



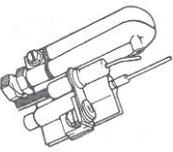
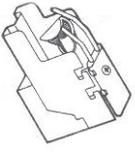
INSTALLATION DATA

780-704 & 780-705

MODERNIZATION KITS CONVERTS “D” SERIES TO “FLAME RECTIFICATION”

The Robertshaw® “D” Series Pilot Ignition System was introduced in 1977. The system consisted of a 7000 BDER gas valve and one of two models of ignition control units. These units had a factory model number of SP720 (nonlockout) and SP750 (lockout). They are obsolete and no longer available. This modernization kit was designed to replace these obsolete ignition control units. The modernization kit will upgrade the old heat sensor/flame switch system to flame rectification.

PILOT ADAPTORS - ORDER SEPARATELY

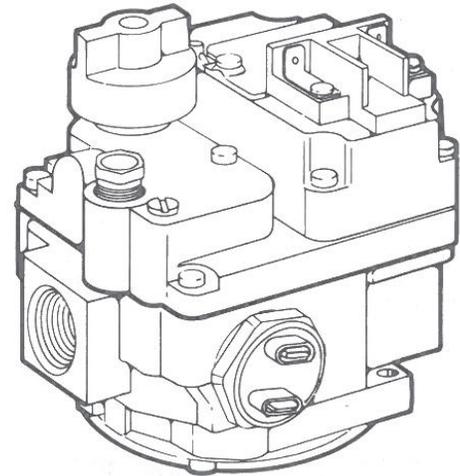
GAFFERS AND SATTLER	CARRIER/BDP 732 Pilot
	
ORDER 1751-712	ORDER 1751-716

KIT ORDERING DATA

UNI-LINE NUMBER	TYPE	REPLACES
780-704	LOCKOUT	780-700, SP750 919-01, SP750-909-01, SP750-909-02, SP750-909-03
780-705	NONLOCKOUT	780-701, SP720-919-01, SP720-909-01 through SP720-909-04

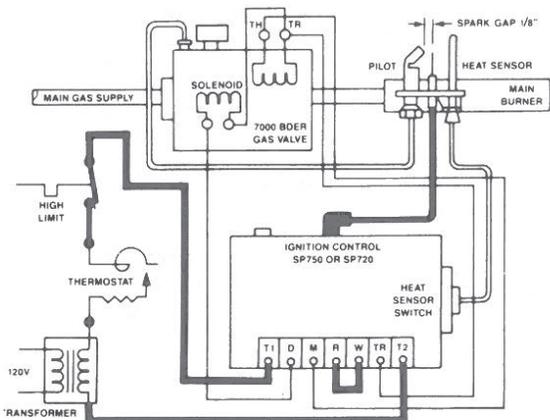
SYSTEM IDENTIFICATION

- Determine ignition control unit type and factory model number.**
Determine the factory model number by locating the number on the control's rating plate and visually comparing it with the drawings below.
- Determine system wiring method.**
There are three types of wiring possibilities that can be encountered. Determine from the schematics below which wiring method the application has. Proceed to appropriate section for that wiring method.
Note: Previously-retrofitted systems will have a plug-in connector in the wiring harness at the ignition control unit.

