SPECTRUM POWER Management Systems

A Spectrum Control Business

Installation and Operation Manual

7832M Series
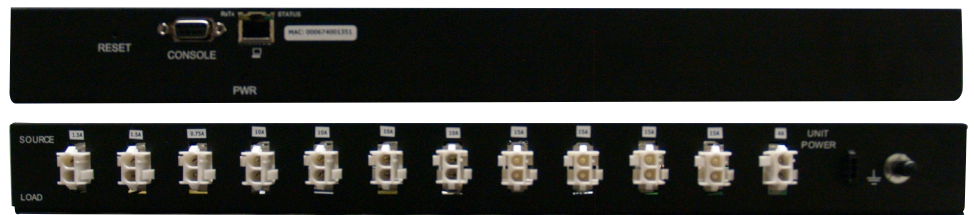
Remote Monitored Units (RMUs)

Contents

Introduction

This Spectrum Power Management Systems RMU has the capability for in-the-field application software updates. This is referred to as 'reflashing' since the software image is stored in flash memory. Reflashing is a multi-step process, described later in this document.

The Remote Managed Unit has the capability to utilize the widely available DHCP protocol to obtain the critical network parameter information needed for operation on a local area network. This feature is enabled or disabled using the @FEAT command.

Monitoring and control can be accomplished via standard SNMP version 2 protocol. The SNMP MIB for this device is defined in a separate document. The SNMP feature is enabled or disabled using the @FEAT command.

Operational control is accomplished either manually using the controls and indicators on the front panel of the unit or by several communication schemes using a remote computing device such as a laptop computer, desktop computer, palm pilot, etc.

This product complies with FCC, CE, TUV, UL 60950 and IEC 950 requirements.

Safety Information

This installation and operation manual contains information about the Remote Managed Unit and basic installation instructions. The person installing or integrating the RMU into an electronic system must be supplied with this manual and read it to become familiar with the installation procedure and precautions. It is important that the installation and operation procedures of this manual be followed to prevent any damage to persons or property.

If the safety information is not observed, personnel could be put at risk. Only authorized personnel who have been properly trained should operate the device. There are no user serviceable parts inside. No modifications should be made to the unit by any organization or persons other than the factory.

The general regulations governing the use of electricity in the country in which the device or integrated system is installed must be observed.

The serviceperson MUST REMOVE FEED POWER TO THE RMU, or PHYSICALLY DISCONNECT load channel wiring, before starting to work on downstream wiring, circuitry, or devices.

Technical Specifications

Input

Please refer to sales drawing. The number/type of inputs varies depending on model number.

Output

Please refer to sales drawing. The number/type of outputs varies depending on model number.

Environmental

Operating Temperature	0-45°C (32-113°F)
Operating Humidity	0-95% (non condensing)
Operating Elevation	0-10,000 ft (0-3000m)

Communication

- RS-232: Front panel DB-9F connector
- 10/100 Ethernet LAN using RJ-45 connector
  - Standard Telnet Protocol
  - Proprietary UDP based protocol
  - SNMP V2

(Caution: Do not connect the RJ45 LAN jack to a telephone network.)

Physical

- Unit height: 1U, 1.725 in.
- Unit width: 17.00 in.
- Unit depth: 10.00 in.
- Weight: 8 lbs.
- 19" Rack mountable
- Finish: Black powder coat, fine texture

Declaration of Conformity

According to ISO/IEC Guide 22 and EN45014

Manufacturer's Name: Spectrum Control, Inc.

Manufacturer's Address: 8061 Avonia Road
                          Fairview, PA 16415

Declares that the product:

Model Number: 7832 Series

Conforms to the following Product Specifications:

Safety: IEC 950

EMC: Emissions per EN 50081-1 (1992):
      EN 55022 (1991) - Class B

      Immunity per EN 50082-2 (1995):
      IEC 1000-4-2 (1995) - 4kV CD, 8kV AD
      IEC 1000-4-3 (1998) - 10 V/m
      IEC 1000-4-4 (1995) - 2kV Power and Signal Lines

      IEC 1000-4-6 (1996) - 10 V
      ENV50204 (1996) - 10 V/m

Supplementary Information:

The product herewith complies with the requirements of both the EMC Directive 89/336/EEC and the Low Voltage Directive 72/23/EEC and carries the "CE" mark accordingly.

