New Software Version
See Page 1 for New Features and Changes

Installation Manual

SG SECURITY COMMUNICATIONS™

A MEMBER OF THE DSC GROUP

BABT

MLR2-DG

Version 2.1i

Important Information Relating to the Connection of this Equipment to the Telephone Network

1 This equipment is approved for connection to the Public Switched Telephone Network (PSTN) via direct exchange lines offering LD (pulse) or MF (tone) dialling facilities.

2 This equipment has a ringer equivalence number (REN) of 3.0.

The REN indicates how many telephone or other types of equipment may be connected to your telephone line simultaneously. This may be calculated by adding up all the REN values of the equipment connected to the line. A standard telephone can operate correctly if the total is 4 or less. If you exceed this number, some or all of the bells or ringers may not operate correctly. In an installation with ringing detectors or bells of mixed types, it is not possible to guarantee correct operation even with a REN total of less than 4.

3 It is strongly recommended that this equipment has the exclusive use of a direct exchange line. This equipment will automatically answer an incoming call.

4 Only the Network Operator, or a person authorised by the network operator is allowed to make the connection from this apparatus to the PSTN.

5 The approval of this equipment for connection to the PSTN is **INVALIDATED** if the apparatus is subject to any modification in any material way not authorised by BABT or is used with or connected to internal software that has not been formally accepted by BABT. Use with external control software or apparatus that causes the operation of the integral modem or call setup equipment to contravene the requirements of the standards for approval as designated.

All apparatus connected to this equipment and thereby connected directly or indirectly to the PSTN must be approved in accordance with Section 16 of the Telecommunications Act 1981.

6 It is important that the installer verifies the correct operation of stored telephone numbers subsequent to their entry.

7 The connection to this equipment consist of:

Mains (AC) power	Excessive voltage circuit
Telephone line	TNV circuit
All other connections	SELV (Safety Extra-Low Voltage) circuits

This equipment is only to be installed and serviced by qualified personnel. The main cabinet contains circuits working at excessive voltages (240VAC mains) and must be kept securely closed to prevent unauthorised access. All connections to mains circuitry must comply with current IEE regulations. This equipment is intended to be supplied from a 220-250V 50Hz AC supply rated at 0.5A or greater.

8 This equipment is not suitable for use as an extension to a payphone.

9 This equipment has been approved for the use of the following features:

Auto Answering

Tone Detection

Any other usage will invalidate the approval of this apparatus if as a result it then ceases to comply with the standards against which approval was granted.

10 All connections to the PSTN must be via 0.4 - 0.6mm solid copper core conductors suitable for connection to 2.8mm diameter screw terminals. Standard core cable is not acceptable.

11 The definition of a Relevant Branch System (RBS) can be found in BS6789 Section 6.1:1986 Clause 2.4.

12 This apparatus has not been designed for use with a PABX/Switchboard.

13 This apparatus does not generate Loop Discounnect dialing.

14 This apparatus has not been approved for 2-way Audio/Listen-In or Video Downlook.

LIMITED WARRANTY

Sur-Gard Ltd. warrants that for a period of sixty months from the date of purchase, the product shall be free of defects in materials and workmanship under normal use and that in fulfillment of any breach of such warranty, Sur-Gard Ltd. shall, at its option, repair or replace the defective equipment upon return of the equipment to its repair depot.This warranty applies only to defects in parts and workmanship and not to damage incurred in shipping or handling, or damage due to causes beyond the control of Sur-Gard Ltd., such as lightning, excessive voltage, mechanical shock, water damage, or damage arising out of abuse, alteration or improper application of the equipment.

The foregoing warranty shall apply only to the original buyer, and is and shall be in lieu of any and all other warranties, whether expressed or implied and of all other obligations or liabilities on the part of Sur-Gard Ltd. This warranty contains the entire warranty.Sur-Gard neither assumes, nor authorizes any other person purporting to act on its behalf to modify or to change this warranty, nor to assume for it any other warranty or liability concerning this product.

In no event shall Sur-Gard Ltd. be liable for any direct, indirect or consequential damages, loss of anticipated profits, loss of time or any other losses incurred by the buyer in connection with the purchase, installation or operation or failure of this product.

WARNING

Sur-Gard Ltd.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.

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INTRODUCTION

The MLR2-DG is a Multi-Line, Multi-Format Digital Receiver, Listed U.L. and U.L.C. for commercial fire and burglary. The basic unit consists of a CPM2 Central Processor Module and a two DRL2A Digital Receiver Line Card Module. Additional DRL2A Line Cards may be added to enable the CPM2 to monitor up to 14 telephone lines. The MLR2-DG includes many features, all designed to make the receiver more powerful and easier to use. The MLR2-DG can decode a variety of popular and widely used communication formats. Refer to Appendix D "DRL2A Communication Formats" for a list of the available communication protocols.

The MLR2-DG's real-time clock and calendar "stamps" all information received with the time and date, and all information is displayed on the receiver's LCD screens and may be printed or forwarded to a computer. To ensure security, adjustment of the clock, calendar and other programming is protected by password codes.

CPM2

The CPM2 Central Processing Module oversees operation of the receiver. Along with its built-in keypad and LCD message screen, the CPM2 features both a printer and computer interface.

The CPM2 features a 128-event nonvolatile memory buffer. The buffer may be examined on the LCD screen or printed. If the printer or computer is off-line, the CPM2 will retain events in the buffer and will automatically send the events to the computer or printer when communications are restored.

DRL2A

Each DRL2A Line Card Module can monitor two telephone lines. The Line Card module is equipped with a 256-event nonvolatile memory to record events and corresponding telephone numbers. Caller Identification (Call Display) capability is built-in and telephone numbers can be displayed, printed out, and stored in memory. Events and information stored in memory may be printed at any time.

Power and Supervision

The MLR2-DG requires 16VAC, 40VA from a 115V or 230 VAC 50/60 Hz transformer. When more than 6 lines (3 DRL2A) are installed, a 16VAC, 75VA transformer is required. The receiver is equipped with 12V rechargeable stand-by battery connections and automatic battery charger.

The stand-by battery voltage and connections are supervised. The Line Cards are also continuously supervised to ensure uninterrupted communication with the CPM2. Any trouble conditions are reported on the LCD screens and may be sent to the printer and the computer.

The DRL2A Line Card Module also verifies communications with the CPM2. In the event of a malfunction, the operator will be advised with an audible indication and the Line Cards will continue to function with their individual LCD displays and controls. Each line card will continue to receive information, and the operator may review the event buffer on each line card.

The printer is supervised for loss of power, off-line, paper out and other trouble conditions. The communication link to the computer through the RS232 port can be monitored by the supervisory "heartbeat" test transmissions.

Compatibility

The DRL2A has one programmable output which in factory default is used to indicate that a faulty data has been received.

It can also be used for the video, audio and other applications. Central station automation software packages, such as, ABM, ALARMSOFT, APROPOS, BOLD, CSM SIMS, DICE, GENESIS, MAS, MENTOR, MICRO KEY, MONITOR, SMS, SIMS and SIS support the Sur-Gard interface. The receiver also provides a basic communication protocol similar to the RADIONICS 6500 interface for other software packages that have yet to be updated to include the Sur-Gard interface.

CPM2 Outputs

The CPM2 features three switched-negative outputs. One output labelled "OPTION" has a corresponding LED on the CPM2 front panel. The factory default programming slowly flashes the OPTION LED when the "OPTION" output is activated. Switched negative outputs are also provided for the Acknowledge and Trouble LEDs.

SG-DRL2A

NEW SOFTWARE RELEASE VERSION 2.1i

NEW FEATURES

Modem Detection

Upon power up, each line card will detect whether the modem installed is Bell 103 or CCITT v.21, and then print the result.

Delay Time Before Hang-up

The time between the last kiss-off and when the receiver hangs up, now follows the time programmed in the interval delay between handshakes (option [48]).

Delay Time Between Pickup and First Handshake

The delay between the time that the receiver picks up the line and when the first handshake is sent out, can now be varied from 0.2 - 2 seconds (EPROM programmable).

Scantronics 283 digits account code implementation

SYSTEM OVERVIEW

- Caller Identification (Call Display) capability
- Non-Volatile RAM on each DRL2A line card module for programming and event buffer
- 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.
- Contact ID (DTMF) format
- 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 BFSK format
- Scantronics DTMF format
- SIA format: 110 and 300 baud, tone and data acknowledgement
- FSK 200 baud
- Outel
- Robofon
- Telenot/Telim
- Telenot Pulse
- Scancom 433
- ITI
- 1400Hz, 2300Hz, Dual Tone, SIA FSK and Modem II handshakes selected by configuration commands
- Large, easy to read 2-lines 16-characters-per-line Liquid Crystal Display screens
- Plain language message display capability
- New EUROCARD circuit board design for reduced complexity, high reliability and easy servicing
- All modules function individually to help ensure uninterrupted operation during hardware or software upgrades
- Line Cards available for DVACS-compatible multiplex operation and remote receiver connection
- Output on DRL2A for 2-Way audio communication
- Input and output on DRL2A for MLRV-VIDEO DOWNLOOK VERIFICATION
- Inputs for ring simulation on DRL2A and inputs on CPM2 for UPS supervisory
- 14 lines maximum per receiver
- 128-event memory buffer on CPM2
- Real-time clock.
- CPM2 features multiprocessor with 16-bit micro-controller
- 1 parallel printer port; 2 serial RS232 ports
- 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
- Continuous verification of the computer-receiver link with the "heartbeat" function
- switched-negative outputs on CPM2 (special applications)
- Outputs on CPM2 for Acknowledge and Buzzer
- 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 option
- Telephone Line Supervision

* All formats noted as (optional) are selected using configuration commands

Receiver Setup and Operation Without Programming

Unpacking

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

Introduction to Operation

Refer to the following sections of this manual for an overview of the operation of the DRL2A Digital Receiver Line Card and the CPM2 Central Processing Module:

- DRL2A General Information
  Features
  Installation
  Controls and Display
- CPM2 General Information
  Controls and Display
  Cold Start-up

If the receiver is to be used with a computer and central station automation software, refer to "MLR2-DG Computer Interface"

Bench Testing

It is suggested that the receiver be tested before actual installation. Become familiar with the connections and setup of the unit on the work bench to make final installation easier.

The following items are required:

- 16VAC transformer
- 2 telephone lines
- One or more dialers or digital dialer control panels

Direct connection testing without the use of telephone lines is possible by using the ring simulator switch input connections on the back of the receiver

Dialers and control panels using an optocoupler phone line interface will require a connection method providing a DC current for direct connection testing.

Power Up

When power is applied, the receiver will beep and will indicate one or more trouble conditions on the LCD message screen. If the Line Cards do not have telephone lines connected, the DRL2A modules will beep and their "ALARM" lights will FLASH.

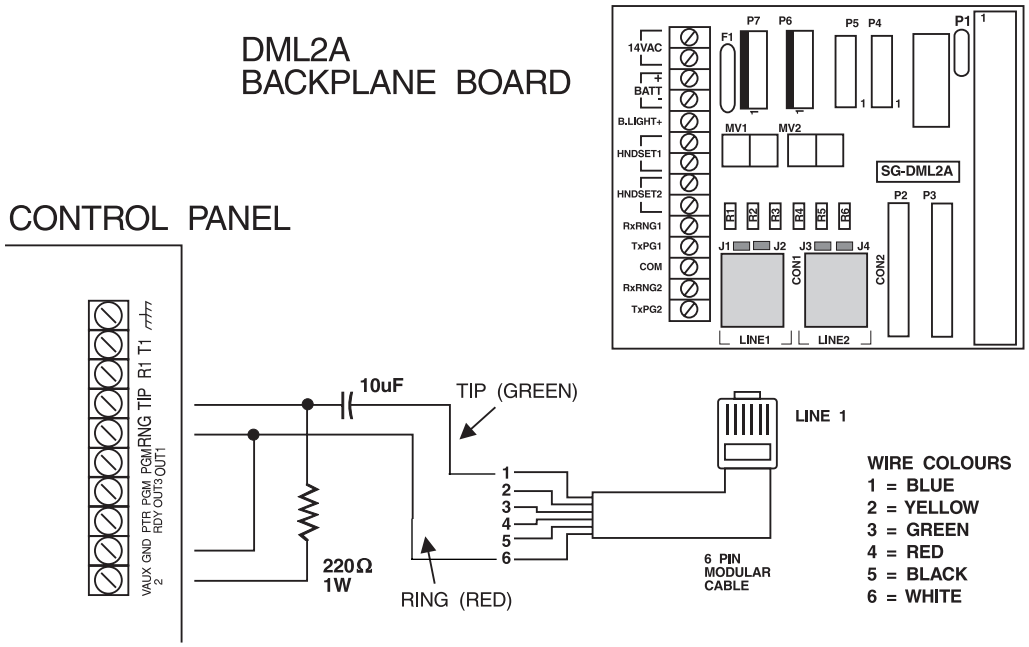
Press the flashing [ACK] button to silence the buzzer. If there is no computer or printer connected, a trouble message will be displayed on the CPM2 LCD and the "ACK" light will FLASH. Press the [ACK] button to silence the CPM2 buzzer.

Operation with Default Program

Without any changes to the factory default programming, the receiver operates as follows:

- The master ID password is "CAFE".
- 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 tone as fifth handshake
  Sends 1600 Hz as sixth handshake
- Receives all Communication Formats, except for:
  3/2, 4/1 express, 4/2 extended and VONK
  The above formats can be manually selected, but may conflict with more commonly used formats.
- Signals will be displayed on the Line Card LCD as they are received. The signals are then sent to the parallel printer and computer connected to serial port COM1. The default event codes described in the "DRL2A Library Decoding and Event Codes Table" will be used with the Sur-Gard RS-232 Communication Protocol to send signals to the computer, if connected.
- If a computer is not connected, press the [ACK] button on the CPM2 module to silence the buzzer. The time and date of the Acknowledgment will be printed.

Direct Connect Testing Wiring Diagram Shown with a Control Panel



Mounting the Receiver

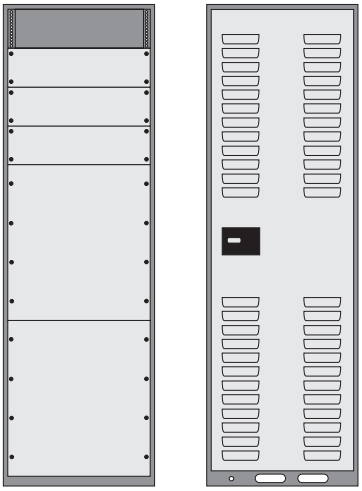
- Install the MLR2-DG in a closed 19" rack or cabinet with a locking rear access door. Cover all unused spaces with blank metal plates. The LCD screens on the receiver are designed to be viewed below eye level. If the unit must be mounted where the screens are above eye level, angle the unit downwards to improve visibility. The following items can be supplied for a complete installation:

Stand-up Unit (61.25" tall up to 14 telephone lines)
Part # MLR2A-CL

Part

Rack
Door with lock and ventilation
Blank plates 21" (2)
Blank plate 5.25" (3)
Screws
Washers
Clipnuts
FROST 16V 75VA transformer (RTFR7516)
AC Utility Box
AC Cable Clamps (2)
8' Battery Cables
18 gauge 3-conductor AC Cable

FRONT VIEW **REAR VIEW**



Note: If 14 telephone lines are not used, cover each unused location with a blank plate

Desk-mount Unit (28" tall up to 14 telephone lines)
Part # MLR2A-CM

Part

Rack
Louvred door back plate
Blank Plate 1.75"
Back Plate 7"
Blank Plates 5.25 (4)
Screws
Washers
Clipnuts
16V 75VA Transformer
AC Utility Box
AC Cable Clamp for 3/8" cable N/A
8' Battery Cable
18 gauge 3-conductor AC Cable

Note: If 14 telephone lines are not used, cover each unused location with a blank plate

Printer Connections

The following printers can be used with MLR2-DG:

Model	Column Width	DIP Switch Settings 1	2	3	4	5	6	7	8
Citizen 180D	40/80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Epson LQ-570+	40/80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Okidata ML 182 Turbo	40/80	off	off	off	off	on	off	on	off
Okidata ML 182 Plus	40/80	off	off	off	off	on	off	on	off
Okidata ML 184 Turbo	40/80	on	off	off	off	on	off	on	off
Panasonic KX-P1150	40/80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Star NX-1000	40/80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Star DP8340	40	on	on	on	on	on	on	on	on
Tandy DMP-206	40/80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

For the **Star DP8340** (Sur-Gard part # DCDP8340), the SG-1220B power supply should be used (Sur-Gard part number XP1220) The SG-1220B is a 12V 2A power supply housed in a metal case with a tamper switch. It requires one 12VDC sealed rechargeable battery (6 to 25 Ah rating) and one 16VAC 40VA Class 2 wire-in transformer (Frost FTC4016 or equivalent).

Connect the parallel printer to the MLR2-DG printer output port using a parallel printer cable.

IMPORTANT: Do not use a printer cable which has only 1 common ground wire.

Computer Connections

- Connect the computer to the MLR2-DG RS-232 port using a serial cable to COM1.

IMPORTANT: Do not use a null modem cable.

Receiver RS-232 25 pin connector	Computer RS-232 25 pin connector	Computer RS-232 9pin connector
1	1	
2	2	3
3	3	2
7	7	5

Telephone Line Connections

- With 6-pin modular cables, connect each line module output to its corresponding telephone line.

Grounding

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

Power Supply

- Ensure that all electrical connections are made correctly. After verifying all connections, connect the RED and BLACK leads to a 12VDC sealed rechargeable battery. Be sure to observe polarity when connecting the battery. When the battery is connected, test the system under battery power only.
- If a separate DC input is used to power the LCD backlighting during AC power failures, connect it to the BLGT terminal. It must be a listed Fire-Protective Signalling

System power supply rated 12VDC. Connect the positive lead from the DC supply to the BLGT terminal; connect the negative lead from the DC supply to the GND terminal. ***CAUTION: Connecting a positive (+) terminal to a negative (-) terminal may cause a fire and possibly serious personal harm.***

- For 24 hour stand-by, 12V 17.5Ah rechargeable battery should be used for 6 lines configuration, and 12V 38Ah rechargeable battery should be used for 14 lines configuration.

Battery Charging Current

The maximum battery charging current is factory set at 1A.

Removing and Installing System Components

Note that the receiver does not have to be powered down when components are removed or installed.

To Remove the CPM2 Module:

The CPM2 charges the battery and provides for low battery voltage disconnect. Removing the CPM2 module will disconnect the battery and shut down the entire system if AC power is not available. If the CPM2 must be removed during an AC power failure, first connect a temporary battery (protected with a 5A fuse and reasonably charged) to the +BATT and GND terminals of the DML2A before removing the CPM2.

Remove the 4 retaining screws on the front panel of the module. Slowly pull the module out of the metal cabinet.

After the CPM2 is replaced, remove the temporary battery so that the CPM2 can properly maintain the main battery.

To Remove a Line Card Module

Remove the 4 retaining screws from the front panel of the module. Slowly pull the module out of the metal cabinet.

To Install a Line Card Module

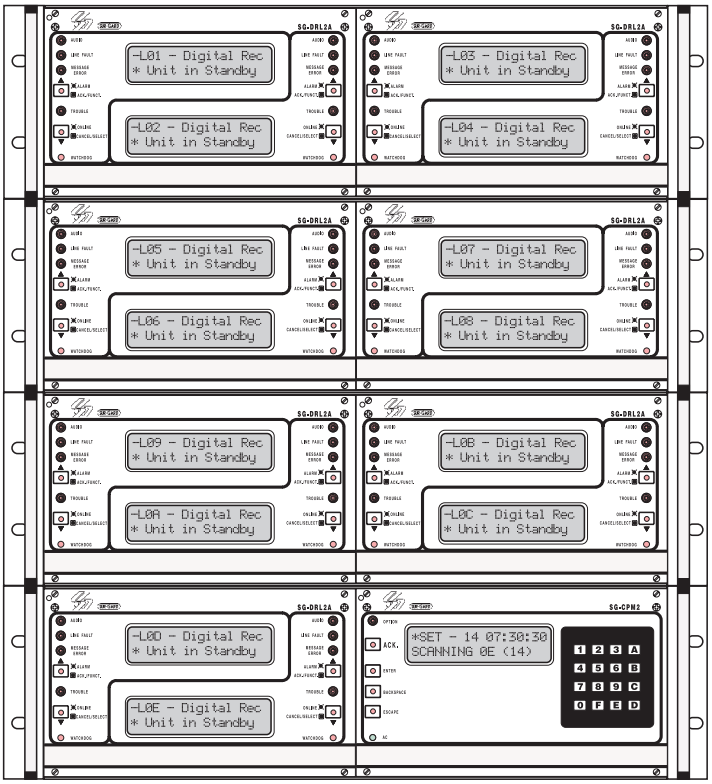
Adding a Line Card Module to the MLR2-DG requires the addition of an MLRX Expansion Card Cage. Each MLRX can hold two DRL2A modules. The MLRX is shipped with power and communications bus cables.

