MINER’S CAP LAMP

MAINTENANCE
AND
TROUBLE SHOOTING NOTES

FIRST NATIONAL BATTERY PTY LTD
REG. 66/05564/07

BENONI
Liverpool & Bristol Roads, Benoni South
P.O. Box 5015, Benoni South 1502, South Africa
Phone: +27 11 741-3600
Fax: +27 11421-2642/421-1625
E-mail: marketing@battery.co.za

EAST LONDON
Settlers Way & Edison Road
Gately Township, East London
P.O. Box 182, East London5200, South Africa
Phone: +27 43 731-1111
E-mail: manufacture@battery.co.za

http://www.battery.co.za
LAMP ROOM ROUTINE

1. Before a lamp is issued or taken it should be checked to verify that the lamp is in good working condition.

2. At the end of the working shift faulty lamps must be handed in for repair.

3. Lamps returned at the end of the working shift should be handed in to a lamp room staff member or placed on charge in a clean condition.

4. Lamps used on different shifts should, as far as possible, be segregated into different charging frames and marked accordingly.

5. Cap Lamps, accumulators and loco lights held as spares should be cycled (discharged and recharged) every 3 months.

6. Once per month, lamp room attendant to re-charge lamps after shift, and then place lamp on “Burn Down” test as follows:

   * 4 Ah LED – After burn down of 9hrs, Lux meter reading to be Min 2500 Lux
   * 16 Ah LED – After burn down of 19hrs, Lux meter reading to be Min 3200 Lux

BURN DOWN TEST PROCEDURE

(i) Test must be conducted in a dark room.

(ii) LED light source and light meter must be aligned and be 1 meter apart.

(iii) During the alignment process, check readings on the light meter – best alignment will result in the highest lux reading.

(iv) After this has been achieved, allow specified burn down duration to elapse and check Lux readings.

(v) If Lux values are at specified minimum and above, units are good to be returned to service otherwise needs to be hospitalized.

NOTE:

On taking the lamp the user must strap the accumulator to his waist, clip the headpiece cable to his helmet and need to ensure that the clothing clip is clipped to his back as shown on the wall chart. Do not switch the lamp on until necessary.

UNDER NO CIRCUMSTANCES should the accumulator be carried by the cable.
PREVENTATIVE MAINTENANCE

It is recommended that a quantity of headpieces complete with cables be assembled and kept ready to be fitted to replace lamps which are handed in as faulty. The advantages of this system are:

1. Minimal time is lost in returning the lamps to their charging positions.
2. This method ensures that the replacement headpiece and cable has been completely overhauled and should function as new.
3. The repair staff has sufficient time available to overhaul the faulty headpiece and cable the following day/night shift.
4. The lamp room supervisor should examine a percentage of repaired lamps daily to ensure repairs are being done correctly.
5. Visually inspect all lamps after these have been placed on charge and check for loose or damaged outer covers, damaged headpieces or cables and unsealed headpieces. Also do random checks to ensure that the headpieces have been correctly inserted for correct charging.
6. For good accumulator life and recharge performance, lamp room to lamp room working shifts should not exceed:

   **16 AH ACCUMULATOR ONLY**
   - 12 hours using a 1.0 amp bulb
   - 17 hours using a 0.75 amp bulb

   **BULB LOCO LIGHT ASSEMBLY**
   - 8 Hours using a 1.25 amp bulb
   - 6 Hours using a 1.5 amp bulb

   **FOR LED ACCUMULATORS**
   - 9 Hours using 4 Ah accumulator
   - 38 Hours using 16 Ah accumulator

   **LED LOCO LIGHT ASSEMBLY**
   - 38 Hours using LED

7. It is also important to record all repairs done and the date of these repairs to keep a control on the quality of the repair work, to eliminate the misuse of lamps by the users, and to prevent the loss of certain spares.
HEADPIECE MAINTENANCE

