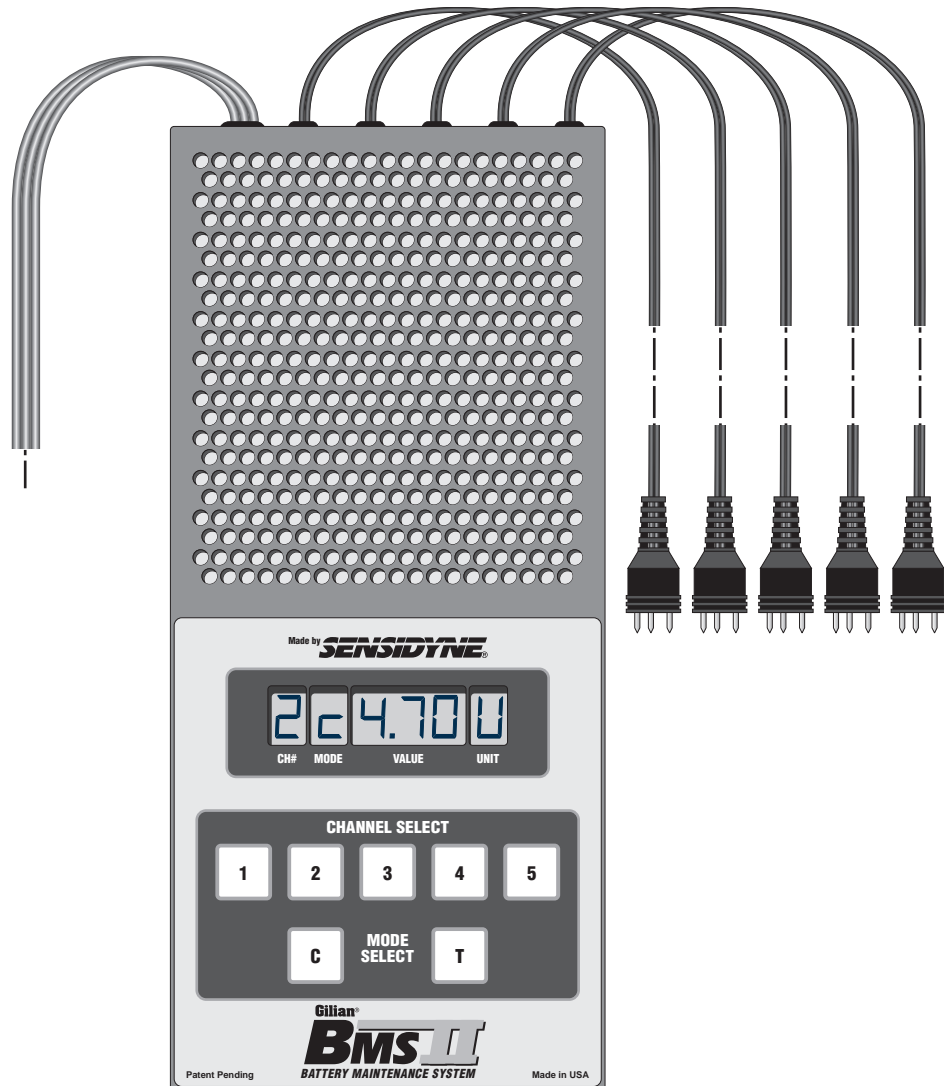




BATTERY MAINTENANCE & DIAGNOSTIC SYSTEM

(Models: BMS II-200, BMS II-200CE, & BMS II-100CE)



OPERATION MANUAL



16333 Bay Vista Dr. • Clearwater, FL 33760 • (800) 451-9444 • (727) 530-3602 • (727) 539-0550 (FAX) • www.sensidyne.com

Revision G • Document No. F-CHG-2651

PACKING LIST

The following items are shipped with the
BMS II Battery Maintenance & Diagnostic System
(Model BMS II-200, BMS II-200CE, & BMS II-100CE):

- Charger Unit
- Instruction Manual (this manual)

***ALWAYS check to make certain
you have received all of the items listed above.***

***If you have any questions or need assistance,
contact your Sales Representative, or call***

(800) 451-9444

or

(727) 530-3602

PROPRIETARY NOTICE

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WARNINGS !



READ AND UNDERSTAND ALL WARNINGS BEFORE USE

WARNING

DO NOT USE THE BMS II-200 or BMS II-200CE CHARGERS TO CHARGE SIRA APPROVED BATTERY PACKS.

Read and understand **ALL** warnings before using this product. Failure to read, understand, and comply with **ALL** warnings could result in property damage, severe personal injury, or death.

Read and understand **ALL** applicable Federal, State, and Local environmental health and safety laws and regulations, including OSHA. Ensure complete compliance with **ALL** applicable laws and regulations before and during use of this product. In particular, follow ALL OSHA guidelines set forth for confined space entry testing in 29 CFR Part 1910.

UNDER NO CIRCUMSTANCES should this product be used except by qualified, trained, technically competent personnel and not until the warnings, *Instruction Manual*, labels, and other literature accompanying this product have been read and understood.

Each user **MUST READ AND UNDERSTAND** the *Instruction Manual* before operating this product in order to ensure proper and safe use and installation of this product and to ensure familiarity with the proper treatment and safety procedures in the event of an accident.

CAUTION: Risk of electrical shock if unit is opened.

ALWAYS use unit with Gilian battery packs. **DO NOT** use in conjunction with any other battery equipment.

