

LDM Lamp Driver Modules

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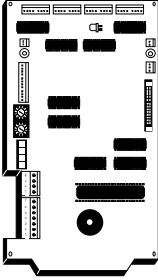
* Indicates those sections where changes have occurred since the last printing.

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Introduction

Description

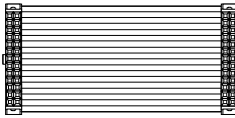


This document describes how to install the LDM Series Lamp Driver with an IFC-1010/2020 Intelligent Fire Controller, IFC-200 Intelligent Fire Controller, or an FC-2000 Fire Controller. The Lamp Driver Module (LDM) provides the IFC-1010/2020, IFC-200, or FC-2000 with a direct interface to a custom graphic display. The LDM-32 (Figure 1) features 32 points for annunciation (Alarm Only Mode operation) or 16 points of annunciation and control (Alarm/Trouble Mode operation). It can be expanded to 64 points (for each LDM-32 address) with the addition of optional LDM-E32 Expander Modules (Figure 1). These Lamp Drivers turn their outputs ON and OFF as commanded by the control panel. With custom switches installed, the LDM can be used to report selected switch activations to the control panel for action. Each module may be configured to provide 32 alarm indications or alternately, 16 alarm, 16 trouble, and 16 control switch points.

An optional LDM-R32 Relay Module (Figure 1) provides 32 dry normally open contacts for electrical isolation when connecting the control panel to other equipment. One side of each contact is connected to a common terminal. A separate common is provided for each group of eight relays.

The LDM-32, LDM-E32, and LDM-R32 modules mount on four standoffs inside of the custom graphic annunciator cabinet. Alternately, the modules can be installed in a standard CHS-4L low-profile chassis for mounting in a CAB-x3 series cabinet.

Communication between the CPU and the LDMs is accomplished over a two-wire serial interface employing an RS-485 annunciator communication trunk. Power for the LDM is provided via a separate power circuit from a regulated power supply inherently supervised by the LDM (loss of power results in an annunciator communication failure at the control panel).



Expander Ribbon Cable (75120)

Cable sets for connecting LDM-32 and LDM-E32 outputs to lamps or LEDs are provided through the optional LDM-CBL24 (24 inch long) and LDM-CBL48 (48 inch long) assemblies. Each cable has a plug on one end for connection to the annunciator module and stripped and tinned ends on the other end of the assembly. Each cable supports eight output lamps. The LDM-CBL24 and LDM-CBL48 are cable sets that provide several cables, sufficient for most applications.

Note: The LDM-32 is functionally identical to the ACM-16AT or ACM-32A Annunciator Control Modules. The terms “lamp driver” and “annunciator” are used interchangeably throughout this document. Although the term “lamp” is used, the LDM is most often used to drive Light-Emitting Diodes (LEDs).

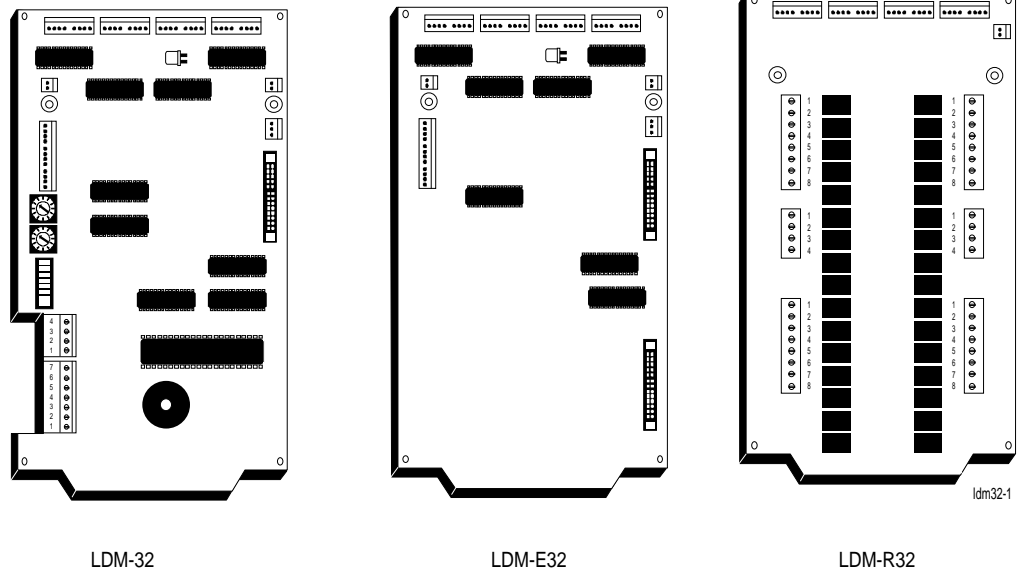


Figure 1: LDM Lamp Driver Annunciator Modules

Design Considerations

When considering the design of your LDM annunciator system, there are two different types of configurations available: Receive Only Annunciators or Receive/Transmit Annunciators.

Limits

Up to 32 annunciators may be installed on an RS-485 circuit. The actual number of annunciator modules may be larger, depending on the number of expander modules employed.

Note: The FC-2000 can address four annunciator/expander combinations (address 1-4). All other annunciators installed in the FC-2000 must be set to “Receive Only.”

Wire Runs

Communication between the Fire Alarm Control Panel and the LDM is accomplished over a 2-wire RS-485 annunciator trunk. This communication, to include the wiring, is supervised by the Receive/Transmit LDM. Power is provided via a separate power circuit from the control panel, which is supervised by the LDM. Loss of power also results in a communication failure at the control panel.

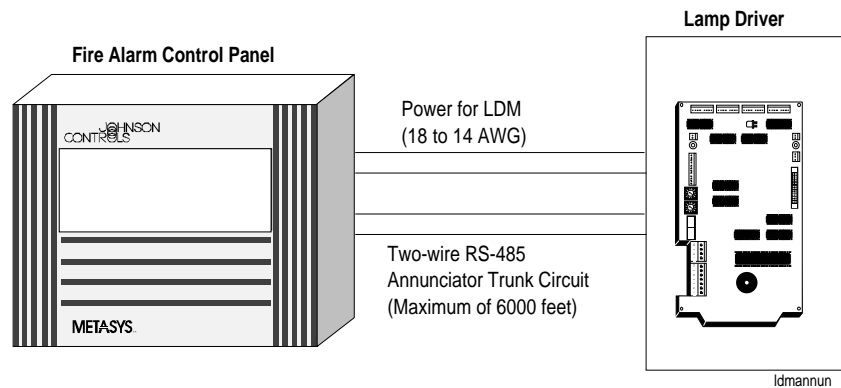


Figure 2: LDM Annunciator Wire Runs

Wiring Specifications

- The RS-485 annunciator trunk circuit must be twisted shielded pair cable and cannot be T-Tapped; it must be wired in a continuous fashion from the control panel to each annunciator.
- The maximum RS-485 annunciator trunk wiring distance between the panel and the last annunciator is 6000 feet when 16 AWG is used and 4000 feet when 18 AWG is used.
- The RS-485 annunciator trunk wiring must be an 18 AWG to 16 AWG twisted shielded pair.

- Limit the total wire resistance to 100 ohms on the RS-485 annunciator trunk circuit, and 10 ohms on the annunciator power circuit.
- Do not run cable adjacent to, or in the same conduit as, 120 VAC service, noisy electrical circuits that power mechanical bells or horns, audio circuits above 25 volts (RMS), motor control circuits, or SCR power circuits.

***Receive Only
Annunciators***

For redundant annunciation of system points, annunciators can be configured as Receive Only annunciators. Receive Only annunciators must be set to the same address as the “Receive/Transmit” annunciators they duplicate. Receive Only annunciators are not fully supervisable. Receive Only annunciators intercept information being transmitted to a “Receive/Transmit” annunciator so that this information can be duplicated at another display location. When configured for Receive Only operation, they can not send annunciator status information to the control panel or perform system functions such as Acknowledge, Silence, or Reset. In addition, they can not manually override addressable devices such as M510CJ control modules or XPC-8 or XPR-8 control modules. Control switches on Receive Only annunciators can be used for local lamp test only. Wiring to Receive Only annunciators may be supervised by installing a Receive/Transmit annunciator at the end of the RS-485 annunciator trunk.

***Receive/
Transmit
Annunciators***

Annunciators configured to serve as full-function annunciators can receive device and/or zone status information as well as transmit commands and annunciator status to the control panel. They can also transmit or override commands to control modules and control points using custom-wired point control switches. This capability allows the annunciator to execute system functions from a remote location in addition to displaying the status of system points. You must place a Receive/Transmit annunciator at the end of the RS-485 circuit to provide supervision of the power supplied to the annunciator(s) and the RS-485 circuit.

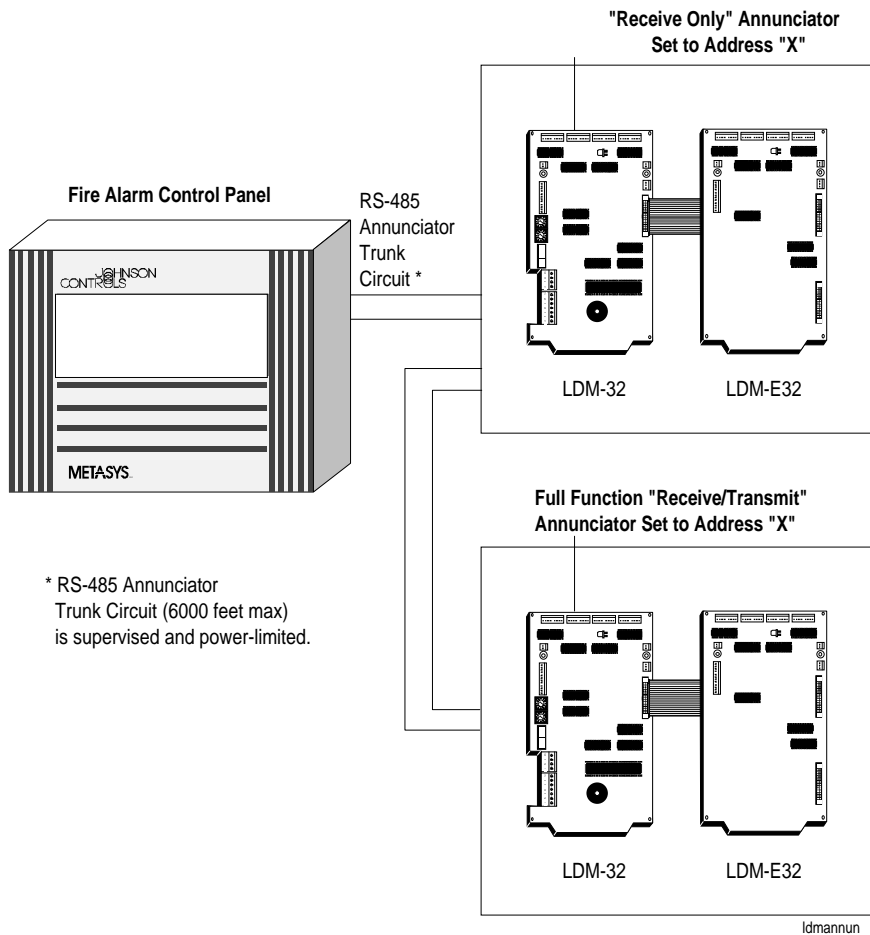


Figure 3: Connecting Receive Only LDM Annunciator

**Lamp Driver
Electrical
Ratings**

The LDM module may use either 24 VDC (regulated) or internal 5 VDC for power connected LEDs. The 5-volt usage conserves power, but limits the current available to drive the LEDs. Refer to Figures 13 and 14 for connection illustrations.

Table 1: 5-Volt LED power Limitations

LED Current Desired (mA)	Maximum Number of LEDs	Number of Modules	
		LDM-32	LDM-E32
2	130	1	3
5	66	1	1
10	34	1	0
20	17	1/2	0

Notes:

1. The LDM-32 has 34 LEDs and each LDM-E32 adds 32 more LEDs. An LDM system configured for Alarm and Trouble Mode and employing three expanders could have as many as 130 LEDs.
2. 5-volt power is not used with the LDM-R32 relay module configurations. The LDM-R32 is compatible with 24 VDC operation.

Maximum Current per Output: 100 mA (external circuit must limit current)

Voltage Rating on Output Drivers: 20 VDC

Circuit (typical rating): 5 volts DC at 0.5 mA

Characteristics: Output Driver: Bipolar Darlington Open Collector NPN Transistor

**LDM-32 and
LDM-E32 Ratings**

Maximum Current per Output: 100 mA (external circuit must limit current)

Voltage rating on Output Drivers: 30 VDC

Circuit (typical rating): 5 volts DC @ 0.5 mA

Output Driver: Bipolar Darlington Open Collector NPN Transistor

**LDM-R32 Ratings
(LDM-R32)**

Contact Rating (UL): 1 amp, 30 VDC (resistive)

Contact Material: Gold Clad Silver Alloy

**Supervision of
LDM Points**

Any LEDs or lamps connected to the LDM-32 or LDM-E32 are not supervised for failure. In addition, the dry contacts of the relays on the LDM-32 cannot be supervised. Therefore, circuits connected to the relay contacts, as well as all LEDs or lamps, must be located within 20 feet of the LDM series modules. If the lamps are in a separate cabinet from the LDM modules, the inter-cabinet wiring must be enclosed in conduit or metal raceway.

Calculating the Power Supply Requirements

The LDM series annunciators can draw their power from the MPS-24A or PS5-BFS-24-UL power supply and must be considered when calculating primary and secondary power requirements.

Table 2: Standby Current Draw for LED Power at 24 VDC

Standby Current	
[] No. of LDM-32 Modules X 40 mA =	
The 40 mA can be reduced to 30 mA for modules with Piezo Disable or Flash Inhibit modes selected.	
[] No. of LDM-E32 Modules X 2 mA =	
[] No. of LDM-R32 Modules X (see note) =	
Standby Total at 24 VDC =	

Note: Enter data here only if the LDM-R32 is connected to an LDM-32 (not an LDM-E32 expander) AND the LDM-32 has not been set for the 8-point shift (FC-2000). If both conditions have been met, then add 18 mA for each LDM-R32 in Alarm and Trouble Mode, or 9 mA in Alarm Only Mode.

