Sur-Gard MLR2000

Virtual Network Receiver

Installation Manual

version 1.7

FCC Compliance Statement

CAUTION: Changes or modifications not expressly approved by Digital Security Controls could void your authority to use this equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Re-orient the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/television technician for help.

The user may find the following booklet prepared by the FCC useful: "How to Identify and Resolve Radio/Television Interference Problems". This booklet is available from the U.S. Government Printing Office, Washington D.C. 20402, Stock # 004-000-00345-4.

IMPORTANT INFORMATION

This equipment complies with Part 68 of the FCC Rules. On the side of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, this number must be provided to the Telephone Company.

FCC Registration Number: 1VDCAN-25404-AL-N

REN: 0.2B

USOC Jack: RJ11C

Telephone Connection Requirements

A plug and jack used to connect this equipment to the premises wiring and telephone network must comply with the applicable FCC Part 68 rules and requirements adopted by the ACTA. A compliant telephone cord and modular plug is provided with this product. It is designed to be connected to a compatible modular jack that is also compliant. See installation instructions for details.

Ringer Equivalence Number (REN) The REN is used to determine the number of devices that may be connected to a telephone line. Excessive RENs on a telephone line may result in the devices not ringing in response to an incoming call. In most but not all areas, the sum of RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local Telephone Company. For products approved after July 23, 2001, the REN for this product is part of the product identifier that has the format US: AAAEQ##TXXXX. The digits represented by ## are the REN without a decimal point (e.g., 03 is a REN of 0.3). For earlier products, the REN is separately shown on the label.

Incidence of Harm If this equipment Sur-Gard MLR2000 causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice is not practical, the Telephone Company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

Changes in Telephone Company Equipment or Facilities The Telephone Company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the Telephone Company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

Equipment Maintenance Facility If trouble is experienced with this equipment Sur-Gard MLR2000, for repair or warranty information, please contact the facility indicated below. If the equipment is causing harm to the telephone network, the Telephone Company may request that you disconnect the equipment until the problem is solved. This equipment is of a type that is not intended to be repaired by the end user.

DSC

c/o APL Logistics

757 Douglas Hill Rd, Lithia Springs, GA 30122

Additional Information Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

If your home has specially wired alarm equipment connected to the telephone line, ensure the installation of this equipment Sur-Gard MLR2000 does not disable your alarm equipment. If you have questions about what will disable alarm equipment, consult your telephone company or a qualified installer.

Customer Premises Equipment and Wiring
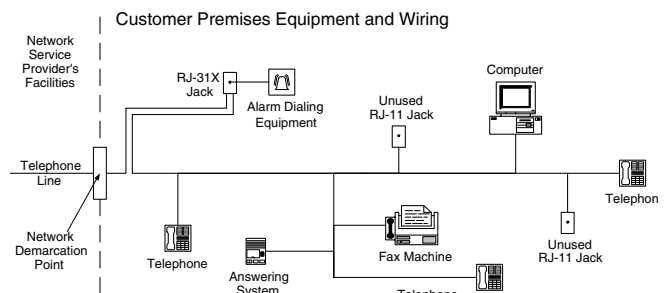
Industry Canada Statement

IC: 160A-MLR2000

NOTICE: This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation, IC, before the registration number signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

NOTICE: The Ringer Equivalence Number (REN) for this terminal is 01. The REN assigned to each terminal equipment provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed five.

Classification

The equipment MLR2000 is a CLASS 1, RACK-MOUNTED, (FIXED – STATIONARY) EQUIPMENT, PLUGGABLE TYPE A USING A DETACHABLE POWER SUPPLY CORD, designed to be INSTALLED, OPERATED and MAINTAINED by SERVICE PERSONNEL ONLY. [persons having appropriate technical training and experience necessary to be aware of hazards to which they are exposed in performing a task and of measures to minimise the danger to themselves or other persons].

The equipment MLR2000 is designed to be installed in RESTRICTED ACCESS LOCATIONS within an environment that provides the Pollution Degree max 2 and OVERVOLTAGES CATEGORY II - NONHAZARDOUS LOCATIONS, INDOOR ONLY.

Table of Contents

WARNING Please Read Carefully

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.

System Failures

This system has been carefully designed to be as effective as possible. There are circumstances, however, involving fire, burglary, or other types of emergencies where it may not provide protection. Any alarm system of any type may be compromised deliberately or may fail to operate as expected for a variety of reasons. Some but not all of these reasons may be:

■ Inadequate Installation

A security system must be installed properly in order to provide adequate protection. Every installation should be evaluated by a security professional to ensure that all access points and areas are covered. Locks and latches on windows and doors must be secure and operate as intended. Windows, doors, walls, ceilings and other building materials must be of sufficient strength and construction to provide the level of protection expected. A reevaluation must be done during and after any construction activity. An evaluation by the fire and/or police department is highly recommended if this service is available.

■ Criminal Knowledge

This system contains security features which were known to be effective at the time of manufacture. It is possible for persons with criminal intent to develop techniques which reduce the effectiveness of these features. It is important that a security system be reviewed periodically to ensure that its features remain effective and that it be updated or replaced if it is found that it does not provide the protection expected.

■ Access by Intruders

Intruders may enter through an unprotected access point, circumvent a sensing device, evade detection by moving through an area of insufficient coverage, disconnect a warning device, or interfere with or prevent the proper operation of the system.

■ Power Failure

Control units, intrusion detectors, smoke detectors and many other security devices require an adequate power supply for proper operation. If a device operates from batteries, it is possible for the batteries to fail. Even if the batteries have not failed, they must be 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 security system. After a power interruption has occurred, immediately conduct a complete system test to ensure that the system operates as intended.

■ Failure of Replaceable Batteries

This system's 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.

■ 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.

■ 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.

■ Smoke Detectors

Smoke detectors that are a part of this system may not properly alert occupants of a fire for a number of reasons, some of which follow. The smoke detectors may have been improperly installed or positioned. Smoke may not be able to reach the smoke detectors, such as when the fire is in a chimney, walls or roofs, or on the other side of closed doors. Smoke detectors may not detect smoke from fires on another level of the residence or building.

Every fire is different in the amount of smoke produced and the rate of burning. 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 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.

■ Motion Detectors

Motion detectors can only detect motion within the designated areas as shown in their respective installation instructions. They cannot discriminate between intruders and intended occupants. Motion detectors do not provide volumetric area protection. They have multiple beams of detection and motion can only be detected in unobstructed areas covered by these beams. They cannot detect motion which occurs behind walls, ceilings, floor, closed doors, glass partitions, glass doors or windows. Any type of tampering whether intentional or unintentional such as masking, painting, or spraying of any material on the lenses, mirrors, windows or any other part of the detection system will impair its proper operation.

Passive infrared motion detectors operate by sensing changes in temperature. However their effectiveness can be reduced when the ambient temperature rises near or above body temperature or if there are intentional or unintentional sources of heat in or near the detection area. Some of these heat sources could be heaters, radiators, stoves, barbeques, fireplaces, sunlight, steam vents, lighting and so on.

■ Warning Devices

Warning devices such as sirens, bells, horns, or strobes may not warn people or waken someone sleeping if there is an intervening wall or door. If warning devices 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 warning devices may be interfered with by other noise sources such as stereos, radios, televisions, air conditioners or other appliances, or passing traffic. Audible warning devices, however loud, may not be heard by a hearing-impaired person.

■ Telephone Lines

If telephone lines are used to transmit alarms, they may be out of service or busy for certain periods of time. Also an intruder may cut the telephone line or defeat its operation by more sophisticated means which may be difficult to detect.

■ 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 to protect the occupants or their belongings.

■ 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.

■ Inadequate Testing

Most problems that would prevent an alarm system from operating as intended can be found by regular testing and maintenance. The complete system should be tested weekly and immediately after a break-in, an attempted break-in, a fire, a storm, an earthquake, an 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.

■ 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.

Limited Warranty

Digital Security Controls warrants the original purchaser that for a period of twelve months from the date of purchase, the product shall be free of defects in materials and workmanship under normal use. During the warranty period, Digital Security Controls shall, at its option, repair or replace any defective product upon return of the product to its factory, at no charge for labour 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 purchaser must promptly notify Digital Security Controls 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. There is absolutely no warranty on software and all software products are sold as a user license under the terms of the software license agreement included with the product. The Customer assumes all responsibility for the proper selection, installation, operation and maintenance of any products purchased from DSC. Custom products are only warranted to the extent that they do not function upon delivery. In such cases, DSC can replace or credit at its option.

International Warranty

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

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 Digital Security Controls must first obtain an authorization number. Digital Security Controls will not accept any shipment whatsoever for which prior authorization has not been obtained.

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 Digital Security Controls 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 Digital Security Controls);
- 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.

Items Not Covered by Warranty

In addition to the items which void the Warranty, the following items shall not be covered by Warranty: (i) freight cost to the repair centre; (ii) products which are not identified with DSC's product label and lot number or serial number; (iii) products disassembled or repaired in such a manner as to adversely affect performance or prevent adequate inspection or testing to verify any warranty claim. Access cards or tags returned for replacement under warranty will be credited or replaced at DSC's option. Products not covered by this warranty, or otherwise out of warranty due to age, misuse, or damage shall be evaluated, and a repair estimate shall be provided. No repair work will be performed until a valid purchase order is received from the Customer and a Return Merchandise Authorisation number (RMA) is issued by DSC's Customer Service.

Digital Security Controls'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. Under no circumstances shall Digital Security Controls 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. The laws of some jurisdictions limit or do not allow the disclaimer of consequential damages. If the laws of such a jurisdiction apply to any claim by or against DSC, the limitations and disclaimers contained here shall be to the greatest extent permitted by law. Some states do not allow the exclusion or limitation of incidental or consequential damages, so that the above may not apply to you.

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 Digital Security Controls Digital Security Controls neither assumes responsibility for, 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.

WARNING: Digital Security Controls 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.

Installer's Lockout

Any products returned to DSC which have the Installer's Lockout option enabled and exhibit no other problems will be subject to a service charge.

Out of Warranty Repairs

Digital Security Controls 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 Digital Security Controls must first obtain an authorization number. Digital Security Controls will not accept any shipment whatsoever for which prior authorization has not been obtained.

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

Products which Digital Security Controls 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.

Section 1 - Introduction

The MLR2000 is a Multi-Line, Multi-Format Digital Receiver for commercial fire and burglary. The basic unit consists of 60 individual line-cards (DRL2000) connected to a dual redundant central resource, router and protocol converter (CPM2000). The MLR2000 includes many features, especially high bandwidth internal buses and high bandwidth external connections to allow traditional network philosophies to be observed for the first time on a central station receiver. The MLR2000 can decode a variety of popular and widely used communication formats. Refer to Appendix A, DRL2000 Communication Formats for a list of the available communication protocols.

The MLR2000's real-time clock and calendar 'stamps' all information received with the time and date, and all information may be printed or forwarded to a computer. To ensure security, adjustment of the clock, calendar and other programming is protected by password codes.

1.1 CPM2000

The CPM2000 Central Processing Module oversees operation of the receivers. Along with its built-in keypad and LCD message screen, the CPM2000 features TCP/IP, two parallel printers, one serial printer and two serial computer interface capability.

1.2 DRL2000

Each DRL2000 module can monitor two telephone lines. The line card module is equipped with a 256-event non-volatile memory buffer to record events and corresponding telephone numbers. Caller Source capability is built-in and telephone numbers can be printed out, sent to automation and stored in memory. Events and information stored in memory can be printed at any time. Each line card also features flash EPROM uploads through the Debug port for software upgrades or options programming.

1.3 Power and Supervision

1.3.1 Power

The MLR2000 power supplies inputs are 120 Vac at 10A, 60 Hz. Each AC power supply supplies a nominal 28 Vdc +/-5% power. The receiver is equipped with 24V rechargeable stand-by battery connections at 160 Ahr. and an automatic battery charger. Provision is made for an internal battery pack for temporary use. User supplied batteries may be used externally but must be fused and connected to 10-32 lugs supplied via a stud termination.

Full power operation is .5 Amps per line and 1 Amp per CPM at 28 Vdc nominal. All elements have extensive power down capabilities and are implemented in CMOS logic.

1.3.2 Supervision

The stand-by battery voltage and connections are supervised. The Line Cards are also continuously supervised to ensure uninterrupted communication with the CPM2000. Any trouble conditions are reported on the LCD screens and sent to the printer and the computer.

The DRL2000 Line Card Module also verifies communications with the CPM2000. In the event of a malfunction, the operator will be advised with a visual indication and the Line Cards will continue to function. Each line card will continue to receive information.

The printer is supervised for off-line, paper out and other trouble conditions. The communication link to the computer through the RS232 ports is monitored by the supervisory 'heartbeat' test transmissions.

1.3.3 Compatibility

Central station automation software packages such as:
- MAS • DICE • SIMS II • GENESYS • S.I.S. • IBS • MicroKey

support the MLR2000 Sur-Gard interface.
Refer to automation software specifications for compatibility.

***NOTES:** Automation connections are considered supplementary per UL864 Listing. Compatibility with the automation software in a system used at a central station is intended to be handled under a separate UL1981 software and/or site certification evaluation.*

1.4 CPM2000 Outputs/ Inputs

- The CPM2000 features four switched-negative (PGMOUT1 is activated when automation fails) outputs, two relay outputs and four inputs.

1.5 System Overview

- Patented Caller Identification (Call Display) capability
- Patent Pending DNIS Identification
- nonvolatile RAM on each DRL2000 line card module for programming and event buffer.
- Fast Ethernet communication between line-cards and CPM
- Flash download for software upgrades
- Up to 64 different options set (profiles per line)
- Patented virtual configurations
- 3/1, 4/2 formats with or without parity, 4/1 without parity at 10, 14, 20, or 40 baud
- 4/1, 4/2, 4/3, and 4/3 DTMF formats
- Optional* formats: 3-2, 4/1, 4/2 extended
- ACRON DTMF format
- Contact ID (DTMF) format
- Adcor 20 baud
- Super fast or high speed DTMF format, with or without parity
- DTMF 4/1 express format (optional)
- DTMF 4/2 express format
- FBI super fast format with or without parity
- Radionics Modem II, Modem IIE, Modem IIIa2 and BFSK formats
- SIA format: 110 and 300 baud, tone and data acknowledgement
- SK FSK0, FSK1, FSK2
- Any handshake frequencies by increment of 100 Hz from 100 Hz to 2300 HZ, Dual Tone, SIA FSK, Modem II and ITI selected by configuration commands
- Up to 8 different handshakes per profile.
- Large, easy to read 2-line, 16-characters-per-line, LCD (Liquid Crystal Display) screen
- All modules function individually to help ensure uninterrupted operation during hardware or software upgrades
- Inputs on CPM2000 for UPS supervisory
- 255 lines maximum per receiver
- 512-event memory buffer on each individual line card
- Real-time clock
- CPM2000 features 32-bit micro-controller
- Two parallel printer port; three serial RS232 ports and one 10 BaseT connection.
- Programmable serial ports configuration
- Programmable System Functions: Computer and printer
- Fast transmission of multiple alarms to the computer and printer to ensure operator's quick response

All formats noted as optional are selected using configuration commands.

- Continuous verification of the computer-receiver links with the 'heartbeat' function
- Switched-negative outputs on CPM2000 (special applications)
- AC-lost detection and stand-by battery supervision
- Low battery detection and automatic low battery disconnect to prevent deep-discharge damage to battery
- Operator Acknowledge
- Telephone Line Supervision

1.6 Virtual Receiver Architecture

The most novel feature of the DRL2000 is the ability to use Telco information delivered as a DNIS (dialed number identification service) to allow the Sur-Gard expert format identification system to option on the fly each received call to eliminate dedicated line pool hardware. Instead the DNIS allows call up options which set up virtual line pools to identify security formats and extend account numbers. Standard dialed number identification is supported up to 10 digits.

Each dialed number should be assigned to a virtual receiver. Each dialed number would have formerly been a line pool on conventional line-cards.

1.7 Number of Line Cards Supported

The system will support a maximum of 255 line-cards concurrently connected. Optional hubs will be required for backplane connectivity in installations beyond 5 shelves.

1.8 Redundancy

The MLR2000 has a main power supply module for side A and for side B, and an optional stand-by power supply per rack. Additional 10B2 Ethernet is available as a backup B side. This and the ability to mount an optional second CPM2000 controller will allow for seamless system redundancy in maximum configuration. In practical terms this means that any line card may fail and not affect system performance ; and with redundant CPM's the B unit will take up where the A unit failed with a loss of no more than 30 seconds. External networking components would necessarily be duplicated to take full advantage of this configuration.

1.9 Approvals

1.9.1 Industry Approvals

The MLR2000 in redundant configuration is listed under the following UL standards:

- UL 864 Control Units for Fire-Protective Signaling Systems
- UL 1610 Central Station Burglar Alarm Units

This equipment should be installed in accordance with the requirements of NFPA72, NFPA70 and UL827.

1.9.2 System Connectivity

The system may have two identical CPMs both connected to internal resources. Internal connections are A and B side 28 V power and A and B side 10B2 Ethernet. Additional internal connections are power monitoring services on the primary rack. External connections are two parallel printer and three serial ports. The serial ports are intended primarily for debug applications but may be used for fallback automation outputs (optional). The primary automation connection is via 10BT Ethernet connection. Again if redundant CPM's are used the external network components must be duplicated to allow for full redundancy.

1.9.3 Automation Mode

In automation mode it is expected that the primary connection is via TCP/IP networking on the 10BT Ethernet connection. A menu on the CPM2000 will prompt the user for the IP address setup and port setup. Once the configuration management port is set up, all other options and setups may be done via a Telnet session or the Sur-Gard Console.

1.9.4 UL Manual Mode

For UL manual mode, each event will activate the internal buzzer to be acknowledged manually. Each event will be sent automatically to all connected printers.

NOTE: For central station applications the signaling performance of each dact shall be manually tracked. Failure to receive a signal from a dact over a 24-hour period shall be handled as a trouble signal.

1.10 Virtual Connectivity

Each receiver has one IP address and a number of associated ports. Internal socket programming uses specific ports for expected tasks. The MLR2000 is the listener.

1.10.1 Configuration Management - Sur-Gard Configuration Port 1024

A tool is provided for NT 4 + or Windows 9x/2000/XP environments which provides graphical style menu for configuration management. Additional features are storage of virtual receiver setups, formats conversion table and configuration wizards.

1.10.2 Status Addressing

Line card status will be reported via physical addressing. This will be assigned by shelf and slot number. All device status information is in Sur-Gard format. The reporting of status on this port, automation output and printer will relate to physical addressing.

1.10.3 Automation input/output (Port 1025, 1026)

Traditional automation communication will be provided via a minimum of two ports. The primary port is Sur-Gard standard output and provides Sur-Gard standard automation output.

Optional secondary automation communication will be provided to map to proprietary types. It is expected that named virtual receiver types will be mapped to this output. In addition two way automation commands may be supported on this port.

1.11 Internal 10B2 Ethernet

Internal Ethernet is not standard TCP/IP instead it has allocated proprietary type per Internet standards. Full physical 10B2 requirements are met allowing approved segment interconnects to be used including hubs, optical transceivers and wan interconnects (wan interconnects preclude trap and capture commands).

Section 2 - Quick Start

2.1 Receiver Setup and Operation

2.1.1 Unpacking

Carefully unpack the receiver and inspect for shipping damage. If there is any apparent damage, notify the carrier immediately.

2.1.2 Ethernet Connections

NOTES: *Be sure to be properly grounded.*

- Take a 50 ohm coaxial cable and connect one end to the BNC connector (ETHERNET A) of the CPM2000. The other end of the coaxial cable should be connected to the BNC connector (ENET A IN) of the backplane.

- Take a 50-ohm coaxial cable and connect one end to the BNC connector (ETHERNET B) of the CPM2000. The other end of the coaxial cable should be connected to the BNC connector (ENET B IN) of the backplane.

- Make sure that there are 50 ohm BNC terminators on the other end of the T Connectors of the CPM2000 labelled ETHERNET A AND B.

- Make sure that there are 50 ohm BNC terminators connected on the BNC terminals marked ENET A OUT and ENET B OUT of the backplane. (This should be already done.)

