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Basic Fuel Gauge Operation and Fuel Gauge Sender Ordering Procedure for BNC Type Senders

Overview

This procedure provides technicians and parts personnel a brief overview of the LNG fuel tank fuel level gauge operation. It also outlines the type of information that must be supplied to Chart when ordering a sender. It is important to provide appropriate information when ordering senders to ensure they are shipped with the correct calibration.

Basic Fuel Gauge Operation

The Chart Inc. LNG vehicle tank fuel gauge system is a fairly simple design. A capacitance tube is permanently attached to the inside of the tank. The capacitance tube creates capacitance, the capacitance changes as liquid level is increased or decreased inside the tank. As the liquid level increases, the capacitance reading increases. As the liquid level decreases the capacitance reading decreases. The capacitance tube has a wire attached to it. The capacitance wire runs through the tank knuckle to the outside of the tank, and to a BNC nipple. The BNC nipple is basically a fire proof seal to keep the methane/pressure/liquid inside the tank. The BNC nipple is also a conductive pass through for the capacitance reading to get to the outside of the tank. A cable is connected to the outside of the BNC nipple, the cable leads to a fuel gauge sender box. The sender is an interface, it receives the capacitance reading and turns it into a reference signal that is sent to the dash-mounted gauge. A three-wire (OEM) harness connects the sender to the fuel contents gauge. The capacitance tube and internal tank wiring are not able to be serviced or repaired in the field.

Serviceable Fuel Gauge Parts

The following fuel gauging system parts are serviceable:

- The small brass electrical contact: Connects the tank knuckle end of the capacitance wire to the BNC nipple inside contact pin.

The BNC nipple: Provides a ceramic safety seal between the LNG in the inner tank and the ambient conditions outside the tank.

- The sender: Usually mounted inside the tank shroud or bottom side of the top head ring support. The sender connects to the BNC nipple outside connector via an RG 59 cable. The sender changes the capacitance reading to a corresponding reference used by the fuel contents gauge.
- The three-wire OEM harness: Has the following wires:
    - o Red–Circuit voltage 12 or 24 volts
    - o Green–Connects the sender to the gauge
    - o Black–Circuit ground
- The gauge: Usually mounted in the drivers compartment or the fuel management panel.

Two types of BNC nipples are used:

- A threaded type BNC
- A flare type BNC

The difference between the two types of BNC nipples is how the BNC mounts to the tank knuckle elbow. The threaded type nipple requires a female ¼" pipe thread elbow. The flared type nipple requires a ⅜" male 37° flared elbow.

Two types of senders are available:

- A single cable sender
- A dual cable sender

This procedure is intended for use by trained technicians with experience on systems using LNG. Review all applicable safety documents before beginning this procedure.

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The single cable sender is normally used on single tanks. A dual cable sender is used for dual tank applications. One lead from the dual cable sender connects to the BNC nipple and the other connects to a patch cable from the BNC nipple on the other tanks. The sender must be calibrated for the dual tank configuration in order for the fuel gauge to read correctly.

Capacitance Readings

The amount of capacitance the sender measures is based on the following factors:

- The diameter of tank(s)
- The number of tanks in the system
- The level of LNG in the tank
- The length of cabling to the sender
- The economizer regulator setting

The sender is factory calibrated based upon the above factors.

Example: A single cable sender mounted on a single tank system may have normal capacitance readings of between 340pF empty to 520pF full (pF=pico Farad). A dual tank sender may have normal capacitance readings of 690pF empty and 1050pF full. Therefore the sender must be factory calibrated. Since the sender unit is sealed, it is not possible to change or set sender calibration in the field.

Ordering Senders

The sender must be calibrated for the specific tank size and operating characteristics for the system it will be installed on. Therefore information must be provided to Chart when the sender is ordered. This ensures the sender is calibrated to read correctly:

- Diameter of inner tank. Provide the tank serial number (located on the tanks data plate) to Chart customer service to determine the inner tank diameter.
- Quantity and size of tanks in the system.
- Economizer regulator setting.
- Length of patch cable (if equipped) The patch cable attaches a second tank to the dual tank sender lead.

To order parts call Chart Inc. customer service at 952-758-8238. Or if you know the part number and setting information go to the Chart dedicated parts website. http://www.chartparts.com/

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