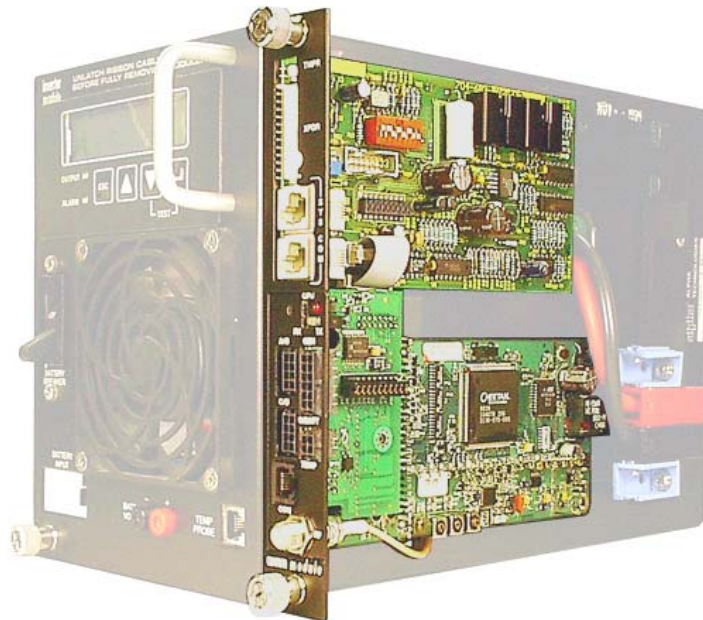


# Acterna Embedded Transponder



## Addendum to USM2.5 Status Monitor Technical Manual

*Effective: July, 2002*

*Power* **Alpha Technologies.** Protecting The Power in Communications.

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# Acterna Embedded Transponder Installation Manual

018-041-C0-002, Rev B

Effective Date: July, 2002

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**NOTE:** Photographs contained in this manual are for illustrative purposes only. These photographs may not exactly match your installation.



**NOTE:** Review the drawings and illustrations contained in this manual before proceeding. If there are questions regarding the safe operation of this powering system, please contact Alpha Technologies or your nearest Alpha representative.

## Contacting Alpha Technologies:

For general product information and customer service

**1-800-863-3930**

*(7:00 AM to 5:00 PM Pacific Time )*

For complete technical support

**1-800-863-3364**

*(7:00 AM to 5:00 PM Pacific Time, or 24/7 emergency support)*

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# 1. Installation

## 1.1 Installation in an XM Series 2 Power Supply

1. Record the transponder address.
2. Open the power supply enclosure.



**NOTE:** Backup power will not be available while batteries are disconnected.

3. Set the battery breaker on the front of the power supply to the OFF position.
4. Unplug all connectors on the front of the power supply inverter module.
5. Loosen the thumb screws holding the inverter module into the power supply.
6. Slide the inverter module out far enough to unplug the ribbon cable at the back of the inverter module (fig A). Disengage the two latches holding the plug into the socket (fig. B), and remove the plug.
7. Slide the inverter module all of the way out of the power supply.
8. Remove the blanking plate and USM2 (if installed) from the inverter module.
9. Install the USM2.5 (refer to USM2.5 installation manual)
10. On the USM2.5, unplug the ribbon cable from J3, near the DIP Switch (fig. C).
11. Connect the other end of the ribbon cable to the connector (JP2) at the top of the transponder (fig. C).



Fig. A

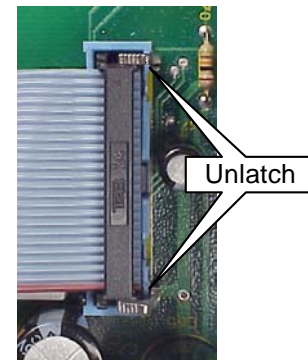


Fig. B

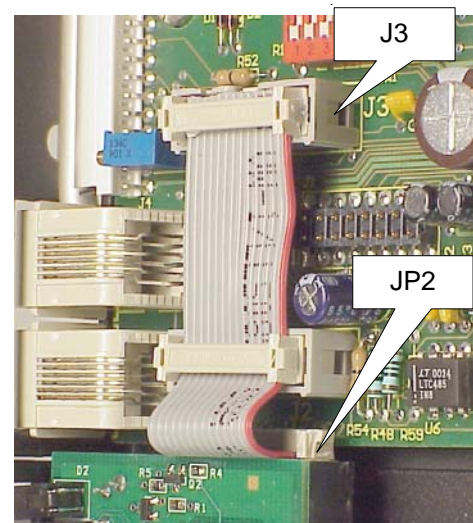


Fig. C

# 1. Installation

## 1.1 Installation in an XM Series 2 Power Supply, *continued*

- Using the two captive screws just behind the face plate, secure the transponder to the inverter module.

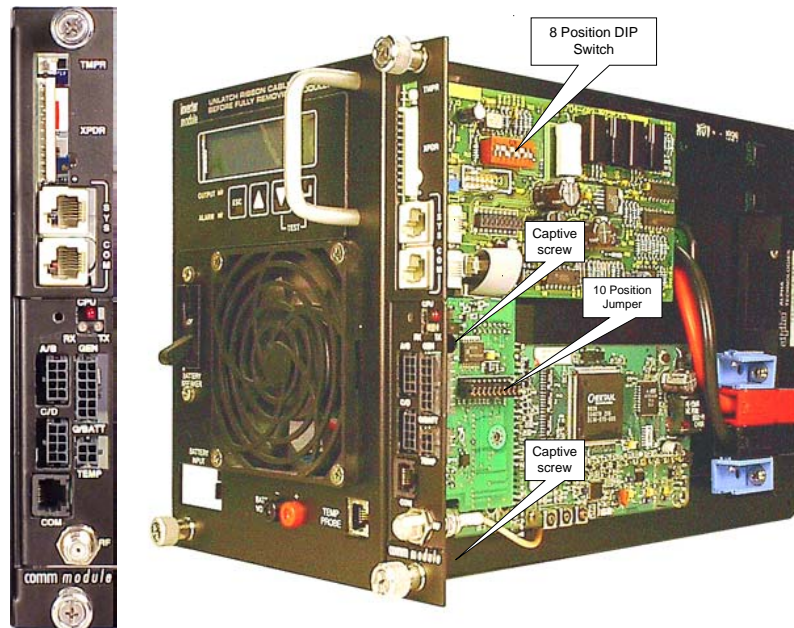


Figure 1-1 Transponder Installation

- Verify that the 10 position jumper on the transponder is set to the correct battery pack voltage.
- Verify that the 8 position DIP Switch on the USM2.5 is set correctly. Refer to the USM2.5 operators manual (Alpha p/n 704-683-B0).
- Set the inverter module onto the guides, and slide it 1 or 2 inches into the power supply.
- Reconnect the ribbon cable to the inverter module, and latch the two retaining clips over the ribbon cable plug.
- Slide the inverter module fully into the power supply, and tighten the thumb screws. Set the BATTERY BREAKER to the ON position.
- Verify after 10-30 seconds, the Smart Display on the power supply reads 'OPERATION NORMAL'.
- Download Alarm Profile from NetMentor to initiate appropriate mode of operation.
- Verify that, after approx. 1 minute, the 'CPU' LED on the front of the transponder is blinking, if not, press the RESET button behind the hole next to the LEDs (see Fig. 1-2).

