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SM-619
G127, GP127
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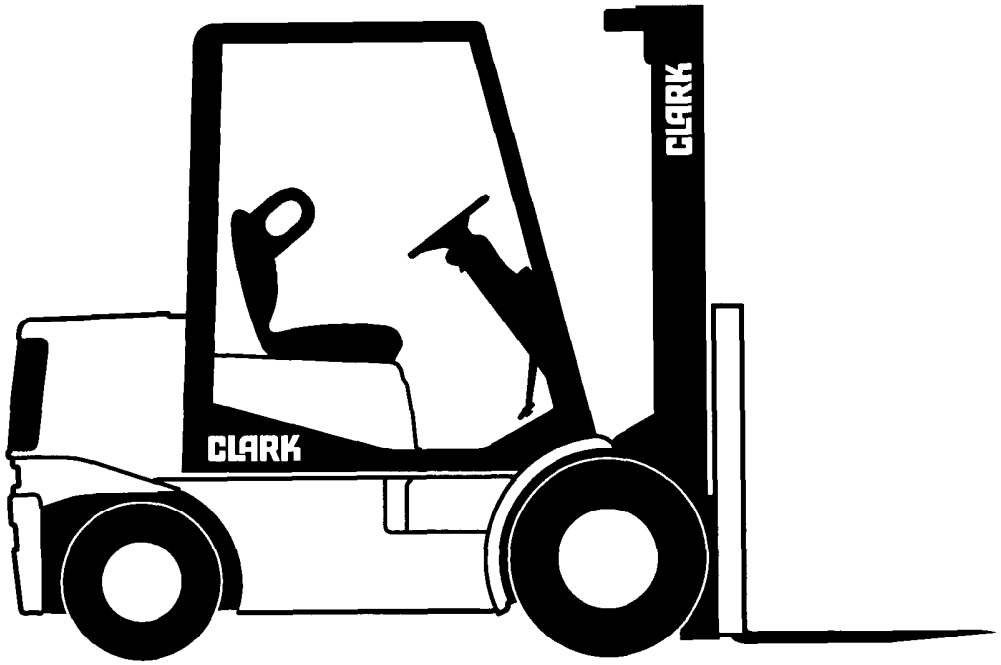

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SERVICE MANUAL
SM619

GCS 12 - 15 - 17S
GCX 12 - 15 E
GPS 12 - 15 - 17
GPX 15 - 17 E

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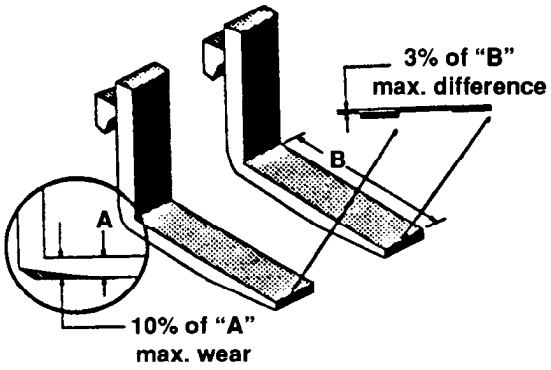
Forks

Inspect the load forks for cracks, breaks, bending and wear. The fork top surfaces should be level and even with each other. The height difference between both fork tips should be no more than 3% of the fork length.

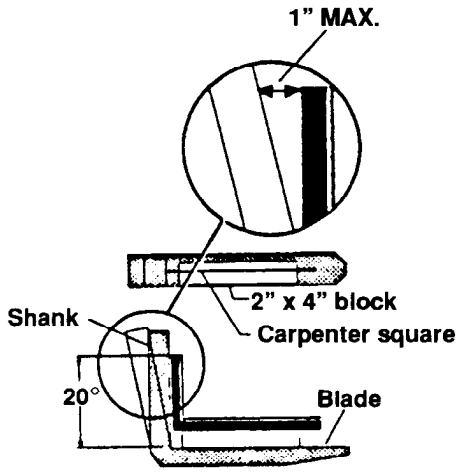


Check the amount of wear at the heel of the fork.

⚠ WARNING

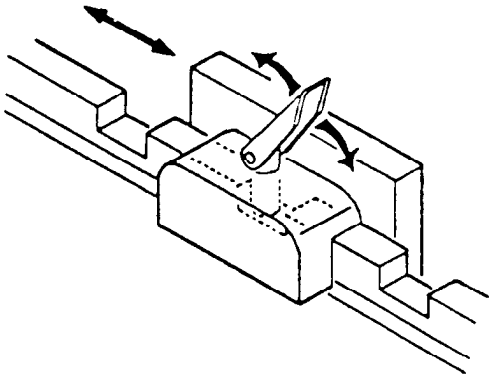
If the fork blade at the heel is worn down by more than 10%, the load capacity is reduced and the fork must be replaced.

Inspect the forks for twists and bends. To check, put a 2" thick metal block, at least 4" wide by 24" long on the blade of the fork with the 4" surface against the blade. Put a 24" carpenters square on the top of the block and against the shank. Check the fork 20" above the blade to be sure it is not bent more than 1 inch maximum.



