

**Lucent Technologies**  
Bell Labs Innovations



***Thermal Probe Multiplexer  
210E Control Module  
J85501X-1 List K30***

Product Manual  
Select Code 157-010-202  
Comcode 108001728  
Issue 4  
August 2000  
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***Lucent Technologies***  
***Thermal Probe Multiplexer***  
***210E Control Module***  
***J85501X-1 List K30***

**Notice:**

The information, specifications, and procedures in this manual are subject to change without notice. Lucent Technologies assumes no responsibility for any errors that may appear in this document.



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# ***1 Introduction***

## ***210E***

This product manual (Select Code 157-010-202) describes the J85501X-1 List K30 Thermal Probe Multiplexer Module 210E Control Unit. This module was designed for customers who wish to expand the thermal management capability of their 24V and 48V CPS, Millennium system, or Vector system.

## ***Applications***

Up to 8 thermal probes can be connected to a 210E module. The 210E monitors the temperature of the probes and provides the highest temperature to its output. The output of the 210E Thermal Probe Multiplexer (TPM) is equivalent to the output of the 10K standard thermistor thermal probe used with a Lucent Technologies Cabinet Power System and Millennium or Vector Controller.

Number of 210E modules allowed:

- CPS 2000: One per system
- CPS 4000: Two per system
- Millennium System: One connected to controller and one for each bay with a BLJ board
- Vector System: Up to three connected to each bay with a BLJ board

Note: Using the maximum number of probes allowed provides the best temperature protection for a battery system.

## ***Customer Assistance Contacts***

### ***Customer Training***

Lucent Technologies offers customer training on many Power Systems products. For information call 1-972-284-2163. This number is answered from 8:00 a.m. until 4:30 p.m., Central Time Zone (Zone 6), Monday through Friday.

### ***Customer Service***

For customers in the United States, Canada, Puerto Rico, and the US Virgin Islands, call 1-800-THE-1PWR (1-800-843-1797). Services provided through this contact include initiating the spare parts procurement process for out of service emergencies, ordering Lucent Technologies documents, and providing other product and service information.

For other customers worldwide, call 001-972-840-0382. This number is answered from 8:00 a.m. until 4:30 p.m., Central Time Zone (Zone 6), Monday through Friday.

### ***Technical Support***

Technical support for Lucent Technologies customers is available around the world during the normal product warranty period and also while specific contractual agreements extend this service.

For customers in the United States, Canada, Puerto Rico, and the US Virgin Islands, call 1-800-CAL-RTAC (1-800-225-7822) to contact a product specialist to answer your technical questions and assist in troubleshooting problems.

For other customers worldwide, contact your local field support center or your sales representative to discuss your specific needs.

### ***Product Repair and Return***

Repair and return service is provided for Lucent Technologies customers around the world.

For customers in the United States, Canada, Puerto Rico, and the US Virgin Islands, call 1-800-255-1402 for information on returning of products for repair.

For other customers worldwide, contact your sales representative to discuss your particular circumstances.

***Warranty Service***

For domestic warranty service, contact your Warranty Service Manager (WSM). For international warranty service, contact your sales representative.

***On-Line Power  
Systems Product  
Manuals***

For Lucent Technologies users logging in from inside the corporate firewall, the address of the “Power Systems On-Line Product Manuals” page is  
<http://www.cic.lucent.com/lineage.html>.

For customers logging in from outside the firewall, the address is <http://www.lucent8.com/lineage.html>. The annual subscription fee for access to this site is \$25. To obtain a password, follow the instructions on-line or call 1-888-Lucent8 (1-888-582-3688). When prompted for an order number, enter or say “167-790-010.”

***On-Line Power  
Systems Software  
Upgrades***

EasyView software upgrades are on-line at  
<http://www.lucent.com/networks/power/software.html>.

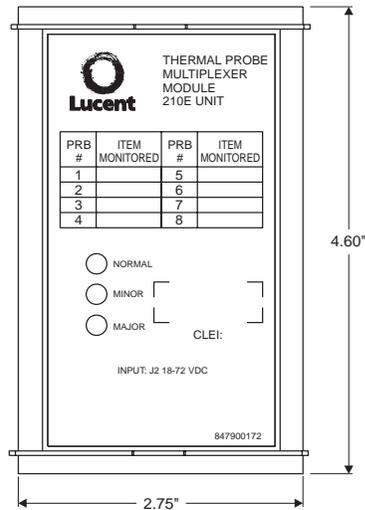


## 2 *Product Description*

### *Overview*

The 210E Thermal Probe Multiplexer Module provides three LEDs for status: Normal, Major, and Minor (see Figure 2-1). The 210E terminal block provides connections for up to 8 thermal probe assemblies.

The 210E is powered from the battery plant. A cable assembly for installing the 210E is provided in kit K30 (see Section 3, *Ordering Information.*) The input power to the 210E must be fused in the hot lead.



**Figure 2-1: 210E Thermal Probe Multiplexer Module**

## Block Diagrams

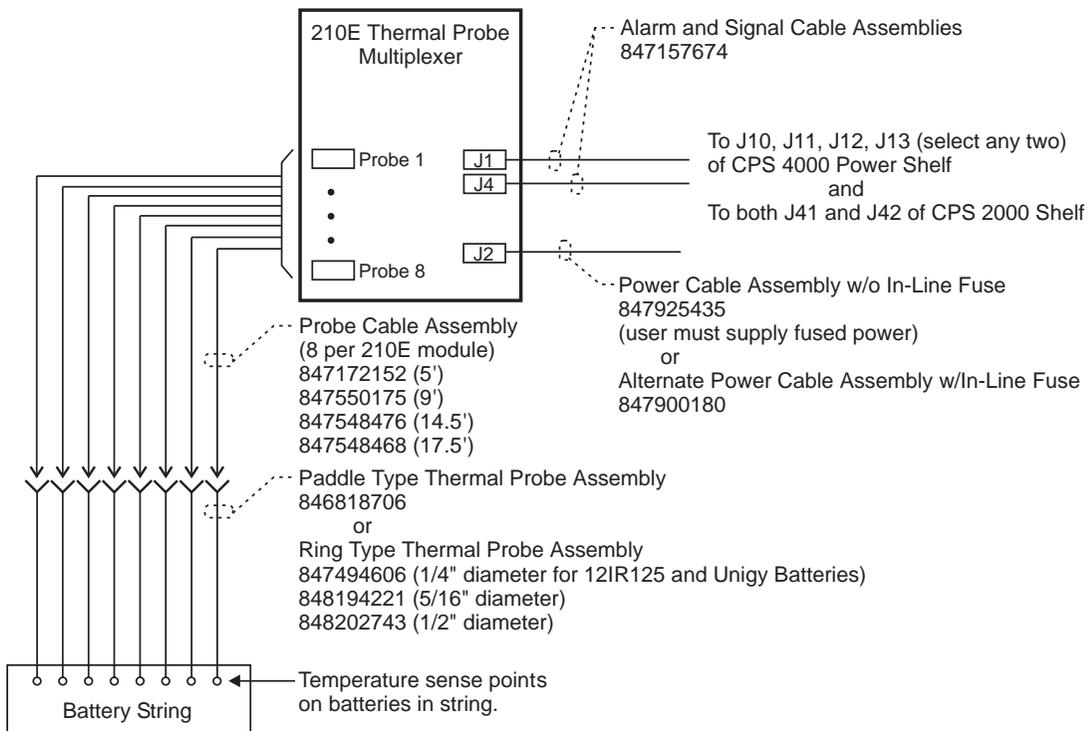
### CPS (Cabinet Power System)

Figure 2-2 is a typical block diagram of a Cabinet Power System (CPS) using the 210E Thermal Probe Multiplexer.

