Ballantine 323 Voltmeter - Battery Substitution

Some of these HF voltmeters can be operated using an internal battery or from the AC line. Not all of these voltmeters have an internal battery. My voltmeter has an internal battery. The way the instrument appears to work is that the internal power supply actually charges the battery



and the instrument runs off the battery. The battery is unusual as it is a 12 volt battery with a 6 volt tap. A replacement battery is not readily available. When the battery failed in the voltmeter I have, I initially decided I would build a power supply using a couple of 3 terminal regulators (6 and 12 volts) and install them in place of the battery when I got around to it. Well I never got around to it. When I wanted to use the voltmeter again I wanted a quick fix. What I did was a little crude but it seems to work. Initially I got a 10 Watt 100 Ohm resistor with a slider so as to take the 6 Volts required from the slider. I used a lower value 100 Ohm resistor initially to provide improved regulation. I finally settled for a 200 Ohm 10 Watt resistor with a slider. The resistor is installed where the battery was originally. The idea is to supply a regulated 13.8 Volts DC from an external source to the top of the resistor and use the resistor tap to supply the required 6 Volts DC. The low side of the resistor was connected to the voltmeter's electrical ground not the chassis ground. BTW, the external 13.8 power supply I planned to use

is homebrew and does not have the negative side connected to the power supply chassis. I installed a polarity protection diode in series with the positive side of the external power supply at the 100 Ohm resistor. Something like a 1N4001 will do. The 12 Volt DC required by the voltmeter is taken from the top of the resistor on the cathode side of the protection diode.

I removed the AC line cord and used the hole where the line cord went for the DC power cord I used.

For the 6 Volt adjust on the resistor tap, I initially adjusted the slider for about half way and applied 13.8 Volts from the external power supply. I then adjusted the slider tap for 6.3 Volts on the slider tap. The voltmeter doesn't appear to draw much current from the 6 Volts and not much adjustment was required. The total current draw by the voltmeter including the 200 Ohm voltage divider resistor is about 85 MA.

I did not do any extensive testing on the voltmeter. The accuracy still seems good when compared with my Wavetek RF signal generator and my HP 652A test oscillator. It wasn't tested in a high ac/rf noise environment.

I don't know if the voltmeter would work satisfactorily using a wall wart. Regulation might be an issue. The voltmeter seems to compensate well with varying voltages but takes a little time to recover and may show jitter in the readout.

Due to the age of the voltmeter there might be a number of these out there that have the same problem and are not used. This is a simple solution and so far I haven't discovered any issues.

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Update January 31, 2024

The external 13.8 Volt power supply was replaced with a 12.6 Volt switching wall wart. I believe it was used as a charger for an old Motorola cell phone. This wall wart appears to have good regulation. The polarity protection diode mentioned above was replaced with a Schottky 1N5821 diode. This was done to increase the voltage slightly to the instrument while still providing polarity protection. The polarity protection diode is probably not need now because the wall wart was hard wired. I also added a 1000 μ F capacitor across the 10 Watt resistor mentioned above.



Voltages are approximate

There was a concern regarding the lower voltage supplied to the meter. The meter internal battery test indicated the voltage was slightly lower than it should be. I checked the meter accuracy against three other instruments, an HP652A test oscillator, an HP8640B signal generator, both have calibrated output meters. It was also compared against a Boonton 92B RF millivolt meter.

The accuracy is quite good up to 40 MHz. It was down 1 dB at 50 MHz. The meter's guaranteed specs were to 25 MHz.

This wall wart conversion appears to work quite well with no abnormal meter fluctuations even on the lowest scale.

Note: The parts chosen are what I had on hand. Other parts may work equally well. You will need to determine what works for you.

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