Figure 1, 60 Line Cards Configuration
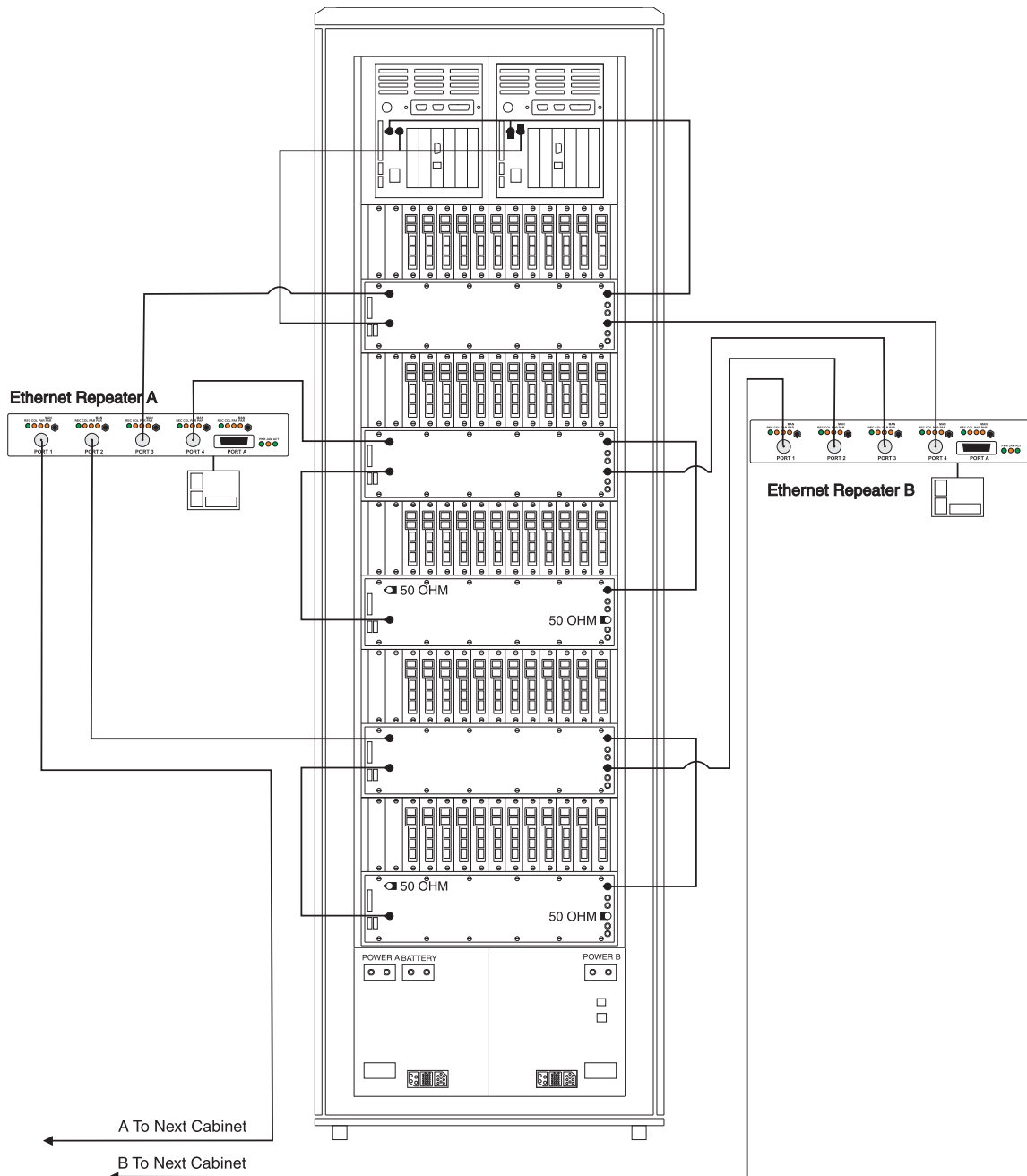
Figure 2, 72 Line Cards Configuration (Expansion cabinet)
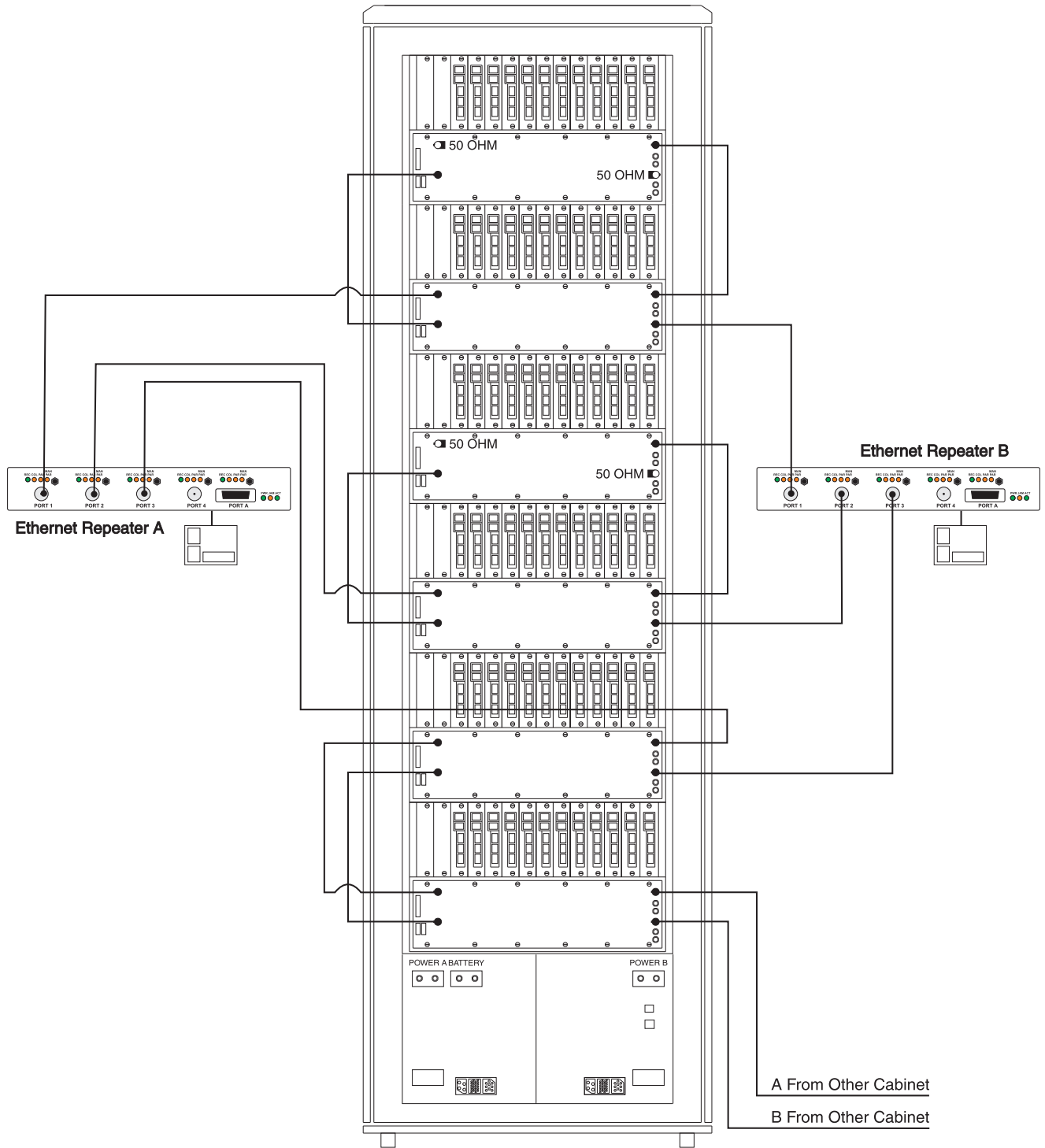
2.1.3 Power Cable Connections

- Take the power cable for the CPM2000 and connect the labelled wire to the designated terminal on the back-plane. Take the other end of the power cable and connect it to the power connector on the CPM2000.

- Take the power cables (10 gage) and connect one end to the power terminals of the backplane marked PWR-GND (black cable) and +28 V_{DC} A (red cable). Take the other end of the power cables and connect to a 28 V_{DC} power supply (make sure power is OFF).

Figure 3, 60 Line Cards Configuration

NOTE: Battery wiring should be run in conduit and batteries should be housed in a separate UL Listed enclosure.
Recommended batteries: 2x12V / 140-190Ah 4 hours backup batteries used in conjunction with power generator. Model:INTERSTATE SG8D.

WARNING: To reduce the risk of electric shock, this product is provided with a grounding type power supply cord. Connect product to a grounded receptacle.

NOTE: AC supply cords shall be run in conduit or be provided with equivalent mechanical protection.

120V/60Hz/10A

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Figure 4, 72 Line Cards Configuration (Expansion Cabinet)

Fan Tray

Ethernet Repeater A

PORT 1   PORT 2   PORT 3   PORT 4   PORT A

Ethernet Repeater B

PORT 1   PORT 2   PORT 3   PORT 4   PORT A

NOTE: Battery wiring should be run in conduit and batteries should be housed in a separate UL Listed enclosure.

Recommended batteries: 2x12V / 140-190Ah 4 hours backup batteries used in conjunction with power generator. Model:INTERSTATE SG8D.

POWER A BATTERY

POWER B

Non Power

Limited Circuit

WARNING: To reduce the risk of electric shock, this product is provided with a grounding type power supply cord. Connect product to a grounded receptacle.

120V/60Hz/10A

NOTE: AC supply cords shall be run in conduit or be provided with equivalent mechanical protection.

6

2.1.4 Signaling/Supervisory Connections

Figure 5, 60 Line Cards Configuration
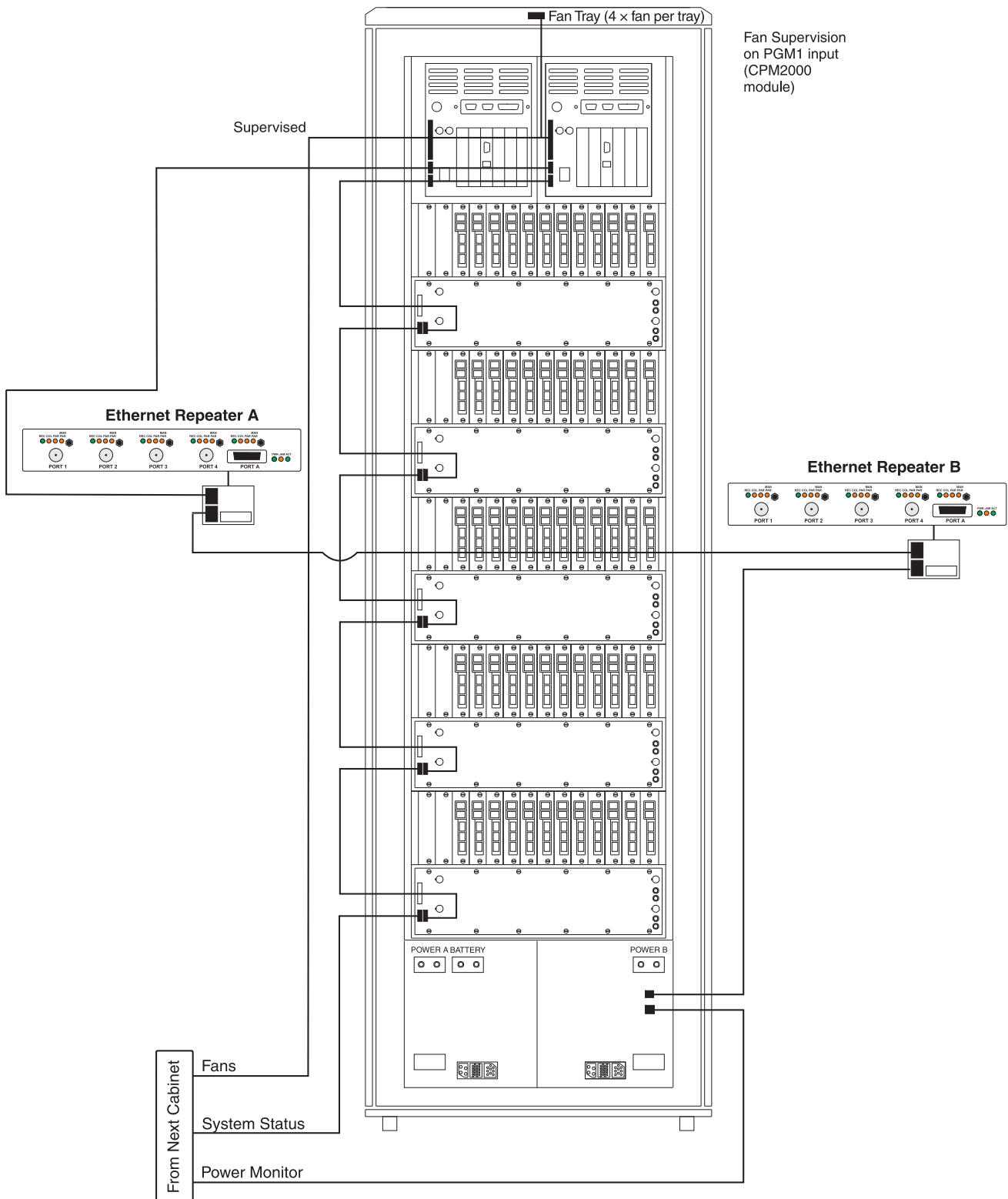
Figure 6, 72 Line Cards Configuration (Expansion Cabinet)

Supervised

Fan Tray (4 × fan per tray)

Fan Supervision on PGM1 input (CPM2000 module)

Ethernet Repeater A

PORT 1 PORT 2 PORT 3 PORT 4 PORT A

Ethernet Repeater B

PORT 1 PORT 2 PORT 3 PORT 4 PORT A

POWER A BATTERY

POWER B

To Next Cabinet

Fans

System Status

Power Monitor
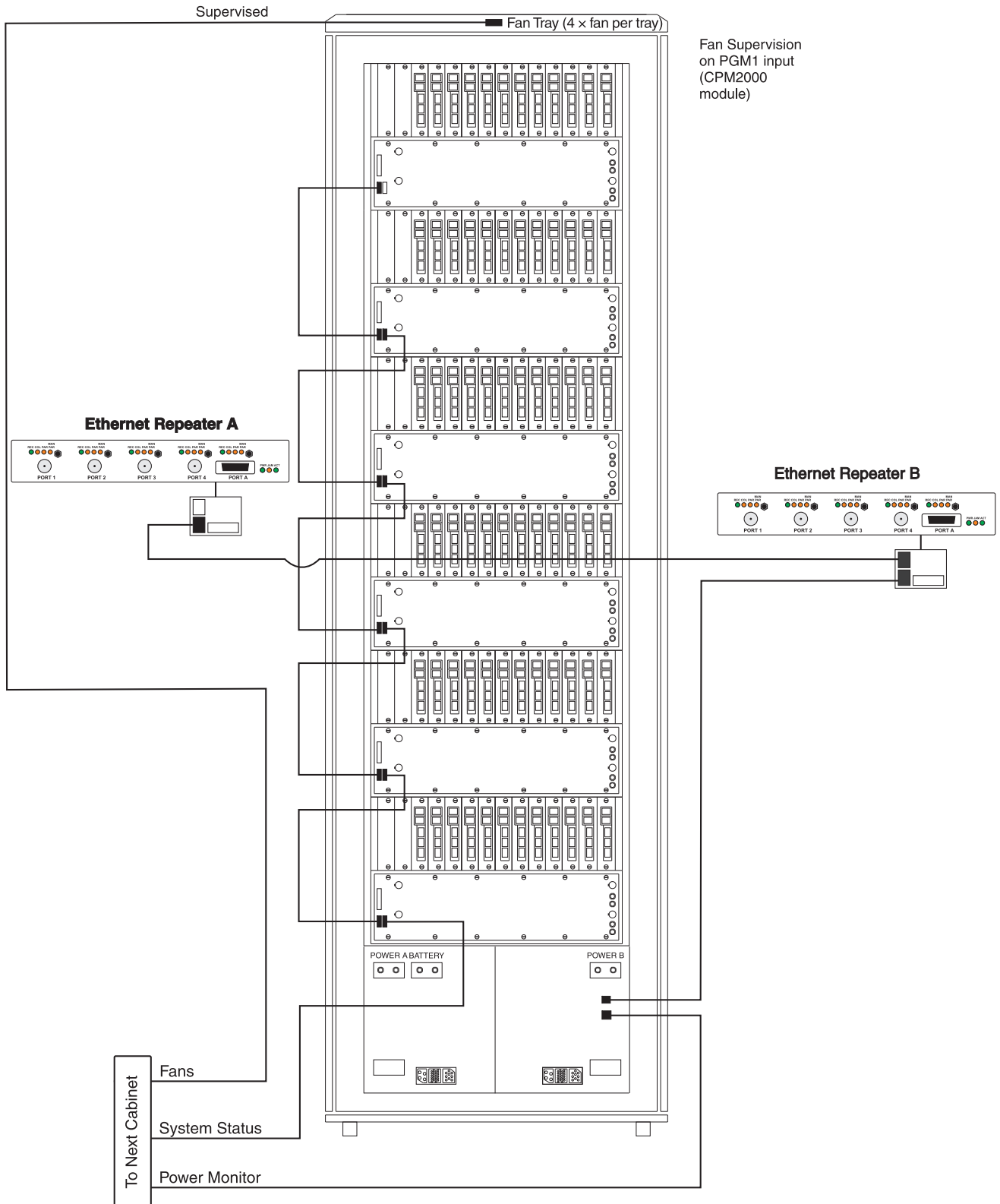
2.2 Bench Testing

It is suggested that the receiver be tested before actual installation; becoming familiar with the connections and setup of the unit on the work bench will make final installation more straightforward.

The following items are required:
- 28 V_DC Power supply
- One telephone line
- One or more dialer or digital dialer control panels

2.2.1 Power Up

When the 28 V_DC power is applied, the CPM2000 unit will beep for approximately 1-2 minutes during system initialization. The buzzer will deactivate as soon as the CPM2000 software initializes and is running. The LCD display on the CPM2000 should display 'Primary'. If the Line Cards do not have telephone lines connected, the DRL2000 modules will activate 'Line Fault' lights. The telephone line should be connected to the POTS jack at the back of the DRL SUBRACK. As soon as the line card detects a phone line, a line restore message will be sent to the printer and computer output. If the phone line is removed, a line fault message will be sent to the printer and computer output.

If there is no computer or printer connected, a trouble message will be displayed on the CPM2000 LCD and the 'ACK' light will flash. Press the [ACK] button to silence the CPM2000 buzzer.

The watchdog LED on the line card should flicker as soon as it is initialized. The Trouble LED will activate if the line card is not receiving a poll from the CPM2000. As soon as the line card responds to the polling, the Trouble LED should deactivate.

2.2.2 Operation with Default Programming

Without any changes to the factory default programming, the receiver operates as follows:
- Answers incoming calls on the first ring
- Sends 2300 Hz as the first handshake
- Sends 1400 Hz as the second handshake
- Sends dual tone as the third handshake
- Sends SIA FSK tone as the fourth handshake
- Sends ITI , Modem IIE/ IIIa[2] tone as fifth handshake
- Sends Modem II tone as sixth handshake
- Receives all communication formats, except for: 3/2, 4/1 express, 4/2 extended and 4/2 checksum.
- The above formats can be manually selected.
- Signals can be displayed on the debug output computer as they are received. The signals are then sent to the parallel printer and computer connected to serial port COM1 or to the 10BT connector. The default event codes described in the 'DRL2000 Library Decoding and Event Codes Table' will be used with the Sur-Gard automation communication protocol to send signals to the computer, if connected.
- If a computer is not connected, press the [ACK] button on the CPM2000 module to silence the buzzer.

2.2.3 Debug Output

The debug output is another means of accessing the line-card's programmed options and diagnostics features. A debug cable is required to connect by serial communication from the line card to a standard PC running Windows 9x/2000/XP.

2.2.4 Debug Cable Connectivity

- Connect the RJ45 end of the debug cable to the debug jack on the front of the line card or to the debug jack of the paddle board on the back of the sub-rack.
- Connect the female DB-9 connector to the serial port of a computer (COM1 port - usually DB-9 male, COM2 port - DB-25 female).

2.2.5 Debug Software Setup

- Using WIN95, point and click on the 'START' button. Access 'Programs' -> 'Accessories' -> 'HyperTerminal'. Once in the HyperTerminal window, point and click on 'Hypertrm.exe' icon.
- A connection description window should appear. A prompt should appear on the 'Name' category. Type a name. Point and click on the 'OK' button.
- A phone number window should appear. Choose the direct to COM port required for connection and point and click on 'OK'.
- COMX properties windows should appear. The configuration should be:
- Bits per second: 19200
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None
- Point and click on the 'OK' button after setting the configuration.
- The HyperTerminal window should appear. Press any button. The debug menu will be displayed.

2.2.6 Button Commands

A:This button will display the address of the line card. The address includes the shelf and slot number of the line card making each line card unique.

D:This button will initiate the download of a file to the line card.

O:This button will enable the user to dump the current programmed options of the line card or set an option to a particular value.

P:Sets the message priority to be displayed. This is useful for debugging purposes only.

2.2.7 Downloading steps

1. Press the 'D' button to initiate downloading of the binary file. The Hyper Terminal will display:
   Ready to download.
   CCCC
2. Point and click at 'Transfer' on the Hyper Terminal menu and access the 'Send File' category. The 'Send File' window should appear.
3. Change the protocol to 'X-modem' and place the correct path and file name of the binary file to be downloaded.
4. Point and click on the [Send] button and the downloading status window should appear.

The line card will restart automatically after a successful download.

2.2.8 Printer output

Printer Examples:

Date	Time	SS/00	Receiver Type	Receiver #	Line #	Account #	Alarm Code	Message
Ex. JUN 01 2000	- 08:00:22	- 01/02	-SG	- 01	- 061	- 965	- E9	RESTORE
Ex. JUN 01 2000	- 08:00:22	- 01/02	-SG	- 01	- 061	- 965	- F9	TROUBLE
Ex. JUN 01 2000	- 08:00:22	- 01/02	-SG	- 01	- 061	- 965	- 2	PANIC ALARM

Section 3 - Installation

3.1 Dimensions

The MLR2000 is implemented into a 42U * 600 mm * 800 mm cabinet. The cabinet has 7 subracks, each on is 19 inches * 6U high. Housed in the top subrack, the CPM2000 comes complete with its own 19 inch * 6U tray. Bellow the CPM2000 tray, the MLRX-2000 expansion cage provides for up to 12 DRL2000 line cards. Each DRL2000 line card is 6U * 6HP * 220 mm. Each paddle board is 3U * 6 HP * 220 mm. The PSU-2000 comes complete in its own 19 inch * 6U high cage.

The main MLR2000 cabinet will hold 2×CPM2000, 5×MRLX-2000, 60×DRL2000, 2×PSU-2000.

The expansion MLR2000 cabinet will hold 6×MRLX-2000, 72×DRL2000, 2×PSU-2000.

3.1.1 Spacing

All units of a receiver must be within 50 ft. (cable length) of the CPM to provide system timing integrity.

3.2 Definity DNIS

The AT&T Definity G3 DTMF vdn codes have been tested and are supported by the MLR2000.

3.3 Mounting the Receiver

Install the MLR2000 in a closed 19" rack or cabinet with a locking rear access door. Cover all unused spaces with blank metal plates. The LCD screen on the receiver is designed to be viewed below eye level. A Stand-up Unit (61.25" tall up to 60 telephone lines, part #90000016) can be supplied for a complete installation.

NOTE: *If 60 telephone lines are not used, cover each unused location with a blank plate.*

3.4 Printer Connections

The following UL Listed printers can be used with the MLR2000: Sur-Gard CPU-1150 (Panasonic KX-P1150)
        DMP SCS-PTR (Okidata Microline 182/184)
Connect the parallel printers to the MLR2000 printer output ports using parallel printer cables.

NOTE: *A minimum of two printers are required for UL Listed applications.*
Do not use a printer cable which has only 1 common ground wire.

3.5 Computer Connections

Connect the computer to the MLR2000 RS232 port using a serial cable to COM1.

CPM2000 DB-9 Female		Computer DB-9 Female		CPM2000 DB-9 Female		Computer DB-25 Female	
FRAME	1	1	FRAME	FRAME	1	1	FRAME
RX	2	2	RX	RX	2	2	RX
TX	3	3	TX	TX	3	3	TX
DTR	4	4	DTR	DTR	4	4	DTR
GND	5	5	GND	GND	5	5	GND
DSR	6	6	DSR	DSR	6	6	DSR
RTS	7	7	RTS	RTS	7	7	RTS
CTS	8	8	CTS	CTS	8	8	CTS
N/C	9	9	N/C	N/C	9	20	N/C
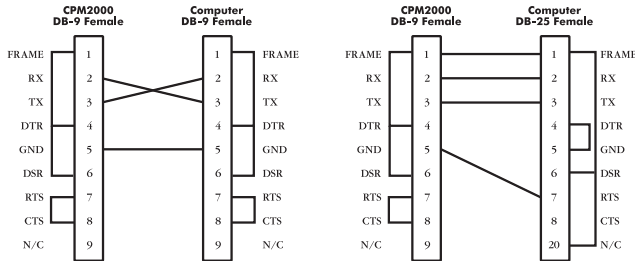
NOTE: *Pins 1, 4 and 6 on the receiver side are connected together. Pin 7 and 8 are also shorted together. Pin 9 is not connected.*

3.6 Telephone Line Connections

Each paddle module has the connections shown here. Connect each line module output (POTS) to the telephone line (analog) with 6-pin modular cables.

