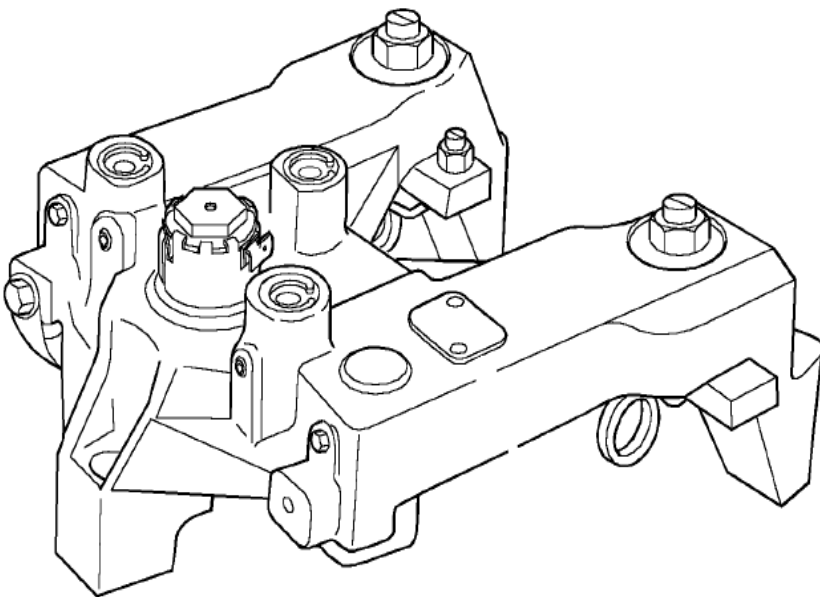




Models 750, 760, 765, 770 Tune-Up Kit Instructions

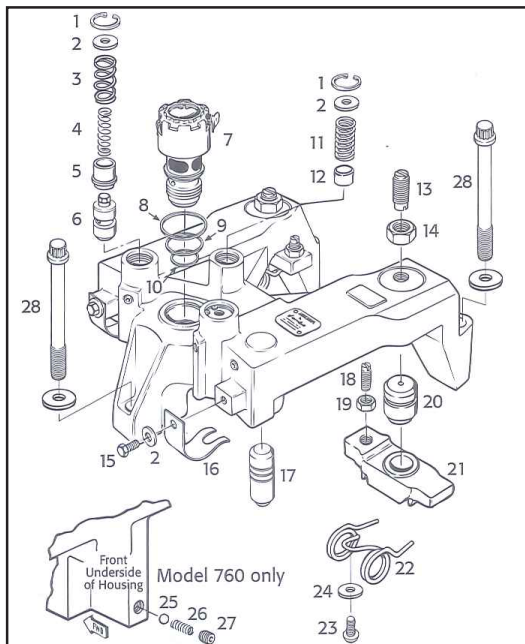


TUNE-UP KIT APPLICATIONS

FOR MODEL:	USE KIT:
750	20530
750A	20530
750B	26615
760	19875
760A	20531
760A (two-housing kit)	20530
760B	25405
760B (two-housing kit)	25455
765	20531
765 (two-housing kit)	20530
765A	20531
765A (two-housing kit)	20530
770	26618
770 (two-housing kit)	26615

Tune-up Kit Contents

Illus. No.	P/N	Part Name	19875	20531	25405	20530	25455	26615	26618
			Quantity Per Kit						
1	12991	Retaining Ring	9	9	9	6	6	6	9
2	16505	Washer/Cover	15	15	15	10	10	10	15
3	1519	Outer Control Valve Spring	6	6	6	4	4	4	6
4	18179	Inner Control Valve Spring (Yellow)	6	6	6	4	4	4	6
5	16557	Control Valve Collar	6	6	6	4	4	4	6
6	11930	Control Valve	6	6	6	4	4	4	6
8	20229	Upper Seal Ring	3	3	3	2	2	2	3
9	1082	Center Seal Ring	3	3	3	2	2	2	3
10	1083	Lower Seal Ring	3	3	3	2	2	2	3
11	12990	Accumulator Spring	3	3	3	2	2	2	3
13	20382	Power-Lash Assembly		6		4			
13	25380	Power-Lash Assembly			6		4		
13	28082	J-Lash Assembly						4	6
15	1492	Capscrew	6	6	6	4	4	4	6
16	16535	Master Piston Spring	6						
16	17658	Master Piston Spring		6	6	4	4	4	6
22	19576	Torsion Spring	6	6	6	4	4	4	6
23	12996	Buttonhead Screw	6						
23	19740	Buttonhead Screw		6	6	4	4	4	6
24	19741	Washer		6	6	4	4	4	6
25	1021	Check Ball	3						
26	11720	Spring	3						
27	8888	Pipe Plug	3						
NI	18960	Instructions	1	1	1	1	1	1	1



