

TBA-SP-WD00
PMU Lower DC Startup Voltage Kit
Installation Instructions



Introduction

The battery control circuitry in the PMU monitors the DC input voltage from the battery. It prevents deep discharge of the battery by removing the load from the battery if the voltage falls below a minimum threshold. This threshold is independent of the microprocessor threshold, which is set by the user with the Service Kit/CSS. Once the PMU has shut down to protect the battery, it will not start up again until the battery voltage reaches the battery protection startup voltage (refer to “[Revised Specifications](#)” on page 3).

In some situations it may be necessary for the base station to run as long as possible, even if this risks reducing the life of the battery by allowing the PMU to start while battery capacity is very low. This document describes how to modify the PMU to lower the minimum startup voltage to:

- 10.9V (12V PMU)
- 21.8V (24V PMU)
- 43.6V (48V PMU).

Applicability

These modifications apply to PMUs with hardware version 00.02 and earlier with the following product codes:

- TBA30x1-xxxx (12V DC module fitted)
- TBA30x2-xxxx (24V DC module fitted)
- TBA30x4-xxxx (48V DC module fitted).

PMUs with hardware version 00.03 and later do not need these modifications as the lower startup voltage is a standard feature in these versions.

Tools Required

As well as the standard tools and equipment of any service centre, you will need the following:

- TB8100 Service Kit version 03.07 and later, or TB9100 CSS version 3.2x and later.
- TB8100 Calibration Kit version 03.07 and later, or TB9100 Calibration Software version 3.2x and later.
- PMU card remover (part number 220-02034-01).



Note: The TB9100 CSS and Calibration Software version 3.2x is due for release in May 2008.

Contents of Kit

- Battery control card XBAWDB0 revision 014 or later.
- HVDC control and microprocessor card XBAWAHA with hardware ID 3 or later.
- PMU card remover (part number 220-02034-01).



Note: The XBAWAHA card is fully compatible with all models of PMU. It can safely replace the XBAWAH0 card fitted to a DC PMU.

Personal Safety



Warning!! The PMU contains voltages that may be lethal. Refer to the ratings label on the rear of the module.

Disconnect the mains IEC connector and wait for five minutes for the internal voltages to self-discharge before dismantling. The AC power on/off switch does not isolate the PMU from the mains. It breaks only the phase circuit, not the neutral. The DC power on/off switch disables only the control circuitry. The DC input is still connected to the power circuitry.



Warning!! These switches do not totally isolate the internal circuitry of the PMU from the AC or DC power supplies. You must disconnect the AC and DC supplies from the PMU before dismantling or carrying out any maintenance.

The PMU should be serviced only by qualified technicians. All servicing should be carried out only when the PMU is powered through a mains isolating transformer of sufficient rating. We **strongly recommend** that the mains power to the whole of the repair and test area is supplied via an earth leakage circuit breaker.



Caution: The magnetics and power devices attached to the heatsink in the PMU get hot when they are operating. Take care when working on a PMU that has been in recent use.



Caution: The PMU can weigh up to 6.4kg (14.1lb). Take care when handling the PMU to avoid personal injury.

Method

If you are unfamiliar with any of these procedures, refer to the Service Manual for more information.

1. Remove the top and bottom covers and front panel.
2. Replace the HVDC control and microprocessor card and the battery control card with the new cards. Use the card remover supplied in the kit to remove the cards, as described in the Service Manual.
3. Refit the front panel and covers.

- Using the Calibration Kit/Calibration Software, recalibrate the output voltage. Refer to the Calibration Kit/Calibration Software documentation for a full description of this procedure.

Optional Procedure

- If you want the correct PMU hardware details to appear in the Service Kit/CSS, you must reprogram the serial number and product code into the PMU (these fields are blank in the replacement HVDC control and microprocessor card). This procedure requires the use of a dongle with the Calibration Kit/Calibration Software, and is described in “[Reprogramming the PMU](#)” below.

