Honeywell

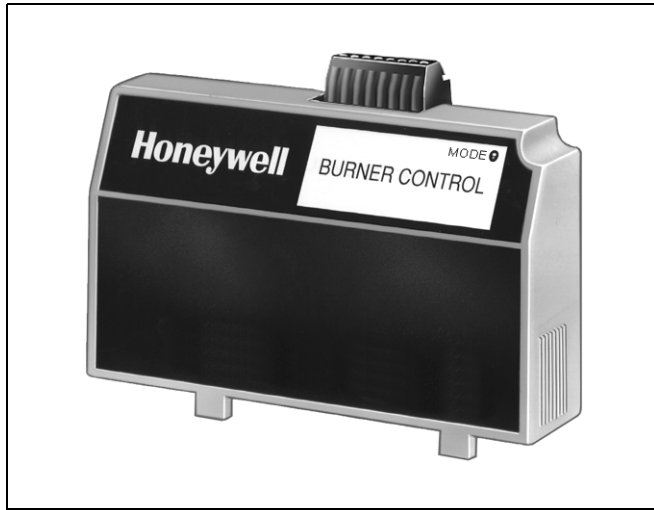# S7810M
ModBus™ Module

APPLICATION

The Honeywell 7800 SERIES is a microprocessor-based integrated burner control for automatically fired gas, oil or combination fuel single-burner applications. 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.

The S7810M ModBus™ Module supports remote mounting of a Keyboard Display Module (KDM), personal computer PLC interface for multi-dropped 7800 SERIES subnetworks, and remote reset of a 7800 SERIES Relay Module.

FEATURES

* **Multi-dropped communications bus interface.**
* **Remote reset.**

Contents

65-0249

SPECIFICATIONS

Model:
S7810M ModBus™ Module.

Electrical Ratings:
Voltage and Frequency:
    13 Vdc peak full-wave rectified (+20/-15%)
Power Dissipation:
    2W maximum.

Terminal Ratings:
Power: 13 Vdc peak full-wave rectified.
Earth ground.
Local DDL (1,2,3) and Multi-Drop ModBus™ (6,7,8): 5 Vdc at
    60 mA maximum.

Electrical Connector (included):
ControlBus™: 208727 8-pin electrical connector.

Environmental Ratings:
Ambient Temperature:

Operating: -40°F to +140°F (-40°C to +60°C).

Storage: -40°F to +150°F (-40°C to +66°C).

Humidity: 85% relative humidity, continuous, noncondensing.

Vibration: 0.5G environment.

Dimensions: See Fig. 1.

Weight: 4 ounces.

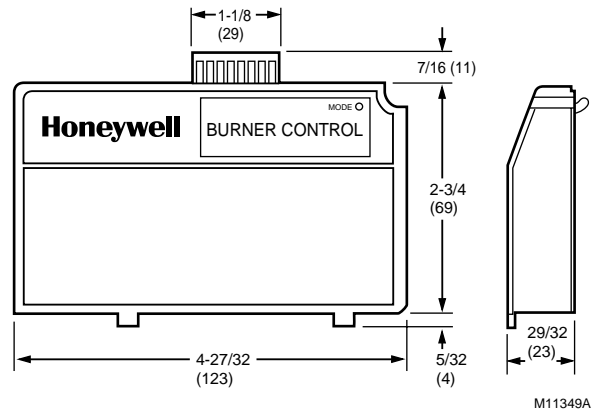**Accessory:** 208727 eight-pin connector.

**Fig. 1. Mounting dimensions of
S7810M ModBus™Module in in. (mm).**

ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the
TRADELINE® Catalog or price sheets 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 Home and Building Control Sales Office (check white pages of your phone directory).
2. Home and Building Control Customer Logistics
    Honeywell, 1885 Douglas Drive North
    Minneapolis, Minnesota 55422-4386 (612) 951-1000
In Canada—Honeywell Limited/Honeywell Limitée,35 Dynamic Drive, Scarborough, Ontario m1V 4Z9.
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. The installer must be a trained, experienced flame safeguard technician.
4. Disconnect the power supply before beginning installation to prevent electrical shock and equipment damage. More than one power supply disconnect can be required.
5. Wiring must comply with all applicable codes, ordinances and regulations.
6. After installation is complete, check out product operation as provided in these instructions.

IMPORTANT:

> ***This equipment can cause interference with radio communications.***
>
> *This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the Instructions Manual, may cause interference with radio communications. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J 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 is likely to cause interference, in which case, users, at their own expense, will be required to take whatever measures may be required to correct the interference. Any unauthorized modification of this equipment may result in the revocation of the owner's authority to continue its operation. When operating the S7810M remotely with a separate power supply, FCC compliance is not guaranteed unless an FCC-approved power supply is used.*

Canadian EMI: This digital apparatus does not exceed the ClassB limits for radio noise emission from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques depassant les limites applicables aux appareils numériques de la Classe B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Humidity

Install the S7810M where the relative humidity never reaches the saturation point. The S7810M is designed to operate in a maximum humidity environment of 85 percent relative humidity, continuous, noncondensing moisture.

Weather

The S7810M is not designed to be weather-tight. When installed outdoors, protect the S7810M with an approved weather-tight enclosure.

Vibration

Do not install the S7810M where it could be subjected to vibration in excess of 0.5G continuous maximum vibration.

Mounting the S7810M ModBus™ Module (Fig. 2).

1. Align the two ears of the ModBus™ Data ControlBus™ Module with the two mating slots on the 7800 SERIES Relay Module.
2. Insert the two interlocking ears into the two mating slots and, with a hinge action, push on the lower corners of the ModBus™ Data ControlBus™ Module to secure it to the 7800 SERIES Relay Module.

Fig. 2. ModBus™ Module mounting.

Wiring (Fig. 3)

1. Refer to Fig. 3 for proper wiring.
2. All wiring must comply with all applicable electrical codes, ordinances and regulations.
3. Recommended wiring size and type:
   a. For all communications, use 22 AWG, 3-wire shielded cable (Belden part number 8723 or equivalent).
   b. For 13 Vdc and remote reset switch operation, use 22 AWG wire insulated for voltages and temperatures in the application. Suggested wire types included TW (60°C), THW (75°C) and THHN (90°C). Terminal identification numbers and letters are shown in Table 1.
4. Wire routing:
   a. Do not route the communication cable in conduit with line voltage circuits.
   b. Do not route the communication cable close to the ignition transformers.
   c. Route the communication cable outside of conduit if properly supported and protected from damage.
   d. Route the communication cable so that all devices are connected in a daisy chain configuration. See Fig. 3.
5. Maximum wire lengths:
   a. Communications bus, 4000 feet (1219 meters).
   b. Remote reset switch, 1000 feet (305 meters).

Table 1. S7810M Terminal Identification.

