ENGINE OVERHAUL ON BENCH

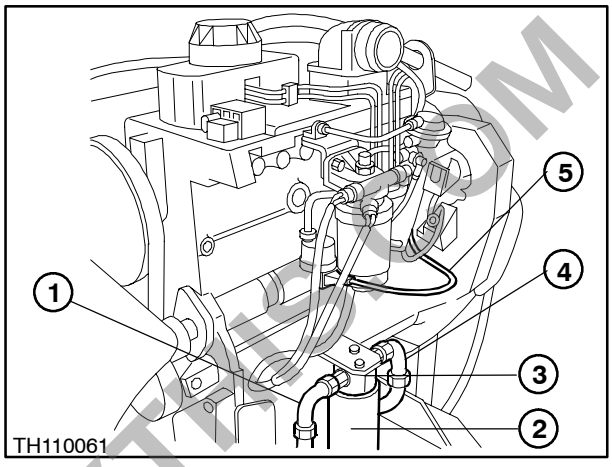
Engine disassembly

Drain the engine oil by removing the sump plug and the filler cap on the cylinder head cover.

Remove the fan group from the fan pulley.

To install bracket 380000661 to the engine to secure it on the engine overhaul stand proceed on the left side of the engine:

- remove oil filter (2) from support (3) using tool 380000670;
- remove oil pipes (1) and (4) of filter support (3);
- remove support (3);
- remove electric harness (5).



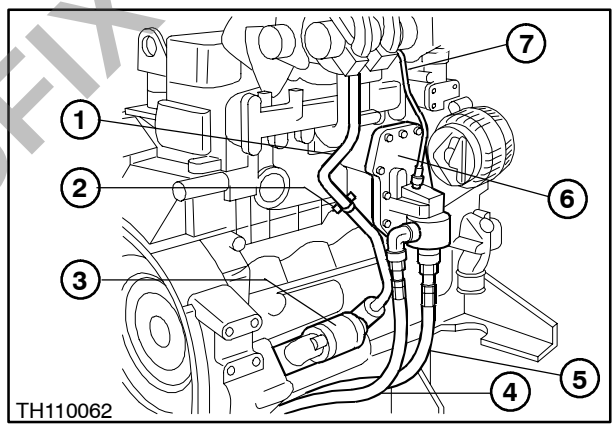
48

To install bracket 380000661 on the right side of the engine, remove:

- starter motor (3);
- oil return (1) securing bracket (2);
- oil return pipe (1) relative to the turbine;
- remove oil pipes (4) and (5) from heat exchanger group (6).

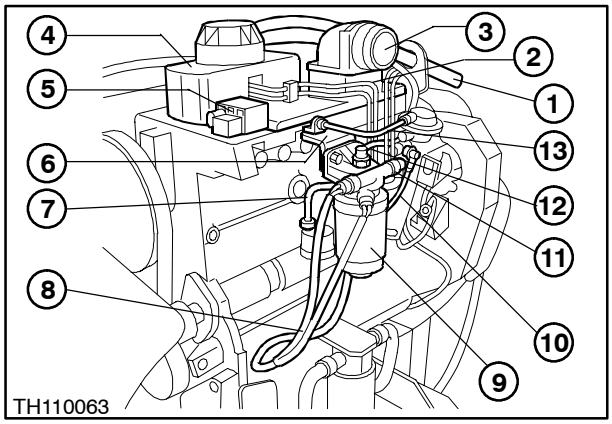
Secure the engine to rotary stand 380000301

- disconnect turbine lubrication delivery pipe (7)



49

- disconnect the engine oil fumes recovery pipe from blow-by (1);
- remove rocker arm cover (4);
- remove electric harness (8);
- remove fuel filter (9);
- remove intake manifold (3);
- remove heater (2);
- remove heater (5) controller;
- remove LDA system pipe (13);
- remove quick release pipes (7), (10), (11) and (12) following the notices provided in figure 51;
- remove fuel filter support (6).



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Service manual
LM1340 – LM1440 – LM1740
TELESCOPIC HANDLERS

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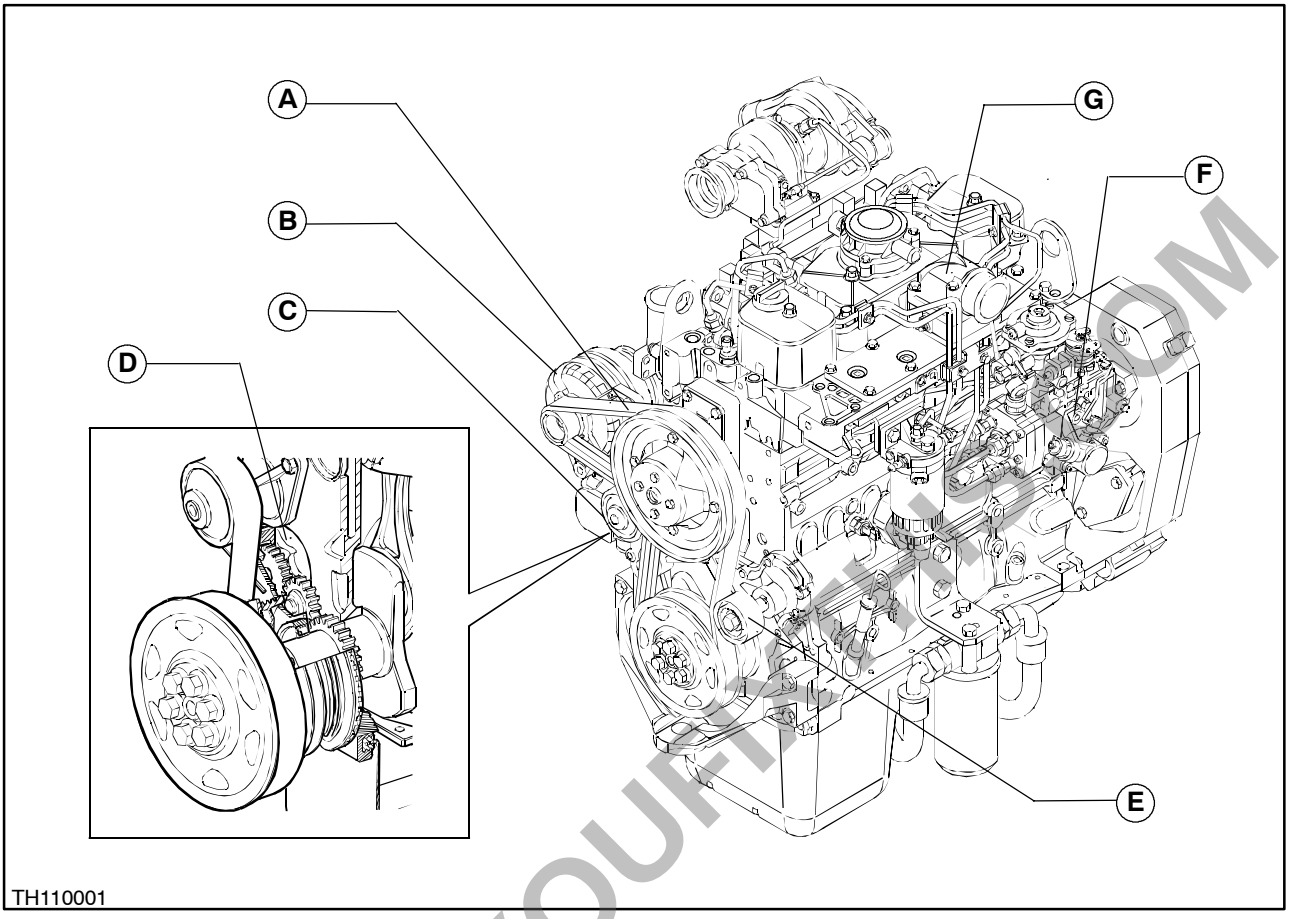
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GENERALITIES



