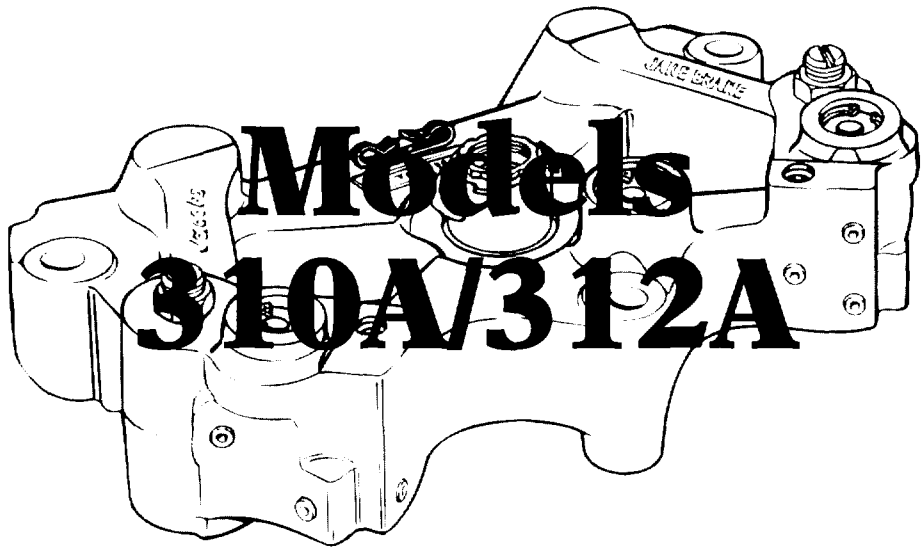
INSTALLATION



Models 310A/312A

For Caterpillar C-10 and C-12 Engines

The Jake Brake® Model 310A is designed and approved for use on all 1996 and later Caterpillar C-10 engines with an engine serial number prefix of 2PN. The Jake Brake® Model 312A is designed and approved for use on all 1996 and later Caterpillar C-12 engines with an engine serial number prefix of 1YN.

Jacobs Service Letters should be consulted for additional applications and updated information. Information in this manual was current at the time of printing and is subject to change without notice or liability.

Table of Contents

Safety Precautions

The following symbols in this manual signal potentially dangerous conditions to the mechanic or equipment. Read this manual carefully. Know when these conditions can exist. Then, take necessary steps to protect personnel as well as equipment.

⚠ WARNING

THIS SYMBOL WARNS OF POSSIBLE PERSONAL INJURY.

⚠ CAUTION

THIS SYMBOL REFERS TO POSSIBLE EQUIPMENT DAMAGE.

NOTE:
INDICATES AN OPERATION, PROCEDURE OR INSTRUCTION THAT IS IMPORTANT FOR CORRECT SERVICE.

Fuels, electrical equipment, exhaust gases and moving engine parts present potential hazards that could result in personal injury. Take care when installing an engine brake. Always use correct tools and proper procedures as outlined in this manual.

⚠ WARNING

SEE JACOBS DRIVER'S MANUAL FOR PROPER ENGINE BRAKE DRIVER TECHNIQUES.

THE JAKE BRAKE RETARDER IS A VEHICLE SLOWING DEVICE, NOT A VEHICLE STOPPING DEVICE. IT IS NOT A SUBSTITUTE FOR THE SERVICE BRAKING SYSTEM. THE VEHICLE'S SERVICE BRAKES MUST BE USED TO BRING THE VEHICLE TO A COMPLETE STOP.

Section 1: Introduction

Housing Identification

The housing serial number, engine brake model number and housing part number are printed on a nameplate located on the top surface of the housing.

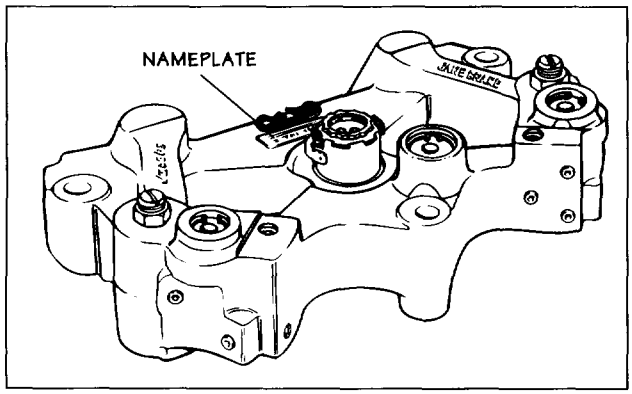


FIG. 1

Engine Identification

Engine serial number information is printed on the nameplate located on the intake manifold or stamped on the lower right side of the block. Engine serial number prefix "2PN" designates a 1996 or later model year C-10 engine. Serial number prefix "1YN" designates a 1996 or later model year C-12 engine.

Tools Needed

There are no special tools required for installation of the Models 310A and 312A Jake Brake® engine retarders. However, the Caterpillar Series C-10 and C-12 engines and Models 310A and 312A Jake Brake retarders are of metric design and will require the use of metric hand tools.

Recommended Torque Values

Cylinder head bolt	(see section on Brake Housing Mounting Stud Installation, page 5)
Cylinder head bolt spacer	95 ±15 N•m (70 ±11 lb.-ft.)
Brake mounting stud assy.	95 ±15 N•m (70 ±11 lb.-ft.)
Housing hold-down nut	80 ±15 N•m (59 ±11 lb.-ft.)
Housing hold-down bolt (10 x 70 mm)	55 ±10 N•m (41 ±7 lb.-ft.)
Spacer/valve cover bolt (6 x 100 mm)	12 ±3 N•m (9 ±2 lb.-ft.)
Slave piston adjusting screw locknut	35 ±8 N•m (25 ±6 lb.-ft.)
Exhaust and inlet rocker arm adjusting screw locknut	25 ±7 N•m (18 ±5 lb.-ft.)
Solenoid valve	
Valve with 12-point, 7/8" head	12.5 N•m (110 lb.-in.)
Valve with 6-point, 3/4" head	20 N•m (180 lb.-in.)

NOTE:
UNLESS OTHERWISE SPECIFIED, THE TORQUE VALUES LISTED HERE AND IN THE TEXT ARE DIRECT VALUES USING NO TORQUE WRENCH ADAPTERS OR EXTENSIONS. WHEN ADAPTERS OR EXTENSIONS ARE USED WITH A TORQUE WRENCH, THE TORQUE VALUES MUST BE ADJUSTED. FOLLOW THE MANUFACTURER'S RECOMMENDED PROCEDURES FOR THE TORQUE WRENCH AND ADAPTER BEING USED.

Section 2: Engine Preparation

Valve Cover Base

The illustrations in this manual show the valve cover base in place during engine brake installation. Production engines will be equipped with a cover base (1) that includes three support brackets (2) for containment of the injector wire harnesses (see Fig. 2).

The support brackets may prevent access to the three cylinder head bolts which must be removed for the installation of three Jacobs bolts. Because the injector harness support brackets are difficult to remove with the cover base in place, **it may be necessary to remove the valve cover base to permit access to the cylinder head bolts.**

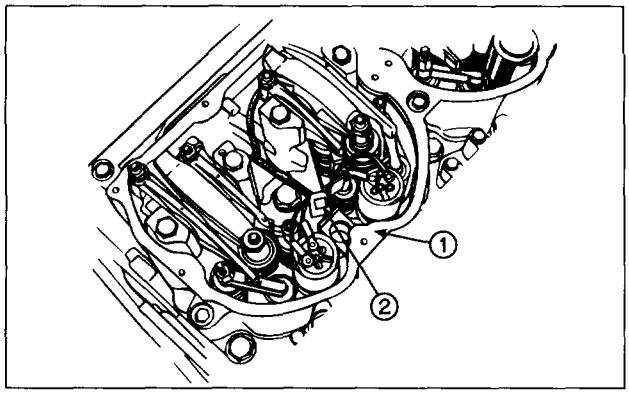


FIG. 2

Exhaust Valve Bridge Replacement

Thoroughly clean the engine.

