CHAPTER 19

ASSORTED ADJUSTMENTS

This chapter describes several tricks of the trade to help your vehicle take advantage of alcohol's characteristics. These modifications can even be done (for the most part) on flexible-fuel vehicles, to squeeze more mileage out of your fuel. On older carbureted or throttle body fuel injection (TBI) vehicles, some of these techniques can make the difference between a smooth, reliable conversion or one that is balky. So the details do matter.

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PREHEATING FUEL

The major disappointment in the design of the internal combustion engine is that it doesn't burn "large" droplets of fuel efficiently. Only the drop's surface actually burns, leaving a great volume of fuel unburned or partially burned. This results in waste heat and increased emissions. For greater efficiency, smaller droplets are required. Theoretically, the best results possible would be obtained by burning individual molecules, such as in a vapor. We discussed vaporization in Chapter 13 and will have more to say on it later.

But simply preheating, even without vaporizing, is helpful. Preheating reduces the surface tension of large drops, letting them break up into smaller droplets. Fuel is usually heated through the exchange of heat from hot radiator water, exhaust, or engine oil.

Carburetors

When fuel is heated, it leaves the carburetor or TBI better atomized and at a higher temperature to withstand evaporative cooling in the manifold. When vehicles have carburetors or TBI, the fuel's trip through the manifold tends to cool the fine spray on its way to the engine. It does so by absorbing the spray's heat and reforming the fog into large drops, which are often deposited on the manifold surface and never reach the engine as a burnable spray.

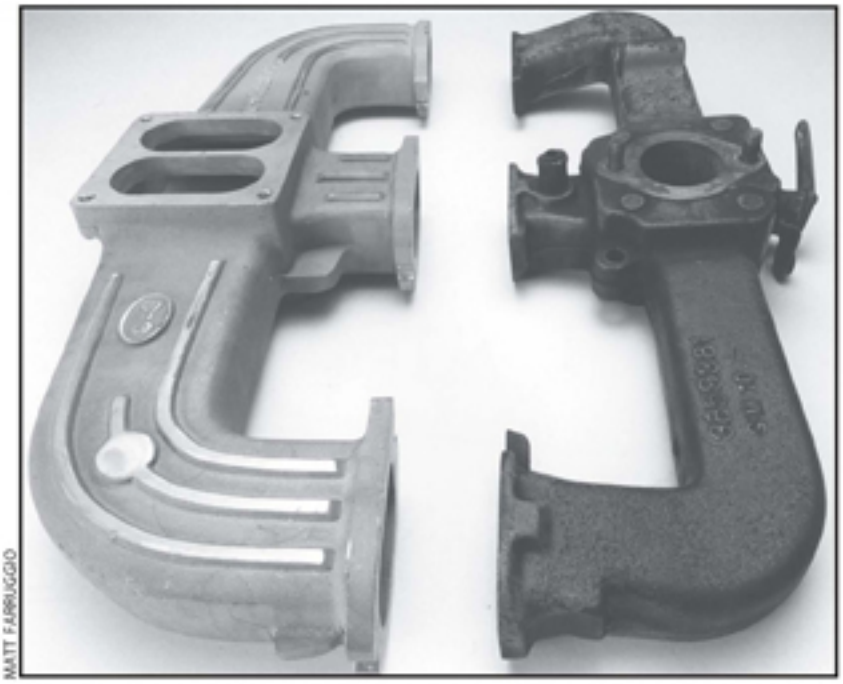

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Fig. 19-1 Equal-feeding manifolds. *The manifold on the left has been engineered so that the cylinders on the end get the same amount of air/fuel mixture as the cylinders in the center. You'll also note that the turns are smooth, which can make a world of difference on a carbureted or TBI vehicle.*

been advanced. Also, in some tests, hotter plugs have been shown to increase mileage a little. They do have to be changed back if you go back to using gasoline.

For the committed alcohol user, hotter plugs may be worth it, especially since spark plugs can last well over 150,000 miles on alcohol, compared to 10,000 miles on gasoline. The spark plug gap should be checked once a year, and reinstalled with new compression rings, if necessary.

Some aftermarket ignition control systems specify spark plugs that are compatible with their hardware. This assumes you are using a programmable electronic ignition and plan to go back and forth between alcohol and gasoline.

MANIFOLD AND CARBURETOR GASKETS

This modification is only helpful with carbureted or TBI engines. Between a car's cool intake manifold and the very hot head to which the manifold is bolted, sits a gasket made of fiber or heavy paper; these materials act as insulators to keep heat out of the manifold. If you allow your normally cool intake manifold to get hot, you can make use of that heat to keep your fuel reasonably well atomized on its way to the engine. So, you want to replace the gasket with one made of copper or aluminum to allow the heat to transfer.

There's another gasket between the manifold and the carburetor or TBI. In cars with no air heating, the carburetor or TBI can get so cold (from the freezing effect of fuel rushing and evaporating through it) that ice will form on the outside of it! Since all your fuel is evaporated through this narrow passage, replacing this gasket helps maintain heat. (Some carbureted engines had the exhaust manifold integrated with intake manifold(s) so exhaust could be directed under the carburetor when the engine was cold.)

A replacement copper gasket should be about 0.035 inches thick, **annealed** in an oven at 250° F for 20 minutes (annealing softens the metal and makes it a more effective gasket), and allowed to cool slowly. Burying it in warm sand is a great way to slow the cooling. An aluminum replacement gasket is fine, as it is. Copper-spraying a paper gasket won't work.

Fig. 19-7