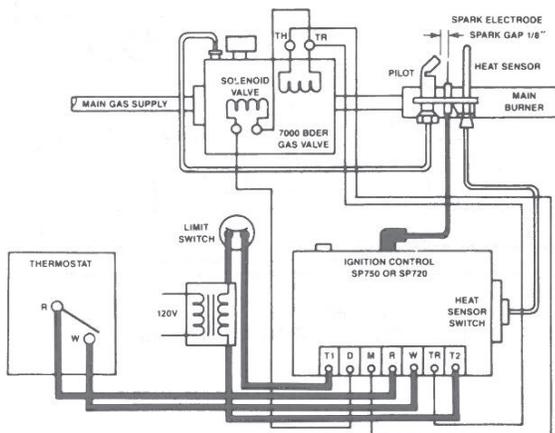


CAUTION

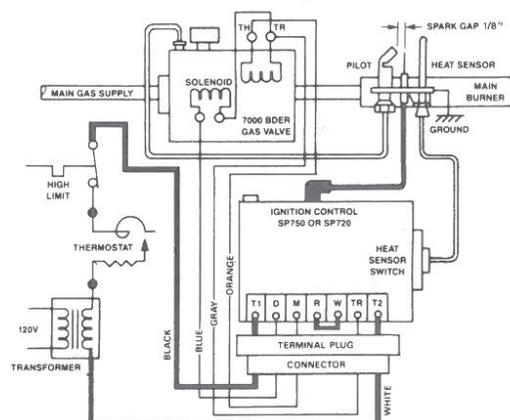
THE 780-704 AND 780-705 MUST BE INSTALLED BY A QUALIFIED INSTALLING AGENCY WITH DUE REGARD FOR SAFETY. IMPROPER INSTALLATION COULD RESULT IN A HAZARDOUS CONDITION.



WIRING METHOD “B” – O.E.M. PAGE 3



WIRING METHOD “A” – O.E.M. PAGE 2



WIRING METHOD “C” – RETROFITTED PAGE 4

INSTALLATION INSTRUCTIONS - WIRING METHOD "A" - O.E.M.

STEP 1 - REMOVING THE OLD SYSTEM

1. Turn off all electrical power to the furnace being serviced.
2. Double check existing wiring against wiring method "A" schematic on page one. If identical, then proceed as directed below.
3. Disconnect all the wires from the gas valve and the ignition control unit terminals D, M and TR. Discard these wires. **Note:** The gas valve is not removed.
4. Disconnect the orange high voltage wire from the top of the ignition control unit.
5. At the ignition control unit, disconnect the wires from terminals T1 and R. Cut the connectors from these wires and wire-nut these two wires together. (Figure 2.)
6. Disconnect the wire from terminal W. Wire-nut this wire to the gray wire in the new wiring harness included in the modernization kit.
7. Disconnect the wire from terminal T2 and wire-nut this wire to the black wire in the new wiring harness. Move the new wiring harness aside for the moment. Proceed to step 2 below.

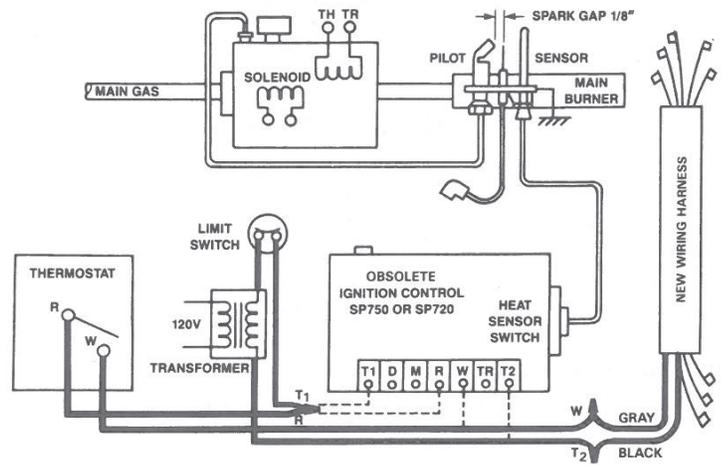


FIGURE 2
WIRING AT THE END OF STEP 1

STEP 2 - PILOT ELECTRODE/SENSOR ASSEMBLY

There are two types of pilots that may be encountered on your application: O.E.M. type and retrofitted type. To determine which type you have and how to "modernize" it, turn to page 5. Follow the instructions given on page 5, then return to this page and continue to Step 3.

STEP 3 - INSTALLING AND WIRING NEW SYSTEM

1. Remove the old ignition control unit. Install the new ignition control unit using the mounting screws or double-faced tape included in the modernization kit.
2. The new wiring harness in the modernization kit should be pre-wired. If for any reason it isn't, connect the harness to the ignition control units as follows: **NOTE:** Three-wire connector (green, white and black wire) may be connected to any terminal labeled GND, MV/PV or TR.

