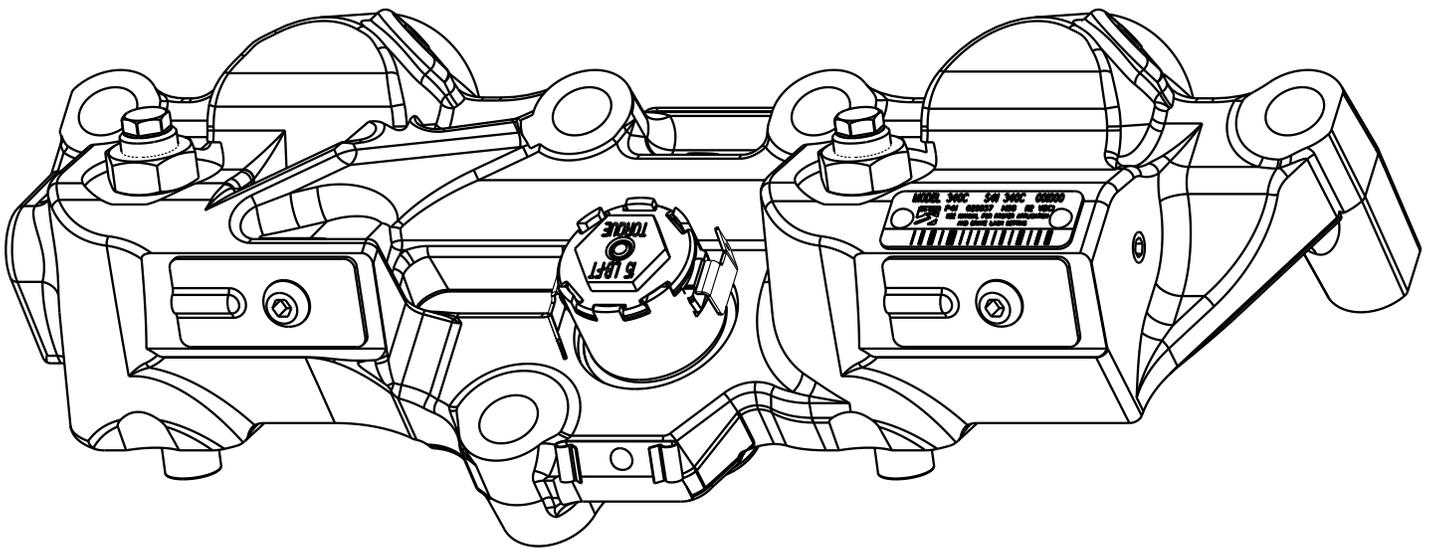




Jacobs Vehicle Systems[®]