1 = Bulb  
2 = LED

Is Headpiece damaged

YES → Replace

NO

Is the lock pin or locking device operational

YES → Replace headpiece moulding

NO

Worn lock contact

YES → Replace

Worn lock barrel

YES → Replace

Worn lock spring

YES → Replace

Worn/corroded switch connections

YES → Replace

Worn/corroded bulb & switch connections

YES → Replace

Worn/corroded switch blade

YES → Replace

Worn/damaged switch knob

YES → Replace

Corroded bulb holder

YES → Replace

Worn/damaged positive charging contact

YES → Replace or install “O” ring

Is “O’ ring damaged or missing

YES → Replace

NO

Damaged lens ring

YES → Replace

1 & 2

Damaged or worn reflector/LED channel gasket

YES → Replace

NO

1 & 2

Scratched/damaged reflector/LED Optic

YES → For change out of LED – Refer WI-23-62

NO

1 & 2

Chipped or scratched glass lens

YES → Replace

NO

1 & 2

Damaged or worn cap hook

YES → Replace

NO

Damaged or broken lens ring lock pin

YES → Replace

NO

Damaged or broken lock pin insert in headpiece moulding

YES → Replace headpiece moulding
**CABLE MAINTENANCE**

Is the cable gland (headpiece) damaged  
**YES**  
Replace  

**NO**  
Is the cable “O” ring (headpiece) damaged or missing  
**YES**  
Replace / install “O” ring  

**NO**  
Is the cable outer sheath damaged  
**YES**  
Replace  

**NO**  
Is the cable the correct length  
**NO**  
Replace  

**YES**  
Is the cable to SABS 1438 standard  
**NO**  
Replace  

**YES**  
Does the cable test for * continuity  
**NO**  
Replace  

**YES**  
Is clothing clip fitted to cable  
**NO**  
Fit Clothing Clip – Refer wall chart  

**YES**  
Faulty insulation on cable ends  
**YES**  
Replace  

**NO**  
Corroded terminal lugs  
**YES**  
Replace terminal lugs  

**NO**  
Is sleeving fitted over cable ends  
**YES**  
Fit sleeving on all cable ends  

---

**OUTER COVER MAINTENANCE**

Is the cover worn or damaged  
**YES**  
Replace  

Is the cable grommet damaged  
**YES**  
Replace  

Is the cable clamp fitted and in good order  
**NO**  
Replace or fit new clamp  

**NO**  
Is the retaining clip and screw in good order and clean  
**NO**  
Replace  

* Note: test for resistance (ohm) using multimeter
MAJOR CAP-LAMP CHARGER

Service Conditions

The equipment is suitable for operation in ambient temperatures not exceeding 40°C.

A.C. Input

The equipment is designed to operate from a three phase 50 Hz A.C. supply, having a nominal voltage of 380/525 volts. The voltage may vary by a maximum 10% without materially effecting the output of the charger. (220 volt 50hz chargers can be supplied on request).

D.C. Output

The equipment has been designed to recharge 2 cell, 4.0V nominal cap-lamp accumulators.

- Maximum output current - 300 amps at 5.0V nominal;
- C.V.C. voltage - adjustable between 4.95 volts and 5.05 volts
- Lamp capacity - recommended 204 cap-lamps maximum

Maintenance

The charger requires no maintenance apart from occasional cleaning to prevent “tracking” due to a build-up of conductive dirt.

Cabling

The D.C. supply cable from the charger output to the charging frame must not be less than 70mm² and must be firmly bolted at the charger and frame connection points. The lugs would preferably be soldered not crimped.

Charger Protection

- 3 Phase main circuit breaker in the A.C. input.
- Fuse protection in the diode circuit.
- Transient suppression network.

The unit is factory pre-set and should not be tampered with by unauthorised personnel. Incorrect adjustment can damage the charger or accumulators. If the charger is suspect, contact a qualified electrician and notify your nearest First National Battery branch.

Warning

High voltage testers, meggers, etc. should not be used for checking the charger or frame circuitry as this will damage the electronic circuits.
Service Conditions

The equipment is suitable for operation in ambient temperatures not exceeding 40°C.