Signal	S7810M Terminal
Local Bus Data +	1
Local Bus Data -	2
Common • Local Bus Common • +13 Vdc Common • Remote Reset Common	3
+13 Vdc	4
Remote Reset	5
ModBus™ Common	6
ModBus™ Data +	7
ModBus™ Data -	8

Table 2. Explanation of MODE LED light patterns.

LED Code/Behavior	Pulse Period	Interval	Meaning
Always OFF		OFF	Not powered or device failure.
Always ON		ON	Device failure.
Mostly ON with 1 blink	50 ms (OFF)	1 second	Both DDL and Modbus are active
Mostly OFF with 1 flash	50 ms (ON)	3.85 seconds	DDL is active, and Modbus is not active.
Mostly OFF with 2 pulses	2 x (200 ms ON 200 ms OFF)	1.750 seconds	Program CRC error.
Mostly OFF with 3 pulses	3 x (200 ms ON 200 ms OFF)	2.15 seconds	No DDL signal from the Burner Control

Fig. 3. Wiring S7810M ModBus™ Module.
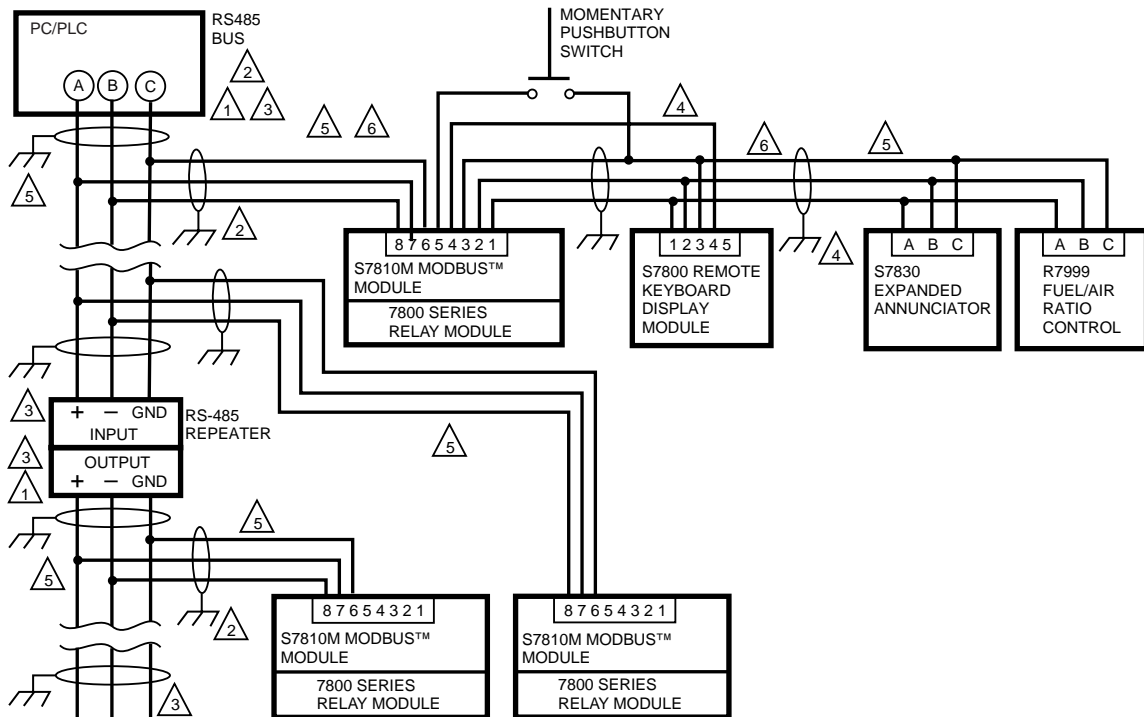
⚠1 MULTI-DROP RS-485 COMMUNICATION BUS. UP TO 31 S7810M MODBUS™ MODULES CAN BE CONNECTED TO A SINGLE BUS WITHOUT AN RS-485 REPEATER. UP TO 99 S7810M MODBUS™ MODULES (SUBNETWORKS) CAN BE CONNECTED TO A BUS WITH RS-485 REPEATERS. WHEN USING AN RS-485 REPEATER, THE REPEATER MUST BE INSTALLED EVERY 30TH MODULE.

⚠2 THE SUBNETWORKS MUST BE WIRED IN A DAISY CHAIN CONFIGURATION. RECOMMEND THAT THE PC/PLC BE AT ONE END OF THE DAISY CHAIN.

⚠3 MODBUS™ COMMUNICATION BUS TERMINATION RESISTORS:

A. WITHOUT RS-485 REPEATER:
MODULES AT THE CLOSEST AND FARTHEST END OF THE DAISY CHAIN REQUIRE TERMINATION
RESISTORS. INSTALL A 120 OHM, 1/4 WATT RESISTOR BETWEEN TERMINALS a AND b OF THE PC/PLC. (IF INSTALLED AT ONE END OF DAISY CHAIN). INSTALL A 120 OHM, 1/4 WATT RESISTOR BETWEEN TERMINALS a AND b OF THE PC/PLC (IF INSTALLED AT ONE END OF THE DAISY CHAIN. INSTALL A 120 OHM, 1/4 WATT RESISTOR BETWEEN TERMINALS 7 AND 8 OF THE LAST S7810M MODBUS™ MODULE IN THE DAISY CHAIN.

B. WITH RS-485 REPEATER:
WHEN AN RS-485 REPEATER IS USED, TWO DAISY CHAIN CONFIGURATIONS ARE EFFECTIVELY FORMED.
MODULES AT THE CLOSEST AND FARTHEST END OF EACH DAISY CHAIN REQUIRE TERMINATION RESISTORS. INSTALL A 120 OHM, 1/4 WATT RESISTOR BETWEEN TERMINALS a AND b OF THE PC/PLC. (IF INSTALLED AT ONE END OF DAISY CHAIN). INSTALL A 120 OHM, 1/4 WATT RESISTOR BETWEEN INPUT TERMINALS DATA+ AND DATA- OF THE RS-485 REPEATER. INSTALL A 120 OHM, 1/4 WATT RESISTOR BETWEEN TERMINALS 7 AND 8 OF THE LAST S7810M MODBUS™ MODULE IN THE ADDITIONAL DAISY CHAINS.

⚠4 LOCAL RS-485 COMMUNICATION BUS. THE DEVICES ON THIS BUS MUST BE WIRED IN A DAISY CHAIN CONFIGURATION. THE ORDER OF INTERCONNECTION IS NOT IMPORTANT. THE MODULES ON THE CLOSEST AND FARTHEST ENDS OF THE DAISY CHAIN REQUIRE A 120 OHM 1/4 WATT TERMINATION RESISTOR BETWEEN TERMINALS 1 AND 2 OR a AND b.

⚠5 RECOMMEND THREE-WIRE SHIELDED CABLE (BELDEN 8723 SHIELDED OR EQUIVALENT). CABLE SHIELD MUST TERMINATE TO EARTH GROUND AT BOTH ENDS OF CABLE.

