

Total Access™ Battery Backup Unit (BBU) with Optional HDSL2 Support Installation and Maintenance

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1. GENERAL

This practice provides installation and maintenance procedures for the ADTRAN Total Access BBU with Optional HDSL2 Support (P/N 1175044L4). Figure 1 is an illustration of the Battery Backup Unit. The BBU is designed to be used with the Total Access 750 or Total Access 850. Figure 2 shows the connections between the BBU and Total Access 750. Table 1 shows the pinout for the BBU HDSL connector.

Revision History

Revision B of this document includes updated shipping contents list and clarified Warranty and Customer Service information.

Features

Features of the Battery Backup Unit, P/N 1175044L4, include the following:

- -54 VDC nominal output float voltage for battery charging and powering a Total Access 750 shelf, or a Total Access 850 shelf.
- Uses four 7-amp/hr batteries to provide at least 8 hours

- of backup power to a single shelf at AC power failure.
- User-available alarm contacts (available on the dedicated connector, AC ALARM OUT) that indicate battery state (float, battery backup, or end-of-charge) and battery end-of-life.
- No spill battery design.
- Alarm signal provided to the powered equipment (Total Access 750/850) with similar indications as the alarm contacts.
- Continuous monitor of the battery health and performance.
- Battery fault visual and audible alarm. ACO switch for easy disabling of the sound alarm.
- Multi-color LED that indicates normal operation, battery backup, or power fail.
- Low battery disconnect (from equipment and from the internal AC/DC power supply board) when battery voltage falls below -40 VDC in battery backup mode to prevent over-discharge damage to the battery.
- An internal 5x20 mm fuse (3A) for primary circuit protection.
- 4 wire output cable with compatible Molex connector for easy connection to equipment.
- Captured AC line cord.
- Designed to be mounted vertically on a 3/4 inch or thicker plywood.
- The Total Access 750/850 can be easily mounted on top of the unit.
- All mounting hardware is included (1/4" x 3/4" pan-head wood screws).

