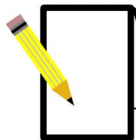


Figure 5-5: Cable connections for BSDU daisy chaining



Note: When daisy-chaining BSDUs, it does not matter which 100Base-T ports you use to connect two BSDUs. For example, you can connect **100Base-T 1 to 100Base-T 2**, or **100Base-T 1 to 100Base-T 1**.

5.8. Connecting Sync IN/OUT ports

The BSDU's front panel provides an in/out synchronization 8-Pin RJ-45 ports for synchronization between BSDUs at the base station. The **SYNC OUT** of the master BSDU is connected to the **SYNC IN** of a slave BSDU, which then connects its **SYNC OUT** to the **SYNC IN** of another slave BSDU, and so on.

- **Connector:** 8-Pin RJ-45 (male)

- **Cable:** straight-through cable

- **Connector Pinouts:**

- Sync IN

Pin	Name	Description
1	TD+	Transmit data to GPS
2	TD-	Transmit data from GPS
3	Rx+	Receive Data (hop synchronization)
4	NC	Not connected
5	NC	Not connected
6	Rx-	Receive Data (hop synchronization)
7	1PPS+	GPS pulse per second
8	1PPS-	GPS pulse per second

■ Sync OUT

Pin	Name	Description
1	TD+	Transmit data to GPS
2	TD-	Transmit data from GPS
3	Tx+	Transmit Data (hop synchronization)
4	RD+	Receive Data (from GPS)
5	RD-	Receive Data (to GPS)
6	Tx-	Transmit Data (hop synchronization)
7	1PPS+	GPS pulse per second
8	1PPS-	GPS pulse per second

5.9. Connecting to BSPS for Power Management

The BSDU's front panel provides a 9-Pin DB-type port for serial RS-232 power management of the BSPS. WipLL's WipManage manages BSPS by connecting to the BSDU through the IP network (i.e., from the BSR), and then manages BSPS through the serial connection between the BSDU and BSPS. The reason for the serial connection is that the BSPS does not support SNMP-based management, which is the basis of WipManage.

- **Connector:** depending on the BSPS model:
 - 9-Pin D-type female (BSDU and BSPS)
 - Or-
 - 9-Pin D-type female (BSDU) to 8-Pin RJ-45 (BSPS) adapter (see Figure 5-6)

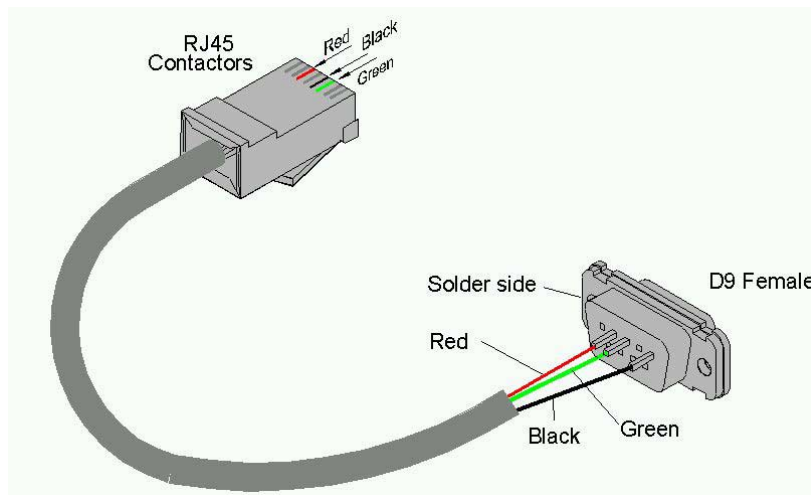


Figure 5-6: BSDU-to-BSPS power management connectors (RJ-45 to 9-Pin D-type cable adapter)

- **Cable length:** 60 cm

■ Connector pinouts:

BSDU			BSPS	
9-Pin D-type			RJ-45	
Pin	Name	Description	Pin	Name
1	NC	Not connected	1	NC
2	Rx	Receive Data	2	NC
3	Tx	Transmit Data	3	Rx
4	NC	Not connected	4	NC
5	GND	Ground	5	GND
6	NC	Not connected	6	Tx
7	NC	Not connected	7	NC
8	NC	Not connected	8	NC
9	NC	Not connected		

To connect the BSDU to the BSPS for BSPS serial power management:

1. Connect the **9-pin D-type female** connector, at one end of the cable, to the BSDU's 9-pin D-type port labeled **POWER Management** (see Figure 5-7).
2. Connect the **RJ-45** connector, at the other end of the cable, to the BSPS System Controller's RJ-45 serial port (see Figure 5-7).

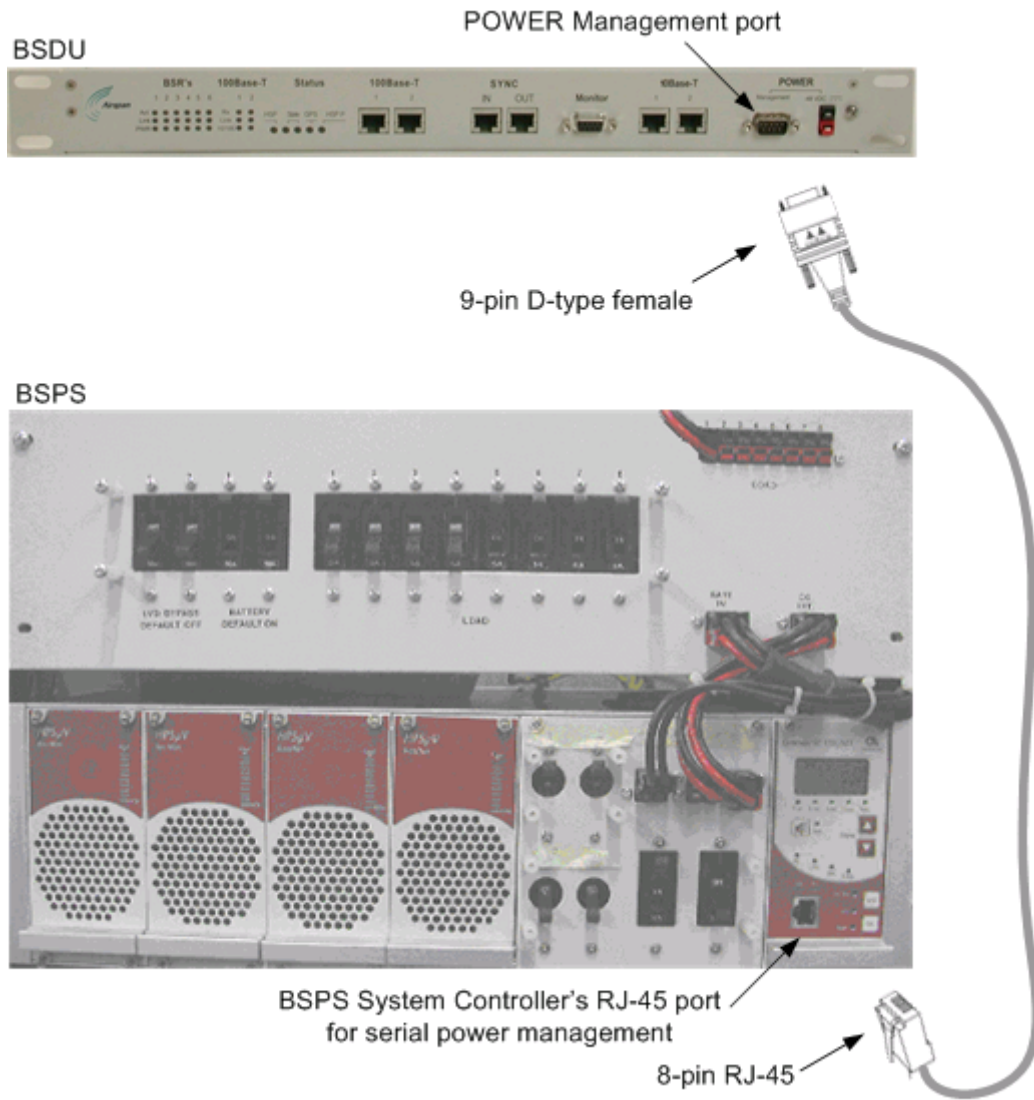


Figure 5-7: BSDU-to-BSPS serial cable connections for BSPS power management

5.10. Connecting to PC for Serial Management

The BSDU's front panel provides a 9-Pin D-type port for BSDU serial management (labeled **Monitor**). Serial management allows you to connect the WipLL's network management system (WipConfig) to BSDU without assigning BSDU an IP address.

- **Connector:** 9-pin D-type male
- **Cable:** straight-through
- **Connector pinouts:**

9-Pin D-type Connector	
Pin	Signal
1	Not connected (NC)
2	Rx
3	Tx
4	NC
5	NC
6	NC
7	NC
8	NC
9	NC

To connect the PC to the BSDU by serial connection (see Figure 5-8):

1. Connect the **9-pin D-type female** connector to the PC.
2. Connect the **9-pin D-type male** connector, at the other end of the cable, to the BSDU's serial port (labeled **Monitor**).

