

MISTRAL AMERICA

40HST - 45HST - 50HST

TRAINING MANUAL
P/N 3676168M1 - EDITION 07-2004

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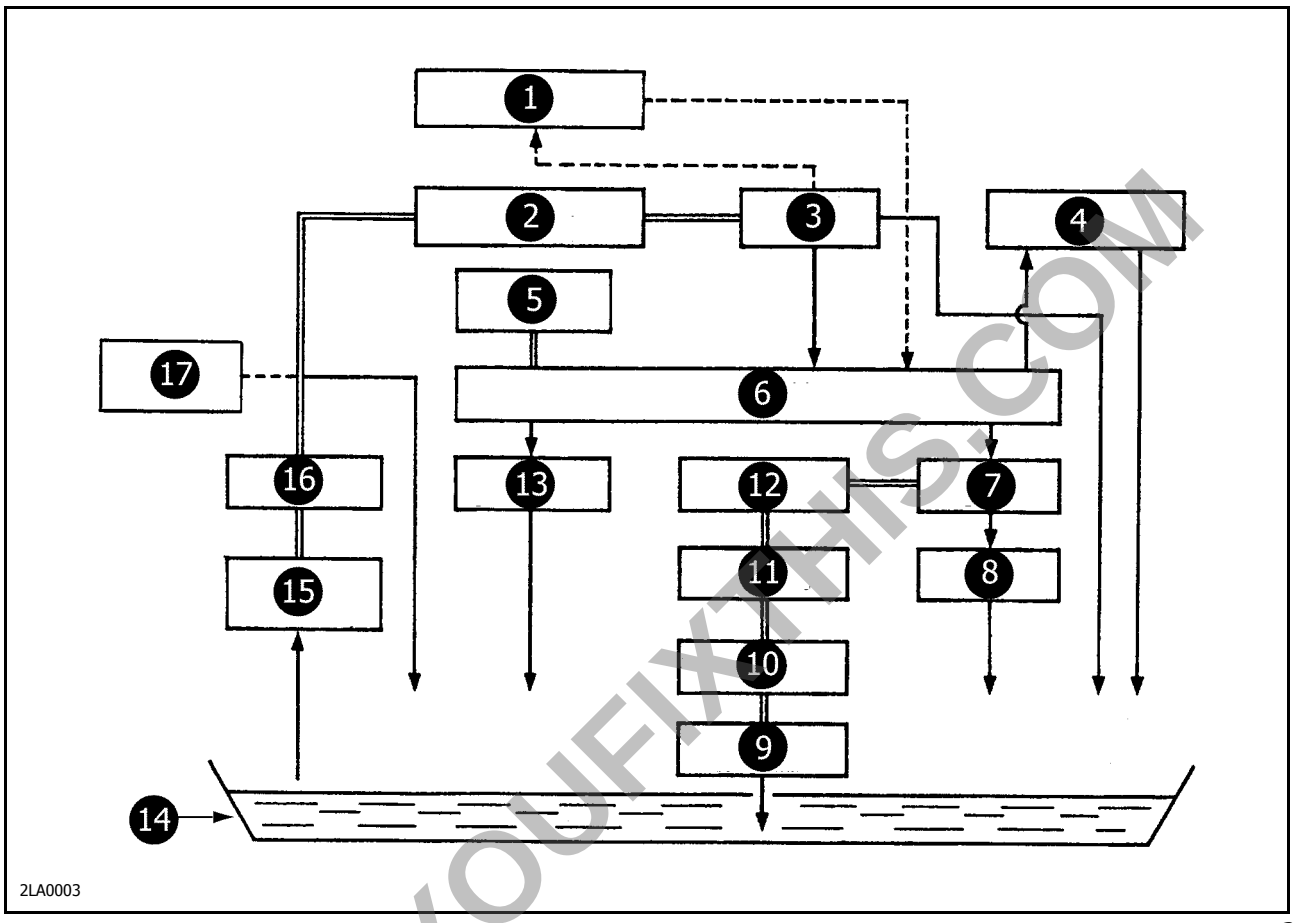
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LUBRICATION, COOLING AND FUELLING CIRCUIT DIAGRAMS



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Engine lubrication circuit diagram.

