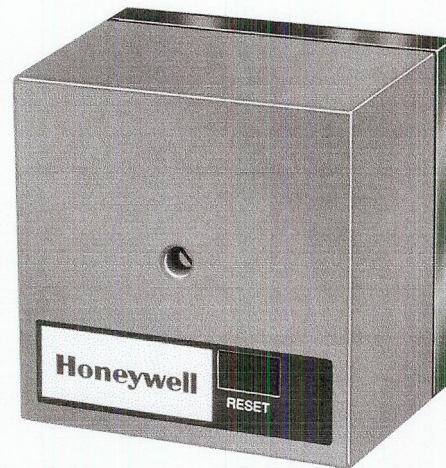


R7795A,B,C,D Flame Safeguard Primary Controls

The R7795 Flame Safeguard Primary Control provides flameout protection plus automatic control of commercial and industrial gas and oil burners. Models provide intermittent pilot or interrupted pilot with delayed main valve.



- Integral solid state color-coded flame amplifiers: R7795A,C for ultraviolet detection systems (purple). R795B,D for rectification detection systems (green). See Table 1.
- Solid state plug-in ST95A Purge Timers provide prepurge timings of 1.5, 7, 10, 30, 60, or 90 seconds.
- Includes terminals for connection of a line voltage airflow switch to prove airflow from the start of prepurge through the run period.
- Mounts on a Q795A Subbase with two captive screws. All electrical connections are automatically provided between the device and subbase. Wiring terminals are accessible for testing.
- Meter jack on amplifier board for measuring flame signal with system in operation.
- Internal light-emitting diode (LED) indicates presence of flame signal.
- Field selectable ten or four second trial for pilot flame ignition.
- Powered alarm terminal to operate an external line voltage alarm on safety lockout.
- R7795 models are available with either intermittent pilot (interrupted ignition) or interrupted pilot and delayed main valve. See Table 2.
- Run-Test switch on interrupted pilot/delayed main valve models.
- Safe-start feature prevents start-up with lockout if flame or a flame simulating failure exists.
- Recycle or lockout on flame failure is field selectable.
- Safety switch must be manually reset after lockout.
- Meets Underwriters Laboratories, Canadian Standards Association, and Factory Mutual Approved standards.

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EPRI Edgemont Precision Rebuilders, Inc.
Matlack Industrial Center
207 Carter Dr Unit C
West Chester, PA 19382
800 356-3774

Specifications

TABLE 1—FLAME DETECTION SYSTEMS.

Model	Flame Detection Amplifier Type	Fuel	Applicable Flame Detectors	
			Type	Models
R7795A,C	Ultraviolet (purple)	Gas, oil	UV (Minipeeper)	C7027, C7035, C7044
R7795B,D	Rectification (Green)	Gas	Rectifying flame rods	Holders: ^a C7004, C7007, C7011 Complete Assy: C7005, C7008, C7009, Q179
		Oil	Rectifying photo cells ^b	C7003, C7010, C7013, C7014
		Gas, oil, coal	UV (Purple Peeper)	C7012A,C

^a Order flame rod separately.

^b Use Honeywell part no. 38316 Photocell only.

TABLE 2—R7795 MODELS AVAILABLE.

R7795	Flame Detection Type	Amplifier Color	Flame Establishing Period (sec)		Flame Failure		Run/Test Switch
			Pilot ^a	Main	Nominal Response (sec)	Device Reaction ^b	
R7795A	UV	Purple	Intermittent	Intermittent Pilot	3	Recycle or Lockout	No
R7795B	Rectification	Green					
R7795C	UV	Purple	10/4	10			Yes
R7795D	Rectification	Green	Interrupted	Seconds			

^a Field selectable:

10 sec with the orange jumper wire unclipped.

4 sec with the orange jumper wire clipped.

^b Field selectable:

Recycle with the yellow jumper wire unclipped.

Lockout with the yellow jumper wire clipped.

Ordering Information

When purchasing replacement and modernization products from your TRADELINE® wholesaler or your distributor, refer to the TRADELINE Catalog or price sheets for complete ordering number, or specify—

1. Order number, TRADELINE, if desired.

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Honeywell Home and Building Control Sales Office (check white pages of phone directory).
2. Home and Building Control Customer Satisfaction
Honeywell Inc., 1885 Douglas Drive North
Minneapolis, Minnesota 55422-4386 (612) 951-1000

In Canada—Honeywell Limited/Honeywell Limitée, 740 Ellesmere Road, Scarborough, Ontario M1P 2V9. International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

ELECTRICAL RATINGS:

Voltage and Frequency: 120 Vac, (+10, -15%), 50/60 Hz.

Power Consumption:

R7795A,C: 17 VA (maximum).

R7795B,D: 15 VA (maximum).

TERMINAL RATINGS:

Terminal	Load	Maximum Rating at 120 Vac
5	Pilot Valve	125 VA pilot duty.
18	Ignition	360 VA.
6, 7	Main Fuel Valve(s)	125 VA pilot duty or 25 VA pilot duty plus one or more motorized valves with a total rating of 500 VA opening, 250 VA holding.
8	Fan or burner motor	9.8A full load; 58.8A locked rotor.
9	Alarm	1.0A.

NOTE: Allowable inrush can be up to ten times the pilot duty rating.

Example:

Pilot duty rating = 125 VA. At 120V, running current is $125/120 = 1.05A$.

Maximum allowable inrush is 10 times 1.05 = 10.5A.

AMBIENT TEMPERATURE RANGES:

Operating: -40° F [-40° C] to +135° F [+57° C].

FLAME FAILURE RESPONSE: 3 seconds nominal.

DIMENSIONS: Approximately 5 x 5 x 5-1/4 in. [127 x 127 x 133.5 mm].

WEIGHT: 2.0 lb [0.9 kg].

MOUNTING: Two captive screws in device for mounting onto Q795A Subbase (ordered separately).

APPROVALS:

Underwriters Laboratories Inc. listed: File No. MP268, Guide No. MCCZ.

Canadian Standards Association certification: pending.

Factory Mutual approved: Report No. J.I. OR4A2.AF

ACCESSORIES (See Fig. 1):

W136A Test Meter (includes 196146 Meter Connector Plug).

196146 Meter Connector Plug for older W136A Test Meters.

123514A Flame Simulator for rectification systems.

123514B Flame Simulator for ultraviolet systems.

Q624A Solid State Spark Generator.

Q795A Wiring Subbase.

ST795A Plug-in Purge Timer (models available with 1.5, 7, 10, 30, 60, and 90 second timings).

FSP5004A with adapter for operational check of the R7795.

R1061012 Ignition Cable for ignition installations in high temperature environments; rated at 350° F [177° C] for continuous duty, and up to 500° F [260° C] for intermittent use; tested to 20,000 Vrms.

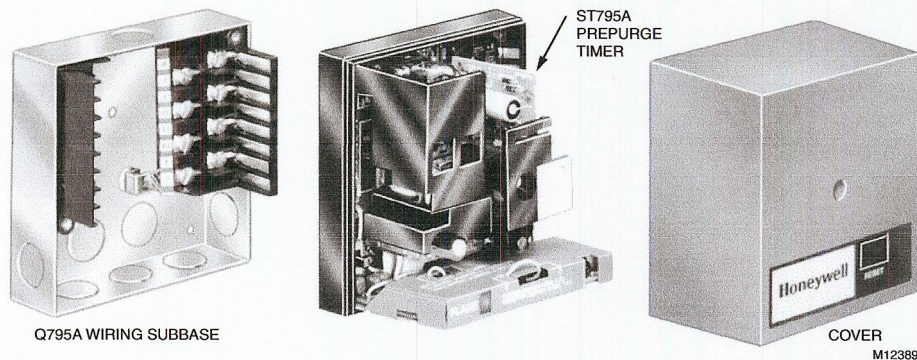
R1239001 High Tension Ignition Cable for ignition installations in a contaminating environment; very resistant to severe conditions of oil, heat, and corona. Tested to withstand high voltages up to 25,000 Vrms in a salt bath for one minute without breakdown. Rated at 200° F [93° C] for continuous duty, and up to 250° F [177° C] for intermittent use.

R1298020 Cable for flame detector (F leadwire) installations in a high temperature environment; rated up to 400° F [204° C] for continuous duty; tested for operation up to 600V and breakdown up to 7500V.

198365A Remote Reset Cover. Heavy duty cover with remote reset assembly; 120 Vac, 50/60 Hz solenoid will only fit R7795 with a series number of 1.

198365B Remote Reset Cover. Heavy duty cover with remote reset assembly; 120 Vac, 50/60 Hz solenoid will only fit R7795 with a series number of 2.

Fig. 1—R7795 System components.



Detailed Operating Sequence

The R7795A,B provides the following operational sequence when used with the appropriate flame detector. (See Figs. 2 and 3.)

STANDBY

The R7795 Primary Control is ready to start up when the burner controller closes (limits are closed).

NORMAL START-UP

1. With power applied (limits and controller closed, terminal L1 to 16, and no flame signal present) the 3K relay pulls in and the burner motor (terminal 8) is energized.
2. As soon as the airflow switch closes (terminal 3 to 8), the ST795A Prepurge Timer starts to time out (pre-purge begins).

NOTE: The ST795A Prepurge Timer returns to zero any time the airflow switch opens. The prepurge restarts when the airflow switch recloses.

3. PILOT FLAME ESTABLISHING PERIOD.

At the end of prepurge (ST795A timed out), the 1K relay pulls in, energizing the ignition transformer (terminal 18) and the intermittent pilot valve (terminal 5). This starts the ten or four second pilot flame establishing period. Safety shutdown and lockout will occur if presence of flame is not proven within:

- Ten seconds if the ORANGE jumper is *not* clipped.
- Four seconds if the ORANGE jumper is clipped.