## 1.2 Transponder Inputs and Outputs

The following section describes the input and output connections on the transponder. Refer to the sections indicated below for a brief description and pin-out of the connector.

- CPU LED    Flashing: Normal operation, P-Code running.  
              Solid: Initial start-up, R-Code running.
- RX LED     Data is being recieved from the HEC (Head End Controller).
- TX LED     Data is being sent to the HEC.

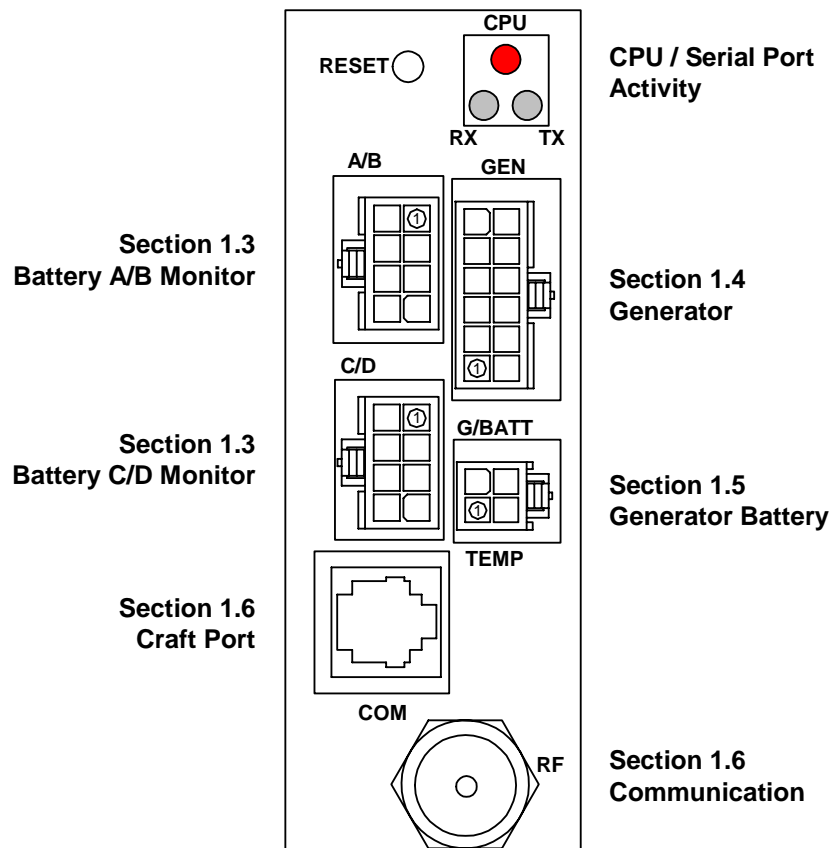


Figure 1-2 Input / Output Connections

# 1. Installation

## 1.3 Battery Monitor Connections

Refer to section 4 for wire kit part numbers.



**WARNING:** Verify that the 10 Position jumper on the transponder is set to the proper battery voltage prior to connecting the battery monitor wire kit.



**NOTE:** A maximum of 12 batteries can be monitored by the transponder.

Connector	Pin #	String Reference	Wire Label	NetMentor Display (48V)
A/B	1	1A - (0Vdc)	<b>A/B</b> [C/D] NEG	
	2	1A + (+12Vdc)	Vbatt <b>1A</b> [C] 12V	Battery #4 Vdc
	3	2A + (+24Vdc)	Vbatt <b>2A</b> [C] 24V	Battery #3 Vdc
	4	3A + (+36Vdc)	Vbatt <b>3A</b> [C] 36V	Battery #2 Vdc
	5	1B + (+12Vdc)	Vbatt <b>1B</b> [D] 12V	Battery #8 Vdc
	6	2B + (+24Vdc)	Vbatt <b>2B</b> [D] 24V	Battery #7 Vdc
	7	3B + (+36Vdc)	Vbatt <b>3B</b> [D] 36V	Battery #6 Vdc
	8	4A + (+48Vdc) 4B + (+48Vdc)	Vbatt <b>A/B</b> [C/D] <b>48V</b>	Battery #1 Vdc Battery #5 Vdc
C/D	1	1C - (0Vdc)	A/B[C/D] NEG	
	2	1C + (+12Vdc)	Vbatt <b>1A</b> [C] 12V	Battery #11 Vdc
	3	2C + (+24Vdc)	Vbatt <b>2A</b> [C] 24V	Battery #10 Vdc
	4	3C + (+36Vdc)	Vbatt <b>3A</b> [C] 36V	Battery #9 Vdc
	5			
	6			
	7			
	8	4C + (+48Vdc)	Vbatt A/B [C/D] <b>48V</b>	Battery #12 Vdc



**NOTE:** Only TWO 48V strings can be monitored when using a generator. DO NOT connect to the BATT C/D connector if using the generator option.