NOTE: *Use minimum AWG 26 wires for telephone cables.*

*NOTE: Connection of an Ademco radio receiver model 7810RT or 7830R can be done on the serial port of the paddle module. The device should be mounted in the same room as the MLR2000 receiver (within 20 ft.). The connection shall be run in conduit or equivalent i.e. providing mechanical protection.

6 Pin — POTS — Telephone Line

AUX — Auxiliary Line (Not Used)

DEBUG — Trouble-Shooting Output

8 Pin — SERIAL — Serial Communication Output *

Not Used
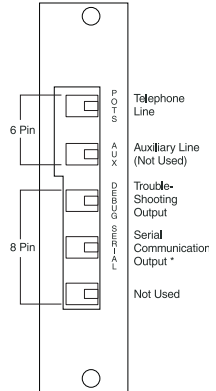
3.7 Grounding

For maximum resistance to static and electrical noise, the 19" rack frame must be connected to earth ground through the AC utility box.

3.8 Power Supply

Ensure that all electrical connections are made correctly. After verifying all connections, connect the RED and BLACK leads to a 24 (2 × 12V batteries in series) V_{DC} sealed rechargeable battery. Be sure to observe polarity when connecting the battery. When the battery is connected, test the system under battery power only.

CAUTION: *Connecting a positive (+) terminal to a negative (-) terminal may cause a fire and possibly serious personal harm.*

3.9 Battery Charging Current

The maximum battery charging current is factory set at 5A.

3.10 Removing and Installing System Components

To remove the Power Supply Modules
The Power Supply charges the battery and provides low battery voltage disconnect; removing the power supply module will disconnect the battery and shut down the entire system. Please make sure there is a second power supply module installed.

To Remove the CPM2000 Module
Disconnect all cables and slowly pull the module out of the metal cabinet.

To Remove a Line Card Module
Slowly pull the module out of the sub rack.

3.11 To Install a Line Card Module

Slowly insert the module in the sub rack.

Installation Checklist (Complete Operation)

❑ 19" Rack Mount Cabinet connected to earth ground
❑ SG-PSU2000 Power Supply installed
❑ 6-pin modular cable(s) connected to DRL2000 and telephone line
❑ Parallel Printer Cable connected to MLR2000 Parallel Printer Port
❑ Parallel Printer power connected
❑ Computer connected to MLR2000 COM1 port using serial cable
❑ Computer connected to MLR2000 10BT port using 10BT cable

Section 4 - DRL2000 Digital Receiver Line Card

The DRL2000 acts as an interface between the digital alarm transmitter and the CPM2000. Different communication formats can be used to transmit the information.

The main functions of the line-cards are to continuously monitor the telephone line, receive calls from digital dialers or control panels, and to report alarms to the CPM2000. In addition, if a Line Card is unable to communicate with the CPM2000, then each Line Card is capable of functioning independently. Each Line Card can record 256 different alarm messages and 256 Caller-ID telephone numbers.

4.1 General Information

The receiver is capable of processing signals from digital communicators in variety of formats. The type of signal (alarm, trouble, restore, cancel and so on) can be printed.

4.2 DRL2000 Features

- Operator selection of communication formats and handshake priority
- 64 profiles per line card, up to 255 line pools.
- On-Board Ethernet interface.
- Flash Download for software upgrades.
- Records up to 256 messages.
- Records up to 256 Caller-ID phone numbers. This feature helps locate and identify the source of the device in communication and assists in troubleshooting
- Multiple alarms are forwarded to the computer and printer through the CPM2000 with minimum delay
- The DRL2000 monitors the telephone line connection, and line faults will result in reports to the computer and the printer
- DRL2000 automatically goes into stand-alone mode in case of CPM2000 failure
- 'Watchdog' timer continually monitors receiver operation
- 'Cold boot' option allows receiver's configuration to be reset to factory default programming
- DSP processing to reduce data receiving errors, and to help for weak and noisy signals
- Gain boost available to amplify weak signals
- Serial link for troubleshooting

4.3 Installation

It is recommended that a DRL2000 Cold Start-up be performed when the unit is updated with a new program version. Refer to Operating Mode Section (DRL2000 Cold Start-up for information).

After the cold start-up, check the configuration information listed in the Quick Reference Guide to make any required changes for your particular application.

4.4 DRL2000 Controls

Each DRL2000 Module has one telephone line.
Momentarily depressing and releasing a button will register as a single input or keystroke.

ON LINE
LINE FAULT
TROUBLE
WATCHDOG

ACK

CANCEL

F1

F2

™

DRL2000

HANDSET

DEBUG

ON LINE: The 'on-line' light will be ON when the Line Card is on-line in communication. The 'on-line' light will be OFF when the Line Card is in Standby Mode. When the line card is on-line but not in communication, the on-line LED will FLASH to indicate that the buffer is full, or that there is a checksum error after download.

LINE FAULT: The 'Line Fault' light will come ON if the telephone line is disconnected. The 'Line Fault' light will turn OFF automatically when the telephone line is restored.

TROUBLE: The 'Trouble' light will come ON when the Line Card is shut down by an operator's command or when communication with the CPM2000 is interrupted. The 'Trouble' light will be shut OFF when the trouble condition is corrected.

WATCHDOG: The 'Watchdog' light will FLASH to indicate that Line Card operation is being monitored

[ACK] Button: Not used.

[CANCEL] Button: Not used.

HANDSET: Not used.

DEBUG: Connection to a PC for troubleshooting.

[F1] + [F2] Buttons: Press and hold both buttons simultaneously on power up for 10 seconds will reset the line card to factory default.

Section 5 - DRL2000 Operating Mode

5.1 DRL2000 Standby Mode

After start-up the Line Card enters the Stand-by Mode and monitors the telephone line and the CPM2000. Depending on the system's status, the following conditions will be indicated:

- Line Fault light
- Trouble light: of Line Card communication problem with CPM2000

5.1.1 Line Fault

The DRL2000 verifies the telephone line voltage. The 'Line Fault' light will come ON when the voltage drops below 12V.

If the Line Check option is enabled, the following information will be transmitted to the printer and computer:

- Printer:
  Jul 17 1998-08: 08: 28-SS/OO-SG-RR-LLL-0000-
  PHONE LINE TROUBLE
- Computer:0RRLLL[#0000¦NLTSSOO][DC4]

A hexadecimal number from 00 to 0B representing the slot number of the Line Card will be sent for each 'O' shown above.

A hexadecimal number from 01 to FE representing the shelf number of the Line Card will be sent for each 'S' shown above.

If the Line Check option is disabled, the DRL2000 will not send the report to the printer or computer. Refer to 'DRL2000 Programmable Features' for information on enabling the Line Check option.

When the line condition returns to normal, the 'Line Fault' light will be shut OFF.

If the Line Check option is enabled and the telephone line returns to normal, the following information will be transmitted to the printer and computer:

- Printer:
  Jul 17 1998 - 08: 08: 35-SS/OO-SG-RR-LLL-0000-
  PHONE LINE RESTORE
- Computer:0RRLLL[#0000¦NLRSSOO][DC4]

5.1.2 CPM2000 Error

If the DRL2000 cannot detect CPM2000 polling, the trouble light will come on.

If alarm messages cannot be sent to the CPM2000 because of the error, the DRL2000 will start buffering incoming calls.

Up to 256 alarm messages for the printer and computer will be retained in the DRL2000 event buffer. When the event buffer is full, the line card will stop answering the calls.

When the CPM2000 Error condition is corrected, the alarm messages in the event buffer will be transmitted to the CPM2000 with the corresponding time/ date the alarm have been received.

5.2 DRL2000 Cold Start-up

To perform a Cold Start-up, press the [F1] and [F2] buttons simultaneously for 10 seconds while powering up.

5.3 Communications in Progress

5.3.1 Data Reception

During data reception, the on-line LED will turn on. The DRL2000 decodes all information received and stores the information in its Event Buffer. When a valid signal is received, the DRL2000 sends a kiss-off signal and transmits the decoded alarm signal to the computer and then to the printer through the CPM2000.

The DRL2000 will send each message it receives to the printer for review by the system operator. Two messages may be sent to the printer to indicate reception problems: the 'Fault Data' and 'Fault Call'.

5.3.2 Fault Data Message

When this problem is encountered, the following information is transmitted to the printer and the computer:

- Printer:
  Jun 25 1998-11:18:07-SS/OO-SG-12-234-0000-
  INVALID REPORT
- Computer: 012234[#0000¦NYNSSOO][DC4]

This output for account code '0000' indicates that data has been received, but is not valid (for example, there are unmatched rounds or wrong parity).

5.3.3 Fault Call

When this problem is encountered, the following information is transmitted to the printer and the computer:

- Printer:
  Jun 25 1998-11:18:07-SS/OO-SG-12-234-0000-
  COMMUNICATION FAIL
- Computer: 0RRLLL[#0000¦NYCSSOO] [DC4]

This output indicates that a call was received, but no data was detected. The call may have been a wrong number, or the calling control panel was unable to connect with the receiver's handshakes.

5.3.4 Caller ID

When Caller-ID is enabled:

- Printer:
  19-Nov-1998 10:40:54 - Nov 19 1998-11:32:25- F3/
  00-SG -19-069-123F——
- Computer: 419069 123F0000000000

5.3.5 Calling Name

When Calling name is enabled:

- Computer: u19069 123FSUR-GARD SECURT
- Printer:
  19-Nov-1998 10:40:56 - Nov 19 1998-11:32:25-F3/00-
  SG -19-069-123F——SUR-GARD SECURT

Section 6 - Advanced Programming

6.1 Profiles Introduction

The DRL2000 'virtual receiver' will load unique 'profiles' in order to effectively communicate with control panels. A profile is a set of pre-programmed line card options unique for a particular DNIS number. The 'DNIS' will point to a particular profile, which will then be loaded into the line card before the first handshake is sent. It is essential that the correct option be programmed for a profile in order to correctly communicate with the control panel. Each 'virtual receiver' can have a maximum of 64 profiles. To change the options for a particular profile, the MLR2000 Console software is provided. This software will allow the user/operator to edit the profiles.

NOTE: DNIS (Dialled Number Identification Service). This number represents the dialled number, or the number being called. ANI: (Automatic Number Identification). This number represents the source of a call and allows the system to determine the handshake protocol. Caller ID: This number identifies the source of a call. For the purpose of this document, Caller ID and ANI will be referred to as Caller ID, but both can not be used at the same time. Contact your provider to determine which service is available.

DNIS or Caller ID can be used for profile selection.
Line Cards Identification Number Handling:

Call Processing Flowchart
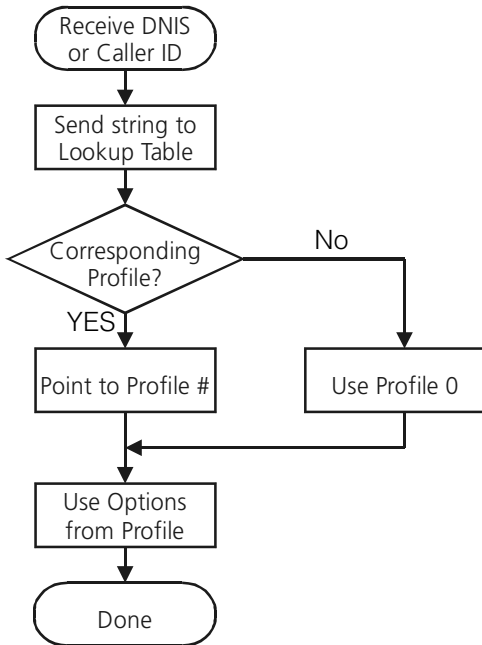
Each profile is made up of Static Options and Dynamic Options. The static options are the same for all profiles, but the dynamic options can be programmed specifically per hunt groups, panel type, etc.

By receiving the DNIS or Caller ID, the appropriate profile can be selected through a look-up table "stored" on the line card.

Profile 0 is the default. When no Caller ID or unknown DNIS is received, or when the received number does not point to a profile, the default will be used.

Profiles are used to reduce on-line time, and for specific customers or panel/format types, one can have a profile with certain handshakes sent first. Also, some formats require certain options, and this can be pre-defined as well.

Profiles allow for a more customized system. Rather than having a line card (or a receiver itself) devoted to certain customers, the MLR2000 can "handle" any format at any time through the use of profiles. Each line card holds its own look-up table that can be shared through line pools, or shared within the entire receiver.

Two types of tables are available, but only one type can be chosen. The first type, which consists of 10 000 entries, is used strictly with DNIS of up to 5-digits.

Table type 1:

DNIS receivedProfile # to be used

DNIS Received	Profile# to be used
00001	01
00002	03
00003	24
…	…
99999	45

The second type is used if ANI-Caller ID and/or DNIS are received, and can consist of up to 5,000 entries, with Caller ID or DNIS of up to 10 digits.

Table type 2:

Caller ID Number	Convert Data	Profile
05 603000	Not Used	0
05 603001	Not Used	1
05 603002	Not Used	2
05 603003	Not Used	3

DNIS Number	Convert Data	Profile
12345	54321	0
12346	54322	1
1234	54333	2

Each portion may contain 0-10000 entries with the total of all the entries not exceeding 10000.

The receiver will first check through the Caller ID section if a Caller ID number is received. If only a DNIS number is received, or Caller ID is received but the Caller ID was not found, it will check in the DNIS section.

On a standard receiver, the Automation output would look similar to the following:

```
1RRLLLssssssAAAAsYsZZ[DC4]
```

On the MLR2000, it will replace the RRLLL, which is normally the receiver number and the line card number, by the DNIS received or the convert data found in the table.

This makes possible the duplication of accounts, as long as they are dialling different numbers.

The output will become:

```
1DDDDDssssssAAAAsYsZZ[DC4]
```

Where DDDDD is the DNIS number. See Option 20 for more information on how to enable the combined table.

6.2   Static Options: [00] - [2F]

Option [00]: Reserved

Option [01]: Line Card Number - Default [01]

The line card Number provides a virtual identification code for each DRL2000 module. Hexadecimal numbers '01' to 'FE' can be programmed in Option [01] to identify line cards.

Option [02]: Line Card Number Length - Default [0A]

This option is used to determine how many digits from the line card number will be sent to the output. You also have the option of displaying the number in hex or decimal. Program Option 02 with one of the following:

01   Send only one hex digit to the printer or computer output (if you have a 2-digit line card number only the last digit will be sent to the output)

02   Send 2 hex digit line card number to the output

03   Send 3 hex digit line card number to the output (leading Zeros will be inserted prior to the line card number)

0A   Send 3-digit line card number as entered (no conversion).

0D   Send 3-digit line card number in decimal (conversion from decimal to hex decimal

NOTE: When using the DRL2000, the line card Number Length option should always correspond to the number of DNIS digits being received. For example, if 5-digits are being received then the line card Number Length Option should be programmed to 3, so that the 5 digits of DNIS will become 1ddddd and overwrite 1RRLLL.

Option [03]: Internal messages RS-232 - Default [01]

When this option is programmed as '00', the DRL2000 will output its internal messages in the following format:
SRRLLL[#AAAA|Nxxyy]
If it is programmed as '01' internal messages will be output as
0RRLLL[#AAAA|Nxxyy]
Where S, 0 (zero) = Protocol number
RR = Receiver number
LLL = Line number
AAAA = Account code, always 0000
Nxxyy = SIA event

Option [04]: 2-Way Audio Activation Time - Default [00]

Option [04] determines how long, in 10-second increments, the 2-way audio function will be active once it is initiated. At the end of this time, the line card will hang up the line. Program a value from "01" to "FF" for 10 seconds to 2550 seconds. Three (3) minutes is the recommended length of time for the 2-way audio activation time. To disable the 2-way audio feature, program Option [04] as "00".

NOTE: Enabling 2-way audio will affect NFPA 72 system loading requirements. Refer to Par. 4-5.3.2.2.2 of NFPA 72 for details.
If the alarm panel sends a listen-in code activation request and audio is enabled for this format (Option [7F]), the receiver will remain in two-way voice for a period of 60 seconds even if the activation time is not programmed.

Option [05]: Pre-H.S. Duration - Default [0A]

When the line card seizes the line, it will wait the time programmed at Option [05]; then send the first handshake. The value programmed (hex) at this location will be multiplied by 100 ms. [e.g., 100 ms., 200 ms.] The default is 0A, for 1000ms (100ms x default value).

The minimum time is 1 second. If the option is programmed with any value lower than 0A, the line card will use a 1 second delay.

Options [06] to [09]: Reserved

Options [0A] to [0C]: Reserved

Option [0D]: Ring Select - Default [00]

Enables or disables the double ring detection. If programmed as 00, the line card will detect single ring. If programmed as 01, the line card will detect the double ring.

Options [0E-10]: Reserved

Option [11]: Hook-flash Enable/Disable - Default [00]

Enables or disables ability to hookflash the phone line and determines its duration in increments of 10 ms.
If programmed as 00, the option is disabled. If set to anything else, you multiply the decimal equivalent of the hex value by 10 ms and that is the duration. For example, if hookflash time of 500 ms is wanted, program Option 2A to 32 hex.

| 500 ms / 10 | = 50 |
| 50 Dec | = 32 hex |

Option [12]: Caller Source ID Option - Default [00]

Option [12] allows the line card to receive Caller Identification data or DNIS that is transmitted after the first ring on the telephone line. The appropriate service must be available and requested from the Telephone Company for this feature to be operational.

00 Disabled
01 Standard Bellcore Caller-ID
02 Reserved for future use
03 Reserved for future use
0X Receive X (4 to 10) digits DTMF DNIS
2X Receive DNIS and ANI in <DNIS>C<ANI>C
4X Receive ANI and DNIS in <ANI>C<DNIS>C

General messages other than Caller ID or DNIS:
- **Private Call:** An anonymous indication is received instead of the originating telephone number.
- **No Call No.:** An out-of-area or unavailable indication is received instead of the originating telephone number.
- **Unknown Call:** The originating telephone number has not been received or was not transmitted.

Option [13]: Caller Source to SG Computer - Default [00]

Option [13] allows the transmission of the Caller Identification or ANI, to the computer output. Program Option [13] as one of the following:

	Protocol	
00		Do not send to the computer
01	4RRLL	Send to the computer (North American Caller ID)
02	URRLLL	Send to the computer (International Caller ID)
04	4RRLLL	Send ANI information to the computer

NOTE: *Option [12] must be programmed as "01" to use Caller ID or "4x" to use ANI. Where "x" represents the number of DNIS digits (including the terminator digit).*

Option [14]: Caller Source to printer - Default [00]

Option [14] allows the transmission of the Caller Identification or ANI, to the printer output. Program Option [14] as one of the following

00	Do not send to the printer
01	Send to the printer; each alarm will print an extra line, showing the Caller ID
04	Send to the printer; each alarm will print an extra line, showing the ANI number.

NOTE: *Option [12] must be programmed as "01" for Caller ID or "4x" ANI, where "x" represents the number of DNIS digits (including the terminator digit).*

Options [15]: Reserved

Option [16]: Format disabling Option - Default [00]

This option is bit oriented and will disable the decoding of the following DTMF formats. For multiple formats all corresponding bit must be disabled.
Example: to disable 13, 22 and 23 digits DTMF formats, set option to 4A.
Bit 01: 15 digits DTMF formats
Bit 02: 13 digits DTMF formats
Bit 03: 8 digits DTMF formats
Bit 04: 22 digits DTMF formats
Bit 05: 11 digits DTMF formats
Bit 06: 12 digits DTMF formats
Bit 07: 23 digits DTMF formats

Option [17]: DMP User Length - Default [00]

Option 17 is for the variable length zone and user numbers. The first digit in the option represents the user number and the second digit represents the zone number. For example, if Option 17 is set for 24 than the receiver will output a 2-digit user number and a 4-digit zone number.

The default value is 00 for 2-digit zone and 2-digit user number.

NOTE: *Option [17] Only affects DMP Serial 1 format not DMP Serial 3.*

Option [18]: Sur-Gard DTMF 4/3 Format Output - Default [00]

Each nibbles of this option controls how the 4/3 format computer output string is formatted. The first nibble allows for the user and group codes for openings and closings to be combined. When programmed as "1x", group arming/disarming signals will be combined with the user code into one signal which will be sent to the computer.
Example, the following information may be sent to the computer: (The printer output does not change)
Printer:
1234-B01 CloseGrp
1234-416 Close
1234-C02 OpenGrp
1234-532 Open
Computer:
1234 C1 16 (instead of 1234 C 01 and 1234 C 16)
1234 O2 32 (instead of 1234 O 02 and 1234 O 32)
If a user code is not received after the group opening/closing, the message "1234 C1 FF" will be sent; "FF" indicates that a user code was not received.
The second nibble of this option controls the user/zone number conversion. The Sur-Gard 4/3 DTMF format is made up of a 4-digit account code, a 1-digit event code, and a 2-digit hexadecimal zone code or user number. However, some central station software packages use a common event code and require decimal user codes. This option allows the user codes to be converted from hexadecimal to decimal to meet the needs of the central station software. Program with one of the following:

X0 Send the last two digits as user codes without conversion
X1 Convert the last 2-digit user codes to decimal as shown here:

User Code Receive	User Code after Conversion
00 to 99	00 to 99
B0 to B9	100 to 109
C0 to C9	110 to 119
D0 to D9	120 to 129
E0 to E9	130 to 139
F0 to F9	140 to 149

Example, if 1234 4B1 is received, 1234 C 101 will be sent to the computer.
X2 Send the last 3 digits as the zone codes with the 5th digit still used as the event code
Example, if 1234 161 is received, 1234 A 161 will be sent to the computer.
When individual event codes are used, if 1234 401 is received, 1234 C 01 will be transmitted to the computer. When common event codes are used, if 1234 401 is received, 1234 Z 401 will be transmitted to the computer, where Z is the common event code.
X3 Send the last 3 digits as the zone codes and convert the user codes only to decimal

NOTE: *When the first nibble of the option is set to 1 the 3-digit user codes will be combined with the group number as follows:*

Code received	Code sent to computer
1234B01	No transmission
12344B1	1234 C1 101

Option [19]: Fault Call Counter - Default [00]

Option 19 is used for limiting the number of Fault Call messages that are sent to the printer and computer. The default setting will send a Fault Call alarm for every 10 Fault Calls. To have every Fault Call sent to the computer and printer set Option 19 to 01.

Option [1A]: DNIS Input Sensitivity - Default [00]

NOTE: *Do not change this option unless instructed to do so by DSC Technical Support.*

Option [1B]: Reserved

Option [1C]: Busy Out - Default [00]

This option allows the line card to seize the phone line in case of checksum error after download or when its internal buffer is full after loss of communication with the CPM. Program Option [1C] with one of the following:

00   The line is seized if any of the conditions mentioned above occurs.
01   The line is NOT seized if any of the conditions mentioned above occurs.
04   The line will be seized immediately if the automation computer is absent.
05   The line will be seized if there is a loss of automation software or no communication to the CPM2000 ONLY if the internal computer buffer is full. If there is a loss of printer(s), any new alarms will not be buffered in the internal printer buffer. (note: the line card has two independent printer and computer buffers).

