MPM-100 Series and BDS-256 Series Monitors and Battery Monitor Data Manager Software

User's Guide

Albércorp.

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This manual is for use with the following
versions of software and firmware:

BMDM Software Version 4.1 or later
MPM Firmware Version 1.20 or later
BDS Controller Firmware Version 2.11 or later
DCM Firmware Version 2.31 or later

Regulatory Information

Type of Service: The MPM Series and the BDS Series equipment is designed to be used on standard device telephone lines. It connects to the telephone line by means of a standard jack called the USOC RJ11C (or USOC FJ45S). Connection to telephone company provided coin service (central office implemented systems) is prohibited. Connection to party line service is subject to state tariffs.

Telephone Company Procedures: The goal of the telephone company is to provide you with the best service it can. In order to do this, it may occasionally be necessary for the company to make changes in its equipment, operations or procedures. If these changes might affect your service or the operation of your equipment, the telephone company will give you notice, in writing, to allow you to make any changes necessary to maintain uninterrupted service.

In certain circumstances, it may be necessary for the telephone company to request information from you concerning the equipment that you have connected to your telephone line. Upon request of the telephone company, provide the FCC registration number and the ringer equivalence number (REN); both of these items are listed on the equipment label. The sum of all the RENs on your telephone line should be less than five in order to assure proper service from the telephone company. In some cases, a sum of five may not be useable on a given line.

If Problems Arise: If any of your telephone equipment is not operating properly, you should immediately remove it from your telephone line, as it may cause harm to the telephone network. If the telephone company notes a problem, it may temporarily discontinue service. When practical, the company will notify you in advance of the disconnection. If advance notice is not feasible, you will be notified as soon as possible. When you are notified, you will be given the opportunity to correct the problem and informed of your right to file a complaint with the FCC. Contact your telephone company if you have any questions about your telephone line.

Safety Information

- Except as explained in this manual, do not attempt to service Albércorp equipment yourself. Opening the equipment may expose you to dangerous voltages. Refer servicing beyond that described in this manual to authorized personnel.

- Do not allow liquids or moisture to get into the equipment. If liquid does get into the equipment, unplug it immediately and contact your nearest authorized service center or Albércorp directly.

- Ensure equipment is provided adequate ventilation. Do not block equipment ventilation openings.

- Do not exceed equipment voltage or power ratings and capabilities.

- Make sure that equipment is properly grounded.

- Do not let unauthorized persons operate the equipment.

- Do not energize the cabinet or any component with 115VAC or battery voltage until after the installation is complete.

- Use of this product in a manner not specified could compromise the designed-in safety of this product.

WARNING: High voltage or current may be present in the equipment. Only qualified personnel should perform the operations described in this manual.

WARNING: High voltages exist inside the system components and on the equipment terminals. Calibration must be performed only by technically qualified persons. Observe electrical safety precautions when removing and installing equipment covers, and when connecting leads and making adjustments.

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1. *System Requirements*

The following are the minimum system requirements for Battery Monitor Data Manager program and monitor operation.

Microsoft Windows™ 95, 98, 2000 or NT4.0.
Personal computer using a Pentium™ 400MHz or higher microprocessor.
One modem, or two modems for managing more than 100 monitors.
64M of memory.
20M of hard disk space available for software installation. 1G of hard disk space available for future data storage.
3.5" high-density (1.44MB) disk drive.
CD-ROM drive.
SVGA monitor.
Mouse or compatible pointing device.

A typical MPM system requires the following manuals:

MPM-100 Series and BDS-256 Series Monitors and Battery Monitor Data Manager Software User's Guide, 4200-004
Battery Monitor Data Manager Report Generator Software User's Guide, 4200-010
MPM-100 Series Installation Instructions, 4200-034
UPS (uninterruptible power supply) manufacturer's instruction manual (if a UPS is used)

A typical BDS system requires the following manuals:

MPM-100 Series and BDS-256 Series Monitors and Battery Monitor Data Manager Software User's Guide, 4200-004
BDS-256 Battery Diagnostic System with BDS Controller Installation Instructions, 4200-007 (non–UL version) or 4200-028 (UL version)
Battery Monitor Data Manager Report Generator Software User's Guide, 4200-010
BDS-256 Commissioning Procedure and Acceptance Test for the DCM-480 System, 4200-009 (optional)
UPS (uninterruptible power supply) manufacturer's instruction manual (if a UPS is used with the system)
BDS Quick Start Cards, 4200-026

2. MPM and BDS General Description

The MPM is a low cost, stand-alone monitor for communication and power industry applications, while the BDS is specially designed for UPS applications. What sets these monitors apart from all others is their ability to provide early warning of any battery problems. The monitors automatically check the state of health of each cell by performing a proactive resistance test, which is a reliable predictor of battery performance. In addition, to indicate immediate battery health and monitor status of a given location, the system automatically reports to a Central computer (a generic PC) with easily read system status screens.

With its automatic polling and data transfer algorithms, the Battery Monitoring Data Manager software lets a Central computer manage over one thousand monitor systems. Data is automatically transmitted to the Central computer and stored in a database for later analysis and reporting. At any time, service personnel may call a battery location from the Central computer or a remote location (such as from home), or directly connect to the monitor without losing contact with the Central computer.

The Data Manager software string and monitor status indicators make central battery monitoring easier than ever. Terms such as Discharging, Alarm or Warning for string status or Active for monitor status quickly summarize an occurrence. After being reported to the Central computer, the condition is displayed on a tabular list for easy identification of trouble areas. The system also features several methods of automated reporting of alarm occurrences, such as contacting key personnel via a pager or faxing a message.

Flexibility was also a major design consideration. Because the monitors are stand-alone units with no external computer required, a primary protocol using MODBUS ASCII was selected to allow incorporation of the monitor into large-scale facility monitors. This allows third-party interfaces to be written to access all the stand-alone features of the monitor, while still having the advanced features of the Data Manager remote communication software available for service personnel.

3. MPM and BDS Series Configurations

This section is an overview of the MPM and BDS Series monitor configurations.

3.1. MPM Configuration Options

The MPM can accommodate up to 30 different battery configurations, which may be modified for nonstandard battery configurations. (For example, a 1 x 60 configuration can only have 59 cells.)

The MPM-100 model numbers are structured as follows.

1001-nnnA xxxxxx

                      MPM model.

               Group of letters/numbers that indicates the following options:
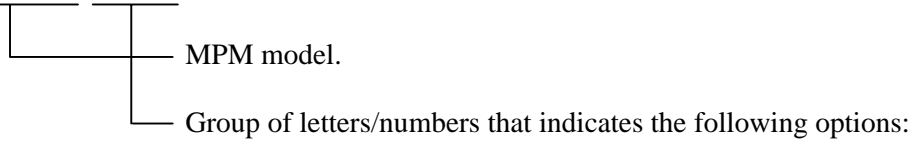
Position 1 (Xxxxxx): Power
    A = Unit is powered by AC wall plug. (Available only on 120V units.)
    D = Unit is powered by the DC bus.

Position 2 (xXxxxx): Communication options (fiber optic, Ethernet or RS-232). Refer to the appendix in this manual for details.

Position 3 (xxXxxx): Method of sensing discharge current.
    C = Current transducer.
    S = Shunt.

Position 4 (xxxXxx): Float current transducer.
    [blank] = No float current transducer.
    F = Float current transducer.

Position 5 (xxxxXx): Main power line frequency.
    5 = 50Hz.
    6 = 60Hz.

Position 6 (xxxxxX): Brand labeling.
    A = Albércorp.
    S = OEM model.

The following list describes the standard configurations supported. For special configurations or custom system integration for OEM applications, contact Albércorp directly.

	Model Number	**Configuration**	**Description**
12V Batteries	1001-391	MPM-100-1x10x1*	1 string of 10 – 1v cells in series.
	1001-392	MPM-100-2x10x1	2 strings in parallel of 10 – 1v cells in series.
	1001-393	MPM-100-3x10x1	3 strings in parallel of 10 – 1v cells in series.
	1001-394	MPM-100-4x10x1	4 strings in parallel of 10 – 1v cells in series.
24V to 31V Batteries	1001-386	MPM-100-1x26x1	1 string of 26 – 1v cells in series.
	1001-387	MPM-100-2x26x1	2 strings in parallel of 26 – 1v cells in series.
	1001-388	MPM-100-3x26x1	3 strings in parallel of 26 – 1v cells in series.
	1001-361	MPM-100-1x25x1	1 string of 25 – 1v cells in series.
	1001-362	MPM-100-2x25x1	2 strings in parallel of 25 – 1v cells in series.
	1001-363	MPM-100-3x25x1	3 strings in parallel of 25 – 1v cells in series.
	1001-364	MPM-100-4x25x1	4 strings in parallel of 25 – 1v cells in series.
	1001-360	MPM-100-1x20x1	1 string of 20 – 1v cells in series.
	1001-371	MPM-100-2x20x1	2 strings in parallel of 20 – 1v cells in series.
	1001-372	MPM-100-3x20x1	3 strings in parallel of 20 – 1v cells in series.
	1001-373	MPM-100-4x20x1	4 strings in parallel of 20 – 1v cells in series.
	1001-382	MPM-100-1x13x2	1 string of 13 – 2v cells in series.
	1001-383	MPM-100-2x13x2	2 strings in parallel of 13 – 2v cells in series.
	1001-384	MPM-100-3x13x2	3 strings in parallel of 13 – 2v cells in series.
	1001-385	MPM-100-4x13x2	4 strings in parallel of 13 – 2v cells in series.
	1001-338	MPM-100-1x12x2	1 string of 12 – 2v cells in series.
	1001-339	MPM-100-2x12x2	2 strings in parallel of 12 – 2v cells in series.
	1001-340	MPM-100-3x12x2	3 strings in parallel of 12 – 2v cells in series.
	1001-375	MPM-100-4x12x2	4 strings in parallel of 12 – 2v cells in series.
	1001-334	MPM-100-1x6x4	1 string of 6 – 4v modules in series.
	1001-335	MPM-100-2x6x4	2 strings in parallel of 6 – 4v modules in series.
	1001-336	MPM-100-3x6x4	3 strings in parallel of 6 – 4v modules in series.
	1001-337	MPM-100-4x6x4	4 strings in parallel of 6 – 4v modules in series.
	1001-378	MPM-100-1x4x6	1 string of 4 – 6v modules in series.
	1001-379	MPM-100-2x4x6	2 strings in parallel of 4 – 6v modules in series.
	1001-380	MPM-100-3x4x6	3 strings in parallel of 4 – 6v modules in series.
	1001-381	MPM-100-4x4x6	4 strings in parallel of 4 – 6v modules in series.
	1001-374	MPM-100-1x3x8	1 string of 3 – 8v modules in series.
	1001-343	MPM-100-2x3x8	2 strings in parallel of 3 – 8v modules in series.
	1001-344	MPM-100-3x3x8	3 strings in parallel of 3 – 8v modules in series.
	1001-345	MPM-100-4x3x8	4 strings in parallel of 3 – 8v modules in series.
	1001-330	MPM-100-1x2x12	1 string of 2 – 12v modules in series.
	1001-331	MPM-100-2x2x12	2 strings in parallel of 2 – 12v modules in series.
	1001-332	MPM-100-3x2x12	3 strings in parallel of 2 – 12v modules in series.
	1001-333	MPM-100-4x2x12	4 strings in parallel of 2 – 12v modules in series.

*1 volt cells are NiCd

Model Number	Configuration	Description
1001-389	MPM-100-1x41x1	1 string of 41 – 1v cells in series.
1001-390	MPM-100-2x41x1	2 strings in parallel of 41 – 1v cells in series.
1001-354	MPM-100-1x24x2	1 string of 24 – 2v cells in series.
1001-355	MPM-100-2x24x2	2 strings in parallel of 24 – 2v cells in series.
1001-365	MPM-100-3x24x2	3 strings in parallel of 24 – 2v cells in series.
1001-366	MPM-100-4x24x2	4 strings in parallel of 24 – 2v cells in series.
1001-395	MPM-100-1x22x2	1 string of 22 – 2v cells in series.
1001-396	MPM-100-2x22x2	2 strings in parallel of 22 – 2v cells in series.
1001-397	MPM-100-3x22x2	3 strings in parallel of 22 – 2v cells in series.
1001-398	MPM-100-4x22x2	4 strings in parallel of 22 – 2v cells in series.
1001-350	MPM-100-1x8x6	1 string of 8 – 6v modules in series.
1001-351	MPM-100-2x8x6	2 strings in parallel of 8 – 6v modules in series.
1001-352	MPM-100-3x8x6	3 strings in parallel of 8 – 6v modules in series.
1001-353	MPM-100-4x8x6	4 strings in parallel of 8 – 6v modules in series.
1001-346	MPM-100-1x4x12	1 string of 4 – 12v modules in series.
1001-347	MPM-100-2x4x12	2 strings in parallel of 4 – 12v modules in series.
1001-348	MPM-100-3x4x12	3 strings in parallel of 4 – 12v modules in series.
1001-349	MPM-100-4x4x12	4 strings in parallel of 4 – 12v modules in series.
1001-367	MPM-100-1x80x1	1 string of 80 – 1v cells in series.
1001-368	MPM-100-1x92x1	1 string of 92 – 1v cells in series.
1001-369	MPM-100-1x96x1	1 string of 96 – 1v cells in series.
1001-370	MPM-100-1x97x1	1 string of 97 – 1v cells in series.
1001-357	MPM-100-1x60x2	1 string of 60 – 2v cells.
1001-358	MPM-100-1x30x4	1 string of 30 – 4v modules in series.
1001-359	MPM-100-1x20x6	1 string of 20 – 6v modules in series.
1001-376	MPM-100-1x15x8	1 string of 15 – 8v modules in series.
1001-377	MPM-100-2x15x8	2 strings in parallel of 15 – 8v modules in series.
1001-356	MPM-100-1x10x12	1 string of 10 – 12v modules in series.

44V to 50V Batteries (rows 1001-389 through 1001-349)

96V to 120V Batteries (rows 1001-367 through 1001-356)

3.2. BDS Configuration Options

The BDS can accommodate virtually any battery configuration. The following list describes the more commonly used configurations.

Configuration	Description
BDS-256-108x2	108 – 2v cells.
BDS-256-122x2	122 – 2v cells.
BDS-256-1x180x2	1 string of 180 – 2v cells.
BDS-256-1x182x2	1 string of 182 – 2v cells.
BDS-256-1x188x2	1 string of 188 – 2v cells.
BDS-256-1x192x2	1 string of 192 – 2v cells.
BDS-256-1x210x2	1 string of 210 – 2v cells.
BDS-256-1x216x2	1 string of 216 – 2v cells.
BDS-256-1x232x2	1 string of 232 – 2v cells.
BDS-256-1x234x2	1 string of 234 – 2v cells.
BDS-256-1x238x2	1 string of 238 – 2v cells.
BDS-256-1x239x2	1 string of 239 – 2v cells.
BDS-256-1x240x2	1 string of 240 – 2v cells.
BDS-256-1x241x2	1 string of 241 – 2v cells.
BDS-256-1x244x2	1 string of 244 – 2v cells.
BDS-256-1x246x2	1 string of 246 – 2v cells.
BDS-256-1x236x2	1 string of 236 – 2v cells.
BDS-256-1x252x2	1 string of 252 – 2v cells.
BDS-256-1x256x2	1 string of 256 – 2v cells.
BDS-256-1x6x4	1 string of 6 – 4v modules in series.
BDS-256-1x90x4	1 string of 90 – 4v modules in series.
BDS-256-1x120x4	1 string of 120 – 4v modules in series.
BDS-256-1x121x4	1 string of 121 – 4v modules in series.
BDS-256-1x122x4	1 string of 122 – 4v modules in series.
BDS-256-1x123x4	1 string of 123 – 4v modules in series.
BDS-256-1x60x6	1 string of 60 – 6v modules in series.
BDS-256-1x78x6	1 string of 78 – 6v modules in series.
BDS-256-1x80x6	1 string of 80 – 6v modules in series.
BDS-256-1x81x6	1 string of 81 – 6v modules in series.
BDS-256-1x60x8	1 string of 60 – 8v modules in series.
BDS-256-1x61x8	1 string of 61 – 8v modules in series.
BDS-256-1x27x12	1 string of 27 – 12v modules in series.
BDS-256-1x30x12	1 string of 30 – 12v modules in series.
BDS-256-1x31x12	1 string of 31 – 12v modules in series.
BDS-256-1x32x12	1 string of 32 – 12v modules in series.
BDS-256-1x33x12	1 string of 33 – 12v modules in series.
BDS-256-1x34x12	1 string of 34 – 12v modules in series.
BDS-256-1x36x12	1 string of 36 – 12v modules in series.
BDS-256-1x40x12	1 string of 40 – 12v modules in series.

4. MPM and BDS Series Features

This section describes the standard and optional MPM and BDS series features.

- Scans all pertinent battery parameters, such as overall voltage, cell voltages, current, and temperature.

- Performs a scheduled resistance test of all cell/jars, intercells and intertiers, and stores results for trending analysis.

- Auto detects discharges based on Overall Volts or Discharge Current, and stores data for real time or accelerated time playback.

- Signals if any parameter is outside user-programmed limits, energizes a Form C relay contact, and automatically calls a Central computer to report the alarm condition.

- Incorporates a Form C alarm contact for monitor hardware failure or power failure.

- Communicates with an external computer via RS-232 or remotely via modem or LAN.

- Performs a scheduled test, programmed by the user, of shutting down the charger and monitoring discharge, with real time or fast time playback. (MPM series only)

- Monitors up to sixteen digital inputs.

- Eight control outputs, triggerable on any alarm event. (BDS series only)

- Network compatible.

4.1. Data Manager Program Features

- Windows™ 95, 98, 2000 or NT4.0 compatible Central computer control software.

- Easy to read string and monitor status.

- Automatic polling for over 1000 monitor sites for monitor and string status reporting.

- Historical event list for complete string history.

- Automatically receive calls from monitors and update the central database for data analysis.

- Service mode for service personnel, and local RS-232 direct connect viewing of string details and system setup when loaded on a laptop computer.

- Microsoft Access™ database compatible, with management of all stored data.

- Playback of discharge rundown test and controlled rundown test data.

- Automatic paging and faxing of alarm events.

- Instant trend graphs of any selected parameter.

- Complete memo tracking down to the cell/module level.

- Status display can be customized for multi-customer monitoring.

- Network compatible.

4.2. Optional Accessories*

- Shunt for measuring discharge current.

- Hall Effect current transducer for measuring discharge and float current.

- Temperature sensor: Electrolyte Probe or Contact Ambient Probe.

- Fiber optic communication ports for connecting to a Serial Port Multiplexer. The customer may specify which port is used with the Serial Port Multiplexer: a modem port, an RS-232 port, or both. (BDS uses switch settings; MPM has factory configured jumpers.)

- Serial Port Multiplexer for connecting one telephone line to up to sixteen monitors.

- Serial Port Multiplexer for connecting one Local computer via local RS-232 to up to sixteen monitors.

- Network interface.

*These accessories have not been evaluated for compliance to UL® requirements.

5. *Operating Features*

This section describes the system operating features.

5.1. Normal Operating Mode

In normal operating mode, the system scans all parameters in one to five seconds, depending on the configuration. As readings are taken, they are compared to the user-programmed alarm levels. The monitor can be programmed to call a Central computer and/or energize an alarm contact if a parameter exceeds preset levels. Front panel LEDs indicate scan and alarm status. All alarm events are stored in memory for future analysis. The BDS can be programmed for critical and maintenance alarms.

5.2. Discharge Mode

If a discharge is detected, the system triggers into a data-logging mode and stores battery voltages and discharge current into a discharge record.

5.3. Resistance Test Mode

A battery resistance test may be performed at user-programmable intervals. The test is similar to the measurement performed by the Albércorp Cellcorder. Up to eight intertiers on an MPM or fifteen on a BDS can be configured for inclusion in this measurement. Also, certain models are capable of separate intercell connection measurements.

5.4. Alarm Features

The monitor may be set to automatically call the Central computer to report an alarm condition when it is detected. You can program high and low alarm levels on all voltage and temperature parameters, and a high alarm level for resistance measurements. When any parameter goes outside the normal range, the monitor stores the event in memory, the Alarm LED lights, and an alarm relay with a Form C contact energizes. The alarms may be set for latching or nonlatching.

5.5. Controlled Run Down Test (MPM Only)

You can program time intervals (in days) and length of time (in minutes) to have a relay automatically shut down the charger. During this time, the system treats the condition as a discharge and saves the changing parameters to a discharge record for playback and analysis.

6. Panel Controls and Indicators

This section describes the items on the front and rear panels of the discreet components that comprise a typical MPM or BDS system. Additional item descriptions may appear elsewhere in this manual or in related manuals.

6.1. MPM Front Panel Indicators

Scan (green) - Blinks during normal operating conditions.

Alarm (red) - On when an alarm condition is detected.

Alarm Disable (red) - On when the user has disabled alarm reporting using the BMDM software.

Resistance Test (green) - On when performing a manual or automatic resistance test.

Error (red) - On when a hardware failure is detected.

6.2. MPM Front Panel Connectors

Local Port - An RS-232 port for connecting to a portable computer for servicing purposes only.

6.3. MPM Front Panel Controls

Local Port switch - Enables the front RS-232 port or the rear optional RS-232, fiber optic or network port. When the switch is lit, the front port is selected.

Alarm Reset switch - During normal operation, resets alarms. If held during power up, clears existing names in the monitor, disables alarms, disables dial out, clears data memory, and resets the password to `alber`.

6.4. MPM Rear Panel Connectors

Option Port - Top left rear panel. This port may be an RS-232 Local Port, an Rx / Tx fiber optic port, or an RJ-45 network port. The front panel Local Port switch enables this port. Use the RS-232 port for connecting to a permanent Local computer, Service computer, and on-site Central computer. For modem, RS-232 and network connections, refer to *Connecting to a Battery Location*. Use the upper fiber optic Tx and Rx port for connecting to a Serial Port Multiplexer that uses RS-232. Tx and Rx are described in the *Serial Port Multiplexer User's Guide* manual.

Telco - An RJ-11 jack for communicating with a remote computer via telephone.

Tx, **Rx** - Use the lower fiber optic Tx and Rx port for connecting to a Telco Serial Port Multiplexer. Refer to the *Serial Port Multiplexer User's Guide*.

J1, **J3**, **J4, J6, J7** - Sense lead wiring to connectors J1, J3, J4, J6 and J7 depends on the battery configuration. Cell/Jar voltage sense leads connect from J1 (and J3 on units with the expansion module) to the individual cells/jars. Refer to the *MPM-100 Series Installation Instructions*.

J2 - Provides for alarm and digital connections on all MPM configurations. Two sets of dry Form C alarm contacts are also available. Do not use for current transducers if J5 is available. Refer to the *MPM-100 Series Installation Instructions*.

J5 - Current Transducer connector (optional). Provides for signal connection and +15V and –15V power for up to four discharge current transducers (CTs) and signal connection for the float current sensor.

Load Connections 1 to 5 - The most-positive battery connection must always be to Load Connection #1 on the MPM rear panel. The negative connection is determined by the battery configuration. Refer to the *MPM-100 Series Installation Instructions* manual.

Load Connections 6 to 10, 11 to 15, 16 to 20 - See Load Connections 1 to 5.

Power Connector - Right side of rear panel. When the MPM requires AC power because of battery configuration, connect a 24VDC wall plug transformer to this connector. AC power must be from a UPS protected source.

6.5. BDS Controller Front Panel Indicators

DCM Tx (green) - Blinks during fiber optic transmit.

DCM Rx (green) - Blinks during fiber optic receive.

Status (green) - Blinks during normal operating conditions.

Com Port (green) - Blinks to indicate communication via the LAN port or an incoming call.

Critical Alarm (red) - On when a critical alarm is detected.

Maintenance Alarm (yellow) - On when a maintenance alarm is detected.

Resistance Test (green) - On when performing a manual or automatic resistance test.

6.6. BDS Controller Front Panel Connectors

Local Port - An RS-232 port for connecting to a portable computer.

6.7. BDS Controller Front Panel Controls

Alarm Reset switch - Clears latched alarms when unit already on. If pressed while powering up, clears names in the BDS, resets the password to `alber`, and disables dial out and alarms.

Local Port Select switch - Enables the front or rear RS-232 port. When the switch is lit, the front port is selected.

6.8. BDS Controller Rear Panel Connectors

F1, **F2** - User replaceable fuses. Refer to the *BDS Controller Specifications*.

AC Power - User replaceable fuse and receptacle for AC power cord. Refer to the *BDS Controller Specifications*.

DCM Power Output 1 to 4 - Four pairs of screw terminals that provide 24VAC.

Fiber Optic Repeaters Tx 1 Rx 1 to Tx 7 Rx 7 - Input/output connectors used to amplify signals before a long fiber optic cable run.

Load Control - Used for connecting to an Albércorp CLU Series load bank (not a DCM external load module).

Control Outputs 1 to 8 - Form C contacts for control of external devices.

Digital Inputs 1 to 16 - Optically isolated inputs for sensing contact closures.

Printer - A DB-9 port for connecting to a printer.

UPS - A DB-9 port for monitoring the battery inside a UPS (uninterruptible power supply).

Configuration Settings - A DIP switch for setting configurations when using an Albércorp Serial Port Multiplexer.

Local Tx/FO Rx/FO - Fiber optic transmit / receive ports for Serial Port Multiplexer communication.

Local port - An RS-232 port for connecting to a computer.

Telco Tx/FO Rx/FO - Fiber optic transmit / receive ports for Telco Serial Port Multiplexer communication.

Telco - An RJ-11 jack for remote computer communication via telephone.

Critical Alarm - Form C alarm contacts, software configurable.

Maint Alarm - Form C alarm contacts, software configurable.

Remote Alarm Reset - Reads momentary contact closure. Requires a user-supplied 12V to 32V signal.

Fiber Optic Tx/FO Rx/FO - Fiber optic transmit / receive ports for DCM communication. communicating with DCMs.

LAN - An RJ-45 port for remote computer communication via network.

LAN - A DB-9 port for connecting to an external network conversion unit. This port is active only if the RJ-45 LAN connector is not installed.

6.9. DCM Front Panel Indicators

Rx (green) - Blinks during fiber optic receive.

Tx (green) - Blinks during fiber optic transmit.

Status (green) - Blinks during normal operating conditions.

6.10. DCM Rear Panel Connectors

TX/FO Rx/FO - Fiber optic transmit / receive ports for communicating with a BDS or other DCMs.

24VAC Power - A 4-pin connector for daisy-chaining 24VAC to other DCMs.

Load Control - Port for External Load Module communication.

Sense Leads J1, J2, J3, J4 - For connecting voltage sense leads to the batteries.

Overall Volts - A DB-25 port for connecting overall voltage and discharge sense leads when connecting to a shunt.

Current Transducer - A DB-9 port for sense and power supply connections for discharge and float sensors.

6.11. External Load Module Front Panel Indicators

Power (red) - When lit, indicates 24VAC power is applied.

Service (red) - When lit, indicates the unit requires factory service, usually because internal temperature exceeded specifications.

6.12. External Load Module Rear Panel Connectors

DCM 1 to 6 - Port for DCM communication.

Power 24VAC - Power input connectors.

Load Connections - Connectors that load the batteries when activated.

7. Connection Notes for MPM

Connection to an MPM can be via a modem from a remote location or on-site using the RS-232 Local port. Both methods let you check all battery parameters. This section explains how to set the internal DIP switch and connect the MPM, modem, computer, and serial multiplexer. When connecting via modem, use a minimum 26AWG Telco line cord. For initial installation, refer to the *MPM-100 Series Installation Instructions* manual.

7.1. Modem Connection (MPM)

To communicate with an MPM from a remote location, connect the MPM rear panel Telco connector to a telephone line. Connect the Central computer modem to the phone line according to the computer manufacturer's instructions.

7.2. Local Port Connection (MPM)

There is one 9-pin RS-232 local port on the MPM front panel and a 9-pin RS-232 local port on the rear panel. You may use only one port at a time. Use the front panel Local Port switch to select the front or rear port. When the switch is lit, the front port is selected. Use the rear port for connecting to a permanent Local computer or on-site Central computer, and use the front port when using a portable Service computer. NOTE: As an option, the rear panel RS-232 may have been factory replaced with a fiber optic or LAN connector.

Connect a 9-pin female to female cable (pin to pin construction) to the MPM Local Port and to an available port on the computer.

7.3. Telco Serial Port Multiplexer (MPM)

Multiple monitors on one telephone line - When only one telephone line is available for multiple MPMs at the same location, use the Albércorp Telco Serial Port Multiplexer. This optional accessory is available in six configurations that can connect up to eight or sixteen MPM monitors with different power requirements.

When the Telco Serial Port Multiplexer is used, the MPM requires an optional factory installed fiber optic interface that replaces the modem and provides a connection port for the multiplexer. When this option is used, the RJ-11 modem port is disabled but still present.

Each unit connected to the multiplexer requires a unique MUX ID. This setting is under Setup|System|Link on the Data Manager software. Refer to *Setting Up a New System* and *Synchronizing Battery Locations*, and to the *Serial Port Multiplexer User's Guide*.

Part Number	Description
1000-292	8 channel Telco multiplexer 12V
1000-293	16 channel Telco multiplexer 12V
1000-296	8 channel Telco multiplexer 24V
1000-297	16 channel Telco multiplexer 24V
1000-300	8 channel Telco multiplexer 48V
1000-301	16 channel Telco multiplexer 48V

7.4. DIP Switch Configuration (MPM)

For the MPM to function properly with a Telco multiplexer, set the DIP switch inside the MPM. Only change this switch when using the MPM with a Telco multiplexer.

If the MPM has a factory-installed fiber optic Telco port, the DIP switch is correctly set. To verify the switch setting without removing the MPM cover, select Diagnostics|DIP Switch from the String View screen. The diagnostic box indicates each switch position. Refer to *DIP Switch* in the *Diagnostics* section of this manual. If the switch must be set, do the following.

WARNING: Do not use a pencil to change the DIP switch settings. Graphite residue may harm the internal MPM components.

1. Power off the MPM.
2. Remove the MPM cover by removing four screws on the top edges of the cover, two screws on the top edge of the rear panel, and one screw at the top center of the front panel.
3. To enable the Telco multiplexer option, set DIP switch 1, position 8 to On.
4. Replace the MPM cover.
5. The new switch setting takes effect when the power is applied.

