USER'S MANUAL

Omni16R Series

19" Rack Alarm Annunciator

DATE	REVISION	COMMENTS
Aug 2013	1	Initial issue
Nov 2013	2	Connection details corrected
Jul 2016	3	Added details of C1692A terminal board
Dec 2016	4	Added dimensions of Surface Mount version
Jul 2018	5	Correct dimensions of Rack mount version and maximum lamp current draw

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The pdf file is named UMC1680AR05.pdf

SCOPE

This User Manual provides information necessary to install, configure and operate your Omni16R product.

This manual covers the following product Model Numbers:

Model	Description	Picture*
19 inch Sub-Racks		
C1679A-0	Omni16R 19 inch sub-rack	Figure 1-1
C1679A-1	Omni16R surface-mount sub-rack	
3U Cards		
C1680A	Omni16R 16 Way Alarm Card	Figure 1-2
C1683A-0	Omni16R 16 Way Repeat Relay Card with rear access	
C1683A-1	Omni16R 16 Way Repeat Relay Card with front terminal access	Figure 1-2
C1685A	Omni16R Common Services Card	
C1686A	Omni16R 16Way Front Access Power Input Termination Card	
C1687A	Omni16R 16Way Front Access Common Services Termination Card	
C1688A	Omni16R 16 Way Front Access I/O Termination Card	Figure 1-2
Terminal Boards		
C1690A	Omni16R Input Terminal Board	
C1691A	Omni16R Universal I/O Terminal Board	
C1692A	Omni16R Isolated Input Terminal Board (Special Order Only)	
C1695A	Omni16R Common Services Terminal Board	
C1696A	Omni16R Power Supply Terminal Board	

* Pictures are for reference only. Some details may change between models.

Introduction

The OMNIFLEX OMNI16R family is a range of highly flexible 19” rack modules, including full function alarm Annunciator card and multiple option cards designed to fulfil all the requirements of the modern industrial plant.

Alarm Annunciators are a key component in the safety of the plant, and these products have been designed with safety integrity in mind. Continuous advanced internal self testing creates a product suitable for use in IEC61508 SIL1 applications. Combined with the C1670A OmniX series remote displays, the Omni16R allows high density SIL rated alarm systems to be constructed.

All products in the range are available “off-the-shelf” with no factory customisation required. Because these units are not built to order, spares holding and maintenance are significantly enhanced. Standard 3U-high 19” racks allow systems from 16 to 320 points to be constructed by the user.

Panel mounted OmniX display options use high-bright back-lit LED’s with a selection of colours to satisfy various indication standards.

Display legends for the backlit displays are created by the user on any standard laser/inkjet printer using software templates supplied with the product.

All popular configuration options are accomplished by switch settings on top edge of the alarms cards. Software programming can be used to select more advanced options.

Omni16R is a 24V dc-powered system with ability to make use of dual redundant supplies. These rugged products are designed to fit directly into 19” rack cabinets with straightforward interfaces for the lowest cost system implementation.

Additional options include:

- Fully isolated RS232/422/485 Modbus© compatible serial port to interface to PLC, DCS, or SCADA systems.
- Isolated inputs.
- Input repeat relays to minimise field wiring when also connecting inputs to other systems.
- A Software Configuration Utility for more advanced customisation.

This manual covers all of the products listed on page 3. See section 6 for details of available options.

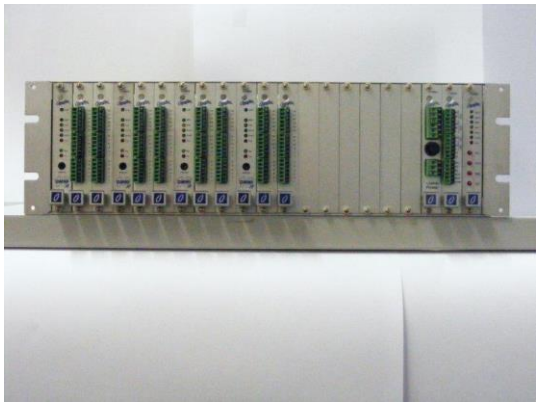

Figure 1-1 The Omni16R 19" Rack Mount Alarm Annunciator system.

Figure 1-2 The Omni16R Cards with front termination

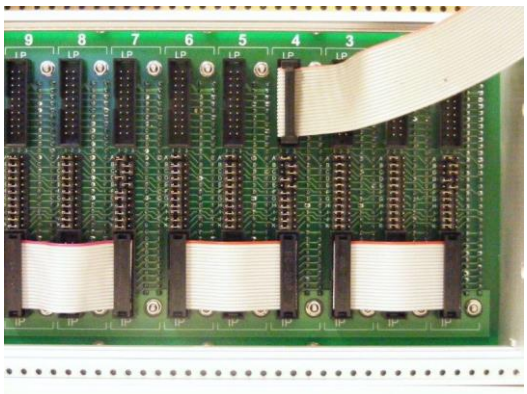

Figure 1-3 The Omni16R 19"Rack Mount rear link area.

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1. GENERAL DESCRIPTION

1.1 Standard Features of Omni16R system

- Systems from 16 to 320 alarm points in 3U height easily constructed by the user.
- Integral or Remote pushbuttons for maximum flexibility.
- 16 points of alarm/display in single width 3U high modules to minimise panel space.
- All modules in the range are supplied off-the-shelf with no factory customisation required, minimising spares holding.
- User-created display legends on standard laser/inkjet printer using software templates supplied – no window engraving required.
- Relay outputs for common group alarm and external audible device control.
- Integral hardware watchdog relay for safety critical applications.
- Removable terminals on front-access cards for easy installation and maintenance.
- Wetting voltage supplied to the inputs to allow potential free input contacts to be directly connected.
- Switch selectable Normally Open or Normally Closed input contact sense selection while installed.
- 27 switch selectable alarm sequences built in covering most alarm annunciator specifications and configurations.
- 24Volt dc powered.

1.2 Options available

- Front access Power Supply card for direct connection of the rack to 24Vdc (for systems up to 6 C1680A cards).
- Input repeat relays to minimise field wiring when also connecting inputs to other systems.
- Advanced Software Configuration Utility to configure the Omni16R in “SOFT-SET” mode for more specialised applications.

1.3 Front View of 16-point Rack Mount Units showing Display Layout

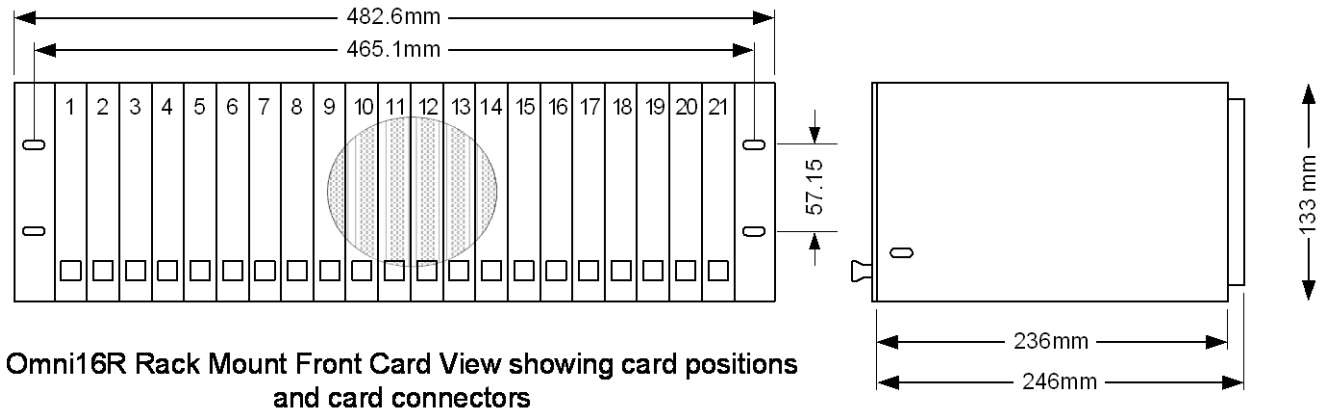


Figure 1-4 – Panel Mount Omni16R Front View showing card positions

1.4 Front View of 16-point Surface Mount Units showing Display Layout

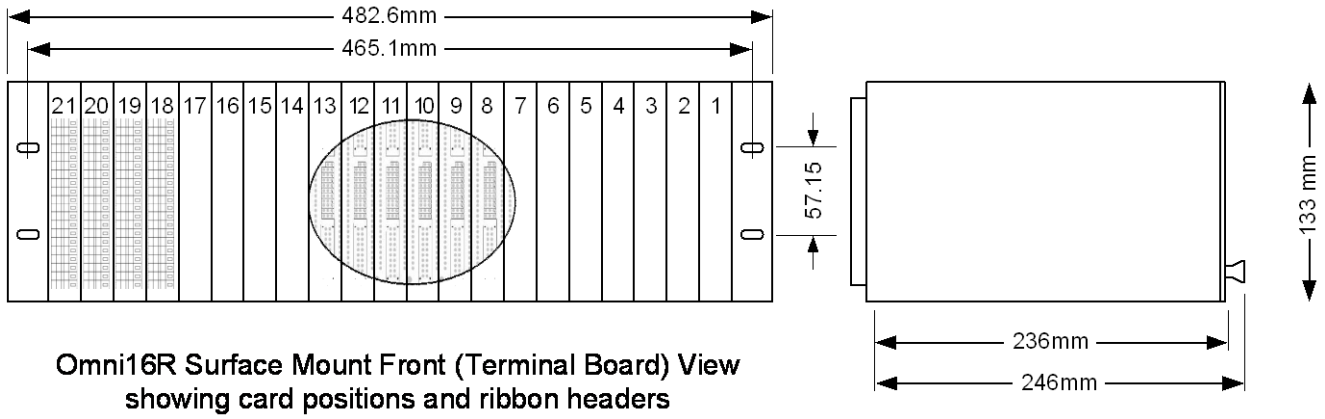


Figure 1-4 – Surface Mount Omni16R Front View showing card positions

1.5 Omni16R Alarm Unit showing available connections

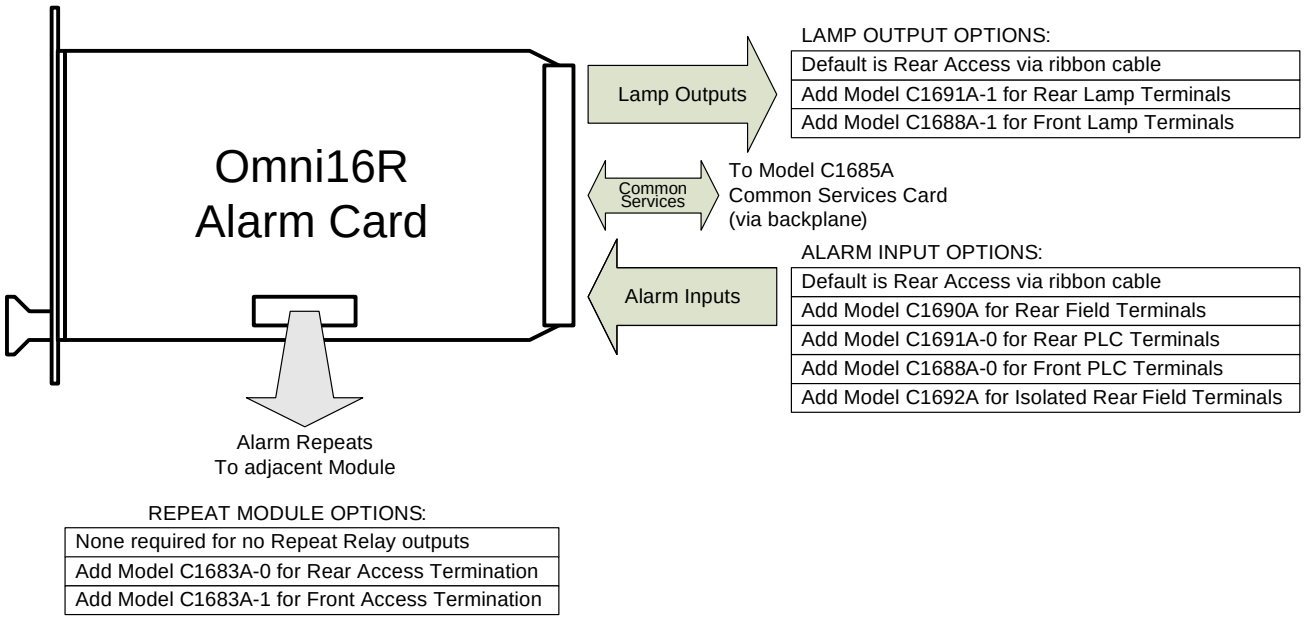


Figure 1-5 – Omni16R Side View showing available connections

View of Omni16R Motherboard showing link fields

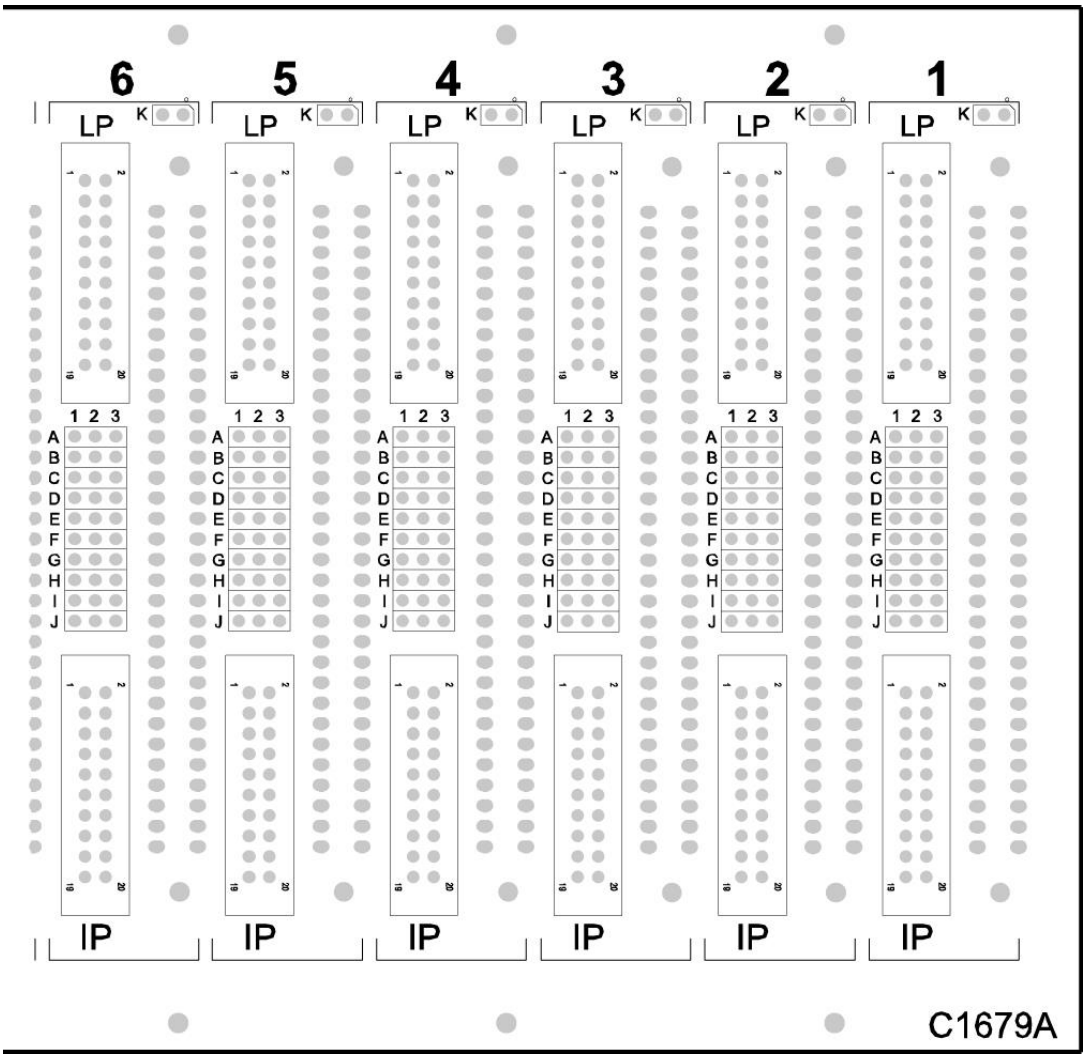


Figure 1-6 – Motherboard View showing link fields.

2. MECHANICAL INSTALLATION

2.1 19 inch Rack Mounting

For 19” rack mounting, insert alarm cards in the desired positions. Alarm cards C1680A are inserted from left to right. If entire rack is a single system and one set of Common services connections is required, then preferably install Common Services Card C1685A in Slot 21.

To achieve correct functionality, follow the installation steps as stipulated below:

1. Fully insert Alarm Cards C1680A into required slots.
2. If Repeat Relay Cards C1693A are used, install one on the right-hand side of corresponding C1680A and connect both cards with internal ribbon cable.
3. If Front Access Input Card is used install one on the left of the corresponding Alarm Card.
4. Install Common Services Card C1685A to the right pf the last card, preferably in Slot 21.
5. If Front Access Power Card C1686A Card is used install it next to the Common Services Card C1685A to facilitate interconnection.
6. Next access the back of the motherboard and install the necessary links according to the links Table.
7. Install 50mm ribbon links between the Alarm Card and Front Input Card using IP ribbon headers on the motherboard.
8. Install 50mm ribbon links between Common Services Card and Front Input Power Card (if used) using LP ribbon headers on the motherboard.
9. If rear Terminal boards are used, install them now and link to corresponding cards.
10. Mount the entire assembly in the 19” rack.
11. Link Lamp outputs to OmniX Displays using 20W ribbon cables. Use LP (Lamp) ribbon headers along the top edge of the motherboard.
12. If Terminal Boards are not used, use 20W ribbon cables to connect inputs to C632x Input terminal boards. Use IP (Input) ribbon headers along the lower edge of the motherboard.
13. Test the entire rack to ensure that correct functionality is achieved.

Note that Alarm cards can be arranged into smaller groups so that more than one group is installed on the same rack. However, not all functions can be implemented in this case. It is necessary to use a special plug (available separately) to start a new group. Also, RS485 connections cannot be separated and work on an entire rack. Hence only one set of RS485 connections on a selected C1685A card should be used.

Connections such as pushbuttons, Horn and parallel GA outputs (close to Alarm) can be easily linked into groups.

2.2 Surface Mounting of Omni16R system.

The Omni16R may be surface-mounted without using a 19” rack. In this case, special side plates are installed “in reverse” so that the mounting flanges are at the rear. Please note that only correctly selected original 19” rack side plates will have required mounting holes ready for this style of installation.

The mounting points securing of the Omni16R rack to the user’s panel/surface have the same spacing and pitch as the mounting points of the 19” rack.

In surface mount units, the rear space is not available for installation of Omni16R-series rear Terminal Boards. The user must select front-access cards for all functions. There is however space for ribbon cables so connections to displays and separately mounted Input Terminal Boards (such as C6320) are not affected.

2.3 Links Connection Table.

The Link field should be connected as per Table below. Tables 1 and 2 show link positions when the entire rack is a single system with one set of Common Services (one C1685A card).

X denotes linked positions.

Description	Link	1-2	2-3
GA4 failsafe	A		X
GA3 failsafe	B		X
Horn	C	X	
Watchdog	D		X
First Out	E	X	
Inhibit	F	X	
Silence	G	X	
Test	H	X	
Reset	I	X	
Acknowledge	J	X	

Table 1. Standard links at Alarm Card slot position (card installed).

Input Logic link K (top) has only one position and sets the input common to positive common. Remove the link if negative common is required.

Description	Link	1-2	2-3
GA4 failsafe	A	X	
GA3 failsafe	B	X	
Horn	C	X	
Watchdog	D	X	
First Out	E	X	
Inhibit	F	X	
Silence	G	X	

Test	H	X	
Reset	I	X	
Acknowledge	J	X	

Table 2. Bypass links at Alarm Card slot position (card not installed).

In slot 21 link K is not used unless the slot is used for Alarm Card. If used for Common Services card, the links at position 21 only relate to Relays 3, 4 and Watchdog. They are used as follows (failsafe connections as default):

Description	Link	1-2	2-3
GA4 failsafe	A		X
GA3 failsafe	B		X
Watchdog	C		X

Table 3. Bypass links at CS Card slot position 21.

All other Common Services signals are routed to the corresponding connections on the Common Services card and do not required links in Slot 21.

2.4 Links Connection Tables for Groups.

When Alarm Cards are organised into groups, each ending with a Common Services Card, follow Table 1 for cards in one group. If the first C1680A card is not in Slot 1, then a special shorting plug (Group Starter) is required at positions marked in the table as SG.

It is recommended that each group ends with a blank (unoccupied) slot. All links are removed at the end of one group. Flash sync will still be available across groups as it is applied to the entire rack, as is RS485 connection.

Several C1680A cards can then be used as a subsystem, with its own Common Services C1685A card. C1680A are inserted in sequence – as many as required – immediately followed by C1685A.

2.5 Installing Common Services Pushbuttons

The control pushbuttons required to manage the alarm sequences selected in the Omni16R are available as standard in the C1685A card.

They can also be located external to the Omni16R when using Common Services Terminal Board C1696A or Front Access Common Services Card C1687A.

