



# Primary Instrument Questionnaire

For each of the gauges listed below, please include the following gauge marking information based on visual inspection of the manufacturer installed gauges, or the attach copies of Aircraft Flight Manual for each gauge. Draw X through gauges not installed in the aircraft.

Aircraft Information		Example
Customer Name		John Smith
Customer Phone #		949-555-1212
Aircraft Manufacturer		Cessna
Aircraft Model		182
Engine Manufacturer		Lycoming
Engine Model		IO-360
Any engine STCs ?		
Tail Number		N1234W
Engine Temps F or C?		F

Tachometer Markings:	From	To	Example
Radial Red Line (or arc)			2650 RPM
Yellow Arc (or N/A)			2600 – 2650 RPM
Green Arc			2250 - 2650 RPM
Red Arc (area to avoid)			2200 - 2250 RPM
Green Arc			2000 - 2200 RPM

AFM information attached \_\_\_\_\_ (Y/N)

MAP Markings:	From	To	Example
High Value Radial Red Line (or arc)			37 – 40 IN HG
Yellow Arc (or N/A)			N/A
Green Arc			15 – 37 IN HG
Low Value Radial Red Line (or arc)			NA

AFM information attached \_\_\_\_\_ (Y/N)

EGT / TIT Markings:	From	To	Example
Red Line (or band)			1650 F
Yellow Band (or N/A)			1600 – 1650 F
Green Band			850 – 1600 F

AFM information attached \_\_\_\_\_ (Y/N)

CHT Markings:	From	To	Example
Red Line (or band)			450 – 500 F
Yellow Band (or N/A)			425 – 450 F
Green Band			250 – 425 F

AFM information attached \_\_\_\_\_ (Y/N)

If Aircraft includes a manufacturer installed CDT gauge, include markings:

CDT Markings:	From	To	Example
Red Line (or band)			260 F
Yellow Band (or N/A)			250 – 260 F
Green Band			100 – 250 F

AFM information attached \_\_\_\_\_ (Y/N)

OIL TEMP Markings:	From	To	Example
Red Line (or band)			235 F
Yellow Band (or N/A)			220 – 235 F
Green Band			100 – 220 F
Yellow Band (or N/A)			0 – 100 F

AFM information attached \_\_\_\_\_ (Y/N)

OIL PRESSURE Markings:	From	To	Example
Red Line (or band)			100 PSI
Yellow Band (or N/A)			75 - 100 PSI
Green Band			25 - 75 PSI
Yellow Band (or N/A)			15 - 25 PSI
Red Line (or band)			0 - 15 PSI

AFM information attached \_\_\_\_\_ (Y/N)

If Aircraft includes a manufacturer installed FUEL PRESSURE gauge, include markings:

FUEL PRESSURE Markings:	From	To	Example
Red Line (or band)			19.5 – 20 PSI
Yellow Band (or N/A)			NA
Green Band			3.5 – 19.5 PSI
Yellow Band (or N/A)			N/A
Red Line (or band)			0 – 3.5 PSI

AFM information attached \_\_\_\_\_ (Y/N)

**Electrical System:**

14 volts \_\_\_\_\_ 28 volts \_\_\_\_\_

If Aircraft includes a manufacturer installed voltmeter, include markings:

VOLTS Markings:	From	To	Example
Red Line (or band)			15 V
Yellow Band (or N/A)			N/A
Green Band			11.5 – 15 V
Yellow Band (or N/A)			10 – 11.5 V
Red Line (or band)			10 V

AFM information attached \_\_\_\_\_ (Y/N)

If Aircraft includes a manufacturer installed ammeter, include markings:

AMPS Markings:	From	To	Example 1	Example 2
Red Line (or band)			25 A	100 A
Yellow Band (or N/A)			N/A	N/A
Green Band			0 – 25 A	0 – 100 A
Yellow Band (or N/A)			N/A	N/A
Red Line (or band)			-25 – 0 A	N/A

AFM information attached \_\_\_\_ (Y/N)

If Aircraft includes a manufacturer installed FUEL FLOW gauge, include markings:

FUEL FLOW Markings:	From	To	Example
Red Line (or band)			N/A
Yellow Band (or N/A)			N/A
Green Band			1 – 25 GPH
Yellow Band (or N/A)			N/A
Red Line (or band)			0 – 1 GPH

AFM information attached \_\_\_\_ (Y/N)

If Aircraft includes a manufacturer installed OAT gauge, include markings:

OAT Markings:	From	To	Example
Green Band			100 F
Yellow Band (or N/A)			32 – 25 F
Green Band			-40 – 25 F

AFM information attached \_\_\_\_ (Y/N)

**Fuel Quantity Information:**

Accurate fuel quantity information is possibly **the most important information** you can provide to JP Instruments for your aircraft. Inaccurate information could cause inaccurate FUEL QTY gauge readings, invalidating your FAA certification. For a full explanation of ways to obtain the fuel quantity calibration information, see Appendix A of this document.