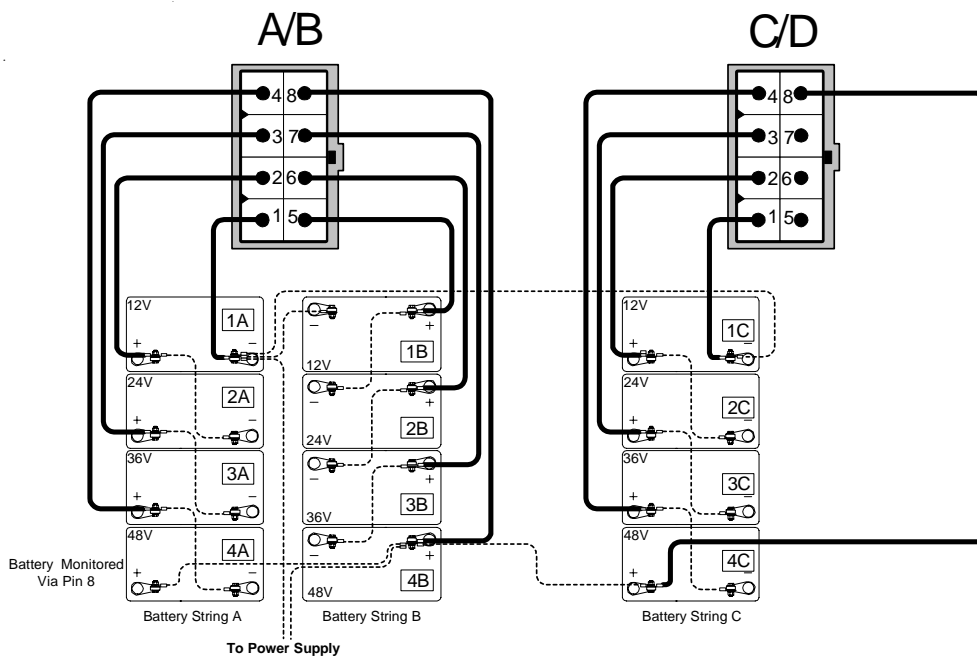


Figure 1-3 Battery Monitor Connections for three 48Vdc battery packs



## 1.3 Battery Monitor Connections, *continued*

Connector	Pin #	String Reference	Wire Label	NetMentor Display (48V)
A/B	1	1A - (0Vdc)	<b>A/B</b> [C/D] NEG	
	2	1A + (+12Vdc)	Vbatt <b>1A</b> [C] 12V	Battery #4 Vdc
	3	2A + (+24Vdc)	Vbatt <b>2A</b> [C] 24V	Battery #3 Vdc
	4	3A + (+36Vdc)	Vbatt <b>3A</b> [C] 36V	Battery #2 Vdc
	5	1B + (+12Vdc)	Vbatt <b>1B</b> [D] 12V	Battery #8 Vdc
	6	2B + (+24Vdc)	Vbatt <b>2B</b> [D] 24V	Battery #7 Vdc
	7	3B + (+36Vdc)	Vbatt <b>3B</b> [D] 36V	Battery #6 Vdc
	8	4A + (+48Vdc) 4B + (+48Vdc)	Vbatt <b>A/B</b> [C/D] <b>48V</b>	Battery #1 Vdc Battery #5 Vdc

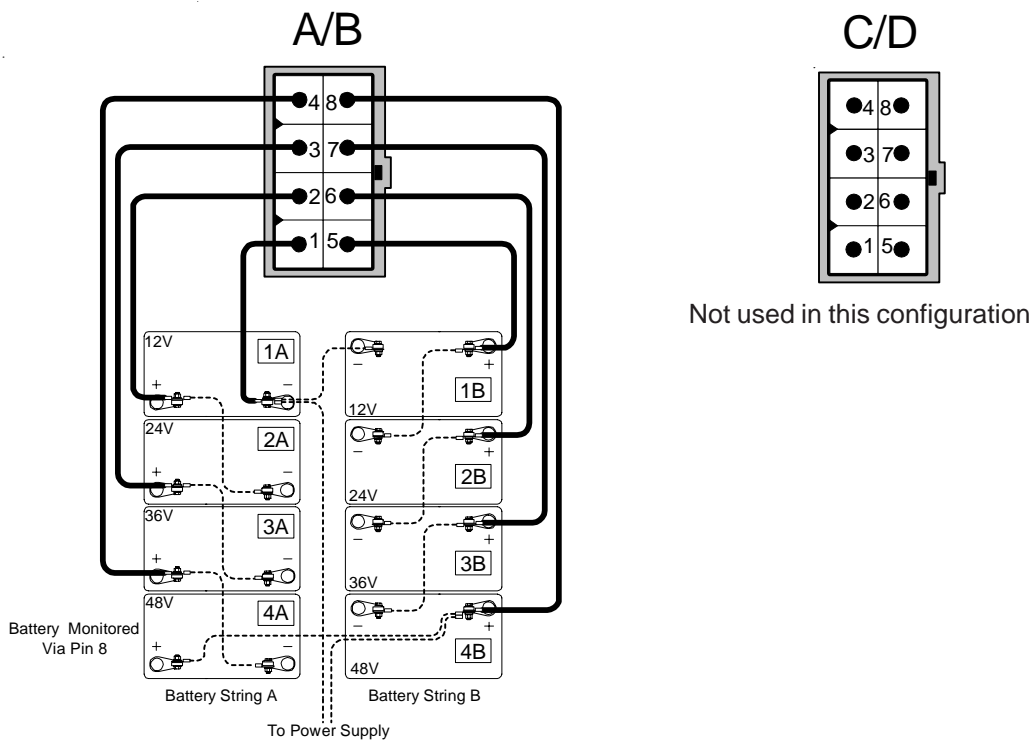


Figure 1-4 Battery Monitor Connections for two 48Vdc battery packs

# 1. Installation

## 1.3 Battery Monitor Connections, *continued*

Connector	Pin #	String Reference	Wire Label	NetMentor Display (48V)
A/B	1	1A - (0Vdc)	<b>A/B</b> [C/D] NEG	
	2	1A + (+12Vdc)	Vbatt <b>1A</b> [C] 12V	Battery #4 Vdc
	3	2A + (+24Vdc)	Vbatt <b>2A</b> [C] 24V	Battery #3 Vdc
	4	3A + (+36Vdc)	Vbatt <b>3A</b> [C] 36V	Battery #2 Vdc
	5			
	6			
	7			
	8	4A + (+48Vdc)	Vbatt <b>A/B</b> [C/D] <b>48V</b>	Battery #1 Vdc

