



### BrainDrain® Warranty

Lentequip warrants the BrainDrain® for a period of one year from date of purchase when used under normal operating conditions. Lentequip's warranty terms are available at [lentequip.com](http://lentequip.com) in our Terms and Conditions document. Any unauthorized disassembly of the BrainDrain® voids the warranty. If you have any questions regarding the proper operation of the BrainDrain® not described in this booklet, please contact Lentequip. Specifications are subject to change without notice.

In the event that your BrainDrain requires servicing, contact Lentequip for instructions before shipping the unit.

Please see other products by Lentequip including the CanaTrans® video transmitter at:

**[lentequip.com](http://lentequip.com)**



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BrainDrain® is a registered Trade Mark



# braindrain®

Please read before using!





### 1.0 Introduction:

Congratulations on your purchase of the BrainDrain®. The BrainDrain® is an original Lentequip design capable of measuring and monitoring important electrical parameters such as Volts, Amps, Watts, Amp-Hours, and Watt-Hours in various battery applications. The ability to measure Amp-Hours and Watt-Hours allows the user to receive feedback about the energy usage of equipment or energy efficiency of batteries that has been previously only available in high-end expensive in-house battery analysers. The BrainDrain® brings this important measurement for the first time into field use and is not available in any other type of smart cable. The BrainDrain® is designed to interface easily with Lentequip chargers and block batteries as well as other power equipment and loads commonly used in the film production industry as illustrated in Figure 1.



Figure 1

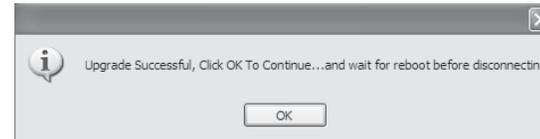


Figure 19

#### What if programming does not complete properly?

Occasionally a power failure might occur, or the USB cable may be accidentally disconnected during a field program upgrade session. This is called a bad upgrade session. The BrainDrain product and BrainDumpXL1 Upgrade utility have been designed to allow recovery from such events. When this occurs the BrainDrain will enter Recovery Mode that will be announced on the BrainDrain display at next power-up after the bad session. To recover, simply follow the procedures from STEP 1 onwards again, and the unit will be reprogrammed correctly as long as the power remains on and the USB cable remains undisturbed for the complete duration of the programming session.



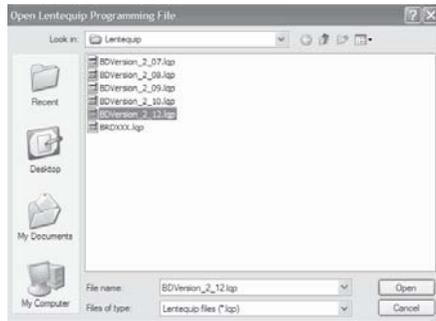


Figure 17

**STEP 6:**

You will be prompted for one last chance to abort before reprogramming begins.

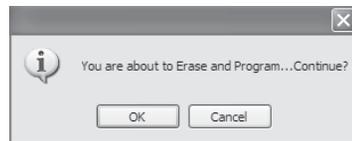


Figure 18

When you click OK, the process will begin. You will see the display on the BrainDrain change to announce that it is ERASING, followed by a count-up prompt from 0-47 which indicates that programming is in process.

If everything works correctly the dialogue of Figure 19 will be displayed.

**2.0 Getting Started:**

The BrainDrain has the following keys and indicators as illustrated in Figure 2.

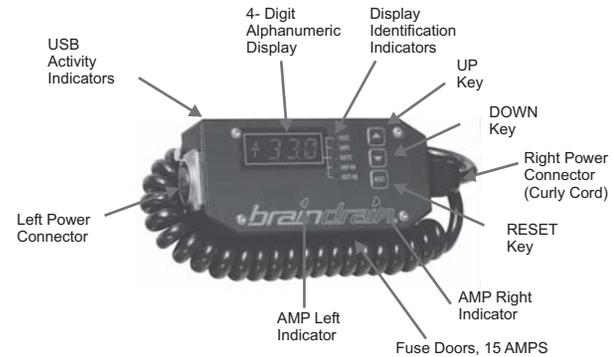


Figure 2

**3.0 Basic Functions:**

**3.1 Display Selection:**

The display of 5 different electrical parameters is possible. The illuminated green LED adjacent to the VOLTS, AMPS, WATTS, AMP-HOURS, or WATT-HOURS text indicates which item is presently being displayed. Two modes of display selection are provided. These are MANUAL and AUTO-SCAN modes.