Model 340 Tune-Up Kit Instructions

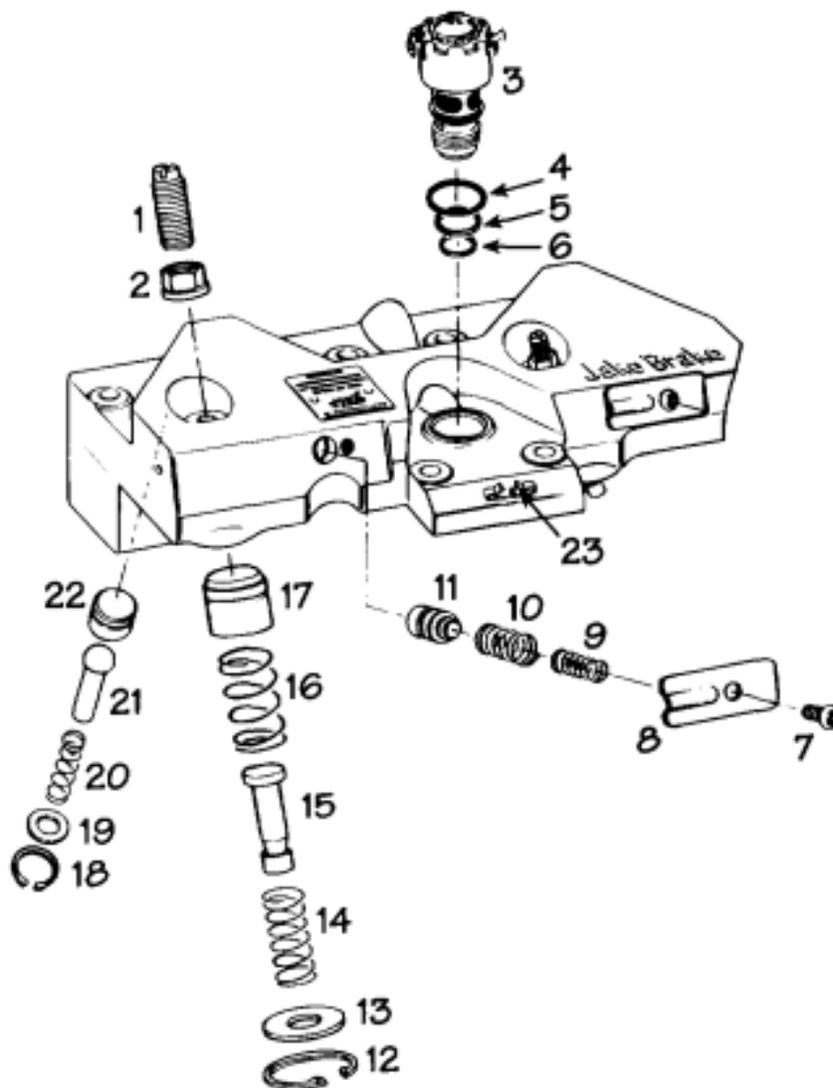
Jacobs P/N 019654



Tune-up Kit Contents

Illus. No.	Jacobs P/N	Part Name	Quantity Per Kit
4	020229	Upper Seal Ring	3
5	001082	Center Seal Ring	3
6	001083	Lower Seal Ring	3
7	003790	Buttonhead Screw	6
8	018222	Control Valve Cover	6
9	011823	Control Valve Inner Spring	6
10	010843	Control Valve Outer Spring .054" Wire	6
11	039022*	Control Valve Assembly	6
20	018214	Master Piston Spring .035" Wire	6
NI	019655	Instructions	1

*039022 replaces 011930



General Information

For additional information on the Model 340 engine brake, refer to Jacobs Engine Brake Installation Manual, P/N 019644.

Use OSHA-approved cleaning solvent for cleaning parts. Original parts to be reused should be inspected for wear and replaced as required. 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.

Access Engine Brake

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

Access Engine Brake

1. Thoroughly clean engine.
2. Remove valve cover.
3. Disconnect the lead wires from the solenoid valves.
4. Remove the mounting nuts and washers from each engine brake housing. Remove the housings.

Disassemble Housings

The following describes the disassembly and inspection procedure for each component group. Note that during reassembly, the parts included in the kit are to replace the appropriate parts removed from the housing.

Solenoid Valve

NOTE: REFERENCE TECH TIP NO. 2003-01 FOR MORE INFORMATION ON THE APPLICATION OF SOLENOID SEALS.

CAUTION DO NOT DISASSEMBLE OR TAMPER WITH THE SOLENOID VALVE. ENGINE DAMAGE COULD RESULT.

1. Disconnect the solenoid harness. Using 7/8" socket and extension, unscrew solenoid valve.
2. Remove and discard the three rubber seal rings (see Fig. 1). If the lower ring stays in the bottom of the housing solenoid bore, remove with a seal pick.

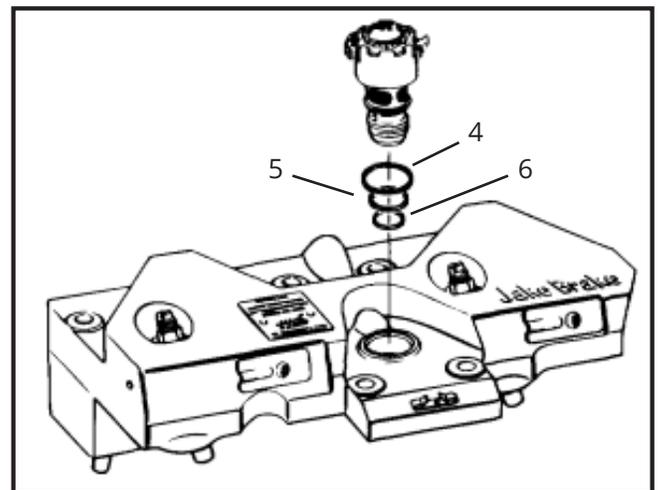


Fig. 1

3. Wash out the solenoid valve with an 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. Using the new solenoid seal rings, coat them with clean lube 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.
6. Be sure the seals are seated properly and carefully screw the solenoid into the housing without unseating the seals. Torque the valve to 60 lb.-in. (7 qdNm). Be careful not to twist the seals while installing.

