



Boeing Field 206-768-3099

The following troubleshooting guide is designated to help you, the mechanic or pilot, determine if the source of your ignition system's "bad mag check" lies with your engine's magnetos. This guide is, of necessity, incapable of addressing every conceivable ignition or engine fault, however, it is a good foundation in initial basic troubleshooting and will enable you to find the source of the "bad mag check", most of the time. Consult your pilots operating handbook for acceptable mag drop values.

Most "bad mag checks" are sparkplug related. The sparkplug is fouled and shorted to ground or is open and the magneto, which is functioning normally, is unable to fire it. A typical bad plug will cause an immediate drop of 250 or more RPM, at the mag check. The key indicator is the suddenness of the drop.

You have tried leaning and cleaning the plug to no avail. How do you find it? No fancy equipment is needed to isolate the cylinder and its defective plug, if you follow this method:

- Shutdown the engine and remove the cowling.
- Allow the engine to cool completely.
- When the cylinders are at ambient temperature, or just slightly warm, restart and immediately turn to the "bad mag". Adjust the RPM to allow the engine to run at its roughest.
- Run the engine for approximately 2 minutes, reduce RPM idle and shutdown with mixture to idle cutoff. Mags off.
- With the palm of your hand placed on the cylinder head fins, go from cylinder to cylinder comparing the temperatures.
- The cylinder with the bad plug will be colder, if not dramatically colder.
- Trace the ignition harness from the "bad mag" to the cold cylinder sparkplug and you will find the non-firing or misfiring sparkplug.
- The sparkplug could be lead fouled, fuel fouled, oil fouled, or effectively opened through its resistor.
- Pick out lead deposit clinkers, inspect the barrel for cracked insulator.
- Clean and inspect the plug (correct gap for most plugs is .015" to .019" consult your plug specifications).
- Take an OHM Meter and measure the resistance value from the connection down in the barrel to the clean center electrode at the firing end.
- A new plug will have a value of 800 to 1200 OHMS. Replace any plug above 5000 OHMS.
- A sparkplug bomb tester will test a bad plug as good. The OHM Meter check is simple, readily available, and amazingly accurate in finding misfiring plugs.
- Reinstall the cleaned, tested, and inspected plug. Re-run the engine.

If you get the same cold cylinder test, the sparkplug lead is possibly shorted to ground. You will need an high tension lead tester to find the fault:

- Remove the harness cap and test the lead for high voltage breakdown and continuity. (resistance values vary increase with lead length.)
- Inspect the insulator boots at both ends of the lead. Leaks resemble dark pin points on the insulator.
- Inspect the magneto distributor block tower that goes to your cold cylinder. You are looking for evidence of carbon tracking and a resultant short to ground.

If you cannot discern any major difference in cylinder to cylinder temperature you have a bad magneto. It is firing all the plugs intermittently and all the cylinders have been functioning.

- Remove the P-Lead from the "bad mag" and run the engine again to eliminate the mag switch, p-lead wire, and filter capacitor if one is installed.

A magneto drop that exceeds the allowable limit, but is smooth, with no roughness is in most cases, late engine timing. Cam follower wear makes point opening late.

- Check magneto to engine timing.

The magneto designers have gone to great lengths to have the cam follower wear at the same rate as the point faces. This design feature keeps the magnetos internal timing, "e-gap", at the correct angular opening point for long periods of time.

- Inadequate lubrication of cams will accelerate follower wear, causing late engine timing.
- A late spark reduces the sustainable RPM at the mag check. All the fuel is not burned and returned as energy to the piston, but is burned in the exhaust system. Higher than normal EGT will result with late ignition timing.
- On impulse coupled magnetos a broken impulse coupling spring will severely retard engine timing and result in a very large, slowly occurring RPM drop. In some cases the engine will slow down sufficiently to quit.

Keep the sparkplug ceramic barrel and harness boot clean. No finger prints. Inspect the ignition harness cigarette springs where they contact the sparkplug in the barrel. Look for evidence of arcing. The spring will erode and become razor sharp. This is a bad connection. Change the spring. High resistance connections dissipate energy and can cause hard starting and underperforming ignition.