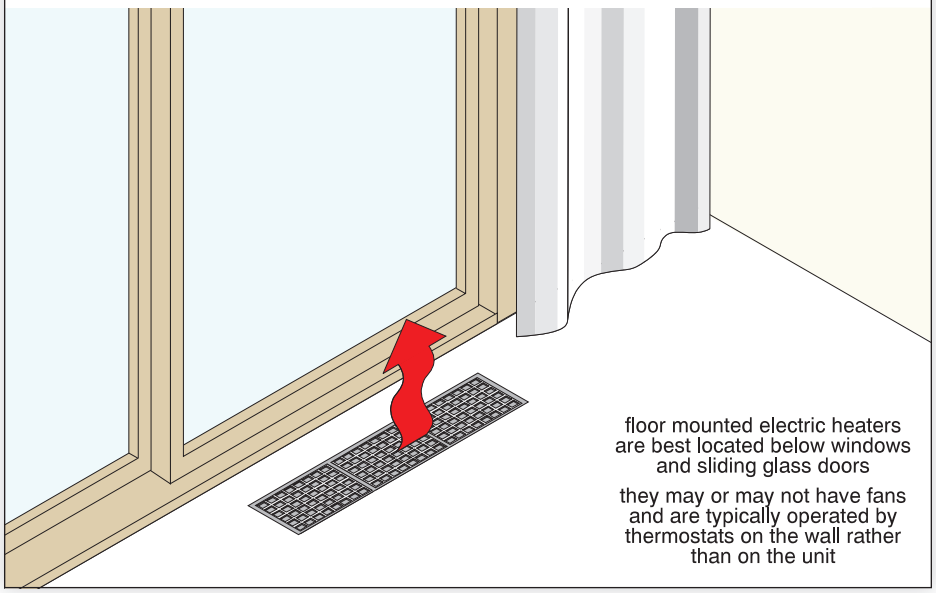
4.0 Space Heaters

Space heaters do not have distribution ducts or piping systems. They heat only the room or area that they are in.

Electric space heaters include –

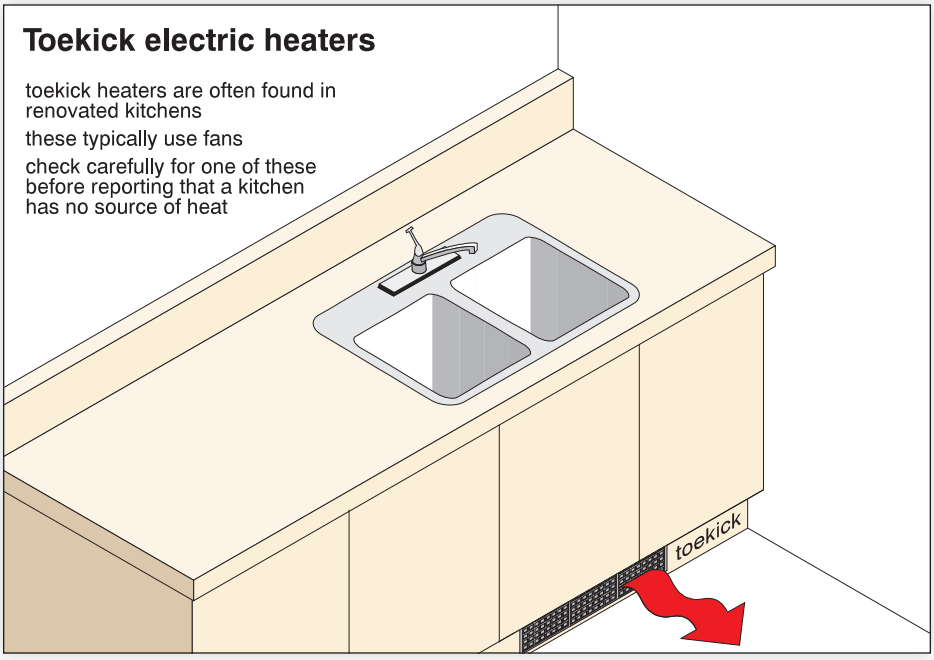
- baseboard heaters
- wall mounted heaters
- floor mounted heaters
- ceiling mounted heaters
- toekick heaters which fit under cabinets and deliver heat through the front of the toekick

