A Battery Monitor for 12 V Systems (June 2013)

Mert Nellis, WØUFO, outlined a neat little circuit for battery monitoring using the LM339N quad comparator IC. He makes no mention of what the total quiescent current drain of his circuit is, however. With two LEDs powered on when the circuit is active, along with the other parts, it looks to me like the quiescent current could be on the order of 50 mA or more. (This is assuming 0.8 mA for the LM339, 18 mA for the two LEDs, and 35 mA for the voltage reference Zener diode.)

So, in 24 hours the drain will be approximately 0.05 A × 24 H or 1.2 AH. In my opinion, that is too high a high price to pay to monitor a small gel battery, which may only have a capacity of 5 or 7 AH. In a few days the battery will be flat, just from monitoring.

I have a small solar-powered 12 V dc system with seven 50 AH gel batteries that power my ham shack lighting and all my rigs. I also have a stand-alone "kitchen ham shack," where a parallel pair of 7.5 AH gel batteries power a 440 MHz and 1.2 GHz rig. For these reasons, I have always been interested in a simple means of monitoring the battery bank(s).

One of the most important issues for any battery system monitor is the power burden placed on the battery system. This should be as small as possible. I have tried voltage monitoring kits that use the LM3914 dot/bar driver, such as Quality*Kits* Model FK939, but they have the same problem, which is excessive current drain. See **store.qkits.com/moreinfo.cfm/FK939**.

Another very well-thought-out kit is the BVM1 from **cirkits.com**. Here, the designer pulses the circuit on for a low duty cycle, resulting in an average drain of only 6 to 7 mA. I have one of these, and was able to reduce the average current drain to about 5 mA by extending the duty cycle.

When all is said and done, however, the simplest approach is to use a low cost 5 V dc analog panel meter with a series connected 11 V Zener diode, (such as a 1N5241B). This gives you an expanded scale voltmeter, with a range of 11 to 16 V.

Any suitable current meter in the range of 50 µA to 1 mA full scale can also be used, provided that you add an appropriate series resistor as well as the 11 V Zener diode to give you 16 V full scale.

Figure 2 — A battery monitor meter with a customized scale added. The banana jacks on the front of the enclosure make it convenient to connect this monitor to any battery pack.

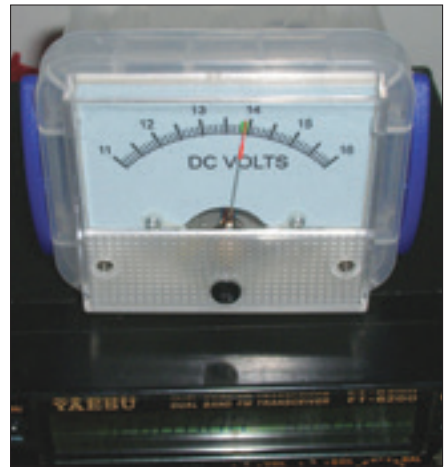

Figure 3 — This meter monitors the battery voltage in Don's, "kitchen shack."

I have used the excellent meter scale drawing program, *Meter*, by Jim Tonne, W4ENE, (**www.tonnesoftware.com**) many times to design and print a new meter scale. See Figures 2 and 3 for examples of the meter scales I am using. [*MeterBasic* is a program with a subset of the features available in *Meter*. It has been included on *The ARRL Handbook* CD-ROM for a number of years.[5] — *Ed.*]

In my opinion, the analog expanded scale voltmeter beats any other means of battery voltage monitoring hands down. The current drain on the battery being monitored can be less than 1 mA. — *73, Don Dorward, VA3DDN, 1363 Brands Ct, Pickering, Ontario, Canada L1V2T2*; **ddorward@sympatico.ca**

[5]H. Ward Silver, NØAX, Ed., *The ARRL Handbook*, 2014 Edition (2013), ISBN: 978-1-62595-001-7; ARRL Publication Order No. 0007, $49.95. ARRL publications are available from your local ARRL dealer or from the ARRL Bookstore. Telephone toll free in the US: 888-277-5289, or call 860-594-0355, fax 860-594-0303; **www.arrl.org/shop**; **pubsales@arrl.org**.

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