

STARTUP AND CHECKOUT

Check out the gas control system:

- At initial appliance installation.
- As part of regular maintenance procedures.
- At maintenance intervals determined by the application.
- As the first step in troubleshooting.
- Any time work is done on the system.

Maintenance frequency must be determined individually for each application. See Maintenance section.

WARNING

**FIRE OR EXPLOSION HAZARD
CAN CAUSE PROPERTY DAMAGE, SEVERE
INJURY, OR DEATH.**

1. If you smell gas or suspect a gas leak, turn off the gas at the manual service valve and evacuate the building. Do not try to light any appliance; do not touch any electrical switch or telephone in the building until you are sure no spilled gas remains.
2. Gas leak test must be done as described in steps 1 and 6 below on initial installation and anytime work is done involving the gas piping.

Step 1: Perform visual inspection.

- a. With power off, make sure all wiring connections are clean and tight.
- b. Turn on the power to the appliance.
- c. Open the manual shutoff valves in the gas line to the appliance.
- d. Test for gas leak before gas control if piping has been disturbed.

Gas Leak Test:

Paint the gas control gasket edges and all pipe connections downstream of the gas control, including pilot tubing connections, with a rich soap and water solution. Bubbles indicate gas leaks. Tighten the joints and screws or replace the component to stop the gas leak. Recheck with soap and water solution.

Step 2: Verify control system ground.

The igniter, flame sensor, and ignition module must share a common ground with the main burner. Use thermoplastic insulated wire with a minimum rating of 105°C (221°F) for the ground wire; asbestos insulation is not acceptable. If the temperature at the wire could exceed 105°C (221°F), use a shield to protect the wire from radiant heat generated by the burner. Connect the ground wire as follows:

- a. Fit one end of the ground wire with a female 1/4 in. quick-connect terminal and connect it to the male quick-connect GND (BURNER) terminal on the ignition module.
- b. Strip the other end of the wire and fasten it under the igniter bracket mounting screw. If necessary, use a shield to protect the ground wire from radiant heat.
- c. The burner serves as the common grounding area. If there is not good metal-to-metal contact between the burner and ground, run a lead from the burner to ground.

NOTE: Earth ground is not required.

Step 3: Review normal operating sequence and module specifications.

- a. See Operation and Specifications sections.

Step 4: Reset the module.

- a. Turn the thermostat to its lowest setting.
- b. Wait one minute.

As you do Steps 5 and 6, watch for points where operation deviates from normal. Refer to Troubleshooting Guide, Fig. 8, to correct the problem.

Step 5: Check safety shutoff operation.

- a. Turn off the gas supply.
- b. Set thermostat or controller above the room temperature to call for heat.
- c. Watch for spark at pilot burner.
- d. Time spark from start to shutoff. Spark should shut off after 90 seconds maximum. Ignition sequence repeats after five minutes minimum.
- e. Open the manual gas control knob and make sure no gas is flowing to the pilot or main burner.
- f. Set the thermostat below the room temperature and wait one minute before continuing.

Step 6: Check normal operation.

- a. Set the thermostat or controller above the room temperature to call for heat.
- b. Make sure the pilot lights smoothly when the gas reaches the pilot burner.
- c. Make sure the main burner lights smoothly without flashback.
- d. Make sure the burner operates smoothly without floating, lifting, or flame rollout to the furnace vestibule or heat buildup in the vestibule.
- e. If the gas line was disturbed, complete the gas leak test.

Gas Leak Test:

Paint the gas control gasket edges and all the pipe connections downstream of the gas control, including pilot tubing connections, with a rich soap and water solution. Bubbles indicate gas leaks. Tighten the joints and screws or replace the component to stop the gas leak. Recheck with soap and water solution.

- f. Turn the thermostat or controller below the room temperature. Make sure the main burner and pilot flames go out.

MAINTENANCE

WARNING

**FIRE OR EXPLOSION HAZARD CAN CAUSE
PROPERTY DAMAGE, SEVERE INJURY, OR
DEATH.**

Do not attempt to take the module apart or to clean it. Improper assembly and cleaning can cause unreliable operation.

