RAM-2944LCD

Annunciator Driver

Installation and Operation Manual

LT-2020 Rev. 1
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1.0 Technical Information

1.1 General

The RAM-2944LCD Annunciator Driver is capable of controlling up to 576 LEDs, as 192 zones of 3 LEDs each (Alarm, Supervisory, Trouble), for use with columnar or graphic annunciators. Two optional LCD displays are available, an 80 character (4 x 20) display display and a larger display twice that size. Both can be used to display text messages.

The RAM-2944LCD uses the NWM-2944-R Network Communications Board for network interface. The RAM-2944LCD can use all variants of the NWM-2944-R board. The RAM-2944LCD may also use the FM-2200-R1 Fiber Optic Modem for connecting a fiber network between panels.

The RAM-2944LCD uses the AN4 program for connection to FX-2200 networks.

The LEDs are interfaced to the Annunciator Driver using the RAM-2944-24 Annunciator Strip, the RAM-2944-8 Annunciator Strip or the AGD-2944-8 LED Driver.

1.2 AGD-2944-8 LED Driver

The AGD-2944-8 LED Driver drives up to 24 LEDs. There is a 50 pin connector for connection to a wire-wrap socket. The LEDs would be connected to the wire-wrap legs of the socket.

1.3 RAM-2944-24 Annunciator Strip

The Annunciator Strip contains 24 sets of zone indicating LEDs. Individual LEDs are provided to display alarm, supervisory and trouble conditions by zone. The LED functions, from the left, are: Alarm (red), Supervisory (yellow or amber) and Trouble (yellow).

1.4 RAM-2944-8 Annunciator Strip

The Annunciator Strip contains 8 sets of zone indicating LEDs. Individual LEDs are provided to display alarm, supervisory and trouble conditions by zone. The LED functions, from the left, are: Alarm (red), Supervisory (yellow or amber) and Trouble (yellow).

1.5 Technical Specifications

Table 1 Technical Specifications

	RAM-2944LCD	RAM-2944-8	AGD-2944-8	RAM-2944-24
Voltage	24 VDC	24 VDC	5 VDC (Optional)	24 VDC
Normal Current	no LCD: 50 mA LCD: 75 mA	5 mA	10 mA	10 mA
Max Current	500 mA	125 mA	250 mA	250 mA
Operator Key	SPST N/O			

1.6 Environmental Specifications

This annunciator is intended for indoor use only.

1.7 Contact Us

For General Inquiries, Customer Service and Technical Support you can contact us Monday to Friday 8:00 A.M. to 5:00 P.M. E.S.T.

1.7.1 General Inquiries

Toll Free	1-888-660-4655 (North America Only)
Local	905-660-4655
Email	mail@mircom.com

1.7.2 Customer Service

Toll Free	1-888-MIRCOM5 (North America Only)
Local	905-695-3535
Toll Free Fax	1-888-660-4113 (North America Only)
Local Fax	905-660-4113
Email	salessupport@mircom.com

1.7.3 Technical Support

Toll Free	1-888-MIRCOM5 (North America Only)
	888-647-2665
International	905-647-2665
Email	techsupport@mircom.com

1.7.4 Website

www.mircom.com

2.0 Installation

2.1 Mounting

These mounting instructions apply only to annunciators that come complete with cabinet.

1. Choose a suitable location for mounting.
2. Mark placement of mounting screws using template. Make sure that the template is level.
3. Drill holes, install plugs (if necessary) and top two screws.
4. Hang the cabinet on screws and pull down to ensure a snug fit. The cabinet should be level.
5. Install bottom screw(s) and tighten all screws.
6. Connect network and power wiring. Operator key wiring and LED wiring, if any, is done at the factory. Power can be taken from an external 24VDC source. An external source must be UL/ULC listed for use with fire alarm systems.

Note: For use with FM-2200-R1 Fiber Optic Modem, power must be supplied by a regulated, power-limited 24 VDC power supply that is UL-listed for Fire Protective Signalling Service.

2.2 Wiring

Note: Operator key and LED wiring is required only for units that do not come complete in a cabinet.

2.2.1 Power

The Annunciator panel requires 24 VDC for operation from a power limited source. This shall be provided from either the AUX 1 or AUX 2 auxiliary power connections on the Fire Alarm Control Panel. The 24 VDC is connected to the +24 terminal (positive) and the GND terminal (negative). See Figure 1 for terminal locations.

Note: Annunciator must be powered from panel or from a regulated, power-limited power supply listed for Fire Protective Signalling Service (or any other power supply for which compatibility has been verified by UL).