Floor mounted electric heaters



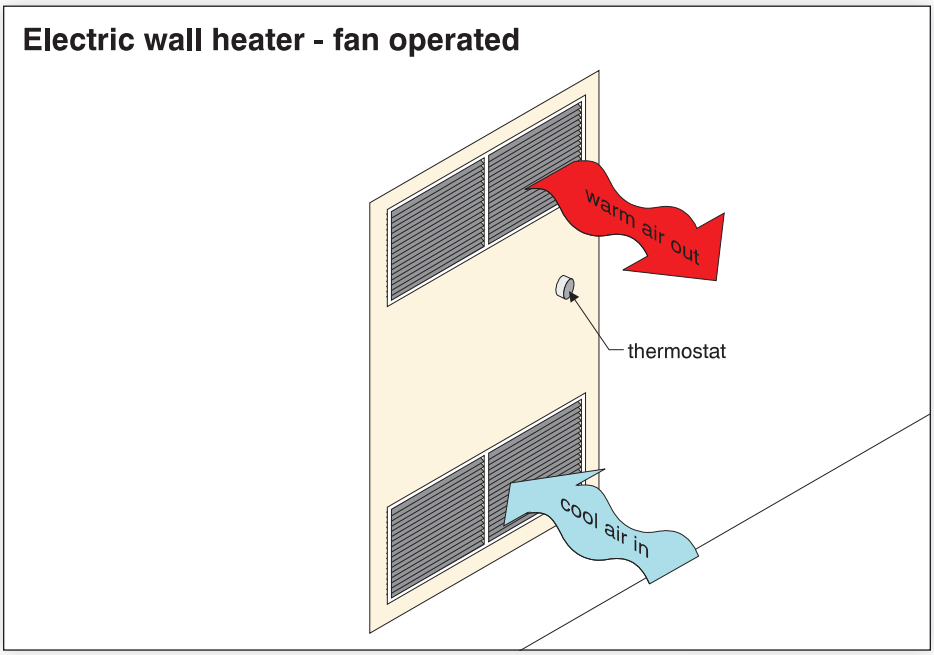
floor mounted electric heaters are best located below windows and sliding glass doors

they may or may not have fans and are typically operated by thermostats on the wall rather than on the unit



CONVECTION OR FORCED AIR

These systems may or may not have a fan. In other words, they may be **convection** or **forced air** heating systems. The convection units draw air in at the bottom and discharge heated air out at the top. They need to have free airflow to function properly. The fan units can pull air in from one side and discharge air out though the other, or pull air in from the bottom and discharge it from the top.

