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1. System Overview

1.1 Description

1.1.1. Introduction:

The BTAS16 is a system designed to automate the measurement and analysis of battery parameters as encountered in the process of the testing and certification of aircraft Nickel-Cadmium batteries. *Note: Applicable also to Lead-Acid batteries.*

Proper servicing of Nickel-Cadmium aircraft batteries requires that each of the cells be monitored throughout the charge and discharge cycles, not just the battery terminal voltage. Due to the large number of cells, typically 20, this becomes a laborious and error prone task, so much that it is currently reduced to a practical minimum of readings.

Although this minimum of test data marginally satisfies certification requirements, it does not provide the time detailed information needed to determine the "true" condition of the cells. Lack of continuous cell voltage measurements prevents a better assessment of the condition of the battery and also prevents a better prediction of the future performance of the battery.

The continuous measurements provided by the BTAS16 make it possible to determine, well in advance, the condition of the battery thus providing opportunities to save testing time.

Measurements are not limited to cell voltages. The system measures also the temperature of the battery as well as the charge/discharge current, thus providing a more complete picture of the test being performed.

Cell readings also become more accurate because they are all performed at the same time, and are conveniently stored with a time stamp, which provides an accurate voltage vs. time performance indication.

In addition, the system provides limited monitoring and control of specially modified Charger-Analyzers such as the Superseder IIIC and MasterCharger LXC, and full monitoring and control of new Intelligent Charger-Analyzers SupersederXG, SuperMasterCharger, 24-400xg, miniCharger and miniMasterCharger.

1.1.2. System Components:

The BTAS System is comprised of a number of Battery Data Acquisition Terminals (one to 16), known as C-Scan, connected to a computer that receives and processes the information.

There are two types of accessories used to read the individual cell voltages, Cables with Clips suitable for any battery and custom Crowns for specific types of batteries.

A Test Box, known as the Cell Simulator, is also part of the system and it is used to test all functions and verify the performance of the system.

In addition to battery measurement, the BTAS16 also provides monitoring and control of Battery Charger-Analyzers.

An optional Barcode scanner is also part of the system and it is used to simplify the task of tracking batteries.

1.1.3. Screen views:

User-friendly screens provide the environment to select the terminals in operation and to program the tests to be performed. Once started, the computer collects data from all terminals and displays the information in graphical and numerical format. Colors in the bar graphs are used to indicate the relative state of the batteries and of individual cells.

1.1.4. Reports:

Once tests are completed (or terminated), screen and printed reports are available showing the information accumulated, and providing an end-of-cycle summary analysis. Note that this information is also available as the data is being collected.

1.1.4.1. Types of Reports:

- Battery Data
- Cell Data (if applicable to the type of battery)
- Test Summary
- Work Order Log
- Work Order Summary
- Work Order List
- Search for a Battery

1.1.5. Graphs

During the tests or once tests are completed (or terminated), screen and printed graphs are available showing the information accumulated, and providing an end-of-cycle summary analysis.

1.1.5.1. Types of Graphs:

- Battery Voltage
- Battery Current
- Battery Temperature
- Cell Voltages (if applicable to the type of battery)

1.1.6. Data archive:

All information is tracked and archived using work orders as the primary record and battery serial number and barcode as identifiers. Data from new tests can be compared to the previous test to establish battery performance benchmarking.

1.1.7. Databases:

Databases for Customer Batteries and Customers are used to fill in work orders.

1.1.8. Charger-Analyzer Monitoring and Control:

- The system can also provide full monitoring and control of new Intelligent Charger-Analyzers such as SupersederXG, SuperMasterCharger, 24-400xg, miniCharger and miniMasterCharger.
- The system can also provide limited monitoring and control of specially modified Charger-Analyzers such as the Superseder IIIC and the MasterCharger LXC
- Special modifications to the above mentioned instruments allow the C-Scan to determine if a Charger-Analyzer is connected, if the power is on, which type of charger it is and can start/stop its operation synchronizing the data recording with the operation of The Charger-Analyzer.

1.2 Specifications

1.2.1. Number of C-Scan Terminals: 16 max

1.2.2. Number of Charger-Analyzers: 16 max

1.2.3. Number of cells per C-Scan: 24 max

1.2.4. Number of C-Scans per Charger: 1 or 2 (battery type dependent)

1.2.5. Number of batteries per C-Scan: One battery of up to 22 cells, two batteries of up to 11 cells and 3 batteries of up to 7 cells.

1.2.6. Cell Voltage: 2V max

1.2.7. Battery Voltage: 40V max

1.2.8. Battery Current: 100A max for Charger-Analyzers for Mainship Batteries and 2A/10A for Charger-Analyzers for small battery packs.

Current is measured via the internal shunt on Intelligent Chargers and specially modified chargers or via an external accessory shunt cable for other types of Charger-Analyzers.

Other currents available are 20A, 10A and 2A

1.2.9. Battery Temperature (4 sensors via the Temperature Plate or Temperature Cable for battery packs)

1.3 Customer supplied items:

1.3.1. Computer: PC with Pentium Dual Core or i5, 2.5GHz clock speed

1.3.2. Operating System: Windows XP Professional or Windows 7

1.3.3. Memory: 2G for Windows XP and 3G for Windows 7

1.3.4. Monitor: 19” minimum, 24” recommended

1.3.5. Screen Resolution: as required to fit the screen in the monitor.

1.3.6. Hard Drive: 20G minimum

1.3.7. R/W CDROM Drive

1.3.8. Audio Speakers

1.3.9. Bar Code Scanner (optional)

1.3.10. Printer: Standard Color Inkjet (recommended) or monochrome Laser

1.3.11. Power Back-up for the Computer: 500VA minimum, 1000VA recommended

1.3.12. Power Back-up for the C-Scan Terminals: 300VA minimum

1.4 Operating Overview

1.4.1. Operating Summary

The BTAS16 main function is to collect data from each of the terminals (C-Scan) connected to the computer and to store the information in data tables.

The acquisition of data is the function of the Data Terminal (C-Scan) which measures and converts all parameters concerning the battery(ies) under test.

Once the data is collected and stored, it can then be retrieved for review in screen views and for reporting through the printer.

All data is organized primarily under Work Orders (one per battery type and serial number). It is therefore necessary to enter a Work Order before any testing can be performed. [See 5.1]

In addition to Work Orders, Customers [See 4.2] and Customer Batteries must be entered in the database. [See 4.4]

Batteries must also be identified in the database. The Standard Battery Database contains information on most of the batteries currently in use. For any batteries not listed in the Standard Battery Database there is a Custom Battery Database where information on other batteries can be stored. [See 4.1]

The Operator programming a particular work order can also be identified with the Work Order. See [4.3]

Once the Work Order and other basic information is available in the System, the Work Order(s) can now be associated with a Data Terminal Station. [See 6.3]

The Data Terminal must now be associated with a Charger Station Number. [See 6.5.4]

If the Charger-Analyzers are interfaceable with the C-Scan, the Link check mark can be set. See [7.1.3].

The color of the box surrounding the check mark will determine the status of the Charger-Analyzer. See [7.1.2]

The Test to be performed must be selected from the pull down menu.

If all preliminary information is set and the Data Terminal is Active, the Record check mark area will be green indicating that the test can be started. See [6.7]

Once the recording of data has started, the E-Time box will display the elapsed time and the Status box will display the number of records taken and the total number of recordings expected for the specific test.

The recording can be Stopped (and Resumed) by unchecking and rechecking the Rec box.

The recording will also stop automatically at the end of the test duration (as determined by the test selected) or will stop at any time if the Charger-Analyzer operation is interrupted (no current detected).

Voltage, Current and Temperature readings can be seen in numerical format in the right hand area or in bar graph format in the bottom area.

Data from any current or past test can be viewed and printed in numerical format (reports) or in bar-graph format (graphs).

When viewing bar-graph data, two tests can be displayed for comparison, such as first and last capacity test, or current capacity test compared to a prior capacity test, or battery voltage vs. charger current, etc.

Colors in all bar-graphs reflect good-marginal-fail conditions of battery or cell voltages.

Note: Do not run any other programs simultaneously with the BTAS-16 as this may result in severe performance degradation, (speed and data integrity).

1.4.2. Opening Screen

The opening screen provides the greeting and the Program Version

1.4.3. Comm Ports Screen

The Com Ports Screen is used initially to synchronize the two USB Data and Control connections. For more details, see [3.2.2]

The DEMO MODE allows to start the program without the need for USB connections, useful for testing and demonstration.

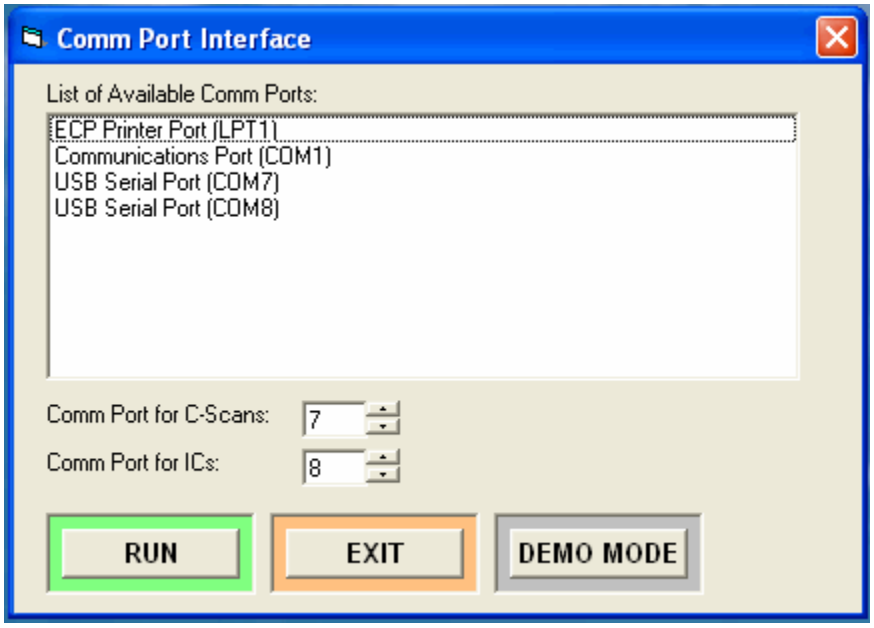


Figure 1 – Comm Ports Screen

1.4.4. There are three principal sections in the Main Screen – [See Figure 2]:

1.4.4.1. DATA TERMINAL STATUS

- Data Terminal / Charger Status
- This is the area where tests and operating details of each of the 16 possible Data Terminals and Chargers can be monitored and controlled

1.4.4.2. REAL TIME DATA

- Real time numerical data for the selected Data Terminal
- This is the data that originates in the Data Terminals as it is received by the program with each one of the scans.
- The Print Data Snapshot Button prints the information being displayed.

1.4.4.3. GRAPHICAL DATA

- Graphical data for the selected Data Terminal
- This bar-graph display provides information as it is received and stored by the program.
- Cell Voltages is the bar graph voltmeter display of the numerical data seen on the right hand side. This is real time data. All others are cumulative (voltage, current and temperature vs. time) type of bar-graph displays.
- The Print Graph Button prints the graph currently being displayed

1.4.5. Main Screen displays and controls

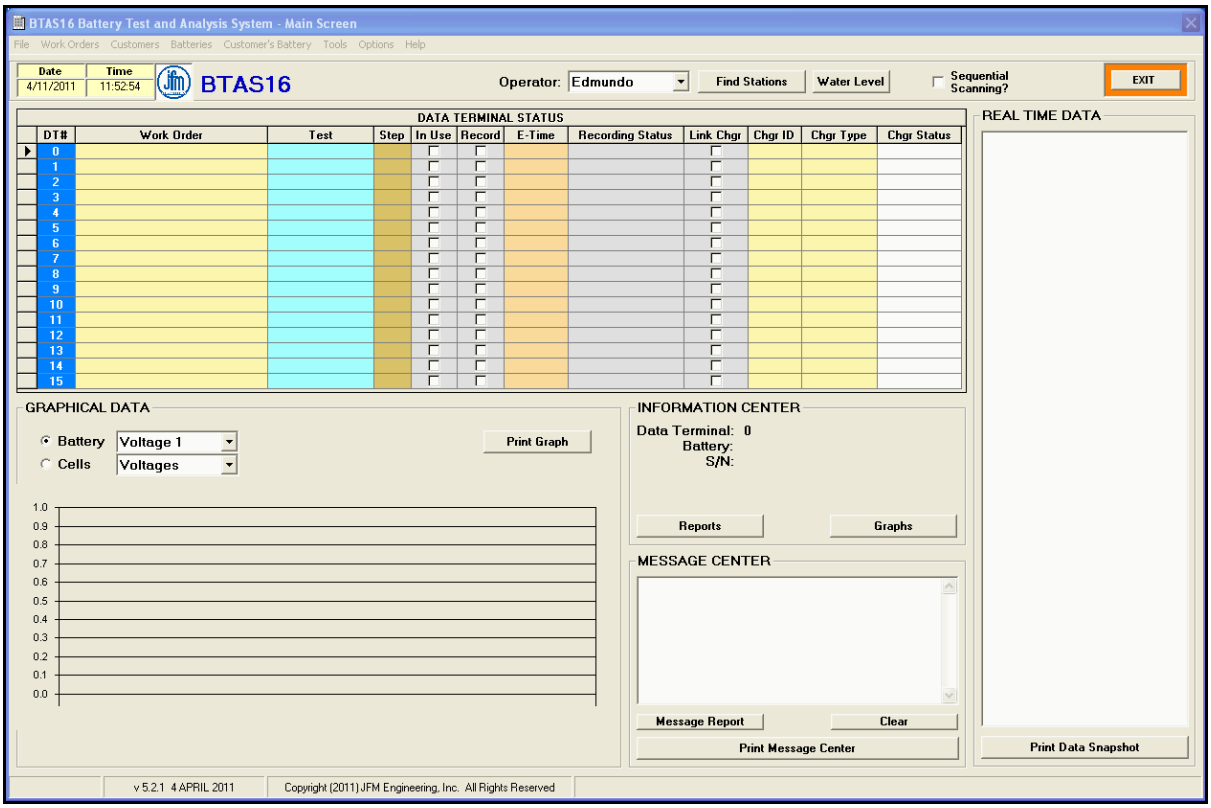


Figure 2 - Main Screen

1.4.6. Other sections are:

1.4.6.1. Pull down menus (from the toolbar at the top of the screen)

1.4.6.1.1. File

- Comm Port Operations (USB port assignment for data and control)
- Database Operations (backup and restore the database)

1.4.6.1.2. Work Orders

- New Work Order
- View/Edit/Delete Work Orders

1.4.6.1.3. Customers

- Enter/Edit/Delete Customers

1.4.6.1.4. Batteries

- View Standard Batteries List
- Add/Edit/Delete Custom Batteries

1.4.6.1.5. Customer Batteries

- Find Customer Battery
- New Customer Battery

1.4.6.1.6. Tools

- Change Custom Times (Custom Charge and Discharge Time Durations)
- Edit Technicians (Enter/edit/delete name of technicians that will operate the BTAS16)
- Fast Readings (Accelerated recording of readings for test and demonstration purposes)
- Debug Mode (additional data shown in the right hand side window)

1.4.6.1.7. Options

- Select printer for graphs and reports

1.4.6.1.8. Help

- Program Version
- Bar graph color definitions

1.4.6.2. Operator

- List of available technician names to display as current operator

1.4.6.3. Find Stations

- To find which Data Terminals are connected and available

1.4.6.4. Water level

- Sub screen to enter and record water dispensed into each of the cells (it becomes part of the Summary Report).

1.4.6.5. INFORMATION CENTER

1.4.6.5.1. Data Terminal Information

- Data Terminal #
- Battery Model
- Battery Serial Number

1.4.6.5.2. Reports

- Sub screen to view and print numerical reports

1.4.6.5.3. Graphs

- Sub screen to view and print graphs

1.4.6.5.4. MESSAGE CENTER

- Window to display error messages and a charger status messages
- Test termination due to completion of expected number of samples.
- Test termination due to Charger-Analyzer termination (no current detected)
- System error messages
- Message Report shows the details of Windows error messages
- Clear, clears the information in the window

2. Condensed Operating Procedure

2.1 Introduction

Simplified Instructions for the operation of the BTAS software

Numbers in parenthesis ( ) refer to sections in the Instruction Manual

2.2 Operational Steps

2.2.1. Enter basic information

Note: The BTAS16 requires that specific data be available in the database before a Work Order can be entered and processed.

2.2.1.1. Users Table (4.3)

Enter the names of technicians that will use the system

2.2.1.2. Battery Table (4.1)

Check the batteries listed in the Standard Battery Table.
If the required battery is not listed, enter the required battery in the Custom Battery Table.

At this time, only the Battery Manufacturer Name and the Battery Model # are required (i.e. SAFT 4078).

2.2.1.3. Customers Table (4.2)

Enter the names of customers that are/will be serviced. If your organization does not perform battery test for others, enter the name of your organization.

2.2.1.4. Customer Battery Table (4.4)

Enter the serial numbers of batteries belonging to customers (or to tour organization).

2.2.1.5. Create Work Orders (5.1)

Create a Work Order for a battery that is listed in the Customer Battery Table

2.2.1.6. Apply the Work Order (6.5)

Apply the Work Order to the Data Terminal (C-Scan DT#) where the battery is connected (Pull down menu).

2.2.1.7. Select the Test (6.6.2)

Select the test to be performed (Pull down menu). The program will fill-in the Step # once the test has started.

2.2.1.8. Click “In Use” (6.7.1)

If not already selected, click “In Use”. The area around the check box will turn greens indicating that the program is communicating with the Data Terminal.

2.2.2. Set the Charger-Analyzer

2.2.2.1. Select the Charger-Analyzer (7.2.4)

From the Pull-down, select the Charger-Analyzer Station Number:

2.2.2.1.1. Intelligent Charger-Analyzer (ICA)

For an Intelligent Charger-Analyzer (SupersederXG, SuperMasterCharger, etc.) enter the terminal number in the upper left hand corner of the LCD window (T1, T2, etc.)

2.2.2.1.2. Controllable Charger-Analyzer (CCA)

For a Controllable Charger-Analyzer (Superseder IIIC, MasterCharger C, etc.) select a unique station number (different from any other). Note that current is monitored through an internal shunt connected to the C-Scan and that control is through a cable between the C-Scan and the Charger-Analyzer.

2.2.2.1.3. Other Charger-Analyzer

For any other Charger-Analyzer select a unique station number (different from any other). Note that the BTAS must be able to see current as provided by an external shunt connected to the C-Scan.

2.2.2.2. Program the Charger-Analyzer

Setup the Charger-Analyzer for the test to be performed (see the Charger-Analyzer instruction manual).

2.2.2.3. Link the Charger-Analyzer (6.7.3)

Click on Link (check) to allow the program to control (Start-stop) the Charger-Analyzer in synchronization with the starting/stopping of recording. The box will turn yellow to indicate that the Charger-Analyzer is ready to be linked. Note that this is applicable only for ICAs and CCAs.

2.2.3. Run the Test

2.2.3.1. Start the Test and Charger-Analyzer (6.7.4)

Prior to starting a new test verify that the data displayed in the Readings Window is consistent.

Click on Record to start the recording of battery data (check).

If the Charger-Analyzer is not linked, then it must be started prior to the start of the recording.

Note that the program must detect current (charge or discharge) to process the recording.

The program will stop and generate an error message if current is not detected.

2.2.3.2. Stop the Test and Charger-Analyzer (6.7.4)

Click off Record to stop the recording of battery data.

If linked, it will stop the Charger-Analyzer.

If the Charger-Analyzer is not linked, then it must be stopped manually.

2.2.3.3. Message Center (1.4.6.5.4)

The system will report through the Message Center the reasons for stopping the recording.

2.2.4. View information as it develops

2.2.4.1. Numerical

View numerical data on the selected channel (DT#) for cell voltages, battery voltage, current, etc. (right hand screen)

2.2.4.2. Bar Graph

View graphical data on the selected channel (DT#) cell voltages, battery voltage, current, etc. (bottom screen)

2.2.5. Review the information after the test

2.2.5.1. Reports (1.4.6.5.2)

Click on Reports and select the Work Order and Test Step

View and print the results

2.2.5.2. Graphs (1.4.6.5.3)

Click on Graphs and select the Work Order and Test Step

View and print the results

3. Initial Setup

See [12.5] for typical installation pictures

3.1 Connections

3.1.1. Computer

- Setup, connect and power up the computer per the computer manufacturer's instructions.
- Load the BTAS16 special software. Follow the instructions provided with the CD ROM
- Load the Drivers required for the Data Interface USB connections

3.1.2. Data Interface

- Connect the Data Interface USB cables to the Computer's USB ports
- Note that the USB cables are identified as USB1 and USB2 although the order of connection is of no importance at this time.
- Verify that the power LED turns on.

Figure 3 - Data Interface Front Panel

- Connect the 6 pin Data Cables to the Data Interface and route to the locations where the C-Scans and Charger-Analyzers will be operating.
- Ports 1 – 4 are for the C-Scans (Data)
- Ports 5 – 8 are for the Intelligent Charger-Analyzers (Control)

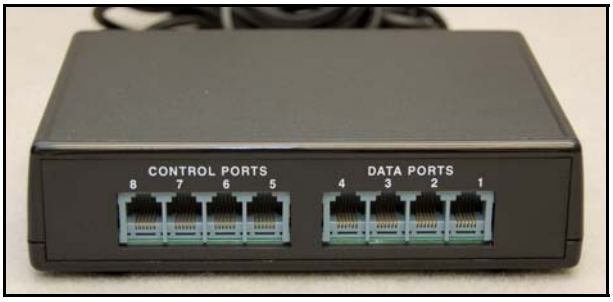


Figure 4 - Data Interface Rear Panel

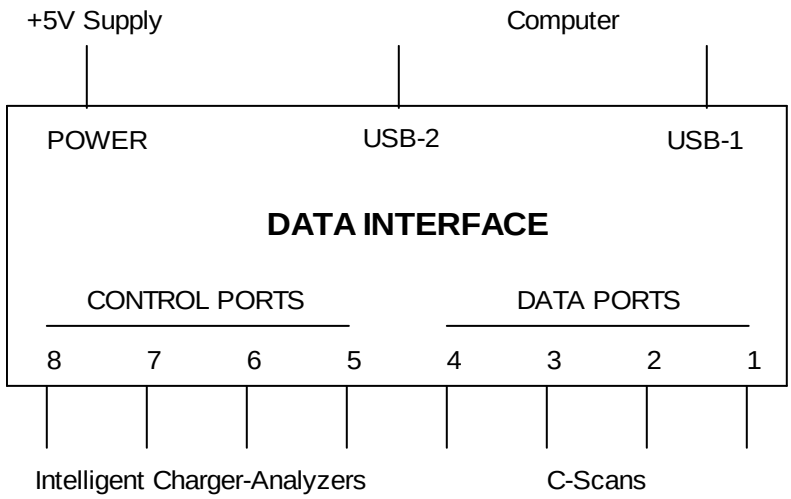


Figure 5 - Data Interface Connections

- Use Data Hubs to facilitate the routing of Data and Control Cables from the Data Interface to the C-Scans (cascading daisy chain as opposed to direct connections). For connections, see [Figure 9], [Figure 10] and [Figure 11]

Figure 6 - Data Hub

3.1.3. C-Scan

- Locate the C-Scans in the vicinity of the Charger-Analyzers.
- Set the desired Channel Numbers (0 through 15) with the Rotary Switch labeled TERMINAL.

