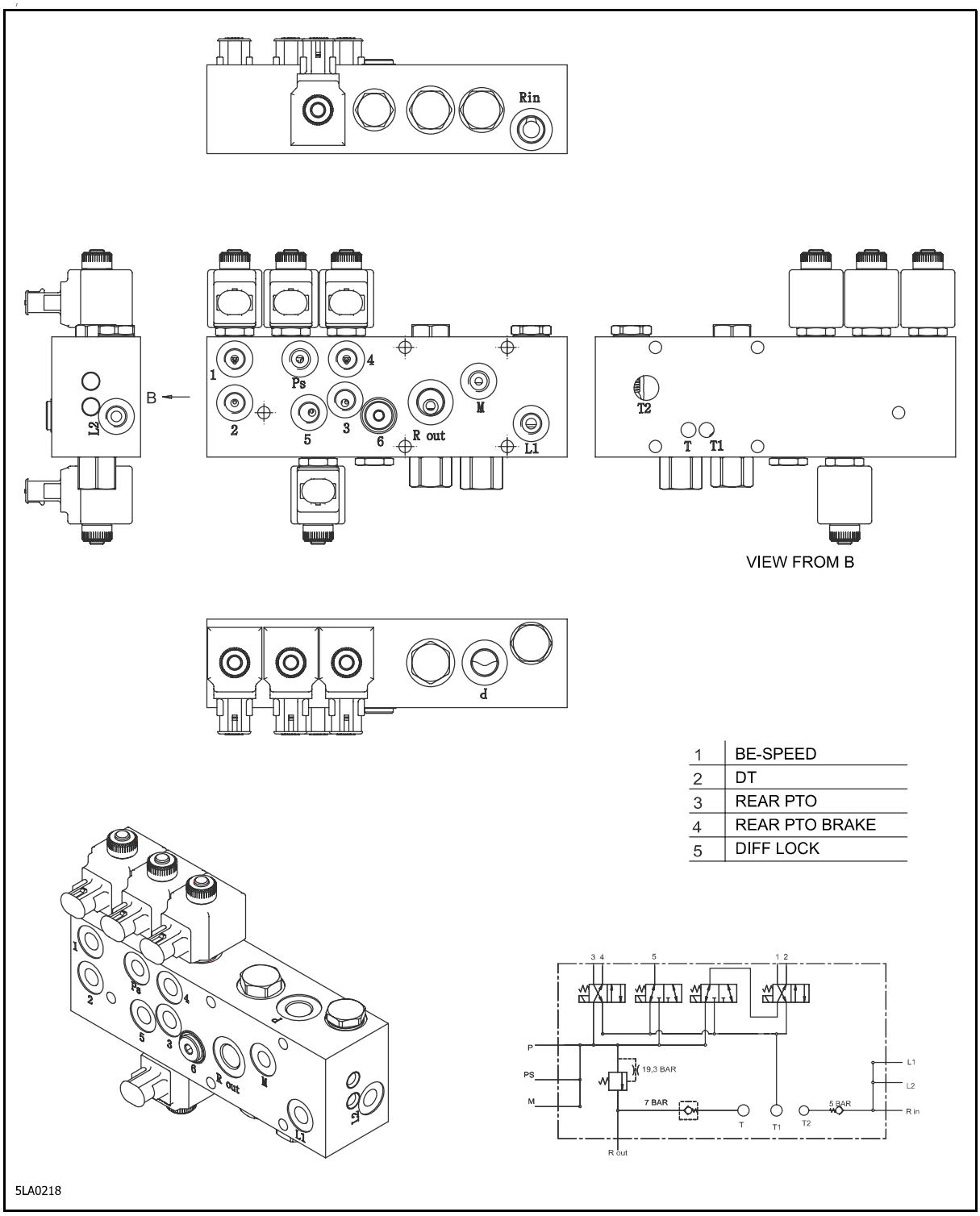
10. Fit the power lift assembly.



1

General hydraulic circuit

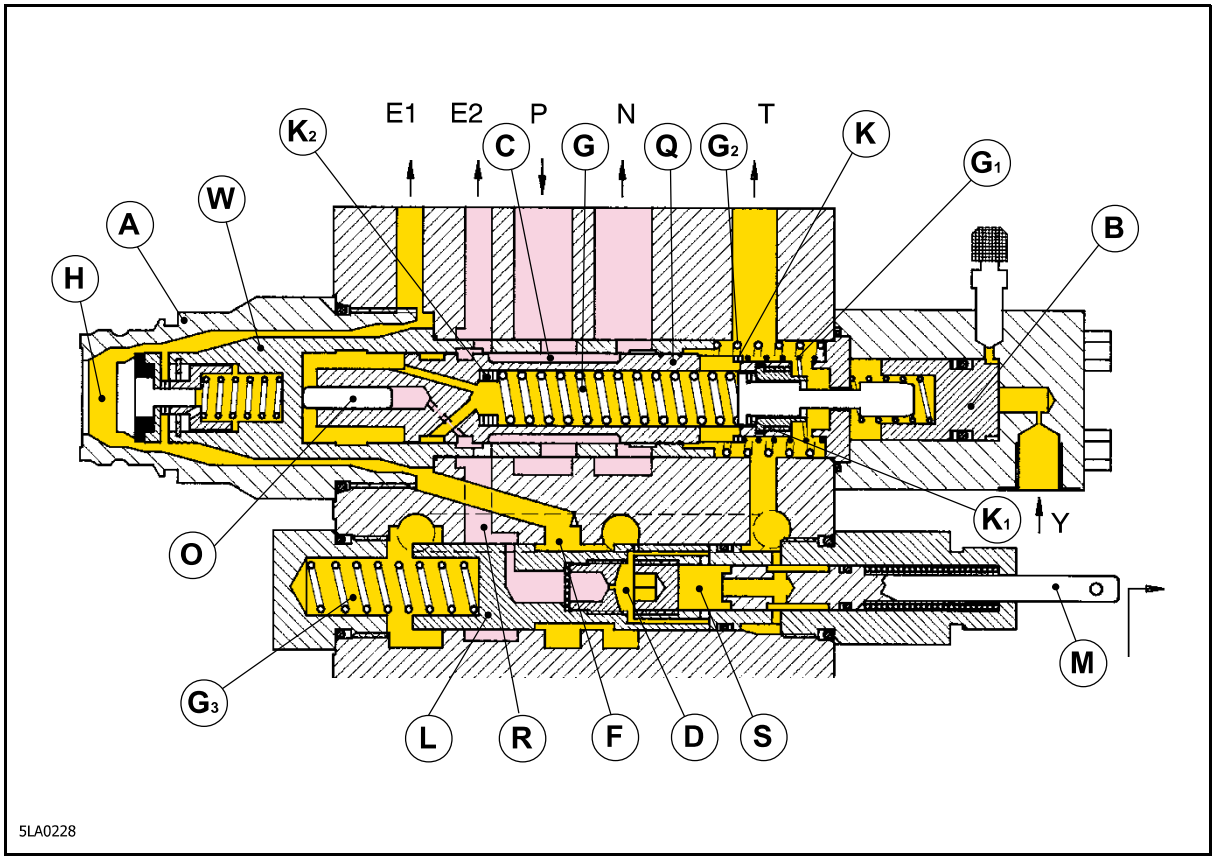
HYDRAULIC UNIT WITH FOUR SOLENOID VALVES FOR FAST RUN



8

Step with parking brake applied and brake pedals released

By activating the parking brake via the tie-rod "M", communication is effected between the exhaust "T" and the chamber "S" inside the tie-rod; being the latter connected to the chamber "H" which feeds the trailer, has practically no pressure. The automatic trailer braking device is released in this way. The oil from the pump, in addition to being conveyed into chamber "D", feeds the hydraulic power lift via the pipe "N" put into communication by groove "C".



18

A. Trailer brake connection quick connection
B. Distributor activation piston
C. Pump-power lift connection groove
D. Chamber
E1. Pressure switch
E2. Pressure switch
F. Chamber
G. 140 bar pressure hold spring
G1. 10-15 bar pressure hold spring
G2. Sleeve return spring (W)
G3. Piston spring (L)
H. Trailer brake outlet chamber
K. 10-15 bar pressure adjustment shims
K1. Piston stroke adjustment shims (Q)
K2. 140 bar pressure adjustment shims
L. Trailer brake feeding command piston
M. Parking brake connection tie-rod
N. Power lift feeding
O. Return piston
P. Pump feed
Q. Main piston
R. Trailer brake feeding channel
S. Brake tie-rid inner channel
T. Discharge channel
W. Sleeve
Y. Tractor brake feed

HYDRAULIC-MECHANICAL POWER LIFT

Description and operation

The tractor hydraulic-mechanical power lift is connected by appropriate tie-rods to the external implements which are raised and lowered.

