Master Switch

There are several reasons why aircraft have a battery master switch. Some equipment, such as electrically driven gyros, do not have on-off switches. The pilot must be able to isolate them from the battery to prevent draining it when the engine is shut down.

Practicality dictates a convenient method of removing all electrical equipment from the battery simultaneously rather than turning each unit off individually. Safety dictates that during certain situations, such as emergency landings, the pilot should be able to shut down the electrical system to minimize potential fires. Logic says it really isn't a good idea to have wires running through the cockpit carrying potentially high amperage, so the actual master switch is powered by low-amperage current. It is this low-amperage current that operates an electromagnetic remote relay, located as close as possible to the actual battery, that physically connects and disconnects the battery from the electrical system.

If the alternator becomes inoperative, its exciter field will continue to demand system current, which is now supplied by the battery. To solve this problem, manufacturers have devised a "split" master. One-half of the master switch controls the alternator and the other half the battery. It is possible to remove the alternator from the electrical system and still use the battery. The rule is, if the alternator fails, turn off that half of the master switch.

Alternator Preflight

If practical, a preflight inspection should include a good look at the alternator. Mounting bolts should be tight and clean because they form an electrical connection to the aircraft. In fact, they should be tightened to specific torque value: too loose and the unit vibrates and shifts in its mounting, too tight and the lugs and/or brackets may crack or break.

The drive belt, which also must be properly torqued, should not be so loose as to allow slippage and loss of alternator output. On the other hand, if it is too tight, the belt may break; even worse, it may cause a side load on the alternator shaft, imposing an abnormal load on the bearings and seals. Such a condition would lead to an early failure of the unit. If you can see the alternator fan, visually inspect it for general condition. It should not have any cracks, something to watch for particularly in the area of the welds. The fan should not appear bent, and it should have sufficient clearance to turn without scraping a baffle or other structure.

In multiengine aircraft one of the most common complaints about the dual alternator system is an imbalanced output reading. If both alternators use a single regulator, it is neither uncommon nor inappropriate for an imbalanced output reading to occur. The old dual generator systems needed a balanced output to prevent component damage, so over the years many pilots became accustomed to watching for an imbalanced output reading. Old habits die hard. Output readings on modern dual alternator systems do not have to be balanced. Variations in resistance characteristics between two charging circuits will cause imbalanced indications. This could be the result of voltage drops in the charging system, wiring, or ground-circuit connections or even variation in manufacturers' tolerances between alternators.