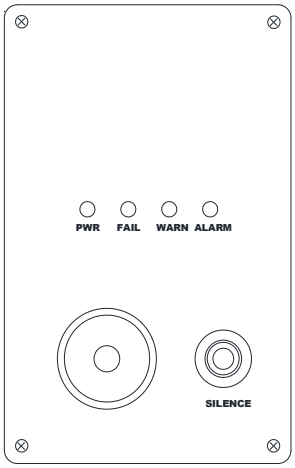
GREYSTONE
ENERGY SYSTEMS INC

M-ANNUNCIATOR



INSTALLATION
OPERATION AND MAINTENANCE
MANUAL

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1 Glossary

RS-485 (properly EIA-485): A wiring and electrical standard for digital communication in a multi drop environment. It is a 2-wire system, with a differential signal allowing relative immunity to variations in grounds between devices. RS-485: maximum 32 transceivers per loop, 4000 ft (1300 meters) max. 120 ohm line termination required. (Line termination resistors are available on all M-Series devices via selectable jumpers).

Note: All GES devices, such as the M-Annunciator RS-485 driver uses only 1/8 unit load, which allows up to 256 devices on a single bus segment when it connects to GES Q-Controller or M-Controller.

2 General System Overview

The M-Annunciator is a device located at some distance from the M-Controller or Q-Controller and provides an audible and visual indication of the status of the control system. The M-Annunciator has the following features:

- An RS-485 interface to communicate with the Q-Controller or M-Controller
- A series of four (4) LEDs, 3 of which can be programmed to indicate a certain state of the controller
- A piezo-electric buzzer that can be programmed by DIP-switch settings to sound on specific controller conditions
- A single push-button that can be used to disable/hush the audible buzzer
- Diagnostic check of RS-485 communication failure
- Powered by nominally 24VAC or 24VDC

3 M-Series Annunciator Panel Specifications

Power Supply:

- Voltage 24VDC nominal, range 18 to 30VDC
  24VAC nominal, range 15 to 24VAC 50/60HZ
- Fuse F1 Polyswitch 750mA. Polyswitch device resets after the fault is cleared and power to the circuit is removed. Actual power consumption is less than 200mA at 24VAC/DC

Note:

1. **Input power J4 is a full-wave rectifier circuit. The M-Controller is a full-wave rectifier circuit, so when working with the M-Controller, connect to J4 with the same power supply of the M-Controller. AC power must be non-grounded (Floating)**
2. **Input power J3 is a half-wave rectifier circuit. The Q-Controller is a half-wave rectifier circuit, so when working with the Q-Controller, connect to J3 with the same power supply of the Q-Controller**
3. **Half-wave rectifier circuit can be either non-grounded or grounded. You will damage devices if you mix half wave and full wave rectifiers on the same AC source. Use extreme caution when sharing a common AC source. Sharing a common DC source is less problematic.**

Button SPST, Momentary Contact

Indicators 4 Status LED's

- POWER LED green
- FAIL LED red
- WARN LED yellow
- ALARM LED red

Buzzer 90 db at 10 cm, 3600 Hz

- Alarm: Continuous
- Warning: Double-tap Intermittent
- Fault: Continuous
- Communication loss: Chirp every 10 seconds

4 Functions and Configuration

The M-Annunciator is designed to allow 1) Easy installation on the RS-485 network and 2) Easy control by the controller. It can display the status of the Controller and can be configured by the controller interface software. Digital communication over a RS-485 link allows flexibility in installation and wiring. The M-Annunciator operates from 24VAC/VDC and may be powered via the same power for the controller.

