The Customer's Quick Test
User Guide

For Firmware V6 and BatteryShop Version 6

This document will describe the steps a customer must take to create a matrix usable by the QuickTest program on a C7400 platform.

1.1 Definitions

QuickTest™   QuickTest™ is a program on the C7400 platform that estimates the state of health (SoH) of a battery in three minutes. The percentage response is an approximation of the battery's capacity.

State of health (SoH)   A measure of the battery's overall condition and includes: capacity, internal battery resistance, self-discharge, charge acceptance, discharge capabilities and mobility of electrolyte.

Matrix   A set of numbers obtained with the Learn programs. It is used by QuickTest to calculate the state of health of a battery.

C-code   The configuration code containing battery parameters such as chemistry, voltage, capacity (mAh), discharge and charge rate, end-of-discharge voltages, etc.

QuickLearn   A program that creates a matrix within three minutes by scanning a 'known good battery'.

Learn   A program that first primes a battery then runs QuickTest so that the true capacity of the battery is used in creating/modifying a matrix.

Confidence Grades   Indicates the range of batteries used in making the currently stored matrix. As the CG increases from C->B->A, the ability of the matrix to test batteries improves.

2. Equipment Requirements

Firmware Version:
- **6** (upgrade your analyzer if you have any firmware version below V6)

Products:
- Cadex **C7200**, **C7400, C7400ER** Battery Analyzers

- Batteryshop versions **6** (only necessary if using BatteryShop)

- Cadex C4000, C7000 or C7000ER does not support QuickTest™, QuickLearn or Learn programs.

- Adapters need to have a **16K** label marked on the back to use these features.

3. Version 6.0 Procedure Selection

3.1 Decide Who Makes the Matrix

3.1.1 Are you making the matrix?
   a. If Yes, go to step 3.1.2
   b. If No, go to step 3.1.3

3.1.2 Is the matrix being made using BatteryShop?
   a. If Yes, go to step 3.3
   b. If No, go to step 3.2

3.1.3 Is Cadex making the matrix for you?
   a. If Yes, go to step 3.1.4
   b. If No, contact your Cadex representative to verify that whomever is making your matrix is qualified.

3.1.4 Are you sending batteries to Cadex?
   a. If Yes, go to step 4.1
   b. If No, go to step 4.2

Note: if Cadex designs a matrix, there is an NRE charge of US$250 for each matrix.

3.2 Making a Matrix without BatteryShop

1. Calibrate the adapter to be used. Calibration instructions are provided in the User's Manual available on the Cadex web site

2. Select a known good battery as the first one for learning. The first battery needed to make a matrix must be 80% or higher. If unsure about the capacity of your batteries, prime two or three overnight and select one whose capacity is greater than 80%.

3. Select the appropriate c-code for the battery and set the program to Learn.

4. Place the battery in the adapter and run the program.

5. At the completion of the program, press the station key to view the C-Code and check that the letter T has appeared in the top right corner of the adapter's c-code. This indicates a matrix has been formed.

6. Change the program to QuickTest and run the newly learned battery to verify that the SoH result is comparable with the capacity.

7. If satisfied with the comparison, select another battery and learn it. If unsatisfied with the result, erase the matrix and select a different battery to form the matrix.

8. Repeat step 6.

9. Steps 7-8 can be repeated as many times as wanted as new batteries become available.

Note: Version 6 Learn does NOT require that batteries be learned in order.

3.3 Making a Matrix using BatteryShop

These instructions assume that the user is familiar with operating BatteryShop software.

1. Calibrate the adapter to be used. Calibration instructions are provided in the User's Manual available on the Cadex web site or by clicking here.

2. In BatteryShop, select 'Database' and then select 'Battery Model'. Confirm that the model exists in the database. Create a new battery model if it does not exist. Write down the battery model in the 'Battery Model' section of the worksheet.

3. Choose a known good battery as the first one for learning. The first battery needed to make a matrix must be 80% or higher. If unsure about the capacity of your batteries, prime two or three overnight and select one whose capacity is greater than 80%.

4. In BatteryShop, go to 'Analyzers' and Select 'Analyze Battery'. Select 'By Model', select the battery model from the list and select the 'Learn' program at the bottom of the screen.