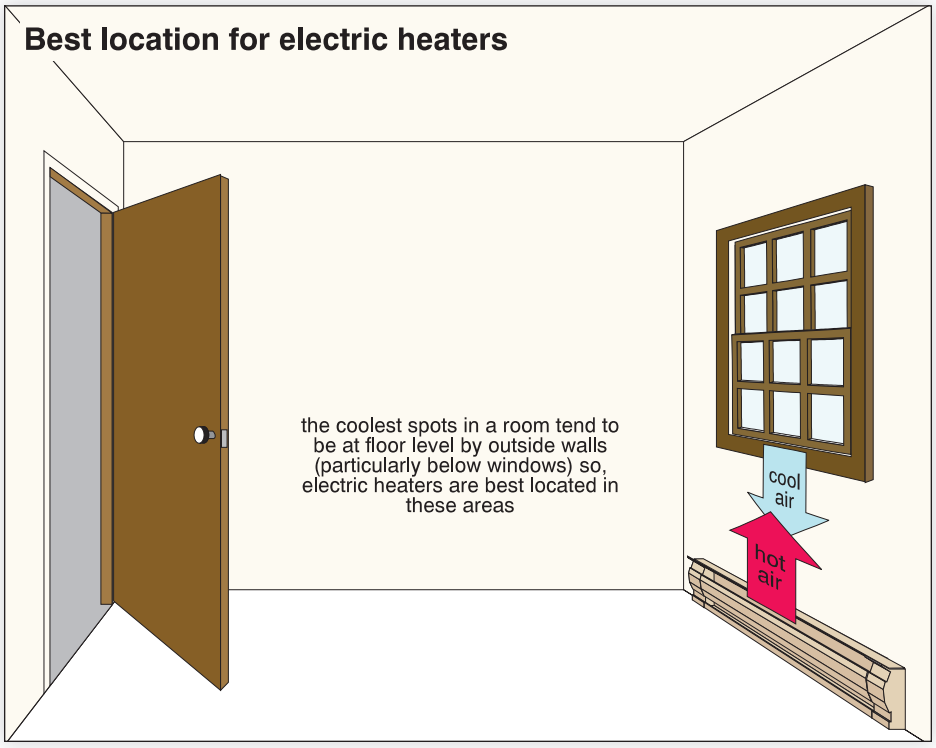


HOT WIRES WARM THE AIR

The heating principle is very simple. Electric wires (elements) get warm and heat the air around them. The warm air rises by convection and is replaced with cooler air, which is then heated by the wires. Convective loops are set up, which carry heat through the room.

LOCATION

Ideal locations of electric heaters are the same as supply registers on forced air systems or radiators on hot water systems. The heat is typically supplied near floor level on exterior walls, ideally below windows. This tends to be the coolest part of the room and channeling most of the heat to this area results in relatively even temperatures.



UNIT OR UNITARY HEATERS

Because electric space heaters are small and independent, they are sometimes called **unit** or **unitary heaters**.