Remove all accessory equipment that is necessary to remove the rocker covers.

Remove the rocker covers. Note the valve arrangement shown in Fig. 3.

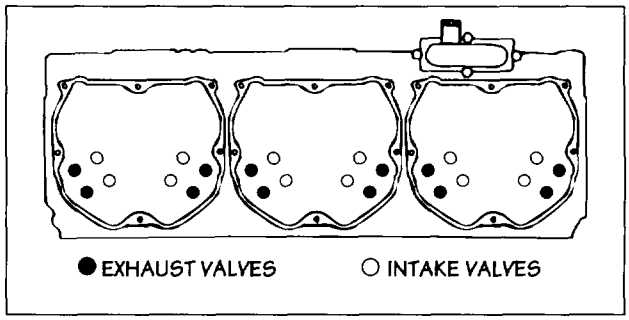


FIG. 3

Refer to Fig. 4. Loosen the locknut (2) and the adjusting screw (1) on the exhaust rocker arm (3).

Move the exhaust valve push rod aside to permit the rocker arm to be rotated.

Remove the Caterpillar standard exhaust valve bridge (1) (see Fig. 5).

Install the Caterpillar bridge assembly used for Jacobs' screw and pin assembly (2) (see Fig. 5) with the adjusting screw toward the rocker shaft as shown in Fig. 6. This is 180° from the original position.

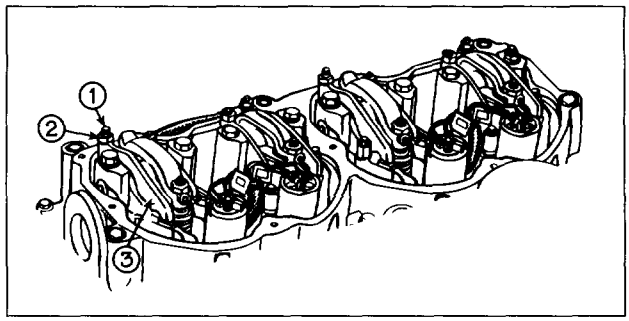


FIG. 4

Lubricate the Jacobs' bridge, top pad and screw and pin assembly with clean lube oil.

⚠CAUTION

DO NOT DISASSEMBLE THE JACOBS' BRIDGE ASSEMBLY AS THIS WILL CHANGE THE POSITION OF THE LEVELING SCREW. IMPROPER LEVELING OF THE BRIDGE COULD RESULT IN SERIOUS ENGINE DAMAGE.

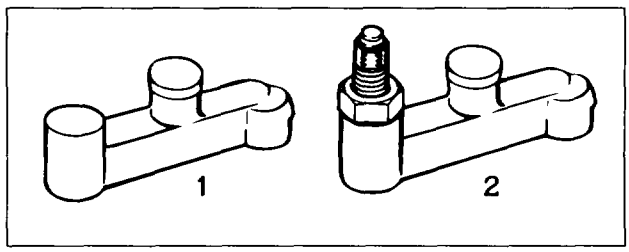


FIG. 5

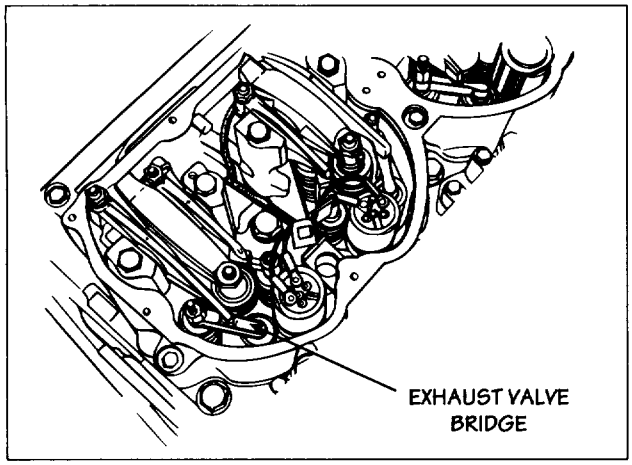


FIG. 6

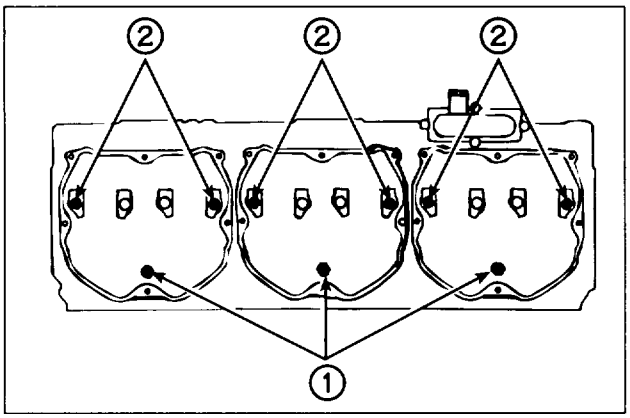


FIG. 7

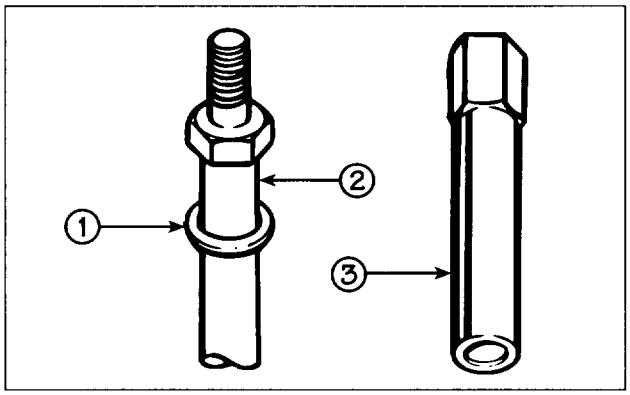


FIG. 8

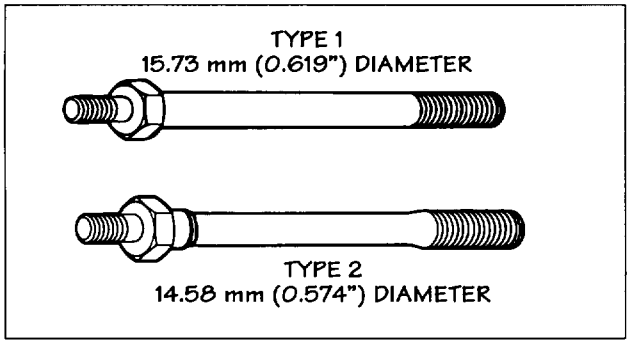


FIG. 9

⚠ CAUTION

BE SURE THE EXHAUST VALVE BRIDGE IS PROPERLY LOCATED ON THE EXHAUST VALVE STEM. THE VALVE STEM MUST FIT IN THE COUNTERBORE OF THE BRIDGE ON THE SIDE WITHOUT THE ADJUSTING SCREW. FAILURE TO DO SO WILL RESULT IN SERIOUS ENGINE DAMAGE.

Brake Housing Mounting Stud Installation

Refer to Fig. 7 to identify the cylinder head bolts (1) and rocker shaft hold-down bolts (2) to be replaced.

⚠ CAUTION

REPLACE THE THREE CYLINDER HEAD BOLTS WITH THE JACOBS BOLTS ONE AT A TIME. THIS WILL PREVENT CYLINDER HEAD DISTORTION.

Remove the cylinder head bolt and washer closest to the intake manifold, one per brake housing.

Using a blow gun nozzle with an extension, remove the oil from the cylinder head bolt hole.

⚠ WARNING

WEAR EYE PROTECTION AND COVER THE CYLINDER HEAD BOLT HOLE WITH TOWELS TO MINIMIZE OIL SPRAY AND HELP PREVENT PERSONAL INJURY.

Refer to Fig. 8. Install the Caterpillar washer (1) on the Jacobs cylinder head bolt stud (2). Coat the head bolt threads (2) and both faces at the washer (1) with thread lubricant (Caterpillar 6V4876 Molylcote Paste Lubricant or equivalent) prior to assembly. Install the bolt and torque according to the following procedure.

