	VT-0042	000	BBK
	<b>Fuel Gauge Feed Through Inversion</b>		

**Purpose**

The purpose of this Technical Service Bulletin (TSB) is to provide guidance for inverting a fuel gauge feed through on certain models of Chart Inc. LNG vehicle tanks.

**Overview**

It has been determined that certain HLNG vehicle tank models may develop methane seepage or leaks through the fuel gauge sender cable wire at what is called the feed through. A capacitance tube is mounted inside of the tank which sends a corresponding liquid/fuel level reading to the sender box via a cable type wire that runs from the capacitance tube inside the tank to the sender box outside the tank. Where the wire exits the fuel tank it is encased in a hardened seal (feed through) that is inside of a brass fitting. It has been determined that improper tank filling/fueling techniques can cause a leak to occur at the feed through seal. In some cases the leak will allow cold methane to enter (and thus damage) the sender box. The sender box is typically mounted inside the tank shroud.

The following procedure will outline an inspection of the fuel gauge sender and feed through for identification purposes. It will also provide detailed instructions for repair procedures and part numbers if repairs are deemed necessary.

**Warning:**

**Always wear appropriate LNG protective gear and eye protection when performing the following procedures. This procedure is intended for use by trained technicians with hands on experience with LNG vehicle fuel systems. Review all applicable safety documents before beginning this procedure.**

**Tanks Affected**

Tanks that may fall under this TSB were manufactured between August 2009 and February 2010.

Tanks manufactured prior to August 2009 will use a BNC style connector and feed through and are not impacted by this TSB. Tanks that were manufactured during or after February 2010 have the feed through mounted above the "tee" and are not impacted by this TSB.

**Inspection Procedure**

Inspect tanks data plate to identify the manufacture date. The data plate is mounted on the outside of the shroud or head ring (on bus tanks). If it falls within the manufacturing range (between August 2009 and February 2010) perform a visual inspection of the tank plumbing and particularly the feed through plumbing to determine if the feed through is a BNC type or soldered type.

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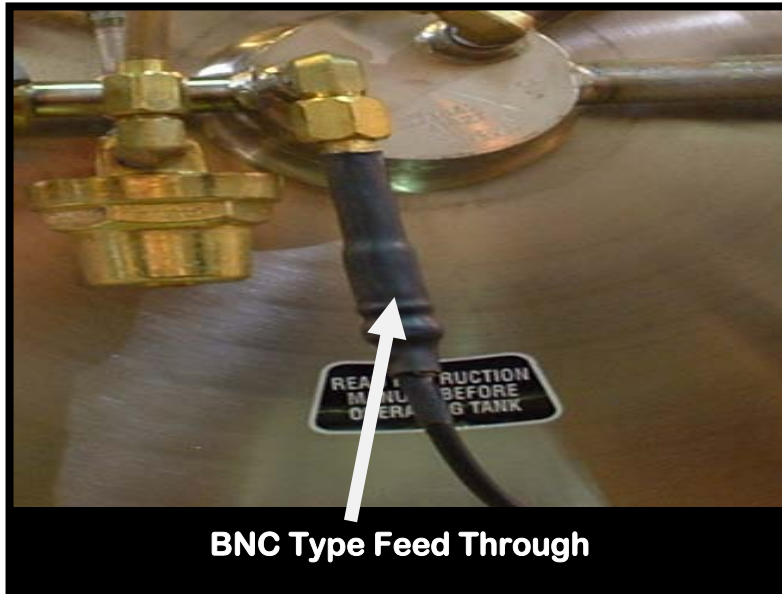


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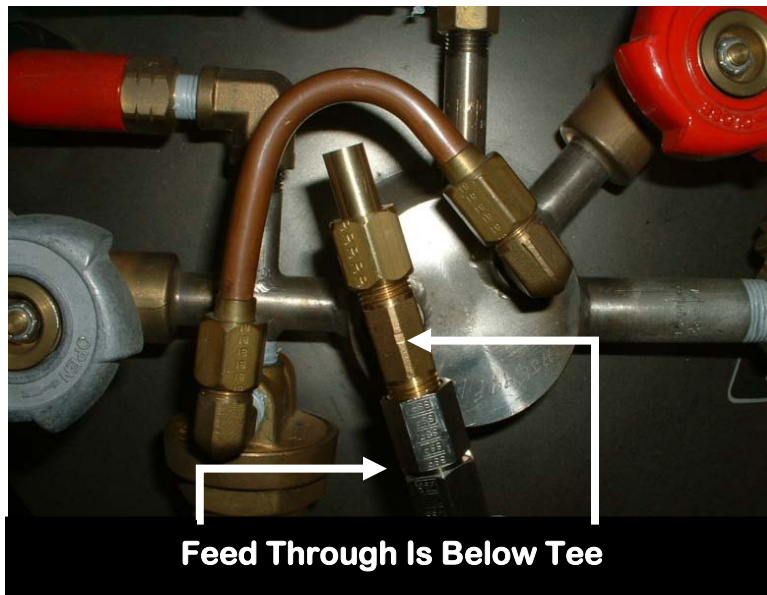
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**BNC Type Feed Through**