If mounted externally, then they must be wired to the terminals of the C1696A on the rear of the unit or the terminals of C1687A at the front of the unit. See Section 3.9 for further details.

3. ELECTRICAL INSTALLATION

3.1 Introduction

All electrical connections to the Omni16R are made on the rear of the unit on rear terminals unless front access cards are installed in which case connections can be made using removable terminals at the front.
The following general block diagrams provide an overview of the connections required.
Not all products in the range have all the facilities shown. These connections are described individually in more detail later in this section.

3.2 Omni16R Block Diagram

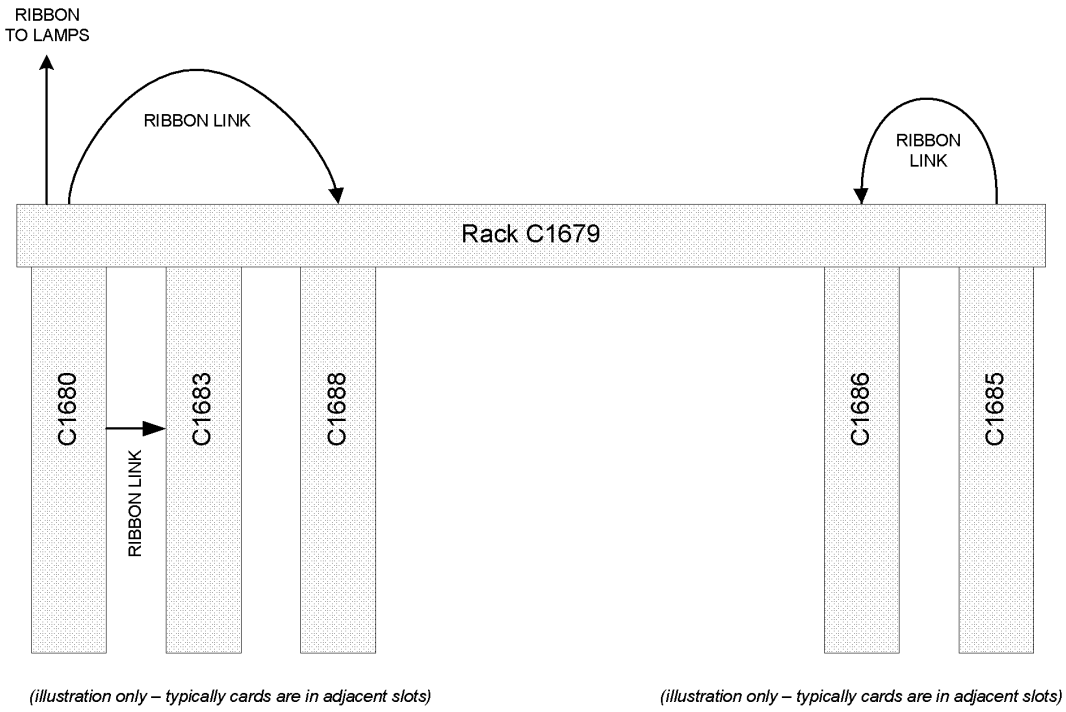


Figure 3-1 –Omni16R Annunciator Block Diagram

Figure 3-1 shows typical Omni16R Block diagram. Only one C1680 card with optional cards C1683 and C1688 is shown. In a typical system there would be multiple C1680 cards, with or without optional cards. Each C1680 card can process 16 alarms. The rack with ten C1689 cards would therefore become a 160-point alarm system.

3.3 Omni16R Modules Terminal Schedule

Module Terminal Number	Terminal Marking	Description
C1683A-1		Repeat Relay Card with Front Access
18	COM1	Common 1 Connection (Excitation) – A common voltage for Relays 9-16. This connection is fused.
17	RLY16	Relay 16 contact
16	RLY15	Relay 15 contact
15	RLY14	Relay 14 contact
14	RLY13	Relay 13 contact
13	RLY12	Relay 12 contact
12	RLY11	Relay 11 contact
11	RLY10	Relay 10 contact
10	RLY9	Relay 9 contact
9	COM2	Common 2 Connection (Excitation) – A common voltage for Relays 1-8. This connection is fused.
8	RLY8	Relay 8 contact
7	RLY7	Relay 7 contact
6	RLY6	Relay 6 contact
5	RLY5	Relay 5 contact
4	RLY4	Relay 4 contact
3	RLY3	Relay 3 contact
2	RLY2	Relay 2 contact
1	RLY1	Relay 1 contact

C1686A		Front Access Power Input Card
9	+	RS485 positive
8	–	RS485 negative
7	G	RS485 Ground
6	A	Alarm NO – redundant supply failure
5	B	Alarm NC – redundant supply failure
4	C	Alarm Com – redundant supply failure
3	1	+24V – power input 1
2	2	+24V – power input 2
1	G	Ground
C1687A		Front Access CS Termination Card
18	GA2-NO	GA2 Relay NO connection
17	GA2-NC	GA2 Relay NC connection
16	GA2-C	GA2 Relay Common connection
15	GA1-NO	GA1 Relay NO connection
14	GA1-NC	GA1 Relay NC connection
13	GA1-C	GA1 Relay Common connection
12	HN-NO	Horn relay connection 1
11	HN-NC	Horn relay connection 2
10	WD-NO	Watchdog relay connection 1
9	WD-NC	Watchdog relay connection 2
8	FO	First-Out output
7	FS	Flash Sync output
6	INH	Inhibit input
5	TST	Test pushbutton connection
4	SIL	Silence pushbutton connection
3	ACK	Acknowledge pushbutton connection
2	RES	Reset pushbutton connection
1	COM	Common negative for pushbuttons
C1688A		Front Access I/O Termination Card
18	COM	Common Connection (Excitation) – A common voltage for Inputs 1-16.
17	COM	Common Connection (Excitation) – A common voltage for Inputs 1-16.
16	16	Input 16 Connection
15	15	Input 15 Connection
14	14	Input 14 Connection
13	13	Input 13 Connection
12	12	Input 12 Connection
11	11	Input 11 Connection
10	10	Input 10 Connection
9	9	Input 9 Connection
8	8	Input 8 Connection
7	7	Input 7 Connection
6	6	Input 6 Connection
5	5	Input 5 Connection
4	4	Input 4 Connection
3	3	Input 3 Connection
2	2	Input 2 Connection
1	1	Input 1 Connection

24 Volt power		(On motherboard)
+24V (spade)	+24V	+24 volt supply to the Omni16R.
GND (spade)	0V	0 volt supply to the Omni16R.
C1690A		Input Terminal Board
Row1-16	8A	Input 8 Common
Row1-15	8B	Input 8
Row1-14	7A	Input 7 Common
Row1-13	7B	Input 7
Row1-12	6A	Input 6 Common
Row1-11	6B	Input 6
Row1-10	5A	Input 5 Common
Row1-9	5B	Input 5
Row1-8	4A	Input 4 Common
Row1-7	4B	Input 4
Row1-6	3A	Input 3 Common
Row1-5	3B	Input 3
Row1-4	2A	Input 2 Common
Row1-3	2B	Input 2
Row1-2	1A	Input 1 Common
Row1-1	1B	Input 1 Common
Row2-16	16A	Input 16
Row2-15	16B	Input 16 Common
Row2-14	15A	Input 15
Row2-13	15B	Input 15 Common
Row2-12	14A	Input 14
Row2-11	14B	Input 14 Common
Row2-10	13A	Input 13
Row2-9	13B	Input 13 Common
Row2-8	12A	Input 12
Row2-7	12B	Input 12 Common
Row2-6	11A	Input 11
Row2-5	11B	Input 11 Common
Row2-4	10A	Input 10
Row2-3	10B	Input 10 Common
Row2-2	9A	Input 9
Row2-1	9B	Input 9 Common
C1691A		PLC Input Terminal Board
19	C+	Positive Common for Inputs (+24V)
18	PU	Pullup/pulldown common for inputs
17	C–	Negative Common for Inputs (GND)
16	16	Input 16 Connection
15	15	Input 15 Connection
14	14	Input 14 Connection
13	13	Input 13 Connection
12	12	Input 12 Connection
11	11	Input 11 Connection
10	10	Input 10 Connection
9	9	Input 9 Connection
8	8	Input 8 Connection
7	7	Input 7 Connection
6	6	Input 6 Connection

5	5	Input 5 Connection
4	4	Input 4 Connection
3	3	Input 3 Connection
2	2	Input 2 Connection
1	1	Input 1 Connection
C1695A		Power Supply Terminal Board
5	+	RS485 positive
6	–	RS485 negative
7	G	RS485 Ground
8	A	Alarm NO – redundant supply failure
9	B	Alarm NC – redundant supply failure
10	C	Alarm Com – redundant supply failure
1	1	+24V – power input 1
2	2	+24V – power input 2
3	G	Ground
4	G	Ground
C1696A		Common Services Terminal Board
18	GA2-NO	GA2 Relay NO connection
17	GA2-NC	GA2 Relay NC connection
16	GA2-C	GA2 Relay Common connection
15	GA1-NO	GA1 Relay NO connection
14	GA1-NC	GA1 Relay NC connection
13	GA1-C	GA1 Relay Common connection
12	HN-NO	Horn relay connection 1
11	HN-NC	Horn relay connection 2
10	WD-NO	Watchdog relay connection 1
9	WD-NC	Watchdog relay connection 2
8	FO	First-Out output
7	FS	Flash Sync output
6	INH	Inhibit input
5	TST	Test pushbutton connection
4	SIL	Silence pushbutton connection
3	ACK	Acknowledge pushbutton connection
2	RES	Reset pushbutton connection
1	COM	Common negative for pushbuttons

3.4 Omni16R Serial Port Pinouts to PC or PLC

The isolated serial port is available as default on Common Services Card C1685A. However this card uses other modules to connect RS485 to user's terminals. The connection option must be specified when ordering your annunciator, and the following options are available:

1. On rear terminals using C1696A Power Terminal Board.
2. On front Terminals using C1686A Front Access Power Termination Card.

The selection will depend on rack design and method of mounting.

C1686A or C1696A have to be linked with ribbon cable to the top ribbon connector of the Common Services Card C1685A for the RS485 to operate.

If using the Serial Port the Serial connections are as follows:

RS485 connection	C1686A terminals	C1696A terminals
RS485 +	9	10
RS485 -	8	9
GND	7	8

Figure 3-2 RS232/485 Connector Pin-out (Omni16R).

Only 3-wire RS485 communication terminals are available.

NB: Unlike in Omni16C, the Serial Jack plug facility normally used to configure the annunciator is not disabled when using RS485. However, plugging in the programming jack temporarily disables RS485 on this Alarm Card.

3.5 Power Requirements

The standard Omni16R is 24Volt dc powered.

The table below gives the maximum current requirement of each of the products in the range.

If any of the options are fitted, then these must be added to the base consumption to determine the total consumption of the product.

Model	Max Current Consumption at 24Volts dc
C1680A	0.1 A Note1
C1680A	1.1 A with lamps
C1683A-0	0.14 A
C1683A-1	0.14 A_1
C1685A	0.2 A
C1686A	0.1 A
C1687A	0.03 A
C1688A	0.12 A
C1690A	0.12 A
C1691A-0	0.12 A
C1691A-1	0.12 A
C1695A	0.0 A
C1696A	0.0 A
Options	

Table 3-1 Omni16R Power Consumption

Note 1: This power consumption EXCLUDES the requirements of the remote display used in conjunction with this product which must be accounted for. Refer to specifications for maximum lamp output current.

3.6 Connecting the Power Supply

3.6.1 Without Front-Input Power Card Installed.

Without an optional internal Power Supply installed, the Omni16R is powered from an external 24Vdc supply.

Connect the external 24Volt supply to spade terminals on the rear of the unit (motherboard). There is no galvanic isolation provided between the 24Volt supply and the internal logic of the unit.

Terminal	Connection
+24V SPADE1,2	+24Volts +/- 15% (20.4 – 27.6 Volts)
GND (SPADE)	0 volts

When power is correctly applied, then the Green “Pwr” indicator on the front of the Alarm Card is lit.

Reverse Polarity Protection

The Omni16R is NOT equipped with reverse polarity protection on these terminals.

Reverse polarity protection is available if diode block for dual redundant power connection is used, and also when using C1686A Front Access Power Input Termination card. In these two cases there is no adverse effect if the 24Volt supply is connected in reverse.

3.7 Connecting the alarm inputs

The Omni16R is operated with potential free contacts connected to the input terminals. On full terminal board C1690A each input is provided with a pair of terminals marked A and B. Terminal A is the alarm input and terminal B is an independently current limited wetting voltage supplied from the internal 24 volt supply as shown below. The standard Input option is 24V common, 0V common can be selected with ‘K’ link on the backplane and link on the card.

NB: The operation of the Full Terminal Board is explained here for illustration purposes. Connections to C1688A, C1691A and C1692A follow the same logic except that there are no individual common connections for each input

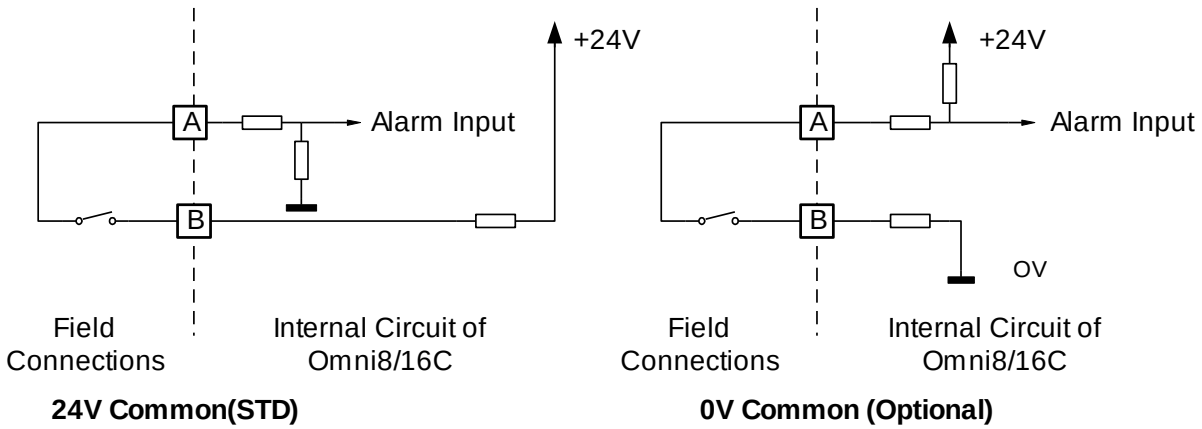


Figure 3-3 Input Connection Diagram using individually wired Potential Free Contacts

If a common return wire for all inputs in the system is required, then this must be wired directly to the +24Volt supply as shown below.

CAUTION: When connecting the *inputs in this way, the common +24Volt return MUST be fused to prevent an earth fault in the field wiring from shorting the power supply. (Power Supply 0 Volts is commonly earthed in practice to ensure that covert earth faults in the system do not go unnoticed.)*

In this configuration, a field earth fault on any one input loop will remove the 24Volt wetting voltage from all the alarm inputs in the system. For this reason, the installation configuration in Figure 3-3 is always preferable.

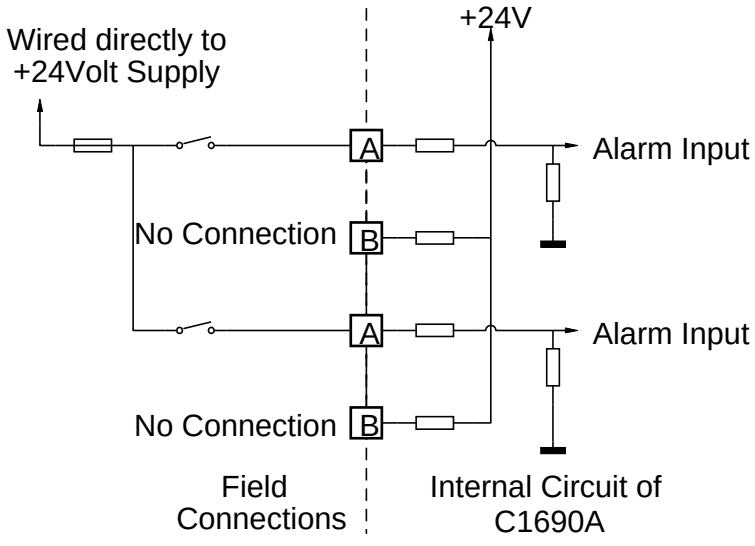


Figure 3-4 Input Connection Diagram using Common Return Wire

3.8 Connecting the Common Service Relay Contacts

Contacts from four Relays are provided as Common Outputs from the Omni16R.

The functions of these contacts may vary between “SWITCH-SET” mode and “SOFT-SET” mode.

NOTE All relay contacts are described below as being “normally open” or “normally closed”. This refers in all cases to the “rest” state of the contact, with no power on the relay coil.

This is not be confused with the “normal” system operating condition, where the relay coil may be “normally” energised (as in “normal” for the operating condition of the system) causing a “normally open” contact to be closed when the system is functioning “normally”!

3.8.1 SWITCH-SET MODE

In “Switch-Set” mode the functions of these relays are predefined as follows:

RELAY	FUNCTION	Description
RL1	Watch-dog	A normally open contact is provided from this relay. This relay is derived from the hardware watch-dog circuitry in the Omni16R. If the hardware watch-dog detects a failure, then this relay will de-energise, and the contact will open. This output can be used in critical applications to monitor the health of the Omni16R.
RL2	Horn	A normally open contact is provided from this relay. This relay is de-energised with no alarms present and will energise when an alarm occurs causing the audible to be sounded. This contact will close to sound the audible device.
RL3	Group Alarm	A change-over contact is provided from this relay. This relay acts as a Group Alarm output for the Omni16R. There are various modes of operation of this Group Alarm. See Section 4.5 for further details of these modes.
RL4	Not Used	A change-over contact is provided from this relay. This relay is not used in Switch-Set mode, and will remain de-energised.

3.9 Connecting Control Pushbuttons

CAUTION: External Pushbuttons are powered from the internal circuitry of the alarm annunciator. Do NOT connect the external pushbuttons to any external power supply.

3.9.1 Controlling a single Omni16R with internal pushbuttons

When a single Omni16R is fitted with a C1685ACommon Services Card, no external wiring of pushbuttons is necessary and Terminals on the rear of the unit may be left unconnected.

3.9.2 Controlling a single Omni16R with external pushbuttons

External Test, Silence Acknowledge and Reset pushbuttons may be connected to the Omni16R via C1696A Terminal Board as shown in the following schematic:

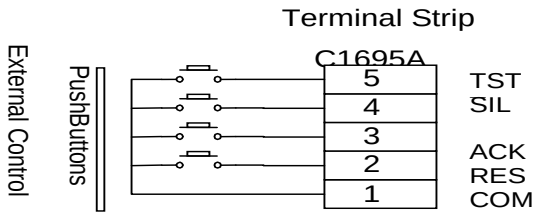


Figure 3-5 External Pushbuttons controlling a single Omni16R

3.9.3 Controlling multiple Omni16R's with external pushbuttons

Up to 20 C1680A cards may be controlled by a single set of external pushbuttons. All units on the same backplane are wired in parallel by backplane links. See par. 2.2.

For connections of external pushbuttons, use C1695A.

3.9.4 Controlling multiple Omni16R's with an C1685 Card.

Up to 20 Omni16R C1680A cards may be controlled from a Model C1685 Common Services Card. Install the Common Services Card in Slot 21 and install links as shown in section 2.2.

The internal Pushbuttons will control all of the connected units.

3.10 Connecting the C1415 Remote Pushbutton Station

Omni16R units may be controlled by a single Remote Pushbutton Station C1415. Simply wire as shown below.

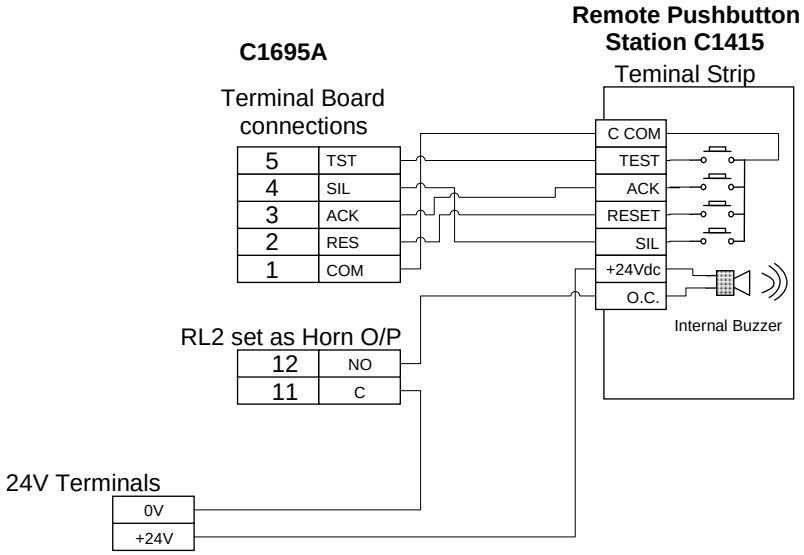


Figure 3-6 Connecting C1415 Remote Pushbutton Station to Omni16R units.

