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# HOW TO SAVE ENERGY AND MONEY IN YOUR HOME

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## Where to Start?

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An energy survey (an analysis of how well your home uses energy) is the most important step you can take to decide the best ways to save energy and money in your home. All homes are not the same. They vary in size, age, type of heating system, and material and structural characteristics. Only through an energy survey can you really determine what energy saving measures are right for your particular home.

**Free on-site energy surveys are available to you provided you are a Peoples customer.**

The energy survey evaluates things such as ceiling, attic, wall and basement insulation, storm windows and doors; night set-back thermostats; caulking; weatherstripping; pipe, duct and hot water heater insulation; and improvements to your heating system including replacement systems.

If you decide you want to make some energy conservation improvements, your utility energy specialist will give you a list of contractors in the area.

See “Getting The Work Done,” beginning on page 35 of this book for more information on how to arrange for a Peoples energy survey.

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# A Quick Energy Tour

## • Are you doing everything you can to save energy in your home?

Before you can answer this question you must know how to identify the areas in your home where additional energy-saving improvements can be made. In addition, you must become aware of just how the amount of energy you use is affected by how you and your family use and care for your home.

## • What can you do now?

First, take a quick energy tour of your home by answering the following questions. Your answers here will tell you whether you need to look more closely at what's involved in energy-saving retrofit of that item, and where to go in this book to learn more. If you check a box, it means you have an energy-saving opportunity.

## QUICK SAVERS

**Does your house feel drafty and cold even when the thermostat says it's warm inside?**

\_\_\_\_\_ yes \_\_\_\_\_ no - go to page 6

**Are you aware of all the ways you can save energy simply by using your lights and appliances more efficiently?**

\_\_\_\_\_ yes \_\_\_\_\_ no - go to page 7

**Do you know how to save on your hot water bill without spending any money?**

\_\_\_\_\_ yes \_\_\_\_\_ no - go to page 8

**Are your heating pipes and ducts in good repair?**

\_\_\_\_\_ yes \_\_\_\_\_ no - go to page 9

**Do you know how to turn windows and doors from energy-loser to energy-savers?**

\_\_\_\_\_ yes \_\_\_\_\_ no - go to page 10

**Do you turn down your thermostat at night and have your heating system serviced regularly?**

\_\_\_\_\_ yes \_\_\_\_\_ no - go to page 11

## INSULATION INSPECTION

# 1

**Is your attic floor or roof/ceiling structure well-insulated?**

\_\_\_\_\_ yes \_\_\_\_\_ no

If it is not insulated at all, or if less than 4" of insulation exists, adding insulation could pay for itself within four to seven years. To determine exactly what's right for your attic, read more on **1** on page 17.

# 2

**Are your exterior walls insulated?** \_\_\_\_\_ yes \_\_\_\_\_ no

If you don't know, you can find out by:

- Drilling small holes through inconspicuous interior walls (such as in a closet), and looking inside;

- Removing a switchplate or outlet cover on an exterior wall and **carefully** probing on the outside of the electrical box where it meets the wall covering, or

- If you have aluminum or vinyl siding outside, looking underneath siding where it meets the foundation wall, to determine whether insulation board exists beneath the siding.

- If no insulation exists, it is wise to consider adding insulation; the energy savings would outweigh the costs. If no insulation exists, go to **2** on page 19.

# 3

**Are any of your floors cold or drafty?** \_\_\_\_\_ yes \_\_\_\_\_ no

If so, one solution may be:

- To insulate the underside of the floor, which is your basement or crawl space ceiling, or

- To insulate the walls of your crawl space or basement.

What's right for you depends on several factors. Before you decide, read pages 20-22.

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**4**

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**Is your free-standing, domestic hot water heater warm to the touch? \_\_\_\_\_ yes \_\_\_\_\_ no**

If you answer "yes", you should insulate our water heater storage tank. Find out how on page 23.

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**5**

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**Do you have uninsulated hot air ducts, steam or hot water heating pipes in unheated spaces? \_\_\_\_\_ yes \_\_\_\_\_ no**

Look in your basement, crawl space, garage - even in your attic. If you do, read 5 on page 24.

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## WINDOW AND DOOR INSPECTION

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**Are your exterior doors and windows creating uncomfortable cold drafts? Can you rattle your windows in their frames or see daylight between storm frames and your house? \_\_\_\_\_ yes \_\_\_\_\_ no**

If any of this is true for you, there are one or more ways to correct the situation - and save energy dollars:

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**6**

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Install new tight-fitting storm windows or doors.

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**7**

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Install weatherstripping.

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**8**

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Caulk window and door frames on the outside of your home.

To decide what's right for you, begin on page 28.

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## HEATING SYSTEM INSPECTION

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**9**

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**Do you turn down your thermostat at night and when you're not at home for a day or more? \_\_\_\_\_ yes \_\_\_\_\_ no**

If you don't, find out how much you could save by installing an automatic clock thermostat. See what's involved and how much you could save beginning at 9 on page 30.

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**10**

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**Do you know how well your central heating system is running and what options you have to improve it?**

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**14**

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If you're like most people, you probably rely on the judgement of your serviceperson or utility, and haven't considered making any energy-saving improvements to that system. Find out what options you have to improve your

heating system efficiency by reading items **10 -14** beginning on page 30. Implementing these options could mean a direct savings of between **5% - 25%** of your heating portion of your gas bill per year.

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# Quick Savers

“Quick Savers” are measures that cost little or nothing to implement and which pay back very quickly, usually within a year or so. Dollar savings will vary considerably depending on the characteristics of your home, fuel costs, and your lifestyle.

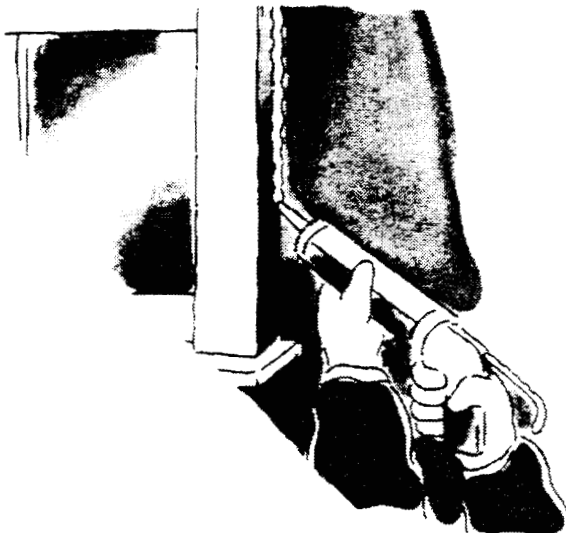
## TIGHTENING YOUR HOUSE

Cold air which seeps into your house through small holes and cracks and heated air which leaks out can cost you lots of money. Since you must pay to heat up the cold air coming in, and you have paid to heat the hot air leaking out, taking care of those “small cracks” can save a large part of your fuel bill.

- **Install Rope Caulk Weatherstripping**

Rope caulk is an inexpensive, flexible, clay-like material which you can install with little effort. Available at local hardware stores, it comes coiled in a box. Press it into cracks between the sash and frame. Since it dries out over time, check it once or twice during the heating season to make sure that it is still tight. You’ll need new rope caulk in the fall and must remove the old caulk in the spring.

- **Caulk Cracks and Gaps Around the House**



As much as 80 percent of air leakage gets in through areas **other than** windows and doors:

- where the wooden sill of the house meets the foundation,
- where dryer vents and fan covers pass through the wall,
- where plumbing pipes and telephone wires enter the house,
- where any two different outside materials meet, and
- where the fireplace chimney meets the siding.

Fill these cracks in the interior and exteriors of your house with caulk. Use only caulking compounds which are flexible over large temperature ranges and that will last for many years. These include acrylic-latex, acrylic-terpolymer, phenolic, latex, monomer, butyl and silicone caulks. They may cost a little more, but are worth it. If cracks are larger than 1/2 inch, stuff them with bits of insulation or oakum before caulking them.

See **8** Caulking on page 28 for more information on materials, how to caulk, and caulking of windows and doors.

- **Install Switch and Outlet Gaskets**

Stop drafts around electric light switches and wall outlets with inexpensive styrofoam or foam rubber gaskets, which fit behind the cover plates. Buy only U.L.-approved products, available at most hardware and discount stores. Remember to turn off the electricity to the outlets or switches before you install the gaskets.

- **Seal Air Leaks in the Attic**

Weatherstrip around the edges of the attic hatch or door to reduce warm air leaking into the attic from the living space. This increases the effectiveness of your insulation significantly, at very little cost. Also, insulate the back of the hatch or door with a piece of fiberglass or rigid board insulation.

Stuff gaps around chimneys with **UNFACED** fiberglass batt. Seal any connections between the heated space and the attic, such as plumbing, vent stack openings, and the tops of interior and exterior walls or stairway framing, using fiberglass batt.

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## LIGHTS AND APPLIANCES

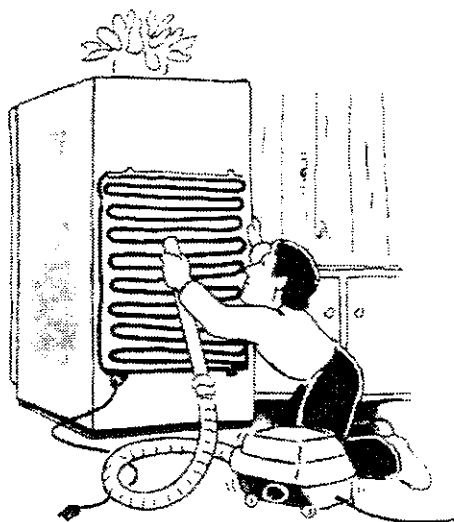
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Save money on your household electrical bill by using less electricity and by using your lights and appliances more efficiently. Here are some tips to help you reduce your energy bill for appliances.

### • Maintain Your Appliances

Keep appliances, particularly large energy users, in top working order. For instance,

- Test the fit of your refrigerator or freezer door by closing the door over a piece of paper so it is half in and half out of the refrigerator. If you can pull the paper out easily, the latch may need to be adjusted or the gasket replaced.

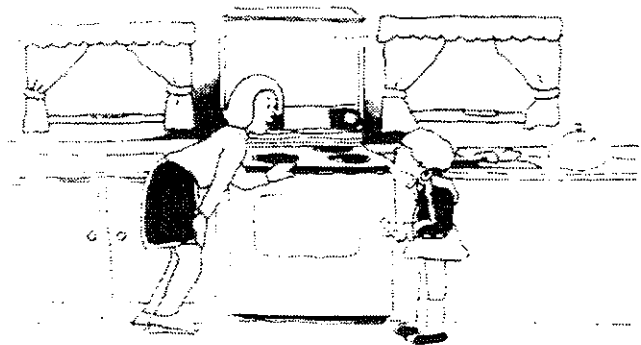


- Keep the fan coils clean on refrigerators, space heaters, and air conditioners.
- Make sure your refrigerator and freezer are located in a cool spot; direct sunlight or heat from an adjacent appliance can place a harmful - and expensive! - strain on cooling appliances.

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### • Purchase Only Energy-Efficient Appliances

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If you are planning to replace or add to your home appliances, buy only those that offer maximum energy efficiency for your dollar. Look for the Federal Trade Commission "Energy Guide" label to guide your choice of appliances. These labels are pasted on refrigerators, refrigerator-freezers, freezers, clothes washers, water heaters, and room air conditioners manufactured after May of 1980. Compare appliances carefully before you buy, and make sure that they are clearly labeled as to the following:

**For gas appliances:** only those which feature an energy saving feature called an **electronic ignition system**. This feature saves fuel by replacing the continuously burning pilot light.

**For dishwashers:** those featuring a heating element that automatically comes on for drying after the rinse cycle may use additional energy unless the appliance also has a clearly-marked switch to let you turn off the drying cycle. Save energy by opening your dishwasher door to help dry dishes.

**Refrigerators and Freezers:** that feature a continuously energized electrical heating unit (use more energy) and should have a clearly marked manual override switch before purchasing same.

**Television receivers:** which maintain a continuous flow of electricity to components ("instant-on" sets) use energy and considerable thought should be given before purchasing same.

#### • Use Lights Wisely

There are several tips here which may help you save on your electric bill.

- Turn off incandescent lights when they are not in use.
- Turn off fluorescent fixtures if you won't be using them for more than 15 minutes. Fluorescent lamps use as much energy in starting as they use during 15 minutes of operation;
- Substitute fluorescent lamps or lower-wattage, long-life bulbs for those you currently use, making sure that the **lumen output** (the amount of light) is adequate for the task;
- Use task lighting (lighting directed at a specific area) instead of overhead or general lighting, which may light areas of the room which are not in use;
- Finally, keep in mind that light colored rooms and furnishings reduce the need for artificial lighting; consider this when you choose your decor.

#### • Use Appliances Wisely

The most obvious way to save here is to use your appliances **less often**. In addition, it saves money and reduces wear. For example, dishwashers, washers and dryers all use as much energy to wash a partial load as a full load. Try to schedule your washing according to full loads only. The same principle applies to cooking appliances.