It consists of a lifting body, one or more double acting cylinders and two external levers which control a hydraulic distributor.

A special **Load Sensing** distributor ensures smooth movements and controls without jerks when moving upwards.

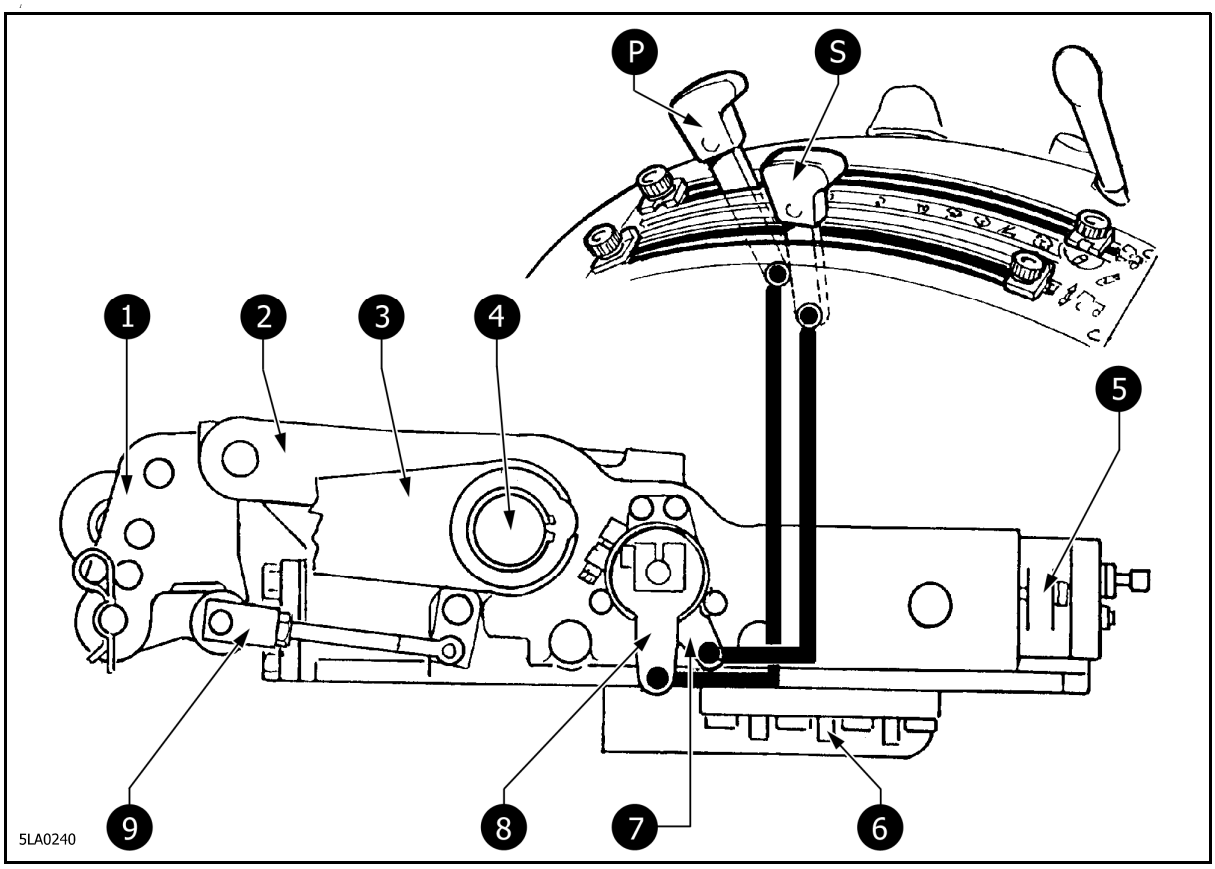
The power lift has four operating modes:

- controlled position operation
- controlled draft operation
- mixed position and draft operation
- floating operation

The hydraulic distributor governs three different steps:

- delivery or lifting step
- neutral step
- discharge or lowering step.

A descent speed regulator provides full control by the operator and hydraulically blocks the system during transportation.



34

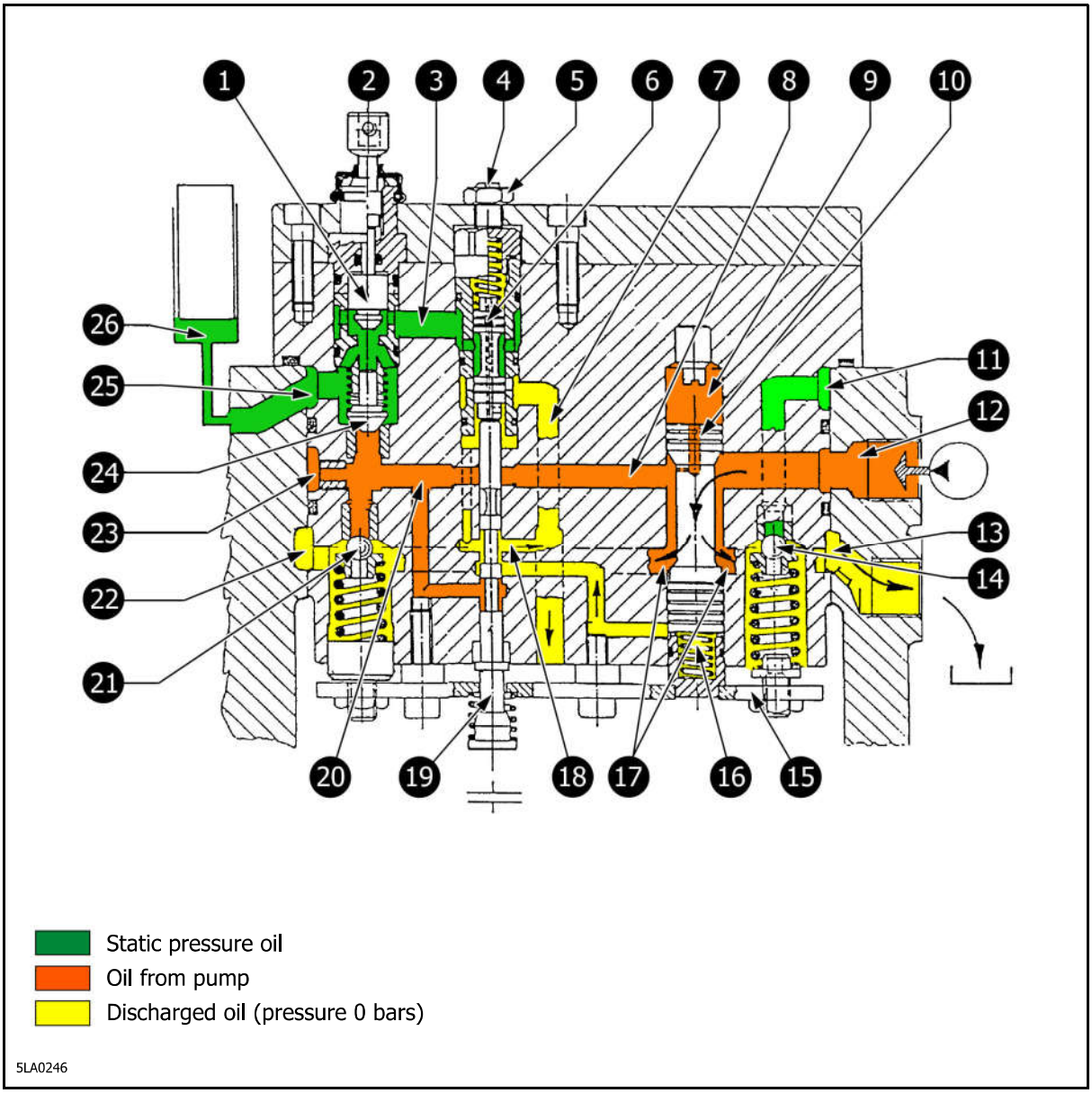
1. Pivoting support
2. Power lift unit
3. Power lift arm
4. Arm holder shaft
5. Command distributor
6. Cylinder
7. Draft control lever
8. Controlled position lever fitted on power lift
9. Control draft rod
P. P - Controlled position lever on control selector
S. S - Draft control lever

Hydraulic distributor - Neutral step

During this step, the control distributor keeps the oil contained in the cylinder under pressure, allowing the oil from the pump to flow freely to the transmission casing. During this step, the control rod (19) is in such a position to connect the chamber (16) directly to the exhaust via the hole (18).

The oil from the pump thus moves the regulator piston (10) downwards, feeds the chamber (9), opens the holes (17) entering inside the annular conduit (22) and then proceeds to the transmission casing.

The oil contained in the chamber cylinder (26) remains pressurised because it is withheld by the check valve (24), by the relief valve (6) and by the safety valve (14) which are connected to the cylinder from the annular conduit (11) and therefore supports the load applied to the lifting arms. The anti-shock safety valve (14) protects the cylinder from overpressure.