**3.2 Manual Selection Mode:**

The "UP" and "DOWN" Arrow keys can be used to select the desired parameter to be displayed such as VOLT, AMP, WATT, AMP-HOUR or WATT-HOUR.

**3.3 Auto Scan Display Mode:**

If the "UP" and "DOWN" keys are pressed simultaneously at any time, the unit will toggle between AUTO SCAN DISPLAY MODE and



**MANUAL SELECTION MODE.** AUTO SCAN DISPLAY MODE, when activated, behaves as if the “DOWN” arrow key were pressed every few seconds giving the user a display that selects VOLTS, AMPS, WATT, AMP-HOURS and WATT-HOURS in a never ending sequence. This allows hands-free operation and convenient viewing from a distance. When in AUTO SCAN DISPLAY mode, the “UP” and “DOWN” arrows can still be used to force the AUTO-SCAN display to read whatever is desired. To exit AUTO-SCAN DISPLAY MODE press the “UP” and “DOWN” keys simultaneously.

Each time the “UP” and “DOWN” keys are pressed simultaneously a message confirming what MODE is now active will scroll across the screen as follows:

“MANUAL MODE” if the toggle event is changing to the MANUAL MODE  
 “AUTO MODE” if the toggle event is changing to the AUTO MODE.

**3.4 VOLT Display Mode:**

When the VOLT DISPLAY Identification indicator is on, the unit displays VOLTS. The BrainDrain measures both positive and negative polarities of voltage without any user intervention.

**3.5 AMP Display Mode:**

When the AMP DISPLAY identification indicator is on, the unit displays AMPS. The BrainDrain measures both positive and negative polarities of AMPS again without any user intervention. The AMP display mode has a few variations (source meter mode and load meter mode) that is described in Section 4.4.

**3.6 WATT Display Mode:**

When the WATT DISPLAY identification indicator is on, the unit displays WATTS. The BrainDrain measures both positive and negative polarities of WATTS allowing change in energy flow to be observed.

**3.7 AMP-HR Display Mode:**

When the AMPHR DISPLAY identification indicator is on, the unit displays AMP-HOURS. The BrainDrain measures both positive and



If an error occurs, USB communication is not functioning properly. Check if the power is on to the BrainDrain and that the internal BrainDrain fuses are OK. Also check that the BrainDrain display is illuminated to verify the internal BrainDrain electronics are working. If problems cannot be further solved contact your local BrainDrain supplier for assistance.



Figure 15

**STEP 4:**

Click on the “Upgrade BrainDrain” button. The Password window of Figure 16 should open. The password for upgrade is as follows:

**rusure**



Figure 16

**STEP 5:**

The File Open dialogue illustrated in Figure 17 will open. Navigate to the directory where the LQP Upgrade file exists and select it.





**9.0 BrainDumpXL1 Field Software Upgrade Procedures:**  
 Programming files for the BrainDrain are specially encrypted files that are provided by Lentequip and available at [www.lentequip.com](http://www.lentequip.com).

These files have the unique .LQP extension, for example, BDvers2\_12.lqp.

LQP files should be uploaded and normally be placed in the directory:  
 C:\Lentequip.

The procedure for upgrading is described as follows:

**STEP 1:**

Launch the BrainDumpXL1 Firmware Upgrade Utility by double clicking the desktop icon shown in Figure 13. The resulting window is shown in Figure 14.



Figure 14

**STEP 2:**

Connect the BrainDrain unit to be programmed to the PC via a USB connector. Power the BrainDrain "on". Windows should detect the device.

**STEP 3:**

Click the "Software Version" Button. The BrainDrain should respond by writing the text that represents the current detected software version existing within the BrainDrain as illustrated in Figure 15.



negative polarities of AMP-HOURS. The accuracy of this measurement is better than 2% and can be used as an accurate gauge of your batteries' performance.

**3.8 WATT-HR Display Mode:**

When the WATTHR DISPLAY identification indicator is on, the unit displays WATT-HOURS, also known as Joules. The BrainDrain measures both positive and negative polarities of WATT-HOURS. Sophisticated power measurement electronics are used to ensure highly accurate readings.

**3.9 AMP-LEFT and AMP-RIGHT Indicators:**

These are blue LED indicators which blink at a rate proportional to the current flowing. Two indicators are provided to allow distinct indication of the direction of current flow.

