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| **Department:** | **P/W Mechanic Shop** | **Area** | **Shop** |  |
| **Subject:** | **Battery Charger SWP** |

**Battery Charger**

**Warning:**

The use of this tool may be hazardous. The lead-acid battery charger is a tool that could possibly cause an explosion or spark because of the lethalness of the lead-acid battery it is charging. Special safety precautions must be observed to reduce the risk of personal injury and fire. You must take extra precautions to protect the vehicle it’s attached to and yourself. Testing the lead-acid battery first to see it will take a charge, observing the temperature of the lead-acid battery while charging the lead-acid battery. The voltage capacity and removal of lead-acid battery (batteries) from vehicle before charging and testing is important to fully understand. Please observe the safety precautions and procedures below. If not familiar with the use of this equipment, obtain practical instruction from a competent operator or supervisor. Do not operate without thorough training or unless under the direct supervision of an instructor. Do not operate if safety devices are not in place.

**Purpose:**

The lead-acid battery charger is a tool that converts A/C voltage from a wall outlet into D/C voltage. That D/C voltage is then applied directly to the automotive lead-acid battery. That voltage then restores the energy potential in an automotive lead-acid battery by giving charge back to the molecules in the electrolyte. You as the operator can change the amount of voltage and amperage applied to battery that you are charging.

**Hazards:**

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| * Chemical Burns
 | * Fire
 | * Sparks
 | * Explosive
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**PPE Required:**

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| * CSA approved face shield
 | * Safety footwear
 | * Spark resistant clothing
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| * Acid resistant apron
 | * Acid resistant gloves
 | * Baking soda, soap and water
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**Pre Set-Up:**

* Put on PPE and have baking soda in same vicinity. Ensure lighting is adequate.
* Remove lead-acid batteries from vehicle without causing damage to the battery posts and place on sturdy table or surface. REMOVE VEHICLE GROUND FIRST, POSITIVE AFTER
* Make sure there are no flammables around batteries and area is well ventilated.
* Check battery for cracks or leakage from battery case and post and battery vent is not plugged.
* Be aware of your surroundings and the closest eye wash station and water source.

**Procedure:**

Test the battery: Maintenance Battery 12v

* Remove vent caps from battery; observe electrolyte level in each cell,
* Top up with distilled water if necessary.Make sure battery is at room temperature.
* Use a hydrometer to test the electrolyte level in each cell.
* If at 75% or greater than 1.225 specific gravity in each cell on specified chart, perform a load test to confirm the battery with the carbon pile battery tester.
* If between 50-75%, 1.190 and 1.224 specific gravity, put on slow charge at 5-7 amps for 2 to 8 hours with vent caps off battery while keeping an eye on voltage in battery does not exceed 15.5v as tested with carbon pile.
* If between 25-50% specific gravity in each cell, complete a 3 minute fast charge on battery. If the voltage after 3 minutes is above 15.5V as seen on carbon pile, the battery is likely sulphated and not chargeable.

Test the battery: Maintenance free Battery 12v (Delco eye)

* The eye of the maintenance free battery tells you what state of charge the one cell is in, to give you an idea of the rest of the cells specific gravity.
* If you see a green or yellow dot in the sight glass, assume the specific gravity is above 75% and does not need a charge.
* If you see a black dot, assume the specific gravity is above 25-75% and could use a slow or trickle charge.
* If the sight glass is clear, assume the specific gravity is below 25% and the battery is completely discharged.
* The sight glass colors can change depending on brand and glass only shows one cell so you should not completely depend on eye, you can always do a load test to confirm results.

Load Testing the battery:

* The load test is done with a carbon pile tester
* Place lead post nuts on the battery post for proper connection.
* Place both positive leads (RED) off the tester onto the positive post of the battery.
* Place both negative leads (BLACK) onto the negative side of the battery
* Observe the CCA of the battery and divide it in half (400cca/2=200amp)
* Observe the voltage showing from the battery
* Apply the divided CCA through application dial off load tester for 15 seconds
* If it is a 12v battery, during the test if the voltage from the battery drops below 9.6V, depending on the speed and end voltage, the battery failed. It needs to be charged on slow for 2 to 8 hours or trickle for 24 hrs, It could also be a shorted cell or completely sulphated.
* You can also use the computerized battery tester that will do close to the same functions

Charging the battery:

* Make sure the battery charger is unplugged from its power source
* Apply the positive clamp (RED) to the positive post on battery.
* Apply the negative clamp (BLACK) to the negative post on the battery.
* Turn off all switches on the battery charger
* Apply carbon pile large positive to charger positive and positive post on battery
* Apply carbon pile large negative to charger negative on battery negative to see what voltage is being applied to the battery to make sure it is not over 15.5v
* Plug battery charger back into power source.
* Select proper voltage of battery on charger dial.
* Select desired amperage you want to charge at depending on the results from the battery test
* Let sit for allotted time as per results from test.
* Go back and check on the status of the battery and be observant of temperature of the battery, if it feels really hot, you will have to turn down amperage. Having it hot, it could explode.
* Be aware of any smells of rotten eggs in the area which is the sign hydrogen sulphide which is a very flammable gas that can cause the battery to explode if there are any sparks in the area.

Post Procedure/take Down:

* Turn off the battery charger Dials or buttons. Unplug charger from power source.
* Observe the new voltage on the carbon pile tester.
* Remove the carbon pile clamps NEGATIVE FIRST.
* Remove the battery charger clamps NEGATIVE FIRST.
* Look over battery for abnormalities. Clean battery post for good connections in vehicle.
* Install back into vehicle positive cable first NEGATIVE LAST.

**Summary:**

* Always wear appropriate PPE and keep baking soda and an acid proof apron around you for testing with hydrometer..
* Ensure Battery charger looks in good condition before you use it; power cord, clamps etc.
* Always make sure the battery charger is unplugged and turned off before applying clamps to battery.
* Be sure you are charging the battery at the right voltage to the battery
* Be very aware of your surroundings and smells while you are doing anything with batteries because they can be lethal.
* Consult the supervisor if unsure of how to use.

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