



# Control Supplement Spark Ignition





#### NOTICE

#### INSTALLER -

This control supplement is intended as a supplement to the GSA Boiler Manual, part number 550-110-738. Follow the GSA Boiler Manual for installation, service, maintenance, repair parts and general boiler information.

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### Hazard definitions

#### DANGER

Hazards that **will cause severe** personal injury, death or substantial property damage.

#### WARNING

Hazards that can cause severe personal injury, death or substantial property damage.

#### CAUTION

Hazards that will or can cause minor personal injury or property damage.

#### NOTICE

Special instructions on installation, operation or maintenance that are important but not related to personal injury or property damage.

#### WARNING

**INSTALLER** — Read all instructions, including the GSA Boiler Manual and this Supplement, before installing. Follow all instructions in proper order to prevent personal injury or death.

This system is not offered for retrofit, or conversion from standing pilot systems. Any attempt to apply the system components to boilers shipped for use with a different control system can cause severe personal injury, death or substantial property damage.

#### WARNING

**USER** — Please read the following. Failure to comply could result in severe personal injury, death or substantial property damage.

- This document is for use only by your qualified heating installer/service technician.
- Please see the User's Information Manual for your reference.
- Have the boiler serviced by a qualified service technician, at least annually.

#### WARNING

This manual must only be used by a **qualified heating installer/service technician**. Failure to comply could result in severe personal injury, death or substantial property damage.

#### NOTICE

When calling or writing about the boiler—Please have: • boiler model number from the boiler rating label and • CP number from the boiler jacket. You may list the CP number in the space provided on the Installation and Service Certificate found on page 20 of Boiler Installation Manual.

# 1 Boiler wiring — GSA boilers with probe LWCO

### **Controls and wiring**

#### **Follow Boiler Manual**

Follow the GSA Boiler Manual to install the boiler.

### Controls — with probe LWCO

- 1. Controls are mounted and wired as shown in Figure 1.
- 2. For actual tapping locations, refer to the Boiler Manual.
- 3. See page 3 for wiring diagram.

### Field wiring connections

- Refer to the Boiler Manual for instructions on field wiring connections.
- Use minimum 14 gauge wire for line voltage supply wiring to the boiler.

### Install vent damper

Follow GSA Boiler Manual instructions to install and connect the vent damper.

Figure 1 GSA boiler with probe low water cut-off — control locations

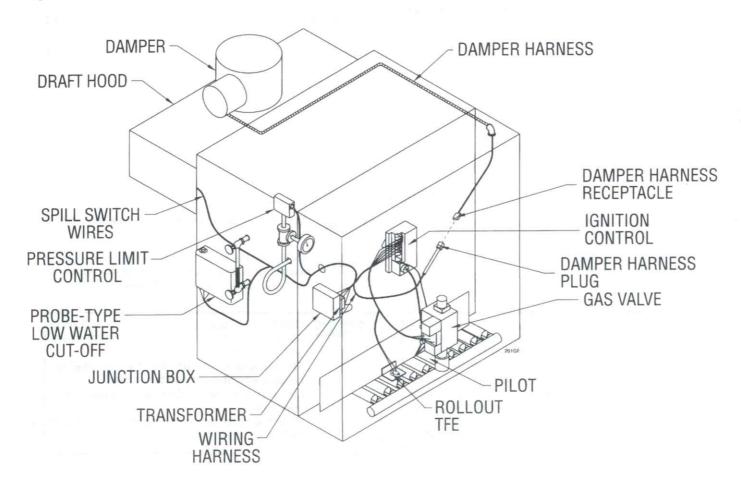
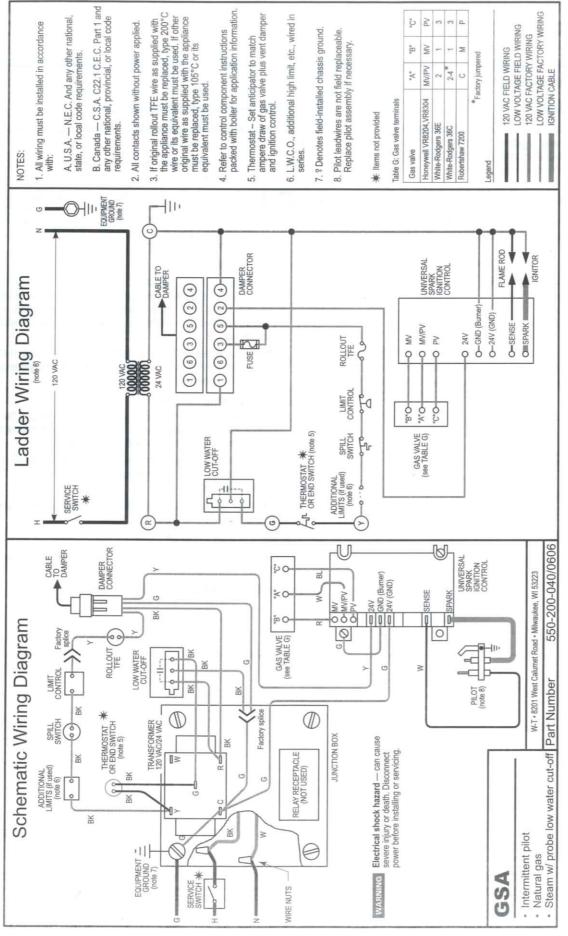


