



Pacbrake Exhaust Brake Controller Troubleshooting

TABLE OF CONTENTS

CLAIM 1: BRAKE DOESN'T TURN ON:.....	2
DODGE 2003-2008 THROTTLE POSITION SENSOR RESETTING PROCEDURE:	3
STEP 6: COMPRESSOR TROUBLESHOOTING	3
STEP 7: PRESSURE SWITCH TROUBLESHOOTING	4
STEP 10: AIR SOLENOID TROUBLESHOOTING	4
CLAIM 2: BRAKE WORKS CORRECTLY EXCEPT FOR WHEN TRUCK IS IN OVERDRIVE	6
CLAIM 3: BRAKE WORKS IN BOTH THE ON AND OFF BRAKE ENABLE SWITCH POSITION:.....	7
CLAIM 4: BRAKE TURNS ON IMMEDIATELY WHEN BRAKE ENABLE SWITCH IS TURNED ON	7
CLAIM 5: COMPRESSOR RUNS WHILE VEHICLE IS OFF:	8
CLAIM 6: CEL (CHECK ENGINE LIGHT) IS ON:	9
CLAIM 7: NORMAL VEHICLE OPERATION HAS CHANGED – FAULT OF PACBRAKE QUESTIONED:	9
CLAIM 8: FORD 6.0L TOW HAUL LIGHT BLINKS WHEN BRAKING.....	12
CLAIM 9: LED ON BRAKE ENABLE SWITCH FLASHING ORANGE.....	13
APPENDIX A: CONTROLLER SERIAL NUMBER IDENTIFICATION	12
APPENDIX B: CONTROLLER OPERATING PARAMETERS CHART.....	13

NOTE: *Keep in mind effects of modification to vehicle such as power boxes, significant change in tire size, and transmission modifications. Also, referring to a wiring diagram to confirm correct wire location in the main grey connector would be helpful in conjunction with the following troubleshooting procedure. If all diagnosis and solutions above fail, it's likely to be a controller quality issue.*

Tools Needed: *Multimeter and test light.*



CLAIM 1: Brake Doesn't Turn On

DIAGNOSIS:

Step 1:

While driving, ensure brake enable switch is in the ON position, sufficient brake engage speed (>40 mph for testing) has been reached at a constant throttle position, and Tow/Haul or Overdrive Off mode is engaged, and re-try. Also consider such things as DPF regeneration status for Duramax LMM trucks as indicated with a green light or flashing green light on the LED switch.

Step 2:

With the brake enable switch in the OFF position, cycle the ignition (start truck, even though properly wired ignition "ON" position should be sufficient) and wait for brake self test/anti-fouling cycle.

*If brake DOES cycle 2 or 3 times as it is supposed to: **Solenoid circuit and throttle position sensor good. Later on in troubleshooting, skip Step 4 and 6. Proceed to Step 3.***

*If brake DOES NOT cycle: **Proceed to Step 4***

Step 3 (Brake passes cycle test in Step 2):

With the brake enable switch in the ON position, cycle the ignition and wait for brake self test/anti-fouling cycle.

*If brake cycle DOES cycle as it did with the switch in the OFF position: **Ignition power not detected by control unit. Ignition power connection on vehicle is incorrect or switch is faulty.***

*If brake DOES NOT cycle (correct operation): **Proceed to Step 5***

Step 4 (Brake fails test from Step 2):

Either using a gauge, listening for the compressor to pump, or by draining the air quick connect and allowing the compressor to refill the tank, check for air pressure in the system.

*If air pressure IS up to correct pressure: **Proceed to Step 5***

*If air pressure IS NOT adequate: **Proceed to Step 6***

Step 5 (Air Pressure is present from Step 4 or brake fails test in Step 3):

Check that the accelerator pedal is returning to the idle position fully when in the resting position. Try pulling the pedal up with the toe of a foot when let off the throttle to check it is not a physical return issue. If possible, use a diagnostic tool to measure accelerator pedal position at and idle, and how reliably it returns to 0% when pressed and released.

Dodge 2003-2008 Throttle Position Sensor Resetting Procedure:

Note that it may be necessary to do this more than one time to get it reset. Read through fully before starting:

- a) Turn the key to the RUN position (but not started)
- b) Slowly depress the accelerator pedal all the way to the floor, slowly release to idle (remove your foot from the pedal @ idle), slowly depress to the floor and back to idle 2 more times so you have gone 3 times in each direction.
- c) After the 3rd time to idle, turn the key off.
- d) Start the truck and allow it to idle for 3-5 minutes. (DO NOT TOUCH THE THROTTLE)
- e) After it has idled for 3-5 min. Turn the truck off, then restart it and go for a test drive.

