

Tune-up & Repair Tips

P-39A - CATERPILLAR 3406E/C-15/C-16

PAGE 1/4

PROBLEM	DETECTION	REPAIR INSTRUCTIONS (NOT in order)
(A) Electrical Fault:	Confirm "CEL" (check engine light) only comes on when Pacbrake is applied.	(1) Use diagnostic reader to determine if fault is in Low or Medium position, center housing is Low and Medium is Front or Rear housing. - For engine serial numbers Prefix 5EK and 6TS follow procedure in Caterpillar manual #SERN5582-05 - For engine serial numbers Prefix 1LW and 5DS follow procedure in Caterpillar manual #REN1328-02 - For engine serial numbers Prefix 2WS and 1MM follow procedure in Caterpillar manual #REN2238
	If problem is detected on LOW circuit short to ground. Cause of "CEL" is under the center valve cover.	(2) Inspect vehicle wiring harness to the CENTER housing (consult vehicle wiring diagram if necessary): -Remove center valve cover. -Visually inspect engine brake wiring, looking for chaffed or worn-through wires near moving parts. If a fault is found, repair as necessary and test. If OK proceed to instruction 6.
	If problem is detected on MEDIUM circuit short to ground. Cause of "CEL" is under the front & rear valve covers.	(3) Inspect vehicle wiring harness to the FRONT and REAR housings (consult vehicle wiring diagram if necessary): -Remove front and rear valve cover. -Visually inspect engine brake wiring, looking for chaffed or worn-through wires near moving parts. If a fault is found, repair as necessary and test. If OK proceed to instruction 6.
	If problem is detected on LOW "OPEN" circuit. Cause of "CEL" is under the center valve cover.	(4) Check CENTER housing wiring connection at Pacbrake terminal. -Remove center valve cover. -Ensure for positive wiring connection at solenoid. -Check for correct solenoid torque (150 in. lbs.) -Repair or replace as necessary. If proper operation returns, stop and reassemble. If OK proceed to instruction 6.
	If problem is detected on MEDIUM "OPEN" circuit. Cause of "CEL" is under the front & rear valve covers.	(5) Check FRONT & REAR housing wiring connection at Pacbrake terminal. -Remove front and rear valve cover. -Ensure for positive wiring connection at solenoid. -Check for correct solenoid torque (150 in. lbs.) -Repair or replace as necessary. If proper operation returns, stop and reassemble.
	If repair instructions 1, 2, 3, 4, and 5 are OK. No wiring faults are found. Solenoid resistance check required.	(6) Disconnect solenoid wiring harness at solenoid, then using a digital ohm meter, check solenoid resistance: -@ 70 degrees F. solenoid temperature, resistance should be 15.5 ohms \pm 15% -@ 180 degrees F. solenoid temperature, resistance should be 20.0 ohms \pm 15% -Replace as necessary. -Check for continuity from either terminal to solenoid. Body should be none .000 Ω . If so, replace solenoid assembly.
	If solenoids are OK from instruction 6.	(7) Check voltage to solenoids (11.3 volts minimum required). This check must be done with engine NOT running and engine brake switch placed in HIGH position. -Inspect vehicle wiring, switches and connections (consult vehicle wiring diagram). -Repair or replace as necessary. -With 12 volts to solenoids, wait ten minutes, then using your fingernail only, try to pull up armature, armature must stay activated. Recheck ohms resistance as specified in instruction 6. -If no electrical faults are found, contact Pacbrake (800-663-0096)

