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Crankcase - Backlash

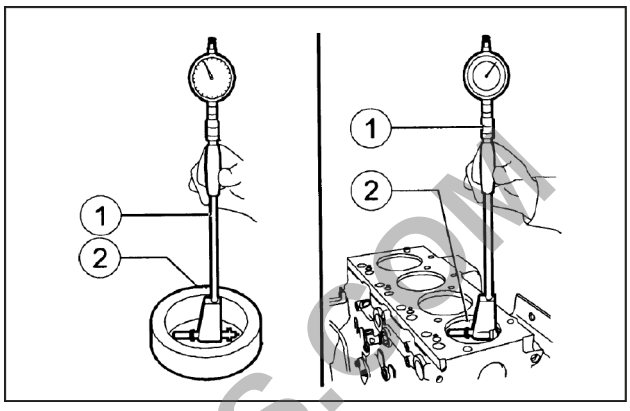
Checking and measuring

1. After disassembling the engine, thoroughly clean the cylinder block. Use appropriate rings to transport the cylinder block.
2. Check carefully for cracks in the cylinder block.
3. Check the conditions of the plugs and the mechanical seals. If they are rusty or their sealing is doubtful, replace them.
4. Examine the cylinder sleeve surfaces: they must not present signs of widening, galling, ovalization, conicity or excessive wear.
5. To check the internal diameter of the cylinder heads for ovalization, conicity or wear, use a sudden **(1)**, equipped with a calibration gauge zeroed on a standard ring **(2)** the same diameter as the cylinder sleeve.

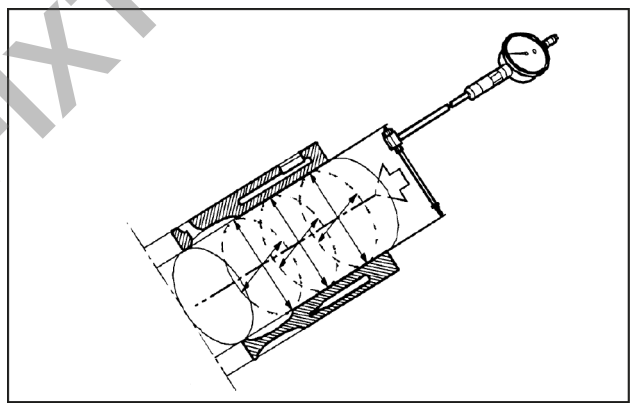
NOTICE: *If no standard ring is available, use a micro meter.*

6. Measurements must be taken for each cylinder sleeve at three different heights and on two orthogonal faces: one parallel to the engine's axis and the other perpendicular; maximum wear is generally found on this face, corresponding to the first measurement.
7. If ovalization, conicity or general wear are noticed, polish and overhaul the cylinder sleeves. The cylinder sleeves must be rectified according to the diameter of the pistons supplied as spare part with an oversize of **0.5 mm** above the rated measurement and the dimensions specified for assembly.

NOTICE: *In case of servicing, all the cylinder sleeves must have the same oversize of* ***0.5 mm****.*



LAIL11TM0996A0A 1



LAIL11TM0997A0A 2

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Intake and exhaust manifolds and muffler - Torque

Air intake union installation **(M8 x 1.25)**	**20 - 28 N·m**
Intake manifold installation **(M8 x 1.25)**	**20 - 28 N·m**
Exhaust manifold installation **(M10 x 1.5 x 65)** (see **Exhaust manifold - Assemble (10.254)**)	**37 - 49 N·m**

