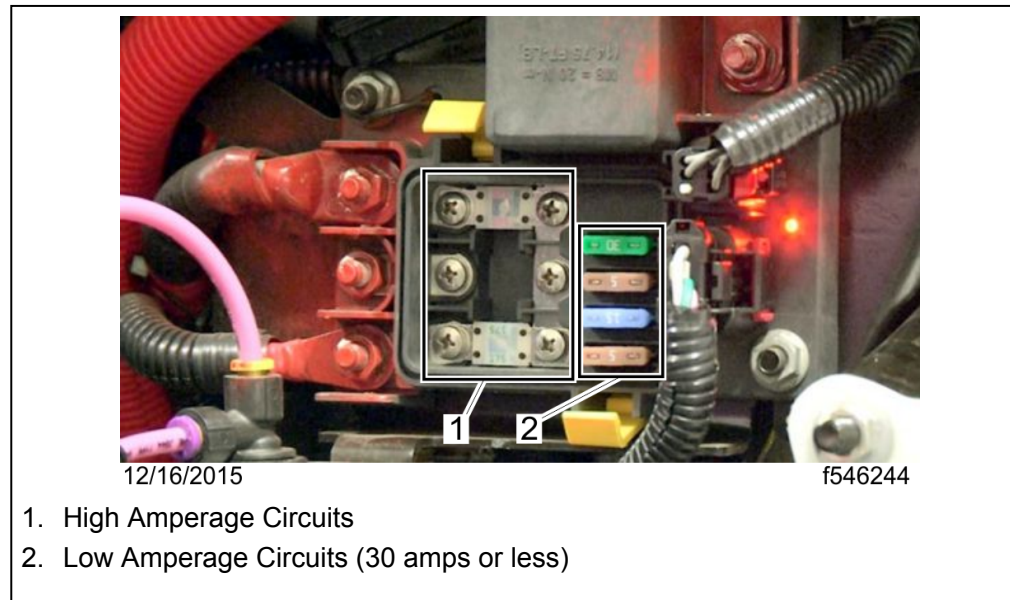


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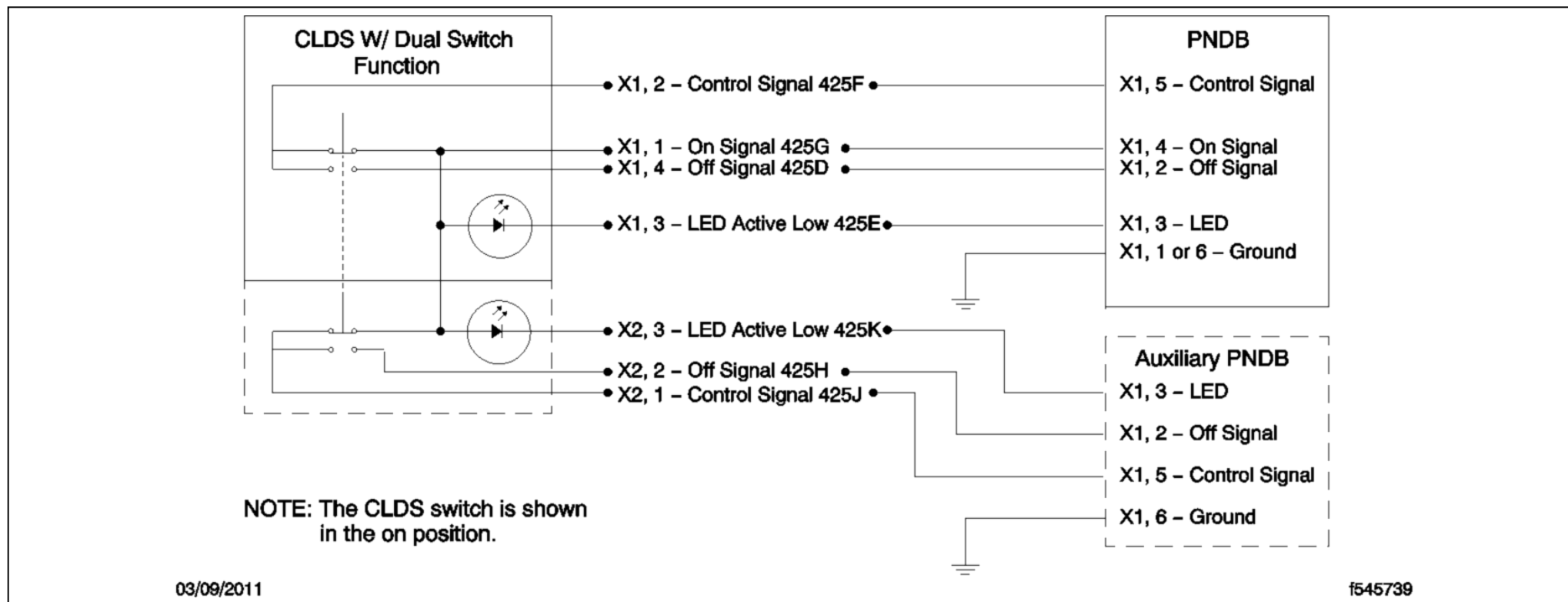
## PNDB Troubleshooting

