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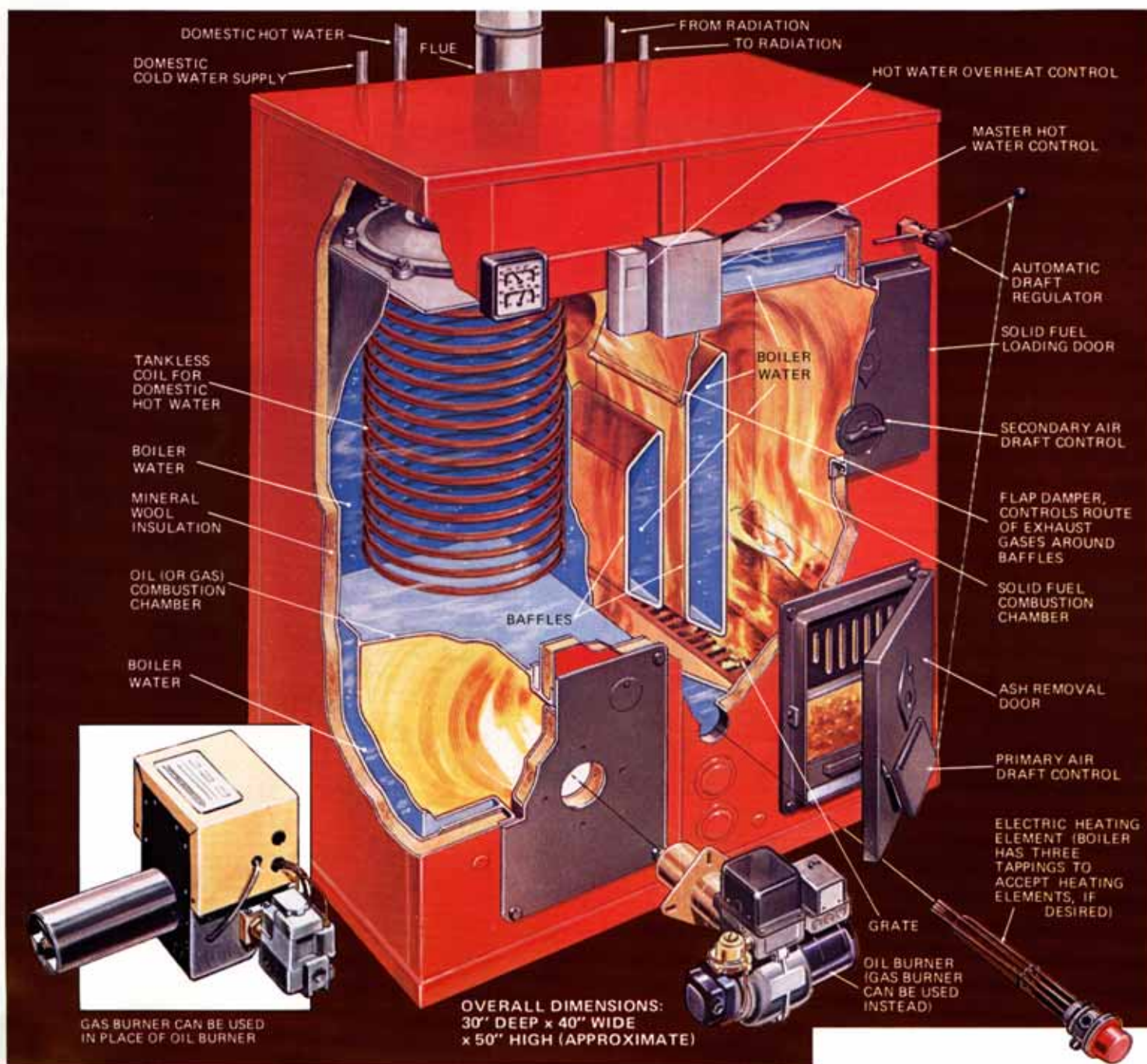
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Now: Multifuel heaters let you choose the fuel you burn

by Joseph R. Provey
ASSISTANT HOME AND SHOP EDITOR

Versatile new furnaces and boilers can burn oil, gas, wood or coal—whichever fuel is most economical at the moment.