3.11 Connecting the Inhibit Input

By switching this input to 0 Volts of the 24Volt Supply, all new alarms are prevented from occurring. Repeat outputs when set to follow inputs will be unaffected and input status can still be monitored via the serial link.

3.12 Connecting the optional Input Repeat Relay Contacts (Model C1683A)

The Omni16R may be fitted with optional Input Repeat Relay boards. These boards provide a single normally open contact as a repeat of each alarm input in the unit. This may be used for connecting to other equipment such as sequence-of-event recorders or data-loggers.

The contact will be closed when the corresponding input is the normal condition, and will be open when the input is in the alarm condition. This is independent of whether the input is set to be normally open or normally closed.

3.13 Connecting the optional OmniX Displays (Model C167x)

The Omni16R may drive optional OmniX Displays directly.

The motherboard is equipped with two 20 way ribbon cable headers.

The bottom ribbon cable header is used for 16 alarm inputs in the unit. This header may be used for connecting to other equipment such as OMNIFLEX's C632x Terminal Boards.

The top header provides 16 outputs used to drive a remote display. The output will be on when the corresponding lamp is illuminated.

The output will be off when the corresponding input is the normal condition, and will be on when the input is in the alarm condition. This is independent of whether the input is set to be normally open or normally closed.

Each of these outputs is an open collector transistor output with the following electrical specification:

Collector Voltage	40Volts max.
Collector Current	100mA max.

CAUTION:

These outputs are not protected from short circuits, and exceeding the above ratings will damage the unit.

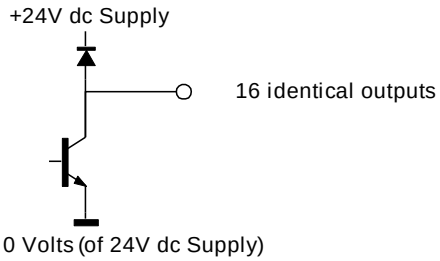


Figure 3-7 Open Collector Transistor Output Arrangement

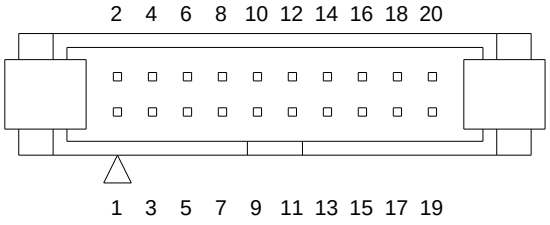


Figure 3-8 Ribbon Header Pin Layout

Pin No.	Description
1	0 Volts
2	0 Volts
3	24 Volts
4	24 Volts
5	Output 16
6	Output 15
7	Output 14
8	Output 13
9	Output 12
10	Output 11
11	Output 10
12	Output 9
13	Output 8
14	Output 7
15	Output 6
16	Output 5
17	Output 4
18	Output 3
19	Output 2
20	Output 1

Table 3-2 Ribbon Header Pin Allocation

3.14 Synchronising flashing between multiple Omni16R's

Up to 16 Omni16R racks may be connected together into a single display system of up to 5120 points. In order to synchronise the display flashing in the system FS Terminals on all C1687A or C1696A boards in the system must be wired together.

All units in the system must share a common power supply reference. Wire COM Terminal on all units together to achieve this.

3.15 Expanding First-Out Groups between multiple Omni16R's

Some of the alarm sequences selectable in the Omni16R are "First-Out" alarm sequences. This means that the flashing sequence is such that the first alarm to occur in the group will flash differently to all subsequent alarms to allow the operator to identify which alarm occurred first.

In order to quickly identify the C1680 card generated FO output see LED indicators on the front panel of the card.

Up to 16 C1680's may be connected together into a single First-Out group. Link on the reverse of the motherboard as shown in paragraph 2.2 to accomplish this.

All units in the system must share a common power supply reference. Wire Terminal COM on all units together to achieve this.

4. CONFIGURING THE Omni16R FOR OPERATION

4.1 Introduction

The Omni16R is configured by means of 8-way “set-up” switches. These are located with the connection terminals. The location of these switches can be seen in Figure 4-1.

These “set-up” switches fall into two groups:

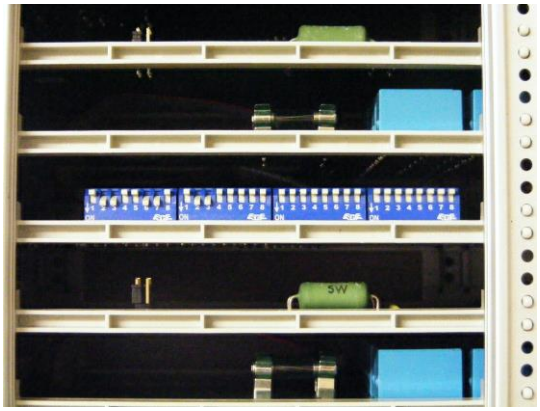
Input Sense Selection Switches

There are two 8 way “set-up” switches associated with 16 inputs and are used to configure the inputs for normally open or normally closed operation (DIPSW1,2). These are the two switches located closer to the front edge of C1680. See section 4.3 for further information.

Mode Selection Switches

This is a group of two 8-way switches located towards the back of the unit (SW1 and 2).

Each 8-way switch has 8 individual miniature switches, numbered from 1 to 8. Each of these miniature switches can be referred to individually: for example, the 8 miniature switches on SW1 are referred to as SW1-1 to SW1-8.



BACK	SW1	SW2	DIPSW1	DIPSW2	FRONT
	Config	Config	Inputs 1-8	Inputs 9-16	

Figure 4-1 Location of switches on top of C1680 card.

4.2 Modes of Operation

SW1 and SW2 are used to set the operational configuration of the Omni16R.

The Omni16R can be set into one of two modes of operation:

“**SWITCH-SET**” mode or “**SOFT-SET**” mode.

In “SWITCH-SET” mode, the entire operation of the unit is set by selections on these mode switches.

In “SOFT-SET” mode, the operation of the product is set via the programming port on the front of the unit using the optional Software Configuration Software.

The product is put into “SOFT-SET” mode by a specific selection on the mode switch SW1. (SW1-1 to SW1-8 set on)

This manual covers the “SWITCH-SET” configuration. "For SOFT-SET configuration see the on-line help in the Omni16R Configuration template supplied with the Omniset Configuration Utility"

SOFT-SET mode offers the optimum in flexibility whilst SWITCH-SET Mode offers Omni16a and b style functionality and limited options. The table below summarises the capabilities of each mode and the limitations.

COMPARISON OF DIP SWITCH MODE VERSUS SOFTSET MODE CONFIGURATION OPTIONS		
CONFIGURATION OPTION	***DIP SWITCH SET MODE***	***SOFT-SET MODE***
Input Sense		
SET INPUT FOR NORMALLY OPEN OR CLOSED *Can only be set on DIP switch on each Input module*	Yes	No
Common Services		
Common Service Input Status If any bit below is 1 then the input is ON. Bit 0: INH (Inhibit input) Bit 1: TST (Lamp Test input) Bit 2: ACK (Acknowledge input) Bit 3: SIL (Silence input) Bit 4: RES (Reset input) Bit 5: FS (Flash Sync input - this bit is READ ONLY) Bit 6: FO (First Out input - this bit is READ ONLY) Bits 7-15: Reserved	No *Actuated via terminals at rear of Omni16*	Yes
Alarm Sequences		
Select Sequence number from Table 4-1. DIP switches must be set to Sequence 31 on SW1 for this register to be recognised, otherwise the DIP switch setting is used.	Sets : Input 1-8 Input 9-16	Each Input individually set
Timers		
Setup Timer Setting: Input delay timer set per input. One input per byte.	Input 1-16 *Single Timer for all Alarm Points*	*Each Alarm Point individually set Timer*
Setup Timer Resolution	Yes	Yes
Relay Outputs 1 to 4		
Setup Relay Output Function	No RL1 = Watchdog RL2 = Horn RL3 = Group Alarm RL4 = Not used	Yes Choose option for each
Setup Relay Output 1 to 4 Alarm Members. i.e. Map inputs to Relay Outputs	No Fixed all 16 Alarms mapped to Relay Outputs	Yes
Setup Group Alarm 1 to 4 Type If a relay output has been configured as a GA output, then the GA operation can be set-up for one of the following: ▪ GA follows input ▪ GA follows alarm	Yes GA1 RL 3 only	Yes

COMPARISON OF DIP SWITCH MODE VERSUS SOFTSET MODE CONFIGURATION OPTIONS		
CONFIGURATION OPTION	***DIP SWITCH SET MODE***	***SOFT-SET MODE***
▪ GA acts as ring back ▪ GA set to multiple reflash ▪ GA follows ACK pushbutton (not available in switchset mode)		
Lamp Sense		
Setup Lamp Sense All Lamps Normal Sense or Lamps Reversed Sense. **Note:** This setting only applies when SW1-8 is ON.	Yes	Yes
Split First Out Group		
First Out Group Split Enter a number between 1 and 16 to decide the split between First Out Group 1 and 2. For example: A value of **4** will arrange input 1 to 4 into First Out Group 1 and inputs 5 to 16 into First Out Group 2.	No Single group of 16	Yes
System Operation		
Various System functions can be setup as follows:		
▪ Pushbutton Edge/Level Detection (default: edge)	No	Yes
▪ Auto ACK on Startup i.e. Turn off running light sequence (default is ON)	No	Yes
▪ Inhibit Input operation i.e. Close or Open to Inhibit (default is Close to Inhibit) **Note:** Only applies when SW1-8 is ON.	Yes	Yes
▪ Repeat Relay Output Options: ▪ Follows Input, Normally Open ▪ Follows Input, Normally Closed (Default) ▪ Follows Alarm, Normally Open ▪ Follows Alarm, Normally Closed ▪ Acts as GA output	No	Yes

4.3 Selecting the Input Sense

There is an 8 way “set-up” switch associated with each group of eight inputs (DIPSW1 and 2). These are used to set the sense of the eight input contacts – normally open or normally closed. See Figure 4-1.

These switches are located close to the front of the Omni16R C1680 card.

There is one switch for each input (numbered 1 to 8 in the group).

When the switch is OFF, the input is set to NORMALLY OPEN. (i.e. the input will enter the alarm state when the input contact is closed.)

When the switch is ON, the input is set to NORMALLY CLOSED. (i.e. the input will enter the alarm state when the input contact is opened.)

4.4 Selecting the alarm/display logic sequences

There are three fundamental variations to the switch settings chosen, dependent upon the settings of SW1-8 and SW2-7

First decide upon the setting of these two switches before proceeding to select the other switch settings.

These are shown in the following table:

	SW1-8	SW2-7	SW1-1 to 5	SW2-1 to 5	SW2-6 to 8
A	Off	Off	Sets sequence for inputs 1-8	Sets sequence for inputs 9-16	Operate as per Table 4-1
B	Off	On	Sets sequence for inputs 1-16	Sets Timer value for all input timers.	Operate as per Table 4-1
C	On	-	Sets sequence for inputs 1-16	Sets Serial Port address and R/W	Sets Baud Rate etc.

NOTES:

1. Settings A and B are compatible with Omni16C products.
2. When SW1-8 and SW2-7 are set as per A or B in the table above, the serial port address defaults to 2, and the communications settings default to ASCII 9600 baud.
3. When SW1-8 is ON as per C in the table above, then the following default settings apply:

   Inhibit Contact Sense is set to normally open, close to inhibit.

   Lamp sense is set to normal.

Table 4-1: The Sequence Switch Settings

SEQ. NO.	SEQUENCE SWITCHES SW1 1	2	3	4	5	6	7	8	SW2 1	2	3	4	5	6	7	8	DESCRIPTION	ISA DESIGNATION	T TIME DELAY ON...
0	0	0	0	0	0				0	0	0	0	0				FACTORY TEST MODE		
1	1	0	0	0	0				1	0	0	0	0				LAMP FOLLOWS INPUT	--	--
2	0	1	0	0	0				0	1	0	0	0				MOMENTARY (FLEETING) ALARM, MANUAL RESET	M-1	INPUTS
3	1	1	0	0	0				1	1	0	0	0				ALARM ONLY (NO LOCK-IN) AUTO RESET	A-1-4	INPUTS
4	0	0	1	0	0				0	0	1	0	0				MOMENTARY ALARM, MANUAL RESET WITH RINGBACK	R-1-10	INPUTS
5	1	0	1	0	0				1	0	1	0	0				MULTIPLE GROUP, FIRST OUT MANUAL RESET	F2M-1	--
6	0	1	1	0	0				0	1	1	0	0				FIRST OUT, AUTO RESET, F.O. RESET INTERLOCK	F3A-1-3	--
7	1	1	1	0	0				1	1	1	0	0				SINGLE GROUP, 1st OUT, MANUAL RESET, 1st UP CONTINUOUS FLASH	--	--
8	0	0	0	1	0				0	0	0	1	0				1st OUT, MANUAL RESET WITH NO SUBSEQUENT ALARM STATE SILENCE PUSHBUTTON	F1M-1	INPUTS
9	1	0	0	1	0				1	0	0	1	0				MOMENTARY (FLEETING) ALARM MANUAL RESET	--	HORN
10	0	1	0	1	0				0	1	0	1	0				MOMENTARRY (FLEETING) ALARM MANUAL RESET	--	REFLASH
11	1	1	0	1	0				1	1	0	1	0				MOMENTARY (FLEETING) ALARM MANUAL RESET FOR MOTOR ALARMS	--	INPUTS
12	0	0	1	1	0				0	0	1	1	0				MOMENTARY (FLEETING) ALARM	--	RETURN TO NORMAL
13	1	0	1	1	0				1	0	1	1	0				PULSE MONITORING ALARM WITH MANUAL RESET	--	--
14	0	1	1	1	0				0	1	1	1	0				MOMENTARY (FLEETING ALARM), MANUAL RESET, WITH RINGBACK.		
18	0	1	0	0	1				0	1	0	0	1				MOMENTARY (FLEETING) ALARM AUTO RESET	--	INPUTS
21	1	0	1	0	1				1	0	1	0	1				MULTIPLE GROUP, FIRST OUT, AUTO RESET	F2A-1	--
23	1	1	1	0	1				1	1	1	0	1				SINGLE GROUP, 1st OUT, AUTO RESET, 1st UP CONTINUOUS FLASH	--	--
24	0	0	0	1	1				0	0	0	1	1				MULTIPLE GROUP, FIRST OUT, AUTO RESET, NO SUBSEQUENT ALARM STATE, SILENCE PUSHBUTTON	F1A-1	--
25	1	0	0	1	1				1	0	0	1	1				MOMENTARY (FLEETING) ALARM AUTO RESET	--	HORN
26	0	1	0	1	1				0	1	0	1	1				MOMENTARY FLEETING ALARM, AUTO RESET	--	NO ACTION REALARM
27	1	1	0	1	1				1	1	0	1	1				MOMENTARY ALARM AUTO RESET FOR MOTOR ALARMS	--	INPUT
28	1	0	1	1	1				1	0	1	1	1				PULSE MONITORING ALARM AUTO RESET	--	--
31	1	1	1	1	1	1	1	1	0	1	0	0	1	0	0	1	SOFT-SET MODE. ALL SETTINGS ARE SET VIA SOFTWARE. *(Refer Table 4-2)*	--	--

FOLLOWS INPUT						0	0										FUNCTION OF GROUP ALARM ON RELAY 3 (G.A.)
FOLLOWS ALARM STATE						1	0										
ACTS AS RINGBACK HORN						0	1										
ACTS AS MRF (REFLASH)						1	1										
SW2=TIMERS/SEQUENCE 9-16								0									When SW1-8 is OFF, SW2 sets functions as shown in this table.
SW2=SERIAL PORT SETTINGS								1	#	#	#	#	#	#	#	#	When SW1-8 is ON , SW2 sets Serial Port Address and Baud Rate etc. See Section 4.9
CLOSE TO INHIBIT														0			With SW1-8 OFF, when SW2-6 is OFF, close contact on Inhibit Input to stop further alarms
OPEN TO INHIBIT														1			With SW1-8 ON, when SW2-6 is ON, open contact on Inhibit Input to stop further alarms
TIMERS OFF															0		With SW1-8 OFF and SW2-7 OFF: Timers are off, and SW2-1 to SW2-5 set the sequence of inputs 9-16
TIMERS ON									*	*	*	*	*		1		With SW1-8 OFF and SW2-7 ON: SW2-1 to SW2-5 sets Time-out value. See Figure 4-2
LAMP SENSE NORMAL																0	With SW1-8 OFF, when SW2-8 is OFF: Lamp outputs operate normally
LAMP SENSE REVERSE																1	With SW1-8 OFF when SW2-8 is on: Lamp outputs operate in reverse sense. i.e. On instead of off and v.v.

NOTE:

In the above sequences, the switch sense is as follows:

"1" = switch in on position
"0" = switch in off position

4.5 Selecting the Group Alarm Relay (RL3) Output Function

The Group Alarm (G.A.) relay RL3 offers a changeover contact.
SW1-6 and SW1-7 are used to set the mode of operation of this relay.
There are four modes to choose from:

1. ***Relay follows input***
   The relay is normally energised.
   Any abnormal input will de-energise the relay. The relay will re-energise when all inputs return to their normal states, regardless of the state of the alarm lamps.
   This is useful for tracking the actual state of the inputs. Any abnormal input will cause the relay to be de-energised.
2. ***Relay follows alarm state***
   The relay is normally energised.
   Any alarm state will de-energise the relay. The relay will return to normal when all alarm states have returned to normal. (i.e. the alarms have been acknowledged by the operator and the entire display is off)
   This is useful for tracking the actions of a local operator in clearing the problem. If a 'fleeting' alarm sequence is chosen, the relay will remain de-energised until the operator clears the display, even though the input contact may have already returned to the normal state.
3. ***Relay acts as ring-back horn***
   The relay is normally de-energised.
   The G.A. relay will energise when any abnormal input returns to normal. The RESET pushbutton must be depressed to return the G.A. to its normal state.
   (This G.A. type can be used to alert an operator to the fact that an alarm has returned to its normal state).
4. ***Relay acts in Multiple Reflash Mode***
   The relay is energised with all inputs in their normal state.
   The relay is de-energised by the first input changing to the abnormal state.
   Upon each subsequent input changing to the abnormal state, the relay will momentarily energise (for about 1 second), then return to the de-energised state.
   This is useful when the relay contact is used for example to trigger a dial up alarm, and if subsequent inputs going into alarm must also trigger the dial-up alarm.

   Referring to Table 4-1: The Sequence Switch Settings, select one of the 4 relay modes by setting switches SW1-6 and SW1-7 to the appropriate positions.

4.6 Selecting the Inhibit Input Contact Sense

Select the required inhibit input sense by setting switch SW2-6 to the appropriate position (refer to Table 4-1).

Note: SW1-8 must be off for this selection to be operational. When SW1-8 is on, SW2-8 is reassigned, and the inhibit input defaults to normally open, close to inhibit.

4.7 Selecting the Lamp Status

The lamp status of the display windows may be selected on SW2-8 to give the following:

NORMAL: lamps OFF when inputs are normal, ON when inputs are abnormal.

REVERSE: lamps ON when inputs are normal, OFF when inputs are abnormal.

Note: SW1-8 must be off for this selection to be operational. When SW1-8 is on, SW2-6 is reassigned, and the lamp status defaults to Normal.

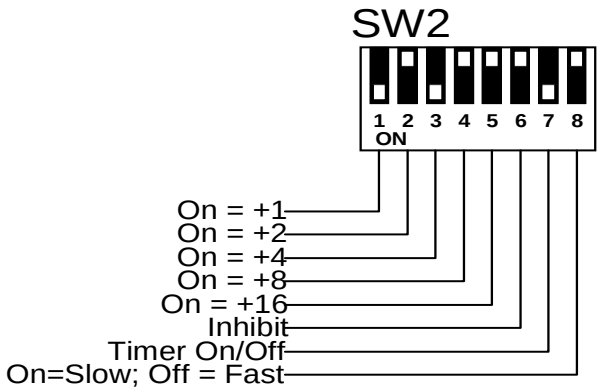
4.8 Selecting Time Delays

The Omni16R has a timer associated with each alarm point.

These timers are used with special Timer sequences. A large “T” in the sequence diagram in Section 7 identifies these sequences.

There are two methods of selecting a time delay setting for these sequences:

1. The timers may be set using SW2-1 to SW2-5. This method is invoked by switching SW2-7 on. This method is recommended when all timers have the same time setting.
2. Programming the memory of the Omni16R using the optional Software Configuration Utility will set each input timer individually. If this memory is not programmed, then the timers default to the switch settings. This method should be used when different input timer settings are required.



Example:

SW1-8 must be off to enable SW2 as time setting.

SW2 in this diagram shown set for 0.5 seconds.

Slow = Uses the Slow timer i.e. 1 sec increments

Fast = Uses the Fast timer i.e. 1/10 sec increments

Figure 4-2 Setting Time Delays on SW2

4.8.1 Omni16R Fast and Slow Timers

Figure 4-2 above shows the use of the Fast and Slow timer. These timers allow the user the most flexible timing options. For very short timing durations, the Fast timer should be used. This timer counts time in units of 100ms or 1/10 of seconds.