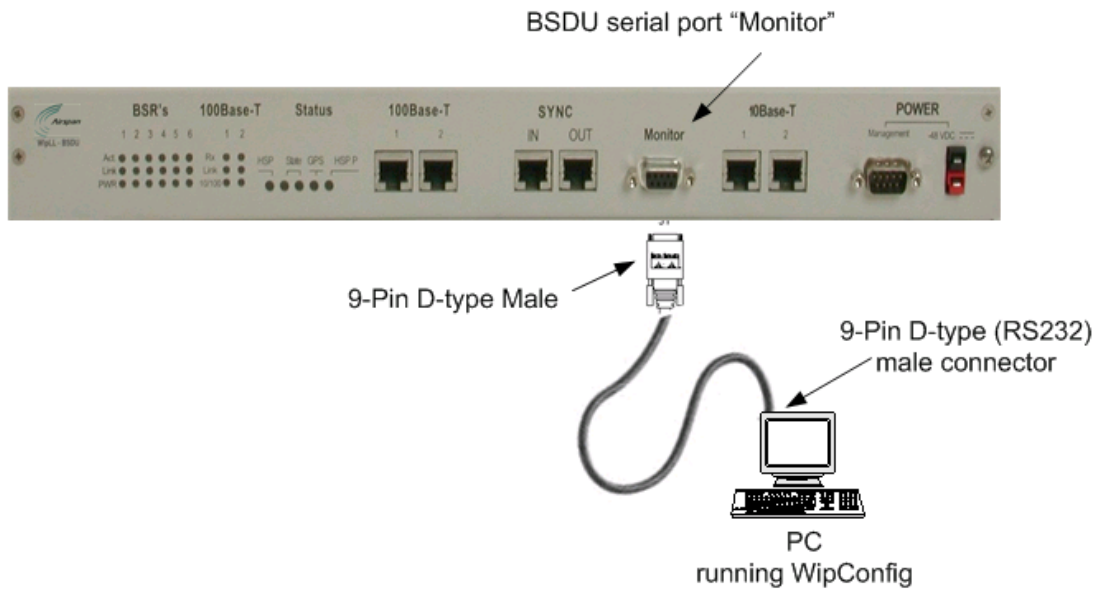


Figure 5-8: PC-to-BSDU Serial Connections

5.11. Connecting to PC for Network IP Management

For network (IP) configurations, you can connect the PC to the BSDU's local port, or remotely (from anywhere) if you have IP connectivity to the device. For PC-to-BSDU local network (IP) connections you need to connect the PC to the BSDU's 10BaseT or 100BaseT port. The BSDU's front panel provides two 10Base-T ports: left is labeled **10Base-T 1**; right is labeled **10Base-T 2**. Port **1** provides PC management interface to all BSRs connected to the BSDU. Port **2** provides management interface only to the BSDU. If you connect the BSDU's two 10BaseT ports (i.e., loop the ports) to one another by a crossover cable, then you can connect the PC to one of the BSDU's 100BaseT ports. If the two BSDU 10BaseT ports are not connected to one another, then you need to connect the PC to the BSDU's right-most 10BaseT port (labeled **10Base-T 2**).



Note: For WipLL management, it is recommended to connect Port 1 to Port 2 by a crossover cable, and then connect the management station (PC) to one of the 100Base-T ports. In such a setup, you can provide management to all daisy-chained BSDUs and their associated BSRs through one 100Base-T port.

- **Connector:** 8-Pin RJ-45 (male)
- **Cables:**
 - Crossover cable for looping the two 10BaseT ports
 - Straight-through for connecting the PC to the 100BaseT port

■ Connector pinouts:

RJ-45 (10Base-T)	
Pin	Signal
1	+Rx
2	-Rx
3	+Tx
4	NC
5	NC
6	-Tx
7	NC
8	NC

RJ-45 (100Base-T)	
Pin	Function
1	+Tx
2	-Tx
3	+Rx
4	NC
5	NC
6	-Rx
7	NC
8	NC

To connect the PC to the BSDU using a network connection:

1. Connect the **RJ-45** connector to the PC's Ethernet port.
2. Connector the RJ-45 connector, at the other end of cable, to the BSDU's 10Base-T port labeled **2** (see Figure 5-9);

-Or-

Connect the BSDU's two 10Base-T ports with the supplied crossover cable, and then connect the RJ-45 connector to the BSDU's 1000Base-T port (see Figure 5-10).

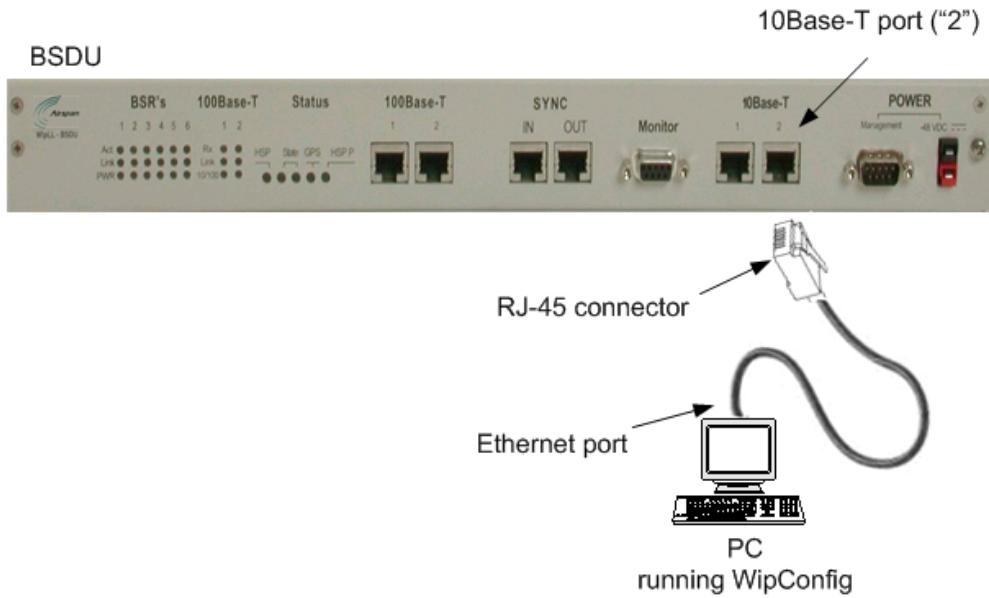


Figure 5-9: PC-to-BSDU Local Network Connection – 10Base-T Port

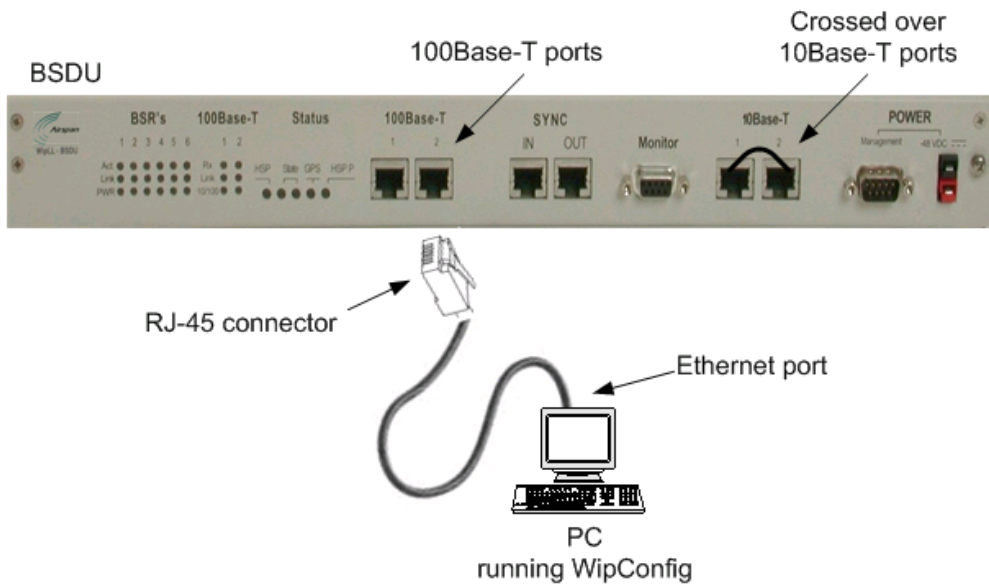


Figure 5-10: PC-to-BSDU Local Network Connection – 100Base-T Port



Note: If you have multiple BSDUs at a base station (i.e., daisy chained BSDUs), the connection to any BSDU 100Base-T provides management to all the BSDUs in the daisy chain.

5.12. Connecting to Power

The BSDU requires a power supply of -48 VDC. If the service provider's base station cannot supply AC-to-DC voltage, the BSDU can be powered by an optional WipLL BSPS unit (see Chapter 7, "Installing the BSPS") that supplies -48 VDC power as well as power redundancy. Table 5-2 lists the BSDU's power requirements.

Table 5-2: BSDU power requirements

Parameter	Value	Comment
Voltage	-48 VDC nominal	<ul style="list-style-type: none"> • Minimum -38 VDC • Maximum -55 VDC
Power consumption	Maximum 300W	Including the feeding of six BSRs



Note: Before you can connect the BSDU to a power supply, you need to ground (earth) the BSDU.

5.12.1. Grounding the BSDU

Before connecting the power supply to the BSDU, you need to ground (earth) the BSDU.

To ground the BSDU:

1. Connect one end of the grounding lug wire (green/yellow) to the grounding lug screw located on the rear panel of the BSDU chassis (see Figure 5-11).
2. Connect the other end of the grounding wire to the cabinet rack or any other customer grounded point at the base station.