5. When the battery is inserted, BatteryShop will indicate a confirmation screen on whether the battery is over 90%. Click on 'UNSURE' and insert the battery into the analyzer to start service. Do not click on 'Battery is 90% - 100%' as this will initiate the QuickLearn program that will give a matrix with lower reliability.

6. When the Learn program has completed, remove the battery. Select the battery model, change the program on the 'Analyze Battery' Screen to QuickTest and run the same battery on QuickTest. The QuickTest program takes 5 minutes or more.

7. After the program completes, check the result. The SoH of the battery should be in range with its capacity. If the capacity and SoH are not comparable, remove the battery, close the 'Analyze Battery' Screen, go to 'Database' and select 'Battery Models'. Scroll to the Battery Model and delete the matrix and repeat step 5-7.

8. If satisfied with the matrix, select another battery and run steps 4-7. This can be done as many times as wanted. If you are unsuccessful in creating the matrix, please send service@cadex.com the bsmodels file of this battery type and we will contact you with some advice on what to do next.

Note: Version 6 Learn does NOT require that batteries be learned in order.

4. Details for Cadex Making the Matrix

Note: if Cadex designs a matrix, there is an NRE charge of US$250 for each matrix.

4.1 Sending Test Batteries to Cadex

1. Select 3 or more batteries of varying capacity (70-100%)

2. Send them by courier to Cadex Electronics

Atten: ENTER SALES REPS NAME
Cadex Electronics Inc.
22000 Fraserwood Way
Richmond, BC
V6W 1J6

4.2 Sending Battery Data to Cadex

1. Copy the worksheet available in Appendix B to a new Excel spreadsheet.

2. Enter the Battery model type, the voltage, and the Ah rating of the battery in to the Excel spreadsheet.

3. Label each battery with a distinct number.

4. On the analyzer, calibrate the adapter. Calibration instructions are provided in the User's Manual available on the Cadex web site or by clicking here.

5. Run each battery through the Prime program and record its capacity on the Excel spreadsheet.

6. Place a battery in the adapter and do the following:

    a. Set the program to QuickTest

    b. Put in a battery and run the program

    c. Before taking out the battery, hit Alt-Menu and when prompted for a password, type 2317. You have now entered the diagnostic menu.

    d. Hit ESC to get to the screen that says CONFIGURATION

    e. Hit ENTER and scroll using the up/down arrows until the screen says QuickTest Parameters.

    f. Hit ENTER.

    g. Select the station in which the battery resides.

    h. Record the R2, V1, V2, V3, V4, and T1 values on to the Excel spreadsheet in the same row as the battery's capacity.

    i. Use the ESC button to exit out of the diagnostic menu.

7. For each subsequent battery in the group repeat step 6.

8. Repeat step 6 and 7 again so that each battery has been run through the QuickTest program twice.

9. Save the Excel file and send to your friendly neighborhood Cadex Sales Representative.

5. Problem Resolution

5.1 Version 6 with BatteryShop

The battery vectors and matrix are stored in the c-code of the battery model. This allows for quick diagnosis of a matrix to catch any errors. To acquire this data, simply export the bsmodel file with the specified battery model selected and send this to service@cadex.com.

5.2 Version 6 without BatteryShop

The vectors used to make the matrix are stored in the c-code of the adapter. These vectors and the matrix are necessary for diagnosing any problems with the matrix. Perform the following steps and send the selected data to service@cadex.com.

1. Enter the configuration screen by going to Alt-menu. When prompted for a password, select 2317 and hit enter twice.

2. Select the Configuration Menu and scroll to QuickTest Vectors.

3. Inside QuickTest Vectors, select the station and c-code of the model for which you are recording information.

4. Record the data in Vec1, Vec2, and Vec3.

5. Exit this menu option by hitting ESC and scroll to Matrix Parameters

6. Inside Matrix Parameters, select the station and c-code of the model for which you are recording information.

7. Record the data in R1, DV1, DV2, and T1.

Appendix A Matrix Making Worksheet

Battery Model: _____

Date	Battery ID	Resistance (mO)	Capacity (%)	Learn Order	SoH (%)

Appendix B Battery QuickTest Data

Battery Model:
Battery Ah rating:
Battery Voltage:
Analyzer Version:

Battery ID	Capacity	R2	V1	V2	V3	V4	T1	R2	V1	V2	V3	V4	T1