ED510 DISPLAY MODULE

FOR USE WITH FIREYE® FLAME-MONITOR™ AND MicroM™ BURNER MANAGEMENT CONTROLS

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DESCRIPTION

The ED510 Display Module is designed to operate with the FLAME-MONITOR Burner Management Control System using the EP and EPD style (remote mount only for EPD style) programmer modules as well as the MicroM series of controls. The ED510 display module provides the following features and capabilities:

- Two (2) line by sixteen (16) character backlit LCD display.
- Continuous display of current burner operating status, including first out annunciation in the event of a lockout condition.
- Three (3) key, tactile dome keypad to provide historical information of the burner, last six (6) lockout conditions (with burner cycle and burner hour time stamp), assign messages associated with the operation of the E300 expansion module, and diagnostic messages.
- Design mounts directly onto the front face of the EP style programmers.
- RJ style connector for connection to the EP and EPD programmer.
- Remote display capability with the EP and EPD style programmers and MicroM system using standard DIN sized opening and remote mounting kit. Refer to Bulletin E-8002.
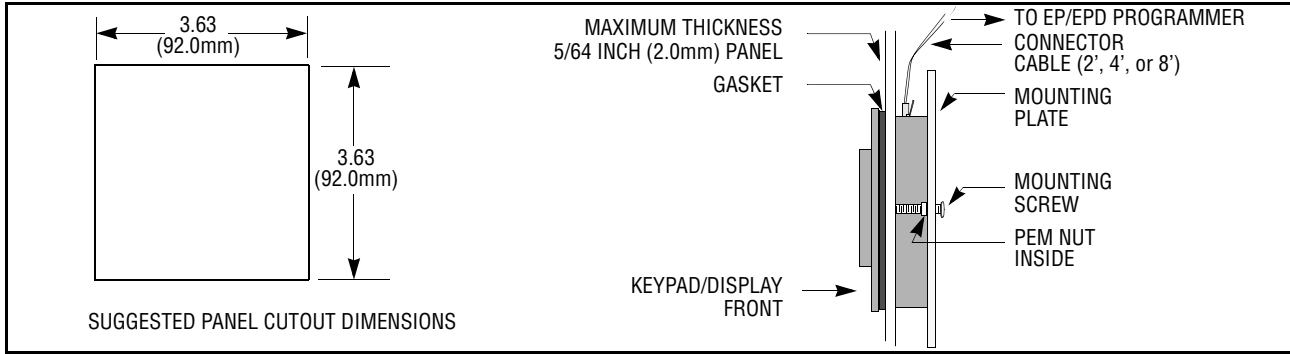- Weather proof housing (NEMA 4 using remote mounting kit 129-145-1, -2).

INSTALLATION

The ED510 display mounts directly onto the front of the EP style programmers. The ED510 can be mounted onto the programmer when the programmer is either installed in the EB700 chassis or not.

- Remove power from the EB700 chassis if the programmer is installed in the chassis.
- Slide the bottom of the ED510 chassis onto the two (2) mounting tabs on the face of the EP style programmer.
- Tilt the ED510 display towards the cover until the mounting tab on top of the ED510 display snaps into position into the opening on the face of the EP programmer.
- Install the ED580 cable (provided) into the RJ style connectors on both the ED510 display and EP style programmers.
  — Insert the EP style programmer and ED510 display into the second slot on the EB700 chassis (marked "Programmer Module") and restore power.

For information on how to mount the ED510 display remotely for the EP, EPD style programmers and MicroM systems, refer to Bulletin E-8002.

FIGURE 1. INSTALLATION AND MOUNTING DIAGRAM OF ED510 WITH 129-145

ORDERING INFORMATION

P/N	DESCRIPTION
ED510	Display module. Includes ED580-1 cable. (1.25 inches).
129-145-1	Remote mounting kit. Includes ED580-4 cable (4 foot).
129-145-2	Remote mounting kit. Includes ED580-8 cable (8 foot)
ED580-1	1.25 inch display cable.
ED580-4	4 foot remote display cable.
ED580-8	8 foot remote display cable.
ED610	Adaptor for cable lengths greater than 8 feet.

