



Status Monitoring

Power

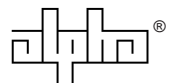


Installation and Technical Manual

DOCSIS® HMS Embedded Transponder

Effective: December, 2004

Alpha Technologies



Alpha Technologies ®

Power

DOCSIS® HMS Embedded Transponder Installation and Technical Manual

745-420-C0-002, Rev. B
Effective Date: December, 2004
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NOTE

Alpha denies responsibility for any damage or injury involving its enclosures, power supplies, generators, batteries or other hardware, manufactured by Alpha or members of the Alpha Group, when used for an unintended purpose, installed or operated in an unapproved manner, or improperly maintained.



NOTE

Photographs and drawings contained in this manual are only for illustrative purposes. These photographs and drawings may not exactly match your installation.



NOTE

Review the written and illustrative information contained in this manual before proceeding. If there are questions regarding the safe installation or operation of this product, please contact Alpha Technologies or your nearest Alpha representative.

Contacting Alpha Technologies: *www.alpha.com*

OR

For general product information and customer service (7 AM to 5 PM, Pacific Time), call

1-800-863-3930

For complete technical support, call

1-800-863-3364

7 AM to 5 PM, Pacific Time or 24/7 emergency support

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Safety Notes

Review the drawings and illustrations contained in this manual before proceeding. If there are any questions regarding the safe installation or operation of the system, contact Alpha Technologies or the nearest Alpha representative. Save this document for future reference.

To reduce the risk of injury or death and to ensure the continued safe operation of this product, the following symbols have been placed throughout this manual. Where these symbols appear, use extra care and attention.

ATTENTION!

The use of ATTENTION indicates specific regulatory/code requirements that may affect the placement of equipment and /or installation procedures.



NOTE

A NOTE provide additional information to help complete a specific task or procedure.



CAUTION!

The use of CAUTION indicates safety information intended to PREVENT DAMAGE to material or equipment.



WARNING!

WARNING presents safety information to PREVENT INJURY OR DEATH to the technician or user.

1.0 Introduction to the DOCSIS Transponder

The DOCSIS Digital Embedded Transponder for the XM2 power supply manages network powering through existing cable modem or high speed data infrastructure. A single transponder can monitor and manage multiple power supplies, multiple strings of batteries, and one generator. The transponder transmits data to a management system via the existing DOCSIS network. SNMP (Simple Network Management Protocol) keeps bandwidth use to a minimum. Status monitoring data is compatible with ANSI/SCTE HMS (Hybrid Management Sublayer) standards.

With optional VoIP test functionality, the power supply transponder becomes a powerful network diagnostics tool. Contact Alpha Technologies for more information.

Outstanding Features:

- Uses existing headend DOCSIS CMTS equipment.
- Uses ANSI/SCTE HMS standards.
- Single transponder supports up to six power supplies, two battery strings, and one generator.
- Additional battery strings (up to a total of six) can be monitored with Alpha's extended MIBs.