Two cylinder head bolt configurations have been used on the C-10 and C-12 engines. Early engines used a full shank bolt (Type 1, Fig. 9). Later engines used a reduced shank bolt (Type 2). When installing a Jake Brake® kit, use the following torque procedure.

Type 1 (Full Shank) Torque Procedure

1. Torque the bolt to 150 ±15 N•m (110 ±11 lb.-ft.).
2. Tighten the bolt an additional 90 ±5 degrees.

Type 2 (Reduced Shank) Torque Procedure

1. Torque the bolt to 160 ±15 N•m (120 ±11 lb.-ft.).

2. Tighten the bolt an additional 90 ±5 degrees.

When reinstalling a Jake Brake retarder following cylinder head replacement, follow the Caterpillar cylinder head torquing procedure. Make note of what type of bolt is in each location to ensure it is torqued to the correct value.

Repeat the above procedure, one bolt at a time, for the remaining two cylinder head bolts.

Install the cylinder head bolt spacers (3, Fig. 8) on the cylinder head bolt studs (2) and torque to 95 ±15 N•m (70 ±11 lb.-ft.).

Remove the rocker shaft hold-down bolts from the six locations next to the exhaust rocker arms (2, Fig. 7).

Install the brake mounting stud assemblies (2, Fig. 10) and torque to 95 ±15 N•m (70 ±11 lb.-ft.).

Valve and Injector Adjustments

NOTE:
EXHAUST VALVE CLEARANCE ADJUSTMENT IS REQUIRED. ADJUSTMENTS OF THE INTAKE VALVE CLEARANCE AND THE INJECTORS WILL BE REQUIRED ONLY ACCORDING TO VEHICLE MILEAGE OR ENGINE SERVICE INTERVALS.

Refer to Caterpillar service literature for proper exhaust valve, intake valve and injector clearances.

Make all adjustments with the engine stopped and cold. Follow the sequence in the following table:

Set Engine	Set Intake Valve No.	Set Exhaust Valve No.	Set Injector
Cyl. #1 TDC Compression	1, 2, 4	1, 3, 5	3, 5, 6
Cyl. #6 TDC Compression	3, 5, 6	2, 4, 6	1, 2, 4

Exhaust Valve Clearance Adjustment

Refer to Fig. 11. Locate the exhaust rocker arm adjusting screw in the socket of the exhaust valve push rod (1). Insert the feeler gage between the rocker arm and valve bridge. Turn the rocker arm adjusting screw (2) clockwise until the proper clearance (4) is set. Hold the adjusting screw and torque the locknut (3) to 25 ±7 N•m (18 ±5 lb.-ft.).

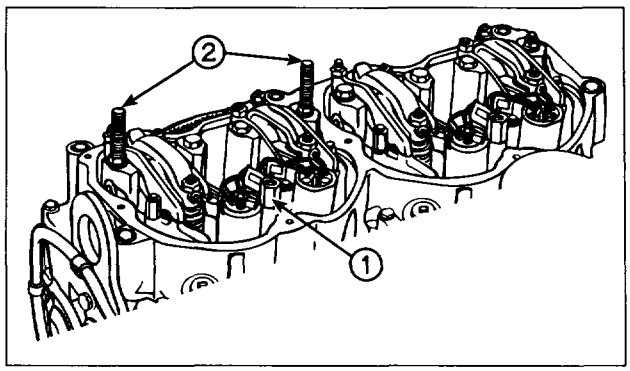


FIG. 10

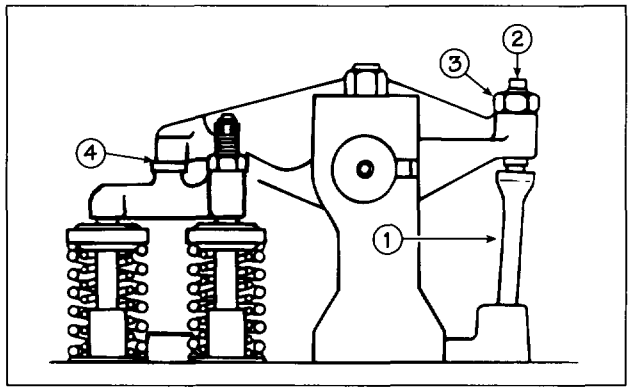


FIG. 11

Section 3: Brake Housing Installation

Housing Installation

Position the engine brake housings on the mounting stud nuts and align the slave piston foot squarely over the bridge screw and pin assembly. Install the Jacobs hold-down nuts (1) on the brake mounting studs and torque to 80 ±15 N•m (59 ±11 lb.-ft.) (see Fig. 12).

Refer to Fig. 12. Install the 70 mm bolts (2) through the housing into the spacer (one per housing) and torque to 55 ±10 N•m (41 ±7 lb.-ft.).

Be sure the slave piston foot (1) remained aligned squarely over the bridge screw and pin assembly (2) during torquing. This will insure proper activation of the exhaust valve stem. Reposition the housing if necessary (see Fig. 13).

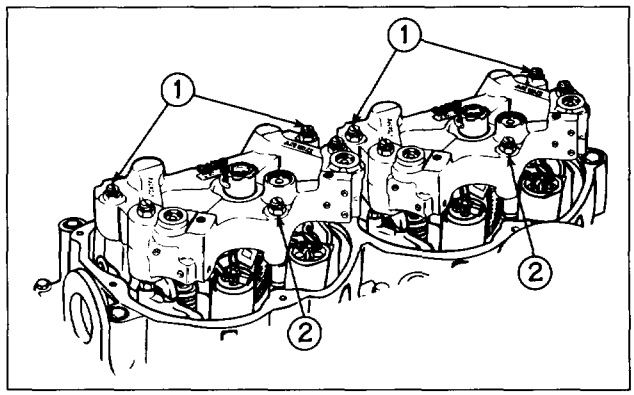


FIG. 12

Slave Piston Adjustment

Slave Piston Adjustment Sequence

Set Engine	Set Slave Piston No.
Cyl. #1 TDC Compression	1, 3, 5
Cyl. #6 TDC Compression	2, 4, 6

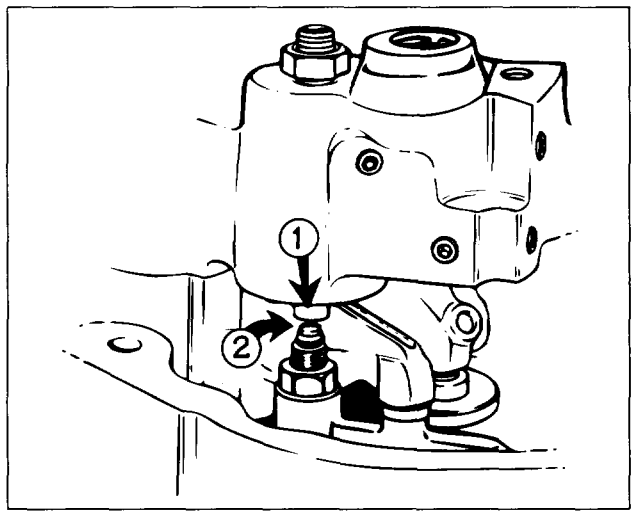


FIG. 13

Slave Piston Clearance Setting

Engine	S/N Prefix	Clearance	Gage P/N
C-10	2PN	0.64 mm (0.025")	022045
C-12	1YN	1.14 mm (0.045")	016896

Refer to Fig. 14. With the exhaust valves closed on the cylinder to be adjusted, insert the proper Jacobs feeler gage (2) between the slave piston and the actuating pin (3) in the valve bridge adjusting screw.

Turn the slave piston adjusting screw (1) in until a slight drag is felt on the feeler gage.

Hold the adjusting screw in this position and tighten the locknut to 35 ±8 N•m (25 ±6 lb.-ft.).

Rotate the engine 360° and set the clearance on the remaining slave pistons.