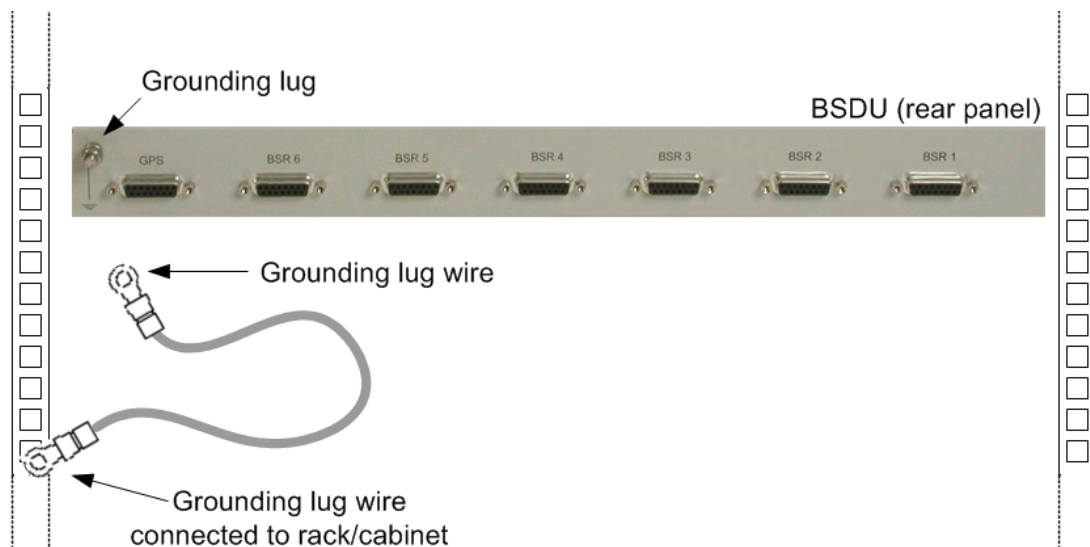


Figure 5-11: BSDU grounding connection (BSDU rear panel)

5.12.2. Connecting to Power Supply (BSPS)

The connection between the BSDU and the power supply unit (BSPS) is made via a two-meter long DC shielded power cable (supplied). The power cable has a power connector at each end of the cable and a wire for preventing cable disturbances and radiation. The power cable is connected to the BSDU's power connector.

The wire color-coding is as follows:

- **Red:** positive
- **Black:** negative

Figure 5-12 displays the power cable with the power connectors on each side and the grounding lug wire on the side that connects to the BSDU.

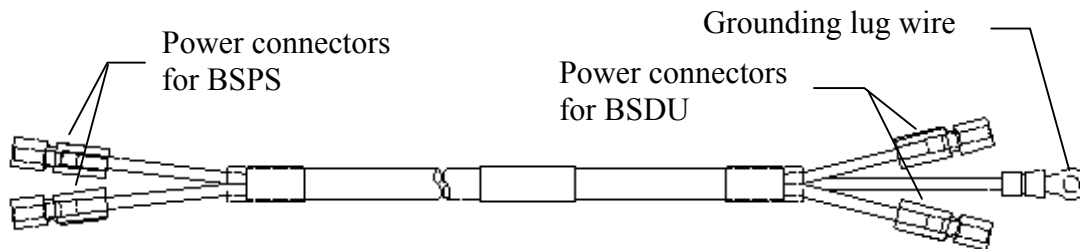


Figure 5-12: Power cable (with ground wire) for connecting BSDU to BSPS

To connect the BSDU to the power supply unit (see Figure 5-13):

1. Connect the cable's power connectors on the cable side that provides an additional wire for preventing power radiation, to the BSDU's power port labeled **POWER -48 VDC**. Ensure that the black-colored (i.e., negative) side of the connector is inserted in the upper part of the power receptacle; and the red-colored (i.e., positive) side of the connector is inserted in the lower part of the power receptacle (see Figure 5-13).
2. Connect the grounding lug wire for radiation immunity, to the BSDU's grounding lug screw, located alongside the BSDU's power receptacle (see Figure).

3. Connect the other end of the power cable to the power source (i.e., to the customer's power supply or to the WipLL BSPS). Ensure that the black-colored (i.e., negative) side of the connector is inserted in the upper part of the power receptacle; and the red-colored (i.e., positive) side of the connector is inserted in the lower part of the power receptacle (see Figure 5-13).

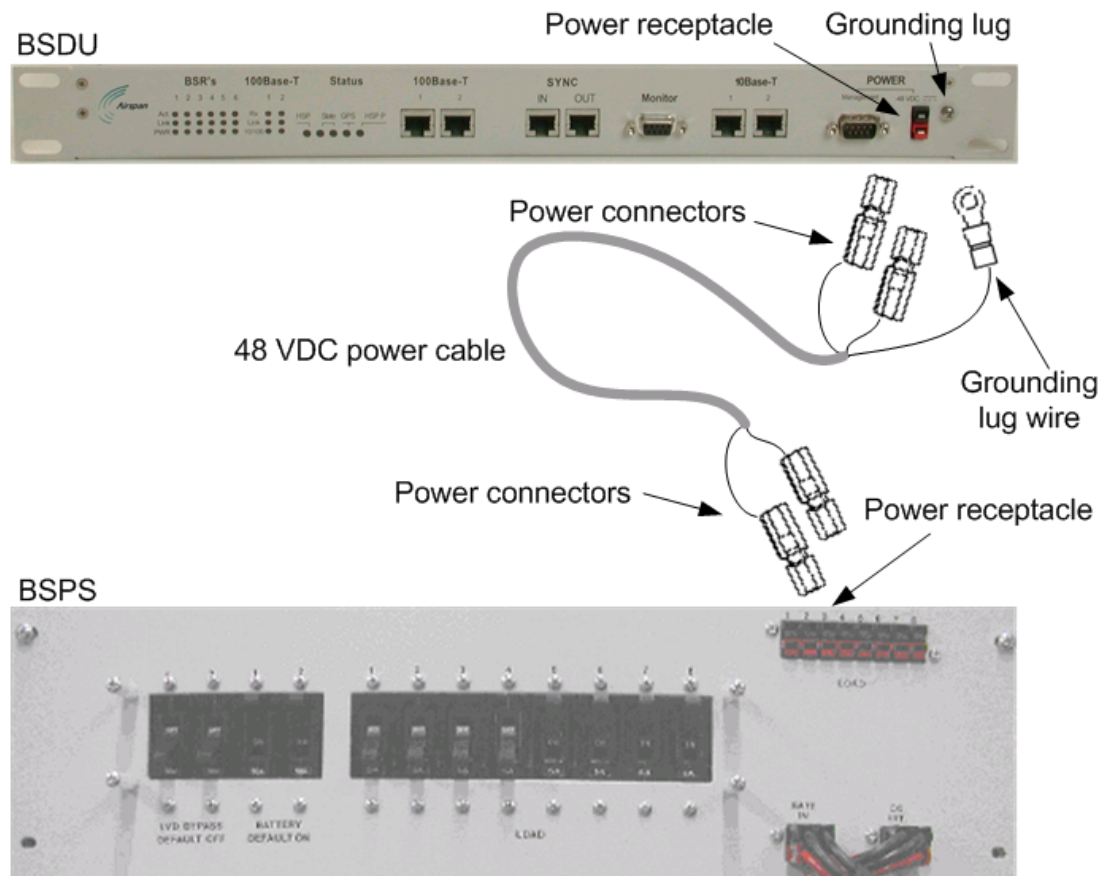


Figure 5-13: BSDU-to-BSPS power cable connections

5.13. LED Indicators

The BSDU provides various LED indicators located on the BSDU's front panel (see Figure 5-14). These LEDs are grouped as follows:

- **BSR's LEDs**
- **100Base-T LEDs**
- **Status LEDs**

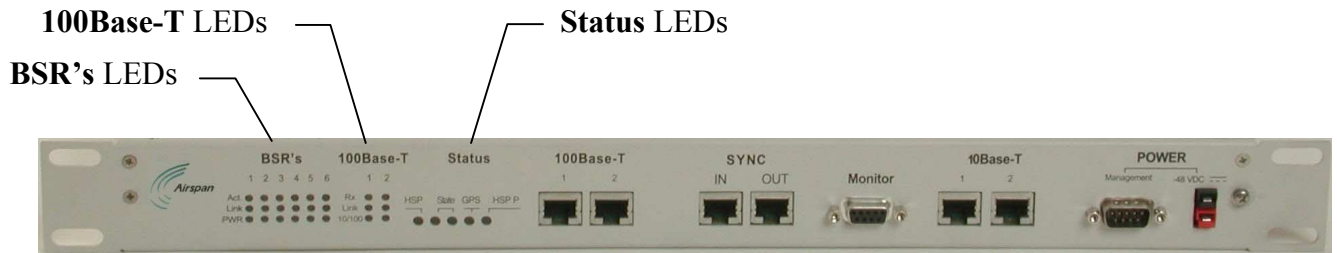


Figure 5-14: BSDU LED indicators

5.13.1. BSR's LEDs

The BSDU's **BSR's** LED indicators, located on the BSDU's front panel, includes three LEDs for each of the six BSR ports. These LEDs are described in Table 5-3.

Table 5-3: BSR's LED Description

LED	Color	Status	Meaning
Act	Yellow	On	Ethernet activity is detected on the BSR port
		Off	No Ethernet activity is detected on the BSR port
Link	Yellow	On	Physical link exists between the BSDU and BSR
		Off	No physical link exists between the BSDU and BSR
PWR	Yellow	On	Power is supplied to the BSDU's BSR port
		Off	The BSDU's BSR port is disabled by software, or port failure has occurred

5.13.2. 100Base-T LEDs

The BSDU's **100Base-T** LED indicators, located on the BSDU's front panel, includes three LEDs for each of the two 100Base-T ports. These LEDs are described in Table 5-4.

