

## OPERATING INSTRUCTIONS FOR SEALED LEAD ACID RECHARGEABLE BATTERY SYSTEM

### 1. GENERAL DESCRIPTION:

#### 1.1 Sealed lead acid rechargeable battery system.

The system consists of 2 each 12/24 volt sealed lead acid rechargeable batteries, BB-490/U, a power supply, MPS-CH2, and a dedicated charger, MPS-AH6. It is capable of supplying power to operate a variety of portable communications-electronics equipment. Having 2 batteries available permits one battery to be in use while the other one is being charged.

1.1.1 BB-490/U. This is a general purpose sealed lead acid rechargeable battery. It contains two 12 volt sections (6 cells in series in each section) which can be placed in a series or parallel arrangement to give a 12 or 24 d.c. output. The desired voltage output is obtained through proper pin contact at the connector with a equipment mating plug. The battery has a nominal capacity of 3.8 Ah at 12 volts d.c. or 1.9 Ah at 24 volts d.c. when discharged over a 20 hour period. Capacities are 2.6 Ah or 1.3 Ah for a one hour rate discharge. The battery weighs 3.5 lbs. Its dimensions are 4.4" x 2.45" x 5.0".

**NOTE:** The BB-490/U is a substitute for the sealed nickel-cadmium rechargeable battery, BB-590/U and the high capacity non-rechargeable lithium-sulfur dioxide battery, BA-5590/U for powering various communications-electronics equipment. It should be noted that although these different battery types have same form factor (physical shape) and are interchangeable on the this basis, they have different performance capabilities.

1.1.2 MPS-AH6 Battery Charger. This is a battery charger dedicated to charging the BB-490/U battery and is part of the overall battery charging system together with the power supply, MPS-CH2. The charger is designed to charge the 2 independent, nominal 12 volt, battery sections included in the BB-490/U from 16 volt d.c. sources such as the MPS-CH2 power supply. Separate LED's indicate the charging status of each battery section. It weighs 0.5 lbs. and its dimensions are 4.75" x 2.75" x 1.4".

1.1.3 MPS-CH2, Power Supply. This is one type of power supply that is used as part of a battery charging system for the sealed lead acid rechargeable battery, BB-490/U. It is a 115 VAC, wall plug-in type with an output of 1500 mA at 16 volt d.c.. The power supply weighs 1.9 lbs. and is 3.5" x 3.0" x 2.5" in size.

2 **INFORMATION LABELS:** See each piece of equipment for pertinent information.

### 3. OPERATOR'S INSTRUCTIONS:

#### 3.1 Checking Unpacked Battery and Charger Equipment

Inspect the battery and charging equipment received from shipment for any damage. If the battery or charging equipment have been damaged, report the the damage on DD Form 6.

#### 3.2 Preinstallation Procedure for the BB-490/U Battery

All new batteries are shipped in an "activated" and charged state. They should be checked with the charging equipment before use to insure a fully charged state.

#### 3.3 Battery Charger

The batteries are charged by the MPS-AH6 charger (which is dedicated to charging the BB-490/U batteries) in conjunction with a compatible power supply, MPS-CH2.

**NOTE: DO NOT USE THIS EQUIPMENT (MPS-AH6) TO  
CHARGE NICKEL-CADMIUM BATTERIES.**

#### 3.4 Charging Instructions

Recharge battery BB-490/U as soon as possible after use. Do not store batteries for extended periods of time in the discharged state. The 12/24 volt BB-490/U sealed lead acid rechargeable battery is charged as two independent 12 volt units.

3.4.1 Connect the 6 pin male connector of the MPS-AH6 charger with the mating connector of the battery, BB-490/U.

**CAUTION: ONLY USE THE PRESCRIBED/DEDICATED  
MPS-AH6 CHARGER WITH BB-490/U BATTERY.**

3.4.2 Next, connect the cable end of the power supply (MPS-CH2) with the MPS-AH6.

3.4.3 Then plug the MPS-CH2 into an appropriate AC outlet with a voltage output of 115 +/- 5 volts. Observe if the two red LED lights on the MPS-AH6 charger flash. Flashing of the LED's indicates the two 12 volt sections of the battery are accepting a charge.

