PS2420 LED Display Operation

Under normal charge circumstances, the LEDs and Menu Switch operate as follows:

- Power On (Red) Illuminates continuously when AC power present. Refer to the section 'TROUBLESHOOTING' if FLASHING, but not when flashing during a Charge Cycle that includes Equalization Charge Stage.
    - Shutdown (Red) Illuminates typically when used only during Error Decode Mode. Refer to 'TROUBLESHOOTING' if FLASHING.
    - Detection (Red) Illuminates when battery not connected (but, while powered from A.C.), or for a brief period immediately following an A.C. Connection. Refer to 'TROUBLESHOOTING' if FLASHING.
    - Charging (Yellow) Charge Status Indicator – FLASHES or illuminates during the Multi-Stage Charge Process.
    - Charged (Green) - Illuminates during the Top-Off Stage and Float/Maintenance Stages of the Multi-Stage Charge Process.
        - When FLASHING in conjunction with a continuously illuminated Power On Red LED it is signifying an ALERT. Refer to the section titled Error Code Description for ALERT definitions.

- Depressing and holding the Menu Select Button depressed for 10 seconds at power up, forces charger to insert the Equalization Stage into the charge algorithm regiment **IF and only IF, that charge MODE selected, would allow it.** After power up, and if switch is again held depressed for 10 seconds, the Equalization Charge Stage is toggled to OFF (de-asserted from the charge algorithm Regiment).

  The following description assumes the charger is set in MODE-2 to charge a typical Flooded Lead Acid Battery.
    - MODE-2 is annunciated for 4-seconds after A.C. Power applied, where the Right Most LED flashes. Refer to the **LED CHARGE MODE INDICATOR TABLE'** and **CHARGE MODE SETTING TABLE**.
    - 'Power On' LED and Detection LED will illuminate to indicate that AC power is applied AND battery is in the process of being detected.
    - If the Red 'Power On' LED Flashes, it is indicating that the pending Charge Cycle will apply a special charge called 'Equalization Charge'. Refer to **Equalization Charge Cycle** section for description of stage.

STAGE ONE – PRE-QUALIFICATION TEST

- Yellow (Charging) LED flashes slowly (once per second) to test battery. Charging stops if faults such as connection of 24v charger to a 36V battery pack or safety timers timed out, etc. Refer to 'Troubleshooting Guide' if an Error Code was displayed.
- Duration of this stage is dependent on condition of battery – approximately 10 seconds under average circumstances, but if your battery pack was allowed to severely discharge to less than 1.75Vdc per cell (example – 21v for a 24v lead-acid battery), then the charger may take several hours of slow charging to try to slowly bring the battery up to above 1.75Vdc per cell.

STAGE TWO – BULK CHARGE (Constant Current)

- Yellow (Charging) LED illuminates continuously indicating charging at full rated output. While charging, voltage is monitored for the occurrence of the next charging stage.

STAGE THREE – ABSORPTION CHARGE (Constant Voltage)

- Yellow (Charging) LED illuminated continuously. The charger now regulates at Absorption Voltage Level while monitoring charge current.
- Once Charge Current has decreased to a sufficiently low level, this stage exits to the next stage. The Battery Pack has achieved approximately 95% State of Charge.

STAGE FOUR – TOP OFF CHARGE STAGE

- Both Green (Charged) and Yellow (Charging) LEDs illuminate. Replenishing last 5-10% of battery capacity. Charging at a low Constant Current rate, this stage monitors for time and dv/dt to terminate. The Battery Pack has achieved approximately 95% State of Charge.

STAGE FIVE – EQUALIZATION CHARGE CYCLE

- This is a special charge condition that is selectively applied and is not typically applied to every battery, nor with every charge cycle. If it is applied, the next stage becomes Stage Six. If not applied, then the next stage becomes Stage Five.
- The Red 'Power-On' LED will flash during the entire cycle in which Equalization Charge Stage has been invoked, and the flashing will cease when charge has completed.
- Equalization Charge is an additional charge stage injected here and is invoked via the following methods:
- A MODE containing a flooded USBattery battery, such as battery type US1800, **and** every 15th charge cycle is started, **and/or**
- If the A.C. Cord is plugged/unplugged 15 times, **and/or** the 'Menu Select' Button is held depressed for 10seconds when A.C. power is applied o While in this specific Charge Stage, the Yellow/Green LEDs will flash alternately. This Stage locks in for a period of 2hrs to 4hrs and can terminate any time after the initial 2hr period when a series of dv/dt measurement records have been satisfied.

STAGE FIVE or SIX – FLOAT/MAINTENANCE (STANDBY)

- Green (Charged) LED illuminates. Battery is fully charged and no further 'charging' action is occurring. Charger is now in standby and monitoring the battery and passage of time. Charger may now also be left connected to battery, indefinitely.
- If the Green LED flashes, it is signaling an abrupt change in the previous charge cycle (but not an error) and may require additional attention according to the flash rate:

  Slow Flash: Charge cycle ended via peak voltage detection in the Top Off Charge stage.

  Medium Flash: Charge cycle ended via peak voltage detection in the Equalization Charge Stage.

  Fast Flash: Charge cycle ended via Maximum Safety Timer time-out.

  Modified Flash Pattern – Flash-Flash-Flash-OFF: When the Battery Temperature Cable is connected and a maximum battery temperature was reached, charging was terminated early.
- If any of these flashing patterns occurred, check all of the equipment or vehicle's inter-wire connections from receptacle to batteries, including series or parallel battery pack wiring for loose and/or dirty or worn or burned connections. Also, check each battery for possible replacement of that battery and battery pack.

STAGE SIX or SEVEN – RECYCLE CHARGE STAGE o

- While in Standby Mode (Stage-5 or 6: Float/Maintenance) and if a substantial load were to be applied, charger will reset; thereby, automatically initiating a new charge cycle routine and restoring battery to full capacity.
- If while charging, the charger finds an abnormal charge condition, it will attempt to shut down and indicate the 'Condition' by flashing any one of the LEDs. Refer to the 'Troubleshooting' section for a description of the Charge Error Condition.