General Information

These instructions describe how to properly remove, clean and reinstall Jacobs Engine Brake components. For additional information on the 750, 760, 765, and 770 Series engine brakes, refer to the Series 60 Engine Service Manual, P/N 6SE483, and the Series 50 Engine Service Manual, P/N 6SE50.

The slave piston clearance settings listed on page 4 of this manual are current as of this printing, for updated settings refer to the Jacobs Engine Brake for Detroit Diesel Engines Application Guide, P/N 24770

Use OSHA-approved cleaning solvent for cleaning parts. Original parts to be reused should be inspected for wear and replaced as required. Be sure to coat parts with clean engine oil when reinstalling them. Wear safety glasses where indicated.

Safety Precautions

The following symbols in this manual signal conditions potentially dangerous 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 equipment or parts. Always wear safety glasses. Always use correct tools and follow proper procedures as outlined in this manual.

Instructions



WARNING

NEVER REMOVE OR ADJUST ANY ENGINE BRAKE OR COMPONENT WITH THE ENGINE RUNNING.

Access Engine Brake

1. Thoroughly clean engine.
2. Remove valve rocker cover and gasket.

NOTE:

IF THE ENGINE HAS A TWO-PIECE COVER, THE LOWER VALVE COVER BASE DOES NOT HAVE TO BE REMOVED TO GAIN ACCESS TO THE ENGINE BRAKE HOUSINGS.

3. Disconnect the lead wires from each of the solenoid valves.
4. Remove the three capscrews (28) and washers securing each engine brake housing. Remove the housings.

Disassemble Housings

1. Remove the solenoid valve (7) and discard the three seal rings (8, 9, 10).



WARNING

WEAR SAFETY GLASSES. REMOVE CONTROL VALVE COVERS AND ACCUMULATOR COVERS CAREFULLY TO AVOID PERSONAL INJURY. COVERS ARE UNDER LOAD FROM CONTROL VALVE SPRINGS (3, 4) AND ACCUMULATOR SPRINGS (11).

2. Hold down the control valve cover while removing the retaining ring (1). Remove and discard all parts.
 3. Hold down the accumulator cover and springs. Discard these parts. Use a magnet to remove the accumulator piston (12) from the bottom of the bore. Save the piston.
 4. Loosen the locknut (14) and remove the slave piston adjusting screw (13) and locknut. Retain the locknuts. **Model 760 only:** retain the adjusting screw. **All other Models:** discard the adjusting screws.
- NOTE:** EARLY MODEL 765A ENGINE BRAKES CONTAIN SPECIAL 5/8" DIAMETER POWER-LASH ADJUSTING SCREWS. IF YOU HAVE THESE SCREWS, RETAIN THEM FOR REUSE.
5. Remove the capscrew (15), washer (2) and spring (16) that retains the master piston; discard the spring, washer and capscrew. Remove and save the master piston.
 6. Remove the screw (23) and spring (22) that retains the slave piston assembly; discard these parts. Remove and save the bridge assembly (21) and slave piston (20).
 7. **Model 760 only:** Remove and discard the pipe plug (27), spring (26) and ball (25).

Assemble Housings

1. Clean all parts in an approved cleaning solvent. Dry with compressed air.
2. Coat all parts to be installed into housings with clean lube oil.
3. Reinstall the original slave piston (20) and bridge (21), reversing the removal procedure.

NOTE:

THE BRIDGE MUST BE INSTALLED WITH THE LEVELING SCREW (18) TOWARD THE CENTER OF THE HOUSING.