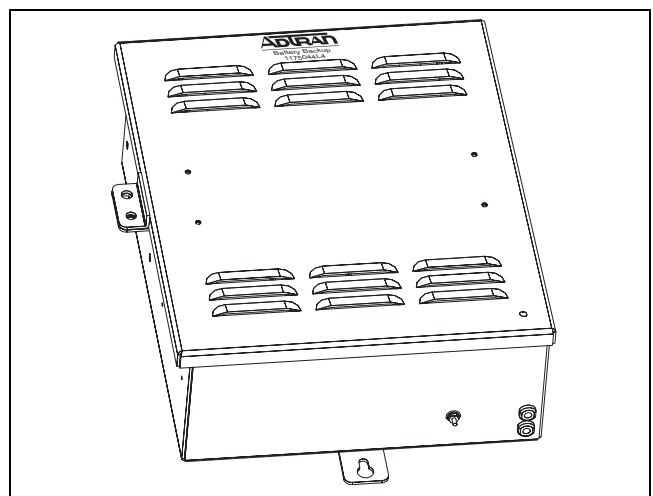


Figure 1. Battery Backup Unit

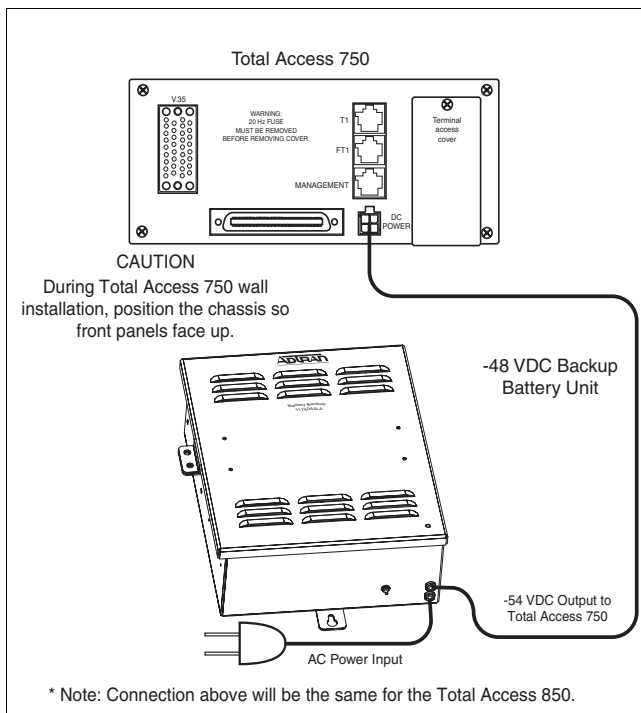


Figure 2. Battery Backup Unit Connections

Table 1. BBU HDSL Connector Pinout

xDSL IN (J3)	Designation	Description
1	N.A.	HDSL Loop ring
2	N.A.	HDSL Loop tip
3		Not used
4	H1-R	HDSL2 Loop ring
5	H1-T	HDSL2 Loop tip
6		Not used
7		Not used
8		Not used

Note that pins 1 and 2 are reserved for a Remote card with HDSL capability

Description

The Total Access BBU is designed for use with ADTRAN's local power H2TU-R card (1222024L6) or similar versions. The unit deploys HDSL2 to T1 for use with the Total Access 750 (1175001L1), or Total Access 850 (1200375L1). The unit is provided with its own power supply/battery charger, and it is designed to provide at least 8 hours of backup power for a single shelf at AC power failure. The Unit also has a battery test board that constantly monitors the health of the batteries. The Unit operates from a nominal 115 VAC line

and provides -54 VDC to the Total Access 750/850 and to the H2TU-R backplane board. The unit provides battery monitoring, alarms, and battery low voltage disconnect. The unit is intended for use at customer's premises; therefore it does not have to be NEBS compliant.

This device complies with part 15 of the FCC rules.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference that may cause undesired operation.

Changes or modifications not expressly approved by ADTRAN could void the user's authority to operate this equipment.

2. INSTALLATION



After unpacking the unit, inspect it for damage. If damage is noted, file a claim with the carrier; then contact ADTRAN Customer Service.

Accessory List

1. Three 1/4" x 3/4" pan-head wood mounting screws
2. One mounting template
3. One 2 foot (RJ45/RJ45) straight-through cable to provide T1 connection to the Total Access 750/850
4. One 6" tie wrap
5. One tie wrap/cable holder
6. One Quick Start Guide

Compliance Codes

A current activated thermal overload disconnects the battery circuitry under excessive current drain. See **Table 2**.

Table 2. Compliance Codes

Code	Input	Output
Power Code (PC)	F	C
Telecommunication Code (TC)	X	X
Installation Code (IC)	E	-

H2TU-R Card Installation

The BBU (P/N 1175044L4) includes the case, batteries, Battery Health Board, H2TU-R Backplane Board, and internal power supply. The H2TU-R card must be ordered separately. The BBU is designed for use with the H2TU-R cards listed in **Table 3**.

Table 3. Battery Backup Unit H2TU-R cards

Part Number	Description
1222024L6	T200 H2TU-R 24-48 VLT LCL PWR
1222024L7	T200 H2TU-R 24-48 VLT LCL PWR

Switch 1 (SW1) is located on the backplane board, below the HDSL2 connector inside the Total Access BBU. When SW1 is in the UP position, the H2TU-R card is powered locally from the backplane board. When SW1 is in the DOWN position, the H2TU-R card is powered by span power from the Central Office. The factory default setting is the UP position.

NOTE *Since the Total Access BBU is capable of providing local power from the backplane board, SW1 must be left in the UP position in order to achieve optimum performance and power management.*

These versions of the H2TU-R work with multiple list versions of the HDSL2 transceiver unit for the Central Office (H2TU-C) as shown in Table 4.