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Clutch - 18

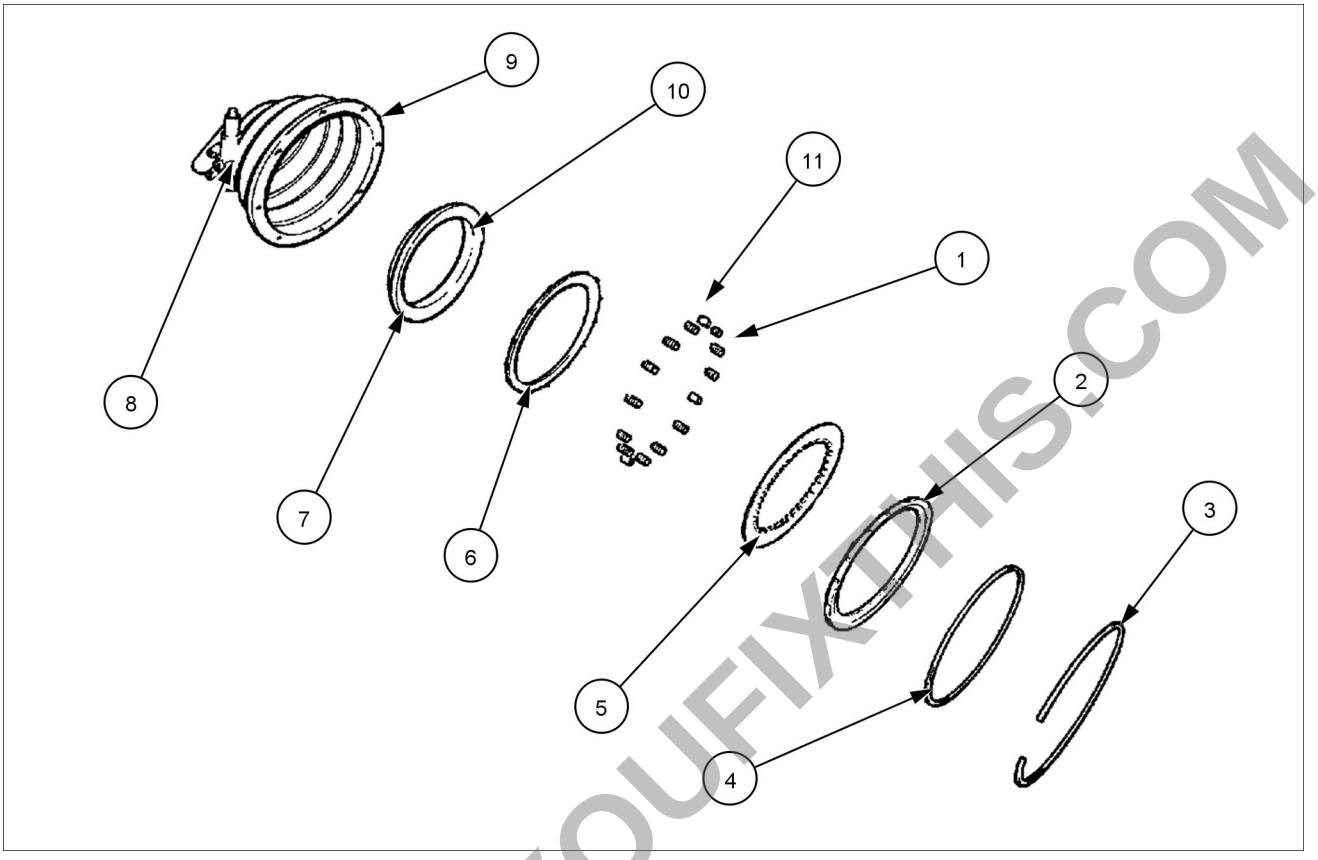
Clutch and components - 110

7630 [Z7CA27168 -]
8030 [Z7CA27168 -]

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Mechanical transmission - Exploded view - Reduction clutch, Dual power transmission



RCPH10TTS013FAF 1

(1) Piston return springs
(2) Pressure plate
(3) Snap ring
(4) Spring retainer
(5) Friction plate
(6) Rear plate
(7) Piston retainers
(8) Control valve body
(9) Planetary gear box
(10) Piston
(11) Dowel pins

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Transmission shaft - Install

Front components

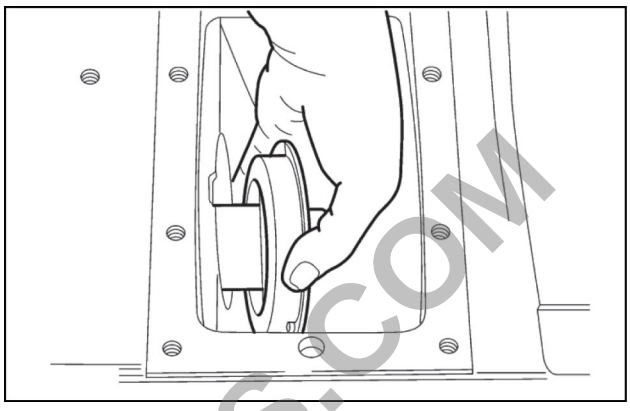
1. Fully install the oil distributor assembly on the secondary shaft in the housing opening, Figure **1**. Align the guide pins with the transmission holes. Check and make sure the lubricating hole is aligned.
2. Install the inverter gear group assembly. DO NOT INSTALL fully.
3. Slide the reverse gear and the inversion synchroniser assembly onto the secondary shaft.
4. Once the synchroniser is in contact with the shaft splines, move the synchroniser and the reverse gears group into place.

NOTE: *If needed, shift the synchroniser into the forward gear position to allow for assembly. After correctly assembling, put into neutral.*

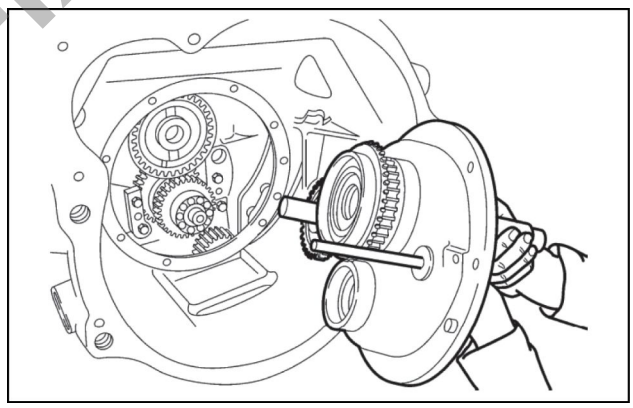
5. Fasten the components with the lock rings.
6. Apply appropriate chemical bond (sealant) between the front cover and the gasket and between the gasket and the transmission casing. Ensure a perfect seal.
7. Install the input shaft assembly and the reverse idler gear in the front cover. Fasten the idler shaft with the retaining bolt and install a new “O” seal.