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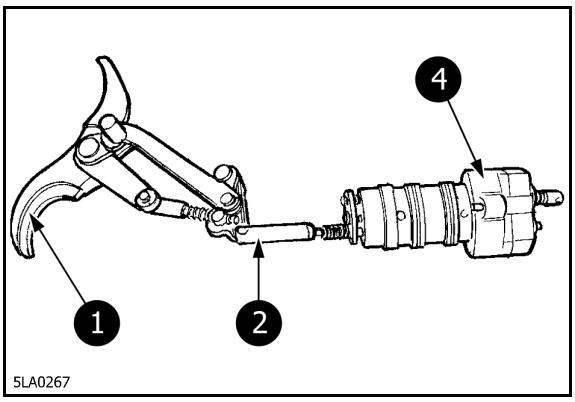

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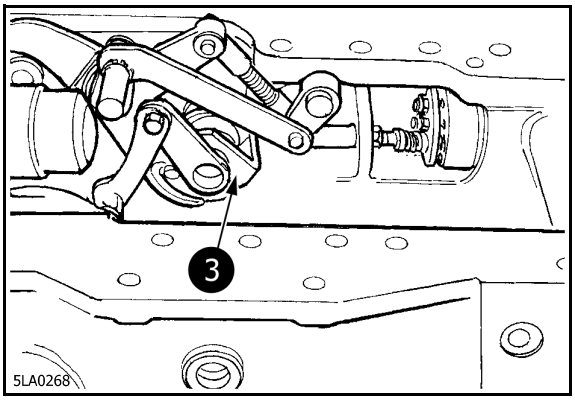
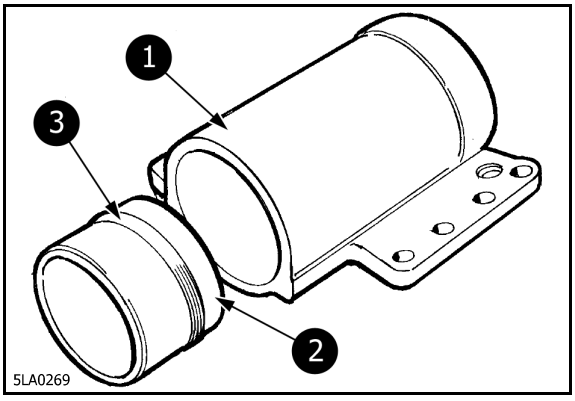
6. Present the complete rocker arm linkage assembly (1) with the tie-rods, levers and hydraulic distributor actuator pins, correctly arranged and then arrange on the cover making sure that the adjustable valve cap (2) is in its circular seat on the power lift body. At the same time, arrange the lower arm of the rocker (1) underneath with the contact rollers arranged on the position connecting rod cam (3), not forgetting to position the snap ring in contact with the rocker (1).
Arrange the hydraulic distributor (4) in its seat on the power lift body and fasten it with the respective screws.



64

Check that the linkage movements are correct after each operation and that there are no improper interferences.
Arrange all the snap rings, the pins and threaded dowels. Tighten the various fastening screws.

7. Position the cylinder with the respective piston (2) and new o-ring (3). Tighten fastening screws at 120 Nm.



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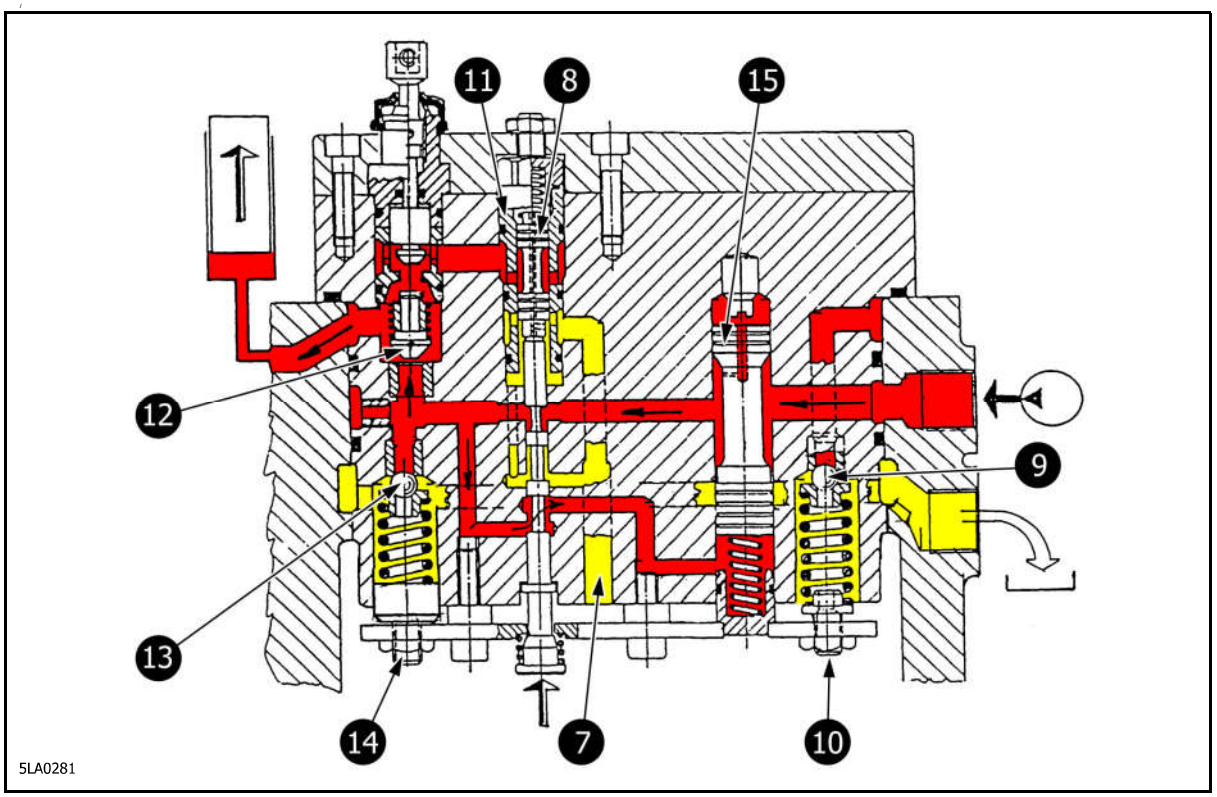

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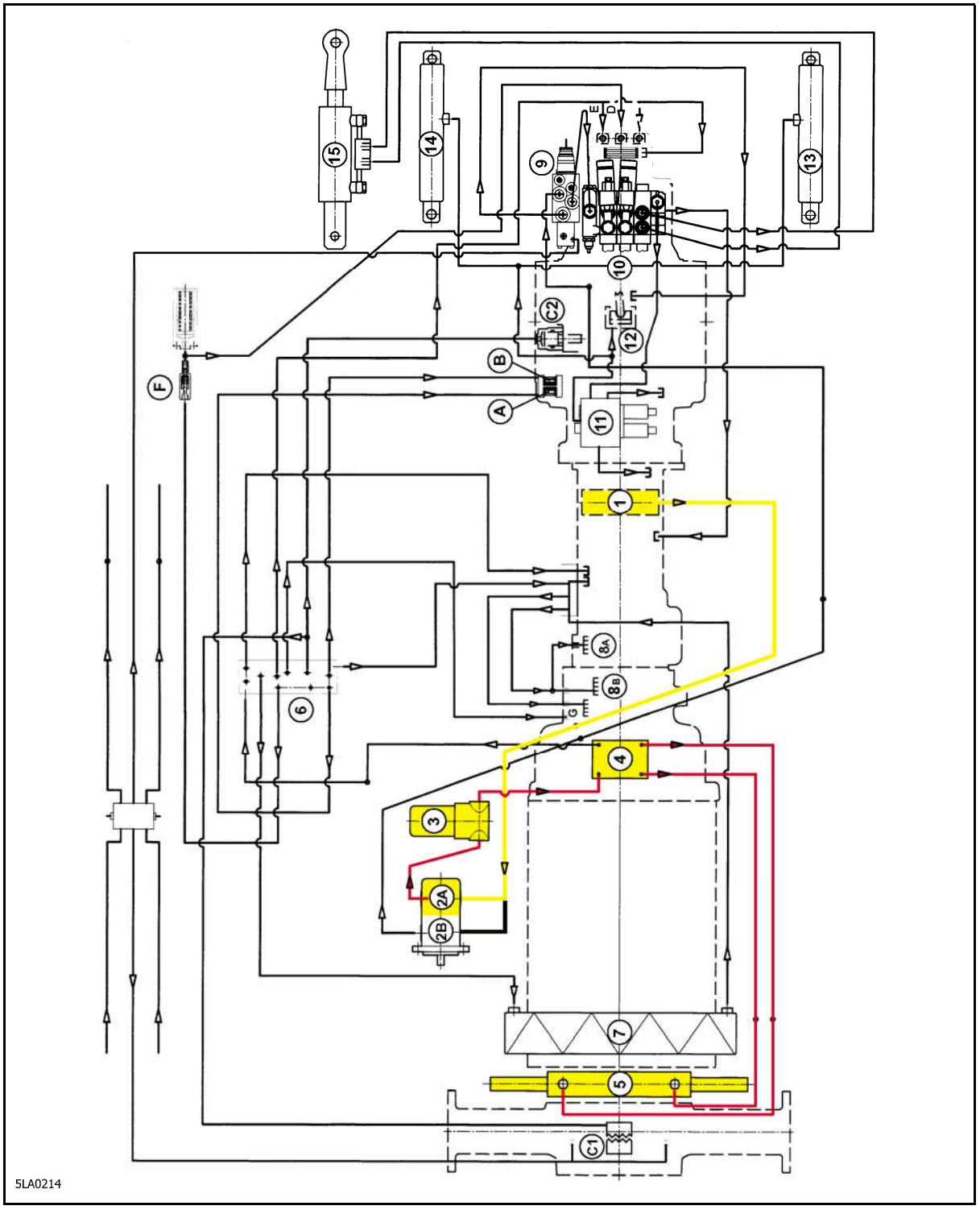


