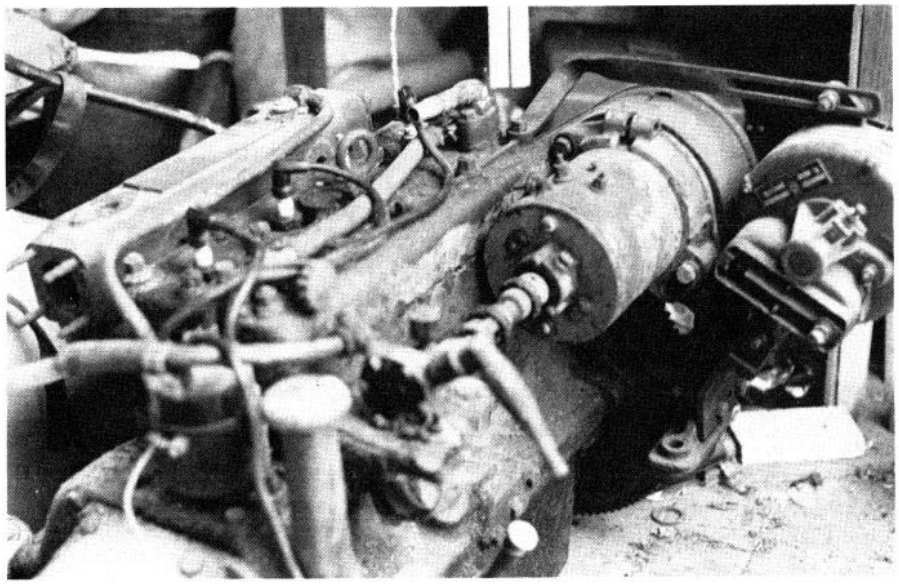
# Boat Clinic

## Life with Lead-Free Fuel

The gasoline you buy for your inboard or outboard engine this year is significantly different from the gas you bought last year-all of this year's gas is functionally lead-free. In addition, in an attempt to boost octane ratings that were previously jacked up with lead, many gasoline producers have begun blending gasolines with various types of alcohol. Both of these changes can be very important to you if you own a gasoline engine.

Lead is recognized as a major component of air pollution, and its removal from fuels is therefore justifiable to reduce the social costs of air pollution that all of us pay. However, the reduction in costs to society as a whole are accompanied by an increase in costs to the individuals using engines born and bred to use lead as an essential component of lubrication and octane.



**Old marine gas engines such as this Graymarine 4-112 are disappearing from boats, and the new fuels are helping them toward extinction**

Although gasoline companies have the right to use miniscule quantities of lead in gasoline until 1988---.1 gram per gallon is allowed, as opposed to the 1.5 grams per gallon allowed last year-you might as well consider all gasoline lead-free from now on, and modify your engine maintenance habits accordingly.

Most gasoline engines built after 1972 are designed to run on low-lead fuel. Individual engine manufacturers, however, have different rules as to how their engines should be treated to handle the new generation of fuels.

The Atomic Four is probably the most common inboard auxiliary in existence. Because it is a relatively low-compression engine, it doesn't require high octane gasoline. However, the lead in gasoline did serve an important function in the Atomic Four-to lubricate the valves. As a substitute for lead, Universal, the Atomic Four's manufacturer, recommends the use of an upper-cylinder lubricant such as Marvel Mystery Oil in unleaded gasoline. Cans of Marvel Mystery Oil and other similar lubricants are printed with mixing instructions for adding to gasoline. The faithful use of the appropriate oil in your gasoline should, according to the company, ensure that the life span of your Atomic Four is unaffected by lead-free fuel.

Small, late model outboards used as auxiliaries are not likely to be affected by the changes in fuel. Most run well on low-octane fuel, and the two-cycle oil mixed with gas used in most small outboards should provide adequate lubrication.

Large, high-compression outboards are another story. Big outboards are quite sensitive to fuel octane, since they get a lot of horsepower out of relatively few cubic inches. Big outboards may require changes including new head gaskets, changes in timing, and carburetor modifications to run properly on lead-free fuel. Because each engine manufacturer has different recommendations on how to deal with lead-free fuel, the only safe course of action-and one that may be required to protect engine warranties -is to contact the manufacturer concerning the particular model and year engine you own.

### Alcohol in Fuel

A greater problem than the removal of lead from fuels may be the addition of alcohols to gasoline in order to boost octane. The gasoline you buy may be blended with methanol, ethanol, or other alcohols. These alcohols may be able to cause damage to parts of your fuel system.

Depending on the type of hoses and the type of alcohol in fuel, your boat's fuel hoses may become soft and vapor-porous or brittle. The same goes for things like the diaphragms of vacuum-operated fuel pumps, gaskets, fuel filters, and other rubber and plastic parts of the fuel system.

There seems to be little consistency in the way fuel hoses react to alcohol in gasoline, since alcohol is not a solvent they had to resist in the past. The different alcohols used as fuel additives will not necessarily affect different rubber compounds in the same way. The fuel you use that is blended with methanol may makes hoses brittle, while that blended with ethanol makes them soft. Filling up from dif-

ferent pumps may pose different risks.

In addition, alcohol tends to separate out of gasoline over time. This is a particular problem in the case of a sailboat auxiliary, where fuel may sit in the tanks for weeks without being used. Alcohol is a pretty good solvent for lubricating oils, so when your engine ingests a good gulp of alcohol and the water it has absorbed from the air, the lubricating film of oil on the cylinder walls may be washed away. The result could be serious damage to pistons, rings, and cylinders. The alcohol/water mixture which settles out of fuels may also accelerate corrosion of the fuel tank.

