SECTION 20. MEASURING AIR TEMPERATURE RISE

You will need 2 thermometers with 1-degree resolution capable of reading up to 175 degrees F.

Air temperature rise (supply air temperature minus return air temperature) must be within allowable air-temperature rise range specified on furnace rating plate and in Table 9.

Follow this procedure:

1. Open supply-air registers and return air grilles. Make sure registers and grilles are free of obstruction from rugs, carpets, drapes or furniture.
2. Set balancing dampers in supply duct system.
3. Check ductwork for obstructions or leaks.
4. Make sure filters are clean and in place.
5. Make sure that blower speed taps are set for proper heating and cooling. Refer to Section 18, "Adjusting Blower Speed." Heating speed should be set according to Table 9. Cooling speed should be set to meet cooling equipment requirements. See Table 10 for cooling airflow capacities at 0.5 inch W.C.
6. Place one thermometer in supply air plenum approximately 2 feet from furnace. Locate thermometer tip in center of plenum to ensure proper temperature measurement.
7. Place second thermometer in return air duct approximately 2 feet from furnace. Locate thermometer tip in center of duct to ensure proper temperature measurement.
8. Set room thermostat on highest temperature setting. Operate furnace 6 minutes. Record supply air and return air temperatures.
9. Calculate air temperature rise by subtracting return air temperature from supply air temperature.
   - ?? If air temperature rise is above temperature rise range specified in Table 9, furnace is overfired or has insufficient airflow. Check gas input following the instructions in Section 14, "Checking Gas Input Rate." If air temperature rise is still above temperature rise range specified, more airflow is needed. Change blower heating speed to a higher setting following instructions in Section 18, "Adjusting Blower Speed."
   - ?? If air temperature rise is below temperature rise range specified in Table 9, furnace is underfired or has too much airflow. Check gas input following the instructions in Section 14, "Checking Gas Input Rate." If air temperature rise is still below temperature rise range specified, less heating airflow is needed. Change blower heating speed to a lower setting following instructions in Section 18, "Adjusting Blower Speed."
   - ?? After making adjustments, you must check air temperature rise to verify that resulting air temperature rise is within allowable range. If air temperature rise is still outside temperature rise range specified in Table 9, check duct system design with a qualified heating engineer. It may be necessary to re-size duct work. Recheck air temperature rise after revising duct systems.
10. Set room thermostat to desired setting.
11. Remove thermometers and seal ductwork holes.

SECTION 21. CHECKING CONTROLS

Before leaving work site, check to see that all controls are functioning properly.

You will need a 0 to 15 inch water manometer with 0.1 inch resolution and a 1/8" NPT manual shut-off valve.

Follow this procedure:

1. Turn off electricity at electrical disconnect switch next to furnace.
2. Remove three screws holding burner access panel in place. Remove burner access panel.
3. Turn gas control switch to OFF position.
4. Connect a manometer to gas control outlet (manifold) pressure tap.
5. Set room thermostat to its highest temperature.
6. Turn on electricity at electrical disconnect switch located next to furnace.
7. Diagnostic light on Fan Timer should be on and cycling bright-dim-bright-dim...
8. Draft inducer should run and pilot igniter should glow but pilot burner should not light. Manifold pressure should remain at zero.
9. Turn gas control switch to ON position.
10. Pilot burner should light and ignite main burners. It may take several minutes to purge gas line before pilot burner lights. Wait 30 seconds after main burner ignition for main blower to start.
11. Cycle electrical disconnect switch next to furnace on and off. Watch at least three ignition cycles. Pilot should ignite main burners smoothly.
12. Burner flames should look the same with circulation blower on and off.
13. Remove manometer from gas control and replace outlet pressure tap
14. Use a commercial soap solution made to detect leaks and check all gas piping connections. Bubbles indicate gas leakage. Seal all leaks before proceeding.
15. Replace burner access panel using three screws removed in step 2.
16. Set room thermostat to desired setting.

SECTION 22. SETTING BLOWER TIMINGS

Heating blower on-delay is fixed at 30 seconds from when main valve opens. It is not adjustable.

Heating blower off-delay is adjustable to one of four times: 60, 100, 140 or 180 seconds. Heating blower off-delay is factory set at 140 seconds. If a different blower off-delay is desired, do the following:

1. Find two small switches located near 24-volt terminal strip on Fan Timer.
2. Determine switch settings for desired heating blower off-delay. See Figure 33.
3. Set switches on Fan Timer using a small screwdriver.

NOTE: Cooling blower off-delay is fixed at 60 seconds and is not adjustable.

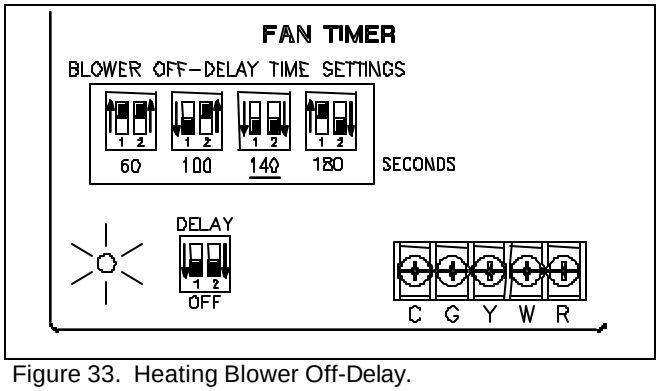

Figure 33. Heating Blower Off-Delay.