4. Connect the white sensor wire to the "SENSE" terminal (red harness).
5. Connect the green ground wire to the ground terminal on the gas valve. **NOTE:** System must be grounded or severe damage to gas valve may result.
6. Connect the RED, WHITE and BLUE wires in the blue wire harness to the GAS VALVE as shown in the wiring schematic below.
7. Locate the white jumper wire in the kit. Attach this wire to the screw terminal TR on the gas valve operator. Attach the other end of this white wire to one terminal of the solenoid valve.
8. Set thermostat heat anticipator to .7 Amp.
9. Modernization of system to FLAME RECTIFICATION is now complete. Restore electrical power to the furnace and proceed to SYSTEM CHECKOUT PROCEDURES, page 6. **NOTE:** The system circuit is closed when the thermostat contacts close. Power is supplied to the new ignition control unit terminals TH and TR.

Wire Color		Terminal Connection
Green		GND
White	Three-wire	MV/PV
Black	Connector	TR
Red		MV
Blue		PV
Gray		TH

3. Install the ground terminal included in the modernization kit. Assemble ground terminal to valve, see figure 1.

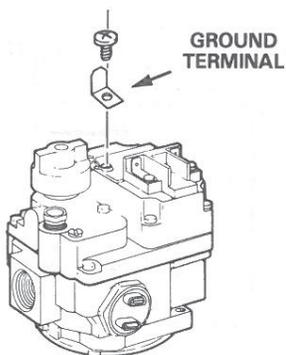


FIGURE 1

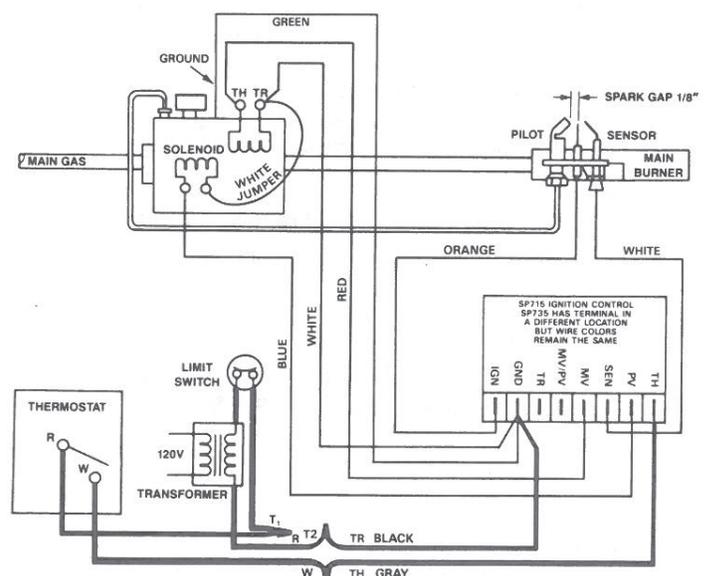


FIGURE 3
WIRING AT COMPLETION OF MODERNIZATION

INSTALLATION INSTRUCTIONS - WIRING METHOD "B" - O.E.M.

STEP 1 - REMOVING THE OLD SYSTEM

1. Turn off **all** electrical power to the furnace being serviced.
2. Double check existing wiring against wiring method "B" schematic on page one. If identical, then proceed as directed below.
3. Disconnect all the wires from the gas valve and the ignition control unit terminals D, M and TR. Discard these wires. **NOTE:** The gas valve is not removed.
4. Disconnect the orange high voltage wire from the top of the ignition control unit.
5. Remove the heat sensor/flame switch from the pilot burner. It will not be reused. Do not disturb the electrode which is riveted to the pilot burner frame.
6. At the ignition control unit, disconnect the wire at terminal T1. Cut the connector and wire-nut this wire to the gray wire in the new replacement wiring harness.
7. Disconnect the wire from terminal T2 and wire nut this wire to the black wire in the new wiring harness. Move the new wiring harness aside for the moment. Proceed to step 2 below.

STEP 2 - PILOT ELECTRODE/SENSOR ASSEMBLY

There are two types of pilots that may be encountered on your application: O.E.M. type and retrofitted type. To determine which type you have and how to "modernize" it, turn to page 5. Follow the instructions given on page 5, then return to this page and continue to Step 3.