Figure 2 Wiring diagrams — GSA spark ignition boilers (with probe LWCO)



NOTICE See page

See page 5 for thermostat anticipator setting recommendations.

# 3 Operation

## Operating the boiler

#### **Follow Boiler Manual**

Follow the GSA Boiler Manual instructions for installation, start-up instructions and system checkout. Follow the Start-up section and Checkout Procedure in the GSA Boiler Manual before proceeding with boiler operation.

### **Operating Instructions**

- 1. Identify the gas valve used on the boiler.
- 2. Select the correct lighting instruction procedure:

_	Gas Valve	Follow:
•	Honeywell VR8204/VR8304	Page 6
	White-Rodgers 36E	Page 7
	Robertshaw 7200	Page 8
•	White-Rodgers 36C	Page 9

- Mark the correct Operating Instructions in the User's Information Manual so the owner will know which applies.
- Follow the Operating Instructions selected to operate the boiler.

### Verify the sequence of operation

- Raise the thermostat to call for heat. The vent damper actuator will slowly open the damper.
- When the vent damper is fully open, the ignition control powers the pilot spark generator and opens the pilot valve.

### DANGER

The vent damper must be in the open position when the main burners are operating. If the damper is not in the open position, flue products will escape into the building, causing severe personal injury or death.

- 3. The pilot should light:
  - a. If the pilot does not light within 15 seconds, the pilot valve will close and the spark generator is turned off. The ignition control initiates a five-minute wait period. If the call for heat continues after five minutes, the ignition sequence starts again at step 2.
  - If the pilot lights and the ignition control senses flame current, the main gas valve opens and the spark generator is turned off. The main burners will light.
- 4. During main burner operation:
  - The ignition control monitors pilot flame current. If flame signal is lost, the main valve is closed, the spark generator is activated, and sequence returns to step 3.
  - If power is interrupted, the ignition control turns off pilot and main gas valves. The sequence returns to step 1 when power is restored.
- When the thermostat is satisfied, the pilot and main gas valves are closed. The vent damper will close.
- The boiler is now in the off cycle.
- Repeat steps 1 through 6 above several times to verify operation.
- 8. Return the thermostat to its normal setting.

### Set the thermostat anticipator

- The thermostat anticipator must be set to match the operating ampere load for best operation.
- Find the correct setting from Figure 3. Add the total amperes for the gas valve, ignition control and vent damper.

Figure 3 Thermostat anticipator setting — set to equal the total current of the gas valve, ignition control and vent damper used on the boiler

	Device	Amps
	Honeywell VR8204	0.5
	Honeywell VR8304	0.7
Gas	White-Rodgers 36E	0.3
vaives	White-Rodgers 36C	0.6
	Robertshaw 7200	0.4
Ignition	Honeywell S8620C	0.2
	United Technologies 1003	0.1
Vent	Effikal	0.1
lampers	Johnson	0.2

## Verify proper operation after servicing

Follow the instructions in the Boiler Manual to verify proper operation after servicing the boiler or replacing components.

