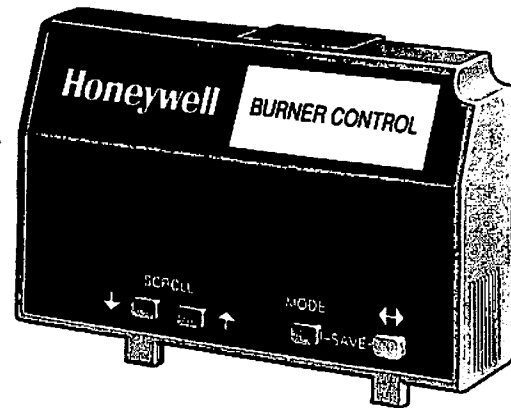


## 7800 SERIES S7800A Keyboard Display Module

The Honeywell 7800 SERIES is a microprocessor based integrated burner control for automatically fired gas, oil, coal or combination fuel single burner applications. The 7800 SERIES consists of a Relay Module, Subbase and Amplifier. Options include Keyboard Display Module, Purge Card, Personal Computer Interface, DATA CONTROLBUS MODULE™, Remote Display mounting, First-Out Expanded Annunciator and COMBUSTION SYSTEM MANAGER™ Software.

The 7800 SERIES is programmed to provide a level of safety, functional capability and features beyond the capacity of conventional controls.

Functions provided by the 7800 SERIES include automatic burner sequencing, flame supervision, system status indication, system or self diagnostics and troubleshooting.



- Application flexibility.
- Communication interface capability (RM78XX only).
- Dependable, long-term operation provided by microcomputer technology.
- First-out annunciation and system diagnostics provided by a 2 row by 20 column Vacuum Fluorescent Display (VFD) located on the Keyboard Display Module.
- First-out expanded annunciation with 24 limit and interlock Light Emitting Diodes (LEDs).
- Local or remote annunciation of operation and fault information.
- Remote reset.
- Report generation.
- Burner controller data:
  - Sequence status.
  - Sequence time.
  - Hold status.
  - Lockout/alarm status.
  - Flame signal strength.
  - Expanded annunciator status.
  - Total cycles of operation.
  - Total hours of operation.
  - Fault history of six most recent faults:
    - Cycles of operation at time of fault.

- Expanded annunciator data at time of fault.
- Fault message and code.
- Hours of operation at time of fault.
- Sequence status at time of fault.
- Sequence time at time of fault.

—Diagnostic information:

- Device type.
- Flame amplifier type.
- Flame failure response time.
- Manufacturing code.
- On/Off status of all digital inputs and outputs.
- PREPURGE time selected.
- Software revision and version of 7800 SERIES Relay Module and Keyboard Display Module.
- Status of configuration jumpers.
- Status of Run/Test Switch.

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# Specifications

## ELECTRICAL RATINGS:

Voltage and Frequency: 13 Vdc peak full wave rectified (+20/-15%).

Power Dissipation/VA Consumption: 7W maximum, 2 VA maximum.

## TERMINAL RATINGS:

Power: 13 Vdc peak full wave rectified.

Earth ground.

ControlBus (1(a), 2(b), 3(c)) 5 Vdc at 1 mA maximum.

## ENVIRONMENTAL RATINGS:

Ambient Temperature:

Operating: -40°F to 140°F.

Storage: -40°F to 150°F.

Humidity: 85% RH continuous, noncondensing.

Vibration: 0.5G environment.

Dimensions: See Fig. 1

Weight: 4 ounces, unpacked.

## DISPLAY:

Vacuum Fluorescent Display (VFD), 40 character (2 row by 20 column):

—part no. S7800A1001 English language display.

—part no. S7800A1035 French language display.

—part no. S7800A1043 German language display.

—part no. S7800A1050 Italian language display.

—part no. S7800A1068 Spanish language display.

—part no. S7800A1118 Japanese language display.

## APPROVAL BODIES:

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

Canadian Standards Association certified: LR9S329-3.

Factory Mutual approved: Report No. J11V9A0.AF.

IRI acceptable.

Federal Communications Commission, Part 15, Class B Emissions.

Please note the following to comply with EN60730 for remote mounting of the display or remote reset. It is necessary to provide electrical separation by insulation at least equivalent to double or reinforced insulation.

This can be accomplished by either:

—Optically isolating the communication or remote reset lines from the control cabinet, or

—Providing physical separation from the communication or remote display cover assembly (part no.

204718A) or other suitable enclosure that meets IP40 class of protection.

## ACCESSORIES:

ControlBus 5-wire Electrical Connector: part no. 203541.

DATA CONTROLBUS MODULE™: part no. S7810A1009.

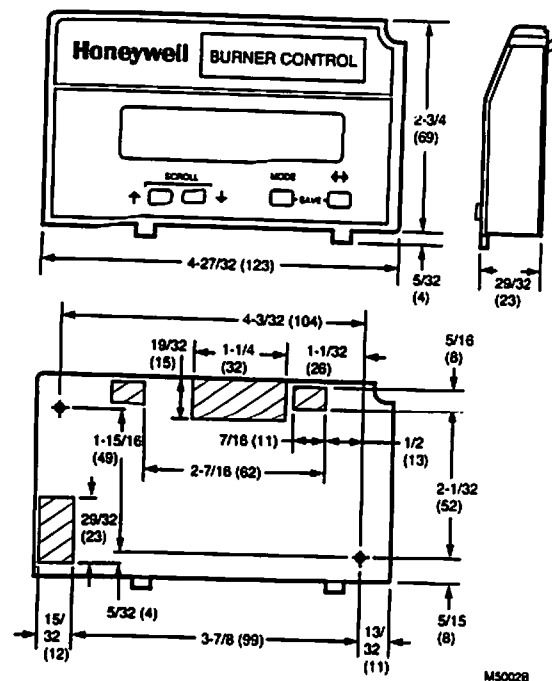
Remote Display Mounting Bracket: part no. 203765.

Sixty-inch (1.5 meter) Extension Cable Assembly: part no. 221818A.

NEMA 4 Cover Assembly for S7800A Keyboard Display Module: part no. 204718A.

Remote Display Flush Mount Kit: part no. 205321B.

Fig. 1—Approximate dimensions of S7800 in inches (millimeters).



# Ordering Information

When purchasing replacement and modernization products from your 7800 SERIES distributor, refer to the TRADELINE® Catalog for complete ordering number.

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 your phone directory).
2. Home and Building Control Customer Logistics  
Honeywell Inc., 1885 Douglas Drive North  
Minneapolis, Minnesota 55422-4386 (612) 951-1000  
In Canada—Honeywell Limited/Honeywell Limitee, 740 Ellesmere Road, Scarborough, Ontario M1P 2V9
3. Honeywell B.B. HEDC  
P.O. Box 3003  
2130 KA Hoofddorp  
The Netherlands

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.

# 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 marked on the product to make sure the product is suitable for your application.

3. Installer must be a trained, experienced, flame safe-guard service technician.

4. After installation is complete, check out the product operation as provided in these instructions.

5. Disconnect the power supply before beginning installation to prevent electrical shock and equipment damage. More than one power supply disconnect may be involved.

6. Be sure wiring complies with all applicable codes, ordinances and regulations.

7. See Figs. 6 and 7 for S7800A unique wiring connections.

## IMPORTANT:

1. *This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class B computing device of Part 15 of FCC rules which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference; in which case, users at their own expense may be required to take whatever measures are required to correct this interference.*

2. *This digital apparatus does not exceed the Class B limits for radio noise for digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.*

## HUMIDITY

Install the S7800A where the relative humidity never reaches the saturation point. The S7800A is designed to operate in a maximum 85% RH continuous, noncondensing, moisture environment. Condensing moisture may cause improper Keyboard Display Module operation.

## VIBRATION

Do not install the S7800A where it could be subjected to vibration in excess of 0.5G continuous maximum vibration.

## WEATHER

The S7800A is not designed to be weather tight. If installed outdoors, the S7800A must be protected by an approved weather-tight enclosure.

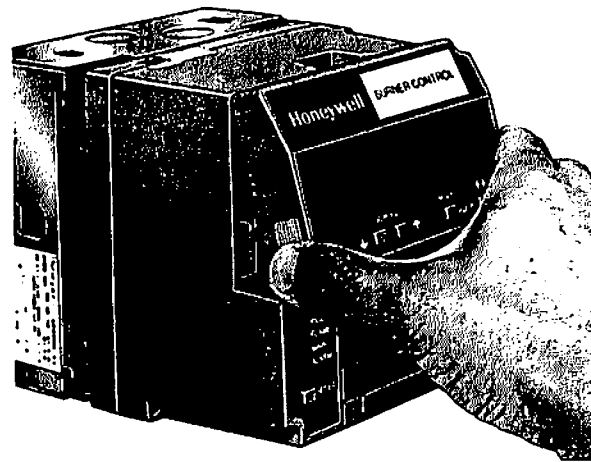
## MOUNTING KEYBOARD DISPLAY MODULE (VFD)

1. Align the two interlocking ears of the Keyboard Display Module with the two mating slots on the 7800 SERIES Relay Module, see Fig. 2.

2. Insert the two interlocking ears into the two mating slots and with a hinge action push on the lower corners of the Keyboard Display Module to secure it to the 7800 SERIES Relay Module.

3. Assure the Keyboard Display Module is firmly in place.

Fig. 2—Keyboard Display Module mounting.



## REMOTE MOUNTING KEYBOARD DISPLAY MODULE (VFD)

1. The Keyboard Display Module (VFD) can be mounted either on the face of a panel door or on other remote locations, see Fig. 3.

2. When mounting the Keyboard Display Module on the face of a door panel, closely follow the instructions.

a. Select the location on the door panel for flush mounting. Pay attention to the insertion dimension of the two Keyboard Display Modules screws, two interlocking ears and the two plug-in connectors to allow for sufficient clearance.

b. Use the Keyboard Display Module or DATA CONTROLBUS MODULE™ as a template, see Fig. 16. Mark the two screw locations, two interlocking ear locations and the two plug-in connector locations. Drill the pilot holes for the mounting screws. Provide for two holes on the door panel for the interlocking ears and plug-in connector holes, see Fig. 3.

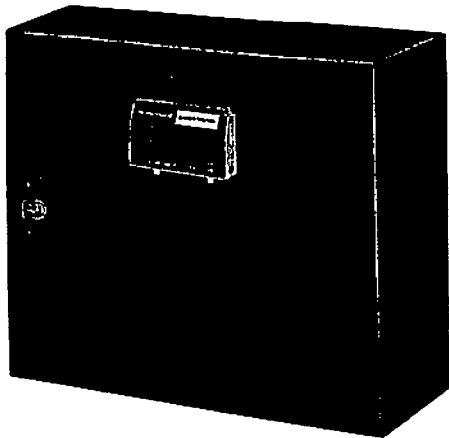
c. Mount the Keyboard Display Module, securing it with the two extra screws provided in a bag assembly with the Keyboard Display Module.