If the fork blades are obviously bent or damaged, have them inspected by a trained maintenance person.

Inspect the fork latches. Be sure they are not damaged or broken and operate freely and lock correctly. Check the fork stop pins (or bolt and washer) for secure condition.



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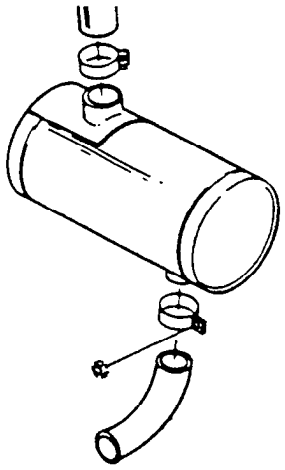
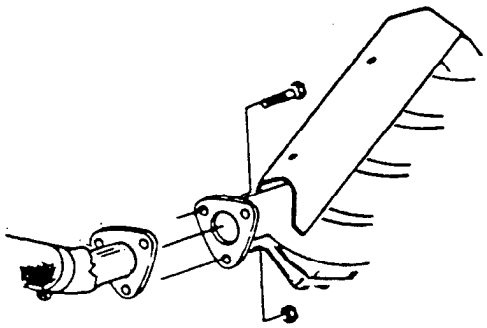
5. Remove the muffler and tailpipe as an assembly. First loosen the clamps on each end of the muffler. This will free the muffler and tail pipe.



6. Remove the exhaust pipe. Disconnect the exhaust pipe from the engine exhaust manifold by removing three fasteners at the flange joint and removing the exhaust pipe together with the ring and the gasket.



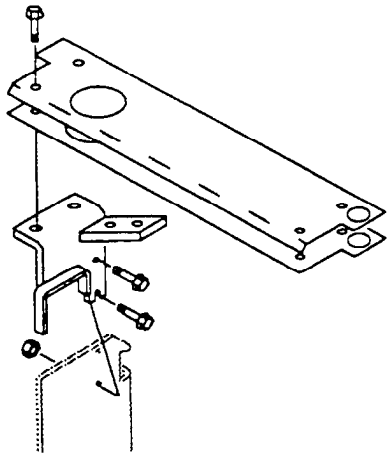
7. Remove the radiator.

First, drain the cooling system of fluid. Next, remove the four capscrews which fasten the radiator cover to the frame and remove the cover. This will expose the radiator top mounting brackets. Then, remove the two bolts fastening each bracket and remove the brackets and the pads under each bracket.

Unfasten the hose clamps from the inlet and outlet water hoses at the radiator and pull the hoses off the radiator.

Remove the transmission cooling lines from the radiator by unfastening the fittings. Note or mark which is theshortest line and where it fastens to the radiator.

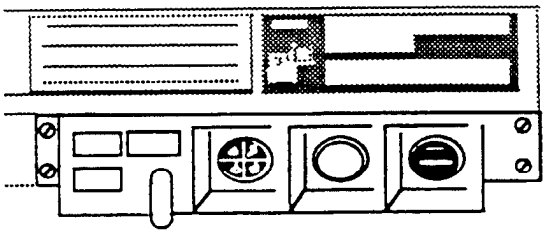
Lift the radiator out of truck and store in a safe location.



8. Remove the radiator shroud.

9. Disconnect the fuel line from the fuel pump.

10. Remove the four screws from the dash panel which will let the wiring and instruments remain with the engine. Use wire or tape to hold the panel to the engine to prevent damage to it when the engine is removed.



11. Connect a short section of lift chain of correct capacity to the engine lifting eyes, using bolts to fasten the chain to the eyes. One eye is bolted to the engine block LH side at the rear; the other is bolted to the RH side near the front. Connect a chain hoist to this lift chain and raise slightly to remove all slack.

