Tutorial

Super*Master*Charger

Battery Charger-Analyzer

Preliminary – V0.9

Receiving – Inspection

1. Unpacking the unit
    1. Caution! Heavy equipment.
    2. Verify that the following are in the package:
        - Charger-Analyzer
        - Accessory Kit containing:
            - Battery Cable
            - Temp-Plate
            - Single Cell Adaptor
            - Spare Parts
        - Operator Manual, Commands Sheet, and various certificates
    3. Inspect the equipment
    4. Save the carton – It will be needed if the equipment has to be sent out for calibration/repair.

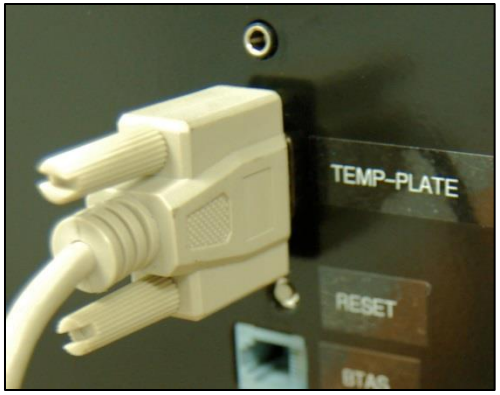
Installation

1. Place the Charger-Analyzer on a suitably strong bench
    1. Caution! Heavy equipment (175 lb. – 79.3 Kg)
    2. Connect to a dedicated (not shared) outlet with 208V/230V/240V with 30A capability (with motor load rated circuit breaker)
        1. In the US, use a NEMA-630R receptacle

        2. Very that the unit is wired for the proper line (mains) voltage

Installation (continued)

3. Connect the Battery Cable to the Front Panel and connect the Temp-Plate sensing cable
4. Connect the Temp-Plate sensing cable extension to the Temp-Plate
   - Note that there are two DB9 cables in the Temp-Plate. Connect to either one (the other one is used by the BTAS-16)
5. Connect the extension Cable to the Rear Panel Connector



Installation (continued)

6. Turn Power ON
7. Observe the following:
   - Meters and Timer indicators are ON
   - Ammeter reads zero and Voltmeter reads about 0.2V
   - Status indicators show RESET (green)

Operating Introduction

1. Tutorial for the operation of the SMC Battery Charger-Analyzer
2. Refer to the Operator's Manual for complete details on the operation of the instrument
   - Section 5 – Controls and Displays
   - Section 6 – Modes of Operation
   - Section 7 – Keypad Functions
   - Command Instructions (separate sheet)

Warnings *(general)*

1. This tutorial is intended for professional personnel experienced in the testing of aircraft batteries
2. Refer to the Operator's Manual for complete details on the operation of the instrument
3. Information provided on battery testing is solely as an operational reference - Refer to the manufacturer's battery manual and/or CMM for battery specific information

Warnings *(specific)*

1. Observe precautions when handling batteries
    1. Batteries are heavy
    2. Batteries will generate extremely high currents if shorted
        - Tools can easily be dropped shorting several cells
2. Follow battery test procedures as outlined in the CMMs and OMMs provided by the manufacturers.
3. The Operator is ultimately responsible for the correct and proper analysis of the batteries under test.

Basic Information

1. The SMC Battery Charger-Analyzer operates based on programmed battery test profiles
2. A battery test profile is based on the following parameters:
   - Test Mode (type of test)
   - Time Duration (s)
   - Current (s)
   - Voltage (s)
3. Consult the CMMs for battery specific test parameters

Keypad Functions

1. Numeric Keys
   - 0 through 9 for the entry of parameters
2. Other Keys
   - VIEW
     - For the review of programmed information
   - FUNCTION
     - For special operations such as different Timer Speed and other (see the Commands sheet)
     - Note: FUNCTIONS revert to default values when power is turned off
   - MODE
     - Battery Test Mode
   - BATTERY
     - For stored Battery Test Profiles
   - OPTION
     - Special operational selections as number of batteries and other (see the Commands sheet)
     - Note: OPTIONS are maintained in non volatile memory (selections remain after power is turned off)

Keypad Functions (continued)

Other Keys (continued)

- CLEAR
  - Clears the screen and incomplete entries (does not clear previously entered information – if in doubt, reprogram)
  - Clears a FAULT condition (error message and alarm)
- TIME
  - Time duration(s) for the selected test
- CURRENT
  - Charge or discharge current(s) as required for the test being performed
- VOLTAGE
  - Voltage limit(s) as required for the test being performed
- PARAMETER
  - Special test parameter such as RESISTANCE

Keypad Functions (continued)

Other Keys (continued)

- RUN
  - Starts a TEST and Re-Starts a TEST if it has been stopped
- STOP
  - Stops a TEST (puts the operation on hold)
  - Can be re-started by pressing RUN
- RESET
  - Resets all variables after the end of a TEST
  - Applicable only if a TEST has been stopped (on hold) or has ended
  - A TEST that has been RESET can be re-started (Test Parameters remain programmed)
- ENTER
  - Completes an entry