Do you mean to tell me that those things really exist?" That's what most people say when they're told about multifuel central heaters. Such heaters not only exist, but they exist in a proliferation of designs that are heralded by their makers with a barrage of claims. This article will help put multifuel units in perspective for the reader who is thinking about buying one.



PM installs a multifuel boiler

Here's what it takes to make the switch to multifuel heat—and energy security—for your family.

by Joseph R. Provey
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The first time I fired up my multifuel boiler with a load of wood, it struck me that it was also the first time in my life I was taking full responsibility for providing heat for my family. It felt good, but also a little scary—a contract with the oil company had always taken care of everything. The burner fed itself and deliveries were automatic. In recent years, however, so were the price-per-gallon increases.

Now I can call the shots—without giving up the admitted convenience of oil. The HS TARM unit I chose will burn oil, gas, coal, coke or wood and even operate on electricity. I ruled out gas and electricity since the former is not available to me and the latter costs too much. Coal is a last resort even though its cost per B.T.U. is about half that of oil. (See page 118 for a description of how a multifuel boiler works.)

We scheduled and completed our installation last spring, when a service interruption was not critical and installers weren't completely booked. This fall a similar unit, completely installed, will cost about \$3400.

The initial cost was not as high as it sounds, considering the old unit would soon have to be replaced anyway. In fact, the payback period is relatively short. In my case, I am using oil to heat my domestic water during the mild-weather months and will use wood for both domestic hot water and space heating during



Multifuel unit (top) operates at efficiency of 84 percent (oil) or 62 percent (wood). Old oil burner (below, left) was 68 percent efficient. Door and unit sizes were compared before boiler was delivered. Basement entry eased task of getting new unit in, old one out.

the winter. The wood, even in my well-populated suburban area, costs only sweat. My oil savings will be about 600 gallons, which converts to nearly \$500 at 82 cents per gallon. Conservatively projecting the price of heating oil to rise 10 percent a year, my multifuel unit will pay for itself (beyond the cost of a new oil-

fired unit) in three to four years. A federal tax credit for wood-burning appliances would shorten the time.

We began planning our installation by looking at available units and sending for manufacturer's literature (see list on page 198). After choosing the unit which suited my needs, I checked the dimensions of

PM photos: Carl Weese
Boiler installation: Alternative Energy Associates, Inc.,
Underhill, Vt. 05489.
Consultant: John F. Connolly, inspector, Building Dept.,
Norwalk, Conn.



Installation of boiler jacket and mounting of doors and components can be done by homeowner to cut installation cost.



Connecting overheating control (A) and master hot-water control (B) normally requires skill of a professional.



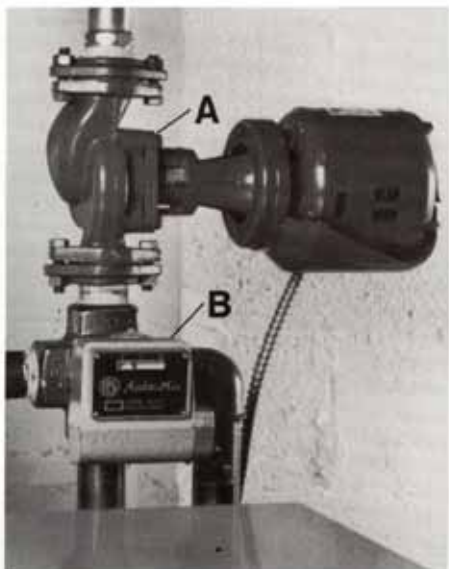
Before flue pipe was passed through wall, thimble was mortared in place. Then flue pipe was inserted and the joint sealed.



