

**Lucent Technologies**  
Bell Labs Innovations



# *Supplemental Battery Stand*

## *J85504D-1 List 16*

Product Manual  
Select Code 157-003-101  
Comcode 108745712  
Issue 2  
September 2000  
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*Product Manual*  
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*Lucent Technologies*  
*Supplemental Battery Stand*  
*J85504D-1 List 16*

**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***

## ***J85504D-1 List 16***

This product manual (Select Code 157-003-101) provides information on Lucent Technologies' Supplemental Battery Stand, J85504D-1 List 16, and its accessories.

This battery stand is used in conjunction with Lucent Technologies battery products like the 12IR125 and 12IR125LP, and with Hawker C11 batteries. These valve-regulated lead acid batteries and the accessories listed in this manual are designed by or recommended for use by Bell Laboratories, an acknowledged leader in technology, research, and design of power systems.

All products and the manufacturing processes meet Lucent Technologies' strict specifications and quality standards. Lucent's power products have proved their field reliability by providing dependable standby reserve power for the telecommunications industry for decades.

Lucent Technologies maintains a nationally deployed force of battery specialists. Special engineering and consulting services for existing or new applications, or resolution of questions regarding any information in this manual are available. Refer to the "Customer Assistance Contacts" portion of this section.

***Engineering and  
Installation  
Options***

A customer or user can choose to fully or partially engineer and/or install equipment based on the information supplied and their own experience. But it is beyond the scope of this manual to give complete theoretical and tutorial information on the subject. However, Lucent Technologies offers complete engineering and installation services that result in “turn-key” plant operation. Contact your Lucent Power Systems Account Representative for further information.

***Documentation***

This product manual is one of several that provide information on Lucent Technologies battery products. Other manuals, including those describing Lucent’s battery, controller, rectifier, and power plant products may be required, used, or referenced to fully configure, engineer, and install a system. Each manual contains a technical description of the product, followed by detailed information on engineering, installation, operation, and maintenance. A documentation package is included with each product shipped. The contents of the documentation package for each product listed in this manual is identified for ordering and reference purposes in the various sections associated with product listed in this manual.

## ***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 Descriptions***

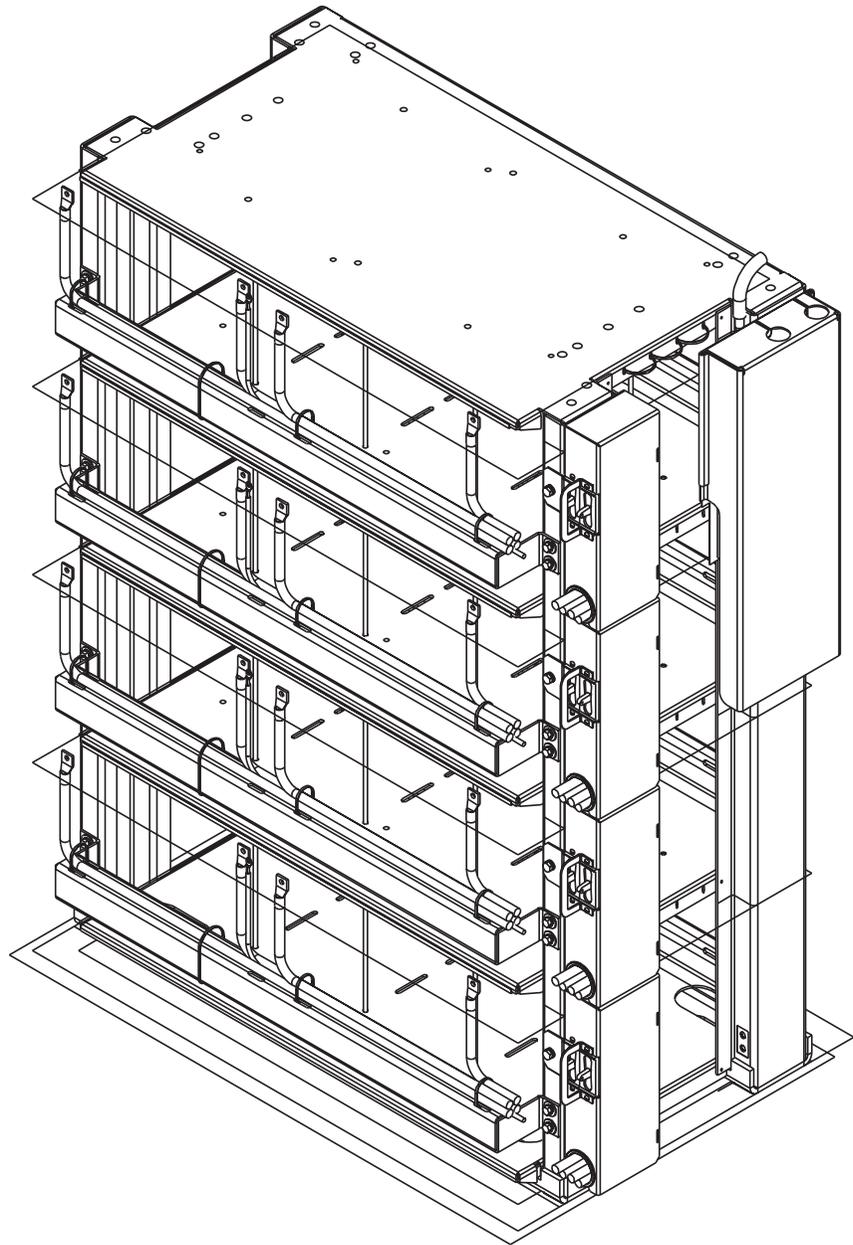
### ***Battery Stands***

#### ***Overview***

The J85504D-1 List 16 Supplemental Battery Stand is designed for applications requiring the Lucent Technologies 12IR125/12IR125LP or Hawker C11 batteries to create 24- or 48-volt battery strings to meet backup power needs.

This battery stand is designed and tested to meet the requirements of Bellcore's Network Equipment Building Systems (NEBS - GR63-CORE) Generic Equipment Requirements for use in seismic zones 0 through 4. This stand has been seismically qualified using the anchoring hardware listed in this manual. In addition, this stand has also been seismically qualified for use with the GPS half height cabinet products and equipment mounted in half height network bay frames. Refer to Section 8, "Equipment Frames (Mini-frames)."

The stand is only available in a four shelf high configuration, which is shown in Figure 2-1.



**Figure 2-1: 12IR125 Four Shelf Battery Stand**

Optional equipment available for use with this battery stand includes battery covers for the 12IR125 battery, battery adapter/connection kit for C11 batteries (terminal covers provided with batteries), 1000 ampere fuse kit, supplementary equipment frame(s), anchoring hardware, remote power off switch, and 210E Control Module (Thermal Probe Multiplexer). Section 5 lists the various types of anchoring hardware that have been assembled and tested for use with these stands in the various seismic zones.

The strength of concrete is usually measured as compressive strength-pressure in pounds per square inch (psi) required to crush it. Qualification testing of this stand, anchoring system, and respective seismic zones was made using concrete with compressive strength of 4000 psi.

Each shelf of the battery stand will hold either four 12IR125 (two 24V strings or one 48V string) series batteries or six C11 batteries (one 24V string). Each shelf is provided with a service disconnect switch (maximum rating of 125 amps) to remove the string (shelf) from service and battery terminal thermal probe (includes 35ft cable for connection to 210E or controller). All the switches are connected in parallel for a maximum total stand input/output rating of 500 amps.

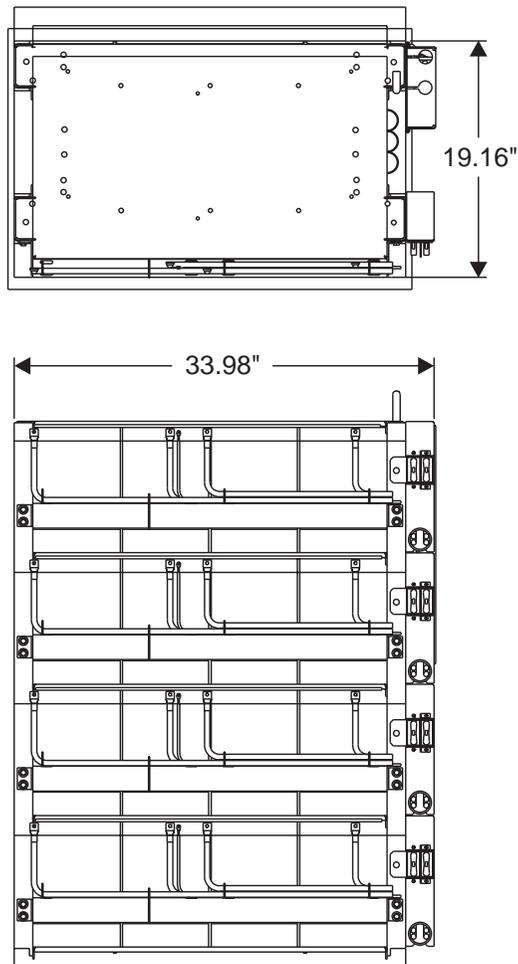
### ***Features***

- Four shelf high welded metal superstructure
- Fire retardant UL94 V-0
- One battery string disconnect switch (125 amps maximum) provided on each shelf
- One battery terminal thermal probe provided on each shelf
- Single point termination for connecting to your battery plant. All four battery shelves are wired in parallel to a common terminating bus bar assembly for easy, single point connection to the plant distribution
- Front-access installation and maintenance
- Optional battery stand fuse kit
- Easy Installation: The Battery Stand arrives on site ready to install. Batteries are easily inserted into the shelves, and battery interconnections and cables are easily attached.

**Construction**

The battery stand is all welded steel construction. The welded assembly is pre-treated with either zinc phosphate or iron phosphate and coated with a electrically insulating epoxy finish (.002-.004 inch thick). The battery stand is provided with battery retainer and spacer bars to secure the batteries into position (spacers for the C11 batteries are provided with the C11 adapter kit - ordered separately). Battery terminal (front cover) shields to protect front access electrical connections from accidental contact are ordered separately for the 12IR125 battery and are provided with the C11 and 12IR125LP batteries.

