



Model 5300, 5600 and 5800 Monitoring Systems

Instruction Manual

WARNING

THIS MANUAL MUST BE CAREFULLY READ BY ALL INDIVIDUALS WHO HAVE OR WILL HAVE THE RESPONSIBILITY FOR USING, MAINTAINING OR SERVICING THIS PRODUCT. Like any piece of complex equipment, this product will perform as designed only if installed, used and serviced in accordance with the manufacturer's instructions. OTHERWISE, IT COULD FAIL TO PERFORM AS DESIGNED AND PERSONS WHO RELY ON THIS PRODUCT FOR THEIR SAFETY COULD SUSTAIN SEVERE PERSONAL INJURY OR DEATH.

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Section 1

General Information

System Definition

The Model 5300, 5600 and 5800 Monitors are modular instruments with completely independent dual-channel (Channels A and B) capabilities for remotely monitoring various sensors. The Monitors' high density allows a greater number of channels per wall space or control room. Its three set points per channel offer the user maximum Hazard Level set point flexibility.

There are two Control Module types:

- One is for frequency inputs (silver handle descriptors)
- Other is for 4 to 20 inputs (gold handle descriptors).

See Section 5, "Parts List" for part numbers.

Additionally, the Monitors' relays can be configured to activate on more than one module's alarm using the Relay Programmer Module.

Possible configurations of modular units (Control Modules) with corresponding dual channel capabilities are shown in TABLE 1-1.

Features

Modular Versatility

The Series 5000 Monitor can be expanded to accommodate additional Control Modules per TABLE 1-1. This feature enables the customer to meet future needs.

One-Man Calibration

Model 5300, 5600 and 5800 Monitor calibration requires only one person at the sensor. No calibration adjustments are made at the Control Module. This feature reduces the personnel needed to calibrate your System.

Protected Hazard Level Set Point Values

All Hazard Level set point settings and user-selected variable ranges made via the front-panel are placed into the System's memory. These values remain unchanged during power outages and when the System is turned OFF. There are no back-up batteries to monitor or replace in the System.

Table 1-1.
Possible System Configurations

NO. OF CONTROL MODULES	NO. OF CHANNELS	SYSTEM CONFIGURATION
1	2	
2	4	
*3	6	Complete Model 5300
4	8	
5	10	
6	12	Complete Model 5600
7	14	
8	16	
9	18	Partial Model 5800
10	20	
11	22	
12	24	Complete Model 5800
* For simplicity and clarity, this Instruction Manual generally refers to a typical Model 5300 Monitor made up of three Control Modules with two Channels each (FIGURE 1-1). Other Monitors are multiples of the six-channel system.		

User Readout Range Select

Each Monitor Processor Board includes a READOUT RANGE SELECTOR SWITCH for each channel (SW2 and SW3, FIGURE 1-2). This switch enables the user to connect a different type of sensor for each channel, and to select the proper readout range for each application. It is also possible to select a different full scale range than the ones given in Table 3-1. This allows many pre-set full scale reading selections *or* user-scrolled ranges from 0.1 to 99.9 in .1 increments, or 1 to 999 in 1.0 increments.

User Function Select

The warning and alarm Hazard set points can be activated upon excursions above or below a set value of the LED display. Either or both channels may be disabled when not in use to avoid misleading Trouble indications. Each Channel's Warning and Alarm Hazard Level set points may be selected to provide latching operation. This is done via the two FUNCTION SELECTOR SWITCHES on each processor board (SW1 and SW4, FIGURE 1-2) in the System.

CAUTION

To comply with FMRC requirements, the "alarm must be in the latching mode."

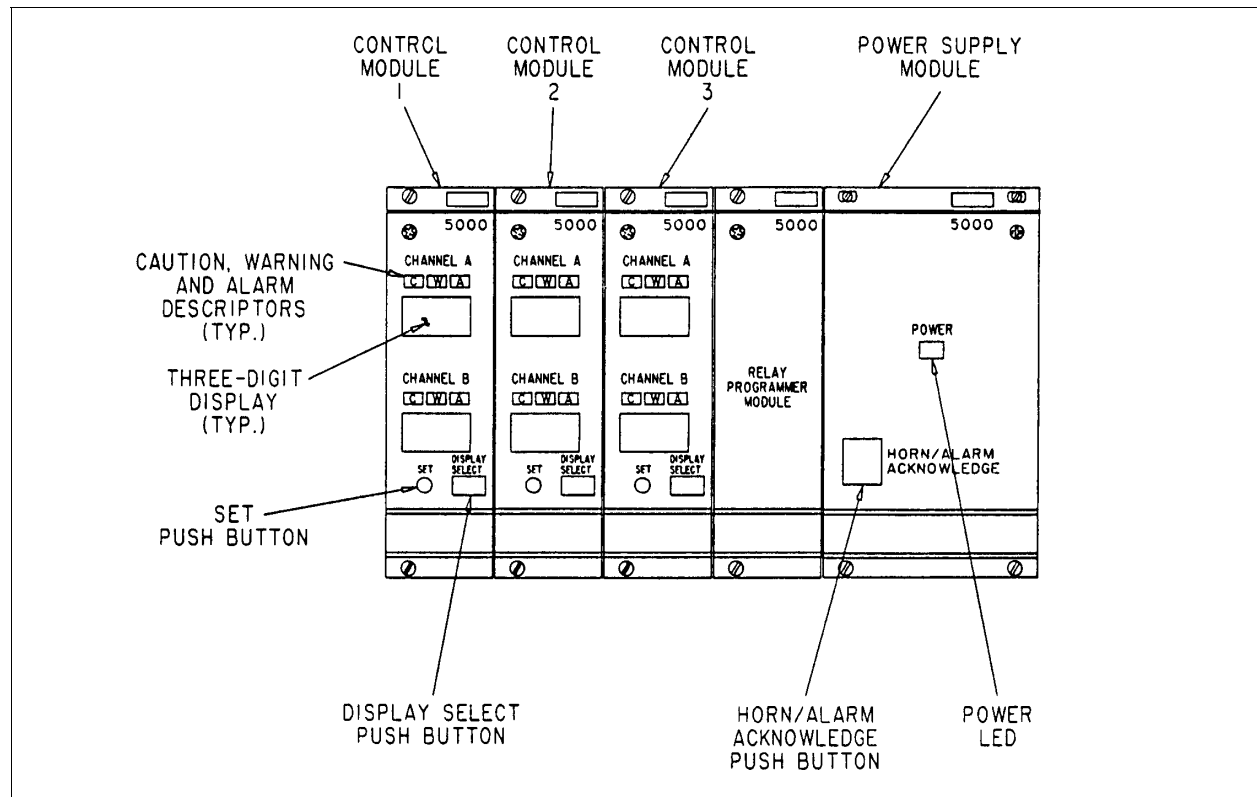


Figure 1-1.
Series 5000 Monitor, Six-Channel Configuration, Front Panel (MODEL 5300 shown)