# **Spark ignition**

Gas valve — Honeywell VR8204/VR8304

### FOR YOUR SAFETY READ BEFORE OPERATING

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

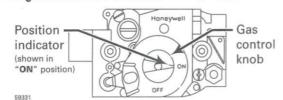
- A. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
- B. BEFORE OPERATING, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor. See below.
- C. Use only your hand to turn the gas control knob. Never use tools. If the knob will not 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.

### WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric 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.

## OPERATING INSTRUCTIONS

- 1. STOP! Read the safety information above on this label.
- Set the thermostat to lowest setting.
- When equipped with Effikal vent damper Model RVGP, place service switch in "HOLD DAMPER OPEN" position. See Control Supplement for additional information.
- 4. Turn off all electrical power to the appliance.
- 5. Remove front panel.
- When equipped with Johnson Controls vent damper Model M35, manually rotate damper blade in direction of arrow to "OPEN" position indicated on damper assembly.
- 7. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
- 8. Turn gas control knob clockwise \to "OFF."



- 9. When equipped with vent damper, verify damper blade is in full open position.
- 10. Wait five (5) 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
- 11. Turn gas control knob counterclockwise \( \cap \) to "ON."
- 12. Turn on all electric power to the appliance.
- 13. When equipped with Effikal vent damper, place service switch in "AUTOMATIC OPERATION" position.
- 14. Set thermostat to desired setting.
- 15. If the appliance will not operate, follow the instructions "To Turn Off Gas To The Appliance" and call your service technician or gas supplier.
- 16. Replace front panel.

## TO TURN OFF GAS TO THE APPLIANCE

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

  - 5. Replace front panel.

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# **Spark ignition**

## Gas valve — White-Rodgers 36E

### FOR YOUR SAFETY READ BEFORE OPERATING

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

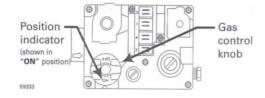
- A. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
- B. BEFORE OPERATING, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor. See below.
- C. Use only your hand to turn the gas control knob. Never use tools. If the knob will not 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.

### WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric 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.

## OPERATING INSTRUCTIONS

- STOP! Read the safety information above on this label.
- Set the thermostat to lowest setting.
- When equipped with Effikal vent damper Model RVGP, place service switch in "HOLD DAMPER OPEN" position. See Control Supplement for additional information.
- 4. Turn off all electrical power to the appliance.
- Remove front panel.
- 6. When equipped with Johnson Controls vent damper Model M35, manually rotate damper blade in direction of arrow to "OPEN" position indicated on damper assembly.
- 7. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
- 8. Turn gas control knob clockwise \to "OFF."



- 9. When equipped with vent damper, verify damper blade is in full "OPEN" position.
- 10. Wait five (5) 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
- 11. Turn gas control knob counterclockwise \( \square \) to "ON."
- 12. Turn on all electric power to the appliance.
- 13. When equipped with Effikal vent damper, place service switch in "AUTOMATIC OPERATION" position.
- 14. Set thermostat to desired setting.
- 15. If the appliance will not operate, follow the instructions "To Turn Off Gas To The Appliance" and call your service technician or gas supplier.
- 16. Replace front panel.

## TO TURN OFF GAS TO THE APPLIANCE

- Set the thermostat to lowest setting.
- Turn off all electric power to the appliance if service is to be 4. Turn gas control knob clockwise \to "OFF." Do not force. performed.
- 3. Remove front panel.

  - Replace front panel.

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# **Spark ignition**

Gas valve — Robertshaw 7200

## FOR YOUR SAFETY READ BEFORE OPERATING

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. See below.
- C. Use only your hand to depress or move the selector arm. Never use tools. If the selector arm will not depress or move by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- 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.

### WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric 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.

## OPERATING INSTRUCTIONS

- 1. STOP! Read the safety information above on this label.
- Set the thermostat to lowest setting.
- When equipped with Effikal vent damper Model RVGP, place service switch in "HOLD DAMPER OPEN" position. See Control Supplement for additional information.
- 4. Turn off all electrical power to the appliance.
- Remove front panel.
- When equipped with Johnson Controls vent damper Model M35, manually rotate damper blade in direction of arrow to "OPEN" position indicated on damper assembly.
- 7. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
- Depress and move selector arm left ← to "OFF." Note: Selector arm cannot be moved to "OFF" unless selector arm is depressed slightly. Do not force.
  - Position Selector indicator arm (shown in "OFF" position) 59337

- 9. When equipped with vent damper, verify damper blade is in full "OPEN" position.
- 10. Wait five (5) 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.
- 11. Move selector arm right \to "ON."
- 12. Turn on all electric power to the appliance.
- 13. When equipped with Effikal vent damper, place service switch in "AUTOMATIC OPERATION" position.
- Set thermostat to desired setting.
- 15. If the appliance will not operate, follow the instructions "To Turn Off Gas To The Appliance" and call your service technician or gas supplier.
- 16. Replace front panel.

## TO TURN OFF GAS TO THE APPLIANCE

- Set the thermostat to lowest setting.
- Turn off all electric power to the appliance if service is to be 4. Depress and move selector arm to "OFF." Do not force. performed.
- Remove front panel.

  - 5. Replace front panel.

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# **Spark ignition**

Gas valve — White-Rodgers 36C

## 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. See below.
- C. Use only your hand to depress or turn the gas control knob. Never use tools. If the knob will not depress 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.

### WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric 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.

## **OPERATING INSTRUCTIONS**

- 1. STOP! Read the safety information above on this label.
- 2. Set the thermostat to lowest setting.
- 3. When equipped with Effikal vent damper Model RVGP, place service switch in "HOLD DAMPER OPEN" position. See Control Supplement for additional information.
- 4. Turn off all electrical power to the appliance.
- Remove front panel.
- When equipped with Johnson Controls vent damper Model M35, manually rotate damper blade in direction of arrow to "OPEN" position indicated on damper assembly.
- 7. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
- Depress gas control knob slightly and turn clockwise ~ to "OFF." Note: Knob cannot be turned to "OFF" unless knob is depressed slightly. Do not force.



- 9. When equipped with vent damper, verify damper blade is in full "OPEN" position.
- 10. Wait five (5) 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.
- 11. Turn gas control knob counterclockwise of to "ON."
- 12. Turn on all electric power to the appliance.
- 13. When equipped with Effikal vent damper, place service switch in "AUTOMATIC OPERATION" position.
- 14. Set thermostat to desired setting.
- 15. If the appliance will not operate, follow the instructions "To Turn Off Gas To The Appliance" and call your service technician or gas supplier.
- 16. Replace front panel.

## TO TURN OFF GAS TO THE APPLIANCE

- Set the thermostat to lowest setting.
- performed.
- Remove front panel.
- Turn off all electric power to the appliance if service is to be 4. Depress gas control knob slightly and turn clockwise are to "OFF." Do not force.
  - Replace front panel.

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# 4 Troubleshooting

WARNING

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

WARNING

Never jumper (bypass) rollout thermal fuse element or any other device except for momentary testing as outlined in Chart 2, page 12. Severe personal injury, death or substantial property damage can result.

WARNING

Burner base access panel must be in position during boiler operation to prevent momentary flame rollout on ignition of main flame. Severe personal injury or substantial property damage will result.

### Before troubleshooting:

- 1. Have the following items:
  - a. Voltmeter that can check 120 VAC and 24 VAC.
  - b. Continuity checker.
  - c. U-tube manometer.
- Check for 120 VAC (minimum 102 VAC to maximum 132 VAC) to boiler.
- Make sure thermostat is calling for heat and contacts (including appropriate zone controls) are closed. Check for 24 VAC between each thermostat wire nut and ground.