⚠6 THE MODBUS™ BUS COMMON, S7810M MODBUS™ TERMINAL 6, AND THE LOCAL BUS COMMON (S7810M MODBUS™ TERMINAL 3) MUST NOT BE ELECTRICALLY CONNECTED TOGETHER.

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OPERATION

The S7810M ModBus™ Data ControlBus™ Module has two communications ports. One communications port allows communications on a local bus that contains a burner controller and a keyboard display module(s) and/or an expanded annunciator and/or a proportional position controller (PPC).

A second communications port supports RS-485 communications using ModBus™ protocol. The following tables provide ModBus™ mapping information.

Table 3 provides register mapping. It identifies the mapping of the 7800 SERIES parameters to ModBus™ registers. These codes are transmitted by the relay modules and the S7830 Expanded Annunciator.

Supported function codes are 3, 4, 6, and 17. Function code 4 reads the same registers as function code 3 (4x references, there are no 3x references).

Device Address and Baud Rate

Assign each S7810M in the system a unique address by setting the MODBUS ADDRESS switches on the bottom of the device to the correct number. See Fig. 4. Only RTU communications with no parity is supported.

NOTE: Assign a device address number from 01 to 99. 00 is not an acceptable address number and will not work.

The default baud rate is 9600. To change the baud rate to 19.2K, use a needle-nosed pliers to remove the jumper.

NOTE: In Tables 3,5 and 9:Line 1 and Line 2 refer to the two lines of text on the S7800 Keyboard Display Module. In Tables 5, 7 and 9; The String Code column references Table 6, String Codes.

In Table 5; The burner Control State Bits column references Table 11, Burner Control State Bits. "cb_sqst" is the Burner Control Sequence Status.
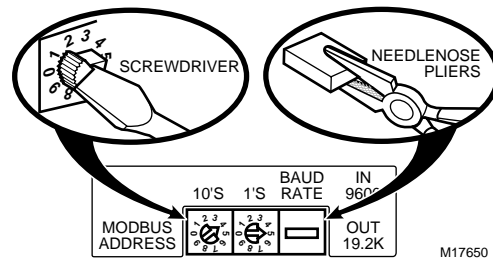

Fig. 4. S7810M Address Switches and Baud Rate Jumper.

Table 3. ModBus™ Register Assignments.

Address (hex)	Register (dec)	Parameter Name	Read/ Write	Format	Notes
0000	40001	Fault code	R	U16	See Table 7.
0001	40002	Fault String Code	R	U16	See Table 6.
0002	40003	Sequence State	R	U16	See Table 5 (valid only if Fault code = 0).
0003	40004	State String Code (line 1)	R	U16	See Table 6 (always valid).
0004	40005	State String Code (line 2)	R	U16	See Table 6 (always valid).
0005	40006	Sequence time	R	U16	0-4095 Seconds
0006	40007	Total cycles	R	U32	Converted from DDL format to long integer. Max value is 0xFFFFFFFF.
0008	40008	Total hours	R	U32	Converted from DDL format to long integer. Max value is 0xFFFFFFFF.
000A	40011	Flame 1 signal strength	R	U16	0 to 255 represents 0.0 to 25.5 volts.
000B	40012	Flame 2 signal strength	R	U16	0 to 4095.
000C	40013	BC State Bits	R	U16	See Table 11.
000D	40014	Expanded Annunciator first out code	R	U16	See Table 9.
000E	40015	Expanded Annuncia-tor Points (bit map)	R	U32	Bit 31 (MSB) to Bit 0 (LSB) represent Terminals T31 to T0 of the Expanded Annunciator.
0010-0019	40017-40026	Fault history record 1	R		Newest fault record. See Table 8.
001A-0023	40027-40036	Fault history record 2	R		Second newest fault record. See table 8.
0024-002D	40037-40046	Fault history record 3	R		Third newest fault record. See Table 8.
002E-0037	40047-40056	Fault history record 4	R		Fourth newest fault record. See Table 8.
0038-0041	40057-40066	Fault history record 5	R		Fifth newest fault record. See Table 8.
0042-004B	40067-40076	Fault history record 6	R		Oldest fault record. See Table 8.
004C	40077	Flame Failure Response Time	R	U16	Seconds x 10.
004D	40078	BC Manufacturing code	R	U32	Converted from BCD to long integer.
004F	40080	BC Type Code	R	U16	See Table 10.

Table 3. ModBus™ Register Assignments. (Continued)

Address (hex)	Register (dec)	Parameter Name	Read/ Write	Format	Notes
0050	40081	BC software version	R	U32	
0052	40083	EA software version	R	U32	
0054	40085	Remote control status. Bit 4 is set until the reset has been sent to the BC and this register has since been read.	R	U16	Bit packed Bit 0: 1 = autonomous. Bit 1: 1 = Remote commanded off. Bit 2: 1 = Remote commanded High fire. Bit 3: 1 =Remote commanded low fire. Bit 4: 1 =Remote reset has/will be sent to BC.. Bits 5-14: Unused. Bit 15: Copied from the most recent write to the burner control command.
0055	40086	Flame Amplifier type	R	U16	0 = Standard 1 = Unknown 2 = Amplicheck or missing amplifier 3 = Shutter
0056	40087	Purge Time	R	U16	Seconds
0057-0065	40088-40102	Burner control terminals	R	U16	String codes indicating terminal/jumper state. See Table 6.
0066-007E	40103-40127	Unused		U16	Available for future use.
007F	40128	Burner control command	W	U16	One and only one bit in the LSB must be set: Bit 0 =revert to autonomous operation. Bit 1 = don't fire, remain off. Bit 2 = go to Hi Fire during Run. Bit 3 = go to Lo Fire during Run. Bit 4 = remote reset. Bits 5-7 must be 0. Bits 8-14 are ignored. Bit 15: Copied to the control status register. The remote control status register can be used to verify operation of the command.

The register addresses that follow are assigned to status information received from the R7999 Proportional Position Control (PPC). The PPC outputs status messages in two different formats,0x0C, and 0x8C. Start code 0x0C is issued on the DDL bus following an even interval timer message. It contains the most rapidly changing data produced by the PPC. This information is interpreted by the S7810M and placed in Registers 40130-40144. Each even message is also stored in a PPC even buffer location. this circular buffer scheme can be used to capture all PPC status information at a sampling frequency as low as one sample every seven seconds.

Start code 0x8C is issued on the DDL bus following an odd interval timer message. It contains mostly configuration and profile data stored in the PPC EEPROM. This information is not interpreted by the S7810M but is placed in a PPC odd buffer location. This circular buffer scheme can be used to capture all PPC configuration and profile information at a sampling frequency as low as one sample every seven seconds.

NOTE: It may take several minutes for all configuration/ profile data to pass through the S7810M.