Figure 7 - C-Scan Rear Panel

- Note: The rotary switch to select the channel number is marked 0 through 9 and A through F, where A is channel 10, B is 11, C is 12, D is 13, E is 14, and F is 15.

Note: verify that all channel numbers are unique. Any repetition of channel numbers will cause the system to fail.

- Connect the Power Supplies to a battery backed-up AC source (UPS).
- Connect the Power Supplies to the C-Scans in the connector labeled POWER.
- Connect the 6 pin flat Data cables to the C-Scans in the connector labeled DATA
- Note: if using Hubs, observe that hubs have one input (from the Interface) and four outputs. Three for terminals and one to cascade to the next location. See [Figure 9], [Figure 10] and [Figure 11].

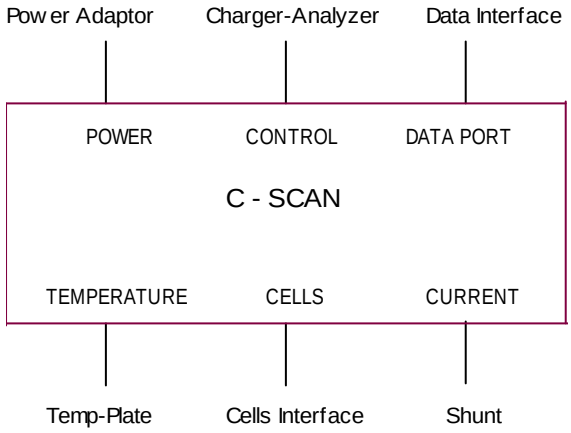


Figure 8 - C-Scan Connections

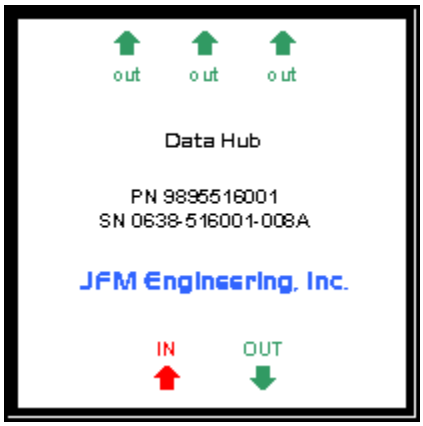


Figure 9 - Data Hub Label

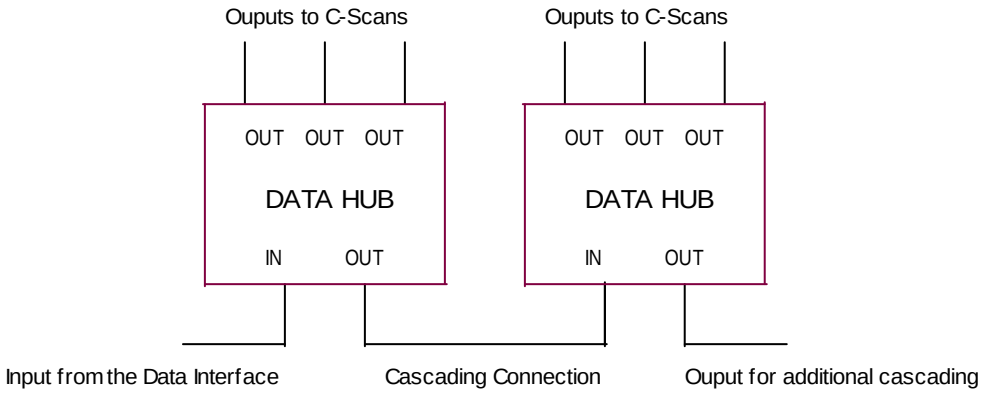


Figure 10 - Data Hub Connection for cascading

Figure 12 - C-Scan Front Panel

- Verify that the Terminal Number LED Readouts turn on showing the selected terminal number.

Note: The ACTIVITY LEDs will not blink until the program has been started.

- Connect the Control Cable from the Charger-Analyzer with the "C" mod (SupersederIIIC, and MasterChargerLXC) to the connector labeled "CONTROL".

Figure 13 - C-Scan Rear Panel

3.1.4. Connection for control of Intelligent Charger-Analyzers

- Connect ports 5-8 in the Data Interface to the Connector in the rear of the Charger-Analyzer labeled BTAS. See [Figure 14]

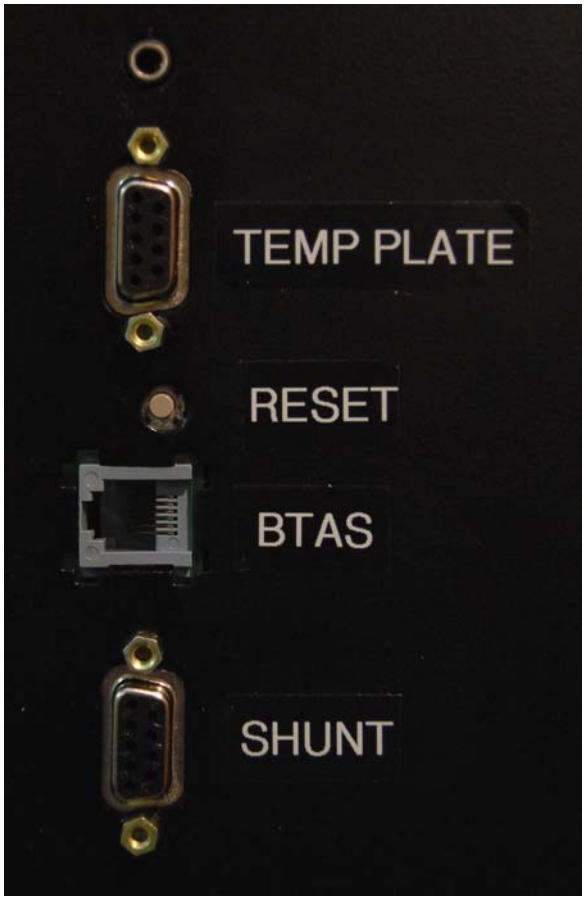


Figure 14 – SMC Rear Panel Connections

3.2 System Test

3.2.1. Start the BTAS-16 program. The screen should come up with no selections (immediately after setup).

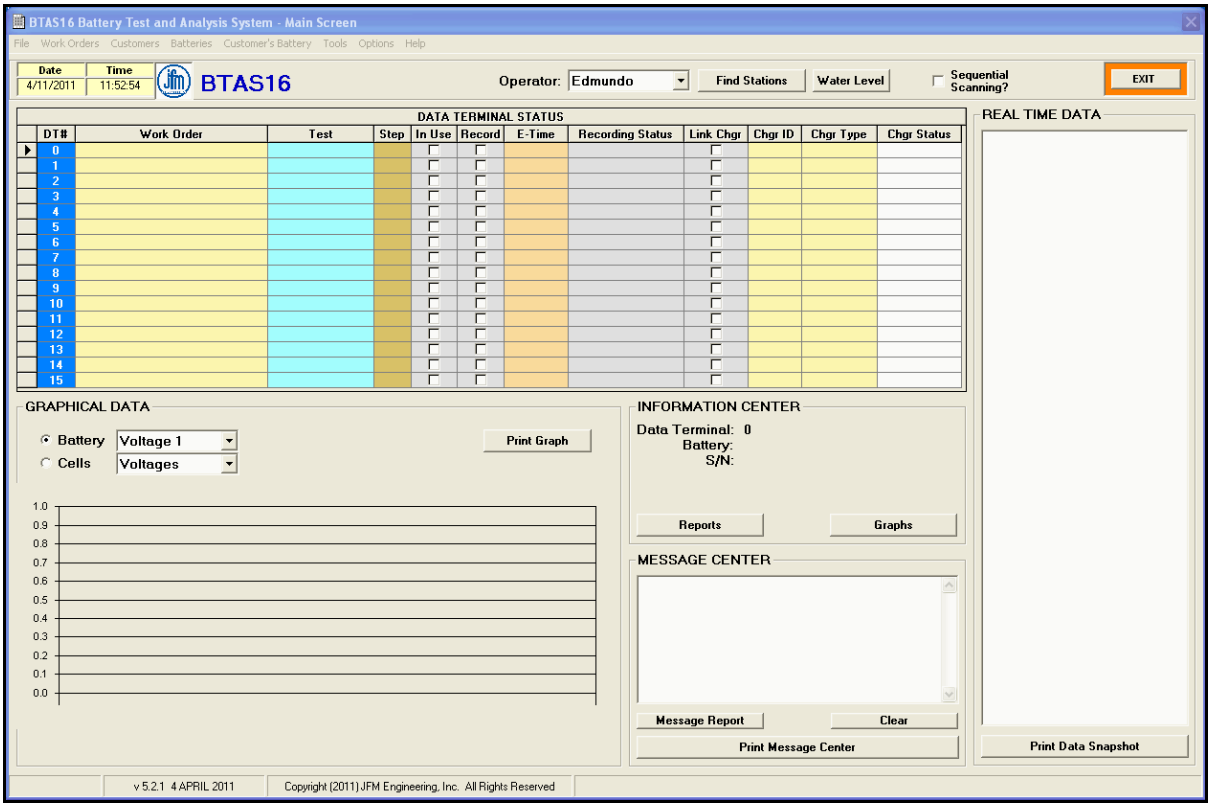


Figure 15 - Control Program Main Screen

3.2.2. Assign USB Ports for Data and Control

On the Main Screen:

- Click on the File pulldown (upper left)
- Open Comm Port Operations – see [**Figure 16**]
- Determine that two USB channels are available (there may be other USB ports already assigned depending on the accessories connected to the computer).
- With the up/down arrows, update the number of the Comm Ports for Data (C-Scans) and Control (ICAs) to match the available USB ports.
- Observe the activity lights for USB1 and USB2 on the Data Interface
- If the LED for USB1 is blinking (about once every two seconds) then, the setup is OK.
- If the LED for USB2 is blinking, then invert the numbers for the USB Comm Ports
- Verify that the blinking LED now corresponds to USB1

3.2.3. Click on the In Use section for each of the C-Scan channels available

3.2.4. Click the FIND TERMINALS button to automatically display all available C-Scan Terminals.

3.2.5. Verify that basic C-Scan information is displayed on the data window at the right hand of the screen.

3.2.6. The ACTIVITY LED indicators in the front panel of the C-Scan will indicate if the program is interrogating terminals (top LED, green) and if the particular Terminal is responding (bottom LED, red).

3.2.7. The top C-Scan LED indicates that the terminal (all terminals, simultaneously) is being interrogated (short flash, about once every two seconds), and the bottom LED responds when it detects its assigned terminal number (longer flash, once per cycle, the actual time period depending on the number of terminals connected).

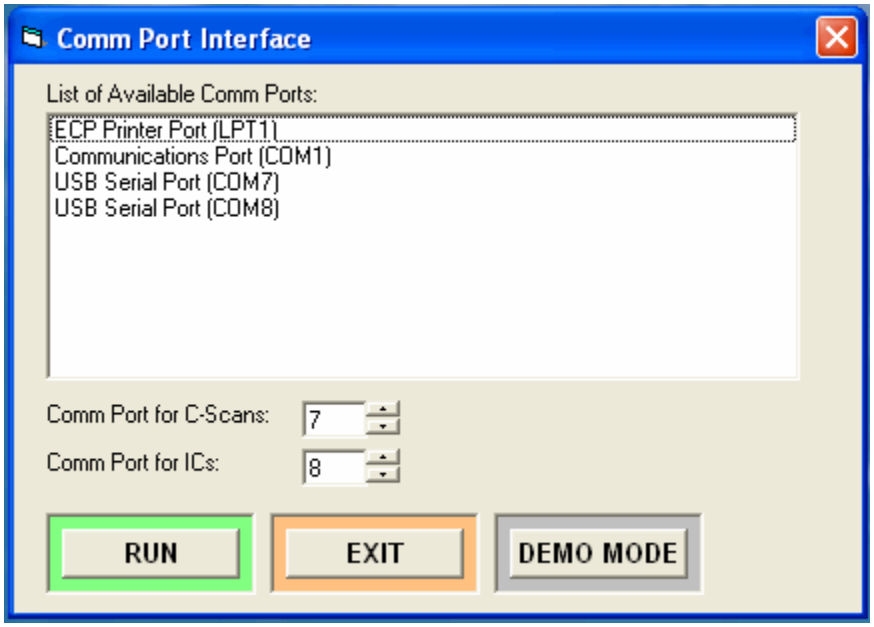


Figure 16 – Comm Ports

Figure 17 - C-Scan Front Panel

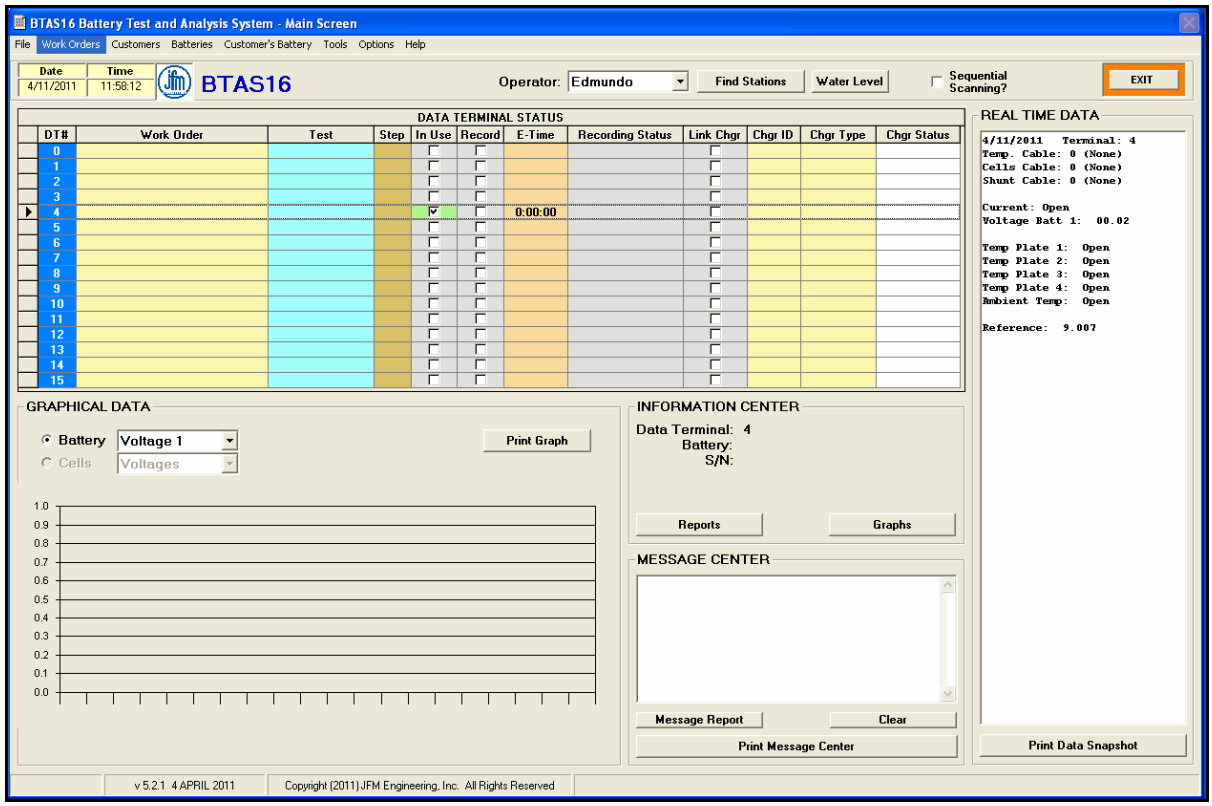


Figure 18 - Control Program Main Screen, Showing a C-Scan available as Terminal #4