NOTE: *Install the cover on the transmission, Figure* **2***, making sure the oil pipe from the front cover to the transmission housing is correctly positioned. Fasten the cover with the eight retaining bolts.*

8. Assemble the clutch hydraulic actuator assembly and fasten with three bolts.
9. Install the hydraulic pipes.



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LAIL11TS0263A0A 2

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Free plays and adjustments

Resistance to turning of intermediate differential bearing:	**0.4 - 1.0 kgf** (**0.88 - 2.20 lbf**) Adjustable by calipers: **0.1 mm** (**0.004 in**), **0.25 mm** (**0.010 in**), **0.3 mm** (**0.012 in**), **0.5 mm** (**0.020 in**)
Resistance to turning of output shaft bearings:	**1.5 - 3.5 kgf** (**3.31 - 7.72 lbf**) Adjustable by calipers: **0.1 mm** (**0.004 in**), **0.25 mm** (**0.010 in**), **0.3 mm** (**0.012 in**), **0.5 mm** (**0.020 in**)
Free length of clutch springs:	**48.0 mm** (**1.890 in**)

Lubrication

Fluid type:	Rear axle oil
Capacity: Increase in rear shaft, to the installation of rear shaft	**1.3 l** (**2.7 US pt**)

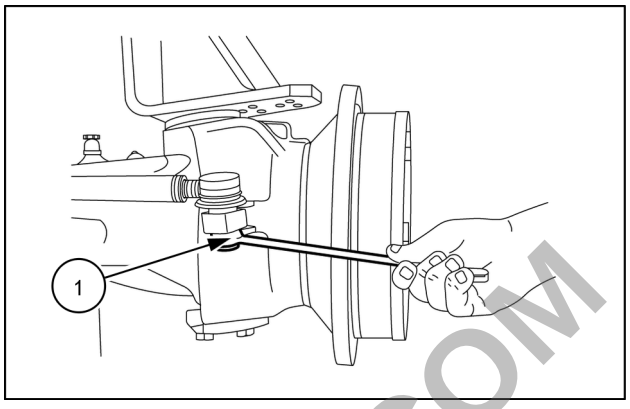
Thread sealant

Setscrew, intermediate gear	**LOCTITE® 569**

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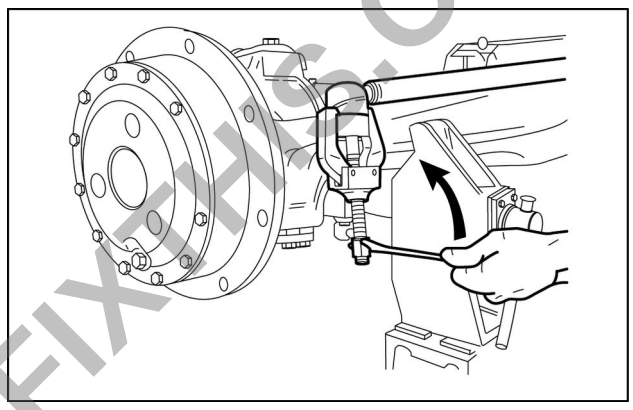
4. Unbolt both fastening bolts **(1)** from the wheel shafts.



LAIL11TS0030A0A 5

Before removing the wheel shafts, make sure that the hubs do not turn on the articulations, leading to the shaft falling from the work bench.

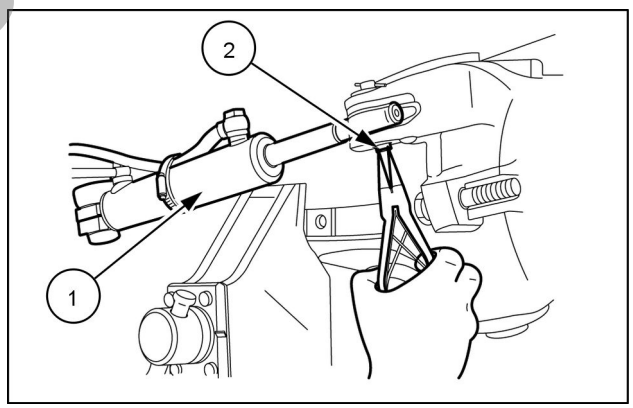
5. During disassembly, also remove the pins from their holes in the pin shaft housing and remove the shaft from the wheels.



LAIL11TS0031A0A 6

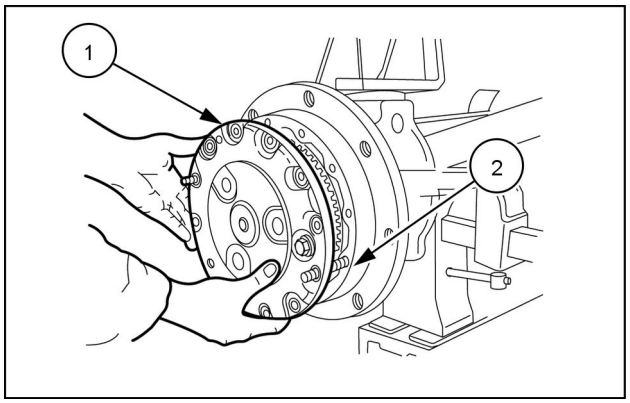
6. Remove the retention rings **(2)** from the articulated pins on the cylinder rod, unbolt the fastening bolts from the cylinder pin **(1)**, remove the pins and separate the two cylinders.

Remove the four pins, rings, spacers and the cylinders complete with tubes.



LAIL11TS0033A0A 7

7. Remove the fastening bolts from the left end of the transmission box cover **(1)**. Bolt the two studs **292888 (2)** and using a sliding hammer bolted to the oil drain plug, remove the cover **(1)** from the box.