A.C. Input

The equipment is designed to operate from a single phase 50 Hz A.C. supply, having a nominal voltage of 200-240volts. 380 V 50 Hz chargers can be supplied on request.

D.C. Output

The equipment has been designed to recharge 2 cell, 4.0V nominal cap-lamp accumulators.

Maximum output current - 200 Amp at 5.0V nominal;
Voltage - 4.95 volt ~ 5.05 volt
Lamp capacity - recommended 102 cap-lamps maximum

Maintenance

The charger requires no maintenance apart from occasional cleaning to prevent “tracking” due to a build-up of conductive dirt. Also ensure that the internal fan is in clean working order and needs to be cleaned from dust build up

Cabling

Each unit is factory assembled and all cabling conforms to specifications.

Charger Protection

2 Pole circuit breakers installed at the A.C. voltage supply.
Transient suppression network.
The unit is factory pre-set and should not be tampered with by unauthorised personal.
Incorrect adjustment can damage the charger or accumulators. If the charger is suspect contact SYBO TEC.

Warning

High voltage testers, and meggers etc should not be used for checking the charger or frame circuitry as this will damage the electronic circuits.
# MAINTENANCE FOR WOODEN CHARGING FRAME

| Are shelves and legs clean and sound | NO | Replace where necessary |
| Are protective asbestos boards fitted | NO | Install |
| Are charging keys: | YES |
| Worn | NO | Replace |
| Clean | NO | Clean |
| Tight and aligned | YES | Tighten and Align |
| Are positive clips: | YES |
| Clean | NO | Clean |
| Tight | NO | Tighten |
| Tension OK | NO | Replace |
| Are charging springs: | YES |
| Tight | NO | Tighten |
| Stretched | YES | Replace |
| Correctly soldered | NO | Resolder or replace |
| Hooked together | YES | Solder or replace |
| Are pushbuttons clean and operating | NO | Clean or Replace |
| Yes | YES |
| Is master meter working | NO | Replace |
| Yes | YES |
| Is charger voltage: | YES |
| Above 5.05 volts | YES | Call qualified electrician or FNB Rep |
| Below 4.95 volts | YES | Call qualified electrician or FNB Rep |
| Between 4.95 and 5.05 volts | YES | Call qualified electrician or FNB Rep |
| Is charger min. output 250 amps at 5.0V | NO | Call qualified electrician or FNB Rep |
| Yes | YES |
| Are D.C. cables from charger: | NO |
| At least 70mm² | NO | Fit correct cable min 70mm² |
| Tight and clean | NO | Tighten and clean |
| Are riser bar cables clean and tight | NO | Tighten and clean |
| Yes | YES |
| Are all bus bars clean and tight | NO | Tighten and clean |
LOCOLIGHT: MAINTENANCE

1 = Flat Top Assembly
2 = Canopy Top Assembly
3 = FNB Loco light Assembly

1. Are the any of the casings damaged
   - YES: Replace
   - NO

2. Are the securing cap screws missing
   - YES: Replace
   - NO

3. Is the lens scratched or damaged
   - YES: Replace
   - NO

4. Is the reflector / LED optic / Aux LED / bulb holder scratched or damaged
   - YES: Replace
   - NO: For change out of LED Optic – refer WI-23-61

5. Is the reflector housing & Lock Ring loose / damaged
   - YES: Tighten / Replace
   - NO

6. Is reflector housing gasket damaged
   - YES: Replace
   - NO

7. Is lens gasket damaged
   - YES: Replace
   - NO

8. Is charge contact assembly blocked / damaged
   - YES: Replace charge contact harness sub-assembly
   - NO

9. Is the lock bracket screw loose or missing
   - YES: Tighten / Replace
   - NO

10. Is the locking bracket damaged
    - YES: Replace
    - NO

11. Is the toggle switch operational
    - NO: Replace
    - YES

12. Is the battery spacer missing
    - YES: Replace
    - NO
LOCOLIGHT HOSPITALISATION PROCEDURE

1. Are the Accumulators physically damaged
   - Yes: Hold for FNB recycling
   - No: Are poly switches Ok / correct – Refer note 1 + 2 (accumulator hospitalisation chart)