Table 4. ModBus™ Register Assignments. (Continued)

Address (hex)	Register (dec)	Parameter Name	R/W	0C	8C	A6	Format	Notes
0080	40129	PPC reserved	N/A				U16	Not used—always zero.
0081	40130	PPC program mode	R	3			U16	
0082	40131	PPC fault code	R	4			U16	
0083	40132	PPC operational status	R	5			U16	
0084	40133	PPC air position	R	6-7			U16	(0-4095)
0085	40134	PPC active fuel position	R	8-9			U16	(0-4095)
0086	40135	PPC fgr position	R	10-11			U16	(0-4095)
0087	40136	PPC fuel id	R	3.7			U16	0 = fuel 1, 1 = fuel 2
0088-0089	40137-40138	PPC cycles	R	10-13			U32	id = 6.
008A	40139	PPC diagnostic bits.	R	6, 8, 10, 12			U16	Bit Meaning 15— LCO state 14—HFP state 13—LFP state 12—ALARM state 11—LCI state 10—HF state 9—MV state 8—LF state 7—LCO Relay Drive 2 feedback 6—LCO Relay Drive 1 feedback 5—LCM state 4—AUTO/MAN select 3—Selected Fuel 2—Fuel Select 2 Input 1—Fuel Select 1 Input 0—Hold State
008B	40140	PPC firing rate input	R	12			U16	(0-255)
008C	40141	PPC manual pot input	R	13			U16	(0-255)
008D	40142	PPC auxiliary input	R	14			U16	(0-255)
008E	40143	SPARE	R				U16	
008F	40144	PPC Hold	R	3,4			U16	Same as register 40139 bit 0
0090-009E	40145-40159	SPARE	R				U16	
009F	40160	PPC sequence	R			Each even timer message: - value is incremented. - current odd/ even buffers are cleared.	U16	Bits 2-0 - Indicate the currently active buffer index for both odd and even data buffers. Bits 15-0 Sequence counter synchronized with even numbered burner control message.

Table 4. ModBus™ Register Assignments. (Continued)

Address (hex)	Register (dec)	Parameter Name	R/W	0C	8C	A6	Format	Notes
00A0-00AB	40161-40172	PPC even buffer #0	R	3-14				See ***DDL Interface Design Specification*** NOTE: All zeros in a buffer indicate that no data was received during the time interval. The current buffer will be zeros until the associated DDL message is received.
00AC-00B7	40173-40184	PPC even buffer # 1	R	3-14				
00B8-00C3	40185-40196	PPC even buffer # 2	R	3-14				
00C4-00CF	40197-40208	PPC even buffer # 3	R	3-14				
00D0-00DB	40209-40220	PPC even buffer # 4	R	3-14				
00DC-00E7	40221-40232	PPC even buffer # 5	R	3-14				
00E8-00F3	40233-40244	PPC even buffer # 6	R	3-14				
00F4-00FF	40245-40256	PPC even buffer # 7	R	3-14				
00A0-00AB	40161-40172	PPC odd buffer # 0	R		3-14			
00AC-00B7	40173-40184	PPC odd buffer # 1	R		3-14			
00B8-00C3	40185-40196	PPC odd buffer # 2	R		3-14			
00C4-00CF	40197-40208	PPC odd buffer # 3	R		3-14			
00D0-00DB	40209-40220	PPC odd buffer # 4	R		3-14			
00DC-00E7	40221-40232	PPC odd buffer # 5	R		3-14			
00E8-00F3	40233-40244	PPC odd buffer # 6	R		3-14			
00F4-00FF	40245-40256	PPC odd buffer # 7	R		3-14			

Sequence State Codes

Sequence state codes are provided by the Burner Control. Each code is translated into two string codes for displaying an associated message in two lines. Each code is also translated into burner control state bits which may be used to generate and control system diagrams on an operator interface.

The Sequence State Codes shown in Table 5 are valid only if the Fault Code has a value of zero. If the Fault Code is non-zero, the sequence state field contains the sequence state code when the lockout occurred.

Table 5. Sequence State Codes and Associated register code values.

cb_sqst Value	Sequence State	String Code		Uses mm:ss	Burner Control State Bits
		Line 1	Line 2		
Fault code not zero	LOCKOUT	52	Table 7		8000h
0	UNUSED HISTORY	0	0		0000h
1	INITIATE	48	0	✓	0001h
2	INITIATE HOLD: AC FREQUENCY/NOISE	49	8		4001h
3	INITIATE HOLD: AC LINE DROPOUT	49	9		4001h

Table 5. Sequence State Codes and Associated register code values. (Continued)

cb_sqst Value	Sequence State	String Code		Uses mm:ss	Burner Control State Bits
		Line 1	Line 2		
4	INITIATE HOLD: AC FREQUENCY	49	7		4001h
5	INITIATE HOLD: LOW LINE VOLTAGE	49	60		4001h
6	STANDBY	103	0		0002h
7	STANDBY HOLD: REM REMOTE CONTROL	104	94		4002h
8	STANDBY HOLD: START SWITCH	104	106		4002h
9	STANDBY HOLD: F/G FLAME DETECTED	104	35		4002h
10	STANDBY HOLD: T20 PREIGNITION LOCK	104	86		4002h
11	STANDBY HOLD: T7 RUNNING INTERLOCK	104	101		4002h
12	STANDBY HOLD: T7 LOCKOUT INTERLOCK	104	55		4002h
13	STANDBY HOLD: AIRFLOW SWITCH	104	13		4002h
14	PURGE HOLD: T19 HIGH FIRE SWITCH	93	40		4004h
15	PURGE DELAY: T19 HIGH FIRE JUMPRD	89	39		4004h
16	PURGE HOLD: TEST RUN/TEST SWITCH	93	98		4004h
17	PURGE DELAY: T18 LOW FIRE JUMPRD	89	56		4004h
18	PURGE HOLD: F/G FLAME DETECTED	93	35		4004h
19	PURGE	87	0	✓	0004h
20	PURGE HOLD: T18 LOW FIRE SWITCH	93	58		4004h
21	PURGE HOLD: T7 RUNNING INTERLOCK	93	101		4004h
22	PURGE HOLD: LOCKOUT INTERLOCK	93	54		4004h
23	PURGE HOLD: AIRFLOW SWITCH	93	13		4004h
24	PURGE HOLD: START SWITCH	93	106		4004h
25	PILOT IGN	78	0	✓	0008h
26	PILOT HOLD: TEST RUN/TEST SWITCH	77	98		4008h
27	PILOT HOLD: START SWITCH	77	106		4008h
28	MAIN IGN	66	0	✓	0010h
29	MAIN IG HOLD: MANUAL-OPEN SWITCH	67	72		4010h
30	RUN	95	0		0020h