1. Heat exchanger (on request)
2. Oil filter (with bypass valve)
3. Pressure governor valve
4. Injection pump
5. Pressure switch
6. Main cylinder block duct
7. Main bearing
8. Big end bearing
9. Tappets/cam surfaces
10. Rocker arms
11. Rocker arm pin
12. Camshaft bearing
13. Intermediate gear pin
14. Oil sump
15. Oil intake pipe (with gauze filter)
16. Oil pump
17. Safety valve

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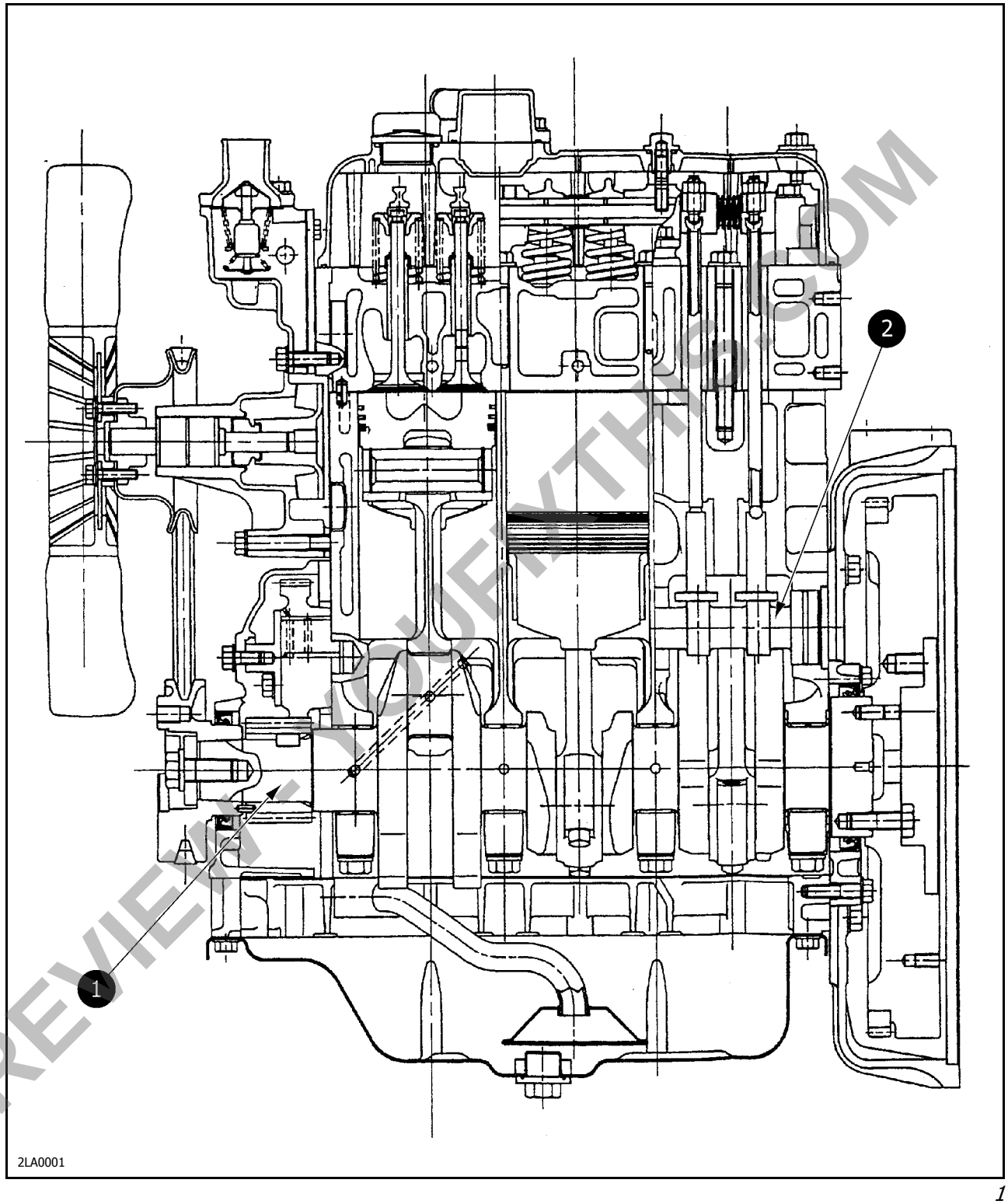
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SECTION 700

HYDRAULIC CIRCUITS – REAR POWER LIFT

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SECTIONS



1

Longitudinal section of engine (mod. MISTRAL AMERICA 40HST).