3.4.4 When the MPS-AH6 charger is first connected the LED will flash indicating charge acceptance. As the charging rate drops off (with the battery having more charge) the LED flashing rate will increase.

3.4.5 When the LED's stop flashing and stay on continuously it is an indication that the two 12 volt sections of the battery are fully charged. The battery is now ready for use. A fully depleted battery can be restored to a fully charged condition in 4 hours. Leaving the battery on charge for over 4 hours is not harmful. Periodic charging for approximately 12 hours is beneficial.

3.4.6 If either of the red LED's stays on when the BB-490/U battery is first connected to the charger it may indicate a bad 12 volt section or bad charger. Leave the charger on for up to 12 hours and if the LED does not start flashing by this time, change chargers and retest. If LED still does not flash the battery shall be considered unusable. Check open circuit voltage per paragraph 3.5.2 to get confirmatory information.

#### 3.5 Charge Retention

3.5.1 A fully charged BB-490/U rechargeable sealed lead acid battery will lose its energy (capacity) very gradually while it is being stored. The amount of capacity lost during storage depends on the temperature and time in storage. This is shown in Figure 1.

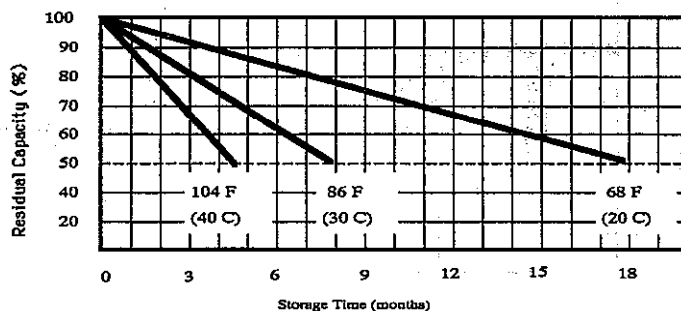


Figure 1  
Shelf Life vs. Storage Temperature

**NOTE:** If the batteries are not going to be used for some time or to be put in storage it would be advisable to charge the batteries first. Also, putting the last charge date on a piece of tape and affixing it to a battery would be desirable. The condition of the battery can then be determined when it is next used.

3.5.2 If the last charge date is not known the voltage of the battery can be used as a rough estimate of the service time available in the battery after storage. Figure 2 provides the approximate capacity retention expected of each 12 volt section (pins 1,4 for one section; pins 2,5 for the other section) based on the open circuit voltage.

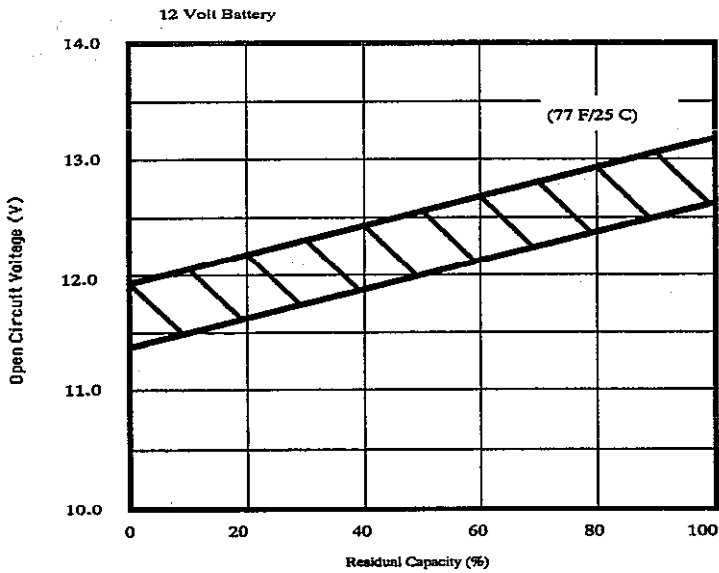


Figure 2  
Expected Capacity vs Open Circuit Voltage

3.6 Temperature Range for Operation

Table 1 gives an indication of the range of operation and storageability of the of the BB-490/U temperature wise.