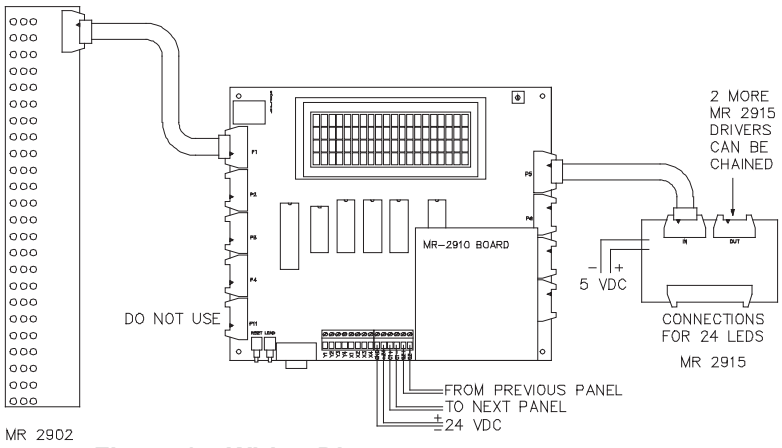

Figure 1 Wiring Diagram

Notes: If the annunciator is programmed for two port operation, both communications ports must be connected even if there is only one other unit in the system.

If the annunciator is programmed for single port operation, only COM2 (C2+/C2) is connected.

COM1 and COM2 are power-limited and supervised.

For information on connecting a fiber optic network, please refer to the Fiber Optic Module's Installation Manual.

2.2.2 Network to FX-2200

Network wiring for communications to the FX-2200 is connected to the terminal pairs marked C1+/C1- and C2+/C2- (see Figure 1). The wiring is not polarity sensitive. COM1 (C1+/C1-) is connected to COM2 the next panel in the network loop. Ensure that the Annunciator is programmed to communicate with the next panel or that COM1 is disabled as required in the downloaded database. COM2 (C2+/C2-) is connected to the previous panel in the network loop.

2.2.3 Operator Keys

All operator keys are wired between an X and a Y terminal. A key switch may be placed in series with the Y2 terminal to make certain operator keys limited access (see Figure 2). The figure is typical only; any, all or none of the operator keys can have the key switch used.

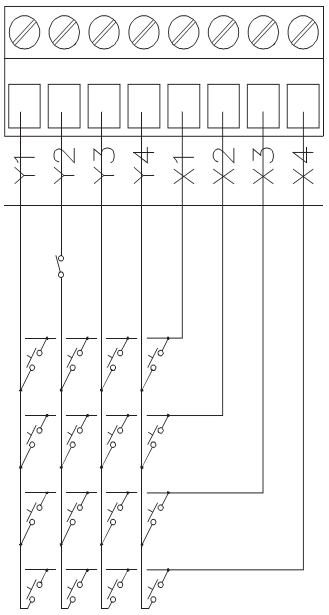

Figure 2 Operator Key Wiring (Typical)

2.2.4 LEDs

The RAM-2944-24 Annunciator Strip, RAM-2944-8 Annunciator Strip and the AGD-2944-8 LED Driver are connected to the Annunciator by ribbon cables (see Figure 1). The eight connectors on the Annunciator are labelled P1 to P8. P1 is for zones 1 to 24, P2

for zones 25 to 48, etc. Each RAM-2944-8 and AGD-2944-8 controls 8 zones. Up to 3 RAM-2944-8s or AGD-2944-8s can be chained together to provide up to 24 zones per chain. Each RAM-2944-8 will require a jumper for addressing (see below). No jumpers are set on the AGD-2944-8 for addressing purposes.

Attention: Do not use P11 for LEDs. This will cause damage to both the RAM-2944LCD and the LED driver.

The AGD-2944-8 LED Driver has a 50 pin connector for connection to the LEDs. The LEDs are wired to a 50 pin socket which the AGD-2944-8 plugs into. The pin-outs are shown in Figure 3.

2.2.5 RAM-2944-8 Jumper Settings

The jumpers for setting the octet are located just below the ribbon cable connector (see Figure 4). There are three pairs of holes. Soldering a wire jumper across the required pair will set the RAM-2944-8 to be the first, second or third octet. There is a trace on the board jumpering the pair for the first octet. This will need to be cut if the board is for the second or third octet.