Table 5-4: 100Base-T LED Description

LED	Color	Status	Meaning
Rx	Yellow	On	Data is received through the 100Base-T port
		Off	No data is received through the 100Base-T port
Link	Yellow	On	Viable physical link between the 100Base-T port and the external device to which this port connects
		Off	No physical link between the 100Base-T port and the external device to which this port connects
10/100	Yellow	On	Power is supplied to the 100Base-T port
		Off	No power at the 100Base-T port

5.13.3. Status LEDs

The BSDU's **Status** LED indicators, located on the BSDU's front panel, are displayed in Figure 5-15.

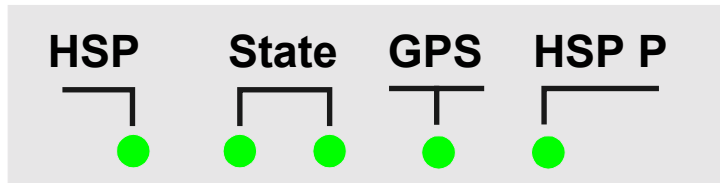


Figure 5-15: BSDU Status LEDs

The **Status** LEDs are described in Table 5-5.

Table 5-5: Status LED Description

LED	Color	Status	Meaning
HSP (Hop Synchronization Process)	Green	On	BSDU synchronization process is active
State (two LEDs)	Green	Only right LED is on	Synchronization process is starting
		Both LEDs are on	BSDU is the master unit
		Only left LED is on	BSDU is a slave unit
		Both LEDs are off	BSDU sync pulse lost
GPS (Global Positioning Satellite)	Green	On	GPS is connected to the BSDU
		Blinking	Receiving a satellite signal
HSP P (Hop Synchronization Process Pulse)	Green	On	Change state for the HSP pulse

Installing the GPS

The WipLL system provides BSDU connectivity to GPS antennas for synchronizing multiple base stations and avoiding radio frequency ghosting effects. The GPS antenna ensures that the entire WipLL network operates with the same clock, based on a universal satellite clock signal.



Figure 6-1: GPS antenna for clock synchronization

6.1. Mounting the GPS

Depending on individual customer requirements and environmental influences there are several available options for mounting the GPS:

- **Pole Mounting:**

The GPS may be mounted to a pole similar to that used to mount the BSR (See Chapter 4, “Installing the BSR”).

- **Mounting Plate:**

The GPS may be mounted to a wall or roof top structure using a purpose-made mounting plate supplied with the unit.

- **Direct Mounting:**

The unit may be mounted directly to a suitable structure that has been provided with holes suited to the GPS mounting details.

- **Magnetic Mounting:**

An optional magnetic mounting device is available to allow GPS mounting to a suitable surface, e.g., vehicle roof or steel building structure. This device is attached by means of the threaded holes provided in the base of the GPS.

6.2. Connecting to the BSDU

The GPS antenna is connected to the BSDU's 15-Pin D-type port, labeled **GPS** (see Figure 6-2).

15-Pin D-type
port for GPS



Figure 6-2: BSDU rear panel showing GPS port



Note: Airspan supplies un-terminated cables for connecting the GPS to the BSDU. Refer to Appendix B, "Cable Crimping" for cable crimping procedures for these connectors.



Warning: To avoid electrical or fire hazard, ensure that the connection to the GPS is made prior to connecting the BSDU to the power supply.

The following describes the cables and connectors:

- **Connector:**
 - **GPS:** 12-pin female (Deutsch MMP26C-2212S1)
 - **BSDU:** 15-Pin D-type male
- **Cable:** Multipair Overall Shielded (22 AWG)

- **Connector pinouts:** The GPS connector receptacle contains 12 male contacts, as displayed in Figure 6-3.

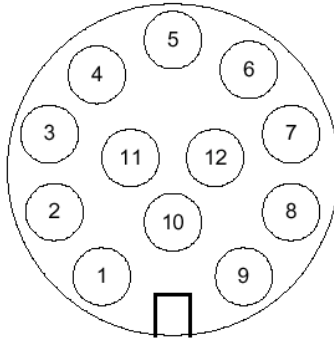


Figure 6-3: GPS connector pinouts

The connector pinouts for the GPS and BSDU are described in the following table.

12-pin female (GPS)			15-pin D-type male (BSDU)	
Pin	Pin name	Cable color	Pin	Lead
1	POWER	Red	9	
2	RX_DATA_1-	Blue	5	TD+ (after R5)
3	RX_DATA_1+	Black	6	TD-
4	TX_DATA_1-	Yellow	4	RD-
5	TX_DATA_1+	Black	3	RD+ (after R3)
6	RX_DATA_2-	Brown	x	
7	RX_DATA_2+	Black	x	
9	GND	Black	10	
11	1PPS+	Green	8	1PPS-
12	1PPS-	Black	7	1PPS+ (After R7)

To connect the GPS antenna to the BSDU:

1. Connect the **12-pin female** connector, at the one end of the cable, to the 12-pin receptacle connector located at the underside of the GPS.
2. Connect the **15-pin D-type male** connector, at the other end of the cable, to the 15-pin D-type port labeled “**GPS**” at the rear panel of the BSDU.

Figure 6-4 illustrates the BSDU-to-GPS cable connections.

**Note:**

- When installing the cable, secure the cable to the mounting pole or bracket with a cable tie to hold the weight of the cable (cable strain relief).
- A loop should be left in the dressed cable for maintenance purposes and to prevent the cable weight being taken directly on the connector itself.
- Ensure that the connector is waterproof.

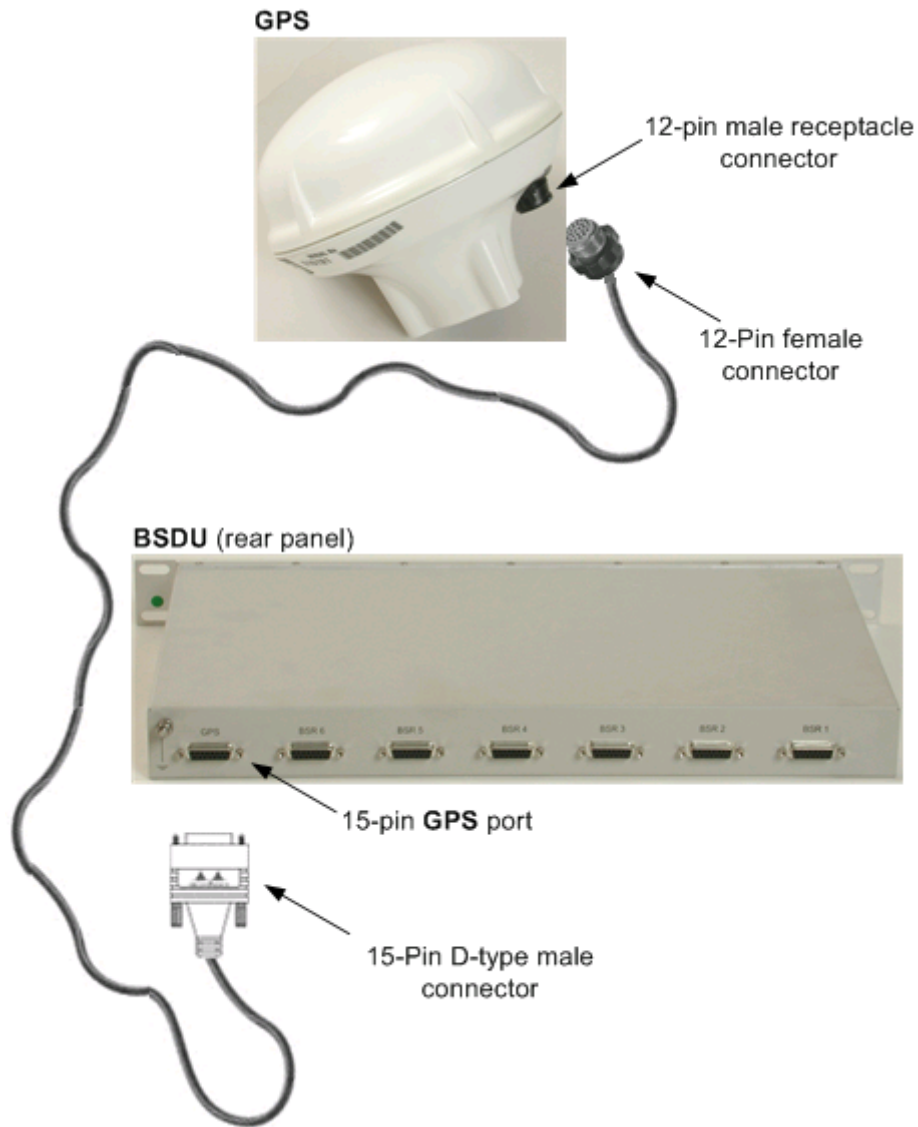


Figure 6-4: BSDU-to-GPS cable connections



Installing the BSPS

This chapter describes the installation of the WipLL **Base Station Power Supply** unit (BSPS), which is installed at the base station.

