SERVICE MANUAL

EXCAVATOR

688

Crawler

7-32651

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

SERVICE MANUAL

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688 Crawler Excavator

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DON 8-88991 REPLACES DON 8-88990

CASE CORPORATION

Don 8-88991

Printed in England
May 1990

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GENERAL SPECIFICATIONS

Capacities

Engine Oil Capacity (with filter change)	10.5 litres	2.77 US gallons
Engine Cooling System (with cab heater)	14 litres	3.7 US gallons
Fuel Tank	247 litres	65 US gallons
Hydraulic Oil Tank Capacity	100 litres	26.3 US gallons
Total Hydraulic System Capacity	155 litres	40.9 US gallons
Final Drive Transmission Capacity (each side)	1.5 litres	1.6 US quarts
Swing Reduction Gear Capacity	3.5 litres	3.7 US quarts
Track Front Idlers	0.25 litres	0.26 US quarts
Track Lower Rollers	0.26 litres	0.28 US quarts

NOTE: *These capacities are only a guide to the quantities. Always use the dipstick, sight gauge or level plug to make sure that fluid levels are correct.*

Drawbar Pull

Drawbar Pull	101080 N	22725 lb

Drive Speed

Drive Speed	3.5 kph	2.17 mph

Electrical System

Type of System ..... 24 volts, negative ground

Alternator
- Manufacturer ..... Bosch
- Output ..... 28 volts at 45 amperes
- Resistance of rotor winding ..... 9.0 ohms
- Resistance of stator winding ..... 0.22 ohms
- Minimum brush length ..... 14 mm (0.55 inch)

Batteries
- Number of batteries required 2
- Voltage of each battery ..... 12 volts
- Reserve capacity ..... 160 minutes
- Cold cranking capacity at -17°C (0°F) ..... 800 amperes
- Load for capacity (load) test ..... 400 amperes

Starter Motor
- Manufacturer ..... Bosch
- No load test at 27°C (80°F)
  - volts ..... 23 volts
  - current draw ..... 85 amperes maximum
  - armature speed ..... 7000 rpm minimum
- Brush length ..... 8.5 mm (0.3125 inch) minimum
- Armature run-out ..... 0.03 mm (0.001 inch) maximum
- Commutator diameter ..... 42.5 mm (1.74 inch) minimum
- Armature end play ..... 0.05 to 0.4 mm (0.002 to 0.15 inch)

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STANDARD TORQUE DATA FOR NUTS AND BOLTS

Where no special torque data is specified, the following torque figures should be applied. Threads should be lubricated with engine oil or chassis grease.

TORQUE SPECIFICATIONS ± 10%									
SIZE	GRADE 8.8			GRADE 10.9			GRADE 12.9		
	lb-ft	Nm	kg/m	lb-ft	Nm	kg/m	lb-ft	Nm	kg/m
5 mm	4	5.5	0.56	5.5	7.5	0.76	6.6	9	0.92
6 mm	6.6	9	0.92	9.2	12.5	1.27	11	15	1.53
8 mm	16.5	22.5	2.3	23	31.5	3.2	26.5	36	3.67
10 mm	32	44	4.5	45	62	6.3	55	75	7.65
12 mm	57	77.5	7.9	81	110	11.2	95	130	13.2
14 mm	88	120	12.2	125	170	17.3	155	210	21.4
16 mm	140	190	19.4	195	265	27	236	320	32.6
18 mm	192	260	26.5	269	365	37.2	320	435	44.3
20 mm	273	370	37.7	383	520	53	457	620	63.2
22 mm	369	500	51	516	700	71.4	619	840	85.6
24 mm	471	640	65.2	665	900	92	796	1080	110
27 mm	702	950	97	996	1350	137.7	1195	1620	165.2
30 mm	955	1300	132.5	1328	1800	183.6	1593	2160	220.3

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Troubleshooting guide for the diesel fuel injection system.

NOTE: *It is assumed that the engine is in good working order and properly tuned, and that the electrical system has been checked and repaired as necessary.*

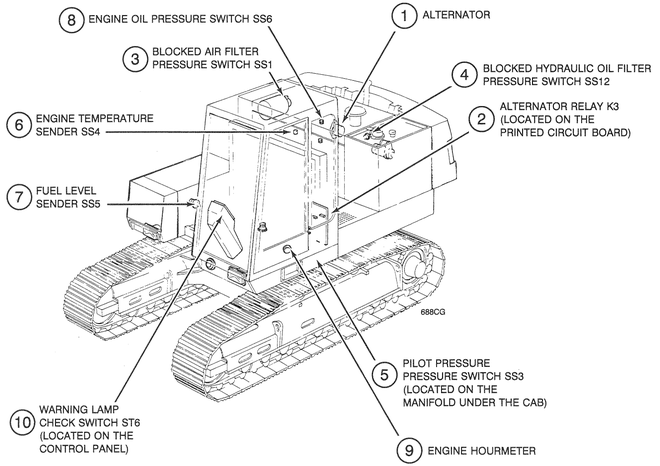
SYMPTOM: Starting Problem	Engine surges at idle	Rough idle when engine is warm	Engine misses under load	Low Power	Excessive Fuel Consumption	Engine cannot be shut off	Poor performance **or** black smoke **or** low power	Fog-like exhaust in full-load range (white or blue)	Incorrect idle or maximum speed	Engine does not rev up	CAUSE † REMEDY
■		■	■	■			■	■		■	Improper fuel in the tank † Drain tank, flush system, fill with proper fuel
■	■		■	■				■		■	Tank empty **or** tank vent blocked † Fill tank/bleed system, check tank vent (See Section 3410)
■	■	■	■				■	■		■	Air in the fuel system † Bleed fuel system, eliminate air leaks (See Section 3410)
	■	■									Pump rear support bracket loose † Replace as necessary (See Section 3412)
■						■					Voltage supply malfunction/stop solenoid defective † Correct electrical faults/replace stop solenoid (See Section 3412)
■			■	■			■			■	Fuel filter blocked † Replace fuel filter (See Section 3410)
■			■	■			■			■	Fuel-supply lines blocked/restricted † Test all fuel supply lines - flush or replace
■			■	■							Loose connections, injection lines leak or broken † Tighten the connection, eliminate the leak
■			■				■			■	Paraffin deposit in fuel filter † Replace filter, use Diesel Fuel no. 1 (See Operators Manual)
■			■	■		■	■			■	Pump-to-engine timing incorrect † Readjust timing (See Section 3412)
		■	■	■		■					Injection nozzle defective † Repair or replace (See Section 3413)
			■	■		■					Engine air filter blocked † Replace air filter element
■	■		■	■		■					Injection sequence does not correspond to firing order † Install fuel injection lines in the correct order (See Section 3412)
	■		■	■			■	■	■		Overflow fitting interchanged with inlet fitting † Install fittings in their proper positions (See Section 3412)
■	■				■		■		■	■	Cold-start device malfunction (If equipped) † Check cold-start mechanism (If equipped)
■		■		■			■			■	Low or uneven engine compression † Repair as necessary (See Section 2425)
■	■	■	■	■	■		■	■	■	■	Fuel injection pump defective or cannot be adjusted † Replace (See Section 3412)

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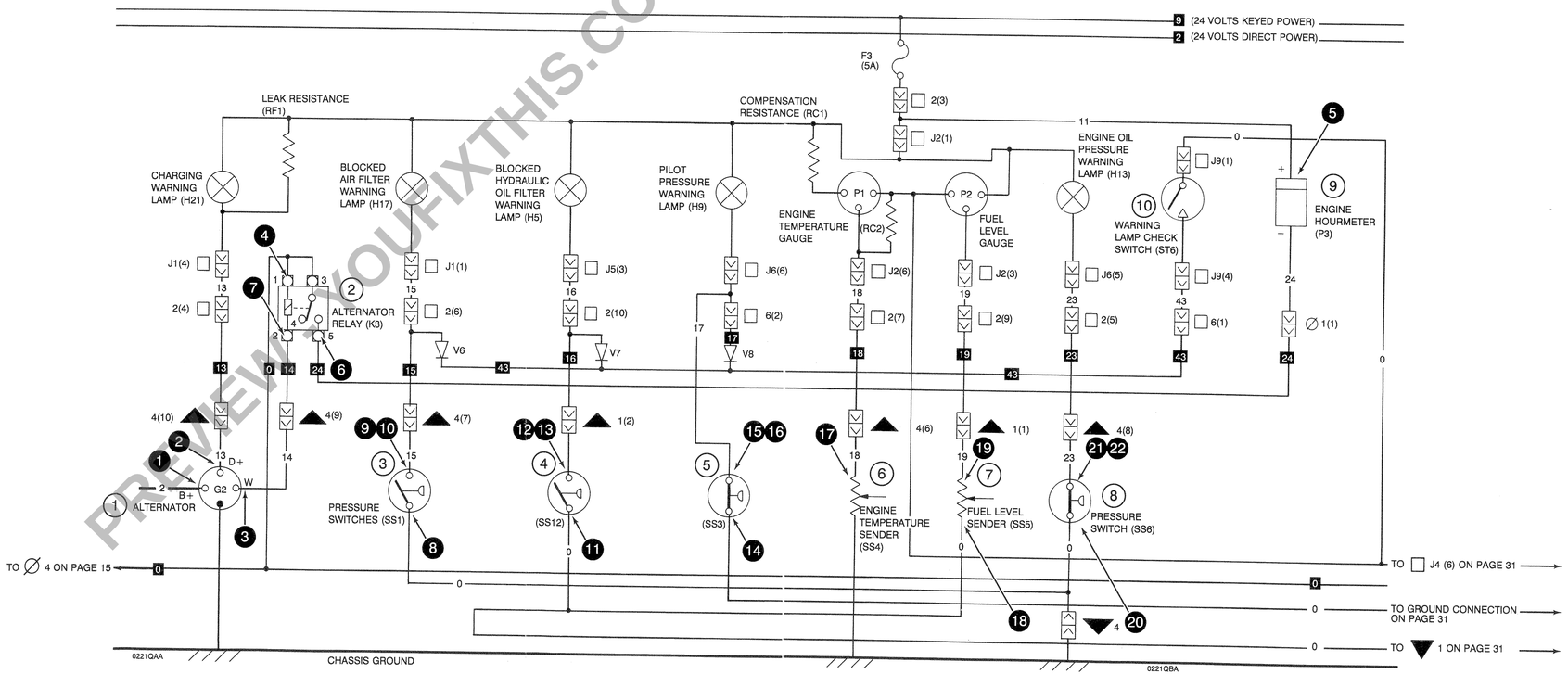
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Engine Oil Pressure Circuit Test

Test Points	Reading	Possible Causes of Bad Reading
NOTE: *Check the warning lamp bulb and check that the engine oil filter is not blocked before doing the test. Disconnect wire 23 from pressure switch SS6. Turn the master disconnect switch to the ON position. Turn the keyswitch to the OFF position.*		
20 Between the connection of wire 0 at pressure switch SS6 and chassis ground.	Continuity	Damaged wire or loose connectors between the pressure switch and chassis ground.
NOTE: *Disconnect wire 0 from pressure switch SS6.*		
21 Between the terminals of pressure switch SS6	Continuity	Faulty switch.
NOTE: *Turn the keyswitch to the ON position.*		
22 Connector of wire 23 to chassis ground.	24 volts	Faulty fuse F3. Damaged wire or loose connectors between the fuse and the connector. Check the fuse. Test the circuit for continuity.



