

MODEL LMC - LARGE MESSAGE CENTER DISPLAY

- FULL MESSAGE CENTER CAPABILITIES IN A LARGE LED DISPLAY
- 5x7 DOT MATRIX, RED LED CHARACTERS
- 2x20 VERSION, 1" (25.4 mm) HIGH CHARACTERS READABLE TO 60 FEET (18 Meters)
- 1x10 VERSION, 2" (50.8 mm) HIGH CHARACTERS READABLE TO 120 FEET (36 Meters)
- LED INTENSITY IS SOFTWARE ADJUSTABLE TO SUIT AMBIENT LIGHT CONDITIONS
- 115/230 VAC SWITCH SELECTABLE
- RUGGED STEEL CONSTRUCTION



- NEMA 4/IP65 SEALED FRONT PANEL
- EASY INSTALLATION WITH VERSATILE MOUNTING OPTIONS

DESCRIPTION

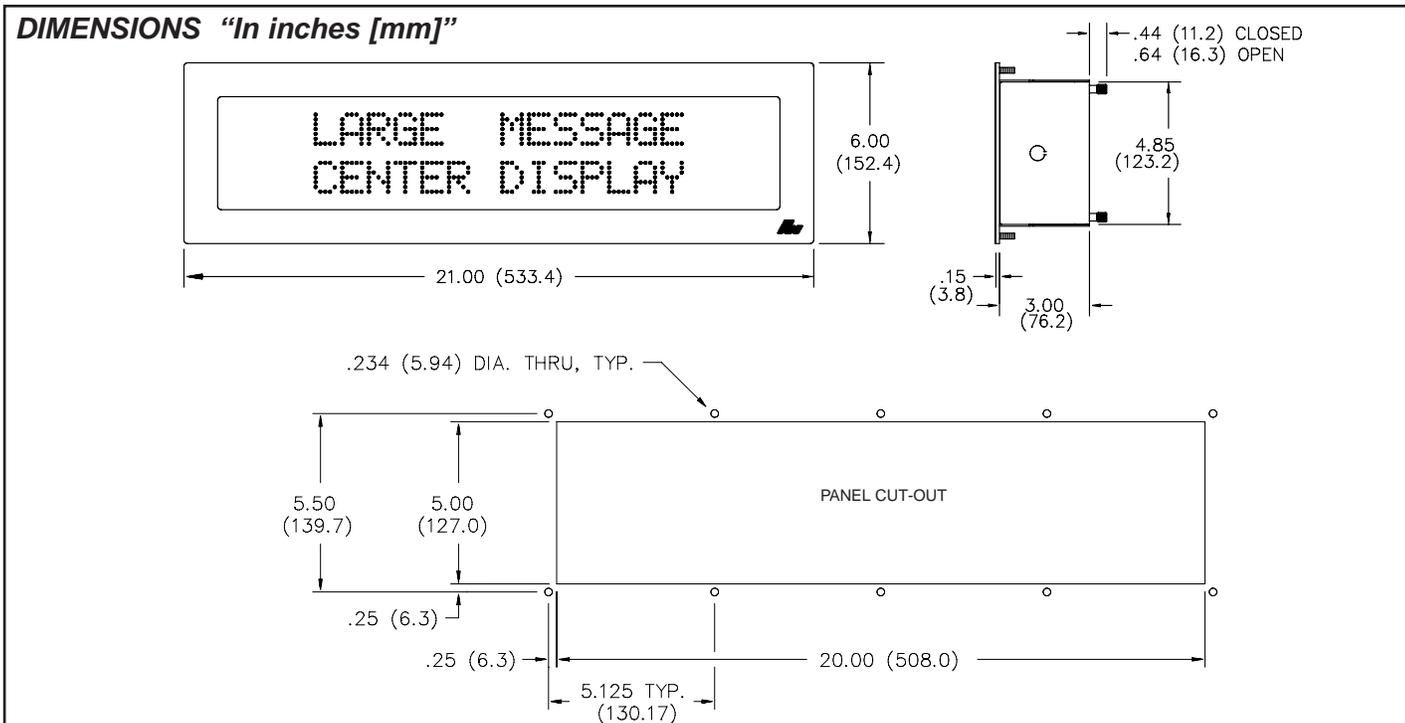
The Large Message Center Display unit (LMC) provides the equivalent capabilities of the Apollo Message Display series of products with a large dot matrix LED display. See the MDI or MDS Bulletin for more information on programming and capabilities. The LMC display characters are red, 5 by 7, dot matrix LED's, available in either 1 line with 10 characters or 2 lines with 20 characters per line. A Message Display Personality Module (MDP) must be installed to control the LMC display. There are two modules available to meet specific application needs.