3. When mounting the Keyboard Display Module on a wall or remote location, use the Remote Mounting Bracket, part no. 203765.

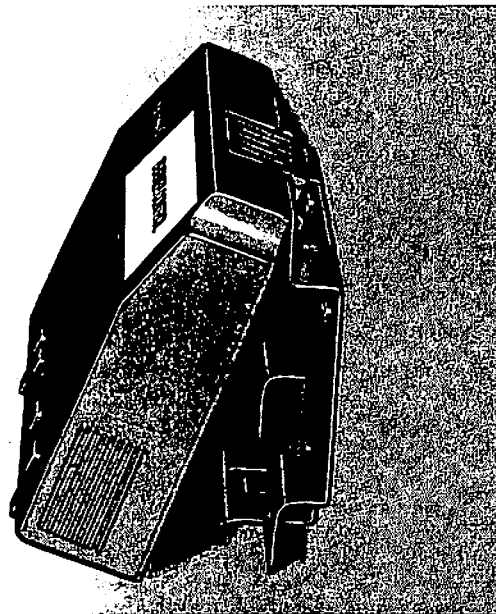
a. Use the Remote Mounting Bracket as a template. Mark the four screw locations and drill the pilot holes. Mount the Remote Mounting Bracket by securing the four no. 6 screws (M3.5 x 0.6), see Fig. 4.

- b. Mount the Keyboard Display Module by aligning the two interlocking ears with the two mating slots on the Remote Mounting Bracket.
- c. Insert the two interlocking ears with the two mating slots. Push on the lower corners of the Keyboard Display Module to secure it to the Remote Mounting Bracket.
- d. Assure the Keyboard Display Module is firmly in place.

**Fig. 3—Panel mounting of a Keyboard Display Module.**



**Fig. 4—Remote mounting of a Keyboard Display Module using a Remote Mounting Bracket.**



## Wiring

1. Refer to Fig. 5, 6, and 7 for proper wiring.
2. *Disconnect the power supply from the main disconnect before beginning installation to prevent electrical shock and equipment and control damage. More than one disconnect may be involved.*
3. Be sure all wiring complies with all applicable electrical codes, ordinances and regulations.
4. Recommended wire size and type:
  - a. Keyboard Display Module—For communications purposes, use an unshielded (no. 22 AWG) 2-wire twisted cable and one wire for ground if the leadwire run and noise conditions permit; however, some installations may need up to five wires, three for communications and two for remote reset (in either a single cable or separate cables for communications or remote reset) or use Belden 8771 shielded cable or equivalent. The Keyboard Display Module, DATA CONTROLBUS MODULE™ (for remote mounting or communications) or Communication Interface ControlBus Module must be wired in a daisy chain configuration, (1(a)-1(a), 2(b)-2(b), 3(c)-3(c)). The order of interconnection of all the devices listed above is not important. Be aware that modules on the closest and farthest end of the daisy chain configuration string require a 120 ohm (1/4 watt minimum) resistor termination across terminals

- nals 1 and 2 of the electrical connectors for connections over 100 feet (30 meters), see Fig. 5, 6, and 7.
- b. DATA CONTROLBUS MODULE™—For communications purposes, use an unshielded (22 AWG) 2-wire twisted cable and one wire for ground if the leadwire run and noise conditions permit; however, some installations may need up to five wires, three for communications and two for remote reset (in either a single cable or separate cables) or Belden 8771 shielded cable or equivalent. The Keyboard Display Module, DATA CONTROLBUS MODULE™ (for remote mounting or communications) or Communication Interface ControlBus Module must be wired in a daisy chain configuration, (1(a)-1(a), 2(b)-2(b), 3(c)-3(c)). The order of interconnection of all the devices listed above is not important. Be aware that modules on the closest and farthest end of the daisy chain configuration string require a 120 ohm (1/4 watt minimum) resistor termination across terminals 1 and 2 of the electrical connectors, for connections over 100 feet (30 meters), see Fig. 5, 6, and 7.
- c. Remote Reset—Use no. 22 AWG or greater twisted pair wire, insulated for low voltage, see Fig. 5, 6, and 7.

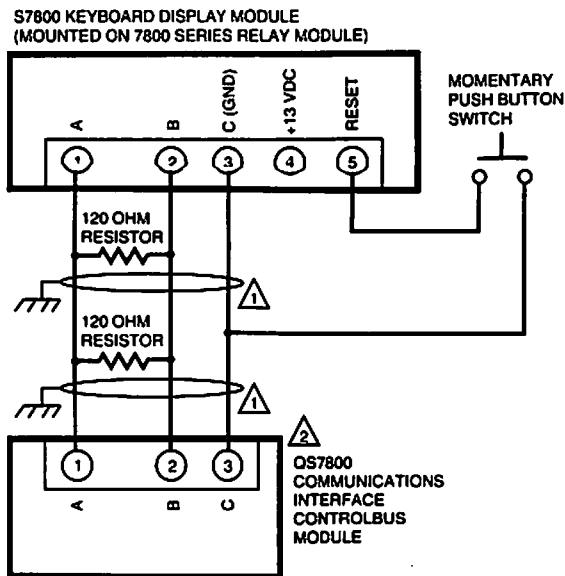
- d. Use the appropriate wire size for the 13 Vdc peak full wave rectified transformer power input of (18 AWG) insulated for voltages and temperatures encountered in the application.

5. Recommended grounding practices for the Keyboard Display Module or the DATA CONTROLBUS MODULE™ or Communication Interface ControlBus Module—The shield, if used, should be connected to the signal ground terminal 3(c) provided as part of the 7800 SERIES device ControlBus connection. Connect the shield at both ends to earth ground.

6. Recommended wire routing:

- a. ControlBus:
  1. Do not route the ControlBus cable in conduits that carry line voltage circuits.
  2. Avoid routing the ControlBus cable close to ignition transformer leadwires.
  3. Route the ControlBus cable outside of conduit if properly supported and protected from damage.
- b. Remote Reset:
  1. Do not run high voltage ignition transformer wires in the same conduit with the Remote Reset wiring.

Fig. 5—Wiring the Keyboard Display Module.

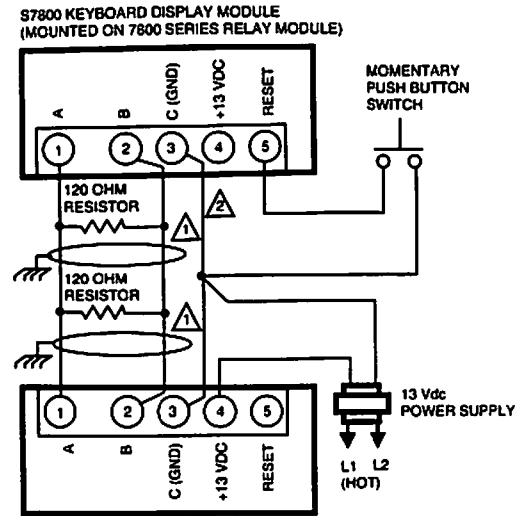


⚠️ THREE WIRE SHIELDED CABLE MAY BE REQUIRED. TWO 120 OHM TERMINATING RESISTORS ARE REQUIRED FOR CONNECTIONS OVER 100 FEET (30 METERS). CABLE SHIELD MUST BE TERMINATED TO EARTH GROUND AT BOTH ENDS. IF SHIELDED CABLE IS NOT USED, TWISTED PAIR WIRE MUST BE USED.

⚠️ WHEN CONNECTING THE KEYBOARD DISPLAY MODULE DATA CONTROLBUS MODULE™, OR REMOTE RESET MODULE EXTERNAL FROM THE CONTROL CABINET, APPROPRIATE MEASURES MUST BE TAKEN TO MEET EN60730 SAFETY LOW VOLTAGE REQUIREMENTS (SEE APPROVALS).

M11990E

Fig. 6—Wiring for multiple Keyboard Display Modules.



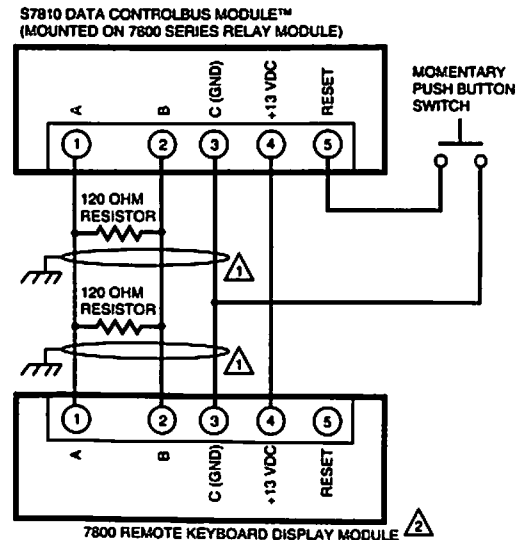
S7800 REMOTE KEYBOARD DISPLAY MODULE ⚠️

⚠️ THREE WIRE SHIELDED CABLE MAY BE REQUIRED. TWO 120 OHM TERMINATING RESISTORS ARE REQUIRED FOR CONNECTIONS OVER 100 FEET (30 METERS). CABLE SHIELD MUST BE TERMINATED TO EARTH GROUND AT BOTH ENDS. IF SHIELDED CABLE IS NOT USED, TWISTED PAIR WIRE MUST BE USED.

⚠️ WHEN CONNECTING THE KEYBOARD DISPLAY MODULE DATA CONTROLBUS MODULE™, OR REMOTE RESET MODULE EXTERNAL FROM THE CONTROL CABINET, APPROPRIATE MEASURES MUST BE TAKEN TO MEET EN60730 SAFETY LOW VOLTAGE REQUIREMENTS (SEE APPROVALS).

M5006E

Fig. 7—Wiring the Keyboard Display Module for remote mounting.



⚠️ THREE WIRE SHIELDED CABLE MAY BE REQUIRED. TWO 120 OHM TERMINATING RESISTORS ARE REQUIRED FOR CONNECTIONS OVER 100 FEET. CABLE SHIELD MUST BE TERMINATED TO EARTH GROUND AT BOTH ENDS. IF SHIELDED CABLE IS NOT USED, TWISTED PAIR WIRE MUST BE USED.

⚠️ WHEN CONNECTING THE KEYBOARD DISPLAY MODULE DATA CONTROLBUS MODULE™, OR REMOTE RESET MODULE EXTERNAL FROM THE CONTROL CABINET, APPROPRIATE MEASURES MUST BE TAKEN TO MEET EN60730 SAFETY LOW VOLTAGE REQUIREMENTS (SEE APPROVALS).