DO NOT block the venting holes on the top, sides, or bottom of the unit. The unit should always be placed on a firm surface away from other equipment generating heat. **ONLY** operate the unit in a normal environment that is safe from excessive chemical, water vapor, or dust atmospheres.

DO NOT remove or alter any label or tag on this product, its accessories, or related products.

DO NOT operate this product should it malfunction or require repair. **DO NOT** attempt to repair or modify the product, except as specified in the *Instruction Manual*. Operation of a malfunctioning product, or a product requiring repair may result in serious personal injury or death. If repair is needed, contact Gilian Service to arrange for a Returned Material Authorization (RMA).

ONLY use genuine Sensidyne[®] replacement parts when performing any maintenance procedures provided in this manual. *Failure to do so may seriously impair instrument performance.* Repair or alteration of the product beyond the scope of these maintenance instructions, or by anyone other than an authorized Sensidyne Service Technician, *will void the warranty*, and could cause the product to fail to perform as designed and persons who rely on this product for their safety could sustain severe personal injury or death.

DO NOT dispose of a battery pack in a fire or heat them. This may cause the cells to explode. **DO NOT** throw a battery pack into water. This may cause the batteries to malfunction.

DO NOT short-circuit a battery pack. This may result in damaging appliances or burns to person by the generated heat inside the battery cells.

DO NOT attempt to disassemble a battery pack. The battery cells may be short-circuited or the strong electrolyte in the cells may hurt the skin or clothes. Also, the electrode in the cell may catch fire by reaction with oxygen.

SECTION ONE INTRODUCTION

1.1 OVERVIEW

The BMS II Charger is capable of charging and performing diagnostics on up to five (5) battery packs simultaneously. The charger automatically recognizes 4 and 5 cell Gilian battery packs in any combination and will operate at 120V, 60 Hz (domestic) or 230V, 50 Hz (European) line voltage.

The charger offers timed charging that switches to a trickle charge when the battery pack reaches full charge capacity.

The BMS II diagnostic programs (“Evaluate” & “Double Evaluate”) provide accurate test data regarding battery voltage under load and battery capacity, as well as single and double discharge cycles. *Excessive use of these discharge/charge features will needlessly shorten battery life (maximum use for Double Evaluate mode per battery pack should be once monthly).*

• Battery Notes

Gilian battery packs are capable of providing between 300 & 500 charging cycles. Since this is difficult to track over the life of the battery, the table below will help in determining how long your battery pack should last.

Usage	Hours per Week	Est. Batt. Life
High	40–60	1–1.5 years
Medium	20–39	1.5–2.5 years
Low	< 20	> 2.5 years

The estimated battery life shown is based on proper battery maintenance. Gilian battery packs must be fully charged and maintained properly to achieve maximum pump run time. It is the responsibility of the pump owner to ensure that the battery pack has enough charge to complete the intended run time. To ensure maximum battery life you should track daily pump usage and charge the battery pack only when necessary.

Nickel-Cadmium batteries always have a small internal leakage current. If the battery pack has been removed from the charger for more than 2 days without use, it will require additional charging to restore it to full capacity. This process can be repeated 2–3 times without causing a “memory effect”.

1.2 FEATURES

1.2.1 Controls

- **Channel Select Button:** Selects the channel (CH#) to be displayed.
- **Capacity Evaluate Mode Button [“C”]:** Starts the “Evaluate” mode when pressed following a channel selection (Press Channel Select Button, then C).
- **Test Voltage Button [“T”]:** Displays the battery voltage under load for the indicated channel (during Evaluate & Double Evaluate modes).

1.2.2 Front Panel Display

The Front Panel displays information in the following windows:

- **CH#:** Displays the channel number (1, 2, 3, 4, or 5). A decimal point appearing in this window indicates that a 5-cell battery pack is connected (Evaluate & Double Evaluate modes only).
- **MODE:** Displays the current operation condition.
“c” = continuous charging
“P” = trickle charging
“d” = discharging (Evaluate mode)
 (“.”) [dot]: Flashing dot occurs during the 1st cycle of the Double Evaluate Mode. A non-flashing dot appears during the 2nd cycle of the Double Evaluate mode.
 (“–”) [dash]: Appears during the first 1.5 seconds of the Automatic Charge mode. Appears *after* the first 1.5 seconds of the Automatic Charge mode if the battery pack is inoperable. Appears together with other dashes in the “Value” and “Unit” windows when no battery is connected.
- **VALUE:** Displays values from 0.00 to 9.99.
- **UNIT:** Displays the unit of value as either “U” [Volts] or “A” [Ampere-hours]

1.2.3. AC Line Voltage Switch

A switch for selection of 120 VAC or 230 VAC line voltage is located on the bottom of the unit. *Please check the position of the switch before plugging the unit into an electrical outlet.*