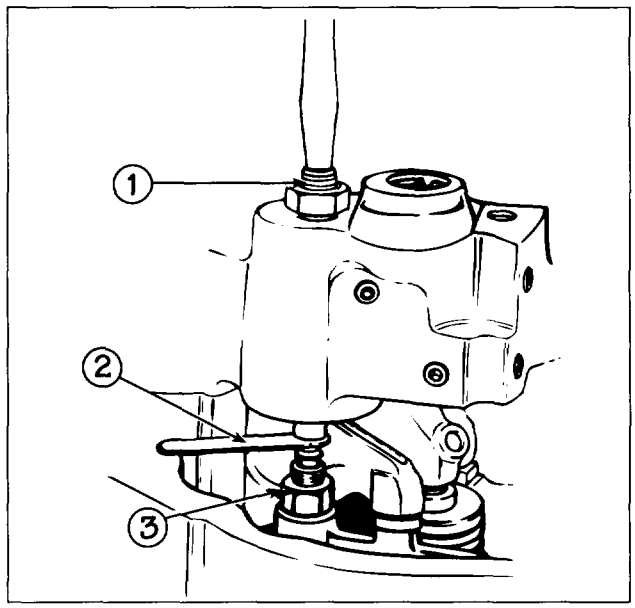


FIG. 14

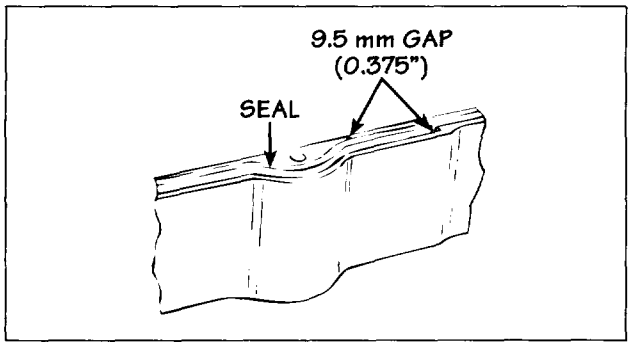


FIG. 15

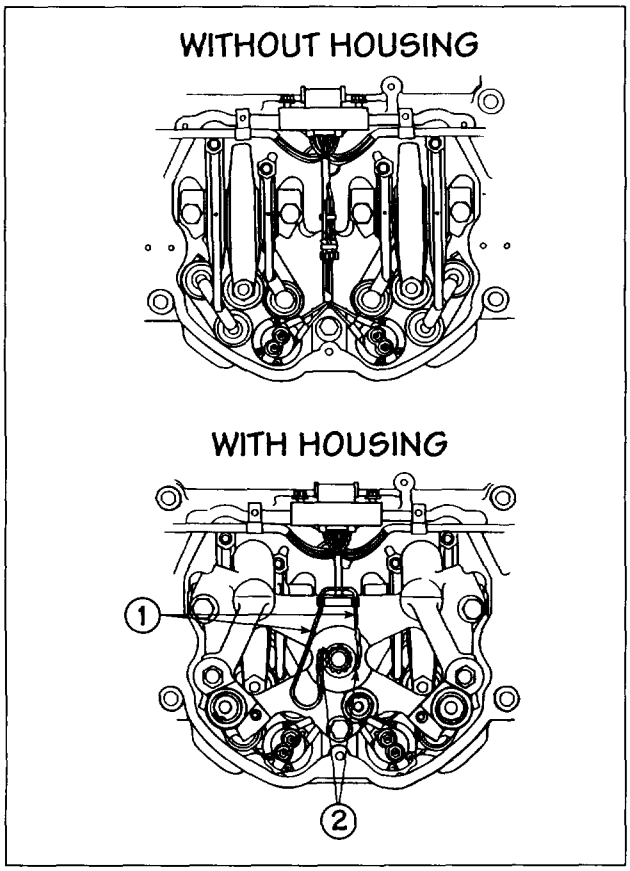


FIG. 16

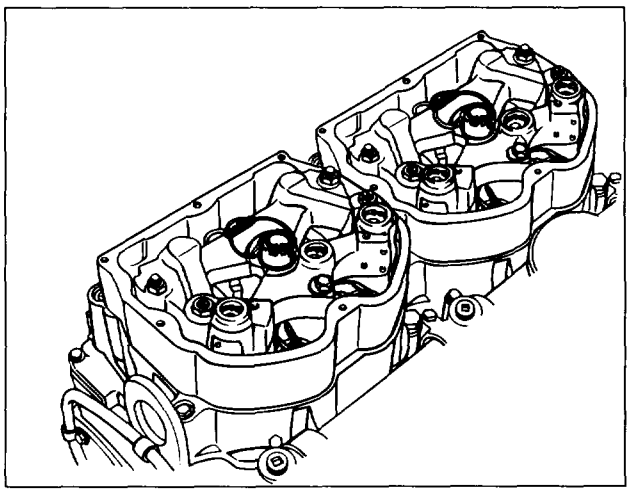


FIG. 17

Spacer Installation

Be sure the seal is seated in the groove in the bottom surface of the Jacobs' spacer (see Fig. 15).

NOTE:
A 9.5 MM (0.375") GAP SHOULD BE LEFT BETWEEN EACH END OF THE GASKET AND THE SPACER.

Connect both solenoid lead wires (1) to the terminal lead outs (2) on the solenoids (see Fig. 16).

NOTE:
THE SOLENOID LEAD WIRES ARE NOT POLARITY SENSITIVE AND MAY BE CONNECTED IN EITHER DIRECTION.

Install the three Jacobs' spacers on the valve cover base (see Fig. 17, only 2 shown for clarity).

Section 4: Engine Brake Operation Check

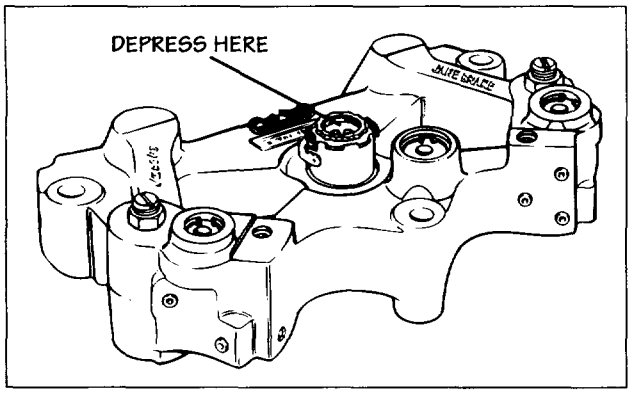


FIG. 18

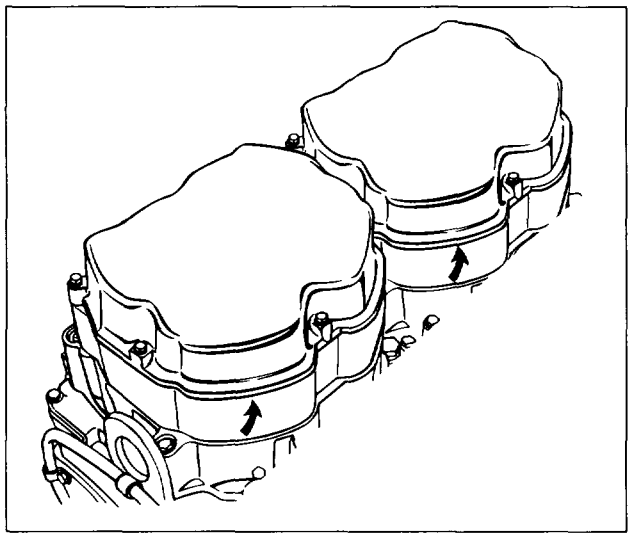


FIG. 19

Bleed Brake Housings

⚠ WARNING

WEAR EYE PROTECTION AND DO NOT EXPOSE YOUR FACE OVER THE ENGINE AREA. TAKE PRECAUTIONS TO PREVENT OIL LEAKAGE ONTO THE ENGINE.