Temperature Rating

32° F — 140°F (0° C— 60°C)
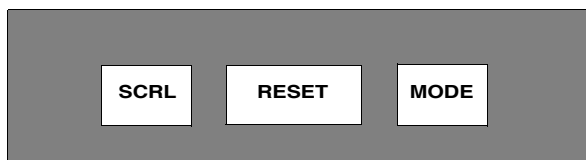
BACKLIT LCD DISPLAY

The ED510 display has a two (2) line by sixteen (16) character backlit LCD display. The backlit function is continuously energized.

Contrast Control: The contrast for the LCD display is factory set. If the contrast must be adjusted for any reason (e.g.: remote mounting), a potentiometer is provided on the back of the ED510 display board.

TACTILE DOME KEYPAD

The ED510 has a three (3) key, tactile dome keypad to review both current and historical information associated with the operation of the burner. Following is the function of each key:
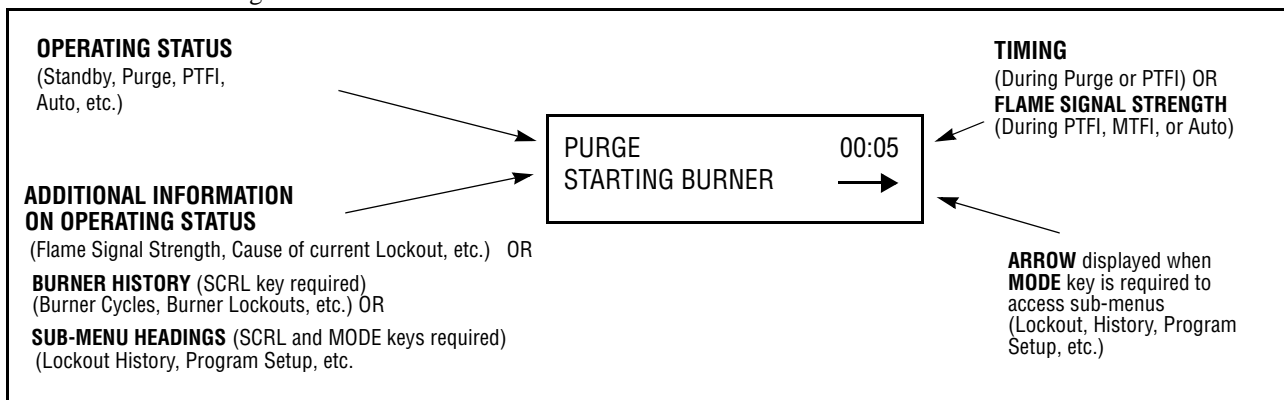
SCRL   SCRL key is used to advance through and display historical and operational information associated with the control and various sub-menus.

RESET   RESET key resets the control in the event of a lockout condition. The reset key is also used to modify Unit Address and messages associated with the E300 expansion module.

MODE   MODE key selects and enters a sub-menu (e.g. LOCKOUT HISTORY). The SCRL key then advances through the selections within each sub-menu. The MODE key will also exit the sub-menu. A right-hand arrow (→) displayed on the bottom line indicates the MODE key is operational.

GENERAL OPERATION

The ED510 displays current burner status, first out annunciation in the event of a lockout condition, historical burner information, detailed lockout information of the last six (6) lockout conditions, diagnostic messages, and the ability to program messages associated with the E300 Expansion Module.

Depending on the information being displayed, data is displayed on the ED510 screen in the following locations.

OPERATING STATUS
(Standby, Purge, PTFI, Auto, etc.)

ADDITIONAL INFORMATION ON OPERATING STATUS
(Flame Signal Strength, Cause of current Lockout, etc.)   OR

BURNER HISTORY (SCRL key required)
(Burner Cycles, Burner Lockouts, etc.) OR

SUB-MENU HEADINGS (SCRL and MODE keys required)
(Lockout History, Program Setup, etc.