Ed Sveda
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Ed Sveda
NARTE Certified EMC Engineer

Connections & Installation

Operating Environment	Locate RMU in dry area on a bench, desktop or shelf.

Rack mount in equipment rack using mounting brackets. RMU may be flush with front of rack or center mounted.

If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ratings of the product.

Mounting of the equipment in the rack should be such that a hazardous condition is not created due to uneven mechanical loading.

Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable earthing of equipment should be maintained. Consult the local electrical code for additional information. |
| **Electrical Connections** | •   Connect the main DC input cables to the input connectors on the rear panel. The power source and input cables must have a minimum voltage, current and temperature rating for the application.

•   Total current for all connected loads must not exceed the rated current for that Channel.

•   The RMU chassis ground must be connected to the system ground for safety and for proper RMU functions.
•   Protection against overcurrent, short-circuits and earth faults shall be provided in the building installation and be readily accessible, and use an appropriately certified circuit breaker.

•   A method of securing wiring connecting to the RMU must be used to adequately protect wires from abuse.

CAUTION:
Power source for RMU must be properly grounded.The RMU control logic is active when power is applied to either channel A and/or B main input terminal blocks. |

Connections & Installation

**Communication
Connections**

- For LAN communications, plug into the front RJ-45 jack.
  When connecting to a 10/100 Base-T Ethernet LAN hub or router,
  use a straight through LAN cable. Use a crossover cable if
  connecting the RMU directly to a PC LAN port.
- For RS-232 to PC or laptop computer, use a straight through
  serial cable (Rs-232C) to the RS-232 (DB-9F) connector on
  front panel.
- Consult Factory for additional Assistance with these
  communication schemes.

Operational Control of RMU

Login Procedure

All control functions as well as system configuration must be implemented via either the RS232 serial or Ethernet LAN interfaces. A proprietary ASCII based command line protocol is used. Using this protocol consists of a remote operator (via terminal emulator [serial] or Telnet [LAN]) typing RMU commands and receiving ASCII based responses.

Note: There is no "Echo" of commands.

All commands begin with the "@" symbol and end with a carriage return. All control and configuration of the RMU settings can be changed using the command set described later in this chapter.

The DC RMU has two levels of security and three user levels.

Security Level 0 requires no login.

Security Level 1 requires a login with password.

If the security level is set to zero (0), login is not required. Commands can be issued to the RMU immediately after physical, electrical, and protocol specific connections are established with the unit. All commands can be issued, just as though logged in as 'admin'.

If the security level is set to one (1), a login with password is required. After login, commands may be issued to the RMU. If communications with the unit are not maintained (i.e., no command issued for 30 seconds), the connection will be automatically logged out.

User levels are: monitor, operator, and admin. Admin level user can issue any supported command to the RMU. The other user levels are restricted to certain commands as described in the privileges table.

Login by sending the "@PLOG" command followed by the user name and password.
For example: @PLOG admin, 34567890

If there was an error in the user name or password the unit will respond with an error message, otherwise it will return:
"#PLOG OK"
Default factory passwords are:
    monitor, 12345678
    operator, 23456789
    admin,   34567890

Please note the user names are in lower case.

Operational Control of RMU

Summary of Commands

System level control

@MDST x,y,z<CR> - Set name and alarm enable/disable for measured channel 'x'.

x=channel (1-x)
y=channel name
z=alarm enable/disable (0/1)

This command is used to set the name for the channel and also to enable/disable alarm assertion for the channel. By turning off the alarm, the trap message that would normally be sent if the measured value moves above or below the limits (set with the @MDUA and @MDLA commands respectively), is not sent.

The MDST command takes three parameters, channel number, channel name, and alarm enable/disable. For example:

@MDST 2, newChan2Name, 0 // Set channel name for measured channel 2 to 'newChan2Name', and turn alarm OFF.

@MDCL x,y,z<CR>   Execute Lo or Hi Calibration Routine - Amps
-x- = Channel (1-x), -y- = Lo/Hi ('1' | '2'),
-z- = Amps value.

1.   User applies current near low end of measurement range (for ex. 80 volts) to selected channel (for ex. 3).
2.   User issues command @VCAL 3,1,80<CR>
3.   System samples measured value and assigns that value to lower cal point along with the user supplied voltage.
4.   User applies current near upper end of measurement range (for ex. 230 volts) to same channel (for ex. 3).
5.   User issues command @VCAL 3,2,230<CR>
6.   System samples measured value and assigns that value to upper cal point along with the user supplied voltage.
7.   This channel is now calibrated. The system will interpolate measured readings against the cal points.