Fuel Qty System Information:	Example
Fuel quantity units (circle one): GAL LBS LTRS KGS	GAL
Fuel level sensor type (circle one): Resistive Capacitive	Resistive
Usable fuel quantity, Total, Left, Right:	75, 37.5, 37.5

**If using Resistive sensors, complete the following 2 tables (required)**

Left Tank Resistive Sensor Readings:	Ohms	Gallons	Example
Full Level Reading (required)			2265, 37.5 GAL
¾ Level Reading			2268, 27 GAL
½ Level Reading			2931, 18
¼ Level Reading			3294, 9
Empty Reading (required)			4294, 0

Right Tank Resistive Sensor Readings:	Ohms	Gallons	Example
Full Level Reading (required)			2265, 37.5 GAL
¾ Level Reading			2268, 27 GAL
½ Level Reading			2931, 18
¼ Level Reading			3294, 9
Empty Reading (required)			4294, 0

**If using Capacitive sensors, complete the following 2 tables (required)**

Left Tank Capacitive Sensor Readings:	Hz	Gallons	Example
Full Level Reading (required)			500
$\frac{3}{4}$ Level Reading			N/A
$\frac{1}{2}$ Level Reading			N/A
$\frac{1}{4}$ Level Reading			N/A
Empty Reading (required)			0 – 5 GAL

Right Tank Resistive Sensor Readings:	Hz	Gallons	Example
Full Level Reading (required)			5 – 37.5 GAL
$\frac{3}{4}$ Level Reading			N/A
$\frac{1}{2}$ Level Reading			N/A
$\frac{1}{4}$ Level Reading			N/A
Empty Reading (required)			0 – 5 GAL

**FUEL QTY Gauge Markings (REQUIRED)**

FUEL QTY Gauge (L/R) Markings:	From	To	Example
Green Band			5 – 37.5 GAL
Yellow Band (or N/A)			N/A
Red Line (or band)			0 – 5 GAL

AFM information attached \_\_\_\_\_ (Y/N)

**If incomplete fuel quantity information is supplied, your EDM fuel quantity subsystem will be inoperative.**

# Appendix A

## Fuel Level Gauge Calibration

EDM900/930 units installed for Primary Instrument operations (STC) are not allowed to modify fuel tank calibration parameters. You may only select fuel units to be displayed, K factors, etc.

### CALIBRATION METHODS

There are two different methods of obtaining fuel level sensor calibration information for the EDM-900/930. Both methods require that you start with empty tanks and add measured amounts of fuel.

1. The first method requires you to start the EDM-900/930 in Fuel Calibration Mode and write down the calibration parameters and the amount of fuel that has been added for each data point. After you have all of the data points written down, you can manually enter the information into EzConfig II and then download the information into the EDM-900/930.
2. The second method uses a precision ohmmeter to obtain the calibration parameters for the EDM-900/930.

Both methods require you to start with empty tanks, add fuel to the tanks and record the readings from the aircraft's fuel level sensors. Power is only applied after the fuel has been added and all fuel caps have been returned to their closed position.

### OBTAINING FUEL SENSOR READINGS USING EDM DISPLAY

The technique for displaying the fuel level sensor readings is described in the EDM-900/930 Pilots Guide. It is important that you always turn off the main power supply while adding fuel to the system.

When the EDM-900/930 is powered up in Fuel Calibration mode, write down the current left and right tank readings. Next turn off power, then add a measured amount of fuel to both tanks and restart the EDM and write down the next set of readings. Repeat until both tanks are "full." As a minimum, you must provide values for **Empty** and **Full** levels. **Note: If your aircraft uses capacitive sensors this method must be used if manufacturer's data is unavailable.**

### OBTAINING FUEL SENSOR READINGS USING AN OHMMETER

If you have not yet installed your EDM instrument, you may use a precision ohmmeter to read fuel sensors. **We need a description of taking readings with an ohmmeter.**

As a minimum, you must enter values for **Empty** and **Full** levels.

### SAMPLE DATA

A sample table of parameters might look like this:

LEFT TANK			RIGHT TANK	
Calibration parameter	Gallons		Calibration parameter	Gallons
5000	00.0	Empty	5100	00.0
4900	05.0	1/4	4800	05.0
4500	10.0	1/2	4400	10.0
3600	15.0	3/4	3700	15.0
1000	20.0	Full	1100	20.0

The values of the calibration parameters only have meaning to the EDM-900/930; it is the value that the fuel level sensor transmits to the EDM-900/930 when the corresponding amount of fuel is in the tank. In the table above, the first data point for the left tank had a calibration parameter of 5000. This value is associated with the left tank having 0 gallons in it. The same data point for the right tank has a value of 5100 and the amount of fuel associated with this value is also 0 gallons.

The calibration parameters are used during operation of the EDM-900/930 to interpolate the value read from the fuel level sensor and determine the displayed amount of fuel in the tank.

The number of data points to use is user selectable from 2 to 5. The number of points that should be chosen depends on the shape and orientation of each fuel tank and the linearity of the fuel level sensor. As a minimum, you must enter values for **Empty** and **Full** levels. If the fuel tank is a regular shape and the fuel sensor is linear, then the relationship between each sensor reading and the actual amount of fuel will be linear. Some tanks are not regular in shape and most resistive fuel sensors are not linear. In that case more points should be used. With 5 data points, it's possible to approximate the curve with 4 line segments.

In the example below a 2 point calibration is shown along with a 5 point calibration. The linear 2 point calibration has a considerable error in the mid-range. It would only be accurate at the extremes: empty and full. The 5 point calibration would have a much smaller error.

