Application Brief - Switching Inputs to Digital Meters Part I

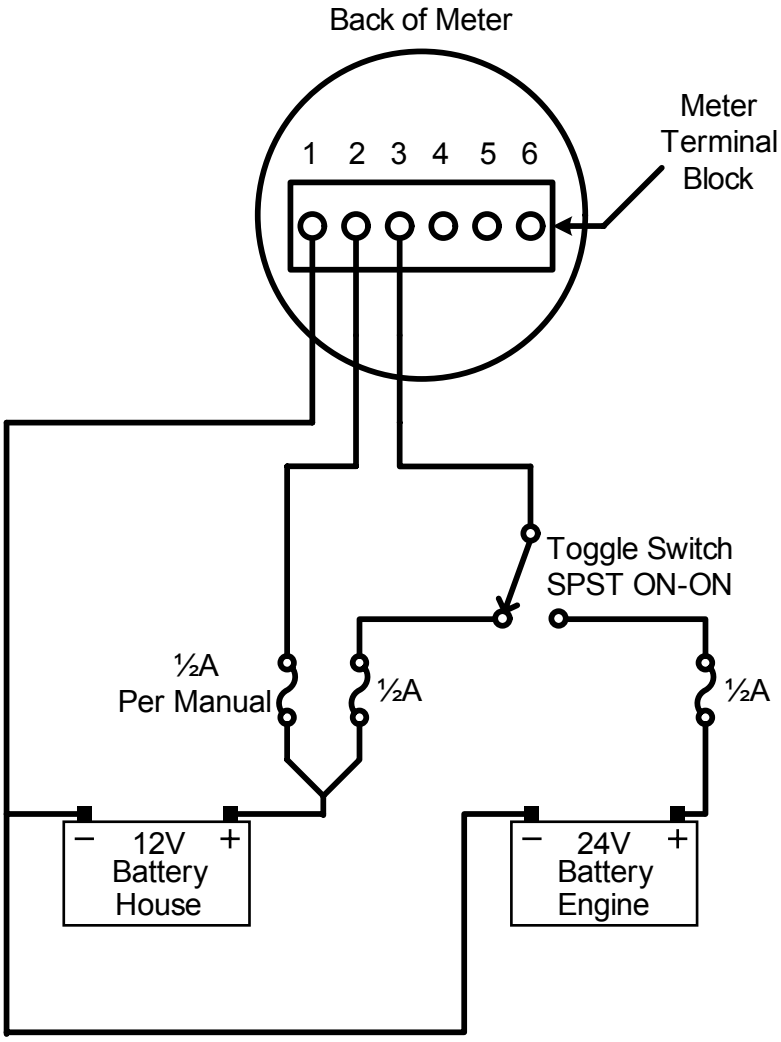
Using a Single 8200 Series Digital Meter to Monitor Multiple Voltages and Currents

Overview
This application note will be presented in two parts: Part One will deal with DC meters and Part Two will address AC meters. Both show how to expand the usefulness of the 8200 Series Digital Meters by supplying multiple voltages, shunt, and current transformer inputs through various switching arrangements. The installation manual for the specific meter being installed must be thoroughly understood before attempting any additional input switching. If the system is 120/240V AC please also review the article in Newsletter #6 titled "Understanding Current Flow In 120/240V AC Single Phase Systems". This technical brief will explain where to best install the required current transformers.

Switching Inputs on DC Meters
The DC Digital Meters (Models 8235, 8236, 8248, and 8251) are powered by supplying 7-60 V DC to terminals #1 & #2 on the back of the meter. These terminals provide power to the internal electronics and microprocessor. The voltage sensing and current shunt inputs are supplied on other terminals and may be switched as desired to monitor multiple battery voltages and currents, **provided they share a common negative and the shunts are installed in the negatives of the circuits to be measured**.

DC Voltage
For example suppose a system has a "house battery" and an engine starting battery. **As long as the negatives of the two systems are connected together (common)**, you may switch the Voltage Sense Terminal #3 between the two batteries. This is true even if the batteries are different voltages. So, for our example let's assume a 24V starting system and a 12V house system, we can simply install a SPDT (Single Pole Double Throw) switch. Meter terminal #3 is connected to the common of the switch and the 12V and 24V sense leads from the batteries are connected to the other two poles. See Drawing #1. While we have shown this example with only two batteries any number of batteries may be switched to into terminal #3 Vsense. Switching in more than two batteries is most easily accomplished with a multiple position rotary switch. Also note that all ungrounded current carrying conductors must be supplied with over-current protection (note the fuse shown in each sense lead).