If it is a BNC type no further action is necessary.

If it is a soldered type, determine if the feed through is above or below the tee.



**Feed Through Is Below Tee**

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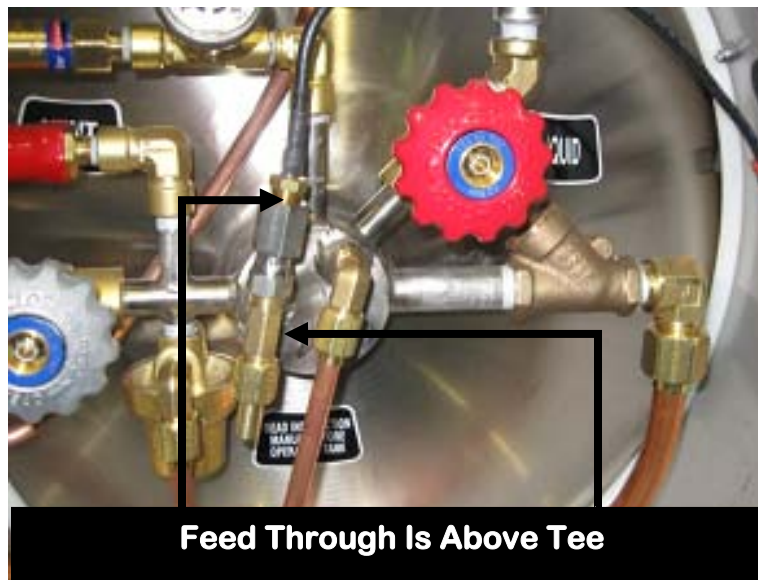
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### Fuel Gauge Feed Through Inversion

If the feed through is above the tee (see below) no further action is necessary. If it is below the tee (as shown above) proceed to the inversion procedure below.




#### Parts Needed

The following parts will be needed to invert the feed through.

1 roll - Nickel impregnated Teflon tape	11811511
1 Ea - Orifice Tee 3/8ODT*1/4MPT	14863595
4 Ea - Flaretite seals 3/8 JIC	11751555
1 Ea- Heat shrink tube	10560124
1 Ea - Economizer U tube Inverted	14712236

Parts are available from Chart Parts at 1-800-400-4683 or <http://www.chartparts.com/>

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### Inversion Procedure Steps

1. Ensure all liquid (LNG) and flammable methane vapors are purged from the tank (see VT-004-002). [http://www.nexgenfueling.com/p\\_ofs\\_bulletins.html](http://www.nexgenfueling.com/p_ofs_bulletins.html) Ensure the tank pressure is at 0 psi.
2. Slowly loosen economizer tube nuts and allow any residual pressure to bleed to 0 psi. Remove nuts and tube. Remove economizer elbows.
3. Remove the cap and nut from the capped end of the feed through tee.
4. Use a heat gun to heat the shrink tubing that protrudes from the feed through tee. Once the heat shrink is hot you can use a shop towel to grasp the shrink tubing and remove it from the wires and solder joint. (see photo below)



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- Use a solder gun to heat the exposed solder joint. Un-solder and separate the wires.



- Loosen the feed through nut and remove the feed through and wire.
- Remove the tee and feed the capacitance wire out of the tee.
- Use a wire brush to clean the tee threads. Use an internal wire brush to clean the internal coupling threads.
- Install new thread sealant tape to the NPT threads on the tee.
- Feed the capacitance wire back into the tee and thread the tee into the knuckle coupling threads.
- Tighten the tee. The final stopping point should have the tee in the 1 O'clock position with the capacitance wire protruding from the bottom of the tee (7 O'clock position).
- Install new Flaretite seal onto top side of flare tee.