Table 3: Alarm Current Draw for LED Power at 24 VDC

Alarm Current	
[] No. of LDM-32 Modules X 56 mA =	
[] No. of LDM-E32 Modules X 18 mA =	
[] No. of LDM-R32 Modules X 288 =	
[] No. of LEDs X [] mA per LED =	
Alarm Total at 24 VDC =	

Table 4: Standby Current Draw for LED Power at 5 VDC

Standby Current	
[] No. of LDM-32 Modules X 40 mA =	
[] No. of LDM-E32 Modules X 2 mA =	
Standby Total at 5 VDC =	

Table 5: Alarm Current Draw for LED Power at 5 VDC

Alarm Current	
[] No. of LDM-32 Modules X 56 mA =	
[] No. of LDM-E32 Modules X 18 mA =	
[] No. of LEDs X [() mA/3] =	
Alarm Total at 5 VDC =	

Installation

The LDM-32 and LDM-E32 modules mount on four standoffs inside a custom annunciator graphic box. Alternately, the modules may be installed in a standard CHS-4L chassis (not CHS-4) in a CAB-x3 series enclosure. The module size is approximately 4.4 in. x 7.1 in. If you are using a CHS-4L chassis to mount the LDM, see Figure 4. See Figure 5 for instructions on connecting expander modules together. Refer to Figures 6 and 7 for the procedure on installing the LDM-R32 modules. See the appropriate installation document for more information about installing in a CHS-4L in a CAB-x3 series cabinet.

Note: Remember to ground the enclosure to a solid metallic ground.

Cable Sets for LDM-32 and LDM-E32 Outputs to Lamps or LEDs

The LDM-CBL24 (24 inch) and LDM-CBL48 (48 inch) are cable sets for connecting the LDM-32 and LDM-E32 outputs to lamps or LEDs. Each cable set provides several cables (listed in Table 6), sufficient for most applications.

Table 6: LDM Cable Sets

LDM-CBL24	LDM-CBL48
75116	75147
75117	75148
75118	75149
75122	75150

Cable information and descriptions can be found in the *Fire Management Cable Reference Guide* in this manual.

Installing LDM Modules

Mount all modules to the chassis or enclosure as shown in Figure 4. One expander may be added for Alarm Only Mode operation. One to three expanders may be installed when the lamp driver is configured for Alarm/Trouble Mode operation. To install the LDM-32 and LDM-E32, follow the steps below and refer to Figure 4.

1. Slip the bottom edge of the LDM-32 into the slot on the CHS-4L chassis and swing the module toward the standoffs (Figure 4).
2. If not employing the optional relay expander (LDM-R2), secure the LDM-32 to the chassis with the screws provided (Figure 4).
3. Repeat for installation of any LDM-E32 expander modules on the chassis (Figure 4).

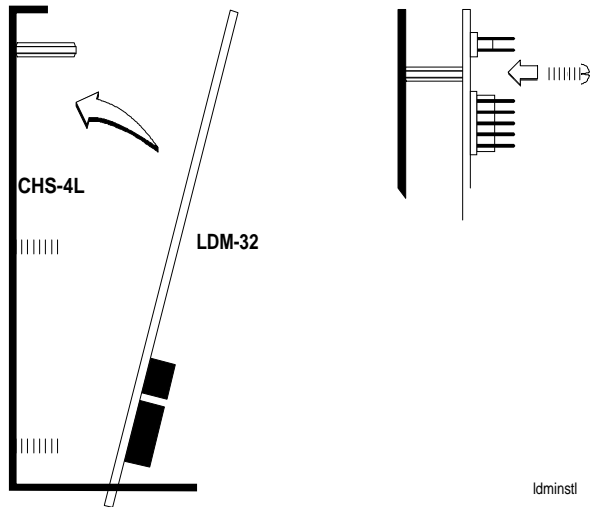


Figure 4: Installing the LDM Module in the CHS-4L Chassis

Connecting LDM-E32 Expander Modules (Optional)

Connect an expander ribbon cable between the LDM-32 (Connector J2) and the LDM-E32 expander modules (Connector J3) as illustrated in the figure below.

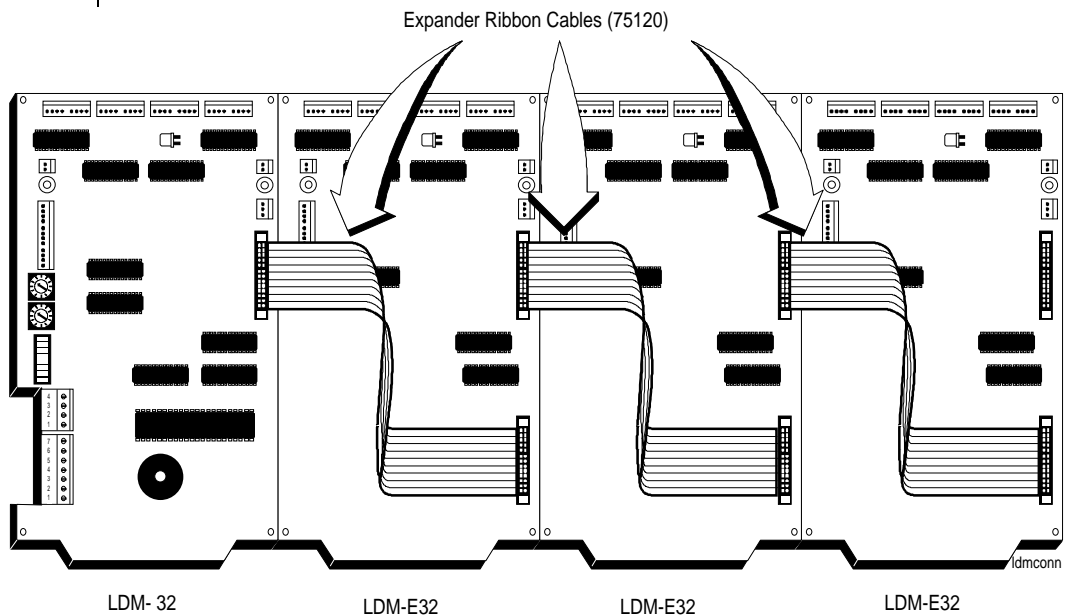


Figure 5: LDM Ribbon Cable Connection

Installing LDM-R32 Relay Modules (Optional)

The outputs on the LDM-32 or LDM-E32 module, instead of driving LEDs, may be used to activate the LDM-R32 relay module. This option provides the system with up to 32 electrically isolated outputs per relay module. If employing an LDM-R32, install it using the following steps and refer to Figures 6 and 7.

1. Secure the LDM-R32 to the LDM-32 with the standoffs provided. (See Figure 6.)

- Attach ribbon cables between the LDM-32 and the LDM-R32 for each group of relays needed (connector J5 to J5, J6 to J6, etc.) as illustrated at in Figure 6.

Note: The relay module can also be connected to an LDM-E32.

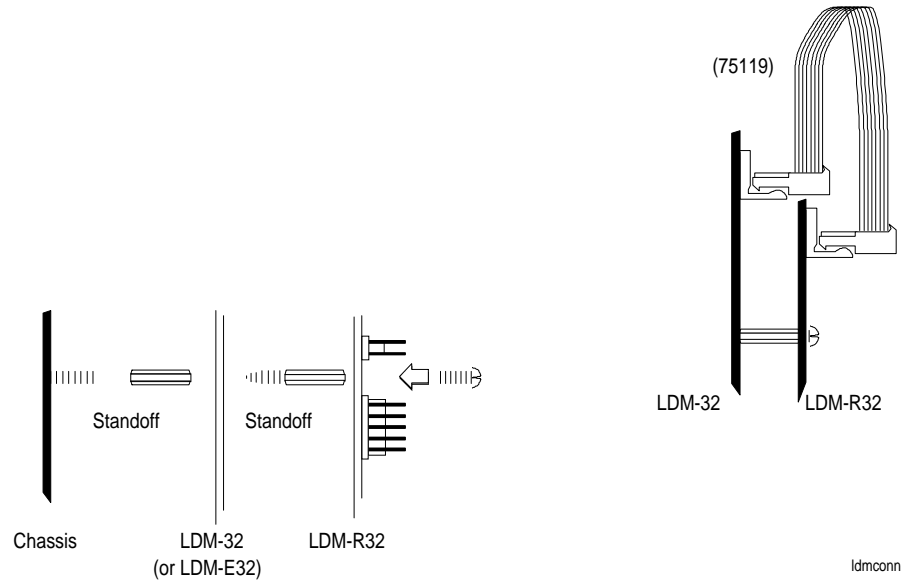


Figure 6: Installing LDM-R32 Relay Modules

- Connect the relay power ribbon cable (75119) between J10 on the LDM-R32 and J10 on the LDM-32 or LDM-E32 (Figure 6). This connection supplies the power needed to energize the LDM-R32's 24 VDC relay coils during activation.

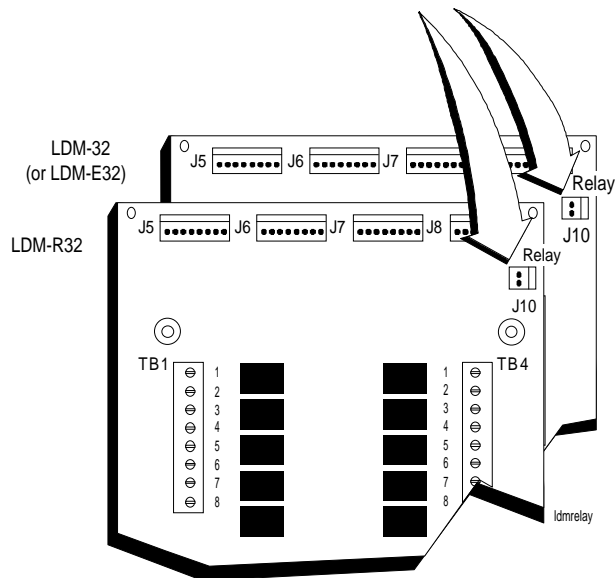


Figure 7: Powering LDM-R32 Relay Modules

Terminating the Shield

Wire the RS-485 annunciator trunk circuit using a twisted-shielded pair cable. Do not run cable adjacent to, or in the same conduit as, 120 VAC service, noisy electrical circuits powering mechanical bells or horns, audio circuits above 25 VRMS, motor control circuits, or SCR power circuits. *All enclosures, including the control panel backbox, must be connected to earth ground! Never use the shield for grounding purposes.* Terminate the RS-485 annunciator trunk shield at the Fire Alarm Control Panel only.

When the RS-485 Annunciator Trunk Shield is in Conduit

Connect the shield to system reference (system common). The shield can enter the cabinet, but must be insulated from the cabinet (not electrical contact). Between annunciators, wire-nut multiple shields together. The shields may be inside of the respective enclosure).

When the RS-485 Annunciator Trunk Shield is Not in Conduit

Terminate the shield at the outside of the control panel backbox (ground). Do not allow the shield to enter or even touch the cabinet. Between annunciators, wire-nut multiple shields together outside of the respective enclosures.

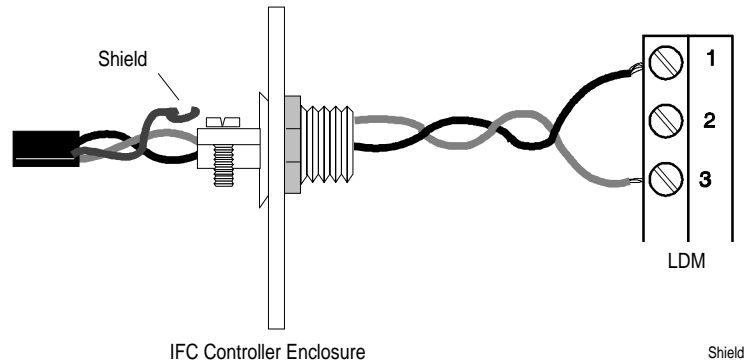


Figure 8: Terminating the Shield

Wiring the Lamp Driver Module

Up to 32 annunciator devices may be installed on the RS-485 annunciator trunk circuits. However, if you use both RS-485 annunciator circuits, a total of 64 devices can be installed, but the number of addresses is limited to 32. Communication between the control panel and the LDM is accomplished over a 2-wire RS-485 annunciator trunk serial interface.

LDM Terminal Wiring

Figure 9 shows the LDM annunciator trunk and power terminations. Figure 10 illustrates how to wire multiple LDM modules. When wiring the LDM module, follow these guidelines:

- Do not T-Tap the RS-485 annunciator trunk circuit.
- Leave the 120-ohm ELR resistor installed across the RS-485 Out terminals at the last annunciator on the circuit. (See Figure 10). Remove this resistor from all other annunciators.
- Connect earth ground to a mounting screw on the backbox or cabinet.
- The 24 VDC power supplied to the annunciator need not be supervised by an end-of-line power supervision relay. This power is inherently supervised (as long as the last annunciator on the RS-485 annunciator trunk is in the Receive/Transmit configuration). The control panel registers a loss of communications during loss of power to the annunciator.

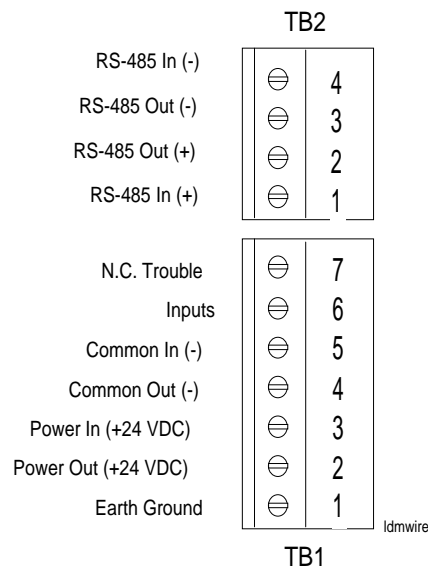


Figure 9: LDM Terminal Wiring

The RS-485 annunciator trunk circuits must be twisted shield type cable with a maximum distance of 6000 feet with 16 AWG or 4000 feet with 18 AWG.