Modem Call Out	DIP Switch 1 - Position 8
Enable Multiplexer Support	ON
Disable Multiplexer Support	OFF - default

Figure 1. DIP Switch Settings

7.5. RS-232 Serial Port Multiplexer (MPM)

Multiple monitors on one Local computer - When only one Local computer is available for multiple MPM monitors at the same location, use the RS-232 Serial Port Multiplexer. This optional accessory is available in six configurations that can connect up to eight or sixteen MPM monitors with different power requirements.

When the RS-232 Serial Port Multiplexer is used, the MPM requires an optional factory installed fiber optic interface that replaces the rear RS-232 Local port and provides a connection port for the multiplexer. With this option, the MPM front panel Local port is still available; however, if you connect a Service computer via this port for servicing or setup, disconnect the fiber optic cables.

Each unit connected to the multiplexer requires a unique MUX ID. This setting is under Setup|System|Link. Refer to *Setting Up a New System* and *Synchronizing Battery Locations*, and to the *Serial Port Multiplexer User's Guide*.

Part Number	Description
1000-290	8 channel RS-232 multiplexer 12V
1000-291	16 channel RS-232 multiplexer 12V
1000-294	8 channel RS-232 multiplexer 24V
1000-295	16 channel RS-232 multiplexer 24V
1000-298	8 channel RS-232 multiplexer 48V
1000-299	16 channel RS-232 multiplexer 48V

7.6. Connection Notes

Observe the following when connecting these devices:

7.6.1. MPM Serial Port

There are 9-pin RS-232 local ports on the front and rear panels. You may use only one port at a time. Use the front panel Local Port Select switch to select the front or rear port. When the switch is lit, the front port is selected. Use the rear port for connecting to a permanent Local computer, and use the front port when using a portable computer. Refer to *Local Port Connection* for MPM or BDS and *Local Computer*. Cable construction details are in the *MPM Installation Instructions* manual, or you may order the cable (part number 2025-117) from Albércorp.

7.6.2. Serial Port and Fiber Optic Interface (MPM)

When the RS-232 Serial Port Multiplexer is used, the MPM requires an optional factory installed fiber optic interface. The fiber optic interface replaces the rear panel RS-232. With this option, the MPM front panel Local port is still available. Use the front panel Local Port Select switch to select the front or rear port. When the switch is lit, the front port is selected.

7.6.3. Modem and Fiber Optic Interface (MPM)

When the Telco Serial Port Multiplexer is used, the MPM requires an optional factory installed fiber optic interface. With this option, the RJ-11 modem port is disabled but still present. Also, the MPM internal DIP switch must be set.

8. Connection Notes for BDS

Connection to a BDS can be via a modem or WAN (wide area network) from a remote location or on-site using the RS-232 Local port or LAN (local area network) port. Both methods let you check all battery parameters. This section explains how to connect the BDS, modem, computer, and serial multiplexer. When connecting via modem, use a minimum 26AWG Telco line cord. For initial installation, refer to the *BDS-256 Battery Diagnostic System with BDS Controller Installation Instructions* manual.

8.1. Modem Connection (BDS)

To communicate with a BDS from a remote location, connect the BDS rear panel modem connector to a telephone line. Connect the Central computer modem to the phone line according to the computer manufacturer's instructions.

8.2. Local Port Connection (BDS)

There are two 9-pin RS-232 local ports on the BDS controller, on the front and rear panels. You may use only one port at a time. Use the front panel Local Port Select switch to select the front or rear port. When the switch is lit, the front port is selected. Use the rear port for connecting to a permanent Local computer, and use the front port when using a portable computer.

8.3. Ethernet Port Connection (BDS)

There are two optional ports on the BDS Controller for Ethernet connection. A DB-9 is available for connecting to an external network conversion unit, and an RJ-45 is available for connecting directly to the LAN. If the RJ-45 is not installed, you may purchase the conversion unit that connects to the DB-9 from Albércorp.

8.4. Telco Serial Port Multiplexer (BDS)

Multiple monitors on one telephone line - When only one telephone line is available for multiple BDS units at the same location, use the Albércorp Telco Serial Port Multiplexer. This optional accessory is available in two configurations that can connect up to eight or sixteen BDS monitors with different power requirements.

When the Telco Serial Port Multiplexer is used, you must set a configuration settings DIP switch on the BDS controller to activate a fiber optic interface that replaces the modem and provides a connection port for the multiplexer. When this option is used, the RJ-11 modem port is disabled but still present.

Each unit connected to the multiplexer requires a unique MUX ID. This setting is under Setup|System|Link on the Data Manager software. Refer to *Setting Up a New System* and *Synchronizing Battery Locations*, and to the *Serial Port Multiplexer User's Guide*.

Part Number	Description
1000-292	8 channel Telco multiplexer 12V
1000-293	16 channel Telco multiplexer 12V

8.5. RS-232 Serial Port Multiplexer (BDS)

Multiple monitors on one Local computer - When only one Local computer is available for multiple BDS monitors at the same location, use the RS-232 Serial Port Multiplexer. This optional accessory is available in two configurations that can connect up to eight or sixteen BDS monitors with different power requirements.

When using the RS-232 Serial Port Multiplexer, you must set the configuration settings DIP switch on the BDS controller rear panel. This activates a fiber optic interface that replaces the rear RS-232 Local port and provides a connection port for the multiplexer. With this option, the BDS front panel Local port is still available; however, if you connect a Service computer via this port for servicing or setup, you must set the BDS Local Port Select switch to select the front port. NOTE: The rear RS-232 connector is still present but should not be used.

Each unit connected to the multiplexer requires a unique MUX ID. This setting is under Setup|System|Link. Refer to *Setting Up a New System* and *Synchronizing Battery Locations*, and to the *Serial Port Multiplexer User's Guide*.

Part Number	Description
1000-290	8 channel RS-232 multiplexer 12V
1000-291	16 channel RS-232 multiplexer 12V

8.6. DIP Switch Configuration (BDS)

For the BDS to function properly with a Telco or RS-232 multiplexer, you must set a configuration settings DIP switch on the BDS controller rear panel. The switch is factory set for BDS controller or 256 system operation with the Telco RJ-11 and RS-232 local port enabled. If the switch must be changed, do the following.

WARNING: Do not use a pencil to change the DIP switch settings. Graphite residue may harm the internal BDS components.

1. Power off the BDS.
2. Change the configuration settings DIP switch, positions 1 through 4, to select Modem or Telco multiplexer.
3. Change the DIP switch, positions 5 through 8, to select RS-232 local port or RS-232 multiplexer.
4. The new switch setting takes effect when the power is applied.

Configuration DIP Switch Switch Position	Modem		Rear Panel RS-232	
	Modem	Telco Fiber Optic	RS-232 Local Port	Local Fiber Optic
1	ON	OFF	X	X
2	ON	OFF	X	X
3	OFF	ON	X	X
4	OFF	ON	X	X
5	X	X	ON	OFF
6	X	X	ON	OFF
7	X	X	OFF	ON
8	X	X	OFF	ON

Figure 2. DIP Switch Settings

9. *Installing the Data Manager Software*

The Battery Monitor Data Manager program is distributed on one CD-ROM. To install the program, insert the CD into the computer and select Start|Run from the Windows screen. From the Run dialog box, type **d:\setup** (or other appropriate drive letter) to start the installation. Follow the on-screen instructions when installing the software.

The BMDM program can run in languages other than English. In the latest version, the English, Chinese, Korean, and Spanish languages are available. Screens and menus automatically appear in the language of the computer operating system when the BMDM program is started. Language selection is set at the factory.

9.1. *Starting the Program*

To start the Data Manager, double-click the Data Manager icon on the desktop. At start-up, the program asks if you want to load a sample database. Load the database only if you want to explore the Data Manager software; otherwise, do not load the database.

If this is the first time the software is being used, a question about computer type appears. A computer type needs to be selected only once, during initial setup. After initial setup, each time the program starts, it configures the software for the computer type selected. Read the section *Understanding Computer Types* before answering and continuing.

After initial setup, when the program is run, the title bar at the top of the screen indicates whether the computer is configured for Central, Local or Service. To change the computer type, refer to the following *Changing Computer Type* section.
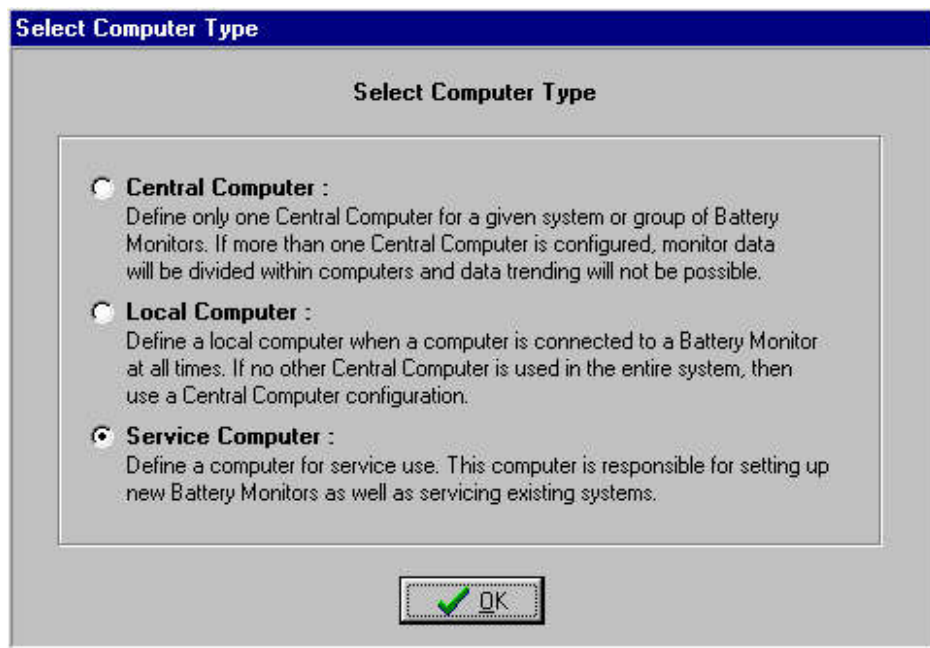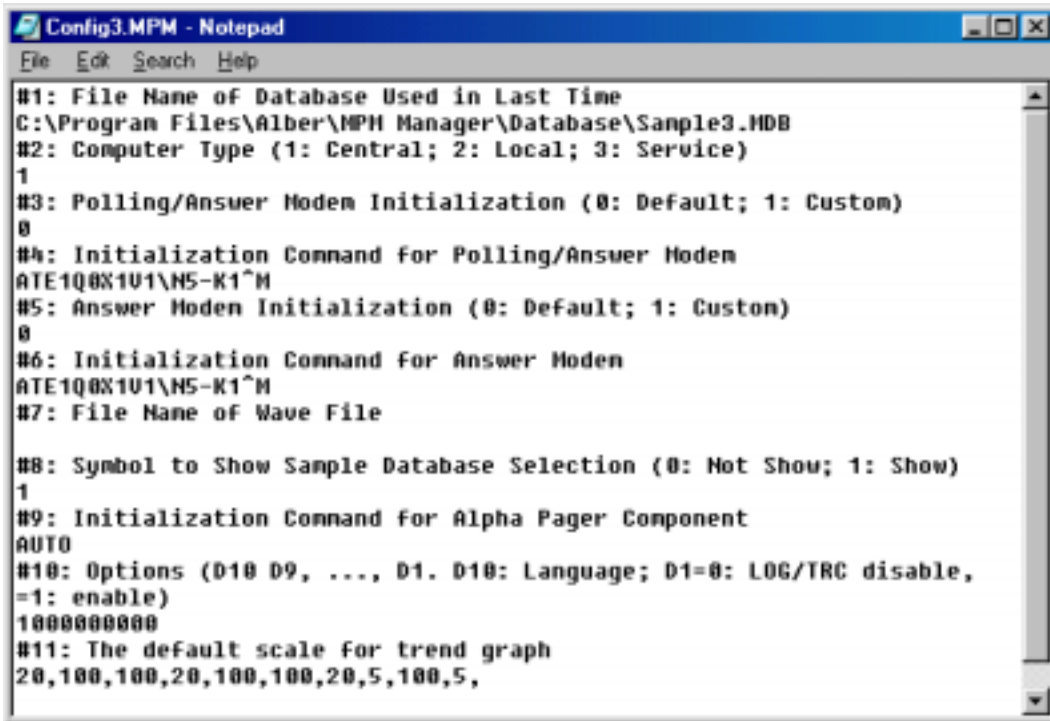

Figure 3. Select Computer Type

9.2. Changing Computer Type

The Select Computer Type screen only appears the first time the BMDM software is installed. You cannot change the computer type by installing the software again. To change the computer type, you must edit the text file described below.

To change the computer type, close all programs, including the BMDM program, and open Windows Explorer or open a text editor program such as Microsoft Notepad or Microsoft WordPad, located under Start|Programs|Accessories.

Open the text file **Config3.MPM** under Program Files\Alber\MPM Manager.

Using the text editor, edit the number beneath the line labeled #2 Computer Type so that the digit indicates the computer type you want. Select 1 for Central, 2 for Local or 3 for Service. For example, the following figure shows a 1 under line #2. The 1 indicates a setting of Central computer.

Figure 4. Config3.MPM File

Save the text file and close Explorer or the text editor program. Run the BMDM program and confirm the title bar at the top of the screen indicates the correct computer type: Central, Local or Service.

NOTE: The Config3.MPM text file shown in the above figure is for illustration only and is not meant to be copied exactly.

9.3. Understanding Computer Types

There are several ways to interface to the monitoring systems. When installing the Data Manager software, select one of three computer types: Local, Central or Service. This section explains the types of computer connections.

9.3.1. Central Computer

When managing many sites, the use of a central personal computer running Windows 95, 98, 2000 or NT4.0 is recommended. The computer can be a remote computer with at least one modem, or two modems for managing more than 100 monitors. A computer continuously running the Data Manager can automatically poll the monitoring systems and test for normal status, answer calls made by an alarming monitor, receive and store data in a central database, and report problems to key personnel. The String Status default screen is an effective tool for quickly determining where problems are.

If you are using only one site per Central computer, you may connect the Central computer to a monitor via the RS-232 DB-9 rear port for continuous viewing of battery and monitor status. In this configuration, no other Central computers may exist for the same site.

You may temporarily use a portable computer as the Central computer. To manually extract data, connect the portable computer either via modem or directly using the RS-232 Local port. This type of Central computer is the least desirable because it cannot automatically poll units for status and automatically extract data or receive calls from alarming monitors.

Only use one Central computer per site. A unique Central computer per site is important because only the Central computer removes data permanently from the monitor memory. If multiple Central computers were allowed to do this, no one computer would have all the data for a site, and data trending analysis could not be performed.

Select Central Computer when you want to:

Connect a computer remotely via a telephone line to manage one or more monitors, or when you want to use an on-site (Local) computer with no remote Central computer.

A Central computer can do the following:

Set up alarm parameters and test intervals.

Collect data manually or automatically, which permanently removes the data from monitor memory.

Report string and monitor status automatically.

Page personnel upon an alarm occurrence.

Fax a report upon an alarm occurrence.

Sound an alarm upon an alarm occurrence.

Control more than 1000 monitors from a remote location (not on-site).

Assign a location name, battery name, and string name when setting up a new system.

Calibrate a monitor via only an RS-232 connection, when the Central computer is on-site.

NOTE: You may set up an on-site, remote (off-site) or laptop (portable) computer as Central, but there must be only one Central computer per battery site.

NOTE: A serial multiplexer is required when using more than one monitor with an on-site computer. Refer to *Multiple Monitors on One Telephone Line* for remote applications or *Multiple Monitors on One Local Computer* for on-site applications.

9.3.2. Local Computer

A Local computer is recommended when you want an on-site display of battery information at all times. You can use a Local computer in conjunction with a Central computer. A Local computer can perform most of the same functions as a Central computer, except that only the Central computer can permanently remove data from the monitor memory.

Typically, this computer type is connected via the RS-232 port on the rear of the MPM or BDS.

MPM CAUTION: The MPM front panel Local Port switch enables the front RS-232 port or optional rear RS-232 port, fiber optic port or LAN port. The front port is for servicing purposes only. When the switch is lit, the front port is selected. Use the rear port for connecting to a permanent Local computer, Service computer, and on-site Central computer. Use the front port for using a portable computer for servicing. For example, if the MPM is not near the Local computer, an on-site connection may be required for calibration or troubleshooting.

BDS CAUTION: A BDS front panel switch can disable the rear RS-232 Local port or the fiber optic port. Select the Local position to use the front Local port. When the switch is lit, the front Local port is selected. Be sure to select the rear Local port after use to re-establish connection to the Local computer.

With a Local computer, the Data Manager can monitor a combination of up to 16 MPM or BDS monitors with the use of a Serial Port Multiplexer option. Refer to *Multiple Monitors on One Local Computer*.

The software on a Local and Central computer is the same, except the software is set up for Local rather than Central during initial setup to implement special data handling rules when connected to a monitor.

Select Local Computer when you want to:

Connect a computer to a monitor for continuous viewing of monitor and battery status.

A Local computer can do the following:

Set up alarm parameters and test intervals.

Calibrate a monitor.

Collect data manually and automatically without permanently removing the data from monitor memory.

Report battery and monitor status automatically.

Page personnel upon an alarm occurrence.

Fax a report upon an alarm occurrence.

Control no more than 16 monitors, unless a network is implemented.

NOTE: When no network is available, a serial multiplexer is required when using more than one monitor. Refer to *Multiple Monitors on One Local Computer*.

9.3.3. Service Computer

The Service computer can be either a desktop computer, or a notebook computer temporarily connected to a monitor on-site to view battery information. The software on the Service computer is the same as that on a Central or Local computer, except it is set up for Service during initial setup. A Service computer also lets service personnel call a site from a remote location and observe a situation without removing any data the Central computer might be waiting to extract.

Select Service Computer when you want to:

Connect a computer on-site or from a remote location for viewing battery data real time, or when you want to set up new monitors.

A Service computer can do the following:

Set up a new monitor, including alarm parameters and test intervals.

Calibrate a monitor.

Collect data manually without permanently removing the data from MPM memory.

9.3.4. Facility Monitor

You can connect the monitor to a facility monitor or any device that can communicate using MODBUS ASCII protocol. Third-party vendors can access all information available to the Data Manager. Upon request, Albércorp will supply the register map and application notes required for this implementation. Connection to a facility monitor from a BDS or MPM monitoring system can be via RS-232 or network. Dry closure contacts are available for monitoring alarm status. Refer to *MPM MODBUS Application Notes* on the Albércorp web site www.alber.com for more details.

10.   Communication Port Settings

Setup Communication

From the String Status screen, click Setup|Communication to access and define communication settings.

Figure 5. Communication Setup

Polling/Answer Port and **Answer Port** - You may define one or two modem COM ports for communication to the monitors. If two COM ports are defined, one port calls and polls the monitors, and the other answers calls from the monitors. Define these ports from the drop-down lists under Polling/Answer Port and Answer Port. If you define only one port, it both polls and answers the monitors. Define one port from the list under Polling/Answer Port and choose Not Selected under Answer Port. On larger systems, the use of two modems is recommended.

Modem Initialization - If Default is selected, the modem initialization string is the default value coded into the Data Manager. To enter a different string value, click Custom.

Baud Rate - Set the baud rate to 19200. The monitor modem has a fixed baud rate of 14400. The computer modem adjusts to the optimum baud rate.

Modem Initialization for Alpha Pager - This is the initialization string used when alphanumeric paging is used. This setting may be left at Auto, which causes the monitor to search your modem INF file from Windows and prepare a string that works with most paging carriers.

Direct Connection - Com Port - If the Direct button is selected under System Setup|Link, use this area to define the com port being used.

Network Connection - Time Out - This setting determines the time allowed to attempt connecting to the network. The time is typically set to 2 seconds.

Disable Continuous Polling - For a computer connected to the monitor via RS-232 or the network, if you do not check this box, continuous polling is enabled. With continuous polling, the software polls the monitor string status at the time interval set in the Continuous Polling Interval box. Refer to *Polling and Extraction*.

Continuous Polling Interval - If Disable Continuous Polling is not selected, set the time interval in seconds that polling occurs. The software continuously polls the monitor string status at the interval set in this box. The time is usually set to 15 seconds. Refer to *Polling and Extraction* for definitions of status and data.

Auto Extract Data - Automatic data extraction removes (Central computer) or copies (Local computer) data from monitor memory when polling each monitor. Normally, select Auto Extract Data for a Central computer; otherwise, you will have to manually call each site and extract data. Refer to *Polling and Extraction*.

10.1. Polling and Extraction

This section explains the types of polling and extraction.

Polling - Polling is the process of having the Data Manager program connect to the BDS or MPM and request present battery and monitor status. This can be done manually or automatically.

Manual Polling - To connect to a string, click the Connection button on the String Status screen.

Auto Polling - The computer automatically connects to one or more monitors, depending on user settings.

Auto Polling via Modem - Occurs a maximum of one time per day for each string.

Auto Polling Interval - This is selected on the System Setup|Link dialog box, and is available when connecting to a BDS or MPM via modem.

Auto Polling via RS-232 or LAN (Continuous Polling) - The computer continually polls each string in the database sequentially.

Continuous Polling Interval - This is selected on the Communication Setup dialog box. It is the time between sequential connection to strings in the database.

Disable Continuous Polling - Selected on the Communication Setup dialog bog. To enable continuous polling, do not check the box.

Extraction of Data

Manual Extract - When connected to an MPM or BDS, data is transferred from the monitor memory to the database when the following are clicked: View Voltage, View Resistance, View Intercell, View Current Historical Alarms, View String Memo, and View Discharge. NOTE: If this is done with a Central computer, the data is permanently removed from the monitor.

Auto Extraction - Selected in the Communication Setup dialog box. Check the box to enable. Data is automatically transferred from the monitor to the computer database during polling. NOTE: If this is done with a Central computer, the data is permanently removed from the monitor.

Do not confuse status and data, with respect to polling:

Status - Status is a report of the normal and error conditions for the strings being monitored.

Data - Data is the alarms, discharges, and resistance and voltage values acquired through testing.

Auto Polling via Modem with a Central Computer - Polling is available for a Central computer no more than one time a day and starts at 12AM (midnight). This 12AM time is not adjustable. When Modem is selected on the Setup|System|Link dialog box, the Polling Interval (Days) field becomes active. If you set the interval (days) to 0, polling is disabled. Auto polling via modem with a Local computer is not available, because this type cannot be connected via modem. Continuous polling is not available using a Central computer connected via modem. See *Continuous Polling* below.

Extracting Data with a Central Computer via Modem - A Central computer connected via modem can extract data. Select Auto Extract Data on the Setup|Communication dialog box. The Central computer polls the monitor status at midnight, copies monitor data to the Central computer database, and deletes the data from the monitor. Status is never deleted using Extract.

Continuous Polling - A Central, Local or Service computer connected to the monitor via RS-232 or network can be set for Continuous Polling. On the Setup|Communication dialog box, unselect the Disable Continuous Polling check box. In the Continuous Polling Interval (seconds) field, set the time interval in seconds that continuous polling occurs. Continuous polling is usually set to 15 seconds. Although a Service computer may be used, it is not generally recommended for continuous polling.

Extracting Data with a Central or Local Computer via RS-232 or Network - A Central or Local computer connected via RS-232 or network can extract data. A Service computer cannot extract data. Select Auto Extract Data on the Setup|Communication dialog box. The Local computer polls the monitor status at 10PM, copies monitor data to the Local computer database, but does not delete the data from the monitor. The Central computer polls the monitor status at 12:00AM (midnight), copies monitor data to the Central computer database, and deletes the data from the monitor.

The following table summarizes the Central, Local, and Service computer types with respect to polling and extraction.

Computer Type	Connected Via	Auto Polling	Auto Extraction
Central	Modem	Begins at 12:00AM	Copy status; copy then delete data. Occurs when auto polled.
Central	RS-232	Continuous	Copy status; copy then delete data. Occurs during first auto poll after 12AM.
Central	LAN	Continuous	Copy status; copy then delete data. Occurs during first auto poll after 12AM.
Local	Modem	N/A	N/A
Local	RS-232	Continuous	Copy status; copy data. Occurs during first auto poll after 10PM.
Local	LAN	Continuous	Copy status; copy data. Occurs during first auto poll after 10PM.
Service N/R	Modem	N/A (Manual Only)	N/A
Service N/R	RS-232	Continuous	N/A
Service N/R	LAN	Continuous	N/A

Figure 6. Computer Types: Polling and Extraction Table

Pause Auto Polling - At the main menu on the String Status screen, you may select Setup|Pause Auto Polling to temporarily suspend continuous polling. This function is convenient if you are attempting to highlight and select other strings in the list. Selecting Pause Auto Polling does not change settings on the Communication Setup or Link dialog boxes.

11. Setting Up a New MPM or BDS Installation

This section describes how to set up the Data Manager software and put the MPM or BDS monitor into operation. Refer to the appropriate *Installation Instructions* manual to install the MPM or BDS, then read this section before placing the system into service.

The monitor is fully calibrated and should require only final parameter settings relevant to the installation. Albércorp recommends that you initially configure all monitor settings on-site through the front or rear panel RS-232 Local port at installation. You may change all programmed settings via modem at a later time.

When the monitor is shipped, the location, battery, and string names are blank, and the auto call-out and alarms are disabled. This prevents any nuisance alarms and unintentional communication during setup.

NOTE: The MPM monitor temporarily loses communication with a locally-connected computer during the modem handshaking process when a monitor calls out. After connection is established, normal operation resumes.

The location name, battery name, and string name must be unique for each system, and they must be recorded and known to the user to allow system setup at a Central computer. These names must correspond between the monitor and the calling computer for a connection to occur.

11.1. Connecting Using a Local Computer

The following list describes how to set up an MPM or BDS monitor for use with a Local computer when a Central computer is being used off-site.

To set up the system . . .	If you need more help, refer to . . .
1. Install the Data Manager as a Local computer.	*Installing the Data Manager Software.*
2. Set communication parameters for a direct connect.	*Communication Port Settings.*
3. Set up for a new system.	*Setting Up a New System.*
4. Direct connect the monitor to the computer.	*Local Port Connection* for MPM or BDS.
5. Establish communication between the monitor and the computer.	*Connecting via the RS-232 Local Port.*
6. Perform battery setup and set alarm thresholds, test intervals, and options.	*Configuring Programmable Settings.*
7. Synchronize the monitor to the Central computer.	*Synchronizing Battery Locations.*

The Local computer and monitor are now ready to operate.

11.2. Connecting Using a Central Computer

The following list describes how to set up an MPM or BDS monitor for use with a Central computer. NOTE: You may set up an on-site or laptop (portable) computer as a Central computer, but there must be only one Central computer per battery site.

- If the Central computer is an on-site computer:

To set up the system . . .	If you need more help, refer to . . .
1. Install the Data Manager as a Central computer.	*Installing the Data Manager Software.*
2. Set communication parameters.	*Communication Port Settings.*
3. Set up for a new system.	*Setting Up a New System.*
4. Direct connect the monitor to the computer.	*Local Port Connection* for MPM or BDS.
5. Establish communication between the monitor and the computer.	*Connecting via the RS-232 Local Port.*
6. Synchronize the monitor to the computer. (MPM only)	*Synchronizing Battery Locations.*
7. Perform battery setup, and set alarm thresholds, test intervals, and options.	*Configuring Programmable Settings*.
8. Synchronize the monitor to the computer. (BDS only)	*Synchronizing Battery Locations.*

The Central computer and monitor are now ready to operate.

- If the Central computer is a remote (off-site) computer:

To set up the system . . .	If you need more help, refer to . . .
1. Set up the monitor.	*Service Computer* or *Local Computer*.
2. Install the Data Manager as a Central computer.	*Installing the Data Manager Software.*
3. Set communication parameters.	*Communication Port Settings.*
4. Connect the computer modem to the telephone line.	
5. Set up for a new system.	*Setting Up a New System.*
6. Establish communication between the monitor and computer.	*Connecting via a Modem.*
7. Synchronize the monitor to the computer.	*Synchronizing Battery Locations.*

The Central computer and monitor are now ready to operate.

11.3. Connecting Using a Service Computer

The following list describes how to set up a computer as a Service computer.

- If the Service computer is a direct connection (on-site) computer for setting up a new MPM or BDS monitor:
  (NOTE: This option is used only if a Local computer is not available.)

To set up the system . . .	If you need more help, refer to . . .
1. Install the Data Manager as a Service computer on a laptop (portable) computer.	*Installing the Data Manager Software.*
2. Set communication parameters.	*Communication Port Settings.*
3. Set up for a new system.	*Setting Up a New System.*
4. Direct connect the monitor to the computer.	*Local Port Connection* for MPM or BDS.
5. Establish communication between the monitor and computer.	*Connecting via the RS-232 Local Port.*
6. Perform battery setup, and set alarm thresholds, test intervals, and options.	*Configuring Programmable Settings.*
7. Synchronize the monitor to the computer.	*Synchronizing Battery Locations.*

The Service computer and monitor are now ready to operate.

- If the Service computer is a direct connection (on-site) computer for viewing battery data, and a copy of the Central computer database is available:

To set up the system . . .	If you need more help, refer to . . .
1. Install the Data Manager as a Service computer on a laptop (portable) computer.	*Installing the Data Manager Software.*
2. Copy the database from the Central computer to the Service computer.	*Data Manager Database* for file names.
3. Set communication parameters.	*Communication Port Settings.*
4. Direct connect the monitor to the computer.	*Local Port Connection* for MPM or BDS.
5. Establish communication via the site selected from the String Status.	*Connecting via the RS-232 Local Port.*

To view battery data, refer to *Viewing a Battery Location*.

- If the Service computer is a remote connection (off-site) computer for viewing battery data via telephone line, and a copy of the Central computer database is available:

To set up the system . . .	If you need more help, refer to . . .
1. Install the Data Manager as a Service computer.	*Installing the Data Manager Software.*
2. Copy the database from the Central computer to the Service computer.	*Data Manager Database* for file names.
3. Set communication parameters.	*Communication Port Settings.*
4. Connect the computer modem to the telephone line.	
5. Establish communication via the site selected from the String Status.	*Connecting via a Modem.*

To view battery data, refer to *Viewing a Battery Location*.