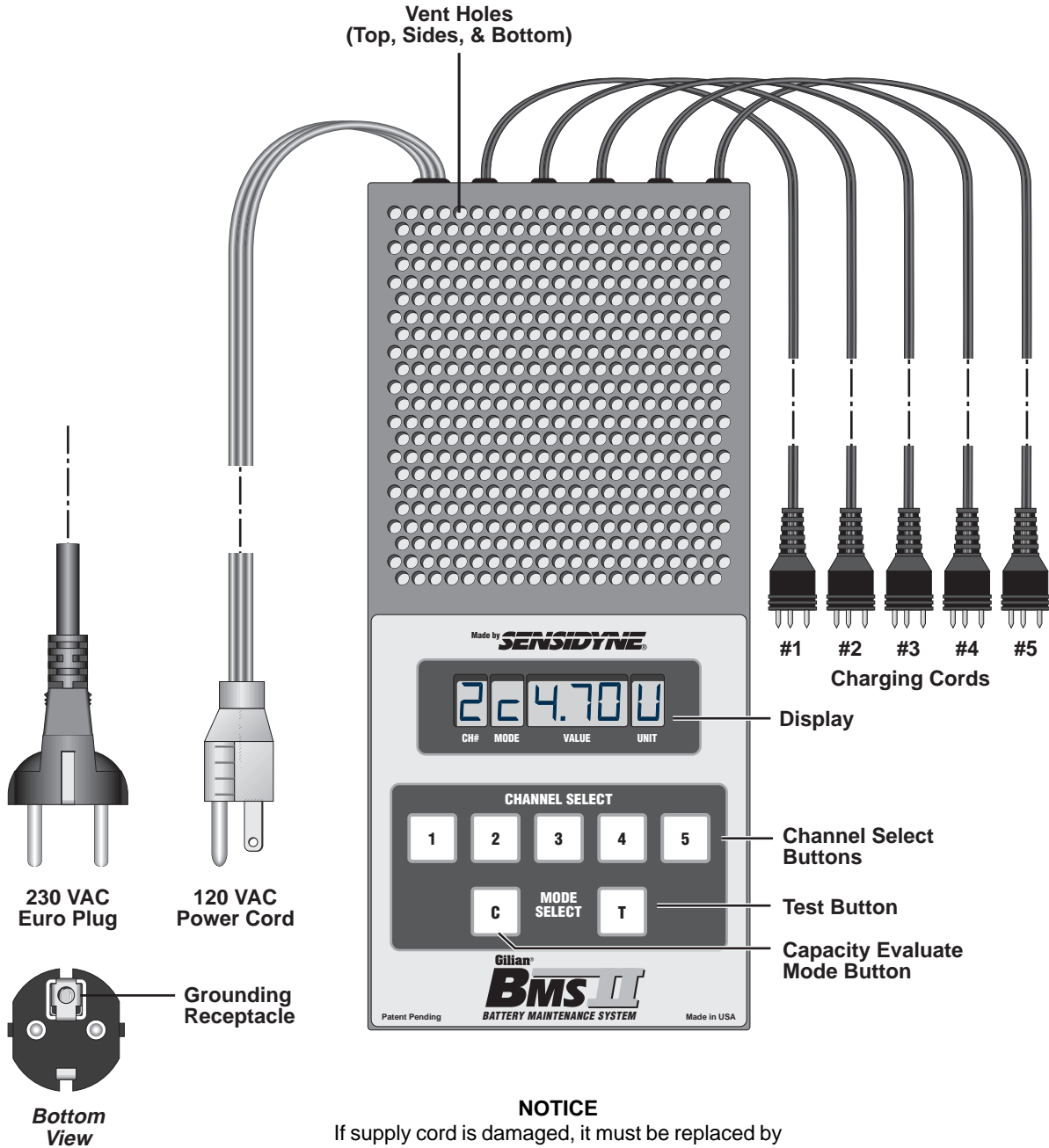


Figure 1.1
BMS II Battery Maintenance & Diagnostic System: Top View

1.3 PLUGS & ADAPTERS

The BMS II Battery Maintenance and Diagnostic System is designed primarily to charge GilAir-3, GilAir-5, GilAir II, and BDX II battery packs. However, HFS-513 and HFS-113 battery packs can also be charged when used with the optional charging adapter plugs. Two types of adapters are available: Type I for direct charging without diagnostic capabilities, and Type II for charging, battery conditioning, and complete diagnostic capabilities. See Appendix A: Parts List for ordering information. Figure 1.3 shows the

1.3.1 Type I Adapters

Type I adapters offer only a basic charging sequence through the HFS sampler's charging jack. These adapters allow the BMS II Charging System to fully charge the battery pack and then automatically switch to trickle charge to prevent overcharging and to preserve battery life.

When Type I adapters are used, there will be a "c" in the "MODE" window. When the battery pack is fully charged, a "P" appears in the "MODE" window. Also, zeros ("0.00") will appear in the "VALUE" window. The standard charging connector is diode protected which prevents normal operation of the battery conditioning modes utilized by the BMS II charging system. Since no battery voltage or current capacity can be measured with the use of Type I adapters, the Evaluate and Double Evaluate modes cannot be used.

Installation

The Type I adapter connects to the 3-prong charger plug on the BMS II. The barrel plug on the other end is plugged into the charging jack on the HFS sampler.

1.3.2 Type II Adapters

Type II adapters (see Figures 1.2 & 1.3) utilize the complete battery conditioning and diagnostic capabilities of the BMS II charging system. All features of the BMS II system are utilized because the adapters are directly connected to the battery pack itself. Adapter extensions are available for each of these Type II adapters. These extensions allow HFS battery packs to be charged at greater distances from the BMS II Charger base.

IMPORTANT

The battery pack must first be completely removed from the sampler before using the Type II charging adapter.

Installation

First remove the battery pack from the sampler. This is done by removing the 2 screws holding the battery pack in place (both top & bottom). On HFS-513 samplers you must carefully disconnect the cable connecting the battery pack to the sampler. On HFS-113 samplers you can slide the battery pack out from under the belt clip and away from the pump. The electrical connections will automatically disconnect.