CHASSIS GROUND Completes battery circuit.	SPLICE Connects one or more electrical circuits that do the same function.	CONNECTOR Connects one or more electrical circuits.	FUSE Protects electrical circuits from too high a current.	SWITCH Directs electrical current to one or more circuits.	RELAY A magnetic switch.	LAMP A heated wire emits artificial light.	ALTERNATOR Converts mechanical energy to alternating electrical current.	VARIABLE RESISTOR Controls the amount of electricity going through an electrical circuit.



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SCHEMATIC SYMBOLS

RESERVOIR
- Vented
- Pressurized

LINES AND LINE FUNCTIONS
- Working Line
- Pilot Line
- Return Line
- Joining Line
- Crossing Line
- Direction of Flow

PUMPS
- Fixed Flow
- Variable Flow

CONTROL (VALVES)
- Check Valve
- Fixed Restrictor
- Relief Valve
- Variable Restrictor (Needle Valve)
- Flow Control valve

DIRECTIONAL CONTROL VALVES
- Basic 4 way, 3-position valve
- Optional center porting for 3-position valves

ACTUATORS
- Solenoid
- Solenoid-spring Centered
- General Purpose
- Pilot Operated
- Spring Return
- Hand Lever
- Foot Pedal
- Mechanical
- Detented

CYLINDERS
- Single Acting
- Double Acting

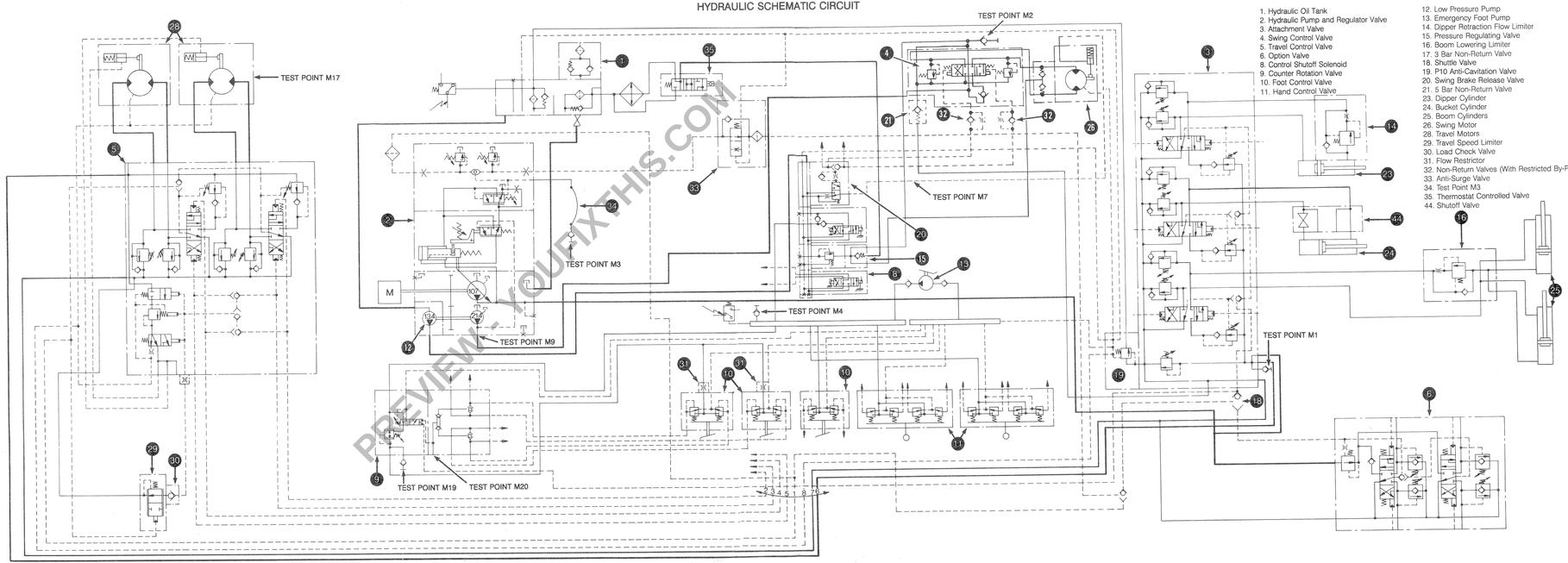
MISCELLANEOUS
- Filter
- Oil Cooler
- Component Block
- Quick coupler Coupled
- Quick coupler Uncoupled
- Flow Shutoff Valve

TEST INSTRUMENTS
- Pressure gauge
- Flowmeter

Don 8-89092

Issued 01-90 Printed in England

HYDRAULIC SCHEMATIC CIRCUIT

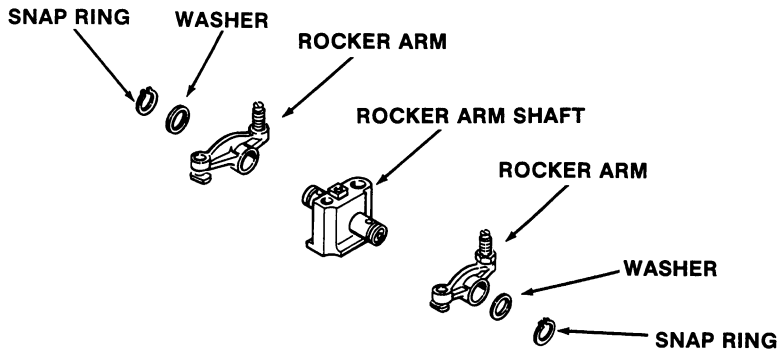


1. Hydraulic Oil Tank
2. Hydraulic Pump and Regulator Valve
3. Attachment Valve
4. Swing Control Valve
5. Travel Control Valve
6. Option Valve
8. Control Shutoff Solenoid
9. Counter Rotation Valve
10. Foot Control Valve
11. Hand Control Valve
12. Low Pressure Pump
13. Emergency Foot Pump
14. Dipper Retraction Flow Limiter
15. Pressure Regulating Valve
16. Boom Lowering Limiter
17. 3 Bar Non-Return Valve
18. Shuttle Valve
19. P10 Anti-Cavitation Valve
20. Swing Brake Release Valve
21. 5 Bar Non-Return Valve
23. Dipper Cylinder
24. Bucket Cylinder
25. Boom Cylinders
26. Swing Motor
28. Travel Motors
29. Travel Speed Limiter
30. Load Check Valve
31. Flow Restrictor
32. Non-Return Valves (With Restricted By-Pass)
33. Anti-Surge Valve
34. Test Point M3
35. Thermostat Controlled Valve
44. Shutoff Valve

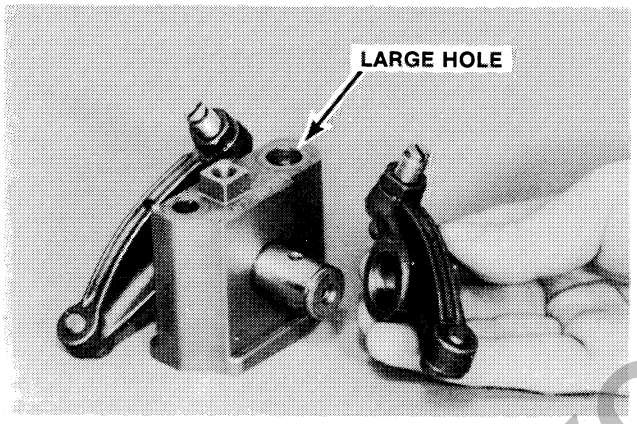
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Rocker Arm Assembly



STEP 105



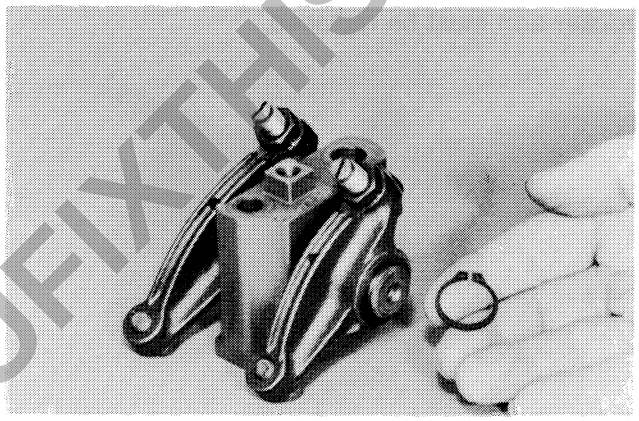
Install the rocker arms on the rocker arm shaft with the adjusting screws on same end as the large hole in the bracket.

STEP 106



Install the washers on the rocker arm shaft.