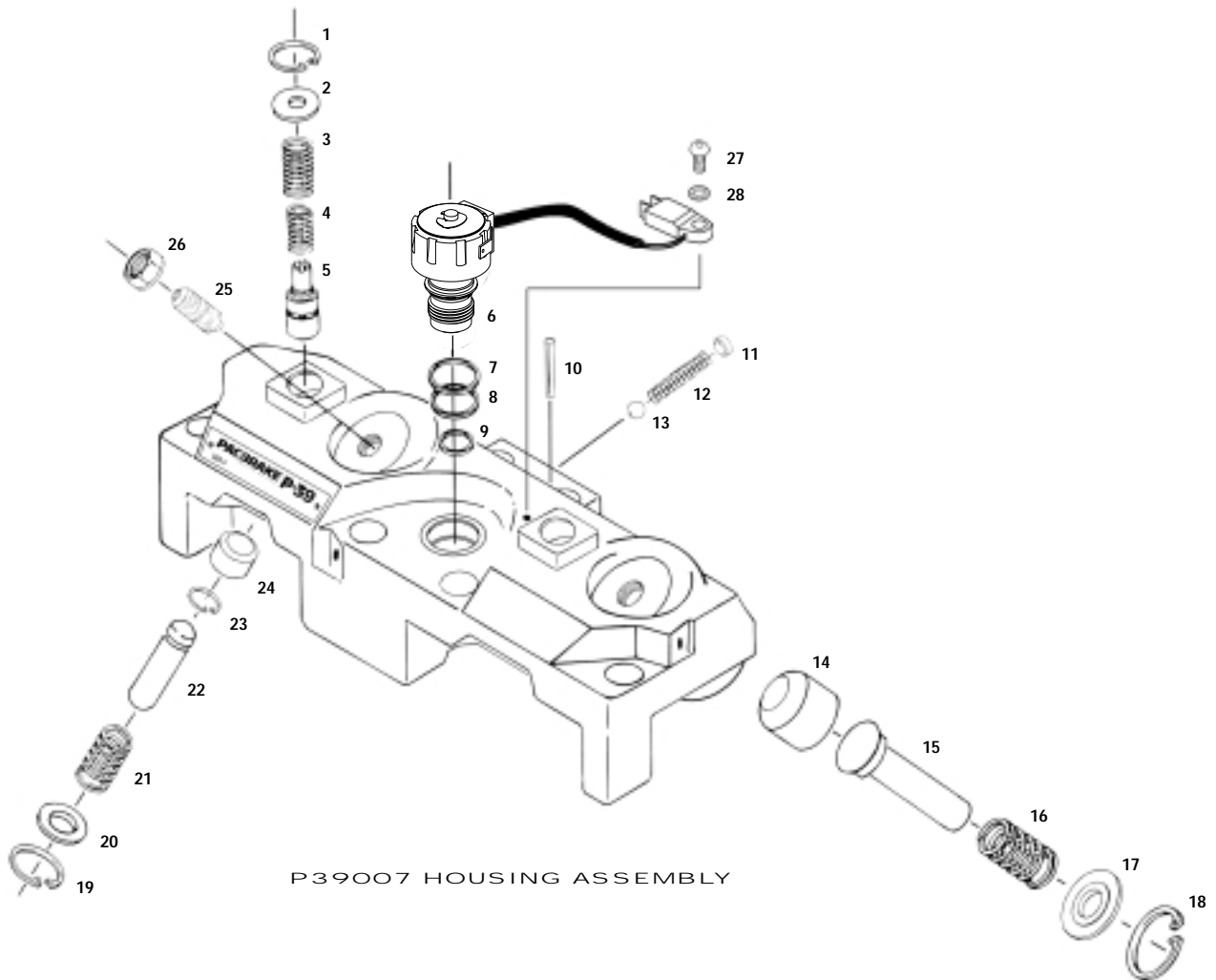


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(B) Hydraulic Fault: Retarder is NOT operating properly (low on power) and NO active engine warning codes when engine brake is applied.	Check for correct engine oil level.	(8) Add oil if necessary. -Oil pressure test at engine brake may be required. Model P-39 engine brake requires a minimum of 42 PSI at housing to operate properly.																		
	If oil level is correct and vehicle equipped with a turbo boost gauge, check boost @ 2100 rpm on LOW, MED. and HIGH.	(9) Check air to air system for leakage: -Repair if necessary. -Turbo boost should increase with LOW, MED. and HIGH settings (amount of boost will depend on air temperature and condition of both turbo and air to air system.) Approximate boost should read: LOW - 6 psi @ 2100 rpm MED. - 12 psi @ 2100 rpm HIGH - 18 psi @ 2100 rpm.																		
	If instruction 9 is OK the engine brake is operating properly. If boost readings are erratic or not evenly spread proceed to instruction 10.	(10) Remove valve cover and visually inspect. DO NOT remove engine brake housing at this time. -Check housing torque (80 ft. lbs.) -Repair as necessary.																		
	If instruction 10 is OK, proceed to instruction 11.	(11) Check slave piston links for damage. If a slave piston link assembly is damaged it must be replaced. Earlier models have a wobbly foot at base of link assembly. A revised link assembly is available. Consult Pacbrake factory.																		
	If links are OK from instruction 11 go to instruction 12.	(12) Verify slave lash setting is correct. Reference engine horsepower and adjust as follows: <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">1994 to 1997</td> <td style="width: 55%;">410 HP and UNDER</td> <td style="width: 30%;">0.69 mm (.027")</td> </tr> <tr> <td>1994 to 1997</td> <td>435 HP and HIGHER</td> <td>0.76 mm (.030")</td> </tr> <tr> <td>1998</td> <td>ALL H.P. RANGES</td> <td>0.76 mm (.030")</td> </tr> <tr> <td>1999</td> <td>410 HP and UNDER</td> <td>1.07 mm (.042")</td> </tr> <tr> <td>1999</td> <td>410 HP and HIGHER</td> <td>0.76 mm (.030")</td> </tr> <tr> <td>1999</td> <td>2WS MULTI TORQUE 375/435/450 H.P.</td> <td>1.07 mm (.042")</td> </tr> </table>	1994 to 1997	410 HP and UNDER	0.69 mm (.027")	1994 to 1997	435 HP and HIGHER	0.76 mm (.030")	1998	ALL H.P. RANGES	0.76 mm (.030")	1999	410 HP and UNDER	1.07 mm (.042")	1999	410 HP and HIGHER	0.76 mm (.030")	1999	2WS MULTI TORQUE 375/435/450 H.P.	1.07 mm (.042")
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	If lash is incorrect on one or two cylinders.	(13) Remove all the Paclash adjusting screws and inspect their plungers for even spring pressure. If all are okay, re-adjust slave lash to above specifications, insert correct feeler gauge. Turn adjusting screw beyond contact point to squeeze out trapped oil. Back out the screw, then turn in again until a slight drag is felt on the feeler gauge. Torque the lock nut to 35 N·m (25 lb. ft.)																		
	If instruction 13 is OK.	(14) Using solenoid wrench (p/n P11494) remove solenoids to check seal rings for damage (should be pliable and not torn). If damaged, replace as necessary (torque to 150 in. lbs.)																		
	If OK from instruction 14.	(15) Remove control valve snap rings and washers. Check the control valve springs for damaged coils. -Inspect spring coils for broken or ends curled over. -Use caution and wear safety glasses. -Replace damaged parts as necessary.																		
	If damaged springs are found (instruction 15).	(16) Inspect for broken or missing spring parts: -Complete disassembly may be necessary to locate all spring pieces.																		