NOTE: *If the option is programmed to 01, the line card will NOT buffer any new alarms once the internal buffer is full. Setting Option [1C] to 01 is NOT RECOMMENDED.*

Options [1D] - [1E]: Reserved

Option [1F]: Debug Output - Default [00]

Set to 01 to enable. The debug mode should only be used when required and disabled after use.

Option [20]: C.L.A.S.S. Field Data - Default [04]

00   Send "0"s in C.L.A.S.S. field of E.-bus.
01   Send receiver line card number from options in C.L.A.S.S. field of E.-bus.
02   Send DNIS in C.L.A.S.S. field of E.-bus.
03   Send Caller ID in C.L.A.S.S. field of E.-bus.
04   Send whatever Option [12] Caller Source is set to in the C.L.A.S.S. field of E.-bus
05   When the receiver is programmed to receive DNIS, send the Convert Data from the DNIS / Caller-ID Conversion table in the C.L.A.S.S. field of EBUS for alarms. If the convert data is 0, the received DNIS will be inserted. If the linecard is not programmed to receive DNIS (for example, Caller-ID), then the table lookup functionalities remain the same. If the entry is found use the Profile from the table to perform the profile switching.

NOTE: *When the CLASS Field option is set to 00-04 then the receiver assumes a DNIS table has been uploaded to the linecard. When the option is set to 05 the receiver assumes a Combined Table has been uploaded to the linecard. All other conditions (NOT RECOMMENDED) will cause failure in the Table Lookup and/or Profile Selection steps of the linecard and the linecard will default to profile 0.*

Option [21]: Reserved

Options [22] - [24]: Internal Use Only

Option [25]: Reserved

Option [26]: Internal Use Only

Option [27]: Caller Source Process - Default [05]

This option determines how many digits of Caller ID or DNIS the receiver will process.
0x - x is number of digits of DNIS or Caller ID to be processed (range from 1 to A hex)

Options [28] - [29]: Reserved

Option [2A]: Hook-flash Delay - Default [00]

Time delay before hang-up option. Option value x 100ms to a maximum of 9.5 seconds.
When programmed with values starting with A the second digit will be multiplied by 10 seconds. The second digit must be converted to decimal first.
Example a value of [AF] would result is 150 seconds delay.

Options [2B] - [2C]: Reserved

Option [2D]: A.H.S. - Default [00]

A.H.S., Automatic Handshake Selection is the process of the line card to send a handshake to be used with the ANI. Also included in A.H.S. is the ability for the CPM2000 to "remember" which handshakes are used for which ANI.
The A.H.S. have the ability to be used in conjunction with the DNIS to select a predefined profile based on the DNIS table that is stored in the line card. The handshake is retrieved from the A.H.S. table, and the remainder of the options to be taken from the DNIS profile.
Also, if the panel does not respond to the handshake given by the line card, it will proceed with it's handshake sequence from this profile as opposed to the default profile.
00 A.H.S. Disable
01 A.H.S. enable, 10 digits
02 A.H.S. enable international
Call Blocking When A.H.S. is active
At any time the operator may want to use a call blocking type feature for particular customers (i.e. inactive accounts). The operator will be able to manually update the A.H.S. database with the MLR2000 AHS software. If the operator wishes to call block a particular customer (Caller ID), they would do this by entering for that entry the handshake value of 99. When this is sent to the line card, the line card will release the line as soon as it sees the Caller ID.
Computer Message:
0RRLLL[#0000|ACPM 2000 BLOCKED CALL]
Printer Message:
RRLLL–0000--CPM2000 BLOCKED CALL

Option [2E]: Reserved

Option [2F]: Online Time Out - Default [00]

The Online Time Out option hangs up after a predetermined time delay. Time Out range can be programmed from 01 to 255 seconds (Hex 01 - FF) or until the call is completed by the panel (Hex 00). When time out occurs, the DRL3 hangs up and generates a signal to the printer and to the automation (SIA identifier YB).
For Example:
   Printer Message: "DRL Online Time-Out"
   Automation: NYS0102 (shelf 01, slot 02)

6.3 Dynamic Options: [30] - [FF]

Options [30] - [3F]: 3/1 - 4/1 Digit 0-F

The DRL2000 uses a unique Sur-Gard communication format to transmit data through the CPM2000 to the central station computer. Event codes corresponding to alarm codes in 10 to 40 Baud formats and DTMF 4/1 to 4/3 formats are used in this unique format to enable the computer software to determine alarm types.

The DRL2000 will use the last digit of data received in 3/1 and 4/1 formats to determine the computer event code. The event code will then be transmitted to the central station computer. Refer to the DRL2000 Decoding Library for the complete set of event codes used by the DRL2000. In Sections [30] through [3F], program ASCII codes according to the Decoding Library.

Do **NOT** use values other than 20-7F (ASCII).

Defaults:

Option	Value	Code
30	41	A
31	41	A
32	41	A
33	41	A
34	41	A
35	41	A
36	41	A
37	41	A
38	41	A
39	52	R
3A	41	A
3B	4F	O
3C	43	C
3D	5C	/
3E	52	R
3F	54	T

Options [40] - [4F]: 3/2 - 4/2 Digit 0-F

The DRL2000 will use the first digit following the account code in 4/2, 3/1 extended or 3/2 formats to determine the computer event code. The event code will then be transmitted to the central station computer. Refer to the DRL2000 Decoding Library for the complete set of event codes used by the DRL2000.

In Sections [40] through [4F], program ASCII codes according to the Decoding Library. Do **NOT** use values other than 20-7F (ASCII).

Defaults:

Option	Value	Code
40	41	A
41	41	A
42	41	A
43	41	A
44	41	A
45	41	A
46	41	A
47	41	A
48	41	A
49	52	R
4A	41	A
4B	4F	O
4C	43	C
4D	5C	/
4E	52	R
4F	54	T

Options [50] - [5F]: 4/3 Digit 0-F

The DRL2000 will use the fifth digit of data received in 4/3 formats to determine the message and event code. The event code will then be transmitted to the central station computer. Refer to the DRL2000 Decoding Library for the complete set of messages and event codes used by the DRL2000. In Sections [50] through [5F], program ASCII codes according to the **Decoding Library.** Do **NOT** use values other than 20-7F (ASCII).

NOTE: *The old value programmed in each Option will not be changed until a command with valid data is received.*

Defaults:

Option	Value	Code
50	41	A
51	41	A
52	41	A
55	41	A
54	41	A
55	41	A
56	41	A
57	41	A
58	41	A
59	52	R
5A	41	A
5B	43	C
5C	4F	O
5D	42	B
5E	54	T
5F	5C	/

Options [60] - [6F]: Printer Words.

The English Printer Library is provided and can be selected by programming the event codes to the corresponding word.

For example, if the words 'exit alarm' are required when the alarm code 1 is received in 3/1 (or 4/1 formats), Option [61] must be programmed as '90'.

Refer to Appendix A for a list of available words.
Defaults:

Option	Value	Word
60	F2	PERIODIC TEST REPORT
61	OA	FIRE ALARM
62	14	PANIC ALARM
66	1E	BURGLARY
64	63	CLOSING
65	62	OPENING
66	E5	SERVICE
67	00	MEDICAL*
68	E4	MESSAGE
69	61	RESTORE
6A	F2	PERIODIC TEST REPORT
6B	C6	GROUP CLOSING
6C	C7	GROUP OPENING
6D	E6	ZONE BYPASS
6E	50	SYSTEM TROUBLE
6F	A6	CANCEL
Use only with Model MLR2000 CE. MLR2000 CE is not UL Listed.		

Option [70]: Automation Common Event Code - Default [00]

Some central station software packages are unable to process an alarm using the event codes listed in the DRL2000 Decoding Library. Where a central station monitors thousands of accounts belonging to different companies, the same reporting codes may have different meanings for different companies. Because of this, the individual event codes in Options [30] through [5F] cannot accurately represent the alarm condition. To overcome this, Option [70] may be programmed as indicated below:

Program Operation:

00 - Use individual event codes to computer.

20, 30-39 & 41-5A - Use common event codes (space, 0-9, A-Z). When using common event codes, DSC recommends that either hexadecimal code '5A' (ASCII 'Z') or hexadecimal code '41' (ASCII 'A') be used. The 'Space' character (Hex 20) can be used as the common event code with certain automation software packages to avoid account code database changes when switching over from other brand receivers to the Sur-Gard receiver.

Option [71]: Library Select - Default [04]

Determines how to use Printer Words Options.

00 No printer words.

01 Printer words options used for 1-digit reporting code formats only; other will use pre-defined library.

02 Printer words options used for 2-digit reporting code formats only; other will use pre-defined library.

03 Printer words options used for 3-digit reporting code formats only; other will use pre-defined library.

04 Printer words options used for 1-digit and 2-digit reporting code formats only; other will use pre-defined library.

05 Printer words options used for 1-digit, 2-digit and 3-digit reporting code formats.

NOTE: Option [71] is ignored when using SIA, ITI, Contact-ID, ACRON, MODEM II, MODEM IIE, MODEM IIIa², FBI SuperFast, BFSK, ADEMCO Super Fast and SK FSK1, 2 formats.

Option [72]: SIA Option - Default [00]

This option is a bit selectable Option meaning some or all of these choices may be enabled. For example, to enable "Force SIA Zone Number", and "Convert Pulse formats to SIA", set Option[72]=05. To enable only "Convert Pulse to SIA" and "Convert BFSK to SIA" set Option[72]=0C.

Bit0 - Force SIA Zone Number.

The receiver will decode SIA Alarms sent without Zone numbers and add '00' as the zone number to the automation output:

Example: [#1234|NriBA] becomes [#1234|NriBA00]

Bit1 - Convert SIA Account A's.

Any Account Digits received as 'A' will be converted to '0'. Example: [#A123|NriBA01] becomes [#0123|NriBA01]

Bit2 - Convert Pulse formats to SIA.

All Pulse Format Printer and Computer outputs will be converted to a SIA format, in a two step conversion process. The automation Output will use the Protocol ID of 'R'.

First the type of alarm is determined by Options[30]-[5F], [70].

Secondly the type of alarm is mapped to a SIA output as per the following table.

Example:
12341 becomes '1234 A 1' becomes [#1234|NBA1]

Value	Codes	SIA
41	A	BA
42	B	BA
43	C	CL
46	F	FA
48	H	HA
4F	O	OP
4D	M	MA
50	P	PA
52	R	BR
54	T	TA
5C	\	OC
62	b	BR
66	f	FH
68	h	HH
6D	m	MH
70	p	PH
74	t	TH
7C			UB

Values programmed in Options[30]-[5F],[70] other than in this table will default to UAxx for Undecoded Alarm.

Bit3 - Convert BFSK format to SIA.

The BFSK outputs will be converted to a SIA format. The automation Output will use the Protocol ID of 'R'.

When this option is enabled it has precidence over the BFSK RS232 Option[A4]. The Accounts 3/x to 4/x Option[76] may be used to insert a leading 0 to the account code.

Example:[#123|NFA1]

Option [73]: DSP Input & Output - Default [43]

The upper nibble will set the input sensitivity of the DSP where as the lower nibble of the option will set the output level. *NOTE: This option should be left as default and should be changed only on the recommendation of a DSC technician.*

Option [74]: Equivalent Line Number - Default [00]

The equivalent line number is used with the receiver number for sending signals to the central station software. This option may be used if there is no DNIS number being received by the line card.

Option [75]: Receiver Number - Default [01]

The receiver number is used for sending signals to the central station software. Refer to the manuals for any central station automation software being used to determine if there are any special requirements for this number. Also, check the numbers used for any other receivers in the station to ensure that numbers are not duplicated.

Option [76]: Accounts 3/x to 4/x - Default [00]

When programmed as 00, if the alarm is reported in 3/1, 3/1 extended, BFSK, 3/2 or 3/8 ACRON formats, a leading space will be communicated in front of the 3-digit account codes.

Ex: 1RRLLLssssssssAAAsXsssY[DC4]

01 - If the alarm is reported in 3/1, 3/1 extended, 3/2 or 3/8 ACRON formats, a leading '0' (zero) will be communicated in front of the 3-digit account codes.

Ex: 1RRLLLsssss0AAAsXsssY[DC4]

02 - Alarms communicated to the computer. If the alarm is reported in 3/1, 3/1 extended, 3/2 or 3/8 ACRON formats, a leading '0' (zero) will be communicated in front of the 3-digit Account. And a '0' (zero) will be communicated in front of the 1-digit alarm code for the above formats as well as 4/1 formats.

Ex: 1RRLLLsssss0AAAsXss0Y[DC4]

04 - If the panel is reported in SIA a leading '0' (zero) will be communicated in front of the 3-digit account.
EX: S1011[#0AAA|Nri0/FH00]
05 - If the alarm is reported in 3/1, 3/1 etended, 3/2 BFSK, SIA, 3.8 ACRON formats then a leading '0' (zero) will be communicated in front of the 3-dgit account.
06 - If the alarm is reported in 3/1, 3/1 extended, 3/2 BFSK, SIA, 3.8 ACRON formats then a leading '0' (zero) will be communicated in front of the 3-dgit account and a '0' (zero) will be communicated in front of the 1-digit alarm code.

Option [77]: Digit Replace - Default [00]

Option 77 works in conjunction with Option A2. Option 77 is programmed with an ASCII value that will replace an account code digit or insert a value into an account code. Option A2 is used to replace a digit or insert a digit. To replace a digit use 0x where x is the digit to be replaced. To shift a digit use Option A2 and set to 8x where x is the location in the account code.

Example 1:
Option 77 is set for 41 and Option A2 is set for 01:
Standard 4/2-format output:

```
1RRLLLssssssAAAAsXssYZ
Account code is 9876
1RRLLLssssss9876sXssYZ
```

The receiver will do the following. First it will replace the first digit (Option A2=01) of the account code (in this example "1") and replace it with the ASCII value of 41, which is an "A".
New Output:

```
1RRLLLsssssA876sXssYZ
```

Example 2:
To insert a digit use 8x were x is the spot were the digit is to be inserted.
Option 77 is set to 2D and Option A2 is set for 82:

```
Account code is 9876
1RRLLLssssss9876sXssYZ
```

The receiver will do the following, it will insert the ASCII value of Option 77, in this case the ASCII value of 2D (2D is a " - ") into position two (Option A2=82), and the account code will shift to the left. So it will convert account code 9876 as indicated below:

```
1RRLLLsssss9-876sXssYZ
```

* This will not affect SIA.

Option [78]: Max Inter-digit - Default [00]

Certain old dialers may have difficulties in communicating with the DRL2000 line cards. The DRL2000 provides a possible solution by programming this option. This option should be left as a default and should be changed only on the recommendation of a DSC technician. When programmed as 00, the inter-digit time is determined by the Baud rate of the format being used; all other values are in 100 ms. intervals. 0 determined by Baud rate (default).

00	auto
01	100 ms
02	200 ms
.....	.....
0A	1000 ms

Option [79]: Max Inter-burst - Default [00]

Certain old dialers may have difficulties in communicating with the DRL2000 line cards. The DRL2000 provides the possible solution by programming this option. This option should be left as default and should be changed only on the recommendation of a DSC technician. When programmed as 00, the inter-burst has a time of 100 ms, all other values are in 10 ms increments.

00	100 ms (default)
01	10 ms
02	20 ms... and so on

Option [7A]: 4 and 5 Digit Account Codes to Activate 2-Way Audio - Default [00]

Option [7A] determines which account codes will be able to activate the 2-way audio feature. Program the first digits of the desired account codes in Option [7A].
For example:
To allow all account codes between 1000 and 2FFF to activate the 2-way audio function, program Option [7A] as '12'.
To allow all account codes between 3000 and 6FFF to activate the 2-way audio function, program Option [7A] as '36'.
To disable the 2-way audio function, program Option [7A] as '00'.

***NOTE:** Option [7A] may be used with any formats supported by the MLR2000.*

Option [7B]: 3 Digit Account Codes to Activate 2-Way Audio - Default [00]

Option [7B] determines which 3-digit account codes will be able to activate the 2-way audio feature. Program the first digits of the desired account codes in Option [7B].
For example:
To allow all 3-digits account codes between 200 and 3FF to activate the 2-way audio function, program Option [7B] as '23'.
To allow all 3-digit account codes between 300 and 6FF to activate the 2-way audio function, program Option [7B] as '36'.
Program Option [04] as '00' to disable this function.

***NOTE:** Option [7B] may be used with any 3-digit account code formats supported by the MLR2000.*

Option [7C]: Alarm Codes to Activate 2-Way Audio - Default [00]

Option [7C] determines the range of alarm codes, which will activate the 2-way audio function. Program the first digits of the desired alarm codes in Option [7C].
For example:
The DRL2000 will initiate audio by the account range, Options [7A] and [7B] or by Option [7C] ALARM CODE or by both.
If all alarm codes beginning with 6, 7 and 8 are to activate 2-way audio, program Option [7C] as '68'. Option [7C] may be used with 10 to 40 Baud formats, DTMF 4/1, 4/2, and 4/3 formats.
Program Option [7C] as '00' to disable this function.
Example:
4/2 format with account code 1234, alarm code 2 on zone 3. (1234-23)

Option -	[7A] [7C]	Switch Reason (or [7B]) to Audio	
00 1-2	Yes	Alarm code 2 falls within the code range 1-2.	
1-1 00	Yes	Account code 1234 falls within the range 1-1.	
2-3 00	No	Account code 1234 is outside the range 2-3.	
00 3-4	No	Alarm code 2 is outside the range 3-4.	
1-2 3-4	No	If both are programmed, both must be good and alarm code 2 is outside the range 3-4.	
3-5 1-3	No	Both must be good and account code 1234 is outside the range 3-5.	
1-4 1-5	Yes	Alarm code 2 falls within the code range 1-5, account code 1234 falls within the range 1-4.	

Option [7D]: Audio Zone Code - Default [00]

Audio zone code is the range of zone codes that will activate audio. The first digit is the lowest code. The second digit indicates the highest zone that will activate audio. Option [7D] may be used with 10 to 40 Baud formats, DTMF 4/1, 4/2, and 4/3 formats.

NOTE: *Option [7D] Only works for DMP Serial 1 not for DMP Serial 3.*

Option [7E] Audio RS-232 - Default [00]

This is the code sent to the automation software that indicates that two-way audio has been initiated. If this option is set to '00' there will be no audio-initiated message sent to the automation output. If set to 01, the automation message for audio will be generated with protocol ID 'S'. If set to 02, the automation message will be generated with protocol ID '0'.

00	No Automation Output
01	Send SRRLLL[#AAAA|NLFssoo][DC4]
02	Send 0RRLLL[#AAAA|NLFssoo][DC4]

Option [7F]: Audio Format Enable - Default [00]

This option gives you the ability to enable and disable audio for selected formats. A '1' in the formats bit position will enable the format for audio. A '0' in the formats bit position will disable audio for the format.

Bit 0	3 Digit pulse format
Bit 1	4 and 5 Digit pulse format
Bit 2	DTMF format
Bit 3	Contact ID
Bit 4	SIA format
Bit 5	Modem II format
Bit 6	ITI Format
Bit 7	Westec format

For example: if the user wants audio to work only for 3-digit pulse and SIA formats, Option 7F would have to be programmed as 11 hex which enables bit 0 and bit 4.

Option 80: Kiss-Off to Hang-up Time - Default [1F]

This option determines the delay between Kiss-off and the release of the line. The hex value programmed at this location will be converted to decimal and then multiplied by 100 milliseconds to generate the delay.

For example:
Option 80 = 0A hex = 10 decimal * 100 ms = 1000 ms = 1 second delay
Option 80 = 28 hex = 40 decimal * 100 ms = 4000 ms = 4 second delay

Options [81] through [88]: Handshake Selection -

Default:	**[81]**	**23**	**[85]**	**0E**
	[82]	**14**	**[86]**	**0B**
	[83]	**2D**	**[87]**	**00**
	[84]	**0C**	**[88]**	**00**

The DRL2000 is a multi-format receiver capable of sending several handshakes to a dialer. Often it is important which handshake is sent first. Program Options [81] through [88] according to your applications. Handshake Options:

00	No handshake
2D	Double dual-tone handshake
0C	SIA FSK handshake
0B	Modem II handshake
0E	Modem IIE and ITI handshake
1D	Single dual-tone handshake
0F	DMP handshake
0D	Westec handshake*
EC	SURTEC

* Special software is required.
All other frequencies can be programmed using the first two digits to represent the 3rd and 4th decimal places.
Example:

23	2300 Hz
18	1800 Hz
14	1400 Hz
10	1000 Hz

Option [89] to [90]: Handshake and Kiss-off Duration - Default [00]

Some control panels may require a different handshake duration. Each unit has increments of 100 ms, from 100 ms to a maximum of 8.1 seconds. Program Options 88 to 90 for the desired duration.

00	1 second
01	100 ms
02	200 ms
03	300 ms
04	400 ms
0A	1 second.
0C	1.2 second.... and so on

DSC does not recommend programmed durations longer than 1.5 seconds, as it may not be tolerated by the alarm panel. For special applications, it may be necessary, but any durations higher than 8.1 seconds will not be accurate and may not match the duration programmed.

NOTE: *These options will only affect steady tones handshakes.*

Option [89]: Handshake #1 duration
Option [8A]: Handshake #2 duration
Option [8B]: Handshake #3 duration
Option [8C]: Handshake #4 duration
Option [8D]: Handshake #5 duration
Option [8E]: Handshake #6 duration
Option [8F]: Handshake #7 duration
Option [90]: Handshake #8 duration

Option [91]: Inter-Handshake Duration - Default [00]

The DRL2000 line card will usually wait for signals from the control panels for 4 seconds before sending the next hand-shake, if there are no signals received. In certain applications, control panels cannot wait long enough to get its own handshake especially if the handshake is programmed as the fifth or later handshake. Program Option [91] with one of the following:

00	4-second interval
01	1-second interval
02	2-second interval
03	3-second interval

Option [92]: Reserved

Option [93]: Min Audio Tone - Default [00]

This option is used for Two-way audio tone detection from specific audio panels. This option should be left as default unless otherwise instructed by DSC Technical Support.