STEP 107



Install the snap rings in the groove on the rocker arm shaft.

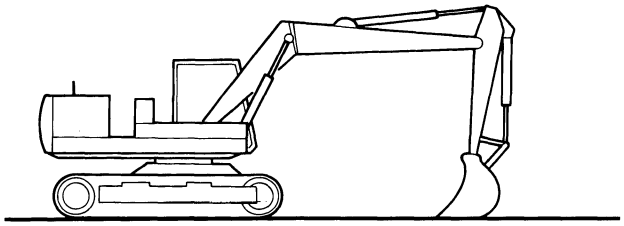
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Removal

WARNING: *When the machine is operating, the engine systems and the hydraulic pump systems heat up to a high temperature. To avoid the possibility of being burnt by hot metal or scalded by hot oil or water, allow the machine to cool before starting any maintenance work.*

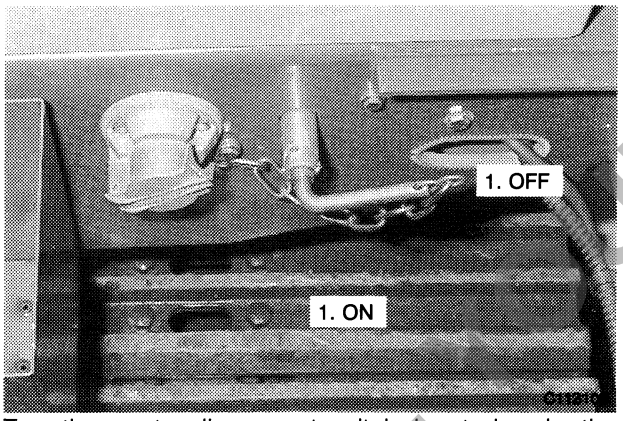
STEP 1



EA2836

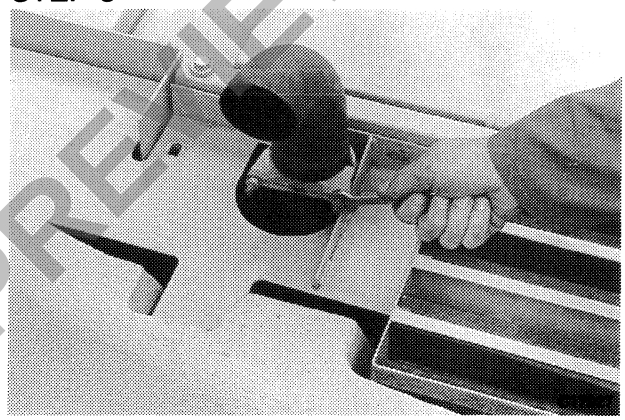
Put the machine on level ground. Lower the attachment to the ground. Stop the engine and allow the systems to cool.

STEP 2



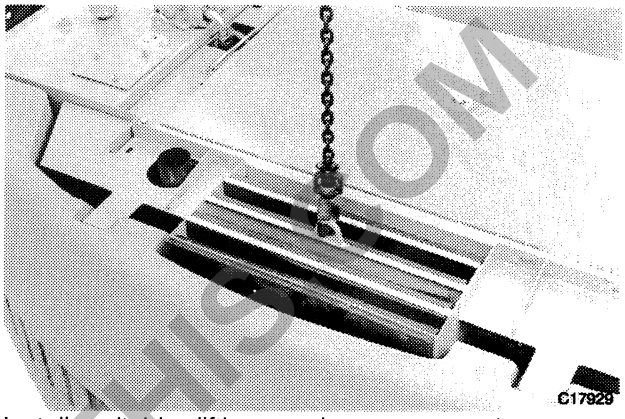
Turn the master disconnect switch, located under the right-hand side of the walkway, to the OFF position and remove the key.

STEP 3



Loosen the nuts on the exhaust muffler extension tube. Remove the exhaust muffler extension tube.

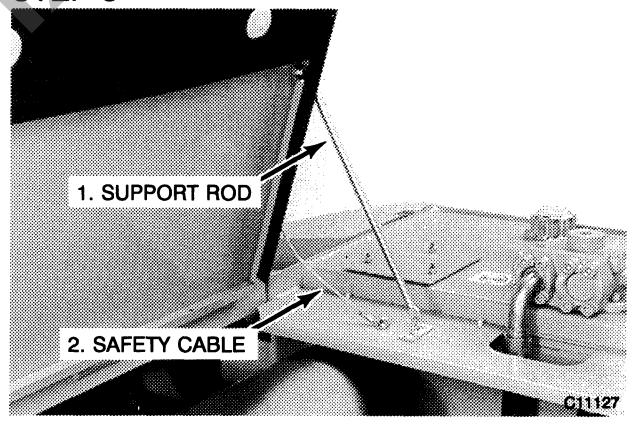
STEP 4



C17929

Install suitable lifting equipment onto the engine insulator. Remove the engine insulator mounting bolts and spacers and remove the engine insulator.

STEP 5



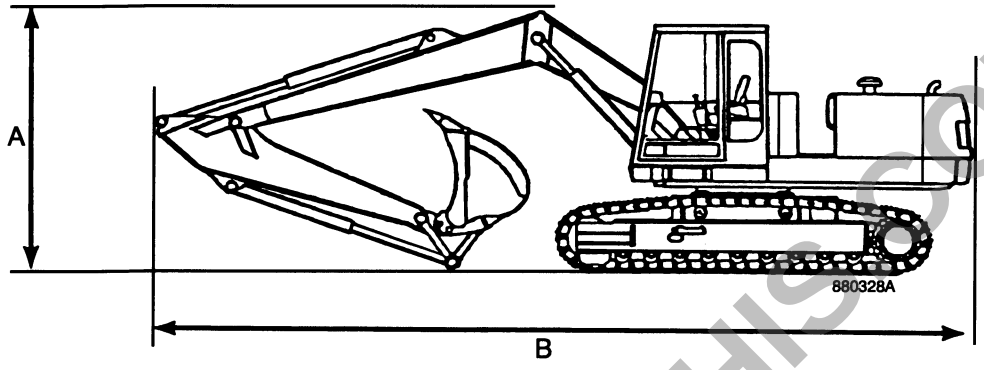
C11127

Raise the engine upper access cover and install the support rod. Remove the engine front cover. Remove the safety cable retaining bolt, spacers and nut. Lower the engine upper access cover.

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TRANSPORT DIMENSIONS



	2.10 m (6 ft 10 inch) Dipper	2.65 m (8 ft 8 inch) Dipper
A	2.89 m (9 ft 6 inch)	2.89 m (9 ft 6 inch)
B	7.7 m (25 ft 3 inch)	7.55 m (24 ft 9 inch)

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GENERAL INFORMATION

CLEANING

Clean all metal parts except bearings, in mineral spirits or by steam cleaning. Do not use caustic soda for steam cleaning. After cleaning dry, and put oil on all parts. Clean oil passages with compressed air. Clean bearings in kerosene, dry the bearings completely and put oil on the bearings.

INSPECTION

Check all parts when the parts are disassembled. Replace all parts that have wear or damage. Small scoring or grooves can be removed with a hone or crocus cloth. Complete visual inspection for indications of wear, pitting and the replacement of parts necessary will prevent early failures.

BEARINGS

Check bearings for easy action. If bearings have a loose fit or rough action replace the bearing. Wash bearings with a good solvent or kerosene and permit to air dry. DO NOT DRY BEARINGS WITH COMPRESSED AIR.

NEEDLE BEARINGS

Before you press needle bearings in a bore always remove any metal protrusions in the bore or edge of the bore. Before you press bearings into position put petroleum jelly on the inside and outside diameter of the bearings.

GEARS

Check all gears for wear and damage. Replace gears that have wear or damage.

OIL SEALS, O-RINGS AND GASKETS

Always install new oil seals, o-rings and gaskets. Put petroleum jelly on seals and o-rings.

SHAFTS

Check all shafts that have wear or damage. Check the bearing and oil seal surfaces of the shafts for damage.

SERVICE PARTS

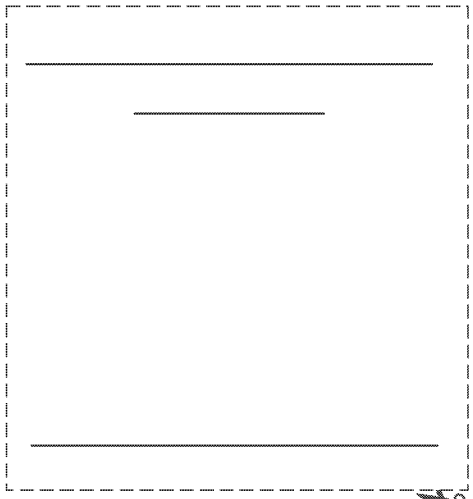
Always install genuine Case service parts, when ordering refer to the Parts Catolog for the correct part number of the genuine Case replacement items. Failures due to the use of other than genuine Case replacement parts are not covered by warranty.

LUBRICATION

Only use the oils and lubricants specified in the Operator's or Service Manual. Failures due to the use of non specified oils and lubricants are not covered by warranty.