Control Valve



WARNING

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



CAUTION

INSTALLING THE INCORRECT SPRINGS IN THE CONTROL VALVE BORE WILL RESULT IN LOSS OF PERFORMANCE AND POSSIBLE ENGINE DAMAGE.

1. Press down on the control valve cover to relieve spring pressure.
2. Remove the buttonhead screw using a 5/32" hex key.
3. Slowly remove the cover until spring force ceases, then remove the two control valve springs (see Fig. 2).

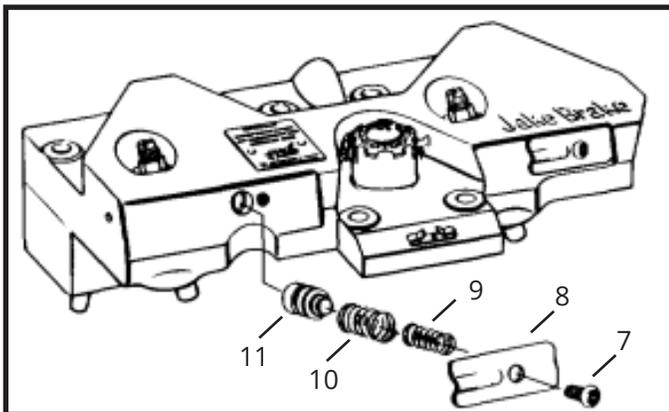


Fig. 2

4. Using needle-nose pliers, remove the control valve.
5. Wash the control valves with approved cleaning solvent. Push a wire through the hole in the base of the valve to the distance required to insure that the ball check is free. 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.
6. Thoroughly clean the control valve bore in the housing using clean paper towels. Dip the control valves in clean lube oil and replace the valve into its bore. If binding occurs, replace the control valve.

Auto-Lash® Adjusting Screw

NOTE:

THIS SECTION DOES NOT APPLY TO MODEL 340D.



CAUTION

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

1. Loosen the slave piston adjusting screw locknut and remove the slave piston adjusting screw (Auto-Lash) from housing (See Fig. 3).

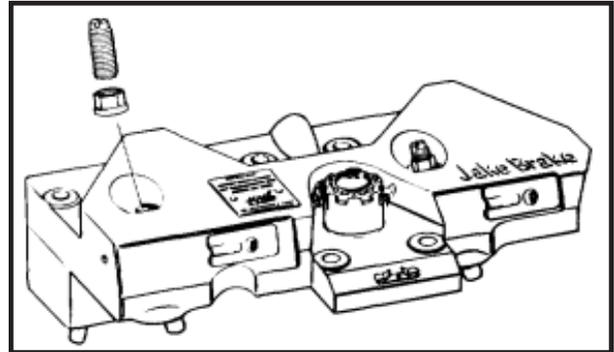


Fig. 3

2. Inspect the adjusting screw. The plunger should protrude from the bottom of the screw. Approximately 12 lb.-ft. (53 Nm) force is required to move the plunger. Be sure the retaining pin is fully seated in its hole.
3. Clean in an approved cleaning solvent or replace the entire screw as necessary. The screw assembly is not to be serviced in the field.

Master Piston



CAUTION

INSTALLING THE INCORRECT SPRINGS IN THE MASTER PISTON BORE WILL RESULT IN LOSS OF PERFORMANCE AND POSSIBLE ENGINE DAMAGE.

1. Remove the master piston retainer using small retaining ring pliers. Slowly lift the ring out, holding the ring and retaining washer with the other hand. Remove the master piston spring.
2. Remove the master piston and pushrod from its bore. Use needle-nose pliers, if necessary, to pull the piston out. If binding occurs, check for burrs or contaminants in lube oil.
3. Clean in approved solvent. Inspect the pushrod/piston interface. Pitted, chipped, cracked or galled

components should be replaced.