Drawing #1
Switching DC Inputs to Terminal #3 Vsense



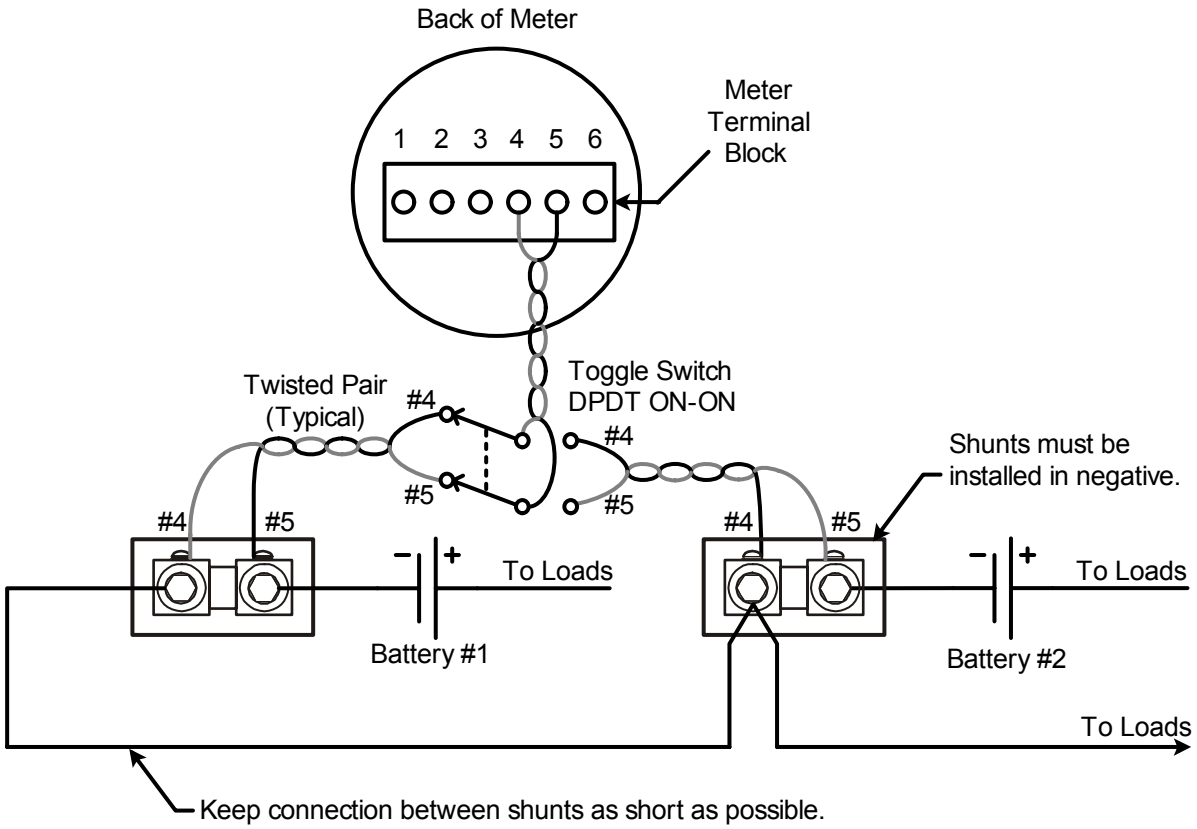
Negatives must be common

Note: See manual for balance of wiring.

DC Current
Measuring the current flow in and out of multiple batteries requires that a shunt be installed in the negative of each battery. (See the installation manual for a discussion of Current Shunts.) Also the shunts must be at the same negative potential; that is connected in common with each other. This is basically the same restriction as for voltage measurement, however because the signal is much smaller it is necessary to be sure that the current carrying connections between the shunts be short and of adequate size to not induce errors during large current flows.

Drawing #2 illustrates how to wire two shunts into terminals #4 & #5. In the example, two batteries are shown with a shunt in the negative of each. A Double Pole Double Throw (DPDT) switch is used to connect one shunt, or the other, to the meter. You must use a Double Pole switch because both terminals from the shunts must be switched into terminals #4 and #5 of the meter. If more than two batteries are to be monitored use a double pole multiple position rotary switch.

Drawing #2
Switching DC Shunt Inputs to
Terminals #4 and #5



Note: See manual for balance of wiring.