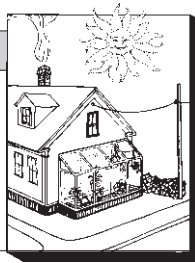


Combination Space and Water

by J.D. Ned Nisson



Boilers with "sidearm" water heaters have been around for generations in the Northeast. But in the rest of the country where forced-air heating is king, the concept of integrated space and water heating may seem foreign. While they may not be for everybody, several types of systems that use a single appliance for both space and water heating are worth considering.

Introducing the "Hydronic Furnace"

The term "hydronic furnace" usually causes my engineering friends to cringe. But it does accurately describe a type of heating appliance that uses a hot water coil to heat air. As a central heating system, it resembles an electric furnace in which the electrically heated coil has been replaced by a hydronically heated coil—thus the term "hydronic furnace."

A typical hydronic furnace is a self-contained unit that includes a finned-tube water coil, blower, and circulating pump (Figure 1). Heated water (from any source) is circulated through the coil and in turn transfers heat to air that is blown over the coil.

In houses with low heating loads, hot water for a hydronic furnace can be supplied from an ordinary domestic

water heater, which eliminates the need for a furnace or boiler. The water heater serves double duty, making hot water for both space heating and water heating.

The first hydronic furnace system to gain popularity for residential applications was the "Apollo Hydroheat," manufactured by Apollo Industries (now Apollo Comfort Products, Division of State Industries). The concept first caught on in mild climates and was used primarily for small multifamily housing. But with the advent of highly energy efficient houses, the practicality and popularity of hydronic furnaces has spread rapidly into the colder regions of the United States, Canada, and even Alaska.

And Apollo is no longer alone in the marketplace. First Company, manufacturer of the original Apollo units, is now aggressively marketing its line of hydronic furnaces—the "Aqua-Therm Aire." Mainstream appliance manufacturers are also getting into the picture. SnyderGeneral entered the market two years ago with vertical- and horizontal-mount units sold under the Arcoaire and Comfortmaker brand names. Rheem also introduced its "EnergyMate" system last year. All are available with direct expansion coils for air conditioning. (The Aqua-Therm Aire coil can also be used for heating with a heat pump.)

The most innovative combined water and space heating system on the market is the "Mor-Flo Integra"—a sealed combustion water heater with a space heating fan coil mounted on top. The water heater itself has several distinct advantages including power venting and sealed combustion, and the combined unit has the unique advantage of very small footprint. The Integra provides space heating, cooling, and domestic water heating while occupying less than 6 square feet of floor area.

Engineering Development Inc., a small manufacturer in Colorado Springs, Colo., sells another unique fan-coil system which also includes a heat recovery ventilator (air-to-air heat exchanger).

All the systems mentioned above are marketed as something new and

innovative, but hydronic fan coils for residential space heating are standard fare for some companies. For example, probably the plainest of the plain vanilla hydronic furnaces is the Myson series, manufactured by the Myson Group Inc. Available with heating coil only and no frills, the Myson line includes several models of fan coil units with capacities ranging up to 23,000 Btu/hr.

Furnaces For Water Heating—Hard To Find

What about turning things around and using the central space heating system for water heating? Two manufacturers—Amana and Glowcore—make furnaces with water heating capability. In principle, both are actually self-contained hydronic furnaces. The Amana "Energy Command" and the Glowcore UGX series gas furnaces both work by heating water which is pumped to an internal fan coil for space heating and an external tank with heat exchanger for domestic water heating.

Heat Pumps For Water Heating—Getting Better

Any heat pump or air conditioner can be modified for water heating by simply attaching a device called a "desuperheater" which siphons waste heat from the compressor when the system is in cooling mode. As an add-on device, desuperheaters never really caught on.

During the past two years, however, four manufacturers have begun producing "triple-function" heat pumps that are designed to produce year-round hot water at high efficiency. The first was the Carrier Hydrotech 2000, the most sophisticated and most expensive residential comfort system on the market. Next came the "Mac-Pac," a less sophisticated (and less costly) system produced by Artesian Systems Inc. The other two triple-function heat pumps are ground-coupled systems produced by WaterFurnace International and Phillips Energy.

All four systems are designed to produce hot water at high efficiency whether or not the system is operating for space heating or cooling.

Boilers For Water Heating—Son of Sidearm

Sidearm and tankless water heaters on boilers are gone. They have been replaced by three basic types of systems that use a separate zone off the boiler to heat domestic water.

The most common configuration is the "indirect heater"—a storage tank with a submerged heat-exchange coil

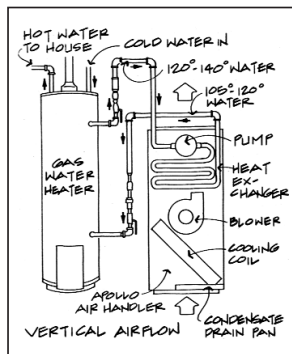


Figure 1. A conventional domestic water heater coupled to a "hydronic furnace" supplies both space heating and water heating to the house. This schematic is representative of systems such as the Apollo "Hydroheat," First "Aqua-Therm Aire," or Rheem "EnergyMate."