Most marine engine manufacturers warn against the use of fuels containing alcohols, and in some cases may void an engine's warranty if it has been run on alcohol-laced fuel. This could be a serious problem in the case of outboard engines. For example, boat owners usually have far fewer fuel sources to choose from than automobile drivers, and may have a harder time finding alcohol-free fuel. We suspect that in the short run there may be a fair amount of confusion at the gas pump as to whether or not the fuel being pumped contains alcohol. The lack of consistency in the blending of fuel has nightmare potential for the owner trying to protect his warranty. Will there be a lag in pump labeling, even in those states requiring it? What happens when a fuel blender switches from alcohol-free to alcohol-doped fuel?

We can see a conscientious outboard owner badgering fuel distributors for written acknowledgement that fuel does or does not contain alcohol, to be turned in with his engine if it is damaged. Then all you have to do is prove that you always ran the engine on that particular fuel, and that the fuel didn't change composition at different times.

Even if an engine isn't under warranty, it may pay to get a written explanation of the engine manufacturer's policy on fuels used in their engines, including the required octane rating, changes necessary to run on lead-free fuel, and policies concerning engines which may be run on alcohol-blended fuels. Even a half pound of prevention is cheaper than a ton of cure.

Unfortunately, you may not know if the gas you buy either at the marina or at the local gas station contains alcohol. At this time, less than two thirds of the states require the labeling of fuel pumps for alcohol content.

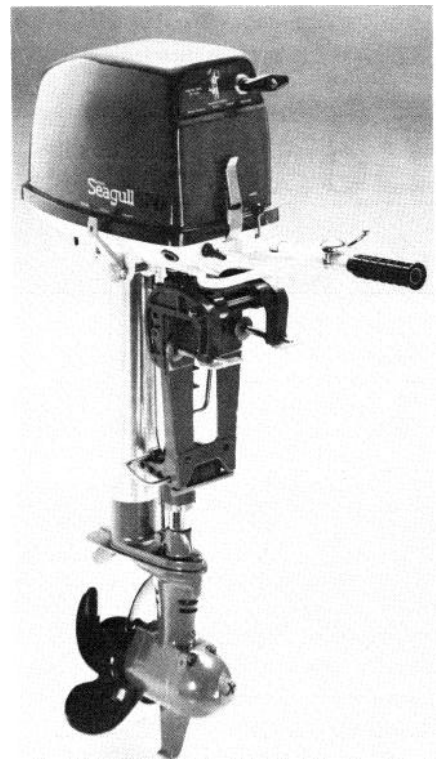
Frequent examination of your fuel system is the only way to protect yourself at this point. Research is currently underway to determine requirements for alcohol-resistant hoses, but all information is tentative at this time. A smell of gasoline in your engine compartment, or higher than normal crankcase oil levels may well signal damage to the fuel system.

Atomic Four engines built prior to 1978 are likely to be equipped with mechanical fuel pumps, and the rubber diaphragm in these mechanical pumps may or may not-depending on the type of alcohol in your fuel-be damaged by alcohol-blended fuels. Universal suggests replacing mechanical fuel pumps with the newer electrical pump, and has packaged this pump in a retrofit kit (part #299250) for older Atomic Fours, You may be able to get this kit from a local engine shop, or you can order directly from Universal Motors-Medalist, Box 3008, 1552 Harrison, Oshkosh, WI 54903, (414) 231-4100. The fuel pump kit isn't cheap at $154, but it's pretty cheap insurance when you consider the alternatives.

## States Requiring Labeling of Fuel Pumps for Alcohol Content

| | | |
|---|---|---|
| Arizona | Maryland | Oklahoma |
| Arkansas | Michigan | Oregon |
| Colorado | Minnesota | Rhode Island |
| Connecticut | Mississippi | South Dakota |
| Florida | Missouri | Tennessee |
| Illinois | Montana | Utah |
| Indiana | New Mexico | Virginia |
| Iowa | North Carolina | Washington |
| Kansas | North Dakota | West Virginia |
| Louisiana | Ohio | Wisconsin |

This list may be obsolete by the date of publication. Contact your state's Department of Transportation to determine the current status where you live.




**Smaller outboards used as sailboat auxiliaries usually run well on lower-octane lead-free fuels, but only the manufacturer can tell you what fuel a particular engine requires**

Oshkosh is also the home of Graymarine, the other major manufacturer of gasoline auxiliaries. For information on how the new fuels may affect the operation of popular engines such as the Graymarine 4-1 12, widely used as auxiliary power on older boats up to about 40', contact the company at 339 W. 20th Avenue, Oshkosh WI 54901, (414)231-4560.

The development of small diesel inboards in the last 15 years pretty much sealed the doom of inboard gasoline auxiliaries. The new fuels may finish off the job. You don't have to panic and unload your boat or repower if it has a gas inboard auxiliary, but you should be aware of how the changes in fuel will affect you. Needless to say, these changes aren't going to do anything to enhance the resale value of boats with gasoline engines.

Because the outboard engine market is such a large portion of the entire marine industry, we suspect that it's only a matter of time before outboard manufacturers come up with modified engines that run on the new fuels without problems. However, until lead-free fuels become consistent in their composition, it isn't realistic to expect engine manufacturers to modify their products on an ad hoc basis to deal with every change in fuel. - N N