**3.10 Adjusting Display Intensity:**

The four digit display intensity can be adjusted at any time by first arranging for the BrainDrain to display VOLTS using the "UP" and "DOWN" arrow keys as required. To increase the display intensity press and hold the "RESET" button, followed by repetitive "UP" button pushes. To decrease the display intensity press and hold the "RESET" button, followed by repetitive "DOWN" button pushes. The display intensity is stored in non-volatile memory and is restored to the last setting the next time power is applied.





#### 4.0 Power Up Press-and-Hold Functions:

##### 4.1 INFO Mode:

Lentequip Inc. can preprogram your BrainDrain with personal or company information (if requested) before shipment. Each unit has a factory-assigned unique serial number. This information is permanent and can only be changed by Lentequip or approved Lentequip representatives.

To activate the INFO Mode, disconnect power from the BrainDrain, then push and hold the "UP" button while applying power. On awakening, the BrainDrain will detect the pushed and held "UP" button and will enter INFO mode.

INFO mode will display the following information once it is triggered at power-up as described above. The information below scrolls across the display in a seemingly endless loop.

*INFO MODE...  
BRAINDRAIN OS VERSION X-XX...  
LENTEQUIP INC...  
SERIAL NUMBER XXXX  
CUSTOMER NAME*

To abort the endless loop, remove power, or push and hold the "RESET" button for a few seconds or until the unit returns to normal operation.

##### 4.2 Factory Default Reset:

The BrainDrain is equipped with a means to restore non-volatile memory contents to a known acceptable reset condition. This may be necessary if the internal backup battery becomes discharged causing loss of internal settings.

To reset your BrainDrain to factory default settings disconnect power from the BrainDrain. Push and hold the "RESET" button and then turn the power on. The BrainDrain will detect the pushed and held "RESET" button during power-up and then will set all internal nonvolatile parameters of the



#### 8.3 Installing Drivers:

If this is the first time you have installed BrainDumpXL1 the Drivers for your BrainDrain USB interface have not yet been installed. At this point behaviour may vary from PC to PC, but in general the following procedure can be followed.

- 1) Click Close to exit the BrainDumpXL1 installation (Figure 12)
- 2) Arrange to connect you BrainDrain unit to a USB port on your computer
- 3) Apply power to the BrainDrain

Windows plug-n-play software will detect the new USB device and ask if you want to search for new drivers. Click No, and choose the option "Have Disk" that allows you to direct the plug-n-play software where to find the drivers.

The "Browse" capability of the plug-n-play software can be used to point to the directory:  
C:\Program Files\Lentequip\Drivers.

Once the drivers are installed you can launch BrainDumpXL1 from the desktop icon.

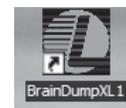


Figure 13



The BrainDumpXL1 utility will now install as illustrated in Figure 11.

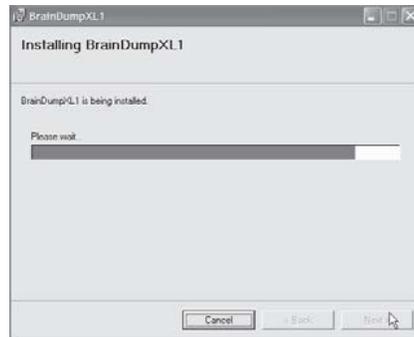


Figure 11

If everything is OK, in a few seconds BrainDumpXL1 installation will be complete as illustrated in Figure 12.

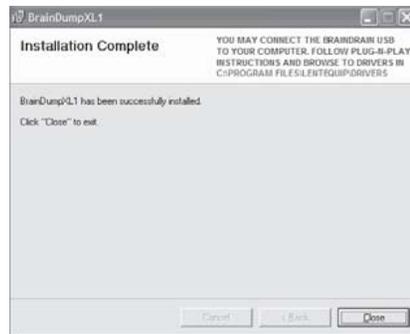


Figure 12

BrainDrain to the Factory Default Reset settings. If a factory default reset is triggered it will be announced as a scrolled message across the screen.

#### 4.3 Auto Polarity Operation:

The BrainDrain is designed to have any polarity of voltage connected to it (less than +/-50V). Consequently, an incorrect polarity connection normally has no effect on the BrainDrain. This applies to the power pins ONLY! Pin 2 on a 4 pin XLR BrainDrain and pin 3 on a 3 pin XLR BrainDrain are reserved for special functions and should never be connected to any external power!