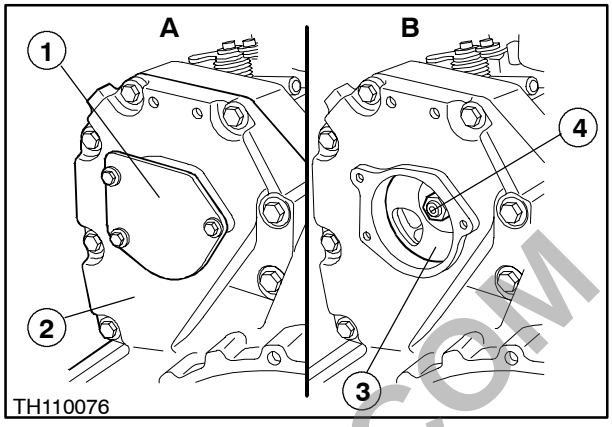
2

A. Drive belt for: water pump – alternator fan
B. Alternator
C. Water pump
D. Oil pump
E. Belt tensioner
F. Rotary injection pump
G. Air heater for cold starting

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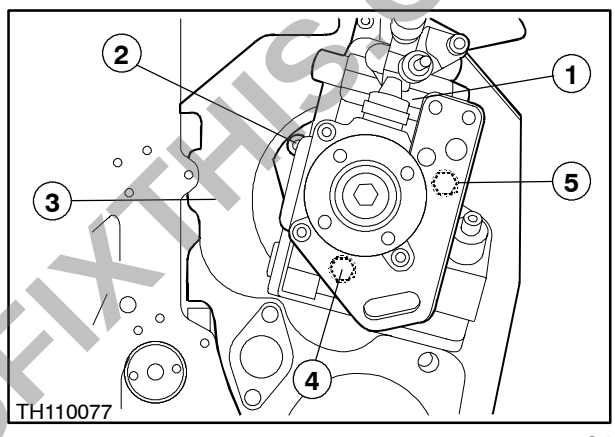
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- Remove cover (1) from gear cover (2).
- Lock the engine flywheel as described in figure 48.
- Remove nut (4) securing injection pump drive gear (3).



63

Remove the three nuts (2) (4) (5) securing injection pump (1) to flywheel housing (3) and extract it from its seat using tool 380000322 properly installed on gear (3) of figure 63B.

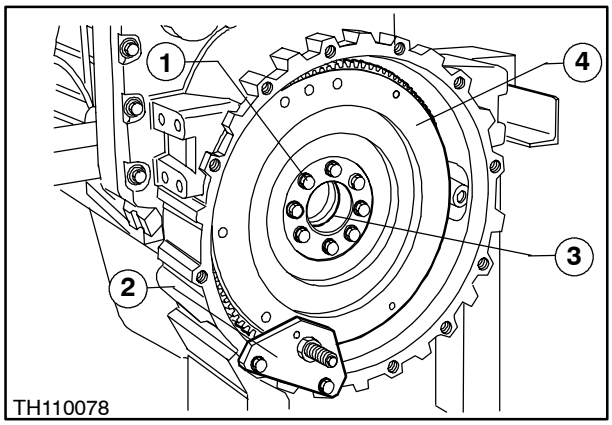


64

Install tool 380000990 (2) to loosen screws (1).

Remove tool 380000990 (2).

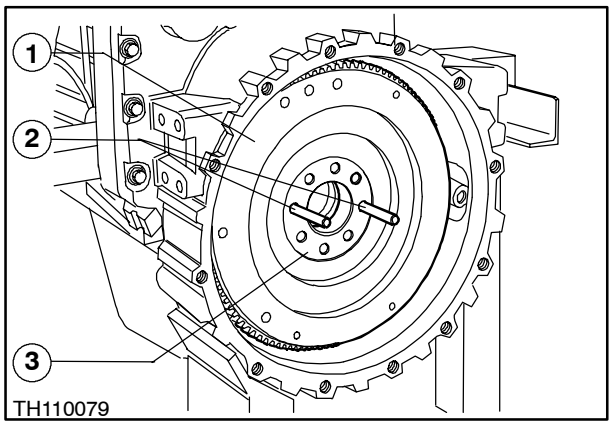
Remove screws (1) securing flywheel (4) on crankshaft (3).



65

Install two pins (2) of appropriate length in the holes of crankshaft (3).

Extract flywheel (1) so that it is possible to sling it with a lifter and rest it in a container.

