

Carburetor Adjustments for Changes in Nitro Content of Fuel 08/23/09

Changing the nitro content of the fuel you use requires carburetor adjustment to achieve peak performance at the new nitro content. If you increase nitro content, the engine will tend to run lean and you will need to richen the mixture for peak performance at the higher nitro content. Similarly, if you lower the nitro content, the engine will tend to run rich and you will have to lean out the mixture for peak performance at the lower nitro content. These mixture changes can be significant depending on the engine and how much the nitro content is changed.

Explaining this phenomenon requires a brief discussion of power production in an internal combustion engine and the unique chemistry of methanol and nitro methane (nitro).

1. The power produced in an internal combustion engine is directly related to how much air (oxygen) you can get into the engine in a complete operating cycle. Most flyers believe that the only way to get oxygen into the engine is by way of the carburetor.
2. There is a second way to get oxygen into the engine: with the fuel! Both methanol and nitro contain oxygen which when burned release that oxygen into the cylinder to aid the combustion process. Nitro releases twice the amount of oxygen into the cylinder as methanol.
3. The chemical formula for methanol is CH_3OH . For every molecule of methanol burned, one oxygen atom is released. The chemical formula for nitro methane is CH_3NO_2 . It is very similar in structure to methanol, but when burned releases 2 oxygen atoms.

To explain how all this affects carburetor mixture settings, consider the following.

Let's start with a fuel mix of 10% nitro and 20% oil. This means that 70% of the fuel is methanol. Adjust the fuel mix for peak performance. Replace the fuel with a 20% nitro/20% oil mix and run the engine without changing the needle settings. (Note that the new fuel mix now contains only 60% methanol.) Because you have replaced 10% of the methanol (which releases less oxygen than nitro) with nitro, more oxygen will be released during the combustion process and the engine will run leaner. As a result, the engine will

have to be richened to achieve peak performance with the higher nitro content.

Similarly, if you start with a fuel having a 20% nitro content and go to a fuel with a 10% nitro content, the engine will run richer because of the reduced amount of oxygen released during combustion. The engine will have to be leaned out to achieve peak performance with the lower nitro content.

How significant are these changes? An OS 120 four cycle engine was tested with 10% and 20% nitro fuels. The high-speed needle adjustment was in the range of 4 to 5 clicks.