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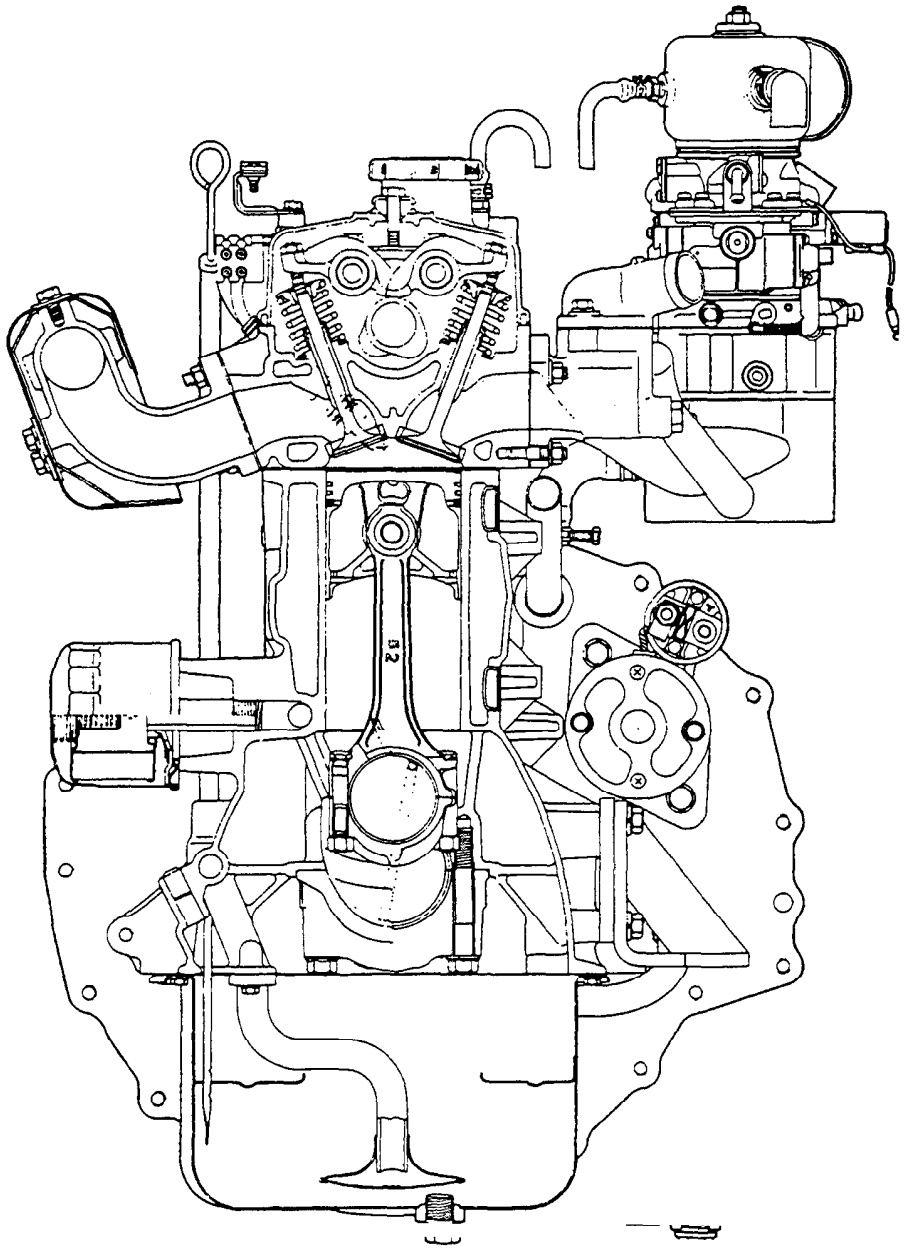
Cross Sectional View



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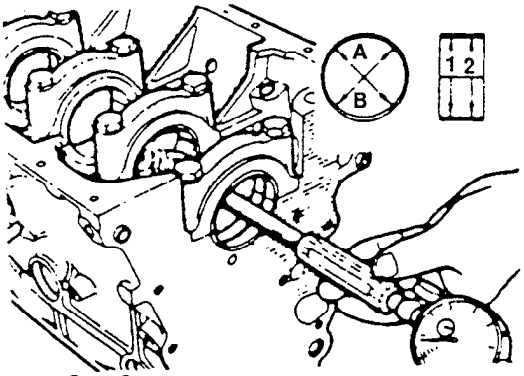
Main bearing and connecting rod bearing

1) Visually inspect the bearings for breaking away, melting, seizing and improper contact. If any damage is found, replace the bearings.

2) Check the oil clearances to the crankshaft journals and pins.

Install the bearing caps and tighten the cap bolts to the specified torque. Measure inside diameter (ID)of each bearing in two directions A and B at the front and rear ends of the bearing.

Compare these measurements with the measurements of the journals and pins (see previous section) to determine the oil clearances. Each clearance is calculated by subtracting journal or pin OD from ID of the installed bearing. If any clearance is outside the limit, the fault must be corrected before reassembly.



BEARING OIL CLEARANCE

Description	Specification	Repair limit
Journal/Main brg. oil clearance: [mm] in. (Center bearing)	[0,020-0,080] .0008-.0031	[0,15] .006
Pin/Conn. rod brg. oil clearance: [mm] in.	[0,014-0,064] .0005-.0025	[0,10] .004
Main brg. cap bolt torque: [N.m] lbf.ft.	[73.6-83.4] 54-61	
Connecting. rod cap bolt torque: [N.m] lbf.ft.	[44.1-47.1] 32-35	

NOTE

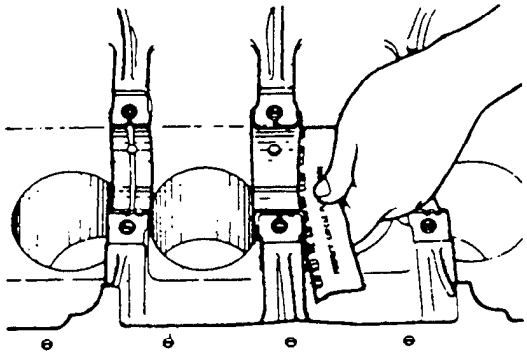
•When installing a new crankshaft, use the standard-size bearings.