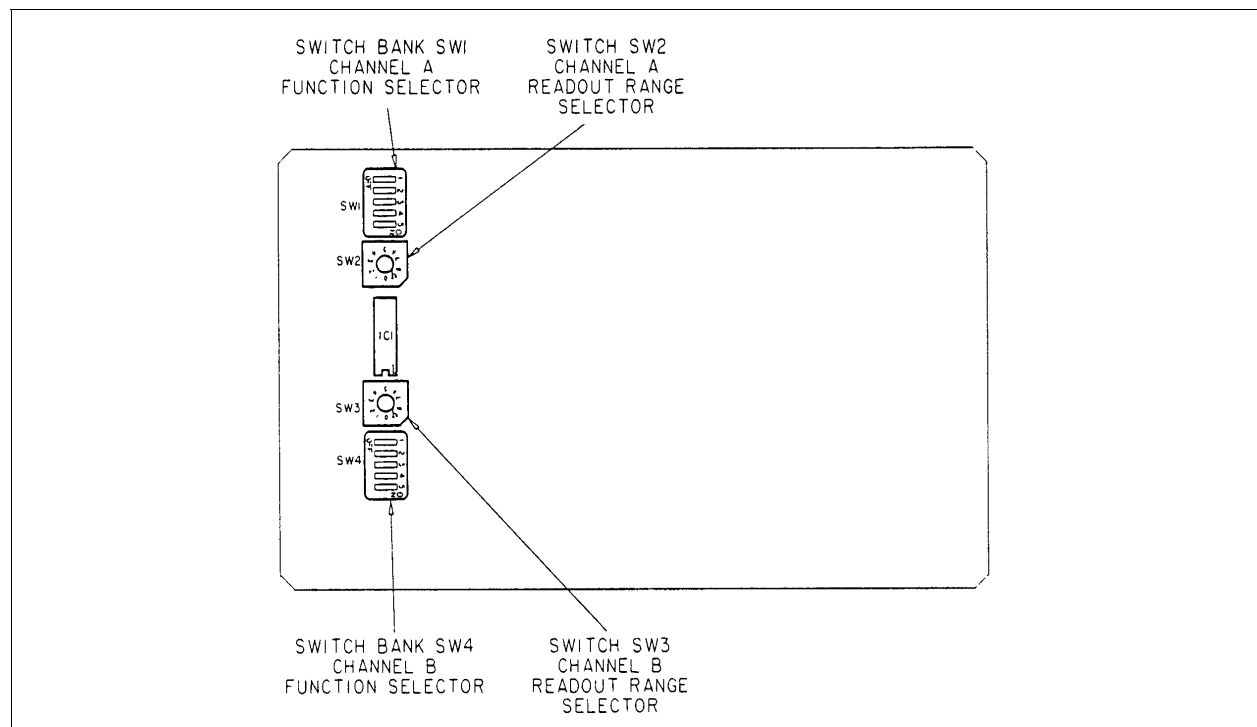


Figure 1-2.
Processor Board Functions

General Specifications						
Electrical Characteristics (Software Version 4.0)						
POWER REQUIREMENT		STANDARD AC VOLTAGE	Nominal	120/220 (universal)		100 vA (max) 5300
			Range	90 to 264 VAC		200 vA (max) 5600
			Frequency	50/60 Hz		400 vA (max) 5800
		OPTIONAL DC VOLTAGE	Nominal	12 VDC	24 VDC	48 VDC
			Range	(9 to 18)	(18 to 36)	(36 to 72)
MODULE SENSOR CAPACITY			One or two sensors per Control Module			
MODULE READOUT			Three-digit LED display per Channel; 3/8" digits			
SET POINTS		HAZARD LEVEL	Three Hazard set points per channel (CAUTION, WARNING and ALARM) with indicating descriptors (C, W and A)			
		FULL SCALE RANGE	Variable .1 to 99.9 or 1 to 999 or commonly used pre-sets			
HYSTERESIS			2% of the selected full-scale range for all set points			
RELAYS		HAZARD LEVEL	Six Programmable (three with dropout delay selectable up to 15 minutes)			
		TROUBLE	One (common)			
		HORN	One (common)			
		STATUS	All (except horn) have one LED to indicate coil voltage			
		TERMINALS	#12 gauge maximum wire size			
		CONTACTS	Single-pole, double-throw (form C) 120 VAC, 5 amps, resistive			
AUDIBLE ALARM			Piezo electric horn; approximately 75 decibels at 3 feet with door open			
CONTROL MODULE	OUTPUT		4-20 mA output ($\pm 1\%$ of full-scale) per channel Non-isolated, 250 Ohm load (maximum), Current sourcing			
	INPUT	DUAL CHANNEL	Frequency reception 4-9 KHz range (nominal) 200 mV peak-to-peak sensitivity			
			4-20 mA, non-isolated, sinking, 30-ohm input resistance to common (-)			
	OPERATING RANGE	RELATIVE HUMIDITY	15 to 95%			
		TEMPERATURE	Operating	32° to 104°F (0° to 40°C)		
			Storage	-40° to 131°F (-40° to 55°C)		
	CLASS		General-Purpose, <i>not</i> suitable for use in hazardous locations			
Physical Characteristics						
RACK MOUNT DIMENSIONS		Model 5300	5.18 in. high x 10.56 in. wide x 17 in. deep (132 mm. high x 268 mm. wide x 431.8 mm. deep)			
		Model 5600	5.18 in. high x 19.00 in. wide x 17 in. deep (132 mm. high x 483 mm. wide x 431.8 mm. deep)			
		Model 5800	10.44 in. high x 19.00 in. wide x 21 in. deep (265 mm. high x 483 mm. wide x 533 mm. deep)			
GENERAL- PURPOSE ENCLOSURE DIMENSIONS		Model 5300	18.83 in. high x 15.00 in. wide x 11 in. deep (479 mm. high x 381 mm. wide x 279 mm. deep)			
		Model 5600	31.32 in. high x 18.00 in. wide x 11 in. deep (795 mm. high x 457 mm. wide x 279 mm. deep)			
		Model 5800	31.32 in. high x 18.00 in. wide x 11 in. deep (795 mm. high x 457 mm. wide x 279 mm. deep)			
RACK MOUNT WEIGHT		Model 5300	Approximately 15 lbs. (6.8 KG.)			
		Model 5600	Approximately 30 lbs. (13.5 KG.)			
		Model 5800	Approximately 65 lbs. (27.5 KG.)			
GENERAL- PURPOSE CASE WEIGHT		Model 5300	Approximately 50 lbs. (22.5 KG.)			
		Model 5600	Approximately 110 lbs. (49.5 KG.)			
		Model 5800	Approximately 110 lbs. (49.5 KG.)			

Relay Programmer Module

The Relay Programmer Module allows the user to select the relays to be operated by the desired channel(s). There are six relays plus two dedicated relays (a common Trouble relay and a common, separately located Horn relay). The six relays are divided into three groups of two relays each [one pair for each of the Hazard Level set points (Caution, Warning and Alarm)]. One relay of each pair provides Time Delayed drop-outs after the Hazard Level ceases; this delay is selectable from 1 second to 15 minutes.

Relay set-up is done at the Relay Programmer Module (FIGURE 1-3).

Relay Board

The six Hazard Level programmable relays plus the Trouble relay are located on the Relay board.

The board has a GREEN status indicator LED that must be lit at all times when the instrument is in operation. This LED monitors board power (12 VDC) only.

Each of the six Hazard Relays has an associated RED LED that is ON when coil voltage is present.

Similarly, the common Trouble relay has an associated YELLOW LED that is ON when its coil voltage is present.

All user wiring to the relay contacts is made at the board; refer to any of the Installation Outline Drawings.

