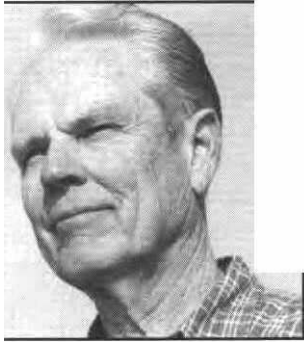


Spark Ignition Troubleshooting Part III

by Bob Angel



A real help in isolating ignition problems is a clip-on ignition system. You can use it for bench running or hook it up to an airplane quickly to see if the on-board ignition system is faulty.

The clip-on can be a simple, wired-together set of coil, batteries, etc.; with three connectors for ground, points and spark plug.

Or it can be a more elaborate enclosed unit incorporating an ammeter.

In the August 1985 issue of Model Aviation, Bill Schmidt, as a guest in D.B. Mathews' column, published a clip-on ignition set housed in a Tupperware container. The article has some worthwhile text, photos, and a schematic. It's available through the SAM library. The schematic, as published, had one small omission, that of the ammeter. The 0-5 amp ammeter is placed in series in a battery lead. Be sure to observe proper polarity.

I had built my own version of such a set shortly before Bill's was published; Poor timing. Too late to "scoop" Bill and too early to take advantage of his advice. But the designs are essentially the same, other than a few small details. Bill used a push-on, push-off switch which he felt he could slap off faster for emergency shut down. I prefer my toggle switch to see at a glance whether the switch is on or off.

Bill put the battery inside the box, but I left mine outside and use Sermos connectors, so I can use different batteries.

Bill prefers the switch in the points-lead where the current is less. I don't trust a transistor not to leak, so I switch mine off at the battery.

On the pictured box you'll notice three pairs of Sermos connectors at the right. The top pair is battery input and the bottom pair goes to points and ground. An auxiliary battery is usually used to power the clip-on set, but I can also plug in the plane's ignition battery to power it. That can give you a clue about condition of the on-board battery. The static, points-closed ammeter reading will drop as battery current drops.

The middle pair of Sermos connectors are "amps out" leads which go through the ammeter (un-switched) so the meter can be used separately from the ignition system.

When using the clip-on set, the ammeter needle pops up when the points close, letting you know how they're operating. As you gain experience, you'll learn to recognize bat-

tery condition by current flow with points closed (usually 2 to 4 amps), and what normal readings should be when the engine is running (usually 1 amp or less).

Spark plug: Substitution of a known good plug is easy and about the only way to find a bad plug.

Points: A continuity light or ohmmeter clipped to the points can tell you if points are shorted, open, or operating normally. You can also estimate dwell, find a cam positioned wrong or estimate degrees of advance. Add a degree wheel to the prop shaft, and you can find exact dwell or advance. You can do similar things with the clip-on ignition set by watching the ammeter, but it's not a good idea to leave the points closed too long with the spark system hot.

On board ignition system: If the engine runs OK on a glow plug, it indicates an ignition system problem, not a fuel feed problem. If it runs OK on a clip-on ignition set, you know points and plug are OK, and the problem is in wiring or ignition components. If you lack a clip-on set, the coarse file mentioned in Part II (SAM Speaks #144) can be used for breaker point simulation, which can tell you if the on-board components are producing a reasonable spark.

Coil: Make an ohmmeter check through all three coil terminals and compare with a

known, good similar coil.

This should reveal an open internal circuit, or shorted windings. Melted wax from inside the coil is a sign that it has been overheated, but I've seen coils with this symptom which still operated well. A common failure mode is an intermittent internal connection.

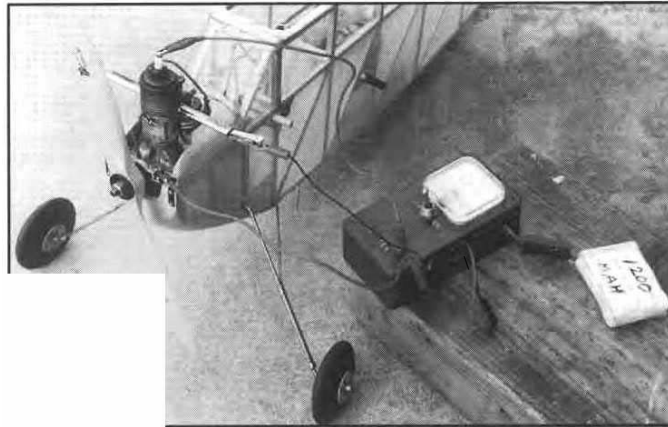
Condenser: Most transistorized circuits (recommended) no longer use a condenser (capacitor). A few electronic guys have capacitor checkers, but substitution is about as easy and capacitors are cheap.

Transistor: As with capacitors, some folks have transistor checkers, but substitution can be made and a spare is not expensive.

Microswitch: These can show normal operation using a continuity light or meter, but still be erratic from vibration with engine running. You can put a jumper across the Microswitch connections, start the engine, and see if the missing goes away

Electronic switches such as the "E" switch or "Hot Spot" can have their own peculiar problems which we've dealt with in earlier columns. Due to the complexities involved in troubleshooting and frequent returns of good units, Bob Holman (for one) has stopped supplying these.

The hard cases may take lots of wire tugging, close inspection of points with a magnifier, or part-by-part substitution. If all else fails, you can always build a twin pusher. Robert L. Angel, 1001 Patterson Rd., Santa Maria CA 93455.



Bob's clip-on ignition system for troubleshooting on-board components and wiring. Switch off the internal system first. If the motor runs properly with the clip-on attached, it's a pretty good sign there's something wrong with the internal system. In the text, Bob explains how to diagnose the situation using this device.