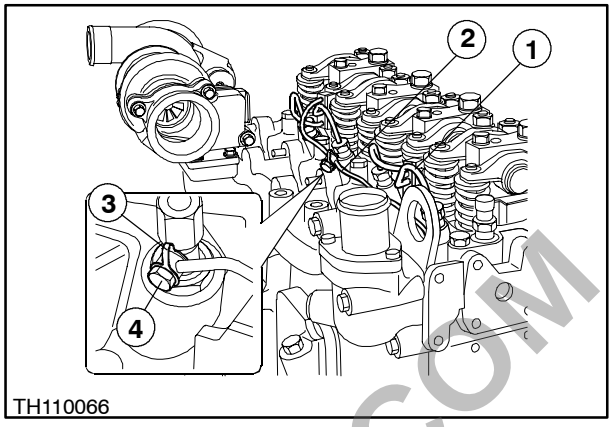


66

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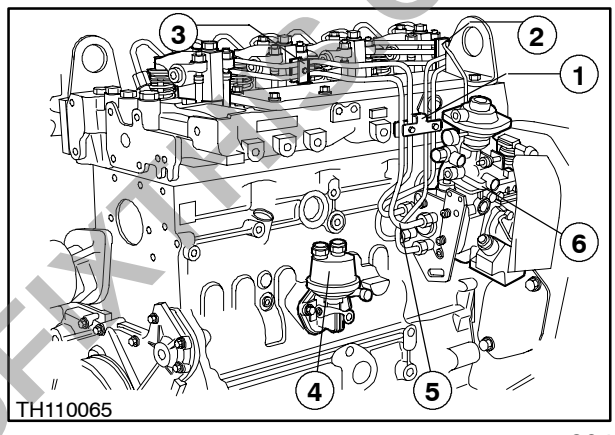
Install the injector fuel lines group (1). Install fuel unloading lines (2) from the injectors, using gaskets (3) and tightening screws (4).



203

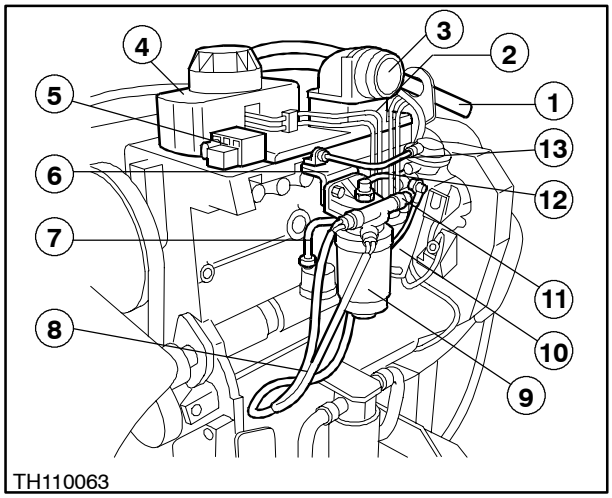
Install injector fuel lines (5) of injection pump (6), secure lines group (1), (2) and (3) brackets on the cylinder head.

Install primer pump (4).



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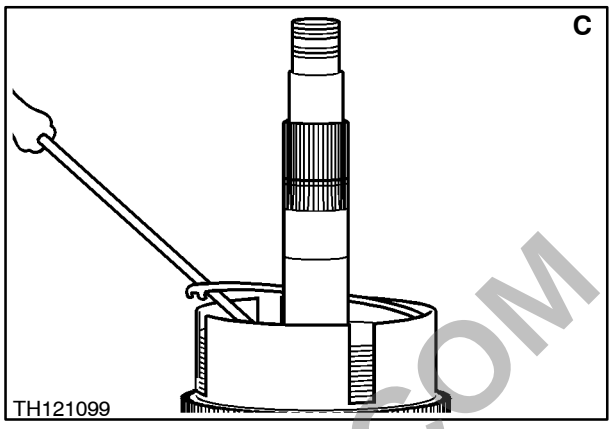
- Install rocker arm cover (4)
- Install heater (2)
- Install the elbow of intake manifold (3)
- Install heater controller (5)
- Install fuel filter support (6)
- Install fuel filter (9)
- Connect the lines with quick release couplings (7), (10), (11) and (12) following the recommendations listed in Figure 206.
- Install electric harness (8)
- Install the line of the LDA system (13)
- Connect the engine oil fumes recovery line to blow-by (1).



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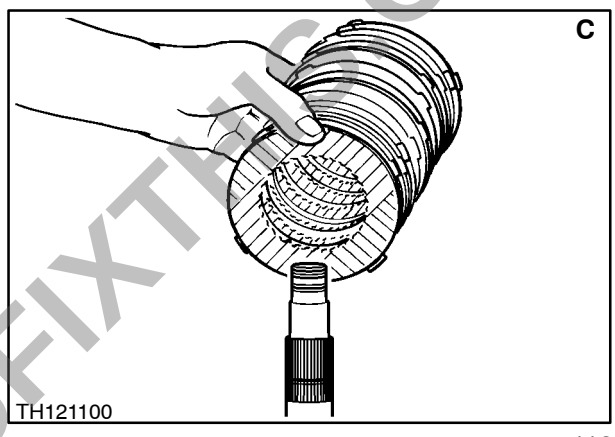
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Remove the end plate retaining ring.



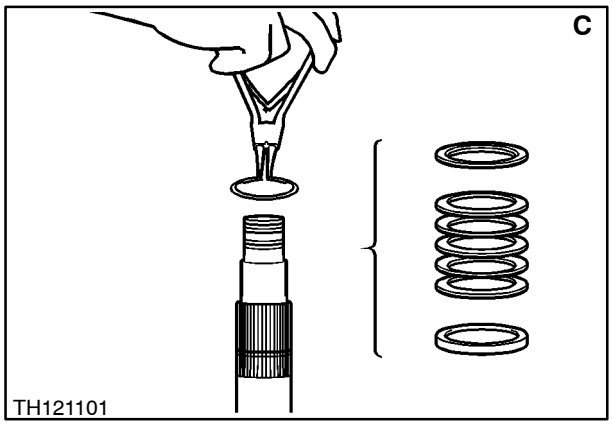
117

Remove the end plate and six friction discs and six separator plates.



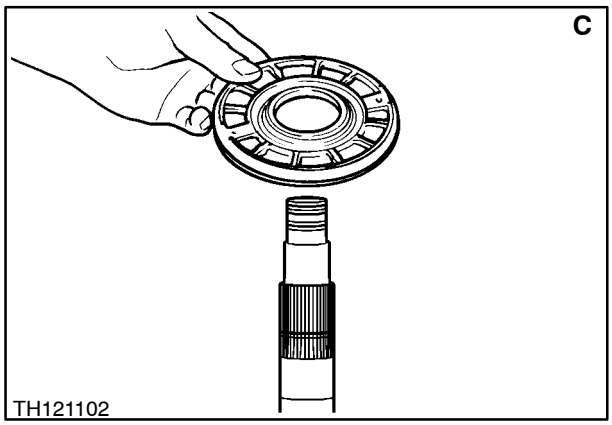
118

Compress the belleville washers and remove the snap ring, then proceed to remove the snap ring retainer, belleville washers and clutch piston wear plate.



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Remove the clutch piston by turning the clutch pack upside down and tapping the shaft on a block of wood.