- If the Service computer is a remote connection (off-site) computer for viewing battery data via telephone line, and a copy of the central database is not available:

To set up the system . . .	If you need more help, refer to . . .
1. Install the Data Manager as a Service computer.	*Installing the Data Manager Software.*
3. Set communication parameters.	*Communication Port Settings.*
2. Connect the computer modem to the telephone line.	
4. Set the telephone number and the MUX ID number if required. (MPM only)	*Setting Up a New System.*
5. Set the telephone number, the MUX ID number if required, the string number and the configuration to the BDS-256. (BDS only)	*Setting Up a New System.*
6. Establish communication via the Service location.	*Connecting via a Modem*
7. Synchronize the monitor to the computer.	*Synchronizing Battery Locations*

To view battery data, refer to *Viewing a Battery Location*.

11.4. Setting Up a New System

Setting up the Data Manager involves defining what systems exist. Each system must have a setup that identifies customer, location, contact names, battery and string information, phone numbers, polling interval, and other data.

Password - The System Setup dialog boxes are password protected. When you first select Setup|System from the String Status screen, the Password screen appears. Type the system setup password and click OK. The default password is: `alber` (case sensitive). If the password is not valid, the Setup screens appear, but the New, Save and Delete buttons are inactive. NOTE: The system setup and battery setup passwords may be different.

First Time Setup The String Status screen appears at program start-up. The first time this screen is displayed, no information exists for string status. As you add new systems, they are listed, with the status set to Unknown. To set up a new system, select Setup|System, click the New button, and complete the System Setup dialog boxes. After completing each box, click Save to save the information to the database.

The New Button and Adding a New Customer Systems that were previously set up are listed on the String Status screen. When you click Setup|System, whatever name is highlighted in the list appears in the System Setup - Customer dialog box. Click the New button at the bottom of the dialog box to add a new system (new customer).

NOTE: If you fail to click the New button, you will overwrite the existing customer information in the file.

The New button is also active on the Location, Battery, and String dialog boxes. You may click New to add a new location under an existing customer, a new battery under an existing location, or a new string under an existing battery.

Changing Names and Information There may be times when you need to change the customer name or information for a previously set up system. You may change the customer name or information using the dialog box under Setup|System|Customer. You must not, however, change the location, battery or string name using Setup|System. To change the location, battery or string name after setting up the monitor, make the change under Setup|Battery|General after connecting to the site with a Central or Local computer. This ensures the names in the database match the names in the monitor. If the database names do not match the names stored in the monitor, connection will fail and an error message appears.

NOTE: Do not change the location, battery or string name using Setup|System. You must use Setup|Battery|General if the system has been set up. (See above.)

You may change certain text information on the location, battery or string dialog boxes, if necessary, under Setup|System. For example, you may change the cell manufacturer's name or the location contact person's name. If you make changes under Setup|System|Location or Battery or String, be careful not to change any configuration information.

The Close Button The Close button closes the dialog boxes under Setup|System. If you make changes, the message, "Do you want to save change?" appears after you click Close.

When setting up a system, if you click Close before completing the Customer, Location, Battery and String dialog boxes, the Customer, Location, Battery and String names will not appear in the list on the String Status screen. To access a name and resume editing, open Setup|System, select the Customer, Location, Battery or String tab, and select the required name from the drop-down list next to the Name box.

To display the String ID, Customer Name, and Battery Name columns on the String Status screen, check the boxes on the Setup|Preferences dialog box.

The Delete Button Depending on which System Setup dialog box is visible when you click the Delete button, clicking the Delete button removes all information for the displayed customer, location, battery or string. All customer, location, battery, and/or string set up information and data will be permanently lost.

NOTE: All system setup screens except System Setup|String are identical for both the MPM and BDS.

The following items appear on the Setup|System|Customer dialog box. (* indicates required field.)

Figure 7. System Setup - Customer

Customer Name* - To add new customer information, select Setup|System|Customer, click New, and type the customer name. This may be different from the location name, which describes where the system is located and which is entered under Setup|System|Location. If monitoring only one customer, you may use this area to identify a division, etc. At Address, type address details.

NOTE: You cannot have two identical customer names. Selecting different customers changes the available locations on the Location dialog box.

Customer Contact - Type the name of the person at the customer location who is primarily responsible for the battery system, and their contact information. This name is used as the address name for reports automatically faxed using the option on the Setup|System|Reporting dialog box.

After entering the information, click Save to save to the database or click the next tab to cause the message "Do you want to save change?" to appear.

WARNING: Clicking the Delete button deletes all information for the displayed customer. All locations, batteries, and strings set up for the customer will be permanently lost.

The following items appear on the Setup|System|Location dialog box. (* indicates required field.)

Figure 8. System Setup - Location

Before configuring a location, confirm the correct customer is selected under the Customer dialog box.

Location Name* - Type the location name where the monitor is installed, then type the address of the installation. Location name, battery name, and string name are used with each other to identify the strings and hardware to which the monitor is connected.

NOTE: To change the location name after setting up the monitor, make the change under Setup|Battery|General after connecting to the site with a Central or Local computer. This ensures the names in the database match the names in the monitor. If the database names do not match the names stored in the monitor when attempting to connect, connection fails and an error message appears. Extra or missing blank spaces or hyphens can affect a name.

NOTE: You cannot have two identical location names under the same customer name. Selecting different locations changes the available batteries on the Battery dialog box.

Location Contact - Type the name of the person at the monitor location who is primarily responsible for the battery system, and their contact information. This name is used as the address name for reports automatically faxed using the option on the Setup|System|Reporting dialog box.

After entering the information, click Save to save to the database or click the next tab to cause the message "Do you want to save change?" to appear.

WARNING: Clicking the Delete button deletes all information for the displayed location. All batteries and strings set up for the location will be permanently lost.

The following items appear on the Setup|System|Battery dialog box. (* indicates required field.)

Figure 9. System Setup - Battery

Before configuring a battery, confirm the correct customer and location are selected under the Customer and Location dialog boxes.

Select Setup|System|Battery to assign a battery name, cell and string parameters, and how results appear on the String View screen.

Battery Name* - Assign a unique name to the battery. Location name, battery name, and string name are used with each other to identify the strings and hardware to which the monitor is connected.

NOTE: To change the battery name after setting up the monitor, make the change under Setup|Battery|General after connecting to the site with a Central or Local computer. This ensures the names in the database match the names in the monitor. If the database names do not match the names stored in the monitor, an error message appears. Extra or missing blank spaces or hyphens can affect a name.

NOTE: You cannot have two identical battery names under the same location name. Selecting different batteries changes the available strings on the String dialog box.

Battery Capacity - Type the combined capacity of all parallel strings in the battery (in amp-hours). This is the Amp-hour rating of the battery specified at the eight hour rate.

Installation Date - Type the battery installation date.

Number of Strings* - Type the number of parallel strings within the battery.

Cells per String* - Type the number of cells or modules per string.

Start # of Cells Area - Select how the cells are numbered when displayed on the String View screen and when printed in reports. Refer to the following two items.

Always Start From 1 - Select Always Start From 1 to cause each group (string) of cells to be numbered starting with 1 when displayed. Subsequent groups of cells displayed after the first group will also be numbered starting with 1. For example, four groups may be numbered 1 to 24, 1 to 24, 1 to 24, and 1 to 24.

Sequenced - Select Sequenced to cause each group of cells to be numbered in a continuous sequence when displayed. The first group of cells displayed will be numbered starting with 1. The starting number of the subsequent group will be one more than the final number in the preceding group. For example, four groups may be numbered 1 to 24, 25 to 48, 49 to 72, and 73 to 96.

Multiple Strings Connected in Series - Select the Connected in Series box when connecting more than one monitor across cells in the same string. For example, if using two monitors across a 1 x 120 configuration, connect the first monitor across cells 1 to 60 and the second monitor across cells 61 to 120. In the Number of Strings box, type 1, and in the Cells per String box, type 60.

Cell # Label Start From - This feature allows the reverse numbering of cells. Select Most Negative Cell when the cells are numbered such that Cell 1 is the most negative.

After entering the information, click Save to save to the database or click the next tab to cause the message "Do you want to save change?" to appear.

WARNING: Clicking the Delete button deletes all information for the displayed battery name. All strings set up for the battery will be permanently lost.

The following items appear on the Setup|System|String dialog box. NOTE: The Start Cell # box for MPM changes to String # when BDS-256 is selected. See description below. (* indicates required field.)

Figure 10. System Setup - String (MPM shown)

Before configuring a string, confirm the correct customer, location, and battery are selected under the Customer, Location, and Battery dialog boxes.

Select Setup|System|String to assign a string name, configuration, model and manufacturer names, capacity, and MPM string names.

String Name* - Type a name for each MPM or names for each string if using a BDS. Location name, battery name, and string name are used with each other to identify the strings and hardware to which the monitor is connected.

NOTE: To change the string name after setting up the monitor, make the change under Setup|Battery|General after connecting to the site with a Central or Local computer. This ensures the names in the database match the names in the monitor. If the database names do not match the names stored in the monitor, an error message appears. Extra or missing blank spaces or hyphens can affect a name.

NOTE: You cannot have two identical string names under the same battery name. Selecting different strings changes the selections on the Link and Reporting dialog boxes.

Monitor Configuration* - Select a configuration from the drop-down list. For the MPM, determine the hardware configuration by cross-referencing the model number using the chart in the *MPM Configuration Options* section.

Start Cell # (MPM only)* - Type the first cell number for the first string in the battery being monitored by the MPM.

String # (BDS only)* - Up to 16 DCM units can be assigned the same string number, and the BDS can control up to eight strings. Type the string number of the DCM units to which the information being entered applies.

Cell Model and **Cell Manufacturer** - Type the model number and manufacturer of the cells.

String Capacity - Type the capacity of the individual string (in amp-hours).

String Name of MPM (MPM only) - Assign individual string names within the MPM. The fields available are dependent upon the monitor configuration selected. If the MPM configuration has two or more strings, such as a 2 x 24, you may type names for each string. These names appear in reports wherever string names are used. The default names are String 1, 2, 3 and 4. This area is disabled when BDS is selected.

After entering the information, click Save to save to the database or click the next tab to cause the message "Do you want to save change?" to appear.

WARNING: Clicking the Delete button deletes all information for the displayed string name. The string name and string data will be permanently lost.

The following items appear on the Setup|System|Link dialog box. (* indicates required field.)

Figure 11. System Setup - Link

Before defining link fields, confirm the correct customer, location, battery and string are selected under the Customer, Location, Battery, and String dialog boxes.

Select Setup|System|Link to select the polling interval and how the computer connects to the monitor.

Direct* - Click the Direct button when the monitor is directly connected to a computer serial port. On the Setup|Communication screen, define the COM Port in the Direct Connection area.

Modem* - Click the Modem button to connect the computer to the monitor via modem. In the **Phone Number** box, type the telephone number of the monitor that the Central computer calls. (This is the number to which the monitor is connected.) On the Setup|Communication screen, define the COM Port in the Modem Connection area. Clicking Modem also activates the Polling Interval field on this screen.

Network* - Click the Network button to connect the computer to the monitor via network.

IP Address - (*Required if Network above is selected.) - In the IP Address box, type the IP address of the monitor. NOTE: The IP Address is specific to the monitor (MPM or BDS Controller); it is not the IP address of the PC running the software.

Network Port* - In the Network Port box, type 502. The TCP/IP address is used when the Send Network Configuration button is clicked on the Battery Setup|General screen.

Netmask - In the Netmask box, type the subnetmask number of the monitor.

Gateway - In the Gateway box, type the default gateway number used by the monitor.

Polling Interval (Days) - Polling is the process of having a Central computer call via modem and request present battery and monitor status. Polling Interval (Days) is enabled only after you select Modem on the Link dialog box. Select how often (in days) the software requests monitor and battery status. Polling starts at 12:00 A.M. (midnight). If the interval is set to 0, polling is disabled. During polling, if Auto Extract Data is selected on Communication Setup, data is copied to the Central computer database and deleted from monitor memory. Refer to *Polling and Extraction*.

MUX ID* – Possible entries are 0 to 16. A zero indicates the MPM or BDS is not connected to a multiplexer. Device 1 to 16 corresponds to the connection ports on the multiplexer rear panel. Refer to *Serial Port Multiplexer User's Guide* for more information.

After entering the information, click Save to save to the database or click the next tab to cause the message "Do you want to save change?" to appear.

The following items appear on the Setup|System|Reporting dialog box.
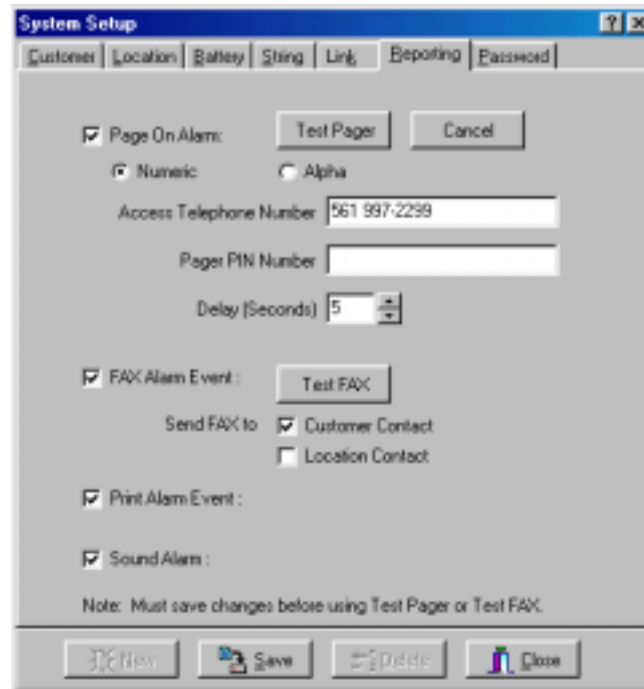
Figure 12. System Setup - Reporting

Before defining reporting fields, confirm the correct customer, location, battery, and string are selected under the Customer, Location, Battery, and String dialog boxes.

Use Setup|System|Reporting to select the devices the Central or Local computer contacts when the monitor reports during continuous polling or calls in an event.

Page On Alarm - Check the Page On Alarm box to send alarm notification to a pager. Click the appropriate button for the kind of pager being used: numeric or alphanumeric.

With a numerical pager, a six digit code is sent. The following codes are used:
    Digit 1: Report Type
            1 = Discharge
            2 = Alarm
            3 = Warning
    Digits 2 to 6: String ID
For example, to report an alarm in String ID 1, the pager would display 200001.

An alphanumeric pager displays the location name, battery name, string name, and alarm detail.

Access Telephone Number - Type the pager telephone number if numeric or the modem ID number if alphanumeric. If using an alphanumeric pager, you must use an access number that has a TAPI interface that lets you communicate using a modem instead of voice. For example, SkyPage's access number is (800) 759-6366.

Pager PIN Number - Type the pager private ID (PIN) number if one is needed.

Delay - If using a numeric pager, type the delay (in seconds) before the numeric message is sent.

Test Pager - After the Page On Alarm box is checked and access numbers are entered, to test the alarm notification, click Test Pager after saving changes. The system dials the access telephone number typed on the Setup|System|Reporting dialog box.

For a numeric pager, typical test results are: 100001.
(The numeric code is described in the preceding *Page On Alarm* item.)
For an alphanumeric pager, typical test results are:
    Albércorp Monitor
    Alarm: Discharge
    String: Test String
    Battery: Test Battery
    Location: Test Location

Fax Alarm Event Area - Check the **FAX Alarm Event** box to send alarm notification to a fax machine. Check the appropriate box to direct the report to a fax machine at the customer or monitor location. To test the alarm notification, click **Test FAX** after savings changes. The system dials the fax telephone numbers typed on the Setup|System|Customer and Setup|System|Location dialog boxes.

Print Alarm Event - Check the Print Alarm Event box to send alarm notifications to a printer. To select a default printer, at the String Status screen, click File|Printer Setup. NOTE: If your system does not print alarms as they are received, change the printer Spool Data Format setting as follows: On the Windows desktop, click Start|Settings|Printers. Right click the icon for your system printer, then click Properties|Details|Spool Settings. At Spool Data Format, select either EMF or RAW.

Sound Alarm - Check Sound Alarm to enable an audible alarm when an alarm event occurs. You may select the type of alarm sound by using Select Sound on the Setup|Preferences dialog box. Refer to *Selecting Preferences*.

After entering the information, click Save to save to the database. NOTE: You must save any changes before using the Test Pager or Test Fax buttons.

The following items appear on the Setup|System|Password dialog box.

Figure 13. System Setup - Password

Select Setup|System|Password to change the system setup password required to fully access password protected screens. On protected screens, if the password is not correct, you can view the screen but cannot save changed parameters.

New Password - To change the system setup password, type the new password in the New Password box and in Re-type Password. The password must be five alphanumeric characters and is case sensitive. NOTE: The default password is: `alber` (case sensitive). NOTE: The system setup and battery setup passwords may be different.

Click Save. The new password is now in effect. NOTE: Record the new password for reference. If the password is lost, you must contact the factory.

11.5. Selecting Preferences

At any time, you may select the Setup|Preferences dialog box on the String Status screen and change the program appearance or activate options disabled from other screens.

Figure 14. Preferences

The following items appear on the Preferences dialog box.

Database Version - This is the version of the database accessed by the program. Do not confuse the database version with the Data Manager program version under Help|About, or the firmware version under Diagnostics|Self Test.

Sample Database - When the Data Manager starts, the message appears, "Do you want to load sample database?" If this message was disabled, you can display it again by checking the box on the Preferences screen.

Select Date / Temperature Format - Click USA or European to select the date and temperature format displayed. The program automatically calculates between F (Fahrenheit) and C (Celsius). For example, if you select European (C) format after taking readings in USA (F) format, all temperature readings convert from Fahrenheit to Celsius. To minimize temperature rounding errors, do not change the date/temperature format, if possible, after readings are taken.

NOTE: Switching back and forth between Fahrenheit (F) and Celsius (C) may cause rounding errors in the temperature readings.

String Status Display area - You can display or hide the three items listed below.

Display String ID, **Display Customer Name**, and **Display Battery Name** - Check these boxes to display the columns on the String Status screen.

Disable Alarm Reporting - Check this box to globally disable all report functions on the Setup|System|Reporting dialog box.

Disable Log/TRC File Logging - For the default setting, this box is normally checked to disable this feature. If not checked, a text file for logging and tracing communication is created. This feature may be requested by the factory for troubleshooting and is normally left at disabled by the user.

Report Alarm - To select the alarm sound, click **Select Sound** and choose a sound from the list. Click Open then click **Apply** to hear the sound. To enable the sound when an alarm event occurs, check Sound Alarm on the Setup|System|Reporting dialog box for the specific string. Refer to *Setting Up a New System*.

12. *Configuring Programmable Settings*

After completing the System Setup and Preferences screens, complete the Battery Setup screens described in this section.

Access the programmable settings under the Battery Setup dialog boxes. To open the Battery Setup screens, you must establish a connection between the computer and the battery monitor. From the String Status screen, highlight the location name, and click the Connection button to establish connection. After communication is established and the String View screen appears, select Setup|Battery. If the Password screen appears, type the battery setup password and click OK. The default password is: alber (case sensitive). NOTE: The system setup and battery setup passwords may be different.

The Battery Setup dialog boxes display settings you may change. Read the following descriptions before configuring the monitor. NOTE: If the password is not valid, the screens appear, but the Send button is inactive.

CAUTION: If you need to change the location, battery or string name after the monitor has been set up and is communicating, do not make the changes from the System Setup screens. Use the Battery Setup dialog boxes accessed using a Central or Local computer and described in the following sections.

Send Button On the Battery Setup dialog boxes, the Send button transfers settings to the monitor. On the Test Parameters screen, the Historical Log, Resistance Test, and Load Test settings are sent only if changed. It is not necessary to click the Send button on each dialog box. You may complete all the boxes before clicking Send. Clicking Send on any dialog box transfers settings on all boxes to the monitor.

Close Button The Close button closes the dialog boxes under Setup|Battery. If you make changes, the changes are not saved or sent if you click Close.

12.1. Configuring Programmable Settings for the MPM

The following items appear on the MPM Setup|Battery|General dialog box.
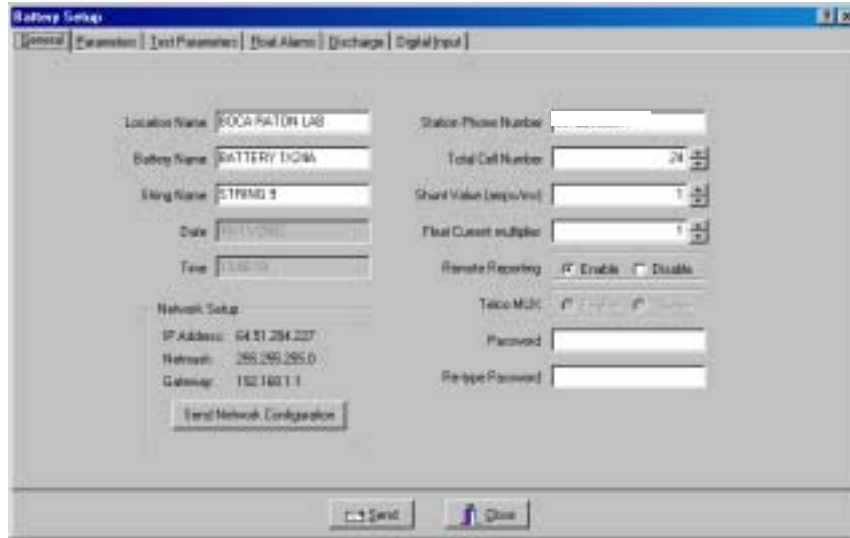
Figure 15. Battery Setup - General (MPM)

CAUTION: Location name, battery name, and string name are used with each other to identify the strings and hardware to which the monitor is connected. These names can only be changed using a computer configured as Central or Local. If you are using both types of computers, make sure both databases have the same names to ensure proper connection.

Location Name - Type the location name where the monitor is installed. There cannot be two of the same location name under the same customer name. This location name must match the location name in the database of the connecting computer.

Battery Name - Assign a unique name to the battery. There cannot be two of the same battery name under the same location name. This battery name must match the battery name in the database of the connecting computer.

String Name - Type a name for each MPM. There cannot be two of the same string name under the same battery name. This string name must match the string name in the database of the connecting computer.

Date/Time - The date and time of the PC. When a new configuration is sent to the monitor, it sends the date and time of the computer connected.

Station Phone Number - The telephone number of the Central computer the monitor calls when a system goes into an alarm or discharge.

Total Cell Number - This is automatically defined from Monitor Configuration under the Setup|System|String. Normally, you will not change the Total Cell Number value on the Setup|Battery|General dialog box. However, you may change this field for custom configurations. For example, if the battery configuration is a 1x60 and only 59 cells are used, set this value to 59 to configure the system for a 59 cell battery. This feature is available only when using one string. NOTE: Do not change the Total Cell Number for multi-string configurations. If you enter a lower cell number for a configuration of, for example, 2x24, only the total cell count for the second string changes.

Shunt Value - Type the shunt rating in amps per millivolt. For example, if the shunt is stamped 600 amps/100mV, type 6. (600 amps/100mv = 6 amps/1mv.) This value must be an integer.

Remote Reporting Enable and **Disable** - Globally enable or disable the call-out function of the monitor upon alarm, and Alarm Detail reporting on the Historical Events screen when continuously polling. For a parameter to report on alarm, you must not select the global Disable Alarm Reporting on the Setup|Preferences dialog box, and you must select Remote Reporting on the Setup|Battery|Float Alarms or Setup|Battery|Discharge dialog boxes.

Telco MUX Enable and **Disable** - Not available for MPM.

Password - To change the battery setup password, type the new password in the Password box and in Re-type Password. The password must be five alphanumeric characters and is case sensitive. NOTE: The default password is: `alber` (case sensitive). NOTE: The system setup and battery setup passwords may be different.

IP Address - Displays the IP address typed on the Setup|System|Link dialog box.

Netmask - Displays the netmask typed on the Setup|System|Link dialog box.

Gateway - Displays the gateway typed on the Setup|System|Link dialog box.

Send Network Configuration - Click this button to send the IP address, netmask, and gateway to the MPM. The MPM must have the internal network option installed. The address can only be transferred to MPMs connected via RS-232 or modem, not via network.

The following items appear on the Setup|Battery|Parameters dialog box.
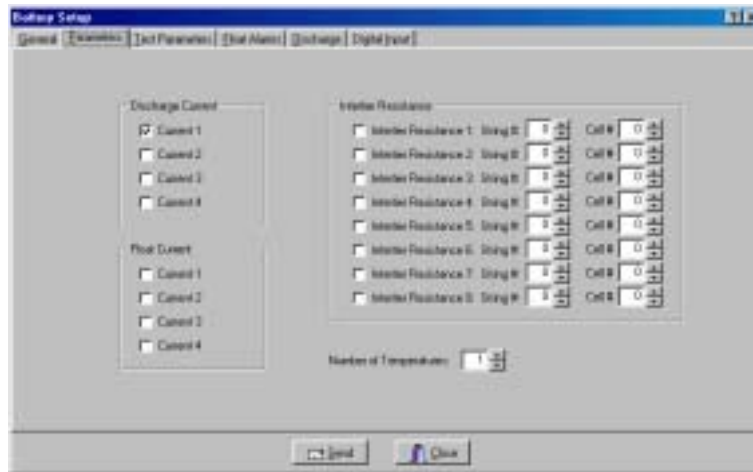
Figure 16. Battery Setup - Parameters (MPM)

On the Battery Setup|Parameters screen, select the hardware and parameters that will be polled and displayed.

Discharge Current - You can define up to four discharge current channels, but only one current channel per string is allowed. If the configuration is one string, then only one current channel may be used. Only Current 1 can trigger the recording of a discharge if Current Mode is selected on the Setup|Battery|Discharge dialog box.

Intertier Resistance - The MPM can monitor up to four strings. If selecting an Intertier Resistance option, at String #, enter the number of the string that contains the intertier. At Cell #, enter the number of the cell that is before the intertier.

Number of Temperatures - You may select up to eight temperature probes to monitor ambient or electrolyte temperature.

Float Current - The MPM can monitor up to four float currents. Float values are displayed on the bottom of the Cell Voltage screen. The value is set in the High Float Current field on the Setup|Battery|Float Alarms screen. When actual current exceeds the set value, it is displayed in red on the Cell Voltage screen and causes an alarm condition. NOTE: Because of the high-performance filtering algorithm, the float charging current probe (FCCP) may require up to 25 minutes to stabilize after a sudden power change. For more details, refer to the Multitel, Inc. *Float Charging Current Probe User's Manual*.

The following items appear on the Setup|Battery|Test Parameters dialog box.

Figure 17. Battery Setup - Test Parameters (MPM)

Historical Log - Specify how often (in days) the voltages, currents, and temperatures are recorded in the history log.

Resistance Test - Specify the resistance test interval in days. If set to 30, resistance is tested every 30 days starting at 12:00 A.M. (midnight). NOTE: If you program the Load Test for the same interval as the Resistance Test, the Resistance Test is delayed three days.

Load Test - Specify load test interval in days and length of the load test in minutes. Load test closes a relay that shuts down the charger, if connected, and enables tracking of the discharge. If set to 30, load test is done every 30 days starting at 12:00 A.M. See note at Resistance Test (above).

Standard or **Average** - Normally select Standard. Some types of chargers, however, employ digital control of battery voltage, which causes the voltage to constantly fluctuate. If the charger has this feature, select Average.

The following items appear on the Setup|Battery|Float Alarms dialog box.
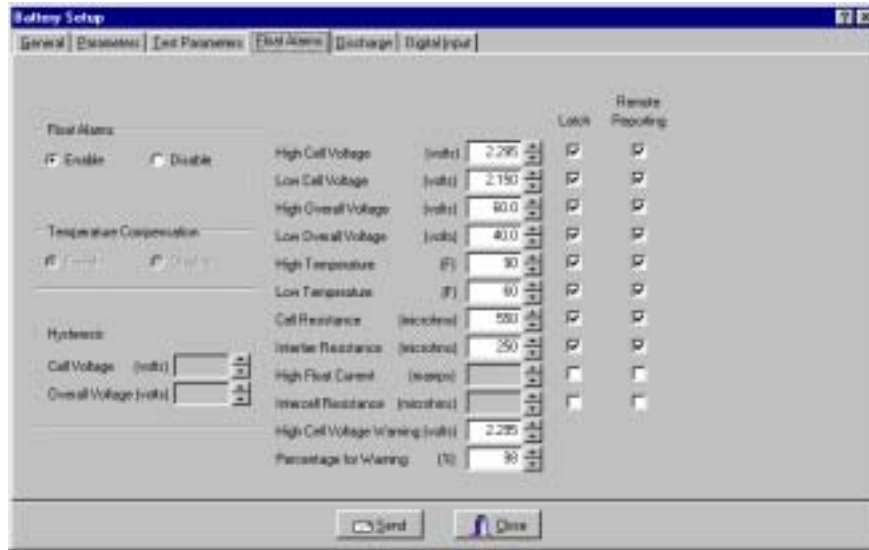
Figure 18. Battery Setup - Float Alarms (MPM)

Float Alarms Enable - Global enable for all float alarms for local alarm status and alarm contact activation. Enable the call-out of float alarms and digital input alarms.

Float Alarms Disable - Global disable for all float alarms for local alarm status and alarm contact activation. When selected, the MPM Alarm Disable LED is lit, and the String Status column on the String Status screen indicates Alarms Disabled.

Temperature Compensation Enable and **Disable** - This feature is not supported at this time.

Hysteresis-Cell Voltage and **Hysteresis-Overall Voltage** - These features are not supported at this time.

Alarm Thresholds - For high and low cell voltage, overall voltage, temperature, resistance, and current, select violation threshold values that activate an alarm during a float condition. These thresholds are deactivated for 30 minutes following a resistance test. If a discharge occurs, the alarms are disabled until the overall voltage recovers to a value above the low threshold.

