

BATTERY REPLACEMENT: A PLAN FOR THROWING IN THE TOWEL

When configuring a system it is not sufficient to simply select a battery that is adequate to the task when new. The capacity of a battery begins to decline from the time it is first placed in service. The fade is slow at first but increases with age and abuse. The life of the battery in flight cycles will be a function of how much excess capacity the battery has when new and how well the battery is treated during its life.

Monitoring the battery's condition becomes important when the battery is small and of limited life to begin with. If your engine starts in a few blades, then the battery never gets a chance to demonstrate its true capacity. I consider it good practice to shut down the alternator on long VFR day flights and do load shedding equal to that which you would do in a real loss-of-alternator emergency. Measure the length of time that the battery supplies 10.5 volts or more to aircraft systems and record this number in your log. When the battery-only time value reaches an unacceptably low number, it's time to replace the battery irrespective of how well it cranked the engine that day. Other chapters in this publication will describe system monitoring and bus structuring techniques to make the capacity evaluation procedure easy and precise.

BATTERY PERFORMANCE TESTING

Figure 2-4 illustrates a simple test setup for tracking the condition of your battery. Remove your battery from the airplane after a flight that has put as much charge on the

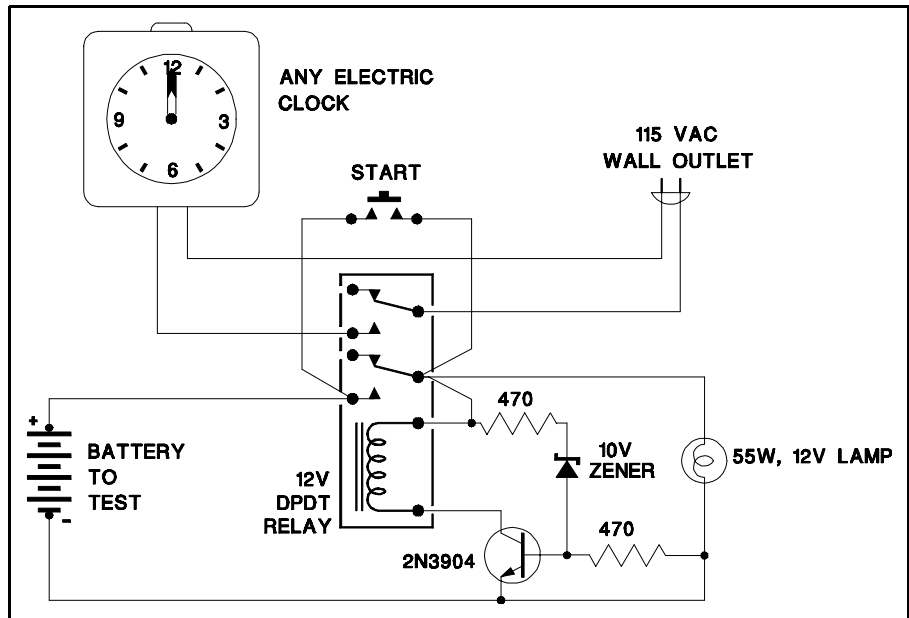


Figure 2-4. Poor Man's Battery Capacity Tester.

battery as it is going to get; say an hour or more. If you have 115 VAC in your hangar, you can do this test without removing the battery. Set the electric clock to 12:00 and connect the fixture to the battery. Press the START button. The relay will energize and apply power to the clock and the 55W lamp. When the battery is depleted the relay will drop out, stopping the clock and disconnecting the lamp.

Come back in a few hours and you will find the battery depleted and the clock stopped. Keep track of the time that it takes to discharge the battery. Repeat this test every 6 months or so. When depletion time falls to one-half of the time a new battery runs, it's time for a replacement. Or if at some point the battery's ability to crank the engine is noticeably diminished, then you can use the last time recorded on your capacity tester to raise an advanced

warning of impending replacement. Of course, the battery should be recharged shortly after this test is completed.

This is a self-calibrating system that works with any battery. It doesn't measure actual ampere-hours of your battery but it does measure the amount of degradation since new of any battery, a sort of "dipstick" into its inner workings. I like to use a 55W lamp because it puts approximately a 4-amp load on the battery . . . about the same load as a full-up essential bus. The measured run time with this tester is in the same ballpark with useful run-time for alternator-out ops. More on "essential busses" later in this book.

LOAD TESTING THE BATTERY

A second consideration of battery condition, the one most used by battery stores, is to test the ability of the battery to carry a heavy load. They hook a tester to the battery that contains an ammeter, a voltmeter and a heavy duty variable resistor known as a 'carbon pile' (we'll talk again about these critters later). With the tester connected, the pile is tightened down until the ammeter reads some value commensurate with its size. The actual value isn't terribly important: 200 amps is a heavy load for any battery. The voltmeter is observed for a few seconds while holding the

current constant. If it holds well for twenty seconds or so, the battery is generally deemed to be in good health. If it begins to sag, the battery should be charged and then tested again.

B&C uses 8.5 volts as a benchmark for battery condition. They crank the load tester up in current until the battery terminal voltage falls to 8.5 volts and then observe the current required to produce that voltage. The magnitude of the reading is used to quote the current dump capability of their battery products.

You can do a load test right on the airplane. Get a voltmeter with a needle on it - digital voltmeters are hard to read when the numbers jump around. Observe the voltage at the battery's terminals while you crank your engine. Compare this number taken while the battery is new with numbers observed later in the battery's life. An accurate voltmeter isn't necessary for this test, just use the same voltmeter each time. As the battery begins to fold with age, the numbers will foretell the coming of the end.

Your local friendly battery store will probably be glad to do the test for you periodically with its fancy tester especially if it thinks it can sell you a new battery. Write the numbers down and track them with the age of the battery.