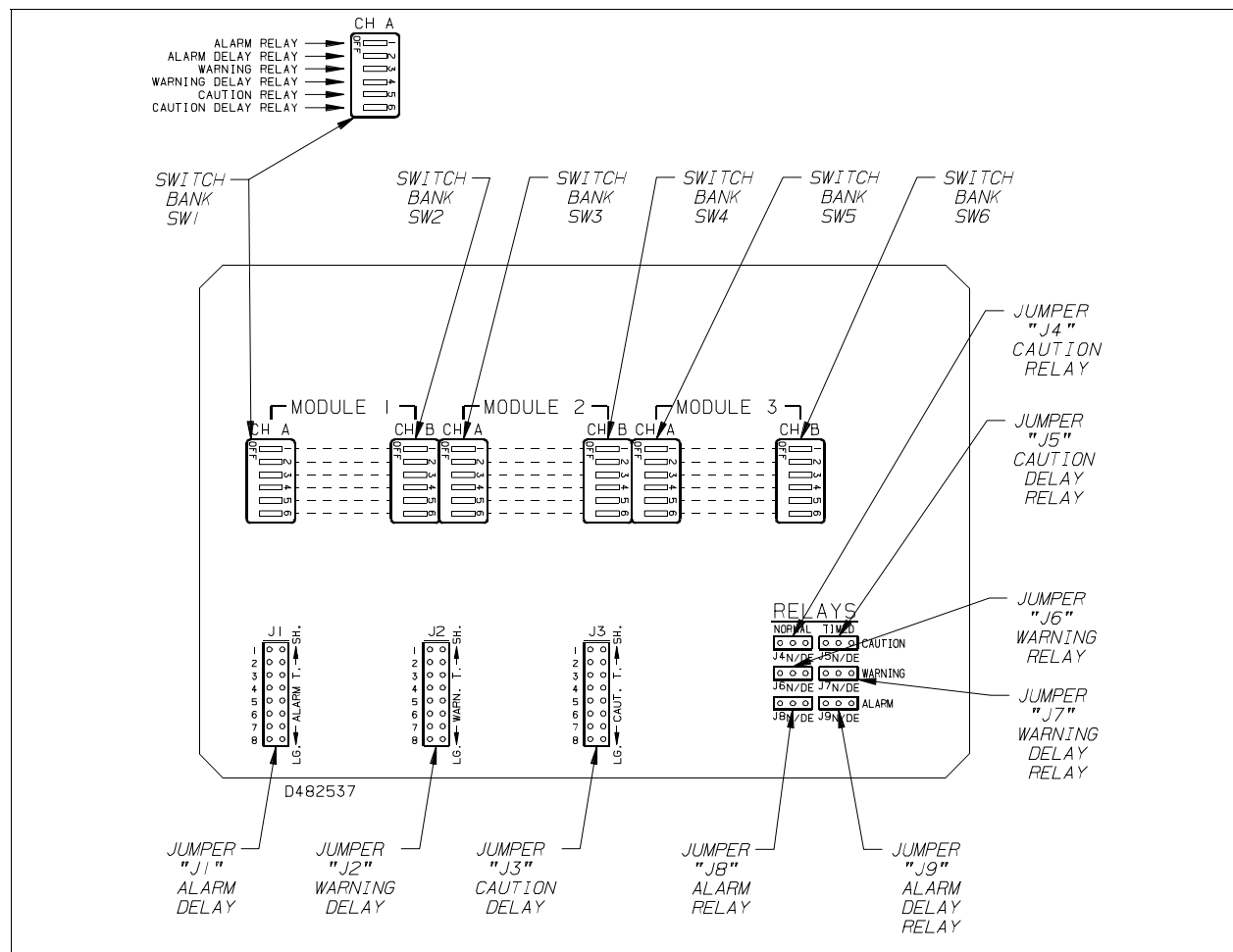


Figure 1-3.
Relay Programmer Module Functions

Horn Relay Board

This assembly contains the Horn and Horn Relay. The relay contacts are accessed at the

board; refer to any of the Installation Outline Drawings.

Section 2 Installation Description

Mounting the System

1. Choose a mounting location that is as free as possible from shock, vibration, physical damage and water. (See the Appendix A, Installation Outline Drawing for your System at the end of this manual.)

CAUTION

Make sure that the front panel of each Control Module is not blocked; otherwise, the front-panel lights and controls will be obscured from view.

2. Model 5300, 5600 and 5800 Monitors Are mounted by using four 1/4-inch diameter bolts (not supplied). See the Appendix A, Installation Outline Drawing for your System at the end of this manual.

Connections

Perform all wiring connections and conduit runs according to accepted commercial wiring practices. Install your Monitor in compliance with the applicable requirements of the National Electrical Code and/or any other local code requirements.

Primary Power Connections

WARNING

When wiring the unit, disconnect the main power to prevent bodily harm.

The Model 5300, 5600 and 5800 Monitors do not include an ON/OFF switch; if local power OFF is required, a convenient disconnect should be installed.

1. Route power, ground and signal wiring through electrical entry holes in the housing. Power and ground wiring should be separated from signal wiring.
2. To connect the Monitor to its power source, connect AC, ACN and GND terminals of the AC connector to the power source (See Appendix A, the "Power Connections" portion of the Installation Outline Drawing for your System at the end of this manual).

CAUTION

Improper application of the primary power to the System may cause damage to the unit. If unsure of the available power, contact your local power utility for clarification. Verify that the unit's power is rated for the proper AC supply line (See Section 1, "General Specifications").

The Model 5300, 5600 and 5800 Monitors operate with a 120/220 universal supply or a DC power module.

NOTE: Look on the handle of the Power Supply Module to determine the type of power.

Non-Standard Power Supply Module Connections

DC Power Supply Modules

- Connect the positive (+) and negative (-) of the DC power to the terminal strip (Appendix A, "Power Connections" portion of the Installation Outline Drawing for your System).
- This optional DC power capability is *not* a DC power backup or a non-interruptible power source capability.

Sensor Connections

There are two types of control Modules:

- frequency input
- 4-20 mA input.

To identify your Control Module, locate the handle insert on the front panel of the Control Module (see FIGURE 1-1). If the handle insert is a silver color, your Control Module is a frequency input type. If your control Module handle insert is a gold color, your Control Module is a 4-20-mA input type.

Refer to Appendix A, "Sensor Connections" portion of the Installation Outline Drawing for your system for proper connection information.

Remote Device Connections

4 to 20 mA Output Connections

(Appendix A, "Current Output" portion of the Installation Outline Drawings)

Each module provides two 4 to 20 mA outputs, each capable of driving remote device(s).

Connections can be made with a two-conductor, shielded cable. Connect remote devices to the positive (+) and negative (-) terminals of each channel. The Shield of the cable may be connected only to the Grounding Bar.

Route remote device wiring through electrical entry holes, separate from AC power wiring.

NOTE: This signal is non-isolated and can drive a 250-ohm load max.

Relay Connections

(See Appendix A, "Relays" portion of Installation Outline Drawings)

Control relays, corresponding to the three Hazard Levels (CAUTION, WARNING and ALARM) are mounted on the relay output module located below the Control Module. The terminals of each relay are available on the lower portion of the board. These terminals are identified as C (COMMON), N/O (NORMALLY OPEN) and N/C (NORMALLY CLOSED) when the relay is not energized. Remote devices such as additional alarms, fans or controls may be connected to these relay contacts.

NOTES:

- 1) The Horn and Horn Relay energize with any Hazard Levels configured as latching; they are dedicated Latching and will remain energized until acknowledged. On any Hazard Levels configured as non-latching, the Horn and Horn Relay will not activate upon Hazard Level conditions.
- 2) The Trouble relay (located on the relay board) is normally energized, and de-energizes when Trouble is detected.
 - The common Trouble and common Horn relays cannot be programmed via the relay programmer module.
- 3) The programmable CAUTION, WARNING and ALARM relays are located on the relay board and are selectable for normally-energized (N/E) or normally de-energized (N/DE) modes of operation.
- 4) Verify the intended function before wiring.
- 5) In order to prolong relay life and to reduce noise, it is recommended that the user install capacitor-resistor protective devices at the load (see Section 5, "Parts List"). Ratings must correspond to the line voltage and load.

Module Installation

The Monitors are shipped from the factory with the Power Supply, Control Module(s) and Relay Programmer Module(s) installed.

- The Power Supply Module is installed in the right-most slot in the System (FIGURE 1-1)
- The Relay Programmer Module is installed next to the Power Supply Module (FIGURE 1-1)
- The Control Modules are installed, starting with the left-most slot in the System (The left-most slot is for Control Module number 1, channels A and B installation) (see FIGURE 1-1).
- Check that the types of modules (4 to 20 mA or frequency) are placed in the desired order.