Regular preventive maintenance is important in commercial cooking, agricultural and industrial industries applications that place a heavy load on system controls, because:

- In many such applications, particularly commercial cooking, the equipment operates 100,000 to 200,000 cycles per year. Such heavy cycling can wear out the gas control in one to two years.
- Exposure to water, dirt, chemicals and heat can damage the gas control and shut down the control system. A NEMA 4 enclosure can reduce exposure to environmental contaminants. See Electronic Ignition Service Manual, form 70-6604.

The maintenance program should include regular system checkout as outlined in the Startup and Checkout section, and control system checkout as described in appliance manufacturer literature.

Maintenance frequency must be determined individually for each application. Some considerations are:

- Cycling frequency. Appliances that can cycle 20,000 times annually should be checked monthly.
- Intermittent use. Appliances that are used seasonally should be checked before shutdown and again before the next use.

- Consequence of unexpected shutdown. Where the cost of an unexpected shutdown would be high, the system should be checked more often.
- Dusty, wet, or corrosive environment. Because these environments can cause the gas control to deteriorate more rapidly, the system should be checked more often.

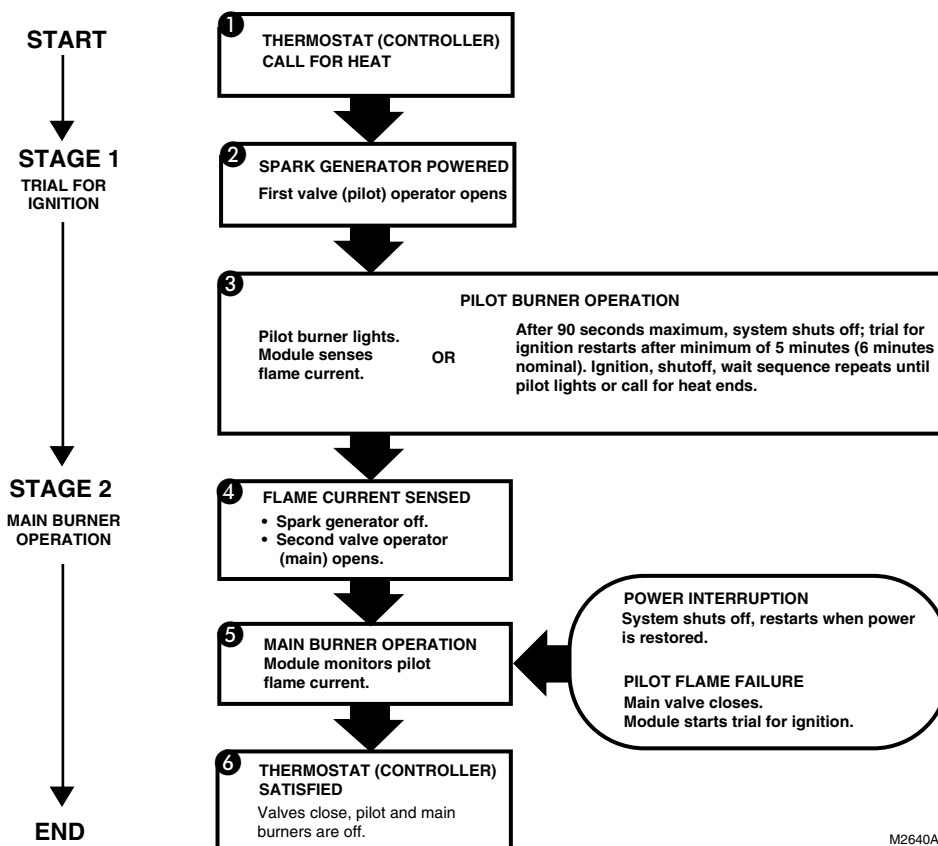
Any control should be replaced if it does not perform properly on checkout or troubleshooting. In addition, replace any module if it is wet or looks like it has ever been wet. Protective enclosures as described in the Planning the Installation section are recommended, regardless of checkout frequency.

OPERATION

Module operation can be conveniently divided into two phases for the S8610:

- Trial for ignition.
- Main burner operation.

Fig. 6 summarizes the normal operating sequence of the module.



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Fig. 6. S8610U normal operating sequence.