Installation Checklist

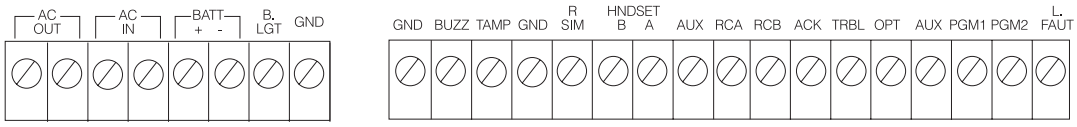
Complete	*Operation*
☐	MLR2-DG installed in 19" Rack Mount Cabinet
☐	19" Rack Mount Cabinet connected to earth ground
☐	SG-1220B Printer Power Supply installed (with transformer and battery) if DP8340 printer is used
☐	6-pin modular cable(s) connected to MLR2-DG and telephone line
☐	Parallel Printer Cable connected to MLR2-DG Parallel Printer Port
☐	Parallel Printer power connected
☐	Computer connected to MLR2-DG COM1 port using serial cable
☐	CPM2 Cold Start-up completed

MLR2-DG INSTALLATION

Maximum configuration



DML4 Connections



AC IN 16VAC power input

AC OUT 16VAC filtered power output

BATT 12V battery

B.LGT Backlight Power Terminal: connect as secondary 12V power supply to illuminate the LCD screens

GND Ground

BUZZ Buzzer Output: this 12V output follows the internal buzzer

TAMP UPS Low Battery Supervisory

R SIM UPS AC Failure Supervisory

HNDSET B Not used

HNDSET A Not used

AUX Fused 12V output

RCA Not Used

RCB Not Used

ACK Acknowledge Output: this 12V output follows the "Acknowledge" light

TRBL Not used

OPT Option Output: this 12V output follows the "Option" light

PGM1 Output 1 (used for RED1 installation)

PGM2 Output 2 (not used)

14VAC May be used as an external AC output.

BATT May be used as an external 12V power source. Do not connect a battery to these terminals.

B. LIGHT Backlight power input terminal. Connect a secondary 12V power source to illuminate the LCD screens. A secondary power supply is not required if a 12V supply has already been connected to the DML4 B LGT terminal.

HNDSET1
HNDSET2 Handset connections for Line 1 and Line 2. These terminals are used to provide 2-way voice communication when the Audio Mode is activated. Note that the handsets must normally be off-hook.

RxRNG1
RxRNG2 These terminals are used to simulate a ring signal on the telephone lines for test purposes. These terminals are also used for Downlook video communication or to remotely cancel an audio session.

TxPG1
TxPG2 12V programmable outputs. These terminals are also used for Downlook video communications. When Downlook is being used, these terminals may not be used as programmable outputs.

Connections for DML2A Line Card Expansion

DRL2A DIGITAL RECEIVER LINE CARD

The DRL2A acts as an interface between the digital alarm transmitter and the CPM2. 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 CPM2. In addition, if a Line Card is unable to communicate with the CPM2, each Line Card is capable of functioning independently with manual interaction with the central station operator. Each Line Card can record 256 different alarm messages and 256 Caller-ID telephone numbers.

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 displayed and printed. The following formats are accepted by the DRL2A on power up:

- 3/1, 3/1 extended, 4/2 format with or without parity, 10, 14, 20, or 40 baud
- 4/1, 4/1 extended at 10, 14 or 20 baud
- 3/1 with parity at 40 baud
- 4/1, 4/2, 4/3, and 4/3 DTMF formats
- Ademco Contact ID (DTMF) format
- Ademco Super Fast or High Speed DTMF format with and without parity
- Ademco DTMF 4/2 Express
- FBI Super Fast
- Radionics BFSK
- SIA format: 110 and 300 baud, tonal and data acknowledge
- 1400Hz, 2300Hz, Dual Tone, Modem II, SIA FSK, and other handshakes selected by configuration commands

The following formats can be selected using configuration commands:

- 4/2 extended from 10 to 40 baud
- 3/2
- Ademco DTMF 4/1 Express
- Scantronics
- FSK 200baud
- Outel
- Robofon
- Telenot/Telim
- Telenot Pulse
- Scancom 433
- ITI

DRL2A Features

- Operator selection of communication formats and handshake priority
- Records up to 256 messages for later display
- 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 CPM2 with minimum delay
- The DRL2A monitors the telephone line connection every 10 seconds. Telephone line faults will result in messages on the LCD screens, and reports to the computer and the printer after 2 consecutive failed test
- DRL2A automatically goes into stand-alone mode in case of CPM2 failure
- “Watchdog” timer continually monitors receiver operation
- “Cold boot” option allows receiver’s configuration to be reset to factory default programming
- Built-in storage for one current and one backup system configuration
- LCD contrast is easily adjusted
- “Examine” mode combines Caller-ID phone number and alarm messages for the account
- Built-in sounder can be programmed in the “MUTE BUZZER” option for different functions to suit different applications
- One programmable output can be used for “message error” indication or other applications
- Filter and pulse-count tone processing to reduce data receiving errors for weak and noisy signals
- Gain boost available to amplify weak signals
- Line switching to handset or telephone for listen-in, 2-Way audio and medical systems
- Serial link for video monitoring control

Installation

It is recommended that a DRL2A Cold Start-up be performed when the unit is updated with a new program version. Refer to Operating Mode Section 3.0 (DRL2A Cold Start-up and Changing The Line Card Number) 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.

DRL2A Controls

Each DRL2A Module features 2 line cards. The LEDs and push buttons on the left side and the upper LCD are for Line Card 1. The LEDs and push buttons on the right side and the lower LCD are for Line Card 2.

Momentarily depressing and releasing a button will register as a single input or keystroke. Pressing and holding a button for approximately 1 second will register as a repeating input or keystroke. For example, to quickly scroll through a list of items, you press and hold the appropriate button, rather than pressing the button repetitively.

Liquid Crystal Display: Displays incoming data, programming and other information. The display is backlit for visibility in low light environments.

AUDIO: The “Audio” light comes ON when the receiver is in Audio Mode. When ON, “listen-in” or “2-Way Audio” is in use. The “Audio” light will automatically turn OFF at the end of the timed period or when the [CANCEL] button is pressed.

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.

MESSAGE ERROR: The “Message Error” light will come ON when faulty data is received. For example, if the round pair does not match, or if the parity is incorrect. Press the [ACK] button to acknowledge the error. The “Message Error” light will be shut OFF.

[ACK/FUNCTION] button: Press this button to acknowledge an alarm in emergency manual mode. In the normal mode, press this button to access the Line Card Menu.

ALARM: The “Alarm” light is located inside the [ACK/FUNCTION] button. The “Alarm” light will flash if an alarm is received. The “Alarm” light will be shut OFF when the alarm is successfully communicated to the CPM2, or when the operator acknowledges the alarm by pressing the [ACK/FUNCTION] button.

TROUBLE: The “Trouble” light will come ON when the Line Card is shut down by an operator’s command or when communication with the CPM2 is interrupted. The “Trouble” light will be shut OFF when the trouble condition is corrected.

[CANCEL/SELECT] button: With the Line Card on-line, press [CANCEL/SELECT] to take the Line Card off-line. In Stand-by Mode, pressing [CANCEL/SELECT] has no effect. When in Menu Mode, press [CANCEL/SELECT] to select the menu item currently displayed on the LCD screen. When a menu item is selected, pressing [CANCEL/SELECT] will display the next feature.

ON LINE: The "On-Line" light will be ON when the Line Card is on-line. The "On-Line" light will be OFF when the Line Card is in Stand-by Mode.

WATCHDOG: The "Watchdog" light will FLASH once every 4 seconds to indicate that Line Card operation is being monitored.

1.0 DRL2A Stand-By Mode

With the Line Card installed, apply power to the unit. This message will be displayed on the LCD screen for 1 second:

```
JUNE 04,97 V 2.1i
```

The following messages are sent to the printer and computer:

Printer: L0x???????Dx LCardReset

Computer: 0000 A Dx

A hexadecimal digit from 1 to E representing the number of the Line Card will be sent for each "x" shown above.

After these start-up transmissions, the Line Card enters the Stand-By Mode and monitors the telephone line and the CPM2. Depending on the system's status, the following conditions will be indicated:

- Line fault
- Shutdown of Line Card communication with CPM2
- CPM2 error; display alarm message
- Keep last alarm message
- System in stand-by

1.1 Line Fault

The DRL2A verifies the telephone line voltage every 10 seconds. The "Line Fault" light will come ON after two successive line verifications indicate irregular telephone line voltage. This message will be displayed:

```
-L01-Digital Rec
<<-Line Fault->>
```

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

Printer: L01???????20 Line Fault

Computer: 0000 A 20

If the Line Check option is disabled, the DRL2A will not send the report to the printer or computer. Refer to "DRL2A Line Card Options Programming" 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: L01???????30 Line Restr

Computer: 0000 R 30

1.2 Shutdown of Line Card Communication with CPM2

A Line Card may be temporarily removed from CPM2 polling for testing and maintenance purposes (refer to "CPM2 Utility Modes" for information on shutting down a line card). While in the shutdown mode, the Line Card will retain up to 256 alarm messages in its event buffer. When the Line Card is shut down, the "Trouble" light will come ON and this message will be displayed:

```
-L01-Digital Rec
LnCard Shutdown!
```

1.3CPM2 Error: Display Alarm Messages

If the DRL2A cannot detect CPM2 polling and there are no alarm events in the event buffer, this message will be displayed:

```
-L01-Digital Rec
<<-CPM Error!->>
```

If alarm messages cannot be sent to the CPM2 because of the error, the DRL2A will display the oldest message which has not been manually acknowledged. The "Alarm" light will FLASH and the sounder will beep if the "Mute Buzzer" Option is programmed as [00], [02] or [03].

When a CPM2 Error is present, each alarm must be manually acknowledged. Press the [ACK/FUNCTION] button to acknowledge the alarm and silence the Line Card sounder. If several alarms have been received but cannot be sent to the CPM2, they will have to be individually acknowledged. When all alarms are acknowledged, the Line Card sounder will be silenced.

Up to 256 alarm messages for the printer and computer will be retained in the DRL2A event buffer. When the event buffer is full, the oldest messages will be deleted as new events are recorded.

When the CPM2 Error condition is corrected, the alarm messages in the event buffer will be transmitted to the CPM2.

1.4 Keep Last Alarm Message

The DRL2A may be programmed to leave the last alarm message on the display screen until a new message is received. A typical alarm message is shown below:

```
L01-1234-312
Alarm    240
```

- "L01" indicates Line Card 01
- "1234" is the account code
- In this example, a 4/3 communication format is used. "3" indicates an alarm, while "12" is the zone number.
- "Alarm" indicates an alarm event.
- "240" is the event's location in the event buffer.

1.5 Stand-by Mode

When the Line Card is operating normally, this message will be displayed:

```
_L01-Digital Rec
*Unit in Standby
```

2.0 Line Card Menu Mode

When the unit is not on line, pressing the [ACK/FUNCTION] button will display the first Function Menu:

```
Dsp PRINTER alm
ACK:menu SEL:sel
```

Press the [ACK] button to scroll through the menu items. Press the [SELECT] button to select the function displayed on the LCD screen. When a function is selected, press [ACK] and [SELECT] together to exit from the Menu Mode. The DRL2A will automatically exit from the Menu Mode if no keys are pressed for 30 seconds.

The following functions are available in the Line Card Menu Mode:

- Display Printer and Caller ID Alarm Buffer
- Display Line Card Configuration
- Display Program Version
- Adjust LCD Contrast

2.1 Display Printer and Caller ID Alarm Buffer

```
Dsp  PRINTER  alm
ACK:menu  SEL:sel
```

With this message displayed, press the [SELECT] button. The most recent alarm message will be displayed.

Press the [SELECT] button to scroll backwards through alarm messages; press the [ACK] button to scroll forward through alarm messages.

```
L01-3576-312
Alarm      001
```

- "L01" represents Line Card 01
- "3576" is the Account Code
- In this example, a 4/3 communication format is used. "3" indicates an alarm, while "12" is the zone number.
- "Alarm" indicates an alarm.
- "001" is the event's location in the Event Buffer.

The Event Buffer can record up to 256 alarm messages and Caller Identifications. To print these messages, a print command may be sent from the CPM2. Refer to "System Command Mode" for information.

2.2 Display System Configuration Buffer

```
Dsp  CONFIG  syst.
ACK:menu  SEL:sel
```

With this message displayed, press the [SELECT] button, the current Line Card Configuration will be displayed. Press the [ACK] button to scroll forward through the configuration displays, or press the [SELECT] button to scroll backwards.

Shown below is a typical configuration display (refer to "DRL2A Line Card Options Programming" for Line Card configuration information).

```
L01  #00   00
4/1  DIGIT#0  -A-
```

Press [ACK] and [SELECT] together to return to the Stand-By Mode.

2.3 Display Program Version

```
Dsp  PROGRAM  vers
ACK:menu  SEL:sel
```

With this message displayed, press the [SELECT] button. The date and the software version number will be displayed as shown below:

```
JUNE  04,97  V 2.1i
JUNE  04,97  V 2.1i
```

Press [ACK] and [SELECT] together to return to the Stand-By Mode.

2.4 Adjust LCD Contrast

```
Adjust  CONTRAST
ACK:menu  SEL:sel
```

With this message displayed, press the [SELECT] button to adjust the LCD screen's contrast. When the [SELECT] button is pressed, this message will be displayed:

```
Adjust  CONTRAST
```

Press the [ACK] button to increase the contrast, press the [SELECT] button to reduce the contrast. The display will indicate the contrast level on the second line.

Press [ACK] and [SELECT] together to return to the Stand-By Mode.

3.0 DRL2A Cold Start-up and Changing the Line Card Number

A "Progr En" switch is located on the side of each Line Card. To perform a Cold Start-up or to change the Line Card's number, this switch must be turned ON. To gain access to the switch, remove the screws from the DRL2A faceplate and slide the unit partially out of the card cage. A "Progr En" switch will be found on either side of the DRL2A module. The switch on the left is for the top Line Card and the switch on the right is for the bottom Line Card.

Insert a small flat screwdriver and turn the switch ON. Replace the Line Card in the card cage and apply power. This message will be displayed:

```
SYST  COLD  BOOT
ACK:yes  CAN:no
```

To cancel the Cold Start-up and change the Line Card number, press the [CANCEL] button. To perform the Cold Start-up, press the [ACK] button. When the [ACK] button is pressed, this message will be displayed for 1 second:

```
     COLD  BOOT
     COLD  BOOT
```

After 1 second, or if the [CANCEL] button was pressed to cancel the Cold Start-up, this message will be displayed:

```
CHANGE  LCARD  NBR
0F
```

Press the [ACK] or [CANCEL] buttons to scroll through the list of valid numbers for the line card. The list will scroll through the hexadecimal numbers "01" to "0E" (1 to 14). When the desired number is displayed, press the [ACK] and [CANCEL] buttons together.

When the [ACK] and [CANCEL] buttons are pressed, this message will be displayed:

```
TURN  OFF  SWITCH
```

The Line Card will not operate until the Program Enable switch is shut OFF. Partially remove the Line Card as described above and use a small flat screwdriver to move the Program Enable switch to the OFF position. Replace the DRL2A module and secure the faceplate.

4.0 Communications in Progress

4.1 Data Reception

During data reception, a message similar to this will be displayed:

```
In Communication
1234  56
```

The DRL2A decodes all information received and stores the information in its Event Buffer. When a valid signal is received, the DRL2A sends a kissoff signal and transmits the decoded alarm signal to the computer and then to the printer through the CPM2.

Option [3C] may be enabled to allow the DRL2A to compensate for noisy telephone lines (refer to "DRL2A Line Card Options Programming" for information on programming this Option).

The DRL2A 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".

Fault Data Message

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

Printer: L0X???????10 Fault Data *

Computer: 0000 T 10

This output for account code "0000" indicates that data has been received, but is not valid (for example, there are unmatched rounds or the wrong parity). The following is an example of faulty data received by the DRL2A, and the printer output generated:

Round	*Data Received*	*Printer Output*
1st	123456	[No printout]
2nd	123446	?1234?56 Fault Data ?1234?46 Fault Data
3rd	123356	?1233?56 Fault Data
4th	123456	?1234?56 Fault Data
5th	123346	?1233?46 Fault Data ?????10 Fault Data

Fault Call

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

Printer: L0X???????40 Fault Call *

Computer: 0000 T 40

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.

4.2 Stopping Data Reception Manually

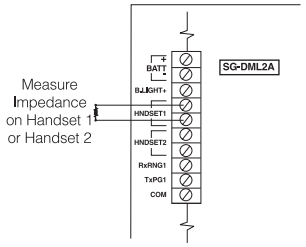
To cancel communications between the DRL2A Line Card and the calling control panel, press the [CANCEL] button. Pressing the [CANCEL] button will hang up the line. This feature may be used to hang up on a control panel that is repeatedly sending alarms.

4.3 2-Way Audio Mode / SG-MLR2-DG Receiver Connections

The DRL2A features two telephone line outputs. The connections are labelled HNDSET1 for the Left Line Card, HNDSET2 for the Right Line Card. These terminals allow a touch-tone telephone to be connected to the DRL2A for voice communication over the same telephone line after digital data has been received. This feature is especially useful for medical signalling installations and vocal alarm verifications.

IMPORTANT NOTE: If a regular touch-tone telephone is used for 2-Way audio communication, the phone must be left in the ***off-hook*** position. If the phone is not kept in the off-hook position, the DRL2A will switch to an open line, causing the line to be dropped (hang up).

If used with a PBX system, 2-Way audio communication needs bridging resistors. Measure the handset phone impedance and use a resistor of the same value. A typical value is 220W.



If the impedance is incorrect, the handset terminal switchover will behave as if switching to an on-hook phone, and the line will be dropped.

Audio Communication Methods

Two methods are available for using the 2-Way Audio Mode:

Alarm type code Method

After the digital alarm data has been received and the receiver has transmitted the last kissoff, the receiver compares the alarm type codes in 3/1, 3/2, 4/1, 4/2, 4/3, 10-40 BD or DTMF touch-tone formats to the value programmed in Option [4C]. This is done to determine if the 2-Way Audio Mode should be activated. This feature is designed for use with medical signalling systems in areas where privacy regulations apply.

This method of activation is recommended as it can distinguish between different types of alarms from the same panel, and activate the 2-Way Audio Mode only when needed. Note that Options [49] and [4C] must be programmed to use this method (see Alarm Zone Method below).

Reserved Account Code Range Method

The first digit of the Account Code will determine if the 2-Way Audio Mode is to be activated.

This method is used by some alarm panels and medical signalling systems. The central station manager can group these panels into a range of account codes in order to switch on the 2-Way Audio Mode. The transmission of an Account Code from any of these panels will trigger the DRL2A's 2-Way Audio Mode. Note that Options [49], [4A] or [4B] must be programmed to use this method.

A combination of all methods may also be used, please refer to p.18.

Example: Reserve a block of account codes, such as 800-9FF (for 3-digit formats) or 7000 - 8FFF (for 4-digit formats) for panels which can communicate in 2-Way Audio.

Note: The DRL2A can switch in 2-Way when it receives the proper audio code with the following formats: SIA or FSK 200baud.

Audio Mode Operation

When in Audio Mode, the “Audio” light will be ON and this message will be displayed:

```
-L01 Digital Rec
TWO WAY AUDIO ON
```

The DRL2A buzzer can be used to indicate Audio Mode operation by programming Option [3E] MUTE BUZZER as “02”. To silence the buzzer, press the [ACK] button.

Select Option [4D] to have a message indicating Audio Mode operation sent to the printer and the computer.

For example, use the character “P” (for “phone”) to represent Audio Mode operation. Program Option [4D] as “50” (the ASCII code for “P” is 50). When Audio Mode operation has begun, the following messages will be sent to the printer and computer:

Printer: “L01-0000-P01 AudioLine1”

Computer: “0000 P 01”

- “L01” indicates Line Card 01
- “0000” is the internal signals Account Code
- “P” is the character programmed in Option [4D]; “01” again is the Line Card number

2-Way Audio Mode operation may be manually cancelled by pressing the [CANCEL] button. If not manually cancelled, Audio Mode operation will automatically be cancelled when the time programmed in Option [49] expires.

The Audio Mode may also be cancelled remotely through the Ring Simulation input on the back of the receiver. Future central station audio management equipment will be able to use this input to hang up the line and put the receiver in Stand-By Mode when the operator’s telephone is hung up.

To disable the 2-Way Audio Mode feature, program Option [49] as “00”.

An output is also available on the SG-DML2A module (TXPG1 and TXPG2) which may be used to indicate activation of Audio Mode operation or to indicate which telephone line should be picked up for audio operation.

Alarm Zone Method

After the digital alarm data has been received and the receiver has transmitted the last kiss off, the receiver compares the alarm zone codes received in 3/1, 4/1, 4/2, 4/3, 10-40 BD or DTMF touch-tone formats to the value programmed in option [50]. The alarm zone code is the last digit for all formats. This is done to determine if the 2-Way Audio Mode should be activated.

For more details, please refer to the programmable options section.

There are 5 main Programming Commands available on the DRL2A Line Card Module:

- F7 Options Programming
- FA Buffer Output
- FB Shutdown Line Card Communications with CPM2
- FC Reactivate Line Card Communication with CPM2
- FE Line Card Buffer Maintenance

Some Programming Commands have options, each with a variety of functions. Each command is fully explained in the following sections of this manual.

Entering Commands

Commands are entered on the CPM2 keypad using the following format:

LCard; Comd; OP; CD; SC

- LCard: "Line Card" is the Line Card number. Enter a hexadecimal number from 01 to 0E for Line Cards 1 through 14
- Comd: "Command" is the Command. Enter a command from the list above
- OP: "Option" indicates a function that is part of a command. The following sections of this manual will explain which commands have options. Enter a 2-digit hexadecimal number
- CD: "Code" is the code or value to be programmed for the Option. Enter a 2-digit hexadecimal number
- SC: "Second Code" is a code or value that is only used with SCADA commands. If required, enter a 2-digit hex number

Example:

The following is how to enter the Programming Password and program an Option in the F7 Options Programming section:

Entering Data

- Press and hold the [C] button on the CPM2 until the CPM2 displays the following message:

```
Enter  PASS-WORD
      ****
```

The default password is "CAFE". Enter the password using the CPM2 keypad.

