



Sedan Range

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SERVICE

TECHNICAL BULLETIN

Incorrect Fuel Gauge Reading – Diagnosis
of Fuel Level Sender UnitMODEL 1995-96 MY
XJ12 Sedan

VIN

720001-787489

ISSUE:

When diagnosing incorrect fuel gauge readings, the calibration of the fuel sender unit should always be checked first before further diagnosis and/or replacing any components.

Recent investigations show that in over 90% of cases where sender units are returned against warranty claims, the sender is not defective.

ACTION:

After verifying a customer complaint of an inaccurate fuel gauge, perform the following calibration check:

CHECKING THE FUEL TANK SENDER UNIT CALIBRATION

▲ WARNING Observe all fire and safety precautions described in Section 5.1.2 of the XJ6-XJ12 Vehicle Service Manual when working on the fuel system.

1. Ensure that the vehicle is standing on a level surface in a normal attitude with no excessive loads in the passenger or luggage compartments.
2. If possible, the tank should contain 2.6-4.0 gallons (10-15 liters) of fuel when beginning the diagnostic procedure. This amount corresponds to a fuel gauge indication between E and 1/4 full. The low fuel warning lamp should be OFF.
3. With the ignition OFF, disconnect both wires at the sender unit.
4. Connect a multimeter, set to 0-1000 ohm resistance range, to the terminals of the sender unit.
5. Using a suitable pump and container, pump fuel out of the vehicle's tank until the fuel tank is empty. The meter reading should increase during this process to more than 900 ohms.
6. Slowly add fuel (approximately 1.6 gallons [6 liters]) to the tank until the meter reading is 900 ohms \pm 18 ohms. **The process must be done as accurately as possible since it creates the base line for the remaining steps in the procedure.**
7. Disconnect the multimeter and reconnect the vehicle wiring to the sender unit. Turn the ignition ON. The gauge should now show empty with the low fuel level lamp ON. Turn the ignition OFF.

8. Measure 1.1 gallons (4 liters) of fuel into the vehicle fuel tank using a funnel to avoid spillage. Use an accurate means to measure the fuel.

The fuel tank now contains 2.6 gallons (10 liters) from empty.

9. Disconnect the vehicle wiring from the sender. Reconnect the multimeter and check that reading is 735 ohms maximum. If the reading is greater than 735 ohms, add a maximum of 0.3 gallon (1 liter) of fuel. The reading should now be 735 ohms or less. Reconnect the wiring and check that the low fuel level warning light is OFF with the ignition ON.

If the low fuel level warning light remains ON with a reading of 735 ohms or slightly less, the sender unit is not defective. If an incorrect warning lamp indication is the only fault found, interrogate the instrument pack using the PDU in the Diagnostic Mode.

10. Add 2.6 gallons (10 liters) of fuel to the tank. The gauge should now indicate approximately 1/4 full.

The fuel tank now contains 5.3 gallons (20 liters) from empty.

11. Add another 5.3 gallons (20 liters). The gauge should now indicate approximately 1/2 full.

The fuel tank now contains 10.6 gallons (40 liters) from empty.

12. Add another 5.3 gallons (20 liters). The gauge should now indicate approximately 3/4 full.

The fuel tank now contains 15.9 gallons (60 liters) from empty.

13. Add another 5.3 gallons (20 liters). The gauge should now indicate full.

The fuel tank now contains 21.1 gallons (80 liters) from empty.

If the fuel tank accepts more than 21.1 gallons (80 liters), continue filling until no more fuel is accepted. The specified capacity of the tank is 21.4 gallons (81 liters) from "run dry." The total amount that was added from step 8 above, indicates whether the tank is now actually full, and whether the 1.6 gallons (6 liters) from empty point was accurately achieved in step 6.

14. If fuel filling facilities are not available on the same premises, an accurate allowance must be made in the procedure for fuel consumed while traveling between the gas station and the workshop. Where appropriate, fuel should be added to compensate before resistance measurements are made.

MEASURING SENDER UNIT RESISTANCE

The following resistance measurements correspond to the major markings on the fuel gauge. These figures should be used as a guide only because of tolerances in the gauge and sender units.

| <u>Tank Contents</u> | <u>Gauge Indication</u> | <u>Approximate Resistance (Ohms)</u> |
|-----------------------------|--------------------------------|---|
| Dry to 1.6 gal. (6 liters) | E | 900 |
| 2.6 gal. (10 liters) | Low Fuel Warning lamp on/off | 735 |
| 5.3 gal. (20 liters) | 1/4 | 560 |
| 10.6 gal. (40 liters) | 1/2 | 360 |
| 15.9 gal. (60 liters) | 3/4 | 195 |
| 21.1 gal. (80 liters) | F | 80 |

MINIMUM USABLE FUEL LEVEL

When the fuel level in the tank drops to approximately 1.6 gallons (6 liters) from dry, it is normal for air to be ingested into the fuel system via the fuel pump. This condition will result in aerated fuel being circulated causing erratic running or cutting out of the engine.