4.1 Visual Indicators

The M-Annunciator uses 4 LEDs that are colored and identified as follows:

Power Green LED	Non-programmable
ON condition:	Indicates that the M-ANNUNCIATOR's internal power supplies are functional
Blinking only:	Indicates reply acknowledge to controller on RS-485 bus
Blinking and Chirp:	Indicates fault detected, loss of communication with the controller

Fail Red LED	Programmable as relay1 to controller
ON/OFF Condition:	Programmable to respond to specific controller states

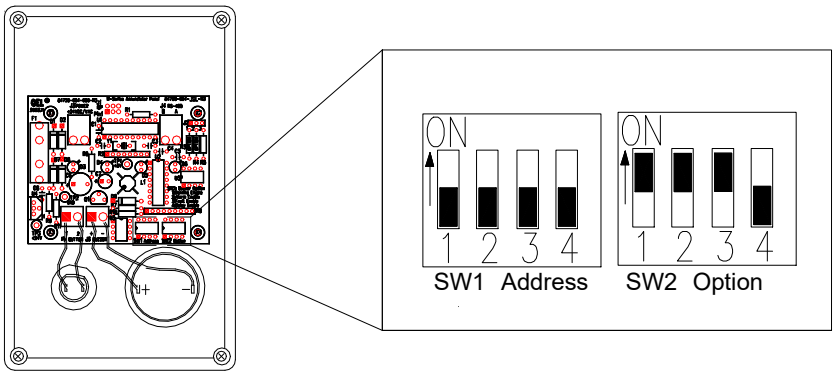
Warn Yellow LED	Programmable as relay2 to controller
ON/OFF Condition:	Programmable to respond to specific controller states

Alarm Red LED	Programmable as relay3 to controller
ON/OFF Condition:	Programmable to respond to specific controller states

4.2 Audible Indicators

The buzzer shall sound according to the user-selected settings of the DIP-switches SW2 on the board as defined below.

The buzzer shall "chirp" if RS-485 communication is lost. This feature is independent of the SW2 setting. The chirp shall be ON every 10 seconds.



Buzzer Actuation Options SW2 4-position DIP-switch:

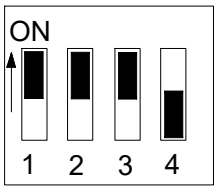
SW2 Dip-Switch	Functions
Position 1, ON:	Audible Warning enabled, buzzer shall be pulsed if the Warning LED is turned ON
Position 1, OFF:	No audible sound for Warning condition
Position 2, ON:	Audible Alarm enabled, buzzer shall be continuous if the Alarm LED is turned ON
Position 2, OFF:	No audible sound for Alarm condition
Position 3, ON:	Audible Fail enabled, buzzer shall be continuous if the Fail LED is turned ON
Position 3, OFF:	No audible sound for Fail condition
Position 4, ON:	Delay enabled, audible alarm will sound for 10 minutes max.
Position 4, OFF:	Delay disabled, audible alarm will sound for duration of Warning/Alarm/Fail state or until Alarm Acknowledge button is pressed

The sound priority: Alarm Condition is highest

Warning Condition is lower

Fail Condition is lowest

Factory Default Setting:



SW2 Option

1. Audible Warning Enable
2. Audible Alarm Enable
3. Audible Fault Enable
4. Delay Disable

4.3 Hush Button

Press the Hush button to silence the buzzer. The Buzzer will sound again when another condition is ON or the hushed condition is reset and ON again.

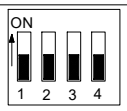
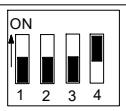
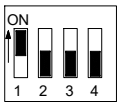
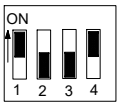
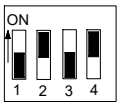
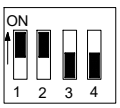
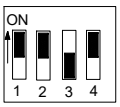
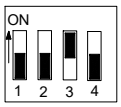
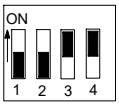
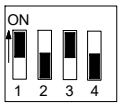
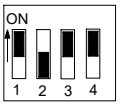
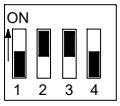
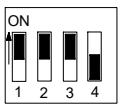
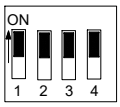
5 Addressing

The M-Annunciator address is defined on four position dipswitch SW1 and A4 on the circuit card.