- When the password is entered, the CPM2 will display this message:

```
LCard:__  Comd:__
Op:__  Cd:__  Sc:__
```

- Enter the Line Card number. In this example, Line Card 01 will be used. When "01" is keyed in, the number will appear on the display as shown below:

```
LCard:01  Comd:__
Op:__  Cd:__  Sc:__
```

- Enter the Command number. In this example, the F7 Options Programming command will be used. When "F7" is keyed in, the command will appear on the display as shown below:

```
LCard:01  Comd:F7
Op:__  Cd:__  Sc:__
```

- Enter the Option number. In this example, Option [36] will be changed. When "36" is keyed in, the Option will appear on the display as shown below:

```
LCard:01  Comd:F7
Op:36  Cd:__  Sc:__
```

- Enter the value to be programmed at Option 36. In this example, 01 will be programmed at Option [36] to enable it. When "01" is keyed in, the value will appear on the display as shown below:

```
LCard:01  Comd:F7
Op:36  Cd:01  Sc:__
```

Note that "Sc" is not used and stays blank. After the value is entered at "Cd:", press [ACK] or [Escape] to save the changes. **NOTE:** If the [Escape] button is pressed before the value at "Cd:" is entered, the changes will not be saved.

Verifying Data

- To verify the changes just entered, press and hold the [ACK] button on the DRL2A until this message is displayed:

```
Dsp  CONFIG  syst.
ACK:menu  SEL:sel
```

- Press the [SELECT] button to view the system configuration. This message will be displayed:

```
L01  #00  00
4/1  DIGIT#0  -A-
```

Press the [ACK] button to scroll forward through the configuration displays until you reach option 36, or press the [SELECT] button to scroll backwards through the configuration displays. Press [ACK] and [SELECT] together to return to the Stand-By Mode.

1.0 Line Card Options Programming: LC-F7-OP-CD

The F7 Options Programming command is used to change various operating parameters for the Line Card. (Reporting Codes, the Line Card number, buzzer operation and other features). Also functions may be changed using the F7 command.

Refer to the example illustrated in "Entering Commands" in the "DRL2A Programming Commands" section of this manual.

Refer to the DRL2A Reference Sheets in the back of this manual. Be sure to record any programming changes on these sheets.

NOTES: Options are programmed with 2 hexadecimal or decimal digits (depending on the option), but are shown on the DRL2A screen with 3 digits. This allows 3-digit decimal display for some options.

Options [00] through [30], and [4D] are programmed with ASCII codes (refer to Appendix F for ASCII code information).

Options [00] - [0F]: 3/1, 4/1 Format Event Codes and printer library selection

The DRL2A uses a unique Sur-Gard communication format to transmit data through the CPM2 to the central station computer. Event codes corresponding to alarm codes in 10 to 40 BD 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 DRL2A will use the last digit of data received in 3/1 and 4/1 formats to determine the printer message and computer event code. The event code will then be transmitted to the central station computer. Refer to the DRL2A Decoding Library for the complete set of messages and event codes used by the DRL2A.

In Sections [00] through [0F], program ASCII codes according to the Decoding Library. Values other than 20-7F (ASCII) will not be accepted. Note that the old value programmed in each Option will not be changed until a command with valid data is received.

The *Limited English Printer Library* is provided and can be selected by programming the event codes to the corresponding ASCII code to the following letters.

Words available:Alarm (A; ASCII 41), Bypass (B; ASCII 42), Close (C; ASCII 43), Cancel (\ or D; ASCII 5C OR ASCII 44), Open (O; ASCII 4F), Restr (R; ASCII 52), and Trble (T; ASCII 54).

For example, if the word "Alarm" is wanted when the alarm code 1 is received in 3/1 (or 4/1 formats), the option [01] must be programmed as "41". The print out will be as follows:

L01-1234-X1 Alarm 10:32:54-18/09

Options [10] - [1F]: 4/2 Format Event Codes and printer library Selection

The DRL2A will use the first digit following account code in 4/2, 3/1 extended or 3/2 formats to determine the printer message and computer event code. The event code will then be transmitted to the central station computer. Refer to the “DRL2A Decoding Library” for the complete set of messages and event codes used by the DRL2A.

In Sections [10] through [1F], program ASCII codes according to the Decoding Library. Values other than 20-7F (ASCII) will not be accepted. Note that the old value programmed in each Option will not be changed until a command with valid data is received.

The *Limited English Printer Library* is provided and can be selected by programming the event codes to the corresponding ASCII code to the following letters.

Words available:Alarm (A; ASCII 41), Bypass (B; ASCII 42), Close (C; ASCII 43), Cancel (\ or D; ASCII 5C OR ASCII 44), Open (O; ASCII 4F), Restr (R; ASCII 52), and Trble (T; ASCII 54).

For example, if the word "Alarm" is wanted when the 2-digit alarm code "12" is received in 4/2, 3/1 extended or 3/2 formats, the option [11] must be programmed as "41". The print out will be as follows:

L01-1234-12 Alarm 10:32:54-18/09

Options [20] - [2F]: 4/3 Format Event Codes and printer library Selection

The DRL2A 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 “DRL2A Decoding Library” for the complete set of messages and event codes used by the DRL2A.

In Sections [20] through [2F], program ASCII codes according to the Decoding Library. Values other than 20-7F (ASCII) and will not be accepted. Note that the old value programmed in each Option will not be changed until a command with valid data is received.

Words available: Alarm (A; ASCII 41), Bypass (B; ASCII 42), Close (C; ASCII 43), Cancel (\ or D; ASCII 5C OR ASCII 44), Open (O; ASCII 4F), Restr (R; ASCII 52) and Trble (T; ASCII 54).

For example, if the word "Alarm" is wanted when the alarm code "312" is received in 4/3 or 4/2 extended formats, the option [23] must be programmed as "41". The print out will be as follows:

L01-1234-312 Alarm 10:32:54-18/09

Option [30]: Common Event Code and Library Selection

Some central station software packages are unable to process the alarm using the event codes listed in the DRL2A Decoding Library. Where a central station monitors thousands of accounts belonging to different companies, the same reporting codes may have different meanings between companies. Because of this, the individual event codes in Options [00] through [2F] and the corresponding library cannot accurately represent the alarm condition. To overcome this, Option [30] may be programmed as follows:

Program	*Operation*
00	Use Individual Event Codes to computer, with Library enabled on the printer
01	Use Individual Event Codes to computer, without Library on the printer
20, 30-39 and 41-5A	Use Common Event Codes (space, 0-9, A-Z) without Library on the printer
B0-B9 and C1-DA	Use Common Event Codes (0-9, A-Z) with customized Library on the printer

When using Common Event Codes without Library, it is recommended that either hexadecimal code “5A” (ASCII “Z”) or hexadecimal code “41” (ASCII “A”) be used.

When using Common Event Codes with Library, it is recommended that either hexadecimal code “DA” (“Z” with the bit 7 set) or “C1” (“A” with the bit 7 set) be used. Note that the event codes will still choose the word printed if a common event is programmed with library. When viewing the DRL2A configuration, this message will be displayed:

```
L01 #30   30
RS-232 CD: -ZL
```

Where “-ZL” indicates that the Common Event Code is “Z” and that the Library is 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 switch over from other brand receivers to Sur-Gard receiver.

Note that Option [30] is ignored when using SIA, Contact-ID, VONK, ACRON, SCANTRONIC, MODEM II, FBI Super Fast, BFSK and Scancom 433 formats.

Option [31]: SIA Option

The DRL2A provides SIA Protocol 1 for SIA level 1 RS-232 communication and SIA Protocol 2 for SIA level 1, 2, 3 RS-232 communication. Refer to *"MLR2-DG Computer Interface"* for more information.

Program "00" for SIA Protocol 1 and "01" for SIA Protocol 2

Option [32]: Communication Select

If the MLR2-DG Receiver is not to be used with central station automation software and a computer, program Option [32] as “00”.

If the MLR2-DG is to be used with central station automation software, program Option [32] with one of the values listed below:

Value	*Function*
00	No communication to computer
01	Alarms communicated to computer. If the alarm is reported in 3/1, 3/1 extended, 3/2 or 3/8 ACRON formats,a leading space will be communicated in front of the 3-digit Account Codes when sent to the computer
Ex:	1011ssssss**s**AAAsXsssY[DC4]
02	Alarms communicated to 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 Codes
Ex:	1011ssssss**0**AAAsXsssY[DC4]
03	Alarms communicated to 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 Codes. If the alarm is reported in 3/1 or 4/1 formats, a leading "0" (zero) will be communicated in front of the 1-digit alarm code
Ex:	1011ssssss**0**AAAsXss**0**Y[DC4]

Option [33]: Printer Enable: Communicate Information to Printer Through CPM2

If a printer is not used with the MLR2-DG, program Option [33] as "00".

If a printer is to be used with the MLR2-DG, program Option [33] with one of the values listed below:

00	Printer not selected
01	Printer selected

Option [34]: Receiver Number

The Receiver Number is used for sending signals to the central station software. This number should be the same for all DRL2A Line Card modules connected to the same CPM2.

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 [35]: Line Card Number

The Line Card Number provides a unique identification code for each Line Card in the DRL2A module. Since the CPM2 can be connected to a total of 14 Line Cards, it is very important to program a unique code for each of the Line Cards. Failure to do so will cause "clashes", where two Line Cards answer the same CPM2 polling message at the same time. Hexadecimal numbers "01" to "0E" can be programmed in Option [35] to identify Line Cards 01 through 14.

Option [36]: Caller ID

Option [36] allows the Line Card pick up the line after the second ring.

When option [36] = 02, this will allow the Line Card to receive the British caller identification data that is transmitted over the phone line. The call display service must be available and requested from the telephone company for this feature to be operational.

Program Option [36] with one of the following:

00	First ring answer
01	Not used
02	British caller ID
03	Second ring answer

Option [37]: Send Caller ID to Computer

The DRL2A can send the caller identification numbers to the computer. If the telephone number is not received, the caller identification number will not be sent to the computer.

New protocol: URRLAAAAAATTTTTTTTTTTTTTTTT[DC4]

Where:	U	is International caller ID protocol identifier
	RR	is the receiver number
	L	is the line number
	AAAAAA	is the account number (leading spaces or leading zeros if account is less than 6 digits)
	TTT...	is the telephone number (up to 18 digits, may include spaces or dashes, trailing "F" will be inserted if the telephone number is less than 18 digits.
	[DC4]	terminator, 14 Hex

Option [38]: Send Caller ID to Printer

When the option is enabled (01), the receiver will send the caller ID to the printer, then the alarm messages. This option is available for any format. The caller ID will be printed once per call.

Option [39]: Line Check

The Line Card will perform a telephone line test every 10 seconds. When Option [39] is enabled, if the line is faulty, a warning message will be displayed on the Line Card screen and an alarm will be sent to the computer and the printer. When this option is disabled, no alarm will be transmitted. Program Option [39] as "01" to enable the line fault report. Program as "00" to disable the transmission of the line fault condition to computer and printer.

Option [3A]: Programmable Output

The DRL2A provides one programmable output at the terminal TxPG1 of the DML2A backplane board, for the left hand Line Card, and one programmable output at the terminal TxPG2 for the right hand Line Card.

Program Option [3A] with one of the following:

00	Programmable output follows the Error Message LED
01	Programmable output will switch to ground for 100mS in Two-way Audio Condition

NOTE: This option will be overwritten by the Video DOWNLOOK option selection.

Option [3B]: PGM Input

When programmed as "01", the RxRNGx terminal on the DML2A will be used as a ring simulator and will force the receiver to pick up the line when shorted to ground. Default is "00".

Option [3C]: Filter Option

The Line Card will process incoming signals through a filter circuit if this option is selected. If this option is not selected, the Line Card will process incoming signals through a software filter. Program Option [3C] as "01" to enable this feature, or as "00" to disable it.

Option [3D]: Reserved

Option [3E]: Mute Buzzer

Operation of the Line Card's buzzer may be programmed as follows:

00	Buzzer sounds for Line Fault, CPM2 Error, or if an Alarm occurs during a CPM2 error
01	Buzzer does not sound for any events
02	Buzzer sounds for Audio, Line Fault, CPM2 Error, or if an Alarm occurs during a CPM2 error
03	Buzzer sounds for all status change conditions

Option [3F]: Last Message On

When Option [3F] is enabled, the last alarm message will be retained on the Line Card display screen until a new signal is received. Program Option [3F] as “01” to enable this feature, or as “00” to disable it. If Option [3F] is disabled, the stand-by message described in Section 1.4 will be displayed when communication of an event is completed.

Option [40]: Hook Flash

The hook flash feature is used for two-way audio in a PBX system. The line card can hook-flash the line for 100ms-900ms programmable to put the line on hold and then back on line for 3 seconds and hangs up. Program option [40] to "01" for 100 ms, "02" for 200 ms, etc. "00" will disable the option.

Options [41] - [46]: Handshake Selection

The DRL2A is a multi-format receiver capable of sending several handshakes to a dialer. Often it is important which handshake is sent first. Program Options [41] through [46] according to your applications. If all six Options are programmed as “00”, 2300Hz handshake will be sent.

Handshake Options

00 No handshake
01 Dual tone handshake
02 2300Hz handshake
03 1400Hz handshake
04 SIA FSK handshake
06 1600Hz handshake
09 2100 Hz handshake
10 ITI handshake
11 Scantronics dual tone
12 5 sec. pause - 1600Hz kissoff
13 Single Dual tone handshake
14 Robofon handshake
15 Cesa handshake
16 Outel handshake

(Refer to Appendix D for Corresponding Formats)

Option [47]: Handshake and Kissoff Duration

Some control panels have difficulty in understanding the receiver’s handshake and/or kissoff tones on noisy phone lines. Option [47] provides a possible solution for this problem by providing longer constant tones. Program one of the following:

00 1.0 second tone (factory default setting)
01 1.5 second tone
02 2.0 second tone
03 800 ms tone

Note that this option affects only handshakes 02 and 03.

Option [48]: Interval Delay Between Handshakes

The DRL2A Line Card will usually wait for signals from the control panels for 4 seconds before sending the next handshake, if there is no signals received. In certain applications, control panels can not wait long enough to get their own handshake especially if the handshake is programmed as the third or fourth handshake.

Program Option [48] with one of the following:

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

Option [49]: 2-Way Audio (Handset) Activation Time

Option [49] determines how long, in minutes, 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 “99” for 1 to 99 minutes. 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 [49] as “00”.

Option [4A]: 4-Digit Account Codes to Activate 2-Way Audio

Option [4A] 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 [4A]. For example, to allow all account codes between 1000 and 2FFF to activate the 2-Way Audio function, program Option [4A] as “12”. To allow all account codes between 3000 and 6FFF to activate the 2-Way Audio function, program Option [4A] as “36”.

Option [4A] may be used with any formats supported by the MLR2-DG. To disable the 2-Way Audio function, program Option [4A] as “00”.

Option [4B]: 3 Digit Account Codes to Activate 2-Way Audio

Option [4B] determines which 3 digits Account Codes will be able to activate the 2-Way Audio feature. Program the first digits of the desired Account Codes in Option [4B]. For example, to allow all 3 digits account codes between 200 and 3FF to activate the 2-Way Audio function, program Option [4B] as “23”. To allow all 3 digits account codes between 300 and 6FF to activate the 2-Way Audio function, program Option [4B] as “36”.

Option [4B] may be used with any 3 digits account code formats supported by the MLR2-DG. To disable the 2-Way Audio function, program Option [49] as “00”.

Option [4C]: Alarm Codes to Activate 2-Way Audio

Option [4C] 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 [4C]. For example, if all alarm codes beginning with 6, 7 and 8 are to activate 2-Way Audio, program Option [4C] as “68”.

Option [4C] may be used with 10 to 40 baud formats, DTMF 4/1, 4/2, 4/3 and Contact ID formats. Program Option [4C] as “00” to disable this function.

First, to enable the audio feature, the option "[49] AUDIO MIN." must be programmed. The DRL2A will initiate audio by the account range, option [4A] and [4B] or by option [4C] ALARM CODE or by both.

Example: 4/2 format with account code 1234, alarm code 2 on zone 3. (1234-23)

Option [4A]/[4B]	Option [4C]	Switch to Audio	Reason
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 but alarm code 2 is outside the range 3-4
3-5	1-3	No	Both must be good but 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 [4D]: Audio Event Code

Option [4D] is used to send a message to the computer and the printer to indicate that the Line Card has enabled the 2-Way Audio function. Program an ASCII code using 0 through 9 and A through Z to be used as the event code for activation of the 2-Way Audio feature.

For example, if an Account on Line Card 01 activates the 2-Way Audio mode and Option [4D] is programmed as "50" (ASCII "P"), the following messages will be sent:

- Sent to computer: 0000 P 01
- Sent to printer: L01-0000-P01 AudioLine1

Note that this event code will not be affected by the common event code selected at Option [30]. Ensure that the event code in Option [4D] is compatible with any automation software being used. Program Option [4D] as "00" to disable this option.

Option [4E]: Video Downlook

The DRL2A is capable of receiving video images from the Sur-Gard DC1664LC , P-16LCD, P-1664, DSC8400, DSC PC1580, Power832 and DSC PC3000 Security Control Panels and sending those images to a video receiver. Option [4E] is used to enable it. Program Option [4E] as "00" to disable this option, or program a value of "01" to enable it.

Note that when this Option [4E] is enabled, the "Message Error" light will not indicate when faulty data is received.

Option [4F]: Downlook Timeout

Option[4F] determines how long, in minutes, Downlook will be active once it is initiated. Default is 3 minutes (recommended).

Option [50]: Audio Zone

Option [50] determines the range of zone number (last digit) which will activate the 2-Way Audio function. Program the digits of the desired zone numbers in option [50]. For example, if all zone numbers finishing with 6, 7, or 8 are to activate 2-Way Audio, program option [4C] as "68".

Option [50] may be used with 10 to 40 baud formats and DTMF 4/1, 4/2 and 4/3. Program option [50] as "00" to disable this function. This option can be used in combination with any of the other audio options. Default is "00".

Option [51]: 3/2 Format

The DRL2A could not distinguish between 4/1, 3/2 or 3/1 with parity because all of them contain a total of 5 digits. Therefore, this option must be programmed to inform the DRL2A which of the 3 formats may be used.

Option 51 (3/2 format)

00 select 4/1 format

01 select 3/2 format

02 select 3/1 with parity format.

03 Select 3/1 with parity only for Radionics Fast (40 baud rate) sent on the 2300Hz handshake, and 4/1 on all other baud rate regardless of the handshake and
Radionics Fast sent on the 1400Hz.

Note that the printer messages for the 3-2 format are the same as those used for the 4/2 format.

Option [52]: 4/1 Extended Format

Program Option [52] as "01" to combine 2 round pairs of 4/1 extended format into 4/2 output for reporting to the computer and the printer.

For example, with Option [52] enabled, the security control panel may transmit the following information:

1234 3
1234 3
3333 1
3333 1

The DRL2A will interpret this information as: 1234 31

This format is not recommended as it occupies the telephone line for long periods of time. Note that all 4/1 and 4/1 extended formats must be at 10,14 or 20 baud rates. The DRL2A will not accept 4/1 or 4/1 extended formats at 40 baud unless option [51] is modified. The default setting for Option [52] is "01". When programmed as "00", the option is disabled.

Option [53]: 4/2 Extended Format

Program Option [53] as "01" or "02" 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 sends: 1234 05
1234 05
0505 16
0505 16

The DRL2A will interpret this information as 1234 516

02 The panel sends: 1234 03
1234 03
3333 01
3333 01

The DRL2A 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 [53] is "00". When programmed as "00", the option is disabled.

Option [54]: 3/1 extended format

Program Option [54] as "01" to combine 2 round pairs of 3/1 extended format into 3/2 output for reporting to the computer and the printer. (For M.A.S. software users, the option should be programmed as "02")

For example, with Option [54] enabled, the security control panel may transmit the following information:

123 3
123 3
333 1
333 1

The DRL2A will interpret this information as: 123 31

The default setting for Option [54] is "01". When programmed as "00", the option is disabled.

Option [55]: 4/1 Express Format

The Ademco 4/1 Express format may cause conflicts with the Sur-Gard DTMF 4/3 with Checksum format or FBI Superfast without checksum. Therefore, this option must be programmed to inform the DRL2A 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

The default setting of Option [55] is "00"

Option [56]: Group Arming / Disarming with User Code

Option [56] applies to the Sur-Gard DTMF 4/3 format.

When Option [56] is programmed as "01", group arming/ disarming signals will be combined with the user code into one signal which will be sent to the computer.

For example, the following information may be sent to the computer and the printer:

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.

Option [57]: 4/3 Format User Conversion / 3-digit Alarm Code

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 the common event code and require decimal user codes.

Option [57] allows the user codes to be converted from hexadecimal to decimal to meet the needs of the central station software. Program Option [57] with one of the following:

00 Send the last two digits as user codes without conversion

01 Convert the last 2-digit user codes to decimal as shown here:

User Code received	*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

For example, if 1234 4B1 is received, 1234 C 101 will be sent to the computer.

02 Send the last 3 digits as the zone codes with the 5th digit still used as the event code

For 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.

03 Send the last 3 digits as the zone codes and convert the user codes only to decimal

NOTE: When Option [56] Group Arming/Disarming with User Code is programmed as "01", 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 [58]: Equivalent Line

Option [58] is used when an incoming signal can be received on another receiver telephone line if the original line is busy. Information printed and/or sent to computer will indicate that the information was received on the originally assigned telephone line card. The receiver number does not change. Program 00 at Option [58], or a number from 01 to 0E.

Examples:

Option [58] = 00; no equivalent line number

If receiver number is 02, and the line number is 3: the printer message will be "L03-1234..." and the computer message will be: 1**023**ssssss1234

Option [58] = 01; equivalent line number is 1

If receiver number is 02 and the line number is 3: the printer message will be "L21-1234..." and the computer message will be: 1**021**ssssss1234

Option [58] = 1; equivalent line number is 1

If receiver number is 12 and the line number is 3, the printer message will be "121-1234..." and the computer message will be: 1**121**ssssss1234

Option [59]: VONK Option

To enable the VONK format, program option [59] as "01".