TROUBLESHOOTING

IMPORTANT

1. The following service procedures are provided as a general guide. Follow appliance manufacturer service instructions if available.
2. Meter readings between gas control and ignition module must be taken within the trial for ignition period. Once the ignition module shuts off, wait for retry or reset at the thermostat.
3. If any component does not function properly, make sure it is correctly installed and wired before replacing it.
4. The ignition module cannot be repaired. If it malfunctions, replace it.
5. Only trained, experienced service technicians should service intermittent pilot systems.
6. After servicing, verify proper system operation.

Perform the checkout steps in the Startup and Checkout section as the first step in troubleshooting. Then check the appropriate troubleshooting guide (Fig. 8) and the schematic diagram (Fig. 9) to determine the cause of the problem. If troubleshooting indicates an ignition problem, see Ignition System Checks section to isolate and correct the problem.

After troubleshooting, perform the checkout procedures again to be sure the system is operating normally.

Ignition System Checks

Step 1: Check ignition cable.

Make sure:

- a. Ignition cable does not run in contact with any metal surfaces.
- b. Ignition cable is no more than 36 in. (0.9m) long.
- c. Connections to the ignition module and to the igniter or igniter-sensor are clean and tight.
- d. Ignition cable provides good electrical continuity.

Step 2: Check ignition system grounding. Nuisance shutdowns are often caused by a poor or erratic ground.

- a. A common ground, usually supplied by the pilot burner bracket, is required for the module and the pilot burner/igniter-sensor.
 - Check for good metal-to-metal contact between the pilot burner bracket and the main burner.
 - Check the ground lead from the GND (BURNER) terminal on the module to the pilot burner. Make sure connections are clean and tight. If the wire is damaged or deteriorated, replace it with No. 14 through 18 gauge, moisture-resistant, thermoplastic insulated wire with 105°C (221°F) minimum rating.
 - Check the ceramic flame rod insulator for cracks or evidence of exposure to extreme heat, which can permit leakage to ground. Replace pilot burner/igniter-sensor and provide a shield, if necessary.
 - If flame rod or bracket are bent out of position, restore to the correct position.

Step 3: Check spark ignition circuit. You will need a short jumper wire made from ignition cable or other heavily insulated wire.

- a. Close the manual gas valve.
- b. Disconnect the ignition cable at the SPARK terminal on the module.



WARNING

ELECTROCUTION HAZARD, CAN CAUSE SERIOUS INJURY OR DEATH.

When performing the following steps, do not touch stripped end of jumper or SPARK terminal. The ignition circuit generates over 10,000 volts and electrical shock can result.

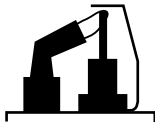




- c. Energize the module and immediately touch one end of the jumper firmly to the GND terminal on the module. Move the free end of the jumper slowly toward the SPARK terminal until a spark is established.
- d. Pull the jumper slowly away from the terminal and note the length of the gap; when sparking stops, refer to the table as follows:

Arc Length	Action
No arc or arc less than 1/8 in. (3 mm).	Check external fuse, if provided. Verify power at module input terminal. Replace module if fuse and power are okay.
Arc 1/8 in. (3 mm) or longer.	Voltage output is okay.

STEP 4: Check pilot and main burner lightoff.

- a. Set the thermostat to call for heat.
- b. Watch the pilot burner during the ignition sequence to be sure:
 - Ignition spark continues after the pilot is lit.
 - The pilot lights and the spark stops, but the main burner does not light.
 - The pilot lights, the spark stops and the main burner lights, but the system shuts down.
- c. If so, verify adequate flame current as follows:
 - Turn off the furnace at the circuit breaker or fuse box.
 - Clean the flame rod with an emery cloth.
 - Make sure the electrical connections are clean and tight. Replace the damaged wire with moisture-resistant No. 18 wire rated for continuous duty up to 105°C (221°F).
 - Check for a cracked ceramic insulator, which can cause short to ground, and replace igniter-sensor or sensor, if necessary.
 - At the gas control, disconnect the main valve wire from the TH or MV terminal.
 - Turn on the power and set the thermostat to call for heat. The pilot should light but the main burner remains off because the main valve actuator is disconnected.
 - Check the pilot flame. Make sure it is blue, steady, and envelops 3/8 to 1/2 in. (10 to 13 mm) of the flame rod. See Fig. 7 for possible flame problems and the causes.