For longer time periods, the Slow timer should be used. This timer is derived from the Fast timer and therefore counts time in multiples of the Fast timer. The default setting of the Slow timer is to count time in seconds. It is possible to alter the timing mechanism of the Slow timer to count in larger units of time via the programming port.

4.8.2 Explanation of Timer Operation in a Timer Sequence

With reference to any one of the special timer sequences:

When the alarm point moves from a state where the timer is stopped to a state where the timer is running, the timer will be started.

When the alarm point moves from a state where the timer is running to a state where the timer is also running, the timer is allowed to continue timing.

When an alarm point moves from a state where the timer is running to a state where the timer is stopped, the timer is put into the timed-out (stopped) state.

4.9 Selecting Serial Port Settings

The Omni16R is fitted with an isolated R485 serial port. This port supports the Modbus protocol. In Switch-Set or Soft-Set mode, inputs and outputs can be read via the serial port using standard Modbus© commands. Please refer to Section 8 for the layout of Modbus Registers that are available in the Omni16R.

4.9.1 Default Settings

When the unit is in Switch set mode (refer to settings A or B of section 4.4), the unit may be accessed via Modbus without changing the dipswitch settings at all. In this mode, communications settings are fixed as follows:

Default Modbus Settings with SW1-8 OFF	
Modbus Slave Address	2
Comms settings	ASCII; 9600 baud; No Parity, 7 Data bits, 2 Stop Bits

Table 4-2– Default Serial Port Settings with SW1-8 OFF

4.9.2 Modbus Address and Mode Settings

In applications where the Modbus Slave address and/or comms settings are to be different from the default settings as shown in the table above then set SW1-8 ON to enable SW2 for additional serial port settings.

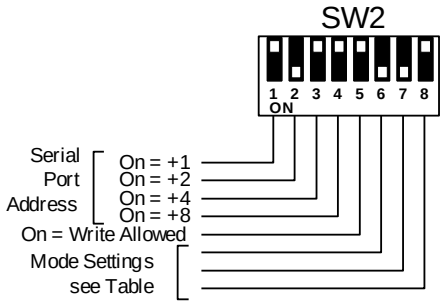


Figure 4-3 Serial Port Settings on SW2

Example:

SW1-8 must be ON to enable SW2 for serial port settings.

SW2 in this diagram is shown set for Address 2; Read only; and RTU mode, 1200 baud, No Parity,

SW2-1 to 4 – Modbus Address Settings	
(0 = Off ; 1 = On)	1:2:3:4
Modbus Slave Address 1	1:0:0:0
Modbus Slave Address 2	0:1:0:0
Modbus Slave Address 3	1:1:0:0
Modbus Slave Address 4	0:0:1:0
Modbus Slave Address 5	1:0:1:0
Modbus Slave Address 6	0:1:1:0
Modbus Slave Address 7	1:1:1:0
Modbus Slave Address 8	0:0:0:1
Modbus Slave Address 9	1:0:0:1
Modbus Slave Address 10	0:1:0:1
Modbus Slave Address 11	1:1:0:1
Modbus Slave Address 12	0:0:1:1
Modbus Slave Address 13	1:0:1:1
Modbus Slave Address 14	0:1:1:1
Modbus Slave Address 15 – 31 With this selection, the Modbus address can be set in Soft-Set mode to any address from 15 (default) to 31.	1:1:1:1

Table 4-3 Serial Port Address Setting on SW2-1 to 4

NOTE: The Omni16R will respond to a broadcast write sent to Address 0 if Modbus writes are enabled regardless of the address setting of the unit. Any data write command from the Modbus Master sent to Address 0 will be recognised by all Omni16R's. No response will be sent.

Modbus Write Enable Setting	
SW2-5 Off	Modbus Port is Read Only. No settings or alarms can be changed when this switch is off.
SW2-5 On	Switch this switch ON to enable the Modbus Master to write to any registers in the Omni16R.

Table 4-4– Modbus Write Enable Setting

SW2-6 to 8 Mode Settings	
(0 = Off ; 1 = On)	6:7:8
ASCII; 9600 baud; No Parity; 7Data 2Stop	0:0:1
ASCII; 4800 baud; No Parity; 7Data 2Stop	1:0:1
ASCII; 2400 baud; No Parity; 7Data 2Stop	0:1:1
ASCII; 1200 baud; No Parity; 7Data 2Stop	1:1:1
RTU; 9600 baud; No Parity; 8Data 1Stop	0:0:0
RTU; 4800 baud; No Parity; 8Data 1Stop	1:0:0
RTU; 2400 baud; No Parity; 8Data 1Stop	0:1:0
RTU; 1200 baud; No Parity; 8Data 1Stop	1:1:0

Table 4-5 Serial Port Mode Parameters on SW2-6 to 8

4.10 Changing the operation of the Repeat Outputs

It is possible to change the operation of the Repeat Output relays should the application require it. In most applications it the Repeat Outputs will repeat the inputs status of the inputs i.e. if the input is normal then the corresponding repeat relay is energised and if the input is abnormal then the repeat relay output is de-energised. This is the default operation.

Using the Omni16R Configuration Utility, the repeat relays may be setup to repeat the Alarm status of the inputs i.e. the repeat is energised when the Alarm sequence is in the alarm condition. This is identified as the state in which the corresponding lamp is illuminated. This is particularly useful in timer sequences where the lamp illuminates after the input timer delay has elapsed. When the repeats are setup for alarms, the repeats will energise when the lamp illuminates, not when the input goes abnormal.

Repeat outputs can additionally be setup for fail-safe operation. In this mode the output relay is energised in the normal condition and de-engerised in the alarm condition.

Please refer to the On-line help available in the Configuration Utility for more information.

5. OPERATION

5.1 Power-up

When power is applied to the Omni16R, each C1680A card commences an automatic, built-in circuit test routine. This results in the unit sounding the audible for approximately half a second followed by the cyclic illumination of each lamp in turn starting at lamp 1 to the last lamp and back to 1 again etc. in a “marching sequence”.
If no internal faults are detected in the unit, then this test mode display continues until the Acknowledge Pushbutton is pressed or until an input changes to the alarm state.
If an internal fault is detected, then the unit will display a fault indication by continuously flashing one of the lamps. If this occurs, then the unit must be sent for service.
If a new alarm occurs while the C1680A is in this test routine, the unit will immediately revert to its normal mode of operation and will deal with the alarm state according to the pre-selected alarm sequence.

5.2 Normal Operation

During the normal operation, the C1680A will deal with any alarm states according to its pre-set alarm sequences. (The instructions for setting-up these sequences are given in section 4.4). Section 7 provides detailed block diagrams for the function of each alarm sequence.
When an alarm condition occurs and the horn sounds, the operator should depress the relevant pushbuttons, where necessary, according to the pre-selected alarm sequence.
When the C1680A is put into its test routine by depressing the TEST pushbutton, any existing alarm states are “remembered” and the alarm annunciator will revert to its previous state when it returns to its normal mode of operation.
If a new alarm state occurs while the C1680A is performing its test routine, the unit will immediately revert to its normal mode of operation and deal with the alarm state according to the pre-selected alarm sequence.

5.3 Test Functions

5.3.1 Overview of the Test Functions

The Test button operates as a combines lamp test and circuit test function.

No information is lost during the entire test routine, and each alarm display returns to the exact state it was in before the test.

5.3.2 Pressing the Test Button

When the Test button is pressed, the unit checks the results of its regular full circuit test, and if all checks performed pass, then a conventional lamp test is performed, by illuminating all of the lamps while the Lamp Test Pushbutton is held down. When the Test pushbutton is released, the C1680A reverts to the state it was in before the Test button was pushed.

If the circuit Test fails then the unit enters its “marching sequence” test routine described in Section 5.3.5 and the test failure code will be displayed by flashing one of the lamps continuously.
In this way, the display/annunciator Test button acts both as a Lamp Test and Circuit Function.

5.3.3 Fault Indication on Circuit Test

If a fault is found in one of the tests performed, then the unit enters its full “marching lamp sequence”, with, in addition, one or more of the lamps flashing continuously to indicate the fault located. This is described in detail in Section 5.3.5.

5.3.4 Manually invoking the Circuit Test Function.

As a confidence measure, the unit may be placed in the full “marching sequence” Circuit Test Mode at any time by holding down the Silence button and then pressing the Test Button. See section 5.3.5

5.3.5 The “Marching Sequence” Circuit Test Display

This routine is entered upon the following conditions:

- Upon power up.
- If the Test button is pressed and a fault is detected in the unit.
- By holding down the Silence button and then pressing the Test button manually enters this function.
- Any time during normal operation, if the unit during its regular self-test routines detects a fault.

This test routine begins by activating the horn output circuit for approximately one second.

The operator should therefore check that the horn sounds for this short period.

Immediately after this one-second period, if the C1680A is functioning correctly, the following visual indication will occur:

The display will begin a “marching light” sequence, with each display window illuminating and then extinguishing, one at a time, starting with the display point 1 and ending with the display point 16. All display windows will then remain extinguished for a brief moment.

The “marching” sequence will then begin again, and this procedure of “marching” sequence followed by the brief “blank” display period will be repeated continuously until the ACKNOWLEDGE pushbutton is depressed, or until an input changes state.

This marching sequence indicates that the alarm annunciator has passed all its own internal tests and is functioning correctly. If the lamp display exhibits any other pattern then a fault has been detected, and the unit should be returned for service.

To exit the test mode and begin normal operation, the ACKNOWLEDGE pushbutton should be pressed.

The pushbuttons may also be tested in this mode:

If the SILENCE button is depressed - lamp No. 1 flashes continuously.

If the ACK button is depressed - the annunciator reverts to normal operation.

If the RESET button is depressed - lamp No. 3 flashes continuously.

If the TEST button is depressed - lamp No. 4 flashes continuously.

If any other lamp flashes continuously, then the unit has detected a fault and must be returned to the factory for service.

If a new alarm occurs while the C1680A is in this test routine, the unit will immediately revert to its normal mode of operation and will deal with the alarm state according to the pre-selected alarm sequence.

It is possible under some circumstances to continue to operate the C1680A even after a fault has been detected. The table below will assist in diagnosing the fault found.

Table 5-1 Fault diagnosis during Circuit Test

Display Window No.	FAULT SYMPTOM		POSSIBLE CAUSE
1	FLASHING	during "Marching Sequence"	SIL pushbutton held down, or stuck in ON state
	STEADY ON	during "Marching Sequence", and stays ON during "Blank" display period.	Window No. 1 has lamp output circuit fault.
	STEADY OFF	during "Marching Sequence", and stays OFF during "Blank" display period.	Window No. 1 has lamp failure or output circuit fault.
2	FLASHING	during "Marching Sequence"	ACK pushbutton held down, or stuck in ON state (this condition must have been present BEFORE the CCT. TEST mode was initiated)
	STEADY ON	during "Marching Sequence", and stays ON during "Blank" display period.	Window No. 2 has lamp output circuit fault.
	STEADY OFF	during "Marching Sequence", and stays OFF during "Blank" display period.	Window No. 2 has lamp failure or output circuit fault.
3	FLASHING	during "Marching Sequence"	RESET pushbutton held down, or stuck in ON state.
	STEADY ON	during "Marching Sequence", and stays ON during "Blank" display period	Window No. 3 has lamp output circuit fault.
	STEADY OFF	during "Marching Sequence", and stays OFF during "Blank" display period	Window No. 3 has lamp failure or lamp output circuit fault.
4	FLASHING	during "Marching Sequence"	TEST pushbutton held down, or stuck in ON state.
	STEADY ON	during "Marching Sequence", and stays ON during "Blank" display period.	Window No. 4 has lamp output circuit fault.
	STEADY OFF	during "Marching Sequence", and stays OFF during "Blank" display period.	Window No. 4 has lamp failure or lamp output circuit fault.
ANY OTHER LAMP	STEADY ON	during "Marching Sequence", and stays ON during "Blank" display period	Window has lamp output circuit fault.
	STEADY OFF	During "Marching Sequence", and stays OFF during "Blank" display period.	Window has lamp failure or lamp output circuit fault.
1,2,3,4,6	STEADY ON	During "Blank" display period but OFF during "Marching Sequence"	Fault detected on one of the INPUT logic circuits
1,2,3,4	STEADY ON	During "Marching Sequence"	Fault detected on the SPI bus OR all four pushbuttons stuck ON
1,2,3,4,5,6	STEADY ON	During "Blank" display period but OFF during "Marching Sequence"	Fault detected on the SPI bus
1,2,3,4,5,7	STEADY ON	During "Blank" display period but OFF during "Marching Sequence"	DIP switches are set all OFF. (Note: This is a special factory test mode. If the acknowledge button is pressed in this mode, then the marching light sequence will stop, and other factory tests will be implemented. Changing any DIP switch will exit this mode.)
1,2,3,4,7	STEADY ON	During "Blank" display period but OFF during "Marching Sequence"	Fault detected with the on-board EEPROM

5.4 Use of the inhibit input

If the Inhibit Input is in the abnormal condition then all of the alarm inputs will be disabled from causing a new alarm. All other functions of the unit will remain unaffected.
When this input reverts to the normal state, then operation of the C1680A reverts to full operation, and the unit will respond to any input changes that may occur thereafter.
The normal state is conventionally with the Inhibit input normally open and may thus be left unconnected.
If SW1-8 is off, the normal state of the Inhibit input may be changed to normally-closed by switching SW2-6 on.

6. SPECIFICATIONS

Power Supply Options			
Voltage Option	24Vdc		
IsolationPSU to I/O	None		
Max dc Ripple	10% pk. to pk.		
Current Consumption	See Section 3.5 of this manual		
Alarm/Display Standard Inputs - Non Isolated			
Type	Potential Free Contacts or switch to 0volts Common +ve	Switch to +24volts Common -ve	
Contact Sense	User Selectable Normally Open or Closed		
Max. open circuit voltage	28Vdc		
Max. closed circuit current	5mA per input circuit		
Max. Loop Resistance to detect closed contact	200 ohms		
Min. Loop Resistance to detect open contact	100 kohms		
Input Scan Rate	4 milliseconds with 8millisecond filter. Inputs must be stable for at least 8 milliseconds for a change of state to be detected.		
Wire size	1.5mm^2 (17SWG/15.5SWG) max.		
Connections	Via plug-in Terminals or cage clamp terminals		
Alarm/Display Inputs – Isolated (contact factory for availability)			
Type	19-60Vdc	90 to 150V ac or dc	
Isolation Input to Logic	1500Vac rms	1500Vac rms	
Input to Input Isolation	500Vac rms	500Vac rms	
Qty and Type	16 Inputs dc	16 Inputs dc or ac	
Contact Sense	User Selectable Normally Open or Closed		
Lamp Outputs			
Voltage	24Vdc nominal		
Current	63mA maximum per window (maximum of 320 windows per rack)		
Polarity	Positive Common – switch to 0V		
Type	Model C1670A Remote Display recommended		
Compliance to Standards			
Safety	IEC/EN 60950		
EMC	EN55011: IEC61000-4-2/-3/-4		
Wire size	1.5mm^2 (17SWG/15.5SWG) max.		
Connections	Via cage clamp Terminals		

Alarm Sequences	
Quantity	27 (user selectable by set-up switches)
ISA types	M-1, A-1, A-1-4, R-1-10, F2M-1, F2A-1, F3A-1-3, F1M-1, F1A-1
Other types	See sequence diagrams for full selection.

Flash Rates	
Fast Flash Rate	140 flashes per minute
Slow Flash Rate	35 flashes per minute

Integral Pushbuttons	
Quantity	Four buttons mounted externally or on front panel of C1685 card, typically in last slot position (21)
Type	Normally Open, Close to operate
Functions	Silence; Acknowledge; Reset; combined Lamp & Circuit Test

Window Display – separate OmniX Display			
Types	C1670	C1672	
Types	Back-lit LED	Back-lit LED	
Connection	20W ribbon	Terminals	
Window Size	24mmx64mm	24mmx64mm	
Legend Area	21mmx60mm	21mmx60mm	
Legend Type	User printed on film with laser/inkjet using software provided.	User printed on film with laser/inkjet using software provided.	

Common Service Relay Contact Outputs	
Contact Type	2 Potential free changeover (Form C) 2 Potential free normally Open (Form A)
Contact Rating	2A 30Vdc or 0.5A 230Vac
Isolation	1000Vac from contact to other circuits

(Optional) Repeat Relay Contact Outputs	
Contact Type	Potential free normally open (Form A) Relay is energised when input contact is normal.
Contact Rating	2A 30Vdc or 0.5A 230Vac
Isolation	250Vac contact/contact and 1000Vac contact/coil

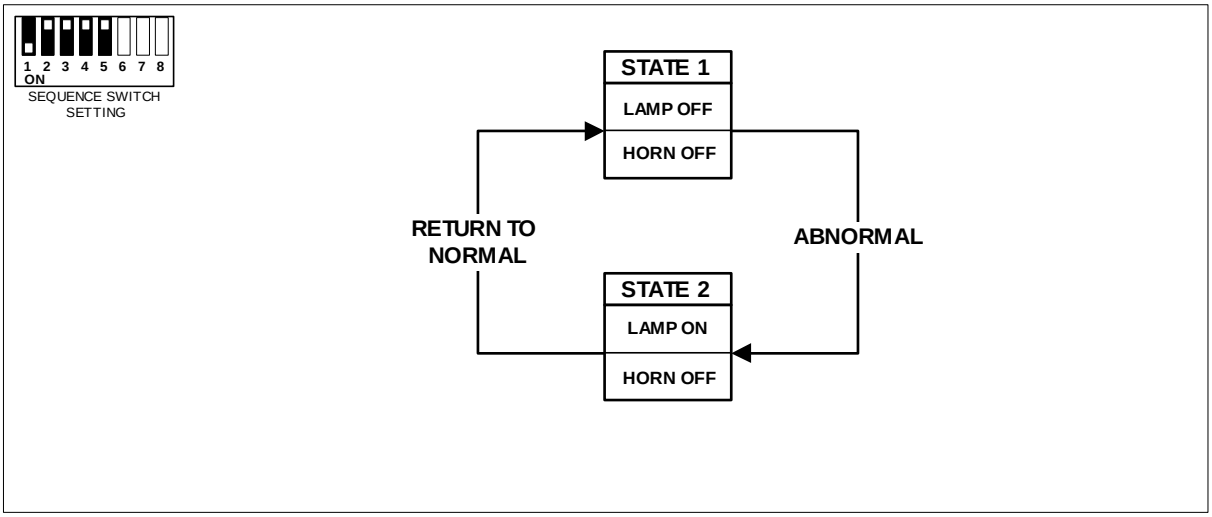
Temperature Range	
Operating Temperature	0°C – 60 °C (+32°F – 140°F)
Storage Temperature	-10°C – 70 °C (+14°F – 158°F)

Weight	
Unpacked	3.0kg approx. – rack only
Packed	5.6kg approx. – fully populated

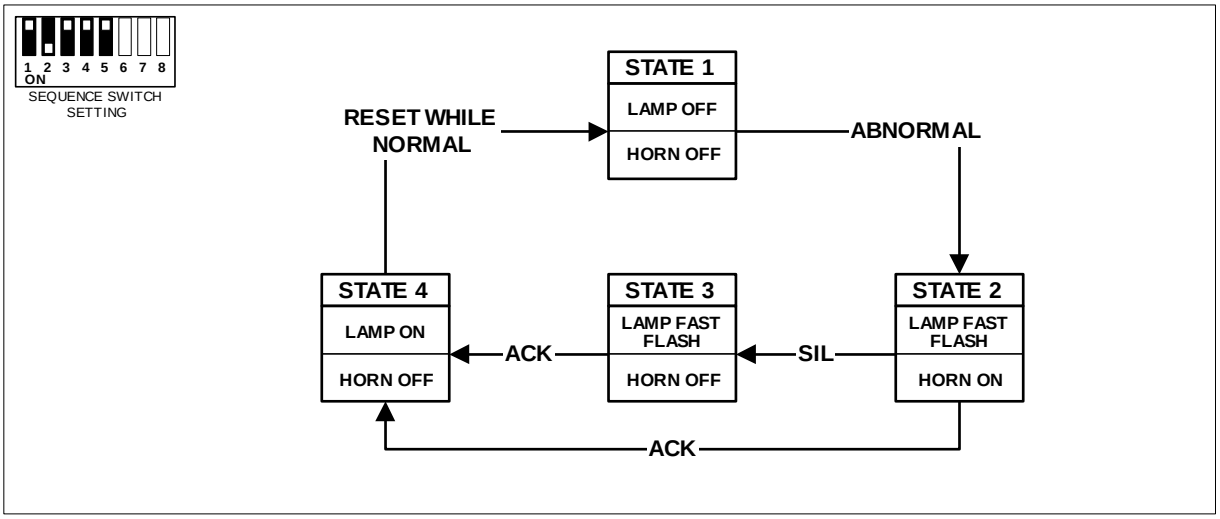
Compliance to Standards	
CE	Meets requirements for CE marking.
Safety	EN 60950:1995
Emissions	EN 55011 and EN50081-2:1994 Group I, Class A
Immunity – ESD	IEC 61000-4-2:1995, level 3
Immunity – RF Fields	IEC 61000-4-3:1995, level 3
Immunity – Fast Transients	IEC 61000-4-4:1995 2 kV – DC power port 1 kV – input/output lines
Supply Variations	IEC 61000-4-7:1991, 24 V dc +15% -10%