M5205B

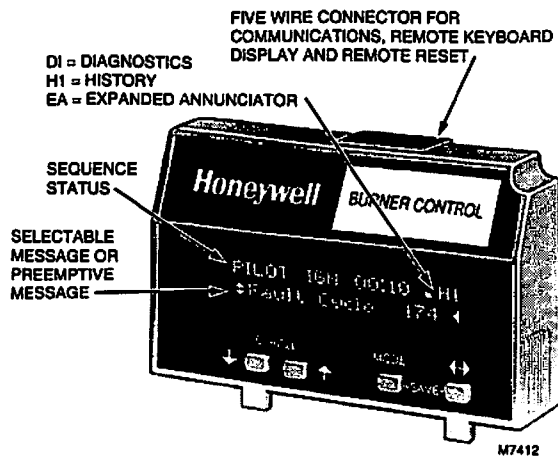
2. Do not route Remote Reset wires in conduit with line voltage circuits.
7. Maximum wire lengths:
  - a. Keyboard Display Module—The maximum length interconnecting wire is 1000 feet (300 meters).
  - b. Remote Reset leadwires—The maximum length wire is 1000 feet (300 meters) to a Remote Reset pushbutton.
8. Install all electrical connectors.
9. Restore power to the panel.

NOTE: A 13 Vdc power supply must be used any time more than one Keyboard Display Module is used.

### KEYBOARD DISPLAY MODULE (VFD)

The first line of the Vacuum Fluorescent Display (VFD) provides current status of the burner sequence (STANDBY, PURGE, PILOT IGN, MAIN IGN, RUN and POSTPURGE), timing information (PURGE, PILOT IGN, MAIN IGN and POSTPURGE) in minutes and seconds, hold information (PURGE HOLD) and lockout information (Lockout, Fault Code, Message and Sequence), see Fig. 8. The extreme right side of the first line will be either blank or it will show a small arrow pointing to the second line followed by a two-letter code (DI-Diagnostic Information, Hn-Fault History Information and EA-Expanded Annunciator). When the arrow and two-letter code are displayed, it indicates the second line is showing a selectable message submenu. The second line will display selectable or preemptive messages. A selectable message supplies information for flame strength, system status indication, system or self-diagnostics and troubleshooting. A preemptive message will have parentheses around the message and supply a detailed message to support the sequence status information. A preemptive message can also be a lockout message. A preemptive message will replace a selectable message to support the sequence status information. It will also replace a selectable message after 60 seconds if it or a lockout message is available. The 7800 SERIES Relay Module LEDs provide positive visual indication of the Relay Modules sequence. The LEDs will be energized simultaneously with the correct sequence description.

Fig. 8—S7800 Keyboard Display Module.



NOTE: The RM7800 and RM7838 Relay Modules will not operate without the Keyboard Display Module installed.

### KEYBOARD FUNCTIONS

The keyboard contains four pushbuttons that each have separate functions (SCROLL-Down, SCROLL-Up, MODE and CHANGE-LEVEL). The MODE and CHANGE-LEVEL pushbuttons, when pressed together, provide a SAVE function.

1. SCROLL Down-Up pushbuttons (↕), see Fig. 9.

The SCROLL Down-Up pushbuttons (↕) are used to scroll through the selectable messages. The double-headed arrow (↕), which is located in the lower left position of the second line of the display, represents the SCROLL Down-Up pushbuttons. The SCROLL Down-Up pushbuttons (↕) can be pressed to display the selectable messages one at a time or held down to scroll through the selectable messages at a rate of two per second. When the last item of the selectable message is viewed, the display wraps around and displays the first selectable message again.

2. CHANGE-LEVEL pushbutton (↔), see Fig. 10.

Fig. 9—(↕) SCROLL pushbutton function.

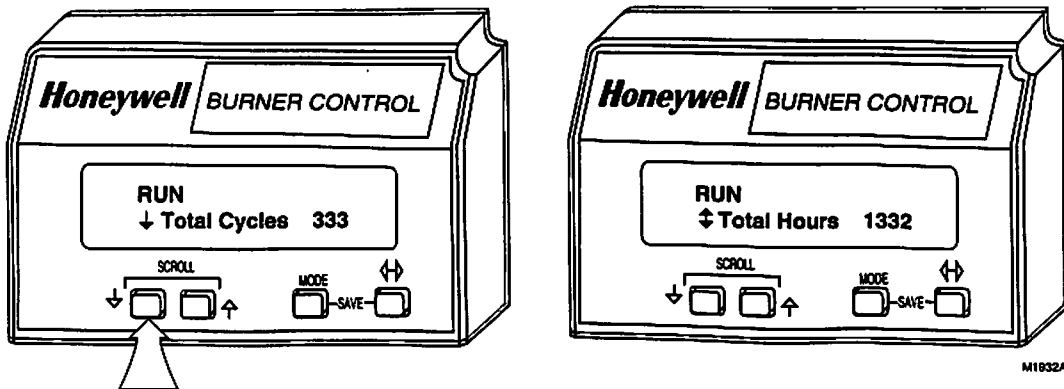


Fig. 10—(↔) CHANGE-LEVEL pushbutton function.

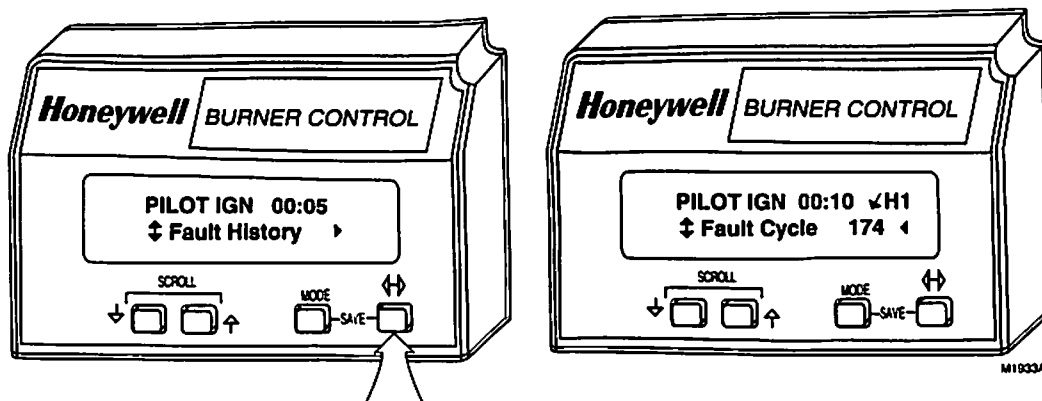
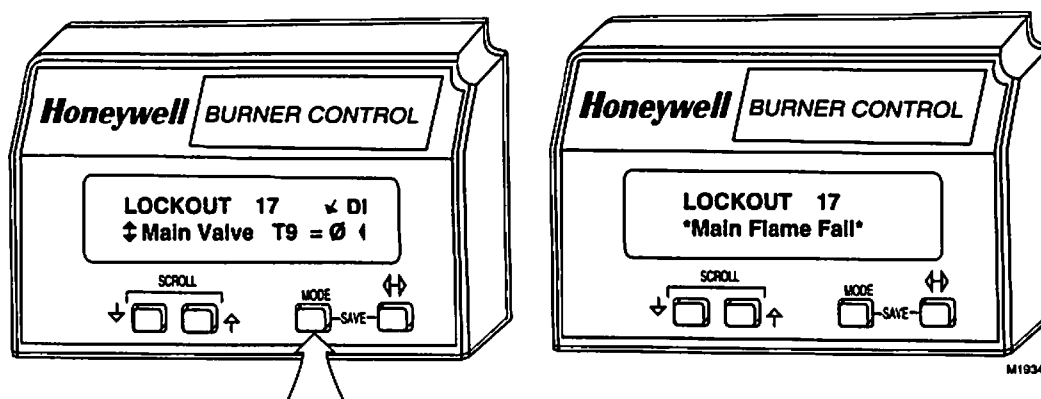


Fig. 11—MODE pushbutton function.



The CHANGE-LEVEL pushbutton is used to change between the first hierarchy of selectable messages to a subset of selectable messages. The CHANGE-LEVEL pushbutton can also be used to change from a subset message to a first level selectable message. The symbol (>) located on the second line in the lower right corner of the VFD represents a first level hierarchy of selectable messages. The symbol (<) located on the second line in the lower right corner of the VFD represents a subset of selectable messages.

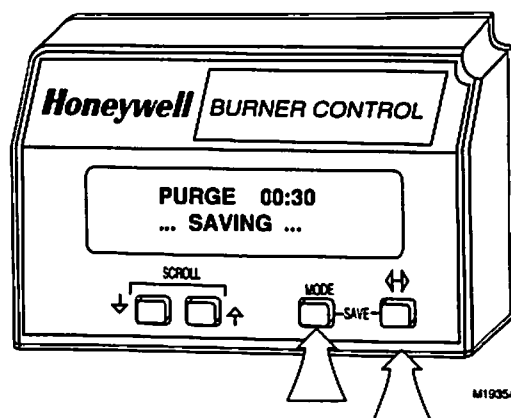
### 3. MODE pushbutton, see Fig. 11.

Use the MODE pushbutton to instantaneously switch the display from a *second-line-selectable* message to a *second-line-preempted* message. The sixty second timeout function can also be used for this task. The MODE pushbutton will work only if there is a *second-line-preempted* message or lockout message.

### 4. SAVE function, see Fig. 12.

The SAVE function enables users to identify the selectable message they want to view upon power restoration. The second line selectable message will be restored to the most recently saved selection when power returns. The SAVE function is performed by pressing and holding the MODE key and then pressing the CHANGE-LEVEL key (↔). The second line of the display will briefly note "... SAVING ..." to confirm that the keys were pressed.

Fig. 12—SAVE function.



## SELECTABLE MESSAGES

VFD Second Line Display, Two-Level Hierarchy, see Table 1.

The display values are as follows:

n represents a numbered value.

T represents the terminal number.

x represents the suffix letter of the Relay Module.

TABLE 1—SELECTABLE MESSAGES.