The charging adapter connects to the 3-prong charger plug on the BMS II. The male plug on the other end of the adapter connects to the battery pack.

NOTE

When connecting the adapter plug (PN^o 850046) to an HFS-113 battery pack, make sure the red dot is facing up.

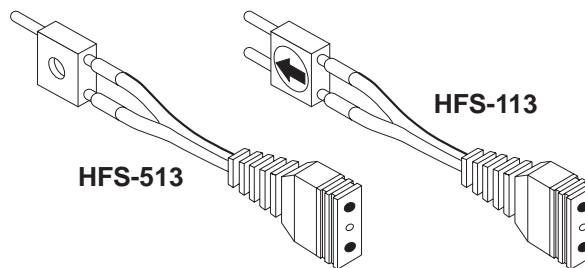


Figure 1.2
Type II Charging Plug Adapters

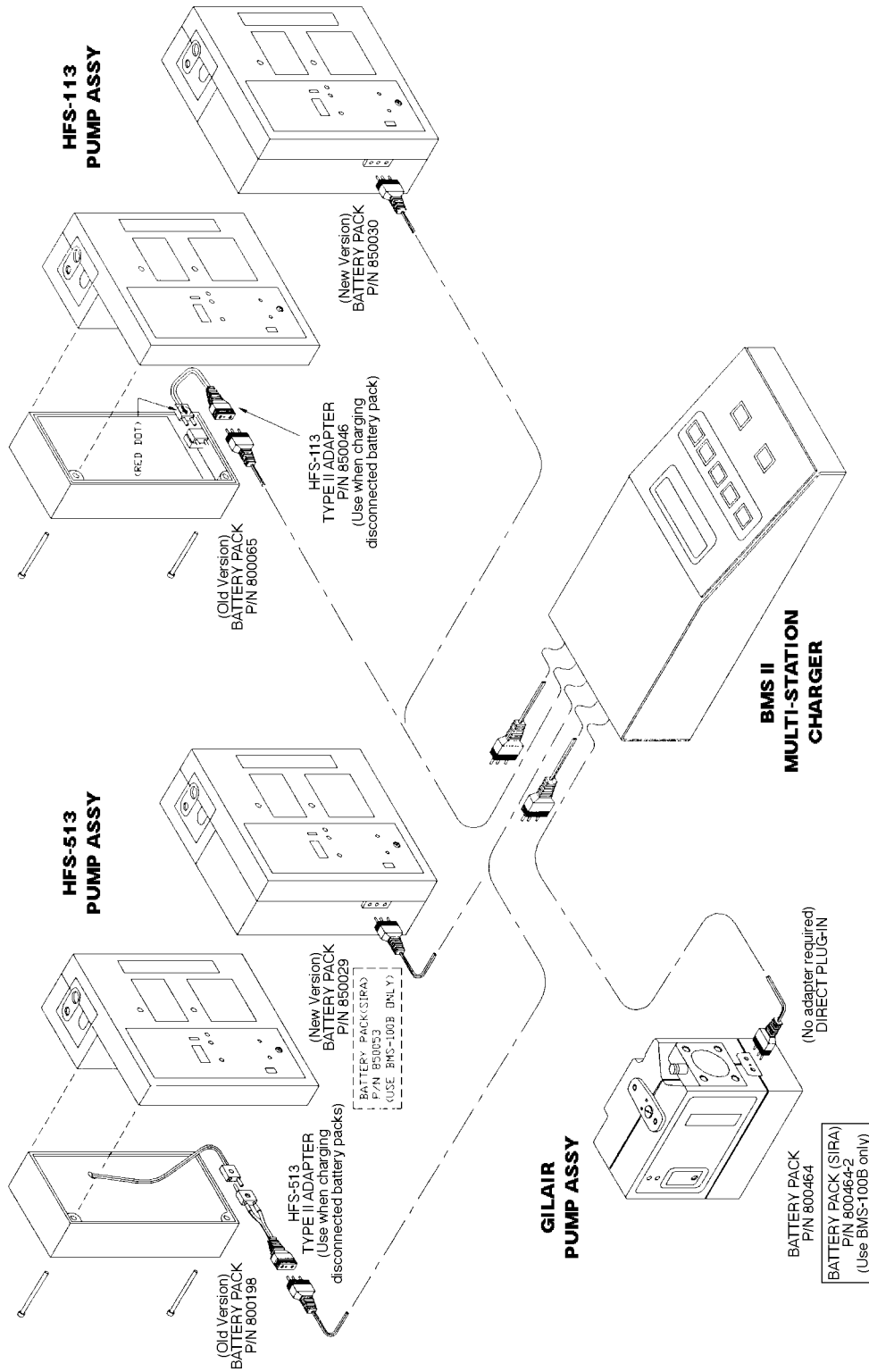


Figure 1.3
Charging Operation Configurations

SECTION TWO

OPERATIONAL MODES

2.1 AUTOMATIC CHARGE MODE

The BMS II has 5 charging channels. Each channel is independently operated and programmed, carrying out a mode of operation different from or the same as the other channels. These modes of operation are “Charge”, “Evaluate” and “Double Evaluate”. Each mode ends with fully charged batteries.

This mode recharges the battery and automatically switches to a trickle charge maintenance mode (see Figure 2.1). When the unit is plugged into an appropriate line voltage receptacle, it will self-test automatically, showing all characters of the display and checking the program. The unit is now ON and active. To turn OFF, you must unplug the unit.