Thermal Probe Assemblies are routed from the Battery String through the 210E Thermal Probe Multiplexer to the CPS to expand its thermal management capability.

CPS 2000: Only one 210E module can be used per system.

CPS 4000: Two 210Es can be used per system.



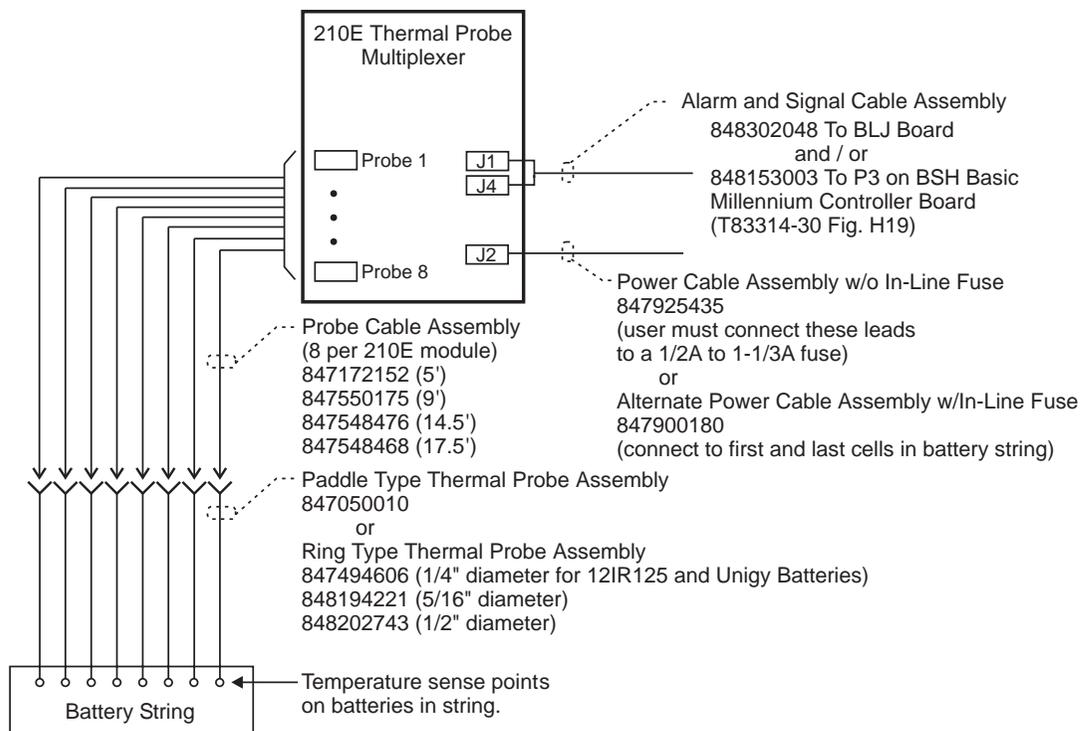
**Figure 2-2: Typical System Block Diagram for CPS Applications**

**Millennium  
Controller**

Figure 2-3 is a typical block diagram of a Millennium Controller using the 210E Thermal Probe Multiplexer.

Thermal Probe Assemblies are routed from the Battery String through the 210E Thermal Probe Multiplexer to the Millennium Controller to enable its thermal management capability

One 210E can be connected directly to the BSH board on the Millennium controller. An additional 210E can be connected to each bay in the system that has a BLJ board.



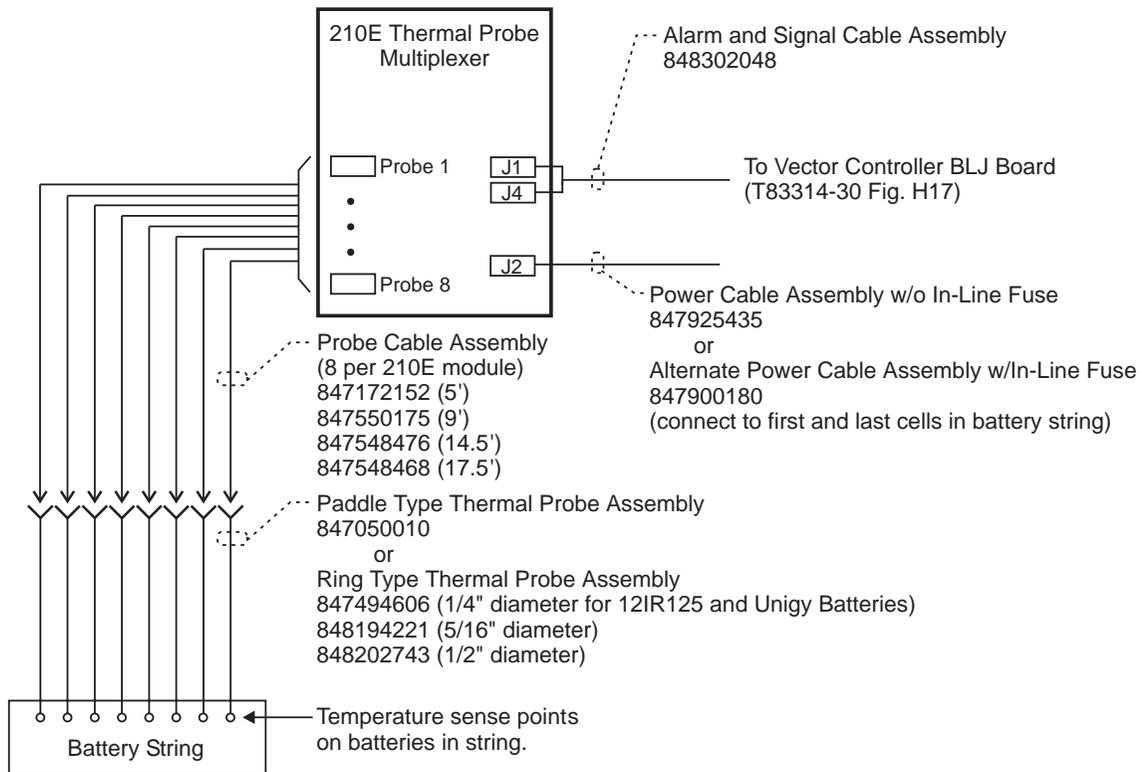
**Figure 2-3: Typical System Block Diagram for  
Millennium Controller System**

**Vector Controller**

Figure 2-4 is a typical block diagram of a Vector Controller using the 210E Thermal Probe Multiplexer.

Thermal Probe Assemblies are routed from the Battery String through the 210E Thermal Probe Multiplexer to the Vector Controller to enable its thermal management capability.

Up to three 210Es can be connected to the BLJ board in each bay in a Vector system.



**Figure 2-4: Typical System Block Diagram for Vector Controller System**

## Operations

Under normal conditions, the 210E Control Unit monitors all eight thermal probe inputs and provides a resistance associated with the highest temperature probe at its output. The 210E Control Unit will issue a minor alarm if it detects either an open or shorted probe(s) on any of the eight inputs. If a defective probe is detected, the 210E ignores the defective probe and continues to monitor the remaining probes.

Table 2-A outlines the operations of the 210E TPM.