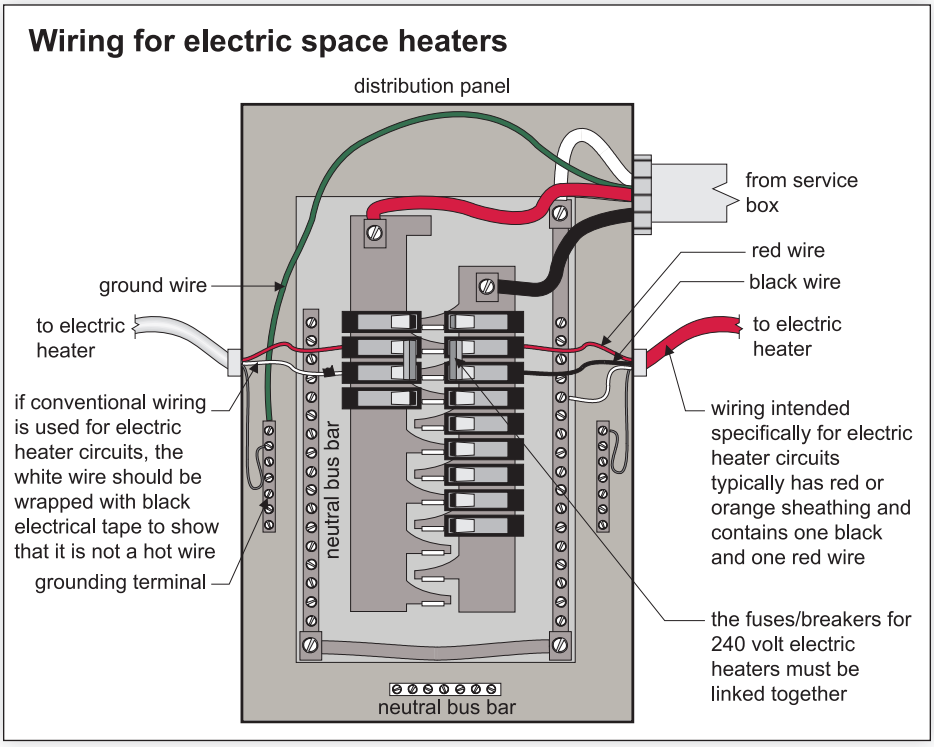
DEDICATED CIRCUITS

Electric heaters are usually run on 10, 12 or 14- gauge wire circuits. Permanently installed heaters are almost always on 240-volt circuits. The smaller current draw of a 240-volt circuit allows the wire and fuse or breaker size to be smaller.

SEPARATE PANELS

If the house is heated entirely with electric space heaters, there is often a double or second electrical distribution panel with several 20 or 30-amp, 240-volt circuits. These circuits are a balanced load and typically only use two conductor cables. No neutral wire is required. The conductors can be black and red, but are often black and white. The white wire should be designated, with black tape for example, to show that it is acting as a hot wire.

Wiring for electric space heaters



THERMOSTAT

Each heater may be controlled by a thermostat on the heater or by a wall thermostat.

LOCATION

A single wall thermostat can control several heaters in a room. Wall thermostats can be **line voltage** (240-volt) or **low voltage** (12 or 24-volt).

CAREFUL WITH WALL THERMOSTATS

Wall thermostats have a maximum wattage rating. You can't put an unlimited number of heaters on a single wall thermostat. Although it goes beyond the scope of a home inspection, some inspectors check the wattage rating of the thermostat against the total wattage of the heaters it controls.

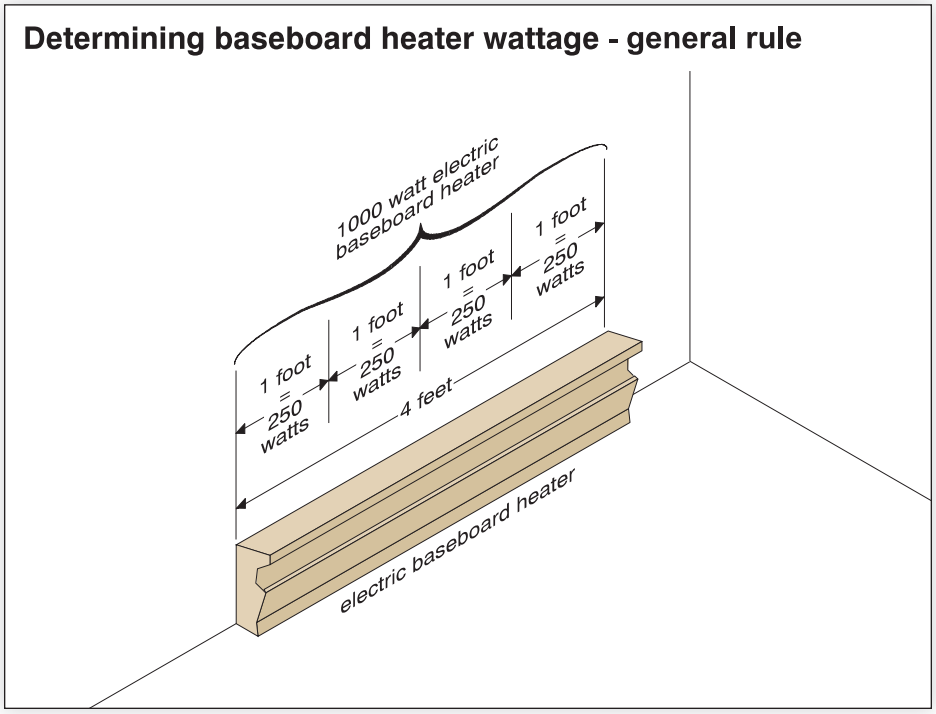
THERMOSTATS ON THE UNITS

Some people feel that the thermostats on the units provide good control. Others maintain that these are too close to the heat source and are subject to more heat fluctuation than a wall-mounted thermostat remote from the heater. Both systems are acceptable.