3.3 Tests with the Cell Simulator

3.3.1. Connect the Cells Simulator to the C-Scan using the 50 conductor flat cable

3.3.2. Connect the 15V Power Supply to the Cell Simulator

Figure 19 - Cells Simulator Rear Panel

3.3.3. Connect the DB9 cables to the SHUNT, TEMP-PLATE and CONTROL corresponding connectors on the C-Scan

Figure 20 - Cells Simulator Front Panel

3.3.4. Simulating cells AS RECEIVED

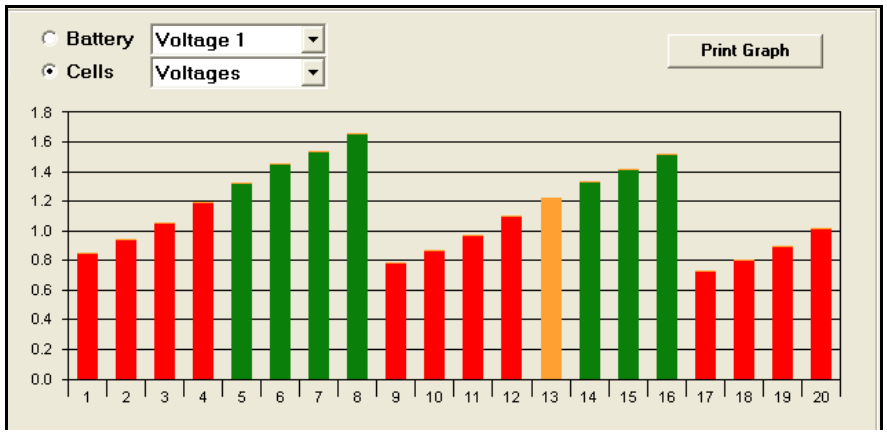


Figure 21 – 20 Cells Simulation pattern with "as Received" test

3.3.5. Numerical values from the simulator

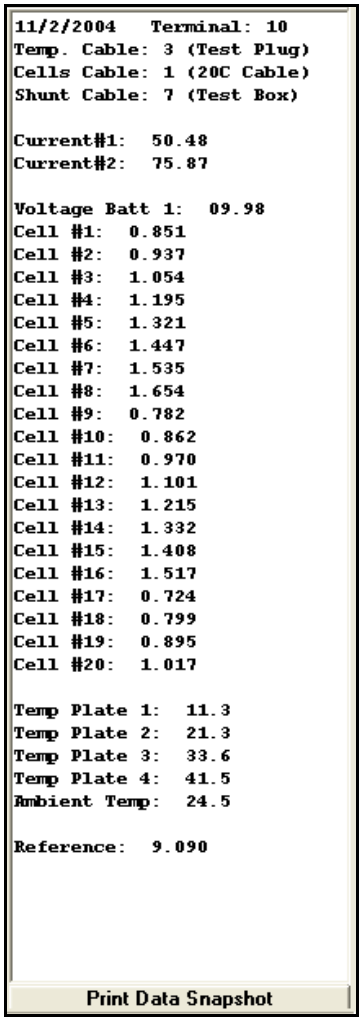


Figure 22 - Numerical results from the Cells Simulator

4. Databases

4.1 Batteries

4.1.1. Enter the custom battery definitions and test parameters

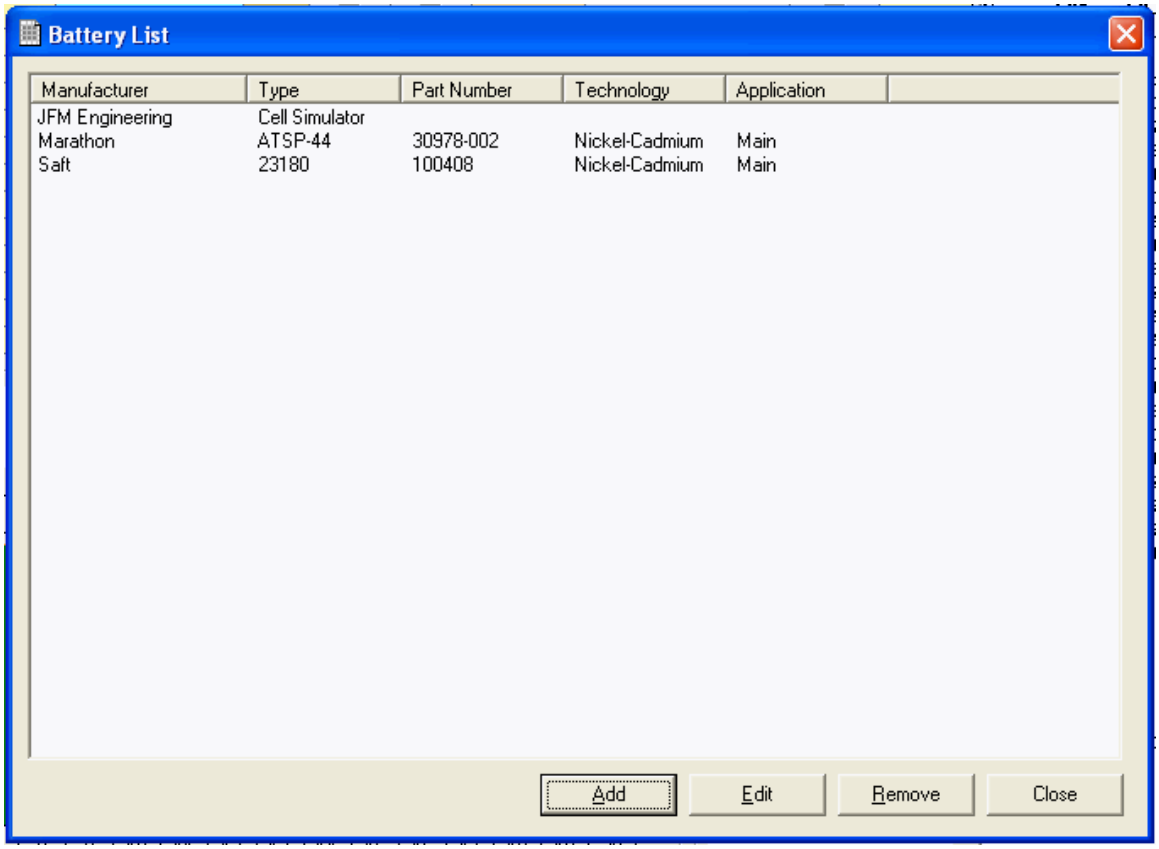


Figure 23 - Screen with custom (user selected) parameters for batteries

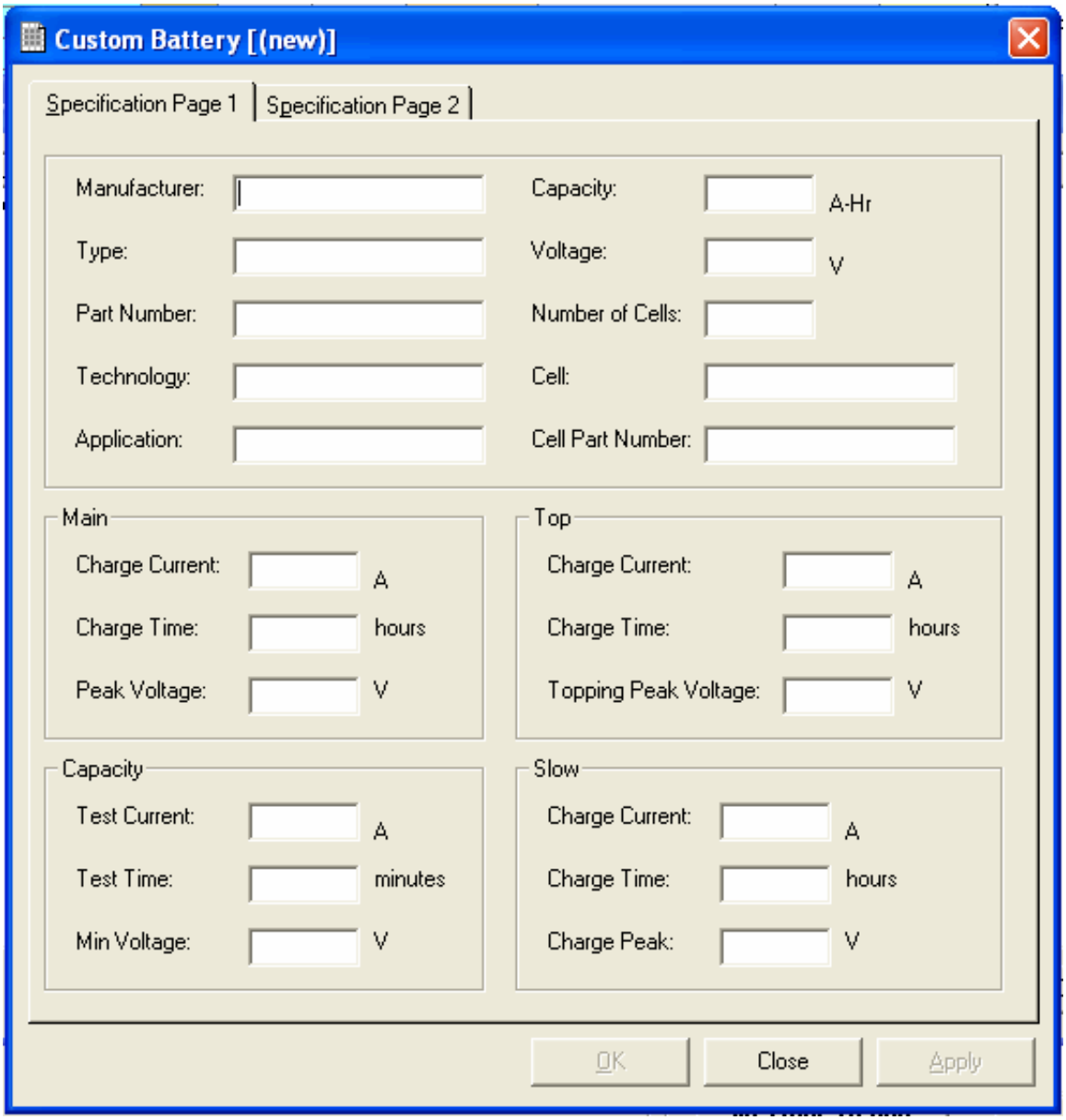


Figure 24 - Custom Battery Entry Screen #1

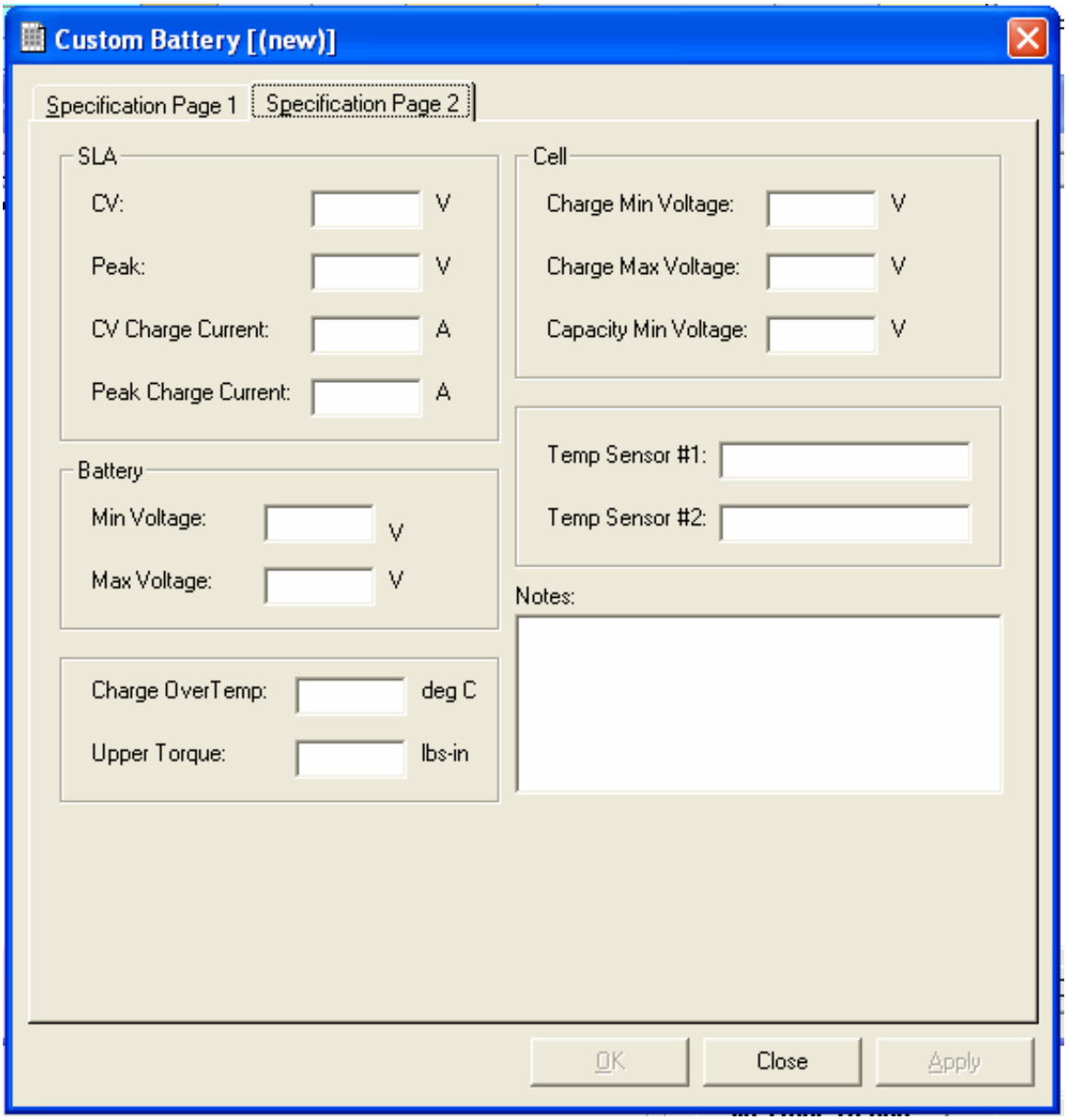


Figure 25 - Custom Battery Entry Screen #2

4.2 Customers

4.2.1. Enter the Customers Information

Note: Customers must be entered in the database before Work Orders can be created

4.2.2. Enter the Customer Name

4.2.3. Other information is optional at this time

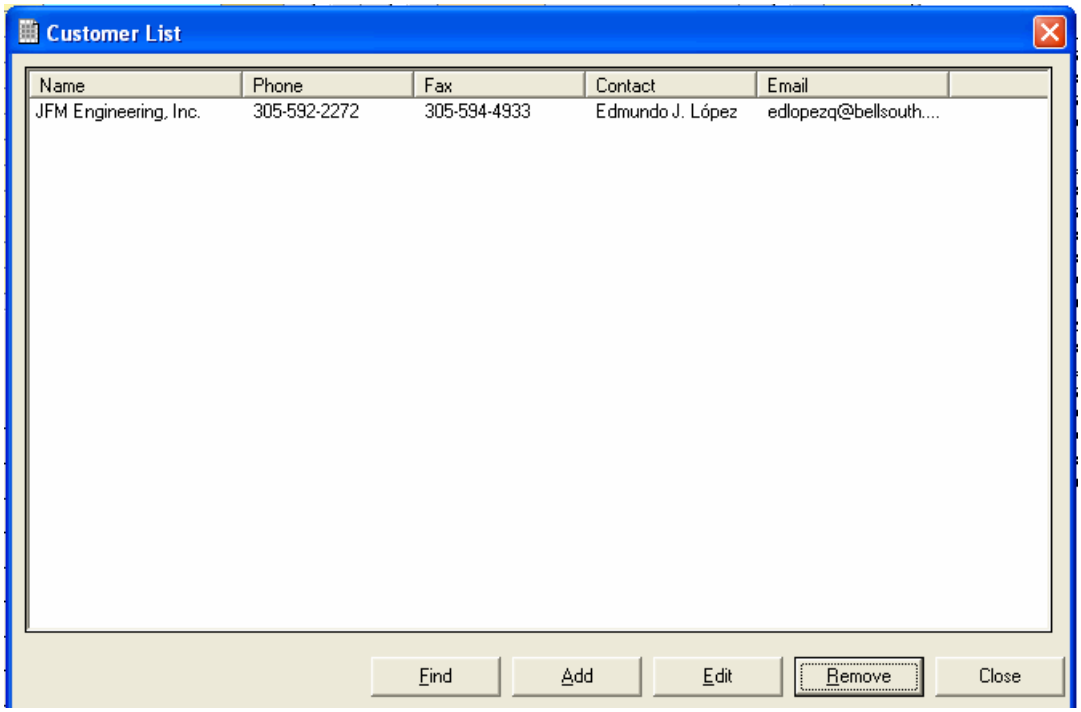
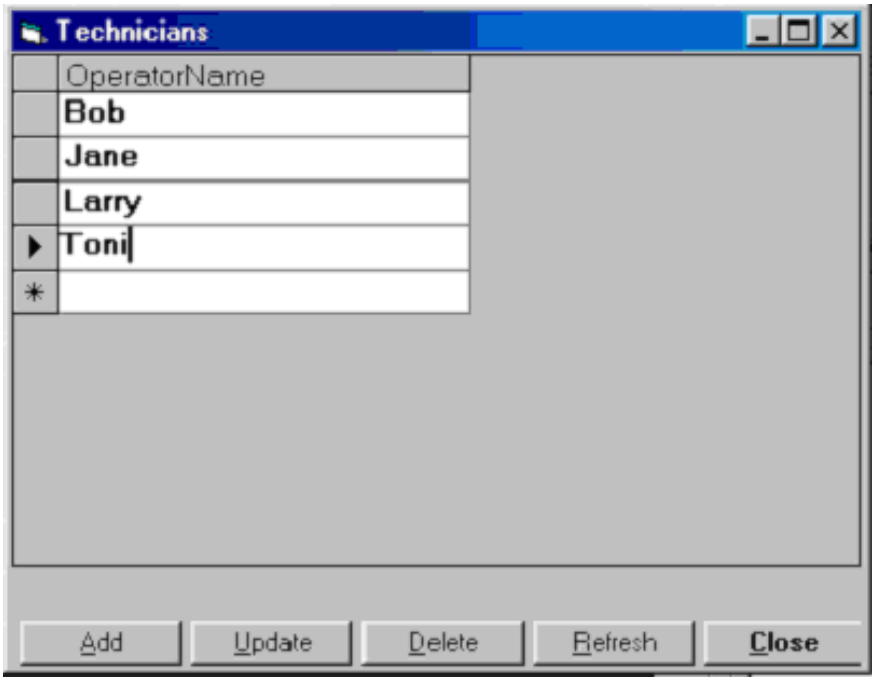


Figure 26 - Screen for the entry of Customer Information

4.3 Operators List

4.3.1. From the Tools Pull Down, open Edit Technicians to add, edit or delete the names of the system operators



4.4 Add Customer Batteries

Note: Customers Batteries must be entered in the database before Work Orders can be created

From the Work Orders pull-down menu select New Customer Battery and enter the Customer Battery Information - see [Figure 28].

4.4.1. Battery Model

Select the Battery Model for the Standard or Custom pull-down lists

4.4.2. Serial Number

Enter the serial number as it appears in the battery nameplate

4.4.3. Customer

Enter the Customer Name.

4.4.4. Barcode

Enter the Barcode. If a Barcode is not used, use the Serial Number (check the "Serial Number as Barcode" option) or enter any other type of number. *Note that this field is not optional.* (The program will not turn on the OK button until information is entered in this field)

Upon entering OK, the program will ask if you wish to enter a Work Order for the battery. Click on YES or NO as applicable. Clicking YES will take you to the create Work Order screen. Note that the battery information will be filled-in automatically (non editable fields).

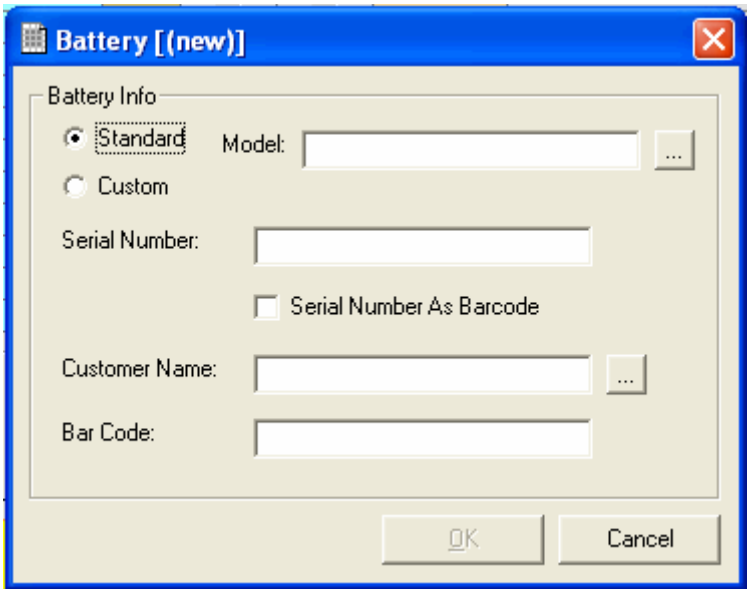


Figure 28 - Add Customer Battery Screen

4.5 Find Customer Batteries

Once Customer Batteries have been created, the Find Customer Batteries screen is used to find a particular battery by Model (Manufacturer Number), Type (Standard or Custom), Serial Number, Customer Name or Barcode.

Open the Work Orders pull-down menu and select Find Customer Battery. See [Figure 29].

4.5.1. Find

Click on Find to search for the desired battery. The program will respond with the screen to enter the search criteria. Click OK or Cancel as applicable.

Enter the information and click OK. Select the desired one in case the system returns multiple choices.

4.5.2. New Work Order

Click on New Work Order to use the selected battery on a new Work Order.

4.5.3. Edit

Click Edit to edit fields as applicable. Note that editing is not allowed once the battery has been entered in a Work Order.

4.5.4. Remove

Click Remove to delete the selected battery from the Customer Battery database. Note that deleting is not allowed once the battery has been entered in a Work Order.

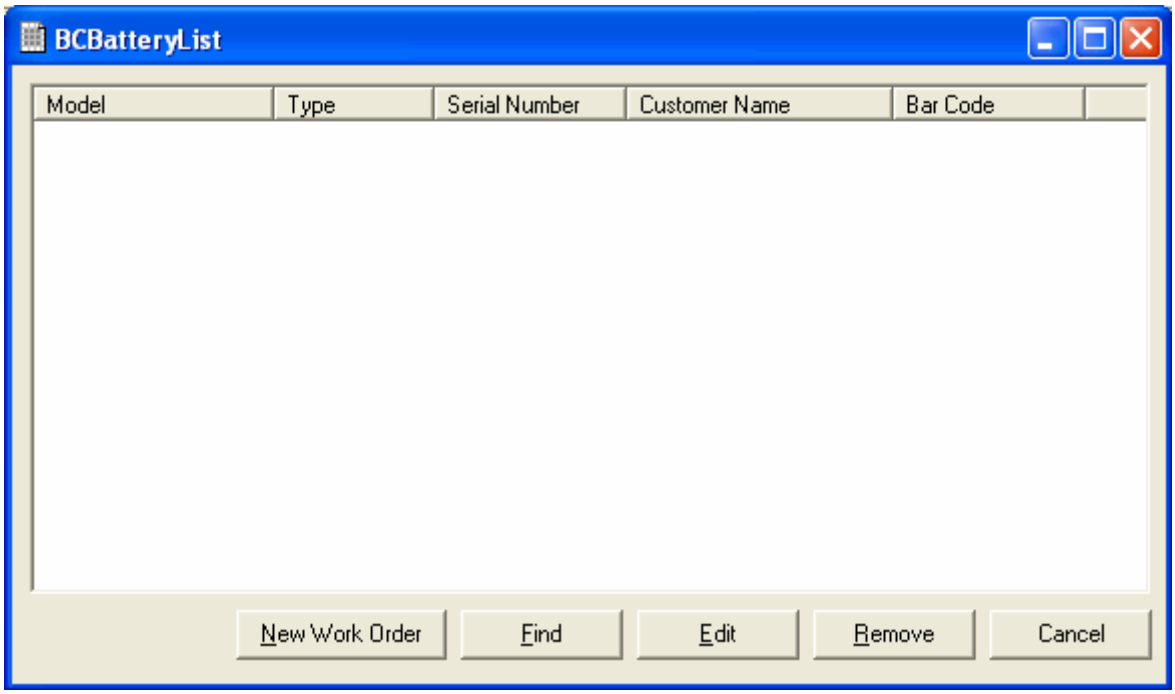


Figure 29 - Find Customer Battery Screen

5. Work Orders

5.1 Entering (creating) Work Orders

5.1.1. Pull down the **Work Orders** Menu (top tool bar)

5.1.2. Click Find Customer Battery

Note1: Customers, Batteries and Customer Batteries must exist in the database before Work Orders can be created

Note2: Do not remove the Work Order ZZZZZZ

5.1.3. Highlight the desired battery

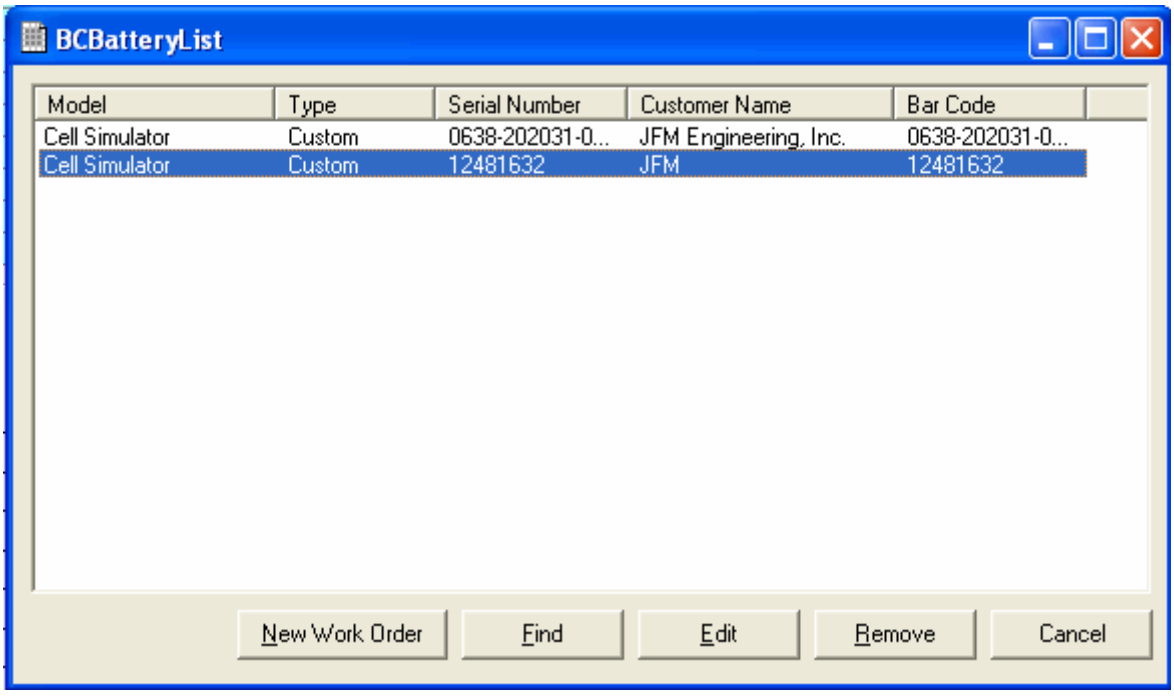


Figure 30 - Screen to find a Customer Battery

5.1.4. Click on **New Work Order.** See [Figure 29] and [Figure 30]

5.1.5. Note that the Battery Info section is already populated (not editable)

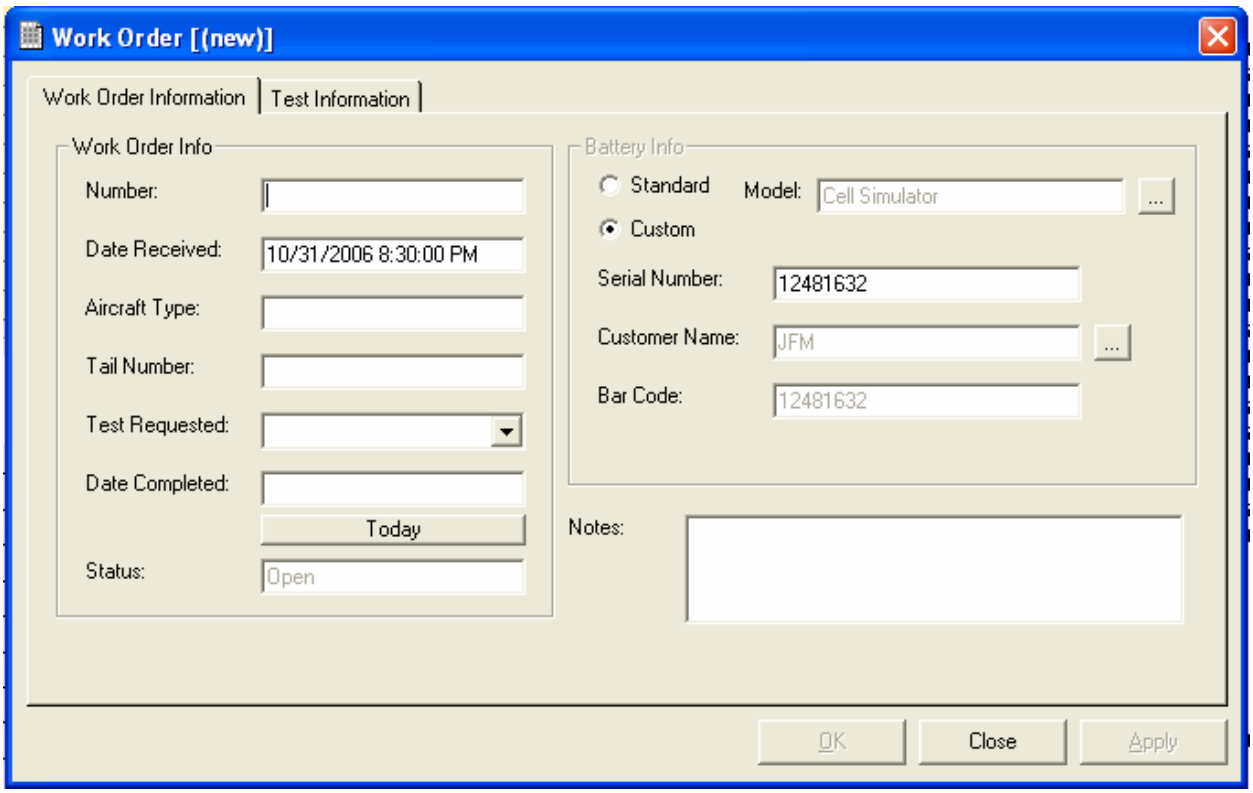


Figure 31 - Screen to enter information into a new Work Order

5.1.6. In the New Work Order screen, enter the following information:

- Work Order Number
- Date or select Today's Date
- Aircraft Type (optional)
- Tail Number (optional)
- Select Test Requested (pull down)
- Notes (optional)

5.1.7. When all basic information has been entered click the **OK** button to store the new Work Order or click the **Close** button to close the screen without entering the new Work Order.