**Table 2-A: 210E Operations**

Condition	Module Operation	Operation	Controller LEDs
No probes plugged into the TPM	Normal LED, no alarms	No thermal compensation from 210E	Probe Fail and Minor LEDs
More than 1 probe plugged into TPM; one probe open	Minor LED	TPM outputs the highest remaining temperature probe	Probe Fail and Minor LEDs
More than 1 probe plugged into TPM; one probe shorted	Minor LED	TPM outputs the highest remaining temperature probe	Probe Fail and Minor LEDs
TPM micro-processor failure	Major LED	No thermal compensation from 210E	Probe Fail, Minor, and Major LEDs
TPM loss of power	No LEDs	No thermal compensation from 210E	Probe Fail, Minor, and Major LEDs

## Specifications

**Table 2-B: 210E Specifications**

Number of Thermistor Inputs	8
Input Voltage Range	18Vdc to 60Vdc (must be fused by .5A to 1-1/3A fuse in the hot lead)
Input Current	50mA @ 27Vdc 25mA @ 54Vdc
Operating Temperature Range	-40° to +167° Fahrenheit (-40° to +75° Celsius)
Alarm Relay Contact Ratings	2A @ 30Vdc or .3A @ 110Vdc
Alarm Relay Thresholds	Shorted probe resistance: ≤ 100 ohms (179°C) Open probe resistance: ≥ 178 k-ohms (-30°C)
Measurable Temperature Range of Input Thermistors	37° to 248° Fahrenheit (-3° to 120° Celsius)
TPM Output Resistance Range	400 ohms to 38 K ohms
Output Resistance Accuracy	± 3 degrees Celsius @ system ambient temperatures of 32° to 131° Fahrenheit (0° to 55° Celsius) ± 4 degrees Celsius @ -40° to 0 and 55° to 75° Celsius
Product Warranty	24 Months
Maximum Applied Voltage to 210E's Resistance	J1 pin 4 voltage must be positive with respect to J1 pin 5, and must not exceed +5Vdc with respect to ground (J1 pin 2).

# **3                      *Ordering***

## ***Introduction***

Table 3-A provides ordering information for the 210E Thermal Probe Multiplexer. Table 3-B lists available spare parts. Table 3-C gives references for associated documentation.

Refer to these GPS Ordering Guides for 210E application materials in these systems:

- H569-434 GPS 4848
- H569-436 GPS 4812
- H569-437 GPS 2424

## ***210E and Cable Assemblies***

**Table 3-A: 210E Ordering Information**

<b>Part No.</b>	<b>Description</b>
J85501X-1 List K30 (108298514)	Equipment and wiring to provide one Thermal Probe Mutliplexer Kit. Includes the following: 1 - 210E Control Unit 1 - Terminal Block Assembly 1 - Mounting Bracket 1 - Velcro Hook and Loop Set 1 - Power Cable Assembly w/o In-Line Fuse (847925435) (input power required for power plant applications where an ABS power supply is not available) 2 - Alarm/Signal Cable Assemblies (847157674) 2 - Cable Ties 1 - 6/32 Screw 1 - 1/4-20 x 5/8 Screw 2 - 12-24 x 5/8 Screws 2 - 1/4 x 20 Nuts
847925435	Power Cable Assembly without In-Line Fuse, Input Power (included in K30)
847900180	Power Cable Assembly with In-Line Fuse, Input Power
847157674	Alarm/Signal Cable Assembly for CPS 2000 and CPS 4000 shelves. Two required per 210E. (included in K30)
848153003	Alarm/Signal Cable Assembly for connecting to Millennium BSH board. One required per 210E.
848302048	Alarm/Signal Cable Assembly for connecting to Millennium or Vector BLJ board. One required per 210E.
846818706	Paddle Thermal Probe Assembly
847494606	1/4 in. Ring Terminal Thermal Probe Assembly
848202743	1/2 in. Ring Terminal Thermal Probe Assembly
848194221	5/16 in. Ring Terminal Thermal Probe Assembly
847172152	5 ft. Thermal Probe Cable Assembly
847550175	9 ft. Thermal Probe Cable Assembly
847548476	14.5 ft. Thermal Probe Cable Assembly
847548468	17.5 ft. Thermal Probe Cable Assembly

## *Spare Parts*

**Table 3-B: Spare Parts**

<b>Part Number</b>	<b>Qty</b>	<b>Description</b>
107789513	1	Replacement 210E Control Unit
847757382	1	Replacement Terminal Board Assembly

## *Documentation References*

**Table 3-C: Documentation References**

<b>210E Thermal Probe Multiplexer</b>	
Assembly and Ordering Drawing	J85501X-1
Product Manual Select Code	157-010-202
Wiring Document	T83199-30
<b>Cabinet Power System</b>	<b>Product Manual Select Code</b>
24-Volt Cabinet Power System J85500N-1	167-790-071
48-Volt Cabinet Power System J85500R-1	167-102-100
CPS 2000 Cabinet Power System	167-102-101
CPS 4024 Cabinet Power System	167-102-120
<b>Millennium or Vector Controller Applications</b>	<b>Ordering Document</b>
GPS 2424	H569-437
GPS 4812	H569-436
GPS 4848	H569-434
Wiring for GPS	T83314-30



# **4**                      ***Installation***

## ***Introduction***

This section provides procedures for assembling and mounting the 210E Thermal Probe Multiplexer module and for installing the 210E in a Lucent Technologies Cabinet Power System (CPS), a Millennium Controller system, and a Vector Controller system.

## ***Safety***

Cabinet Power Systems and Galaxy Power Systems must be installed, serviced, and operated only by skilled and qualified personnel who have the necessary knowledge and practical experience with electrical equipment and who understand the hazards that can arise when working on this type of equipment. Refer to the CPS and GPS product manuals for a more detailed discussion of safety statements and symbols.

### **Caution**

Observe the following ESD (Electrostatic Discharge) precautions:

- Wear grounded antistatic wrist straps when handling all circuit packs.
- The wrist strap must contact the skin and is not to be worn over clothing.
- Never hand a circuit pack from a grounded to a non-grounded person or vice-versa.

Electricity produces magnetic fields that can affect implanted medical electronic devices, such as pacemakers. The strength of the magnetic field depends on the amount of current in the circuit, as well as other conditions (such as number of conductors, placement, and distance from the conductor). DC power and distribution systems, including the batteries, that are

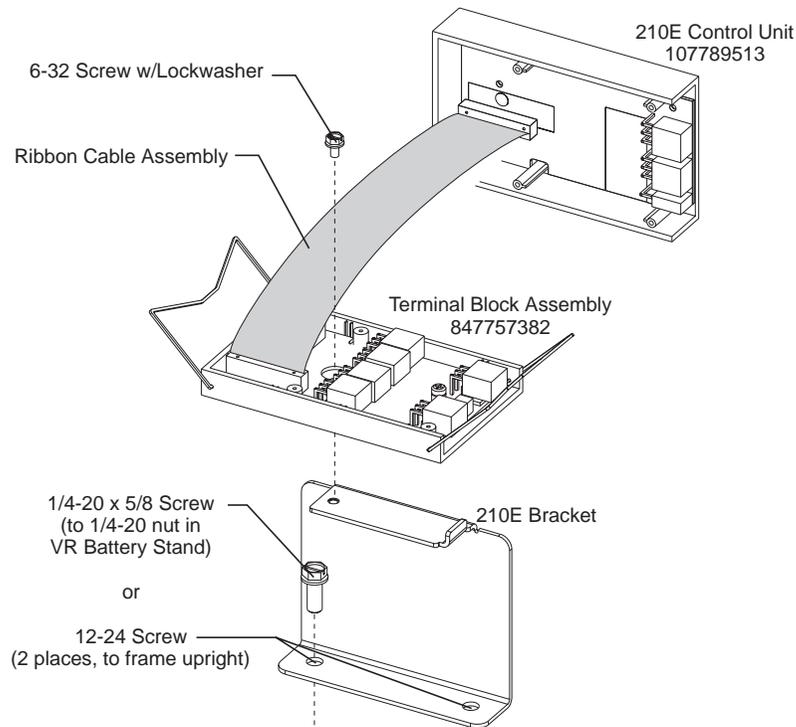
typically used in telecommunications utility rooms can operate at high current levels. Personnel with electronic medical devices need to be aware of their restrictions when working around electricity.