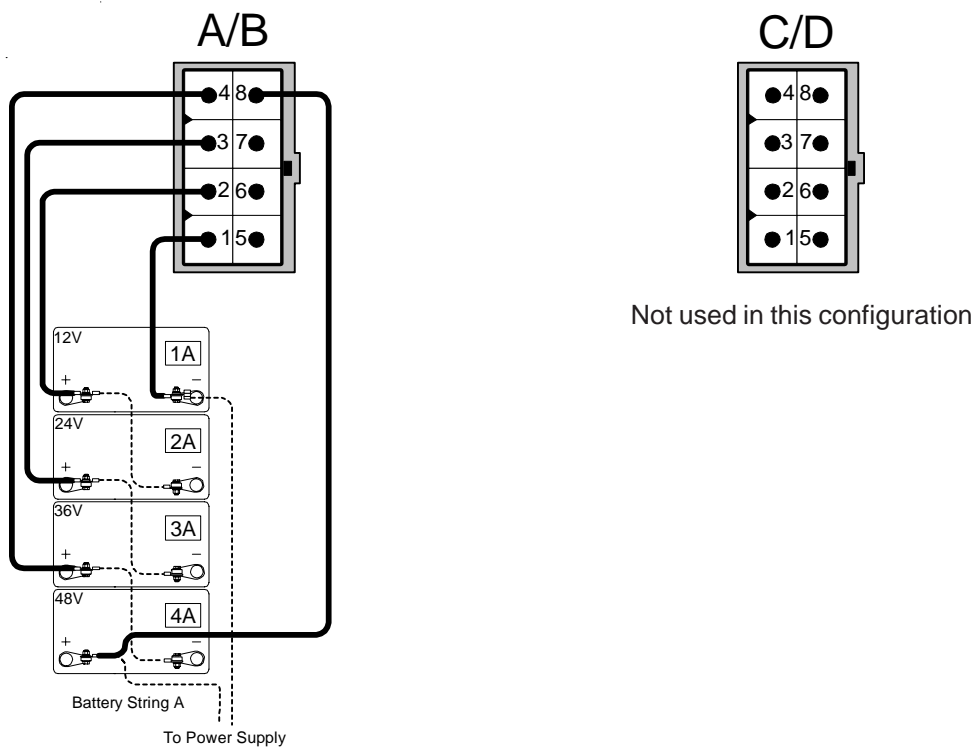


Figure 1-5 Battery Monitor Connections for one 48Vdc battery pack

# 1. Installation

## 1.3 Battery Monitor Connections, *continued*

Connector	Pin #	String Reference	Wire Label	NetMentor Display (36V)
A/B	1	1A - (0Vdc)	<b>A/B</b> [C/D] NEG	
	2	1A + (+12Vdc)	Vbatt <b>1A</b> [C] 12V	Battery #3 Vdc
	3	2A + (+24Vdc)	Vbatt <b>2A</b> [C] 24V	Battery #2 Vdc
	4	3A + (+36Vdc)	Vbatt <b>3A</b> [C] 36V	Battery #1 Vdc
	5			
	6			
	7			
	8			

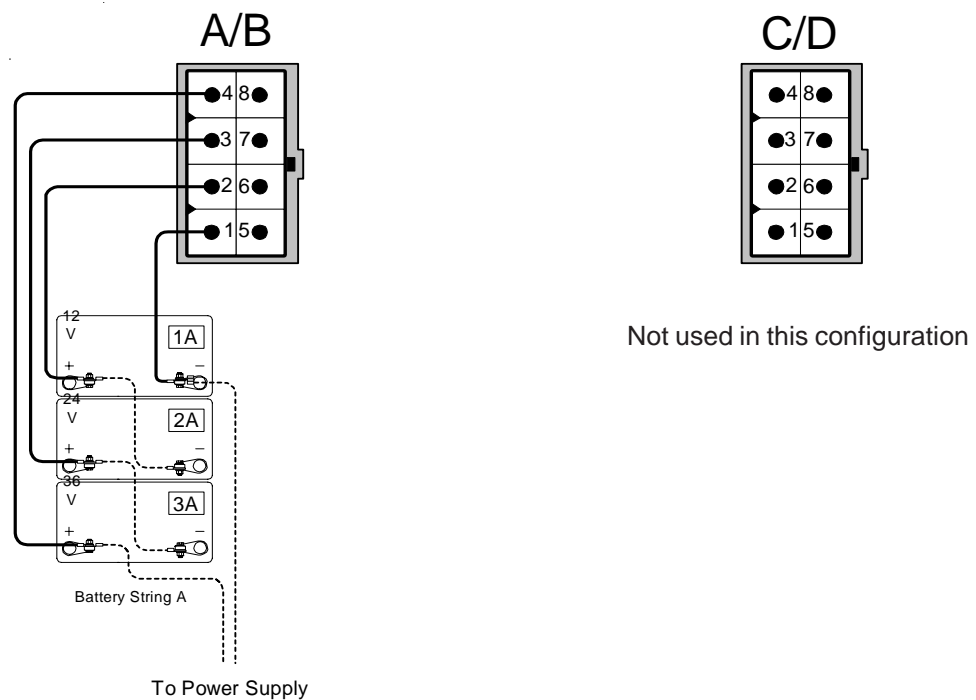


Figure 1-6 Battery Monitor Connections for one 36Vdc battery pack.

# 1. Installation

## 1.3 Battery Monitor Connections, *continued*

Connector	Pin #	String Reference	Wire Label	NetMentor Display (36V)
A/B	1	1A - (0Vdc)	<b>A/B</b> [C/D] NEG	
	2	1A + (+12Vdc)	Vbatt <b>1A</b> [C] 12V	Battery #3 Vdc
	3	2A + (+24Vdc)	Vbatt <b>2A</b> [C] 24V	Battery #2 Vdc
	4	3A + (+36Vdc)	Vbatt <b>3A</b> [C] 36V	Battery #1 Vdc
	5	1B + (+12Vdc)	Vbatt <b>1B</b> [D] 12V	Battery #6 Vdc
	6	2B + (+24Vdc)	Vbatt <b>2B</b> [D] 24V	Battery #5 Vdc
	7	3B + (+36Vdc)	Vbatt <b>3B</b> [D] 36V	Battery #4 Vdc
	8			