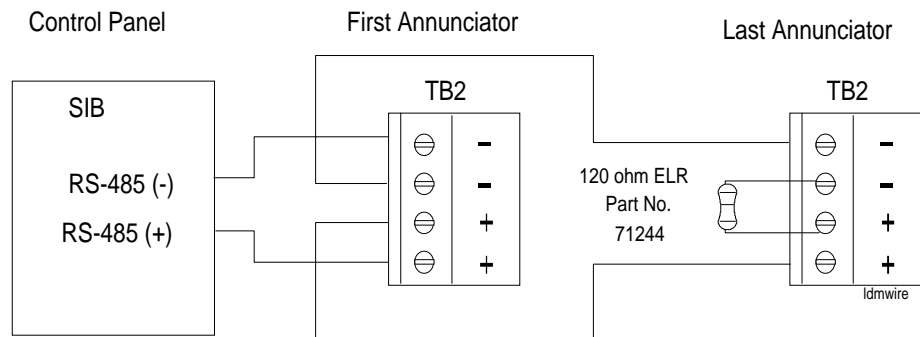


Figure 10: Wiring Multiple Annunciators (4000-Foot Maximum Run at 18 AWG)

Note: IFC-1010/2020 users: Refer to the *Installing the IFC-1010/2020* document in the *IFC-1010/2020 Technical Manual, FAN 448*, for RS-485 annunciator trunk connections at the SIB-2048 or SIB-N2.

Connecting the Supervisory Input

The Trouble Input on P3, terminals 6 and 7 can be used for supervising local power sources or other devices containing a normally closed contact. If employed, all changes in status (to and from the trouble state) will be sent to the control panel in the event of device failure or restoral. If not used, a jumper must be installed across these terminals on TB1. A trouble signal will be registered by the control panel if a short circuit does not exist across these terminals. See Figure 11.

Note: When not using the trouble input, jumper terminals 7 and 6 together.

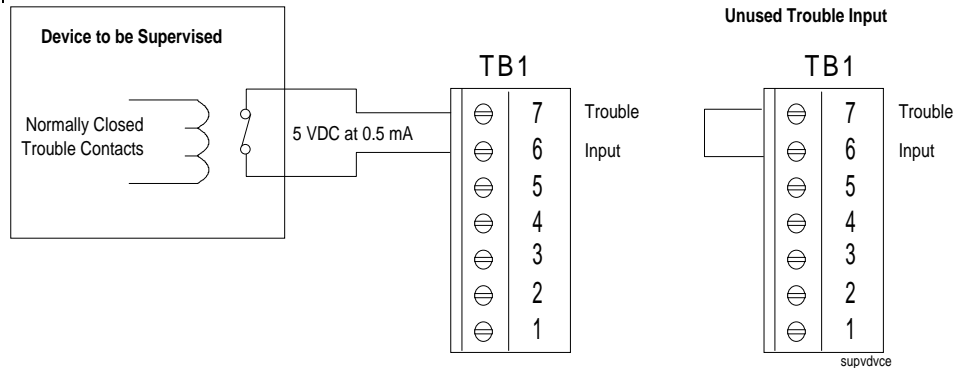


Figure 11: Wiring the Trouble Supervisory Contact

Wiring Point LEDs and Relays

The LDM-32 must be set via SW4 (Figure 19) for Alarm/Trouble Mode to enable the point control switches to function. (The Acknowledge/Lamp Test switch, connected to J1, works in either mode.) A maximum of 16 points per module are available under this configuration (switch inputs 1-16 and annunciator control points 1-16, respectively). Not all switches need to be used--switches can be wired only for desired functions (Figure 12).

Control Switch Security

A key-lock switch wired to J4 on the LDM-32 provides access security for all control switches wired to that module. Switches will not function when the key-lock switch is in its closed position.

Note: Switches must be UL Listed to switch 5 volts DC @ 0.5 mA. Switches must be either key-lock type **or** they must be secured in a locked enclosure or a key switch, such as the AKS-1, to control access and must be installed and wired to J4 (if any of the switch inputs are used to control system functions). All switches must be installed in the same room as, and no more than 20 feet from, the LDM enclosure. Switch wiring must be in conduit.

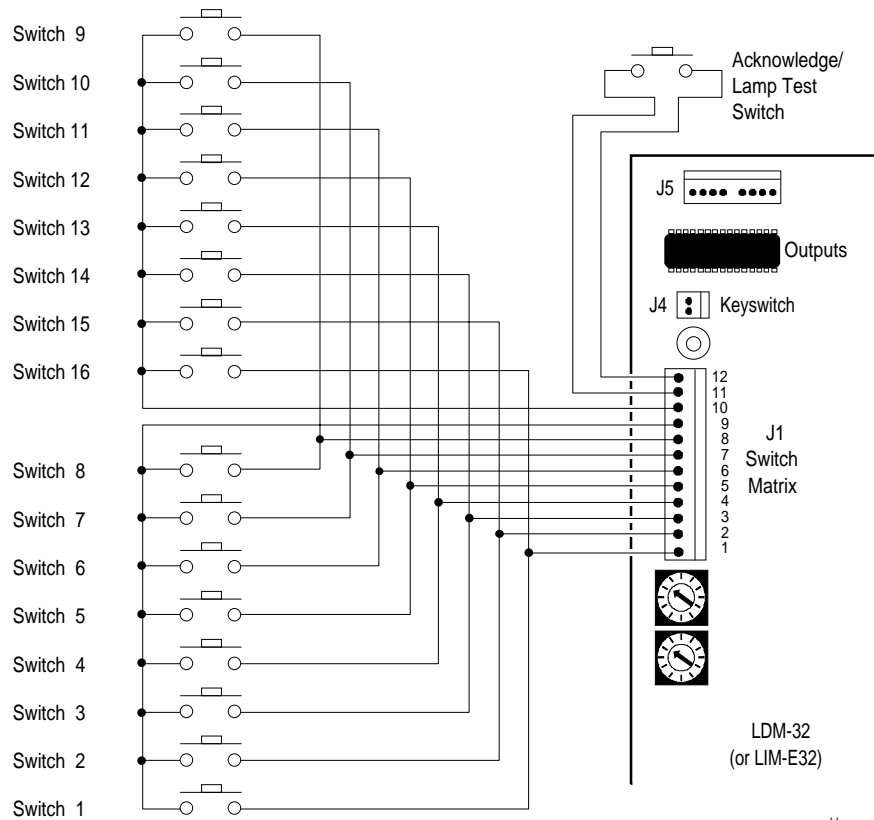
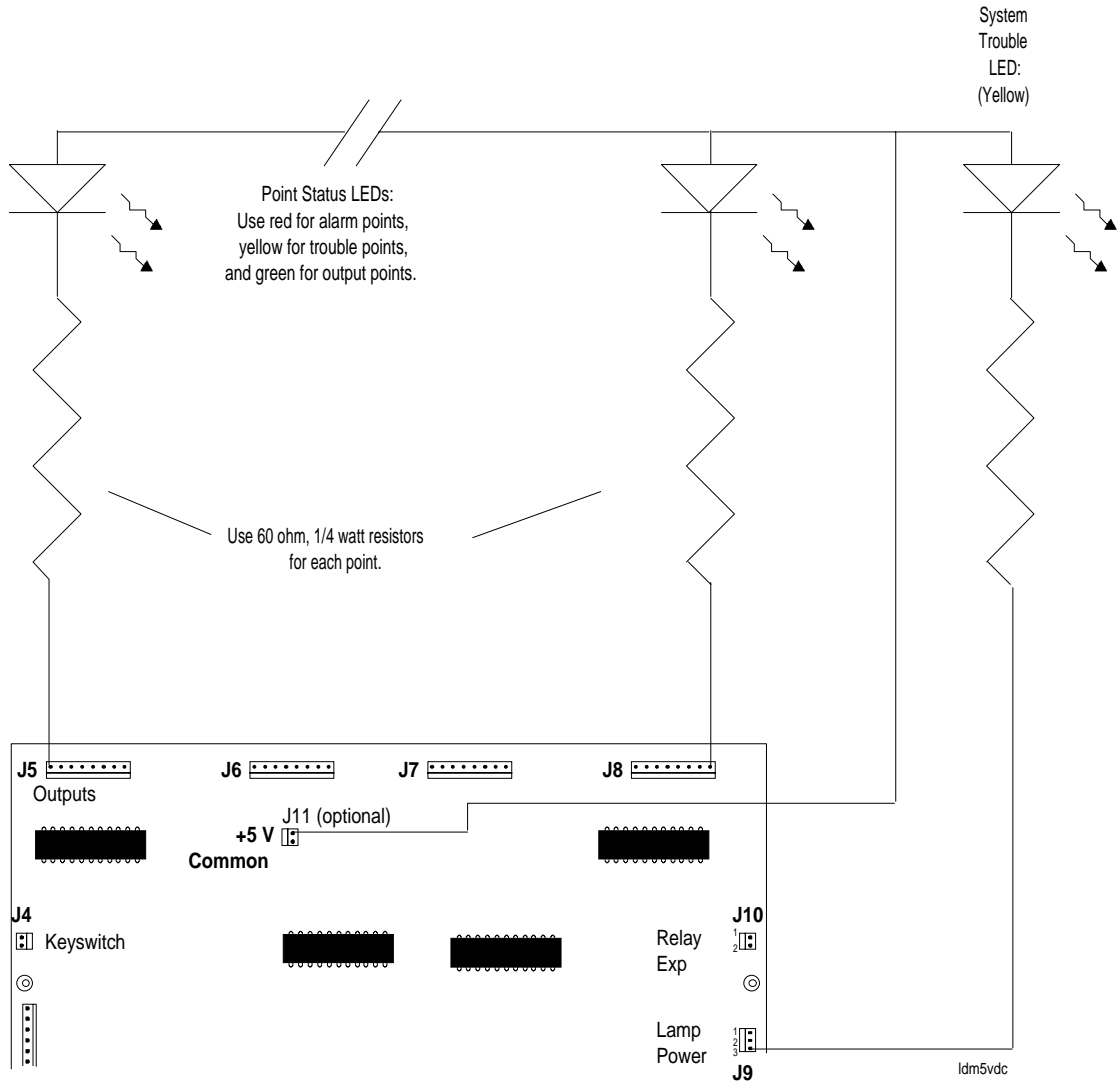


Figure 12: Connecting Optional Point-Control Switches

Lamp Driver Power

Lamp driver outputs can be powered from 24 VDC or 5 VDC, depending on the loading required. Figures 13 and 14 illustrate connection of the desired voltage, as well as the system trouble LED. Connection of LDM operating power from a main power supply is illustrated in Figure 15. The MPS-24A, or other UL Listed regulated 24 VDC power supply, powers the LDM annunciator.



**Figure 13: Typical LDM-to-Custom Annunciator Connection @ 5 VDC
(Using High Efficiency 2 mA LEDs)**

Note: To find the resistor size for LEDs other than 2 mA, use this formula:

$$\frac{(\text{Voltage supplied from LDM} - \text{Voltage draw of LED})}{\text{LED impedance value}}$$

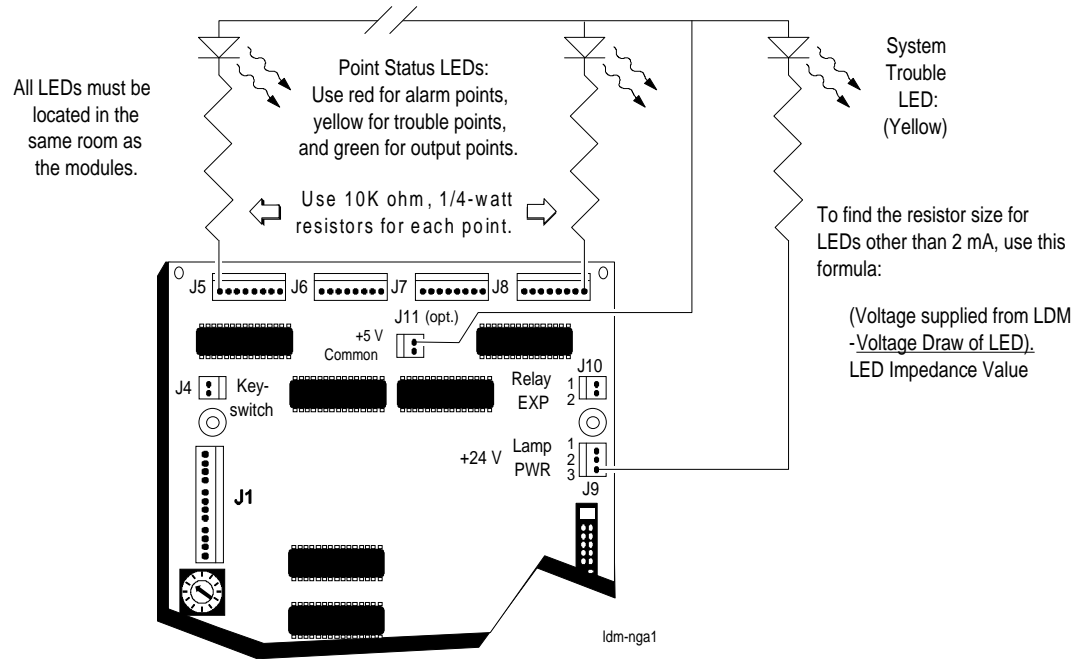


Figure 14: Typical LDM-to-Custom Annunciator Connection @ 24 VDC (Using High Efficiency 2 mA LEDs)

Connecting the Main Power Supply

MPS-24A Main Power Supply

For the FC-2000, connect the power run for the LDM to MPS-24A TB3 Terminals 1 (+) and 2 (-) (1 amp max.). The IFC-1010/2020 requires non-resettable power. Connect the power run for the LDM to MPS-24A TB3 Terminals 3 (+) and 4 (-) (2 amps max.). The total amount of current drawn from these terminals cannot exceed that rating in standby or in alarm.

