



Diesel Glow Plug Circuit – Cold-Start Wiri

Bench reference · Track 02 · Diesel Engine Repair

The glow plug circuit on the 6.7 is GPCM-controlled with a dedicated relay bank. The threshold table below is the diagnostic for "hard-no-start in cold-soak" GPCM reads cold-soak temperature and enables the relay bank for 5-25 seconds depending on the temp. If a single plug reads out of threshold, replace that plug - NOT the GPCM. If you swap the GPCM with no relay bench-check, you are throwing parts; verify the relay drive first.

PER-CYLINDER RESISTANCE - pass / fail thresholds at room temperature

New (Motorcraft ZD-1)	0.10 - 0.30 ohm
Used (acceptable)	0.30 - 0.70 ohm
Failing	> 0.70 ohm (replace)
Shorted	< 0.05 ohm (replace)
Open-circuit	> 1.0 ohm (replace)

GPCM COLD-SOAK ENABLE LOGIC

coolant temp	relay enable time
> 80 degF	0 s
60 degF - 80 degF	4 s
40 degF - 60 degF	8 s
20 degF - 40 degF	15 s
0 degF - 20 degF	20 s
< 0 degF	25 s

- at any temp, "wait-to-start" lamp MUST illuminate BEFORE the relay drive. If the lamp is OFF but the relay is clicking, the lamp driver is failing - do NOT swap the GPCM.

CIRCUIT TOPOLOGY

B+ (fused 80A) -> GPCM C1 pin 1
GPCM C1 pin 3 -> relay bank driver (low-side)
relay bank output -> bus bar (8 plugs, parallel)
each plug -> studded ground at head
PCM feedback -> GPCM C1 pin 6 (Dark Green)

BENCH CHECK FOR "NO WAIT-TO-START"

1. Verify 80A fuse at B+ - most "GPCM failures" trace to this fuse.
2. With fuse pulled, probe C1 pin 1 for B+.
3. With fuse reinstalled, probe C1 pin 3 for ground during the cold-soak enable window.
4. If C1 pin 1 has B+ AND C1 pin 3 pulls ground for the spec window, swap the relay
5. If C1 pin 3 stays high: GPCM driver failure - replace GPCM.
bank first (cheap).

COMMON BENCH MISTAKES

- "Swapped the GPCM and the relay still does not click" - the fuse is bad; check it
- "One cylinder is dead, the rest are fine" - the failing plug is one of the 8 in
BEFORE the swap, no wait-to-start lamp" - the lamp driver wire is broken; chase
the parallel bank; pick it off the bench, do NOT replace all 8.
wiring, not the GPCM. See fuel-system-diagram.pdf for supporting cold-start
fuel-supply benchmarks.