TIMING
(During Purge or PTFI) OR
FLAME SIGNAL STRENGTH
(During PTFI, MTFI, or Auto)

PURGE   00:05
STARTING BURNER   →

ARROW displayed when **MODE** key is required to access sub-menus (Lockout, History, Program Setup, etc.)

⚠ **The EP(D) and MicroM programmers update the messages to the ED510 display at least once every 8 seconds. If the ED510 display does not receive information from the EP(D) programmer within 10 seconds the ED510 will display:**

FIREYE   ED510
WAITING FOR DATA

This can be the result of a defective connection between the programmer and display, defective cable, defective drivers in the programmer or display, or an electrical noise transient causing the EP(D) or MicroM programmers to cease communication.

Removing and restoring power should be executed to recover proper operation. Refer to bulletin SN-100 for recommended techniques for display installation.

ED510 MESSAGES (as used with Flame-Monitor)

RUN MESSAGES

STANDBY
L1-13 OPEN

The operating control of the FLAME-MONITOR (terminals L1-13) is open.

PURGE   00:05
HIGH FIRE PURGE

Firing rate motor sent to high fire (term. 10-X made), purge timing displayed upper right hand corner.

PURGE   00:35
LOW FIRE PURGE

Firing rate motor sent to low fire (term. 10-12 made), purge timing displayed in upper right hand corner.

PTFI   00:02
IGNITION TIMING

PTFI timing started. Pilot not proven yet. PTFI timing displayed in upper right hand corner.

PTFI 19 FLAME SIGNAL	Pilot flame proven during PTFI. Flame signal strength displayed in upper right hand corner.
MTFI 25 FLAME SIGNAL	Main flame proven during MTFI. Flame signal strength displayed in upper right hand corner.
AUTO 40 FLAME SIGNAL	Modulator motor sent to auto position (term 10-11 made). Flame signal strength displayed in upper right hand corner.
POST PURGE 00:05 CYCLE COMPLETE	Demand satisfied. L1-13 open. Blower motor de-energized 15 seconds after L1-13 opens.

HOLD MESSAGES

HOLD STANDBY 3-P INTLK CLOSED	Dipswitch #6 (3-P Proven Open to Start) is set in the Up position (Enabled). At the start of the cycle, the 3-P circuit was closed. It will hold in this position for 60 seconds and then lockout if the 3-P circuit does not open.
HOLD PURGE 00:00 D-8 LIMIT OPEN	The control has driven the firing rate motor to high purge (term. 10-X made) and is waiting for the high fire switch (term. D-8) to close. It will hold this position for ten (10) minutes and then lockout if the D-8 circuit does not close.**Applies to EP160, EP161, EP165, EP170 programmers.**
HOLD PURGE 01:00 M-D LIMIT OPEN	The control has finished purge and the firing rate motor is driving to the low fire position (term. 10-12 made) waiting for the low fire switch (term. M-D) to close. It will hold this position for ten (10) minutes and then lockout if the M-D circuit does not close.
HOLD PURGE 00:10 3-P INTLK OPEN	The running interlock circuit (3/P) has not closed within the first ten (10) seconds of purge. The control will hold for ten (10) minutes and then lockout. **Applies to recycle programmers only.**
HOLD STANDBY 25 FALSE FLAME	Flame has been sensed during the burner off time (term. L1-13 open) or during the purge period. This message will hold for sixty (60) seconds and then lockout if flame is still present. Flame signal strength is displayed in the upper right hand corner.