The LMC utilizes high-efficiency LED's to provide maximum brightness for the display with low power dissipation. The display intensity is software adjustable through sixteen levels using the Message Display User Software, via a personality module, to achieve the desired brightness in virtually any ambient lighting condition. The 2" (50.8 mm) high characters of the 1x10 version are readable to 120 feet (36 M), while the 2x20 version uses 1" (25.4 mm) high characters that are readable to 60 feet (18 M).

The LMC has a sealed front panel which meets NEMA 4/IP65 requirements for wash-down and dusty environments when properly installed. A removable rear cover allows easy access to wiring connections. Panel knock-outs; two 7/8" (22.2 mm) and two 1/2" (12.7 mm) fittings, permit wires to be routed neatly to the LMC unit.

SPECIFICATIONS

- DISPLAY:** 5x7 dot matrix, Red LEDs (AlGaAs Technology).
 1x10 Version: 2.0" (50 mm) character height.
 2x20 Version: 1.0" (25 mm) character height.
- DISPLAY INTENSITY:** Software adjustable in 16 increments from full brightness to display off.
- POWER REQUIREMENTS:** Switch selectable 115/230 VAC ($\pm 10\%$), 50/60 Hz, 25 VA 1x10 version, 30 VA 2x20 version (including MDP module).
- STORAGE TEMPERATURE RANGE:** -20°C to 60°C.
- OPERATING TEMPERATURE RANGE:** 0°C to 50°C.
- MOUNTING REQUIREMENTS:** Max. panel thickness is 0.375" (9.5 mm). Min. panel thickness for NEMA 4/IP65 sealing is 0.125" (3.2 mm). (Mounting template, Panel gasket, and keps nuts included with unit.)
- CONSTRUCTION:** Steel construction with textured black polyurethane paint for scratch and corrosion resistance protection. Front panel meets NEMA 4/IP65 requirements.
- WEIGHT:** 8.12 lbs. (3.7 Kg).



PERSONALITY MODULES

The Message Display Intelligent (MDPI) and Slave (MDPS) Display Modules are P.C. Board Assemblies mounted in a plastic carrier. A module is installed by the user into either the 1x10 or 2x20 Large Message Center Display. When an MDPI module is installed in an LMC Display, all programming and operating procedures are the same as a standard Message

MDPI/MDPS

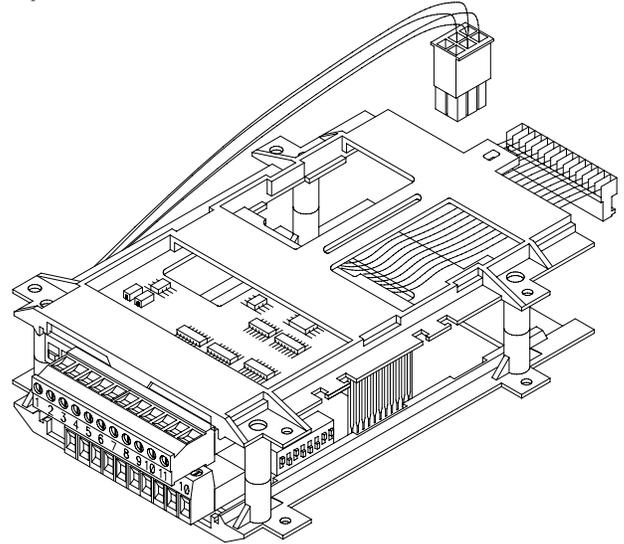
- 153 DIFFERENT DISPLAYABLE CHARACTERS (Including 96 standard ASCII characters)
- DISPLAY CUSTOMIZED CHARACTERS
- SCROLLING AND/OR BLINKING CHARACTERS
- ALARM OUTPUT
- SERIAL COMMUNICATIONS, (isolated 20 mA Current Loop)

MDPI Only

- CAPABLE OF STORING 248 MESSAGES
- PRIORITIZED MESSAGES
- REAL TIME CLOCK
- TIME AND DATE FUNCTIONS
- 2 ELAPSED TIMERS
- EMBEDDED DATA
- ALARM/BUSY OUTPUT
- SCROLLING AND/OR BLINKING
- PERIODIC AND/OR CHAINED MESSAGES

Display Intelligent unit. An MDPS module is the same as a Message Display Slave unit except there is no parallel port option.