HEATER SIZE

Electric space heaters are available in sizes ranging from 75 to 4800 watts. The most common sizes are 500, 1000, 1500 and 2000 watts. One general rule is to count each linear foot of baseboard as 250 watts. There is no magic to this, and if you are willing to get down on your hands and knees, you can usually read the wattage specifications of the heater.

Determining baseboard heater wattage - general rule



120 VS. 240

We have talked a little about the advantage of using 240-volt heaters. The portable heaters that are designed to be plugged into convenience receptacles have to be rated at 120 volts. Some permanently installed heaters are also rated at 120 volts. Obviously, we do not want 120-volt heaters wired at 240 volts. This is dangerous. Similarly, we don't want 240-volt heaters wired on a 120-volt circuit. While it's not dangerous, you won't get all the heat you should.

Let's look at some of the things to watch for on electric space heaters.

4.1 Conditions

We'll obviously be looking for the items listed in 3.0 General Conditions. In addition, we'll be looking at –

1. Inoperative heaters
2. Obstructed heaters
3. Dirty or bent fins on heaters
4. Electrical receptacles above heaters
5. 120-volt heaters installed on 240-volt circuits or vice versa
6. Fans – noisy, inoperative, loose or dirty
7. Thermostat overloaded
8. Missing or too few heaters
9. Damaged or rusted heaters
10. Loose or missing covers

4.1.1 Inoperative heaters

CAUSE

- This is usually an electrical supply problem
- Elements may be burnt out
- There is an integral high-temperature limit on some heaters that will shut the unit off if it overheats, because the airflow is obstructed, for example. This could also cause a heater to be inoperative. These cut-outs usually reset automatically when the heater cools.

IMPLICATION No heat is the implication.

STRATEGY Turn up the thermostat for space heaters. The thermostat may be on the heater or on the wall. Within about 30 seconds, the heating elements or fins should be warm. If it is a convection system, you can usually reach in and touch the fins and feel the heat coming off.

FORCED AIR If it is a forced air unit, the fan should start immediately and the air discharged should be warm within approximately one minute.

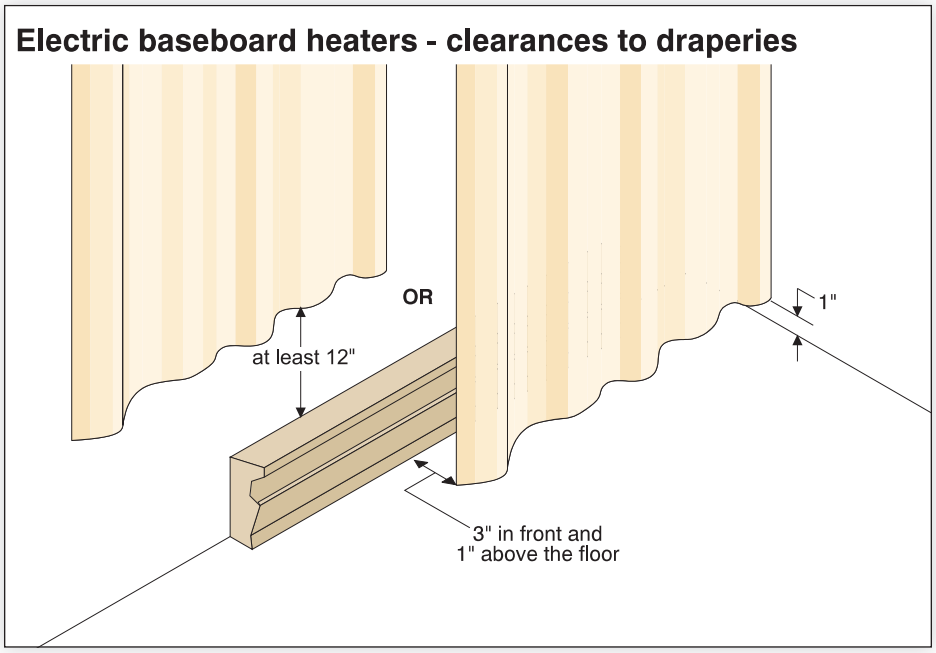
DISCONNECTED Electric baseboard heaters may have been disconnected and left in place where a heat pump or other heat source has been added to a home. The heaters are often not removed because of the cosmetic repairs that would be necessary. You should report the electric heaters as inoperative, but explain there is another heat source in the room, and this may have been done intentionally.