2. Yes: Hold for FNB recycling
   - No: Are one or more cells faulty

3. Yes: Replace faulty accumulator
   - No: Are wiring connections loose / damaged

4. Yes: Secure / Replace
   - No: Assemble Loco light and charge at 5 volt for 24 hours

5. Discharge at 1A amp for 11 hours for bulb assembly
   - Final voltage below 3.4V: Retain accumulators for assessment by First National Battery if within warranty period
   - Final voltage above 3.4V: If out of warranty period
   - Final voltage above 3.6V: Repeat steps 5, 6 and 7

6. Discharge LED assembly for 28 hours
   - Is voltage below 3.6V: Repeat steps 5, 6 and 7
   - Is voltage above 3.6V: Return to service

7. Is voltage above 3.6 volts
   - Yes: Return to service

8. Is voltage above 3.6 volts
   - Yes: Return to service

9. Is voltage above 3.6 volts
   - Yes: Return to service
ACCUMULATOR HOSPITALISATION PROCEDURE

1. Is accumulator physically damaged
   - YES: Hold for FNB recycling
   - NO: Proceed with steps 2 and 3

2. Is polyswitch OK/correct
   - YES: Replace polyswitch
   - NO: Discard polyswitch

3. Connect a good headpiece to the Accumulator
   - See Note 3

4. Charge at 5.0V for 24 hours (Same for 4 & 16Ah)

5. Discharge at 1.0 amp for 11 hours
   - Discharge 4Ah using LED for 7hrs
   - Discharge 16Ah using LED for 28 hrs

6. Final voltage
   - Below 3.4V: Repeat steps 4, 5, 6
   - Above 3.4V: Retain accumulator for assessment by First National Battery if within warranty period
   - Above 3.6V: If out of warranty period

7. Voltage above 3.6V
   - Return to service

8. Voltage below 3.6V
   - Voltage above 3.6V

Notes:
1. Polyswitch – check that the terminals are tight. Measure each cell:
   - Pos Cell: 2.03V
   - Neg Cell: 2.01V
   - Total: 4.04V
   Measure overall accumulator voltage – must be 4.04V. If not, discard polyswitch.
2. 0.4 mA for 4Ah; 0.25 mA for 16Ah.
3. When accumulators are being hospitalised the leads must be firmly screwed down with terminal lugs. DO NOT USE charging clips. Remove polyswitch and use bridge cable.
MAINTENANCE FOR STAINLESS STEEL
CHARGING FRAME

Is the frame securely fastened down

NO → Bolt down securely

Are charging keys:

NO → Replace

YES → Clean

NO → Tighten and Align

YES → Clean

NO → Tighten

YES → Replace

Are positive clips:

NO → Clean

YES → Tighten

NO → Replace

YES → Tension OK

Check for operation of charging positions without cap-lamp on charge

Red L.E.D. – Note 1

Off → On

YES → Place cap-lamp – Note 2 on charging position

NO → Replace P.C.B.

Green L.E.D.

Off → On

YES → Switch on cap-lamp.

Green L.E.D.

On → Off

YES → Replace P.C.B.

Charging position OK

Note 1 – Should the RED L.E.D. indicate ON when the cap-lamp is placed on charge – the lamp/accumulator is faulty – check accumulator and headpiece for polarity and for short circuits.

Note 2 – To test the charging positions ensure that a fully charged accumulator is used. The cap-lamp must be in good working condition.

Note 3 – On a regular basis check the charger D.C. output voltage and charging position voltages, which must read between 4.95 and 5.05 volts. Should, at any charging position, the L.E.D.’s flicker or charging positions read low voltages the P.C.B. must be checked for loose connections – call your First National Battery representative.