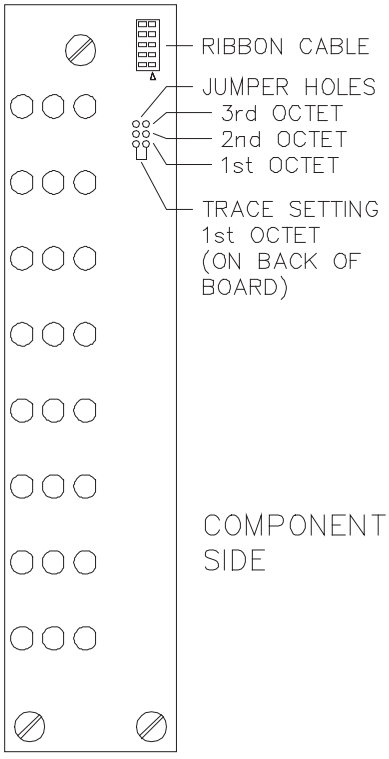

Figure 3 RAM-2944-8

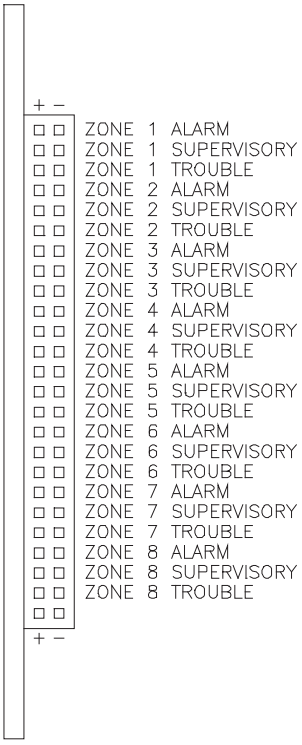

Figure 4 AGD-2944-8 LED Pintouts

3.0 Operation

3.1 LEDs

There are 192 LED zones available on the Annunciator, each zone consisting of Alarm (red), Supervisory (amber) and Trouble (yellow) LEDs. The LEDs will flash if a new condition is received. If the buzzer is sounding, press Acknowledge to silence the buzzer. Press Acknowledge (again) to latch the LEDs. Once the condition is restored, the LED can be turned off by pressing Reset. If global commands are enabled, these operator keys will be broadcast to the network, causing all units to respond to the operator keys. An asterisk will appear at the end of the LCD display line showing the current time if any of the LEDs can be reset. If the Alarm List is being displayed, the current time will not be displayed.

If the RAM-2944LCD has a memory or configuration error, the buzzer will sound every 2 seconds. This also occurs while loading a database.

If LEDs are programmed, the table below shows the meaning for each LED when flashing. The Power On LED flashes when the annunciator first starts operating and stays steady after the Acknowledge key is pressed.

Table 2 LED Descriptions

LED	Meaning	LED	Meaning
Zone 1 alram	Acknowledge available	Zone 3 alarm	2nd Stage Inhibit available
Zone 1 supervisory	Reset available (green)	Zone 3 supervisory	Manual Restart available
Zone 1 trouble	Reset available	Zone 3 trouble	future use
Zone 2 alarm	Signal Silence active	Zone 4 alarm	future use
Zone 2 supervisory	Signal Silence available	Zone 4 supervisory	future use
Zone 2 trouble	2nd Stage Inhibit active	Zone 4 trouble	Power On

If a common LED is programmed, it will show the sum of all the Zone LEDs that are on. The common LED will also indicate troubles that are local to the Annunciator only. The Hot LEDs have no effect on the common LED.

Lamp Test flashes the LEDs in sequence. Pressing Lamp Test repeatedly will cycle through: alarm LEDs, supervisory LEDs, trouble LEDs, and Lamp Test off. The test will automatically end if any new condition is received, or after 5 minutes. The lamp test cannot be performed if AC power is off.

3.2 Buzzer

The buzzer gives audible indication of any conditions in the panel. It may sound in any of four modes. Pressing Acknowledge will silence the buzzer. (Acknowledge will need to be pressed again to latch flashing LEDs.)

The four buzzer modes are:

Steady: This indicates any new fire alarm conditions. This mode can be disabled in the database.

Fast: This indicates any critical failures that must be attended to. These failures can include, but are not limited to memory overflow, network reboot required, database mismatch, etc. The pattern in 50ms on/off.

Medium: This indicates any new supervisory conditions. The pattern is 200ms on/off.

Slow: This indicates any new trouble conditions. The pattern in 500ms on/off. Through programming, a new trouble condition can be made to not sound the buzzer again for a time after it has been silenced. This time can be set from 15 to 255 seconds. By default, the buzzer will sound for all new troubles.