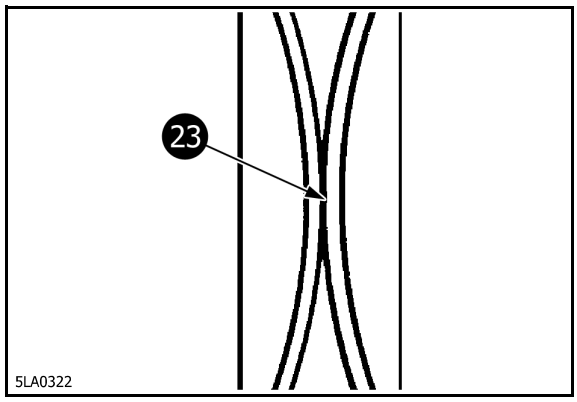
1

Steering circuit

5. Arrange the balls and springs in the anti-shock valve seats (18, fig. 7). Fasten the threaded bushings, arrange the seals and tighten the plugs.

6. Arrange the valve and the spring in the discharge valve (29, fig. 7) and fasten the threaded bushing. Arrange the seal and fasten the plug at a torque of 40 - 60 Nm.

7. Insert the drum (5, fig. 7) in the sleeve (27, fig. 7).



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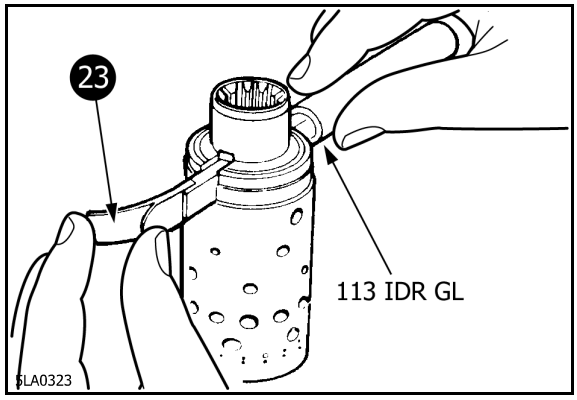
8. Introduce the tool **113 IDR GL** for fitting the centring springs (23) through the slot. Fasten the springs on the tool as shown and arrange the pin (26, fig. 7).



10

9. Position the bushing (16, fig. 7) on the sleeve and drum assembly using the chamfering to facilitate assembly in the distributor.

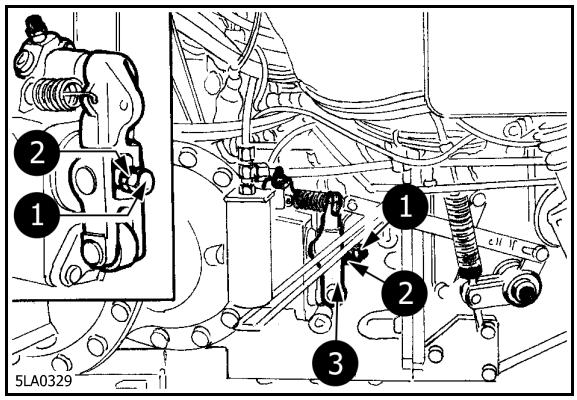
10. Arrange the washers (17 and 20, fig. 7), with the washer chamfering (17, fig. 7) oriented towards the centring springs (23, fig. 7) placing the roller bearing in between (19, fig. 7).

11. Fit the sleeve and drum assembly in the distributor applying a slight oscillating movement. Make sure that the pin (26, fig. 7) is held horizontally.

12. Arrange the two balls and the two spring pins in the suction valve seat (28, fig. 7).

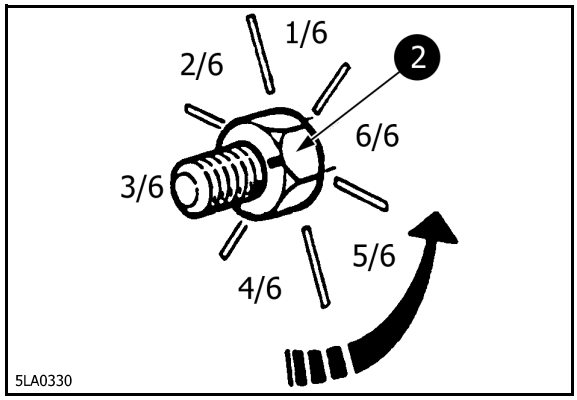
13. Arrange the ball in the check valve seat (2, fig. 7) and fasten the threaded bushing.

5. Mark a reference line on the nut (2) and on the control lever (3).



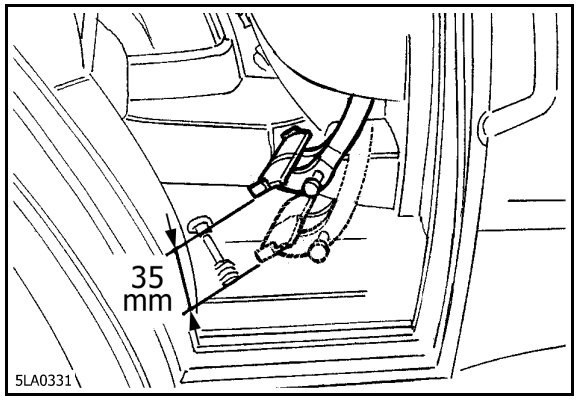
6

6. Loosen the adjustment nut (2) by one turn and 1/6th and until the wheel can be turned again by hand.
Fasten the lock nut.



