# CENTRAL OFFICE AND PABX LEAD-ACID BATTERIES
# SINGLE CELL CHARGING-CONSTANT CURRENT METHOD

## 1. GENERAL

1.01 This Practice covers the charging of an individual cell after a capacity test has been made. It includes restoring a cell or cells which are continually below average in specific gravity or float voltage.

1.02 This Section is being reissued to make additions to Table 1. Marginal arrows indicate additions.

1.03 Under normal conditions, a floated battery should average 2.17 volts per cell and have a specific gravity from 1.200 to 1.225. During a check charge, no cell should be more than .05 volt below the average of all the cells being charged. Sometimes a cell will not meet the above requirements even after repeated equalizing charges are given to the entire battery. Rather than continue charging the entire battery, a single cell charger can be used to restore the cell to a normal condition.

1.04 After making a capacity test on a cell in a battery, a single cell charger is required to restore the cell to its normal condition.

1.05 It is not necessary to remove the cell from the float charging circuit to give the special charge.

## 2. TEST APPARATUS

2.01 Provide test apparatus as follows:

(a) D-C Voltmeter, Weston Model 1 or Model 931.

(b) Thermometer (usually with battery).

(c) Hydrometer Syringe (Do not use hydrometer that is in present use on the battery. Type will depend on type of battery.)

(d) Model C-500903-A Lee Electric Company, or equivalent, Battery Charger for ONE CELL ONLY with an output of 210 amperes at 4 volts. For cells from 200A.H. to 1680A.H.

(e) Model VVR-40-45P Exide, or equivalent, Battery Charger 1 to 18 cells at a maximum of 40 amperes output. For cells from 8A.H. to 200A.H. (Emergency engine batteries may be given special charging with this rectifier.)

(f) Set of AC and DC leads for charger.

## 3. PROCEDURE

3.01 Note the 8 hour capacity of the cell that is to be charged. From Table 1, select charger designated to charge that particular capacity cell.

3.02 Record the cell specific gravity, voltage and temperature.

3.03 Check electrolyte level in cell. Add distilled water as necessary. Do not over-fill the cell as the electrolyte will expand when cell is charged at high rate and may spill acid through vents in top of the cell.

3.04 Place thermometer in the cell to be charged.

3.05 To prepare the charger for use, lay out the D.C. leads, separate and connect to the charger. Check that the AC circuit breaker is open. Check that the variable transformer handwheel is turned counter clockwise to its zero position. Connect AC lead. At this point the Lee Electric charger pilot light will be on. The Exide VVR charger requires that the AC circuit breaker be closed before pilot lamp will light.

3.06 To test the charger, close the AC circuit breaker and slowly rotate handwheel clockwise to approximately 2 volts on rectifier voltmeter. Check polarity and voltage with portable voltmeter at the battery clamps on the DC cable.

3.07 After polarity and the charger function have been checked, restore the handwheel to zero position. Open the AC circuit breaker.

3.08 Connect charging leads to cell (the positive lead to positive terminal and the negative lead to the negative terminal of the cell). Tie these leads in a manner that will prevent someone from stumbling over them and so the weight of the cables will not cause

Table 1. Charging Rate For Single Cells or Entire Battery Constant Current Method.