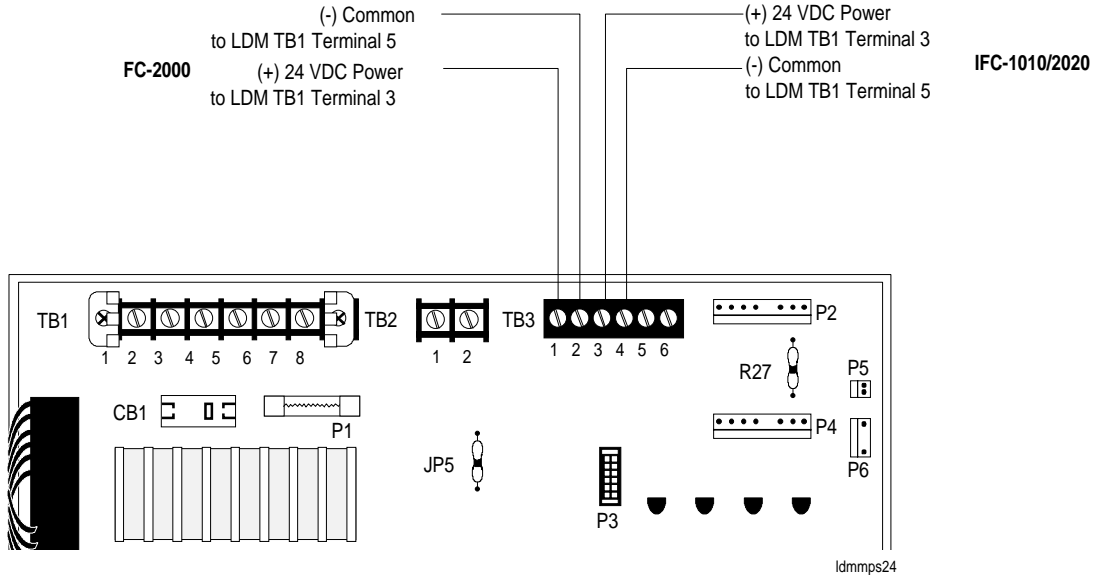


Figure 15a: MPS-24A Power Supply Connections

MPS-24B Main Power Supply (FC-2000 and XP Transponders Only)

Connect the power run for the LDM to MPS-24B TB2 Terminals 1 (+) and 2 (-). No more than 200 mA current can be drawn from these terminals in standby or alarm.

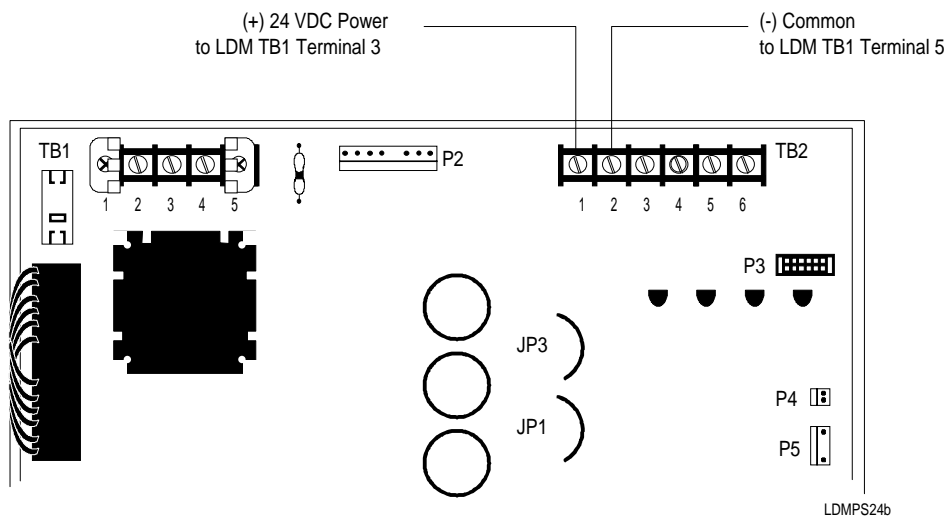


Figure 15b: MPS-24B Power Supply Connections

Operating the Lamp Driver

LDM points track the system points that they are programmed to annunciate. The points do not latch. The following functions are available:

Lamp Test/ Acknowledge

The LDM series annunciator includes a single lamp test switch. The lamp test switch, connected to J1 on the master (LDM-32), illuminates all LEDs on its module, and after a short delay, each expander module in turn illuminates its LEDs. A switch installed for Lamp Test/Acknowledge performs three functions:

- Lights all LEDs wired to the module, except the On Line LED. The integral piezo (if enabled) sounds for as long as the switch is held down. The Lamp Test switch lights the LEDs on the module to which it is wired as well as the LEDs on any connected expander modules.
- Toggles the annunciator points between automatic operation (function of programmed control-by-event statements) and manual override.
- Acknowledges all status changes for both the lamp driver and any expanders connected to that lamp driver. Flashing LEDs latch on solid and the piezo is silenced.

Online LED

This green indicator, located on the LDM-32 module, flashes during communication with the control panel, but will illuminate continuously when operating in manual override.

Note: To adhere to standard fire alarm control panel convention and remain consistent with other Johnson Control products that may exist in the system, the following color convention is employed.

Red Alarm LEDs

Indicates an alarm condition for an initiating device circuit, software zone, or an addressable initiating device.

Yellow Point Trouble LEDs

Indicates that a trouble condition exists with a device or circuit.

Green Controlled Output LEDs

Indicates that power is applied or that the controlled output circuit or device has been activated. Applicable to indicating appliance, relays, speaker, telephone, and time control circuits.

The graphic annunciator may contain a yellow *System Trouble* LED and a red *System Alarm* LED which will light for all trouble or alarm conditions (respectively) in the system (not just for those points of zones mapped to the annunciator/expanders).

Note: For programming the lamp driver series into IFC-1010/2020 memory, and for mapping system points and software zones to annunciator points, refer to the *Designing the Data Base* and *Entering the Data Base* sections of the *IFC-1010/2020 Technical Manual (FAN 448)*.

**Another Use for
the Lamp Driver
Module**

The Lamp Driver Module (LDM-32) can be used for more than the control of lights on a custom annunciator. Adding the LDM-R32 relay module to the light driver provides a cost effective way to provide a number of individually programmable dry contacts. This light driver configuration costs less than using individual control modules (M510CJ or XPR-8) when a quantity of more than approximately 15 contacts are needed in one location; however, this is simply based on the cost of equipment. When you consider the labor to install individual control modules versus a single CAB-A3 cabinet with the light driver, the cost crossover point is usually considerably lower.

An additional reason for using the light driver rather than control modules is that each control module uses one of the addresses on a signaling line circuit. The light driver is connected to the control panel on the RS-485 annunciator communication trunk, and since it is programmed just like the ACM series annunciators, it does not use any of the system device (SLC) addresses. This can be an advantage if there is a significant quantity of dry contacts required for a control function.

LDM-32 and the IFC-1010/2020

Capabilities

When installed with an IFC-1010/2020, LDM series modules can announce the status or control addressable devices, software zones, and several system control functions:

- **Addressable Devices**--2551J (Photo), 1551J (Ion), 2551TJ (Photo with non-analog heat), and 5551J (Thermal) Intelligent Detectors, M500MJ, M501MJ, and M502MJ Monitor Modules, M510CJ Control Modules, and BGX-101L Addressable Manual Pull Stations
- **Software Zones 1-240**
- **System Control Functions**--Acknowledge/Step (the Ack/Step key), Signal Silence, System Reset, Lamp Test
- **XP Series Transponder System**--Power and Audio Supply Supervision, XPP-1 Form-C Alarm and Trouble Relays, XPC-8 Control, XPM-8 Monitor, and XPR-8 Relay Module Circuits

Software Required

The IFC-1010 is fully compatible with LDM Series modules. The IFC-2020 must be operating with software of the following part numbers (or greater):

IFC-2020 Board	EPROM Part Number
Central Processing Unit (CPU-2020)	73123
Display Interface Assembly (DIA-1)	73132
Display Interface Assembly (DIA-2020)	Fully compatible
Loop Interface Board (LIB-200)	73117 (For each LIB 200)

Note: Each EPROM in software installed in the IFC-2020 must be part of the same firmware group.

Hardware Required

Hardware requirements include an RS-485 annunciator communications trunk, a separate power circuit, and an SIB-2048 or SIB-N2 intelligent Serial Interface Board. Up to 32 annunciator devices may be installed on the RS-485 annunciator trunk circuits. The actual number of annunciator modules may be larger depending on the number of expander modules and Receive Only annunciators employed. The IFC-1010/2020 must include an intelligent Serial Interface Board (SIB-2048 or SIB-N2), which can support two RS-485 annunciator trunk circuits.

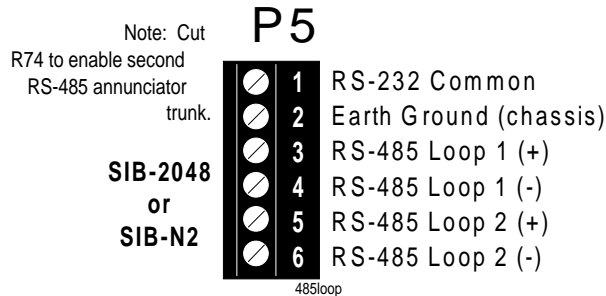


Figure 16: RS-485 Annunciator Trunk Circuit (supervised and power-limited)

The SIB-2048 or SIB-N2 can support two RS-485 circuits, each capable of spanning 6000 feet when SIB resistor R74 is cut, as illustrated below:

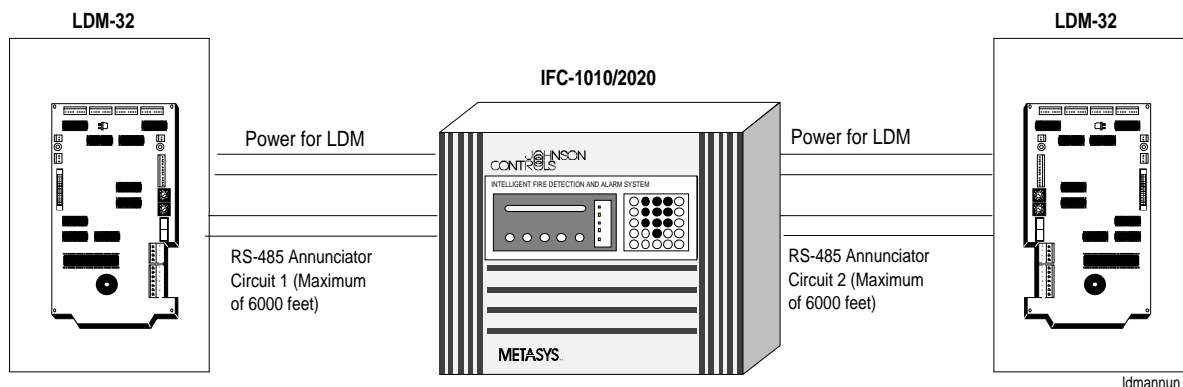


Figure 17: LDM-32 RS-485 Connection with the IFC-1010/2020

Programming for Remote Annunciation

LDM points must be programmed from the IFC-1010/2020 before the LDM will function. The IFC-1010/2020 employs the following format for annunciator points:

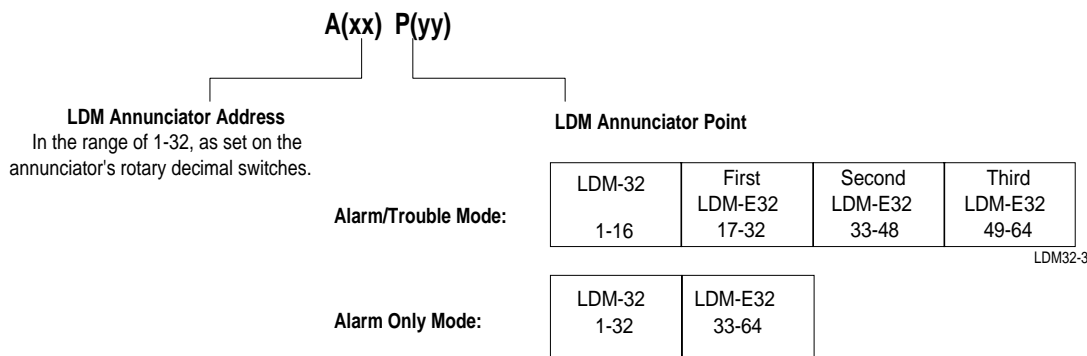


Figure 18: LDM Annunciator Point Format for the IFC-1010/2020

To program the LDM-32 into IFC-1010/2020 memory, and for mapping system points and software zones to annunciator points, refer to the *Entering the Database* document in the *IFC-1010/2020 Technical Manual (FAN 448)*.

Operating the LDM-32 with the IFC-1010/2020

LDM points “track” or follow the system points they are programmed to annunciate. The points do not latch. Table 7 lists the ways the LDM-32 annunciates various IFC-1010/2020 devices and functions.

Table 7: Lamp Driver Point Functions

Point Type	Alarm and Trouble Mode		
	Alarm Mode Only		
	Red LED	Yellow LED	Control Switch
Control Modules XPC Circuit XPR Circuit	Indicates on/off status of module or circuit	Indicates trouble status of module or circuit	Turns module on or off
Monitor Module XPM Circuit	Indicates alarm status of module or circuit	Indicates trouble status of module or circuit	Not used
Intelligent Detector	Indicates alarm status of module or circuit	Indicates trouble status of detector	Not used
Software Zone	Indicates alarm status of software zone	Indicates trouble status of software zone	Not used
Ack/Step Key	Indicates System Alarm	Indicates System Trouble	Functions as an Ack/Step key
Signal Silence Key	Not used	Indicates Signal Silence	Functions as a Signal Silence key
System Reset Key	Indicates System Alarm	Indicates System Trouble	Functions as a System Reset key
Lamp Test Key	Not used	Not used	Functions as a Lamp Test key

Configuring the Lamp Driver for the IFC-1010/2020

Setting the Address

Figure 19 illustrates the address rotary switches. Set each LDM-32 to a different address from 1 to 32, unless you are configuring multiple LDM-32s as Receive Only annunciators.