Selectable Message (Second Line)	Display Value (Second Line) <sup>a</sup>	First Line Message
↓Flame Signal	n.nV	
↓Total Cycles	nnnnn	
↓Total Hours	nnnnn	
↓Fault History↔		
↓Fault Cycle	nnnnn<	↓H1
↓Fault Hours	nnnnn<	↓H1
↓Fault Code	nnn <	↓H1
↓*fault —message*<		↓H1
↓sequence—message<		↓H1
↓(second-line-message)<		↓H1
↓Fault Cycle	nnnnn<	↓H2
↓Fault Hours	nnnnn<	↓H2
↓Fault Code	nnn <	↓H2
↓*fault —message*<		↓H2
↓sequence—message<		↓H2
↓(second-line-message)<		↓H2
↓Fault Cycle	nnnnn<	↓H3
↓Fault Hours	nnnnn<	↓H3
↓Fault Code	nnn <	↓H3
↓*fault —message*<		↓H3
↓sequence—message<		↓H3
↓(second-line-message)<		↓H3
↓Fault Cycle	nnnnn<	↓H4
↓Fault Hours	nnnnn<	↓H4
↓Fault Code	nnn <	↓H4
↓*fault —message*<		↓H4
↓sequence—message<		↓H4
↓(second-line-message)<		↓H4
↓Fault Cycle	nnnnn<	↓H5
↓Fault Hours	nnnnn<	↓H5
↓Fault Code	nnn<	↓H5
↓*fault —message*<		↓H5
↓sequence—message<		↓H5
↓(second-line-message)<		↓H5
↓Fault Cycle	nnnnn<	↓H6
↓Fault Hours	nnnnn<	↓H6
↓Fault Code	nnn<	↓H6
↓*fault —message*<		↓H6
↓sequence—message<		↓H6
↓(second-line-message)<		↓H6
↓Diagnostic Info↔		
↓Device	RM78nnx or EC78nnx<	↓DI
↓Device Suffix	nnnn<	↓DI
↓Run/Test Sw.	RUN or TEST<	↓DI
↓Operating Control (Oper/Control)		↓DI
↓Interlock	T6 =1 or 0<	↓DI
↓Pilot Valve	T7 =1 or 0<	↓DI
↓Main Valve	T8 =1 or 0<	↓DI
↓Ignition	T9 =1 or 0<	↓DI
↓LowFire Sw	T10 =1 or 0<	↓DI
↓HighFireSw	T18 =1 or 0<	↓DI
↓Preignition Interlock (PreIgn ILK)	T19 =1 or 0<	↓DI
↓Pilot Valve/First Stage	T20 =1 or 0<	↓DI
↓Oil Valve/START (Valv/Start)	T21 =1 or 0<	↓DI



TABLE 1—SELECTABLE MESSAGES (Continued)

Selectable Message (Second Line)	Display Value (Second Line) <sup>a</sup>	First Line Message
↓Jumper 1	INTACT or CLIPPED<	↓DI
↓Jumper 2	INTACT or CLIPPED<	↓DI
↓Jumper 3	INTACT or CLIPPED<	↓DI
↓Amplifier Type (Amp Type)	STANDARD or AMP-CHECK or SHUTTER	↓DI
↓Flame Response	0.8s, 1s, 2s or 3s<	↓DI
↓Purge Time	mm:ss<	↓DI
↓Manufacturing Code (Mfg Code)	nnnn<	↓DI
↓Software Revision (SW Rev.)	nnnn/nnnn<	↓DI
↓Expanded Annun.↔ (see Table 2)		
↓Remote Command	NONE/HOLD/HF/LF	

<sup>a</sup> 1 = ON (Powered); 0 = OFF (Not Powered).

**EXPANDED ANNUNCIATOR MESSAGES,  
See Table 2**

The Expanded Annunciator (EA) may or may not be connected because it is an optional device. If the EA is not connected, a display message of "(EA not connected)" will

be shown. If the EA is connected, display messages will be shown; see Table 1. When accessing Expanded Annunciator Messages, follow the same operations as used with the Selectable Messages.

TABLE 2—EXPANDED ANNUNCIATOR.

Selectable Message <sup>a</sup> (Second Line)	Display Value (Second Line) <sup>b</sup>	First Line Message
↓Expanded Annun.↔		
↓Expanded Annunciator (EA not connected)<		
↓Current Status (CS:) <sup>a</sup>	EA Message<	↓EA
↓Valve Closure (Valve Close)	T4 =1 or 0<	↓EA
↓Burner Switch (Burner Sw.)	T5 =1 or 0<	↓EA
↓Operating Control (OperControl)	T6 =1 or 0<	↓EA
↓Auxiliary Limit (Aux Limit 1)	T7 =1 or 0<	↓EA
↓Auxiliary Limit (Aux Limit 2)	T8 =1 or 0<	↓EA
↓Low water Cutoff (LWCO)	T9 =1 or 0<	↓EA
↓High Limit (High Limit)	T10 =1 or 0<	↓EA
↓Auxiliary Limit (AuxLimit 3)	T11 =1 or 0<	↓EA
↓Oil Selection Switch (Oil Select)	T12 =1 or 0<	↓EA
↓High Oil Pressure Switch (Hi OilPres)	T13 =1 or 0<	↓EA
↓Low Oil Pressure Switch (LowOilPres)	T14 =1 or 0<	↓EA
↓High Oil Temperature Switch (Hi OilTemp)	T15 =1 or 0<	↓EA
↓Low Oil Temperature Switch (LowOilTemp)	T16 =1 or 0<	↓EA
↓Atomizing Switch (Atomize Sw)	T19 =1 or 0<	↓EA
↓Gas Selection Switch (Gas Select)	T17 =1 or 0<	↓EA
↓High Gas Pressure Switch (Hi GasPres)	T18 =1 or 0<	↓EA
↓Low Gas Pressure Switch (LowGasPres)	T19 =1 or 0<	↓EA
↓Airflow Switch (Airflow Sw)	T20 =1 or 0<	↓EA
↓Auxiliary Interlock (Aux ILK 4)	T21 =1 or 0<	↓EA
↓Auxiliary Interlock (Aux ILK 5)	T22 =1 or 0<	↓EA
↓EA Fault Code	nnn<	↓EA
↓Software Revision (SW Rev.)	nnnn<	↓EA

<sup>a</sup> Expanded Annunciator Diagnostic Current Status Messages can be reviewed in 7800 SERIES System Annunciation Diagnostics and Troubleshooting, form 65-0118.

<sup>b</sup> 1 = ON (Powered); 0 = OFF (Not Powered).

# Troubleshooting

After the Keyboard Display Module has been installed, return the 7800 SERIES to normal operation, restore power and run the system through at least one complete automatic cycle. For complete Troubleshooting and System Checkout information, see form 65-0118.

## 7800 SERIES SYSTEM DIAGNOSTICS

Troubleshooting control system equipment failures is made easier with the 7800 SERIES self-diagnostics and first-out annunciation. The S7800 provides visual annunciation by displaying a fault code and fault or hold message at the Keyboard Display Module 2 row by 20 column VFD.

Self-diagnostics of the 7800 SERIES enables it to detect and annunciate both external and internal system problems. Internal faults and external faults such as interlock failures, flame failures and false flame signals are annunciated by the Keyboard Display Module VFD via the 7800 SERIES Relay Module.

The VFD displays a sequence status message indicating as appropriate: STANDBY, PREPURGE, PREIGNITION, SAFETY 1, PILOT IGN, PILOT STAB., MAIN IGN, RUN and POSTPURGE. The selectable messages also provide visual indication of current status and historical status of the equipment such as: Flame Signal, Total Cycles, Total Hours, Fault History, Diagnostic Information and Expanded Annunciator terminal status (if used). With this information, most problems can be diagnosed without extensive trial and error testing.

The S7800 provides Diagnostic Information to aid the service mechanic in obtaining information when troubleshooting the system; see Table 3 to access historical and diagnostic information. Information available in the Diagnostic Information includes Device Type, Device Suffix, Software Revision, Manufacturing Code, Flame Amplifier Type, Flame Failure Response Time, Selectable Jumper Configuration Status, Run/Test Switch Status and Terminal Status.

## HISTORICAL INFORMATION INDEX

The S7800A displays historical information for the six most recent lockouts. Each of the six lockout records retain the cycle when the fault occurred, the hour of operation when the fault occurred, a fault code, a fault message, and burner status when the fault occurred, see Table 4.

**SERVICE NOTE:** The RM7800 and RM7838 will not operate without a Keyboard Display Module or a DATA CONTROLBUS MODULE™ installed.

**SERVICE NOTE:** If the Keyboard Display Module VFD is scrambled, remove and reinstall the Keyboard Display Module and reset the 7800 SERIES Relay Module.

TABLE 3—ACCESSING HISTORICAL AND DIAGNOSTIC SELECTABLE MESSAGES.

Step	Operation	Press	Display	Comments
1.	Press SCROLL key to access Diagnostic Information.	(↓)	STANDBY ↓Diagnostic Info >	Use the Down/Up SCROLL keys to access the selectable message. The second line will display Diagnostic Information.
2.	Press Change Level key to Access Diagnostic Information.	(↔)	STANDBY ↓Diagnostic Info>	Use the Change Level key to access the Diagnostic Information.
3.	Continue display of Diagnostic Information.	(↓)	STANDBY ✓ DI ↓Device RM7800<	Push the (↓) SCROLL key to scroll to the next Diagnostic Message.
4.	Continue through remaining Diagnostic Information display following step 3 as required.	—	—	—
5.	Press the Change Level key to return to the first level of Diagnostic Information data prompt or to other selectable messages.	(↔)	STANDBY ↓Diagnostic Info>	Another display can be selected or discontinue accessing Diagnostic Information review.

NOTE: Historical files may be selected similarly.

**SERVICE NOTE:** Reset the 7800 SERIES Relay Module by pressing the reset pushbutton on the 7800 SERIES Relay Module, or pressing a remote reset pushbutton wired through the Keyboard Display Module, DATA

CONTROLBUS MODULE™ or Remote Reset Module. A power-up reset will cause an electrical reset of the 7800 SERIES Relay Module but will not reset a lockout condition.

TABLE 4—SELECTABLE MESSAGES (SEE TABLE 1).

Selectable Message/Display	Description	Possible States/Range (Terminals)	Comments
Flame Signal	Flame signal strength.	0 - 5.0 Vdc Flame Amp (+ and - (Com))	Flame relay pull-in and drop-out value 1.25 Vdc.
Total Cycles	Total number of equipment operating cycles.	0 - 99,999 (250,000) cycles	Cycle will be updated each time main valve is energized.
Total Hours	Total number of equipment operating hours.	0 - 99,999 (250,000) hours	Hour will be updated each time main valve output is energized for 60 minutes.
Fault History > (Six most recent faults)	First level prompt for history information. Has subset level.	—	—
Fault Cycle      ✓ H1	Cycle when fault occurred.	0 - 99,999 cycles (250,000) cycles	—
Fault Hours      ✓ H1	Run hour when fault occurred.	0 - 99,999 (250,000) hours	—
Fault Code      ✓ H1	Number that identifies the reason for lockout.	0 - 999	—
*Fault Message*      ✓ H1	Indicates cause of lockout.	—	—
Sequence Message      ✓ H1	Indicates where in the sequence the lockout occurred.	—	—
(Second Line Message)      ✓ H1	Second line message explains any further information that is available from the 7800 SERIES or may be blank if there is not a preemptive second-line. H2...H6 etc.	—	—
Diagnostic Information >	First level prompt for diagnostic information. Has subset level.	—	—
Device	Device type number.	RM78XXX or EC78XXX	—
Device Suffix	Device suffix number.	nnnn	—
Run/Test Sw.	Position of Run/Test Switch.	RUN or TEST	Indicates if 7800 SERIES is in RUN or TEST mode.
OperControl      T6	Operating Control Input.	= 1 or 0	Indicates if input is on or off, energized or de-energized.
Interlock      T7	Running/Lockout Interlock.	= 1 or 0	Indicates if input is on or off, energized or de-energized.

(continued)

TABLE 4—SELECTABLE MESSAGES (Continued).