LAIL11TS0034A0A 8

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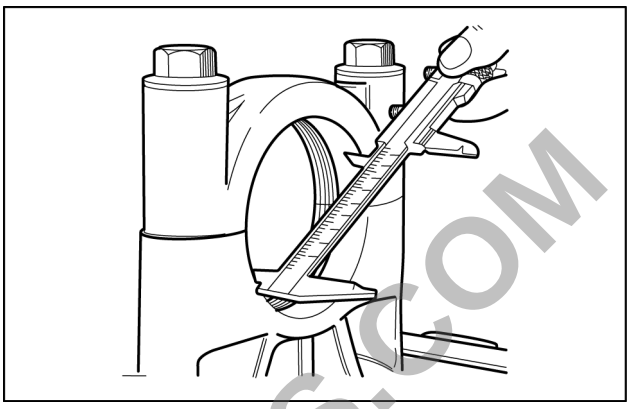
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Differential - Assemble

Assembling the pinion shim with the VL Churchill tool FT.3135

1. Install the roller bearings (without the bearing cover) and fasten with a torque of **113 N·m** (**83.3 lb ft**).
2. Measure the internal dimension of the bearing diameter and call this dimension “A”.
3. Install the pinion bearings in the differential support housing and fasten them in position with tool Nº. **FT 3135**.

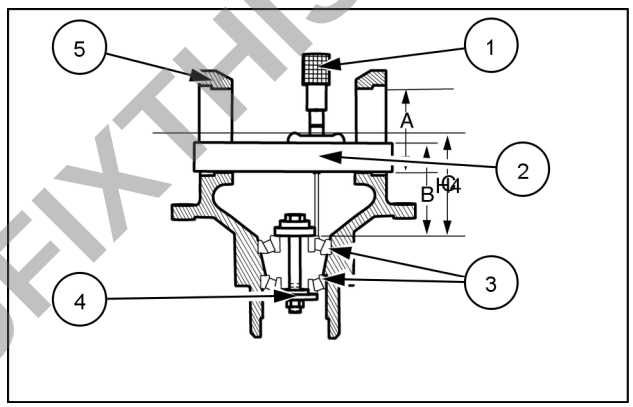
NOTE: *Fasten the clamp so that the bearing cones can be turned by hand.*



LAIL11TL0063A0A 1

4. Place the template bar, tool part Nº. **FT3135**, through the bearing diameter and measure dimension “B”.
   1. Depth Micrometer
   2. Template bar, tool part Nº. **FT.3135**
   3. Pinion shaft bearings
   4. Tool # **3135**
   5. Differential; support box
5. Calculate dimension “H4” using the formula **H4 = B-25*+(A/2)**

NOTE: **The template bar **FT 3135** has a diameter of **25 mm***



LAIL11TL0064A0A 2

6. Determine the thickness of shims “S2” which will be installed behind the pinion gear as follows:

S2 = H4 - H3

Where :-

H4 = Dimension calculated in step 5 above

H3 = **115 mm** + correction factor (C)

115 mm is the manufacturer's nominal dimension of the rear face of the pinion gear to the conical tip of the pinion. (Supplied by the manufacturer).

C = Manufacturer's correction factor, engraved on the pinion face.

Example

A = **95 mm**

B = **95.77 mm**

H4 = B-25*+(A/2)

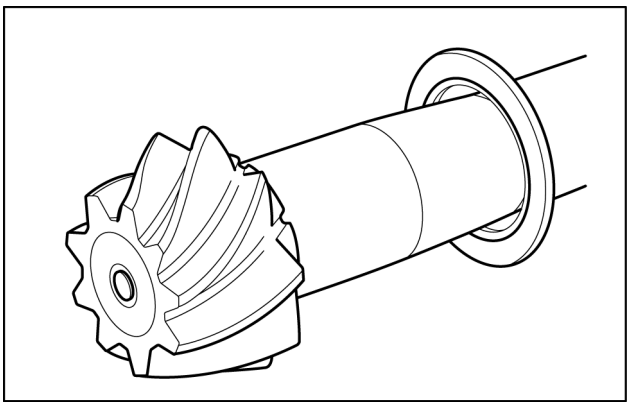
H4 = 95.77–25*+(95/2)

H4 = 118.27

C = **0.1 mm**

H3 = 15+0.1=115.1

Thickness of shim **S2 = 118.27–115.1= 3.17 mm**



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Rear axle system - 27

Powered rear axle - 100

7630 [Z7CA27168 -]
8030 [Z7CA27168 -]

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Differential - Remove - Drive pinion

⚠ DANGER

Heavy parts!
Support designated component(s) with adequate lifting equipment.
Failure to comply will result in death or serious injury.

D0018A

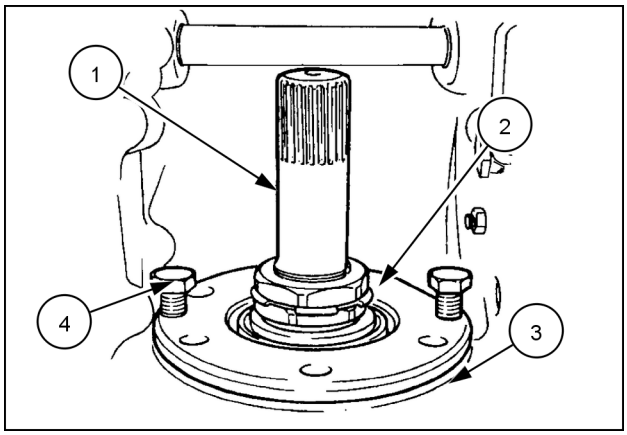
⚠ CAUTION

Pinch hazard!
Always use suitable tools to align mating parts. DO NOT use your hand or fingers.
Failure to comply could result in minor or moderate injury.