LOCKOUT MESSAGES

LOCKOUT STANDBY 3-P INTLK CLOSED	Dipswitch #6 (3-P Proven Open to Start) is set in the Up position (Enabled). At the start of the cycle, the 3-P circuit was closed, and the control has waited 60 seconds for the 3-P circuit to open.
LOCKOUT PURGE D-8 LIMIT OPEN	The control has held for more than 10 minutes waiting for the high fire switch (D-8) to close. **Applies to EP160, EP161, EP165, EP170 programmers**.
LOCKOUT PURGE 3-P INTLK OPEN	The running interlock circuit (3-P) has opened during the purge period or failed to close within the first 10 seconds of purge on non-recycle programmers, or has not closed within 10 minutes on recycle programmers.
LOCKOUT 13-3 FUEL VALVE END SWITCH	The fuel valve end switch wired between terminals 13 and 3 opened during purge or at start up.

LOCKOUT PURGE M-D LIMIT OPEN	The control has held for more than 10 minutes waiting for the low fire switch (M-D) to close.
LOCKOUT PTFI 3-P INTLK OPEN	The running interlock circuit (3-P) has opened during the pilot trial for ignition period. **Applies to non-recycle programmers only**.
LOCKOUT MTFI 3-P INTLK OPEN	The running interlock circuit (3-P) has opened during the main trial for ignition period. **Applies to non-recycle programmers only**.
LOCKOUT AUTO 3-P INTLK OPEN	The running interlock circuit (3-P) has opened during the main burner on period. **Applies to non-recycle programmers only.**
LOCKOUT STANDBY FALSE FLAME	Flame has been sensed during the burner off time (term. L1-13 open) or during the purge period for sixty (60) seconds.
LOCKOUT PTFI FLAME FAIL	A flame failure occurred during the pilot trial for ignition period.
LOCKOUT MTFI FLAME FAIL	A flame failure occurred during the main trial for ignition period.
LOCKOUT AUTO FLAME FAIL	A flame failure occurred during the main burner on period.
LOCKOUT PTFI SCANNER NOISE	This message appears because of ignition cable noise. Reroute scanner wires away from high voltage ignition cables. Check for proper spark gap or cracked porcelain. Check for proper grounding of wiring base and power supply. Replace worn ignition cable and/or faulty connections.
LOCKOUT PTFI SHORT CIRCUIT TERM 5,6,7	Excessive current or short circuit detected on terminals 5, 6, or 7 during PTFI, MTFI, or Auto. The control will lockout upon sensing this condition on two consecutive cycles.
LOCKOUT PTFI FUEL VALVE STATE CHANGE	During pilot trial for ignition period, voltage sensed on terminal 7 is different from the previous cycle. (e.g.: jumper added or removed between term. 7 and 5 or 6).
LOCKOUT AUTO LINE FREQUENCY NOISE	Electrical noise detected on terminals L1 and L2.
LOCKOUT AC POWER FAIL	A power interruption to terminals L1 and L2 has caused the control to lockout. **Applies to EP165 programmer only.**

CHECK MESSAGES

CHECK PURGE 00:15 D-8 HIGH LIMIT	The "Run-Check" switch has been placed in the Check position during purge and will hold indefinitely. The firing rate motor is being driven to the high purge position.

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┌─────────────────────────────────────┐
│ CHECK PURGE            00:45         │
│ M-D LOW LIMIT                        │
└─────────────────────────────────────┘
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The "Run-Check" switch has been placed in the Check position after high fire purge and will hold indefinitely. The firing rate motor is being driven to the low fire position.

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┌─────────────────────────────────────┐
│ CHECK PTFI                 19        │
│ FLAME SIGNAL                         │
└─────────────────────────────────────┘
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The "Run-Check" switch has been placed in the Check position during the pilot trial for ignition period. Flame signal strength is displayed in the upper right hand position. The control will lockout on safety only when no flame signal is sensed for a continuous 30 seconds while the control is in the Check position.

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┌─────────────────────────────────────┐
│ CHECK AUTO                 25        │
│ LOW FIRE                             │
└─────────────────────────────────────┘
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The "Run-Check" switch has been placed in the Check position during the main burner on period and the firing rate motor is driven to the low fire position. Flame signal strength is displayed in the upper right hand corner.