High Cell Voltage Warning (volts) - Type a value that is between the Low Cell Voltage and High Cell Voltage levels. This setting affects only the colors on the bar graph on the Cell Voltage String View screen. During normal float condition, the bars on the graph change color as follows:

High Cell Volt....................Red
High Cell Volt Warning.....Blue
Normal.............................Green
Low Cell Volt ....Yellow

Percentage for Warning - Determines the violation threshold that causes a Warning battery status. The value entered is a percentage of the internal resistance alarm. For example, if the internal resistance alarm is set to 100 microhms and the percentage for warning is 75%, the system issues a warning when the internal resistance is between 75 and 100 microhms. When the value exceeds 100 microhms, the system issues an alarm. The warning status is displayed only on the String Status and Historical Events screens, not on the Alarms screen.

<-----Normal-----75%<-----Warning----->100%-----Alarm----->

Latch - When selected, the alarm contact stays energized until manually reset. If not selected, the alarm contact de-energizes when the alarm condition clears.

Remote Reporting - When selected, causes the monitor to report the alarm. When not selected, call-out is disabled for that parameter. You must select this option and Remote Reporting Enable under Setup|Battery|General to enable the call out function and to display Alarm Detail on the Historical Events screen during polling.

The following items appear on the Setup|Battery|Discharge dialog box.
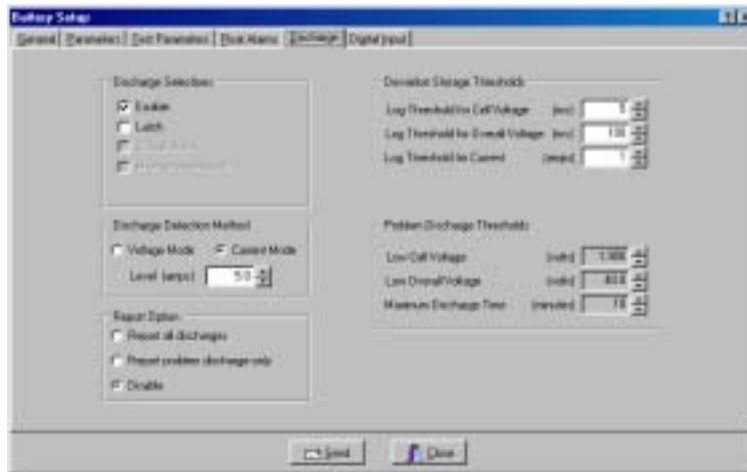
Figure 19. Battery Setup - Discharge (MPM)

Discharge Selections Area - The Enable and Latch selections are described below.

Enable - Select to enable the monitor to capture and store discharge data. If this is not selected, the MPM does not log discharges.

Latch - When selected, the alarm contact stays energized until manually reset. If not selected, the alarm contact de-energizes when the discharge ends.

The Critical Alarm and Maintenance Alarm options are not available on the MPM.

Discharge Detection Method - Select **Voltage Mode** or **Current Mode**, then set the threshold **Level** in volts or amps to activate data logging during a discharge. When the voltage goes below the set level or the current exceeds the set level, the monitor begins recording cell voltages, discharge current, and overall voltage, based on the deviation storage thresholds (described in a following paragraph). Only one temperature sample is stored at the beginning of the discharge.

> **Voltage Mode** - Threshold value (in volts) that activates the data logger during a discharge. If you are measuring discharge current, using Discharge Current Mode as a reliable source of trigger is recommended. Voltage mode allows data to be recorded during recharge, since data logging does not stop until the voltage goes above the threshold.

> **Current Mode** - Threshold value (in amps) that activates the data logger during a discharge. In current mode, the monitor triggers only on Current Channel 1 (selected on the Setup|Battery|Parameters screen).

Report All Discharges - If selected, all discharge events are reported from the monitor to the Central PC. Remote Reporting on Setup|Battery|General must be enabled.

Report Problem Discharge Only - If selected, only discharge events that exceed the voltage or time values set in the Problem Discharge Thresholds area on this screen are reported from the monitor to the Central PC.

Disable - If selected, stops the MPM from reporting a discharge.

Deviation Storage Thresholds Area - Settings for Log Thresholds for Cell Voltage, Overall Voltage, and Current determine the recording of an event. The event is recorded each time the voltage or current changes by the amount specified in these boxes.

For most applications, 10 mv for cell voltage, 100 mv for overall voltage, and 1 amp for discharge current are recommended. Selecting too small a value could result in running out of memory within the monitor. CAUTION: Do not set these values to 0. If set to 0, no data will be logged during discharge. Refer to *Data Storage in the MPM*.

Problem Discharge Thresholds - Select the voltage or time levels that trigger the reporting of a discharge. These values are in effect only if Report Problem Discharge Only is selected in the Report Option area on this screen.

This setting also affects the colors on the bar graph on the Cell Voltage String View screen. During a discharge event, the bars on the graph change color as follows:

> Normal Condition..Green
> Problem Discharge Thresholds or Low Cell Voltage....................Yellow

The following items appear on the Setup|Battery|Digital Input dialog box.
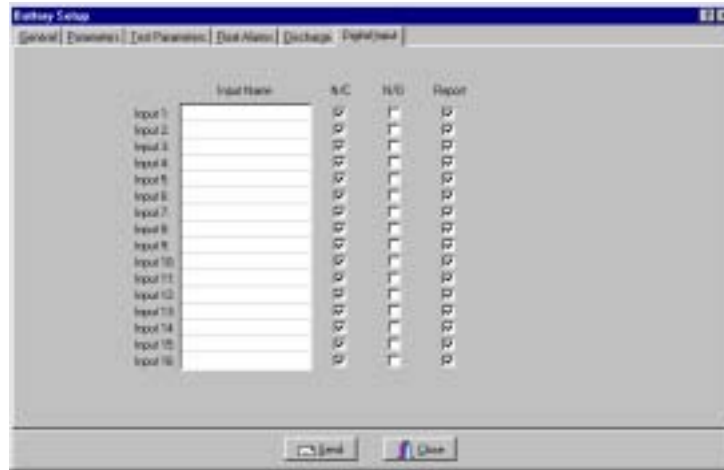
Figure 20. Battery Setup - Digital Input (MPM)

In the Input Name boxes, assign names to the external contacts and indicate if they are normally open or closed. To disable an input, clear the input name.

N/C - Check the N/C box if the external contacts are normally closed.

N/O - Check the N/O box if the external contacts are normally open.

Report - Select boxes in this column to enable local alarms and cause the monitor to call out and report an alarm.

12.2. Configuring Programmable Settings for the BDS

The following items appear on the BDS Setup|Battery|General dialog box.

Figure 21. Battery Setup - General (BDS)

CAUTION: Location name, battery name, and string name are used with each other to identify the strings and hardware to which the monitor is connected. These names can only be changed using a computer configured as Central or Local. If you are using both types of computers, make sure both databases have the same name to ensure proper connection.

Location Name - Type the location name where the monitor is installed. There cannot be two of the same location name under the same customer name. This location name must match the location name in the database of the connecting computer.

Battery Name - Assign a unique name to the battery. There cannot be two of the same battery name under the same location name. This battery name must match the battery name in the database of the connecting computer.

String Name - Type a name for each string. There cannot be two of the same string name under the same battery name. This string name must match the string name in the database of the connecting computer.

Date/Time - The date and time of the PC. When a new configuration is sent to the monitor, it sends the date and time of the computer connected.

Station Phone Number - The telephone number of the Central computer the monitor calls when a system goes into an alarm or discharge.

Total Cell Number - This is automatically defined from Monitor Configuration under the Setup|System|String. Normally, you will not change the Total Cell Number value on the Setup|Battery|General dialog box. However, you may change this field for custom configurations. For example, an MPM configuration of 1x60x2 selected under Setup|System|String has an actual string configuration of 59 cells. This would require you to change the Total Cell Number field to 59 using the Setup|Battery|General dialog box.

Shunt Value - Type the shunt rating in amps per millivolt. For example, if the shunt is stamped 600 amps/100mV, type 6. (600 amps/100mv = 6 amps/1mv.) This value must be an integer.

Remote Reporting Enable and **Disable** - Globally enable or disable the remote reporting function of the monitor. For a parameter to report on alarm, you must not select the global Disable Alarm Reporting on the Setup|Preferences dialog box, and you must select Remote Reporting on the Setup|Battery|Float Alarms or Setup|Battery|Discharge dialog boxes.

Telco MUX Enable and **Disable** - Select Enable when using a Telco multiplexer. This feature can be set only when the BDS Controller is connected to String 1.

Password - To change the battery setup password, type the new password in the Password box and in Re-type Password. The password must be five alphanumeric characters and is case sensitive. NOTE: The default password is: `alber` (case sensitive). NOTE: The system setup and battery setup passwords may be different.

IP Address - Displays the IP address typed on the Setup|System|Link dialog box.

Netmask - Displays the netmask typed on the Setup|System|Link dialog box.

Gateway - Displays the gateway typed on the Setup|System|Link dialog box.

Send Network Configuration - Click this button to send the IP address, netmask, and gateway to the BDS. The BDS must have the internal network option installed. The address can only be transferred to BDSs connected via RS-232 or modem, not via network.

Set BDS Default Values - Click this button to take the parameters for the configuration selected for Monitor Configuration under System Setup|String and transfer them to the Battery Setup|Parameters and Battery Setup|Float Alarms dialog boxes, and to the Total Cell Number field.

The following items appear on the Setup|Battery|Parameters dialog box.

Figure 22. Battery Setup - Parameters (BDS)

DCM - For all DCM units 1 to 16 in use, configure the following items according to the configuration chart on the next pages.

    Cells - Total number of cells monitored by the DCM.

    LS/D - Load Steps per DCM.

    R/LS - Reads per Load Step.

    RLLS - Reads on Last Load Step.

    SS# - Starting Step Number.

Config	DCM	Cells	LS/D	R/LS	RLLS	SS#
1x8x2V	1	8	-	-	-	-
1x108x2V	1	36	2	18	18	1
	2	36	2	18	18	3
	3	36	2	18	18	5
1x122x2V	1	48	4	12	12	1
	2	48	4	12	12	5
	3	26	4	12	14	9
1x180x2V	1	46	2	23	23	1
	2	46	2	23	23	3
	3	46	2	23	23	5
	4	42	2	23	19	7
1x182x2V	1	46	2	23	23	1
	2	46	2	23	23	3
	3	46	2	23	23	5
	4	44	2	23	21	7
1x188x2V	1	48	2	24	24	1
	2	48	2	24	24	3
	3	48	2	24	24	5
	4	44	2	24	20	7
1x192x2V	1	48	2	24	24	1
	2	48	2	24	24	3
	3	48	2	24	24	5
	4	48	2	24	24	7
1x210x2V	1	48	2	24	24	1
	2	48	2	24	24	3
	3	48	2	24	24	5
	4	48	2	24	24	7
	5	18	1	18	18	9
1x216x2V	1	48	2	24	24	1
	2	48	2	24	24	3
	3	48	2	24	24	5
	4	48	2	24	24	7
	5	24	1	24	24	9
1x232x2V	1	46	2	23	23	1
	2	46	2	23	23	3
	3	46	2	23	23	5
	4	46	2	23	23	7
	5	48	2	23	25	9
1x234x2V	1	48	2	24	24	1
	2	48	2	24	24	3
	3	48	2	24	24	5
	4	48	2	24	24	7
	5	42	2	24	18	9
1x238x2V	1	48	2	24	24	1
	2	48	2	24	24	3
	3	48	2	24	24	5
	4	48	2	24	24	7
	5	46	2	23	22	9
1x239x2V	1	48	2	24	24	1
	2	48	2	24	24	3
	3	48	2	24	24	5
	4	48	2	24	24	7
	5	47	2	24	23	9
1x240x2V	1	48	2	24	24	1
	2	48	2	24	24	3
	3	48	2	24	24	5
	4	48	2	24	24	7
	5	48	2	24	24	9
1x241x2V	1	48	2	24	24	1
	2	48	2	24	24	3
	3	48	2	24	24	5
	4	48	2	24	24	7
	5	24	1	24	24	9
	6	25	1	25	25	10

Figure 23. BDS Configuration Data for Setup Files

Config	DCM	Cells	LS/D	R/LS	RLLS	SS#
1x244x2V	1	48	2	24	24	1
	2	48	2	24	24	3
	3	48	2	24	24	5
	4	48	2	24	24	7
	5	24	1	24	24	9
	6	28	1	28	28	10
1x246x2V	1	48	2	24	24	1
	2	48	2	24	24	3
	3	48	2	24	24	5
	4	48	2	24	24	7
	5	24	1	24	24	9
	6	36	1	30	30	10
1x252x2V	1	48	2	24	24	1
	2	48	2	24	24	3
	3	48	2	24	24	5
	4	48	2	24	24	7
	5	24	1	24	24	9
	6	36	1	36	36	10
1x6x4V	1	6	1	6	6	1
1x90x4V	1	45	5	9	9	1
	2	45	5	9	9	6
1x120x4V	1	48	4	12	12	1
	2	48	4	12	12	5
	3	24	2	12	12	9
1x121x4V	1	48	4	12	12	1
	2	48	4	12	12	5
	3	25	2	12	13	9
1x122x4V	1	48	4	12	12	1
	2	48	4	12	12	5
	3	26	2	12	14	9
1x123x4V	1	48	4	12	12	1
	2	48	4	12	12	5
	3	27	2	12	15	9
1x60x6V	1	30	5	6	6	1
	2	30	5	6	6	6
1x78x6V	1	40	5	8	8	1
	2	38	5	8	6	6
1x80x6V	1	40	5	8	8	1
	2	40	5	8	8	6
1x81x6V	1	40	5	8	8	1
	2	41	5	8	9	6
1x60x8V	1	30	5	6	6	1
	2	30	5	6	6	6
1x61x8V	1	30	5	6	6	1
	2	31	5	6	7	6
1x30x12V	1	30	10	3	3	1
1x31x12V	1	31	10	3	4	1
1x32x12V	1	32	8	4	4	1
1x33x12V	1	33	10	3	6	1
1x36x12V	1	36	9	4	4	1
1x40x12V	1	40	10	4	4	1

Figure 24. BDS Configuration Data for Setup Files (continued)

T1 and **T2** columns - Temperature 1 and 2. Each DCM can monitor up to two temperatures. No more than ten temperatures may be monitored for the entire string.

Parameter / DCM # - For OV, DC and FC, assign a DCM:

OV - Overall Volts. Always assign this parameter to DCM #1.

DC - Discharge Current. Assign the number of the DCM to which the discharge current measuring device is connected.

FC - Float Current. This feature is supported only for DCM #1.

Cell Voltage - From the drop-down list, select the nominal voltage of the cell or jar being measured.

Intertier # / Cell # - For intertiers 1 to 15 in use, assign a cell number that relates to each intertier. The cell number is the lower of the two cell numbers across which the intertier is connected. For example, entering 16 assigns the intertier between cells 16 and 17. Each DCM can monitor up to ten intertiers. No more than 15 intertiers may be monitored for the entire string.

The following items appear on the Setup|Battery|Test Parameters dialog box.

Figure 25. Battery Setup - Test Parameters (BDS)

Historical Log - Specify the day of the month, from 1 to 28 (29, 30 and 31 are not used), and the time of day voltages and temperatures are recorded in the history log. See note at Resistance Test below.

Resistance Test - Specify the day of the month, from 1 to 28, and the time of day a resistance test is performed. NOTE: When the monitor performs a resistance test, it creates a historical log entry. For this reason, you may want to select a resistance test 14 days away from a historical log entry.

Standard or **Average** - Normally select Standard. Some types of chargers, however, employ digital control of battery voltage, which causes the voltage to constantly fluctuate. If the charger has this feature, select Average.

The following items appear on the Setup|Battery|Float Alarms dialog box.

Figure 26. Battery Setup - Float Alarms (BDS)

Float Alarms Enable - Global enable for all float alarms for local alarm status and alarm contact activation. Enable the call-out of float alarms and digital input alarms.

Float Alarms Disable - Global disable for all float alarms for local alarm status and alarm contact activation. When selected, the String Status column on the String Status screen indicates Alarms Disabled.

Temperature Compensation Enable and **Disable** - This feature is not supported at this time.

Hysteresis-Cell Voltage and **Hysteresis-Overall Voltage** - These features are not supported at this time.

Alarm Thresholds - For high and low cell voltage, overall voltage, temperature, and resistance, select violation threshold values that activate an alarm during a float condition. These thresholds are deactivated for 30 minutes following a resistance test. If a discharge occurs, the alarms are disabled until the overall voltage recovers to a value above the low threshold. NOTE: Float current is not supported at this time.

High Cell Voltage Warning (volts) - Type a value that is between the Low Cell Voltage and High Cell Voltage levels. This setting affects only the colors on the bar graph on the Cell Voltage String View screen. During normal float condition, the bars on the graph change color as follows:

High Cell Volt....................Red
High Cell Volt Warning.....Blue
Normal..............................Green
Low Cell Volt ....Yellow

Intertier Resistance Input Level - Click Input Level to display the Input Alarm Level box shown below. Type the resistance alarm level threshold (in microhms) for each intertier. The cell numbers in this box are the lower of the two cell numbers across which the intertier is connected. (These cell numbers are selected under Battery Setup|Parameters.)
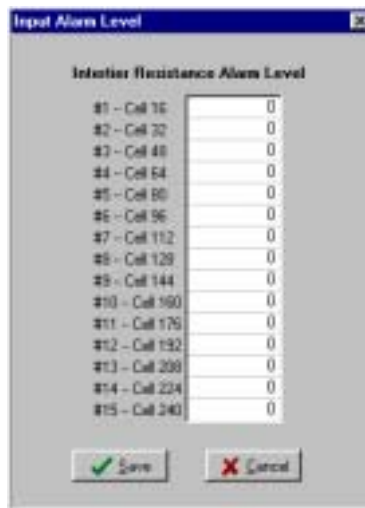
Figure 27. Input Alarm Level
(Intertier Resistance Alarm Level)

Percentage for Warning - Determines the violation threshold that causes a Warning battery status. The value entered is a percentage of the internal resistance alarm. For example, if the internal resistance alarm is set to 100 microhms and the percentage for warning is 75%, the system issues a warning when the internal resistance is between 75 and 100 microhms. When the value exceeds 100 microhms, the system issues a warning. Warning status is displayed only on the String Status and Historical Events screens; it is not displayed on the Alarms screen.

<-----Normal-----75%<-----Warning----->100%-----Alarm----->

Latch - When selected, the alarm contact stays energized until manually reset. If not selected, the alarm contact de-energizes when the alarm condition clears.

Remote Reporting - When selected, causes the monitor to report the alarm. When not selected, reporting is disabled for that parameter. You must select this option and Remote Reporting Enable under Setup|Battery|General to enable the call out function and to display Alarm Detail on the Historical Events screen during polling.

Critical and **Maintenance** - Two alarm contacts are available. Select Critical or Maintenance to define which contacts energize. These settings do not affect how the alarm is reported on the display. If neither one is selected, that parameter will not alarm.

The following items appear on the Setup|Battery|Discharge dialog box.

Figure 28. Battery Setup - Discharge (BDS)

Discharge Selections Area - The Enable, Latch, Critical Alarm, and Maintenance Alarm selections are described below.

Enable - Select to enable the monitor to capture and store discharge data. If this is not selected, the BDS does not log discharges.

Latch - When selected, the alarm contact stays energized until manually reset. If not selected, the alarm contact de-energizes when the alarm condition clears.

Critical Alarm and **Maintenance Alarm** - Two alarm contacts are available. Select Critical Alarm or Maintenance Alarm to define which contacts energize. These settings do not affect how the alarm is reported on the display. If neither one is selected, no discharge alarms will be reported.

Discharge Detection Method - Select **Voltage Mode** or **Current Mode**, then set the threshold **Level** in volts or amps to activate data logging during a discharge. When the voltage goes below the set level or the current exceeds the set level, the monitor begins recording cell voltages, discharge current, and overall voltage. Only one temperature sample is stored at the beginning of the discharge.

> **Voltage Mode** - Threshold value (in volts) that activates the data logger during a discharge. If you are measuring discharge current, using Discharge Current Mode as a reliable source of trigger is recommended. Voltage mode allows data to be recorded during recharge, since data logging does not stop until the voltage goes above the threshold.

Current Mode - Threshold value (in amps) that activates the data logger during a discharge. To select Current Mode, you must define the Current Channel on the Setup|Battery|Parameters screen.

Report All Discharges - If selected, all discharge events are reported from the monitor to the Central PC. Remote Reporting on Setup|Battery|General must be enabled.

Report Problem Discharge Only - If selected, only discharge events that exceed the voltage or time values set in the Problem Discharge Thresholds area on this screen are reported from the monitor to the Central PC.

Disable - If selected, stops the BDS from calling out.

Deviation Storage Thresholds Area - This feature is not available on the BDS.

Problem Discharge Thresholds - Select the voltage or time levels that trigger the reporting of a discharge. These values are in effect only if Report Problem Discharge Only is selected in the Report Option area on this screen.

This setting also affects the colors on the bar graph on the Cell Voltage String View screen. During a discharge event, the bars on the graph change color as follows:

> Normal Condition..Green
> Problem Discharge Thresholds or Low Cell Voltage....................Yellow

The following items appear on the Setup|Battery|Digital Input dialog box.
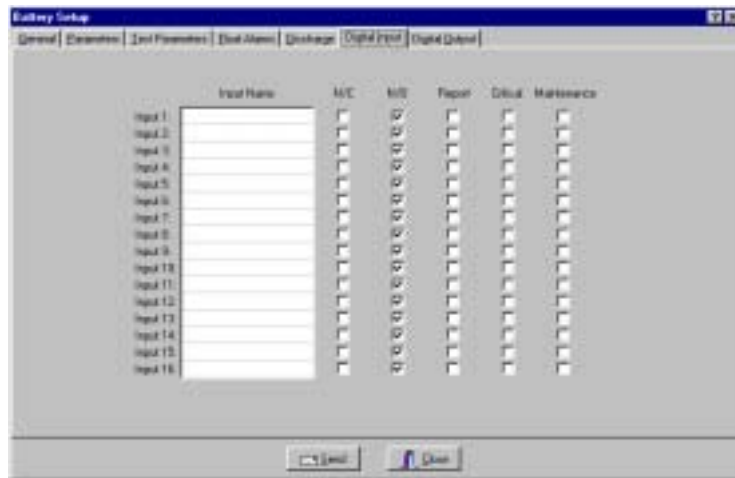
Figure 29. Battery Setup - Digital Input (BDS)

In the Input Name boxes, assign names to the external contacts and indicate if they are normally open or closed. To disable an input, clear the input name.

N/C - Check the N/C box if the external contacts are normally closed.

N/O - Check the N/O box if the external contacts are normally open.

Report - Select boxes in this column to cause the monitor to report an alarm.

Critical and **Maintenance** - Two alarm contacts are available. Select Critical or Maintenance to define which contacts energize. These settings do not affect how the alarm is reported on the display. If neither one is selected, that parameter will not alarm.

The following items appear on the Setup|Battery|Digital Output dialog box. This box is displayed only when connected to String 1 of the BDS controller. This is defined by the string number under Setup|System|String.
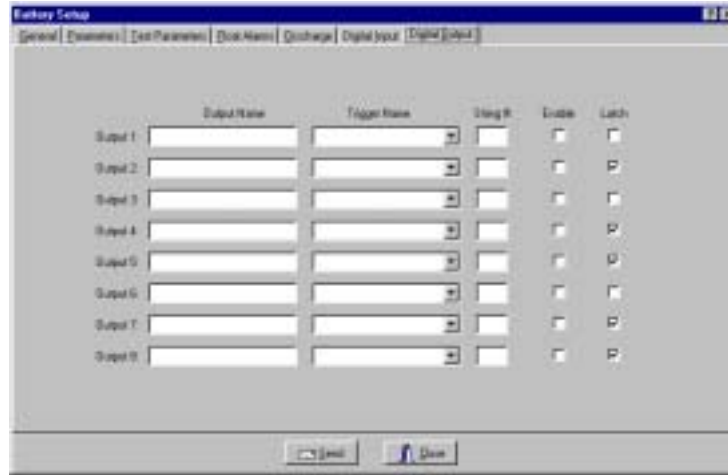
Figure 30. Battery Setup - Digital Output (BDS)

The BDS has eight optional control outputs you can define to trigger on an alarm event. By choosing an Output Name and a Trigger Name, such as High Cell Volts, that output changes state on an alarm event to control a user-selected device. If you select Latch, the control output latches. The relay is a Form C contact that de-energizes when the alarm condition is reset.

Output Name - Type a name that describes the function you are controlling.

Trigger Name - From the drop-down list, select a parameter that energizes the Control Output contact.

String # - The BDS Controller can have up to eight strings. In the String # boxes, type the string numbers that correspond to the string numbers entered on the BDS System Setup|String dialog box.

Enable - Select Enable to energize a rear panel Control Output contact on a trigger event.

Latch - When selected, the Control Output contact energizes until manually reset. If not selected, the Control Output contact de-energizes when the trigger condition clears.

13. *Synchronizing Battery Locations*

Connection

If a copy of the original database used to set up the system is not available, then create a new database. Refer to the *Data Manager Database* section. If the original database is available, copy it to the C:\Program Files\Alber\MPM Manager\database directory.

After completing the System Setup and Preferences screens, synchronize the monitor as described in this section. (At this point, the monitor should have been set up locally via the RS-232 port.)

Synchronize new monitors with the Central computer before putting them into service. The Data Manager must call the monitor to synchronize databases. This configures the monitor with the location, battery, and string names and transfers alarm thresholds, test interval times, and other data. After completion, the site is ready to go into service.

To synchronize the system from the Central computer, from the String Status screen, select the location to be synchronized by clicking the system name. Click the Connection button to establish connection.

System Does Not Connect - If the system does not connect (Error 0102) and names have been assigned in the monitor, either use Setup|System to change the names in the database to match the names in the Error 0102 dialog box, or click Ignore and rename using Setup|Battery or, if on-site with the equipment, clear the names and enter new names as described below.

Clear Existing Names - (On-site) If you need to clear existing names in an MPM monitor, press the MPM Alarm Reset switch while cycling the power off then on. Release the Alarm Reset switch after the MPM front panel LEDs sequence from left to right. This reset also disables the alarms and auto call-out function, resets the password to alber (case sensitive), and clears all data in the monitor, including currently active alarms.

If you need to clear existing names in a BDS monitor, press the BDS Controller Alarm Reset switch while cycling the power off then on. Release the Alarm Reset switch after the BDS front panel Status LED flashes rapidly. This reset also disables the alarms and auto call-out function and resets the password to: alber (case sensitive).

System Connects Normally - If connection is established (the names match), select the Setup|Check Setting|General menu item. After the computer and monitor information appears, click Upload to transfer information from the monitor to the computer database. After upload, click Close to display the String View screen. Refer to *Check Setting Screens*.

"String needs to be set up" Message - If the system connects, but the message "This string needs to be set up" appears, the location, battery, and string names have not been set up, and the monitor must be synchronized to the database.

If you synchronize using a Central computer, the names get defined in the monitor. To do this, at the "This string needs to be set up" message, click OK, then click Upload at the Check Setting dialog box. The names, string ID, date and time transfer to the monitor, and data within the monitor transfers to the computer database.

If you are using a Local or Service computer, information transfers to the computer database from the monitor, but the names, string ID, date and time are not defined in the monitor. The "This string needs to be set up" message continues to appear upon connection until you synchronize using a Central computer.

NOTE: The location, battery, and string names are the key identification used to let any computer type connect to a monitor. All names must match in all computer types or connection will fail. These names can only be assigned in the monitor by a Central computer.

14. How Data is Stored

This section describes how the Data Manager processes data and how the MPM or BDS stores the data.

14.1. Data Manager Database

Data transferred from the MPM or BDS monitor is stored in a Microsoft Access™ compatible database. You are responsible for ensuring the database is protected against uncontrollable failures, such as a hard drive crash. Because the database file may contain unrecoverable trending data for thousands of strings, it is strongly recommended that you regularly back up the database to another computer or storage medium to prevent loss of data in the event of a computer failure.

At installation, the Data Manager creates an empty default database file **mpm-db3.mdb** in the C:\Program Files\Alber\MPM Manager\database directory. At any time, you may save this database as a different name by using File|Save As, or you may create a new, blank database by selecting File|New.

Every time the system receives data from the monitors or you change setup information under System Setup, the working database gets written to. The working database file gets updated when the program is exited or once each day at midnight.

The backup feature helps prevent short term data loss, but does not protect the database against hardware failures, nor does it replace periodic backups that copy the database to a location other than the hard drive.

A backup of the current working database is compressed to a WinZip® compatible file at midnight each day. The number 1 is appended to the file name and the extension is changed to **.zip**. New backups are made for three days, each backup appended with 1, 2 or 3. On the fourth day, the oldest backup is overwritten.

On the first day of the month, another backup is created, with a 0 (zero) appended to the file name. On subsequent first days of each month, this file is overwritten.

To open a backup file, select File|Open Backup on the main menu.

14.2. Data Storage in the MPM

Data in the MPM is stored in nonvolatile E^2 memory, which can retain data for ten years or more with power removed. All the data the MPM collects is temporarily stored in this device until transferred to the Central or Local computer. Enough memory is available to hold a year's worth of typical data.

This same nonvolatile memory also stores setup and calibration information, which is backed up to the Central or Local computer during initial setup. This process, called synchronizing the memory, is required in order to have the system function properly.

The MPM has a second type of nonvolatile memory, Flash memory, for uploads of new MPM firmware. You can upgrade the firmware in the field or from a remote location via modem. Firmware upgrades include a procedure for installing the firmware.

The MPM stores the following data:

<u>Alarms</u> - 100 records that show when a parameter went into alarm and came out of alarm, and the maximum level of the violation. This circular file overwrites the oldest records in memory with recent events. (Older records uploaded to a computer are not overwritten.)

<u>Discharge</u> - 20.5kb of nonvolatile memory are allocated for discharge data. The number of discharges stored is limited by the amount of memory available, and may consist of many short discharges or a couple of full discharges at maximum configuration of 60 cells.

Ten bytes of memory are required for each data point. If the discharge storage threshold is 10mv, and a typical discharge for 24 cells was to discharge 1.875 volts per cell, and assuming the cell voltage was to drop to 1.96 volts when load was applied, the amount of memory required may be calculated as:

20,500 bytes / ((((1.96-1.875) / 0.010 volts) x 10 bytes) x 24 cells) = 10 discharges

This example is worst case and assumes all cells discharge to 1.875 volts.