3.3 Operator Keys

There are 16 operator key inputs. The operator keys can be programmed in the database to be either local or global. If the operator keys are local, they affect the RAM-2944LCD Annunciator only. If the operator keys are global, they will be broadcast over the network, causing all units on the network to respond to the operator key. The operator keys are laid out in a 4 by 4 matrix as follows:

Table 3 Operator Key Input Matrix

	X1	X2	X3	X4
Y1	Acknowledge[1]	System Reset	Lamp Test	Second Stage Inhibit[2]
Y2	Signal Silence[2]	General Alarm[2]		System Reset[1]
Y3	Manual Restart[2]			Scroll
Y4				Details

Notes: [1] These operator keys are both Local and Global.

[2] These operator keys are Global only.

All other operator keys are Local only.

Through the downloaded database, global keys can be programmed to affect only certain panels.

If global commands are enabled, all operator keys that have global ability will be broadcast to the network. All units on the network will respond as if the operator key was pressed at the unit itself, except it will not beep. The annunciator will always send the global commands, even when they are not valid at the Annunciator. The LCD back light will turn on if a operator key is pressed. The back light will automatically turn off in 5 minutes if there is no activity.

3.4 Alarm List

The Alarm List contains all the current Alarms, Supervisory Conditions and Troubles. The Alarm List will hold entries as requested by other panels in the network. The first/last entry of highest priority will be shown, instead of the time display, if there are any entries in the Alarm List. Alarms are the highest priority, Supervisory Conditions are the 2nd priority and Troubles the 3rd priority, Monitor Conditions are 4th priority and Non-reporting signals are the lowest

priority. The Alarm List will turn on the LCD back light when a new entry is received. The back light will automatically turn off in 5 minutes if there is no activity.

To view additional entries in the Alarm List when an entry is showing, press the Scroll key. This will display the next/previous entry of the highest priority showing the device message, if any, otherwise the event screen is shown. Press Scroll again to view the next/previous entry. Use the Details key to rotate between screens of the event.

There are two display modes of operation:

- *First*: Displays the first entry of highest priority and then each next entry as requested.
- *Last*: Displays the last entry of highest priority and then each previous entry as requested.

There are two reset modes of operation:

- *Automatic*: Entries are removed from the Alarm List as soon as the condition restores.
- *Manual*: Entries that can be removed from the list have the condition code shown with a "-" instead of a "+". Press Reset to remove these entries from the Alarm List.

The event screen of an entry shows one of two forms:

1. Line 1: time, sequence number, and Condition Code
   Line 2: date and Zone Number
   Line 4: description of event (alarm, trouble, ground, restore, etc.); or
2. Line 1: time, sequence number, and Condition Code
   Line 2: date and Zone Number
   Line 3: description of event
   Line 4: circuit/device type

Figure 5 Alarm List: Event Screen

The device and panel message screens, if any, show:

Line 1: time, sequence number, and Condition Code
Lines 2 to 4: description from the database

Figure 6 Alarm List: Message Screen

See Supplementary Information for a description of Condition Codes and Zone Numbers.

The summary screen shows either the number of alarm, supervisory and trouble entries in the Alarm List (shown); or the number of supervisory, trouble, and monitor entries (if there are monitor and no alarm entries); or the number of trouble, monitor and non-reporting entries (if there are non-reporting and no alarm or supervisory entries).

Figure 7 Alarm List: Summary Screen

4.0 Programming

4.1 General

The Annunciator Unit's service terminal is accessed through the 9-pin RS-232 serial port located on the bottom of the RAM-2944LCD Driver Board. The programming cable uses pins 2, 3 and 5 straight through from DB9 male to DB9 female plugs. The serial port works at 9600 bps, 8 data bits, 1 stop bit and no parity.

When programming the Annunciator for the first time, the only item that MUST BE PROGRAMMED from the service terminal is the Annunciator's network ID (default value is 101). The network ID is shown on the top line of every screen to identify the panel being serviced. To change the panel's ID, first go to screen 16 by entering the command 16<Tab>. Set Privilege Level 2 by entering (code)<Ctrl-V> where code is the Level 2 passcode (default 2222). To set the ID enter the command idN, where id is the network ID of the Annunciator, a number between 1 and 254.

All other required programming is taken from the database generated by the Modul-R Human Interface program (MHI). Downloading the database into the RAM-2944LCD annunciator is automatically handled by MHI. See the Modul-R Human Interface Database Editor for details on downloading databases.

Non-required programming controlling the operation of the Alarm List and the communications parameters of the primary network port (if used) are set using the service terminal.

4.2 Service Terminal Screens

All screens have a common status line showing the current time, a diagnostic number, the annunciator's ID number and the screen number and name. Screens will also list keyboard commands related to the screen's information. Some commands require a privilege level set before they can be used.