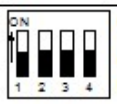
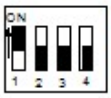
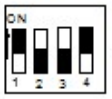
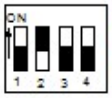
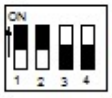
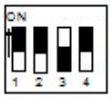
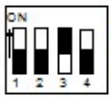
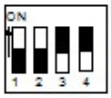
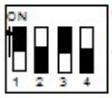
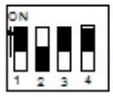
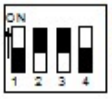
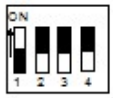
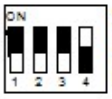
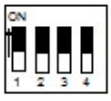
- The M-Annunciator will appear as an M-Relay module when connect to the M-Controller. It can be configured in the M-Controller database with the M-View software application. Accordingly, the M-Annunciator will share the address space with other M-Relay modules.
- The M-Annunciator will appear as a BO-Box when connect to the Q-Controller. It can be configured via the Q-Controller touch screen. Accordingly, the M-Annunciator will share the address space with other BO-Box modules.

NOTE: Don't use an address that has been assigned to other modules. It has to be unique in the network, otherwise it will cause a RS-485 communication conflict.

The following table indicates the relationships in M-Controller system.

M-Annunciator Address	SW1 Setting	Assignment	M-Annunciator Address	SW1 Setting	Assignment
0		Warning = Relay4 Alarm = Relay5 Fault = Relay6	8		Warning = Relay68 Alarm = Relay69 Fault = Relay70
1		Warning = Relay12 Alarm = Relay13 Fault = Relay14	9		Warning = Relay76 Alarm = Relay77 Fault = Relay78
2		Warning = Relay20 Alarm = Relay21 Fault = Relay22	10		Warning = Relay84 Alarm = Relay85 Fault = Relay86
3		Warning = Relay28 Alarm = Relay29 Fault = Relay30	11		Warning = Relay92 Alarm = Relay93 Fault = Relay94
4		Warning = Relay36 Alarm = Relay37 Fault = Relay38	12		Not Available
5		Warning = Relay44 Alarm = Relay45 Fault = Relay46	13		Not Available
6		Warning = Relay52 Alarm = Relay53 Fault = Relay54	14		Not Available
7		Warning = Relay60 Alarm = Relay61 Fault = Relay62	15		Not Available

The following table indicates the relationships in Q-Controller system.