Option [5A]: Austel Ring

Program as "01" to comply with Austel regulations. Default is "00".

Option [5B]: Double ring

To ensure the compatibility with a different ring input sequence. This option should be changed only on advice from a Sur-Gard representative.

Option [5C]: Dialer Tone

When programmed as "01", the receiver will begin its handshake sequence only if a valid dialer presence tone is received. Valid dialer tones are 1300 Hz or 980 Hz. The default setting is "00".

Option [5D]: Inter Digit time

Old dialers may have difficulty communicating with the receiver. Programming this option may solve this problem. This option should normally be left at the default setting and should be changed only on the recommendation of a Sur-Gard technician. Default is "02".

00 1.25 seconds
01 1.50 seconds
02 1.80 seconds

Option [5E]: Inter-burst

Old dialers may have difficulty communicating with the receiver. Programming this option may solve this problem. This option should normally be left at the default setting and should be changed only on the recommendation of a Sur-Gard technician.

00 100 ms (default)
01 150 ms
02 200 ms

Option [5F]: Radionics 6500 computer output

The DRL2A will emulate the Radionics 6500 RS232 protocol on pulse formats only. (00=disable, 01=enable)

Examples:

1. 3/1 format: Account code "123" with alarm code "1", (alarm) the computer output will be:
   00 1RRLsssssss123sAss1[DC4]
   01 1RRLsssssss123sAss1[DC4]
2. 3/1 format: Account code "123" with alarm code "B", (opening) the computer output will be:
   00 1RRLsssssss123sOssB[DC4]
   01 1RRLsssssss123sOsss[DC4]
3. 4/2 extended (or 3/2 or 3/1 extended): Account code "1234" with alarm code "2" on zone "1", (alarm) the computer output will be:
   00 1RRLssssss1234sAs21[DC4]
   01 1RRLssssss1234sAs21[DC4]
4. 3/1 extended (or 4/2 or 3/2): Account code "234" with alarm code "C" on zone "2", (closing) the computer output will be:

00 1RRLsssssss234sCsC2[DC4]
01 1RRLsssssss234sCss2[DC4]

Where RR = Receiver Number
L = Line Number
s = Space
[DC4] = Terminator

Please note that option [30] must be left as individual event code when enabling this option.

Option [60]: ScanCom 4332
When programmed as "01", the receiver will transmit the Scancom 433 as received. Please refer to the computer protocols section on page 36 for more details.

Option [61]: Ademco High Speed RS-232
When this option is programmed as "00", the DRL2A will convert the High Speed format signal into 4/2 format (Ex: 1RRLssssssAAAAsXssYY[DC4]). If it is programmed as "01" the Ademco High Speed will be send to the computer as follows: 8RRLAAAAsCCCCsCCCCsC[DC4]

Where:		
	8	Protocol number
	RR	Receiver number
	L	Line number
	AAAA	Account code
	s	Space
	CCCC	Channel 1-4
	s	Space
	CCCC	Channel 5-8
	s	Space
	C	Channel 9
	[DC4]	Terminator

Option [62]: Scantronics RS232
When enabled, the low battery and test transmission signals will be sent to the computer as T 08 and T 09 instead of T 80 and T 90.

2.0 Buffer Output Command: LC-FA-XX-XX

The "FA" command is used to send part of the Line Card buffer to the printer or the computer. The number of messages to be printed is entered as a hexadecimal number.

The time and date of the buffer output is printed on the same line after the event. A typical event along with the time and date it was printed is shown here: L01*1234*12 AlarmZn#2 09:30:15-27/01

- 09:30:15 is the time (hours:minutes:seconds)
- 27/01 is the date (day-month)

Note that the time and date of the event itself may be viewed by printing the CPM2 buffer.

2.1 Output Alarm Type Printer Messages to the Printer: LC-FA-01-XX

The LC-FA-01-XX command will send the specified number of printer alarm messages to the printer. "XX" should be a hexadecimal number from 01 to FE to indicate a number of events from 1 to 255.

Shown here are typical alarm messages:

L01*1234*12 AlarmZn#2 21:24:00-27/01
L01*1276*02 PanicZn#2 21:24:01-27/01

2.2 Output Alarm Type Computer Messages to the Printer: LC-FA-02-XX

The LC-FA-02-XX command will send the specified number of computer alarm messages to the printer. "XX" should be a hexadecimal number from 01 to FE to indicate a number of events from 1 to 255.

Shown here are typical alarm messages:

L01 COM 1011 0001 A 01 21:24:00-27/01
L01 COM 1011 1234 R 70 21:24:01-27/01

2.3 Output Line Card Configuration: LC-FA-04-04

The LC-FA-04-04 command will print the Line Card configuration. This record may be used for future reference. Refer to "Line Card Configuration Command LC-F7-OP-CD" for more information.

2.4 Output Computer Alarm Messages to the Computer: LC-FA-06-XX

The LC-FA-06-XX command will send the specified number of computer alarm messages to the computer. "XX" should be a hexadecimal number from 01 to FE to indicate a number of events from 1 to 254.

This command provides a means of manually transferring events to the computer. If the computer goes off-line, the CPM2 will record any events in its own buffer. When the computer returns on-line, the CPM2 will automatically send the computer any alarm messages that were received while the computer was off-line.

3.0 Shutdown Line Card Communication with CPM2: LC-FB

The LC-FB command will shut down communications between the Line Card specified at "LC" and the CPM2. Note that this command does not require an Option or Code number to be entered. Simply enter the number of the Line Card to be shut down, the command FB, and then press the CPM2 [Escape] button.

The CPM2 will record the shut down by sending messages to the printer and the computer:

Printer: -L01-Inc.Resp. 11:57:58-15/01

Computer: 1011 0000 A F1

This warning message will also be displayed on the Line Card display:

```
L01-Digital Rec
LnCard Shutdown!
```

4.0 Reactivate Line Card Command: LC-FC

The LC-FC command will reactivate a Line Card that was shut down using the LC-FB command. Note that this command does not require an Option or Code number to be entered. Simply enter the number of the Line Card to be reactivated, the command FC, and then press the CPM2 [Escape] button.

5.0 Line Card Buffer Command: LC-FE-XX-XX

The FE command is used to access the Line Card buffers. The following functions may be performed:

5.1 Erase Alarm Printer/Computer Messages: LC-FE-00-00

Ensure that a copy of the printer and computer alarms exists before using this command. This command erases all computer and printer alarm messages and Caller Identification messages in the Line Card's memory.

5.2 Software Reset: LC-FE-02-02

This command will reset the Line Card.

5.3 Backup Current Line Card Configuration: LC-FE-03-03

When the Line Card has been configured, the programming changes can be recorded as a "back up" program. The "back up" configuration may be later used to restore the Line Card's configuration after temporary changes are made.

To store the present Line Card configuration, enter the LC-FE-03-03 command.

5.4: Install Backup Configuration as Current Line Card Configuration: LC-FE-04-04

If the Line Card configuration is temporarily changed (for example, to overcome a temporary problem or for experimentation), the configuration stored using the LC-FA-03-03 command may be restored.

To restore the "back up" configuration, enter the LC-FE-04-04 command.

DRL2A Communication Formats

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)

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 DRL2A.

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

Ademco Contact ID Format

This DTMF format requires a dual tone handshake and 1400 Hz kissoff, or 1400Hz handshake and 1400Hz kissoff.

NOTE: If the dialer responds to a 2300 Hz handshake by sending the Contact ID Format data, the DRL2A will accept and decode the format. The DRL2A will send a 1400Hz kissoff tone regardless of the handshake.

The DRL2A will display a message similar to this one:

```
L01-1234 E130
01 C025*
```

EVENT CODES CLASSIFICATION

The Event codes have been grouped according to the type of event, as described below.

Medical Alarms - 100
100 Medical
101 Pendant transmitter
102 Fail to report in

Fire Alarms - 110
110 Fire alarm
111 Smoke
112 Combustion
113 Water Flow
114 Heat
115 Pull Station
116 Duct
117 Flame
118 Near alarm

Panic Alarms - 120
120 Panic alarm
121 Duress
122 Silent
123 Audible

Burglar Alarms - 130
130 Burglary
131 Perimeter
132 Interior
133 24 Hour
134 Entry/Exit
135 Day/Night
136 Outdoor
137 Tamper
138 Near alarm

General alarms
140 General alarm
141 Polling loop open
142 Polling loop short
143 Expansion module failure
144 Sensor tamper
145 Expansion module tamper

24 Hour Non-Burglary - 150 and 160
150 24 Hour non-burg
151 Gas detected
152 Refrigeration
153 Loss of heat
154 Water leakage
155 Foil break
156 Day trouble
157 Low bottled gas level
158 High temp
159 Low temp
161 Loss of air flow

Fire supervisory - 200 and 210
200 Fire supervisory
201 Low water pressure
202 Low CO2
203 Gate valve sensor
204 Low water level
205 Pump activated
206 Pump failure

System Troubles - 300 and 310
300 System trouble
301 AC loss
302 Low system battery
303 RAM checksum bad
304 ROM checksum bad
305 System reset
306 Panel program changed
307 Self-test failure
308 System shutdown
309 Battery test failure
310 Ground fault

Sounder/Relay Troubles - 320
320 Sounder/relay
321 Bell 1
322 Bell 2
323 Alarm relay
324 Trouble relay
325 Reversing

System Peripheral Troubles - 330 and 340
330 System Peripheral
331 Polling loop open
332 Polling loop short
333 Exp. module failure
334 Repeater failure
335 Local printer paper out
336 Local printer failure

Communication Troubles - 350 and 360
350 Communication
351 Telco 1 fault
352 Telco 2 fault
353 Long range radio
354 Fail to communicate
355 Loss of radio supervision
356 Loss of central polling

Protection Loop Troubles - 370
370 Protection loop
371 Protection loop open
372 Protection loop short
373 Fire trouble

Sensor Troubles- 380
380 Sensor trouble
381 Loss of super. - RF
382 Loss of super. - RPM
383 Sensor tamper
384 RF xmtr. low battery

Open/close - 400
400 Open/Close
401 O/C by user
402 Group O/C
403 Automatic O/C
404 Late to O/C
405 Deferred O/C
406 Cancel
407 Remote arm/disarm
408 Quick Arm
409 Keyswitch O/C

Remote Access - 410
411 Callback request made
412 Succes - download access
413 Unsuccessful access
414 System shutdown
415 Dialer shutdown

Access Control - 420
421 Access denied
422 Access report by user

System Disables - 500 and 510

Sounder/Relay disables - 520
520 Sounder/Relay disabl
521 Bell 1 disable
522 Bell 2 disable
523 Alarm relay disable
524 Trouble relay disable
525 Reversing relay disable

System peripheral Disables - 530 and 540

Communication Disables - 550 and 560
551 Dialer disabled
552 Radio xmitter disabled

Bypasses - 570
570 Zone bypass
571 Fire bypass
572 24 Hour zone bypass
573 Burg. bypass
574 Group bypass

Test/Misc. - 600
601 Manual trigger test
602 Periodic test report
603 Periodic RF Xmission
604 Fire test
605 Status report to follow
606 Listen-in to follow
607 Walk Test Mode
621 Event log reset
622 Event log 50% full
623 Event log 90% full
624 Event log overflow
625 Time/Date Reset
626 Time/Date inaccurate
627 Program mode Entry
628 Program mode Exit
631 Exception Schedule change

- L01 indicates Line Card 01
- 1234 is the Account Code
- E indicates an opening
- 130 is the event code
- 01 indicates Group 01, 025 indicates Zone 25

Refer to "Communication protocol with central station computer".

Ademco Express Format

This format consists of 4-digit Account Codes and 1- or 2-digit alarm codes. The DRL2A will decode the signal as regular 4/1 or 4/2 format. Option [53] must be programmed as “01” to decode the 4/1 Express format instead of the Sur-Gard 4/3 with Checksum format.

Ademco Super Fast or High Speed Format

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

NOTE: When option [5B] is programmed as "00", the DRL2A will interpret the signal into 4/2 format. When option [5B] is programmed as "01", the DRL2A will send the information as it received to the printer and to the computer using High Speed RS-232 communication protocol.

Channel Status Codes (Digits 5 though 12)

Code

1 New event (previously unreported)
Printer: 1234-11 AlarmZn#01
Computer: 1234 A 01

2 New opening (previously unreported)
Printer: 1234-21 Open-Usr01
Computer: 1234 O 01

3 New restore (previously unreported)
Printer: 1234-31 RestrZn01
Computer: 1234 R 01

4 New closing (previously unreported)
Printer: 1234-41 CloseUsr01
Computer: 1234 C 01

5 Normal (no event since previously reported restore)

6 Previous reported event still in effect.

0 New trouble
Printer: 1234-D1 TrbleZn#01
Computer: 1234 T 01

For the ninth channel (digit 13), the following channel status codes are used:

Code

1 Duress report and status report in the previous 8 channels (specifically channel 1)
Printer: 1234-00 Dures——
Computer: 1234 A 00

2 Opening report in the previous 8 channels (with user ID in channel 1)
Printer: 1234-21 Open-Usr01
Computer: 1234 O 01

3 Zone Bypass/Unbypass status report in the previous 8 channels
Printer: 1234-11 BypasZn#01
Computer: 1234 B 01

Printer: 1234-31 UnBypZn#01
Computer: 1234 H 01

4 Closing report in the previous 8 channels (with user ID in channel 1 if expanded reporting of user # is selected at the communicator)
Printer: 1234-41 CloseUsr01
Computer: 1234 C 01

5 Zone trouble active/ trouble restore status report in the previous 8 channels
Printer: 1234-B1 TrbleZn#01
Computer: 1234 T B1

Printer: 1234-B2 TrbleRst01
Computer: 1234 R B1

6 System trouble active/restore reports in the previous 8 channels
Printer: 1234-C1 AClstZn#01 or 1234-C1 AClstRst01
Computer: 1234 T C1
or 1234 R C1

Printer: 1234-C2 LowBtZn#02 or 1234-C2 LowBtRst02
Computer 1234 T C2 or 1234 R C2

Printer: 1234-C3 SysFlZn#03 or 1234-C3 SysFlRst03
Computer 1234 T C3 or 1234 R C3

Printer: 1234-C4 WDTimZn#04or 1234-C4 WDTimRst04
Computer 1234 T C4 or 1234 R C4

Printer: 1234-C5 StMsgZn#05 or 1234-C5 StMsgRst05
Computer 1234 T C5 or 1234 R C5

Printer: 1234-C6 TelcoZn#06 or 1234-C6 TelcoRst06
Computer 1234 T C6 or 1234 R C6

Printer: 1234-C8 SensoZn#08 or 1234-C8 SensoRst08
Computer: 1234 T C8 or 1234 R C8

NOTE: Zone #07 is not used for code 6.

7 Zone alarm status report, alarms are reported in previous 8 channels

8 New low battery (will not re-report on subsequent calls and will not send restore).
Printer: 1234-80 LowBt——
Computer: 1234 T 80

9 Test report, alarm status is reported in the previous 8 channels
Printer: 1234-90 24HrsTest-
Computer: 1234 T 90

0 Radio diagnostics, radio testing info is reported in previous 8 channels.
Printer: 1234-00 Radio——
Computer: 1234 T 00

FSK 200 Baud Format

The FSK 200baud format uses CCITT V.21 frequencies at a speed of 200 Baud. In order to receive this format properly, the CCITT modem chip on the DRL2A must be installed instead of the Bell 103.

The DRL2A will print the received signals as follows:

L0X-AAAAA-0ZZ Audio

L0X-AAAAA-1ZZ Alarm

L0X-AAAAA-2ZZ Restore

L0X-AAAAA-3ZZ Status: Alarm

L0X-AAAAA-4ZZ Status: Normal

Where: X is the line number
AAAAA is the account number
ZZ is the zone munber

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 DRL2A.

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

FBI Event	*Code*	*Converted Event Code*	*FBI Event*	*Code*	*Converted Event Code*
Fire	1	A	Nine	9	A
Panic	2	A	Zero	0	A
Burglary	3	A	Opening	B	O
Medical	4	A	Closing	C	C
Auxiliary	5	A	Abort	D	T
Bypass	6	B	Restore	E	R
Inactive	7	A	Trouble	F	T
Eight	8	A			

Note that option [3B] can give a unique FBI RS232 output when enabled.

ITI Format

The ITI format covers ITI panel models: RF Commander, Caretaker plus, SX-V, Commander III, Commander 2000 and Security Pro 5000. In order to receive the ITI format, handshake #10 must be programmed. After a coldboot, the fifth handshake (option [45]) is programmed as 10.

ITI Library

Sensor No.	**Printed out as**	**Specifics**
00	00 Buddy Alarm xx	SX-V only
01-32	xx ALM	Caretaker plus
00-16	xx ALM	RF Commander / Commander III
02-07	xx ALM	SX-IVB
01	Bad sensor #xx	SX-V only
02-76	xx ALM	SX-V
01-18	xx ALM	Commander 2000
01-76	xx ALM	Ultraguard 5000
77	77 Alarm Tmpr / Supervisory / CANC	Caretaker plus, SX-IVB, SX-V, Ultraguard 5000 only
78	78 TRB	Caretaker plus, Utraguard 5000 only
79	79 No activ alm / CANC	Caretaker plus, Ultraguard 5000 only
80	80 Alarm	All supported ITI panels
81	81 Alarm	All supported ITI panels
82	82 Alarm	All supported ITI panels
83	83 Phone Tst	All supported ITI panels
84	84 OpenUsr xx	All supported ITI panels
85	85 CloseUsr xx	All supported ITI panels
86	86 SilentDuress	All supported ITI panels
87	87 ForceArmed / AutoForceArm	All supported ITI panels
88	88 TRB	Caretaker plus, Ultraguard 5000 only
89	89 TRB	Caretaker plus, Ultraguard 5000 only
90	90 AC Fail / RESTR	All supported ITI panels
91	91 Low CPU Bat / RESTR	All supported ITI panels
92	92 AlmTamprLoop / RESTR	All supported ITI panels
93	93 AutoPhoneTst	All supported ITI panels
94	94 TRB	All supported ITI panels
95	95 CPU Back In / 95 RESET	All supported ITI panels
96	Failure to communicate	Local alarm only
97	No phone line	Local alarm only
98	98 Event Dump Report	Commander 2000 only

BFSK Format

The printer messages will be similar to the following:

L01-123-CLOSING ID1 15:19:23-10/06

- L01 represents Line 01
- 1234 represents the account codes.

The Signals will be sent to the computer as

6011ssssssAAAAXXYYYY[DC4]

Following the example described above, the signal will be sent to the computer as:

6011ssssss1234sAs300[DC4]

OUTEL Format

This is a 10 baud, single round, pulse format that consists of a 2-digit account code and a one digit reporting code.

The print-out will be as follows:
L0X-ACC:AAssZnXsssssssssHH:MM:SS-DD/MM

Where L0X represents the receiving line card number
ACC:AA represents the 2-digit account number
s represents spaces
X represents the one digit reporting code

Robofon Format

The Robofon format is a 50 Baud pulse format sending ASCII codes.

There is no English text library for the Robofon format, therefore the printer output will look like:
L0X-ACC:AAAAAA YZ HH:MM:SS-DD/MM

Where: L0X represents the Line Card 0X
ACC:AAAAA represents the account AAAAAA
YZ represents the reporting code YZ

Scancom 433

This double round DTMF format uses 4-digit account codes and up to 16 zones. The Scancom format requires either:

- a 1400 Hz handshake
- a Scantronics dual tone handshake
- a dual tone
- a 1600 Hz handshake

Scancom 433 examples:

Zone alarm reports
If zone 3 is violated: 1234 013 003 FF

Zone status message will indicate that the previously reported violation is still present:
Zone 7 status: 1234 0EF 007 FF

Zone restore
Zone 12 restore: 1234 034 012 FF

Zone test cancel:
Zone 9 cancel: 1234 0BC 009 FF

Zone Bypass:
Zone 7 bypassed: 1234 056 007 FF

Zone Trouble
Zone 2 trouble: `1234 078 002 FF

Opening
User 10 is closing Station 1 from keypad 3:
1234 996 010 FF
1234 001 003 FF

Duress
User code 3: 1234 00F 003 FF

Emergency
Emergency 1: 1234 000 002 FF

Test report: 1234 090 000 FF

Low battery: 1234 098 000 FF

Printer Output

For example, a panel sends in a zone 2 alarm.
First round: 1234012002FF
Second round: 1234012002FF

The printer output would be:
1234-02 Alarm

Scantronics Format

This DTMF format uses 2, 3, 4 or 6-digit account codes, 8 or 16 zones, and a 1-digit supervisory zone. The format requires a dual tone handshake to send alarms, and a 1400Hz kissoff to complete the transmission. The following table shows the zone events for this format:

Event code

1 New event
2 Opening
3 Restoral
4 Closure
5 No event
6 Previous reported event still in effect.
7 No event on supervisory zone
8 Low Battery on supervisory zone
9 Test on supervisory zone

In order to receive the Scantronic format, the DRL2A should be programmed using the F7 Command to send the Dual tone handshake. The following are samples of transmissions using this format:

Sample 1

The panel sends the following in 4-16-1 format: 123455555515111555558

This transmission will be decoded as follows:

Printer	***Computer***
1234-800 LowBattery	1234 T 80
1234-107 AlarmZn#07	1234 A 07
1234-109 AlarmZn#09	1234 A 09
1234-110 AlarmZn#10	1234 A 10
1234-111 AlarmZn#11	1234 A 11

Sample 2

The panel sends the following in 6-8-1 format: First round: 987654515255537

The DRL2A decodes:

Printer	Computer
987654-02 AlarmZn#02	987654 A 02
987654-04 Open-Usr04	987654 O 04
987654-08 RestrZn#08	987654 R 08

SIA FSK Format

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

The standard DRL2A is equipped with the Bell 103 modem chip. The CCITT V.21 modem chip may be installed upon request when ordering the MLR2-DG or DRL2A modules. The CCITT V.21 chip is for use with modem frequencies specified by the CCIT V.21 recommendation.