## DOMESTIC HOT WATER HEATING

The money you spend to heat hot water for showers, dishwashing and washing clothes is probably your next largest expense for energy after space heating/cooling costs. Here are five low-cost ways to save on your hot water heating bills.

#### • Install Water Flow Reduction Devices



Install new low-flow showerheads in your showers, and low-flow sink aerators in all the faucets in the house. These devices will reduce your water bill by limiting the flow of water to about two gallons per minute (normally five gallons per minute!) Since you will no longer use as much hot water, your hot water heating bill could be reduced significantly. Showerheads cost about ten dollars each and aerators cost only about a dollar. These measures can save five to fifteen dollars in the first year.

#### • Save on Your Hot Water Bill

Water heaters keep hot water available 24 hours-a-day, every day. Significant savings will occur if:

- (1) you turn down the hot water temperature, and

(2) you regularly turn off your water heater when you're away for extended periods of time, such as weekend trips.

**NOTE:** If you find that after reducing the temperature that you have insufficient hot water for showers, and have already installed a low-flow showerhead, turn the temperature back up a notch. Similarly, if you have a dishwasher and you find that the temperature of the water is too low to clean the dishes satisfactorily, turn the temperature back up a notch (often a thorough rinse of the dishes first will also solve the problem).

**For Free-Standing Gas and Oil Heaters:**

(1) Turn the dial at the bottom of the tank down to 120°F or "low",

(2) Turn the temperature control to "pilot only" when you are away for two days or longer. **DO NOT BLOW OUT THE PILOT LIGHT.** If you do not know how to turn it down, consult your water heater serviceperson.

**For Electric Water Heaters:** (1) Two separate dials are located behind cover plates. Unscrew these and turn down the same way as for gas systems.

**NOTE:** TURN OFF THE ELECTRICITY TO THE HEATER BEFORE YOU ATTEMPT THIS. (2) Turn off the heater by removing the fuse at your electrical fuse panel, or by turning off the appropriate circuit breaker.

**For Tankless Water Heaters:**

(1) Find the **aquastat** or **mixing valve** which is attached either to the tankless unit or to the body of the boiler. With a screwdriver, turn back the setting until you reach a position which provides just enough hot water for your normal needs.

(2) To achieve significant savings in the summer, use the **burner cut-off switch** to turn off the system while you are at work, or out of the house.

• **Drain Sediment from Your Hot Water Heater**

Drain a half-bucket of water from the faucet at the bottom of your hot water heater every two months to remove impurities, rust, and sludge that can collect at the bottom of the tank. Doing this makes the heat transfer from the flame to the water in the tank much more efficient and extends the life of the unit two to three years by reducing corrosion.

• **Use Your Clothes Washer More Efficiently**

1. Wash only full loads of clothing or adjust water level to load size to save water.

2. Lower the temperature settings on your washing machine. One hot wash and warm rinse

combination uses 25 gallons of hot water. If you have an electric water heater, one load a day on this setting can cost \$200 a year. By changing the rinse water to cold, which should not affect your wash results, you will save eight gallons of heated water with every washload, or \$65 a year. By changing the wash setting from hot to warm, you can save another \$65. If you have a gas or oil water heater, the savings is \$35 and \$50 respectively for each strategy. For maximum savings, use a cold water detergent, and wash and rinse with cold water.

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## PIPES AND DUCTS

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The pipes or ducts which deliver heating, cooling, and hot water throughout your home should be kept in good condition. This will not only save money on fuel bills, but also guard against costly repairs or disruption of service. Here are some tips on how to take care of them.

• **Seal Leaky Pipes**

Tighten or plug leaking joints in hot water or steam pipes. A leaking joint or faucet can lose 1 to 10 gallons of hot water a day! Also, repair or replace leaking valves. You may be able to repair these kinds of problems if you have tackled them successfully before and if you have the proper tools. Otherwise, have your plumber fix them.

• **Seal Leaky Ducts**

On hot air heating system ducts, leaky joints will send hot air where it may not be needed. You can easily fix duct leaks yourself using duct tape, available at most hardware stores.

• **Guard Against Freezing Pipes**

It often makes more sense to keep water pipes warm with insulation and "heat tape" rather than to heat the space around the pipes. "Heat tape" is a tape-like piece of plastic which turns on when the temperature falls below a preset level. It is available at most hardware stores with installation instructions. For best results, fiberglass pipe insulation must be installed over the heat tape.

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### • **Tape and Repair Existing Insulation**

If the existing insulation on your pipes and/or ducts is in poor condition, and if it is not asbestos, you can save most of it with a little repair time. Use duct tape to cover cracks which have developed between insulation pieces and cover gaps left at exposed end sections of insulation to prevent cool air from circulating beneath the insulation. Wear protective clothing, a dust mask and gloves to avoid contact with the irritating substances which are frequently found in older insulation.

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## WINDOWS AND DOORS

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Windows and glass doors can be good sources of free energy by admitting sunlight, but can also be one of the worst offenders when it comes to heat loss. Get maximum energy value from your windows by observing these low and no-cost measures.

### • **Maintain Your Windows**

Keep your windows clean and in good repair. It will pay off by reducing leaks and greatly extending the life of the window. Replace or repair broken sash cords, missing parting beads, and old window putty (glazing compound). Replace broken or cracked panes; a piece of clear tape over the crack will work temporarily. Paint the window sashes to prevent wood rot and seal leaks. All the necessary materials can be found at your local hardware store.

Clean your windows in the fall. Dirty glass can block as much as 40 percent of the solar energy coming through during the day, which could contribute to as much as 3 to 4 percent of your heating bill.

### • **Close Your Storm Windows**

As soon as the heating season begins in the fall, close all storm windows and lock all your inside sashes. For aluminum combination storm windows, the pane of glass that rides in the middle track should be at the bottom and the outer pane should be at the top to get the best seal at overlapping edges.

### • **Use Your Sash Locks**

For wood double-hung windows, it is important that the lock both pull together the edges where the top and bottom sashes meet, and push the upper and lower sashes tightly into the frame. The lock which does this is called a "clamshell" lock and is available

at most hardware stores. If there are no locks now, or if you need to replace them, buy this kind of lock.

### • **Use Your Curtains, Draperies, and Shades**

Most curtains, blinds, shades, and drapes provide some insulating value when they are closed over a window; close them tightly in the evening. During sunny winter days, keep windows which are receiving direct sun uncovered, because they will let in more heat (in the form of solar energy) than they will lose. In a typical home, you can achieve 3% to 10% fuel bill savings by taking advantage of window insulating and solar opportunities.

Protect south-facing windows from the summer sun to avoid the extra heat gain. Consider covering your north-facing windows on winter days if they do not have an important lighting or viewing function.

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## HOME HEATING AND COOLING HABITS

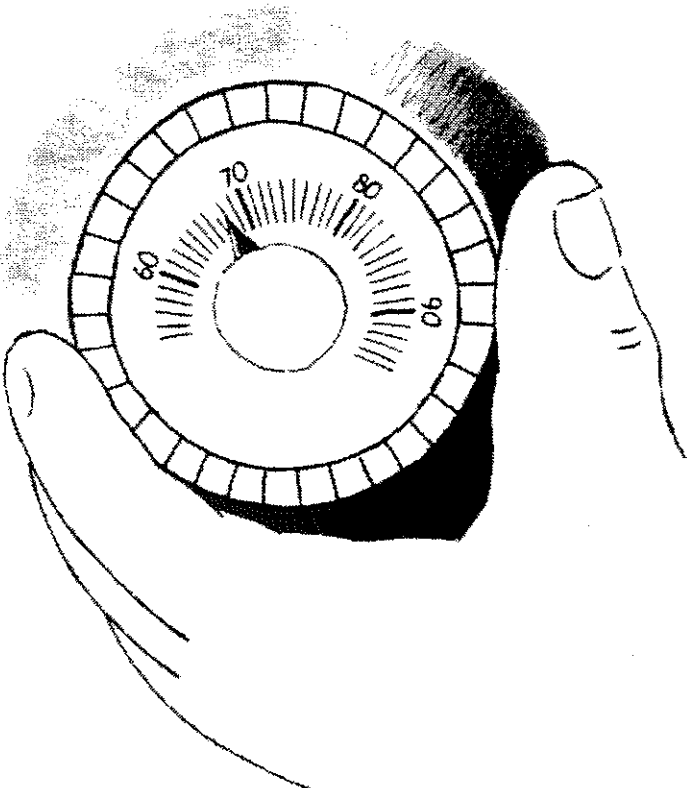
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These low and no-cost measures, discuss important adjustments you can make to your heating and cooling systems. For instance, changing your thermostat setting **costs nothing**, takes only minutes to change, and can save as much on fuel bills as insulation, storm windows, or weatherstripping. Maintaining your heating/cooling system regularly is as important as maintaining your car. Just as a tuned-up car will last longer and get more miles for every gallon of fuel, your heating system will give you longer service and more heat for every unit of fuel. A more efficient heating system saves you money because you need to buy less fuel to get the same amount of heat.

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## Change Your Thermostat Setting

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68°F in winter

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If you have a regular schedule, and/or can't remember to change the setting all the time, read about automatic thermostats on page 30.

**Winter:** Set your thermostat no higher than 65° to 68°F during the day and 55°F during sleeping hours. If the house is empty during the day, set it back to 55°F during that period, too. A 10-degree night setback could save 8 to 12 percent of your heating bills.

**Summer:** Keep your central air conditioner thermostat at 78°F or higher. When you leave the house for 4 hours or more, **turn off** the system. If you have room air conditioners, turn them off if you are out of those rooms for more than an hour.

Remember that the more you turn down (and, in the summer, turn up) your thermostat, the larger the savings will be. You can still stay comfortable

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by wearing more or less clothing. Changing the thermostat setting can become as automatic as turning out the lights at night.

**If your home is electronically heated**, and zoned by room, close off rooms that you do not intend to heat. Otherwise, the thermostat in adjacent rooms may turn on the heat for the cold room.

**If you heat your home with a heat pump**, thermostat setbacks of five degrees or less are recommended. Otherwise, during high demand periods (such as very cold weather or after a thermostat setback), the much less efficient back-up resistance coils may be required to meet the home's heating needs. This can cause **increased** energy consumption.

**CAUTION: Some people, especially the elderly, may require higher indoor temperatures - about 65 degrees at all times - to avoid possibly fatal drop in body-temperature. People with circulatory problems or those taking certain types of drugs may also be vulnerable. In such instances, follow your doctor's advice on both winter and summer thermostat settings in your home.**

### • Tune Up Your Oil Burner

Have a qualified technician from your fuel dealer, or the company with whom you have a service contract, tune up your burner and service the system on an annual basis. A burner tune-up is usually different from the cleaning and servicing offered by most companies.

When you schedule a tune-up, ask your service company about reducing the firing rate of the burner. Most burners are oversized and significant savings can be achieved by downsizing the nozzle. The burner nozzle controls the firing rate (the rate of oil flow in gallons per hour). Only your fuel supplier has the records necessary to determine if this is applicable. Make sure your serviceperson leaves a tag attached to the heating system which records the final **combustion efficiency**, smoke reading, percent carbon dioxide (CO<sub>2</sub>), net stack temperature, and any other work done. Combustion efficiency indicates what percentage of fuel your burner turns into heat.

The items listed here are those that most frequently require attention during a tuneup; however, all may not apply to your specific situation.

- Combustion chamber cleaned or replaced;
- Heat exchanger cleaned;

- Oil pump pressure checked and regulated;
- Oil filter replaced (installed if not present);
- Operating and safety controls (thermostat, aquastat, on/off switches, etc.) checked;
- Pumps and blower motors checked and oiled;
- Barometric draft regulator checked, adjusted, or replaced as necessary;
- Burner fan, motor, electrodes, and transformer cleaned and lubricated;
- Oil pump bled (if necessary);
- Nozzle replaced (must be done annually);
- Leaks into the unit sealed;
- Potential of “baffling” installation assessed (especially if older unit);
- Final combustion tests completed.

For additional information on oil burners, see page 30.

#### • Tune Up Your Gas Burner

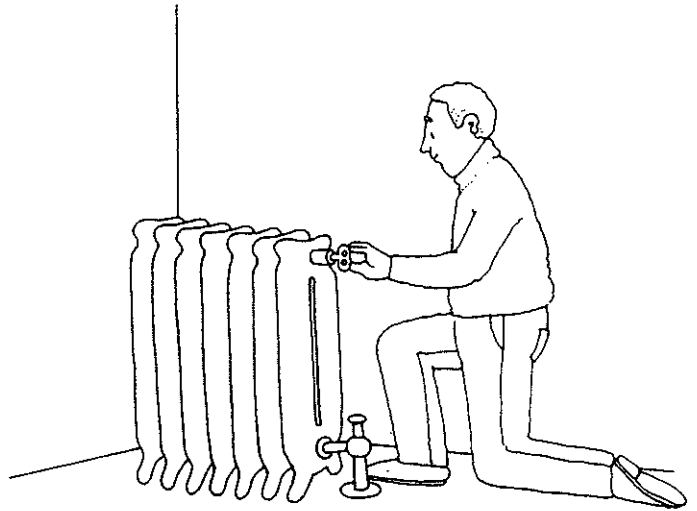
Have a qualified heating contractor tune up the burner and service your system. As with a normal service call, you will be charged a nominal fee. Make sure that the serviceworker leaves a tag attached to the heating system which records the final combustion efficiency, percent carbon dioxide (CO<sub>2</sub>) or percent carbon monoxide (CO), age, net stack temperature, and any other work done.