Table 4. Corresponding H2TU-C Cards for the Central Office

Part Number	Description
1221006L6	T200 H2TU-C
1222001LX	2nd Gen 220/E220 H2TU-C
1222003LX	2nd Gen DDM+ H2TU-C
1222004LX	2nd Gen 3192 H2TU-C
1181112LX	2nd Gen Total Access H2TU-C

NOTE *Since the H2TU-R card is powered by the local backplane board, the customer should disable the span power on the H2TU-C at the Central Office.*

The H2TU-R card must be installed by the customer in the field. To install the H2TU-R card, perform the steps listed below:

1. Remove AC power from the unit by unplugging the AC power cord.
2. Open the Battery Backup Unit.

WARNING *Do not touch battery leads or circuit boards.*

3. Verify the H2TU-R card part number is listed in Table 3 of this document. If the H2TU-R card part number does not match one of the valid part numbers in Table 3, do not install the card. Contact ADTRAN Technical Support for assistance.
4. Use Figure 3 for reference for the remainder of this procedure. Hold the card so that the faceplate containing the LEDs is on the left (closest to the power supply) and the circuitry items (chips, capacitors, etc.) are facing up.
5. Insert the card into the card guides.
6. Push the card until it clicks into the backplane connector.
7. Verify the card is in place and does not move.
8. Close the Battery Backup Unit.
9. Restore AC power to the unit by plugging in the AC power cord.

In the event of a card failure, the card may be replaced in the field by the customer. For instructions on how to change H2TU-R cards, reference the maintenance section of this document.

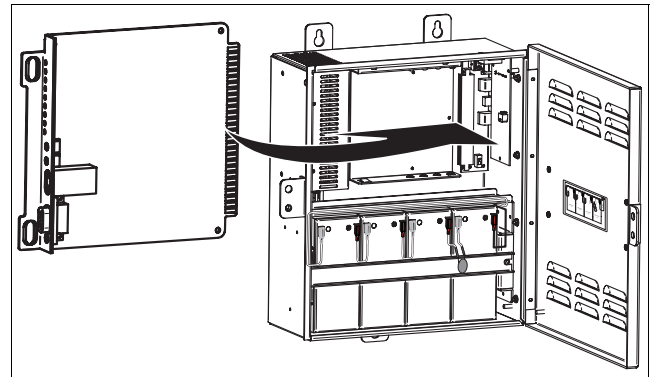


Figure 3. H2TU-R Card Location and Installation

Wall Mount Installation

WARNING

The Battery Backup Unit weighs in excess of 30 lbs. Arrange for assistance when handling the Battery Backup Unit for mounting.

For a wall mount installation the Battery Backup Unit installs on heavy plywood (3/4" minimum) using three 1/4" x 3/4" pan-head wood screws. Install the Battery Backup Unit as follows:

1. Determine the preferred unit layout to ensure cable plugs reach their designated sockets.
2. The BBU must be mounted with the following minimum clearance:
Top - 9"
Bottom - 3"
Left Side - 1"
Right Side - 5"
3. Using the mounting template included with the unit, mark where the pilot holes are to be drilled.
4. Drill all 3 pilot holes using a size I (0.228" Dia) drill bit.
5. Screw the pan-head screws into the keyhole openings. Let the head of each screw protrude 1/8" to 3/16" from the plywood to engage the keyhole slot.
6. With an assistant, lift the Battery Backup Unit and position such as to engage the screw heads. Allow the pack to slide down until the slot end rests against the screws.
7. Connect the Battery Backup Unit to the Total Access 750 or Total Access 850 as shown in Figure 2 on page 2. Use cable tie-downs as appropriate.

Auxiliary Mounts

The Total Access 750 Chassis (P/N 1175001L1) or the Total Access 850 Chassis (P/N 1200375L1) can mount directly to the Battery Backup Unit on the front of the unit using pre-threaded inserts. See Figure 4 for an illustration of the Total Access 750 mounted to the Battery Backup Unit. Note that the front panel is facing up.

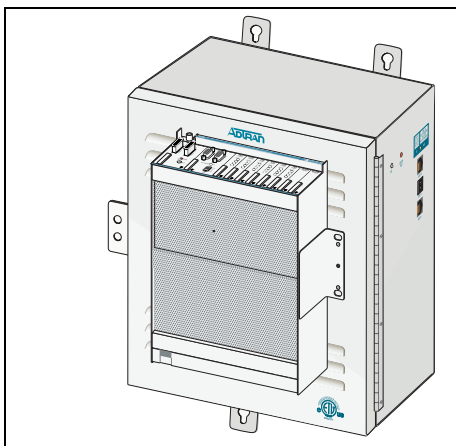


Figure 4. Mounting the TA 750 Chassis to the BBU

Grounding Instructions

The equipment grounding conductor is to be connected to ground at the service equipment at all times. Bare, covered, or insulated grounding conductors are acceptable.