7

7. Check that the pedal free stroke is approximately 35 mm. Otherwise, repeat the adjustment procedure.



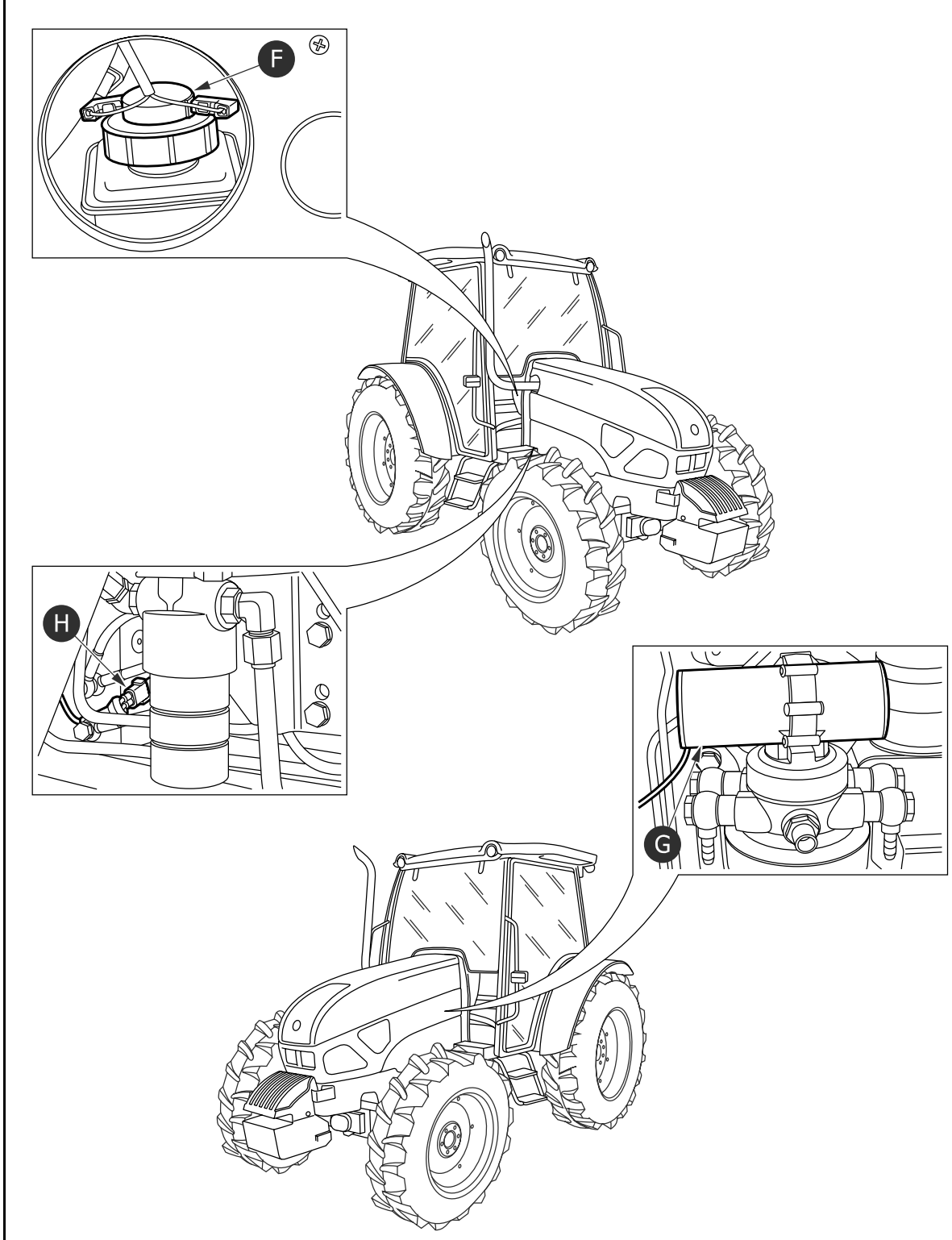
8

8. Repeat the same operations on the other side, making sure that the brake pedal free stroke is identical and that they work simultaneously.

Front brake adjustment

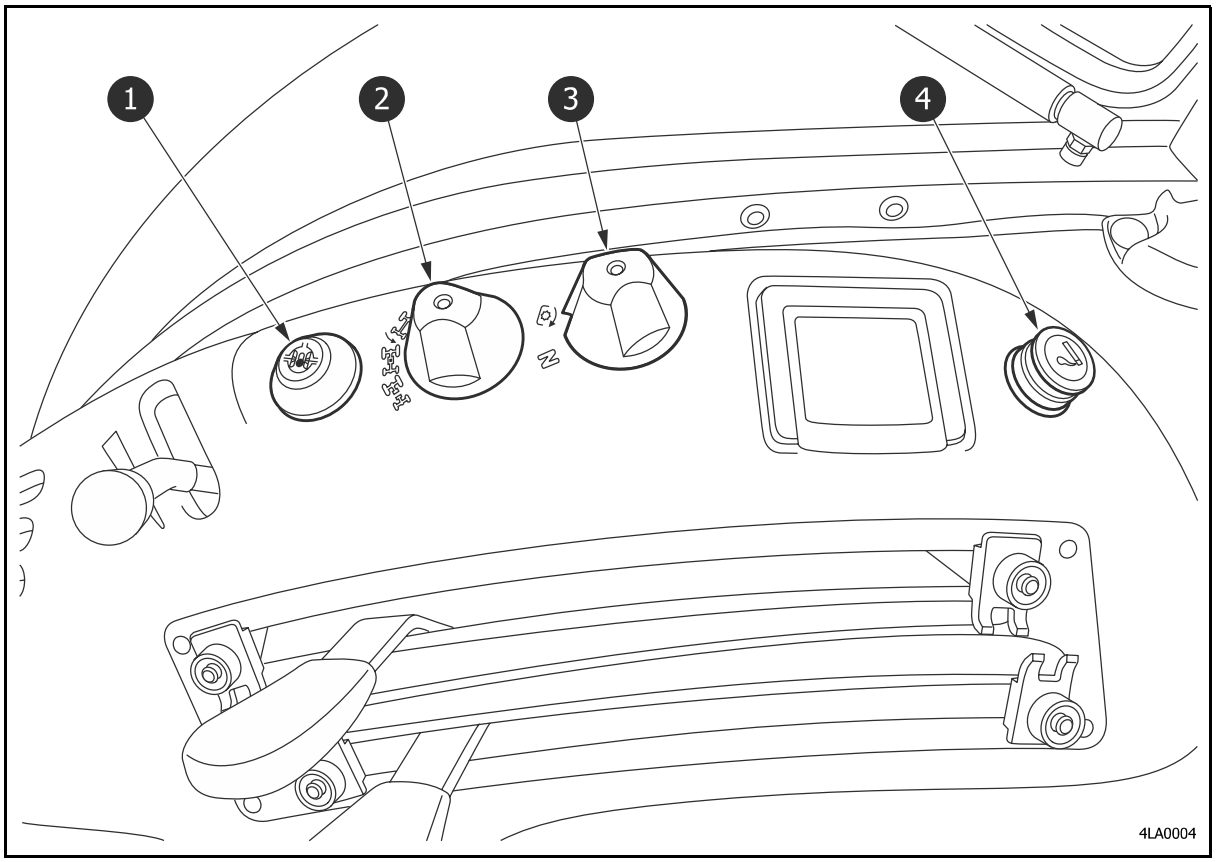
No periodical adjustment is needed because these brakes are self-adjusting.

TRANSMITTERS, SENSORS AND SOLENOID VALVES



7

RIGHT SIDE COMMANDS (VERSION WITHOUT ELECTRONIC POWER LIFT)



8

The following controls and components are located on the right mudguard:

1. Differential lock button
2. 4WD and by speed switch
3. PTO switch
4. Cigar lighter

Differential lock button (1)

Press button (1) to lock the differential.

Locking is confirmed by the indicator light (9, fig. 2) described in section 1000.

Depress one or both of the brake pedals to unlock the differential.

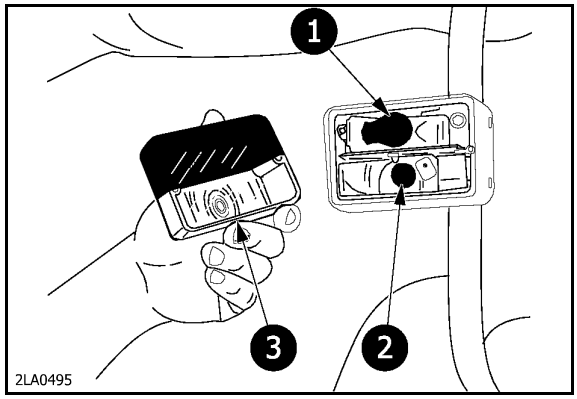
To obtain the best result, the diff lock should be engaged before the wheels begin to slip. Do not engage the lock while a wheel is actually slipping.

Front side light and turn indicator bulbs.
Replacement

Remove the transparent cover (3), and replace the faulty lamp with a new one with the same rating:

- turn indicator bulb (1) (21W): press the bulb inwards, turn it in the anti-clockwise direction and remove it;
- turn indicator bulb (2) (21W): pull the bulb outwards and replace it.

The orange lens must be fitted back pointing upwards.



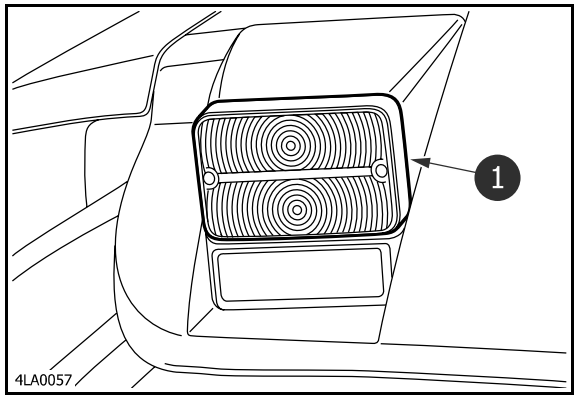
22

Tail light, brake light and rear turn indicator bulbs.
Replacement

Remove the transparent cover (1), press the burnt-out bulb inwards, turn it in the anti-clockwise direction and remove it. Replace it with another of an equal power rating:

- turn indicator bulb (21W):
- double-filament brake lights and side lights 21W/5W.

The orange lens must be fitted back pointing downwards.