Note: An MDP module will only operate with the LMC Display. Do not attempt to install in an LDD.



- MESSAGE QUEUE; HOLDS UP TO EIGHT MESSAGES
- PARALLEL COMMUNICATIONS; 4 or 8 BIT, POSITIVE or NEGATIVE LOGIC

SPECIFICATIONS

- 1. POWER:** AC power is connected to the module but is switch selected via the LMC driver board. See LMC specifications for power requirements.
- 2. PARALLEL COMMUNICATIONS (MDPI ONLY):**

Message Format:

- Binary: 4 or 8 bits.
- BCD: 4, 8, or 9 bits.

Embedded Data Format:

- Binary: 4 or 8 bits.
- BCD: 4 or 8 bits.
- ASCII: 4 or 8 bits.

PARALLEL PORT INPUTS:

Data (D0-D7) inputs:

$V_{IH} = 8 \text{ VDC min.}$, $V_{IL} = 4 \text{ VDC max.}$, $V_{MAX} = 30 \text{ VDC}$

Ctrl (Strobe and message/data) inputs:

$V_{IH} = 4 \text{ VDC}$,
 $V_{IL} = 1 \text{ VDC}$, $V_{MAX} = 30 \text{ VDC}$.

Data SNK/SRC:

Current sink or source Data inputs, switch selectable.

Ctrl SNK/SRC:

Current sink or source Control inputs, switch selectable.

Data LOGIC:

Positive or negative logic for Data inputs, switch selectable.

Ctrl LOGIC:

Positive or negative logic for control inputs, switch selectable.

Current sinking:

Internal 10 K Ω pull-up to +12 VDC, $I_{MAX} = 1.2 \text{ mA}$.

Current sourcing:

Internal 10 K Ω pull-down, $I_{MAX} = 3.1 \text{ mA @ } 30 \text{ VDC}$.

Debounce time: 0.01 to 2.5 seconds (programmable).

Strobe time: 3 to 255 msec (programmable).

- 3. SERIAL COMMUNICATIONS:** 20 mA current loop, full duplex.

Data Format: Four types available. switch selectable.

11 bits: 1 start bit, 8 data bits, 1 parity bit, 1 stop bit.

10 bits: 1 start bit, 8 data bits, 1 stop bit; **or**

1 start bit, 7 data bits, 1 parity bit, 1 stop bit.

9 bits: 1 start bit, 7 data bits, 1 stop bit.

Data Code: ASCII

Maximum Address: 0 to 99, software selectable. (Actual number in a single loop is limited by serial hardware specifications).

Baud Rate: 300 to 19200, Switch selectable.

Parity: Enable or Disabled, Switch selectable.

Even/Odd: Selects parity type, Switch selectable.

7/8 BIT: Selects number of data bits, Switch selectable.

Serial Hardware: Terminal TBA.

+20mA SRC: Provides 20 mA @ 12 VDC

(Powers up to 6 units in a loop).

-20mA SRC: Loop return for +20 mA SRC.

SO - Output Transistor Rating: $V_{MAX} = 30 \text{ VDC}$,

$V_{SAT} = 1 V_{MAX} @ 20 \text{ mA}$

(*Note: This will allow up to 28 units max. in each loop.*)

SI - Input Diode Rating: $V_F = 1.25 V_{TYP}$; $1.5 V_{MAX} @ 20 \text{ mA}$.

(*Note: The compliance voltage rating of the source must be greater than the sum of the voltage drops around the loop. Typically a 30 VDC powered source would be capable of operating between 18 and 22 units in a loop.*)

- 4. OUTPUT/BUSY PIN:**

Solid State: NPN open-collector, current sinking, $V_{MAX} = 30 \text{ VDC}$, $I_{MAX} = 100 \text{ mA}$, $V_{SAT} = 1 V_{MAX}$ at 100 mA.