4. Install the new torsion spring (22), washer (24) and buttonhead screw (23). Tighten the screw to 20 Nm (15 lb-ft).



CAUTION

WHILE TIGHTENING THE SCREW, PUSH THE SPRING AGAINST THE BRIDGE AND TOWARD THE SLAVE PISTON ASSEMBLY. THIS WILL PREVENT POSSIBLE CONTACT OF THE SPRING WITH THE INTAKE VALVE ADJUSTING SCREW. FAILURE TO DO SO MAY RESULT IN SERIOUS ENGINE DAMAGE.

5. Reinstall the master piston (17). Install the new spring (16), washer (2) and screw (15). Tighten the screw to 10 Nm (100 lb-in).

NOTE:

WHEN TIGHTENING THE SCREW, BE SURE THAT THE SPRING LEGS ARE CENTERED AROUND THE MASTER PISTON BOSS.

6. Install the new Power-Lash or J-Lash assembly (13) and locknut (14). Do not tighten the locknut at this time.
7. Install the original accumulator piston (12) with the new spring (11), cover (2) and retaining ring (1). Rotate the retaining ring 90° to ensure that the ring is seated in the groove.

8. Install the new control valve (6), collar (5), spring (3, 4), cover (2) and retaining ring (1). Rotate the retaining ring 90° to ensure that the ring is seated in the groove.

NOTE:

INSTALL THE COLLAR (5) WITH STAMPED SLEEVE UP. IF THE COLLAR IS INSTALLED UPSIDE DOWN, THIS BRAKE CYLINDER WILL NOT OPERATE.

9. Install the lower (smallest) solenoid seal ring (10) into the bottom of the solenoid valve bore. Install the upper (8) and center (9) seal rings on the solenoid valve. Coat the seals with engine oil prior to assembly.

NOTE:

NEW UPPER SEAL RINGS CAN BE IDENTIFIED BY A YELLOW STRIPE.

10. Insert the solenoid valve and torque to 20 Nm (15 lb-ft).

NOTE:

INSTALL THE SOLENOID CAREFULLY TO AVOID CUTTING OR TWISTING THE SEAL RINGS. IMPROPER INSTALLATION COULD RESULT IN POOR ENGINE BRAKE PERFORMANCE.

11. **Model 760 only:** Install the new ball (25), spring (26) and pipe plug (27).

Install Engine Brake Housings

CAUTION

REMOVE THE OIL FROM THE BOLT HOLES PREVENTS THE CYLINDER HEAD FROM CRACKING WHEN BOLTS ARE TIGHTENED. ATTACH A LENGTH OF TUBING TO AN AIR GUN NOZZLE AND BLOW OUT THE OIL FROM THE HOUSING HOLD-DOWN BOLT HOLES. COVER THE HOLES WITH HAND TOWELS TO MINIMIZE OIL SPRAY.

WARNING

WEAR SAFETY GLASSES WHILE BLOWING THE OIL FROM THE BOLT HOLES.

1. Place the engine brake housings on the rocker shafts with the solenoids on the camshaft side of the engine and the slave piston bridges over the exhaust valves.
2. Lubricate each hold-down bolt with clean engine oil prior to installation.
3. Install a washer on each bolt and install the 100 mm (4.375 in.) long capscrews (three per housing).

NOTE:

ONLY MODEL 760 USES TWO LENGTHS OF CAPSCREWS. 120 MM BOLTS ARE TO BE INSTALLED ON THE EXHAUST SIDE OF THE ENGINE. 110 MM BOLTS ARE TO BE INSTALLED ON THE CAMSHAFT SIDE OF THE ENGINE.

CAUTION

INSTALLING 120 MM BOLTS ON THE CAMSHAFT SIDE OF THE ENGINE CAN RESULT IN SERIOUS ENGINE DAMAGE.

4. Before tightening the capscrews, move the housing from side to side. **Models 760B, 765A and 770 only:** Position housing as far as possible toward the camshaft side of the movement range to prevent contact with exhaust rocker. **All other models:** Position housing in the center of the range of motion.
5. Tighten the capscrews in the following sequence:
 - a. Tighten the capscrews on the camshaft side of the engine (one per housing) to 55 Nm (40 lb-ft).