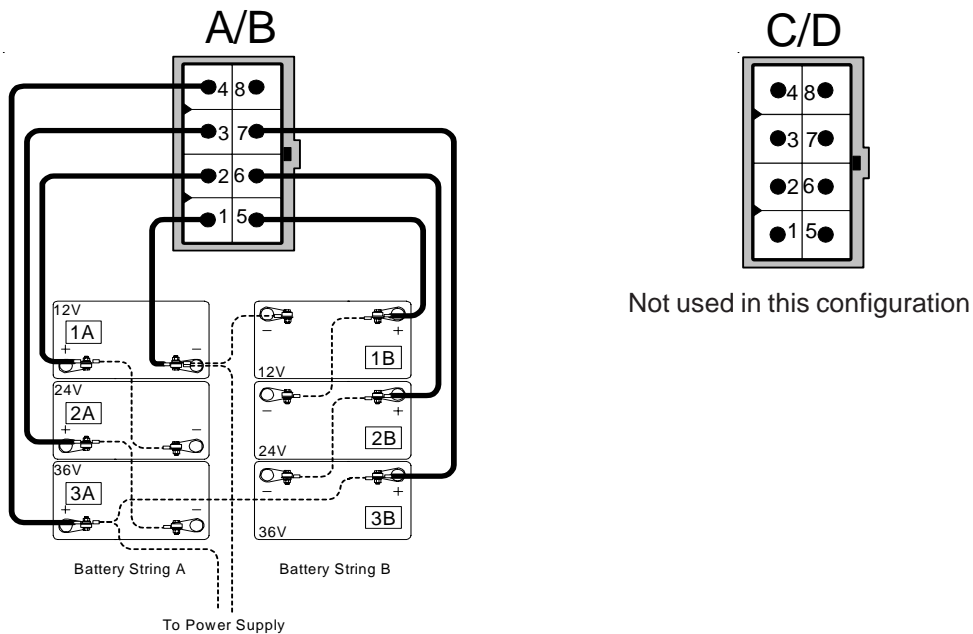


Figure 1-7 Battery Monitor Connections for two 36Vdc battery packs

## 1.3 Battery Monitor Connections, *continued*

Connector	Pin #	String Reference	Wire Label	NetMentor Display (36V)
A/B	1	1A - (0Vdc)	A/B[C/D] NEG	
	2	1A + (+12Vdc)	Vbatt <b>1A</b> [C] 12V	Battery #3 Vdc
	3	2A + (+24Vdc)	Vbatt <b>2A</b> [C] 24V	Battery #2 Vdc
	4	3A + (+36Vdc)	Vbatt <b>3A</b> [C] 36V	Battery #1 Vdc
	5	1B + (+12Vdc)	Vbatt <b>1B</b> [D] 12V	Battery #6 Vdc
	6	2B + (+24Vdc)	Vbatt <b>2B</b> [D] 24V	Battery #5 Vdc
	7	3B + (+36Vdc)	Vbatt <b>3B</b> [D] 36V	Battery #4 Vdc
	8			
C/D	1	1C - (0Vdc)	A/B[C/D] NEG	
	2	1C + (+12Vdc)	Vbatt <b>1A</b> [C] 12V	Battery #9 Vdc
	3	2C + (+24Vdc)	Vbatt <b>2A</b> [C] 24V	Battery #8 Vdc
	4	3C + (+36Vdc)	Vbatt <b>3A</b> [C] 36V	Battery #7 Vdc
	5			
	6			
	7			
	8			

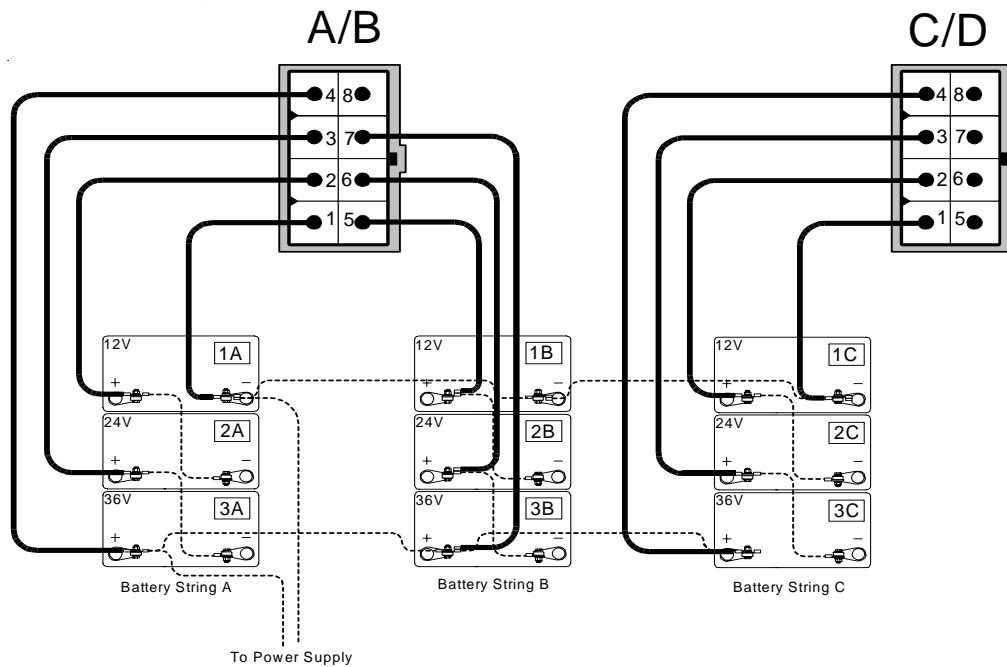


Figure 1-8 Battery Monitor Connections for three 36Vdc battery packs

# 1. Installation

## 1.3 Battery Monitor Connections, *continued*

Connector	Pin #	String Reference	Wire Label	NetMentor Display (36V)
A/B	1	1A - (0Vdc)	A/B[C/D] NEG	
	2	1A + (+12Vdc)	Vbatt <b>1A</b> [C] 12V	Battery #3 Vdc
	3	2A + (+24Vdc)	Vbatt <b>2A</b> [C] 24V	Battery #2 Vdc
	4	3A + (+36Vdc)	Vbatt <b>3A</b> [C] 36V	Battery #1 Vdc
	5	1B + (+12Vdc)	Vbatt <b>1B</b> [D] 12V	Battery #6 Vdc
	6	2B + (+24Vdc)	Vbatt <b>2B</b> [D] 24V	Battery #5 Vdc
	7	3B + (+36Vdc)	Vbatt <b>3B</b> [D] 36V	Battery #4 Vdc
	8			
C/D	1	1C - (0Vdc)	A/B[C/D] NEG	
	2	1C + (+12Vdc)	Vbatt <b>1A</b> [C] 12V	Battery #9 Vdc
	3	2C + (+24Vdc)	Vbatt <b>2A</b> [C] 24V	Battery #8 Vdc
	4	3C + (+36Vdc)	Vbatt <b>3A</b> [C] 36V	Battery #7 Vdc
	5	1D + (+12Vdc)	Vbatt <b>1A</b> [D] 12V	Battery #12 Vdc
	6	1D + (+12Vdc)	Vbatt <b>2A</b> [D] 24V	Battery #11 Vdc
	7	1D + (+12Vdc)	Vbatt <b>3A</b> [D] 12V	Battery #10 Vdc
	8			



**NOTE:**

Only THREE 36V strings can be monitored when using a generator. DO NOT connect a fourth string to the BATT C/D connector if using the generator option.