C0044A

Prior operation:
Differential - Preload (27.106)

1. Separate the machine between the transmission and the differential housing.
2. Remove the PTO clutch assembly.
3. Remove the emergency brake from the transmission.
4. If installed, remove the transmission hand brake shield from the pinion drive gear.
5. Remove the differential and the differential lock assembly.
6. Remove the bolts and washers that secure the drive pinion.
7. Remove the drive pinion assembly **(1)** from the housing **(3)**. Facilitate removal by placing jacking bolts **(4)** in the holes in the bearing retainer **(2)**.



RCPH09TTS418AAD 1

Next operation:
Differential - Disassemble (27.106)

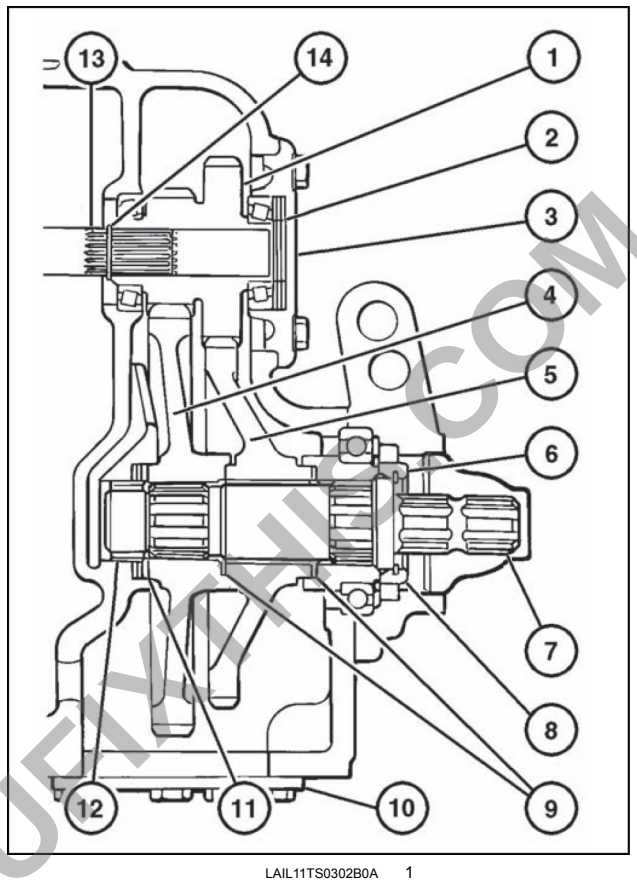
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Rear electro-hydraulic control - Exploded view

Two non-variable speed PTO components:

1. Drive gear
2. Drive gear bearing shims
3. Bearing retainer
4. **540 RPM** driven gear
5. driven gear **1000 RPM**
6. Output shaft brake
7. Output axle
8. Sleeve
9. Bronze rings
10. Covers
11. Needle bearing
12. Output shaft front bearing
13. Upper shaft
14. Locking ring



LAIL11TS0302B0A 1

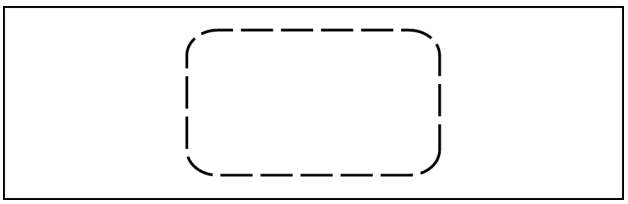
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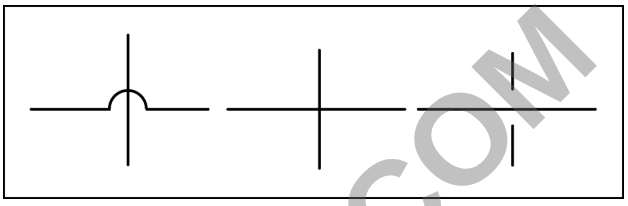
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An enclosure outline indicates that there are several symbols that make up a component assembly such as a valve or a valve stack. The enclosure outline is rectangular and is broken with dashes on all sides.



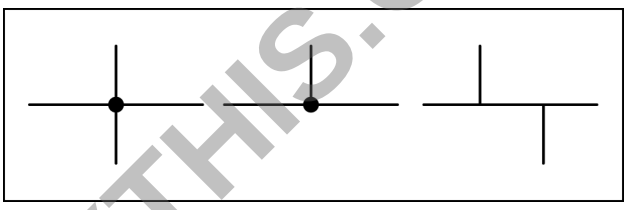
RCIL07CCH028AAA 11

Lines between components are drawn differently when they are crossing or connected. There are lines that cross other lines but are not connected. There are several ways to show crossing lines which are not connected.