This chapter includes the following sections:

- Overview
 - BSPS Components
 - General Site Requirements
 - BSPS Cabinet Cabling
- BSPS Installation Summary
- Installing BSPS Batteries
- Rectifiers
 - Installing
 - Calibrating
- Operating the System Controller
- Connecting BSPS Power to BSDUs
- Connecting the BSPS Management Cables
- BSPS Cabinet Power Requirements
 - BSPS Cabinet Grounding
 - BSPS Equipment Supplementary Grounding
- BSPS Troubleshooting

7.1. Overview

The WipLL **Base Station Power Supply** unit (BSPS) is an optional WipLL unit that provides power (and power redundancy) to the BSDU/BSR if no –48 VDC power supply exists at the base station.

The BSPS front panel is displayed in Figure 7-1.



Figure 7-1: BSPS front panel

The BSPS provides the BSDUs/BSRs with the following:

- Power supply of –48 VDC
- Power redundancy in case of power failure. The BSPS charges a battery bank that provides this power redundancy during mains failure. Thus, the BSPS acts as a DC-UPS with a battery connected to it. The size of the battery determines the backup and charging time. Since the system is current limited, the maximum battery size is based on that limit.)

- Remote management and monitoring through WipLL's WipManage or WipConfig management application.

The BSPS is delivered pre-installed in an Airspan cabinet. The only installation that is required includes the following:

- Installing the BSPS battery
- Connecting the BSPS temperature sensor to measure battery temperature
- Connecting the BSPS to the BSDU

7.1.1. BSPS Components

The BSPS consists of the following basic components:

- **DC Rectifier modules:** The Rectifier converts the AC current to DC. The BSPS can house up to four rectifiers. The rectifiers are “hot plugged” and operate in parallel. This enables the user to define an “N+1” or “N+2” redundant system. Each rectifier has its own current sharing system, satisfying a complete sharing among rectifiers.
- **System controller:** provides BSPS management control and BSPS operating information
- **Electronic Low Voltage Detector (ELVD):** disconnects the battery from the load, avoiding damage to the battery when over-discharged.
- **Battery:** provides the BSPS system with back-up power
- **Load and battery circuit breakers** for DC protection and distribution
- **DC Distribution unit:** provides circuit breakers for distributing the output current to multiple BSDUs.

The unit also contains a bypass switch to bypass the LVD.



Note: For power redundancy, at least two rectifiers must be installed.

The main power rack is housed in a 19” (inches) front mountable chassis.

Figure 7-2 displays the BSPS main components.

DC Distribution module
Power ports for connection to BSDUs

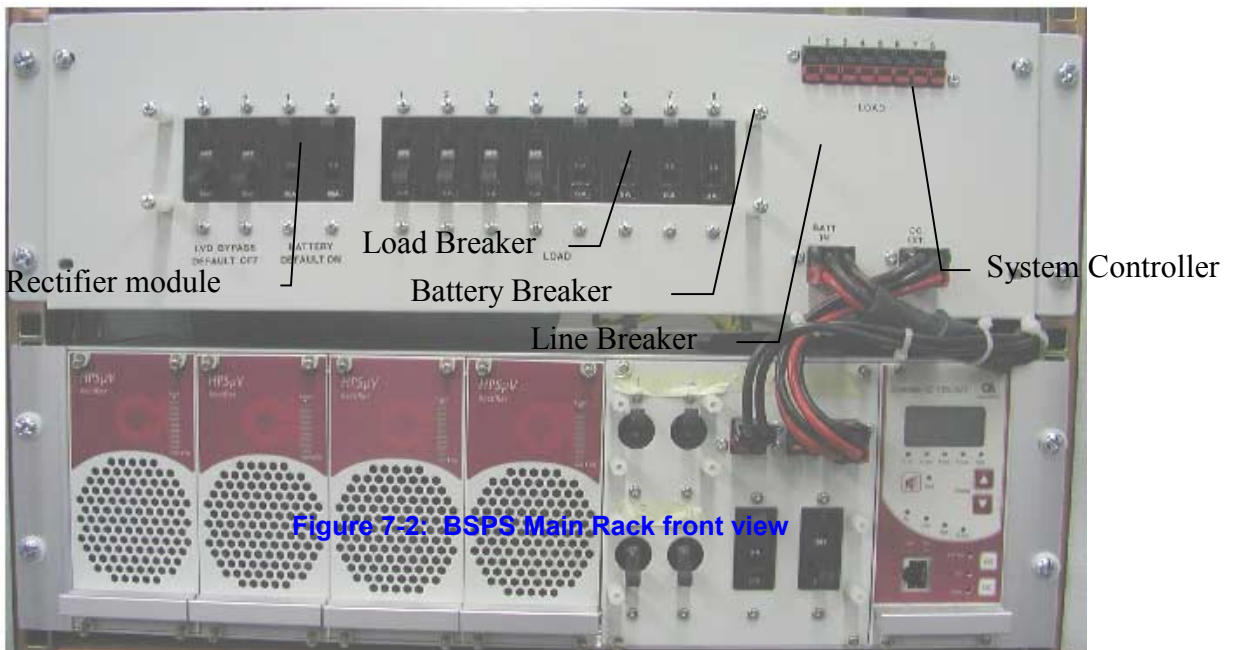


Figure 7-2: BSPS Main Rack front view

Figure 7-3 displays the rear panel of the main BPS rack.

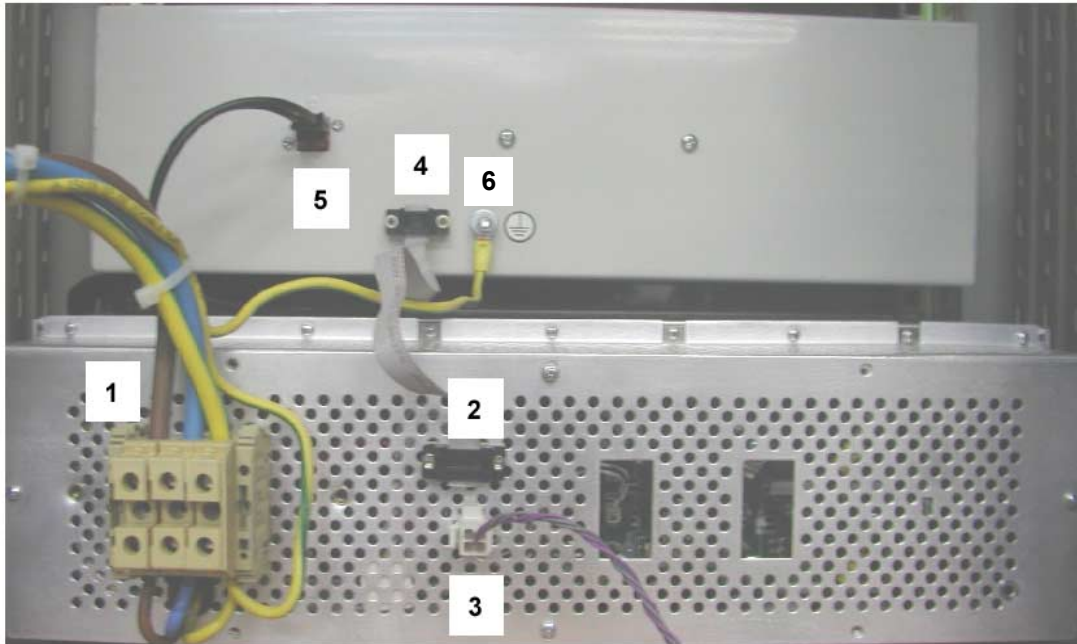


Figure 7-3: BPS Main Rack rear view

1. AC connection
2. Comm to DC Distribution
3. Temperature Sensor
4. Comm to power system
5. LVD connection
6. Ground

7.1.2. General Site Requirements



Note: Cable sizes and electrical circuit protection devices discussed in the following section are typical for 230 Volt AC circuits only. Adjustments are required for applications other than this.

During AC power installation activities at base station premises the following general requirements should be adhered to:

- The customer must provide a valid safety certificate for the electrical circuit to which the equipment is to be connected. If this documentation is not available checks must be carried out in accordance with local electrical installation test requirements.
- A qualified electrician must carry out the provision of any additional power outlets.
- Cables used in the customer premises electrical circuit are to be 3-core 6mm². Color-coding for live neutral and earth conductors shall be in accordance with local electrical regulations.
- The base station premises AC distribution panel must be capable of supplying up to 240 Volts AC.
- The customer is to allocate and clearly identify fuses in AC distribution panel that will provide protection for equipment in BSPS cabinet. The circuit is to be protected by a 32 amp protective device in accordance with local standards.
- The customer shall provide a wall mounted AC power socket adjacent to the BSPS cabinet. Local territory equipment isolation and earth leakage requirements are to be met when selecting the plug and socket type. Alternatively a 32-amp isolator switch may be used for connection to the mains power supply.
- A common earth point (CEP) shall be designated in the customers' base station premises to which the system cabinet earth will be connected.
- A minimum separation distance of 200 mm is to be maintained between AC and DC signaling cables when they run parallel to each other. However these cables may cross each other at right angles.

7.1.3. BSPS Cabinet Cabling

This section defines the procedures to be adhered to when installing data cables in the BSPS cabinet.



Note: A minimum separation of 200 mm should exist between power and data cables.