4. MAIN FLAME IGNITION TRIAL

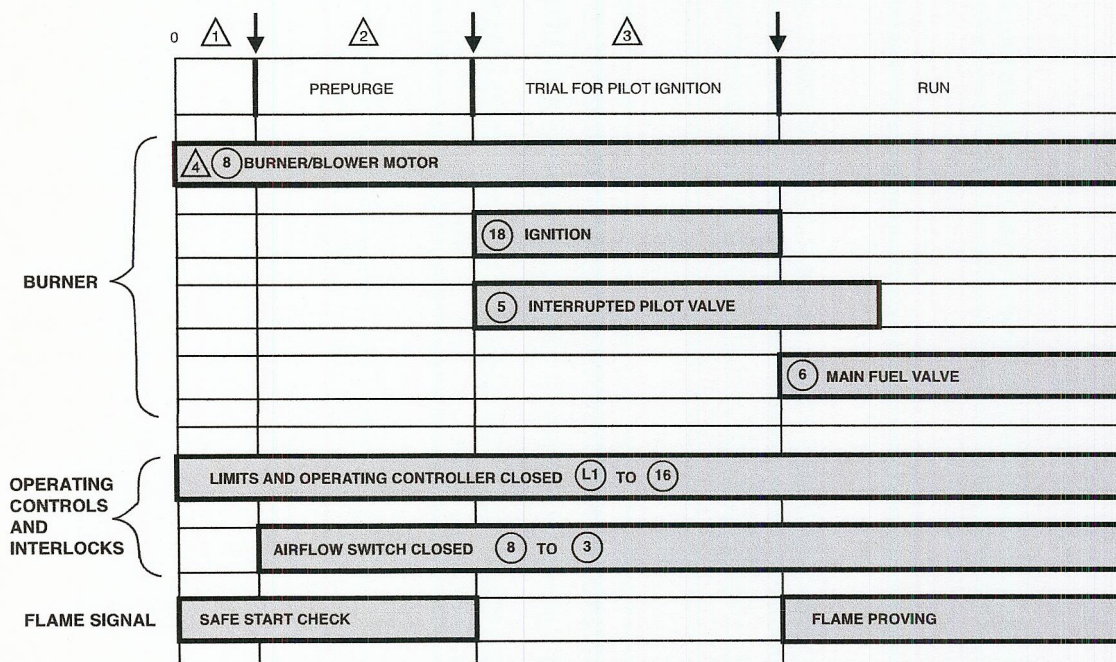
At the end of the pilot flame establishing period (ten or four seconds), and with pilot flame present, the main valve (terminal 6) is energized.

The R7795 is now in the normal burner run mode of operation and will remain so until an external command directs it to do otherwise.

5. NORMAL SHUTDOWN

When the burner controller opens, the pilot valve (terminal 5), the main valve (terminal 6) and the burner/blower motor (terminal 8) are immediately de-energized. The R7795 goes into the standby mode, terminating the operating cycle.

Fig. 2—Operating sequence for the R7795A,B, with intermittent pilot.



△ 1 AIRFLOW SWITCH (3) MUST CLOSE BEFORE PURGE TIMING STARTS.
△ 2 PURGE TIMING OF 1, 5, 7, 10, 30, 60 OR 90 SECONDS DEPENDING ON ST795A PURGE TIMER SELECTED.

△ 3 TRIAL FOR IGNITION:
4 SECONDS IF ORANGE JUMPER IS CLIPPED
10 SECONDS IF ORANGE JUMPER IS NOT CLIPPED

△ 4 TERMINALS ARE DESIGNATED AS CIRCLED NUMBERS ((8))

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Fig. 3—Internal schematic of the R7795A,B with intermittent pilot.

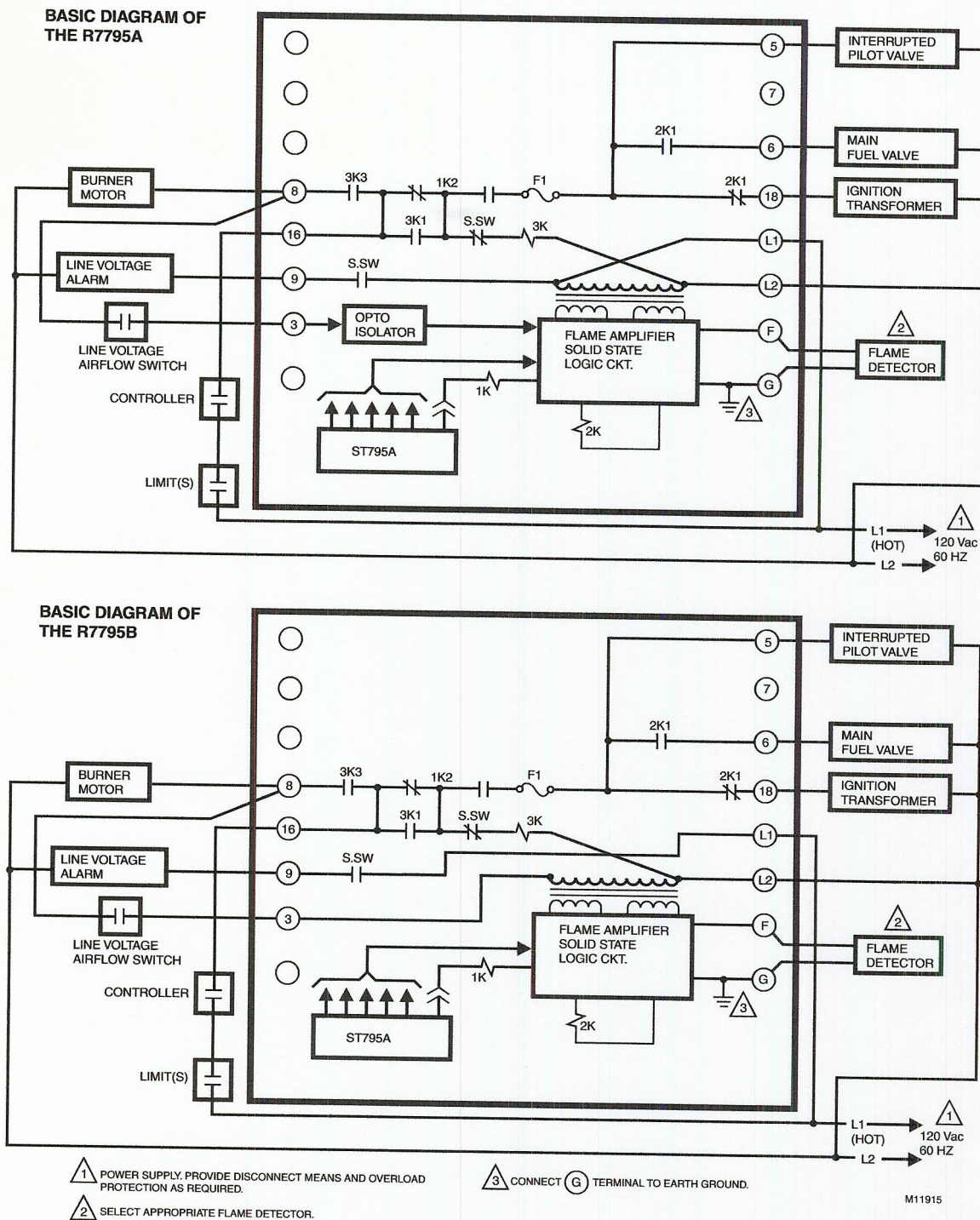
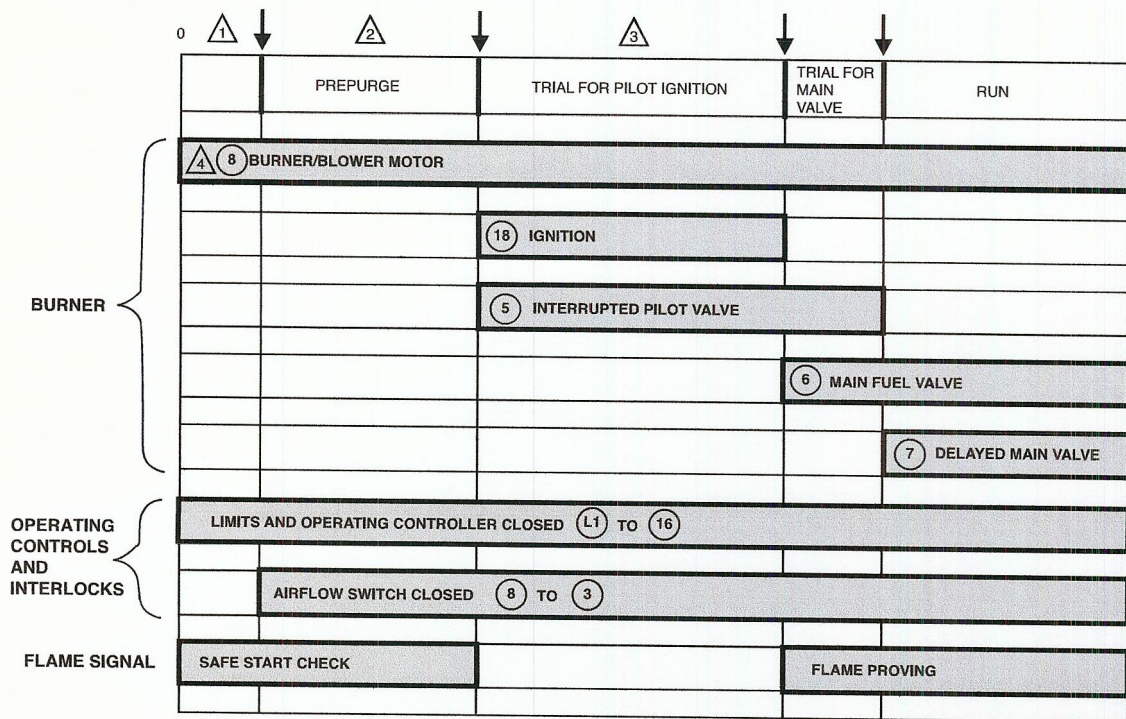


Fig. 4—Operating sequence for the R7795C,D with interrupted pilot.