Option [94]: Account Digit Stripping - Default [00]

When Option 94 is set to 01, the leading digit of a four-digit account code will be stripped if it is an F.
Example:
Standard 4/2 format Output:
1RRLLLssssssAAAAsXssYZ
Example 1:
Option 94 set to 00
Panel account code is F245
104091ssssssF245sXssYZ
IF Option 94 is set to 01 the 'F' will be replaced by a space. This setting will also enable the receiver to decode special pulse extended-extended formats.
104091sssssss245sXssYZ
If Option 94 is set to 02 than the leading digit of a four-digit panel account code will be stripped if it is a zero. This option will work with the following formats:
Standard Pulse and DTMF(3/x, 4/x & Extended)
FBI
Ademco Super Fast (4/8/1, 4/8)
Contact ID
ITI
SIA
Modem II
SKFSK
Example 1:
Option 94 set to 02
Panel account code is 0345
1RRLLLssssss0345sXssYZ
New Output:
1RRLLLsssssss345sXssYZ

Option [95]: 5-Digit Pulse - Default [00]

The DRL2000 cannot distinguish between 4/1, 3/2 and 3/1 with checksum because all of them contain a total of 5 digits. Therefore, this option must be programmed to inform the DRL2000 which of the 3 formats may be used. The DRL2000 cannot distinguish between 4/2 and 5/1 they both contain a total of 6 digits, therefore the DRL2000 must be programmed to indicate what format.

Value	5 Digit Setting	6 Digit Setting
00	select 4/1 format	select 4/2 format
01	select 3/2 format*	select 4/2 format
02	select 3/1 checksum format	select 4/2 format
03	select 3/1 checksum format special**	select 4/2 format
10	select 4/1 format	select 5/1 format***
11	select 3/2 format*	select 5/1 format***
12	select 3/1 checksum format	select 5/1 format***
13	select 3/1 checksum format special**	select 5/1 format***

NOTE 1: The printer messages for the 3/2 format are the same as those used for the 4/2 format.

**NOTE 2: Select 3/1 with checksum only for Radionics Fast (40 baud rate) sent on the 2300Hz handshake, and 4/1 on all other baud rate regardless of the handshake.*

***NOTE 3: The printer messages for the 5/1 format are the same as those used for the 4/1 format.*

Option [96]: 4/1 Extended - Default [00]

Program the 4/1 Extended Option as '01' to enable combining 2 round pairs of 4/1 extended format into 4/2 output for reporting to the automation and the printer. For example, with Option [96] enabled, the security control panel may transmit the following information:
1234 3
1234 3
3333 1
3333 1
The DRL2000 will interpret this information as: 1234 31. The default of '00', means 4/1 Extended is disabled.

Option [97]: 4/2 Extended - Default [00]

Program Option [97] as '01' to combine 2 round pairs of 4/2 extended format into 4/3 output for reporting to the computer and the printer. Program one of the following:
00 4/2: Extended format data is not combined.
01: The panel will send:
123405
123405
050516
050516
The DRL2000 will interpret this information as 1234 516, or the panel will send:
123403
123403
333301
333301
The DRL2000 will interpret this information as 1234 301. Note that a longer on-line time is required for this format than for a standard 4/2 format. The default setting for Option [97] is '00'; when programmed as '00', the option is disabled.

Option [98]: 3/1 Extend - Default [01]

Program Option [98] as '01' to combine 2 round pairs of 3/1 extended or 3/1 partial extended format into 3/2 output for reporting to the computer and the printer. For example, with Option [98] enabled, the security control panel may transmit the following information:
1233
1233
3331
3331
The DRL2000 will interpret this information as: 123 31; the default setting for Option [98] is '01'; when programmed as '00', the option is disabled.

Option [99]: Ademco Express - Default [01]

The Ademco 4/1 Express format may cause conflicts with the Sur-Gard DTMF 4/3 with checksum format or FBI Super fast without checksum. Therefore, this option must be programmed to inform the DRL2000 which of the 3 formats may be used.

00   Sur-Gard DTMF 4/3 with checksum
01   Ademco 4/1 Express
02   FBI without checksum

Option [9A]: Reserved

Option [9B]: Echo Canceller - Default [00]

00   Disabled
01   Enabled: Disable echo canceller

Option [9C]: Acron RS-232 - Default [01]

When this option is programmed as '00', the DRL2000 will convert the Acron Super Fast format signal into 3/2 or 4/2 format (Ex: AAAAsXssYY[DC4]). If it is programmed as '01' the Acron Super Fast will be sent to the computer as indicated below:

> 9RRLLLssssAAAACCCCCCCCC[DC4]

Where 9 = protocol number
RR = receiver number
LLL = line number
ssss = spaces
AAAA = account code
CCCC = channel 1-4
CCCC = channel 5-8
[DC4] = terminator

Option [9D]: MODEM II RS-232 - Default [01]

The DRL2000 is able to decode the Modem II formats. The handshake 0B needs to be programmed as one of the handshakes of the DRL2000 for the Modem II and handshake 0E for Modem IIE or Modem IIIa 2. Option [9D] determines the protocol sent to the computer. Note that this option will also affect the BFSK format only if programmed as 00 or 01.

Option 9D Programming

Option 9D has changed from a value programmed option to a bit programmed option.

Bit 0: Controls if the Modem II output protocol is 01 or 06.
Bit 1: Controls if the Modem II output is Modem II or converted to SIA without text.
Bit 2: Controls if the Modem II to SIA conversion includes the ASCII text.
Bit 3: Enables the full account code to be sent to the printer and automation if receiving more then 4 digits. Refer to example for more details. This affects the standard Modem output protocols as well as the SIA conversion.

NOTE: If disabled, only the first 4 digits will be decoded even if more are received.

For previous versions that were programmed

Prior to 1.70	Equivalent programming on 1.70
00	00
01	01
02	02
03	06

NOTE: Ensure that the automation software supports settings 02 and 04 if the SIA protocol is desired.

Option [9E]: Reserved

Option [9F]: Ademco High Speed RS-232 - Default [01]

When this option is programmed as '00', the DRL2000 will convert the High Speed format signal into 4/2 format (E.g. 1RRLLLssssssAAAAsXssYY[DC4]). If it is programmed as '01' the Ademco High Speed will be sent to the computer as indicated below:

> 8RRLLLAAAAsCCCCsCCCCsC[DC4]

Where 8 = protocol number
RR = receiver number
LLL = line number
AAAA = account code
CCCC = channel 1-4
s = space
CCCC = channel 5-8
s = space
C = Channel 9
[DC4] terminator

Option [A0]: 11 / 12-Digit DTMF (Acron or Scantronics) - Default [00]

When this option is programmed as '00', if 11 or 12-digit DTMF is received, it will be decoded as ACRON Format. When this option is programmed as '01', if 11 or 12-digit DTMF is received, it will be decoded as SCANTRONICS Format.

	Incoming Format	Decoded Format
00	11-digit DTMF	Acron 3-8
00	12-digit DTMF	Acron 4-8
01	11-digit DTMF	Scantronics 2-8-1
01	12-digit DTMF	Scantronics 3-8-1

Option [A1]: FBI RS-232 - Default [01]

To enable the computer for FBI Super Fast protocol, program Option [A1] as '01'. When enabled, the computer output will be as indicated below:

> JRRLLLsssssAAAATZZEss[DC4]

Where:
J = FBI protocol identifier
RR = receiver number
LLL = line number
s = spaces
AAAA = account code
T = zone type
ZZ = zone number, in hex.
E = event code
if E = 0 and T = 0 : listen in.

Option [A2]: Digit Replace - Default [00]

Option 77 works in conjunction with Option A2. Option 77 is programmed with an ASCII value that will replace an account code digit or insert a value into an account code. Option A2 is used to replace a digit or insert a digit. To replace a digit use 0x where x is the digit to be replaced. To shift a digit use Option A2 and set to 8x where x is the location in the account code.

Option [A3]: D6500 RS-232 - Default [00]

This option is used to strip hex digits on the automation output. The DRL2000 will emulate the Radionics 6500 RS-232 protocol on pulse formats, Ademco Express and Varitech only. When Option A3 is set to 01 the hex digit will be stripped for 1-digit reporting codes including Varitech 4/1.

Example 1: Code 1
Computer output: **1RRLLLssssss022sAsss1**
Example 2: Code B
Computer output: **1RRLLLssssss022sOssss**
If Option A3 set to 02: the hex digit will be stripped for 2-digit reporting codes including Varitech 4/2.
Example 1: Code 21
Computer output: **1RRLLLsssssss022sAss21**
Example 2: Code B1
Computer output: **1RRLLLsssssss022sOsss1**
If Option A3 set to 03: the hex digit will be stripped for 1 and 2-digit reporting codes including Varitech.
If Option A3 set to 04: the hex digit will be stripped for BFSK.

***NOTE:** This option will only work if Option A4 is set to 01.*

Example 1: Code 21
Computer output: **6RRLLLsssssss022sAss21**
Example 2: Code B1
Computer output: **604091sssssss022sOsss1**
If Option A3 is set to 05: the hex digit will be stripped for 1-digit reporting and BFSK.
If Option A3 Is set to 06: the hex digit will be stripped for 2-digit reporting and BFSK.
If Option A3 set to 07: the hex digit will be stripped for 1-digit, 2-digit and BFSK.

***NOTE:** Option [70] must be left as an individual event code when enabling this option.*

Option [A4]: BFSK RS-232 - Default [00]

When programming Option [A4] as '00', the BFSK format will be reported as Radionics 6500 BFSK mode to the computer; the protocol identifier will be a 6.
Example 1: Code 21
Computer Output: 604091   022sAsss1
Example 2: Code B1
Computer Output: 604091   022sOsss1
When Option A4 set to 01, the BFSK will be reported as a standard 3/1 extended format, the protocol identifier will also be changed from 6 to 1.
Example 1: Code 21
Computer Output: 104091   022sAss21
Example 2: Code B1
Computer Output: 104091   022sOssB1

Option [A5]: Sescoa Super Speed - Default [01]

If set to 00 Sescoa Super Speed will be disabled and 4/2 with checksum will be enabled.
If set to 01, Sescoa Super Speed will be enabled and 4/2 with checksum will be disabled.
If set to 03 Sescoa Super Speed will be disabled and only 4/2 with checksum will be enabled. 4/2 double round will be disabled.

Option [A6]: ITI Adjust - Default [00]

When set to 01, the ITI account codes will be converted to four digits by stripping the last digit off. For example, a panel account of 23459 will become account 2345. If the leading digit of the panel account is a 0 than it will be stripped and replaced with a space. For example, if 02349 is sent then the receiver will output 234 for the panel account.

Option [A7]: Silent Knight FSK2 RS-232 - Default [00]

The DRL2000 provides two possible outputs to the computer for Silent Knight FSK2 format. The operation of this option is explained below:

[A7] = 00   SKFSK disabled

[A7] = 01   SKFSK enabled for:
SKFSK1
ERRLsssssssAAAAYYssss[DC4]
SKFSK2 Protocol #2
CRRLssssAAAAAAYYZZss[DC4]

[A7] = 02   SKFSK enabled for:
SKFSK1
ERRLsssssssAAAAYYssss[DC4]
SKFSK2 Protocol #2
FRRLssssAAAAAAYYZZss[DC4]

Options [A8] - [AF]: Dial-out Number For 2-way Audio Transfer - Default [00]

These 8 options are used to provide the dial-out number if the user wishes to transfer the call to another extension. Up to 16 digits may be programmed including any 'Feature Command' digits. The values in these options will be sent as DTMF tones on the phone line after the following sequence takes place:

1   The DRL2000 has recognized the current call as a 2-way audio account and alarm code.
2   The calling control panel has finished sending its alarms and switched into 2-way audio mode.
3   The DRL2000 will perform a Hook-flash with the time value as programmed in Option 11 and then start to dial the digits programmed in Options A8-AF.

Options A8-AF must be programmed in the following manner: Digits 1-9 are programmed as the numbers 1-9. The digit 'A' must be programmed if a zero is needed anywhere in the dial string as the digit zero is used to indicate to the line card that there are no more digits to dial. If a '*' is needed, (e.g., *70, the transfer command in some PBX/PABX switches) program a 'B'. Similarly, if a '#' is needed, program a 'C'.
To get the line card to wait for 3 seconds in a dial string, program a 'D'. For example: to have the line card transfer a 2-way audio call to Ext. 51386, with a 3 second pause between the transfer command and dialing, Options A8-AF would be programmed as the following:

A8 = B7	AC = 60
A9 = AD	AD = 00
AA = 51	AE = 00
AB = 38	AF = 00

Options [B0] - [FF]: Reserved

Section 7 - DRL2000 Communication Formats

7.1 Common Formats

The following formats are commonly used:
- 3/1, 4/1, 4/2 formats; 10, 14, 20 Baud
- 3/1 extended format; 10, 14, 20, 40 Baud.
- 3/1, 4/2 formats with or without checksum; 40 Baud
- 3-2 format; 10, 14, 20 Baud (option)
- 4/1 Extended format; 10, 14, 20 Baud (option)
- 4/2 Extended format; 10, 14, 20, 40 Baud (option)

Example:
- 3/1 FORMAT
  Computer: 1011sssss123sAsss1[14]
  Printer: Jun 26 1998-13:42:32-01/02-SG - 01-123-123-
- 1-FIRE ALARM
- 3/1 EXTENDED FORMAT
  Computer: 1011sssss123sAss32[14]
  Printer: Jun26 1998-13:49:38-01/02-SG - 01-123-123-
- 32-BURGLARY
- 4/2 FORMAT
  Computer: 1011sssss1234sAss22[14]
  Printer: Jun 26 1998-15:02:23-01/02-SG - 01-123-1234-
- 22-PANIC ALARM

7.2 Sur-Gard DTMF Formats

Sur-Gard DTMF 4/3 and 4/3 with checksum formats provide fast, reliable and easy-to-understand and decode data transmission. On-line time will be greatly reduced when using 4/3 and 4/3 with checksum formats. The 4/1 and 4/2 DTMF formats can also be decoded by the DRL2000.

The 4/3 with checksum format is recommended for use with Sur-Gard and DSC security control panels.

Example:
- Sur-Gard 4/3 format
  Each round pair represents a single event:
  AAAAEZZ
  AAAA = 4-digit account code.

E= Event code.
ZZ = Zone number or user number.
Computer: 1011sssss2255sAs266[14][6]
Printer: Jun 25 1998-13:20:42-01/02-SG - 01-123-2255266-PANIC ALARM

7.3 Acron Format

The Acron format is a DTMF format. It can transmit 3 or 4 account digits and 8 digits of channel status at a time. Shown below are several examples of Acron transmissions.
- Handshake / Kiss-off: 2300 Hz
- 1234: Account Code

Example:
- AAAAZZZZZZZZorAAAZZZZZZZZ
- 9RRLLLssssAAAACCCCCCCC[DC4]
- With option disabled
  4/8
  Computer: 101123sssssss1234sCssA1[14][6]
  Printer: Jun 25 1998-13:25:12-01/02-SG - 01-123-1234-A1-CLOSEsUSERs01
- With option enabled
  4/8
  Computer:901123sssss1234AAAAA78A[14][6]

7.4 Ademco Contact ID

This DTMF format requires a dual tone handshake and 1400 Hz kiss-off, or 1400 Hz handshake and 1400 Hz kiss-off.

NOTE: If the dialer responds to a 2300 Hz handshake by sending the Contact ID Format data, the DRL2000 will accept and decode the format. The DRL2000 will send a 1400 Hz kiss-off tone regardless of the handshake.

EVENT CODE CLASSIFICATIONS
CONTACT ID
The Event codes have been grouped according to the type of event (see Event Code Library below).

Contact ID Event Code Library

Medical Alarms - 100		121	Duress	141	Polling loop open
100	Medical	122	Silent	142	Polling loop short
101	Pendant transmitter	123	Audible	143	Expansion module failure
102	Fail to report in	Burglar Alarms - 130		144	Sensor tamper
Fire Alarms - 110		130	Burglary	145	Expansion module tamper
110	Fire alarm	131	Perimeter	146	Silent Alarm
111	Smoke	132	Interior	24 Hour Non-Burglary - 150 and 160	
112	Combustion	133	24 Hour	150	24 Hour non-burg
113	Water Flow	134	Entry/Exit	151	Gas detected
114	Heat	135	Day/Night	152	Refrigeration
115	Pull Station	136	Outdoor	153	Loss of heat
116	Duct	137	Tamper	154	Water leakage
117	Flame	138	Near alarm	155	Foil break
118	Near alarm	139	Silent Burg	156	Day trouble
Panic Alarms - 120		General Alarms		157	Low bottled gas level
120	Panic alar	140	General alarm	158	High temp

159	Low temp	355	Loss of radio supervision	456	O/C Partial Arm		
161	Loss of air flow	356	Loss of central polling	457	exit Error		
Fire supervisory - 200 and 210		357	Radio Xmtr VSWR	458	User on Premises		
200	Fire supervisory	**Protection Loop Troubles - 370**		459	Recent Close		
201	Low water pressure	370	Protection loop	**System Disables - 500 and 510**			
202	Low CO2	371	Protection loop open	**Sounder/Relay disables - 520**			
203	Gate valve sensor	372	Protection loop short	520	Sounder/Relay disabl		
204	Low water level	373	Fire trouble	521	Bell 1 disable		
205	Pump activated	374	Exit Alarm	522	Bell 2 disable		
206	Pump failure	**Sensor Troubles- 380**		523	Alarm relay disable		
System Troubles - 300 and 310		380	Sensor trouble	524	Trouble relay disable		
300	System trouble	381	Loss of super. - RF	525	Reversing relay disable		
301	AC loss	382	Loss of super. - RPM	**System peripheral Disables - 530 and 540**			
302	Low system battery	383	Sensor tamper	**Communication Disables - 550 and 560**			
303	RAM checksum bad	384	RF xmtr. low battery	551	Dialer disabled		
304	ROM checksum bad	385	Smoke Hi-Sens.	552	Radio xmitter disabled		
305	System reset	386	Smoke Low Sens.	**Bypasses - 570**			
306	Panel program changed	387	Intrusion Hi-Sens.	570	Zone bypass		
307	Self-test failure	388	Intrusion Low Sens.	571	Fire bypass		
308	System shutdown	389	Detector Self Test Fail	572	24 Hour zone bypass		
309	Battery test failure	**Open/close - 400**		573	Burg. bypass		
310	Ground fault	400	Open/Close	574	Group bypass		
Sounder/Relay Troubles - 320		401	O/C by user	575	Swinger Bypass		
320	Sounder/relay	402	Group O/C	**Test/Misc. - 600**			
321	Bell 1	403	Automatic O/C	601	Manual trigger test		
322	Bell 2	404	Late to O/C	602	Periodic test report		
323	Alarm relay	405	Deferred O/C	603	Periodic RF Xmission		
324	Trouble relay	406	Cancel	604	Fire test		
325	Reversing	407	Remote arm/disarm	605	Status report to follow		
System Peripheral Troubles - 330 and 340		408	Quick Arm	606	Listen-in to follow		
330	System Peripheral	409	Keyswitch O/C	607	Walk Test Mode		
331	Polling loop open	**Remote Access - 410**		608	OFF normal condition		
332	Polling loop short	411	Callback request made	609	Video transmitter active		
333	Exp. module failure	412	Succes - download access	611	Fire test: point tested		
334	Repeater failure	413	Unsuccessful access	612	Fire test: point not tested		
335	Local printer paper out	414	System shutdown	621	Event log reset		
336	Local printer failure	415	Dialer shutdown	622	Event log 50% full		
337	Exp Mod DC Loss	**Access Control - 420**		623	Event log 90% full		
338	Exp ModLow Batt	421	Access denied	624	Event log overflow		
339	Exp Mod Reset	422	Access report by user	625	Time/Date Reset		
341	Exp Mod Tamper	**Special O/C - 440-450**		626	Time/Date inaccurate		
Communication Troubles - 350 and 360		441	Armed Stay	627	Program mode Entry		
350	Communication	450	O/C by Exception	628	Program mode Exit		
351	Telco 1 fault	451	Early O/C	629	1 & 1/3 day no read log		
352	Telco 2 fault	452	Late O/C	630	Sched change		
353	Long range radio	453	Fail to O/C	631	Exception Schedule change		
354	Fail to communicate	455	Auto Arm Fail	632	Access Sched change		

Example:
- COMPUTER: 501123s181234E12200003[14][6]
- PRINTER: Jun 26 1998-16:07:35-01/02-SG - 01-123-1234-122-E122-00sSILENT PANIC 003

7.5 Ademco Express

This format consists of 4-digit account codes and 1- or 2-digit alarm codes. The DRL2000 will decode the signal as regular 4/1 or 4/2 format. Option [99] must be programmed as '01' to decode the 4/1 Express format instead of the Sur-Gard 4/3 with checksum format.

Example:
- Option 99 set to 00
  Raw data: 23451726
  Computer Output: 101123 2345 A 172
  Printer Output: Jul 20 1998-15:54:31-01/02-SG -01-123-2345-172-FIRE ALARM
- Option 99 set to 01
  Raw data: 23451726
  Computer Output: 101123 2345 A 2
  Printer Output: Jul 20 1998-15:48:57-01/02-SG -01-123-2345-2-PANIC ALARM

7.6 Ademco Super Fast (High Speed Format)

The High Speed format consists of 4 digit account numbers, 8 channel status digits, and 1 auxiliary channel.

NOTE: *When option [9F] is programmed as '00', the DRL2000 will convert the signal into 4/2 format. When option [9F] is programmed as '01', the DRL2000 will send the information as it received to the printer and to the computer using High Speed RS-232 communication protocol.*

8RRLLLAAAAsCCCCsC[DC4]

AAAAZZZZ ZZZZ S

AAAA = Three digit or four digit account number.

ZZZZ ZZZZ = Zone status.

S = Status channel indicates the meaning of the message.

AAAAZZZZZZZZS or AAAZZZZZZZZS

Example:
- With option 9F disabled
  Computer: 101001sssss1234sAss02[14][6]
  Printer: Jun 25 1998-14:17:50-F3/00-SG-01-123-1234-02-ALARM ZONE02
- With option 9F enabled
  Computer: 801001 1234s5155s5555s7[14][6]
  Printer: Jun 25 1998-14:21:50-01/02-SG - 01-123-1234- 515555557

7.7 FBI Super Fast Format

This DTMF format consists of 4-digit account codes, 2-digit zone codes, 1-digit zone type codes, and 1-digit event codes. The zone codes will be converted into 3-digit decimal codes by the DRL2000.

The following are the zone type codes used by this format:

FBI Event	Code	Converted Event Code
Fire	1	A
Panic	2	A
Burglary	3	A
MedicaL	4	A
Auxiliary	5	A
Bypass	6	B
Inactive	7	A
Eight	8	A

FBI Event	Code	Converted Event Code
Nine	9	A
Zero	0	A
Opening	B	O
Closing	C	C
Abort	D	T
Restore	E	R
Trouble	F	T

NOTE: *Note that option [A1] can give a unique FBI RS232 output when enable.*

Example:
- FBI RS232 Option On
  Computer:JO112323452032 [14]
  Printer: 20-Jul-1998 13:12:29 - Jul 20 1998-13:14:51 -01/-2-SG - 01-123-2345-003-PANIC
- FBI RS232 Option Off
  Computer:101123 2345 O 001 [14]
  Printer:20-Jul-1998 13:52:35 - Jul 20 1998-13:54:57-01/02-SG - 01-123-2345-001-OPENING

7.8 ITI Format

The ITI format covers ITI panels listed in Appendix E. In order to receive the ITI format, the handshake #10 must be programmed.