If this does not fix problem: Proceed to Step 10.

Step 6: Compressor Troubleshooting (Air Pressure not found in Step 4):

Check for continuity between the battery positive ring terminal contact and the correct side of the small black plug on the controller and from the compressor power to the other side of the black connector.

Alternatively, the two terminals, A & B, on the small black plug going into the brake controller module, can be jumped with a wire, and the compressor should turn on if continuity through both these wires exists, and they are hooked up correctly.

If continuity DOES NOT exist, or compressor does not work when jumped: There exists a power, ground, or fuse problem in these two wires.

If continuity DOES exist on both wires, or compressor works when jumped:

Compressor itself is working correctly so that it builds pressure within the airline system. Proceed to Step 7.

Step 7: Pressure Switch Troubleshooting (Compressor works at Step 6):

With no air pressure in the air system, check for continuity between pressure switch plug terminals.

*If continuity DOES NOT exist between pressure switch wires: **There exists a problem with the pressure switch. Replace pressure switch.***

*If continuity DOES exist (correct operation) between pressure switch wires: **Pressure switch is functioning as intended. Proceed to Step 8.***

Step 8 (Pressure Switch Works at Step 7):

With no air pressure in the tank, check that both sides of the pressure switch are grounded. Make sure to probe the pressure switch wires with the Multimeter while still connected to the system.

*If both sides of the pressure switch ARE NOT grounded: **The vehicle chassis ground side of the pressure switch is not adequately grounded.***

*If both sides of the pressure switch ARE grounded (correct operation): **Pressure switch is operating correctly. Proceed to Step 9.***

Step 9 (Both sides of Pressure Switch grounded in Step 8):

Check voltage on the pressure switch sense wire from the controller and ensure the wire is in the correct pin location. When controller is powered and brake enabled, the voltage should be between 5V and 12V. The power wire to look for will be most likely be coupled with a black wire connected to a terminal to the pressure switch on the harness side of the kit.

*If voltage on pressure switch sense wire is lower than 4.5V (incorrect operation): **Controller is likely at fault.***

*If voltage on pressure switch sense wire is between 5V and 12V (correct operation): **Proceed to Step 10.***

Step 10: Air Solenoid Troubleshooting (Resetting TPS Procedure has no effect or Step 9 Pressure Switch Voltage = 5-12V):

Check that ground side of solenoid wire is continuous to battery ground, and in the correct pin location on the controller plug. *Probe the ground side of the solenoid and battery ground with the Multimeter.*



*If the ground side of solenoid DOES NOT have continuity to battery ground and measures 0V in reference to battery negative: **Fix solenoid grounding issue.***

*If ground side of solenoid DOES have continuity to ground and measures 0V in reference to battery negative: **Solenoid is correctly grounded, and should activate with 12V applied to the power wire. Proceed to Step 11.***

Step 11 (Solenoid grounded correctly in Step 10):

Connect a multimeter or test light to the solenoid signal wire. Although the 2-3 solenoid bursts during the antifouling cycle may be difficult to detect due to the speed of occurrence, during constant driving when the brake would be expected to be on, 12V should be present on this wire.

*If 12V IS NOT present when the brake should be active: **Proceed to Step 12.***

*If 12V IS present when the brake should be active: **Pacbrake controller is correctly communicating with vehicle. Do same test with the solenoid load connected, to ensure the controller can supply 12V at the desired current load draw of the solenoid. Proceed to Step 12.***

Step 12:

Manually power solenoid with 12V.

*If solenoid DOES NOT activate with 12V power applied directly: **Solenoid problem.***

*If solenoid DOES activate with 12V power applied directly: **Solenoid is working properly. If controller supplies 12V correctly when expected, proceed to Step 13.***

Step 13 (Solenoid works properly in Step 12):

Apply >100 PSI air to triggered side of air solenoid line to check brake and cylinder function as intended.

*If air pressure bypassing the solenoid DOES NOT actuate the brake cylinder to full extension: **Mechanical brake problem exists. Check butterfly and air cylinder.***

*If air pressure bypassing the solenoid DOES actuate the brake cylinder to full extension: **Brake mechanicals are good. Improperly diagnosed controller or wiring problem.***



CLAIM 2:

Brake Works Correctly EXCEPT for when Truck is in Overdrive:

DIAGNOSIS:

Step 1:

Verify minimum RPM, vehicle speed and other parameters are sufficient for torque converter lockup and brake engage.