DIAGNOSTIC MESSAGES

	POSSIBLE CAUSE	SOLUTION
LOCKOUT AUTO CHECK AMPLIFIER	— High electrical noise.	— Check for proper ground on power supply. — Install noise suppressor on power supply (P/N 60-2333).
	— Defective field wiring.	— Make sure line phase on interlock circuit is the same as found on L1/L2 power supply to E100.
	— Defective amplifier.	— Replace amplifier.
	— Defective IR scanner.	— Replace IR cell.
LOCKOUT PTFI CHECK CHASSIS	— Voltage on terminal 7 at improper time.	— Check wiring to terminal 7.
LOCKOUT PURGE CHECK PROGRAMMER	— Voltage on terminal 5 or 6 at improper time.	— Check wiring to terminals 5 and 6.
LOCKOUT AUTO CHECK SCANNER	— Flame signal detected during shutter close time on 45UV5 scanner.	— Stuck scanner shutter. Replace 45UV5 scanner.
LOCKOUT AUTO CHECK EXPANSION MODULE	— The E300 Expansion Module has a defective optocoupler.	— Replace E300 Expansion Module.
LOCKOUT AUTO AUTO CHECK AMPLIFIER FAIL	— Amplifier has failed diagnostic checks.	— Replace amplifier.

HISTORICAL INFORMATION /SYSTEM SUB-MENUS

At any time the control is powered, the SCRL key will scroll through and display the total number of burner cycles, burner lockouts, and system hours on the bottom line of the ED510 display. The top line will continue to show the current run mode of the control (e.g. PURGE, AUTO, etc.). Following the historical information, the SCRL key will display four (4) System Sub-menus providing the following information and/or functions:

— Lockout History (with burner cycle and burner hour time stamp).

— E300 Message Select (to program messages associated with the E300 Expansion Module.

— Program Setup (to display programmer type, purge timing, FFRT timing, etc.).

— System Information (status of M-D circuit, average pilot flame signal, etc.).

The system sub-menus require the MODE key to gain access to the information associated with each sub-menu. An arrow is displayed in the lower right hand corner of the display to indicate a system sub-menu. The order in which the information is displayed every time the SCRL key is pressed is as follows:

AUTO	40
BNR CYCLES	385

Number of burner operating cycles. (L1-13 closed). (385 burner cycles in this example.)

AUTO	40
BNR LOCKOUTS	21

Number of burner lockouts. (21 lockouts in this example.)

AUTO	40
SYS HOURS	233

Number of hours the control has been powered. (233 hours in this example.)

AUTO	40
LOCKOUT HISTORY	‰

Sub-menu to display the cause of the last 6 lockouts. The MODE key is required to display the actual lockouts.

AUTO	40
E300 MSG SELECT	‰

Sub-menu to program the messages associated with the operation of the E300 expansion module. The MODE key is required to enter the sub-menu.

AUTO	40
PROGRAM SETUP	‰

Sub-menu to display various operating parameters of the programmer and amplifier. The MODE key is required to enter the sub-menu.

AUTO	40
SYSTEM INFO	‰

Sub-menu to display information pertaining to the operation of the control. The MODE key is required to enter the sub-menu.

LOCKOUT HISTORY

The sub-menu "LOCKOUT HISTORY" will display the last six (6) lockouts, along with the burner cycle and burner hour when the lockout occurred. When the MODE key is pressed, the screen will display the most recent lockout condition and the number of that lockout (e.g. LO #127 represents the 127th lockout of that control). The SCRL key will display the Burner Hour, followed by the

Burner Cycle when the lockout occurred. The SCRL key will advance to the next lockout, and repeat the sequence listed above. The MODE key will exit the sub-menu.