Some older equipment cannot be turned to efficiencies above 60%. Newer units can reach efficiencies of up to 98%. Your serviceworker should be able to determine this.

The items listed here are those most frequently required during a tune-up; however, all may not apply to your specific situation.

- Heat exchanger cleaned;
- Air inlets cleaned, adjusted;
- Operating and safety controls (thermostat, aquastat, on/off switches, etc.) checked;
- Venting systems, gas lines and valves checked for leaks, corrosion;
- Pumps and blower motors checked and lubricated;
- Pilot safety device, automatic gas valve, and pressure regulation unit inspected and serviced as necessary.

#### • Take Care of Your Hot Water Heating System



**Radiators:** “Bleed” air trapped in your radiators regularly to improve heat flow from the radiator. To do this, use the knob at the top of the radiator or a key (available at hardware stores) to open the valve. Keep it open until water spurts out. It will be **hot** and should be caught in a pan or bucket. Then close it securely.

Dust or vacuum radiators frequently. Don’t cover them with boxes, books, or anything else that might block the heat flow.

#### • Take Care of Your Warm Air Heating System

**Air Filters:** Replace every one to two months during the heating season.

**Registers:** Keep clean and unobstructed by rugs or furniture.

**Dampers:** Located within the supply ducts coming from the furnace, can be adjusted to ensure even heat throughout the house. To do this, position handles on the side of each duct near the furnace to the desired heat flow.

If your system is gas-fired, you can turn off the pilot light in the summer, using the pilot control knob. **DO NOT BLOW OUT THE PILOT FLAME.** If you do not know how to turn it off, contact your heating system service company for assistance.

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• **Take Care of Your Steam Heating System**

**Radiators:** Replace air vents that don't work. As the system is warming up you should hear air coming out of the vent and then a click, after which the air will stop rushing out. Another way to check for proper functioning is to unscrew the vent when the radiator is cold and blow through it. Install a new vent if you can't blow through it. Dust or vacuum the radiators frequently. Don't cover them with anything that might block the flow of air around them.

**Boiler:** Prevent sediment buildup by draining, once or twice a month, half a bucketful of water from the low water cut-off valve (looks almost like a faucet and is usually mounted near the bottom of the boiler with a piece of hose attached to it). Once you have drained off the sediment, open another valve located near the ceiling, to let water flow to the boiler.

**IMPORTANT:** You **must** add enough water to keep the level adequate to fill the boiler jacket, usually shown in the glass type (sight glass) as its midway point. Do not add too much water at any one time if the unit is on, because the sudden temperature change can crack the boiler. If you have any questions, consult your heating system serviceperson.

• **Take Care of Your Air Conditioning System**

There's a lot you can do to improve your window a/c unit or central air conditioning system efficiency. If you are replacing or purchasing a new unit, ask your appliance salesperson for one that has a high energy efficiency ratio (EER).

**Window Units:** Every year, at the beginning of the cooling season, unplug the unit, remove the access cover, and check the:

- **air filter:** Clean or replace as needed; check several times during the cooling season;
- **evaporator** (finned tubing behind the front cover): Vacuum as needed;
- **condenser coils** (finned tubing at the rear of the unit, outdoors): Vacuum as needed; and
- **blower** (fan): Clean as needed. If the blower motor has access holes for lubrication, follow the manufacturer's recommendations for lubricating. If directions are not available, a few drops of general purpose oil should be sufficient.

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During winter, remove or cover window units, which can offer an almost unrestricted pathway for cold air to flow into a house. If the unit is too large to move or is a permanently mounted, cover the inside **and** outside with plastic or with a special cover which is available at most hardware stores. Also, block cracks around the unit and stuff foam weatherstripping between the two sashes of the window.

**Central Air Conditioning Systems:** Make sure you get maximum cooling for your dollars here; keep return air grilles and supply air diffusers clear of furniture and draperies, and clean or replace air filters as needed, usually several times during the cooling season.

In addition, at the beginning of each cooling season, have a serviceperson check the air filters, evaporator coil, condenser coil, evaporator and condenser fan motors, and centrifugal fan.

**Use Your Fireplace Damper**

Fireplaces are very **inefficient** heating systems. To get the most out of yours you should remember several tips:

- An open or missing damper can allow as much heat to escape as an open door does! Close it whenever your fireplace is not in use;
  - When you are using the fireplace, carefully close the damper down as far as it will go while still maintaining sufficient draft. The wood will burn much longer;
  - Have your chimney cleaned at least once a year, more often if soot and creosote build up;
  - Consider a variety of products on the market which will improve the operating efficiency of your fireplace when in use, such as glass doors and heat circulating devices.
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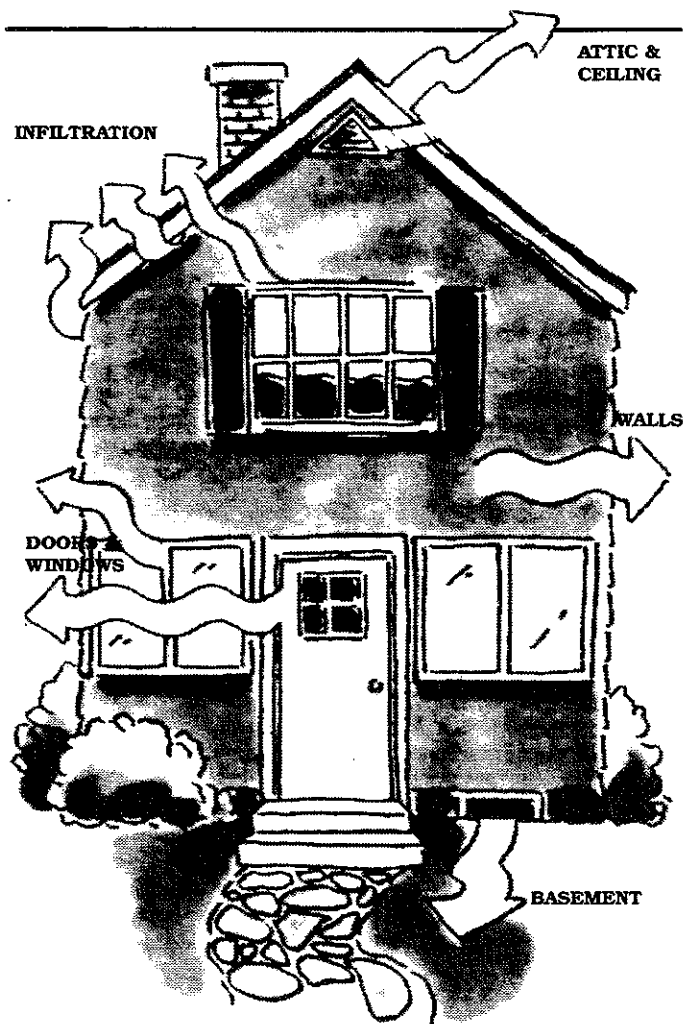
# Energy Saving Home Improvements

## YOUR HOME AND HEAT LOSS

Your home has many energy-using characteristics, many of which can be reduced by the simple changes in lifestyle suggested in the previous section. This section presents home improvement options as solutions to two major sources of heat loss:

- Heat loss through the building envelope,
- Heat loss resulting from inefficiencies in your heating system mechanical equipment.

Heat is lost through the building envelope in two ways: by **conduction** and **infiltration**. Heat lost by conduction passes directly through the building materials which make up your walls, windows, ceilings, roofs and floors. Infiltration is heat lost by cold air coming in and warm air moving out



through cracks around windows and doors, through cracks in wall materials, through key holes, mail chutes, chimneys, etc.

The diagram illustrates the areas where heat is lost through the building envelope.

Heat loss through the building envelope increases your home's **demand** for fuel, but the efficiency of your heating system determines how much fuel you will buy given the same demand. For example, an efficient heating system may consume only two-thirds the fuel of an inefficient system, and still provide you with the same amount of heat.

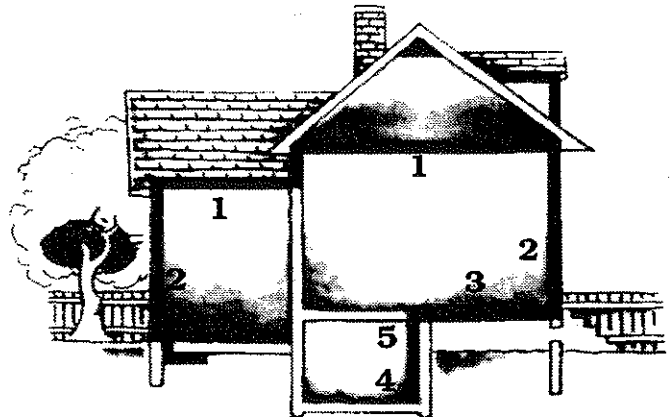
Once you've read through items 1-13 in this section that apply to your home situation, continue to the corresponding number in the next section, "Estimating Your Energy Savings", to find out how much you can save as a result of implementing each one.

## INSULATION

You should insulate any surface that separates a heated space from an unheated space, or from the outside:

1. Ceilings with cold spaces above
2. Exterior walls or walls between heated and unheated spaces
3. Floors over unheated or outside spaces
4. Walls of finished or heated basement
5. Top of foundation or basement wall

The illustration below shows these surfaces in an average house.



### • What You Should Know First

How much insulation should you have? Insulation works by resisting heat transfer. The measure of this resistance is called the “**R**” value. The higher the R-value, the more resistance the material has. Before you decide how much insulation you need, check what you already have. To do this, follow the procedures outlined with each measure in this section.

**TABLE 1: Typical R-values of different kinds of Insulation:**

R-Values	11	13	19	22	30	38
<b>Loose Fill</b>						
Fiberglass	3"	3 1/2"	5"	6"	8"	10"
Rock Wool	4"	4 1/2"	6 1/2"	7 1/2"	10"	13"
Cellulose	3"	3 1/2"	5 1/2"	6"	8 1/2"	10 1/2"
Vermiculite	5"	6"	9"	10 1/2"	14 1/2"	18"
<b>Batts/Blankets</b>						
Fiberglass	3 1/2"	4"	6"	7"	9 1/2"	12"
Rock Wool	3 1/2"	4"	6"	6 1/2"	9"	11 1/2"
<b>Rigid Board</b>						
Polystyrene (extruded)	3"	3 1/2"	5"	5 1/2"	7 1/2"	9 1/2"
Urethane	2"	2"	3"	3 1/2"	5"	6"
Polystyrene (bead board)	3"	3 1/2"	5 1/2"	6"	8 1/2"	10 1/2"
Fiberglass	3"	3 1/2"	5"	5 1/2"	7 1/2"	9 1/2"

R-values computed from values given in the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE) Handbook of Fundamentals, 1981 Edition.

To determine the best investment for your home, compare the amount you would initially spend for insulation to your potential savings on energy costs.

**What Type of Insulation Should You Use?** There are three main types of insulation you can install yourself: loose fill, batts or blankets, and rigid board. As you can see in Table 1, some require greater thickness than others to reach the same R-values. They also vary in price and ease of installation.

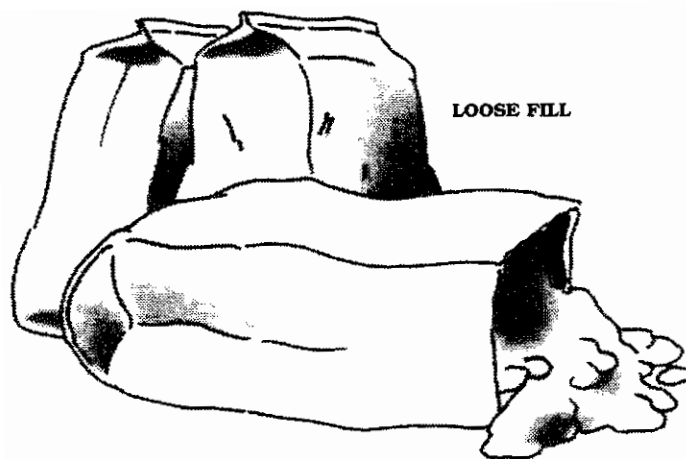
To assure you of the quality of different insulation types, the Federal government has assigned a Federal specification number to those products which meet their standards. Check that the insulation packaging is clearly labeled with the appropriate Federal specification number from Table 2.