Table 5. Sequence State Codes and Associated register code values. (Continued)

cb_sqst Value	Sequence State	String Code		Uses mm:ss	Burner Control State Bits
		Line 1	Line 2		
31	RUN PV HOLD: LOW FIRE SWITCH	96	58		4020h
32	PVHOLD IGN	96	66	✓	4020h
33	PV HOLD: PV HOLD SWITCH	96	45		4020h
34	RUN/LOWFIRE: TEST RUN/TEST SWITCH	97	98		4020h
35	POSTPURGE	83	0	✓	0040h
36	STATE 36	31	0		A000h
37	RESET/ALARM TEST	111	0		6000h
38	SAFE START CHECK	102	105		4020h
39	SAFETY1-1	102	2	✓	4020h
40	SAFETY1-2	102	3	✓	4020h
41	SAFETY1-3	102	4	✓	4020h
42	SAFETY1-4	102	5	✓	4020h
43	SAFETY1-5	102	6	✓	4020h
44	*Blank*	*0*	0		2000h
45	PREIGNITION	84	0	✓	0080h
46	SAFETY 1	102	1	✓	4020h
47	PILOT STAB.	79	0		4080h
48	MAIN TRIAL	68	0	✓	4080h
49	MAIN TRIAL	68	0		4080h
50	STANDBY HOLD:TEST RUN/TEST SWITCH	104	98		4002h
51	STATE 51	31	0		A000h
52	STATE 52	31	0		A000h
53	SAFETY 1: TEST RUN/TEST SWITCH	102	98		4020h
54	STATE 54	31	0		A000h
55	STANDBY HOLD: PURGE FAN SWITCH	104	92		4002h
56	STATE 56	31	0		A000h
57	PURGE HOLD: PURGE FAN SWITCH	93	92		4004h
58	STATE 58	31	0		A000h
59	STATE 59	31	0		A000h
60	STATE 60	31	0		A000h
61	STATE 61	31	0		A000h
62	STATE 62	31	0		A000h
63	STATE 63	31	0		A000h
64	STATE 64	31	0		A000h
65	STATE 65	31	0		A000h
66	STATE 66	31	0		A000h

Table 5. Sequence State Codes and Associated register code values. (Continued)

cb_sqst Value	Sequence State	String Code Line 1	String Code Line 2	Uses mm:ss	Burner Control State Bits
67	INITIATE HOLD: AC AC PHASE ERROR	49	10		4001h
68	STANDBY HOLD: PREIGNITION LOCK	104	86		4002h
69	STATE 69	31	0		A000h
70	STATE 70	31	0		A000h
71	BURNER OFF: T6 BURNER SWITCH	22	23		4002h
72	STANDBY HOLD: T6 EA HOLD MSG	104	30		4002h
73	STANDBY HOLD: T6 CIRCUIT FAULT	104	25		4002h
74	STANDBY HOLD (EA)	184	Table 9		4002h
75	PURGE HOLD (EA)	185	Table 9		4004h
76	PILOT HOLD (EA)	186	Table 9		4008h
77	MAIN IG HOLD (EA)	187	Table 9		4010h
78	RUN HOLD (EA)	188	Table 9		4020h
79	POSTPURGE HOLD (EA)	189	Table 9		4040h
80	PREIGNITION HOLD (EA)	190	Table 9		4080h

String Codes

Table 6 contains a listing of all string codes provided by the S7810M. The associated string is not implemented in the S7810M; it is a string eqivalent to that displayed on the S7800 Keyboard Display Module or similar device..

Table 6. String codes.

String Code	String
0	(blank)
1	1
2	1-1
3	1-2
4	1-3
5	1-4
6	1-5
7	AC FREQUENCY
8	AC FREQUENCY/NOISE
9	AC LINE DROPOUT
10	AC PHASE
11	ACCESSORY FAULT
12	AIRFLOW SW. ON
13	AIRFLOW SWITCH
14	ATOMIZING SW
15	AUX INTERLOCK #4
16	AUX INTERLOCK #5
17	AUX LIMIT #1
18	AUX LIMIT #2

Table 6. String codes. (Continued)

String Code	String
19	AUX LIMIT #3
20	BLOCK INTAKE
21	BOTH FUELS SELECT
22	BURNER OFF
23	BURNER SWITCH
24	CALL SERVICE
25	CIRCUIT FAULT
26	COMB. PRESSURE
27	CONTROL ON
28	DELAYED MV ON
29	DEVICE SPECIFIC
30	EA HOLD MESSAGE
31	ERROR STATE
32	FLAME AMP TYPE
33	FLAME AMP/SHUTR
34	FLAME AMPLIFIER
35	FLAME DETECTED
36	FLAME TOO STRONG
37	FLAME-OUT TIMER
38	FUEL SELECT OFF
39	HIGH FIRE JUMPERED
40	HIGH FIRE SWITCH
41	HIGH GAS PRESSURE
42	HIGH LIMIT

Table 6. String codes. (Continued)

String Code	String
43	HIGH OIL PRESSURE
44	HIGH OIL TEMP
45	HOLD SWITCH
46	IGNITION
47	IGNITION ON
48	INITIATE
49	INITIATE HOLD
50	JUMPERS CHANGED
51	JUMPERS WRONG
52	LOCKOUT
53	LOCKOUT ILK ON
54	LOCKOUT INTERLOCK
55	LOCKOUT SWITCH
56	LOW FIRE JUMPERED
57	LOW FIRE SW OFF
58	LOW FIRE SWITCH
59	LOW GAS PRESSURE
60	LOW LINE VOLTAGE
61	LOW OIL PRESSURE
62	LOW OIL TEMP
63	LWCO
64	MAIN FLAME FAIL
65	MAIN FLAME IGN.
66	MAIN IGN
67	MAIN IGN HOLD
68	MAIN TRIAL
69	MAIN VALVE ON
70	MAN-OPEN SW. OFF
71	MAN-OPEN SW. ON
72	MANUAL OPEN SWITCH
73	NO PURGE CARD
74	OTHER INTERLOCKS
75	OTHER PREIGN ILK
76	PILOT FLAME FAIL
77	PILOT HOLD
78	PILOT IGN
79	PILOT STABALIZE
80	PILOT VALVE 1 ON
81	PILOT VALVE 2 ON
82	POOR FLAME SENSOR
83	POSTPURGE
84	PREIGNITION
85	PREIGNITION ILK
86	PREIGNITION LOCK
87	PURGE
88	PURGE CARD ERROR

Table 6. String codes. (Continued)