1 AIRFLOW SWITCH (3) MUST CLOSE BEFORE PURGE TIMING STARTS.
2 PURGE TIMING OF 1, 5, 7, 10, 30, 60 OR 90 SECONDS DEPENDING ON ST795A PURGE TIMER SELECTED.

3 TRIAL FOR IGNITION:
4 SECONDS IF ORANGE JUMPER IS CLIPPED
10 SECONDS IF ORANGE JUMPER IS NOT CLIPPED

4 TERMINALS ARE DESIGNATED AS CIRCLED NUMBERS (8) M18857

The R7795C,D provides the following operational sequence when used with the appropriate flame detector. (See Figs. 4 and 5.)

STANDBY

The R7795 Primary Control is ready to start up when the burner controller closes (limits are closed).

NORMAL START-UP

1. With power applied (limits and controller closed, terminal L1 to 16, and no flame signal present), the 3K relay pulls in and the burner motor (terminal 8) is energized.

2. As soon as the airflow switch closes (terminal 3 to 8), and with the RUN/TEST switch in the RUN position, the ST795A Prepurge Timer starts to time out (pre-purge begins).

NOTE: The ST795A Prepurge Timer returns to zero any time the airflow switch opens or the RUN/TEST switch is moved to the TEST position. The pre-purge restarts when the airflow switch recloses or the RUN/TEST switch is returned to the RUN position.

3. At the end of pre-purge (ST795A timed out), the 1K and 4K relays pull in, simultaneously energizing the ignition transformer (terminal 18) and the interrupted pilot valve (terminal 5). This starts the ten or four second pilot flame establishing period. Safety shutdown and lockout will occur if presence of flame is not proven within:

- Ten seconds if the ORANGE jumper is *not* clipped.
- Four seconds if the ORANGE jumper is clipped.

If the RUN/TEST switch is moved to the TEST position during the pilot flame establishing period, the sequence is stopped in trial for pilot flame. The safety switch heater is energized during this pilot flame establishing period whenever flame is not present. Safety shutdown and lockout will occur if the absence of flame exceeds 15 seconds (nominal).

4. MAIN FLAME IGNITION TRIAL

At the end of the pilot flame establishing period (ten or four seconds), with pilot flame present, and the RUN/TEST switch in the RUN position, the ignition transformer (terminal 18) is de-energized and the main valve (terminal 6) is energized, starting the main flame ignition trial.

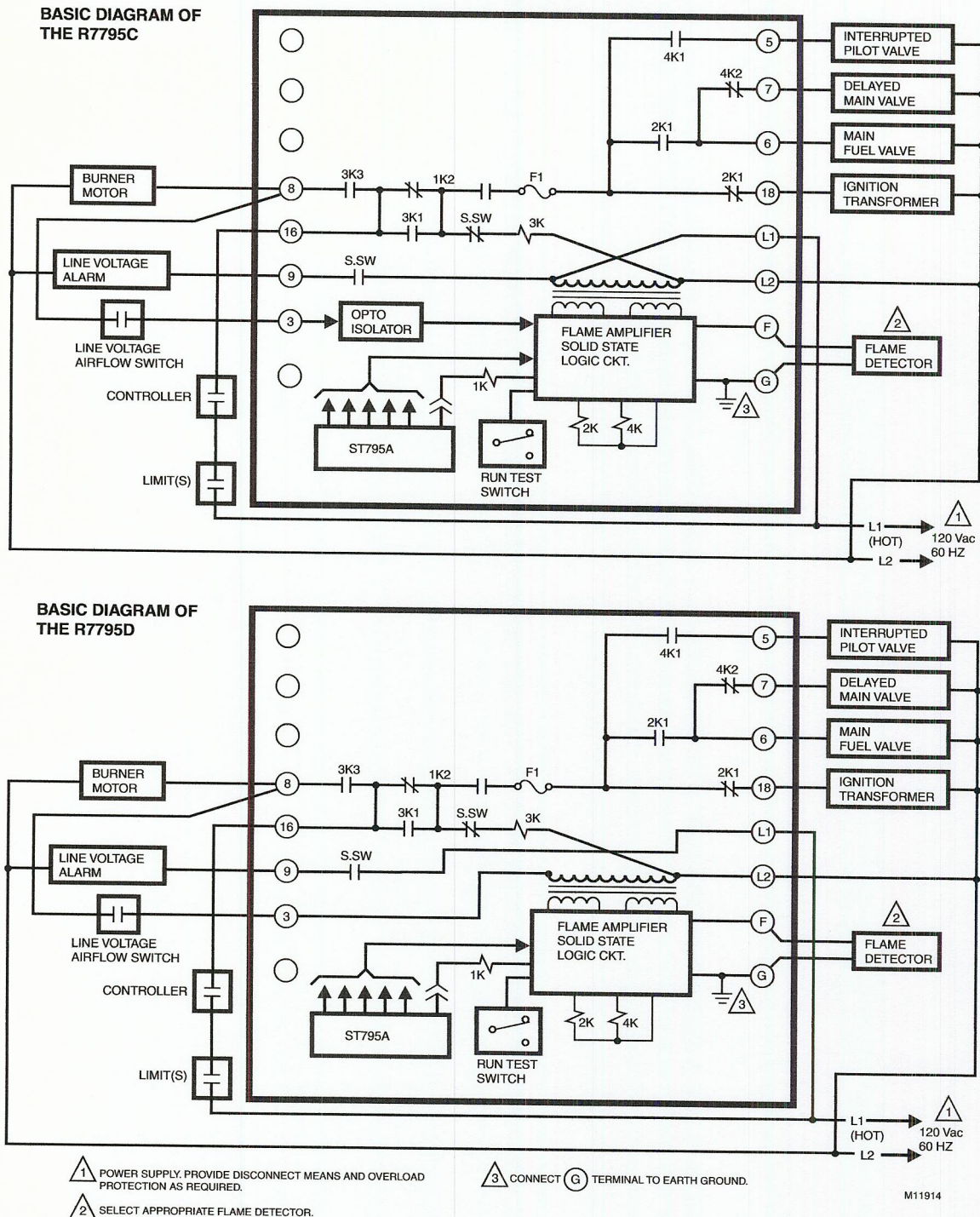
Ten seconds into the main flame ignition trial, the pilot valve (terminal 5) is de-energized and the delayed main valve (terminal 7) is energized. This completes the ten second main flame ignition trial period.

The R7795 is now in the normal burner run mode of operation and will remain so until an external command directs it to do otherwise.

5. NORMAL SHUTDOWN

When the burner controller opens, the main valves (terminals 6 and 7) and the burner/blower motor (terminal 8) are immediately de-energized. The R7795 goes into the standby mode, terminating the operating cycle.

Fig. 5—Internal schematic of the R7795C,D with interrupted pilot.



**USE OF RUN/TEST SWITCH (Fig. 9)
(R7795C,D Only)**

The RUN/TEST switch is located on the lower left corner of the R7795C,D Interrupted Pilot Models. The RUN/TEST switch performs the following functions:

1. DAMPER LINKAGE ADJUSTMENT

The RUN/TEST switch will stop the sequence of the prepurge just before ignition trials (if in TEST position prior to ignition trials). This allows adjustment of the damper linkage. The Prepurge Timer will return to zero when the RUN/TEST switch is moved to the TEST position. The prepurge restarts when the RUN/TEST switch is returned to the RUN position.

2. PILOT TURNDOWN TEST/INTERRUPTED PILOT MODELS

The RUN/TEST switch, when moved to the test position, will stop the sequence of the PILOT IGNITION TRIAL. This allows testing for spark pickup when the system is used with an ultraviolet sensor. When stopped in the TEST position, it is possible to perform the Pilot Turn-down Test (refer to Pilot Turn-down Test of Interrupted Pilot Models in Checkout section). The safety switch heater is energized during the pilot flame establishing period whenever flame is not present. Safety shutdown and lock-out will occur if the absence of flame exceeds 15 sec-onds (nominal).

NOTE: If the RUN/TEST switch is moved to the TEST position during Main Flame Ignition Trial, the R7795 will de-energize the main valve and re-energize the ignition transformer. When the RUN/TEST switch is returned to the RUN position, the sequence is returned to the Main Flame Ignition Trial.

If the RUN/TEST Switch is moved to the TEST position during Run, the R7795 will de-energize the Main Valve and Delayed Main Valve and energize the Ignition Transformer and Pilot Valve. When the RUN/TEST Switch is returned to the RUN position, the sequence advances to the Main Flame Ignition Trial.

**CAUTION**

When a C7012, C7027 or C7035 Flame Detector is in use, the RUN/TEST Switch should not be placed in the TEST position from the Main Flame Ignition Trial or from the RUN portion of the sequence.

IMPORTANT: MAKE SURE THAT THIS SWITCH IS IN THE RUN POSITION BEFORE LEAVING THE INSTALLATION.

Installation

WHEN INSTALLING THIS PRODUCT...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced flame safeguard technician.
4. After installation is complete, check out product operation as provided in these instructions.

**CAUTION**

1. Disconnect power supply before beginning installation to prevent electrical shock or equipment damage.
2. Perform a thorough checkout before leaving installation.

