Battery Load Testing Procedures for CO-OPS Water Level Observation Systems

Procedure Number: SOP # 6.3.2.1.12
Created: March 30, 2017
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1. **Title:** Battery Load Testing Procedures for CO-OPS Water Level Observation Systems

2. **Purpose:** This document describes the procedure for load testing fully charged PowerSonic PS12400 40Ah batteries using the FOD custom engineered battery load tester as well as the Schumacher Electric PST-200 ProSeries battery load tester and other comparable off-the-shelf 12-volt automotive battery load testers.

3. **Background/History:** CO-OPS utilizes PowerSonic PS-12400 12-volt 40Ah batteries in most DCPs and ancillary power boxes. These batteries are swapped out on a four-year cycle to minimize failures but early failures are still possible. It is beneficial to test the health of the batteries during regularly scheduled maintenance to identify and replace batteries that are in less than optimal condition prior to actual failure.

   There are several battery load testers that can be used for this purpose. Approved units include the FOD custom designed battery load testers and the Schumacher Electric PST-200, or comparable, 12-volt off-the-shelf automotive battery load tester. The FOD battery load tester was purpose engineered specifically for testing the PowerSonic PS-12400 battery. The PST-200 battery load tester was designed to test 12-volt automotive batteries but also works with the PowerSonic PS-12400 battery.

   The FOD load tester applies a 12-amp load across the battery terminals while the PST-200 applies a larger 100-amp load across the battery terminals. The purpose of the test is to provide an indication of the overall health of the battery and its ability to supply sufficient current to run the DCP and/or ancillary device(s). The FOD load testers are available upon request for CO-OPS field crews while the PST-200 and other comparable 12-volt automotive battery testers are available for purchase at most automotive supply stores if needed.

4. **Scope/Applicability:** FOD, CIL, and SIL

5. **Main Processes:** There are several steps needed to load test a PowerSonic PS12400 40Ah battery. These steps are described in detail in Step 6 below:
   A) Disconnect battery from all charging sources
   B) Hook load tester to battery
   C) Ensure battery is fully charged and record initial voltage
   D) Load battery and record minimum voltage
   E) Record final recovered voltage
   F) Remove load tester from battery and reconnect battery to charging sources

6. Detailed Sub-Processes/Checklists:

A. Disconnect battery from all charging sources –

a. There are two methods to accomplish this

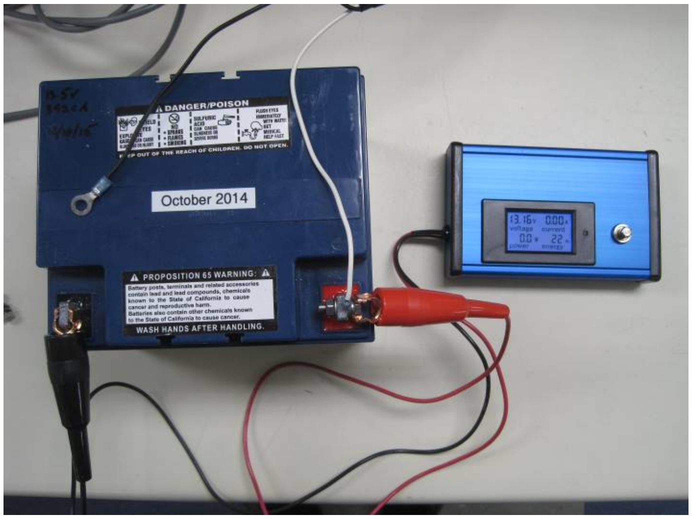
1) Unplug AC power supply or battery charger and disconnect solar panel negative input wire (or completely cover the solar panel blocking all insolation); or