RCIL07CCH038AAA 12

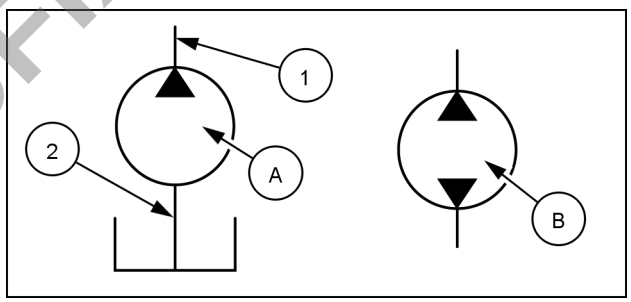
Lines that are connected are shown with a dot that represents the connection or shown as a tee connection. The dot connection is the most commonly used when drawing schematic diagrams.



RCIL07CCH047AAA 13

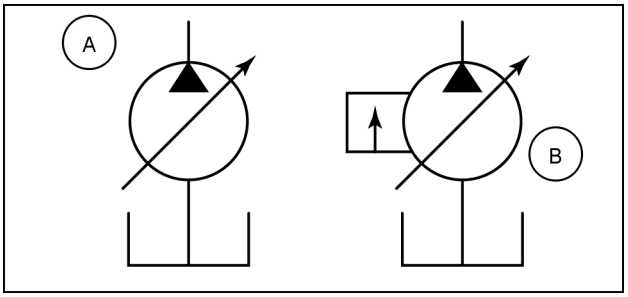
Pumps

There are many basic pump designs. A simple fixed displacement pump **(A)** is shown as a circle with a solid arrow that pointing outward. The arrow points in the direction that the fluid flows. If the pump is reversible **(B)** or designed to pump in either direction, the symbol has two arrows which point in opposite directions. The pump normally has a pressure port and line **(1)** from which pressurized fluid is discharged and a suction port and line **(2)** into which fluid is drawn from the reservoir.



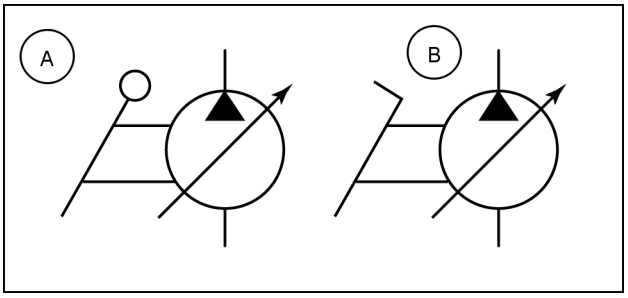
RCIL07CCH048AAA 14

A variable displacement pump **(A)** is shown by an arrow drawn through the pump symbol at a 45 degree angle. A variable displacement, pressure compensated pump **(B)** is shown by a small box with an arrow, added to the side of the pump symbol.



RCIL07CCH040AAA 15

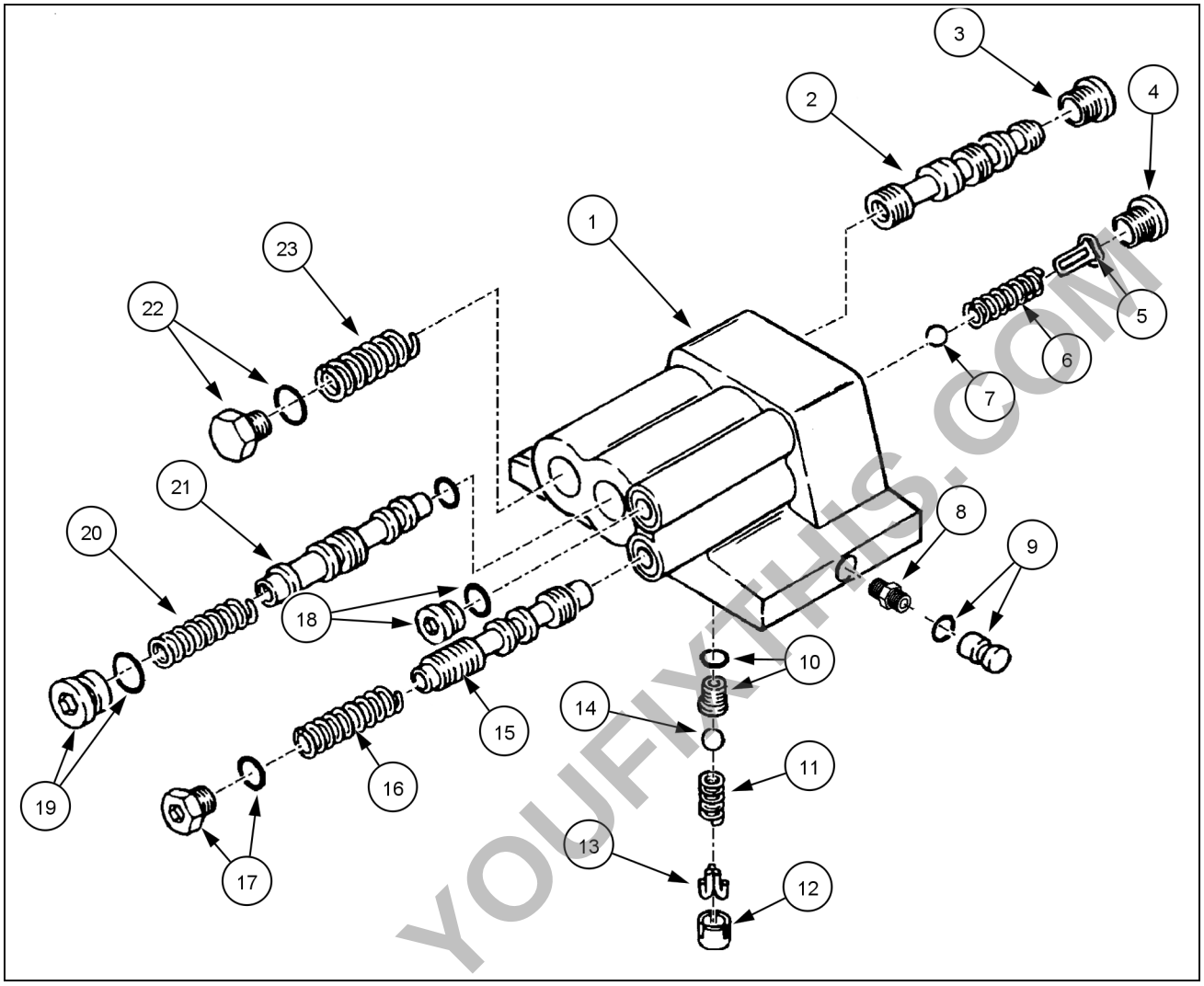
If the pump is controlled by a lever **(A)** or a pedal **(B)**, the appropriate symbol is added to the side of the pump.