Keypad Notes

1. Press CLEAR before a new entry
   - Note: CLEAR solely clears the screen and not previously made entries
2. Press ENTER to complete each entry
3. Press VIEW to verify what has been entered
4. Re-program as needed

Programming the Test Mode

1. Press MODE

```
T0  M0  00:00:00  N0


Test Mode #:__
```

2. Enter the MODE required for the test (consult the Commands Sheet)

```
T0  M0  00:00:00  N0


Test Mode #:10
```

- Press ENTER after entering the MODE number
- Verify that the screen shows the selected MODE
  - Press VIEW then press MODE

```
T0  M10 00:00:00  N0
```

Charge Test Modes

1. 10 - Single Rate Charge
   - Constant Current Charge with optional Stop at an Overvoltage
2. 11 - Single rate Charge with stop on Peak Voltage
   - Constant Current Charge with stop at a peak battery voltage
3. 12 - Constant Voltage Charge
   - Constant Current Charge until the battery reaches the programmed voltage. The current is thereafter automatically adjusted (lowered) to maintain the programmed voltage.
4. 20 - Dual Rate Charge
   - Main Charge followed by Topping Charge with optional Stop at an Overvoltage
5. 21 - Dual Rate Charge with transfer at Peak Voltage
   - Main Charge will transfer to Topping at the programmed voltage

Discharge Test Modes

1. 30 – Discharge
   - Constant Current Discharge (no voltage limit)
2. 31 - Capacity Test
   - Constant Current Discharge with stop (Capacity Failure) at below the test voltage.
3. 32 – Constant Resistance Discharge Capacity Test
   - Constant Resistance Discharge (resistor load simulation) with stop (Capacity Failure) at below the test voltage

Programming TIME

1. Press TIME (in mode 20 and 21 enter TIME 1 and TIME 2)

```
T0  M10 00:00:00  N0


Time: __:__
```

2. Enter up to four digits
   - The format is HH:MM (hours and minutes)

```
T0  M10 00:00:00  N0


Time: 01:00
```

     - The example shows 1 hour and 0 minutes

Programming CURRENT

1. Press CURRENT (in mode 20 and 21 enter CURRENT 1 and CURRENT 2)

```
T0  M10 00:00:00  N0


Current: __._
```

2. Enter up to three digits
   - The format is XX.X Amps

```
T0  M10 00:00:00  N0


Current: 10.0
```

   - The example shows 10.0 Amps

Programming VOLTAGE

1. Press VOLTAGE (in mode 20 and 21 enter VOLTAGE 1 and VOLTAGE 2)

```
T0  M10 00:00:00  N0


Voltage: __.__
```

2. Enter up to four digits
   - The format is XX.XX Volts

```
T0  M10 00:00:00  N0


Voltage: 34.00
```

   - The example shows 34.00 Volts

Programming VOLTAGE (continued)

1. For MODE 10, VOLTAGE is Overvoltage, the voltage at which the battery is above the maximum charge voltage
2. For MODE 11, VOLTAGE is the Peak Voltage at which the charge will stop
3. For MODE 12, VOLTAGE is the Float Voltage
4. For MODE 20, VOLTAGE 1 is Overvoltage, the voltage at which the battery is above the maximum charge voltage
5. For MODE 21, VOLTAGE 1 is the Peak Voltage at which the charge will transfer from Main to Topping
6. For MODE 20 and 21, VOLTAGE 2 is Overvoltage, the voltage at which the battery is above the maximum charge voltage

Programming the Number of Batteries (continued)

1. Optional, normally set to automatic
   - Press OPTION

```
TO  M10 00:00:00  NO


Option: __
```

   - Press 2 followed by ENTER

```
TO  M10 00:00:00  NO

Auto nBA: 1=ON 0=OFF
OPTION VALUE: __
```

   - Press 1 for Automatic or 0 for Manual

Programming the Number of Batteries (continued)

1. If set to Manual:
2. Select OPTION 3 (One battery)
   - Press OPTION

```
TO  M10 00:00:00  NO


Option: __
```

   - Press 3 followed by ENTER

```
TO  M10 00:00:00  NO

Number of Batteries
OPTION VALUE: __
```

   - Press 1

```
TO  M10 00:00:00  NO

Number of Batteries
N VALUE: 1
```

Programming the Number of Batteries (continued)

- Press ENTER
  - Verify that the number changed from N0 to N1 (upper right hand corner of the screen)
- Verify that the available AC voltage is displayed

```
T0  M10 00:00:00  N1

Checking AC Voltage
N VALUE: 1
```

```
T0  M10 00:00:00  N1

Checking AC Voltage
Charge Voltage=36V
```

  - Note: the Charge Voltage displayed is dependent on the line (mains) voltage. The nominal is 36V