To Install Additional Control Modules:

1. Loosen the captive screws from the blank plastic panel covering the slot in which the Module will be installed.
2. Install the Control Module in the slot, pushing the Module until it is seated. Ensure that the connector at the rear of the Module engages with its mating connector on the System.
3. Tighten the captive screws to secure the Module.
4. Install additional Control Modules according to steps 1 through 3.
5. Identify the sensors connected to each Module, and mark sensor identification on the handle insert.

NOTE: Self-adhesive labels (not provided) are recommended.

Module Description

Control Module Description

(FIGURE 1-2)

Each Control Module enables the user to monitor up to two sensors (one sensor per channel).

Front-Panel Indicator and Control Description

Control Module front-panels contain two three-digit LED displays as well as a SET PUSH BUTTON and a DISPLAY SELECT PUSH BUTTON (FIGURE 1-1). The Hazard Level indicators are outlined in TABLE 2-1.

**Table 2-1.
Hazard Level Indications
for Each Channel**

HAZARD LEVELS	FRONT-PANEL DESCRIPTORS	COLOR CODE
CAUTION	C	YELLOW
WARNING	W	ORANGE
ALARM	A	RED

Front-Panel Push Buttons

When the power is ON after start-up, the front-panel push buttons enable the user to:

- 1) Change the Caution, Warning and Alarm set points for each channel
- 2) Place Channel A and/or Channel B of each Control Module into the CALIBRATE mode
- 3) Monitor the value from the sensors
- 4) Change the full scale indication reading.

CAUTION

Set the "FULLSCALE" indication to *match* that of the sensor.

Processor Printed Circuit Board Rocker Switches (SW1 and SW4)

When power is OFF before start-up, ROCKER SWITCHES SW1 and SW4 enable the user to:

- 1) Disable or enable channels
- 2) Set latching or non-latching remote relay status when a warning or alarm setpoint is exceeded (See Section 3, TABLE 3-2 for definitions)
- 3) Set the warning and alarm set point for response on an increasing or decreasing value

Processor Printed Circuit Board Rotary Switches (SW2 and SW3)

These switches (FIGURE 1-2) either set the channel to pre-set ranges per TABLE 3-1, or enable the user to establish any desired range 0.1 to 999. This variable range feature corresponds to switch position 7.

Relay Programmer Module Description

The Relay Programmer Module:

- 1) Receives and decodes digital relay data from each Control Module
- 2) Actuates the desired relays via customer switch selection
- 3) De-energizes the Trouble relay when:
 - a) It receives improper data
 - b) When the System detects a Trouble condition

Power Supply Module Description

The Power Supply Module converts customer-provided power to the voltages necessary to operate the System. The front-panel of this module contains the HORN/ALARM ACKNOWLEDGE PUSH BUTTON and the POWER LED.

Fan Assembly

A fan assembly is pre-wired to the 120 VAC input terminals.

All other voltages (220 and DC) contain a 12 VDC fan that is prewired to a system 12 Volt output. As noted in Section 5, a 12 Volt fan may be installed in a 110 VAC unit if it is connected to a 12 Volt output.

Section 3

Start-Up and Operation

Initial Power-Up

Before turning ON the main power, ensure that the proper voltage is available as described in Section 2, "Power Connections."

Start-Up Procedure

Setting Full-Scale Ranges

1. Before powering the Monitor, loosen the two captive screws at the top and bottom of the Control Module and pull the Modules from the rack (FIGURE 1-1) or General-Purpose enclosure. This allows access to each Processor PC Board (FIGURE 1-2).

⚠ WARNING

Always remove power from the Monitor before removing Control Modules, Relay Programmer Modules or Power Supply Modules; otherwise, damage to these assemblies may occur.

2. Verify channel application and module sensor input type; determine the proper full-scale indication required for the application.
3. Set the desired full-scale indications for the front-panel displays for Channels A and B via the rotary READOUT RANGE SELECTOR SWITCHES SW2 and SW3 (FIGURE 1-2), according to TABLE 3-1.

Table 3-1. Setting Full-Scale Indications		
RANGE SELECTOR SWITCH POSITIONS FOR CHANNEL A (SW2) OR CHANNEL B (SW3)	FULL-SCALE INDICATION	RESOLUTION
0	0.0 to 10.0	0.1
1 †	0 to 100	1.0
2 †	0.0 to 25.0	0.1
3	0 to 250	1.0
4 †	0.0 to 50.0	0.1
5	0 to 500	1.0
*6 †	*0 to 100	1.0
**7	.1 to 99.9	.1
	1 to 999	1.0
8 & 9	DO NOT USE	---
*CAUTION switch position 6 prohibits set point settings of above 60% of full-scale. FMRC approval void if position 6 not used with combustible sensors		
**Variable. Default range 0 to 999 full scale		
† Approved by FMRC; All other positions void FMRC approval		

⚠ CAUTION

Full Scale settings must match that of sensor.

4. If the desired full scale indicated reading is not found on TABLE 3-1, place the corresponding READOUT SELECTOR SWITCH SW2 or SW3 in position 7 (Position 7 is not FMRC approved). The full scale indication must be selected to match the FS of the sensor. This is accomplished during the power up sequence.

NOTE: If the READOUT SELECTOR SWITCH position is changed, the Alarm set point values automatically correspond to the same percentage of new full-scale display reading.

Example:

An Alarm set point of 40.0 on RANGE 6 (0-100) of READOUT SELECTOR SWITCH will change to 20.0 when RANGE 4 (0-50) is selected.

⚠ WARNING

Do not change the RANGE position while power is ON; otherwise, the indication will not switch from the previous selection, and erroneous readings will result.

Channel Enable and Alarm Function Selection

(FIGURE 1-2 and TABLE 3-2)

1. With power OFF and Control Module removed from rack or General-Purpose enclosure, function selections are made via Processor Board CHANNEL A and B FUNCTION SELECTOR SWITCH BANKS SW1 and SW4 (FIGURE 1-2).

NOTE: The depressed side of the rocker switch indicates the switch position.

2. Enable or disable channels by turning the first rocker switch OFF or ON, respectively, of Channel A (SW1) and Channel B (SW4). See TABLE 3-2.

NOTE: If an unused channel is left enabled, a continuous TROUBLE indication will result.

3. Latching and non-latching Warning and Alarm functions are set by using the

Table 3-2.
Setting Channel Enable And Hazard Response Functions (Function Selector Switches)

CHANNEL A (SW1) SWITCH	CHANNEL B (SW4) SWITCH	ROCKER SWITCH "OFF" (PRESSED AT LEFT)	ROCKER SWITCH "ON" (PRESSED AT RIGHT)
1	1	Channel Enabled †	Channel Disabled (for unused Channel)
2	2	* Non-latching: WARNING	* Latching: WARNING †
3	3	* Non-latching: ALARM	* Latching: ALARM †
4	4	** Warns upon exceeding WARNING level set point †	*** Warns upon dropping below WARNING level set point
5	5	** Alarms upon exceeding ALARM level set point †	*** Alarms upon dropping below ALARM level set point
† factory-set position			
* LATCHING/NON-LATCHING DEFINITIONS: LATCHING: Even though Hazard condition may no longer exist, DESCRIPTORS and horn remain ON until HORN/ALARM ACKNOWLEDGE PUSH BUTTON is pressed. NON-LATCHING: When the Hazard condition no longer exists, the DESCRIPTORS turn OFF. FMRC approval void if the Non-latching position is chosen.			
** Descriptor ON when sensor signal goes above set point			

second or third rocker switch
(TABLE 3-2 and FIGURE 1-2).

- Rocker switches 4 and 5 allow selection of the Warning and Alarm Hazard Level outputs for signal increasing or decreasing in value through set points.

NOTE: The Caution Hazard Level is factory set for non-latching and activation on increasing signal. It is not user changeable.

