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Vented Hearth	☐	☐	☐
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Empire Comfort Systems Inc. • 918 Freeburg Avenue • Belleville, Illinois 62220-2623
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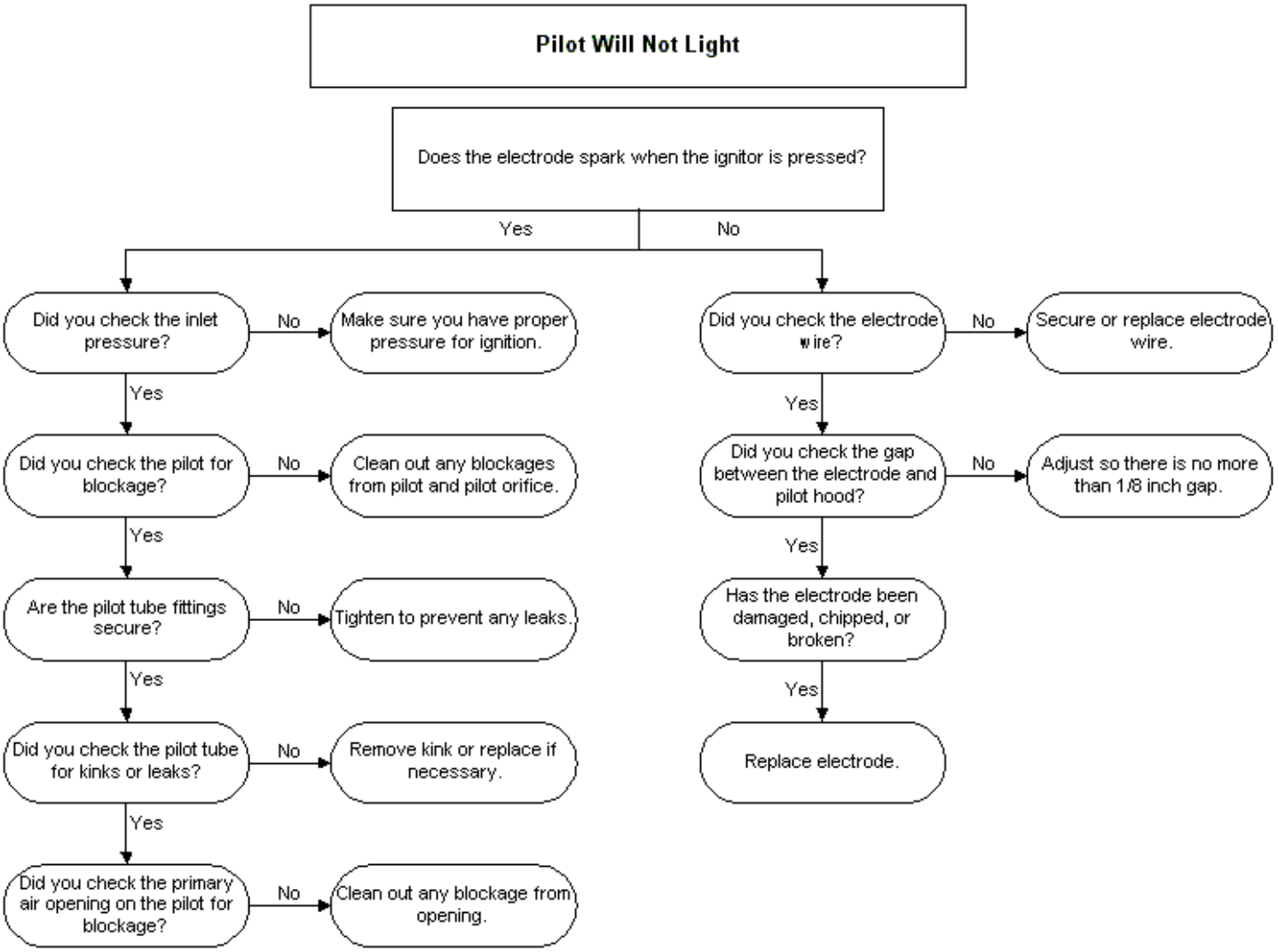
Heater Technical Service And Troubleshooting Manual

TABLE OF CONTENTS

Vent Free Heater Troubleshooting

DIAGNOSING VENT FREE HEATERS



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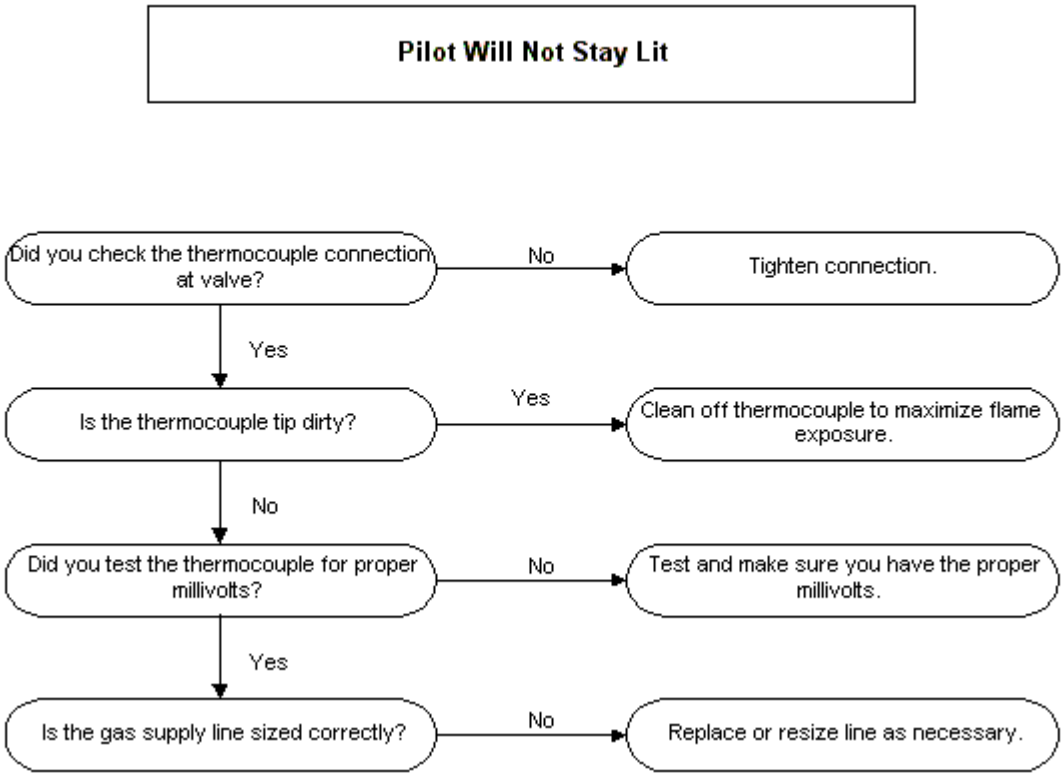

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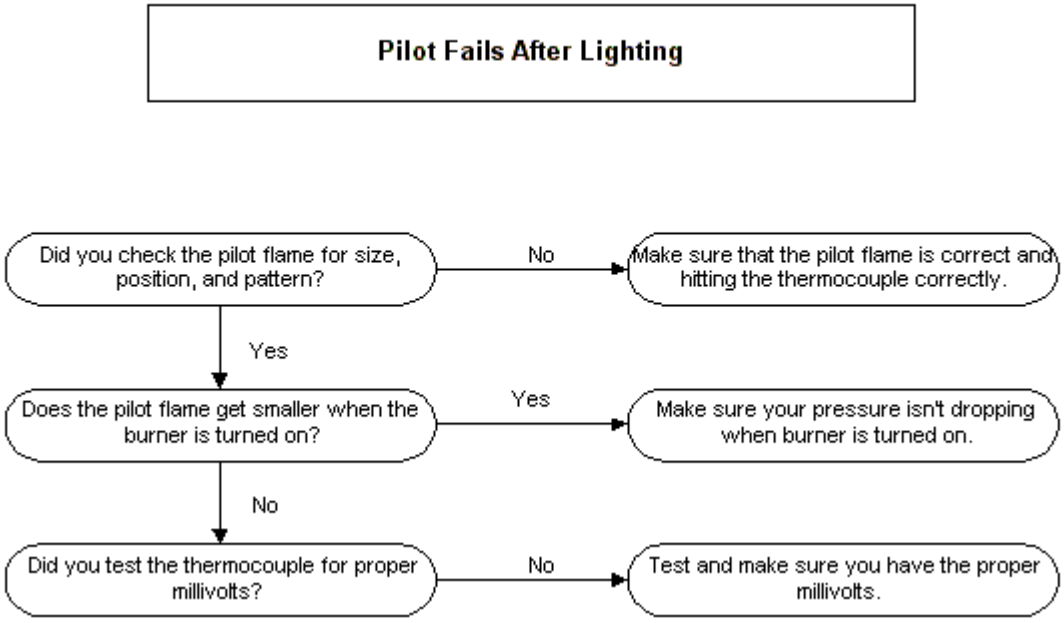

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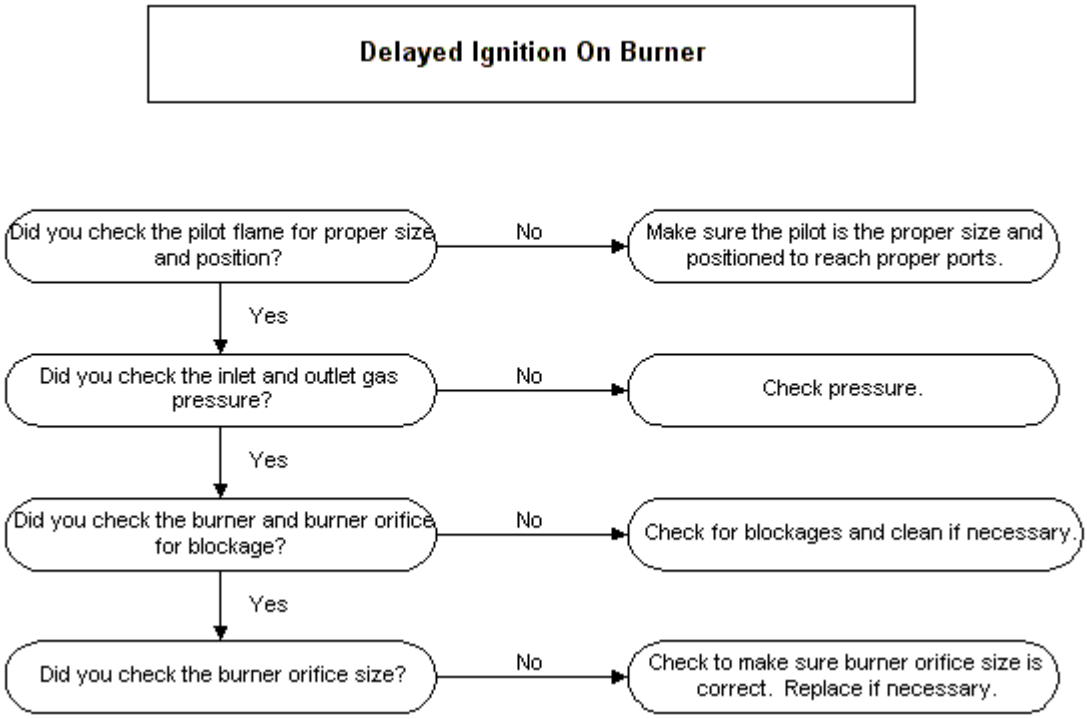

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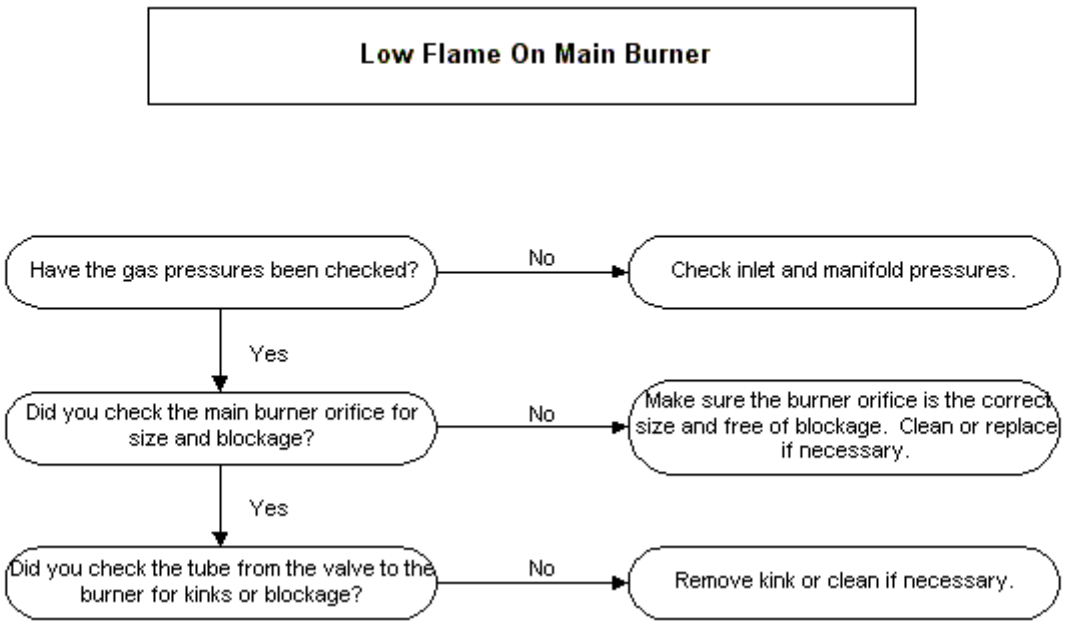

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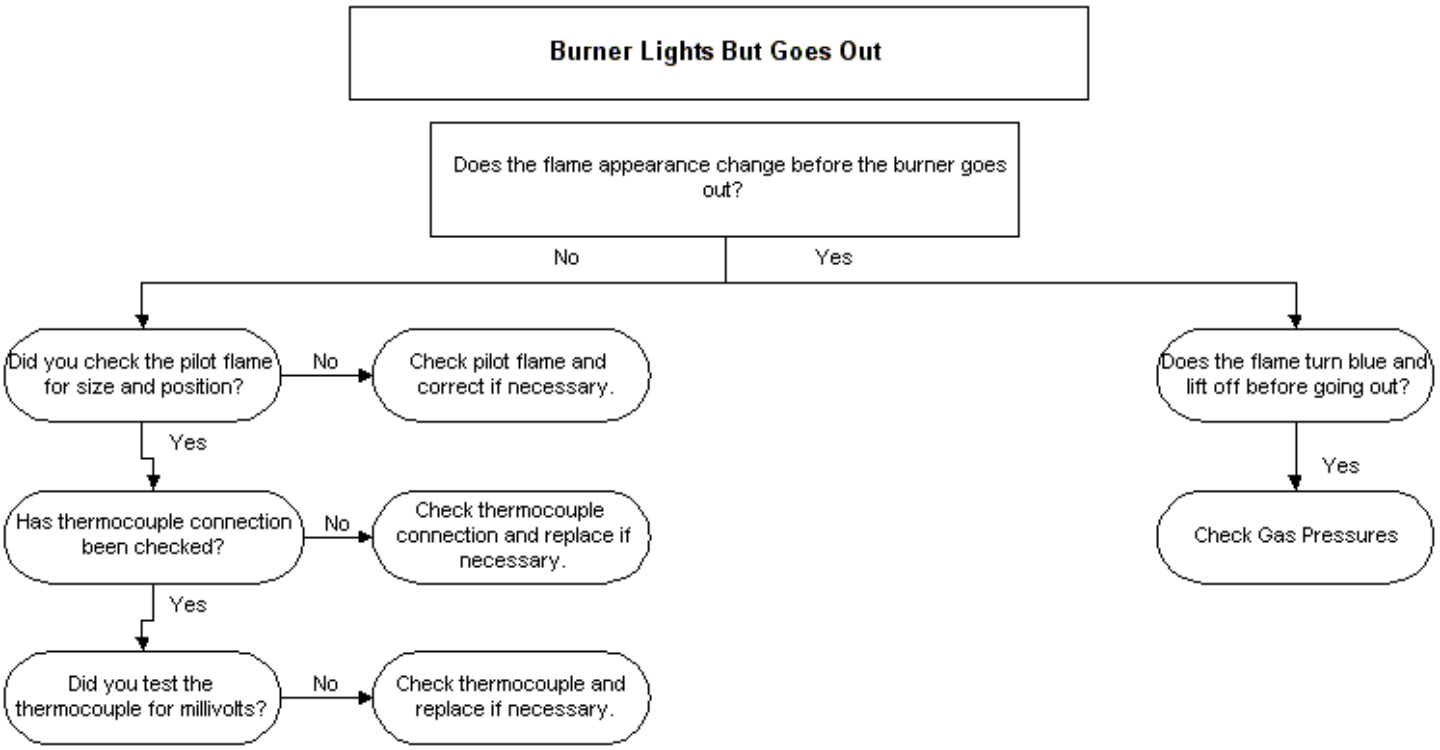

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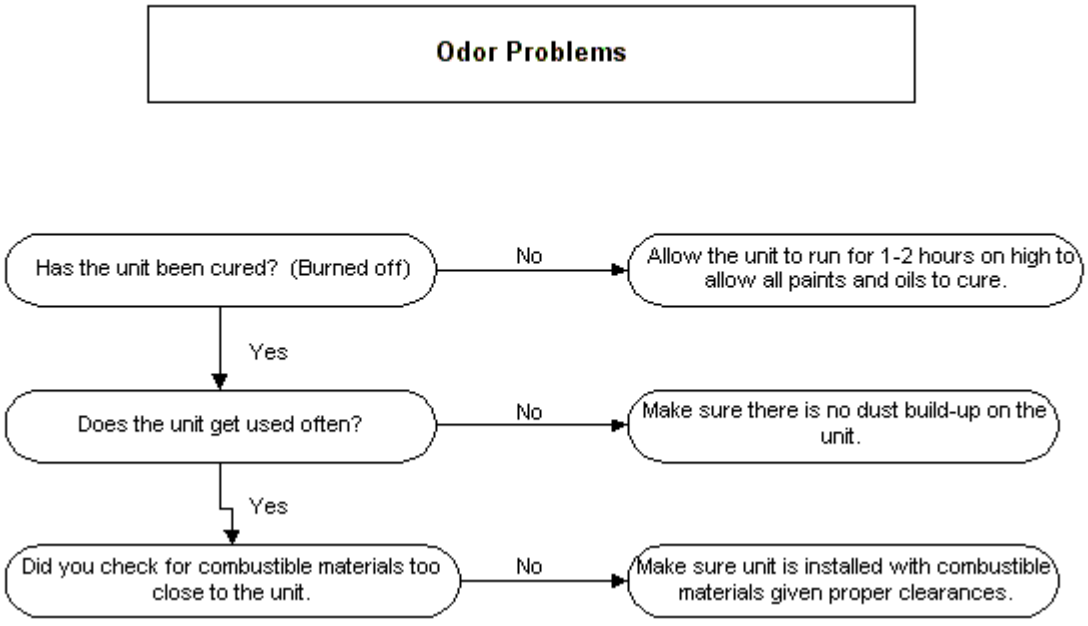

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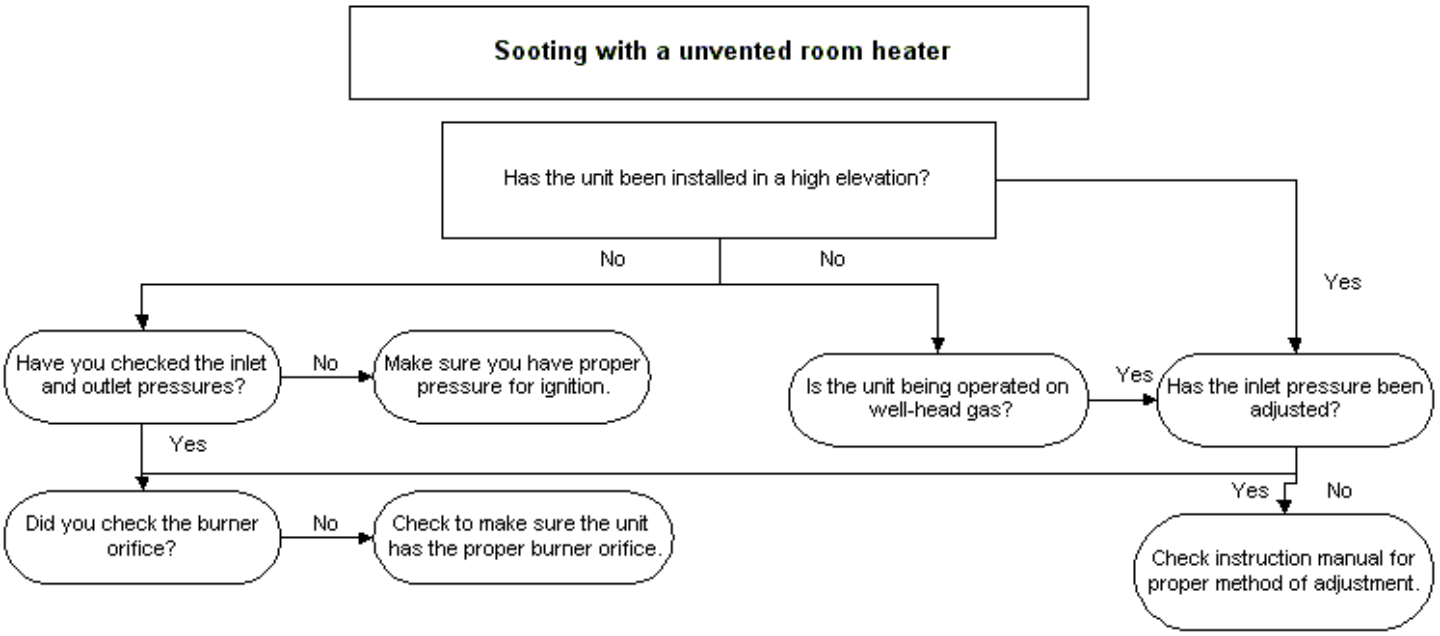


SR Series Heater Troubleshooting

LIGHTING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

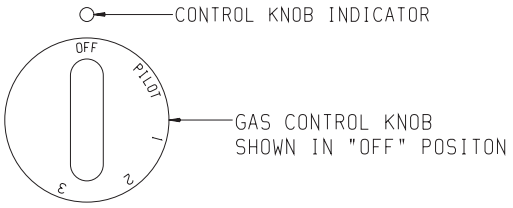
- Do not try to light any appliance.
- Do not touch any electrical switch; Do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.

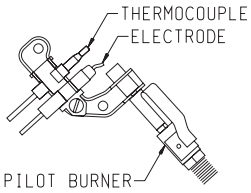
D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

LIGHTING INSTRUCTIONS

1. STOP! Read the safety information above.
2. Turn off all electric power to the appliance (if applicable).
3. Push in manual gas control knob slightly and turn clockwise to “OFF”. Do not force. SR-18 OR SR-30 KNOB SHOWN.



4. Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow “B” in the safety information above. If you don’t smell gas, go to the next step.
5. Find pilot - the pilot is attached at the bottom of the burner assembly .
6. Turn manual gas control knob counterclockwise to "PILOT."



7. Push in manual gas control knob all the way and hold in. Repeatedly push the piezo ignitor button until pilot is lit (or use a match to light pilot). Continue to hold the control knob in for about one (1) minute after the pilot is lit. Release knob and it will pop back up. Pilot should remain lit. If it goes out, repeat steps 3 through 7.
   - If knob does not pop up when released, stop and immediately call your service technician or gas supplier.
   - If the pilot will not stay lit after several tries, turn the gas control knob to “OFF” and call your service technician or gas supplier.
8. Three heat settings can be selected by slightly depressing the manual gas control knob and turning the manual gas control knob counterclockwise to:
   Position 1 (SR-6, SR-10, SR-18 or SR-30)
   Position 2 (SR-18 or SR-30)
   Position 3 (SR-18 or SR-30).
9. CAUTION! When the manual gas control knob has been turned to desired heat setting, ensure the manual gas control knob is locked into that heat setting and cannot be turned without being depressed.
   If the manual gas control knob is in mid-position, between heat settings, incomplete combustion will take place, causing odor, and may produce gas leakage or carbon monoxide.
10. Turn on all electric power to appliance (if applicable).

TO TURN OFF GAS TO APPLIANCE

1. Turn off all electric power to appliance if service is to be performed (if applicable).
2. Push in manual gas control knob slightly and turn clockwise to "OFF". Do not force.

SR-6 CLEARANCES

When facing the front of the appliance the following minimum clearances to combustible construction must be maintained.

Left side 6 inches (152mm). Right side 6 inches 152mm).
Do not install in alcove or closet.
Rear wall 0 (0mm) inches. Ceiling 24 inches (610mm).
Minimum vertical clearance from a projection above the appliance (shelves, window sills, etc.) 10 inches (254mm).
Maximum horizontal extension of projection above the appliance 12 inches (305mm).
Floor (top surface of carpeting, tile, etc.) 2 inches (51mm).

Provide adequate clearances around air openings.

Adequate accessibility clearances for purposes of servicing and proper operation must be provided.

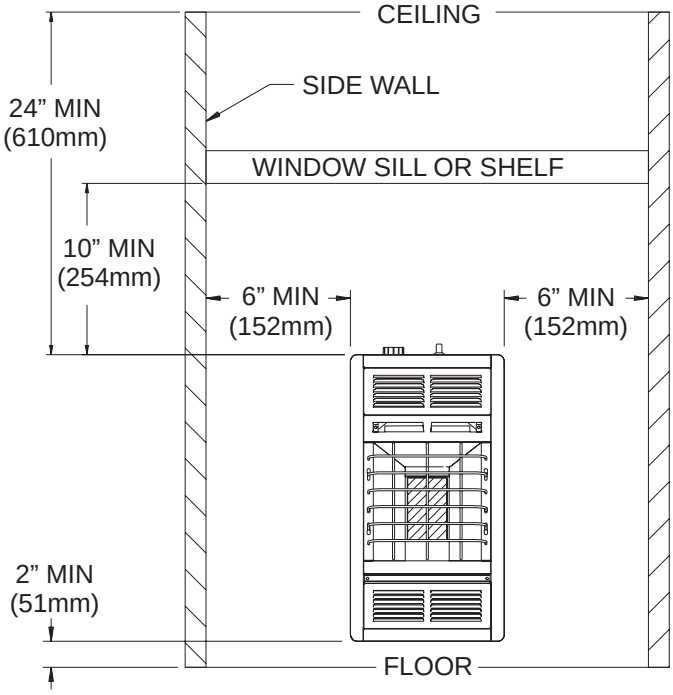


Figure 1 (SR-6)

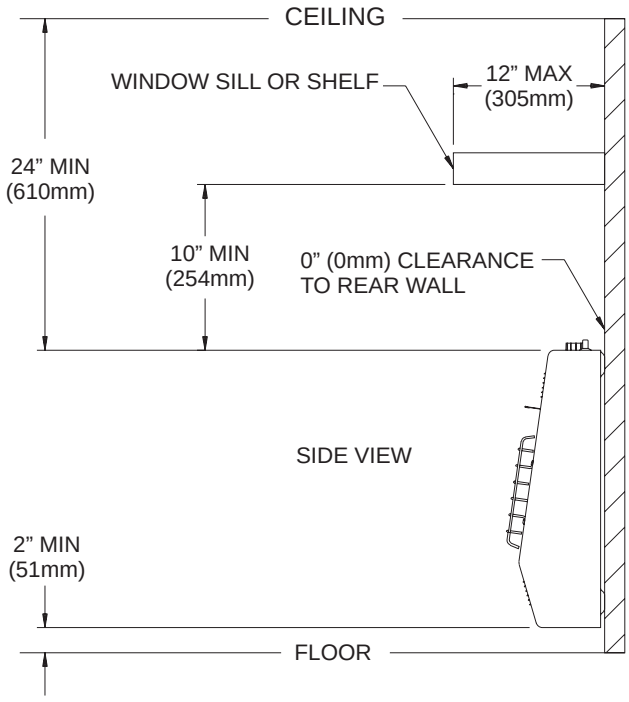


Figure 2 (SR-6)

SR-10 CLEARANCES

When facing the front of the appliance the following minimum clearances to combustible construction must be maintained.

Left side 6 inches (152mm). Right side 6 inches (152mm).
Do not install in alcove or closet.
Rear wall 0 inches (0mm). Ceiling 24 inches (610mm).
Minimum vertical clearance from a projection above the appliance (shelves, window sills, etc.) 14 inches (356mm).
Maximum horizontal extension of projection above the appliance 12 inches (305mm).
Floor (top surface of carpeting, tile, etc.) 2 inches (51mm).

Provide adequate clearances around air openings.

Adequate accessibility clearances for purposes of servicing and proper operation must be provided.

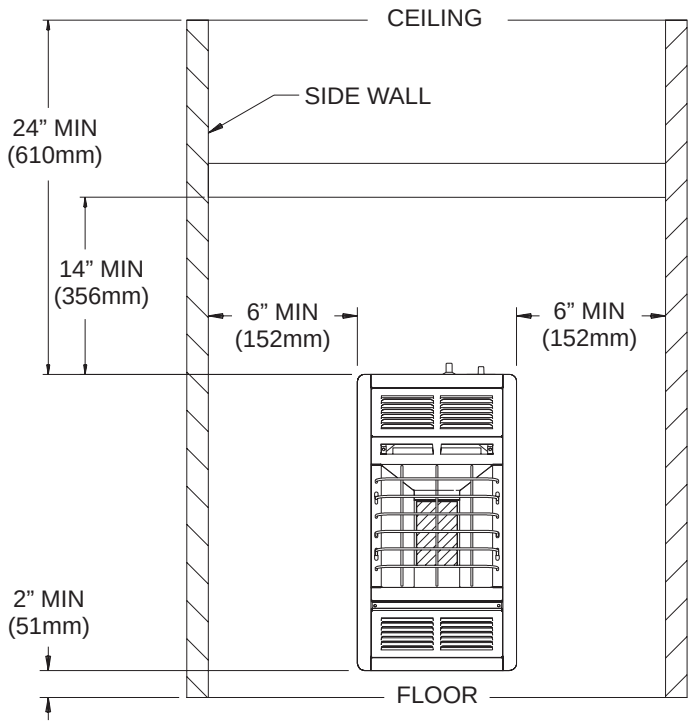


Figure 3 (SR-10)

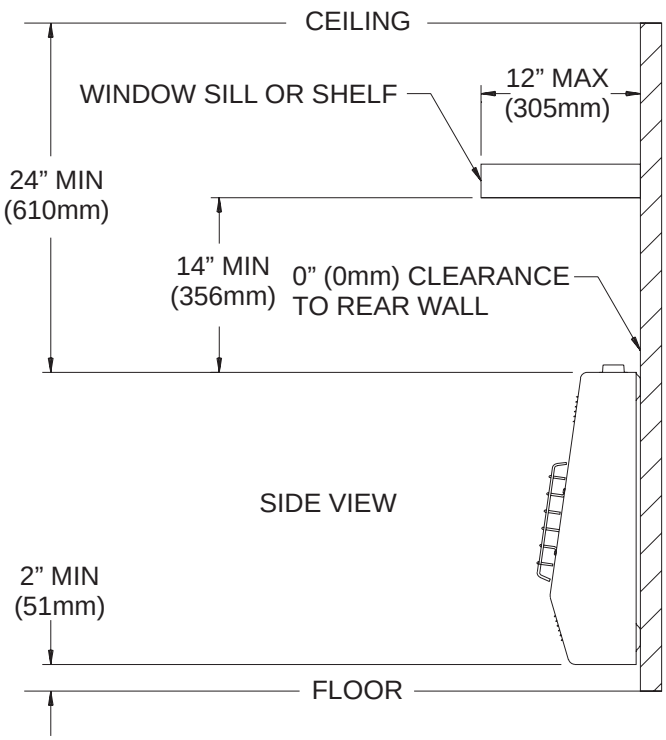


Figure 4 (SR-10)

SR-18 CLEARANCES

When facing the front of the appliance the following minimum clearances to combustible construction must be maintained.

Left side 6 inches (152mm). Right side 6 inches (152mm).
Do not install in alcove or closet.
Rear wall 0 inches (0mm). Ceiling 36 inches (914mm).
Minimum vertical clearance from a projection above the appliance (shelves, window sills, etc.) 36 inches (914mm).
Floor (top surface of carpeting, tile, etc.) 2 inches (51mm).

Provide adequate clearances around air openings.

Adequate accessibility clearances for purposes of servicing and proper operation must be provided.

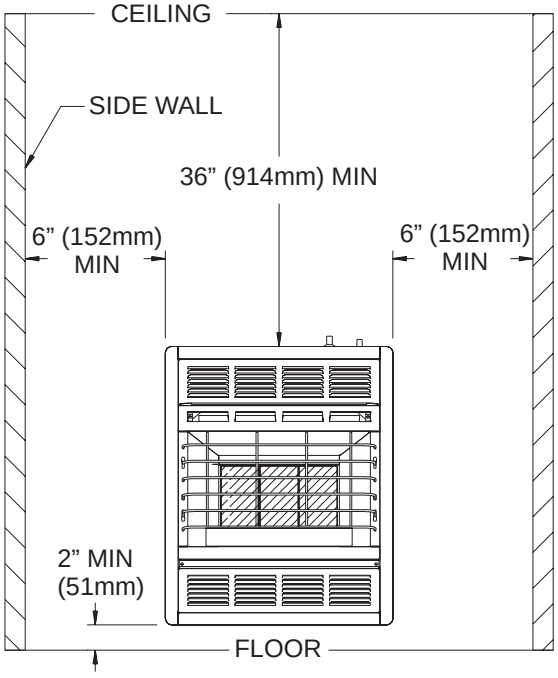


Figure 5 (SR-18)

SR-30 CLEARANCES

When facing the front of the appliance the following minimum clearances to combustible construction must be maintained.

Left side 8 inches (203mm). Right side 8 inches (203mm).
Do not install in alcove or closet.
Rear wall 0 inches (0mm). Ceiling 36 inches (914mm).
Minimum vertical clearance from a projection above the appliance (shelves, window sills, etc.) 36 inches (914mm).
Floor (top surface of carpeting, tile, etc.) 2 inches (51mm).

Provide adequate clearances around air openings.

Adequate accessibility clearances for purposes of servicing and proper operation must be provided.

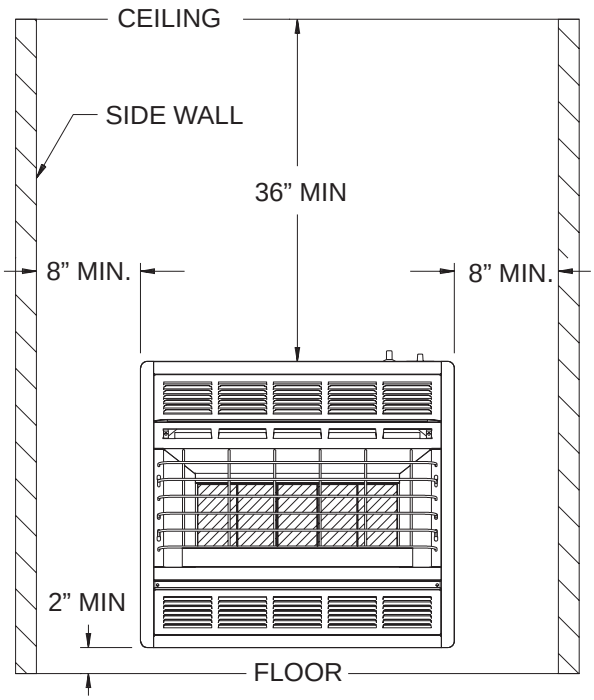


Figure 6 (SR-30)

MAIN BURNER FLAME CHARACTERISTICS

SR-6 Main Burner Flame (Figure 7)

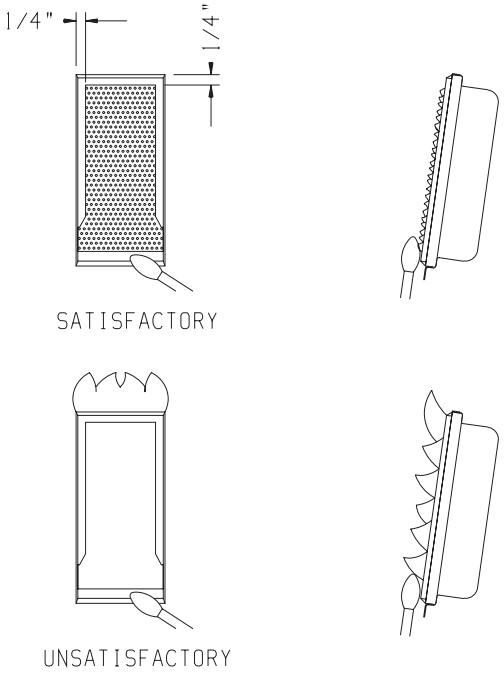
The main burner flame will have a red-orange glow over the surface of the ceramic plaque. The red-orange glow on the surface of the ceramic plaque will have a pattern in the shape of a number 1. The perimeter of the ceramic plaque [approximately the outside 1/4"(6mm)] will not glow. A few small, hairline cracks may form over the surface of the ceramic plaques or at the edges of the ceramic plaques where they have been cemented into position on the burner assembly frame. These small, hairline cracks will not affect the operation or performance of the ceramic plaques. Only, when large cracks develop, with blue flames escaping from the large cracks, should you contact your QUALIFIED SERVICE PERSON.

SR-10, SR-18 and SR-30 Main Burner Flame (Figure 8)

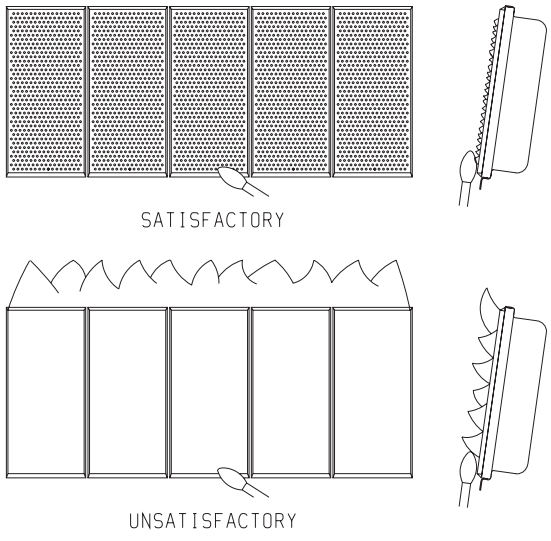
The main burner flame will have a red-orange glow over the surface of the ceramic plaques. A few small, hairline cracks may form over the surface of the ceramic plaques or at the edges of the ceramic plaques where they have been cemented into position on the burner assembly frame. These small, hairline cracks will not affect the operation or performance of the ceramic plaques. Only, when large cracks develop, with blue flames escaping from the large cracks, should you contact your QUALIFIED SERVICE PERSON.

A red-orange haze that is visible on the ceramic plaques is acceptable. A blue flame that rolls out at the top of the ceramic plaques indicates an accumulation of dust, lint or spider webs inside the casing assembly and main burner assembly. Use the following procedure to inspect the casing assembly and main burner assembly.

1. Turn OFF gas supply to the heater.
2. Turn OFF electric supply to the heater if optional blower is installed in heater.
3. Remove lower louver from casing assembly (2 screws).
4. Remove reflector from casing assembly (2 screws).
5. Inspect interior of casing assembly for accumulation of dust, lint or spider webs. If necessary, clean interior of casing assembly with a vacuum cleaner or apply air pressure. Do not damage any components within casing assembly when you are cleaning.
6. Remove pilot bracket from main burner assembly (2 screws).
7. Pivot pilot bracket with attached pilot away from main burner assembly (do not damage pilot tubing).
8. Inspect main burner orifice(s) through the rectangular opening(s) in the venturi (throat) of the main burner(s). Dust, lint and spider webs can accumulate on top of the main burner orifice(s). If necessary, clean main burner orifice(s) with a vacuum cleaner or apply air pressure. To thoroughly clean the main burner orifice(s) proceed to Step 9.
9. Disconnect supply tubing from orifice holder(s).
10. Remove orifice holder from venturi of main burner assembly (1 screw for each orifice holder).
11. Remove main burner orifice from orifice holder.
12. Apply air pressure through main burner orifice and orifice holder to remove dust, lint or spider webs.
13. Apply air pressure into ceramic plaque(s) to remove dust, lint or spider webs.
14. As parts are being replaced in reverse order, check for gas leaks at all gas connections before lower louver is replaced onto casing assembly.



SR-6
Figure 7



SR-30 Shown
Figure 8

PILOT FLAME CHARACTERISTICS

The correct flame will be blue and will extend beyond the thermocouple. The flame will surround the thermocouple just below the tip. A slight yellow flame may occur where the pilot flame and main burner flame meet.

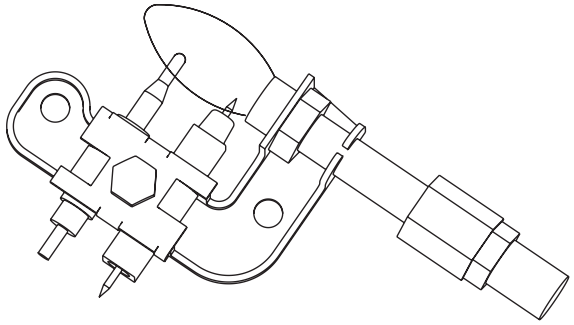


Figure 9

Oxygen Depletion Sensor Pilot (Figure 10)

When the pilot has a large yellow tip flame, clean the Oxygen Depletion Sensor as follows:

1. Clean the ODS pilot by loosening nut B from the pilot tubing. When this procedure is required, grasp nut A with an open end wrench.
2. Blow air pressure through the holes indicated by the arrows. This will blow our foreign materials such as dust, lint and spider webs. Tighten nut B also by grasping nut A.

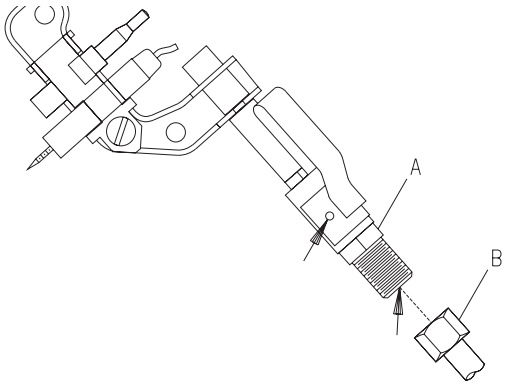


Figure 10

Warning:
Never use needles, wires, or similar cylindrical objects to clean the pilot to avoid damaging the calibrated ruby that controls the gas flow.

MAIN BURNER OPERATION

The main burner operation is MANUAL. The owner must manually place the main burner in operation. The owner will either select one, three or five plaques to be in operation. Once the owner has turned the main burner ON, it will continue to operate until the owner manually turns the main burner OFF.

Description of Manual Gas Control Knob:

OFF position.

PILOT position.

SR-6

Position 1 Will have one plaque in operation, the input will be 6,000 BTUH (1.8KW/H).

SR-10

Position 1 Will have one plaque in operation, the input will be 10,000 BTUH(2.9KW/H).

SR-18

Position 1 Will have one plaque in operation, the input will be 6,700 BTUH (2KW/H).

Position 2 Will have two plaques in operation, the input will be 12,000 BTUH (3.5KW/H).

Position 3 Will have three plaques in operation, the input will be 18,000 BTUH (5.3KW/H).

SR-30

Position 1 Will have one plaque in operation, the input will be 8,000 BTUH (2.3KW/H) for Natural gas and 7,000 Btuh (2.1KW/H) for Propane/LP gas.

Position 2 Will have three plaques in operation, the input will be 18,000 BTUH (5.3KW/H).

Position 3 Will have five plaques in operation, the input will be 30,000 BTUH (8.8KW/H).

APPLIANCE MAINTENANCE

Removing Pilot/Thermocouple From Main Burner Assembly
Attention: The thermocouple CAN NOT be replaced as an individual item. You must order a new pilot when replacing thermocouple.

1. Turn OFF gas supply to the heater.
2. Turn OFF electrical supply to the heater if optional blower is installed in heater.
3. Remove lower louver from casing assembly (2 screws).
4. Remove reflector from casing assembly (2 screws).
5. Disconnect pilot tubing from pilot (see Figure 10, Sect 1:17). Grasp nut A with a wrench when removing nut B with a second wrench.
6. Remove pilot from pilot bracket (2 screws).
7. Remove thermocouple lead from gas valve.
8. As parts are being replaced in reverse order, check for gas leaks at all gas connections before lower louver is replaced onto casing assembly.

Removing Main Burner Orifice(s) From Main Burner Assembly

1. Turn OFF gas supply to the heater.
2. Turn OFF electrical supply to the heater if optional blower is installed in heater.
3. Remove lower louver from casing assembly (2 screws).
4. Remove reflector from casing assembly (2 screws).
5. Remove pilot bracket from main burner assembly (2 screws).
6. Pivot pilot bracket with attached pilot away from main burner assembly (do not damage pilot tubing).
7. Disconnect supply tubing from orifice holder(s).
8. Remove orifice holder from venturi of main burner assembly (1 screw for each orifice holder).
9. Remove main burner orifice from orifice holder. Attention: The number stamped on the main burner orifice is a millimeter diameter.
10. As parts are being replaced in reverse order, check for gas leaks at all gas connections before lower louver is replaced onto casing assembly.

Removing Manual Gas Control From Casing Assembly

1. Turn OFF gas supply to the heater.
2. Turn OFF electrical supply to the heater if optional blower is installed in heater.
3. Remove lower louver from casing assembly (2 screws).
4. Remove reflector from casing assembly (2 screws).
5. Disconnect inlet supply tubing, outlet supply tubing, pilot supply tubing and thermocouple lead from manual gas control.
6. If heater is attached to wall, disconnect gas supply line from inlet regulator.
7. Remove heater from wall.
8. Remove cotter pin from manual gas control rod.
9. Remove manual gas control bracket from casing assembly (3 screws to be removed are located on casing assembly back).
10. Loosen nut that secures manual gas control to bracket. Remove manual gas control from bracket.
11. As parts are being replaced in reverse order, check for gas leaks at all gas connections before reflector and lower louver are replaced onto casing assembly.

Removing Main Burner From Casing Assembly

1. Turn OFF gas supply to the heater.
2. Turn OFF electrical supply to the heater if optional blower is installed in heater.
3. Remove lower louver from casing assembly (2 screws).
4. Remove reflector from casing assembly (2 screws).
5. Disconnect supply tubing from orifice holder(s).
6. Remove pilot bracket from main burner assembly (2 screws).
7. Remove main burner assembly from casing assembly (4 screws).
8. Remove orifice shield from main burner assembly. Attach orifice shield to new main burner assembly.
9. As parts are being replaced in reverse order, check for gas leaks at all gas connections before lower louver is replaced onto casing assembly.

Piezo Pilot Ignitor Instructions

Depressing the ignitor button completely causes a spark to occur at the pilot.

To light the pilot, it is important that the electrode be 1/8" (3mm) from the pilot. The spark must occur at the point the pilot flame hits the thermocouple.

On a new installation with air in the gas line, it is suggested that a match be used. The match will light the pilot faster than the piezo under this condition.

TROUBLESHOOTING

1. Spark electrode does not produce spark.
   a. Spark electrode broken - replace.
   b. Ignitor wire may not be attached to spark electrode - attach.
   c. Ignitor wire damaged - replace.
   d. Piezo ignitor defective - replace.

2. Spark electrode produces spark but pilot does not light.
   a. No gas to heater - turn on gas.
   b. PILOT position not properly aligned - turn gas control knob to PILOT position and depress.
   c. Pilot is blocked from spider web or dirt - clean pilot, see Sect 1:16.

3. Pilot flame does not stay "ON" when control knob is released.
   a. Control knob in PILOT position not completely depressed or held in long enough.
   b. Thermocouple not tightened into gas control - tighten thermocouple.
   c. Pilot flame not surrounding thermocouple - clean pilot, see Sect 1:17.
   d. Inlet gas pressure too low, contact gas supplier.
   e. Thermocouple defective - replace.
   f. Gas control defective - replace.

4. Main burner does not ignite.
   a. Main burner orifice is blocked - clean, see "Main Burner Flame Characteristics," Sect 1:16. Attention: The number stamped on the main burner orifice is a millimeter diameter.
   b. Inlet gas pressure too low, contact gas supplier.

5. Heater keeps shutting "OFF" during normal operation.
   a. Pilot is blocked - clean pilot, see Sect 1:17.
   b. Inlet gas pressure too low, contact gas supplier

BF Series Heater Troubleshooting

LIGHTING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

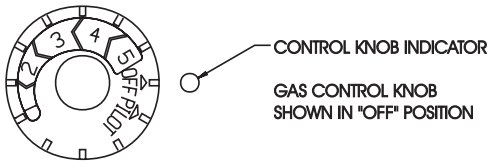
WHAT TO DO IF YOU SMELL GAS
- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.

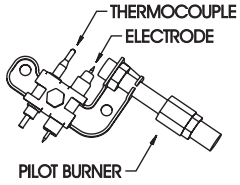
D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

LIGHTING INSTRUCTIONS

1. STOP! Read the safety information above.
2. Set thermostat (gas control knob) to lowest setting.
3. Turn off all electric power to the appliance (if applicable).
4. Push in gas control knob slightly and turn clockwise to "OFF". Do not force.



5. Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.



6. Find pilot - the pilot is attached at the bottom of the burner assembly .
7. Turn gas control knob counterclockwise to "PILOT."
8. Push in gas control knob all the way and hold in. Repeatedly push the piezo ignitor button until pilot is lit (or use a match to light pilot). Continue to hold the control knob in for about one (1) minute after the pilot is lit. Release knob and it will pop back up. Pilot should remain lit. If it goes out, repeat steps 4 through 8.
   - If knob does not pop up when released, stop and immediately call your service technician or gas supplier.
   - If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.
9. Attention! Gas control has an INTERLOCK latching device. When the pilot is initially lit and the safety magnet is energized (pilot stays "ON") the INTERLOCK latching device becomes operative. If the gas control is turned to the "OFF" position or gas flow to the appliance is shut off, the pilot cannot be relighted until the safety magnet is de-energized (approximately 60 seconds). There will be an audible "click" when the safety magnet in the gas control is de-energized. Pilot can now be relighted. Repeat steps 4 through 8.
10. Turn gas control knob counterclockwise to "HI".
11. Turn on all electric power to appliance (if applicable).
12. Set thermostat (gas control knob) to desired setting from "HI" to "LO".

TO TURN OFF GAS TO APPLIANCE

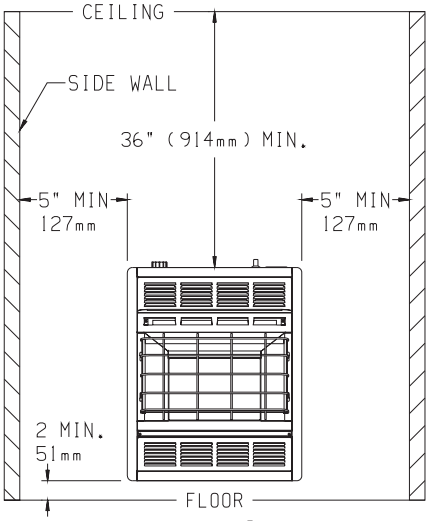
1. Set thermostat (gas control knob) to lowest setting.
2. Turn off all electric power to appliance if service is to be performed (if applicable).
3. Push in gas control knob slightly and turn clockwise to "OFF". Do not force.

CLEARANCES

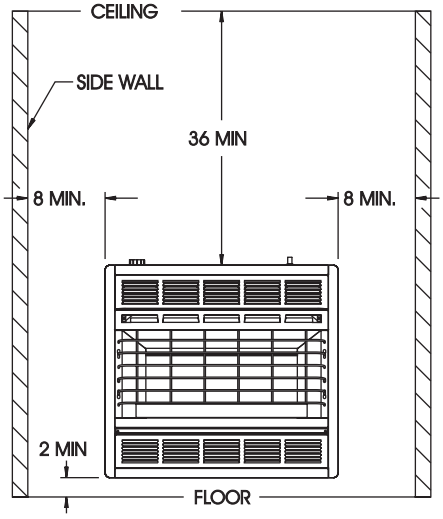
When facing the front of the appliance the following minimum clearances to combustible construction must be maintained.
Do not install in alcove or closet.

	BF-10/BF-20	BF-30
Left side	5" (127mm)	8" (203mm)
Right side	5" (127mm)	8" (203mm)
Rear wall	0" (0mm)	0" (0mm)
Ceiling	36" (914mm)	36" (914mm)
Minimum vertical clearance from a projections above the appliance (shelves, window sills, etc.)	36" (914mm)	36" (914mm)
Floor (top surface of carpeting, tile, etc.)	2" (51mm)	2" (51mm)

Provide adequate clearances around air openings.
Adequate accessibility clearances for purposes of servicing and proper operation must be provided.



BF-10 and BF-20
Figure 1



BF-30
Figure 2

MAIN BURNER FLAME CHARACTERISTICS

Piezo Pilot Ignitor Instructions

Depressing the ignitor button completely causes a spark to occur at the pilot.

To light the pilot, it is important that the electrode be 1/8" (3mm) from the pilot. The spark must occur at the point the pilot flame hits the thermocouple.

On a new installation with air in the gas line, it is suggested that a match be used. The match will light the pilot faster than the piezo under this condition.

There will be a short blue inner flame with a much larger, lighter blue, secondary flame. The burner flame may have a small yellow tip when hot. Dust in the combustion air will produce an orange or red flame. Do not mistake the orange or red flame for an improper yellow flame. Clean main burner by applying compressed air into ports and throat of main burner.

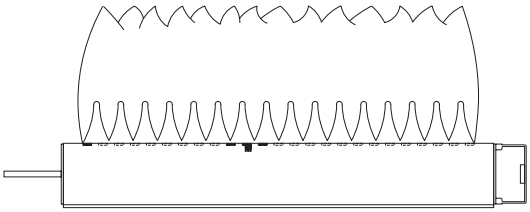


Figure 3

Attention: BF-10, Natural or Propane gas has a front and rear air shutter.
BF-20, Propane gas only has a front air shutter.
BF-30, Propane gas only has a front air shutter.

Air Shutter Adjustment (Figure 4)

The air shutter on main burner is factory set at a 3/32" opening. If yellow flames occur on main burner loosen 1/4" screw on air shutter in order to increase air shutter opening. The slot on air shutter allows the air opening to be increased or decreased. Tighten 1/4" screw on air shutter after air shutter adjustment has been completed.

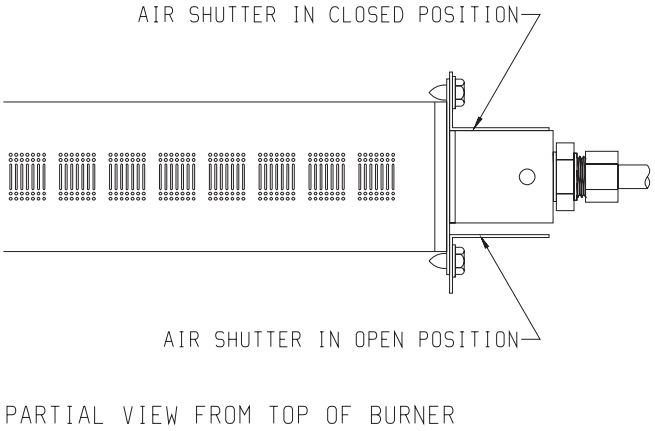


Figure 4

Cleaning Main Burner Orifice and Main Burner

1. Turn OFF gas supply to the heater.
2. Turn OFF electric supply to the heater if optional blower, SRB-18T or SRB-30T is installed in heater.
3. Remove lower louver from casing assembly (2 screws).
4. Remove reflector from casing assembly (2 screws).
5. Inspect interior of casing assembly for accumulation of dust, lint or spider webs. If necessary, clean interior of casing assembly with a vacuum cleaner or apply air pressure. Do not damage any components within casing assembly when you are cleaning.
6. Remove main burner orifice from orifice holder.
7. Apply air pressure through main burner orifice and orifice holder to remove dust, lint or spider webs.
8. Apply air pressure into main burner to remove dust, lint or spider webs.
9. As parts are being replaced in reverse order, check for gas leaks at all gas connections before lower louver is replaced onto casing assembly.

PILOT FLAME CHARACTERISTICS

The correct flame will be blue and will extend beyond the thermocouple. The flame will surround the thermocouple just below the tip. A slight yellow flame may occur where the pilot flame and main burner flame meet.

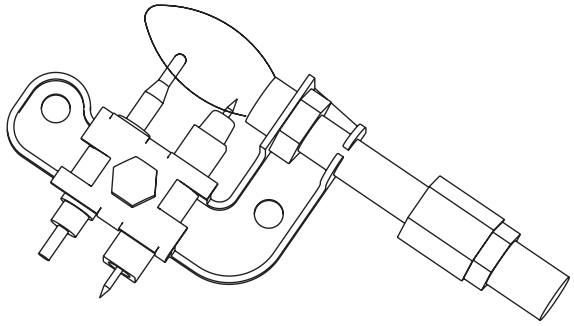


Figure 5

Oxygen Depletion Sensor Pilot (Figure 6)
When the pilot has a large yellow tip flame, clean the Oxygen Depletion Sensor as follows:

1. Remove pilot from main burner assembly, see "Appliance Maintenance", Sect 1:26.
2. Apply air pressure through the holes in the pilot indicated by the arrows in Figure 6. This will blow out foreign materials such as dust, lint and spider webs.

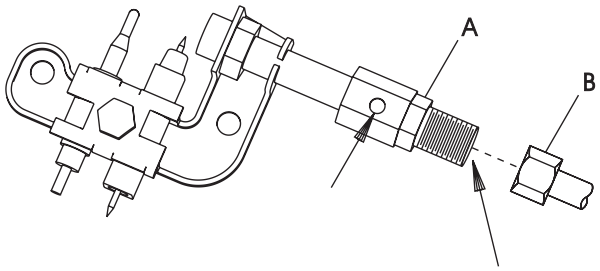


Figure 6

Warning:
Never use needles, wires, or similar cylindrical objects to clean the pilot to avoid damaging the calibrated ruby that controls the gas flow.

TROUBLESHOOTING

SYMPTOMS - POSSIBLE CAUSES AND CORRECTIONS

1. Spark electrode does not produce spark.
   a. Spark electrode broken - replace.
   b. Ignitor wire may not be attached to spark electrode - attach.
   c. Ignitor wire damaged - replace.
   d. Piezo ignitor defective - replace.

2. Spark electrode produces spark but pilot does not light.
   a. No gas to heater - turn on gas.
   b. PILOT position not properly aligned - turn gas control knob to PILOT position and depress.
   c. Pilot is blocked from spider web or dirt - clean pilot, see Figure 6.

3. Pilot flame does not stay "ON" when control knob is released.
   a. Control knob in PILOT position not completely depressed or held in long enough.
   b. INTERLOCK latching device is operative - see "Lighting Instructions," Sect 1:23, Step 9.
   c. Thermocouple lead not tightened into gas control - tighten thermocouple lead.
   d. Pilot flame not surrounding thermocouple - clean pilot, see Figure 6.
   e. Inlet gas pressure too low, contact gas supplier.
   f. Thermocouple defective - replace pilot.
   g. Gas control defective - replace.

4. Main burner does not ignite.
   a. Main burner orifice is blocked - clean, see "Main Burner Flame Characteristics," Sect 1:24.
   b. Inlet gas pressure too low, contact gas supplier.

5. Heater keeps shutting "OFF" during normal operation.
   a. Pilot is blocked - clean pilot, see Figure 6.
   b. Inlet gas pressure too low, contact gas supplier

APPLIANCE MAINTENANCE

Glass Removal, Cleaning and Glass Replacement

1. Remove chrome grill from reflector.
2. Slide glass upward to remove glass from chrome grill.
3. Clean glass with a non-abrasive household glass cleaner and warm water. Gas fireplace glass cleaner can also be used.
4. Align glass with rails on chrome grill and slide glass downward into chrome grill.
5. Attach chrome grill onto reflector.
   Warning: Do not operate unvented room heater without glass/ chrome grill attached to reflector.

To Remove Pilot From Main Burner Assembly

1. Turn OFF gas supply to the heater.
2. Turn OFF electrical supply to the heater if optional blower, SRB-18T or SRB-30T is installed in heater.
3. Remove lower louver from casing assembly (2 screws).
4. Remove reflector from casing assembly (2 screws).
5. Disconnect pilot tubing from pilot (see Figure 6, Sect 1:25). Grasp nut A with a wrench when removing nut B with a second wrench.
6. Remove pilot from pilot bracket (2 nuts).
7. As parts are being replaced in reverse order, check for gas leaks at all gas connections before lower louver is replaced onto casing assembly.

To Remove Main Burner Orifice From Main Burner Assembly

1. Turn off gas supply to the heater.
2. Turn off electrical supply to the heater if optional blower, SRB-18T or SRB-30T is installed in heater.
3. Remove lower louver from casing assembly (2 screws).
4. Remove reflector from casing assembly (2 screws).
5. Disconnect supply tubing from orifice holder.
6. Remove orifice holder from venturi of main burner assembly.
7. Remove main burner orifice from orifice holder.
8. As parts are being replaced in reverse order, check for gas leaks at all gas connections before lower louver is replaced onto casing assembly.

To Remove Gas Valve From Casing Assembly

1. Turn OFF gas supply to the heater.
2. Turn OFF electrical supply to the heater if optional blower, SRB-18T or SRB-30T is installed in heater.
3. Remove lower louver from casing assembly (2 screws).
4. Remove reflector from casing assembly (2 screws).
5. Remove upper louver from casing assembly (2 screws).
6. If installed, remove optional blower assembly (4 screws).
7. Disconnect inlet supply tubing, outlet supply tubing, pilot supply tubing and thermocouple lead from gas valve.
8. If heater is attached to wall, disconnect gas supply line from inlet regulator.
9. Remove heater from wall.
10. Remove gas valve bracket from casing assembly (4 screws to be removed are located on casing assembly back).
11. Remove hydraulic thermostat bulb from thermostat bulb clip located at casing assembly bottom.
12. Remove gas valve from gas valve bracket.
13. As parts are being replaced in reverse order, check for gas leaks at all gas connections before upper louver, reflector and lower louver are replaced onto casing assembly.

To Remove Main Burner From Casing Assembly

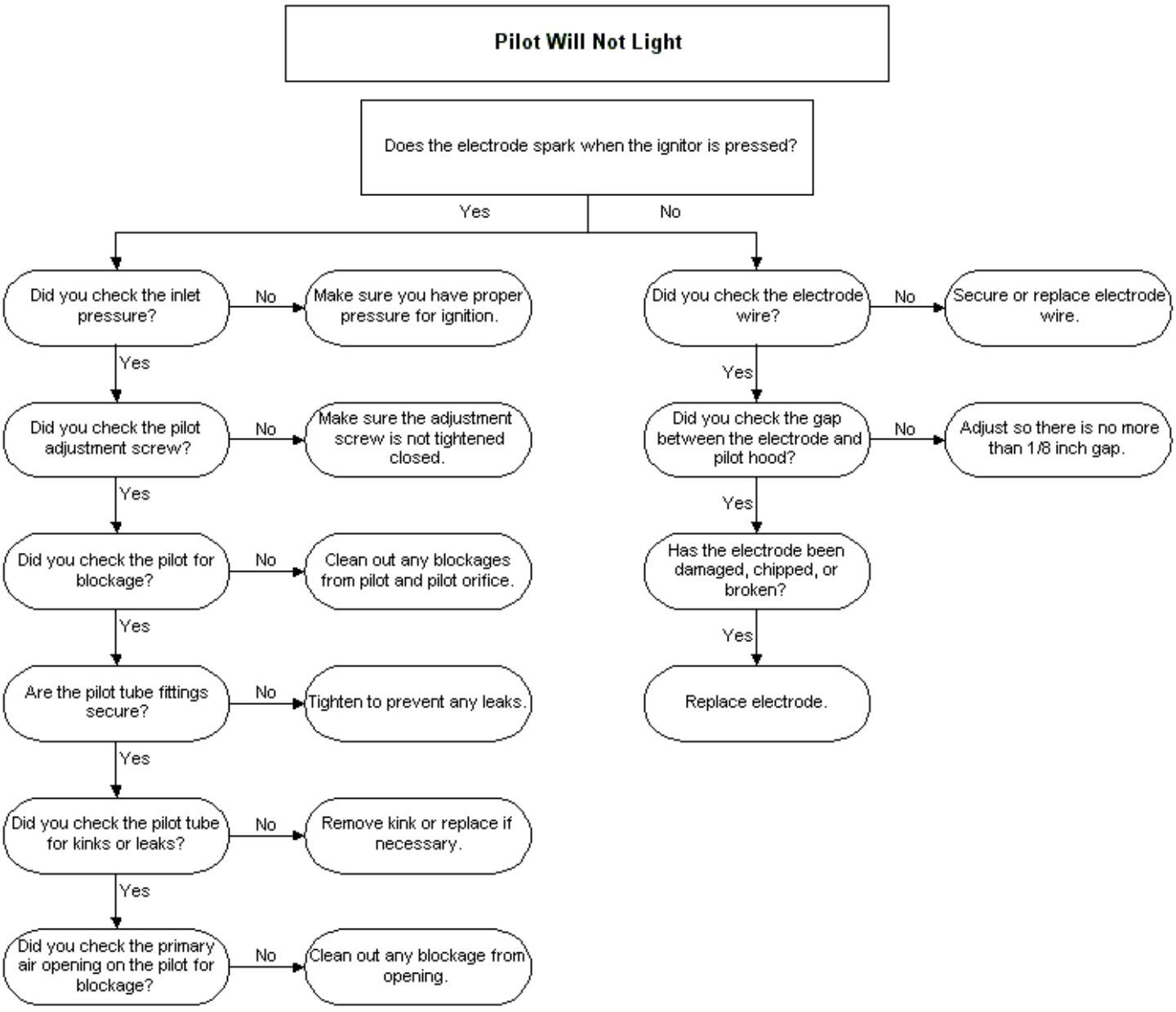
1. Turn OFF gas supply to the heater.
2. Turn OFF electrical supply to the heater if optional blower, SRB-18T or SRB-30T is installed in heater.
3. Remove lower louver from casing assembly (2 screws).
4. Remove reflector from casing assembly (2 screws).
5. Disconnect supply tubing from orifice holder.
6. Remove main burner assembly from casing assembly (2 screws).
7. Remove air shutter(s) from main burner. BF-10 Natural and LP has two (2) air shutters, BF-20 LP has one (1) air shutter and BF-30 LP has one (1) air shutter. Attach air shutter(s) to new main burner assembly.
8. As parts are being replaced in reverse order, check for gas leaks at all gas connections before lower louver is replaced onto casing assembly.