7.9 ITI Sensor Library

Sensor #	Printed Out As	Specifics
00	Buddy Alarm	SX-V Only
01-32	ALARM	Caretaker Plus
00-16	Alarm	RF Commander/ Commander III
02-07	Alarm	SX-IVB
01	Bad Sensor #	SX-V Only
02-76	Alm	SX-V
01-18	Alarm	Commander 2000
01-76	Alarm	UltraGard 5000
77	AlarmTmpr	Caretaker Plus, SX-IVB, SX-V, UltraGard 5000 Only
78	Trouble	Caretaker Plus, UltraGard 5000 Only
79	No Activ Alm	Caretaker Plus, UltraGard 5000 Only
80	Alarm	ALL Supported ITI Panels
81	Alarm	ALL Supported ITI Panels
82	Alarm	ALL Supported ITI Panels
83	PhoneTst	ALL Supported ITI Panels
84	OpenUsr xx	ALL Supported ITI Panels
85	CloseUsr xx	ALL Supported ITI Panels
86	SilentDuress	ALL Supported ITI Panels
87	Force Arm, Auto ForceArm	ALL Supported ITI Panels
88	Trouble	Caretaker Plus, UltraGard 5000 Only
89	RF Touchpad	Caretaker Plus, UltraGard 5000 Only
90	AC Fail	ALL Supported ITI Panels
91	Low Battery	ALL Supported ITI Panels
92	AlmTamprLoop	ALL Supported ITI Panels
93	AutoPhoneTst	ALL Supported ITI Panels
94	Recevier Failure	ALL Supported ITI Panels
95	CPU Back In	ALL Supported ITI Panels
98	Event Dump Report	Commander 2000 Only.

NOTE: *The UltraGard 5000 and the Security Pro5000 are the same panel with different marketing names. Therefore all references above to the UltraGard 5000 include the Security Pro5000.*

7.10 Modem II, Modem IIE, Modem IIIa² and BFSK Formats

BFSK, Modem II, Modem IIIa² or Modem IIE formats (refer to appendix D) can be decoded by the DRL2000.

7.10.1 Modem II
Example:
- Modem II RS-232 Option ON
  Computer Output: **6**01001 7112 T 9[14]
  Printer Output: 23-Jun-1998 09:49:02 - Jun 23 1998 -09:53:00-01/02-SG - 01-123-7112- BATTERY MISSING
- Modem II RS 232 option OFF
  Computer Output: **1**01001 7112 R F01[14]
  Printer Output: 23-Jun-1998 11:07:47 - Jun 23 1998-11:11:45-01/02-SG - 01-123-7112- PROG ACCESS OK

7.10.2 BFSK
Example:
- BFSK option ON
  Computer Output: **6**01001 112F 1[14]
  Printer Output: 22-Jun-1998-11:17:26 - Jun 22 1998-11:21:32-01/02-SG-01-123-112-FIRE ALARM
- BFSK option OFF
  Computer Output: **1**01001 112F 1[14]
  Printer Output: 22-Jun-1998 13:05:17 - Jun 22 1998-13:09:23-01/02-SG-01-123-112-FIRE ALARM

7.11 SIA FSK

The SIA digital format is a modem format communicating at 110 or 300 Baud and using the SIA protocol to transfer information to the computer.

The standard DRL2000 can receive Bell 103 modem frequencies.

***NOTE:** The DRL2000 can accept SIA formats with and without separators. The DRL2000 version 1.4 software implements Levels 1, 2 and 3 of the SIA 1993IIb Digital Communication Standard, but it does not support "Receiver Call out and Access Passcode Block," "Reverse Channel Block," and "V-Channel Communications".*

The DRL2000 supports an account code with a maximum of 16 digits, (including any displayable ASCII characters except the pipe symbol: "|"). It also supports an alarm code with a maximum of 4 digits. Usually, the central station automation refers to the SIA Event Block Data Code Definitions for information on interpreting the alarm codes.

Acknowledgments for the SIA format are tonal by default. The transmitter may, however, request data acknowledgment by transmission of the optional configuration block. When the DRL2000 receives the configuration block from a transmitter requiring data acknowledgment, it will send the tonal acknowledgment to this block. It will then send the data acknowledgment to the following data blocks if the data received is valid.
Example:
- Printer: Jul 20 1998-17:30:16-01/02-SG-01-123-1234 - NM008
- Computer: S011[#1234:NBA08]

7.12 Silent Knight FSK1, FSK2
7.12.1 Silent Knight FSK1 Protocol
ERRLLLssssAAAAAAXXssss[DC4]
Where:

E	FSK protocol identifier
RR	Receiver number
LLL	Line number
s	Spaces
AAAAAA	Account number (if the account is 4 or 5 digits, the leading "A"s will be replaced by spaces)
XX	Alarm code

Possible alarm codes are as follows:

00	Alarm Panic
01-08	Alarm 01-08
09	Holdup
10-19	Alarm 10-19
30	Test code
31	Trouble line 1
32	Trouble line 2
33	Expand trouble
34	Forced access
35	Restore line 1
36	Restore line 2
37	Expand restore
38	Cancel code
39	Data lost
40	Closing
41-49	Closing 1-9
50-59	Bypass 10-19
60	Trouble AC
61-68	Trouble 1-8
69	Trouble bat
70	Restore AC
71-78	Restore 1-8
79	Restore bat
80	Access
81-89	Access 1-9
90	Opening
91-99	Opening 1-9
[DC4]	Represents the terminator

Example
- Printer:L1-1234-03-LIBRARY WORD
  HH:MM:SS-DD/MM
- Computer: E01001   123403   [14]

7.13 Silent Knight FSK2 Protocol

The DRL2000 will provide two possible outputs to the computer, according to the value set under option A7. When the option is programmed as "02", the computer output will be as follows:
FRRLLLssssAAAAAAYYZZsss[DC4]
Where:

F	FSK2 protocol 1 identifier
RR	Receiver number
LLL	Line number
s	Spaces

AAAAAA	Account number (if the account is 4 or 5 digits, the leading "A"s will be replaced by spaces)	
YY	Event code	
ZZ	Zone/user number	
[DC4]	Represents the terminator	

Possible events are as follows:

YT00	Battery Trouble
YR00	Battery Restore
AT00	System Trouble AC
DOZZ	Access left open ID ZZ
DFZZ	Access forced ID ZZ
DSZZ	Access Station ID ZZ
AJ00	System Restore AC
LT0z	Trouble phone line #0Z
	Restore phone line 0Z
	Expand trouble device ID z
	Expand restore device ID z
ETZZ	Expand trouble station ID ZZ (ZZ=17-31)
ERZZ	Expand restore station ID ZZ (ZZ=17-31)
RP00	Automatic test
RXZZ	Manual test zone ZZ
CA	Automatic closing
OA	Automatic opening
CLZZ	Normal closing ID ZZ
OPZZ	Normal opening ID ZZ
CFZZ	Forced closing ID ZZ
ORZZ	Forced opening ID ZZ
	Supervised closing ID ZZ
OTZZ	Supervised opening ZZ
CG0a	Closing area 0a
OG0a	Opening area 0a
DRZZ	Access granted ID ZZ

When the option is programmed as "01", the computer output will be as follows:

CRRLLLssssAAAAAAXYZZss[DC4]

Where:

C	FSK2 protocol 2 identifier
RR	Receiver number
LLL	Line number
s	Spaces
AAAAAA	Account number (if the account is 4 or 5 digits, the leading "A"s will be replaced by spaces)
X	Event code
Y	Condition code
ZZ	Zone/user number
[DC4]	Represents the terminator

Possible events are as follows:

B600	Battery Trouble
BE00	Battery Restore
C600	System Trouble AC
CE00	System Restore AC
D60z	Trouble phone line #0z
DE0z	Restore phone line 0z

E60z	Expand trouble device ID z
EE0z	Expand restore device ID z
E6zz	Expand trouble station ID zz (zz=17-31)
EEzz	Expand restore station ID zz (zz=17-31)
E100	Automatic test
E2zz	Manual test zone ZZ
F000	Automatic closing
F400	Automatic opening
F1zz	: Normal closing ID ZZ
F5zz	: Normal opening ID ZZ
F2zz	: Forced closing ID ZZ
F6zz	: Forced opening ID ZZ
F3zz	: Supervised closing ID ZZ
F7zz	: Supervised opening ZZ
FD0a	: Closing area 0a
FF0a	: Opening area 0a
F8zz	: Access
F9zz	: Access left open ID zz
FAzz	: Access forced ID ZZ
FBzz	: Access station ID ZZ
FC00	: Duress
FE00	: Data lost

7.14 Sescoa Super Speed

Sescoa Super Speed is a 40 Baud communication format. Account codes are programmed as 4-digit decimal codes ranging from 0001 to 3374. The account code is followed by a 1-digit event code, a 2-digit alarm code, and 1-digit checksum.

Option [A5] must be programmed as "01" in order to use Sescoa Super Speed decoding instead of 4/2 with checksum decoding.

Example:
- Printer: L01-1234—LOW BATT HH:MM:SS-DD/MM
- Computer: 701007ssssss1234sF

7.15 DRL2000 Predefined Library Decoding and Event Codes Table

7.15.1 3/1 - 4/1 Alarm Library

For Alarm Message	Corresponding Code		Event Code (Options 30-3F)
	0 (A)	A	PER TEST REPORT
	1	A	FIRE ALARM
	2	A	PANIC ALARM
	3	A	BURGLARY
	4	A	GENERAL ALARM
	5	A	GENERAL ALARM
	6	A	GENERAL ALARM
	7	A	MEDICAL
	8	A	SYSTEM TROUBLE
Restore	9	R	RESTORE
Open	B	O	OPENING
Close	C	C	CLOSING
Cancel	D	/	CANCEL
Restore	E	R	RESTORE
Trouble	F	T	SYSTEM TROUBLE

7.15.2 3/1-4/1 Extended, 3/2 & 4/2 Alarm Library

Alarm	0x (Ax)	A	PER TEST REPORT
Alarm	1x	A	FIRE ALARM
Alarm	2x	A	PANIC ALARM
Alarm	3x	A	BURGLARY
Alarm	4x	A	GENERAL ALARM
Alarm	5x	A	GENERAL ALARM
Alarm	6x	A	GENERAL ALARM
Alarm	7x	A	MEDICAL
Alarm	8x	A	SYSTEM TROUBLE
Restr	9x	R	RESOTRE
Open	Bx	O	OPENING
Close	Cx	C	CLOSING
Cancl	Dx	/	CANCEL
Restr	Ex	R	RESTORE
Trble	Fx	T	SYSTEM TROUBLE

7.15.3 4/2 Extended & 4/3 Alarm Library

Alarm	0xx(Axx)	T	0	PER TEST REPORT
Alarm	1xx	A	1	FIRE ALARM
Alarm	2xx	A	2	PANIC ALARM
Alarm	3xx	A	3	BURGLARY
Close	4xx	C	4	CLOSING
Open	5xx	O	5	OPENING
Alarm	6xx	T	6	SERVICE
Alarm	7xx	A	7	MEDICAL
Alarm	8xx	A	8	MESSAGE
Restr	9xx	R	9	RESTORE
CloseGrp	Bxx	C	C	OPENING
OpenGrp	Cxx	O	O	CLOSING
Bypas	Dxx	B	B	CANCEL
Unbyp	Exx	H	H	RESTORE
Cancl	Fxx	/	/	SYSTEM TROUBLE

Ensure that the central station automation software is able to accept these codes if they are to be used.

7.15.4 Event Codes Summary

Code	Event
0	Automatic Test
1	Fire Alarm
2	Panic Alarm
3	Burglary Alarm
4	Closing by User Number
5	Opening by User Number
6	Service
7	Medical Emergency
8	Message
9	Restore
A	Alarm
B	Bypass
C	Closing
D or /	Cancel
H	Unbypass
O	Opening
R	Restore
T	Trouble
Z	Common Event Code
20 Hex	Common Event code "Space"

Section 8 - CPM2000 Central Processing Module

The CPM2000 is the central processing module that monitors the DRL2000 Line Cards and forwards the information from the Line Cards to the computer and printer. The CPM2000 is capable of monitoring a maximum of 255 DRL2000 modules.

8.1 General Information

The CPM2000 64-bit micro-controller and real-time language program running at 133 MHz allow the system to quickly and efficiently execute several tasks at the same time. The use of a unique menu display system enhances the system's ease of use for the operator and makes the system configuration and programming simple and efficient. Several diagnostics modes are available to assist the operator in troubleshooting and maintenance, the MLR2000 Console software through Windows 9x/2000/XP computer is also available to setup the CPM and Line cards

8.2 Features

- Multi-tasking allows the receiver to perform functions that might otherwise be delayed by a slow computer acknowledgement response
- Fast internal communication results in practically no delay in transfer of information between the Line Card and the CPM2000. The CPM2000 is capable of polling more than 200 Line Cards in less than 2 seconds.
- LCD contrast easily adjusted
- Hot switching to secondary CPM2000
- 3½ floppy drive for data input/ output and software upgrades.

- Ethernet A and B to DRL2000 line-cards
- TCP/IP output to automation software and MLR2000 console software.
- Two RS232 ports for automation software
- 11 input/ outputs for BUZZER, ACT, etc.
- 2 relay outputs
- Available COM1 and COM2 baud rates: 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200 or 38400
- COM1 or COM2 Data bits: 7, 8 or 9
- COM1 or COM2 Parity: Even, odd or none
- COM 1 or COM2 Stop Bits: fixed at 1
- System menu for easy initial programming.
- Software Version 1.0 supports line-cards and CPM2000 programming through TCP/ IP from a computer

8.3 CPM2000 Controls

- [ACK] Button: Used to manually acknowledge an alarm event when a computer is not connected to the receiver. Press the [ACK] button to turn the 'ACK' light OFF and silence the buzzer.

8.3.1 "ACK" light
Flashes when a message is received from the line card and the computer is disconnected.

8.3.2 [Enter] button
Not used.

8.3.3 [Backspace] button
Not used.

8.3.4 [Escape] button
Not used.

Figure 7, CPM2000 Front View
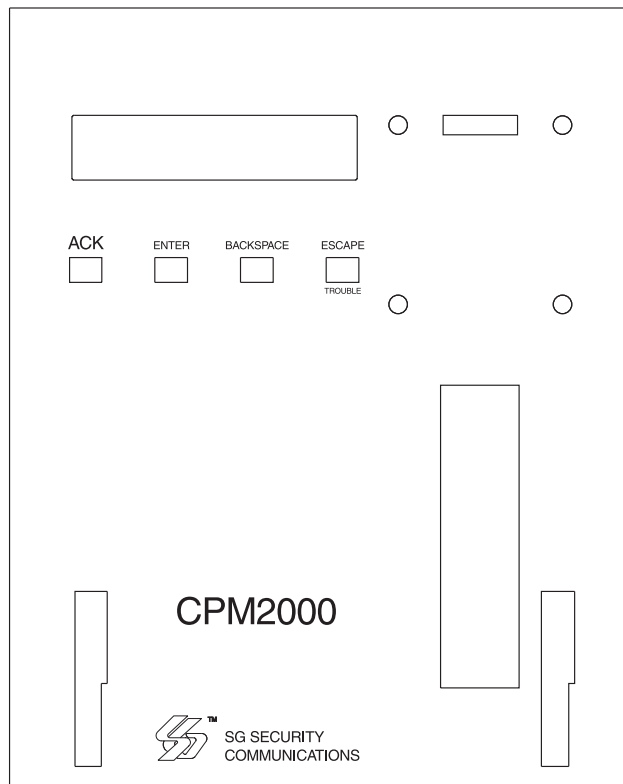
Section 9 - CPM2000 Wiring Diagram

BACKUP CPM2000 MODULE — PC Keyboard (Optional) — SG Serial Automation Output (Supervised) — SG Serial Automation Output (Supervised) — Backup Parallel Printer #1 (Supervised) — PC Keyboard (Optional) — SG Serial Automation Output (Supervised) — SG Serial Automation Output (Supervised) — Primary Parallel Printer #1 (Supervised) — PRIMARY CPM2000 MODULE

KEYBOARD   COM1   COM2   LPT1   KEYBOARD   COM1   COM2   LPT1

1 ETHERNET A B   1 ETHERNET A B

PROGRAMMABLE INPUTS/OUTPUTS   MONITOR   COM3   COM4   PROGRAMMABLE INPUTS/OUTPUTS   MONITOR   COM3   COM4

16   POWER 28 VDC   TCP/IP   16   POWER 28 VDC   TCP/IP

(SUPERVISED)   POWER MONITOR   (SUPERVISED)   POWER MONITOR

(SUPERVISED)   LPT2   (SUPERVISED)   LPT2

SYSTEM STATUS   SYSTEM STATUS

PC Monitor (Optional) — SG Console / TCP/IP Automation Output (Supervised) — Backup Parallel Printer #2 (Supervised) — Backup Serial Printer #3 (Optional) (Supervised) — Modem (Optional) — SG Console / TCP/IP Automation Output (Supervised) — Primary Parallel Printer #2 (Supervised) — Primary Serial Printer #3 (Optional) (Supervised) — Modem (Optional) — PC Monitor (Optional)

Programmable Inputs/Outputs

Relay contacts rating: 3 A, 250 VAC
Non-supervised for connection to
power-limited circuits only
1   Relay 2 Pin 1
2   Relay 2 Pin 2
3   Relay 1 Pin 1
4   Relay 1 Pin 2
5   GND

Outputs switched to negative
Max. short circuit current 80 mA/12 VDC
Limited by 150 ohm/1 W resistors
Non-supervised
6   Trouble Output
7   ACK Output
8   Buzzer Output
9   PGMOUT 4
10 PGMOUT 3
11 PGMOUT 2
12 PGMOUT 1

Max. input voltage 12 V, 10 mA
Input treshold 1.3 V
Supervised
13 PGMIN 4
14 PGMIN 3
15 PGMIN 2
16 PGMIN 1 (Used for fans supervision)

Notes:
1. PC keyboard and monitor are used only for
   CPM2000 module configuration
2. SG console is used for software updates on
   line card
3. All external devices should be installed in
   the same room as the receiver (within 20 ft.)
4. All circuits are power limited
   - CPU 1150 (Panasonic KX-P1150)
   - SCS-PTR (Okidata Microline 182/184

9.1 Loss of Socket/Automation

It is estimated that sockets may appear and disappear regularly as processes are terminated and reconstituted. After 5 seconds of loss the CPM2000 shifts to the next connection level. The connection level cases are.

As an Example of Source Destination
the Fall-down case

Table 1

Slot 1	CPM A TCPIP	Automation TCPIP
Slot 2	CPM A serial 1	Automation serial
Slot 3	END	

Each slot may be populated by a selection. After 5 seconds in a slot not running the CPM2000 will go to the next running resource (i.e. actively polling) until 'END' is encountered. When End is encountered the unit will continuously try to connect to the last entry. One of the switched negative output on the CPM (PGMOUT 1) will be activated when automation fails.

The Manual Restore rule is a command that may be issued on the Sur-Gard console to jump back to the first entry.

The CPM and automation must connect to all resources announced all the time. In the CPM's case this means that a socket is presented for each automation to connect to.

9.2 CPM Redundancy

CPM's are directly redundant. The secondary CPM constantly monitors the first CPM by observing polling events. If the primary is considered failed either by loss or by agreed upon takeover, the unacknowledged signals on the systems line-cards are flushed out of the failed CPM. As the secondary CPM resumes polling the previously unacknowledged signals are re-transmitted from the line card in chronological order.

9.3 CPM Restoral

All contemplated scenarios for recovery of a CPM except watchdog restart involve a serviceman. It is expected that CPM restoral will be manually switched from the console.

Section 10 - MLR2000 Computer Interface

The CPM2000 is able to send alarm messages to a computer connected to the TCP/IP or serial port. This section describes the communication procedures, and the communication formats available for use.

10.1 Virtual connectivity

Each CPM2000 has one IP address and a number of associated ports. Each MLR2000 receiver may have up to two CPM2000's, configured as a primary CPM plus an optional 'hot backup' CPM. Internally, socket programming uses specific ports for expected tasks. The MLR2000 is the 'Server' in a connection-oriented protocol (Berkeley Socket 4.3BSD).

In the case of an IP Fall-down, serial ports will carry the same 'stream' of traffic as TCP/IP, as backup communications channels.

As the CPM does not attempt to save state, when it fails communications are switched to the backup CPM. Line cards will re-transmit unacknowledged packets through the system, restoring any CPM message loss.

10.2 Automation Mode

In automation mode it is expected that the primary connection is via TCP/IP networking on the 10BaseT Ethernet connection. To setup this mode a menu will prompt the user for an IP Address. Once the IP address is set up all other options and setups may be done via the Sur-Gard Console Package running on a Windows 9x/2000/XP platform.

The TCP/IP connection is the primary output of the CPM2000 for automation computer alarms. It is estimated that sockets may appear and disappear regularly as processes are terminated and reconstituted. After 5 seconds of socket loss, a socket loss is declared and automation output is shifted to the next connection level, which is the serial automation output connection.

10.2.1 First configuration: LOOP (0)

If both outputs are present, the CPM2000 will send to the TCP/IP until it fails, proceed to the serial until it fails, proceed back to the TCP/IP until it fails ... and so on.

10.2.2 Second configuration: FALL BACK (1)

If both outputs are present, the CPM2000 will send to the TCP/IP until it fails, proceed to the serial until it fails, and will keep trying on the serial continuously, or until the reset fallback command is generated from the console, in which case it would go back to try the TCP/IP connection.

10.2.3 Third Configuration: ALL (2)

The CPM2000 will always send to all connected outputs. If at least one output replies with a ACK, then the alarm is considered as transmitted regardless if the other output acknowledged it or not. This setting is NOT recommended.