**TABLE 2: Federal Specifications Numbers**

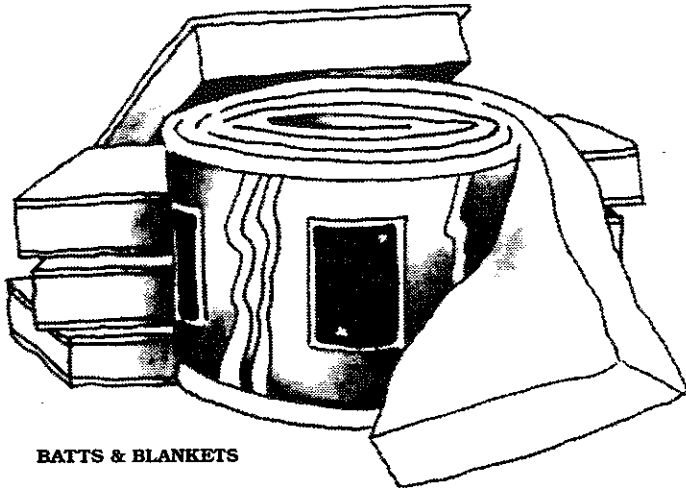
<b>Loose Fill</b>	
Fiberglass	HH-I-1030B
Rock Wool	HH-I-1030B
Cellulose	HH-I-515D (UL Listed)
Vermiculite	HH-I-585C (amendment 1)
<b>Batts/Blankets</b>	
Fiberglass	HH-I-521F
Rock Wool	HH-I-521F
<b>Rigid Board</b>	
Polystyrene (extruded)	HH-I-524B
Urethane	HH-I-00530B
Polystyrene (bead board)	HH-I-524B
Fiberglass	HH-I-526C

The specification numbers listed above are the most recent available. However, they may change periodically due to upgraded testing procedures.

**Loose Fill** (fiberglass, rock wool, cellulose, vermiculite) is a common type of insulation that is sold in bags by weight and doesn't include an attached vapor barrier. It can be poured by hand (which you can do yourself) or blown into place (usually by a contractor). Installation often requires using **baffles** or **blocking** to contain the loose-fill within the desired areas.

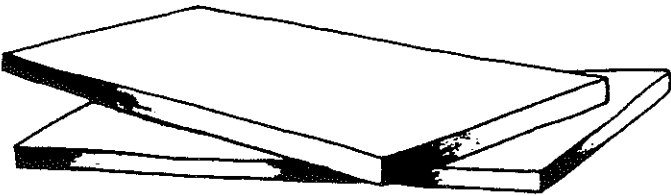


**Batts and Blankets** (fiberglass, rock wool) are sold in widths for installation between regular 16" or 24" on center joist spacings. Batts are pre-cut in four and eight foot lengths. Blankets come in continuous rolls and usually waste less during installation than batts. Batts and blankets can be bought faced (with a vapor barrier) or unfaced (without a vapor barrier).



BATTs &amp; BLANKETS

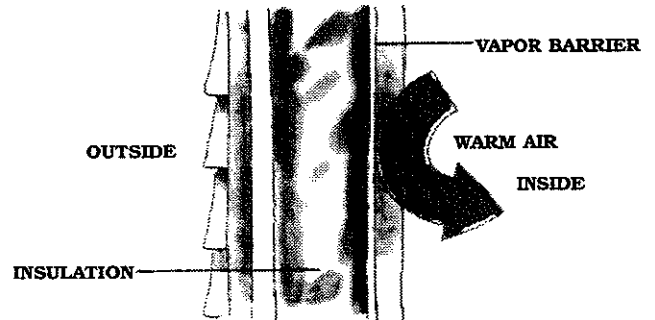
**Rigid Board** (extruded polystyrene, urethane, polystyrene bead board, fiberglass) is used most often to insulate basement walls. You can also insulate mobile home ceilings and the interior surfaces of walls and ceilings in any home, using rigid board.



Available in widths of 24" and 48", most rigid boards are not fire-resistant and must be covered by 1/2" gypsum wallboard to assure fire safety. Extruded polystyrene and urethane form their own vapor barriers. The others do not, but may include attached vapor barriers. Rigid board is usually installed by a contractor.

#### • Vapor Barriers

Water vapor that exists in the warm air of your home tends to migrate through most walls, floor and ceiling materials to the cold exterior. If this is allowed to happen, the water vapor can condense against cold surfaces and freeze. This can cause paint peeling and extensive damage to insulation and other materials. For this reason, when you add insulation, it's a good idea to install a **vapor barrier** on the warm side of the insulation.

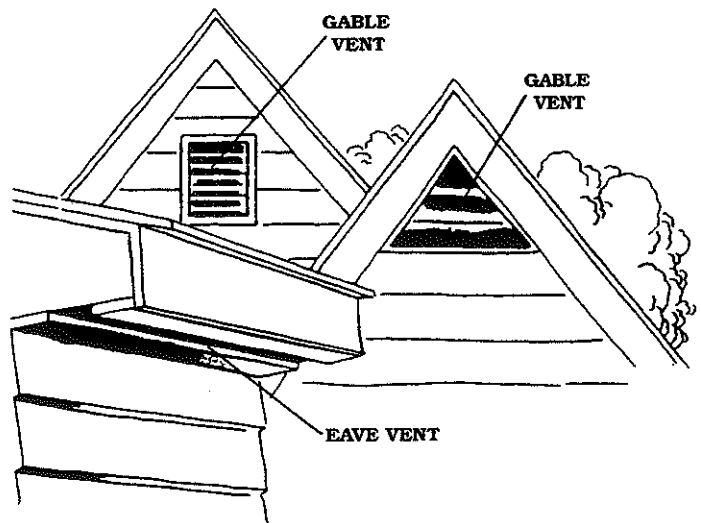


#### The right way to install a vapor barrier.

There are several types of materials available that qualify as vapor barriers. **Kraft paper** and **foil facing** on fiberglass batts and blankets, when carefully installed, provide a vapor barrier. **Polyethylene sheeting**, 4 or even 6 mil thick, is an excellent vapor barrier. Foil-backed gypsum board can also be used as a vapor barrier and room finishing material. Some **paints** are effective vapor barriers also. Check with your local paint supply dealer. By Federal standards, any material with a **perm rating** (a measure of how much water can flow through the material) of one or less is considered a good vapor barrier.

#### • Ventilation

**Attics:** Vapor barriers are never 100% effective, so it's reasonable to expect some moisture in your attic. For this reason, vents must be installed in insulated attics. If there is a vapor barrier in the ceiling, or if you put one in, provide one square foot of net vent area for



each 300 square feet of ceiling. In attics without a vapor barrier in the ceiling, provide one square foot of net vent area for each 150 square feet of ceiling. In some areas of the State, venting requirements may vary. Consult your local utility for details.

There are several types of attic vents you may want to consider. **Gable end** and **eave** or **soffit vents** are the most common and least expensive to install. However, **roof vents** or **ridge vents** are used for special types of attic construction. Consult your local contractor for details.

**Crawl Spaces:** Moisture can build up in crawl spaces under houses during warmer months as easily as it does in attics during the winter. To properly ventilate a crawl space, install vents in opposite walls from each other in a ration of one square foot of vent area to 1500 square feet of crawl space if a vapor barrier covers the ground. Without a vapor barrier, one square foot for each 150 square feet of area is required.

Both attic and crawl space vents must be protected by **screening** to keep out vermin, and **louvers** to keep out rainwater. However, these items decrease the actual or “free” ventilation area of the vent. If the free ventilation area is not specified on the vent you buy, assume it is 1/2 of the measured area to conform to current Federal ventilation standards. Ordinarily, vents will have to be installed by a contractor (unless you’ve had significant experience).

#### • Safety Precautions

Whenever you install insulation, be sure to wear gloves, a hat, a breathing mask or respirator and a loose-fitting, long-sleeved shirt.

The tightly compressed new material should not be unwrapped until you’re ready to put it in place. Whatever materials you use, follow the manufacturer’s recommendations printed on the packaging for proper installation.

When working in damp areas, like basement crawl spaces, be sure to keep lights, fans and wires off the wet ground.

In attics with no subfloor - watch your step! - and set up temporary platforms as work stations.

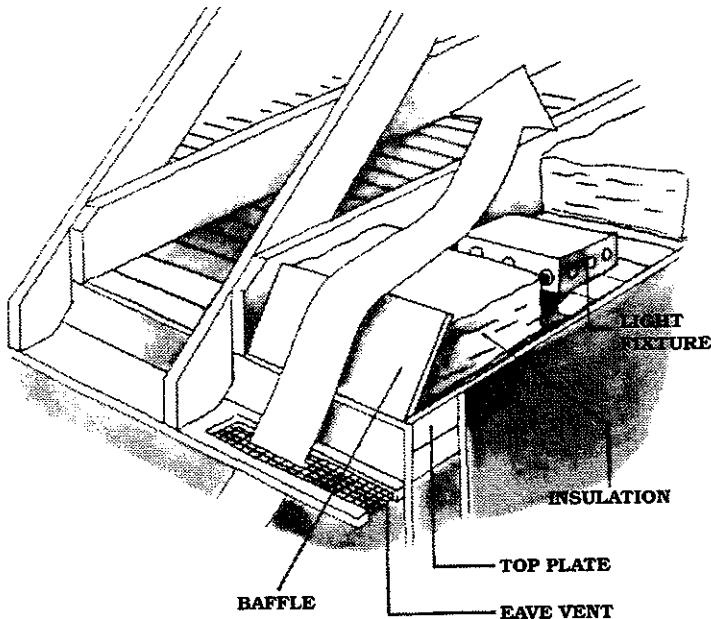
## INSULATING ATTICS

# 1

Depending on the size and condition of your attic relative to the rest of your house, you could save up to 25% of your heating and cooling costs by insulating your uninsulated attic or top floor ceiling. Even if you already have one or two inches of old insulation, your attic loses a substantial amount of heat.

**Before** you insulate:

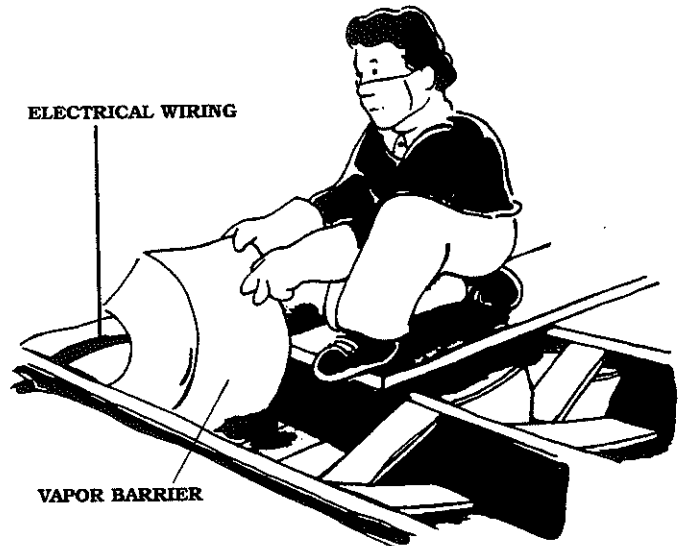
1. Look for water stains on the underside of the roof or ceiling below to find out if your roof has leaks. You’ll have to have leaks repaired first.
2. Decide whether or not you can install a vapor barrier, and compute the ventilation you will need accordingly. If you need more ventilation to meet the standards discussed on pages 16-17, have these vents installed at the same time you insulate.
3. If there is no floor in your attic space, you’ll need to lay boards or plywood on top of the joists for a working platform. (Be careful, the ceiling won’t carry your weight.)
4. Use caulking compound to seal openings around pipes and wires which penetrate the attics floor. For instructions, see **8** Caulking, page 28.
5. Install **baffles** to keep insulation out of unwanted areas. Baffles must be installed:
  - to prevent insulation from blocking air flow from eave vents into the attic (see page 18),
  - to keep loose-fill insulation at least 3” away from recessed light fixtures or other heat-producing devices, and
  - to keep loose-fill insulation from spilling over attic hatch door openings.



6. If you are going to install a separate polyethylene vapor barrier, don't lay it in a continuous sheet over joists and trusses unless you cover these framing members with at least 3-1/2" of insulation. Instead, lay polyethylene strips between joists or trusses. Staple or tuck in place. Seal seams, rips or tears in the plastic with tape. (If you wish, instead of taping vapor barrier seams, you can overlap the ends by 6 inches.) Now you can begin your installation.

**Unfinished, unfloored attics** include the unheated spaces beneath your pitched or flat roof, or within the space behind the kneewalls (short vertical walls) in an otherwise finished heated attic. You can easily install floor insulation in your attic floor yourself if the attic space is accessible and if the joists in the attic floor are not covered with floor boards. There are two ways that you can insulate your unfloored attic.

**Option 1: Blankets and batts** should fit snugly. Place attached vapor barriers face down, closest to the living areas. Slide insulation under wiring when possible. **Don't** install insulation in areas where wiring is cracked or frayed until such wiring has been repaired.



Cut ends of batts or blankets to fit snugly around cross bracing. Cut the next batt in a similar way to allow the ends to butt tightly together. If a second layer of insulation is required to achieve the R-value you want, it may be lined up directly on top of the first layer or at right angles to it.