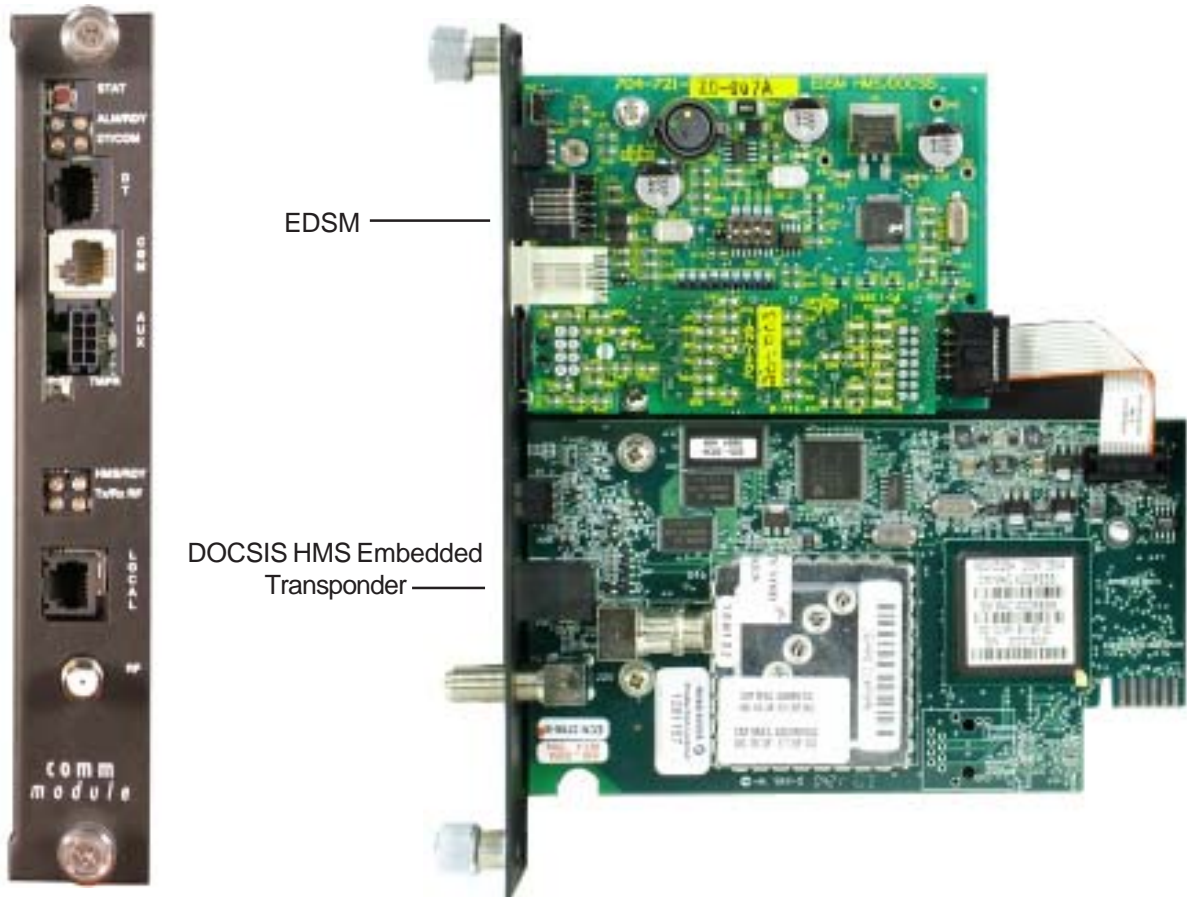


Fig. 1-1, DOCSIS Embedded Transponder with EDSM

1.0 Introduction to the DOCSIS Transponder, continued

1.1 System Overview

The DOCSIS Digital Transponder obtains data from the EDSM (Enhanced Digital Status Monitoring) interface card through an XM2 Power Supply. The EDSM collects data directly from the battery strings or from the AlphaBus Communications Network, depending on system configuration.

Equipment monitored (direct battery monitoring):

- An XM2 Power Supply
- One or two 36VDC or 48VDC battery strings
- One AlphaGen stationary generator system (if installed)