NOTE: The DRL2A can accept SIA formats with and without separators. The DRL2A Version 2.1i Software implements Level 1, Level 2 and Level 3 of the 1993 IIb SIA Digital Communication Standard, except that it does not support "Receiver Call out and Access Passcode Block", "Reverse Channel Block", and "V-Channel Communications".

To distinguish from the other formats already decoded by the DRL2A, the data will be displayed on the printer as follows:

L01-xx1234NBA-3423 18:36:00-30/09

- L01 represents Line Card 01
- xx1234 represents Account Code 001234
- N represents New event
- BA represents a Burglary Alarm
- 3423 represents Zone 3423
- 18:36:00 is the time in the 24-hour clock format (hours:minutes:seconds; in this example, the time is 6:36 pm)
- 30-09 represents the date; in this example, the date is September 30

The DRL2A supports a maximum of 16 digits account code, (including any displayable ASCII characters except the "|") with option 31 (SIA option for Level 2 & 3 decoding) enabled (01), up to 6 digits account code with option 31 disable(00). If option 31 (SIA level 2-3) is disabled, the "A"s received in the account code will be converted to "0"s. It also supports a maximum of 4 digits for the Alarm Code. Usually, the central station automation software will interpret the Alarm Codes. For manual operation, refer to the SIA Event Block Data Code Definitions for information on interpreting the Alarm Codes.

When an alarm is received, it will be displayed in the DRL2A display. For the alarm message shown above, the following would be displayed:

```
L01-xx1234
NBA-3423----
```

Acknowledgements for the SIA format are tonal by default. The transmitter may, however, request data acknowledgement by transmission of the optional configuration block. When the DRL2A received the configuration block from the transmitter requiring the data acknowledgement, it will send the tonal acknowledgement to this block. It will then send the data acknowledgement to the following data blocks if the data received is identical.

Telenot / Telim Format

The Telenot format is a 10 Baud F.S.K. format that complies with CCITT V.21 specifications.

A Telenot signal will be printed similar to the following:

L0X-AAAAAA AlarmZn#ZZ HH:MM:SS-DD/MM

Where: L0X represents the line card number of the receiver

AAAAAA represents the received account number

AlarmZn#ZZ represents the English reporting code message

Telenot Printer Words Library

- Alarm
- Trouble
- Restore
- Open Usr
- Close Usr
- TrblRstr
- Test
- Low Batt
- AC Fail

VONK Format

VONK Format is a 110 baud modem communication protocol using the CCITT V.21 frequencies. When using the VONK format, Option [3B] must be programmed to “01”.

Shown here are typical printouts from VONK communications. In these examples, the Account Code is 98, and zones 2 and 3 are in alarm. Note that L01 indicates Line Card 01.

- First call, Zone 2 in alarm: L01-98 .2.....
- Second call, Zones 2 and 3 in alarm: L01-98 .23.....

The following will be printed when the zones restore:

- First call, Zone 2 restore: L01-98 ..3.....
- Second call, Zone 3 restore: L01-98 .....

The VONK format requires a CCITT modem chip. As a result, receiving SIA format from most SIA panels using Bell 103 standards will not be possible on the same phone lines.

DRL2A Library Decoding and Event Codes Table

3/1 - 4/1 Alarm Library

For Alarm Message	*Corresponding Code*	*Event Code (Options 00-AF)*
Alarm	0 (A)	A
Alarm	1	A
Alarm	2	A
Alarm	3	A
Alarm	4	A
Alarm	5	A
Alarm	6	A
Alarm	7	A
Alarm	8	A
Restore	9	R
Open	B	O
Close	C	C
Cancel	D	/
Restore	E	R
Trouble	F	T

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

Message	*For Alarm Code*	*Corresponding Event Code (Options 10-1F)*
Alarm	0x (Ax)	A
Alarm	1x	A
Alarm	2x	A
Alarm	3x	A
Alarm	4x	A
Alarm	5x	A
Alarm	6x	A
Alarm	7x	A
Alarm	8x	A
Restr	9x	R
Open	Bx	O
Close	Cx	C
Cancl	Dx	/
Restr	Ex	R
Trble	Fx	T

4/2 Extended & 4/3 Alarm Library

Message	*For Alarm Code*	*Corresponding Event Code (Options 20-2F)*	
		Default	*Other **
Alarm	0xx (Axx)	T	0
Alarm	1xx	A	1
Alarm	2xx	A	2
Alarm	3xx	A	3
Close	4xx	C	4
Open	5xx	O	5
Alarm	6xx	A	6
Alarm	7xx	A	7
Alarm	8xx	A	8
Restr	9xx	R	9
CloseGrp	Bxx	C	C
OpenGrp	Cxx	O	O
Bypas	Dxx	B	B
UnByp	Exx	H	H
Cancl	Fxx	/	/

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

Event Codes Summary

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

MODULE

The CPM2 is the central processing module that monitors the DRL2A Line Cards and forwards the information from the Line Cards to the computer and printer. The CPM2 is capable of monitoring a maximum of 14 telephone lines from 7 DRL2A modules.

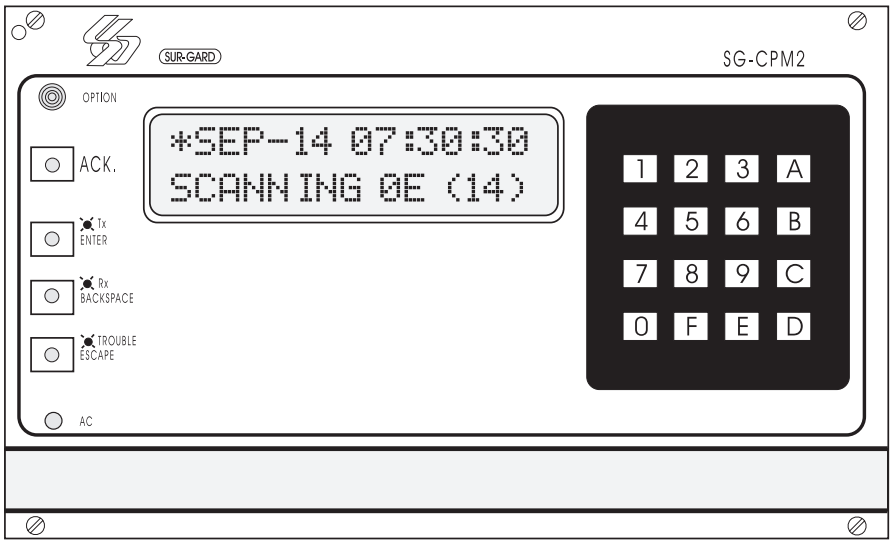
General Information

The CPM2 16-bit micro-controller and real-time assembly language program running at 16MHz 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.

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 CPM2. The CPM2 is capable of polling 14 Line Cards in 1 second
- 128-event printer alarm message buffer
- 128-event computer alarm message buffer
- LCD contrast easily adjusted
- Ability to individually examine each Line Card message
- "Cold boot" option allows easy installation of default configuration
- Built-in diagnostic "debug" mode allows each Line Card to be monitored individually
- Serial Port COM1 features LED indicators for Transmit (Tx) and Receive (Rx) functions
- Available COM1 baud rates: 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200 or 38400
- COM1 Data bits: 7, 8 or 9
- COM1 Parity: Even, odd or none
- COM 1 Stop Bits: fixed at 1
- Built-in Serial Communication Diagnostic Mode for COM1. The technician can test the communication with the central station computer and monitor what is being transmitted to and received from the receiver and computer
- Two programmable outputs, one with front panel LED indicator
- Buzzer mute option for system testing
- System menu for easy programming and diagnostics
- Software Version 2.3 supports SCADA Line Cards for networks of receivers
- Software Version 2.3 supports line cards programming through computer

CPM2 Controls



Liquid Crystal Display: 2-line, 16 character per line liquid crystal display; backlit for easy reading in low level light

"Option" light: Indicates the state of the "Option" programmable output. Flashing 2 seconds ON, 2 seconds OFF, with the standard program.

[ACK] button: Used to manually acknowledge an alarm event when a computer is not connected to the receiver or when the UL Receiver Option is enabled. Press the [ACK] button to turn the "ACK" light OFF and silence the buzzer. The [ACK] button is also used in the Configuration Mode to select menu items.

"ACK" light: Flashes when a message is received from the Line Card and COM1 is disabled or disconnected

[Enter] button: Executes a command or scrolls the display to the next message.

"TX" light: Monitors the COM1 transmission signal

[Backspace] button: Used to erase errors or move the cursor back one character; also used to scroll the display back to the previous message.

"RX" light: Monitors the signal received from the computer connected to COM1.

[Escape] button: Used to save changes and exit a mode; also used for other functions when indicated on the display screen.

"TROUBLE" light: Illuminates when a trouble condition is present (not used).

"AC" light: Indicates that AC power is present.

CPM2 OPERATING MODE

CPM2 Cold Start-up

The "cold boot" should be performed to install the default system software.

Follow the procedure described here to perform a "cold boot" of the CPM2.

- Remove the CPM2 from the card cage
- Turn the "PROG EN" (Program Enable) switch ON. The Program Enable switch is located on the left side of the CPM2 unit. Use a small screwdriver to turn the switch ON.
- Re-install the CPM2 in the card cage, but do not fasten the mounting screws. The CPM2 should power up and this message will be displayed:

```
SYST COLD BOOT?
Ent=Yes  Bsp=No
```

- Press the [Enter] button to perform the "cold boot". This message will be displayed:

```
SYST COLD BOOT
Executing!
```

After approximately 1 second, this message will be displayed:

```
Please Turn Off
Program Switch!
```

The CPM2 will remain in an inoperative mode until the Program Enable switch is turned OFF.

- Pull the CPM2 part way out of the card cage
- Use a small screwdriver to turn the Program Enable switch OFF
- Reinstall the CPM2 in the card cage and secure the faceplate screws

The CPM2 is now ready for operation. Set the clock and calendar and configure the CPM2.

CPM2 in Stand-By Mode

When the CPM2 is in Stand-By mode, a message similar to this will be displayed:

```
*FEB-23  07:30:45
Scanning 0E (14)
```

This indicates that the system is ready to receive data from the Line Cards and input from the numeric keypad and push buttons.

CPM2 Configuration Mode

The Configuration Mode allows programming of the various features and options available on the CPM2. To enter the Configuration Mode, press the [Escape] button. This message will be displayed:

```
Enter MASTER-ID
****
```

Enter the Master Access Code using the keypad. The default Master Access Code is "CAFE". When the access code is entered, the screen will display the first option in the Options Menu:

```
01:Sys Date/Time
Ent:+ Bs:- Ack:S
```

Press the [Enter] button to display the next menu item, or press the [Backspace] button to display the previous menu item Press the [ACK] button to select the menu item presently displayed on the screen.

Configuration Options

The CPM2 features 23 configuration options:

01 System Date and Time
02 System Passwords
03 Number of Line Cards
04 Printer Select
05 COM1 Configuration
06 COM1 Format
07 Acknowledge Wait Delay
08 Heartbeat Select
09 COM2 Configuration
10 COM2 Format
11 Contrast Adjust
12 UL Receiver Option
13 Erase Memory
14 Mute Buzzer
15 Keep Last Message
16 Debug ComPort
17 Test 9v/12v Batt
18 Debug Line Card
19 Program Version
20 Monitor Battery
21 Year / Second
22 Force Reset
23 Change Receiver Number
24 COM1/2 Control
25 Printer Control
26 Printer Test
27 Printer Width
28 Tamper Input

Option 01: Setting the Clock

Option [01] allows the CPM2 date and time to be set. Press the [ACK] button when the "01: Sys Date/Time" message is displayed. This message will be displayed:

```
(D/M/Y)  23/02/97
(H:M:S)  07:30:45
```

Enter the date and time using the numbers 0 through 9 only. Press the [Enter] button to move the cursor one character to the right. Press the [Backspace] button to move the cursor one space to the left.

When the date and time are entered, press the [Escape] button. When the [Escape] button is pressed, the next Configuration Option will be displayed on the screen.

Note that if "0" or a number greater than "12" is programmed for the month, the screen will display the word "Nul" in place of the month while in the Stand-By mode. "Nul" will also be displayed for the time if the time has not be programmed properly.

Option 02: Changing System Passwords

Option [02] allows the CPM2 passwords to be changed or erased. Press the [ACK] button when the "02: Sys Passwords" message is displayed. This message will be displayed:

```
PassID#0:  xxxx
Operator:  S.G.
```

Sixteen 4-digit passwords are available for use on the CPM2. Password 0 is the Master Password, and Passwords 1 through F may be assigned to individual operators. Two letters, representing the initials of the operator, may be assigned to each Password to help in identifying the operator.

When this option is entered, a cursor will appear beneath the first character in the 4-digit Password. Enter a new Password using the 0 through 9 and the A through F keys.

To enter the operator's initials, used the [0] and [1] keys to scroll forward or backward through the alphabet. When the desired letter is displayed, press the [Enter] button - the cursor will move to the next character. To move the cursor to the previous character, press the [Backspace] button.

When the Password and initials have been entered, press the [Escape] button - the next Password will be displayed. When all Passwords have been programmed, the display will advance to the next Configuration Option.

Option 03: Change the Number of Line Cards

Option [03] is used to set the number of Line Cards polled by the CPM2. Press the [ACK] button when the "03: Numb of Lcard" message is displayed. This message will be displayed:

```
#LnCard Attached
E Change to: x
```

Enter a number from 1 to E to indicate how many Line Cards, from 1 to 14, are to be polled by the CPM2. When the new number is entered, press the [Enter], [Backspace], or [Escape] button. The screen will then display the next Configuration Option.

Option 04: Select Printer Function

Option [04] determines how the printer connected to the CPM2 will operate. Press the [ACK] button when the "04: PrinterSelect" message is displayed.This message will be displayed:

```
Prter Config As:
Bkup:0 Enable:1
```

Enter a digit from 0 through 1 for both "Bkup" and "Enable" according to the chart below:

Bkup	*Enable*	*Printer Operation*
0	0	Bypass printer
0	1	Enable printer (default setting)
1	0	Enable printer only if COM1 is in failure
1	1	Enable printer only if COM1 is in failure (same as above)

If "Bkup" is programmed as "1", messages will only be sent to the printer if an acknowledge signal is not received from COM1.

When using the Star 8340 printer, the CPM2 is able to print in both red and black. If an IBM-compatible printer is selected, the CPM2 will print in black only.

When programming is complete, press the [Escape] button. When the [Escape] button is pressed, the next Configuration Option will be displayed on the screen.

Option 05: COM1 Configuration

Option [05] determines the baud rate, data bits and parity to be used on COM1. Press the [ACK] button when the "05: Com#1 Config." message is displayed. This message will be displayed:

```
Com#1 Config As:
Br:12 Da:7 Pa:2
```

Br: Baud Rate	*Enter...*	*for baud rate*
	11	110
	15	150
	03	300
	12	1200
	24	2400
	48	4800
	96	9600
	19	19200
	38	38400

Da: Data Bits Enter a number from 7 through 9 to indicate 7, 8, or 9 data bits.

Pa: Parity	*Enter*	*for parity*
	0	no parity
	1	odd parity
	2	even parity

Note that the stop bit is fixed at 1.

When programming is complete, press the [Escape] button. When the [Escape] button is pressed, the next Configuration Option will be displayed on the screen.

Option 06: COM1 Communication Format

Option [06] determines the communication format to be used on COM1. Press the [ACK] button when the "06: Com#1 Format" message is displayed. This message will be displayed:

```
Com#1 Format is:
1 Change to: x
```

Enter a number from 0 to 5 to select one of the following:

0 COM1 disabled
1 Sur-Gard format (default setting)
2 Sur-Gard format with common event code "A"
3 Sur-Gard format with header 01 Hex.
4 Sur-Gard Clock Signal format
5 SIA CIS format

When option [06] is programmed as 5, the information to the computer will be sent as follows:

<identifier><LF><CRC><HT><seq><rec><line>|<data>|<cr>

When programming is complete, press the [Enter], [Backspace], or [Escape] button. When a button is pressed, the next Configuration Option will be displayed on the screen.

Option 07: Wait Time for Acknowledge on COM1

Option [07] determines the acknowledge wait time, in seconds, to be used for COM1. Press the [ACK] button when the "07: ACK Wait Time" message is displayed. This message will be displayed:

```
<ACK> Wait Delay
4.0S Chg to:x.xS
```

Enter a decimal number from 4.0 to 9.9. Use the [Enter] and [Backspace] buttons to move the cursor forward or backward when editing the acknowledge time.

When programming is complete, press the [Escape] button. When the [Escape] button is pressed, the next Configuration Option will be displayed on the screen.

When the <ACK> wait time is programmed as "0.0", the CPM2 will not require a "06H" (ACK) from the computer.

Note: It is strongly recommended not to change the default (4.0 sec.) unless recommended to by a Sur-Gard representative technician.

Option 08: Heartbeat Time for COM1

Option [08] determines at what time interval, in seconds, the supervisory "heartbeat" transmission will be sent to COM1.

The "heartbeat" transmission is used to ensure that communications through COM1 are functioning normally. Press the [ACK] button when the "08: Heartbeat Sel" message is displayed. This message will be displayed:

```
Heartbeat Select
30S Chg to:XXSec
```

Enter a decimal number from 01 through 99 to determine the time interval between heartbeat transmissions. Program this option as "00" to disable the heartbeat transmission.

Use the [Enter] and [Backspace] buttons to move the cursor forward or backward when editing the heartbeat time.

When programming is complete, press the [Escape] button. When the [Escape] button is pressed, the next Configuration Option will be displayed on the screen.

Option 09: COM2 Configuration

Option [09] determines the baud rate, data bits and parity to be used on COM2. Press the [ACK] button when the "05: Com#1 Config." message is displayed. This message will be displayed:

```
Com#2 Config As:
Bd:03 Da:8 Pa:2
```

Bd: Baud Rate	***Enter...***	***for baud rate***
	11	110
	15	150
	03	300
	12	1200

Da: Data Bits Enter a number from 7 through 9 to indicate 7, 8, or 9 data bits.

Pa: Parity	***Enter***	***for parity***
	0	no parity
	1	odd parity
	2	even parity

Note that the stop bit is fixed at 1.

When programming is complete, press the [Escape] button. When the [Escape] button is pressed, the next Configuration Option will be displayed on the screen.

Option 10: COM2 Communication Format

Option [10] determines the application to be used on COM2. Press the [ACK] button when the "10: Com#2 Format" message is displayed. This message will be displayed:

```
Com#2 Format is:
0 Change to x
```

Enter a number from 0 to 2 to select one of the following:

0 PC Computer Programming Software capability (default setting) See page 42.

1 SCADA connection through Com#2 enable

2 SCADA connection through Com#2 with Redundancy Backup enable

Option 11: Adjust LCD Contrast

Option [11] allows the contrast of the message display screen to be adjusted. Press the [ACK] button when the "11: Contrast Adj" message is displayed. This message will be displayed:

```
Contrast Level
```

Press the [Enter] button to increase the contrast; press the [Backspace] button to reduce the contrast.

When the display contrast is adjusted to the desired level, press the [Escape] button. When the [Escape] button is pressed, the next Configuration Option will be displayed on the screen.

Option 12: UL Receiver Option

To have the MLR2-DG operate in compliance with UL-Listed Central Station requirements, press the [ACK] button when the "12: UL Receiver" message is displayed. This message will be displayed:

```
UL Requirement:
0 Change to:x
```

When Option [12] is programmed as "1", the CPM2 will operate according to the following U.L864 requirements:

1 All signals are sent to the computer and/or the printer if connected.

2 The CPM2 retains alarm messages received from the Line Cards and the CPM2 supervisory signal on the LCD display, and activates the buzzer to alert the operator. The display will also indicate if additional signals are waiting to be displayed and acknowledged.

3 The operator must press the [ACK] button to acknowledge the signal manually. The CPM2 will scroll to the next message if there are more messages to display.

4 The CPM2 returns to the Stand-by Mode when all signals have been manually acknowledged.

When Option [12] is programmed as "00", functions described above will be bypassed. The default setting for Option 12 is "00".

Option 13: Erase Alarm Message Buffer

Note: Under normal operating conditions, the buffer should not be erased.

Option [13] is used to erase the CPM2 alarm message buffer. Press the [ACK] button when the "13: Erase Memory" message is displayed. This message will be displayed:

```
Erase all MEMORY
ent=Y bs=N esc=X
```

Press the [Backspace] or [Escape] buttons to cancel this option without erasing the CPM2 buffer. To erase the buffer, press the [Enter] button. When the [Enter] button is pressed, this message will be displayed:

```
Are You Sure?
ent=Y bs=N esc=X
```

Again, press the [Backspace] or [Escape] buttons to cancel this option without erasing the CPM2 buffer. To erase the buffer, press the [Enter] button. When the [Enter] button is pressed, all printer and computer messages will be erased. Ensure that a printed record of the alarm messages is made before erasing the buffer.

Option 14: Mute Buzzer

A tone will sound when the CPM2 receives an alarm and is unable to forward the alarm message to COM1. The tone may be silenced by programming Option [14] as "1". Press the [ACK] button when the "14: Mute Buzzer" message is displayed. This message will be displayed:

```
Mute Buzzer: 1/0
0 Change to:X
```

When programmed as "1", the buzzer will not sound when an alarm is received and cannot be forwarded to COM1.

When programmed as “0”, the buzzer will sound when an alarm is received and cannot be forwarded to COM1. The default setting is “0”.