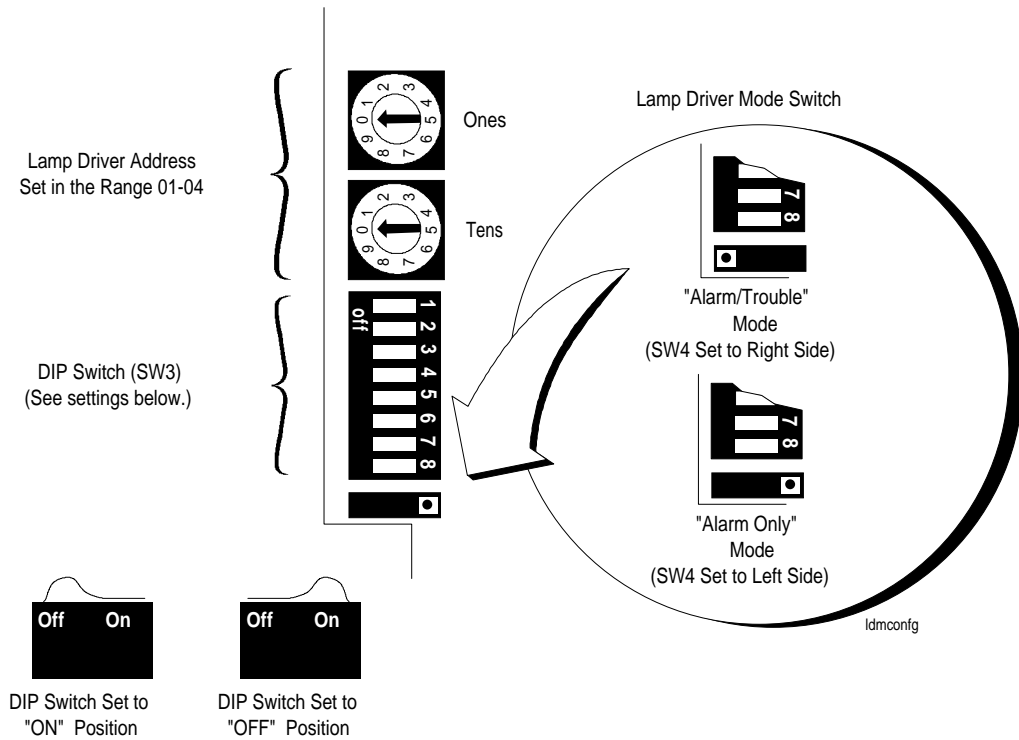


Figure 19: Lamp Driver Address Settings, DIP Switches, and Alarm/Trouble Mode Switch

Setting Lamp Driver DIP Switches

Some earlier versions of LDM modules could not be configured for two LDM-E32 expander modules. For those versions, only one or three expanders are valid options.

LDMs may be used for common annunciation or relay control. Set SW3 DIP switches per the requirements of your particular job. See Figure 19 for location of SW3.

Table 8: Annunciator DIP Switch Settings

DIP Switch	Function
1	Relay Control --Set to ON position when lamp driver is used to control relays or to provide fan shutdown.
2	Expanders Installed --Set OFF for zero or two expanders installed. Set ON for one or three expanders installed.
3	Expanders Installed --Set OFF for zero or one expander installed. Set ON for two or three expanders installed.
4	Eight Point Shift --Always set to OFF in IFC-1010/2020 systems.
5	Receive Only --Set this ON for each annunciator that will provide the same information as another annunciator in a different location (when two or more annunciators hold the same address, all but one must be configured as "Receive Only" annunciators).
6	Piezo Disable --Set this switch ON to disable the piezo for any event.
7	Switch Inhibit --Set this switch OFF to enable any point control switches wired to the LDM. If set ON, switches wired to the LDM do not execute their programmed manual overrides, but will serve only as a local lamp test for their respective points.
8	Flash Inhibit --Set to ON position to disable the flashing of LEDs associated with unacknowledged events. Flash Inhibit also disables the piezo from sounding. Flash Inhibit must be ON when using the relay expander module (LDM-R32).

**LDM-32/LDM-E32
IFC-1010/2020
Alarm Point
Configurations**

Various point wiring schemes and relay connections based on LDM configuration are illustrated in Figures 20, 21, 22, and 23. All LEDs, lamps, and relay circuits being driven by the LDM series must be located in the same enclosure as the modules, or in separate enclosures less than 20 feet apart. The wiring between enclosures should run in conduit or metal raceway.

The LDM-32 and one expander can be configured for up to 64 alarm points by setting Switch SW4 to the Alarm Only position. See Figures 19 and 20.

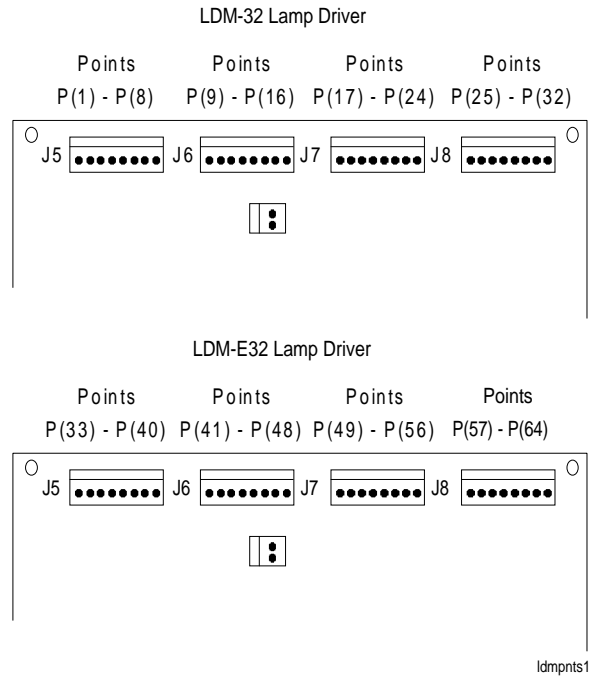


Figure 20: Lamp Driver Alarm Points

The LDM-32 and up to 3 expanders can be configured for up to 64 alarm and trouble points by setting Switch SW4 to the “Alarm/Trouble” position. See Figures 19 and 21.

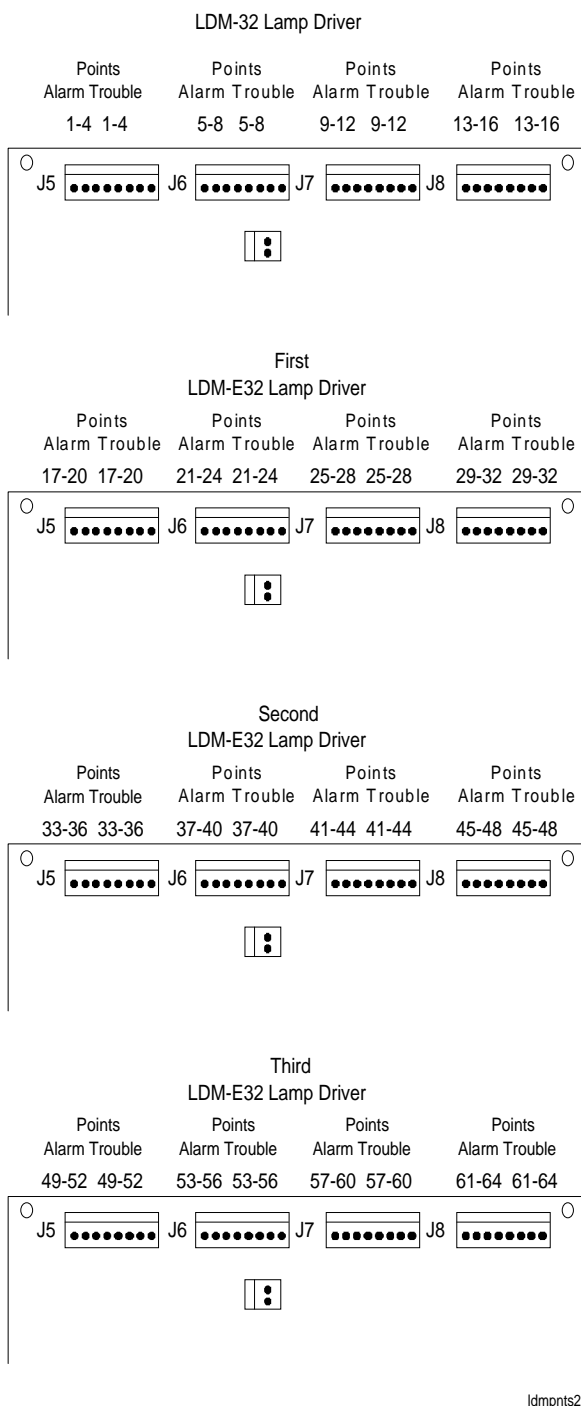


Figure 21: Alarm and Trouble Points

IMPORTANT: When setting each of the LDM switches (SW4) for the LDM-32 and LDM-E32s, make sure that the switch settings agree on all LDMs (LDM-32 and LDM-E32s) with the same address.

**LDM-R32
IFC-1010/2020
Alarm Point
Configurations**

Figure 22 illustrates wiring the LDM-R32 Relay Module to activate alarm relays for up to 64 IFC-1010/2020 points.

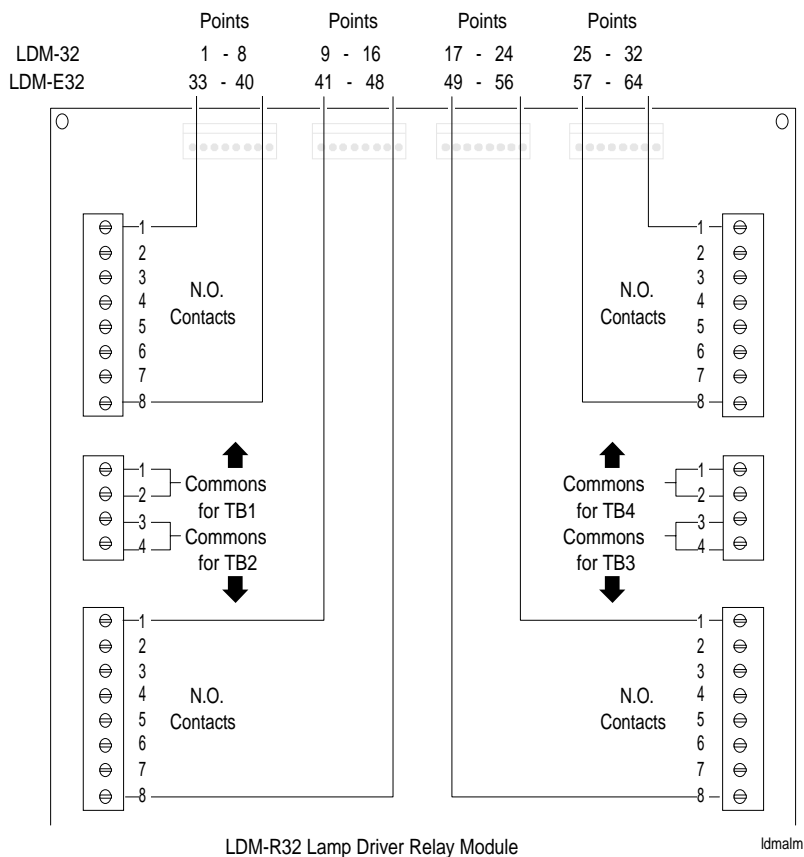


Figure 22: LDM-R32 Alarm-Only Relay Operation

Figure 23 illustrates wiring the LDM-R32 Relay Module to activate alarm and trouble relays for up to 64 IFC-1010/2020 points.

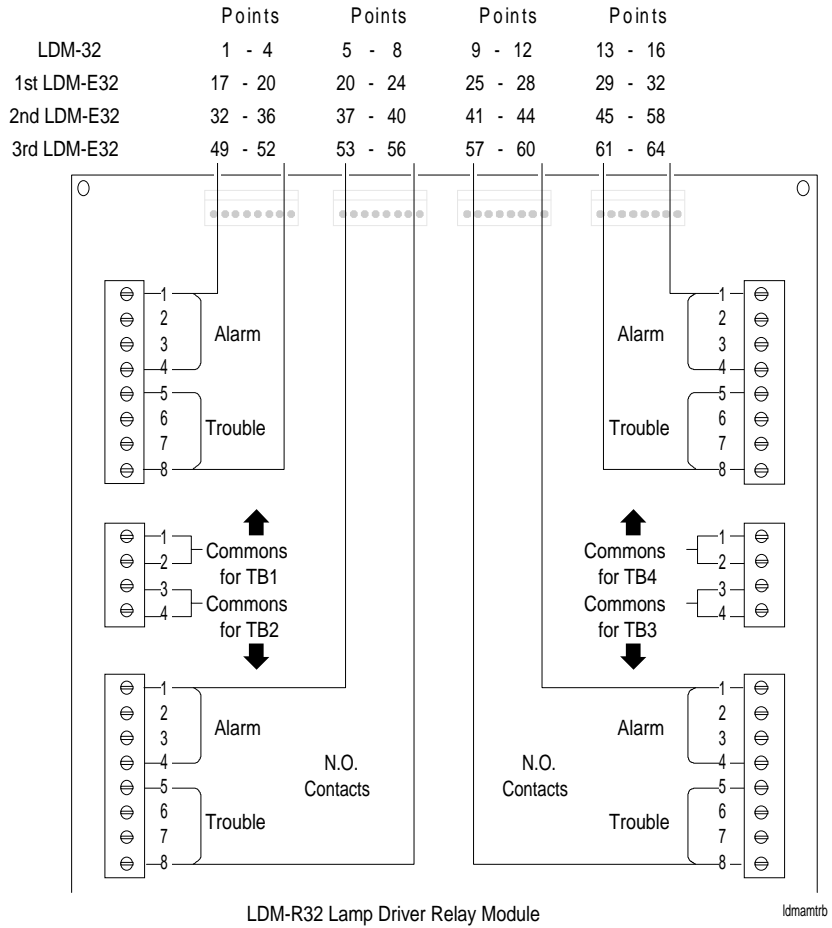


Figure 23: LDM-R32 Alarm and Trouble Relay Operation

LDM-32 and the FC-2000

Capabilities

When installed with an FC-2000, LDM Series modules can annunciate the status of initiating and indicating circuits, relays, and several system control functions. Each lamp driver output is automatically assigned to one system point.

- **Circuits**--IZM-8 Initiating Device Circuits (alarm and trouble), AIM-200 Zones (alarm and trouble), ICM-4/ICE-4 Indicating Appliances (trouble), CRM-4/CRE-4 Control Relays, TCM-2 Circuits, TCM-4, VCM-4/VCE-4, DCM-4.
- **System Controls**--Acknowledge, Signal Silence, System Reset, and activation of selected system outputs (indicating circuits, relays).

Software Required

For the LDM-32 to function properly, the FC-2000 must use CPU-2000 U4 ROM, part number 73085 or later.

Hardware Required

The LDM-32 requires CPU-2000 revision D or later to operate. Configure the RS-485 circuit that drives the LDM-32 as shown in Figure 24.