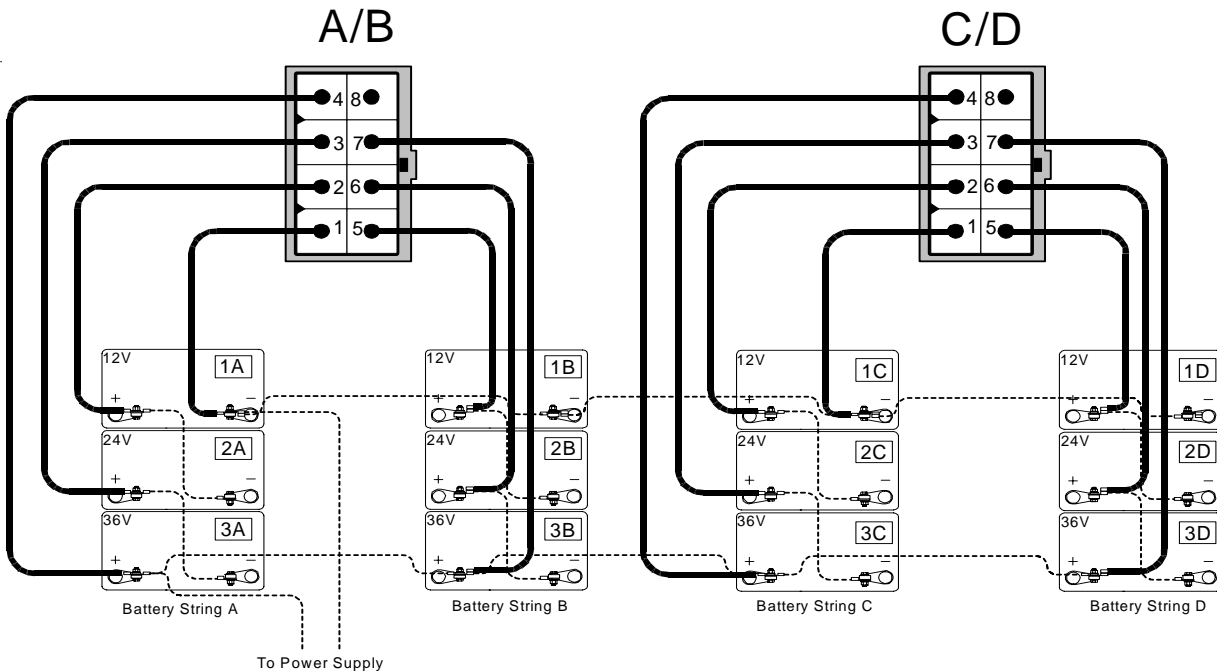


Figure 1-9 Battery Monitor Connections for four 36Vdc battery packs

# 1. Installation

## 1.4 Generator Connection

The Generator Connector provides the Transponder with alarms and status signals. Control signals can also be sent to the generator for test and Run / Stop. Refer to the ECM operation and maintenance manual for further information on the generator connections.

PIN #	Generator connection
1	APU Fail / Major Alarm
2	APU Minor Alarm
3	Engine Alarm
4	Gas Hazard Alarm
5	APU Test Fail Alarm
6	APU Enclosure Alarm
7	Engine Status
8	APU Enclosure Tamper
9	APU Signal Return / ground
10	APU Run / Test Command
11	Run / Test Command Return
12	No Connection

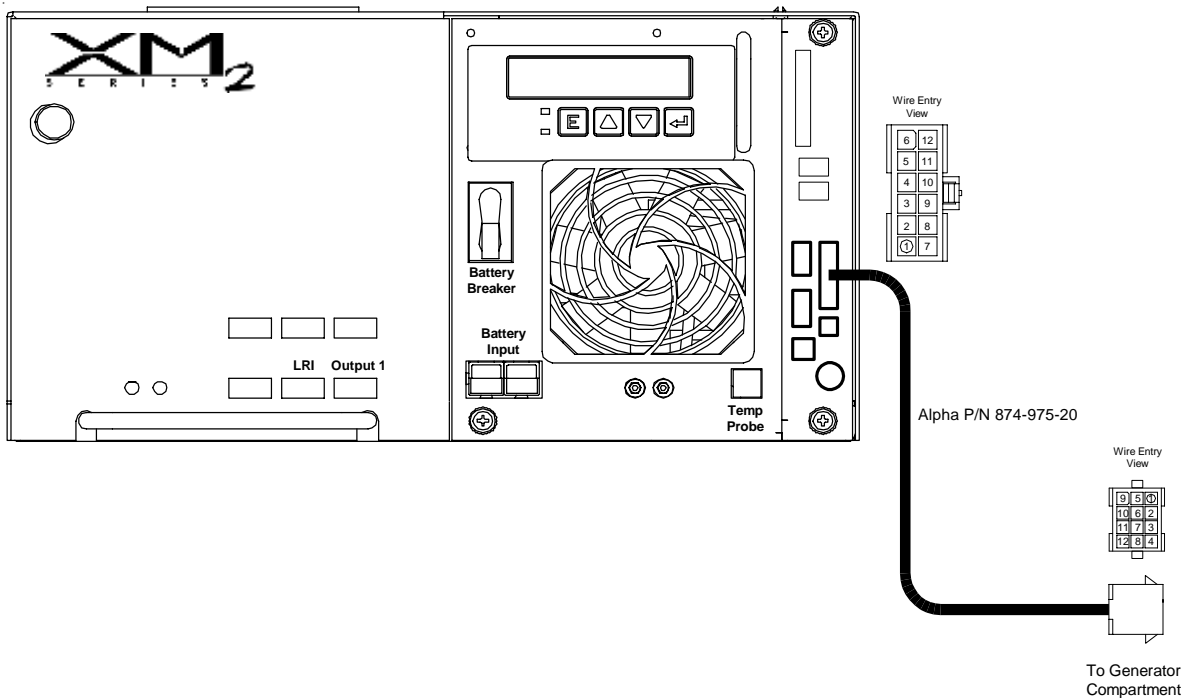


Figure 1-10 Generator monitor connections

# 1. Installation

## 1.5 Generator Ignition Battery Connection

The Generator Battery Connector provides the transponder with voltage information on the Ignition Battery and optional ambient temperature probe.

PIN #	Generator Connection
1	Ignition Battery Negative / Chassis Ground
2	Ignition Battery Positive
3	External Temperature Probe
4	Ignition Battery Negative / Chassis Ground