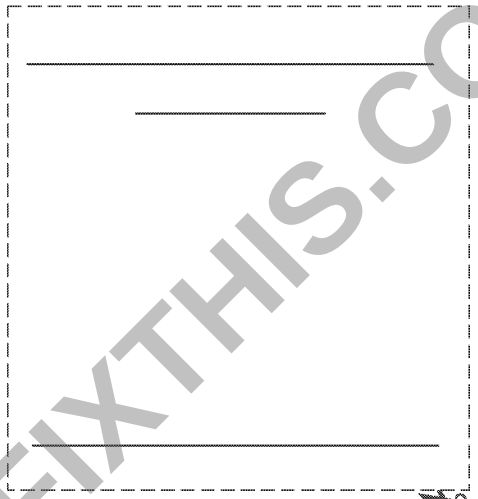
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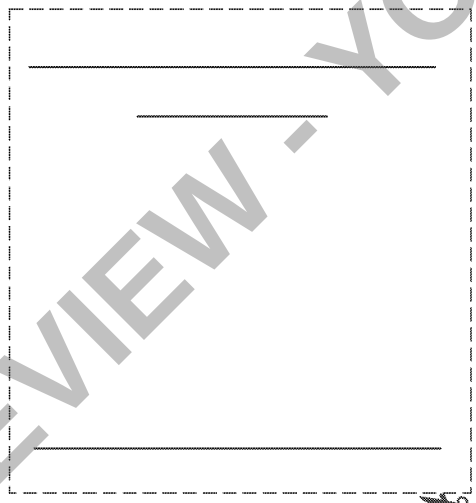
1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4



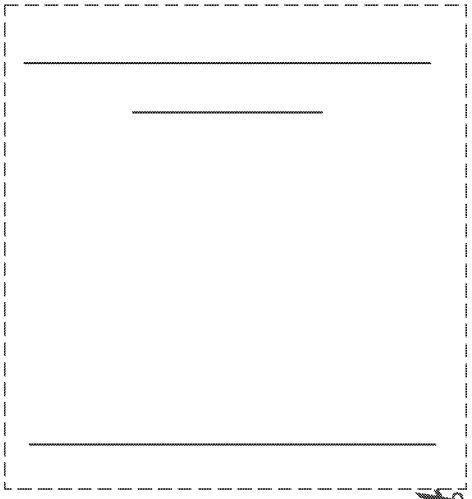
1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4



1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4



1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

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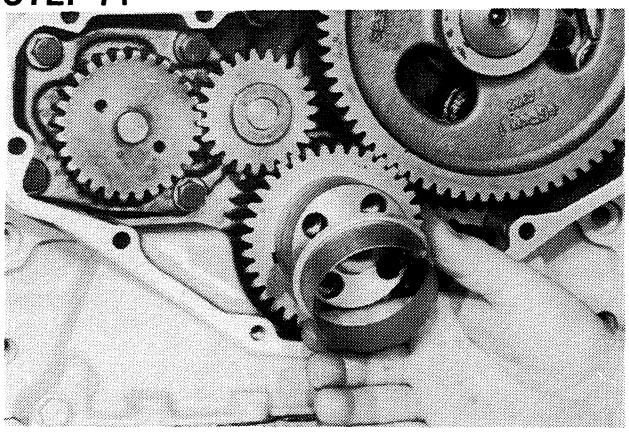
SPECIAL TORQUES

	U.S. Value	Metric Value
Belt Tensioner Bracket Bolts (Allen head)	18 lb ft	24 Nm (2.4 kgm)
Belt Tensioner Bolt	32 lb ft	43 Nm (4.3 kgm)
Exhaust Manifold Bolts	32 lb ft	43 Nm (4.3 kgm)
Fan Belt Pulley Bracket Bolts	18 lb ft	24 Nm (2.4 kgm)
Fan Belt Pulley Bolts	18 lb ft	24 Nm (2.4 kgm)
Fuel Filter Housing Nut	24 lb ft	32 Nm (3.2 kgm)
Injector Leak Off Fitting	4 lb ft	6 Nm (0.6 kgm)
Injector Cap Nut	41 to 44 lb ft	55 to 60 Nm (5.5 to 6.0 kgm)
Cylinder Head Bolts	93 lb ft	126 Nm (12.6 kgm)
Intake Manifold Cover Bolts	18 lb ft	24 Nm (2.4 kgm)
Rocker Arm Bracket Bolts	18 lb ft	24 Nm (2.4 kgm)
Valve Cover Bolts	18 lb ft	24 Nm (2.4 kgm)
Thermostat Housing Bolts	18 lb ft	24 Nm (2.4 kgm)
Alternator Bracket Bolts	18 lb ft	24 Nm (2.4 kgm)
Lift Bracket Bolts (Rear)	57 lb ft	77 Nm (7.7 kgm)

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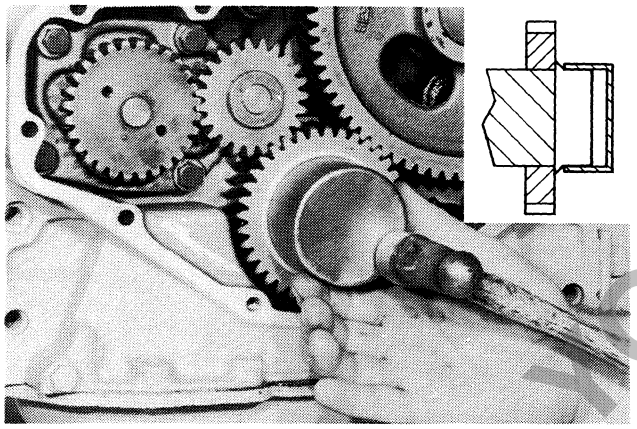
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STEP 71



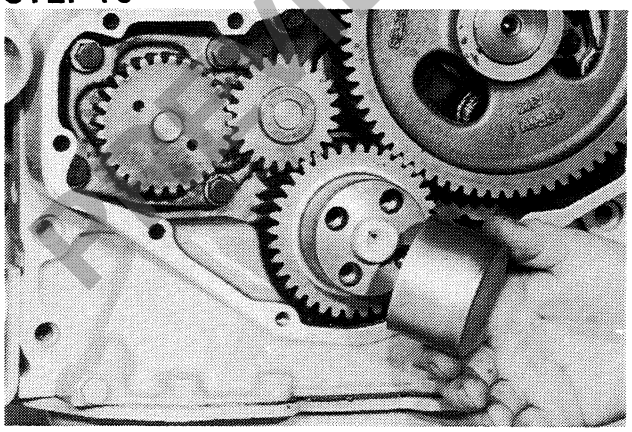
Install the wear sleeve on the crankshaft with the flange toward the engine.

STEP 72



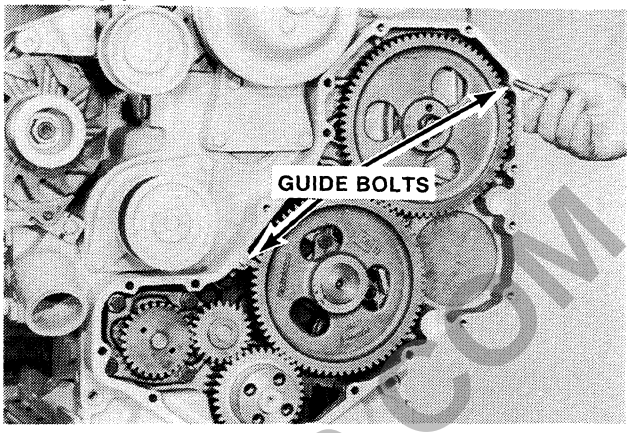
Install the wear sleeve installation tool over the wear sleeve. Push the wear sleeve on the crankshaft until the flange makes contact with the face of the crankshaft gear.

STEP 73



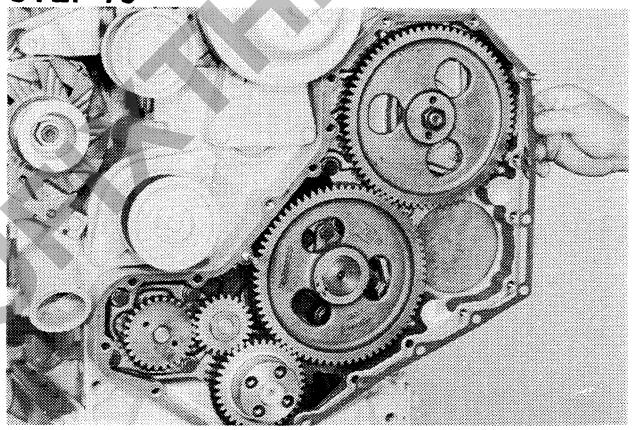
Remove the wear sleeve installation tool.

STEP 74



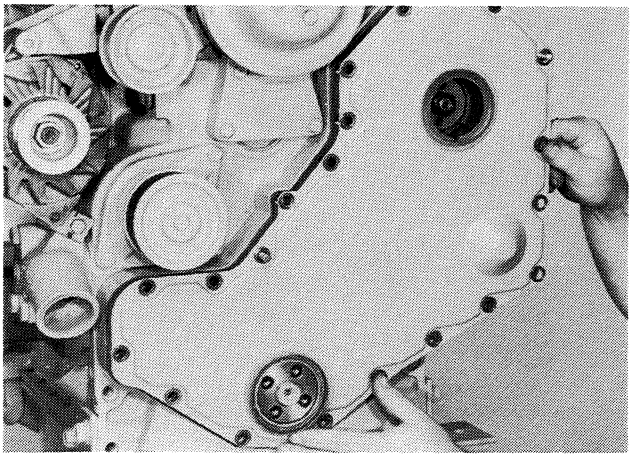
Install two guide bolts (M8 x 12.5 x 75 mm).

STEP 75



Install a new front cover gasket.

STEP 76



Carefully install the front cover.

