Introduction:

This document shows how to adapt an in-tank fuel sender for remote monitoring of fuel level, either for use with a distant analog meter or for input to the SRMS remote monitoring board from EtherTek Circuits: [http://www.remotemonitoringsystems.ca/rms2/](http://www.remotemonitoringsystems.ca/rms2/)

In-Tank Sender:

The design is based on a general-purpose marine fuel tank sender unit. This variable rheostat is designed to be retrofit into existing tanks, and can be easily modified. Use the Teleflex Fuel Level Sender, Adj. 4"-24" 90424P, Code F, 240-33 ohm [http://cgi.ebay.ca/Teleflex-Fuel-Level-Sender-Adj-4-24_W0QQitemZ130191501492QQihZ003QQcategoryZ26451QQrdZ1QQssPageNameZWD1VQQtrksidZp1638.m118.l1247QQcmdZViewItem](http://cgi.ebay.ca/Teleflex-Fuel-Level-Sender-Adj-4-24_W0QQitemZ130191501492QQihZ003QQcategoryZ26451QQrdZ1QQssPageNameZWD1VQQtrksidZp1638.m118.l1247QQcmdZViewItem)
The sender unit is adjustable for tanks between 4" and 24" deep (by shortening the vertical support or bending the float arm). For this application, the rheostat unit is mounted in the reversed in position, so that the highest resistance is when the float is at the top of a full tank. Note that stainless steel screws on the side are used to secure the rheostat to the vertical support, allowing easy reversal of orientation.

In order to make the sender unit have zero ohms when the tank is empty, I have made a small modification to the rheostat to allow greater angular motion of the sensing arm. A notch is cut in the plastic body of the rheostat unit, as shown below:
Circuit Diagram:

A simple resistor circuit is used to monitor fuel level. The in-tank sender is powered by a regulated 5 volt source, either from the SRMS board or from a 3-pin positive 5V voltage regulator. The circuit is a voltage divider designed to have slightly less than 2.5 VDC maximum output, proportional to the angular motion of the float arm in the tank. The output is connected to one of the 2.5 VDC inputs on the SRMS board (note: the output must NOT exceed 2.5 VDC, or the SRMS voltmeter Gauge will not display properly). With an empty tank, the Gas Gauge Circuit will draw about 20 mA and use about 0.1 watt.

Remote Gas Gauge Circuit

\[
\begin{align*}
+5 \text{ VDC regulated} \\
\downarrow \\
250 \\
\downarrow \\
244 \\
\downarrow \\
24K \\
\downarrow \\
\text{modified Teleflex in-tank fuel gauge sender} \\
\downarrow \\
\text{to SRMS voltmeter} \\
\text{FS = 2.5 V} \\
\downarrow \\
\text{analog fuel gauge} \\
1-100\%
\end{align*}
\]
Analog Fuel Gauge Meter:

In addition to a digital readout of fuel level by the SRMS board, it is also possible to install an analog meter (note, this circuit will NOT work with a standard analog fuel gauge). The meter selected is a STANDARD ST-670 meter movement (full scale 100 uA), available from:

Lee's Electronics
4533 Main Street
Vancouver, BC
604-875-1993
www.leeselectronic.com
Note that the face of the meter is calibrated with a scale of 0-100 uA. This is useful because the numbers can easily be interpreted as a percent. The meter face cover is secured by two screws, allowing easy removal. The actual metal scale is also attached by two small screws, and it too can be easily removed.

Use a sharp knife to carefully scrape away the uA designation on the scale (leaving the white paint). Then, black Letraset adhesive letters can be attached, giving a professional appearance. Alternatively, use a ultra-fine Sharpie and label the meter face by hand.

Note that the meter movement is extremely sensitive and requires a 24K resistor in series for it to read properly. Thus the meter requires less than 0.1 milliamps and can be located an arbitrarily long distance from the fuel sender unit at the tank. Also, multiple analog fuel meters (with 24K resistor) can be connected in parallel (e.g. one in the generator powerhouse and a second in a summer cabin); since each analog meter has high resistance, multiple parallel meters to not noticeably affect the fuel level reading from the voltage divider circuit.