*Note: The **OK** button is not available until all required information is entered.*

5.1.8. Exit the screen by clicking **Close**

5.2 Viewing and Editing Work Orders

5.2.1. Pull down the Work Orders Menu (top tool bar)

5.2.2. Select Edit/Delete Work Orders

5.2.3. Search for the desired Work Order and highlight it.

5.2.4. Click on Edit

5.2.5. Edit information if required.

5.2.6. Click Apply to save the information (without exiting the screen) or click OK to save the changes and exit the screen.

5.2.7. Click Close to exit the screen.

5.2.8. or

5.2.9. Open the Test Information Tab (see [Figure 33])

5.2.10. View/edit notes as required

5.2.11. Delete Last Step if required because of an erroneous test or system error.

Caution! Deletion of Steps is permanent - There is no undo

5.2.12. Click Close to exit the screen.

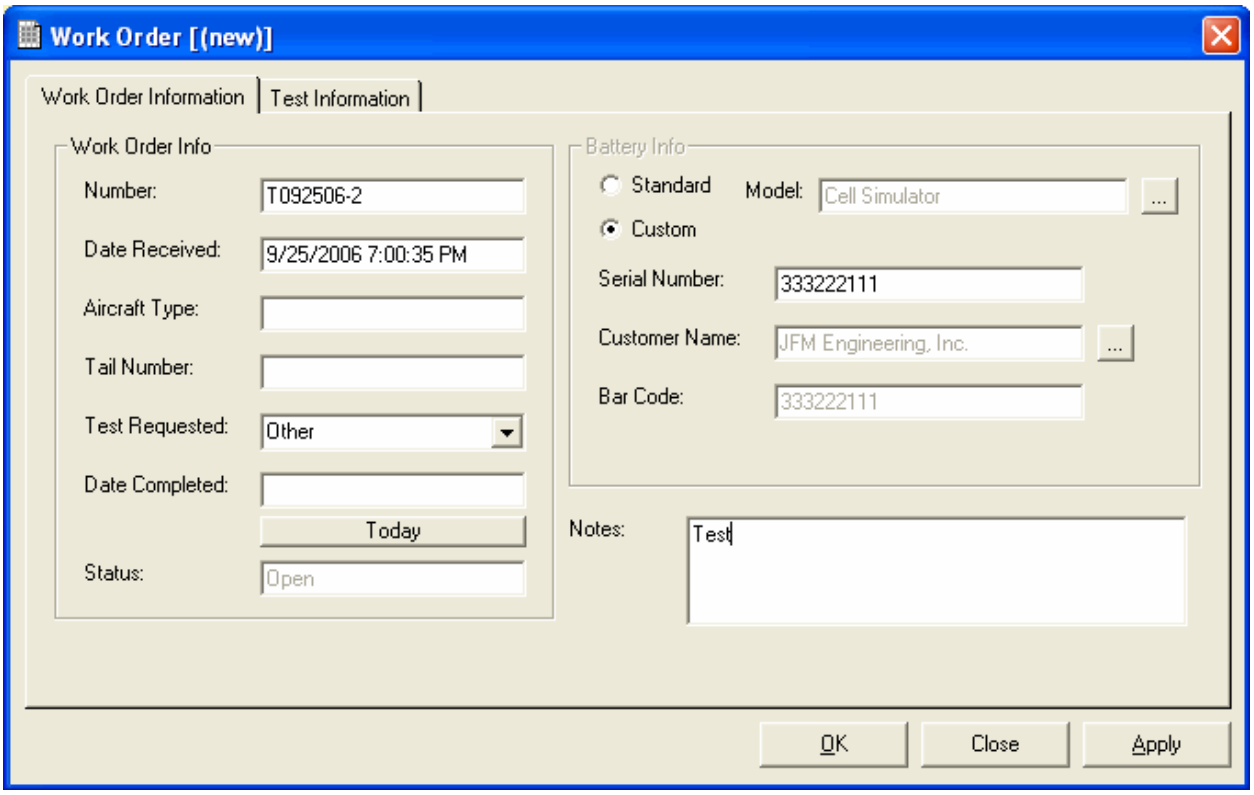


Figure 32 - Screen for the review of Work Orders

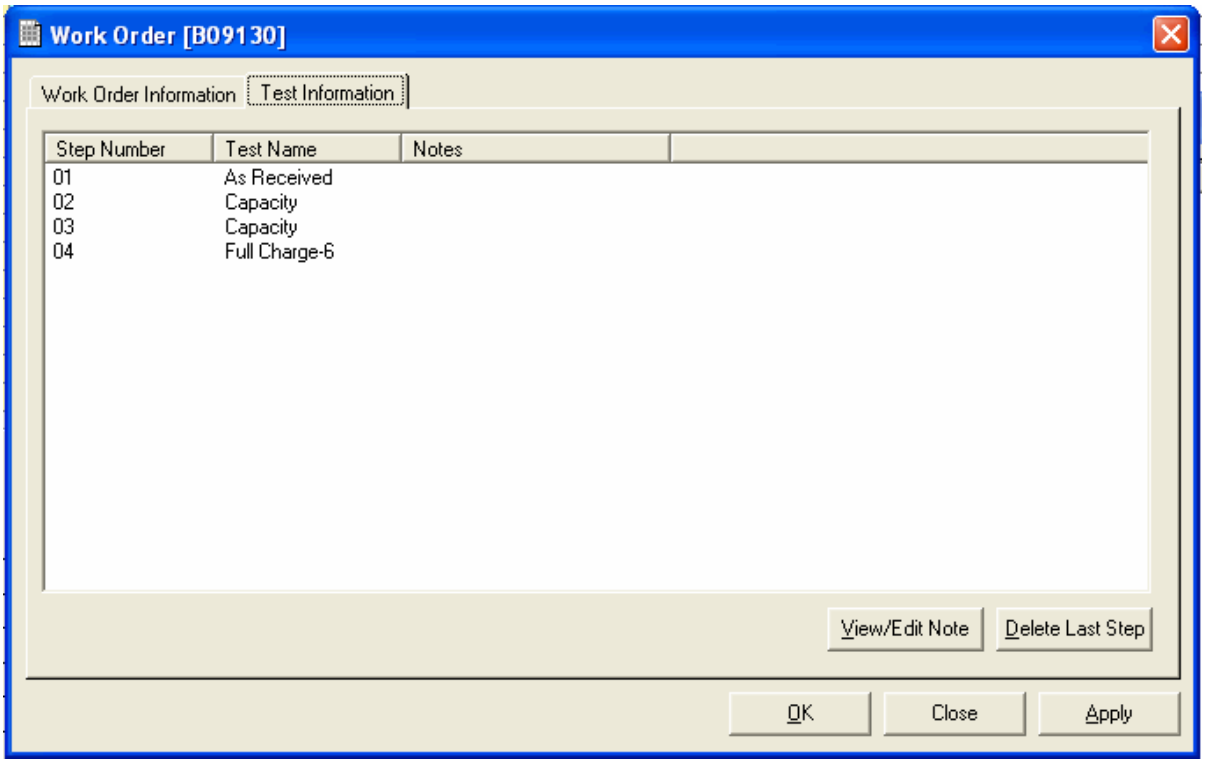


Figure 33 - Screen for the viewing and editing of tests performed

5.3 Closing Work Orders

5.3.1. Pull down the Work Orders Menu (top tool bar)

5.3.2. Select Edit/Delete Work Orders

5.3.3. Search for the desired Work Order and highlight it.

5.3.4. Click on Close Order

5.3.5. Click Close to exit the screen

Note: If the status says "Assigned", the work order is still associated with a terminal. It must first be deselected before it can be closed

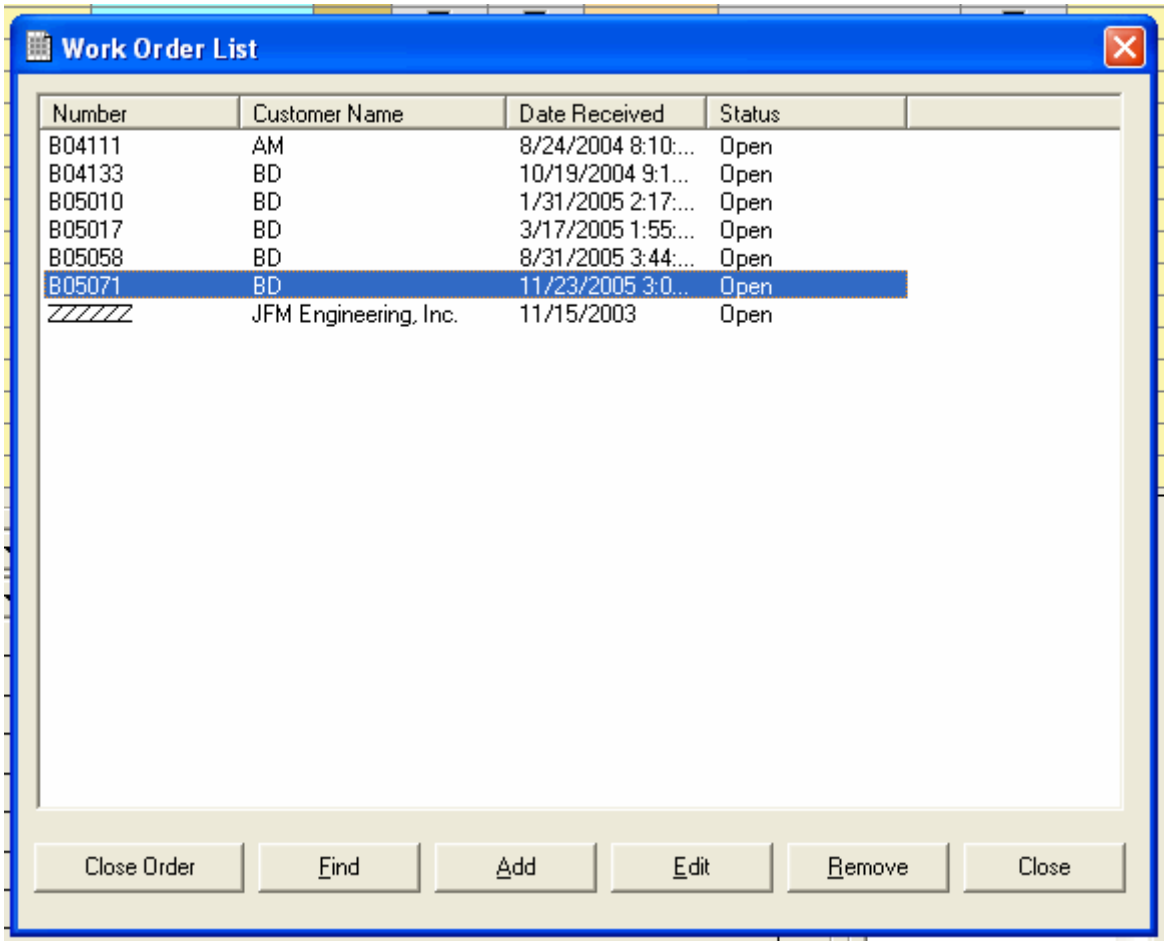


Figure 34 - Screen for the closing of Work Orders

5.4 Archiving a Work Order

Archiving the Work Orders reduces the database overload when searching for graphs and reports. If needed, they can be recalled. See [6.12], Viewing Graphical Results

5.4.1. After closing the work order (per [5.3]), select find and enter Closed as the status.

5.4.2. From the returned list, select the desired Work Order and Click Archive.

5.5 Deleting a Work Order

5.5.1. Pull down the Work Orders Menu (top tool bar)

5.5.2. Select Edit/Delete Work Orders

5.5.3. Search for the desired Work Order

5.5.4. Click Remove and Close to exit the screen

Note: Do not delete the Work Order ZZZZZZ

Caution! Deletions of Work Orders from the database are permanent (there is no undo…)

6. Data Acquisition (to take battery readings)

6.1 Connecting a Nickel-Cadmium Battery with available cell terminals.

Connection to the battery by way of a Universal Cell Cable with clips or with a battery specific Crown.

Note that when connecting a Universal Cell Cable or a Crown, the C-Scan will recognize what is connected to it and will display its description in the upper section of the right hand window (i.e. 20 Cell Cable, 2x11 Crowns, etc.) – see [Figure 35]

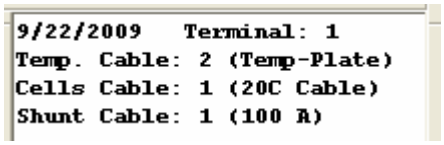


Figure 35 - Screen showing information on cables detected

6.1.1. Using Cell Clips

- Select a Cells Cable with clips consistent with the number of cells of the battery. Connect the Cells Cable to the C-Scan via the 50-conductor ribbon cable.
- Connect the BLK clip to the most negative side of the battery (negative post of the first cell) and connect the remaining cell clips to the corresponding cells positive post.
  Note: cells are numbered from the most negative terminal.
- Monitor the Cell voltages in the bottom left side of the screen to verify that all cells are connected properly as per [6.2]

6.1.2. Using a Crown

- Select a Crown consistent with the battery type.
- Connect to the C-Scan via the 50-conductor ribbon cable.
- Monitor the Cells voltages in the bottom left side of the screen to verify that all cells are reading properly as per [6.2]

6.2 Testing the connection

6.2.1. After the C-Scans have been connected to the battery, verify that all connections are proper by viewing the Bar Graph (bottom screen) and the cell voltage readings (right screen). Any bars, which are red, may indicate an error.

6.2.2. If any of the cells read full scale (2V) and negative, it indicates that a connection is open and or reversed.

Note: A cell with a true negative voltage will display without a corresponding overscale bar (this is a true reading!).

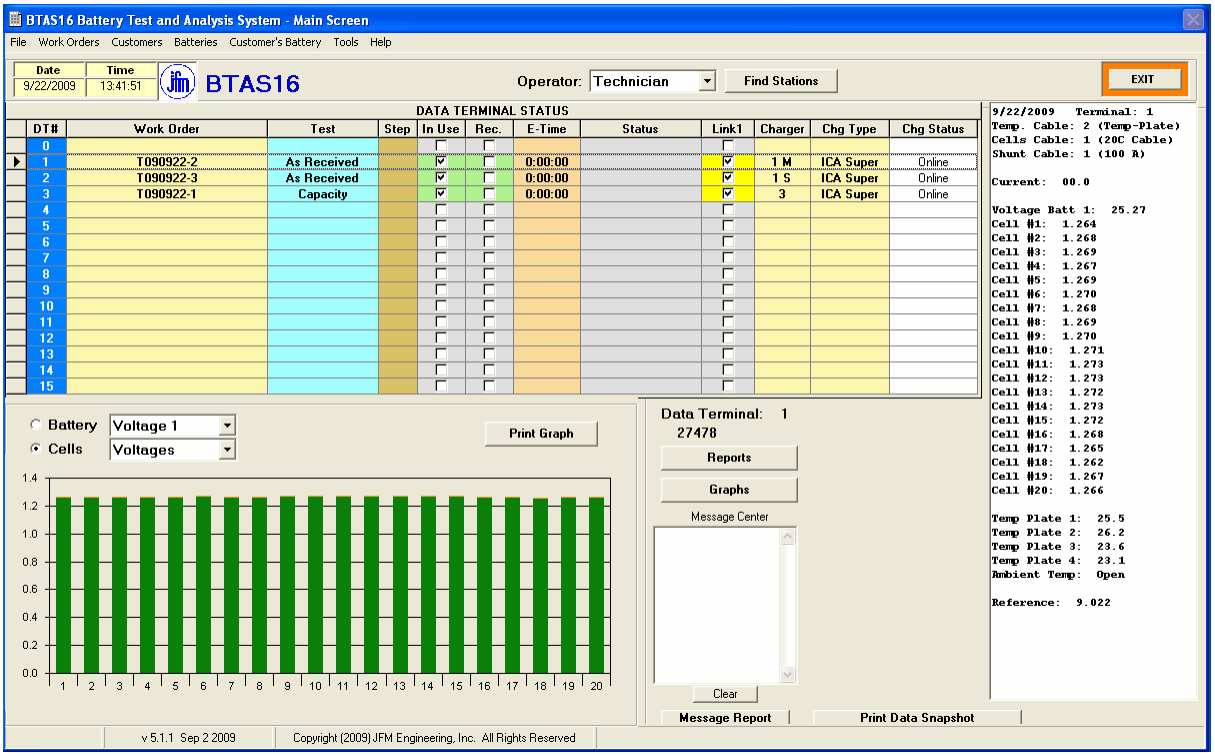


Figure 36 - Main Screen showing information from various Data Terminals

6.2.3. Bar graph showing the effect of the Common lead disconnected

Note that cell #1 is also affected

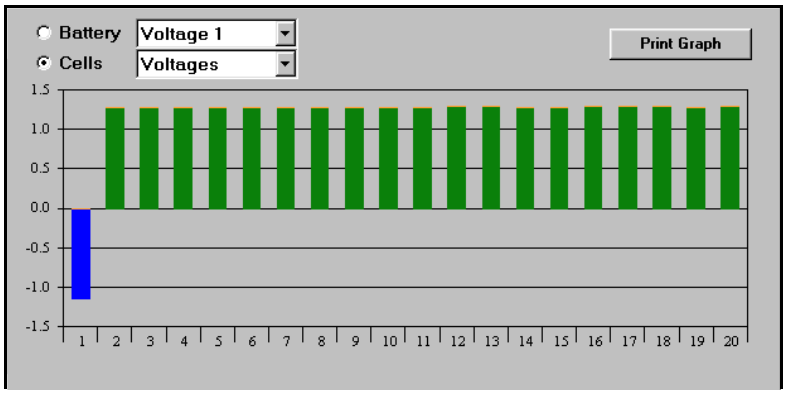


Figure 37 - Common lead disconnected

6.2.4. Bar Graph showing the effect of cell #1 being disconnected

Note that cell #2 is also affected

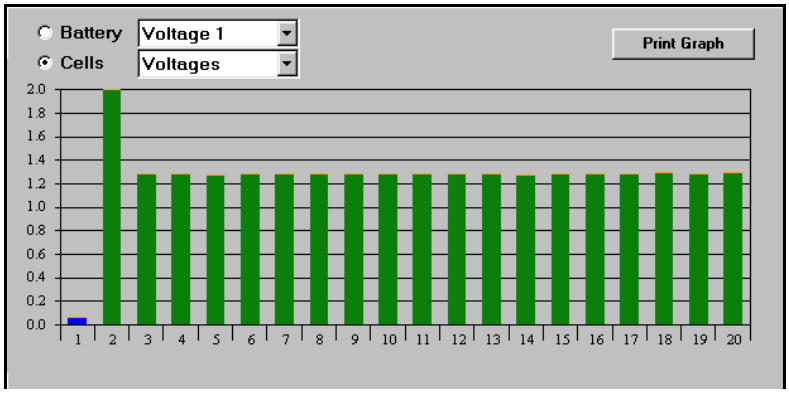


Figure 38 - Cell #1 lead disconnected

6.2.5. Bar Graph showing the effect of cells #1 and #2 reversed

Note that cell #3 is also affected

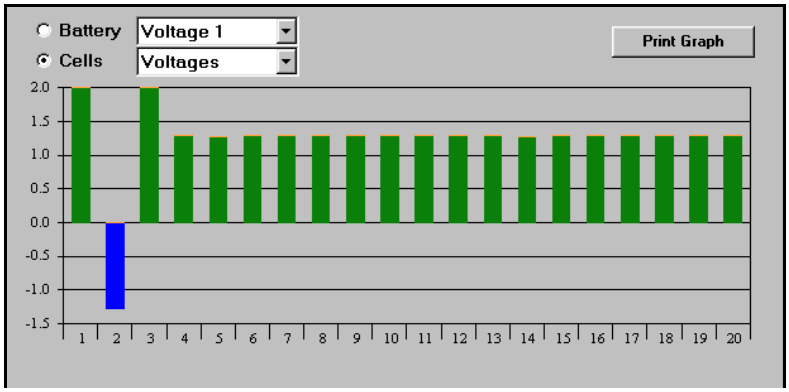


Figure 39 - Cell #1 and Cell #2 leads reversed

6.2.6. Bar Graph showing the effect of Cell #20 being disconnected

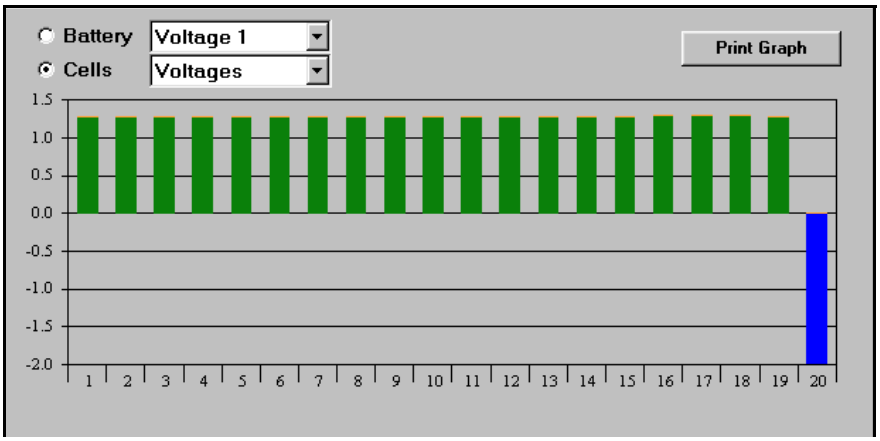


Figure 40 - Cell #20 disconnected

6.3 Connecting a Battery with no block/cell terminals.

Connection to the battery(ies) by way of a Four Battery Cable (with clips – two clips for each of the batteries), as applicable to small battery packs or sealed Lead-Acid batteries where there is no access to cells.