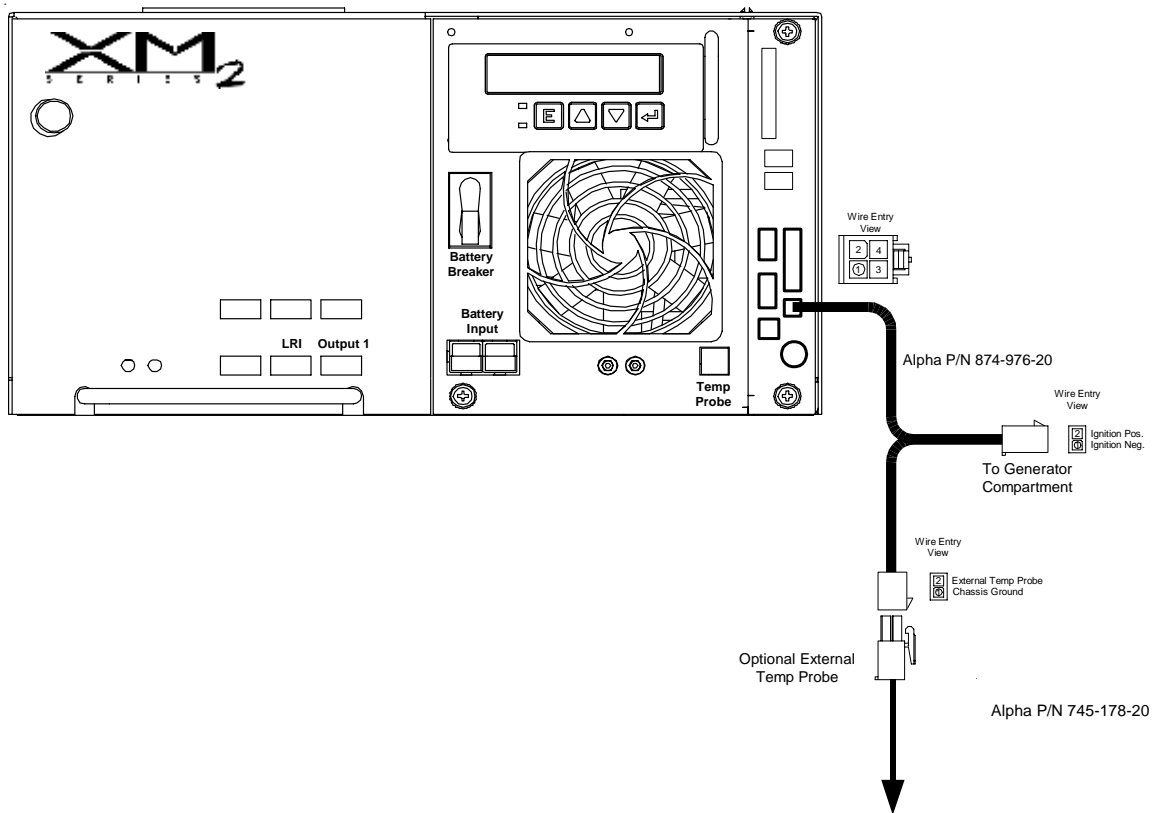


Figure 1-11 Generator Ignition battery connection



# 1. Installation

## 1.6 COMM and RF Connections

The COMM connector allows the technician to bypass the RF modulator and communicate with the transponder through a PC's RS-232 serial port.

The RF connector is the primary I/O port to the head-end modem.

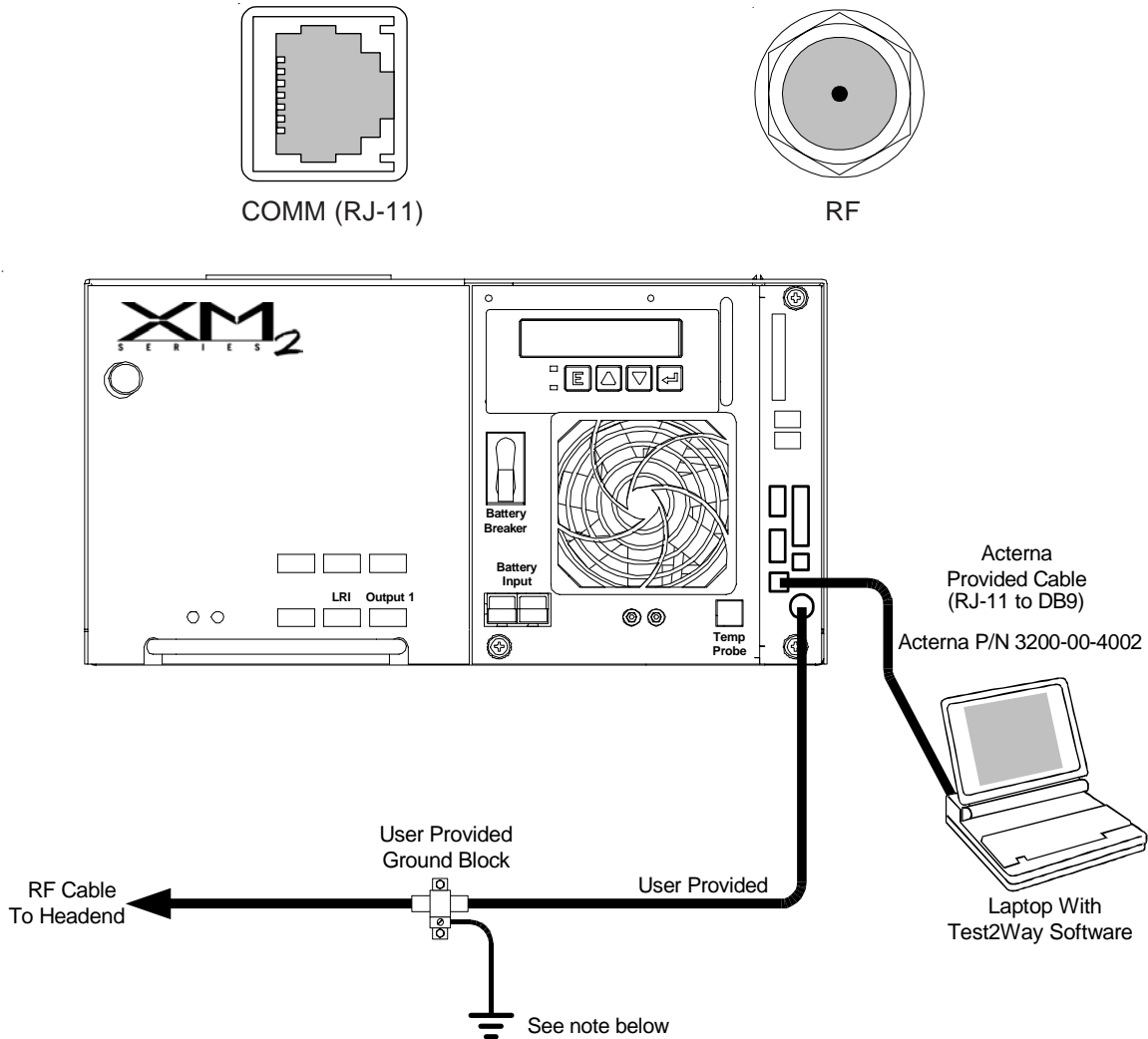


Figure 1-12 COMM / RF connections



**NOTE:** Wire from the ground block **MUST** be connected to the enclosure's grounding lug, or ground bar. Ensure that all connections are clean and bare. Coax **MUST** share the same ground as the power supply.