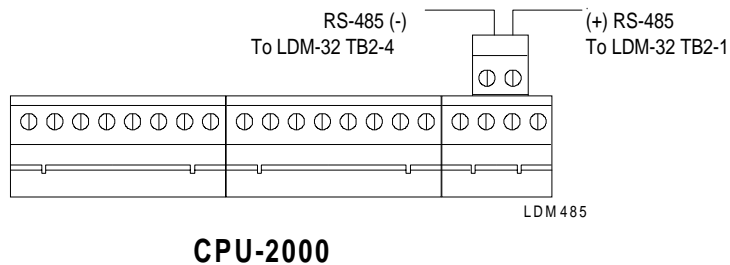


Figure 24: Connecting the RS-485 Circuit to the CPU-2000

Operating the LDM-32 with the FC-2000

Lamp Driver points do not latch--they track or follow the status of those points they are programmed to annunciate. Table 10 outlines the annunciation of various FC-2000 circuits and functions.

Configuring the Lamp Driver for the FC-2000

Setting the Address

Figure 25 illustrates the address rotary switches.

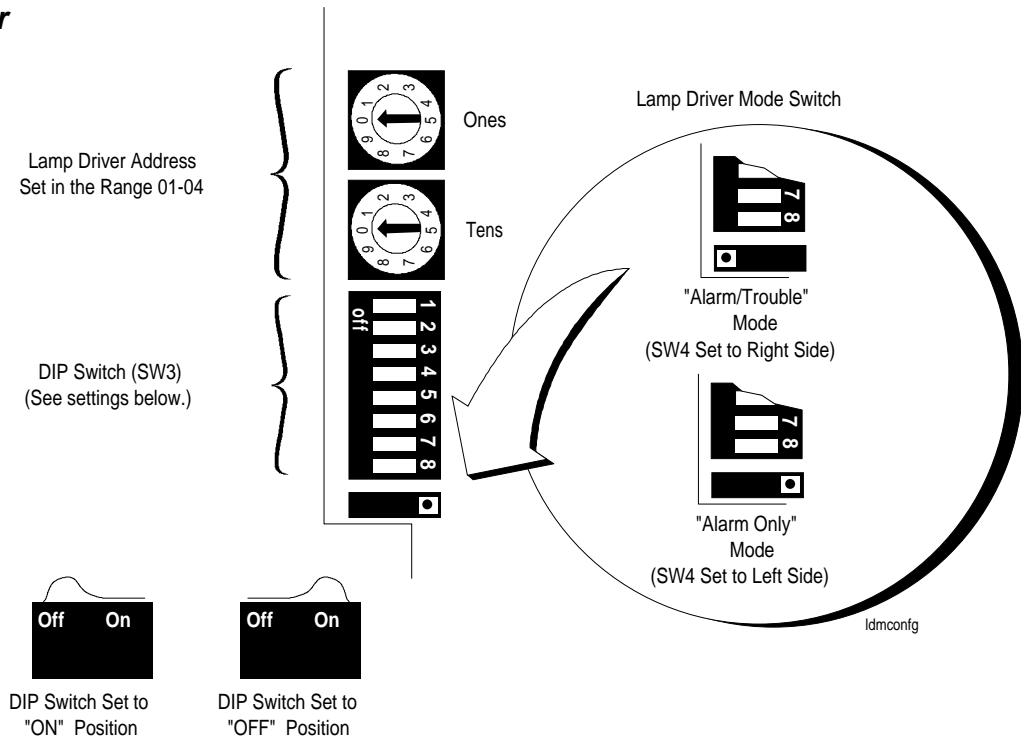


Figure 25: Lamp Driver Address Settings, DIP Switches, and Alarm/Trouble Mode Switch

Setting Lamp Driver DIP Switches

Some earlier versions of LDM modules could not be configured for two LDM-E32 expander modules. For those versions, only one or three expanders are valid options.

Table 9: Annunciator DIP Switch Settings

DIP Switch	Function
1	Relay Control --Set to OFF position on the FC-2000.
2	Expanders Installed --Set OFF for zero or two expanders installed. Set ON for one or three expanders installed.
3	Expanders Installed --Set OFF for zero or one expander installed. Set ON for two or three expanders installed.
4	Eight Point Shift --Always set to ON to shift the CPU-2000 functions from the first eight annunciator positions to expander positions 57-64. This shift can only be set on an annunciator set for address "1."
5	Receive Only --Set this ON for each annunciator that will provide the same information as another annunciator in a different location (when two or more annunciators hold the same address, all but one must be configured as "Receive Only" annunciators).
6	Piezo Disable --Set this switch ON to disable the piezo for any event.
7	Switch Inhibit --To disable the point control switches on the annunciator from executing system control functions, set this switch "ON." When inhibited, the switches serve as local Lamp Test switches only. In addition, the Acknowledge/Lamp Test switch only function in a local capacity, unrecognized by the FC-2000.
8	Flash Inhibit --Set to ON position to disable the flashing of LEDs associated with unacknowledged events. Flash Inhibit also disables the piezo from sounding. Flash Inhibit must be ON when using the relay expander module (LDM-R32).

The lamp driver can be set for addresses 1, 2, 3, or 4. The actual mapping arrangement for a respective module and its expanders depends on FC-2000 annunciator programming.

Table 10: FC-2000 Lamp Driver Point Functions

	Alarm and Trouble Mode		
	Alarm Mode Only		
Circuit Type	Red LED	Yellow LED	Control Switch (Note 2)
Modules			
IzM-8 Circuit	Indicates alarm	Indicates trouble status of circuit	Not used
ICM-4/ICE-4	Indicates Activation (Notes 3 and 4)	Indicates trouble status of circuit	Controls Indicating Circuit (Note 5)
CRM-4/CRE-4 Circuit	Indicates Activation (Notes 3 and 4)	Indicates trouble status of relay	Controls relays (Note 5)
TCM-2/TCM-4 Circuit	Indicates Activation (Notes 3 and 4)	Indicates trouble status of relay	Remote switch functions (Note 5)
AIM-200	Indicates alarm status of eight software zones	Indicates trouble status of eight software zones	Not applicable
CPU 2000			
Annunciator Point 1	Indicates system alarm	Indicates system trouble	Functions as Acknowledge
Annunciator Point 2	not used	Indicates that signals have been silenced	Functions as Signal Silence
Annunciator Point 3	Not used	Not used	Functions as System Reset
Annunciator Point 4	Not used	Indicates supervisory condition	Not used
Annunciator Point 5	Indicates that Indicating Circuit 1 has been activated (Note 4)	Indicates trouble status of circuit	Controls Indicating Circuit 1
Annunciator Point 6	Indicates that Indicating Circuit 2 has been activated (Note 4)	Indicates trouble status of circuit	Controls Indicating Circuit 2
Annunciator Point 7	Indicates that the Remote Signaling Municipal Tie has been activated (Note 4)	Indicates trouble status of circuit	Controls Remote Signaling Municipal Tie
Annunciator Point 8	Indicates that the Alarm Relay has been activated (Note 4)	Indicates module trouble, power failure, or disabled circuits	Controls alarm relay

Notes:

1. If the 8-point shift (DIP Switch 4) is set **ON**, the eight CPU functions are shifted from annunciator points 1-8 to points 57-64 (provided that those points exist in the system).
2. These controls switches are active only if all of these conditions are set:
 - a. 8-point shift (DIP Switch 4) is set to **OFF**
 - b. Receive Only (DIP Switch 5) is set to **OFF**
 - c. Switch Inhibit (DIP Switch 7) is set to **OFF**.
3. These Status LEDs are active only when the FC-2000 is programmed for “Output Status.”
4. Use green LEDs to indicate activation on controlled output circuits.
5. These control switches require that the FC-2000 be programmed for “Output Control.”

Control switches marked “not used” still functions as local Lamp Test or local Acknowledge switches for their respective points.

***AIM-200 Point
Annunciation***

The CPU-2000 can be programmed for an alternate method of annunciating the AIM-200. Up to 192 intelligent devices can be annunciated on a single AIM-200 with LDM series annunciators. The FC-2000 annunciates the AIM-200 installed directly to the right of the CPU-2000. Note that an annunciator cannot be used to execute manual ON/OFF control of intelligent AIM-200 points, only standard FC-2000 zones. The option provides annunciation of up to 256 points for the FC-2000, broken down as shown in Table 11.

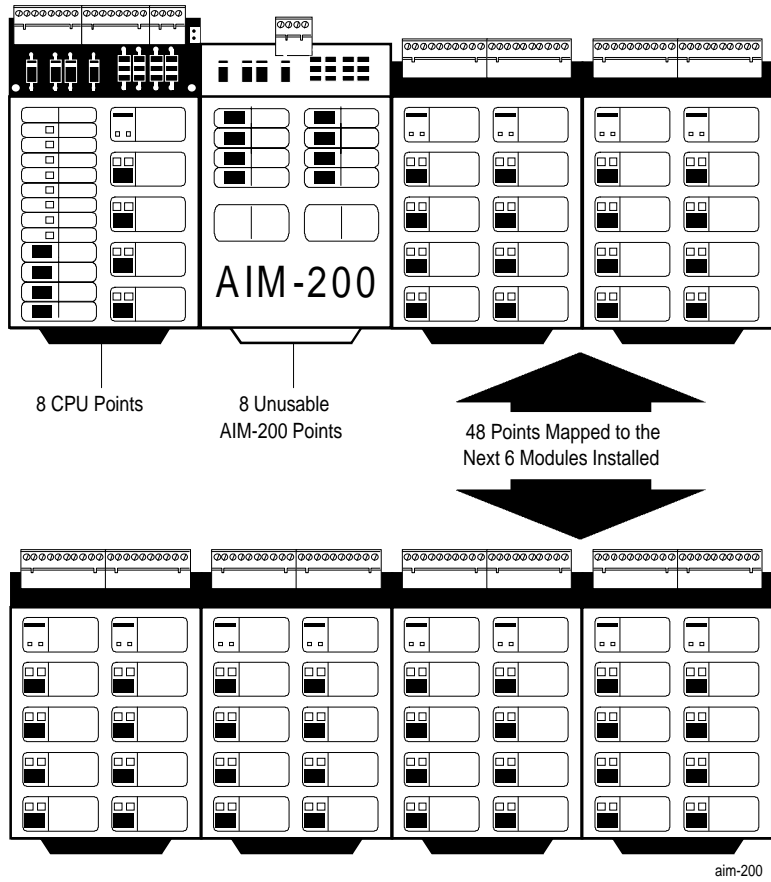


Figure 26: Point Location

Table 11: Point Annunciation for the AIM-200

Annunciator Address 1	8 CPU points (CPU point shift not an option). 8 unusable points (redundant AIM-200 points). 48 points mapped to the next 6 modules installed in the FC-2000 (which can also be AIM-200s for annunciation of their 8 software zones).
Annunciator Address 2	Intelligent detectors, addressed 1-64 on the AIM-200 installed next to the CPU-2000.
Annunciator Address 3	Addressable Modules, addressed 1-64, on the AIM-200 installed next to the CPU-2000.
Annunciator Address 4	Intelligent detectors, addressed 65-96, followed by addressable modules, addressed 65-96, on the AIM-200 installed next to the CPU-2000.

Refer to the *FC-2000 Technical Manual* for programming instructions for this option. Refer to program choice “AIM(256).”

Note: AIM-200 detector and module addresses 97, 98, and 99 may be used, but cannot be point-annunciated.

**LDM Switch
Control
Functions**

Table 12: Alarm and Trouble Mode without 8-Point Shift

Switch	LDM-32	First LDM-E32	Second LDM-E32	Third LDM-E32
1	Acknowledge	Circuit 9	Circuit 25	Circuit 41
2	Signal Silence	Circuit 10	Circuit 26	Circuit 42
3	Reset	Circuit 11	Circuit 27	Circuit 43
4	Not used	Circuit 12	Circuit 28	Circuit 44
5	Ind. Circuit 1	Circuit 13	Circuit 29	Circuit 45
6	Ind. Circuit 2	Circuit 14	Circuit 30	Circuit 46
7	Municipal Tie	Circuit 15	Circuit 31	Circuit 47
8	Alarm Relay	Circuit 16	Circuit 32	Circuit 48
9	Circuit 1	Circuit 17	Circuit 33	Circuit 49
10	Circuit 2	Circuit 18	Circuit 34	Circuit 50
11	Circuit 3	Circuit 19	Circuit 35	Circuit 51
12	Circuit 4	Circuit 20	Circuit 36	Circuit 52
13	Circuit 5	Circuit 21	Circuit 37	Circuit 53
14	Circuit 6	Circuit 22	Circuit 38	Circuit 54
15	Circuit 7	Circuit 23	Circuit 39	Circuit 55
16	Circuit 8	Circuit 24	Circuit 40	Circuit 56

A second LDM-32 with expanders would cover control switches for circuits 57 to 120.