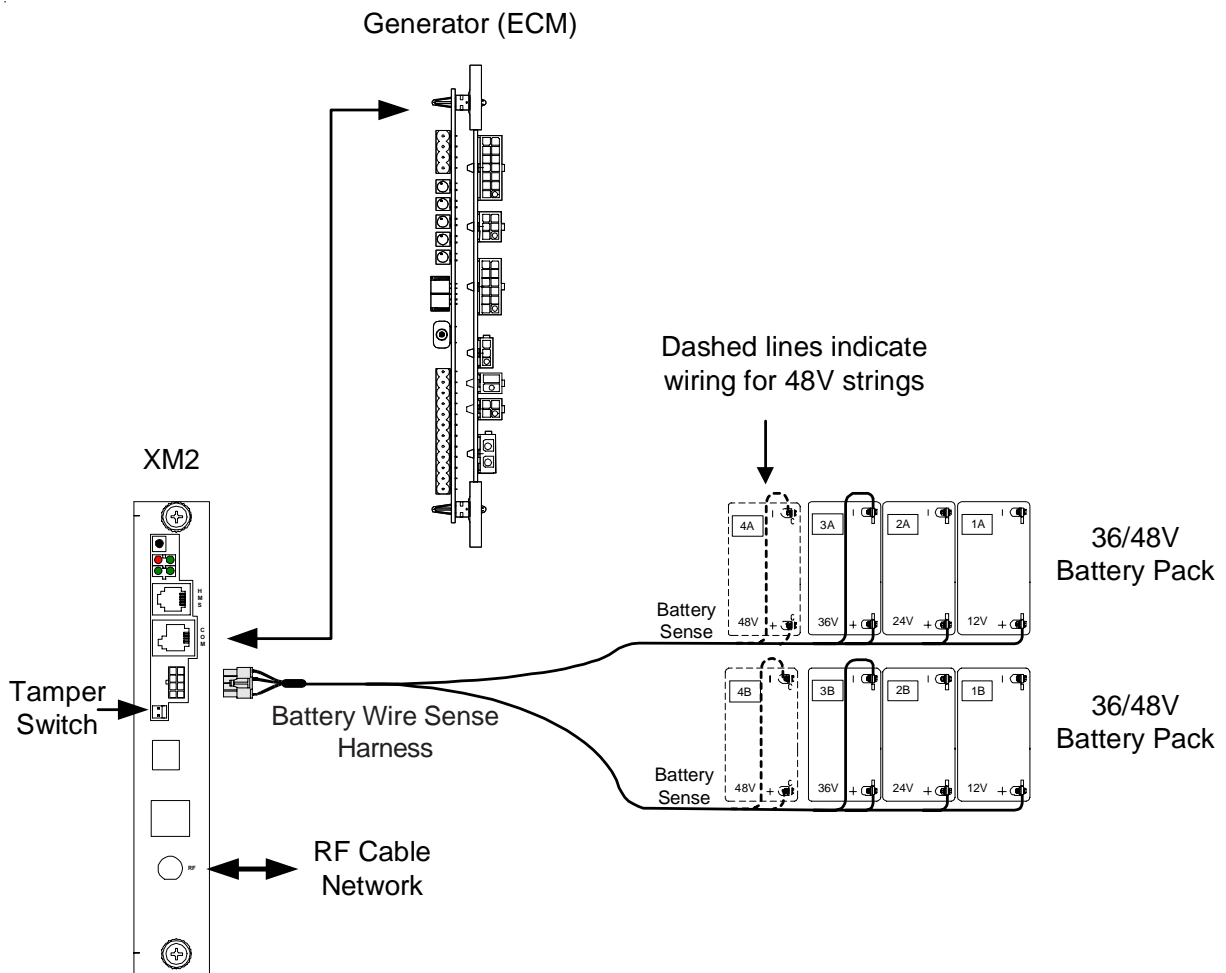


Fig. 1-2, System Interconnection Diagram 1

1.0 Introduction to the DOCSIS Transponder, continued

1.1 System Overview, continued

Equipment monitored (via AlphaGuard):

- A primary XM2 Power Supply (via an internal network connection).
- Up to five additional XM2 Power Supplies equipped with Serial Interface (SI) cards.
- One or two 36VDC or 48VDC battery strings with AlphaGuard CMM Battery Monitors
- Up to four additional AlphaGuards with extended CMM modules
- One AlphaGen stationary generator system (if installed)