For a second layer of insulation, **do not** use material with an attached vapor barrier. If your insulation has an attached vapor barrier, **remove** the vapor barrier from the insulation to prevent trapping moisture between layers of insulation.



Loose fill can be leveled with a garden rake or a board.

**Option 2: Loose-fill** insulation can be poured in between the joists in your attic floor to the depth necessary to achieve the desired R-value. Make sure that the installed depth is uniform throughout the attic.

**Floored Attics:** if your attic has one or more layers of flooring, **do not** insulate over the floor. Either remove the flooring to insulate the floor cavity, or have your contractor blow loose-fill insulation into the floor cavities. If you do it yourself and you want to blow in the insulation, the proper equipment is available for rental at most hardware and lumber stores.

**Sloped Ceilings,** in finished attic rooms, must also be insulated. In addition to “before” installation procedures for attics, be sure to block the base of these ceiling cavities **before** you begin. This is usually done by rolling pieces of fiberglass batt and stuffing them into the base of the cavity.

If you are going to refinish or re-paint sloping ceilings anyway, you may want to have your contractor blow loose-fill insulation into these cavities through the inside wall. If not, and if you can get up into the crawl space above the finished ceiling, you can pour loose-fill insulation down into each cavity from above.

• **Checkpoints:**

- Make sure that insulation completely covers the desired area and that there are no gaps between insulation pieces.
- Insulate and weatherstrip all attic hatches and access doors to prevent air leakage to the attic.

## INSULATING FRAME WALLS

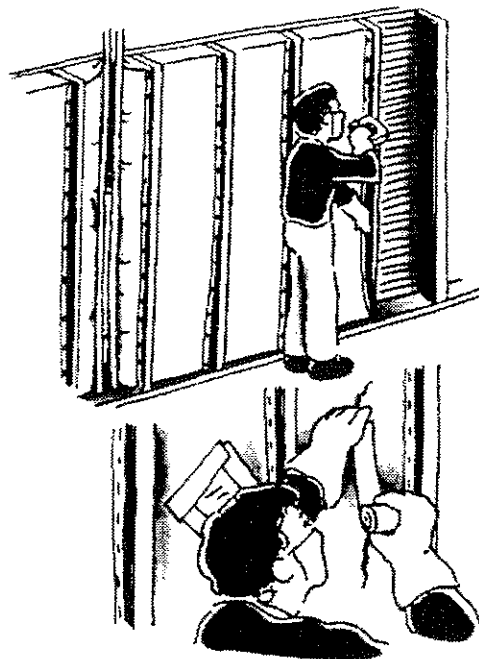
# 2

If wall spaces are accessible, you will be able to install insulation yourself. Such unfinished walls may exist in a portion of your attic or a room which is undergoing major renovation. If walls are already finished and you decide to insulate, you

can have the work done by a contractor who will blow in insulation. (See page 35 for advice on how to select a contractor.)

If you want to do it yourself, here's how to install **batt** or **blanket** insulation in frame walls that are still unfinished on one side.

**Before** installation, measure your stud spacing; buy insulation according to that spacing. If you buy unfaced batt, install a vapor barrier.



Measure and cut insulation blankets to fit snugly against top and bottom framing members and between the studs. If faced blankets are used, staple the 1" flanges on each side to the interior edge of the studs starting from the top down, about every 4 inches.

If stud spacings are irregular, cut insulation about one inch wider than the space you want to fill to make the draft or foil facing form a stapling flange. Install insulation on the winter-cold side of pipes, wiring and electrical outlets to help prevent frozen pipes and uncomfortable drafts. Stuff small gaps between framing with loose scraps of insulation, with the vapor barrier facing removed.

Carefully fit the vapor barrier around outlets. Patch rips or tears in the vapor barrier with tape. Cover

the vapor barrier with a finish material like gypsum wall board or suitable fire-resistant paneling.

#### • Contractor-Installed

Unless you've had considerable construction experience, you will need to hire a contractor to insulate the exterior frame walls of your home. A contractor will blow insulation into the wall cavities by drilling through the wall surface or by removing some siding. This type of insulation job can vary in price considerably depending on several factors:

- Type of frame construction,
- The insulation material used,
- Whether it's installed through the interior or exterior wall surface,
- The finish materials that make up your walls, and
- How much finish work (sanding, painting, etc.) is done by your contractor.

It's important that you understand **exactly** what your contractor will give you for the price, so that you can compare bids accurately and fairly. See "Selecting a Contractor," page 35.

If you plan to refinish the interior of your home anyway, consider insulating your home through the inside wall surface. Using this method requires that you or your contractor patch, sand, and paint (or wallpaper) the holes left from drilling.

If your walls will be insulated from the exterior, the type of siding or exterior finish will determine the installation method and price. The contractor must remove sections of wood shingles, clapboards, aluminum or vinyl siding to drill and insulate through the exterior sheathing; this siding must be replaced once insulation is installed. Holes are drilled directly through stucco and (the mortar between) brick siding, then patched and finished with similar materials once the cavities are insulated.

#### • Checkpoints:

- Your contractor must never leave openings in wall sections unprotected overnight, and should repair or replace finish materials to match the original as closely as possible.
- During installation, make sure your contractor carefully checks to make sure that all wall cavities are insulated by continually probing wall cavities for obstructions.

## INSULATING FOUNDATIONS AND BASEMENTS

# 3

#### • Insulating Basement, Perimeter and Masonry Walls

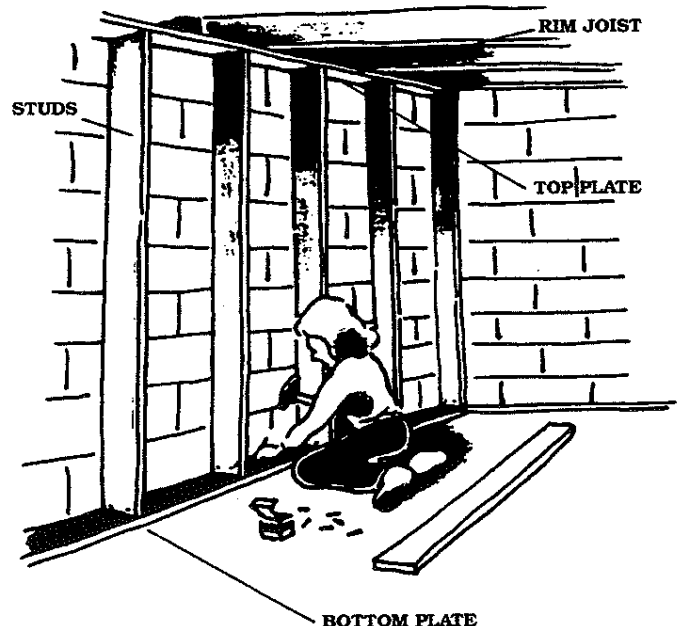
Usually, basement walls are worth insulating only if you plan to refinish your basement into a heated living space such as a playroom. However, if your heating system is in the basement, insulating the inside perimeter of the basement walls where the house sits on the foundation will help reduce heat loss to the outside.

**Before** installation, if moisture is coming through your basement walls from the ground outside, eliminate the source of the dampness. In addition, follow all "before" installation procedures for frame wall insulation that apply.

**CAUTION:** Depending upon your local soil type and frost penetration this insulation method may cause foundation problems.

#### • Installation

Install batts (preferably R-19) in the space above the foundation wall at the rim joist around the



entire perimeter of the basement. Cut the insulation so that it fits snugly in place.

When insulating basement walls, there are two insulation materials that you can use: batts and blankets or rigid board. For **batts and blankets**, you must first construct a stud framework against the masonry wall. A 2"x4" wall can be insulated to R-11; a 2"x6" wall, or a 2"x4" wall built 2" away from the masonry wall, can be insulated to R-19. Nail the bottom plate directly to the basement floor using masonry nails. Nail the top plate to the joists above. Place studs 16 or 24 inches on center, and nail them to the top and bottom plate.

To install the batts or blankets, follow the procedures outlined in 2" Frame Walls, making sure to place the vapor barrier on the winter-warm side of the wall.

For rigid board insulation, you must first nail 1" or 2" wide wood strapping (the same thickness as the insulation) directly to the masonry wall using masonry nails. Place strapping along the top and bottom of the wall, and nail vertical strips to the wall at 24 or 48 inch intervals, depending on the width of the rigid board. Fasten sheets of rigid board between the strapping using an adhesive recommended for use with the insulation you bought.

• **Checkpoints:**

- Make sure there are no gaps between sections of insulation and that any rips or tears in a vapor barrier are patched with tape
- Also, cover insulation and vapor barriers with a finish material such as 1/2" gypsum wall board or suitable fire-resistant paneling.

• **Insulating Heated Crawl Space Walls**

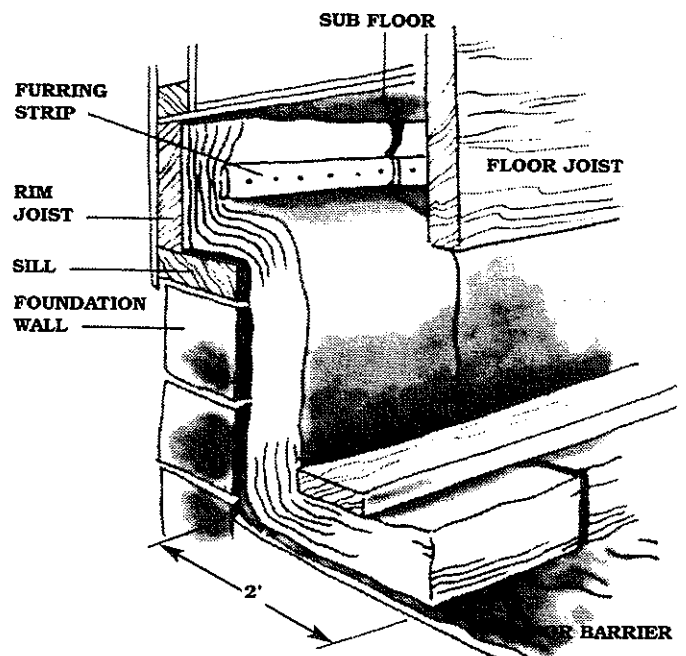
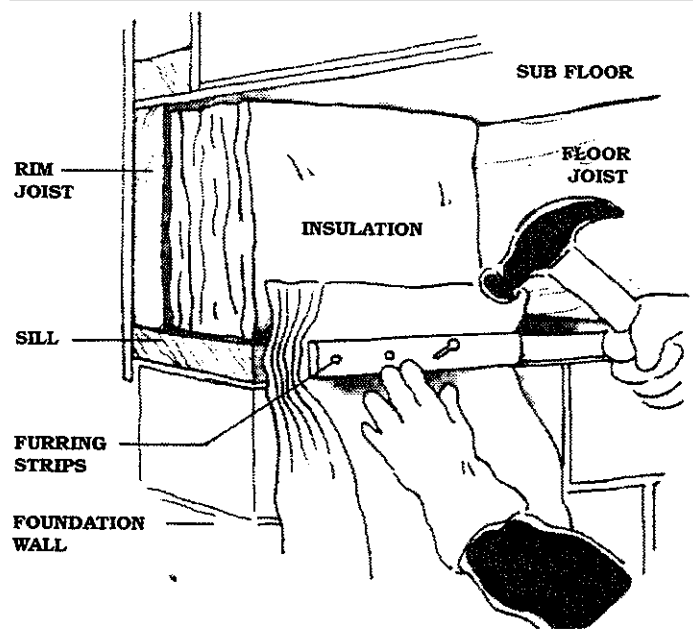
If you don't have a full basement but do have a heated crawl space, it is still important to insulate.

**Before** you begin, make sure that your crawl space does not have excessive ground moisture due to high water table in your area. If it does, you may not be able to insulate using this method. To keep normal ground moisture out of the insulation, lay down a six mil polyethylene vapor barrier ground cover over the entire ground area and up at least 6" of the crawl space wall. Overlap sections of the ground cover and tape the seams.

**Installation:** Install insulation to cover the height of the crawl space wall plus at least two feet along the ground. Where the floor joists run at right angles to the wall, measure and cut short pieces of insulation

to fit snugly against the rim joist so there will be no heat loss through this area. Then, nail the top of each strip of insulation to the sill using 1/2" x 1-1/2" wood strapping. Make sure there are no gaps between sections of insulation.

When floor joists run parallel to walls, don't cut short pieces of insulation. Simply nail longer pieces (again with furring strips) directly to the rim joist.



Lay a 2"x4" lumber or bricks on two of the batts to keep them in place. Try to minimize your walking or crawling on the vapor barrier and patch any rips which may have occurred.

A crawl space area that is not connected to a basement should be ventilated in the spring and summer to prevent moisture accumulation. Since you'll be heating your crawl space, make the most of your new insulation by closing those vents tightly in the winter. Otherwise your pipes could freeze.

Also, when doing major exterior renovations, or if you are thinking of adding a new room to your home, remember that earth berms can provide insulating value to your basement and crawl space walls.