### Troubleshooting sequence:

- 1. Before proceeding, check for:
  - · Loose connections, blown fuse or service switch off?
  - · High limit switch set below boiler water temperature?
  - Thermostat set below room temperature?
  - · Gas not turned on at meter or boiler?
  - Incoming gas pressure less than:
     5" w.c. for natural gas? 11" w.c. for propane gas?
- 2. If all of the above check correctly, check gas pressures:
  - a. With boiler off:
    - 13" w.c. maximum natural or propane gas pressure upstream of gas valve.
  - b. With boiler on:
    - 5" w.c. minimum natural gas pressure or 11" w.c. propane gas pressure upstream of gas valve.
    - 3.5" w.c. minimum natural gas pressure or 10" w.c. propane gas pressure downstream tapping on gas valve — Can be adjusted by regulator on gas valve.
  - If gas pressure is incorrect or gas is not available to boiler, contact gas supplier to correct before proceeding further.

### In event of vent damper failure:

#### Effikal vent damper

If troubleshooting chart recommends replacing actuator and actuator is not immediately available, damper blade can be fixed in an open position to allow boiler operation. Manually turning blade can cause actuator damage. Follow these instructions only in case of no heat or damper actuator malfunction.

- Move damper service switch to Hold Damper Open position. Apply call for heat to boiler. Damper blade should then rotate to Open position and boiler will fire.
- If step 1 does not open damper, manually rotate damper blade to open position using wrench or pliers on flat shaft between damper and actuator. Boiler will fire. Verify that damper service switch is in Hold Damper Open position. See Figure 4.
- Do not leave vent damper permanently in this position. Replace actuator immediately. If vent damper is left in Open position, boiler will not operate at published efficiencies.

#### Johnson Controls vent damper

If troubleshooting chart recommends replacing actuator and actuator is not immediately available, damper blade can be fixed in an open position to allow boiler operation. Follow these instructions only in case of no heat or damper actuator malfunction. See Figure 4.

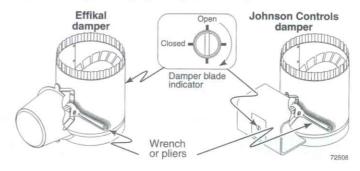
Turn off power to boiler.

WARNING

Failure to turn off power to boiler can result in severe personal injury, death or substantial property damage.

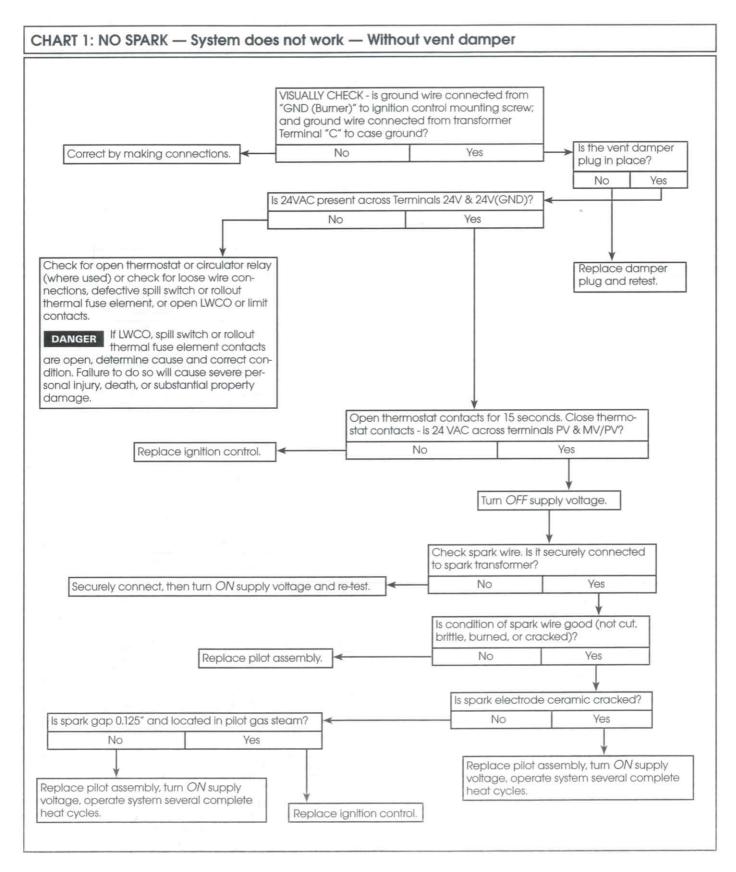
- 2. See vent damper manufacturer's instructions for procedure to fix vent damper in open position.
- Turn on power to boiler.
- Using wrench or pliers on flat shaft section, manually rotate damper blade until green light turns on. Boiler will fire. See Figure 4.
- Do not leave vent damper permanently in this position. Replace actuator immediately. If vent damper is left in Open position, boiler will not operate at published efficiencies.