3. OPERATION

During operation the unit provides power to the Total Access 750/850 PSU for distribution to channel bank elements. It also provides -54 VDC to the H2TU-R backplane board. The power supply battery charging circuit maintains the battery at peak charge of -54 VDC. During an AC power failure, the internal power supply allows the battery pack to provide up to 8 hours of battery power to the Total Access 750/850 PSU and H2TU-R backplane for uninterrupted service. When AC power is restored, the internal power supply automatically switches to the AC supply and the battery charging circuit recharges the battery pack to peak voltage (-54 VDC).

Battery Backup mode

The BBU provides several ways to inform the customer of the status of the unit. First of all, the unit is equipped with two LED indicators. The BATTERY FAULT LED indicates the battery health of the unit (see Battery Fail Mode section), while the tricolor multi-function LED provides AC operation and battery operation status. Also an open/close alarm connector AC ALARM OUT (located under the LEDs) and an open/ground alarm signal (pin 3 on the -54 VDC Output Cable that plugs to the Total Access 750/850) are provided to show the status of the unit to a remote side and to the Total Access 750/850 respectively.

When the unit is in battery backup mode (AC power failure) the magnitude of the internal power supply output voltage will initially be pulled down to the battery voltage (-40V minimum) but will increase as the battery charges once AC power is restored. The output voltage (and thus battery voltage) will level off and float at -54.5V. When AC power is present and the battery is charged or being charged, the LED will be green, the alarm AC ALARM OUT contacts open, and the -54 VDC Output Cable alarm signal opens.

For AC line failure the LED will be yellow to indicate battery backup mode, the AC ALARM OUT contacts will be cycling open to close with a period of 2 seconds (1 ± .25 seconds open and 1 ± .25 seconds closed). The alarm signal will alternate open to ground in the same manner. When the battery voltage discharges below -45 ± 1V, the alarm contacts will be closed and the alarm signal will be grounded. The LED will remain yellow. This state indicates that battery is rapidly approaching an end-of-charge condition..

The contacts and the alarm signal will open automatically when normal AC voltage is restored. See Table 5 for AC ALARM OUT and Alarm Signal Operation.

Table 5. Alarm Relay Operation

Status	AC ALARM OUT	Alarm Signal to TA 750/850
Normal	Open	Open
AC Power Failure/Battery Backup Engaged	Cycle open/closed once per second	Cycle open/ground once per second
Battery voltage is less than -45V	Stays closed	Stays grounded

Battery Disconnect mode

Excessive discharge decreases battery operational life. When the battery voltage discharges below $-39.5 \pm 0.5V$ during battery backup mode, the batteries will be disconnected from the equipment (Total Access 750/850) by a relay on the internal power supply. At this point the LED will become RED indicating a depleted battery. The AC ALARM OUT contact will remain closed and the Alarm Signal connected to the Total Access 750/850 will remain grounded. These alarm features slowly drain the battery power. Therefore, at the point when the relay opens on the internal power supply unit, the internal health board will continue to monitor the battery status. If AC power is not restored in 15 minutes, the health board will disconnect itself and the internal power supply from the batteries, causing the LED light to go off. This is to prevent deep-discharge in the case of a long-term power outage. The alarm contact remains closed and the alarm signal remains grounded.

Battery Fail Mode

The battery health board is provided to identify a failed battery. The health board will attempt to run a test upon initial power up and once every 24 hours thereafter. When a failed battery is detected, the BATTERY FAULT LED will flash and an audible alarm will sound. To disable the audible alarm, press the ACO switch for three seconds. The LED will continue to flash until the failed battery is replaced (reference the battery replacement section) or until the battery passes a retest.

A test can be initiated at anytime (except when the audible alarm is energized) by pressing the switch and holding down for a second or longer. The test will initiate within a few seconds after the switch is released.

If main AC power is lost during a battery test, the test will terminate and the battery will be reconnected to the output to prevent the powered equipment from losing power.