This battery stand has been designed and tested to Bellcore's Network Equipment-Building System (NEBS) Generic Equipment Requirements (GR63-CORE). The maximum seismic rating this stand has been qualified to is shown in Table 2-A for the batteries indicated. These are the only batteries that have been tested for use in this stand.



**Figure 2-2 - Battery Stand Dimension**

**Specifications**

**Table 2-A: Battery Stand Specifications**

					Dimensions			Weight	
Battery	Drawing	List No.	No. of Shelves	Max Seismic Zone	Width inches (mm)	Depth inches (mm)	Height inches (mm)	With Batteries lbs (kg)	Without Batteries lbs (kg)
12IR125 12IR125LP	J85504D-1	16	4		34.11 (866)	19.18 (487)	4424 (1123)	2210 (1003)	290 (132)
C11 (Hawker)								1876 (851)	290 (132)

**Battery Specifications**

**Table 2-B: Batteries Physical and Thermal Specifications**

Model	12IR125		12IR125LP		C11	
	KS-23997 List 1		KS-23997 List 2			
	8 HR	10 HR	8 HR	10 HR	8 HR	10 HR
Name Plate Capacity (AH)	120	125	120	125	91.9	91.2
Depth - in(cm)	16.82 (42.72)		17.82 (42.72)		15.6 (396)	
Width - in(cm)	6.97 (17.7)		6.97 (17.7)		4.1 (104)	
Height - in(cm)	10.10 (25.65)		9.36 (238)		10.00 (254)	
Weight - lbs(kg)	120 (54.55)		120 (54.55)		66.1 (30)	
Material	Polypropylene	Noryl	Polypropylene	Noryl	ABS	
Cycle Life @ 80% DOD*	400 cycles		400 cycles		400 cycles	
Nominal Float Voltage	12		12		12	
Float Life @77½F (25½C)	20 years		20 years		20 years	
UL Flammability Rating	V-0		V-0		V-0	



## 3 *Ordering Information*

### *Battery Stand*

**Table 3-A: Battery Stand**

<b>Ordering Code</b>	<b>Drawing</b>	<b>Description</b>
848474656	J85504D-1 List 16	Supplemental Battery stand

### *12IR125 Batteries*

**Table 3-B: 12IR125 and 12IR125LP Ordering Information**

<b>Description (Battery Wet Filled with Acid, UN2794)</b>	<b>Comcode and Rating</b>				<b>Miscellaneous</b>
	<b>Rating</b>	<b>12IR125 KS-23997 L1</b>	<b>Rating</b>	<b>12IR125LP KS-23997 L2</b>	
Ground Transport (Domestic shipments only)		407155399		408044295	Standard packaging, 6-sided box with 4 foam blocks, 36x36 pallet
Air Transport – 2/pallet (Domestic and International shipments)		407535103		408086528	Cargo Air Transport packed per IATA DGR
Air Transport – 8/pallet		407885128		408071041	Cargo Air Transport packed per IATA DGR
Ground Transport – 8/pallet (Domestic shipments only)	DA	408048916		408072064	Packed in a 5-sided box for shipment from the battery supplier to job site only. Note: Batteries cannot be shipped without a pallet.
Dummy (non-battery)		407885474		--	No hazard classification
Accessory Kit (Kit includes one bus bar, NO-OX-ID A <sup>®</sup> , and mounting hardware. One kit is provided with each battery. Supplementary kits may be ordered as required.)		847682754			
12IR125 battery terminal cover (one per two batteries)		848514097			

## ***C11 Batteries***

**Table 3-C: C11 Batteries**

<b>Ordering Code</b>	<b>Description</b>
408188241 (300115979)	C11 90AL high power density lead-acid battery (6 per shelf)
848466900	C11 Adapter Kit

## ***Options***

**Table 3-D: Options**

<b>Ordering Code</b>	<b>Drawing</b>	<b>Description</b>
See Section 9	J85504C-1 List D	Remote Power Off Switch
See Section 8	J85504D-1	Equipment Frames (Mini-Frames)
848353645	J85501X-1 List K30	210E Control Module

## ***Kits and Thermal Probe***

**Table 3-E: Kits and Thermal Probe**

<b>Ordering Code</b>	<b>Description</b>
848480372	1000 amp Fuse Kit
848480380	35 foot long cable kit (alarm and power cables for connecting 210E control Module to the plant)
848346847	Additional thermal probe

**Hardware**

The J85504D-1 List 16 battery stand is not supplied with anchoring hardware. Select anchoring hardware for each application that is sized to meet the earthquake requirements for that application.

This battery stand has a maximum input/output rating of 500A when all four shelves of the stand are populated. Each shelf has a maximum rating of 125A. The string/shelf disconnect should not be exceeded.

**Anchor Bolts and Washer Plates**

Table 3-F outlines available anchoring kits. (See also Table 3-G.)

**Table 3-F: Anchor Bolt Kits**

Recommended Seismic Zone	Anchor (Individual)			Washer Plate*	Anchor Kit**
	Description	Hilti Item No.	Comcode	Comcode	Comcode
0 - 1	HDI - 3/8	000457531	405865948	841630155	847135720***
	HDI - 1/2	000457549	402980056	841628571	847135662***
0 - 3	HSLG M12/0	002172161	406967794	847303484	847320835
	HSLB M12/6	000457069	405814492	841628571	847532678
	HSLG M12/25	000685927	406241570	841628571	847135688****
4	HSLB M16/6	000457077	405821844	846818250	847532694
	HSLB M16/25	000674028	406876847	846818250	847221074

\* Dimensions and ordering information for washer plates are given in Table 3-G.

\*\* Anchor kits contain 4 anchors.

\*\*\* Anchor kit is provided with 4 each of: 841628639 Insulating Bushing, Hold Down Washer, 84064793 Hex Nut, 841068208 Stud 3/4-13 x 3 °, 814251914 Washer.

\*\*\*\* Anchor kit is provided with 4 each of: 841628621 Insulating Bushing, Hold Down Washer, 84064793 Hex Nut, 841068208 Stud 3/4-13 x 3 °, 814251914 Washer.

**Table 3-G: Washer Plates**

Comcode	Length	Width	Thickness	Hole Dia.
841628571	2	2	.25	.72
841630155	2	2	.19	.58
846818250	2	2	.19	1.06
847303484	2	4	.38	.58

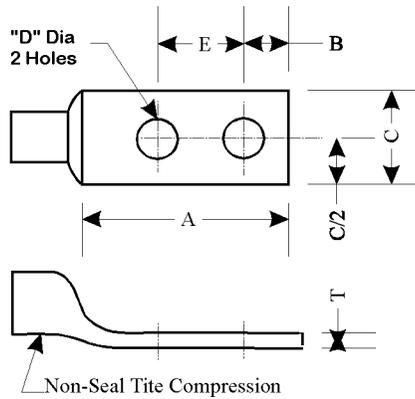
**Wire Terminating Connectors**

All electrical connections should be made by Listed closed-loop pressure wire connectors secured by screw and star washers, Listed pressure cable connectors, Listed receptacles and plugs, or leads made mechanically secured before soldering, or Listed or Recognized Component wire connectors (ZMVV2).

The terminals on the J85504D-1 L16 battery stand are sized to accommodate termination lugs for various wire sizes. The lugs recommended for connections to this battery stand are listed in Table 3-H. The dimensions are illustrated in Figure 3-1.

**Table 3-H: Wire Connectors**

Wire Size	WP-91412 List No.	Dimensions						Crimp Die	Part Number (Comcode)
		A	B	C	D	E	T		
4/0 AWG	L27	1.81	.37	1.00	3/8	1.00	.15	62 Yellow	405347923
350 MCM	L183	1.817	.37	.96	3/8	1.00	.21	80	407890748
500 MCM	L185	2.053	.50	1.63	3/8	1.00	.26	99 Pink	407890755
750M CM	L184	2.076	.53	1.63	3/8	1.00	.32	115 Yellow	407890730



**Figure 3-1: Two Hole Lug**

**Wire**

The connections to the power distribution system should be made with 90°C ampacity conductors.

Table 3-I lists the various Class I wires that can be used for connections to the J85504D-1 L16 battery stand.

**Table 3-I: KS-24194 List 2 Class “I” Stranding  
(No Cotton Braid)**

<b>Gauge</b>	<b>Black</b>	<b>Blue</b>	<b>Gray</b>	<b>Red</b>	<b>Red-T</b>	<b>Blue-T</b>
4/0	407409526	407399500	407399534	407399542	407399518	407399559
350	407403336	407403344	407403351	407403369	407403385	407403377
500	407403393	NONE	407403401	NONE	NONE	NONE
750	407403427	NONE	407403419	NONE	NONE	NONE



# 4

## *Safety*

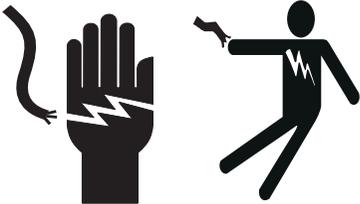
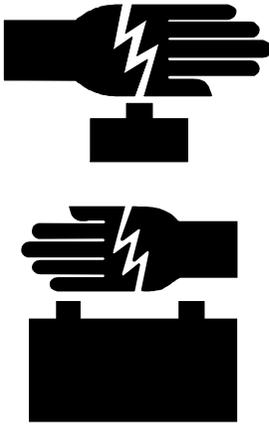
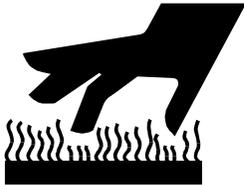
### *Safety Statements*

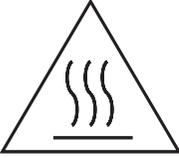
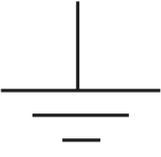
Please read and follow all safety instructions and warnings before servicing or installing the product listed in this manual. Reference the individual module product manuals for additional safety statements specific to the modules

- The system is in a restricted access area (dedicated equipment rooms, equipment closets, or the like) in accordance with articles 110-16, 110-17, and 110-18 240 of the U.S. National Electric Code (NEC), ANSI/NFPA No. 70, and pursuant to applicable local codes.
- This equipment is intended for use in a controlled environment (an area where the humidity is maintained at levels that cannot cause condensation on the equipment, the contaminating dust is controlled, and the steady-state ambient temperature is within the range specified).
- This equipment has been evaluated for use in a continuous ambient temperature of up to 40°C. Short term excursions to 45°C are acceptable.
- Torque electrical connections to the values specified on labels or in the product documentation.
- Fuses may not be provided with the equipment. Refer to the product documentation for the proper hardware. Use only the parts specified in the equipment documentation. Installing fuses not specified for use in this equipment may result in injury to service personnel or equipment damage.