When a channel cord is connected to a battery pack and no mode selection is made within 1.5 seconds, the channel will automatically default to the “Charge” mode of operation. At this time, a “c” will appear in the “MODE” window, a channel number will appear in the “CH#” window and “U” will appear in the “UNIT” window, indicating a voltage reading.

The unit will then charge the battery pack to full capacity. Charging times will vary, depending on the BMS II model number and the original battery charge level when connected to the unit.

Once the batteries are fully charged, the unit automatically switches to a trickle charge to maintain the full charge while avoiding overcharging. During trickle charge operation, a “P” appears in the “MODE” window (see Figure 2.1).

2.2 CAPACITY EVALUATE MODE

This mode offers remaining battery capacity evaluation, reconditioning of the battery, and automatic recharging/trickle charge maintenance (see Figure 2.2).

The channel number appears in “CH#” window, “d” (discharge) in the “MODE” window and the capacity measured in the “VALUE” window, which starts from 0.00 and increase as the battery is discharged. These 3 digits flash continuously until the remaining capacity measurement is completed. Once a full reading is attained, the value digits stop flashing. An “A” in the “UNIT” window stands for Ampere-hours.

Note: If a decimal point appears in the “CH#” window, the unit has recognized a 5-cell battery pack connection to that channel.

NOTE

The “Evaluate” and “Double Evaluate” modes are useful sequences for determining battery capacity data. However, these cycles should only be used periodically or when battery pack performance is in question (maximum once monthly). Repeated use of discharge cycles will unnecessarily accelerate battery life deterioration.

2.2.1 Double Evaluate Mode

Double Evaluate Mode offers full capacity evaluation, along with battery reconditioning and automatic recharging/trickle charge maintenance (see Figure 2.3). This mode is identical in nature to the Memory Erase Mode, except that it automatically repeats the capacity evaluation once full charge has been attained. In the “Capacity Evaluate” mode, the decimal point in the “MODE” window flashes during the first evaluation cycle and remains non-flashing during the second evaluation cycle.

2.2.2 Voltage Test

To read the voltage status of a battery pack any time during the “Capacity Evaluate” or “Double Evaluate” modes, simply push the “T” test button (refer to Figure 2.2 and Figure 2.3).

NOTE

If a dash (-) appears in the “MODE” window after the first 1.5 seconds of the “Charge” mode, the battery pack is inoperable and the channel is automatically disconnected and inactive.