A battery test will not be performed on a battery that is being recharged. When a test is commanded but the battery is being charged, the test will be delayed until charging is complete. If the battery cannot be fully recharged within 24 hours, a failed battery will be indicated.

In addition to the audible and visible alarms, the battery health board provides an electronic alarm to the AC/DC power supply when a failed battery is detected. The AC/DC power supply passes the fail battery alarm to two different connectors. First the AC ALARM OUT connector alternates open to close with a period of 900 ms (450 ± 20 ms open, 450 ± 20 ms closed). This alarm is intended for use with an open/close alarm system provided by the customer. Similarly the failed battery alarm is passed to the Total Access 750/850 on the -54 VDC Output cable. This signal is normally open and alternates between -54 VR (ground) and open with a period 900ms (450 ± 20 ms on, 450 ± 20 ms open) during the fail battery alarm condition.

Fuse

A 3-amp fuse on the internal power supply protects the unit from overcurrent. The fuse isolates the AC input from the power supply in the event of a fault. The fuse must be changed by the customer in the field. For directions on how to change the fuse, reference the maintenance section of this document. After the fuse is changed, the unit should return to normal operation.

Status LED

A single multi-feature LED on the side panel provides AC power status or battery backup status. **Figure 5** shows the Battery Backup Unit status LEDs. Refer to **Table 6** and **Table 7** for indication descriptions.

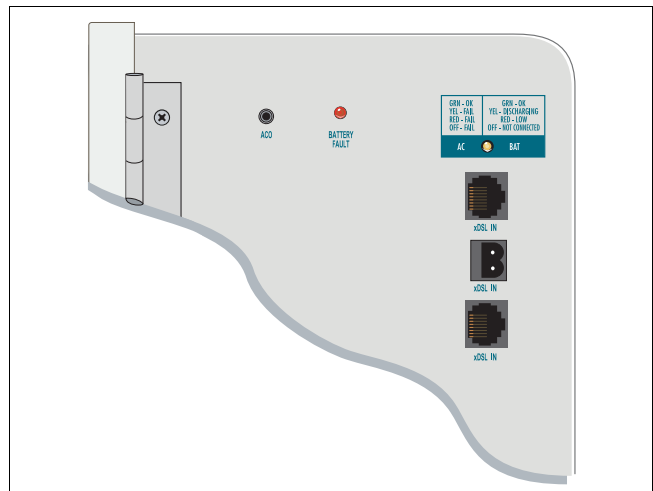


Figure 5. Battery Backup Unit Status LEDs

Table 6. Battery Fault LED Indication

Battery Fault LED	
Flashing	Battery Failure
Off	Batteries are OK or not connected

Table 7. AC Power LED Indication

AC Power Operation (AC power only)		Battery Operation (AC power supply or battery backup)	
Green	OK	Green	OK (charging)
Yellow	Power Fail	Yellow	Discharging
Red	Power Fail	Red	Low (<-40 V)
Off	Power Fail	Off	Disconnected

4. MAINTENANCE

The Battery Backup Unit does not require routine maintenance for normal operation. The life expectancy of the battery pack is 3 to 5 years on standby use.

Excessive heat decreases battery power and life. Ideal ambient temperature for battery life and capacity is 68° F (20 °C). Extreme low temperature also decreases battery capacity.

Old batteries should be recycled per the manufacturer's instructions. For more information on battery replacement and recycling, reference 60000120-36A.

Malfunctioning or damaged units should be returned to ADTRAN. ADTRAN does not recommend that repairs be attempted in the field. Repair services are obtained by returning the defective unit to ADTRAN Customer Service.

Fuse Replacement

Fuses must be replaced by the customer in the field. To replace the fuse, perform the steps listed below.

1. Remove AC power from the unit by unplugging the AC power cord.
2. Open the Battery Backup Unit.
3. Twist the black cap to the left and pull the fuse out.
4. Insert the new fuse.
5. Push the cap back in and turn it to the right.
6. Close the Battery Backup Unit.
7. Restore AC power to the unit by plugging in the AC power cord.

Battery Replacement

<p>WARNING Do not touch battery leads or circuit boards.</p>

Batteries can be replaced by the customer in the field. To replace a battery, perform the steps listed below.