Reprogramming the PMU

The following procedures will allow you to update the hardware details of the PMU. Note that these procedures require the use of a dongle.

- Connect the dongle to the parallel port or USB port on the PC (according to the type of dongle).
- Run the Calibration Kit/Calibration Software and connect to the base station. If any error messages appear, click **Ignore** and continue.
- From the main menu, select Base Station > PMU. The following screen appears. If any error messages appear before this screen, click **Ignore** and continue.

	Old	New
Serial Number:	<input type="text"/>	<input type="text"/>
Product Code:	<input type="text"/>	<input type="text"/>

OK Cancel

- Enter the serial number (18xxxxxx) and product code (TBA30xx-xxxx) of the PMU under repair into the appropriate **New** fields. These details are printed on a label fixed to the rear panel.
- Click **OK**.

Revised Specifications

The specifications for the PMU battery protection startup voltage limits and user-programmable limits will change as a result of these modifications. The appropriate section from the Specifications Manual is reproduced on the following page. The amended specifications are underlined.

Input - DC Module

	12V PMU	24V PMU	48V PMU
Input Voltage			
User-programmable Alarms ^a			
Low Battery Voltage	10V to 14V	20V to 28V	40V to 56V
High Battery Voltage	14V to 17.5V	28V to 35V	56V to 70V
User-programmable Limits ^b			
Startup Voltage (after shutdown)	<u>10.9V</u> to 15.0V	<u>21.8V</u> to 30V	<u>43.6V</u> to 60V
Shutdown Voltage	10V to 13.5V	20V to 27V	40V to 54V
Battery Protection (Fail-safe) Limits ^c			
Startup Voltage	<u>10.8V</u> ±0.2V	<u>21.6V</u> ±0.5V	<u>43.2V</u> ±1V
Undervoltage Shutdown	9.5V ±0.3V	19V ±0.5V	38V ±1V
Overvoltage Shutdown	18.1V ±0.3V	36.2V ±0.5V	72.4V ±1V
Overvoltage Shutdown Reset	17.1V ±0.3V	34.2V ±0.5V	68.4V ±1V
<p>a. User-programmable alarms can be set for low or high battery voltage, using the Service Kit/CSS software. The alarms will be triggered when the set voltage levels are reached. These limits are subject to the tolerances of the battery protection circuitry, as stated in “Battery Protection (Fail-safe) Limits” above.</p> <p>b. The user-programmable startup and shutdown limits allow for adjustable startup and shutdown voltages. Using the Service Kit/CSS software, these limits can be adjusted for different numbers of battery cells, or for the particular requirements of the base station operation. Once the limits are reached, the PMU will shutdown. These limits are subject to the tolerances of the battery protection circuitry, as stated in “Battery Protection (Fail-safe) Limits” above. This feature is only available if the standby power supply card is fitted.</p> <p>c. The battery protection limits are set in hardware at the factory, and cannot be adjusted by the user. These limits will not be reached under normal operation conditions, but are provided as “fail-safe” measures to protect the battery from deep discharge.</p>			

	12V PMU	24V PMU	48V PMU
Input Current			
0V to Battery Protection Startup Voltage ^d	2mA maximum	2mA maximum	1.2mA maximum
Battery Protection Startup Voltage to User-programmed Startup Voltage ^e	40mA (typical) at <u>10.8V</u>	30.1mA (typical) at <u>21.6V</u>	13.2mA (typical) at <u>43.2V</u>
Operating Current	refer to “System Specifications” in the Specifications Manual		
<p>d. When the input voltage drops below the battery protection undervoltage shutdown limit, and until the voltage rises above the battery protection startup voltage.</p> <p>e. At initial power-up; or, after battery protection has occurred, when the input voltage rises above the battery protection startup voltage (PMU now under control of its microcontroller), but is still below the user-programmed startup voltage.</p>			