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	If damaged springs are NOT found (instruction 16).	(17) Inspect control valves: -Should move freely up and down in bore -Check control valves. Any with "loose tops" must be replaced. -Replace damaged or worn parts as necessary.
	If control valves are OK (instruction 17).	(18) Re-install control valves, springs, washers and snap rings. -Proceed to (D) Mechanical Fault
(C) Engine brake won't shut off.	Retarder continues to operate after it's turned off.	(19) Inspect wiring for possible "shorts to ground": -Check wiring harness for any bare wires touching ground. Inspect engine brake control valves: -Check control valves move freely within their bores. -Check for any sign of damaged control valve springs. -Repair or replace as necessary. -Check solenoid seals for damage. -Check solenoid for insufficient torque. -Check solenoid armature travel or leakage out the release port while braking.
(D) Mechanical fault. Retarder is NOT operating properly (low on power) and NO active engine warning codes when engine brake is applied.	If no faults have been detected to this point it may be necessary to run the engine with the valve cover removed.	(20) Abnormal oil leakage and audible inspection, both at the same time (Caution must be taken in following this procedure as oil will also spray from the control valve washers when the solenoid armature is released): -Operate engine at idle speed, manually depress solenoid armature and inspect for abnormal oil leakage (oil from a different location than above.) -Listen to "individual" housings (you should hear two cylinders braking or "popping"). Keep in mind, due to firing order, each housing will sound slightly different. -When solenoid is activated each master piston link should extend into injector rocker cavity and engine braking should take place. If in doubt, contact Pacbrake factory at 800-663-0096.





P39007 HOUSING ASSEMBLY

ILLUS. NO.	PART NO.	DESCRIPTION	QTY. PER HSG. ASSEMBLY	ILLUS. NO.	PART NO.	DESCRIPTION	QTY. PER HSG. ASSEMBLY
1.	P15561	SNAP RING	2	15.	P39135	SLAVE LINK ASSEMBLY	2
2.	P38015	PLAIN WASHER	2	16.	P39032	SLAVE PISTON SPRING	2
3.	P11434	OUTER C.V. SPRING	2	17.	P39037	SLAVE RETAINER	2
4.	P39100	INNER C.V. SPRING	2	18.	P39038	SLAVE SNAP RING	2
5.	P01500	CONTROL VALVE	2	19.	P39042	MASTER SNAP RING	2
6.	P04215	SOLENOID - 12V	1	20.	P39041	MASTER RETAINER	2
7.	P01081	UPPER SOLENOID SEAL	1	21.	P39046	MASTER LINK SPRING	2
8.	P01082	CENTER SOLENOID SEAL	1	22.	P39045	MASTER LINK	2
9.	P01083	LOWER SOLENOID SEAL	1	23.	P39044	MASTER CLIP	2
10.	P39022	REGULATOR SPRING PIN	1	24.	P39040	MASTER PISTON	2
11.	P39023	REGULATOR RETAINER	1	*25.	P39076	PACLASH ADJ. SCREW	2
12.	P39020	REGULATOR SPRING	1	26.	P09353	FLANGE NUT	2
13.	P39021	REGULATOR BALL	1	27.	P02751	WASHER	1
14.	P39030	SLAVE PISTON	2	28.	P02750	BUTTON SOCKET SCREW	1

*P39076 INCLUDES P09353 WHEN SOLD SEPARATELY