Selectable Message/Display	Description	Possible States/Range (Terminals)	Comments
Pilot Valve T8	Pilot Valve.	= 1 or 0	Indicates if output terminal is on or off, energized or de-energized.
Main Valve T9	Main Fuel Valve.	= 1 or 0	Indicates if output terminal is on or off, energized or de-energized.
Ignition T10	Ignition.	= 1 or 0	Indicates if output terminal is on or off, energized or de-energized.
LowFire Sw T18	Low Fire Switch.	= 1 or 0	Indicates if input is on or off, energized or de-energized.
HighFireSw T19	High Fire Switch.	= 1 or 0	Indicates if input is on or off, energized or de-energized.
PreIgn ILK T20 or T17 <sup>a</sup>	Preignition Interlock.	= 1 or 0	Indicates if input is on or off, energized or de-energized.
Valv/Start T21	Interrupted/Intermittent Pilot Valve, First Stage Oil Valve or Start Input.	= 1 or 0	Indicates if output is on or off, energized or de-energized.
Jumper 1	Pilot Flame Establishing Period (PFEP).	INTACT/CLIPPED	Display shows state of PFEP jumper. If jumper is intact, 7800 SERIES has 10 second PFEP. If jumper is clipped, 7800 SERIES has 4 second PFEP.
	First Safety Time (for EC7850).	INTACT/CLIPPED	Display shows state of First Safety Time (EC7850) jumper. If jumper is intact, EC7850 has 5 second First Safety Time. If jumper is clipped, the EC7850 has 3 second First Safety Time.
Jumper 2	Pilot Valve.	INTACT/CLIPPED	Display shows state of Pilot Valve (terminal no. 21). If jumper is intact, RM7800G has Intermittent Pilot Valve. If jumper is clipped, RM7800G has 15 or 30 second Interrupted Pilot Valve.
	Main Trial Time (for EC7850).	INTACT/CLIPPED	Display shows state of Main Trial Time (EC7850) Valve (terminal no. 21). If jumper is intact, EC7850 has 5 second Main Trial Time. If jumper is clipped, EC7850 has 3 second Main Trial Time.
Jumper 3	Start-up Airflow Switch (AFS) check.	INTACT Disabled/ CLIPPED Enabled	Display shows state of Start-up AFS check jumper. If jumper is clipped, RM7800 AFS check is enabled and if jumper is intact, AFS check is disabled.

<sup>a</sup> Preignition Interlock Terminal 17 or 20 is model dependent.

(continued)

TABLE 4—SELECTABLE MESSAGES (Continued).

Selectable Message/Display	Description	Possible States/Range (Terminals)	Comments
Amp Type	Defines type of amplifier installed.	STANDARD/AMP-CHECK/SHUTTER	Display shows type of flame detection system installed (i.e., as STANDARD, AMP-CHECK/AMPLI-CHECK™ and SHUTTER/Dynamic Self-Checking).
Flame Response	Amplifier Flame Failure Response Time (FFRT) in seconds.	.8s, 1s, 2s, or 3s	—
Purge Time	Timing value of purge card.	mm:ss	Two seconds to 30 minutes.
Mfg Code	Manufacturing code is five digit number representing date code.	nnnnn	—
SW Rev.	Software revision and version code for 7800 SERIES and Keyboard Display Module.	nnnn/nnn	—
Expanded Annunciator	First level prompt for history information. Has sub-set level; see Table 2.	—	—
Remote Command	Status of firing rate command from remote controller.	NONE/HOLD HF/LF	—

**LOCKOUT MESSAGES**

When the 7800 SERIES is locked out, it displays a repeating cycle of messages; see Table 5. There are four states in the cycle:

1. STATE 1, see Fig. 13: First state message display lasts six seconds. First line displays the word LOCKOUT followed by the fault code number, and possibly a lower case letter if an Expanded Annunciator is connected. The lockout reason corresponding to the fault code number is displayed on the second line, highlighted by asterisks on each side. If the lockout reason is being enhanced due to the presence of an Expanded Annunciator, a lower case letter following the fault code number. This letter corresponds to the first-out code supplied by the Expanded Annunciator.

2. STATE 2, see Fig. 14: Display of the second state message lasts two seconds.

3. STATE 3, see Fig. 15: Display of the third state message lasts three seconds. It is a replica of the burner status as it existed at the time of lockout. The second line will be blank if the burner status at the time of lockout was one that did not include a preemptive message (in parentheses) for the second line.

4. STATE 4: In the fourth state, both lines are blanked for one-half second, then sequences to the first state.

NOTE: For further explanation of Lockout Messages, Troubleshooting and Checkout, refer to 7800 SERIES System Annunciation Diagnostics and Troubleshooting, form 65-0118.

Fig. 13—Lockout message state 1.

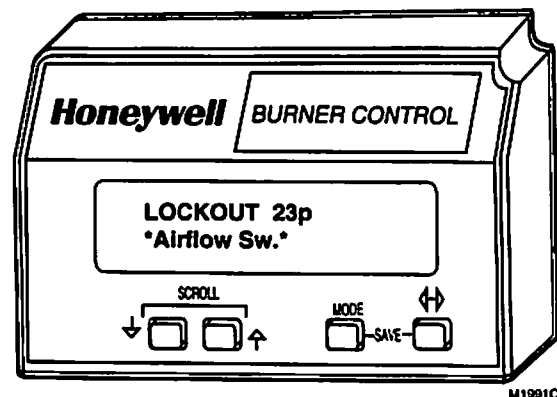


TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING.

Fault Code	System Failure	Recommended Troubleshooting
Fault 01 *No Purge Card*	No card is plugged into the purge card slot	<ol style="list-style-type: none"> <li>1. Assure the purge card is seated properly.</li> <li>2. Inspect the purge card and the connector on the relay module for damage or contaminants.</li> <li>3. Reset and sequence the 7800.</li> <li>4. If fault code reappears, replace the purge card.</li> <li>5. Reset and sequence the 7800.</li> <li>6. If fault persists, replace the relay module.</li> </ol>
Fault 02 *AC Freq/Noise*	Excess noise or device running on slow AC.	<ol style="list-style-type: none"> <li>1. Check the relay module and display module connections.</li> <li>2. Reset and sequence the 7800.</li> <li>3. Check the 7800 power supply to assure that both frequency and voltage meet specifications.</li> <li>4. Check the backup power supply as appropriate.</li> </ol>
Fault 03 *AC Line Dropout*	AC Line dropout detected.	<ol style="list-style-type: none"> <li>1. Check the relay module and display module connections.</li> <li>2. Reset and sequence the 7800.</li> <li>3. Check the 7800 power supply to assure that both frequency and voltage meet specifications.</li> <li>4. Check the backup power supply as appropriate.</li> </ol>
Fault 04 *AC Frequency*	Device running on fast AC.	<ol style="list-style-type: none"> <li>1. Check the relay module and display module connections.</li> <li>2. Reset and sequence the 7800.</li> <li>3. Check the 7800 power supply to assure that both frequency and voltage meet specifications.</li> <li>4. Check the backup power supply as appropriate.</li> </ol>
Fault 05 *Low Line Voltage*	Low AC line detected.	<ol style="list-style-type: none"> <li>1. Check the relay module and display module connections.</li> <li>2. Reset and sequence the 7800.</li> <li>3. Check the 7800 power supply to assure that both frequency and voltage meet specifications.</li> <li>4. Check the backup power supply as appropriate.</li> </ol>
Fault 06 *Purge Card Error*	The purge card timing has changed from the original configuration.	<ol style="list-style-type: none"> <li>1. Assure that the purge card is seated properly.</li> <li>2. Inspect the purge card and the connector on the relay module for any damage or contaminants.</li> <li>3. Reset and sequence the 7800.</li> <li>4. If fault code reappears, replace the purge card.</li> <li>5. Reset and sequence the 7800.</li> <li>6. If code persists replace relay module.</li> </ol>

(Continued)

TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING (Continued).

Fault Code	System Failure	Recommended Troubleshooting
<b>Fault 07</b> *Flame Amplifier*	Flame not sensed when checked for a nonself-check version.	<ol style="list-style-type: none"> <li>1. Check wiring, correct any errors.</li> <li>2. Assure that the flame detector and flame amplifier are compatible.</li> <li>3. Remove the flame amplifier and inspect its connections. Reseat the amplifier.</li> <li>4. Reset and sequence the 7800.</li> <li>5. If the code reappears, replace the flame amplifier and/or the flame detector.</li> <li>6. If fault persists, replace the relay module.</li> </ol>
<b>Fault 08</b> *Flame Amp/Shutr*	Flame sensed when checked for shutter-check or ampli-check versions.	<ol style="list-style-type: none"> <li>1. Check wiring, correct any errors.</li> <li>2. Assure that the flame detector and flame amplifier are compatible.</li> <li>3. Remove the flame amplifier and inspect its connections. Reseat the amplifier.</li> <li>4. Reset and sequence the 7800.</li> <li>5. If the code reappears, replace the flame amplifier and/or the flame detector.</li> <li>6. If fault persists, replace the relay module.</li> </ol>
<b>Fault 09</b> *Flame Detected*	Flame sensed when shutter open and no flame is expected during Standby.	<ol style="list-style-type: none"> <li>1. Check that flame is not present in the combustion chamber, correct any errors.</li> <li>2. Check wiring, correct any errors.</li> <li>3. Remove the flame amplifier and inspect its connections. Reseat the amplifier.</li> <li>4. Reset and sequence the 7800.</li> <li>5. If the code reappears, replace the flame amplifier and/or the flame detector.</li> <li>6. If fault persists, replace the relay module.</li> </ol>
<b>Fault 10</b> *Preignition ILK*	Preignition interlock fault during Standby.	<ol style="list-style-type: none"> <li>1. Check wiring, correct any errors.</li> <li>2. Check Preignition Interlock switches to assure that they function properly.</li> <li>3. Check fuel valve operation.</li> <li>4. Reset and sequence the 7800, monitor the Preignition interlock status.</li> <li>5. If code persists, replace the relay module.</li> </ol>
<b>Fault 11</b> *Running ILK On*	Running interlock powered at improper point in sequence.	<ol style="list-style-type: none"> <li>1. Check wiring to assure that the Running Interlocks are connected properly between terminals 6 and 7. Correct any errors.</li> <li>2. Reset and sequence the 7800.</li> </ol>

(Continued)

TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING (Continued).