Changing the discharge storage threshold to a higher value can increase the number of discharges that can be stored. The data is time stamped to allow a full analysis of battery performance during the event.

<u>Resistance</u> - 1.6kb of nonvolatile memory are allocated for resistance data. The number of resistance tests stored is limited by the amount of memory available. The number of resistance records available can be calculated using the formula:

1600 bytes / ((Number of cells x 2) + 10)

For a string of 24 cells, there is enough memory for 27 records.

<u>Historical Data</u> - 1.65kb of nonvolatile memory are allocated for historical readings. Historical readings are snapshots of cell voltage, temperature, overall voltage, and current taken at intervals determined under Battery Setup. The number of historical records available can be calculated using the formula:

1650 bytes / ((Number of cells x 2) + 18)

For a string of 24 cells, there is enough memory for 25 records.

14.3. Data Storage in the BDS

Data in the BDS is stored in nonvolatile SRAM memory, which can retain data for ten years or more with power removed. All the data the BDS collects is temporarily stored in this device until transferred to the Central or Local computer. Enough memory is available to hold a year's worth of typical data or six month's worth for large string configurations.

This same nonvolatile memory also stores setup and calibration information, which is backed up to the Central or Local computer during initial setup. This process, called synchronizing the memory, is required in order to have the system function properly.

The BDS has a second type of nonvolatile memory, Flash memory, for uploads of new BDS firmware. You can upgrade the firmware in the field or from a remote location via modem. Firmware upgrades include a procedure for installing the firmware.

The BDS stores the following data:

<u>Alarms</u> - 100 records that show when a parameter went into alarm and came out of alarm, and the maximum level of the violation. This circular file overwrites the oldest records in memory with recent events. (Older records uploaded to a computer are not overwritten.)

<u>Discharge</u> - 160kb of nonvolatile memory are allocated for discharge data. The number of discharges stored is limited by the amount of memory available and the number of cells being monitored, and may consist of many short discharges or a few full discharges.

Ten bytes of memory are required for each data point. The discharge storage threshold is 10mv. If a typical discharge for 192 cells was to discharge 1.65 volts per cell, and assuming the cell voltage was to drop to 1.96 volts when load was applied, the amount of memory required may be calculated as:

$$160,000 \text{ bytes} / ((((1.96\text{-}1.65) / 0.010 \text{ volts}) \times 10 \text{ bytes}) \times 192 \text{ cells}) = 2.7 \text{ discharges}$$

This is the worst case, in that it assumes every cell will reach the end voltage. The data is time stamped to allow a full analysis of battery performance during the event.

<u>Resistance</u> - 10.6kb of nonvolatile memory are allocated for resistance data. The number of resistance tests stored is limited by the number of cells being monitored. The number of resistance records available can be calculated using the formula:

$$10,600 \text{ bytes} / ((\text{Number of cells} \times 4) + 30)$$

For a string of 192 cells, there is enough memory for 12 records.

<u>Historical Data</u> - 32kb of nonvolatile memory are allocated for historical readings. Historical readings are snapshots of cell voltage, temperature, overall voltage, and current taken at intervals determined under Battery Setup. The number of historical records available can be calculated using the formula:

32,000 bytes / ((Number of cells x 2) + 38)

For a string of 192 cells, there is enough memory for 75 records.

15. *Obtaining Battery and Monitor Status*

At program start, the String Status screen displays a status summary for all available systems. The program can sound a **.wav** file alarm, contact a pager, send a fax, or print details of an alarm event. When a monitor reports an alarm, a window describing alarm event details is displayed until you acknowledge the alarm. The String Status column on the String Status screen lists the condition, and Update Date indicates when the alarm was reported. The Historical Events window displays the history of all events and more details about the alarm. When this window has a new entry, the Historical Events (alarm clock) button flashes. Click it to display the history. This following sections describe these screens.

15.1. *String Status*

At start-up, the Data Manager displays the String Status screen. The first time the program is run, no strings are listed. Your screen may look different from the following one.

Figure 31. String Status

The String Status screen has up to eight columns that indicate the status of each string: String ID, Customer Name, Location Name, Battery Name, String Name, String Status, Monitor Status, and Update Date. The columns are updated every time the monitor reports status, a user manually calls a location, or during a polling sequence. You can hide the String ID, Customer Name, and Battery Name columns using the Setup|Preferences dialog box. Refer to *Selecting Preferences*.

String ID - The string ID is required only if using a pager. When a page is issued, part of the numeric message includes the string ID. This number references the string in alarm condition.

String Status - The String Status column can report six conditions on the Historical Events screen, no priority assigned, and eight on the String Status screen, each assigned a priority level. For example, if conditions Alarm and Warning must be reported, when the monitor calls, it reports only Alarm because Alarm has a higher priority than Warning. However, Warning is not lost. When you call to acknowledge and reset the alarm, the Warning status is updated when you disconnect.

Priority Level	Status	Meaning
1*	DCM Com Error	Communication error between DCM and BDS Controller.
2	Discharging	The battery entered a discharge.
3*	Unknown	The system has not yet been called. (New string entry.)
4*	Discharge Occurred	
5*	Alarm	A battery parameter violated an alarm threshold.
6*	Warning	A resistance reading violated a warning threshold.
7*	Alarm Disabled	
8	Good	System is within normal parameters.

* indicates item also appears on Historical Events screen.

Monitor Status - The Monitor Status column can report ten conditions, which do not have priority ratings assigned.

Status	Meaning
Invalid Data	Data received from the monitor was corrupted.
Check Hardware	Monitor reported a hardware failure. The items checked are described in *Diagnostics – Self Test*.
Network Error	Cannot connect or cannot initialize.
No Dial Tone	No dial tone detected when calling.
Monitor Busy	Busy signal detected when calling.
Modem Error	Modem cannot be initialized.
Inactive	Monitor did not answer. This could, however, be hiding the real problem. With no response, the assumption is the monitor is inoperative. For no dial tone or a busy line, the system attempts to poll one more time.
Active	Monitor answered. Did not report any problems.
Data Corrupt	After connecting to the monitor, you must click Clear Data Memory on the Diagnostics|Memory dialog box.
Comm Error	During autopolling, if computer cannot establish communications after three attempts, this error message is displayed.

All the above conditions except Active produce an Unknown in the String Status column.

Update Date/Time - The date and time the status was delivered.

The String Status screen sorts on the String ID column, but you may sort the data differently. Click the column header to sort column data in ascending or descending order. To rearrange the columns, click and drag a column header onto another column header, then release the mouse button.

Optionally, right click the mouse to display the following menu, then click an item to display a list of a String Status category.

Figure 32. String Status Viewing Selection

The Strings in Inactive screen is shown below. The Strings in Alarm and Strings in Discharge screens are similar to this screen.

Figure 33. Strings in Inactive

15.2. Summary Screen

Summary Σ

The Summary screen displays an overall status summary of the battery sites. Click Summary to display this screen.

Figure 34. Summary

15.3. Historical Events

Historical Events   Note: View Alarm icon has a ringing clock

The Historical Events screen lists reported events and the history of one or all strings. Click Historical Events on the String Status screen to display this screen. When an event is added, the Historical Events button flashes to indicate a new entry.

Click the column header to sort column events in ascending or descending order. To view a site, select View|Single String, then type a string name to view information for that site. To rearrange the columns, click and drag a column header onto another column header, then release the mouse button. You can hide the String ID, Customer Name, and Battery Name columns using the Setup|Preferences dialog box. Refer to *Selecting Preferences*.

Figure 35. Historical Events

Alarm Detail - A computer polling or receiving an alarm call from a monitor receives and displays this information if:

> Remote Reporting options are enabled under Setup|Battery|Float Alarms,
> Remote Reporting is enabled on Setup|Battery|General,
> Report Option is not disabled on Setup|Battery|Discharge, and
> Disable Alarm Reporting is not checked on the Setup|Preferences screen.

The Alarm Detail column can report the following conditions, which do not have priority ratings assigned.

High Cell Voltage at String *n*, Cell *n*	High Intertier Resistance *n*
Low Cell Voltage at String *n*, Cell *n*	Discharge
High Resistance at String *n*, Cell *n*	Digital Input *n*
High Intercell Resistance at String *n*, Cell *n*	UPS Low Voltage
High Overall Voltage	UPS Line Fail
Low Overall Voltage	Pager Busy
High Float Current	Pager Error
Warning at String *n*, Cell *n*	Pager Fail
High Temperature *n*	Unknown
Low Temperature *n*	Inactive

15.4. Check Setting Screens

The Check Setting dialog boxes display settings in the Data Manager database and the MPM or BDS nonvolatile E^2 or SRAM memory. Use these screens when synchronizing a battery location between the Data Manager database and the MPM or BDS monitor.

To open the Check Setting screens, at the String View screen, select Setup|Check Setting.
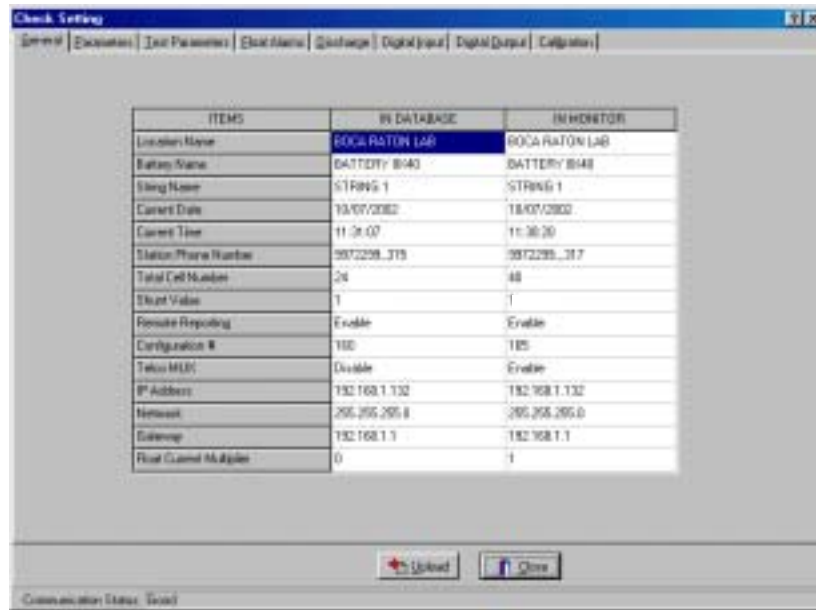
Figure 36. Check Setting - General (MPM / BDS)

The Check Setting boxes only display information; you cannot enter or change data on these screens. Refer to *Synchronizing Battery Locations* and *Connecting to a Battery Location*.

The Upload button transfers information between the database and the monitor. The data transferred depends on the computer type.

If you are using a Central computer and the monitor has never been synchronized, when you click Upload, the location name, battery name, string name, string ID, current date, and current time are sent to the monitor, and all other settings are sent from the monitor to the database. After data is transferred, click Close.

If you are using the service string setup on a Service computer, enter the site telephone number, and the MUX ID number if applicable, under Setup|System|Link and, if using a BDS, also enter the String number and the BDS monitor configuration under Setup|System|String. After communication is established, the Check Setting screens appear. Click Upload to transfer data from the monitor to the database. After data is transferred, click Close. This is an easy way of connecting to a monitor when site details are not known.

When using a Local, Central or Service computer, whenever the String View screen is displayed, either with an active connection or offline, you may click Setup|Check Setting to view the Check Setting screens.

The following Check Setting screens are for reference only. For definitions of screen items, refer to *Configuring Programmable Settings for the BDS* or *MPM*.

The Check Settings - Parameters dialog boxes are shown below.
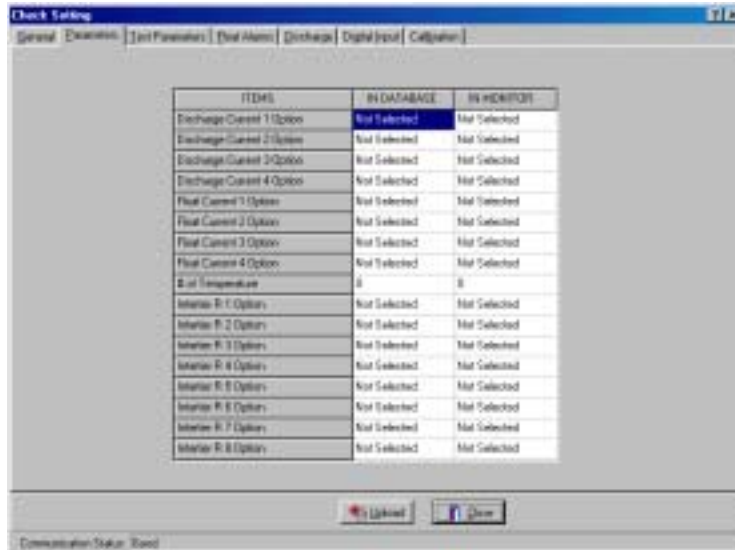
Figure 37. Check Setting - Parameters (MPM)
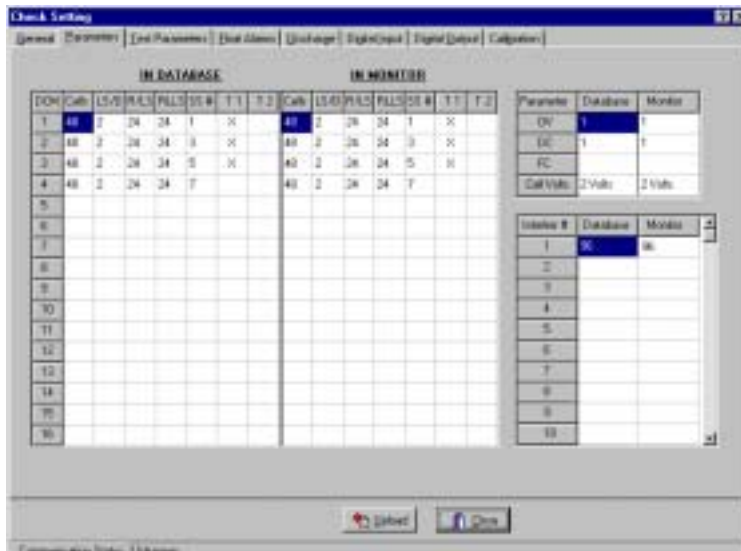
Figure 38. Check Setting - Parameters (BDS)

The Check Settings - Test Parameters dialog boxes are shown below.
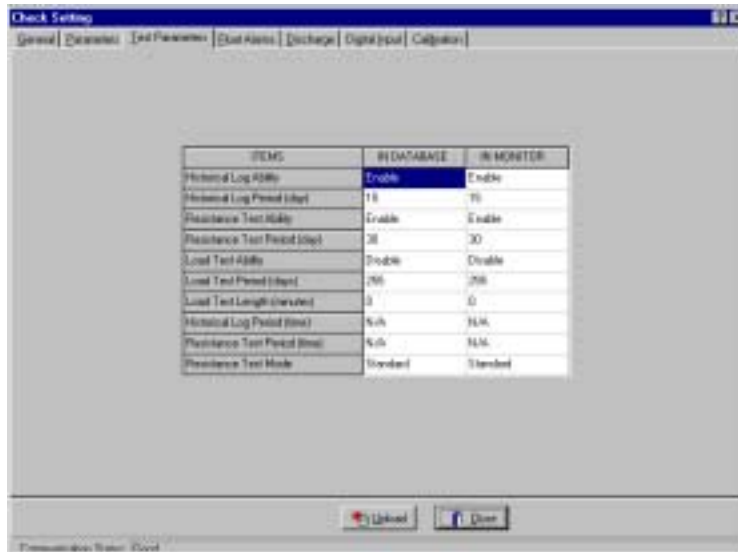
Figure 39. Check Setting - Test Parameters (MPM)
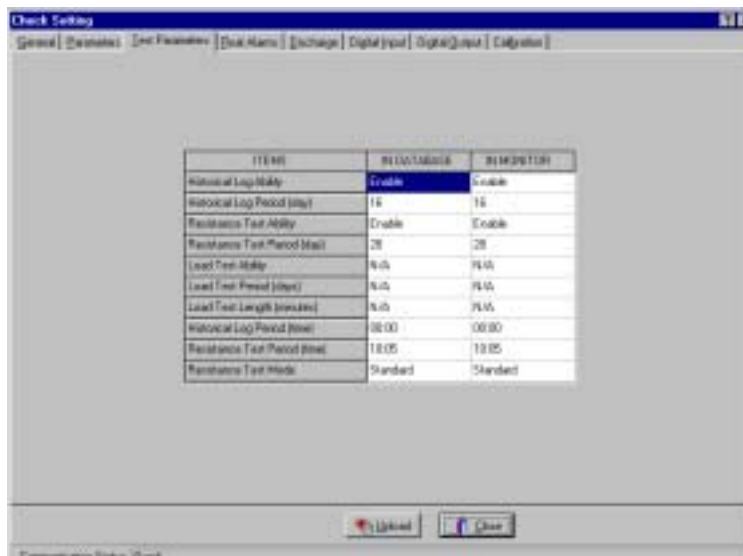
Figure 40. Check Setting - Test Parameters (BDS)

The Check Settings - Float Alarms dialog boxes are shown below.
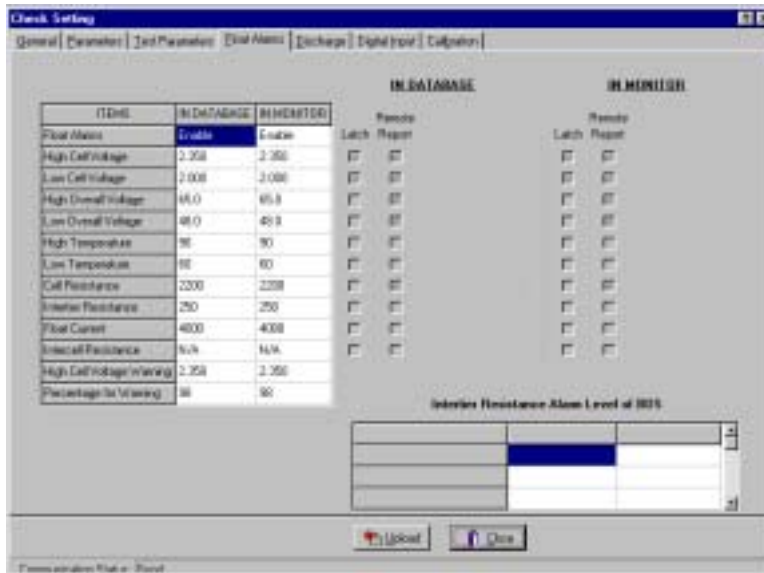
Figure 41. Check Setting - Float Alarms (MPM)
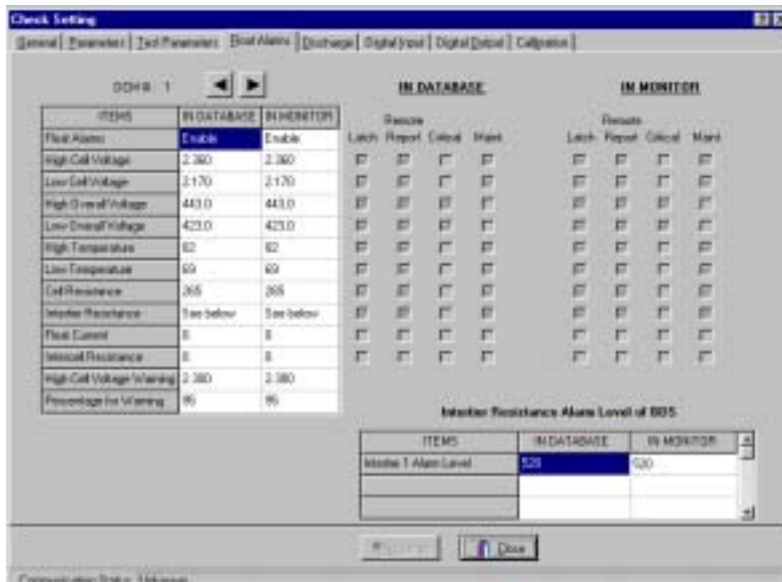
Figure 42. Check Setting - Float Alarms (BDS)

The Check Settings - Discharge dialog boxes are shown below.
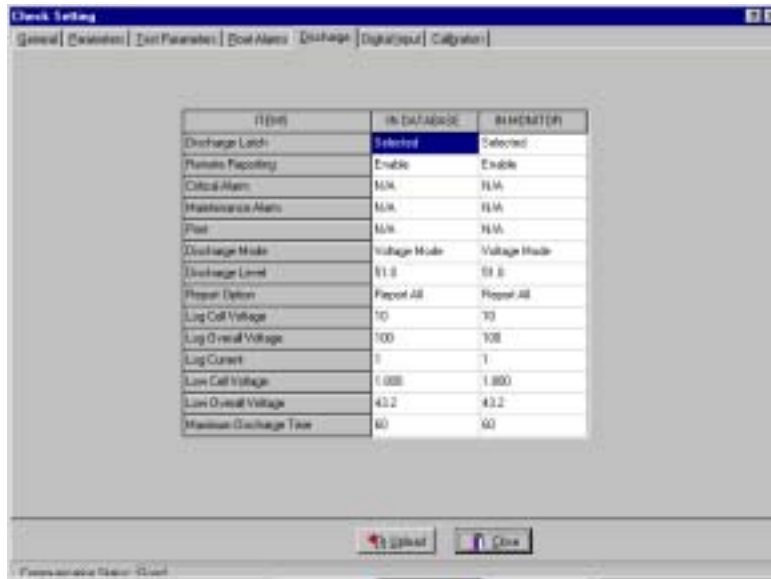
Figure 43. Check Setting - Discharge (MPM)
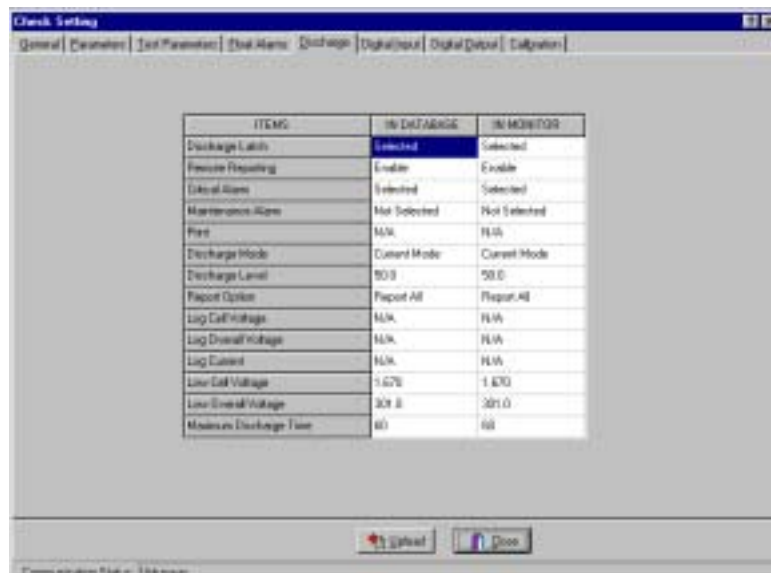
Figure 44. Check Setting - Discharge (BDS)

The Check Settings - Digital Input dialog boxes are shown below.
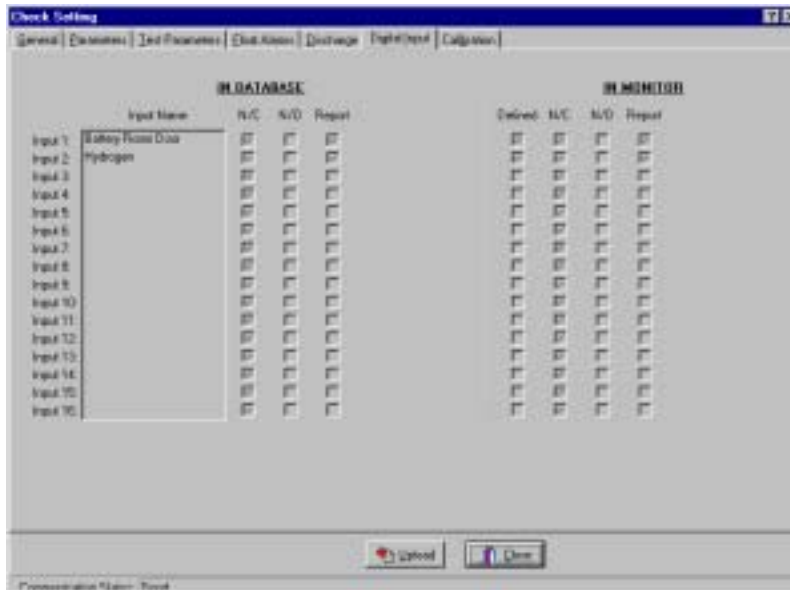
Figure 45. Check Setting - Digital Input (MPM)
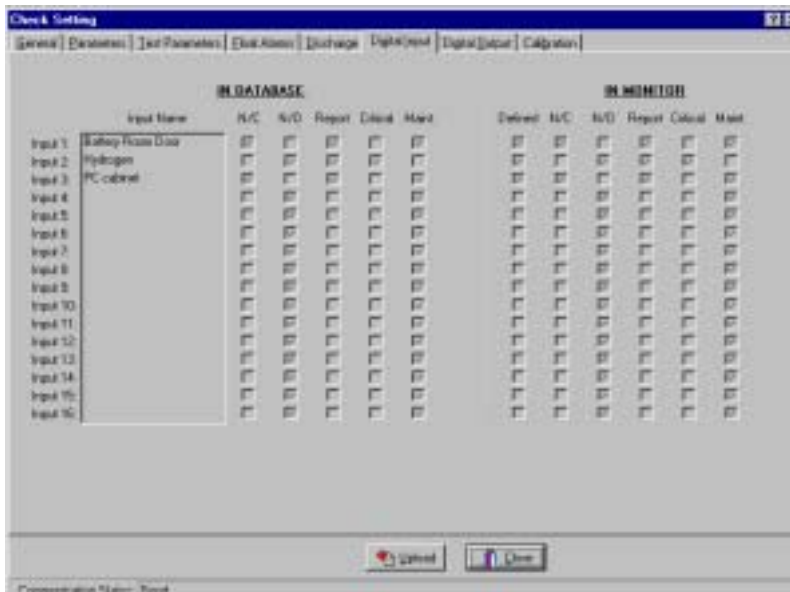
Figure 46. Check Setting - Digital Input (BDS)

The Check Settings - Digital Output screen is shown below. This screen appears only for the BDS.

Figure 47. Check Setting - Digital Output (BDS)

The Check Settings - Calibration dialog boxes are shown below.

Figure 48. Check Setting - Calibration (MPM)
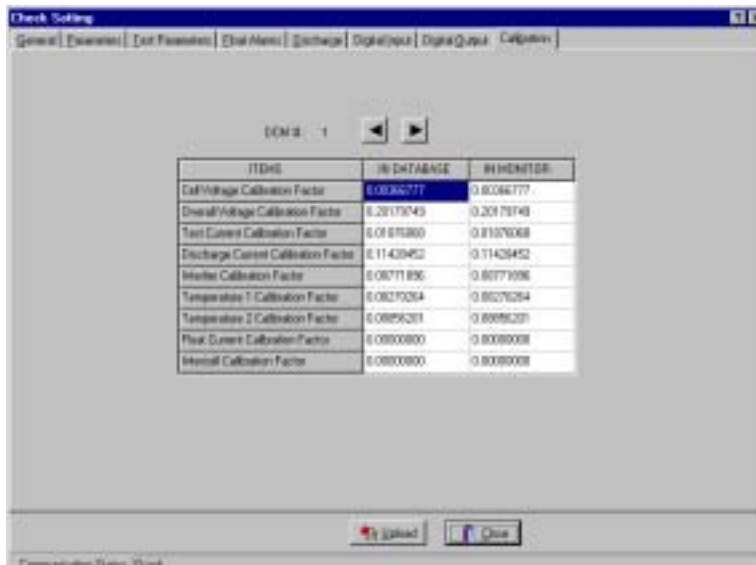
Figure 49. Check Setting - Calibration (BDS)

15.5. Check Setting Screens in Controller

A second series of Check Settings screens, for use only as a diagnostic tool, is available for the BDS. These Check Setting in Controller screens retrieve data from the BDS Controller instead of the DCM, and data in the Controller data is not cleared. To open the Check Setting in Controller screens, at the String View screen, hold down the CTRL key while selecting Setup|Check Setting. A typical screen is shown below.

Figure 50. Check Setting in Controller - Typical (BDS)

NOTE: These screens are a diagnostic tool only and not normally used.

16. Connecting to a Battery Location

To connect a computer to a monitor that has already been set up with parameters such as thresholds, test intervals, monitor configuration, and digital inputs, complete this section.

You may connect to a battery location site (MPM or BDS) via modem or network from a remote location or on-site using the RS-232 Local port or network. Both methods let you check all battery parameters. This section explains how to use the Data Manager to connect to a location.

Error 102 - When connecting, if the location, battery and string names do not match, an error message appears. Extra or missing blank spaces or hyphens can affect a name. To ignore the error, click the Ignore button. You may correct the problem by fixing names under the System Setup screens.
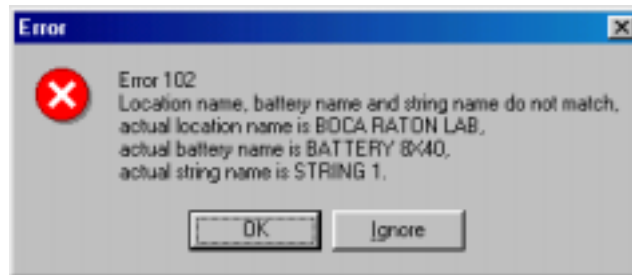
Figure 51. Connection Error Message

16.1. Connecting via a Modem

Connection

Confirm the Setup|System|Link dialog box is configured for a modem connection. Refer to *Setting Up a New MPM or BDS Installation*.

Select the string from the String Status screen, then click Connection on the toolbar to call the number specified under Setup|System|Link. Upon connection, the String View screen displays all real time data. Refer to *Viewing a Battery Location*.

Service Computer If connecting from a Service computer using the Service setup, enter a telephone number and MUX ID (if a multiplexer is used) under Setup|System|Link. If using a BDS, also confirm the BDS monitor configuration and string ID are set under Setup|System|String. Click Connection to establish connection. The Check Setting|General dialog box appears. Click Upload to synchronize the Service computer configuration with the connected monitor, then click Close. The String View screen displays all real time data. Refer to *Viewing a Battery Location* and *Check Setting Screens*.