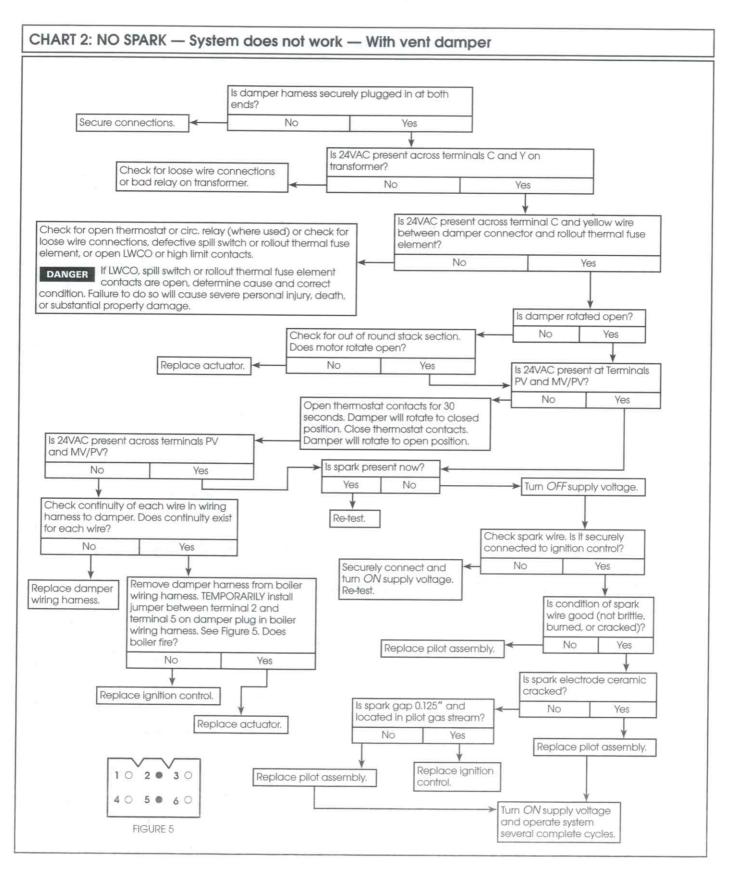
Figure 4 Manually opening vent damper



WARNING

Verify proper operation after servicing. • See vent damper manufacturer's instructions packed with vent damper for additional information. Failure to comply could result in severe personal injury, death or substantial property damage.





#### CHART 3: PILOT LIGHTS — Main valve will not come on — With or without vent damper Does spark stay on for more than a few seconds after pilot is established? Is 24VAC between terminals MV and Make sure sense wire is not wrapped around any pipes or PV on ignition control? accessories. No Is sense wire securely attached to sense terminal and pilot Replace assembly? ignition control. No Yes Check inlet gas pressure. Is pressure: at least 5.0 inches w.c.? Correct Is sensing probe ceramic • not more than 14.0 inches w.c.? cracked? No Yes No Yes Contact gas supplier to correct pressure. Is sense wire or sensing probe Replace pilot Is main valve wiring secure at assembly. shorted out to a metal surface? terminals? No No Yes Correct wiring. Correct Replace gas valve. Check sense wire continuity. Check condition of insulation. Both OK? No Replace pilot assembly. Does system have proper flame signal? d. Energize the system. Spark should ignite the pilot. As Set up microammeter to measure output current in flame soon as pilot is burning, the microammeter should read sensor circuit as follows: at least 1.0 microamp for Honeywell \$8620C control. a. Detach sense lead from ignition control. Attach or 0.1 microamp for United Technologies 1003-611A negative lead from microammeter to sense terminal on ignition control. e. Is flame current signal less than the minimum specified b. Attach positive lead to sense wire from pilot assembly. in step "d" above? c. Disconnect main valve lead from terminal "MV" on ignition control.