Fault Code	System Failure	Recommended Troubleshooting
<p>Fault 11 *Running ILK On*</p>	<p>Running interlock powered at improper point in sequence.</p>	<ol style="list-style-type: none"> <li>3. If the fault persists, measure the voltage between terminals 6 and G (ground), then terminal 7 and G (ground). If there is 120 Vac at terminal 6 when the controller is off, the controller switch may be bad or is jumpered.</li> <li>4. If steps 1 through 3 are correct and there is 120 Vac at terminal 7 while the controller is closed and the fault persists, check for a welded or jumpered Running Interlock, Lockout Interlock or Airflow Switch. Correct any errors.</li> <li>5. If steps 1 through 4 are correct and the fault persists, replace the relay module.</li> </ol>
<p>Fault 12 *Lockout ILK On*</p>	<p>Lockout interlock powered at improper point in sequence.</p>	<ol style="list-style-type: none"> <li>1. Check wiring to insure that the Lockout Interlocks are connected properly between terminals 6 and 7. Correct any errors.</li> <li>2. Reset and sequence the 7800.</li> <li>3. If the fault persists, measure the voltage between terminals 6 and G (ground), then terminal 7 and G (ground). If there is 120 Vac at terminal 6 when the controller is off, the controller switch may be bad or is jumpered.</li> <li>4. If steps 1 through 3 are correct and there is 120 Vac at terminal 7 while the controller is closed and the fault persists, check for a welded or jumpered Running Interlock, Lockout Interlock or Airflow Switch. Correct any errors.</li> <li>5. If steps 1 through 4 are correct and the fault persists, replace the relay module.</li> </ol>
<p>Fault 13 *Airflow Sw. On*</p>	<p>Combustion airflow interlock fault during Standby.</p>	<ol style="list-style-type: none"> <li>1. Check wiring to assure that the Airlock Switch is connected properly between terminals 6 and 7. Correct any errors.</li> <li>2. Reset and sequence the 7800.</li> <li>3. If the fault persists, measure the voltage between terminals 6 and G (ground), then terminal 7 and G (ground). If there is 120 Vac at terminal 6 when the controller is off, the controller switch may be bad or is jumpered.</li> </ol>

(Continued)



**TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING (Continued).**

Fault Code	System Failure	Recommended Troubleshooting
<b>Fault 13</b> *Airflow Sw. On*	Combustion airflow interlock fault during Standby.	<ol style="list-style-type: none"> <li>4. If steps 1 through 3 are correct and there is 120 Vac at terminal 7 while the controller is closed and the fault persists, check for a welded or jumpered Running Interlock, Lockout Interlock or Airflow Switch. Correct any errors.</li> <li>5. If steps 1 through 4 are correct and the fault persists, replace the relay module.</li> </ol>
<b>Fault 14</b> *High Fire Sw.*	High fire interlock switch failure to close during prepurge.	<ol style="list-style-type: none"> <li>1. Check wiring, correct any errors.</li> <li>2. Reset and sequence the 7800.</li> <li>3. Use either the manual motor potentiometer to drive the motor to the High Fire position or use the Run/Test Switch option (if available) sequence to Prepurge drive to High Fire and place in the Test position. Adjust the High Fire switch while in this state to assure that it is closing properly.</li> <li>4. Measure the voltage between terminal 18 and G (ground) while in the Prepurge drive to High Fire state. 120 Vac should be present. If not, the switch adjustment is incorrect and/or the switch is defective and should be replaced.</li> <li>5. Reset and sequence the 7800. If 120 Vac was present between the High Fire switch and terminal 18, and the fault still persists, replace the relay module.</li> </ol>
<b>Fault 15</b> *Flame Detected*	Flame sensed when shutter open and no flame is expected.	<ol style="list-style-type: none"> <li>1. Check that flame is not present in the combustion chamber; correct any errors.</li> <li>2. Assure that the flame amplifier and flame detector are compatible.</li> <li>3. Check wiring and correct any errors.</li> <li>4. Remove the flame amplifier and inspect its connectors. Reseat the flame amplifier.</li> <li>5. Reset and sequence the 7800.</li> <li>6. If the code reappears, replace the flame amplifier and/or the flame detector.</li> <li>7. If fault persists, replace the relay module.</li> </ol>

(Continued)

TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING (Continued).

Fault Code	System Failure	Recommended Troubleshooting
<b>Fault 16</b> <b>*Flame-Out Timer*</b>	Integrated no-flame time exceeded the limit during Pilot Flame Establishing Period.	<ol style="list-style-type: none"> <li>1. Measure the flame signal. If one exists, does it meet specifications? Make appropriate burner adjustments.</li> <li>2. Assure that the flame amplifier and the flame detector are compatible.</li> <li>3. Replace the flame amplifier and/or the flame detector if necessary.</li> <li>4. If the fault persists, replace the relay module.</li> </ol>
<b>Fault 17</b> <b>*Main Flame Fail*</b>	Main flame failure during Run after flame has been established and on for at least 10 seconds.	<ol style="list-style-type: none"> <li>1. Inspect the main fuel valve(s) and its connection(s).</li> <li>2. Verify that the fuel pressure is sufficient enough to supply fuel to the combustion chamber. Inspect the connections to the fuel pressure switches. Assure that they are functioning properly.</li> <li>3. Inspect the Airflow Switch and assure that it is functioning properly.</li> <li>4. Check the flame detector sighting position; reset and cycle. Measure flame signal strength. Does it meet specifications? If not, refer to the flame detector and/or flame amplifier checkout procedures in the installation and instruction sheets.</li> </ol>
<b>Fault 18</b> <b>*Flame Detected*</b>	Flame sensed when shutter open and no flame is expected during Prepurge.	<ol style="list-style-type: none"> <li>1. Check that flame is not present in the combustion chamber. Correct any errors.</li> <li>2. Assure that the flame amplifier and flame detector are compatible.</li> <li>3. Check wiring, correct any errors.</li> <li>4. Remove the flame amplifier and inspect its connectors. Reseat the flame amplifier.</li> <li>5. Reset and sequence the 7800.</li> <li>6. If the code reappears, replace the flame amplifier and/or the flame detector.</li> <li>7. If the fault persists, replace the relay module.</li> </ol>

(Continued)

TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING (Continued).

Fault Code	System Failure	Recommended Troubleshooting
Fault 19 *Main Flame Ign.*	Flame was lost during MFEP or the first 10 seconds of the Run state.	<ol style="list-style-type: none"> <li>1. Inspect the main fuel valve(s) and connections.</li> <li>2. Verify that the fuel pressure is sufficient to supply fuel to the combustion chamber. Inspect the connections to the fuel pressure switches to assure that they are functioning properly.</li> <li>3. Inspect the Airflow Switch to assure that it is functioning properly.</li> <li>4. Check the flame detector sighting position; reset and cycle. Measure flame signal strength. Does it meet specifications? If not refer to the flame detector and/or flame amplifier checkout procedures in the installation and instruction sheets.</li> </ol>
Fault 20 *Low Fire Sw. Off*	Low fire interlock switch failure to close during Prepurge.	<ol style="list-style-type: none"> <li>1. Check wiring; correct any errors.</li> <li>2. Reset and sequence the 7800.</li> <li>3. Use either the manual motor potentiometer to drive the motor to the Low Fire position, or use the Run/Test switch option (if available) sequence to Prepurge drive to Low Fire and place in the Test position. Adjust the Low Fire switch while in this state to assure that it is closing properly.</li> <li>4. While in the Prepurge drive to Low Fire state, measure the voltage between terminal 19 and G (ground). 120 Vac should be present. If not, the switch adjustment is incorrect and/or the switch is defective and should be replaced.</li> <li>5. Reset and sequence the 7800. If 120 Vac was present between the Low Fire switch and terminal 19 and the fault still persists, replace the relay module.</li> </ol>
Fault 21 *Running ILK*	Running interlock fault during Prepurge.	<ol style="list-style-type: none"> <li>1. Check wiring; correct any errors.</li> <li>2. Inspect the fan, assure that there is no blockage of the air intake and that it is supplying air.</li> <li>3. Assure that the Running Interlock switches are functioning properly and that the contacts are free from contaminants.</li> </ol>

(Continued)

Fault Code	System Failure	Recommended
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TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING (Continued).

Fault Code	System Failure	Recommended Troubleshooting
Fault 21 *Running ILK*	Running interlock fault during Prepurge.	<ol style="list-style-type: none"> <li>4. Reset and sequence the 7800 to Prepurge (place the Run/Test switch into the Test position, if available). Measure the voltage between terminal 7 and G (ground). 120 Vac should be present.</li> <li>5. If steps 1 through 4 are correct and the fault persists, replace the relay module.</li> </ol>
Fault 22 *Lockout ILK*	Lockout interlock fault during Prepurge.	<ol style="list-style-type: none"> <li>1. Check wiring; correct any errors.</li> <li>2. Inspect the fan, assure that there is no blockage of the air intake and that it is supplying air.</li> <li>3. Assure that the Lockout Interlock switches are functioning properly and that their contacts are free from contaminants.</li> <li>4. Reset and sequence the 7800 to Prepurge (place the Run/Test switch into the Test position, if available). Measure the voltage between terminal 7 and G (ground). 120 Vac should be present.</li> <li>5. If steps 1 through 4 are correct and the fault persists, replace the relay module.</li> </ol>
Fault 23 *Airflow Switch*	Combustion airflow interlock fault during Prepurge.	<ol style="list-style-type: none"> <li>1. Check wiring; correct any errors.</li> <li>2. Inspect the fan, assure that there is no blockage of the air intake and that it is supplying air.</li> <li>3. Assure that the Airflow Interlock switches are functioning properly and that their contacts are free from contaminants.</li> <li>4. Reset and sequence the 7800 to Prepurge (place the Run/Test switch into the Test position, if available). Measure the voltage between terminal 7 and G (ground). 120 Vac should be present.</li> <li>5. If steps 1 through 4 are correct and the fault persists, replace the relay module.</li> </ol>
Fault 24 *Call Service*	The flame interlock (relay module) was on when it should have been off.	<ol style="list-style-type: none"> <li>1. Reset and sequence the 7800.</li> <li>2. If fault persists, replace the relay module.</li> </ol>
Fault 25 *Call Service*	The flame interlock (relay module) was off when it should be on.	<ol style="list-style-type: none"> <li>1. Reset and sequence the 7800.</li> <li>2. If fault persists, replace the relay module.</li> </ol>

(Continued)

**TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING (Continued).**

Fault Code	System Failure	Recommended Troubleshooting
<b>Fault 26</b> <b>*Man-Open Sw. Off*</b>	The Manual Open Valve Switch was off when it should be on.	<ol style="list-style-type: none"> <li>1. Check wiring, correct any errors.</li> <li>2. Assure that the Manual Open Valve Switch is fully open.</li> <li>3. Assure that the Manual Open Switch is functioning properly and that the contact is free from contaminants.</li> <li>4. Reset and sequence the RM7838B.</li> <li>5. Assure that there is voltage going into the switch and coming out of the switch when closed. Verify that the relay module is receiving power at terminal 17.</li> <li>6. If steps 1 through 5 are correct and the fault persists, replace the relay module.</li> </ol>
<b>Fault 27</b> <b>*Start Switch On*</b>	Start Switch was on during Prepurge.	<ol style="list-style-type: none"> <li>1. Start Switch held "on" too long.</li> <li>2. Check wiring, verify that the Start Switch has been connected correctly. Correct any errors.</li> <li>3. Assure that the Start Switch is functioning properly and that the contact is free from contaminants.</li> <li>4. Reset and sequence the RM7838B to Prepurge, place the Run/Test switch into the Test position. Assure that there is no power at terminal 6 during Prepurge.</li> <li>5. If steps 1 through 3 are correct and the fault persists, replace the relay module.</li> </ol>
<b>Fault 28</b> <b>*Pilot Flame Fail*</b>	Pilot flame failure.	<ol style="list-style-type: none"> <li>1. Check pilot valve wiring and operation. Correct any errors.</li> <li>2. Check fuel supply.</li> <li>3. Check pilot pressure and repeat pilot turn down test.</li> <li>4. Check ignition transformer electrode, flame detector, flame detector sighting, and flame amplifier.</li> <li>5. If steps 1 through 4 are correct and the fault persists, replace the relay module.</li> </ol>
<b>Fault 29</b> <b>*Lockout ILK*</b>	Lockout interlock fault.	<ol style="list-style-type: none"> <li>1. Check wiring, correct any errors.</li> <li>2. Inspect the fan, assure that there is no blockage of the air intake and that it is supplying air.</li> <li>3. Assure that the Lockout Interlock switches are functioning properly and that their contacts are free from contaminants.</li> <li>4. Reset and sequence the 7800 to Prepurge (place the Run/Test Switch into the Test position, if available). Measure the voltage between terminal 7 and G (ground). 120 Vac should be present.</li> </ol>

*(Continued)*

TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING (*Continued*).