@TMPL   Get/Set the Internal Temp Alarm Limit.
-x- = 0-99 degrees Celcius or '?'.

For example:
Cmd - @TMPL 45.6<CR>   Response - #TMPL OK<CR>
Cmd - @TMPL ?<CR>   Response - #TMPL 45.6<CR>

Operational Control of RMU

@SSTR x,y<CR>   Get/Set SNMP Community strings.

                            -x- = 'PUBLIC' | 'PRIVATE'
                            -y- = '?' | ASCII string, max 15 chars, no whitespace.
                            '?' queries for current string.

For example:
Cmd - @SSTR PUBLIC, publicstring<CR>   Response - #SSTR OK<CR>
Cmd - @SSTR PRIVATE,?<CR>   Response - #SSTR privatestring<CR>

@WDOG x<CR>   Read/Clear Watchdog Reboot Count.
                            -x- = Read/Clear/Enable/Disable/Test ('?'/'C'/'E'/'D'/'T')

     For example:
     Cmd - @WDOG 0<CR>   Response - #WDOG OK<CR>
     Cmd - @WDOG ?<CR>   Response - #WDOG 14<CR>   (Note – a nonzero watchdog reboot count could indicate serious system problems).

@DLOG x,y,z<CR> Read/Clear Data Log
                       x=Mode Parameter - 'CLEAR';'INDEX';'DUMP'
                       y=Starting Index
                       z=Entry Count

@ELOG x,y,z<CR> Read/Clear Event Log
                 x=Mode Parameter - 'CLEAR';'INDEX';'INDEXLONG';'DUMP';'DUMPLONG'
                 y=Starting Index
                 z=Entry Count

@NAME x,y,(z)<CR>   Get/Set System/Channel Name
                 x='SYS'
                 y=System Name or '?'
                       OR
                 x='CHAN'
                 y= Channel (1-x)   Not used on 7832MC
                 z= Channel Name or '?'
Only used for 'SYSTEM' name on the 7832MC, only need two parameters.
Cmd - @NAME SYS,?   Response - #NAME SYS,?, A_HPE

@TRAP x,y,(z)<CR>   Get/Set Trap Parameters
                 x=param ('ADDR'; 'ENABLE')
                 y=Enable/Disable/Query (1/0'?') (for 'ENABLE')
                 y=dst number (1/2) (for 'ADDR')

Operational Control of RMU

z=trap dst IP addr (ASCII string of the form
xxx.xxx.xxx.xxx (for 'ADDR')

System Status

@STTP<CR>   Get internal system temperature.

    Cmd - @STTP<CR>   Response - #STTP 44.5<CR>

@STAT<CR>   Get formatted status screen.

    Cmd - @STAT<CR>   Response – System will output ascii text
information showing the current state of all monitored and measured vari-
ables.

System Information and Configuration

@SYSB<CR>   Get system bank count

@SYSI<CR>   Get system ident/config information.
                   Comma delimited fields.
    See users guide.

@SYSF<CR>   Save current system settings to Flash.

    Cmd - @SYSF<CR>   Response - #SYSF OK<CR>

@SYSR<CR>   Immediate SOFT reboot.

    Cmd - @SYSR<CR>   Response - Undefined

@NETP v,w,x,y,z<CR>   Get/Set network config params.
                   v ' = SmartStart unit IP address. (Ex. 192.168.1.10)
                   if ' v ' == '??', Get network config params.
                   'w' = Netmask.   (Ex. 255.255.255.0)
                   'x' = Gateway IP address.   (Ex. 192.168.1.100)
                   'y' = TCP/IP port number.   (Ex. 2000)
                   'z' = Web port number.   (Ex. 80)

  Cmd - @NETP 192.168.1.100,255.255.255.0,192.168.1.1,2000,80<CR>

Operational Control of RMU

Response - #NETP OK<CR>

Cmd - @NETP ?<CR>
Response - #NETP 192.168.1.100,255.255.255.0,192.168.1.1,2000, 80<CR>