WHENEVER THE ENGINE IS RUNNING WITH THE VALVE COVERS REMOVED, OIL SPLASHING IN THE ENGINE AREA COULD CAUSE PERSONAL INJURY.

1. Start the engine and allow to run for a few minutes.
2. Manually activate and release the engine brake solenoid several times to allow the housing to be filled with oil. This is done by depressing the solenoid disc or inserting a small rod into the hole on the top of the solenoid (see Fig. 18).

   NOTE:
   PLACE RAG OVER CONTROL VALVE AND ACCUMULATOR COVERS TO REDUCE OIL SPRAY.

3. Watch the master piston to be sure it is moving down onto the injector rocker arm pad.
4. Watch the slave piston assembly. It should move down to contact the pin in the exhaust valve screw.
5. Repeat Steps 2 - 4 for each housing to insure proper function.
6. Shut down engine. Clean the gasket surface for the cover.

Rocker Cover Installation

Be sure the seal is seated in the groove of the cover and install the cover on the spacer (Fig. 19). Install the Jacobs' bolts, six per cover. Final torque is 12 ±3 N•m (9 ±2 lb.-ft.). Tighten in steps to assure uniform compression of the seals in accordance with Caterpillar procedures.

⚠ CAUTION

BE SURE TO TIGHTEN ALL ROCKER COVER BOLTS EVENLY. EXCESSIVE OR UNEVEN TIGHTENING MAY CAUSE THE ROCKER COVER TO CRACK.

Chassis Wiring

Consult vehicle manufacturer's wiring diagrams to locate engine brake switch location and wire coding. The brake control function is performed by the engine electronic control module.

NOTE:
1996 AND LATER MODEL TRUCKS SHOULD HAVE ENGINE BRAKE CONTROL WIRING LOCATED BEHIND THE DASH. LOCATE THE APPROPRIATE WIRES AND CONNECT TO CORRECT VEHICLE MANUFACTURER'S SWITCH. SWITCH MAY NEED TO BE PROCURED FROM VEHICLE MANUFACTURER.

Jacobs' Cab Control Group, P/N 020280, can be used if dash switches are required. This group includes the low resistance gold contact switches required to interface with the engine electronic control module.

Section 5: Engine Brake Maintenance

Theory of Operation

Energizing the engine brake effectively converts a power producing diesel engine into a power absorbing air compressor. This is a accomplished by opening the cylinder's exhaust valves near the top of the normal compression stroke, releasing the compressed cylinder charge back into the atmosphere.

The blow-down of the compressed cylinder charge to atmosphere prevents return of the stored energy to the piston on the expansion stroke. The effect is a net energy loss, since the work done in compressing the cylinder charge is not returned to the crankshaft during the expansion stroke. The energy being lost is drawn from the forward motion of the vehicle. The effect is to slow the vehicle on level roads and help control vehicle speeds on downhill grades.

The power required to operate the brake is obtained from the engine's cam shaft and rocker arms. The motion of the injector rocker arm for the braking cylinder is utilized to open the exhaust valve and blow-down the cylinder.

Energizing the solenoid valve (1) permits engine lubricating oil to flow under pressure to the accumulator (2) and through the control valve (3) to the slave piston (4) and master piston (5). The oil pressure causes the master piston (5) to descend down and come to rest on the injector rocker arm (6).

The injector rocker arm (6) moves up, as it normally does due to injector cam lobe rotation, forcing the master piston (5) back into the brake housing. This creates a high pressure in the oil passage between the master piston (5) and slave piston (4) of the braking cylinder. The ball check valve in the control valve (3) traps the high pressure oil in the master/slave piston hydraulic circuit.

The high pressure created by the motion of the master piston (5) causes the slave piston (4) to move down. After traveling the clearance set during brake installation, the slave piston (4) contacts the valve actuating screw and pin assembly (7). Prior to the piston reaching the top dead center position, the exhaust valve (8) is forced open releasing the compressed cylinder charge into the exhaust manifold. Slave piston (4) travel is limited when the D-Lash™ adjusting screw (9) uncovers a passageway in the slave piston (4). This allows oil to flow back to the low pressure side of the control valve (3), where it is stored in the accumulator (2) for the next braking cycle.

The compressed cylinder charge released into the exhaust manifold flows through the turbocharger as it escapes back to the atmosphere. The energy in the released charge spins the turbocharger and increases the intake manifold pressure. This helps to increase the overall engine braking effect.