Follow the burner manufacturer's instructions if supplied; otherwise, proceed as follows.

MOUNTING THE SUBBASE

Locate the subbase where the ambient temperature is within the specified limits.

Do not mount the Q795A Subbase in any angle that condensation can accumulate in the R7795 Cover. See Fig. 6 for mounting dimensions of the Q795A Subbase.

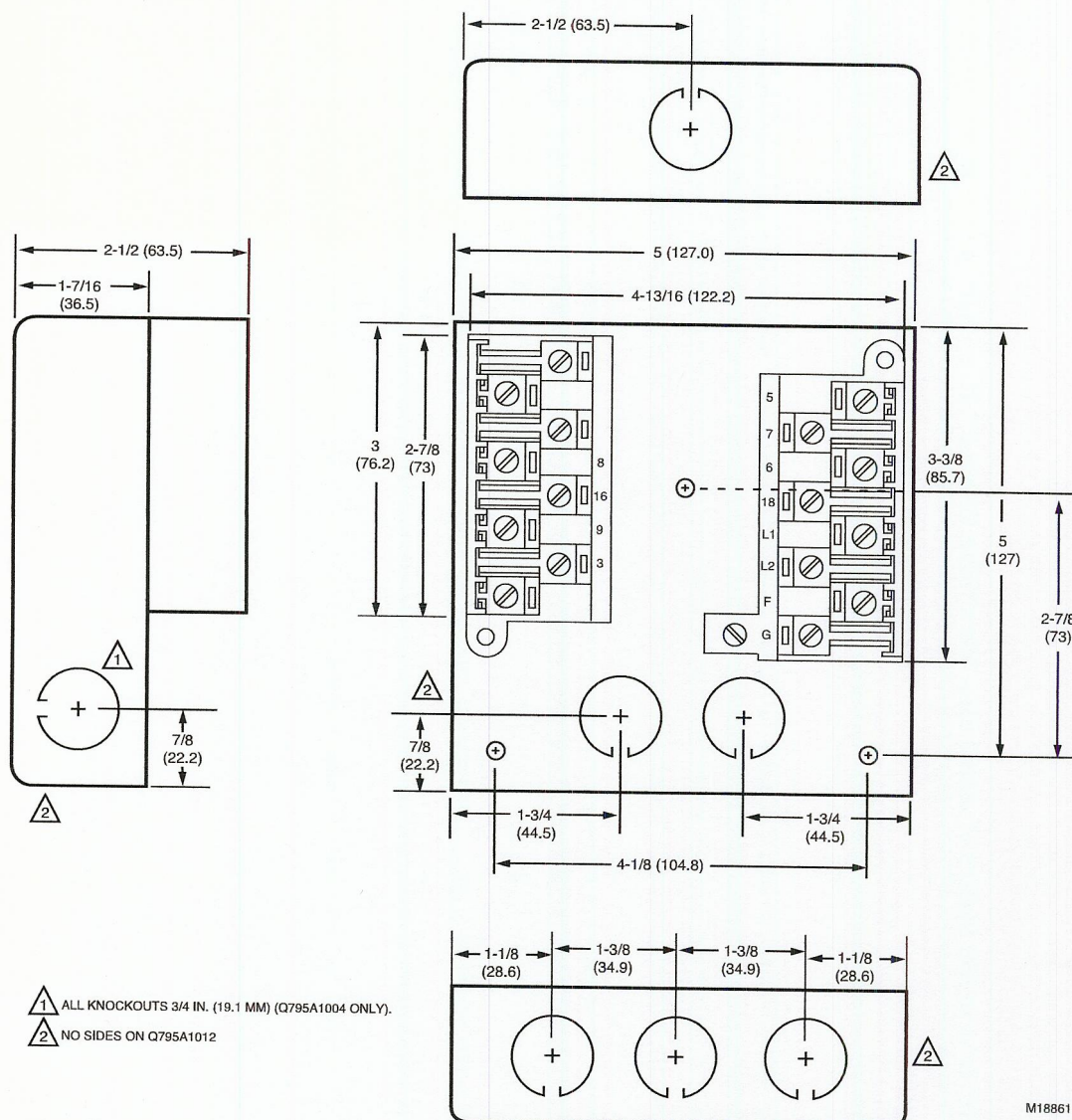
Use the Q795A Subbase as a template to mark the mounting screw locations.

WIRING TO THE SUBBASE

1. Disconnect power supply before beginning installation to prevent electrical shock or equipment damage. All wiring connections to the subbase must comply with applicable codes, ordinances, and regulations. All wiring to the subbase must be NEC Class 1 (line voltage) wiring.
2. For *normal installations* use moisture resistant wire suitable for at least 194° F [90° C].
3. For *high temperature applications*, use moisture resistant wire selected for a temperature rating above the maximum operating temperature for all but the ignition and F leadwires.
 - a. For the *ignition*, use Honeywell specification no. R1061012 Ignition Cable or equivalent. (This wire is rated at 350° F [175° C] for continuous duty and up to 500° F [260° C] for intermittent use.)
 - b. For the *flame detector F leadwire*, use Honeywell specification no. R1298020 or equivalent. (This wire is rated up to 400° F [205° C] for continuous duty. It is tested for operation up to 600 volts and breakdown up to 7500 volts.)

IMPORTANT: To avoid possible ignition interference and nuisance shutdowns, do not run high voltage ignition transformer wires in the same conduit with the flame detector wiring.

Fig. 6—Mounting dimensions of the Q795A Subbase shown in in. [mm].



5. For ignition installations in a contaminating environment, use Honeywell specification no. R1239001 High Tension Ignition Cable or equivalent. (This wire is very resistant to severe conditions of oil, heat, and corona, and is tested to withstand high voltages up to 25,000 Vrms in a salt bath for one minute without breakdown. It is rated at 200° F [93° C] for continuous duty and up to 300° F [175° C] for intermittent use.)

WIRING HOOKUPS

The typical wiring hookups in Figs. 7 and 8 show the connections to the Q795A Subbase.

INSTALLING THE R7795

1. Remove the cover from the R7795.
2. Position the R7795 over the terminal barrier strips as shown in Fig. 1, and press the R7795 onto the subbase.
3. Tighten the two captive screws.

NOTE: Do not overtighten these screws. Maximum recommended torque is 10 lb.-in. (1.13 N•m).

4. Install the ST795A Purge Timer into its slot (see Fig.

Fig. 7—Wiring the R7795A,B with intermittent pilot.

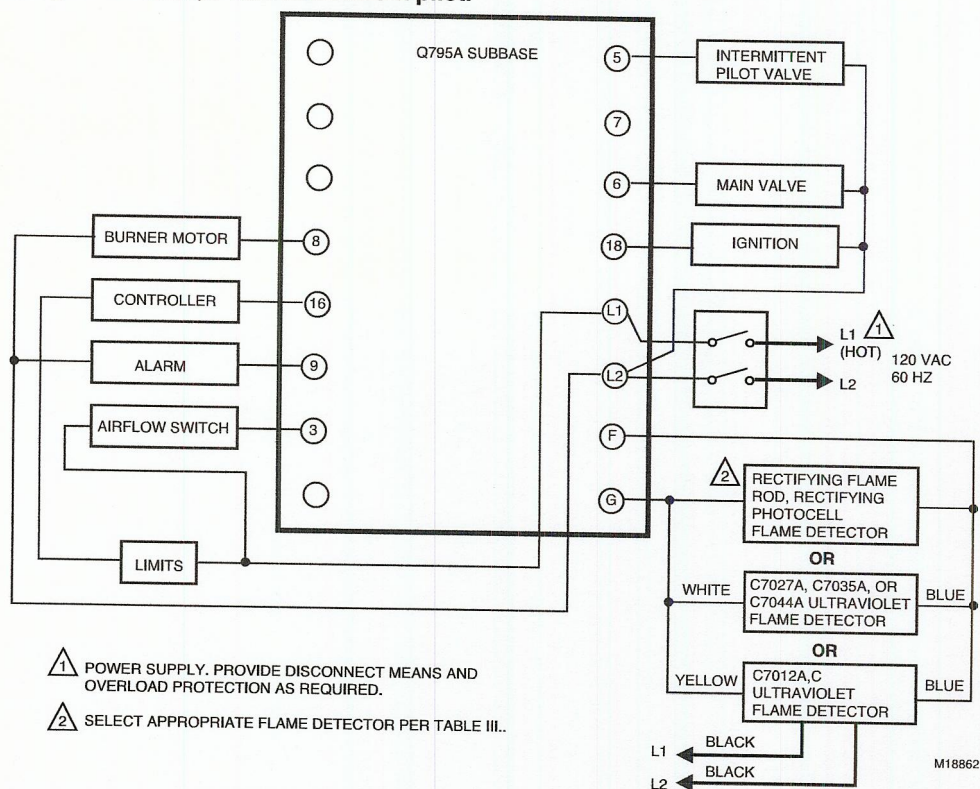
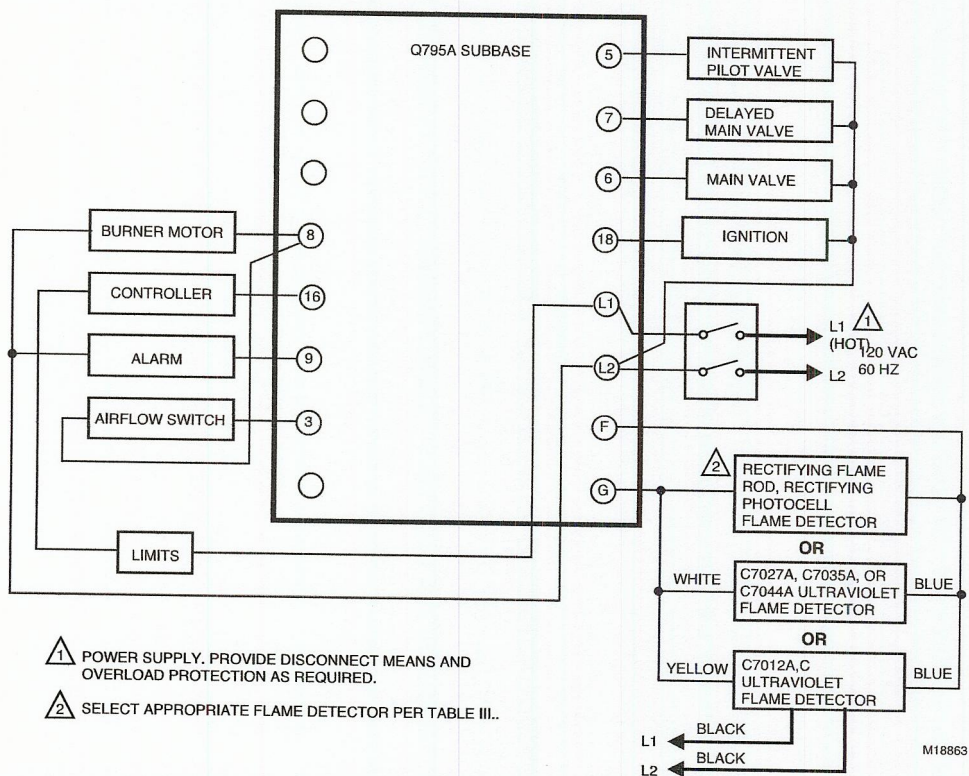