Busy Mode: Indicates the Ready/Busy status of the unit.

Output Mode: Output is activated from a Command or Message for a specified time out value.

Time Out: 10 msec to 63 mins or Latched.

- 5. REAL-TIME CLOCK:** Nonvolatile Date and Time, accurate to 1 minute/month.

- 6. MDPI MESSAGE MEMORY:** Nonvolatile.

32 K: Provides space for 248 messages of 120 characters each.

MDS MEMORY: Nonvolatile EPROM memory retains all factory configuration settings when power is removed or interrupted.

- 7. TEMPERATURE RANGE:**

Operational: 0° to +50° C

Storage: -20° to +60° C

- 8. CONSTRUCTION:** P.C. Board mounted in a plastic carrier.

- 9. CONNECTIONS:** Removable terminal blocks.

- 10. WEIGHT:** 0.6 lbs (272g)

MDPI

The MDPI module is capable of displaying messages consisting of alphanumeric, extended ASCII, and/or customized characters on an LMC display. Up to 248 messages can be programmed into the MDPI and stored in nonvolatile memory. Communication is accomplished via a serial and/or a parallel port, which can be fully configured to satisfy most requirements. Connections are made on removable terminal blocks to simplify installation.

Messages are requested by sending a message request to the MDPI via the serial or parallel port. A message can be requested by loading a BCD or binary value onto the parallel port and strobing the value in, or by using a computer to automatically request messages via the serial port. Messages can be programmed as periodic and displayed automatically at a specific time. Each message may contain parameters including message scrolling, character blinking, date and/or time fields, embedded data fields, etc. The MDPI has the ability to retrieve data from other Red Lion Controls products with 20 mA serial

communications, as well as from various devices such as Programmable Logic Controllers (PLC), and embed the data received into the body of a message.

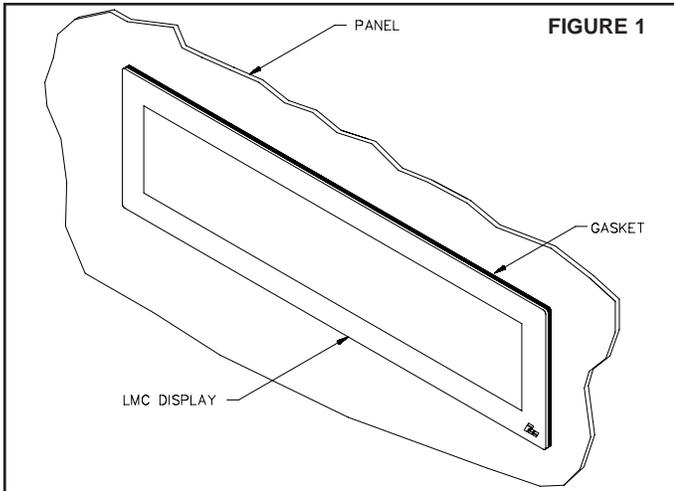
A unique feature of the MDPI is the Message Queue. The Queue will hold up to eight messages, which allows for multiple message requests without loss of previously requested messages. Messages can be assigned priorities which determine the order in which queued messages will be displayed. The MDPI may also serve as a master controller for Slave units (model MDPS), allowing programmed messages in the MDPI to be displayed at remote locations.

MDPS

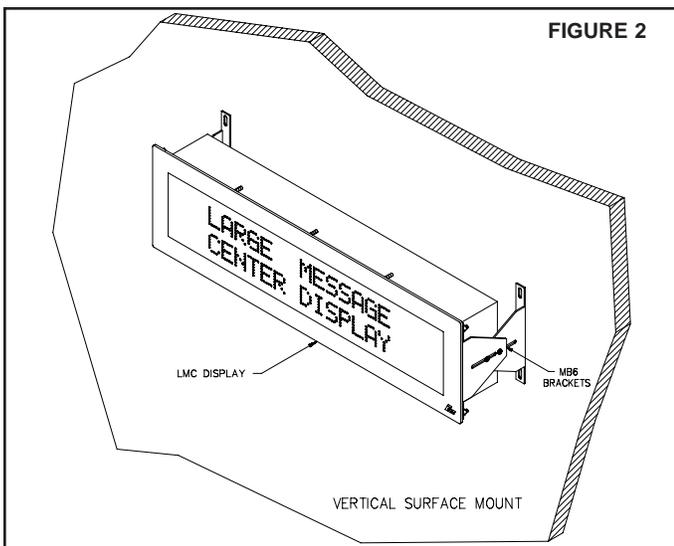
The MDPS is capable of displaying full alphanumeric information received via the serial port on a 1x10 or 2x20 Large Message Center Display. Information received may be messages from an MDPI, or host computer. A nonvolatile memory retains all configuration set-up information when power is removed.