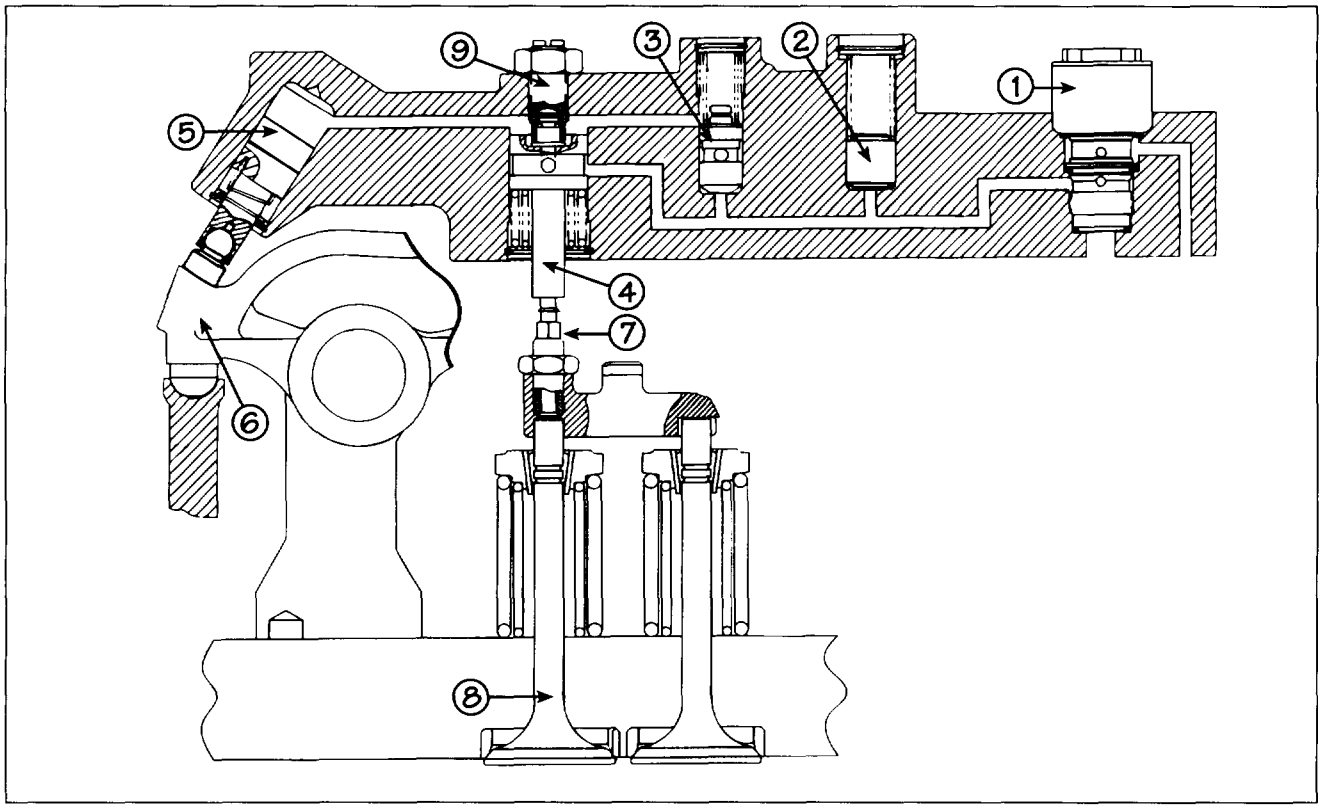


FIG. 20

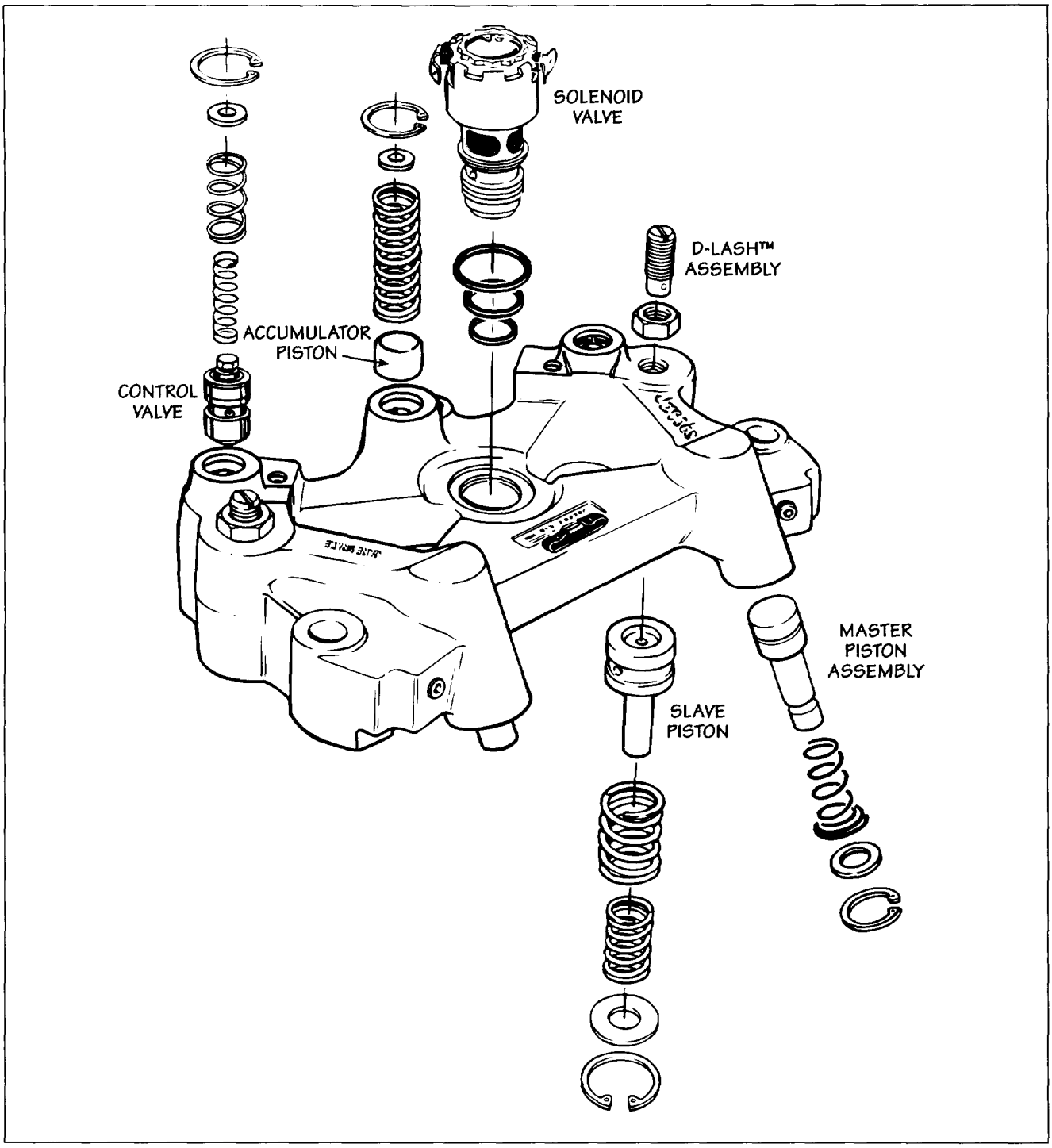


FIG. 21

Engine Brake Overhaul Procedures

⚠ WARNING

NEVER REMOVE ANY ENGINE BRAKE COMPONENT WITH ENGINE RUNNING. PERSONAL INJURY MAY RESULT.

The Jacobs Engine Brake is a relatively trouble-free and maintenance-free device. However, inspections and routine maintenance are necessary to assure proper operation. Use the following procedures to keep the engine brake in top condition.

This section will cover how to properly remove, clean and reinstall engine brake components. Use an OSHA-approved cleaning solvent when washing parts. Be sure to coat parts with clean engine oil when reinstalling them.

Solenoid Valve

⚠CAUTION

DO NOT DISASSEMBLE OR TAMPER WITH THE SOLENOID VALVE. ENGINE DAMAGE COULD RESULT. THE SOLENOID VALVE IS NOT FIELD SERVICEABLE.

1. Disconnect solenoid harness. Using 7/8" 12-point or 3/4" 6-point socket (based on solenoid type) and extension, unscrew solenoid valve.

2. Remove and discard the three rubber seal rings (see Fig. 22). If the lower ring stays in the bottom of the housing solenoid bore, remove with a seal pick.

3. Wash out the solenoid valve with approved cleaning solvent. Use a brush to clean the oil screen. When clean, dry the valve with compressed air.

4. Clean out the solenoid valve bore in the housing. Use clean paper towels. Never use rags as they may leave lint and residue which can plug the oil passageways.

5. Coat the new solenoid seal rings with clean engine oil. Install the upper and center seal rings on the solenoid body and the lower seal ring into the bottom of the solenoid bore in the housing (see Fig. 23).

6. Be sure the seals are seated properly and carefully screw the solenoid into the housing without unseating the seals. Be careful not to twist the seals while installing.

7. Torque the solenoid with the 7/8" 12-point head to 12.5 N•m (110 lb.-in.). Torque the solenoid with the 3/4" 6-point head to 20 N•m (180 lb.-in.).

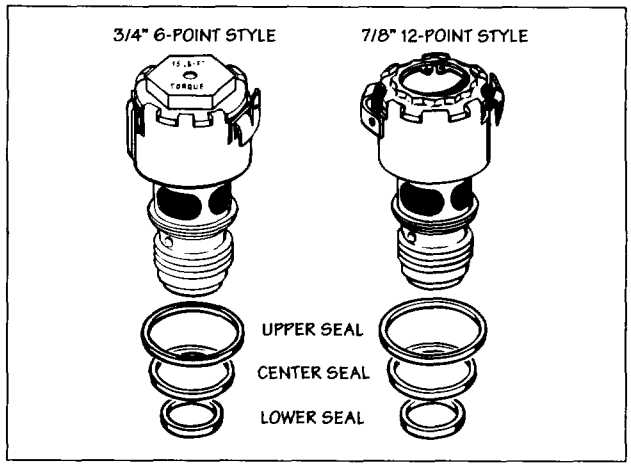


FIG. 22

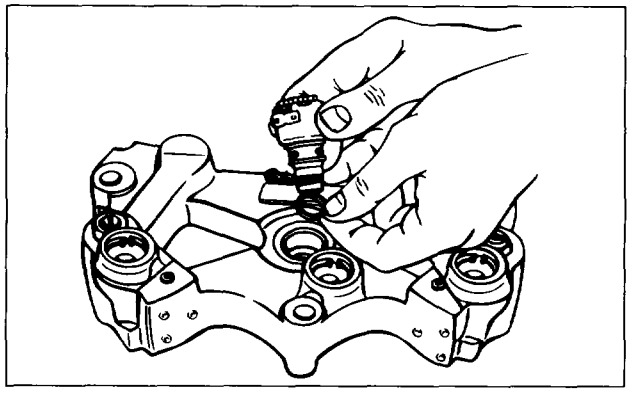


FIG. 23

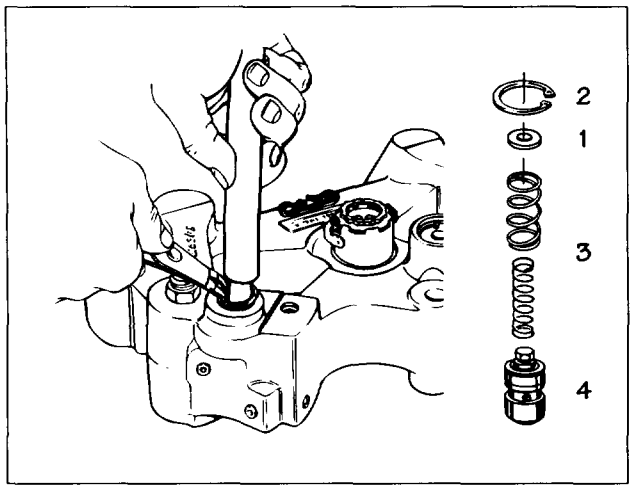


FIG. 24

Control Valve

⚠ WARNING

WEAR SAFETY GLASSES. REMOVE CONTROL VALVE COVERS CAREFULLY TO AVOID PERSONAL INJURY. CONTROL VALVE COVERS ARE UNDER LOAD FROM THE CONTROL VALVE SPRINGS.