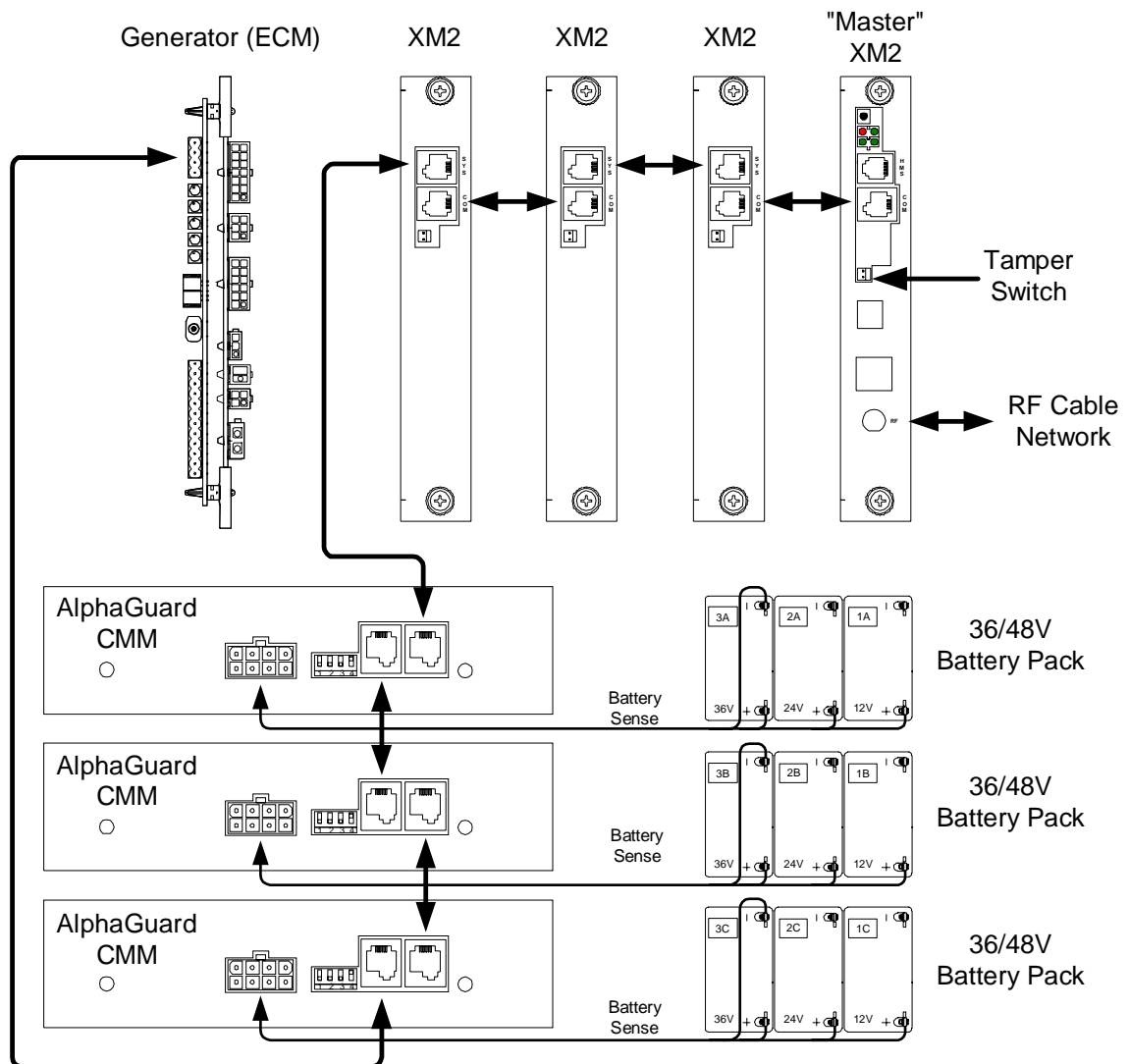


Fig. 1-3, System Interconnection Diagram 2

1.0 Introduction to the DOCSIS Transponder, continued

1.2 LED Indicators



HMS:	Indicates status of serial communications between transponder and EDSM
OFF:	No communications
OFF flickering ON:	Communicating with EDSM
RDY:	Indicates status of transponder
OFF:	No power to transponder from EDSM, or malfunctioning transponder.
ON:	Transponder reset in progress
Flashing ON & OFF:	Normal operation
RX:	Indicates status of link with CMTS
OFF:	No communication with CMTS
ON flickering OFF:	Receiving data, CMTS link established
OFF flickering ON:	Receiving data, CMTS link failed
Flashing ON & OFF:	Failed communications
TX:	For future use

2.0 Transponder Installation

Steps to a Successful Installation:

- Operator's IT Department must allow the transponders' Cable Modem (CM) to obtain an IP address from the DHCP Server.
- Operator's IT Department must load the `HMSINIT.ini` file on the TFTP Server.
- Operator's network security policies must allow SNMP traffic to pass between transponder and SNMP manager.
- Install the transponder and any related equipment in the power supply.
- Connect an RF drop.
- Verify proper operation.

2.1 Provisioning the Transponder

Complete Sections 2.1.1 and 2.1.2 before connecting the transponder to the RF network. Otherwise, you must reset each transponder.

2.1.1 Network Connectivity

The transponder's CM must be recognized by the CMTS as a valid device. The CM must obtain an IP address from the DHCP server, locate the TFTP and TOD servers, and communicate with the SNMP management server (trap receiver). CMTS and system vendors use different security methods to insure network integrity, but some common issues are:

- A "subscriber account" (where the subscriber is the transponder) may be required for each transponder.
- The transponder's MAC address may have to be pre-loaded into the CMTS.
- MAC filtering may have to be modified to allow MAC addresses starting with `00:10:3f:xx:xx:xx` to be registered.
- For SNMP access, UDP ports 161 & 162 must not be blocked.
- Firewalls must allow communication between the CM and the TFTP, DHCP, SNMP, and TOD servers.
- If the address of the TFTP and/or TOD server is different than the DHCP server, the response from the DHCP server must contain the TFTP and TOD addresses.

2.0 Transponder Installation, continued

2.1 Provisioning the Transponder, continued

2.1.2 Transponder Configuration File

The transponder's CM, at first power-up or reset command, requests a configuration file from the TFTP server. The file must contain the IP address of the SNMP manager. It may also contain up to five additional SNMP trap recipients. The SNMP manager will be the only device that can perform SNMP set/get/get-next commands. The trap recipients and SNMP manager receive the same traps generated by the transponder.

- File type: ASCII text file
- File name: HMSINIT.ini
- File location: Root directory of the TFTP server
- Maximum file size: 4096 bytes (4Kb)
- File format:

```
// IP address of the SNMP manager
[SERVER IP]
10.1.1.5
// IP address of up to 5 additional trap receivers
[TRAP SERVER IP]
10.1.1.6
10.1.1.7
```

- The “//” characters indicate an optional comment line.
- The identifiers must be in all caps, and enclosed by brackets “[]”.
- The IP addresses must appear on the next line after the identifier, one address per line. Replace the IP addresses in this example with the actual addresses used in the network.
- The trap server IP identifier is optional. Addresses for up to five trap recipients can be listed.

2.0 Transponder Installation, continued

2.2 Verifying Software Version and Device Address

Before removing the Inverter Module (IM), verify the power supply software version and device address are correct.

- IM firmware v3.00.0 is the minimum version compatible with the DOCSIS Embedded Transponder.
 - The power supply device address must not be set to zero, and no two power supplies monitored by a single transponder may have the same address.
1. Press the Enter key on the inverter module twice to access the SETUP Menu.
 2. Press the Down key until CODE VER is displayed.
 3. Verify that the software code is 3.00.0 or higher.
 4. Press the Down key twice until DEVICE ADDRESS is displayed.
 5. If the address is correct (and not zero), skip to Step 10.
 6. To change the address, press the Enter key to enter the Edit mode.
 7. Press the Up or Down key until the desired address (between 1 and 7) is displayed. Remember that each power supply on a single transponder must have a unique address.
 8. Press the Enter key to load the new address.
 9. Press the Enter key again to accept the new data.
 10. Press ESC three times to return to the OPERATION NORMAL screen.

2.3 Installing the Transponder Hardware

The following installation procedure assumes the EDSM card, AlphaGuard CMM data collection module and AlphaBus network have already been installed. If not, see the EDSM Installation and Technical manual (P/N 704-721-C0) for further instructions.