PRESS	SCREEN DISPLAYS	DESCRIPTION
SCRL	AUTO 45 LOCKOUT HISTORY >	Scrolling through the historical information. Control has released to auto modulation, flame signal strength = 45.
MODE	LO #158 PURGE D-8 LIMIT OPEN	The last (most recent) lockout condition. This is the 158th lockout of the control.
SCRL	LO #158 PURGE @ BNR HOURS 136	The last lockout occurred after 136 hours of burner operation.
SCRL	LO #158 PURGE @ BNR CYCLE 744	The last lockout occurred on the 744 burner cycle.
SCRL	LO #157 AUTO 3-P INTLK OPEN	The next to last lockout condition. This is the 157th lockout of the control.
MODE	AUTO 45 FLAME SIGNAL	Screen has returned to the run message. Control has released to auto modulation, flame signal strength = 45.

E300 MESSAGE SELECT (Flame-Monitor system only)

The sub-menu "E300 MSG SELECT" will allow the user to modify the lockout alarm messages associated with the operation of the E300 Expansion Module. The various safety limits had to be wired in the exact order that was shown in the E3001 Product Bulletin for the E300. For example, the low water cutoff had to be wired between terminals 23 and 24 of the 60-1950 wiring base of the E300. With the EP style programmers (Engineering code 28 or later), the user will now be able to select which message applies to the individual terminals. The messages associated with the E300 are divided into four (4) groups: Recycle, Non-recycle, Gas Select, and Oil Select.

The **Recycle** group pertains to the limits that are connected between terminals L1 and 13 of the E100/E110 FLAME-MONITOR. These are terminals 20-21, 21-22, and 22-13.

Note: Refer to Bulletin E-3001 for a wiring diagram of the E300 terminals.

The **Non-Recycle** group pertains to the limits that are connected between terminals 3 and P of the E100/E110 FLAME-MONITOR. These are terminals 3-23, 23-24, 30-31, 31-32, 32-33, 33-34, 34-35, and 35-P.

The **Gas Select** group pertains to the terminals associated with the gas interlocks of the E300. These are terminals 25-27, 27-30.

The **Oil Selec**t group pertains to the terminals associated with the oil interlocks of the E300. These are terminals 26-28, 28-29, and 29-30.

The lockout messages associated with the above terminals can be modified via the ED510 Display. The selection of available messages are dependent on each group. For example, the message "Low Oil Pressure" is a selection only for the Oil Select group. The default message for a particular interlock is the standard message for those terminals as indicated in the E3001 bulletin. For example, the default message for terminals 20-21 is "L1-13 AUX #1 OPEN."

TO MODIFY THE E300 MESSAGES

All three keys: Mode, Reset and Scroll, are used to modify the E300 messages. The Mode key is used to enter or exit the sub-menu associated with the E300 messages. The Scroll key is used to advance through the various terminals or selectable messages. The Reset key is used to modify a terminal message and select a new message.

To modify the E300 messages:

Press the Scroll key until the ED510 displays:

E300 MSG SELECT

Press the Mode key and the screen displays:

E300 TERM #20-21

L1-13 AUX#1 OPEN or programmed message.

Press the Scroll key and the screen displays:

E300 TERM #21-22

L1-13 AUX#2 OPEN or programmed message.

To change the message, press and hold the Reset key for one (1) second. When the Reset key is released, the screen displays:

MDFY TERM #21-22

L1-13 AUX#2 OPEN

Press the Scroll key to display the available messages for the particular group being modified. See attached List of available messages for each group.

When the messages displayed is appropriate for the terminals, press and hold the Reset key for one (1) second. When the Reset key is released, the screen displays:

E300 TERM #21-22

LOW WATER or programmed message.

Press the Mode key to exit the E300 Message Sub-menu.