The following screens are available, those that are most useful for the installer are marked with an asterisk:

Table 4 Service Terminal Screens

Screen	Name	Description
0*	Index	List of all available screens.
2	Miscellaneous Info	A list of the program version, boards installed in the system and other information not listed elsewhere.
7	Keypad	Displays a list of each operator key function.
8	Alarm List Config	Display the current operating modes of the Alarm List, ie first or last sequencing, and Auto or Manual restores. See §3.4 Alarm List for a description of operation. <u>Level 1 Commands</u> 0 R Set Alarm List to Automatic restore mode 1 R Set Alarm List to Manual restore mode
9*	Alarm List	List the first entries in the Alarm List. Up to 20 entries will be shown. <u>Level 0 Commands</u> J Page down 0J Go to end of the list K Page up 0K Go to beginning of the list
10*	Miscellaneous Troubles	List of the current troubles.
11*	LEDs	Display a grid showing the status of all LEDs. A dot (.) is off, an F is flashing, an asterisk (*) is on, and an R is on and resettable. The first row is zones 1 to 24, the second row is zones 25 to 48, etc. The common and hot key zones are identified at the bottom of the screen. <u>Level 0 Commands</u> 0 A Disable Trouble buzzer inhibit (15-255) A Set Trouble buzzer inhibit from 15 to 255 seconds
14	Printer	A copy of everything sent to the printer. This is useful for capturing print-outs to a file. **Note**: Status line updating is disabled while on this screen.
15	Printer Status	Displays the current printer status.
16	Network	Displays information about network communications. This includes frames sent and received, frames in error and orphan messages. <u>Level 0 Commands</u> 0 V Clear counters on screen

Table 4 Service Terminal Screens

Screen	Name	Description
17	Port 1	Displays information about the primary network communication port (COM1). Level 0 Commands 0 V Clear the network counters. Level 1 Commands (1-25) B Set the retry limit for COM1. This is the number of retries attempted before the unit is considered off-line. The default value is 8. (baud) B Set the baud rate of COM1. This can be any of 9600 (default), 4800, 2400, 1200, 600, 300 or 150.
18	Port 2	Displays information about the secondary network communication port (COM2). A question mark will appear in front of the baud rate when the port is off-line. Level 0 Commands 0 V Clear the network counters.
29	System Reset	Displays a list of resettable items. These are the items that are reset when *System Reset* is pressed.
38	Switches	Show the current on/off status of each switch and list the timer associated with each one.
49	Clock	Show the current clock calibration or calibration status.
50	Stacks	This screen is for diagnostic purposes.
51*	FIFOs	This screen is for diagnostic purposes. Level 0 Commands 0 <Ctrl-F> Clear maximum usage counters
52	Extended Memory	Displays the type and amount of extended memory installed in the system.
68*	Remote Terminal	Displays the service terminal screens for another panel in the network. This allows for the troubleshooting of a system from a single location. This screen will automatically disconnect the remote connection if memory gets low or if no communication is received for 15 seconds. The remote panel will stop sending data after 15 minutes. Level 0 Commands (id) N Display the service terminal for Panel id <Esc> Disconnect remote connection
69*	Network Verify	Displays the detailed status of the Network Verify feature.

4.3 Keyboard Commands

These keyboard commands are available on all screens.

Table 5 Keyboard Commands

Command	Description
<Del>	Clear and redisplay the current screen.
<Tab>	View next available screen. Unused/unavailable screens are skipped over.
<Backspace>	View previous available screen. Unused/unavailable screens are skipped over.
0<Tab>	View Index screen showing the numbers of all available screens.
0-127<Tab>	View Selected Screen. If selected screen is unused/ unavailable, the next available screen is shown.
0.0<Tab>	TeleVideo cursor control mode.
0.1<Tab>	VT100 cursor control mode.
A	Silence buzzer.
D	Print the date and time.
(month).(date) D	Enter the date.
(month).(date).(year) D	Enter the date and year. The year may be entered as 00 to 99 in a two-digit format, or as 1991 to 2090 in a four digit format.
(hours).(minutes) T	Set the time.
(hours).(minutes).(seconds) T	Set the time.
<Ctrl-V>	Clear privilege (Set to User Privilege.)
(code)<Ctrl-V>	Set privilege. (code) is either the Level 1 or Level 2 passcode programmed into the panel.