@TIME z<CR>   Get or set system time. z = yyyymmddwwhhmmss
                  'yyyy' = year
                  'mm' = month
                  'dd' = day of month
                  'ww' = day of week
                  'hhmmss' = hours, minutes, seconds

Cmd - @TIME 2005012604235959<CR>
Response - #TIME OK<CR>

Cmd - @TIME ?<CR>
Response - #TIME System Date/Time: 2005012604235959<CR>

@FEAT x,y<CR>   Query/Enable/Disable System Features
                -x- = feature, -y- = On/Off ('1' | '0' | '?')
                where 'x' can be
                'LAN' | 'DHCP' | 'SNMP' | 'SOCKET' |
     'WEB' | 'ALL'
                'ALL' is only relevant for queries.

Cmd - @FEAT DHCP,1<CR>   (Turn on DHCP)
Response - #FEAT OK<CR>

Cmd - @FEAT ALL,?<CR>   (Give enable status of all features)
Response –
 #FEAT
 LAN 1   (LAN enabled)
 DHCP 0   (DHCP disabled)
 SNMP 1   (SNMP enabled)
 SOCKET 0   (TCP/IP socket access disabled)
 WEB 0   (Web access disabled)
 MODEM 0   (Modem access disabled)

@HELP<CR>   List all commands.
@XXXX ?<CR> - Get additional help detail on specific command.
-XXXX- = one of the other commands listed in this table.

Operational Control of RMU

Monitored channel commands

@MDCT<CR>   Get number of measured channels.

Cmd - @MDCT   Response - #MDCT 8<CR>

@MDVL x<CR>   Get value for measured channel 'x'.

Cmd - @MDVL 8   Response - #MDVL 3.046
Measurement is in Amps.

@MDGT x<CR>   Get more data for measured channel 'x'.

Cmd - @MDGT 8   Response - #MDGT,8,ROUTER,2.798,AlmEnabled,
        AlmNotAsserted

        Response - #MDGT,x,Channel Name, value, Alm
        Enabled or disabled, AlmAsserted Lo/AlmAsserted
        Hi/Alm Not Asserted

@MDUA x,y<CR> Get/Set measured channel upper alarm limit
        x=Channel(1-x)
        y=Alarm limit value/query (.1-999.9)/'?'

@MDLA x,y<CR> Get/Set measured channel lower alarm limit
        x=Channel(1-z)
        y=Alarm limit value/query (.1-999.9)/'?'

Security

@PLOG x,y<CR> Login
        'x' = login id, ('monitor' | 'operator' | 'admin')

Cmd - @PLOG monitor,12345678<CR> Response - #PLOG OK<CR>

@POUT<CR>   Log out.

 Cmd - @POUT<CR>   Response - #POUT OK<CR>

Operational Control of RMU

@PLEV x,y   Set security Level
          x=interface('CONSOLE', 'TELNET')
          y=login off/login on (0/1)

Only login level 'admin' can change security level
Level 0=Password OFF
Level 1=Password ON

@PSWD x,y<CR>   Process for changing a user password.
    'x' = login level, ('monitor' | 'operator' | 'admin')
    'y' = new password, max. 15 char ASCII string, no whitespace.

Cmd - @PSWD monitor,newmonpswd<CR>
Response - #PSWD OK<CR>

@LLEV<CR>   Get current login level.

@DFLT<CR>   Reset network setup and passwords to default
                  configuration.

SNMP Access

The following data values are accessible via SNMP. Each is prefixed with 'RO', 'WO' or 'RW' to designate whether that value is
'ReadOnly' (accessible via snmpGet), or
'WriteOnly' (accessible via snmpSet), or
'ReadWrite' (accessible via snmpGet and snmpSet).

System accessible configuration variables

'RO'   deviceSpecificContact
      "Latest assigned contact information for this device."
'RO'   model
      "Spectrum Control Model number designation."
'RO'   serialNum
      "Unit Serial number."
'RO'   macAddr
      "Ethernet Mac Address for unit."
'RO'   bootRev
      "Software Revision String for system startup boot/loader code."
'RO'   backupRev
      "Software Revision String for backup OS code."