- If necessary, adjust the pilot flame by turning the pilot adjustment screw on the gas control clockwise to decrease or counterclockwise to increase the pilot flame. Following adjustment, always replace the pilot adjustment cover screw and tighten firmly to assure proper gas control operation.
 - Set the thermostat below the room temperature to end the call for heat.
- d. Recheck ignition sequence as follows:
- Reconnect the main valve wire.
 - Set the thermostat to call for heat.
 - Watch the ignition sequence at the burner.
 - If spark still does not stop after pilot lights, replace the ignition module.
 - If the main burner does not light or if the main burner lights but system locks out, check module, ground wire, and gas control, as described in the Troubleshooting Guide, Fig. 8.

APPEARANCE	CAUSE
<p>SMALL BLUE FLAME</p> 	<p>CHECK FOR LACK OF GAS FROM:</p> <ul style="list-style-type: none"> • CLOGGED ORIFICE FILTER • CLOGGED PILOT FILTER • LOW GAS SUPPLY PRESSURE • PILOT ADJUSTMENT AT MINIMUM
<p>LAZY YELLOW FLAME</p> 	<p>CHECK FOR LACK OF AIR FROM:</p> <ul style="list-style-type: none"> • DIRTY ORIFICE • DIRTY LINT SCREEN, IF USED • DIRTY PRIMARY AIR OPENING, IF THERE IS ONE • PILOT ADJUSTMENT AT MINIMUM
<p>WAVING BLUE FLAME</p> 	<p>CHECK FOR:</p> <ul style="list-style-type: none"> • EXCESSIVE DRAFT AT PILOT LOCATION • RECIRCULATING PRODUCTS OF COMBUSTION
<p>NOISY LIFTING BLOWING FLAME</p> 	<p>CHECK FOR:</p> <ul style="list-style-type: none"> • HIGH GAS PRESSURE
<p>HARD SHARP FLAME</p> 	<p>THIS FLAME IS CHARACTERISTIC OF MANUFACTURED GAS</p> <p>CHECK FOR:</p> <ul style="list-style-type: none"> • HIGH GAS PRESSURE • ORIFICE TOO SMALL

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Fig. 7. Examples of unsatisfactory pilot flames.