Verifying Programmed Parameters

1. Press VIEW then press MODE

```
T0  M0  00:00:00  N1

Test Mode – 10
T=01:00
```

- After three seconds:

```
T0  M0  00:00:00  N1

C=10.0
V=34.00
```

  - This shows that the Test Mode is 10, the Time is 1:00, the Current is 10.0A and the Voltage is 34.00V

Saving the Programmed Battery Test Profile

1. Press Battery

```
T0  M10 00:00:00  N1

BATTERY: 1=View
2=Load   3=Store
```

2. Press 3 to select storing the information

```
T0  M10 00:00:00  N1

BATTERY - 3=Store
BATTERY #: __
```

3. Enter 1 to save it as Battery #1
   - This battery test profile is now saved as Battery #1
   - Note: this information will remain even if the power is turned off (stored in the non-volatile memory of the processor)
   - Note: available Battery Numbers are 1 to 99

Viewing Programmed Battery Test Profiles

1. Press Battery

```
T0  M10 00:00:00  N1

BATTERY: 1=View
2=Load   3=Store
```

2. Press 1 to view stored profiles

```
T0  M10 00:00:00  N1

BATTERY - 1=View
BATTERY #: __
```

3. Enter 1 to view what is stored as Battery #1
   - The program will show the same information as displayed with VIEW MODE
   - If there is nothing programmed, the processor returns NOT PROGRAMMED

Viewing a Programmed Battery Test Profile

1. Press Battery

```
T0  M10 00:00:00  N1

BATTERY: 1=View
2=Load   3=Store
```

2. Press 1 to view a profile

```
T0  M10 00:00:00  N1

BATTERY - 2=Load
BATTERY #: __
```

3. Enter the Battery #
   - The processor shows the parameters stored
   - If there is nothing programmed, the processor returns NOT PROGRAMMED

Loading a Programmed Battery Test Profile

1. Press Battery

```
T0  M10 00:00:00  N1

BATTERY: 1=View
2=Load   3=Store
```

2. Press 2 to load a profile

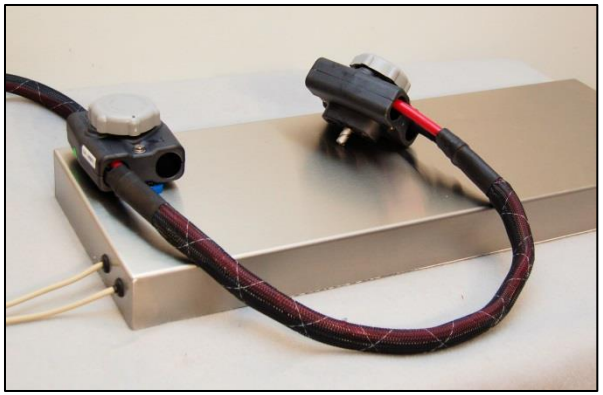
```
T0  M10 00:00:00  N1

BATTERY - 2=Load
BATTERY #: __
```

3. Enter the Battery #
   - Select VIEW MODE to verify the profile that has been loaded
   - If there is nothing programmed, the processor returns NOT PROGRAMMED

Running a Battery Test Profile

1. Press VIEW MODE to verify the Test Parameters
2. Connect the Battery Cable to the Battery(ies)
    1. If working on one battery, connect one plug to the battery and the other one to the shorting receptacle on the Temp-plate.



    2. Verify that the Battery Voltage is displayed in the Voltmeter

Running a Battery Test Profile (continued)

3. Press RUN to start and observe the following:
    1. The Green Status indicator will indicate the type of test
    2. The Colon in the Timer will flash once per second and the elapsed time will be shown
        - Note that the elapsed time can also be seen at the LCD screen
    3. The Current will ramp up over several seconds and will settle on the programmed value
    4. The test will end when the time is completed
        - If a fault is detected, the test will stop and the LCD screen will show the reason for the fault. See also the Status Indicators
    5. The test can be stopped at any time by pressing STOP
        - The test can be either re-started by pressing RUN or terminated by pressing RESET

Running a Battery Test Profile (continued)

4. Warnings
    1. Do not disconnect the battery while a test is running
    2. Operate in a well ventilated location

Error Messages

1. Error messages are generated whenever the processor determines that the battery has failed a test or that there are internal operational discrepancies.
2. A steady beep is associated with all error messages and a steady display of the associated status indicator.
3. Details on the error messages can be seen at the LCD screen.
4. See section 14.1 in the Manual for details

Error Messages (continued)

5. With some type of error conditions, it is possible to re-start operation without losing the accumulated time.
    1. Press CLEAR
        - The alarm will turn-off
    2. Correct the error (no connection, wrong value programmed, etc.)
    3. Press RUN to resume operation
    4. Verify that all is now normal

Revisions

V0.8 – 8 September 2016 – Preliminary Release