Operational Control of RMU

'RO' mainRev
  "Software Revision String for main Application code."
'RO' dateManuf
  "Date of System Manufacture."
'RO' lastUpdate
  "Date of last software rev update."
'RO' bankCount
  "Number of channel blocks (banks) controlled by this RMU.
'RO' tempC
  "Temperature measurement from internal RMU sensor in degrees
  C."
'RO' tempF
  "Temperature measurement from internal RMU sensor in degrees
  Fahrenheit."
'RO' tempAlarm
  "Flag indicates if internal temp is outside limits."
'RW' netMaskIpAddr
  "Current Netmask used by this RMU device."
'RW' gatewayIpAddr
  "IP Address of default gateway used by this RMU device."
'RW' trapDst1IpAddr
  "IP Address (1) used as destination for Notifications (Traps) issued
  by this RMU device."
'RW' trapDst2IpAddr
  "IP Address (2) used as destination for Notifications (Traps) issued
  by this RMU device."
'RO' internalFaultAlarm
  "Flag indicates if internal fault detected."

SNMP accessible system control commands:

'WO' storeToFlashCmd
  "Any write to this variable causes the RMU to save the current
  running configuration to flash memory."
'WO' rebootCmd
  "Any write to this variable causes the RMU to execute an
  immediate SOFT reboot."

Operational Control of RMU

Reflashing Process

The Spectrum Control SandStorm RMU utilizes a nonvolatile flash memory device for storage of operating system and application software, as well as configuration and calibration information. The configuration and calibration information is regularly modified as part of normal operation in response to user interaction with the unit. A separate and distinct process (commonly called 'reflashing') must be used to modify operating system and application software if necessary to correct errors, add new features, etc.   The @REFL command is used to 'reflash' the unit.

In short, reflashing the unit consists of directing the RMU to download a specially formatted data file ('image') into local ram memory, verifying image integrity via a checksum procedure, erasing specific areas of flash memory, and storing the data from the image file to those same areas of flash memory.

The reflashing process is directed by an operator interacting with the unit using the command line interface either via a serial connection to the front panel RS232 port, or via telnet. In EITHER case, a LAN connection is necessary. The image file to be downloaded must be accessible to a TFTP server application running on a host which is itself accessible to the SandStorm RMU via the LAN. Normally, the reflash process is initiated and carried out via interaction with a unit in normal running condition. A backup procedure, only available via the serial interface, is also provided in case a previous reflash process failed and the unit is rendered inoperable. Both processes, in more detail are explained below.

Reflash Under Normal Operating Conditions

1.   Set up the SandStorm RMU with adequate power and LAN connections. Set up a serial connection, if that is to be used for operator interaction.

2.   Set up a separate computer host accessible via the same LAN used by the RMU. The IP address of this host will be needed in a later step in this process.

3.   Ensure a TFTP server application is running on the host.

4.   Place the new image file (obtained from Spectrum Control) into the directory used by the TFTP server.

5.   Power up the SandStorm RMU and log in (either via serial or telnet) as 'admin'.

6.   Type '@REFL ADDR,xxx.xxx.xxx.xxx<CR>' (xxx.xxx.xxx.xxx is the IP address of the host running the TFTP server application).

Operational Control of RMU

System response is '#REFL OK'.

7.   Type '@REFL CHKSUM,xxxxx<CR>'
(xxxxx is the checksum number supplied along with the image file).
System response is '#REFL OK'.

8.   Type '@REFL TFTP<CR>'
System response is
'#Download starting'
'#Download complete, starting checksum calc…'
'#REFL Download OK'

9.   Type '@REFL REFL<CR>'
System response is
'#Starting checksum calc…'
'#REFL Checksum OK, Reflash in progress…'

10.   The erase/reflash process then takes several minutes. At the end of the process, the system will execute an automatic SOFT REBOOT.

11.   At this point the RMU is executing the new OS/App. An operator can log in to the unit and operate it normally. In particular, typing the '@SYSI<CR>' command will cause the display of something similar to the following:

```
@SYSI
System Name    : ReflashTest
Model          : XXXX-XX
Serial Num.    : 542
MAC Addr.      : 000674000542
Boot Ldr Rev.  : 1.0
Backup Rev.    : 1.0
Main App Rev.  : 3.0
Date Manuf.    : 20040814
Date Last Rev. : 20040816
#OK
```

The 'Main App Rev.' and 'Date Last Rev.' fields should reflect the new image file.

Operational Control of RMU

Emergency Reflash Process

1.   Set up the SandStorm RMU with adequate power and LAN connections. Set up a serial connection. Terminal program must be set up with 57600 baud, 8 bits, no parity, 1 stop bit.