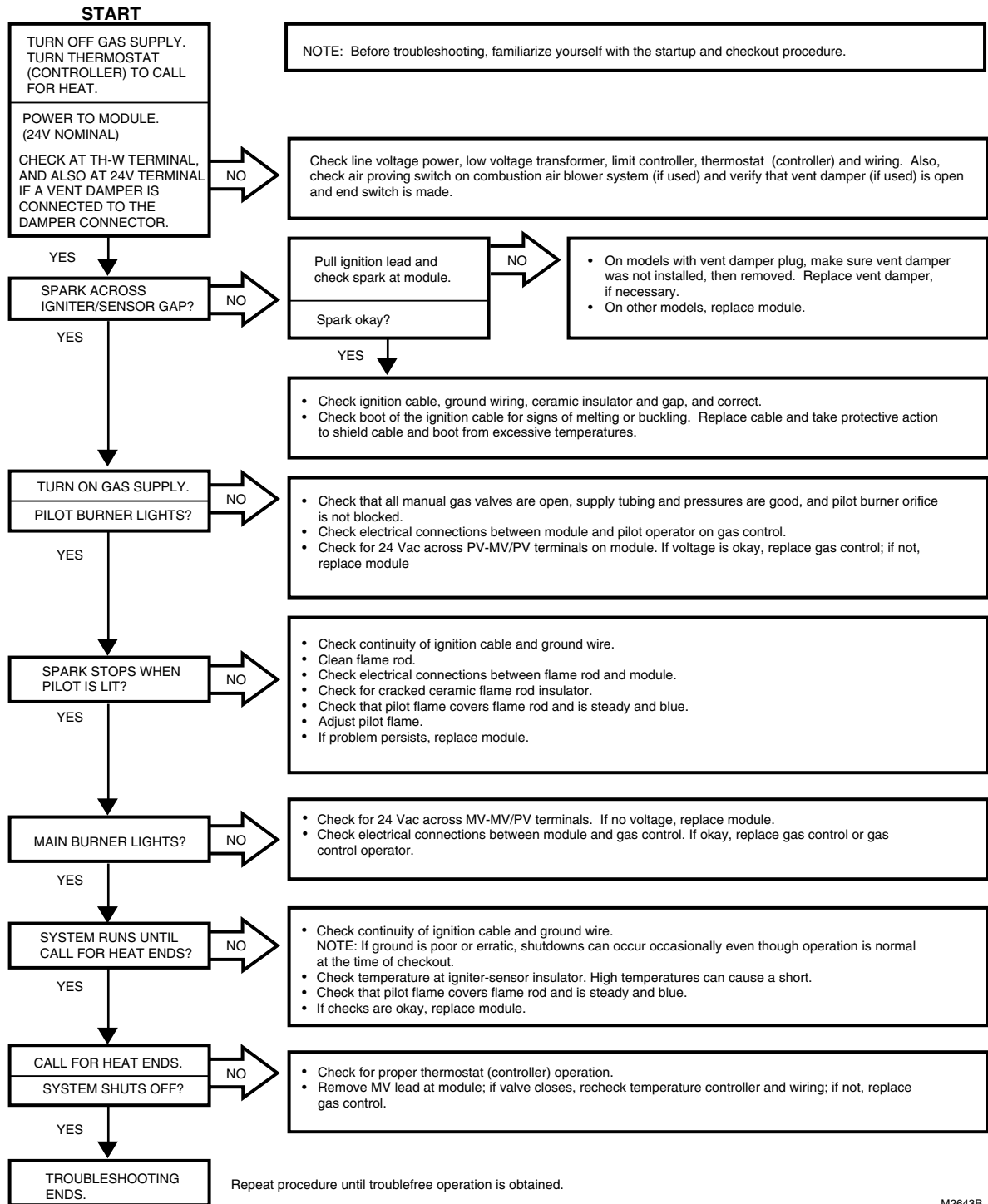


Fig. 8. S8610U Troubleshooting Guide.