GAUGE DOES NOT INDICATE FULL

In case of a customer complaint of the above condition where the fuel tank is believed to be full, but the gauge indicates less than full with the vehicle on level ground, check that the resistance at the fuel level sender unit is approximately 80 ohms.

If the resistance is approximately 80 ohms, but the gauge reading is incorrect, the instrument pack may be incorrectly calibrated. Refer to "Using the PDU" on the next page.

If the resistance is greater than 80 ohms, the fuel tank is not full or the sender unit is sticking.

If necessary, pump fuel from the tank as in the calibration check until the tank is empty. Ensure that a minimum of 21.1 gallons (80 liters) can then be added from that point. Check the fuel gauge indication and/or the sender unit resistance.

SENDER UNIT STICKING

1. With the gauge in its stuck position, use a multimeter to monitor the resistance at the sender unit terminals.
2. Slowly pump out 0.8 gallons (3 liters) of fuel. Resistance should increase distinctly.
3. Slowly replace 0.8 gallons (3 liters) of fuel. The resistance should decrease to the original reading.
4. Slowly add an additional 0.8 gallons (3 liters). The resistance should decrease further to a reading lower than first measured.

5. If the resistance changes as described in steps 1-4, the sender unit is not defective. If no change in resistance was observed in steps 1-4 then either the sender unit is interfering with pipes or wires inside the fuel tank or the sender unit is defective. In either case, empty the fuel tank and remove the sender unit.
6. Look through the sender unit opening in the fuel tank and check for obstructions (pipe and wires) that may prevent free movement of the sender unit float and arm. Repair as necessary. Inspect the sender unit. The float should be free to rise and fall under its own weight. If not, replace the unit.

LOW FUEL LEVEL WARNING LAMP

The warning lamp is actuated by the instrument pack. At a sender unit resistance of approximately 735 ohms (2.6 gallons [10 liters]), the lamp should be OFF. With only 2.4 gallons (9 liters) or less remaining in the tank, the warning lamp should be ON.

USING THE PDU

The Diagnostic Mode of the PDU can be used to diagnose incorrect operation of the low fuel level warning lamp.

If the resistance readings of the sender unit have been found to be correct, the Gauge Recalibration function of the PDU can be used if the fuel gauge still reads incorrectly.

USING FUEL STORAGE TANKER

It is considered undesirable to return fuel from a storage tanker to a vehicle's fuel tank for the following reasons:

1. Possibility of water or dirt contamination in the fuel storage tank.
2. Possibility of contamination by residual fuel containing lead.
3. Difficulty of accurate measurement where required.
4. Difficulty of achieving full tank due to slow filling rates.

CUSTOMER ADVICE

When making the service appointment to investigate the customer complaint of fuel gauge inaccuracy, the customer should be requested to bring the vehicle with the fuel tank less than 1/4 full if possible. The customer should also be advised that if the complaint is of inaccurate readings with the tank full, that the tank will be filled during the diagnostic procedure, and that this amount of fuel will be included in the repair charge.

FUEL FILLING GUIDELINES

The following guidelines can be suggested to customers who may express concerns of being unable to fully fill the fuel tank.

1. Insert the filler nozzle fully into the filler neck, positioning the hose and nozzle at right angles to the length of the vehicle. (While fuel flow should not be interrupted with the nozzle in other positions, the above is the preferred position).
2. Operate the nozzle trigger to the fully open position. Maintain full flow until the amount required has been dispensed, or until the nozzle shuts off automatically.
3. With a properly functioning nozzle, the vehicle tank should be full when the nozzle first clicks off. Do NOT attempt to overfill past this point. This can cause fuel spillage or create a danger from escaping fuel.
The remaining capacity of the fuel tank is needed to allow for expansion as the fuel temperature increases. Usually fuel supplied from underground storage tanks will be cooler than the highest daytime ambient temperature. As the fuel subsequently warms in the vehicle's fuel tank it will need to expand.
4. It may become necessary for the customer to change gas stations if persistent difficulty in filling occurs at the customer's usual station. Reaching a full tank condition may be affected by the fuel flow rates of different pumps, as well as the operation of the pump nozzles.

PARTS INFORMATION:

| <u>DESCRIPTION</u> | <u>PART NUMBER</u> | <u>QTY</u> |
|--------------------|--------------------|------------|
| Fuel level sensor | DBC 12042 | 1 |

WARRANTY INFORMATION:

| <u>FAULT CODE</u> | <u>R.O. NUMBER</u> | <u>DESCRIPTION</u> | <u>TIME ALLOWANCE</u> |
|-------------------|--------------------|------------------------------------|-----------------------------------|
| MC CB ** | 88.25 | Fuel tank level sensor - diagnosis | Shop time not to exceed 0.65 hrs. |

** RK Over reading
RL Under reading