1. Drive shaft
2. Camshaft

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STANDARD DRIVING TORQUE VALUES

Screws with metric threads

Maximum driving torque values for metric threads in kgm.

Diameter x pitch d x p (mm)	Class 8.8 screw			Class 10.9 screw			Class 12.9 screw		
	Normal	Galvanized	Cadmium plated	Normal	Galvanized	Cadmium plated	Normal	Galvanized	Cadmium plated
3x5	0.153	0.137	0.122	0.193	0.173	0.15	0.234	0.21	0.187
4x0.7	0.316	0.284	0.252	0.438	0.394	0.35	0.53	0.477	0.424
5x0.8	0.612	0.55	0.49	0.87	0.78	0.69	1.03	0.93	0.82
6x1	1.06	0.95	0.85	1.48	1.33	1.18	1.78	1.60	1.42
8x1.25	2.51	2.25	2.00	3.54	3.18	2.83	4.24	3.02	3.39
8x1	2.65	2.38	2.12	3.73	3.35	2.98	4.47	4.03	3.57
10x1.5	5.11	4.60	4.08	7.19	6.47	5.75	8.63	7.76	6.90
10x1.25	5.34	4.81	4.27	7.51	6.75	6.00	9.02	8.11	7.21
12x1.75	8.65	7.78	6.02	12.14	10.92	9.71	14.59	13.13	11.67
12x1.25	9.24	8.32	7.39	12.95	11.66	10.36	15.61	14.05	12.48
14x2	13.77	12.39	11.01	19.38	17.44	15.50	23.26	20.93	18.60
14x1.5	14.59	13.13	11.67	20.61	18.55	16.48	24.69	22.20	19.75
16x2	20.91	18.82	16.72	29.38	26.44	23.50	35.30	31.77	28.24
16x1.5	21.83	19.65	17.46	30.81	27.73	24.64	36.93	33.24	29.54
18x2.5	28.87	25.98	23.09	40.61	36.55	32.48	48.77	43.69	39.00
18x1.5	31.42	28.28	25.13	44.28	39.85	35.42	53.06	47.75	42.44
20x2.5	40.81	36.73	32.64	57.34	51.61	45.87	68.77	61.89	56.00
20x2.5	40.81	36.73	32.64	57.34	51.61	45.87	68.77	61.89	56.00
20x1.5	43.97	39.58	35.17	61.93	55.74	49.54	74.28	66.25	59.42
22x2.5	54.23	48.85	43.42	76.32	68.69	61.05	91.53	82.37	73.22
22x1.5	58.26	54.43	46.60	81.93	73.74	65.54	98.36	88.53	78.68
24x3	70.51	63.45	56.40	99.08	89.17	79.26	119.33	107.44	95.50
24x2	74.53	67.13	59.67	105.10	94.59	84.08	125.51	112.95	100.40
27x3	100.36	92.75	82.44	144.89	130.40	115.91	173.46	156.12	138.76
27x2	109.18	98.26	87.34	153.06	137.75	122.44	183.67	165.30	140.97
30x3.5	130.79	125.81	111.03	198.93	177.24	157.54	235.71	212.14	183.60
30x2	151.02	135.91	120.81	212.24	191.02	169.79	254.08	228.67	203.26

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ENGINE TROUBLESHOOTING

Faults	Possible causes	Remedies
The engine fails to start	**1.** Battery slightly low.	Check, recharge the battery and replace it if necessary.
	2. Connections to battery terminals corroded or slack.	Clean, inspect, tighten the nuts and, if necessary, replace any excessively corroded terminals and nuts.
	3. Circuit open.	Close the circuit.
	4. Intake/exhaust valve play incorrect.	Adjust valve play.
	5. Intake/exhaust valve seized.	Replace.
	6. Piston rings seized or broken.	Replace piston ring.
	7. Cylinder and piston rings worn.	Lap and use larger size parts.
	8. Big end pins and bearings seized.	Repair or replace.
	9. Foreign body in combustion chamber.	Demount and repair the chamber. Remove the foreign body.
	10. Intake/exhaust valve timing incorrect.	Adjust the valve play and check the timing of the intake/exhaust valves.
	11. Incorrect timing of injection pump on engine.	Correctly time the injection pump on engine.
	12. 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.
	13. No fuel in tank	Fill tank.
	14. No fuel supplied to injection pump	Check and, if necessary, replace the fuel pump.
	15. Air in the fuel circuit.	Check the pipes, unions, fuel pump, filters and injection pump for air. Lastly, bleed the circuit.
	16. Starter motor damaged.	Repair or replace the starter motor.
	17. Thermostarter inefficient.	Check or replace the thermostarter.