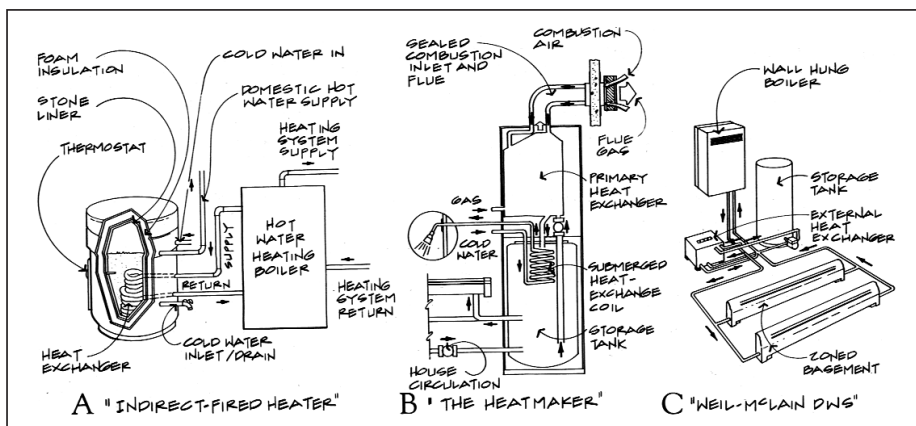


Figure 2. Three basic configurations are used for heating domestic water from a boiler. (a) "Indirect-fired heaters" consist of a storage tank filled with domestic water that is heated by a submerged coil carrying hot boiler water. (b) The Heatmaker boiler uses a reservoir of boiler water with a submerged heat exchange coil. Domestic water is heated during a single pass through the heat exchange coil. (c) The third type of system, such as the Weil-McLain DWS, uses an external heat exchanger to transfer heat from a boiler water loop to a domestic water loop. The heat exchanger is simply one zone off the boiler.

(Figure 2a). Domestic water in the storage tank is heated by circulating boiler water through the coil. A few examples are the Amtrol "Hot Water Maker", Everhot "EA" series, Belcher "Maxi-Tank," the Vaillant water heater and the "Phase III" indirect heater produced by Ultimate Engineering Corp.

Another approach is to reverse the system. A storage tank is filled with heated boiler water. Domestic water is heated by passing it through a submerged coil in the tank. In some systems, such as the Everhot "Sediment Fighter," a second separate tank is used for water storage (Figure 2a). In

others, such as the Heatmaker boiler, domestic water is instantaneously heated and distributed to the system (Figure 2b). No separate storage is used. This configuration is similar to the old sidearm heaters except it provides more even heating due to the large mass of boiler water in the tank.

A third type of system uses a conventional water storage tank and an external heat exchanger to transfer heat from a boiler water loop to a domestic water loop (Figure 2c). External heat exchangers are used in systems sold by Energy Kinetics, Weil-McLain, and Aero Environmental Ltd.

One interesting side topic to all this

is that the line between plumbing and heating gets a bit fuzzy. Who, for example, installs the Mor-Flo Integra? Is it a water-heating furnace or a space-heating water heater? Perhaps not a serious question, but surely one that will come up more and more as new integrated systems come onto the market and gain popularity. ■

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For More Information: MANUFACTURERS

Triple-function Heat Pumps

Carrier Hydrotech 2000
Carrier Corporation
P.O. Box 4808
Syracuse, NY 13221
315/432-6000

Mac-Pac heat pump
Artesian Building Systems
100 Creasy Court
P.O. Box 6296
Lafayette, Indiana 47903
317/448-4538.

WaterFurnace TF
WaterFurnace International Inc.
4307 Arden Drive
Fort Wayne, IN 46804
219/432-5667

Phillips triple-function heat pump
Phillips Energy
989 S. Airport Rd. West
Traverse City, MI 49684
616/929-1396

Hydronic Furnaces

Apollo Hydroheat
Apollo Comfort Products
Division of State Industries
3216 B Wellington Ct.
Raleigh, NC 27609
919/872-1852

First Aqua-Therm Aire
First Company
8273 Moberly Lane
Dallas, TX 75227-2388
214/388-5751

ArcoAire and Comfortmaker
Snyder General Corporation
9375 Landmark Parkway Drive
St. Louis, MO 63127
314/991-1033

Rheem EnergyMate
Rheem Manufacturing Company
Water Heater Division
5780 Peachtree-Dunwoody Road
N.E.
Atlanta, GA 30342
404/256-2037

Mor-Flo Integra
Mor-Flo/American
18450 South Miles Road
Cleveland, OH 44128
216/663-7300

Myson Fan Convectors
Myson, Inc.
P.O. Box 7789
Fredericksburg, VA 22404
703/371-4331

Water Heating Furnaces

Amana Energy Command
Amana Refrigeration, Inc.
Amana, IA 52204
319/622-5511

Glowcore UGX
Glowcore Heating and Cooling
products
P.O. Box 8971
Cleveland, OH 44136
216/273-4040

Boiler/Water Heating Systems

Amtrol Hot Water Maker
Amtrol, Inc.
West Warwick, RI 02893
401/884-6300

Weil-McLain DWS Water Heating
System
Weil-McLain Corporation
Blaine Street
Michigan City, IN 46360
219/879-6561

Everhot EA Series and Everhot Sediment
Fighter
Everhot All-Copper, Inc.
191 Arlington St.
P.O. Box 416
Watertown, MA 02272
617/924-3877

Belcher Maxi-Tank
Belcher New England, inc.
222 Lee Burbank Highway
Revere, MA 02151
617/284-4490

Vaillant VIH 115 Indirect Water
Heater
Vaillant Corp.
2607 River Rd.
Cinnaminson, NJ 08077
609/786-2000

Phase III Indirect Water Heater
Ultimate Engineering Corp.
200 West Central St.
Natick, MA 01760
617/653-6699