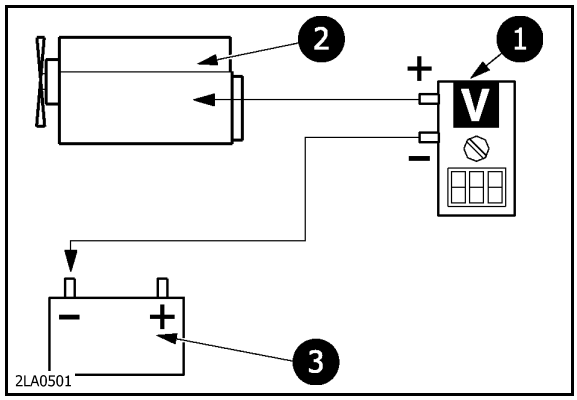
23

CAUTION

Handle halogen bulbs by the metal part only. The light intensity of the bulb would be impaired if it were touched by the fingers and it would not last so long.
If your fingers accidentally touch the bulbs, clean them with a cloth soaked in cleaning spirits and allow them to dry.

Battery ground cable

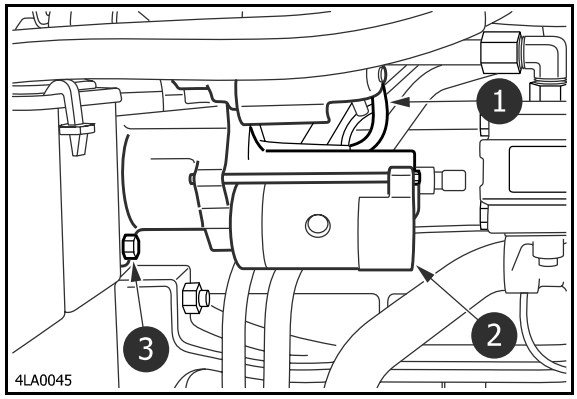
1. Connect the positive prod of the voltmeter (1) to the engine block (2).
2. Connect the negative prod of the voltmeter to the negative terminal of the battery (3).
3. Allow the engine to operate and check the reading on the voltmeter. If the voltage exceeds 0.2 Volts, check and tighten the ground cable connections. Check the voltage again and install a new ground cable if it is still too high.



4

STARTER MOTOR. REMOVAL - REFITTING

1. Disconnect the negative wire from the battery.
2. Loosen the nut and remove the power terminal (1).
3. Remove the two fixing bolts (3) of the starter motor (2) and remove it.
4. Work through the removal operations in reverse order to remount the starter motor.

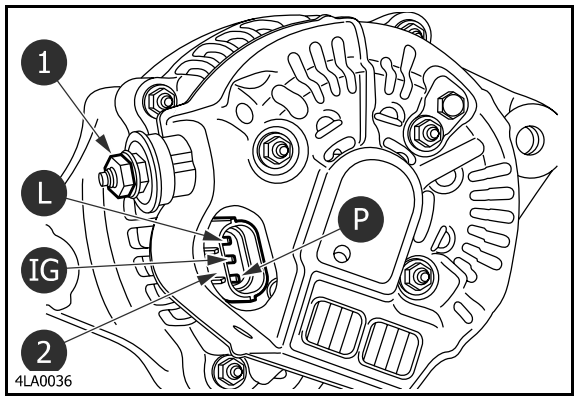


5

Charge current and regulated voltage tests

Make sure that all the tractor's electrical users are off and that the ignition key is in the OFF position.

1. Disconnect negative battery terminal and terminal (1) of the alternator.
2. Connect an ammeter between the detached cable and alternator terminal (1).
3. Connect a voltmeter between terminal (1) of the alternator and ground.
4. Re-connect the battery. Start the engine and accelerate to 2000 RPM. Check the voltmeter and ammeter readings.



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The voltmeter must give a higher value than the battery voltage and, when the ammeter reading drops below 10 A, the voltmeter reading must stabilize between 13.6 V 14 V.

5. Slowly increase the current charge (lowering the value of the resistance) until the ammeter reading becomes 40 A.
6. Check the voltmeter reading, which must not drop below 13.6 V.

A reading of less than 13.6 means that there is a defective component in the alternator. Test the alternator components as described in this chapter.

Alternator component tests

The component tests, which must only be carried out if the INITIAL TESTS have identified a defective component in the alternator, allow you to check:

- the governor;
- the no-break condition of the rotor field windings;
- the brushes, springs and contact rings of the rotor.

The previously described component tests can be conducted with the alternator installed in the tractor. To test the other components, the alternator must be removed from the tractor.

Tests

Before beginning the tests, check the battery to make sure that none of the vents are clogged, that there is no rust, raise vent caps and that the case is not cracked.

Equipment required for the tests:

- Densimeter
- Battery starter tester (high current discharge tester)
- Thermometer
- Battery charger

Relative density: This test establishes the battery charge status.

1. Take a reading with the float in the vertical position.
2. Adjust the reading of the densimeter for the temperature variations of the electrolyte by subtracting 4 points (relative density 0.004) for every 5.5°C below the temperature for which the densimeter is calibrated, and by adding 4 points (relative density 0.004) for every 5.5°C above this temperature.

The following examples have been calculated using a densimeter with a 30°C setting.

Example 1:

Temperature less than	30°C
Electrolyte temperature	19°C
Densimeter reading	1.270
Subtract 11.0 / 5,5 x 0.004	
Correct relative density =	1.262

Example 2:

Temperature more than	30°C
Electrolyte temperature	40°C
Densimeter reading	1.220
Add 10.0 / 5,5 x 0.004	0.007
Correct relative density =	1.227

3. Use the following table to establish the charging condition.

Charging condition	Relative density correct at 15°C	Relative density correct at 25°C	Average battery voltage
100%	1.295	1.287	12.66
75%	1.253	1.246	12.45
50%	1.217	1.210	12.30
25%	1.177	1.170	12.00
Discharged	1.137	1.130	11.84

The relative density should not vary more than 0.025 points between the various cells.

LOCATIONS OF FUSES AND RELAYS

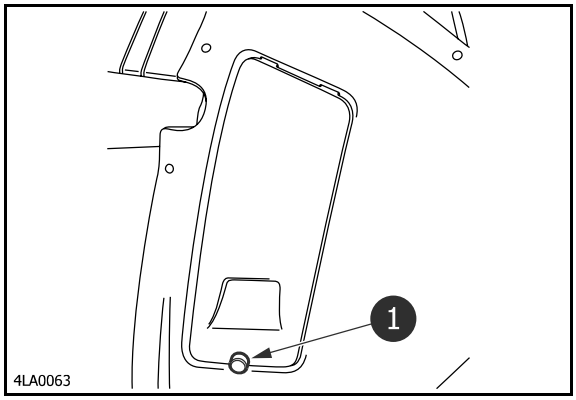
Main fuse box

CAUTION

When fuses are changed, make sure that the new fuse has the same rating as the old one. Even though they are interchangeable, use of different fuses would seriously impair tractor operation.

Main fuse box location

The fuse box is located inside the dashboard on the left side. To access the fuses, remove the cover panel by loosening the screw (1).



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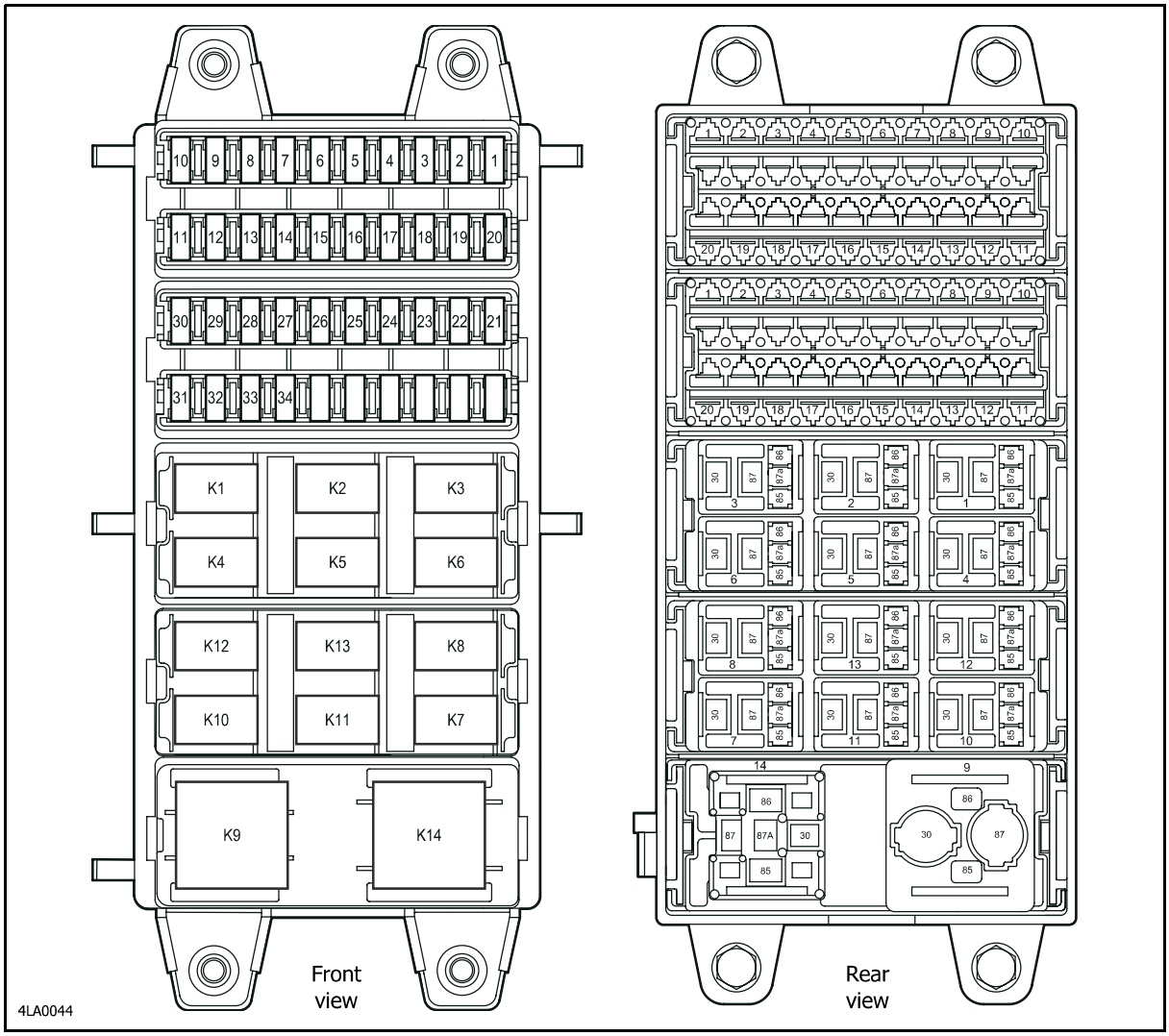