- Cable access apertures are located in the top surface of the cabinet. Separate apertures are provided for power and data cables. All cabling entering and exiting the BSPS cabinet shall be protected using flexible conduit and gland systems suited to the cabinet. Power and data cables should exit from the BSPS cabinet via separate apertures.
- Data cables are to be secured to cable guides provided on the left-hand side of the cabinet when viewed from the rear. Cables are to be brought together to a point on the cable guide from where they can be fanned out and fed to the Base station Distribution Units (BSDU's).
- Data cables terminating at the front of the BSDU's should be fed through the brush gland fitted adjacent to the units and secured to the cable management bar using tie-wraps.
- When cabling the BSPS cabinet consideration should be given to future growth and expansion. Allowances in cable forms should be made for the removal of equipment for maintenance, i.e., BSDU's, Power racks etc.
- Where cables are installed but not connected to equipment they should be tied off in such a way as to prevent damage, allow for future growth and maintenance. Pre-terminated cables should be treated with care and should not be laid out in vulnerable areas where they may be susceptible to damage.
- Cable crossovers should be kept to a minimum to prevent system interference and allow easy equipment removal.
- Ensure that the cables are dressed in such a fashion that they are not exposed to hot exhaust air, sharp edges, doors etc.

- Observe recommended minimum bend radii when installing copper cables. Wherever a cable changes direction, ensure that it does so in a smooth curve with a radius of at least 50mm in order to prevent damage.
- Cables shall be secured directly to cabinet cable trays with plastic cable ties. Secure the data and power cables at regular intervals within the cabinet to the cable management trays/trunking provided using cable ties. These ties should be tensioned and cut using the supplied tool 1PAC10370ACK.
- Care is to be taken to ensure that cables providing connection to peripheral equipment (e.g. PC's) do not pose a trip hazard.
- WipLL system interface cables providing connection to a network shall be terminated and presented to a digital distribution frame (DDF) as agreed with the customer. Dressing of cables at the DDF shall be done to ensure a potential trip hazard is not created.
- All data cables should be labeled with both the source and destination at each end. Un-used cable ends must also be identified with labels to assist with future upgrades.

7.2. BSPS Installation Summary

The following is a summary of the procedural steps for installing the BSPS:

1. Verify that the circuit breakers of the load, battery and line input are disconnected and the system is not connected to the line.
2. Connect the main unit to the battery and load via the Battery and Load terminals on the rear panel.
3. Connect (if needed) the Extension and DC Distribution units. **Pay special attention to the polarities of the wires and locations.**
4. Insert a rectifier module into the main unit. All compartments are similar and connected in parallel.
5. Use 16mm² (5 AWG) wires for the AC terminals. **Minimum requirement is 8mm² (8 AWG)**
6. AC source must be current limited (50A) using an external circuit breaker.
7. Plug the AC input cord into the AC source.
8. Turn on the Line circuit breaker, and verify that the system controller is activated.
9. Insert the other rectifiers, and verify all green LED's on the panels are lit.
10. All parameters such as the output voltage are pre-defined in the factory.
11. Connect the temperature sensors to the appropriate connector at the rear panel of the main unit. Place the sensors in the battery compartment.
12. Switch on the *LOAD* and *BATTERY* circuit breakers. Verify that the *BYPASS* breakers are off.

The system is now ready for use.

13. Verify that the *FAULT* red LED is not lit and the buzzer not active.

14. Connect a PC to the RJ-45 port at the front panel of the main unit to control the system (optional).



Figure 7-4: BPS Main Rack front view

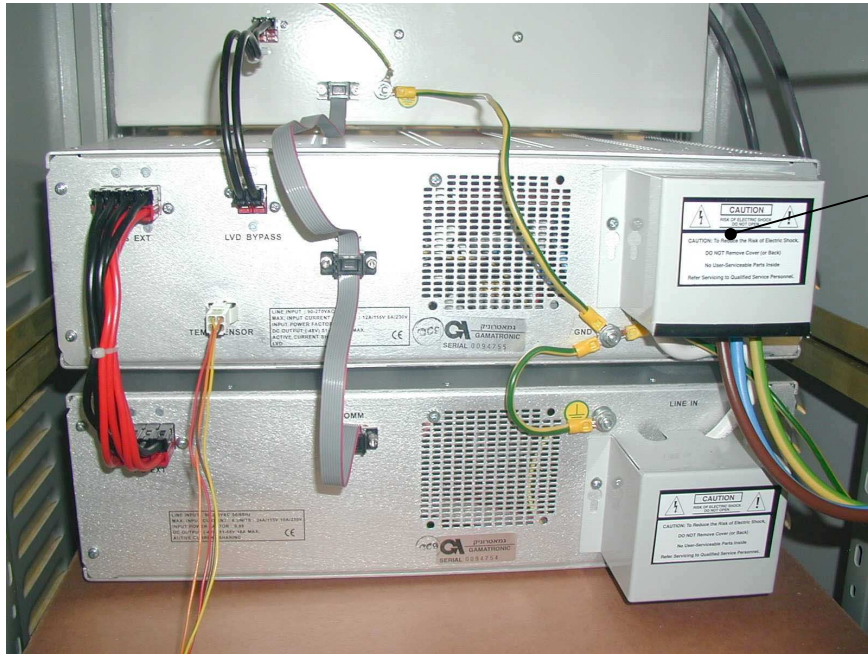


Figure 7-5: Rear BPS cable connections

7.3. Installing BSPS Batteries

To provide the BSPS system with back-up power, two battery circuits are provided. Batteries are located on two shelves fitted in the lower sections of the system cabinet.

A battery protection tray is to be fitted beneath the BSPS racks to prevent tools from falling onto batteries below.



Warnings:

- 1) Final battery connection, at the DC distribution rack, must only be made once the battery is fully installed.
 - 2) The Airspan insulated torque wrench 1PAC10383 AAD must be used when attaching battery terminations. The wrench is pre-set to 'break' at 5.5 Nm (Newton-meters).
 - 3) Caution must be observed when fitting and connecting batteries as to prevent the shorting of connections to the cabinet structure.
-

Insulated tools and the removal of jewellery are mandatory in all live power installations.

To install the BSPS battery:

1. Prior to installation use a digital multimeter (DMM) to measure the voltage output from each monobloc. A reading of 12.3 Volts DC is required from each monobloc.
2. Install the monoblocs onto the battery trays as shown in Figure 7-6.



Figure 7-6: Cabinet battery area

Up to four monoblocs can be housed on each shelf. Connections between the monoblocs are as illustrated in Figure 7-7.

3. Connect a short battery strap between monoblocs 1 and 2.
4. Using an insulated spanner/wrench tighten the battery terminal nut to the torque setting recommended by the manufacturer.
5. Using a digital multimeter check across the positive and negative terminals of the connected monoblocs and ensure that a voltage of 24 VDC is present.
6. Repeat the above steps for the connections between monoblocs 3 and 4.
7. Connect a long battery strap between monoblocs 2 and 3.
8. Using a digital multimeter check across the positive and negative terminals of monoblocs 1 and 4 and ensure that a voltage of 48 VDC is present.

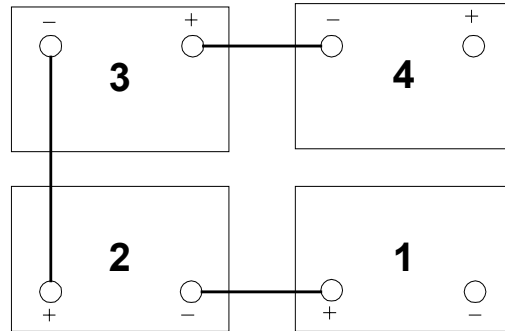
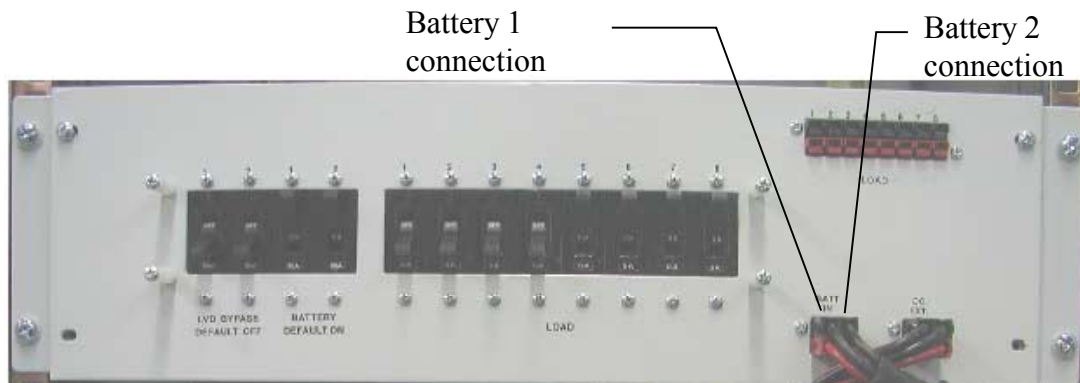


Figure 7-7: Method of interconnection between monoblocs

9. Protect the terminals of the monoblocs using suitable battery grease.
10. Before connecting the BPS battery cables to the battery ensure that the battery isolation circuit breakers are in the **OFF** position.
11. Connect the red lead of the BPS battery cables to the positive terminal on monobloc 4.
12. Connect the black lead of the BPS battery cable to the negative terminal on monobloc 1.



13. Check the voltage across the terminals battery input plug DC distribution rack using a DMM. Ensure that a reading of 48 volts DC is present. If so insert the plug into the corresponding socket on the front of the DC distribution rack.
14. Repeat the above steps for battery 2 if required.



Note: If any faulty readings were recorded during the process, this would indicate a damaged monobloc or battery strap. Investigate and replace the faulty component.