Replace ignition control.

No

- Check for proper gas pressure.
- Clean pilot assembly.
- Tighten mechanical and electrical connections.

Ves

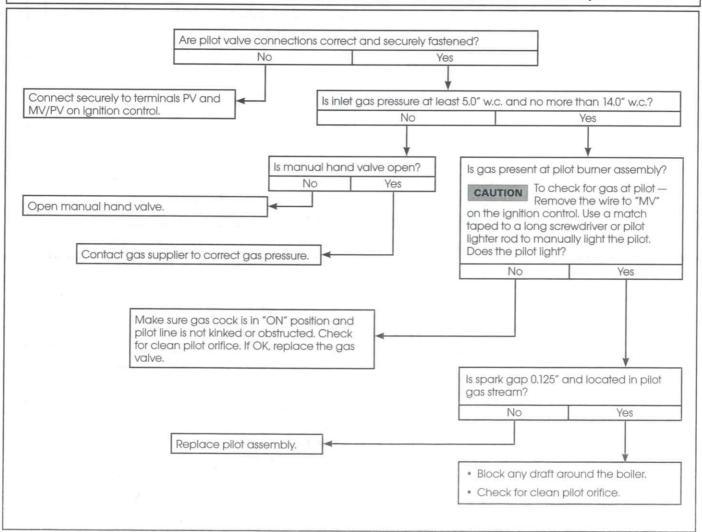
- Check for proper system grounding.
- See procedure to check grounding on next page.

### CHART 3 (continued): Procedure to check system grounding

Pilot assembly and ignition control must share common ground with main burner. Nuisance shutdowns are often caused by poor or erratic ground.

- Check for good metal-to-metal contact between pilot burner bracket and main burner, and between main burner and burner rest.
- Check ground lead from "GND (Burner)" terminal on ignition control to ignition control mounting screw, and from "C" on transformer to transformer case ground. Make sure connections are clean and tight. If wire is damaged or deteriorated, replace with No. 18 gauge moisture-resistant, thermoplastic-insulated wire with 105°C minimum rating.

## CHART 4: PILOT LIGHTS — Main valve will not come on — With or without vent damper



# 5 Parts

Part Description	Vendor Part Number	Part Number
Damper Assembly		
5" (GSA 075-100)	Effikal RVGP-KS-5BKF Johnson Q35GD-2 consisting of MB35BC actuator and Y15 vent pipe	381-800-475WT
6" (GSA 125-150)	Effikal RVGP-KS-6BKF Johnson Q35GF-2 consisting of MB35BC actuator and Y15 vent pipe	381-800-476WT
7" (GSA 175-200)	Effikal RVGP-KS-7BKF Johnson Q35GF-2 consisting of MB35BC actuator and Y15 vent pipe	381-800-477WT
8" (GSA 250)	Effikal RVGP-KS-8BKF Johnson Q35GF-2 consisting of MB35BC actuator and Y15 vent pipe	381-800-478WT
Damper Actuator	Effikal RVGP (Effikal Only) Johnson B35BE-1C (Johnson Only)	510-512-337WT 510-312-255WT
Damper Harness		591-391-795WT
UCS Ignition Control	Honeywell S8620C1003 United Technologies 1003-611A	511-330-097WT
Wiring Harness (in Envelope Assy), GSA 075-250, Steam w/ Probe LWCO		540-130-990WT
Pilot Burner Assembly	Precision Speed Equipment PSE-NA16	511-330-218WT
Gas Valve 1/2"x1/2" Sizes 075-175 Natural Gas	Honeywell VR8204A2001 White Rodgers 36E36-266 Robertshaw 7200IPER	511-044-381WT
Gas Valve 3/4"x3/4" Sizes 200-250 Natural Gas 1.2 step	Honeywell VR8304P4348 White Rodgers 36C 74-474	511-044-382WT

Part Number 550-141-971/0706