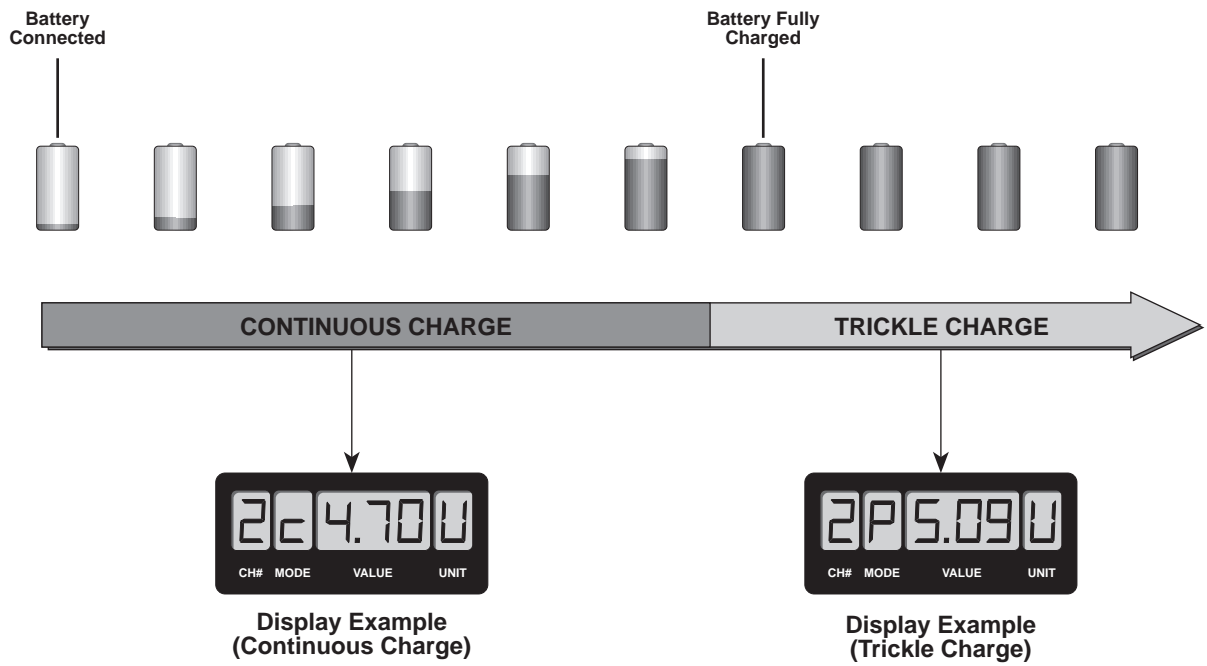
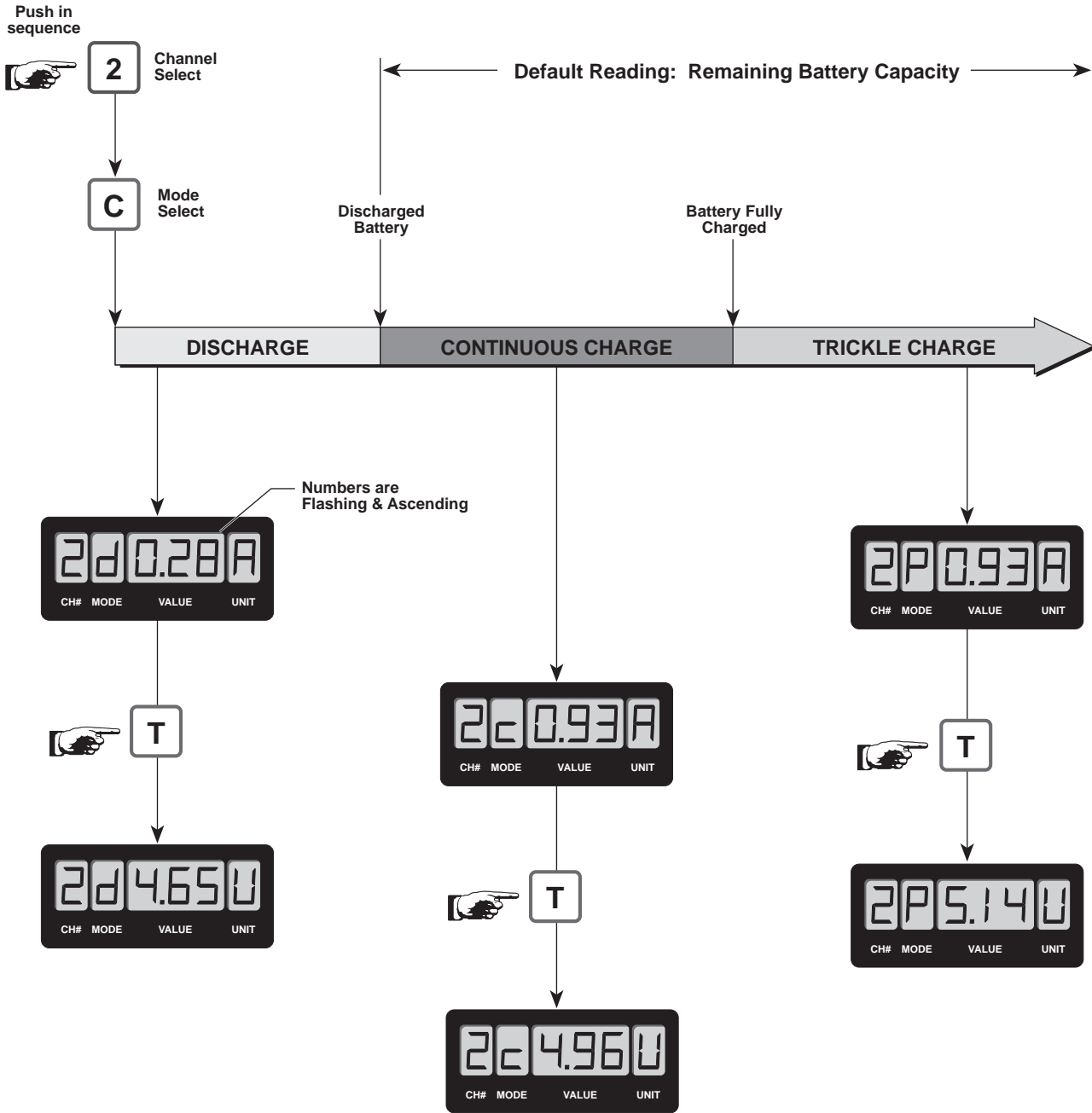
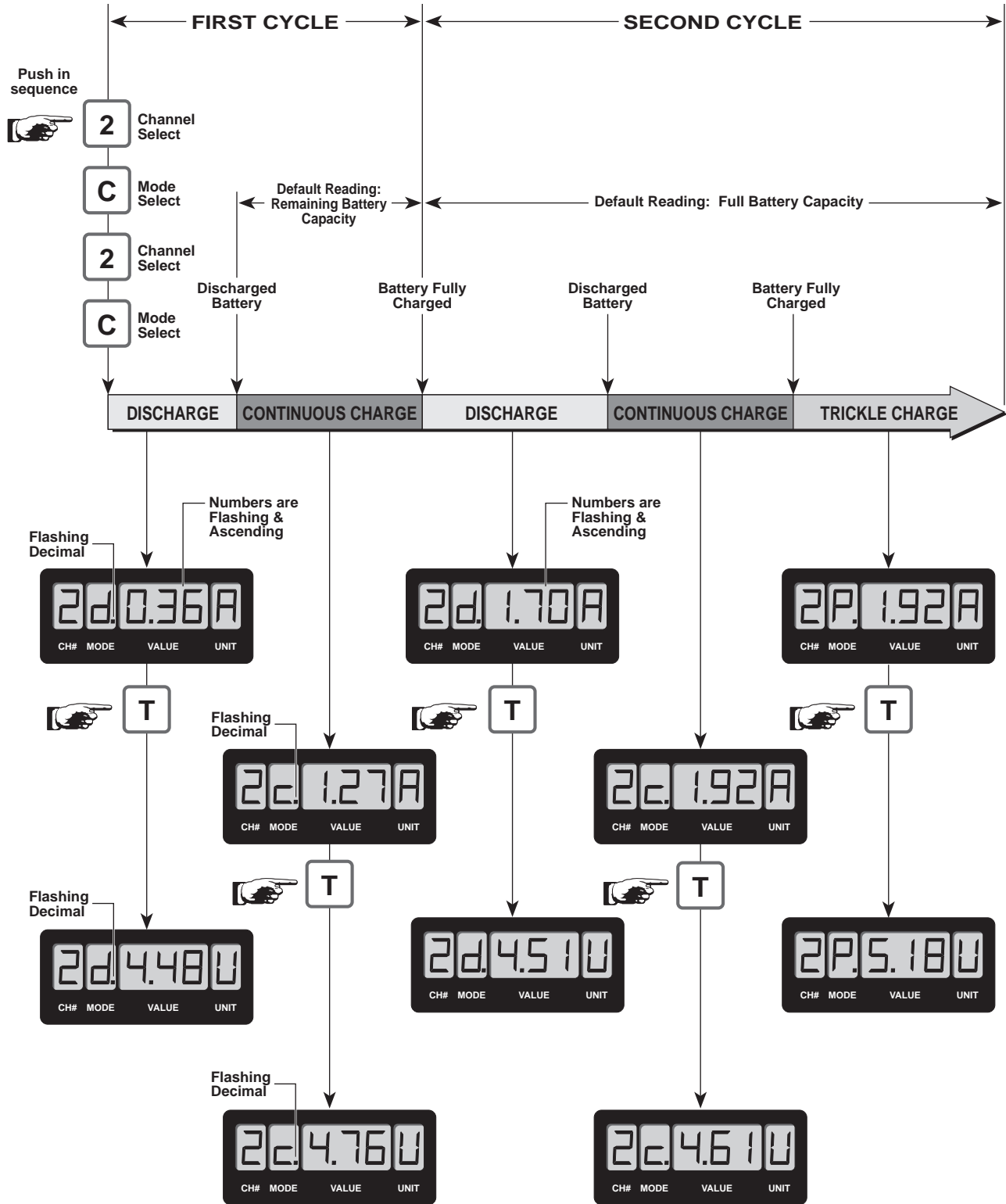