STEP 3 - INSTALLING AND WIRING NEW SYSTEM

1. Install the new ignition control unit using the mounting screws or double-faced tape included in the modernization kit.
2. The new wiring harness in the modernization kit should be pre-wired. If for any reason it isn't, connect the harness to the ignition control units as follows: **NOTE:** Three-wire connector (green, white and black wire) may be connected to any terminal labeled GND, MV/PV or TR.

<u>Wire Color</u>		<u>Terminal Connection</u>
Green		GND
White	Three-wire	MV/PV
Black	Connector	TR
Red		MV
Blue		PV
Gray		TH

3. Install the ground terminal included in the modernization kit. Assemble terminal to valve, see figure 1.

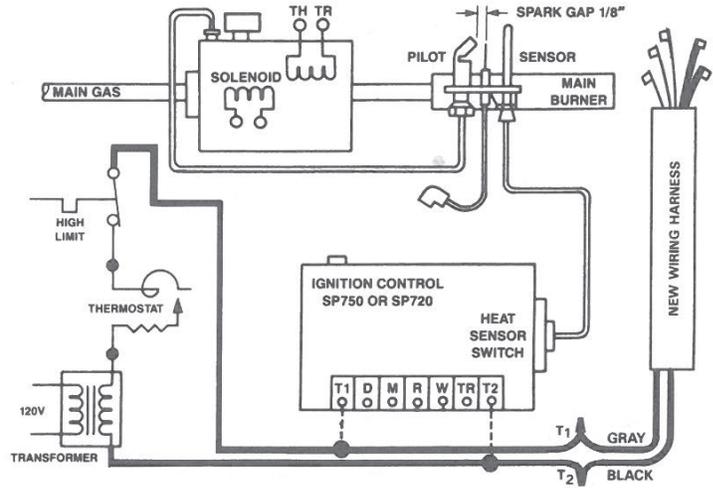


FIGURE 4
WIRING AT THE END OF STEP 1

4. Connect the white sensor wire to the "SENSE" terminal.
5. Connect the green ground wire to the ground terminal on the gas valve. **NOTE:** System must be grounded or severe damage to gas valve may result.
6. Connect the RED, WHITE and BLUE wires in the blue wire harness to the IGNITION CONTROL UNIT and GAS VALVE as shown in the wiring schematic below.
7. Locate the white jumper wire in the kit. Attach this wire to the screw terminal TR on the gas valve operator. Attach the other end of this white wire to one terminal of the solenoid valve.
8. Set thermostat heat anticipator to .7 Amp.
9. Modernization of system to FLAME RECTIFICATION is now complete. Restore electrical power to the furnace and proceed to SYSTEM CHECKOUT PROCEDURES, page 6. **NOTE:** The system circuit is closed when the thermostat contacts close. Power is supplied to the new ignition control unit terminals TH and TR.

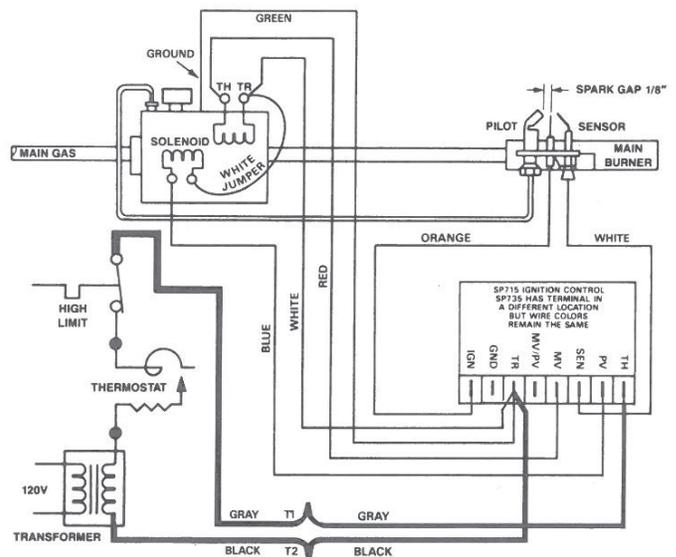
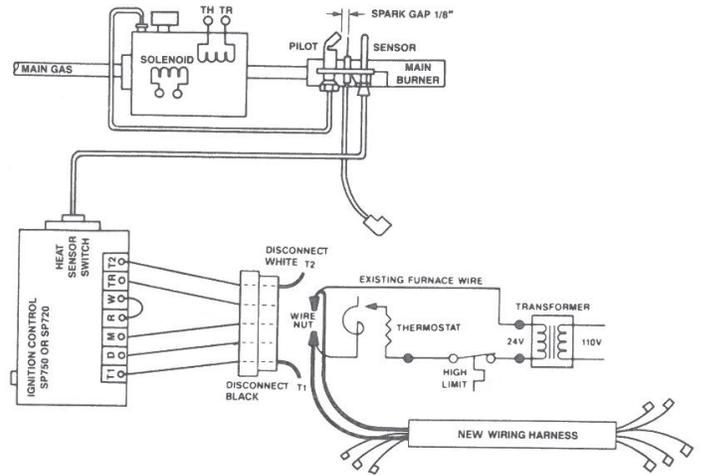