INSTALLATION

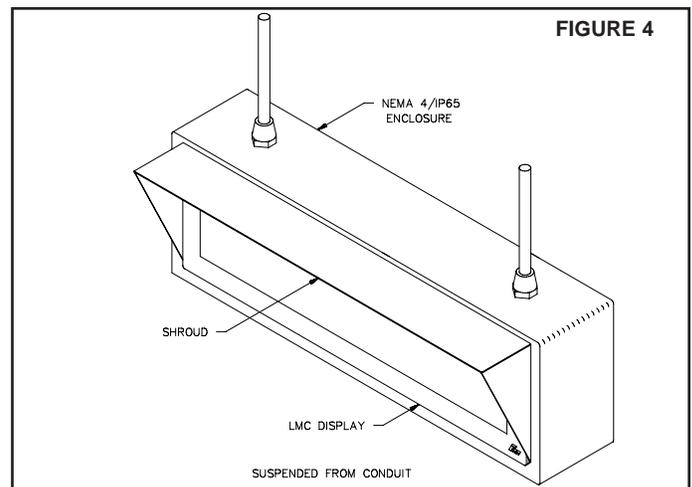
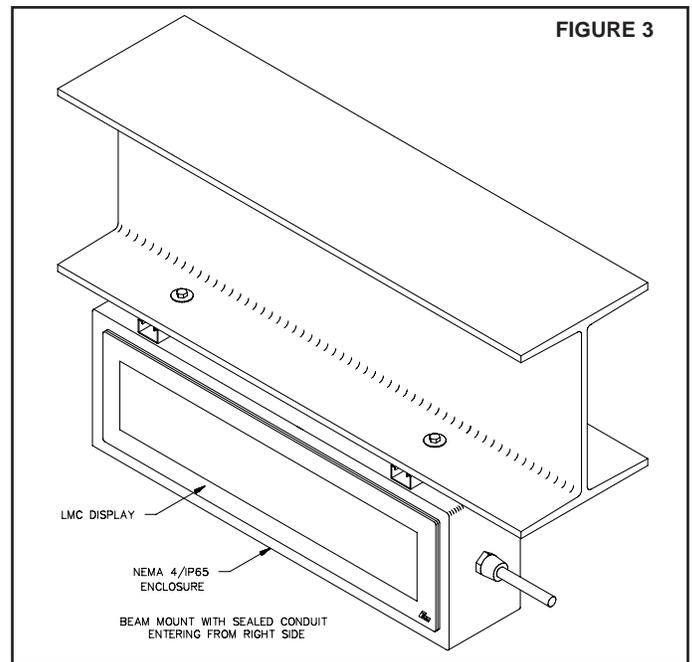
The LMC is designed to be panel-mounted with a gasket to provide a water-tight seal as shown in Figure 1. A gasket, ten keps nuts (#10-32), and a cardboard template are supplied with the unit. The display overlay may be cleaned using alcohol compounds (Isopropanol or methanol) or liquid glass cleaners that **DO NOT** contain ammonia. Exposure of the display overlay to ketone solvents will cause it to whiten.



By using optional accessory hardware, the LMC can be surface-wall mounted, suspended, or bottom mounted. To surface-wall mount the unit, two sets of MB6 brackets are required as shown in Figure 2. To suspend or bottom mount the unit, one set of MB6 brackets is required.



Other accessory items for the LMC include a shroud, to enhance display readability in areas with extremely high intensity overhead light sources, and a NEMA 4/IP65 Enclosure to provide overall protection from wash-down and dust as shown in Figures 3 and 4.