String Code	String
89	PURGE DELAY
90	PURGE FAN SW OFF
91	PURGE FAN SW ON
92	PURGE FAN SWITCH
93	PURGE HOLD
94	REMOTE CONTROL
95	RUN
96	RUN HOLD
97	RUN/LOWFIRE
98	RUN/TEST SWITCH
99	RUNNING ILK
100	RUNNING ILK ON
101	RUNNING INTERLOCK
102	SAFETY CHECK
103	STANDBY
104	STANDBY HOLD
105	START
106	START SWITCH
107	START SWITCH ON
108	TEST STATE
109	VALVE CLOSURE
110	ALL SWITCHES ON
111	RESET/ALARM TEST
NOTE: The codes that follow may appear in the registers allocated to terminals: Registers 88 through 102. Parentheses contain display message numbers.	
112	(860) Run/Test Switch RUN
113	(860) Run/Test Switch TEST
114	(910) Operator Control T7 = 0
115	(910) Operator Control T7 = 1
116	(920) Interlock T7 = 0
117	(920) Interlock T7 = 1
118	(924) Airflow Interlock T7 = 0
119	(924) Airflow Interlock T7 = 1
120	(926) Block Intake T7 = 0
121	(926) Block Intake T7 = 1
122	(930) Valve T8 = 0
123	(930) Valve T8 = 1
124	(932) Intrptd PV T8 = 0
125	(932) Intrptd PV T8 = 1
126	(940) Main Valve T9 = 0
127	(940) Main Valve T9 = 1
128	(950) Ignition T10 = 0
129	(950) Ignition T10 = 1
130	(960) PV Hold T16 = 0
131	(960) PVHold T16 = 1

Table 6. String codes. (Continued)

String Code	String
132	(970) Input A T16 = 0
133	(970) Input A T16 = 1
134	(980) ManOpenSw T17 = 0
135	(980) ManOpenSw T17 = 1
136	(990) Input B T17 = 0
137	(990) Input B T17 = 1
138	(992) PreIgn ILK T17 = 0
139	(992) PreIgn ILK T17 = 1
140	(1000) LowFire Sw T18 = 0
141	(1000) LowFire Sw T18 = 1
142	(1002) Purge Fan T18 = 0
143	(1002) Purge Fan T18 = 1
144	(1010) HighFire Sw T19 = 0
145	(1010) HighFire Sw T19 = 1
146	(1020) PreIgn ILK T20 = 0
147	(1020) PreIgn ILK T20 = 1
148	(1022) Lockout Inp T20 = 0
149	(1022) Lockout Inp T20 = 1
150	(1024) Comb Press T20 = 0
151	(1024) Comb Press T20 = 1
152	(1030) Valv/Start T21 = 0
153	(1030) Valv/Start T21 = 1
154	(1032) Intmitt PV T21 = 0
155	(1032) Intmitt PV T21 = 1
156	(6010) Terminal T6 = 0
157	(6010) Terminal T6 = 1
158	(6020) Terminal T7 = 0
159	(6020) Terminal T7 = 1

Table 6. String codes. (Continued)

String Code	String
160	(6030) Terminal T8 = 0
161	(6030) Terminal T8 = 1
162	(6040) Terminal T9 = 0
163	(6040) Terminal T9 = 1
164	(6050) Terminal T10 = 0
165	(6050) Terminal T10 = 1
166	(6060) Terminal T16 = 0
167	(6060) Terminal T16 = 1
168	(6070) Terminal T17 = 0
169	(6070) Terminal T17 = 1
170	(6080) Terminal T18 = 0
171	(6080) Terminal T18 = 1
172	(6090) Terminal T19 = 0
173	(6090) Terminal T19 = 1
174	(7000) Terminal T20 = 0
175	(7000) Terminal T20 = 1
176	(7010) Terminal T21 = 0
177	(7010) Terminal T21 = 1
178	(7020) Jumper 1 Intact
179	(7020) Jumper 1 Clipped
180	(7030) Jumper 2 Intact
181	(7030) Jumper 2 Clipped
182	(7040) Jumper 3 Intact
183	(7040) Jumper 3 Clipped)

Fault Codes

Table 7 is a complete list of fault codes that may appear in the fault code register. The Fault String Code register will contain the corresponding String code identified in the table.

Table 7. Fault Codes.

Fault Code	Fault Message (NOTE: FAULT n: is not in the strings)	Fault String Code
0	*Blank (no fault)*	0
1	FAULT 1: NO PURGE CARD	73
2	FAULT 2: AC FREQUENY/NOISE	8
3	FAULT 3: AC LINE DROPOUT	9
4	FAULT 4: AC FREQUENCY	7
5	FAULT 5: LOW LINE VOLTAGE	60
6	FAULT 6: PURGE CARD ERROR	88
7	FAULT 7: FLAME AMPLIFIER	34
8	FAULT 8: FLAME AMP/SHUTR	33
9	FAULT 9: FLAME DETECTED	35
10	FAULT 10: PREIGNITION ILK	85
11	FAULT 11: RUNNING ILK ON	100
12	FAULT 12: LOCKOUT ILK ON	53

Table 7. Fault Codes. (Continued)

Fault Code	Fault Message (NOTE: FAULT n: is not in the strings)	Fault String Code
13	FAULT 13: AIRFLOW SW. ON	12
14	FAULT 14: HIGH FIRE SWITCH	40
15	FAULT 15: FLAME DETECTED	35
16	FAULT 16: FLAME-OUT TIMER	37
17	FAULT 17: MAIN FLAME FAIL	64
18	FAULT 18: FLAME DETECTED	35
19	FAULT 19: MAIN FLAME IGN.	65
20	FAULT 20: LOW FIRE SW OFF	57
21	FAULT 21: RUNNING ILK	99
22	FAULT 22: LOCKOUT ILK	54
23	FAULT 23: AIRFLOW SWITCH	13
24	FAULT 24: CALL SERVICE	24
25	FAULT 25: CALL SERVICE	24
26	FAULT 26: MAN-OPEN SW. OFF	70
27	FAULT 27: START SWITCH ON	71
28	FAULT 28: PILOT FLAME FAIL	76
29	FAULT 29: LOCKOUT ILK	54
30	FAULT 30: RUNNING ILK	101
31	FAULT 31: LOW FIRE SW OFF	57
32	FAULT 32: AIRFLOW SWITCH	13
33	FAULT 33: PREIGNITION ILK	85
34	FAULT 34: CONTROL ON	27
35	FAULT 35: CALL SERVICE	24
36	FAULT 36: CALL SERVICE	24
37	FAULT 37: CALL SERVICE	24
38	FAULT 38: CALL SERVICE	24
39	FAULT 39: CALL SERVICE	24
40	FAULT 40: CALL SERVICE	24
41	FAULT 41: MAIN VALVE ON	69
42	FAULT 42: PILOT VALVE 1 ON	80
43	FAULT 43: IGNITION ON	47
44	FAULT 44: PILOT VALVE 2 ON	81
45	FAULT 45: LOW FIRE SW OFF	57
46	FAULT 46: FLAME AMP TYPE	32
47	FAULT 47: JUMPERS CHANGED	50
48	FAULT 48: DELAYED MV ON	28
49	FAULT 49: MAN-OPEN SW. ON	71
50	FAULT 50: JUMPERS WRONG	51
51	FAULT 51: FLAME TOO STRONG	36
52	FAULT 52: CALL SERVICE	24
53	FAULT 53: LOCKOUT SWITCH	55
54	FAULT 54: COMB. PRESSURE	26
55	FAULT 55: PURGE FAN SW ON	91
56	FAULT 56: BLOCK INTAKE	20
57	FAULT 57: PURGE FAN SW OFF	90