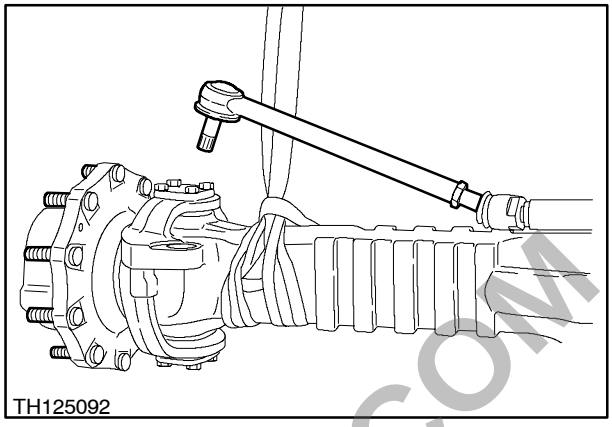
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HOW TO REMOVE THE AXLE DRIVE PINION

Remove the complete arms and the differential unit.

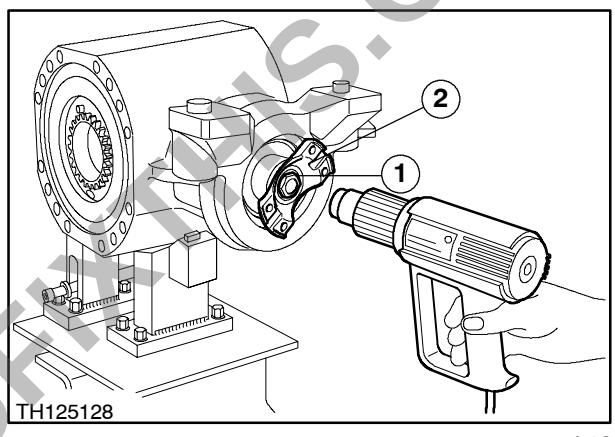
For details, see “CHECKING WEAR AND REPLACING THE BRAKING DISKS” and “REMOVING THE DIFFERENTIAL UNIT”.



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If disassembly is awkward, heat the check nut (1) of the flange (2) at 80°C.

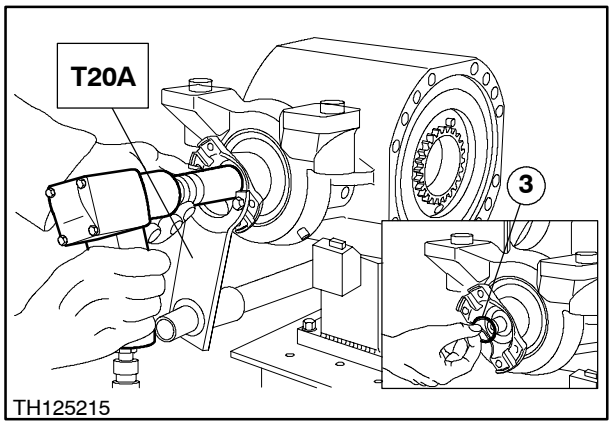
NOTE: *Heating is meant to loosen the setting of Loctite on the nut (1).*



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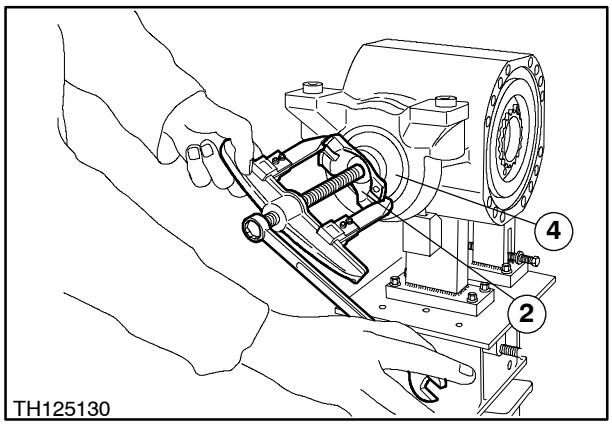
Prevent the rotation of the pinion using a bar (T20A) as indicated in the figure.

Unloose and remove the nut (1); also remove the O-ring (3).



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Remove the flange (2) complete with guard (4) by means of a puller.



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Settings of modules with voltage outputs

Position 0 Turn selector knob S to position 0 **to adjust the frequency of the PWM signal (current)**. Normally, this value should not be modified. If necessary, proceed as follows:
– move any joystick immediately out of rest position;
– holding the joystick in this position, operate the selector RPM+/– installed on the transmitter unit and set the desired value.

Position 1 Turn selector knob S to position 1 to adjust **the maximum and minimum voltage (or current) values of the two semiaxis of each joystick**. Proceed as follows:
1. To set the maximum value, move the joystick to maximum stroke on the semiaxis to be set. Holding the joystick in this position, operate the selector RPM+/– installed on the transmitter unit and set the desired value.
2. To set the minimum value, move the joystick immediately out of rest position on the semiaxis to be set. Holding the joystick in this position, operate the selector RPM+/– installed on the transmitter unit and set the desired value.

Position 3 & 4 Turn selector knob S to positions 3 and 4 to adjust **the minimum and maximum voltage of the auxiliary outputs Z8 and Z9**, respectively. Proceed as follows:
1. To set the maximum value, turn the knob (installed on the transmitter unit) relevant to control Z8 (or Z9) completely clockwise. Holding the knob in this position, operate the selector RPM+/– installed on the transmitter unit and set the desired value.
2. To set the minimum value, turn the knob (installed on the transmitter unit) relevant to control Z8 (or Z9) completely anticlockwise. Holding the knob in this position, operate the selector RPM+/– installed on the transmitter unit and set the desired value.

Setting storage

8. Switch the transmitter unit off to store the settings.
9. Cut out the power supply to the receiver unit.
10. Pull out the setting key K1.
11. Close the receiver unit cover and turn power supply on.