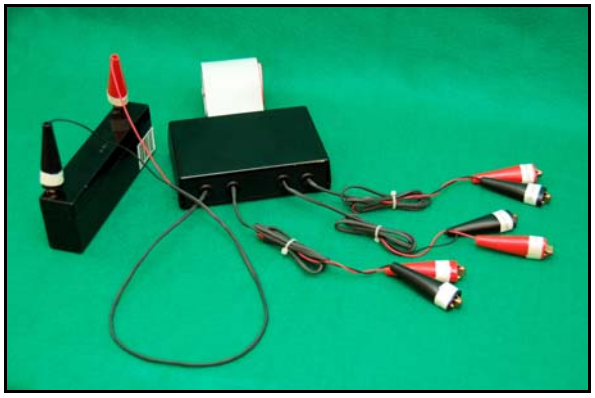


Figure 41 – Four Battery Cable

- Note that when connecting this cable, the C-Scan will recognize it as cable #10 – see [Figure 44]
- See [Figure 42] and [Figure 43] for samples of batteries with no accessible blocks/cells

Figure 42 – SLA Battery with no accessible block terminals

Figure 43 – Nickel-Cadmium Battery with no accessible cell terminals

- The Shunt Cable shown will correspond to the type of Charger being used

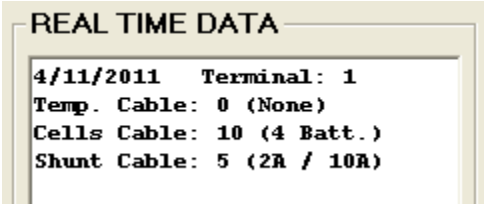


Figure 44 - Screen showing information on cables detected

6.3.1. Connecting the Four Battery Cable to one or more small Battery Packs

For this application you can connect one, two, three, or four packs in series depending on the total voltage capability of the Charger being used.

- Connect each of the clip pairs to each of the batteries being tested.
- Monitor each of the battery voltages in the REAL TIME DATA Screen.
- See [Figure 45]

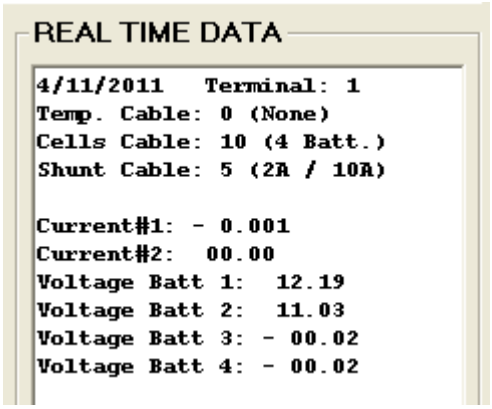


Figure 45 - Screen showing information on two batteries connected

6.3.2. Connecting the Four Battery Cable to one or two mainship batteries.

For this application you can connect one or two mainship batteries in series depending on the total voltage capability of the Charger being used.

- Connect each of the clip pairs to each of the batteries being tested.
- Monitor each of the battery voltages in the REAL TIME DATA Screen.

6.3.3. Connecting the Four Battery Cable to one battery with accessible blocks/terminals.

This is applicable for batteries where the individual block connections become available after removing the lid.

- Battery #1 can be used to measure the entire battery while Battery #2 and #3 can be used to monitor each block individually (Battery #4 is not used).
- See [Figure 46] for a battery with available blocks and terminals

  Monitor each of the battery voltages in the REAL TIME DATA Screen.

Figure 46 – SLA Battery with accessible blocks

6.4 Defining the battery to be measured by the Four Battery Cable

Once the Four Battery Cable is connected and recognized by the program, a button labeled BT becomes visible in the upper right hand section of the Main Screen.

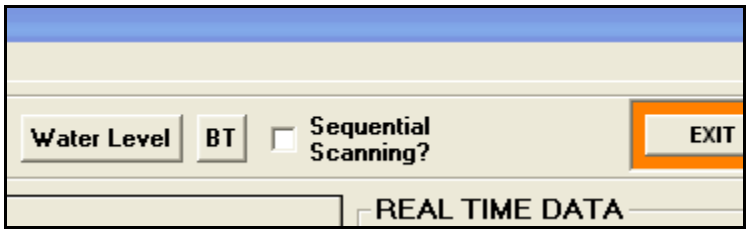


Figure 47 – BT Button

6.4.1. Click on BT to open a small screen to define the battery

With this information, the program will assign the proper colors to the bar-graph in accordance to charge and discharge conditions.

Note: A Work Order must be selected before the BT screen can become available

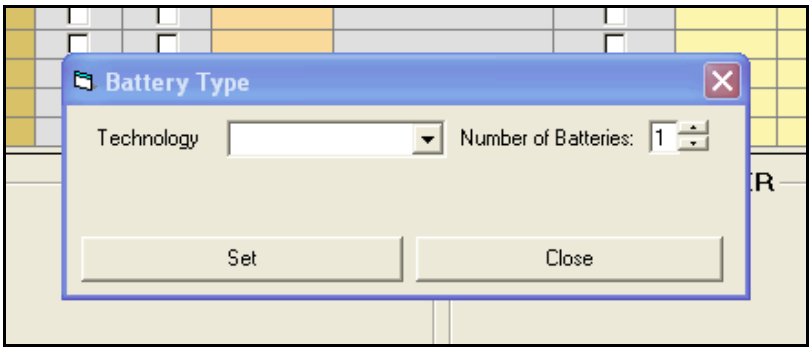


Figure 48 – BT Screen

6.4.2. Select the Battery Technology

After selecting the battery technology an additional window will open to enter number of cells or battery voltage

6.4.2.1. If Nickel-Cadmium, enter the number of cells

6.4.2.2. If Lead-Acid, enter the battery voltage (nominal: i.e. 12V, 24V, etc.)

6.4.3. Select the number of batteries to be monitored

6.4.4. Click Set and then Close

6.5 Selecting/deselecting the Work Order

6.5.1. Single Work Order (One battery connected to the C-Scan)

- Click on the Work Order section of the desired station
- The Work Order Management Screen will come up

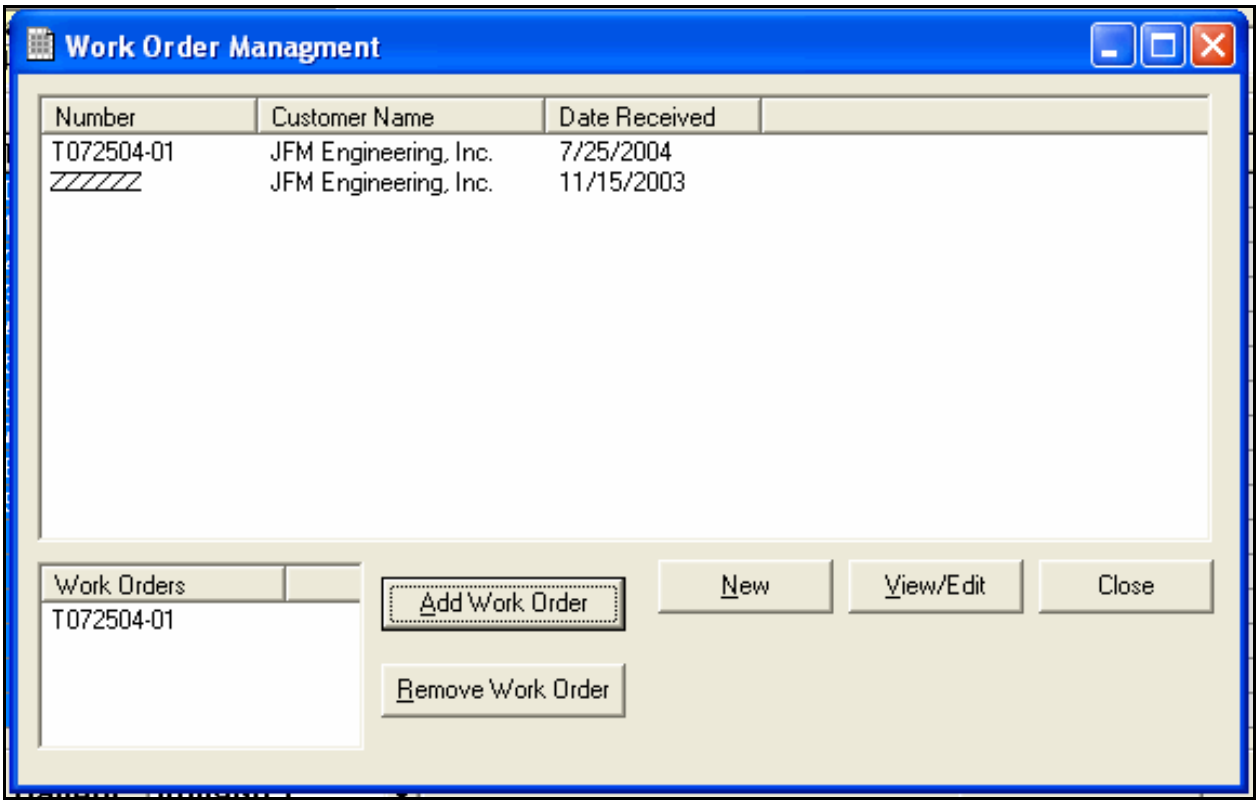


Figure 49 - Screen to select Work Orders

- Search for the desired Work Order (scroll down if needed) or Create a New Work Order.
- Highlight the Work Order in the Work Orders List. Then, click the Add Work Orders button. The selected Work Order will appear in the small box.

6.5.2. Multiple Work Order (More than one battery connected to one C-Scan)

Note: more than one battery in one C-Scan implies that the combined number of cells is no greater that 24

- Search for the desired Work Orders (scroll down if needed) or Create New Work Orders.
- Highlight the first Work Order in the Work Orders List. Then, click the Add Work Orders button. The selected Work Order will appear in the small box.
- Highlight the second Work Order in the Work Orders List. Then, click the Add Work Orders button. The selected Work Order will appear in the small box.
- Repeat for additional orders.

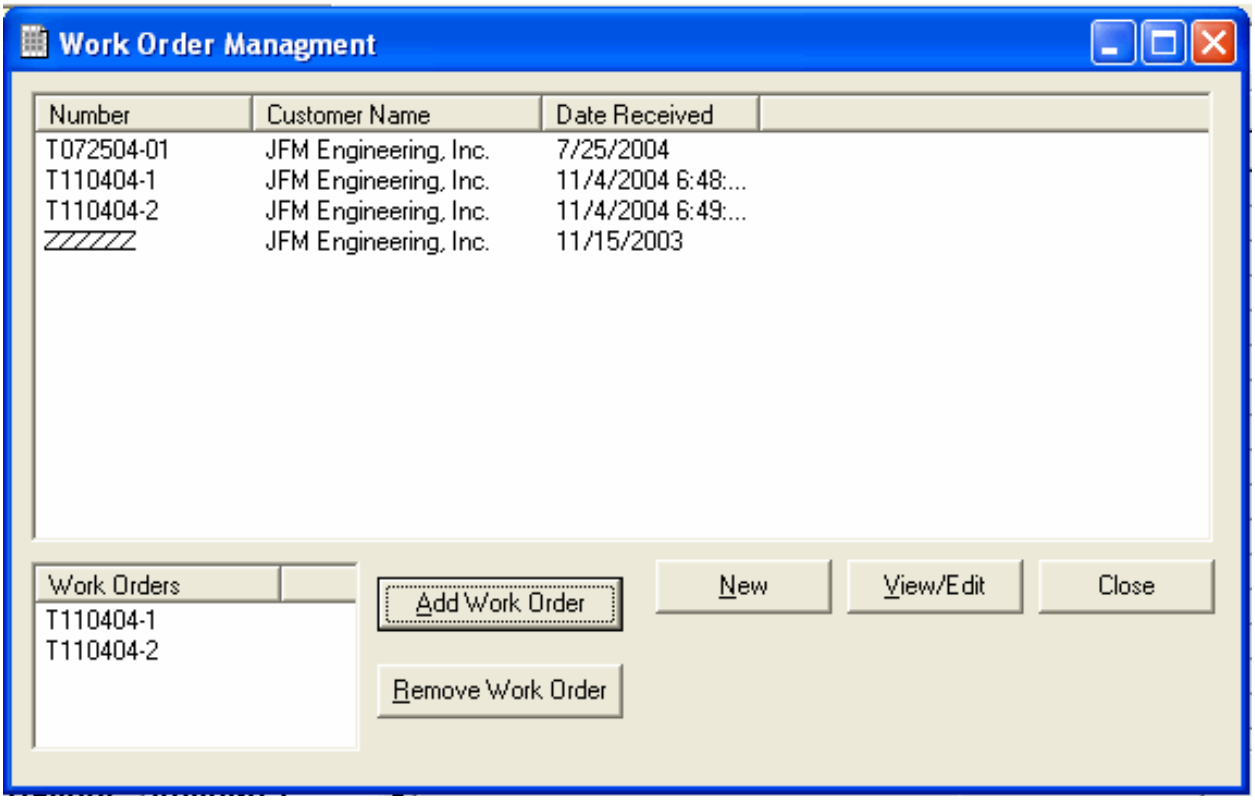


Figure 50 - Selection of Multiple Work Orders

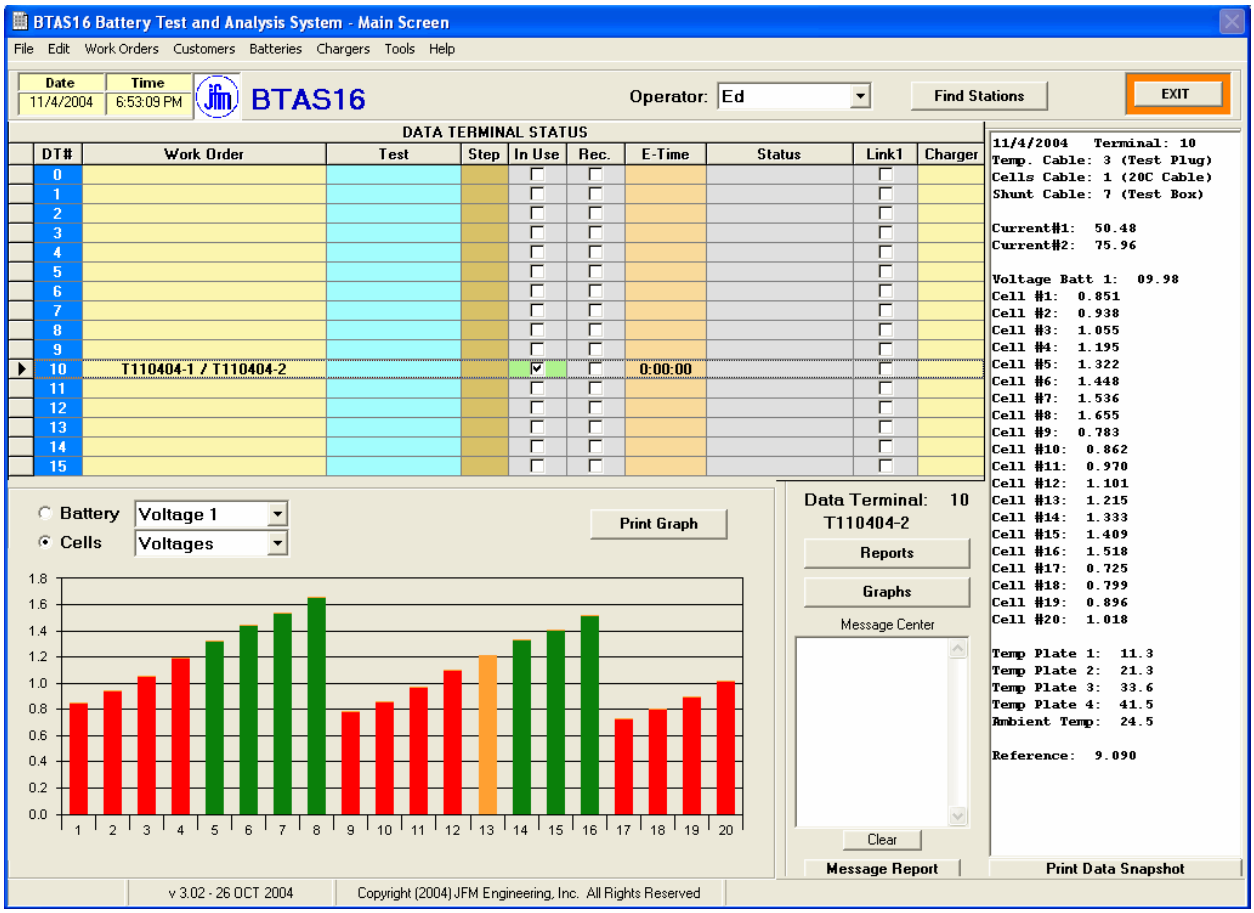


Figure 51 - Multiple Work Orders selection (cell simulator data shown)

6.5.3. Remove Work Order(s)

- Highlight the desired Work Order in the Selected Work Orders window (see Figure 50)
- Click on Remove Work Order

6.5.4. Two C-Scan in one Charger-Analyzer

- When testing more than one battery in one Charger-Analyzer (i.e. two 20 cell batteries or four 11 cell batteries) two C-Scans must now be associated with the Charger-Analyzer.
- With this configuration one of the C-Scans is considered the “Master” because it will be controlling the Charger-Analyzer, will be reading the current from the Charger-Analyzer and the battery temperature from the Temp-plate. The second C-Scan, the “Slave” will only report voltage information from the battery that it is attached to.
- In addition, each of the batteries will have its own Work Order.
- Per figures 40 and 41, associate the Master C-Scan with Battery #1 and the Slave C-Scan with Battery #2.

DATA TERMINAL STATUS

DT#	Work Order	Test	Step	In Use	Rec.	E-Time	Status	Link1	Charger	Chg Type	Chg Status
0				☐	☐			☐			
1	T090922-2	As Received		☑	☐	0:00:00		☑	1 M	ICA Super	Online
2	T090922-3	As Received		☑	☐	0:00:00		☑	1 S	ICA Super	Online
3				☐	☐			☐			
4				☐	☐			☐			
5				☐	☐			☐			
6				☐	☐			☐			
7				☐	☐			☐			
8				☐	☐			☐			
9				☐	☐			☐			
10				☐	☐			☐			
11				☐	☐			☐			
12				☐	☐			☐			
13				☐	☐			☐			
14				☐	☐			☐			
15				☐	☐			☐			

Figure 52 - Data Terminals #1 (Master) and #2(Slave) are associated with Charger-Analyzer #1

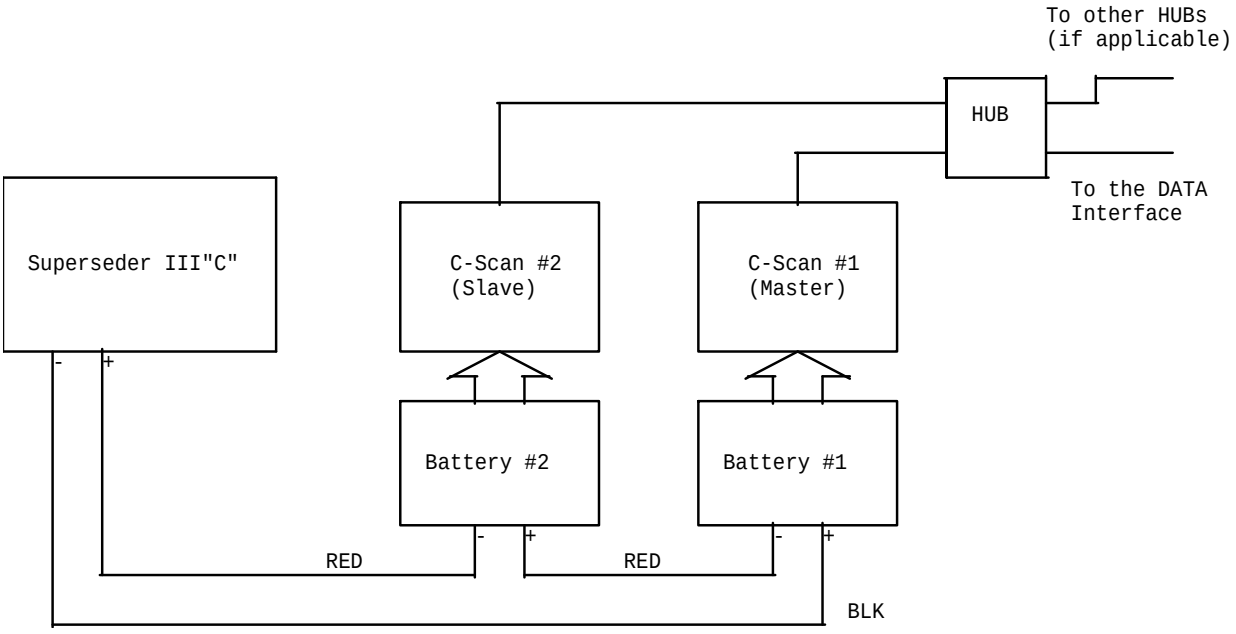


Figure 53 - Two C-Scan with one Charger-Analyzer

6.6 Programming the Test

6.6.1. Click on the Test section

6.6.2. Select the Test from the pull down menu

6.7 Recording the Test Data

6.7.1. Activate the station, if not already activated, in the In Use section.

6.7.2. A check mark will appear and the region will turn green.

6.7.3. Click on Link if the Charger-Analyzer has the “C” modification (start and stop will be under program control).

6.7.4. Setup the Charger-Analyzer for the test to be performed and start it (If Link is checked, the Charger-Analyzer will not start until the program enables it).

6.7.5. If the Rec (record) section is green, activate recording by clicking on it.

- A message screen will come up confirming that a new test will be started.
- The Charger-Analyzer will start.

6.7.6. The Status section will indicate the number of readings taken and the total number of readings. The area is Green while readings are taken and Orange when the total number of readings has been reached. See [Figure 54]

6.7.7. The E-time section will indicate the Elapsed Time in hours, minutes and seconds.

6.7.8. Monitor in the screen the progress of the Battery Voltage, Cell Voltages, Battery Current and the Battery Temperature (if the Temp-Plate option is installed).

6.7.9. When an Intelligent Charger-Analyzer (ICA) is connected, the BTAS program checks for consistency between the Test selected in the Main Screen and the Mode programmed in the ICA. If an inconsistency is detected an error message is generated.