## ***Assembling and Mounting a 210E***

### ***Terminal Block Assembly***

Figure 4-1 shows the 210E Control Unit, Terminal Block Assembly, and the Bracket that is used to mount the terminal block to a Lucent Technologies battery stand.

1. Attach the Bracket to any one of the available 1/4-20 nuts in the VR Battery Stand.
2. Attach the base of the Terminal Block Assembly to the Bracket with a 6-32 screw.



***Figure 4-1: 210E Control Unit, Terminal Block, and Module Bracket***

### ***Thermal Probe Assemblies***

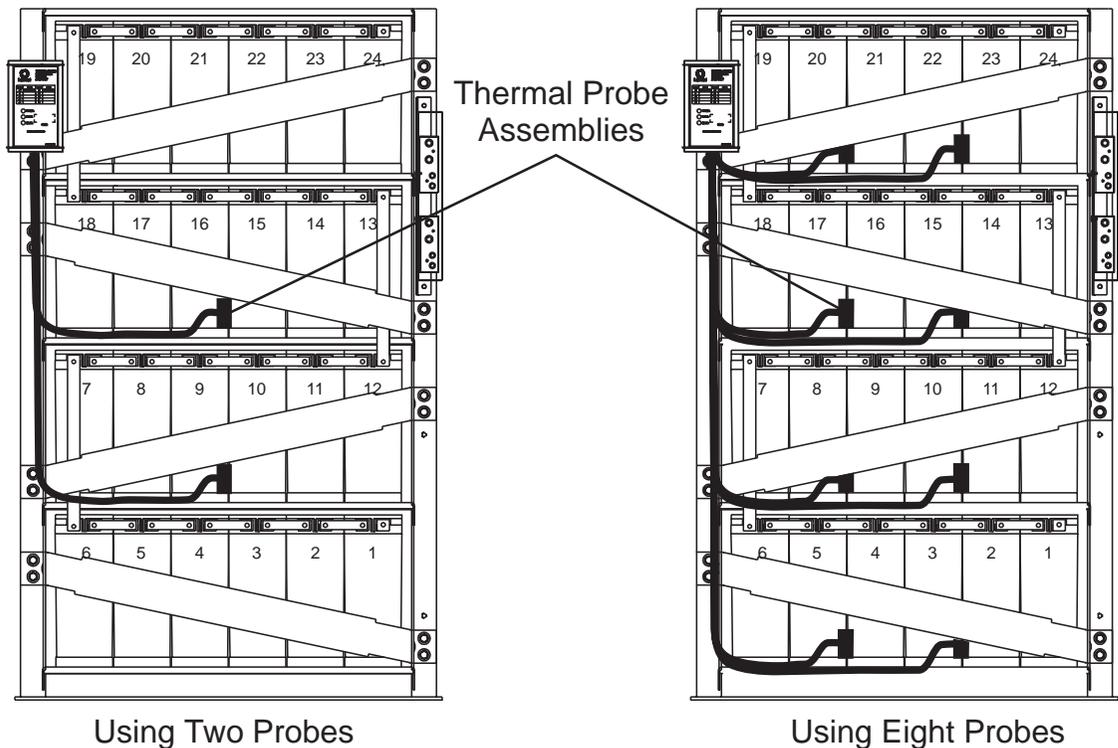
Thermal probe assemblies are used to monitor battery temperatures. The controller adjusts system voltage based on the highest battery temperature detected by the probes. The best thermal monitoring coverage of the battery strings is provided by using the maximum number of probes a system allows.

Regardless of the number of probes used, they should be evenly distributed among the batteries. As an example, Figure 4-2 shows the use of probes with Lucent Technologies VR batteries.

Insert the paddle-type Thermal Probe Assemblies or attach ring-type Thermal Probe Assemblies to the batteries to be monitored.

#### **Note**

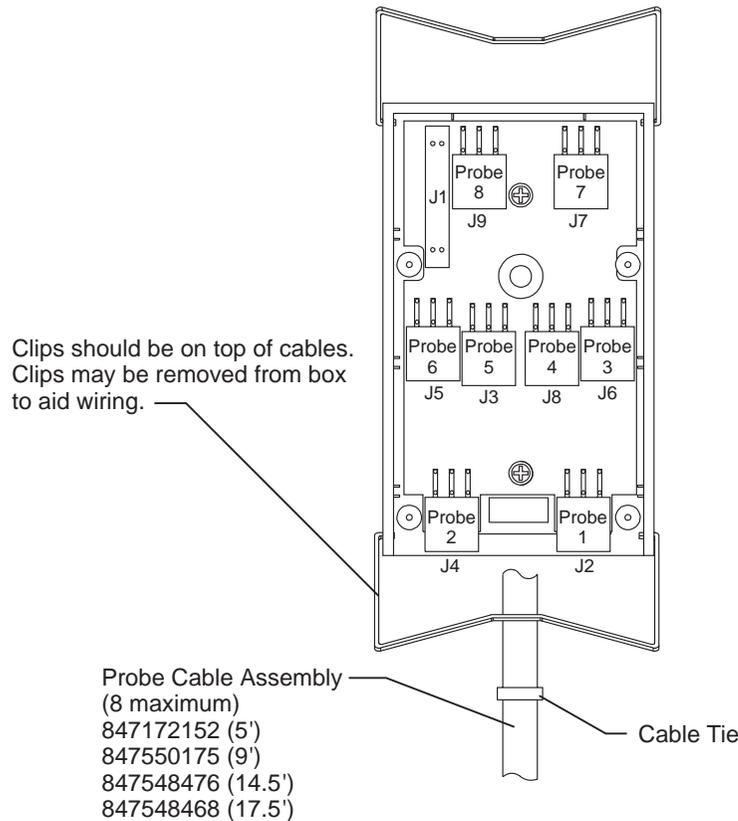
Before connecting ring terminal thermal probes to the battery post, disconnect the batteries and take off line.



***Figure 4-2: Probe Assembly Distribution***

**Probe Cable Assembly**

Once the Terminal Block is mounted and the Thermal Probe Assemblies are installed, attach one end of the Probe Cable Assembly to the probe and the other end to any one of the 8 probe connectors provided on the Terminal Block. (See Figure 4-3.)



**Figure 4-3: Terminal Block Probe Cable Assembly**

**Ribbon Cable Assembly**

1. Using care to properly align the ribbon cable with J1 on the terminal block, plug the Ribbon Cable Assembly of the Control Unit into the Terminal Block. (See Figure 4-1.)
2. Close the two halves of the 210E together, securing them with two fold-over clips. Clips may be removed to aid wiring, and then reattached.