- Re-insert all Control Modules into their original positions in the card rack, and tighten the screw to secure the modules.

Setting the Relay Programmer Module

General Description

(FIGURE 1-3)

- Each relay can be pre-set to be normally energized or de-energized via RELAY JUMPERS (J4 through J9, FIGURE 3-1 and TABLE 3-3).
- The relay operation can be programmed via six SWITCH BANKS (SW1 through SW6), one for each of the six possible Control Module Channels in a Model 5300 System.

- Each Switch Bank Contains Six ROCKER SWITCHES:** Rocker Switch 1 through 6 of all Switch Banks control relays as follows:

- 1ST rocker switch controls ALARM RELAY (A1)
- 2ND rocker switch controls ALARM DELAY RELAY (A2)
- 3RD rocker switch controls WARNING RELAY (W1)
- 4TH rocker switch controls WARNING DELAY RELAY (W2)
- 5TH rocker switch controls CAUTION RELAY (C1)
- 6TH rocker switch controls CAUTION DELAY RELAY (C2)

- When Rocker Switches are Placed in the ON Position:**
the corresponding CAUTION, WARNING and ALARM signals of the channel associated with that bank control corresponding relays.
(ON position: rocker switch is pressed on the RIGHT side)

- When Rocker Switches are Placed in the OFF Position:**
the channel associated with that bank

Table 3-3. Setting Hazard Relay Normal Status

RELAY POSITION JUMPER	RELAY	RELAY NORMALLY DE-ENERGIZED BY PLACING JUMPER OVER PRONGS:	RELAY NORMALLY ENERGIZED BY PLACING JUMPER OVER PRONGS:
J5	CAUTION DELAY	CENTER & RIGHT	LEFT & CENTER
J4	CAUTION	CENTER & RIGHT	LEFT & CENTER
J7	WARNING DELAY	CENTER & RIGHT	LEFT & CENTER
J6	WARNING	CENTER & RIGHT	LEFT & CENTER
J9	ALARM DELAY	CENTER & RIGHT	LEFT & CENTER
J8	ALARM	CENTER & RIGHT	LEFT & CENTER

has no effect on the corresponding relays. (*OFF position: rocker switch is pressed on the LEFT side*)

- 3) The duration of the time delay relays can be programmed via the three JUMPERS J1 through J3 (FIGURE 1-3).

The three time delay relays are:

- CAUTION DELAY RELAY (C2)
- WARNING DELAY RELAY (W2)
- ALARM DELAY RELAY (A2)

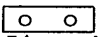
Programming Relay Procedures

(FIGURES 1-3 and 3-1; TABLE 3-3)

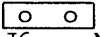
Initial Set-Up

1. With power removed, loosen captive screws at top and bottom of the Module; then, pull the Relay Programmer Module from its position in the card rack (FIGURE 1-1) or General-Purpose enclosure.
2. To select RELAY(S) to be normally de-energized, place the associated JUMPER (J4 through J9) on the Relay Programmer

EXAMPLE 1. ALL SIX JUMPERS SET FOR RELAYS NORMALLY ENERGIZED (PLACED AS SHOWN)

 J4 N/DE
CAUTION
RELAY

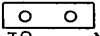
 J5 N/DE
CAUTION DELAY
RELAY

 J6 N/DE

 J7 N/DE

WARNING
RELAY

WARNING DELAY
RELAY

 J8 N/DE

 J9 N/DE

ALARM
RELAY

ALARM DELAY
RELAY

EXAMPLE 2. ALL SIX JUMPERS SET FOR RELAYS NORMALLY DE-ENERGIZED (PLACED AS SHOWN)

 J4 N/DE
CAUTION
RELAY

 J5 N/DE
CAUTION DELAY
RELAY

 J6 N/DE

 J7 N/DE

WARNING
RELAY

WARNING DELAY
RELAY

 J8 N/DE

 J9 N/DE

ALARM
RELAY

ALARM DELAY
RELAY

Figure 3-1. Setting Hazard Relay Normal Status

Module over the center and right prongs (FIGURES 1-3 and 3-1, and TABLE 3-3).

3. To select RELAY(S) to be normally energized, place the associated JUMPER (J4 through J9) on the Relay Programmer Module over the center and left prongs.
4. To program the channel(s) that are to control the ALARM RELAY, turn ON the first rocker switch of the particular channel(s) switch bank(s) (SW1 through SW6):

TYPE OF RELAY	ROCKER SWITCH IN "ON" POSITION
ALARM DELAY	2ND switch of desired switch bank(s)
WARNING	3RD switch of desired switch bank(s)
WARNING DELAY	4TH switch of desired switch bank(s)
CAUTION	5TH switch of desired switch bank(s)
CAUTION DELAY	6TH switch of desired switch bank(s)

5. To program the channel(s) that are to control the remaining relays, see the table above.
6. Check that all other rocker switches are in the OFF position.

Example of Relay Programming

An *example* of multiple channels controlling relays is shown in TABLE 3-4 according to this particular example:

- The ALARM RELAY is controlled by Module 1, Channel A or B, *or* Module 3, Channel A.
- The ALARM DELAY RELAY is controlled by Module 1, Channel A *or* Module 2, Channel B.
- The WARNING RELAY is controlled by all Channels, *except* Modules 2 and 3, Channel B.
- The WARNING DELAY RELAY is controlled by Module 1, Channel A *or* B only.

- The CAUTION RELAY is controlled by *all* Channels..
- The CAUTION DELAY RELAY is *not used*.

7. Programming delay relay *times* (FIGURES 1-3 and 3-2 and TABLE 3-5):

- Three of the six relays are NON-DELAY RELAYS
- The other three relays are DELAY RELAYS

- a. *Non-delay Relays:*
de-activate as soon as a Hazard condition clears.
- b. *Delay Relays:*
continue their function for a pre-determined time period *after* a Hazard condition clears and is reset when the Latching Function is selected. This enables fans or other devices connected to the instrument to continue operating for a pre-determined amount of time.

The three DELAY RELAYS (ALARM DELAY, WARNING DELAY, and CAUTION DELAY) can each be programmed to delay the de-activation of a relay for a customer-determined time period *after* a hazard is cleared.

Example:

In any application, once a hazard clears, the DELAY RELAYS can be used to allow the auxiliary equipment to keep operating for a customer-determined time period.

NOTE: If a time delay is *not* desired, DELAY RELAYS can be used as NON-DELAY RELAYS by programming the DELAY RELAY time for just 1 second.

To Program Delay Relay Times:

- 1) Locate DELAY RELAY JUMPERS J1 THROUGH J3 on the Relay Programmer Module.
- 2) Place JUMPER J1 (ALARM DELAY) in desired position (1 through 8) to obtain the associated DELAY RELAY time (1 second

Table 3-4. Relay Programming Example

ROCKER SWITCH NUMBER	SYSTEM RELAYS	MODULE 1 CHANNEL A SWITCH BANK SW1	MODULE 1 CHANNEL B SWITCH BANK SW2	MODULE 2 CHANNEL A SWITCH BANK SW3	MODULE 2 CHANNEL B SWITCH BANK SW4	MODULE 3 CHANNEL A SWITCH BANK SW5	MODULE 3 CHANNEL B SWITCH BANK SW6
1	ALARM	ON	ON	off	off	ON	off
2	ALARM DELAY	ON	off	off	ON	off	off
3	WARNING	ON	ON	ON	off	ON	off
4	WARNING DELAY	ON	ON	off	off	off	off
5	CAUTION	ON	ON	ON	ON	ON	ON
6	CAUTION DELAY	off	off	off	off	off	off