5.0 Parts List

Table 6 Parts List

Model	Description
RAM-2944	Annunciator Driver
RAM-2944LC	Annunciator Driver c/w 4x20 LCD Display
RAM-2944LCD	Annunciator Driver c/w Double Size 4x20 LCD Display
NWM-2944-R	Network Communications Board
NWM-2944-R1	Network Communications Board, Port 1 RS-232, Port 2 Standard
NWM-2944-R2	Network Communications Board, Port 1 Standard, Port 2 RS-232
NWM-2944-R12	Network Communications Board, Ports 1 and 2 RS-232
Note: The RAM-2944LCD requires one of the NWM-2944-R Network Communications Boards to operate	
FM-2200-R1	Fiber Optic Module, one modem
FM-2200-R2	Fiber Optic Module, two modems
AGD-2944-8	LED Driver
RAM-2944-24	Annunciator Strip, 3 x 24 LEDs
RAM-2944-8	Annunciator Strip, 3 x 8 LEDs
Custom Graphic Annunciator Panels are available on request	

6.0 Supplementary Information

The Alarm List uses the following formats for condition codes and zone numbering. Only those zones that are shown by the Annunciator are listed.

6.1 Condition Code

Alarm List	Description
ALARM	Alarm
bypass	Bypass
com	Comlink
dupl	Duplicate Addressable Device
alert	Maintenance Alert
ground	Ground Fault
ilgl	Illegal Addressable Device
msng	Missing Addressable Device
nofire	Non-Fire/Non-Reporting
M.PULL	Pull Station Alarm
abort	Releaser Abort
spv	Supervisory
trbl	Trouble or Parameter Change
wrong	Wrong Device Type
WFLOW	Waterflow Alarm

A plus sign (+) refers to a new or on condition, a minus sign (-) refers to a restoral or off condition, and an equal sign (=) refers to a one time event.

6.2 Zone Number

PPP:ZZ.SSS Format:
PPP = Control Panel Number
ZZ = Panel Zone

Table 7 Panel Zone Descriptions

Panel Zone	Description	Panel Zone	Description
0	General Alarm	20	Initiating Circuit 20
1	Initiating Circuit 1	21	Initiating Circuit 21
2	Initiating Circuit 2	22	Initiating Circuit 22
3	Initiating Circuit 3	23	Initiating Circuit 23
4	Initiating Circuit 4	24	Initiating Circuit 24
5	Initiating Circuit 5	50	Network Verify
6	Initiating Circuit 6	51	Comlink 1
7	Initiating Circuit 7	52	Comlink 2
8	Initiating Circuit 8	53	Comlink 3
9	Initiating Circuit 9	54	Comlink 6
10	Initiating Circuit 10	55	Printer Port
11	Initiating Circuit 11	59	Addressable Modules Comlink
12	Initiating Circuit 12	60	Output (bell/releaser) Supervision
13	Initiating Circuit 13	61	Auxiliary Power Supervision
14	Initiating Circuit 14	66	AC Power
15	Initiating Circuit 15	67	Low Battery
16	Initiating Circuit 16	84	Test Mode
17	Initiating Circuit 17	87	Passcode Tamper
18	Initiating Circuit 18	94	Network Reboot Required who
19	Initiating Circuit 19	95	Network Reboot Required Why

SSS = Sub-Zone Number

Addressable Circuit:
Device Number

Dual End-of-Line Circuit:
000 - Wiring Fault
001 - Switch #1
002 - Switch #2

Smoke Detector and Contact Device Circuit:
000 - Wiring Fault

001 - Smoke Detector
002 - Contact Device

Comlink 1 (Zone 51):
Unit Network ID number

Comlink 3 (Zone 53):
Unit ID number

Comlink 6 (Zone 54):
Unit ID number

Addressable Module Comlink (Zone 59):
001 - Circuits 1 to 8
002 - Circuits 9 to 16
003 - Circuits 17 to 24

Output Supervision (Zone 60):
Output Circuit Number

Network Reboot Required (Zone 94):
Unit ID of panel generating the trouble

Network Reboot Required Why (Zone 95):
001 - network
002 - network
003 - port 3
006 - negative counter
008 - memory overflow
009 - co-processor memory overflow
All Others: Always 000

7.0 Warranty and Warning Information

7.1 Warning Please Read Carefully

Note to End Users This equipment is subject to terms and conditions of sale as follows:

7.2 Note to Installers

This warning contains vital information. As the only individual in contact with system users, it is your responsibility to bring each item in this warning to the attention of the users of this system. Failure to properly inform system end-users of the circumstances in which the system might fail may result in over-reliance upon the system. As a result, it is imperative that you properly inform each customer for whom you install the system of the possible forms of failure.