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GENERAL FEATURES

GENERAL FEATURES	MISTRAL AMERICA 40HST
Engine	
- Version/Position	3TNE88 - ELAN
- Manufacturer	Yanmar
- Cycle	diesel, four-stroke
- Injection	direct
- Number of cylinders in line	3
- Cylinder liners	formed in the crankcase
- Bore (mm)	88
- Piston stroke (mm)	90
- Total swept volume (cm^3)	1642
- Firing order	1 - 3 - 2
- Compression ratio	18:1
- Power DIN 70020 (ISO 3046/1) (HP/kW)	34/25 (37.5/27.5)
- Top rate on load (RPM)	2800
- Idling rate (RPM)	2995
- Maximum torque (Nm)	103
- Maximum torque rate (RPM)	1800
- Idling rate (RPM)	1000
- Rotation direction	Anti-clockwise (viewed from flywheel)
- Number of main bearings	4
- Recommended diesel fuel	ISO 8217 DMA, BS 2869 A1 or A2 (cetane N.: 45 min)
- Lubrication system	Forced lubrication with trochoid pump
- Capacity of lubricating oil reservoir (liters)	4.7
- Recommended lubricating oil	See section 100
- Cooling system	Coolant/Radiator
- Capacity of cooling fluid reservoir (liters)	2.0
- Cooling fan	Fan with 6 blades, ∅ 335 mm
- Regulator	Centrifugal mechanical type (all speeds)
- Ignition system	Electrical

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ENGINE SPLITTING AND REMOUNTING

Splitting

WARNING

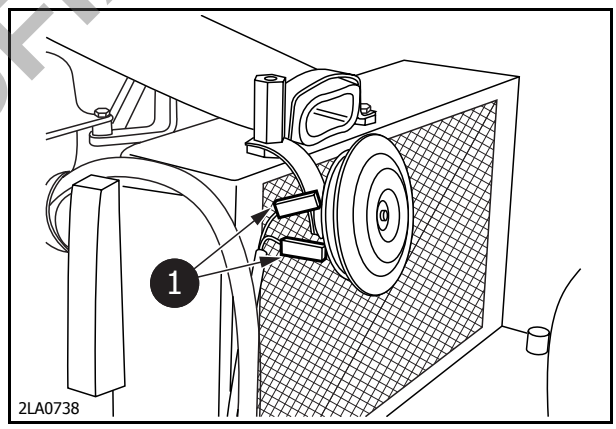
Lift and handle all heavy parts with lifting equipment of an adequate capacity.
Make sure that the units or parts are supported by appropriately sized harness and hooks.
Make sure that there are no bystanders near the load being lifted.

WARNING

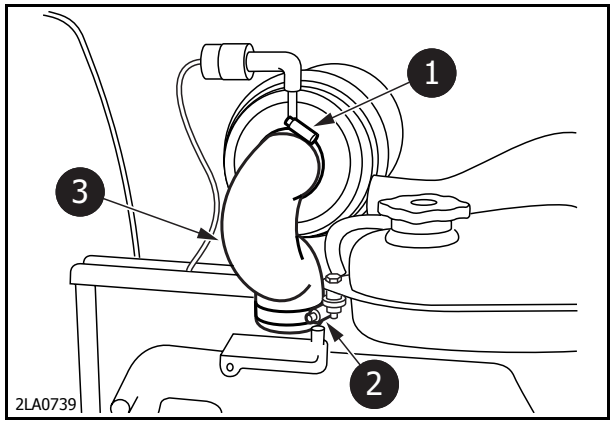
Handle all parts with great care. Do not put your hands or fingers between one part and the next. Wear approved safety garments such as goggles, gloves and safety footwear.