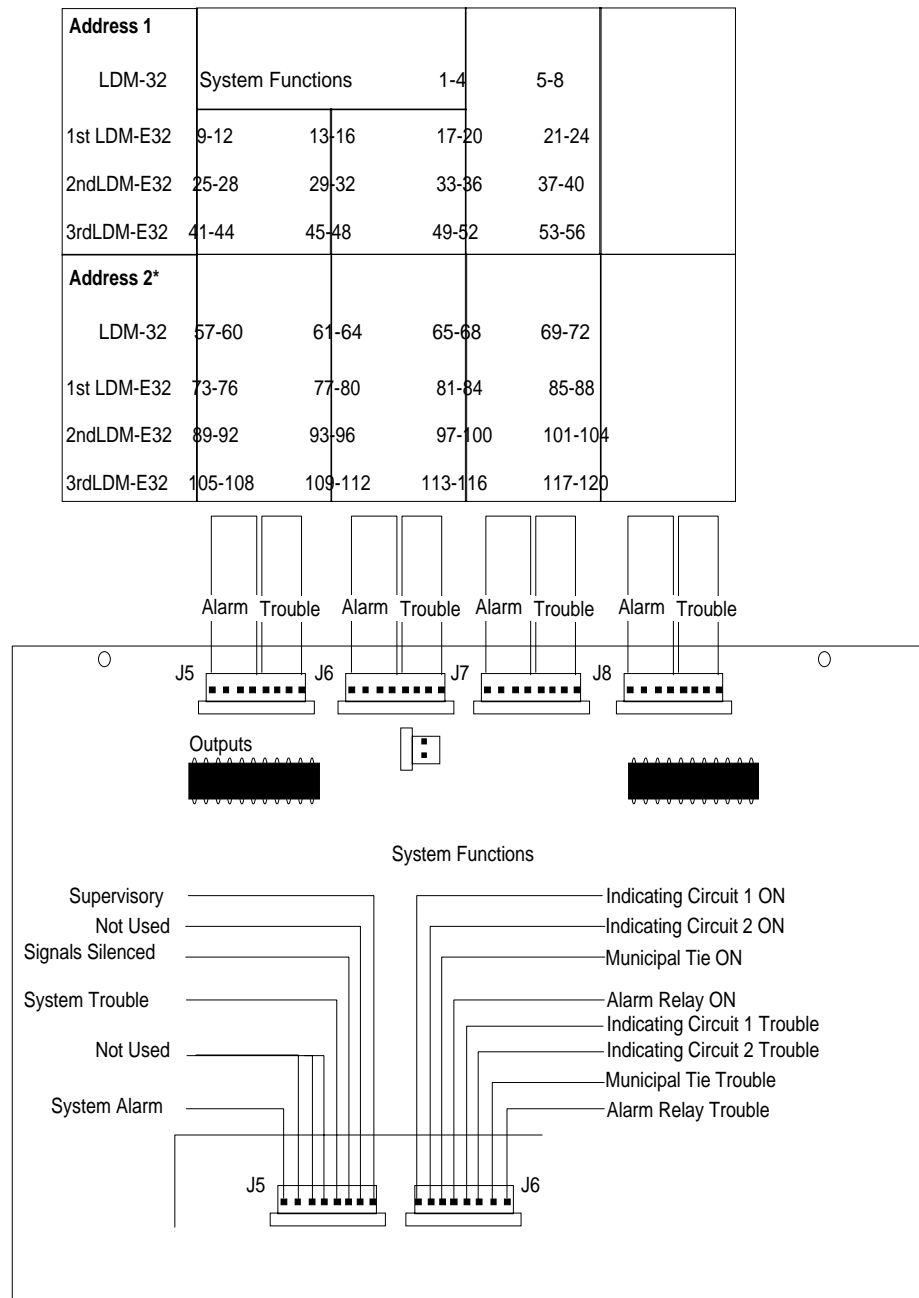
Table 13: Alarm and Trouble Mode with 8-Point Shift

Switch	LDM-32	First LDM-E32	Second LDM-E32	Third LDM-E32
1	Circuit 1	Circuit 17	Circuit 33	Circuit 49
2	Circuit 2	Circuit 18	Circuit 34	Circuit 50
3	Circuit 3	Circuit 19	Circuit 35	Circuit 51
4	Circuit 4	Circuit 20	Circuit 36	Circuit 52
5	Circuit 5	Circuit 21	Circuit 37	Circuit 53
6	Circuit 6	Circuit 22	Circuit 38	Circuit 54
7	Circuit 7	Circuit 23	Circuit 39	Circuit 55
8	Circuit 8	Circuit 24	Circuit 40	Circuit 56
9	Circuit 9	Circuit 25	Circuit 41	Acknowledge
10	Circuit 10	Circuit 26	Circuit 42	Signal Silence
11	Circuit 11	Circuit 27	Circuit 43	Reset
12	Circuit 12	Circuit 28	Circuit 44	Not used
13	Circuit 13	Circuit 29	Circuit 45	Ind. Circuit 1
14	Circuit 14	Circuit 30	Circuit 46	Ind. Circuit 2
15	Circuit 15	Circuit 31	Circuit 47	Municipal Tie
16	Circuit 16	Circuit 32	Circuit 48	Alarm Relay

It is assumed that systems with 8-point shift selected have 56 circuits or less.

**Alarm Points
Only Operation**

Figure 27 illustrates wiring the LDM-32 to annunciate alarms for up to 120 zones (not zone troubles) with the first eight points (P1-P8) dedicated to the FC-2000 functions listed in Figure 27:



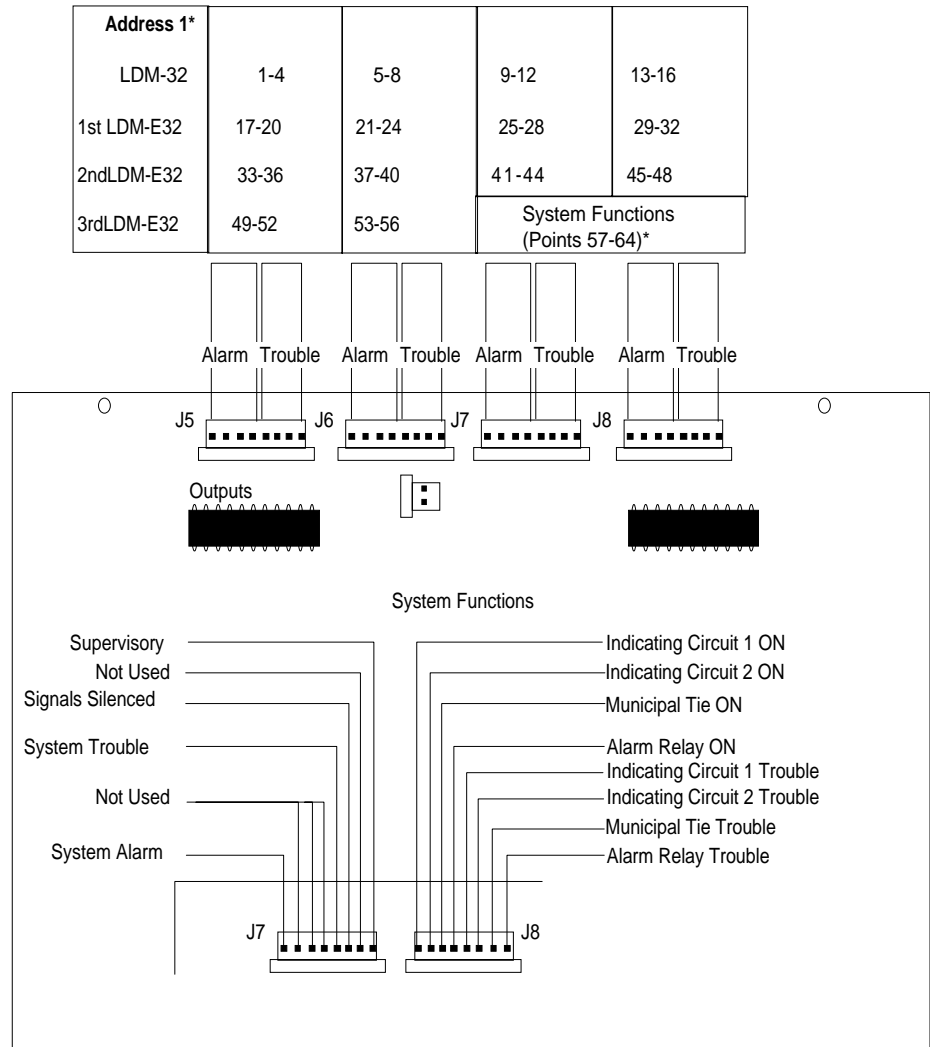
ldmamtrb

Figure 27: Alarm Points Only Operation

*It is assumed that this module/expander annunciates points (circuits 65-128 and is not functioning as a “Receive Only” annunciator.

**Alarm Only
Operation with
CPU Shift**

Figure 28 illustrates wiring the LDM to annunciate alarms for up to 56 zones (with no zone troubles) with the last eight points (P57-P64) dedicated to the FC-2000 functions listed below.



ldmamtrb

Figure 28: Alarm Only Operation with CPU Shift

*It is assumed that the 8-point shift is only selected on systems containing less than 56 circuits or a total of 64 annunciator points or less.

Alarm and Trouble Points Operation

Figure 29 illustrates wiring the LDM-32 to annunciate alarms and trouble for up to 120 zones with the first eight points (J5: P1 through P8 and J6: P1 through P8) dedicated to FC-2000 system functions.

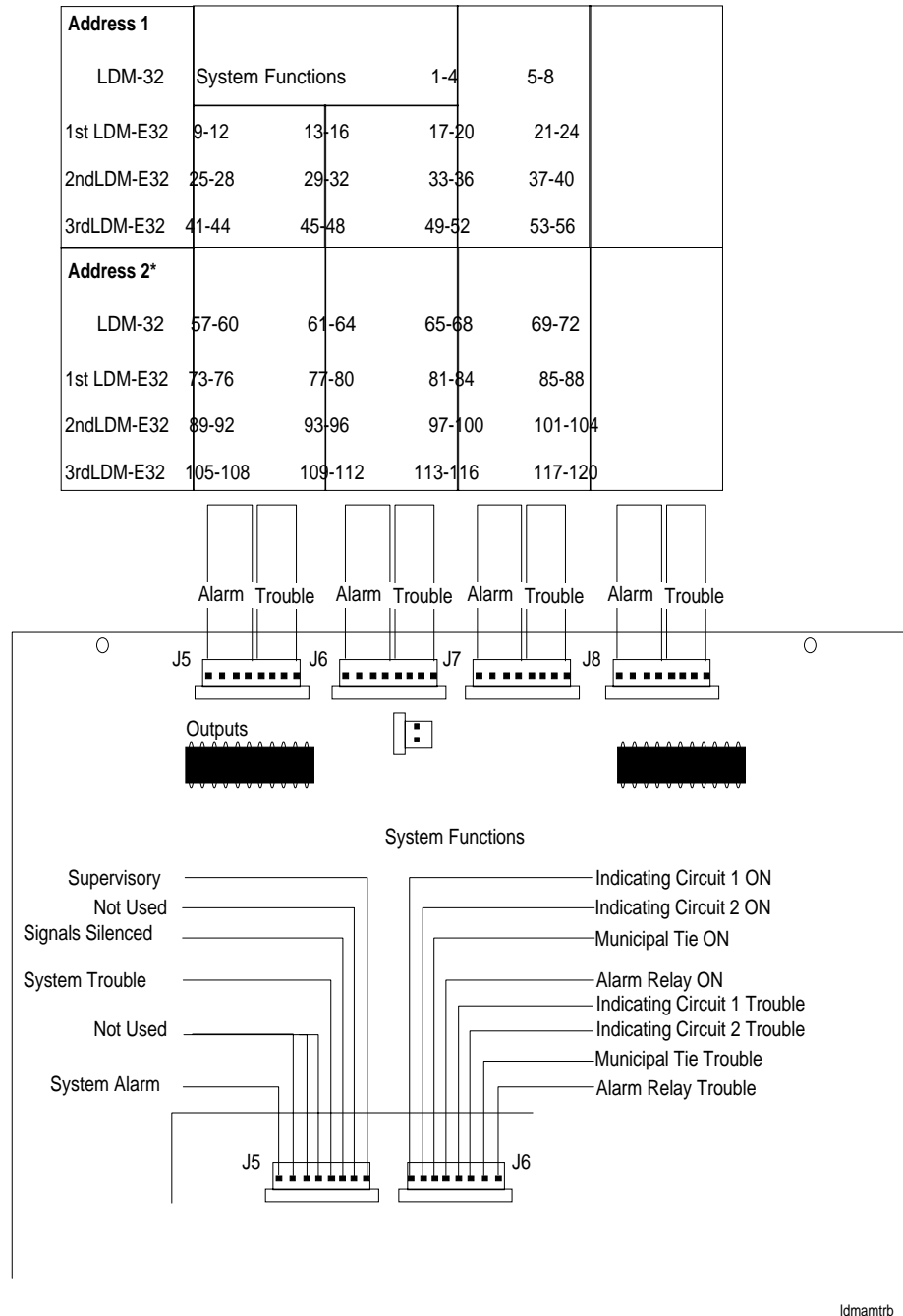


Figure 29: Alarm and Trouble Points Operation

*It is assumed that this module/expander annunciates points 64-128.

**Alarm/Trouble
Operation with
CPU Shift**

Figure 30 illustrates wiring the LDM to annunciate alarms and trouble for up to 56 zones with the last eight points (16 LEDs) dedicated to the FC-2000 system functions listed below.