Accessory Ordering Information	
ORDER CODE	**DESCRIPTION**
C1415	Remote Pushbutton Station with Audible
C1150	Red Back-lit LED Lamp Board
C1151	Yellow Back-lit LED Lamp Board
C1152	Green Back-lit LED Lamp Board
C1153	Blue Back-lit LE Lamp Board
C1463	Assorted Back-lit Colour Filter Kit

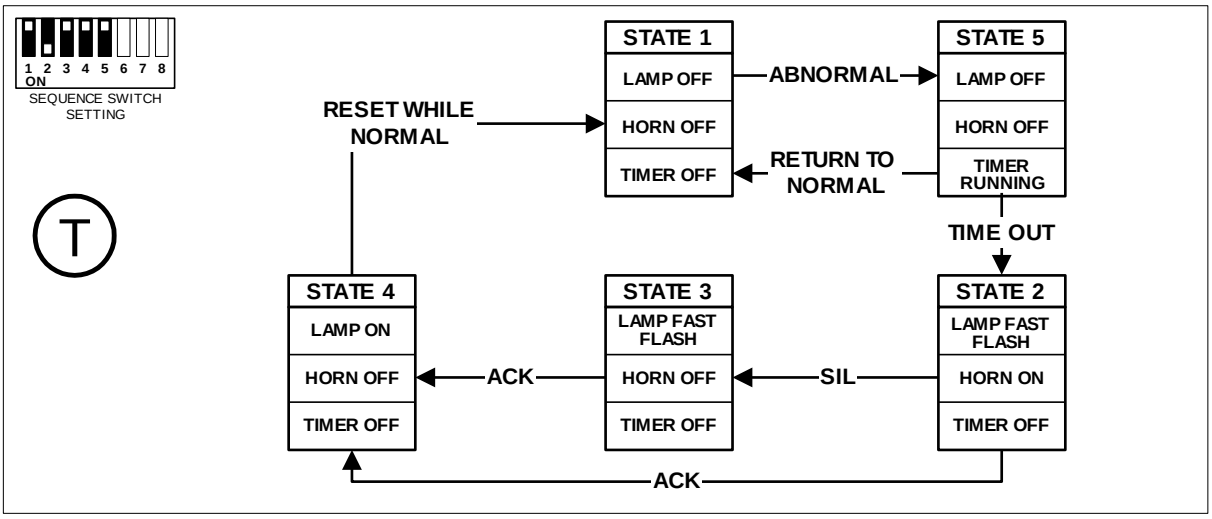
7. ALARM SEQUENCE DIAGRAMS



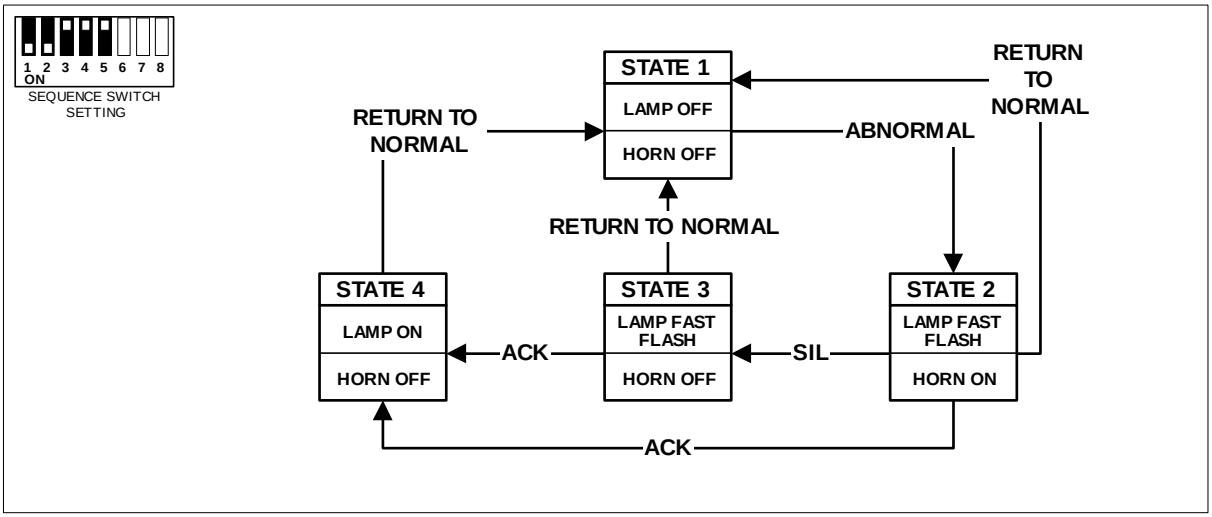
Sequence 1 - Lamp Follows Input



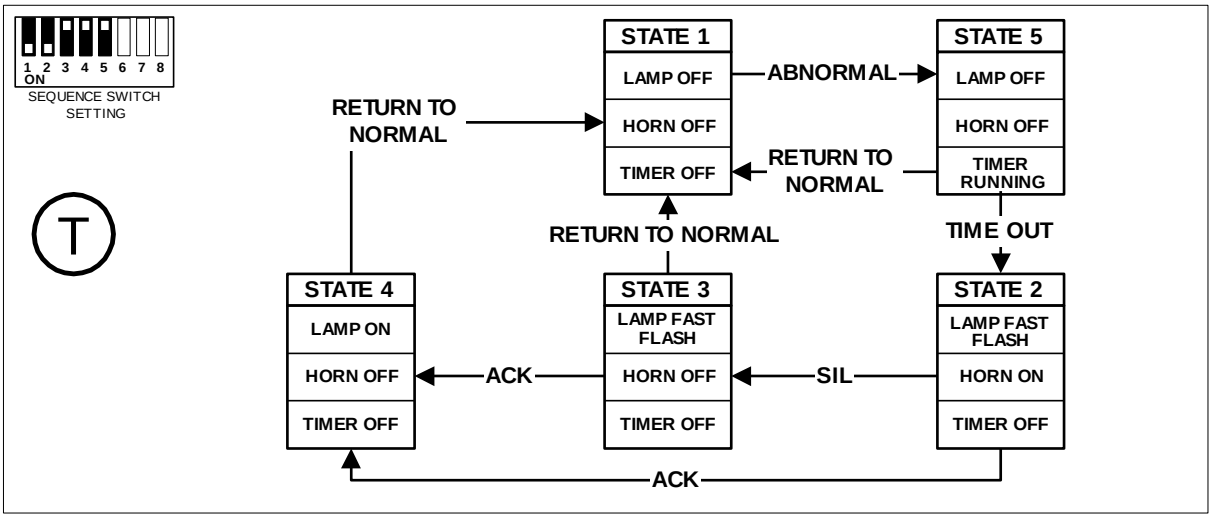
Sequence 2 - Momentary (Fleeting) Alarm, Manual Reset, Timer option off



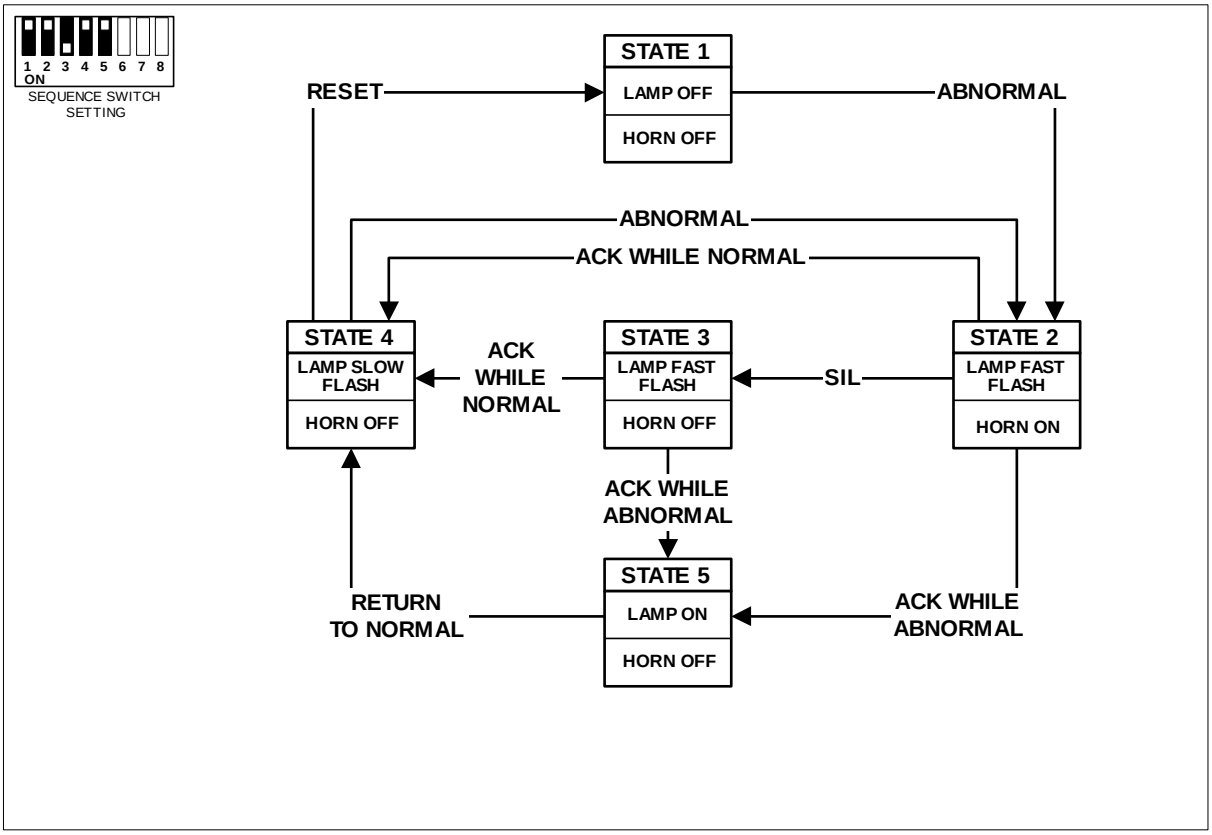
Sequence 2 - Momentary (Fleeting) Alarm Manual Reset with Time Delay on Inputs



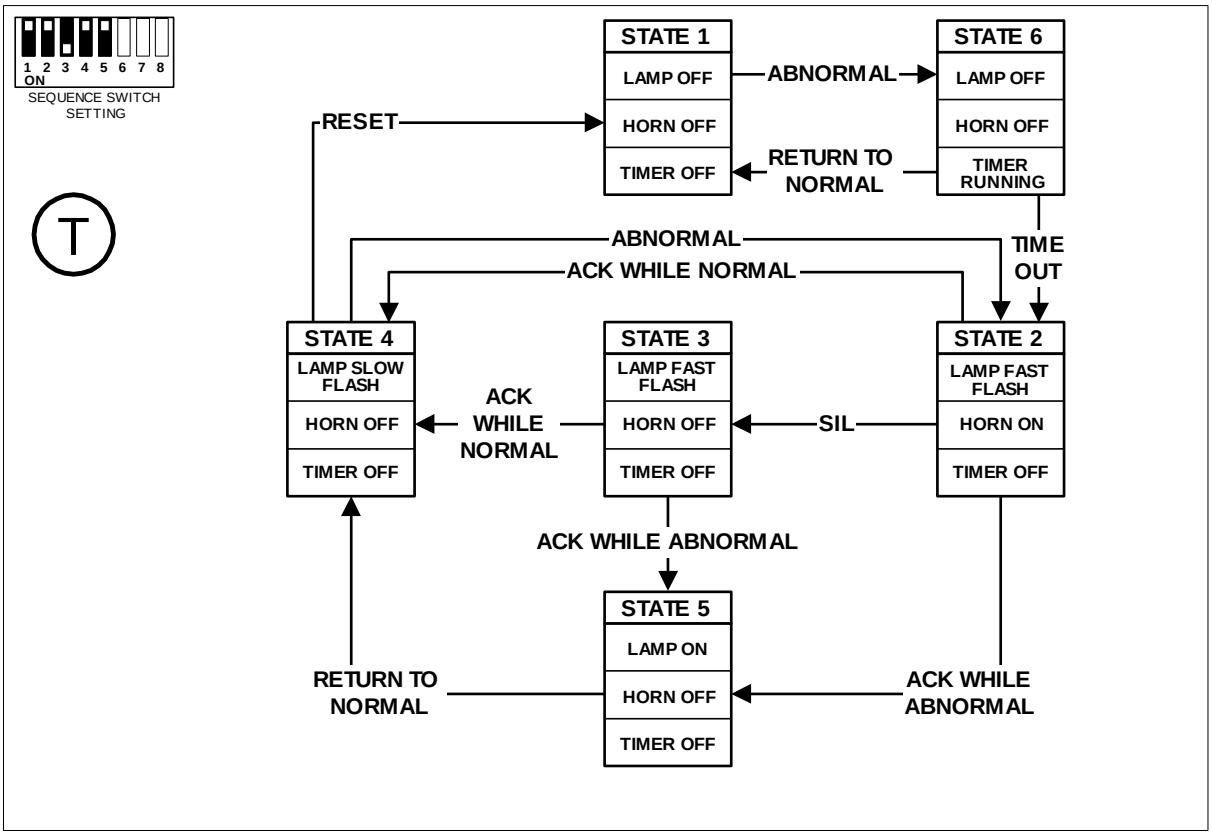
Sequence 3 - Alarm Only (No Lock-in), Auto Reset, (Timer option off)



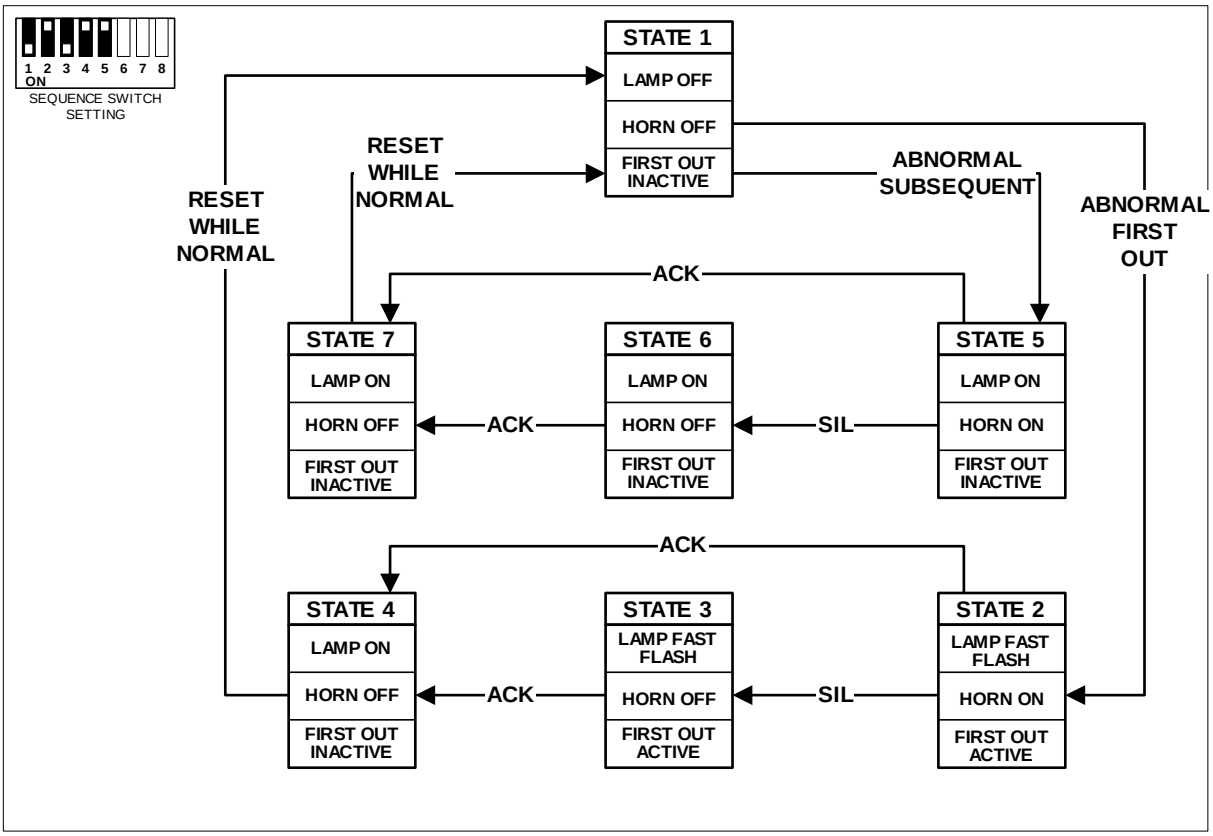
Sequence 3 - Alarm Only (No Lock-in) Auto Reset with Time Delay on Inputs



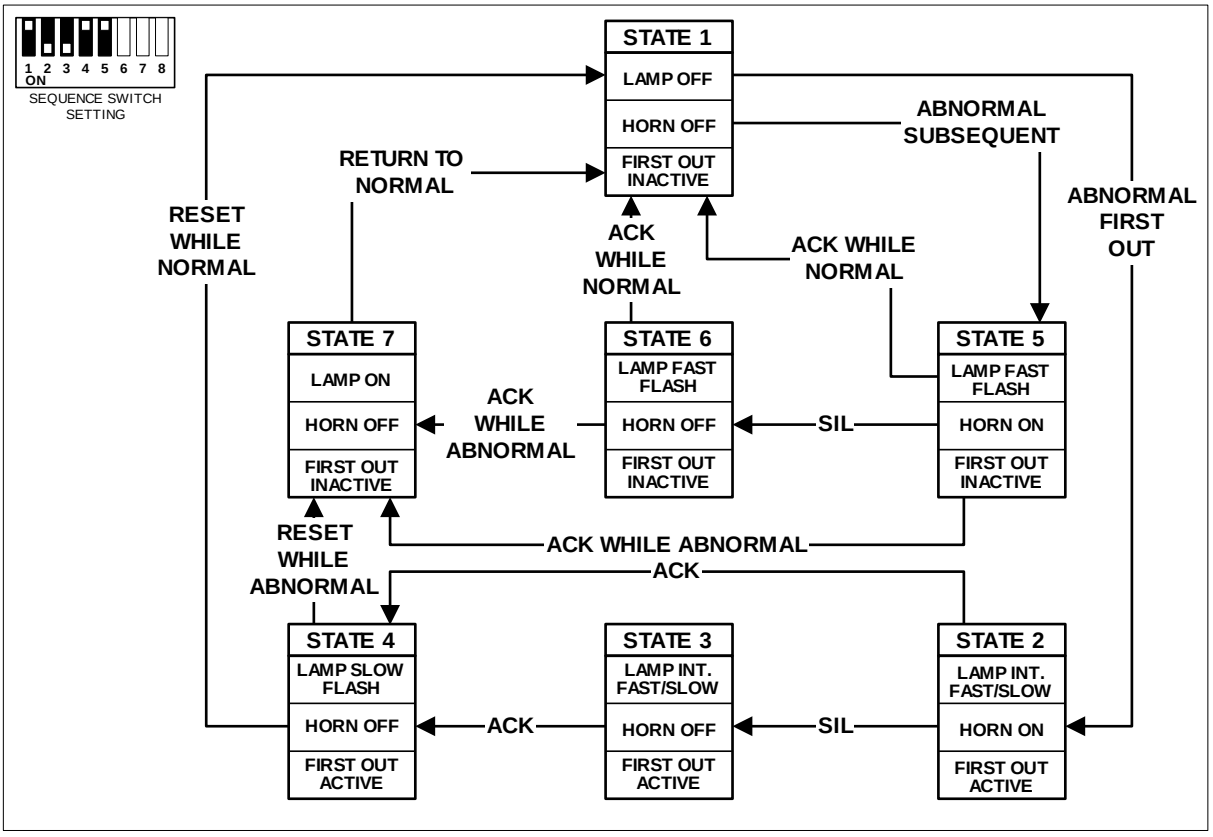
Sequence 4 - Momentary Alarm, Manual Reset, with Ringback, (Timer Option Off)



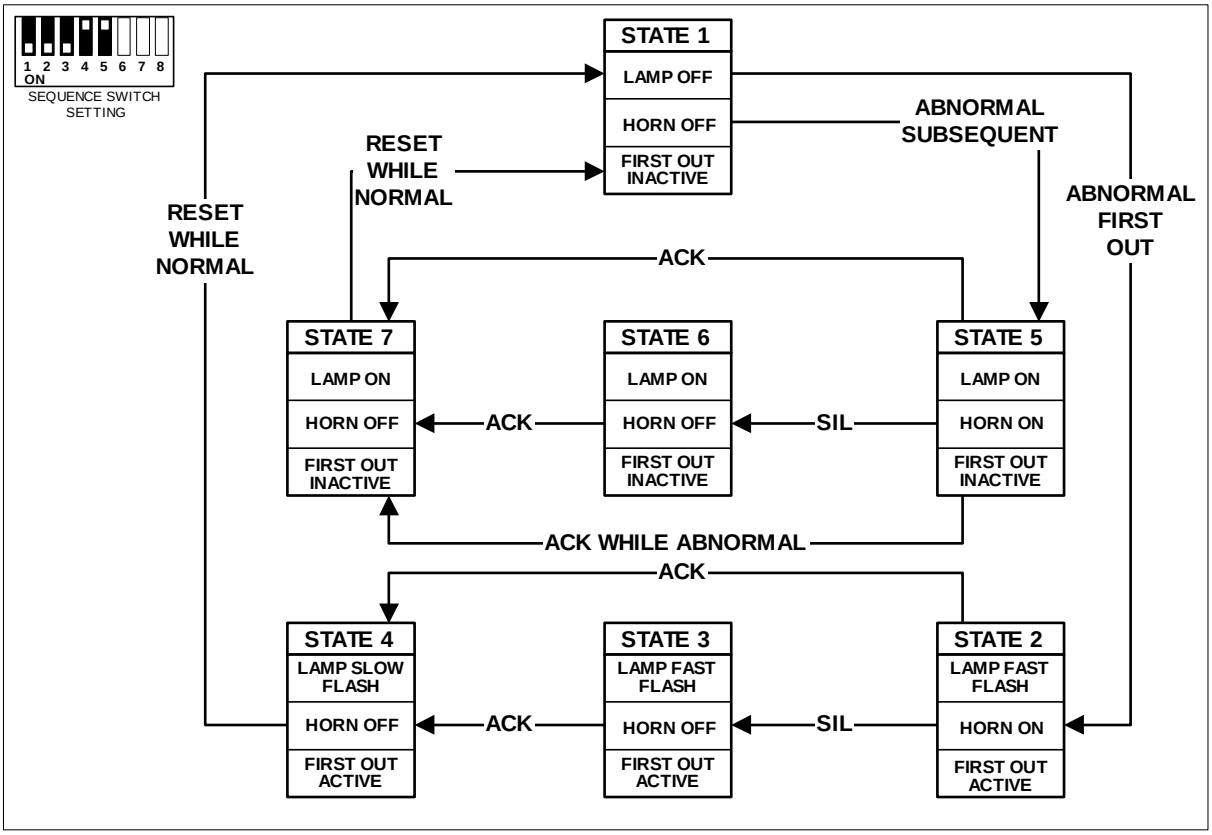
Sequence 4 - Momentary (Fleeting) Alarm, Manual Reset, with Ringback, Timer Delay on inputs.