## 2. Specifications

### 2.1 Channel Parameters

Channel Description	Parameter name	Units	Maj Low	Min Low	Min Hi	Maj Hi	Note
Analog Inputs	Internal Temperature	(C)	0	10	50	60	
Analog Inputs	External Temperature	(C)	0	10	50	60	3
Analog Inputs	AC Output Current 1	(AMPS)	0.5	2	25	25.5	
Analog Inputs	AC Output Current 2	(AMPS)	0.5	2	25	25.5	
Analog Inputs	Battery Voltage #1	(VDC)	10	11	14.4	14.8	
Analog Inputs	Battery Voltage #2	(VDC)	10	11	14.4	14.8	
Analog Inputs	Battery Voltage #3	(VDC)	10	11	14.4	14.8	
Analog Inputs	Battery Voltage #4	(VDC)	10	11	14.4	14.8	
Analog Inputs	Battery Voltage #5	(VDC)	10	11	14.4	14.8	
Analog Inputs	Battery Voltage #6	(VDC)	10	11	14.4	14.8	
Analog Inputs	Battery Voltage #7	(VDC)	10	11	14.4	14.8	
Analog Inputs	Battery Voltage #8	(VDC)	10	11	14.4	14.8	
Analog Inputs	Battery Voltage #9	(VDC)	10	11	14.4	14.8	
Analog Inputs	Battery Voltage #10	(VDC)	10	11	14.4	14.8	
Analog Inputs	Battery Voltage #11	(VDC)	10	11	14.4	14.8	
Analog Inputs	Battery Voltage #12	(VDC)	10	11	14.4	14.8	
Analog Inputs	Generator Battery	(VDC)	10	11	14.4	14.8	
Analog Inputs	AC Output Voltage	(VAC)	50	55	95	98	
Analog Inputs	AC Input Voltage	(VAC)	95	100	125	128	2
Analog Inputs	AC Input Voltage	(VAC)	200	210	245	255	4
		Hi State	Lo State				
Digital input	Standby Mode	Normal	Standby				
Digital input	Tamper Switch	Open	Closed				
Digital input	Output Fail Alarm	Normal	Alarm				
Digital input	General Alarm	Normal	Alarm				1
Digital input	APU Test Fail	Alarm	Normal				1
Digital input	Engine Status	OFF	ON				1
Digital input	APU Fail / ECM	Alarm	Normal				1
Digital input	APU Response	Alarm	Normal				1
Digital input	Gas Hazard Alarm	Alarm	Normal				1
Digital input	APU Engine Alarm	Alarm	Normal				1
Digital input	Generator Enclosure	Open	Closed				1
Digital input	Generator Tamper	Closed	Open				1
Digital output	Standby ON / OFF	OFF	ON				
Digital output	Equalize ON / OFF	OFF	ON				
Digital output	Engine ON / OFF	OFF	ON				
Note 1 - Generator							
Note 2 - AC Input 120 VAC Models							
Note 3 - External Temperature							
Note 4 - AC Input 240 VAC Models							

Table 2-1 Channel Parameters

## 3.1 Testing and Troubleshooting

### Testing

All testing shall be performed via Acterna's NetMentor and Test2way software. Refer to software manufacturer's instructions.

### Troubleshooting

Problem: Missing parts or shipping damage.  
Solution: Contact Alpha Technologies at:

Alpha Technologies, Inc.  
3767 Alpha Way  
Bellingham, WA. 98226  
360-647-2360

Problem: Unable to communicate with transponder.  
Solution: Check port assignments, cables, and RPS name / port.

Problem: Incorrect device type selected when adding unit.  
Solution: Check the device type in the Device Configuration screen (NetMentor).

Problem: Incorrect address.  
Solution: Verify address in the Device Configuration screen (NetMentor).

Problem: Incorrect controller frequencies.  
Solution: Verify frequencies on the HEC port configuration screen.

Problem: Incorrect signal level.  
Solution: Verify forward and return signals are within Acterna specifications. Padding may have to be added or removed.

Problem: Unable to communicate with NetMentor.  
Solution: Verify that the transponder is not in 'R' mode. Use laptop computer running 'Test2Way' to verify what code is running.

If the CPU LED is on steady, unit is in 'R-code', if the LED is flashing, unit is in 'P-code' (normal operation).

## 4. Part Numbers

### 4.1 Cable Kit Options

#### Combination Kits

<u>Part Number</u>	<u>Description</u>
745-181-20	Combo Batt Sense Kit, 1x36V, w/ Gen Interface
745-197-23	Combo Batt Sense Kit, 2x36V, w/ 35' Ext.
745-197-22	Combo Batt Sense Kit, 3x36V, w/ 2x35' Ext.
745-198-21	Combo Batt Sense Kit, 3x36V, 1 @ 6', 2 @ 9'
745-180-20	Combo Batt Sense Kit, 4x36V, w/ 2x35' Ext.
745-182-20	Combo Batt Sense Kit, 4x36V, 2 @ 6', 2 @ 9'
745-246-20	Combo Batt Sense Kit, 1x48V, w/ Gen Interface
745-197-20	Combo Batt Sense Kit, 2x48V, w/ 35' Ext.
745-197-21	Combo Batt Sense Kit, 3x48V, w/ 2x35' Ext.
745-198-20	Combo Batt Sense Kit, 3x48V, 2 @ 6', 1 @ 9'
745-245-20	Combo Generator Xpdr Wire Kit

#### Individual Kits

<u>Part Number</u>	<u>Description</u>
874-842-21	Wire Kit, Battery Sense, 1x36V, 6'
874-842-20	Wire Kit, Battery Sense, 2x36V, 6'
874-842-27	Wire Kit, Battery Sense, 1x36V, 9'
874-842-28	Wire Kit, Battery Sense, 2x36V, 9'
874-841-21	Wire Kit, Battery Sense, 1x48V, 6'
874-841-20	Wire Kit, Battery Sense, 2x48V, 6'
874-841-25	Wire Kit, Battery Sense, 1x48V, 9'
874-841-24	Wire Kit, Battery Sense, 2x48V, 9'
874-841-23	Extension Wire Kit, Battery Sense, 6'
874-841-22	Extension Wire Kit, Battery Sense, 35'
874-975-20	Emb. Transponder Generator Interface Wire Kit
874-976-20	Emb. Transponder Ignition Battery Wire Kit

#### Ribbon Cable Kits (for spare parts or replacement)

<u>Part Number</u>	<u>Description</u>
874-992-20	Wire Assy, Ribbon Cable, 14p, Int/Ext, USM2.5
875-045-20	Wire Assy, Ribbon Cable, 14p, 3 Skt, Int/Ext, USM2.5

#### Dual Power Supply Monitor Conversion Kit

<u>Part Number</u>	<u>Description</u>
745-238-20	Kit, 1Xpndr, 2Pwr Sply, Interconn, XMS2

Table 4-1 Cable kit part numbers







# Power

[www.alpha.com](http://www.alpha.com) Protecting The Power in Communications.

#### **Corporate**

Alpha Technologies  
3767 Alpha Way  
Bellingham, WA 98226

#### **USA**

Tel: (360) 647-2360  
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