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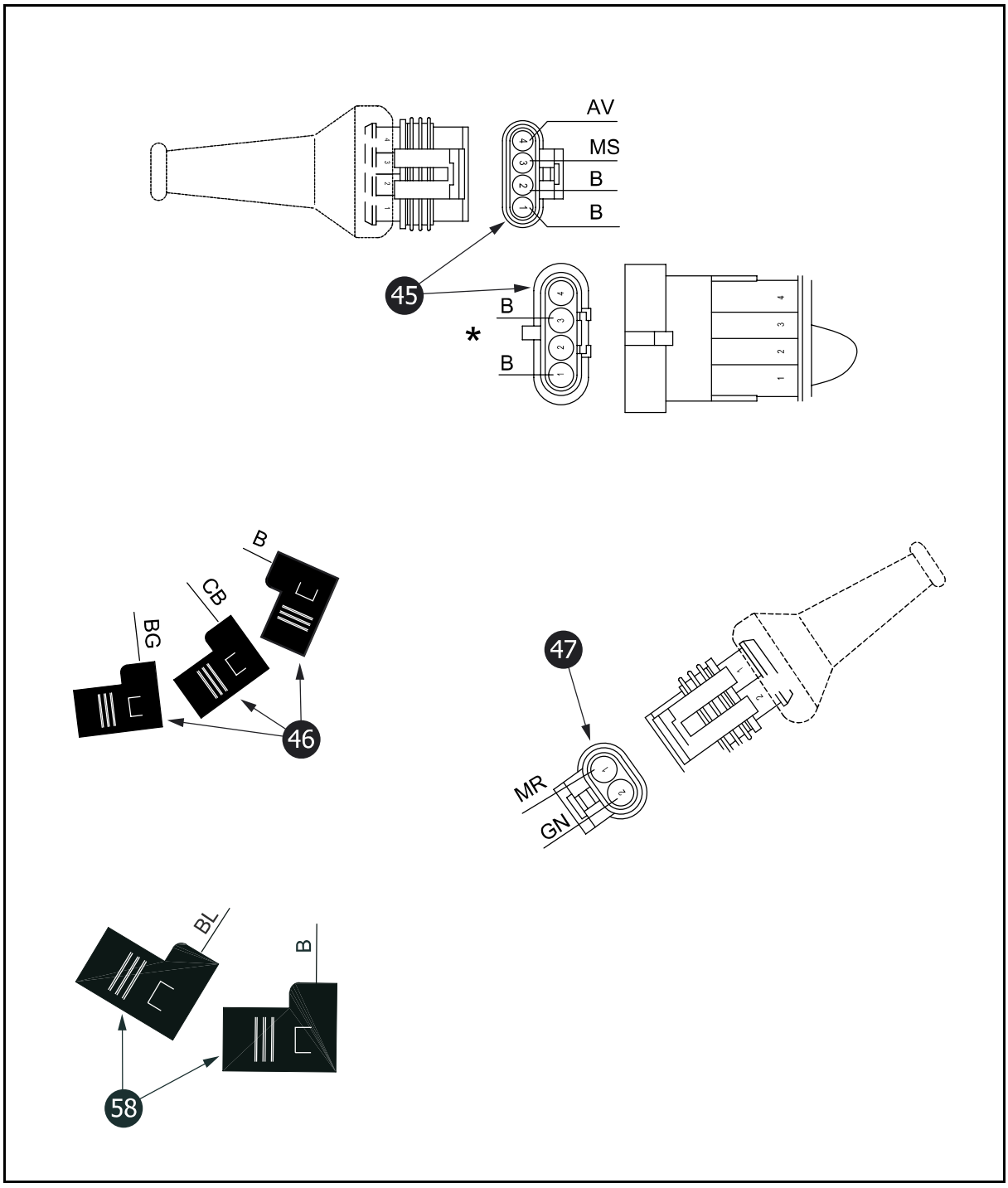
The fuses and relays are arranged in the fuse box as shown in the above figure.



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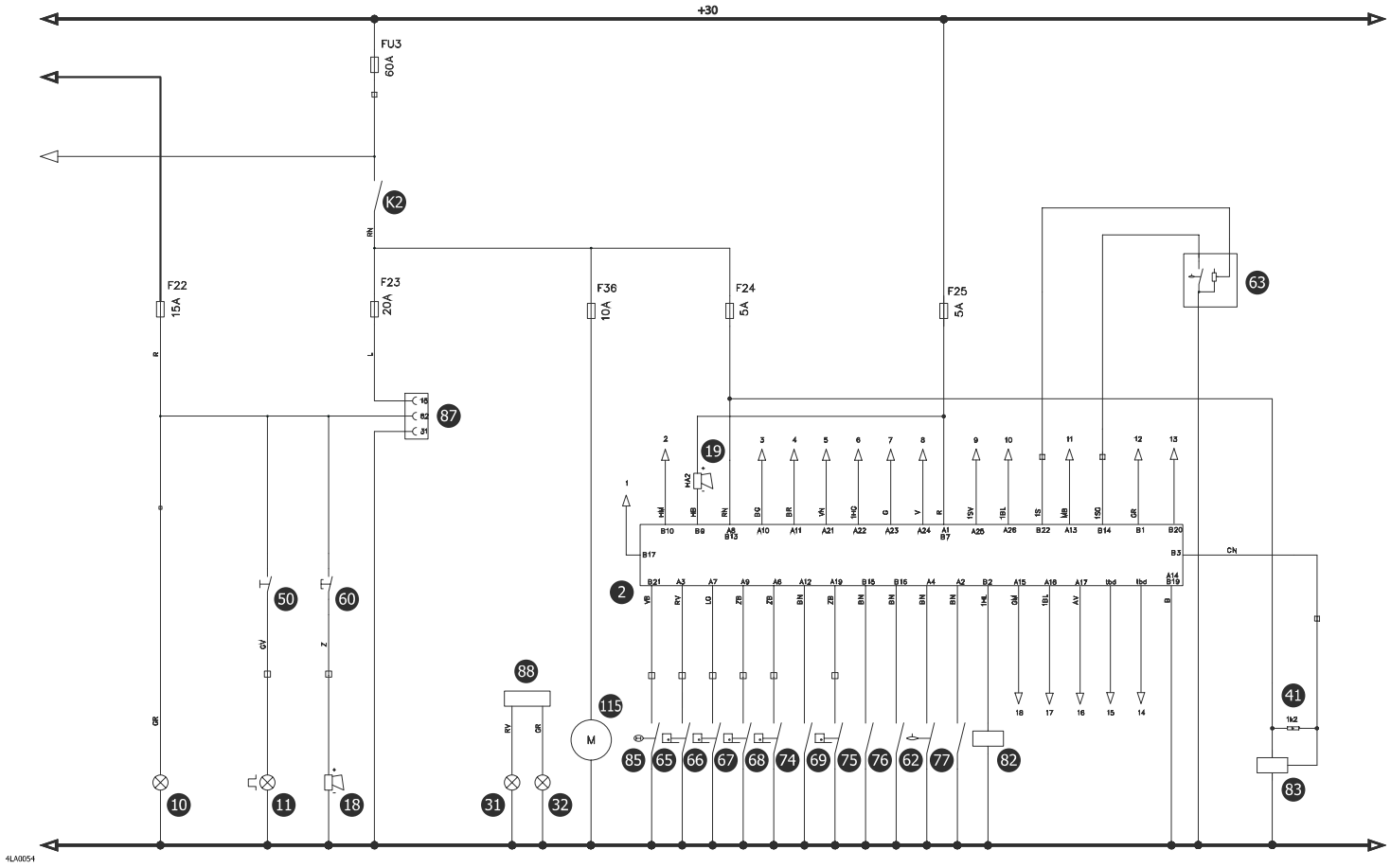
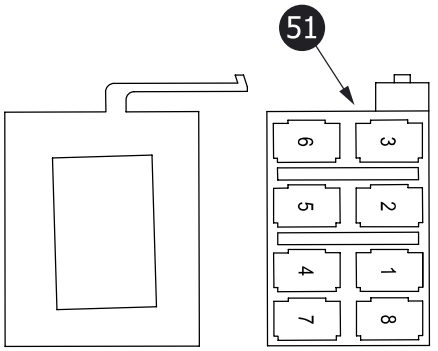
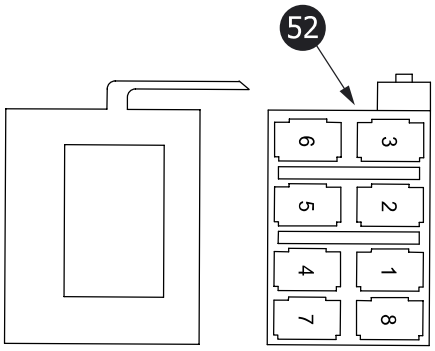
* Jumper valid for outfit without front PTO.