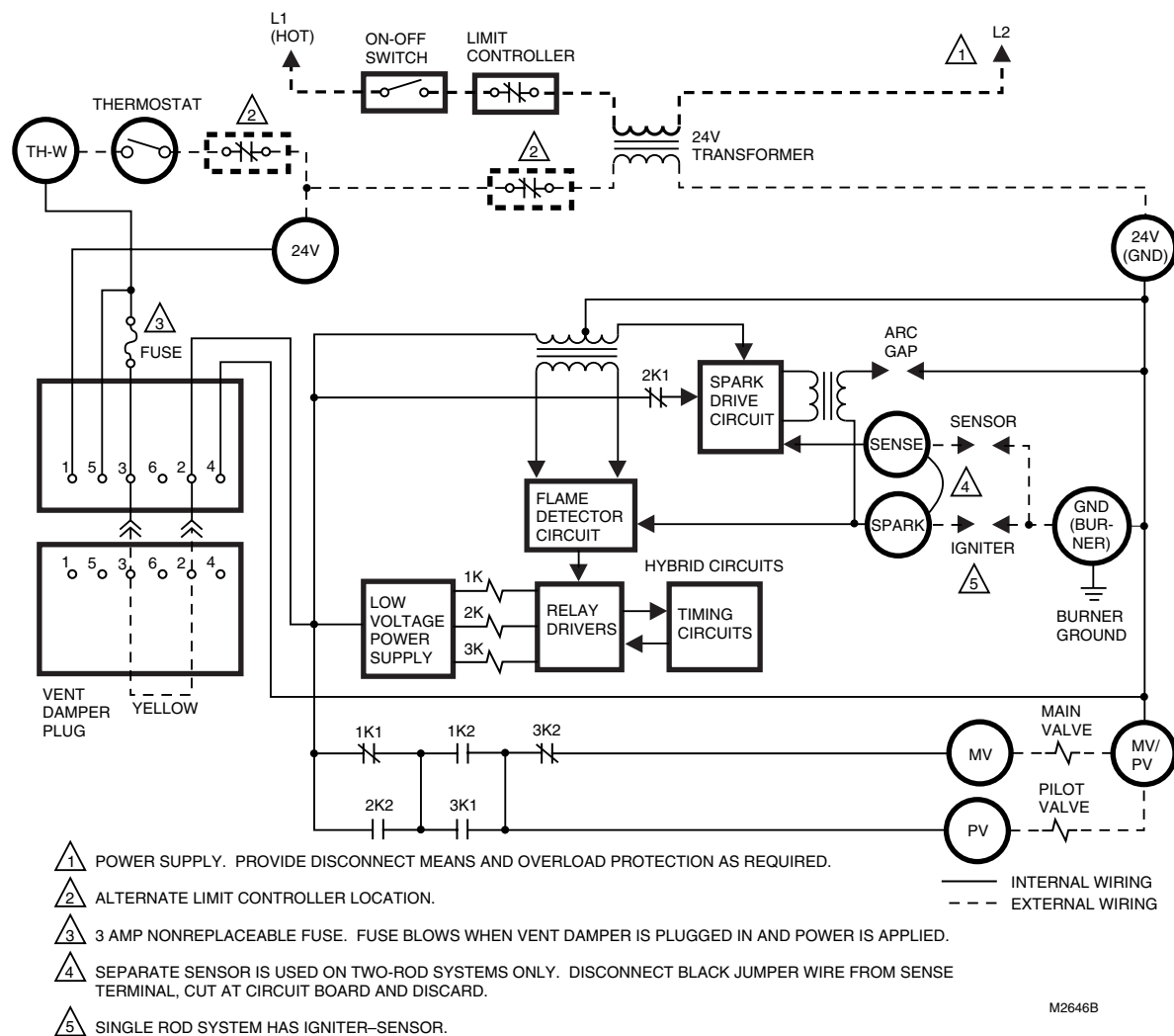


Fig. 9. Schematic for S8610U.

ANSI STANDARDS

Exhibit A

Recommended Procedure For Safety Inspection Of An Existing Appliance Installation As A Preliminary Step To Applying An Automatic Intermittent Pilot System

The following procedure is intended as a guide to aid in determining that an appliance is properly installed and is in a safe condition for continuing use.

This procedure is predicated on central furnace and boiler installations equipped with an atmospheric gas burner(s) and not of the direct vent type. It should be recognized that generalized test procedures cannot anticipate all situations. Accordingly, in some cases, deviation from this procedure may be necessary to determine safe operation of the equipment.

- a. This procedure should be performed prior to any attempt at modification of the appliance or the installation.
- b. If it is determined there is a condition which could result in unsafe operation, the appliance should be shut off and the owner advised of the unsafe condition.

The following steps should be followed in making the safety inspection:

- 1 Conduct a Gas Leakage Test of the appliance piping and control system downstream of the shutoff valve in the supply line to the appliance.
- 2 Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restrictions, leakage or corrosion or other deficiencies that could cause an unsafe condition.
- 3 Shut off all gas to the appliance and shut off any other fuel-burning appliance within the same room. Use the shutoff valve in the shutoff valve in the supply line to each appliance.
- 4 Inspect burners and crossovers for blockage and corrosion.
- 5 Applicable only to warm air heating appliances. Inspect heat exchangers for cracks, openings or excessive corrosion.
- 6 Applicable only to boilers. Inspect for evidence of water or combustion product leaks.
- 7 Insofar as is practical, close all building doors and windows and all doors between the space in which the appliance is located and other spaces of the building. Turn on clothes dryers. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers. If, after completing steps 7 through 12, it is believed sufficient combustion air is not available, refer to 1.3.4 of the National Fuel Gas Code (Z223.1) for guidance.
- 8 Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
- 9 a. Determine that the pilot is burning properly and that main burner ignition is satisfactory by interrupting and re-establishing the electrical supply to the appliance in any convenient manner.
- 10 Determine manifold pressure in order to match input after the new control is installed.
- 11 a. Visually determine that main burner gas is burning properly; i.e., no floating, lifting or flashback. Adjust the primary air shutter(s) as required.
- b. If appliance is equipped with high and low flame control or flame modulation, check for proper main burner operation at low flame.
- 12 Test for spillage at the draft hood relief opening after five minutes of main burner operation. Use a draft gauge, the flame of a match or candle, or smoke from a cigarette, cigar or pipe.
- 13 Return doors, windows, exhaust fans, fireplace dampers and all other fuel-burning appliances to their previous conditions of use.
- 14 Applicable only to warm air heating appliances. Check both limit controller and fan controller for proper operation. Limit controller operation can be checked by temporarily disconnecting the electrical supply to the blower motor and determining that the limit control acts to shut off the main burner gas.
- 15 Applicable only to boilers:
 - a. Determine that the circulating water pumps are in operating condition.
 - b. Test low water cutoffs, automatic feed controls, pressure and temperature limit controls and relief valves in accordance with the manufacturer's recommendations and instructions to determine they are in operating condition.