## ***Installing a 210E in a Power System***

### ***Cables Required***

The following list provides the cables required to connect a 210E to a power system:

#### **CPS 2000**

- One Power Cable Assembly
- Two Alarm/Signal Cable Assemblies

#### **CPS 4000**

- One Power Cable Assembly
- Two Alarm/Signal Cable Assemblies

#### **Millennium Systems**

- One Power Cable Assembly
- One Alarm/Signal Cable Assembly

#### **Vector Systems**

- One Power Cable Assembly
- One Alarm/Signal Cable Assembly

### ***Alarm/Signal Cable Assemblies***

All Alarm/Signal Cable Assemblies are connected to a 210E module at J1 and J4. Refer to Figure 4-4.

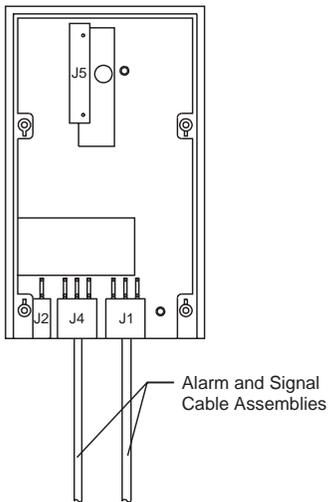
#### **CPS 2000**

1. Connect an Alarm/Signal Cable Assembly (847157674) from J1 of the 210E to J41 on the CPS shelf.
2. Connect a second Alarm/Signal Cable Assembly (847157674) from J4 of the 210E to J42 on the CPS shelf.

#### **CPS 4000**

1. Connect an Alarm/Signal Cable Assembly (847157674) from J1 of the 210E to J10, J11, J12, or J13 (select any one) on the CPS shelf.
2. Connect a second Alarm/Signal Cable Assembly (847157674) from J4 of the 210E to J10, J11, J12, or J13 (select any remaining one) on the CPS shelf.

Note: The remaining two J-positions on the shelf can be used for installing a second 210E.



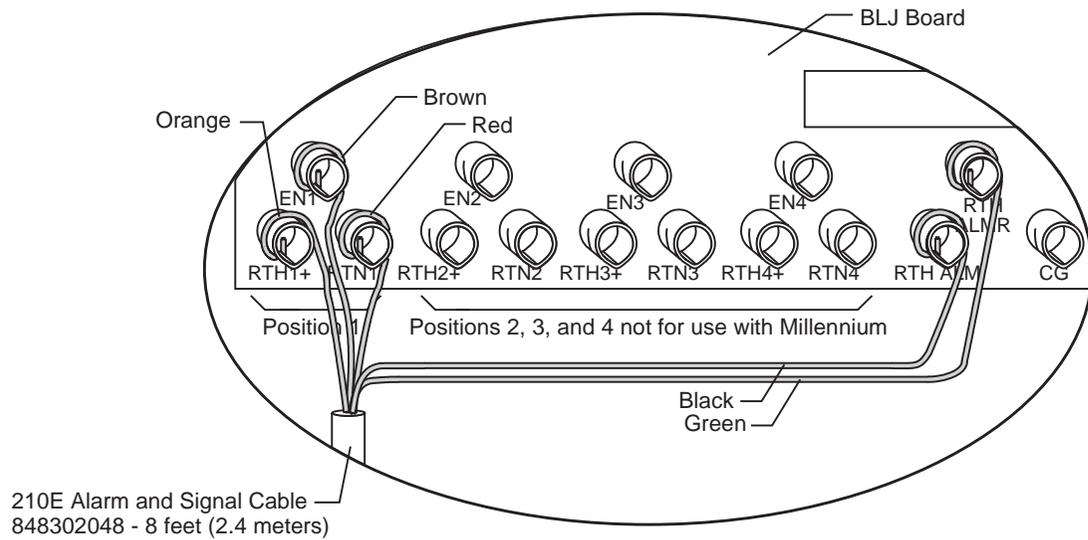
**Figure 4-4: Alarm/Signal Cable Assemblies Connection to 210E**

### Millennium Systems

One 210E can be connected directly to the BSH board on the Millennium controller. An additional 210E can be connected to each bay in the system that has a BLJ board. Two Alarm/Signal Cable Assemblies are available, one for BSH connections and one for BLJ connections. Refer to your system manual for the location of the BLJ board.

Note: If using Battery Reserve Time Prediction feature of the controller, you must use the 848153003 Alarm/Signal Cable Assembly

1. Connect the 848153003 Alarm/Signal Cable Assembly from J1 and J4 of the 210E to P3 on the BSH board to enable the feature.
2. Connect the 848302048 Alarm/Signal Cable Assembly from J1 and J4 of the second 210E to the BLJ terminal board as shown in Figure 4-5.

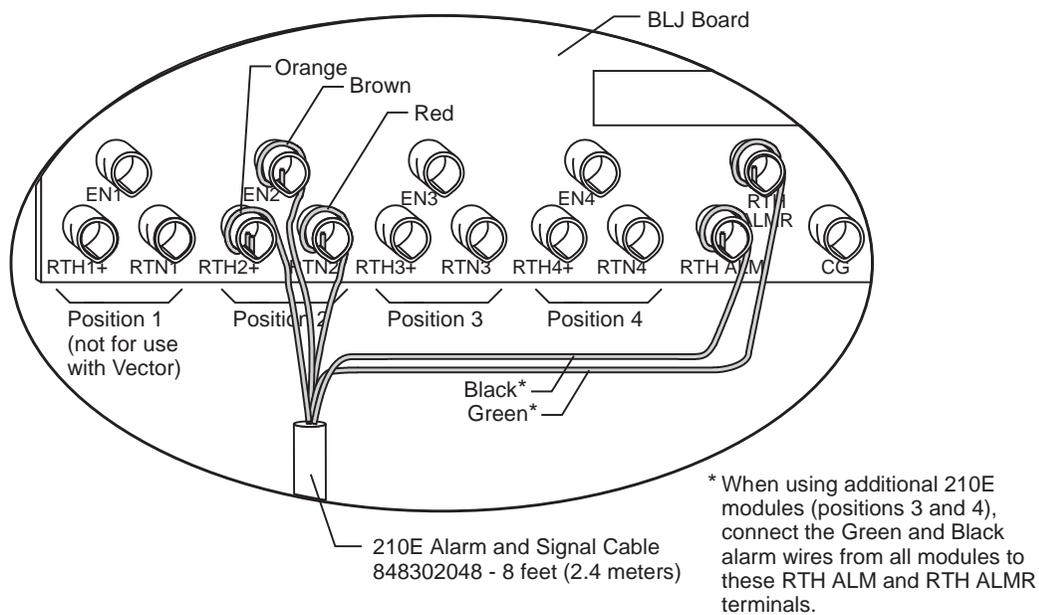


**Figure 4-5: Alarm/Signal Cable Assembly Connections to Millennium BLJ Board**

### Vector Systems

Up to three 210Es can be connected to the BLJ board in each bay in a Vector system. Refer to your system manual for the location of the BLJ board.

1. Connect an Alarm/Signal Cable Assembly (848302048) from J1 and J4 of the 210E to the BLJ board of the Vector controller as shown in Figure 4-6.
2. To connect a second and/or third 210E, connect to the next two positions on the BLJ board of the Vector controller (see Figure 4-6).