*If minimum engage parameters ARE NOT met: **Meet minimum parameters.***

*If minimum engage parameters ARE met: **Proceed to Step 2.***

Step 2 (minimum requirements met in Step1):

Verify brake controller is a controller with Tow/Haul and OD Solenoid wire taps on truck.

*If controller DOES have Tow/Haul and OD Solenoid wire taps: **These two wires are most likely reversed, which leads the controller to thinking that Tow/Haul is continuously being activated when the truck is in OD.***

*If controller DOES NOT have Tow/Haul and OD Solenoid wire taps: **Conduct generic "Claim 1: Brake Does Not Work" troubleshooting to check wiring, etc.***



CLAIM 3:
Brake Works in both the ON and OFF Brake Enable Switch Position:

DIAGNOSIS:

Controller is receiving constant power where there should be switch power. Check that the enable switch power wire is not bypassed and properly connected. If not connected properly, the switch will not be connected rendering the the switch useless in the system.

CLAIM 4:
Brake Turns On Immediately When Brake Enable Switch is Turned On

DIAGNOSIS:

Step 1:

Unplug diagnostic connector and test function again.

If exhaust brake DOES still activate immediately: **Solenoid power wire is receiving ignition power when brake enable switch is toggled. Check brake enable switch wiring.**

If exhaust brake DOES NOT still activate immediately: **Controller thinks parameters are right for activation. Check that this is the case (warm-up feature, etc). If all has been checked and brake is confirmed that it should not be on in this scenario, likely a sensor failure on the truck relating to a required input parameter for brake controller.**



CLAIM 5: Compressor Runs While Vehicle is OFF

DIAGNOSIS:

***Note:** To help in compressor operation related diagnosis, air system can be manually drained or filled to intended operating air pressure, of 105-135 psi.*

Step 1:

Ensure keys are removed from ignition.

Step 2:

Toggle the brake enable switch.

*If compressor turns OFF when brake enable switch is in the OFF position: **There exists constant power where there should be ignition power.***

*If compressor continues to be ON: **Proceed to Step 3***

Step 3:

Disconnect pressure switch controller input or ground.

*If compressor stops running: **There exists constant power to brake enable input on controller. Either a short, or switch issue.***

*If compressor continues to run: **Proceed to Step 4.***

Step 4:

Disconnect smaller, two pin high power connector plugged into controller.

*If compressor run continues to run: **Short in compressor power wiring harness***

*If compressor stops: **Fused compressor relay in controller. Replace controller, or temporarily alleviate problem by opening controller and physically correct and clean fused relay contacts.***



CLAIM 6: CEL (Check Engine Light) Is On:

DIAGNOSIS:

Step 1:

Check to confirm correct controller, wiring harness, pin locations, and all wire taps and splices in harnesses are secure, and have continuity.

Step 2:

Disconnect battery terminals for 10 minutes to reset PCM memory, and go for a short (~100m) drive when reconnected.

If CEL remains on: Proceed to Step 3.

Step 3:

Read Trouble Code(s) and decode to target issue more specifically. In 2003+ Dodge's, cycling the key from the ACC to ON position 3 times within about 3 seconds will display codes on odometer display. Ensure any tapped, spliced, and cut wires are secured correctly. Redo connections if codes are related to tapped, spliced, or cut wires, and re-diagnose issue.

CLAIM 7: Normal Vehicle Operation Has Changed – Fault of Pacbrake Questioned

DIAGNOSIS:

Step 1:

Turn brake enable switch off to see if problem continues.

Step 2:

Refer to "Brake Controller Operating Parameters" table to determine whether or not vehicle operation change is expected, due to Pacbrake control, such as locking up the torque converter under power.

Step 3:

Disconnect Pacbrake control unit, jump pins of any cut wires required for the install; see if issue still exists.



CLAIM 8: FORD 6.0L TOW HAUL LIGHT BLINKS WHEN BRAKING

DIAGNOSIS:

Step 1:

Locate the TCC faking circuit under the dashboard by the steering column. It is not the controller board and it can be described as a black hard molding around a heat sink with a red and grey wire sticking out from the mold. Verify and review thoroughly that all connections are secure and continuous.

*If connections **ARE** secure and continuous: **Proceed to Step 2.***

Step 2:

Malfunction in TCC faking circuit. New circuit needed to replace the old one.



CLAIM 9: LED on Brake Enable Switch Flashing Orange

DIAGNOSIS:

The flashing orange light is indicating a communication malfunction between the Pacbrake controller and the vehicle.

Step 1:

Disconnect any other aftermarket devices within the truck that may be interfering with communication.

Step 2:

Check that communications plugs are securely connected and the pins are free of debris.