FIGURE 5
WIRING AT COMPLETION OF MODERNIZATION

**INSTALLATION INSTRUCTIONS -
WIRING METHOD "C" - RETROFITTED**

STEP 1 - REMOVING THE OLD SYSTEM

1. Turn off **all** electrical power to the furnace being serviced.
2. Double check existing wiring against wiring method "C" schematic on page one. If identical, then proceed as directed below.
3. Disconnect all wiring connections from the gas valve. Do not disconnect the wire harness (black and white wires) from the furnace power source at this time.
4. Unplug the wiring harness from the ignition control unit. Note the harness is still connected to the furnace. Move the harness out of the way.
5. Disconnect the orange high voltage wire from the top of the ignition control unit.
6. Remove the heat sensor/flame switch from the pilot burner.
7. Remove the ignition control unit and flame switch. Discard the electrode, flame switch and ignition control unit.



**FIGURE 6
WIRING AT THE END OF STEP 1**

STEP 2 - INSTALLING THE NEW SYSTEM

Turn to page 5. Follow instructions for retrofitted type pilots.

STEP 3 - INSTALLING AND WIRING NEW SYSTEM

1. Install the new ignition control unit using the mounting screws or double-faced tape included in the modernization kit.
2. The new wiring harness in the modernization kit should be prewired. If for any reason it isn't, connect the harness to the ignition control units as follows: **NOTE:** Three-wire connector (green, white and black wire) may be connected to any terminal labeled GND, MV/PV or TR.

8. Mount the ignition control unit to the furnace chassis using the two sheet metal screws provided or using the double-faced tape.
9. Connect the RED, WHITE and BLUE wires in the blue six-wire harness to the GAS VALVE as shown in the wiring schematic below.
10. Set thermostat heat anticipator to .7 amp.
11. Modernization of system to FLAME RECTIFICATION is now complete. Restore electrical power to the furnace and proceed to SYSTEM CHECKOUT PROCEDURES, page 6. **NOTE:** The system circuit is closed when the thermostat contacts close. Power is supplied to the new ignition control unit terminals TH and TR.