Figure 2.1
Displays: Automatic Charge Mode



Note: The VALUE window contents are shown for example only. Channel #2 was chosen at random.

Figure 2.2
Displays: Evaluate Mode (Battery Capacity)



Note: The VALUE window contents are shown for example only. Channel #2 was chosen at random.

Figure 2.3
Displays: Double Evaluate Mode

SECTION THREE OPERATION

3.1 SETTING UP

CAUTION

This charger unit utilizes a switchable 120/230 voltage switch. Before plugging unit into electrical source, be sure to select proper voltage position: 120V (domestic) or 230V (foreign).

- 1) Plug the BMS II into a grounded AC outlet. The unit will go through an initial program check (about 25-30 seconds) which will show all characters on the display, after which 6 dashes (-) will appear indicating that no battery packs are connected to the unit.
- 2) Connect the battery pack(s) to the selected channel cord(s). The "CH#" window of the display will indicate the corresponding channel number (1 through 5). Each activated battery channel will indicate its number on the display as the packs are connected. The last battery pack connected will be indicated in the "CH#" window. The display will always indicate the channel status of the last battery connection or disconnection, unless another channel is selected by the user.

WARNING

Do not use the BMS II-200 or BMS II-200CE Chargers to charge SIRA approved battery packs. Only use the BMS II-100CE charger to charge SIRA approved battery packs.

3.2 PROGRAM SELECTION

The following programs may be selected:

Automatic Charging
Memory Erase
Capacity Evaluate

3.2.1 Automatic Charging

The BMS II will automatically select the "Auto-charging" program about 1.5 seconds after the battery pack is connected.

3.2.2 Memory Erase

Select the channel number key pad, then press "C".

3.2.3 Capacity Evaluate

This mode can be activated by pressing the channel number and "C" key pads twice in sequence (e.g. 1, C then 1, C).

To change from "Evaluate" or "Double Evaluate" mode to "Charge" mode, reconnect the battery. To change from "Double Evaluate" mode to "Evaluate" mode, press the selected "CH#", then press "C" during the 1st cycle of the "Capacity Evaluate" mode only.

NOTE

The most current HFS-513 and HFS-113 version battery packs should reach > 2.00 Ampere-hours at full capacity. The most current GilAir-3, GilAir-5, GilAir II, and BDX II battery packs should reach > 1.50 Ampere-hours at full capacity.

APPENDIX A PARTS LIST

Part No.	Description
Charging / Diagnostic Systems	
850086	BMS II-200 Charger, 120/230 VAC (Do Not use to charge SIRA approved Battery Packs)
850086-1	BMS II-200CE Charger, 230 VAC (Do Not use to charge SIRA approved Battery Packs)
850089-1	BMS II-100CE Charger, 230 VAC (For use in charging SIRA approved Battery Packs)
HFS-513 Charging Adapters	
850045	HFS-513 (Type II) Internal Battery Lead to 3-Pin Female (use with Battery PN ^o 800198, 800198-1) <i>Allows BMS to test old style batteries using internal battery connector (must remove battery first)</i>
850139	HFS-513 (Extender for Type II) Female Barrel to 3-Pin Male <i>Allows HFS-513 charger to be used with new-style HFS-513, GilAir-5, GilAir II Battery Packs</i>
850047 *	HFS-513 (Type I) Male Barrel to 3-Pin Female <i>Allows BMS, Universal, & DRC chargers to be used with old battery pack</i>
HFS-113 Charging Adapters	
850046	HFS-113 (Type II) Internal Battery Lead to 3-Pin Female (use with Battery PN ^o 800065, 800065-1) <i>Allows BMS to test old style batteries using internal battery connector (must remove battery first)</i>
850109	HFS-113 (Extender for Type II) Female Barrel to 3-Pin Male <i>Allows HFS-113 charger to be used with new-style HFS-113, GilAir-3, BDx II Battery Packs</i>
850048 *	HFS-113 (Type I) Male Barrel to 3-Pin Female <i>Allows BMS, Universal, & DRC chargers to be used with old battery pack</i>