CAUTION!

The Embedded Transponder is static sensitive. An ESD wrist strap should be worn when installing the transponder.

Tools Required: #1 Phillips Screwdriver

1. Move the XM2 Battery Breaker to the OFF position.
2. Unplug all connections to the front of the Inverter Module (battery cable, RTS, etc).
3. Loosen the thumbscrews holding the Inverter Module into the power supply. Slide the Inverter Module out just enough to disconnect the ribbon cable. Now slide the Inverter Module out of the power supply.



WARNING!

To reduce the risk of electric shock, completely remove the Inverter Module from the Power Supply prior to installation.

2.0 Transponder Installation, continued

2.3 Installing the Transponder Hardware, continued

4. Attach the new transponder ribbon cable supplied to the 10-pin connector on the transponder as shown in Fig. 2-1. The connectors are keyed to prevent incorrect orientation.
5. Attach the plastic standoff to the transponder PC board as shown in Fig 2-2.
6. Verify that the MAC address label is installed on the transponder. If the label is missing, locate the label in the packaging and apply to the transponder as shown in Fig 2-3.
7. Place the transponder as shown in Fig 2-3 below. The RF connector must be inserted through the front of the Comm Module bracket.
8. Press the standoff into the Inverter Module chassis.
9. Secure the transponder to the Comm Module Bracket with the two screws provided.
10. Connect the transponder ribbon cable to the EDSM. Note the 90° twist in the cable.
11. Reconnect the Inverter Module ribbon cable, and reinstall the Inverter Module into the power supply.
12. Reconnect all the cables unplugged in Step 2 .
13. Move the Battery Breaker to the ON position.

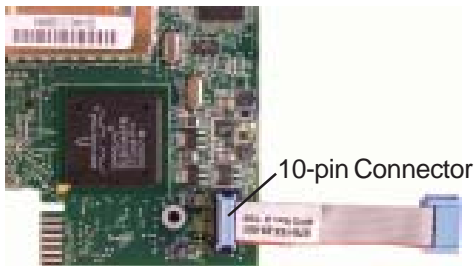


Fig. 2-1, Attaching the 10-pin Connector

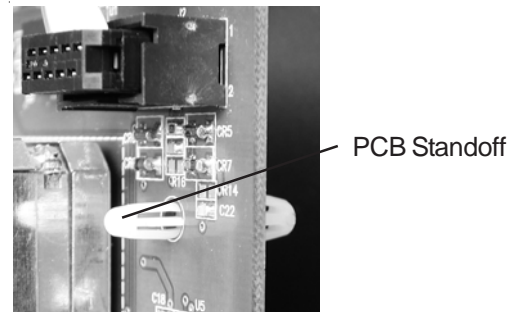


Fig. 2-2, Attaching the PCB Standoff

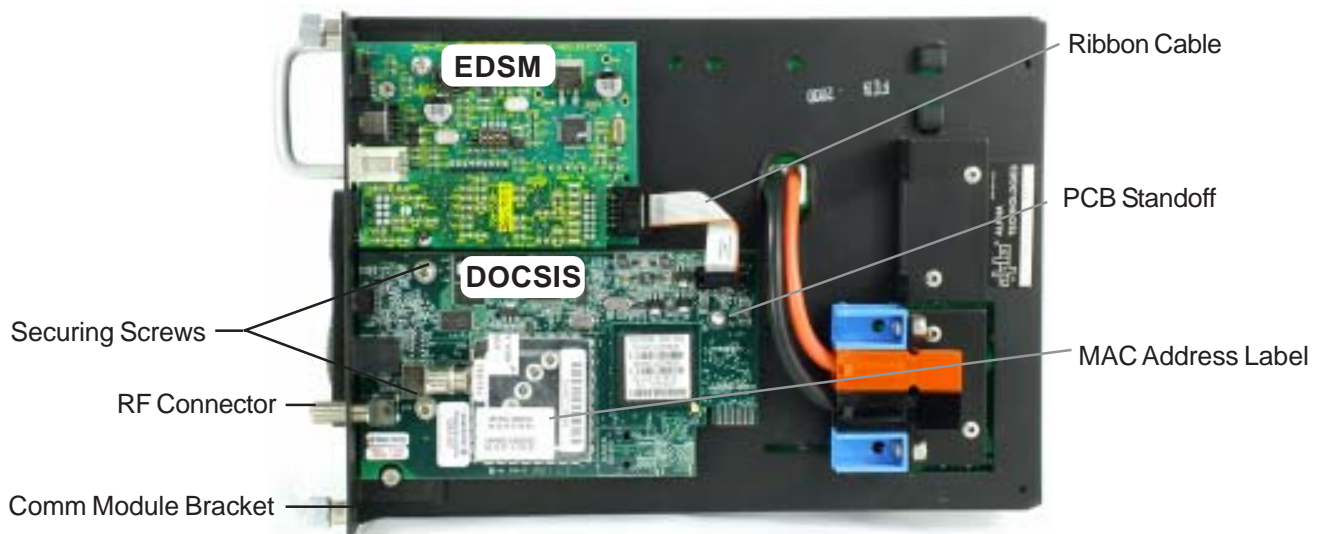


Fig. 2-3, Transponder Components

2.0 Transponder Installation, continued

2.4 RF Connection

Connect the RF drop to the face of the transponder. The drop must have a properly installed ground block in or on the power supply enclosure. Recommended forward RF level is 0 dBmV.