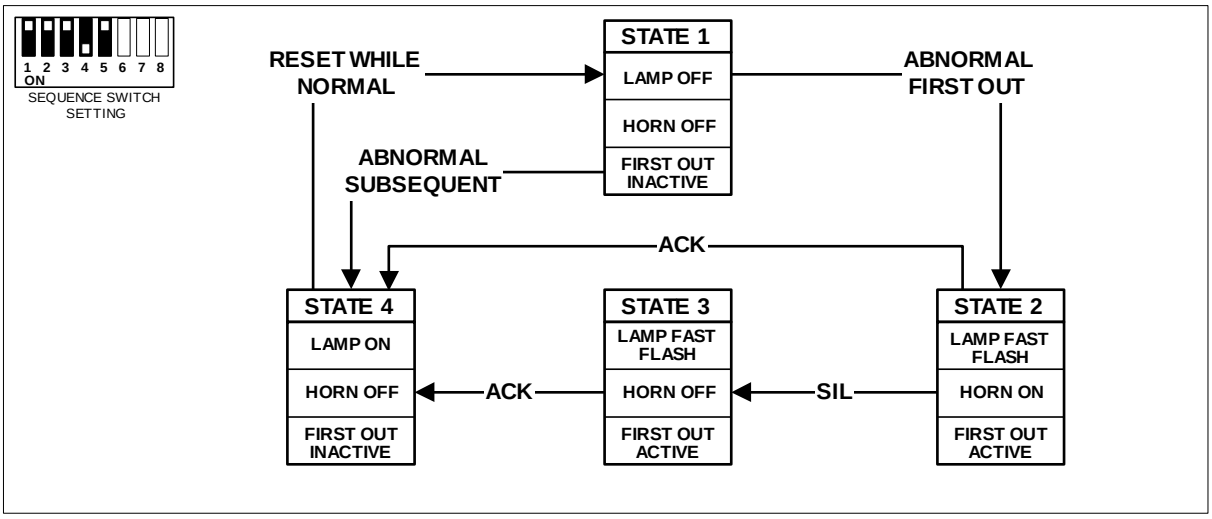
Sequence 5 - Momentary (Fleeting) Alarm, First Out Multiple Groups, Manual Reset, with Ringback.



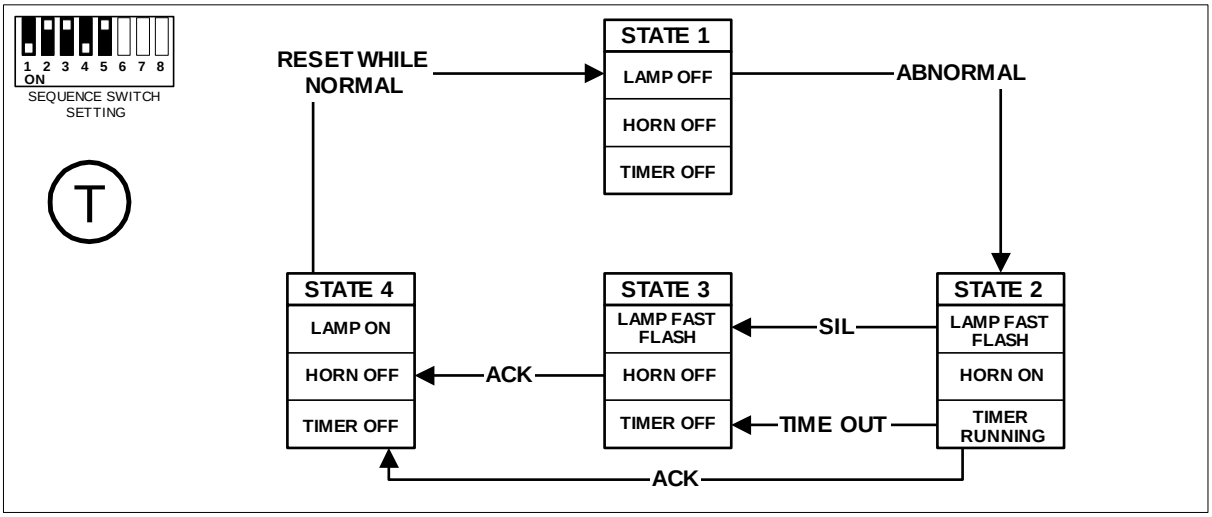
Sequence 6 - Momentary (Fleeting) Alarm, First Out Manual Reset, Auto Reset on subsequent Alarms



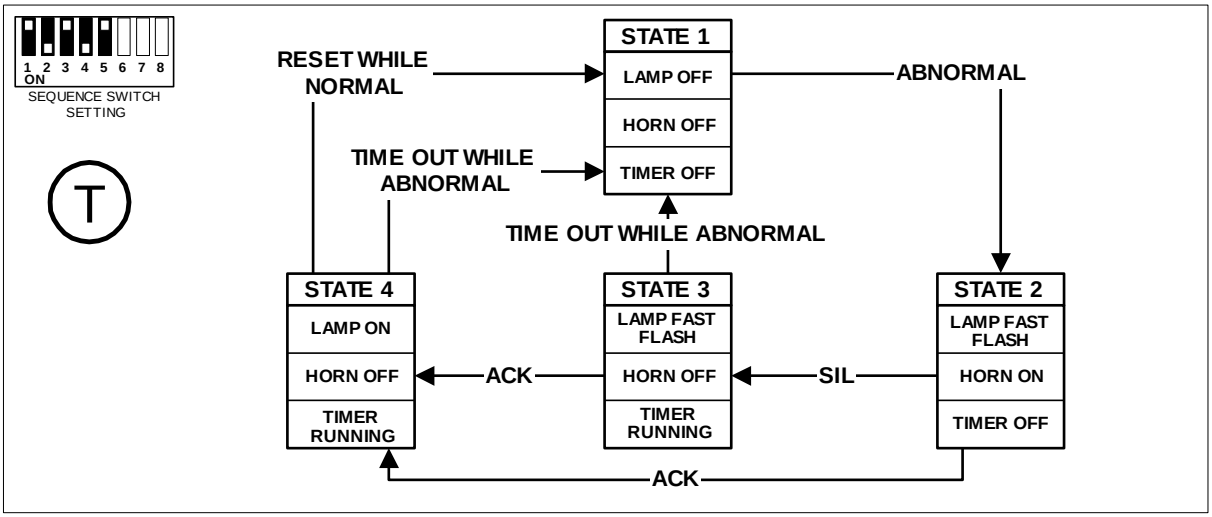
Sequence 7 - Momentary (Fleeting) Alarm, First Out Single Group, Manual Reset, First Out Continuous Flash



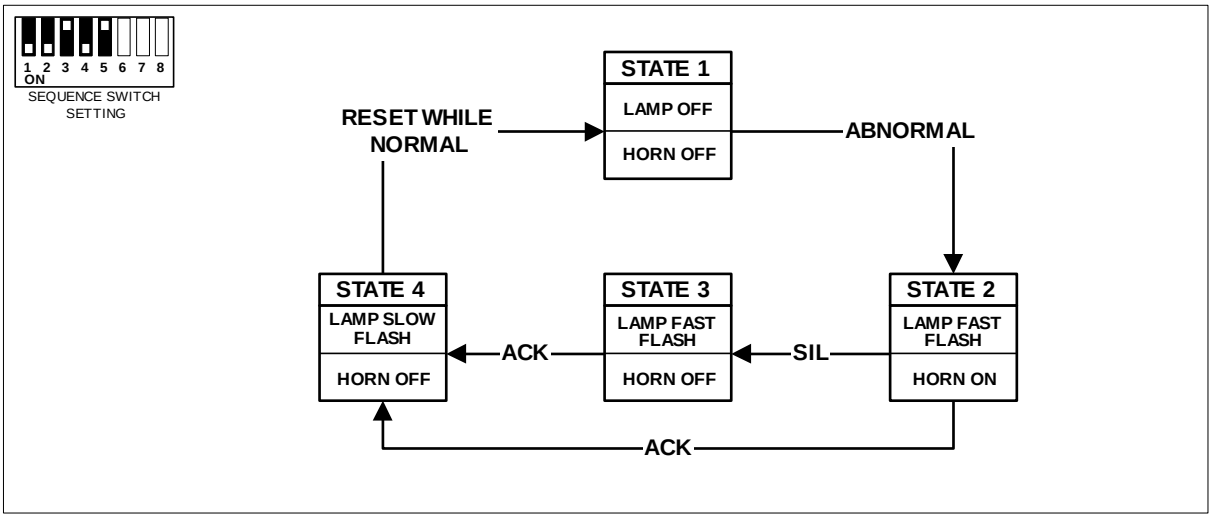
Sequence 8 - Momentary (Fleeting) Alarm; First Out Multiple Group; Manual Reset; No horn for subsequent alarms



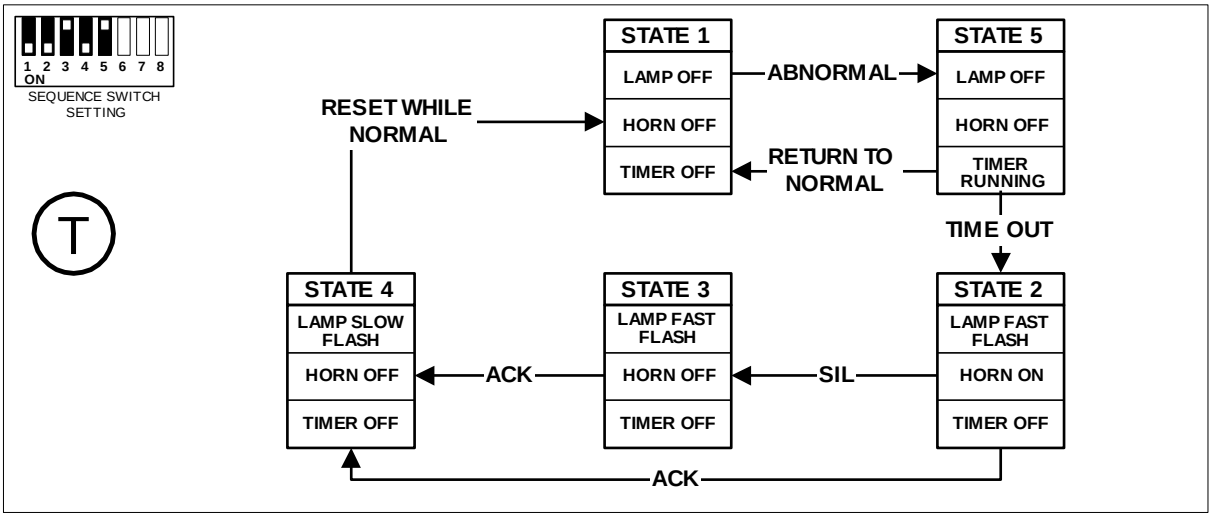
Sequence 9 - Momentary (Fleeting) Alarm; Manual Reset; Auto Silence after Time Delay.



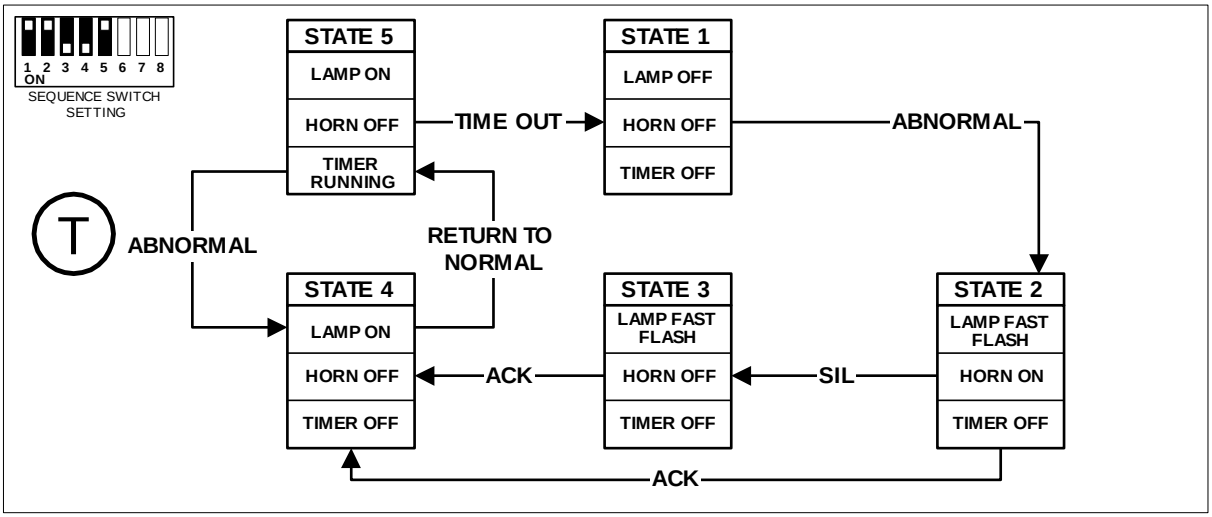
Sequence 10 - Momentary (Fleeting) Alarm; Manual Reset; Re-alarm after time-out if still abnormal.



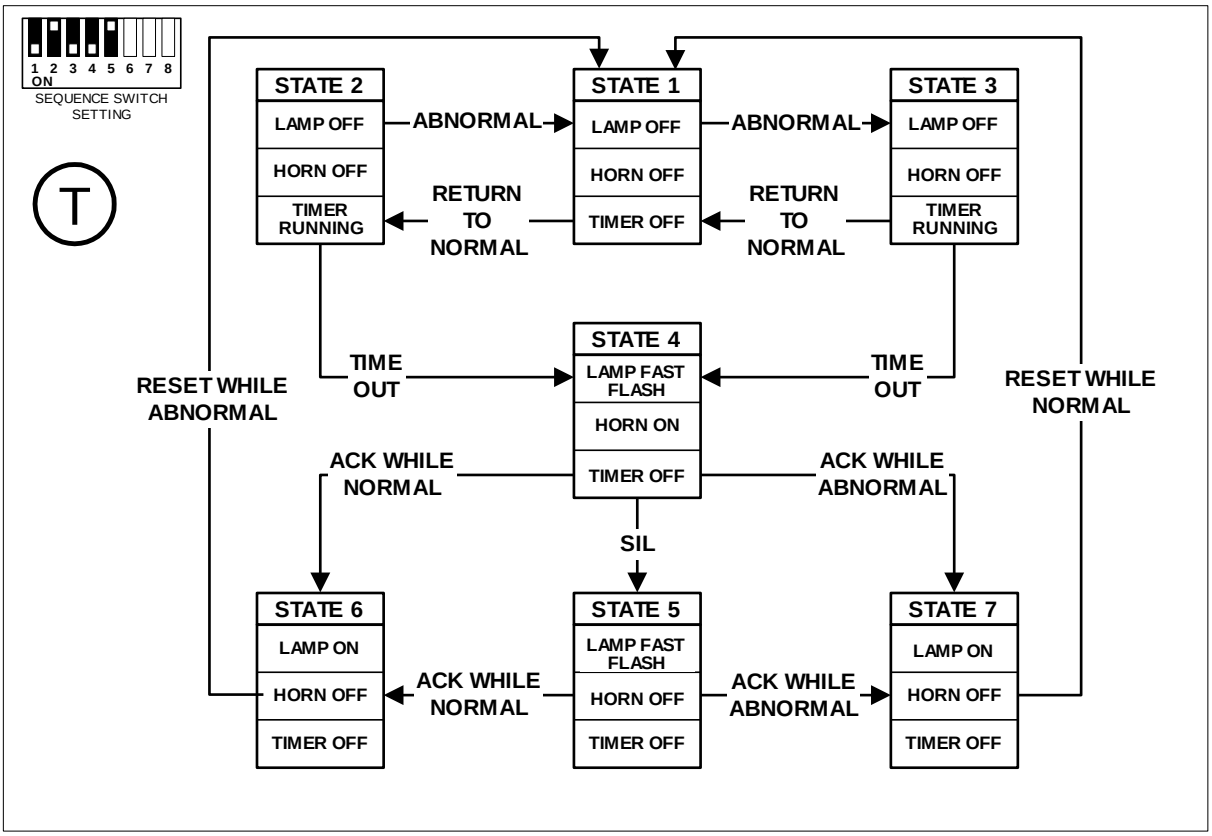
Sequence 11 - Momentary (Fleeting) Alarm, Manual Reset, for Motor Alarms (Timer option off)



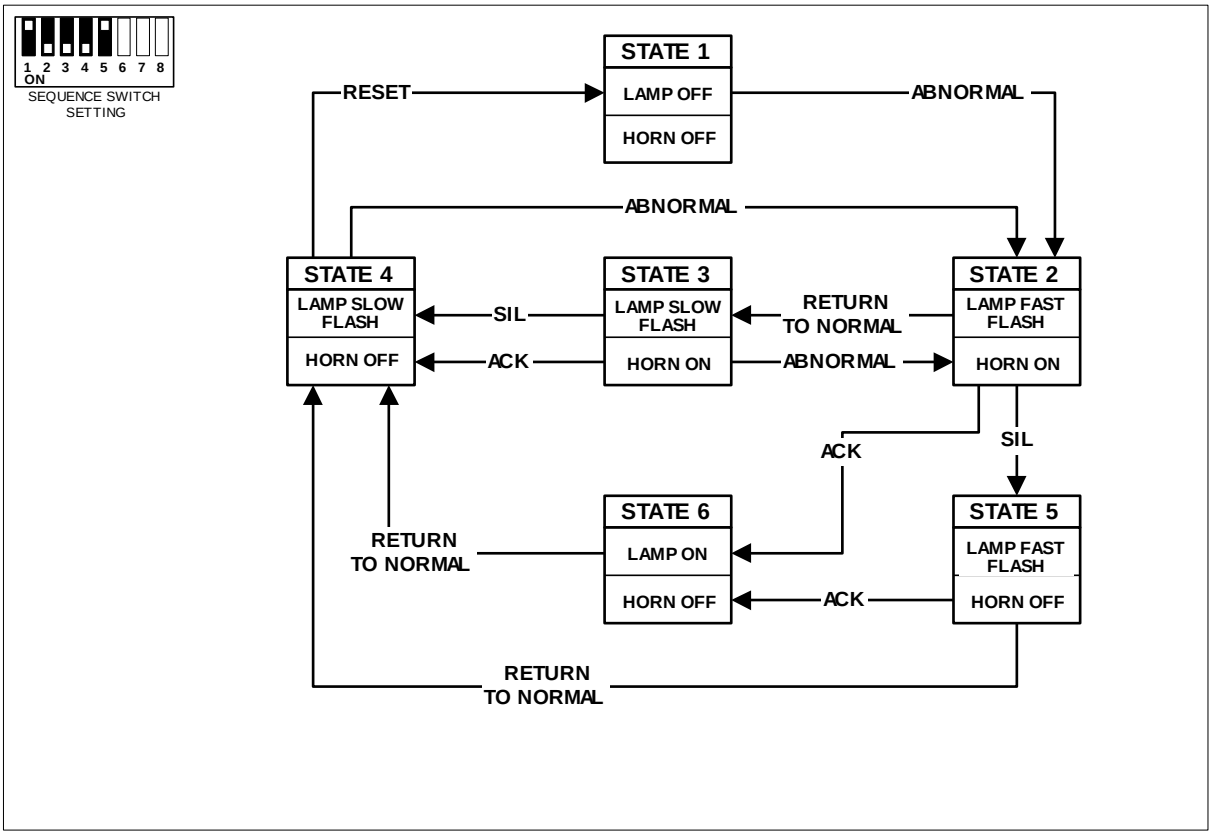
Sequence 11 - Momentary (Fleeting) Alarm; Manual Reset; for Motor Alarms; with Time Delay on Inputs



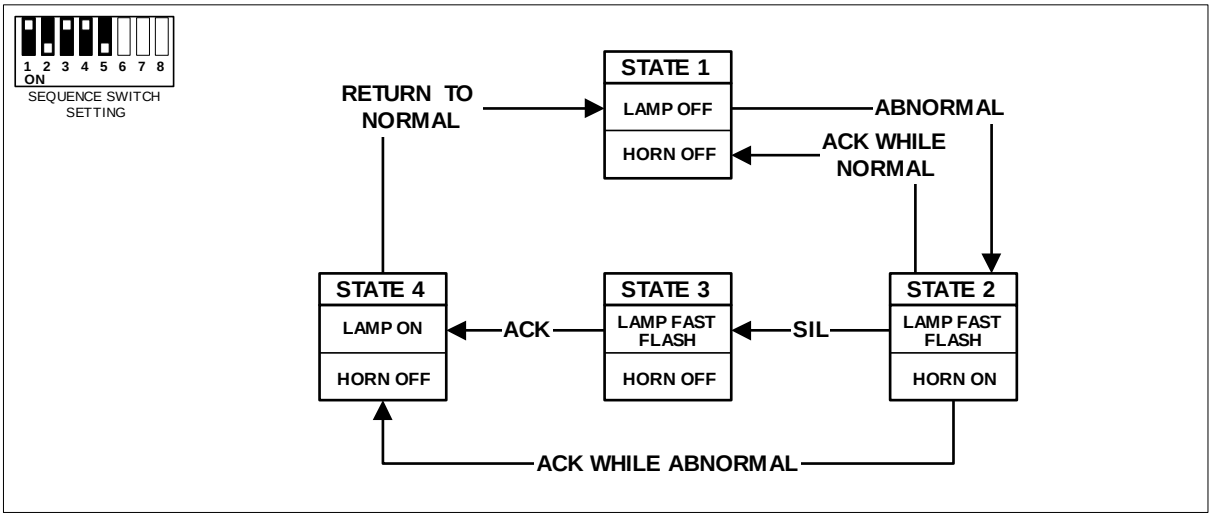
Sequence 12 - Momentary (Fleeting) Alarm; Auto Reset; with Time Delay on Return to Normal.