1. Push down on the control valve cover (1) using the appropriate diameter rod. Remove retaining ring (2) using retaining ring pliers (see Fig. 24).

2. Slowly remove the control valve cover until spring pressure ceases, then remove the two control valve springs (3).

3. Using needle-nose pliers, reach into the bore and grasp the stem of the control valve (4) (see Fig. 24). Remove the control valve.

4. Wash the control valves with approved cleaning solvent. Insert a wire into the hole in the base of the valve until it contacts the ball check. The ball should lift with light pressure on the wire. If the ball is stuck, replace the control valve. Dry the valve with compressed air and wipe clean with a paper towel.

5. Thoroughly clean the control valve bore in the housing using clean paper towels. Never use rags as they may leave lint and residue which can plug the oil passageways.

6. Coat the parts with clean engine oil. Reassemble parts reversing the removal procedure.

Accumulator

⚠ WARNING

WEAR SAFETY GLASSES. THE ACCUMULATOR SPRING IS UNDER STRONG COMPRESSION. USE CAUTION WHEN REMOVING THE RETAINING RING AND COVER.. IF THE SPRING IS ACCIDENTALLY DISCHARGED, PERSONAL INJURY MAY RESULT.

1. Push down on the accumulator cover (1) using the appropriate diameter rod. Remove the retaining ring (2) using retaining ring pliers (see Fig. 25).
2. Slowly remove the accumulator cover until spring pressure ceases, then remove the cover and spring (3).
3. Use a magnet to remove the piston from the accumulator bore.
4. Inspect the parts for wear or damage; replace if needed.
5. Thoroughly clean the accumulator bore in the housing using clean paper towels. Never use rags as they may leave lint and residue which can plug the oil passageways.
6. Coat the parts with clean engine oil. Reassemble by installing the piston, spring, cover and retaining ring, reversing the removal procedure.

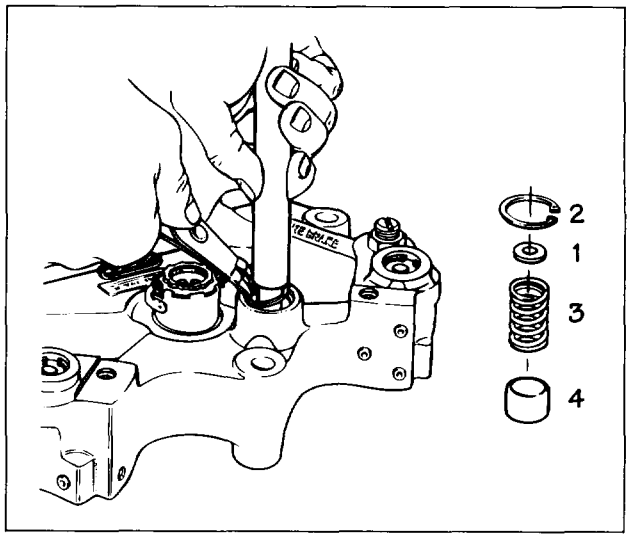


FIG. 25

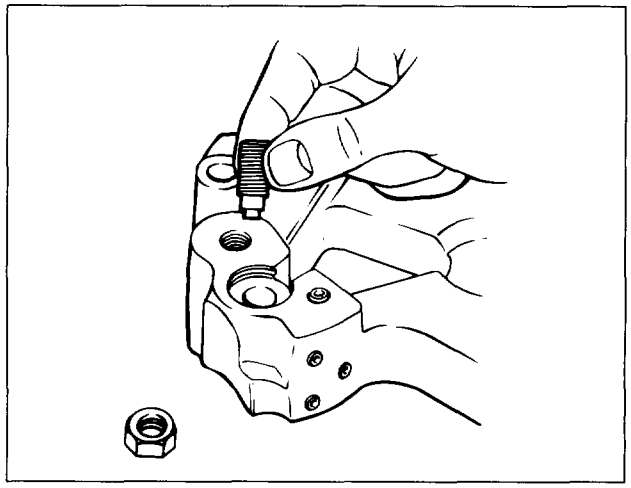


FIG. 26

Slave Piston Adjusting Screw (D-Lash™)

1. Loosen the slave piston adjusting screw locknut and remove the adjusting screw from housing (see Fig. 26).

NOTE:
THE PART NUMBER FOR THE SCREW IS LOCATED AT THE TOP OF THE SCREW NEXT TO THE SCREWDRIVER SLOT. REFER TO THE PARTS MANUAL FOR PROPER PART NUMBER IDENTIFICATION.

⚠ CAUTION

DO NOT ADJUST OR TAMPER WITH THE ADJUSTING SCREW ASSEMBLY. ENGINE DAMAGE COULD RESULT.

2. Wash the adjusting screw in an approved cleaning solvent.
3. Inspect the slave piston adjusting screw. The plunger should protrude from the bottom of the screw and should move freely (see Fig. 27). Replace the entire screw assembly if any defect is found.

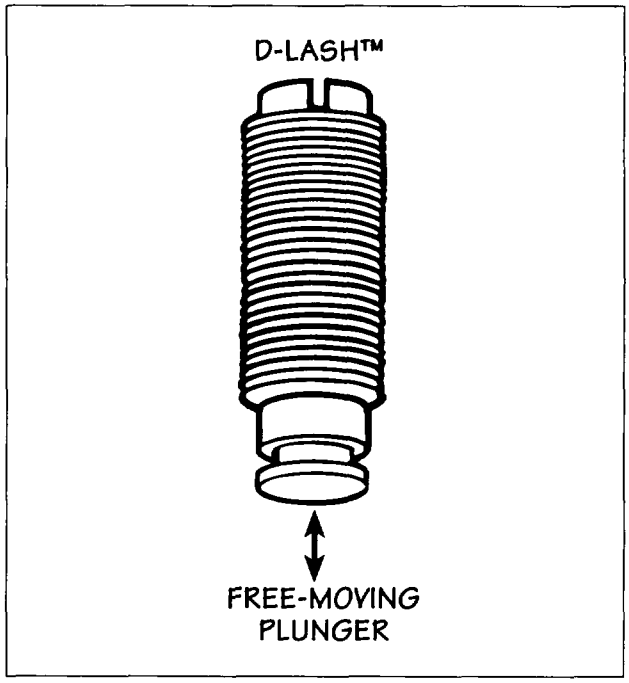


FIG. 27

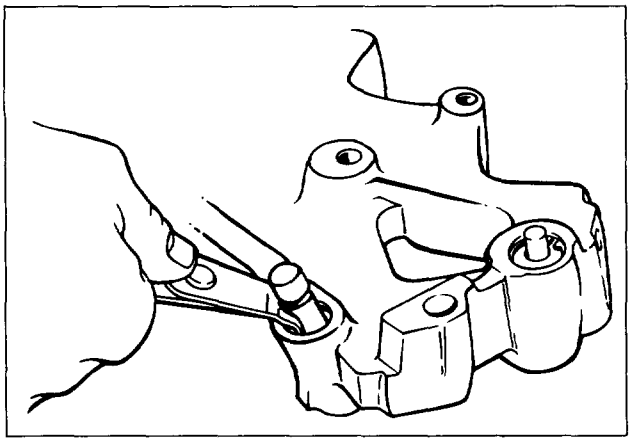


FIG. 28

Master Piston

⚠ WARNING

WEAR SAFETY GLASSES. THE MASTER PISTON SPRING IS UNDER STRONG COMPRESSION. USE CAUTION WHEN REMOVING THE RETAINING RING AND COVER.. IF THE SPRING IS ACCIDENTALLY DISCHARGED, PERSONAL INJURY MAY RESULT.