Step 3:

Check that the communication wires are not run next to any high current wires which may cause electromagnetic interference.

Step 4:

Ensure the wires are in their proper pin locations, free from damage, and securely crimped.

IF ALL DIAGNOSIS AND SOLUTIONS ABOVE FAIL, LIKELY TO BE A CONTROLLER QUALITY ISSUE.

ENSURE REPLACEMENT CONTROLLERS ARE THE CORRECT HARDWARE AND SOFTWARE REVISION AS THE ONES THEY ARE REPLACING BY CHECKING SERIAL NUMBERS.

Current Revision Author: M. Raska/S. Czerniej

Revision Version: 05

Date of Last Revision: May 4, 2009



APPENDIX A: Controller Serial Number Identification

Note: Use this table as a reference only. Always confirm individual serial number records for more detailed information about controller.

Table 1: Controller Serial Number Identification

<u>Serial Number Prefix</u>	<u>Controller P/N</u>	<u>Description</u>	<u>Production Status</u>	<u>Notes</u>
CA	C20206	Dodge 03-04 Auto	Obsolete	Green PCB - M2097
CB	C20201	Duramax 01-07 Auto	Current	Green PCB - M2085
CC	C20210	Dodge 03-05 Auto	Obsolete	S/N: CC000307+ are M2100 Blue Boards 03-05; Prev. are mostly obs. Green PCB's 03-04
CD	C20211/C20212	Duramax LB7 LLY Std	Current	Green PCB - M2085
CE	C20215/C20216	Duramax 01-07 Auto	Current	Green PCB - M2085
CF	C20242	Ford 99-03 7.3L Auto	Current	Black Board - M2110
CG	C20222	Dodge 98.5-02 Auto	Obsolete	Blue Board - Replaced with C20235 - M2100
CL	C20184	Duramax LLY	Obsolete	Green PCB - M2085
CM	C20202	Ford 03-07 6L Auto	Obsolete	Blue PCB - Replaced with C20231 - M2100
CR	C20237	Duramax LMM	Current	Black PCB - M2110
CS	C20190	Ford 03-07 6L Std	Current	Green PCB - M2085
CW	C20235	Dodge 94-05 Auto	Current	Black PCB - M2110
CX	C20231	Ford 03-07 6L Auto	Current	Blue PCB - M2116
CY	C20224	Dodge 94-98 Auto	Obsolete	Black Board - Replaced with C20235

APPENDIX B: Controller Operating Parameters Chart

Excerpt from: "Brake Controller Operating Parameters Rev04.xls"; May 4, 2009; Pg. 1 of 3

A	B	C	D
Truck Kit →	Dodge 94-95 47/48RE (Black Board)	Dodge 94.5-95 47/48RE (Blue Board)	Ford 7.3L 93-93 4R100 Auto
Control Feature ↓			
Lockup Engaged Event	Engage TCC: Lockup While Defuelling - Brake enable switch is ON - TCC has been unlocked for 1 second - TCC is OFF - Vehicle speed between 25-50 km/h Lockup Under Power: - Throttle less than 5% - RPM greater than 1500 - Vehicle speed between 5 and 30 km/h - Throttle position less than 30 - RPM greater than 1200	Engage Speed = 55 km/h Throttle Position Sensor = 30% Engine RPM 1200	Lockup then exhaust brake engage (0.5 sec delay) under no throttle and vehicle speed above 35 km/h
Lockup Disengaged Event	Disengage TCC: - Brake enable switch is OFF - Throttle applied greater than 45% - Engine RPM Below 950 - Tow/Haul pressed (1 second disengage) For 48RE Mode (include above parameters + the following) - Vehicle speed less than 50 - Throttle switch ON	Disengage Speed = 45 Throttle Position Sensor = 3% Engine RPM < 950	Under throttle or vehicle speed under 30 km/h
Brake ON Speed - Tow/Haul/Switch ON (km/h)	25+lockup	25+lockup	N/A
Brake OFF Speed Range - Tow/Haul/Switch ON (km/h)	N/A	N/A	N/A
Brake ON Speed - Tow/Haul/Switch OFF (km/h)	N/A	N/A	N/A
Brake OFF Speed Range - Tow/Haul/Switch OFF (km/h)	N/A	N/A	N/A
Minimum RPM Needed for Exhaust Brake to Engage	1100	1200	N/A
RPM Cut Out to Disable Brake	950	950	N/A
ABS Event Disengages Brake	No	No	N/A
DPF Regeneration Event	No	No	N/A
Maximum Throttle Position until Brake Disengages	5% and throttle switch	0%	N/A
Transmission Mode	PIN 19 grounded = 47RE (default) PIN 19 not grounded = 48RE	3 throws to switch between both modes Antifouling - 2 cycles / 3 cycles	N/A
LED Function	Enable Switch ON: LED RED Brake ON: LED ORANGE TCC ON: LED GREEN TCC OFF: LED RED	N/A	Enable Switch ON: LED RED Brake ON: LED ORANGE TCC ON: LED GREEN TCC OFF: LED RED
Warmup Mode	8 throws to toggle Default Warmup Status = ON Vehicle Stopped Engine RPM between 550 and 900 Engine Coolant Temp below 70° C	Vehicle Stopped Engine RPM between 600 and 850 Engine Coolant Temp below 70° C	8 throws to toggle
Compressor Mode	6 throws to toggle Default ON	N/A	6 throws to toggle
Serial Data Log Mode	10 throws to toggle Default OFF	N/A	10 throws to toggle
Serial Data Out Mode Valid	N/A	N/A	20 throws to toggle