2.   Set up a computer host accessible via the same LAN used by the RMU. The IP address of this host will be needed in a later step in this process.

3.   Ensure a TFTP server application is running on that host.

4.   Place the new image file (obtained from Spectrum Control) into the directory used by the TFTP server.

5.   Power up the RMU. The RMU will perform self checks and then print to the serial port, either:
          'Checksum failed, reflash forced.'

       Otherwise, RMU will print:
          'Type REFL to force a reflash'.

       User types 'REFL'

6.   RMU will print:
          'Reflash process initiated!'
          'Get params via DHCP (type 'Y' or 'N'):

7.   User types 'N'.

8.   RMU will print:
          'Not using DHCP, user typed n'
          'Type in address for THIS unit to use: (ex. 192.168.1.100),
          followed by the 'Enter' key:'

9.   User types in IP address for the RMU to use during the reflash process: 192.168.1.111<CR>

10.   RMU will print:
          '192.168.1.111
          Using Local IP -192.168.1.111-
          Type in netmask assignment: (ex. 255.255.255.0),
          followed by the 'Enter' key:'

11.   User types in netmask for the RMU to use during the reflash process: 255.255.255.0<CR>

Operational Control of RMU

12. RMU will print:
    '255.255.255.0
    Using netmask -255.255.255.0-
    Type in address of TFTP server host (ex. 192.168.1.2),
    followed by the 'Enter' key:'

13. User types in IP address of TFTP server host:
    192.168.1.1<CR>

14. RMU will print:
    '192.168.1.1
    Type in checksum number (max 5 chars, 99999),
    followed by the 'Enter' key:'

15. User types in checksum number (specific to image file):
    xxxxx<CR>

16. RMU system software goes to specified IP location and TFTPs the
    SRec file to local memory.

17. RMU will print:
    '32858
    Using TFTP server address: 192.168.1.1
    Using reflash file image name: reflashImage.s19
    Checking file integrity with checksum: 32858.
    Downloaded file OK, starting reflash process now......'

19. RMU will use downloaded image file to reprogram flash memory.

20. After reflash is complete, RMU executes SOFT REBOOT.

Calibration

Connect serial cable from PC to unit. Power unit ON.

Open a previously saved 7832M HyperTerminal connection or create a new connection as follows:

New connection name: 7832M
Choose correct connection: example "COM1"
Bits per second:56700
Data bits: 8
Parity: none
Stop bits: 1
Flow control: none
Under file drop down menu, select Properties>Settings tab>ASCII setup button>and enable ECHO. Click OK and then save for later use.
Note: The unit does not Echo commands.

Sign on to unit with administrator login.
@PLOG admin,34567890

Example for Channel 1

Using DC variable power supply, pass 0.02 Amps thru unit from Channel 1 source connector to Channel 1 load connector. Calibrate Channel 1's low calibration point with the following command:
@MDCL 1,1,0.02

The format for this function is:
@MDCL x,y,z
x=channel (1-x)
y=Lo/Hi (1,2)
z=Applied Standard value (.1-999.9)

Using DC variable power supply, pass high limit Amps thru unit from source connector to load connector. Calibrate Channel 1's high calibration point with the following command:
@MDCL 1,2,xx.x where (xx.x)=supplied current

Once calibrated type the following command to save calibration points to systems flash memory:
@SYSF

After channel has been calibrated, pass several different current values, within the range, thru the unit to verify accuracy.

@STAT command will display the current value in the command prompt window.

Calibration

Examples of Different Channels	If displayed current value is not within +/-3% of full scale current, the channel will need to be recalibrated. For example, 3% of full scale for channel 1 is 0.30 Amps, which is 3% of 10 Amps.

Also, ensure that sense board is functioning for the entire range as shown on Sales Drawing for the specific channel.

Calibrate remaining channels based on sales drawing, current values, and commands.

Verify that readings are within tolerance and that full range can be achieved for each channel. Channel current sense boards are designed for up to 120% load. Make sure they are appropriately sized and protected.

Substitute your Channel # for "X".