AVAILABLE E300 MESSAGES

The following messages are available for each of the four E300 terminal groups:

GROUP 1 — RECYCLE

E340 OP CNTL OPEN

DAMPER POSITION END SWITCH OPEN

COMBUSTION AIR END SWITCH OPEN

LOW WATER

HIGH WATER

BLOWER MOTOR INTLK

HIGH STACK TEMPERATURE

CONTROL PANEL SWITCH OPEN

HIGH GAS PRESSURE

LOW GAS PRESSURE

GROUP 2 — OIL SELECT

LOW OIL PRESSURE

HIGH OIL PRESSURE

LOW OIL TEMPERATURE

HIGH OIL TEMPERATURE

LOW ATOMIZING MEDIA

GROUP 3 — GAS SELECT

HIGH GAS PRESSURE

LOW GAS PRESSURE

GROUP 4 — NON-RECYCLE

E340 SAFETY INTLK OPEN

HIGH WATER

LOW WATER

HIGH PRESSURE

HIGH TEMPERATURE

AIR FLOW OPEN

OIL GUN END SWITCH OPEN

HIGH STACK TEMPERATURE

BLOWER MOTOR INTLK

I.D. FAN INTLK

F.D. FAN INTLK

USER PROGRAMMED E300 MESSAGES

In addition to selecting the lockout alarm messages for the E300 Expansion Module from a menu selection via the ED510 display, the user can also program any message (up to 40 characters in length) for the individual terminals of the E300 using a dumb terminal (or PC with communication software) and the appropriate interface cables. Refer to bulletin E-3001 for complete details.

PROGRAM SETUP

The sub-menu "PROGRAM SETUP" allows the user to review the various operational settings of the programmer module (e.g. programmer type, purge timing, etc.). The MODE key is used to enter the "PROGRAM SETUP" sub-menu, and the SCRL key is used to advance through the sub-menu.

Press	Screen Displays	Description
SCRL	AUTO 45 SYSTEM SETUP >	SCRL key advances through the historical information. Control has released to auto modulation, flame signal strength = 45.
MODE	AUTO 45 PROGRAMMER EP160	Programmer Type is an EP160.
SCRL	AUTO 45 ENGR CODE NO. 28	Software Engineering code of the programmer module is code 28.
SCRL	AUTO 45 AMP=EUV1 OR ERT1	Amplifier module is an EUV1 or an ERT1.
SCRL	AUTO 45 PURGE TIME 0:30	Purge timing (selected by the dipswitches) is 30 seconds.
SCRL	AUTO 45 PROVE 3-P OPEN=N	Proven 3-P Open To Start is disabled (selected by dipswitches).
SCRL	AUTO 45 FLAME FAIL TIME 4s	Flame Failure Response Time (FFRT) = 4 seconds (maximum).
SCRL	AUTO 45 UNIT ADDRESS #00	Unit Address is 00. Refer to programmer bulletin to modify Unit Address.
MODE	AUTO 45 FLAME SIGNAL	MODE key returns to run message.

SYSTEM INFO

The sub-menu "SYSTEM INFO" allows the user to review information pertaining to the operation of the control (e.g. average main flame signal strength, status of the high fire and low fire end switches, etc.). This information can be very helpful when setting the damper linkages on the firing rate motor. The MODE key is used to enter the "PROGRAM SETUP" sub-menu, and the SCRL key is used to advance through the sub-menu.

Press	Screen Displays	Description
SCRL	AUTO 45 SYSTEM INFO >	SCRL key advances through the historical information. Control has released to auto modulation, flame signal strength = 45.
MODE	AUTO 45 AVG. PILOT FLM 22	The average flame signal strength of the pilot flame = 22.
SCRL	AUTO 45 AVG. MAIN FLM 40	The average flame signal strength of the main flame = 40.
SCRL	AUTO 45 SHORT CKTS 0	The total number of short circuits (excessive current) detected on terminals 5, 6, and 7. The short circuit condition must be sensed twice consecutively to be considered a short circuit.
SCRL	AUTO 45 D-8 LIMIT CLOSED	The status of the high fire end switch (D-8) is closed.
SCRL	AUTO 45 M-D LIMIT CLOSED	The status of the low fire end switch (M-D) is closed.
MODE	AUTO 45 FLAME SIGNAL	MODE key returns to run message.