

Automotive Spark Plugs in Aircraft Engines

Martin Pavlovich (WI) - Since exchanging the C85 Continental for an O-200, I have had chaffed top spark plug leads due to extra movement the O-200 mounts have over the C-85. Not wanting to put unsightly bumps in the cowling, using shorter spark plugs was the next logical step!

The engine, used in the following article, was about 100 hrs. from TBO. The frayed spark plug wires needed to be replaced which made this an opportune time for experimenting.

Test aircraft: Vari-Eze

Engine: Continental O-200A (High Compression Pistons)

Ignition: Stock Bendix Magneto

Spark Plugs: Only two plugs were originally replaced, - 1 Champion RF11YC, installed on top of #2 cylinder, and 1 Bosh DR8BPX, installed on top of #4 cylinder, with gaps on both reduced from .060" to .018".

Plug wires: 7.5mm silicon wires-steel conductor spirally wrapped around a carbon core.

Not many auto engines use 18mm plugs. The plugs available don't provide much selection of heat range. To find a plug with a heat range, close to a Champion REM40E, I inserted a piece of safety wire down along the center electrode insulator and measured the depth. Next I went to a local automotive store, with my piece of safety wire, and proceeded to check plug depths until I found one that matched. This is known as S.W.A.G. (*scientific wild a__ guess*). I selected a Champion RF-11YC. While in K-Mart, I spotted a Bosh platinum plug, DR8BPX. The cross reference chart showed it had the same heat range as the Champion. Now I had two plugs to compare. About this time, Gene Zabler from Racine Wi., received an Electroair electronic ignition system which came with Bosh DR8BPX plugs. Not bad for a S.W.A.G.!

Some modifications must be made to the gasket end of the plugs. Automobile plugs have a tapered end, while aircraft engines use a flat cop-

per washer. The best way to use the copper gasket would be to machine a shoulder on the end of the plug. Another way would be to use the gasket over the tapered end, but caution must be observed when tightening, as the taper in the plug will expand the gasket and the plug will make contact with the cylinder head. I have used the plugs both ways. To tighten the plug use a 3/8" drive ratchet wrench and torque to about 15 pounds.

The next step was selection of plug wires. First I tried shielded wires with regular spark plug boots, but take-off radio static was too great.

I rejected carbon core resistor wire because I believed the high resistance might cause arcing inside the mags, especially at high altitudes.

The wires I selected have a steel conductor wire spirally wrapped around a carbon core and are for a 2.5 liter GM 4 cylinder engine. The theory is to induce resistance when electricity passes through the wires and suppresses the static. I can hear some static after transmitting, and when trying to listen to faint ATIS's. If it gets too annoying I just shut the mag off until I'm finished listening to the broadcast.

Flight Testing: - The initial test, with just two new plugs, required me to lower my idle speed by 75 RPM.

The first flight was to confirm the wires would not cause arcing or cross-firing. Departing Waukesha airport, I climbed to 17,000 ft. At full throttle and mixture leaned to peak EGT, I shut off the left mag so only the auto plugs were firing. To my surprise the engine ran very smoothly. There was no unsquelchable radio noise and no cross-firing!

Most flights, after that, were at normal altitudes and power settings between 65 and 75% power.

After twelve hours of plug use and while conducting a high power test at

2,500' the engine began to run rough. The roughness was on the auto plug mag. After landing I tested both plugs and determined the Champion plug had failed. There was no physical damage or signs of fouling. My only explanation was that excessive heat caused the failure. The Champion plug was replaced with another Bosh plug. I flew the Eze for forty more hours before replacing the remaining two plugs and wires. I flew the rest of the summer with no problems.

In late 1992, after 100 hrs. of flying, the engine was pulled for overhaul. On tear down, all parts were inspected and found to be normal. Pistons showed no signs of detonation or preignition. The magneto was inspected closely for signs of carbon tracking; none was found!

The engine was reinstalled with original automotive plugs and wires to continue testing. The only difference was high compression pistons were exchanged for stock pistons.

Normal flying was conducted all through the '93 flying season. One hundred hours have been flown this year. The plugs were pulled, cleaned, gapped and reinstalled.

Summary: - I have flown 200 hours with the same set of spark plugs. They have given good reliable performance with little maintenance. I have found the engine to start easier in both warm and cold temperatures.

If there is any one concern about using these plugs, it is the high temperature environment in which they must operate. Most our aircraft operate at 100-275 degrees F above that of an automobile engine!

My original intention was to use the plugs for 200 hours only and replace them. Since they have proven so reliable I will continue to use them to see just how long they really last!