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SECTION 10 – ENGINE

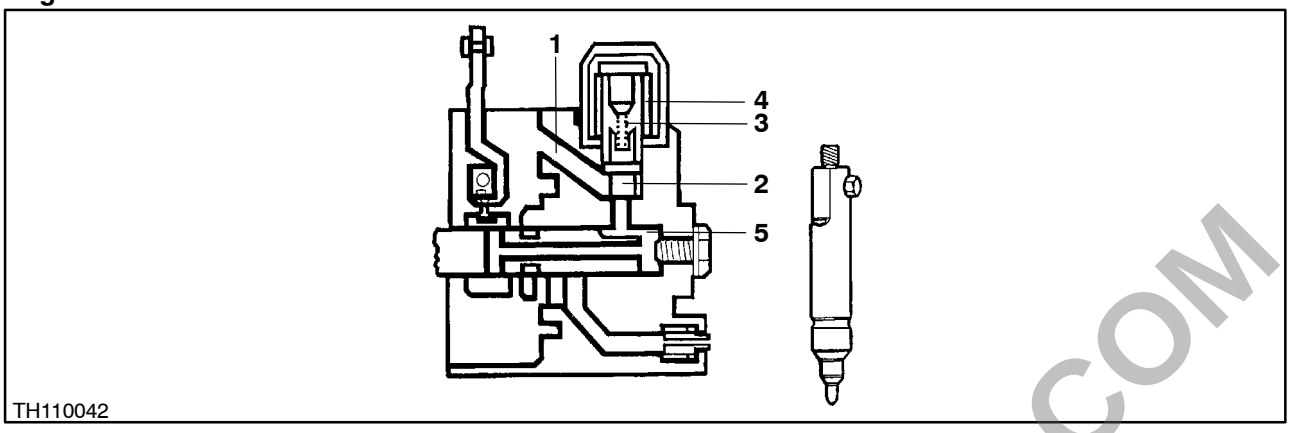
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Engine cut-off



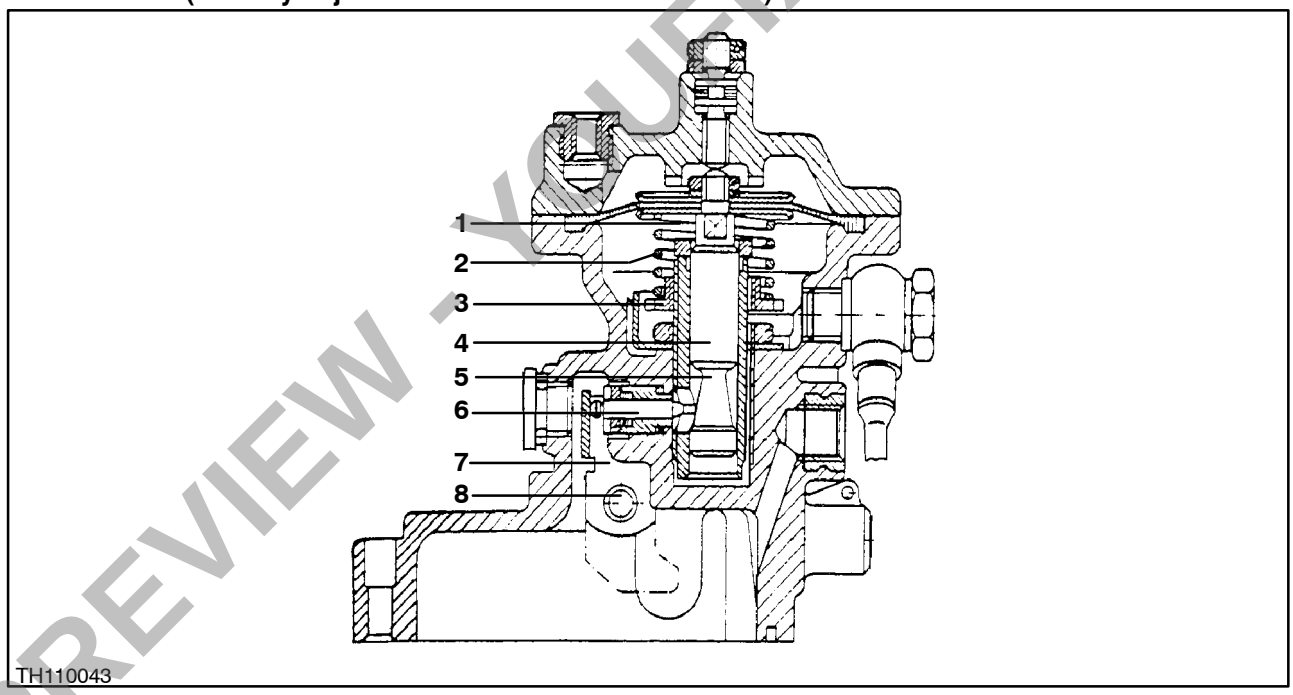
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1. Fuel inlet duct
2. Mobile plug
3. Spring
4. Solenoid valve
5. Compression chamber

The engine cut-off occurs when cutting-off the starting contact. The electric power energising solenoid valve (4) is cut-off.

The solenoid valve, under the effect of spring (3) pushes mobile plug (2) to full stroke, obstructing fuel inlet duct (1).

L.D.A. device (delivery adjustment as a function of the load)



40

Operation of the L.D.A. device

The L.D.A. device has the purpose of changing the delivery of fuel as a ratio of the air pressure in the intake manifold.

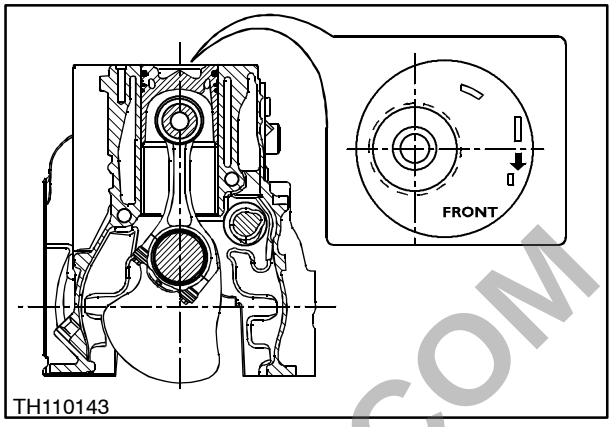
This air pressure actuates membrane (1) connected to regulation pin (4). In the lower side of regulation pin (4) taper seat (5) is machined in which feeling pin (6) slides.

The axial movement of regulation pin (4) causes the sliding of feeling pin (6) that in turn, actuates stop lever (7). Stop lever turns on its axis (8) and actuates the drive plate so that the fuel deliveries are adjusted to the quantity of air introduced into the cylinders.

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DIAGRAM FOR THE INSTALLATION OF THE CONROD-PISTON ASSEMBLY INTO THE GALLERY

- the gap of the piston rings must be 120 ° offset among them;
- the conrod/piston assemblies must have the same weight;
- the wording stamped on the ceiling of the pistons must be directed toward the front side of the cylinder block or the recess machined on the skirt of the pistons corresponds to the position of the oil jets.