Table 7. Fault Codes. (Continued)

Fault Code	Fault Message (NOTE: FAULT n: is not in the strings)	Fault String Code
58-66	FAULT 58-FAULT 66: CALL SERVICE	24
67	FAULT 67: AC PHASE	10
68	FAULT 68: PREIGNITION ILK	85
69	FAULT 69: CALL SERVICE	24
70	FAULT 70: CALL SERVICE	24
71-75	FAULT 71-FAULT 75: DEVICE SPECIFIC	29
76-93	FAULT 76-FAULT 93: ACCESSORY FAULT	11
94-127	FAULT 94-FAULT 127: CALL SERVICE	24
128	FAULT 128: POOR FLAME SENSOR	82
129 – 143	*Not included in the list supplied by H&BC* FAULT xxx: CALL SERVICE	24
144	FAULT 33z: OTHER PREIGN ILK[EA]	75
145	FAULT 33y: VALVE CLOSURE[EA]	109
146	FAULT 32s: OTHER INTERLOCKS[EA]	74
147	FAULT 32r: AUX INTERLOCK #5[EA]	16
148	FAULT 32q: AUX INTERLOCK #4[EA]	15
149	FAULT 32p: AIRFLOW SWITCH[EA]	13
150	FAULT 32o: LOW GAS PRESSURE[EA]	59
151	FAULT 32n: HIGH GAS PRESSURE[EA]	41
152	FAULT 32m: ATOMIZING SW[EA]	14
153	FAULT 32k: LOW OIL TEMP[EA]	62
154	FAULT 32j: HIGH OIL TEMP[EA]	44
155	FAULT 32i: LOW OIL PRESSURE[EA]	61
156	FAULT 32h: HIGH OIL PRESSURE[EA]	43
157	FAULT 32g: BOTH FUELS SELECT[EA]	21
158	FAULT 32f: FUEL SELECT OFF[EA]	38
159	FAULT 32e: AUX LIMIT #3[EA]	19
160	FAULT 32d: HIGH LIMIT[EA]	42
161	FAULT 32c: LWCO[EA]	63
162	FAULT 32b: AUX LIMIT #2[EA]	18
163	FAULT 32a: AUX LIMIT #1[EA]	17
164	FAULT 30s: OTHER INTERLOCKS[EA]	74
165	FAULT 30r: AUX INTERLOCK #5[EA]	16
166	FAULT 30q: AUX INTERLOCK #4[EA]	15
167	FAULT 30p: AIRFLOW SWITCH[EA]	13
168	FAULT 30o: LOW GAS PRESSURE[EA]	59
169	FAULT 30n: HIGH GAS PRESSURE[EA]	41
170	FAULT 30m: ATOMIZING SW[EA]	14
171	FAULT 30k: LOW OIL TEMP[EA]	62
172	FAULT 30j: HIGH OIL TEMP[EA]	44

Table 7. Fault Codes. (Continued)

Fault Code	Fault Message (NOTE: FAULT n: is not in the strings)	Fault String Code
173	FAULT 30i: LOW OIL PRESSURE[EA]	61
174	FAULT 30h: HIGH OIL PRESSURE[EA]	43
175	FAULT 30g: BOTH FUELS SELECT[EA]	21
176	FAULT 30f: FUEL SELECT OFF[EA]	38
177	FAULT 30e: AUX LIMIT #3[EA]	19
178	FAULT 30d: HIGH LIMIT[EA]	42
179	FAULT 30c: LWCO[EA]	63
180	FAULT 30b: AUX LIMIT #2[EA]	18
181	FAULT 30a: AUX LIMIT #1[EA]	17
182	FAULT 29s: OTHER INTERLOCKS[EA]	74
183	FAULT 29r: AUX INTERLOCK #5[EA]	16
184	FAULT 29q: AUX INTERLOCK #4[EA]	15
185	FAULT 29p: AIRFLOW SWITCH[EA]	13
186	FAULT 29o: LOW GAS PRESSURE[EA]	59
187	FAULT 29n: HIGH GAS PRESSURE[EA]	41
188	FAULT 29m: ATOMIZING SW[EA]	14
189	FAULT 29k: LOW OIL TEMP[EA]	62
190	FAULT 29j: HIGH OIL TEMP[EA]	44
191	FAULT 29i LOW OIL PRESSURE[EA]	61
192	FAULT 29h: HIGH OIL PRESSURE[EA]	43
193	FAULT 29g: BOTH FUELS SELECT[EA]	21
194	FAULT 29f: FUEL SELECT OFF[EA]	38
195	FAULT 29e: AUX LIMIT #3[EA]	19
196	FAULT 29d: HIGH LIMIT[EA]	42
197	FAULT 29c: LWCO[EA]	63
198	FAULT 29b: AUX LIMIT #2[EA]	18
199	FAULT 29a: AUX LIMIT #1[EA]	17
200	FAULT 23s: OTHER INTERLOCKS[EA]	74
201	FAULT 23r: AUX INTERLOCK #5[EA]	16
202	FAULT 23q: AUX INTERLOCK #4[EA]	15
203	FAULT 23p: AIRFLOW SWITCH[EA]	13
204	FAULT 23o: LOW GAS PRESSURE[EA]	59
205	FAULT 23n: HIGH GAS PRESSURE[EA]	41
206	FAULT 23m: ATOMIZING SW[EA]	14
207	FAULT 23k: LOW OIL TEMP[EA]	62
208	FAULT 23j: HIGH OIL TEMP[EA]	44
209	FAULT 23i LOW OIL PRESSURE[EA]	61
210	FAULT 23h: HIGH OIL PRESSURE[EA]	43

Table 7. Fault Codes. (Continued)