SERVICE NOTES

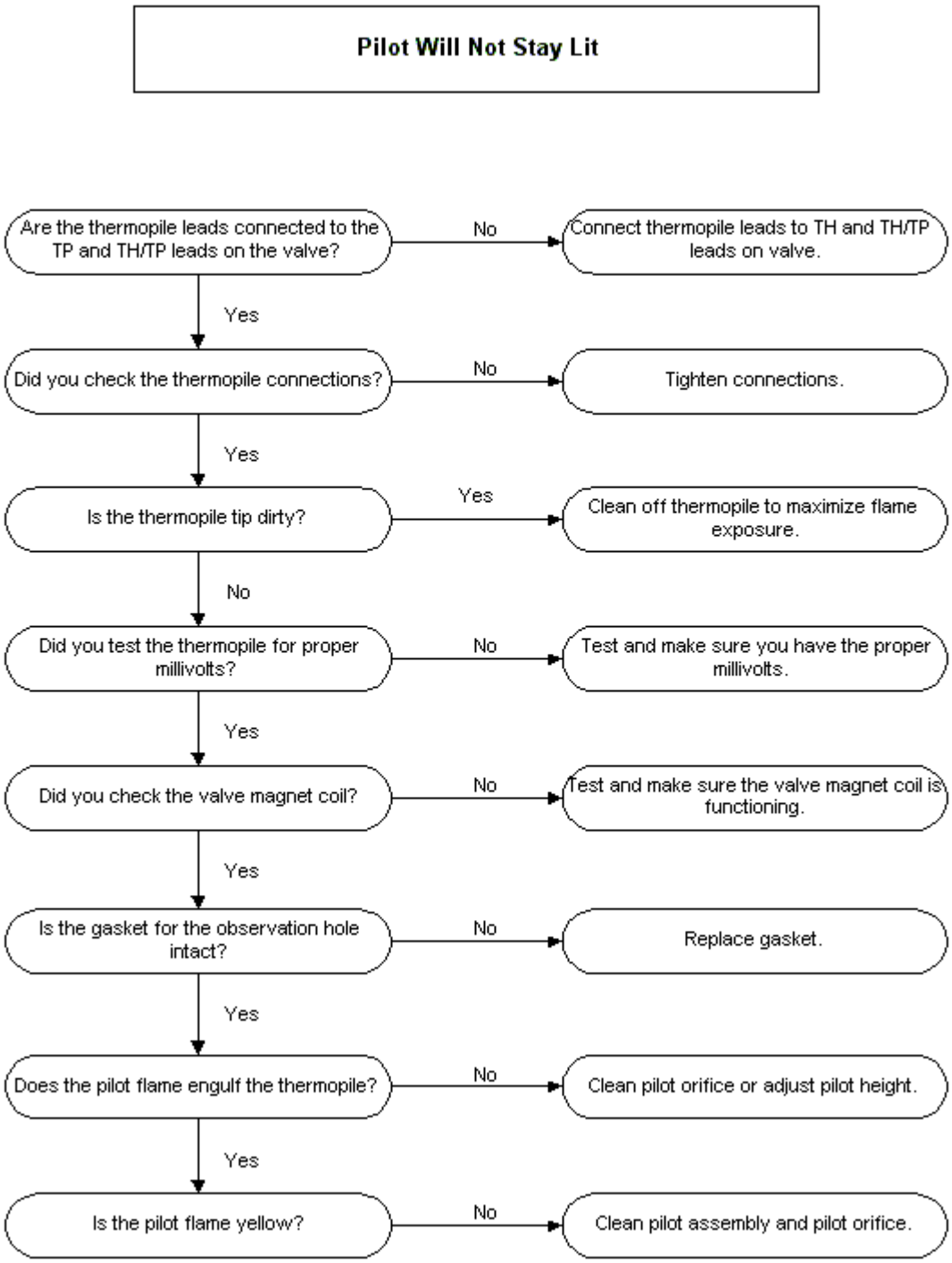
SERVICE NOTES

Millivolt Direct Vent Heater Troubleshooting

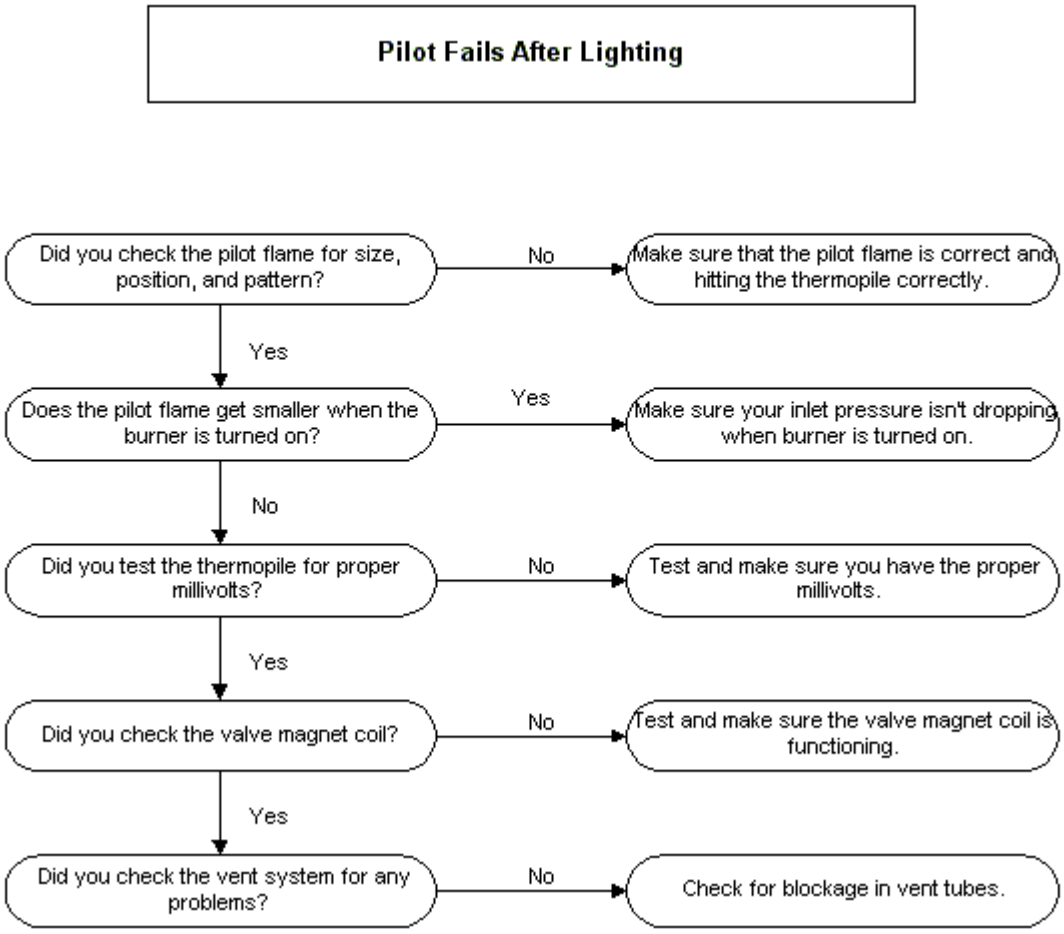
DIAGNOSING MILLIVOLT DIRECT VENT HEATERS



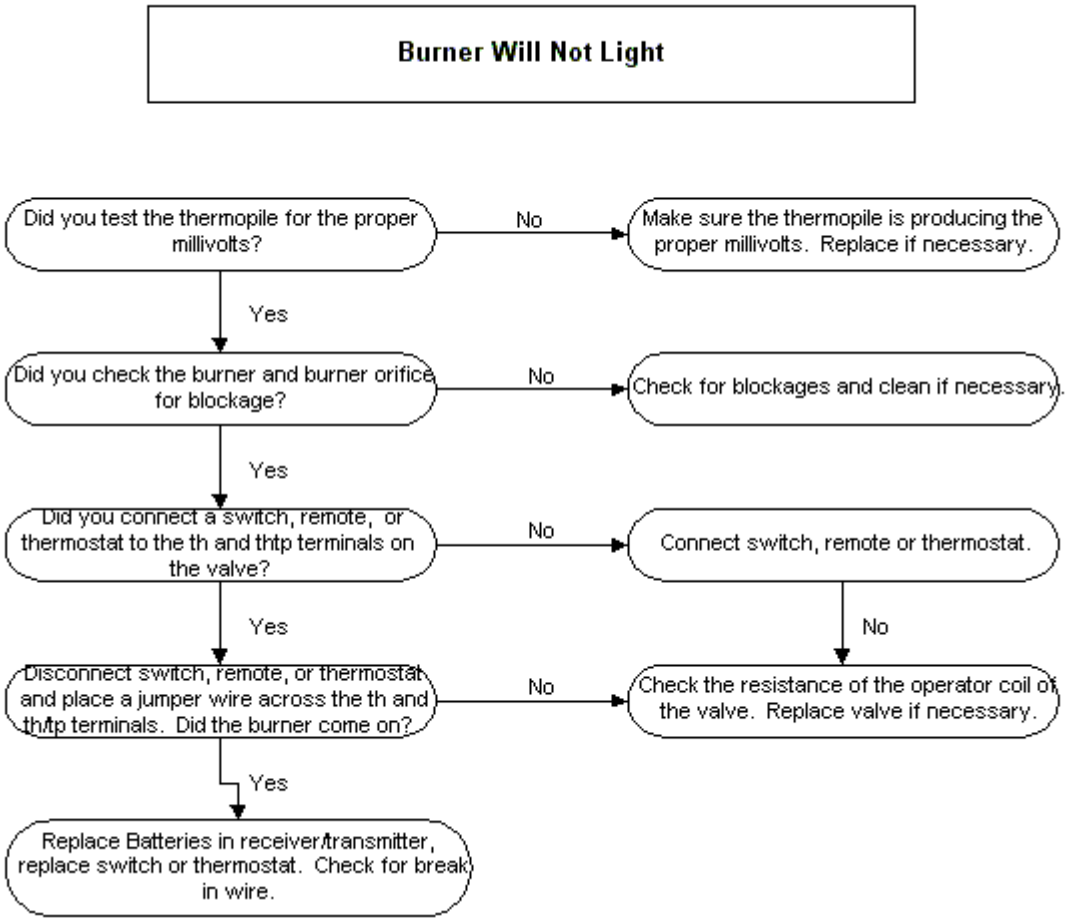
DIAGNOSING MILLIVOLT DIRECT VENT HEATERS



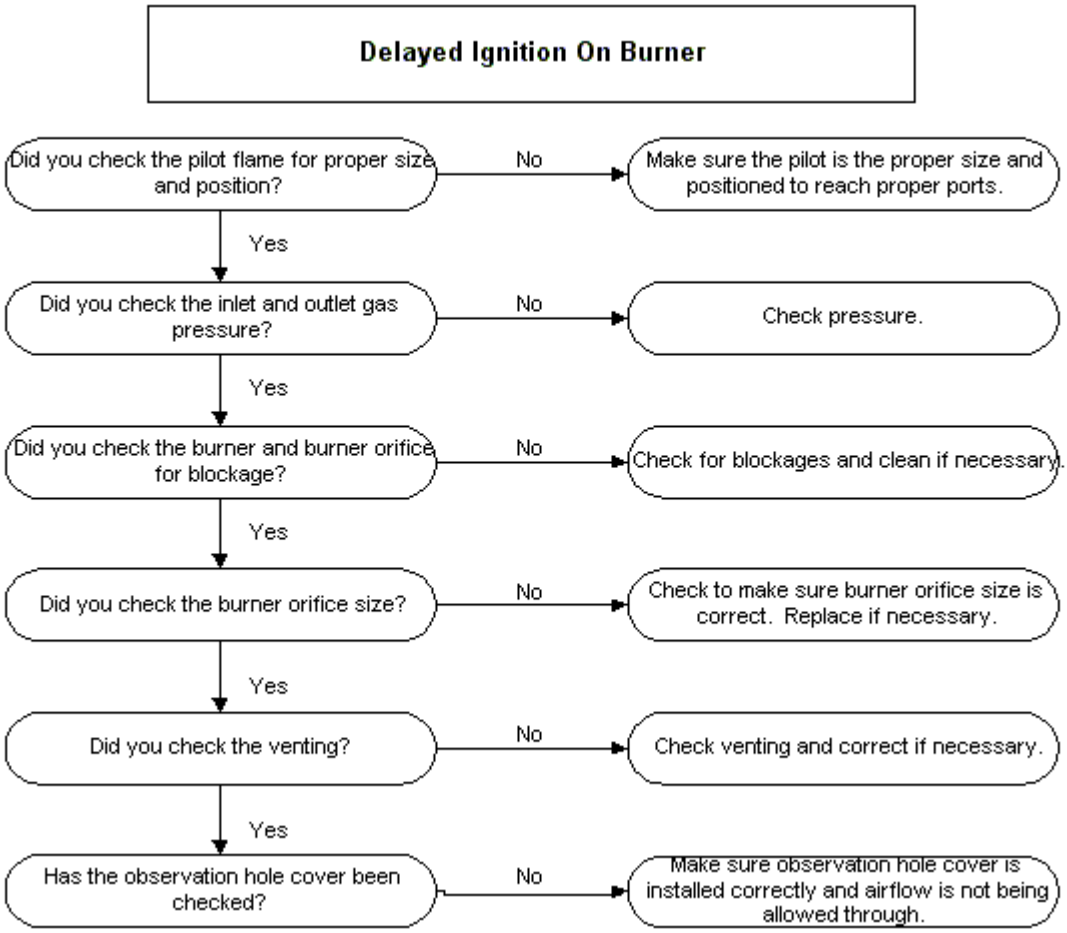
DIAGNOSING MILLIVOLT DIRECT VENT HEATERS



DIAGNOSING MILLIVOLT DIRECT VENT HEATERS



DIAGNOSING MILLIVOLT DIRECT VENT HEATERS



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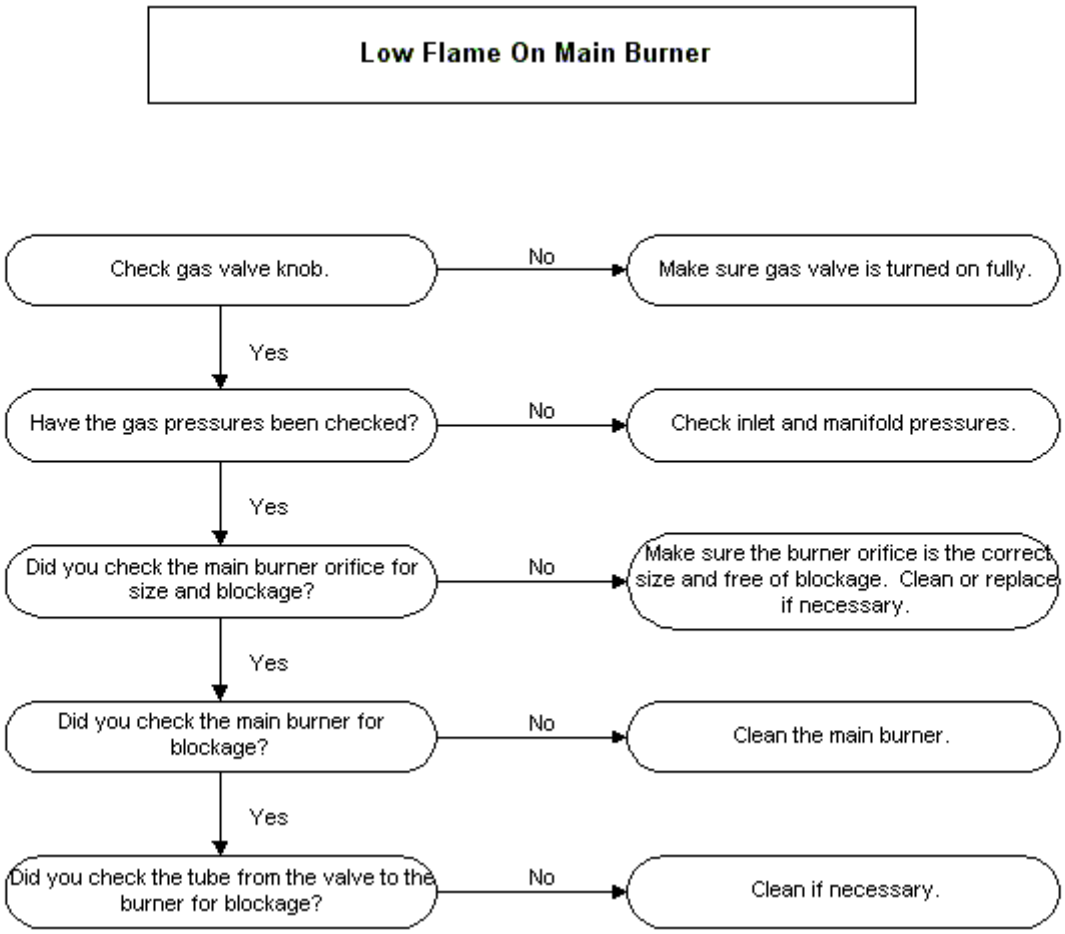

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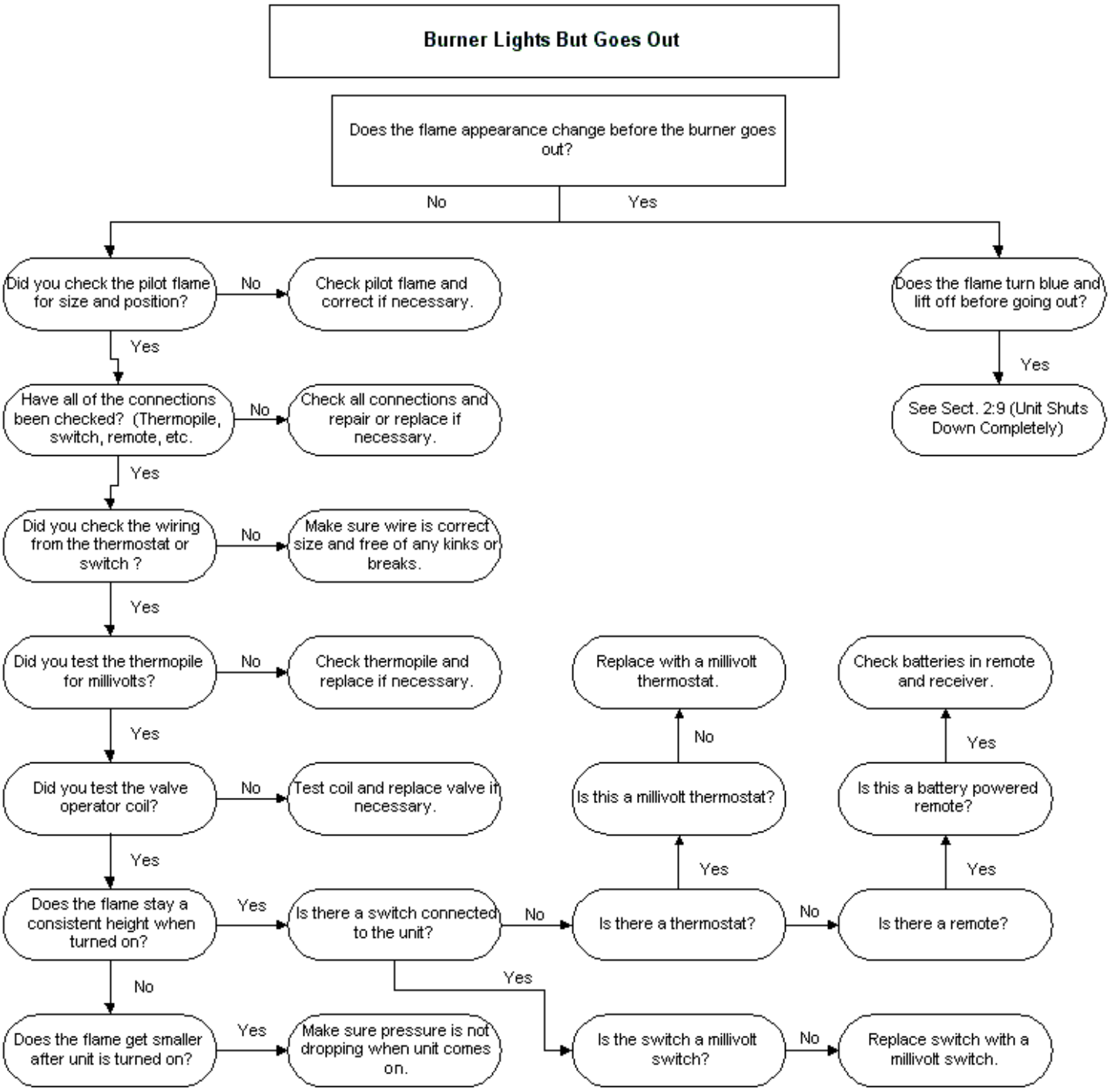

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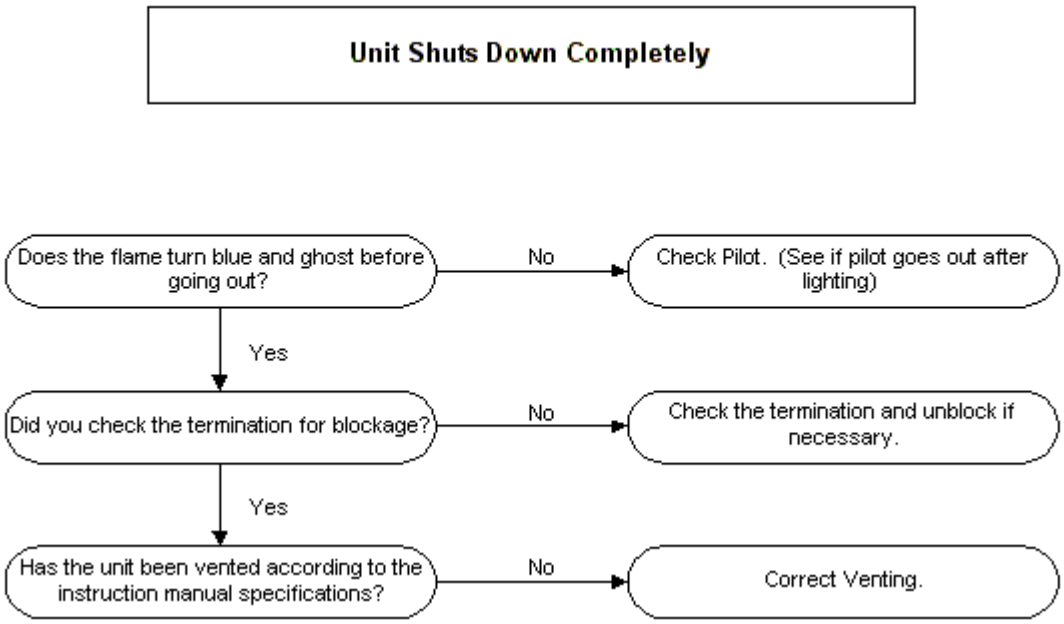
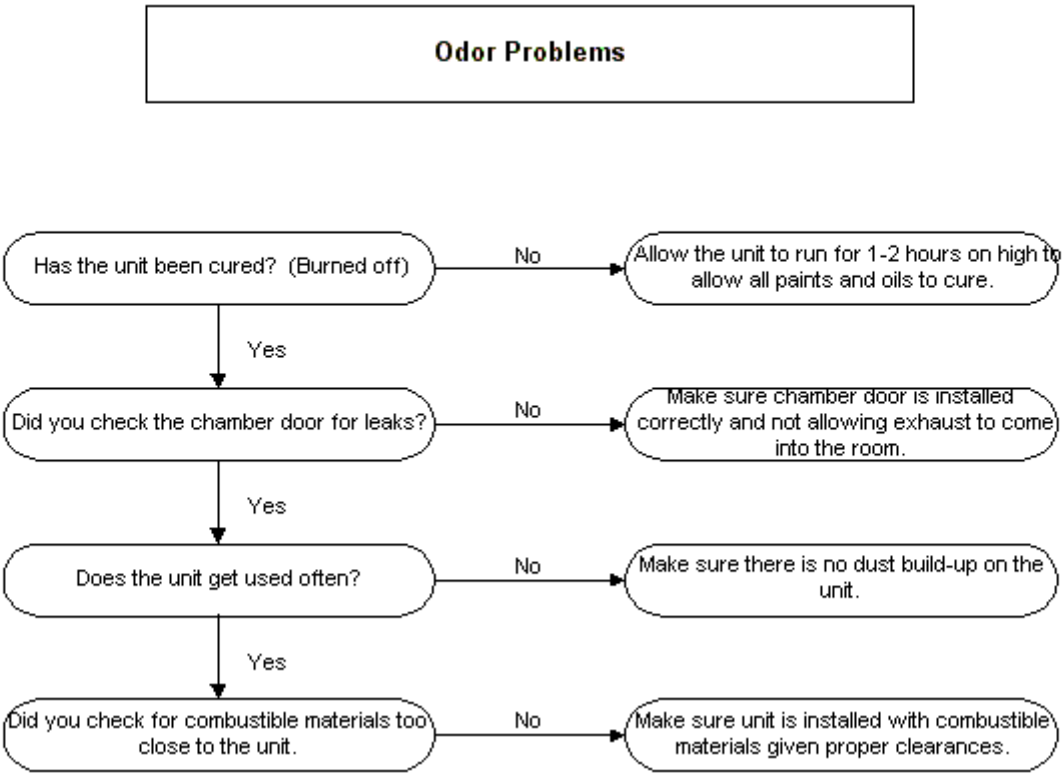
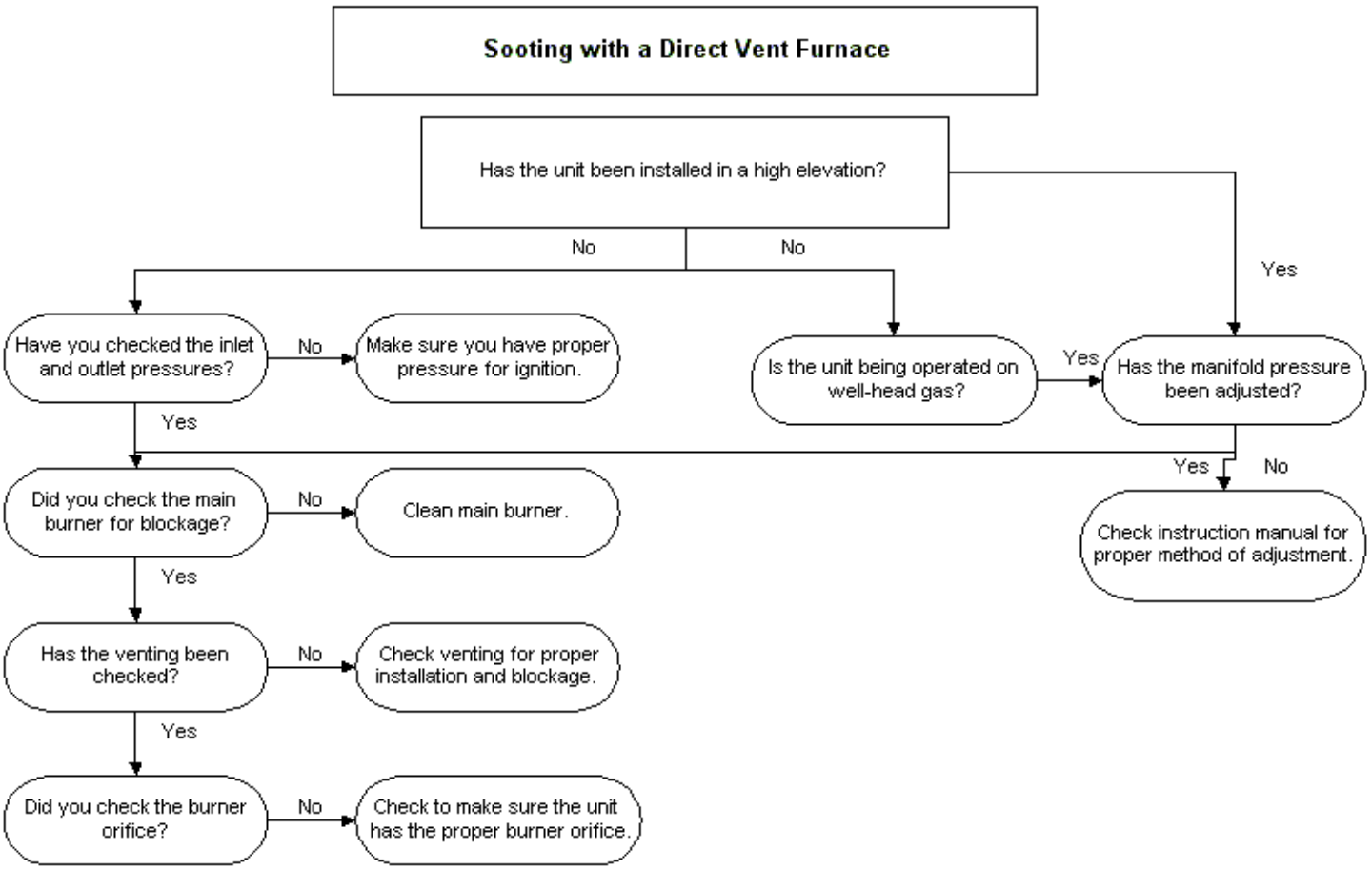



Odor Problems
Has the unit been cured? (Burned off)
No
Allow the unit to run for 1-2 hours on high to allow all paints and oils to cure.
Yes
Did you check the chamber door for leaks?
No
Make sure chamber door is installed correctly and not allowing exhaust to come into the room.
Yes
Does the unit get used often?
No
Make sure there is no dust build-up on the unit.
Yes
Did you check for combustible materials too close to the unit.
No
Make sure unit is installed with combustible materials given proper clearances.

DIAGNOSING MILLIVOLT DIRECT VENT HEATERS



DV 210/215 Series Troubleshooting

LIGHTING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

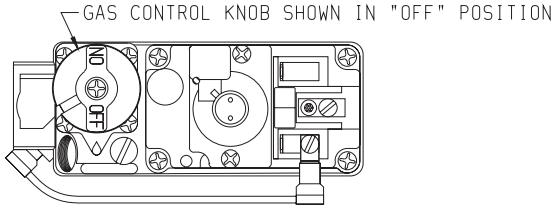
- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

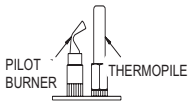
LIGHTING INSTRUCTIONS

1. STOP! Read the safety information above.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance (if applicable).
4. Remove control access panel (front panel).
5. Push in gas control knob slightly and turn clockwise to "OFF".



NOTE: Knob cannot be turned from "PILOT" to "OFF" unless knob is pushed in slightly. Do not force.

6. Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.
7. Remove the pilot access cover located on the combustion chamber.
8. Find pilot - follow metal tube from gas control. The pilot is behind the pilot access cover.



9. Turn knob on gas control counterclockwise to "PILOT."
10. Push in control knob all the way and hold in. Immediately light the pilot with the Piezo Pilot Ignitor or a match. Continue to hold the control knob in for about one (1) minute after the pilot is lit. Release knob, and it will pop back up. Pilot should remain lit. If it goes out, repeat steps 5 through 10.
    - If knob does not pop up when released, stop and immediately call your service technician or gas supplier.
    - If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.
11. Replace pilot access cover.
12. Turn gas control knob counterclockwise to "ON."
13. Replace control access panel (front panel).
14. Turn on all electric power to the appliance (if applicable).
15. Set thermostat to desired setting.
16. CAUTION: Pilot access cover must be kept tightly closed during operation.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to appliance if service is to be performed (if applicable).
3. Remove control access panel (front panel).
4. Push in gas control knob slightly and turn clockwise to "OFF." Do not force.
5. Replace control access panel (front panel).

CLEARANCES

1. In selecting a location for installation, it is necessary to provide adequate accessibility clearances for servicing and proper installation.
2. Although certified for 0 clearance to the floor , the unit is held in place by a wall bracket. Enough clearance [2" (51mm) suggested] to allow changing or adding floor covering is recommended. Other clearances to combustible construction:
   Sides 1" (25mm) and 12" (305mm) from the top.
3. Note the position of the vent relative to the center of the unit. The DV-210 has the vent in the center. The DV-215 vent is 2" (51mm) off center to the right.
4. The minimum distance from the center of the outside vent to the nearest outside corner or obstruction is 16" (406mm).
5. The DV-210/DV-215 minimum wall depth is 4 1/2" (114mm) and maximum wall depth is 13" (330mm). The use of tubes not supplied by the manufacturer result in unsatisfactory performance.

The vent terminal of a direct vent appliance, with an input of 10,000 Btu per hour (3 kW) or less shall be located at least 6" (150mm) from any air opening into a building, and such an appliance with an input over 10,000 Btu per hour (3 kW) but not over 50,000 Btu per hour (14.7 kW) shall be installed with a 9" (229mm) vent terminal clearance and the bottom of the vent terminal and the air intake shall be located at least 12" (305mm) above grade.

WARNING: The nearest point of the vent cap should be a minimum horizontal distant of six (6) feet (1.8m) from any pressure regulator. In case of regulator malfunction, the six (6) feet (1.8m) distance will reduce the chance of gas entering the vent cap.

THERMOSTAT LOCATION

These heating thermostats are specially designed for use on self-generating systems. They should never be used on line or low voltage A.C. circuits.

Exterior Wall — The thermostat may be mounted on an exterior wall above the heater if it is located in the same stud space as the vent tubes and is a minimum of 6" (152mm) above the heater.

Interior Wall — The thermostat should be installed on an inside wall away from the unit but in the same room.

Note: Use 16 gauge wire to prevent excessive loss of millivolts.

Proper operation depends on a good pilot flame. The flame must cover the top of the thermopile. Cleaning of the pilot orifice and burner may be required due to spiders.

System Check

A millivolt meter is required to check the system. The millivolt readings should be:

- Across the thermopile terminals, 400-450 millivolts with thermostat OFF.
- Across the thermopile terminals, 150-250 millivolts with thermostat ON.
- Across the thermostat wires at the valve, less than 30 millivolts with thermostat ON.
- Across the thermostat wires at the thermostat, less than 5 millivolts with thermostat ON. (Strong winds, dirty pilot and low pressure will reduce readings.)

Piezo Pilot Ignitor Instructions

Depressing the piezo ignitor button completely causes a spark to occur at the pilot. This is a substitute for a match which requires opening the pilot hole cover.

To light the pilot, it is important that the electrode be 1/8" (3mm) from the thermopile. The spark must occur at the point the burner flame hits the thermopile. The end of the electrode will be red hot with the pilot on.

On a new installation with air in the gas line, it is suggested that a match be used. The match will light the pilot faster than the piezo under this condition.

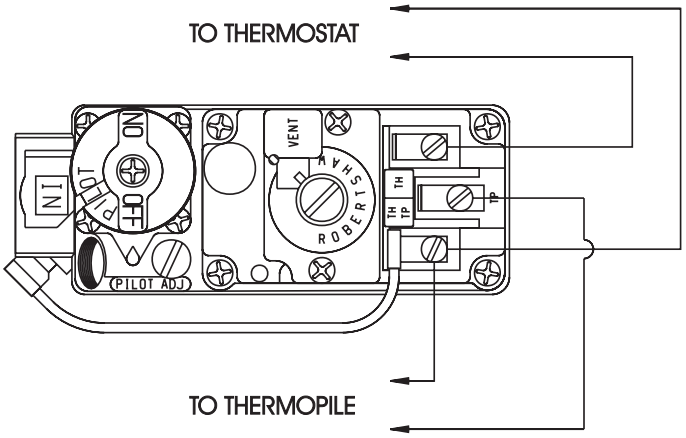


Figure 1

PILOT FLAME CHARACTERISTICS

The pilot flame is blue and goes toward the main burner and thermopile horizontally. A slight yellow tip on the flame is normal. The pilot flame must surround and extend approximately 1/4" (6mm) beyond the thermopile, and must extend beyond the first row toward the second row of main burner ports.

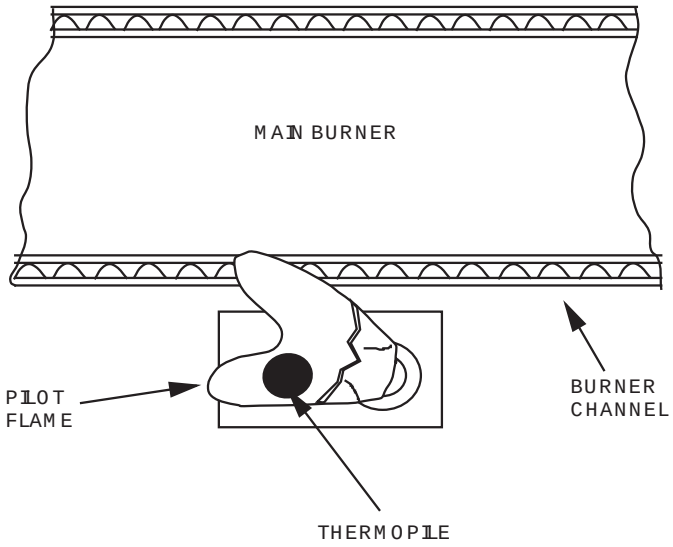


Figure 2

MAIN BURNER FLAME CHARACTERISTICS

On the main burner, the burning gas forms a primary flame and a secondary flame. The primary flame is blue and about 3/16" (5mm) high. The secondary flame is very pale blue, 3 inches (76mm) to 5 inches (127mm) high. Dust in the combustion air will produce an orange flame. Do not mistake it for an improper yellow flame.

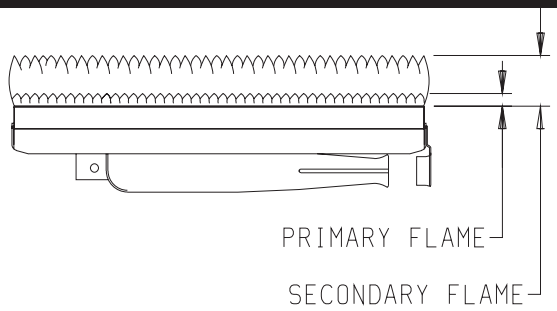


Figure 3

MAINTENANCE

Steps in Removing Main Burner, Orifice and Valve

1. Disconnect the thermopile and pilot supply line at the pilot burner.
2. Remove the burner compartment cover 5/16" (8mm) socket suggested.
3. Remove screw holding left side of burner and lift out.
4. Main burner orifice is now accessible. Use 1/2" (13mm) box end wrench to remove and apply non-hardening pipe dope sparingly to orifice threads when replaced.
5. To remove the entire gas valve the nut holding the orifice fitting to the chamber must be removed and the gas supply to the valve disconnected. After this, the valve and orifice elbow can be removed as a unit.

Cleaning The Pilot Burner

Cleaning of the pilot may be an annual necessity due to spiders. After removing the supply tubing and orifice, use a pipe cleaner or wire to clean the entire internal part of the pilot.

Cleaning the Combustion Chamber and Main Burner

When the main burner and vent cap are removed, all internal areas of the combustion chamber are accessible for cleaning with a vacuum hose. The main burner may be cleaned by forcing water into the ports and the throat of the burner. The burner should be blown dry or heated to dry all water out before reinstalling.

TROUBLESHOOTING

1. Lit match goes out as it enters lighter port.
   a. Certain wind conditions will blow out match. Ignite match, and as it flares, thrust match through opening.
   b. Open nearby door or window and relight pilot.
2. Pilot flames but goes out when knob is released.
   a. See Lighting Instructions. Relight Pilot.
   b. Relight the pilot and hold knob down longer and harder. Close lighter hole cover just after igniting. Check for a good pilot flame.
   c. Defective thermopile or defective magnet in safety section of valve. Replace.
3. Yellow pilot flame.
   a. Obstruction at pilot orifice.
   b. Clean and properly size orifice.
4. Pilot and main burner go out during normal operation.
   a. Check millivolts.
   b. Check for proper size of pilot flame.
   c. Check for defective or weak thermopile.
   d. Check input, reduce as needed.
   e. Cover on pilot lighter hole must be air tight.
   f. Check for tight fit of air and flue tubes at both ends of vent assembly. No obstruction around vent that would prevent the wind from hitting all of the vent equally.
5. Thermostat does not turn the main burner on.
   a. Check wiring.
   b. Check all millivolt readings.
   c. Check for spider in main burner orifice.
6. Yellow main burner flame soot on the vent cap.
   a. Remove main burner to check for obstructions in throat, ports and orifices.
   b. Install new main burner orifice and pilot orifice. Refer to Parts List in Owners Manual.

DV 25/35 Series Troubleshooting

LIGHTING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

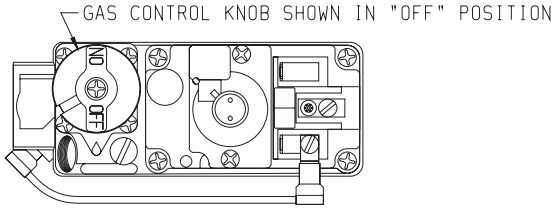
- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

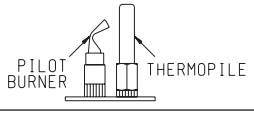
LIGHTING INSTRUCTIONS

1. STOP! Read the safety information above.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance (if applicable).
4. Remove casing front assembly.
5. Push in gas control knob slightly and turn clockwise to "OFF".



NOTE: Knob cannot be turned from "PILOT" to "OFF" unless knob is pushed in slightly. Do not force.

6. Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.
7. Remove the pilot access cover located on the combustion chamber.
8. Find pilot - follow metal tube from gas control. The pilot is behind the pilot access cover.



9. Turn knob on gas control counterclockwise to "PILOT."
10. Push in control knob all the way and hold in. Immediately light the pilot with the Piezo Pilot Ignitor or a match. Continue to hold the control knob in for about one (1) minute after the pilot is lit. Release knob, and it will pop back up. Pilot should remain lit. If it goes out, repeat steps 5 through 10.
    - If knob does not pop up when released, stop and immediately call your service technician or gas supplier.
    - If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.
11. Replace pilot access cover.
12. Turn gas control knob counterclockwise to "ON."
13. Replace casing front assembly.
14. Turn on all electric power to the appliance (if applicable).
15. Set thermostat to desired setting.
16. CAUTION: Pilot access cover must be kept tightly closed during operation.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to appliance if service is to be performed (if applicable).
3. Remove casing front assembly.
4. Push in gas control knob slightly and turn clockwise to "OFF." Do not force.
5. Replace casing front assembly.

CLEARANCES

1. In selecting a location for installation, it is necessary to provide adequate accessibility clearances for servicing and proper installation.
2. Unit is supported by a wall bracket secured to the wall.
3. The minimum clearances from casing to combustible construction is 48" (121cm) on top, 6" (152mm) on each side and 4" (102mm) from the floor or from the top surface of carpeting, tile or other floor covering and 0" (0mm) to rear wall.
4. The minimum distance from the center of the vent cap to the nearest outside corner or obstruction is 24" (610mm).
5. The DV-25 and DV-35 minimum wall depth is 4 1/2" (114mm) (and the maximum is 13" (330mm). The use of tubes not supplied by the manufacturer results in unsatisfactory performance.

The vent terminal of a direct vent appliance, with an input of 50,000 (14.6 KW) BTU per hour or less shall be located at least 9" (229mm) from any opening through which flue gases could enter a building. The bottom of the vent terminal and the air intake shall be located at least 12" (305mm) above grade.

WARNING: The nearest point of the vent cap should be a minimum horizontal distant of six (6) (1.83m) feet from any pressure regulator. In case of regulator malfunction, the six (6) (1.83m) feet distance will reduce the chance of gas entering the vent cap.

THERMOSTAT LOCATION

Millivolt wall thermostats are specially designed for use on self-generating systems. They should never be used on line or low voltage A.C. circuits.

Interior Wall — The thermostat should be installed on an inside wall away from the furnace but in the same room.

It is important to use wire of a gauge proper for the length of the wire:

RECOMMENDED WIRE GAUGES

Maximum Length	*Wire Gauge*
1' to 10'	18
10' to 25'	16
25' to 35'	14

Proper operation depends on a good pilot flame. The flame must cover the top of the thermopile. Cleaning of the pilot orifice and burner may be required due to spiders.

System Check (Figure 1)

A millivolt meter is required to check the system. Millivolt readings should be:

- Across the thermopile terminals, 400-450 millivolts with thermostat OFF.
- Across the thermopile terminals, 150-250 millivolts with thermostat ON.
- Across the thermostat wires at the valve, less than 30 millivolts with thermostat ON.
- Across the thermostat wires at the thermostat, less than 5 millivolts with thermostat ON. (Strong winds, dirty pilot and low pressure will reduce readings.)

Piezo Pilot Ignitor Instructions

Depressing the red button completely causes a spark to occur at the pilot. This is a substitute for a match which requires opening the pilot hole cover.

To light the pilot, it is important that the electrode be 1/8" (3mm) from the thermopile. The spark must occur at the point the burner flame hits the thermopile. The end of the electrode will be red hot with the pilot on.

On a new installation with air in the gas line, it is suggested that a match be used. The match will light the pilot faster than the piezo under this condition.

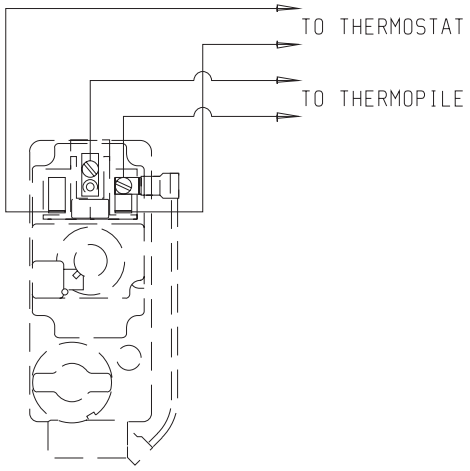


Figure 1

PILOT FLAME CHARACTERISTICS

The correct flame will be almost horizontal, blue and will extend past the thermopile 1/4" (6mm). The flame will surround the thermopile just below the tip.

On propane (LP-gas) slight yellow might occur where the pilot flame and burner flame meet.

Natural gas pilots require adjusting when the inlet pressure is above 5" w.c. (1.25kPa) Turn adjustment screw clockwise to reduce flame.

Propane (LP-gas) will not require adjusting.

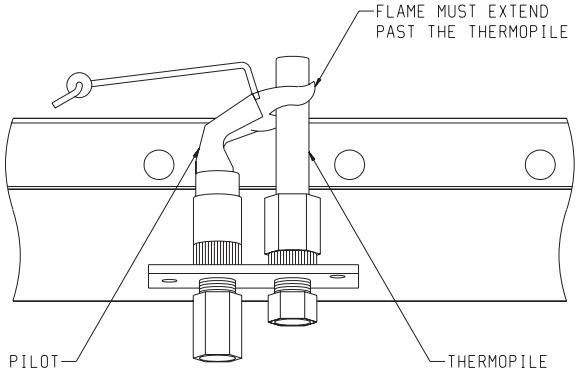


Figure 2

MAIN BURNER FLAME CHARACTERISTICS

There will be a short blue inner flame with a much larger lighter blue secondary flame. The burner flame may have a yellow tip when hot. See the burner drawing showing the approximate heights of each part of the flame. Dust in the combustion air will produce an orange or red flame. Do not mistake the orange or red flame for an improper yellow flame. After use, cleaning may be required for the proper flame.

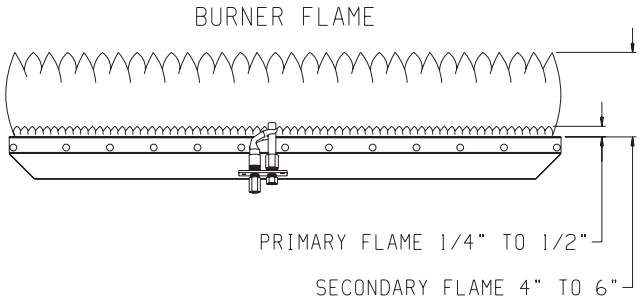


Figure 3

Primary Air Adjustment (Figure 4)

An air adjustment bolt is located on the chamber support bottom. The four inch (102mm) clearance between the furnace and the floor allows access to the air adjustment bolt. The air adjustment bolt is above the rectangular opening on the inner casing bottom.

On Propane gas, if a whistling noise (resonation) occurs, screw air adjustment bolt into the chamber support in order to reduce the amount of primary air. If the whistling noise (resonation) is not eliminated when the air adjustment bolt is screwed into the chamber support this may indicate the air adjustment bolt is misaligned. Grasp air adjustment bolt and pivot (push) air adjustment bolt away from yourself. Observe the main burner flame as you push air adjustment bolt and when the main burner flame begins to develop a yellow flame, you should stop pushing on the air adjustment bolt. Screw air adjustment bolt out of the chamber support until the yellow flame on the main burner is eliminated. The air adjustment bolt should now be properly aligned. The reduction in primary air will soften the main burner flame and will eliminate the whistling noise (resonation).

On Propane or Natural gas, if a yellow flame occurs, screw air adjustment bolt out of the chamber support but do not completely remove air adjustment bolt from chamber support. The repositioning of the air adjustment bolt will increase the amount of primary air. The increase in primary air will sharpen the main burner flame and will eliminate the yellow flame.

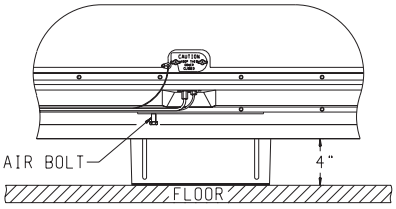


Figure 4

MAINTENANCE

Removing Main Burner

1. Disconnect the thermopile and pilot supply line at the pilot burner.
2. Remove the burner compartment cover.
3. Remove orifice shield.
4. Remove bolt on each side of burner and lift out.

Cleaning Main Burner

The main burner may be cleaned by forcing water into the ports and the throat of the burner. The main burner should be blown dry or heated to remove water from main burner.

Removing Main Burner Orifice

1. Open the brass union located after the gas valve.
2. Loosen valve bracket.
3. Remove the 3/8" (10mm) manifold pipe that is attached to the union elbow until the manifold pipe is free.
4. The main burner orifice is at the end of the manifold pipe.

Removing Pilot Orifice

1. Disconnect the pilot supply line at the pilot burner.
2. Remove pilot orifice from pilot burner. It may be necessary to tap on pilot burner in order to remove the pilot orifice.

Cleaning Pilot Orifice

After use, cleaning of the pilot burner may be required for the proper flame. Also, cleaning of the pilot burner may be required due to spiders (spider webs). The pilot orifice can be cleaned with high pressure air or by placing under running water. Pilot orifice must be dry before replacement. Use a pipe cleaner to clean inside the pilot after the pilot orifice has been removed.

Cleaning Combustion Chamber

When the main burner and vent cap are removed, all internal areas of the combustion chamber are accessible for cleaning with a vacuum hose.

TROUBLESHOOTING

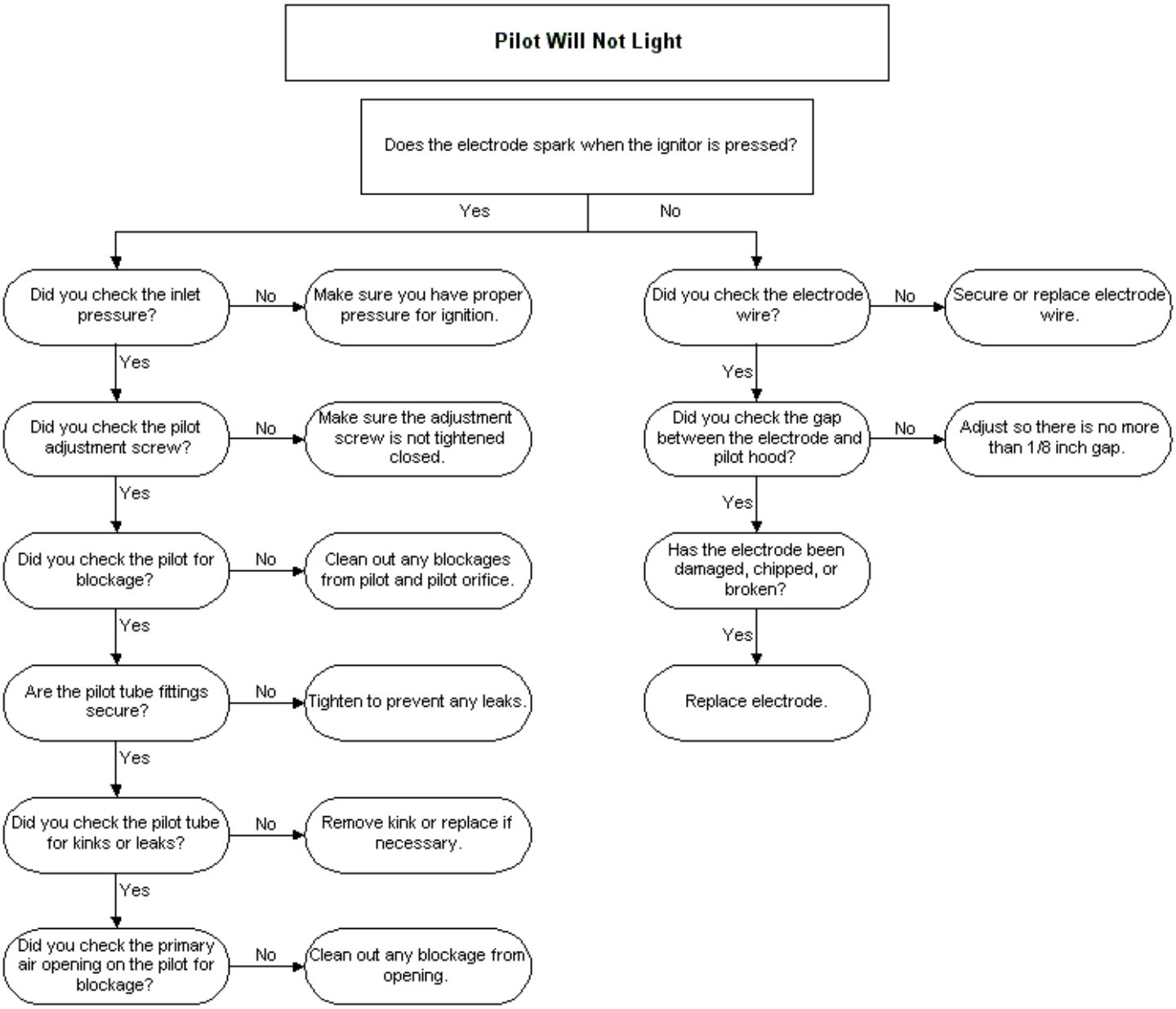
1. Lit match goes out as it enters lighter port.
   a. Certain wind conditions will blow out match. Ignite match, and as it flares, thrust match through opening.
   b. Open nearby door or window and relight pilot.
2. Pilot flames but goes out when knob is released.
   a. See Lighting Instructions. Relight Pilot.
   b. Relight the pilot and hold knob down longer and harder. Close lighter hole cover just after igniting. Check for a good pilot flame.
   c. Defective thermopile or defective magnet in safety section of valve. Replace.
3. Yellow pilot flame
   a. Obstruction at pilot orifice.
   b. Clean pilot orifice.
4. Pilot and main burner go out during normal operation.
   a. Check millivolts.
   b. Check for proper size of pilot flame.
   c. Check for defective or weak thermopile.
   d. Check input, reduce as needed.
   e. Cover on pilot lighter hole must be air tight.
   f. Check for tight fit of air and flue tubes at both ends of vent assembly. No obstruction around vent that would prevent the wind from hitting all of the vent equally.
5. Thermostat does not turn the main burner on.
   a. Check wiring.
   b. Check all millivolt readings.
   c. Check for spider in main burner orifice.
6. Yellow main burner flame soot on the vent cap.
   a. See Sect 2:23, "Primary Air Adjustment".
   b. Remove main burner to check for obstructions in throat and ports.
   c. Install new main burner orifice and pilot orifice. Refer to Parts List in owners manual.
7. On Propane gas, if a whistling noise (resonation) occurs.
   a. See Sect 2:23, "Primary Air Adjustment".
   b. Reduce manifold pressure.
   c. Size main burner orifice with a drill bit. For DV-25 use #54 drill bit. For DV-35 use #50 drill bit.

SERVICE NOTES

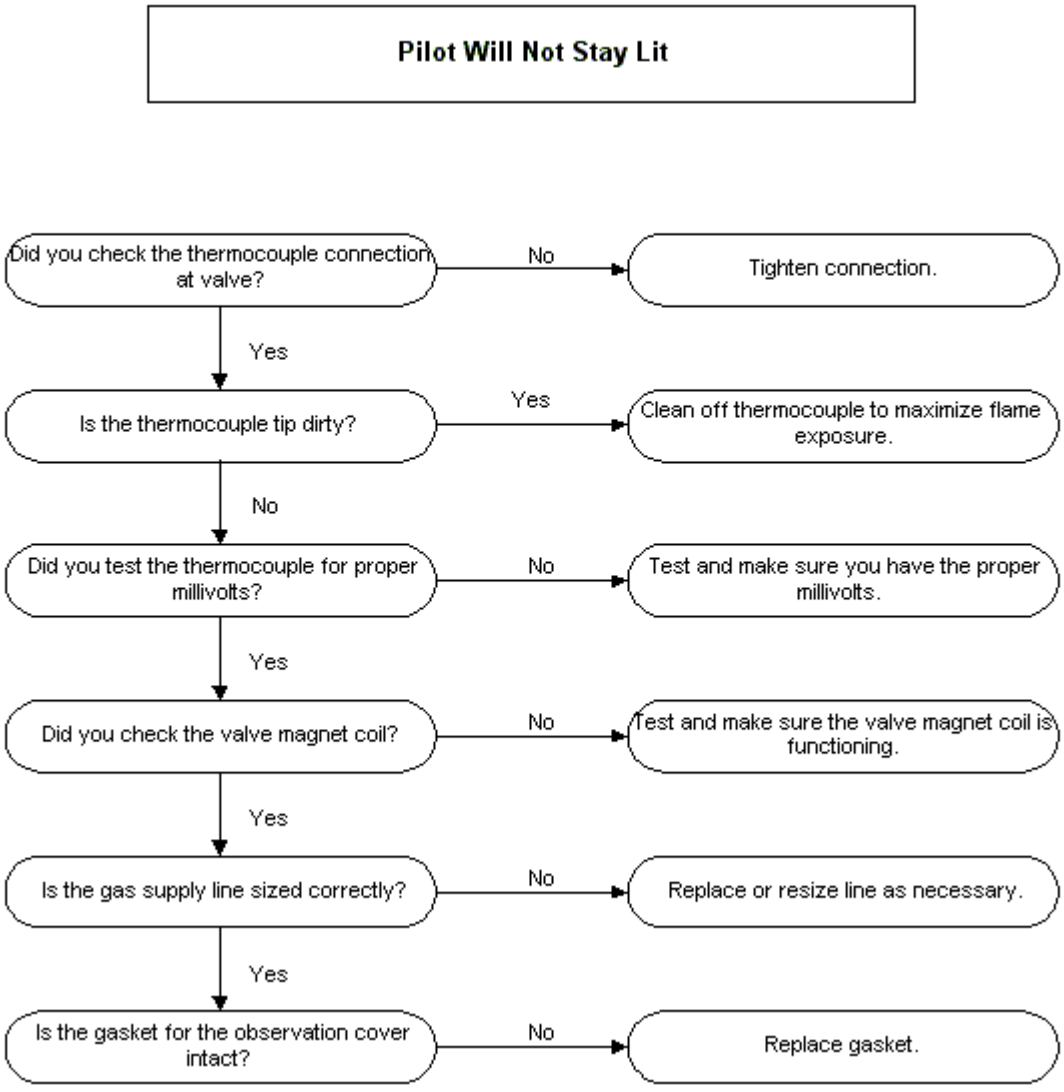
SERVICE NOTES

24 Volt Direct Vent Heater Troubleshooting

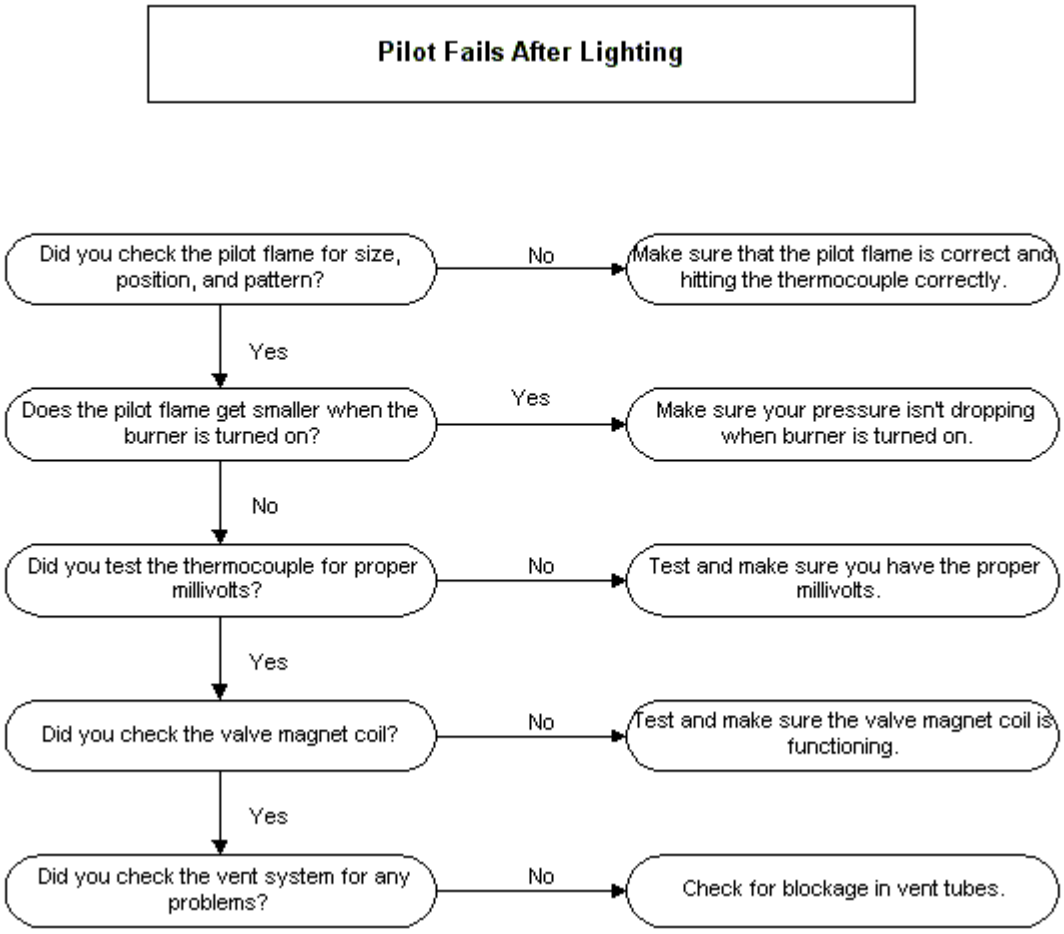
DIAGNOSING 24 VOLT DIRECT VENT HEATERS



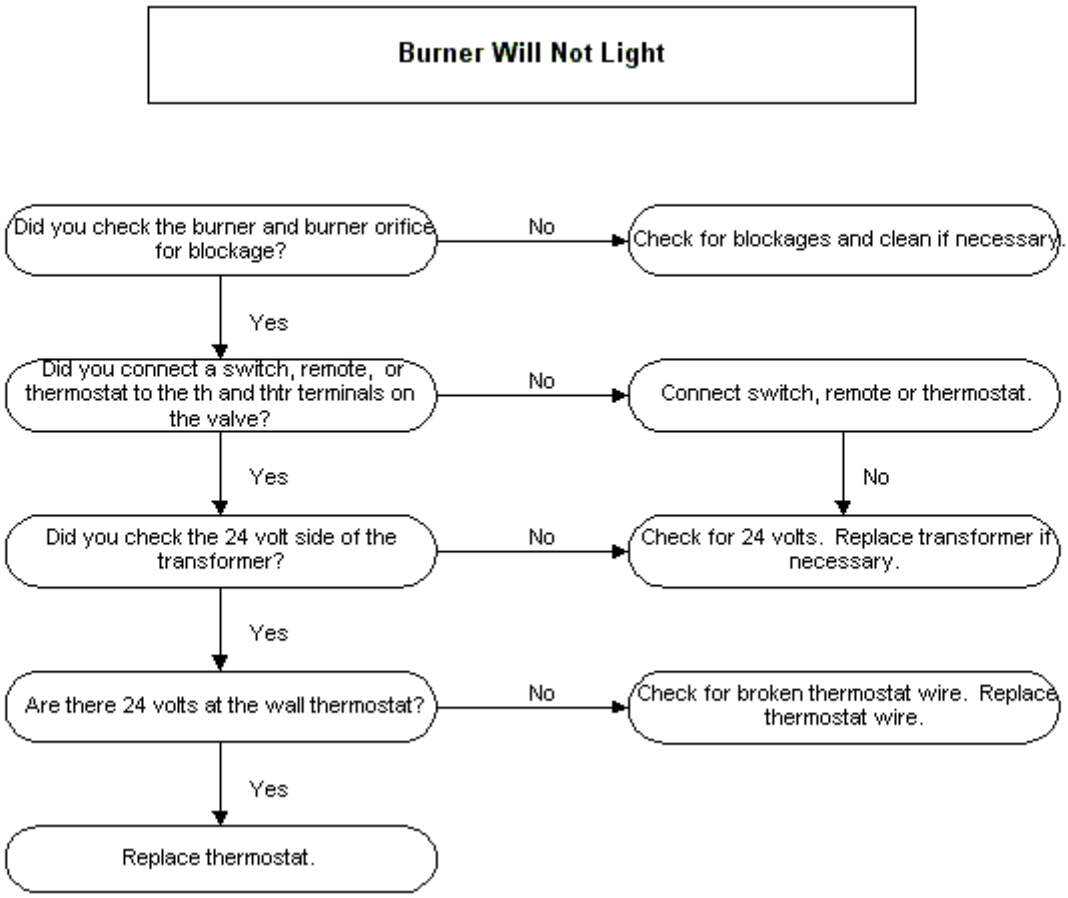
DIAGNOSING 24 VOLT DIRECT VENT HEATERS

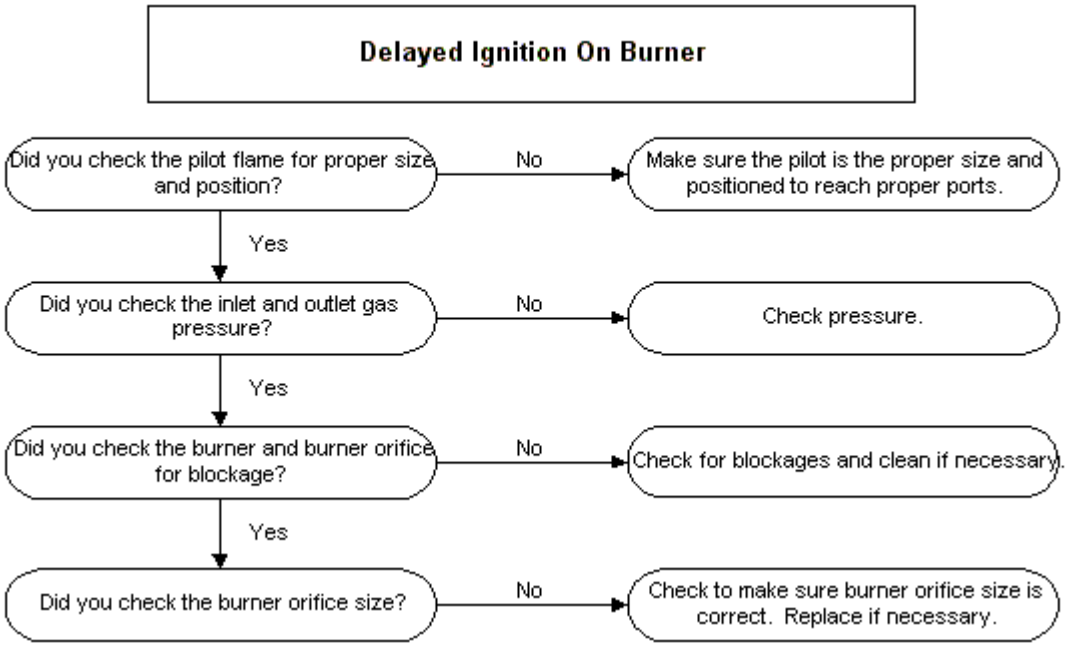


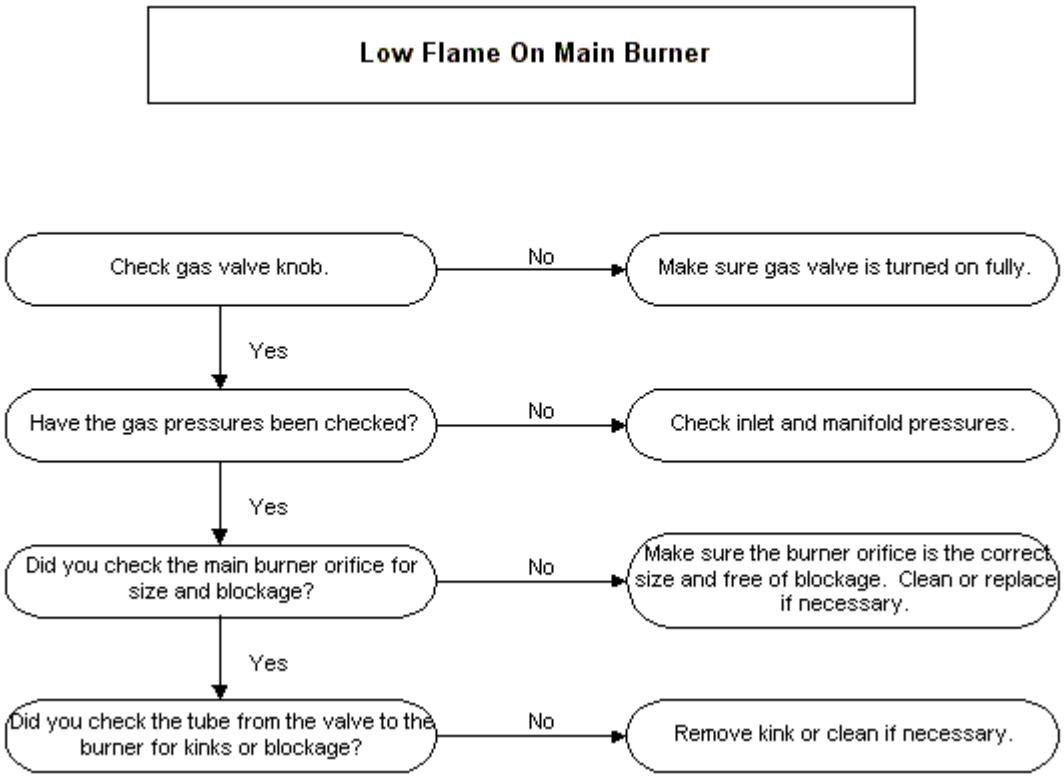
DIAGNOSING 24 VOLT DIRECT VENT HEATERS



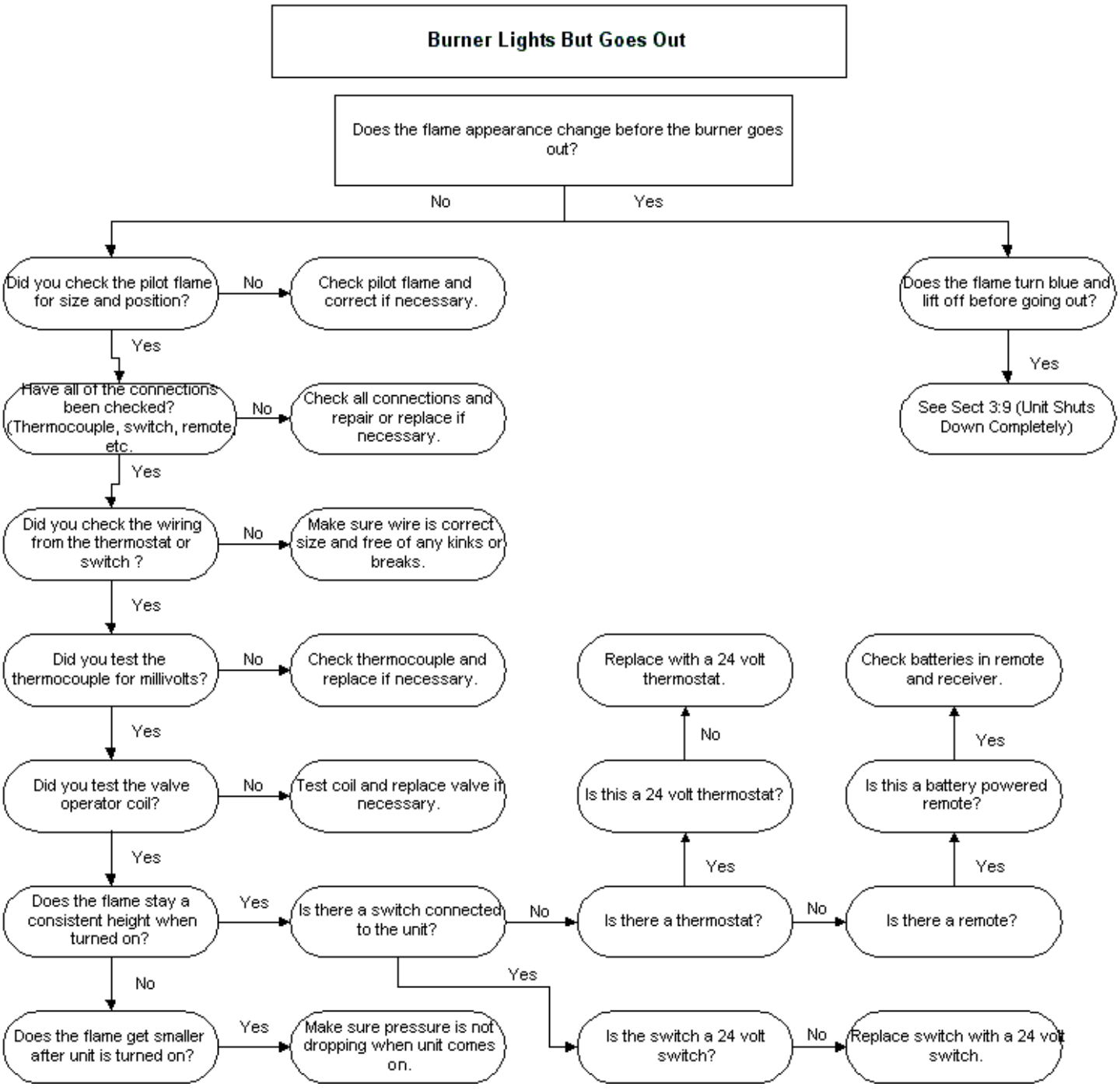
DIAGNOSING 24 VOLT DIRECT VENT HEATERS



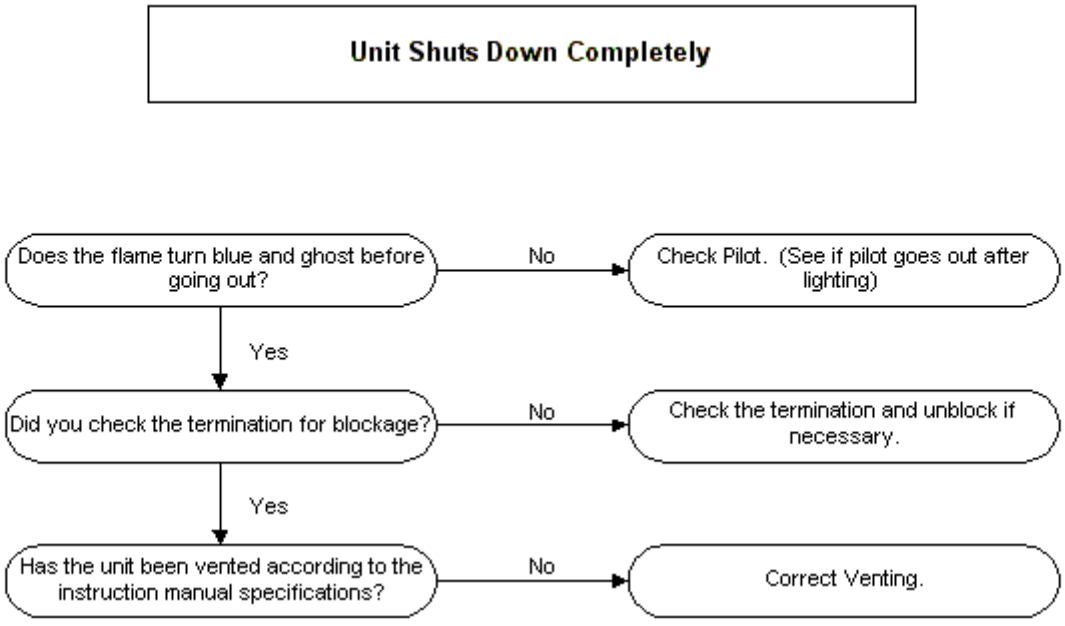

Delayed Ignition On Burner
Did you check the pilot flame for proper size and position?
No
Make sure the pilot is the proper size and positioned to reach proper ports.
Yes
Did you check the inlet and outlet gas pressure?
No
Check pressure.
Yes
Did you check the burner and burner orifice for blockage?
No
Check for blockages and clean if necessary.
Yes
Did you check the burner orifice size?
No
Check to make sure burner orifice size is correct. Replace if necessary.