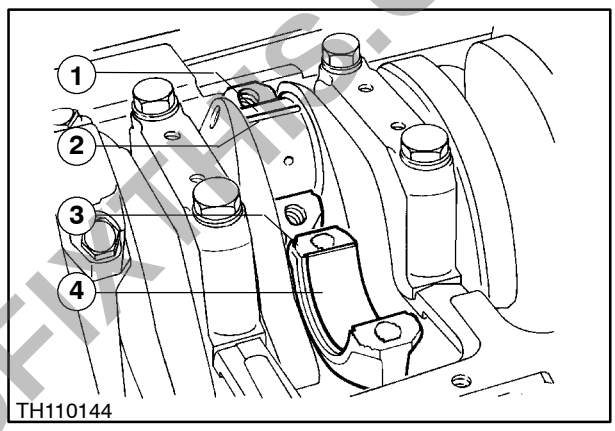


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Measuring the installation play of the conrod pins

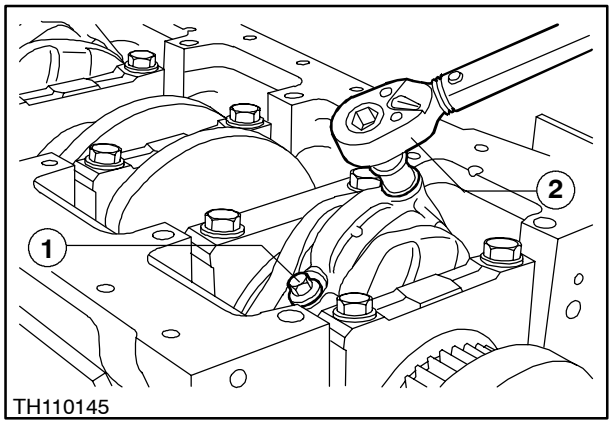
To measure the play operate as follows:

- clean accurately the parts and eliminate all traces of oil;
- place a piece of calibrating wire (2) on crankshaft journals (1);
- install conrod caps (3) with the relevant half bearings (4).



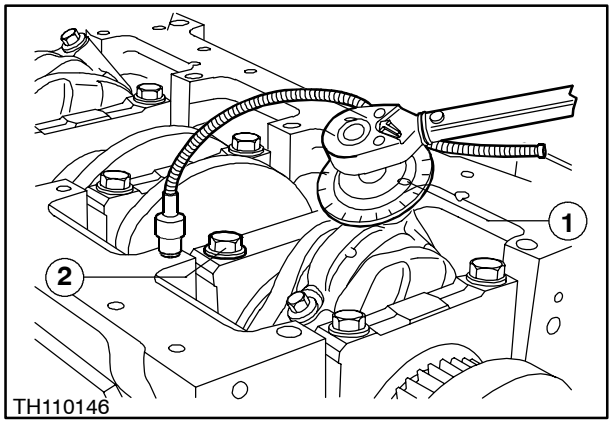
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- tighten screws (1) previously lubricated with engine oil with torque wrench (2) to the prescribed torque.



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- install tool 380000304 (1) on the socket and tighten further screws (2) at the angle.



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MODULATION VALVE OPERATION

The modulation valve shown on the pages opposite consists of the following components:

1. Modulation Valve Housing
2. Modulation Sleeve
3. Accumulator Valve
4. Regulator Valve
5. Stop Pin

The graph shows how the pressure increases in the clutch pack from the moment of solenoid activation (A) until maximum clutch pressure is achieved (F).

Diagram A

Oil is just about to enter the modulation valves and both the accumulator and regulator valves are seated on the stop pins.

Diagram B

Oil initially flows in to the bottom of the regulator valve and unseats the regulator valve. This momentarily sends a high pressure pulse to the clutch pack which takes up the freeplay between the clutch pack plates.

Diagram C

Oil starts to flow through the small orifice in the regulator valve and equalises the pressure on either side.

Diagram D

When the top side of the regulator valve is full of pressurized oil the spring pressure pushes the regulator valve back to its seat. Pressure then begins to act on the bottom of the accumulator valve.

Diagram E

The accumulator valve starts to move up the sleeve and as it does the oil pressure required to push it up becomes greater and greater as the opposing spring pressure increases. This gradual increase in pressure feathers the clutch plates into engagment. The pressure increase stops when the accumulator hits the limit rod at the top.

Diagram F

As the oil supply continues to the clutch pack excess flow is bled off via the regulator valve.

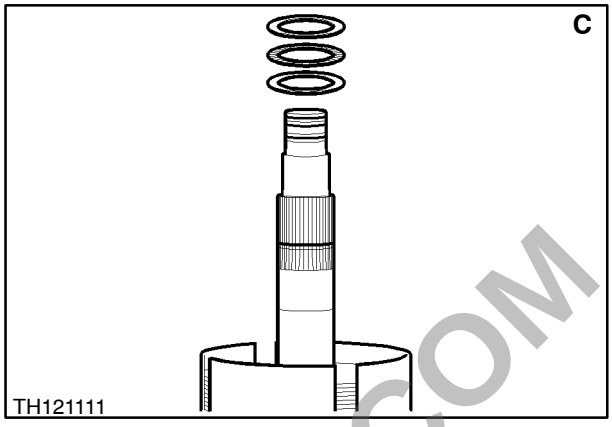
Diagram G

When the supply of oil to the clutch pack is cut off the regulator valve seats on the bottom pin allowing oil to flow out the top of the regulator valve allowing the modulation valve to become seated.

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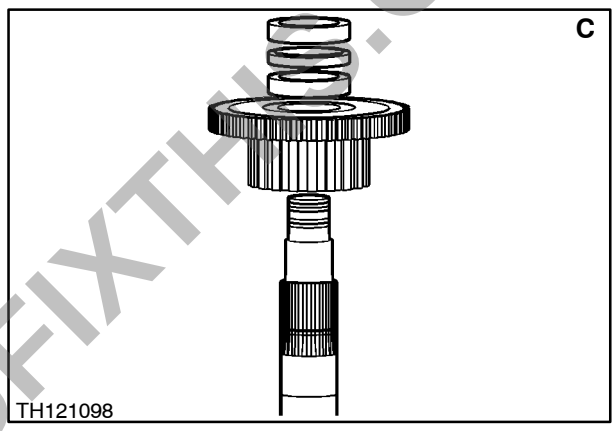
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Position the thrust bearing inner washer, thrust bearing and thrust bearing outer washer over the shaft.