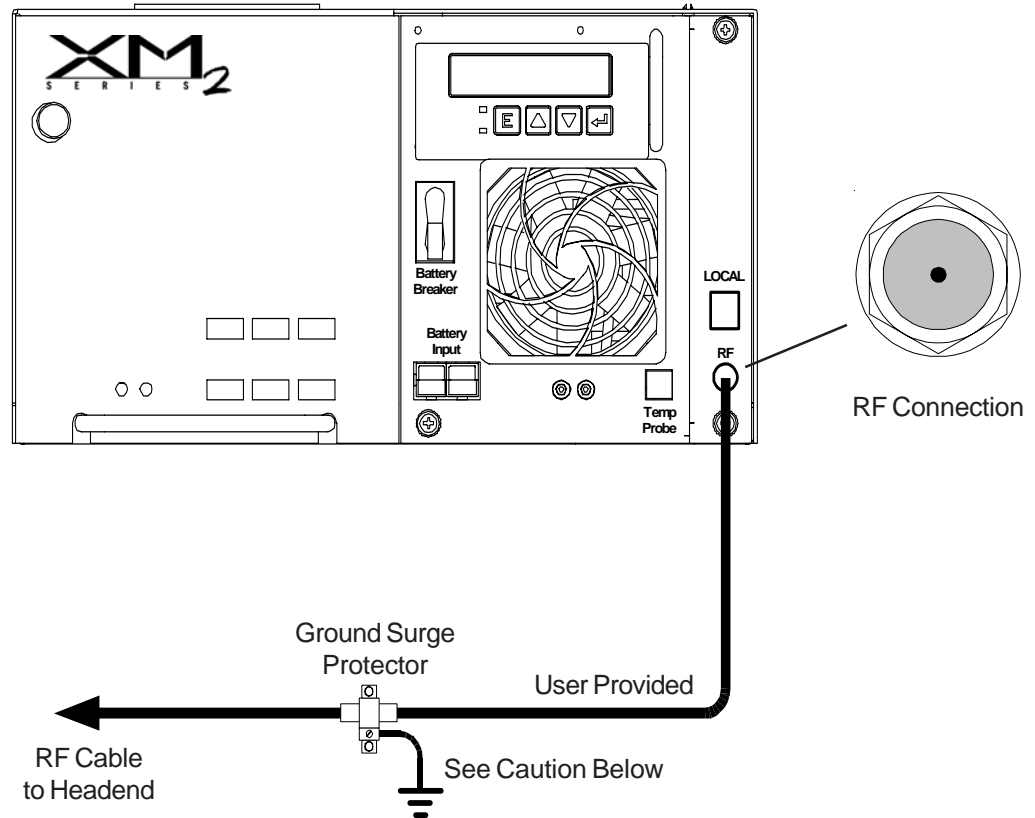


Fig. 2-4, RF Connection with Ground Block



CAUTION!

Alpha requires installing a grounded surge suppressor (Alpha P/N 162-028-10 or equivalent).

2.5 Verifying Transponder Operation

During initial transponder power-up, the RDY LED will be on solid.

- Once the reset is complete, the RDY LED will flash at a ½ sec ON, ½ sec OFF rate.
- The RX LED will now be ON, flickering OFF occasionally, indicating a link with the CMTS has been established.
- The HMS LED will occasionally flicker ON, indicating communication with the EDSM.

3.0 Network/Element Management Software

3.1 Provisioning the SNMP Manager

The following MIB (Management Information Base) files are required for the SNMP Manager to collect data from the transponders. These files can be found on the Society of Cable Telecommunications (SCTE) web site www.scte.org. These are dependencies between MIB files so they should be compiled in the following order listed below:

ANSI/SCTE 36 2002 (formerly HMS 028), SCTE-ROOT Management Information Base (MIB) Definitions

ANSI/SCTE 37 2003 (formerly HMS 072), Hybrid Fiber/Coax Outside Plant Status Monitoring SCTE-HMS-ROOTS Management Information Base (MIB) Definition

ANSI/SCTE 38-1 2002 (formerly HMS 026), Hybrid Fiber/Coax Outside Plant Status Monitoring SCTE-HMS-PROPERTY-MIB Management Information Base (MIB) Definition

ANSI/SCTE 38-2 2002 (formerly HMS 023), Hybrid Fiber/Coax Outside Plant Status Monitoring SCTE-HMS-ALARMS-MIB Management Information Base (MIB) Definition