2) Disconnect the negative wire from the battery terminal

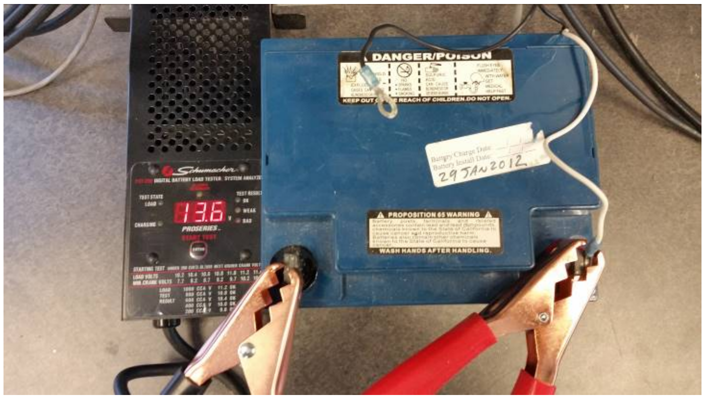
B. Hook battery load tester to battery –

- Hook the red clamp of the load tester to the positive (+) battery terminal
- Hook the black clamp of the load tester to negative (-) battery terminal

FOD Load Tester



PST-200 ProSeries



C. Ensure the battery is fully charged and record Initial voltage –

- Read the battery voltage on the display of the load tester
    - The battery must be fully charged to ≥ 12.6 volts to be load tested
    - If the voltage is less than 12.6 volts charge the battery until it is ≥ 12.6 volts
    - If the battery cannot be charged to ≥ 12.6 volts, then replace the battery
- If the voltage is ≥ 12.6 volts record the voltage from the display of the load tester

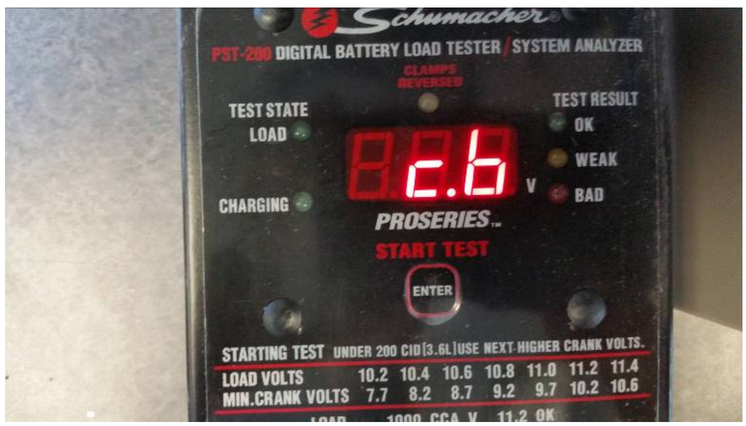
D. Load the Battery –

Using the FOD Load Tester

- Depress and hold silver button for 20 seconds
- Note that the amperage should read approximately 12 amps
- At the end of 20 seconds read the minimum voltage reached and record it
    - If the voltage drops to ≤ 11.8 volts the load tester display will flash indicating a weak battery which must be replaced
- Stop depressing the button to take the battery off of load

Using the PST-200 or comparable load testers

- Press the ENTER button below START TEST to load the battery
- Wait approximately 10 seconds (the PST-200 load tester will turn the load off automatically). Similar load testers may require you to manually hold the load button for 10 seconds.
- Record the end voltage and note the Test Result.
  - o If test returns a weak or bad result (indicated by a yellow or red light) the battery will need to be replaced.
  - o If the voltage display returns a value of **cb** then the battery will need to be replaced.



E. Record Final Voltage

- After the load has been removed from the battery and the voltage stabilizes read and record the final voltage displayed on the load tester

F. Remove Load Tester from Battery

- Remove the black and red clamps from the battery terminals

G. Reconnect Battery to Charging Sources

- Reconnect all charging sources that you disconnected in Step A.

7. Management/Responsibility: SIL and CIL are responsible for maintaining this SOP.

8. References:

A) 3.2.3.9I19 Engineering Bulletin 10-002 (Revised 2015) – Standardized Battery Type
B) 4.3.1.6 (F15) PowerSoinc PS12400 Battery Datasheet