Fig. 8—Wiring the R7795C,D with interrupted pilot.





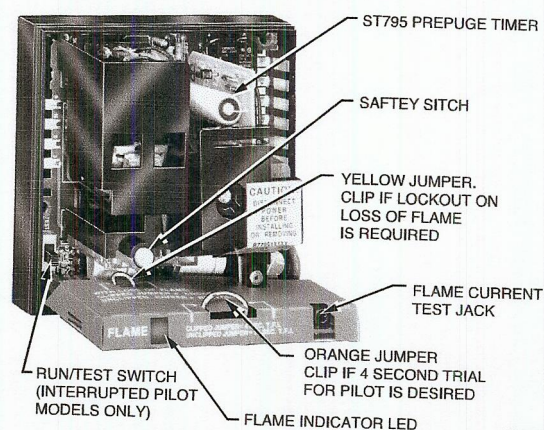
CAUTION

CLIPPING THE JUMPER WIRE(S) TO SELECT ONE OR BOTH OF THE FOLLOWING OPTIONS IS NONREVERSIBLE:

1. Four-second pilot flame trial (clip orange jumper, see Fig. 9).
2. Lockout on loss of flame (clip yellow jumper wire, see Fig. 9).

NOTE: To prevent the ends of the clipped jumper wire from touching each other, make sure that the jumper is clipped in two places. To prevent internal electrical shorts *do not* allow the clipped portion of the jumper to fall into the R7795.

Fig. 9—Location of R7795 jumpers.



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Checkout



WARNING

IF FUEL ENTERS THE COMBUSTION CHAMBER FOR MORE THAN A FEW SECONDS WITHOUT IGNITING, AN EXPLOSIVE MIXTURE COULD RESULT. THE FOLLOWING TIME LIMITS ARE RECOMMENDED:

Trial for PILOT: 10 seconds.

Trial for MAIN FLAME: 5 seconds.

In any case, **DO NOT EXCEED THE MANUFACTURER'S SPECIFIED NORMAL LIGHT-OFF TIME.** Close the manual main fuel shutoff valves if the flame is not burning at the end of the specified time.



CAUTION

1. Use the utmost care when checking the system. Line voltage is present on most terminals when power is on.
2. Open the master switch before installing or removing the R7795 on the subbase, before installing or removing any jumpers, or before making any adjustments.
3. Make sure *all* manual fuel shutoff valves are closed before starting the Initial Lightoff Check or the Pilot Turndown Test.
4. If the low fuel pressure limits are bypassed for any of the tests, make sure that the jumpers are removed before putting the system into operation.
5. Do not put the system into operation until you have satisfactorily completed all applicable Checkout tests in this section and any others required by the burner manufacturer.

EQUIPMENT REQUIRED

Voltmeter (Honeywell W136A or equivalent) with 0 to 300 Vac scale.

Microammeter (Honeywell W136A or equivalent) with 0 to 25 microamp range and SPL scale with damping.

Meter Connector Plug part no. 196146 or equivalent.

Jumper wires (2) No. 14 wire, insulated, 12 in. [304.8 mm] long, with insulated alligator clips at both ends.

Manometer (or pressure gauge) to measure pilot gas pressure.

Thermometer or thermocouple to measure temperatures at the flame detector.

CHECKOUT SUMMARY

The following list summarizes the checkout tests required for each type of installation. Instructions for each test are included in this section; also consult the burner Installation instructions.

- Preliminary inspection—all installations.
- Flame signal measurement—all installations.
- Initial lightoff check for proved pilot—all installations using proved pilot.
- Initial lightoff check for direct spark ignition of oil-oil burners not using a pilot.
- Pilot turndown test—all installations using a pilot.
- Ignition interference test—all installations using a flame rod.
- Hot refractory hold-in test—all installations using a rectifying photocell.
- Ultraviolet response test—all installations using ultraviolet flame detectors.
- Flame signal with hot combustion chamber—all installations.
- Safety shutdown tests—all installations.

Refer to Figs. 7 and 8 for terminal locations, and to Figs. 1 and 9 for the location of component parts. Remove the device cover by loosening the screw.

PRELIMINARY INSPECTION

Perform this inspection to avoid common problems. Make certain that:

1. Wiring connections are correct and all terminal screws are tight.
2. The flame detector(s) is (are) clean and installed and positioned properly. Consult the Installation Instructions for the flame detector.
3. The burner is completely installed and ready to fire (consult the manufacturer instructions); fuel lines are purged of air.
4. Combustion chamber and flues are clear of fuel and fuel vapors.
5. Power is connected to the master disconnect switch.
6. Lockout switch is reset (push in and release the reset button).
7. RUN/TEST switch is in the RUN position (interrupted pilot models only).
8. System is in the standby condition.
9. All limits and interlocks are reset.

FLAME SIGNAL MEASUREMENT (Figs. 9 and 10) (All Installations)

The flame signal measurement is the best indicator of proper flame detector application. This check should be performed when:

- The system is initially set up.
- Any service is done to the system.
- At least once a month while the system is in operation.

This will prevent shutdowns due to poor flame signal. Use the 196146 Meter Connector and a W136A Meter (or equivalent). Connect the RED plug-in tip to the RED (+) meter lead and the BLACK plug-in tip to the BLACK (-) meter lead. Insert the gray plug into the amplifier flame current jack on the R7795 amplifier board (see Fig. 9).

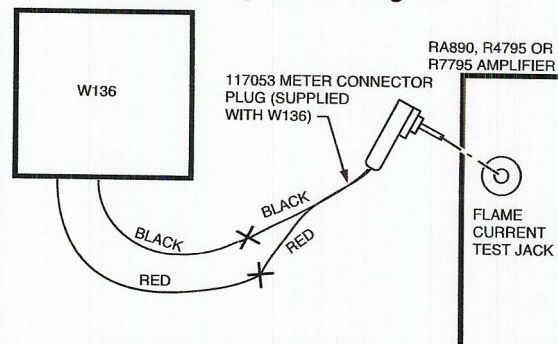
The minimum flame current must be an average of two microamperes for the R7795B,D models and an average of 3.5 microamperes for the R7795A,C models (refer to Table 3).

If the minimum average current level cannot be obtained, one or more of the following conditions may exist:

1. Check the supply voltage at terminals L1-L2 on the wiring subbase. Make sure the master switch is closed, connections are correct, and the power supply is the correct voltage and frequency.
2. Check the flame detector wiring for defects, including:
 - incorrect connections.
 - wrong type or size of wire.
 - deteriorated wire.
 - open circuits.
 - short circuits.

- high resistance shorts caused by accumulated moisture, soot or accumulated dirt.
3. For a flame rod, make sure that:
 - there is enough ground area.
 - the flame rod is properly located in the flame.
 - temperature at the flame rod insulator is no greater than 500° F [260° C].
 - there is no ignition interference (see the Ignition Interference Test in this section).
 4. For all other detectors, clean the detector lens, filter, viewing window, and the inside of the sight pipe, as applicable.
 5. With the burner running, check the temperature at the detector. If it exceeds the detector's maximum rated temperature:
 - add additional insulation between the wall of the combustion chamber and the detector.
 - add a shield or screen to reflect radiated heat away from the detector, or
 - add cooling. Refer to Sight Pipe Ventilation in the Detector Instructions.
 6. Make sure that the flame adjustment is not too lean.

Fig. 10—Measuring the flame signal.



IF 196146 METER CONNECTOR PLUG IS NOT AVAILABLE
(RECTIFICATION AMPLIFIER ONLY)—

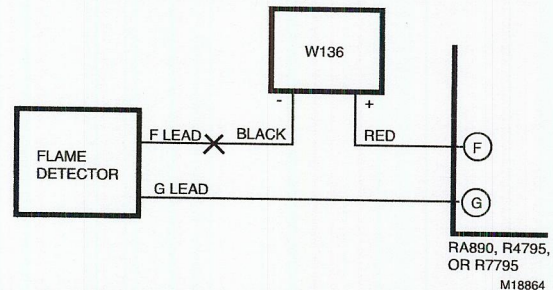


TABLE 3—FLAME SIGNAL.