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13. Locate the sender cable end with the fitting attached and white wire protruding from end.
14. Feed the white wire into the top of the tee (on the knuckle) and thread the fitting nut onto the tee. (photo below)

**Note: Be careful to route and secure the sender cable so that it does not come into contact with any plumbing components that will reach cryogenic temperatures.**

15. After the modification there will be excess sender cable. Ensure the cable does not come into contact with components that reach cryogenic temperatures in normal operation and secure the excess with a zip tie if necessary.



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16. Tighten the stainless fitting onto the top side of the tee flare; use two wrenches on the stainless fitting when tightening. Torque to 14 lb-ft. (See photo below)



17. Cut the wiring to the proper length so that about  $\frac{3}{4}$ " of the wiring is protruding from the end of the Tee. Strip the ends of both wires so that about a  $\frac{1}{2}$ " of wire strands are exposed.

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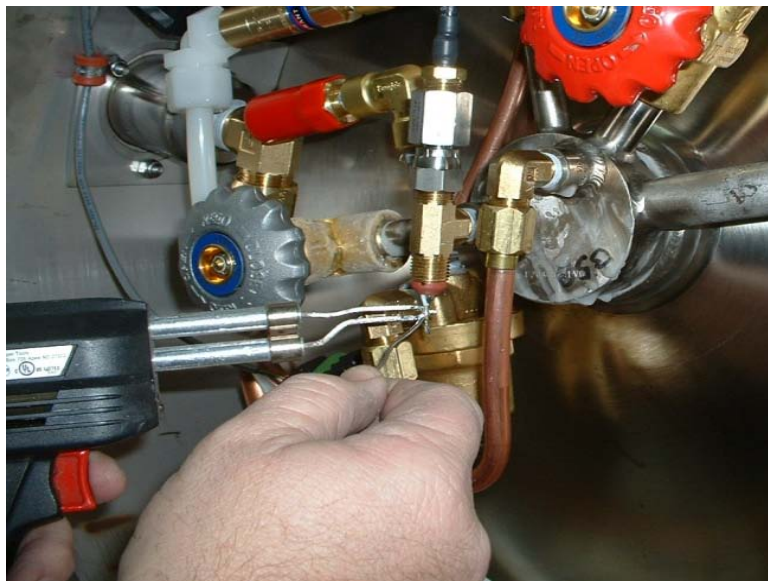
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18. Twist the two ends of the wires together in a uniform fashion. (See photo below)



19. Solder the twisted wires together. Make sure solder flows uniformly into the entire exposed length of the wire strands, then allow the assembly to cool completely.



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20. Measure the length of wire protruding from the tee. The overall wire length (including soldered portion) should be  $\frac{1}{2}$ ". If the overall wiring protruding from the tee is longer than  $\frac{1}{2}$ " trim the soldered end of the exposed wire.



21. Install a 1" piece of  $\frac{3}{32}$ " encapsulating heat shrink over the end of the solder joint. It needs to cover the entire portion of exposed wire from the flared opening of the tee to about a  $\frac{1}{2}$ " past the end of the soldered wires.

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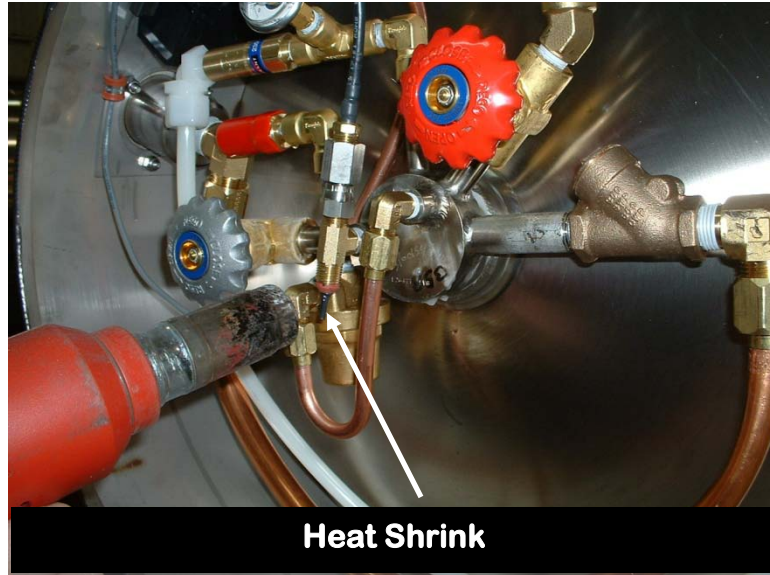


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22. Heat the heat shrink using a heat gun and a uniform heating method. The encapsulating glue needs to flow from both ends of the heat shrink.

