	VT-0016	001	06-17	CWH
CHART®	Capacitance Testing			

OVERVIEW

Chart LNG tanks incorporate a capacitance system for real time monitoring of the liquid level inside LNG tanks. This capacitance reading is converted to a signal that is sent to the fuel level gauge.
Capacitance testing may be necessary when:

- A sender short, or open circuit condition exists but is not found in the external wiring
- Any time a capacitance cable is replaced or suspect, or if an internal component is suspect. Testing will ensure that the circuit is within specification

PARTS NEEDED

Capacitance for Chart tanks is measured in picofarads (pF), so the test equipment will need to be able to read at this level. ChartParts.com has a capacitance meter and the necessary leads available:

Capacitance meter PN: 11633137 standard test leads included

* BNC test lead (with adapter) PN: 11385436 sold separately

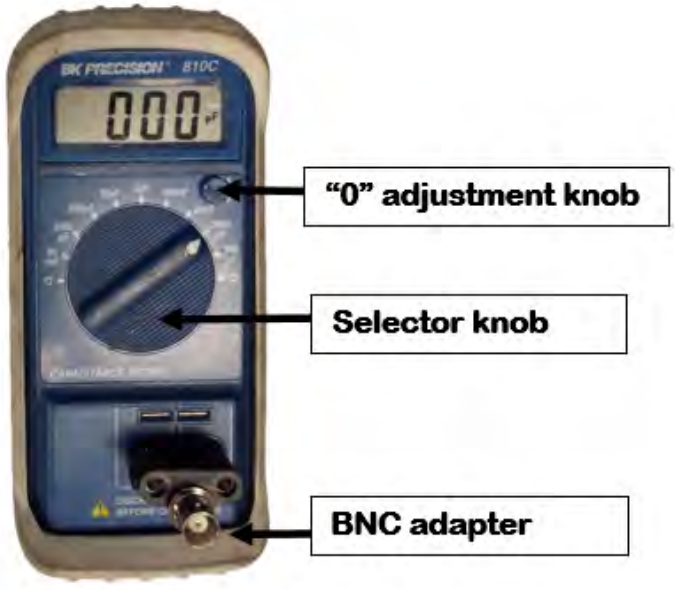
SAFETY

It is recommended to perform defueling and depressurizing of tanks in a well ventilated area so as to avoid gas from concentrating in an area. When air to fuel mixture is correct, concentrated gases become flammable. Insure truck's parking brake is applied, wheels chocked, and ignition switch is in the "off" position. Check for leaks and repair as needed. Wear proper PPE as needed for defueling and depressurizing of tanks & testing.

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

Measuring Capacitance

Step 1: Install BNC two pin adapter into the capacitance meter, turn selector knob on meter to 2000 pF, and adjust the "0" adjustment knob until "000" is displayed:



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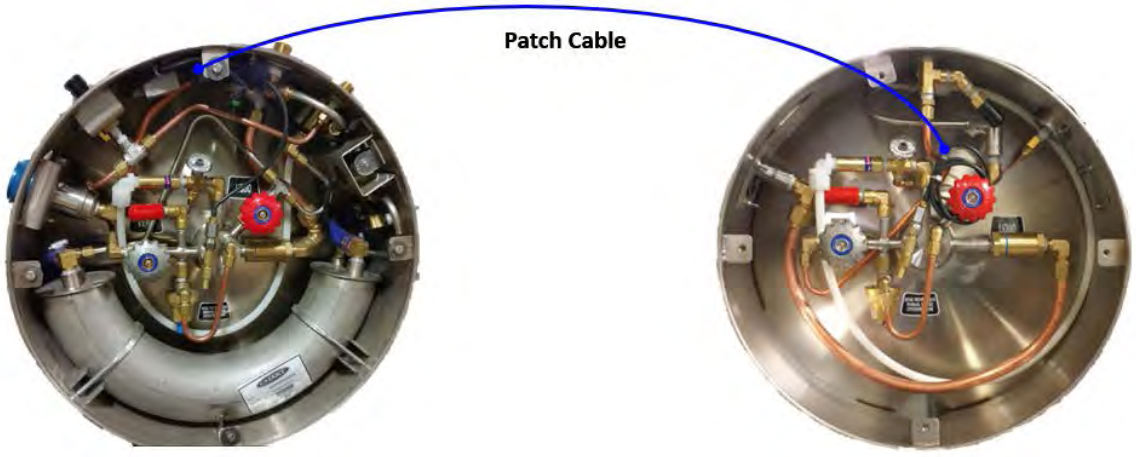
For Newer Style BNC Connectors

Step 2: Disconnect feed through cable BNC connector from the single tank or primary/filling tank sending unit (on dual tank system it may be connected either port) and attach it to BNC adapter on capacitance meter. Compare reading to capacitance table in **Step 18. Note:** If tank contains LNG, capacitance readings will reflect that level as a reading within the range between "Empty" & "Full" capacitances listed.