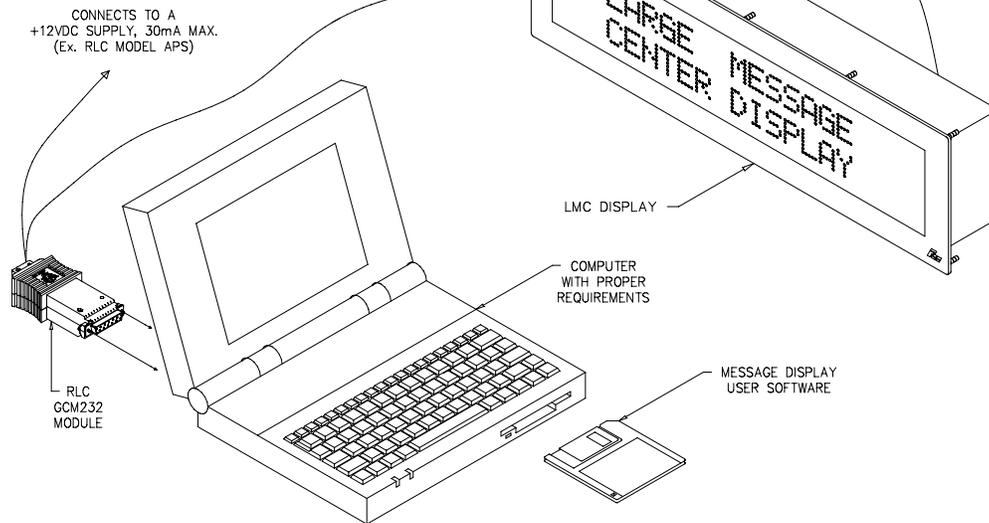
MDPI/MDPS PROGRAMMING SET-UP

The MDPI requires the Apollo Message Display User Software to program messages. Once the module has been installed into a Large Message Center Display, messages are then downloaded to the MDPI from the computer via the serial port, using the Message Display Software. The MDPI will save the messages and perform the appropriate function when the message is requested. Configuration settings initially programmed at the factory can be modified by using the Message Display User Software.

The User Software allows programmed messages to be saved on a floppy or hard disk of an IBM® or IBM® compatible computer. Also the user can simulate any programmed message on the terminal screen assuring the message is programmed to the user's needs.

Since the MDPS does not store messages, it does not require initial set-up in order to be placed into operation; although the MDPS does have initially programmed configuration settings which can be modified by the User software.

The following items (at right) are required to perform the above objectives and the diagram shows a typical hook-up:



MINIMUM REQUIREMENTS:

IBM® compatible PC-AT (286 or greater) with:

RS232 serial port 640 K RAM (550 K free)
DOS 3.0 or later 1.44 Meg floppy drive

Monitor with MDA, CGA, EGA, or VGA graphics card.

MCCA cable for initial set-up of a single unit.

GCM232 - Serial Converter Module (RS232/20 mA Current Loop).

APS (Accessory Power Supply) or equivalent
(+12 VDC power supply).

Apollo Message Display User Software
(available in 3.5" disk)

Large Message Center Display (LMC10000 or LMC20000)

Note: Setup may only be performed via the serial port.

OPERATION

MDPI

The operation of the MDPI simply involves requesting messages, previously loaded into the MDPI. Requesting a message can be accomplished via the serial port or parallel port. Internal to the MDPI a periodic message is requested automatically, based on time. A default message can be programmed which is requested automatically on power-up.

Messages can display text, retrieve data, activate the alarm output, etc. (Refer to Message Features).

MDPS

The MDPS can be configured for either Remote Slave or Serial Slave Mode. The mode selection is accomplished via the serial port by sending the appropriate command.

Remote Slave Mode

The Remote Slave Mode displays messages that are transmitted from an MDPI unit to an MDPS unit. The MDPS can also display information transmitted from a host computer provided that the information is in the correct command string format. To display a message on the MDPS from an MDPI, the desired message is requested at the MDPI. This mode of operation allows the MDPI to act as a message library for multiple MDPS units. The MDPS will automatically select character scrolling for message blocks that are longer than the unit's line length.

All of the message configuration parameters available in the MDPS (scrolling text, blink times characters, etc.), can be changed while in this mode. The internal elapsed timer can be accessed with a maximum elapsed time of 100 hrs.