- b. Tighten the capscrews on the exhaust manifold side of the engine to 55 Nm (40 lb-ft).
 - c. Repeat the tightening sequence and torque all capscrews to 136 Nm (100 lb-ft).
6. Connect the lead wires to the solenoid valves.

Adjust Slave Piston Clearance

CAUTION

FAILURE TO FOLLOW ADJUSTMENT PROCEDURES CAN RESULT IN ENGINE OR ENGINE BRAKE DAMAGE.

NOTE:

MAKE SLAVE PISTON ADJUSTMENT WITH THE ENGINE STOPPED AND COLD. ADJUST EACH CYLINDER WITH THE EXHAUST VALVES IN THE CLOSED POSITION.

1. Back out the leveling screw in the slave piston bridge until the end of the screw is recessed beneath the surface of the bridge.
2. Choose the correct size feeler gage using the following chart:

Slave Piston Clearance Setting for Model 750/760/765/770 Series Engine Brakes

Years	Engine	Clearance	
1998-99	8.5 liter	0.584 mm	0.023 in
1998-99	11.1 liter	0.584 mm	0.023 in
1998-99	12.7 liter	0.584 mm	0.023 in
1991-97	8.5 liter	0.660 mm	0.026 in
1991-97	11.1 liter	0.660 mm	0.026 in
1991-97	12.7 liter	0.660 mm	0.026 in
Pre-1991	11.1 liter	0.660 mm	0.026 in
Pre-1991	12.7 liter	0.508 mm	0.020 in

NOTE:

ENGINE IDENTIFICATION IS LOCATED ON THE TAG ON THE VALVE COVER AND STAMPED ON THE INTAKE SIDE OF THE CYLINDER BLOCK. REFER TO SERVICE MANUAL IF UNSURE OF THE SETTING. CURRENT SETTINGS ARE LISTED IN APPLICATION GUIDE P/N 24770.

3. Select and follow the procedure below for the appropriate engine brake model. Repeat the adjustment procedure for each engine cylinder.

A. Model 750, 750A, 760, 760A, 765, 765A:

- i. Place the correct feeler gage between the solid side of the slave piston bridge (side without the leveling screw) and the exhaust rocker arm adjusting screw.
- ii. Turn the slave piston adjusting screw clockwise until a slight drag is felt on the feeler gage. Hold the screw in this position and tighten the locknut to 40 Nm (30 lb-ft).
- iii. Following the same procedure, set the same clearance between the slave piston leveling screw and the rocker arm adjusting screw.

Hold the leveling screw and tighten the locknut to 40 Nm (30 lb-ft).

B. Model 750B and 770:

NOTE: MODELS 750B AND 770 UTILIZE J-LASH ADJUSTING SCREWS. THE J-LASH ADJUSTING SCREW RETAINS OIL, WHICH CAN CAUSE AN INCORRECT SLAVE PISTON LASH SETTING IF THE CORRECT SETTING PROCEDURE IS NOT FOLLOWED DURING ADJUSTMENT.

- i. Turn in the J-Lash adjusting screw until the solid line of the slave piston bridge assembly (side without the screw) contacts the exhaust rocker adjusting screw and the valve springs begin to compress, then turn in one (1) additional turn. Wait at least 30 seconds for oil to be purged from the J-Lash adjusting screw.

NOTE: ALL THE OIL MUST BE PURGED FROM THE J-LASH ADJUSTING SCREW. IF OIL IS BELOW 60°F, 16°C, WAIT AT LEAST TWO MINUTES FOR OIL TO BE PURGED FROM THE J-LASH ADJUSTING SCREW.

- ii. After the time interval specified in step (i), back out the adjusting screw ONLY until the correct size feeler gage can be inserted between the solid side of the slave piston bridge assembly and the rocker adjusting screw. Adjust the J-Lash adjusting screw so that a light drag is felt on the feeler gage. Do not retract more than required to obtain a light drag on the feeler gage. Hold the J-Lash adjusting screw in place and torque the lock nut to 35 Nm (25 lb-ft).