•When a clearance does not fall into the specified range even after replacing the bearing, grind the journal or pin to the next undersize and install the correct bearing of same undersize.

OIL CLEARANCE - ALTERNATE METHOD

Oil clearances also may be checked with a Plastigage using the following procedure:

1. Clean to remove oil and dust from the bearings and journals to be checked.
2. Cut down the Plastigage strip to the same length as the width of bearing. Put the strip into the journal bearing cap, taking care not to pass the oil hole.
3. Install the crankshaft, bearings and caps. Tighten the main bearing bolts to the specified torque. Be careful not to rotate the crankshaft. Remove the cap and measure the amount of flattening (the maximum width) of the gage with a special scale supplied with the Plastigage.



Crankshaft sprocket

1) Check the crankshaft sprocket teeth for damage and wear. If damaged, replace the sprocket.

Flywheel and ring gear

1) Check the flywheel for any evidence of damage. Look for evidence of cracks or corrosion. If damaged, replace the flywheel.

2) Inspect the ring gear for damage, cracks and wear of the teeth or evidence of improper seating of ring gear. If damaged, replace the ring gear.

3) Ring gear replacement procedure

When removing the ring gear, use a hammer to tap lightly around the side face of the ring gear until it comes off the flywheel. Do not heat the ring gear when removing it.

When installing a new ring gear, heat the ring gear to [260°-280°C] 500°-536°F and shrink-fit it to the flywheel.

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Service Precautions

Match Marks

Mark parts with match marks before disassembly to guide reassembly. However, be careful not to place match marks where they could harm the function of a part.

Special Tools

Be sure to use special tools when their use is specified.

Using substitute tools will result in malfunction of or damage to the part.

Tightening Torque

Tighten the part properly to specified torque.

Replacement Parts

When oil seal, O-ring, packing, or gasket have been removed, be sure to replace them with new parts.

However, rocker cover gasket may be reused if it is not damaged.

Rubber Parts

Do not stain timing belt and V-belt with oil or water.

Do not clean the pulley or sprocket with detergent.

Oil and Grease

Before reassembly, apply specified oil to the rotating and sliding parts.

Sealant Specifications

Use specified brand of sealant.

Use of sealant other than specified sealant may cause water or oil leaks.

	Specified sealant
Rocker cover	3M ATD Part No. 8660 or equivalent
Semicircular packing	3M ATD Part No. 8660 or equivalent
Engine support bracket bolt	3M ATD Part No. 8660 or equivalent
Oil pan gasket	Mitsubishi Genuine Part MD970389 or equivalent
Water outlet fitting	Mitsubishi Genuine Part MD970389 or equivalent
Engine coolant temperature gauge unit	3M ATD Part No. 8660 or equivalent
Engine coolant temperature sensor	3M Nut Locking Part No. 4171 or equivalent
Oil pressure switch	3M ATD Part No. 8660 or equivalent
Oil pressure gauge unit	3M ATD Part No. 8660 or equivalent

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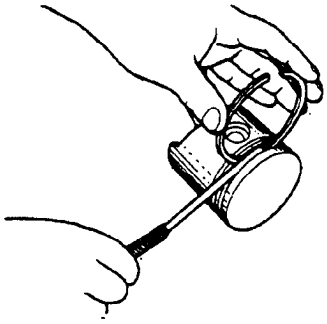
Piston Ring

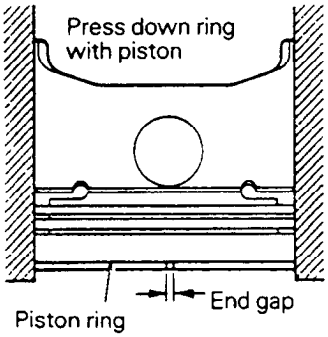
1. Check the piston ring for damage, excessive wear, and breakage and replace if defects are evident. If the piston has been replaced with a new one, the piston rings must also be replaced with new ones. (Or, replace piston and rings as an assembly.)
2. Check for the clearance between the piston ring and ring groove. If the limit is exceeded, replace the ring or piston, or replace piston and rings as an assembly.



Standard value: 0.03 - 0.07 mm (0.0012 - 0.0028 in.)

Limit: 0.1 mm (0.004 in.)

3. Install the piston ring into the cylinder bore. Force it down with a piston, its crown being in contact with the ring, to correctly position it at right angles to the cylinder wall. Then, measure the end gap with a feeler gauge. If the ring gap is excessive, replace the piston ring.



Standard value:

No. 1: 0.25 - 0.40 mm (0.0098 - 0.0157 in.)

No. 2: 0.45 - 0.60 mm (0.0177 - 0.0236 in.)

Oil Ring: 0.10 - 0.40 mm (0.0039 - 0.0157 in.)