**Note:** No evidence of the solder joint or wire can protrude out of, or be seen at the open end of the heat shrink. It is very important to allow heat shrink to cool completely.

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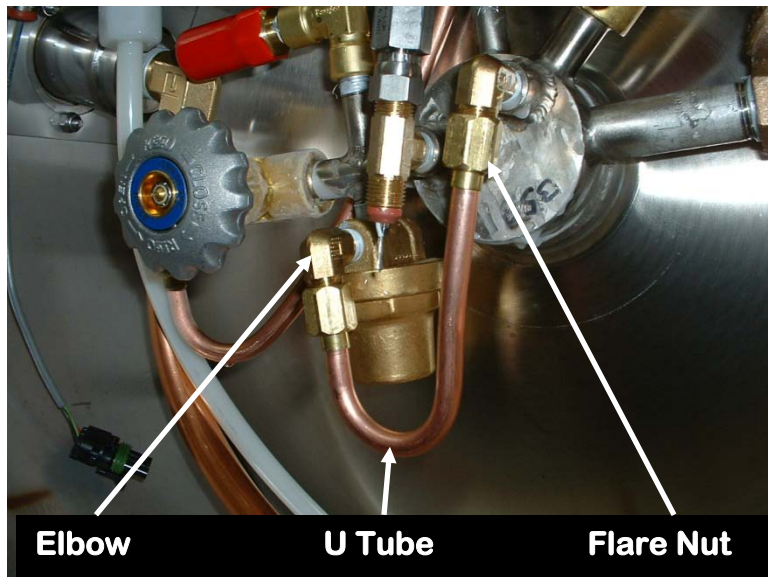
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23. While the heat shrink is cooling install nickel thread tape onto the MPT threaded portion of the economizer and knuckle elbows. Install both elbows to a final tight position so that the flared ends are pointing in a downward direction. Install new Flaretite seals and install copper u tube, adjust elbow positioning as necessary to allow u tube to sit squarely on the flare seals. Thread both flare nuts onto fittings and tighten to 14 lb/ft.



24. Install a new Flaretite seal on the bottom side of tee flare.

25. Install the wiring cap and flare nut. The wiring cap should not contact or come within ¼” of contacting the economizer U tube, fitting, or nut. Torque the nut to 14 lb-ft.

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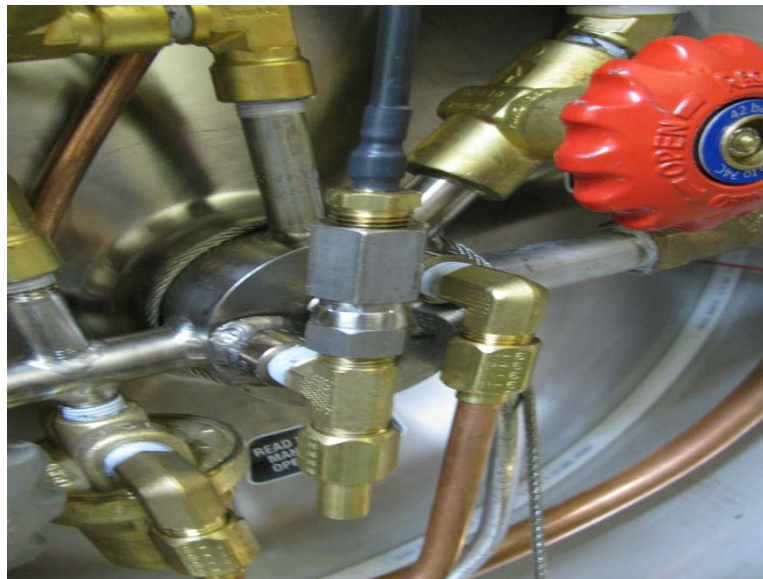
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### Fuel Gauge Feed Through Inversion



26. The final assembly should look like the photo below.



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27. Pressurize the tank with 50 psi of nitrogen and spray a liquid leak tester solution on all threads and fittings, leave on for 5 minutes and re-check for any signs of leaks.
28. Turn on the vehicles ignition switch, the gauge should read empty.
29. After filling the tank recheck the gauge reading, it should be at or nearly full.
30. Re-check system for signs of leaks.

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