

## THE HARLEY RUMBLE

Some of my alcohol engines of yore (e.g., my slant-six-Chrysler) have been so quiet that on frigid mornings when the unwarmed car stalled at an intersection, I wouldn't know that it had died, except for my alternator light signaling from the dashboard. One Harley-Davidson rider I've spoken to insists that running his motorcycle on alcohol takes away half the fun, since the traditional Harley rumble is severely reduced.

In California, and increasingly everywhere, the problem is even more grim. Reformulated gasoline in two-stroke engines raises octane by including a large amount of the proven carcinogens benzene, toluene, and xylene. Since these smaller devices do not have catalytic converters, some of the unburned mixture flows out the exhaust, and users are exposed to highly dangerous chemicals. These chemicals, especially benzene, have been banned from most other industrial uses in California and much of the world.

In the '80s, I used a number of different substances to lubricate alcohol-fueled two-stroke engines. Castor bean oil is an old standard; I also used synthetic two-stroke oils made for alcohol-powered motorcycle racing. Blendsol and Klotz have been used by methanol-powered auto racers for some time; there is also Red Line Alcohol Pre-Mix, which is, in my view, a newer and superior product. There are also new lubricants made from vegetable oils that successfully mix with alcohol or gasoline for use in two-stroke engines.

Using a synthetic oil/alcohol mix makes a two-stroke engine very happy. The plugs never seem to foul. There is little noticeable smoke from the exhaust (other than a slight acetaldehyde odor while warming up), and hardly any oily residue to drip from the exhaust. Lack of fouled plugs is often a problem when chainsawing (see Chapter 14, Figure 14-5), since it deprives the woodsman of his best excuse for taking a break. The reduction of carbon in the exhaust pipes of two-stroke engines will save you from poor performance, maintenance trips to the shop, and messes to clean up.

The degree to which you should dilute your fuel with synthetic oil varies with the product, but it's always much more diluted than a gasoline two-stroke mix. Depending on the manufacturer, 60 parts (or even 100 parts) alcohol mixed with one part oil is the ratio.

Although it's possible to get these synthetics to mix with low-proof alcohol, they work much better with high-proof. Fuel below 190-proof can cause cylinder or bore wear in two-stroke engines. My moped let me know, with quite a clatter, never to feed it 151-proof rum again. Oil injection engines, in which oil is injected into the cylinder rather than mixed with the fuel, are more accommodating than most. But even with these, use of alcohol fuel below 190-proof is not recommended.

## A Two-Stroke Alcohol/ Biodiesel Experiment

In the 1980s, I ran a variety of two-stroke equipment (and my moped) using alcohol-soluble two-stroke oil for the lubricant. But recently, I decided to set my sights a bit higher. Since I knew that Brazil used castor oil mixed with alcohol in diesel engines, I reasoned that biodiesel mixed with alcohol might work in North America, on two-stroke engines. After all, biodiesel's lubricity has been well documented.

I picked up a used Husqvarna 51 chainsaw and had it disassembled and inspected to see that it was up to specs, with no unusual wear. After reassembly, I took the saw up to T. Gray Shaw, a master arborist in Berkeley, California. He runs his own vehicles on biodiesel and veggie oil, so he was keen to participate.

We mixed up a gallon of E-95 and added biodiesel in the same proportion that gasoline is mixed with two-stroke oil, about 40:1. The saw had two mixture-control jets with adjustable needles in them, one for idling and one for main operation. I said, "Let's see how many quarter-turns we have to go in, on both the low- and high-range mixture screws, to hit bottom. That will tell us where to start." So we tried to turn in the low-range screw, and after a quarter-turn, it stopped. Odd. We tried to turn it out, and we only got about a half-turn and it stopped again. So did the high-range adjustment screw.

We pulled off the cover so we could see the carburetor. What we found were two anti-tamper plastic pieces that fit over the mixture screws, with ears sticking out so the screws could only go about a quarter-turn each way. Obviously, a shop mechanic had pressed these on after tuning the saw. Well, I'm sure he meant well, but they were kind of flimsy, and sort of fell off when we tugged on them with pliers.