Fault Code	System Failure	Recommended Troubleshooting
Fault 29 *Lockout ILK*	Lockout interlock fault.	5. If steps 1 through 4 are correct and the fault persists, replace the relay module.
Fault 30 *Running ILK*	Running interlock fault.	<ol style="list-style-type: none"> <li>1. Inspect the running interlocks (including the air flow switch) and its connections.</li> <li>2. Assure that the running interlocks (including the air flow switch) are functioning properly and the contacts are free from contaminants.</li> <li>3. Reset and sequence the 7800 to prepurge (place the Run/Test Switch into the Test position, if available). Measure the voltage between terminal 7 and G (ground). 120 Vac should be present.</li> <li>4. If steps 1-3 are correct and the fault persists, replace the relay module.</li> </ol>
Fault 31 *Low Fire Sw. Off*	Low fire interlock switch failure to close during Run.	<ol style="list-style-type: none"> <li>1. Check wiring, correct any errors.</li> <li>2. Reset and sequence the 7800.</li> <li>3. Use either the manual motor position to drive the motor to the Low Fire position, or use the Run/Test switch option (if available) sequence to Run drive to Low Fire and place in the Test position. Adjust the Low Fire Switch while in this state to assure that it is closing properly.</li> <li>4. While in Run drive to Low Fire state, measure the voltage between terminal 19 and G (ground). 120 Vac should be present. If not, the switch adjustment is incorrect and/or the switch is defective and needs replacement.</li> <li>5. Reset and sequence the 7800. If 120 Vac was present between the Low Fire Switch and terminal 19 and the fault still persists, replace the relay module.</li> </ol>
Fault 32 *Airflow Switch*	Combustion airflow interlock fault.	<ol style="list-style-type: none"> <li>1. Check wiring, correct any errors.</li> <li>2. Inspect the fan, assure that there is no blockage of the air intake and that it is supplying air.</li> <li>3. Assure that the Airflow Interlock switches are functioning properly and that their contacts are free from contaminants.</li> <li>4. Reset and sequence the 7800 to Prepurge (place the Run/Test switch into the Test position, if available). Measure the voltage between terminal 7 and G (ground). 120 Vac should be present.</li> </ol>

*(Continued)*

**TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING (Continued).**

<b>Fault Code</b>	<b>System Failure</b>	<b>Recommended Troubleshooting</b>
Fault 32 *Airflow Switch*	Combustion airflow interlock fault.	5. If steps 1 through 4 are correct and the fault persists, replace the relay module.
Fault 33 *Preignition ILK*	Preignition interlock fault.	1. Check wiring, correct any errors. 2. Inspect the Preignition Interlock switches and assure that they function properly. 3. Check fuel valve operation. Valve must close within five seconds. 4. Reset and sequence the 7800. During Standby or Prepurge, measure the voltage between terminal 20 and G (ground). 120 Vac should be present. If not, the Preignition Interlock switches may be defective and need replacement. 5. If the fault persists, replace the relay module.
Fault 34 *Control On*	CTL input was energized at the wrong time for the RM7838A. This fault implies a field wiring error was made.	1. Check wiring, correct any errors. 2. Reset and sequence the RM7838A. 3. If fault persists, replace the relay module.
Fault 35 *Call Service*	Safety relay was off when it should be on or fuse has blown.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 36 *Call Service*	Main valve terminal was off when it should be on.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 37 *Call Service*	Pilot (ignition) valve terminal was off when it should be on.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 38 *Call Service*	Ignition terminal was off when it should be on.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 39 *Call Service*	V2S valve terminal was off when it should be on.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 40 *Call Service*	Safety relay was on when it should be off.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 41 *Main Valve On*	Main valve terminal was on when it should be off.	1. <b>Warning!</b> Remove system power, turn off fuel supply. 2. Check wiring, correct any errors. 3. Inspect the Main Fuel Valve(s) and connections. Assure that switches are functioning correctly and are not jumpered or welded. 4. Reset and sequence the 7800. 5. If the fault persists, replace the relay module.

(Continued)



TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING (Continued).

Fault Code	System Failure	Recommended Troubleshooting
Fault 42 *Pilot Valve On* (Pilot Valve 1 on- for EC78XX controls)	Pilot (ignition) valve terminal was on when it should be off.	<ol style="list-style-type: none"> <li>1. Warning! Remove system power, turn off fuel supply.</li> <li>2. Check wiring, correct any errors.</li> <li>3. Inspect the Pilot Fuel Valve(s) and connections. Assure that switch is functioning correctly and is not jumpered or welded.</li> <li>4. Reset and sequence the 7800.</li> <li>5. If the fault persists, replace the relay module.</li> </ol>
Fault 43 *Ignition On*	Ignition terminal was on when it should be off.	<ol style="list-style-type: none"> <li>1. Warning! Remove system power, turn off fuel supply.</li> <li>2. Check wiring, correct any errors.</li> <li>3. Inspect the Ignition terminal and connections. Assure that switch is functioning correctly and is not jumpered or welded.</li> <li>4. Reset and sequence the 7800.</li> <li>5. If the fault persists, replace the relay module.</li> </ol>
Fault 44 *Pilot Valve 2 On*	V2S valve terminal, used as a pilot, was on when it should be off.	<ol style="list-style-type: none"> <li>1. Warning! Remove system power, turn off fuel supply.</li> <li>2. Check wiring, correct any errors.</li> <li>3. Inspect the Pilot Fuel Valve 2 and connections. Assure that switch is functioning correctly and is not jumpered or welded.</li> <li>4. Reset and sequence the 7800.</li> <li>5. If the fault persists, replace the relay module.</li> </ol>
Fault 45 *Low Fire Sw. Off*	Low fire interlock switch failure to close or stay closed.	<ol style="list-style-type: none"> <li>1. Check wiring, correct any errors.</li> <li>2. Reset and sequence the 7800.</li> <li>3. Use either the manual motor position to drive the motor to the Low Fire position, or use the Run/Test Switch option, if available. Sequence to the Low Fire position and place the switch in the Test position. Adjust the Low Fire switch while in this state to insure that it is closing properly.</li> <li>4. While in the drive to Low Fire state, measure the voltage between terminals 19 and G (ground). 120 Vac should be present. If not, the switch adjustment is incorrect and/or the switch is defective and should be replaced.</li> <li>5. If steps 1-4 are correct and the fault still persists, replace the relay module.</li> </ol>

(Continued)

TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING (Continued).

Fault Code	System Failure	Recommended Troubleshooting
Fault 46 *Flame Amp Type*	This fault indicates either that the Flame Failure Response Time (FFRT) or TYPE input from the Amplifier changed while the device was powered, or that a standard amp has been used in a pilot valve application or a three second FFRT Amplifier has been used with the relight option on the RM7890.	<ol style="list-style-type: none"> <li>1. Remove power to the device. Reseat the flame amplifier. Reset and sequence.</li> <li>2. For RM7890 only: Assure that if a three second Flame Failure Response Time amplifier is being used, Jumper 2 is completely clipped. Conversely, if Jumper 2 is intact (Relight option has been selected), a 0.8 second Flame Failure Response Time amplifier must be used with this configuration.</li> <li>3. For RM7838B only: Assure that a Shutter Check Flame Amplifier is being used when the Pilot Valve Hold option has been selected.</li> </ol>
Fault 47 *Jumpers Changed*	The configuration jumpers differ from the sample taken at startup.	<ol style="list-style-type: none"> <li>1. Inspect the jumper connections. Assure that clipped jumpers have been completely removed.</li> <li>2. Reset and sequence the 7800.</li> <li>3. If fault persists, replace the relay module.</li> </ol>
Fault 48 *Delayed MV On*	V2S valve terminal, used as a delayed main valve, was on when it should be off.	<ol style="list-style-type: none"> <li>1. <b>Warning!</b> Remove system power, turn off fuel supply.</li> <li>2. Check wiring, correct any errors.</li> <li>3. Inspect the V2S Fuel Valve and its connections. Assure that its switch is functioning properly and is not jumpered or welded.</li> <li>4. Reset and sequence the 7800.</li> <li>5. If the fault persists, replace the relay module.</li> </ol>
Fault 49 *Man-Open Sw. On*	The manual open switch was on when it should be off.	<ol style="list-style-type: none"> <li>1. <b>WARNING!</b> Remove system power; turn off fuel supply.</li> <li>2. Check wiring; correct any errors.</li> <li>3. Inspect the Manual-Open Switch and its connections. Assure that its switch is functioning properly and is not jumpered or welded.</li> <li>4. Reset and sequence the 7800.</li> <li>5. If the fault persists, replace the relay module.</li> </ol>
Fault 50 *Jumpers Wrong*	The sequence logic has detected a combination of jumpers that is illegal for the sequence (e.g., if it was correct to clip jumper 1 or jumper 2, but not both, this fault would be used if both were clipped).	<ol style="list-style-type: none"> <li>1. Inspect jumpers and consult the instruction and installation guide for compatible jumper configurations. Assure clipped jumpers are completely removed.</li> <li>2. Reset and sequence the 7800.</li> <li>3. If fault persists, replace the relay module.</li> </ol>

(Continued)

TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING (Continued).