7.3 System Failures

This system has been carefully designed to be as effective as possible. There are circumstances, such as fire or other types of emergencies where it may not provide protection. Alarm systems of any type may be compromised deliberately or may fail to operate as expected for a variety of reasons. Some reasons for system failure include:

7.3.1 Inadequate Installation

A Fire Alarm system must be installed in accordance with all the applicable codes and standards in order to provide adequate protection. An inspection and approval of the initial installation, or, after any changes to the system, must be conducted by the Local Authority Having Jurisdiction. Such inspections ensure installation has been carried out properly.

7.3.2 Power Failure

Control units, smoke detectors and many other connected devices require an adequate power supply for proper operation. If the system or any device connected to the system operates from batteries, it is possible for the batteries to fail. Even if the batteries have not failed, they must be fully charged, in good condition and installed correctly. If a device operates only by AC power, any interruption, however brief, will render that device inoperative while it does not have power. Power interruptions of any length are often accompanied by voltage fluctuations which may damage electronic equipment such as a fire alarm system. After a power interruption has occurred, immediately conduct a complete system test to ensure that the system operates as intended.

7.3.3 Failure of Replaceable Batteries

Systems with wireless transmitters have been designed to provide several years of battery life under normal conditions. The expected battery life is a function of the device environment, usage and type. Ambient conditions such as high humidity, high or low temperatures, or large temperature fluctuations may reduce the expected battery life. While each transmitting device has a low battery monitor which identifies when the batteries need to be replaced, this monitor

may fail to operate as expected. Regular testing and maintenance will keep the system in good operating condition.

7.3.4 Compromise of Radio Frequency (Wireless) Devices

Signals may not reach the receiver under all circumstances which could include metal objects placed on or near the radio path or deliberate jamming or other inadvertent radio signal interference.

7.3.5 System Users

A user may not be able to operate a panic or emergency switch possibly due to permanent or temporary physical disability, inability to reach the device in time, or unfamiliarity with the correct operation. It is important that all system users be trained in the correct operation of the alarm system and that they know how to respond when the system indicates an alarm.

7.3.6 Automatic Alarm Initiating Devices

Smoke detectors, heat detectors and other alarm initiating devices that are a part of this system may not properly detect a fire condition or signal the control panel to alert occupants of a fire condition for a number of reasons, such as: the smoke detectors or heat detector may have been improperly installed or positioned; smoke or heat may not be able to reach the alarm initiating device, such as when the fire is in a chimney, walls or roofs, or on the other side of closed doors; and, smoke and heat detectors may not detect smoke or heat from fires on another level of the residence or building.

7.3.7 Software

Most Mircom products contain software. With respect to those products, Mircom does not warranty that the operation of the software will be uninterrupted or error-free or that the software will meet any other standard of performance, or that the functions or performance of the software will meet the user's requirements. Mircom shall not be liable for any delays, breakdowns, interruptions, loss, destruction, alteration or other problems in the use of a product arising our of, or caused by, the software.

Every fire is different in the amount and rate at which smoke and heat are generated. Smoke detectors cannot sense all types of fires equally well. Smoke detectors may not provide timely warning of fires caused by carelessness or safety hazards such as smoking in bed, violent explosions, escaping gas, improper storage of flammable materials, overloaded electrical circuits, children playing with matches or arson.

Even if the smoke detector or heat detector operates as intended, there may be circumstances when there is insufficient warning to allow all occupants to escape in time to avoid injury or death.

7.3.8 Alarm Notification Appliances

Alarm Notification Appliances such as sirens, bells, horns, or strobes may not warn people or waken someone sleeping if there is an intervening wall or door. If notification appliances are located on a different level of the residence or premise, then it is less likely that the occupants will be alerted or awakened. Audible notification appliances may be interfered with by other noise sources such as stereos, radios, televisions, air conditioners or other appliances, or passing traffic. Audible notification appliances, however loud, may not be heard by a hearing-impaired person.

7.3.9 Telephone Lines

If telephone lines are used to transmit alarms, they may be out of service or busy for certain periods of time. Also the telephone lines may be compromised by such things as criminal tampering, local construction, storms or earthquakes.

7.3.10 Insufficient Time

There may be circumstances when the system will operate as intended, yet the occupants will not be protected from the emergency due to their inability to respond to the warnings in a timely manner. If the system is monitored, the response may not occur in time enough to protect the occupants or their belongings.

7.3.11 Component Failure

Although every effort has been made to make this system as reliable as possible, the system may fail to function as intended due to the failure of a component.

7.3.12 Inadequate Testing

Most problems that would prevent an alarm system from operating as intended can be discovered by regular testing and maintenance. The complete system should be tested as required by national standards and the Local Authority Having Jurisdiction and immediately after a fire, storm, earthquake, accident, or any kind of construction activity inside or outside the premises. The testing should include all sensing devices, keypads, consoles, alarm indicating devices and any other operational devices that are part of the system.