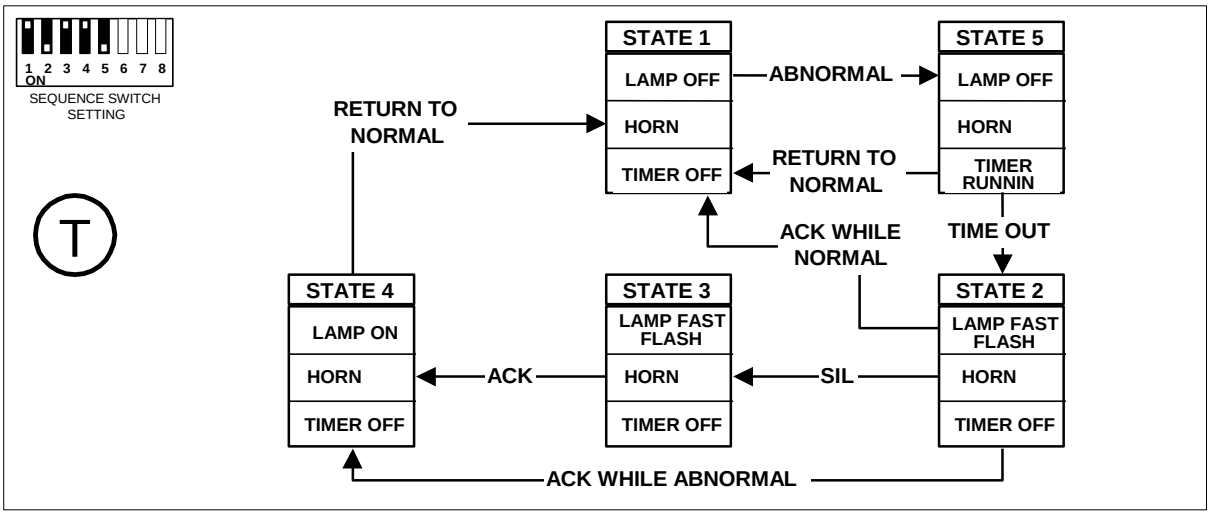
Sequence 13 - Pulse Monitoring Alarm, Manual Reset



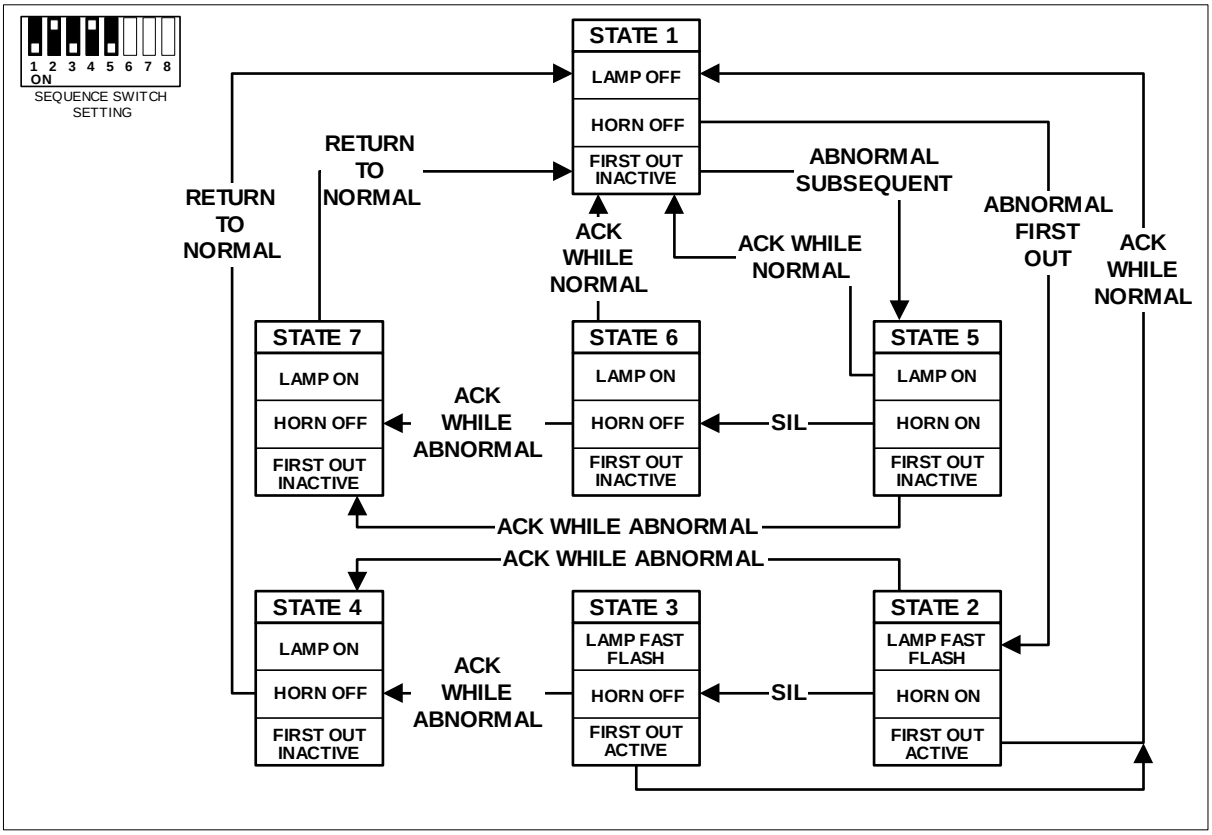
Sequence 14 - Momentary (Fleeting Alarm), Manual Reset, with Ringback.



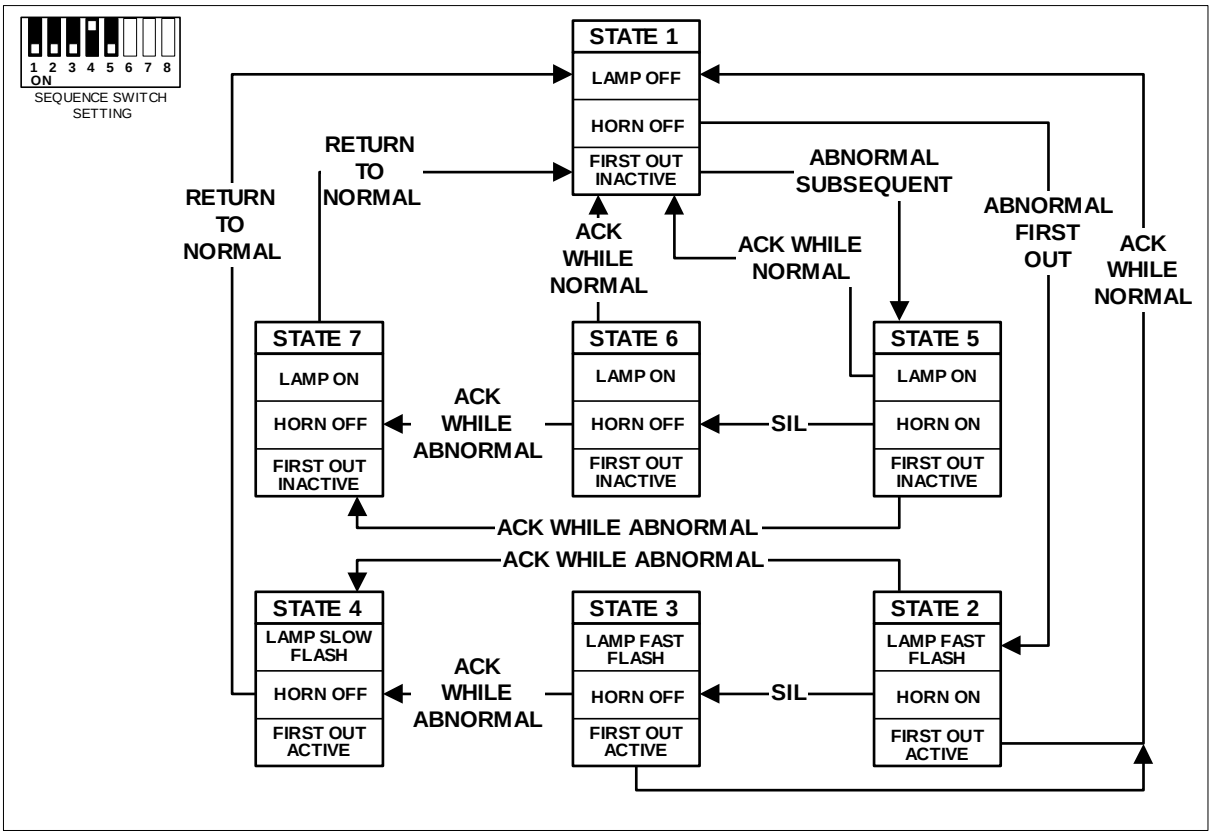
Sequence 18 - Momentary (Fleeting) Alarm, Auto Reset, (Timer option off)



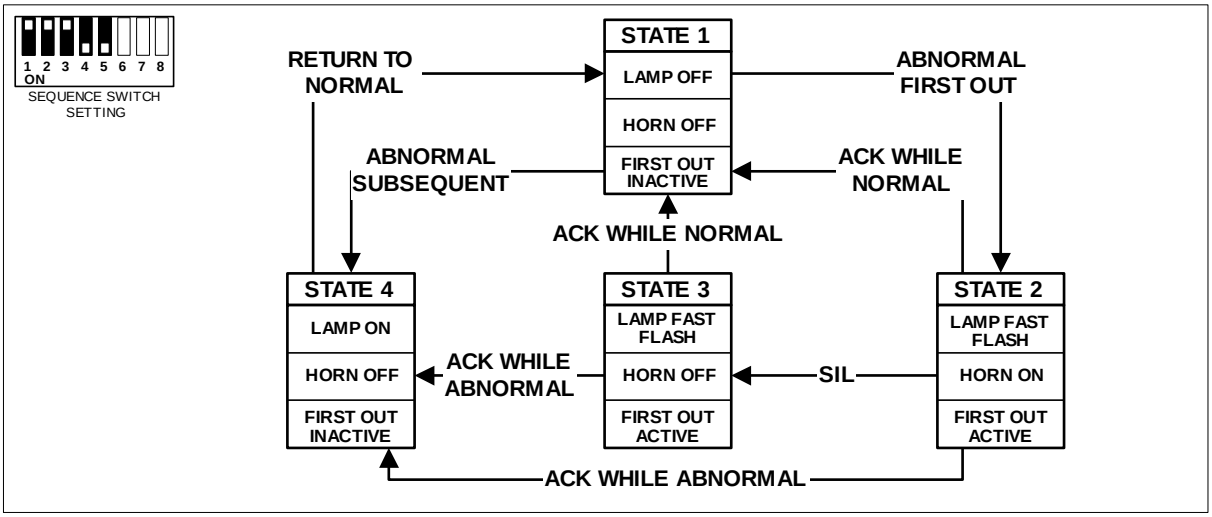
Sequence 18 - Momentary (Fleeting) Alarm; Auto Reset; with Time Delay on Inputs



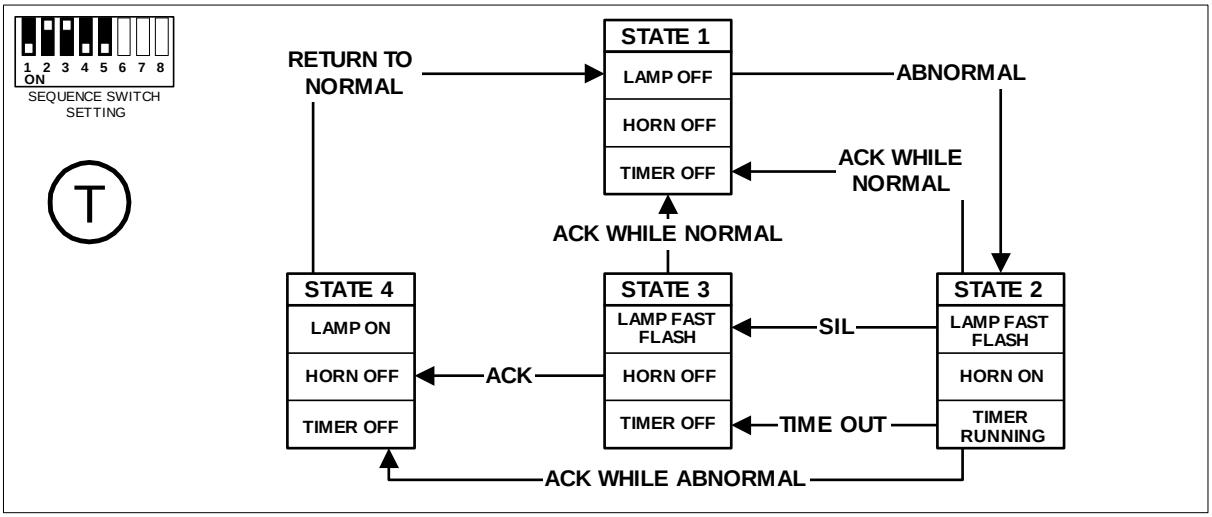
Sequence 21 - Momentary (Fleeting) Alarm, First Out Multiple Groups, Auto Reset.



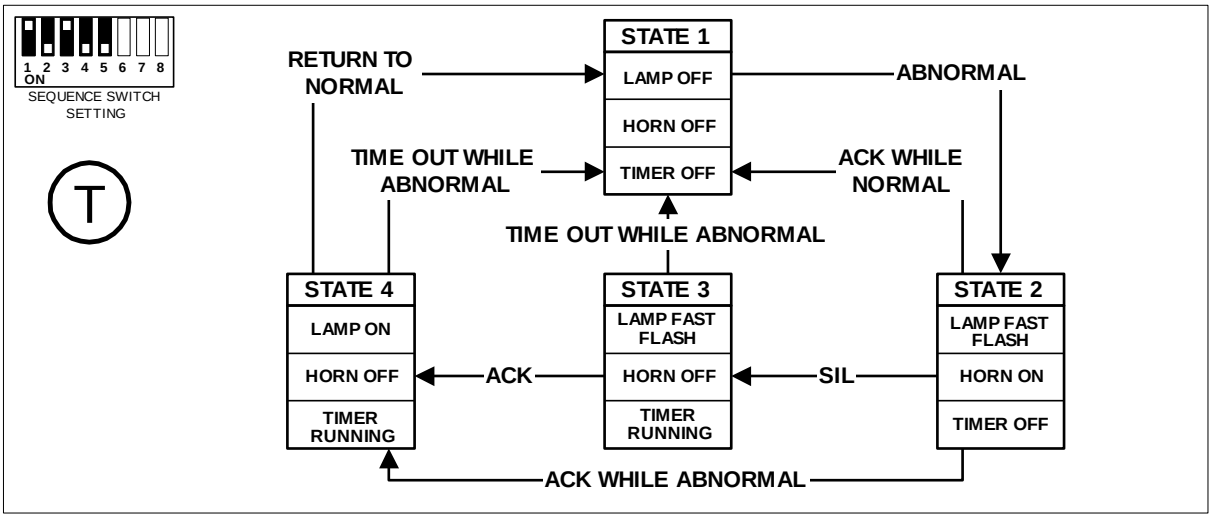
Sequence 23 - Momentary (Fleeting) Alarm, First Out Single Group, Auto Reset, First Out Continous Flash.



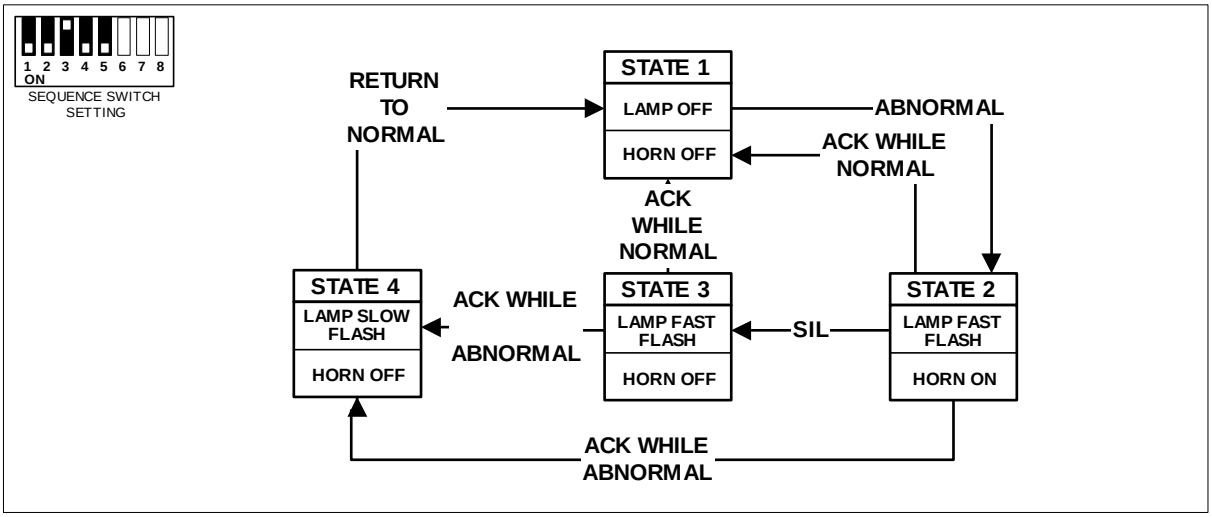
Sequence 24 - Momentary (Fleeting) Alarm; First Out Multiple Group; Auto Reset; No horn for subsequent alarms.