RCIL07CCH041AAA 16

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RCPH10TTS013FAD 1

NOTICE: *Install spools into valves using gentle pressure and rotation. Excessive force will damage the valves.*

1. Replace all O-rings and seals. Coat O-rings with petroleum jelly. Confirm O-rings are seated properly (where installed).
2. Lubricate all parts with clean 134D **AMBRA MULTI G** hydraulic oil.
3. Install the lift circuit check valve.
   A. Install the O-ring and seat **(10)**, ball **(14)**, spring **(11)**, and cage **(13)**.
   B. Install spacer with plug **(12)**.
4. Install flow control valve.
   A. Slide the spool **(15)** into the flow control valve.
   B. Insert the spring **(16)** in the valve front.
   C. Screw in the rear plug **(3)** by one thread.
   D. Install the front plug with O-ring **(22)** completely and tighten.
   E. Tighten the rear plug **(3)** to a torque of **27 N·m** (**239 lb in**).

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Remote control valve - Detailed view

Detailed view of a remote valve and attached components

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Remote control valve Closed center mechanical remote valve - Pressure test

Pressure tests

The hydraulic pressure of the automatic disarm activator must be regulated when the valve set is serviced or when the control levers and rod prematurely return to neutral. Perform the test according to the following procedure, Refer to Fig. **1** .

1. Install the inlet tube of a flowmeter **(4)** in the top coupler of the set to be tested.

Set the flow control lever **(5)** to maximum flow.

2. Install the flowmeter return tube **(2)** on the top coupler of the other group of remote control valves.
3. Completely open the flow meter load valve **(3)**.
4. Run the engine at **1700 RPM**.
   Put the lever of the valve assembly to which the flowmeter RETURN is coupled, in the FLOTATION position.
   Put the lever of the valve assembly to which the flowmeter INLET is coupled, in the LIFTING position.
5. Adjust the flowmeter load valve to a pressure of **140 bar** and keep the engine running until a temperature of **75 °C** is attained.
6. Gradually close the load valve and record the disarm pressure of the remote control lever.

The disarm pressure should be between **148 - 162 bar**.

7. To adjust the pressure:
8. Turn off the engine of the machine.
   - To INCREASE the pressure FASTEN the retainer screw **(1)**.
   - To REDUCE the disarm pressure, LOOSEN the screw **(1)** by turning it in the anti-clockwise direction

Each half a turn of the screw is equivalent to approximately **32 bar**.

NOTICE: *Never adjust the retainer screw with the machine running.*

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Rear three-point hitch - Assemble Assembling the lift cover

1. Apply sealant to the two sides of the joint. Application should be continuous around the entire face of the joint and with a thickness of approximately **1 mm**;
2. Install the cover in the rear axle central housing and fasten the retaining bolts to **15.2 kgf** ;
3. With the engine stopped, raise the lift arms by hand and check if they come down slowly by the action of their own weight. If this does not occur, re-check the torque applied on the arm fixing bolts;
4. Re-assemble the other components following the opposite order to that of disassembly.

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Steering - 41

Hydraulic control components - 200

7630 [Z7CA27168 -]
8030 [Z7CA27168 -]

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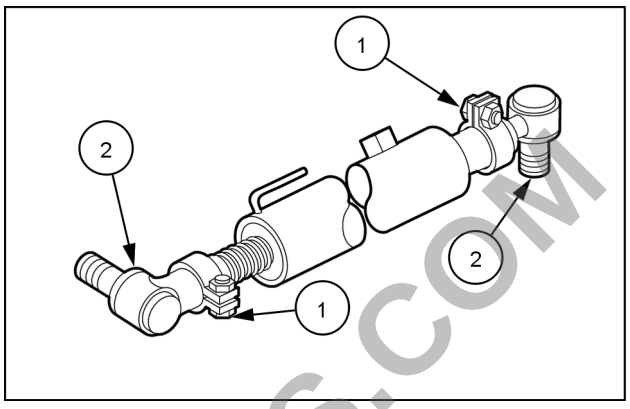
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Steering cylinder - Disassemble