7.4. Rectifiers

The Rectifier module is the heart of the Full-Redundancy 48 VDC BPS power system. It converts the input AC to DC current. The Rectifier is a plugged-in module designed specifically for modular systems. The BPS can house up to three basic rectifiers

7.4.1. Installing

The following provides a step-by-step procedure for installing a rectifier.

To install a rectifier in the BPS system:

1. Remove the blank panel from where you want to install an additional rectifier in the rectifier shelf.
2. Insert the rectifier into its place with the upper and lower slides.
3. Secure the rectifier in place with 4 screws in the front panel.
4. Verify that the **ON** LED is lit.
5. If there is a load on the BPS system, verify, via the Load Bar, that there is current sharing in the BPS system by the rectifier.

7.4.2. Calibrating

The output current indication is indicated by an LED bar graph shown on the unit front panel. This bar graph is used to verify current sharing operation between modules fitted in the rack, and to indicate the percentage of the full load.

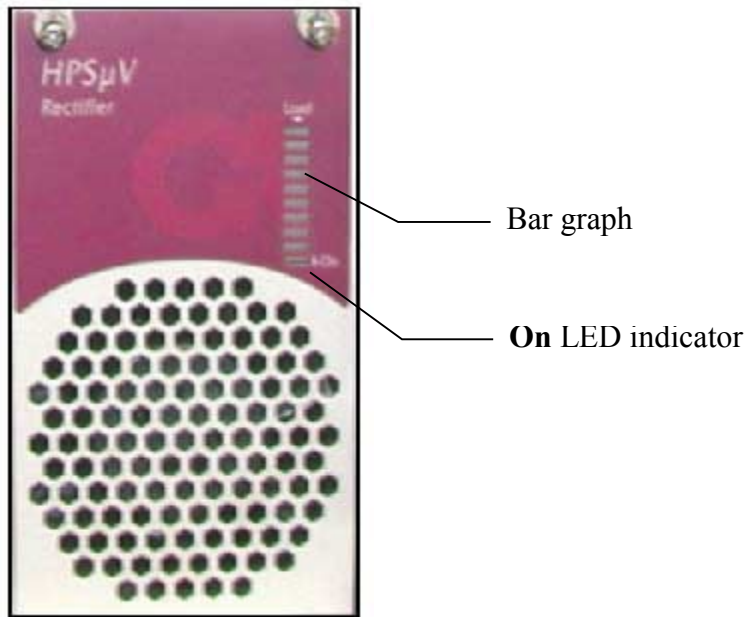


Figure 7-8: Rectifier module front view

The calibration of the Rectifier module is simple and involves a single trimmer-potentiometer that adjusts the output voltage.

To calibrate the rectifier:

1. Remove the rectifier from the unit.
2. Connect the Share (+) bus to the negative pole (-) of the rectifier.
3. Using a DMM set the output voltage to 53.50 VDC.
4. Check the single rectifier using a female connector (such as the one used in the units of the system).

Or

5. Perform provisions for the calibration on a dedicated unit.
6. Access the trimmer via the small opening at the back of the cover.

7.5. Operating the System Controller

Figure 7-9 shows the features provided on the front panel of the system controller module.

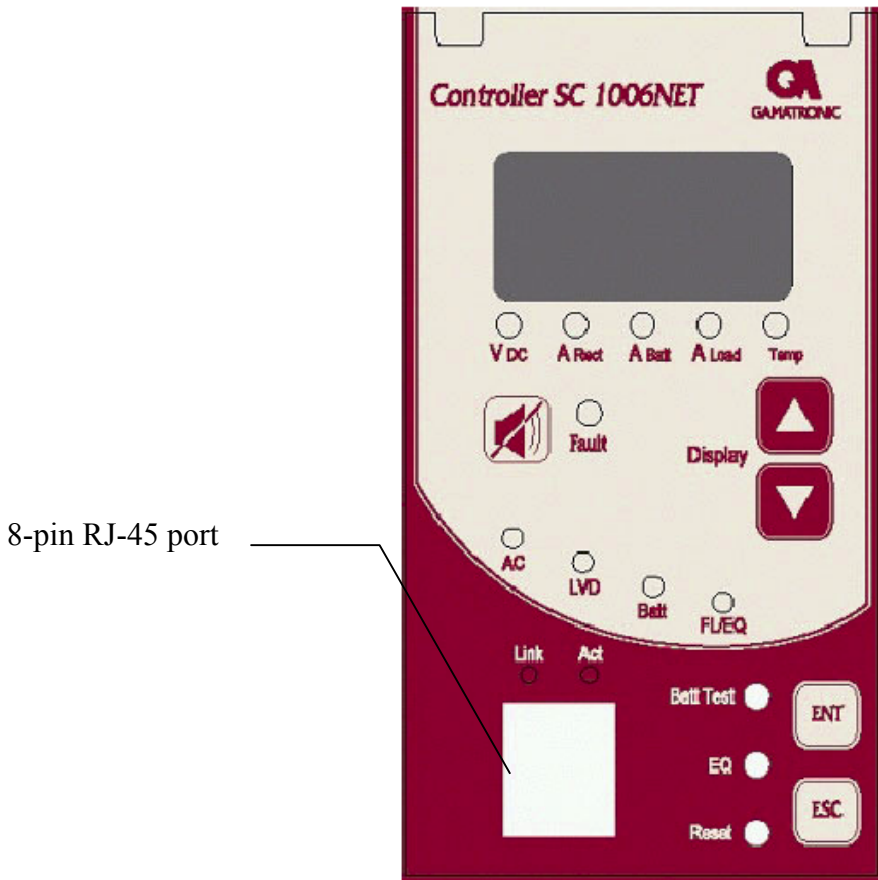


Figure 7-9: System controller front panel

The function of the LED's provided on the System controller module can be defined as follows:

LED	Color	Meaning
AC	Green	Input AC voltage is normal
DC	Green	Output DC voltage is normal
LVD	Red	State of the Low Voltage Disconnect circuit: red indicates that the battery is disconnected
BATT	Green	Battery test has passed
FAULT	Red continuous	General fault alarm
	Red blinking	Faulty rectifier detected

The following lists the buttons and their functions on the System Controller module.

Button	Function
BATT TEST	This is a manual battery test button. A pencil tip may be used to activate.
ALARM OFF	This button silences the module internal buzzer. A pencil tip may be used to activate.
RESET	This button resets the module. A pencil tip may be used to activate.

7.6. Connecting BSPS Power to BSDUs

The BSPS's DC Distribution unit provides circuit breakers for distributing power output to BSDUs housed in the WipLL cabinet.

The DC Distribution unit contains a switch that provides an LVD circuit bypass option. When this switch is activated the battery is no longer protected against deep discharge and the system controller alarm is then activated.

The distribution rack is provided with front panel and rear panel terminations for connecting to the BSPS main power rack.

To connect the BSPS DC power supply to the BSDU:

1. Attach the shielded power cable connector (supplied) end that contains the wire for preventing power radiation, to the BSDU's power port—labeled **POWER - 48 VDC**. Ensure that the black-colored (i.e., negative) half of the connector is positioned at the top and the red-colored (i.e., positive) half at the bottom.

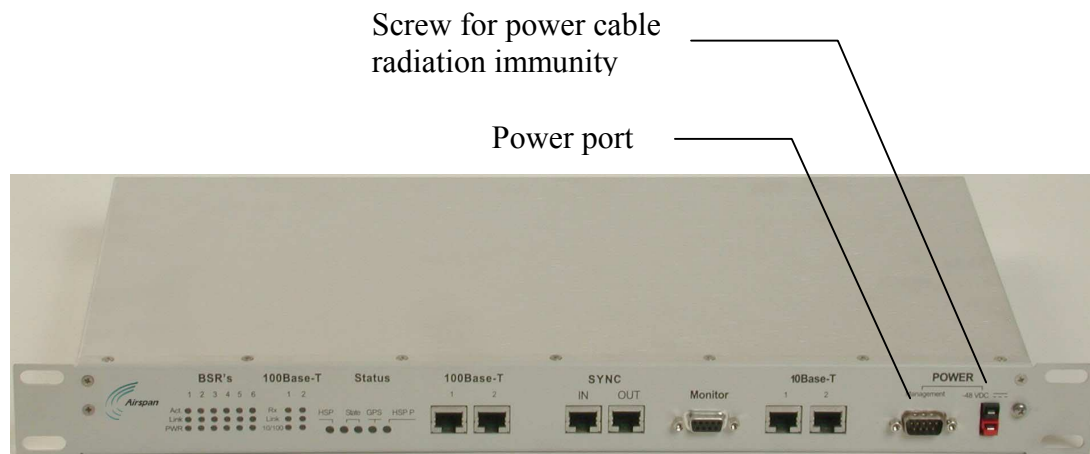


Figure 7-10: BSDU front panel with power port and screw attachment for power radiation immunity

2. Connect the power cable's yellow/green lug wire, for radiation immunity, to the BSDU chassis by using the screw attachment located alongside the power port, as displayed in Figure 7-10.

3. Connect the other end of the power cable to the DC output port of the BSPS's DC Distribution unit (labeled **LOAD**).

The rack front panel is shown in Figure 7-11.