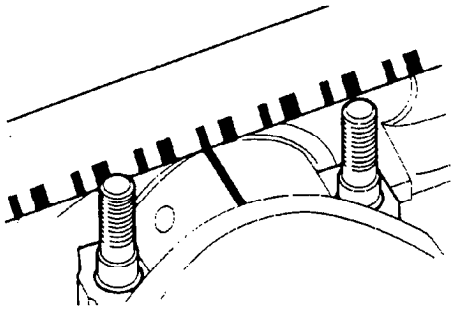
Limit:

No. 1, No. 2: 0.8 mm (0.031 in.)

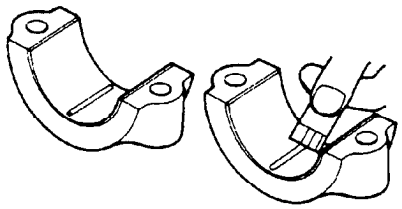
Oil Ring: 1.0 mm (0.039 in.)

Crankshaft Pin Oil Clearance (Plastic Gauge Method)

1. Remove oil from the crankshaft pin and the connecting rod bearing.
2. Cut the plastic gauge to the same length as the width of the bearing and place it on the crankshaft pin in parallel with its axis



3. Install the connecting rod cap carefully and tighten the bolts to the specified torque
4. Carefully remove the connecting rod cap.
5. Measure the width of the plastic gauge at its widest part by using the scale printed on the plastic gauge package.



Standard value: 0.02 - 0.05 mm (0.0008 - 0.0020 in.)

Limit: 0.1 mm (0.004 in.)

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GROUP 06 TRANSAXLE

CONTENTS NO.

GENERAL DESCRIPTION 06-01
TRANSMISSION TROUBLESHOOTING 06-02
TRANSMISSION PRESSURE CHECKS 06-03
TRANSAXLE REMOVAL 06-04
TRANSAXLE OVERHAUL 06-05
TRANSAXLE INSTALLATION 06-06

06-01 GENERAL DESCRIPTION

Clark Model TA-12 Hydratork transmission with integral drive axle (transaxle). Full floating straight axle with self-adjusting drum-and-shoe brakes at the drive wheels. Spiral bevel ring and pinion gear set. The directional control is operated with electrical controls from hand lever on the steering column. Inching control operated hydraulically with operator foot pedal. An accumulator-type control valve mounted within the transmission cushions impact of forward to reverse shifting, and lengthens transmission life. Transmission fluid is radiator-cooled.

Ratios: 1-speed, forward and reverse.
Overall Ratio: 15.45:1
Torque Converter Stall Ratio: 3.15:1

06-02 TRANSMISSION TROUBLESHOOTING

The following information is presented as an aid to isolating and determining the specific problem area in a transmission that is not functioning correctly.

When troubleshooting a "transmission" problem, it should be kept in mind that the transmission is only the central unit of a group of related powertrain components. Proper operation of the transmission depends on the condition and correct functioning of the other components of the group. Therefore, to properly diagnose a suspected problem in the transmission, it is necessary to consider the transmission fluid, charging pump, torque converter, transmission assembly, oil cooler, filter, connecting lines, and controls, including the engine, as a complete system.

By analyzing the principles of operation together with the information in this section, it should be possible to identify and correct any malfunction which may occur in the system.

HYDRATORK TRANSMISSIONS

Hydratork (powershift with torque converter) transmission troubles fall into two general categories: mechanical problerms, and hydraulic problems.

In addition to the mechanical components, all of which must be in the proper condition and functioning correctly, the correct functioning of the hydraulic circuit is most important. Transmission fluid is the "life blood" of the transmission. It must be supplied in an adequate quantity and delivered to the system at the correct pressures to ensure converter operation, to engage and hold the clutches from slipping, and to cool and lubricate the working components.

TROUBLESHOOTING PROCEDURES

1. Stall Test - Use a stall test to identify transmission, converter or engine problems.

2. Transmission Pressure Checks - Transmission problems can be isolated by the use of pressure tests. When the stall test indicates slipping clutches, then measure clutch pack pressure to determine if the slippage is due to low pressure or clutch plate friction material failure. In addition, converter charging pressure and transmission lubrication pressure may also be measured.

3. Mechanical Checks - Prior to checking any part of the system for hydraulic function (pressure testing), the following mechanical checks should be made:

1) Be sure all control lever linkage is properly connected and adjusted in each segment and at all connecting points.

2) Check shift levers and rods for damage and restrictions that could prevent full travel movement. Move the levers by hand at the control valve. If the control spool does not actuate fully, the problem may be in the control cover and valve assembly. If the controls are actuated electrically, check the wiring and electrical components.