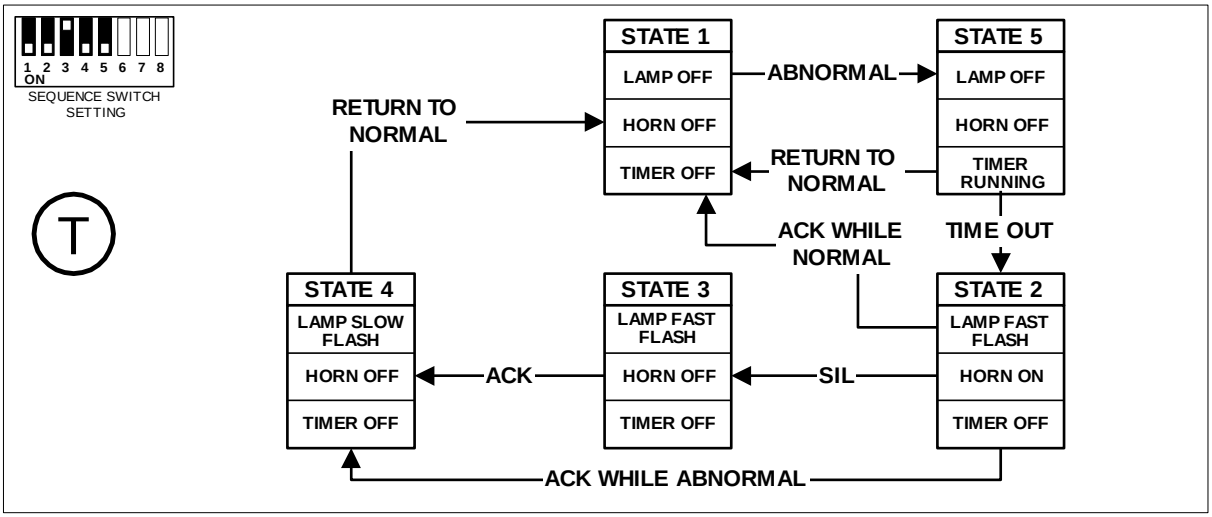
Sequence 25 - Momentary (Fleeting) Alarm; Auto Reset; Auto Silence after Time Delay.



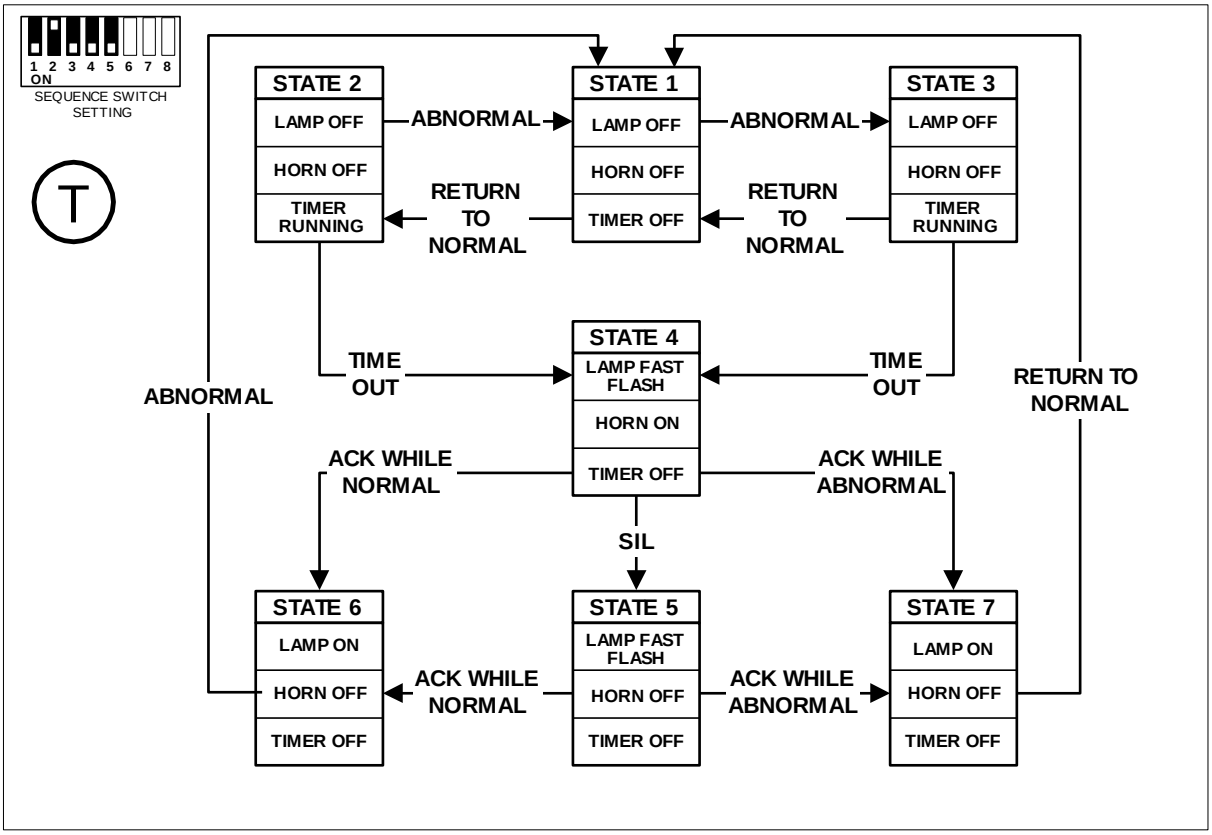
Sequence 26 - Momentary (Fleeting) Alarm; Auto Reset; Re-alarm after time-out if still abnormal.



Sequence 27 - Momentary (Fleeting) Alarm, Auto Reset, for Motor Alarms (Timer option off)



Sequence 27 - Momentary (Fleeting) Alarm; Auto Reset; for Motor Alarms; with Time Delay on Inputs



Sequence 29 - Pulse Monitoring Alarm - Auto Reset

8. MODBUS REGISTER LAYOUT

The following table provides the contents of the registers available through the programming port and the serial port using the Modbus protocol. This layout pertains to Versions of C1680A that conform to Omni16C DIT Layout Version 2.00. (Omni16C Software Kernels V5.xx support this layout)

Omni16R supports the following Modbus functions:

Modbus Function 1 – Read Coil Statuses

Modbus Function 2 – Read Input Statuses

Modbus Function 3 – Read Holding Registers

Modbus Function 4 – Read Input Registers

Modbus Function 5 – Write Single Coil

Modbus Function 6 – Write Single Holding Register

Modbus Function 16 – Write Multiple Holding Registers

Note:

Maximum Number of Holding Registers to read or write: 4

16 coils or input status to be read at a time, starting from positions1,17,33,49 only.

Note that the Table below refers to Modbus Holding registers without any starting offset. If a third party Modbus Master is being used to poll the Omni16R, add the offset for that device to the register addresses below. For example, some Modbus Master devices, Holding registers start at address 40 001. Therefore to read the status of the Omni16R inputs, read Holding register 40101.

(Using the optional Configuration Software, this data is presented in easy-to-use pull-down menus enabling the data to be accessed without needing to know the specific register numbers):

Holding / Input Reg	*Coil/ Input Status.*	*DIT No.*	*DESCRIPTION*	**Read/ Write**
1-100		0-99	PRODUCT INFORMATION	
1	N/A	0	Product Code Product Code that reflects the product range/ family. For the Omni16R family, the product code is 0501.	R
2	N/A	1	DIT Revision Number Version number of the DIT Layout used by the Omni16R Kernel. The formal is BCD with major revision number in the MSB and minor revision in the LSB.	R
3	N/A	2	Kernel Version Number Version number of the Omni16R Kernel. The value is stored in BCD format with major revision number in the MSB and minor revision in the LSB.	R
4	N/A	3	Supported Services Flags This register shows what network related services are supported by the Omni16R Kernel: Bit 0: DIT service Bit 1,2: Reserved Bit 3: Datagram Service Bits 4,5: Reserved Bit 6: Programming Service Bit 7: Presentation Layer Management Service Bits 8-15: Reserved The Omni16R currently supports the DIT service. The value read is 1.	R
5	N/A	4	User Tag 1 Name or Model number of the product in ASCII format, 2 characters per register.	R
6	N/A	5	User Tag 2	R
7	N/A	6	User Tag 3	R
8	N/A	7	User Tag 4	R

Holding / Input Reg	Coil/ Input Status.	DIT No.	DESCRIPTION	Read/ Write
9 - 23	N/A	8 – 22	Reserved	
24	N/A	23	Alive Counter Counter incremented frequently by the Omni16R Kernel to indicate it is running.	R
25 – 100	N/A	24-99	Reserved	
101- 200		100-199	STATUS DATA	
101	1-16	100	Input Status 16 Inputs as individual bits – bit 0 (lsb) = input 1 etc. Note that any Change of State to "1" will remain latched until read by a Modbus Poll. This will ensure that any fleeting abnormal input is never missed by the Modbus Master. These status bits can also be written to the unit for serial display. When using Modbus Coil writes (Modbus Function 5) the coil mapping is as follows: Coil Number : Input Number 1 : 1 2 : 2 3 : 3 4 : 4 5 : 5 6 : 6 7 : 7 8 : 8 9 : 9 10 : 10 11 : 11 12 : 12 13 : 13 14 : 14 15 : 15 16 : 16	R/W

Holding / Input Reg	Coil/ Input Status.	DIT No.	DESCRIPTION	Read/ Write
102	17-32	101	Common Service Input Status If any bit below is 1 then the input is ON. Bit 0: INH (Inhibit input) Bit 1: TST (Lamp Test input) Bit 2: ACK (Acknowledge input) Bit 3: SIL (Silence input) Bit 4: RES (Reset input) Bit 5: FS (Flash Sync input - this bit is READ ONLY) Bit 6: FO (First Out input - this bit is READ ONLY) Bits 7-15: Reserved **NOTE:** The SIL, ACK and RES bits are automatically reset to 0 after 3 seconds when set by the Modbus Master. All other bits must be reset by the Modbus Master. When using Modbus Coil writes (Modbus Function 5) the coil mapping is as follows: Coil Number : Control Input 17 : INH (Inhibit input) 18 : TST (Lamp Test input) 19 : ACK (Acknowledge input) 20 : SIL (Silence input) 21 : RES (Reset input) 22-32 : Reserved	R/W
103	N/A	102	Alarm Status 1 bit for every input where “1” means the input is in alarm and “0” means the input is in the normal condition. Bit 0 (lsb) = alarm status of input 1.	R
104	N/A	103	Common Service Output Status If any bit below is 1 then the output Relay is energised Bit 0: RL1 – Relay 1 output Bit 1: RL2 – Relay 2 output Bit 2: RL2 – Relay 3 output Bit 3: RL2 – Relay 4 output Bits 4-15: Reserved	R
105	N/A	104	Lamp Status: Lamp 2 (high byte) : Lamp 1 (low byte) The current lamp status for a given lamp can be read or written to here. Status for two lamps is provided per Modbus register, one lamp per byte. Status is as follows:	R/W

Holding / Input Reg	Coil/ Input Status.	DIT No.	DESCRIPTION	Read/ Write
			0 = OFF 8 = FAST FLASH 16 = SLOW FLASH 24 = INTERMITTENT FAST FLASH 56 = STEADY ON	
106	N/A	105	Lamp Status: Lamp 4 (high byte) : Lamp 3 (low byte)	R/W
107	N/A	106	Lamp Status: Lamp 6 (high byte) : Lamp 5 (low byte)	R/W
108	N/A	107	Lamp Status: Lamp 8 (high byte) : Lamp 7 (low byte)	R/W
109	N/A	108	Lamp Status: Lamp 10 (high byte) : Lamp 9 (low byte)	R/W
110	N/A	109	Lamp Status: Lamp 12 (high byte) : Lamp 11 (low byte)	R/W
111	N/A	110	Lamp Status: Lamp 14 (high byte) : Lamp 13 (low byte)	R/W
112	N/A	111	Lamp Status: Lamp 16 (high byte) : Lamp 15 (low byte)	R/W
113-115	N/A	112 – 114	Reserved	
116	N/A	115	Fault Status If the unit discovers a fault it is reflected in this register. The error codes are as follows: NO fault found: 0 INPUT fault: 47 SPI fault: 63 EEPROM fault: 79	R
117-200	N/A	116 – 199	Reserved	
201-250		200 – 249	SETUP DATA	
201	N/A	200	Setup Sequence Number: Input 2 (high byte) : Input 1 (low byte) Select Sequence number from Table 4-1. DIP switches must be set to Sequence 31 on SW1 for this register to be recognised, otherwise the DIP switch setting is used. If an invalid setting is written into these registers, the relevant sequence is set to Sequence 1.	R/W
202	N/A	201	Setup Sequence Number: Input 4 (high byte) : Input 3 (low byte)	R/W
203	N/A	202	Setup Sequence Number: Input 6 (high byte) : Input 5 (low byte)	R/W

Holding / Input Reg	Coil/ Input Status.	DIT No.	DESCRIPTION	Read/ Write
204	N/A	203	Setup Sequence Number: Input 8 (high byte) : Input 7 (low byte)	R/W
205	N/A	204	Setup Sequence Number: Input 10 (high byte) : Input 9 (low byte)	R/W
206	N/A	205	Setup Sequence Number: Input 12 (high byte) : Input 11 (low byte)	R/W
207	N/A	206	Setup Sequence Number: Input 14 (high byte) : Input 13 (low byte)	R/W
208	N/A	207	Setup Sequence Number: Input 16 (high byte) : Input 15 (low byte)	R/W
209	N/A	208	Setup Timer Setting: Input 2 (high byte) : Input 1 (low byte) Input delay timer set per input. One input per byte. The data format for an input is as follows: Most significant bit: 1 = Use the slow timer, 0 = Use the fast timer (1/10 s) Least significant 7 bits: time delay in multiples The fast timer counts time in units of tenths of a second (i.e. 1/10 s). The slow timer counts in multiples of the fast timer and is programmable. Refer to DIT 135 to configure it. The default setting is 10 which makes is a seconds counter. Fast timer example: To delay Input 1 by 20 seconds, enter 200 (or C8 hex) Slow timer example: If DIT 135 is set to 10 then to delay Input 1 by 20 seconds, enter 148 (94hex) Set to **255** to use timer setting set by SW2.	R/W
210	N/A	209	Setup Timer Setting: Input 4 (high byte) : Input 3 (low byte)	R/W
211	N/A	210	Setup Timer Setting: Input 6 (high byte) : Input 5 (low byte)	R/W
212	N/A	211	Setup Timer Setting: Input 8 (high byte) : Input 7 (low byte)	R/W
213	N/A	212	Setup Timer Setting: Input 10 (high byte) : Input 9 (low byte)	R/W
214	N/A	213	Setup Timer Setting: Input 12 (high byte) : Input 11 (low byte)	R/W
215	N/A	214	Setup Timer Setting: Input 14 (high byte) : Input 13 (low byte)	R/W
216	N/A	215	Setup Timer Setting: Input 16 (high byte) : Input 15 (low byte)	R/W
217-219	N/A	216-227	Reserved	
229	N/A	228	Setup Lamp Sense 65535 = All Lamps Normal Sense. 0 = All Lamps Reversed Sense. **Note:** This setting only applies when SW1-8 is ON.	R/W

Holding / Input Reg	Coil/ Input Status.	DIT No.	DESCRIPTION	Read/ Write
230	N/A	229	First Out Group Split Enter a number between 1 and 16 to decide the split between First Out Group 1 and 2. For example: A value of **4** will arrange input 1 to 4 into First Out Group 1 and inputs 5 to 16 into First Out Group 2.	R/W
231	N/A	230	Setup System Operation Bit 0: Pushbutton Edge/#Level: 1 – Edge, 0 – Level Bit 1: Auto ACK on Startup: 1 – NO Auto ACK on Startup, 0 - Auto ACK on Startup Bit 2: Inhibit Input operation: 1 – Close to Inhibit, 0 – Open to Inhibit **Note:** This setting only applies when SW1-8 is ON. Bit 3-5: Repeat Output operation: The bit map is as follows: Bit 5:4:3: 1:1:1 – Repeat Relay Follows Input, Normally Open Bit 5:4:3: 1:0:1 – Repeat Relay Follows Input, Normally Closed (default) Bit 5:4:3: 1:1:0 – Repeat Relay Follows Alarm, Normally Open Bit 5:4:3: 1:0:0 – Repeat Relay Follows Alarm, Normally Closed Bit 5:4:3: 0:0:0 – Repeat Relay Acts as GA Bit 6-15: Reserved	R/W
232	N/A	231	Setup Slow Timer The slow timer counts in multiples of the fast timer. This is configurable to allow the most flexible use of timers. Some examples are given below: To count in seconds: set to 10 To count in 10s of seconds: set to 100 To count in 20s of seconds: set to 200	R/W

Holding / Input Reg	Coil/ Input Status.	DIT No.	DESCRIPTION	Read/ Write
233	N/A	232	Setup Common Relay Operation: Common Relay 1 (high byte) : Common Relay 2 (low byte) Configure the operation of the four common fitted to the Common Services Card, labled RL1, RL2, RL3 and RL4. These relays can be configured for Horn operation or a selection of GA (Group Alarm) operations as follows: ▪ Relay Follows Input: ▪ Relay Follows Alarm ▪ Relay acts as ring-back horn ▪ Relay acts as Multiple Reflash ▪ Relay Follows ACK pushbutton NOTE: Relay 1 can also be configured for watchdog operation.	R/W
234	N/A	233	Setup Common Relay Operation: Common Relay 3 (high byte) : Common Relay 4 (low byte)	R/W
235-236	N/A	234-235	Reserved	R/W
237	N/A	236	Setup Repeat Relay GA Operation: Repeat Relay 1 (high byte) : Repeat Relay 2 (low byte) Configure the operation of the repeat relays fitted to the Repeat Relay cards when they have been configured for “Acts as GA” operation in the Setup System Operation group. In this case the relays can be configured for Horn operation or a selection of GA (Group Alarm) operations as follows: ▪ Relay Follows Input ▪ Relay Follows Alarm ▪ Relay acts as ring-back horn ▪ Relay acts as Multiple Reflash ▪ Relay Follows ACKnowledge pushbutton	
238	N/A	237	Setup Repeat Relay GA Operation: Repeat Relay 3 (high byte) : Repeat Relay 4 (low byte)	R/W

Holding / Input Reg	Coil/ Input Status.	DIT No.	DESCRIPTION	Read/ Write
239	N/A	238	Setup Repeat Relay GA Operation: Repeat Relay 5 (high byte) : Repeat Relay 6 (low byte)	R/W
240	N/A	239	Setup Repeat Relay GA Operation: Repeat Relay 7 (high byte) : Repeat Relay 8 (low byte)	R/W
241	N/A	240	Setup Repeat Relay GA Operation: Repeat Relay 9 (high byte) : Repeat Relay 10 (low byte)	R/W
242	N/A	241	Setup Repeat Relay GA Operation: Repeat Relay 11 (high byte) : Repeat Relay 12 (low byte)	R/W
243	N/A	242	Setup Repeat Relay GA Operation: Repeat Relay 13 (high byte) : Repeat Relay 14 (low byte)	R/W
244	N/A	243	Setup Repeat Relay GA Operation: Repeat Relay 15 (high byte) : Repeat Relay 16 (low byte)	R/W
245	N/A	244	Setup Common Relay Input Members: Relay 1 Configures the group of inputs that the relay will respond to. Inputs are individually mapped to any relay. Mapping is setup in binary format where Input 1 is the least significant bit. For example: to map inputs 1 to 6 to Common Relay 1, set the corresponding binary value: "0000000000111111" for DIT register 244.	R/W
246	N/A	245	Setup Common Relay Input Members: Relay 2	R/W
247	N/A	246	Setup Common Relay Input Members: Relay 3	R/W
248	N/A	247	Setup Common Relay Input Members: Relay 4	R/W
249	N/A	248	Setup Repeat Relay Input Members: Repeat Relay 1 Configures the group of inputs that the repeat relay will respond to. Inputs are individually mapped to any relay. Mapping is setup in binary format where Input 1 is the least significant bit. For example: to map inputs 1 to 6 to Repeat Relay 1, set the corresponding binary value: "0000000000111111" for DIT register 248. NOTE: the function will only apply if the Repeat Relays have been setup to “Act as GA” in the System Operation setup.	R/W
250	N/A	249	Setup Repeat Relay Input Members: Repeat Relay 2	R/W
251	N/A	250	Setup Repeat Relay Input Members: Repeat Relay 3	R/W
252	N/A	251	Setup Repeat Relay Input Members: Repeat Relay 4	R/W
253	N/A	252	Setup Repeat Relay Input Members: Repeat Relay 5	R/W

Holding / Input Reg	Coil/ Input Status.	DIT No.	DESCRIPTION	Read/ Write
254	N/A	253	Setup Repeat Relay Input Members: Repeat Relay 6	R/W
255	N/A	254	Setup Repeat Relay Input Members: Repeat Relay 7	R/W
256	N/A	255	Setup Repeat Relay Input Members: Repeat Relay 8	R/W
257	N/A	256	Setup Repeat Relay Input Members: Repeat Relay 9	R/W
258	N/A	257	Setup Repeat Relay Input Members: Repeat Relay 10	R/W
259	N/A	258	Setup Repeat Relay Input Members: Repeat Relay 11	R/W
260	N/A	259	Setup Repeat Relay Input Members: Repeat Relay 12	R/W
261	N/A	260	Setup Repeat Relay Input Members: Repeat Relay 13	R/W
262	N/A	261	Setup Repeat Relay Input Members: Repeat Relay 14	R/W
263	N/A	262	Setup Repeat Relay Input Members: Repeat Relay 15	R/W
264	N/A	263	Setup Repeat Relay Input Members: Repeat Relay 16	R/W
265	N/A	264	Setup Modbus Extended Slave Address When the Modbus address switch is set to 15, then the alarm annunciators will use the setting in this register to determine its Modbus Slave Address. Bits 0-7: Modbus Extended Slave Address: Can be in the range 1-255 Bit 8-15: Reserved. Set to zero when writing to this register.	