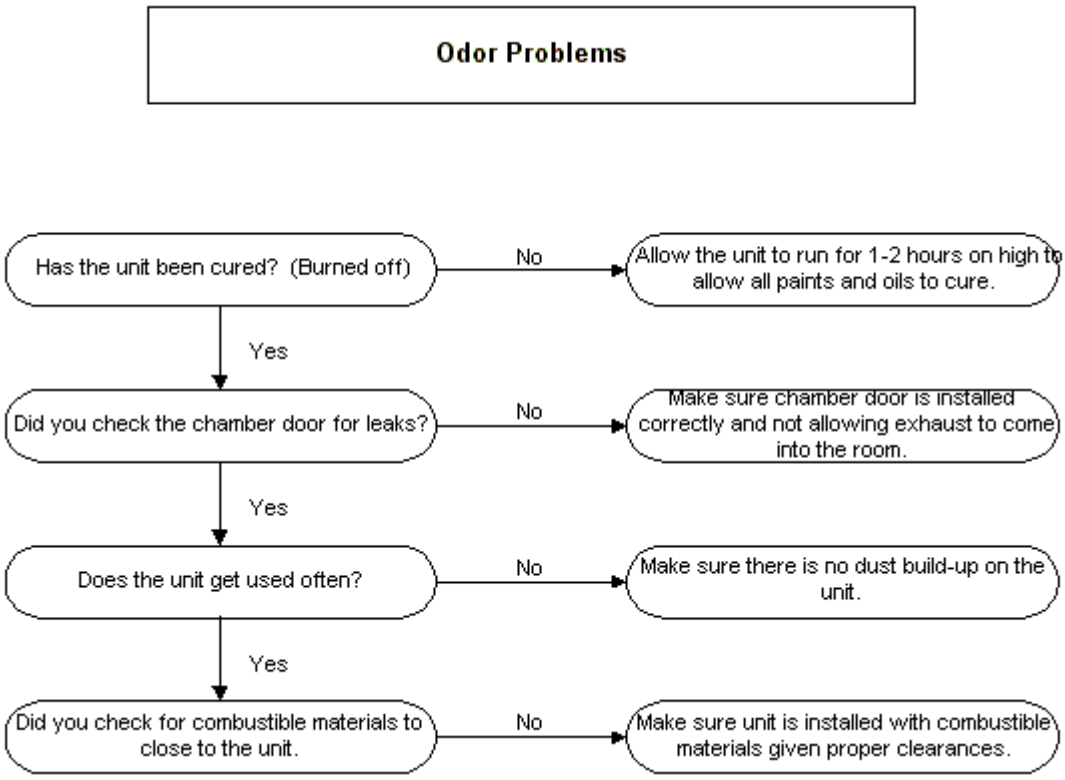

Low Flame On Main Burner
Check gas valve knob.
No
Make sure gas valve is turned on fully.
Yes
Have the gas pressures been checked?
No
Check inlet and manifold pressures.
Yes
Did you check the main burner orifice for size and blockage?
No
Make sure the burner orifice is the correct size and free of blockage. Clean or replace if necessary.
Yes
Did you check the tube from the valve to the burner for kinks or blockage?
No
Remove kink or clean if necessary.

DIAGNOSING 24 VOLT DIRECT VENT HEATERS

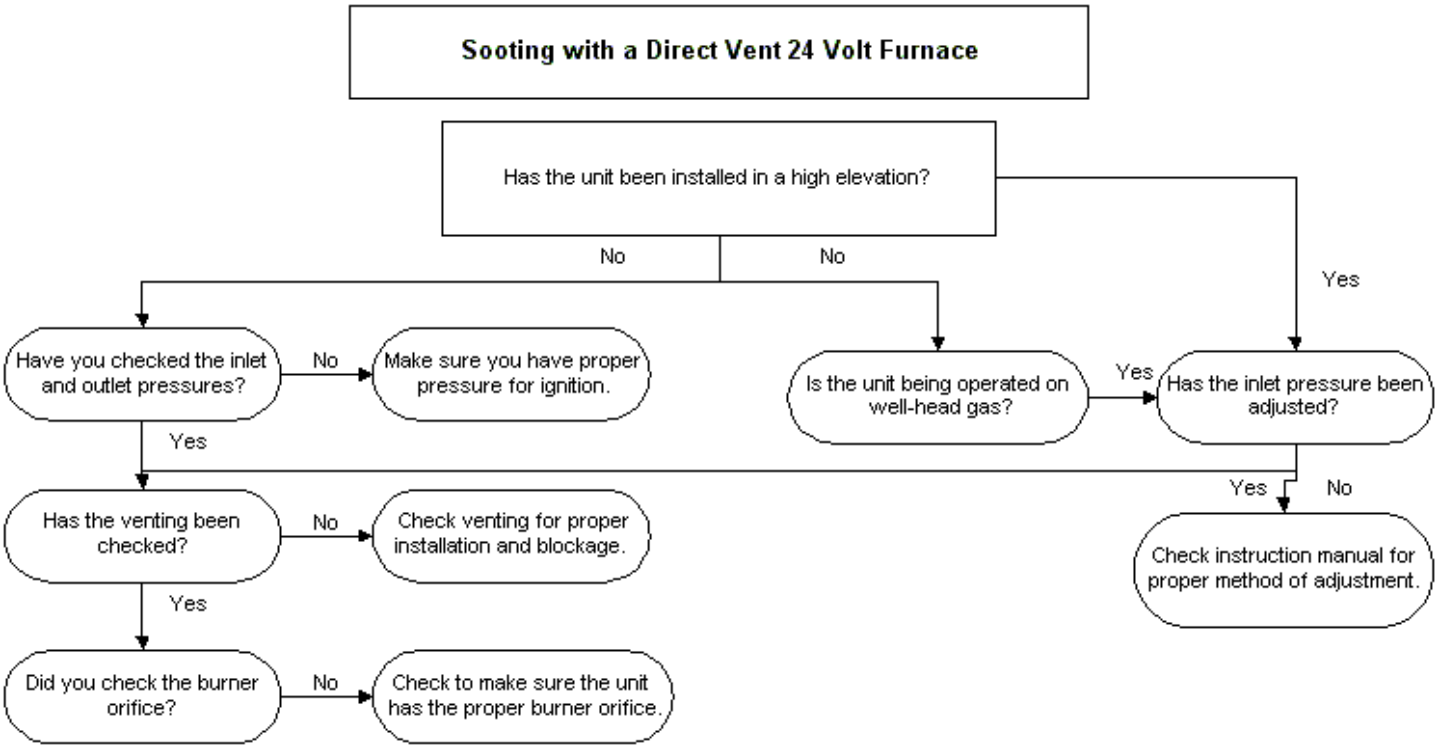


DIAGNOSING 24 VOLT DIRECT VENT HEATERS




Odor Problems
Has the unit been cured? (Burned off)
No
Allow the unit to run for 1-2 hours on high to allow all paints and oils to cure.
Yes
Did you check the chamber door for leaks?
No
Make sure chamber door is installed correctly and not allowing exhaust to come into the room.
Yes
Does the unit get used often?
No
Make sure there is no dust build-up on the unit.
Yes
Did you check for combustible materials to close to the unit.
No
Make sure unit is installed with combustible materials given proper clearances.

DIAGNOSING 24 VOLT DIRECT VENT HEATERS



DV55SPP Heater Troubleshooting

LIGHTING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

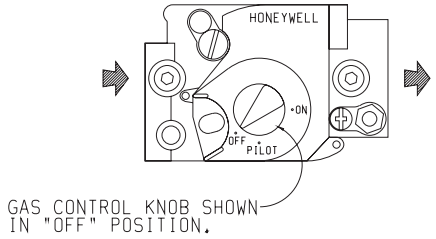
- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.

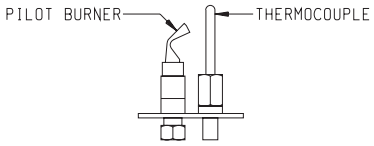
D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

LIGHTING INSTRUCTIONS

1. **STOP! Read the safety information above.**
2. **Set the thermostat to lowest setting.**
3. **Turn off all electric power to the appliance.**
4. **Remove control access panel (lower front panel).**
5. **Turn gas control knob clockwise to "OFF."**



6. **Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.**
7. **Remove the pilot access cover located on the combustion chamber.**
8. **Find pilot - follow metal tube from gas control. The pilot is located between the two burner tubes behind the pilot access cover.**



9. **Turn gas control knob counterclockwise to "PILOT."**
10. **Push and hold red reset button down completely and repeatedly push the ignitor button until the pilot burner is lit. Pilot may also be lit with a match. Continue to hold the red reset button down for about one (1) minute after the pilot is lit. Release button and it will pop back up. Pilot should remain lit. If it goes out, repeat steps 5 through 10.**
    - **If button does not pop up when released, stop and immediately call a qualified service technician or gas supplier.**
    - **If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.**
11. **Replace pilot access cover.**
12. **Turn gas control knob counterclockwise to "ON."**
13. **Replace control access panel (lower front panel).**
14. **Turn on all electric power to the appliance.**
15. **Set thermostat to desired setting.**

TO TURN OFF GAS TO APPLIANCE

1. **Set the thermostat to lowest setting.**
2. **Turn off all electric power to appliance if service is to be performed .**
3. **Remove control access panel (lower front panel).**
4. **Push in gas control knob slightly and turn clockwise to "OFF." Do not force.**
5. **Replace control access panel (lower front panel).**

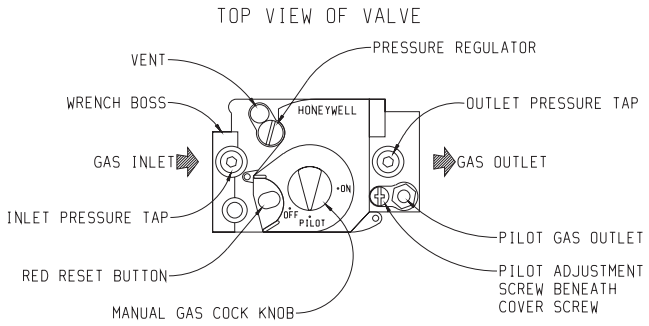


Figure 1

Checking Manifold Pressure

Both Propane and Natural gas valves have a built-in pressure regulator in the gas valve. Natural gas models will have a manifold pressure of approximately 4.0" w.c. at the valve outlet with the inlet pressure to the valve from a minimum of 6.0" w.c. for the purpose of input adjustment to a maximum of 7.0" w.c. Propane gas models will have a manifold pressure approximately 10.0" w.c. at the valve outlet with the inlet pressure to the valve from a minimum of 11.0" w.c. for the purpose of input adjustment to a maximum of 13.0" w.c.

A 1/8" N.P.T. plugged tapping, accessible for test gauge connection, is located on the outlet side of the gas control.

The built-in regulator comes on at approximately 1/4th pressure and full on in 10 seconds.

CLEARANCES

Clearances

1. In selecting a location for installation, it is necessary to provide adequate accessibility clearances for servicing and proper installation.
2. The DV-55 minimum wall depth is 4 1/2 inches and maximum wall depth is 13 inches. The maximum wall depth may be extended to 19" (483mm) using the model DV-1190 extended flue kit. The use of tubes not supplied by the manufacturer results in unsatisfactory performance.
3. The DV-55 can be attached to the wall or recessed into the wall up to 4 inches in depth but the minimum 4 1/2 inches vent/air intake system wall depth must be maintained. Example: If furnace is recessed into the wall at a depth of 4 inches, the minimum wall depth must be 8 1/2 inches.
4. The wall in which the furnace is recessed has (0) zero clearance to the furnace sides and top.
5. When using side discharge registers, SOR-1 or SOK-1, the furnace cannot be recessed into the wall.
6. Clearance to sidewall or combustible material is 4 inches.
7. Ceiling clearance is 4 inches.
8. Floor and rear wall clearance is (0) zero inches.
9. Clearance of 18 inches is required to sidewall or combustible material when flush mounted SOR-1, side outlet register is used. See Figure 4.
10. The minimum distance from the center of the vent cap to the nearest outside corner or obstruction is 24 inches.

The vent terminal of a direct vent appliance with an input over 50,000 BTU per hour shall be located at least 12 inches from any opening through which flue gases could enter a building. The bottom of the vent terminal and the air intake shall be located at least 12 inches above grade.

WARNING: The nearest point of the vent cap should be a minimum horizontal distant of six (6) feet from any pressure regulator. In case of regulator malfunction, the six (6) feet distance will reduce the chance of gas entering the vent cap.

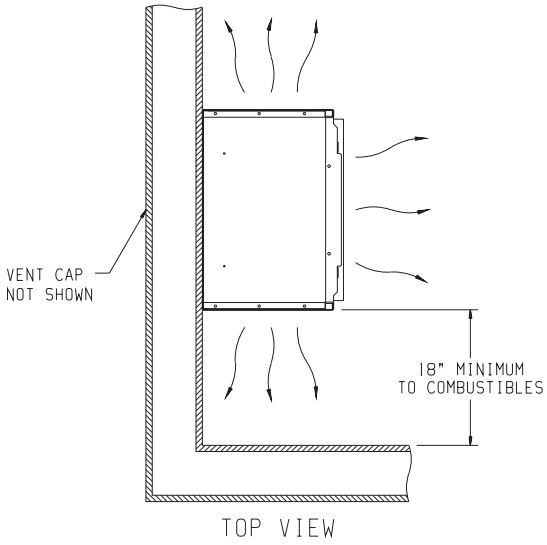


Figure 2

PILOT FLAME CHARACTERISTICS

The correct pilot flame (Figure 3) will be blue, extending past the thermocouple. The flame will surround the thermocouple just below the tip.

Natural gas pilots require adjusting when the inlet gas pressure is above 5" w.c. Remove the pilot cover screw on the control valve (Figure 3, page 8), and turn the adjustment screw clockwise to reduce flame. Replace pilot cover screw to eliminate gas leaking at that control valve opening.

LP gas (propane) will not require adjustment.

After use, cleaning may be required for the proper flame.

PROPER FLAME ADJUSTMENT

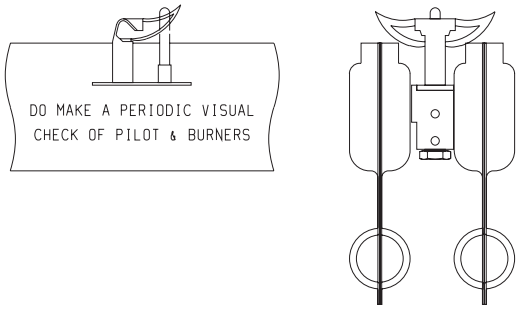


Figure 3

MAIN BURNER FLAME CHARACTERISTICS

The correct flame will be a short blue inner flame with a much larger light blue outer flame. The main burner (Figure 4) shows the approximate height of each part of the flame for each gas. The burner does not have a primary air adjustment. The flame will be correct if the factory-set pressure and orifice opening are used. After the furnace has been operating, the burner ports may be blocked by foreign matter carried in by combustion air. Therefore, cleaning of the burner may be needed for proper flame.

To clean burner port disconnect the gas supply to the valve, and remove the eight screws fastening the burner door. After removing the burner door from the combustion chamber, remove rear burner, pilot burner and front burner. With front and rear burners removed from furnace, force water into the ribbon ports and dry with air pressure.

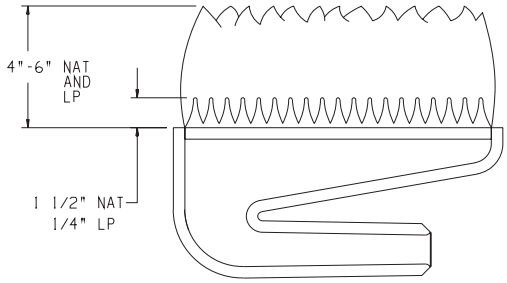


Figure 4

WIRING

Wiring

The appliance, when installed, must be electrically grounded in accordance with local codes or, in the absence of local codes, with the *National Electrical Code, ANSI/NFPA 70 or Canadian Electrical Code, CSA C22.1,* if an external electrical source is utilized. **This appliance is equipped with a three-prong [grounding] plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle. Do not cut or remove the grounding prong from this plug.** For an ungrounded receptacle, an adapter, which has two prongs and a wire for grounding, can be purchased, plugged into the ungrounded receptacle and its wire connected to the receptacle mounting screw. With this wire completing the ground, the appliance cord plug can be plugged into the adapter and be electrically grounded. A 7/8" hole is provided in the junction box for use with a conduit connector if local codes require this type of protection.

Thermostat Installation

The thermostat should be installed in the same room as the furnace 4' to 5' above the floor and away from another heat source (cooking stove, hot water heater, etc.) including walls and doorways with a heat source in an adjoining room. **Do Not Install Thermostat on Outside Wall.**

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

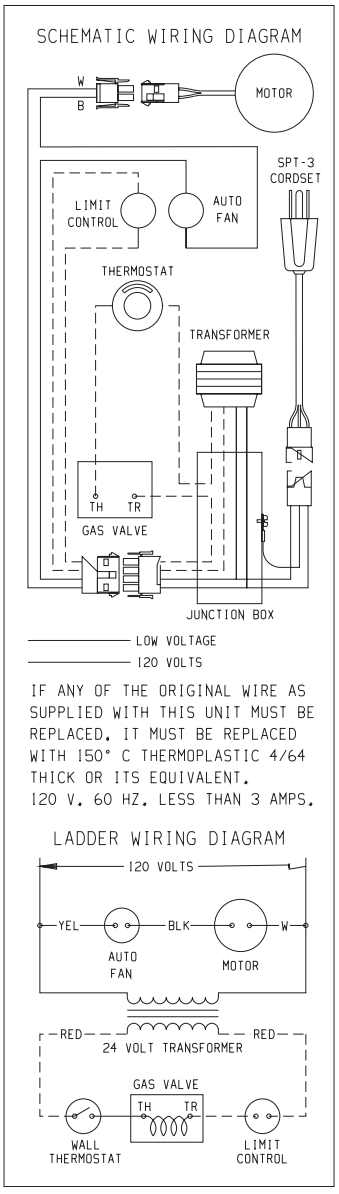


Figure 5

SERVICE & MAINTENANCE SUGGESTIONS

Replacing Fan and Oiling the Motor
The fan motor should be cleaned and oiled once each heating season. To reach the motor, withdraw the metal shroud surrounding the fan blade by removing the screws on each side. Oil holes are located on the top at each end of the motor. Use a few drops of #10 motor oil. To clean the motor, blow air through its ventilation openings with a vacuum cleaner or low pressure air source.

If fan motor is replaced, the silicone rubber gaskets, see owners manual, Index No. 4, Part No. 712059, should also be replaced. The gaskets must be stretched to fit the motor bolts into the gasket holes and then the motor and gaskets installed on the motor mounting bars.

GENERAL: All furnaces have been fire-tested to check for proper operation. This includes, main burner flame, pilot flame, fan operation, fan control, limit control and automatic valve operation. If the furnace fails to function on initial installation, it is advisable to re-check the following:

1. 115 volts to the junction box.
2. Inlet gas pressure.
3. The 24 volt system.
4. Type of gas being used and that shown on the rating label.

The Service Department at Empire Comfort Systems, Inc. may be contacted to assist in servicing furnace or call a qualified serviceman..

Servicing the Pilot and Main Burners, Pilot Orifice, Thermocouple, and Main Burner Orifices: Disconnect the gas supply at the inlet to the control valve. Then remove the burner door to which the above components are attached.

Servicing The Fan Motor: The upper front panel, the shroud surrounding the fan blade and fan blade must be removed. See "Replacing Fan and Oiling the Motor" paragraph above.

Spark Igniter Does Not Light Pilot: With air in the gas line, such as when the furnace is first installed or was off all summer, the pilot flame may be too lean to ignite on the first few trials. Turn the control valve knob to pilot position and depress the red reset button. Holding the button down continually to bleed the line:

1. Use lighter rod to light pilot with a match.
2. Use the piezo ignitor at 30 second intervals until it lights.

If Electrode Does Not Produce Spark:

1. Check wire connections.
2. Check gap for pilot burner to the electrode tip. Should be between 1/8" and 3/16". Electrode wire and tip must be more than 1/4" away from all other metal components.

If Pilot Does Not Light By Any Means:

1. Check valve knob for being in the "Pilot" position.
2. Check pilot adjustment for being full open (counterclockwise to open).
3. If gas is available in the supply tubing, the pilot orifice and/or pilot burner is probably restricted by a spider web. Clean pilot assembly and relight.

If Pilot Does Not Remain On After Releasing Knob:

1. Follow instructions and hold button down longer and harder.
2. Determine if pilot flame extends past thermocouple; if not, adjust input or clean pilot burner.
3. Replace thermocouple if millivolts read less than 15 millivolts.

Pilot Outage During Normal Operation:

1. Check air inlet tube for a good tight fit at both ends (6" diameter tube).
2. Check burner door and pilot hole cover for tight seal.
3. Check input by manifold pressure gauge or gas meter.

Main Gas Valve Does Not Open When Thermostat Is Turned To On:

1. Check for 24 volts to valve by removing one wire and touching to the **SAME TERMINAL** it was on. Terminal should have a light spark. **DO NOT SHORT ACROSS TERMINALS, AS IT WILL BURN OUT THE WALL THERMOSTAT.**
2. Thermostat wires at the wall may be shorted, so check for a faulty thermostat.
3. To check for line voltage to furnace, remove lower front panel and switch compartment cover and short across two-terminal fan control to allow fan to operate. (Figure 5, Sect 3:17)

DV55IP Heater Troubleshooting

LIGHTING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance is equipped with an ignition device which automatically lights the pilot.
Do not try to light the pilot by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

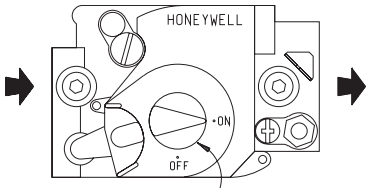
- **Do not try to light any appliance.**
- **Do not touch any electrical switch;**
  Do not use any phone in your building.
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

1. **STOP! Read the safety information above.**
2. **Set the thermostat to lowest setting.**
3. **Turn off all electric power to the appliance.**
4. **This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.**



GAS CONTROL KNOB SHOWN IN "ON" POSITION

5. **Remove control access panel (lower front panel).**
6. **Turn gas control knob clockwise ↷ to "OFF."**
7. **Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.**
8. **Turn gas control knob counterclockwise ↶ to "ON".**
9. **Replace control access panel (lower front panel).**
10. **Turn on all electric power to the appliance.**
11. **Set thermostat to desired setting.**
12. **If the appliance will not operate, follow the instructions "TO TURN OFF GAS TO APPLIANCE" and call your service technician or gas supplier.**

TO TURN OFF GAS TO APPLIANCE

1. **Set the thermostat to lowest setting.**
2. **Turn off all electric power to the appliance if service is to be performed .**
3. **Remove control access panel (lower front panel).**
4. **Turn gas control knob clockwise ↷ to "OFF." Do not force.**
5. **Replace control access panel (lower front panel).**

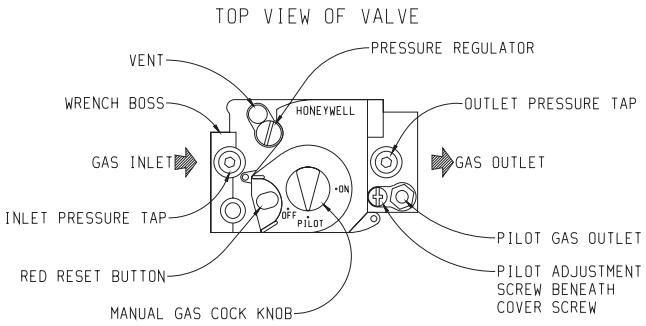


Figure 1

Checking Manifold Pressure

Both Propane and Natural gas valves have a built-in pressure regulator in the gas valve. Natural gas models will have a manifold pressure of approximately 3.5" w.c. at the valve outlet with the inlet pressure to the valve from a minimum of 5.0" w.c. for the purpose of input adjustment to a maximum of 7.0" w.c. Propane gas models will have a manifold pressure approximately 10.0" w.c. at the valve outlet with the inlet pressure to the valve from a minimum of 11.0" w.c. for the purpose of input adjustment to a maximum of 13.0" w.c.

A 1/8" N.P.T. plugged tapping, accessible for test gauge connection, is located on the outlet side of the gas control.

The built-in regulator comes on at approximately 1/4th pressure and full on in 10 seconds.

Safety Lockout

S8600H module provides 100 percent shutoff, or safety lockout. If the pilot fails to light within 90 seconds, the control system will shut down. The control system must be reset by setting the thermostat below room temperature for one minute or by turning off power to the module for one minute.

CLEARANCES

Clearances

1. In selecting a location for installation, it is necessary to provide adequate accessibility clearances for servicing and proper installation.
2. The DV-55 minimum wall depth is 4 1/2 inches and maximum wall depth is 13 inches. The maximum wall depth may be extended to 19" (483mm) using the model DV-1190 extended flue kit. The use of tubes not supplied by the manufacturer results in unsatisfactory performance.
3. The DV-55 can be attached to the wall or recessed into the wall up to 4 inches in depth but the minimum 4 1/2 inches vent/air intake system wall depth must be maintained. Example: If furnace is recessed into the wall at a depth of 4 inches, the minimum wall depth must be 8 1/2 inches.
4. The wall in which the furnace is recessed has (0) zero clearance to the furnace sides and top.
5. When using side discharge registers, SOR-1 or SOK-1, the furnace cannot be recessed into the wall.
6. Clearance to sidewall or combustible material is 4 inches.
7. Ceiling clearance is 4 inches.
8. Floor and rear wall clearance is (0) zero inches.
9. Clearance of 18 inches is required to sidewall or combustible material when flush mounted SOR-1, side outlet register is used.
10. The minimum distance from the center of the vent cap to the nearest outside corner or obstruction is 24 inches.

The vent terminal of a direct vent appliance with an input over 50,000 BTU per hour shall be located at least 12 inches from any opening through which flue gases could enter a building. The bottom of the vent terminal and the air intake shall be located at least 12 inches above grade.

WARNING: The nearest point of the vent cap should be a minimum horizontal distant of six (6) feet from any pressure regulator. In case of regulator malfunction, the six (6) feet distance will reduce the chance of gas entering the vent cap.

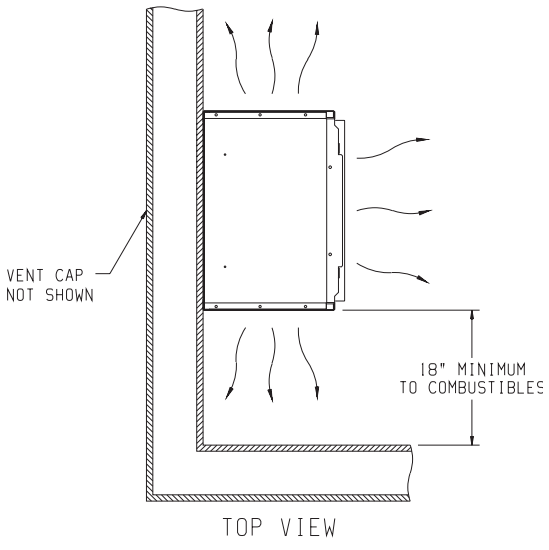


Figure 2

PILOT FLAME CHARACTERISTICS

The pilot flame (Figure 3) going to the spark must be large enough to completely cover the sparking area. With the proper flame, only 2 or 3 sparks will occur. More sparks indicate a small pilot flame and no ignition with spark stopping after approximately 90 seconds generally means not enough flame.

To adjust pilot flame remove the pilot cover screw on the control valve (Figure 3, Page 8), and turn the adjustment screw clockwise to reduce flame. Replace pilot cover screw to eliminate gas leakage.

The pilot flame will appear large. A blue nearly horizontal flame is proper. The spark gap must be 1/8". A larger gap can result in the spark occurring some other place. The pilot flame and the spark gap are factory checked and tested.

After use, cleaning may be required for the proper flame.

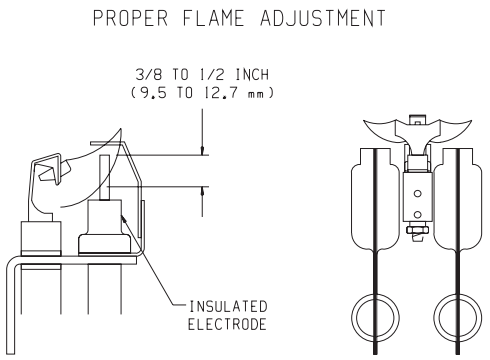


Figure 3

Electrode and pilot burner must be kept clean. Clean through pilot access hole with a small brush (toothbrush) and water.

MAIN BURNER FLAME CHARACTERISTICS

The correct flame will be a short blue inner flame with a much larger light blue outer flame. The main burner (Figure 4) shows the approximate height of each part of the flame for each gas. The burner does not have a primary air adjustment. The flame will be correct if the factory-set pressure and orifice opening are used. After the furnace has been operating, the burner ports may be blocked by foreign matter carried in by combustion air. Therefore, cleaning of the burner may be needed for proper flame.

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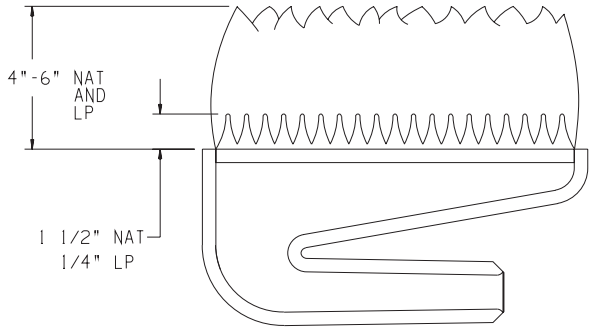

Figure 4

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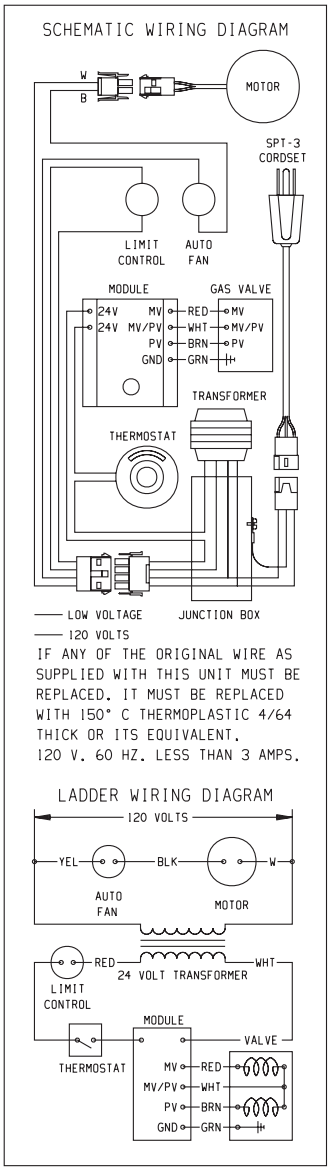

Figure 5

SERVICE & MAINTENANCE SUGGESTIONS

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If fan motor is replaced, the silicone rubber gaskets, see owners manual, Index No. 4, Part No. 712059, should also be replaced. The gaskets must be stretched to fit the motor bolts into the gasket holes and then the motor and gaskets installed on the motor mounting bars.

S8600H INTERMITTENT IGNITION MODULE SPECIFICATIONS
Lockout timing is 90 seconds. Ignition timing is until pilot lights or lockout occurs.

Module shuts down and cuts power to gas control on flame failure. Gas control closes to provide 100 percent lockout on flame failure. Manual reset required.

ELECTRICAL RATINGS:
Voltage and frequency: 20.5 to 28.5V (24V nom.) 60 Hz.
Current rating: 0.2 A.
Valve contact ratings (at 24 Vac):

	Run	Inrush
Pilot	1.0 A	10.0 A
Main	1.0 A	10.0 A

SPARK GENERATOR OUTPUT: 13kV peak at 25 pf load.
THERMOSTAT ANTICIPATOR SETTING: 0.2 A plus pilot valve rating plus main valve rating.
THERMOSTAT COMPATIBILITY: Standard models compatible with all open-close switch type 24 Vac thermostats capable of supplying rated voltage and current to the module.
AMBIENT TEMPERATURE RATING: Minus 40 F to plus 175 F (minus 40 C to plus 79 C).
RELATIVE HUMIDITY RATING: 5 to 90 percent RH at 95 F.
FLAME FAILURE RESPONSE TIME: 0.8 seconds at 1.0 uA flame current.
FLAME CURRENT: 1 uA, min.

CHECKOUT
Check out the gas control system:
1. At initial installation of the appliance.
2. As part of regular maintenance procedures.
3. As the first step in troubleshooting.
4. Any time work is done on the system.

STEP 1: Perform Visual Inspection.
A. With power off, make sure all wiring connections are clean and tight.
B. Turn on power to appliance and ignition module.
C. Open manual shutoff valves in the gas line to the appliance.
D. Do gas leak test ahead of gas control if piping has been disturbed. GAS LEAK TEST: Paint pipe joints with rich soap and water solution. Bubbles indicate gas leak. Tighten joints to stop leak.

STEP 2: Review Normal Operating Sequence and Module Specifications.

STEP 3: Reset the Module.
A. Turn the thermostat to its lowest setting.
B. Wait one minute.
As you do Steps 4 and 5, watch for points where operation deviates from normal. Refer to Troubleshooting Chart to correct problem.

STEP 4: Check Safety Lockout Operation.
A. Turn gas supply off.
B. Set thermostat above room temperature to call for heat.
C. Watch for spark at pilot burner.
D. Time length of spark operation. Maximum spark time is 90 seconds.
E. Open manual gas cock and make sure no gas is flowing to pilot or main burner.
F. Set thermostat below room temperature and wait one minute before continuing.

STEP 5: Check Normal Operation.
A. Set thermostat above room temperature to call for heat.
B. Make sure pilot lights smoothly when gas reaches the pilot burner.
C. Make sure main burner lights smoothly without flashback. Make sure burner operates smoothly without floating or lifting.
D. If gas line has been disturbed, complete gas leak test. GAS LEAK TEST: Paint gas control gasket edges and all pipe connections downstream of gas control, including pilot tubing connections, with rich soap and water solution. Bubbles indicate gas leaks. Tighten joints and screws or replace component to stop gas leak.
E. Turn thermostat below room temperature. Make sure main burner and pilot flames go out.

OPERATION
Module operation can be conveniently divided into two phases for S8600H. The phases are trial for ignition and main burner operation.

TRIAL FOR IGNITION

Pilot Ignition

Following call for heat (system start on S8600H), the module energizes the first main valve operator. The first main valve opens, which allows gas to flow to the pilot burner. At the same time, the electronic spark generator in the module produces a 13,000 volt spark pulse output (at 25 pf load). The voltage generates a spark at the igniter-sensor that lights the pilot.

If the pilot does not light, or the pilot flame current is not at least 1.0 uA and steady, the module will not energize the second main valve and the main burner will not light.

Safety Lockout

S8600H provides 100 percent shutoff, or safety lockout. A timer starts timing the moment the trial for ignition starts. Ignition spark continues only until the timed trial for ignition period ends. Then the module goes into safety lockout. Lockout de-energizes the first main valve operator and closes the first main valve in the gas control, stopping pilot gas flow.

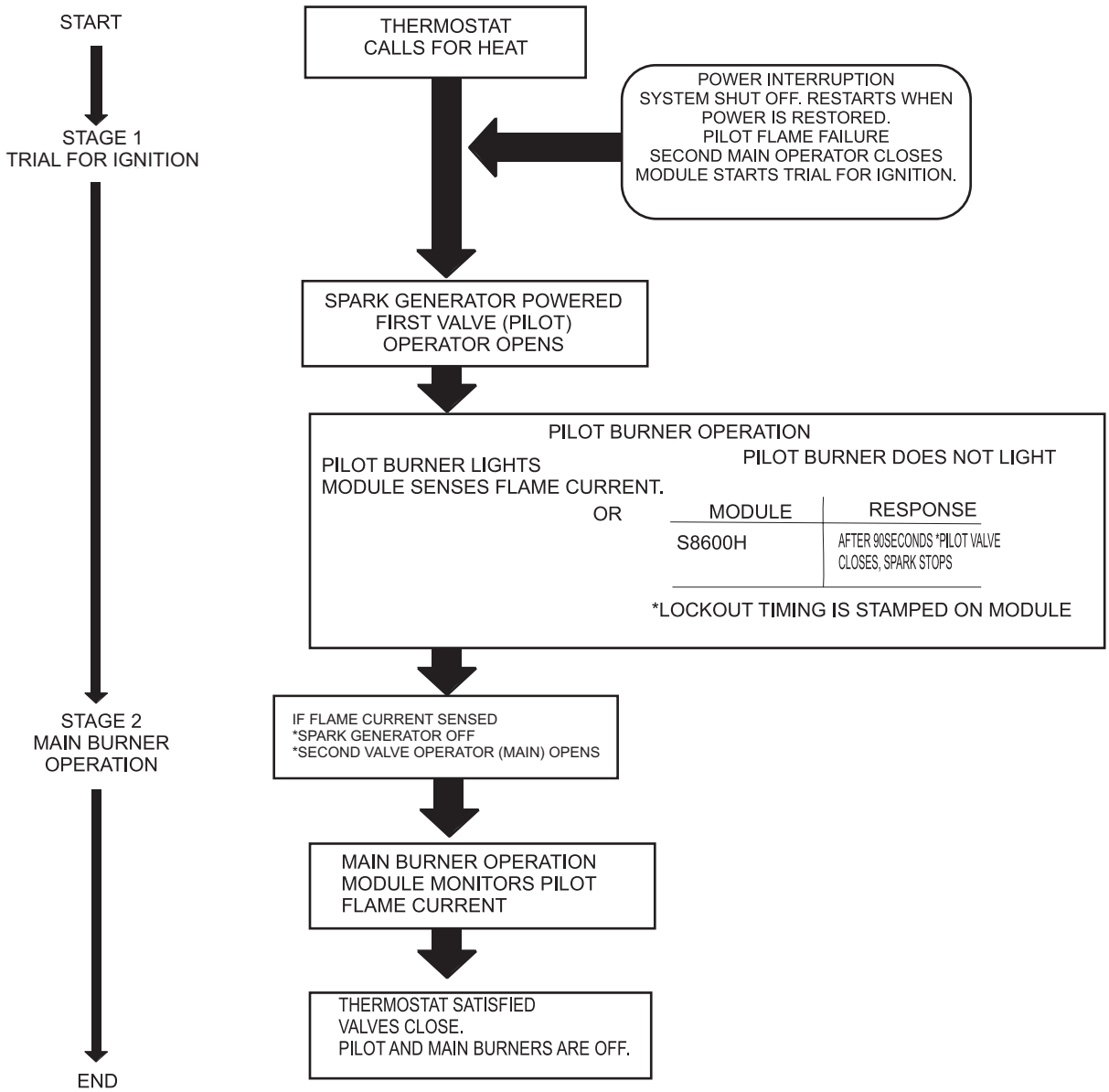
The control system must be reset by setting the thermostat below room temperature for one minute or by turning off power to the module for one minute.

Main Burner Operation

When the pilot flame is established, a flame rectification circuit is completed between the sensor and burner ground. The flame sensing circuit in the module detects the flame current, shuts off the spark generator and energizes the second main valve operator. The second main valve opens and gas flows to the main burner, where it is ignited by the pilot burner. The flame current also holds the safety lockout timer in the reset (normal) operating condition.

When the call for heat ends, both main valve operators are de-energized, and both main valves in the gas control close.

S8600H NORMAL OPERATING SEQUENCE



TROUBLESHOOTING

Important

1. The following service procedures are provided as a general guide.
2. Meter readings between gas control and ignition module must be taken within the trial for ignition period. Once the ignition module locks out, the system must be reset by setting the thermostat down for at least one minute before continuing.
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, it must be replaced.
5. Only trained, experienced service technicians should service intermittent pilot systems.

Perform the **CHECKOUT** steps on page 15 as the first step in troubleshooting. Then check **TROUBLESHOOTING GUIDE** to pinpoint the cause of the problem. If troubleshooting indicates an ignition problem, see Ignition System Checks below to isolate and correct the problem.

Following troubleshooting, perform the **CHECKOUT** procedure (Sect 3:25) again to be sure system is operating normally.

Ignition System Checks

Step 1: Check ignition cable.

Make sure:

A. Ignition cable does not touch any metal surfaces.
B. Ignition cable is no more than 36 inches long.
C. Connections to the ignition module and to the 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 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. 14-18 gauge, moisture-resistant, thermoplastic insulated wire with 105 C (221 F) minimum rating.
     - If flame rod or bracket are bent out of position, restore to correct position.
     - Replace pilot burner/igniter sensor if insulator is cracked.

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

When performing the following steps, do not touch stripped end of jumper or SPARK terminal. The ignition circuit generates 13,000 volts at 25 pf load and electrical shock can result.

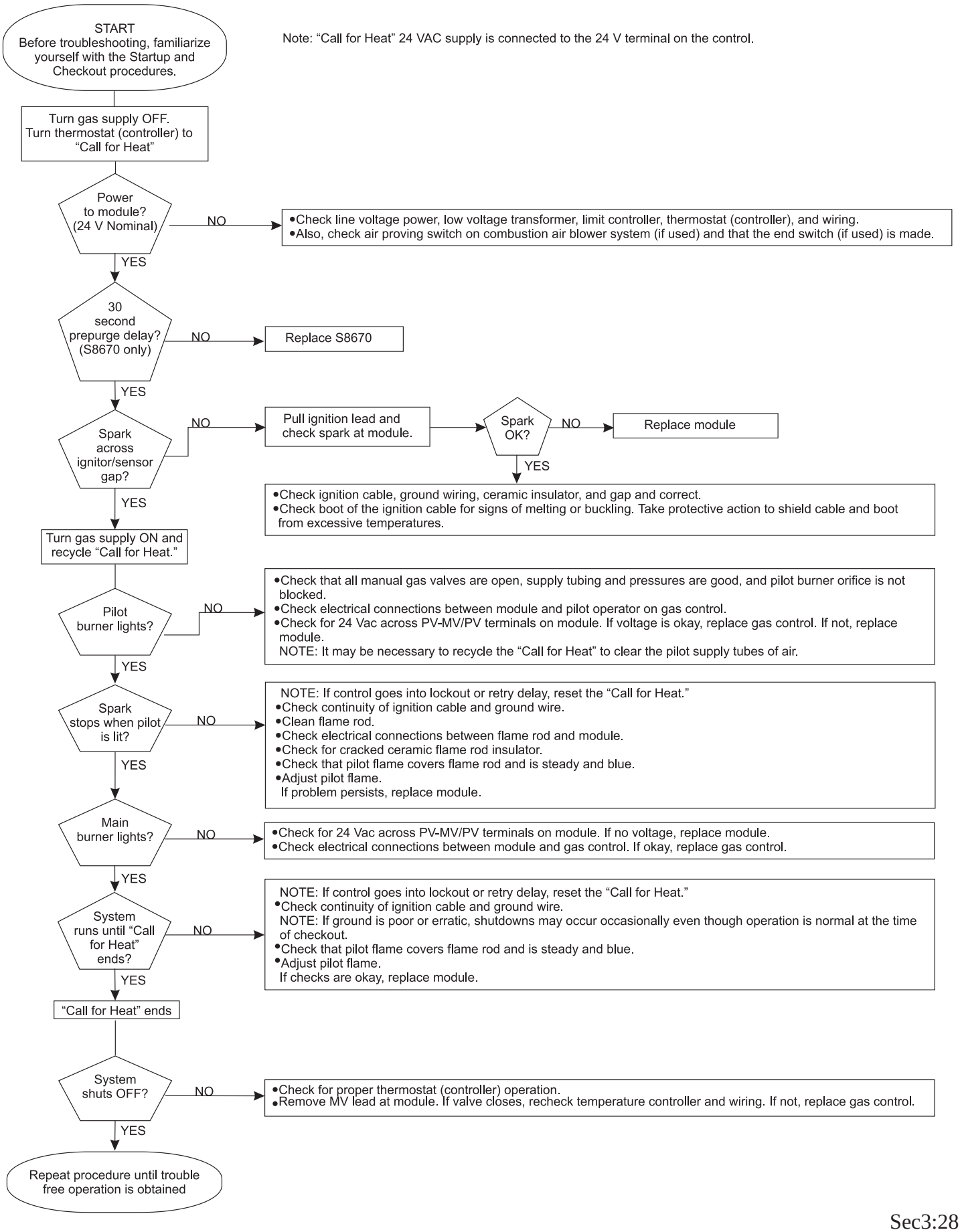
C. Energize the module and immediately touch one end of the jumper firmly to the GND terminal on the module. Move the free end of the jumper slowly toward the SPARK terminal until a spark is established.
D. Pull the jumper slowly away from the terminal and note the length of the gap when sparking stops. Check table below.

ARC LENGTH	ACTION
No arc or arc less than 1/8 inch	Check external fuse, if provided. Verify power at module input terminal. Replace module if fuse and power okay.
Arc 1/8 inch or longer	Voltage output is okay.

Step 4: Check pilot flame current.

A. Turn off furnace at thermostat.
B. Disconnect main valve wire from the TH or MV terminal on the gas control.
C. Disconnect ground wire from GND (BURNER) terminal at module.
D. Connect a meter (dc microamp scale) in series with the ground lead.
   - Disconnect ground lead from GND terminal on ignition module.
   - Connect the black (negative) meter lead to the ignition module GND (BURNER) terminal.
   - Connect the red (positive) meter lead to the free end of the ground lead.
E. Set thermostat to call for heat. The spark will light the pilot but the main burner will not light because the main valve actuator is disconnected.
F. Read the meter. The flame sensor current must be steady and at least 1.0 uA.
G. If the reading is less than the minimum or unsteady,
   - Make sure pilot flame envelopes 3/8 to 1/2 inch of the flame rod.
   - If necessary, adjust pilot flame by turning the pilot adjustment screw on the gas control clockwise to decrease or counterclockwise to increase pilot flame. Following adjustment, always replace pilot adjustment cover screw and tighten firmly to assure proper gas control operation.
   - Check for cracked ceramic insulator, which can cause short to ground, and replace igniter-sensor if necessary.
   - Make sure electrical connections are clean and tight. Replace damaged wire with moisture-resistant No. 18 wire rated for continuous duty up to 105 C (221 F).
H. Remove meter and reconnect all wires. Return system to normal operation before leaving job.

TROUBLESHOOTING



TROUBLESHOOTING

Green LED Status Codes

Green LED Flash Code (X + Y)[a]	Indicates	Next System Action	Recommended Service Action
OFF	No "Call for Heat"	Not applicable	None
Flash Fast	Startup-Flame sense calibration	Not applicable	None
Heart Beat	Normal operation	Not applicable	None
3	Recycle - Flame failed during run	Initiate new trial for ignition. Flash code will remain through the ignition trial until flame is proved.	If system fails to light on next trial for ignition, check gas supply, pilot burner, flame sense wiring, contamination of flame rod, burner ground connection.
4	Flame sensed out of sequence	If situation self corrects within 10 seconds, control returns to normal sequence. If flame out of sequence remains longer than 10 seconds, control goes to Flash code 6 + 4 (see below).	Check for pilot flame. Replace gas valve if pilot flame present. If no pilot flame, cycle "Call for Heat." If error repeats, replace control.
7	Flame sense leakage to ground	Control remains in wait mode. When the fault corrects, control resumes normal operation after a one minute delay.	Check flame sense lead wire for damage or shorting. Check that flame rod is in proper position. Check flame rod ceramic for cracks, damage or tracking.
8	Low secondary voltage supply - below 15.5 Vac)	Control remains in wait mode. When the fault corrects, control resumes normal operation after a one minute delay.	Check transformer and AC line for proper input voltage to the control. Check with full system load on the transformer.
6 + 2	Failed trial for ignition resulting in lockout	Remain in lockout until "Call for Heat" is cycled.	Check gas supply, pilot burner, spark and flame sense wiring, flame rod contaminated or out of position, burner ground connection.
6 + 3	More than 5 flame failures during run on the same "Call for Heat" resulting in lockout	Remain in lockout until "Call for Heat" is cycled.	Check gas supply, pilot burner, flame sense wiring, contamination of flame rod, burner ground connection.
6 + 4	Flame sensed out of sequence - longer than 10 seconds	Control waits until flame is no longer sensed and then goes to soft lockout. Flash code continues. Control auto resets from soft lockout after one hour.	Check for pilot flame. Replace gas valve if pilot flame present. If no pilot flame, cycle "Call for Heat." If error repeats, replace control.
ON	Soft lockout due to error detected during self check sequences	Control auto resets from soft lockout after one hour.	Reset by cycling "Call for Heat." If error repeats, replace the control.

[a]Flash Code Descriptions:

- Flash Fast: Rapid blinking
- Heartbeat: Constant 1/2 second bright 1/2 second dim cycles
- A single flash code number signifies that the LED flashes X times at 2Hz, remains off for two seconds, and then repeats the sequence.
- X + Y flash codes signify that the LED flashes X times at 2Hz, remains off for two seconds, flashes Y times at 2Hz, remains off for three seconds, and then repeats the sequence.

DVC35 Heater Troubleshooting

DVC-35 SPP STANDING PILOT LIGHTING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

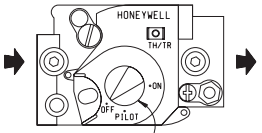
- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone, Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

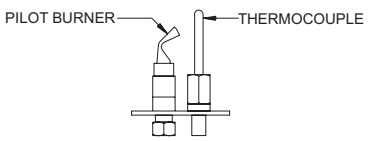
LIGHTING INSTRUCTIONS

1. **STOP! Read safety information above.**
2. **Set the thermostat to lowest setting.**
3. **Turn off all electric power to the appliance.**
4. **Remove control access panel (lower front panel).**
5. **Turn gas control knob clockwise to "OFF."**



GAS CONTROL KNOB SHOWN IN "OFF" POSITION

6. **Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.**
7. **Remove the pilot access cover located on the combustion chamber.**
8. **Find pilot - follow metal tube from gas control. The pilot is located between the two burner tubes behind the pilot access cover.**



9. **Turn gas control knob counterclockwise to "Pilot."**
10. **Push and hold red reset button down completely and repeatedly push the ignitor button until the pilot burner is lit. Pilot may also be lit with a match. Continue to hold the red rest button down for about one (1) minute after the pilot is lit. Release button and it will pop back up. Pilot should remain lit. If it goes out, repeat step 5 through 10.**
    - **If button does not pup up when released, stop and immediately call a qualified service technician or gas supplier.**
    - **If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.**
11. **Replace pilot access cover.**
12. **Turn gas control knob counterclockwise to "ON."**
13. **Replace control access panel (lower front panel).**
14. **Turn on all electric power to the appliance.**
15. **Set thermostat to desired setting.**

TO TURN OFF GAS TO APPLIANCE

1. **Set the thermostat to lowest setting.**
2. **Turn off all electric power to appliance if service is to be performed.**
3. **Remove control access panel (lower front panel).**
4. **Push in gas control knob slightly and turn clockwise to "OFF." Do not force.**
5. **Replace control access panel (lower front panel).**

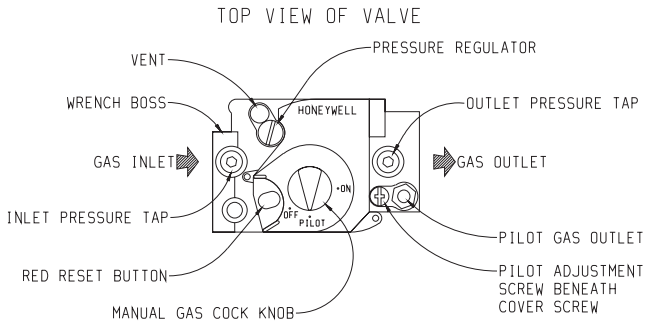


Figure 1

Checking Manifold Pressure

Both Propane and Natural gas valves have a built-in pressure regulator in the gas valve. Natural gas models will have a manifold pressure of approximately 4.0" w.c. (.996kPa) for DVC-35T and 3.5" w.c. (.871kPa) for DVC-35IPT at the valve outlet with the inlet pressure to the valve from a minimum of 5.0" w.c. (1.245kPa) for the purpose of input adjustment to a maximum of 7.0" w.c. (1.743kPa). Propane gas models will have a manifold pressure approximately 10.0" w.c. (2.49kPa) at the valve outlet with the inlet pressure to the valve from a minimum of 11.0" w.c. (2.739kPa) for the purpose of input adjustment to a maximum of 13.0" w.c. (3.237kPa).

A 1/8" N.P.T. plugged tapping, accessible for test gauge connection, is located on the outlet side of the gas control.

The built-in regulator comes on at approximately 1/4th pressure and full on in 10 seconds.

CLEARANCES

Clearances

1. In selecting a location for installation, it is necessary to provide adequate accessibility clearances for servicing and proper installation. A front clearance of 36" is recommended. Do not block outlet or inlet air openings on the front grill.
2. **The DV4T-59-1, 5" to 9" wall depth is the standard vent kit provided with the DVC-35T or DVC-35IPT. See Accessories Page 6 to order vent kits for wall depths of 8" to 12" or 12" to 19". The use of tubes not supplied by the manufacturer results in unsatisfactory performance.**
3. The DVC-35T and DVC-35IPT can be attached to the wall or recessed into the wall up to 9 1/2" in depth but the minimum 5" vent/air intake system wall depth must be maintained. Example: If furnace is recessed into the wall at a depth of 9 1/2", the minimum wall depth behind the furnace must be 5".
4. The wall in which the furnace is recessed has (0) zero clearance to the furnace sides and top.
5. When using side discharge registers, SOR-1 or SOK-1, the furnace cannot be recessed into the wall.
6. Clearance to sidewall or combustible material is 4".
7. Ceiling clearance is 4".
8. Floor and rear wall clearance is (0) zero inches.
9. Clearance of 18" is required to sidewall or combustible material when flush mounted SOR-1, side outlet register is used.
10. The minimum distance from the center of the vent cap to the nearest outside corner or obstruction is 12".

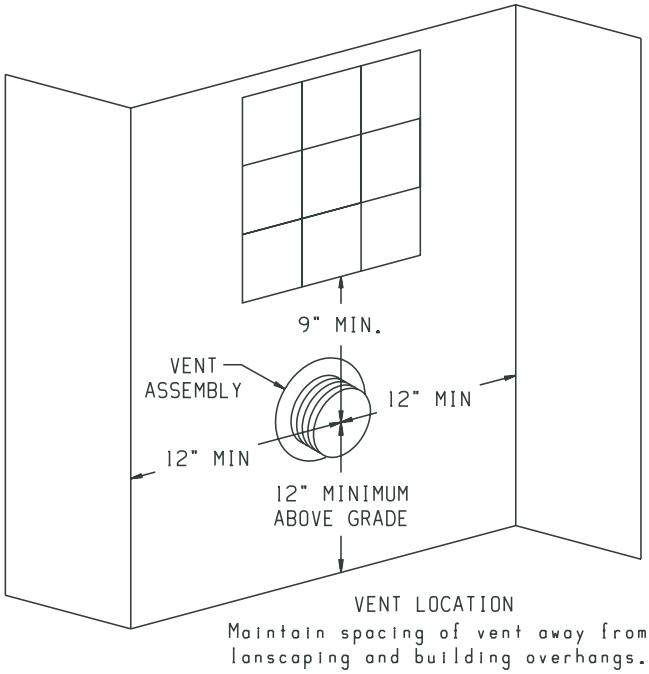


Figure 2

The vent terminal of this direct vent appliance shall be located at least 9" from any opening through which flue gases could enter a building. The bottom of the vent terminal and the air intake shall be located at least 12" above grade. See vent location, Figure 4.

WARNING: The nearest point of the vent cap should be a minimum horizontal distant of six (6) feet from any pressure regulator. In case of regulator malfunction, the six (6) feet distance will reduce the chance of gas entering the vent cap.

DVC-35IP INTERMITTENT PILOT LIGHTING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance is equipped with an ignition device which automatically lights the pilot. Do NOT try to light the pilot by hand.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

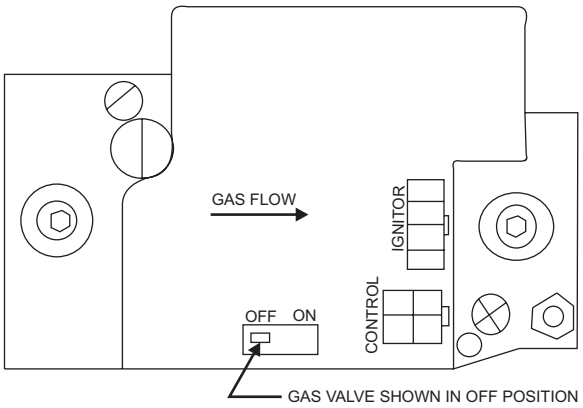
- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone, Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

1. **STOP! Read safety information above.**
2. **Set the thermostat to lowest setting.**
3. **Turn off all electric power to the appliance.**
4. **This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.**



HONEYWELL IP SMART VALVE

5. **Remove front panel door.**
6. **Slide gas control switch to "OFF."**
7. **Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.**
8. **Slide gas control switch to "ON."**
9. **Replace front panel door.**
10. **Turn on all electric power to the appliance.**
11. **Set thermostat to desired setting.**
12. **If the appliance will not operate, follow the instructions, "TO TURN OFF GAS TO APPLIANCE" and call your service technician or gas supplier.**

TO TURN OFF GAS TO APPLIANCE

1. **Set the thermostat to lowest setting.**
2. **Turn off all electric power to the appliance if service is to be performed.**
3. **Remove front panel door.**
4. **Slide gas control switch to "OFF."**
5. **Replace front panel door.**

PILOT FLAME CHARACTERISTICS

The correct pilot flame (Figure 3) will be blue, extending past the thermocouple. The flame will surround the thermocouple just below the tip.

Natural gas pilots require adjusting when the inlet gas pressure is above 5" w.c. (1.245kPa). Remove the pilot cover screw on the control valve, and turn the adjustment screw clockwise to reduce flame. Replace pilot cover screw to eliminate gas leaking at that control valve opening.

LP gas (Propane) will not require adjustment.

After use, cleaning may be required for the proper flame.

IP-Model Pilot

This heater is using a Honeywell "Smart Valve" system for intermittent pilot ignition.

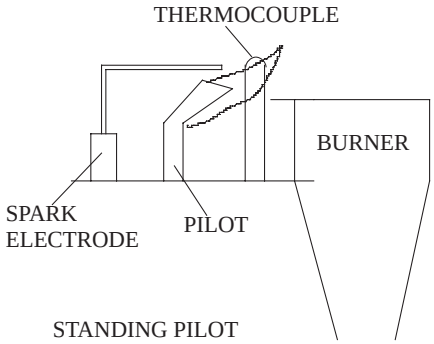
On a call for heat by the thermostat, this control turns on a 24 volt mini hot surface ignitor which lights a pilot that in turn lights the main burner. The gas valve used in this system is a step opening which opens at a lower pressure for ignition and then steps to a full inlet pressure of 4" H_2O pressure on Natural gas and 10" H_2O pressure on LP gas.

Pilot Flame Adjustment

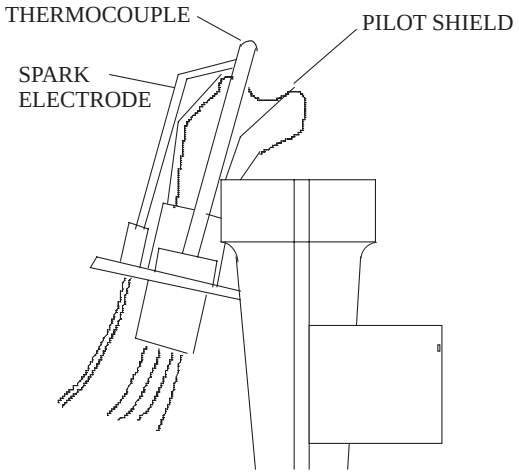
The pilot flame should envelop 3/8 to 1/2 inch (10 to 13mm) of the tip of the flame rod. See Figure 3.

To adjust:

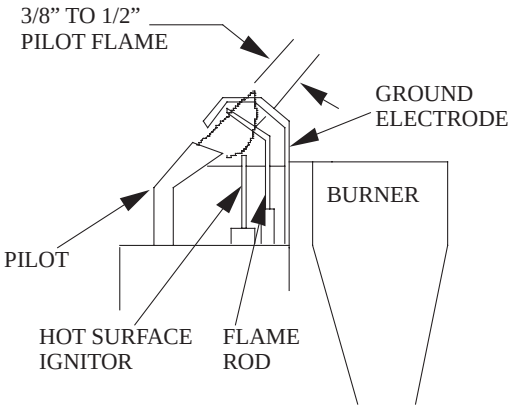
1. Remove the pilot adjustment cover screw.
2. Turn the inner adjustment screw clockwise to decrease or counterclockwise to increase pilot flame. Pilot adjustment is shipped at full flow rate. Turn the inner adjustment screw clockwise if the inlet pressure is too high.
3. Replace the cover screw after the adjustment to prevent gas leakage.



STANDING PILOT



PILOT LOCATION END VIEW
STANDING PILOT SHOWN



IP-MODEL PILOT

Figure 3

MAIN BURNER FLAME CHARACTERISTICS

The correct flame will be a short, blue inner flame with a much larger, light blue, outer flame. The burner does not have a primary air adjustment. The flame will be correct if the factory-set pressure and orifice opening are used. After the furnace has been operating, the burner ports may be blocked by foreign matter carried in by combustion air. Therefore, cleaning of the burner may be needed for proper flame.

The clean burner port disconnect the gas supply to the valve, and remove the screws fastening the burner. After removing the burner door from the burner box, remove each main burner. Pilot mounting bracket will need to be unscrewed and moved out the way to remove all burners. Burners can be blown out using compressed air or by blowing through them. Be sure there is no lint or foreign debris blocking the burner ports. Reassemble using the same screws earlier removed and locate pilot in the same position as before and noted above.

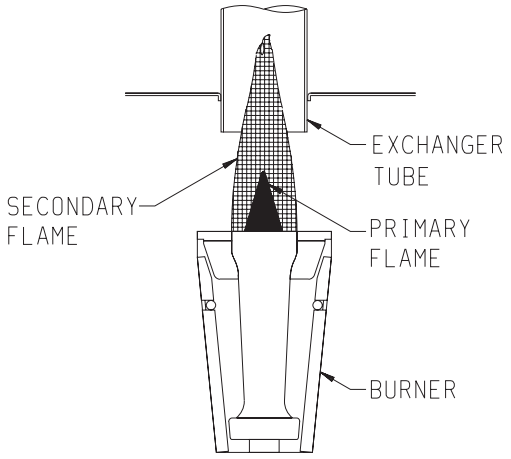


Figure 4

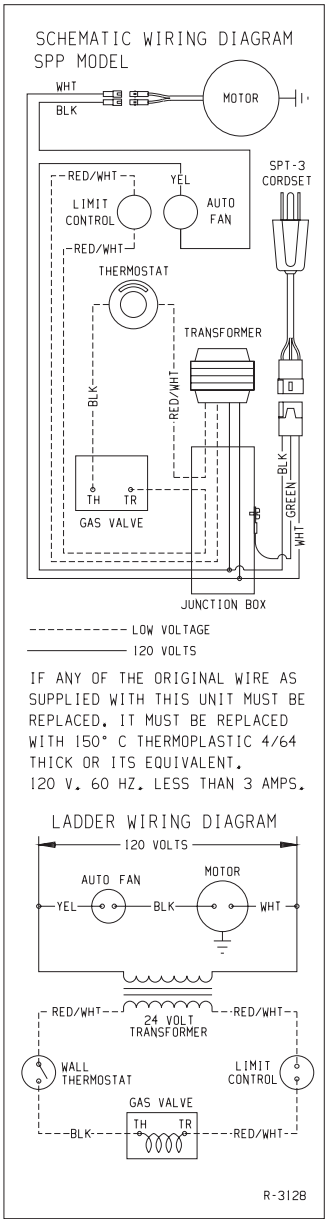
WIRING

The appliance, when installed, must be electrically grounded in accordance with local codes or, in the absence of local codes, with the *National Electrical Code, ANSI/NFPA 70 or Canadian Electrical Code, CSA C22.1, if an external electrical source is utilized.* **This appliance is equipped with three-prong (grounding) plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle. Do not cut or remove the grounding prong from this plug.** For an ungrounded receptacle, an adapter, which has two prongs and a wire for grounding, can be purchased, plugged into the ungrounded receptacle and its wire connected to the receptacle mounting screw. With this wire completing the ground, the appliance cord plug can be plugged into the adapter and be electrically grounded. A 7/8" hole is provided in the junction box for use with a conduit connector if local codes require this type of protection.

Thermostat Installation

The thermostat should be installed in the same room as the furnace 4' to 5' above the floor and away from another heat source (cooking stove, hot water heater, etc.) including walls and doorways with a heat source in an adjoining room. **Do Not Install Thermostat on Outside Wall.**

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.