NOTE: Option 14 will have no effect on the buzzer if the UL Receiver Option is enabled.

Option 15: Display Last Message

When an alarm is received, the alarm message will be displayed on the screen until the message is forwarded to the computer and printer. When the message is sent to the computer and printer, the Stand-By Mode message will be displayed.

The most recent alarm message may be retained on the screen until the next alarm message is received. To retain the most recent alarm message, program Option [15] as “1”. Press the [ACK] button when the “15: Keep Lst Msg” message is displayed. This message will be displayed:

```
Keep Lst Msg:1/0
0 Change to:X
```

To have the Stand-By Mode message displayed after an alarm is received and sent to the computer or printer, program Option [15] as “0”. The default setting is “0”. When “0” or “1” has been entered, press the [Enter] key.

Option 16: ComPort Diagnostics

The CPM2 features a diagnostics mode that allows the operator to view all data being communicated through COM1 (or COM2) on the display screen. To use this feature, press the [ACK] button when the “16: Debug ComPort” message is displayed. This message will be displayed:

```
Debug ComPort1,2
0 Change to:x
```

Enter “1” and press the [Enter] button to enable the diagnostics feature on Com1 (or “2” for Com2). All data being sent through COM1 will now be displayed on the screen. A typical transmission is shown here:

```
1RRL   AAAAsX
YY   N 06
```

- N represents the number of times the CPM2 tries to re-send the message to COM1. This value should be “1” during normal communication
- 06 represents the acknowledge received from COM1

To disable the diagnostics feature, program Option 16 as “0”. The diagnostics mode should only be enabled to test and review the information being sent to COM1. The diagnostics feature should be disabled during normal receiver operation.

Option 17: Test 9V/12V Battery

Some earlier CPM2 units provide 9V battery for memory storage while present CPM2 units use different technology for this purpose.

If the unit uses 9V battery , the battery voltage should be supervised by enabling this option. Press [ACK] button when the "17:Test 9V Batt." message is displayed. Then the following message will be displayed:

```
9V/12V Batt: 0-3
3 Change to:x
```

0 Do not supervise the 12V and 9V batteries

1 Supervise 9V only

2 Supervise 12V only

3 Supervise both batteries

Option 18: Line Card Diagnostics

The CPM2 features a diagnostics mode that allows the operator for view all data being communicated between the CPM2 and the Line Cards. To enable this feature, press the [ACK] button when the “18: Debug LnCard#” message is displayed.

Enter a hexadecimal number from “1” through “E” to monitor Line Card 01 through 14, or enter “F” to monitor all Line Cards connected to the CPM2.

Stand-By communications between the Line Card and the CPM2 will be displayed with messages similar to this:

```
01
                FE
```

- 01 represents the Line Card number
- FE represents the normal Stand-By response from the Line Card to the CPM2

Alarm messages transmitted by the Line Cards will be displayed with messages similar to this:

```
L01-1234-C01
OpenGrp
```

NOTE: When diagnostic modes are enabled, messages will be displayed according to the following priority:

- UL message - Acknowledge required
- COM1 Diagnostic messages
- Line Card Diagnostic messages
- “Retain last message” displays
- Internal Troubles messages
- Stand-By Mode message

Refer to “Message Priorities” for more information.

Option 19: Display Software Version

To display the software version presently installed in the CPM2, press the [ACK] button when the “19: Program Vers#” message is displayed. A message similar to this will be displayed:

```
SG-CPM2 RECEIVER
*May-22-97 V2.30
```

Option 20: Battery Monitor

To view the present voltage of the 12V general back-up batteries, press the [ACK] button when the “20: Monitor Batt.” message is displayed. A message similar to this will be displayed:

```
Battery Monitor:
12V:13.9 Volt
```

If the 12V battery is disconnected, approximately 11.2V will be indicated for that battery.

NOTE: If option 17 is at 03, a message similar to this will be displayed:

```
Battery Monitor:
9V:08.8 12V:13.9
```

Option 21: Alarm Messages Print Year or Seconds

Alarm messages may be programmed to include either the year in their dates, or the seconds in their times. To program Option [21], press the [ACK] button when the “21: Year/ Second” message is displayed. This message will be displayed:

```
Year/Second:0/3
0 Change to:X
```

Program Option [21] as “1” to include the year in the alarm message date. Alarm messages will be printed as follows:

L01-1234-05 Alarm 21:24-24/11/94

Note that the time (21:24) is represented with just hours and minutes, and that the year is added to the date (24/11/94).

Program Option [21] as “0” to include the seconds in the alarm message time. Alarm messages will be printed as follows:

L01-1234-05 Alarm 21:24:30-24/11

Note that the time (21:24:30) now includes hours, minutes and seconds. The date (24/11) only indicates the day and the month.

System option [21] provides the following choices for the printer time and date format:

0 hh:mm:ss-DD/MM
1 hh:mm-DD/MM/YY
2 hh:mm:ss-MM/YY
3 hh:mm-MM/DD/YY

NOTE: This option will affect COM1 when COM1 is programmed with communication format 4.

Option 22: System Reset

To reset the CPM2, press the [ACK] button when the “22: Force Reset” message is displayed. This message will be displayed:

```
Force Sys Reset
Ent=Yes  Bsp=No
```

Press the [Backspace] button to cancel the option without resetting the CPM2. To reset the CPM2, press the [Enter] button.

The reset will take approximately 8 seconds to complete. Press the [Backspace] or [Escape] buttons to move to the next Configuration Option.

Option 23: Change Receiver Number

The receiver number is used to identify the receiver when communicating to COM1 and printer to report internal troubles. To change the receiver number, press the [ACK] button when the “23: Chg Receiver#” message is displayed. This message will be displayed:

```
Receiver Number:
01  Chg  to:xx
```

Enter a new receiver number using the hexadecimal numbers “01” to “FF”. When a new number is entered, press the [Enter] button.

Note that when Option [23] is programmed, the display will return to Option [01].

Option 24: COM1/2 Control

SCADA

The MLR2-SCADA (SCADA stands for Supervisory Control and Data Acquisition) consists of a SCADA receiver and a CPM2 module. Its function is to transport alarm data from a local (satellite) central station to the master central station reliably. This is done using linked modems (like the SG-M1) over leased phone lines. This system is specifically intended for use with a point to point 300 baud Schedule 3A data line (Canada), but can be used with any data line.

The CPM2 software version 2.3 supports data transactions for up to 14 digital and/or DVACS-compatible lines. But, we strongly suggest a maximum of 8 lines on the remote location when used within a SCADA configuration. For alarm output choices, (option [24]) a number corresponding to each of the line cards, 1 to 14, is indicated on the LCD at 14 positions from left to right as follows:

```
24:  COM1/2  Control
Ent:  +  Bs:-  Ack:S
```

```
123456789ABCDE:
44444444444444
```

Press Enter or Backspace to move the cursor over the digit corresponding to the line card you wish to change. Enter the new digit. The CPM2 will display the change on the LCD, and the cursor will move to the next digit. Change another digit, as above, if desired, or exit and save the changes by pressing <Escape>.

The numbers which can be programmed are:

0 : no route at all - no printer output, no computer output (not recommended).

1 : send computer alarm messages only to the Com#1 (local computer) only.

2 : send computer alarm messages only to Master central through Com #2 for transmission to the SCADA DVL2A of the master receiver only.

3 : send computer alarm messages to Com #1 (local computer) and next to Com #2 for DVL2A SCADA.

4: send computer alarm messages to Com #1 and Com #2, and send printer alarm messages to Com #2.

Option 25: Printer Control

The remote receiver SCADA CPM2 sends data to the local printer in the normal way, which can be enabled/disabled for each line at option [25] as follows:

```
25:  Prter  Control:
Ent:  +  Bs:-  Ack:S
```

```
123456789ABCDE  :
11111111111111
```

Programming "1" will enable the local printer report for this specific line. "0" will disable the local printer for this specific line.

NOTE: When the receiver routes the data to the serial port Com #2, it needs to insert the checksum calculation and support the protocol described in more detail in the MLR2-SCADA manual.

Option 26: Printer Test

When this option is enabled, a test signal will be sent to the printer at 05:00 and 17:00 hrs. This option is set to "0" (OFF) by default. Press [ACK] when "26: Printer Test" is displayed. The following message will then be displayed:

```
Printer  Test:  1/0
0  Change  to:
```

Enter "1" and press the [Enter] button to enable the test feature. The CPM2 will send a test signal to the printer at the scheduled time.

Printer message: L10 Printer Test 17:00:00 - 12/05

Option 27: Printer Width

NOTE: The 80-column mode is not supported with SCADA installation.

This new option has been included to support the new CIS format. The new format will be available with future line card revisions. This option will set the printer width to either 40 or 80-columns. Press [ACK] when the message "27: Printer

Width" is displayed. The following message will then be displayed:

```
40/80 Column:  0/1
0 Change to:
```

Press "1" and then [Enter] to enable the 80-column width feature.

Option 28: Tamper Input

To view the Tamper Input / UPS Low Battery supervisory, press the [ACK] button until "28: Tamper Input" is displayed. Press [ACK], the following message will then be displayed:

```
UPS/<ACK> :  0/1
0 Change to:
```

When this option is set to "0", the tamp terminal when shorted to ground will send a UPS Low Battery supervisory to the computer and activate the buzzer and ACK LED. The buzzer will shut off when the [ACK] button is pressed, or the UPS Low Battery is restored. When the option is set to "1", the tamp terminal can be used as a remote [ACK] button when shorted to ground. The default setting is "0".

Connect a push button switch between the TAMP terminal and the GND terminal. When shorting the TAMP terminal with the ground, the receiver will react as if the front <ACK> button has been pressed. This could be used to install a remote acknowledge button when using the receiver in manual mode.

Message Priorities

When in Stand-By Mode, the CPM2 will display warning and other operational messages according to the following priority:

1. UL Requirement Message
2. COM1/COM2 Diagnostics
3. Line Card Diagnostics
4. “Retain last message” displays
5. Printer Error
6. COM1 Absent
7. 12V Battery Low
8. 9V Battery Low
9. AC Failure
10. Stand-By Mode message

UL Requirement Message

When Option [12] is programmed as “01”, the “ACK” button must be pressed to acknowledge each incoming alarm manually and to silence the internal buzzer.

COM1 Diagnostics

If both Option [16] and Option [06] are enabled, the screen will display the data being communicated through COM1. Refer to Option [16] for information.

Line Card Diagnostics

If Option [18] is enabled, the screen will display that data exchanged between the CPM2 and the selected Line Card. Refer to Option [18] for more information.

“Retain Last Message” Displays

If Option [15] is enabled, the latest printer message will be retained on the display screen. Refer to Option [15] for more information.

Printer Error

If Option [04] is enabled and there is a printer trouble (for example, printer off-line, paper out, and so on), a message similar to this will be displayed:

```
*Feb-23  07:30:45
<Printer ERROR!>
```

COM1 Absent

If Option 06 is enabled and COM1 is absent (for example, disconnects, off-line, or fails to sent acknowledge signal), a message similar to this will be displayed:

```
*Feb-23  07:30:45
<<Com#1 ABSENT>>
```

12V Battery Low

If the 12V back-up battery is disconnected or its voltage is low, a message similar to this will be displayed:

```
*Feb-23  07:30:45
12V Battery LOW!
```

AC Failure

If AC power is removed from the CPM2, this message will be displayed:

```
*Feb-23  07:30:45
<AC Power LOST!>
```

Stand-By Mode Message

During normal stand-by operation, this message will be displayed:

```
*Feb-23  07:30:45
Scanning 0E (14)
```

When the CPM2 is in the Stand-By Mode, the following functions may be accessed by pressing the [A] through [F] keys:

- [A] Send Computer Messages to Printer
- [B] Operator Log-On
- [C] System Command Mode
- [D] Send Printer Messages to the Printer
- [E] Examine Printer Messages on Display Screen
- [F] Examine Computer Messages on Display Screen

[A] Send Computer Messages to Printer

This mode is used to send the computer messages from the buffer to the printer. When the [A] key is pressed, this message will be displayed:

```
Dump COM Msg->PRT
Lcard#:F Ent:EXE
```

Enter a hexadecimal number to print the following:

Enter...	*to Print*
"0"	CPM2 internal supervisory signals (if any)
"F"	Computer messages for all Line Cards and CPM2 internal supervisory signals
"1-E"	Computer messages for specified Line Card

Example: If "0" is entered, the following will be printed:

Dump Computer Alarm Buffer
1011 ..... 0000 . R .. 06 12:37:31 - 12/10 106
1011 ..... 0000 . A .. 01 12:38:22 - 12/10 106

- "106" indicates the message was successfully sent to the computer and the computer has responded correctly with an [06] acknowledge.

[B] Operator Log-On

Different operators may "log-on" to the system by entering this mode. When an operator logs on, a message similar to this one will be printed: "Operator on duty S.G. 11:03-21/12/92"

The operator's initials (if programmed) and the time and date will be printed. If the Star 8340 printer is being used, this message will be printed in red.

To log on, press the [B] key, and then enter a 4-digit Password. If a valid password is entered, a log-on message will be printed. If an invalid password is entered, the CPM2 will sound a tone to indicate that the code was entered incorrectly.

Refer to CPM2 Option [02] for information on programming operator Passwords and initials.

[C] System Command Mode

The System Command Mode is used to send commands to the Line Cards through the CPM2. To enter this mode, press [C] and then enter an Operator Password. When the Password is entered, this message will be displayed:

```
LCard:__ Comd:__
Op:__ Cd:__ Sc:__
```

- LCard: Enter a 2-digit hexadecimal number from 01 to 0E to indicate which Line Card is to be affected.
- Comd: Enter one of the Line Card Commands described in the DRL2A Line Card Menu Mode section of this manual
- Op: and Cd: "Op" and "Cd" are used to indicate parameters that may be required within certain commands. For example, when using the F7 Line Card programming command "Op" and "Cd" are used to indicate the Option number and the new code programmed for that option.
- Sc: "Sc" is used with SCADA applications.

Enter digits using the keypad. When a digit is entered, the cursor will move one character to the right. Press the [Backspace] button to delete the character presently indicated by the cursor and move the cursor 1 character to the left.

When a command has been entered, press the [Escape] button to send the command to the Line Card.

If more than one command is to be sent, press the [ACK] button to send the command presently displayed on the screen. Another command may now be entered.

[D] Send Printer Messages to the Printer

With the CPM2 in the Stand-By Mode, press the [D] key to send printer messages in the buffer to the printer. When the [D] key is pressed, this message will be displayed:

```
Dump PRT Msg->PRT
LCard#:F ent:EXE
```

Enter a hexadecimal number to print the following:

Enter...	*to print*
"0"	CPM2 internal trouble messages (if any)
"1" to "E"	Print messages for specified Line Card
"F"	Print messages for all Line Cards

If an error is made in entering the number, simply re-enter the desired number again on the keypad.

Press the [Backspace] or [Escape] button to cancel this function and return to the Stand-By Mode. Or, press the [Enter] button to print the indicated messages. When the [Enter] button is pressed, the CPM2 will print the printer messages, starting with the oldest message first. The messages will be printed in red if the Star DP8340 printer is being used.

If the CPM2 receives new alarms from the Line Card while buffer is being printed, the new alarms will be sent to the printer when the buffer printout is completed.

[E] Examine Printer Messages on Display Screen

With the CPM2 in the Stand-By Mode, press the [E] key to review printer messages on the display screen. When the [E] key is pressed, this message will be displayed:

```
Exam PRINTER msg
LCard#:F ent:EXE
```

Enter a hexadecimal number to view the following:

Enter...	*to view*
"0"	CPM2 internal trouble messages (if any)
"1" to "E"	Messages for specified Line Card
"F"	Messages for all Line Cards

If an error is made in entering the number, simply re-enter the desired number again on the keypad.

Press the [Backspace] or [Escape] button to cancel this function and return to the Stand-By Mode. Or, press the [Enter] button to view the indicated messages.

When the [Enter] button is pressed, the CPM2 will display the printer messages, starting with the most recent message. When [Enter] is pressed, a message similar to this will be

displayed:

```
L01-1234-05
Alarm       xx
```

- xx indicates the number (in hexadecimal) of printer messages in the Line Card buffer.

Press the [Enter] button to scroll through the messages. The messages will be displayed in order from the most recent to the oldest. Press the [Backspace] button to scroll from the oldest message to the most recent.

When finished viewing the messages, press the [Escape] button.

[F] Examine Computer Messages on Display Screen

With the CPM2 in the Stand-By Mode, press the [F] key to review computer messages on the display screen. When the [F] key is pressed, this message will be displayed:

```
Examine COM1 msg
LCard#:F ent:EXE
```

Enter a hexadecimal number to view the following:

Enter...	*to view*
"0"	CPM2 internal trouble messages (if any)
"1" to "E"	Computer messages for specified Line Card
"F"	Computer messages for all Line Cards

If an error is made in entering the number, simply re-enter the desired number again on the keypad.

Press the [Backspace] or [Escape] button to cancel this function and return to the Stand-By Mode. Or, press the [Enter] button to view the indicated messages. When the [Enter] button is pressed, the CPM2 will display the computer messages, starting with the most recent message. When [Enter] is pressed, a message similar to this will be displayed:

```
1011......0000.A
..03   1.06  xx
```

- xx indicates the number (in hexadecimal) of computer messages in the Line Card buffer.

Press the [Enter] button to scroll through the messages. The messages will be displayed in order from the most recent to the oldest. Press the [Backspace] button to scroll from the oldest message to the most recent. When finished viewing the messages, press the [Escape] button.

MLR2-DG Computer Interface

The CPM2 is able to send alarm messages to a computer connected to the COM1 serial port. This section describes the communication procedures, and the communication formats available for use.

Overview of Communication

When the CPM2 receives data from a Line Card, it forwards the data to COM1 and awaits an acknowledgment signal from the computer. If a NAK signal is received from the computer, the CPM2 will make 4 attempts to send the data. If all four attempts fail, CPM2 buzzer will sound and the CPM2 will retain the alarms in its internal buffer until communications are restored. This routing provides reliable and supervised communication between the CPM2 and the Line Cards.

The CPM2 also monitors the connection to the computer by sending a supervisory "heartbeat" signal through COM1 every 30 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#1 Absent!! 09:45-21/09/92

Note that 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#1 Restored 09:50-21/09/92

Note that the message indicates the time and date that communications through COM1 were determined to be re-established.

The "heartbeat" feature may be disabled if this feature is not compatible with the central station automation software being used on the computer.

CPM2 COM1 Status Report Messages

The CPM2 will send the following messages to COM1 to report internal status conditions. CPM2 will use an Account Code of "0000" to indicate that it is reporting an internal condition. The line number is fixed to be "0".

Sent to COM1	*Event*
0000 A 00:	Indicate Operator activity for C or ESC mode. Whenever programming modes are entered from the keypad, the CPM2 will send the following to the printer: Programming entered hh:mm:ss-DD/MM
0000 A 01:	Printer Error
0000 R 02:	Printer Restored
0000 A 03:	12V Battery Low
0000 R 04:	12V Battery Restored
0000 A 05:	COM#1 Absent
0000 R 06:	COM#1 Restored
0000 A 07:	UPS AC Fail
0000 R 08:	UPS AC Restored
0000 A 11:	9V Batt. Low
0000 R 12:	9V Batt. Restr
0000 A 13:	COM#2 Absent
0000 R 14:	COM#2 Restored
0000 A 15:	AC Failure
0000 R 16:	AC Restored
0000 A 17:	UPS Low Battery
0000 R 18:	UPS Low Batt Restr
0000 T 19:	CPM2 Master Fail
0000 A C1 to CE:	Internal communication error
0000 A D0:	CPM2 Reset
0000 A F1 to FE:	Line Card 01 to 0E Absent
0000 R E1 to EE:	Line Card 01 to 0E Restored

The following messages will be sent to COM1 to report status changes on the Line Cards. Again, the Account Code of "0000" indicates that an internal event is being reported. The line number will vary depending on which line card is reporting.

Sent to COM1	*Event*
0000 T 10:	Faulty Data Received on Line Card
0000 A 20:	Telephone Line Fault on Line Card
0000 R 30:	Telephone Line Restored on Line Card
0000 T 40:	Faulty Call; no data received on Line Card
0000 P 0X:	Audio on line X
0000 A D1 to DE:	Line Card 01 to 0E Reset

The Sur-Gard DRL2-DS receiver sends the following protocol to report signals to the central station computer via the RS-232 port.

Data Byte Protocol:

The Sur-Gard receiver uses 1200 baud rate, 1 start bit, 7 data bits, 1 even parity bit, and 1 stop bit structure, to transmit and receive signals. The above protocol can be programmed on the receiver by the central station operator to enable different configurations.

Acknowledgement of the Signal:

The Sur-Gard receiver requires an acknowledge signal [ACK] from the computer software within a certain programmable time for each message sent. The waiting period for the [ACK] can be adjusted up to 10 seconds. Failure to receive the [ACK] will result in the re-transmission of the same signal three more times before giving up. In case of communication failure with the computer, the Sur-Gard receiver can store up to 256 messages in its Static RAM memory. When the communication is resumed, these messages will be automatically sent to the computer.

Basic Signal Protocol:

1RRLssssAAAAAAsXGYYY[DC4]

Where,	1	: Protocol number.
	RR	: Receiver number.
	L	: Line number.
	s	: Space Character.
	AAAAAA	: Account Code, usually 4 digits with 2 leading spaces.
	X	: Event Code. See Table below.
	G	: O/C by Area Number (1-F), or Space.
	YYY	: Zone Number or User Number.
	[DC4]	: Terminator, 14 Hex.