#### • Insulating Floors Over Unheated Spaces

If there are no pipes or heating ducts running through the crawl space or unheated basement under your floor, and if the floor joists are exposed and easily accessible, you can insulate the floor yourself from underneath.

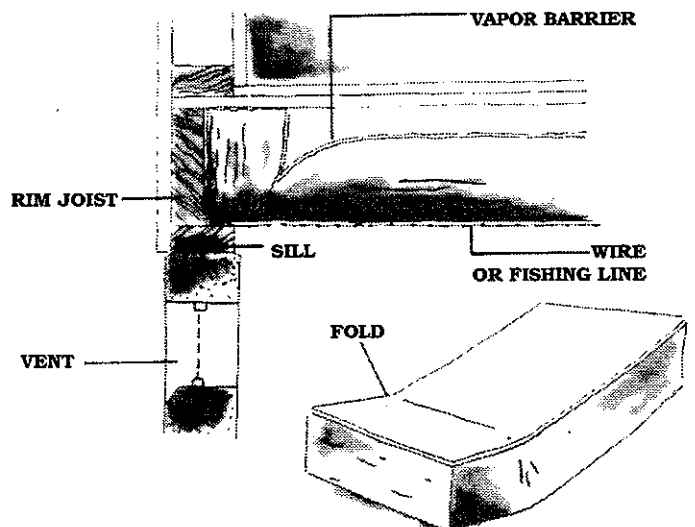
**Before** you begin, check your floor joist spacing. If they are spaced every 16" or 24", your job will be easier since these are standard widths for insulation. Otherwise, you'll have a lot of cutting and fitting to do and some waste of material. Buy insulation with a vapor barrier; R-19 is recommended here.

Install the batt with the vapor barrier facing up, toward the living space. Support the insulation using



spring metal stays, wire or fishing line strung back and forth in a criss-cross pattern on nails.

Carefully fit insulation around any cross-bridging, supports, pipes or anything else that you may find between the joists, and don't leave gaps between pieces of insulation. Keep insulation at least 3" away from heat-producing devices, such as lights, which may exist in the floor/ceiling structure. Don't block the vents from the unheated crawl space or combustion air openings for furnaces if there are any here. Make sure that the rim joist is insulated around the entire perimeter of the foundation.



**If a ceiling exists**, such as in a garage or a portion of a house supported on piers, you will probably need to hire a contractor to do the installation. In this case, a loose-fill insulation is blown into the cavity between the ceiling and floor above, either by drilling holes through the ceiling at regular intervals or by removing small sections of ceiling. In either case, make sure you understand who's responsible for patching and refinishing the ceiling before you accept a contractor's bid.

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## INSULATING WATER HEATERS

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# 4

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While you're considering your insulation needs, don't overlook the water heater. If your water heater storage tank is warm to the touch it needs insulation. Even if it isn't warm it could be underinsulated; heat losses from underinsulated tanks can be significant. You can cut this heat loss by covering the water heater with either a pre-cut insulation kit (available at most lumber or hardware stores) or by wrapping the storage tank with vinyl-backed fiberglass insulation, secured with duct tape. Foil-backed insulation can also be used, although it is more difficult to work with. The vinyl backing should be labeled for a flame spread classification of no more than 150 for electric resistance water heater or 25 for oil and gas-fired water heaters.

**Before** you begin, determine the fuel type (gas, electric, oil) of the water heater. Different procedures are necessary for each type, as follows:

**For Electric Hot Water Heaters,** cover the top and sides with insulation. The pressure relief valve, temperature relief valve, thermostat controls, power wiring and connections, and drain valve must remain unobstructed. If a kit is not being used, each section of insulation should be taped to itself starting at the bottom of the tank and working up. The vinyl backing must face outwards and all seams and edges should be taped securely. See Figure.

**For Gas Hot Water Heaters,** only the sides can be covered with insulation. Insulation **must** be cut to leave openings for the burner air inlet at the bottom, the thermostat control, the pilot light access plate, the drain valve, and other necessary access plates. The draft hood **must not** be blocked by insulation, which might prevent toxic fumes from properly venting to the outdoors. See Figure.

**For Free-Standing Oil Hot Water Heaters,** the side can be covered with insulation. The top can be covered with insulation only **if** the vent pipe is side-mounted. If the vent pipe is side-mounted, be sure

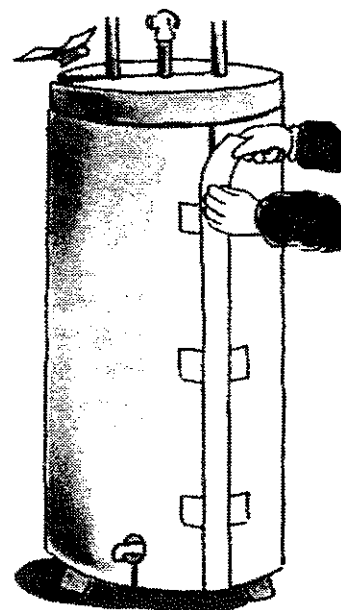
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to maintain at least 18 inches between the vent and the insulation. Take care not to cover valves, access plates, and the flame peep sight.

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GAS WATER HEATER



ELECTRIC WATER HEATER

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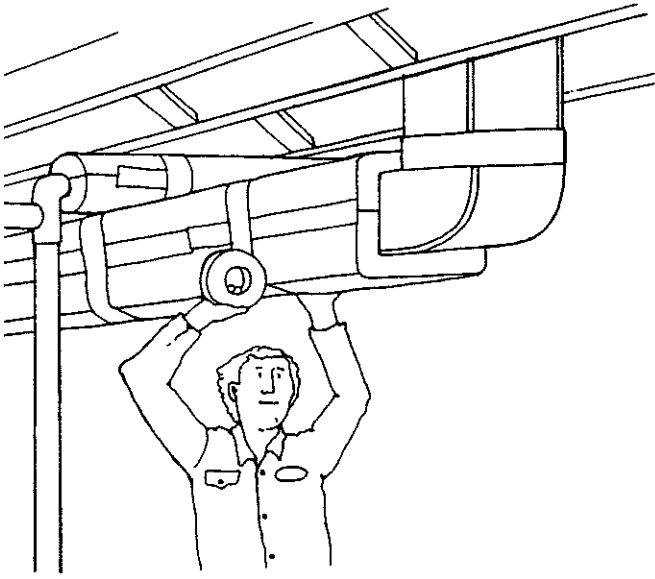
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## INSULATING DUCTS AND PIPES

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# 5

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One of the most cost-effective energy-conserving measures you can take is to insulate duct or pipe runs that exist in the unheated areas of your home. By **not** insulating them you are essentially delivering heat that you've paid for to areas of your home that you never use!

### • How To Insulate Your Ducts

Install vinyl or foil-backed fiberglass duct insulation on all heating system supply ducts. (You can also use regular faced fiberglass insulation which is less expensive and has higher R-value, but is more difficult to use in this application). To determine how much insulation you need, first measure the distance around each section of duct and multiply that by the total length. Order about 30% **more** insulation than the duct area that you calculated to account for the overlaps you'll need for fastening and waste from odd cuts. Duct insulation can be found at plumbing and heating supply houses and insulation suppliers.

**Before** you insulate: seal all air leaks in the system with duct tape and/or a high temperature caulk such as silicone.

To insulate, cover the supply ducts with insulation and secure it using clinch-type staples (preferred), wire, or tape. Although not as long-lasting as staples, duct tape is easier to install. The tape would be wrapped completely around the duct and overlapped. The backing on the insulation must be on the outside surface. Any exposed fiberglass and all joints between pieces of insulation should be covered with duct tape. Damper control handles must be left in accessible and operable position. Any labels on the ducts should be transferred to the outside of the insulation.

**WARNING: Take caution when installing insulation near a flue pipe.**

### • How to Insulate Your Pipes

**For hot water systems**, install "elastomeric" or urethane rubber pipe insulation with a suggested minimum R value of 6 on all supply pipes only. This may not be used in applications where the temperature of the pipe exceeds 200°F (such as on steam pipes). Be sure to look for the R value on the product.

**For steam systems**, install molded fiberglass pipe insulation with a minimum recommended R value of 6 on all supply pipe only.

**Before** you purchase the insulation, carefully measure the outside diameter and lengths required. Remember to add a little for waste at joints.

**Before** installation, check for leaks in the system. If you find a leak(s), have your plumbing contractor repair it **before** you insulate.

To install, place pipe insulation over the pipes, and seal with either glue, duct tape, or appropriate fasteners. Exposed ends of insulation sections at joints should be tightly sealed to eliminate air flow underneath the insulation.

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## WINDOWS AND DOORS

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On a per square foot basis, windows and doors are by far the highest heat loss areas in your home. A well insulated wall is 14 times more resistant to

heat loss than a single pane window. The heat loss could almost be cut one third or more by installing storm windows and doors.

There are several measures you can take to tighten up your windows and doors and increase their insulating value: installing storms, interior glazings, insulating shutters and shades, installing weatherstripping, and/or caulking window and door frames and storm windows. If window or door replacement is necessary, use only thermal replacement windows or doors; these are double or triple glazed and have insulated sashes. It may not make sense for you to undertake all of these things since, for example, the savings you will realize for installing storm windows may mean that you need not weatherstrip those same windows, depending on their original condition.

Read through items 6, 7, and 8 to help you decide what's right for you.

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## INSTALLING STORMS

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# 6

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The quality of construction of storm windows will affect their strength and appearance. As with insulation, there are recognized standards which will assure you of high quality storm windows and doors. The latest standards are:

Aluminum Storm Windows - ANSI/AAMA  
#1002.10-1980

Aluminum Storm Doors - ANSI/AAMA #1102.7-  
1977

Wood Storm Doors - NWMA #1S-5-1973

However, you should still conduct your own thorough inspection. Check the corners; they should be strong and air-tight. If you can see through the corner, the window will leak cold air. For exterior storms, check to ensure that "weep" holes exist at the base of the units. These drain condensed water away from the window. Look for hardware that's sturdy and as durable as the rest of the window. Make sure that aluminum storms have baked

enamel or anodized finishes, so that they will last. Above all, look at a number of different storm windows or doors before you decide which is the best type for your house.

### • Thermal Shutters and Shades

Window insulation primarily reduces heat loss at night, though it can also reduce unwanted heat gain, especially in direct sun, by providing shading. Like storm windows, window insulation saves energy by reducing both heat losses through the glass and leaks around the window itself. While these devices are generally more expensive than storm windows they can achieve five times the insulating value.

Window insulation is available in a variety of shutter, shades, panels, etc. Qualities to look for are flame retardancy, moisture resistance and durability. Be sure to select materials that won't produce dangerous fumes if ignited. Quality of hardware and ease of operation are very important since daily opening/closing cycles are expected in normal use. Airflow around the top, bottom, and sides of the insulation should be prevented with high quality seals or weatherstripping.

Window insulation should be installed according to the manufacturer's instructions, so as to operate smoothly with a minimum of stress transferred to the shade/shutter materials. They should not interfere with the operation of the window or, in the case of shutters, nearby windows or doors. Edges at the sides, top and bottom must seal tightly with the shade/shutter closed. Shutters should latch in both open and closed position. Shades should secure positively in the open position.

To be most effective, window insulation should be in place at night or whenever sunlight or daylight is not being absorbed through the window. Window insulation requires careful maintenance of the edge seals to prevent condensation between the insulation and the window, and if externally installed, must maintain weather-resistance.

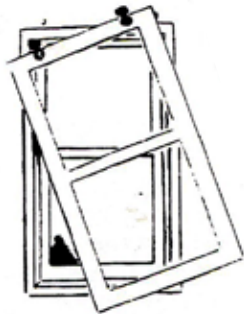
**Aluminum Storm Doors** should be reinforced at the middle and have hinges that are continuous along the whole length of the door. The latching hardware should be sturdy and adjustable. Look for weatherstripping along the sides and an adjustable sweep at the bottom.

**Wooden Storm Doors** should be treated with wood preservative and/or painted. Glass inserts should be insulating glass. Wooden storm doors are gener-

ally more durable than aluminum doors, but may be slightly more expensive. Weatherstripping and a sweep should be installed when the door is hung.

#### • How to Install Storm Windows

**Aluminum storm windows** can be installed by a contractor or as a do-it-yourself item if you have the necessary skills and tools. The surface where a window is to be installed must be clean, free of obstructions, and structurally sound. Combination (triple-track) and fixed windows should be bedded with an unbroken bead of caulk along the top and sides and fastened with a minimum of eight screw per window. Apply a bead of caulk along the bottom of the window from the inside leaving two small weep holes open at the sill to allow for necessary ventilation and drainage. Fixed panes should be pre-weatherstripped and may be attached to the casing either with screws, thumb screws, or, in the case of interior or removable applications, spring loaded clips.



**Single sash** will cost you less than combination windows. The window is fairly easy to install.

**Temporary plastic storm windows** are an inexpensive storm window which can be installed using polyethylene or clear vinyl plastic and waterproof tape or wood nailing strips or can be purchased in kits from your hardware store. Although in most cases they must be removed to be able to operate the window, and reapplied the next year, they are as effective as aluminum storms at cutting heat loss.

