

A LITTLE ABOUT GLOW PLUGS



The glow plug as we know it today was perfected in 1946 by Ray Arden, a very talented engine designer and engineer. Perhaps some of you have seen the Arden .09 and .19 engines. These are prized collector items today and are jewels of workmanship. The glow plug is based on a very simple principle of physics and chemistry, i.e., catalytic action. Platinum in the presence of methyl alcohol will spontaneously glow. Platinum is one of the heaviest metals known. It can be worked and shaped in almost every possible way, drawn into fine wire, or hammered into thin sheets. It does not tarnish or corrode. The melting point of platinum is 1769° Centigrade (approximately 3200° Fahrenheit). It is very easily alloyed with other metals. Based on the foregoing, we have a perfect metal for use in glow plugs. Glow plug elements (the part that glows) are alloys of platinum, steel, and perhaps some tungsten for durability. When we connect the battery to a glow plug, the element glows red and we are able to start the engine. It will continue to run, not only because of the heat of combustion but because of the alcohol atmosphere inside the engine.

One point I would like to stress here: it is not always necessary to have a battery connected to the plug to get the engine to fire and run. Given the right conditions, i.e., compression, atmospheric conditions, fuel, glow plug, and some means to flip the prop, sometimes the engine will fire and run. How do I know? I have scars on my right arm to prove it. The point is, don't randomly flip the prop just to do it. The engine may surprise you. Sorry for the digression. Back to glow plugs.

There are different kinds and heat ranges of glow plugs; hot, cold and a so-called medium. What governs the plug temperature? You guessed it, the alloy (platinum) of the plug element.

Hot plugs are generally used with alcohol/oil fuels or FAI fuel (no nitro). The plug will stay hot without other fuel additives, one of which we are familiar with, nitromethane. Our fuels are generally made up of oil, alcohol, and nitromethane. We can usually buy fuels with 5%, 10%, 25%, and more nitro content. In our sport type engines, we are able to make do with the medium heat glow plug. Bear with me, we are getting there.

Nitromethane in its chemical make-up has extra oxygen molecules. This oxygen bearing chemical, when added to our alcohol based fuel, causes it to burn better and hotter. (Think of an oxyacetylene torch, without oxygen - a dirty flame. Add oxygen and you get a hot, clean, blue flame). If one was to increase the amount of nitro in the fuel say to 40 or 50%, then we would use a cold plug. The extra heat generated by the oxygen additives (nitro) would help the plug stay hot (less platinum). Too much nitro destroys your plugs. One has to use the correct plug for the intended use. A high speed racing engine running on 60% nitro fuel for power would use a cold plug. Anything else wouldn't last perhaps more than a few seconds.

Our sport engines get along fine on Fox, K&B, or whatever plug. These are medium heat plugs and the fuels are in the middle range as far as nitro content is concerned. In passing, things have come a long way since the inventions of the glow plug. A plug used to cost 39¢ to 49¢ and it didn't last long. Today, a glow plug costs about \$1.50 but treated correctly, it may last a season or more of flying.

Don't expect a glow plug to last long if you see tiny particles in the exhausted oil from your engine. These particles (impurities) get on the glow plug element and cause hot spots and usually destroy the element. Take care of your engine and it won't let you down.

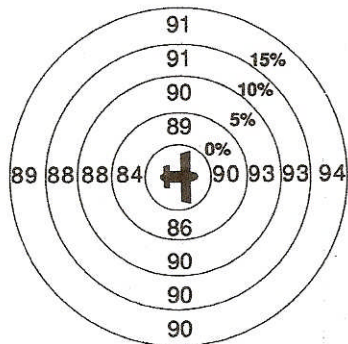
Incidentally, platinum is more valuable than gold and many times more expensive.

Hot, cold, and medium plugs are available and are often so designated by the manufacturer on the package. Once out of its package, it is hard to tell the difference.

One last thing: the reason 4C glow plugs are more expensive is that the element is approximately 60% platinum. -Cliff Kell

TEST: EFFECT OF NITRO CONTENT ON NOISE AND RPM

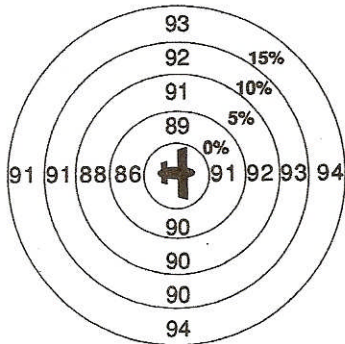
OS .40 SF



PROPELLER: TOP FLIGHT 10x6

0% NITRO MAX RPM 11,500
 5% NITRO MAX RPM 12,000
 10% NITRO MAX RPM 12,100
 15% NITRO MAX RPM 12,200

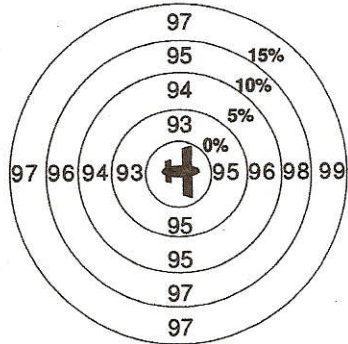
FOX .40



PROPELLER: MASTER AIRSCREW 10x6

0% NITRO MAX RPM 11,420
 5% NITRO MAX RPM 12,400
 10% NITRO MAX RPM 12,500
 15% NITRO MAX RPM 12,700

WEBRA .61



PROPELLER: MASTER AIRSCREW 12x6

0% NITRO MAX RPM 11,650
 5% NITRO MAX RPM 11,900
 10% NITRO MAX RPM 12,000
 15% NITRO MAX RPM 12,050

ALL SOUND READINGS TAKEN 10 FEET FROM AIRCRAFT. ALL SOUND READINGS ARE IN DBA. FUEL IS ALL BYRON SPORT PREMIUM, CASTOR/ SYNTHETIC MIX