

## Spark Ignition Troubleshooting, Part II

by Bob Angel



We now have fewer spark plug problems than we did in the old days, and by using NiCd cells and transistor ignition systems, plug life has also been improved. But plug problems still occur, and one of the easiest things to check when the engine goes sour is to swap a known good plug into the system. Not necessarily a new plug, but one you've previously tested. Even new plugs can have a hidden flaw.

Timers (breaker points) have several possible failure modes, some of which can be tough to identify. If a timer problem is suspected, first hook up your trusty continuity light.

One clip goes to ground and the other to the insulated point. The lead from the airplane's ignition system to the point can be left attached but keep the system switched off. Turn the prop through and watch for the light to indicate points closing and opening. The bulb should light during the piston down stroke indicating point closure and the start of dwell, and should go off about 45° or less before top dead center. If the light stays on continuously, remove the on-board system's wire to the point and try again.

If the light still stays lit continuously, it indicates a short in the points or points not opening. If the light never lights, there is an open circuit caused by points not closing, poor timer to engine ground, etc.

A second test is simulating point operation to tell you if the rest of your ignition system is operating. Take a coarse file and two test leads with alligator clips on each end. Attach one lead between the file and engine ground. Be sure the points are open. Attach the second lead to the insulated point, and clip some sharp edged metal object such as a short piece of piano wire to the lead's other end.

We're going to switch the ignition system on and rake the piano wire across the file to simulate point operation. But first the high tension lead needs to be removed from the plug and positioned near engine ground to

see if the spark is jumping.

If you get a good continuous spark when you scratch the file, it shows the rest of the system is probably working and you may have a point problem. Maybe, but if you can't get a good series of sparks, you now have a stronger clue that the problem lies outside the points.

Jim Adams had an erratic running Brown Jr. which had the modern Hurlman type timer. It turned out that the riveted-on moving point had loosened ever so slightly and was only making intermittent contact. Jim soldered the point to its spring and then he soldered the other end of the point spring also, because it's just crimped to the timer frame. After Jim's experience, I did the same thing to my Brown Jr., just for insurance. A problem like this might escape detection with the test light.

Henry Smith of SAM 21 used a strip of copier paper to clean his points. Henry had stuttering problems until he found that the copy paper had put a coating on the points. John Richmond of SAM 26 stored his engine with a piece of absorbent paper closed in the points to soak out oil. But John missed a flyoff when a small speck of the paper stuck between the points during removal.

I was getting ragged runs on a McCoy 60 and found that the fiber cam follower had been slightly overlapping the cam drive area on the crankshaft, and was running partially on the solid crank edge. Filing a few thousandths from the edge of the follower fixed it. You often need a magnifier and very careful inspection for this sort of thing.

"Point float" has always been a source of worry, but its actual occurrence is fairly rare. Point float can occur when the moving point spring is too weak, the RPM is high, and possibly the dwell (closure time) ground into the cam is short. The idea is that the cam grind drops away from the cam follower faster than the moving point can follow, so the points close late, giving short dwell and weak spark.

Point float would be a possible cause of a rough running engine. If you

suspect point float just pull the moving point open and compare its spring pressure to a couple of other engines. Most engines have more than enough spring pressure to prevent float, and excess spring pressure just creates drag on the engine. I've put a small prop on a McCoy 60 and run it beyond 15,000 with no float. If your engine has been running fine and suddenly develops a miss, I'd look elsewhere before worrying about point float.

Batteries have always been a problem. NiCds are preferred because ounce for ounce they deliver more amps under load, even though dry cells may show higher no-load voltage. And since dry cells must be replaced often, they are more likely to be used in a spring loaded battery box, instead of being soldered together. Battery boxes are notorious for failures. Think about how often a flashlight fails for no other reason than poor battery connections.

We've found that 3 cells greatly improve reliability over 2 cells. If you need to save weight, go to 3 smaller capacity cells. For our use, 270 mAh cells are quite adequate, and can be used in a transistor system without boosters. If you go any smaller, it would be a good idea to use a booster for starting. I once stripped down a 9V rechargeable battery, hooked up 3 of its tiny cells to an ignition system and ran an O&R 23 for about 9 minutes before it began to miss.

Ignition service is more severe on batteries than radio use, so expect to replace the cells more often. A year or two is about the expected life of a 270 mAh battery, and smaller ones will go much sooner. You should get over 4 volts with a light load on a freshly charged 3 cell NiCd pack, and around 3.6 V or less, you may begin to get missfire.

You can buy neat little 270 mAh, 3 cell packs made for telephones. Buy only ones with cylindrical cells. I tested the disc shaped button cells and got very short life. Besides, the button cells are unvented and could crack or even explode if fast charged. SR Batteries can make up 3 packs in almost any capacity, even down to 150 mAh. RLA