Flame Detector	R7795 Model	Minimum Acceptable Average Current (microamperes)	Maximum Current Expected (microamperes)
C7027, C7035, C7044 Ultra-violet Minipeeper	A, C	3.5	7.5
Rectifying Flame Rod or Rectifying Photocell	B, D	2	5
C7012A,C Ultraviolet (Purple Peeper)		2	6

7. Make sure that the detector is sighting the flame properly.

8. If necessary, resight or reposition the flame detector. If proper operation cannot be obtained, replace the flame detector and/or the R7795.

INITIAL LIGHTOFF CHECK FOR PROVED PILOT (All Installations Using a Pilot)

Perform this check on all installations using a pilot. It should immediately follow the preliminary inspection.

NOTE: Low fuel pressure limits, if used, *could be open*. If so, bypass them with jumpers during this check.

1. Open the master switch.
2. Make sure the manual main fuel shutoff valve(s) is closed. Open the manual pilot shutoff valve. (If the pilot takeoff is downstream from the manual main fuel shutoff valve, make sure the main fuel is shut off just upstream from the burner inlet, or disconnect the power from the automatic main fuel valve(s).)
3. Close the master switch and start the system with a call for heat (raise the setpoint of the burner controller).
4. Let the sequence advance through the prepurge. During the ignition trial period, spark should occur and the pilot should light. If ignition occurs, proceed to step 7.
5. If the pilot flame is not established in ten seconds (four seconds if the orange jumper is clipped), safety shutdown will occur. Let the sequence complete its cycle.
6. Reset the lockout switch and let the system recycle once. If the pilot still fails to ignite, make the following ignition/pilot adjustments:
 - a. *Open the master switch* and remove the R7795 from the subbase.
 - b. Jumper subbase terminal L1 to the ignition terminal 18.
 - c. Close the master switch. This energizes only the ignition transformer.
 - d. If the ignition spark is not strong and continuous, *open the master switch* and adjust the ignition electrode spark gap to the manufacturer recommendation.
 - e. Make sure the ignition electrodes are clean.
 - f. Close the master switch and observe the spark.
 - g. Once a continuous spark is obtained, *open the master switch* and add a jumper from L1 to the pilot terminal 5.
 - h. Close the master switch. This energizes both the pilot valve and ignition transformer.
 - i. If the pilot does not ignite with continuous spark, adjust the pilot gas pressure regulator until a pilot is established.
 - j. Open the master switch, remove the jumpers, and reinstall the R7795 onto the subbase. Close the master switch and let the system recycle.
7. When the pilot ignites, measure the flame signal. If necessary, adjust the flame or detector to give the proper flame signal.

8. Recycle the system to recheck lightoff and the pilot flame signal.

NOTE: The next steps require two people—one to open the manual main shutoff valve(s) and one to watch for ignition.

9. When entering the main flame ignition trial period, make sure that the automatic main fuel valve(s) are open; then smoothly open the manual main fuel shutoff valve (and manually opened safety shutoff valve, if used) and watch for main burner flame ignition. If the main burner flame is not established within five seconds (or the time specified by the burner manufacturer), *close the manual main fuel shutoff valve(s), open the master switch and continue with step 10*. If the main burner flame is established, proceed to step 13.

10. Wait about three minutes, close the master switch, and let the R7795 recycle to the main flame ignition trial period. *Smoothly* open the manual main fuel shutoff valve(s) and try lightoff again. The first attempt may have been necessary to purge the fuel lines and bring sufficient fuel to the burner.

11. If the main burner still does not light off within five seconds (or the time specified by the burner manufacturer), *close the manual main fuel shutoff valve(s) and open the master switch*. Check all burner adjustments.

12. Repeat steps 10 through 12 until the main flame establishes properly; then go on to step 13.

13. When the main flame is established, the sequence will stay in run. Make burner adjustments for flame stability and input rating.

14. Shut down the system by lowering the setpoint of the controller. Make sure that:

- the main burner flame goes out.
- the intermittent pilot (if used) goes out.
- all automatic fuel valves close.

15. If used, remove the bypass jumpers from the low fuel pressure limit.

16. Restart the system by raising the controller setpoint. Observe that the pilot is established during the trial for pilot flame period within the normal lightoff time specified by the burner manufacturer.

17. Measure the flame signal. Continue to check for the proper signal (Table 3) through the run period.

18. Run the burner through another sequence, observing the flame signal for:

- pilot alone (if applicable).
- pilot and main burner.
- main burner flame alone (unless monitoring an intermittent pilot).

Also observe the main flame lightoff time.

19. Make sure that all readings are in the required ranges before proceeding.

INITIAL LIGHTOFF CHECK FOR DIRECT SPARK IGNITION OF OIL (Oil Burners Not Using a Pilot)

This check applies to oil burners not using a pilot. It should immediately follow the preliminary inspection.

NOTE: Low fuel pressure limits, if used, could be open. If so, bypass them with jumpers during this test.

1. Open the master switch.
2. Complete the normal *ready to fire* checkout of the oil supply and equipment as recommended by the oil burner manufacturer.
3. Close all manual fuel shutoff valves. Check that the automatic fuel valve(s) are closed. *Make sure oil is not entering the combustion chamber.*
4. Close the master switch and start the system with a call for heat. (Raise the setpoint of the controller.) The program sequence will start.
5. Let the sequence advance through prepurge. When entering the ignition trial period, watch for ignition spark and listen for the click of the first stage oil solenoid.
6. Let the program sequence complete its cycle.
7. Open the manual first stage oil valve.
8. Reset the lockout switch and recycle the system through prepurge.
9. When entering the ignition trials, watch for the first stage burner flame to establish. If the first stage oil burner flame does not establish within five seconds (or the normal lightoff time specified by the manufacturer, *close the manual first stage oil valve and open the master switch*, and continue with step 10. If flame is established, proceed to step 14.
10. Purge the combustion chamber to remove any unburned oil; check all burner adjustments.
11. Wait about three minutes, close the master switch, open the manual first stage oil valve, and try lightoff again. The first attempt may have been necessary to purge the fuel lines and bring sufficient fuel to the burner.
12. If the first stage oil burner flame is not established within five seconds (or the time specified by the burner manufacturer), *close the manual first stage oil valve and open the master switch.*
13. If necessary, repeat steps 10 through 12 to establish the first stage burner flame. Then proceed to step 14.
14. When the first stage oil burner flame is established, the sequence advances to the normal burner run period. Make burner adjustments for flame stability and input rating. *If a second stage is used, make sure the automatic second stage oil valve has opened.*
15. Shut down the system by lowering the setpoint of the burner controller. *Make sure that the flame has gone out and all automatic oil valves close.*
16. If used, remove the bypass jumpers from the low fuel pressure limits.
17. *If a second stage oil valve is used*, check the lightoff as follows. Otherwise go to step 18.
 - a. Open the manual second stage oil valve.
 - b. Restart the system by raising the setpoint of the burner controller.
 - c. When the first stage burner flame is established, watch for the automatic second stage oil valve to open. Observe that the second stage flame lights off properly.

- d. Make burner adjustments for flame stability and input rating.
- e. Shut down the system by lowering the setpoint of the burner controller. *Make sure the burner flames go out and all of the automatic oil valves close.*
18. Restart the system by raising the setpoint of the burner controller. Observe that the burner flame is established during the ignition trial period within the normal lightoff period specified by the burner manufacturer.
19. Measure the flame signal. Continue to check for the proper signal (Table 3) into the normal run period. Check the signal at the high and low firing rate positions, if applicable. Any pulsating or unsteady readings require further adjustments.
20. Make sure all readings are in the required ranges before proceeding.

PILOT TURNDOWN TEST (All Installations Using a Pilot)

Perform this check on all installations using a pilot. This test makes sure that the main burner can be lighted by the smallest pilot flame that will hold in the flame relay. Clean the detector to assure that it will detect the smallest acceptable pilot flame.

NOTE: Low fuel pressure limits, if used, *could be open*. If so, bypass them with jumpers during this test.

1. Open the master switch.
2. Close the manual main fuel shutoff valve(s).
3. Connect a manometer or pressure gauge to measure the pilot gas pressure during the turndown test.
4. Open the manual pilot shutoff valve.
5. Close the master switch and start the system with a call for heat (raise the setpoint of the burner controller). The sequence should start.

NOTE: INTERMITTENT PILOT MODELS should continue with step 6. INTERRUPTED PILOT MODELS should proceed to step 7.

6. INTERMITTENT PILOT MODELS—After the sequence has entered the normal burner run period, very slowly turn down the pilot gas pressure, reading the manometer (or gauge) as the pressure drops. Stop immediately when the Flame Indicator LED goes out. Note the pressure at this point.

- a. If the orange jumper IS NOT CLIPPED: allow the R7795 to recycle through prepurge. If the orange jumper IS CLIPPED: reset the safety switch and allow the R7795 to recycle through prepurge.
- b. As the control attempts to relight the pilot, turn the pilot gas pressure back up slowly until the Flame Indicator LED comes on. (Complete this step within the four or ten second pilot flame establishing period or lockout will occur.)
- c. Turn the pilot back down slightly but not enough to cause the Flame Indicator LED to go out. (Keep the pilot gas pressure just above the reading noted in step 6 above.)

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NOTE: The next step requires two people—one to open the manual main fuel valve(s) and one to watch for ignition.

- d. With the sequence in the normal burner run mode, make sure that the automatic main fuel valve(s) are open. Smoothly open the manual main fuel shutoff valve and watch for main burner lightoff. If the main flame is not established within five seconds or the normal lightoff period specified by the burner manufacturer, *close the manual main fuel shutoff valve and open the master switch*. Then proceed to step 8. If the burner flame is established in the normal lightoff period, proceed to step 14.