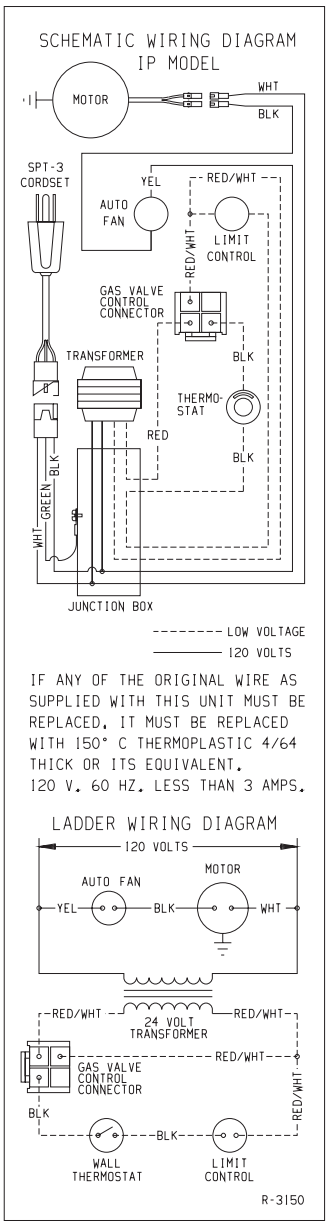


Figure 5

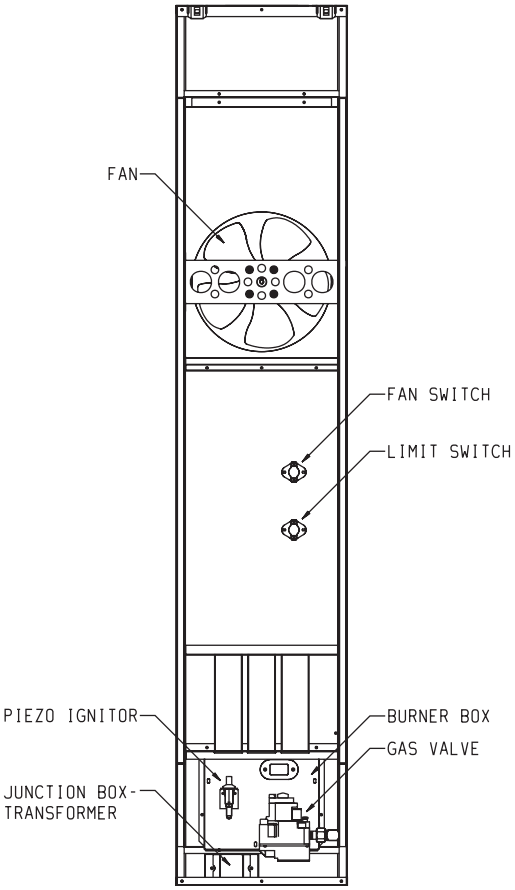
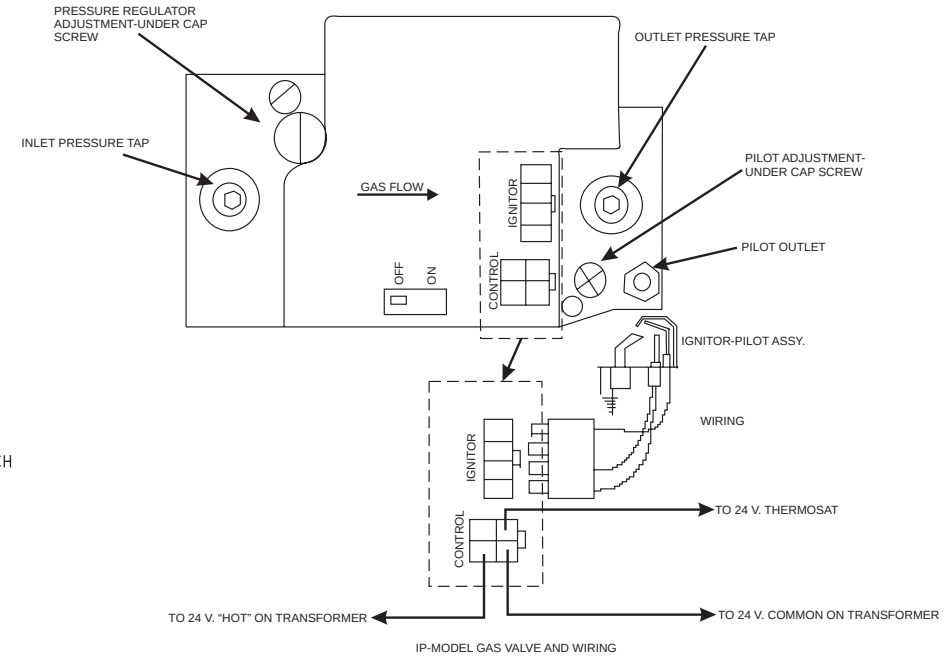
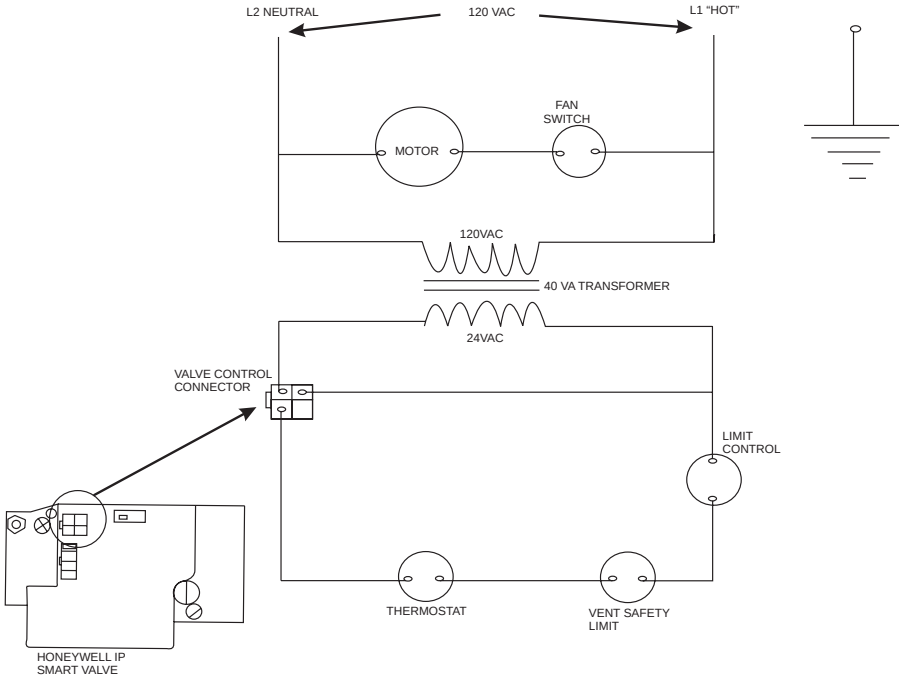


Figure 6



IP-MODEL GAS VALVE AND WIRING



LADDER WIRING DIAGRAM

Figure 7

SERVICE AND MAINTENANCE SUGGESTIONS

GENERAL: All furnaces have been fire-tested to check for proper operation. This includes, main burner flame, pilot flame, fan operation, fan control, limit control and automatic valve operation. If the furnace fails to function on initial installation, it is advisable to re-check the following:

1. 115 volts to the junction box.
2. Inlet gas pressure.
3. The 24 volt system.
4. Type of gas being used and that shown on the rating label.

The Service Department at Empire Comfort Systems, Inc. may be contacted to assist in servicing furnace.

Standing Pilot Model

Servicing the Pilot and Main Burners, Pilot Orifice, Thermocouple, and Main Burner Orifices: Disconnect the gas supply at the inlet to the control valve. Then remove the burner door to gain access to the above listed components.

Spark Igniter Does Not Light Pilot: With air in the gas line, such as when the furnace is first installed or was off all summer, the pilot flame may be too lean to ignite on the first few trials. Turn the control valve knob to pilot position and depress the red reset button. Holding the button down continually to bleed the line;

1. Use lighter rod to light pilot with a match
2. Use the piezo ignitor at 30 second intervals until it lights.

If Electrode Does Not Produce Spark:

1. Check wire connections.
2. Check gap for pilot burner to the electrode tip. Should be between 1/8" (3mm) and 3/16" (4.8mm). Electrode wire and tip must be more than 1/4" (6.3mm) away from all other metal components.

If Pilot Does Not Light By Any Means:

1. Check valve knob for being in the "Pilot" position.
2. Check pilot adjustment for being full open (counterclockwise to open).
3. If gas is available in the supply tubing, the pilot orifice and/or pilot burner is probably restricted by a spider web. Clean pilot assembly and relight.

If Pilot Does Not Remain On After Releasing Knob:

1. Follow instructions and hold button down longer and harder.
2. Determine if pilot flame extends past thermocouple; if not, adjust input or clean pilot burner.
3. Replace thermocouple if millivolts read less than 15 millivolts.

Pilot Outage During Normal Operation:

1. Check air inlet tube for a good tight fit at both ends (6" diameter tube).
2. Check burner door and pilot hole cover for tight seal.
3. Check input by manifold pressure gauge or gas meter.

Main Gas Valve Does Not Open when Thermostat Is Turned To On:

1. Check for 24 volts to valve by removing one wire and touching to the **SAME TERMINAL** it was on. Terminal should have a light spark. **DO NOT SHORT ACROSS TERMINALS, AS IT WILL BURN OUT THE WALL THERMOSTAT.**
2. Thermostat wires at the wall may be shorted, so check for a faulty thermostat.
3. To check for line voltage to furnace, remove front panel and short across two-terminal fan control to allow fan to operate (Figure 6).

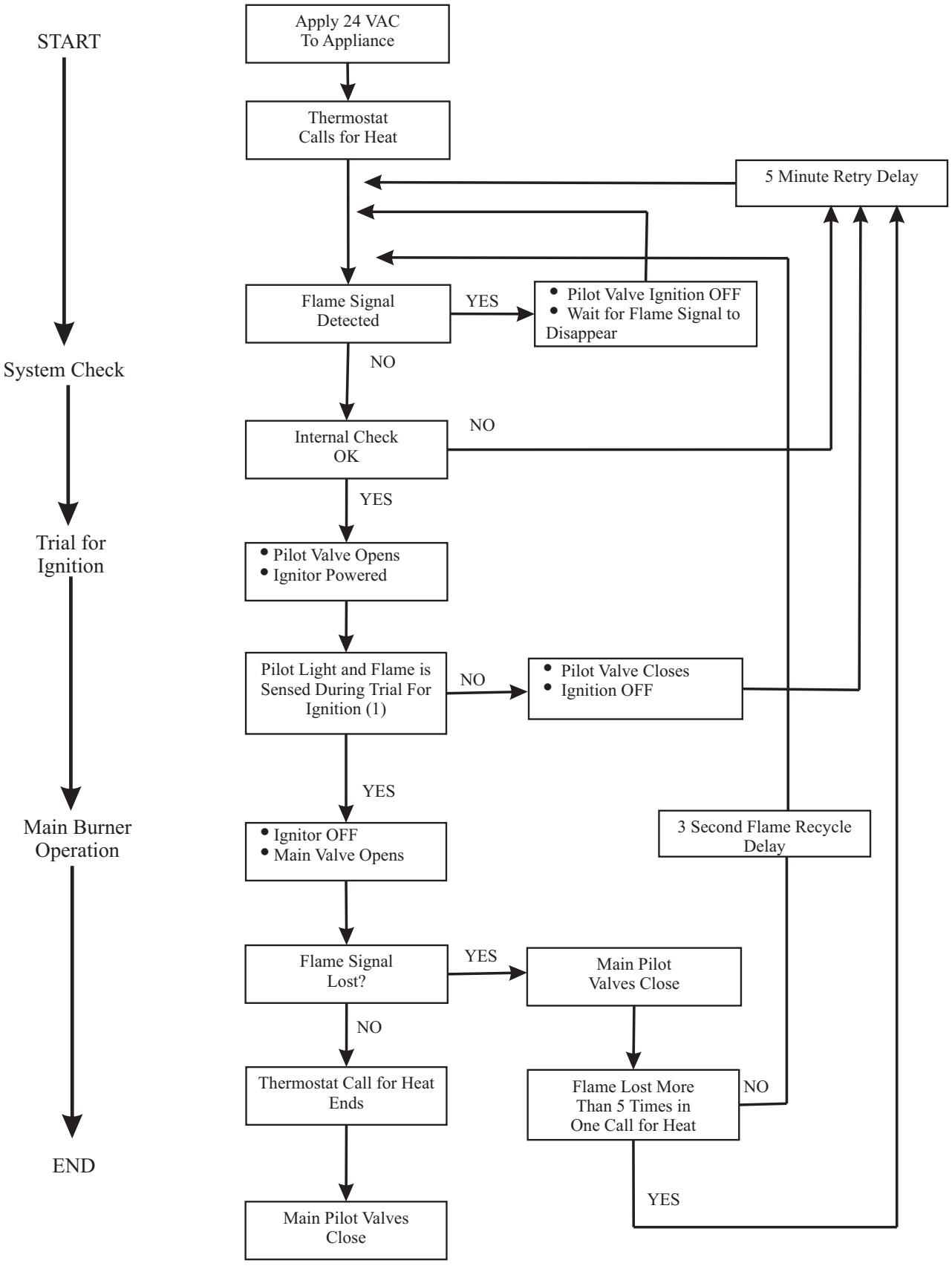
Cleaning Combustion (Exchanger) Assembly

A QUALIFIED SERVICE PERSON should remove the combustion (exchanger) assembly and flue baffles. Apply air pressure to the inside of the combustion (exchanger) assembly and flue baffles in order to clear all passageways.

Oiling the Motor

The Fan motor should be cleaned and oiled once each heating season. Oil holes are located on the top at each end of the motor. Use a few drops of #10 motor oil. To clean the motor, blow air through its ventilation openings with a vacuum cleaner or low pressure air source.

DVC-35IP INTERMITTENT PILOT SEQUENCE OF OPERATION

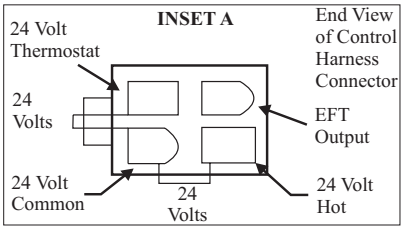


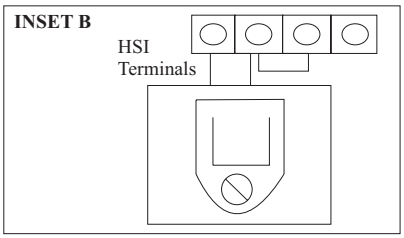
(1) Ignitor will turn OFF about 30 seconds into the trial for ignition if the pilot flame has not lit. It will turn back ON for the final 30 seconds of the 90 second trial for ignition. The pilot will be energized during the entire trial for ignition. This is normal operation for this gas ignition system.

DVC-35IP INTERMITTENT PILOT SYSTEM TROUBLESHOOTING SEQUENCE

IP SYSTEM TROUBLESHOOTING SEQUENCE

SmartValve™ System Troubleshooting Sequence
Note: Before Troubleshooting, Become Familiar with the Sequence of Operation





START

Turn OFF Gas Supply
Disconnect System Control Harness
Set Thermostat to Call for Heat

Check for Proper Voltage at Control Harness (See Inset A - Voltage Should be 24V Between Thermostat and 24V Common, and 24V Between 24V Common and 24V Hot.)

NO → Check
- Line Voltage Power
- Low Voltage Transformer
- Limit Controller
- Thermostat Wiring

YES

Plug Harness into SmartValve Control
Wait for Internal Check Delay (SV9501)

Igniter Warms UP and Glows Red

NO → Unplug Pilot Burner Cable. Measure Voltage at SmartValue HSI Element Output (See Inset B) 24V Nominal

NO → Replace SmartValve Control

Reconnect Pilot Burner Cable

Replace Igniter/Flame Rod Assembly

Reconnect Pilot Burner Cable

Note: Igniter Will Cycle OFF and Back ON Once During the 90 Second Ignition Trial

YES

Turn On Gas Supply
Pilot Burner Lights

NO → Check that Pilot Gas is Flowing Wait to Assure Pilot Gas Tubing is Purged.

NO → Replace SmartValve Control

Measure Voltage Between 24V Hot and 24V Common Leads to SmartValve Control. Must Measure at Least 19.5 VAC with Igniter Powered. See Inset A to Identify Proper Lead. This Check Must be Done with the SmartValve Control Connected and Igniter Powered.

NO → Check Transformer and Line Volt Supply

YES

Replace Igniter/Flame Rod Assembly

Main Valve Opens and Main Burner Lights

NO → Check that Pilot Flame Makes Good Contact with Pilot Burner Flame Rod
Check for Good Electrical Connection Through the Pilot Tubing
If Both of the Above are Good, Replace Igniter/Flame Rod

YES

Cycle Thermostat OFF and Back ON

System is Okay

Main Burner Lights

NO → Replace SmartValve Control

DV-E Series Heater Troubleshooting

LIGHTING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

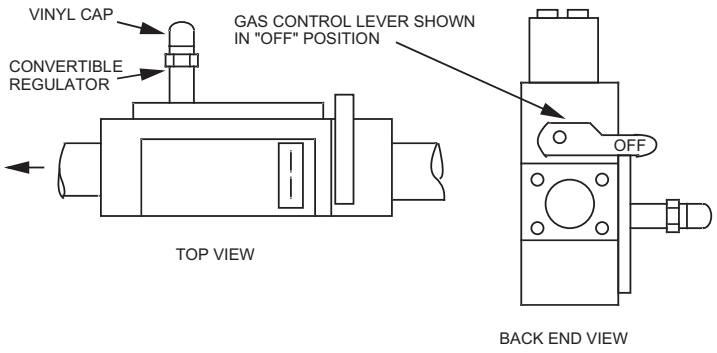
- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.



5. Remove control access panel (front panel).
6. Turn gas control knob clockwise to "OFF."
7. Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.
8. Turn gas control knob counterclockwise to "ON".
9. Replace control access panel (front panel).
10. Turn on all electric power to the appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "TO TURN OFF GAS TO APPLIANCE" and call your service technician or gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed .
3. Remove control access panel (front panel).
4. Turn gas control knob clockwise to "OFF." Do not force.
5. Replace control access panel (front panel).

CLEARANCES

1. Pick a location on a wall with a clear space of 36" (91.4cm) high by 43" (109cm) wide in the room. In selecting a location for installation, it is necessary to provide adequate accessibility clearances for servicing and proper installation. Be sure to locate the unit close enough to a 115 VAC wall receptacle to properly power appliance.
2. Unit is supported by a wall bracket secured to the wall.
3. When facing the front of the furnace the minimum clearances from casing to combustible construction are 10" (254mm) on top, 3" (76mm) on each side, recommend 18" (457mm) on right side for servicing and 0" (0mm) from the floor and 0" (0mm) to rear wall.
4. The black flocked exhaust pipe, contained in DVE-1 Kit or DVE-2 Kit, has zero (0") inches (0mm) clearance to combustibles.
5. The minimum distance from the center of the vent cap to the nearest outside corner or obstruction is 12" (305mm).
6. The minimum wall depth is 2" (51mm) and the maximum is 10" (254mm) [or 32"(813mm) using the extended vent terminal kit accessory]. The use of vent tubes not supplied by the manufacturer may result in unsatisfactory performance.

The vent terminal of a direct vent appliance, with an input of 50,000 BTU (14.6KW) per hour or less shall be located at least 9" (229mm) from any opening through which flue gases could enter a building.

The bottom of the exhaust vent terminal and the air intake shall be located at least 12" (305mm) above grade and must be vented outside.

WARNING: The nearest point of the vent cap should be a minimum horizontal distant of six (6) feet (1.83m) from any pressure regulator. In case of regulator malfunction, the six (6) feet (1.83m) distance will reduce the chance of gas entering the vent cap.

Installation on Rugs and Tile

If this appliance is to be installed directly on carpeting, tile, or other combustible material, other than wood flooring, the appliance shall be installed on a metal or wood panel extending the full width and depth of the appliance.

The base referred to above does not mean the fire-proof base as used on wood stoves. The protection is primarily for rugs that may be extremely thick and light-color tile that can discolor.

WIRING

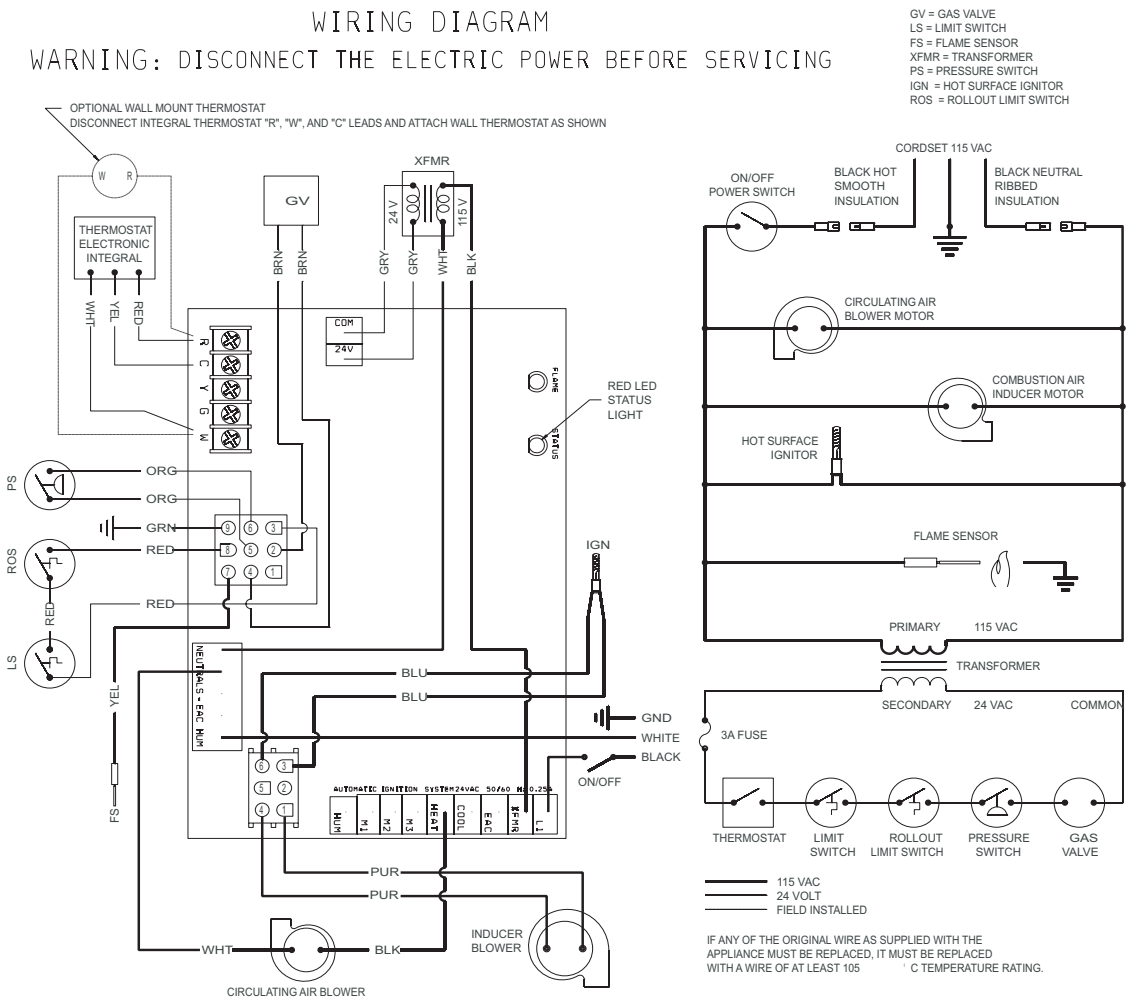


Figure 1

The appliance, when installed, must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70 or Canadian Electrical Code, CSA C22.1, if an external electrical source is utilized. **This appliance is equipped with a three-prong [grounding] plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle. Do not cut or remove the grounding prong from this plug.** For an ungrounded receptacle, an adapter, which has two prongs and a wire for grounding, can be purchased, plugged into the ungrounded receptacle and its wire connected to the receptacle mounting screw. With this wire completing the ground, the appliance cord plug can be plugged into the adapter and be electrically grounded.

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

Note: For testing flame sensor circuit use a micro-amp meter in series with sensor. Minimum current should be 1 micro-amp during operation. Be careful as flame sensor is in the 115VAC circuit. If current is below 1 micro-amp, remove sensor, clean with light sandpaper and retest.

Note: This heater is equipped with a remote bulb electronic thermistor control located down low at the back of the furnace. Sometimes due to field locations different air currents may effect the control sensing of the thermistor. This sensing bulb can be re-located if necessary to provided for better room air sensing and control.

Replacement of Thermistor with 24 Volt Wall Thermostat

1. If furnace is installed, turn off gas supply and electric supply.
2. Remove casing front.
3. Remove black hose from front nipple on pressure switch.
4. Remove junction box cover (4 screws).
5. Please refer to wiring diagram for removal of the following wires.
6. **Internal Electronic Thermostat/Temperature Control Board**
   Attention! No 24 volt wall thermostat wires are to be attached to the internal electronic thermostat.
7. Control Board
   A. Remove white wire form screw marked W.
   B. Remove yellow wire from screw marked C.
   C. Remove red wire from screw marked R.
8. Route (2) wires from any 24 volt wall thermostat through the casing back of furnace to the screws marked W and R on the control board.
9. Replace junction box cover (4 screws).
10. Replace black hose onto front nipple on pressure switch.
11. Replacement of thermistor with 24 volt wall thermostat is completed.

MAINTENANCE

Proper Main Burner Flame

The proper main burner flame will be a blue primary (inner) flame with a larger, lighter blue secondary (outer) blue flame.

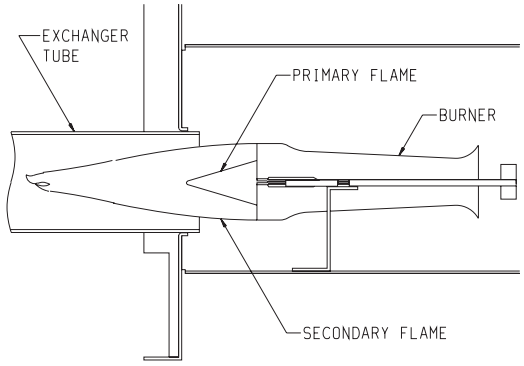


Figure 2

Cleaning Main Burner(s)

Remove main burner(s) and apply air pressure inside the throat and ports of the main burner(s).

Removing Main Burner(s)

1. Remove front grill assembly.
2. Remove burner compartment access panel (2 screws).
3. Remove main burner(s) from burner compartment (2 screws per main burner).

Removing Gas Valve

1. Remove front grill assembly.
2. Disconnect manifold union assembly at gas valve.
3. Remove (2) two 24 volt wires from gas valve. Label wires prior to disconnection from gas valve.
4. Remove gas valve from gas valve bracket.

Removing Main Burner Orifice(s)

1. Remove front grill assembly.
2. Remove burner compartment access panel (2 screws).
3. Disconnect manifold union assembly.
4. Disconnect manifold union assembly brackets (5 screws).

Removing Ignitor and Flame Sensor

1. Remove front grill assembly.
2. Remove ignitor from burner compartment (2 screws).
3. Remove flame sensor from burner compartment (1 screw).

Cleaning Combustion (Exchanger) Assembly

A QUALIFIED SERVICE PERSON should remove the combustion (exchanger) assembly. Apply air pressure to the inside of the combustion (exchanger) assembly in order to clear all passageways.

Oiling

The blower motor has an oil hole located on each end of the motor. Use #20 motor oil only. It is best to oil the motor several times during the heating season using 2 or 3 drops each time.

OPERATION AND TROUBLESHOOTING

Your new furnace should provide many years of trouble free performance, however, a yearly inspection of the burners , flue passageways and the outlet vent assembly should be done. Be sure all passageways are open and clear of any obstruction, or soot build up. Be sure to shut off all power to the unit while performing this inspection.

Periodically remove the circulating air filter and clean with water to remove all dirt. Shake dry and reinstall in unit.

System Operation

1. This furnace has an electronic thermostat and control board to monitor the room temperature and then control the furnace operation to provide the best comfort and performance from a heating appliance. To operate unit turn ON/OFF switch to ON and then turn temperature control knob clockwise slowly till furnace turns on. For typical room comfort, the control knob should be pointed toward medium.
2. The furnace control board follows sequence of operation which allows for self diagnosis in the event there is a problem. The control then blinks a status light, a set number of blinks based on what problem has been encountered. When the furnace is on and there is a no fault condition, the red LED is on.
   On a typical call for heat by the integral thermostat 24 VAC is applied to the W terminal on the board.
   The inducer blower circuit is energized and the inducer blower comes on for 15 seconds pre-purging out any gas and closing the pressure switch.
   The hot surface ignitor is energized and after a 17 second warm-up, the gas valve circuit is energized, opening the gas valve and igniting the burners. After burning for about 30 seconds, the circulating air blower comes on, delivering warm air to the room. If ignition does not occur, the ignition sequence is repeated again up to 2 more times. (3 trials for ignition-total)
3. After the furnace operates and satisfies the thermostat, the gas valve closes and the circulating air blower continues to run for about 2 minutes and then shuts off. The inducer blower runs for 5 seconds and shuts off.
   If for any reason ignition and operation does not occur, the control board will blink the red fault status LED, a sequence code, indicating what to look for as a troubleshooting guide. If the red LED is ON but not blinking check the electronic temperature control to verify its operation. This can be easily done by disconnecting the 3 electronic temperature control leads from the main furnace board and using a pig tail jumper to connect R & W together on the board. If the furnace comes on and runs normally the temperature control board is malfunctioning. If the heater still does not come on, then the main furnace board is malfunctioning. Look for any fault codes below and verify the 3 amp fuse is not blown.

FURNACE CONTROL BOARD DIAGNOSTICS

FAULT SEQUENCE CODE — TROUBLE SHOOTING GUIDE

# of Blinks	Fault Condition	Fault Correction
Steady On	Control OK	
1 Flash	Temperature limit switch is open	-Check Circulating Air Blower Inlet or Grill Outlet for Blockage, Inducer Blower/Circulating Air Blower Run to Cool Heat Exchanger and Limit -Check for Flame Roll Out Condition Causing Roll Out Limit Switch on Burner Box to Open -Clean Circulating Air Filter
2 Flashes	Pressure switch is open with inducer on	-Check Heat Exchanger and Flue System, Outlet and Inlet for Restriction -Check Inducer Blower/Wheel for Operation/Airflow -Check Pressure Switch
3 Flashes	Pressure switch is closed with inducer off	-Check Pressure Switch and Replace
4 Flashes	Lockout due to failed ignition	-Check for Broken Ignitor -Check for Bent Ignitor Bracket - Ignitor too far from Burner -Check for Flame Sensor Malfunction/or False Ground -Check Gas Valve -Reset Thermostat
5 flashes	L1/Neutral reversed or voltage not present on L1	-Shut Off Power to Unit and Dis-Connect Cordset Plug from Wall Receptacle. Open Junction Box and Un-Reverse Polarity of Incoming Power Leads
Rapid Flash	Flame sense or internal control fault	-Check Ignitor Operation -Check Flame Sensor for Malfunction or False Grounding -Check Gas Valve -Reset Thermostat

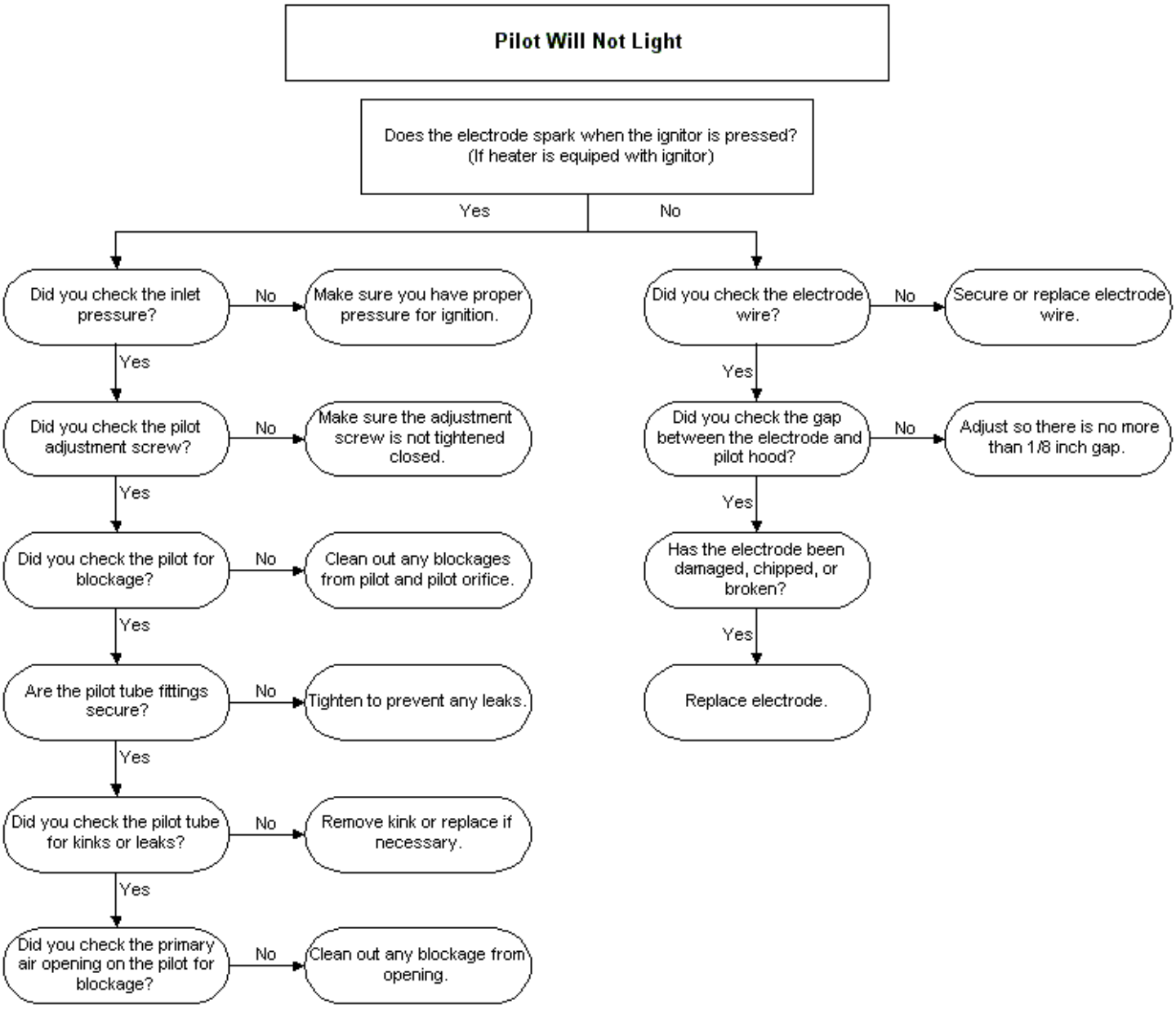
Note: If the hot surface ignitor is to be replaced, be sure to disconnect all power to the unit. Be very careful in handling the new ignitor as they are fragile and can be broken easily if hit or dropped.

SERVICE NOTES

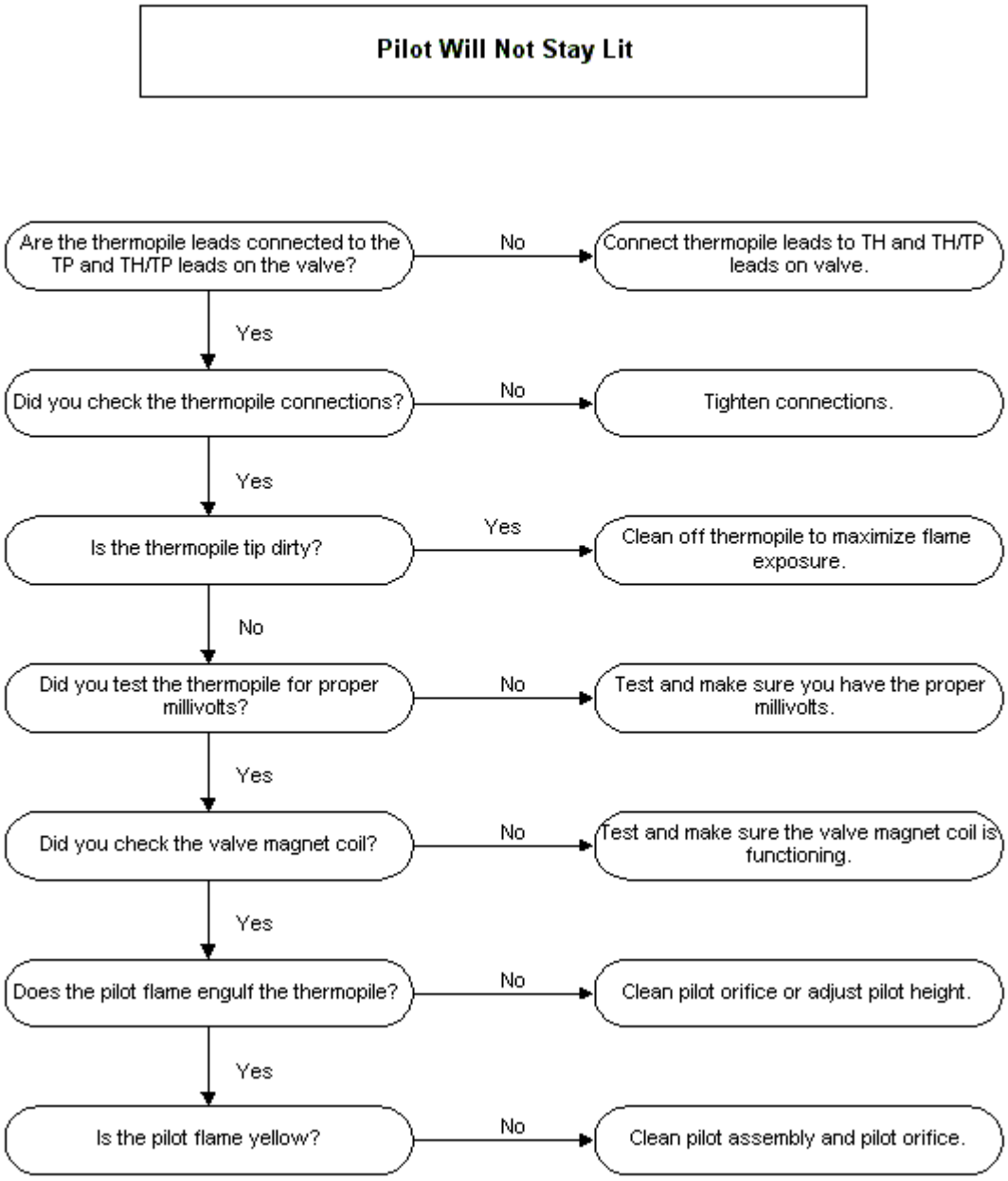
SERVICE NOTES

Millivolt B Vent Heater Troubleshooting

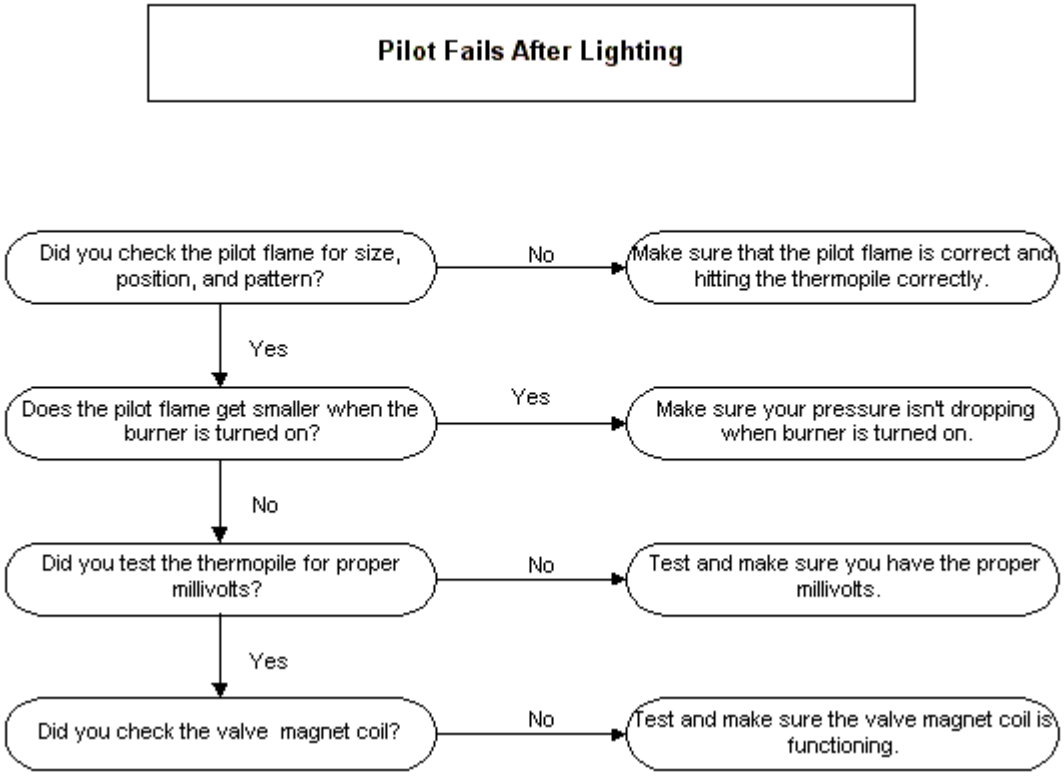
DIAGNOSING MILLIVOLT B VENT HEATERS



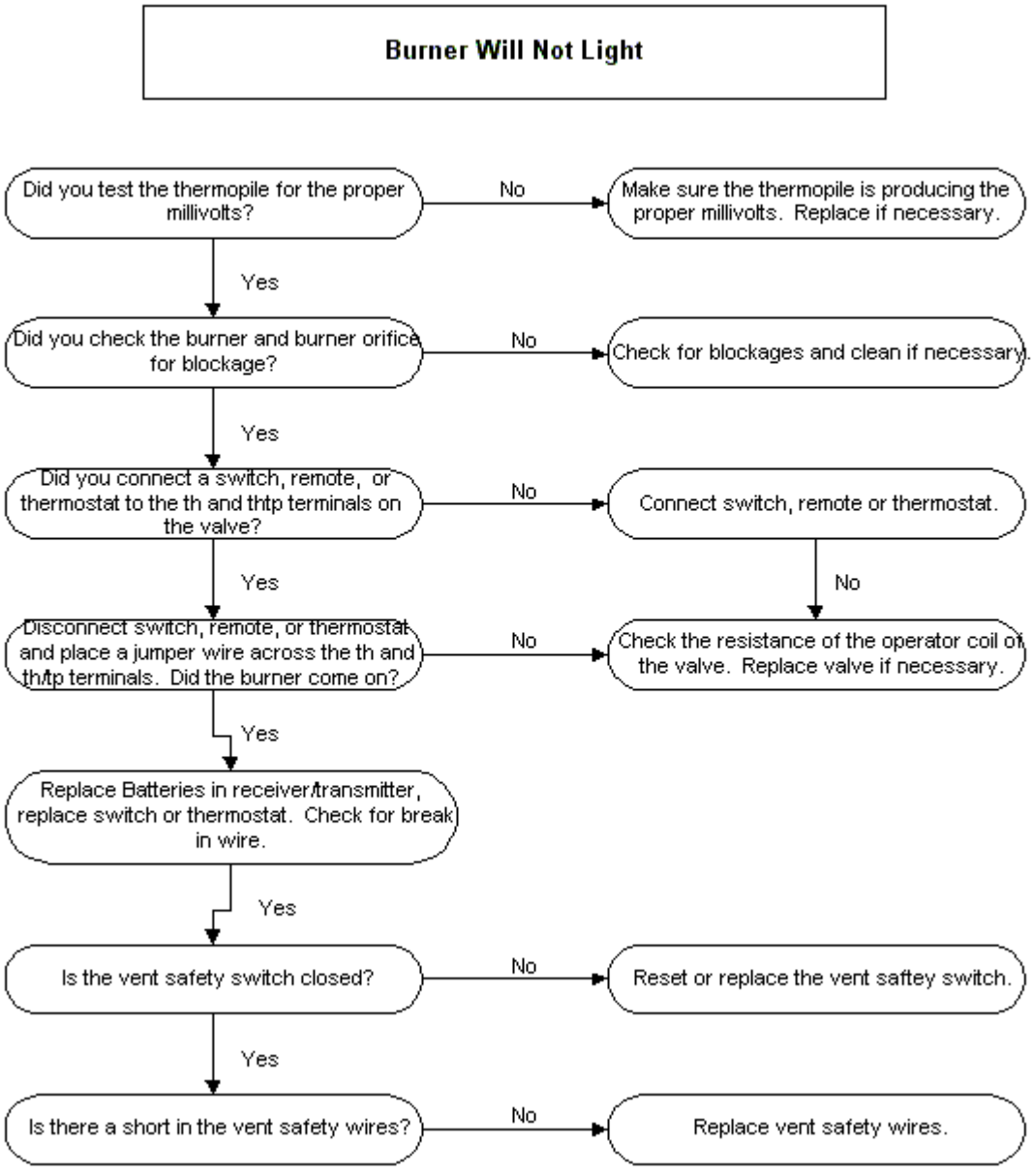
DIAGNOSING MILLIVOLT B VENT HEATERS



DIAGNOSING MILLIVOLT B VENT HEATERS



DIAGNOSING MILLIVOLT B VENT HEATERS



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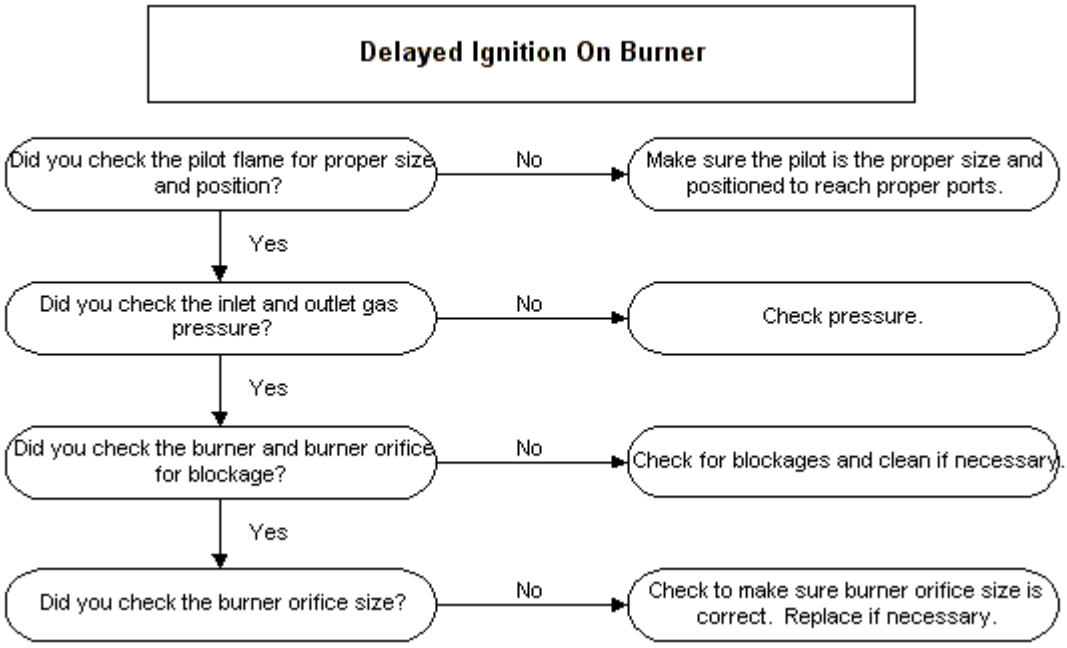
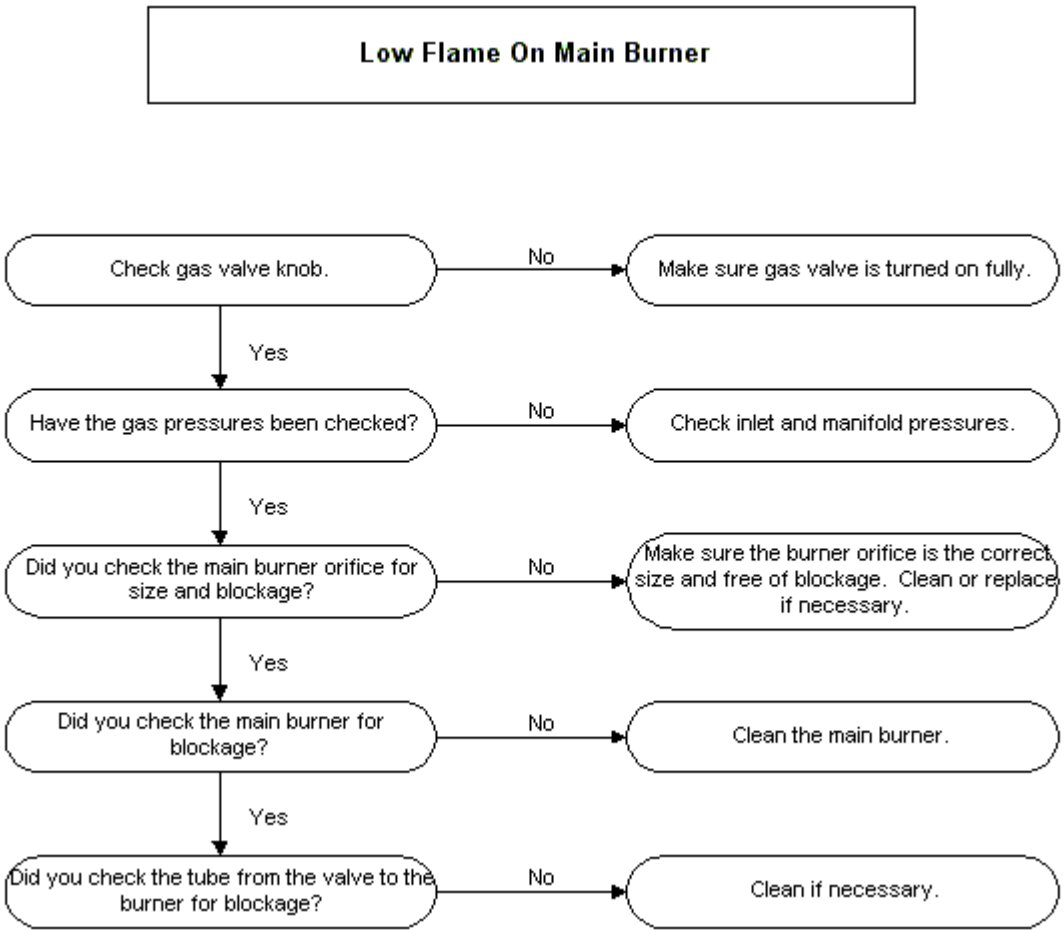
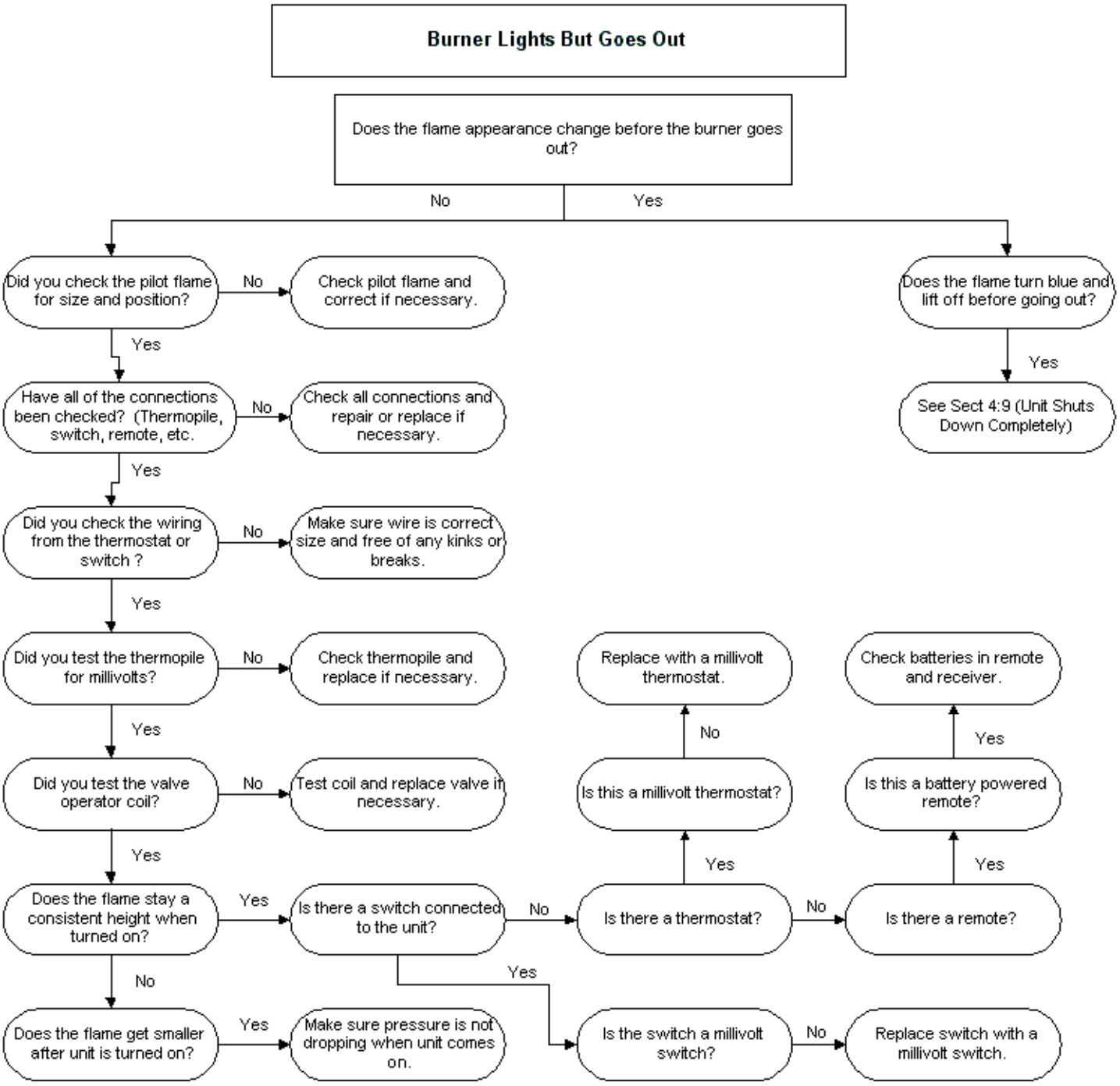
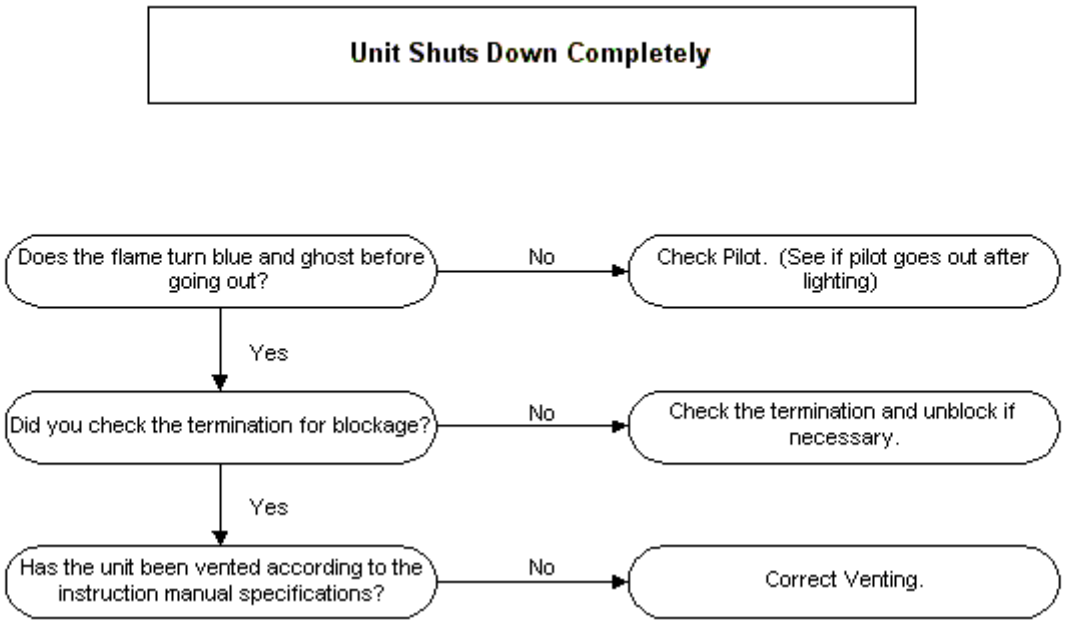



Low Flame On Main Burner
Check gas valve knob.
No
Make sure gas valve is turned on fully.
Yes
Have the gas pressures been checked?
No
Check inlet and manifold pressures.
Yes
Did you check the main burner orifice for size and blockage?
No
Make sure the burner orifice is the correct size and free of blockage. Clean or replace if necessary.
Yes
Did you check the main burner for blockage?
No
Clean the main burner.
Yes
Did you check the tube from the valve to the burner for blockage?
No
Clean if necessary.

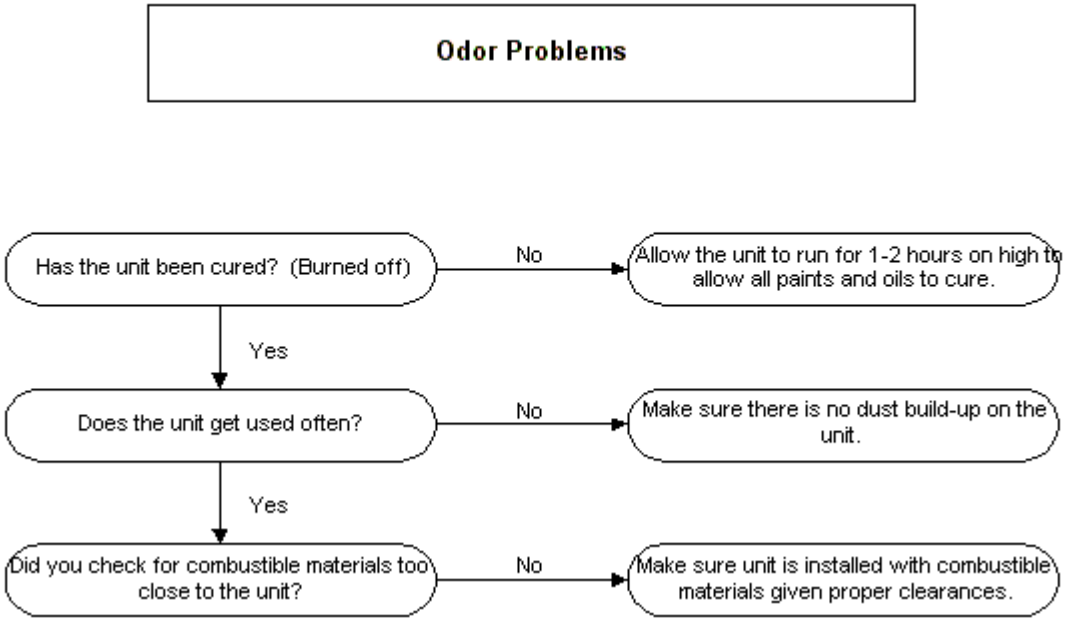
DIAGNOSING MILLIVOLT B VENT HEATERS



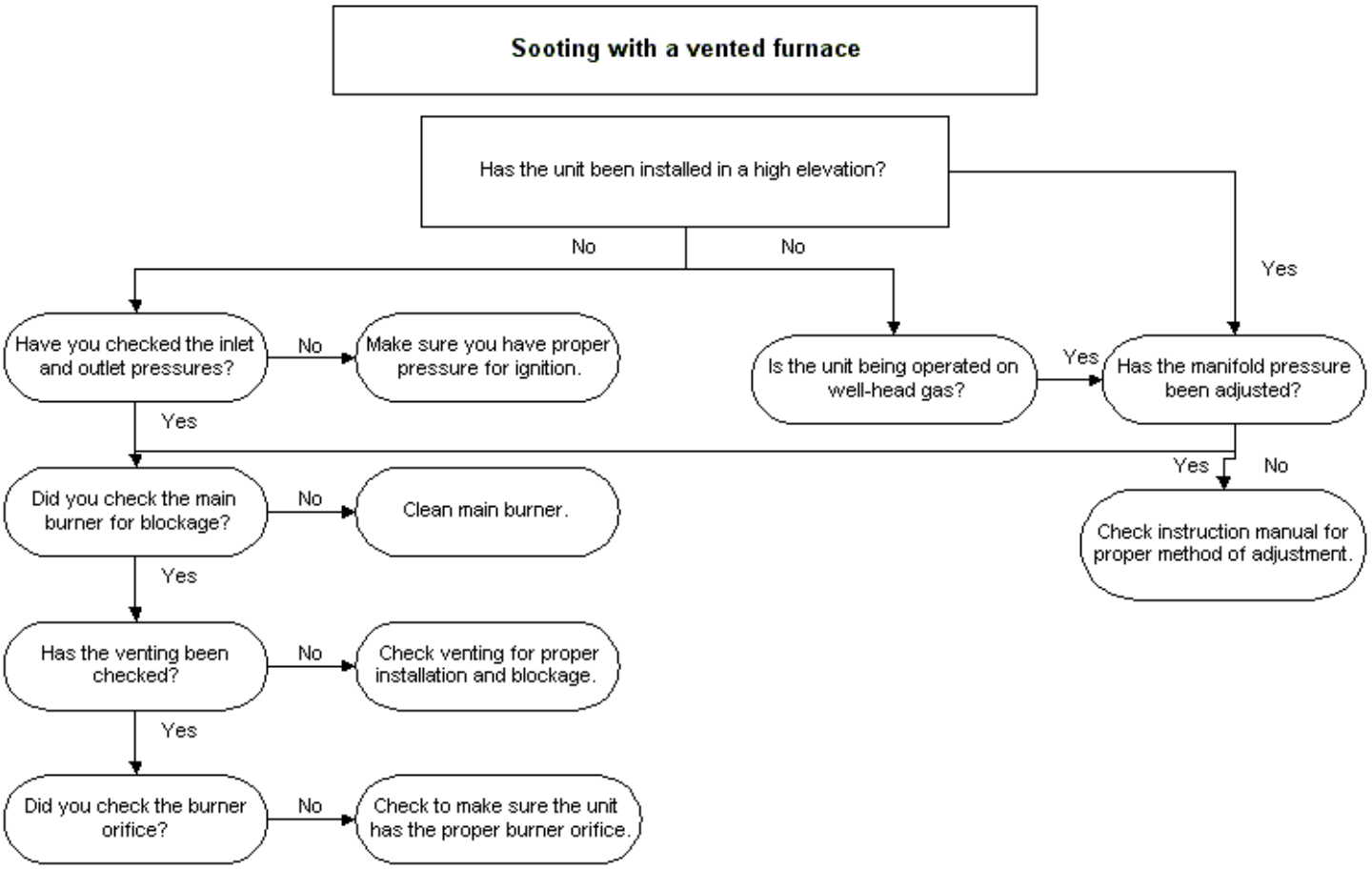
DIAGNOSING MILLIVOLT B VENT HEATERS



DIAGNOSING MILLIVOLT B VENT HEATERS



DIAGNOSING MILLIVOLT B VENT HEATERS



GWT Series Heater Troubleshooting

LIGHTING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage personal injury or loss of life.

A. This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

LIGHTING INSTRUCTIONS

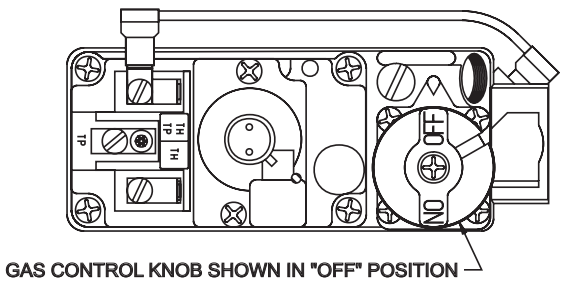
1. STOP! Read the safety information above.

2. Set the thermostat to lowest setting.

3. Turn off all electric power to the appliance (if applicable).

4. Remove control access panel (control door).

5. Push in gas control knob slightly and turn clockwise to "OFF."

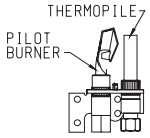


GAS CONTROL KNOB SHOWN IN "OFF" POSITION

NOTE: Knob cannot be turned from "PILOT" to "OFF" unless knob is pushed in slightly. Do not force.

6. Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.

7. Find pilot - follow metal tube from gas control. The pilot is mounted on front of main burner.



8. Turn gas control knob counterclockwise to "PILOT."

9. Push in control knob all the way and hold in. Immediately light the pilot with a match. Continue to hold the control knob in for about one (1) minute after the pilot is lit. Release knob and it will pop back up. Pilot should remain lit. If it goes out, repeat steps 5 through 9.

- **If knob does not pop up when released, stop and immediately call a qualified service technician or gas supplier.**
- **If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.**

10. Turn gas control knob counterclockwise to "ON."

11. Replace control access panel (control door).

12. Turn on all electric power to the appliance (if applicable).

13. Set thermostat to desired setting.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.

2. Turn off all electric power (if applicable) to appliance if service is to be performed.

3. Remove control access panel (control door).

4. Push in gas control knob slightly and turn clockwise to "OFF." Do not force.

5. Replace control access panel (control door).

CLEARANCES

1. In selecting a location for installation, it is necessary to provide adequate accessibility clearances for servicing and proper installation.
2. Clearances to combustible surfaces are 4" (102mm) from sides, 12" (305mm) to top, 1 1/2" (38mm) from floor.

NOTE: Minimum distance of 1 1/2" (38mm) must also be maintained from top surface of carpeting, tile, etc.

THERMOSTAT LOCATION (SG MODELS)

CAUTION — Do not run wire behind flanges of Header Plate or in any location where it might be damaged.

Millivolt wall thermostats are specially designed for use on self-generating systems. They should **never** be used on **line** or **low** voltage A.C. circuits.

Interior Wall — The thermostat should be installed on an inside wall away from the furnace but in the same room.

It is important to use wire of a gauge proper for the length of the wire:

RECOMMENDED WIRE GAUGES

Maximum Length	*Wire Gauge*
1' to 10'	18
10' to 25'	16
25' to 35'	14

Proper operation depends on a good pilot flame. The flame must cover the top of the thermopile. Cleaning of the pilot orifice and burner may be required due to spiders.

System Check (Figure 1)

A millivolt meter is required to check the system. Millivolt readings should be:

- Across the thermopile terminals, 400-450 millivolts with thermostat OFF.
- Across the thermopile terminals, 150-250 millivolts with thermostat ON.
- Across the thermostat wires at the valve, less than 30 millivolts with thermostat ON.
- Across the thermostat wires at the thermostat, less than 5 millivolts with thermostat ON. (Dirty pilot or low pressure will reduce readings.)

Connect thermostat wires to gas valve as shown in Figure 1.

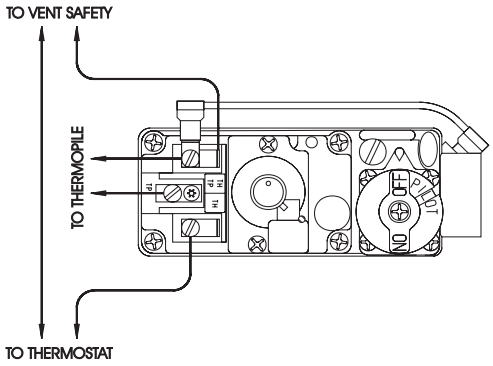
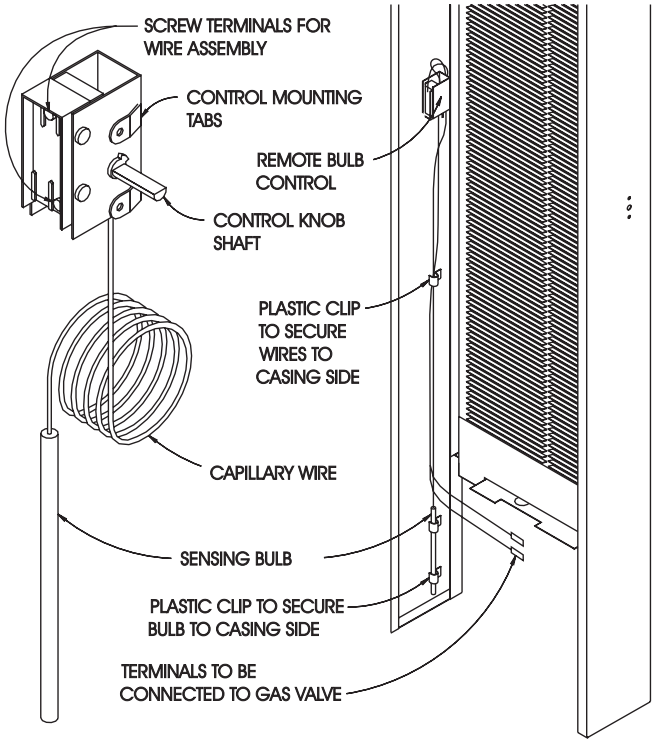


Figure 1

REMOTE BULB CONTROL INSTALLATION INSTRUCTIONS

MODELS
GWT-25 RB, GWT-35 RB, GWT-50 RB



Index No.	Part Number	Description
1	GW-130	Remote Bulb Control Kit
2	R-1224	Remote Bulb Control
3	R-2499	Wire Assembly
4	R-1162	Control Knob
5	R-1720	Plastic Clip (3 Required)
6	R-1223	Instructions
7	R-1578	No. 6-32 x 1/4" (6mm) Screw (2 Required)

Caution: Remote bulb wire routing is important. Wires should be in proper location to avoid damage from being overheated. Incorrect routing of remote bulb control wires may result in damage to wires and incorrect operation of remote bulb control. Follow these instructions and refer to the drawing for proper wire routing.

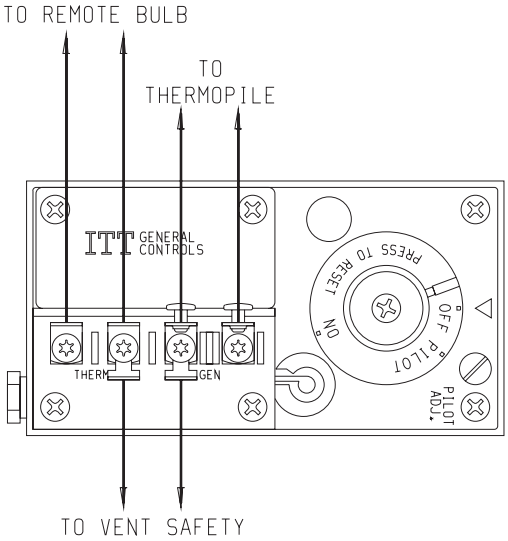
INSTRUCTIONS

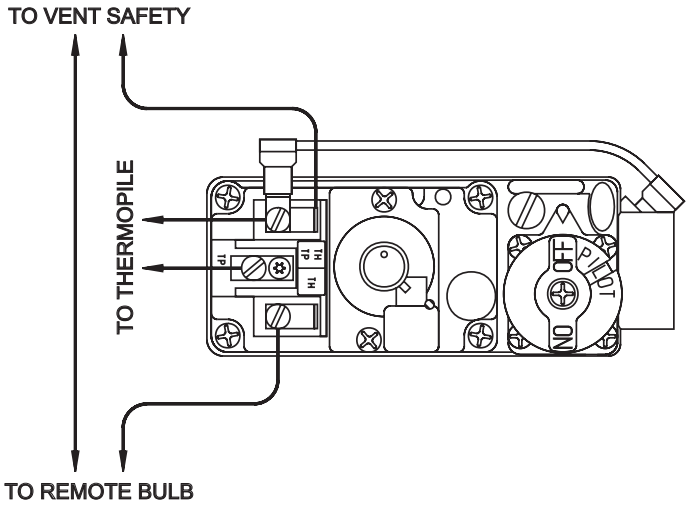
Note: At the option of the owner, the remote bulb control may be located on the left or right side of the outer casing.

1. Remove remote bulb control from the shipping carton.
2. Remove outer casing assembly from shipping carton.
   Note: If wall furnace is already installed, remove outer casing from unit and lay on floor with front side down.
3. Attach wire assembly to remote bulb control.
4. Carefully unwind capillary wire on remote bulb control.
5. Remove (3) hole plugs from left or right side of outer casing where remote bulb control is to be installed.
6. Mount remote bulb control to inside of outer casing with (2) No. 6-32 x 1/4" (6mm) screws.
7. If remote bulb control is located on the right side of the outer casing, carefully bend or loop capillary wire around control. This will enable the sensing bulb to be positioned at the bottom of the unit.
8. Secure sensing bulb on the inside, at the bottom, of the outer casing with (2) plastics clips.
9. Feed the wire assembly down along the inside of the outer casing.
10. Use third plastic clip to secure wire assembly and capillary wire to the casing. (Approximately 24" (610mm) from bottom of unit.)
11. Attach control knob to remote bulb control.
12. Install furnace according to instructions in the Installation Instructions and Owner's Manual.

Note: If wall furnace is already installed, secure outer casing to unit.

13. Attach wire assembly to gas valve at the "TH" and "TH/TP" terminals on the Robertshaw valve.
    Attach wire assembly to gas valve at the "THERMO" terminals on the ITT valve. If the wire assembly has two 1/4" (6mm) female connectors, the connectors should be cut off the wire assembly. Strip and bare the wires and attach wires to the "THERMO" terminals.
    Note: This remote bulb control is connected to the gas valve the same way as a wall thermostat. Any references made to the thermostat in the lighting instructions would also apply to the remote bulb control.





VENT SAFETY SHUTOFF SYSTEM

This appliance must be properly connected to a venting system. This appliance is equipped with a vent safety shutoff system.