	DT#	Work Order	Test	Step	In Use	Rec.	E-Time	Status	Link1	Charger	Chg Type	Chg Status
	0				☐	☐			☐			
▶	1	T090923-1	Top Charge-1	01	☑	☑	0:00:52	Recording 1 of 61	☑	1	ICA Super	Run
	2				☐	☐			☐			
	3				☐	☐			☐			
	4				☐	☐			☐			
	5				☐	☐			☐			
	6				☐	☐			☐			
	7				☐	☐			☐			
	8				☐	☐			☐			
	9				☐	☐			☐			
	10				☐	☐			☐			
	11				☐	☐			☐			
	12				☐	☐			☐			
	13				☐	☐			☐			
	14				☐	☐			☐			
	15				☐	☐			☐			

Figure 54 - Recording test data

6.8 Sample Screens

6.8.1. As received, battery in poor charge condition

- Red indicates cells under 1.2V
- Orange indicates cells between 1.2V and less than 1.25V
- Green indicates 1.25V or above

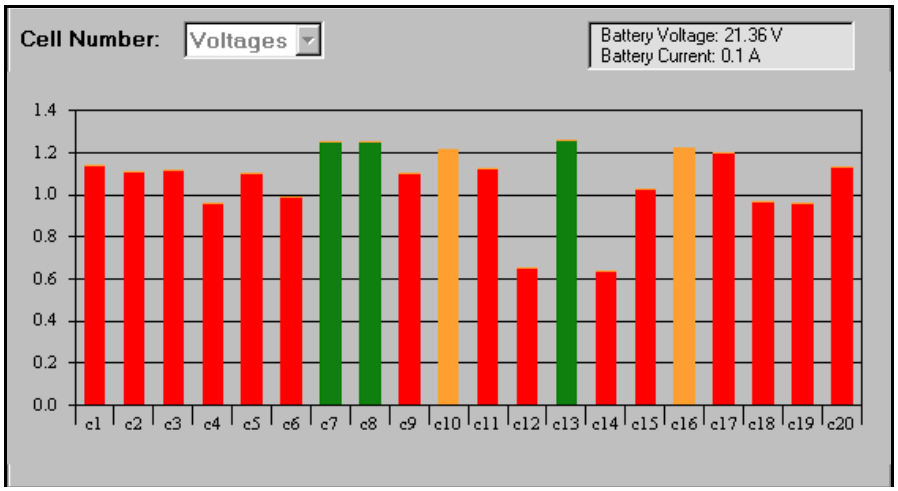


Figure 55 - Battery cells with colors for "AS RECEIVED"

6.8.2. Same battery, beginning of charge

- Yellow indicates cells under 1.2V
- Orange indicates cells between 1.2V and less than 1.25V
- Green indicates 1.25V or above

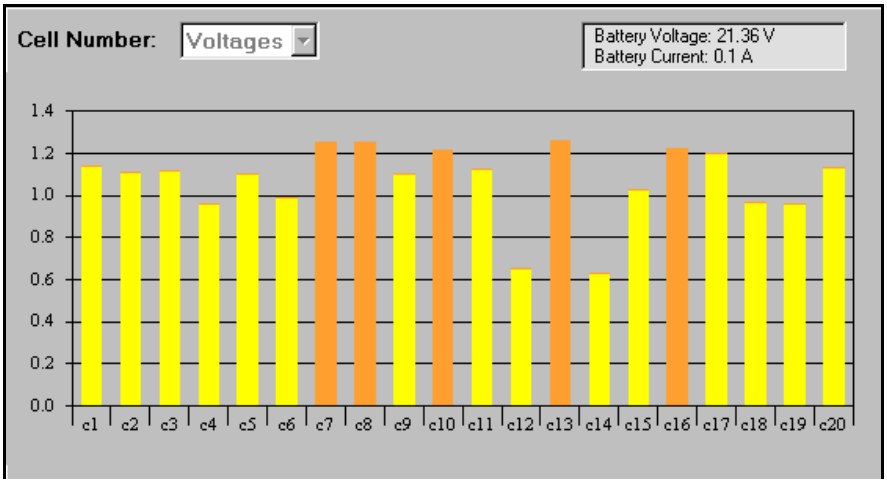


Figure 56 - Same battery cells with colors at the beginning of "CHARGE"

6.8.3. Same battery during charge

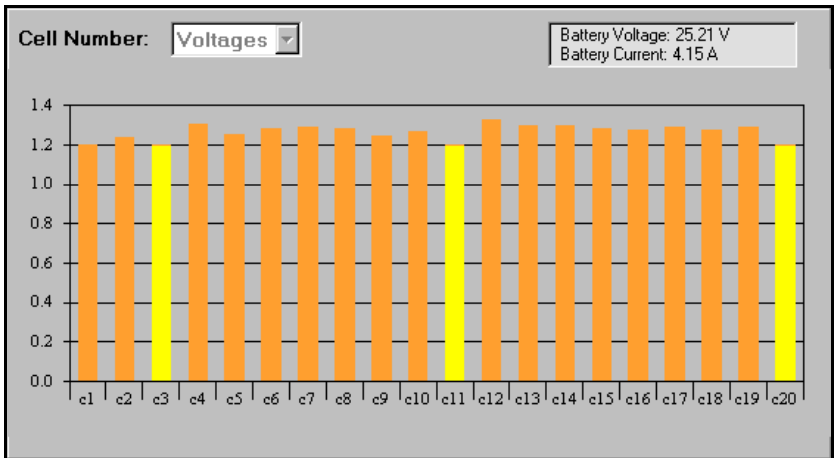


Figure 57 - Same battery cells with colors during "CHARGE"

6.8.4. Same battery, further into charge

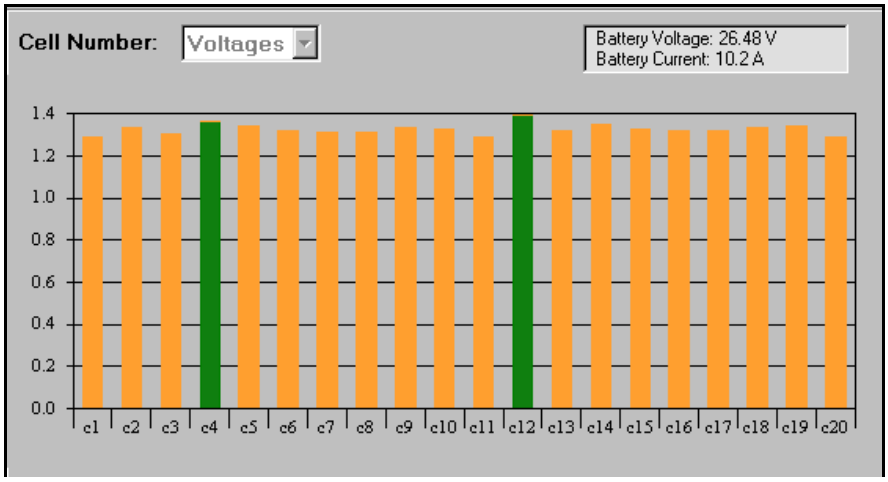


Figure 58 - Same battery with cells, showing bar colors further into "CHARGE" (higher cell voltages)

6.8.5. Same battery, capacity failure

- Red indicates less than 1V or reversed
- Orange indicates between 1.00V and 1.05V (marginal capacity)
- Green indicates 1.05V or greater

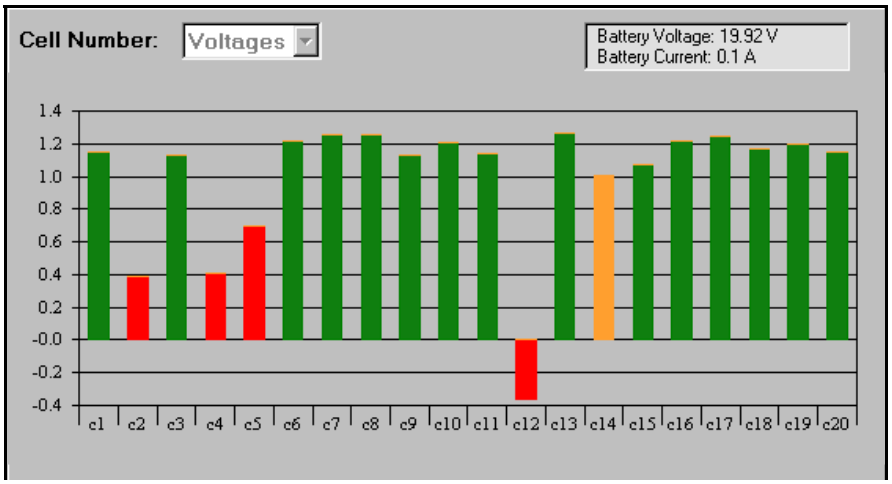


Figure 59 - Screen showing bar colors for the cells of a battery during "DISCHARGE"

6.9 Stopping the Test

Click in the **Rec.** section. A message screen will come up confirming that the readings will be stopped.

6.10 Resuming the Test

Click in the **Rec.** section. A message screen will come up asking if you wish to re-start the Test, or to start a new one.

6.11 Viewing Real Time Graphical Results (Main Screen)

The Bar Graph display can be selected to show Battery or Cell information via the respective pull down selection

6.11.1. The Battery information consists of Battery Voltage vs. Time, Battery Current vs. Time and Battery Temperature vs. Time.

- Battery voltage during discharge.
  The color change indicates the transition into “Capacity Failure”

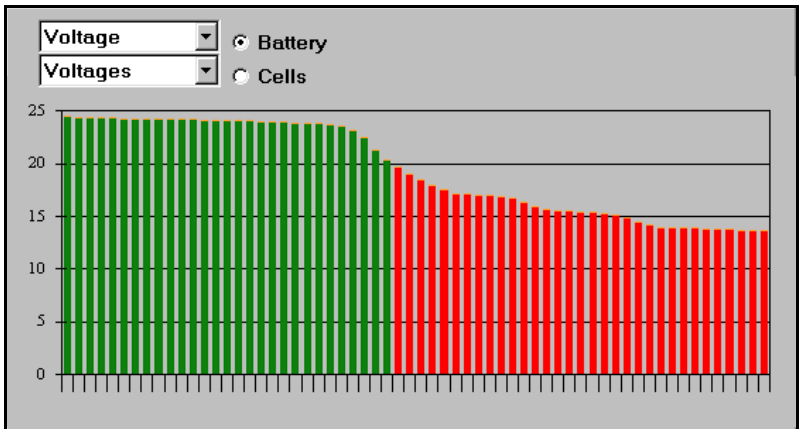


**Figure 60 - Screen showing battery voltage vs. time.
Note the color change as the battery fails capacity**

6.11.2. The Cell information consists of Real Time Cell Voltages (all cells) and Individual Cell Voltages vs. Time

Individual cell during discharge

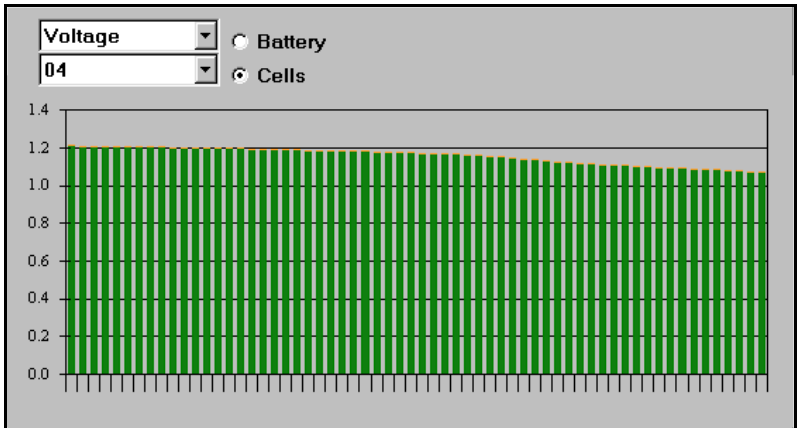


Figure 61 - Screen showing a cell voltage vs. time during capacity testing

6.12 Viewing Graphical Results

6.12.1. Click on **Graphs** and select the desired Work Order

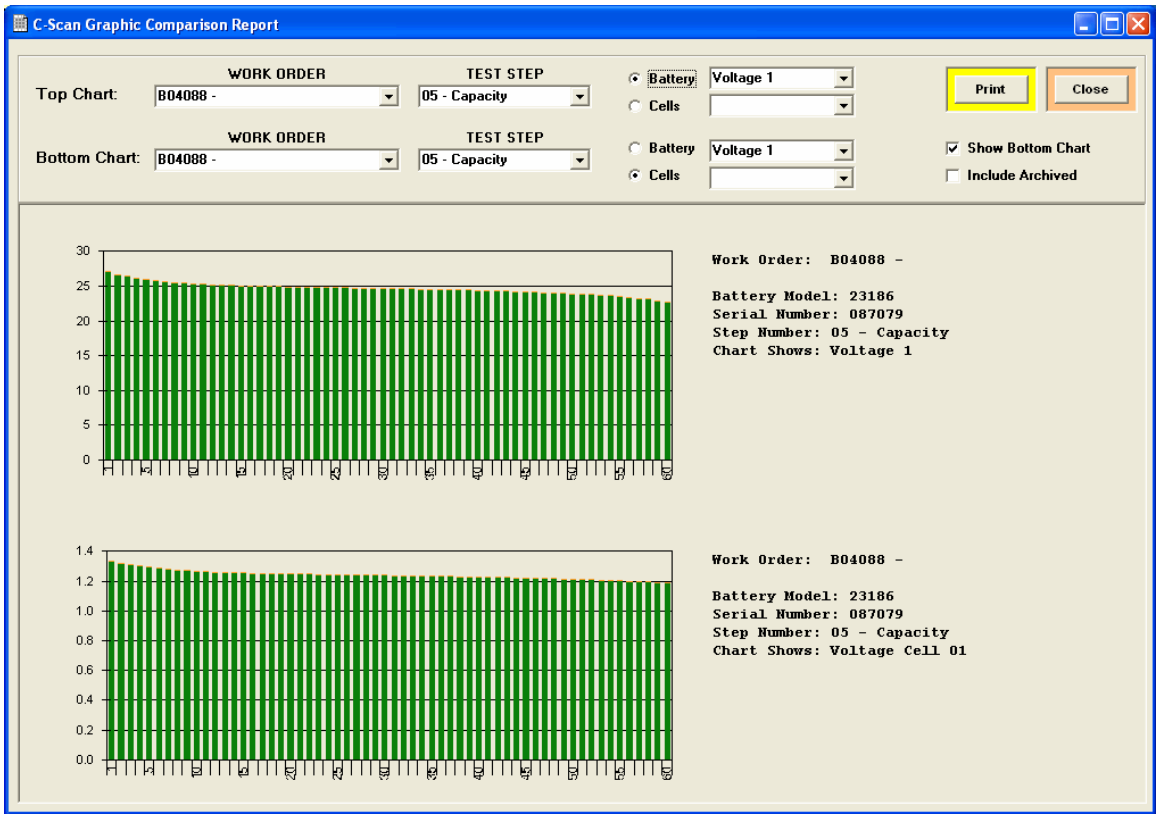


Figure 62 - Graphical Comparison Screen

6.12.2. Select SHOW BOTTOM CHART to compare results

6.12.3. Select INCLUDE ARCHIVED to compare with previously completed Work Orders

6.12.4. Select the WORK ORDER from the pull down

- Top Chart for only one result
- Top and Bottom Chart for results comparison

6.12.5. Select the TEST STEP from the pull down

- Top Chart for only one result
- Top and Bottom Chart for results comparison (e.g. First and Second Capacity Test)

6.12.6. Select BATTERY or CELLS data

- Select BATTERY to view battery data such as Voltage, Current or Temperature
- Select CELLS to view cells data such as All Cell Voltages or individual Cell Voltage (by cell number)

6.13 Viewing Numerical Results

6.13.1. Click on **View Report** and select the desired Work Order

Note: In most cases three print requests are needed, one for the basic data, one for the cell data and one for the summary (the exception is when the "Four Battery" cable is used, in which case there are no cell readings, only battery readings.

6.13.2. Select Scan Data for the basic results (total voltage, current and temperature)

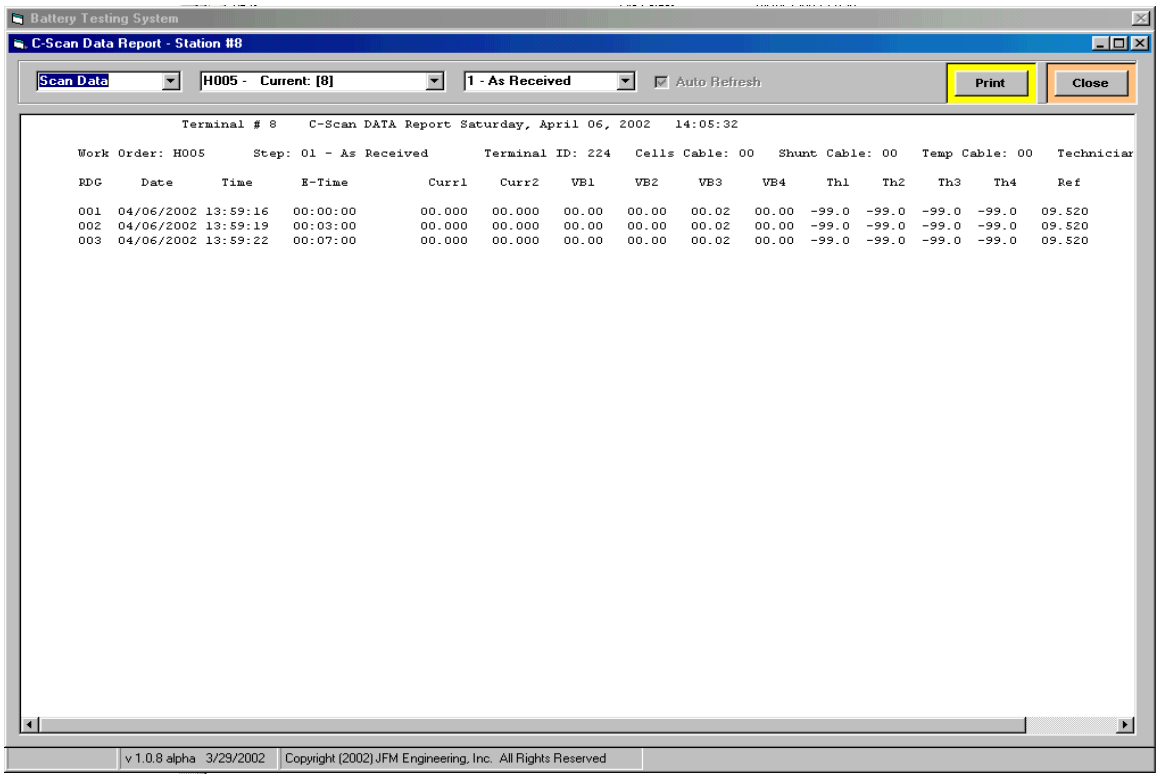


Figure 63 - Report with main battery data (reading number, date & time, Elapsed Time, Battery Voltage, Battery Current and Temperatures)

6.13.3. Select Cell Data for Cell Voltages

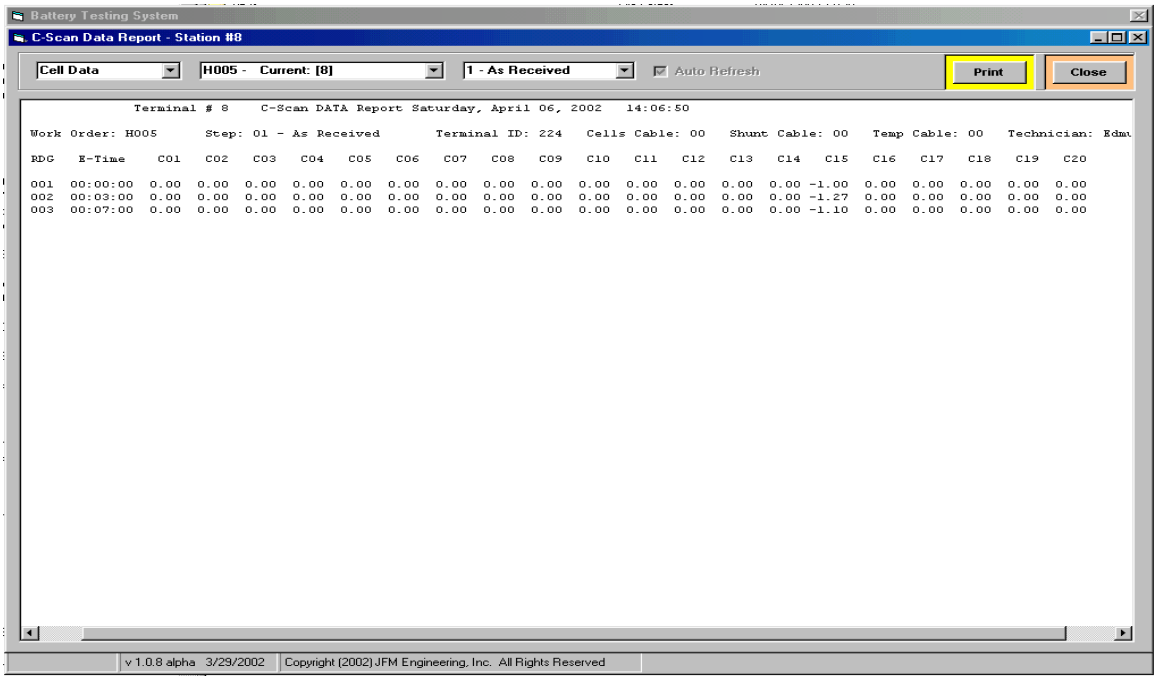


Figure 64 - Report with cells data (reading number, Elapsed Time, Cell Voltages)

6.13.4. Select Test Summary for a summary report of cell readings

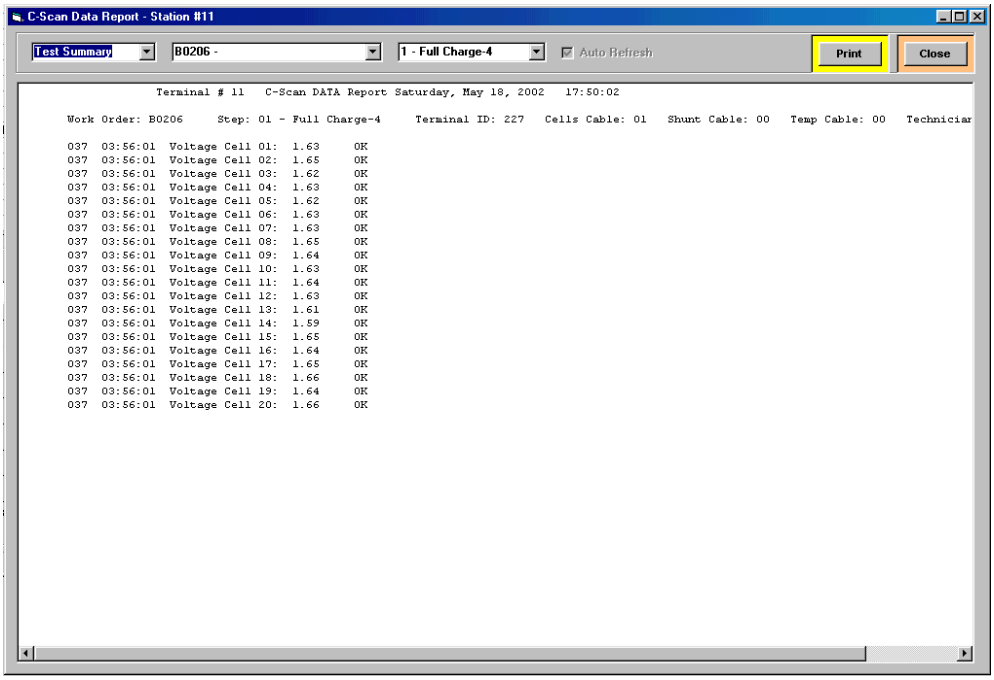


Figure 65 – Cell Readings Summary Report (end of test)

6.13.5. Select Work Order Summary for a summary report of all tests performed

Battery Work Order Summary Report Page 1

Work Order	Date	Customer	Battery	S/N	Cells	A-Hr.	Main	Top	Slow Ch.	Capacity
T031403A	03/14/2003	JFM Engineering, Inc.	7-75M3	NSN	7	75	40A/2h	8A/4h	A/h	40A/115m

Test Performed	Time Started	Time Completed	Station	Charger	Technician	Notes
01 As Received	03/14/2003 09:55:25	03/14/2003 09:55:25	7	Superseder	Edmundo	

	C01	C02	C03	C04	C05	C06	C07	C08	C09	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C01
min	1.22	1.22	1.22	1.22	1.22	1.22	1.22		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.5

Test Performed	Time Started	Time Completed	Station	Charger	Technician	Notes
02 As Received	03/14/2003 09:57:31	03/14/2003 09:57:31	7	Superseder	Edmundo	

	C01	C02	C03	C04	C05	C06	C07	C08	C09	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C01
41 min	1.32	1.31	1.30	1.31	1.31	1.31	1.32		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.1

Test Performed	Time Started	Time Completed	Station	Charger	Technician	Notes
03 Full Charge-6	03/14/2003 09:58:46	03/14/2003 09:58:46	7	Superseder	Edmundo	

	C01	C02	C03	C04	C05	C06	C07	C08	C09	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C01
05:57 hrs	1.73	1.73	1.77	1.76	1.74	1.75	1.76		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.