SECTION 23. MAINTAINING FURNACE IN GOOD WORKING ORDER

WARNING: Use replacement parts listed in parts list only. Use of incorrect parts on this furnace could cause improper furnace operation, resulting in damage, injury or death.

WARNING: Failure to disconnect electrical power before servicing furnace could result in electrical shock or death.

Inspection and cleaning by a qualified service person should be performed once each heating season. Make sure the inspection includes each of the items listed below.

- ?? An operational check of the entire system. Assure that furnace is operating properly and safely.
- ?? Vent pipe must be in place, slope upward at least 1/4 inch per foot and must be physically sound, without holes or loose connections.
- ?? All venting components including vent pipe and vent terminal must be clear and free of obstructions.
- ?? Condensate drain system must be clear and free including all internal and external hoses and condensate trap. Check for signs of condensate leakage.
- ?? Furnace-room or closet combustion and ventilation air openings must be clear and free.
- ?? Furnace combustion-air openings must be clear and free.
- ?? Return air duct must be physically sound, sealed to furnace casing and ending outside the space containing furnace.
- ?? Supply air ducts and return air ducts must be clear and free, and without air leaks.
- ?? Registers and return grilles must be open and unobstructed by rug, carpet or furniture.
- ?? The furnace must be well supported without sagging, cracks, or gaps around the base.
- ?? There must be no obvious signs of deterioration of the furnace. Inspection must include burners, pilot, heat exchanger, inducer pan, and draft inducer.
- ?? Flame holders, located inside the main burners, should be free of lint or dirt. Burners can be cleaned with compressed air.
- ?? Inspect all electrical wiring and connections, including electrical ground.
- ?? Gas pipes must be checked for leaks using a commercial soap solution made to detect leaks.
- ?? Main burners and pilot burner must be in good adjustment as shown in the User's Information Manual. Main burner flame must be clear blue and centered within heat exchanger openings.
- ?? Check furnace area for combustible materials, flammable liquid near furnace, corrosive materials, insulation material within 12 inches of furnace, and signs of high water levels.
- ?? Inspect, clean, or repair as needed the following items: blower housing, blower motor, blower wheel, air filters, draft inducer, and cooling coil.

Heat exchanger flue gas passageways may be cleaned using the following steps:

1. Remove heat exchanger from furnace.
2. Flush heat exchanger passageways with a high-pressure water hose.
3. Replace heat exchanger.

The manufacturer recommends replacement of heat exchanger with a new heat exchanger in the event that flue gas passageways become blocked and cannot be cleaned.

NOTE: Blower motor and inducer motor do not require oiling.

Follow these steps to remove blower assembly:

1. Turn off furnace electrical power.
2. Cut vent pipe and remove vent assembly from the inducer-motor rubber coupling.
3. If necessary, cut and remove air-intake pipe.
4. Disconnect room thermostat wires from 24-volt terminal strip on Fan Timer.

5. Locate five blower motor wires that feed through casing hem.
6. Label blower motor wires for proper replacement.
7. Disconnect blower motor wires from Fan Timer. See Figure 32.
8. Remove 2 screws holding blower door in place. Remove blower door.
9. Pull blower motor wires through casing hem.
10. Remove power-disconnect assembly located in the middle of blower deck.
11. Remove 2 screws holding blower assembly to blower deck.
12. Slide blower assembly out.
13. After cleaning blower assembly, re-assemble in reverse order making sure speed selections are in original positions.
14. Install the vent assembly into the inducer rubber coupling and tighten the hose clamps. The cut vent pipes must be joined using a PVC coupling or rubber coupling available from manufacturer.

panel in plenum. Includes two 16" x 20" x 1" high-velocity, washable filters.

FILTERS: High-velocity washable filters, available in cartons of 10.

RUBBER COUPLINGS AND CLAMPS: May be installed in vent system to provide easier blower access. Each kit contains five sets of 2 couplings and 4 hose clamps.

SECTION 25. OTHER INFORMATION AND PUBLICATIONS

These publications can help you install the furnace. You can usually find these at your local library or buy them directly from the publisher. Be sure to consult current edition of each standard.

National Fuel Gas Code	ANSI Z223.1/NFPA 54
Canadian Installation Codes	CAN/CGA B149
National Electrical Code	ANSI/NFPA Code 70
Canadian Electrical Code	CSA C22.1
Standard For The Installation Of Warm Air Heating And Air Conditioning Systems.	ASHRAE/NFPA 90

For more information, contact these publishers:

ANSI: American National Standards Institute Inc.
1430 Broadway
New York, New York 10018
(212) 642-4900

CSA: Canadian Standards Association
178 Rexdale Boulevard
Rexdale, Ontario, Canada M9W 1R3
(416) 447-4044

ASHRAE: American Society Of Heating Refrigeration And Air-Conditioning Engineers, Inc.
1791 Tullie Circle N.E.
Atlanta, GA 30329
(404) 636-8400

NFPA: National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269
(617) 770-3000