Proceed in the following way:

1. Split the transmission/engine coupling (see section 300).
2. Disconnect the electrical connection (1) from the horn.
3. Unscrew the clamps (1, 2) and remove the intake sleeve (3).



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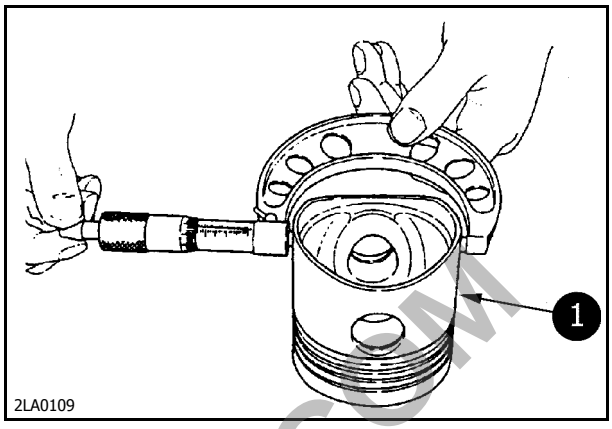
Faults	Possible causes	Remedies
The engine starts but then stops	**1.** Idling rate too low.	Adjust idling rate.
	2. Irregular fuel supply to injection pump	Check the flow rates on the test bench.
	3. Impurities or water accumulated in the fuel pipes.	Detach the pipes, the injection pump and thoroughly 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.
	7. Incorrect engine timing.	Check and correctly time the engine.

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Compare the obtained measuring results with the standard values given in the table on page 11.



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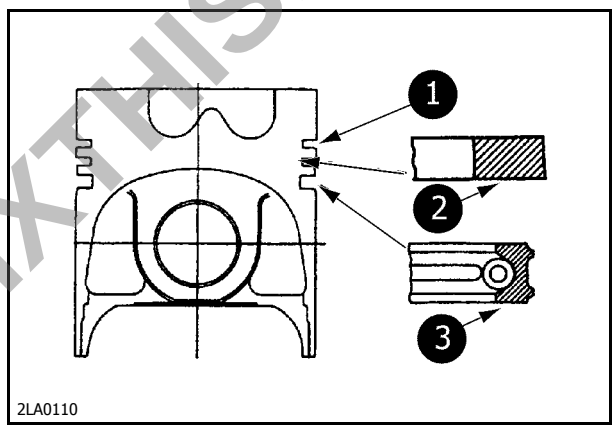
Shape of the piston rings

To identify the piston rings, refer to fig. 109, in which:

1. Upper piston ring.
2. 2nd piston ring (the same for all models)
3. Oil scraper ring (the same for all models)

The section of the upper piston ring is given in the following table:

Upper piston ring (all models)	

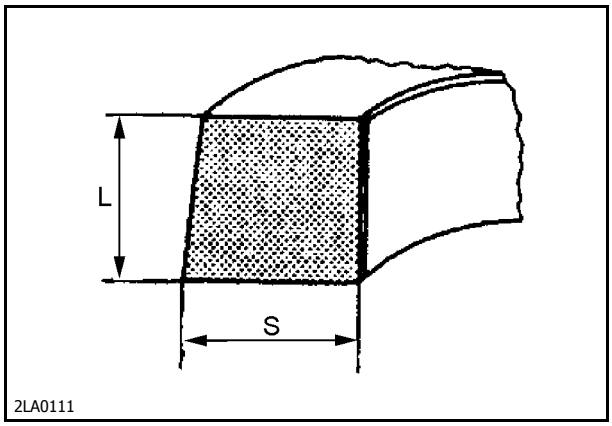


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Measurement of the groove width of the spring ring, the spring ring and the distance between ends

1. To measure the width of the groove, first measure the width (L) of the spring ring (2, fig. 111), then fit it into the carefully cleaned groove. Insert a thickness gauge (3, fig. 111) between the spring ring and groove to measure the distance.
2. Calculate the width of the spring ring groove, adding the width of the ring to the measured side play G.

Compare the obtained measuring results with the standard values given in the table on page 13.

