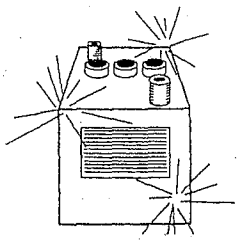
Advance

by Nilfisk-Advance

Battery Care and Maintenance for Advance Equipment.



NEW BATTERY INSTALLATION

1. Always inspect incoming shipments of batteries for damage. Look for and pay particular attention for damage to or wet spots on the shipping cartons, examine those batteries for signs of breakage.
2. If damaged batteries are found secure acknowledgment of the damage from the carrier's representative and file a claim against the transportation company. Contact your supplier for battery replacement.
3. If batteries are received wet and not immediately placed in service, they must be charged at regular intervals as follows:

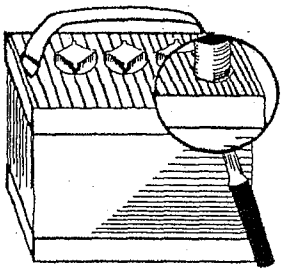
Storage Temperature	Charge
Below 40° F	None required
40° F to 60° F	Every 2 months
60° and above	Once a month

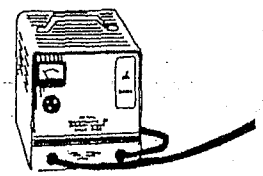
4. Never stack one battery directly on top of another. Post damage and/or container damage can occur from improper stacking. If batteries are stored individually, place supporting boards between layers. Do not stack layers more than three (3) high and rotate stock so that the oldest batteries can be used first.
5. Dry charge batteries should be activated in accordance with instructions of the battery manufacturer.
6. Batteries should be installed in accordance with the machine manufacturer's instructions. Connections should be made tight enabling good contact between connector lugs and battery terminals. Always charge sets of batteries immediately after installation into the machine.

MAINTENANCE-INSPECTION PROCEDURES

1. Water batteries at least once a week.
   a. Add only approved water to the cells. Distilled water is recommended, high mineral content water must not be used. Maximum allowable impurities in percent-iron (.003), chloride (.004), fixed residue (.075).
   b. Remove vent caps and water batteries preferably after charging to prevent overflow of acid due to expansion.
   c. Fill all cells to the proper level. Do not overfill cells. Fill to level indicator or ½ inch over the top of the separators if there is no level indicator. Do not use a hose to water batteries.
   d. Spot check cells between weekly waterings to assure electrolyte is above separators. Excess water usage indicates the presence of any one or all of the following conditions which should be checked.
      1. Overcharging
      2. High temperature operation
      3. Nearing end of service life
   e. Do not allow the electrolyte level to drop below the top of the separators since this will lead to shortened battery life.
2. Clean batteries after weekly watering (or when washing machines.).
   a. Wash the tops of the batteries making sure the vent caps are in place. Do not allow water or other foreign matter to enter the cells
   b. Use a solution of bicarbonate of soda and water to wash batteries if there is an accumulation of acid.
3. Inspect to insure good conditions, which will give better battery service.
   a. When watering batteries inspect battery and other terminal connections for:
      1. Corrosion—If any exists, clean connection and apply a non-metallic grease or protective spray to retard further corrosion.
      2. Loose Connections—Be sure all connections are tight and that good contact is made between terminals.
      3. Broken or Frayed Cables—Be sure all cable connections are good and that no loose or broken wires are exposed. Replace any which look suspicious.
   b. Once a week after the batteries havebeen charged, spot check two (2) or more cells for specific gravity reading. Gravity should be 1.250-1.280. If low readings are noted:
      1. Check charger to insure that proper charge is being returned to the batteries.
      2. Check connections as specified under Inspection 3a.
      3. Check all cells to determine if batteries are near the end of life. This should be done to the same procedure as called for under Section IV covering "Trouble Shooting" of Batteries.
   c. On a regular interval, check machine as outlined in the instruction manual for:
      1. Proper lubrication
      2. Proper operation of electrical system
      3. Proper operation of drive and transmission system
      4. Condition of charge plug and receptacle in machine

   Any of these conditions which are detrimental to machine operation will shorten battery life.





CHARGING PROCEDURE

1. Become familiar with instructions issued with the charger or machine manual.
2. Batteries are to be checked after each day's use as soon as work has been completed.
3. Do not charge batteries if machine was not used that day
4. Do not allow batteries to sit in discharged condition for prolonged periods of time.
5. Always be sure batteries are fully charged each day prior to starting work.

TROUBLE SHOOTING FOR WEAK OR BAD BATTERIES

When a machine fails to operate properly performing less than an acceptable amount of work, the batteries should be examined as follows:

1. Check terminal connections for corrosion, loose connections and broken or frayed cables.
2. If terminal connections appear to be in good condition, check all cells with a hydrometer for variation in specific gravity among cells. A variation of .030 points or more between cells of a battery is cause for suspect. Mark the low cells.
3. Recharge the batteries as recommended by the manufacturer
4. Read all gravities again after recharge. Be sure that batteries are fully charged at gravities of 1.250 to 1.280. If cells vary by .030 points or more it is an indication of possible trouble within that battery.
5. Check the voltage. A fully charged 12 volt battery should have 12.6 volts, and a 6 volt battery should have 6.3 volts, when fully charged.
   a. If the batteries run less than 40 minutes they have either reached the end of life or a defective battery is in the circuit. Battery replacement is then necessary.
   b. If batteries run 40-50 minutes they have lost capacity and may be nearing the end of their useful life.
   c. If batteries run more than 50 minutes, they are in good condition and satisfactory for continued service. Prior to putting the machine back in service it should be checked for the existance of other trouble as outlined in the instruction manual.

BATTERY METER

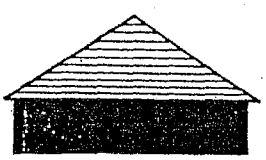
BATTERY REPLACEMENT

Defective Batteries (Premature Failure)

1. Defective battery can be determined by observation of gravity variance after charging (.030 or more points between cells of a battery) or by determining the battery or cell which is defective by use of a voltmeter.
2. Mark the defective battery.
3. Recharge the batteries with the defective battery in the circuit.
4. Remove the defective battery and replace with new battery or battery of comparable age, which is fully charged.

Worn Out Batteries

1. Remove old set of batteries.
2. Clean and recondition battery trays, hold-downs and cables.
3. Inspect new batteries for broken containers and proper electrolyte level before installing in the machine.
4. Install batteries in machine being sure that they are properly held down, firm but not too tight.
5. Replace cables, being sure terminals and connectors are clean and connections are tight.
6. Apply a light coating of non-metallic grease of protective coating.



WINTER STORAGE OF WET BATTERIES

1. Prior to storing machine, batteries should be cleaned, fully charged and properly leveled.
2. While in storage the batteries should be recharged to full charge at time intervals shown below:

Storage Temperature	Charge
Below 40° F	None required

3. Check batteries after machine has been removed from storage and before service begins. Follow inspection and trouble shooting procedures to determine the condition of the batteries.

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