Warning: Operation of this wall furnace when not connected to a properly installed and maintained venting system or tampering with the vent safety shutoff system can result in carbon monoxide (CO) poisoning and possible death.

This furnace is equipped with a manual reset vent safety switch. The manual reset vent safety switch will cause gas flow to the main burner to "shut off" due to improper venting or a blocked flue.

To reset the manual reset vent safety switch:

1. Remove outer casing.
2. Depress manual reset button. The manual reset vent safety switch is located on the draft diverter.
3. Replace outer casing.

If the manual reset vent safety switch continues to "shut off" the gas flow to the main burner a qualified service person must be contacted to inspect for improper venting, blockage in the vent pipe or the manual reset vent safety switch for being defective.

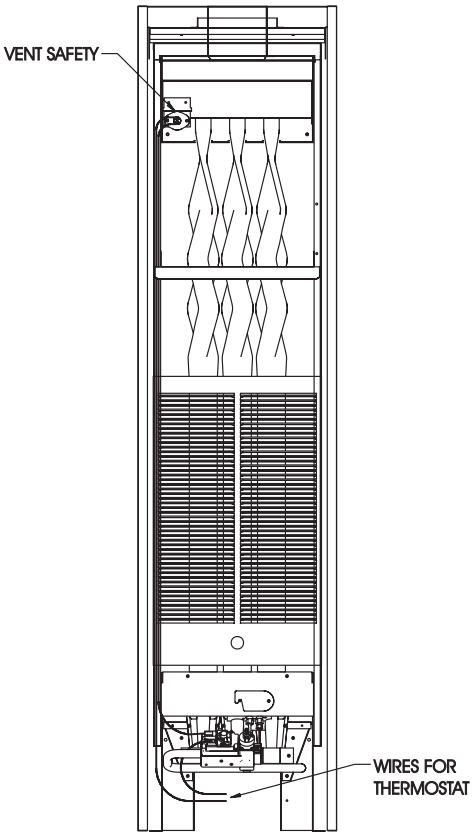


Figure 2

PROPER MAIN BURNER FLAME

The correct flame will be a short blue inner flame with a much larger light blue outer flame. The burner does not have a primary air adjustment. The flame will be proper if the factory-set pressure and orifice are used. After the furnace has begun operating, cleaning of the burner may be needed for proper flame, examine at least 2 times per season.

To clean burner ports, disconnect the gas supply to the valve. Remove the burner assembly from the combustion chamber. Remove pilot burner from main burner and then remove the main burner. Force water into the ports and blow dry with vacuum cleaner air, or low pressure compressed air.

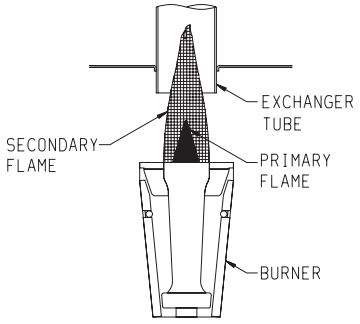


Figure 3

PROPER PILOT FLAME

The correct flame will be blue, extending past the thermopile. The flame will surround the thermopile just below its tip.

Natural gas pilots require adjusting when the inlet gas pressure is above 5" w.c. (1.245kPa). Remove the pilot cover screw on the control valve and turn the adjustment screw clockwise to reduce flame. Replace pilot cover screw to eliminate gas leaking at that control valve opening.

LP gas (propane) will not require adjustment.

After use, cleaning may be required for the proper flame.

Examine the pilot flame before and during each heating season.

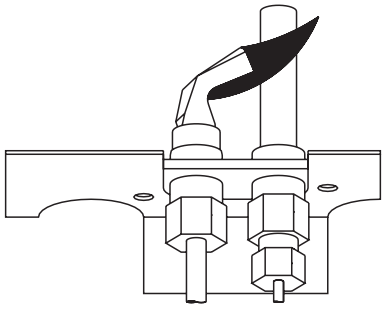


Figure 4

TROUBLESHOOTING

GENERAL All furnaces have been fire-tested to check for proper operation. This includes main burner flame, pilot flame, and gas control operation. If the furnace fails to function on initial installation, it is advisable to re-check the following:

1. Inlet gas pressure.
2. Type of gas being used and that shown on the rating plate.

The Service Department at Empire Comfort Systems, Inc. may be contacted to assist in servicing furnace.

Servicing the Pilot and Main Burner, Pilot Orifice, Thermopile and Main Burner Orifice

Disconnect the gas supply at the inlet to the control valve. Remove the burner assembly to which the above components are attached.

Pilot Does Not Light

With air in the gas line, such as when the furnace is first installed or was "OFF" all summer, the pilot flame may be too lean to ignite on the first few trials. Turn the gas control knob to PILOT position and depress the gas control knob. Hold the gas control knob down to bleed the line;

1. Use lighter rod to light pilot with a match.

If Pilot Does Not Light By Any Means

1. Check gas control knob for being in the "Pilot" position.
2. Check pilot adjustment for being full open (counterclockwise to open).
3. If gas is available in the supply tubing, the pilot orifice and/or pilot burner is probably restricted by a spider web. Clean pilot assembly and relight.

If Pilot Does Not Remain "On" After Releasing Gas Control Knob

1. Follow instructions and hold gas control knob down longer and harder.
2. Determine if pilot flame extends past thermopile; if not, adjust pilot flame or clean pilot burner.
3. Replace thermopile if millivolt reading is less than 300 millivolts when wall thermostat or remote bulb is turned OFF. Replace gas control if magnet dropout millivolt reading is over 100 millivolts.

Pilot Outage During Normal Operation

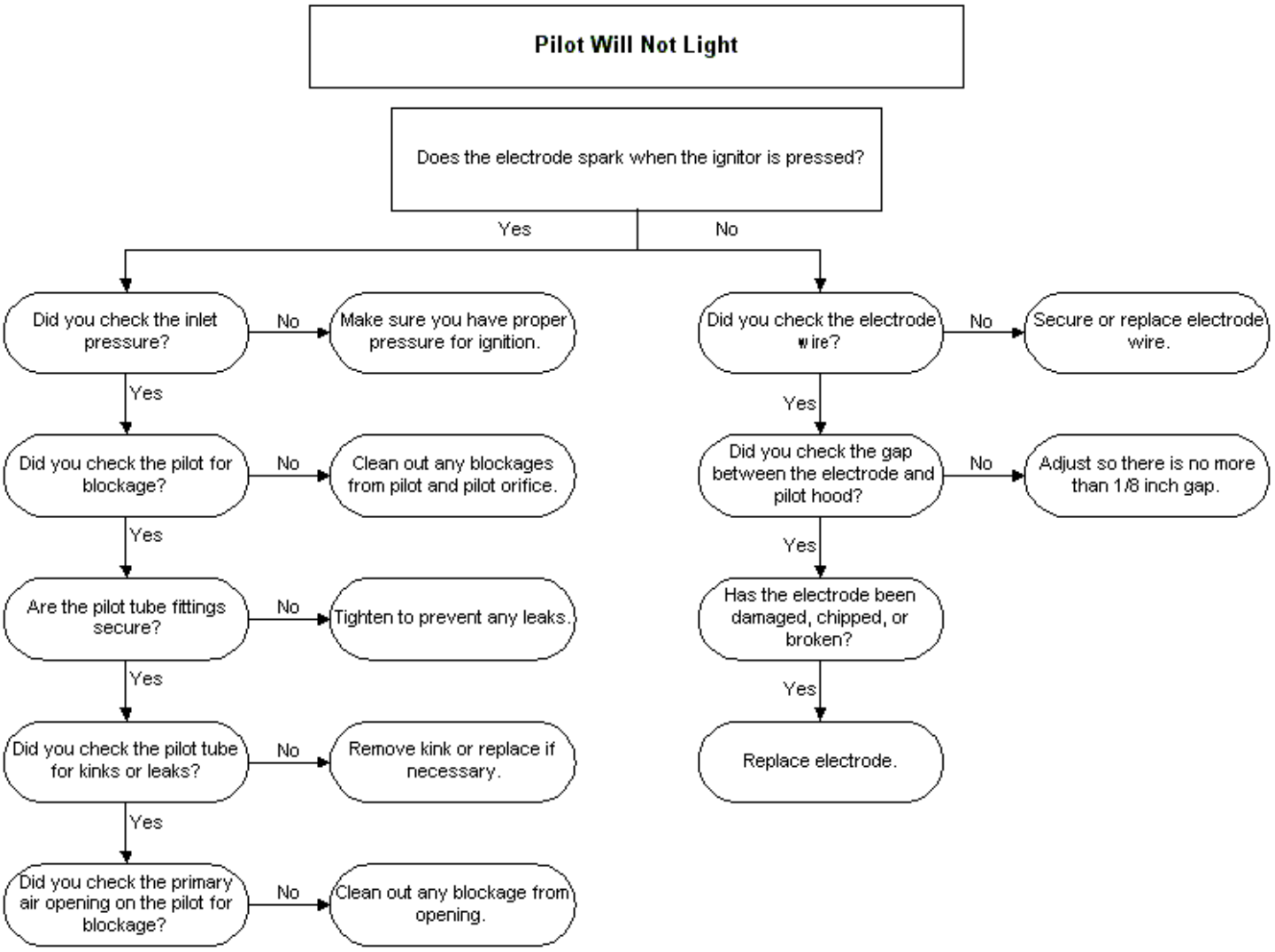
1. Check input by manifold pressure gauge or gas meter.
2. Check millivolt output when furnace is in operation. If millivolt output decreases during furnace operation gas control may be defective.

Main Gas Valve Does Not Open When Thermostat Is Turned "On"

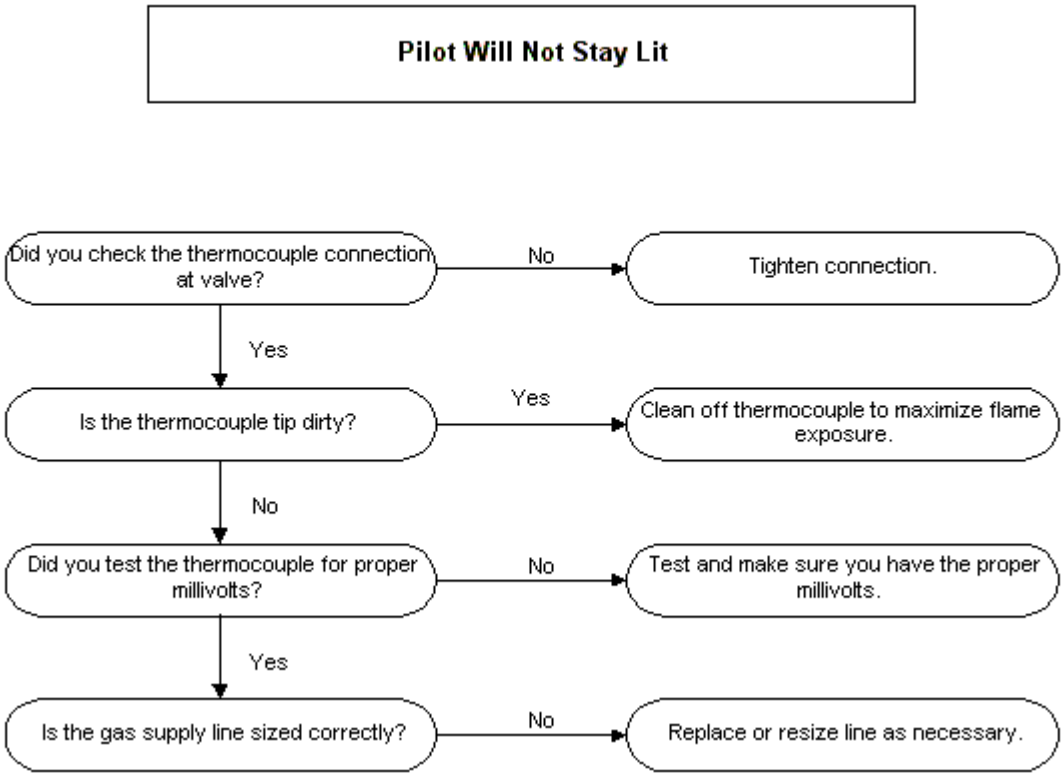
1. Check millivolt output of thermopile.
2. Thermostat wires may be broken.
3. Thermostat may be defective.

Thermocouple B Vent Heater Troubleshooting

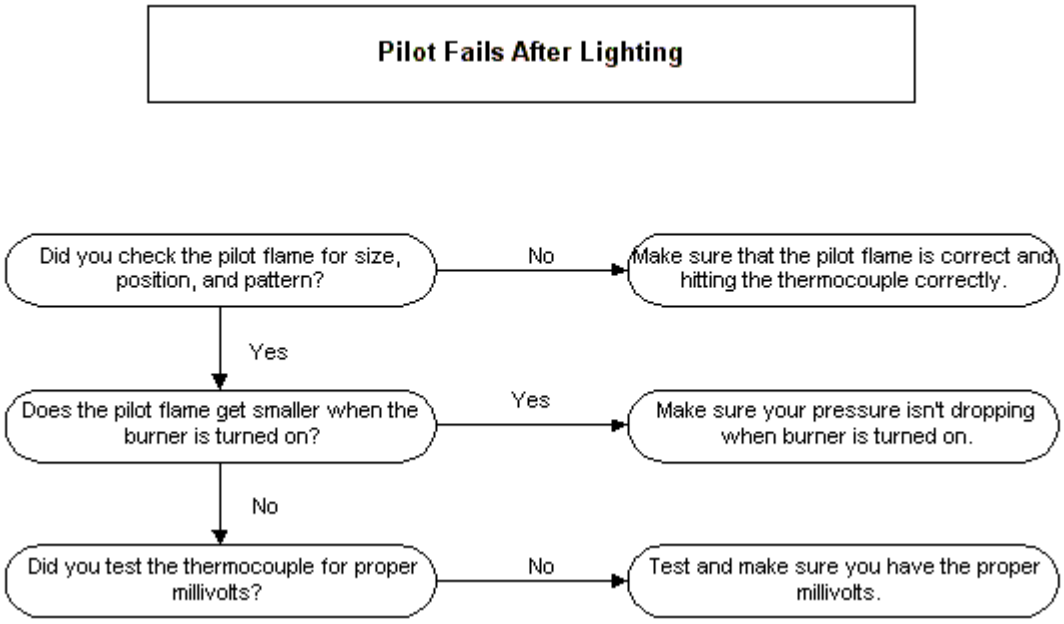
DIAGNOSING THERMOCOUPLE B VENT HEATERS



DIAGNOSING THERMOCOUPLE B VENT HEATERS



DIAGNOSING THERMOCOUPLE B VENT HEATERS



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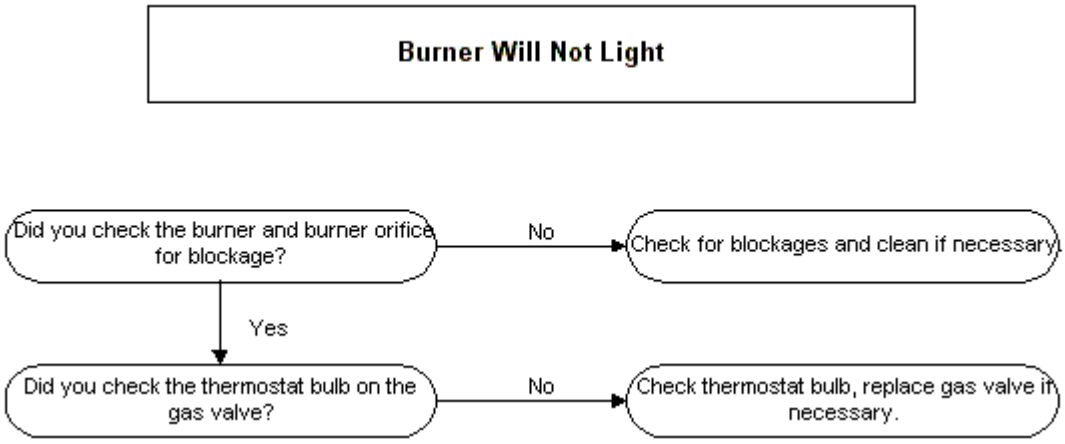

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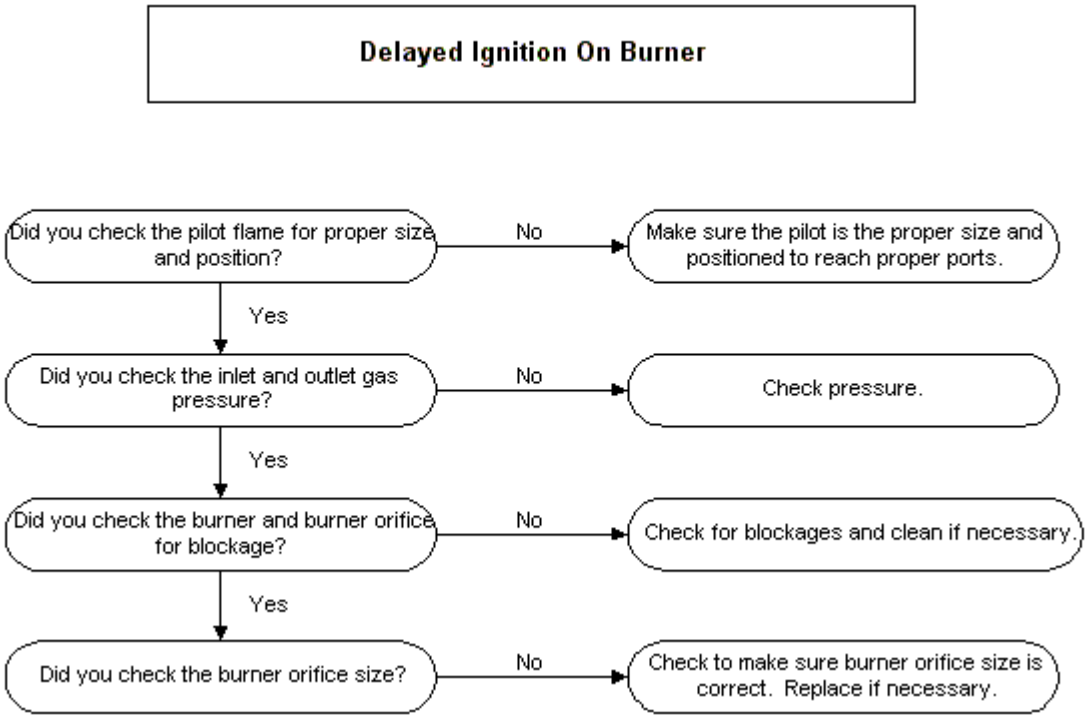
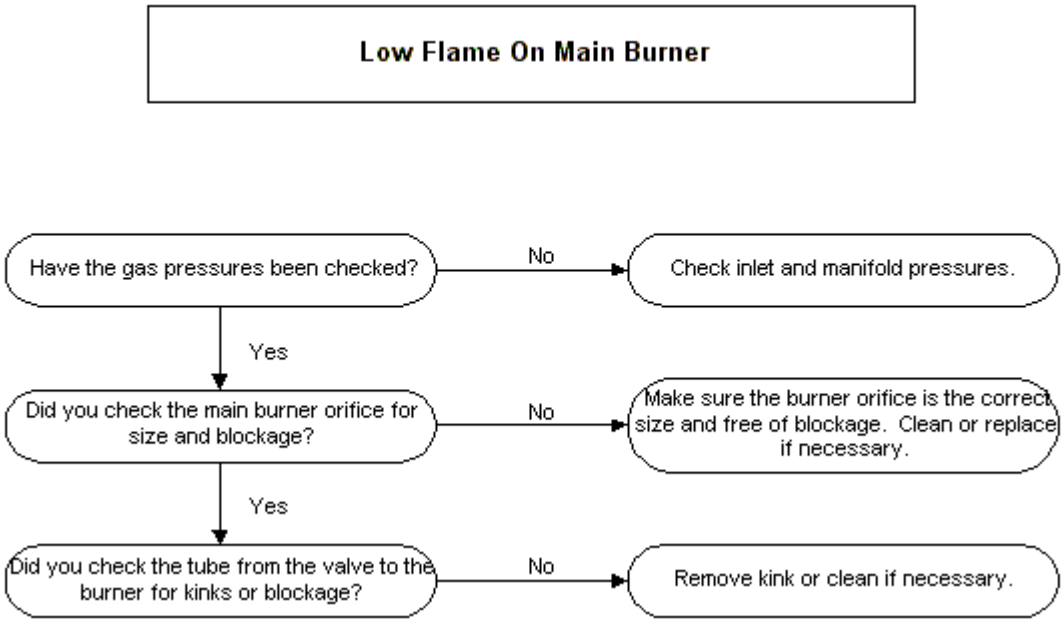
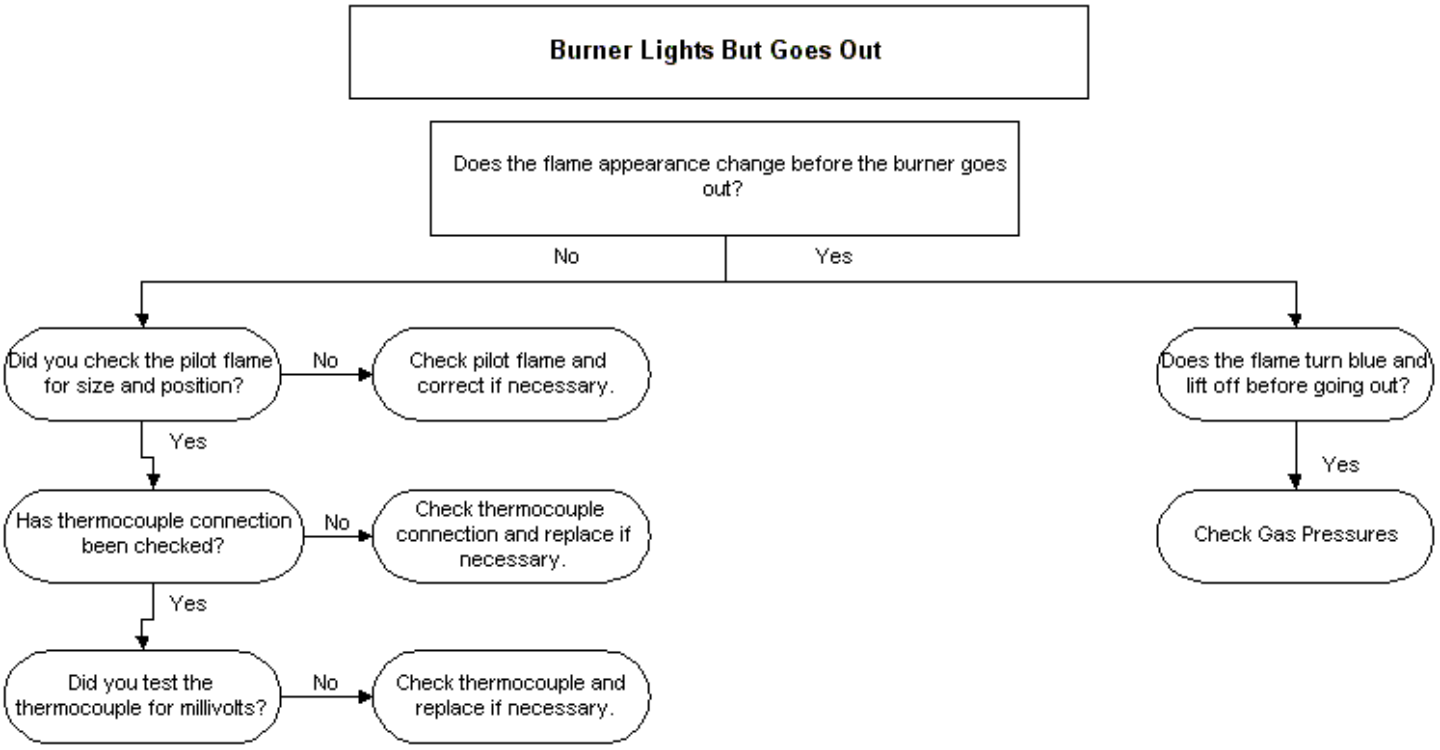


DIAGNOSING THERMOCOUPLE B VENT HEATERS



DIAGNOSING THERMOCOUPLE B VENT HEATERS



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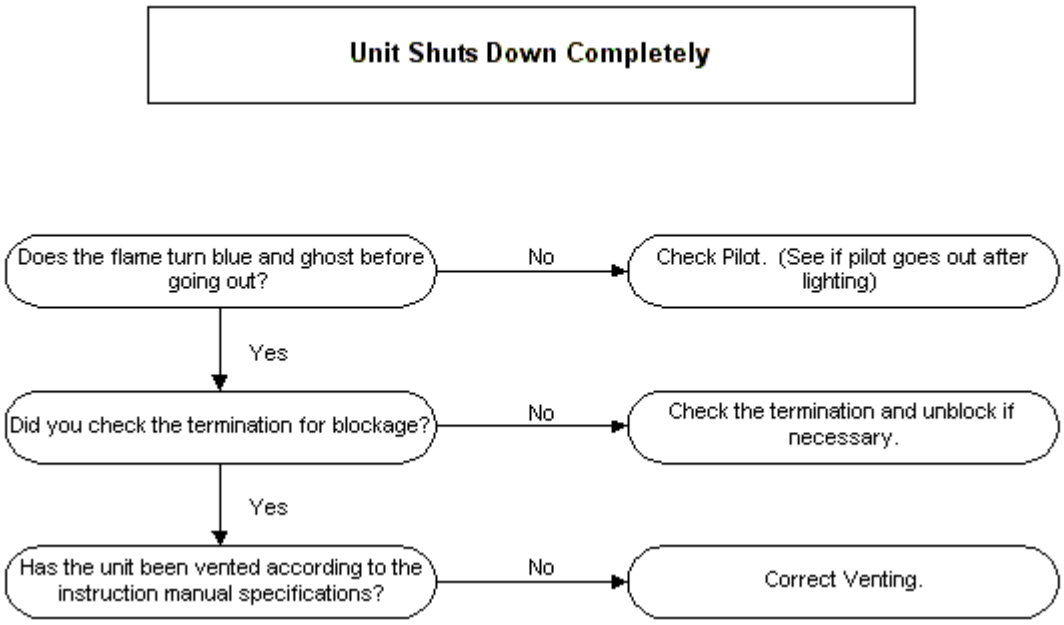

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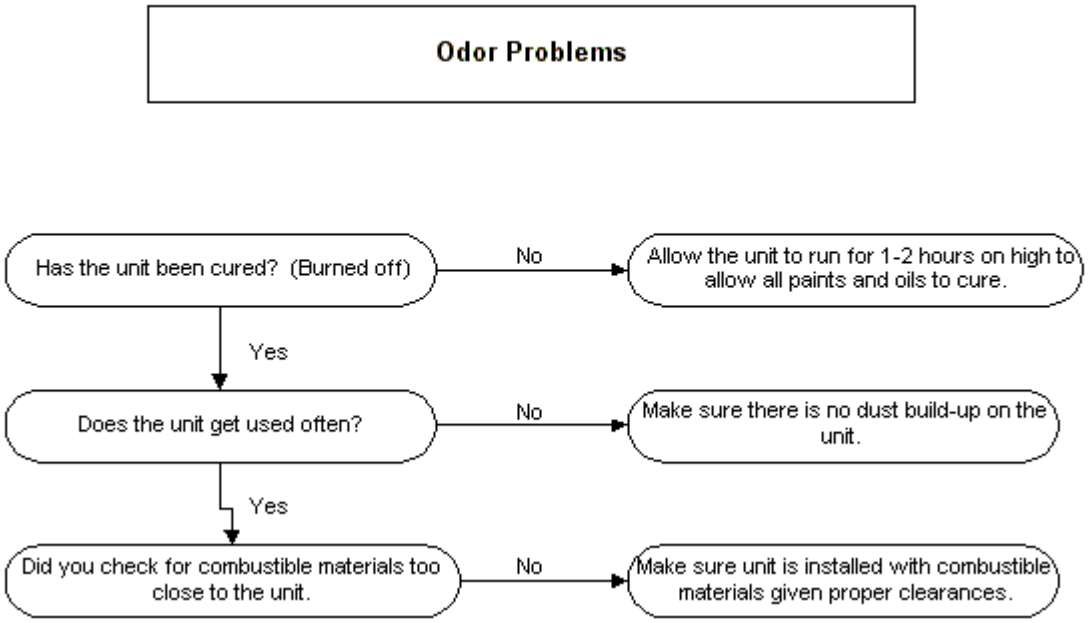

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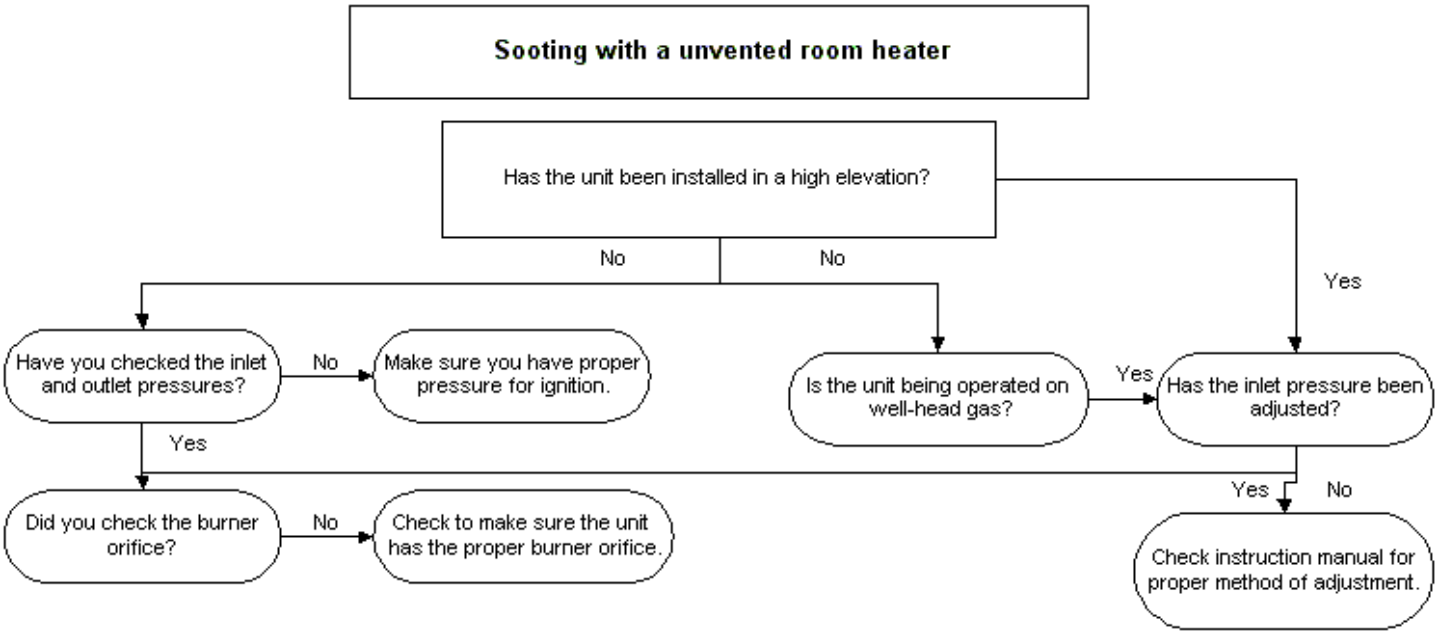


RH Series Heater Troubleshooting

LIGHTING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.

A. This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

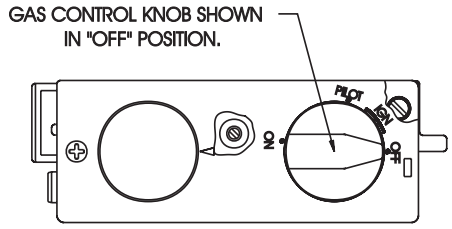
- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.

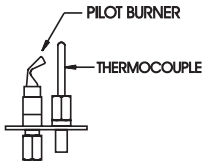
D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

LIGHTING INSTRUCTIONS

1. STOP! Read the safety information to the left of this label.
2. Set thermostat to lowest setting.
3. Turn off all electric power to the appliance. (If applicable)
4. Remove access panel (front panel).



5. Push in gas control knob slightly and turn clockwise ↷ to "OFF". Do not force.
6. Wait ten (10) minutes to clear out any gas. Then smell for gas, including near floor. If you smell gas, STOP! Follow "B" in the safety information to the left of this label. If you do not smell gas, go to the next step.
7. Remove the pilot access cover located on the combustion chamber.
8. Find pilot - the pilot is attached to front of burner.



9. Turn gas control knob counterclockwise ↶ to "IGN".
10. Depress and turn gas control knob counterclockwise ↶ to "PILOT". A spark is produced when gas control knob is turned between "IGN" and "PILOT". Repeatedly depress and turn gas control knob between "IGN" and "PILOT" until pilot is ignited. Continue to hold the control knob in for about one (1) minute after pilot is lit. Release knob and it will pop back up. If it goes out, repeat steps 5 through 10.
    - If knob does not pop up when released, stop and immediately call your service technician or gas supplier.
    - If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.
11. Attention! Gas control has INTERLOCK latching device. When the pilot is initially lit and the safety magnet is energized (pilot stays on) the INTERLOCK latching device becomes operative. If the gas control is turned to the "OFF" position or gas flow to the appliance is shut off, the pilot cannot be relighted until the safety magnet is de-energized (approximately 60 seconds). There will be an audible "click" when the safety magnet in the gas control is de-energized. Pilot can now be relit. Repeat steps 5 through 10.
12. Turn gas control knob counterclockwise ↶ to "ON".
13. Turn on all electric power to the appliance. (If applicable)
14. Replace pilot access cover and access panel (front panel).
15. Set thermostat to desired setting.

TO TURN OFF GAS TO APPLIANCE

1. Set thermostat to lowest setting.
2. Turn off all electric power to the appliance. (If applicable) If service is to be performed.
3. Push in gas control knob slightly and turn clockwise ↷ t o "OFF". Do not force.

CLEARANCES

Clearances: When facing the front of the room heater the minimum clearances to combustible construction (material) are the following:
Right side 6 inches (152mm). Left side 6 inches (152mm).
Recommend 18 inches (457mm) on left side for servicing.

Do not install in alcove or closet. No horizontal projection above heater permitted within 48 inches (122cm).
Ceiling 48 inches (122cm). Rear of draft hood 2 inches (51mm).

Open in front to provide service, access, and clearance to combustibles.

VENTING

Venting

1. Flue pipe must be as large as the flue collar on the draft diverter.
2. Maintain an upward slope of at least 1/4 inch (6mm) per foot (.3m) of horizontal run.
3. Run flue pipe as directly as possible with a minimum of elbows.
4. Flue pipe should extend through the wall of a chimney to be flush with inner wall.
5. Flue pipe must be adequately supported by metal strips.
6. Single wall vent pipe may be attached directly to the draft hood of the room heater when a clearance of 2 1/2 inches (64mm) is maintained between the single wall vent pipe and the combustible wall of the room in which the room heater is located. Use double wall vent pipe for clearances less than 2 1/2 inches (64mm) to combustibles.
7. For flue pipe running through walls and roof, use B-1 [1 inch (25mm) clearance to combustibles) vent pipe.
8. Chimneys should extend at least 2 feet (.6m) above the roof and above any object or nearby building within 10 feet (3m).
9. Open tees should not be used in the flue pipe.
10. Appliance must not be connected to a chimney flue that is servicing a separate solid-fuel burning appliance.

For proper venting, do not attach a 90° elbow directly to draft diverter. If possible, attach 2 feet (.6m) of straight vent pipe before an elbow is used. Use 45° elbows if possible.

Uninsulated single-wall metal pipe shall not be used outdoors in cold climates for venting gas utilization equipment.

Ventilation and Combustion Air

Room heaters shall be installed in a location in which the facilities for ventilation permit satisfactory combustion of gas and proper venting under normal conditions. In buildings of conventional frame, brick or stone construction without tight storm windows and doors, infiltration is normally adequate to provide for combustion and draft hood dilution.

Where appliances are installed in a confined space within a building, the building being of unusually tight construction, air for combustion and ventilation must be obtained directly from outdoors or from such spaces that freely communicate with the outdoors. Under these conditions, the confined space shall be provided with two permanent openings, one near the top of the enclosure and one near the bottom; each opening shall have a free area of not less than one square inch (6.5cm^2)per 1,000 BTU's (.3KW/H) of total input. The draft hood must be in the same atmospheric pressure zone as the combustion air inlet to the appliance.

Liner and Insulated Liner

When you install a vented room heater into a masonry chimney you must follow these steps.

1. The chimney must be lined and sized properly. Most masonry chimneys are over sized and absorb too much heat to be considered a proper vent. If you have any doubts line the chimney with the right size liner. If it's unlined you must line it.
2. Use an insulated liner when the chimney is on the outside, three sides exposed to the weather, and there is no clay liner in the chimney. The insulation will help keep the flue gases warmer.

Insulated Vent Enclosure

Vented room heaters installed with the vent going directly to the outside and above the eaves can cause poor venting. The cold pipe will have a delay in proper venting and cause the room heater to shut "off" by the vent safety switch. To prevent delayed venting as well as condensation of flue products an insulated enclosure is recommended.

Use type B 4" (102mm) diameter vent pipe and maintain at least a one inch (25mm) clearance to combustibles.

Use metal thimble to protect vent pipe as it passes through combustibles.

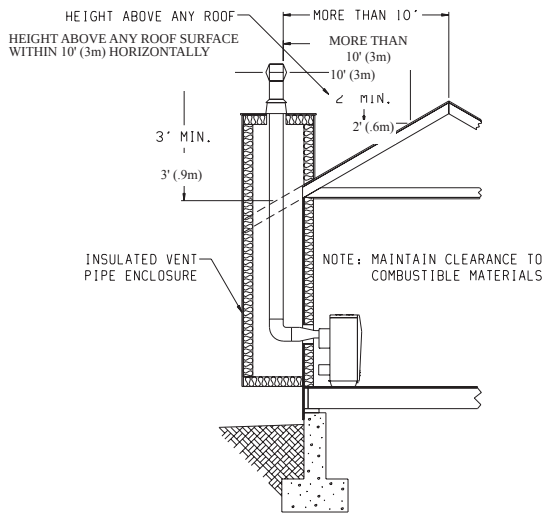


Figure 1

PILOT FLAME CHARACTERISTICS

The correct flame will be almost horizontal, blue and will extend past the thermocouple 1/4" (6mm). The flame will surround the thermocouple just below the tip.

On Propane (LP-gas) slight yellow might occur where the pilot flame and the burner flame meet.

Natural gas pilots require adjusting when the inlet pressure is above 5" w.c. (1.25kPa) Remove pilot adjustment cover. Turn adjustment screw clockwise to reduce flame.

Propane (LP-gas) will not require adjusting.

After use, cleaning of the pilot burner may be required for the proper flame. The pilot orifice can be cleaned with high pressure air or by placing under running water. Pilot orifice must be dry before replacement. Use a pipe cleaner to clean inside the pilot after the pilot orifice has been removed.

To Remove Pilot Orifice

1. Disconnect the pilot supply line at the pilot burner.
2. Remove pilot orifice from pilot burner.It may be necessary to tap on pilot burner in order to remove the pilot orifice.

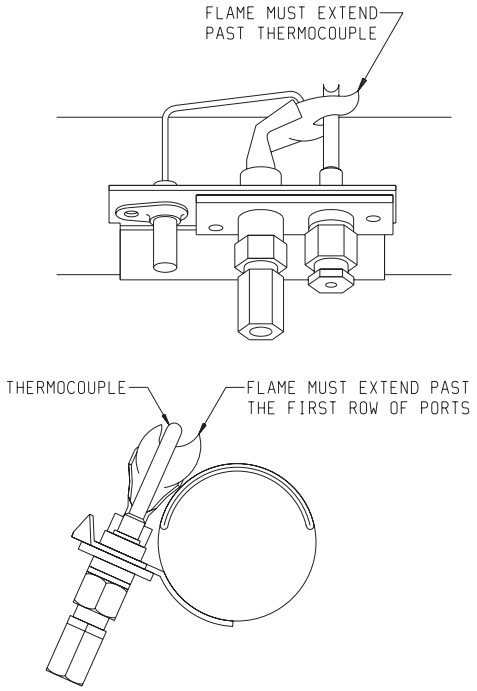


Figure 2

MAIN BURNER FLAME CHARACTERISTICS

There will be a short blue inner flame with a larger, lighter blue secondary flame. The burner flame may have yellow tips when hot. Dust in the combustion air will produce an orange or red flame. Do not mistake the orange or red flame for an improper yellow flame.

Attention: On Propane gas, if a whistling noise (resonation) occurs close the air shutter on the main burner in order to reduce the amount of primary air. The reduction in primary air will soften the main burner flame and will eliminate the whistling noise (resonation).

On Propane or Natural gas if a yellow flame occurs open the air shutter on the main burner in order to increase the amount of primary air. The increase in primary air will sharpen the main burner and will eliminate the yellow flame.

After use, cleaning of the main burner may be required for the proper flame. The main burner may be cleaned by forcing water into the ports and the throat of the burner. The burner should be blown dry or heated to remove all water before replacement.

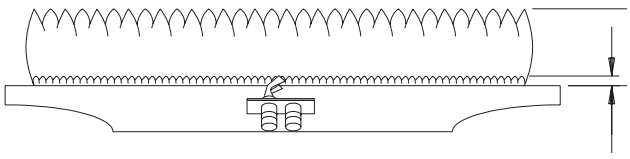


Figure 3

On Propane Gas, if a whistling noise (resonation) occurs

a. Close the air shutter on the main burner in order to reduce the amount of primary air.

MAINTENANCE

To Remove Main Burner

1. Disconnect the thermocouple and pilot supply line at the pilot burner.
2. Unscrew the nut on the orifice fitting union. Orifice fitting is threaded into the main burner.
3. Remove screw on each side of the main burner and lift out.

To Remove Main Burner Orifice

1. Unscrew the nut on the orifice fitting union. Orifice fitting is threaded into the main burner.
2. Unthread the orifice fitting from the main burner.
3. Main burner orifice is located at the end of the orifice fitting.
4. Remove main burner orifice from orifice fitting with a 1/2" (13mm) wrench.

Cleaning Combustion Chamber

A qualified serviceman should remove the chamber and apply air pressure to the inside in order to clear all passageways.

TROUBLESHOOTING

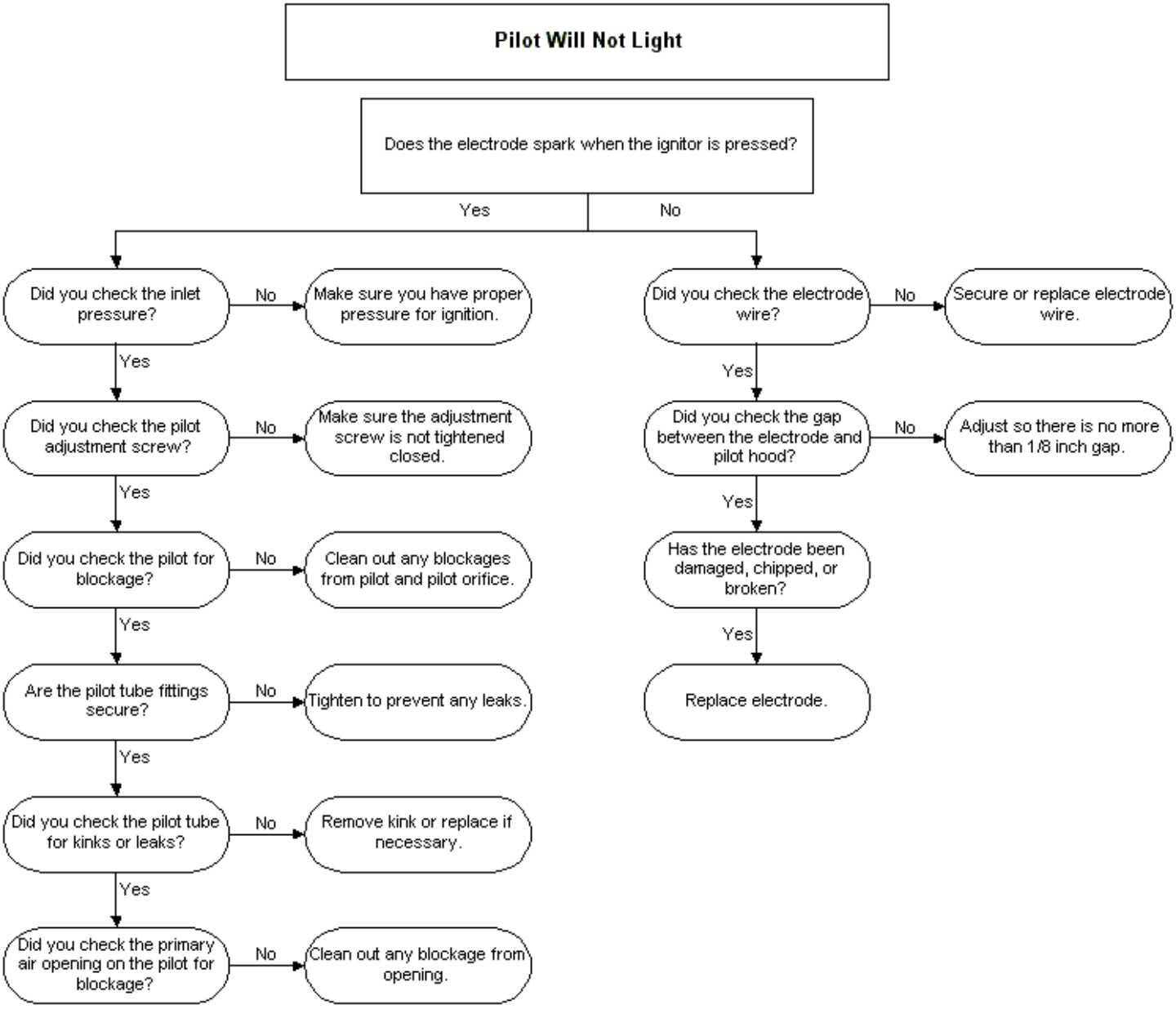
1. **Impossible to light pilot**
   a. If using piezo ignitor, check electrode location.
   b. Remove nut at orifice and check for gas.
   c. If gas available, check for blocked orifice or pilot.
2. **Pilot outage**
   a. Proper size of pilot flame.
   b. Defective or weak thermocouple.
3. **Pilot flames but goes out when knob is released**
   a. Pilot flame not covering the thermocouple properly.
   b. Defective thermocouple.
   c. Defective magnet in the safety section of valve.
4. **Poor thermostat control**
   a. Thermostat needs calibrating.
   b. Defective thermostat section.
5. **Noisy blower**
   a. Tighten blower screws.
   b. Check blower wheel in the open for balance.
6. **Yellow main burner flame**
   a. Remove main burner to check for obstructions in throat, ports and orifices.
   b. Install new main burner orifice and pilot orifice.
   c. Check gas valve for leaking.
   d. Open the air shutter on the main burner in order to increase the amount of primary air.
7. **Yellow pilot flame**
   a. Small yellow tip not objectionable.
   b. Remove pilot orifice. Check and clean.
8. **Pilot and main burner goes out after burning a few minutes**
   a. Improper venting of flue products. Relight and check for improper venting.
   b. If vented properly, check vent safety switch, replace if defective.
9. **Burner flashes- back or "pops" and burns at main burner orifice**
   a. Examine main burner for defects.
10. **Inoperative blower**
    a. Check fan control by shorting across terminals.
    b. Check for blower wheel bind by removing wheel and operating motor.
    c. Check for frozen bearings due to lack of oil.

SERVICE NOTES

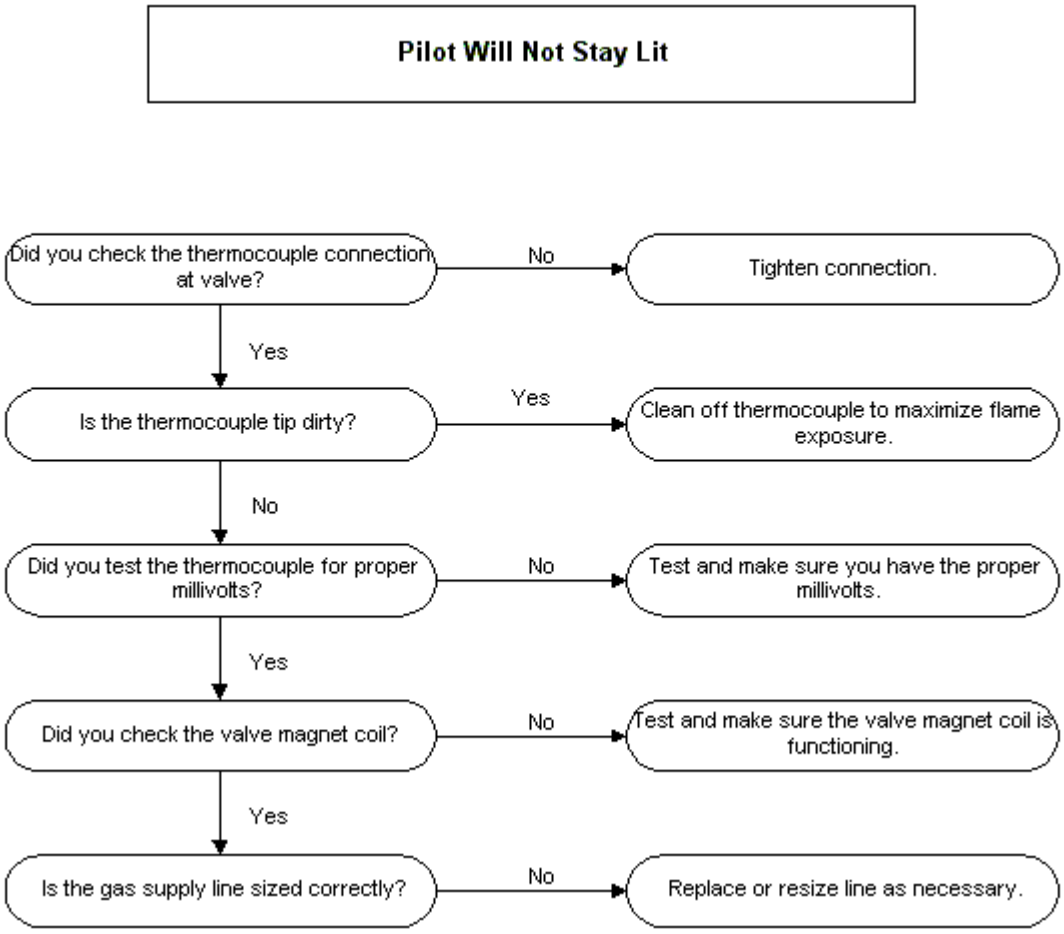
SERVICE NOTES

24 Volt B Vent Heater Troubleshooting

DIAGNOSING 24 VOLT B VENT HEATERS



DIAGNOSING 24 VOLT B VENT HEATERS



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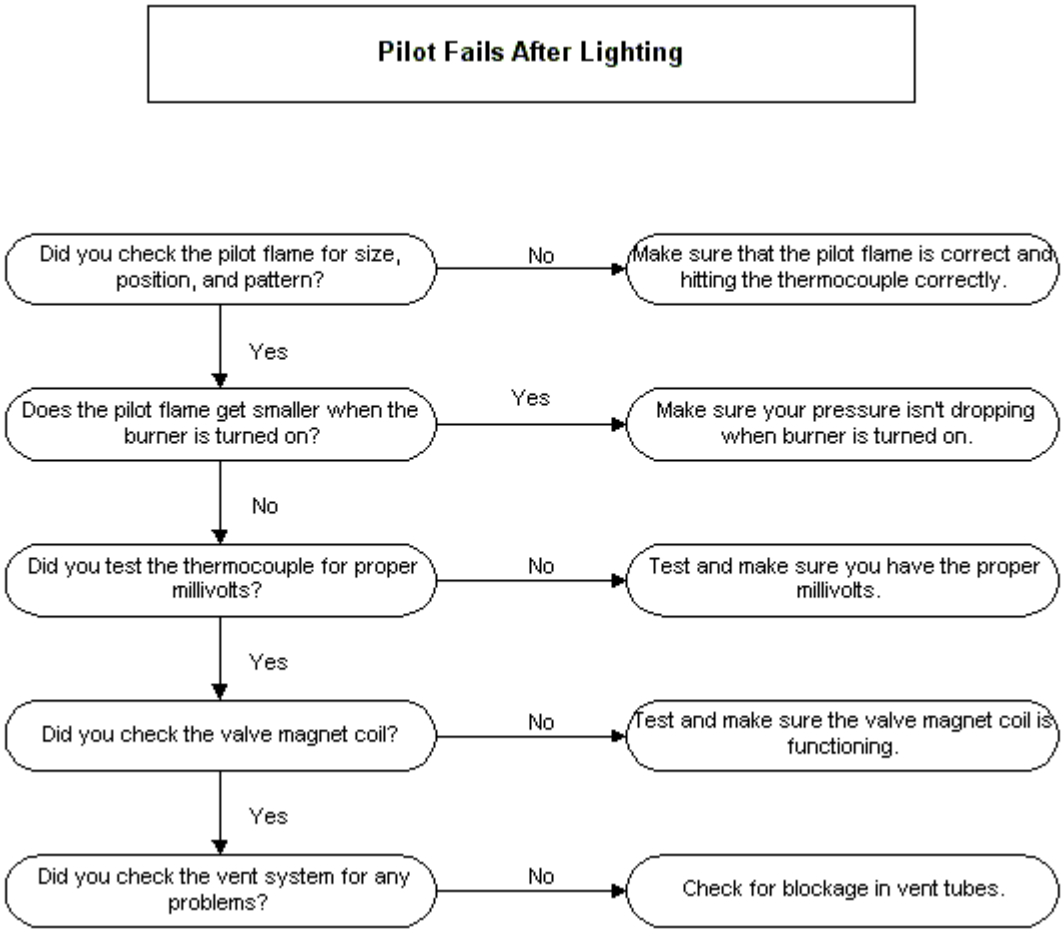
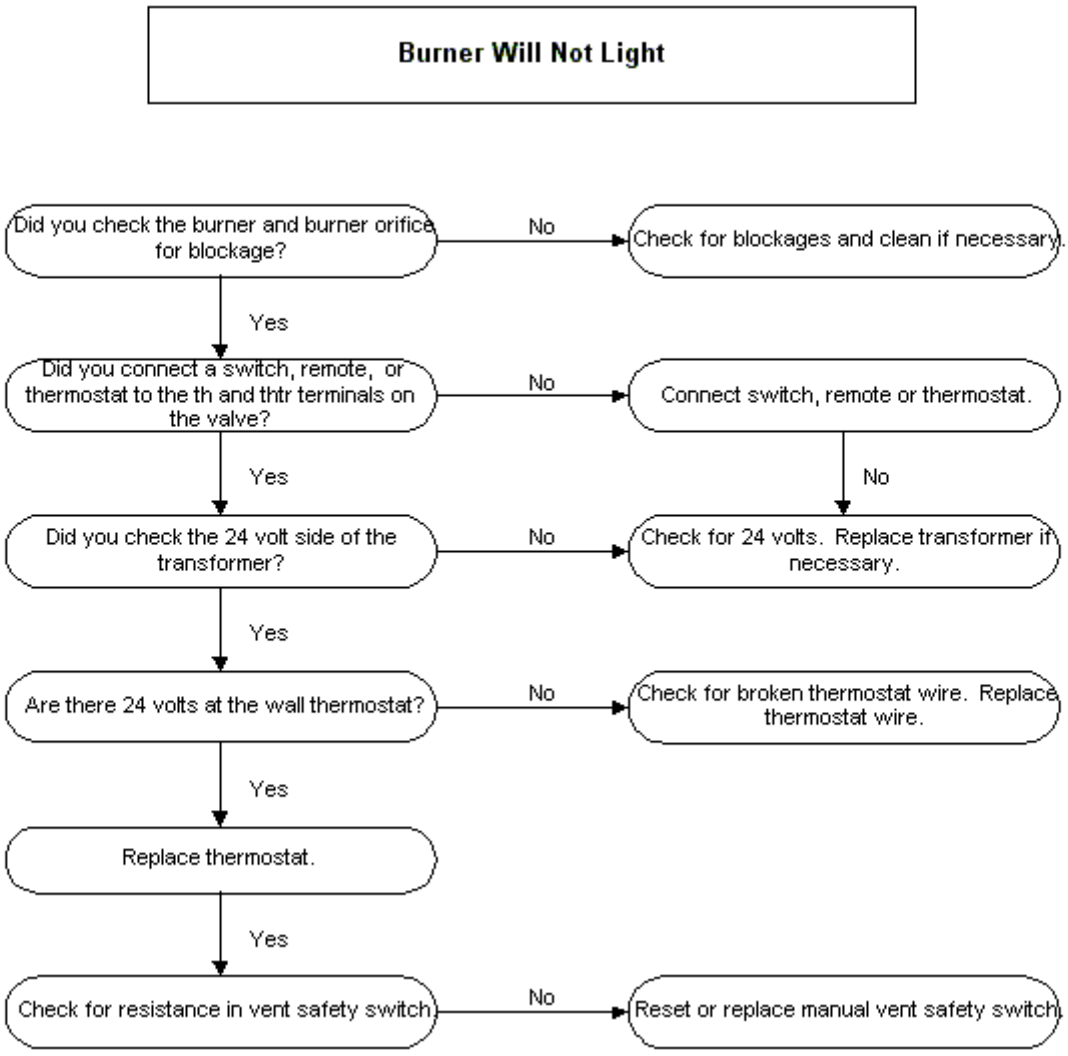
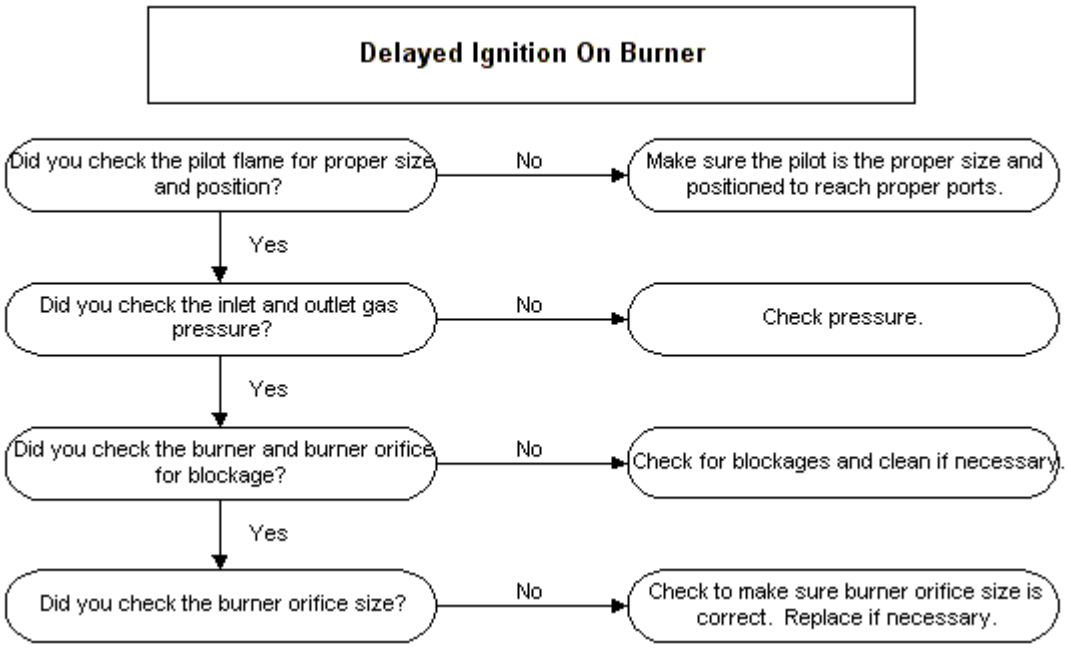
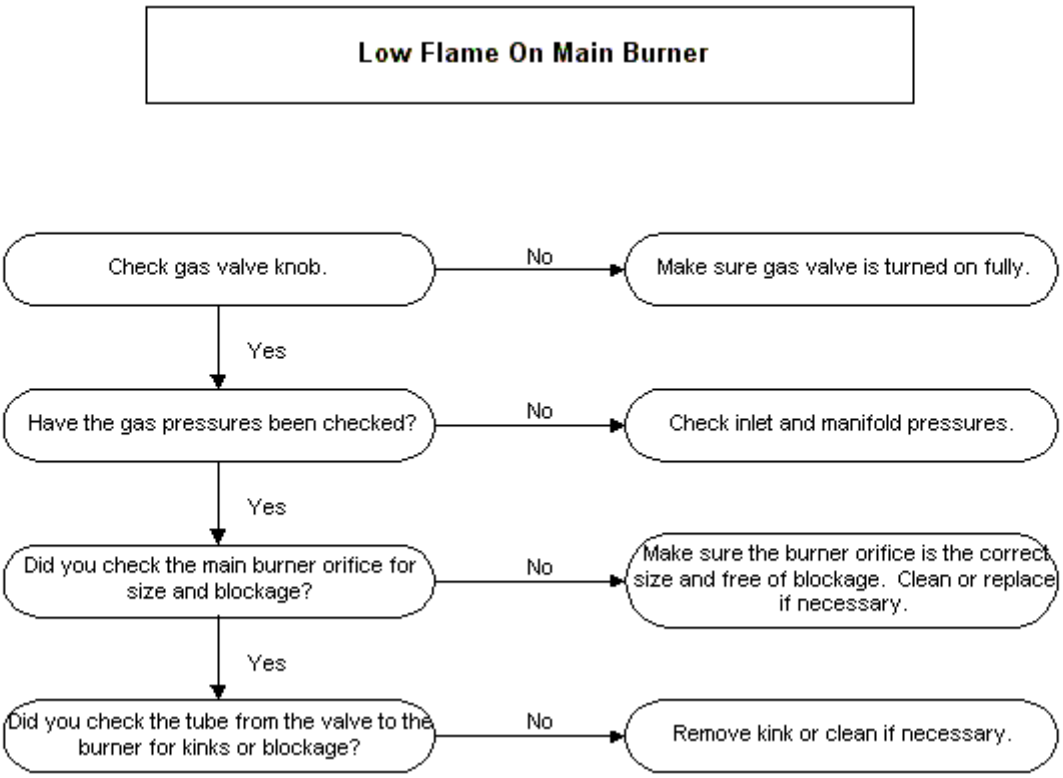


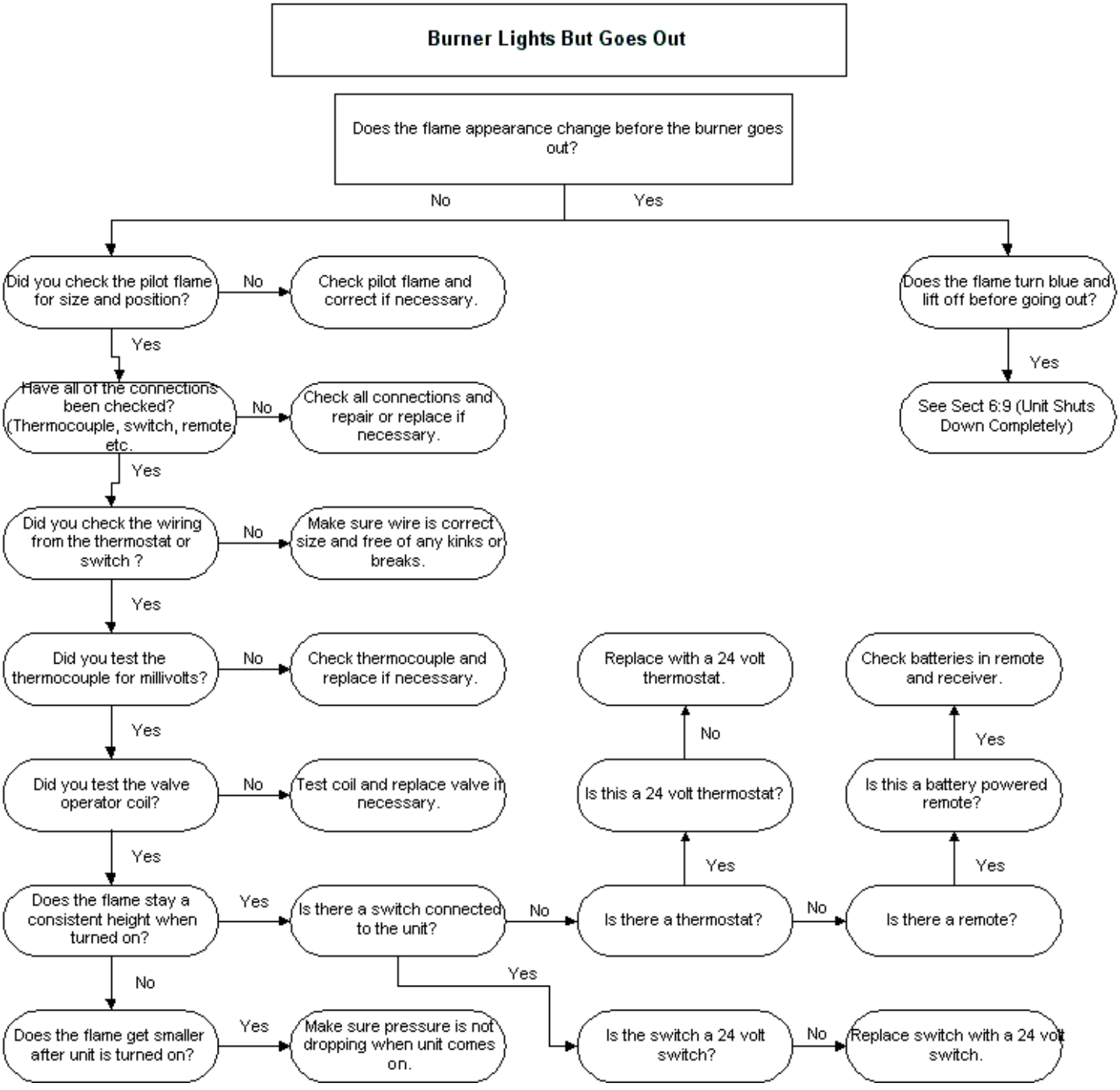
DIAGNOSING 24 VOLT B VENT HEATERS



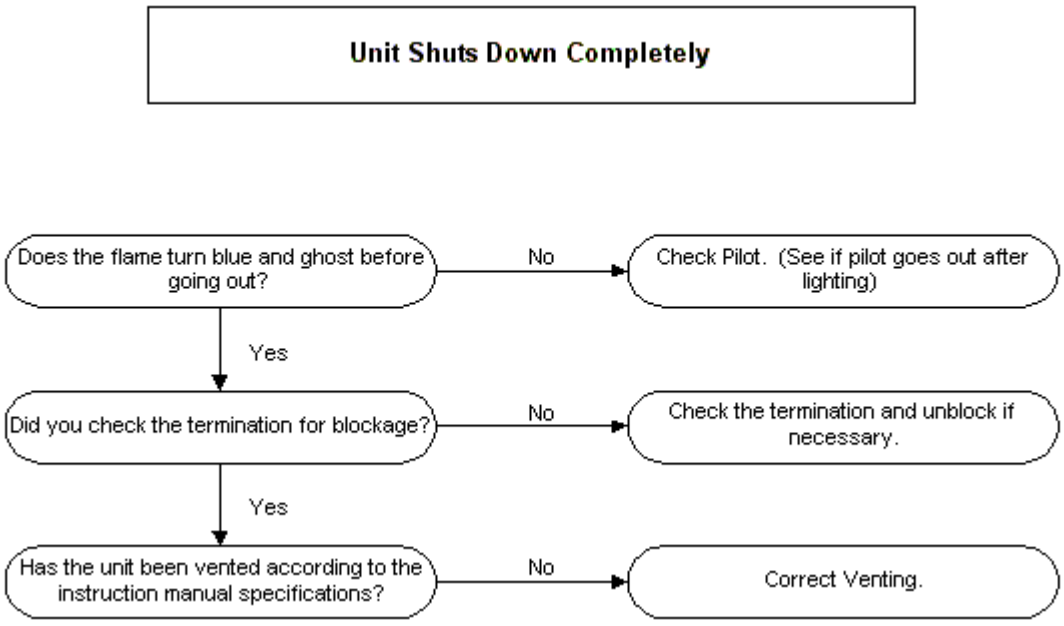

Delayed Ignition On Burner
Did you check the pilot flame for proper size and position?
No
Make sure the pilot is the proper size and positioned to reach proper ports.
Yes
Did you check the inlet and outlet gas pressure?
No
Check pressure.
Yes
Did you check the burner and burner orifice for blockage?
No
Check for blockages and clean if necessary.
Yes
Did you check the burner orifice size?
No
Check to make sure burner orifice size is correct. Replace if necessary.

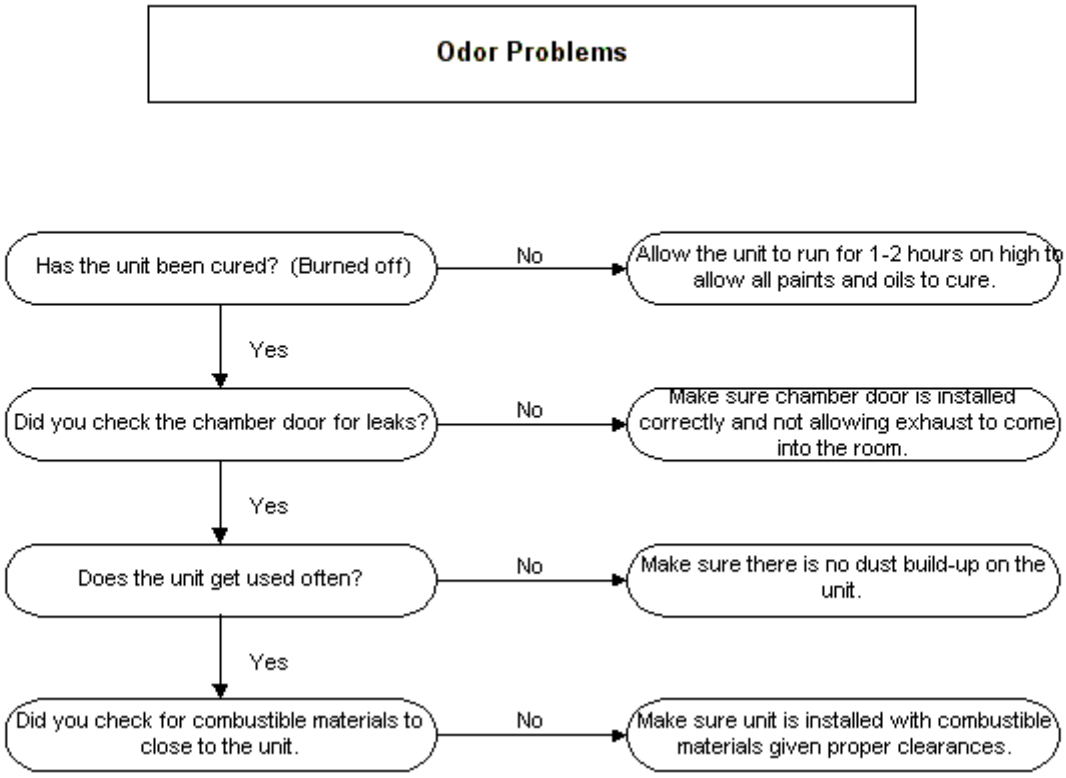

Low Flame On Main Burner
Check gas valve knob.
No
Make sure gas valve is turned on fully.
Yes
Have the gas pressures been checked?
No
Check inlet and manifold pressures.
Yes
Did you check the main burner orifice for size and blockage?
No
Make sure the burner orifice is the correct size and free of blockage. Clean or replace if necessary.
Yes
Did you check the tube from the valve to the burner for kinks or blockage?
No
Remove kink or clean if necessary.