Central Computer When connecting for the first time, a message indicates the monitor needs to be set up if the location, battery, and string names have not been set up. After clicking OK, the Check Setting|General box appears. Click Upload to synchronize the Central computer configuration with the monitor. This transfers the location name, battery name, string name, string ID, date and time. Click Close. The String View screen displays all real time data. Refer to *Viewing a Battery Location* and *Check Setting Screens*.

16.2. Connecting via Network
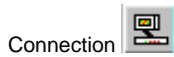
Connection

Confirm the Setup|System|Link dialog box is configured for a network connection. Refer to *Setting Up a New MPM or BDS Installation*.

Select the string from the String Status screen, then click Connection on the toolbar to connect to the IP address specified under Setup|System|Link. Upon connection, the String View screen displays all real time data. Refer to *Viewing a Battery Location*.

Service Computer If connecting from a Service computer using the Service setup, enter an IP address under Setup|System|Link. If using a BDS, also confirm the BDS monitor configuration and string ID are set under Setup|System|String. Click Connection to establish connection. The Check Setting|General dialog box appears. Click Upload to synchronize the Service computer configuration with the connected monitor, then click Close. The String View screen displays all real time data. Refer to *Viewing a Battery Location* and *Check Setting Screens*.

Central Computer When connecting for the first time, a message indicates the monitor needs to be set up if the location, battery, and string names have not been set up. After clicking OK, the Check Setting|General box appears. Click Upload to synchronize the Central computer configuration with the monitor. This transfers the location name, battery name, string name, string ID, date and time. Click Close. The String View screen displays all real time data. Refer to *Viewing a Battery Location* and *Check Setting Screens*.

Local Computer Upon connection, the String View screen displays all real time data. Refer to *Viewing a Battery Location*.

16.3. Connecting via the RS-232 Local Port

Connection

Confirm the Setup|System|Link dialog box is configured for a direct connection. Refer to *Setting Up a New MPM or BDS Installation*.

Select the string from the String Status screen, then click Connection. If the site has been set up, the String View screen displays all real time data. (Refer to *Viewing a Battery Location*.) If the site was not set up, refer below for new systems that require setup.

Service Computer If connecting from a Service computer using the Service setup, the Check Setting|General box appears after clicking Connection. Click Upload to synchronize the Service computer configuration with the connected monitor, then click Close. The String View screen displays all real time data. Refer to *Viewing a Battery Location* and *Check Setting Screens*.

Central Computer Upon connection, a message indicates the location needs to be set up. After clicking OK, the Check Setting|General box appears. Click Upload to synchronize the Central computer configuration with the monitor. This transfers the location name, battery name, string name, string ID, date and time. Click Close. The String View screen displays all real time data. Refer to *Viewing a Battery Location* and *Check Setting Screens*.

Local Computer Upon connection, a message indicates the location needs to be set up. After clicking OK, the Check Setting screens appear. After clicking Close, the String View screen displays all real time data. Refer to *Viewing a Battery Location*.

17. *Viewing a Battery Location*

There are two ways to view data from a battery: offline and real-time.

Viewing data offline means viewing data removed from the monitor and stored in the database. To view data offline, select the site from the String Status screen, then select View|Offline. The String View screen displays data for the site. No voltages are displayed because the system is offline and not connected to the site. To activate the display, you must open data from the database (discussed later in this chapter).

Viewing battery data in real time means having the computer connected via a modem, LAN, or directly via a serial cable to the monitor. Refer to *Connecting to a Battery Location*. After connection, the String View screen displays the readings in real time values.

17.1. String View Screens

This section describes features common among the voltage, resistance, and intercell resistance screens.

To go to the voltage, resistance or intercell resistance screen from any other String View screen, click the view voltage, view resistance, or view intercell resistance button on the top of the screen.

To select a different string, click the Select String button, then click a name in the list to open the string. Only MPM and BDS strings that have the same telephone number, including spaces and commas, appear in the list. MPM strings with a MUX setting of zero do not appear in the list.

The top of the String View screen displays S: B: and L: for string, battery, and location names.

To read the actual level of an individual cell, refer to *Cell Data Box*. To perform a trend analysis, refer to *Trend Analysis*.

You may zoom in on any portion of the bar graph by placing the cursor over the bars and dragging a rectangle over the area of interest while holding the left mouse button. To restore the graph to the original size, type Ctrl-U or click View|Undo Zoom.

17.2. Battery Voltages (String View Screen)

The String View screen, which appears when first connecting to a site, displays bar graphs that show the voltage of each cell or module within the battery. A summary of the readings appears at the bottom of the screen. If the optional current channel and temperature transducers are installed, readings from these also appear.
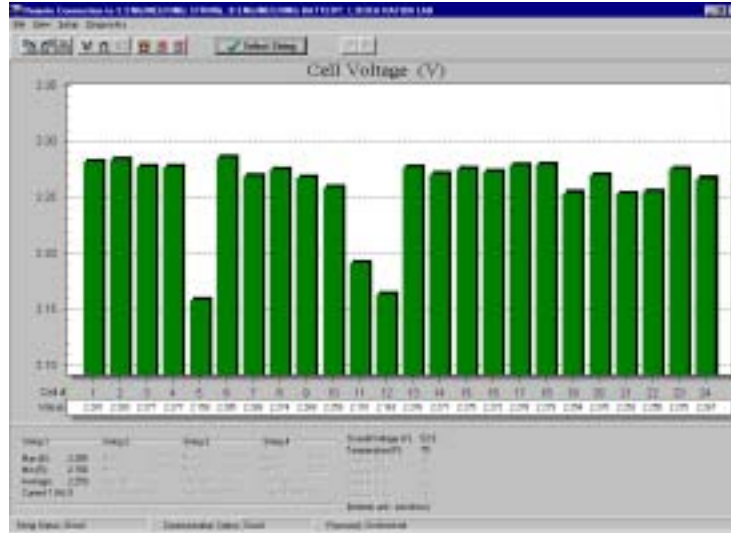
Figure 52. String View - Cell Voltages (MPM shown)

Save History Record   Open   View Voltage

Opening and Saving - At any time, you can save (store) a record with the values currently displayed. Click Save History Record to capture whatever is displayed and save it in the database with a date stamp. Click Open to display a list of available records previously saved. To obtain a real-time value of the present cell voltages, click View Voltage. If history readings are available, the Data Manager saves them to the database, with the date and time taken. In the String View - Voltage screen, you may click File|Save to save the presently displayed data, with date and time.

The String Status box on the bottom left of the String View screen can report nine conditions.

Priority Level	Status	Meaning
1	DCM Com Error	Communication error between DCM and BDS Controller.
2	Discharging	The battery entered a discharge.
3	R-Test in Progress	Resistance test in progress.
4	Calibration in Progress	
5	Check Hardware	Monitor reported a hardware failure. The items checked are described in *Diagnostics – Self Test*.
6	Discharge Occurred	
7	Alarm	A battery parameter violated an alarm threshold.
8	Warning	A resistance reading violated a warning threshold.
9	Good	System is within normal parameters.

17.3. Internal Resistances (String View Screen)

You may read internal cell resistance by setting a timer under Setup|Battery|Test Parameters to run the test automatically, or by starting the test on demand from the Resistance screen. NOTE: Intercell resistance measurements are taken at the same time.

View Resistance **Ω**   Open

View Resistance - To open the Resistance screen, click the View Resistance button or click View|Resistance. If the computer is connected to a BDS or MPM monitor, the monitor transfers readings from its memory. Transfer may take a minute or two before the bar graphs appear. If no readings exist, a message indicates this. If readings are available, the Data Manager displays the latest set and saves them to the database, with the date and time taken.

Figure 53. String View - Resistances (MPM shown)

Open Existing Readings - To open existing sets of readings, click Open to view a list of available readings. Select the date and click OK.

Start, Stop and Get **Start Stop Get**

To capture a new set of readings, click Start to start a resistance test. After a few minutes, depending on the configuration, the 'test in progress' message disappears, the front panel Resistance Test LED goes out, and the Get button becomes active. Click Get to display the readings and transfer them to the database. The bottom of the screen displays a summary of the resistances and any intertier values measured.

To stop the test before completion, click the Stop button.

NOTE: Clicking Start on the BDS Resistance screen selects all DCMs for testing. For troubleshooting, you may select Diagnostics|R-Test in a DCM and choose which DCMs to resistance test. See *Resistance Testing Multiple DCM Units*.

17.4. Intercell Resistances (String View Screen)

You may read intercell resistance by setting a timer under Setup|Battery|Test Parameters to run the test automatically, or by starting the test on demand from the Intercell Resistance screen. The Intercell Resistance screen is available for the BDS only. An intercell reading option is required in the BDS. NOTE: Internal resistance measurements are taken at the same time.

View Intercell Resistance **IC**   Open   Start, Stop and Get **Start** Stop Get

View Intercell Resistance - To open the Intercell Resistance screen, click the View Intercell Resistance button or click View|Intercell Resistance. If the computer is connected to a BDS, the monitor transfers readings from its memory. Transfer may take a minute or two before the bar graphs appear. If no readings exist, a message indicates this. If readings are available, the Data Manager displays the latest set and saves them to the database, with the date and time taken.
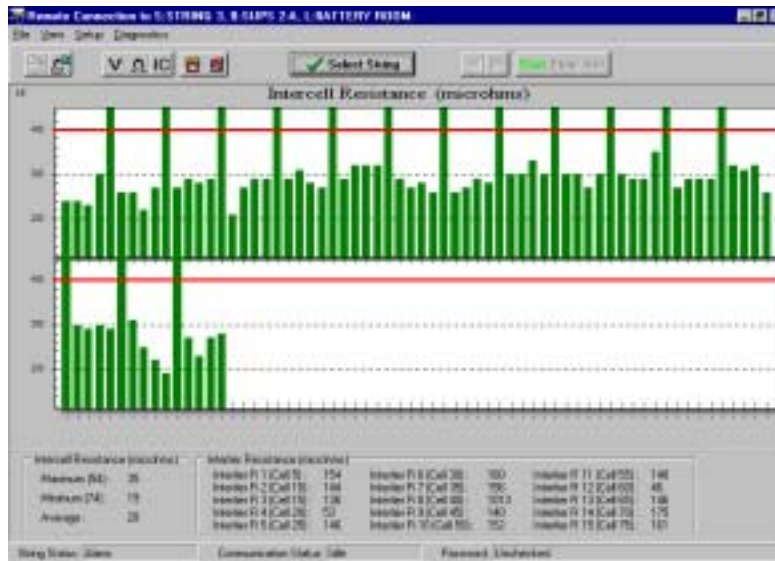
Figure 54. String View - Intercell Resistances (BDS)

Open Existing Readings - To open existing sets of readings, click Open to view a list of available readings. Select the date and click OK.

To capture a new set of readings, click Start to start an intercell resistance test. After a few minutes, depending on the configuration, the 'test in progress' message disappears, and the Get button becomes active. Click Get to display the readings and transfer them to the database. The bottom of the screen displays a summary of the resistances and any intertier values measured.

To stop the test before completion, click the Stop button.

NOTE: Clicking Start on the BDS Intercell Resistance screen selects all DCMs for testing. For troubleshooting, you may select Diagnostics|R-Test in a DCM and choose which DCMs to resistance test. See *Resistance Testing Multiple DCM Units*.

17.5. Cell Voltage Box

The cell values displayed in the Cell Voltage box are continually updated, which is convenient when monitoring a discharge. To read the actual level of an individual cell on any String View screen, click a bar graph to display the Cell Voltage box, which displays the string number, cell number, and value along the bottom.
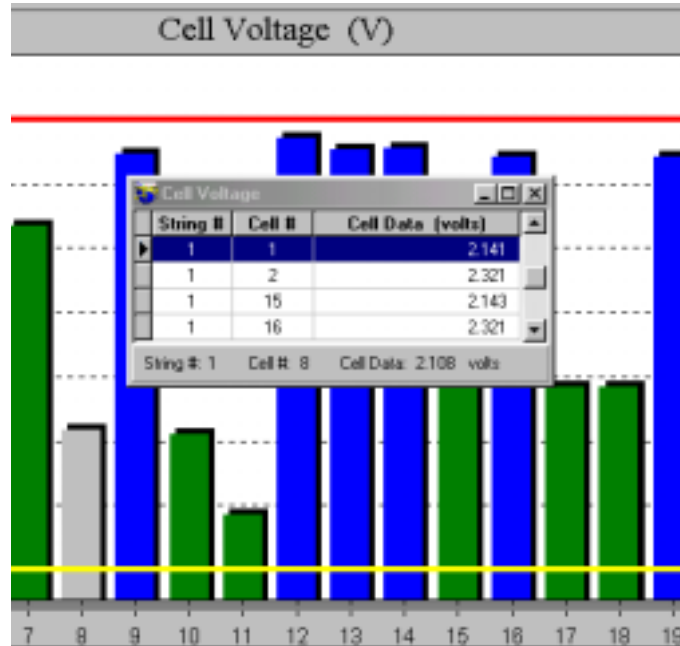
Figure 55. Cell Voltage Box

You may create a list of cells in the Cell Voltage box and monitor the values. To add cells to the list, hold the Alt key and click a cell bar graph. If part of the list is hidden, increase the box size by dragging an edge of the box. To sort the list, click a column header. To display the value of a cell not in the list, click the cell bar graph to display the value along the bottom.

The above figure shows the Cell Voltage box positioned over a bar graph. The list contains four cells, added using the Alt key and clicking the bar graph. Cell 8, displayed along the bottom but not in the list, was selected by clicking on the bar graph for cell 8, which is now light gray. All voltage readings are continually updating.

17.6. Trend Analysis

To perform a voltage, resistance or intercell resistance trend analysis for any selected cell, click a bar graph of interest on the String View screen to display the Cell Data box, which identifies the cell and value. Now right click on the bar graph to display a pop-up menu.
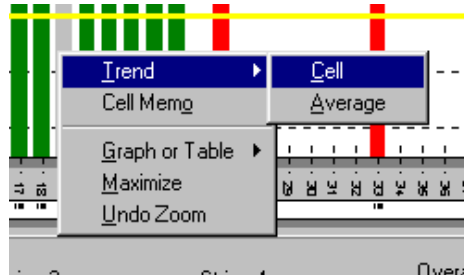
Figure 56. Trend Menu

On this menu, click Trend then click Cell or Average to display the trend analysis graph. If the trend analysis screen has active **Previous Parameter** or **Next Parameter** arrows at the top, you may click them to view the previous or next cell. To adjust the y-axis, select a percent with the up-down arrows then click **Adjust Scale**.
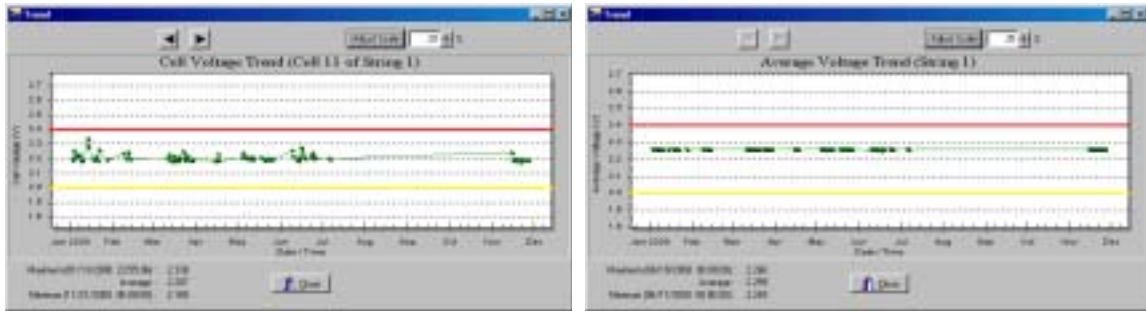
Figure 57. Trend - Cell Voltage / Average Voltage

The trend analysis screens for resistance are shown below.
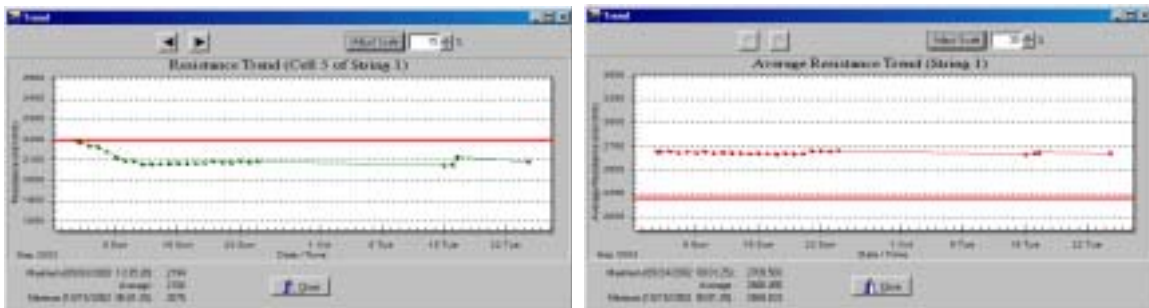
Figure 58. Trend - Cell Resistance / Average Resistance

The trend analysis screens for intercell resistance are shown below.
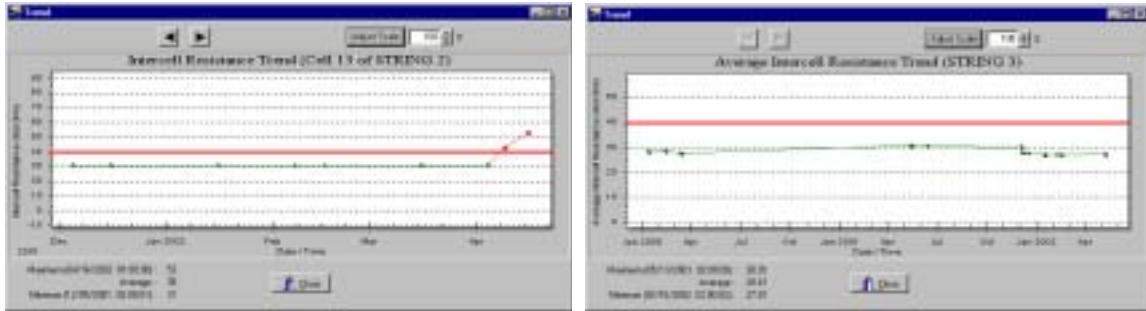
Figure 59. Trend - Intercell Resistance / Average Resistance

To display a Data Point Value box, click on any dot (point) that appears on a trend analysis graph.
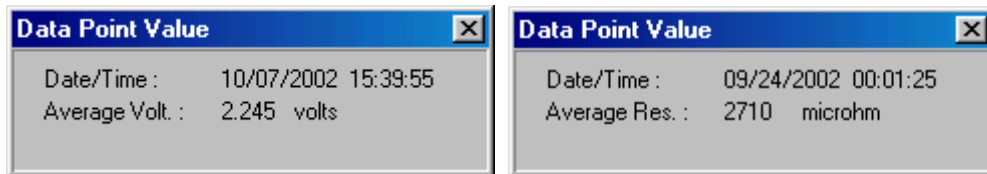
Figure 60. Data Point Value Boxes: Volts and Ohms (Typical)

The Data Point Value box is useful when you must determine a numerical value (in volts or ohms) and date and time for a particular event on the graph.

17.7. Alarm Data

View Alarm

Reset Alarm

Get Current Alarms

View Historical Alarms

Get Current Historical Alarms

Select Historical Alarms

The MPM or BDS monitor constantly checks user-programmed threshold values set under Battery Setup. As long as the alarms are enabled, the monitor creates a record of any threshold violated. Click View Alarm to check for active alarms. If no alarms exist, a message indicates this.

When the Alarm screen is active, the Get Current Alarms, Reset Alarm, Get Current Historical Alarms, and View Historical Alarms buttons become active.

Current Alarms - The Current Alarm screen displays the present state of the alarm contacts, either Active or Latched. **Active** indicates a parameter is presently violating a threshold. The screen displays the alarm name and the time the alarm event started. **Latched** indicates the parameter returned back to normal levels, but the alarm relay remains energized until reset. The end time indicates when the alarm event changed to a latched state. Peak value indicates the highest or lowest value reached during the alarm event. For the latch function to work, you must select latch enable under Battery Setup for each parameter. If latch is not selected, the alarm contact de-energizes when the parameter returns to normal. A record of a present alarm is saved as a Current Historical Alarm. (Refer to Current Historical Alarms below.)

Current Historical Alarms - The Current Historical Alarm screen displays alarms that returned to normal values and were not set to latch. The status of this type of alarm is Normal, indicating it returned to a valid value on its own. No reset date or time is displayed. If a current alarm exists and it is reset, an entry is created in Current Historical Alarms at the reset time, and a new current alarm is created because the alarm condition still exists. A status of Reset means a latched alarm was reset. The reset date and time column indicates when the reset occurred. Peak Value indicates the highest or lowest value the parameter reached during the alarm event. When you access Current History, the data is transferred from the monitor to the database and saved under Historical Alarms. If you access Current History using a Central computer, the Current History data is permanently removed from the monitor.

Historical Alarms - The Historical Alarm screen shows a history of alarms transferred to the computer database using the Current History command.

Figure 61. Current Alarm List

If you click Get Current Alarms, active or latched alarms in the monitor are retrieved. Active or latched alarms stay active until the condition is cleared or you click Reset Alarm. However, if you click Reset Alarm and the violation is still present, the alarm reappears in the Current Alarm list.

Get Current Historical Alarms retrieves a list of alarms that may have been reset or cleared on their own but are still in monitor memory. View Historical Alarms displays a list of alarm events that pertain to the battery and are saved in the database.

Figure 62. Historical Alarm List

If any alarm records exist, the Select Historical Alarms button becomes active. Click Select Historical Alarms to display the Historical Alarm Selection dialog box, then choose the desired alarm filters, such as All Dates or Selected Types, so only alarms of interest appear.

To delete alarms from the database, select File|Delete or File|Delete All from the main menu. NOTE: If the Historical Alarm list is filtered using the Historical Alarm Selection screen, selecting File|Delete All will delete all alarms in the database, not just those appearing in the list on the screen.
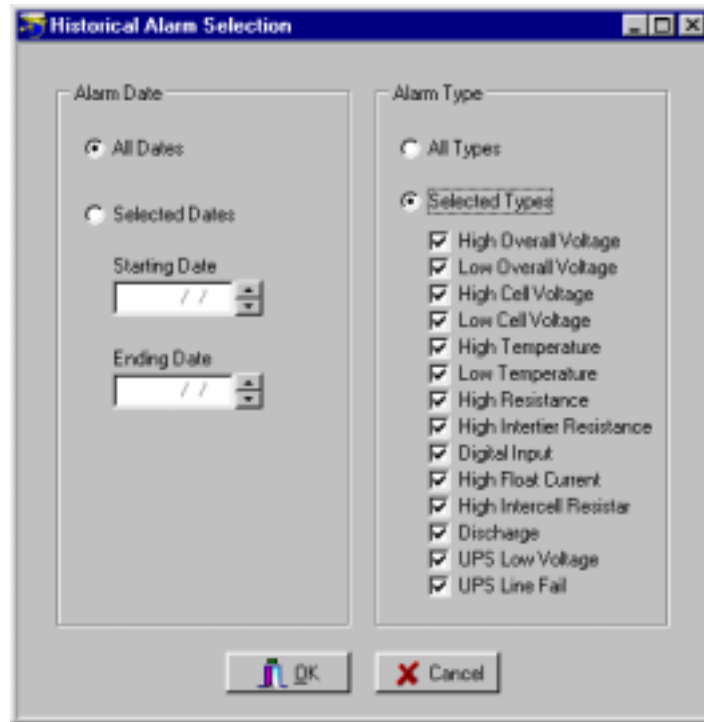
Figure 63. Historical Alarm Selection

17.8. *Discharge Data*

View Discharge   View Load Test   Discharge Replay   Discharge Curve

Replay Option   Curve Option
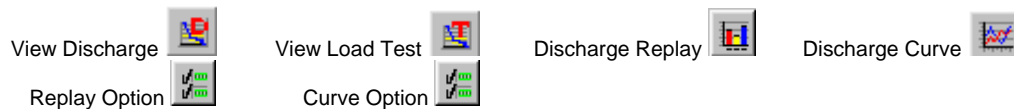
From the String View screen, click View|Load Test (MPM only) or View|Discharge (MPM or BDS) to display the All Load Tests or All Discharges screen, which lists records for the connected string. View Load Test displays discharges detected by user-programmed tests. View Discharge displays automatically detected discharges.

NOTE: If System Status on the bottom left of the String View screen indicates *Discharging*, *Logging Discharge Data* or *R-test in Progress*, the View Discharge and View Load Test buttons and menu selections are disabled.

Figure 64. All Discharges List

The Lowest OV column shows the lowest value reached during the discharge. OV@30S lists the overall voltage 30 seconds into the discharge, and AvgCV@30S lists the average cell voltage 30 seconds into the discharge.

After selecting a discharge from the list by clicking it, you can perform two types of analysis. Click Discharge Replay to play back the discharge. Click Discharge Curve to display line graphs of up to three specified parameters.

17.8.1. Discharge Replay

Click the Discharge Replay button to display the Discharge Replay screen.
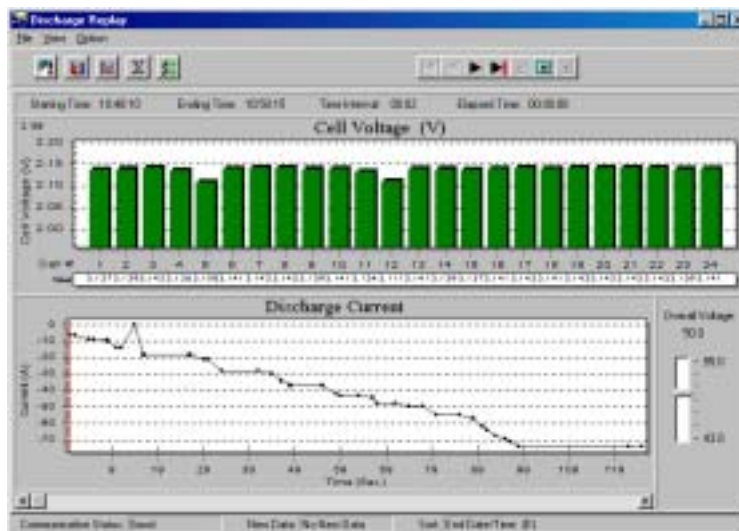
Figure 65. Discharge Replay (MPM)
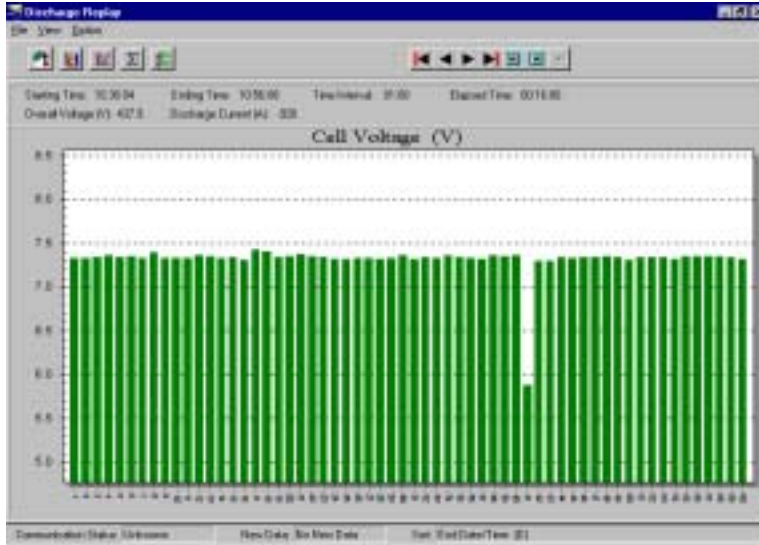
Figure 66. Discharge Replay (BDS)

Click the Replay Option button to display the Replay Option box.

In the Interval area, click either Time or Overall Voltage and select a value. If Time is selected, replay time advances in selectable increments measured against real-time. For example, if 00:10 is selected, playback advances 10 seconds every second.

If Overall Voltage is selected, playback advances each time the selected voltage changes. For example, if 0.1 is selected, playback advances each time a 100 mv deviation in overall voltage occurs.
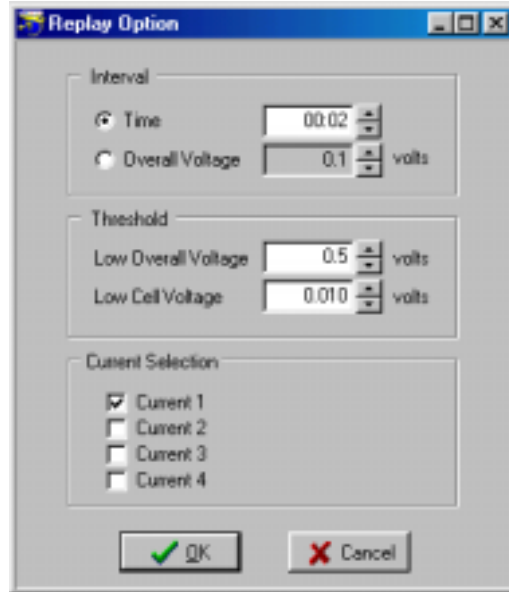
Figure 67. Replay Option

In the Threshold area, you may program low voltage thresholds to identify cells that exceed critical levels. In the Current Selection area, choose up to four current channels to view simultaneously if they are connected. After setting these options, click OK.

Show First, Show Previous, Show Next, Show Last, Replay Backward, Replay Forward, and Stop

The play buttons are at the top of the Discharge Replay screen. Click Replay Forward to play the discharge. The display advances either by time or voltage at the rate selected.

For MPM only, the Change Elapsed Time slider at the bottom of the screen causes the bar graph to display the cell voltages for the time selected. The Overall Voltage indicator on the right indicates overall voltage for the time selected.