Air purger, valves and copper pipes were plumbed and soldered according to the manufacturer's recommendations.



Flue pipe sections were fastened at all joints with sheet-metal screws to keep them from separating due to vibration.



Circulator pump (A) on return line operates constantly during heating season. Auto mix valve (B) feeds more—or less—hot water from boiler to radiators, depending on house thermostat's call for heat. See text for the advantages of this system.



Oil feed line to burner was protected by slipping old garden hose (slit on one side; see inset) over the exposed tubing.

access to basement, condition and size of my chimney flue, and the size of area where the unit was to be installed. I had to be sure I could get the unit into my basement without removing a wall or floor section, that my chimney was the right size, in good repair and tile-lined, and that there was adequate space for recom-

mended clearances. Once satisfied, I visited my local building department to get a heating permit.

Working with this department was particularly important because currently no multifuel units have completed testing at the UL labs in Cleveland. Most units have been

Boiler maintenance

If you are accustomed to low-maintenance fuels like gas or oil, be aware that alternative fuels (coal and especially wood) will demand more of your attention. Chimneys, for instance, must be cleaned once a year. The stovepipe between the boiler and the chimney must be removed and inspected for corrosion, creosote and soot at least twice during a heating season. The oil or gas burner should be adjusted, and the burner firebox cleaned, once a year.

Cleaning of the inside boiler walls and flue passages must be done at least every two months during the heating season. Otherwise, a buildup of creosote will slow heat transfer to the boiler water. Heeding the maker's maintenance schedule is critical to an efficient, safe multifuel system.—J.P.



Ash scoop is used for emptying. Ashes should be removed before they touch grates and restrict airflow.



Wire flue brush and long-handle scraper were provided with unit for cleaning creosote from inside boiler.



Meter reads 23-percent moisture content in logs seasoned for 10 months—slightly high for clean burning.

MULTIFUEL BOILER

Hot-water boiler with independent combustion chambers (above) efficiently burns gas or oil on one side, coal or wood on the other. Chamber walls transfer heat to surrounding water, which is pumped to radiators as needed. If solid-fuel fire is allowed

What they do; how they work

A multifuel heater is a furnace or boiler which will burn some combination of fossil and solid fuels. A typical unit will burn oil or gas, plus wood or coal. Some units can even operate on electricity, while others are restricted to wood, plus oil or gas.

The heat distribution system for multifuel units is the same as for conventional forced-air, hot-water and steam heaters. Installation is not complicated. Most units can be connected to existing house thermostats and Class A chimneys (tile-lined or insulated stainless steel) which are in good repair. Existing flues for gas-fired furnaces and boilers may not be adequate for multifuel units—check manufacturer's specifications and your local building code before you buy.

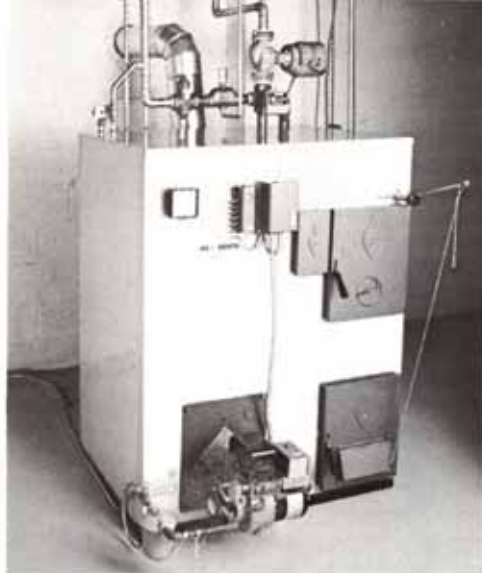
A multifuel heater is usually hand-fired with solid fuel. To do so, a homeowner must turn off the electric current to his oil or gas burner and feed the combustion chamber in much the same way he would a coal- or wood-burning stove. The solid-fuel chamber of most units is equipped with an automatic draft set to keep the fire at an even temperature. If the fire gets too hot, the damper closes to reduce the air supply and retard combustion. If it begins to cool, the damper opens to let in more air. In some units, the primary air is supplied by a small thermostat-activated blower.