ANSI/SCTE 38-3 2002 (formerly HMS 024), Hybrid Fiber/Coax Outside Plant Status Monitoring SCTE-HMS-COMMON-MIB Management Information Base (MIB) Definition

ANSI/SCTE 38-4 2002 (formerly HMS 027), Hybrid Fiber/Coax Outside Plant Status Monitoring SCTE-HMS-PS-MIB Management Information Base (MIB) Definition

ANSI/SCTE 38-6 2003 (formerly HMS 033) Hybrid Fiber/Coax Outside Plant Status Monitoring - SCTE-HMS-GEN-MIB Management Information Base (MIB) Definition

ANSI/SCTE 38-7 2002 (formerly HMS 050), Hybrid Fiber/Coax Outside Plant Status Monitoring SCTE-HMS-Transponder-Interface-Bus(TIB)-MIB Management Information Base (MIB) Definition

3.2 Transponder Acquisition by the SNMP Manager

The transponder must first complete its initialization/registration and retrieve the `.ini` file from the TFTP server. The transponder will then send a warm-start trap to the SNMP Manager (specified as the Server IP in the `.ini` file). This trap provides the SNMP Manager with the MAC and IP addresses of the transponder and should, depending on the configuration of the manager software, initiate monitoring of the power supply system.

4.0 Local Port

The local port allows the technician to communicate with the transponder and power supply through a PC's RS-232C serial port.

1. Connect the optional Local Port to RS-232C Adaptor Cable (Alpha P/N 875-349-10) between the transponder's Local Port and the computer's serial port. Launch the computer's Terminal Emulation Software (HyperTerminal is recommended).

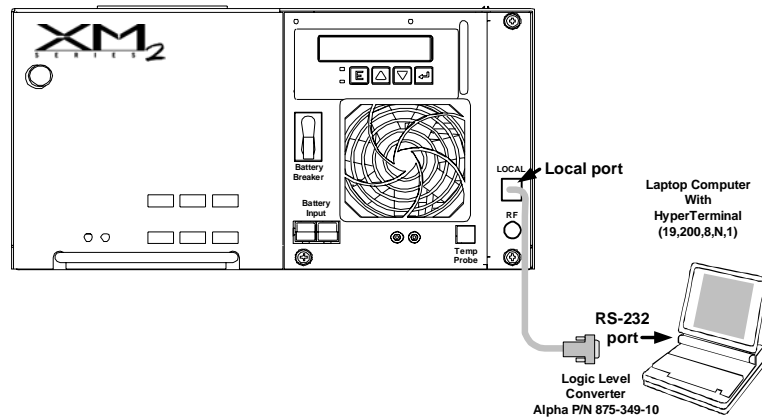


Fig. 4-1, Local Port to PC Connection

2. Communication settings are:
 - 19,200 baud
 - 8 data bits
 - No parity bit
 - 1 stop bit
 - No flow control
3. Press ENTER to initiate communications.
4. Press "?" and ENTER to display the menu:

HELP	- This help
?	- This help
RESET	- Reset transponder
STATUS	- Transponder config and status
ALARMS	- Display active alarms
ID	- Enter logical ID
PSDATA	- Display power supply data
DEVICE	- Display device status
PSTEST	- Initiate power supply test
GENDATA	- Display generator data
GENTEST	- Initiate generator test
GENRESET	- Reset generator alarms

4.0 Local Port, continued

Enter a command, and press ENTER. If there is more than one power supply connected to the transponder, then PSDATA and PSTEST must be followed by the device address number.

Verify communications between the power supply, EDSM and transponder with the PSDATA command. The data returned should match the data of the power supply display.

```
MAC Address:      00-10-3F-00-00-0D
Serial No:        123450000
Version:          1.0.2.L 1600 950-0315 A 05.00
IP Address:       192.168.1.102
Check code:       0x0000
CommonNEStatus:  0x19
(actual data will be different)
```