1. Press down on the master piston retaining washer to relieve the spring force. While holding the washer, use a pair of snap ring pliers to remove the retaining ring from the groove. Carefully release the retainer and remove it along with the old spring.

2. Remove master piston from bore. Clean in approved cleaning solvent. Inspect for wear on the piston and foot. Also inspect the bore.

3. Reinstall the master piston return spring by inserting the small end into the bore. The large coil, identified by **WHITE** paint, **should be facing out.**

4. Place the retaining washer and snap ring over the foot of the master piston and compress them into the bore. Using snap ring pliers, replace the snap ring in the groove to retain the master piston (see Fig. 28).

5. Ensure the snap ring is properly engaged in the groove by gently grasping the master piston foot and pulling out until the master piston bottoms on the retaining washer. Release the master piston. If the assembly is correct, all parts should return to their original position.

NOTE:
AFTER THE SPRING IS INSTALLED WITHIN THE RETAINING WASHER AND SNAP RING, IT IS NORMAL TO BE ABLE TO SEE THE SPRING IN THE BORE AROUND THE RETAINING WASHER.

Slave Piston

⚠ WARNING

WEAR SAFETY GLASSES. THE SLAVE PISTON IS RETAINED BY SPRINGS THAT ARE UNDER HEAVY COMPRESSION. IF THE FOLLOWING INSTRUCTIONS ARE NOT FOLLOWED AND PROPER TOOLS NOT USED, THE SPRINGS WILL BE DISCHARGED WITH ENOUGH FORCE TO CAUSE PERSONAL INJURY.

1. Remove the locknut (3) on the slave piston adjusting screw (1). Back out the adjusting screw until the slave piston is fully retracted (screw is loose).
2. Place the hole in the clamp fixture (2) over the slave piston adjusting screw (see Fig. 29).
3. While holding the fixture in position, screw holder down over the slave piston (4) until the spring retainer (7) is contacted.
4. Turn the handle slowly until the retainer is depressed to about 1 mm (0.040"), relieving pressure against the retaining ring (8).
5. Remove the retaining ring using retaining ring pliers. Back out the holder until the springs (5 and 6) are loose. Remove the fixture.
6. Remove all components, ensuring there is no binding or burrs. Clean in an approved cleaning solvent. Inspect parts and replace as necessary.

NOTE:
BE SURE COMPONENTS ARE REASSEMBLED IN PROPER ORDER (SEE FIG. 30).

7. Use the clamp fixture to reinstall piston and springs. Be sure retaining ring is placed on the retainer before screwing the clamp-holder down over the slave piston.
8. Compress the slave piston springs down until the retainer is about 1 mm (0.040") below the retaining ring groove. Reinstall the retaining ring. Be sure the retaining ring is fully seated in the groove.
9. Remove the clamp fixture slowly to insure proper seating of retaining ring.

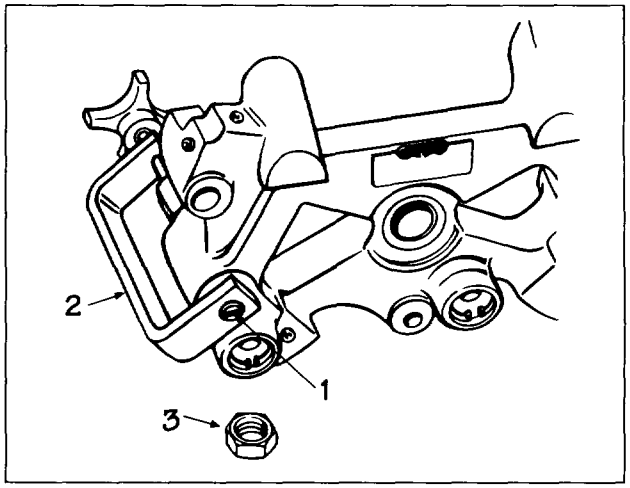


FIG. 29

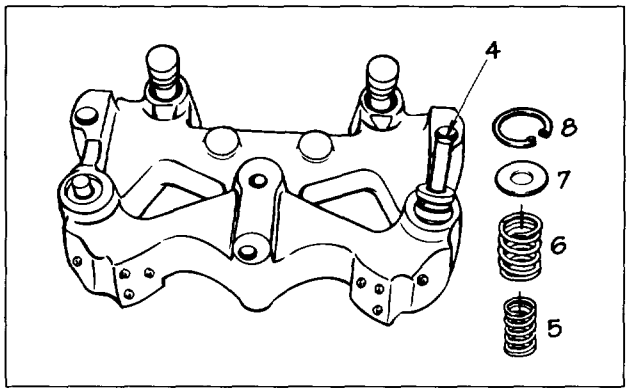


FIG. 30

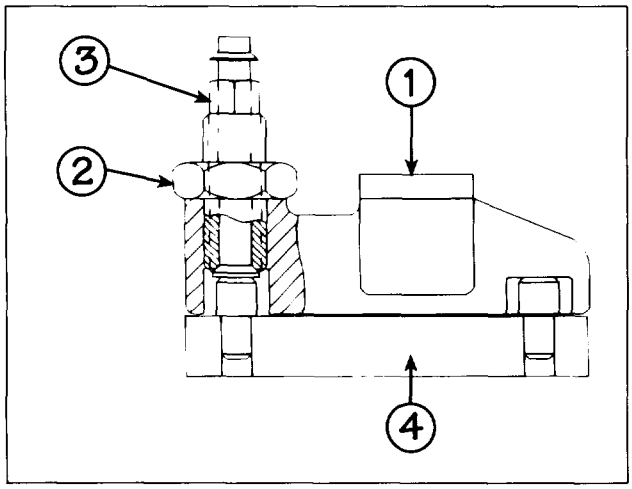


FIG. 31

Screw and Pin Assembly Replacement Procedure

Under normal use, the valve actuating screw and pin assembly does not need to be adjusted. Should the need arise to replace the pin and screw assembly or the guideless bridge, use the following procedure to set the proper height adjustment. (The pin and screw assembly and locknut are Jacobs parts; the bridge is a Caterpillar part.)

1. Place the exhaust valve bridge (1, Fig. 31) in a soft jaw vice. Remove the lock nut (2) and the screw and pin assembly (3). Note that these parts are assembled using a thread retaining compound. Any parts damaged during disassembly must be replaced.

2. Clean the parts to be assembled with an appropriate solvent (Loctite® 755 or equivalent). A primer is recommended to ensure quick setting of the retaining compound.

With Jacobs Assembly Tool, P/N 019764

3. Place the bridge on the assembly tool (4) with the recesses in the bridge over the pins on the tool. Clamp the bridge flush against the assembly tool in a soft jaw vice.

4. Apply retaining compound to the screw body threads (Loctite® 620 or equivalent). Install the screw and pin assembly and lock nut into the bridge. Turn the screw and pin assembly clockwise until it contacts the assembly tool pin.

5. Torque the locknut to 24 N•m (18 lb.-ft.).

Without Jacobs Assembly Tool, P/N 019764

6. Measure and record the depth of the pocket in the end of the bridge opposite the pin and screw assembly with a depth gage.

7. Apply retaining compound to the screw body threads (Loctite® 620 or equivalent). Install the screw and pin assembly and lock nut into the bridge.

8. Turn the screw and pin assembly clockwise until the depth from the bottom surface of the bridge to the face of the valve actuating pin equals the depth measured in Step 6.

9. Torque the locknut to 24 N•m (18 lb.-ft.). Check the depth of the actuating pin to ensure it did not shift during torquing.

NOTES

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