The BrainDrain accepts positive and negative polarities to allow operation in different applied voltage polarity situations. The connector standard that supports ARRI style hook-ups applies positive voltage across the internal BrainDrain +/- terminals. The connector standard that supports PANAVISION style hook-ups applies negative voltage across the internal BrainDrain +/- terminals. Typically, the PANAVISION negative polarity connection occurs only with 24V systems.

It does not matter what polarity the BrainDrain is connected to. It automatically corrects its display for a positive reading of VOLTS, AMPS, AMP-HOURS, WATTS, and WATT-HOURS without any user intervention.

When a BrainDrain is first connected, the polarity of the actual applied voltage is determined. If it is negative (for example if a PANAVISION cable) is used, then it will briefly flash -24V or -12V mode when powering up. If it is positive (for example ARRI connection) then it will briefly flash +24V or +12V mode when powering up. Note that -12V mode is not a typical power-up situation and the BrainDrain will detect this abnormal condition. An additional warning function announces the abnormal condition with an option for the user to press reset to continue. The -12V condition in BrainDrain applications is abnormal because it usually indicates a cable polarity error.

Another way to view the active polarity mode is to open the BrainDump XL1 software utility, downloadable from [www.lentequip.com](http://www.lentequip.com), and select



"Configuration" as shown in Figure 4. The Power Polarity indicators will indicate the correct power-up polarity that was detected.

From the main BrainDumpXL1 program window as shown in Figure 3, and with your BrainDrain unit connected to your PC's USB connector and powered click "Configuration". Installation instructions for BrainDump are in section 8.



Figure 3

The Configuration window will appear as illustrated in Figure 4. The Polarity Mode that is in effect will display as follows:

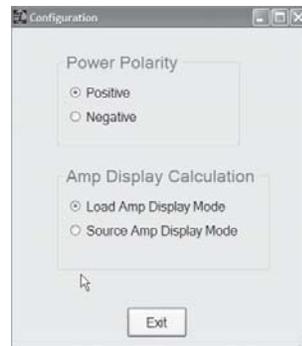


Figure 4



Read the text in the window and click Next.

The software allows you the option to install the program files in a different directory. Lentequip recommends that the software is installed as shown to remain compatible with future upgrades and software offered by Lentequip. Click Next, see Figure 9.

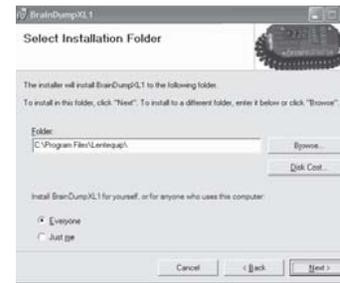


Figure 9

The following window will be presented as illustrated in Figure 10.



Figure 10



The installation utility will prompt you with the following screen illustrated in Figure 7.



Figure 7

If this is the first time you have installed BrainDumpXL1 be sure that the BrainDrain is not connected to your PC via the USB cable before you proceed. Then click Next.

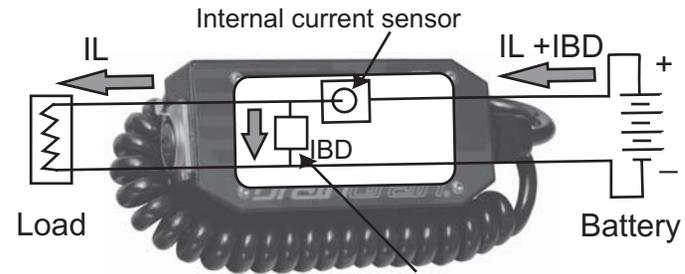
The installation utility should then open the window illustrated in Figure 8.



Figure 8

#### 4.4 LOAD AMP Display Mode and SOURCE AMP Display Mode:

The current extracted by the BrainDrain from a battery connected to the right-side (curly-cord) is delivered to the load (left-side). A small part of the current taken in the curly cord provides power to the BrainDrain internal circuitry (IBD) as shown in Figure 5 below.



BrainDrain circuitry

Figure 5

In the configuration of Figure 5 current measured with an ammeter in series with the battery will always read slightly higher than current measured with an ammeter in series with the load.

The AMP DISPLAY of the BrainDrain therefore can cause confusion to the user if this behaviour is not understood. The BrainDrain has two modes called LOAD AMP DISPLAY mode and SOURCE AMP DISPLAY mode. This setting can be set in the AMP DISPLAY CALCULATION window of Figure 4. Alternatively the AMP DISPLAY mode can be toggled by pressing and holding the UP and DOWN arrows at the same time, where after the effective mode will be displayed.