**Figure 4-6: Alarm/Signal Cable Assembly Connections to Vector BLJ Board**

### **Power Cable Assemblies**

There are two Power Cable Assemblies available:

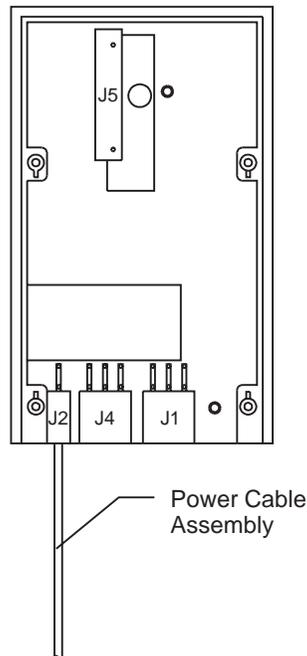
- 847925435 w/o in-line fuse (user must supply fused power) (provided with K30)
- 847900180 with in-line fuse

Notes:

If the 210E is powered without having any thermal probes connected, it will indicate a minor alarm on its output to the CPS, Millennium controller, or Vector Controller, but no alarm LED on the 210E will be illuminated.

The power input to the 210E must be fused in the energized lead. If the cable assembly without an in-line fuse is used (provided with K30), a fused source must be provided. A power cable

assembly with in-line fuse is available from Lucent Technologies. Refer to Table 3-A for ordering information.



**Figure 4-7: Power Cable Assembly Connection to 210E**

### **CPS**

Refer to Figure 4-8 for wiring information for CPS applications. If using the Power Cable Assembly with in-line fuse, remove the fuse.

1. Connect Power Cable Assembly to the battery plant bus bars.
  - In a negative plant connect the red lead to the return bus bar (+) and the black lead to the battery or rectifier bus bar (-). In a negative CPS plant, the red lead would go to TB1 (+) and the black would go to TB2 (-).
  - In a positive plant the red lead goes to the battery or rectifier bus bar (+) and the black lead goes to the return bus bar (-). In a positive CPS plant, the red lead goes to TB2 (+) and the black lead goes to TB1 (-).

2. Plug the other end of the Power Cable Assembly into the 210E at J2 (see Figure 4-7).
3. If using the Power Cable Assembly with in-line fuse, replace the fuse. The normal LED on the 210E should light.
4. Verify there are no alarms.

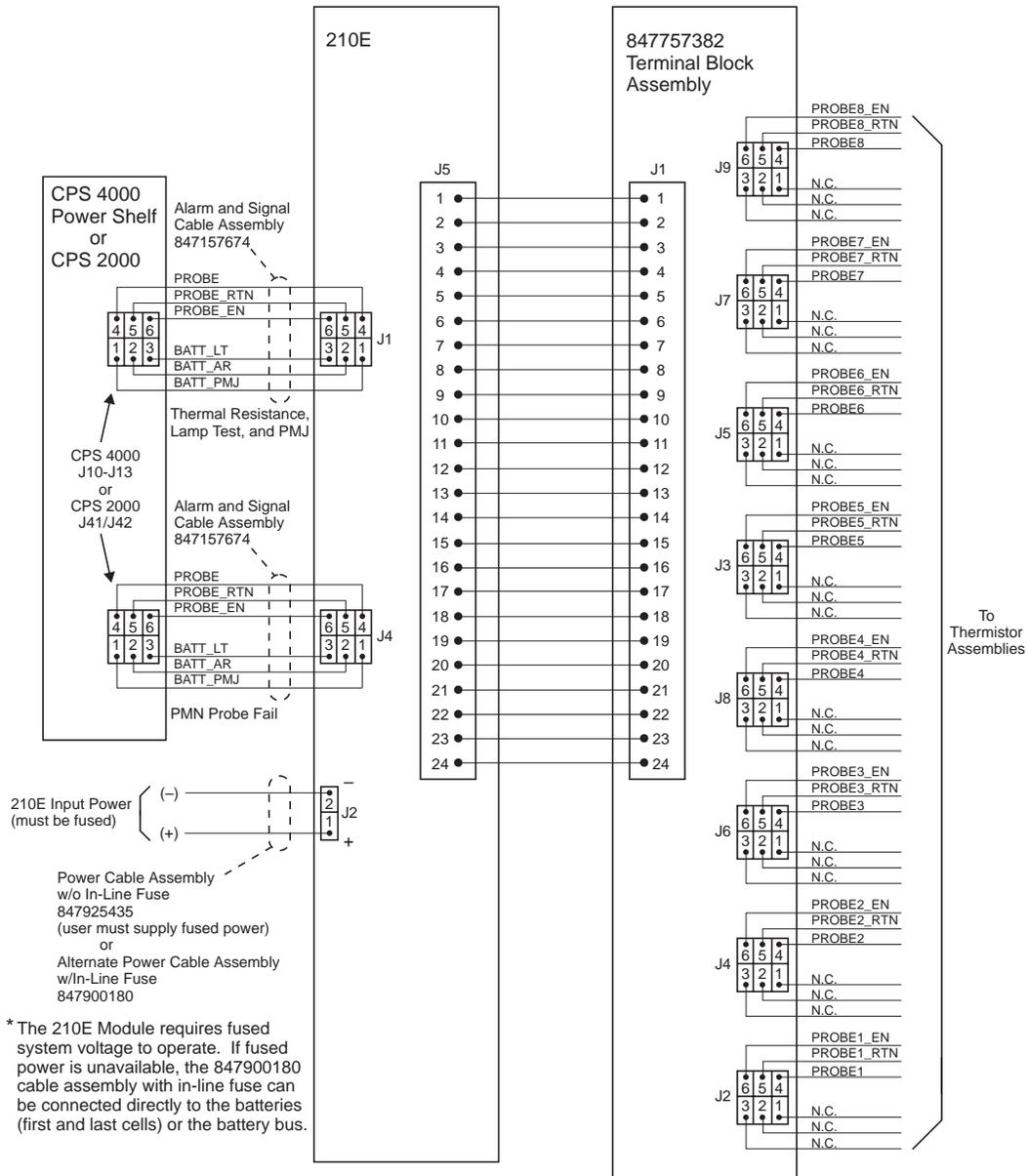


Figure 4-8: Wiring Locations for CPS Applications

## **Millennium and Vector Systems**

Refer to Figure 4-9 for wiring information for Millennium system applications and to Figure 4-10 for Vector systems.

Fused system voltage is available on the ABS and DG terminals of the BLJ board. Multiple ABS and DG terminals are available if required for multiple 210Es. Refer to your system manual for location of the BLJ board. Where more convenient, the 847900180 Power Cable Assembly with in-line fuse can be connected directly to the batteries (first and last cells of a string) or to the system bus bars.

Before beginning:

- Select a connection point for your Power Cable Assembly: BLJ board, batteries, or bus bars.
- Remove power from your selected connection point, if possible. For example, if you are connecting your Power Cable Assembly to a BLJ3 board, remove F1 from the BLJ3 board to disconnect power from the ABS and DG terminals.

Note: Do not connect your Power Cable Assembly to the 210E module until after your power connection has been made.