INSTRUMENT, SENSORS, RADIO, ROTATING BEAM, CAB LIGHT, AIR SEAT CIRCUIT (Diagram C)





Pos.1	-
Pos.2	M
Pos.3	HL
Pos.4	-
Pos.5	-
Pos.6	-
Pos.7	B
Pos.8	HG
Pos.9	-
Pos.10	-



Pos.1	-
Pos.2	M
Pos.3	HM
Pos.4	-
Pos.5	-
Pos.6	-
Pos.7	B
Pos.8	HG
Pos.9	-
Pos.10	-

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Electronic control unit

The ECU (1) is the "brain" of the electronic power lift control system.

The ECU compares the signals from the sensors with those set by the operator on the control console.

When the values transmitted by the sensors and the console do to correspond, the ECU activates the control block solenoid valves to raise or lower the arms until the set values and the measured values are the same.

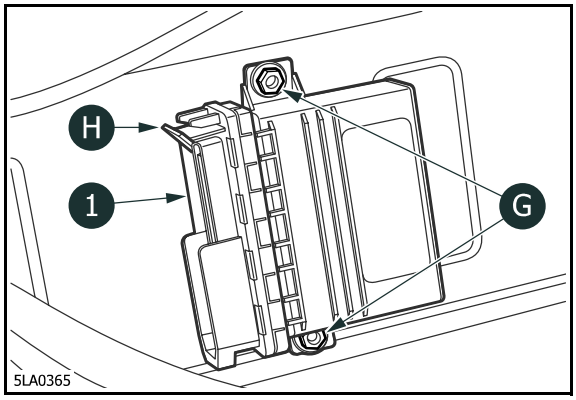
A specific safety system has been installed to prevent the electronic system from running after the engine is stopped.

The ECU requires to power lines to work: the ignition switch power and the alternator power.

The ECU will not run if either one of these two line is missing. Consequently, when the engine is not running, the electronically controlled power lift cannot be operated in any way.

The ECU (1) is located inside the right-hand mudguard.

To remove it, remove the panel from the rear side and loosen the fastening screws (G). Operate the metallic tab (H) to disconnect the connector.



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SECTION 1100

CAB AND A/C SYSTEM

A/C SYSTEM MAIN COMPONENTS

The A/C system consists of essentially five elements:

1. Compressor
2. Condenser
3. Drier filter
4. Thermostatic expansion valve
5. Evaporator.

To explain the operating cycle of the system, we will follow the course of the fluid from the compressor (1).

The compressor takes in the refrigerant in cold vapour state at a pressure of 0.2-2.5 bars and compresses it to a pressure of 10-22 bars.

The fluid heated by compression to 60-120 °C is let into the condenser serpentine (2) on the cab roof always in vapour state.

The current of air produced by the fan on the cab roof near the condenser (2) cools the thermal exchange fluid.

By effect of cooling, the coolant vapour reaches the condensation point from 40 to 70 °C according to the external temperature and turns liquid.

The fluid at the high pressure liquid state is purified by crossing the drier fluid (2) and goes to the expansion valve (4) which intercepting by a bottleneck the flow of coolant lowers its temperature.

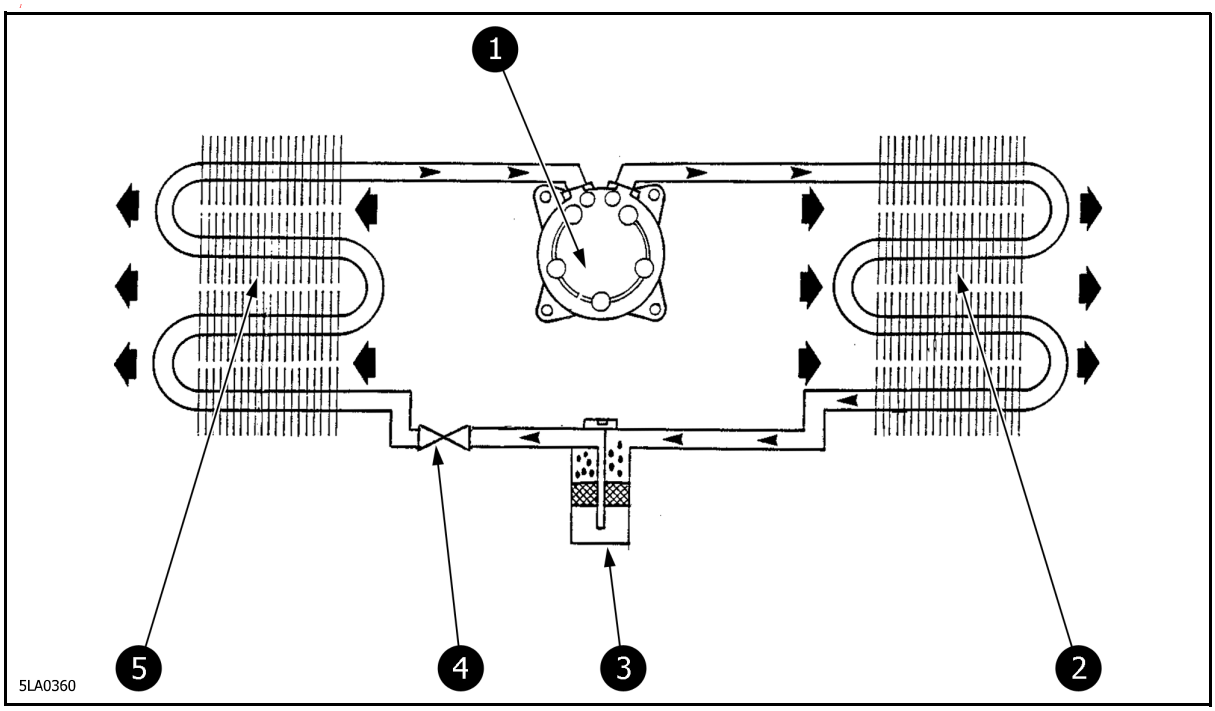
Through the valve (4), a part of the coolant is transformed into low temperature vapour and the mixture thus formed of low temperature and low pressure liquid and vapour is let into the evaporator (5).

Here the fan causes a continuous circulation of air inside the cab on the evaporator fins (5), facilitating the absorption of heat by the mixture which is completely transformed into vapour.

The process of evaporation of the refrigerant subtracts heat from the air with touches the evaporator (5) and therefore cools it, thus lowering the temperature in the cab.

The flow of air on the cold surface of the evaporator (5) also condenses part of the air, thus lowering the degree of humidity in the cab atmosphere.

The low pressure mixture at evaporator outlet (5) from 0 to 15°C is aspirated by the compressor (1) again to start a new cycle.



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Simplified graphic representation of the system

1. Compressor
2. Condenser
3. Drier filter
4. Expansion valve and thermostatic sensor
5. Evaporator.