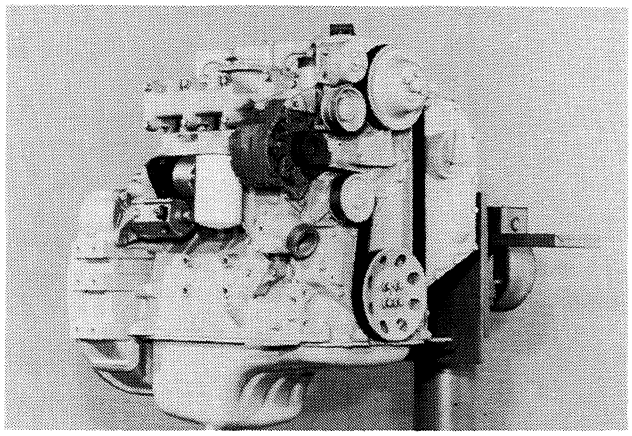
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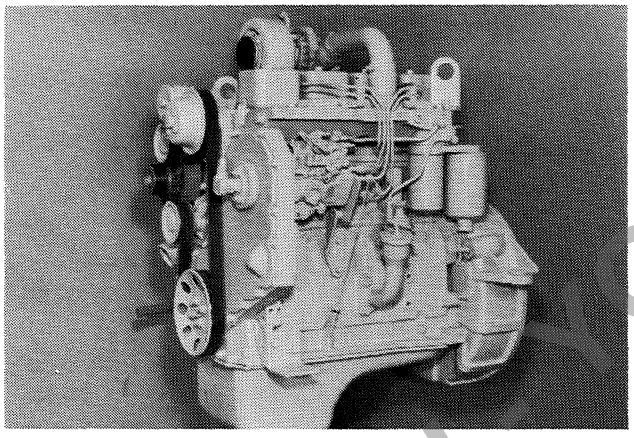
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SERVICING THE LUBRICATION SYSTEM

Oil Pump Removal

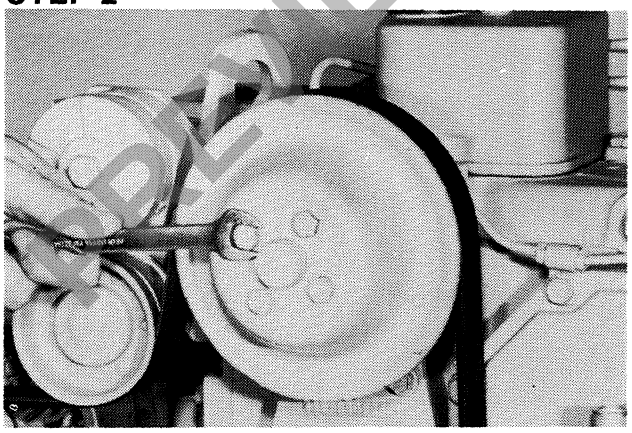
STEP 1





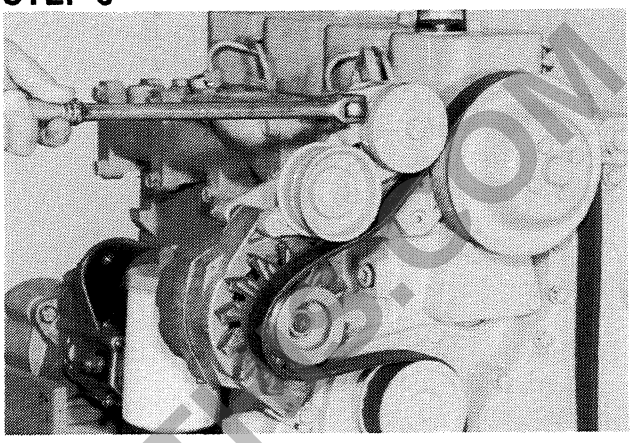
Case 4-390 engine.
Case 4T-390 engine.

STEP 2



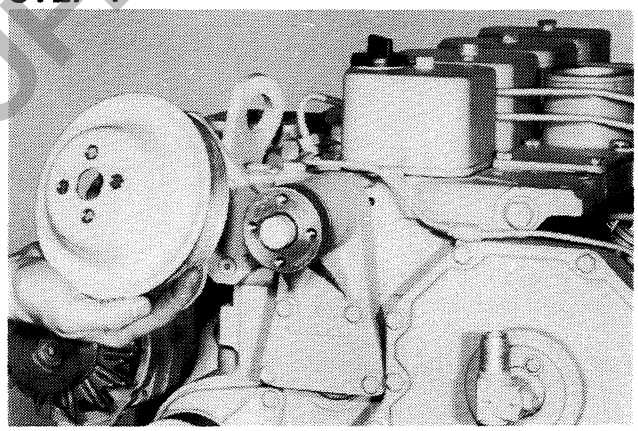
Loosen the fan pulley bolts.

STEP 3



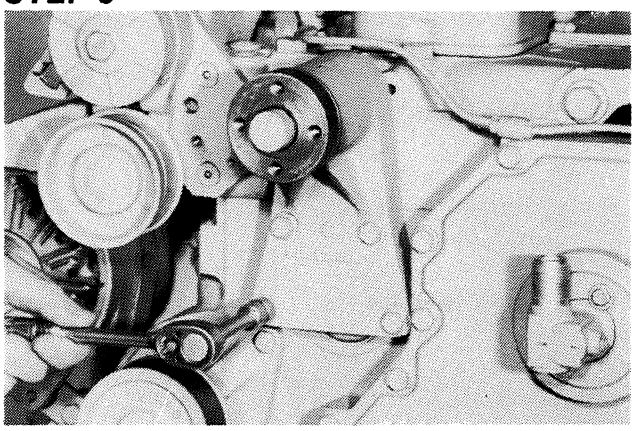
Lift the belt tensioner pulley and remove the fan belt.

STEP 4



Remove the bolts and the fan belt pulley.

STEP 5



Remove the pulley bracket bolts and the pulley bracket.

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Section

3410

FUEL SYSTEMS AND FILTERS

Written In *C*lear
*A*nd
*S*imple
*E*nglish

IMPORTANT: *This engine was made using the metric measurement system. All measurements and the checks must be made with metric tools to make sure of an accurate reading when inspecting parts.*

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CASE CORPORATION

Rac 8-24211

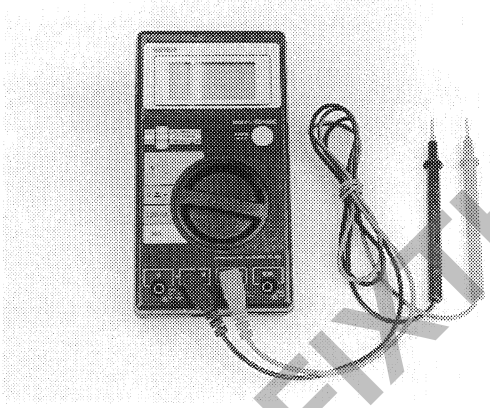
Printed in U.S.A
June, 1983 (Revised June, 1984)

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SPECIFICATIONS

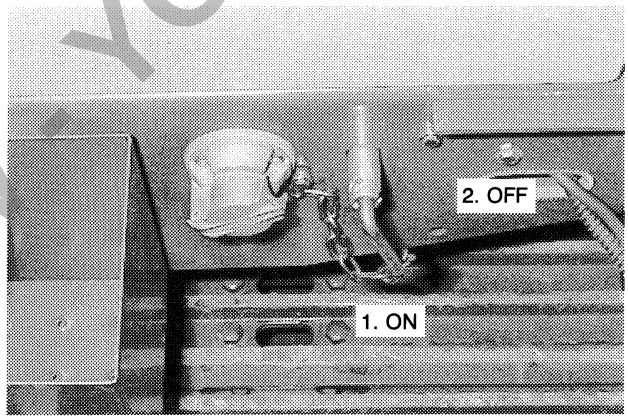
System Voltage	24 Volt Negative Ground
Batteries	Two x 12 Volts Low Maintenance Batteries Connected in Series
Alternator Output	28 Volts at 45 Amperes

SPECIAL TOOLS



1. DIGITAL MULTIMETER (CAS-1559)

MASTER DISCONNECT SWITCH



The master disconnect switch is used to disconnect the batteries. When the switch is in the OFF position, the batteries are disconnected from ground and no electrical power is available to the machine. When the switch is in the ON position, the batteries are connected to ground and electrical power is available to the machine. The master disconnect switch is located under the right-hand side of the walkway.

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NO-LOAD TEST

General Information

STEP 5

The No-Load Test is done with the starter removed from the engine.

STEP 6

Check to make sure the drive clutch slides freely on the armature shaft.

STEP 7

Check to make sure the armature rotates freely. If the armature does not rotate freely, disassemble the starter and make repairs as necessary.

Test Equipment

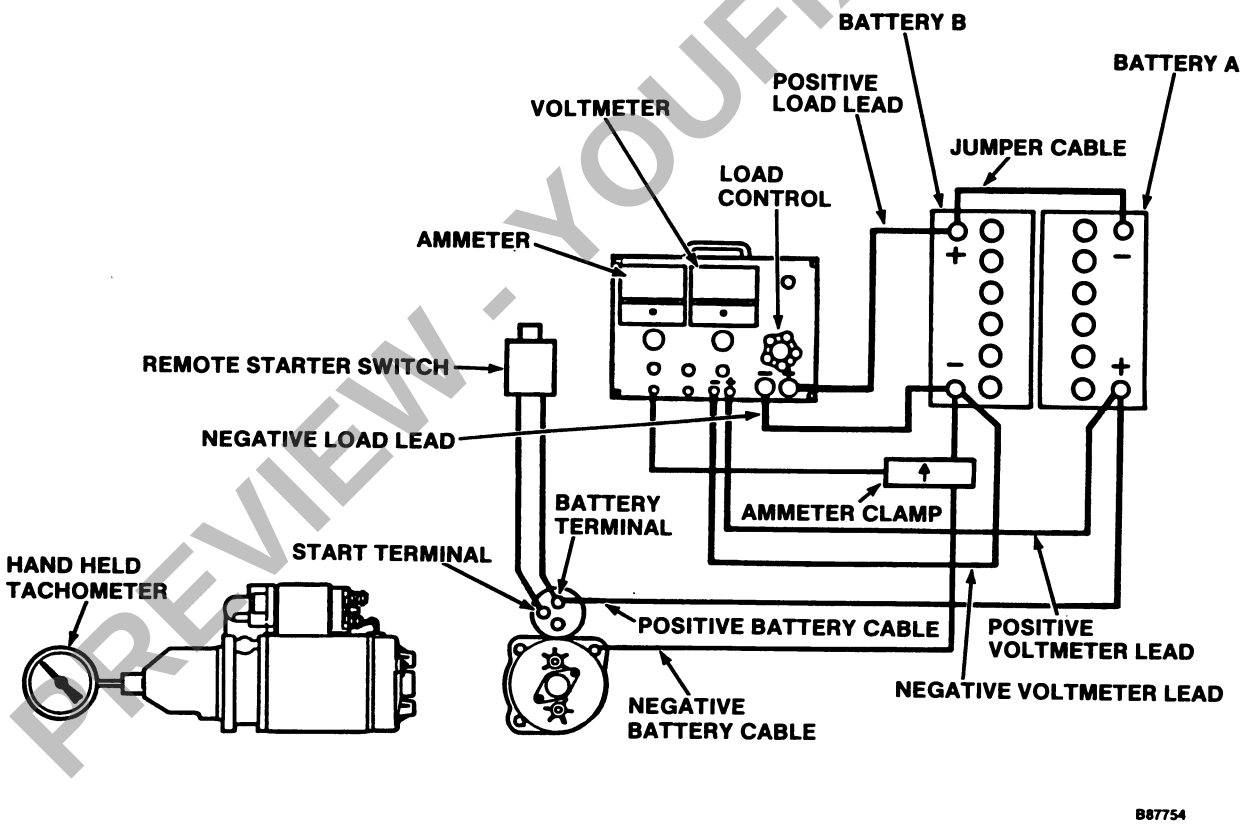
The No-Load Test can be done using a Sun Electric VAT-33 Tester, an equivalent tester, or separate pieces of test equipment.