**Warning  
Statements  
and Safety  
Symbols**

The symbols may sometimes be accompanied by some type of statement; e.g., “Hazardous voltage/energy inside. Risk of injury. This unit must be accessed only by qualified personnel.”

	<p>This symbol identifies the need to refer to the equipment instructions for important information.</p>
	<p>These symbols (or equivalent) are used to identify the presence of hazardous ac mains voltage.</p>
	<p>This symbol is used to identify the presence of hazardous ac or dc voltages. It may also be used to warn of hazardous energy levels.</p>
	<p>One of these two symbols (or equivalent) may be used to identify the presence of rectifier and battery voltages. The symbol may sometimes be accompanied by some type of statement, for example: “Battery voltage present. Risk of injury due to high current. Avoid contacting conductors with uninsulated metal objects. Follow safety precautions.”</p>
	<p>This symbol is used to identify the presence of a hot surface. It may also be accompanied by a statement explaining the hazard. A symbol like this with a lightning bolt through the hand also means that the part is or could be at hazardous voltage levels.</p>

	<p>This symbol may also be used to identify the presence of a hot surface. The marked item should not be touched without taking care.</p>
	<p>This symbol is used to identify the protective safety earth ground for the equipment.</p>
	<p>This symbol is used to identify other bonding points within the equipment.</p>
	<p>This symbol is used to identify the need for safety glasses and may sometimes be accompanied by some type of statement, for example: "Fuses can cause arcing and sparks. Risk of eye injury. Always wear safety glasses."</p>

The symbols may sometimes be accompanied by some type of statement; e.g., "Hazardous voltage/energy inside. Risk of injury. This unit must be accessed only by qualified personnel."

## ***Precautions***

When working on or using this type of equipment, the following precautions should be noted:

- This unit 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.
- High leakage currents may be possible on this type of equipment. Make sure the equipment is properly safety earth grounded before connecting power.
- Hazardous energy and voltages are present in the unit and on the interface cables that can shock or cause serious injury. Follow all safety warnings and practices when servicing this equipment. Exercise care when servicing this area.
- 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.
- In addition to proper job training and safety procedures, the following are some basic precautions that should always be used:
  - Use only properly insulated tools.
  - Remove all metallic objects (key chains, glasses, rings, watches, or any other jewelry).
  - Wear safety glasses.
  - Test circuits before touching.
  - Lock out and tag any circuit breakers/fuses when possible to prevent accidental turn on.
  - Be aware of potential hazards before servicing equipment.
  - Identify exposed hazardous electrical potentials on connectors, wiring, etc. (note the condition of these circuits, especially any wiring).
  - Use care when removing or replacing any covers - avoid contacting any circuits.

# **5**

## ***Installation Guidelines and Preparations***

### ***Tools and Materials***

The following tools and materials are recommended for installation of the battery stands.

- Center punch
- Floor marking device (e.g., pen, pencil)
- Anchor drilling tools as recommended for each anchor type or supplier (see anchoring section)
- Anchor setting tool and torque wrench suitable for setting anchor as recommended for each anchor type or supplier (see anchoring information in this section)
- Insulated nut driver or socket set
- Insulated torque wrench capable of reading 60 inch-pounds
- Blow out bulb or compressed air line
- Wet/dry shop vacuum
- Chemical and impact resistant safety goggles and safety hard hat.
- Acid resistant gloves, rubber overshoes, and apron
- Lime and/or soda (sodium bicarbonate or sal soda)
- Class C fire extinguisher
- Clean cloth
- Thermocouple-base or infrared-based temperature measuring device
- Digital multimeter (DMM) with an accuracy of 0.05 percent on the DC scale
- Proper crimping tools and dies for connectors used

## ***Environmental Requirements***

- The environment must comply with the NFPA 70, National Electric Code Article 110, “Requirements for Electrical Installations” and Article 480-8, “Battery Locations.”
- All lead-acid batteries are affected by its ambient temperature. Lucent Technologies valve regulated batteries can tolerate extreme temperatures in the range of -40° to 149°F (-40° to 65°C) for short, infrequent periods. Nevertheless, try to prevent the battery from being exposed to extreme temperatures. Battery temperatures above 77°F (25°C) decrease battery life while increasing battery capacity. Battery temperatures lower than 77°F (25°C) have the opposite effect; batteries may last longer but capacity is decreased. The product manual for the batteries you have chosen will describe the life and operating characteristics for the battery you have chosen.

### **Note**

<p>Lucent Technologies strongly recommends a temperature compensation device in high-temperature environments. Failure to use such a device may result in high battery temperatures that can cause premature battery failure and reduce or void the warranty. Lucent Technologies offers two types of temperature compensation devices: step compensation and slope compensation.</p>
---

- Battery temperatures within the same string must be maintained within 10°F (5.5°C) of each other. When batteries must be installed where they will be exposed to heat radiation or direct sunlight, provide shields for the radiators or blinds for the windows to maintain the allowable temperature gradient. In particular, the top row of a multi-tiered stand is apt to have a higher environmental temperature than the bottom. Where necessary, use fans or other means of ventilation to minimize the temperature variation.
- The front and rear aisle space around a battery stand should conform to the requirements of NEC or other applicable codes. A minimum aisle width of 30 inches is recommended. When no rear aisle is required, the battery stand may be mounted flush against the wall. However, it is recommended that a minimum gap of 3 inches be maintained to allow for proper ventilation and cooling air flow around the stand.
- A fully loaded battery stand may impart extreme loads on a building floor. The safe floor load for the facility where the battery stand is to be installed should be checked. In addition, the floor thickness should be checked for the type and size of anchor that will be used in the application.

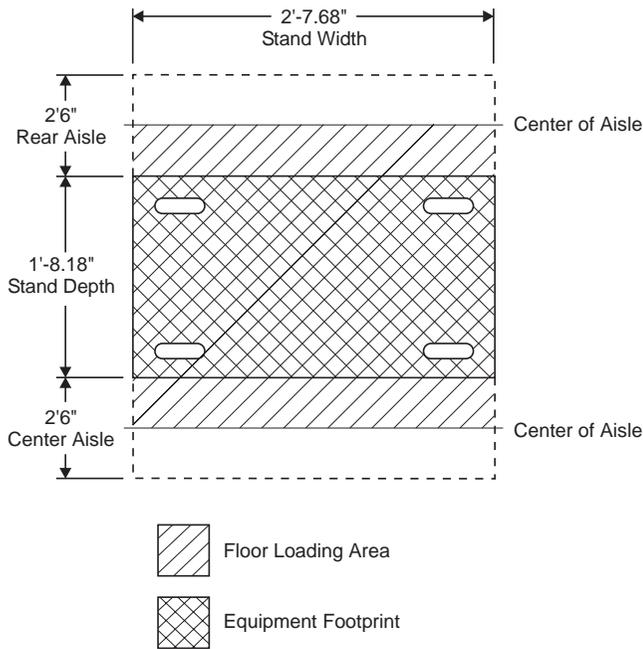
**Note**

The floor load for the battery stand equipped with batteries is computed by averaging the load over the floor area bounded by the stand outline (sides) and the center lines of the front and rear aisles. Special precautions (such as increasing aisle widths or space from adjacent equipment) must be taken to insure that this equipment does not overload the floor on which it will be used.

The floor loads for the stands in this section are shown in Table 5-A. See Figure 5-1.

**Table 5-A: Battery Stand Floor Load Data**

Battery Stand	List No.	Battery	No of Shelves	Stand Weight lbs	Stand Loaded Weight lbs	Floor Area sq ft	Floor Load lbs/sq ft	Floor Area (w/Front and Rear Aisles) sq ft	Floor Load (w/Front and Rear Aisles) lbs/sq ft
J85504D-1	16	12IR125	4	290	2210	4.54	486	10.38	190
J85504D-1	16	C11	4	290	1876	4.54	413	10.38	161



**Figure 5-1: Area Used for Floor Load Calculations (Stand Foot-print With Front and Rear Aisles)**

## ***Unpacking and Handling***

Product is fully inspected prior to shipping from the factory. However, upon receipt of any product and at the time of unloading, each package should be visually inspected for damage. If damage is evident, a more detailed inspection of the entire shipment should be conducted and noted on the bill of lading. Record receipt date and inspection data and notify the carrier of any damage. Check the contents of the package against the packing list and also check for any visible defects. Report any missing parts or shipping damage to Lucent Technologies.

Use appropriate material handling equipment to ensure personnel safety and equipment protection while installing the battery stand and batteries. Move crated equipment and batteries to a convenient predetermined area where the appropriate unpacking and handling equipment and tools are available.