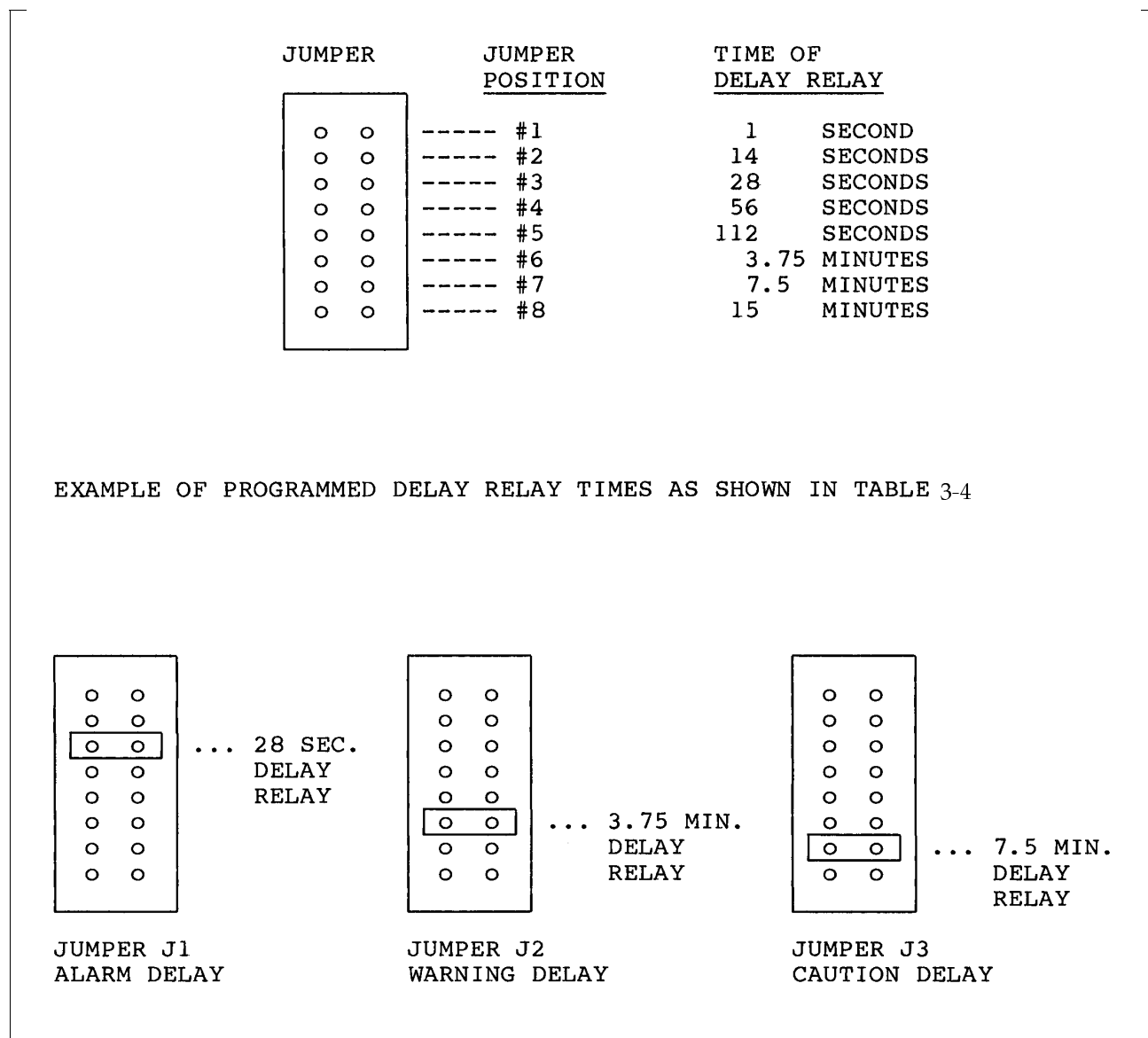


Figure 3-2.
Program Delay Relay Times on Relay Programmer Module

Table 3-5. Example: Programming Delay Relay Times				
DELAY RELAY JUMPER PLACEMENT			ASSOCIATED TIME DELAYS AFTER HAZARD CLEARS	RELAY DELAY TIMES PROGRAMMED
J1 ALARM DELAY	J2 WARNING DELAY	J3 CAUTION DELAY		
1	1	1	1 SECOND	
2	2	2	14 SECONDS	
*3	3	3	28 SECONDS	28 second ALARM DELAY
4	4	4	56 SECONDS	
5	5	5	112 SECONDS	
6	*6	6	3.75 MINUTES	3.75 min. WARNING DELAY
7	7	*7	7.5 MINUTES	7.5 min. CAUTION DELAY
8	8	8	15 MINUTES	

to 15 minutes). The longer delay times are located at the bottom of the JUMPER.

- 3) Perform step 2 for JUMPERS J2 (WARNING DELAY) and J3 (CAUTION DELAY), respectively.

Example:

To Program All Three Delay Relays (TABLE 3-5 AND FIGURE 1-3):

- 1) JUMPER J1 is placed in the third jumper position to obtain a 28-second ALARM DELAY
 - 2) JUMPER J2 is placed in the sixth jumper position to obtain a 3.75-minute WARNING DELAY and
 - 3) JUMPER J3 is placed in the seventh jumper position to obtain a 7.5-minute CAUTION DELAY.)
8. Re-insert the Relay Programmer Module in its place on the Monitor front-panel (FIGURE 1-1), secure the module with the captive screws, and apply power.

30-Second Menu Sequence at Instrument Start-Up and Reset

(FIGURE 1-1)

Turn ON the main power which feeds the Monitor; there is no power switch on the instrument.

- The GREEN POWER LED should immediately turn ON; if it does not, refer to Section 5, "Troubleshooting Guidelines" for proper diagnostic steps.
- Each Control Module automatically runs a 30-second menu sequence for Channels A and B.
- During this 30-second period:
 - All alarms are disabled
 - The 4-20 mA remote device output will go to approximately 4 mA
 - Sensors stabilize without erroneous Hazard indications
 - The trouble relay drops out

The 30-Second Menu Sequence Is Divided Into Two 15-Second Modes:

- The Full Scale Mode and
- The Lamp Test Mode
 - As CHANNEL A performs the Full Scale Mode, CHANNEL B performs the Lamp Test Mode.

- Fifteen seconds into the Menu sequence, CHANNEL A switches to the Lamp Test Mode and CHANNEL B switches to the Full Scale Mode.

Full Scale Mode

When power is applied, the Monitor provides the full scale indication for the channel currently in

Table 3-6.
Determine Increasing/ Decreasing Hazard Set Points

C, W AND A DESCRIPTOR STATUS DURING COUNTDOWN MODE	ASSOCIATED HAZARD LEVEL SET POINT TYPE
ON	LATCHING AND INCREASING HAZARD
OFF	NON-LATCHING AND INCREASING HAZARD
BLINKING	LATCHING OR NON-LATCHING AND DECREASING HAZARD

the Full Scale Mode:

1. The 3-digit reading provides the following data:
 - a. ALL THREE DIGITS (XX.X or XXX) denote the actual Range Setting.

Example:

99.9 = Actual Full Scale Setting

- b. During the Full Scale Mode, observe the front-panel DESCRIPTORS (C, W and A LEDs, FIGURE 1-1) to determine if the Hazard set point provides an increasing or decreasing alarm according to TABLE 3-6.
2. Direct Full Scale Setting Capability: [Applicable when in position 7 of the RANGE SWITCH (position 7 not FMRC approved)]. If the DISPLAY SELECT PUSH BUTTON is pressed during the start-up sequence, the channel displaying its full scale will blink. It is, in effect, asking the user for a new full scale value. By pressing the SET button, it is possible to scroll to a new full scale indication. This value which must correspond to the sensor full scale, will be stored in memory. All hazard levels will be scaled to reflect the new full scale indication. Pressing the DISPLAY SELECT again allows the module to continue its start up sequence. The other channel is programmed the same way.