7. INTERRUPTED PILOT MODELS—When the sequence enters the pilot flame ignition trial period, set the RUN/TEST switch to the TEST position to stop the sequence. The Flame Indicator LED will come on when the pilot ignites. Very slowly turn down the pilot gas pressure, reading the manometer or gauge as the pressure drops. Stop immediately when the Flame Indicator LED goes out. Note the pilot gas pressure at this point.

- a. Immediately increase the pilot gas pressure until the Flame Indicator LED comes back on. Slowly decrease the pilot gas pressure to just above the pressure noted in step 7 above.
- b. Set the RUN/TEST switch to the RUN position and allow the sequence to go on.

NOTE: The next step requires two people—one to open the manual main fuel shutoff valve and one to watch for ignition.

- c. When the sequence enters the trial for main flame period, make sure that the automatic main fuel valve(s) is (are) open. Smoothly open the manual main fuel shutoff valve and watch for main flame ignition.

If the main flame is not established within five seconds or the normal lightoff period specified by the burner manufacturer, *close the manual main fuel shutoff valve, open the master switch and proceed to step 8*.

If the main burner flame is established in the normal lightoff period, proceed to step 14.

8. Purge the combustion chamber to remove any unburned fuel; check all burner adjustments.

9. Wait about three minutes. Close the master switch and allow the sequence to go through the prepurge. Repeat step 6 or 7.

10. If the second attempt is unsuccessful, adjust the flame detector so that a larger pilot flame is necessary to make the Flame Indicator LED come on. This may require repositioning the flame detector to sense farther out on the pilot flame or adding an orifice plate.

11. Measure the pilot flame signal after adjusting the flame detector to make sure that it is stable and is within the limits set in Table 3.

12. Repeat steps 5 through 12 until the main burner positively lights with the pilot just causing the Flame Indicator LED to remain on.

13. Repeat the main burner lightoff several times with the pilot at turndown.

14. When the main burner lights reliably with the pilot at turndown, disconnect the manometer or gauge and turn up the pilot to normal.

15. If used, remove the bypass jumpers from the low fuel pressure limits.

16. Run the system through another cycle to check for normal operation.

IGNITION INTERFERENCE TEST

(All Flame Rods)

Test to make certain that a false signal from a spark ignition system is not superimposed on the flame signal.

Ignition interference can decrease or increase the actual flame signal. If it decreases the signal enough, it could cause safety shutdown. If the signal is increased enough, it could cause Flame Indicator LED to come on when the true flame signal is below the minimum acceptable value.

TEST

Start the burner and measure the flame signal with both the ignition and pilot (or main burner) on, and then with only the pilot (or main burner) on. Any difference greater than one-half microamp indicates ignition interference.

TO ELIMINATE IGNITION INTERFERENCE

1. Make sure there is enough ground area.
2. Be sure that the ignition electrode and the flame rod are on opposite sides of the ground area.
3. Check for correct spacing on the ignition electrode:
 - a. 6,000 volt systems: 1/16 to 3/32 in. [1.6 to 2.4 mm].
 - b. 10,000 volt systems: 1/8 in. [3.2 mm].
4. Make sure the leadwires from the flame rod and ignition electrode are not too close together.
5. Replace any deteriorated leadwires.
6. If the problem cannot be eliminated, consider changing to an ultraviolet flame detection system.

HOT REFRACTORY HOLD-IN TEST (Rectifying Photocells)

Test to make certain that hot refractory will not cause the Flame Indicator LED to remain on after the burner goes out. This condition would delay response to flame failure and also prevent a system restart as long as the hot refractory is detected.

First check the R7795 Flame Signal Amplifier by starting the burner cycle. As soon as the sequence stops in the run period, lower the burner controller setpoint to shut down the system while the refractory is cool. Measure the time necessary for the Flame Indicator LED to go out after the flame extinguishes. If it takes more than four seconds, open the master switch and replace the R7795.

To check *rectifying photocells* for hot refractory hold-in, operate the burner until the refractory reaches its maximum operating temperature. Then lower the setpoint of the burner controller to terminate the firing cycle, or set the Fuel Selector switch to OFF. DO NOT OPEN THE MASTER SWITCH. Observe the flame go out.

NOTE: Some burners continue to purge the oil lines between the valve(s) and nozzle(s) even though the fuel valve(s) is (are) closed. Termination of the firing cycle rather than opening the master switch will allow purging of the combustion chamber, if available. This will reduce a buildup of fuel vapors in the combustion chamber caused by oil line purging.

If the Flame Indicator LED remains on for more than four seconds after the flame disappears, the photocell is sensing hot refractory.

If the detector is sensing hot refractory, add an orifice plate in front of the cell to restrict the viewing area of the detector or resight the detector to a more distant, cooler part of the combustion chamber.

NOTE: If the detector is resighted, the flame must still be properly sighted.

Continue adjustment until hot refractory hold-in is eliminated.

ULTRAVIOLET RESPONSE TESTS (All Ultraviolet Detectors)

Ignition Spark Response Test

Make sure that ignition spark is not causing the Flame Indicator LED to come on.

1. Close the pilot and main fuel manual shutoff valves.
2. Start the burner and run through the ignition period. Ignition spark should occur but the Flame Indicator LED must not come on.
3. If the Flame Indicator LED does come on, resight the detector farther out from the spark. Measure the flame current. It should not be more than one-fourth microampere.

NOTE: The Honeywell Q624A Solid State Spark Generator will prevent detection of ignition spark when properly applied with the C7027, C7035, or C7044 Minipeeper Ultraviolet Flame Detectors. The Q624A is for use only with gas pilots.

RESPONSE TO OTHER ULTRAVIOLET SOURCES

Some sources of artificial light produce small amounts of ultraviolet radiation. Under certain conditions, an ultraviolet detector may respond to them as if it were detecting flame. DO NOT USE AN ARTIFICIAL LIGHT SOURCE TO CHECK THE RESPONSE OF AN ULTRAVIOLET DETECTOR.

FLAME SIGNAL WITH HOT COMBUSTION CHAMBER (All Installations)

With all initial tests and burner adjustments completed, operate the burner until it is at maximum expected temperature. (Observe the burner manufacturer warmup instructions.) Recycle the burner under these hot conditions and measure the flame signal.

Check the pilot alone, the main burner flame alone, and the main burner and pilot flames together (unless monitoring only the pilot flame when using intermittent ignition, or only the main burner flame with direct spark ignition). Check the signal at both high and low firing rate, if applicable.

Also check the flame failure response time. Lower the setpoint of the burner controller and observe the time it takes for the Flame Indicator LED to go out after the burner flame extinguishes (should be within four seconds).

If the flame signal is too low or is unsteady, check the flame detector temperature. Relocate the flame detector if the temperature is too high. If necessary, realign the sighting to obtain the proper signal and response time. If the response time is still too slow, replace the R7795. If the detector is relocated or resighted, or the R7795 is replaced, repeat all applicable tests in this section.

IMPORTANT: Repeat ALL required checkout tests after all adjustments have been completed. ALL tests must be satisfactory when the flame detector is in its FINAL position.

SAFE SHUTDOWN TESTS

Limit Action

With the burner operating, lower the high limit setting to simulate an overheated boiler or furnace. Normal shutdown should occur. Restore the normal light setting and the burner should go through the normal prepurge, ignition, and run cycle.

The use of manual reset limits is desirable to prevent the system from cycling off the high limit, and to make sure that the condition that caused the limit action is detected and corrected as soon as possible.

Flame Failure

Let the burner operate five minutes; then manually shut off the fuel supply to simulate flame failure. The flame indicator LED should go out and the fuel valves close. If the lockout on flame failure mode is chosen, the R7795 will lock out in about 15 seconds. If the recycle mode of operation is chosen, the system will purge and then attempt to relight the pilot. After this attempt, the system will lock out.

Power Failure

Let the burner run for five minutes. Simulate power failure by opening the line switch. All relays should drop out and the fuel valves should close. Close the power switch. The R7795 should go through the complete normal cycle.

IMPORTANT: At the completion of all Checkout tests, make sure that the R7795 is not on safety lockout, that the pilot is turned up to the correct level, and all limit settings are correct. Operate the system through a normal cycle. Replace the device cover and tighten the screw securely.

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Troubleshooting

The first step in troubleshooting the R7795 is to determine the location of the trouble in the system. Reset the safety switch and operate the system on a normal start. Refer to the OPERATION section for details of the normal operating sequence. Observe the operation carefully to determine exactly when the trouble occurs. Refer to the list below and follow the procedures outlined.

IMPORTANT: At the completion of any troubleshooting procedure, be sure to perform the checkout tests listed in the CHECKOUT section.

EQUIPMENT REQUIRED

Voltmeter (Honeywell W136A or equivalent): with 0 to 300 Vac scale.

Microammeter (Honeywell W136A or equivalent) with 0 to 25 microampere range and SPL scale with damping.

Meter connector plug part no. 196146 or equivalent.

123514A Flame Simulator: for use with the R7795B,D (rectification models).

123514B Flame Simulator: for use with the R7795A,C (ultraviolet models).

Watch or clock: with second hand.

Manometer (or gauge): to measure pilot gas pressure.

Thermometer or thermocouple: to measure temperature at the flame detector.

Orifice plates (aperture discs) or filters: to adjust the sensitivity of flame detector(s).