Test Performed	Time Started	Time Completed	Station	Charger	Technician	Notes
04 Custom Capacity	03/17/2003 08:53:28	03/17/2003 08:53:28	7	Superseder	Edmundo	

	C01	C02	C03	C04	C05	C06	C07	C08	C09	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C01
01:59 hrs	1.00	1.05	1.06	1.07	1.06	1.05	0.92		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.2

Figure 66 - Summary Report with cell voltage results from all tests performed

6.13.6. Select Work Order Log for a list of all tests performed for a specific Work Order.

Work Order Log for: T022103-1 Monday, March 10, 2003 1:03:52 PM

Test Performed	Time Started	Time Completed	Station	Charger	Technician	Notes
01 As Received	2/21/03 10:02:32	2/21/03 10:02:32	5	Superseder	Pepe	
02 As Received	2/21/03 13:22:17	2/21/03 13:22:17	7	Superseder	Pepe	
03 As Received	2/21/03 13:22:25	2/21/03 13:22:25	7	Superseder	Pepe	
04 Full Charge-6	2/24/03 08:26:37	2/24/03 08:26:37	7	Superseder	Pepe	
06 Full Charge-6	2/25/03 09:25:43	2/25/03 09:25:43	7	Superseder	Pepe	
07 Custom Capacity	2/28/03 08:47:17	2/28/03 08:47:17	7	Superseder	Pepe	
08 Full Charge-6	2/28/03 12:25:09	2/28/03 12:25:09	7	Superseder	Pepe	
09 Custom Capacity	3/3/03 08:28:13	3/3/03 08:28:13	7	Superseder	Pepe	
10 Custom Charge	3/3/03 11:20:27	3/3/03 11:20:27	7	Superseder	Pepe	
11 Custom Capacity	3/4/03 08:43:49	3/4/03 08:43:49	7	Superseder	Pepe	
12 Custom Charge	3/5/03 12:31:47	3/5/03 12:31:47	7	Superseder	Pepe	
13 Full Charge-6	3/5/03 12:32:17	3/5/03 12:32:17	7	Superseder	Pepe	
14 Custom Capacity	3/7/03 09:38:02	3/7/03 09:38:02	7	Superseder	Pepe	
15 Custom Charge	3/7/03 13:34:20	3/7/03 13:34:20	7	Superseder	Pepe	
16 Custom Charge	3/7/03 13:34:33	3/7/03 13:34:33	7	Superseder	Pepe	
17 Custom Capacity	3/10/03 09:05:23	3/10/03 09:05:23	7	Superseder	Pepe	

Figure 67 - Work Order Log with record of tests performed

6.14 Printing results

6.14.1. Click **Print** to print the data displayed

7. Charger-Analyzer Monitoring and Control

This is for the monitoring and control of specially modified ("C" modification) versions of the Superseder III and MasterCharger and for the new Intelligent Charger-Analyzers (SupersederXG, SuperMasterCharger, 24-400XG and miniMasterCharger) that communicate directly with the BTAS.

7.1 Modified Charger-Analyzers

7.1.1. Connect the control cable from the rear of the C-Scan to the control connector (or cable) on the Charger-Analyzer.

Figure 68 - C-Scan Rear Panel

7.1.2. Verify that the column named "Charger" turns green if the Charger-Analyzer is ON or red if it is OFF.

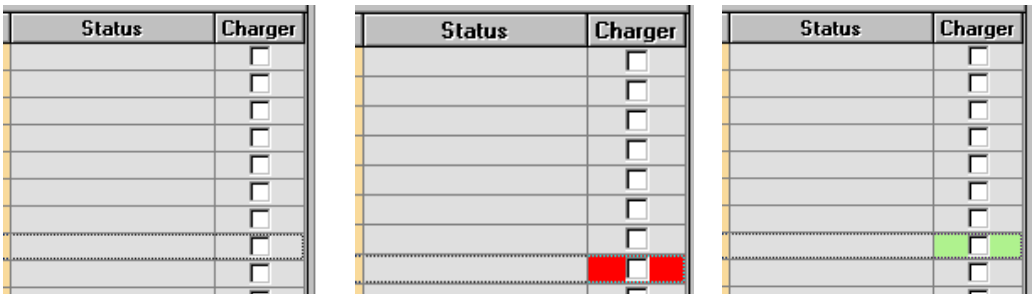


Figure 69 – Charger-Analyzer status

7.1.3. Click on the little box inside the area. If the power is ON for the Charger-Analyzer, then the color will change from green to yellow to indicate that the charger is now controlled (held) by the C-Scan.

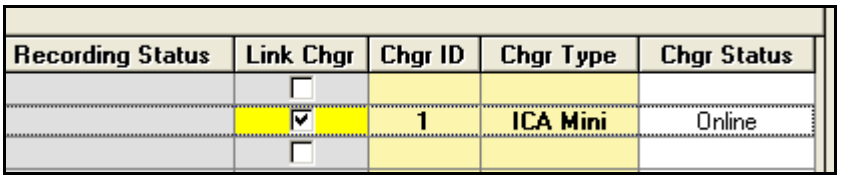


Figure 70 - Charger is ON and Linked to the C-Scan Data Terminal

7.1.4. Program the Charger-Analyzer and start it. Verify that it will not run.

7.1.5. Start the test in the BTAS16 screen and verify that the Charger-Analyzer is now running (current is flowing). If the system detects that there is no current in the Charger-Analyzer (three attempts), the program will stop the test.

7.1.6. The test (recording) will be terminated at the completion of the programmed test in the BTAS16 or if the Charger-Analyzer has stopped (no current).

7.2 Intelligent Charger-Analyzers

7.2.1. Connect a control cable to the Rear Panel of the Charger-Analyzer (connector labeled BTAS) – see [Figure 71]

Figure 71 – Rear Panel Connections

7.2.2. Enter a Terminal ID number (0 to 15) on the Charger-Analyzer

7.2.3. Enter a Work Order

7.2.4. Select from the **Charger** column pull-down, the number assigned to the Charger-Analyzer

7.2.5. Verify that the Charger-Analyzer is recognized – see [Figure 72]

DATA TERMINAL STATUS

DT#	Work Order	Test	Step	In Use	Rec.	E-Time	Status	Link1	Charger	Chg Type	Chg Status
0				☐	☐			☐			
1	T090922-2	As Received		☑	☐	0:00:00		☐	1	ICA Super	Online
2				☐	☐			☐			
3				☐	☐			☐			
4				☐	☐			☐			
5				☐	☐			☐			
6				☐	☐			☐			
7				☐	☐			☐			
8				☐	☐			☐			
9				☐	☐			☐			
10				☐	☐			☐			
11				☐	☐			☐			
12				☐	☐			☐			
13				☐	☐			☐			
14				☐	☐			☐			
15				☐	☐			☐			

Figure 72 – Screen showing that the Charger is On Line (controllable)

DT#	Work Order	Test	Step	In Use	Rec.	E-Time	Status	Link1	Charger	Chg Type	Chg Status
0				☐	☐			☐			
1	T090923-1	Top Charge-1	01	☑	☑	0:00:52	Recording 1 of 61	☑	1	ICA Super	Run
2				☐	☐			☐			
3				☐	☐			☐			
4				☐	☐			☐			
5				☐	☐			☐			
6				☐	☐			☐			
7				☐	☐			☐			
8				☐	☐			☐			
9				☐	☐			☐			
10				☐	☐			☐			
11				☐	☐			☐			
12				☐	☐			☐			
13				☐	☐			☐			
14				☐	☐			☐			
15				☐	☐			☐			

Figure 73 – Screen showing that the Charger is running

DATA TERMINAL STATUS

DT#	Work Order	Test	Step	In Use	Rec.	E-Time	Status	Link1	Charger	Chg Type	Chg Status
0				☐	☐			☐			
1	T090923-1	Top Charge-1	01	☑	☐	0:01:50	Recorded 2 of 61	☑	1	ICA Super	Hold
2				☐	☐			☐			
3				☐	☐			☐			
4				☐	☐			☐			
5				☐	☐			☐			
6				☐	☐			☐			
7				☐	☐			☐			
8				☐	☐			☐			
9				☐	☐			☐			
10				☐	☐			☐			
11				☐	☐			☐			
12				☐	☐			☐			
13				☐	☐			☐			
14				☐	☐			☐			
15				☐	☐			☐			

Figure 74 – Screen showing that the Charger is on hold

8. Water Level

To record the water dispensed into each of the cells, select the Data Terminal (DT#) with the applicable Work Order and open the Water Level pull-down.
Verify that the window opens with the required Work Order number or manually select a different Work Order.

8.1 Manual

- Enter the amount of water dispensed into each of the cells in CCs (no decimals)
- When finished, click on Save Data to store the information under the selected work order.
- Close the Water Level screen

8.2 Automatic

- Set the MasterFiller to be ready to communicate with BTAS.
- Click Acquire for BTAS to interrogate the MasterFiller.
- Verify that the data received is proper (edit manually is needed)
- Click on Save Data to store the information under the selected work order.
- Close the Water Level screen

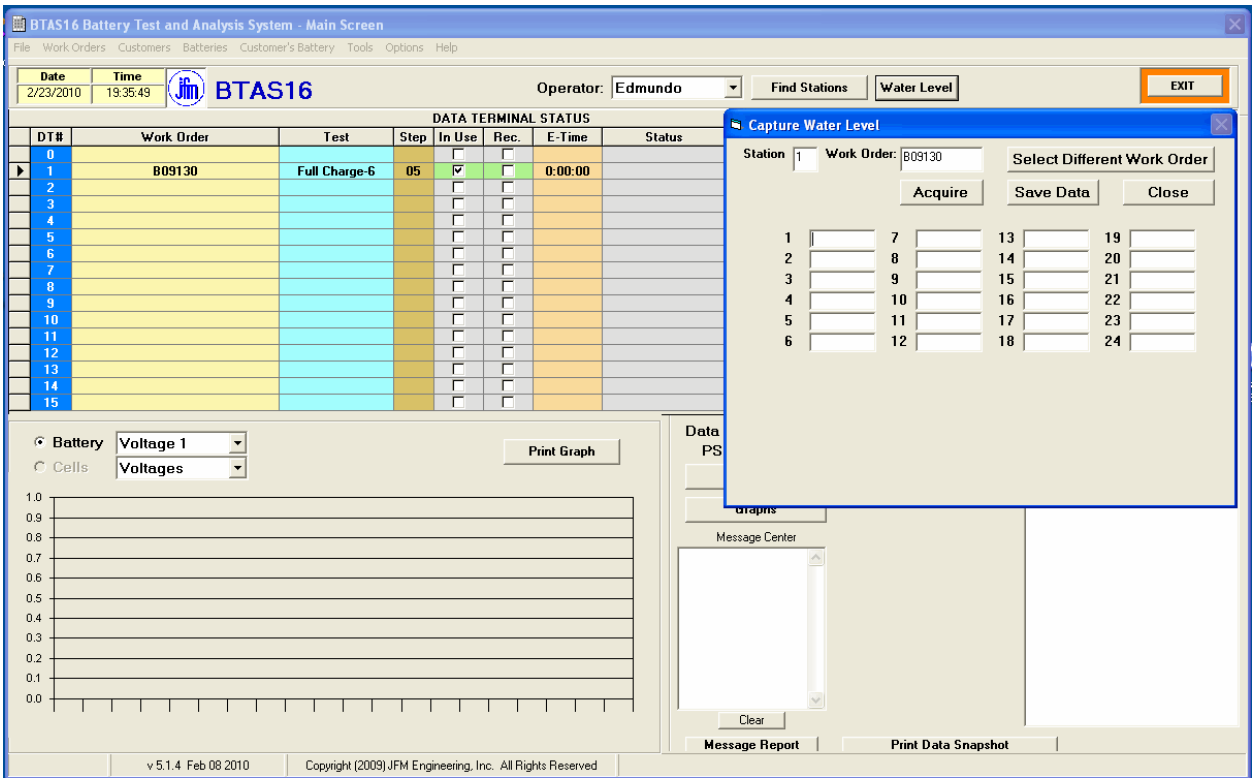


Figure 75 – Main Screen with Water Level sub Screen

9. Calibration

There are no adjustments to perform in on any part of this system. A verification of performance, however, is to be performed to determine if the system is functioning correctly. In case of uncorrectable situations, contact the distributor or manufacturer for applicable repairs.
Perform at least once per year or at any time, to determine the integrity of the system.
(See Verification of Performance)

10. Verification of Performance

10.1 Cell Simulator

10.1.1. The **Cell Simulator** generates simulated cell voltages, battery voltages, currents and temperatures as needed for system test and verification.

10.1.2. The stair case pattern and resulting screen colors are used to quickly determine if all cell channels are reading correctly without the need for actual voltage measurements.

10.1.3. All numerical information is made available at the right hand window of the Main Screen and can be printed by clicking on **Print Data Snapshot** to have a record of the test

10.1.4. The **Cell Simulator** can be set to simulate a 20 cell battery, two, 11 cell batteries, three, 7 cell batteries or display all 24 cell channels.

10.1.5. In addition, front panel switches can be used to simulate the Charger-Analyzer connected/disconnected and with power-on/power-off.

10.1.6. Simulation of a 20-cell battery (default simulation mode)

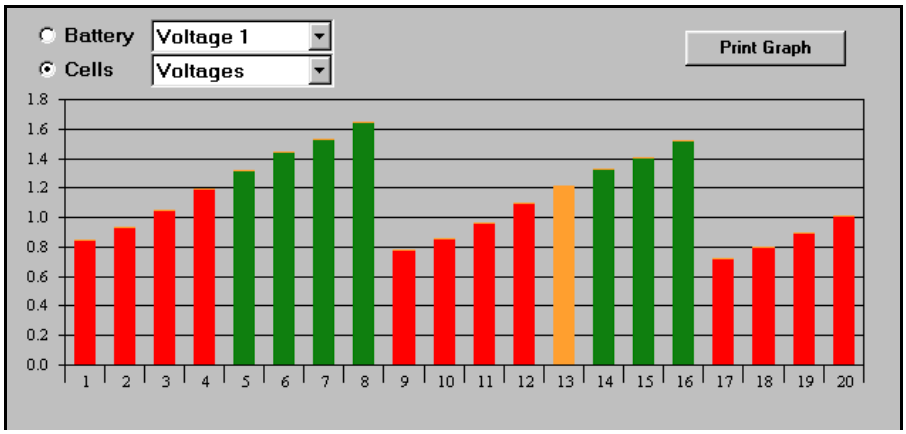


Figure 76 - Cells simulation for a 20 cell battery

10.1.7. Simulation of two 11-cell batteries

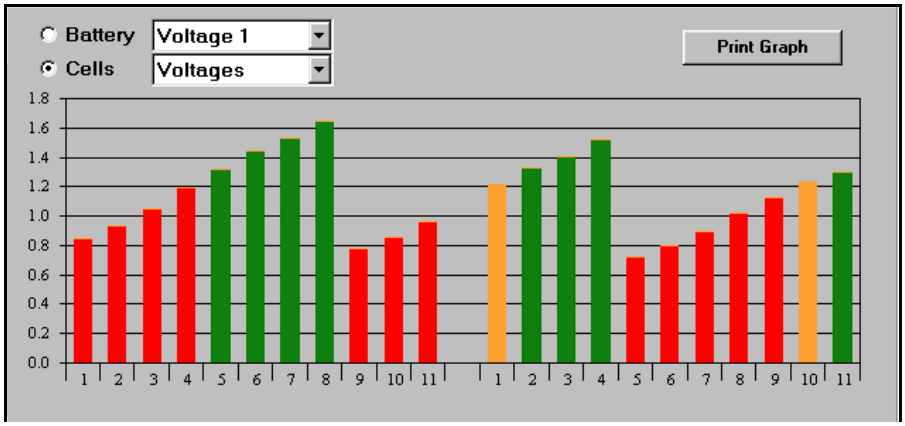


Figure 77 - Cells simulation for two eleven cell batteries

10.1.8. Simulation of three 7-cell batteries.

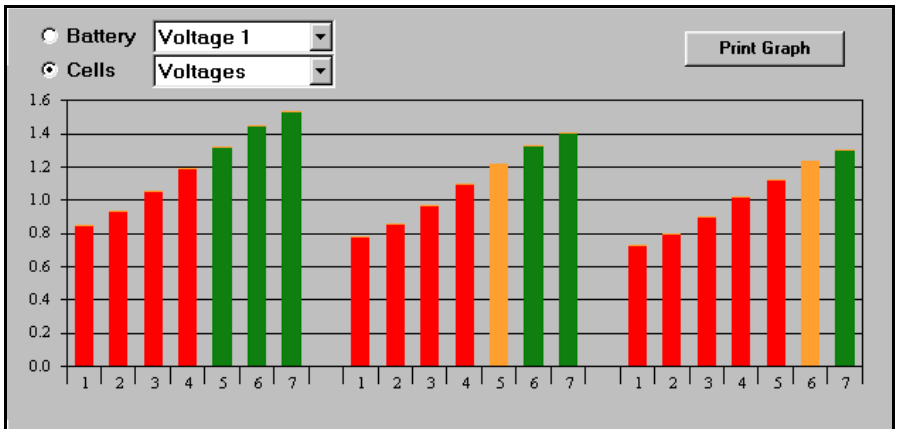


Figure 78 - Cells simulation for three seven cell batteries

10.1.9. Test of all 24 channels

Figure 79 - Simulation for 24 cells

10.1.10. Cable simulation Selector Switch

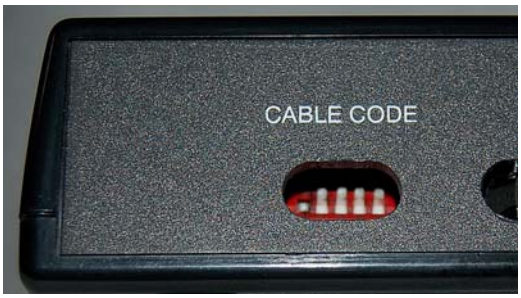


Figure 80 - Cable Code Switch (#1 shown)

Cable Codes:

1 – 20 Cells
2 – 19 Cells
3 – 2x11 Cells
4 – 3x7 Cells
10 – Four Batteries
17 – 20 Cell Crown
19 – 2x11 Cell Crown
20 – 3x7 Cell Crown
22 – 22 Cells
31 – 24 Cells (Test)

10.1.11. Charger-Analyzer Simulation (for controllable, non-intelligent equipment)

Refer to the switches as shown in Figure 81

Figure 81 - Cell Simulator Front Panel Switches

- CON simulates that the Charger-Analyzer Control Cable is connected
- PWR simulates that the Charger-Analyzer is turned ON
- TYPE is not used at this time

10.2 External Measurements

Using external measurements of voltage and current for system test and verification

10.2.1. Perform an AS RECEIVED test on a battery using an external voltmeter and compare the internal system readings with the external measurements.

10.2.2. Perform a charge or discharge test using an external ammeter or shunt and compare the internal system readings with the external measurements.

10.2.3. For any of the tests print a Data Snapshot for record purposes.

11. Tools

11.1 Change Custom Times

For tests requiring time periods other than what is available in the standard list, enter the required duration for Charge and Capacity tests

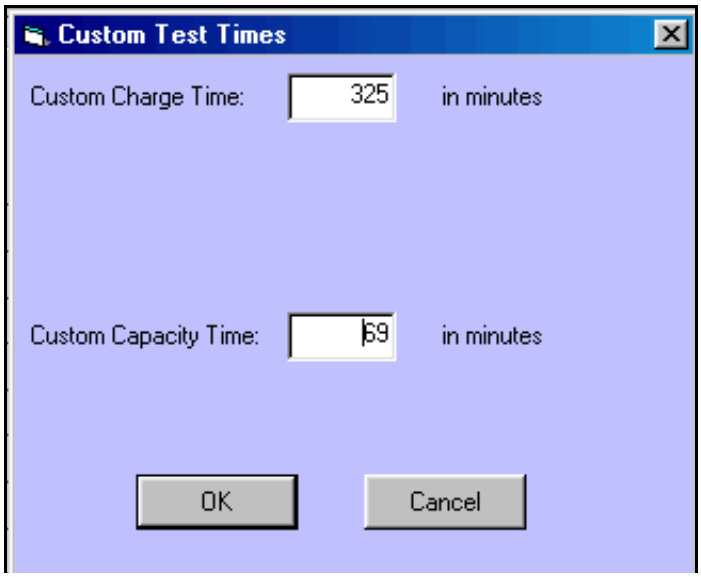


Figure 82 - Screen to change custom charge and discharge times (in minutes)

11.2 Fast Readings

Note: For test and demonstration purposes only!

11.2.1. Select FAST READINGS to perform system tests, demonstrations and training.

Note: Do not use if normal tests are running.

11.2.2. Note that a large message is displayed to alert that Fast Readings has been selected.

11.2.3. Return to normal before starting new tests.

11.3 Debug

Use the debug mode to display additional information from the C-Scan Terminals for test and debugging purposes.