If capacitance readings are incorrect, a reading from the tank's capacitance cable will be needed to verify the integrity of the sender cable and/or the tank's capacitance cable.

If this measurement is needed, skip to **Step 10**

Step 3: For secondary tank (dual tank system), disconnect secondary tank's patch cable from sender unit on primary tank. Attach patch cable to meter. Reading should be approximately 185 pF higher when compared to capacitance table in **Step 18** if patch cable is 10ft. in length, and approximately 200 pF higher when compared to capacitance table in **Step 18** if patch cable is 11ft. in length. Cable length can be determined by contacting Chart Industries with the serial numbers from the tanks. **Note:** If tank contains LNG, capacitance readings will reflect that level as a reading within the range between "Empty" & "Full" capacitances listed.



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Step 4: If secondary tank reading is out of specifications, the secondary tank will need to be tested without patch cable. Use a razor knife to score into the entire length of the BNC heat shrink. Do not press so hard with the razor knife as to cut completely through the heat shrink, as this could damage the underlying components.




Use a heat gun to heat the heat shrink equally on both sides of the incision at 90 degrees either side of the incision. The heat shrink will start to split at the incision and peel away from the BNC. Use a shop towel to remove the heat shrink and discard, and remove excess glue residue.

Note: Use caution, the heat shrink and its glue will be hot.

Step 5: Attach secondary tank's feed through cable BNC cable to meter. Due to secondary tank having a longer feed through cable (36 in.), capacitance readings should be approximately 30 pF higher when compared to capacitance table in **Step 18**. **Note:** If tank contains LNG, capacitance readings will reflect that level as a reading within the range between "Empty" & "Full" capacitances listed.


If capacitance readings are incorrect, a reading from the tank's capacitance cable will be needed to verify the integrity of the sender cable and/or the tank's capacitance cable.

If this measurement is needed, skip to **Step 10.**

Step 6: Patch cable can be tested by disconnecting it from the primary tank's sender unit and from the secondary tank's BNC connector. Use a razor knife to score a vertical incision into the entire length of the BNC heat shrink. Do not press so hard with the razor knife as to cut completely through the heat shrink, as this could damage the underlying components. Use a heat gun to heat the heat shrink equally on both sides of the incision at 90 degrees either side of the incision. The heat shrink will start to split at the incision and peel away from the BNC. Use a shop towel to remove the heat shrink and discard, and remove excess glue residue. Connect BNC connector to the meter. Prevent open end of patch cable from contacting any conductive surfaces. Patch cable readings should be approximately 185 pF for 10 ft. & 200 pF for 11 ft. Cable length can be determined by contacting Chart Industries with the serial numbers from the tanks.

For Older Style Fuel Gauge Systems Using A BNC Nipple

Step 7: Use a razor knife to score a vertical incision into the entire length of the BNC heat shrink. Do not press so hard with the razor knife as to cut completely through the heat shrink, as this could damage the underlying components. Use a heat gun to heat the heat shrink equally on both sides of the incision at 90 degrees either side of the incision. The heat shrink will start to split at the incision and peel away from the BNC. Use a shop towel to remove the heat shrink and discard, use caution as the heat shrink and its glue will be hot.

Step 8: Remove BNC Cable connector from BNC nipple. Twist it a ¼ turn counterclockwise to unlock and pull it away from the nipple to disconnect.

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Step 9: Attach BNC cable adapter on capacitance meter, zero meter, then attach to BNC connector on tank. Compare the reading to capacitance table in **Step 18**. **Note:** If tank contains LNG, capacitance readings will reflect that level as a reading within the range between "Empty" & "Full" capacitances listed.

If capacitance readings are incorrect, a reading from the tank's capacitance cable will be needed to verify the integrity of the sender cable and/or the tank's capacitance cable.