1. Connect Power Cable Assembly:
  - -48V system: Red wire to the DG terminal or to a battery or system return bus bar (+); black wire to the ABS terminal or to a battery or rectifier bus bar (-).
  - +24V system: Black wire to the DG terminal or to a battery or system return bus bar (+); red wire to the ABS terminal or to a battery or rectifier bus bar (-).
2. Plug the other end of the Power Cable Assembly into the 210E at J2 (see Figure 4-7).
3. Restore power. The normal LED on the 210E should light.
4. Verify there are no alarms.

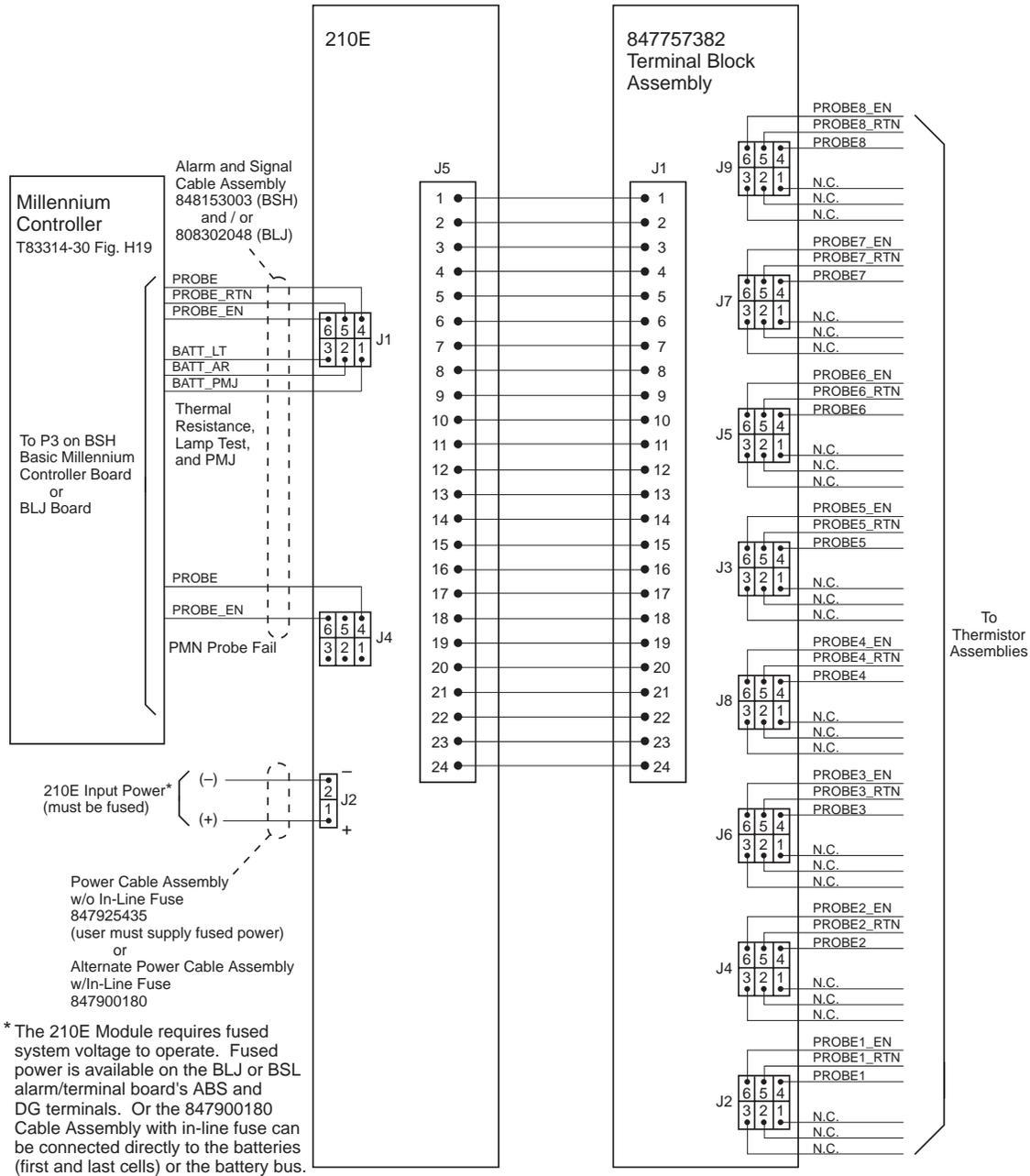


Figure 4-9: Wiring Locations for Millennium Controller

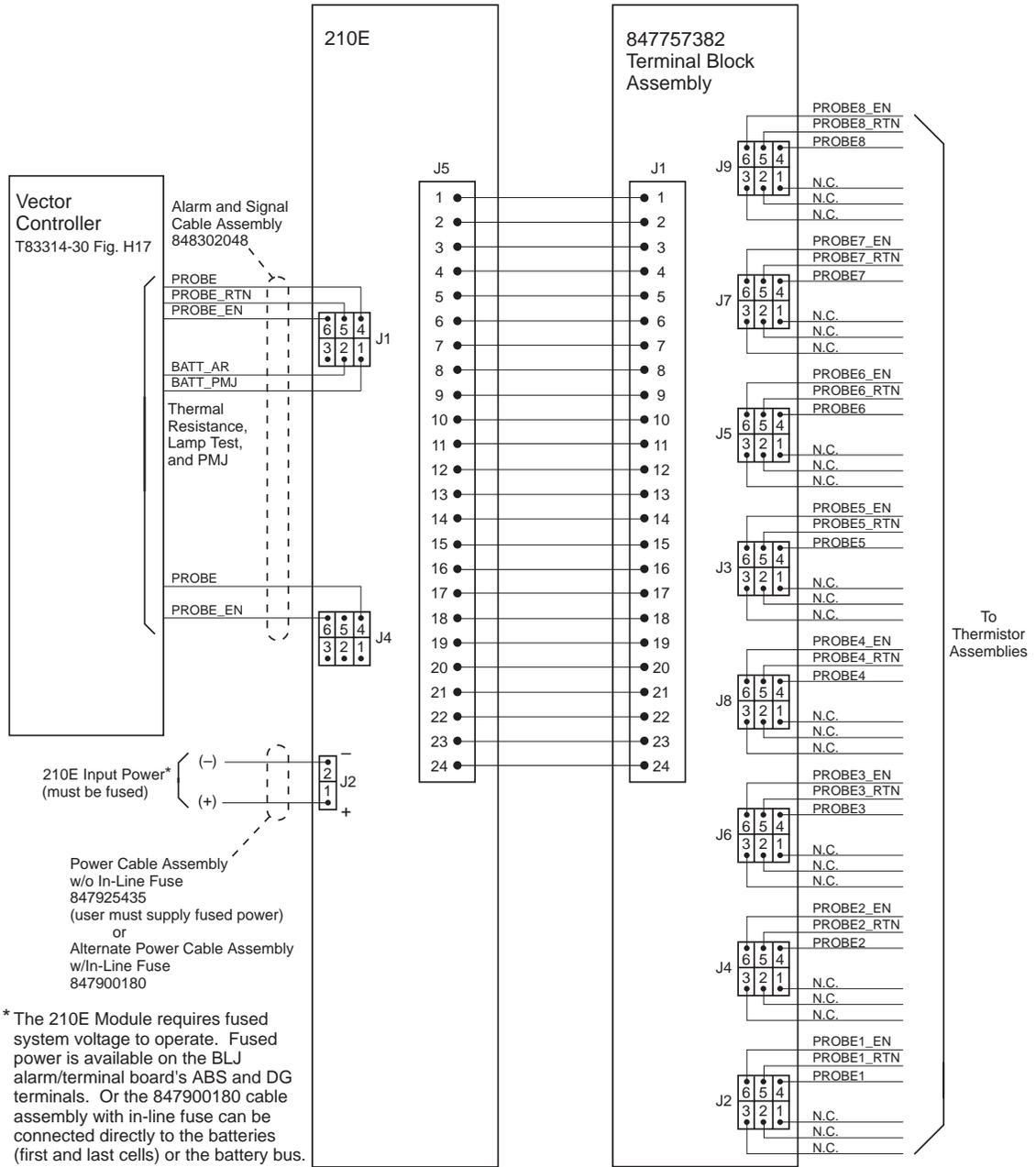
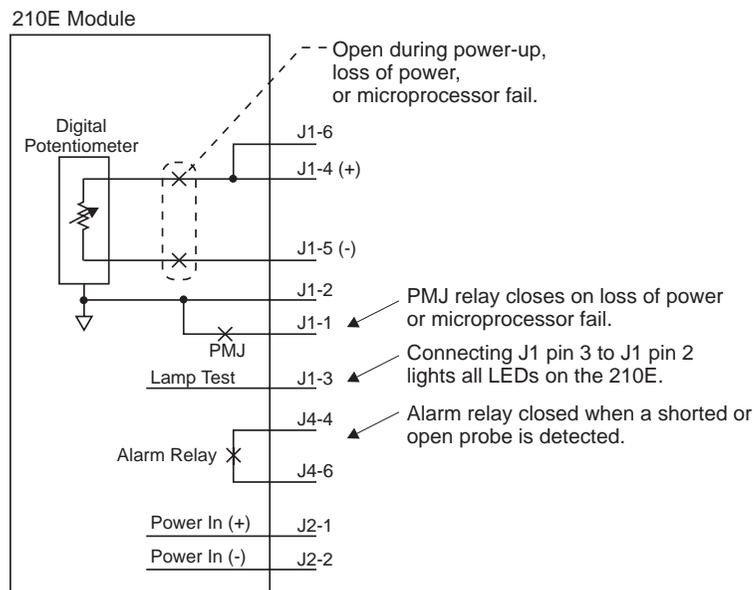