NOTE: IF THE J-LASH ADJUSTING SCREW IS BACKED OUT UNTIL IT NO LONGER COMPRESSES THE SLAVE PISTON SPRING, OIL WILL ENTER THE SCREW AND THE ADJUSTMENT WILL BE INCORRECT. IF THIS OCCURS, REPEAT STEPS (I) AND (II).

- iii. Place the correct feeler gage between the slave piston leveling screw and the rocker arm adjusting screw. Turn the leveling screw clockwise until a slight drag is felt on the feeler gage. Hold the leveling screw in this position and tighten the locknut to 40 Nm (30 lb-ft).
- iv. Recheck lash settings. If lash setting is incorrect, repeat steps (i) through (iii) above.

NOTE: ONCE THE ENGINE BRAKE HAS BEEN RUN YOU WILL NOT BE ABLE TO CHECK THE ENGINE BRAKE ADJUSTMENT. THIS IS BECAUSE OF OIL RETAINED IN THE J-LASH ADJUSTING SCREW. IF UNSURE OF THE ADJUSTMENT, YOU MUST REPEAT STEPS (I) THROUGH (IV) ABOVE.

Engine Brake Operational Check

Bleed the engine brake housings.



WEAR EYE PROTECTION AND DO NOT EXPOSE YOUR FACE OVER THE ENGINE AREA. TAKE PRECAUTIONS TO PREVENT OIL LEAKAGE ONTO THE ENGINE. COVER CONTROL VALVE AREAS SUFFICIENTLY TO PREVENT OIL SPLASH.

1. Be sure wires are away from moving parts.
2. Start the engine and allow to run for a few minutes.
3. Manually activate the solenoid valve several times to allow the housing to be filled with oil.

NOTE: THE SOLENOID VALVE IS MANUALLY ACTIVATED BY DEPRESSING THE ARMATURE. THE ARMATURE IS LOCATED IN THE CENTER OF THE TOP OF THE SOLENOID.

Check for proper operation.

1. Manually activate the solenoid valve and watch the master piston to be sure it is moving down onto the roller in the injector rocker arm.
2. Watch the slave piston assembly. It should move down to contact the exhaust valve rocker arm adjusting screws.
3. Check each housing to be sure it is functioning.
4. Shut down engine.

Rocker Cover Installation

One-piece rocker cover installation.

1. Install the seal into the groove in the cover and set the cover in place on the cylinder head.
2. Install the four retaining bolts with isolators and washers.
3. Starting with the center bolts and working outward, tighten the bolts to 22 Nm (16 lb-ft).
4. Press the protective plugs into the two center holes.

Two-piece rocker cover installation.

1. Make sure the seal is in place in the rocker cover base and set the cover in place on the cover base.
2. Install the bolt with a flat washer, isolator and limiting sleeve into the cover holes.
3. Tighten the bolts to 14 Nm (10 lb-ft) in the sequence shown in Fig. 1.
4. Torque the bolts to 27 Nm (20 lb-ft).

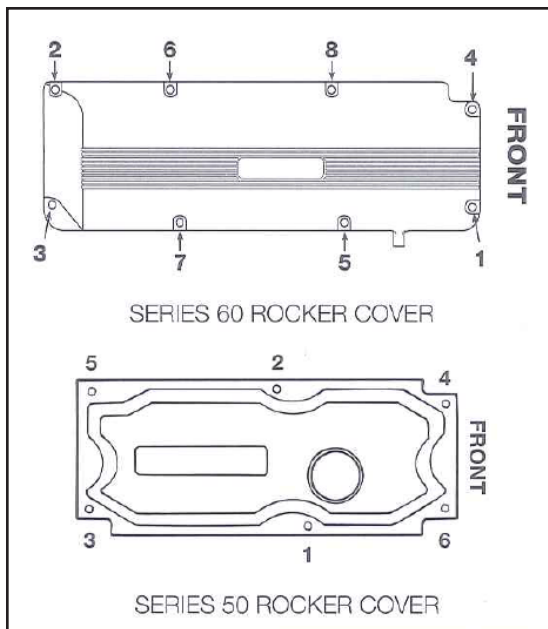


Fig. 1

Warranty

The standard Jacobs Vehicle System Service Parts Warranty applies to the components of this Tune-up Kit. The warranty is administered by Detroit Diesel Corporation.