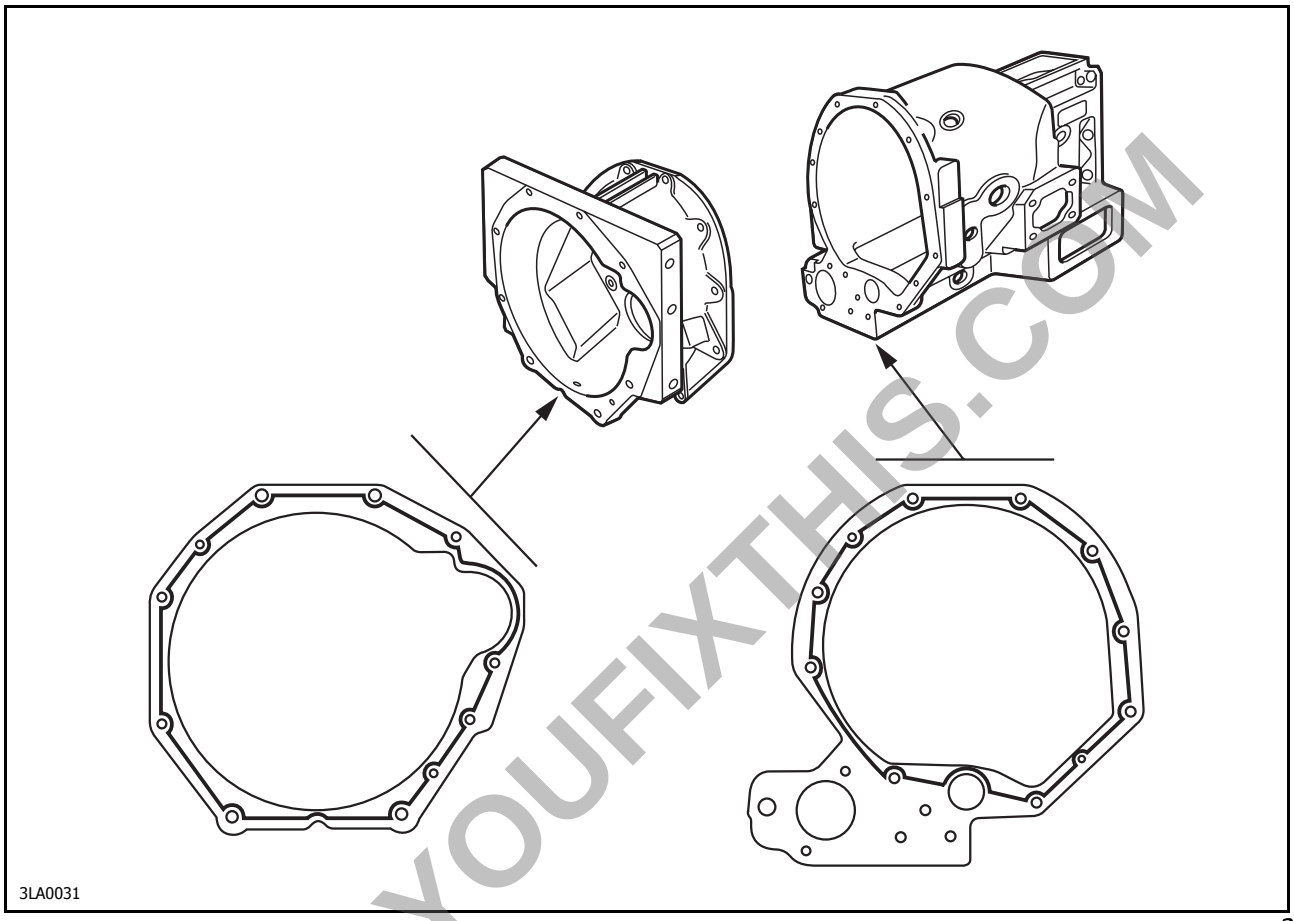


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WHERE THE SEALANT IS APPLIED FOR THE ENGINE COUPLING ENGINE



2

The types of sealant to apply are indicated in section 100.