PRELIMINARY INSPECTION

1. Disconnect the power to the R7795 by opening the system disconnect switch.
2. Reset the safety switch.

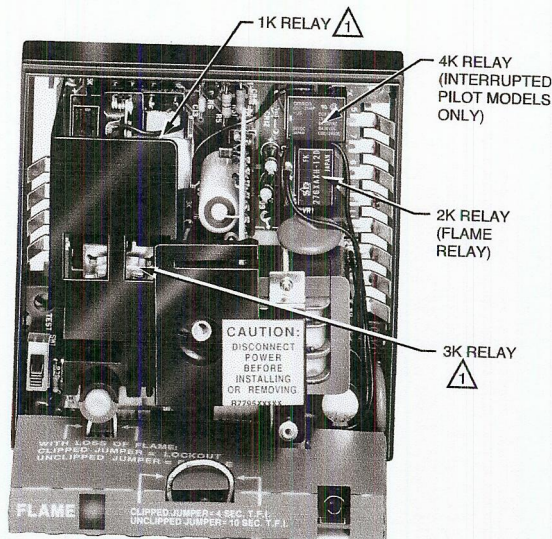
TROUBLE LIST

Compare the following list of possible system troubles with the actual deviations from the normal operating sequence. Select the appropriate symptoms by letter and proceed to that troubleshooting procedure. (See Fig. 11 for relays.)

- A. Relay 3K does not respond to a call for heat.
- B. Relay 3K pulls in but the burner motor does not start.
- C. Control locks out during prepurge.
- D. Burner motor starts but prepurge does not stop at the end of purge timing (relay 1K does not pull in).
- E. Relay 1K pulls in but the pilot does not light, ignition does not occur, or the pilot valve does not open.
- F. Pilot lights but Flame Indicator LED does not come on (control locks out without lighting main burner).
- G. Pilot lights and the Flame Indicator LED comes on but the main burner does not light.
- H. Flame Indicator LED remains on after the flame goes out.

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Fig. 11—R7795 Relay location.



⚠ LOCATED UNDER METAL SHIELD

M18860

TROUBLESHOOTING PROCEDURES



CAUTION

1. Be very careful when troubleshooting the R7795; line voltage is present on most contacts when the power is on.
2. To prevent electrical shock or equipment damage, disconnect the power supply before cleaning any contacts, or removing and reinstalling the R7795 from the subbase.

IMPORTANT:

1. Output terminals **MUST NOT BE SHORTED TO L2**. Shorted output terminals will cause permanent damage to the R7795.
2. If, after performing an applicable troubleshooting procedure, proper operation cannot be obtained, replace the R7795 (except the ST795A Purge Timer, unless noted).

A. Relay 3K does not respond to a call for heat:

1. Make sure that the safety switch is reset.
2. Check the power at terminals L1 and 16 with the controller calling for heat.
 - a. Voltage must be between plus 10 and minus 15 percent of the rated voltage for dependable operation.
 - b. If the voltage is zero, check the power supply and the continuity of the limit and controller contacts. Look for blown fuses, open switches, and bad wiring connections.

3. If the voltage at terminals 16 and L1 are correct and relay 3K does not pull in, replace the R7795.

B. Relay 3K pulls in but the burner motor does not start:

1. Check for power at terminal 8 when the 3K relay pulls in.
 - a. If terminal 8 is not powered, replace the R7795.
 - b. If terminal 8 is powered, check the fan or burner motor circuit and wiring.

C. Control locks out during prepurge:

If the flame indicator LED lights during the prepurge period and remains lighted for six seconds or longer, the control will lock out electrically (the device holds at the start of prepurge with the blower energized). If the flame on condition corrects itself after six seconds, the safety switch will trip, causing a mechanical lockout. The line voltage alarm (terminal 9) is energized and the burner/blower (terminal 8) is de-energized. Check for a flame simulating failure.

1. R7795B, D (rectification) models:
 - a. Disconnect flame circuit by inserting the plug end of a meter jack or flame simulator into the flame current jack on the front of the amplifier board. Do not ground the other end of the plug or simulator.
 - b. Restart the system. If the flame indicator LED lights, replace the R7795. If not, check the flame detector and external flame detection circuit. Look for light reaching the detector, hot refractory hold-in, defective wiring, or a defective detector.
2. R7795A,C (ultraviolet) models:
 - a. Measure the flame current during prepurge. The flame current should not exceed one-fourth microampere during the prepurge period.
 - b. If excessive flame current is present, check the flame detector circuit for wiring problems. If no wiring problems are found, replace the flame detector. Recheck the flame current during prepurge. If the excessive flame current persists, replace the R7795.

D. Burner motor starts but prepurge does not stop at the end of the purge timing (relay 1K does not pull in).

1. If the R7795 is an interrupted pilot model, check that the RUN/TEST switch is in the RUN position.
2. Check the seating of the ST795A Purge Timer.
3. Check for line voltage on the airflow switch (terminals 3 to L2).
4. Check the condition of the flame indicator LED. If it is lighted, look for a flame simulating failure (see item C above).
5. Replace the ST795A with one of the same timing. If the problem still persists, replace the R7795.

E. Relay 1K pulls in but the pilot does not light, ignition spark does not occur, or the pilot valve does not open.

1. Make sure that all manual fuel valves are opened.
2. Check the voltage at the pilot (or first stage oil) valve terminal 5 and the ignition terminal 18. Check must be made before device locks out.
3. If the voltage is zero, replace the R7795.

NOTE: If terminals 5 and/or 18 are shorted to L2, the R7795 will be permanently damaged. This shorted condition must be corrected before repowering the system.

4. If the terminals are powered, check the pilot and ignition circuits for faulty wiring or defective devices.

F. Pilot lights but Flame Indicator LED does not come on.

1. Use the appropriate flame simulator (UV or rectification) to check the Flame Indicator LED. Follow the instructions supplied with the simulator.
2. If no simulator is available, check the flame current as instructed on page 10. If the current is satisfactory, replace the R7795. If the flame current is not satisfactory, check the items listed in the Checkout section.

G. Pilot lights and Flame Indicator LED comes on but the main burner does not light.

1. Check that the manual main fuel valves are open.
2. Check the voltage at terminal 6.
 - a. If the voltage is normal, check the main valve and its external circuitry.
 - b. If the voltage is zero, replace the R7795.

NOTE: If any of the terminals are shorted to L2, the R7795 will be permanently damaged. This shorted condition must be corrected before repowering the system.

H. Relay Flame Indicator LED remains on after the flame goes out.

RECTIFICATION MODELS:

1. If the flame detector is a rectifying flame rod, install a new R7795.
2. If the detector is a rectifying photocell or a C7012A, plug the jack end of the flame simulator into the flame current jack on the amplifier board.
 - a. If the flame indicator LED does not go out, replace the R7795.
 - b. If the flame indicator LED goes out, the trouble is caused by hot refractory hold-in, detector failure or other flame simulating conditions.
 - (1) Remove the flame simulating condition such as false light.
 - (2) Resight the photocell to a cooler, more remote area of the combustion chamber.
 - (3) Check the flame current as recommended in the Checkout section. Replace the detector if necessary.
 - (4) Check for a short or high resistance between terminals F and G.

ULTRAVIOLET MODELS:

- a. Remove any flame simulating condition such as false light.
- b. Resight the detector to a cooler, more remote area of the combustion chamber.
- c. Replace the detector if necessary.
- d. Check for a short or high resistance between terminals F and G.

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Service

GENERAL

1. Only qualified personnel should attempt to service heating equipment or controls.
2. Check all the items required in the Checkout section when replacing or servicing the R7795 or when restoring power or relighting the system after shutdown.
3. On each service call, check the controller for approximate calibration and differential. Make sure that it is mounted securely.
4. Never use oil on any part of the R7795.
5. **DO NOT PUSH IN THE R7795 RELAYS MANUALLY.** Damage may result or important safety features of the device may be overridden. Clean contacts only as instructed below.

PERIODIC MAINTENANCE

The specific maintenance schedule depends on a number of factors, including the types of equipment controlled, operating conditions, and the cost of nuisance shutdowns. The following must be included in any program:

Perform flame failure and pilot turndown tests whenever the burner is serviced and at least annually.

Inspect and clean the detector and any viewing windows as often as required by soot accumulation and heat conditions at the detector.

Check flame current at least monthly and more often when a shutdown may be costly.

Clean contacts *only* when required by a failure to operate.

CONTACT CLEANING



CAUTION

Open the master switch before removing the cover or cleaning contacts. Line voltage is present on most contacts when the power is on.

IMPORTANT:

1. *Do not clean contacts unless absolutely necessary.*
2. *Use only Honeywell contact cleaner part no. 132569. DO NOT use any other type of contact cleaner.*
3. *Use the utmost care to avoid bending the contacts or changing the configuration in any way.*
4. *Do not use abrasive materials to clean contacts.*
5. *Do not use hard paper such as a business card to clean contacts.*

If relay contacts must be cleaned, use only Honeywell pressurized contact cleaner part no. 132569. The Honeywell chemical analysis laboratory finds this cleaner to be acceptable for this task. Follow the directions listed on the can.

Do not use other types of contact cleaners. Analysis shows that other pressurized contact cleaners are undesirable for these reasons:

1. Some have solvents that deteriorate plastic parts or wire insulation.
 2. Some leave oily residues that collect dust or dirt. The residue further breaks down to form various carbonaceous products. Either results in early contact failure.
- Do not use abrasives (burnishing tools, sand paper stick, file, etc.) to clean contacts. Use of abrasives can cause early contact failure for these reasons:
1. Some relay contacts are plated with gold for increased reliability. Burnishing removes the plating.
 2. The radii or points of the contacts are designed with specific shapes to best serve the intention of the contacts. Burnishing can alter these contact configurations.
 3. Use of abrasives loosens fine particles of the contact materials that adhere to the surface of the contact, increasing its resistance.
 4. Contact specifications (pressures, pressbacks, and gaps) are carefully controlled during manufacturing to assure maximum contact life. Burnishing can easily change these specifications.

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