EVENT CODE TABLE

0	Automatic Test	*
1	Fire Alarm	*
2	Panic Alarm	*
3	Burglary Alarm	*
4	Arming by User #	*
5	Disarming by User #	*
6	Service	*
7	Medical Emergency	*
8	Message	*
9	Restore	*
A	Alarm	
B	Bypass	
C	Arming by User #	
F	Auxiliary	
H	Unbypass	
O	Disarming by User #	
R	Restore	
T	Trouble	
Z	Common Event Code	
20(H)	Common Event Code Space Character	

**** These codes are used in the Sur-Gard digital control panel with the DTMF 4/3 format.***

The "Space" character (20 Hex) can be used in case the automation software package combines the event code with the zone code, conflicting with the existing account code data base.

When the O/C signals are transmitted by Groups with the user number included, the “G” code, currently from 1-F, will be in effect to show the Group number, including the proceeding Event Code O or C, as well as the User number at the “YYY” position. The computer may then redirect this signal when necessary.

Example: The panel 0012 is partially armed on Group #1 and Group #2 by user #128. The Sur-Gard receiver will send following messages to the computer:

1RRLssssss0012sC1128[DC4]

1RRLssssss0012sC2128[DC4]

The computer software could probably redirect these signals to a programmable sub-account, in which an o/c schedule for users can be available.

The user report codes on Sur-Gard receiver can be decimal or hexadecimal digits.

Two-Way Audio:

Once the Sur-Gard receiver is in the two-way audio mode, it sends an optional signal to the computer: (Option [4D])

1RRLssssss0000sPss0L[DC4]

Where,	1	: Protocol number.
	RR	: Receiver number.
	L	: Line number.
	s	: Space Character.
	0000	: Account Code 0000.
	P	: Event Code. P is recommended, but it is programmable (DRL2A option [4D]).
	L	: Line number.
	[DC4]	: Terminator 14 Hex.

This signal tells the operator which line is in the two-way audio mode.

Supervisory Heartbeat Signal Protocol:

1011sssssssssss@ssss[DC4]

Where,	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, programmable on the receiver. The computer should acknowledge this signal with an [ACK]. It is recommended to have this signal running.

SIA Protocol 1:

3RRLssssAAAAAAXXYYYY[DC4]

Where,	3	: Protocol number.
	RR	: Receiver number.
	L	: Line number.
	ssss	: Spaces.
	AAAAAA	: Six digit account codes. Leading spaces will be sent if account codes are less than six digits
	XX	: Event code, follows the SIA “Event Block Data Code Definitions”.
	YYYY	: Zone codes. Leading spaces will be sent if zone codes are less than four digits. If no zone codes are received from the control panel, “ss00” will be sent.
	[DC4]	: Terminator, 14 Hex.

SIA Protocol 2:

The SIA Protocol 1 can not handle certain information in the SIA level 2 and 3. We now provide the optional SIA Protocol

2 as the following: (option [31] enable)

SRRL[#AAAAAA|EMMZZZZ/MMZZZZ/MMZZZZ][DC4]

Where,	S	: Beginning transmission of the new SIA protocol
	RR	: Receiver number 00-FE
	L	: Line number 0-E
	[	: Beginning data delimiter
	#	: Account ID block code
	AAAAAA	: Account ID, maximum sixteen digits.
	|	: Field separator
	E	: Function block code
	MM	: Event code or modifier
	ZZZZ	: Zone code, or user code, or time/ date information
	/	: Data code packet separator
	]	: Ending data delimiter
	[DC4]	: Terminator, 14 Hex

The length of the signal varies, and it can support the maximum 63 byte data block transmission from the control panel. When this optional protocol is selected, all SIA information will be sent to the host computer using this protocol.

Examples from a SIA Control Panel:

Standard Transmission:

SRRL[#1234|Nri1/BA01][DC4] or
SRRL[#1234|Nri1BA01][DC4]

Where,	S	: Protocol identifier for SIA protocol 2
	RR	: Receiver number 01-FE
	L	: Line number 1-E
	[	: Beginning data delimiter
	#	: Account ID block code
	1234	: Account ID
	|	: Field separator
	N	: New event function block
	ri1	: Area/Partition number 1
	BA01	: Burglary Alarm zone 01
	]	: Ending data delimiter
	[DC4]	: Terminator, 14 Hex

Listen-in Transmission:

SRRL[#1234|L90][DC4] or

SRRL[#1234|Lri1BA01][DC4] or

SRRL[#1234|Nri1BA01/L90][DC4]

Where,	S	: Protocol identifier for SIA protocol 2
	RR	: Receiver number 01-FE
	L	: Line number 1-E
	[	: Beginning data delimiter
	#	: Account ID block code
	1234	: Account ID
	|	: Field separator
	L	: Listen-in block
	ri1	: Area/Partition number 1
	/	: Data code packet separator
	BA01	: Burglary Alarm zone 01
	L90	: Listen in, panel will stay on line 90 s
	]	: Ending data delimiter
	[DC4]	: Terminator, 14 Hex

The receiver will switch on listen-in only if option 49 is programmed.

Compatible Alarms-related Function Code Blocks on DRL2A v2.1i

Block Type	Block Code	Block Type
System	0	End of data
Inf.	E	Environmental
Inf.	N	Event (new)
Inf.	O	Event (old)
Special	@	Configuration
Special	#	Account ID
Special	A	ASCII
Special	I	Downlook
Special	X	Extended
Special	L	Listen-in
Special	&	Origin

DRL2A v2.1i SIA Digital Compatible Levels

Supported Feature	SIA1	SIA2	SIA3	DRL2A
Tonal acknowledgment	✓	✓	✓	✓
N block with zone numbers only	✓	✓	✓	✓
Single account block per call	✓	✓	✓	✓
O block	✓	✓	✓	✓
X block	✓	✓	✓	✓
300 baud	✓	✓	✓	✓
Configuration block		✓	✓	✓
Data acknowledgment		✓	✓	✓
Modifiers, name		✓	✓	✓
Multiple account block per call		✓	✓	✓
Extended block		✓	✓	✓
Data code with unit numbers		✓	✓	✓
Receiver call out and access passcode block			✓	
Reverse channel C blocks			✓	
Reverse channel P blocks*			✓	N/A
Reverse channel ASCII blocks			✓	
Dynamic block and group sizes			✓	✓
Listen-in			✓	✓
Video			✓	✓
ASCII blocks to receiver			✓	✓
V-channel communications*			✓	N/A
Origin block			✓	✓

* Support of feature is optional for receiver.

FSK 200 baud Protocol:

GRRLsssssAAAAAsXssZZ[DC4]

Where:	G	: CESA protocol identifier

RR : receiver number
L : line number
AAAAA : account number (5 digits)
X : alarm type
When: X=1 : Alarm
X=2 : Restore
X=3 : Status: Alarm
X=4 : Status: Normal
ZZ : zone number
[DC4] : represents the terminator
s : represents spaces

Contact-ID Protocol:

5RRLs18AAAAQXYZGGCCC[DC4]

Where, 5 : Protocol number.
RR : Receiver number.
L : Line number.
s : Space.
18 : Contact-ID format identifier.
AAAA : Four digit account codes.
Q : Qualifier, E=New event or opening, R=New restore or closing. P=Previous event
XYZ : Class code and event code.
GG : Group number.
CCC : Zone codes or user ID.
[DC4] : Terminator,14 Hex

Example: Account 1234 sends in a duress alarm with group number 01, and zone code 001, the receiver number 01 and line number 1 will send this signal as follows:

5011s181234E12101001[DC4]

BFSK Protocol:

6RRLssssssAAAAXXYYYY[DC4]

When used with the SUR-GARD interface. This protocol is compatible to the RADIONICS D6500 Mode except that the protocol number is '6'.

Or 1RRLssssssAAAAXXYYYY[DC4]

When used with the RADIONICS 6500 interface. This is fully compatible to the RADIONICS D6500 Mode.

Telenot/Telim Protocol

TRRLAAAAAAsEssZZ[DC4]

Where, T : Telenot format identifier
RR : Receiver number
L : Line number
s : Spaces
AAAAAA : account code
E : event code
When E=A: alarm
E=F: fault
E=H: maintenance restoral
E=K: restore
E=L: maintenance alarm
E=N: emergency alarm
E=O: call
E=Q: remote programming
E=R: test transmission
E=T: closing
E=U: opening
ZZ : zone or user number
[DC4] : terminator character

Ademco High Speed Protocol:

8RRLAAAAsCCCCsCCCCsC[DC4]

Where, 8 : Protocol number
RR : Receiver number
L : Line number
AAAA : Account code
s : Space
CCCC : Channel 1-4
s : Space
CCCC : Channel 5-8
s : Space
C : Channel 9
[DC4] : Terminator, 14 Hex

Outel Protocol

1RRLsssssssss00AAsEss0Z[DC4]

Where, L : Outel format identifier
RR : receiver number
L : receiving line card number
s : spaces
0 : leading zeros
AA : 2-digit account number
E : corresponding event code of the received reporting code
Z : received reporting code
[DC4] : terminator string from receiver

ITI Protocol

The Sur-Gard SG-MLR2-DG ITI protocol is based on the ITI generic format, with added protection levels.

IRRLsssACAAAAGIZZEWN[DC4]

Where, I : Protocol number (ITI)
RR : Receiver number (00-FF)
L : Line number (0-E)
sss : Spaces
A : Highest character of the ITI account code
C : CPU panel type / zone attribute code
AAAA : Lower 4 characters of the ITI account code
G : Group number
I : User ID for opening / closing
ZZ : Zone Number
E : Alarm Condition code
W : Previous protection level
N : Current protection level
[DC4] : Terminator

Panel Identifier

' = SX-V (60 hex)
P = Others (70 hex)

Alarm Code Condition

A = Alarm
R = Cancel
E = Exit fault
S = Supervisory
L = Low battery
B = Bypass
T = Tamper alarm
W = Restoral
P = Auto phone test
V = Instant method
N = New log
J = Trouble
I = Improper ID code

The group number and user number are calculated as follows:

Reported Number	Group / User Byte
0-9	"0" - "9"

10-35	“A” - “Z”
36-61	“a” - “z”
62 and greater	“?”

NOTE: The DRL2A will not respond to any interactive commands from the ITI panels. The audio feature is supported for ITI accounts.

Video Downlook Protocol:

DRRLssssssAAAAGCsVPa[DC4]

Where,	D	: Protocol number
	RR	: Receiver number
	L	: Line number
	ssssss	: Spaces
	AAAA	: Account code
	G	: Line Test Grade 1-9, 0=Bypassed A-Z=Text to follow, up to 6 characters
	C	: Control code 1-F, which is the first digit of alarm code from 4/3 format or 4/2 format
	s	: Space
	V	: Camera number 1-F, 0=No, X=Unknown
	P	: Picture number 1-8, 0=No
	a	: Audio Indicator, 1=Audio, 0=No Audio
	[DC4]	: Terminator, 14 Hex

SIA Video Downlook Protocol

DRL2A v2.1i supports the SIA video block (available on the DSC PC1580, DSC PC5010 and DSC PC5015). In order to ensure proper decoding, options [31] (SIA option) and [4E] (Downlook option) must be enabled. The video signal will be sent to the computer as follows:

SRRL[#AAAA|pt010/cn00x/im00x][DC4]

Where,	S	: SIA header
	RR	: Receiver number
	L	: Line number
	AAAA	: Account code
	|	: Field separator
	pt	: Manufacturer identifier (010 for DSC/Sur-Gard)
	/	: Data code packet separator
	cn	: Camera number
	im	: number of images (3 digits)
	[DC4]	: Terminator, 14 hex

SIA AIR Downlook Protocol:

SRRL[#AAAA|lpt010/ad004/cn00x][DC4]

Where,	S	: SIA header
	RR	: Receiver number
	L	: Line number
	AAAA	: Account code
	|	: Field separator
	l	: Video block function code
	pt	: Manufacturer identifier (010 for DSC/Sur-Gard)
	/	: Data code packet separator
	ad	: Additional images (fixed to 004)
	cn	: Camera number
	[DC4]	: Terminator, 14 hex

FBI Protocol

JRRLssssssAAAATZZEss[DC4]

Where,	J	: FBI protocol identifier
	RR	: receiver number
	L	: 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.

Robofon Protocol

HRRLssssAAAAAAsEssYZ[DC4]

Where,	H	: Robofon protocol identifier
	RR	: Receiver number
	L	: Line number
	s	: Spaces
	AAAAAA	: account code
	E	: event code
	YZ	: reporting code
	[DC4]	: terminator string from receiver

Scancom 433 Protocol

1RRLssssssAAAAsEssZZT

Where,	AAAA	: account code
	E	: event code
When (protocol 1)		E=A: alarm E=B: bypass E=H: maintenance restoral E=C: close E=K: keypad E=O: open E=R: restore E=T: trouble
	ZZ	: zone number
	T	: terminator character

or KRRLssssAAAAEEEZZZFFT (option 60=01)

Where,	K	: protocol identifier
	RR	: receiver number
	L	: line number
	s	: spaces
	AAAA	: account code
	EEE	: event type

Event Type	Code
Status	0EF
Restore	034
Test cancel	0BC
Bypass	056
Trouble	078
Opening	996
Closing	995
Duress	00F
Emergency 1	00B
Emergency 2	00C
Emergency 3	00D
Emergency 4	00E

ZZZ : zone number

Zone	Code	Zone	Code
1	011	9	021
2	012	10	022

3	013	11	023
4	014	12	024
5	015	13	025
6	016	14	026
7	017	15	027
8	018	16	028

FF : format terminator
T : terminator character

British Caller ID Protocol

URRLAAAAAATTTTTTTTTTTTTTTTT[DC4]

Where: U is International caller ID protocol identifier
RR is the receiver number
L is the line number
AAAAAA is the account number (leading spaces or leading zeros if account is less than 6 digits)
TTT... is the telephone number (up to 18 digits, may include spaces or dashes, trailing "F" will be inserted if the telephone number is less than 18 digits.
[DC4] terminator, 14 Hex

VONK Protocol

The VONK format signal is sent to the computer in the following protocol:

VRRLAA123456789ABCDEFG [DC4]

Where, F : FBI protocol identifier
V : protocol ("Vonk")
RR : receiver number
L : Line Card number
AA : Account number
1 through G : Zones 1 through 16
[DC4] : Hex 14

If zone has just restored or is normal, a "." (period) will be sent for the zone position in the printout.

Clock Signal Protocol:

1RRLssssAAAAAAsXGYYYHH:MM:SS-dd/mm[DC4]

3RRLssssAAAAAAXXYYYYHH:MM:SS-dd/mm[DC4]

4RRLAAAAAALLLTTTTTTTHH:MM:SS-dd/mm[DC4]

5RRLs18AAAAQXYZGGCCCHH:MM:SS-dd/mm[DC4]

6RRLssssssAAAAXXYYYYHH:MM:SS-dd/mm[DC4]

7RRLssssssXXXXsIAACsHH:MM:SS-dd/mm[DC4]

8RRLAAAAsCCCCsCCCCsCHH:MM:SS-dd/mm[DC4]

9RRLssssAAAACCCCCCCCHH:MM:SS-dd/mm[DC4]

ARRLssssssLLLTTTTTTTHH:MM:SS-dd/mm[DC4]

DRRLssssssAAAAGCsVPaHH:MM:SS-dd/mm[DC4]

Where, HH : Hour
MM : Minute.
SS : Second.
dd : Day.
mm : Month.

And the other codes are of the same definition as in the previous signal protocols. The supervisory heartbeat signal can also be used along with this protocol, but the structure remains unchanged.

Using the MLR2-DG with SIMS II Software

Ask Sur-Gard Technical Support for the information sheet on using the MLR2-DG with SIMS II software.

Using the MLR2-DG with SIMS CSM Software

Ask Sur-Gard Technical Support for the information sheet on using the MLR2-DG with SIMS CSM Software

Using the MLR2-DG with SIS Software

Ask Sur-Gard Technical Support for the information sheet on using the MLR2-DG with SIS Software.

Using the MLR2-DG with Micro Key Software Central-1(TM)

Ask Sur-Gard Technical Support for the information sheet on using the MLR2-DG with Micro Key Software Central-1(TM).

Using the MLR2-DG with ABM Software

Ask Sur-Gard Technical Support for the information sheet on using the MLR2-DG with ABM Software

CPM2 EPROM Programming

Most of the CPM2 options can be changed in the RAM accessed by the system's configuration. However, some less important features are installed in the EPROM. The following features are located in the CPM2 standard EPROM and programmed to the following default settings:

ROM Address	*Default*	*Function*
6500H	05H	Printer strobe pulse width Default = 5µs (microseconds)
6501-6502	3E80	Delay time × 0.25ms to resend message to COM1 if heartbeat is not selected. Default = 16000 x 1ms = 16 s delay
6505-6506	0100H	Test Line Card 01 at 01:00
6507-6508	0115H	Test Line Card 02 at 01:15
6509-650A	0130H	Test Line Card 03 at 01:30
650B-650C	0145H	Test Line Card 04 at 01:45
650D-650E	0200H	Test Line Card 05 at 02:00
650F-6510	0215H	Test Line Card 06 at 02:15
6511-6512	0230H	Test Line Card 07 at 02:30
6513-6514	0245H	Test Line Card 08 at 02:45
6515-6516	0300H	Test Line Card 09 at 03:00
6517-6518	0315H	Test Line Card 0A at 03:15
6519-651A	0330H	Test Line Card 0B at 03:30
651B-651C	0345H	Test Line Card 0C at 03:45
651D-651E	0400H	Test Line Card 0D at 04:00
651F-6520	0415H	Test Line Card 0E at 04:15

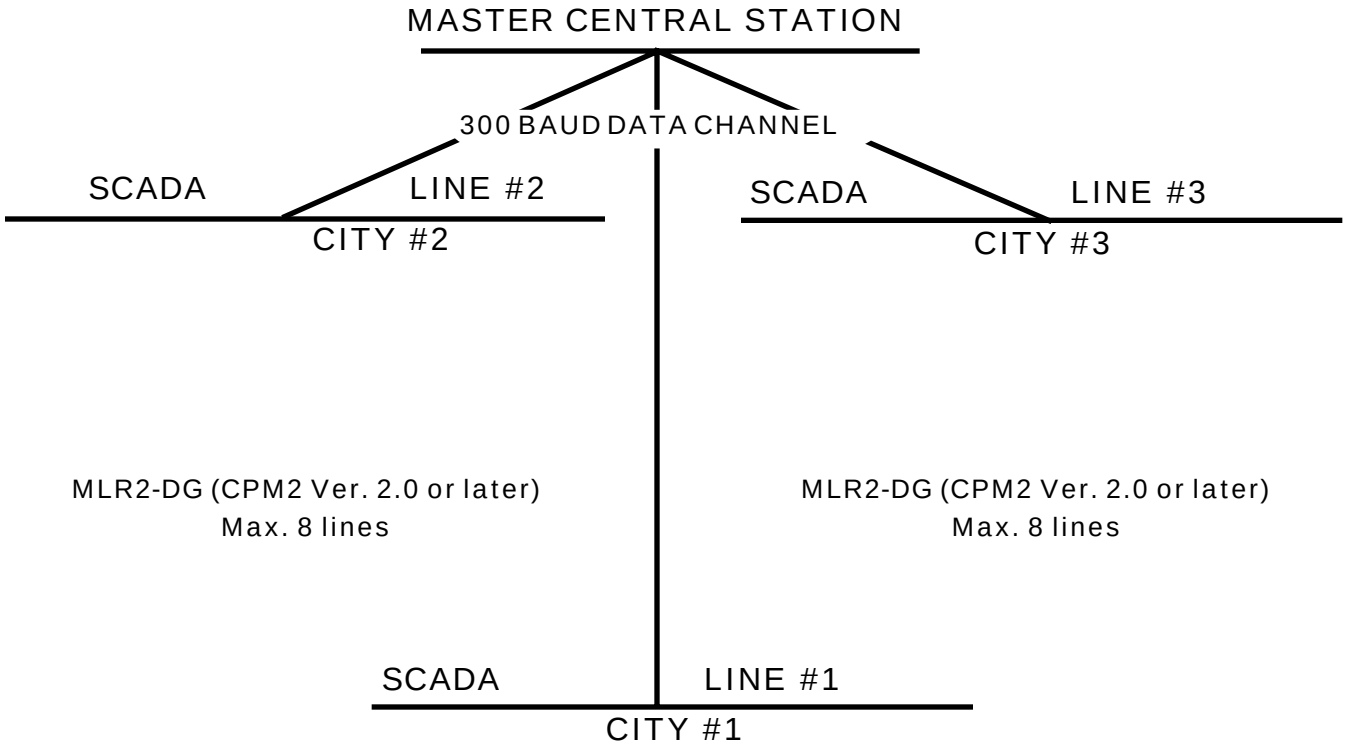
Changes are rarely required, but these features may be changed to suit particular needs. To make changes to the EPROM programming, first insert a standard CPM2 EPROM into an EPROM programming unit. Follow the instructions provided with the EPROM programmer to select addresses and modify data. Ensure that the correct addresses are being programmed, and verify the existing data in the address before making changes.

SUR-GARD NETWORK (SCADA)

A complete package to allow one or more receivers in distant cities to communicate their alarm information to a master receiver and to be remotely controlled by the master receiver.

The acronym "SCADA" stands for Supervisory Control And Data Acquisition. It is used to transport the alarm data from a local (satellite) central station to the master central station reliably by using linked Modem over leased phone lines. This system is specifically intended to be used with a point to point 300 baud Schedule 3A data line.

DVL2A SCADA/CPM2



MLR2-DG (CPM2 Ver. 2.0 or later)
Max. 8 lines

Introduction:

The MLR2-DG can be programmed through the serial port #2 on the CPM2 from a computer, with the DOS-based MLR2-DG programming software. This method of programming is more user friendly, faster and each installation configuration can then be saved on disk. For more information or ordering, please contact your distributor.

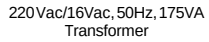
QUICK START

The following steps must be taken so as to utilize the receiver PC software :

Note: A RS-232 standard cable is required between COM2 and PC.