Serial Slave Mode

The Serial Slave Mode is used with PC's, PLC's, or any serial equipped device capable of transmitting ASCII characters of the appropriate serial format. All ASCII characters received by the MDPS will be displayed and the MDPS will automatically select character scrolling for character strings which are

longer than the unit's line length. All units can be addressed separately using the proper control code.

Control codes are used to perform commands which affect scroll rate, blink rate, etc. An internal elapsed timer can also be requested by using the proper Control codes.

SERIAL PORT

The serial port is a half duplex, isolated two-way 20 mA current loop. Some typical devices that can be connected to the serial port are; ASCII terminal, programmable controller, host computer, and any Red Lion Controls product with 20 mA current loop. In order for the MDPI or MDPS to communicate to the above devices, they must conform to the same data format, baud rate, address number, etc. An internal Serial Hardware (Loop-Back) test can be performed on the serial port to verify proper operation of the unit.

MDPI Only

The serial port can be used to perform the following operations: Request messages; issue commands; request and receive embedded data; and receive files from a computer using the Message Display software. Data transmitted from the MDPI may be the result of embedded data messages, error messages, remote display messages, and certain commands.

PARALLEL PORT (MDPI ONLY)

An 8 bit parallel port with separate STROBE and MESSAGE/DATA control lines is provided. DIP switches are used to select either positive or negative logic and source or sink current, for the 8 bit port and control line inputs.

The parallel port can be used to request messages and receive embedded data. The parallel port can be 4, 8, or 9 bits wide and is the same width for both message request and data reception. Except in the 9-bit mode where 9 bits are used to request a message, any data received can only be 8 bits wide. Message requests may be in binary or BCD, whereas, embedded data items may be in binary, BCD, or ASCII. Some typical devices that can be connected to the parallel port are; PLC's, BCD switches, and indicators with a parallel port.

OUTPUT/BUSY PIN (MDPI only)

The output can be programmed as either an ALARM or BUSY output. As an Alarm output, a message on the LMC display or a command transmitted to the LMC can activate the NPN open collector output.

Programmed for the BUSY function, the output is used for hardware handshaking in which case the output will be active during the message process time. During the process time the MDPI will NOT acknowledge any communications until the process has been completed.

ALARM OUTPUT (MDPS only)

This output functions as an ALARM output only. The output will be active when a message, programmed for alarm, is received from the MDPI or when an alarm code is received.

MESSAGES (MDPI Only)

Messages are programmed using the Apollo Message Display User Software and loaded into the memory of the MDPI via the serial port. Each message is assigned a specific message number (1-248). Text within a message may contain any of the 153 programmed characters. A message may contain text or it may contain one, some, or all of the message features, such as blinking characters, time-out, alarm, embedded data, etc.

MESSAGE FEATURES (MDPI/MDPS)

Dual or single line	Display dependent
Blinking field(s):	
Blink Time Top line	0.01 to 2.50 secs
Blink Time Bottom line	0.01 to 2.50 secs
Horizontal scrolling:	
Scroll Time Top line	0.01 to 2.50 secs
Scroll Time Bottom line	0.01 to 2.50 secs
Block scrolling:	
Scroll Time Top line	1 to 250 secs
Scroll Time Bottom line	1 to 250 secs
Alarm:	
Time-out values	Timed = 1 to 250 secs Latched = 0
Message Time-out	0-250 seconds
Standard characters	20H to 7FH
Extended	80H to B8H
* Message Destination	Display and/or serial
* Periodic Messages	Up to 32
* Chained Message	Up to 248/message
* Command Messages	Issues a command
* Current date/time	Full calendar and clock
* Request time	Time of Message Request
* Priority	0 to 248
* Embedded data	Up to 4 items/message
** Elapsed time	2 internal timers
* MDPI Only	
** MDPS has only one internal timer	

ORDERING INFORMATION FOR LARGE MESSAGE CENTER

MODEL NO.	DESCRIPTION	PART NUMBER
LMC1	LARGE MESSAGE CENTER 1x10	LMC10000
LMC2	LARGE MESSAGE CENTER 2x20	LMC20000
MB6	LMC/LDD MOUNTING BRACKETS	MB600000
ENC7	LMC/LDD NEMA 4/IP65 ENCLOSURE	ENC70000
SHR	SHROUD FOR LMC	SHR10000

ORDERING INFORMATION FOR

APOLLO MESSAGE DISPLAY PERSONALITY MODULE

MODEL NO.	DESCRIPTION	PART NUMBER
MDPI	MDPI MODULE	MDPI1000
MDPS	MDPS MODULE	MDPS0000

Note: 1) These modules will NOT operate in a Model LDD unit.
2) The MDPI requires the Apollo Message Display User Software to program messages.
3) See MDI or MDS Bulletin for more information.