17.8.2. Discharge Curve

Click the Discharge Curve button to display the Discharge Curve screen. The Change Time slider at the bottom of the screen causes the values on the right to indicate levels for the time selected.
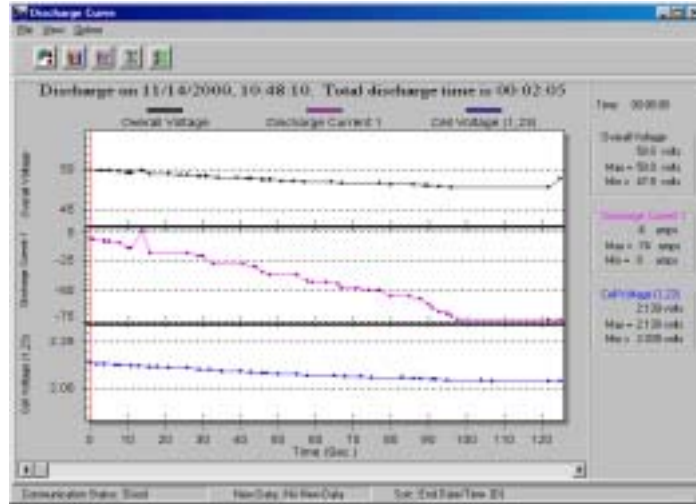
Figure 68. Discharge Curve (MPM and BDS)

Click Curve Option to display the Curve Option box, which lets you select up to three parameters for viewing.
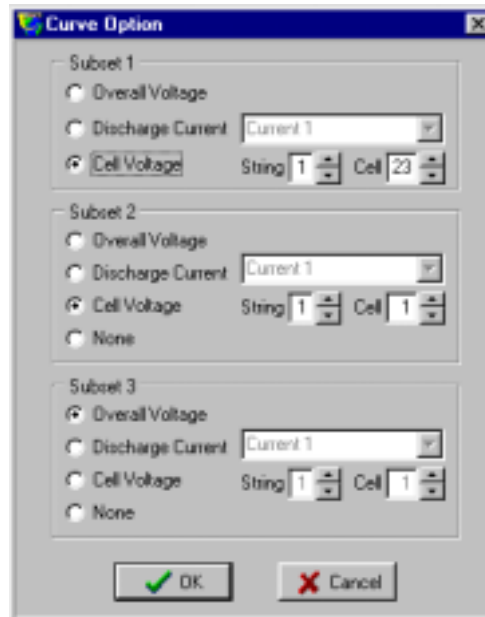
Figure 69. Curve Option

In the Subset areas, select Overall Voltage, Discharge Current or Cell Voltage curves. If Discharge Current is selected, choose a Current (for string) 1, 2, 3 or 4 from the drop-down list. NOTE: The MPM has strings 1 to 4 available; the BDS has only string 1.

If Cell Voltage is selected, choose a string and cell number. If you select an invalid current, string or cell number, the area appears on the Discharge Curve screen, but no curve is displayed. If you select None in Subset 2 or 3, the area does not appear.

17.9. Cell Memo / String Memo

Use the Cell Memo or String Memo options to add notes that apply to a cell or string.

Figure 70. Cell Memo

You may enter a cell or string memo using a Local, Central or Service computer. In all cases, the memo is saved to the database. If you use a Service computer and are connected to the monitor, the string memo is saved in the Service computer database and monitor memory; it is removed from monitor memory if manually imported or the Central computer performs an automatic data extraction. If using a Service computer, type the author's name in the memo field if needed. NOTE: A Service computer can store a string memo in the monitor, but not a cell memo.

To enter a cell memo, at the String View screen, click a cell then right click the cell. On the pop-up menu, click Cell Memo. The Cell Memo screen appears.

Click the New button on the screen and type the data and memo. To have the installation date, model number, and serial number data apply to all cells in the string, check the Entire String box. To save the information, click Save. If Entire String was checked, when you select Cell Memo and click New for any other cell, the installation date, model number, and serial number data appears.

Figure 71. String Memo

To enter a string memo, on the String View screen, click View|String Memo. After the String Memo screen appears, type a global memo that applies to the entire string. To save the information, click Save.

To import a string memo into the Central computer database that was entered on-site into the monitor by a technician using a Service computer, on the String Memo screen, select File|Import. This removes the memo from monitor memory.

18. Generating and Printing Reports

The Report Generator program can customize, save, and print reports.

18.1. Using the Report Generator

The Battery Monitor Report Generator (BMRG) is a separate program that accesses the last database opened by the BMDM and creates customized reports. After the BMDM software collects data from the monitoring systems, the data is saved to an Access database, and it is this data that battery personnel rely on to analyze battery system performance.

The Report Generator can display and print pages of text and graphs, and save reports in an archive (**.ZRF**) format that protects against changes and ensures the integrity of the information. Refer to the *Battery Monitor Data Manager Report Generator Software User's Guide* for details. You may also view and print ZRF files using the Archive Reader program. Refer to *Using the Archive Reader*.

18.2. Using the Archive Reader

The Archive Reader is similar to the Report Viewer and may be used to view and print saved ZRF format reports created by the Report Generator. The Archive Reader is typically distributed along with ZRF report files when these files are sent to locations that do not have the Report Generator program. You may freely copy and distribute the Archive Reader with archive files when required. You can download the Archive Reader from the software download section of the Albércorp Web site at www.alber.com.

19. Calibration

To ensure reliability of readings, Albércorp strongly recommends that a qualified technician check MPM or BDS monitor calibration annually. Perform calibration using a computer directly connected via the RS-232 port. (Refer to *Connecting via the RS-232 Local Port*.) The Calibration screen displays all the parameters the unit monitors. To display this screen, select Setup|Calibration from the String View screen.

Figure 72. Calibration Setup (MPM)

The BDS Calibration screen differs slightly. It has arrows to select other DCMs, and does not have a Test Current cell selector.

Figure 73. Calibration Setup (BDS)

There are four columns on the Calibration screen: Measurement Point, Measured Value, Actual Reading, and Calibration Factor.

Measurement Point – Allows selection of input channels when calibrating. Usually, the parameters selected never need to be changed. The Measurement Point also serves as a diagnostic tool that can lock in on a channel for troubleshooting.

Measured Value – Type measured values in this column. The MPM uses only Temperature 1; the BDS uses two temperature channels per DCM. NOTE: Float Current is not supported at this time.

Actual Reading – The value from the A/D (Analog to Digital) converter before any calibration (Calibration Factor) is applied. Also referred to as Raw Counts.

Calibration Factor – The correction factor required to obtain a value that can be displayed on the String View screen.

Required Test Equipment:
> 4-1/2 digit DVM – Fluke 87 or equivalent.
> 100 millivolt and 10 millivolt source.
> Clamp-on current meter. A 0.1% shunt is recommended.
> Temperature probe.

The calibration procedures are available to qualified personnel trained by Albércorp in the calibration of this equipment.

20. MPM Diagnostics

The diagnostics are primarily used for production testing, but may assist in troubleshooting a hardware failure in the field. Select Diagnostics from the String View screen. The computer must be connected to an MPM and the communication status at the bottom of the screen must be responding.

20.1. Rebooting the MPM

To reboot the MPM from the Data Manager, at the String View screen, select Setup|Reboot Firmware. This does a "warm reset" of the MPM.

20.2. Power-Up Diagnostics (MPM)

At power-up, the unit performs some comprehensive diagnostics that take about two minutes. If the unit fails any tests except failure to detect a dial tone, the Error LED blinks. Identify the parameters that failed by using the *Self Test* diagnostics described below.

20.3. Self Test (MPM)

Self Test reads an MPM status register and displays the parameter status on the Self Test Diagnostics screen. These parameters are tested only at MPM power-up. If an update is needed, cycle the power to the MPM or reboot by selecting Setup|Reboot Firmware. To open the Self Test Diagnostics screen, select Diagnostics|Self Test from the String View screen.

Figure 74. Self Test Diagnostic (MPM)

Items on the Self Test Diagnostics screen are described below.

Processor - Checks processor internal registers and timers.

External RAM - Writes and reads to each RAM location to verify accessibility.

PROM - Calculates and verifies the program checksum in the PROM.

A/D - Reads and confirms the A/D converter reference voltage is within specification.

Modem - Verifies the modem echoes commands.

Dial Tone - Confirms the telephone is connected.

Running Firmware - Displays the memory type from which the firmware is running. Typically, this is the PROM, but the system can upload a new version to Flash memory.

Firmware Version - Displays the version of firmware running.

20.4. Load Module (MPM)

The Load Module diagnostic tests each load connection to the battery. This diagnostic tests the connections, load cable fuses, load relays and load module, and can confirm actual load current. The following figure shows which load steps are used for each configuration. Refer to *Configuration Options* for configuration descriptions.

Configuration	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 x 10 x 1	x	x														
2 x 10 x 1	x	x			x	x										
3 x 10 x 1	x	x			x	x			x	x						
4 x 10 x 1	x	x			x	x			x	x			x	x		
1 x 20 x 1	x	x	x	x												
2 x 20 x 1	x	x	x	x	x	x	x	x								
3 x 20 x 1	x	x	x	x	x	x	x	x	x	x	x	x				
4 x 20 x 1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1 x 25 x 1	x	x	x	x												
2 x 25 x 1	x	x	x	x	x	x	x	x								
3 x 25 x 1	x	x	x	x	x	x	x	x	x	x	x	x				
4 x 25 x 1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1 x 26 x 1	x	x	x	x												
2 x 26 x 1	x	x	x	x	x	x	x	x								
3 x 26 x 1	x	x	x	x	x	x	x	x	x	x	x	x				
1 x 41 x 1	x	x	x	x												
2 x 41 x 1	x	x	x	x	x	x	x	x								
1 x 80 x 1	x	x	x	x	x	x	x	x								
1 x 90 x 1	x	x	x	x	x	x	x	x	x							
1 x 92 x 1	x	x	x	x	x	x	x	x	x							
1 x 96 x 1	x	x	x	x	x	x	x	x								
1 x 97 x 1	x	x	x	x	x	x	x	x								
1 x 12 x 2	x	x	x	x												
2 x 12 x 2	x	x	x	x	x	x	x	x								
3 x 12 x 2	x	x	x	x	x	x	x	x	x	x	x	x				
4 x 12 x 2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1 x 13 x 2	x	x	x	x												
2 x 13 x 2	x	x	x	x	x	x	x	x								
3 x 13 x 2	x	x	x	x	x	x	x	x	x	x	x	x				
4 x 13 x 2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1 x 22 x 2	x	x	x	x												
2 x 22 x 2	x	x	x	x	x	x	x	x								
3 x 22 x 2	x	x	x	x	x	x	x	x	x	x	x	x				
4 x 22 x 2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1 x 24 x 2	x	x	x	x												
2 x 24 x 2	x	x	x	x	x	x	x	x								
3 x 24 x 2	x	x	x	x	x	x	x	x	x	x	x	x				
4 x 24 x 2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1 x 58 x 2	x	x	x	x	x	x	x	x	x	x						
1 x 60 x 2	x	x	x	x	x	x	x	x	x	x						
1 x 6 x 4	x	x	x													
2 x 6 x 4	x	x	x		x	x	x									
3 x 6 x 4	x	x	x		x	x	x		x	x	x					
4 x 6 x 4	x	x	x		x	x	x		x	x	x		x	x	x	
1 x 30 x 4	x	x	x	x	x	x	x	x	x	x						
1 x 4 x 6	x	x	x	x												
2 x 4 x 6	x	x	x	x	x	x	x	x								
3 x 4 x 6	x	x	x	x	x	x	x	x	x	x	x	x				
4 x 4 x 6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1 x 8 x 6	x	x	x	x												
2 x 8 x 6	x	x	x	x	x	x	x	x								
3 x 8 x 6	x	x	x	x	x	x	x	x	x	x	x	x				
4 x 8 x 6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1 x 20 x 6	x	x	x	x	x	x	x	x	x	x						

Configuration	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 x 3 x 8	x	x	x													
2 x 3 x 8	x	x	x		x	x	x									
3 x 3 x 8	x	x	x		x	x	x		x	x	x					
4 x 3 x 8	x	x	x		x	x	x		x	x	x		x	x	x	
1 x 15 x 8	x	x	x	x	x	x	x	x								
2 x 15 x 8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1 x 2 x 12	x	x														
2 x 2 x 12	x	x			x	x										
3 x 2 x 12	x	x			x	x			x	x						
4 x 2 x 12	x	x			x	x			x	x			x	x		
1 x 4 x 12	x	x	x	x												
2 x 4 x 12	x	x	x	x	x	x	x	x								
3 x 4 x 12	x	x	x	x	x	x	x	x	x	x	x	x				
4 x 4 x 12	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1 x 10 x 12	x	x	x	x	x	x	x	x	x	x						

Figure 75. MPM Load Module Configuration

To open the Load Module Diagnostics screen, select Diagnostics|Load Module from the String View screen. Using the Load Module Configuration figure above, identify the configuration that applies to the installation. You can turn on each load step and confirm the current for that step. Each load step must be from 17 to 23 amps when energized.

WARNING: When testing, do not leave the load module on for long periods of time. The load module can overheat and cause permanent hardware damage if not allowed to cool down between tests (about 10 seconds).
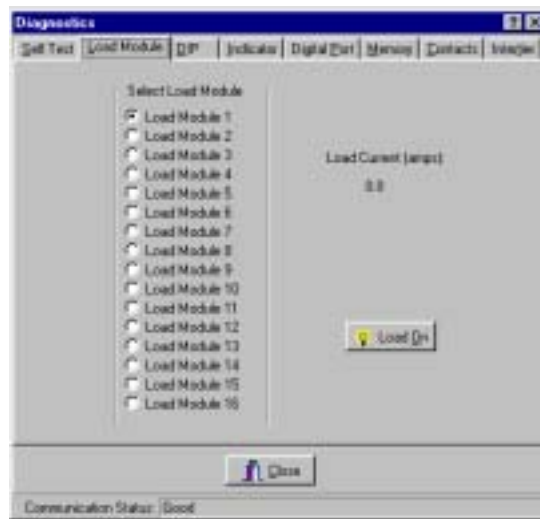
Figure 76. Load Module Diagnostic (MPM)

In the **Select Load Module** area, select a load module, then click **Load On**. To stop the test, click **Load Off**.

20.5. DIP Switch (MPM)

The DIP Switch diagnostic confirms each position of the DIP switch inside the MPM. Although not all switch positions are used, every position is checked during manufacturing. This diagnostic allows remote checking of switch settings, possibly saving a trip to the site. To open the DIP Switch Diagnostics screen, select Diagnostics|DIP Switch from the String View screen. The screen indicates each switch position as it is changed.

WARNING: Exit this diagnostic with the switch in the same positions it was in when the diagnostic was entered.

Figure 77. DIP Switch Diagnostic (MPM)

20.6. Indicator (MPM)

This diagnostic confirms MPM front panel LED operation. To open the Indicator Diagnostics screen, select Diagnostics|Indicator from the String View screen. To activate an LED, click an LED name then click **On**.

Figure 78. Indicator Diagnostic (MPM)

20.7. Digital Port (MPM)

The Digital Port diagnostic checks the status of the digital inputs. If the system is connected to external contacts, this diagnostic is useful for checking each contact. To open the Digital Port Diagnostics screen, select Diagnostics|Digital Port from the String View screen. The screen displays the status of the inputs. An ON status means a contact is closed.
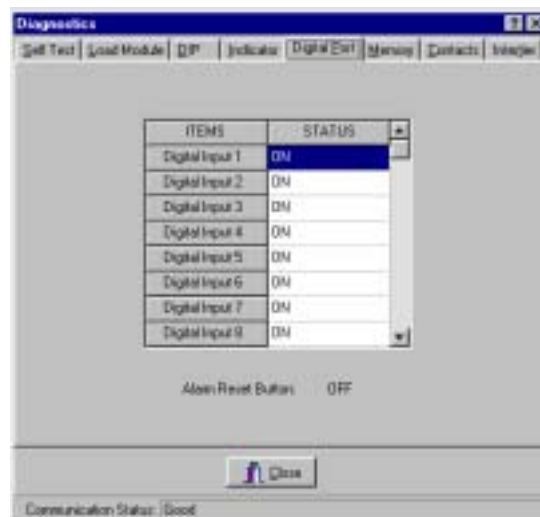
Figure 79. Digital Port Diagnostic (MPM)

20.8. Memory (MPM)

This diagnostic checks both types of nonvolatile monitor memory: E^2 (electrically erasable) and Flash. E^2 memory stores calibration and setup information and actual data, such as Discharge, Alarm and Resistance test data. Flash memory is used for uploads of MPM firmware, which can be upgraded in the field or from a remote location via modem. Refer to the *Upgrades* section. To open the Memory Diagnostics screen, select Diagnostics|Memory from the String View screen.

Figure 80. Memory Diagnostic (MPM)

To test memory, in the Memory Type area select **EEPROM** or **Flash Memory**, then click **Start**. During the EEPROM test, communication is briefly lost, then a status result indicates pass or fail. During the Flash memory diagnostics, the integrity of the upgraded firmware file is checked. After starting this test, select a file to compare to the contents in Flash memory. This test takes several minutes to complete.

To clear all measured data stored in E^2 memory, click **Clear Data Memory**.

20.9. Contacts (MPM)

This diagnostic checks the external alarm contact and charger contacts for proper connection. To open the Alarm Contacts Diagnostics screen, select Diagnostics|Contacts from the String View screen. In the Select Contact area, click **Parameter Alarm** or **Charger Control**, then click **On**.

CAUTION: The charger contact turns the charger off until it is re-energized or until the diagnostic is exited.

Figure 81. Alarm Contacts Diagnostic (MPM)

20.10. Intertier (MPM)

The Intertier diagnostic monitors the signal on each intertier input. Use this diagnostic for verifying the calibration of these input channels or troubleshooting. To open the Intertier Diagnostics screen, select Diagnostics|Intertier from the String View screen.

Figure 82. Intertier Diagnostic (MPM)

Up to eight intertiers for the MPM may be defined on the Battery Setup|Parameters screen, but Intertiers 2 through 4 are active only when expansion ports J3, J4, J6 and J7 are installed on the MPM.

Intertier Voltage (mvolts) - This column indicates the voltages being sent. This screen displays up to eight intertiers for the MPM and is used to confirm calibration accuracy. The cell number is the lower of the two cell numbers across which the intertier is connected (selected on the MPM Battery Setup|Parameters screen).

21. BDS Diagnostics

The diagnostics are primarily used for production testing, but may assist in troubleshooting a hardware failure in the field. Select Diagnostics from the String View screen. The computer must be connected to a BDS and the communication status at the bottom of the screen must be responding.

21.1. Rebooting the BDS

To reboot the BDS from the Data Manager, at the String View screen, select Setup|Reboot Firmware. This does a "warm reset" of the BDS.

21.2. Power-Up Diagnostics (BDS)

At power-up, the unit performs some comprehensive diagnostics that take about two minutes. If a failure occurs, identify the parameters that failed by using the *Self Test* diagnostics described below.

21.3. Self Test (BDS)

Self Test reads status registers in the BDS and DCM units and displays the parameter status on the Self Test Diagnostics screen. These parameters are tested only at BDS power-up. If an update is needed, cycle the power to the BDS or reboot by selecting Setup|Reboot Firmware. To open the Self Test Diagnostics screen, select Diagnostics|Self Test from the String View screen.

Figure 83. Self Test Diagnostic (BDS)

Items in the Self Test Diagnostics box are described below. Click the left or right arrows to view settings for other DCM units.

Processor (BDS Controller and DCM) - Checks processor internal registers and timers.

External RAM (BDS Controller and DCM) **-** Writes and reads to each RAM location to verify accessibility.

PROM (BDS Controller and DCM) - Calculates and verifies the program checksum in the PROM.

Flash Memory (BDS Controller) - Calculates and verifies the program checksum in Flash memory.

Firmware Version (BDS Controller and DCM) - Displays the version of firmware running.

PIO (DCM) - Checks the read/write functions of the parallel input/output device.

A/D (DCM only) - Reads and confirms the A/D converter reference voltage is within specification.

HW Reset Counter (DCM) - Indicates how many times power is cycled or the DCM performs a hardware self-reset.

FW Reset Counter (DCM) - At boot up, the DCM runs diagnostics. If an error is found, the DCM reboots to retest. When this happens, this counter is incremented.

Modem - Verifies the modem echoes commands.

Dial Tone - Confirms the telephone is connected. If connected via a multiplexer, this field indicates *Failed* as a normal condition.

Clear Counters - This button resets the HW (hardware) and FW (firmware) counters to zero.

21.4. Load Module (BDS)

The Load Module diagnostic tests each load connection to the battery. This diagnostic tests the connections, load cable fuses, load relays and load module, and can confirm actual load current. Depending how the system is set up, only the load module for the selected DCM is enabled. Typically, all ten load steps are used and are distributed across multiple DCM units.

To open the Load Module Diagnostics screen, select Diagnostics|Load Module from the String View screen. Select the DCM for the desired load module. You can turn on each load step and confirm the current for that step.

WARNING: When testing, do not leave the load module on for long periods of time. The load module can overheat and cause permanent hardware damage if not allowed to cool down between tests (about 10 seconds).

Figure 84. Load Module Diagnostic (BDS)

In the **Select Load Module** area, select a load module, then click **Load On**. To stop the test, click **Load Off**. Click the left or right arrows to select other DCM units.

21.5. DIP Switch (BDS)

The DIP Switch diagnostic confirms each position of the DIP switches inside the BDS and DCM. This diagnostic also allows remote checking of switch settings, possibly saving a trip to the site. To open the DIP Switch Diagnostics screen, select Diagnostics|DIP Switch from the String View screen. The diagnostic indicates each switch position. Click the left or right arrows to select other DCM units.

NOTE: The DIP switches are set at the factory before shipping and are not usually changed by the user.

Figure 85. DIP Switch Diagnostic (BDS)

21.6. Indicator (BDS)

This diagnostic confirms BDS front panel LED operation. To open the Indicator Diagnostics screen, select Diagnostics|Indicator from the String View screen. To activate an LED, click an LED name then click **On**.

Figure 86. Indicator Diagnostic (BDS)

21.7. Digital Port (BDS)

The Digital Port diagnostic checks the status of the digital inputs. If the system is connected to external contacts, this diagnostic is useful for checking each contact. To open the Digital Port Diagnostics screen, select Diagnostics|Digital Port from the String View screen. The screen displays the status of the inputs. An ON status means a contact is closed.
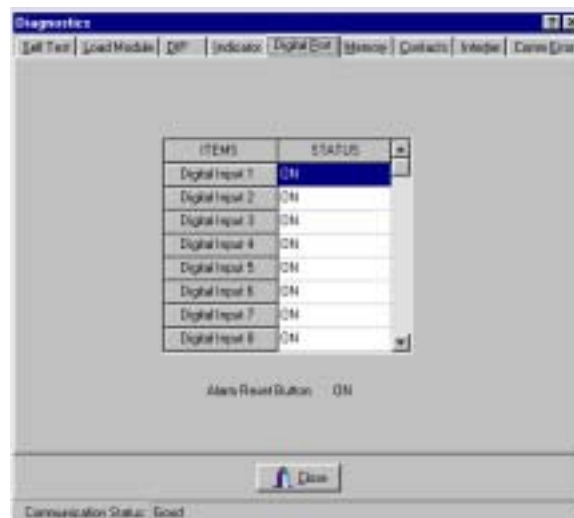
Figure 87. Digital Port Diagnostic (BDS)

21.8. Memory (BDS)

To open the Memory Diagnostics screen, select Diagnostics|Memory from the String View screen. To clear all measured data stored in nonvolatile SRAM memory, click **Clear Data Memory**.

Figure 88. Memory Diagnostic (BDS)

SRAM memory stores calibration and setup information and actual data, such as Discharge, Alarm and Resistance test data. Flash memory is used for uploads of BDS firmware, which can upgraded in the field or from a remote location via modem. Refer to the *Upgrades* section.

The Memory diagnostic checks Flash memory for the integrity of the upgraded firmware file. To run this test, click **Start** and select a file to compare to the contents in Flash memory. This test takes several minutes to complete.

21.9. Contacts (BDS)

This diagnostic checks the external critical and maintenance alarm contacts and the optional contacts for proper connection. To open the Alarm Contacts Diagnostics screen, select Diagnostics|Contacts from the String View screen. In the **Select Contact** area, click a contact or alarm button, then click **On**. You can confirm contact operation by verifying a device connected to the contacts turns on and off.

Figure 89. Alarm Contacts Diagnostic (BDS)

21.10. Intertier (BDS)

The Intertier diagnostic monitors the signal on each intertier input. Use this diagnostic for verifying the calibration of these input channels or troubleshooting. To open the Intertier Diagnostics screen, select Diagnostics|Intertier from the String View screen.

Figure 90. Intertier Diagnostic (BDS)

Intertier Voltage (mvolts) - This column indicates the voltages being sent. This screen displays up to 15 intertiers for the BDS and is used to confirm calibration accuracy. The cell number is the lower of the two cell numbers across which the intertier is connected (selected on the BDS Battery Setup|Parameters screen).

21.11. Communication Error (BDS)

Communication integrity between the BDS and DCM is constantly monitored. When a communication error occurs, the Error Counts for the associated DCM increments, and String Status on the String View screen indicates "DCM - Comm Error." Error Counts can reach 255 before rolling back to zero.

Check DCM Address - Click this button to check the DCM address. Using groups of flashes, the DCM Status LED indicates the string and DCM address for that DCM. The first series of flashes indicates the string ID. (For example, one flash represents string 1, five flashes string 5.) After a pause, a second series of flashes indicates the DCM ID within that string. After another pause, two rapid flashes indicate the end of the cycle, which then starts over.

Figure 91. Communication Error Diagnostic (BDS)

Clear Comm Error Counts - Click this button to reset the values in the Error Counts column to zero.

21.12. Resistance Testing Multiple DCM Units

When a BDS resistance test is performed, all the DCM units connected to the BDS are tested. To test a specific DCM that may be causing problems, at the Resistance screen or Intercell Resistance screen, select Diagnostics|R-Test in a DCM from the main menu. On the Select DCM box, click the buttons for the DCM you want to test. To capture new readings, click OK.

Figure 92. Select DCM

If you clicked OK from the Resistance screen, the screen heading changes to Resistance in DCM *n* (Cells *n* - *n*) (microhms) and the resistance test starts.

If you clicked OK from the Intercell Resistance screen, the screen heading changes to Intercell in DCM *n* (Cells *n* - *n*) (microhms) and the resistance test starts.

After a few minutes, the 'test in progress' message disappears, and the Get button becomes active. Click **Get** to display the readings. The bottom of the screen displays a summary of the resistances and any intertier values measured.

To stop the test before completion, click the Stop button.

NOTE: When Diagnostics is used, resistance readings are not transferred to the permanent database.

21.13. View DCM Resistance and View DCM Intercell

After conducting a resistance test using Diagnostics|R-Test in a DCM and obtaining results using the Get button, you may select Diagnostics|View DCM Resistance or Diagnostics|View DCM Intercell to alternately view the Resistance in DCM *n* or Intercell in DCM *n* screens. As previously mentioned, when Diagnostics is used, resistance readings are not transferred to the permanent database. Be certain to record the needed results before closing these screens.

22. Upgrades

On the MPM, E^2 (electrically erasable) memory stores calibration and setup information and actual data, such as Discharge, Alarm and Resistance test data. On the BDS Controller, SRAM memory stores similar information. On both units, flash memory is used for uploads of firmware, which can be upgraded on-site or from a remote location via modem. Refer to the MPM or BDS *Memory Diagnostic* section for a complete description.

Software and firmware upgrades are distributed on a CD-ROM or in a PROM IC, or as a downloadable file on the Albércorp Web site at www.alber.com. Upgrade instructions are included with the upgrade CD or IC, or are on the Web site. Because upgrade instructions may change, they are not described in this manual.

NOTE: On the BDS, the Setup|Upgrade Firmware item is enabled only when the BDS Controller is connected to String 1.
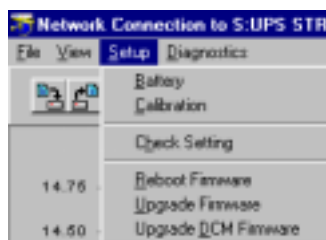
Figure 93. Upgrade Menu (BDS)

23.   MPM Specifications

Power

- Less than 15 watts. Operates directly from the bus when monitoring 24V to 48V batteries. When monitoring 120VDC batteries, requires a 120VDC to 24VDC internal converter or a wall plug transformer. The wall plug transformer must be used on a protected (uninterruptible power supply) 90VAC to 264VAC, 47Hz to 63Hz source.

  Wall Plug Transformer - Albércorp part number 4200-029.
  Input: 90 to 264VAC, 47Hz to 63Hz, 1.0A maximum.
  Output: 24VDC (nominal), 1.5A 36W maximum.

Fuses

- Fuse F1/F1A: 2A fast blow. On PC board. Not user replaceable.
- Fuse F2: 1A fast blow. On PC board. Not user replaceable.
- Fuse F3: 0.5A fast blow. On PC board. Not user replaceable.

Inputs	Range	Tolerance
100 voltage sense channels	0 to 15V	0.1% of reading ±LSD
One overall voltage channel	0 to 150 volts	0.1% of reading ±0.10V
Eight temperature channels*	-40°F to 160°F	±1°F
Eight intertier resistance channels	0 to 5mΩ	0.1% of reading ±5μΩ
Four discharge current channels*	0 to 4000A	±1A
Four float current channels*	0 to 5000mA	±5mA

- 8 standard and 8 optional optically isolated contact closure inputs for normally-open or normally-closed.
- Alarm reset. Normally-open dry contact required.

  *Temperature and current transducers are optional.

Outputs

- Parameters alarm contact: one Form C alarm relay contact, 2A at 30VDC.
- Hardware failure or power failure alarm contact: one Form C alarm relay contact, 2A at 30VDC.
- Charger shutdown relay: one N/O dry contact, 2A at 30VDC.
- LEDs (one each): green status, red alarm, red alarm disable, green resistance test on, and red hardware error.

Communication

- One local RS-232 port or optional fiber optic port for connection to multiplexer or LAN.
- One remotely accessible modem port or optional fiber optic port for connection to multiplexer.

Data Storage

- E^2 nonvolatile memory for calibration constants, alarm levels, telephone numbers, and setup information.
- 100 alarm events in revolving nonvolatile memory.
- 20.5K bytes of discharge data in nonvolatile memory.
- 1.6K bytes resistance test records.
- 1.65K bytes historical data.
- Flash memory for firmware revision updates.

