

Tune-up & Repair Tips

DETROIT DIESEL® SERIES 60® P-63 (12.7L) / P61 (11.1L)

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PROBLEM	DETECTION	REPAIR INSTRUCTIONS (NOT in order)
(A) Electrical Fault: Vehicle's "CHECK ENGINE" light comes on when engine brake is applied.	Confirm "CEL" only comes on when Pacbrake is applied.	(1) Use Prolink to determine if problem is on the LOW circuit or MEDIUM circuit and OPEN circuit or SHORT TO GROUND. Proceed as follows: If Prolink diagnostic tool is not available, confirm with operator if "CEL" comes on in LOW (center housing) or MED (front or rear housing) position.
	If problem is detected on LOW circuit short to ground.	(2) Inspect vehicle wiring harness to the CENTER housing (consult vehicle wiring diagram if necessary): - Remove valve cover (two-piece cover, remove only top). - Visually inspect engine brake wiring, looking for chaffed or worn-through wires near moving parts.
	If problem is detected on MEDIUM circuit short to ground.	(3) Inspect vehicle wiring harness to the FRONT and REAR housings (consult vehicle wiring diagram if necessary): - Remove valve cover (two-piece cover, remove only top). - Visually inspect engine brake wiring, looking for chaffed or worn-through wires near moving parts.
	If problem is detected on LOW "OPEN" circuit.	(4) Check CENTER housing/wiring to center: - Remove valve cover (two-piece cover, remove only top). - Ensure for positive wiring connection at solenoid. - Check connector on two-piece harnesses, located between cylinders #5 and #6 for positive connection. - Check for correct solenoid torque (150 in.lbs.) - Repair or replace as necessary. If proper operation returns, stop and reassemble. If no fault found proceed to instructions 5.
	If problem is detected on MEDIUM "OPEN" circuit.	(5) Check FRONT and REAR housing/ or wiring to housings: - Remove valve cover (two-piece cover, remove only top). - Ensure for positive wiring connection at solenoids. - Check connector on two-piece harnesses, located between cylinders #5 and #6 for positive connection. - 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 and 3 are OK. No wiring faults are found.	(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 ± 15%*. - @ 180 degrees F. solenoid temp., resistance should be 20.0 ohms ± 15%*. * Refer to service bulletin #141. - Replace as necessary.
	If solenoids are OK from instructions 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 the HIGH position. (DDEC III systems will allow activation of solenoids with engine not running to determine voltage). - Inspect vehicle wiring, switches and connections (consult vehicle wiring diagram). Replace as necessary. - Check at relay on DDEC II systems. - 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 instructions 6. - If no electrical faults are found, contact Pacbrake (phone 1-800-663-0096)
(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.
cont. (B) Hydraulic Fault: Retarder is NOT operating properly (low on power) and NO active engine warning codes when engine brake is applied.	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 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

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	If instructions 9 are OK.	(10) Remove valve cover and visually inspect. DO NOT remove engine brake housings at this time. - Check housing torque (80 lbs. ft.) Later bolts are 100 lbs. ft. See service bulletin #136. - Repair as necessary.								
	If instructions 9 and 10 are OK.	(11) Verify slave lash setting is correct: - On cylinders where the exhaust rocker arm is not contacting exhaust valves, loosen Pacbrake adjusting screw locknut and using a 5/32 allen wrench, turn screw clockwise 1/2 turn. This should be zero lash. If not lash was set incorrectly.								
	If lash is OK from instructions 11.	(12) Remove all the Paclash adjusting screws and inspect all their plungers for spring pressure. - Visually check inner slave piston. P-63, P-63A and P-63B must have bleed hole. P-63C has no inner slave bleed hole. - Check for plunger sealing surface (if damaged, must be replaced). - Readjust engine brake slave lash to .025", or exactly 1/2 turn counterclockwise from zero lash, and torque to 25 ft.lbs.								
	If lash is incorrect on one or two cylinders (instructions 11)	(13) Check slave piston carbide wear pad (damaged or missing). - Replace as necessary and readjust.								
	If instructions 12 are OK.	(14) Using solenoid wrench (p/n P11494) remove solenoids to check seal rings for damage (should be pliable). - If damaged, replace as necessary (torque to 150 in.lbs.)								
	If instructions 14 are OK.	(15) Remove control valve and accumulator cover plates. - Check the two control valve spring(s) for damaged coils*. - Check the accumulator spring(s) for damaged coils*. DO NOT interchange control valve springs and accumulator springs . <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; border-bottom: 1px solid black;">*P-63 Three (3) accumulator springs (natural)</td> <td style="width: 25%; border-bottom: 1px solid black;">*P-63A Single accumulator spring† (natural)</td> <td style="width: 25%; border-bottom: 1px solid black;">*P-63B Double accumulator springs (1 red, 1 yellow)</td> <td style="width: 25%; border-bottom: 1px solid black;">*P-63C Single accumulator spring (red)</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Two (2) control valve springs (blue)</td> <td style="border-bottom: 1px solid black;">Single control valve spring† (blue)</td> <td style="border-bottom: 1px solid black;">Single control valve spring (blue)</td> <td style="border-bottom: 1px solid black;">Single control valve spring (blue)</td> </tr> </table> <small>†Not all P-63A brakes had single control valve and accumulator springs. Two batches of field trial housings were released with single springs before the final release. In between these field trials, production of multiple spring housings was continued.</small>	*P-63 Three (3) accumulator springs (natural)	*P-63A Single accumulator spring† (natural)	*P-63B Double accumulator springs (1 red, 1 yellow)	*P-63C Single accumulator spring (red)	Two (2) control valve springs (blue)	Single control valve spring† (blue)	Single control valve spring (blue)	Single control valve spring (blue)
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Two (2) control valve springs (blue)	Single control valve spring† (blue)	Single control valve spring (blue)	Single control valve spring (blue)							
	If broken springs were found (instructions 15).	(16) Inspect for broken or missing spring parts: - Complete disassembly may be necessary to locate all spring pieces.								
	If broken springs are NOT found (instructions 16).	(17) Inspect control valves: - Should move freely up and down in bore. - Check control valves. One's with "loose tops" must be replaced.								
	If control valves are OK (instructions 17).	(18) Inspect accumulator valves: - Should move freely up and down in bore.								
(C) Engine Brake Won't Shut Off.	Retarder continues to operate after it's turned off.	(20) Inspect wiring for possible "shorts to ground": - Check wiring harnesses 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. - Replace or repair as necessary.								
(D) Mechanical Fault (idle rpm). 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.	(21) Abnormal oil leakage and audible inspection, both at the same time (Caution must be taken following this procedure on P-63, P-63A, P-63B as oil will spray from the inner slave piston bleed holes when the solenoid armature is depressed (P-63C doesn't use these inner slaves). Oil will also spray from the control and accumulator valve cover plates 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.								