Disassembly

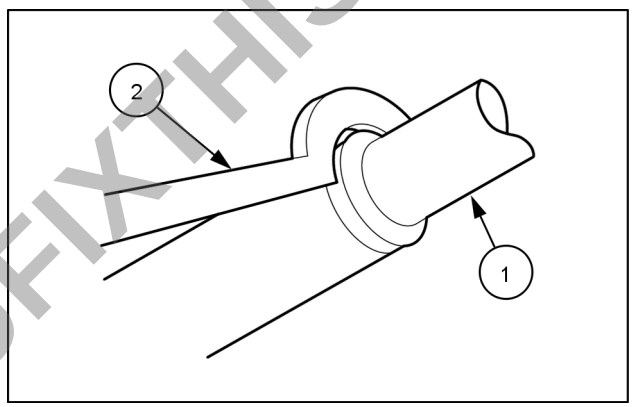
1. Drain all the oil from the cylinder and cover the ends.
2. Loosen the clamp bolts **(1)** and remove the ball joint assemblies **(2)**, Fig. **1**.
3. Install the appropriate adaptations to the cylinder orifices to fix it in a vise.

NOTICE: *Do not fasten directly around the cylinder, as the assembly may be damaged.*



LAIL11TS0137A0A 1

4. With a "C" screwdriver **(2)**, unscrew the extension tube **(1)** and the bushing assembly, Fig. **2**.
5. Remove the bushing and the piston/connecting rod assembly from the cylinder.
6. Replace all sealing rings.



LAIL11TS0138A0A 2

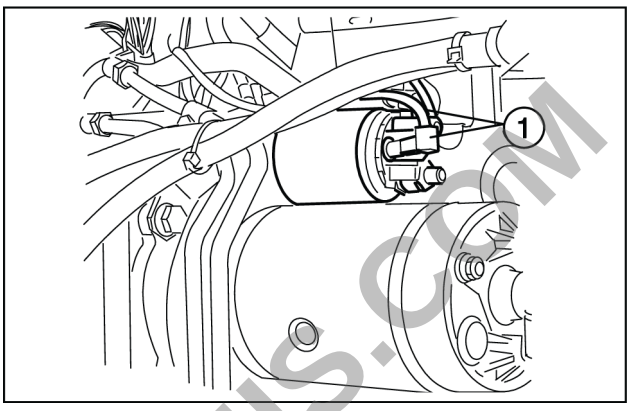
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Engine starter - Remove

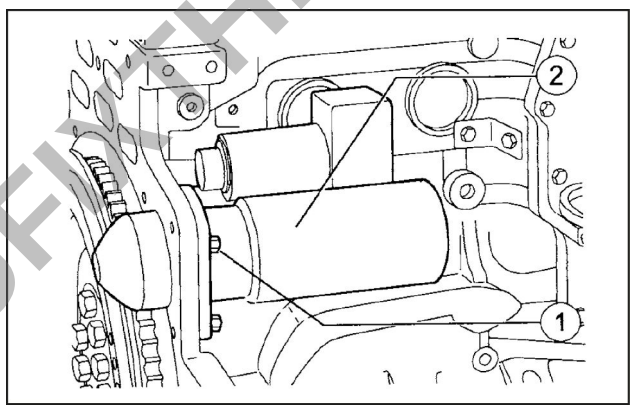
Starter motor removal

1. Disconnect the battery ground cable (negative).
2. Remove the protective cover of the solenoid assembly **(1)**. Disconnect the positive cables from the solenoid and disconnect the power supply wires from the solenoid coil.



LAIL11TM0723A0A 1

3. Remove the three mounting bolts **(1)** from the starter motor **(2)**. Remove the starter motor.



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Battery - Preliminary test

Tests

Before starting battery tests, check the battery to make sure that the stoppers are not dirty, corroded, open and that the box is not damaged.

Equipment required for tests:

- Densimeter
- Appliance for checking batteries (Checking high discharge)
- Thermometer
- Battery charger.

Density:

This test determines the battery charge status.

1. With the buoy in the vertical position take the reading.
2. Adjust the densimeter readouts for the electrolyte temperature variations subtracting 4 points (density of 0.004) for every **5.5 °C** below the temperature value to which the densimeter is calibrated and adding 4 points (density of 0.004) for every **5.5 °C** above this value.

The following examples are calculated for a densimeter calibrated to **30 °C**.

Example 1:		
Temperature below		**30 °C**
Electrolyte temperature		**19 °C**
Reading on densimeter		1.270
Subtract	$\frac{11.0}{5.5}$ x 0.004	0.008
Corrected density	=1.262	

Example 2:		
Temperature over		**30 °C**
Electrolyte temperature		**40 °C**
Densimeter readout		1.220
Add	$\frac{10.0}{5.5}$ x 0.004	0.007
Corrected density	=1.227	

3. Use the table below to determine the battery charge status.

Charge Status	Corrected density @ 15 °C	Corrected density @ 25 °C	Average battery voltage (Volts)
100 %	1.295	1.287	**12.76 V**
75 %	1.253	1.246	**12.52 V**
50 %	1.217	1.210	**12.30 V**
25 %	1.177	1.170	**12.06 V**
0 %	1.137	1.130	**11.84 V**

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