DIAGNOSING 24 VOLT B VENT HEATERS

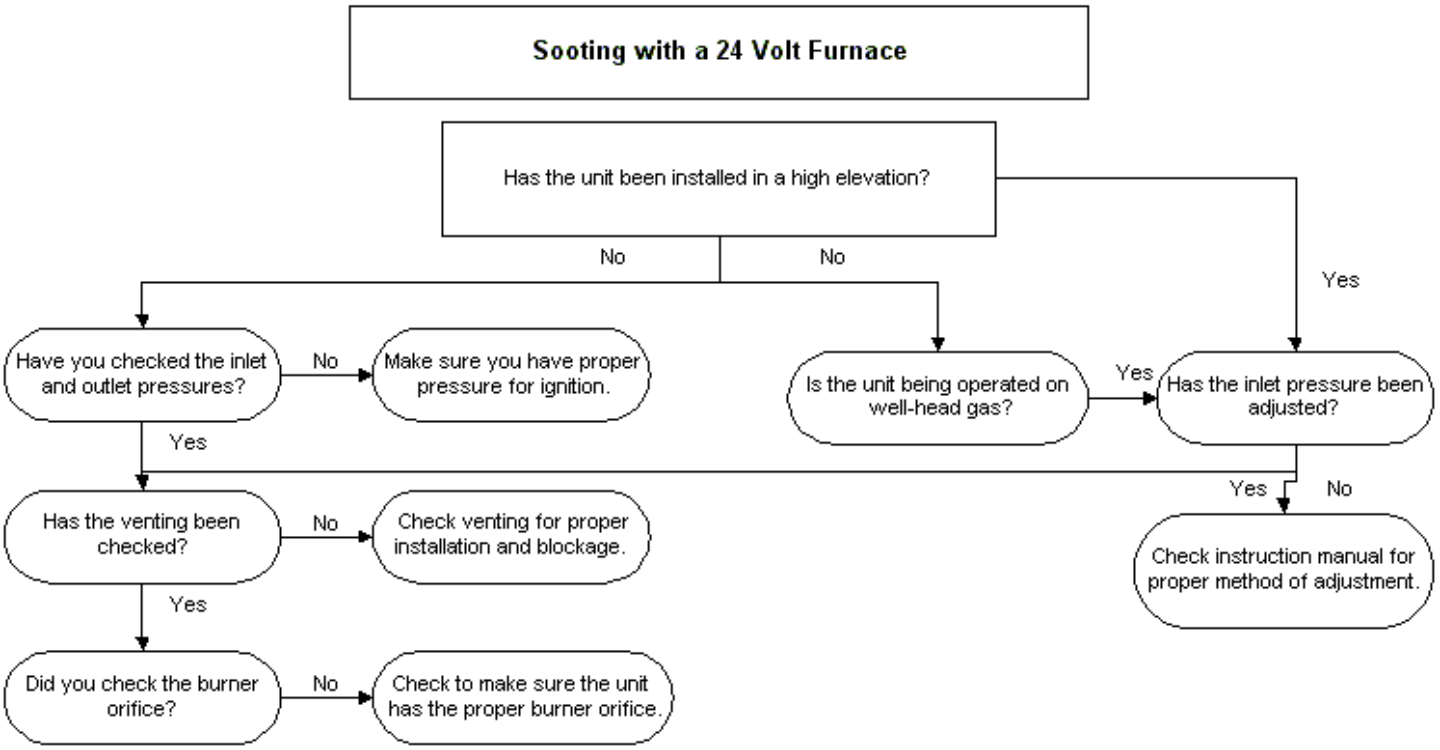


DIAGNOSING 24 VOLT B VENT HEATERS




Odor Problems
Has the unit been cured? (Burned off)
No
Allow the unit to run for 1-2 hours on high to allow all paints and oils to cure.
Yes
Did you check the chamber door for leaks?
No
Make sure chamber door is installed correctly and not allowing exhaust to come into the room.
Yes
Does the unit get used often?
No
Make sure there is no dust build-up on the unit.
Yes
Did you check for combustible materials to close to the unit.
No
Make sure unit is installed with combustible materials given proper clearances.

DIAGNOSING 24 VOLT B VENT HEATERS



FAW Series Heater Troubleshooting

FAW-40-SPP and IP Series Heater Troubleshooting

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

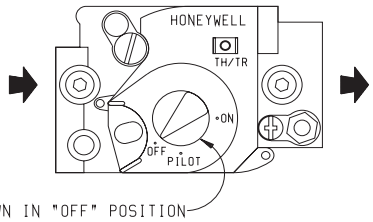
- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

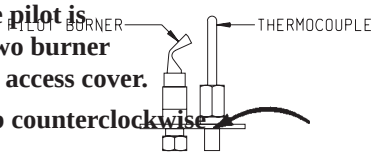
LIGHTING INSTRUCTIONS

1. **STOP! Read the safety information above.**
2. **Set the thermostat to lowest setting.**
3. **Turn off all electric power to the appliance.**
4. **Remove control access panel (lower front panel).**
5. **Turn gas control knob clockwise to "OFF."**



GAS CONTROL KNOB SHOWN IN "OFF" POSITION

6. **Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.**
7. **Remove the pilot access cover located on the combustion chamber.**
8. **Find pilot - follow metal tube from gas control. The pilot is located between the two burner tubes behind the pilot access cover.**



9. **Turn gas control knob counterclockwise to "PILOT."**
10. **Push and hold red reset button down completely and repeatedly push the ignitor button until the pilot burner is lit. Pilot may also be lit with a match. Continue to hold the red reset button down for about one (1) minute after the pilot is lit. Release button and it will pop back up. Pilot should remain lit. If it goes out, repeat steps 5 through 10.**
    - **If button does not pop up when released, stop and immediately call a qualified service technician or gas supplier.**
    - **If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.**
11. **Replace pilot access cover.**
12. **Turn gas control knob counterclockwise to "ON."**
13. **Replace control access panel (lower front panel).**
14. **Turn on all electric power to the appliance.**
15. **Set thermostat to desired setting.**

TO TURN OFF GAS TO APPLIANCE

1. **Set the thermostat to lowest setting.**
2. **Turn off all electric power to appliance if service is to be performed .**
3. **Remove control access panel (lower front panel).**
4. **Push in gas control knob slightly and turn clockwise to "OFF." Do not force.**
5. **Replace control access panel (lower front panel).**

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance is equipped with an ignition device which automatically lights the pilot.
Do not try to light the pilot by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

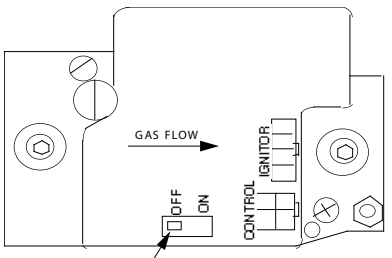
WHAT TO DO IF YOU SMELL GAS
- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

C. Use only your hand to slide the gas control knob. Never use tools. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

1. **STOP! Read the safety information above.**
2. **Set the thermostat to lowest setting.**
3. **Turn off all electric power to the appliance.**
4. **This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.**



GAS VALVE SHOWN IN OFF POSITION
HONEYWELL IP SMART VALVE

5. **Remove front panel door.**
6. **Slide gas control switch to "OFF."**
7. **Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.**
8. **Slide gas control switch to "ON".**
9. **Replace front panel door.**
10. **Turn on all electric power to the appliance.**
11. **Set thermostat to desired setting.**
12. **If the appliance will not operate, follow the instructions "TO TURN OFF GAS TO APPLIANCE" and call your service technician or gas supplier.**

TO TURN OFF GAS TO APPLIANCE

1. **Set the thermostat to lowest setting.**
2. **Turn off all electric power to the appliance if service is to be performed.**
3. **Remove front panel door.**
4. **Slide gas control switch to "OFF."**
5. **Replace front panel door.**

Attention! If one of the above procedures results in pressures in excess of 1/2 psig (14" w.c.) (3.5 kPa) on the appliance gas valve, it will result in a hazardous condition.

Checking Manifold Pressure

Both Propane and Natural gas valves have a built-in pressure regulator in the gas valve. Natural gas models will have a manifold pressure of approximately 4.0" w.c. (.996kPa) at the valve outlet with the inlet pressure to the valve from a minimum of 5.0" w.c. (1.24kPa) for the purpose of input adjustment to a maximum of 10.5" w.c. (2.615kPa). Propane gas models will have a manifold pressure approximately 10.0" w.c. (2.49kPa) at the valve outlet with the inlet pressure to the valve from a minimum of 11.0" w.c. (2.739kPa) for the purpose of input adjustment to a maximum of 13.0" w.c. (3.237kPa).

A 1/8" (3mm) N.P.T. plugged tapping, accessible for test gauge connection, is located on the outlet side of the gas control.

The built-in regulator comes on at approximately 1/4th pressure and full on in 10 seconds.

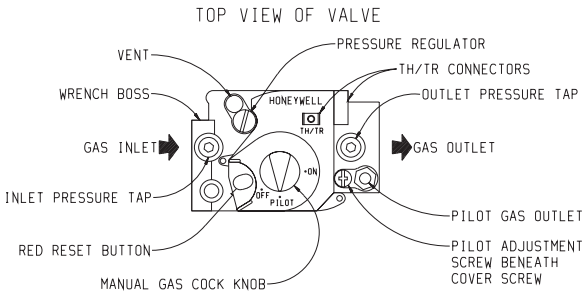


Figure 1

High Altitudes

For altitudes/elevations above 2,000 feet (610m), input ratings should be reduced at the rate of 4 percent for each 1,000 feet (305m) above sea level. For Canadian high altitude applications, this appliance is suitable for installation at elevations between 0 feet (0m) and 4,500 feet (1,372m) without change.

Piezo Pilot Ignitor Instructions

Depressing the red button completely causes a spark to occur at the pilot. This is a substitute for a match which requires opening the pilot hole cover.

To light the pilot, it is important that the electrode be 1/8" (3mm) from the thermocouple. The spark must occur at the point the burner flame hits the thermocouple. The end of the electrode will be red hot with the pilot on.

On a new installation with air in the gas line, it is suggested that a match be used. The match will light the pilot faster than the piezo under this condition.

Proper Pilot Flame

The correct pilot flame (Figure 2) will be blue, extending past the thermocouple. The flame will surround the thermocouple just below the tip.

Natural gas pilots require adjusting when the inlet gas pressure is above 5" w.c. (1.245kPa). Remove the pilot cover screw on the control valve (Figure 1), and turn the adjustment screw clockwise to reduce flame. Replace pilot cover screw to eliminate gas leakage.

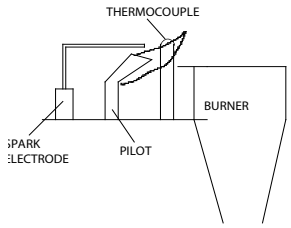
LP gas (propane) will not require adjustment.

After use, cleaning may be required for the proper flame.

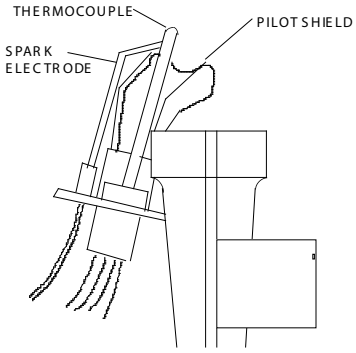
Proper Main Burner Flame

The correct flame will be a short, blue inner flame with a much larger, light blue, outer flame. The burner does not have a primary air adjustment. The flame will be correct if the factory-set pressure and orifice opening are used. After the furnace has been operating, the burner ports may be blocked by foreign matter carried in by combustion air. Therefore, cleaning of the burner may be needed for proper flame.

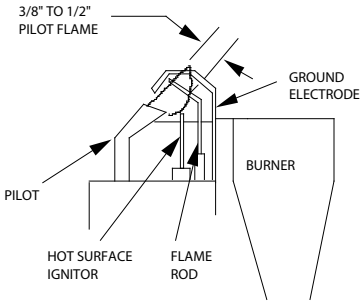
To clean burner port disconnect the gas supply to the valve, and remove the screws fastening the burner door. After removing the burner door from the burner box, remove each main burner. Pilot mounting bracket will need to be unscrewed and moved out of the way to remove all burners. Burners can be blown out using compressed air or by blowing through them. Be sure there is no lint or foreign debris blocking the burner ports. Reassemble using the same screws earlier removed and locate pilot in the same position as before and noted above.



STANDING PILOT



PILOT LOCATION END VIEW
STANDING PILOT SHOWN



IP-MODEL PILOT

Figure 2

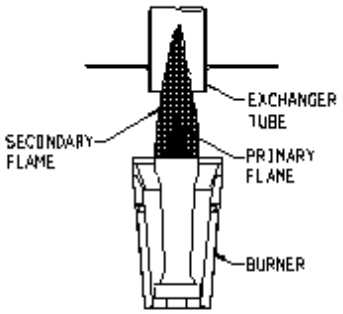


Figure 3

Cleaning Combustion (Exchanger) Assembly

A QUALIFIED SERVICE PERSON should remove the combustion (exchanger) assembly and flue baffles. Apply air pressure to the inside of the combustion (exchanger) assembly and flue baffles in order to clear all passageways.

Oiling the Motor

The fan motor should be cleaned and oiled once each heating season. Oil holes are located on the top at each end of the motor.

Use a few drops of #10 motor oil. To clean the motor, blow air through its ventilation openings with a vacuum cleaner or low pressure air source.

Wiring

The appliance, when installed, must be electrically grounded in accordance with local codes or, in the absence of local codes, with the *National Electrical Code, ANSI/NFPA 70 or Canadian Electrical Code, CSA C22.1*, if an external electrical source is utilized. **This appliance is equipped with a three-prong [grounding] plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle. Do not cut or remove the grounding prong from this plug.** For an ungrounded receptacle, an adapter, which has two prongs and a wire for grounding, can be purchased, plugged into the ungrounded receptacle and its wire connected to the receptacle mounting screw. With this wire completing the ground, the appliance cord plug can be plugged into the adapter and be electrically grounded. A 7/8" (22mm) hole is provided in the junction box for use with a conduit connector if local codes require this type of protection.

Thermostat Installation

The thermostat should be installed in the same room as the furnace 4' (1.2m) to 5' (1.5m) above the floor and away from another heat source (cooking stove, hot water heater, etc.) including walls and doorways with a heat source in an adjoining room. **Do Not Install Thermostat on Outside Wall.**

Insulated Vent Enclosure

Vented wall furnaces installed in buildings with flat roofs can have poor venting. The cold vent pipe will have a delay in proper venting and cause the wall furnace to shut "OFF" by the vent safety switch. To prevent delayed venting as well as condensation of flue products an insulated vent enclosure is recommended.

Use type B vent pipe and maintain at least a one inch (25mm) clearance to combustibles.

Use metal thimble to protect vent pipe as it passes through combustibles.

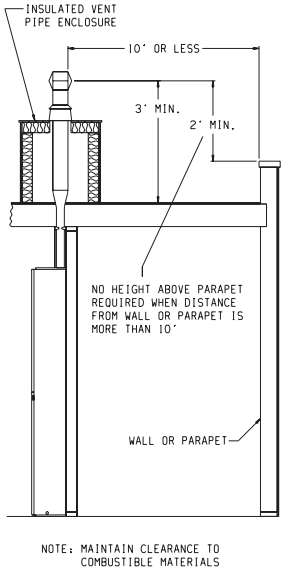


Figure 4

Vent Safety Shutoff System

This appliance must be properly connected to a venting system. This appliance is equipped with a vent safety shutoff system.

Warning: Operation of this wall furnace when not connected to a properly installed and maintained venting system or tampering with the vent safety shutoff system can result in carbon monoxide (CO) poisoning and possible death.

This furnace is equipped with a manual reset vent safety switch. The manual reset vent safety switch will cause gas flow to the main burners to "shut off" due to improper venting or a blocked flue.

To reset the manual reset vent safety switch:

1. Remove front panel.
2. Depress manual reset button. The manual reset vent safety switch is located on the draft diverter.
3. Replace front panel.

If the manual reset vent safety switch continues to "shut off" the gas flow to the main burners a qualified service person must be contacted to inspect for improper venting, blockage in the vent pipe or the manual reset vent safety switch for being defective.

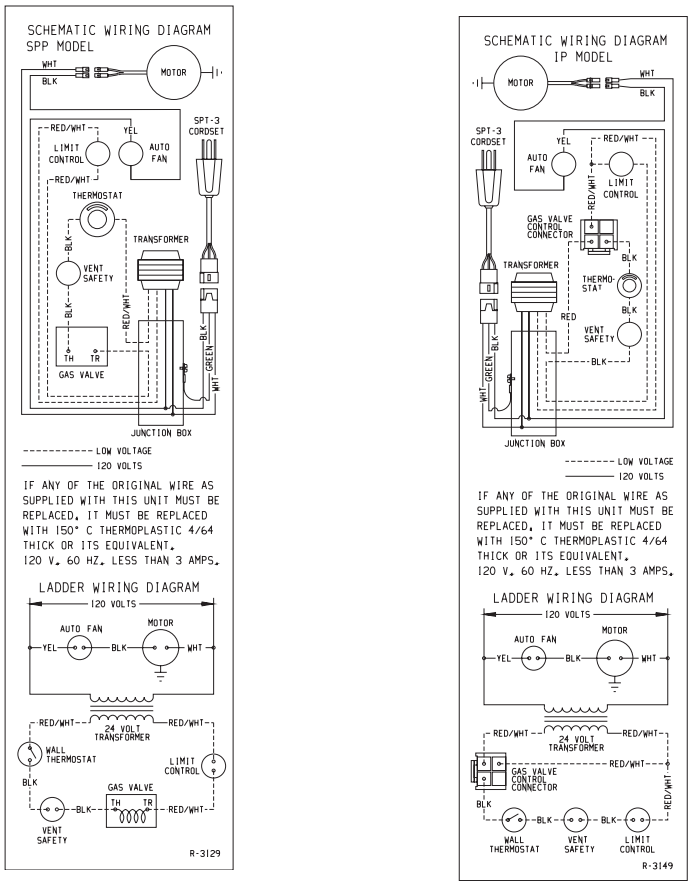


Figure 5

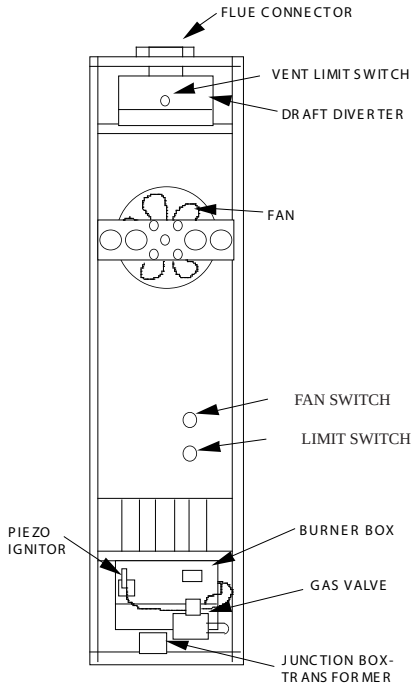


Figure 6

SERVICE AND MAINTENANCE SUGGESTIONS

CALL SERVICEMAN

GENERAL: All furnaces have been fire-tested to check for proper operation. This includes, main burner flame, pilot flame, fan operation, fan control, limit control and automatic valve operation. If the furnace fails to function on initial installation, it is advisable to re-check the following:

1. 115 volts to the junction box.
2. Inlet gas pressure.
3. The 24 volt system.
4. Type of gas being used and that shown on the rating label.

The Service Department at Empire Comfort Systems, Inc. may be contacted to assist in servicing furnace.

Standing Pilot Model

Servicing the Pilot and Main Burners, Pilot Orifice, Thermocouple, and Main Burner Orifices: Disconnect the gas supply at the inlet to the control valve. Then remove the burner door to gain access to the above listed components.

Spark Igniter Does Not Light Pilot: With air in the gas line, such as when the furnace is first installed or was off all summer, the pilot flame may be too lean to ignite on the first few trials. Turn the control valve knob to pilot position and depress the red reset button. Holding the button down continually to bleed the line;.

1. Use lighter rod to light pilot with a match.
2. Use the piezo ignitor at 30 second intervals until it lights.

If Electrode Does Not Produce Spark:

1. Check wire connections.
2. Check gap for pilot burner to the electrode tip. Should be between 1/8" (3mm) and 3/16" (5mm). Electrode wire and tip must be more than 1/4" (6mm) away from all other metal components.

If Pilot Does Not Light By Any Means:

1. Check valve knob for being in the "Pilot" position.
2. Check pilot adjustment for being full open (counterclockwise to open).
3. If gas is available in the supply tubing, the pilot orifice and/or pilot burner is probably restricted by a spider web. Clean pilot assembly and relight.

If Pilot Does Not Remain On After Releasing Knob:

1. Follow instructions and hold button down longer and harder.
2. Determine if pilot flame extends past thermocouple; if not, adjust input or clean pilot burner.
3. Replace thermocouple if millivolts read less than 15 millivolts.

Main Gas Valve Does Not Open When Thermostat Is Turned To On:

1. Check for 24 volts to valve by removing one wire and touching to the **SAME TERMINAL** it was on. Terminal should have a light spark. **DO NOT SHORT ACROSS TERMINALS, AS IT WILL BURN OUT THE WALL THERMOSTAT.**
2. Thermostat wires at the wall may be shorted, so check for a faulty thermostat.
3. To check for line voltage to furnace, remove front panel and short across two-terminal fan control to allow fan to operate (Figure 6).

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

IP-Model Pilot

This heater is using a Honeywell "Smart Valve" system for intermittent pilot ignition.

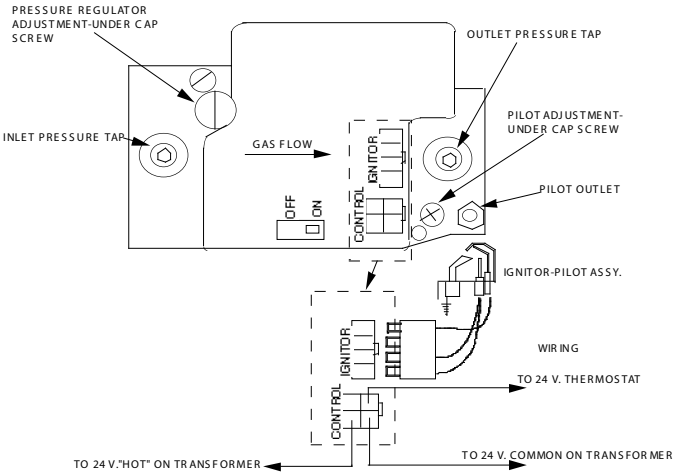
On a call for heat by the thermostat this control turns on a 24 volt mini hot surface ignitor which lights a pilot that in turn lights the main burner. The gas valve used in this system is a step opening which opens at a lower pressure for ignition and then steps to a full inlet pressure of 4" H_2O pressure on Natural gas and 10" H_20 pressure on LP gas.

Pilot Flame Adjustment

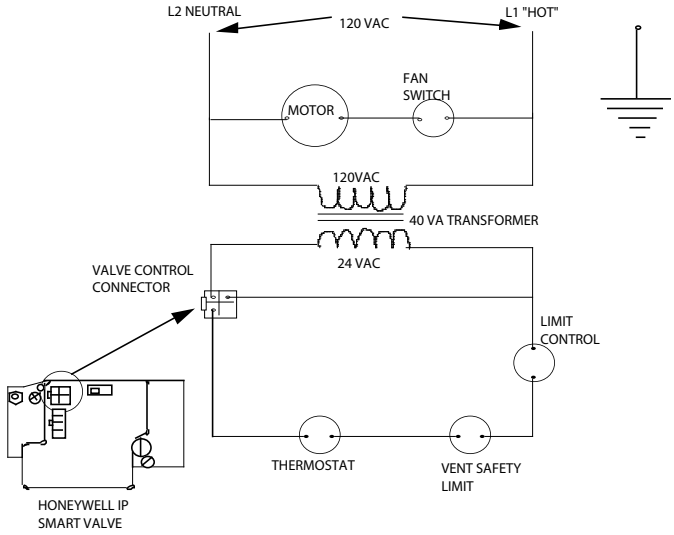
The pilot flame should envelop 3/8 to 1/2 inch (10 to 13mm) of the tip of the flame rod. See Figure 2.

To adjust:

1. Remove the pilot adjustment cover screw.
2. Turn the inner adjustment screw clockwise to decrease or counterclockwise to increase pilot flame. Pilot adjustment is shipped at full flow rate. Turn the inner adjustment screw clockwise if the inlet pressure is too high.
3. Replace the cover screw after the adjustment to prevent gas leakage.



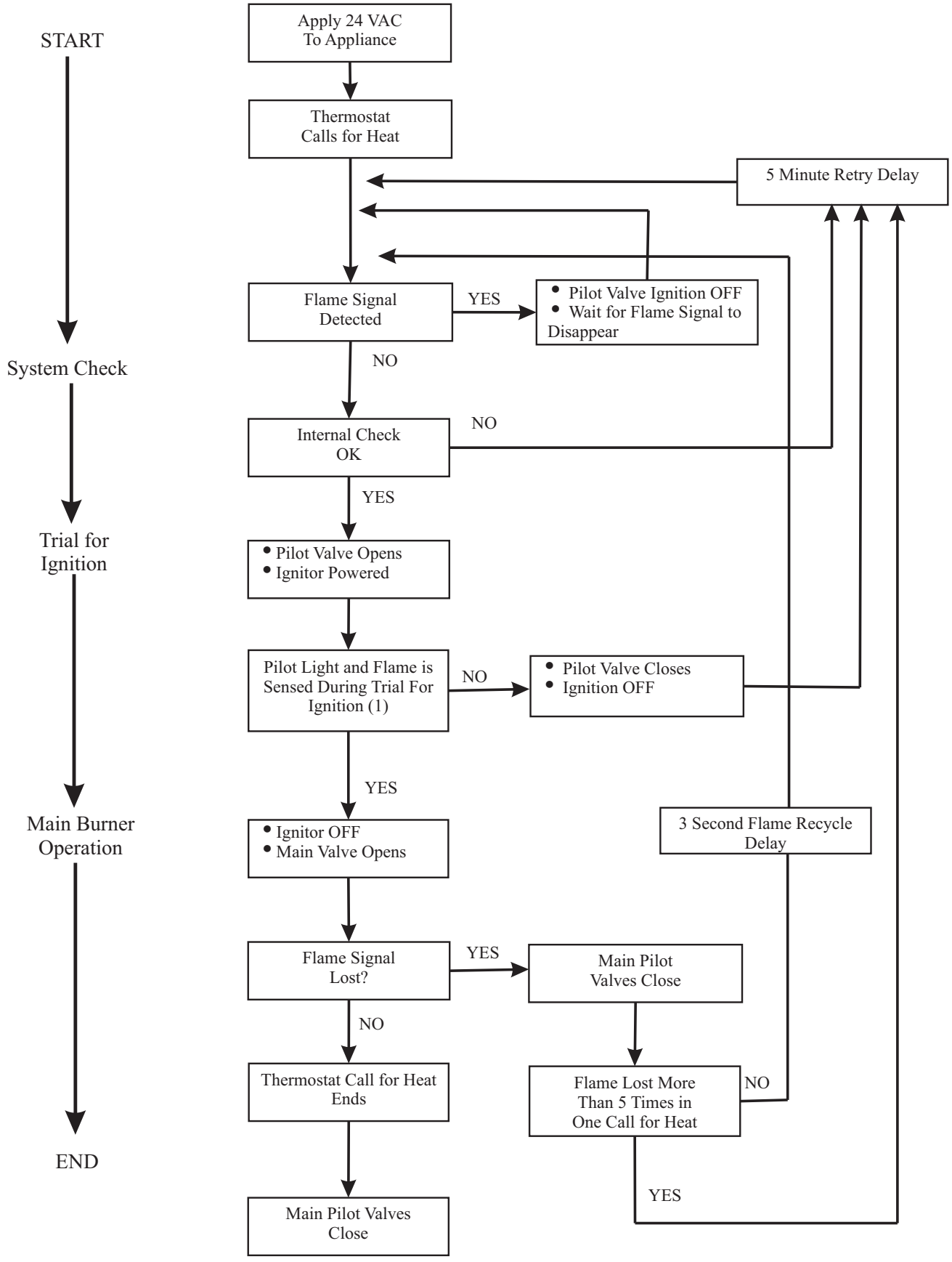
IP-MODEL GAS VALVE AND WIRING



LADDER WIRING DIAGRAM-IP VALVE

Figure 7

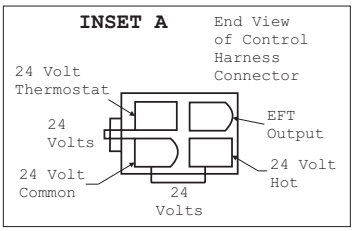
SEQUENCE OF OPERATION

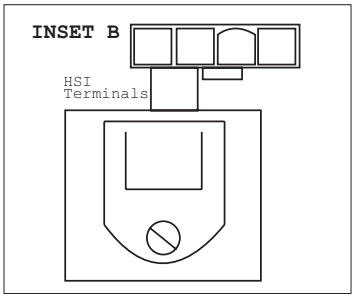


(1) Ignitor will turn OFF about 30 seconds into the trial for ignition if the pilot flame has not lit. It will turn back ON for the final 30 seconds of the 90 second trial for ignition. The pilot valve will be energized during the entire trial for ignition. This is normal operation for this gas ignition system.

IP SYSTEM TROUBLESHOOTING SEQUENCE

SmartValve™ System Troubleshooting Sequence
Note: Before Troubleshooting, Become Familiar with the Sequence of Operation





START

- Turn OFF Gas Supply
- Disconnect System Control Harness
- Set Thermostat to Call for Heat

Check for Proper Voltage at Control Harness (See Inset A - Voltage Should be 24V Between Thermostat and 24V Common, and 24V Between 24V Common and 24V Hot.)

NO → Check
- Line Voltage Power
- Low Voltage Transformer
- Limit Controller
- Thermostat
- Wiring

YES

Plug Harness into SmartValve Control
Wait for Internal Check Delay (SV9501)

Igniter Warms UP and Glows Red

NO → Unplug Pilot Burner Cable. Measure Voltage at SmartValue HSI Element Output (See Inset B) 24V Nominal

NO → Replace SmartValve Control → Reconnect Pilot Burner Cable

Replace Igniter/Flame Rod Assembly → Reconnect Pilot Burner Cable

Note: Igniter Will Cycle OFF and Back ON Once During the 90 Second Ignition Trial

YES

- Turn On Gas Supply
- Pilot Burner Lights

NO → Check that Pilot Gas is Flowing Wait to Assure Pilot Gas Tubing is Purged.

NO → Replace SmartValve Control

Measure Voltage Between 24V Hot and 24V Common Leads to SmartValve Control. Must Measure at Least 19.5 VAC with Igniter Powered. See Inset A to Identify Proper Lead. This Check Must be Done with the SmartValve Control Connected and Igniter Powered.

NO → Check Transformer and Line Volt Supply

YES

Replace Igniter/Flame Rod Assembly

Main Valve Opens and Main Burner Lights

NO →
- Check that Pilot Flame Makes Good Contact with Pilot Burner Flame Rod
- Check for Good Electrical Connection Through the Pilot Tubing
- If Both of the Above are Good, Replace Igniter/Flame Rod

YES

Cycle Thermostat OFF and Back ON

System is Okay

Main Burner Lights

NO → Replace SmartValve Control

FAW-55SPP Series Heater Troubleshooting

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

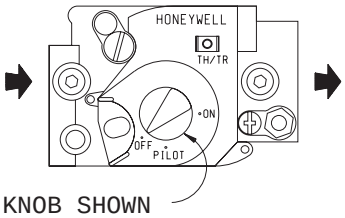
- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone, Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

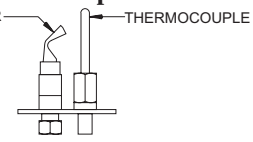
LIGHTING INSTRUCTIONS

1. **STOP! Read safety information above.**
2. **Set the thermostat to lowest setting.**
3. **Turn off all electric power to the appliance.**
4. **Remove control access panel (lower front panel).**
5. **Turn gas control knob clockwise to "OFF."**



GAS CONTROL KNOB SHOWN IN "OFF" POSITION.

6. **Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.**
7. **Remove the pilot access cover located on the combustion chamber.**
8. **Find pilot - follow metal tube from gas control. The pilot is located between the two burner tubes behind the pilot access cover.**



9. **Turn gas control knob counterclockwise to "Pilot."**
10. **Push and hold red reset button down completely and repeatedly push the ignitor button until the pilot burner is lit. Pilot may also be lit with a match. Continue to hold the red rest button down for about one (1) minute after the pilot is lit. Release button and it will pop back up. Pilot should remain lit. If it goes out, repeat step 5 through 10.**
    - **If button does not pup up when released, stop and immediately call a qualified service technician or gas supplier.**
    - **If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.**
11. **Replace pilot access cover.**
12. **Turn gas control knob counterclockwise to "ON."**
13. **Replace control access panel (lower front panel).**
14. **Turn on all electric power to the appliance.**
15. **Set thermostat to desired setting.**

TO TURN OFF GAS TO APPLIANCE

1. **Set the thermostat to lowest setting.**
2. **Turn off all electric power to appliance if service is to be performed.**
3. **Remove control access panel (lower front panel).**
4. **Push in gas control knob slightly and turn clockwise to "OFF." Do not force.**
5. **Replace control access panel (lower front panel).**

On a new installation with air in the gas line, it is suggested that a match be used. The match will light the pilot faster than the piezo under this condition.

Proper Pilot Flame

The correct pilot flame (Figure 1) will be blue, extending past the thermocouple. The flame will surround the thermocouple just below the tip.

Natural gas pilots require adjusting when the inlet gas pressure is above 5" w.c. (1.245kPa). Remove the pilot cover screw on the control valve (Figure 5), and turn the adjustment screw clockwise to reduce flame. Replace pilot cover screw to eliminate gas leakage.

LP gas (propane) will not require adjustment.

After use, cleaning may be required for the proper flame.

PROPER FLAME ADJUSTMENT

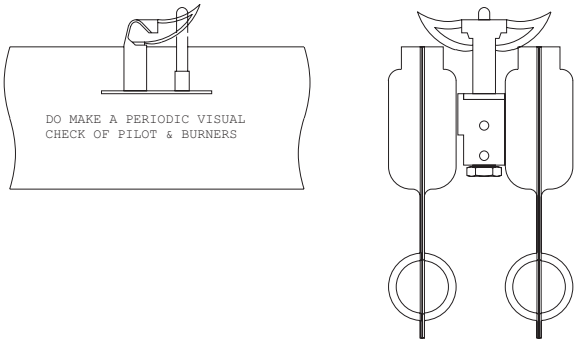


Figure 1

Proper Main Burner Flame

The correct flame will be a short blue inner flame with a much larger light blue outer flame. The main burner (Figure 7) shows the approximate height of each part of the flame for each gas. The burner does not have a primary air adjustment. The flame will be correct if the factory-set pressure and orifice opening are used. After the furnace has been operating, the burner ports may be blocked by foreign matter carried in by combustion air. Therefore, cleaning of the burner may be needed for proper flame.

To clean burner port disconnect the gas supply to the valve, and remove the eight screws fastening the burner door. After removing the burner door from the combustion chamber, remove rear burner, pilot burner and front burner. With front and rear burners removed from furnace, force water into the ribbon ports and dry with air pressure.

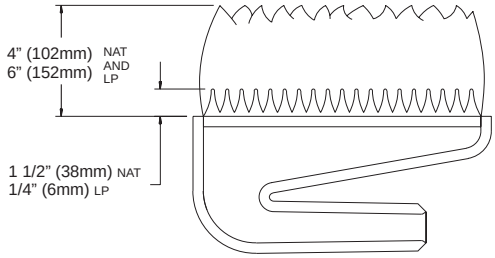


Figure 2

Replacing Fan and Oiling the Motor

The fan motor should be cleaned and oiled once each heating season. To reach the motor, withdraw the metal shroud surrounding the fan blade by removing the screws on each side. Oil holes are located on the top at each end of the motor. Use a few drops of #10 motor oil. To clean the motor, blow air through its ventilation openings with a vacuum cleaner or low pressure air source.

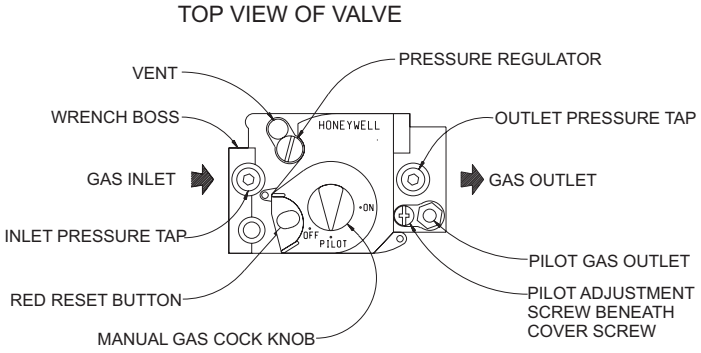
If fan motor is replaced, the silicone rubber gaskets, see owners manual, Index No. 5, Part 712059, should also be replaced. The gaskets must be stretched to fit the motor bolts into the gasket holes and then the motor and gaskets installed on the motor mounting bars.

Wiring

The appliance, when installed, must be electrically grounded in accordance with local codes or, in the absence of local codes with the *National Electrical Code, ANSI/NFPA70 or Canadian Electrical Code CSA C22.1*, if an external electrical source is utilized. **This appliance is equipped with a three-prong (grounding) plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle. Do not cut or remove the grounding prong from this plug.** For an ungrounded receptacle, an adapter, which has two prongs and a wire for grounding, can be purchased, plugged into the ungrounded receptacle and its wire connected to the receptacle mounting screw. With this wire completing the ground, the appliance cord plug can be plugged into the adapter and be electrically grounded. A 7/8" (22mm) hole is provided in the junction box for use with a conduit connector if local codes require this type of protection.

Thermostat Installation

The thermostat should be installed in the same room as the furnace 4' (1.2m) to 5' (1.5m) above the floor and away from another heat source (cooking stove, hot water heater, etc.) including walls and doorways with a heat source in an adjoining room. **Do Not Install Thermostat on Outside Wall.**



Checking Manifold Pressure

Both Propane and Natural gas valves have a built-in pressure regulator in the gas valve. Natural gas models will have a manifold pressure of approximately 4.0" w.c. (.996kPa) at the valve outlet with the inlet pressure to the valve from a minimum of 5.0" w.c. (1.24kPa). Propane gas models will have a manifold pressure approximately 10.0" w.c. (2.49kPa) at the valve outlet with the inlet pressure to the valve from a minimum of 11.0" w.c. (2.739kPa) for the purpose of input adjustment to a maximum of 13.0" w.c. (3.237kPa).

A 1/8" (3mm) N.P.T. plugged tapping, accessible for test gauge connection, is located on the outlet side of the gas control.

The built-in regulator comes on at approximately 1/4th pressure and full on in 10 seconds.

Figure 3

High Altitudes

For altitudes/elevations above 2,000 feet (610m), input ratings should be reduced at the rate of 4 percent for each 1,000 feet (305m) above sea level. Canadian High Altitudes for locations having an elevation above mean sea level between 2,000 feet (610m) and 4,500 feet (1370m), the manifold pressure is to be decreased from 4.0" w.c. (.996kPa) to 3.2" (.797kPa) w.c. for Natural Gas and from 10.0" w.c. (2.49kPa) to 8.0" w.c. (1.992kPa) for Propane Gas.

Piezo Pilot Ignitor Instructions

Depressing the red button completely causes a spark to occur at the pilot. This is a substitute for a match which requires opening the pilot hole cover.

To light the pilot, it is important that the electrode be 1/8" (3mm) from the thermocouple. The spark must occur at the point the burner flame

Vent Safety Shutoff System

This appliance must be properly connected to a venting system. This appliance is equipped with a vent safety shutoff system.

Warning: Operation of this wall furnace when not connected to a properly installed and maintained venting system or tampering with the vent safety shutoff system can result in carbon monoxide (CO) poisoning and possible death.

This furnace is equipped with a manual reset vent safety switch. The manual reset vent safety switch will cause gas flow to the main burners to "shut off" due to improper venting or a blocked flue.

To reset the manual reset vent safety switch:

1. Remove upper front panel.
2. Depress red manual reset button. The manual reset vent safety switch is located on the draft diverter.
3. Replace upper front panel.

If the manual reset vent safety switch continues to "shut off" the gas flow to the main burners a qualified service person must be contacted to inspect for improper venting, blockage in the vent pipe or the manual reset vent safety switch for being defective.

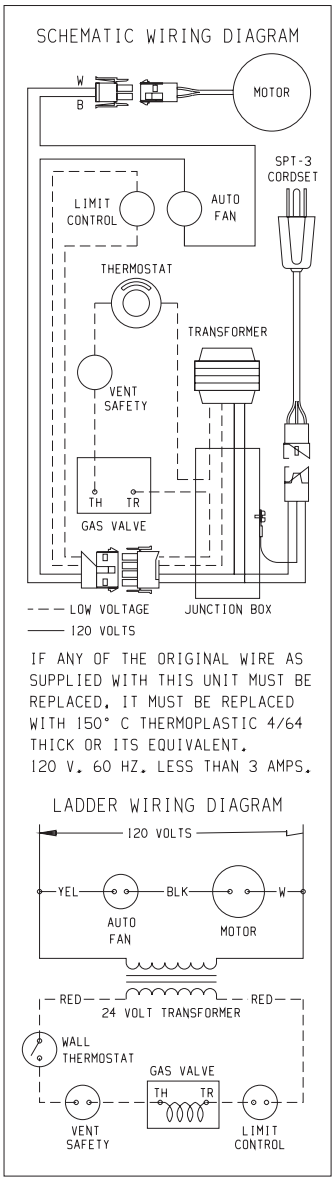


Figure 4

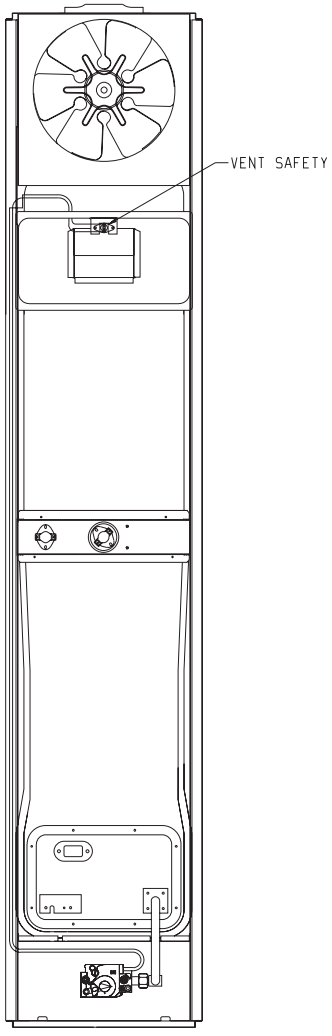


Figure 5

SERVICE AND MAINTENANCE SUGGESTIONS

CALL SERVICEMAN

GENERAL: All furnaces have been fire-tested to check for proper operation. This includes, main burner flame, pilot flame, fan operation, fan control, limit control and automatic valve operation. If the furnace fails to function on initial installation, it is advisable to re-check the following:

1. 115 volts to the junction box.
2. Inlet gas pressure.
3. The 24 volt system
4. Type of gas being used and that shown on the rating label.

The Service Department at Empire Comfort Systems, Inc. may be contacted to assist in servicing furnace.

Servicing the Pilot and Main Burners, Pilot Orifice, Thermocouple, and Main Burner Orifices: Disconnect the gas supply at the inlet to the control valve. Then remove the burner door to which the above components are attached.

Servicing The Fan Motor: The upper front panel the shroud surrounding the fan blade and fan blade must be removed. See "oiling the Motor" paragraph on page 7 in owners manual.

Spark Igniter Does Not Light Pilot: With air in the gas line, such as when the furnace is first installed or was off all summer, the pilot flame may be too lean to ignite on the first few trials. Turn the control valve knob to pilot position and depress the red reset button. Holding the button down continually to bleed the line;

1. Use lighter rod to light pilot with a match.
2. Use the piezo ignitor at 30 second intervals until it lights.

If Electrode Does Not Produce Spark

1. Check wire connections.
2. Check gap for pilot burner to the electrode tip. Should be between 1/8" (3mm) and 3/16" (5mm). Electrode wire and tip must be more than 1/4" (6mm) away from all other metal components.

If Pilot Does Not Light By Any Means:

1. Check valve knob for being in the "Pilot" position.
2. Check pilot adjustment for being full open (counterclockwise to open).
3. If gas is available in the supply tubing, the pilot orifice and/or pilot burner is probably restricted by a spider web. Clean pilot assembly and relight.

If Pilot Does Not Remain On After Releasing Knob:

1. Follow instructions and hold button down longer and harder.
2. Determine if pilot flame extends past thermocouple; if not, adjust input or clean pilot burner.
3. Replace thermocouple if millivolts read less than 15 millivolts.

Main Gas Valve Does Not Open When Thermostat is Turned To On:

1. Check for 24 volts to valve by removing one wire and touch to the **SAME TERMINAL** it was on. Terminal should have a light spark. **DO NOT SHORT ACROSS TERMINALS, AS IT WILL BURN OUT THE WALL THERMOSTAT.**
2. Thermostat wires at the wall may be shorted, so check for a faulty thermostat.
3. To check for line voltage to furnace, remove lower front panel and switch compartment cover and short across two-terminal fan control to allow fan to operate (Figure 4).

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

FAW-55IP Series Heater Troubleshooting

LIGHTING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance is equipped with an ignition device which automatically lights the pilot.
Do not try to light the pilot by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

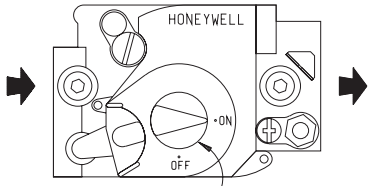
WHAT TO DO IF YOU SMELL GAS
- **Do not try to light any appliance.**
- **Do not touch any electrical switch; Do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

1. **STOP! Read the safety information above.**
2. **Set the thermostat to lowest setting.**
3. **Turn off all electric power to the appliance.**
4. **This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.**



GAS CONTROL KNOB SHOWN IN "ON" POSITION

5. **Remove control access panel (lower front panel).**
6. **Turn gas control knob clockwise ↷ to "OFF."**
7. **Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.**
8. **Turn gas control knob counterclockwise ↶ to "ON".**
9. **Replace control access panel (lower front panel).**
10. **Turn on all electric power to the appliance.**
11. **Set thermostat to desired setting.**
12. **If the appliance will not operate, follow the instructions "TO TURN OFF GAS TO APPLIANCE" and call your service technician or gas supplier.**

TO TURN OFF GAS TO APPLIANCE

1. **Set the thermostat to lowest setting.**
2. **Turn off all electric power to the appliance if service is to be performed .**
3. **Remove control access panel (lower front panel).**
4. **Turn gas control knob clockwise ↷ to "OFF." Do not force.**
5. **Replace control access panel (lower front panel).**

INSTALLATION

Checking Manifold Pressure

Both Propane and Natural gas valves have a built-in pressure regulator in the gas valve. Natural gas models will have a manifold pressure of approximately 3.5" w.c. (.871kPa) at the valve outlet with the inlet pressure to the valve from a minimum of 5.0" w.c. (1.24kPa) for the purpose of input adjustment to a maximum of 10.5" w.c. (2.615kPa) Propane gas models will have a manifold pressure approximately 10.0" w.c. (2.49kPa) at the valve outlet with the inlet pressure to the valve from a minimum of 11.0" w.c. (2.739kPa) for the purpose of input adjustment to a maximum of 13.0" w.c. (3.237kPa).

A 1/8" (3mm) N.P.T. plugged tapping, accessible for test gauge connection, is located on the outlet side of the gas control.

The built-in regulator comes on at approximately 1/4th pressure and full on in 10 seconds.

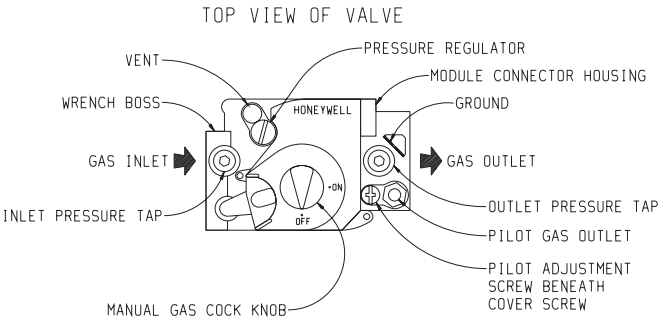


Figure 1

High Altitudes

For altitudes/elevations above 2,000 feet (610m), input ratings should be reduced at the rate of 4 percent for each 1,000 feet (305m) above sea level. **Canadian High Altitudes** for locations having an elevation above mean sea level between 2,000 feet (610m) and 4,500 feet (1370m), the manifold pressure is to be decreased from 3.5" w.c. (.871kPa) to 2.8" w.c. (.697kPa) for Natural Gas and from 10.0" w.c. (2.49kPa) to 8.0" w.c. (1.992kPa) for Propane Gas.

Proper Pilot Flame

The pilot flame (Figure 2) going to the spark must be large enough to completely cover the sparking area. With the proper flame, only 2 or 3 sparks will occur. More sparks indicate a small pilot flame and no ignition with spark stopping after approximately 90 seconds generally means not enough flame.

To adjust pilot flame remove the pilot cover screw on the control valve (Figure 1), and turn the adjustment screw clockwise to reduce flame. Replace pilot cover screw to eliminate gas leakage.

The pilot flame will appear large. A blue nearly horizontal flame is proper. The spark gap must be 1/8" (3mm) . A larger gap can result in the spark occurring some other place. The pilot flame and the spark gap are factory checked and tested.

After use, cleaning may be required for the proper flame.

Safety Lockout

S8600H module provides 100 percent shutoff, or safety lockout. If the pilot fails to light within 90 seconds, the control system will shut down. The control system must be reset by setting the thermostat below room temperature for one minute or by turning off power to the module for one minute.

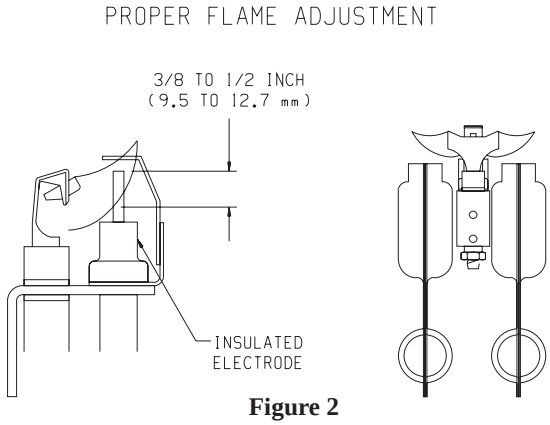


Figure 2

Electrode and pilot must be kept clean. Clean through pilot access hole with a small brush (toothbrush) and water.

Proper Main Burner Flame

The correct flame will be a short blue inner flame with a much larger light blue outer flame. The main burner (Figure 7) shows the approximate height of each part of the flame for each gas. The burner does not have a primary air adjustment. The flame will be correct if the factory-set pressure and orifice opening are used. After the furnace has been operating, the burner ports may be blocked by foreign matter carried in by combustion air. Therefore, cleaning of the burner may be needed for proper flame.

To clean burner port disconnect the gas supply to the valve, and remove the eight screws fastening the burner door. After removing the burner door from the combustion chamber, remove rear burner, pilot burner and front burner. With front and rear burners removed from furnace, force water into the ribbon ports and dry with air pressure.

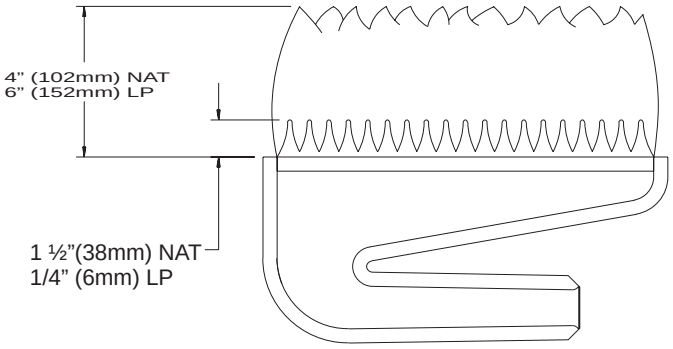


Figure 3

Replacing Fan and Oiling the Motor

The fan motor should be cleaned and oiled once each heating season. To reach the motor, withdraw the metal shroud surrounding the fan blade by removing the screws on each side. Oil holes are located on the top at each end of the motor. Use a few drops of #10 motor oil. To clean the motor, blow air through its ventilation openings with a vacuum cleaner or low pressure air source.

If fan motor is replaced, the silicone rubber gaskets, see owners amnual, page 14, Index No. 5, Part No. 712059 should also be replaced. The gaskets must be stretched to fit the motor bolts into the gasket holes and then the motor and gaskets installed on the motor mounting bars.

INSTALLATION

Wiring

The appliance, when installed, must be electrically grounded in accordance with local codes or, in the absence of local codes, with the *National Electrical Code, ANSI/NFPA 70 or Canadian Electrical Code, CSA C22.1*, if an external electrical source is utilized. **This appliance is equipped with a three-prong [grounding] plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle. Do not cut or remove the grounding prong from this plug.** For an ungrounded receptacle, an adapter, which has two prongs and a wire for grounding, can be purchased, plugged into the ungrounded receptacle and its wire connected to the receptacle mounting screw. With this wire completing the ground, the appliance cord plug can be plugged into the adapter and be electrically grounded. A 7/8" (22mm) hole is provided in the junction box for use with a conduit connector if local codes require this type of protection.

Thermostat Installation

The thermostat should be installed in the same room as the furnace 4' (1.2m) to 5' (1.5m) above the floor and away from another heat source (cooking stove, hot water heater, etc.) including walls and doorways with a heat source in an adjoining room. **Do Not Install Thermostat on Outside Wall.**

Insulated Vent Enclosure

Vented wall furnaces installed in buildings with flat roofs can have poor venting. The cold vent pipe will have a delay in proper venting and cause the wall furnace to shut "OFF" by the vent safety switch. To prevent delayed venting as well as condensation of flue products an insulated vent enclosure is recommended.

Use type B vent pipe and maintain at least a one inch (25mm) clearance to combustibles.

Use metal thimble to protect vent pipe as it passes through combustibles.

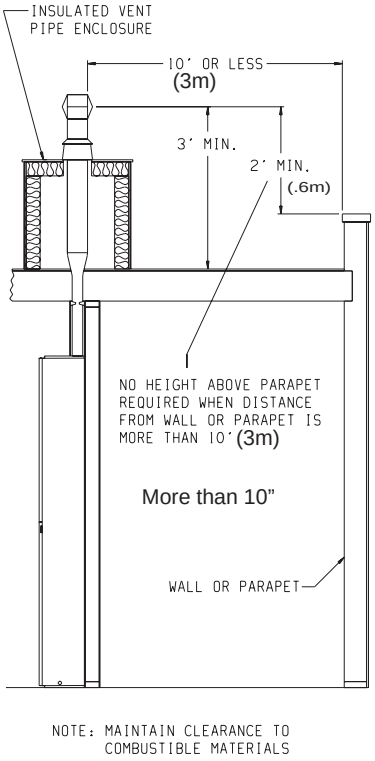


Figure 4

Vent Safety Shutoff System

This appliance must be properly connected to a venting system. This appliance is equipped with a vent safety shutoff system.

Warning: Operation of this wall furnace when not connected to a properly installed and maintained venting system or tampering with the vent safety shutoff system can result in carbon monoxide (CO) poisoning and possible death.

This furnace is equipped with a manual reset vent safety switch. The manual reset vent safety switch will cause gas flow to the main burners to "shut off" due to improper venting or a blocked flue.

To reset the manual reset vent safety switch:

1. Remove upper front panel.
2. Depress red manual reset button. The manual reset vent safety switch is located on the draft diverter.
3. Replace upper front panel.

If the manual reset vent safety switch continues to "shut off" the gas flow to the main burners a qualified service person must be contacted to inspect for improper venting, blockage in the vent pipe or the manual reset vent safety switch for being defective.

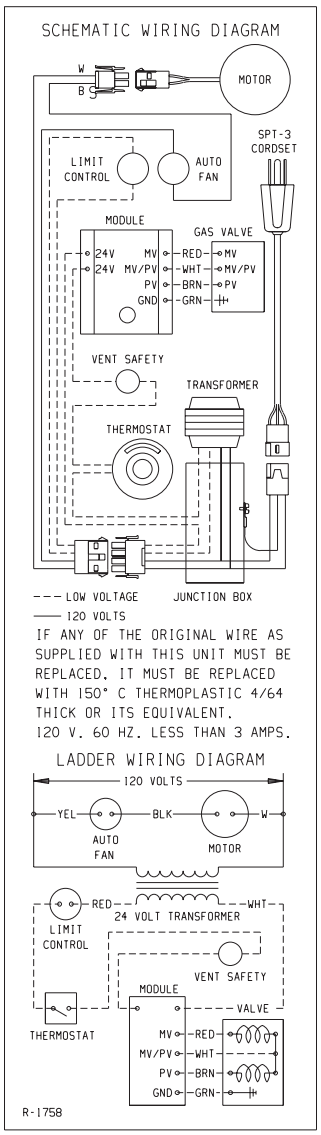


Figure 5

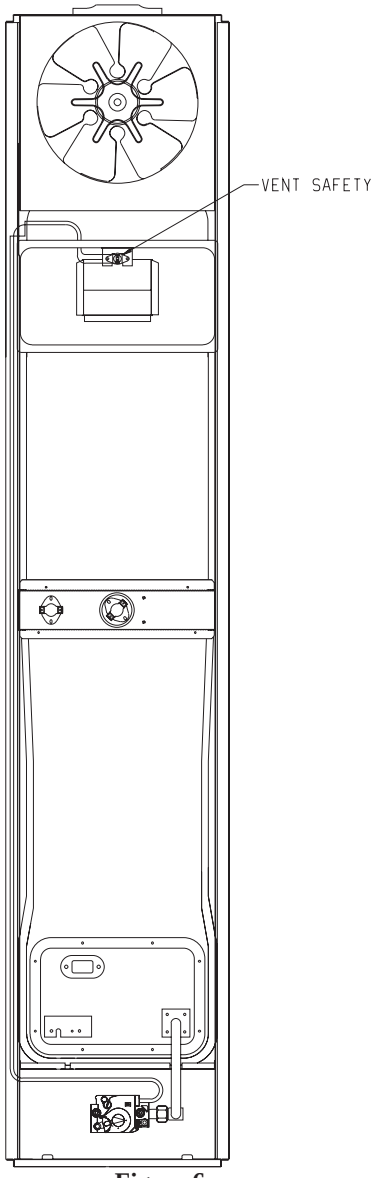


Figure 6

SERVICE AND MAINTENANCE SUGGESTIONS

CALL SERVICEMAN

GENERAL: All furnaces have been fire-tested to check for proper operation. This includes, main burner flame, pilot flame, fan operation, fan control, limit control and automatic valve operation. If the furnace fails to function on initial installation, it is advisable to re-check the following:

1. 115 volts to the junction box.
2. Inlet gas pressure.
3. The 24 volt system.
4. Type of gas being used and that shown on the rating label.

The Service Department at Empire Comfort Systems, Inc. may be contacted to assist in servicing furnace.

Servicing the Pilot and Main Burners, Pilot Orifice, and Main Burner Orifices: Disconnect the gas supply at the inlet to the control valve. Then remove the burner door to which the above components are attached.

Servicing The Fan Motor: The upper front panel, the shroud surrounding the fan blade and fan blade must be removed. See "Oiling the Motor" paragraph on page 7 in owners manual.

S8600H INTERMITTENT IGNITION MODULE SPECIFICATIONS

Lockout timing is 90 seconds. Ignition timing is until pilot lights or lockout occurs.

Module shuts down and cuts power to gas control on flame failure. Gas control closes to provide 100 percent lockout on flame failure. Manual reset required.

ELECTRICAL RATINGS:

Voltage and frequency: 20.5 to 28.5V (24V nom.) 60 Hz.

Current rating: 0.2 A.

Valve contact ratings (at 24 Vac):

	Run	Inrush
Pilot	1.0 A	10.0 A
Main	1.0 A	10.0 A

SPARK GENERATOR OUTPUT: 13kV peak at 25 pf load.

THERMOSTAT ANTICIPATOR SETTING: 0.2 A plus pilot valve rating plus main valve rating.

THERMOSTAT COMPATIBILITY: Standard models compatible with all open-close switch type 24 Vac thermostats capable of supplying rated voltage and current to the module.

AMBIENT TEMPERATURE RATING: Minus 40 F to plus 175 F (minus 40 C to plus 79 C).

RELATIVE HUMIDITY RATING: 5 to 90 percent RH at 95 F.

FLAME FAILURE RESPONSE TIME: 0.8 seconds at 1.0 uA flame current.

FLAME CURRENT: 1 uA, min.

CHECKOUT

Check out the gas control system:

1. At initial installation of the appliance.
2. As part of regular maintenance procedures.
3. As the first step in troubleshooting.
4. Any time work is done on the system.

STEP 1: Perform Visual Inspection.

A. With power off, make sure all wiring connections are clean and tight.
B. Turn on power to appliance and ignition module.
C. Open manual shutoff valves in the gas line to the appliance.
D. Do gas leak test ahead of gas control if piping has been disturbed.
GAS LEAK TEST: Paint pipe joints with rich soap and water solution. Bubbles indicate gas leak. Tighten joints to stop leak.

STEP 2: Review Normal Operating Sequence and Module Specifications.

STEP 3: Reset the Module.

A. Turn the thermostat to its lowest setting.
B. Wait one minute.
As you do Steps 4 and 5, watch for points where operation deviates from normal. Refer to Troubleshooting Chart to correct problem.

STEP 4: Check Safety Lockout Operation.

A. Turn gas supply off.
B. Set thermostat above room temperature to call for heat.
C. Watch for spark at pilot burner.
D. Time length of spark operation. Maximum spark time is 90 seconds.
E. Open manual gas cock and make sure no gas is flowing to pilot or main burner.
F. Set thermostat below room temperature and wait one minute before continuing.

STEP 5: Check Normal Operation.

A. Set thermostat above room temperature to call for heat.
B. Make sure pilot lights smoothly when gas reaches the pilot burner.
C. Make sure main burner lights smoothly without flashback. Make sure burner operates smoothly without floating or lifting.
D. If gas line has been disturbed, complete gas leak test.
GAS LEAK TEST: Paint gas control gasket edges and all pipe connections downstream of gas control, including pilot tubing connections, with rich soap and water solution. Bubbles indicate gas leaks. Tighten joints and screws or replace component to stop gas leak.
E. Turn thermostat below room temperature. Make sure main burner and pilot flames go out.

OPERATION

Module operation can be conveniently divided into two phases for S8600H. The phases are trial for ignition and main burner operation.

TRIAL FOR IGNITION

Pilot Ignition

Following call for heat (system start on S8600H), the module energizes the first main valve operator. The first main valve opens, which allows gas to flow to the pilot burner. At the same time, the electronic spark generator in the module produces a 13,000 volt spark pulse output (at 25 pf load). The voltage generates a spark at the igniter-sensor that lights the pilot.

SERVICE AND MAINTENANCE SUGGESTIONS

If the pilot does not light, or the pilot flame current is not at least 1.0 uA and steady, the module will not energize the second main valve and the main burner will not light.

Safety Lockout

S8600H provides 100 percent shutoff, or safety lockout. A timer starts timing the moment the trial for ignition starts. Ignition spark continues only until the timed trial for ignition period ends. Then the module goes into safety lockout. Lockout de-energizes the first main valve operator and closes the first main valve in the gas control, stopping pilot gas flow. The control system must be reset by setting the thermostat below room temperature for one minute or by turning off power to the module for one minute.

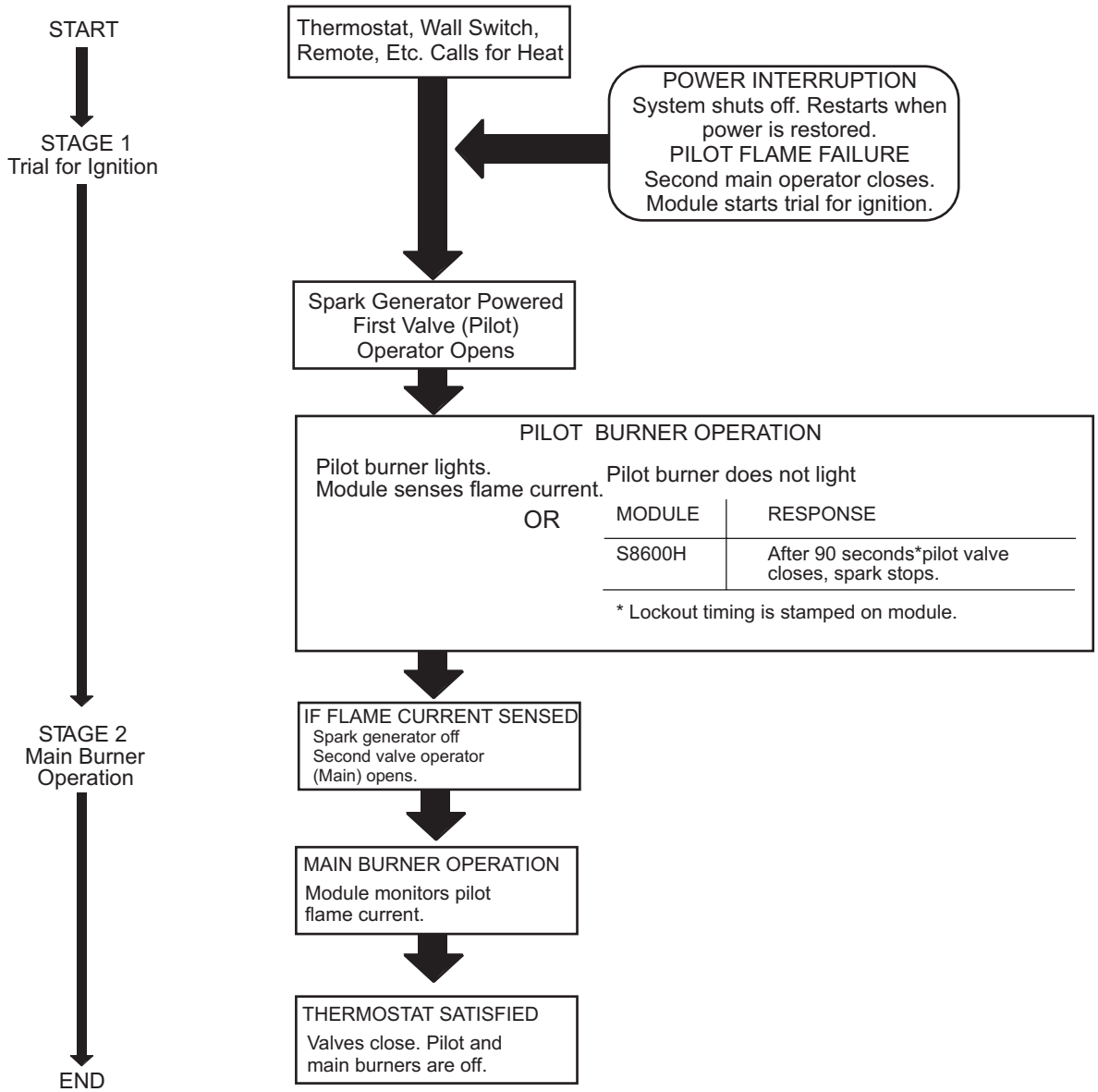
Main Burner Operation

When the pilot flame is established, a flame rectification circuit is completed between the sensor and burner ground. The flame sensing circuit in the module detects the flame current, shuts off the spark generator and energizes the second main valve operator. The second main valve opens and gas flows to the main burner, where it is ignited by the pilot burner. The flame current also holds the safety lockout timer in the reset (normal) operating condition.

When the call for heat ends, both main valve operators are de-energized, and both main valves in the gas control close.

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

S8600H NORMAL OPERATING SEQUENCE



TROUBLESHOOTING

Important

1. The following service procedures are provided as a general guide.
2. Meter readings between gas control and ignition module must be taken within the trial for ignition period. Once the ignition module locks out, the system must be reset by setting the thermostat down for at least one minute before continuing.
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, it must be replaced.
5. Only trained, experienced service technicians should service intermittent pilot systems.

Perform the **CHECKOUT** steps on page 10 as the first step in troubleshooting. Then check **TROUBLESHOOTING GUIDE** to pinpoint the cause of the problem. If troubleshooting indicates an ignition problem, see **Ignition System Checks** below to isolate and correct the problem.

Following troubleshooting, perform the **CHECKOUT** procedure (page 10) again to be sure system is operating normally.

Ignition System Checks

Step 1: Check ignition cable.

Make sure:

A. Ignition cable does not touch any metal surfaces.
B. Ignition cable is no more than 36 inches (914mm) long.
C. Connections to the ignition module and to the 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 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. 14-18 gauge, moisture-resistant, thermoplastic insulated wire with 105 C (221 F) minimum rating.
     - If flame rod or bracket are bent out of position, restore to correct position.
     - Replace pilot burner/igniter sensor if insulator is cracked.

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

When performing the following steps, do not touch stripped end of jumper or SPARK terminal. The ignition circuit generates 13,000 volts at 25 pf load and electrical shock can result.

