Electronics International Inc.

Troubleshooting

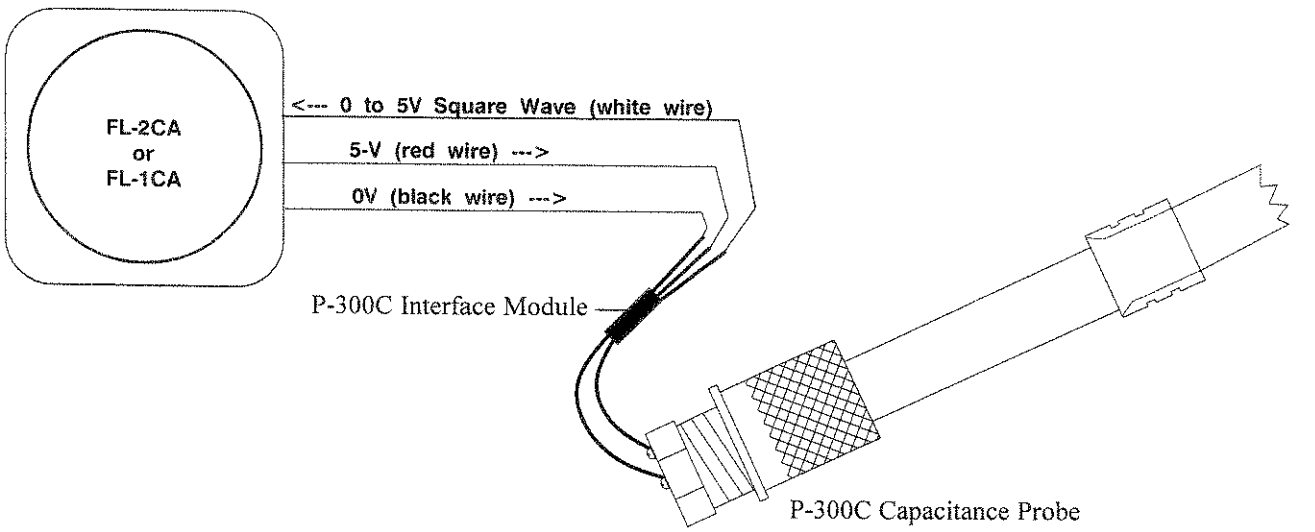
0822021

8/22/02

Function: Fuel Level from P-300C (Capacitive Probe).

Instruments: FL-1CA and FL-2CA

Theory of Operation: The P-300C Capacitance Probe consists of a center electrode in a grounded tube. The capacitance of the P-300C Probe increases as fuel covers the center electrode. The P-300C Interface Module connects to the center electrode and converts the P-300C Probe capacitance to a 0 to 5-volt square wave with a frequency that is proportional to the fuel level. This signal is provided on the white wire. The FL-2CA instrument provides +5-volts on the red wire and ground on the black wire to the P-300C Interface Module.



The FL-2CA instrument converts the frequency on the white wire to a digital count called a Sensor Count. The Sensor Counts can be displayed in the calibration mode and are proportional to the fuel level on the P-300C Probe. The approximate correlation of the frequency out of the P-300C Interface Module and Sensor Counts displayed on the FL-2CA is as follows:

Frequency	Sensor Counts	
5.3K Hz.	0000	(minimum count)
3.2K Hz.	1600	
1.6K Hz.	2850	
.4K Hz.	3780	
.2K Hz.	3940	(maximum count = 4095)

The approximate Sensor Counts for a given length P-300C Probe (with no fuel on the center electrode) is as follows:

Probe Length	Sensor Counts
4 feet	500
11 feet	2350

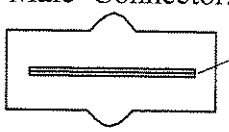
During calibration the FL-2CA builds a lookup table with fuel levels associated with a specific Sensor Count. The exact Sensor Count for a given length P-300C Probe with a specific fuel level is not important. What is important is the Sensor Counts start at a relative low count at empty and increase as fuel is added to the tank. Also, the Sensor Counts should range from 10 to 4085 (max range = 0 to 4095).

Common Problems:

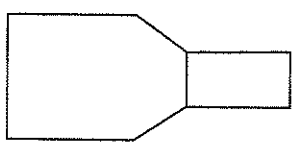
1. A damaged P-300C Interface Module can cause a 4095 Sensor Count.
2. An incorrect connection at the P-300C Interface module can cause a 4095 Sensor Count.
3. Water, sealant or other foreign material in the P-300C Probe can cause a 4095 Sensor Count.
4. If the center electrode at the tip of the P-300C Probe is touching the tank, you can get a 4095 Sensor Count.
5. Loose or poor connections at the P-300C Interface Module can be a source of problems.

Troubleshooting Suggestions:

Male Connector.