Operating Environment
- Temperature range: 5°C to 40°C (41°F to 104°F)
- Humidity range: 0% to 80% RH (non condensing) at 5°C to 31°C
                        0% to 50% RH (non condensing) at 32°C to 40°C
- Indoor use only.
- Installation category II
- Pollution degree 2.
- Altitude 0 to 2000 meters above sea level.

Packaging
- Rack mount 19" or 23" and height of 1.75"
- Wall mount with optional mounting brackets.

Ɔ Specifications subject to change without notice.

24. BDS System Specifications

Parameters / Features

- Number of cell channels: Up to eight strings of 256 cells per string.
                             Up to 6 DCM-480 units per string.

Input Range / Accuracy

- Cell voltage: 0 to 16V, 0.1% of reading ±1mV

- String voltage: 0 to 80.00V, 0.1% of reading ±0.02V
                             0 to 400.0V, 0.1% of reading ±0.1V
                             0 to 600.0V, 0.1% of reading ±0.5V

- Discharge Current: 0 to 4000A, 0.1% of reading ±1A
                             Note: An optional current transducer is required.
                             Transducer accuracy affects overall current reading accuracy.

- Float Current: 0 to 5000mA ±5mA
                             Note: An optional current transducer is required.

Operating Environment

- Temperature range: 5°C to 40°C (41°F to 104°F)
- Humidity range: 0% to 80% RH (non condensing) at 5°C to 31°C
                        0% to 50% RH (non condensing) at 32°C to 40°C
- Indoor use only.
- Installation category II
- Pollution degree 2.
- Altitude 0 to 2000 meters above sea level.

Notes

- Optional temperature transducer can be contact type or immersible.

WARNING: A BDS system, comprising a BDS Controller, DCM-480Rs, and External Load Modules may be mounted in a 19" or 23" wide rack enclosure. If using such rack enclosure, be certain that it is properly earth grounded and that adequate ventilation is provided to prevent equipment overheating. Refer to the respective installation manual for more information. The receptacle for the AC cord from the cabinet must have protective earth connection (three prong). You must not defeat the use of the earth connection prong.

25. BDS Cabinet Specifications

Cabinet Model

- 1100-262, in which the computer, monitor, UPS, Controller, DCM, and External Load Module may be mounted as required.

Power

- 115 VAC ±10% 60Hz, 12 amps maximum.

Maximum Dimensions

- 24" wide x 26" high x 37" deep with folding keyboard tray down.

Ventilation Requirements

- A minimum of 8" clearance must be maintained on all sides of the cabinet to allow for proper ventilation.

  NOTE: You must provide adequate ventilation to prevent equipment overheating. The cabinet has two ventilation fans that run when power is applied. The external load module has a fan that runs when required to cool internal circuitry. Do not block ventilation ports, and ensure that the equipment is operated only within the temperature and humidity ranges described in the specification sheets.

Installation Requirements

- Only equipment that is part of the BDS system should be installed in the BDS cabinet.
- The four corners of the cabinet must be securely bolted to the floor.

Operating Environment

- Temperature range: 5°C to 40°C (41°F to 104°F)
- Humidity range: 0% to 80% RH (non condensing) at 5°C to 31°C
                          0% to 50% RH (non condensing) at 32°C to 40°C
- Indoor use only.
- Installation category II
- Pollution degree 2.
- Altitude 0 to 2000 meters above sea level.

WARNING: A BDS system, comprising a BDS Controller, DCM-480Rs, and External Load Modules may be mounted in a 19" or 23" wide rack enclosure. If using such rack enclosure, be certain that it is properly earth grounded and that adequate ventilation is provided to prevent equipment overheating. Refer to the respective installation manual for more information. The receptacle for the AC cord from the cabinet must have protective earth connection (three prong). You must not defeat the use of the earth connection prong.

26.   BDS Controller Specifications

Power

- Less than 5 amps at 115 VAC ±10% 60Hz (for a configuration of 8 strings of 240 cells).

Fuses

- Two 250mA slow blow. On PC board. Not user replaceable.
- Fuse #1 and #2: 10 A slow blow, MDA or equivalent. Rear panel.
- One 5A fast blow, ABC or equivalent. AC power block. Rear panel.

Inputs

- Remote alarm reset: User-supplied 12 to 32V signal. (Current draw less than 50ma.) Momentarily applying voltage initiates the reset action.
- Digital input (certain models):   Sixteen 12V to 32 V at less than 50mA.

Outputs

- 24 VAC power: Four for DCMs and External Load Modules.
- Alarm contacts   Two Form C: 2A at 30VDC. (One for critical alarm; one for maintenance alarm.)
- Digital output (certain models):   Eight Form C: 2A at 30VDC.
- LEDs (one each): green DCM Tx transmit, green DCM Rx receive, green status, green com port, amber maintenance alarm, green resistance test, and red port select switch.

Communication

- Modbus protocol, ASCII to PC, Albércorp proprietary to DCMs.
- Local port, RS-232 DB-9 connector (front panel).
- Local port, RS-232 DB-9 connector (rear panel).
- LAN port, RJ-45 (optional) (rear panel).
- RJ-11 Telco line, internal 14.4Kbs modem (rear panel).
- Fiber optic ports: 20 rear panel Agilent HFBR series connectors: two for DCM communications; four for optional serial port multiplexer communications; 14 for active repeater.

Data Storage

- SRAM (8 MB) nonvolatile memory for all configuration settings and data.
- Flash memory for firmware upgrades.

Control Switches

- Power on/off: Main DCM power switch on rear panel of BDS controller module. Rocker switch.
- Alarm reset: Alarm Reset switch on front panel of BDS controller module. Momentary push button.
- Local port select: Rocker switch (front panel).
- Configuration settings: DIP switch (rear panel).

Operating Environment

- Temperature range: 5°C to 40°C (41°F to 104°F)
- Humidity range: 0% to 80% RH (non condensing) at 5°C to 31°C
                        0% to 50% RH (non condensing) at 32°C to 40°C
- Indoor use only.
- Installation category II
- Pollution degree 2.
- Altitude 0 to 2000 meters above sea level.

Packaging

- 19" rack mount. 19" width, 5.25" height, 8.15" depth.
- Optional brackets available for mounting in a 23" rack.

27. DCM-480R Specifications

Power

● Less than 0.5 amps at 24 VAC ±10%.

Fuses

● Two 0.5 A slow blow. On PC board. Not user replaceable.

Combined Input / Output Connectors (rear panel)

● 24VAC
● 2 fiber optic ports

Inputs (rear panel)

● 48 cell voltage channels
● 10 intertier channels
● 2 temperature channels
● 1 discharge current channel
● 1 overall voltage channel (certain models)
● 48 intercell channels (certain models)

Outputs (rear panel)

● +15VDC, -15VDC power output (certain models only)
● External load module control cable output.
● LEDs (one each): green DCM Tx transmit, green DCM Rx receive, and green status.

Communications

● Fiber optic, Albércorp proprietary.

Data Storage

● E^2 nonvolatile memory for setup.
● Flash memory for firmware upgrade.

Control Switches

● DCM addressing: PC board mounted DIP switches inside DCM, accessible using cut-out
                                 in top panel.

Operating Environment

- Temperature range: 5°C to 40°C (41°F to 104°F)
- Humidity range: 0% to 80% RH (non condensing) at 5°C to 31°C
                        0% to 50% RH (non condensing) at 32°C to 40°C
- Indoor use only.
- Installation category I
- Pollution degree 2.
- Altitude 0 to 2000 meters above sea level.

Packaging

- 19" rack mount. 19" width, 1.75" height, 12.125" depth.
- Optional brackets available for mounting in a 23" rack.

28.   *External Load Module Specifications*

Power
- Less than 1.0 amps at 24 VAC ±10%.

Fuses
- Two 0.5 A slow blow. On PC board. Not user replaceable.

Inputs / Outputs (rear panel)
- One 24VAC input
- 6 load control cable inputs
- 12 load connections

Outputs (front panel)
- LEDs (one each): red power.

Operating Environment
- Temperature range: 5°C to 40°C (41°F to 104°F)
- Humidity range: 0% to 80% RH (non condensing) at 5°C to 31°C
                        0% to 50% RH (non condensing) at 32°C to 40°C
- Indoor use only.
- Installation category I
- Pollution degree 2.
- Altitude 0 to 2000 meters above sea level.

Packaging
- 19" rack mount. 19" width, 5.25" height, 12.156" depth.
- Optional brackets available for mounting in a 23" rack.

29. Error Codes

CATEGORY	CODE	MESSAGE	SITUATION
Database	0001	The database could not be copied to the working database. Hard drive may be full.	When copying a database to a working database
	0002	The working database could not be backed up. Hard drive may be full.	When backing up a database
	0003	You cannot save the database to the working database that is reserved by the Data Manager.	The user tries to save a database to MPM.MDB
	0004	You cannot open the working database that is reserved by the Data Manager.	The user tries to open MPM.MDB as a database
	0005	Database Not Found. <Database File Name>	When opening a database
	0006	Data import error (DDetail Table). Please try again.	When importing discharge data
	0007	Data import error (DSummary Table). Please try again.	When importing discharge data
Location	0100	The location name and ID must be unique for each battery location. The location name or ID chosen has already been used.	The user set up two locations using the same name or ID
	0101	There are more than 16 locations.	In the local computer, there are more than 16 locations set up.
	0102	Location ID does not match. Actual location name is <Location name>.	In direct connection, compare location ID in monitor and in database
	0103	SERVICE cannot be deleted.	The user tries to delete Service location
	0104	Invalid location name.	Input invalid location name in location setup
	0105	Location not found in <Database table name>.	Search location
	0106	Location ID not found in <Database table name>.	Search location
Communi-cation	0200	No response on Polling/Answer Port Modem.	When initializing modem
	0201	No response on Answer Port Modem.	When initializing modem
	0202	The currently selected COM Port, COM <ComPort #>, does not exist. Click OK and choose a different port.	When initializing COM port
	0203	The currently selected COM Port, COM <ComPort #>, is already in use by another program. Click OK and choose a different port.	When initializing COM port
	0204	The currently selected Com Port, Com <ComPort #>, is not available. Click OK and choose a different port.	When initializing COM port
	0205	No response from Modem/Cable Multiplexer.	When connecting modem/cable multiplexer
Firmware Upgrade	0300	Upgrade failed: No response for sending code three times.	When sending frames
	0301	Upgrade failed: Not responding.	Check firmware location (PROM or flush memory) in the beginning of firmware upgrade

CATEGORY	CODE	MESSAGE	SITUATION
Data	0400	Resistance test failed: 60 minute time-out.	Manual R-test is not completed in 60 minutes
	0401	Data format error. The data may be saved for a different monitor configuration.	When reading resistance or historical data
	0402	The raw count equals 0. Please check hardware.	During calibration
	0403	Data import error (Encode date/time). Please try again.	When importing alarm data
	0404	Wrong overall voltage data.	Got invalid overall voltage in discharge data
	0405	Subset <Subset #> does not have an initial value.	When viewing discharge curves, found invalid subset
	0406	Subset <Subset #> does not have a final value.	When viewing discharge curves, found invalid subset
Operation	0500	Subset 3 is selected, but Subset 2 is not selected. If you want to show two curves, the second curve should be in Subset 2.	Wrong selection in Curve Option of Discharge View screen

30.   Appendix A: Communication Options

This section describes the letter used in the second position of the MPM model number. Refer to the *MPM and BDS Series Configurations* section for more details.

Communication Option A
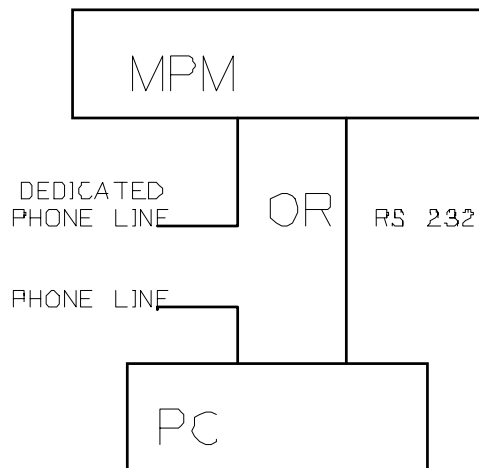
Option A:
- This is for one MPM that will be accessed by one PC, either locally with an RS-232 connection or via telephone connection.

- NOTE: For all features to operate, the phone line used for the MPM must be dedicated to the MPM.

Communication Option B
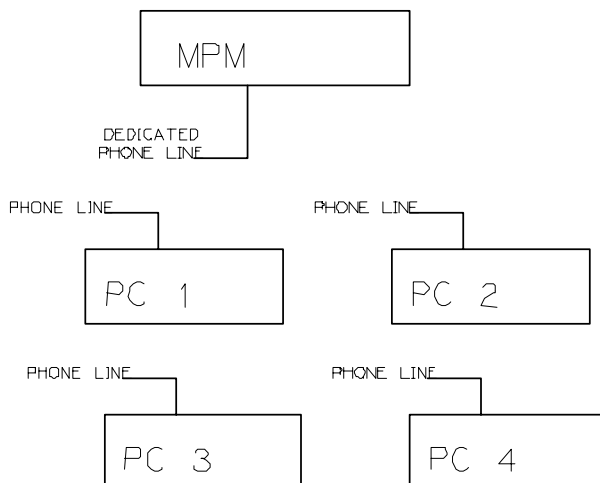
Option B:
- This is for one MPM that will be accessed by two or more PCs via a telephone connection.

- NOTE: For all features to operate, the phone line used for the MPM must be dedicated to the MPM.

Communication Option C
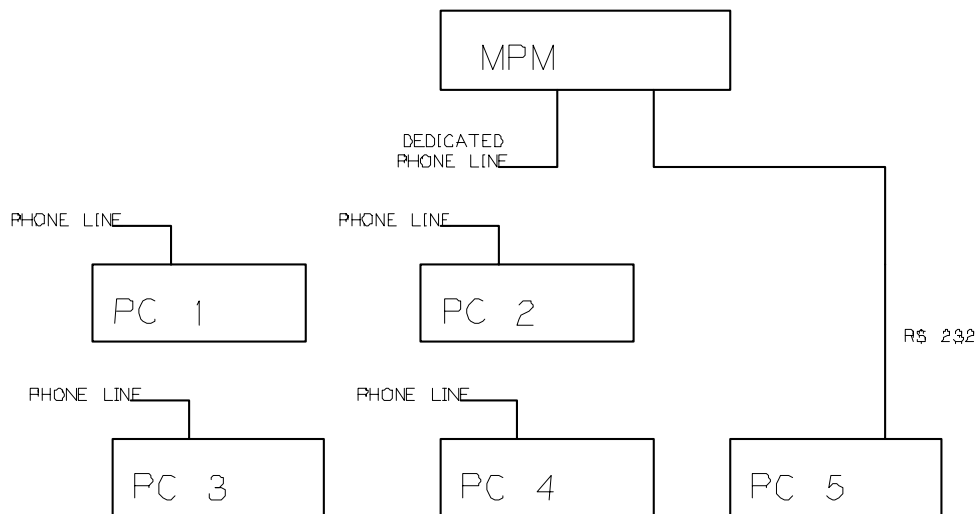
Option C:
- This is for one MPM that will be accessed locally by one PC via an RS-232 connection and

- That will also be accessed by additional PCs via a telephone connection.

- NOTE: If the locally RS-232 connected PC is not the Central computer, then for all features to operate, the phone line used for the MPM must be dedicated to the MPM.

Communication Option D
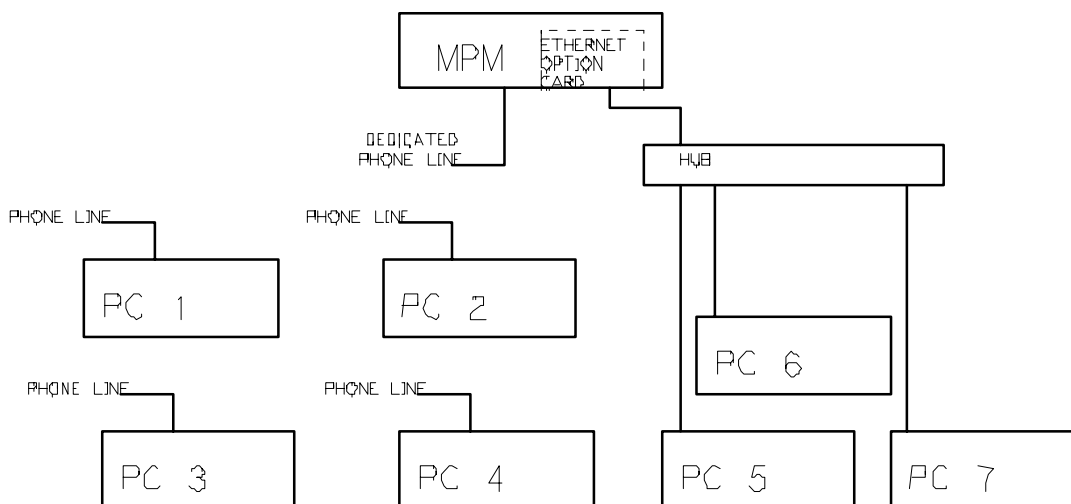
Option D:
- This is for one MPM that will be accessed by two or more PCs locally.

- This option requires installation of the LAN option in the MPM, and

- This option also requires connection of the MPM to an existing LAN or installation of a LAN.

- The MPM can also be accessed by PCs via a telephone connection.

- The LAN can be set up to allow MPM access via the Internet.

- NOTE: If one of the PCs connected via the LAN is not the Central computer, then for all features to operate, the phone line used for the MPM must be dedicated to the MPM.

Communication Option E

```
 ┌─────────┬────────────┐
 │  MPM    │ ETHERNET   │
 │         │ OPTION     │
 │         │ CARD       │
 └─────────┴────────────┘
            │
            │
 ┌─────────────────────────┐
 │ HUB                     │
 └─────────────────────────┘
    │  │               │
    │  │               │
    │ ┌──────────────┐ │
    │ │   PC  1      │ │
    │ └──────────────┘ │
    │                  │
 ┌──────────────┐  ┌──────────────┐
 │   PC  2      │  │   PC  3      │
 └──────────────┘  └──────────────┘
```
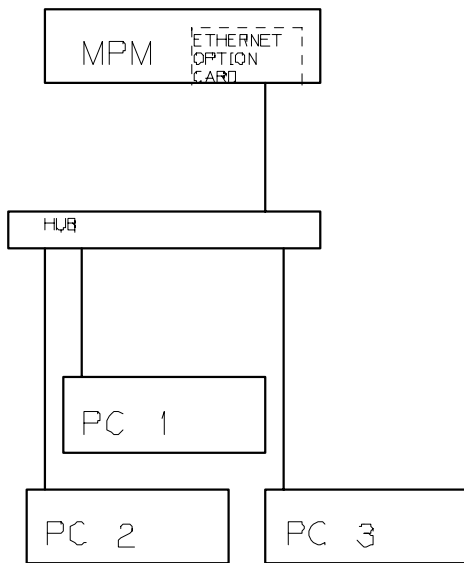
Option E:

- This is for one MPM that will be accessed by two or more PCs locally.

- This option requires installation of the LAN option in the MPM, and

- This option also requires connection of the MPM to an existing LAN or installation of a LAN.

- The LAN can be set up to allow MPM access via the Internet.

Communication Option F
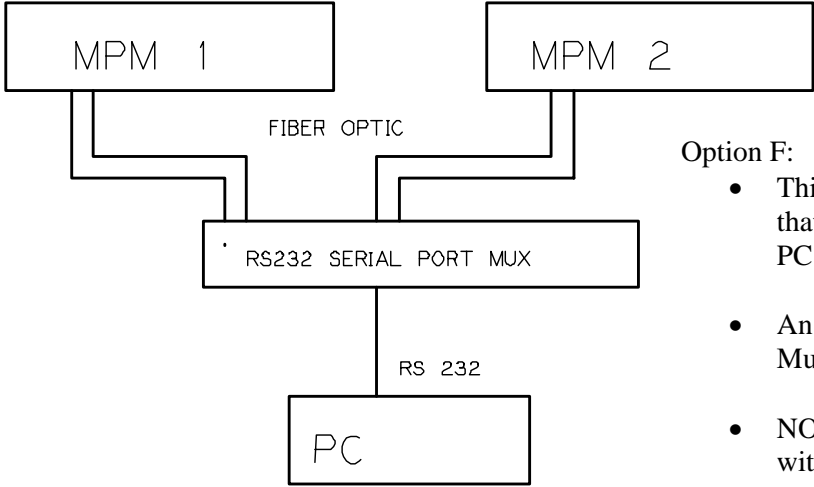
Option F:
- This is for two to 16 MPMs that will be accessed by one PC via a serial connection.

- An RS-232 Serial Port Multiplexer is required.

- NOTE: The MPMs must be within 500 meters (cable run) of the Serial Port Multiplexer.

Communication Option G
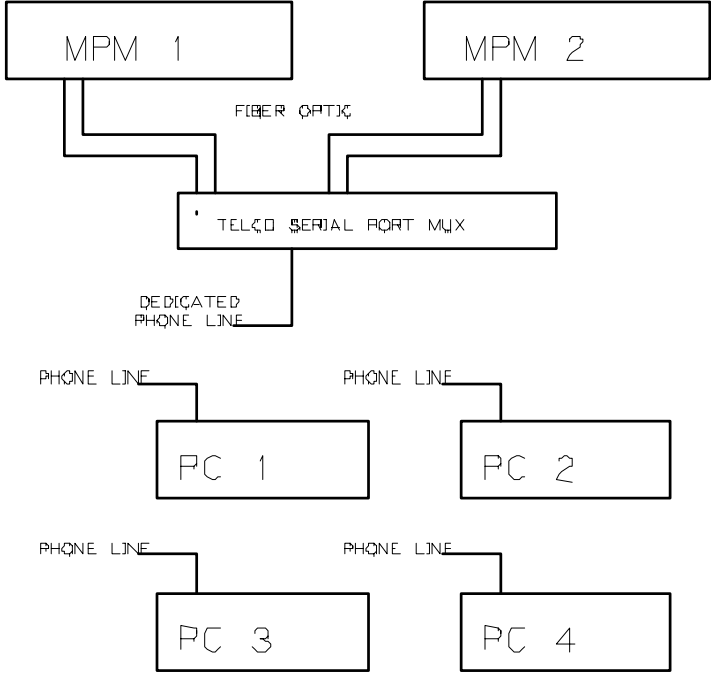
Option G:
- This is for two to 16 MPMs that will be accessed by one or more PCs via a phone line connection, and

- There will be one phone line for up to 16 MPMs.

- A Telco Serial Port Multiplexer is required.

- NOTE: The MPMs must be within 500 meters (cable run) of the Serial Port Multiplexer.

Communication Option H
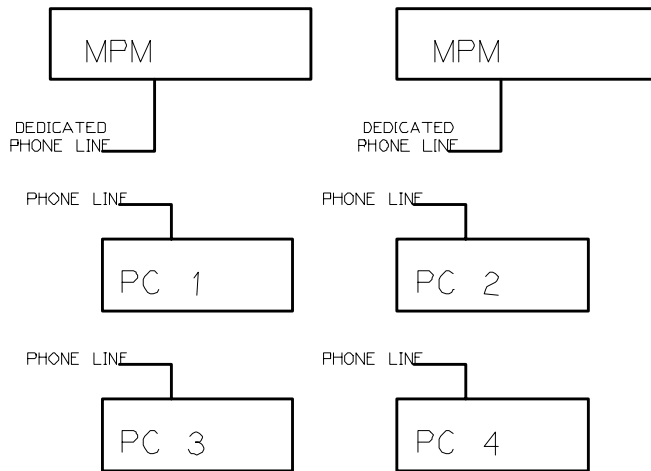
Option H:
- This is for two or more MPMs that will be accessed via phone line connection, and

- All MPMs must have their own dedicated phone line.

Communication Option J
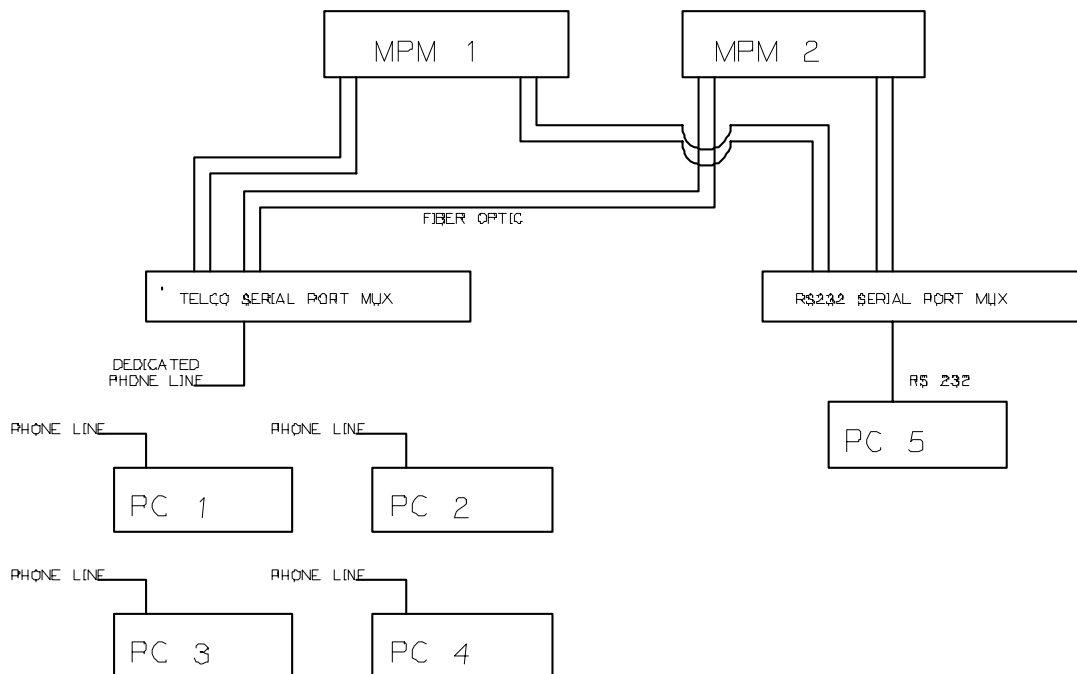
Option J:
- This is for two to 16 MPMs that will be accessed by one PC via a serial connection and other PCs via a phone line connection, and
- There will be one phone line for up to 16 MPMs.
- An RS-232 Serial Port Multiplexer is required.
- A Telco Serial Port Multiplexer is required.
- NOTE: The MPMs must be within 500 meters (cable run) of the Serial Port Multiplexers.

Communication Option K
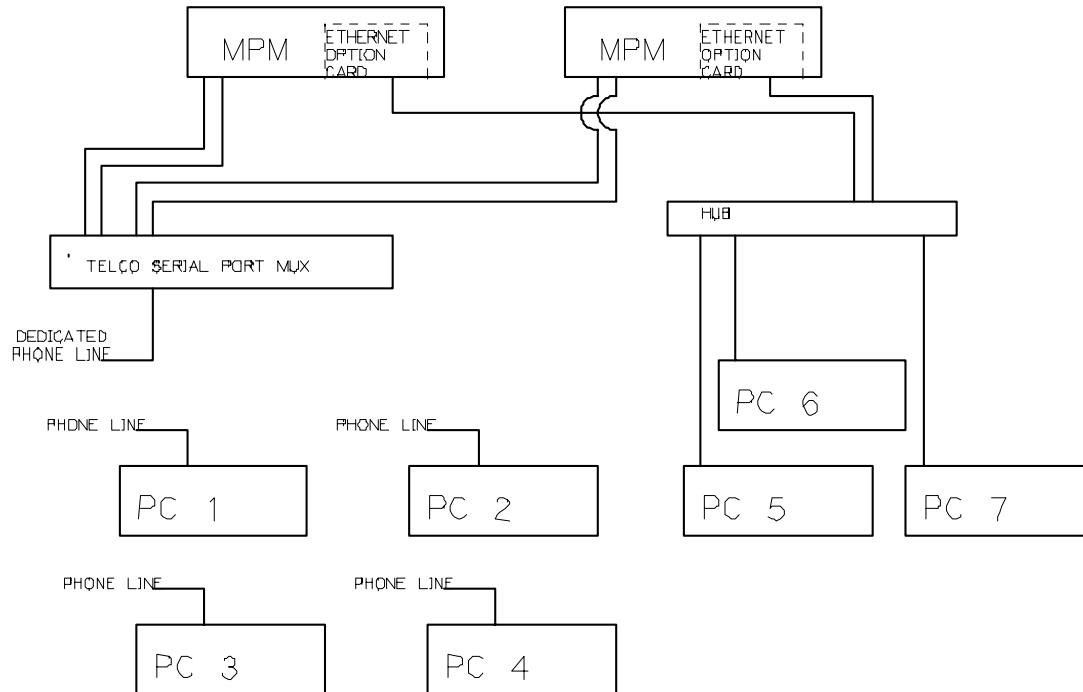
Option K:
- This is for two to 16 MPMs that will be accessed locally by two or more PCs and accessed via a phone line, and
- There will be one phone line for up to 16 MPMs, and
- This option also requires connection of each MPM to an existing LAN or installation of a LAN, and
- This option requires installation of the LAN option in each MPM.
- The LAN can be set up to allow MPM access via the Internet.
- NOTE: The MPMs must be within 500 meters (cable run) of the Serial Port Multiplexer.

Communication Option L
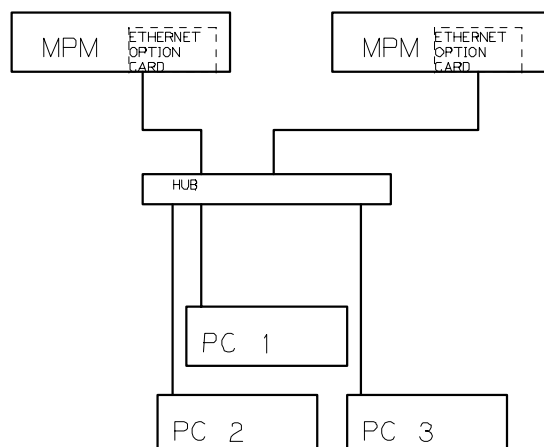
Option L:
- This is for two or more MPMs that will be accessed via a LAN and/or an Internet connection.

- This option requires installation of the LAN option in the MPMs, and

- This option also requires connection of each MPM to an existing LAN or installation of a LAN.

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