## ***Anchoring***

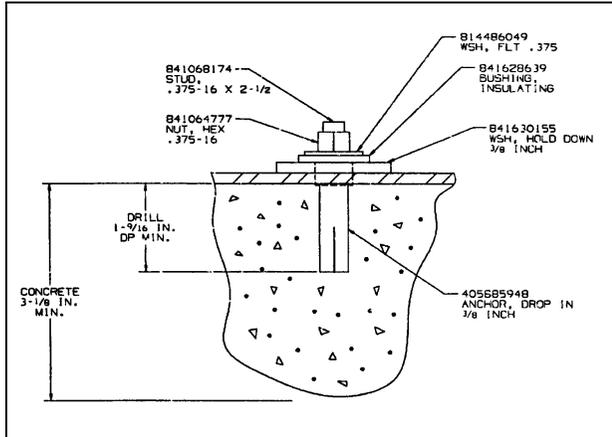
- Anchor bolts for mounting the battery stand should be located in positions labeled A1 and B1 (Figure 6-1). Positions marked A2 and B2 are alternate anchoring locations and should only be used when interference with floor reinforcing bars occurs during installation of the battery stand.
- Anchor bolts are provided in kit form and are ordered in addition to the battery stand. Three anchor bolt kits are available for seismic zones 0 through 1, 2 through 3, and zone 4. (See Table 3-F.) Each kit provides all the hardware required to properly anchor the battery stand (4 each - anchor bolts and washer plates).
- When selecting HDI type anchor(s), the installer should use the anchor setting tool listed in Table 5-B to properly set the anchor. Table 5-B also provides the anchor specifications.
- When using the HDI type anchors, follow the instructions in Section 6. Position the equipment to be anchored, insert threaded rods provided with the anchor kits, and fasten using hardware provided. Torque to maximum tightening torque listed in Table 5-B.

### **Notes**

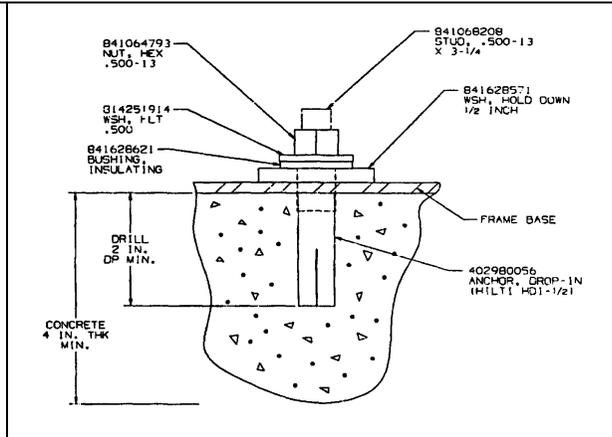
- |  |
|--|
| <ul style="list-style-type: none"><li>• The HSL type anchor bolts can be installed in a bottomless hole. (See Table 5-B for recommended drill (hole) size.</li><li>• For HDI type anchor bolts, the hole depth should be adjusted so that the anchor will be flush with the base material surface.</li></ul> |
|--|

**Table 5-B: Anchor Bolt Specifications**

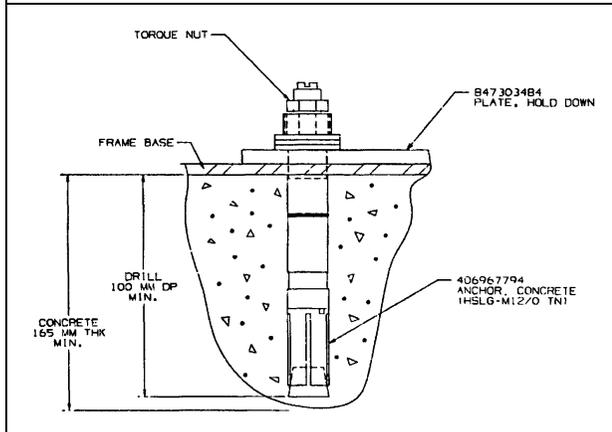
Specification	HDI - 1/2		M12/0		M16/25	
	mm	in	mm	in	mm	in
Drill Bit Diameter = Anchor OD	16	5/8	18	11/16	24	1
Hole Depth	51	2	100	4	125	5
Min. Depth of Embedment	51	2	80	3-5/32	105	4-1/8
Max. Thickness Fastened		--	25	1	25	1
Anchor Length	51	2	120	4-11/16	148	5-15/16
Usable Thread Length	17	11/16				
Head Height + Washer	--	--	11	7/16	14	9/16
Wrench Size			19	3/4	24	15/16
HSL/HSLG	--	--	24	15/16	30	1-3/16
HSLB						
Max. Gap Between Concrete and Fastened Material	--	--	8	5/16	9	3/8
Min. Base Material Thickness (mm)	--	--	160	6-1/4	180	7-3/32
Specification	HDI - 1/2		M12/0		M16/25	
	N-m	ft-lbs	N-m	ft-lbs	N-m	ft-lbs
Max. Tightening Torque	29.8	22	**82	**60	204	150
Specification	Tension lbs	Shear kN	Tension lbs	Shear kN	Tension lbs	Shear kN
Ultimate Load in 4000 psi	7140 31.8	8500 37.8	11240 50.0	18900 84.1	20205 90.1	33640 149.6
Hand Setting Tool	HST 1/2 000329805					
Automatic Setting Tool	TE-C-SD-12 00032980					
Drill Bit (Hilti)			TE-C+18/20 TE-Y-18/34		TE-C+24/25 TE-P24/32	
Notes: * Use Hilti Setting Tool ** Initial installation of HSLB anchor requires no torque wrench. The torque cap shears off at a predetermined torque value.						



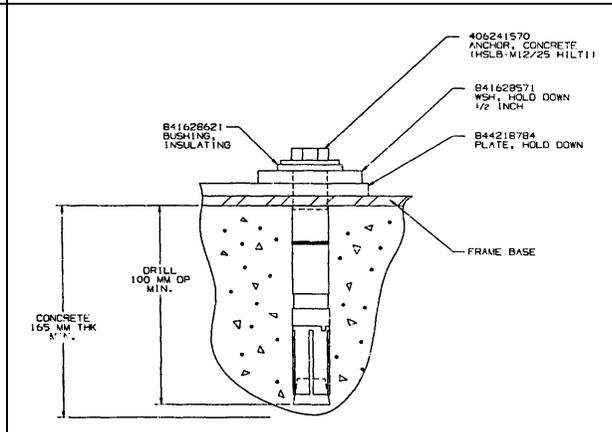
**Figure 5-2: HDI - 3/8 (Kit 847135720)**



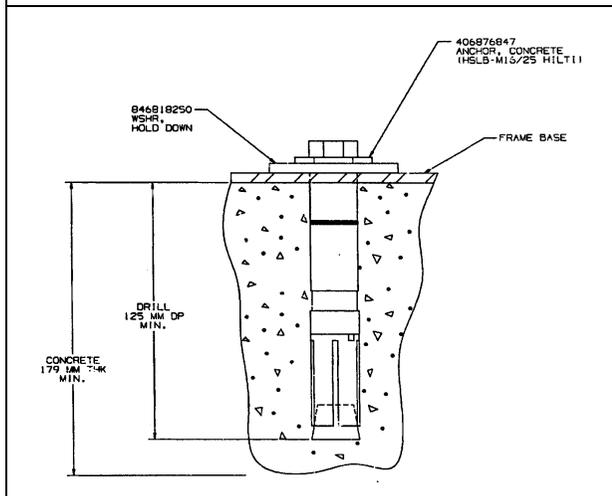
**Figure 5-3: HDI - 1/2 (Kit 847135662)**



**Figure 5-4: HSLG M12/0 (Kit 847320835)**



**Figure 5-5: HSLB M12/25 (Kit 847135688)**



**Figure 5-6: H569-407 Group 20 (Kits 847532678, 847532694, 847221074)**

## ***Connections***

### ***Tightening Torques***

**Table 5-C: Tightening Torques for Batteries**

<b>Battery</b>	<b>Hardware Size</b>	<b>Maximum Tightening Torque</b>
12IR125/12IR125LP	1/4 - 20	60 inch-pounds
C11 (Hawker)	10 mm	60 inch-pounds

### ***Battery Stand***

This battery stand is designed to be easily connected to your plant distribution. Two connection points are provided on the battery stand terminal plate for an easy, single point connection. A maximum of two cables may be connected to each positive and negative terminal. Connections to the battery stand should be designed such that maximum current rating of 500 amperes and maximum loop drop voltage of .25 volts are not exceeded. The terminals of the terminal plate are sized to accept the various size cables from 4/0 through 750 MCM. Refer to Tables 5-E and 5-F.

This stand may be used by itself or in a lineup of battery stands. Careful consideration of the cable sizes for each run of cable from the plant distribution to each stand should be made such that the loop drop voltage and cables current carrying capacity are not exceeded.

***Voltage Drop***

$$\# \text{ of cables} = \frac{\text{battery current/hr X cable resistance/ft X total loop length}}{\text{loop voltage drop}}$$

**Table 5-D: Typical Values for Cable Voltage Drop Calculations**

<b>KS20921 Wire (Class I Flex)</b>	<b>Ohms/Feet at 20°C</b>	<b>KS5482 Wire (Class B Std.)</b>	<b>Ohms/Feet at 20°C</b>
2	0.000172	2	0.000169
1/0	0.000109	1/0	0.000109
2/0	0.0000868	2/0	0.000084
4/0	0.0000546	4/0	0.000052
350 MCM	0.0000334	350 MCM	0.000032
500 MCM	0.0000234	500 MCM	0.000022
750 MCM	0.0000157	750 MCM	0.000015

**Class B Stranded  
Cables Lugs**

**Table 5-E: KS24194 Class “B” Stranded Conductor Information**

Wire Size AWG or KCMIL	Area (Circ Mils) (NOM)	Current		Max. DC Res. Ohms/ 1000 ft. @20C	Number of Strands	Dia. of Strand Const.*	Avg. Ins. Thick (in.)	Diameter	Weight/ 1000 ft. (lb.)	Max. Ship Length Per Reel
		Capacity AMPS (see Notes)	Cond Dia. (in.)					List 3	List 3	
2/0	133100	195	0.419	0.084	19	0.405	0.080	0.622	534	1500
4/0	211600	260	0.528	0.052	19	0.512	0.080	0.730	806	1000
350	350000	350	0.681	0.032	37	0.661	0.095	0.922	1301	700
500	500000	430	0.813	0.022	37	0.789	0.095	1.052	1804	500
750	750000	535	0.998	0.0148	61	0.968	0.110	1.265	2669	350
Note: Minimum bend radius is equal to 5X the overall wire diameter. *Minimum diameter compressed stranded construction.										