4.1.2 Obstructed heaters

Airflow into and out of the heater should not be obstructed. Heaters set directly on the floor should not have their inlets obstructed by carpeting, especially deep pile carpeting.

Drapes can obstruct the heater outlet, as can furniture. Drapes should typically be at least 12 inches above baseboard heaters (manufacturers' recommendations vary

between 6 and 12 inches) or, at least 3 inches out in front and 1 inch above the floor. Furniture should be at least 3 inches away from the front of heaters (some manufacturers say as much as 12 inches). Manufacturer's recommendations can be checked for specific clearance requirements. Different heaters have different requirements.



CAUSE Obstructed heaters are usually an installation or homeowner furnishing issue.

IMPLICATIONS This is a fire hazard if furniture or drapes are too close to the heater. At best, heat distribution will be inhibited. The unit may overheat if the inlet or outlet is restricted. The heater may shut off consistently on high temperature. This may also result in no heat or poor comfort as a result of erratic operation.

STRATEGY Make sure that the airflow surrounding heaters is clear.

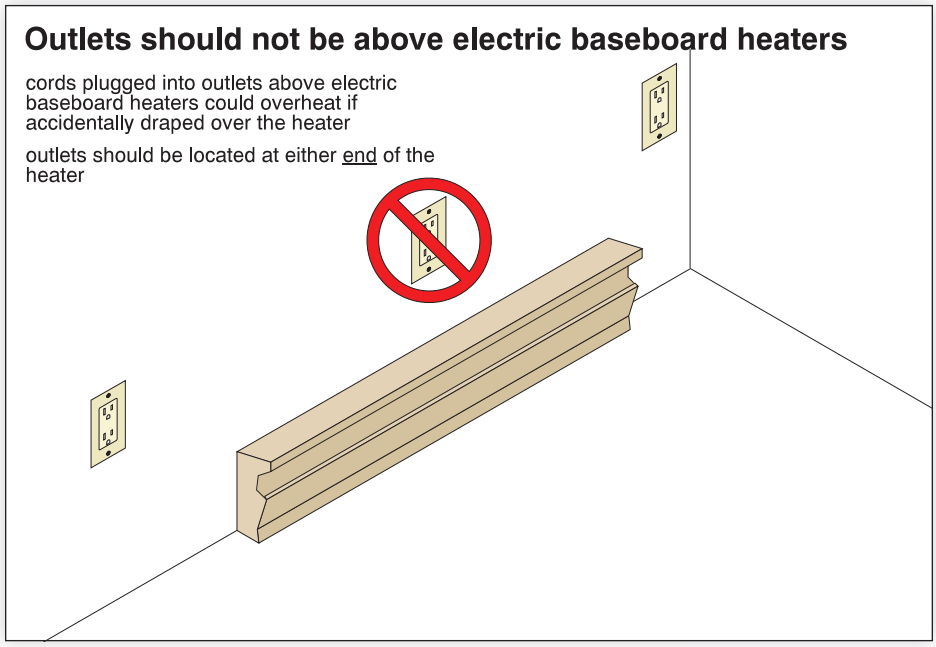
4.1.3 Fins bent or dirty

CAUSE Mechanical damage.