Each powernet distribution box (PNDB) on the vehicle provides up to 4 low amperage circuits (30 amp and less), and up to three high amperage circuits through midi fuses. The fuses are located behind a cover on the face of the PNDB. On vehicles equipped with a cab load disconnect switch (CLDS), the high amperage circuits are switched on and off with the CLDS. See Fig. 11 . The low amperage circuits are always live.



**Fig. 11, PNDB and CLDS Amperage Circuits with Battery Power**

Vehicles may have one or two PNDBs and both are connected to the same CLDS. See Fig. 12 for a schematic of the dual PNDB system with the cab load disconnect switch option.



**Fig. 12, Primary and Auxiliary PNDB with CLDS Option**

To test for open fuses, use conventional troubleshooting methods. The LEDs in the PNDB and switch are not affected by open fuses or the circuits they connect. See Fig. 7 , Fig. 8 , Fig. 9 , and Fig. 10 for illustrations of the connectors with pin identification.

When the CLDS is in the on position, an LED on the switch, and another on the PNDB, will be illuminated. When there is an error condition with the PNDB system, the LED on the PNDB and CLDS may flash. A flashing LED indicates an error. An LED that remains on when the switch is off, or no LED when the switch is on, also indicates an error condition. See Fig. 13 . A solid illuminated LED indicates that the system is working properly.

**NOTE:** PNDB connector X2 is not part of the switching and control system.



Fig. 13, PNDB with the LED ON

See Table 2 to troubleshoot a switched PNDB system.

See Table 3 for LED troubleshooting.

See Table 4 for PNDB and CLDS Troubleshooting.

Switched PNDB System Troubleshooting			
Step	Test Procedure	Test Result	Action
1	Check the power cables on the PNDB for proper torque. Open the cover and inspect the MIDI fuse fastener torque and for discoloration caused by excessive heat.	Loose fasteners or heat discoloration	Determine if the fasteners can be properly torqued or if the PNDB needs replacement. Repair or replace as required.
		All OK	Go to step 2.

2	NOTE: Before cycling the CLDS, make sure that all customer installed wiring is first removed from the PNDB output posts. Cycle the CLDS to the OFF position, then turn it ON. Does the LED on the PNDB flash in a constant pattern when the CLDS is switched to the OFF or ON position or does the LED on the PNDB just randomly flicker?	Constant Repeating Flashing Pattern	Troubleshoot and repair any wiring faults on circuits 425E, 425D, 425F, or circuit 425G between the CLDS and the PNDB. If there is no wiring fault, replace the CLDS.
		Random flickering	Cycle the CLDS to the OFF position again, then turn it ON. If this does not solve the problem, replace the PNDB.
		No	Go to step 3.
3	Measure for ground on PNDB connector 1, pins 1 and 6. If either of these pins are not populated with a wire disregard measuring the unpopulated pin. Is ground present in the wiring harness supplying these pins?	Yes	If the fault is present, measure the voltage on PNDB connector X1, pin 4. If pin 4 is at about 11 volts then troubleshoot and repair for a wiring fault in circuits 425E, 425D, 425F, 425G between the CLDS and the PNDB and for a open or short circuit in the CLDS.
		No	Repair an open ground circuit to the PNDB.

**Table 2, Switched PNDB System Troubleshooting**

LED Troubleshooting				
Main LED PNDB	Main LED CLDS	CLDS Position	Potential Fault Conditions	Checks
OFF	OFF	OFF	Normal Operation, no faults.	N/A
ON Solid	ON Solid	ON	Normal Operation, no faults.	N/A
ON Solid	OFF	ON	Open in Circuit 425E.	Check PNDB and CLDS connector C1, terminal 3. The terminal may not be seated.
OFF	OFF	ON	Open or short in Circuits 425F or 425G.	Check PNDB connector X1, pin 4 for 11 volts. If there is no voltage at pin 4, replace the PNDB. If voltage is present, check for 11 volts at CLDS connector X1, terminals 1 and 2, and PNDB connector X1, terminal 5 to find the location of the open or short in the circuit.
OFF	ON Solid	OFF	Circuit 425E short to ground.	Check terminal 3 on PNDB and CLDS connector X1. The terminal may not be seated.