Wire Color

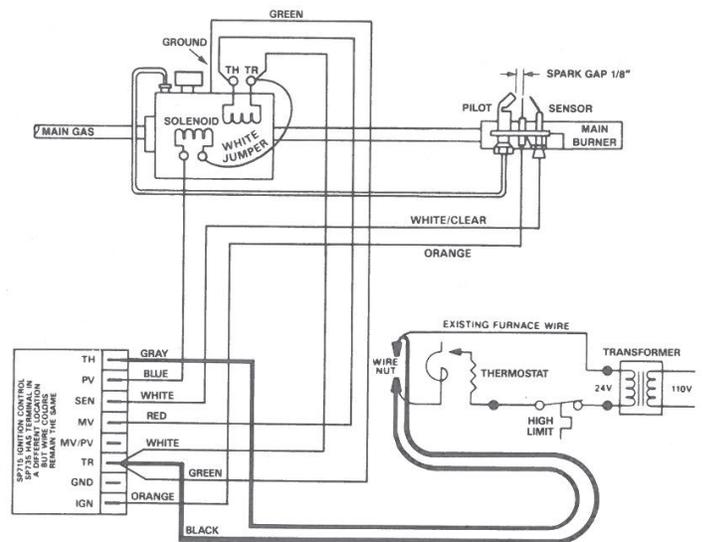
Green
White
Black
Red
Blue
Gray

Three-wire
Connector

**Terminal
Connection**

GND
MV/PV
TR
MV
PV
TH

3. Install the ground terminal included in the modernization kit. Assemble ground terminal to valve, see figure 1.
4. The old harness is still connected to the furnace power source. Disconnect the white wire from the power source and wire-nut the black wire in the new harness to this power wire.
5. Disconnect the black wire in the old harness. Discard the old harness. Connect the gray wire in the new harness to this remaining power wire.
6. Connect the orange wire in the red two-wire harness to the "IGN" terminal on the ignition unit.
7. Connect the white sensor wire in the red two-wire harness to the "SENSE" terminal on the ignition unit.



**FIGURE 7
WIRING AT COMPLETION OF MODERNIZATION**

PILOT ELECTRODE/SENSOR ASSEMBLY

There are two types of pilots that may be encountered on your application: O.E.M. type and retrofitted type. Compare your pilot with the drawings below (figure 8 and figure 9). Follow the appropriate instructions given for your pilot type, then return to Step 3.

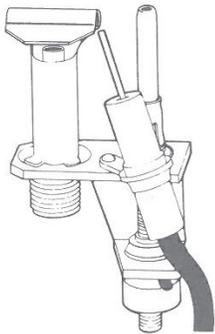


FIGURE 8
O.E.M. TYPE

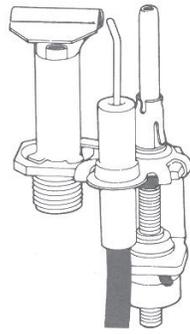
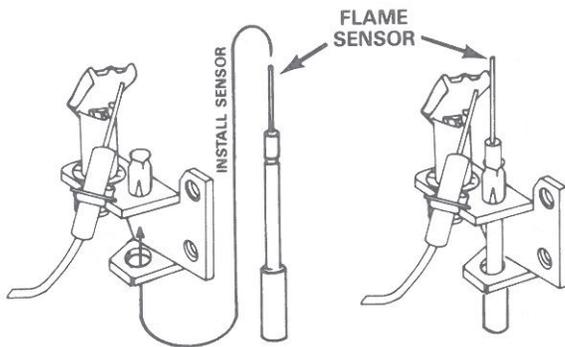


FIGURE 9
RETROFITTED TYPE

O.E.M. TYPE PILOT

A. The pilot has a small hole with a tinerman clip and the electrode is riveted to the pilot frame. If you have this type of pilot assembly, locate the new "Flame Sensor" included in the modernization kit. Insert it into the tinerman clip as shown below.



B. Locate the red two-wire harness that is included in the kit. Pull the orange wire out and discard it. Leave only the white or clear sensor wire in the red protective sheath.

C. Connect the white or clear sensor wire to the base of the flame sensor.

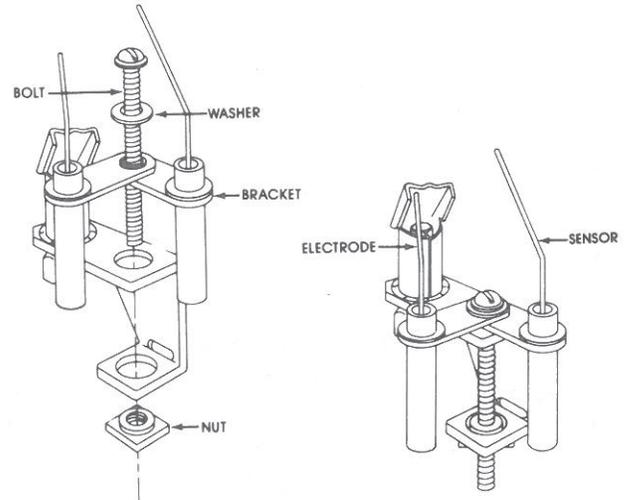
D. Locate the high voltage cable adaptor included in the kit. Attach it to the "IGNITOR" terminal on the new ignition control unit. (See Figure 10.)