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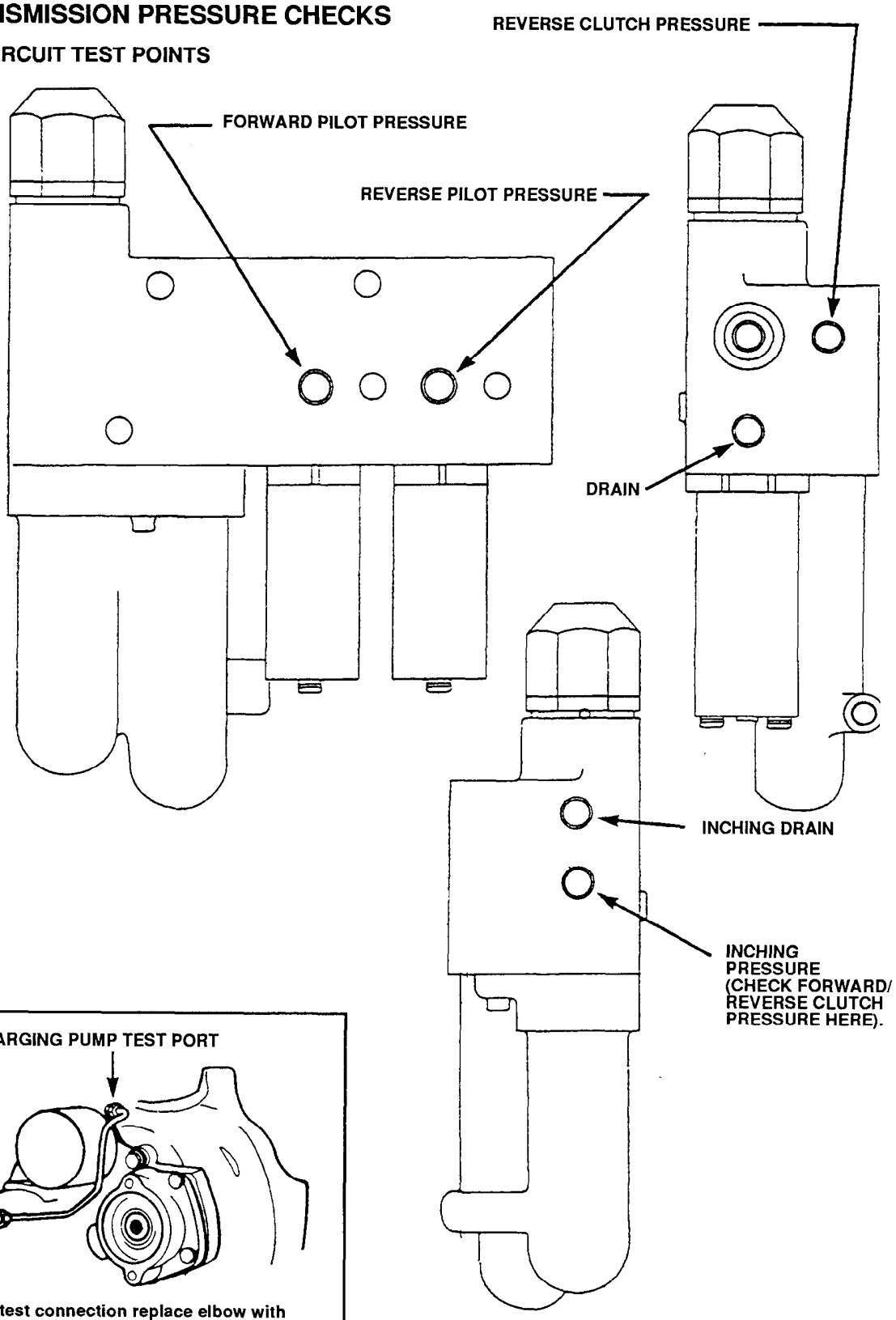
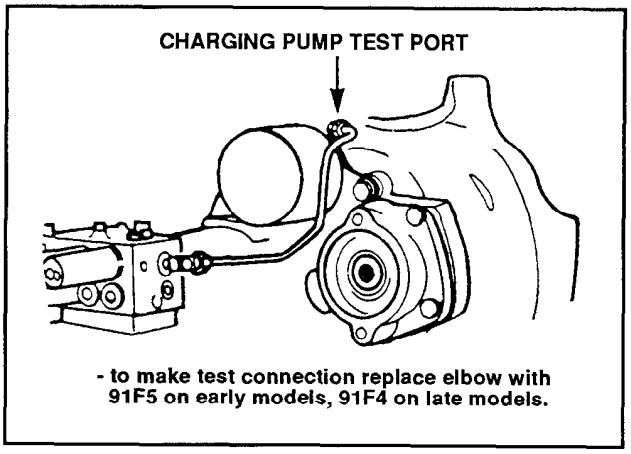
06-03 TRANSMISSION PRESSURE CHECKS