**NOTE:** Some fire codes prohibit the use of plastic on the interior; check with your local fire marshall before installing them. Mount plastic storms on the outside of the windows if interior use is prohibited.

#### • Installing Storm Doors

Install storm doors in accordance with the manufacturer's instructions. They should be set to close automatically and latch tightly, leaving no room for excess movement. Proper installation may require custom work around the existing frame, including

chiselling or planing down of high points, or adding trim to low points to achieve a flat installation surface. Whether you install the storm door yourself or have a supplier install it, the door must fit squarely, be weatherstipped, and form a tight seal all the way around.

**IMPORTANT:** Care must be taken to maintain the smooth operation and fit of the storm door, since its insulating value relies on the tightness of the seal. Replace weatherstripping when worn, and keep hardware used to close and latch the door adjusted and in good repair.

## INSTALL WEATHERSTRIPPING

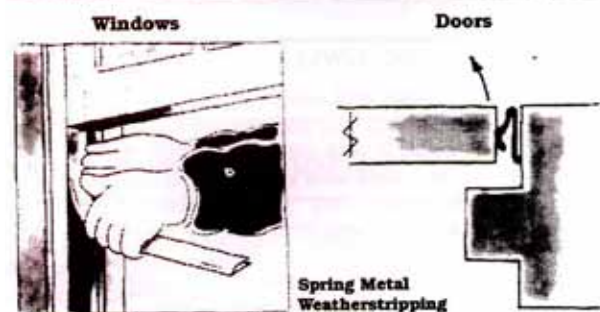
# 7

Loose-fitting windows and doors will lose heat through cracks around their edges. If they must open and close throughout the winter, they can be weatherstripped along those cracks. Weatherstripping is purchased either by the foot or in kit form for each window. Make a list of your windows and measure them to find the total length of weatherstripping you'll need. Allow for some extra. If you buy a kit, be sure it's intended for your window type and size.

#### • Materials

There are many weatherstripping materials to choose from.

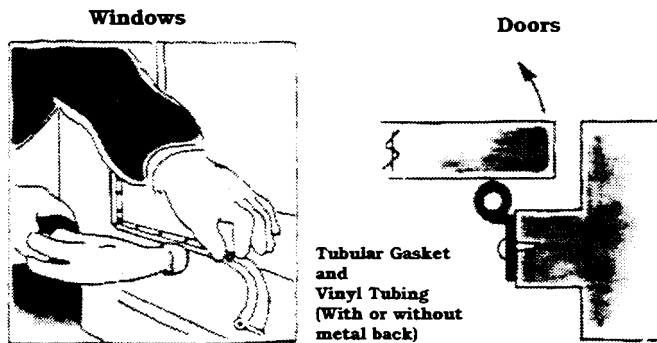
**Spring Metal Weatherstripping**, although somewhat more difficult to install, is one of the most



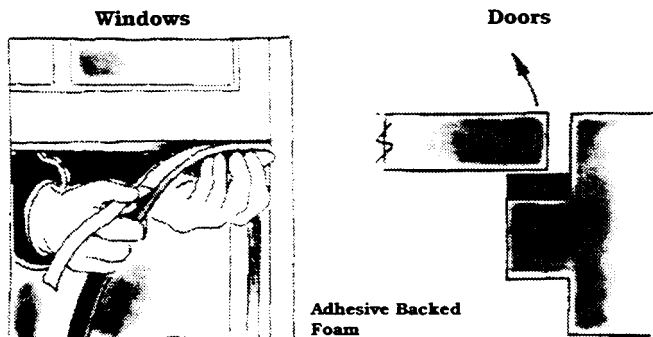
effective weatherstripping available. Since it is metal, it is more durable and longer-lasting than any of the vinyl or foam types. In addition, it can improve the operation of older, double hung windows, by offering a smooth surface for them to slide on.

**“Spring V Plastic” Weatherstripping** is an effective weatherstripping which is easy to install. It is more durable than the vinyl bulb type and is frequently available with a peel-off adhesive strip.

**Vinyl and Vinyl Bulb Weatherstrippings** are effective and sometimes easier for a homeowner to install because they are installed against the sash instead of in the track like the spring types. Since they are plastic, they don't stand up well to extreme temperatures and tend to wear out after two to three years.



**Adhesive-backed Foam Rubber and felt strips** are easy to install but wear quickly and are not as effective sealants as any of the above. Use these weatherstrippings only where they will be squeezed, like on the underside of double-hung windows, not where they will rub.



Foam rubber and felt also come with wood backings which makes them very easy to nail around door jambs for a snug fit.

There are more durable weatherstripping materials intended specifically for door bottoms. Some are illustrated below. Except for the sweeps, they are fairly difficult to install. Unless you are quite handy around the house, you may be better off having a contractor do the work for you.

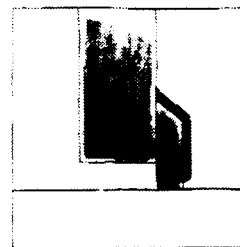
The **sweep** is screwed to the bottom of doors. It can be installed on the inside or outside of the door.

A **gasket threshold** is used where there is no threshold or where it can replace a worn existing threshold. The vinyl gasket seals doors well but wears as it is walked on and eventually must be replaced.

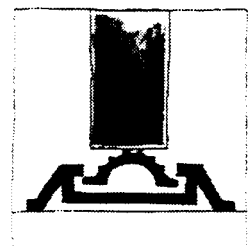
A **door shoe** has a more protected gasket that slips into a metal piece that's attached to the bottom of the door. The door shoe can be used on any threshold that isn't worn down in the middle.

You can also seal your **garage door** inexpensively and easily with a heavy rubber or plastic weatherstripping. It will keep your garage warmer and seal against snow and wind.

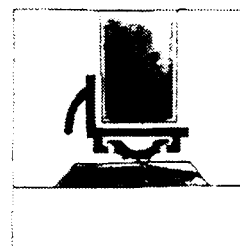
When you have stopped all the drafts around doors and windows, your house will be more comfortable and energy-efficient.



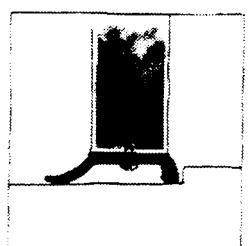
SWEEP



GASKET THRESHOLD



TWO-PIECE DOOR SHOE



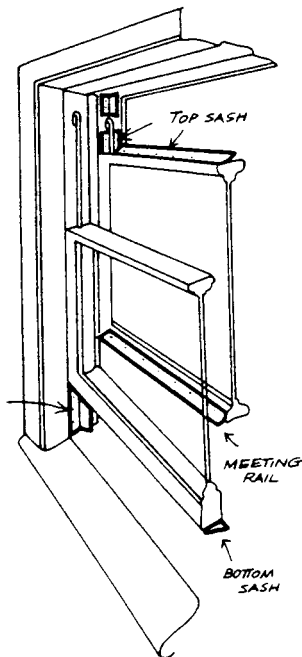
GARAGE-DOOR STRIP

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### • Weatherstrip Windows

**For a double-hung window**, weatherstripping should be installed at seven separate edges on the frame. Four pieces are required in the gaps between the sides of the sashes and the casing and three more are required, one between the top sash and the casing, one between the meeting rails, and one between the bottom sash and casing. Since there are many different types, refer to the weatherstripping manufacturer's instructions for proper installation techniques.

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**For a casement window**, weatherstripping should be installed around all four sides of the frame. Follow the weatherstripping manufacturer's instructions for the proper installation techniques.

### • Weatherstrip Doors

**Weatherstripping** should be installed on the two sides (covering hinges) and at the top of the door frame. "Lock-keeper strips" should be used around striker plates. Follow the manufacturer's instructions for the proper installation technique.

**Door sweeps** should be installed along the bottom of the door itself and should be positioned to create a seal when the door is closed. Follow the manufacturer's instructions for the proper installation technique.

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## CAULKING

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# 8

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Cracks around windows and doors (and other openings) in your home can be one of the major causes of heat loss. You can cut this loss substantially by caulking those cracks. Even if you're inexperienced, this is a job you can do yourself. The materials and tools you'll need are inexpensive.

As a general rule, caulk where a permanent seal is desired, and weatherstrip when doors and windows must be opened and closed.

The seams around doors and windows were probably tight when your house was built, but with time, cracks develop and old caulking loosens and breaks up. The areas where this might have occurred on windows and doors are:

- At joints between trim (casings) and exterior siding.
- Where storm windows meet the window frame. (**NOTE:** there should be drain holes at the window sill.)

### • Materials

Caulking compounds are available in rope form (see pg. 6), and in cartridges to be used in a caulking gun.

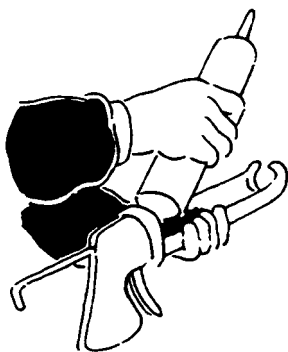
**Caulking Compounds** vary significantly in composition and in appropriateness of application. Elastomeric caulks, which remain flexible over long periods of time, should be used instead of less expensive oil-based caulks. Acceptable types include silicone, acrylic-terpolymer, acrylic-latex, latex, phenolic-based and butyl-based caulks. Check the directions carefully to note whether the caulk is suitable for the application you have in mind.

**CAUTION:** Lead based caulking is toxic. Don't use it.

**Fillers** such as oakum, urethane foam and fiberglass batt should be used in cracks greater than 3/8 of an inch. Caulk should then be applied over the filler.

#### • How to Caulk

**Before** installing caulk, remove all loose material and dirt from the crack, or the caulk won't adhere to the surface. When caulking a wide crack, stuff it to within a fraction of an inch of the surface with a filler material such as bits of insulation or oakum, and then apply the caulking material.



Cut off the tip of the nozzle on the tube at an angle so that it gives you a bead of caulk no wider than you need. Next, pierce the inner seal of the cartridge. If necessary, smooth the newly applied bead of caulk immediately after applying it with a tool like a putty knife, or your fingers. You will soon acquire a technique that allows you to apply the caulk to the crack firmly, and smooth it to an acceptable finish, in one pass of the caulking gun.

Caulk should adhere properly to the surfaces around the crack. Problems of inadequate bonding can be caused by poor cleaning of crack area, incorrect caulk type (material, temperature restrictions), or improper placement.

#### • Caulk Your Storm Windows and Clean Out the "Weep" Holes

If the caulk that seals your storm windows is drying out or missing, caulk the top, sides and bottom of the storm window frame from the inside (between the sash and storm). Leave the weep holes at the bottom of your storm window **unplugged**; they allow excess moisture to drain out, and thus help preserve both the window sill and storm. Several times a year, remove any old paint, leaves or other residue that has collected on the sills.

See page 6 for applications of caulking on other parts of your home.

## HEATING SYSTEM MODIFICATIONS

Heating system modification could potentially save between 5-25% of your fuel bill, depending on the efficiency of your current system. It is important to know that some heating system modifications apply only to specific types of heating systems, as you'll see by reading through items 9-13. Most importantly though, know that the savings you can achieve by implementing any of the following measures cannot be added directly to savings that you calculate for any other measure. This is because if you increase the efficiency of your heating system, you are using less fuel to begin with, and installation of other energy-conserving measures, though just as effective, will not pay back as quickly. A free utility energy survey includes an analysis of your heating system. It will help you determine the applicability and payback of many of the measures listed in this section.

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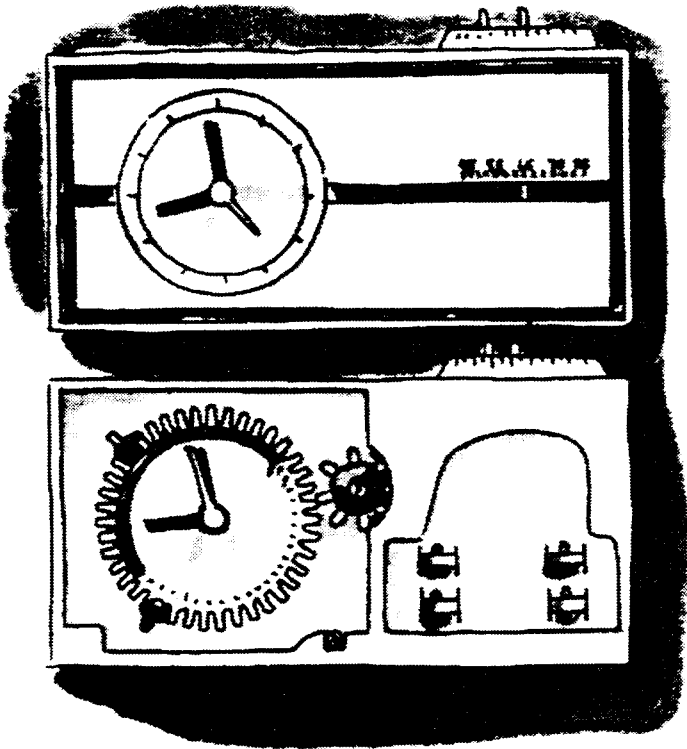
## CLOCK THERMOSTATS

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# 9

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As you know, you save on your energy bills by keeping daytime temperatures at 68°F or lower. You'll save even more by turning the thermostat down 5 to 10 degrees each night, and more if you also turn it down during the work day. (This 5 to 10 degree difference between night and daytime temperatures is called the "setback".)