4. Reassemble in reverse order.

NOTE: BE SURE COMPONENTS ARE REASSEMBLED IN PROPER ORDER (SEE FIG. 4).

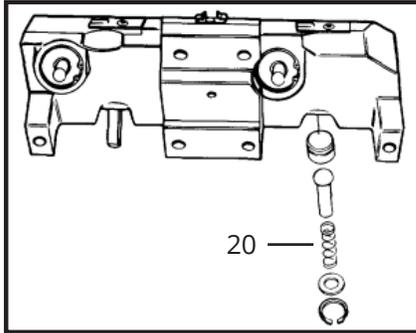


Fig. 4

Slave Piston

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



WARNING

1. Remove the locknut from the slave piston adjusting screw (Auto-Lash). Back out the adjusting screw until the slave piston is fully retracted (screw is loose).
2. Place the hole in the Jacobs slave piston tool (P/N 018238) over the slave piston adjusting screw (See Fig. 5).

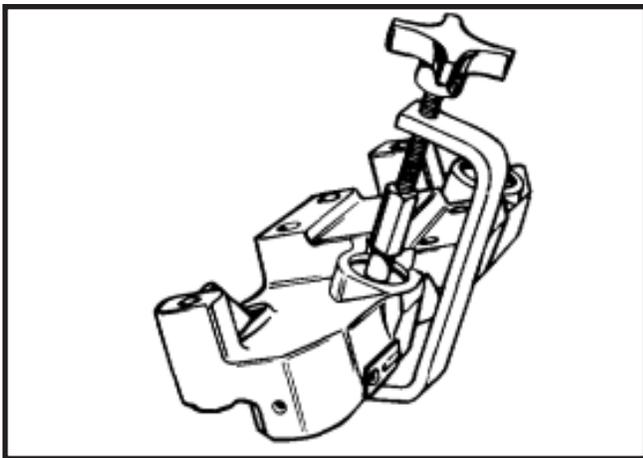


Fig. 5

3. Turn the handle slowly until the retainer is

against the retaining ring.

4. Remove the retaining ring with retaining ring pliers. Back out the holder until the springs are loose. Remove the tool.
5. Remove all components, ensuring there is no binding or burrs. Clean in an approved cleaning solvent or replace as necessary. Check to see if the retaining ring in the foot is intact. Inspect the piston/pushrod interface. Pitted, cracked or galled components should be replaced.

NOTE: BE SURE COMPONENTS ARE REASSEMBLED IN PROPER ORDER (SEE FIG. 6).

6. Use the slave piston tool to reinstall piston and springs. Be sure retaining ring is placed on the retainer before screwing the clamp-holder down over the slave piston.
7. Compress the slave piston springs down until the retainer is about 0.040" (1 mm) below the retaining ring groove. Reinstall the retaining ring. Be sure the retaining ring is fully seated in the groove.
8. Remove the slave piston tool slowly to insure proper seating of retaining ring.
9. Assemble adjusting screw (Auto-Lash®) and nut. Do not tighten at this time.

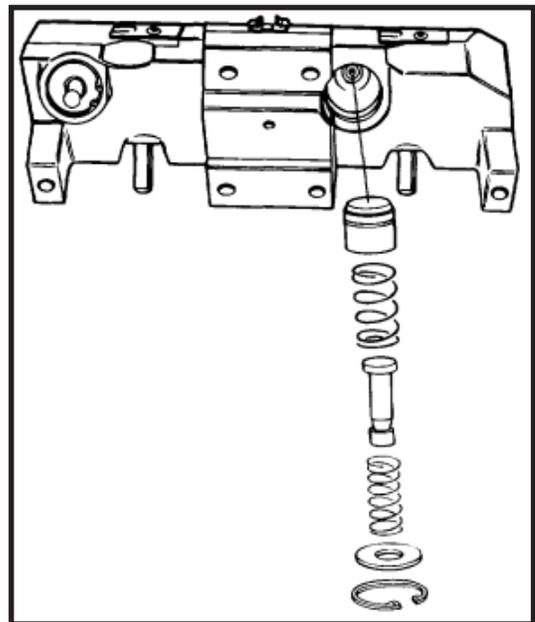


Fig. 6

Brake Housing Installation

1. Place brake housing over the two studs. The brake housing will rest on the support tubes and rocker shaft.

NOTE: BE SURE MASTER PISTON PUSH ROD IS SEATED IN THE POCKET OF THE INJECTOR ROCKER ARM (SEE FIG. 7).