A hand held tachometer is needed to measure the speed of the armature shaft.

A remote starter switch is needed to actuate the starter.

Two fully charged 12 volt batteries connected in series are needed to supply the electricity to turn the starter.

Test Procedure



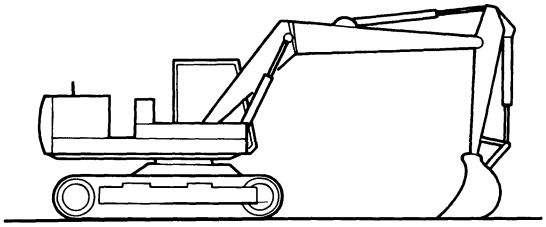
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DRIVE MOTOR

Removal

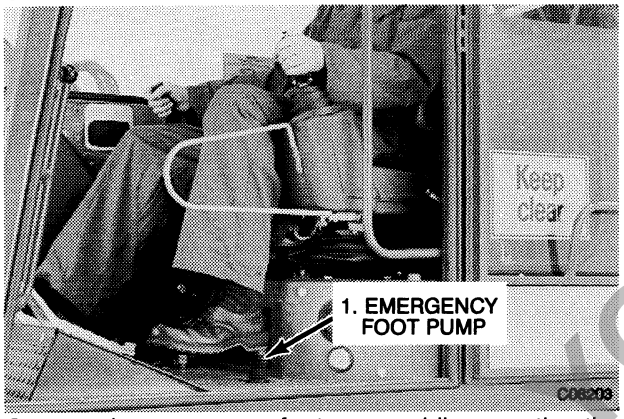
STEP 1



EA2836

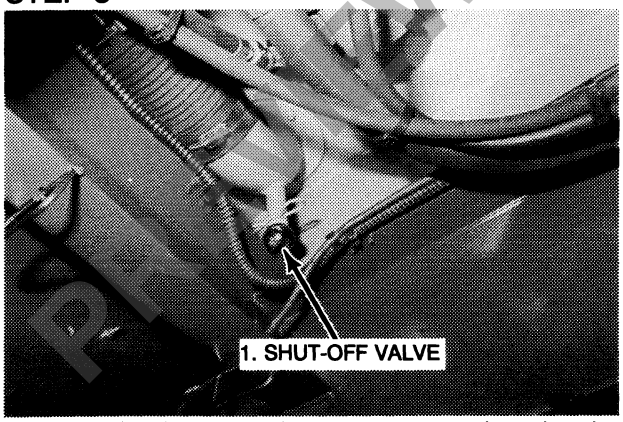
Park the machine on level ground in the position shown. Lower the boom and stop the engine.

STEP 2



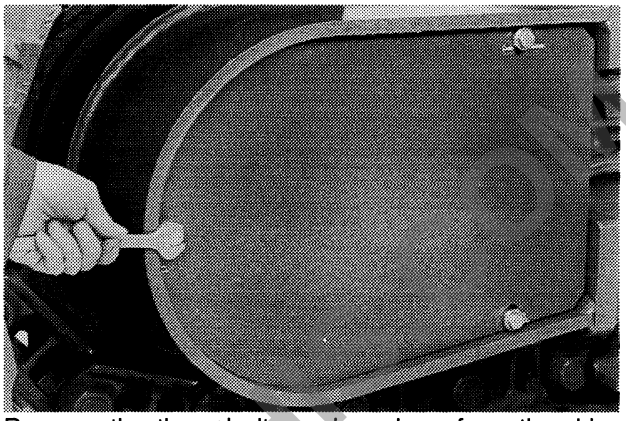
Operate the emergency foot pump while operating the boom and dipper control levers to release pressure in the hydraulic system.

STEP 3



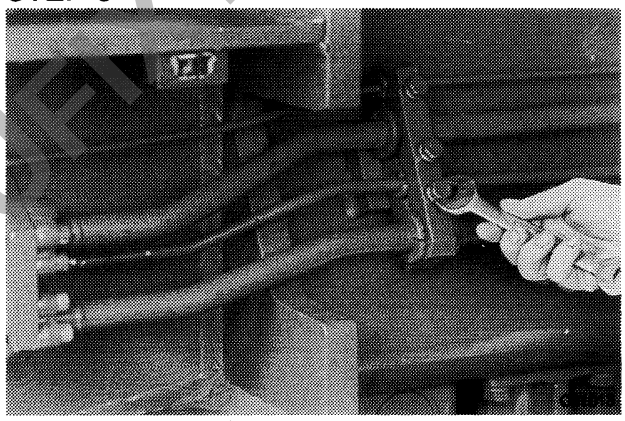
Remove the lower engine access panel under the hydraulic oil tank. Remove the pin and pull the knob down to close the hydraulic oil tank shut-off valve.

STEP 4



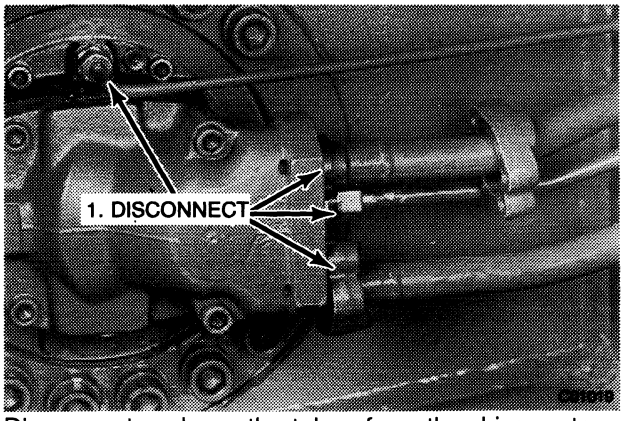
Remove the three bolts and washers from the drive motor guard and remove the guard.

STEP 5



Remove the tube clamps.

STEP 6

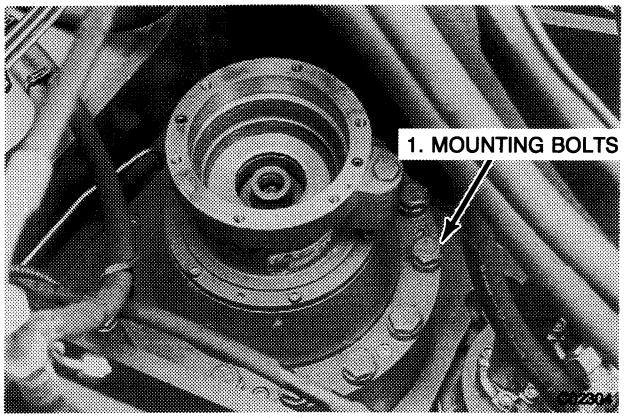


Disconnect and cap the tubes from the drive motor.

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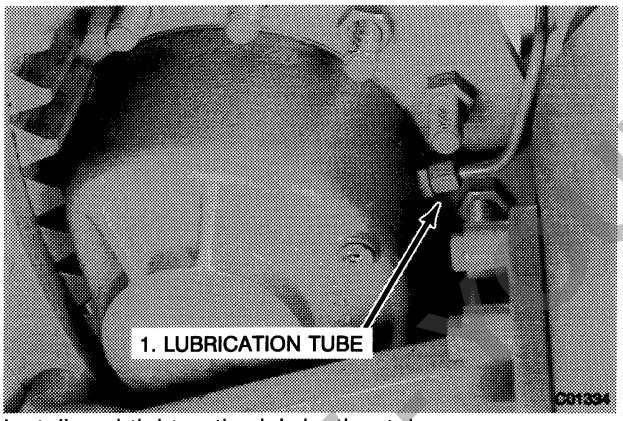
Installation

STEP 61



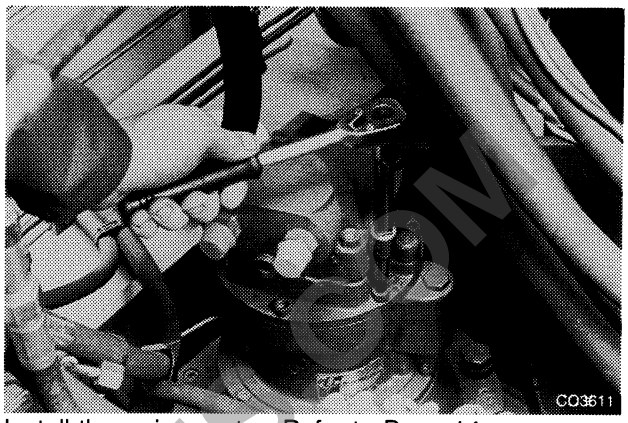
Install the swing transmission. Install the mounting nuts and bolts and tighten to a torque of 610 to 730 Nm (450 to 540 lb ft).