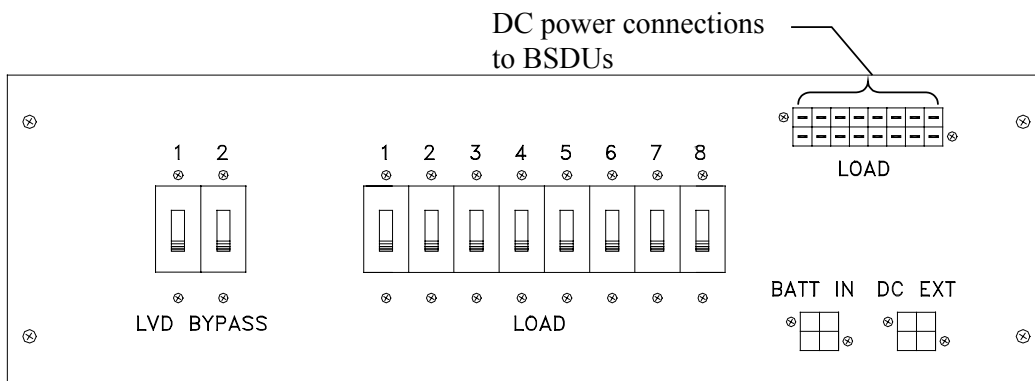


Figure 7-11: DC Distribution Rack front view

- **LOAD DC**—DC connection to BSDUs
- **DC EXT**—extension rack DC power input connection
- **BATT IN**—battery input connection
- **LVD BYPASS**—bypass circuit breakers
- **LOAD**—load circuit breakers

The rack rear panel is shown in Figure 7-12.



Figure 7-12: DC Distribution Rack rear view

- **LVD BYPASS**—LVD bypass input connection from main rack
- **COMM**—Main/Extension Rack Communication port

7.7. Connecting BSPS Management Cables

Connecting the BSPS's System Controller module to the WipLL BSDU provides the user with the ability to control the power system operating parameters, retrieving system data, and status information.

The BSPS System Controller connects to the BSDU(s) via an RJ-45 port located on the front panel of the controller module. This is connected to BSDU's 9-Pin D-type port, labeled **POWER Management**.

- **Connectors:**
 - **BSPS:** 8-pin RJ-45 (or for previous BSPS models, a 9-Pin D-type)
 - **BSDU:** 9-pin D-type female
- **Connector pinouts:**
 - BSPS's 8-Pin RJ-45:

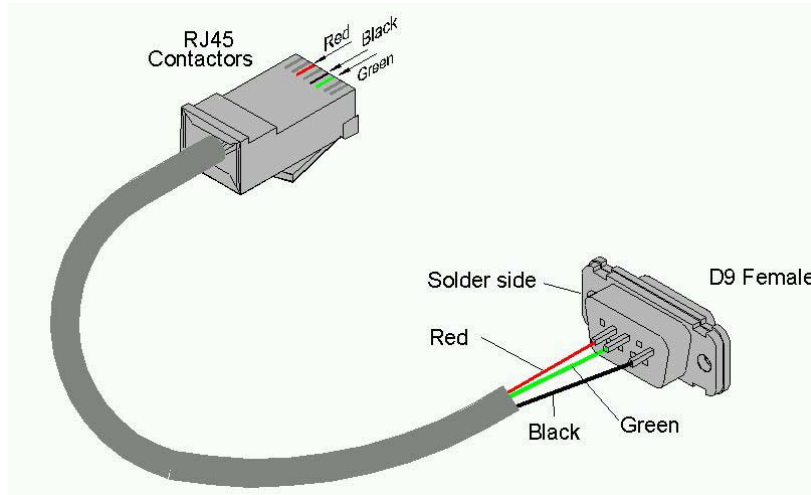


Figure 7-13: BSDU-to-BSPS management connectors via RJ-45 (BSPS) to 9-Pin D-type (BSDU)

- BSDU’s 9-pin D-type:

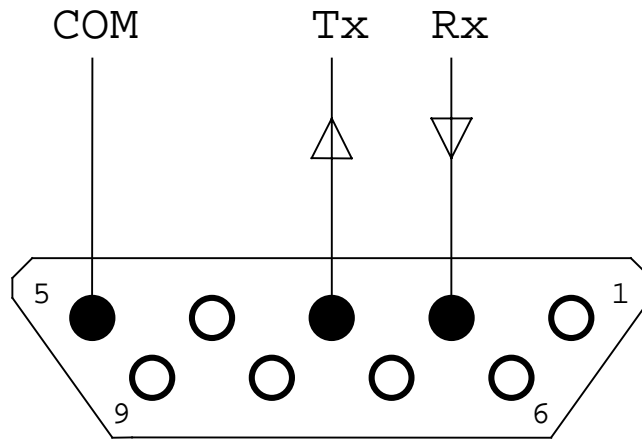


Figure 7-14: BSDU’s 9-pin D-type Connector Pinouts



Note: See Chapter 5, “Installing the BSDU” for detailed connector pinouts.

7.8. BSPS Cabinet Power Requirements

The following section describes the BSPS cabinet mains power requirements.



Warning: The following information assumes a fully populated BSPS cabinet with main and extension power racks fitted.

Cable sizes and electrical circuit protection devices discussed in the following section are typical for 230 Volt AC circuits only. Adjustments are required for other applications.

- Within the BSPS cabinet protected AC mains feeds are required for the main power rack and two power outlets.
- Both power outlets are to be installed within the cabinet on an independent radial circuit. Sockets are to be used for the connection of ancillary test/commissioning equipment only. The type of socket used is dependant on local electrical requirements.
- Power within the BSPS cabinet is to be distributed from a modular AC consumer unit fitted with a 100 amp DP isolator. The unit is to be a metal-clad type with sufficient outputs for services in the cabinet.
- The following tables displays the protective device rating and cable specification required for each element of the cabinet AC circuit.

Service	Fuse Rating	Cable Spec
Cabinet power input	32 amp	6 mm ²
Main rack input	16 amp	2.5 mm ²
Extension rack link	N/A	2.5 mm ²
Power socket No.1	6 amp	1.5 mm ²
Power socket No.2	6 amp	1.5 mm ²

- Provision is made on the rear of the BSPS main power rack for the AC power connection. A terminal block is provided for the link to the extension power rack when fitted.

- A terminal block is provided on the rear of the power extension rack for the link from the main power rack.
- When connecting racks to the AC mains supply loosen the grub screws on the terminal blocks. Insert the bare copper conductor ensuring correct polarity. Firmly tighten the screw and gently pull on each cable to ensure the grub screw has made full contact. Ensure that bare wires are not exposed.
- The plug fitted to the BPS cabinet power input cable is to be compatible with the socket provided in the customers' premises. It must comply with local regulations for connection of products with earth leakage exceeding 3.5 mA.
- Once AC power connections to the power racks are completed fit protective covers over the terminal blocks as shown in Figure 7-15.



Figure 7-15: Fitting protective covers over terminal block

- Power cables are to be routed in the cable guide down right-hand side of the BPS cabinet (when viewed from the rear).
- Secure cables in position using strategically located cable ties.

- Power cables external to the BSPS cabinet must be housed in trunking. The trunking is to be secured to the wall of the equipment room. Type, securing method and route of trunking is to be in accordance with customers' requirements.
- A minimum separation distance of 200 mm is to be maintained between AC and DC/signaling cables when they run parallel to each other. However these cables may cross each other at right angles.
- Any dust/debris created during the installation of electrical equipment or cables shall be cleared and correctly disposed of as the installation progresses.

7.8.1. BSPS Cabinet Grounding



Warning: The WipLL BSPS cabinet must be connected to the customers building common earth point (CEP) earth before connecting AC power supplies and installing any equipment.

- When the BSPS cabinet has been located an earth cable shall be run from the building common earth point (CEP) to the primary earth stud of the cabinet.
- Earth cable specification is to be 6mm². Cable color-coding is to comply with local regulations.
- Crimp M6 x 6mm² lug to the end of the cable to be attached to the CEP with crimp tool 'BMR 16U3' (Airspan Code 1PAC10336AED).
- The required length of cable is to be measured back to the cabinet earthing stud and the excess removed.
- Crimp M6 x 6mm² lug to the cable end to be attached to the cabinet earth stud using crimp tool 'BMR 16U3' (Airspan Code 1PAC10336AED).
- Attach the earth cable to the CEP using fastenings provided.
- Attach the earth cable to the cabinet primary earth stud using the fastenings provided.

7.8.2. BPS Equipment Supplementary Grounding

- Equipment housed in the BPS cabinet must be supplementary grounded by connecting a ground lead between each unit ground stud and the cabinet primary ground stud.
- Cable specification is to be 2.5 mm². Cable color-coding is to comply with local regulations.

7.9. BPS Troubleshooting

The table below indicates methods of solving problems that may arise during the BPS installation process.

Table 7-1: BPS troubleshooting

Symptom	Possible Cause	Remedy
FAULT LED is blinking	One or more rectifier modules are faulty	Replace the faulty rectifier/s
FAULT LED is on	<ul style="list-style-type: none"> • Any breaker is left open • Abnormal input or output voltages • Over temperature • LVD is open • Battery test failed 	<ul style="list-style-type: none"> • Check all breakers • Check line voltage and load, rectifiers may be over-loaded • Check the temperature sensor • Check the line, general check • Check the battery breaker, cables and replace battery if none of this helps
No backup time when AC is absent	Battery is not connected Battery is discharged or power is low.	Check battery charge, connections and circuit breaker
Load is not operating	Load is not connected	<ul style="list-style-type: none"> • Check load cables. • Check load circuit breaker.
No current sharing among rectifiers (more than 2 segments difference between any two	<ul style="list-style-type: none"> • Load is too high. • Extension rack is not properly connected to the main rack. 	<ul style="list-style-type: none"> • Decrease the load or add rectifiers to the system. • Check connections.