11.4 Technicians

Use Edit Technicians to add, edit or delete the names of the system operators

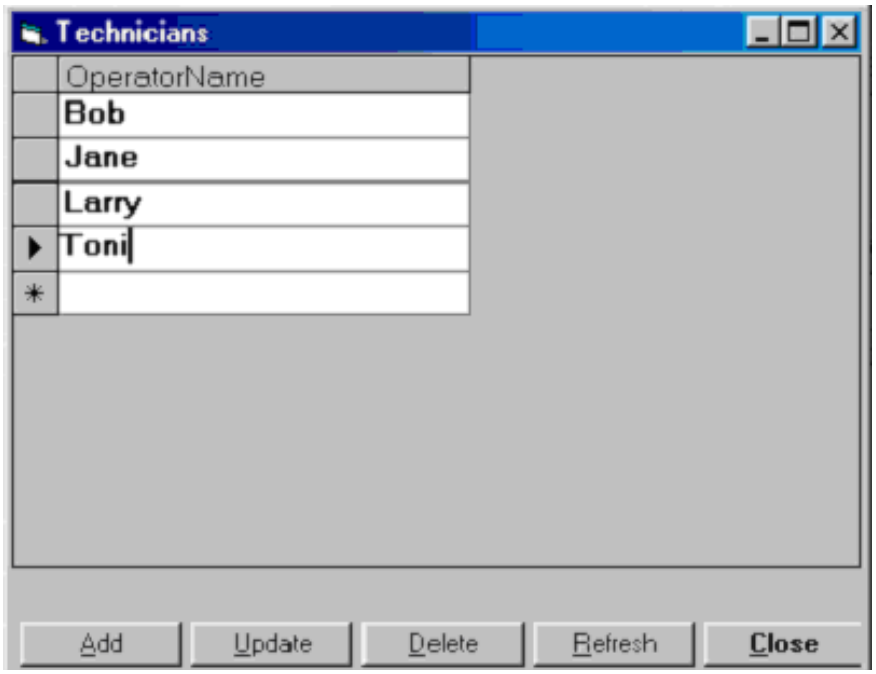


Figure 83 - Screen to enter/edit the names of the system operators

12. Installation

12.1 Power (mains):

12.1.1. Provide backed-up (UPS) power for the computer, peripherals and BTAS devices.

12.1.2. Insure that there is a solid earth ground connection between the charger analyzers and the BTAS.
Note: a faulty earth ground will result in unstable current and corrupted communication between the computer and the C-Scans and Charger-Analyzers.

12.2 Computer

12.2.1. Install and test the computer and its peripherals in accordance to the instructions from the computer manufacturer.

12.2.2. Install the BTAS program per the instructions provided with and within the installation CD.

12.3 Connections

12.3.1. Connect the BTAS devices and test per section [2]

12.4 Test

12.4.1. Perform a Verification of Performance to determine the integrity of the installation, per section [10]

12.5 System Installation Pictures

Typical connections in a BTAS16 system

12.5.1. Data Interface and C-Scan

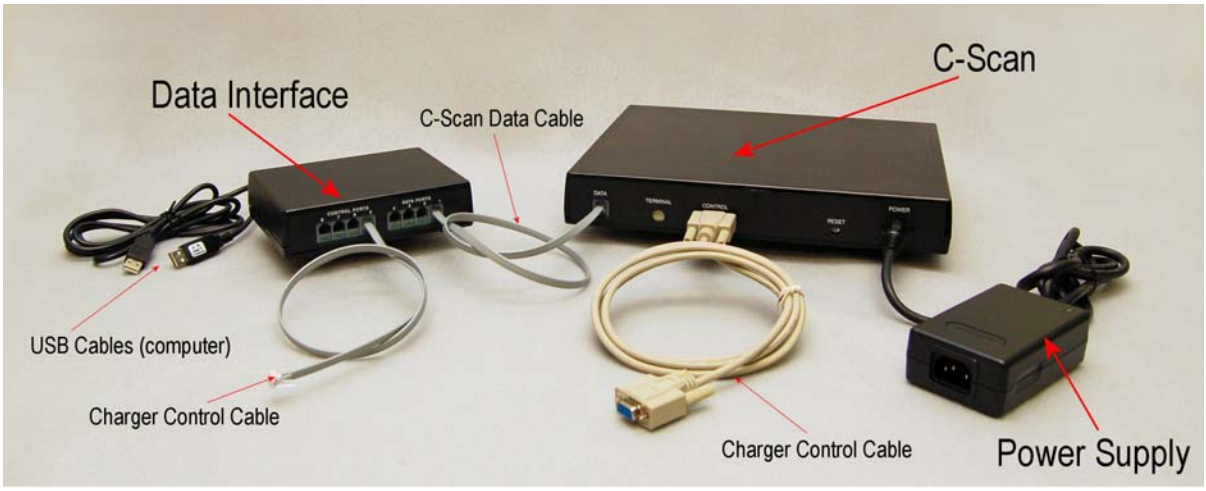


Figure 84 – Data Interface and C-Scan

12.5.2. Cell Simulator and C-Scan

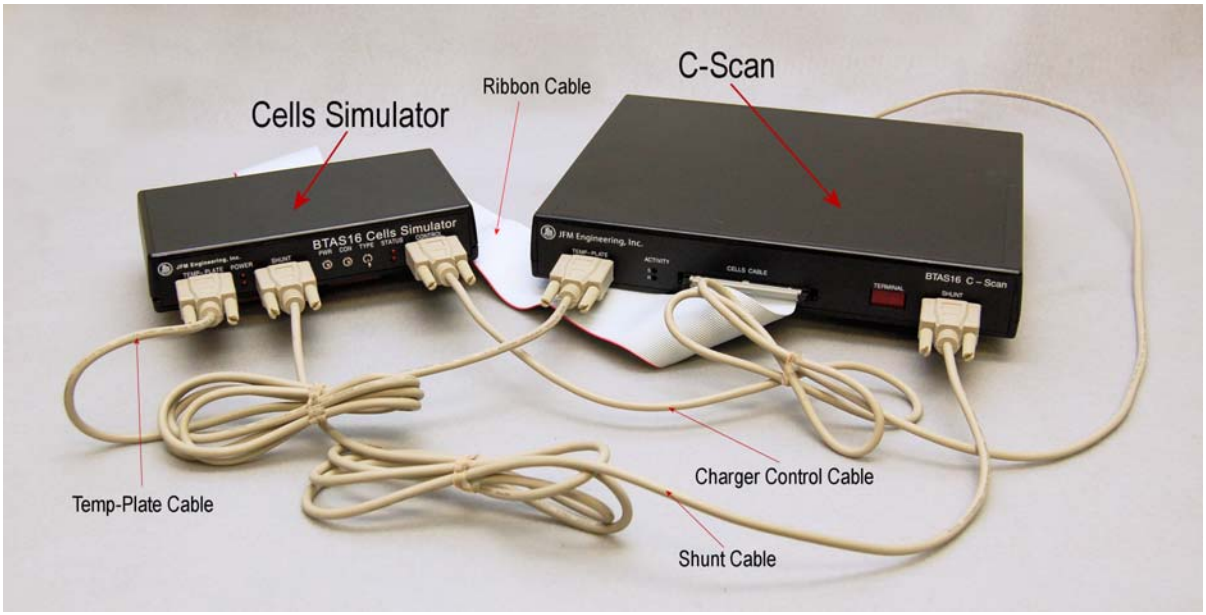


Figure 85 – Cell Simulator and C-Scan

12.5.3. Temp-Plate and C-Scan

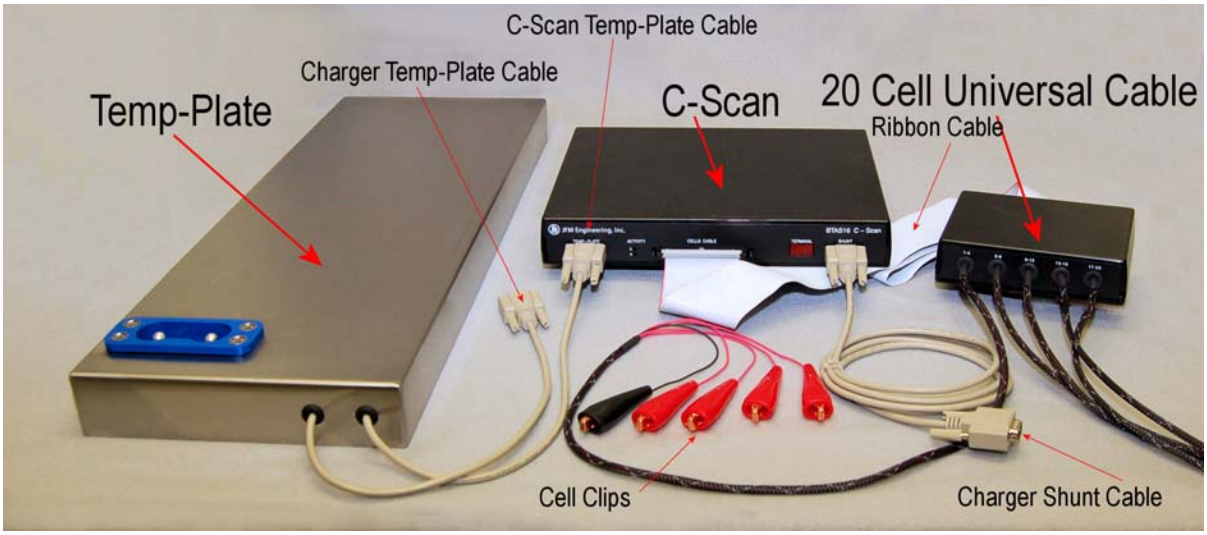


Figure 86 – Temp-Plate and C-Scan

12.5.4. Charger-Analyzer, Data Interface, C-Scan and Temp-Plate

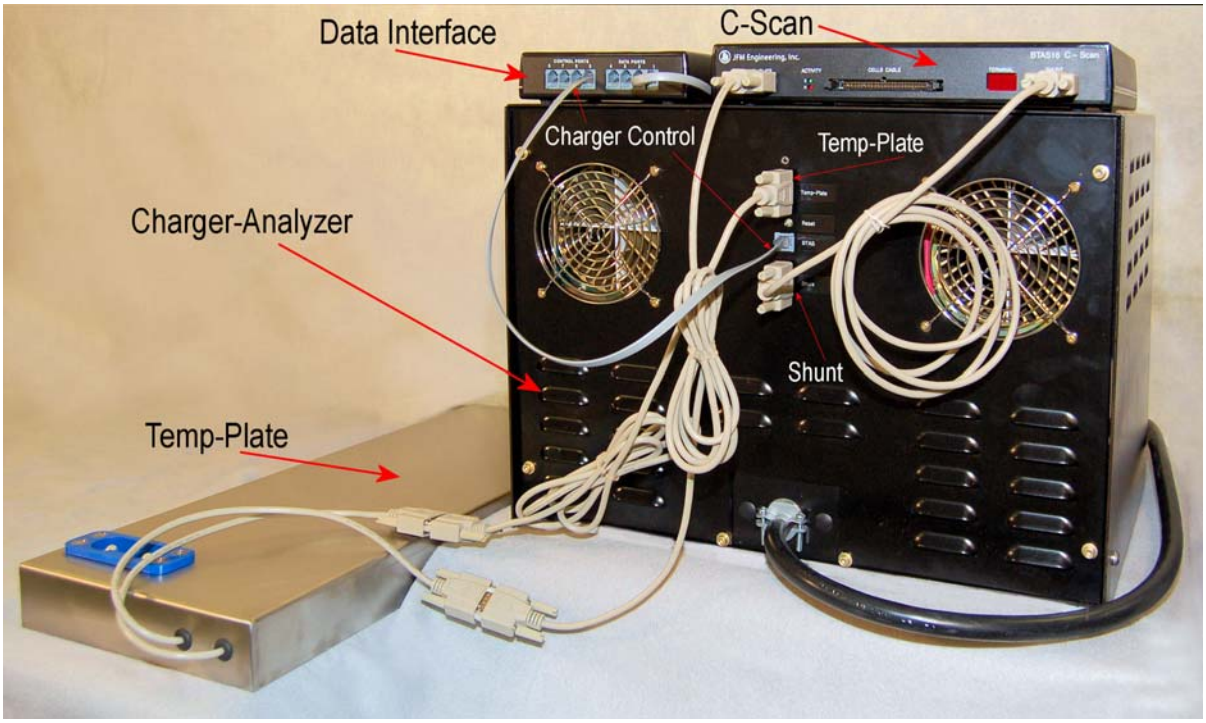


Figure 87 – Charger-Analyzer, Data Interface, C-Scan and Temp-Plate

13. System Maintenance

13.1 Data Files

Data Files are located in the folder C:\btsPrg\BTS Files. The name of the file is BTS16NV.mdb

13.2 Data File Backup

For best safeguard from data losses, backup data on a daily basis.

In case of heavy daily workload, backup data more than once a day.

13.2.1. Click on FILE

13.2.2. Click on BACKUP DATA BASE

13.2.3. The program will respond with the message: Backup Successful

13.2.4. The Back-up files are stored in C:\btsProg\Backup and are named with the date and time of the backup.

13.2.5. Alternate File Backup

13.2.6. Copy and store the file BTS16NV.mdb. Rename the file adding the date of the copy.

13.2.7. Copy the Data onto CDs and store in a safe place.

13.3 Data File Restore

Copy the data from the latest backup and rename it BTS16NV.mdb into the folder C:\btsProg\BTS Files

13.4 Viewing Data Files

The content of the data files can be viewed using MS Access (2000 or XP)

Caution: Altering the file structure or contents could render the system unusable.

13.5 Software Location and Updates

13.5.1. Review the notes pertaining to the latest software release. The notes will indicate if this is a mandatory file replacement (to correct a problem) or if it is optional (new functionalities, screen changes, etc.).

13.5.2. The program file is named btsProg.exe and it is located within the directory C:btsProg

13.5.3. If updates are received, there will be an updated btsProg.exe file (Inside a ZIP folder).

13.5.4. Rename the existing file by adding program version as in “btsProg-rev.exe”

13.5.5. Copy the new file into the C:btsProg directory.

13.5.6. Start the program and note the revision level in the bottom left hand side of the screen. Verify that it is consistent with the information received with the update.

14. Troubleshooting

14.1 List of common operational issues

#	Problem	Probable Cause	Solution
12.1.1	C-Scan Terminal Number not visible	• No Power • No communication with the computer	• Connect power • Press the RESET button in the rear panel of the C-Scan
12.1.2	C-Scan Scan Indicator not turning on (not blinking)	• C-Scan data cable not plugged-in • Program not running • Data Interface with no power or not connected.	• Connect the data cable in the back of the C-Scan • Start the program • Verify that power is on for the Interface and that the Interface is connected to the Computer.
12.1.3	C-Scan Reading indicator not turning on (not blinking)	• Data Terminal not selected in the main screen	• Click the corresponding IN USE check-box
12.1.4	IN USE box is RED	• C-Scan not responding.	• See 3.2 • Verify that the data cables are properly connected all the way to the Interface Box. • Temporarily connect a different C-Scan Terminal and determine if the problem is with the cabling or with the original terminal. • Reset or Disconnect and re-connect power • C-Scan defective
12.1.5	No battery cell readings	• Crown or Cell Cables not connected to the battery. • Ribbon Cable not connected to the C-Scan	• Connect Crown or Cell Cables to the battery. • Connect Ribbon Cable to the C-Scan
12.1.6	One or more cells not reading correctly when using a crown	• Improper contact with the cell link.	• Verify that the link in the battery and the spring loaded contact in the Crown are free from corrosion. • Clean or replace links and contacts as necessary
12.1.7	Cannot fit the crown on to the battery	• Crown shape, size, or configuration not for the battery. • Attempting to fit the crown backwards. • Battery can is distorted	• Use a crown made for the battery. • The proper orientation of the crown is with the ribbon cable opposite to the battery connector. • Straighten up the distortion in the battery can until the crown fits the battery properly.
12.1.8	One or more cells not reading correctly when using the Cables with Clips	• Clips out of sequence or reversed • Corroded clip • Broken connection	• Verify that clips are placed in the correct order (cell #1 is the most negative one). • Clean or replace the clip • Repair the connection

12.1.9	The number of cells reported is not consistent with the number of cells in the battery when using the Cables with Clips.	• Cable not consistent with the battery type.	• Replace with the cable wired for the specific number of cells. (Verify the type of cable reported in the top section of the numerical results screen).
12.1.10	Recording stops after three attempts	• No current is detected – check for the "No Current" error message.	• Verify that the Shunt Cable is connected to the C-Scan.
12.1.11	No temperature data	• Temp-Plate Cable not connected to the C-Scan	• Verify that the Temp-Plate Cable is connected.
12.1.12	No control of Charger-Analyzers.	• Control Cable not connected between the Charger-Analyzers and the Data Interface or between the Charger-Analyzer and the C-Scan. • Link Charger not selected	• Verify that the Control Cable is connected. • Verify that Link Charger is checked
12.1.13	Recordings are too frequent (seconds)	• Fast Mode turned on	• Check Fast Readings off in the Tools Menu
12.1.14	The number of recordings is less than expected	• Recording turned off prematurely. • Charger-Analyzer terminated prematurely (no current detected) • Charger-Analyzer terminated ahead of the program.	• Check for proper system operation. • Check the time programming in the Charger-Analyzer • It is normal for the Charger-Analyzer to finish ahead of the program. Program an additional minute in the Charger-Analyzer
12.1.15	The colors of the Cells Bar Graph in the Main Screen change color after a test is finished.	• The Cells Bar Graph in the Main Screen is real time. Voltages in a battery at rest will change (If it was being discharged, the cell voltages will go up and vice-versa).	• The color coding in the Bar Graphs is always in accordance to the test requested (or just finished). • For true end-of-test readings, check the display through the Graphs Screen.
12.1.16	Current readings are unstable or different at the BTAS screen but are stable at the charger.	• Improper earth grounding between the charger(s) and the BTAS computer.	• Verify/rectify the integrity of the earth grounding between the charger(s) and the BTAS computer.

14.2 List of current program shortcomings.

#	Section	Problem	Solution
12.2.1	N/A	• N/A	• N/A
12.2.2	Timing	• The timing of records is off by seconds	• Normal Windows limitation – does not affect the accuracy of the System
12.2.3	Screen	• Occasional blinking	• Normal limitation of the Windows programming.
12.2.4	Work Orders	• Deleting the Work Order that is last in the list causes an error message and a program shutdown.	• Create a fictitious work order and call it ZZZZZZ to make sure that it will always be the last in the list (and do not delete it).
12.2.5	Work Orders	• After archiving a second Work Order, there is an apparent sequence error in the Edit Work Order Screen.	• Close the Edit Work Order Screen – The sequencing will be restored the next time that the Edit Work Orders Screen is re-opened. • Archive only one Work Order at a time.

15. Parts List

List of parts used in the BTAS16 System

15.1 Data Interface – P/N 9895516003

15.2 Data Hub – P/N 9895516001 (optional)

15.3 C-Scan – P/N 9895202001

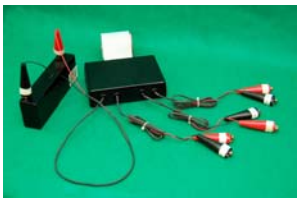
15.4 Cell Simulator – P/N 9895202301

15.5 Universal 20 Cells Cable – P/N 9895202L20

15.6 External Shunt - P/N 9895202803 (Charger-Analyzer dependent)

15.7 Four Battery Cable – P/N 9895202804 (optional)

Note: battery shown for reference only



15.8 20 Cell Cable with Universal (small) Clips – P/N 9895202M20

15.9 2x11 Cell Cable with Universal Clips – P/N 9895202D11

15.10 3x7 Cell Cable with Universal Clips – P/N 9895202307 (optional)

15.11 Data Cable 6 (6 conductor cable with plugs; 12 ft) – P/N 6079M0D612

15.12 Data Cable 9 (9 conductor cable with DB9 plugs; 6 ft) – P/N 6079DB9MF6

15.13 Bar Code Scanner – (optional)

16. DISCLAIMER

16.1 The BTAS16 is a precision system intended to be operated by personnel qualified in the servicing of aircraft, industrial or medical batteries.

16.2 JFM Engineering's responsibility is limited to the repair/replacement of any malfunctioning part of the system (not responsible for any losses incurred from the usage of the system).

16.3 User's Responsibility

16.3.1. It is the user's responsibility to verify suitability in the intended application.

16.3.2. It is the user's responsibility to verify the performance of the instruments and to operate and maintain it in accordance with the above given instructions.

16.3.3. It is the user's responsibility to test batteries in accordance to the instructions and recommendations of the manufacturers of the batteries.

16.3.4. It is the user's responsibility to operate the Instrument within standard safety procedures applicable to the operation of a Battery Test Facility.

16.3.5. It is the user's responsibility to install power receptacles and wiring in accordance with local wiring codes.

16.3.6. It is the user's responsibility to observe all necessary precautions and to be equipped with personal protective equipment when working with batteries to avoid injury due to electrolyte splashing, short circuits with tools and to avoid injury due to the size and weight of the batteries.

16.3.7. It is the user's responsibility to provide backup power (UPS) for the Computer and the Data Acquisition Terminals.

16.3.8. It is the user's responsibility to backup data files to safeguard against data losses due to hardware (Computer) malfunction.

16.3.9. It is the user's responsibility to verify the integrity of the performance of this instrument in accordance with the instructions of Section [10].

16.3.10. It is the user's responsibility to install the equipment in accordance with the instructions of section [12].

17. REVISION INDEX

REV	DATE	SOFTWARE	NOTES
1.0	22 November 2004		Released
2.0	28 April 2006		Text updates
2.1	25 July 2006		Text and figures updates
3.0	25 September 2006	V 3.1.6	New features: Section 3.3 Creating Customer Batteries, section 3.4 Finding Customer Batteries Correction: section 4.4 Archiving of Work Orders Renumbered figures
3.1	3 October 2006		Text and formatting enhancements
3.2	9 October 2006		Added section 12 on System Components and section 9 on Condensed Operating Instructions.
3.3	31 October 2006		Text enhancements in sections: 3.5 (page 27) – Additional notes on Find Customer Batteries 4.1 (page 29) – Additional notes on Work Orders 5.1 (page 34) – Additional notes on automatic recognition of battery cables and crowns 5.3.4 (page 41) – Additional notes on Master/Slave C-Scans 7.1 (page 55) – Expanded Cell Simulator description
3.4	7 November 2006		7.15 and 7.16 – Additional notes on the Cell Simulator
3.5	2 March 2009	V 4.0.4	Text and formatting enhancements
4.0	28 October 2009	V 5.1.1	Re-written to incorporate the details on the monitoring and control of Intelligent Chargers plus miscellaneous enhancements.
4.1	10 May 2010	V5.1.8	Adding Water Level Screen (various sections)
5.0	21 April 2011	V5.2.4	Adding battery type functionality when using the Four Battery Cable Adding a section on Condensed Operating Procedures Notes and Graphics of changes to the Main Screen (mostly cosmetic)
5.1	24 June 2011	V5.2.4	Added typical System Installation Pictures

18. Notes

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