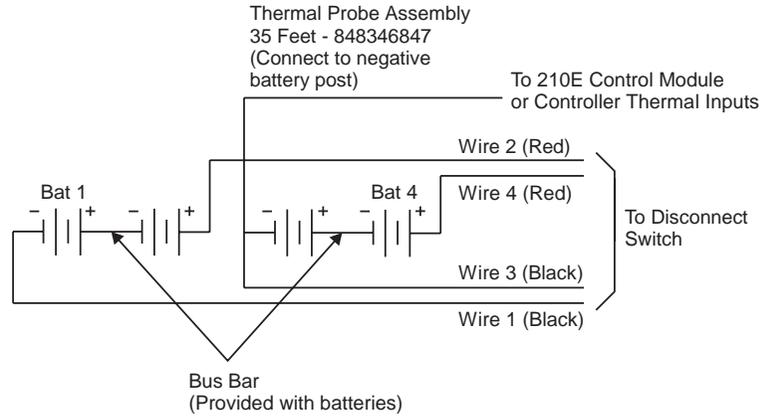
**Class I Stranded  
Cables Lugs**

**Table 5-F: KS24194 Class “I” Stranded Conductor Information**

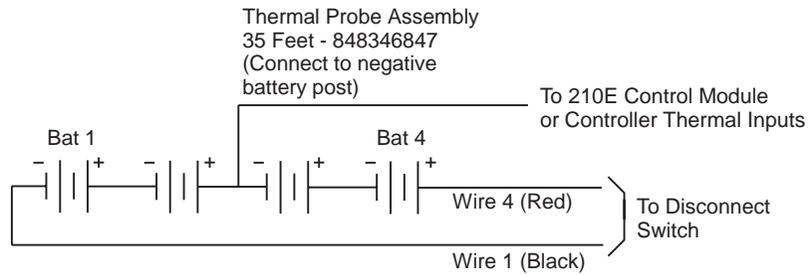
Wire Size AWG or KCMIL	Area (Circ Mils) (NOM)	Current		Max. DC Res. Ohms/M @20C	Strand Construction	Number of Strands	Avg. Ins. Thick (in.)	Diameters (in.)	Weight/ 1000 ft. (lb.)	Max. Ship Length Per Reel
		Capacity AMPS (see Notes)	Cond Dia. (in.)					List 2	List 2	
4/0	211600	260	0.613	0.0546	19x28	532	0.080	0.800	835	1000
350	350000	350	0.800	0.0334	19x45	855	0.095	0.960	1337	700
500	500000	430	0.941	0.0234	37x33	1221	0.095	1.170	1830	500
750	750000	535	1.100	0.0157	37X50	1850	0.110	1.340	2734	350
Note: Minimum bend radius is equal to 5X the overall wire diameter. *Minimum diameter compressed stranded construction.										

**Battery String**

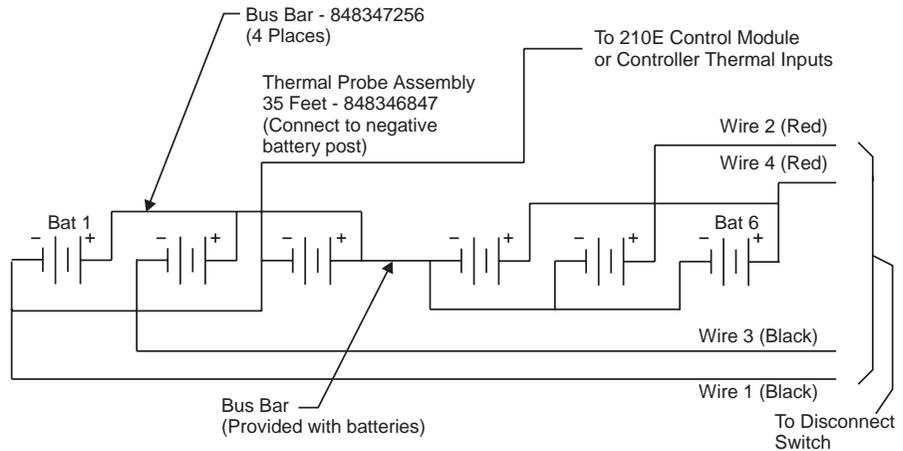
The batteries used in this stand may be wired in various ways to generate the string voltage required for the plant. The following schematics show the various wiring options for the 12IR125 and C11 batteries.



**Figure 5-7: Schematic of 24V 12IR125 Battery String**



**Figure 5-8: Schematic of 48V 12IR125 Battery String**



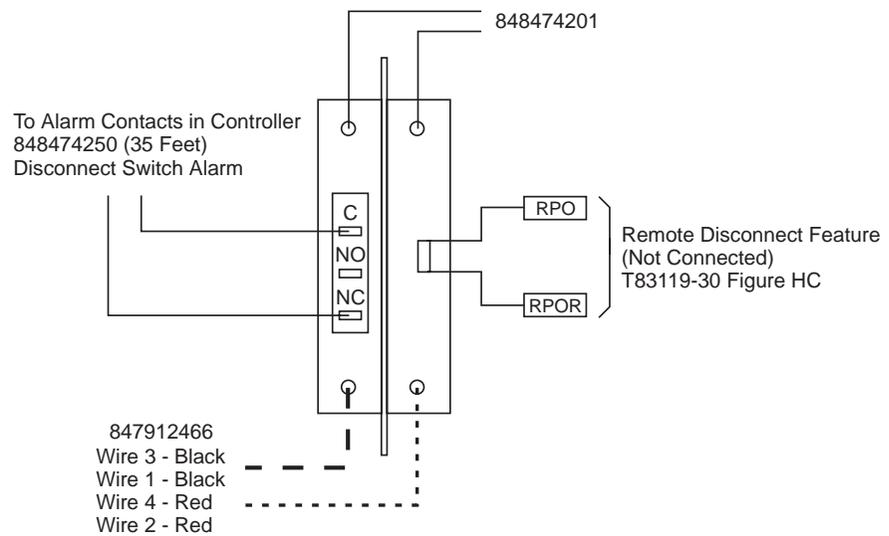
**Figure 5-9: Schematic of 24V C11 Battery String**

**Battery String  
Disconnect Switch**

The battery stand is provided with four battery string disconnect switches. One switch is provided for each shelf of batteries, and is intended to serve as a means to disconnect a string(s) of batteries from the plant for service. **NO OVERCURRENT PROTECTION IS PROVIDED.** Each disconnect switch is connected in parallel to the battery stand terminal plate. See Figure 5-10.

The disconnect switch alarm should be brought to the plant controller as an open string alarm. This is a resistive battery open string alarm that can be used with Millennium, Vector, and ECS controllers. Refer to Drawing T-83280-30 for connection to the Vector controller.

The maximum rating for the disconnect switch is 125A, providing the battery stand maximum output rating of 500A at either 24 or 48 volts. **DO NOT EXCEED THE MAXIMUM STAND OUTPUT/INPUT RATING OF 500A OR SWITCH RATING OF 125A.**



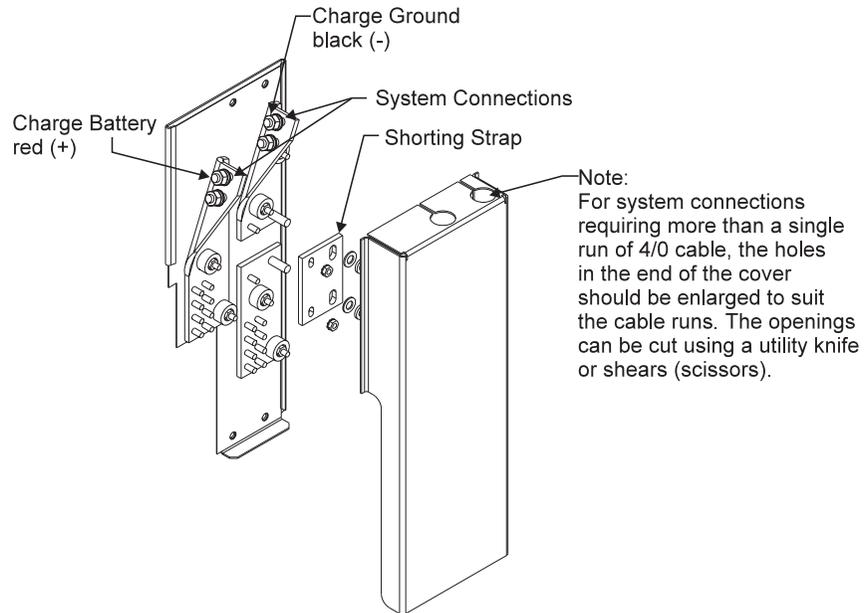
**Figure 5-10: Battery String Disconnect Switch**

**Other Connections**

Input, output, and open string alarm connections are already made on the stand. Connections for an optional remote disconnect feature are available (see Section 9, Remote Power Off Switch (J85504C-1 List D)).

### ***Terminal Plate***

The battery stand is equipped with a terminal plate (848474714) to which all plant connections are made. All the stand disconnect switches are connected in parallel to this plate. The plant connection to this terminal plate assembly consists of two 3/8-16 threaded studs, 1 inch long and spaced on 1 inch centers. Both the positive and negative terminals are sized for terminations using two lugs (back to back). Lug sizes from 4/0 to 750 MCM are available (see Table 3-H).



***Figure 5-11: Battery Stand Terminal Plate Assembly***

The battery stand comes configured so that the positive terminals of the batteries are connected to the charge battery and the negative battery terminals are connected to the charge ground bus bars of the terminal plate assembly (see Figure 5-12). For positive ground systems, the plant connection should be reversed at the battery and ground system connections shown in Figure 5-11.



## Optional Fuse Assembly

An optional 1000A fuse kit is available for use with this battery stand. This kit provides a 1000A fuse, an alarm indicating fuse, and remote alarm indicating switch. This kit is intended for use where customer or code requirements specify the need for circuit protection. Careful consideration for the size and usage of fuses in you back up power system is essential to ensure proper over-current protection.