Flow diagram for Automation LOOPMode (0)
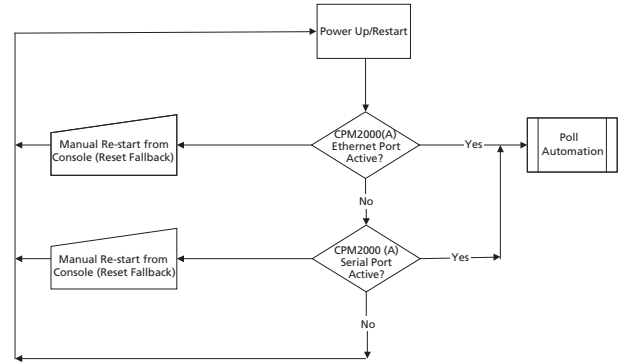
Flow diagram for Automation FALL BACK Mode (1)
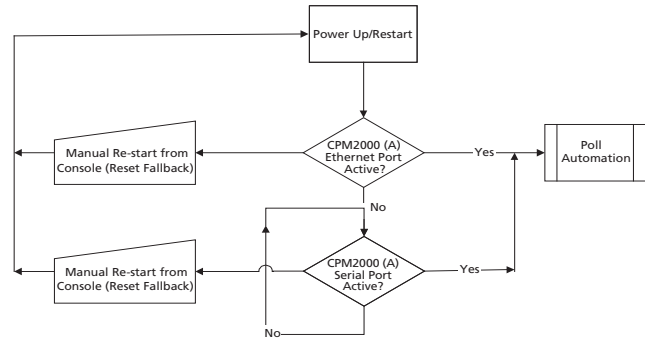
Flow diagram for Automation ALL Mode (2)
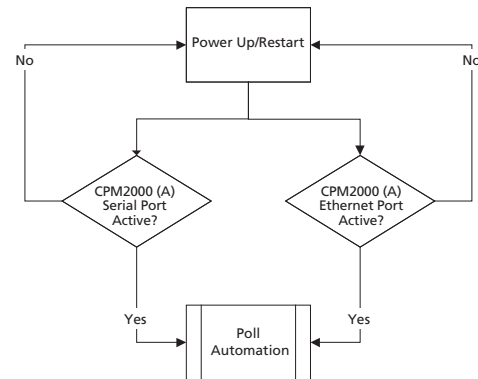
10.3 TCP/IP Ports

Each CPM2000 has a user selectable IP address and Port base address which is applied on the next reboot. Originally the unit will be shipped with IP address 10.0.7.00 on both , the primary and the secondary CPM.

Table 2

Base Port #	Port Name	Base +
1024	Sur-Gard Console Port	Base
1025	SG-Automation Port	Base + 1
1026	2nd-Automation Port	Base + 2
1027	Reserved	Base + 3
1028	Reserved	Base + 4
…		…
1034	Reserved	Base + 9

The primary point to be made is that the base port is user configurable as is the IP address.

10.4 Client Side Connects

The Automation 'Client' attaches a socket to the CPM 'server as per the following diagram after Stevens 'UNIX Network Programming' Prentice Hall 1990 section 6.2.

10.5 Stream Packet Structure

The stream is an encapsulation of MLR2000 Automation Serial Output.

Server (CPM)

Connection Oriented Protocol

```
socket ()
   │
   ▼
bind ()
   │
   ▼
listen ()
   │
   ▼
accept ()  ◄──── connection establishment ────  connect ()  ◄── Client (Automation) ── socket ()
   │                                                 │
   ▼                                                 ▼
read ()  ◄──── data (request) ────  write ()
   │
   ▼
write ()  ──── data (reply) ────►  read ()
```
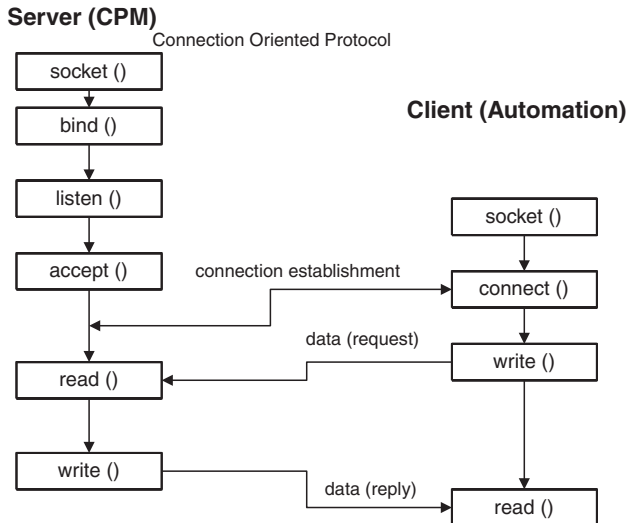
10.6 Status Addressing

Line card status will be reported via physical addressing. The line-cards will be assigned by shelf and slot number. All device status information is in Sur-Gard format. The reporting of status on this port, automation output, CPM display and printer will relate to physical addressing. Physical addressing was chosen to facilitate maintenance, error outputs will include the physical address to assist in maintenance.

10.7 Overview of Communication

When the CPM2000 receives data from a Line Card, it forwards the data to the automation and awaits an acknowledgment signal from the computer. The CPM2000 also monitors the connection to the computer by sending a supervisory 'heartbeat' signal to every port every 10 seconds. If the 'heartbeat' transmission determines that the computer is off-line or disconnected, a message similar to this will be sent to the printer:

Com Absent! or SG TCP/IP Absent

NOTE: *The message indicates the time and date that communications through COM1 were determined to be interrupted.*

When COM1 communications are re-established, a message similar to this one will be printed:

Com Restored or SG TCP/IP Restored

NOTE: *The message indicates the time and date that communications through COM were determined to be re-established.*

CPM2000 Internal Status Messages:

Description	Printer Message	Automation message
24V Battery Low	24V Battery Low	YT0000
24V Battery Restored	24V Battery Restored	YR0000
5V Failure	5V Failure	YT0001
5V Restored	5V Restored	YR0001
Fan Circuit Failure	Fan Circuit Failure	YX0000
Fan Circuit Restored	Fan Circuit Restored	YZ0000
Operator activity mode.	Programming Entered	LB0000
Primary CPM2000 Failure	Primary CPM2000 Failure	YX0001
Printer #1 Error	Printer#1 Error	VZ0001
Printer #1 Restored	Printer#1 Restored	VY0001
Printer #2 Error	Printer#2 Error	VZ0002
Printer #2 Restored	Printer#2 Restored	VY0002
Printer #x Error	Printer#x Error	VZ000x
Printer #x Restored	Printer#x Restored	VY000x
PSU2000 AC Source A Failure	PSU-AC A Fail	AT0000
PSU2000 AC Source A Restored	PSU-AC A Restored	AR0000
PSU2000 AC Source B Failure	PSU-AC B Fail	AT0001
PSU2000 AC Source B Restored	PSU-AC B Restored	AR0001
PSU2000 DC Source A Failure	PSU-DC A Fail	YP0003
PSU2000 DC Source A Restore	PSU-DC A Restore	YR0003
PSU2000 DC Source B Failure	PSU-DC B Fail	YP0004
PSU2000 DC Source B Restore	PSU-DC B Restore	YR0004
Secondary CPM2000 Failure	Secondary CPM2000 Failure	YZ0002
Serial Port #1 not responding.	COM#1 Absent.	YC0001
Serial Port #1 responded ACK	COM#1 Restored	YK0001
Serial Port #2 not responding	COM#2 Absent.	YC0002
Serial Port #2 started polling	COM#2 Restored	YK0002
TCP/IP Printer error	TCP/IP Printer Error	VZ0000
TCP/IP Printer Restored	TCP/IP Printer Restored	VY0000
TCP/IP Socket 1025 Failed	SG -TCP/IP Failed	NT1025
TCP/IP Socket 1025 Restored	SG -TCP/IP Restored	NR1025
UPS AC Fail (PGM	UPS AC Fail	AT0002
UPS AC Restored	UPS AC Restored	AR0002
UPS Low Battery Restore	UPS Low Battery Restore	YR0002
UPS Low Battery.	UPS Low Battery.	YT0002
Secondary CPM2000 Failure	Secondary CPM2000 Failure	YX0002
Line Fault	Line Fault	LTSStt
Line Restore	Line Restore	LRSStt
Fault Call	Fault Call	YCSStt
Fault Data	Fault Data	YNSStt
Line Card Reset	Line Card Reset	RRSStt
Line Card Restored	Line Card Restored	YESStt
Line Card Absent	Line Card Absent	YDSStt
Primary CPM2000 Reset	Primary CPM2000 Power Up	RR0000
Secondary CPM2000 Reset	Secondary CPM2000 Power Up	RR0001
Line Card Busy(Buffer Full)	Line Card Busy Out	YBSStt
Internal communication error with Line card	Internal Comm Error	YOSStt
Checksum fail on DRL2000 Boot up	Checksum Failed	YFSStt
DRL Online Time-Out	DRL Online Time-Out	NYSsstt
Internal Communication Error with Computer	Computer Internal Comm Error	NTSSoo

where

SS	= Shelf in Hex
tt	= Slot in Hex
XXXX	= Socket number

CPM2000 LCD Messages by priority:

VZ0000:	Parallel port Printer Error
VZ0001:	TCP/IP Printer Error
YC0001:	COM#1 Absent
YC0002:	COM#2 Absent
YT0000:	12V Battery Low
YT0001:	5V Failure
AT0000:	AC CPMA Failure
AT0001:	AC CPMB Failure

Special Messages:

S67890[#0000|ABLOCKEDCALL 1234567890][14]

S01001[#0000|ABLOCKEDCALL 12345 1234567890][14]

S01001[#0000|AAHS TABLE FULL]

10.8 Console Specifies which SG Automation to Supervise

A selection which defines a combination of SG Sockets, Ports and Protocols may be active. This setup, is saved in the configuration file. Also presented is the selection of ports that may be supervised for the purposes of restorals or fall down.

Section 11 - PSU2000 Power supply Module
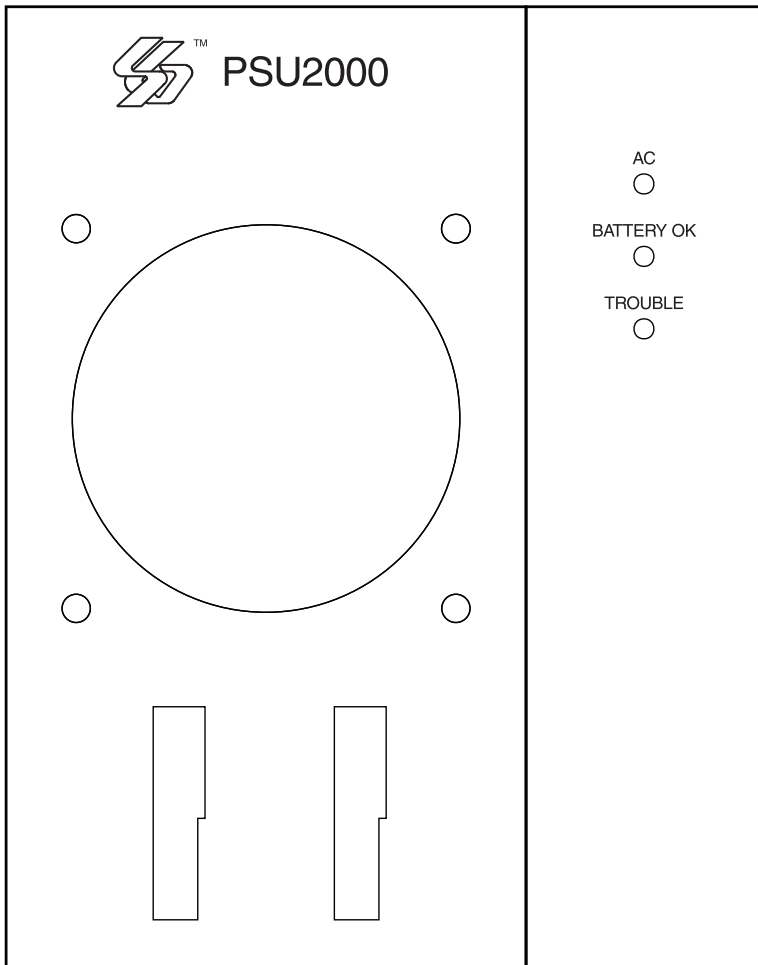
'AC' LED
It indicates the presence of AC.

'BATTERY OK' LED
It indicates the battery status (ON when battery is charged).

'Trouble' LED
It indicates a trouble in the power supply.

Section 12 - Automation Protocols

The Sur-Gard MLR2000 receiver sends the various protocols to report signals to the central station computer via an RS232 port. The complete description of protocols is available upon request.

12.1 Data Byte protocol

The Sur-Gard MLR2000 receiver uses a default configuration of 9600 Baud, one start bit, 8 data bits, no parity bit, and one stop bit structure to transmit and receive signals on the RS-232 port. This protocol can be programmed on the receiver to enable different configurations.

12.2 Acknowledgment of the Signal

The Sur-Gard receiver requires an acknowledgment signal [ACK] (Hex 06) from the computer software within 4 seconds for each message sent. Failure to receive the [ACK] will result in the retransmission of the same signal three times before giving up. The same thing happens if the receiver receives a [NAK] (hex 15). In case of communication failure with the computer, the Sur-Gard receiver can store up to 127 times the number of lines installed in its internal memory. The communication is resumed when the first ACK is received on the heartbeat.

Section 13 - Detailed Description of Computers

13.1 COM Responses

When the CPM2000 sends an event to the computer, it checks for 3 responses: Ack, Nack or Unknown/No Response

An ACK tells the CPM2000 the computer got the event successfully. A NACK tells the CPM2000 the computer got the message but didn't understand it. The CPM will attempt to send the message 20 times. If after 20 attempts it continually got NACK from the computer, the CPM and line card will send a communication error event to the printer, and then begin attempting to send the next event in the Line card buffer to the computer. Any other response from the computer, including no response will cause the CPM to attempt to send the message again, up to 4 attempts. If after 4 attempts the CPM got no response or an unknown response, it will assume nothing is connected and generate an alarm.

13.2 Automation Absent

When the computer is not responding to transmissions, the CPM will generate a 'COMx Absent' or 'TCP/IP Absent' trouble. When a trouble occurs, the CPM will continue to attempt to send a signal to the computer until it gets a response.

The CPM2000 will use the heartbeat signal to poll automation for a response. It will make 4 attempts, then wait the next Heartbeat time before making another 4 attempts. The typical heartbeat interval is 30 seconds.

Supervisory Heartbeat Signal Protocol (1):

> 1RR000ssssssssssss@ssss[DC4]

RR: Receiver number (Real programmed number. Never virtual).

s: Space Character.

@: Supervisory Signal.

[DC4]: Terminator, 14 Hex.

This signal is used to supervise the communication between the receiver and the computer. It is sent to the computer about every 30 seconds and is programmable from the receiver. The computer should acknowledge this signal with an [ACK].

The CPM can be programmed to send a test signal to the computer once every 01-99 seconds to test the connection between the CPM and the computer (30 seconds is recommended). If a heartbeat fails to get a response from the computer, the CPM will immediately transmit the heartbeat again, up to 4 attempts.

If all automation outputs failed, the CPM will start the manual mode operation. (See manual mode). If the line-cards buffers are full, the line-cards will stop answering the calls.

Appendix A - DRL2000 Communication Formats

NAME	HANDSHAKE	DATA	BAUD	FORMAT	EXTENDED	KISS OFF
Ademco Express	Dual Tone	DTMF	DTMF	4/1(oprion),4/2	NO	1400Hz
Ademco Slow	1400Hz	1900Hz	10bps	3/1,4/1(or 3/2),4/2	NO	1400Hz
Ademco Slow	1400Hz	1900Hz	10bps	4/2,4/1,3/1	YES	1400Hz
ADT Focus *	-	-	-	-	-	-
ADT Multi-point II *	-	-	-	-	-	-
ADT SIA *	-	-	-	-	-	-
Contact ID	Dual Tone	DTMF	DTMF	10/2/1/3/2	NO	1400Hz
Contact ID	Dual Tone	DTMF	DTMF	4/2/1/3/2/3	NO	1400Hz
FBI Super Fast	2300Hz	DTMF	DTMF	4/3/1	NO	2300Hz
Franklin	2300Hz	1800Hz	20bps	3/1,4/1(or 3/2),4/2	NO	2300Hz
Franklin	2300Hz	1800Hz	20bps	4/2,4/1,3/1	YES	2300Hz
ITI	ITI	FSK	110/300	-	NO	ITI
Modem II	Modem II	FSK	110	FSK	NO	Modem II
Modem IIE	Modem IIE	FSK	300	FSK	NO	Modem IIE
Modem IIIa^2	Modem II	FSK	300	FSK	NO	Modem IIIa^2
Radionics	2300Hz	1800Hz	40bps	3/1,4/2	NO	2300Hz
Radionics	2300Hz	1800Hz	40bps	4/2,3/1	YES	2300Hz
Radionics	2300Hz -	1800Hz -	40bps -	3/1+parity 4/2+parity	NO	2300Hz
Radionics	2300Hz	1800Hz	40bps	3/1+parity	YES 4/2+parity	2300Hz
RadionicsBFSK	1400Hz	FSK	42	3/2	NO	1400Hz
RadionicsBFSK	2300Hz	FSK	42	3/2	NO	2300Hz
Sescoa S. Speed	2300Hz	1800Hz	40bps	4/3+Checksum	NO	2300Hz
S.F. Ademco	Dual Tone	DTMF	DTMF	4/8/1	NO	1400Hz
S.F. Ademco	Dual Tone	DTMF	DTMF	4/8/1 + Checksum	NO	1400Hz
SIA FSK Level 1, 2, and 3.	SIA -	FSK mark Space	110 bps/ 300 bps	Tonal data, ACK -	- -	--
Silent Knight Fast	1400Hz	1900Hz	14bps	3/1,4/1(or 3/2),4/2	NO	1400Hz
Silent Knight Fast	1400Hz	1900Hz	14bps	4/2,4/1,3/1	YES	1400Hz
Silent Knight FSK0	1400Hz	FSK	110	4/1	NO	1400Hz
Silent Knight FSK1	1400Hz	FSK	110	4/1	NO	1400Hz
Silent Knight FSK2	1400Hz	FSK	110	4/2	NO	1400Hz
Sur-Gard	2300Hz	DTMF	DTMF	4/1,4/2,4/3	NO	2300Hz
Sur-Gard	2300Hz	DTMF	DTMF	4/3+Checksum	NO	2300Hz
Sur-Gard	Dual Tone	DTMF	DTMF	4/1,4/2,4/3	NO	1400Hz
Sur-Gard	Dual Tone	DTMF	DTMF	4/3+Checksum	NO	1400Hz
WESTEC *	DTMF					
Contact ID Safety net *	Serial					
SF Ademco safety net	Serial					
DMP Serial 1	DMP	FSK	110	DMP	NO	DMP
DMP Serial 3	DMP	FSK	110	DMP	NO	DMP
Varitech	2300Hz	FSK	110	4/1, 4/2	NO	2300Hz
Adcor	2300Hz	Pulse	Pulse	3/1, 3/2	NO	2300Hz

* Not available on the standard version.

Appendix B - Decimal - HEX - Binary Conversion Chart

DEC	HEX	Binary	DEC	HEX	Binary	DEC	HEX	Binary	DEC	HEX	Binary
000	00	0000 0000	064	40	0100 0000	128	80	0100 0000	192	C0	0100 0000
001	01	0000 0001	065	41	0100 0001	129	81	0100 0001	193	C1	0100 0001
002	02	0000 0010	066	42	0100 0010	130	82	0100 0010	194	C2	0100 0010
003	03	0000 0011	067	43	0100 0011	131	83	0100 0011	195	C3	0100 0011
004	04	0000 0100	068	44	0100 0100	132	84	0100 0100	196	C4	0100 0100
005	05	0000 0101	069	45	0100 0101	133	85	0100 0101	197	C5	0100 0101
006	06	0000 0110	070	46	0100 0110	134	86	0100 0110	198	C6	0100 0110
007	07	0000 0111	071	47	0100 0111	135	87	0100 0111	199	C7	0100 0111
008	08	0000 1000	072	48	0100 1000	136	88	0100 1000	200	C8	0100 1000
009	09	0000 1001	073	49	0100 1001	137	89	0100 1001	201	C9	0100 1001
010	0A	0000 1010	074	4A	0100 1010	138	8A	0100 1010	202	CA	0100 1010
011	0B	0000 1011	075	4B	0100 1011	139	8B	0100 1011	203	CB	0100 1011
012	0C	0000 1100	076	4C	0100 1100	140	8C	0100 1100	204	CC	0100 1100
013	0D	0000 1101	077	4D	0100 1101	141	8D	0100 1101	205	CD	0100 1101
014	0E	0000 1110	078	4E	0100 1110	142	8E	0100 1110	206	CE	0100 1110
015	0F	0000 1111	079	4F	0100 1111	143	8F	0100 1111	207	CF	0100 1111
016	10	0001 0000	080	50	0101 0000	144	90	0101 0000	208	D0	0101 0000
017	11	0001 0001	081	51	0101 0001	145	91	0101 0001	209	D1	0101 0001
018	12	0001 0010	082	52	0101 0010	146	92	0101 0010	210	D2	0101 0010
019	13	0001 0011	083	53	0101 0011	147	93	0101 0011	211	D3	0101 0011
020	14	0001 0100	084	54	0101 0100	148	94	0101 0100	212	D4	0101 0100
021	15	0001 0101	085	55	0101 0101	149	95	0101 0101	213	D5	0101 0101
022	16	0001 0110	086	56	0101 0110	150	96	0101 0110	214	D6	0101 0110
023	17	0001 0111	087	57	0101 0111	151	97	0101 0111	215	D7	0101 0111
024	18	0001 1000	088	58	0101 1000	152	98	0101 1000	216	D8	0101 1000
025	19	0001 1001	089	59	0101 1001	153	99	0101 1001	217	D9	0101 1001
026	1A	0001 1010	090	5A	0101 1010	154	9A	0101 1010	218	DA	0101 1010
027	1B	0001 1011	091	5B	0101 1011	155	9B	0101 1011	219	DB	0101 1011
028	1C	0001 1100	092	5C	0101 1100	156	9C	0101 1100	220	DC	0101 1100
029	1D	0001 1101	093	5D	0101 1101	157	9D	0101 1101	221	DD	0101 1101
030	1E	0001 1110	094	5E	0101 1110	158	9E	0101 1110	222	DE	0101 1110
031	1F	0001 1111	095	5F	0101 1111	159	9F	0101 1111	223	DF	0101 1111
032	20	0010 0000	096	60	0110 0000	160	A0	0110 0000	224	E0	0110 0000
033	21	0010 0001	097	61	0110 0001	161	A1	0110 0001	225	E1	0110 0001
034	22	0010 0010	098	62	0110 0010	162	A2	0110 0010	226	E2	0110 0010
035	23	0010 0011	099	63	0110 0011	163	A3	0110 0011	227	E3	0110 0011
036	24	0010 0100	100	64	0110 0100	164	A4	0110 0100	228	E4	0110 0100
037	25	0010 0101	101	65	0110 0101	165	A5	0110 0101	229	E5	0110 0101
038	26	0010 0110	102	66	0110 0110	166	A6	0110 0110	230	E6	0110 0110
039	27	0010 0111	103	67	0110 0111	167	A7	0110 0111	231	E7	0110 0111
040	28	0010 1000	104	68	0110 1000	168	A8	0110 1000	232	E8	0110 1000
041	29	0010 1001	105	69	0110 1001	169	A9	0110 1001	233	E9	0110 1001
042	2A	0010 1010	106	6A	0110 1010	170	AA	0110 1010	234	EA	0110 1010
043	2B	0010 1011	107	6B	0110 1011	171	AB	0110 1011	235	EB	0110 1011
044	2C	0010 1100	108	6C	0110 1100	172	AC	0110 1100	236	EC	0110 1100
045	2D	0010 1101	109	6D	0110 1101	173	AD	0110 1101	237	ED	0110 1101
046	2E	0010 1110	110	6E	0110 1110	174	AE	0110 1110	238	EE	0110 1110
047	2F	0010 1111	111	6F	0110 1111	175	AF	0110 1111	239	EF	0110 1111
048	30	0011 0000	112	70	0111 0000	176	B0	0111 0000	240	F0	0111 0000
049	31	0011 0001	113	71	0111 0001	177	B1	0111 0001	241	F1	0111 0001
050	32	0011 0010	114	72	0111 0010	178	B2	0111 0010	242	F2	0111 0010
051	33	0011 0011	115	73	0111 0011	179	B3	0111 0011	243	F3	0111 0011
052	34	0011 0100	116	74	0111 0100	180	B4	0111 0100	244	F4	0111 0100
053	35	0011 0101	117	75	0111 0101	181	B5	0111 0101	245	F5	0111 0101
054	36	0011 0110	118	76	0111 0110	182	B6	0111 0110	246	F6	0111 0110
055	37	0011 0111	119	77	0111 0111	183	B7	0111 0111	247	F7	0111 0111
056	38	0011 1000	120	78	0111 1000	184	B8	0111 1000	248	F8	0111 1000
057	39	0011 1001	121	79	0111 1001	185	B9	0111 1001	249	F9	0111 1001
058	3A	0011 1010	122	7A	0111 1010	186	BA	0111 1010	250	FA	0111 1010
059	3B	0011 1011	123	7B	0111 1011	187	BB	0111 1011	251	FB	0111 1011
060	3C	0011 1100	124	7C	0111 1100	188	BC	0111 1100	252	FC	0111 1100
061	3D	0011 1101	125	7D	0111 1101	189	BD	0111 1101	253	FD	0111 1101
062	3E	0011 1110	126	7E	0111 1110	190	BE	0111 1110	254	FE	0111 1110
063	3F	0011 1111	127	7F	0111 1111	191	BF	0111 1111	255	FF	0111 1111