1. Open the Battery Backup Unit. Refer to Figure 6 and Figure 7 on page 7 for the remainder of this procedure. Figure 6 shows the location of the wiring instruction label. Figure 7 is an expanded view of the label with

additional wiring designations for use with this procedure. The component shown on the cable connecting batteries 3 and 4 (wire D) is a thermistor which is installed for safety purposes.

2. Disconnect Wire A (white wire) from the black terminal (-) on battery 1.
3. Disconnect Wire E (black wire) from the red terminal (+) on battery 4.
4. Remove the restraining bar across batteries 1-4.
5. Remove remaining wires B, C, and D from batteries 1-4.
6. Before removing the bad battery, note the battery orientation. Remove the bad battery.
7. Install the new battery. Keep the battery orientation the same as the orientation of the original battery. Reference Figure 6. The battery terminals should be positioned at the top of the unit (closest to the circuit boards.) The black battery terminal (-) should be on the left of every battery.
8. Reinstall Wires B, C, and D on batteries 1-4. Verify the black connector on the cables connects to the black terminal (-) on the batteries.
9. Reinstall Wire E (black wire). Verify the red connector on the cable is connected to the red terminal (+) of battery 4.
10. Reinstall Wire A (white wire). Verify the black connector on the cable is connected to the black terminal (-) on battery 1.
11. Reinstall the restraining bar across batteries 1-4. Verify the batteries do not move once the bar is reinstalled.
12. Close the Battery Backup Unit.
13. If the BBU was in alarm prior to start of the battery replacement procedure, the audible alarm and BATTERY FAULT LED should now disappear and the unit return to normal operation. Note that if the battery replacement was due to routine maintenance as opposed to a failure condition, there would be no audible alarm.

H2TU-R Card Replacement

H2TU-R cards can be replaced by the customer in the field. To replace an H2TU-R card, perform the steps listed below.

1. Remove AC power from the unit by unplugging the AC power cord.
2. Open the Battery Backup Unit.

<p>WARNING Do not touch battery leads or circuit boards.</p>

3. Use Figure 3 on page 3 for reference for the remainder of this procedure. Using a screwdriver, push in the lever which holds the H2TU-R card in place. This lever is

located in the lower left corner, close to the power supply.

4. While holding down the lever, pull the H2TU-R card up slightly and slide it to the left, disengaging it from the backplane connector.
5. Verify the replacement H2TU-R card part number is listed in Table 3 on page e3 of this document. If the replacement H2TU-R card part number does not match one of the valid part numbers in Table 1, do not install the card. Contact ADTRAN Technical Support for assistance.
6. Hold the card so that the face plate containing the LEDs is on the left (closest to the power supply) and the circuitry items (chips, capacitors, etc.) are facing up.
7. Insert the card into the card guides.
8. Push the card until it clicks into the backplane connector.
9. Verify the card is in place and does not move.
10. Close the Battery Backup Unit.
11. Restore AC power to the unit by plugging in the AC power cord.

The unit should return to normal operation.