Sensor A For Full Range 0-0.75 Amps

Source and load pins X
Tolerance +/-0.022 Amps
Full range 0-0.75 Amps
Channel X, low current 0.02 Amps
@MDCL X,1,0.02
Channel X, high current 0.75
@MDCL X,2,0.75
@SYSF

Sensor B For Full Range 0-1.5 Amps

Source and load pins X
Tolerance +/-0.045 Amps
Full range 0-1.5 Amps
Channel X, low current 0.02 Amps
@MDCL X,1,0.02
Channel X, high current 1.5 Amps
@MDCL X,2,1.5
@SYSF

Sensor C For Full Range 0-4 Amps

Source and load pins X
Tolerance +/-0.12 Amps
Full range 0-4 Amps
Channel X, low current 0.02 Amps
@MDCL X,1,0.02
Channel X, high current 4 Amps
@MDCL X,2,4.0
@SYSF

Calibration

Sensor D For Full Range 0-10 Amps	Source and load pins X Tolerance +/-0.300 Amps Full range 0-10 Amps Channel X, low current 0.02 Amps @MDCL X,1,0.02 Channel X, high current 10 Amps @MDCL X,2,10.0 @SYSF
Sensor E For Full Range 0-15 Amps	Source and load pins X Tolerance +/-0.45 Amps Full range 0-15 Amps Channel X, low current 0.02 Amps @MDCL X,1,0.02 Channel X, high current 15 Amps @MDCL X,2,15.0 @SYSF
Sensor F For Full Range 0-20 Amps	Source and load pins X Tolerance +/-0.60 Amps Full range 0-20 Amps Channel X, low current 0.02 Amps @MDCL X,1,0.02 Channel X, high current 20 Amps @MDCL X,2,20.0 @SYSF

Power unit OFF

Maintenance & Warranty

Maintenance and Replacement Parts

There are no user serviceable parts inside the RMU. In the event there is an electronic problem with the unit, please contact the factory.

Warranty

Under normal use and specified operation conditions, the Smart Start DC RMU is warranted from the day of delivery for a period of one year. During this period, if the product should fail, the device can be sent back to the factory for repair or replacement at the discretion of Spectrum Control.

If the device is misused or tampered with in any way, the warranty becomes invalid. SCI is not liable for any damage caused by products that have been modified or serviced by other parties.

Appendix A

Network Notation Basics and IP Addressing

IP Addresses

Each TCP/IP node on a network host has a unique IP address. This address provides the information needed to forward packets on the local network and across multiple networks if necessary.

IP addresses are specified as x.x.x.x, where each x is a number from 0 to 255; for example, 192.0.1.99. The LAN Module must be assigned a unique IP address to use TCP/IP network functionality.

IP addresses contain three pieces of information: the network, the subnet, and the host.

Network Portion

The network portion of the IP address is determined by the network type: Class A, B, or C. The most common setting for use with the RMU is Class C.

Network Portion of IP Address

Network Class	Network Portion of Address
Class A	First byte (2nd, 3rd, and 4th bytes are the host)
Class B	First 2 bytes (3rd and 4th bytes are the host)
Class C	First 3 bytes (4th byte is the host)

In most network examples, the host portion of the address is set to zero.

Available IP Addresses

Class	Reserved	Available
A	0.0.0.0 127.0.0.0	1.0.0.0 to 126.0.0.0
B	128.0.0.0 191.255.0.0	128.1.0.0 to 191.254.0.0
C	192.0.0.0 225.255.255.0	192.0.1.0 to 225.255.254.0

Consider the IP address 36.1.3.4. This address is a Class A address; therefore, the network portion of the address is 36.0.0.0 and the host portion is 1.3.4.

Appendix A

Subnet Portion

The subnet portion of the IP address represents which sub-network the address is from. Sub-networks are formed when an IP network is broken down into smaller networks using a subnet mask.

A router is required between all networks and all sub-networks. Generally, hosts can send packets directly only to hosts on their own sub-network. All packets destined for other subnets are sent to a router on the local network.

Host Portion

The host portion of the IP address is a unique number assigned to identify the host.

Network Address

A host address with all host bits set to 0 addresses the network as a whole (for example, in routing entries).

Sample Network Address

192.168.1.0

Broadcast Address

A host address with all host bits set to 1 is the broadcast address, meaning for "for every station."

Sample Broadcast Address

192.168.1.25

Network and broadcast addresses must not be used as a host address; for example, 192.168.1.0 identifies the entire network, and 192.168.1.255 identifies the broadcast address.