* **Use these adapters ONLY for charging on the BMS or BMS II. DO NOT use Evaluate or Double Evaluate Modes with these adapters.**

APPENDIX B

SPECIFICATIONS

Features	Programmable microprocessor controlled operation, outputs short circuit protected buzzer warning of reversed battery connection, charging time automatically adjusted to battery charge condition, automatic recognition of connected 4 or 5 cell battery types.
Measurements	Battery Capacity: remaining and/or full Battery Voltage with resistive load and load current approximately 220 mA
Input Power Ranges	105–125 VAC, 60 Hz, 50 W 210–250 VAC, 50 Hz, 50 W
Input Power	120 VAC @ 440 mA 230 VAC @ 220 mA
Output Power	7.5 Vdc @ 230 mA (Continuous) 7.5 Vdc @ 50 mA (Trickle)
Fuse	250 V 1A slowblow AC line fuse
Display	LCD Type, 0.5" High, 6 characters
Size	4.6" (W) x 2.2" (H) x 10.0" (D) 117 mm (W) x 56 mm (H) x 254 mm (D)
Weight	3.5 lbs. (1.6 kg)
Operating Humidity	0–90 %RH
Operating Temperature	10°–40°C (50°–104°F)
Operating Modes	Capable of maintaining 5 different batteries in different modes simultaneously: Automatic Charge Mode (sequence): Continuous Charge / Trickle Evaluate Mode (sequence): Discharge / Continuous Charge / Trickle Double Evaluate Mode (sequence): Discharge / Continuous Charge / Discharge / Continuous Charge / Trickle

Charger & Battery Pack Specifications Table located on next page

Battery Pack Specifications

BMS II Charger Specifications

BMS II Model No.	Voltage	Charger Part No.	Continuous Charge (mA)	Trickle Charge (mA)	Avg Discharge (mA)	HFS-113	HFS-513	GilAir-3	GilAir-5	GilAir II	BDX II
BMS II-100CE (for SIRA approved Battery Packs)	115/230	850089-1	200 mA (± 5%)	50 mA (± 10%)	220 mA			800464-2 800464-3			
					270 mA	850053 850043-1		850195			
BMS II-200 BMS II-200CE	115/230	850086 850086-1	348 mA (± 5%)	50 mA (± 10%)	370 mA	800030 800030-1 800065 * 800065-1 *		800464 800464-1 800464-4			801817 801862
					450 mA			800198 ** 800198-1 ** 850029 850029-1		800869 800869-1 800869-2	800869

* Requires 3-Pin Connection Adapter (PN^o 850046)

** Requires 3-Pin Connection Adapter (PN^o 850045)

APPENDIX C

RETURNED MATERIAL AUTHORIZATION

Sensidyne maintains an instrument service facility at the factory to provide its customers with both warranty and non-warranty repair. Sensidyne assumes no liability for service performed by personnel other than Sensidyne personnel. To facilitate the repair process, please contact the Sensidyne Service Department in advance for assistance with a problem which cannot be remedied and/or requires the return of the product to the factory. All returned products require a Returned Material Authorization (RMA) number. Sensidyne Service Department personnel may be reached at:

Sensidyne
16333 Bay Vista Drive
Clearwater, FL 33760 USA
727-530-3602
727-539-0550 [FAX]

All non-warranty repair orders will have a minimum fee of \$50 whether the repair is authorized or not. This fee includes handling, administration and technical expenses for inspecting the instrument and providing an estimate. However, the estimate fee is waived if the repair is authorized.

If you wish to set a limit to the authorized repair cost, state a "not to exceed" figure on your purchase order. Please indicate if a price quotation is required before authorization of the repair cost, understanding that this invokes extra cost and handling delay. Sensidyne's re-

pair policy is to perform all needed repairs to restore the instrument to its full operating condition.

Repairs are handled on a "first in - first out" basis. Your order may be expedited if you authorize an expediting fee. This will place your order next in line behind orders currently in process.

Pack the instrument and its accessories (preferably in their original packing) and enclose your return address, purchase order, shipping and billing information, RMA number, a description of the problem encountered with your instrument and any special instructions. All prices are subject to change without notice.

If this is the first time you are dealing directly with the factory, you will be asked to prepay or to authorize a COD shipment.

Send the instrument, prepaid, to:

SENSIDYNE
16333 BAY VISTA DRIVE
CLEARWATER, FL 33760 USA

ATTENTION: Service Department

RMA #: _____

SERVICE OPTIONS

The Sensidyne Service Department offers a variety of service options which will minimize costly interruptions and maintenance costs. These options include initial training, on-site technical assistance, and full factory repairs. Sensidyne has developed several programs which offer options best suited to your applications and needs. For further information, contact the Sensidyne Service Department at the following numbers: 800-451-9444 • 727-530-3602 • 727-538-0671 [fax].



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