HYDRAULIC CIRCUIT TEST POINTS





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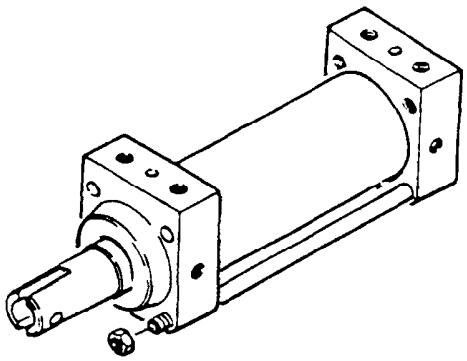
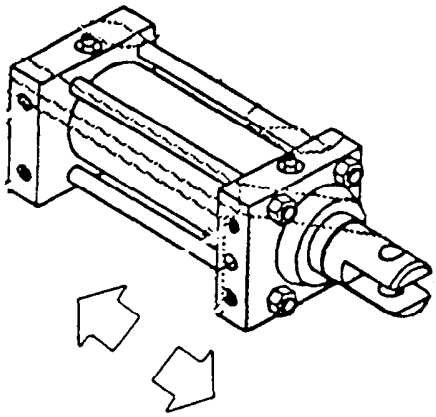
3. Carefully put the cylinder ends in position on the cylinder making sure the seals are in place and that the caps are in the identical positon they were before disassembly.

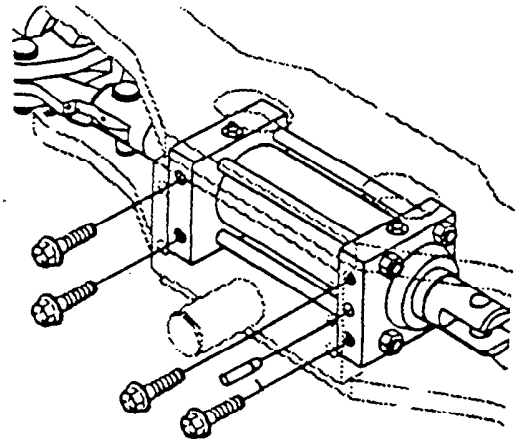


4. Insert the tie rods in the cylinder and tighten the nuts to a torque of [70-80 N.m] 52-59 lbf.ft.

5. Check the correct positioning of parts and make sure the cylinder rod moves freely in the cylinder.

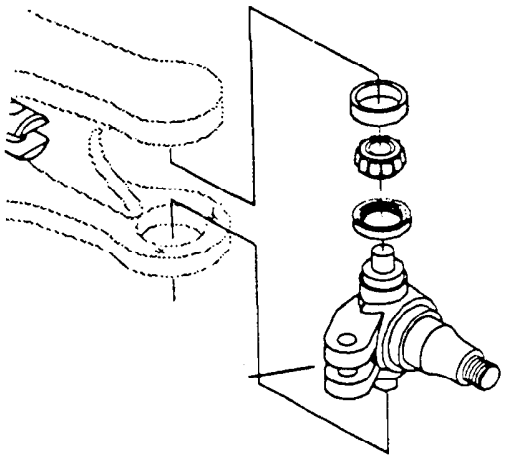


6. Put the cylinder in position in the axle frame (making sure the locator pin is in correct position) and insert the four fasteners attaching it to the frame.



Tighten the fasteners to a torque of [70-80 N.m] 52-59 lbf.ft.

7. Position a new seal and the upper bearing cone on the steering knuckle upper trunnion.



Insert this assembly in the steer axle and install the lower new seal and bearing cone and then the knuckle pin cover and bearing assembly.

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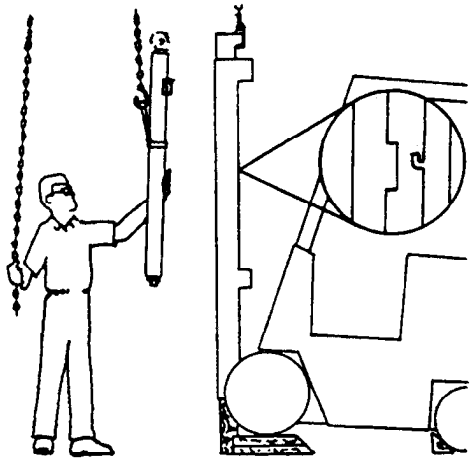
Raising the hoist/chainfall detach the final lift cylinder upper mounting bracket from the tie bar hook and out the front of the upright. Lower the cylinder onto a pallet or other adequate support.



You are Now Ready To Expose the Rail Rollers For Shimming

A. To expose the outer rail upper and intermediate rail lower rollers:

1) Wrap 3/8" chain/safety strap around both the inner and intermediate rail top tie bars and hook onto hoist/chainfall.

NOTE

Check to assure that lift chains and anchors will not catch or jam when raising and lowering the rails.

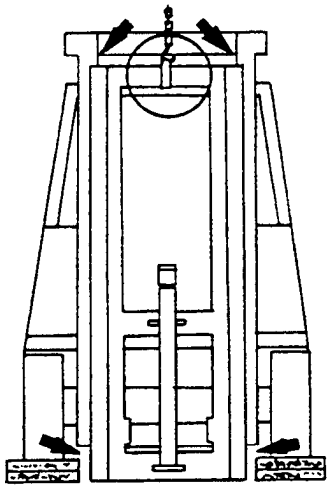
2) Raise both rails with hoist/chainfall and remove the blocks from under the primary cylinder and the intermediate rail.