If it is desired for the BrainDrain to display the current correctly as if there were an ammeter in the load (left side) of Figure 5, then select LOAD AMP DISPLAY MODE (the BrainDrain's default condition). If it is desired for the BrainDrain to display the current correctly as if there were an ammeter in



the source (right side), then select SOURCE AMP DISPLAY MODE.

Be sure not to let the directions left and right confuse you. In Figure 5 above, if the load is replaced by a charger, then the left side now becomes the source, and the right side becomes the load and the BrainDrain will figure out how to display the source or load correctly. This makes the BrainDrain very flexible and highly intelligent device!

#### 4.5 24V and 12V Modes- LOW BATTERY Alerts:

When the BrainDrain first powers up it measures the voltage applied to its terminals and establishes the battery-voltage mode of operation. If the magnitude of the applied voltage at power-up time is greater than 18.00 volts, then the BrainDrain operates in 24V Mode, and a display message will scroll across the 4-DIGIT alphanumeric display stating "24V MODE". If the magnitude of the voltage at power up is less than 18.00 volts then the BrainDrain operates in 12V Mode, and a display message will scroll across the 4-DIGIT alphanumeric display stating "12V MODE".

The difference between 12V MODE and 24V MODE is in choice of the internal threshold selections for low battery. After power up has completed the 12V MODE and 24V MODE setting is used to determine the voltage conditions for low battery and Coma.

In the case of 12V MODE, the BrainDrain will announce the message "LOW BAT" when the voltage falls below 11.00V volts and remains above 10.00 volts. If the voltage falls below 10.00V the BrainDrain will enter "COMA" mode (see section 4.6).

In the case of 24V MODE, the BrainDrain will announce the message "LOW BAT" when the voltage falls below 22.00V volts and remains above 20.00 volts. If the voltage falls below 20.00V the BrainDrain will enter "COMA" mode. It should be noted that there are actually 4-possible modes, +12V, -12V,+24V and -24V modes which are captured on power-up depending on the sign and the magnitude of the applied voltage.



## 8.0 BrainDumpXL1 Upgrade Utility Installation Procedures:

### 8.1 Introduction:

The BrainDump XL1 firmware upgrade utility is required to support in-the-field software upgrades of the BrainDrain. Upgrades for your BrainDrain unit will be posted from time to time on the Lentequip website [www.lentequip.com](http://www.lentequip.com).

Before you are able to do remote firmware upgrades the BrainDumpXL1 utility must be installed on your PC.

### 8.2 BrainDumpXL1 Installation:

This facility is available for download from [www.lentequip.com](http://www.lentequip.com). The following procedure describes the basic procedure to install the BrainDumpXL1 utility. Once you have downloaded the BrainDumpXL1 software from Lentequip, you need to launch the setup.exe file as illustrated in Figure 6. Your screen may look slightly different due to variations between various PC environments.

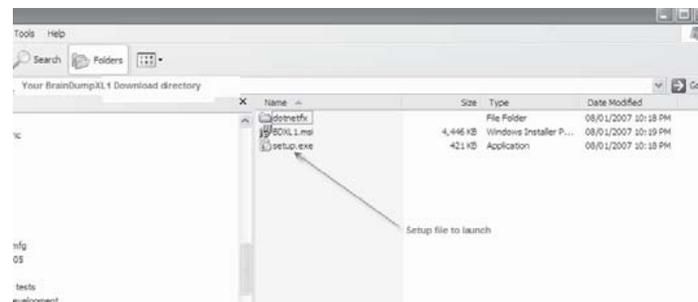


Figure 6





#### 7.2 DISPLAY INTENSITY INCREASE, “UP” + “RESET”:

For this mode to work the selected display items must be in VOLTS. When in normal operation pressing “UP” and “RESET” together increases the intensity.

#### 7.3 DISPLAY INTENSITY DECREASE, “DOWN” + “RESET”:

For this mode to work the selected display items must be in VOLTS. When in normal operation pressing “DOWN” and “RESET” together decreases the intensity.

#### 7.4 AMP-HR ACCUMULATOR RESET, “RESET”:

For this mode to work the selected display items must be AMP-HRS. When in normal operation pressing and holding “RESET” and waiting for the down-count to finish resets the AMP-HR accumulator in memory.

#### 7.5 WATT-HR ACCUMULATOR RESET, “RESET”:

For this mode to work the selected display items must be WATT-HRS. When in normal operation pressing and holding “RESET” and waiting for the down-count to finish resets the WATT-HR accumulator in memory.