If the DISPLAY SELECT is not pushed during the start up sequence, the module will use the default 0 to 999 full scale value or a full scale value that was entered previously.

Lamp Test Mode

During the channel Lamp Test Mode:

- A front-panel digital reading of 88.8 is displayed
- The C, W and A DESCRIPTORS turn ON to verify that all lamps are working properly.

Control Module Factory-Set Values

Hazard Level Set Point Values

The Hazard Level set point values for each channel are normally factory-set as follows:

- Caution set point: 20
- Warning set point: 30
- Alarm set point: 40

These set point values can be changed (See Section 3, "Changing Hazard Level Set Points" and TABLE 3-1). The user must verify that the System is set up to meet his requirements.

Function Selector Switch Position

(TABLE 3-2 and FIGURE 1-2)

All FUNCTION SELECTOR SWITCHES are normally factory-set for the following operation:

SW1 and SW4 Factory Set-up		
NUMBER	FUNCTION	POSITION
1	Channel enabled	OFF
2	Latching Warning	ON
3	Latching Alarm	ON
4	Warns upon exceeding WARNING set point	OFF
5	Alarms upon exceeding ALARM set point	OFF

Range Switch Position (SW2 and SW3)

(TABLE 3-1 and FIGURE 1-2)

The normal factory-setting is position 6, 0 to 100 full scale.

NOTE: If position 7 (variable range) is selected, the pre-set range is 0 to 999 full scale.

Relay Programmer Module Factory-set Values

(TABLES 3-3 and 3-6, and FIGURE 1-3)

Relay Jumpers

JUMPERS J4 through J9 are factory-set at the center and left position for normally energized relays (TABLE 3-3).

Delay Relay Jumpers

JUMPERS J1 through J3 are factory-set on position 1 for the minimum 1-second delay (TABLE 3-5).

Relay Activation Switch Banks

SWITCH BANKS SW1 through SW6 are factory-set in the ON position for all relays to respond with all Hazard Level DESCRIPTORS on all channels (FIGURE 1-3)

Viewing Existing Hazard Level Set Points on Front-Panel Display Select Menu

(FIGURE 1-1 and TABLE 3-7)

To view the existing Hazard Level set points for each Control Module, step through the Display Select Menu by pressing the front-panel DISPLAY/SELECT PUSH BUTTON (FIGURE 1-1) the number of times indicated in column 1 of TABLE 3-7.

Changing Hazard Level Set Points

(FIGURE 1-1 and TABLE 3-7)

To Change The Hazard Level Set Points Of Each Control Module:

1. Press the front-panel DISPLAY/SELECT PUSH BUTTON on the desired Control Module the number of times indicated in TABLE 3-7 until reaching the set point to be changed.
 - The appropriate Caution, Warning or Alarm Descriptor will turn ON
 - The existing set point value will flash.
2. Using a small screwdriver or small diameter tool, press the associated Control Module front-panel SET push button, via the hole in the front-panel.
3. Hold down the SET push button, and allow the set point value to scroll. When the desired set point is displayed, release the button.
4. Press the DISPLAY/SELECT push button to manually place the Module in the RUN MODE. This also enters the new set point

Table 3-7. Front-Panel Display/Select Menu

TIMES DISPLAY SELECT BUTTON PUSHED	ASSOCIATED DISPLAY SELECTED	ASSOCIATED CHANNEL	FRONT-PANEL DISPLAY DESCRIPTION (SEE "NOTES" BELOW)	
START	RUN MODE			SENSOR VALUE SHOWN
1	CAUTION SET POINT	A	(*)	CAUTION DESCRIPTOR ON
2	RUN MODE			SENSOR VALUE SHOWN
3	WARNING SET POINT	A	(*)	WARNING DESCRIPTOR ON
4	RUN MODE			SENSOR VALUE SHOWN
5	ALARM SET POINT	A	(*)	ALARM DESCRIPTOR ON
6	RUN MODE			SENSOR VALUE SHOWN
7	CAUTION SET POINT	B	(*)	CAUTION DESCRIPTOR ON
8	RUN MODE			SENSOR VALUE SHOWN
9	WARNING SET POINT	B	(*)	WARNING DESCRIPTOR ON
10	RUN MODE			SENSOR VALUE SHOWN
11	ALARM SET POINT	B	(*)	ALARM DESCRIPTOR ON
12	RUN MODE			SENSOR VALUE SHOWN
13	CALIBRATE MODE	A	(**)	Flashes sensor value; sensor can now be calibrated with Calibration Box and appropriate calibration procedure
14	RUN MODE			SENSOR VALUE SHOWN
15	CALIBRATE MODE	B	(**)	Flashes sensor value; sensor can now be calibrated with Calibration Box and appropriate calibration procedure
16	RUN MODE			SENSOR VALUE SHOWN
17	CALIBRATE MODE	A & B	(**) (***)	Can calibrate 2 sensors simultaneously
START	RUN MODE			Repeat cycle
CAUTION: Do not leave the instrument in the CALIBRATE mode; otherwise, the instrument will not actuate the Horn or relays to alert the user of any dangerous conditions that may develop. There is a two hour time limit. After the time limit, the instrument returns to the RUN MODE.				
NOTES:				
(*) When in this Select Mode, the display flashes existing value of Hazard Level set points. The 4-20 mA signal continues to follow the sensor output signal. If left idle, the system				
(**) When in this Select Mode, the 4-20 mA output of that channel will hold at that channel's preceding RUN Mode output value.				
(***) It is possible to go direct to calibration of both channels by pressing both the "DISPLAY SELECT" and the "SET" push buttons simultaneously.				

Table 3-8. Control Module Front-Panel Display Indications

LED READOUT	ASSOCIATED INDICATION	DESCRIPTION
— — —	*TROUBLE	No signal received; Sensor reading below -15% of full-scale
— 0 —	*OVER RANGE	Sensor reading above range select value
— U —	UNDER RANGE	Displayed below -10% of full-scale; System still operates, but warns operator to calibrate sensor before reading falls to -15% of full-scale and TROUBLE indication occurs.
0.0	CENTERED ZERO	Extra precision zero in "CALIBRATION" only.
FLASHES SENSOR VALUE	**CALIBRATION	Sensor can be calibrated without inadvertently tripping an ALARM. During calibration, if set points are exceeded, no alarms will activate.
*WARNING: A hazardous and over limit condition may exist at the sensor location when the OVER RANGE or Trouble indication is displayed on the LED readout.		
**CAUTION: Do not leave the Monitor in the CALIBRATION mode; otherwise, the instrument will not monitor the sensors or alert the user of any dangerous conditions that may develop. There is a two hour time limit. After the time limit, the instrument returns to the run mode.		

into the memory. The display will now show the sensor value. The new set point can be verified by stepping through the menu per TABLE 3-7.

5. Repeat steps 1 through 4 above until all desired set point changes for all Channels of all Control Modules are completed.

Interpreting Control Module Front-Panel Display Indications

(FIGURE 1-1 and TABLE 3-8)

TABLE 3-8 identifies Control Module front-panel, three-digit displays for TROUBLE, OVER RANGE, UNDER RANGE and CALIBRATION conditions.

Responding to Hazard Level Conditions

When the Sensor Value Digital Reading Exceeds a Hazard Level Set Point

NOTE: Decreasing value may be for oxygen deficiency monitoring.

1. With The *Non-latching* Function Selected (TABLE 3-1):
 - a. The digital reading and the hazard level descriptor of the exceeded set point will flash simultaneously, and any relay selected for that descriptor will transfer. This condition will continue until acknowledged or until that hazard condition no longer exists.

ACKNOWLEDGE:

- 1) Pressing the HORN/ALARM ACKNOWLEDGE PUSH BUTTON *while the hazard condition still exists* will:
 - a) Stop the flashing of the digital reading and descriptor (they will remain steadily ON)
 - b) Allow any selected relay to remain transferred until that hazard condition no longer exists

- 2) Pressing the HORN/ALARM ACKNOWLEDGE PUSH BUTTON *after the hazard condition no longer exists* will:

Clear all hazard indications.