Figure 4-10: Wiring Locations for Vector Controller

## Other Applications

### Overview

The 210E can also be used in other applications that use a standard 10K ohm thermistor assembly. The 210E monitors the resistance(s) of up to 8 connected thermal probes, selects the lowest valid resistance (which corresponds to the highest measured temperature), and makes this resistance available across J1 pins 4 and 5 (see Figure 4-11). This resistance is a digital potentiometer output, with a range of 400 ohms to 38K ohms. The 210E also provides a clean contact closure between J4 pins 4 and 6 when a shorted or open probe is detected. If the 210E loses power, or its microprocessor fails, a contact closure to ground (J1 pin 2) can be detected on J1 pin 1. A lamp test feature turns on all 210E LEDs when ground is applied to J1 pin 3.



**Figure 4-11: 210E Functional Block Diagram**

### Notes

- The 210E ground (J1 pin 2) must be connected to the ground of the application monitoring the 210E resistance.
- A fused dc voltage between 18 and 60 Vdc must be applied across J2 pin 1 (+) and J2 pin 2 (-).
- Typically the output resistance is measured by inserting the digital potentiometer resistance into an external resistor

## **5**                      ***Product Warranty***

A. Seller warrants to Customer only, that:

1. As of the date title to Products passes, Seller will have the right to sell, transfer, and assign such Products and the title conveyed by Seller shall be good;
2. Upon shipment, Seller's Manufactured Products will be free from defects in material and workmanship, and will conform to Seller's specifications or any other agreed-upon specification referenced in the order for such Product;
3. With respect to Vendor items, Seller, to the extent permitted, does hereby assign to Customer the warranties given to Seller by its Vendor of such Vendor Items, such assignment to be effective upon Customer's acceptance of such Vendor Items. With respect to Vendor items recommended by Seller in its specifications for which the Vendor's warranty cannot be assigned to Customer, or if assigned, less than Sixty (60) days remain of the Vendor's warranty or warranty period when the Vendor's items are shipped to Customer or when Seller submits its notice of completion of installation if installed by Seller, Seller warrants that such Vendor's items will be free from defects in material and workmanship on the date of shipment to Customer. In such an event, the applicable Warranty Period will be sixty (60) days.

B. The Warranty Period listed below is applicable to Seller's Manufactured Products furnished pursuant to this Agreement, unless otherwise stated:

**Warranty Period**

<b>Product Type</b>	<b>New Product</b>	<b>Repaired Product or Part*</b>
<b>Central Office Power Equipment**</b>	<b>24 Months</b>	<b>6 Months</b>
<p>* The Warranty Period for a repaired Product or part thereof is as listed or, in the case of Products under Warranty, is the period listed or the unexpired term of the new Product Warranty Period, whichever is longer.</p> <p>** The Warranty Period for Products ordered for Use in Systems or equipment Manufactured by and furnished by Seller is that of the initial Systems or equipment.</p>		

C. If, under normal and proper use during the applicable Warranty Period, a defect or nonconformity is identified in a Product and Customer notifies Seller in writing of such defect or nonconformity promptly after Customer discovers such defect or nonconformity, and follows Seller's instructions regarding return of defective or nonconforming Products, Seller shall, at its option attempt first to repair or replace such Product without charge at its facility or, if not feasible, provide a refund or credit based on the original purchase price and installation charges if installed by Seller. Where Seller has elected to repair a Seller's Manufactured Product (other than Cable and Wire Products) which has been installed by Seller and Seller ascertains that the Product is not readily returnable for repair, Seller will repair the Product at Customer's site.

With respect to Cable and Wire Products manufactured by Seller which Seller elects to repair but which are not readily returnable for repair, whether or not installed by Seller, Seller at its option, may repair the cable and Wire Products at Customer's site.

D. If Seller has elected to repair or replace a defective Product, Customer shall have the option of removing and reinstalling or having Seller remove and reinstall the defective or nonconforming Product. The cost of the removal and the reinstallation shall be borne by Customer. With respect to Cable and Wire Products, Customer has the further responsibility, at its expense, to make the Cable and Wire

Products accessible for repair or replacement and to restore the site. Products returned for repair or replacement will be accepted by Seller only in accordance with its instructions and procedures for such returns. The transportation expense associated with returning such Product to Seller shall be borne by Customer. Seller shall pay the cost of transportation of the repair or replacing Product to the destination designated by Customer within the Territory.

- E. The defective or nonconforming Products or parts which are replaced shall become Seller's property.
- F. If Seller determines that a Product for which warranty service is claimed is not defective or nonconforming, Customer shall pay Seller all costs of handling, inspecting, testing, and transportation and, if applicable, traveling and related expenses.
- G. Seller makes no warranty with respect to defective conditions or nonconformities resulting from actions of anyone other than Seller or its subcontractors, caused by any of the following: modifications, misuse, neglect, accident, or abuse; improper wiring, repairing, splicing, alteration, installation, storage, or maintenance; use in a manner not in accordance with Seller's or Vendor's specifications or operating instructions, or failure of Customer to apply previously applicable Seller modifications and corrections. In addition, Seller makes no warranty with respect to Products which have had their serial numbers or month and year of manufacture removed, altered, or with respect to expendable items, including, without limitation, fuses, light bulbs, motor brushes, and the like.

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