## *"The DC power supply, the work horse of our industry":*

I recently had a customer come to me with a problem in regard to DC power. The customers problem reminded me of how important most over looked device we rely on in this industry, the DC power supply. Many of us take the DC supply for granted, be it the bench supply used in troubleshooting or the base station supply operating continuously 24/7. The DC supply is the workhorse of the land mobile industry.

Many providers of LMR products and services cut corners when specifying a power supply for an application. The reality is that this is no place for cost cutting when bidding or quoting system equipment, especially the DC power supply. There are features and functions the power supply provides us, here I would like to emphasize these benefits and why going with a "cheap" supply for a customer quote may not be in everyone's best interest. We must emphasize upon some of the main characteristics of a supply when selecting the proper supply for a particular application.

***Ripple**:* DC ripple, measured by use of an oscilloscope, must be kept as low as possible. An acceptable value is 3mV to 15Mv. Also make note of the ripple frequency, high frequency ripple can begin to have adverse effect on communications equipment or a DUT (Device Under Test). Ripple can propagate through equipment, sending the technician on a wild goose chase, believing that the problem is in the equipment when in reality the malfunction is caused in part by the power supply. A quality power supply will provide you the ripple values in the specifications. Measuring the DC ripple is something to take note of before the trouble shooting process. Knowing what your supply is putting out will save much effort and needless guesswork in circuit diagnostics.

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***Regulation:*** Regulation is the most important quality in a good quality power supply. Load regulation is the ability of the supply to maintain constant output voltage under varying load current demands. The other, is the ability to maintain constant output voltage under varying AC power at the supply input.

Widely varying load demands placed on a DC supply require that the output remain constant. This ability of a supply to maintain this constant output is measured in percent of regulation. Expressed as:

$$(\%\ \text{supply regulation}) = \frac{(V_{no\ load} - V_{full\ load})}{(V_{full\ load})} \times 100$$

% of Regulation should be ideally around 1%, Example, let say my bench supply is adjusted to provide me a constant 12.5 volts (no load) then drops to 11.3 volts (full load), simple math tells us

$$\%\ \text{Reg} = \frac{(12.5\text{Vdc} - 11.3\text{Vdc})}{(11.3\text{Vdc})} \times 100 = 10.6\%$$

Not great, but this percent of regulation is common among less costly DC supplies on the market. I am not saying that install techs and systems engineers must employ lab grade power supplies but to be aware of the value of using a quality power supply.

Another way to look at this is now let's consider the power supply with a line regulation rated at 1% over a AC line input voltage between 110Vac and 120Vac and measured at a fixed value of 50% of the rated load current. Therefore, the power supply voltage at 50% load current is 13.6V, then the voltage should not vary more than 0.136V as line voltage varies from 110V to 120V.

**Duty Cycle:**

There are two factors you must consider when selecting a power supply for a particular application, continuous duty and intermittent duty. If a supply is rated for continuous duty at 15A this simply means that the supply is providing 15A all the time. In other words, the supply will maintain 15A constant supply for 24/7 period with little or no change in output. On the other hand, if a supply gives a rating of 35A intermittent duty, the manufacture states that a supply can provide 35A at 20% duty cycle this means we can expect 4min at 35A within a 20minute period. *("keep in mind that the definition of intermittent duty is given in the manufactures specifications"*)

Example, given an intermittent rating of 25A at 60% intermittent duty cycle will deliver 36min operating at 25A. Another example, given an intermittent duty cycle of 50% at 15A is simply (50min X $0.50_{\text{int dutycycle}}$)= 25min intermittent duty cycle.

To summarize, the DC supply deserves much more respect than we give it. Simply stated, it's not just a source of electrons but the firm foundation of stability in our communication installations and the cornerstone to the technician troubleshooting a problem to the component level. Next time you consider a power supply look at the specs. It makes no sense to employ a $80 power supply on $500.00 installation , It just does not make sense. If the manufactures only provides only output voltage and operating current you should look else ware for a manufacture that provides a good quality product with the characteristics we just discussed here.

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