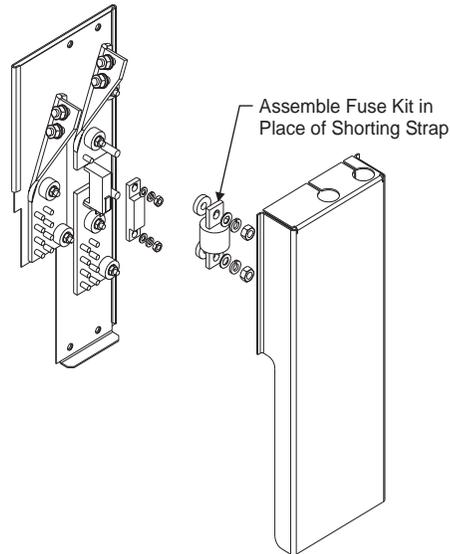


Figure 5-13: Fuse Assembly (optional)

**1000A Kit Contents** The fuses provided in this kit are:

Table 5-G: Fuses for Optional 1000A Kit

Comcode	Description	Manufacturer
407676972	Alarm-indicating Fuse, IA6160-01	Bussman
408151140	Fuse, FWA-1000A	Bussman **
408342541	Switch, 170H3027	Bussman
**Other fuse sizes suitable for use in this application are available from Bussman but only those that can mount using the same mounting centers and hardware should be used.		

The kit also provides mounting hardware, assembly instructions, and a wire assembly for connecting the remote alarm signal.

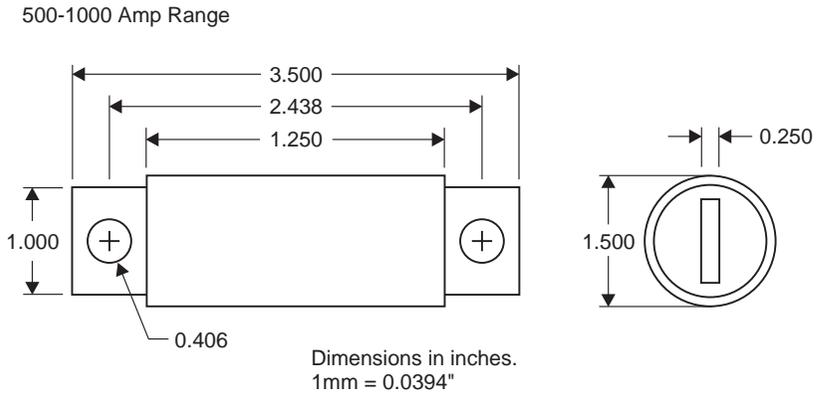
Note: This option is only available as a field upgrade and should be assembled before connecting the battery stand to the battery plant.

**Fuse Electrical  
Characteristics and  
Ordering  
Information**

**Table 5-H: Fuse Electrical Characteristics  
and Ordering Information**

Electrical Characteristics				Ordering Information				Dimensions
Type	Rated Current RMS-Amps	I <sup>2</sup> t (A <sup>2</sup> Sec)		Watts Loss	Part No.	Carton Qty.	Carton Weight (lbs)	
		Pre-arc	Clearing at 150V					
FWA 150V	500	39000	120000	35.0	FWA-500A	5	2.42	See Figure 5-14
	600	46000	140000	47.0	FWA-600A			
	700	75000	220000	49.0	FWA-700A			
	800	92000	280000	58.0	FWA-800A			
	1000	170000	510000	60.0	FWA-1000A			

- Interrupting rating 100kA RMS Symmetrical.
- Watts loss provided at rated current.
- 150 Vdc UL Recognition on 70 through 800A only. Consult Bussmann for additional ratings.



**Figure 5-14: Fuse Dimensions**

**Table 5-I: Electrical Characteristics**

<p><b>Total Clearing <math>I^2t</math></b></p> <p>The total clearing <math>I^2t</math> at rated voltage and at power factor of 15% are given in Table 5-H. For other voltages, the clearing <math>I^2t</math> is found by multiplying by correction factor K, given as a function of applied working voltage <math>E_g</math> (RMS).</p>	<p>1) 500-1000 Amp Range 2) 70-400 Amp Range</p>
<p><b>Arc Voltage</b></p> <p>This curve gives the peak arc voltage <math>U_L</math>, which may appear across the fuse during its operation as a function of the applied working voltage <math>E_g</math> (RMS) at a power factor of 15%.</p>	
<p><b>Power Losses</b></p> <p>Watts loss at rated current is given in the electrical characteristics. The curve allows the calculation of the power losses at load currents lower than the rated current. The correction factor <math>K_p</math> is given as a function of the RMS load current <math>I_b</math> in % of the rated current.</p>	

# 6 Installation Procedures

## Positioning Battery Stand

1. Temporarily position the stand per office layout and mark (trace) holes for anchor bolts using marking pen or pencil.

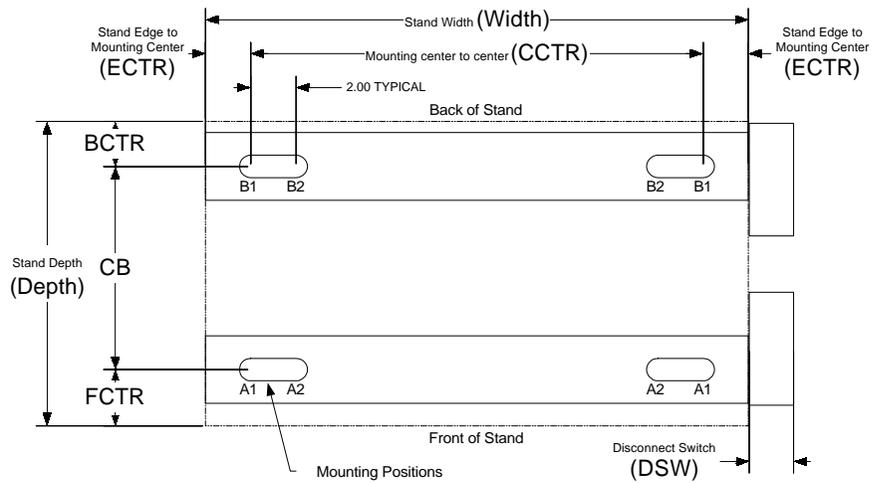


Figure 6-1: Typical Battery Stand Footprint

2. Remove stand, and drill holes for the anchors specified for the application. Holes should be drilled in preferred anchor positions shown in Figure 6-1 designated as A1 and B1. Anchor positions A2 and B2 should only be used when interference with floor reinforcing bars occurs.

Table 6-A: Floor Drilling Data

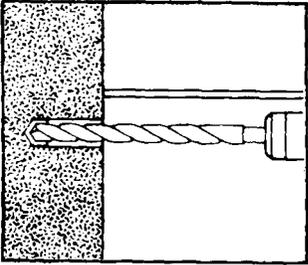
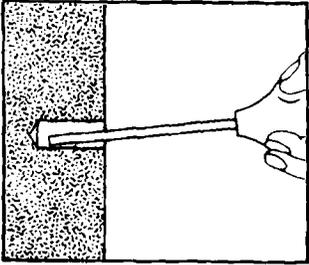
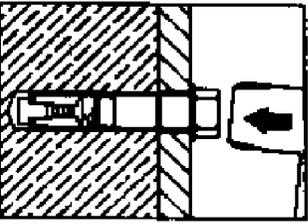
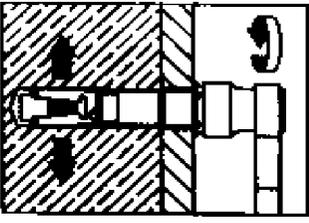
Battery Stand	List No.	Width	Depth	CCTR	ECTR	AB	CB	BCTR	FCTR	DSW
J85504D-1	16	31.68	19.18	24.18	3.75	4.18	12.90	1.77	4.50	2.43

## Installing HSL Type Anchors

Refer to Table 6-B for spacing requirements for HSL anchors.

### Caution

Use eye protection during this procedure.

<p>1. Drill hole with the prescribed drill bit.</p> <p>Note: The HSL anchors can be installed in a bottomless hole.</p> 	<p>2. Clean hole using a blow-out bulb or compressed air.</p> 
<p>3. Using a hammer, tap the pre-assembled anchor through the material being fastened and into the hole. The anchor should be seated firmly against the base plate.</p> <p>Note: Do not expand the anchor by hand before tapping it into the hole.</p> 	<p>4. Tighten anchor bolt to the maximum specified torque, using a torque wrench.</p> <p>Note: When using an HSLB anchor, no torque wrench is required. The torque cap shears off at a predetermined torque value.</p> 

## ***Installing HDI Type Anchors***

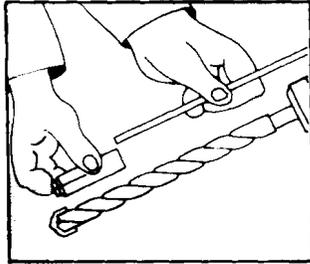
The HDI Drop-in anchor is an internally threaded, flush mounted expansion anchor for use in concrete. These anchors meet the description in Federal Specification FF-S-325, Group VIII, Type 1, for expansion shield anchors.

Refer to Table 6-C for spacing requirements for HDI anchors.

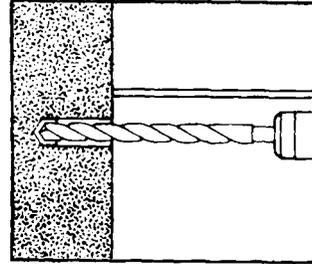
### **Caution**

Use eye protection during this procedure.

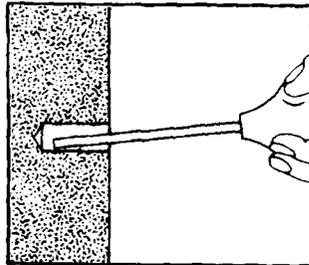
1. Adjust depth gauge so anchor will be flush with the base material surface.