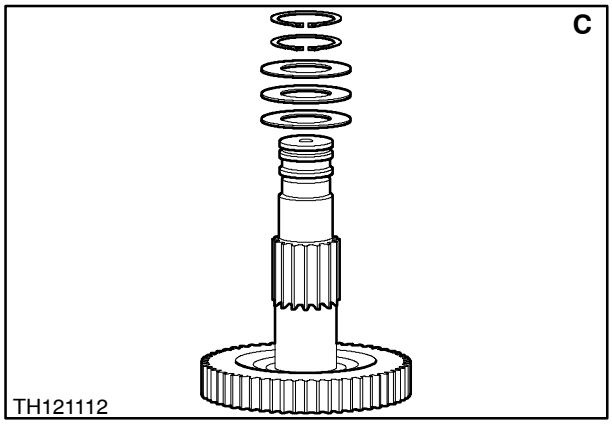
133

Press one bearing into the hub then place the spacer on top and press the next bearing flush to the face of the gear. Install into the clutch assembly.



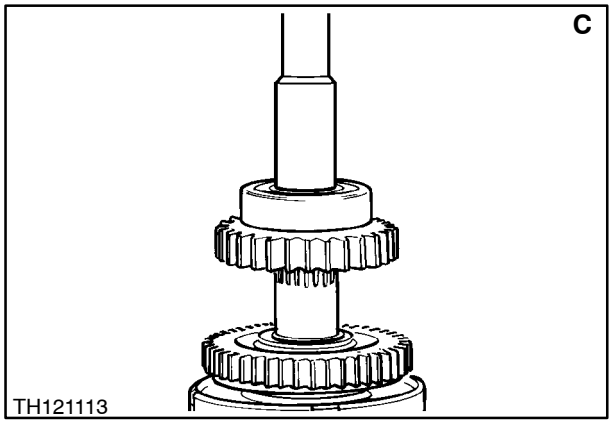
134

Position the inner thrust washer, thrust bearing and outer thrust washer over the shaft. Then fit the snap ring on top and end gear locating snap ring.



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Install the end gear and then press on the bearing with the bearing shield upwards.

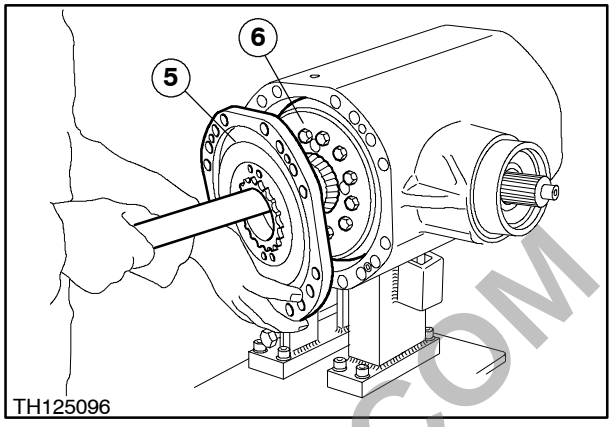


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Insert a screw-driver in the opposing slots then force and remove the middle cover (5) and the complete differential unit (6).

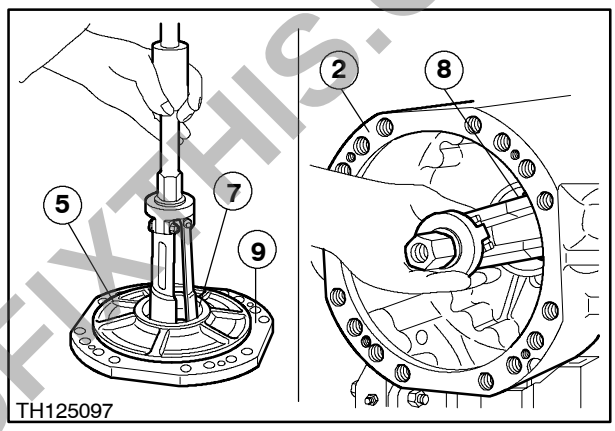
NOTE: *Support the pieces using a rod.*



110

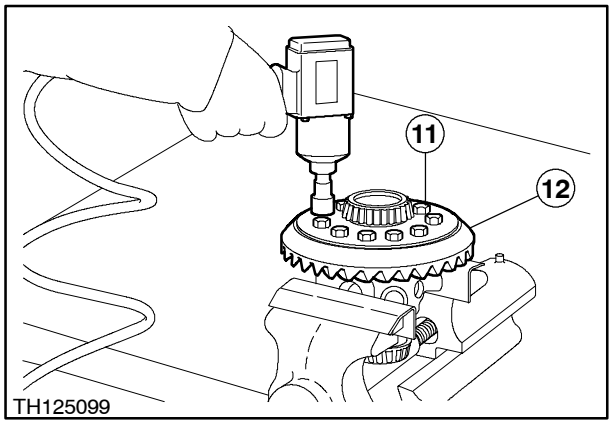
If the bearings need replacing, extract the external thrust blocks of the bearings (7) and (8) from middle cover (5) and central body (2).

NOTE: *Accurately check the O-ring (9).*



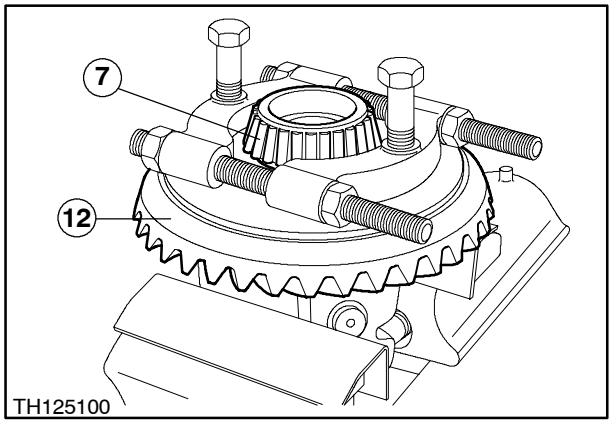
111

Remove the fitting screws (11) from the crown (12).



112

If the bearing need replacing, extract the bearing (7) and remove the crown (12).