You can dial the thermostat up in morning and down at night by hand, but this requires special attention and you always wake up in cool house. If you prefer, there are mechanical devices which will "remember" the setback for you.

You can regulate the amount of setback and its duration at any time. After this adjustment, the setback is controlled by the thermostat in many different ways.

Because some setback thermostats must be connected to your home's electrical system, some communities may require that they be installed by a licensed electrician. Refer to the manufacturer's instructions. The thermostat should be located away from hot and cold spots such as radiators, fireplaces and exterior walls. Air should be able to circulate freely around the unit.

Prices for setback thermostats vary between \$40 and \$300. They can save you energy used for space heating. You can purchase an automatic setback thermostat from hardware-equipment dealers, electrical supply stores, hardware stores and heating contractors.

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## REPLACEMENT BURNERS

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# 10

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The burner on your furnace or boiler controls the rate at which the fuel is burned. In an oil-fired system, it is a gun-like apparatus at the base of the heating unit. In a gas-fired system, it is either a series of plates with small holes (orifices) or a gun-like power burner.

If your present burner is old, it may be running at a low efficiency. A combustion efficiency test with

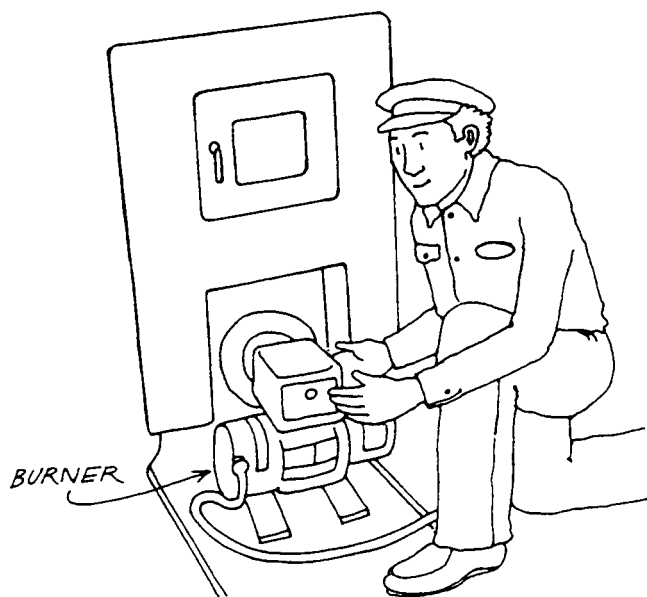
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results of 60% or less suggests that a new burner or a whole new system is a wise step. A new burner may increase that efficiency by 10 to 15%.

Oil-fired flame-retention head burners mix the oil and air more efficiently than conventional burners. This results in a hotter flame, less excess air and a higher efficiency.

Gas-fired power burners can also improve the efficiency of your heating system. This is obtained by using a forced air burner and premixing of air and gas. Many existing gas systems cannot be retrofitted with the new efficient gas power burners without great expense; however, the burners can be used to convert oil-fired heating systems to gas.

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#### • What to Expect from the Installation

The installation of a new burner must be completed by an experienced burner technician. The unit should be tuned and the entire system completely serviced to enable the burner to operate at its maximum efficiency. A qualified heating contractor may have other suggestions (in addition to burner replacement) to modify the system to enhance overall efficiency. You should expect a new combustion efficiency between 78% and 83%.

Since most existing burners are oversized, it is important that the installer match the combustion chamber to the new burner (which may involve resurfacing or rebuilding the combustion chamber) when a new burner is being selected.

The following information should be recorded by the installer, who should leave one copy with you and one copy attached to your heating system:

- Date of burner replacement;
  - Name of service company and installer;
  - Original and replacement burner make, model, and model number; gas orifice or oil nozzle size;
  - Other modifications to the unit;
  - The initial and final efficiency; which includes smoke reading (for replacement oil burners only), net stack temperature, CO<sub>2</sub> level and stack draft reading.
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## AUTOMATIC VENT DAMPERS

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# 11

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### How it Works

Automatic vent dampers reduce heat loss up the chimney by closing the flue pipe when the burner is not operating. Closing the flue prevents the naturally induced draft that is the principle cause of heat loss while the system is idle.

**NOTE:** A heating system with a flame retention burner, gas power burner or a pulse combustion burner has little use for a damper, since the burner reduces draft while the system is idle.

There are basically two types:

**A thermally-actuated automatic vent damper** consists of moveable bi-metallic elements mounted inside the flue pipe. These elements open upon ignition of the burner and close automatically when the burner goes off. No electrical connections are necessary. These can only be used on gas systems.

**An electrically-actuated automatic vent damper** consists of a metal disc mounted inside the flue pipe. The disc is opened by an electric motor when the system is turned on and closed when the system is off.

**IMPORTANT!** Dampers should be considered with extreme caution. If the damper should malfunction and remain in the closed position when the burner is firing, hazardous fumes can escape into the dwelling. The Underwriter's Laboratory as well as the American Gas Association have established testing procedures for dampers and many state and local codes permit use of UL or AGA-tested dampers. It is suggested that you avoid devices that do not meet UL or AGA standards.

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### • What to Expect from the Installation

This installation must be carried out by a qualified service technician. Prior to installation, the safe operating condition of all existing equipment must be checked. Attention should be given to the flue pipe to ensure that all connections are properly made and all piping properly supported.

The unit will be installed between the existing draft hood and the chimney. Installation and an inspection following must be made according to manufacturer's specifications and all relevant state and federal guidelines.

The damper should be cleaned and tested at the time your heating system receives its periodic servicing. If any problems arise, call your serviceperson.

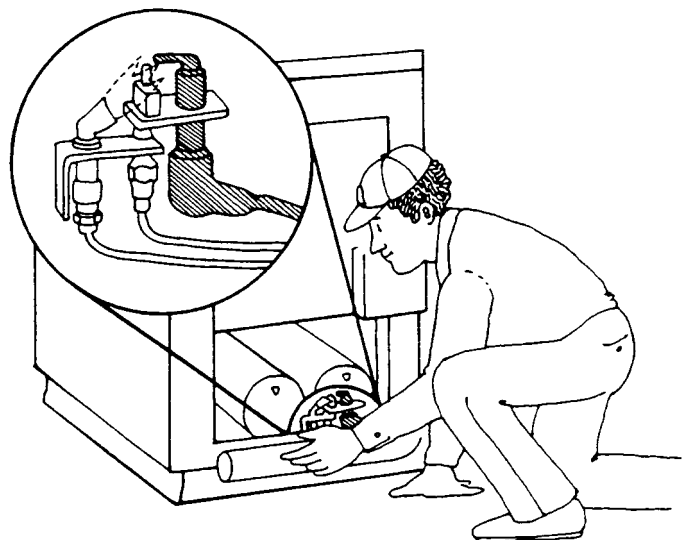
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## INTERMITTENT IGNITION DEVICES

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# 12

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INTERMITTENT  
IGNITION DEVICE

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**• How it Works**

An intermittent ignition device (IID) ignites the main gas burners by use of small amounts of electricity, thus eliminating the need for a continuously burning pilot light. This saves unnecessary fuel consumption.

**• What to Expect From the Installation**

Have your heating contractor install an IID on your central gas heating appliance. The present pilot system will remain to be a part of the IID. A number of manufacturers offer IID's for retrofit to existing gas central heating appliances. Your heating contractor can determine which is most appropriate for your heating system and what alterations to the existing system may be required to properly install the intermittent ignition device.

An IID must be installed by a qualified heating contractor. The existing condition of the heating system must be examined first to be sure that it is operating correctly and efficiently. The serviceperson will determine if valve and electrical controls which are compatible with the new IID need to be installed. The IID must be installed in accordance with manufacturer's specifications and state and federal requirements. After installation, the serviceperson should run the appliance through a number of cycles to ensure proper operation of the device.

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**HEATING SYSTEM REPLACEMENTS**

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**13**

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Although it requires a large investment, if your system is old, and it currently operates at a low combustion efficiency, you may benefit the most in the long run by replacing your entire heating system. Consult several heating contractors for advice and estimates, and make sure that the items listed here are considered before you select your new system.

**• System Sizing**

Proper sizing of the boiler or furnace is critical to economical operation of the system. Select the size that meets your home heating needs by having a heating service professional calculate your heating load requirement. Your new heating system should be matched as closely as possible to the heat loss of your home. If you have recently insulated your home, your heating needs may be considerably less than in the past. Make sure that your heating contractor takes all of your recent and future conservation installations into account when sizing your new unit. If you wish, ask to see the contractor's calculations. At maximum, your new heating unit should be sized to accommodate no more than 120% of the heating requirements of your home.

**• System Efficiency**

Select a system with the highest efficiency. The Federal Government now requires retailers of boiler/furnaces to have fact sheets on the equipment available to their customers. Your heating contractor should be able to obtain these fact sheets for you. These fact sheets include energy efficiency ratings, which offer information estimating how well one heating system will perform over the length of the heating season compared to other similar systems. The fact sheets list: the range of energy efficiency ratings for systems of the same size and type; the efficiency rating of the particular system you are

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considering and average annual cost information based upon varying fuel rates. Check the ratings of several systems before buying and select one with a high energy efficiency rating. Although higher efficiency may equal higher initial cost, it pays for itself in the long run.

• **What to Expect from the Installation**

Do not purchase a heating system that is not covered by a warranty. A minimum of one year coverage on all major components is recommended. Installation must be done by an experienced heating system technician, plumber or gas-fitter. Call your local heating association for service references.

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## OTHER OPTIONS

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# 14

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• **Domestic Hot Water System Option**

Solar domestic hot water systems use solar collectors to gather the heat provided by the sun. These systems use a fluid or air to transfer the heat from the collector to your hot water heating system. There are a wide variety of systems available from numerous manufacturers.

• **Modulating Aquastats**

An energy-saving device which can be installed on your heating system is a **modulating aquastat**, also called **outdoor reset control**. This device can save you as much as 7% of your present heating bill.

These devices work by monitoring outside temperature fluctuations and signaling the boiler to raise the temperature of the water supplied to the radiators when it is coldest out, and lower it when it is not as cold. In this way, the heat demand of your house is met and the boiler operates at greater efficiency than if it were required to continuously hold boiler water temperatures higher to keep the building warm on the coldest day. In addition, since average hot water supply temperatures are lower, heat loss through distribution pipes which pass through unheated spaces is also reduced. Although a fairly simple installation, it must be performed by an experienced service technician.

# Getting The Work Done

## SELECTING A CONTRACTOR

Although you can install many of the conservation measures discussed in this book yourself, you may want some help on certain jobs.

Here are some things you should keep in mind when selecting a contractor to do the work you can't do yourself.

### • Where To Look

One of the best places to get contractors' names is from friends and neighbors who have had similar work done, and who were satisfied with the contractor they chose.

In addition, you can check with your utility energy specialist, who will provide you with a listing of local contractors. All contractors on this list should have:

- at least one year's experience,
- adequate training in the installation of conservation measures,
- good standing with the Better Business Bureau,
- a satisfactory credit rating,
- comprehensive insurance
- any required licenses, and
- a guarantee on all work and materials for a full year.

## AN AFTERWORD

The information you've found in this workbook is based on current research and construction practices. It is not the intention of Peoples or its consultants to endorse any particular product or service but only to suggest methods and solutions. You may find, because of your unique housing style, that there are appropriate measures we didn't include. Access them as you have the measures in the book to decide which are the most cost-effective.

Energy conservation is a self-help effort; it has to start with each and every resident of our nation and state. By taking the directions and actions pointed out in this guide, you are on the way to major energy and dollar savings.

### • Making the Selection

Get written estimates from at least three contractors for work you want done. The estimate should spell out, in detail, the nature of the work to be done so you have a basis for comparison. If it's an insulation job, for example, the contractor should include information on the R-value and type of insulation to be used, how much will be installed and exact areas to be covered. If you buy blown-in insulation, find out if the contractor will guarantee to repair anything that may be damaged in the process of installing the insulation. Check to be sure the contractor guarantees the performance of the materials he uses and his workmanship.

Ask each contractor for a list of past customers and check to see if those customers were satisfied. Find out how long the contractor has been in business. Remember - the lowest bid is not always the best selection. The quality of the work is extremely important.

On the basis of this information, compare the estimates and make your selection.

### • Put it in Writing

Before work begins, you and your contractor should sign a contract which documents, as described above, the work to be done. Sign it when you're sure it includes everything you want done. You both are protected by knowing the exact limits of each other's responsibilities.

**For more information, contact Peoples.**