Excerpt from: "Brake Controller Operating Parameters Rev04.xls"; May 4, 2009; Pg. 2 of 3

A	E	F	G	
Truck Kit →	Ford 03-07 Standard	Ford 03-07 5R110W Auto	Doramax LB7/LLY 01-05 Standard	LB
Control Feature ↓				
Lockup Engaged Event	N/A	Over 35 km/h	N/A	Ve
Lockup Disengaged Event	N/A	Under 1200 RPM	N/A	Ve
Brake ON Speed - Tow/Haul/Switch ON (km/h)	30	35+lockup	30	
Brake OFF Speed Range - Tow/Haul/Switch ON (km/h)	Below 25	Below 25	Below 25	
Brake ON Speed - Tow/Haul/Switch OFF (km/h)	N/A	50+lockup	N/A	
Brake OFF Speed Range - Tow/Haul/Switch OFF (km/h)	N/A	Below 45	Below 80	
Minimum RPM Needed for Exhaust Brake to Engage	1200	1200	1200	
RPM Cut Out to Disable Brake	900	750	900	
ABS Event Disengages Brake	No	No	No	
DPF Regeneration Event	No	No	No	
Maximum Throttle Position until Brake Disengages	5%	0%	5%	
Transmission Mode	N/A	6 throws to change mode 4 cycles - higher speed (~50km/h) lockup 5 cycles - lower speed	N/A	
LED Function	N/A	N/A	N/A	
Warmup Mode	N/A	N/A	N/A	
Compressor Mode	3 throws to toggle	3 throws to toggle	N/A	
Serial Data Log Mode	N/A	N/A	N/A	
Serial Data Out Mode Valid	N/A	N/A	N/A	

Excerpt from: "Brake Controller Operating Parameters Rev04.xls"; May 4, 2009; Pg. 3 of 3

A	H	I	J
Truck Kit →	Duramax LB7/LLY/LBZ 01-06	Duramax LMM 07-08	Mini Aris
Control Feature ↓			
Lockup Engaged Event	Vehicle Speed Over 70 km/h	Truck Controlled	Truck Controlled
Lockup Disengaged Event	Vehicle Speed Under 70 km/h	Truck Controlled	Truck Controlled
Brake ON Speed - Tow/Haul/Switch ON (km/h)	30	35	If in gear 2: > 35 All else: > 50
Brake OFF Speed Range - Tow/Haul/Switch ON (km/h)	Below 25	Below 30	If in gear 2: > 30 All else: > 45
Brake ON Speed - Tow/Haul/Switch OFF (km/h)	N/A	80	N/A
Brake OFF Speed Range - Tow/Haul/Switch OFF (km/h)	N/A	Below 75	N/A
Minimum RPM Needed for Exhaust Brake to Engage	1200	1200	400
RPM Cut Out to Disable Brake	700	750	400
ABS Event Disengages Brake	No	Yes	No
DPF Regeneration Event	No	Exhaust brake disengaged until DPF regeneration is complete and complete engine cycle (key must be out of ignition)	No
Maximum Throttle Position until Brake Disengages	5%	0%	5%
Transmission Mode	N/A	N/A	N/A
LED Function	N/A	Brake Enable Switch ON: LED RED Brake ON: LED ORANGE DPF Regen Active: LED GREEN DPF Regen Complete: LED FLASHING GREEN	N/A
Warmup Mode	N/A	N/A	N/A
Compressor Mode	N/A	6 throws to toggle	N/A
Serial Data Log Mode	N/A	10 throws to toggle	N/A
Serial Data Out Mode Valid	N/A	20 throws to toggle	N/A