3) Lower the rails to the floor which will expose the lower intermediate rail rollers. Shim as needed.

NOTE

Both rails must be on the floor at this time.

4) Also the outer rail upper rollers are now exposed. Shim as needed.



B. To expose inner rail and intermediate rail upper rollers:

1) With both rails resting on the floor wrap the 3/8" chain/safety strap around only the intermediate rail top tie bar.

NOTE

Check to assure chain anchor mounts are clear. Also assure the chain and anchors do not catch or jam when raising or lowering the rails.

2) Raise the intermediate rail with hoist/chainfall until a two (2') foot 4x4 block can be inserted horizontally, front to back across the tie bars and under the top of the intermediate rail tie bar.

3) Lower the intermediate rail until the tie bar rests on the block.

NOTE

Inner rail must remain on the floor during this procedure.

4) Intermediate rail upper rollers are now exposed. Shim as needed.

5) Inner rail lower rollers are now exposed. Shim as needed.

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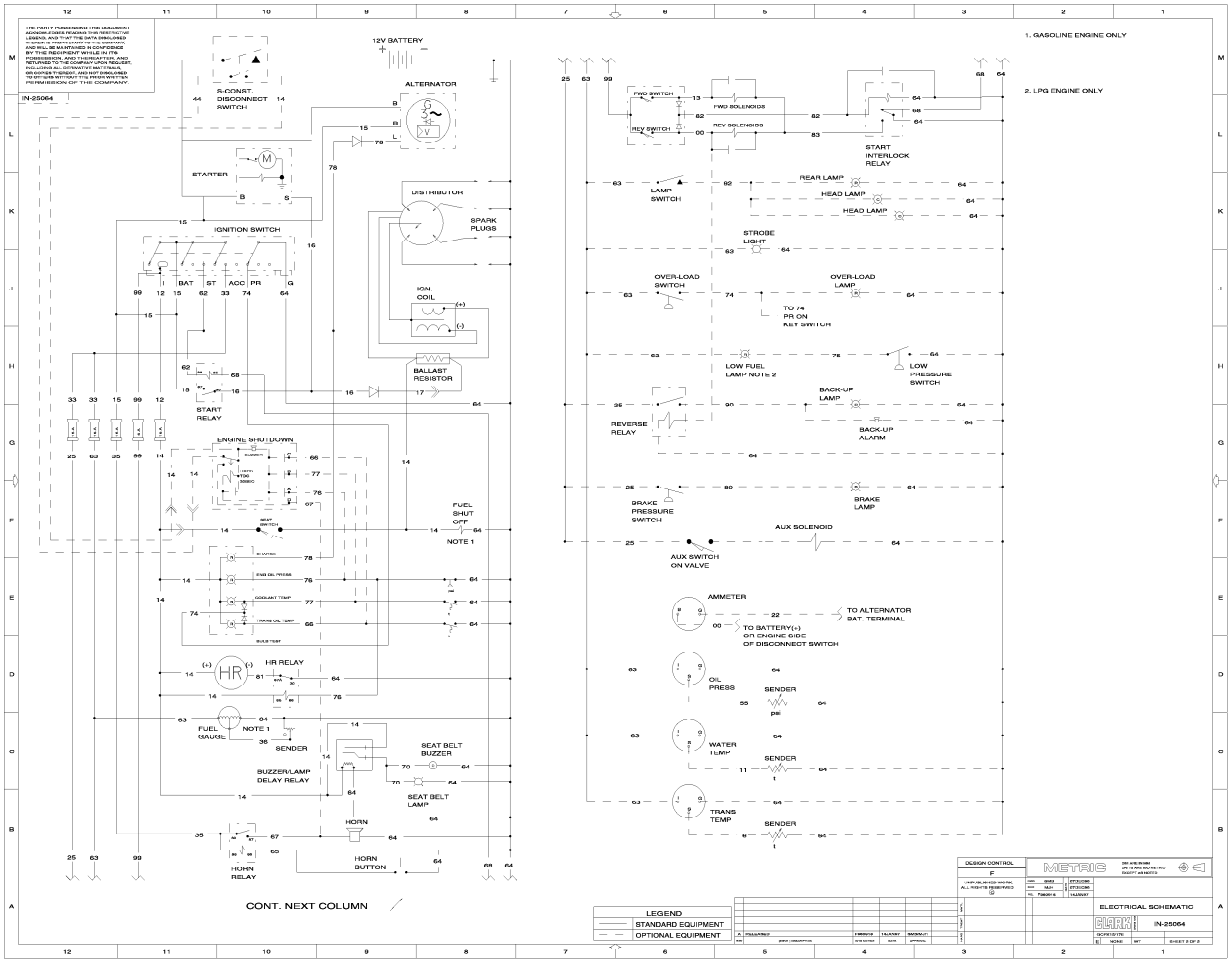

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