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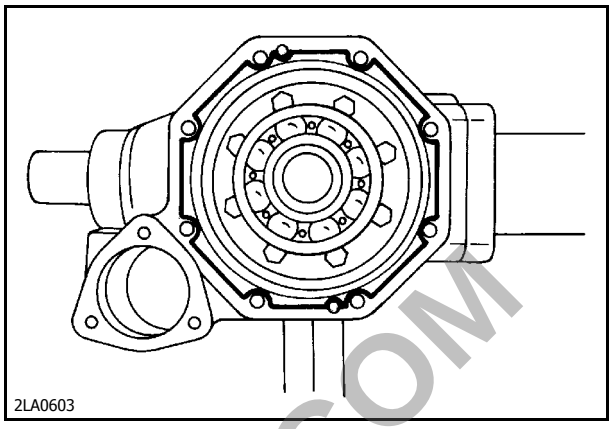
- Mount the plug with the spring and the retainer ball of the rod controlling the range selection.
- Mount the shaft of the rear PTO drive. Take care not that the rotary retention ring inside the front part of the main shaft is not damaged.
- Position and fix the cover of the power lift.
- Connect the cylinders to the lifting links, using the relative connection plugs.
- Position and fix the valve system to the gearbox transmission housing.
- Connect the hydraulic hose of the valve system.
- Connect the power lift valve gear transmission rods.
- Remove the gearbox-transmission housing from the stand.

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6. Apply sealant along the indicated part of the jointing edge between the side housing and central housing.

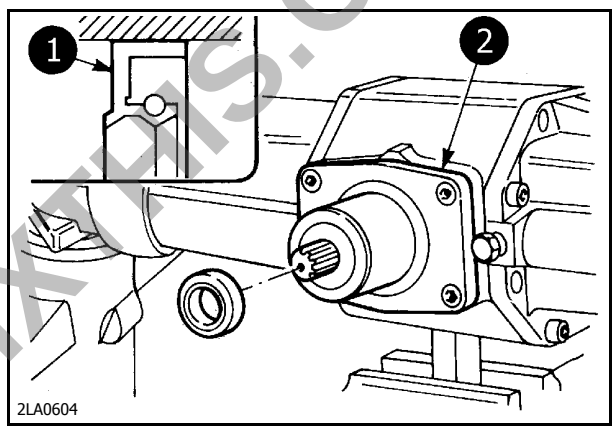
7. Remount both side housings and tighten the screws to the prescribed driving torque value.



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8. Remount the pinion support with the spacer and retention ring, then tighten the screws to the prescribed driving torque value.

9. Mount the seal (1) on the pinion support (2) using a suitable mallet and complying with the indicated positions.

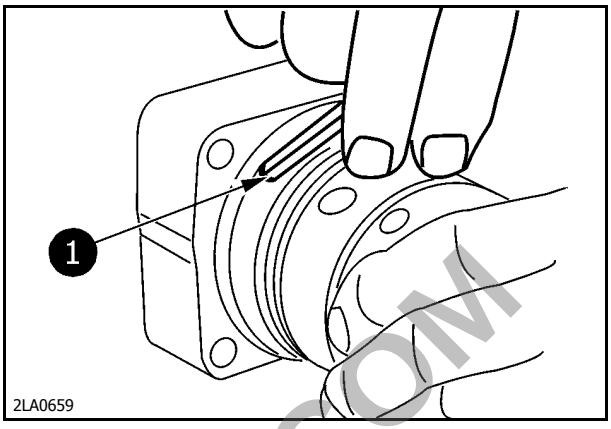


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25. Demount the calibrated nozzle (1).