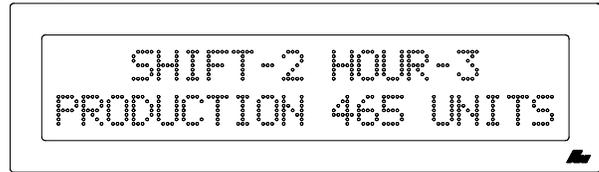
ORDERING INFORMATION FOR MESSAGE DISPLAY ACCESSORIES

MODEL NO.	DESCRIPTION	PART NUMBER
SFMD	Apollo Message Display User Software (3½": 1.44M)	SFMD0
MCCA	AC Communications Adapter	MCCA0000
*GCM232	Serial Converter Module RS-232	GCM23201
*APS01	+12 VDC Unregulated Power Supply, 115 VAC	APS01000
*APS02	+12 VDC Unregulated Power Supply, 230 VAC	APS02000
SKT1	8-Pin Socket	SKT10000
-	Din Rail Mount, 8-Pin Octal	SKTDIN00

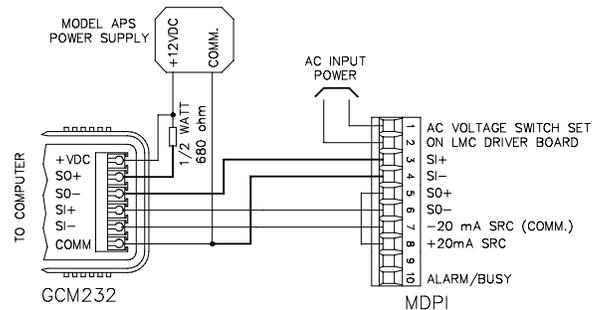
Note: Only one copy of software is required for multiple units.
* Refer to MDPI/MDPS Programming Set-up section for minimum requirements.

APPLICATION MDPI

A plant manager wants to display the date and time in the production area so that it is readable to all employees. The manager also would like the ability to display other information about the production facility such as; desired and actual quantity produced, work stoppage alerts, safety messages, etc.



The Large Message Center (LMC) with an MDPI module installed is located at ceiling height to meet the necessary requirement. A cable connected between the LMC and the office computer allows the manager to update the display with on-line information when necessary.



DISPLAYING MESSAGES (MDPI ONLY)

After a message is requested, the MDPI will determine if the message should be displayed, placed on the Queue, or discarded. If the LMC display is empty, the message is placed on the display. If a message currently occupies the display, the MDPI determines which of the two messages has the higher priority. If the priority of the new message is equal to or greater than the currently displayed message, the new message is displayed and the message on the display is placed on the Queue. If the priority is less than the currently displayed message, the new message will be placed on the Queue.

QUEUE

The Queue is a temporary storage area for messages while the LMC display is currently occupied. This feature can prevent a requested message from being discarded if the display is currently occupied. The Queue can hold up to eight messages.

POWER UP MESSAGE

When the MDPI is powered up, it will display the unit address, serial terminator, and diagnostic results about the Message Display. The series of self diagnostics will also be transmitted over the serial port.

DEFAULT MESSAGE

One message may be designated as a default message, and on power-up will automatically be requested.

CANCELLATION OF MESSAGES

MDPI

Messages are cancelled by either timing out or by using a command. If the message is programmed with a Time-Out Value, the message will automatically expire after the time-out value is attained. Time-out values for messages are reset and do not time-out while on the Queue.

Commands may be used to cancel any or all messages. These commands can be sent via the serial port. A "command message" which has been programmed to issue a cancel message command can be requested, over the serial port or the parallel port.

MDPS

If a message time-out value is sent to the MDS with the message, it will automatically expire after the time-out value is attained. A message can have a time-out value from 1 to 250 seconds. If the message time-out value is NOT sent with the message, the message will remain on the display until a new message is received, power is removed from the unit a cancel displayed message is sent, or a reset unit command is sent.

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