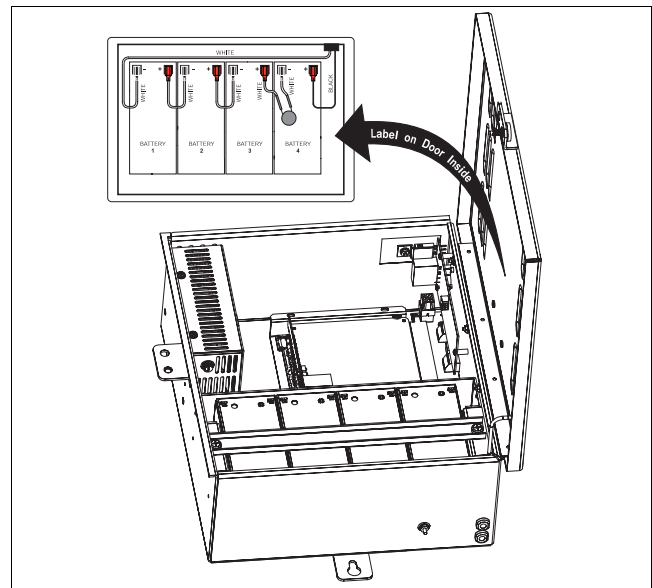


Figure 6. Battery Placement and Label Location

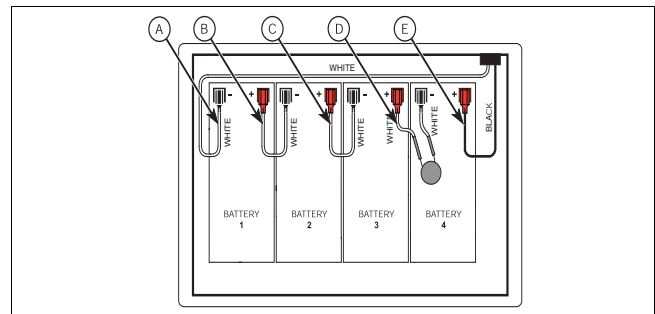


Figure 7. Battery Wiring Connections

5. SPECIFICATIONS

Refer to **Table 8** for battery specifications.

Table 8. BBU Specifications

Battery	
Part Number	311212V02
Suppliers:	YUASA and PANASONIC
Batteries:	7 Amp/hr per battery
Voltage:	-12 VDC per battery
Backup Time:	Up to 8 hours
Wire Gauge:	18 AWG
Internal Power Supply	

Table 8. BBU Specifications (Continued)

AC Input:	115 V nominal
Range:	88 to 132 VAC
DC Output:	-54 Volts, 60 W avg., 100 W peak
Battery charging:	16 hr nominal, 24 hr maximum
Battery discharge:	Up to 8 hours
Fuse	
Part Number:	32543A03
Rating:	3 A, 250 V
Dimensions:	5 mm x 20 mm
Environmental	
Operating Temperatures:	Charge: 5° to 122° F (-15° to 50° C) Discharge: -4° to 140° F (-20° to 60° C)
Preferred:	68° F (20° C)
Physical	
Dimensions:	13.85 " W x 16.77 " H x 5.7 " D
Weight:	32 lb.

Important Safety Instructions

When using your telephone equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock and injury to persons, including the following:

- Do not use this product near water, for example, near a bathtub, wash bowl, kitchen sink or laundry tub, in a wet basement or near a swimming pool.
- Avoid using a telephone (other than a cordless type) during an electric storm. There may be remote risk of electric shock from lightning.
- Do not use the telephone to report a gas leak in the vicinity of the leak.
- Use only the power cord and the batteries indicated in this manual. Do not dispose of batteries in a fire. They may explode. Check with local codes for possible special disposal instructions.

6. WARRANTY AND CUSTOMER SERVICE

All Total Access Battery Backup systems have a 10 year warranty coverage on the product. This includes cables, housings, PCBs, and any other ADTRAN-built components (excluding lead acid batteries).

Batteries have a 1 year warranty from their manufacturer. ADTRAN will replace any defective battery within 1 year of shipment. After the 1 year period, the customer will be responsible for replacement and disposal of the old batteries. The replacement part number for the 12V battery contained in these backup systems is PN: 1975044L1 and can be ordered from distribution or ADTRAN Inside Sales.

Note: The 1175044L4 requires 4 batteries per system. Nominal life expectancy is 3 to 5 years according to the battery manufacturer when used at room temperature.

ADTRAN will replace or repair the battery housing and cables within 10 years from the date of shipment if it does not meet its published specifications or fails while in service. (See: ADTRAN Equipment Warranty, Repair, and Return Policy and Procedure, document 60000087-10A).

Contact Customer and Product Service (CAPS) prior to returning equipment to ADTRAN.

For service, CAPS requests, or further information, contact one of the following numbers:

Part Number

1175044L4

ADTRAN Sales

Pricing and Availability
(800) 827-0807

ADTRAN Technical Support

Pre sales Applications/Post-sale Technical Assistance
(888) 4-ADTRAN

Standard hours: Monday-Friday, 7 a.m.-7 p.m. CST

Emergency hours: 7 days/week, 24 hours/day

ADTRAN Repair/CAPS

Return for repair/upgrade;
(256) 963-8722

Repair and Return Address

ADTRAN, Inc.
CAPS
901 Explorer Boulevard
Huntsville, Alabama 35806-2807