IP Subnet Mask

An IP subnet mask divides IP address differently than the standards defined by the classes A, B, and C. An IP subnet mask defines the number of bits to be taken from the IP address as the network or host sections. The LAN Module prompts for the number of host bits to be entered and then calculates the netmask, which is displayed in standard decimal-dot notation (for example, 255.255.255.0) when saved parameters are displayed.

Appendix A

Standard IP Network Netmasks

Network Class	Network Bits	Host Bits	Netmask
A	8	24	255.0.0.0
B	16	16	2555.255.0.0
C	24	8	255.255.255.0

Netmask Examples

Netmask	Host Bits
255.255.255.252	2
255.255.255.248	3
255.255.255.240	4
255.255.255.224	5
255.255.255.192	6
255.255.255.128	7
255.255.255.0	8
255.255.254.0	9
255.255.252.0	10
255.255.248.0	11
…	…
255.128.0.0	23
255.0.0.0	24

Private IP Networks and the Internet

If your network is not and will not be connected to the Internet, you may use any IP address. If your network is connected or will be connected to the Internet, or if you intend to operate the LAN Module on an intranet, you should use one of the reserved sub-networks. Consult you network administrator with questions about IP address assignment.

Network RFCs

For more information about IP addresses, refer to the following documents, which can be located on the World Wide Web using one of the following directories or indices:

- RFC 950   Internet Standard Subnetting Procedure
- RFC 1700   Assigned Numbers
- RFC 1117   Internet Numbers
- RFC 1597   Address Allocation for Private Networks

Appendix B

Current Monitoring Systems
- Quick Reference

@DFLT<CR> - Reset to Default Configuration.
@DLOG x,y,z<CR> - Read/Clear Data Log.
@ELOG x,y,z<CR> - Read/Clear Event Log.
@FEAT x,y<CR> - Enable/Disable Feature Bit
@HELP<CR> - List all commands.
@LLEV<CR> - Get current login level.
@MDCL x,y,z<CR> - Execute Channel Calibration Routine
@MDCT <CR> - Get number of measured channels.
@MDLA x,y<CR> - Get/Set measured channel lower alarm limit.
@MDUA x,y<CR> - Get/Set measured channel upper alarm limit.
@MDVL x<CR> - Get value for measured channel 'x'.
@MDGT x<CR> - Get data for measured channel 'x'.

@MDST x<CR> - Set name and alarm enable/disable for measured channel 'x'.

This command is used to set the name for the channel and also to enable/disable alarm assertion for the channel. By turning off the alarm, the trap message that would normally be sent if the measured value moves above or below the limits (set with the @MDUA and @MDLA commands respectively), is not sent.

The MDST command takes three parameters, channel number, channel name, and alarm enable/disable. For example:

@MDST 2, newChan2Name, 0 // Set channel name for measured channel 2 to 'newChan2Name', and turn alarm OFF.

@MDST 4, BigAmps, 1 // Set channel name for measured channel 4 to 'BigAmps', and turn alarm ON.

@NAME x,y,(z)<CR> - Get/Set System Name   // This is to be corrected in future release. Only used for 'SYSTEM' name on the 7832MC, and therefore will only need two parameters.
@NETP -??- or -v,w,x,y,z-<CR> - Get or Set Network Parameters.
@PLOG x,y<CR> - Login process.,
@PLEV x<CR> - Set Security Level. -x- = New Level (0/1).
@POUT<CR> - Log out.
@PSWD x,y,z<CR> - Command to change a user password.
@REFL<CR> - Multi-step reflash process. See users guide for details.
@SSTR x,y<CR> - Get/Set SNMP Community strings.
@STAT<CR> - Get Global System State
@STTP<CR> - Get Internal System Temperature Reading.
@SYSB<CR> - Get System Bank Count.
@SYSF<CR> - Save current configuration settings to Flash memory.

Appendix B

@SYSI<CR> - Get System Version Information.
@SYSR<CR> - Causes System to do immediate SOFT reboot.
@TIME x<CR> - Get/Set System Time.
@TMPL x<CR> - Get/Set the Internal Temp Alarm Limit.
@TRAP x,y(,z)<CR> - Get/Set Trap Parameters.
@WDOG x<CR> - Read/Clear Watchdog Reboot Count -x- = Read/ Clear ('??'/C)