E. Locate the orange high voltage wire that is attached to the electrode on the pilot frame. Connect it to the adaptor on the "IGNITOR" terminal on the new ignition control unit.

RETROFITTED TYPE PILOT

A. The existing ignitor is not riveted to the pilot frame but is held in place by metal tabs, as shown in figure 9. If you have this type of pilot, remove the pilot assembly from the furnace. Disassemble and remove the ignitor sensor from the pilot frame.

B. Locate the twin electrode/sensor assembly included in the modernization kit. Assemble it to the pilot burner frame as shown below.



C. The electrode/sensor assembly can now be positioned for correct sparking and sensing. Because the leads are identical, you can select either to be the electrode.

D. Position the electrode so that the electrode wire can be bent and positioned to spark to the pilot hood. Cut off excess wire and position the tip of the electrode wire for a 1/8" maximum spark gap. Be sure sparking will occur in the path of the gas flow.

E. Next, position the flame sensor and bend this wire so that the pilot flame fully envelops the sensor wire. This sensor wire can be cut to length also. Tighten the bolt firmly so that the bracket assembly will not move or change position once the pilot is installed.

CAUTION: The electrode must not spark to the sensor wire.

F. Locate the red two-wire harness in the kit. Attach the orange wire to the electrode and the white wire to the sensor.

G. Reinstall the pilot in its exact previous location. NOTE: Pilot is not to be relocated or altered. If replacing the pilot becomes necessary, due to damage, an exact replacement should be used. Return to step 3.

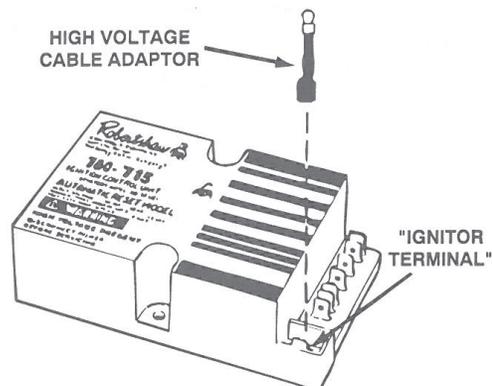


Figure 10

SYSTEM CHECKOUT PROCEDURES

The initial installation portion is now complete and ready for final system checkout. The checkout procedures listed below must be followed. While there are redundant safety features built into the system, it is imperative that you follow the steps outlined below to ensure proper and safe operation. If you encounter any irregularities, refer to the TROUBLESHOOTING GUIDE in the Owner's Manual.

1. Check all wiring connections.
2. Turn on main gas supply and manual valve on the gas valve.
3. Turn on electrical power.
4. Thermostat set high.
5. Sparking begins, pilot gas ignites.
6. Pilot flame on sensor, main burner on.
7. With main burner on, cycle thermostat off then on.
 - A. Nonlockout system will turn off and immediately on again.
 - B. Lockout system will turn off. Sparking will not begin for 5 seconds.
8. With the main burner on, turn the manual gas valve to off position. Wait until all flame is out. Turn manual gas valve on again.
 - A. Sparking will begin as soon as the pilot flame is out.
 - B. Pilot ignition takes place when gas flow is restored.
9. If this is a lockout system, with main burner on, turn manual gas valve off. Sparking will begin when the pilot flame goes out. After 60 seconds the system will lockout and sparking will cease.
10. To restart the system turn thermostat low for 5 seconds. Then set high again. Sparking will begin in 5 seconds.
11. It is absolutely necessary that the system be cycled normally (thermostatically controlled) through at least three complete heating cycles. Set thermostat to a temperature slightly higher than the existing ambient. Allow appliance to cycle ON and run through a normal cycle. Do not manually shorten the cycle.
12. The initial checkout procedures have been completed. If the system has functioned normally, return thermostat setting to its normal setting. The qualified installing agency must completely fill out and apply the yellow appliance conversion sticker to the front of the appliance. Leave these and all other instructions with the homeowner.



Customer Service Telephone 1.800.304.6563
Customer Service Facsimile 1.800.426.0804
HVACCustomerService@robertshaw.com

For Technical Service
Telephone 1.800.445.8299
Facsimile 1.630.260.7294
TechnicalService@robertshaw.com

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