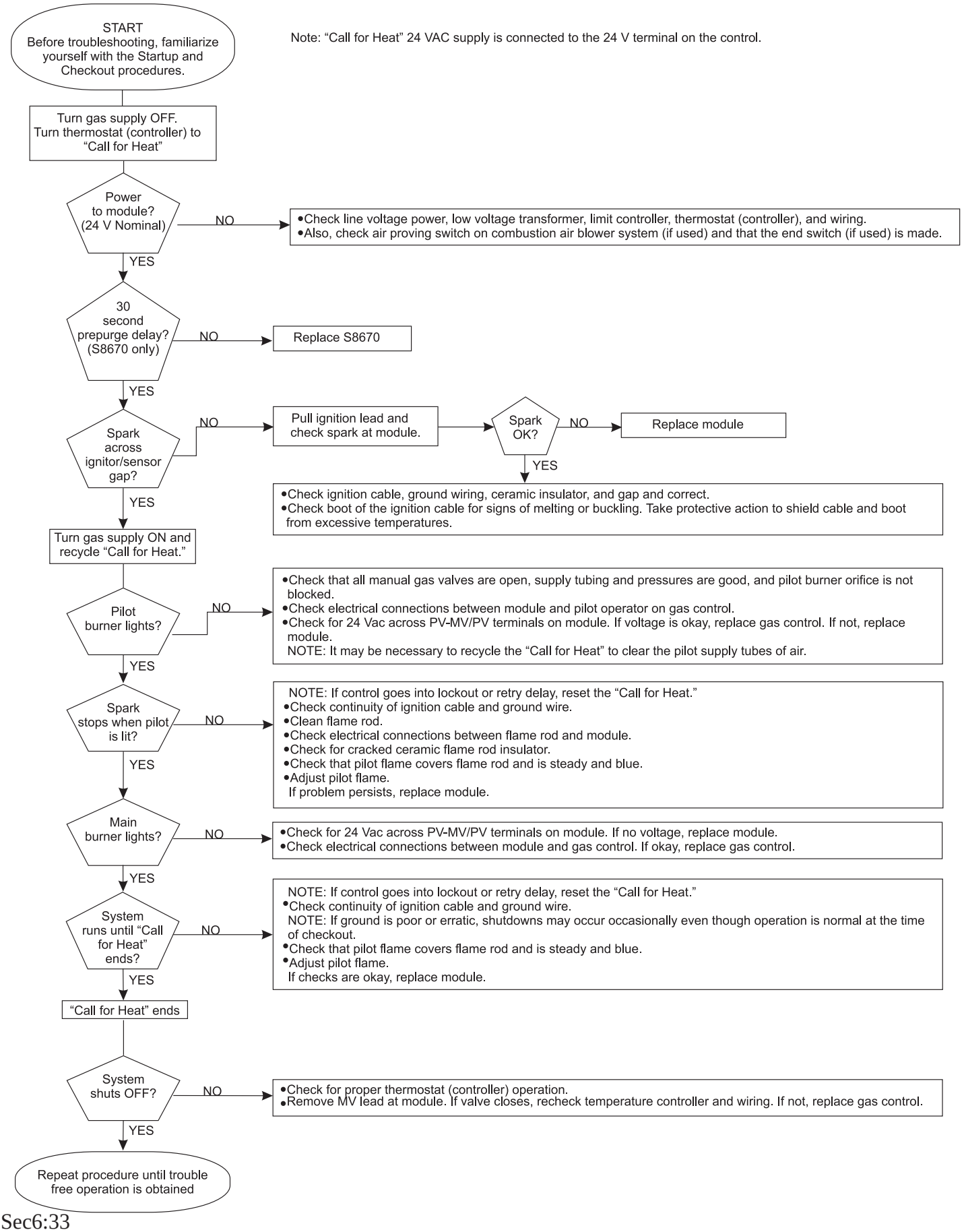
C. Energize the module and immediately touch one end of the jumper firmly to the GND terminal on the module. Move the free end of the jumper slowly toward the SPARK terminal until a spark is established.
D. Pull the jumper slowly away from the terminal and note the length of the gap when sparking stops. Check table below.

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

Step 4: Check pilot flame current.

A. Turn off furnace at thermostat.
B. Disconnect main valve wire from the TH or MV terminal on the gas control.
C. Disconnect ground wire from GND (BURNER) terminal at module.
D. Connect a meter (dc microamp scale) in series with the ground lead.
   - Disconnect ground lead from GND terminal on ignition module.
   - Connect the black (negative) meter lead to the ignition module GND (BURNER) terminal.
   - Connect the red (positive) meter lead to the free end of the ground lead.
E. Set thermostat to call for heat. The spark will light the pilot but the main burner will not light because the main valve actuator is disconnected.
F. Read the meter. The flame sensor current must be steady and at least 1.0 uA.
G. If the reading is less than the minimum or unsteady,
   - Make sure pilot flame envelopes 3/8 (9.5mm)to 1/2 inch (13mm) of the flame rod.
   - If necessary, adjust pilot flame by turning the pilot adjustment screw on the gas control clockwise to decrease or counterclockwise to increase pilot flame. Following adjustment, always replace pilot adjustment cover screw and tighten firmly to assure proper gas control operation.
   - Check for cracked ceramic insulator, which can cause short to ground, and replace igniter-sensor if necessary.
   - Make sure electrical connections are clean and tight. Replace damaged wire with moisture-resistant No. 18 wire rated for continuous duty up to 105 C (221 F).
H. Remove meter and reconnect all wires. Return system to normal operation before leaving job.

S8600H TROUBLESHOOTING GUIDE



S8600H TROUBLESHOOTING GUIDE

Green LED Status Codes

Green LED Flash Code (X + Y)[a]	Indicates	Next System Action	Recommended Service Action
OFF	No "Call for Heat"	Not applicable	None
Flash Fast	Startup-Flame sense calibration	Not applicable	None
Heart Beat	Normal operation	Not applicable	None
3	Recycle - Flame failed during run	Initiate new trial for ignition. Flash code will remain through the ignition trial until flame is proved.	If system fails to light on next trial for ignition, check gas supply, pilot burner, flame sense wiring, contamination of flame rod, burner ground connection.
4	Flame sensed out of sequence	If situation self corrects within 10 seconds, control returns to normal sequence. If flame out of sequence remains longer than 10 seconds, control goes to Flash code 6 + 4 (see below).	Check for pilot flame. Replace gas valve if pilot flame present. If no pilot flame, cycle "Call for Heat." If error repeats, replace control.
7	Flame sense leakage to ground	Control remains in wait mode. When the fault corrects, control resumes normal operation after a one minute delay.	Check flame sense lead wire for damage or shorting. Check that flame rod is in proper position. Check flame rod ceramic for cracks, damage or tracking.
8	Low secondary voltage supply - below 15.5 Vac)	Control remains in wait mode. When the fault corrects, control resumes normal operation after a one minute delay.	Check transformer and AC line for proper input voltage to the control. Check with full system load on the transformer.
6 + 2	Failed trial for ignition resulting in lockout	Remain in lockout until "Call for Heat" is cycled.	Check gas supply, pilot burner, spark and flame sense wiring, flame rod contaminated or out of position, burner ground connection.
6 + 3	More than 5 flame failures during run on the same "Call for Heat" resulting in lockout	Remain in lockout until "Call for Heat" is cycled.	Check gas supply, pilot burner, flame sense wiring, contamination of flame rod, burner ground connection.
6 + 4	Flame sensed out of sequence - longer than 10 seconds	Control waits until flame is no longer sensed and then goes to soft lockout. Flash code continues. Control auto resets from soft lockout after one hour.	Check for pilot flame. Replace gas valve if pilot flame present. If no pilot flame, cycle "Call for Heat." If error repeats, replace control.
ON	Soft lockout due to error detected during self check sequences	Control auto resets from soft lockout after one hour.	Reset by cycling "Call for Heat." If error repeats, replace the control.

[a]Flash Code Descriptions:

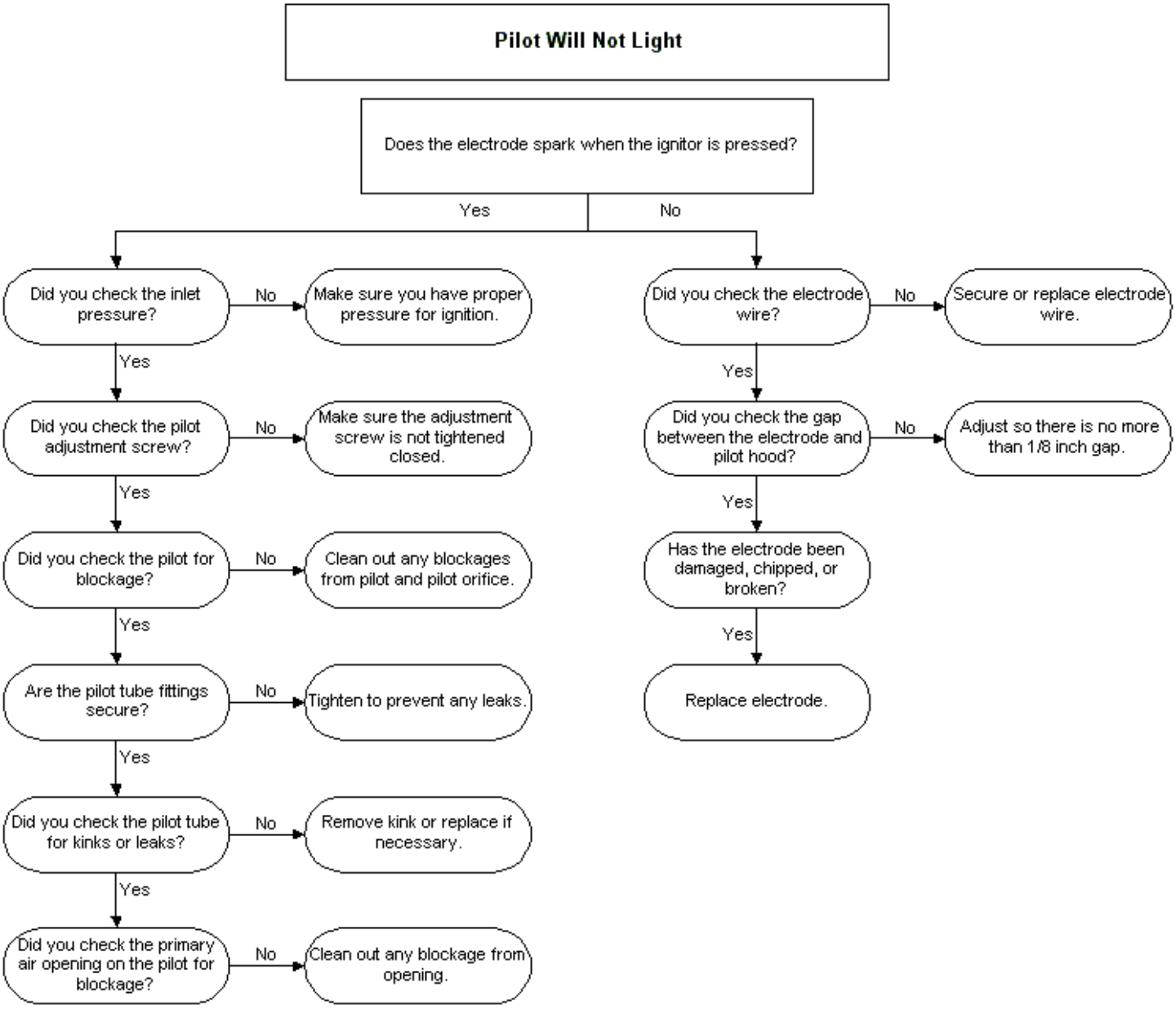
- Flash Fast: Rapid blinking
- Heartbeat: Constant 1/2 second bright 1/2 second dim cycles
- A single flash code number signifies that the LED flashes X times at 2Hz, remains off for two seconds, and then repeats the sequence.
- X + Y flash codes signify that the LED flashes X times at 2Hz, remains off for two seconds, flashes Y times at 2Hz, remains off for three seconds, and then repeats the sequence.

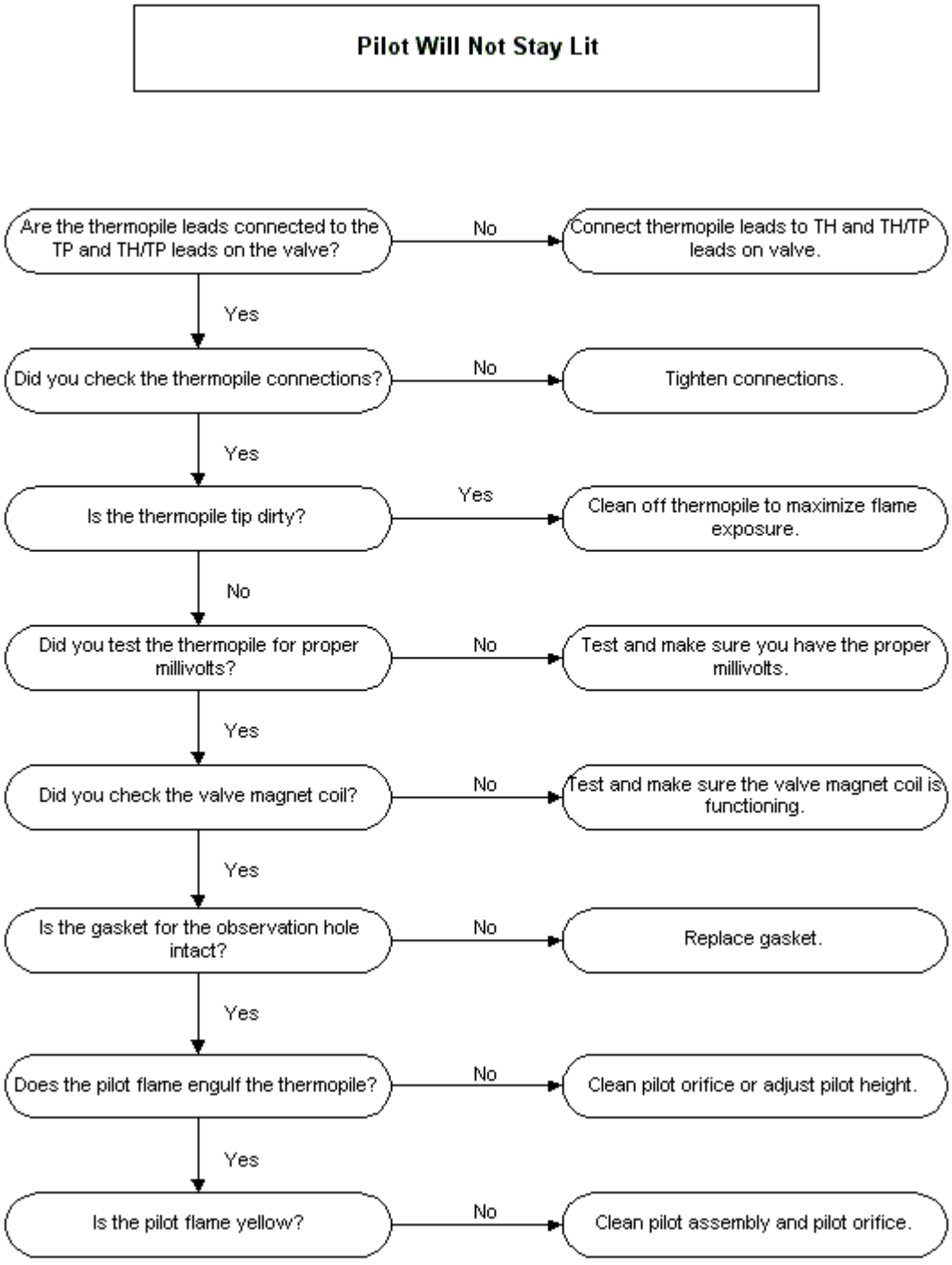
SERVICE NOTES

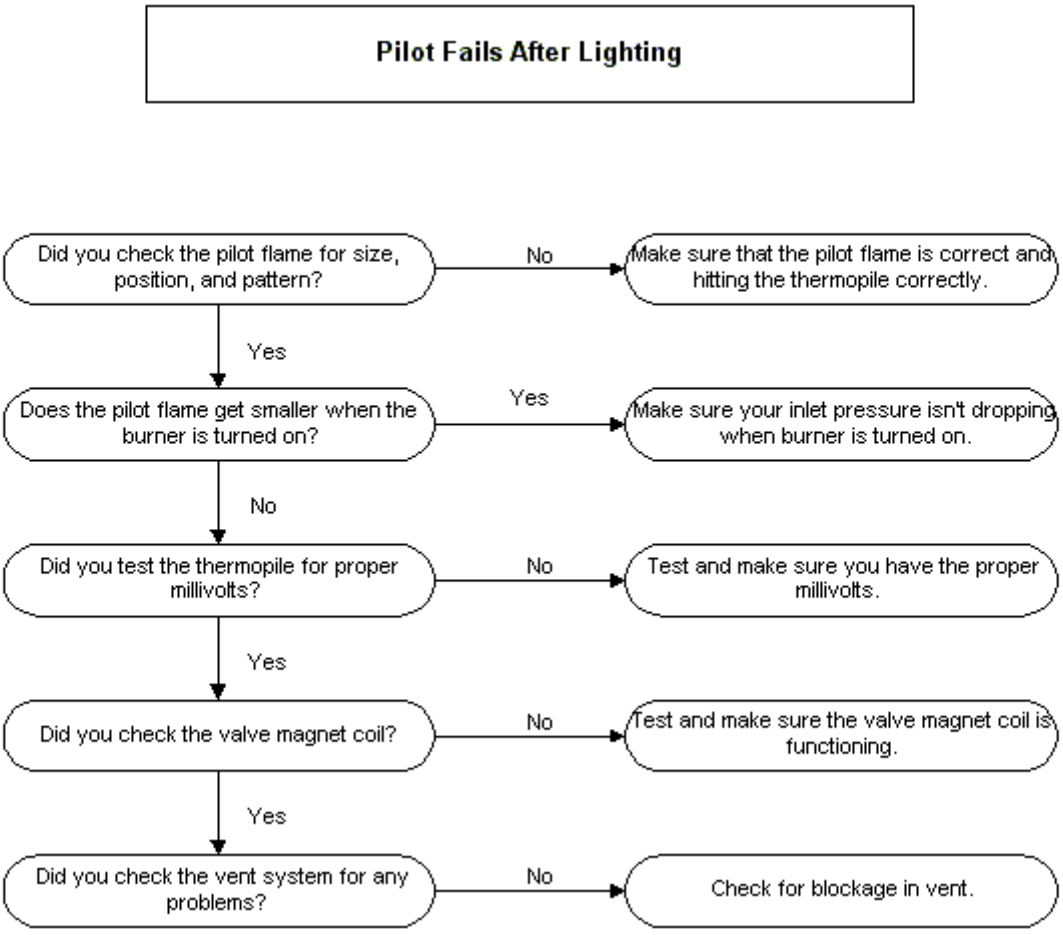
SERVICE NOTES

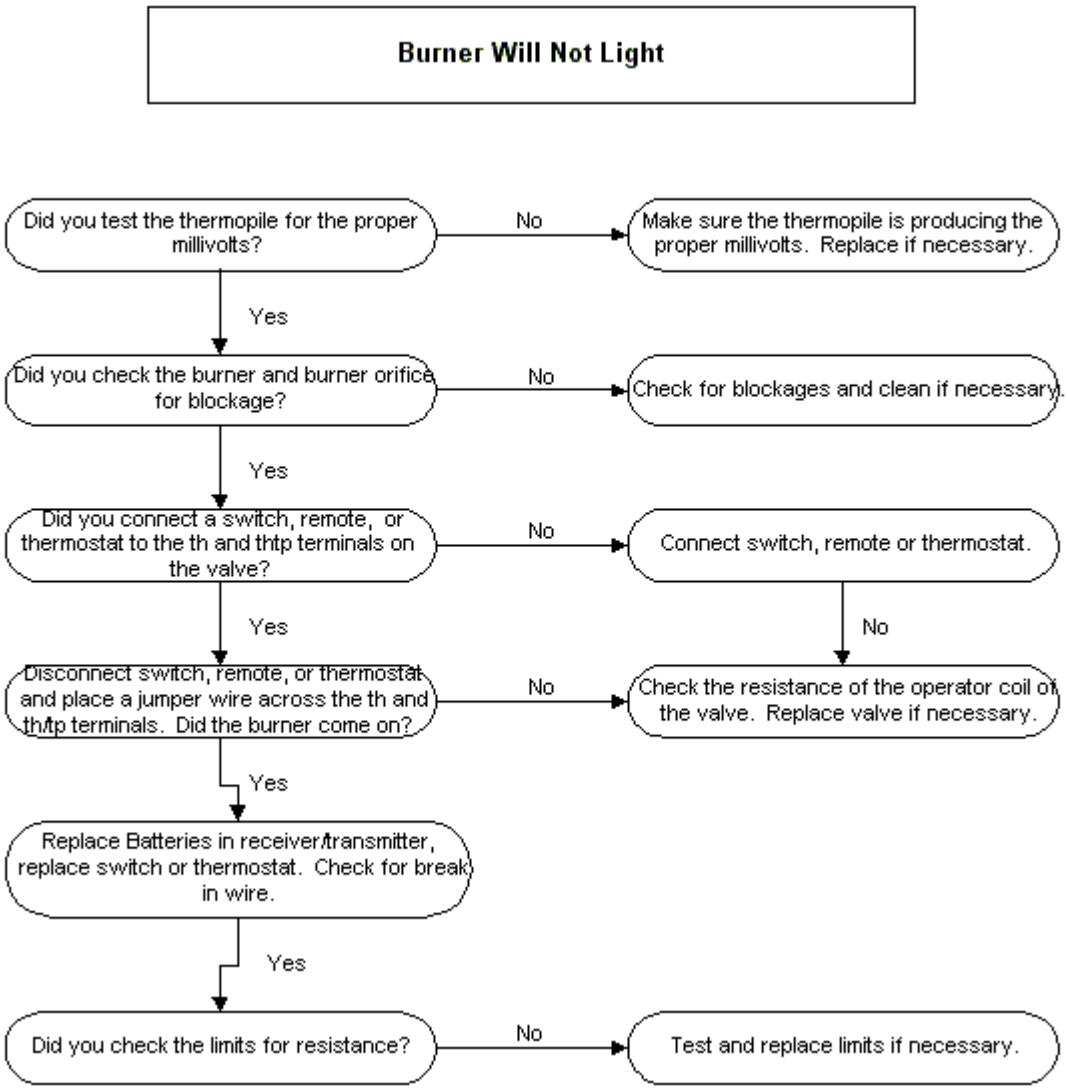
Floor Furnace Troubleshooting

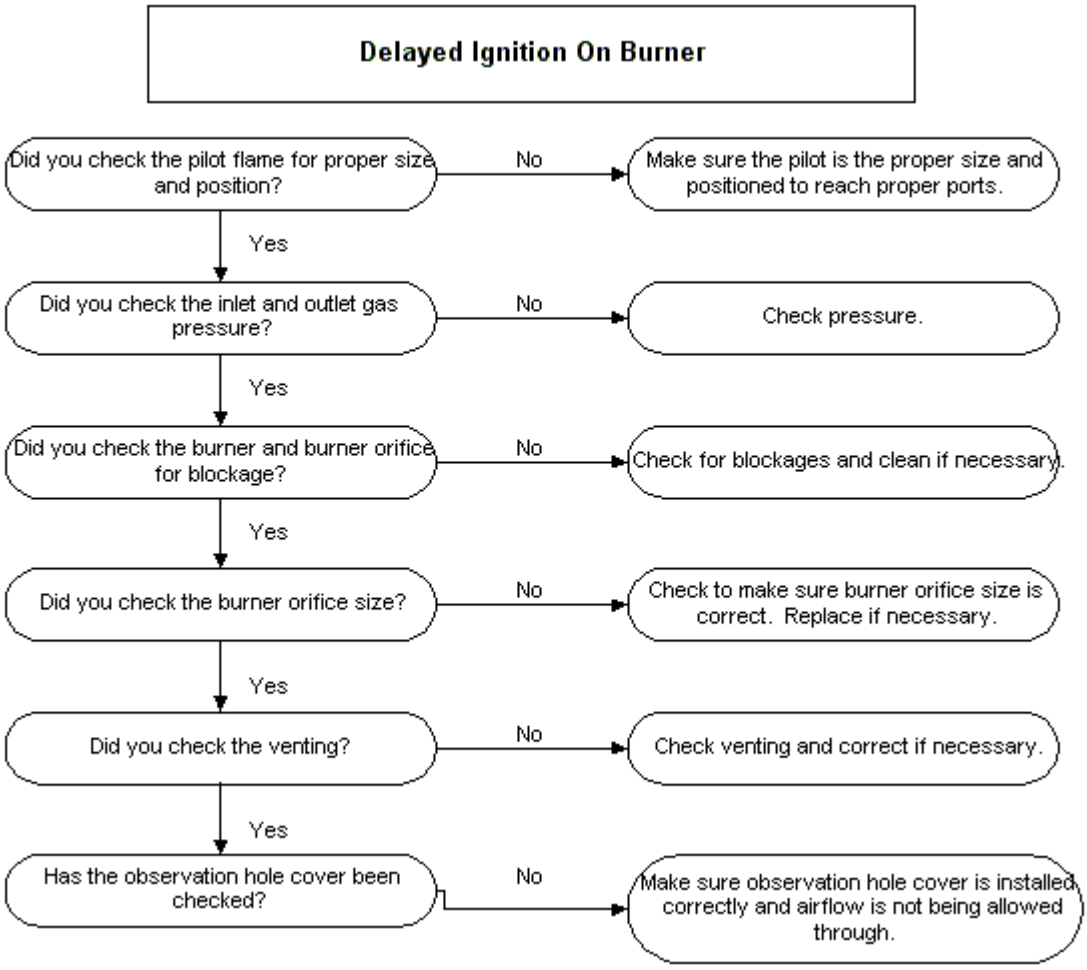
DIAGNOSING FLOOR FURNACES

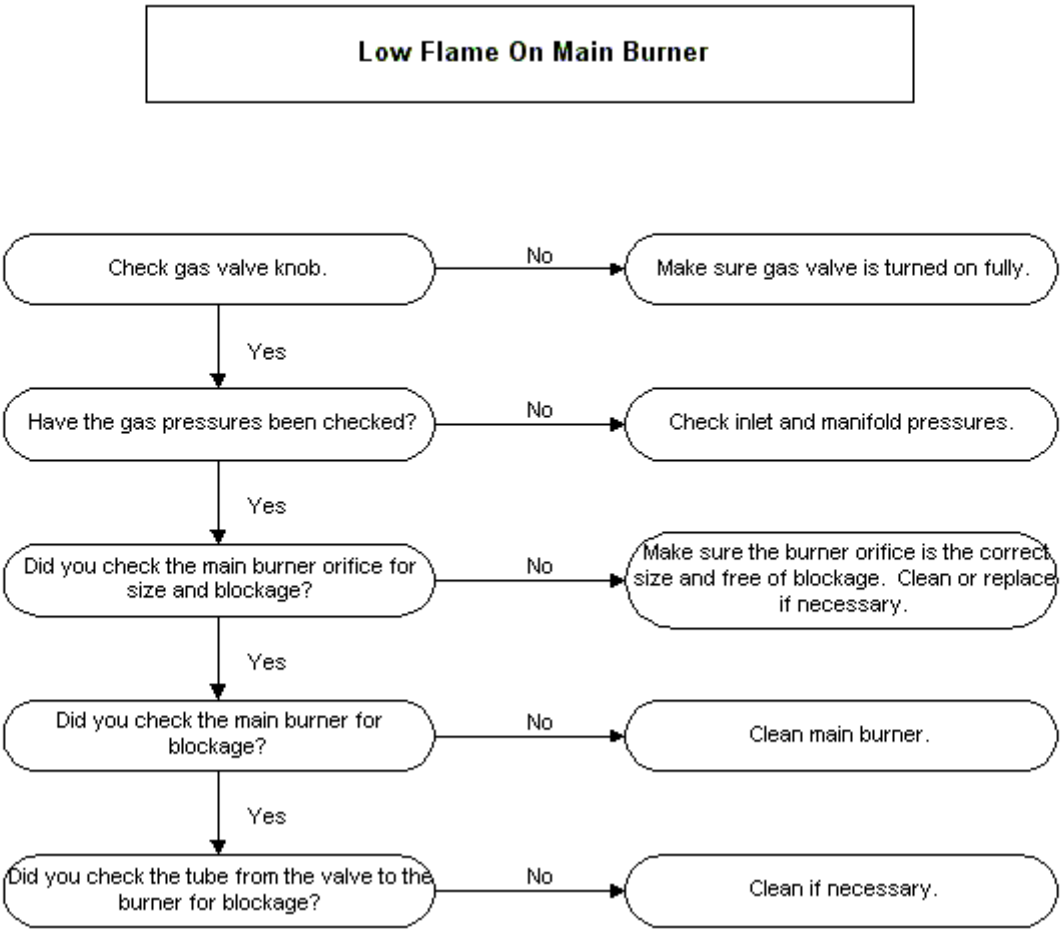



Pilot Will Not Stay Lit
Are the thermopile leads connected to the TP and TH/TP leads on the valve?
No
Connect thermopile leads to TH and TH/TP leads on valve.
Yes
Did you check the thermopile connections?
No
Tighten connections.
Yes
Is the thermopile tip dirty?
Yes
Clean off thermopile to maximize flame exposure.
No
Did you test the thermopile for proper millivolts?
No
Test and make sure you have the proper millivolts.
Yes
Did you check the valve magnet coil?
No
Test and make sure the valve magnet coil is functioning.
Yes
Is the gasket for the observation hole intact?
No
Replace gasket.
Yes
Does the pilot flame engulf the thermopile?
No
Clean pilot orifice or adjust pilot height.
Yes
Is the pilot flame yellow?
No
Clean pilot assembly and pilot orifice.

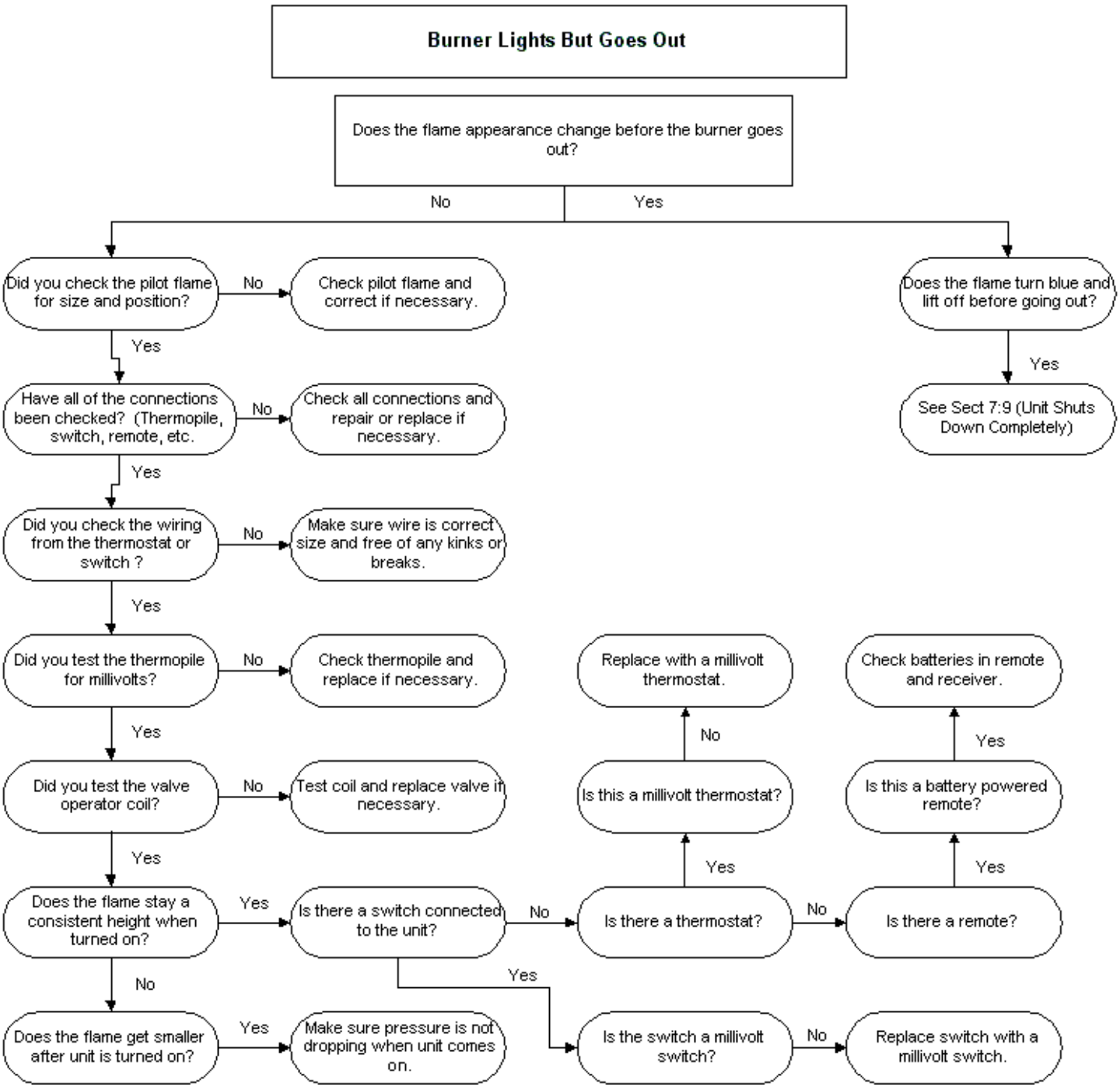

Pilot Fails After Lighting
Did you check the pilot flame for size, position, and pattern?
No
Make sure that the pilot flame is correct and hitting the thermopile correctly.
Yes
Does the pilot flame get smaller when the burner is turned on?
Yes
Make sure your inlet pressure isn't dropping when burner is turned on.
No
Did you test the thermopile for proper millivolts?
No
Test and make sure you have the proper millivolts.
Yes
Did you check the valve magnet coil?
No
Test and make sure the valve magnet coil is functioning.
Yes
Did you check the vent system for any problems?
No
Check for blockage in vent.

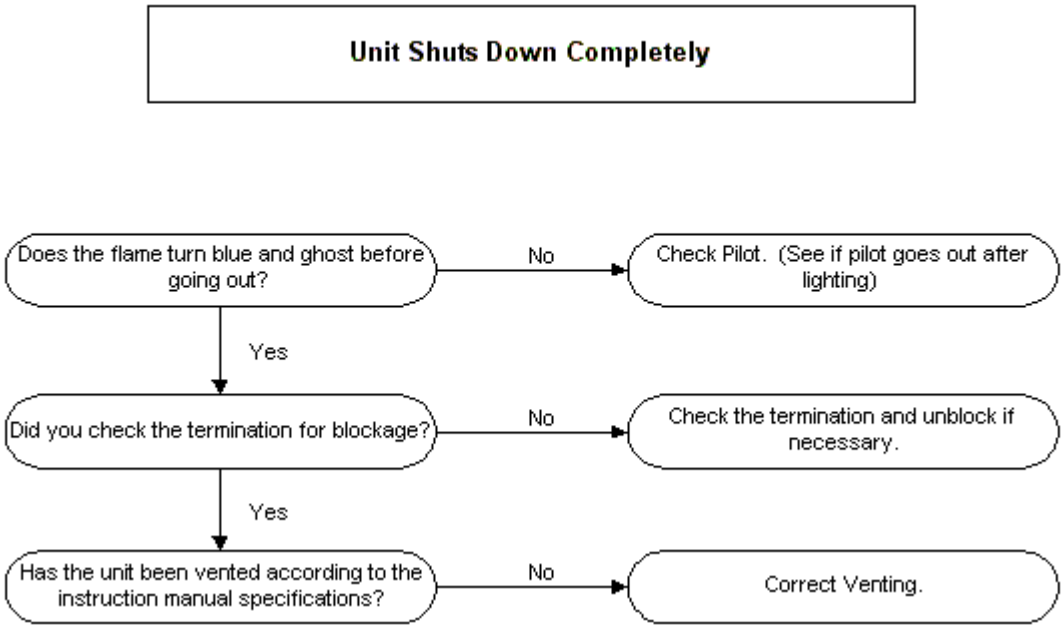

Burner Will Not Light
Did you test the thermopile for the proper millivolts?
No
Make sure the thermopile is producing the proper millivolts. Replace if necessary.
Yes
Did you check the burner and burner orifice for blockage?
No
Check for blockages and clean if necessary.
Yes
Did you connect a switch, remote, or thermostat to the th and thtp terminals on the valve?
No
Connect switch, remote or thermostat.
Yes
No
Disconnect switch, remote, or thermostat and place a jumper wire across the th and th/tp terminals. Did the burner come on?
No
Check the resistance of the operator coil of the valve. Replace valve if necessary.
Yes
Replace Batteries in receiver/transmitter, replace switch or thermostat. Check for break in wire.
Yes
Did you check the limits for resistance?
No
Test and replace limits if necessary.

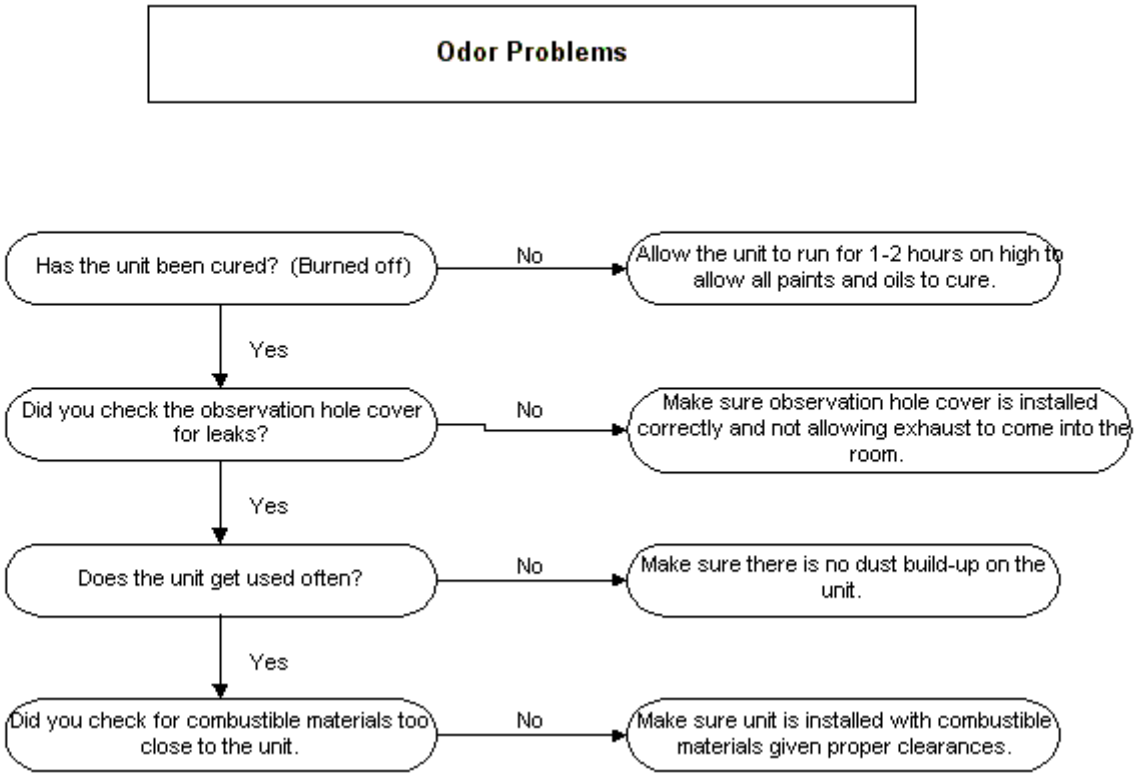

Delayed Ignition On Burner
Did you check the pilot flame for proper size and position?
No
Make sure the pilot is the proper size and positioned to reach proper ports.
Yes
Did you check the inlet and outlet gas pressure?
No
Check pressure.
Yes
Did you check the burner and burner orifice for blockage?
No
Check for blockages and clean if necessary.
Yes
Did you check the burner orifice size?
No
Check to make sure burner orifice size is correct. Replace if necessary.
Yes
Did you check the venting?
No
Check venting and correct if necessary.
Yes
Has the observation hole cover been checked?
No
Make sure observation hole cover is installed correctly and airflow is not being allowed through.


Low Flame On Main Burner
Check gas valve knob.
No
Make sure gas valve is turned on fully.
Yes
Have the gas pressures been checked?
No
Check inlet and manifold pressures.
Yes
Did you check the main burner orifice for size and blockage?
No
Make sure the burner orifice is the correct size and free of blockage. Clean or replace if necessary.
Yes
Did you check the main burner for blockage?
No
Clean main burner.
Yes
Did you check the tube from the valve to the burner for blockage?
No
Clean if necessary.

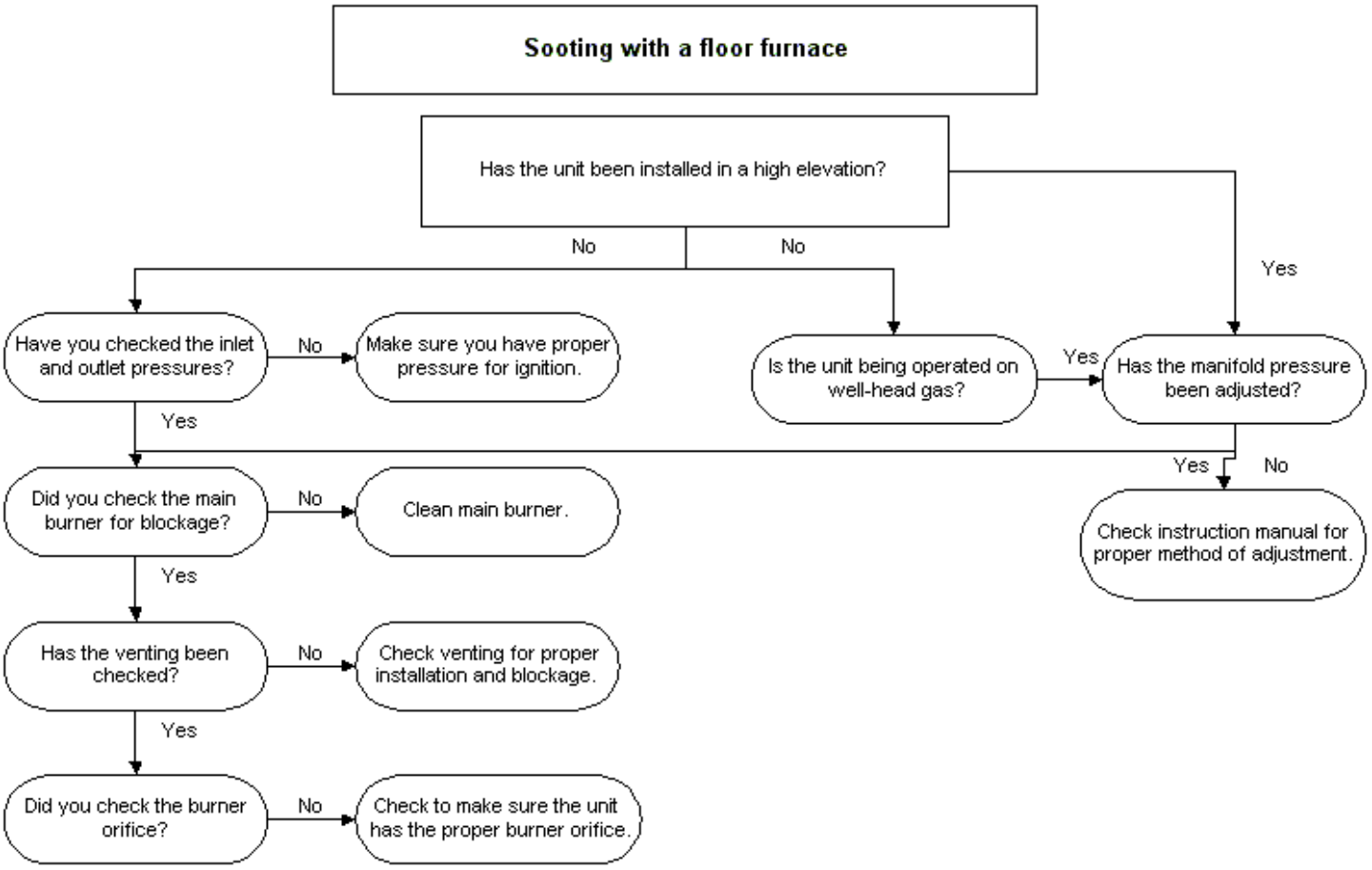
DIAGNOSING FLOOR FURNACES




Unit Shuts Down Completely
Does the flame turn blue and ghost before going out?
No
Check Pilot. (See if pilot goes out after lighting)
Yes
Did you check the termination for blockage?
No
Check the termination and unblock if necessary.
Yes
Has the unit been vented according to the instruction manual specifications?
No
Correct Venting.


Odor Problems
Has the unit been cured? (Burned off)
No
Allow the unit to run for 1-2 hours on high to allow all paints and oils to cure.
Yes
Did you check the observation hole cover for leaks?
No
Make sure observation hole cover is installed correctly and not allowing exhaust to come into the room.
Yes
Does the unit get used often?
No
Make sure there is no dust build-up on the unit.
Yes
Did you check for combustible materials too close to the unit.
No
Make sure unit is installed with combustible materials given proper clearances.

DIAGNOSING FLOOR FURNACES



FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

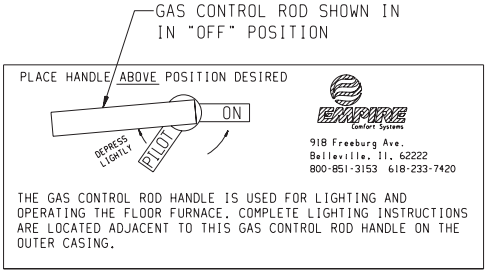
- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

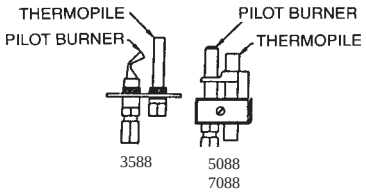
LIGHTING INSTRUCTIONS

1. **STOP! Read the safety information above.**
2. **Set the thermostat to lowest setting.**
3. **Remove floor register.**
   NOTE: The gas control rod is attached to the gas control knob.
4. **Push in gas control rod slightly and turn clockwise to "OFF."**



NOTE: Rod cannot be turned from "PILOT" to "OFF" unless rod is pushed in slightly. Do not force.

5. **Remove the pilot access cover located on the combustion chamber.**
6. **Wait ten (10) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.**
7. **Find pilot - the pilot is adjacent to the center portion of the main burner in the area directly below the pilot access opening.**



8. **Turn gas control rod counterclockwise to "PILOT."**
9. **Push and hold control rod in and repeatedly push the ignitor button until pilot is lit (or use match and lighter rod to light.) Continue to hold the control rod in for about one (1) minute after the pilot is lit. Release rod and it will pop back up. Pilot should remain lit. If it goes out, repeat steps 4 through 9.**
   - **If rod does not pop up when released, stop and immediately call a qualified service technician or gas supplier.**
   - **If the pilot will not stay lit after several tries, turn the gas control rod to "OFF" and call your service technician or gas supplier.**
10. **Replace pilot access cover.**
11. **Turn gas control knob counterclockwise to "ON."**
12. **Replace floor register.**
13. **Set thermostat to desired setting.**

TO TURN OFF GAS TO APPLIANCE

1. **Set the thermostat to lowest setting.**
2. **Remove floor register.**
3. **Push in gas control rod slightly and turn clockwise to "OFF." Do not force.**
4. **Replace floor register.**

PROPER MAIN BURNER FLAME AND PILOT FLAME 3588

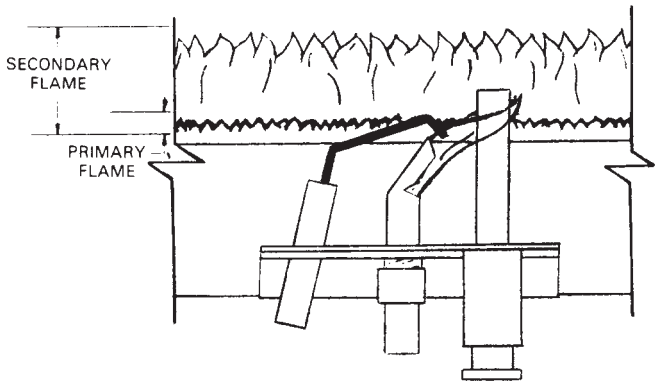


Figure 1

The correct pilot flame will be blue and extend past the thermopile as shown in the drawing. LP gas models do not require adjusting. The input of Natural gas models will require adjusting if the inlet pressure to the valve is above 5" w.c.

PROPER MAIN BURNER FLAME 5088, 7088

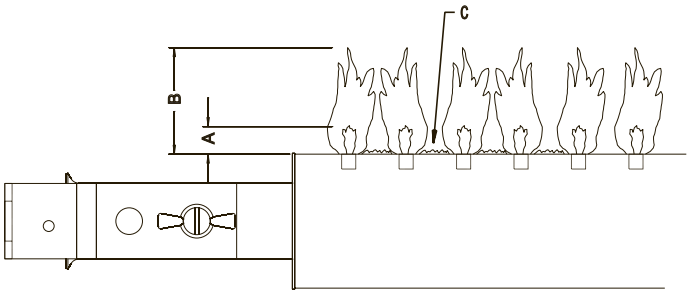


Figure 2

Model	Gas	Inner Cone (A) Dark blue	Outer Cone (B) Light blue	Carry down flame (C) Blue
7088	Nat	1 inch	2 1/2 inches	1/4 inch
	LP	3/4 inch	2 inches	small cone
5088	Nat.	3/4 inch	2 inches	3/16 inch
	LP	1/2 inch	1 1/2 inch	small cone

DO NOT MISTAKE AN ORANGE FLAME CAUSED BY PARTICLES IN THE AIR FOR THE UNDESIRABLE YELLOW FLAME.

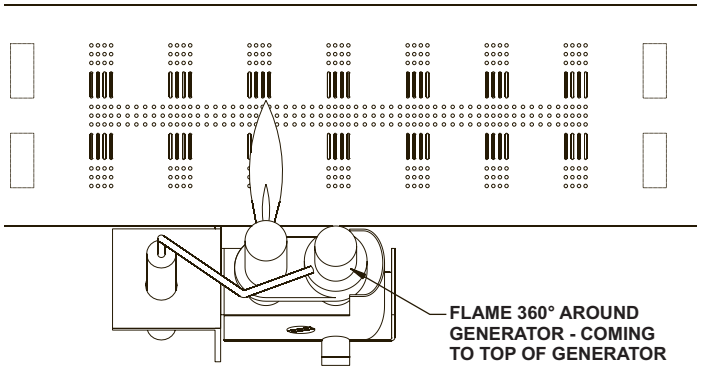


Figure 3

PROPER PILOT BURNER FLAME 5088, 7088

A blue flame shooting toward the main burner with an inner blue cone and a larger light blue outer flame. The generator will be surrounded by a blue flame that terminates near the top of the generator.

HIGH ALTITUDES

Orifice size must be reduced for high altitude use, or carbon monoxide may be generated and excessive heat will seriously damage the unit. When altitudes over 2,000 feet are specified, in the United States, main burner spuds will be furnished to reduce input 4% for each 1,000 feet of altitude above sea level. Contact the manufacturer or your gas company before changing spud sizes.

CHECKING MANIFOLD PRESSURE

Both Propane and Natural gas valves have a built-in pressure regulator in the gas valve with factory-set adjustment. Natural gas models should have a manifold pressure of approximately 3.5" w.c. at the valve outlet with the inlet pressure to the valve from a minimum of 5.0" w.c. for the purpose of input of input adjustment to a maximum of 7.0" w.c. Propane gas models will have a manifold pressure approximately 10.0" w.c. at the valve outlet with the inlet pressure to the valve from a minimum of 11.0" w.c. for the purpose of input adjustment to a maximum of 13.0" w.c.

An 1/8" N.P.T. plugged tapping, accessible for test gage connection, is located on the outlet side of the gas control.

CLEANING THE MAIN BURNER

Remove the burner and apply air pressure inside the throat of the burner and down into the ports.

Check for proper burner and pilot flame before and during each heating season.

SERVICING

INSTALLATION AND REPAIR SHOULD BE DONE BY A QUALIFIED SERVICE PERSON. The appliance should be inspected before use and at least annually by a professional service person. More frequent cleaning may be required due to excessive lint from carpeting, bedding material, etc. It is imperative that control compartments, burners and circulating air passageways of the appliance be kept clean.

Floor furnace must not be connected to a chimney flue servicing a separate solid-fuel burning appliance.

DON'T put anything around the furnace that will obstruct the flow of combustion and ventilation air.

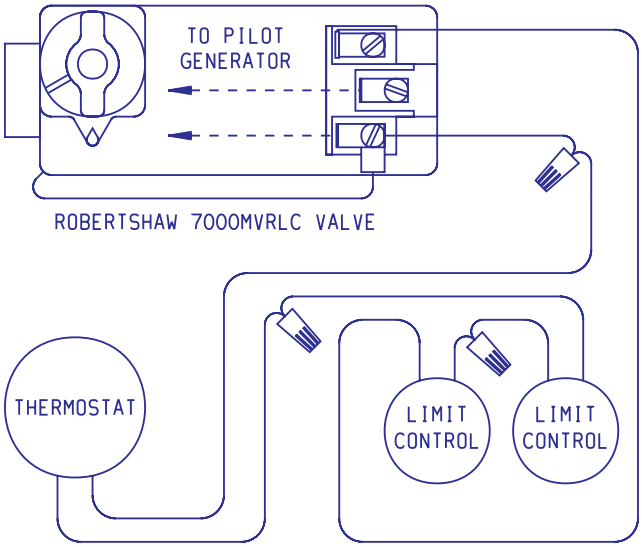
DO keep the appliance area clear and free from combustible material, gasoline and other flammable vapors and liquids.

DO examine venting system periodically and replace damaged parts.

DO examine burners periodically. Clean and replace damaged parts.

MAKE periodic visual check of pilot and burner flame.

Wiring Diagram



OPERATING INFORMATION

PIEZO LIGHTING INSTRUCTIONS

This unit is equipped with a Piezo (spark) for lighting the pilot without removing the lighter hole cover. A lighter rod is supplied and can be used to see if the pilot is getting gas and also for faster lighting when there is excessive air in the lines.

REGISTER TEMPERATURE CONTROLS

The register temperature control has two positions. LOW HEAT (Black) output and FULL HEAT (Red) output. Use the low position when children are present. This will cause your furnace to turn off and on several times before the living area is completely comfortable. This is normal and limits the register temperature to a maximum of 235°F.

CAUTION

Contact of bare skin on the hot air register may result in burns when the appliance is in operation. KEEP CHILDREN OFF!

You can reduce the heat of the register by moving the register temperature control.

MILLIVOLT INFORMATION

500 average with the thermostat OFF.
225 average with the thermostat ON.

140 minimum for valve to open.
65 minimum for pilot to stay on.

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify operation after servicing.

SOME HELPFUL WARNINGS

- Use low heat output when children are nearby.
- Do not cover the floor register when the furnace or pilot is turned on.
- Do not restrict the flow of air around the register by placing a screen under it.
- Do not dry clothes or any objects by putting them on floor register because this creates a fire hazard.

Figure 4

- Do not hang clothes or any object above or over floor register because this too creates a fire hazard.
- During warm weather months, turn to full OFF position before you cover the register with a rug, because this too creates a fire hazard.

CAUTION

NEVER run your furnace with the lighter hole open or with a broken lighter hole window. Exhaust gases can get into the living area through an open lighter hole and be fatal.

TROUBLESHOOTING INFORMATION

A. All units have been fire-tested to check the operation of the furnace. This includes the BTU input, main burner flame, pilot flame, limit controls and automatic operation. If problems are encountered on initial installation the following should be checked
   1. Is the unit equipped for the gas being used?
   2. Are all of the wires connected to the gas valve properly?
   3. Is the venting system functioning? Check for spillage at the diverter.
   4. Is the gas inlet pressure proper? Read instructions for minimum pressure.

B. It is necessary to use a millivolt meter to determine if the power from the generator is adequate. 500 millivolts is normal with the thermostat off and 140 millivolts minimum with thermostat on.

C. This floor furnace cannot be expected to function properly if exposed to wind as found when installed in a house supported by pillars (open foundation). The wind is most harmful if it can go beneath the front of the draft diverter and produce a pressure directly on the outlet of the chamber. This wind can result in pilot outage and a reduction in millivolts, causing the valve not to open.

D. Good operation of the system is dependent on the pilot and generator working properly. It is possible for the pilot to require cleaning yearly. Replace pilot assembly if cleaning does not produce proper flame. Replacement on generator alone is not recommended.

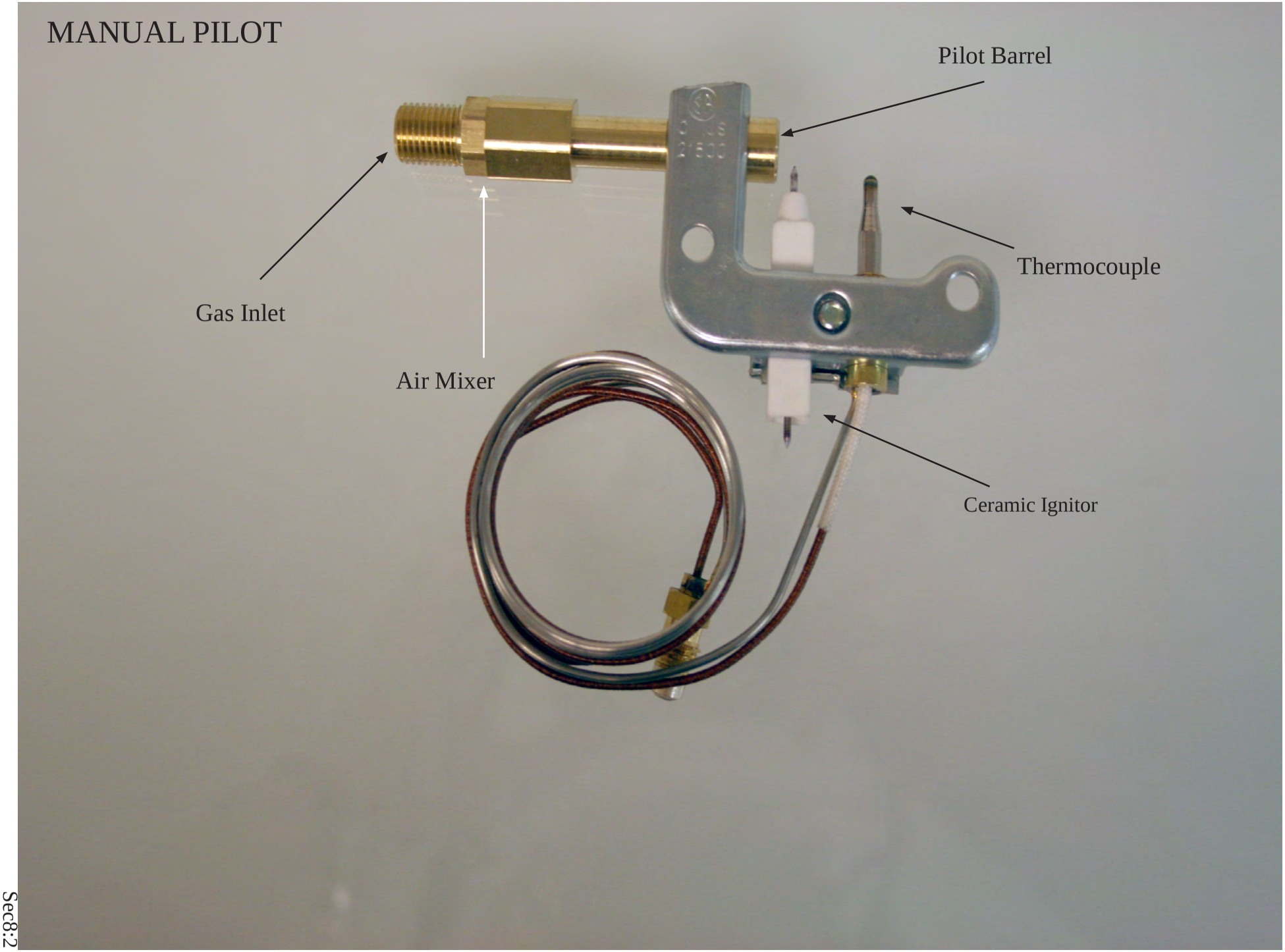
E. Gas Valve will not open. To determine problem area:
   1. By-pass thermostat on the wall.
   2. By-pass thermostat at the valve.
   3. By-pass limit and thermostat at the valve.
   4. Check millivolts.