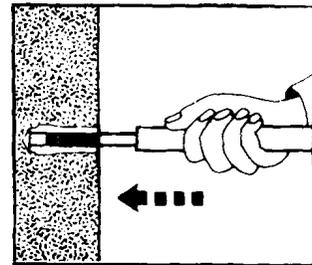
2. Drill hole with the prescribed drill bit.



3. Clean hole using a blow-out bulb or compressed air.



4. Install anchor using proper setting tool. Drive setting tool into anchor until shoulder meets top of anchor.



## ***Anchoring Battery Stand***

1. Position battery stand over anchor holes or bolts. Some anchor types require being inserted into the holes prior to positioning the equipment to be anchored. See Figures 5-2 through 5-6 for anchor hardware assembly.
2. Tighten the anchor bolt to the torque value specified for the anchor. See Table 5-B, Anchor Bolt Specifications.
3. Connect the framework ground pigtail (provided with the battery stand) to the building ground. The framework ground is provided loose with the battery stand and should be assembled onto one of the four non-painted ground connection points that are provided on the stand. This cable is provided with additional lugs and c-tap for connections to the building ground. Additional hardware may be discarded.
4. BEFORE PROCEEDING BE SURE THAT ALL DISCONNECT SWITCHES ARE SET TO THE OFF (DOWN) POSITION.
5. Connect the stand to the plant distribution (bus work). (see “plant connection”).
6. Remove battery retainer bars and position to the side for battery installation. Do not cut wire ties securing retainer bars to disconnect switch wiring.

## ***Installing Batteries***

1. Before proceeding with the installation of the batteries, review or determine the arrangement of the batteries for the application. Also review the batteries Pre-Service Checking and Charging instructions. All batteries should be fully charged before being put into service
2. In applications using batteries other than the 12IR125 series of batteries the spacer rods provided with the stand should be removed and replaced by spacers ordered for the batteries to be used in your application. The spacer rods may be removed by sliding through the holes in the top of the battery stand and should be removed before mounting any equipment on top of the stand.
3. For Hawker C11 batteries install the battery adapter kit (comcode 848466900). The kit contains: (1) rear mounted spacer, (7) battery spacers, and (4) battery inter-connection bus bars. The rear mounted spacer mounts into slots in the rear of each battery shelf. The battery spacers should be positioned between each of the batteries and on each end of the string. Connect the

inter-connection bus bars as described in the wiring section of this manual. Reserve bus bars and proceed to next step of these instructions before making battery connections.

4. Beginning with the bottom shelf, slide the batteries onto the shelf. Each shelf should be completely filled with batteries. Un-even distribution of batteries on a shelf or improper loading of batteries causing the center of gravity to be shifted to one side or elevated will adversely affect the seismic rating of the stand. Orient the batteries so that the narrow end with battery posts are facing the front of the stand (note positive post location in schematic for the type of battery and wiring option chosen). Observe proper handling instructions for the batteries.
5. Before proceeding, measure and record all battery voltages. Any battery whose voltage does not agree with values as specified in its product manual should be measure a second time and replaced if found to be defective.
6. Install the battery retainer bars using the 1/4-20 hardware (flat washer, lockwasher and bolt) provided with the battery stand. Torque to 60 in-lbs.
7. The battery terminals are pre-coated with NO-OX-ID "A" compound. If terminals appear dirty, clean surface areas of the exposed terminal with a non-abrasive cloth and re-coat with NO-OX-ID "A" (provided with batteries).
8. Using the hardware provided with the batteries, or the respective adapter kit, connect the batteries into strings. Refer to "Connections" in Section 5.
9. Each shelf of the battery stand is pre-wired for connection to the string disconnect switch. Two wires marked with red bands are intended for connection to the positive (+) post of the battery string and the remaining two wires (black) are for connection to the negative (-) post of the battery string. Remove the protective insulation from the ends of the wires by cutting around the barrel of the wires terminating lug. Connect wires to the respective positive and negative posts of the battery string. Assemble all hardware hand tight until all connections are made.
10. Torque battery connections to 60 inch pounds or as otherwise specified in the batteries product manual.

11. Install the battery covers to protect the battery terminals. Battery covers are ordered separately for the 12IR125 batteries and are provided with the 12IR125LP and C11 batteries.
12. Determine the appropriate charging procedures before connecting the batteries to the plant bus work. (See specifications provided with the plant for plant bus work torque requirements.)

**Caution**

Do not connect the stand to the plant bus until instructed to do so.
--

***Placing a  
Battery String  
Into Service***

Before connecting parallel strings together or individual strings to the plant bus, make the following voltage measurements:

1. Measure across each string to verify that the batteries are connected properly and that the polarity is correct. The string voltage should be 24 or 48 volts as determined by wiring option chosen (see "Connections" in Section 5).
2. Measure across the plant charge and discharge battery buses. The voltage difference between the string and plant should not exceed 0.05 volts unless the plant is at 0 volts because the chargers are turned off. If a larger differential exists, the string should be charged at the plant voltage (or the plant voltage lowered) until the voltage differential is less than 0.05 volts. This should prevent arcing during the final connection.
3. After the battery strings have been connected to the plant bus for one hour, make the final reading to record voltages of individual batteries or strings. Record these in the Installation Battery Report (see battery product manual).

# 7 *Maintenance and Battery Replacement*

## *Inspection and Cleaning*

A visual inspection of the battery plant should be done on an annual basis. If necessary, the battery modules and racks can be cleaned using a soft cloth dampened in water or battery cleaning kit (available from Lucent Technologies). The inter-battery connections should be inspected for corrosion. Report any sign of acid or corrosion to Lucent Technologies.

## *Re-torquing Inter-battery Connections*

All battery connections (i.e. inter-battery, disconnect switch) made during installation will require periodic re-torquing. Using an insulated torque wrench, re-torque each connection to the torque recommended for the battery.

### **Warning**

An explosion could occur when sparks are created near the battery string. Use insulated tools and discharge all static electricity from your body before performing any work.

### **Caution**

Over-tightening of connectors could strip or damage the bolt and/or nut threads, resulting in loose connections that will increase circuit resistance and operating temperatures.

## ***Battery Replacement***

If you need to replace one or more batteries in a battery string, charge the replacement batteries according to instructions provided with the battery.

When you replace a battery in an existing string, you can exchange it without removing the whole stand from the plant bus. Disconnect the string by setting the respective string disconnect switch to the OFF (down) position. Remove the battery stand retainer bar and connections for the string being exchanged. Replace the defective battery(ies) and reconnect by reversing order of disassembly.

Before reconnecting to the plant see “Placing a Battery String Into Service.”

When a single replacement battery is being installed in an existing string, both the “End of Charge Voltage” and the “Float Voltage at Turnover” must be recorded. The “Float Voltage at Turnover” is recorded one hour after the battery is installed in the string. The record should also include a brief description of the charging procedure. For example, “Battery was charged at a central location at 2.25V (for EVR type batteries) for 2 weeks before being brought to this site for installation. The module was on open circuit for about 13 hours in transit.” Alternatively, the replacement battery(ies) may be installed in the string and then given an initial charge using a portable charger. The portable charger must be left across the replacement battery for seven days, even if the initial charge is given at the float voltage.

# **8**

## ***Equipment Frames (Mini-Frames)***

### ***Overview***

In addition to the battery stands listed in Section 2, Lucent Technologies has reduced height equipment bay frames (mini-frames) designed for mounting on top of the battery stands or separately. These mini-frames are designed to mount power and distribution equipment used in conjunction with the batteries on top of the four shelf high battery stands. The available frame heights are designed to maintain the standard equipment height of 7'-0" (2.13 meters). These mini-frames are designed and tested to meet the requirements of Bellcores Network Equipment Building Systems (NEBS) Generic Equipment Requirements for use in seismic zones 0 through 4 when used in conjunction with the stands as shown in Table 8-A, Mini-Frame Specifications.

The seismic qualifications for each of the mini-frames listed only applies to that frame when mounted/assembled on top of the respective battery stand listed. The mini-frames may be mounted separately (on the floor), but no seismic ratings have been assigned for these applications. Proper anchoring to the mounting surface (i.e. concrete floor) should be specified by the job engineer.

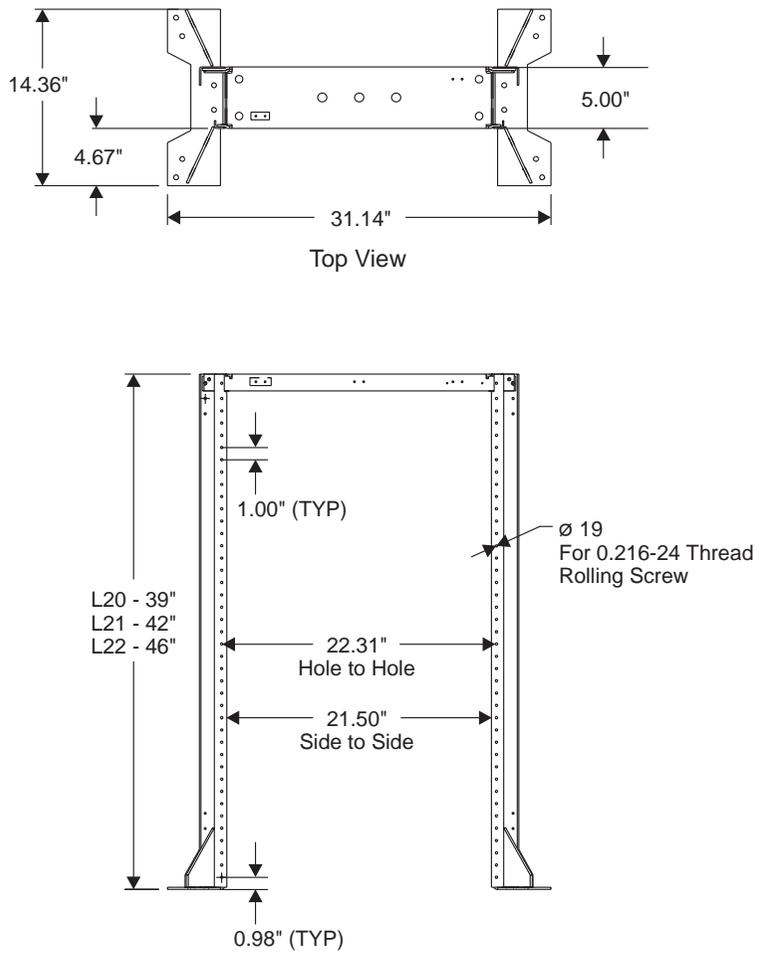


Figure 8-1: Mini-frame Dimensions

Table 8-A: Mini-Frame Specifications

Drawing	List No.	Max Seismic Zone	Dimensions					1-inch Mounting Spaces
			Width inch (mm)	Depth inch (mm)	Height inch (mm)	Open Height	Open Width	
J85504D-1	20	4	31.14 (791)	14.36 (365)	39 (991)	37 (944)	21.50 (546)	36 (915)
	21				42 (1067)	40 (1016)		39 (991)
	22				46 (1169)	44 (1118)		43 (1092)