If this measurement is needed, proceed to **Step 10.**

Measuring Capacitance at the Tank Capacitance Wire

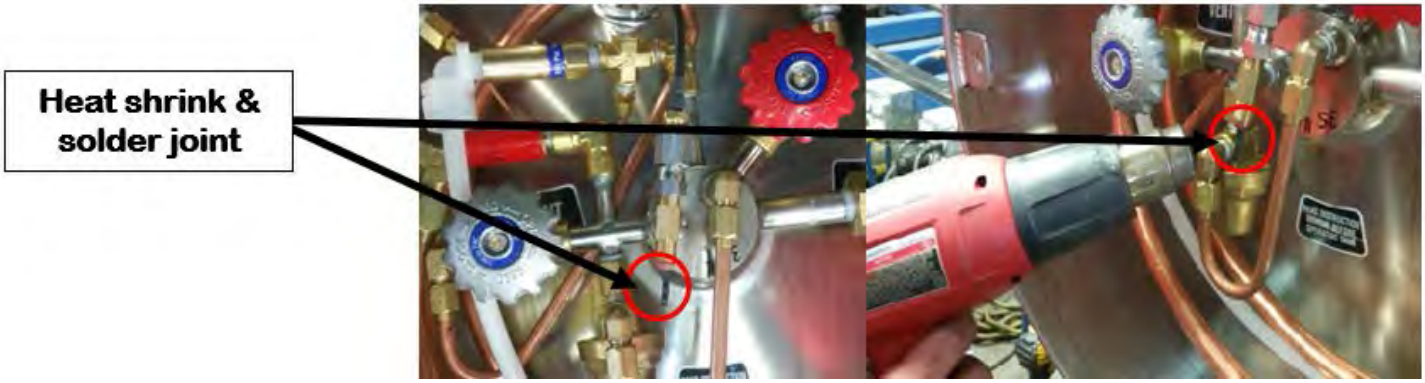
Step 10: Defuel tank.

Step 11: Fill tank with 30 PSI of nitrogen gas, then open vent valve to exhaust nitrogen gas pressure to 0 PSI. Repeat nitrogen purge.

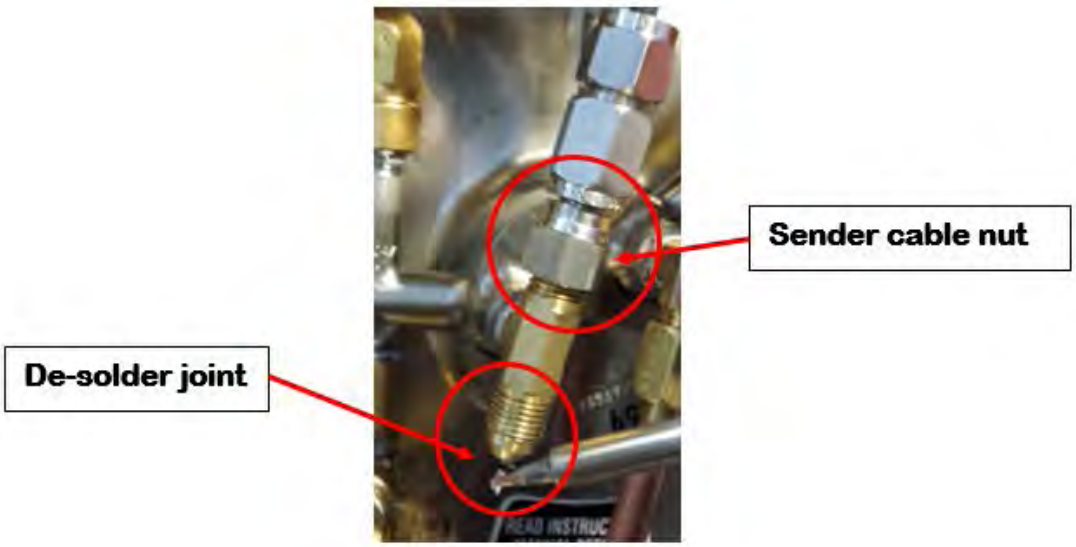
Step 12: Remove the cap and nut from the capped end of the feed through tee shown below:

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

Step 13: Use a razor knife to score a vertical incision into the heat shrink. Do not press so hard with the razor knife as to cut completely through the heat shrink, as this could damage the underlying components. Use a heat gun to heat the heat shrink equally on both sides of the incision at 90 degrees either side of the incision. The heat shrink will start to split at the incision and peel away. Use a shop towel or pliers to remove the heat shrink and discard, use caution as the heat shrink and its glue will be hot.