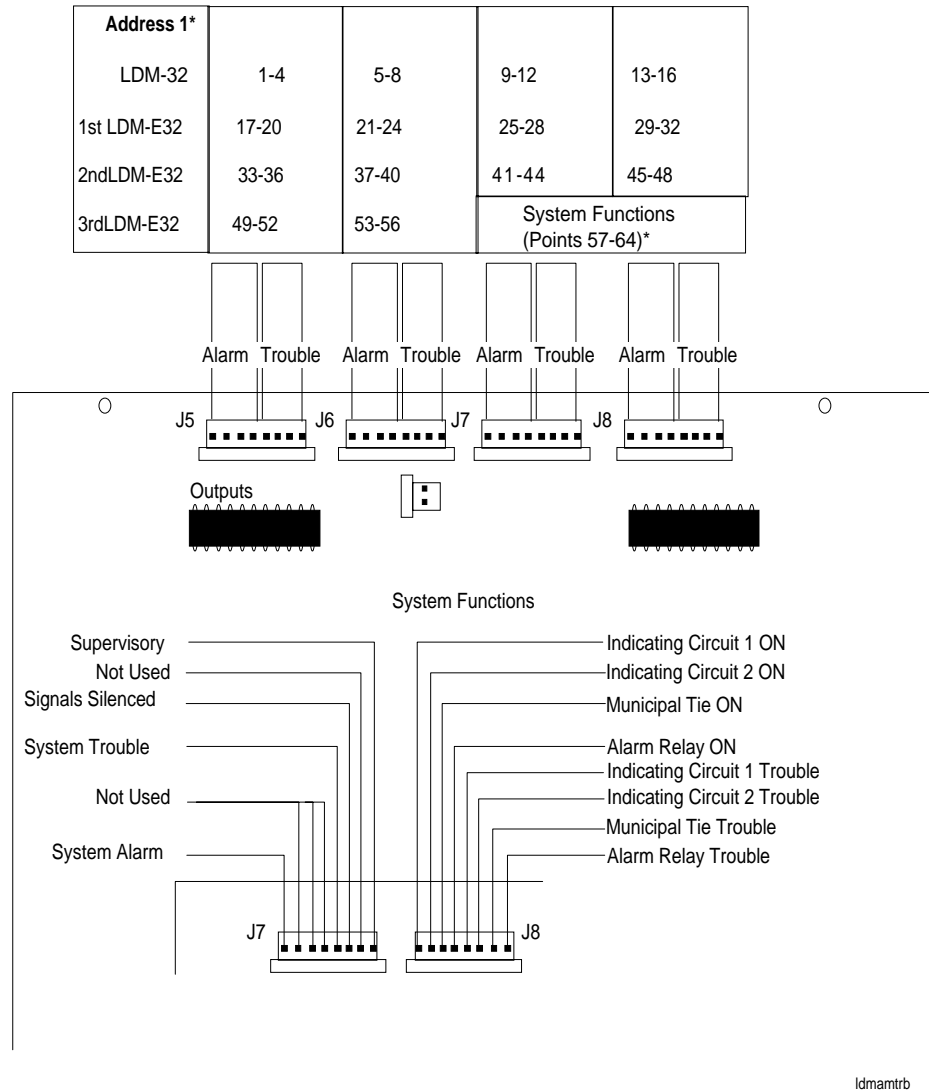


Figure 30: Alarm/Trouble Operation with CPU Shift

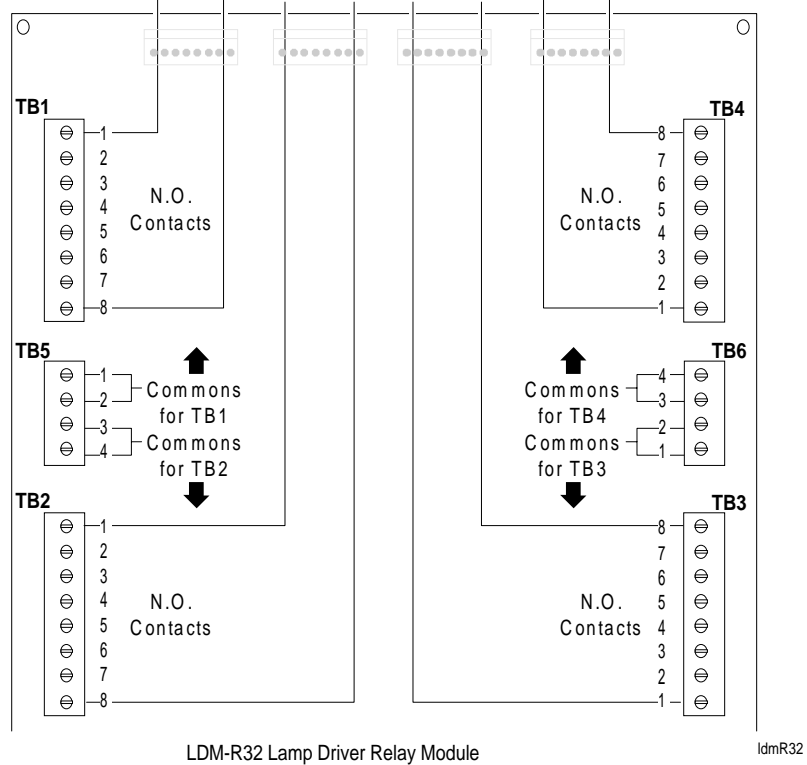
*It is assumed that the 8-point shift is selected only on systems containing less than 56 circuits.

Alarm Relays with LDM-R32

Figure 31 illustrates wiring the LDM-R32 Relay Expander to activate alarm relays for up to 56 zones with the first eight relays dedicated to the FC-2000 functions listed below.

Address 1	Points	Points	Points	Points
LDM-32	System Functions	1 - 8	9 - 16	17 - 24
LDM-E32	25 - 32	33 - 40	41 - 48	49 - 56

Address 2*	Points	Points	Points	Points
LDM-32	57 - 64	65 - 72	73 - 80	81 - 88
LDM-E32	89 - 96	97 - 104	105 - 112	113 - 120



System Functions

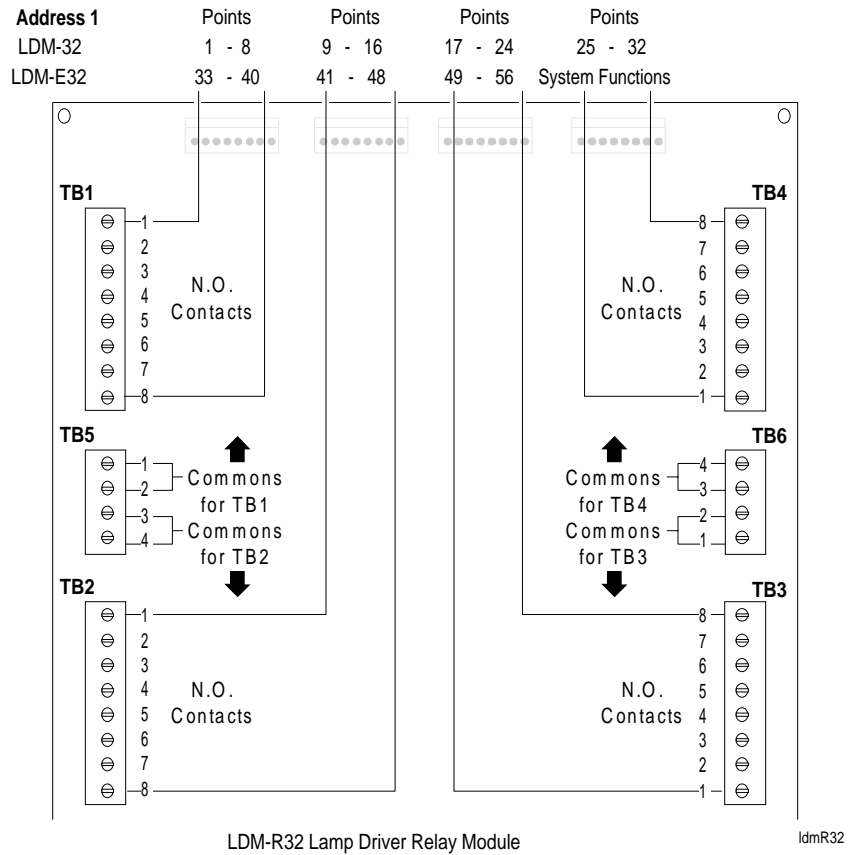
TB1	
System Alarm	1
not used	2
not used	3
not used	4
Indicating Circuit 1 ON	5
Indicating Circuit 2 ON	6
Municipal Tie ON	7
Alarm Relay ON	8

Figure 31: Alarm Relays with the LDM-R32

*It is assumed that this module/expander annunciates points 65-128.

Alarm Relays with CPU Shift

Figure 32 illustrates wiring the LDM-R32 Relay Expander to activate alarm relays for up to 56 zones with the last eight relays dedicated to the FC-2000 functions listed below.



System Functions

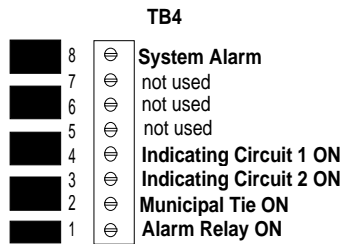
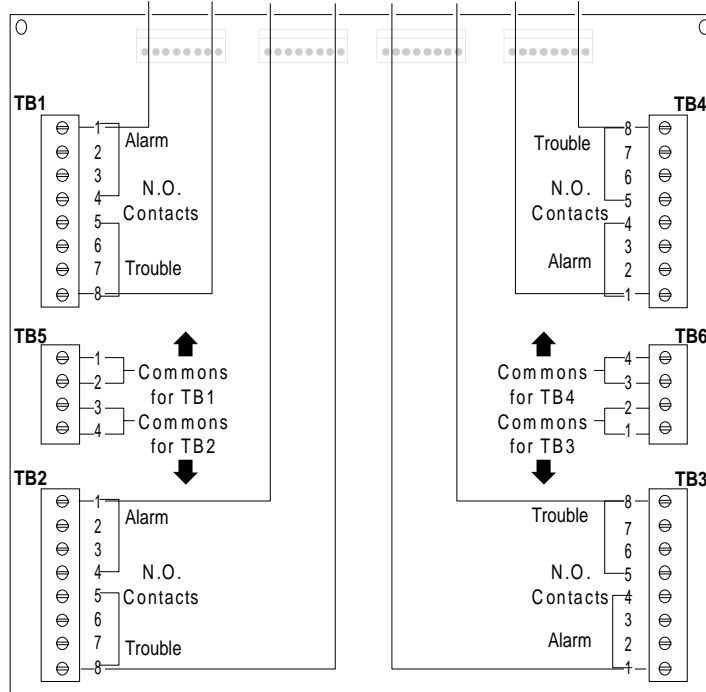


Figure 32: Alarm Relays with CPU Shift

Alarm and Trouble Relays with LDM-R32

Figure 33 illustrates wiring the LDM-R32 Relay Expander to activate alarm and trouble relays for up to 120 zones with the first eight relays dedicated to the FC-2000 functions listed below.

Address 1					
LDM-32	System Functions			1-4	5-8
1st LDM-E32	9-12	13-16	17-20	21-24	
2nd LDM-E32	25-28	29-32	33-36	37-40	
3rd LDM-E32	41-44	45-48	49-52	53-56	
Address 2					
LDM-32	57-60	61-64	65-68	69-72	
1st LDM-E32	73-76	77-80	81-84	85-88	
2nd LDM-E32	89-92	93-96	97-100	101-104	
3rd LDM-E32	105-108	109-112	113-116	117-120	



ldmR32

LDM-R32 Lamp Driver Relay Module

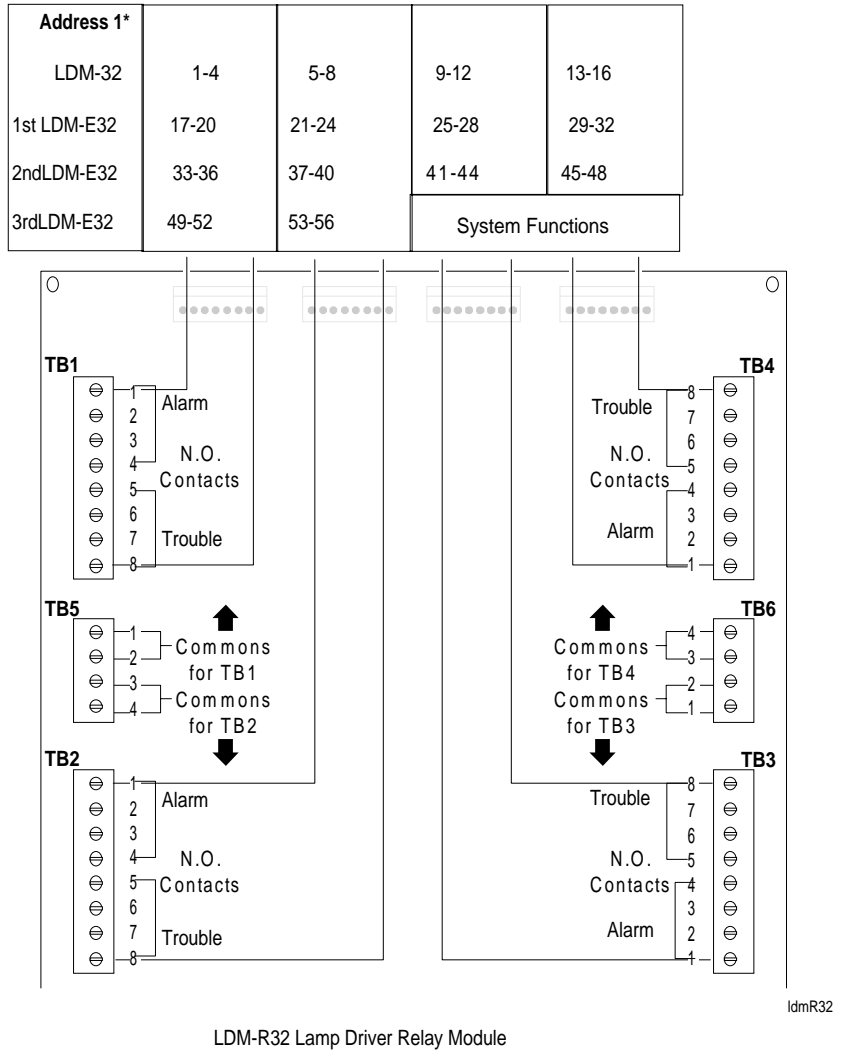
System Functions

TB1		TB2	
System Alarm	⊖ 1	Indicating Circuit 1 ON	⊖ 1
not used	⊖ 2	Indicating Circuit 2 ON	⊖ 2
not used	⊖ 3	Municipal Tie ON	⊖ 3
not used	⊖ 4	Alarm Relay ON	⊖ 4
System Trouble	⊖ 5	Indicating Circuit 1 Trouble	⊖ 5
Signal Silenced	⊖ 6	Indicating Circuit 2 Trouble	⊖ 6
not used	⊖ 7	Municipal Tie Trouble	⊖ 7
Supervisory	⊖ 8	Alarm Relay Trouble	⊖ 8

Figure 33: Alarm and Trouble Relays with the LDM-R32

Alarm and trouble Relays with CPU Shift

Figure 34 illustrates wiring the LDM-R32 Relay Expander to activate alarm and trouble relays for up to 56 zones with the last eight relays dedicated to the FC-2000 functions listed below:



System Functions

TB3		TB4	
System Alarm	⊖ 1	Indicating Circuit 1 ON	⊖ 1
not used	⊖ 2	Indicating Circuit 2 ON	⊖ 2
not used	⊖ 3	Municipal Tie ON	⊖ 3
not used	⊖ 4	Alarm Relay ON	⊖ 4
System Trouble	⊖ 5	Indicating Circuit 1 Trouble	⊖ 5
Signal Silenced	⊖ 6	Indicating Circuit 2 Trouble	⊖ 6
not used	⊖ 7	Municipal Tie Trouble	⊖ 7
Supervisory	⊖ 8	Alarm Relay Trouble	⊖ 8

Figure 34: Alarm and Trouble Relays with CPU Shift

Notes

Notes

Notes



Controls Group
507 E. Michigan Street
P.O. Box 423
Milwaukee, WI 53201

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