SERVICE NOTES

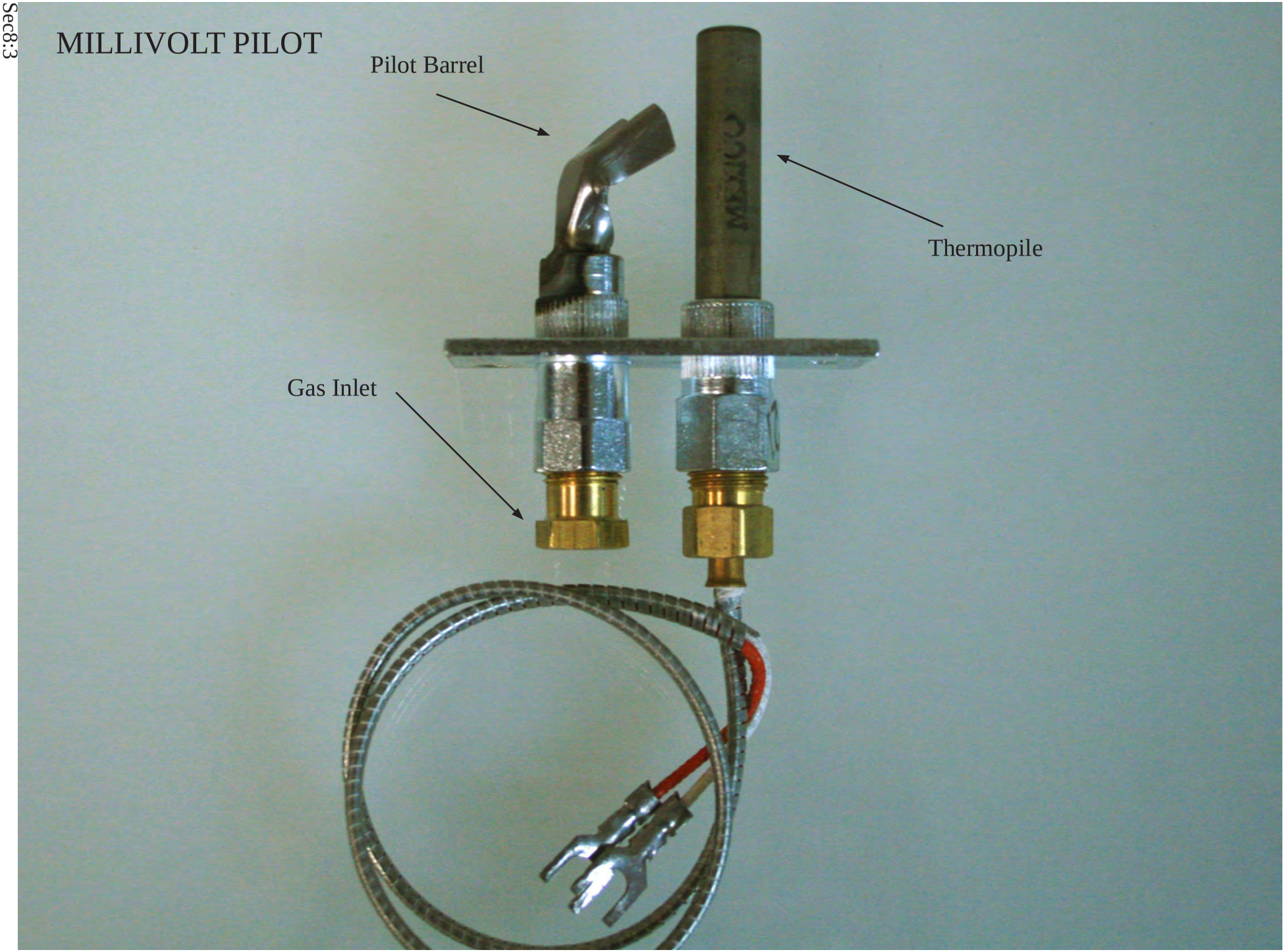
SERVICE NOTES

Control Valve and Control Devices

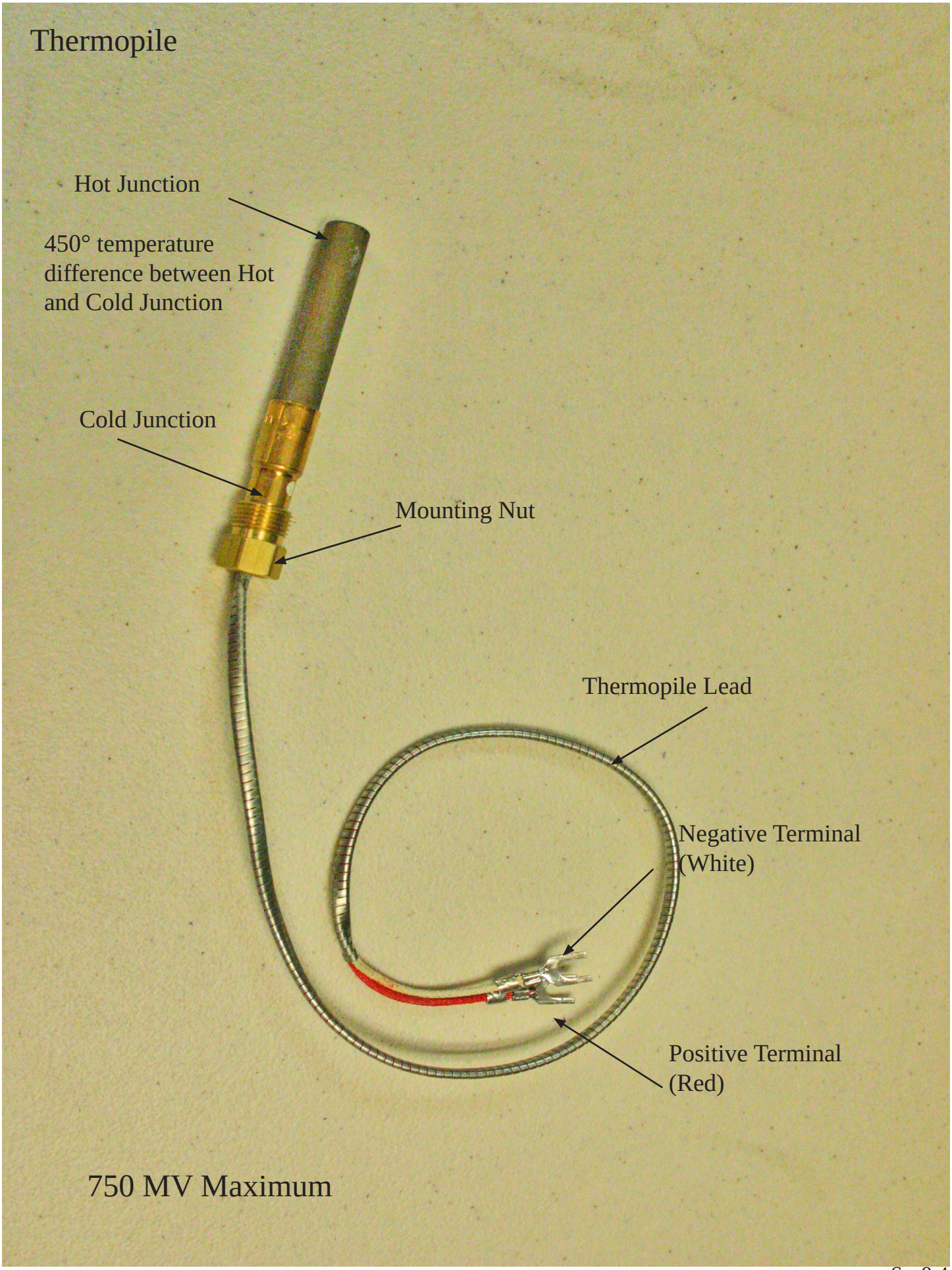
MANUAL PILOT



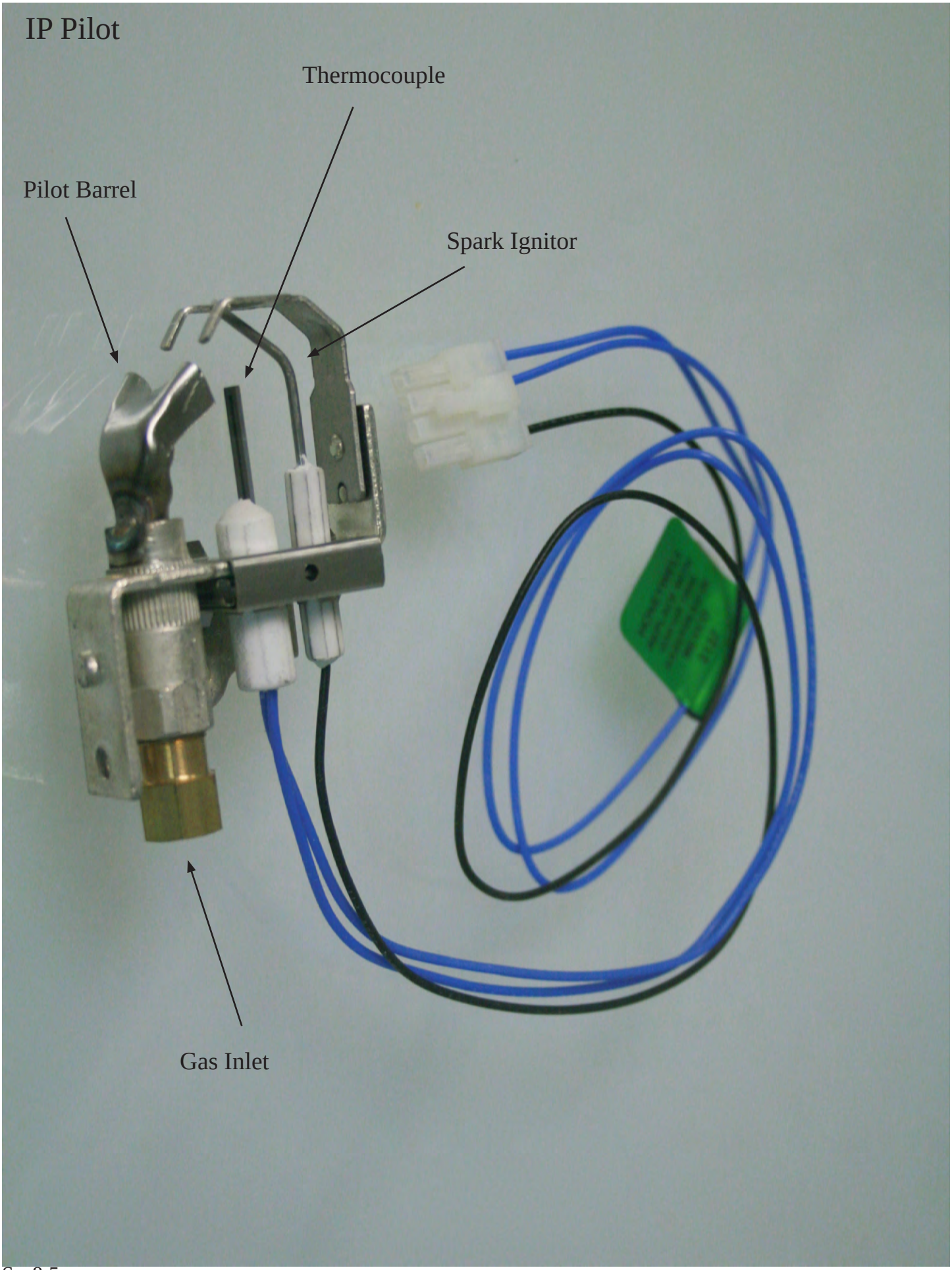
MILLIVOLT PILOT



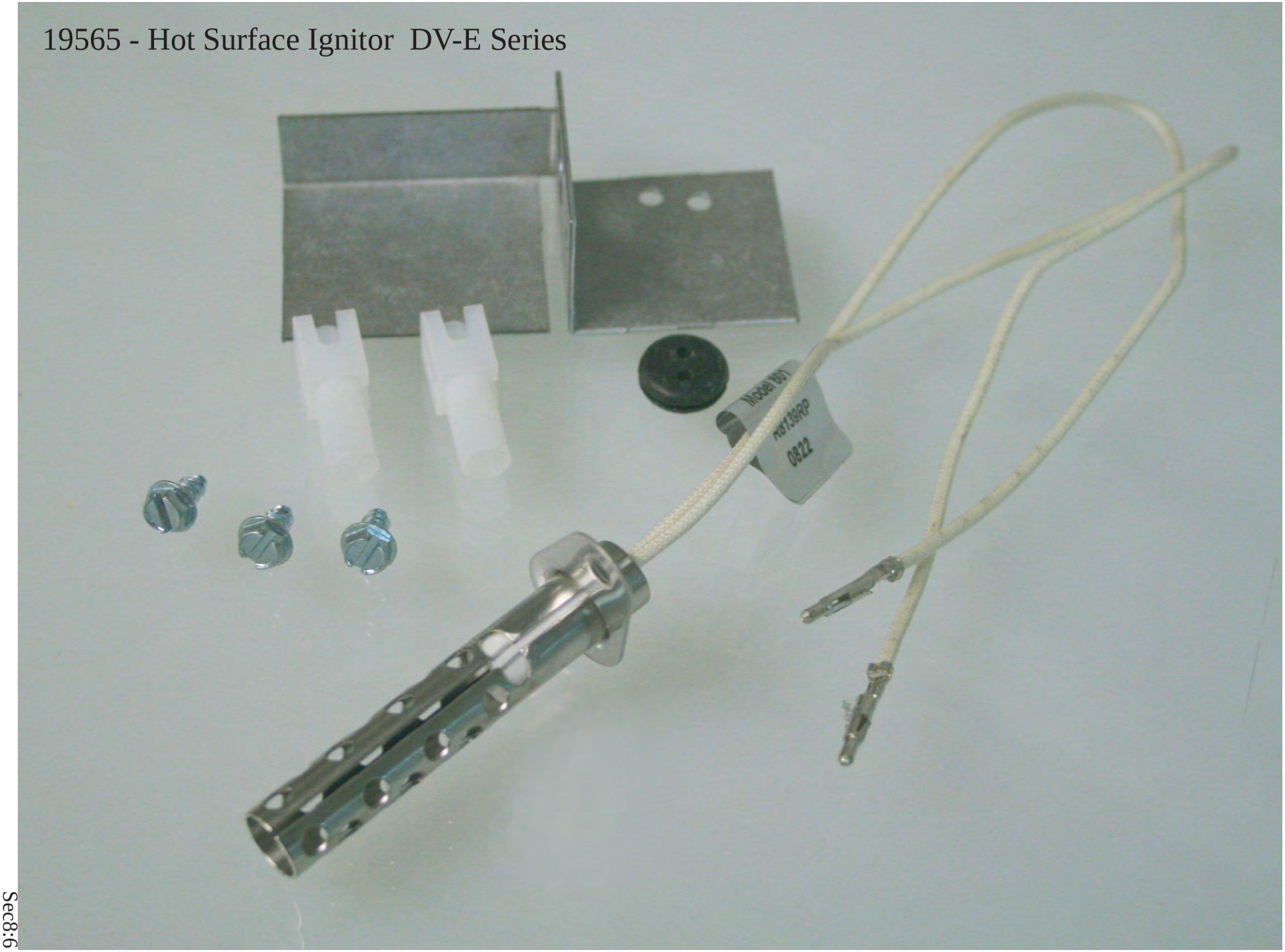
Thermopile



750 MV Maximum

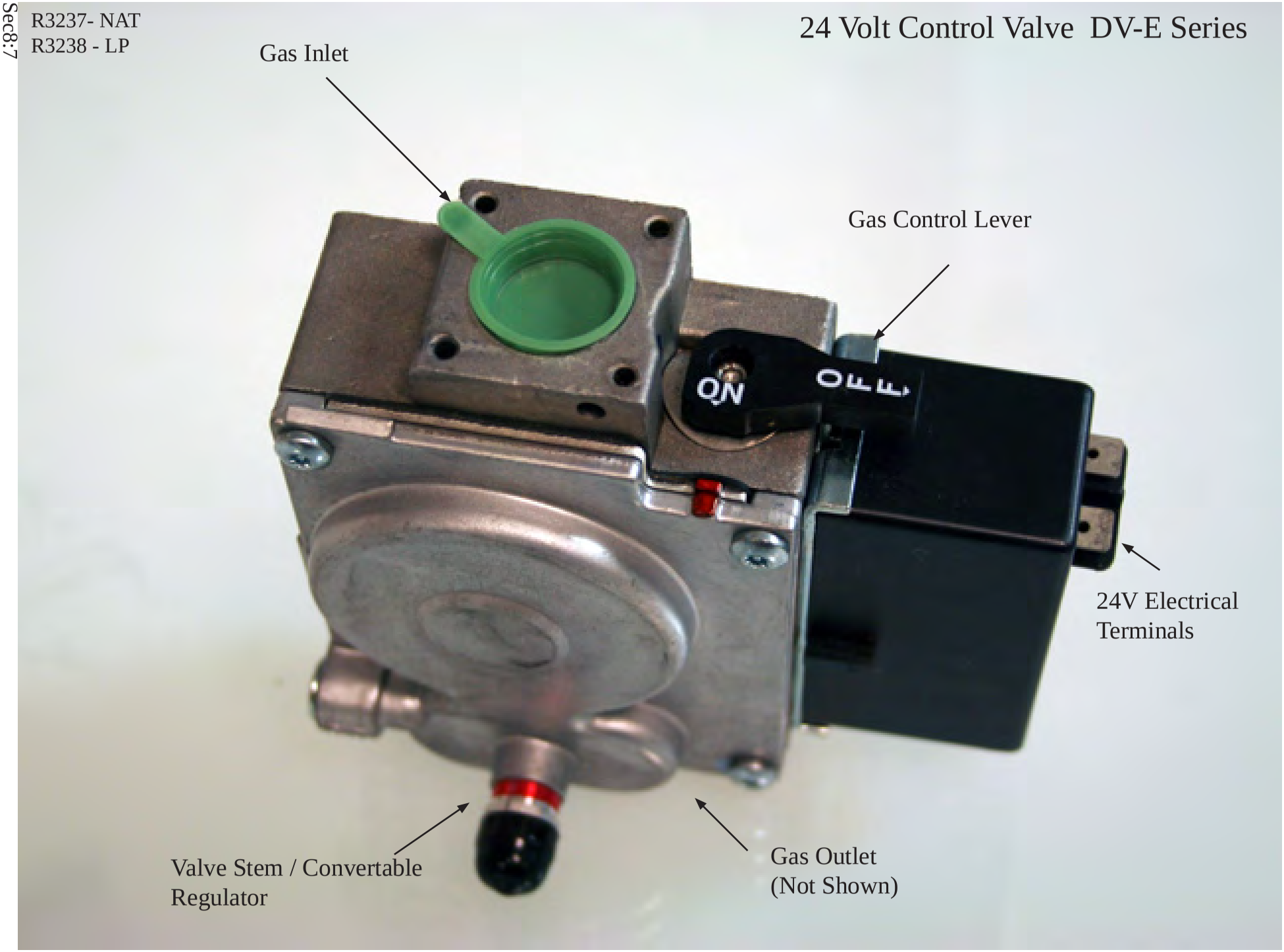

IP Pilot
Thermocouple
Pilot Barrel
Spark Ignitor
Gas Inlet

19565 - Hot Surface Ignitor DV-E Series



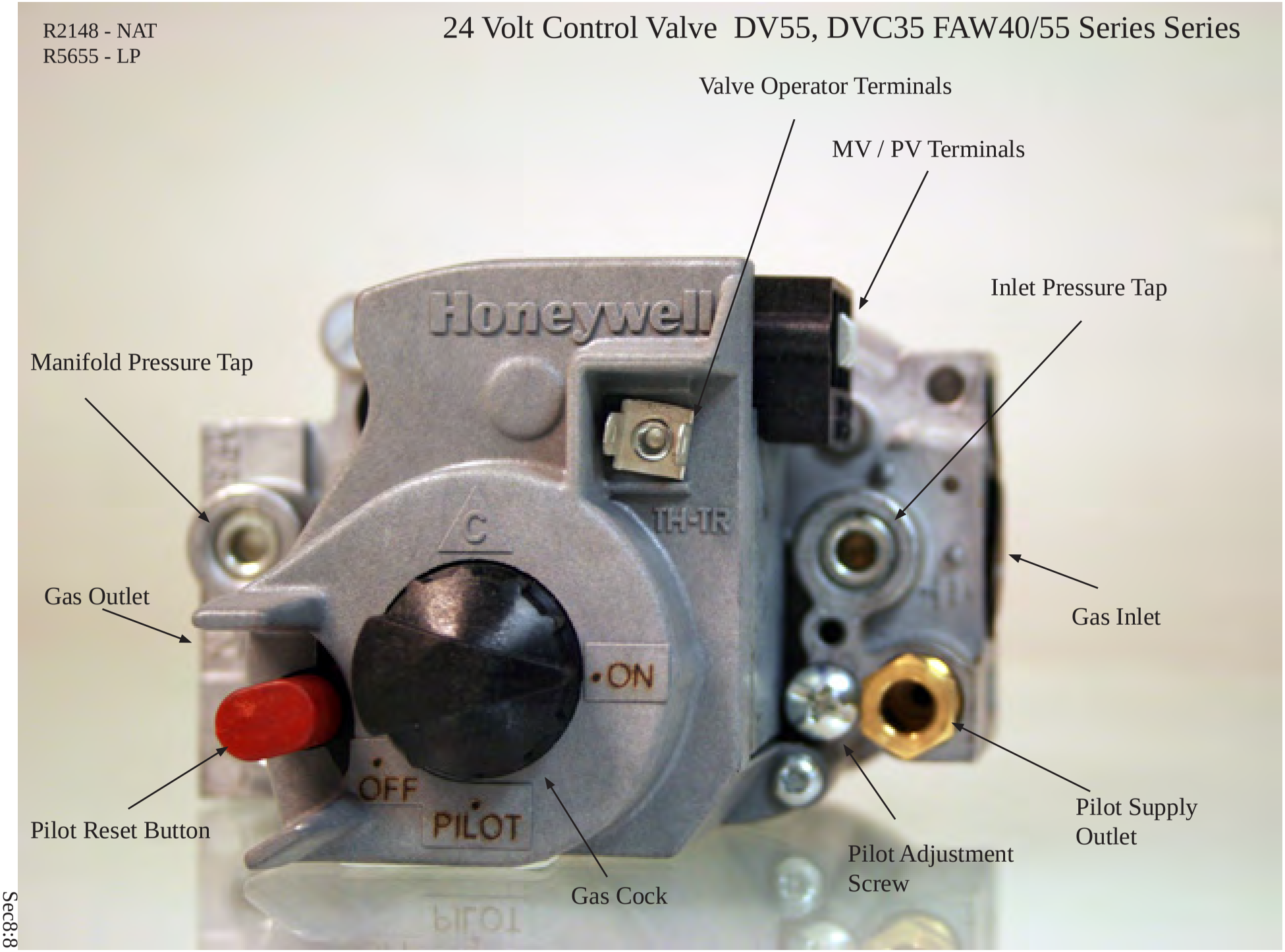
R3237- NAT
R3238 - LP

24 Volt Control Valve DV-E Series



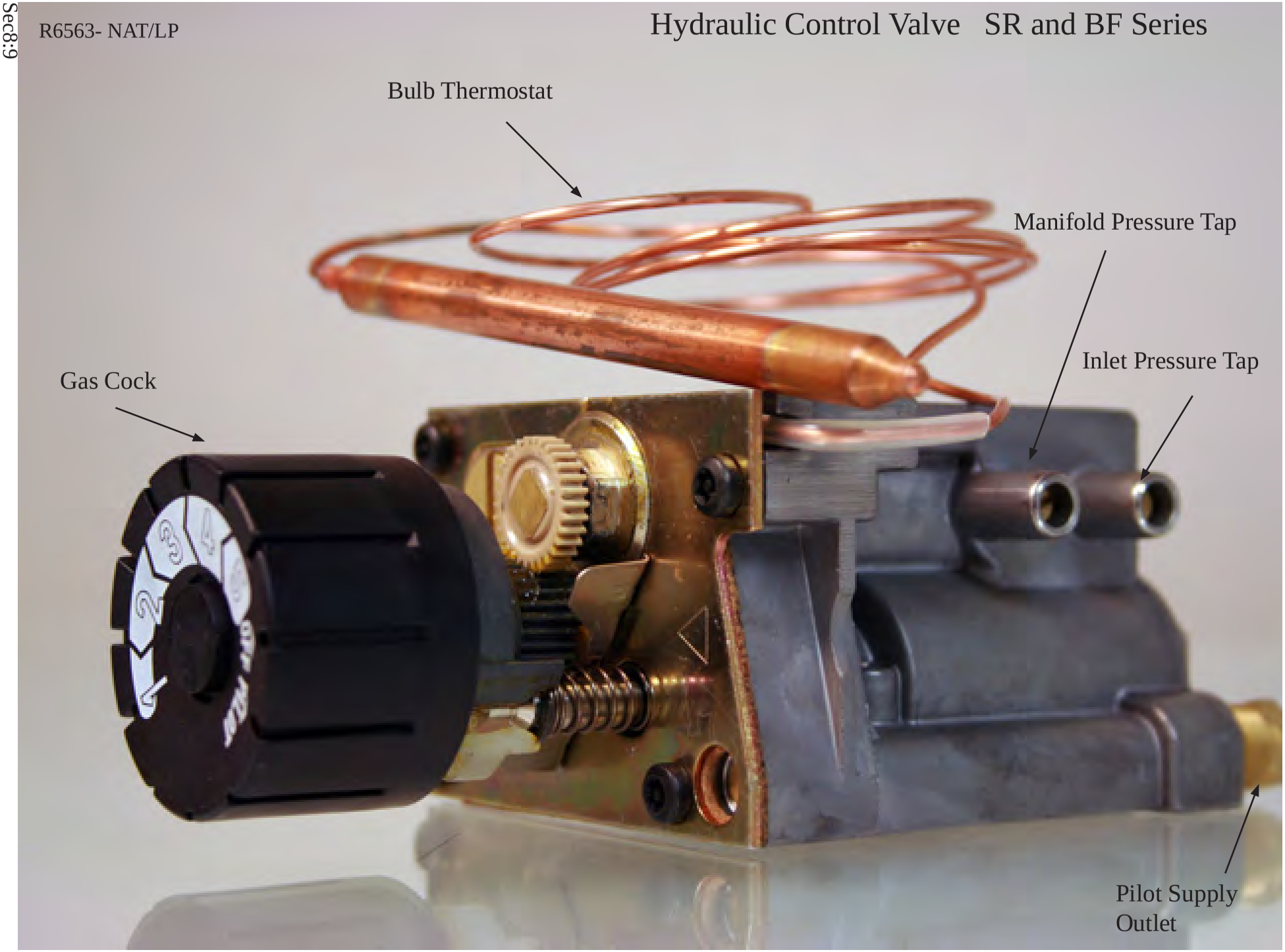
R2148 - NAT
R5655 - LP

24 Volt Control Valve DV55, DVC35 FAW40/55 Series Series



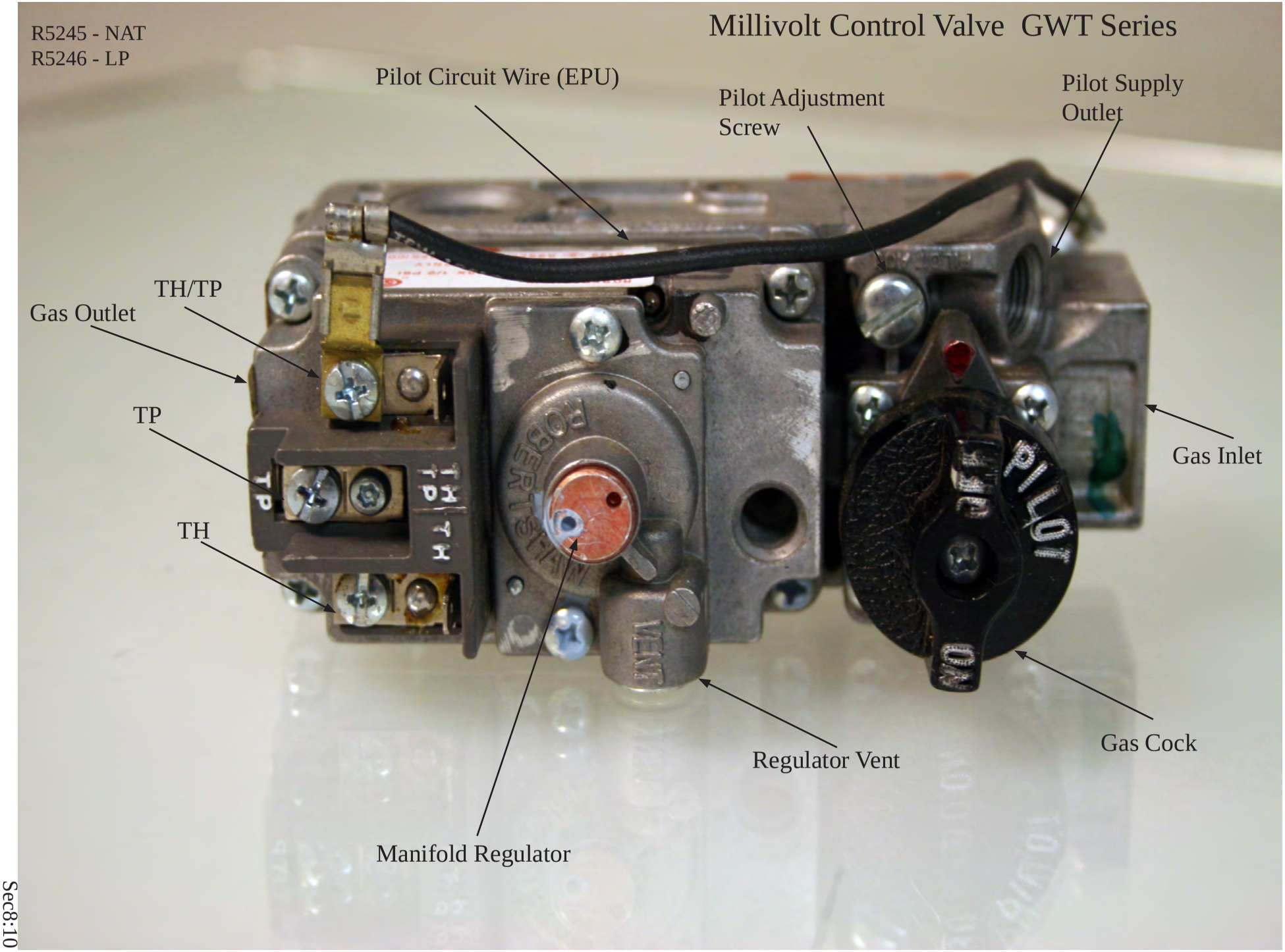
R6563- NAT/LP

Hydraulic Control Valve SR and BF Series



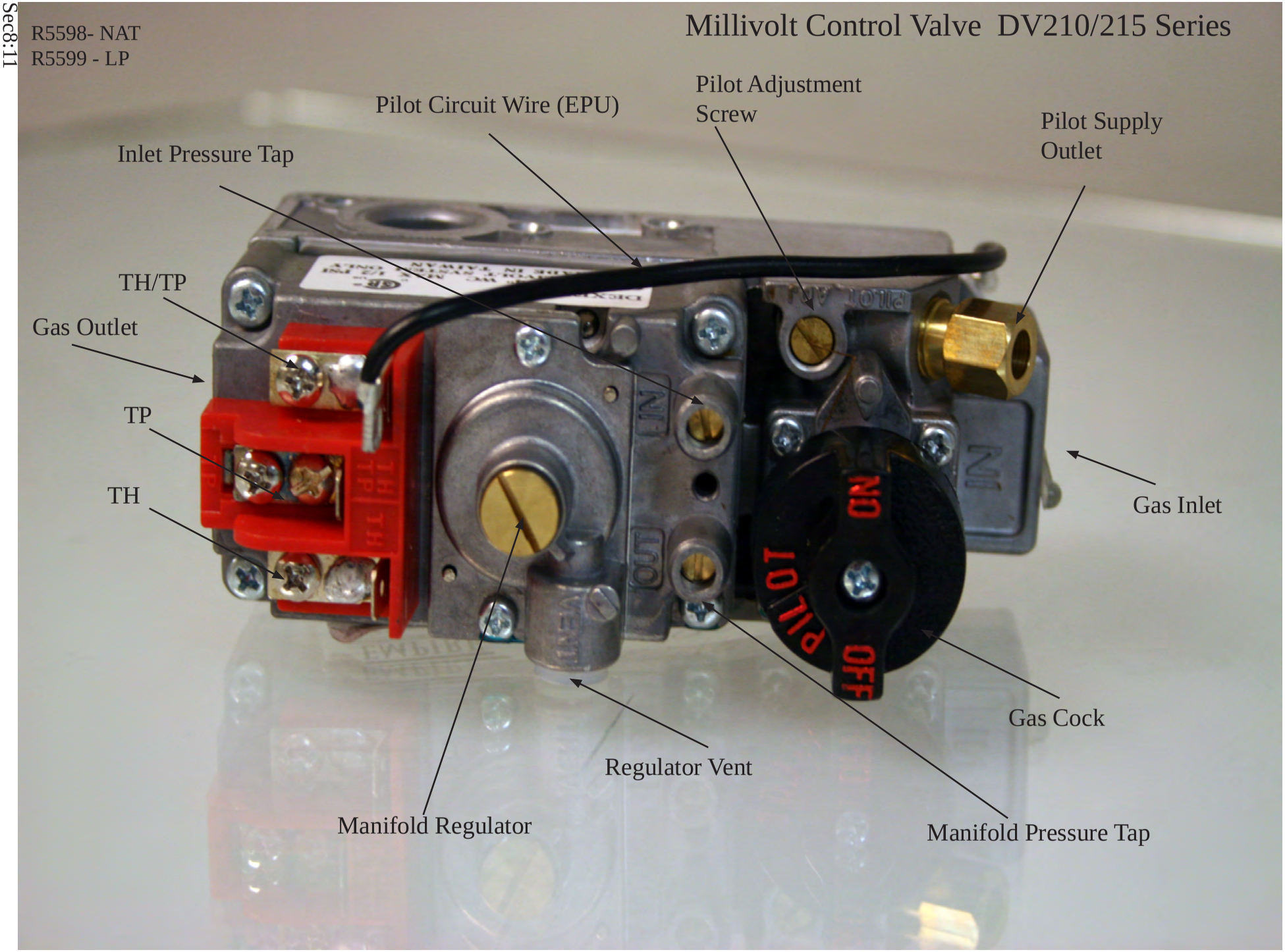
Millivolt Control Valve GWT Series

R5245 - NAT
R5246 - LP



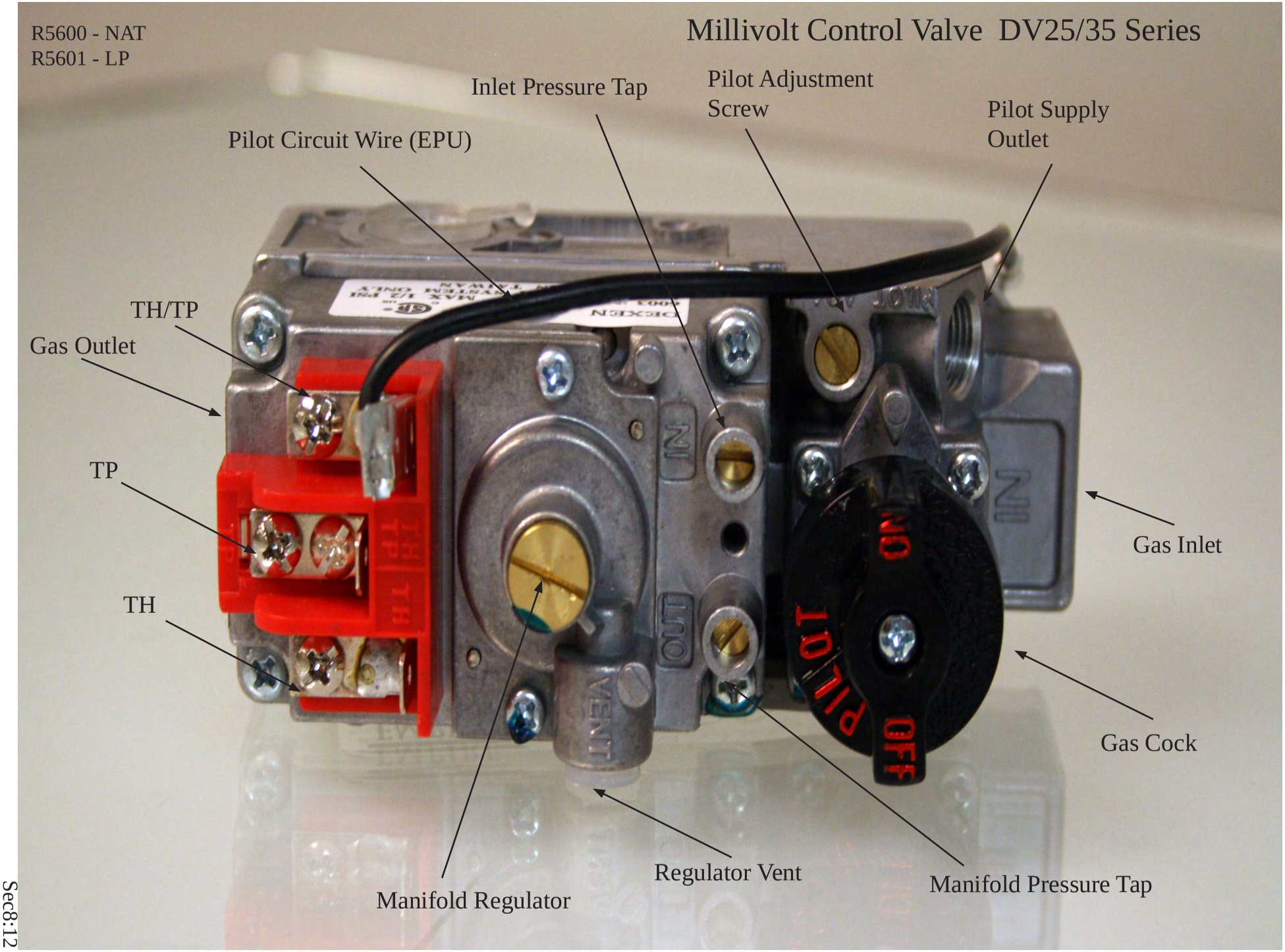
R5598- NAT
R5599 - LP

Millivolt Control Valve DV210/215 Series



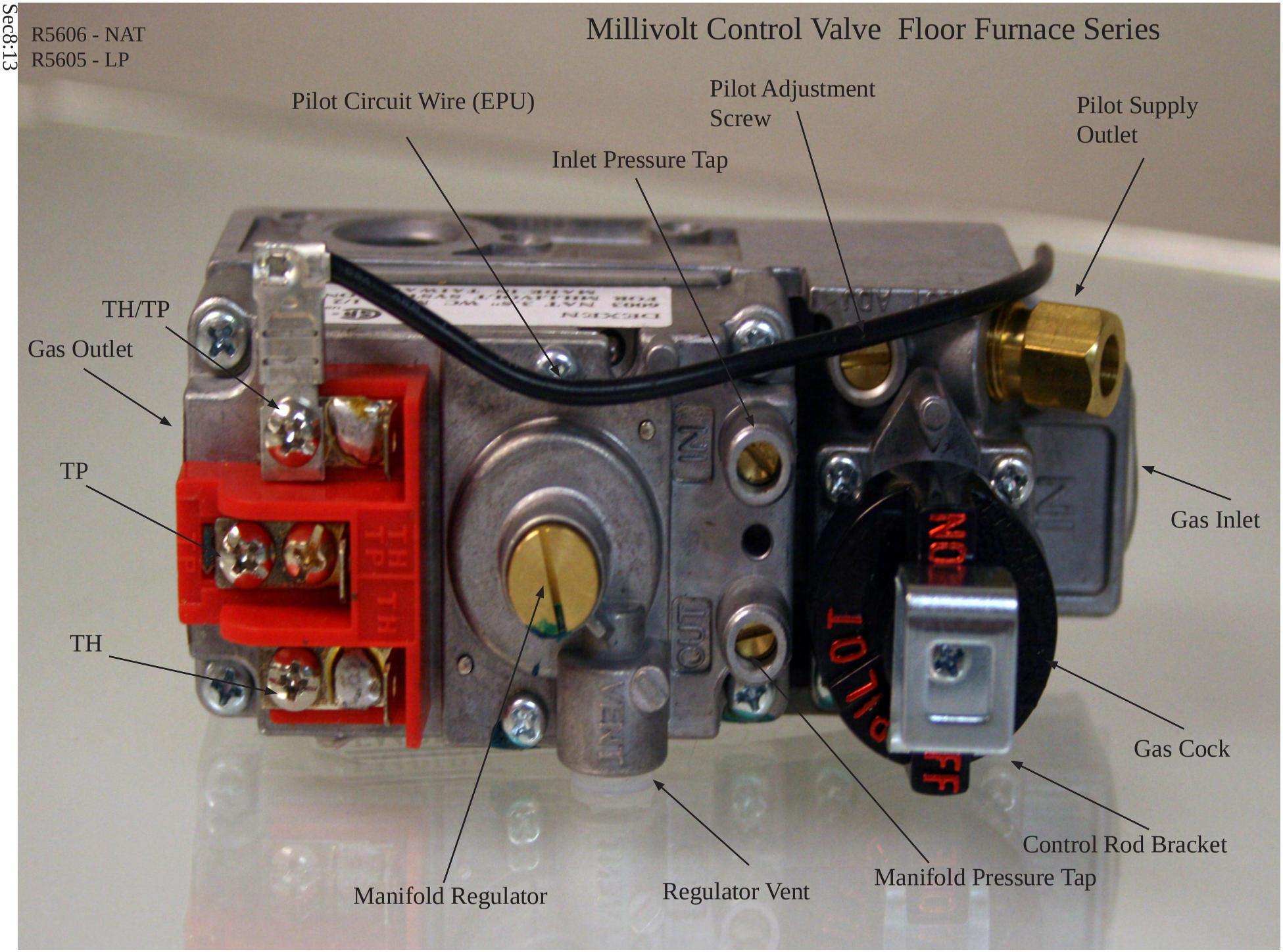
R5600 - NAT
R5601 - LP

Millivolt Control Valve DV25/35 Series



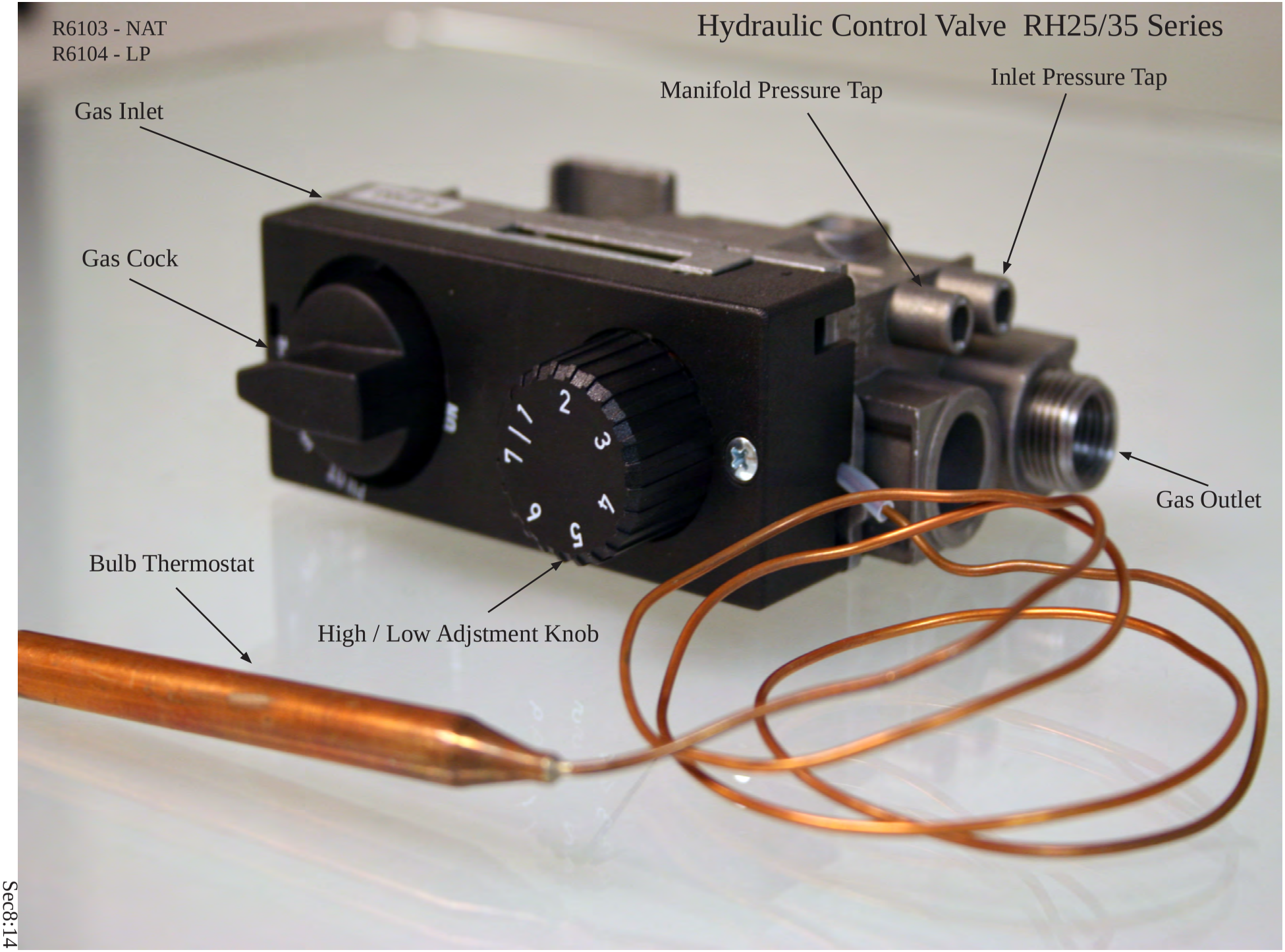
R5606 - NAT
R5605 - LP

Millivolt Control Valve Floor Furnace Series

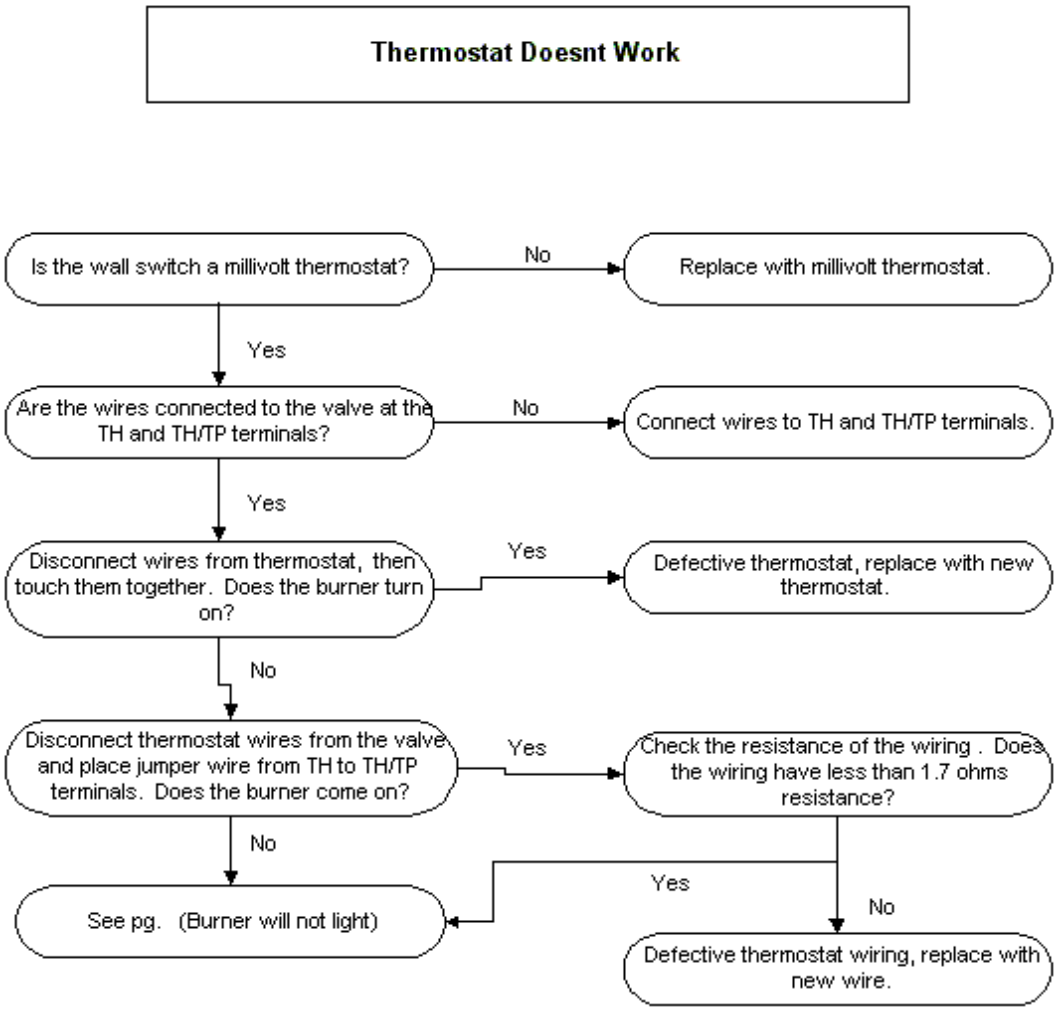


R6103 - NAT
R6104 - LP

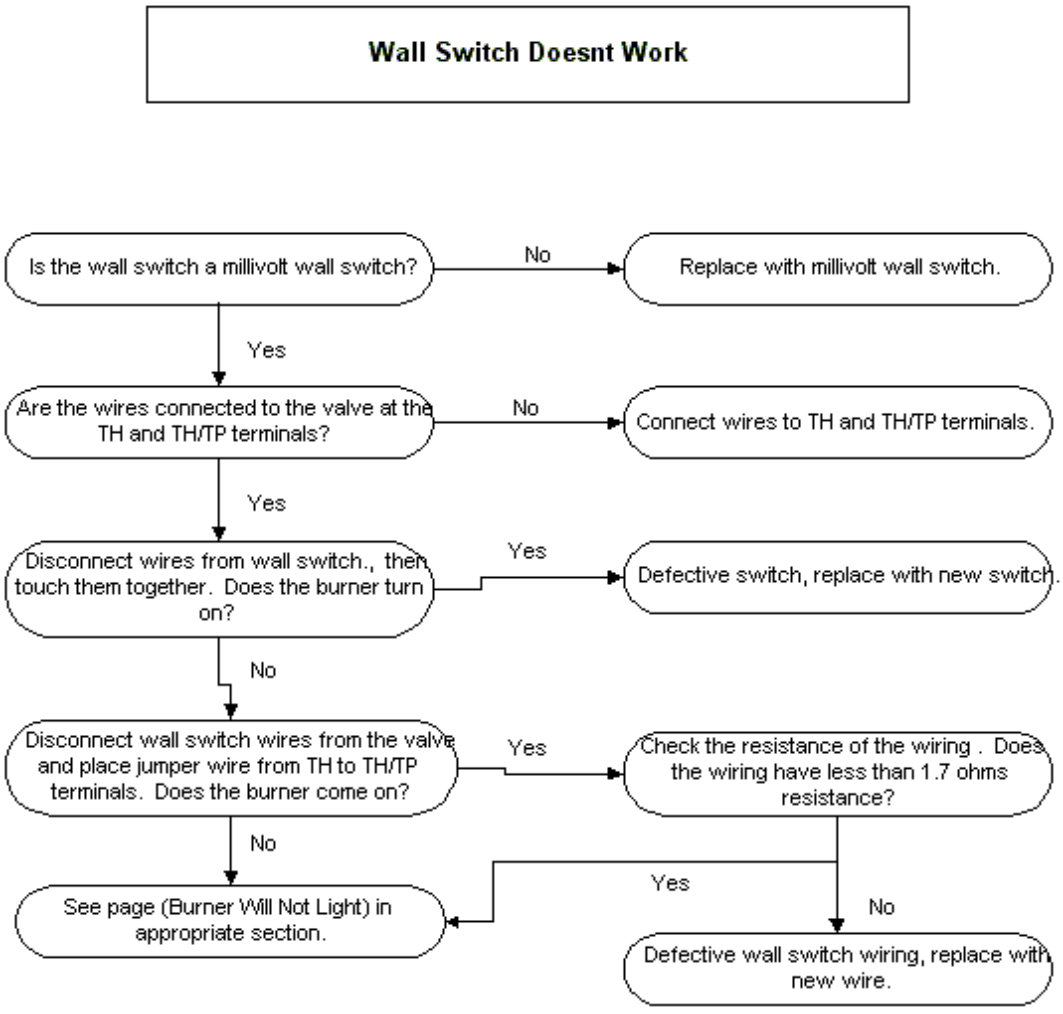
Hydraulic Control Valve RH25/35 Series



DIAGNOSING THERMOSTATS



DIAGNOSING WALL SWITCHES



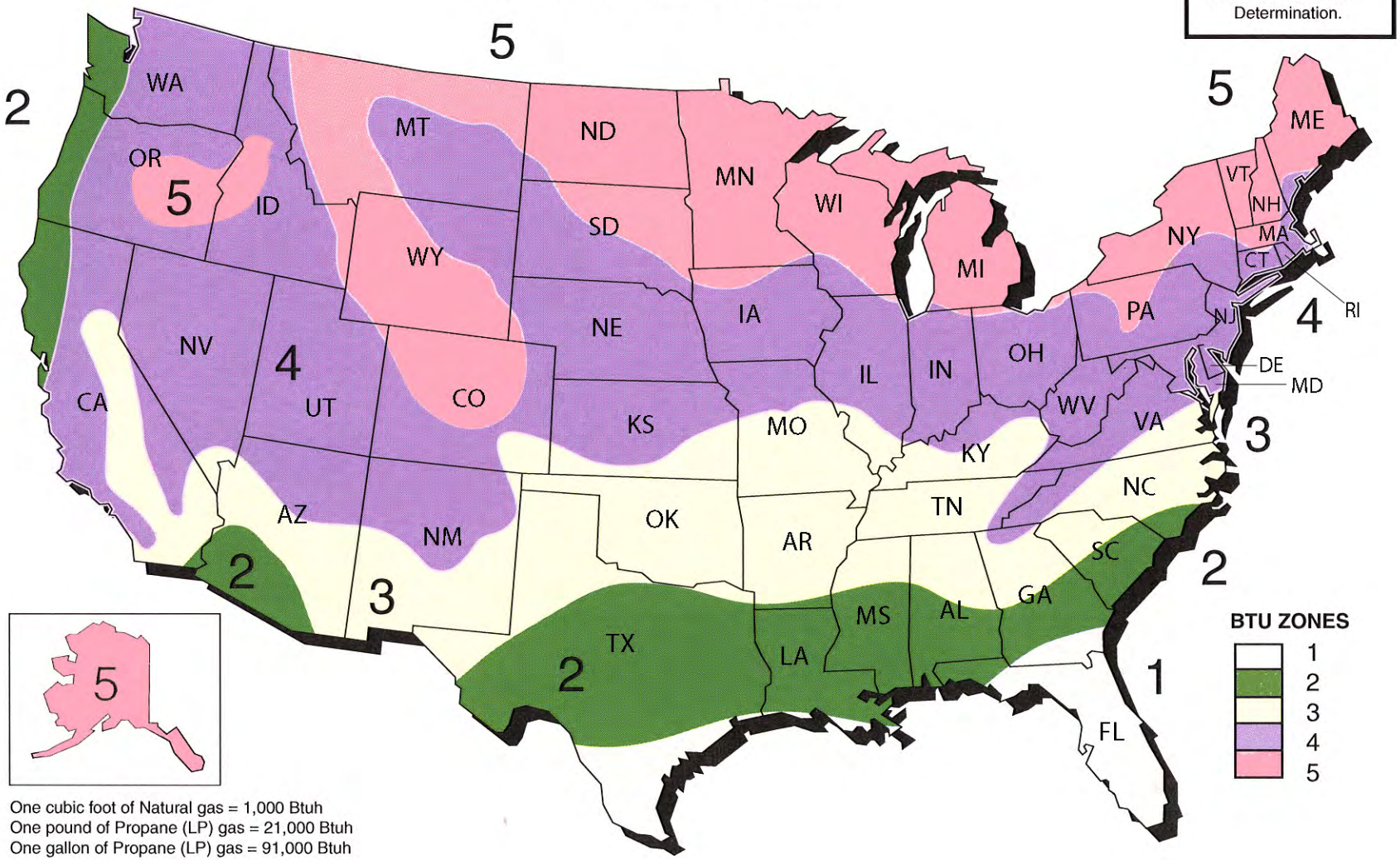
SERVICE NOTES

SERVICE NOTES

Vented and Vent Free Sizing Charts

EMPIRE COMFORT SYSTEMS
HEATER SIZING CHART

This Chart Shall Be Used As A Guide Only. Consult Your Installer/Dealer For Final Model/Size Determination.



One cubic foot of Natural gas = 1,000 Btuh
One pound of Propane (LP) gas = 21,000 Btuh
One gallon of Propane (LP) gas = 91,000 Btuh

This chart is for rooms with average insulation and windows for your Btu zone. The sizing chart is based on a 72 temperature. To maintain higher room temperature, use the next higher Btu zone.

Empire Comfort Systems, Inc. • 918 Freeburg Avenue • Belleville, IL 62220 • 618-233-7420 • 800-851-3153

Room Size Chart for Vent-Free Heaters

QUICK REFERENCE (Based on Ceiling Height of 8 Feet)

			Square Feet BTU Zone					Approximate Room Size BTU Zone				
Model	BTU/HR Input	BTU/HR Output	1	2	3	4	5	1	2	3	4	5
Infrared/Blue Flame Heaters												
SR6, HB06, HR06	6,000	6,000	750	375	250	188	150	27 x 27	19 x 19	16 x 16	14 x 14	12 x 12
SR10, SR10T, BF10, HB10, HR10	10,000	10,000	1250	625	417	313	250	35 x 35	25 x 25	20 x 20	18 x 18	16 x 16
HR15	15,000	15,000	1875	938	625	469	375	43 x 43	31 x 31	25 x 25	22 x 22	19 x 19
HR17	17,000	17,000	2125	1063	708	531	425	46 x 46	33 x 33	27 x 27	23 x 23	21 x 21
SR18, SR18T, HR18	18,000	18,000	2250	1125	750	563	450	47 x 47	34 x 34	27 x 27	24 x 24	21 x 21
BF20, HB20, HR20	20,000	20,000	2500	1250	833	625	500	50 x 50	35 x 35	29 x 29	25 x 25	22 x 22
HR25	25,000	25,000	3125	1563	1042	781	625	56 x 56	40 x 40	32 x 32	28 x 28	25 x 25
SR30, SR30T, BF30, HB30, HR30	30,000	30,000	3750	1875	1250	938	750	61 x 61	43 x 43	35 x 35	31 x 31	27 x 27
Log Set Burners												
VFDR-18LB10	10,000	10,000	1250	625	417	313	250	35 x 35	25 x 25	20 x 20	18 x 18	16 x 16
VF (SR, SV)-16	25,000	25,000	3125	1563	1042	781	625	56 x 56	40 x 40	32 x 32	28 x 28	25 x 25
VFD (R, M, T)-18LB	28,000	28,000	3500	1750	1167	875	700	59 x 59	42 x 42	34 x 34	30 x 30	26 x 26
VFS (M, R, V)-18	32,000	32,000	4000	2000	1333	1000	800	63 x 63	45 x 45	37 x 37	32 x 32	28 x 28
VFD (M, R, T)-24LB	34,000	34,000	4250	2125	1417	1063	850	65 x 65	46 x 46	38 x 38	33 x 33	29 x 29
VFS (M, R, V)-24	36,000	36,000	4500	2250	1500	1125	900	67 x 67	47 x 47	39 x 39	34 x 34	30 x 30
VFS (M, R, V)-30	38,000	38,000	4750	2375	1583	1188	950	69 x 69	49 x 49	40 x 40	34 x 34	31 x 31
VFD (R,M,T)-30LB	40,000	40,000	5000	2500	1667	1250	1000	71 x 71	50 x 50	41 x 41	35 x 35	32 x 32
Fireplace/Hearths												
VF-24FP2, VFD26FP30L10	10,000	10,000	1250	625	417	313	250	35 x 35	25 x 25	20 x 20	18 x 18	16 x 16
VF-24-FP (2,3) VFD-26 (FM) (FP) (20,30)	20,000	20,000	2500	1250	833	625	500	50 x 50	35 x 35	29 x 29	25 x 25	22 x 22
VFB (H, L) 30	30,000	30,000	3750	1875	1250	938	750	61 x 61	43 x 43	35 x 35	31 x 31	27 x 27
VFP32	32,000	32,000	4000	2000	1333	1000	800	63 x 63	45 x 45	37 x 37	32 x 32	28 x 28
VFP36	36,000	36,000	4500	2250	1500	1125	900	67 x 67	47 x 47	39 x 39	34 x 34	30 x 30
Heritage Cast Iron Stoves												
VFP-30-CA30	32,000	32,000	4000	2000	1333	1000	800	63 x 63	45 x 45	37 x 37	32 x 32	28 x 28

*See map on opposite side to determine BTU Zone for your location.

Note: • Not all heater models are allowed by some local codes; i.e., Vent-Free. Be sure the heater model you have chosen is allowed in your area.
• At high altitudes, additional heat may be required
• If you have a single room with 4 exterior walls, additional heat my be required.

Use this Chart as Guide Only. Consult your Installer/Dealer for Final Model/Size Determination

1. Multiply the square feet of area by the ceiling height to determine cubic feet.
2. Determine BTU zone from map on other side, either zone 1, 2, 3, 4, or 5.
3. Multiply the cubic feet by your BTU zone. This number will be the BTU/H Output that is required to heat your area.
4. Go to the BTU/H Output column to match as closely as possible your BTU needs with heater output. Several heaters will have the required BTU output to heat your area.
5. Please have your Empire dealer explain the features of the different types of heaters available.

Example: Room Size is 28' x 28'
Ceiling Height is 8'
BTU Zone is 4
28' x 28' x 8' x 4 = 25,088
BTU/H Output

EMPIRE COMFORT SYSTEMS
Empire Comfort Systems Inc.
918 Freeburg Avenue
Belleville, IL 62220

6/09

EMPIRE COMFORT SYSTEMS
HEATER SIZING CHART

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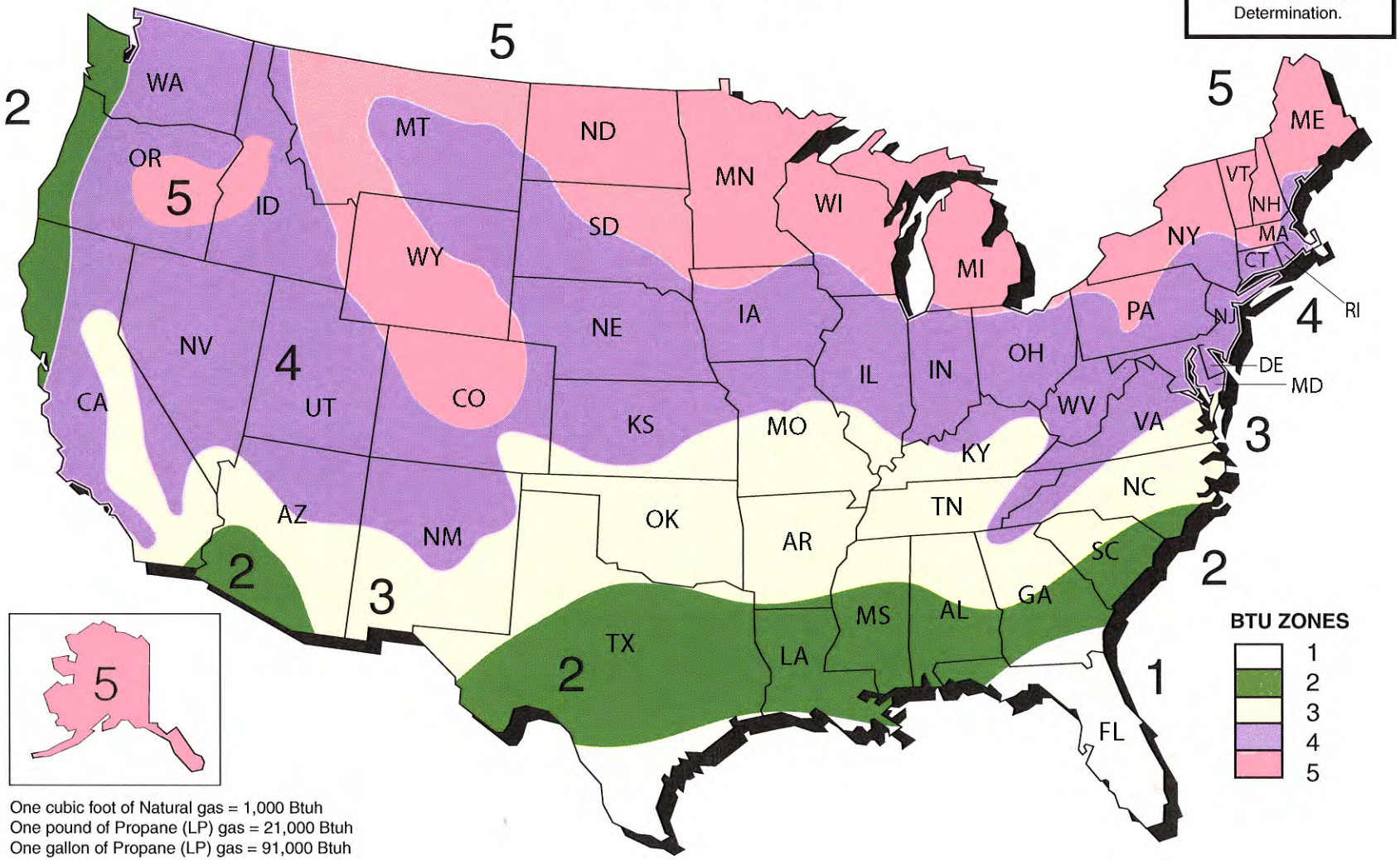

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This chart is for rooms with average insulation and windows for your Btu zone. The sizing chart is based on a 72 temperature. To maintain higher room temperature, use the next higher Btu zone.

Empire Comfort Systems, Inc. • 918 Freeburg Avenue • Belleville, IL 62220 • 618-233-7420 • 800-851-3153

Room Size Chart for Vented Heaters

QUICK REFERENCE (Based on Ceiling Height of 8 Feet)

			Square Feet BTU Zone					Approximate Room Size BTU Zone				
Model	BTU/HR Input	BTU/HR Output	1	2	3	4	5	1	2	3	4	5
Direct-Vent Wall Furnaces												
DV-55	55,000	42,000	5250	2625	1750	1312	1050	72 x 72	51 x 51	42 x 42	36 x 36	32 x 32
DVC-35	35,000	27,700	3462	1731	1154	865	692	59 x 59	42 x 42	34 x 34	29 x 29	26 x 26
DV-35	35,000	24,500	3063	1531	1021	766	613	55 x 55	39 x 39	32 x 32	28 x 28	25 x 25
DV-25	25,000	17,500	2187	1093	728	546	437	47 x 47	33 x 33	27 x 27	23 x 23	21 x 21
DV-215	15,000	10,500	1312	656	478	328	262	36 x 36	27 x 27	22 x 22	18 x 18	16 x 16
DV-210	10,000	7,000	875	437	291	218	175	30 x 30	17 x 17	17 x 17	15 x 15	13 x 13
Direct-Vent Wall Furnaces												
DV-20E	20,000	16,000	2050	1100	800	600	500	45 x 45	33 x 33	28 x 28	24 x 24	22 x 22
DV-40E	40,000	32,000	3900	2100	1450	1125	950	63 x 63	47 x 47	38 x 38	33 x 33	31 x 31
DV-55E	55,000	44,000	5350	280	1900	1500	1175	73 x 73	53 x 53	44 x 44	38 x 38	34 x 34
Room Heaters												
RH-65	65,000	45,500	5687	2843	1895	1421	1137	75 x 75	53 x 53	44 x 44	38 x 38	34 x 34
RH-50	50,000	35,000	4375	2187	1458	1093	875	66 x 66	47 x 47	38 x 38	33 x 33	30 x 30
RH-35	35,000	24,500	3060	1530	1020	765	612	55 x 55	39 x 39	32 x 32	28 x 28	25 x 25
RH-25	25,000	17,500	2187	1093	729	546	437	47 x 47	33 x 33	27 x 27	23 x 23	21 x 21
Gravity Wall Furnaces												
GWT-50	50,000	37,000	4625	2312	1541	1156	925	68 x 68	48 x 48	39 x 39	34 x 34	30 x 30
GWT-35	35,000	25,900	3237	1613	1079	809	647	57 x 57	40 x 40	32 x 32	28 x 28	25 x 25
GWT-25	25,000	18,500	2312	1156	770	578	462	48 x 48	34 x 34	28 x 28	24 x 24	21 x 21
Counterflow Vented Wall Furnaces												
FAW-55	55,000	42,000	5250	2625	1750	1312	1050	72 x 72	51 x 51	42 x 42	36 x 36	32 x 32
FAW-40	40,000	31,000	3875	1937	1291	968	775	63 x 63	44 x 44	36 x 36	31 x 31	28 x 28
Floor Furnaces												
7088	65,000	45,500	5687	2843	1895	1421	1137	75 x 75	53 x 53	44 x 44	38 x 38	34 x 34
5088	45,000	31,500	3937	1968	1312	984	787	63 x 63	44 x 44	36 x 36	31 x 31	28 x 28
3588	32,500	22,750	2843	1421	947	710	568	53 x 53	38 x 38	31 x 31	27 x 27	24 x 24
Heritage Cast Iron Stoves												
DVP-30-CA30	30,000	21,000	2625	1312	875	656	525	51 x 51	36 x 36	30 x 30	26 x 26	23 x 23
Mantis												
FW/FI/FF-28	28,000	25,200	3500	1700	1225	950	775	39 x 39	42 x 42	35 x 35	31 x 31	28 x 28
BF/BI/BP-28	28,000	25,200	3500	1700	1225	950	775	39 x 39	42 x 42	35 x 35	31 x 31	28 x 28

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BTU/H Output

Empire Comfort Systems Inc.
918 Freeburg Avenue
Belleville, IL 62220

7/09

Service Bulletins

Suggested Parts List

HEATER SUGGESTED PARTS LIST

PART NUMBER	MANUFACTURER	MAN PART #
SR 6, 10, 10T, 18, 18T, 30, 30T-3		
R6307 NAT PILOT ASSY	COPRECI, S. COOP., LTDA.	ODS 21500/144
R6308 LP PILOT ASSY	COPRECI, S. COOP., LTDA.	ODS 21.500/206
R2313 PIEZO IGNITOR	CHANNEL PRODUCTS, INC.	1244-44
	SKG ITALIA S.P.A.	00G0130-01
R2277 VALVE LP & NAT	S.I.T. CONTROLS USA, INC.	R-2277
	ARCHER MARKETING CORP.	GH396010001
	COPRECI, S. COOP., LTDA.	
R6563 VALVE LP & NAT T SERIES	S.I.T. CONTROLS USA, INC.	630568
R1649 VALVE LP & NAT	ARCHER MARKETING CORP.	GH396002001
	COPRECI, S. COOP., LTDA.	
BF 10, 20, 30-2		
R6563 VALVE LP & NAT	S.I.T. CONTROLS USA, INC.	630568
R6306 NAT PILOT ASSY	COPRECI, S. COOP., LTDA.	ODS 21500/142
R6308 LP PILOT ASSY	COPRECI, S. COOP., LTDA.	ODS 21.500/206
R6309 SPARK IGNITOR		
R6310 THERMOCOUPLE	COPRECI, S. COOP., LTDA.	T11300/611X750
DV 210 / 215-7SG		
M155 OBS HOLE GASKET	GASKET & SEAL	M-155
R1055 ELECTRODE & WIRE	CHANNEL PRODUCTS, INC.	1647-41
R1054 THERMOPILE	HONEYWELL, INC.	Q313A 1261/B
R2890 LP GAS PILOT	HONEYWELL, INC.	Q314A 6730/B
R2893 NAT GAS PILOT	HONEYWELL, INC.	Q314A 6722/B
R5598 NAT GAS VALVE	DEXEN INDUSTRIES, INC	758 711 349
	INVENSYS CLIMATE CONTROLS	758 711 349
R5599 LP GAS VALVE	DEXEN INDUSTRIES, INC	758 712 346
	INVENSYS CLIMATE CONTROLS	758 712 346
R5788 T-STAT (MILLIVOLT)	COLUMBUS ELE. (TPI)/GEMINI CO.	RK130EAW
DV 55 / FAW 55 SPP		
M155 OBS HOLE GASKET	GASKET & SEAL	M-155

R5655	LP VALVE	HONEYWELL, INC.	VR8100 C2991/B
R2148	NAT VALVE	HONEYWELL, INC.	VR8200C 1165/B
R685	THERMOCOUPLE	WHITE RODGERS DIVISION	H06E022B1
R1941	FAN SWITCH	THERM-O-DISC, INC.	#313325
R1995	TRANSFORMER	TYCO / ECS ACCT #15358-1-1	1611449-8
R630	LIMIT	THERM-O-DISC, INC.	#201607
R622N	NAT PILOT	INVENSYS CLIMATE CONTROLS	77304
R622L	LP PILOT	INVENSYS CLIMATE CONTROLS	77303
R619	MOTOR	MC MILLAN ELECTRIC COMPANY	D0510B3325 REV5
		FASCO / REGAL BELOIT	7151-3029
R6389	WALL T-STAT (24 VOLT)	COLUMBUS ELE. (TPI)/GEMINI CO.	RK120EAW
R2708	PIEZO	CHANNEL PRODUCTS, INC.	1244-46
		SKG ITALIA S.P.A.	00G0 131.01

DVC 35 / FAW 40 SPP

M155	OBS HOLE GASKET	GASKET & SEAL	M-155
R2148	NAT VALVE	HONEYWELL, INC.	VR8200C 1165/B
R5655	LP VALVE	HONEYWELL, INC.	VR8100 C2991/B
R1995	TRANSFORMER	TYCO / ECS ACCT #15358-1-1	1611449-8
R6389	WALL T-STAT (24 VOLT)	COLUMBUS ELE. (TPI)/GEMINI CO.	RK120EAW

DV 20E, 40E, 55E

M155	OBS HOLE GASKET	GASKET & SEAL	M-155
R8139RP	IGNITOR	SAINT GOBAIN IGNITOR PRODUCTS	601-XBM
R2543	FLAME SENSOR	P.S.E. INC	PSE-ES2
R2575	FLAME ROLLOUT SWITCH	THERM-O-DISC, INC.	#10694
R3237	NAT VALVE	INVENSYS CLIMATE CONTROLS	606 013 024
R3238	LP VALVE	INVENSYS CLIMATE CONTROLS	606 013 025
R2577A	TEMP CONTROL BOARD	ICM CORP. (HILL & CO REP)	AB7801B
		A.C.T. CORP	R2577
R2576	CONTROL BOARD	ICM CORP. (HILL & CO REP)	AB1012-B
R6989	PRESSURE SWITCH (20 & 40 ONLY)	HONEYWELL, INC.	IS22050051S5110
R6988	PRESSURE SWITCH (55 ONLY)	HONEYWELL, INC.	IS22029051S5109
R1279	LIMIT	HILL AND COMPANY	2511L014-1863
		THERM-O-DISC, INC.	#313033

DV 25 / 35-2

M155 OBS HOLE GASKET	GASKET & SEAL	M-155
DV1004	PILOT TUBING WITH FITTINGS	
R5600 NAT GAS VALVE	DEXEN INDUSTRIES, INC	763 711 350
	INVENSYS CLIMATE CONTROLS	763 711 350
R5601 LP GAS VALVE	DEXEN INDUSTRIES, INC	763 712 351
	INVENSYS CLIMATE CONTROLS	763 712 351
R2708 PIEZO IGNITOR	CHANNEL PRODUCTS, INC.	1244-46
	SKG ITALIA S.P.A.	00G0 131.01
R2224 NAT GAS PILOT	HONEYWELL, INC.	Q314A 6797/B
R2223 LP GAS PILOT	HONEYWELL, INC.	Q314A 6789/B
R942 THERMOPILE	HONEYWELL, INC.	Q313A 1279/B
DV772-G ELECTRODE & WIRE	CHANNEL PRODUCTS, INC.	1647-13
R5788 T-STAT (MILLIVOLT)	COLUMBUS ELE. (TPI)/GEMINI CO.	RK130EAW
GWT 25, 35		
R5245 NAT VALVE	DEXEN INDUSTRIES, INC	742 851 408
	INVENSYS CLIMATE CONTROLS	742 851 408
R5246 LP VALVE	DEXEN INDUSTRIES, INC	742 852 409
	INVENSYS CLIMATE CONTROLS	742 852 409
R1054 THERMOPILE	HONEYWELL, INC.	Q313A 1261/B
R3239 VENT SAFETY SWITCH – GWT25	ARROW ADVANTAGE	2450CMG86980003
R3045 VENT SAFETY SWITCH – GWT35	ARROW ADVANTAGE	2450CMG86980002
GWT 50		
R3046 VENT SAFETY SWITCH	HILL AND COMPANY	2450CMG86980001
	ARROW ADVANTAGE	2450CMG86980001
R5245 NAT V ALVE	DEXEN INDUSTRIES, INC	742 851 408
	INVENSYS CLIMATE CONTROLS	742 851 408
R5246 LP VALVE	DEXEN INDUSTRIES, INC	742 852 409
	INVENSYS CLIMATE CONTROLS	742 852 409
R1054 THERMOPILE	HONEYWELL, INC.	Q313A 1261/B
RH 25, 35-6		
M155 OBS HOLE GASKET	GASKET & SEAL	M-155
R2706 ECO SWITCH	THERM-O-DISC, INC.	#311967
R926 ECO WIRE	INVENSYS CLIMATE CONTROLS	
R6104 LP VALVE	MAXITROL COMPANY	GV31-B3A2LAG-

R6103	NAT VALVE	MAXITROL COMPANY	GV31-B3A2NAG
RH 50C, 65C-1			
R776	THERMOCOUPLE	WHITE RODGERS DIVISION	H06E048B1
R6101	NAT VALVE	MAXITROL COMPANY	GV31-B3A2NAG
R6102	LP VALVE	MAXITROL COMPANY	GV31-B3A2LAG
R1156	FAN SWITCH	THERM-O-DISC, INC.	#11931
R8195	ECO WIRE	EXCEL SPECIALTY CORP.	835/91
R2706	ECO SWITCH	THERM-O-DISC, INC.	#311967
R1630	ECO ADAPTER	SKYTECH PRODUCTS GROUP	2385-15
		HONEYWELL, INC.	392451-1
MV – 120, 130, 145			
SD44175800	PIEZO IGNITOR		
SD44177000	NAT GAS CONTROL	S.I.T. CONTROLS USA, INC.	0630513 / 3.5NG
SD44176900	LP GAS CONTROL	S.I.T. CONTROLS USA, INC.	0630503
SD44305500	THERMOCOUPLE	S.I.T. CONTROLS USA, INC.	290216
3588, 5088, 7088-4			
M155	OBS HOLE GASKET	GASKET & SEAL	M-155
R5606	NAT VALVE	DEXEN INDUSTRIES, INC	GM970-A013-GV02
		INVENSYS CLIMATE CONTROLS	711 711 347
R5605	LP VALVE	DEXEN INDUSTRIES, INC	GM970-A053-GV02
		INVENSYS CLIMATE CONTROLS	711 712 348
R1821	PRIMARY LIMIT	THERM-O-DISC, INC.	#13493
R5788	T-STAT	COLUMBUS ELE. (TPI)/GEMINI CO.	RK130EAW
3588-4			
R1227	NAT PILOT ONLY	HONEYWELL, INC.	Q314A 6664/B
R1228	LP PILOT ONLY	HONEYWELL, INC.	Q314A 6649/B
R942	THERMOCOUPLE ONLY	HONEYWELL, INC.	Q313A 1279/B
R1820	REGISTER LIMIT	THERM-O-DISC, INC.	#13492
5088, 7088-4			
R1822	REGISTER LIMIT	THERM-O-DISC, INC.	#13494
R715N	NAT PILOT WITH THERMOPILE	WHITE RODGERS DIVISION	PG9A0251L20B2
R715L	LP PILOT WITH THERMOPILE	WHITE RODGERS DIVISION	PG9A0251L10B2

THERMOPILE ONLY WHITE RODGERS DIVISION #101934F32B2

REPLACEMENT VALVE KIT FOR ITT VALVE
3588 -1 & -2 LP 12276 NAT 12278
5088, 7088 -1 & -2 LP 12277 NAT 12279