NOTE: Timed relays will remain transferred for the selected time.

2. With the *Latching* Function Selected:
 - a. The digital reading and the Hazard Level descriptor of the exceeded set point will flash simultaneously, and any relay selected for the descriptor will transfer. This condition will continue until acknowledged.
 - b. The horn will sound, and the horn relay will energize until acknowledged

ACKNOWLEDGE:

- 1) Pressing the HORN/ALARM ACKNOWLEDGE PUSH BUTTON *while the hazard condition still exists* will:
 - a) Silence the horn, and de-energize the horn relay
 - b) Stop the flashing of the digital reading and descriptor (they will remain steadily ON)
 - c) Allow any selected relay to remain transferred (See "NOTE")

NOTE: When the Latching Function is selected, the HORN/ALARM ACKNOWLEDGE PUSH BUTTON must be pressed *again* when the hazard condition no longer exists in order to clear all hazard indications. Otherwise, the Monitor will not respond to a repeat of that hazard condition for that sensor (the horn will not sound, etc.).

- 2) Pressing the HORN/ALARM ACKNOWLEDGE PUSH BUTTON *after the Hazard condition no longer exists* will:

Clear all hazard indications.

NOTE: Timed relays will remain transferred for the selected time.

Section 4

Calibration and Maintenance

Calibration

1. Press the DISPLAY SELECT PUSH BUTTON until the CALIBRATE mode appears on the display (TABLE 3-7) or by pressing both the DISPLAY SELECT and SET PUSH BUTTONS simultaneously.
2. The sensor can be calibrated with the appropriate calibration procedure. Refer to the Instruction Manual Supplement for your sensor.

WARNING

Do not leave the instrument in the CALIBRATE mode; otherwise, the instrument will not monitor the sensors or alert the user of any dangerous conditions that may develop. There is a two-hour time limit. After the time limit, the instrument returns to the RUN Mode.

Maintenance

See the following "Troubleshooting Guidelines."

Troubleshooting Guidelines		
SYMPTOM	CAUSE	SOLUTION
POWER LED fails to turn ON	1) Customer input power interrupted	1)* Check & correct input power
	2) Bad connection between power cable and connector	2)* Check fuse
	3) Inoperative LED	3) Replace LED
	4) Improper voltage selection	4) Make proper voltage selection
	5) Inoperative Power Supply Module	5) Replace Power Supply Module
TROUBLE (---) indication turns ON	1) Open or shorted cable between control unit & sensor assembly	1) Check for continuity of sensor cable; tighten sensor-to-pc board connections
	2) Uncalibrated sensor	2) Calibrate sensor
	3) Inoperative sensor	3) Replace sensor
	4) Blown sensor fuse	4) Replace sensor fuse
OVER RANGE (-O-) indication turns ON	1) Uncalibrated sensor	1) Calibrate sensor
	2) Loose sensor connections	2) Tighten sensor-to-pc board connections
	3) Inoperative sensor	3) Replace sensor
	4) Inoperative control module	4) Replace control module
UNDER RANGE (-U-) indication turns ON	1) Uncalibrated sensor	1) Calibrate sensor
	2) Inoperative sensor	2) Replace sensor
	3) Inoperative control module	3) Replace control module
HAZARD LEVEL (AAA) ERROR	1) Accidental Hazard Level changes	1) Verify setpoints; Replace control module if condition persists

Digital readout does not indicate condition	1) Uncalibrated sensor	1) Calibrate
	2) Inoperative or dirty sensor	2) Replace Sensor
	3) Improperly seated control module	3) Re-install control module
	4) Control module disabled	4) Verify and re-power the control module controls
CAUTION, WARNING and/or ALARM DESCRIPTORS will not turn OFF, and digital readout indicates non-hazard condition	1) Latched function selected	1) Reset
	2) Improperly set CAUTION, WARNING and/or ALARM set points	2) Re-adjust set points
	3) Monitor un-powered	3) Replace control module
Remote devices fail to operate	1) Remote devices improperly connected	1) Verify remote device wiring connections
	2) Improperly seated relay programmer module	2) Re-install programmer module
	3) Relay programmer module controls improperly set	3) Verify and re-set relay programmer module controls
	4) No output from current loop connections	4) Verify and re-connect current output connections
	5) Low output from current loop connections	5) Reduce external load to 250 Ohms or less; Check at 4 and 20 mA
HORN does not sound when Hazard condition exists	1) Improperly set module controls	1) Verify and re-set module controls
	2) Loose interconnecting cables of the System	2) Re-connect interconnecting cables
	3) Inoperative horn relay board	3) Replace horn relay board
TROUBLE relay de-activates	1) Loose interconnecting cables of the System Monitor	1) Re-connect interconnecting cables and check relay programmer board for proper insertion

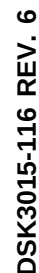
***CAUTION:** Exercise caution as potential shock hazard exists.

Section 5

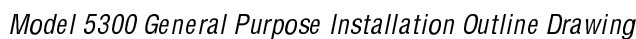
Parts List

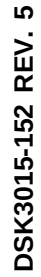
ITEM			
Model 5300 Monitor, Rack Mount		†	484417
Model 5300 Monitor, General Purpose Wall Mount Housing		†	483514
Model 5600 Monitor, Rack Mount		†	484418
Model 5600 Monitor, General Purpose Wall Mount Housing		†	483980
Model 5800 Monitor, Rack Mount		†	484419
Model 5800 Monitor, General Purpose Wall Mount Housing		†	484300
Sub-Assemblies			
Control Module, Frequency Input Type		†	490892
Control Module, 4 - 20 mA Input Type		†	814441
Relay Module		†	482118
AC Power Supply Module (110/220 50/60 Hz, nominal)		†	482459
DC Power Supply Module (12 Volts, nominal)		†	483977
DC Power Supply Module (24 Volts, nominal)		†	483978
DC Power Supply Module (48 Volts, nominal)		†	483979
Relay Programmer Module		†	483471
Horn Relay Module		†	482210
User I/O Module Assembly		†	482209
Model 5300, 5600 and 5800 Manual		†	484900
Accessories			
Universal Calibrator		†	483725
Paktron Quencharc™			630413
Remote Discrete Relay Package, Complete			488008
Remote Relay Expansion Driver			487970
Relay Board Cable Back Plane to Remote Relay Driver (Wall Mount)			487969
Relay Board Cable Back Plane to Remote Relay Driver (Rack Mount)			487970
**	Fan Assembly with Bracket, 120 VAC	Original equipment replacement, 120 VAC units	486552
**	Fan only, 120 VAC		629642
***	Fan Assembly with Bracket, 12 VDC	Original equipment replacement, DC and 220 VAC units	710780
***	Fan only, 12 VDC		655506
** Wire to 120 Volt input terminals ONLY			
*** Wire to any available 12 volt output ONLY.			
† Only the indicated to be used for FMRC Approval			

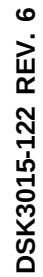
Appendix A, Installation Outline Drawings



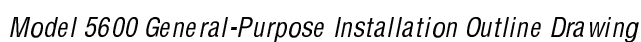
Model 5300 Rack Mount Installation Outline Drawing

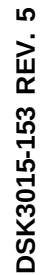




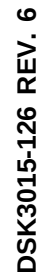


Model 5600 Rack Mount Installation Outline Drawing

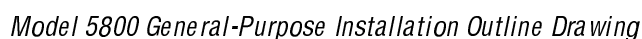


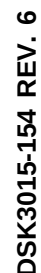


Model 5600 NEMA4X Enclosure Installation Outline Drawing



A-8





A-10