Note: The tab inside the male connector **must be centered** (not bent up or down) to mate properly. Check each connector before installation. **Two drops of oil on the connector will protect it from corrosion for many years.**



Note: If you remove a connector, **double over the wire** before installing it into a new connector. Each connector must be double crimped very tightly.

Note: If connectors have been disconnected several times the female connector may become loose. If this happens use a pair of needle nose pliers to **retighten the female receptacle** then mate the connectors.

Troubleshooting Suggestions:

Symptom: The Sensor Counts displayed on the FL-2CA during calibration is not correct.

1. Measure the voltage on the red wire at the P-300C Interface Module. Look for 5-volts (+/ - .3 volts). The FL-2CA instrument supplies this voltage to the P-300C Interface Module.

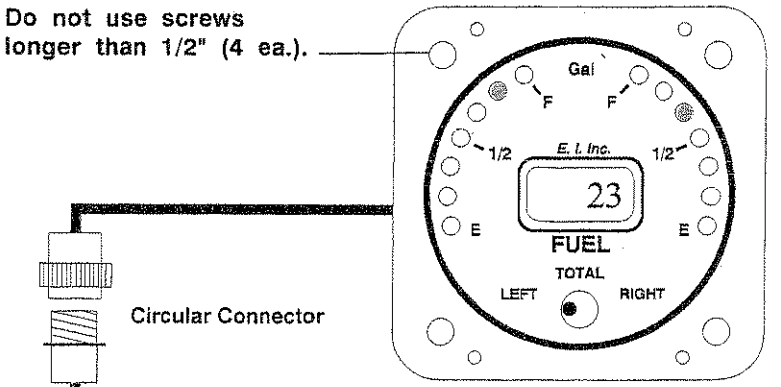
2. Measure the voltage on the black wire at the P-300C Interface Module. Look for 0-volts (+/- .3 volts). The FL-2CA instrument supplies this ground to the P-300C Interface Module.

3. Measure the voltage on the white wire at the P-300C Interface Module. Look for 2.5-volts (+/- .5 volts). The P-300C Interface Module supplies this voltage to the FL-2CA instrument. The 2.5-volts is an average of the 0 to 5-volt square wave on the white wire. The 2.5-volts indicates the P-300C Interface Module is working, although, the frequency may be wrong.

4. Disconnect the P-300C Interface Module from the P-300C Probe. Place a 100pF cap across the two P-300C Interface Module leads. Repeat step 3. The Sensor Counts displayed on the FL-2CA should be around 1600.

5. Disconnect the P-300C Interface Module from the P-300C Probe. Using an ohmmeter measure the resistance between the center electrode and ground on the P-300C Probe. Look for an open (> 10Meg ohms). A reading less than 10Meg ohms indicates water, sealant or other foreign material in the P-300C Probe.

FL-2CA
Wiring Diagram



Wire Harness

Red — 3' Power Lead, connects to 12 or 24 Volt Bus via 1 amp fuse or circuit breaker.

Black — 3' Ground Lead, connects to Ground.

White/Brwn — 3' Backlight Control Line, connects to 12 Volt Bus via 1 amp fuse (may use the power fuse). 12 volts turns on the digital display backlight.

White/Red — 3' Backlight Control Line, connects to 24 Volt Bus via 1 amp fuse (may use the power fuse). Connect to ground for 12 Volt System.

White/Orng — 3' Analog LED Lighting Control Line, connects to Panel Light Rheostat. 12/24 volts dims the analog LEDs.

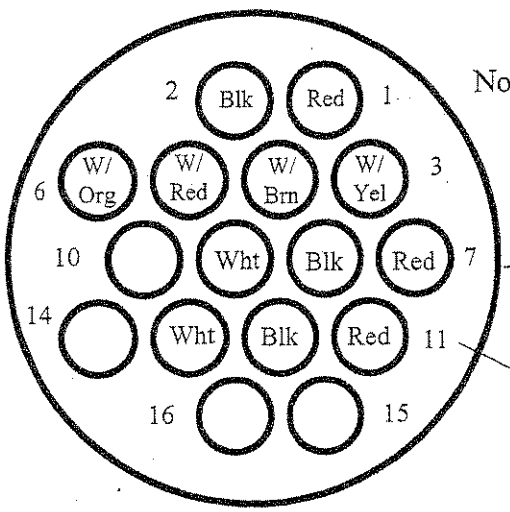
White/Yel — 3' (Optional) External Warning Control Line. Can be connected to a relay to control an external light, buzzer, etc. Grounds when Red Warning Light is on. Current must be limited to 1/10 amp maximum.

Red Wire
Black Wire
White Wire
6' Grouped wires marked "Left", connects to Left Tank Capacitive Sensor.

Red Wire
Black Wire
White Wire
6' Grouped wires marked "Right", connects to Right Tank Capacitive Sensor.

FL-2CA
Circular Connector

Connecting Cable Harness, Back View (wire side)



Note: See Wiring Diagram for hook up information.

7 to 9 (Left Fuel Level Input).

11 to 13 (Right Fuel Level Input).