Exhibit A Of ANSI Standard Z21.71 for Automatic Intermittent Pilot Ignition Systems for Field Installation.

Exhibit B

Procedure for Installing Automatic Intermittent Pilot Systems

Prior to beginning this procedure, a preliminary examination of the appliance and the automatic intermittent pilot system should be made to determine that the automatic intermittent pilot system can be properly applied to the appliance.

This procedure is intended as a guide to aid in safely installing a listed automatic intermittent pilot system on an existing listed appliance equipped with an atmospheric gas burner(s) and not of the direct vent type.

This procedure is based on the assumption that the history of the specific installation has been one of safe and satisfactory operation.

This procedure is predicated on central furnace and boiler installations, and it should be recognized that generalized procedures cannot anticipate all situations. Accordingly, in some cases, deviation from this procedure may be necessary to determine safe operation of the equipment.

The following steps should be followed in making the modifications:

- ① Perform a safety inspection of the existing appliance installation. See Exhibit A for a recommended procedure for such a safety inspection.
- ② Shut off all gas and electricity to the appliance. To shut off gas, use the shutoff valve in the supply line to the appliance. Do not use the shut-off valve which is provided as part of a combination control.
- ③ Install the automatic intermittent pilot system in strict accordance with the manufacturer's installation instructions.
- ④ Turn on all gas and electricity to the appliance.
- ⑤ Determine that the appliance transformer has adequate capacity by following the steps outlined below:
 - a. Compute the approximate current draw by adding the current draw of the automatic intermittent pilot system to (1) the current draw of the associated valving, and (2) the current draw of any relays or other devices operated by the transformer.
 - b. Multiply the total current draw as computed above by 24V to determine the total volt-ampere (VA) required.
 - c. The total VA required should be equal to or less than the VA rating of the transformer.
 - d. If the total VA required is greater than the VA rating of the transformer, the transformer must be replaced with a Class 2 transformer of adequate rating.
- ⑥ Check the heat anticipator in the comfort thermostat to determine if it is properly adjusted to the current draw of the control system. Follow the thermostat manufacturer's instructions.
- ⑦ Make certain wiring connections are tight and wires are positioned and secured so they will not be able to contact high temperature locations.
- ⑧ Conduct a Gas Leakage Test of the appliance piping and control system downstream of the shutoff valve in the supply line to the appliance.
- ⑨
 - a. Adjust the thermostat to its highest temperature setting, and test manifold pressure and adjust the pressure regulator to match original input as required (refer to Exhibit A, step 9b).
 - b. Visually determine that main burner is burning properly; i.e., no floating, lifting or flashback. Adjust the primary air shutter(s) as required.
- ⑩ If the appliance is equipped with high and low flame control or flame modulation, check for proper main burner operation at both high and low flame.
- ⑪ Determine that the pilot is igniting and burning properly and that main burner ignition is satisfactory by interrupting and reestablishing the electrical supply to the appliance in any convenient manner. Make this determination with the appliance burner both cold and hot. Perform this step as many times as is necessary to satisfy yourself that the automatic intermittent pilot system is operating properly.
- ⑫ Test the pilot safety device (1) to determine if it is operating properly, and (2) for turndown characteristics according to the manufacturer's installation instructions. No adjustments should be made other than those recommended by the system manufacturer.
- ⑬ Sequence the appliance through at least three operating cycles.
- ⑭ Applicable only to furnaces. Check both the limit controller and the fan controller for proper operation. Limit control operation can be checked by blocking the circulating air inlet or temporarily disconnecting the electrical supply to the blower motor and determining that the limit controller acts to shut off the main burner gas.
- ⑮ Applicable only to boilers:
 - a. Determine that the circulating water pumps are in operating condition.
 - b. Test low water cutoffs, automatic feed water controls, pressure and temperature limit controllers and relief valves in accordance with the manufacturer's recommendation to determine they are in operating condition.
- ⑯ Add the labels (see 1.6.1-n and -o) on the appliance.

EXHIBIT B OF ANSI STANDARD Z21.71 FOR AUTOMATIC INTERMITTENT PILOT IGNITION SYSTEMS FOR FIELD INSTALLATION.

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