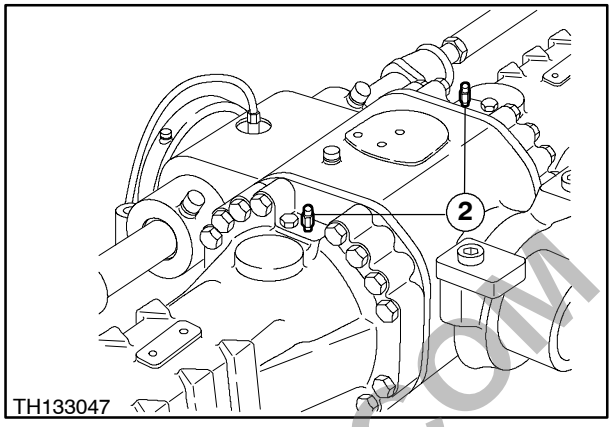


113

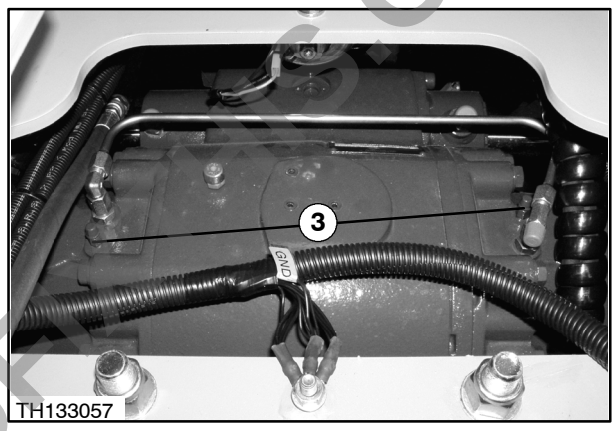
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- Loosen the front and rear axle (3) bleed screw (2). Usually start with rear axle and then proceed as follows:
  - rear right-hand side axle
  - rear left-hand side axle
  - front right-hand side axle
  - front left-hand side axle
- Attach the rubber hose to the end of the bleed screw. Place the other end of the hose in the collection container.

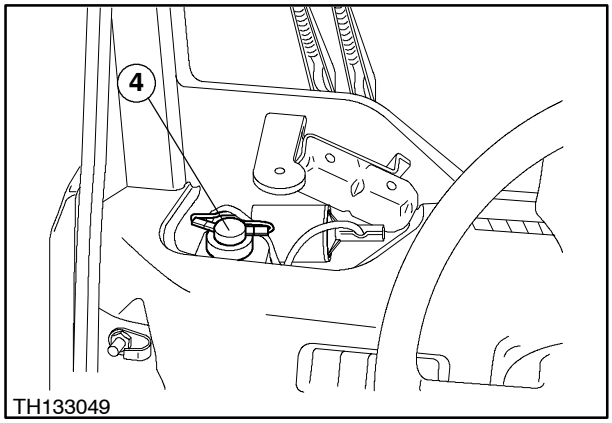


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- Remove the brake pump reservoir cap (4) and fill the reservoir with oil.
- Push the pedal repeatedly, down and up, so oil circulates through the system and the air out.
- As the reservoir level drops, top up.
- When the oil starts to flow down the transparent hose, tighten the bleed screw with the pedal still pushed down.
- Repeat steps for each of the bleed screws in the above mentioned order.
- Test the brakes with the engine off and the pedal should become hard before reaching half its downward stroke. If the pedal can be pressed further or to the floor, repeat the bleeding procedure.
- Re-install front axle cover and instrument panel inside the cabin.



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INSTRUMENT CONSOLE

IMPORTANT: *Gauges and switches mounted in the Instrument panel may vary in position from that shown in this manual. This is dependant upon model and options fitted. Ensure you are familiar with all the functions before operation.*

Engine coolant temperature warning gauge with warning buzzer

The engine coolant temperature indicator responds to a sensor fitted in the engine. During normal operations the indicator will tend to rise from the low point of the green segment to the centre of the gauge. When operating under heavy load conditions, the indicator may continue to rise to just below the red segment and return to a lower position when normal machine operation is resumed.

Should the indicator rise into the red segment a warning buzzer will sound. Stop the engine immediately and investigate the cause. Normal operations can be resumed once the engine has cooled sufficiently or the cause corrected.

NOTE: *When the key-start/stop switch is turned off the gauge needle assumes a random position.*

Tachometer and hour meter

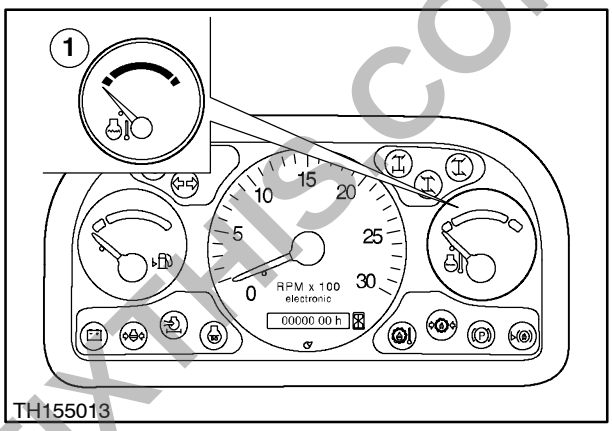
The tachometer (1), graduated to 3000 rev/min, is driven from the alternator and reflects true engine speed.

The hour meter (2), situated in the lower half of the tachometer, records hours of engine operation and is driven from the alternator when running.

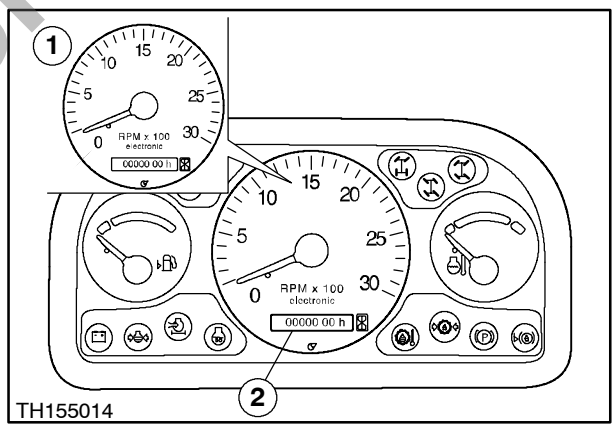
Fuel level gauge

This gauge indicates the level of fuel in the tank on a continuous basis but is only operative with the key-start/stop switch in the “ON” position.

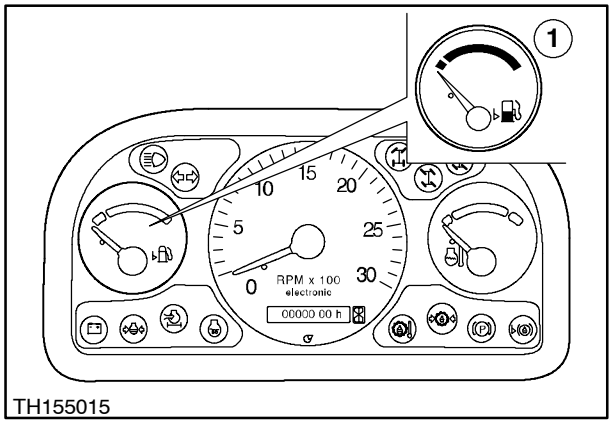
NOTE: *When the key-start/stop switch is turned off the gauge needle assumes a random position.*



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