STEP 62



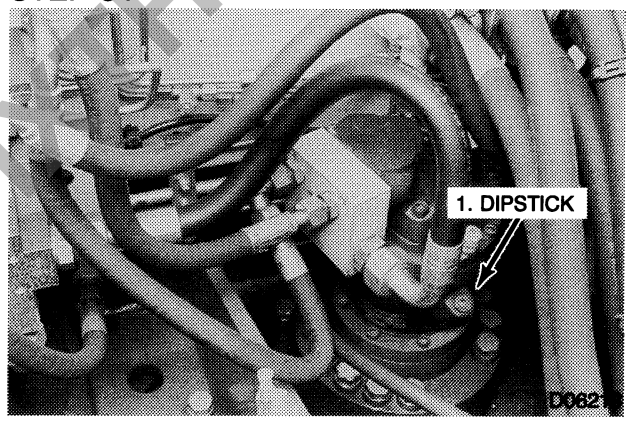
Install and tighten the lubrication tube.

STEP 63



Install the swing motor. Refer to Page 14.

STEP 64

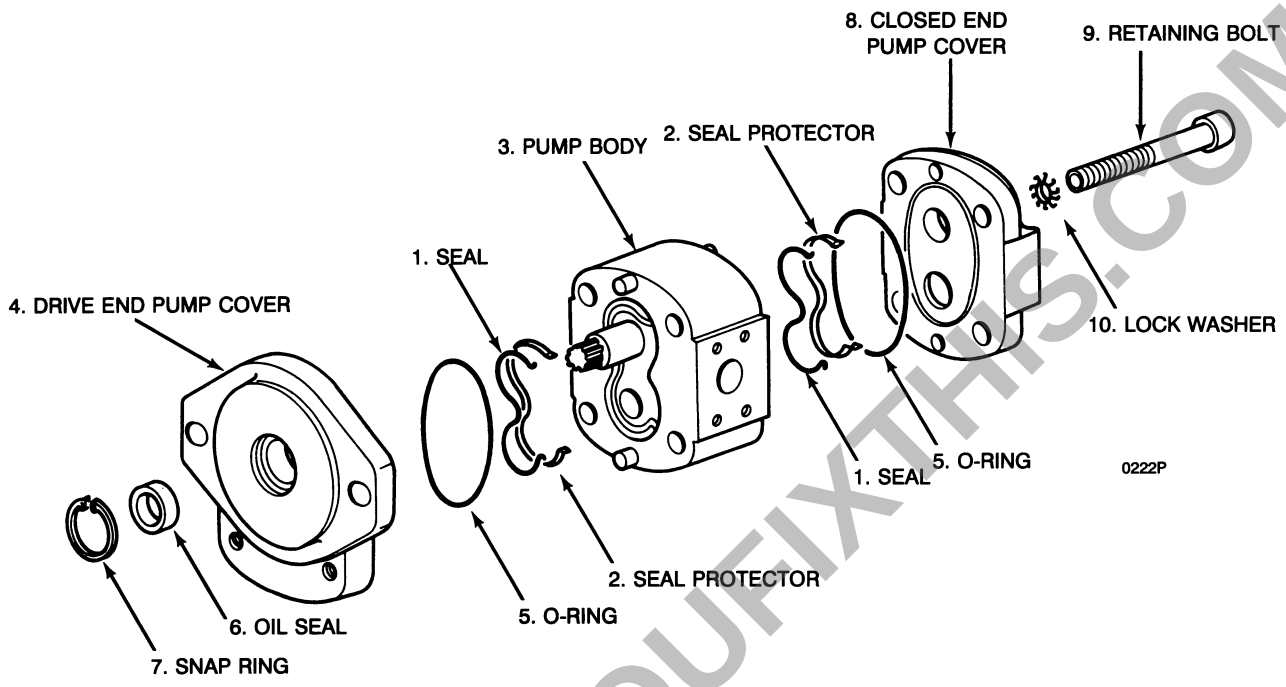


Remove the oil filler dipstick and install 1.7 litres (0.44 US gal.) of CASE IH gear lubricant SAE 85/140 GL5. Check the level on the filler dipstick. Install and tighten the filler dipstick to a torque of 39 Nm (29 lb ft) when the level is correct.

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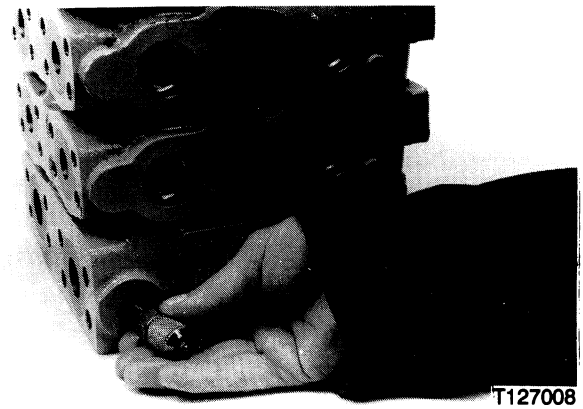
Assembly



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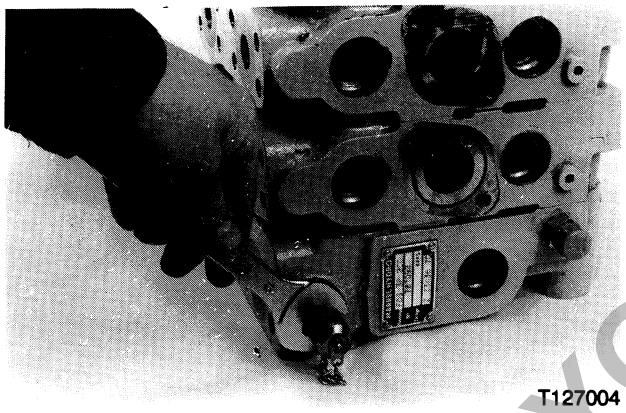
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STEP 58


T127008

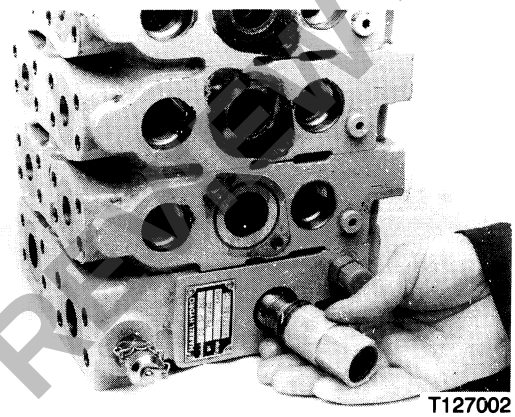
Install a new O-ring on the test point fitting. Install the test point fitting in the inlet/outlet valve section.

STEP 59


T127004

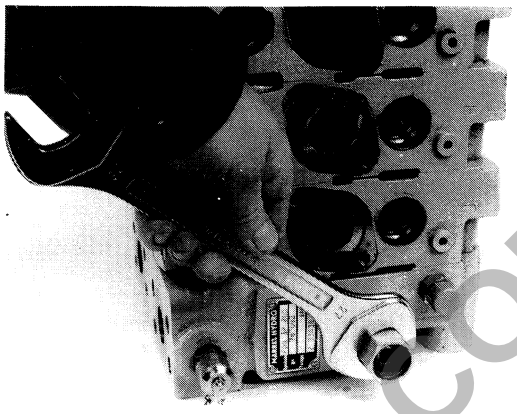
Tighten the test point fitting.

STEP 60


T127002

Install a new back-up ring and O-ring on the main relief valve. Install the main relief valve in the inlet/outlet valve section.

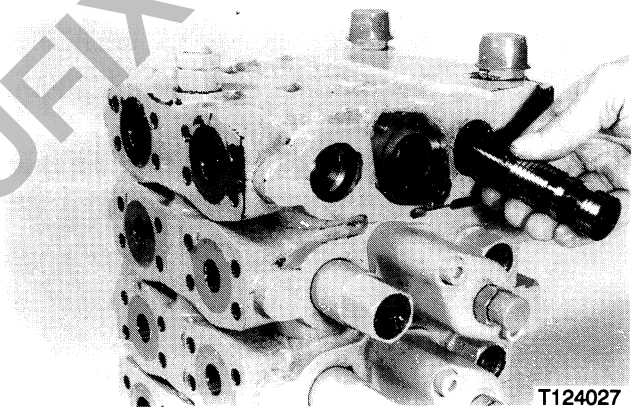
STEP 61


T126034

Tighten the main relief valve to a torque of 75 to 95 Nm (55 to 70 lb ft).

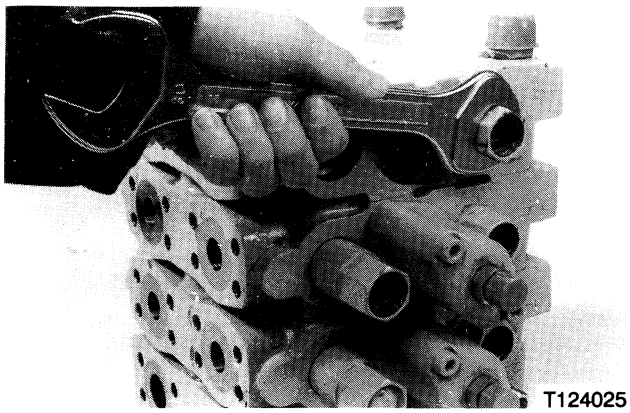
NOTE: *STEP 62 to STEP 76 refer to the Dipper Valve Section. Assembly of the Bucket and Boom Valve Sections are identical.*

STEP 62


T124027

Install the plunger.

STEP 63

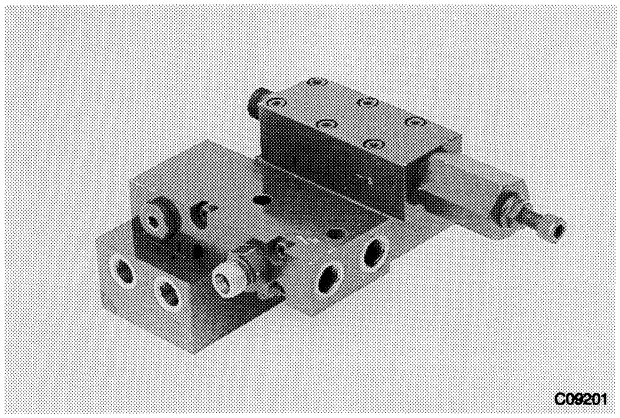

T124025

Install a new back-up ring and O-ring onto the flow control valve. Install and tighten the flow control valve to a torque of 90 to 110 Nm (66 to 80 lb ft).