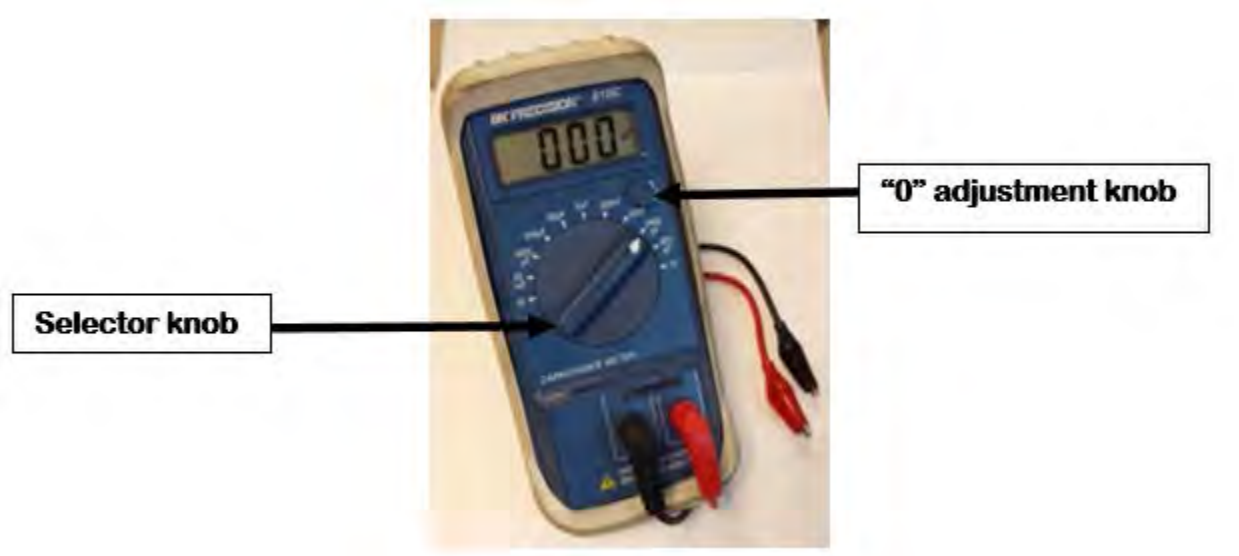
Step 14: Use a solder gun/iron to heat the exposed solder joint. De-solder and separate the two wires (Loosen the sender cable nut on the feed through and remove the sender cable if necessary).



Step 15: Connect standard test leads to the meter. Red to (+), black to (-)

Step 16: Turn selector knob on meter to 2000 pF, and adjust the "0" adjustment knob until "000" is displayed.

Ensure the two wires are completely separated from each other, no wire strands can be touching anything or each other.



Step 17: Connect black lead to a good grounding point on tank/plumbing area, and connect the red lead to the center wire of the tank's capacitance lead extending from the feed through. Do not touch the cable ends or wires with your hands as this will change the capacitance readings.

Step 18: Compare readings from all capacitance tests to the following graphs according to the tank size being tested and feed through cable (+/- 10 pF). **Note:** If tank contains LNG, capacitance readings will reflect that level as a reading within the range between "Empty" & "Full" capacitances listed below.

Tank Outside Diameter	Empty Capacitance	Full Capacitance
20"	287 pF	416 pF
22"	314 pF	458 pF
24"	342 pF	500 pF
26"	370 pF	542 pF
26" Bonus	380 pF	558 pF

WITH 15" FEED THROUGH CABLE ATTACHED

Tank Outside Diameter	Empty Capacitance	Full Capacitance
20"	316 pF	445 pF
22"	343 pF	487 pF
24"	371 pF	529 pF
26"	399 pF	571 pF
26" Bonus	409 pF	587 pF

WITH 36" FEED THROUGH CABLE ATTACHED

Tank Outside Diameter	Empty Capacitance	Full Capacitance
20"	256 pF	385 pF
22"	283 pF	427 pF
24"	311 pF	469 pF
26"	339 pF	511 pF
26" Bonus	349 pF	527 pF

DIRECTLY FROM TANK CAPACITANCE WIRE – FEED THROUGH DISCONNECTED