1 Blink Repeating	1 Blink Repeating	OFF	The PNDB detects voltage on the output side of the cutoff solenoid. This can be caused by the cutoff solenoid mechanically sticking closed when it should be open, or an inverter/battery charger is powering the output side of the PNDB.	If the solenoid can be heard clicking when the CLDS is cycled, check for an inverter or battery charger, otherwise the PNDB is most likely faulty.
2 Blinks Repeating	2 Blinks Repeating	ON	An open occurred in circuit 425F or 425G while the CLDS was in the ON position. If the CLDS LED is off with the switch in the off position, the problem is an open in the 425G circuit.	Check PNDB connector X1, pin 4 for 11 volts. If there is no voltage at pin 4, replace the PNDB. If voltage is present, check for 11 volts at CLDS connector X1, terminals 1 and 2, and PNDB connector X1, terminal 5 to find the location of the open in the circuit.
3 Blinks Repeating	3 Blinks Repeating or OFF	OFF	Circuit 425F or 425G short to ground.	Check PNDB connector X1, pin 4 for 11 volts. If there is no voltage at pin 4, replace the PNDB. If voltage is present, check for 11 volts at CLDS connector X1, terminals 1 and 2, and PNDB connector X1, terminal 5 to find the location of the short in the circuit.
3 Blinks Repeating	OFF	ON	Circuit 425F or 425G short to ground.	Check PNDB connector X1, pin 4 for 11 volts. If there is no voltage at pin 4, replace the PNDB. If voltage is present, check for 11 volts at CLDS connector X1, terminals 1 and 2, and PNDB connector X1, terminal 5 to find the location of the short in the circuit.

Table 3, LED Troubleshooting

PNDB and CLDS Troubleshooting						
Terminal	Switch Position	Fault Condition	CLDS LED Condition, Switch ON	CLDS LED Condition, Switch OFF	PNDB LED Condition, Switch ON	PNDB LED Condition, Switch OFF
PNDB X1, 4	OFF	425G, Short to GND	OFF	OFF	OFF	OFF
PNDB X1, 4	ON	425G, Short to GND	OFF	OFF	3 Blinks	3 Blinks
PNDB X1, 4	OFF	425G, OPEN	OFF	OFF	OFF	OFF

PNDB X1, 4	ON	425G, OPEN	2 Blinks	OFFAfter switch cycle.*	2 Blinks	OFF*
PNDB X1, 5	OFF	425F, Short to GND	OFF	OFF	OFF	OFF
PNDB X1, 5	ON	425F, Short to GND	OFF	3 Blinks	3 Blinks	3 Blinks
PNDB X1, 5	OFF	425F, OPEN	OFF	OFF	OFF	OFF
PNDB X1, 5	ON	425F, OPEN	2 Blinks	2 Blinks	2 Blinks	2 Blinks
PNDB X1, 3	OFF	425E, Short to GND	Solid ON	Solid ON	Solid ON	OFF
PNDB X1, 3	ON	425E, Short to GND	Solid ON	Solid ON	Solid ON	OFF
PNDB X1, 3	OFF	425E, OPEN	OFF	OFF	Solid ON	OFF
PNDB X1, 3	ON	425E, OPEN	OFF	OFF	Solid ON	OFF
CLDS X1, 1	OFF	425G, Short to GND	OFF	OFF	OFF	OFF
CLDS X1, 1	ON	425G, Short to GND	OFF	3 Blinks	3 Blinks	3 Blinks
CLDS X1, 1	OFF	425G, OPEN	OFF	OFF	OFF	OFF
CLDS X1, 1	ON	425G, OPEN	2 Blinks	OFF	2 Blinks	OFF

CLDS X1, 2	OFF	425F, Short to GND	OFF	OFF	OFF	OFF
CLDS X1, 2	ON	425F, Short to GND	OFF	OFF	3	3 Blinks
CLDS X1, 2	OFF	425F, OPEN	OFF	OFF	OFF	OFF
CLDS X1, 2	ON	425F, OPEN	2 Blinks	2 Blinks	2 Blinks	2 Blinks
CLDS X1, 3	OFF	425E, Short to GND	Solid ON	3 Blinks	Solid ON	3 Blinks
CLDS X1, 3	ON	425E, Short to GND	Solid ON	3 Blinks	Solid ON	3 Blinks
CLDS X1, 3	OFF	425E, OPEN	OFF	OFF	Solid ON	OFF
CLDS X1, 3	ON	425E, OPEN	OFF	OFF	Solid ON	OFF

**Table 4, PNDB and CLDS Troubleshooting**

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## SAM Cab and SAM Chassis Automatic Resetting Circuit Protection

**IMPORTANT:** Do not change the self-resetting circuit breakers without using the special removal tool, located inside the cover of the SAM device. See Fig. 14 . Failure to use the special tool could result in component damage.

The SAM Chassis and SAM Cab may use self-resetting circuit protection instead of fuses for some circuits. See Fig. 15 .