TABLE 1  
Temperature Range Summary

Discharge:	5/122 F	-15 - 50 C
Charge:	32/104 F	0 - 40 C
Storage:	5/104 F	-15/40 C

3.7 Cycle Life

Cycle life is dependent on the depth of discharge (DOD) that the battery encounters during use and the temperatures to which it has been exposed. The greater the DOD (the amount of capacity taken out of the battery) the less is the cycle life. A cycle is a charge and a discharge to which a battery is subjected. Figure 3 shows the effect of DOD on cycle life.

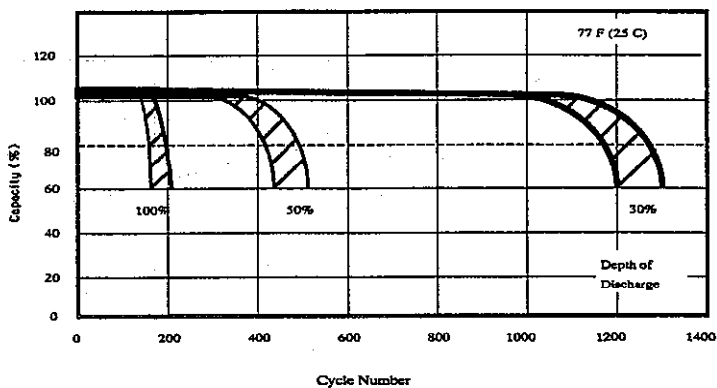


Figure 3  
Cyclic Life vs Depth of Discharge

4. BATTERY TECHNICAL INFORMATION

4.1 Battery Design. The BB-490/U is a rechargeable sealed lead acid battery capable of supplying either 12 or 24 volts. It contains 12 sealed lead acid cells. The cells are configured into two groups, and each group is composed of 6 cells connected in series.

Electrical connection to the battery is made through a 6 pin connector on the top of the battery. The equipment receptacle can be wired to use the two six cell sections in series (24 volt mode) or in parallel (12 volt mode). Pin 3 provides an alternative charging path for the battery. This pin is not connected in the BA-5590/U lithium battery in order to prevent accidental charging.

5. EQUIPMENT APPLICATIONS The BB-490/U can be used to power various communications/electronics equipments. A list of these equipments with approximate service (hrs) at various temperatures is listed in Table 2.

TABLE 2

Equipment	0° F	77° F	130° F
AN/GSQ-187	3.2	4.8	5.5
AN/PDR-75	4.4	6.6	7.5
AN/PPN-19	1.1	2.2	2.6
AN/PRC-104	3.6	5.4	5.8
AN/PRC-113	4.2	6.5	7.3
AN/PRC-117	3.8	5.6	6.3
AN/PRC-119	2.6	3.8	4.2
AN/PRC-132	3.0	4.5	4.8
AN/PSC-3	1.1	2.2	2.3
AN/PSQ-4	2.6	4.0	4.5
AN/TAS-4A	0.4	0.8	1.0
AN/TAS-6A	0.4	0.8	1.0
AN/UIH-6	—	0.4	0.5
AN/UIH-6A	—	0.4	0.5
AN/VRC-100	2.6	3.9	4.2
AN/VRC-101	2.6	3.9	4.2
AN/VRC-110	2.6	3.9	4.2
C-10377/GRC	6.6	9.0	11.0
COMPACT LASER	—	0.6	0.7
MST-4A	0.9	1.8	2.0
LST-5B	1.6	3.2	3.7
MAFIS	1.4	2.8	3.3
MX9331	24.0	35.0	41.0
OD-144/GYK-29	2.2	3.4	3.9
OE-239	42.0	56.0	66.0
PM-15	3.0	4.5	5.0
PM-15A	2.4	3.8	4.4
RT-1175/GSQ	16.0	22.0	24.8
TSEC/HYX-57	8.0	12.0	14.0
TSEC/KY-57	7.0	10.0	10.6
TSEC/KY-67	2.2	3.4	3.9

NOTE: Any questions or information required relative to these operating instructions should be addressed to:

ETD Laboratory  
Power Sources Division  
ATTN: SLCET-PB  
Fort Monmouth, NJ 07703-5000  
(Tel No: 908-544-4246; DSN: 995-4246)