IMPLICATIONS Poor heat transfer from the electric elements into the room air. This may result in uncomfortable room temperature or excessive heating costs.

STRATEGY If needed, use a flashlight to look at the fins on baseboards heaters. Watch for fins that have been bent or jammed together and look for dirt obstructing the airflow between the fins.

4.1.4 Electrical receptacles above heaters



CAUSE This is an installation issue that is specified by manufacturers rather than code.

IMPLICATION An appliance electrical cord touching or close to a heater is a fire and shock hazard.

STRATEGY Watch for outlets above heaters. Recommend that they be moved.

Note: These are common on older homes. This practice used to be accepted in many areas.

4.1.5 120-volt heater installed on a 240-volt circuit or vice versa

CAUSE This is an installation issue.

IMPLICATION Overheating and heater failure are the implications. This is also a fire hazard.

A 240-volt heater operating at 120 volts will not deliver adequate heat.

STRATEGY Again, this is something that may be difficult to detect during a home inspection. Without doing testing that goes beyond the scope, it is hard to know which fuse or breaker controls any given heater in the house. Where most of the heaters are clearly on 240-volt circuits (identified by the linked fuses or breakers at the panel), you can check the heaters' dataplate to make sure that they are rated for 240 volts. Many of them are rated for 208/240 volts. These are appropriate for residential 240-volt use.

Incidentally, you may notice that the rating of the unit is given as two different numbers. Where the system is installed on a 208 circuit (indicating 3-phase power, which would usually be commercial), the wattage rating is lower. This is logical enough, considering P = IV. A lower voltage input will mean a lower wattage output.

4.1.6 Fan – noisy, inoperative, loose or dirty

CAUSE Poor maintenance, wear and tear, or mechanical failure.

IMPLICATIONS Poor comfort, localized overheating of the heater and shut off on thermal cutout.

STRATEGY When the thermostat is turned up, listen to the operation of the fan. Is it working? Is it too noisy? Use a flashlight to ensure that the fan is stable during operation. When the system is idle, use a flashlight to look for dirt on the fan blades or the motor.

4.1.7 Thermostat overloaded

CAUSE This is an installation issue.

IMPLICATIONS Thermostat overheating and failure. Possible fire hazard.

STRATEGY Detecting this problem goes beyond standards. You have to remove the thermostat cover and determine its rating. You then have to operate the circuit and identify all of the heaters controlled by that thermostat. You'll have to total the wattage of those heaters and make sure that they do not exceed the thermostat wattage. If they do, recommend that the thermostat be replaced. Alternatively, the circuit can be split into two circuits.

4.1.8 Missing or too few heaters

CAUSE This is an installation issue.

IMPLICATION Inadequate heat in some areas is the implication.

STRATEGY Look for a heat source in each room. Use some common sense. If the room has no exterior walls, it may not need heat. But you should note it and explain heat may not be needed.

Look for too few or too small heaters in any one area. You'll get a sense of what is commonly used in your area, and will get a sense from the other rooms. Where you see one room that is dramatically different, note it. In most cases it's not expensive to add one or two heaters.

4.1.9 Damaged or rusted heaters

CAUSE This is usually a homeowner related issue. Damaged heaters are common in playrooms. Rusted heaters are common in chronically wet basements and areas with high humidity. Heaters in the bathrooms close to showers and toilets, and below towel bars, are often rusted.

IMPLICATIONS The heater may become inoperative or unsafe.

STRATEGY Look for and note any damage or rust on heaters.

4.1.10 Loose or missing covers

CAUSE This can be an installation issue, but is more often a homeowner caused problem.

IMPLICATION The heater may be susceptible to damage or getting dirty. A missing cover is dangerous if hot elements are exposed to combustibles or accessible to children or pets, for example.

STRATEGY Look for and report any loose or missing heater covers.