Appendix C - ASCII Character Chart

Corresponding ASCII with library on printer (Option 70)	HEX Character
20	Space
30	0
31	1
32	2
33	3
34	4
35	5
36	6
37	7
38	8
39	9
41	A
42	B
43	C
44	D
45	E
46	F
47	G
48	H
49	I
4A	J
4B	K
4C	L
4D	M
4E	N
4F	O
50	P
51	Q
52	R
53	S
54	T
55	U
56	V
57	W
58	X
59	Y
5A	Z
5C	\

Appendix D - Printer Words: Options [60-6F]

The English Printer Library is provided and can be selected by programming the event codes to the corresponding word. Words available:

Hex #	Printer Words
00	MEDICAL
01	PENDANT TRANSMITTER
02	FAIL TO REPORT IN
03	RESERVED
04	RESERVED
05	RESERVED
06	RESERVED
07	RESERVED
08	RESERVED
09	RESERVED
0A	FIRE ALARM
0B	SMOKE
0C	COMBUSTION
0D	WATER FLOW
0E	HEAT
0F	PULL STATION
10	DUCT
11	FLAME
12	NEAR ALARM
13	RESERVED
14	PANIC ALARM
15	DURESS
16	SILENT
17	AUDIBLE
18	POLICE
19	DURESS
1A	RESERVED
1B	RESERVED
1C	RESERVED
1D	RESERVED
1E	BURGLARY
1F	PERIMETER
20	INTERIOR
21	24 HOUR
22	ENTRY/EXIT
23	DAY/NIGHT
24	OUTDOOR
25	TAMPER
26	NEAR BURGLARY ALARM
27	SILENT BURG ALARM
28	GENERAL ALARM
29	POLLING LOOP OPEN
2A	POLLING LOOP SHORT
2B	EXPANSION MODULE FAILURE
2C	SENSOR TAMPER
2D	EXPANSION MODULE TAMPER
2E	SILENT ALARM
2F	AUXILIARY
30	NO ACTIVITY
31	DOOR FORCED
32	24 HOUR NON-BURGLARY
33	GAS DETECTED
34	REFRIGERATION
35	LOSS OF HEAT
36	WATER LEAKAGE
37	FOIL BREAK
38	LOW BOTTLED GAS LEVEL
39	HIGH TEMPERATURE
3A	LOW TEMPERATURE
3B	DAY TROUBLE
3C	LOSS OF AIR FLOW
3D	EXPLOSIVE GAS
3E	CARBON MONOXIDE
3F	FAIL TO CHECK IN _ GUARD'S TOUR
40	FREEZE ALARM
41	SPRINKLER
42	LATCHKEY
43	DOOR LEFT OPEN
44	RESERVED
45	RESERVED

Hex #	Printer Words
46	FIRE SUPERVISORY
47	LOW WATER PRESSURE
48	LOW CO2
49	GATE VALVE SENSOR
4A	LOW WATER LEVEL
4B	PUMP ACTIVATED
4C	PUMP FAILURE
4D	ENVIRONMENTAL
4E	EMERGENCY
4F	FOIL ALRM
50	SYSTEM TROUBLE
51	AC LOSS
52	LOW SYSTEM BATTERY
53	RAM CHECKSUM BAD
54	ROM CHECKSUM BAD
55	SYSTEM RESET
56	PANEL PROGRAM CHANGED
57	SELF-TEST FAILURE
58	SYSTEM SHUTDOWN
59	BATTERY TEST FAILURE
5A	GROUND FAULT
5B	REPEATER TAMPER
5C	RF RECEIVER TAMPER
5D	RESERVED
5E	RESERVED
5F	RESERVED
60	RESERVED
61	RESTORE ALARM
62	OPENING ALARM
63	CLOSING ALARM
64	SOUNDER/RELAY
65	BELL 1
66	BELL 2
67	ALARM RELAY
68	TROUBLE RELAY
69	REVERSING
6A	RESERVED
6B	RESERVED
6C	RESERVED
6D	RESERVED
6E	SYSTEM PERIPHERAL
6F	POLLING LOOP OPEN
70	POLLING LOOP SHORT
71	EXPANSION MODULE FAILURE
72	REPEATER FAILURE
73	LOCAL PRINTER PAPER OUT
74	LOCAL PRINTER FAILURE
75	EXPANSION MODULE DC LOSS
76	EXPANSION MODULE LOW BATTERY
77	EXPANSION MODULE RESET
78	COMMUNICATION
79	TELCO 1 FAULT
7A	TELCO 2 FAULT
7B	LONG RANGE RADIO
7C	FAIL TO COMMUNICATE
7D	LOSS OF RADIO SUPERVISION
7E	LOSS OF CENTRAL POLLING
7F	USER TX USWR
80	LOW RECEIVED SIGNAL STRENGTH
81	RESERVED
82	PROTECTION LOOP
83	PROTECTION LOOP OPEN
84	PROTECTION LOOP SHORT
85	FIRE TROUBLE
86	EXIT ALARM
87	LOSS OF RADIO SUPERVISION
88	SENSOR TROUBLE
89	LOSS OF SUPERVISORY - RF
9A	LOSS OF SUPERVISORY - RPM
9B	SENSOR TAMPER

Hex #	Printer Words
9C	RF TRANSMITTER. LOW BATTERY
9D	SMOKE HI-SENSOR
9E	SMOKE LOW-SENSOR
9F	INTRUSION HI-SENSOR
A0	INTRUSION LOW-SENSOR
A1	SELF TEST FAIL
A2	OPEN/CLOSE
A3	O/C BY USER
A4	GROUP O/C
A5	AUTOMATIC O/C
A6	KEYSWITCH O/C
A7	DEFERRED O/C
A8	CANCEL
A9	REMOTE ARM/DISARM
AA	QUICK ARM
AB	RESERVED
AC	CALLBACK REQUEST MADE
AD	SUCCESSFUL DOWNLOAD ACCESS
AE	UNSUCCESSFUL ACCESS
AF	SYSTEM SHUTDOWN
B0	DIALER SHUTDOWN
B1	RESERVED
B2	RESERVED
B3	RESERVED
B4	RESERVED
B5	RESERVED
B6	ACCESS DENIED
B7	ACCESS REPORT BY USER
B8	RESERVED
B9	RESERVED
BA	RESERVED
BB	RESERVED
BC	RESERVED
BD	RESERVED
BE	GROUP CLOSING
BF	GROUP OPENING
C0	ARMED STAY
C1	O/C EXCEPTION
C2	EARLY O/C
C3	LATE O/C
C4	FAIL TO O/C
C5	AUTO ARM FAIL
C6	O/C PARTIAL ARMED
C7	EXIT ERROR
C8	USER PRESENT
C9	RECENT CLOSE
CA	SOUNDER/RELAY DISABLED
CB	BELL 1 DISABLE

Hex #	Printer Words
CC	BELL 2 DISABLE
CD	ALARM RELAY DISABLE
CE	TROUBLE RELAY DISABLE
CF	REVERSING RELAY DISABLE
D0	RESERVED
D1	RESERVED
D2	RESERVED
D3	RESERVED
D4	DIALER DISABLED
D5	RADIO TRANSMITTER DISABLED
D6	MESSAGE ALRM
D7	SERVICE ALARM
D8	RESERVED
D9	RESERVED
DA	RESERVED
DB	RESERVED
DC	RESERVED
DD	RESERVED
DE	ZONE BYPASS
DF	FIRE BYPASS
E0	24 HOUR ZONE BYPASS
E1	BURGLARY BYPASS
E2	GROUP BYPASS
E3	SWINGER BYPASS
E4	UNBYPASS ALARM
E5	RESERVED
E6	RESERVED
E7	RESERVED
E8	MANUAL TRIGGER TEST
E9	PERIODIC TEST REPORT
EA	PERIODIC RF TRANSMISSION
EB	FIRE TEST
EC	STATUS REPORT TO FOLLOW
ED	LISTEN-IN TO FOLLOW
EE	WALK TEST MODE
EF	OFF NORMAL CONDITION
F0	VIDEO TRANSMITTER ACTIVE
F1	RESERVED
F2	EVENT LOG OVERFLOW
F3	TIME/DATE RESET
F4	TIME/DATE INACCURATE
F5	PROGRAM MODE ENTRY
F6	PROGRAM MODE EXIT
F7	EXCEPTION SCHEDULE CHANGE
F8	EVENT LOG 50% FULL
F9	EVENT LOG 90% FULL
FA	EVENT LOG RESET
FB	SCHEDULE CHANGE

Appendix E - Panels Compatibility List

Panel	Formats	Passed/Failed	Panel	Formats	Passed/Failed
Acron Avenger 4000	20 BPS	Not Verified	C&K System 236	10 BPS	Passed
	Acron Superfast	Not Verified		20 BPS	Passed
Adcor PPD-3		Not Verified		Any DTMF Format	Passed
ADT Safewatch Pro 3000	Ademco Contact ID	Passed	C&K System 238	10 BPS	Passed
Ademco Vista	10 BPS	Passed		20 BPS	Passed
	DTMF	Passed		40 BPS	Passed
Ademco Vista 10SE	10 BPS	Passed		DTMF	Passed
	20 BPS	Passed	CADDX Ranger 8980E	20 BPS	Passed
	Any DTMF Format	Passed		40 BPS	Passed
Ademco Vista 20	Ademco Contact ID	Passed		Any DTMF Format	Passed
ADT Focus 7604-030	10 BPS	Passed		SIA	Passed
	15 BPS	Passed	CADDX Ranger 9000E	10 BPS	Not Verified
	20 BPS	Passed		20 BPS	Not Verified
	40 BPS	Passed		40 BPS (Radionics)	Not Verified
Apex 2100E	10 BPS	Passed		DTMF	Not Verified
	15 BPS	Passed		SIA	Not Verified
	20 BPS	Passed	DMP 1512/105		Not Supported
	40 BPS	Passed	DMP 1812	DMP	Passed
Apex Advantage	10 BPS Silent Knight	Passed	DMP 1912XR/114	Ademco Contact ID	Not Verified
	10 BPS Radionics	Passed		DMP	Not Verified
	Ademco Contact ID	Passed	DMP XR5/103	40 BPS	Passed
Apex System E	10 BPS	Passed		Ademco Contact ID	Passed
	15 BPS	Passed		DMP	Passed
	20 BPS	Passed	DMP XR10/106	40 BPS	Passed
	Ademco Contact ID	Passed		DMP	Passed
Aritech-Moose Advisor	Any DTMF Format	Not Verified		Ademco Contact ID	Passed
	SIA	Not Verified	DMP X20	40 BPS	Passed
Aritech-Moose Discovery 1000	10 BPS	Passed		DMP	Passed
	15 BPS	Passed		Modem IIE	Passed
	20 BPS	Passed	DMP XR200/101	Ademco Contact ID	Not Verified
	40 BPS	Passed		Modem II	Not Verified
	BFSK	Passed		Modem IIE	Not Verified
	Modem II	Passed	DMP XR200/104	20 BPS	Not Verified
Aritech-Moose Z900	10 BPS	Passed		Ademco Contact ID	Not Verified
	10 BPS Sescoa	Passed		Modem IIE	Not Verified
	15 BPS	Passed	DSC NT9005	10 BPS	Passed
	20 BPS Sescoa	Passed		20 BPS	Passed
	20 BPS	Passed		Ademco Contact ID	Passed
	40 BPS	Passed		SIA	Passed
	BFSK	Passed	DSC NT9010	20 BPS	Passed
Aritech Moose Z1100-1	10 BPS Silent Knight	Not Verified		Ademco Contact ID	Passed
	14 BPS Silent Knight	Not Verified		SIA	Passed
	20 BPS Franklin	Not Verified	DSC PC580	20 BPS	Passed
	40 BPS Radionics	Not Verified		Ademco Contact ID	Passed
Aritech-Moose Z1100-E	10 BPS	Passed		SIA	Passed
	10 BPS Sescoa	Passed	DSC PC1000	10 BPS	Passed
	15 BPS	Passed		20 BPS	Passed
	20 BPS	Passed	DSC PC1500	10 BPS	Passed
	20 BPS Sescoa	Passed		20 BPS	Passed
	40 BPS	Passed	DSC PC1550	10 BPS	Passed
	BFSK	Passed		20 BPS	Passed
AT&T System 8300	10 BPS	Passed		40 BPS	Passed
	20 BPS	Passed	DSC PC1555	20 BPS	Passed
	Ademco High Speed	Passed		Ademco Contact ID	Passed
	SIA	Passed		SIA	Passed

Panel	Formats	Passed/Failed
DSC PC1575	20 BPS	Passed
	Ademco Contact ID	Passed
	SIA	Passed
DSC PC2500	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
DSC PC2525	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
DSC PC2550	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
DSC PC3000	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
DSC PC4000	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	Any DTMF Format	Passed
	SIA	Passed
DSC PC4010 V1X	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	Any DTMF Format	Passed
	SIA	Passed
DSC PC4010 V2.X	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	Any DTMF Format	Passed
	SIA	Passed
DSC PC4010 V3.X	20 BPS	Passed
	Ademco Contact ID	Passed
	SIA	Passed
DSC PC4020 V1.X	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	Any DTMF Format	Passed
	SIA	Passed
DSC PC4020 V2.X	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	Any DTMF Format	Passed
	SIA	Passed
DSC PC4020 V3.X	10 BPS	Passed
	20 BPS	Passed
	Ademco Contact ID	Passed
	SIA	Passed
DSC PC4020KT V1.X	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	Any DTMF Format	Passed
	SIA	Passed
DSC PC40X0 V3.12Y	10 BPS	Passed
	20 BPS	Passed
	SIA	Passed
DSC PC5008 V2.3A	20 BPS	Passed
	Ademco Contact ID	Passed
	SIA	Passed

Panel	Formats	Passed/Failed
DSC PC5010 V1.X	20 BPS	Passed
	Ademco Contact ID	Passed
	SIA	Passed
DSC PC5010 V2.X	20 BPS	Passed
	Ademco Contact ID	Passed
	SIA	Passed
DSC WSS 5010 V2.1	SIA	Passed
DSC PC5015 V2.20	10 BPS	Passed
	20 BPS	Passed
	Ademco Contact ID	Passed
	SIA	Passed
DSC PC5016 V1.0	20 BPS	Passed
	Ademco Contact ID	Passed
	SIA	Passed
DSC PC5020 V3.20	10 BPS	Passed
	20 BPS	Passed
	Ademco Contact ID	Passed
	SIA	Passed
DSC PC6010 V2.10	Ademco Contact ID	Passed
	SIA	Passed
DSC PC8400	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	Sur-Gard 4/3	Passed
DSC SN4030 V2.0Y	SIA	Passed
DSC SN4030 V3.0Y	SIA	Passed
DSC WLS-900	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
DTI DSS 665	20 BPS	Not Verified
	40 BPS	Not Verified
	SIA	Not Supported
Electronics Line Summit 3208	10 BPS	Not Supported
	20 BPS	Not Supported
	Ademco Contact ID	Fair
	Scantronics	Not Recommended
	SIA	Fair
FBI XL4600	10 BPS	Passed
	40 BPS	Passed
FBI XL4612	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	FBI Superfast	Passed
ITI Caretaker +	10 BPS	Passed
	20 BPS	Passed
	ITI FSK	Passed
ITI Caretaker	ITI FSK	Not Verified
ITI Commander 2000	20 BPS	Passed
	ITI FSK	Passed
ITI Commander 3000	20 BPS	Passed
	ITI FSK	Passed
ITI Concord	Ademco Contact ID	Passed
	ITI FSK	Passed
ITI Concord Express	Ademco Contact ID	Not Verified
	SIA	Not Verified
ITI Pro 3000	ITI FSK	Not Verified
ITI Pro 4000	ITI FSK	Not Verified

Panel	Formats	Passed/Failed
ITI Simon	ITI FSK	Not Verified
ITI SX-IVB	ITI FSK	Not Verified
ITI SX-V	ITI FSK	Passed
ITI SX-V Special	ITI FSK	Passed
ITI RF Commander	ITI FSK	Passed
ITI Ultragard / Pro 5000	20 BPS	Passed
	ITI FSK	Passed
ITI Fonesafe	ITI FSK	Not Supported
Microtech Galaxy 500	DTMF	Passed
	SIA Level 1	Passed
	SIA Level 2	Passed
	SIA Level 3	Passed
Napco 1016E	10 BPS	Passed
	15 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
Napco 2600	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	BFSK	Passed
Napco 3000	10 BPS Silent Knight	Not Verified
	20 BPS Franklin	Not Verified
	40 BPS Radionics	Not Verified
	BFSK	Not Verified
	DTMF	Not Verified
	Modem II	Not Verified
	SIA	Not Verified
Napco GEM-P1632	10 BPS	Passed
	20 BPS	Passed
	Ademco Contact ID	Passed
	SIA	Passed
Optex-Morse Gensys 824	10 BPS	Passed
	20 BPS	Passed
	SIA	Passed
Optex-Morse MDC-16C	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	BFSK	Passed
	Varitech	Passed
Paradox Digiplex	10 BPS	Passed
	20 BPS	Passed
	Ademco H.S.	Passed
	SIA	Not Verified
Radionics D2071A	40 BPS	Not Verified
	BFSK	Not Verified
Radionics D2112	20 BPS	Passed
	Modem II	Passed
Radionics D2212	20 BPS	Passed
	Modem IIE	Passed
Radionics D4012	40 BPS	Passed
Radionics D4112	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	BFSK	Passed
	Modem IIA	Passed
Radionics D6112	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed

Panel	Formats	Passed/Failed
	BFSK	Passed
	Modem IIA	Passed
Radionics D7112	BFSK	Passed
	Modem IIA	Passed
Radionics D7212	BFSK	Passed
	Modem IIE	Passed
Radionics D7412		Not Verified
Radionics D8112G2	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	BFSK	Passed
	Modem II	Passed
Radionics D8112	Modem II	Passed
Radionics D9112	BFSK	Not Verified
	Modem IIE	Not Verified
Radionics D9412	BFSK	Passed
	Modem IIIA[2]	Passed
Scantronics Avenger IX AV-9000	10 BPS	Passed
	20 BPS	Passed
	Any DTMF Format	Passed
Silent Knight 5104	20 BPS	Passed
	BFSK	Passed
	SIA	Passed
	SK FSK1	Passed
Silent Knight 1410		Not Verified
Silent Knight 2820	20 BPS Silent Knight	Not Verified
	BFSK	Passed
	Silent Kinght FSK 1	Not Verified
	SIA	Not Verified
Silent Knight 4720	10 BPS Sescoa	Not Verified
	20 BPS Silent Knight	Not Verified
	BFSK	Not Verified
	Silent Kinght FSK 1	Not Verified
	Silent Kinght FSK 2	Not Verified
	SIA	Passed
Silent Knight 5107	Silent Knight FSK 1	Passed
Silent Knight 5204	10 BPS Sescoa	Not Verified
	10 BPS Silent Knight	Not Verified
	20 BPS Silent Knight	Not Verified
	SIA	Not Verified
	Silent Knight FSK	Not Verified
Silent Knight 5207	20 BPS Silent Knight	Not Verified
	Silent Knight FSK	Not Verified
	BFSK	Not Verified
	SIA	Not Verified
Sur Gard DC1664LC	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	Any DTMF Format	Passed
	SIA	Passed
Sur Gard P16/P16LC	10 BPS	Passed
	15 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	Any DTMF Format	Passed
	SIA	Passed

Panel	Formats	Passed/Failed
Sur Gard P1664LC	10 BPS	Passed
	20 BPS	Passed
	40 BPS	Passed
	Any DTMF Format	Passed
	SIA	Passed
Linear 1704/SSD	Linear FSK	Not Supported
Westec 800	Westec Format 3	Not Supported
Westec 900	Westec Format 1	Not Supported
Westec 2000 Old	Westec Format 2	Not Supported
Westec 2000 C2K	Westec Format 5	Not Supported
Westec 3000	Westec Format 5	Not Supported
Westec 4000	Westec Format 5	Not Supported
Westec 5000	Westec Format 6	Not Supported
ADT A910	Multi-point II	Passed
ADT Focus D50	ADT SIA	Passed
ADT Focus 45	Old Focus FSK	Passed
ADT Focus 45B	Multi-point II	Passed
ADT Focus 48	Old Focus FSK	Passed
ADT Focus 100B	Old Focus FSK	Passed
ADT Focus 100C	Multi-point II	Passed
ADT Focus 100D	ADT SIA	Passed
ADT Focus 200	ADT SIA	Passed
ADT Focus 200B	ADT SIA	Passed
ADT Focus 200P	ADT SIA	Passed
ADT Focus7580	Old Focus FSK	Passed
ADT Safewatch + RF	ADT SIA	Passed
ADT Unimode 5	ADT SIA	Passed

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