7.3.13 Security and Insurance

Regardless of its capabilities, an alarm system is not a substitute for property or life insurance. An alarm system also is not a substitute for property owners, renters, or other occupants to act prudently to prevent or minimize the harmful effects of an emergency situation.

IMPORTANT NOTE: End-users of the system must take care to ensure that the system, batteries, telephone lines, etc. are tested and examined on a regular basis to ensure the minimization of system failure.

7.4 Limited Warranty

Mircom Technologies Ltd. together with its subsidiaries and affiliates (collectively, the “Mircom Group of Companies”) warrants the original purchaser that for a period of three years from the date of shipment, the product shall be free of defects in materials and workmanship under normal use. During the warranty period, Mircom shall, at its option, repair or replace any defective product upon return of the product to its factory, at no charge for labor and materials. Any replacement and/or repaired parts are warranted for the remainder of the original warranty or ninety (90) days, whichever is longer. The original owner must promptly notify Mircom in writing that there is defect in material or workmanship, such written notice to be received in all events prior to expiration of the warranty period.

7.4.1 International Warranty

The warranty for international customers is the same as for any customer within Canada and the United States, with the exception that Mircom shall not be responsible for any customs fees, taxes, or VAT that may be due.

7.4.2 Conditions to Void Warranty

This warranty applies only to defects in parts and workmanship relating to normal use. It does not cover:

- damage incurred in shipping or handling;
- damage caused by disaster such as fire, flood, wind, earthquake or lightning;
- damage due to causes beyond the control of Mircom such as excessive voltage, mechanical shock or water damage;
- damage caused by unauthorized attachment, alterations, modifications or foreign objects;
- damage caused by peripherals (unless such peripherals were supplied by Mircom);
- defects caused by failure to provide a suitable installation environment for the products;
- damage caused by use of the products for purposes other than those for which it was designed;
- damage from improper maintenance;
- damage arising out of any other abuse, mishandling or improper application of the products.

7.5 Warranty Procedure

To obtain service under this warranty, please return the item(s) in question to the point of purchase. All authorized distributors and dealers have a warranty program. Anyone returning goods to Mircom must first obtain an authorization number. Mircom will not accept any shipment whatsoever for which prior authorization has not been obtained. NOTE: Unless specific pre-authorization in writing is obtained from Mircom management, no credits will be issued for custom fabricated products or parts or for complete fire alarm system. Mircom will at its sole option, repair or replace parts under warranty. Advance replacements for such items must be purchased.

Note: Mircom's liability for failure to repair the product under this warranty after a reasonable number of attempts will be limited to a replacement of the product, as the exclusive remedy for breach of warranty.

7.6 Disclaimer of Warranties

This warranty contains the entire warranty and shall be in lieu of any and all other warranties, whether expressed or implied (including all implied warranties of merchantability or fitness for a particular purpose) And of all other obligations or liabilities on the part of Mircom neither assumes nor authorizes any other person purporting to act on its behalf to modify or to change this warranty, nor to assume for it any other warranty or liability concerning this product.

This disclaimer of warranties and limited warranty are governed by the laws of the province of Ontario, Canada.

7.7 Out of Warranty Repairs

Mircom will at its option repair or replace out-of-warranty products which are returned to its factory according to the following conditions. Anyone returning goods to Mircom must first

obtain an authorization number. Mircom will not accept any shipment whatsoever for which prior authorization has not been obtained.

Products which Mircom determines to be repairable will be repaired and returned. A set fee which Mircom has predetermined and which may be revised from time to time, will be charged for each unit repaired.

Products which Mircom determines not to be repairable will be replaced by the nearest equivalent product available at that time. The current market price of the replacement product will be charged for each replacement unit.

The preceding information is accurate as of the date of publishing and is subject to change or revision without prior notice at the sole discretion of the Company.

WARNING: Mircom recommends that the entire system be completely tested on a regular basis. However, despite frequent testing, and due to, but not limited to, criminal tampering or electrical disruption, it is possible for this product to fail to perform as expected.

NOTE: Under no circumstances shall Mircom be liable for any special, incidental, or consequential damages based upon breach of warranty, breach of contract, negligence, strict liability, or any other legal theory. Such damages include, but are not limited to, loss of profits, loss of the product or any associated equipment, cost of capital, cost of substitute or replacement equipment, facilities or services, down time, purchaser's time, the claims of third parties, including customers, and injury to property.

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