| Use Charger Type | 8 Hr. Capacity Amps | Charge Rate in Amps | | | |
|---|---|---|---|---|---|
| | | 8 Hours | 10 I-fours | 16 Hours | 24 Hours |
| Exide VVR 40-45 P | 8 | 1.0 | 0.8 | 0.5 | 0.3 |
| | 10 | 1.1 | 1.0 | 0.6 | 0.4 |
| | 16 | 2.0 | 1.6 | 1.0 | 0.7 |
| | 20 | 2.5 | 2.0 | 1.2 | 0.8 |
| | 24 | 3.0 | 2.4 | 1.5 | 1.0 |
| | 30 | 3.7 | 3.0 | 1.8 | 1.2 |
| | 40 | 5.0 | 4.0 | 2.5 | 1.6 |
| | 50 | 6.3 | 5.0 | 3.0 | 2.0 |
| | 60 | 7.5 | 6.0 | 3.4 | 2.5 |
| | 75 | 9.4 | 7.5 | 4.6 | 3.0 |
| | 80 | 10.0 | 8.0 | 5.0 | 3.3 |
| | 100 | 12.5 | 10.0 | 6.0 | 4.0 |
| | 105 | 13.0 | 10.5 | 6.6 | 4.3 |
| | 120 | 15.0 | 12.5 | 7.5 | 5.0 |
| | 125 | 15.6 | 12.5 | 7.8 | 5.2 |
| | 150 | 18.7 | 15.0 | 9.3 | 6.2 |
| | 160 | 20.0 | 16.0 | 10.0 | 7.0 |
| | 175 | 21.8 | 17.5 | 10.9 | 7.2 |
| | 177 | 22.1 | 17.7 | 11.0 | 7.3 |
| | 180 | 22.5 | 18.0 | 11.2 | 7.5 |
| | 200 | 25.0 | 20.0 | 12.5 | 8.3 |
| Lee Electric c-500903-11 | 210 | 26.2 | 21.0 | 13.0 | 8.7 |
| | 240 | 30.0 | 24.0 | 15.0 | 10.0 |
| | 300 | 37.5 | 30.0 | 18.7 | 12.5 |
| | 360 | 45.0 | 36.0 | 22.5 | 15.0 |
| | 400 | 50.0 | 40.0 | 25.0 | 16.6 |
| | 420 | 52.5 | 42.0 | 26.2 | 17.5 |
| | 480 | 60.0 | 48.0 | 30.0 | so.0 |
| | 540 | 67.5 | 54.0 | 33.5 | 22.5 |
| | 600 | 75.0 | 60.0 | 37.5 | 25.0 |
| | 660 | 82.5 | 66.0 | 41.0 | 27.5 |
| | 8 4 0 | 105.0 | 84.0 | 52.5 | 35.0 |
| | 1064 | 133.0 | 106.0 | 66.5 | -14.3 |
| | 1080 | 135.0 | 108.0 | 67.5 | -15.0 |
| | 1155 | 144.0 | 115.0 | 72.0 | 48.0 |
| | 1320 | 165.0 | 132.0 | 82.0 | 55.0 |
| | 1680 | 210.0 | 168.0 | 105.0 | 70.0 |
| | 2128 | *210.0 | *210.0 | 133.0 | 88.6 |
| | 4000 | *210.0 | *210.0 | *210.0 | 166.0 |
| | 7000 | *210.0 | *210.0 | *210.0 | *210.0 |

* Charger capacity too small to reach proper rate, therefore, maximum output charging rate is used. The charging period will be extended until specific gravity is stabilized for two consecutive 2-hour readings.

the battery clamps to be pulled from the cell terminal.

3.09 Close AC circuit breaker and rotate the variable transformer handwheel slowly clockwise until the 8 hour charge rate for the particular cell has been achieved.

CAUTION: Do not exceed the maximum capacity of the charger or more than the 8 hour charge rate of the cell being charged.

Typical Cell Charging Condition

3.10 A 120 AH cell is charged, in the beginning at 15 amperes or the 8 hour charge rate of the cell. This current is continued for 2 hours, then the rate is to be reduced. The 15 ampere rate will cause violent gassing in the latter portion of the 2 hour charge. However, on lower charge rates, such as the 10 & 16 hour rates, violent gassing should be avoided by reducing the charge rate. At no time shall the temperature be allowed to rise above 110 F. Reduce charging rate when temperature nears 110°F. The one thing to remember is that the purpose of the charge is to break sulphation and to equalize the specific gravity. Also the charge should cause voltage of the cell to stabilize when the cell is put back on float charge. During the charge, readings of specific gravity and temperature should be taken every 2 hours until two consecutive readings of corrected specific gravity show no change.

4. REPORTS

4.01 Complete the required records in accordance with local practices.