Fault Code	System Failure	Recommended Troubleshooting
Fault 51 *Flame Too Strong*	Flame signal value is too high to be valid.	<ol style="list-style-type: none"> <li>1. Assure that flame detector and flame amplifier are compatible.</li> <li>2. Remove the flame amplifier and inspect its connectors. Reset the flame amplifier.</li> <li>3. Reset and sequence the 7800.</li> <li>4. Check the flame detector sighting position, reset and cycle. Measure flame strength. Does it meet specifications? If not, refer to flame detector and/or flame amplifier checkout procedures in installation and instruction sheets.</li> <li>5. If the code reappears, replace the flame amplifier and/or the flame detector.</li> <li>6. If fault persists, replace the relay module.</li> </ol>
Fault 52 *Internal Fault*	Pilot Valve 2 terminal was off when it should be on.	<ol style="list-style-type: none"> <li>1. Inspect Pilot V25 terminal 21 and connections. Assure that Pilot V25 is functioning properly.</li> <li>2. Reset and sequence the 7800.</li> <li>3. If fault persists, replace the relay module.</li> </ol>
Fault 53 *Lockout Switch*	Lockout Input fault.	<ol style="list-style-type: none"> <li>1. Check wiring; correct any errors.</li> <li>2. Inspect the Lockout switch to assure that it is functioning properly.</li> <li>3. Reset and sequence the 7800. During standby or prepurge, reassure the voltage between terminal 20 and G (ground). 220 - 240 Vac should be present. If not, the lockout switch may be defective and need replacement.</li> <li>4. If fault persists, replace the relay module.</li> </ol>
Fault 54 *Comb. Pressure*	Combustion pressure switch fault (Fulton pulse).	<ol style="list-style-type: none"> <li>1. Check wiring; correct any errors.</li> <li>2. Inspect the Combustion Pressure Switch to assure that it is functioning properly.</li> <li>3. Reset and sequence the 7865. During standby or prepurge, measure the voltage between terminal 20 and G (ground). 120 Vac should be present. If not, the combustion pressure switch may be defective and need replacement.</li> <li>4. If fault persists, replace the relay module.</li> </ol>

(Continued)

**TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING** *(Continued)*.

<b>Fault Code</b>	<b>System Failure</b>	<b>Recommended Troubleshooting</b>
<b>Fault 55</b> *Purge Fan Sw. On*	Purge fan switch is on when it should be off (Fulton pulse).	<ol style="list-style-type: none"> <li>1. Check wiring; correct any errors.</li> <li>2. Inspect the Purge Fan Switch terminal 18 and connections. Assure that the switch is functioning correctly and is not jumpered or welded.</li> <li>3. Reset and sequence the 7865.</li> <li>4. If the fault persists, replace the relay module.</li> </ol>
<b>Fault 56</b> *Block Intake*	Block intake fault (Fulton pulse).	<ol style="list-style-type: none"> <li>1. Check wiring; correct any errors.</li> <li>2. Inspect the block intake switch and assure that it is functioning properly.</li> <li>3. Reset and sequence the 7865. During prepurge, measure the voltage between terminal 7 and G (ground). 120 Vac should be present. If not, the block intake switch may be defective and need replacement.</li> <li>4. If fault persists, replace the relay module.</li> </ol>
<b>Fault 57</b> *Purge Fan Sw Off*	Purge fan switch is off when it should be on (Fulton pulse).	<ol style="list-style-type: none"> <li>1. Inspect the Prepurge Fan Switch terminal 18 and connections. Assure that the switch is functioning properly.</li> <li>2. Reset and sequence the 7865.</li> <li>3. If fault persists, replace the relay module.</li> </ol>
<b>Fault 67</b> *AC Phase*	L1 and L2 mis-wired/exchanged.	<ol style="list-style-type: none"> <li>1. Check L1 and L2 for proper line phasing.</li> </ol>
<b>Fault 68</b> *Preignition ILK*	Preignition interlock fault.	<ol style="list-style-type: none"> <li>1. Check wiring; correct any errors.</li> <li>2. Inspect the Preignition Interlock switches and assure that they function properly.</li> <li>3. Check fuel valve operation. Valve must close within five seconds.</li> <li>4. Reset and sequence the 7800. During standby or prepurge, measure the voltage between terminal 20 and G (ground). 220 - 240 Vac should be present. If not, the preignition interlock switches may be defective and need replacement.</li> <li>5. If the fault persists, replace the relay module.</li> </ol>
<b>Fault 105</b> *Call Service*	Relay Module self-test failure.	<ol style="list-style-type: none"> <li>1. Reset and sequence the 7800.</li> <li>2. If fault reappears, remove power from the device, reapply power, reset and sequence the 7800.</li> <li>3. If fault persists, replace the relay module.</li> </ol>

*(Continued)*

TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING (Continued).

Fault Code	System Failure	Recommended Troubleshooting
Fault 106 *Call Service*	Relay Module self-test failure.	<ol style="list-style-type: none"> <li>1. Reset and sequence the 7800.</li> <li>2. If fault reappears, remove power from the device, reapply power, reset and sequence the 7800.</li> <li>3. If fault persists, replace the relay module.</li> </ol>
Fault 107 *Call Service*	Relay Module flame signal cross-check failure.	<ol style="list-style-type: none"> <li>1. Reset and sequence the 7800.</li> <li>2. If fault reappears, remove power from the device, reapply power, reset and sequence the 7800.</li> <li>3. If fault persists, replace the relay module.</li> </ol>
Fault 109 *Call Service*	Negative cycle test failed, earth ground absent or line voltage phasing improper.	<ol style="list-style-type: none"> <li>1. Assure that a good earth ground connection exists at the installation site and that all earth ground connections are complete and correct.</li> <li>2. Assure that the 7800 and all loads operate at the same line voltage phase.</li> <li>3. Reset and sequence the 7800.</li> <li>4. If fault persists, replace the relay module.</li> </ol>
Fault 110 *Call Service*	The configuration jumpers differ from stored values.	<ol style="list-style-type: none"> <li>1. Inspect the jumper connections. Assure that they match the original selection and that clipped jumpers have been completely removed.</li> <li>2. Reset and sequence the 7800.</li> <li>3. If fault persists, replace the relay module.</li> <li>4. Configuration jumpers must be selected prior to 200 hours of operation. If configuration jumpers are changed after 200 hours of operation, lockout 110 will occur.</li> </ol>
Fault 111 *Call Service*	Relay Module configuration jumper test failure.	<ol style="list-style-type: none"> <li>1. Inspect the jumper connections. Assure that they match the original selection and that clipped jumpers have been completely removed.</li> <li>2. Reset and sequence the 7800.</li> <li>3. If fault persists, replace the relay module.</li> </ol>
Fault 112 *Call Service*	Relay Module self-test failure.	<ol style="list-style-type: none"> <li>1. Reset and sequence the 7800.</li> <li>2. If fault persists, replace the relay module.</li> </ol>
Fault 113 *Call Service*	Relay Module self-test failure.	<ol style="list-style-type: none"> <li>1. Reset and sequence the 7800.</li> <li>2. If fault persists, replace the relay module.</li> </ol>

(Continued)

TABLE 5—FAULT MESSAGE AND RECOMMENDED TROUBLESHOOTING (*Continued*).

Fault Code	System Failure	Recommended Troubleshooting
Fault 114 *Call Service*	Relay Module self-test failure.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 117 *Call Service*	Relay Module self-test failure.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 118 *Call Service*	Relay Module self-test failure.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 119 *Call Service*	Relay Module self-test failure.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 120 *Call Service*	Relay Module self-test failure.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 121 *Call Service*	Relay Module self-test failure.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 122 *Call Service*	Relay Module self-test failure.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 123 *Call Service*	Relay Module self-test failure.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 125 *Call Service*	Relay Module self-test failure.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 126 *Call Service*	Relay Module self-test failure.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.
Fault 127 *Call Service*	Safety relay feedback circuit was in an improper state.	1. Reset and sequence the 7800. 2. If fault persists, replace the relay module.

NOTE: EC78XX controls display Internal Fault rather than Call Service.

### EXPANDED ANNUNCIATOR MESSAGES

If an Expanded Annunciator is wired to the limit control string and interlock control string and connected to the 7800 SERIES Relay Module, additional hold messages, fault messages or code numbers will enhance the original

hold messages, fault messages or code numbers; see the Expanded Annunciator Specification (form 65-0101) for detailed information. The message will demonstrate which device opened first in a monitored series string of limits or interlocks.

Fig. 14—Lockout message state 2.

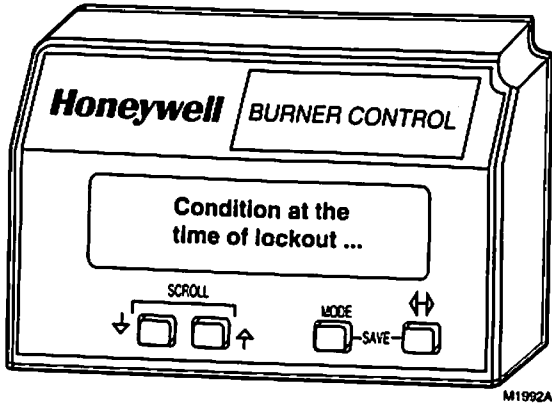


Fig. 15—Lockout message state 3.

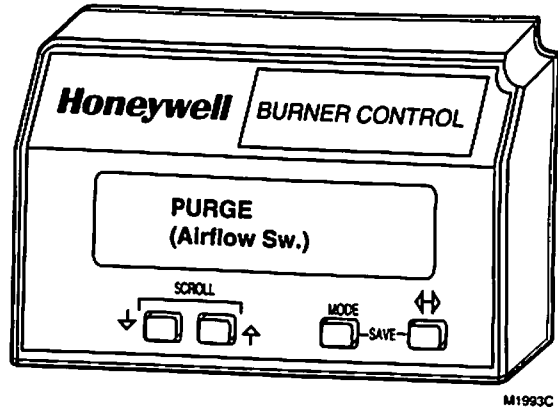
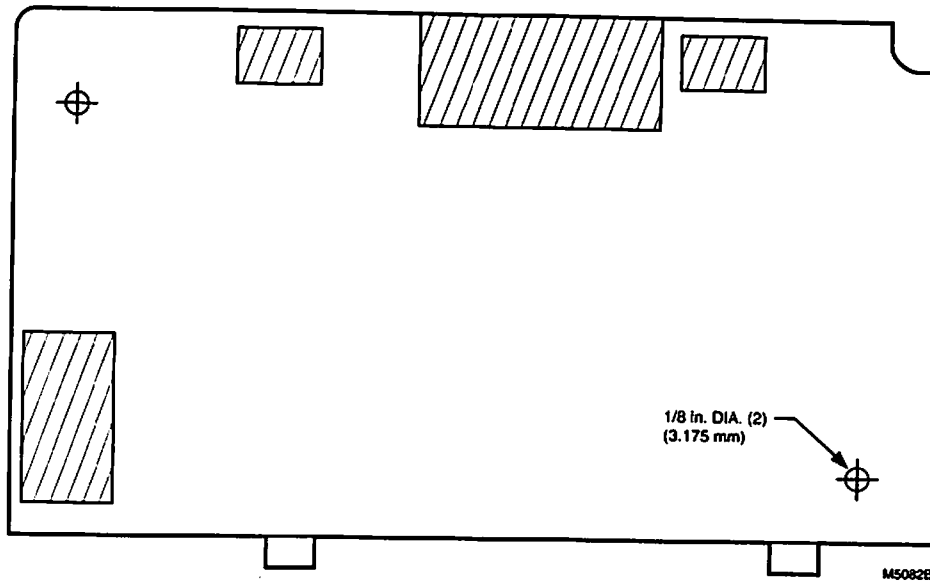


Fig. 16—Flush mounting of a Keyboard Display Module.



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