Multifuel heaters are set up so that when the solid-fuel fire cannot meet the demand because the fuel has dwindled, the automatic gas or oil burner switches on and takes over. Some units, usually those that have single combustion chambers for both solid- and fossil-fuel burning, are designed primarily to burn solid fuel. The oil or gas burner on such units is a backup, to be used when you are away and can't feed-in solid fuel.

Units specifically designed for multifuel burning generally have two independent combustion chambers. Efficiency on the oil-burning side of two-chamber units is usually higher (5 to 10 percent) than oil-burning efficiency in single-chamber units. Firing into "that big

to die down, oil (or gas) burner will kick in automatically. Electrical heat elements can also supplement solid fuel. In addition, tankless coil produces domestic hot water.

barn," as one manufacturer of oil burners puts it, tends to promote greater stack loss of heat. Enno Toomsalu, associate managing engineer at Underwriters Laboratories, agrees and states further that two combustion chambers, sized specifically for the fuel to be burned in them, will tend to be more efficient than single-chamber units for burning oil or gas.



Add-ons convert home heaters to multifuel systems

If you just plunked down \$1200 to \$1500 for a new gas- or oil-fired furnace or boiler, you're not about to replace it with a multifuel unit, no matter how much that unit might save you. Even if your unit is four or five years old, you'd lose on the trade in. You can, however, spend \$400 to \$2900 for an add-on furnace or boiler, which can turn your existing heating plant into an efficient, economical system.

There are two important things to consider when buying an add-on. The first is whether or not to get a unit that can eventually be converted to multifuel capability. Several makers offer this as an option, so when your existing oil- or gas-fired unit needs to be replaced, all you must buy is a new burner.

The second thing you should do is decide, with your local building official and the installer, whether or not the flue for the existing unit will be adequate for use with the add-on. It must be able to handle all combustion products from both units simultaneously. UL is currently proposing that a warning be made by add-on manufacturers, stating that users who connect a solid fuel add-on to an existing gas-fired unit are risking asphyxiation. The reason behind this warning is that if the flue passage were to be blocked by creosote accumulations, deadly, hard-to-detect carbon monoxide could build up in the house. If the flue isn't adequate, and you don't have an unused flue passage, you'll need money for a new chimney.



Oil or gas burner can be mounted (see inset) on MB Solo boiler add-on when existing fossil-fuel-type boiler wears out.

The above material is an excerpt of an article that appeared in the October 1979 issue of POPULAR MECHANICS.

tested by other labs, however, notably the Energy Test Lab in Portland, Me. The inspector was able to tell me if the unit I was considering had met with the approval of the review board in my home state (Connecticut).

Codes vary from state to state and even from city to city. A few city codes have not approved multifuel units, so check before you buy. Don't chance an illegal installation—it may lower the resale value of your home. And if you should have a fire, the insurance adjuster will be the first person to find out if you had a valid heating permit.

When it came to actual installation, I was pleased to find that Tekton corp., distributor of HS TARM boilers, encourages homeowners to participate. Depending on the dealer, you can assemble or trim out the unit yourself and save part of the installation cost (\$400 to \$1000 depending on where you live). I chose to work with a topnotch crew of professional installers and found this gave me invaluable knowledge of the unit.

In my opinion, connecting the electric controls, circulating pump and valves is best left to licensed professionals familiar with your unit—unless you are blessed with plenty of time, can acquire a good installation manual and have a background in plumbing and electrical work.