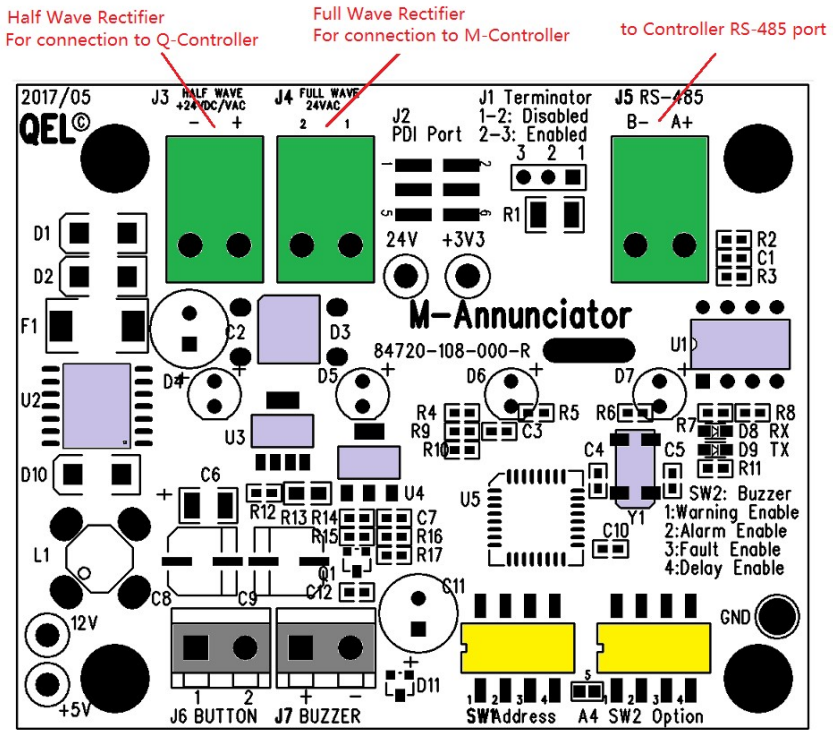
M-Annunciator Address	SW1 Setting	Assignment	M-Annunciator Address	SW1 Setting	Assignment
0		Warning = BO-Box-0-1 Alarm = BO-Box-0-2 Fail = BO-Box-0-3	8		Warning = BO-Box-8-1 Alarm = BO-Box-8-2 Fail = BO-Box-8-3
1		Warning = BO-Box-1-1 Alarm = BO-Box-1-2 Fail = BO-Box-1-3	9		Warning = BO-Box-9-1 Alarm = BO-Box-9-2 Fail = BO-Box-9-3
2		Warning = BO-Box-2-1 Alarm = BO-Box-2-2 Fail = BO-Box-2-3	10		Warning = BO-Box-10-1 Alarm = BO-Box-10-2 Fail = BO-Box-10-3
3		Warning = BO-Box-3-1 Alarm = BO-Box-3-2 Fail = BO-Box-3-3	11		Warning = BO-Box-11-1 Alarm = BO-Box-11-2 Fail = BO-Box-11-3
4		Warning = BO-Box-4-1 Alarm = BO-Box-4-2 Fail = BO-Box-4-3	12		Warning = BO-Box-12-1 Alarm = BO-Box-12-2 Fail = BO-Box-12-3
5		Warning = BO-Box-5-1 Alarm = BO-Box-5-2 Fail = BO-Box-5-3	13		Warning = BO-Box-13-1 Alarm = BO-Box-13-2 Fail = BO-Box-13-3
6		Warning = BO-Box-6-1 Alarm = BO-Box-6-2 Fail = BO-Box-6-3	14		Warning = BO-Box-14-1 Alarm = BO-Box-14-2 Fail = BO-Box-14-3
7		Warning = BO-Box-7-1 Alarm = BO-Box-7-2 Fail = BO-Box-7-3	15		Warning = BO-Box-15-1 Alarm = BO-Box-15-2 Fail = BO-Box-15-3

If an address that is higher than address 15 is needed in a network, cut the A4 track between the two pads to open. The unit address will be added to 16, i.e. 16+0, 16+1, 16+2, 16+3, 16+4… etc.

6 Power Supply and Wiring

6.1 Power Installation

The M-Annunciator power supply voltage requirements are nominally 24 VDC or 24VAC.



1. **Input power J4 is a full-wave rectifier circuit. The M-Controller is a full-wave rectifier circuit, so when working with the M-Controller, connect to J4 with the same power supply of the M-Controller. AC power must be non-grounded (Floating)**
2. **Input power J3 is a half-wave rectifier circuit. The Q-Controller is a half-wave rectifier circuit, so when working with the Q-Controller, connect to J3 with the same power supply of the Q-Controller**
3. **Half-wave rectifier circuit can be either non-grounded or grounded. You will damage devices if you mix half wave and full wave rectifiers on the same AC source. Use extreme caution when sharing a common AC source. Sharing a common DC source is less problematic.**

6.2 RS-485 Installation

Wire Standard: The cable standard is specified in the EIA-485 standard as twisted, balanced, shielded pair, with characteristic impedance of 120 ohms. Several manufacturers produce cable specifically for RS-485 installations. (e.g. Belden 9841).

We recommend using BELDEN 9841 for communications. This wire has 120 ohm input impendence, which will eliminate RS-485 communication problems.

Connections: Wire terminals J5 A+ to A+ to A+ etc. and B- to B- to B- etc.

RS-485 Terminator: The terminator on each end of the RS485 run is designed to match the electrical impedance characteristic of the twisted pair wire, and will prevent signal echoes from corrupting the data on the line. The terminator should be enabled on BOTH ends of the RS-485 run. Short and medium length RS-485 runs can operate without the terminating resistor. Longer runs may require the terminating resistors. But adding terminator dramatically increases power consumption.