5.0 Specifications

DOCSIS® Network Power Monitoring

General Specifications

General	
Power Supplies Supported:	XM2, XM2VP
DOCSIS Compatibility:	DOCSIS 1.1
Monitoring Protocol:	SNMPv1
Devices Monitored:	Power Supply, Batteries and Generator compatible with ANSI/SCTE 25-32002, (formerly HMS 022)
Hardware	
RF Cable Interface:	F-connector, female, 75ohm
Local Interface:	RJ-12, RS-232, 19.2kb,N,8,1 Requires serial port adapter and with terminal emulation software (<i>Hyper-Terminal recommended</i>)
LED Indicators:	Transponder Ready; HMS Communications; RF Transmit; RF Receive
Environmental:	-40°C to +65°C 10 to 90% non-condensing humidity
Emissions:	EN50022 Class A and FCC Part 15 Class A (<i>Installed in power supply enclosure system</i>)
Warranty:	2 years
RF Transmit / Receive	
Tx Frequency Range:	5 to 42 MHz
Output Power:	+8 to +58 dBmV
Channel Bandwidth:	6 MHz
Receive Center Freq Range:	91 to 857 MHz (<i>Standard, HRC, IRC channels</i>)
Input Level:	-15 to +15 dBmV
Monitored Parameters	
Number of Power Supplies:	Up to six, each reporting individual data
Power Supply Data:	Major Alarm (<i>includes: test fail, battery fail, line isolation, output over load/fault, over temp, N+1 active, fuse fail</i>) Minor Alarm (<i>includes: temp probe error, AC line loss, N+1 error</i>) Input AC Line Voltage Output Voltage Output Current 1 Output Current 2,3,4 (<i>if installed</i>) Output Power Power Supply Status (<i>line, standby, test in progress, test alarm</i>) Enclosure Door (<i>open/closed</i>) Remote test start/stop
Power Supply Control:	One or Two Strings of 36V or 48V <i>Additional battery string monitoring available. Call Alpha for more information.</i>
Number of Battery String:	
Battery Data:	Individual Battery Voltages Battery Compartment Temperature
Generator Data:	Status (<i>off, running, alarm</i>) (<i>Alarm includes: low oil pressure, engine over-temp, engine over-speed, crank limit, over-voltage, low fuel, water intrusion, pad shear, gas hazard, test fail</i>) Gas hazard Water Intrusion Pad Shear Enclosure Door (<i>open/closed</i>) Ignition Battery Voltage Enclosure Temperature Low Fuel
Generator Control:	Remote test (<i>start/stop</i>)
Management	
NMS/EMS:	Cheetah™ DOCSIS® Power Supply Management Software Standard SNMP Management Tools
HMS MIBs:	Power Supply (ANSI/SCTE 38-4) Generator (ANSI/SCTE 38-6) Transponder (ANSI/SCTE 38-3) Alarm/Trap (ANSI/SCTE 38-1 and 38-2)

Ordering Information	
EDSM-IDH2 DCS-XM2V-2 (XM2VP)	DOCSIS Monitoring <i>Includes: transponder with VoIP test function, EDSM and bracket. Order AlphaGuard Battery Management or wire sense kit separately.</i>
IDH2	DOCSIS Embedded XM2 Transponder with VoIP Test Function(<i>For installation with existing EDSM. Order AlphaGuard Battery Management or wire sense kit separately.</i>)
875-349-10	Local port adaptor
875-155-20	10-pin Connector
Battery Sense Wire Kits	
874-842-21	1x36V, 6 ft
874-842-20	2x36V, 6 ft
874-842-27	1x36V, 9 ft
874-842-28	2x36V, 9 ft
874-841-21	1x48V, 6 ft
874-841-20	2x48V, 6 ft
874-841-25	1x48V, 9 ft
874-841-24	2x48V, 9 ft

Extended wire lengths available. Contact Alpha for ordering information.

SI-XM2-KIT (XM2)	Additional XM2 Interface Kit Includes SI adaptor and integration kit for connecting an additional power supply for monitoring. One kit required for each additional power supply (up to six total).
SI-XM2V-KIT (XM2VP)	

6.0 Acronym Definitions

ANSI:	American National Standards Institute
CM:	Cable Modem
CMTS:	Cable Modem Termination System
DHCP:	Dynamic Host Configuration Protocol
DOCSIS:	Data Over Cable Service Interface Specification
EDSM:	Enhanced Digital Status Module
EMS:	Element Management System
IT:	Information Technology
MAC:	Media Access Control
MIB:	Management Information Base
NMS:	Network Management System
QoS:	Quality of Service
SCTE-HMS:	Society of Cable Telecommunications Engineers-Hybrid Management Sublayer
SI:	Serial Interface
SNMP:	Simple Network Management Protocol
TFTP:	Trivial File Transfer Protocol
TOD:	Time of Day
UDP:	User Datagram Protocol
VoIP:	Voice over Internet Protocol

Alpha Technologies Power

Alpha Technologies
3767 Alpha Way
Bellingham, WA 98226
USA
Tel: +1 (360) 647-2360
Fax: +1 (360) 671-4936
Web: www.alpha.com

Alpha Technologies Ltd.
4084 McConnell Court
Burnaby, BC, V5A 3N7
CANADA
Tel: +1 (604) 430-1476
Fax: +1 (604) 430-8908

Alpha Technologies
Europe Ltd.
Cartel Business Estate
Edinburgh Way
Harlow, Essex CM20 2TT
UNITED KINGDOM
Tel: +44-1279-422110
Fax: +44-1279-423355

Alpha Technologies
Hansastrasse 8
D-91126 Schwabach
GERMANY
Tel: +49-9122-79889-0
Fax: +49-9122-79889-21

Alphatec, Ltd
P.O. Box 56468
Limassol, Cyprus
CYPRUS
Tel: +357-25-375675
Fax: +357-25-359595

Alpha Technologies
5 Avenue Victor Hugo
F-92140 Calmart France
FRANCE
Tel: +33-3-41-90-07-07
Fax: +33-1-41-90-93-12