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Assembly

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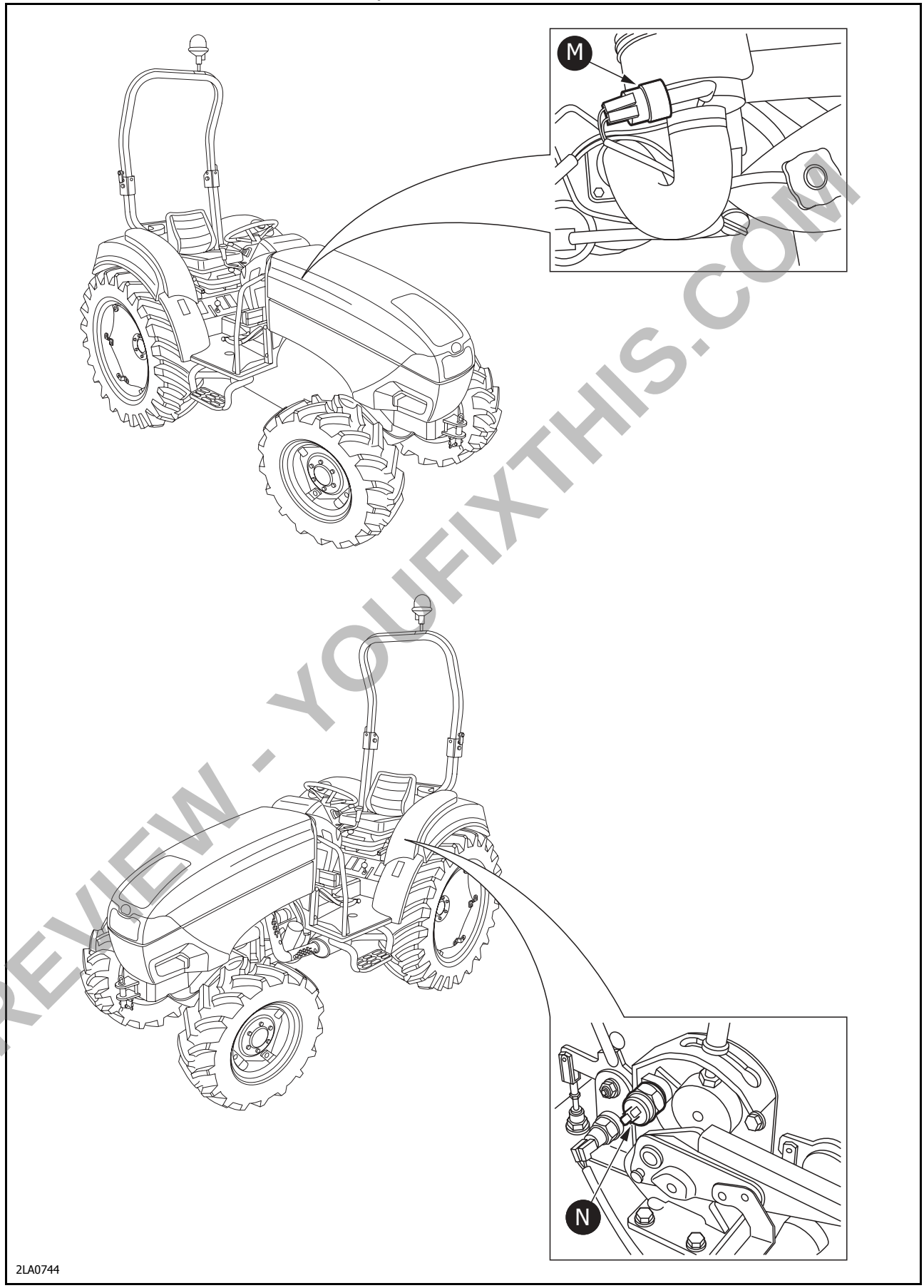
Comply with the following recommendations when remounting the power lift's valve system:

- Comply with the illustrations and descriptions given for the demounting phase in order to position the various parts.
- Mount the calibrated nozzle.
- Insert the non-return valve.
- Insert the discharge valve.
- Position and fix the upper cover of the valve system.
- Mount the sensitivity adjuster lever and fix it in place with the relative spring pin.
- Mount the pilot valve.
- Mount the cylinder safety valve.
- Mount the over-pressure valve.
- Adjust the safety valve and pressure.
- Lock the positions of the valves with the safety wire.
- Insert the pin with its relative spring.
- Lock the valve pin with the relative check screw.
- Remount the two rear shafts (including the spacer rollers).
- Mount the inner eccentric ring (rocker arm).
- Mount the other external lever (take care when positioning as both levers must point towards the valve system).

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TRANSMITTERS, SENSORS AND SWITCHES



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ELECTRICAL SYSTEM COMPONENTS (CONTINUED)

68 "Operator present" safety switch

69 Hydraulic circuit clogged filter indicator sensor

70 Hydrostatic plant pedal microswitch wiring connection

71 Hydraulic oil flow stopping solenoid valve

72 Rear PTO clutch solenoid valve

73 Hydrostatic system pedal microswitch

74 Hydrostatic system diode

75 Operator safety relay (ignition enabling)

76 Ignition enabling microrelay

77 Diesel fuel enrichment jet enabling microrelay

78 PTO safety relay after starting

79 Safety relay

80 Cruise Control selector microswitch

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