CAN Network Testing Cheat Sheet: 9-Pin J1939

9-pin Deutsch diagnostic port (SAE J1939-13), heavy-duty trucks. CAN1 on pins C (High) and D (Low).

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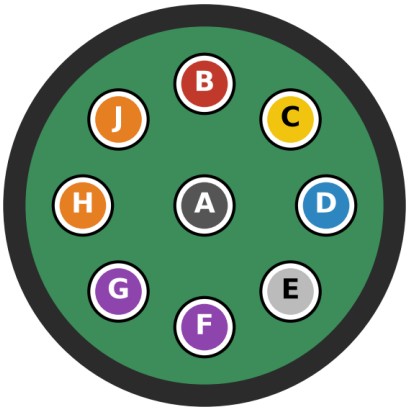

Pin	Black (Type 1, 250k)	Green (Type 2, 500k)
A	Ground	Ground
B	Battery + (often hot key off)	Battery +
C	CAN1 High (J1939)	CAN1 High (J1939)
D	CAN1 Low (J1939)	CAN1 Low (J1939)
E	CAN shield	CAN shield
F	J1708 / J1587 +	J1708 + or CAN3 High*
G	J1708 / J1587 -	J1708 - or CAN3 Low*
H	OEM specific	CAN2 High
J	OEM specific	CAN2 Low

Pin A is in the center. Letters are molded on the connector face; match pins by those letters (ring order here is illustrative).

Tools needed

- Digital multimeter (DMM) with ohms and DC volts
- Back probes or a breakout box for the 9-pin port
- Optional: 2-channel lab scope for waveform checks
- Wiring diagram and service information for the vehicle

Safety and good practice

Key off for all resistance checks. Never probe with a meter set to ohms on a powered circuit.

Do not spread terminals. Back probe, or use a breakout box or the correct terminal test probe. A spread pin causes intermittent faults.

Let the bus go to sleep (modules shut down) or disconnect the battery before reading resistance. An awake bus gives false ohms readings.

Step-by-step procedure (CAN1 on C and D)

1. **Visual and power check.** Inspect the port for bent, pushed-back, corroded or loose pins and a damaged boot or harness. Check the diagnostic port fuse. Pin **B to A** should read battery voltage (about 12.6 V on a rested 12 V system, about 25.2 V on 24 V). Voltage drop: pin **A** to battery negative with the key on should be under about 0.2 V.
2. **Key off, bus asleep or battery disconnected: ohms C to D.**
   - **About 60 ohms:** good, two 120 ohm terminators in parallel
   - **About 120 ohms:** one terminator or one backbone section open
   - **About 40 ohms or less:** extra terminator or a partial short
   - **Near 0 ohms:** CAN High and Low shorted together
   - **Open or very high:** both terminators missing or the wiring open between port and backbone
3. **Shorts to ground and power (key off).** Measure C to A, D to A, C to B and D to B. Each should read high resistance (kilohms or more). A reading near 0 ohms means that line is shorted.
4. **Key on, DC volts to ground (pin A).** C (High) about **2.6 to 2.7 V**, D (Low) about **2.3 to 2.4 V**. High plus Low should add up to about **5 V**. (A meter averages bus traffic.)
   - High near 5 V or B+: shorted to power or a 5 V reference
   - Low stuck near 0 V: Low shorted to ground
   - Both near 0 V: no module power/ground, or bus shorted to ground
   - High and Low read the same: lines shorted together
   - Sum well off 5 V: a short or a loading module; go to the scope
5. **Scope (optional, best proof).** Ch1 on C, Ch2 on D, both grounded at A. About 2 V/div, 20 to 50 us/div for 250k, 10 to 20 us/div for 500k.
   - Normal: both idle (recessive) at about **2.5 V**. Dominant: High goes to about **3.5 V**, Low to about **1.5 V**, as clean mirror images
   - Noise or hash on both lines: check the shield (E), grounds and wire routing near high-current circuits
   - Rounded or slow edges: wet or corroded connector, damaged wire, or extra load on the bus
   - Ringing at the edges: missing or wrong terminator
   - No mirror image: one line open or shorted, or a failing module transceiver
   - One line flat: at 0 V shorted to ground, at battery shorted to power, at about 2.5 V open on that line
6. **Isolate the fault.** Watch ohms (key off) or the scope while you unplug one module at a time, or open splice packs or backbone sections one at a time. When the reading goes normal, the fault is in the last module or branch removed. Locate both terminators: on J1939 they are usually 120 ohm at each end of the backbone (plug-in, in the harness, or inside a module). A good terminator measures about 120 ohms on its own.
7. **Confirm the repair.** Recheck C to D for about 60 ohms and the key-on voltages. Clear codes, cycle the key, and verify every module communicates with the scan tool. Road test if the fault was intermittent.

9-pin connector notes

- **C / D:** CAN1 High / Low, the J1939 backbone. Black Type 1 port is 250k; green Type 2 is 500k (since about 2016)
- **A** ground (center pin), **B** battery, **E** CAN shield
- **F / G:** J1708. *PACCAR (Kenworth, Peterbilt) 2016 and later use F/G for CAN3
- **H / J:** CAN2 on many green Type 2 ports (OEM-specific, check the wiring diagram); OEM-specific on black (older Freightliner Cascadia uses H/J for CAN2, older Navistar can use J for K-line). Test CAN2 the same way on H to J
- A green port accepts black or green cables; a black port accepts black only
- Off-highway and CAT ports can use a different pinout: check the wiring diagram
- Pin positions on the diagram are illustrative; match the letters molded on the connector face