Fault Code	Fault Message (NOTE: FAULT n: is not in the strings)	Fault String Code
211	FAULT 23g: BOTH FUELS SELECT[EA]	21
212	FAULT 23f: FUEL SELECT OFF[EA]	38
213	FAULT 23e: AUX LIMIT #3[EA]	19
214	FAULT 23d: HIGH LIMIT[EA]	42
215	FAULT 23c: LWCO[EA]	63
216	FAULT 23b: AUX LIMIT #2[EA]	18
217	FAULT 23a: AUX LIMIT #1[EA]	17
218	FAULT 22s: OTHER INTERLOCKS[EA]	74
219	FAULT 22r: AUX INTERLOCK #5[EA]	16
220	FAULT 22q: AUX INTERLOCK #4[EA]	15
221	FAULT 22p: AIRFLOW SWITCH[EA]	13
222	FAULT 22o: LOW GAS PRESSURE[EA]	59
223	FAULT 22n: HIGH GAS PRESSURE[EA]	41
224	FAULT 22m: ATOMIZING SW[EA]	14
225	FAULT 22k: LOW OIL TEMP[EA]	62
226	FAULT 22j: HIGH OIL TEMP[EA]	44
227	FAULT 22i: LOW OIL PRESSURE[EA]	61
228	FAULT 22h: HIGH OIL PRESSURE[EA]	43
229	FAULT 22g: BOTH FUELS SELECT[EA]	21
230	FAULT 22f: FUEL SELECT OFF[EA]	38
231	FAULT 22e: AUX LIMIT #3[EA]	19
232	FAULT 22d: HIGH LIMIT[EA]	42
233	FAULT 22c: LWCO[EA]	63
234	FAULT 22b: AUX LIMIT #2[EA]	18
235	FAULT 22a: AUX LIMIT #1[EA]	17
236	FAULT 21s: OTHER INTERLOCKS[EA]	74
237	FAULT 21r: AUX INTERLOCK #5[EA]	16
238	FAULT 21q: AUX INTERLOCK #4[EA]	15
239	FAULT 21p: AIRFLOW SWITCH[EA]	13
240	FAULT 21o: LOW GAS PRESSURE[EA]	59
241	FAULT 21n: HIGH GAS PRESSURE[EA]	41
242	FAULT 21m: ATOMIZING SW[EA]	14
243	FAULT 21k: LOW OIL TEMP[EA]	62
244	FAULT 21j: HIGH OIL TEMP[EA]	44
245	FAULT 21i: LOW OIL PRESSURE[EA]	61
246	FAULT 21h: HIGH OIL PRESSURE[EA]	43
247	FAULT 21g: BOTH FUELS SELECT[EA]	21
248	FAULT 21f: FUEL SELECT OFF[EA]	38

Table 7. Fault Codes. (Continued)

Fault Code	Fault Message (NOTE: FAULT n: is not in the strings)	Fault String Code
249	FAULT 21e: AUX LIMIT #3[EA]	19
250	FAULT 21d: HIGH LIMIT[EA]	42
251	FAULT 21c: LWCO[EA]	63
252	FAULT 21b: AUX LIMIT #2[EA]	18
253	FAULT 21a: AUX LIMIT #1[EA]	17
254	FAULT 10z: OTHER PREIGN ILK[EA]	75
255	FAULT 10y: VALVE CLOSURE[EA]	109

Fault/Alarm History Records

Table 8 describes the registers that are part of a fault or alarm history record. To determine the actual register address for a parameter within the record, add the register offset to the start address of the record.

Table 8. Fault History Record Format.

Offset	Parameter Name	Access	Format	Notes
0	Fault code	R	U16	See Table 7.
1	Fault String	R	U16	See Table 6.
2	Sequence State	R	U16	See Table 5.
3	Filrst line message.	R	U16	See Table 6.
4	Second line message	R	U16	See Table 6
5	Sequence time	R	U16	Seconds.
6-7	Total cycles	R	U32	
8-9	Total hours	R	U32	

Expanded Annunciator Status

The codes shown in Table 9 are available in the Expanded Annunciator Status Register. These codes are normally translated to the appropriate fault code by the Burner Control. The fault code will then be translated to the appropriate first and second line messages as shown in Table 7 for use by the UMC800 Operator Interface.

Table 9. Expanded Annunciator Status Messages.

EA Status Value (binary)	Status Message	Line 2 String Code
000 0000	No Expanded Annunciator	N/A
XX0 0001	Burner Sw.	23
XX0 0010	Manual Open Switch	72
XX0 0011	Aux. Limit #1	17
XX0 0100	Aux. Limit #2	18
XX0 0101	LWCO	63
XX0 0110	High Limit	42
XX0 0111	Aux. Limit #3	19
XX0 1000	FuelSelect Off	38
XX0 1001	BothFuelSelect	21
XX0 1010	High Oil Pres.	43
XX0 1011	Low Oil Pres.	61
XX0 1100	High Oil Temp	44
XX0 1101	Low Oil Temp.	62
XX0 1110	Atomizing Sw.	14
XX0 1111	High Gas Pres.	41
XX1 0000	Low Gas Pres.	59
XX1 0001	Airflow Sw.	13
XX1 0010	Aux. ILK #4	15
XX1 0011	Aux. ILK #5	16
XX1 0100	All switches on	N/A
	Other PII (hold or lockout)	75
X0X XXXX	Valve Closure (bit 5 = 0 implies an error)	109
0XX XXXX	Oil Select	N/A
1XX XXXX	Gas Select	N/A

Burner Control Type Codes

The burner control type code indicates the exact model number of the burner control that supplies the DDL timing messages. The device description is the ASCII string that appears in the device description field response to function code 17. The format for function code 17 is provided in Table 10.

Table 10. Response Message Format for function code 17 (11h). (26 bytes)

	Slave Address	Function Code	Byte Count	Slave ID[a]	Run Indicator Status[b]	Device Description[c]	N/A	CRC	CRC
Byte	0	1	2	3	4	5-15	16-23	24	25

[a] Slave ID: Always 0x78 when using RM78xx or EC78xx Relay Modules(11 bytes) (bytes 5-15).

[b] Run Indicator Status: Always FF=ON (one byte)(byte 4).

[c] Device Description: 16 Character ASCII OS number for the Burner Control (11 bytes) (bytes 5-15).

Table 11. .Burner Control Codes.

CODE	DEVICE DESCRIPTION
0	(undefined)
100	RM7800E
101	RM7800G
102	RM7800L
103	RM7800M
104	RM7838A
105	RM7838B
106	RM7840E
107	RM7840G
108	RM7840L
109	RM7840M
110	RM7885A
111	RM7888A
112	RM7890A
113	RM7895A
114	RM7895B
199	RM78xx
200	EC7810A
201	EC7820A
202	EC7830A
203	EC7850A
204	EC7885A
205	EC7890A
206	EC7895A
207	EC7895C
299	EC78xx

Burner Control State Bits

The burner control sequence state is translated into State Bit Register as shown in Table 12.

Table 12. Burner Control State Bits.

BIT	DESCRIPTION	BC State Bits Register
0	Initiate	0000 0000 0000 0001
1	Standby	0000 0000 0000 0010
2	Purge	0000 0000 0000 0100
3	Pilot Ignition	0000 0000 0000 1000
4	Main Ignition	0000 0000 0001 0000
5	Run	0000 0000 0010 0000
6	Postpurge	0000 0000 0100 0000
7	Preignition	0000 0000 1000 0000
13	Alarm	1010 0000 xxxx xxxx NOTE: Lockout bit is also set.
14	Hold	0100 0000 xxxx xxxx One other bit may be on.
15	Lockout	1010 0000 0000 0000 NOTE: Alarm bit is also set.

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