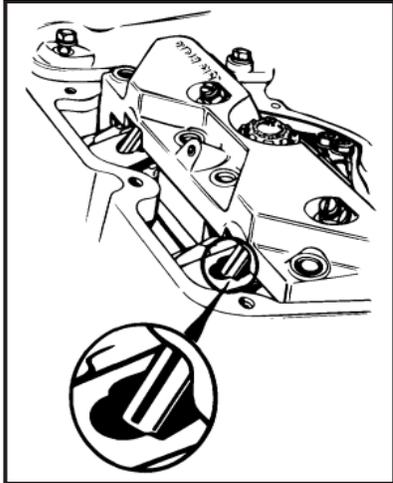


Fig. 7

2. Install capscrews and washers (4 each per housing) through brake housing and rocker shaft assembly into the cylinder head.
3. Place nut and washer on the two studs. Hand tighten.
4. Torque the four capscrews and the two stud nuts in two stages as follows (see Fig. 8):
 - a. Starting with center capscrews and stud nuts and then progressing to outside capscrews, torque to 40 lb.-ft. (54 Nm).
 - b. Repeat, torquing capscrews and stud nuts to 80 lb.-ft. (109 Nm).

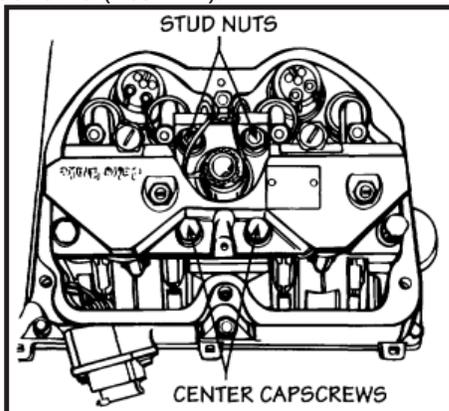


Fig. 8

Valve and Injector Adjustments

Intake and exhaust valves and injectors must be adjusted according to Caterpillar specifications. Use the following sequence:

1. With No. 1 Piston at TDC of compression stroke, set inlet valves on cylinders 1, 2 and 4. Set exhaust valves on cylinders 1, 3 and 5. Set unit injectors on cylinders 3, 5 and 6.
2. Turn crankshaft 360° in the direction of engine rotation (No. 6 Piston at TDC). Set inlet valves on cylinder 3, 5 and 6. Set exhaust valves on cylinders 2, 4 and 6. Set unit injectors on cylinders 1, 2 and 4.

Engine Position	Set Inlet Valves	Set Exhaust Valves	Set Unit Injectors	Set Slave Lash
Cylinder 1	1, 2, 4	1, 3, 5	3, 5, 6	1, 3, 5
Cylinder 6	3, 5, 6	2, 4, 6	1, 2, 4	2, 4, 6

Slave Piston Clearance Adjustment

NOTE: SEE SERVICE LETTER E477 FOR FURTHER INFORMATION ON AUTO-LASH SETTING.

After the intake/exhaust valves and injectors are adjusted, set the slave piston clearance. Exhaust valves on the cylinder to be adjusted must be in the closed position.

1. Place the appropriate feeler gage (see Table 1 on page 8) between the slave piston foot and the exhaust rocker arm (see Fig. 9). Turn the slave piston adjusting screw (Auto-Lash®) in clockwise until a slight drag is felt on the feeler gage.



DO NOT PLACE FEELER GAGE BETWEEN ROCKER ARM ADJUSTING SCREW AND VALVE BRIDGE. THIS WILL RESULT IN IMPROPER ADJUSTMENT AND POSSIBLE ENGINE DAMAGE.

2. Hold the adjusting screw and torque the locknut to 25 lb.-ft. (34 Nm).
3. Rotate the engine crankshaft to complete adjustment of all slave pistons.