- Update the CPM2 firmware to version 2.1 or later if necessary (Cold Boot).
- Manually set the CPM2 COM2 to 300 baud, 8 data bits, even parity and 1 stop bit (Default).
- Manually set the CPM2 COM2 format to 0 (zero) (Default).
- Make sure the CPM2 and computer are well connected (COM2).
- Insert the diskette in Drive A and type A:INSTALL <ENTER>.
- Hit any key when prompted by the Sur-Gard Logo.
- Choose File-New and press <ENTER> to create a new data file.
- Choose the Setup function to select the COM port.
- Choose the Edit/View-CPM2 function to edit and program the CPM2 options.
- Choose the Edit/View-Line function to define type of line cards that need to be programmed.
- When in the Line Card Selection window choose the Edit function to edit and program the line card options.
- Repeat the previous step for every card installed in the receiver.
- Close the Line Card Selection window by pressing Alt-C and exit by pressing Alt-X.
- Please note that the instruction manual may be accessed from the help menu.

NOTE: The new options available on the CPM2 v2.3 cannot be programmed from the MLR2 programming software. If the programming software is utilized for CPM2 programming, the new options MUST be programmed manually. The programming software can still be used to program the line cards. A new version of the programming software will be available on our web site at www.sur-gard.com during the fall of 1997.


220Vac/16Vac, 50Hz, 175VA
Transformer


220Vac
50Hz

MLRV-A AUTOMATED VIDEO RECEIVER MODULE

The Automated MLRV-A Video Receiver Module provides for the receiving of video images over the regular telephone lines following the Event information.

One MLRV-A module connects to and works with one Digital Receiver line (DRL2A). The MLRV-A can only connect to and work with the Sur-Gard MLR2 Multi Line Receiver.

The MLR2 Receiver is a two line receiver expandable to 14 lines, each receiver line, if required can have the MLRV-A module, if expanded to a maximum number additional power must be taken into consideration.

The MLRV-A can be housed in one of two expansion cages available, the MLRXV or MLR2XV, both are 19" rack mount and should be located in the same cabinet as the MLR2 receiver. A four wire connection must be made between the MLRXV or MLR2XV backplane board and the back plane board of the DRL2A.

The Automated MLRV-A provides for two outputs, a Coaxial video output off a BNC post and PC output by a 25 pin video bus and 9 pin data bus. The MLRV-A can be set for video out, PC out or both.

Video images transmitted to the video monitor and PC also include the Account code, time and date and the camera number with amount of images to be sent.

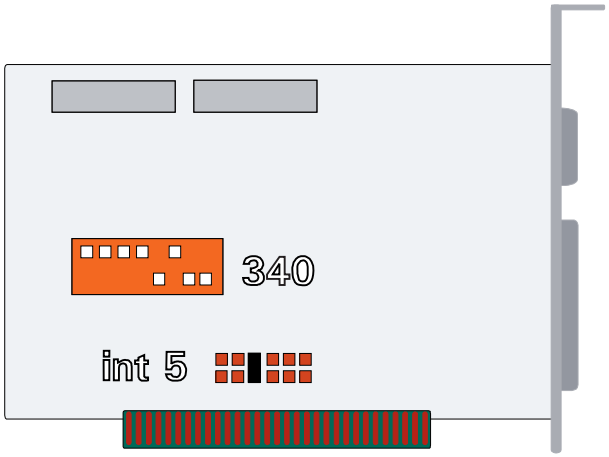
Two set's of dip switches in the MLRV-A provide for several options when viewing the video on a Video monitor, they allow for large or small account code, flashing information and how long it will stay on the screen. The options are only applicable to the video monitor, on the PC the Downlook software will display all images with extended account information.

DLGB
DOWNLOOK GRABBER BOARD

To input the Downlook Video into a PC it will be necessary to have a DLGB card, one DLGB works with one MLRV-A receiver module.

A standard 486 or Pentium PC will be required, up to 4 DLGB cards can be placed into one PC.

Each DLGB occupies an ISA slot.



Two cables are connected from the Downlook Interface card to the DML5A backplane.

A 25-pin cable for the pictures and a 9-pin cable for the serial communication.

Both cables can have a maximum length of 30 meters (100 feet).

These cables are not supplied with the Downlook Interface.

PSA V1.00 SOFTWARE

Downlook PSA software allows for video images to be displayed, saved, retrieved, printed and managed on a standard PC.

A 486 or Pentium with a least 8 Meg of ram must be used, it is advised other than DOS, Windows 3.11 or Windows 95 no other program should run with the Downlook PSA as a conflict of software could exist.

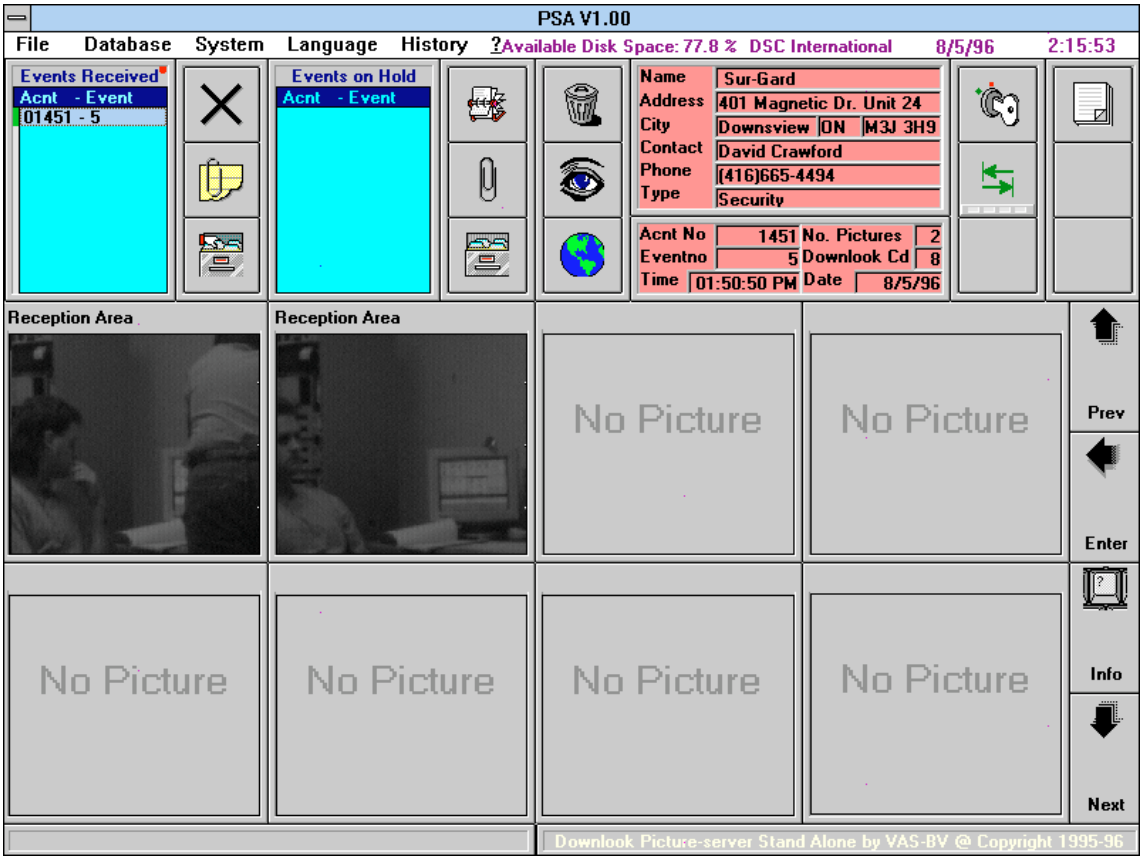
All functions on the software can be accessed by the use of a mouse or by a touch screen monitor.

The complete software and all individual icons and commands can be password protected.

Up to 8 images can be viewed at a time on one screen and each image can be expanded to full size, Picture receive and hold windows provide flexibility.

A stay on line feature allows for automatic request of additional images, this is an on-off feature to allow for continuing viewing of a location. This feature is only available with the Power832 and 5108L module.

The PSA software is provided with the DLGB, the Downlook Grabber Board.



Line Card Configuration Command:

LCard Comd Op Cd Sc

Line Card Command(F7) Option Code Second Code

Option	*Description*	*Default*	*Change*	*ASCII (HEX)*
00	4/1 DIGIT#0	-A-		
01	4/1 DIGIT#1	-A-		
02	4/1 DIGIT#2	-A-		
03	4/1 DIGIT#3	-A-		
04	4/1 DIGIT#4	-A-		
05	4/1 DIGIT#5	-A-		
06	4/1 DIGIT#6	-A-		
07	4/1 DIGIT#7	-A-		
08	4/1 DIGIT#8	-A-		
09	4/1 DIGIT#9	-R-		
0A	4/1 DIGIT#A=0	-A-		Program at Option 00
0B	4/1 DIGIT#B	-O-		
0C	4/1 DIGIT#C	-C-		
0D	4/1 DIGIT#D	-\-		
0E	4/1 DIGIT#E	-R-		
0F	4/1 DIGIT#F	-T-		
10	4/2 DIGIT#0=A	-A-		
11	4/2 DIGIT#1	-A-		
12	4/2 DIGIT#2	-A-		
13	4/2 DIGIT#3	-A-		
14	4/2 DIGIT#4	-A-		
15	4/2 DIGIT#5	-A-		
16	4/2 DIGIT#6	-A-		
17	4/2 DIGIT#7	-A-		
18	4/2 DIGIT#8	-A-		
19	4/2 DIGIT#9	-R-		
1A	4/2 DIGIT#A=0	-A-		Program at Option 10
1B	4/2 DIGIT#B	-O-		
1C	4/2 DIGIT#C	-C-		
1D	4/2 DIGIT#D	-\-		
1E	4/2 DIGIT#E	-R-		
1F	4/2 DIGIT#F	-T-		
20	4/3 DIGIT#0=A	-T-		
21	4/3 DIGIT#1	-A-		
22	4/3 DIGIT#2	-A-		
23	4/3 DIGIT#3	-A-		
24	4/3 DIGIT#4	-C-		
25	4/3 DIGIT#5	-O-		
26	4/3 DIGIT#6	-T-		
27	4/3 DIGIT#7	-A-		
28	4/3 DIGIT#8	-A-		
29	4/3 DIGIT#9	-R-		
2A	4/3 DIGIT#A=0	-T-		Program at Option 20
2B	4/3 DIGIT#B	-C-		
2C	4/3 DIGIT#C	-O-		
2D	4/3 DIGIT#D	-B-		
2E	4/3 DIGIT#E	-H-		
2F	4/3 DIGIT#F	-A-		
30	RS-232C CD:	000		
31	SIA OPTION:	000		

Option	*Description*	*Default*	*Change*	*ASCII (HEX)*
32	COM SELECT:	001		
33	PRT SELECT:	001		
34	RCVER NUMB:	001		
35	LCARD NUMB:	00F		
36	CALLER ID:	000		
37	TEL# to RS-232:	000		
38	TEL# to PRINTR:	000		
39	LINE CHECK:	000		
3A	PGM OUTPUT:	000		
3B	PGM INPUT:	000		
3C	FILTER OPT:	000		
3D	RESERVED	000		
3E	MUTE BUZZER	000		
3F	LST MSG ON:	000		
40	HOOK FLASH:	000		
41	HANDSHK #1:	002		
42	HANDSHK #2:	003		
43	HANDSHK #3:	013		
44	HANDSHK #4:	004		
45	HANDSHK #5:	010		
46	HANDSHK #6:	006		
47	HS/KO TIME:	000		
48	INTER H.S.:	000		
49	AUDIO(MIN):	000		
4A	AUDIO ACCNT	000		
4B	AUDIO 3/1:	000		
4C	AUDIO CODE:	000		
4D	AUDIO EVENT:	000		
4E	VIDEO DNLK:	000		
4F	DLK TIMEOUT:	000		
50	AUDIO ZONE:	000		
51	3/2 FORMAT:	003		
52	4/1 EXTEND:	001		
53	4/2 EXTEND:	000		
54	3/1 EXTEND:	001		
55	4/1 EXPRESS	000		
56	GROUP O/C:	000		
57	4/3 USR/ZN:	000		
58	EQUIV LINE:	000		
59	VONK FORMAT:	000		
5A	AUSTEL RING:	000		
5B	DOUBLE RING:	004		
5C	DIALER TONE:	000		
5D	INTER DIGIT:	002		
5E	INTER-BURST:	000		
5F	RAD6500 RS232:	000		
60	SCANCOM4332:	000		
61	SFAST RS232:	000		
62	SCANT.RS232:	000		

Output (Dump) Commands:

LC-FA-01-XX	Dump xx printer alarm messages to printer.
LC-FA-02-XX	Dump xx computer alarm messages to printer.
LC-FA-04-04	Dump current or active line card configuration.
LC-FA-06-XX	Dump xx computer alarms to computer.

Shutdown / Activate Line Card Command:

LC-FB-XX-XX	Shut down line card, xx=not required
LC-FC-XX-XX	Reactivate line card, xx=not required

Line Card Buffer Commands:

LC-FE-00-00	Erase Caller-ID, printer alarm and computer alarm buffers.
LC-FE-02-02	Stop watchdog timer to force line card reset.
LC-FE-03-03	Save active configuration data to backup configuration. buffer.
LC-FE-04-04	Load backup configuration data to active config. buffer.

APPENDIX B CPM2 QUICK REFERENCE GUIDE

Version 2.1

CPM2 Utility Modes

Press [ACK] when “Ack” light flashes to Acknowledge event

- [A] Send Computer Messages to Printer
- [B] Operator Log-On
- [C] System Command Mode
- [D] Send Printer Messages to the Printer
- [E] Examine Printer Messages on Display Screen
- [F] Examine Computer Messages on Display Screen

CPM2 Configuration Mode

Press the [Escape] button when the system is in Stand-By Mode and enter the Master Password.

Press the [Enter] button to display the next menu item; press the [Backspace] button to display the previous menu item. Press the [ACK] button to select the menu item presented shown on the display screen.

Menu Item	***Function***	***Default***
01	Set Date and Time	00:00:00 00-00-00 (random)
02	System Passwords	CAFE
03	Number of Line Cards	E
04	Printer Select	Backup=0; Enable=1
05	COM1 Configuration	Baud: 1200, Data: 7 bits, Parity: 2
06	COM1 Format	1
07	ACK Wait Delay	4.0 seconds
08	Heartbeat Select	30 seconds
09	COM2 Configuration	Baud: 300, Data: 8 bits, Parity: 2
10	COM2 Format	0
11	Contrast Adjust	
12	UL Receiver Option	0
13	Erase Memory	
14	Mute Buzzer	0
15	Keep Last Message	0
16	Debug COMPort	0
17	Test 9V/12V Battery	3
18	Line Card Diagnostics	0
19	Display Program Version	Version 2.30
20	Monitor Battery	
21	Select Year/Seconds	0
22	Force Reset	
23	Change Receiver Number	01
24	COM1/2 Control	44444444444444
25	Printer Control	11111111111111
26	Printer Test	0
27	Printer Width	0
28	Tamper Input	0

Line Card Command Descriptions

- [F7] Line Card Configuration
- [FA] Print Line Card Buffer
- [FB] Shutdown Line Card Communication with CPM2
- [FC] Reactivate Line Card Communication with CPM2
- [FE] Line Card Buffer Functions

APPENDIX C TROUBLE SHOOTING

Problem: No communication with the central station computer on COM1

Solution: Ensure that the cable connected to COM1 is an RS232 cable; it should not be a null-modem type.

Check the baud rate for COM1 (CPM2 Configuration Option 05)

Check the COM1 communication format (CPM2 Configuration Option 06)

Check the computer software set-up

Enable COM1 Diagnostics with CPM2 Configuration Option 16 and examine the communications on the display screen.

Problem: Bad communication with central station computer.

Solution: The central station software is too slow to provide the acknowledgement signal for the CPM2. Contact the software manufacturer for a software upgrade.

Increase the acknowledge wait time with CPM2 Configuration Option 07.

Check COM1 baud rate and communication format using CPM2 Configuration Options 05 and 06

Ensure that the COM1 connection is secure

Problem: Fault in received data

Solution: Enable DRL2A Option 3D to boost the signal strength.

Check the telephone line to determine if noise is a problem; if so, enable DRL2A Option 3C.

Problem: Line Fault

Solution: Check the voltage on the telephone line; it should measure as at least 4V when the receiver is on-line, and approximately 50V when the receiver is off-line.

Check if the appropriate telephone cable is connected to the DML2A.

Problem: CPM2 displays the COM1 debugging mode and the Master Code is not valid

Solution: The CPM2 needs to be re-booted. Refer to the Cold Boot section of this manual

Problem: Faulty call

Solution: Ensure that the handshake needed by the panel is programmed in the DRL2A handshakes.

Ensure that the handshake is being sent at the proper positions (4th, 5th or 6th position)

Ensure that the security control panel does not hand up before it receives the handshake

Check the DRL2A handshake order or interval between handshakes and make any required changes

Problem: The Line Card displays “<<CPM ERROR>>” and/or alarms are not transmitted to the computer and printer

Solution: Ensure that the Line Card number is not out of the range of the CPM2 scanning

Ensure that the flat cables connected between the DML4 and the Line Cards are connected correctly. Ensure that the contact between the connectors is secure

APPENDIX D DRL2A COMMUNICATION FORMATS (2.1I)

	NAME	HANDSHAKE	DATA	BAUD	FORMAT	EXTENDED	KISS OFF
01	Ademco Slow	1400Hz	1900Hz	10bps	3/1,4/1(or 3/2),4/2	NO	1400Hz
02	Ademco Slow	1400Hz	1900Hz	10bps	4/2,4/1,3/1	YES	1400Hz
03	Silent Knight Fast	1400Hz	1900Hz	14bps	3/1,4/1(or 3/2),4/2	NO	1400Hz
04	Silent Knight Fast	1400Hz	1900Hz	14bps	4/2,4/1,3/1	YES	1400Hz
05	Franklin	2300Hz	1800Hz	20bps	3/1,4/1(or 3/2),4/2	NO	2300Hz
06	Franklin	2300Hz	1800Hz	20bps	4/2,4/1,3/1	YES	2300Hz
07	Radionics	2300Hz	1800Hz	40bps	3/1,4/2	NO	2300Hz
08	Radionics	2300Hz	1800Hz	40bps	4/2,3/1	YES	2300Hz
09	Radionics	2300Hz	1800Hz	40bps	3/1+parity 4/2+parity	NO	2300Hz
10	Radionics	2300Hz	1800Hz	40bps	3/1+parity 4/2+parity	YES	2300Hz
11	SIA FSK Level 1, 2, 3.	FSK mark/ space	FSK	110bps 300bps		NO	Tonal data ACK
12	Contact ID 1400Hz	Dual Tone	DTMF	DTMF	4/2/1/3/2/3	NO	1400Hz
13	Sur-Gard	2300Hz	DTMF	DTMF	4/1,4/2,4/3	NO	2300Hz
14	Sur-Gard 1400Hz	Dual Tone	DTMF	DTMF	4/1,4/2,4/3	NO	1400Hz
15	Sur-Gard	2300Hz	DTMF	DTMF	4/3+Checksum	NO	2300Hz
16	Sur-Gard 1400Hz	Dual Tone	DTMF	DTMF	4/3+Checksum	NO	1400Hz
17	S.F. Ademco	Dual Tone	DTMF	DTMF	4/8/1	NO	1400Hz
18	S.F. Ademco	Dual Tone	DTMF	DTMF	4/8/1 + Checksum	NO	1400Hz
19	Scantronics	Dual Tone 1600 Hz	DTMF	DTMF	4/8/1,4/16/1,2/8/1,3/8/1 6/8/1,6/16/1,2/16/1,3/16/1	NO	1400Hz
20	FSK 200 baud	FSK 200	FSK	200bps	5/3	NO	FSK
21	Outel	1600 Hz	1600 Hz	10bps	2/1	NO	1600 Hz
22	Robofon	Robofon	1000 Hz	50bps	6/2	NO	Robofon
23	VONK FSK	Not required	FSK	110bps	4/5 4/8 4/16 FSK mark/space	NO	FSK
24	Ademco Express	Dual Tone	DTMF	DTMF	4/1(option),4/2	NO	1400Hz
25	FBI Super Fast	2300Hz	DTMF	DTMF	4/3/1	NO	2300Hz
26	ITI	FSK	FSK	110/300baud	FSK		
27	Telenot/Telim	2100 Hz	FSK	10bps		NO	FSK
28	Telenot Pulse	5 sec pause	1800 Hz	20bps	4/2	NO	1600 Hz
29	RadionicsBFSK	1400Hz	FSK	42 baud	3/2		1400Hz
30	RadionicsBFSK	2300Hz	FSK	42 baud	3/2		2300Hz
31	Scancom 433	1600 Hz	DTMF	DTMF	4/3/3/2	NO	1600Hz

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

APPENDIX F ASCII CHARACTER CHART

ASCII with library on printer (Option 30)	Hex	Corresponding ASCII Character
	20	Space
B0	30	0
B1	31	1
B2	32	2
B3	33	3
B4	34	4
B5	35	5
B6	36	6
B7	37	7
B8	38	8
B9	39	9
C1	41	A
C2	42	B
C3	43	C
C4	44	D
C5	45	E
C6	46	F
C7	47	G
C8	48	H
C9	49	I
CA	4A	J
CB	4B	K
CC	4C	L
CD	4D	M
CE	4E	N
CF	4F	O
D0	50	P
D1	51	Q
D2	52	R
D3	53	S
D4	54	T
D5	55	U
D6	56	V
D7	57	W
D8	58	X
D9	59	Y
DA	5A	Z
DC	5C	\

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them.
BABT/503546
SG-MLR2-DG REN = 3.0

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