



## PCMS Power System Overview (as found in Service and Maintenance Manual)

### 2.3 Solar Panel Assembly

The Solar Panels converts sunlight into electrical power (12VDC) to maintain the charge state of the Batteries. This re-charging of the Batteries allows the VMS to operate over a longer period of time before requiring landline (or generator) 120V charging. See Specifications section for more information on the Solar Panel.

### 3.4 Charge the Batteries

The Solar power supply system furnished with Amsig VMS includes multiple deep-cycle 6V Batteries which are uniquely able to withstand the deep discharges that occur periodically during normal operation. The system has been designed to provide sign operation over all of the usable state of charge level of the Batteries.

Depending upon several factors (i.e. length & duration of message displayed, the brightness level, the number of Solar Panels, the amount of available sunlight, the number of Batteries, the age of the Batteries and the ambient temperature), voltage level of the Battery pack can eventually drop below 11.2VDC (Default) and the VMS will stop operating. At that time (or sooner if desired), it will be necessary to recharge the Batteries with 120VAC (from a landline or generator). An abbreviated summary of steps to charge the Batteries with the provided 75A Charger are shown below:

- Turn the VMS system off at Main Power or Sign Display Switch. (Note: The system can be left on during charging, however, it will require more time to fully recharge the Batteries.)
- Bring 120VAC to Trailer and plug into covered Receptacle on right side of Pedestal Assembly
- For fully discharged Batteries, charge for a minimum of 72 hours. Batteries in a higher state of initial charge can be charged for less than 72 hours.
- When Batteries are fully charged, unplug 120VAC power source from Pedestal. Batteries are fully charged when the Specific Gravity with a temperature compensated hydrometer is  $1.25 \pm .010$ .

In dealing with Batteries, great care should be taken during their handling, charging and maintenance. More detailed information on aspects of and precautions for charging Batteries is provided in the Maintenance section and Specification section.



### 4.3 Battery Maintenance

During operation (particularly in the summer months), it is necessary to insure that the Battery electrolyte level is properly maintained.

During the winter months, it is necessary to insure that the Battery state of charge remains above the level necessary to prevent the batteries from freezing. When temperatures below freezing are forecast, test the electrolyte levels in the Batteries using a hydrometer. The voltage level alone is not an accurate indicator of electrolyte freezing temperature. A chart in the Specification section shows how to determine electrolyte freezing points at various hydrometer readings. In the event the hydrometer reading shows that the specific gravity of the electrolyte is low enough to allow the Batteries to freeze, it may be necessary to recharge them.

#### Stratification

Stratification occurs when the Batteries have not moved over a long period of time and the electrolyte fluid in the Battery begins to separate. Stratification results in only the lower parts of the Battery cells doing the work causing reduced Battery capacity and life. The electrolyte stratification that occurs in wet Batteries, standing still at float voltages, can be reduced by inserting the Dual Voltage Plug into the Charger. The Dual Voltage Plug allows for occasional fast charging at 14.2VDC and can cause the Batteries to bubble for a few hours. Be sure to check and maintain the water levels in the batteries before and after the bubbling charge. After the fast charge, remove the Dual Voltage Plug to avoid boiling the batteries dry. See Specification section for more information on Charger.

Stratification does not occur in Batteries which are jostled by frequent moving of the vehicle they are mounted in.

#### Detailed Sequence of Battery Charging Actions

- Make sure you wear protective clothing and a face shield when doing any kind of maintenance or charging of Battery system.
- Disconnect Battery Cables.
- Wash dirt off the top of the Batteries.
- Measure the specific gravity of all cells and remove those Batteries having more than .050 variation between the cells.
- Reconnect the Battery cables to allow charging of those remaining.
- Be sure that all remaining Battery cells have sufficient electrolyte to cover the plates plus  $\frac{1}{4}$  of an inch. Use only distilled or deionized water.
- Connect 120VAC to the covered Receptacle on right side of Pedestal Assembly.



- Do a “dirty connection” check by using a sensitive DC voltmeter to measure the voltage drop between the battery “Posts” at the ends of each jumper cable of the battery pack. If there is more than 4 millivolts drop from Post to Post, then disconnect the 120VAC from the Receptacle and clean and reconnect the cable connections.
- Reconnect the 120VAC to the Pedestal Receptacle.
- After Batteries become fully charged (specific gravity 1.25 +/- ,010 with a temperature compensated hydrometer), replace those which were rejected with good, fully charged batteries of the **SAME** brand and size as the rest of the pack.

**IMPORTANT NOTES:**

- ✓ Electrolyte level in the Batteries should be checked before and after each charging in addition to regular, periodic examinations. Replenish electrolyte with either distilled or de-ionized water up to the bottom of the ‘fill’ vent tube (but no higher). Note: adding water just before taking hydrometer readings will yield erroneous readings.
- ✓ A battery having a lesser or greater charge level than the pack must not be connected to that pack. To do so risks battery explosion.
- ✓ Any sparking as the cables are being connected indicates uneven charging and may ignite an explosion.
- ✓ Charging to specific gravity readings above 1.265 will cause damage to the Battery plates.
- ✓ For proper charging and electrolyte destratification, allow charging, from the 120V line, to continue until the charging voltage drops back from 14.1V+/- to 13.2V+/- . Note that, at the start of charging, the charging voltage may be 13.2V, more or less, but will be rising rather than dropping back.
- ✓ Batteries allowed to be abused by being discharged below the factory ‘default’ level will require considerable time on the Charger just to bring them up to a condition in which they can begin to accept a charge. Under certain low temperature conditions, excessive discharging can permanently damage the Batteries due to freezing. Charging of damaged Batteries can cause a potentially dangerous condition for personnel and equipment. Therefore, maintain a good charge level in the Batteries during cold weather because lead/acid batteries can freeze and can be ruined if they are sufficiently discharged.
- ✓ Interruptions of the 120VAC supply line may cause the Charger to reset which will lengthen the charging time. It may be necessary to disconnect both AC and DC from the Charger, put a load on the Batteries to burn off any surface charge and then reconnect the Batteries and 120VAC to restart the Charger.
- ✓ 12GA 120VAC inlet cords (min.) should be used with the 75A Chargers.
- ✓ 14GA 120VAC inlet cords (min.) should be used with the 55A Chargers.
- ✓ 120VAC generators used with these Chargers should be rated at 5KW, heavy duty (min.).

For service or support please contact the Amsig Service Department at 770.448.6650 ext or [service@amsig.com](mailto:service@amsig.com).