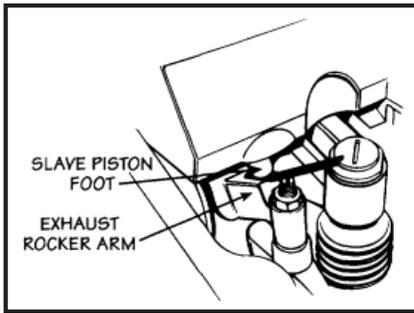


Fig. 9

Final Procedures

1. Connect the lead wires supplied in the undercover harness to the solenoid valves.

NOTE: THE POSITIVE AND NEGATIVE LEADS MAY BE CONNECTED IN ANY ORDER.

2. Start engine and allow to run 5 to 10 minutes.
3. With the engine at low idle, manually depress the solenoid armature several times in succession until the master pistons move out of the housing and the engine brake begins to operate. Normal oil evacuating from the control valve covers should be free of air bubbles before replacing the valve covers. This permits oil to fill brake housing passages and readies the brake for operation.
4. Position valve covers on spacer and install capscrews. Torque to 13 lb.-ft. (18 Nm).
5. Inspect the installation for oil leakage or component interference. If either is found, the problem must be corrected at this time.

Chassis Wiring

Consult vehicle manufacturer's wiring diagrams to locate engine brake switch location and wire coding.

NOTE: MODEL TRUCKS AFTER 1994 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 does not provide controls for models after 1994 products as these controls are integrated into the engine chassis.

Quick Reference Tables

Table 1: Slave Lash Adjustment

Engine Model	Engine S/N Prefix	Brake Model	Engine HP	Brake Lash Adjusting Setting	Tool P/N
C18	C18	CJP1 and up	340C	All Ratings	.040" 150-7227
		MDP1 and up	340C	All Ratings	.040" 150-7227
		MEP1 and up	340C	All Ratings	.040" 150-7227
C16	C16	7CZ03834 and up	340D	All Ratings	.025" 149-6114
		7CZ1 - 03833	340C	575 and 600	0.037" 155-5239
			340B	575 and 600	0.037" 155-5239
		WIA1 and up	340C	All Ratings	.040" 150-7227
C15	C15	BXS1546 and up	340E	All Ratings	0.033" 155-5238
		BXS1 - 1545	340C	All Ratings	0.035" 149-0114
		MBN1 and up	340D	All Ratings	0.030" 149-0049
		C2A (10R9846)	340D	All Ratings	0.030" 149-0049
		6NZ83126 and up	340D	All Ratings	0.025" 149-6114
		6NZ1 - 83125	340C	410 and under	0.037" 155-5239
		6NZ1 - 83125	340C	435 and up	0.033" 155-5238
		6NZ	340B	435 and up	0.033" 155-5238
				410 and under	0.037" 155-5239
		C2A (Except 10R9846)	340C	410 and under	0.037" 155-5239
				435 and up	0.033" 155-5238
				375/435 multitorque rating	0.033" 155-5238
		3406	3406E	1LW33334 and up	340D
1LW1-33333	340C			435 and up	0.027" 149-0028
	340B			410 and under	0.033" 155-5238
				435 and up	0.027" 149-0028
1MM	340C			575 and 600	0.037" 155-5239
				340B	575 and 600
2WS	340C			435 and 550	0.033" 155-5238
				410 and under	0.037" 155-5239
340B				435 and up	0.033" 155-5238
				410 and under	0.037" 155-5239
5DS	340C			600	0.037" 155-5239
				340B	600
5EK01820 and below	340A			435 and up	0.030" 149-0049
				410 and under	0.027" 149-0028
5EK01821 and up	340A			435 and up	0.027" 149-0028
				410 and under	0.027" 149-0028
4AS	340C			All Ratings	0.027" 149-0028
6TS	340A			435 and up	0.030" 149-0049
				410 and under	0.027" 149-0028
9AP	340C			All	0.037" 155-5239
		340B	All	0.037" 155-5239	

Table 2: Torque Values

	Lb.-ft.	Nm
Brake Mounting Studs	65	88
Brake Mounting Bolts	80	109
Brake Mounting Bolts with Full Shank Bolts (p/n 257-2122)	110	150
Stud Nuts	80	109
Auto-Lash Locknut	25	34

Table 3: Special Tools

	Part No.
Snap-on Stud Driver	CJ800-9
Caterpillar Turning Tool	9S9082