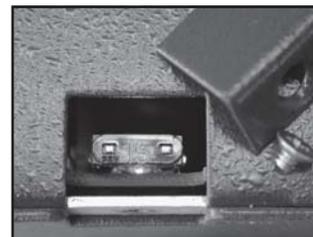


#### 4.6 COMA MODE:

COMA MODE occurs when the battery voltage becomes dangerously low. When in COMA MODE the BrainDrain display blanks and power is reduced in an attempt to reduce current draw from the energy source. The only way to recover from COMA is to cycle the power with a charged battery attached or push the UP button to awake from COMA. If the battery voltage is still in the COMA range, the BrainDrain will re-enter COMA.

#### 4.7 Internal Fuses:

The BrainDrain contains two internal protection fuses that are accessible through two small covers on the bottom of the unit. The fuses are lit from behind with small LEDs to indicate that they are functioning correctly. These fuses should only be replaced with the same type and value, 15A. These fuses can commonly be found in automotive supply stores or ordered through Lentequip. The part number is ATM-15. A



View of open fuse door

#### 4.8 Precaution when using the BrainDrain in-line with a Battery Charger:

Some chargers are able to generate immense inductive voltages when a battery under charge is abruptly disconnected from a charger. It is strongly recommended to disconnect the BrainDrain from the charger before the battery is removed from the BrainDrain!





## 5.0 Understanding BrainDrain Measurements:

It is useful to remember a few pointers when using the BrainDrain to avoid confusion in measurement.

### 5.1 Curly Cord Side Always Measures AMP-HOURS and WATTS Accurately:

The curly cord side is normally connected to the battery. Consequently, the BrainDrain integrates AMP-HOURS positively (counts up) when discharging, de-integrates AMP-HOURS when charging. This allows battery-life tracking because the bidirectional AMP-HOUR flow can be used to detect how much it takes to charge, and how much it takes to discharge the battery to a known state.

The curly cord side is normally connected to the battery. Consequently, the BrainDrain integrates WATT-HOURS positively (counts up) when discharging, de-integrates WATT-HOURS when charging. This allows battery-life tracking because the bidirectional WATT-HOUR flow can be used to detect how much energy it takes to charge, and how much energy it takes to discharge the battery to a known state. The BrainDrain provides the user with both Ah and Wh calculations since battery manufacturers may use either rating.

### 5.2 The AMP DISPLAY always displays the accurate current on the LED display as set by the LOAD or SOURCE AMP DISPLAY Mode:

Because the current on both sides of the BrainDrain can never be equal, the BrainDrain has been designed to allow the user to select what is important to see when the AMP DISPLAY is selected for viewing.

Normally users will operate with a configuration as shown in Figure 5, in positive or negative polarity, it does not matter. The BrainDrain Factory Default Setting for LOAD/SOURCE AMP DISPLAY is LOAD AMP DISPLAY MODE. In Figure 5, the LOAD AMP DISPLAY mode allows the user to monitor the camera load or other equipment to detect abnormal operation. For example, a camera with a bad movement or magazine problem, may exhibit higher than normal current draw.



Remember, for situations where the SOURCE may become a LOAD, such as when in Figure 5 the left side load is replaced with a charger, the DISPLAY will automatically toggle to accurately display the LOAD current of the left side when discharging, and the LOAD current on the right side when charging the battery.

## 6.0 Summary of Available Key Press Functions Available during Power-Up:

The User holds the key combination down during power up until the first character is displayed on the Alphanumeric display, where after, the key should be released.

### 6.1 FACTORY DEFAULT RESET, "RESET":

Returns all internal memory to standard factory default settings.

### 6.2 INFO MODE, "UP":

Triggers endless display of Owner Information and serial number. Note: Hold "RESET" to exit INFO MODE and unit will exit to normal operation

### 6.3 LOAD or SOURCE AMP DISPLAY MODE TOGGLE, "UP" + "DOWN":

Toggles change of the AMP display behaviour as described.

## 7.0 Summary of Available Key Press Functions Available after Power-Up:

### 7.1 AUTO/MANUAL SCAN MODE, "UP" + "DOWN":

When in normal operation pressing "UP" and "DOWN" together toggles the display mode between MANUAL and AUTO-SCAN. A message will scroll across the screen "AUTO" or "MANUAL" as is appropriate to give feedback as to which mode is in effect.