Differences and advantages

Since solid-fuel burning is inherently different from burning gas or oil, the heat distribution and safety systems we chose are more sophisticated than conventional systems. Our installation utilizes a mixing valve and a circulator which runs continuously—instead of a typical hydronic system that periodically circulates fairly high-temperature water. The four-way mixing valve adds more or less return water to the supply being pumped to the radiators and is controlled by the house thermostat. Aside from using heat more efficiently and eliminating costly short cycling of the oil burner, other advantages you will obtain through continuous circulation include:

- Longer boiler life due to elimination of thermal shock to the boiler caused by surges of cold return water every time the circulator is started.

- Longer circulator life, since most wear in circulators occurs during motor start-up.

- A quieter house during the heating season.

- A more comfortable house since the heat is more even.

Continuous circulation of water to radiators also acts as a safety feature for our wood-fired hot-water heating system. Since the wood fire is always generating heat (it can't be turned off like my old oil burner), the system will dispose of the heat efficiently. In a conventional system, there is a greater possibility of boiler overheat (when there is no circulation) and creosote formation (caused by the fire burning too slowly between sporadic calls for heat).

Other safety features on our unit include a high-temperature overheat control which causes overheated boiler water to circulate to radiators—even if there is no call from the house thermostat.

Both the domestic hot-water coil and the boiler have pressure-relief valves piped down to near the floor or to a drain.

A backflow preventer was installed on the feed line to the boiler to prevent the contaminated water in the heat distribution loop from entering the domestic water supply.

In a power failure

Even with the electricity off, my multifuel boiler will keep our house warm. When an outage occurs, a special solenoid valve opens and allows hot boiler water to gravity-feed to the radiators, bypassing the check valve. The fire during such an outage would have to be fueled carefully and in moderation to prevent overheating the boiler. The automatic draft regulator will continue to control the fire even without electricity.

The answer: renewable fuels

The increasing frequency of oil and gas shortages will inevitably force us to depend on safe, renewable energy sources instead of non-renewable and species-endangering ones. During the transition, a smart homeowner will leave as many options as possible open—a multifuel boiler or furnace fills the bill. **PM**

SPECIFICATIONS—HS TARM OT-35S BOILER

Construction: Heavy steel plate with insulated, baked-enamel steel jacket.
Gross output: 140,000 B.T.U./hr. (oil); 112,000 B.T.U./hr. (wood)
Maximum hot-water output: 2.8 gal./min.
Maximum wood length: 20 in.
Weight (boiler with jacket): 1089 lbs.
Minimum flue size: 8x8 in. (Class A chimney)
Minimum chimney height: 20 ft.
Distributor: Tekton Corp., Box 77, Conway, Mass. 01341.
Average installed price: \$3400.

A LOOK AT THE MANUFACTURER

At the turn of the century, Rasmus Soerensen, a blacksmith, opened a shop in the small village of Tarm, Denmark. His son Hans joined him in the trade and expanded the family business with wood stoves of his own design. In 1929, Hans Soerensen made his first central heating boiler. Although the designs have changed with the times, the boilers continue to bear the initials—HS—of this inventive pioneer.

Today, HS TARM is the largest boiler manufacturer in Denmark and a leading supplier to the European market. HS TARM boilers are also sold in the Middle East, Australia, Canada and the United States. The complete line ranges from compact, residential oil- and gas-fired units to large industrial boilers.

Product development and testing are key words at HS TARM. And quality control—from the drawing board to the testing of each boiler before it leaves the factory—is the watchword.

At HS TARM, engineering to ensure efficient use of home heating fuels began long before the worldwide energy shortages became a fact of life.

Tekton Corporation is the U.S. distributor for HS TARM. Located in western Massachusetts, the company specializes in wood energy products. In addition to wood-burning and multi-fuel boilers, Tekton distributes wood-burning hot air furnaces for industrial use; stokers for automatic, solid-fuel firing; and briquetting machinery to compress wood waste into fuel.

For more information on HS TARM boilers or other Tekton products, write or call Tekton Corporation, Box 99, Conway, MA 01341, (413) 369-4367.

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