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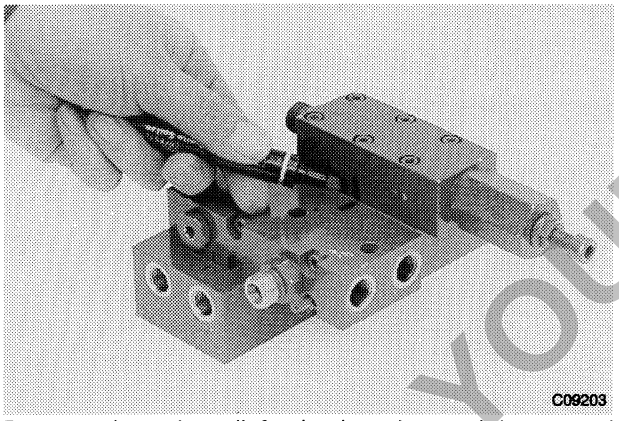
Disassembly

STEP 8



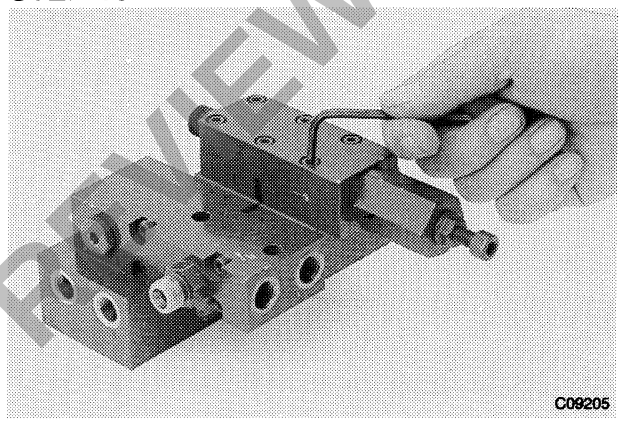
Put the counter rotation valve on a clean workbench.

STEP 9



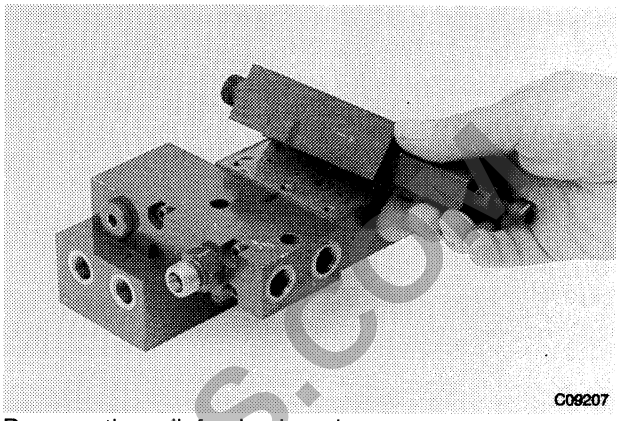
Put a mark on the relief valve housing and the control spool housing.

STEP 10



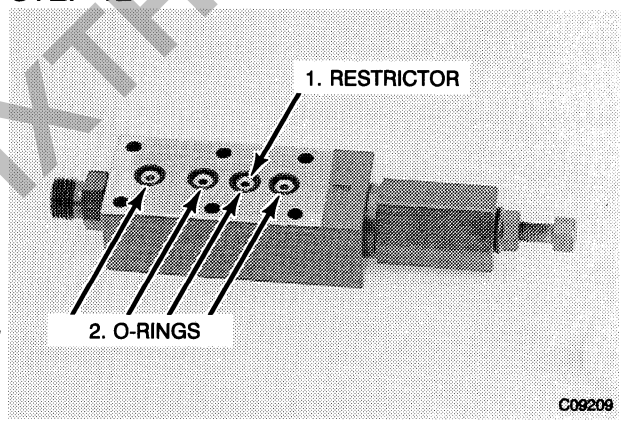
Remove the relief valve housing screws.

STEP 11



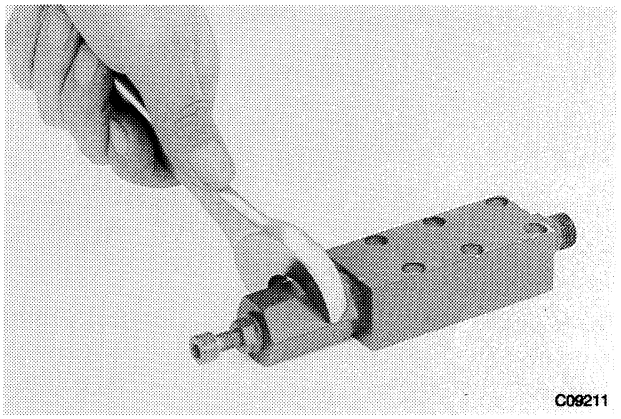
Remove the relief valve housing.

STEP 12



Remove the restrictor. Remove and discard the four o-rings.

STEP 13



Remove the relief valve end cap.

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Section

8013

DRIVE BRAKE RELEASE VALVE

8013

For 688 Crawler Excavators

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CASE CORPORATION

Don 7-32190

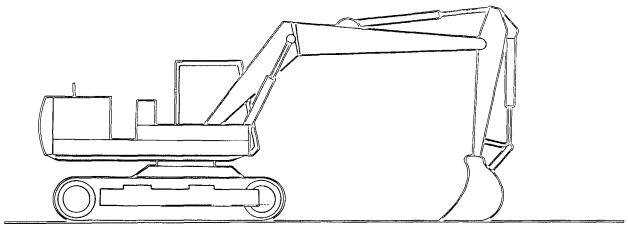
Printed in England
January 1990

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HYDRAULIC PICK HAMMER CONTROL VALVE

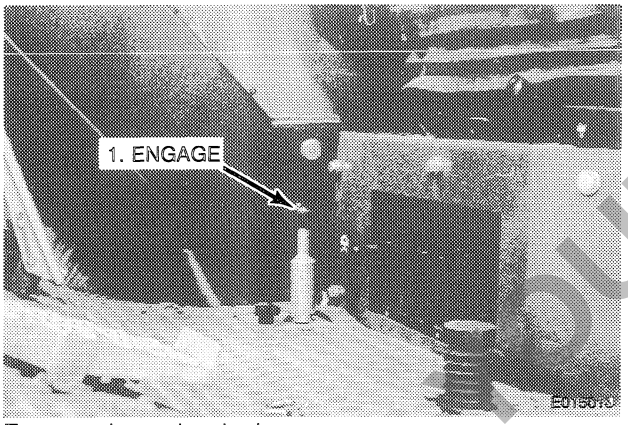
Removal

STEP 1



Park the machine on level ground and in the position shown.

STEP 2

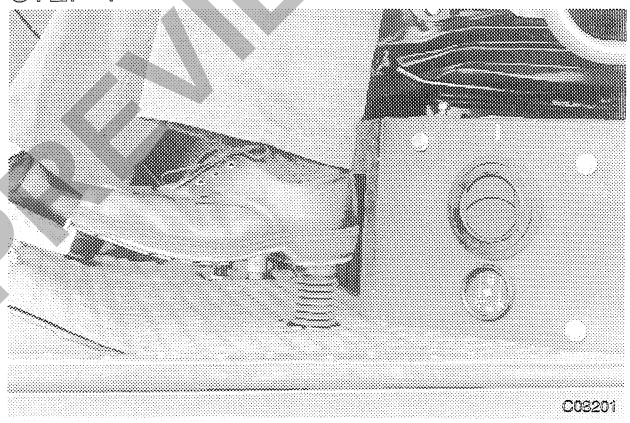


Engage the swing lock.

STEP 3

Stop the engine.

STEP 4

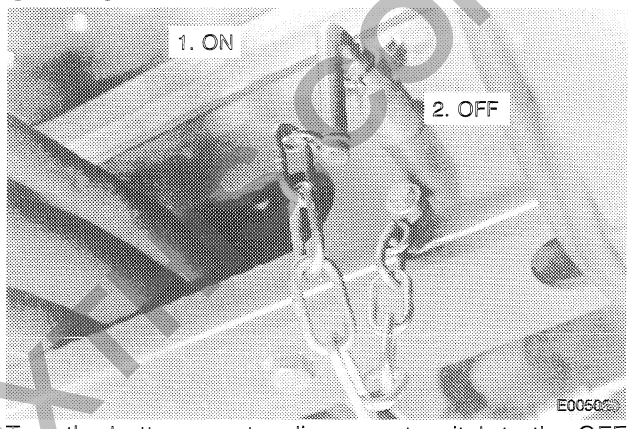


Use the foot pump and move each hydraulic control lever in both directions until the pressure is removed from the circuits.

STEP 5

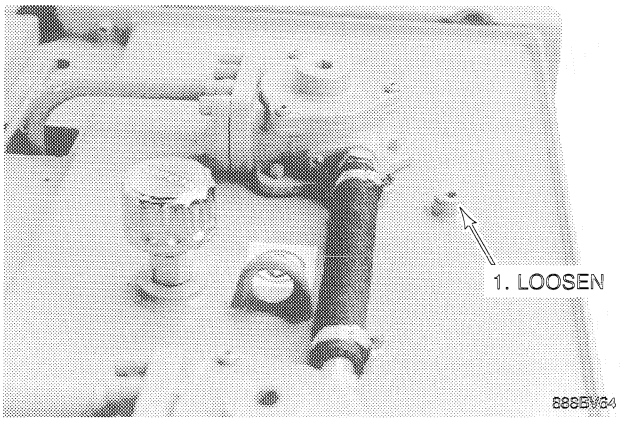
Fasten a DO NOT OPERATE tag on the instrument panel.

STEP 6



Turn the battery master disconnect switch to the OFF position and remove the key.

STEP 7



Loosen the vent screw of the top of the hydraulic tank. Release the pressure. Tighten the vent screw.

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