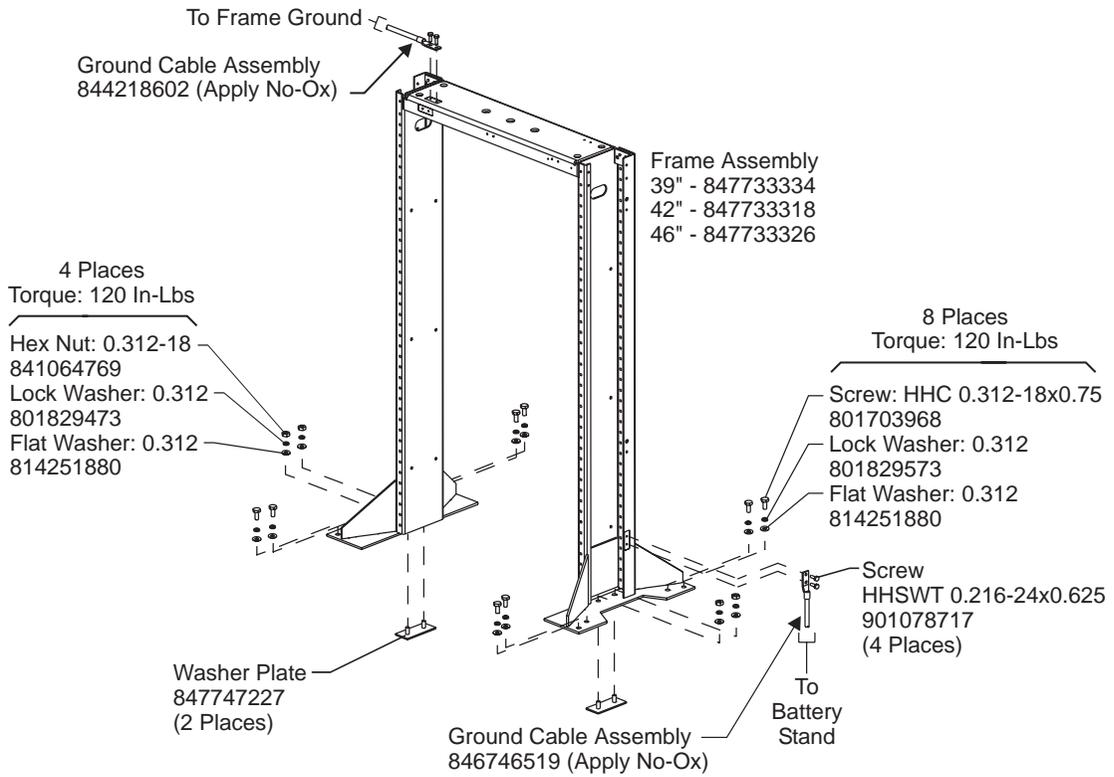
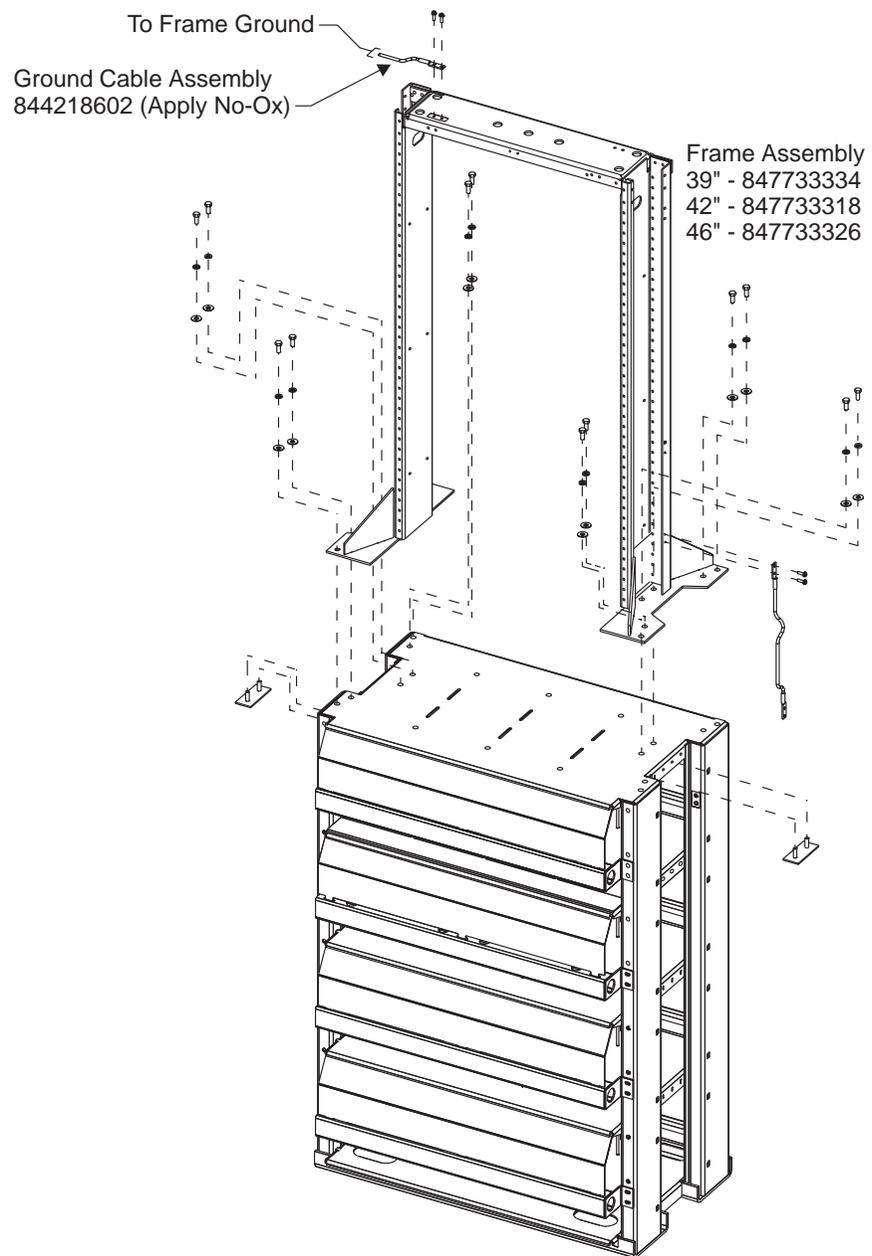


Figure 8-2: Isometric View of Mini-Frame



**Figure 8-3: Frame Assembly on Top of Battery Stand**

## ***Tools and Materials***

The following tools and materials are recommended for installation of the battery stands.

- Nut driver or socket set
- Torque wrench capable of reading 60 inch-pounds

## ***Installing the Mini-frame***

1. Position the mini-frame over mounting holes of battery stand. Batteries should not be installed in the top shelf of the battery stand when mounting the mini-frame.
2. When mounting the mini-frames per J85504D-1 on top of the 12IR125 battery stand, insert the washer plates thru holes in the uprights of the frame. The washer plate stud should face upward through the holes so that the hardware can be assembled and tightened from the top.
3. Torque the mounting hardware to 120 inch-pounds.
4. Connect the framework ground pigtail (provided with the mini-frame) to the building ground. Framework ground is located on the cross member at the top of the frame. Torque to 35 inch-pounds.
5. A secondary framework ground is provided on the uprights. This ground is used to ground the framework to the battery stand. Torque to 35 inch-pounds.



# **9**

## ***Remote Power Off Switch (J85504C-1 List D)***

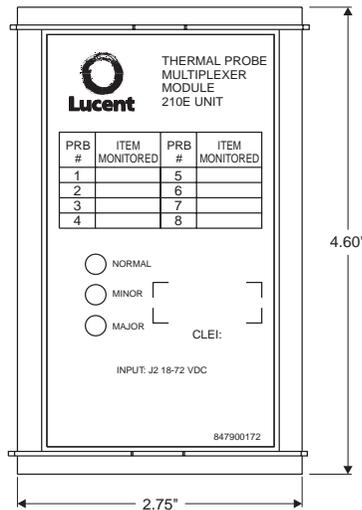
This optional Remote Power Off switch provides the ability to remotely operate each of the disconnect switches on the battery stand. This switch may be added at any time. Refer to installation and operating instructions provided with the switch.



# 10 *210E Control Module*

## *Overview*

The 210E control module monitors the temperature of up to 8 thermal probes and provides the highest temperature to its output. The output of the 210E control module is equivalent to the output of the 10K standard thermistor thermal probe used with a Lucent Technologies Cabinet Power System. When used in conjunction with a Lucent Technologies controller (i.e., CPS or Vector), the 210E expands the thermal management capability by increasing the number of thermal probes that may be used.



**Figure 10-1: 210E Thermal Probe Multiplexer Module**

For a complete description of this product refer to the "Thermal Probe Multiplexer 210E Control Module" Product Manual (Select Code 157-010-202, Comcode 108001728).

## ***Cable Kit***

An optional 35 ft-long cable kit for connecting the 210E to the plant controller is available (see Table 3-E). The wires provided are terminated with connectors used in the Vector outdoor controller. For indoor Vector controllers, these connectors should be removed and the wires connected as shown in T-83280-30.