Factory default setting is disabled terminator.

The M-Annunciator supplies this resistor on the main board, and it is chosen using jumper J1.

J1 1-2: Terminator Disabled / OFF (default)

J1 2-3: Terminator Enabled / ON

Distances: The RS-485 standard allows up to 1300 meters (4000 feet) of line length. It is best to avoid lines of this length if at all possible.

Stubs: Short lengths of cable from the main cable over to a device are called stubs. When the baud rate (communication bit rate) is low – e.g. 2400 baud, then it is often possible to use short lengths of a few inches without seriously impairing the signal integrity, especially when overall distances are relatively short; however, this is taking a chance on garbling your signals and is not recommended.

7 Troubleshooting Hints

This troubleshooting guide is intended as an aid in identifying the cause of unexpected behavior and determining whether the behavior is due to normal operation or an internal or external problem. Identify the symptom or unexpected behavior you are observing from the **SYMPTOMS** listed in the table. A **PROBABLE CAUSE** is provided and a suggested **SOLUTION** is proposed including references to manual sections that provide information that may be of assistance.

SYMPTOMS	PROBABLE CAUSE	SUGGESTED SOLUTION
PWR LED flashes and Buzzer chirps	• RS-485 port connection is broken	• Check RS-485 connections
	• RS-485 driver is damaged	• Change RS-485 driver chip U1
	• Controller is turned off	• Turn on Controller
	• Controller is in Menu Mode	• Wait or exit menu
	• Controller is communicating with host PC or M-View	• Wait
	• Controller has failed	• Reset or replace controller
PWR LED is OFF	• No power in	• Check power supply in
	• Internal regulator is damaged	• Return to factory
Controller reports "Rxx Offline" or "BO-Box Offline" and the relay address is the address you have assigned to the M-ANNUNCIATOR.	• Connection is wrong	• Check connections between Controller and M-Annunciator. Make sure all have power on and no shorts or opens in wiring. Be certain the polarity for RS-485 connections is correct. A-A and B-B. The internal TX/RX LEDs D8 & D9 should be always flashing
	• RS-485 driver is damaged	• Change RS-485 driver chip
	• End-of-line matching resistors are not properly set.	• Review end-of-line resistor settings

WARRANTY STATEMENT

The information contained in this manual is based upon data considered accurate; however, no warranty is expressed or implied regarding the accuracy of this data. All GES equipment is warranted against defects in material and workmanship for a period of two years from date of shipment with the following exceptions:

Electrochemical Sensors (Toxic)	Six Months
Catalytic Sensors (Combustible)	One Year

During the warranty period we will repair or replace, at our discretion, any components or complete units that prove, in our opinion, to be defective. We are not liable for consequential or incidental damage to auxiliary interfaced equipment.

A returned material authorization number should be obtained from the factory prior to returning any goods. All return shipments must be shipped freight prepaid and a copy of the maintenance records should accompany the unit concerned.

Warranty should be considered F.O.B. the factory. Labour and travel time are chargeable for any field site visits required for warranty work.

LIMITED LIABILITY

All GES systems shall be installed by a qualified technician/electrician and maintained in strict accordance with data provided for individual systems in the form of installation/maintenance manuals. GES assumes no responsibility for improper installation, maintenance, etc., and stresses the importance of reading all manuals. GES shall not be responsible for any liability arising from auxiliary interfaced equipment nor any damage resulting from the installation or operation of this equipment.

GES's total liability is contained as above with no other liability expressed or implied, as the purchaser is entirely responsible for installation and maintenance of systems.

This warranty is in lieu of all other warranties, expressed or implied, and no representative or person is authorized to represent or assume for GES any liability in connection with the sales of our products other than that set forth herein.

NOTE: Due to on-going product development, GES reserves the right to change specifications without notice and will assume no responsibility for any costs as a result of modifications.

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