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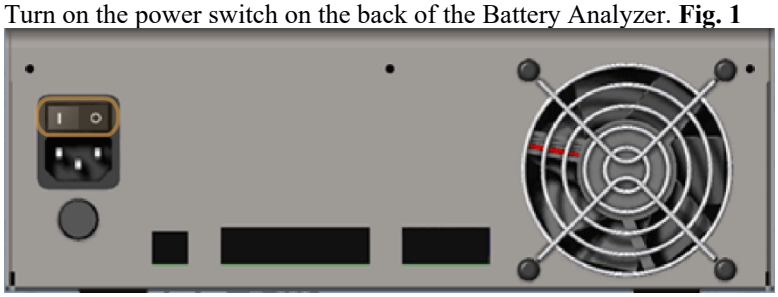
Instructions for Use: Battery Analyzer

Brand Name of Product	Battery Analyzer
Generic Name of Product	Battery Analyzer
Product Code Number(s)	07-720-0100, 07-740-0100, 07-740-1100
Intended Use	To assess the condition of a battery and provide intelligence to safely service them.
Range of Applications for Product	The Battery Analyzer enables users to keep batteries for their optimal life span.
Key Specifications of Product	• Battery analyzers for Lithium, Nickel, and Lead Acid batteries • Display-80-character LCD, backlit, each station features RUN, READY, FAIL signal lights • Data ports- RS-232 or USB interfaces to PC (RS -232 recommended) • Chemistries- Lithium-ion, nickel-metal-hydride, nickel-cadmium, lead-acid • Use to measure capacity, spot check spare capacity after a long day and apply calibration to improve fuel gauge readings. Security- Password protection prevents unauthorized changes of settings. o Level 1- Off, allows full access, no programming restrictions (default) o Level 2- Low, password protected; allows C-code selection and display options o Level 3- High, password protected, most programming choices locked Item code **07-720-0100**- Two independent stations • Voltage- 1.2 - 16V • Charge/discharge current up to 4 amps per station • Maximum charge power- 40 watts per station; 40 watts total • Maximum discharge power- 35 watts; 70 watts total Item code **07-740-0100**- Four independent stations • Voltage- 1.2 - 16V • Charge/discharge current up to 4 amps per station • Maximum charge power- 55 watts per station; 80 watts total • Maximum discharge power 35 watts; 140 watts total Item code **07-740-1100**- High power version • Voltage- 1.2 - 36V • Charge/discharge current up to 6 amps per station • Maximum charge power 75 watts per station • Maximum discharge power 75 watts

Shipping & Storage	
Shipping Conditions & Requirements	
Storage Conditions	Recommended storage temperature: -4°F (-20°C)- 159°F (70°C) Recommended operating temperature: 41°F (5°C)- 95°F (35°C)
Packaging Contents	
Shelf Life	

Instructions for Using Product	
Description of Use(s)	To assess the condition of a battery.
Preparation for Use	Plug in the Battery Analyzer into the power outlet. Choose which program the facility will use. There are 3 different programs to choose from: 1. Basic Programs- a. Auto- Exercises the batteries and applies Recondition if the user-set target capacity cannot be reached. b. Charge- Applies a fast charge only.

	c. Prime- Prepares batteries for field use by repeated cycling until the maximum capacity is reached. d. QuickSort- Sorts lithium-ion packs into Good, Low and Poor in 30 seconds. 2. Advanced Programs- a. Self-Discharge- Determines the rate at which a battery loses charge. b. Life Cycle- Counts the number of charge/discharge cycles before the battery capacity drops to a selected target level. c. Discharge Only- Discharges battery for storage; tests chargers. d. Extended Prime- Applies a 16-hour trickle charge, followed by Prime. Prepares difficult to charge batteries. e. OhmTest- Measures internal battery resistance in 6 seconds. f. Runtime- Simulates field application with three adjustable load currents and time intervals g. Boost- Reactivates seemingly dead batteries that have been discharged too low. h. QuickTest- Provides battery state-of-health in 3 minutes. Needs specific battery matrix. i. Q-Learn- Provides initial QuickTest matrix by scanning a good battery. Service time is 3-5 minutes. j. Learn- Improves QuickTest matrix by scanning batteries with different state-of -health status. Service time is 3-8 hours per battery. 3. Custom programs- a. Four separate custom programs allow user-defined programs composed of charge, discharge, recondition, wait and repeats. The programs follow a different path if a certain condition occurs. ● Batteries in daily use should be serviced every 1-3 months. A 4-station battery analyzer processes 160 batteries based on a monthly maintenance schedule. ● The Battery Analyzers are automated to reduce the time required to service a large battery feet to about 30 minutes per day.
Diagrams (drawings, pictures)	
Steps for Use of Product	1. Turn on the power switch on the back of the Battery Analyzer. **Fig. 1**  **Figure 1** 2. Once powered up, the unit will flash with Start Up Screen and then it will display the Status Screen which will indicate which Station Bays currently hold adapters. **Fig. 2**  **Figure 2** 3. Each battery adapter is programmed with up to 10 configuration codes known as C-Codes, allowing you to service all battery types within a product family. 4. You can select and lock a C-Code, compose a new one or make changes to an existing one. 5. Use the correct battery adapters for your facility. The correct adapter for your battery can be found in the Battery Database.

6. Once you have selected the appropriate battery adapter, install it in one of the four stations of the Battery Analyzer. **Fig. 3**

Figure 3

7. Before servicing a battery, you can verify the C-Code and service program by pressing the appropriate station key (#3). **Fig. 4, Fig. 5**

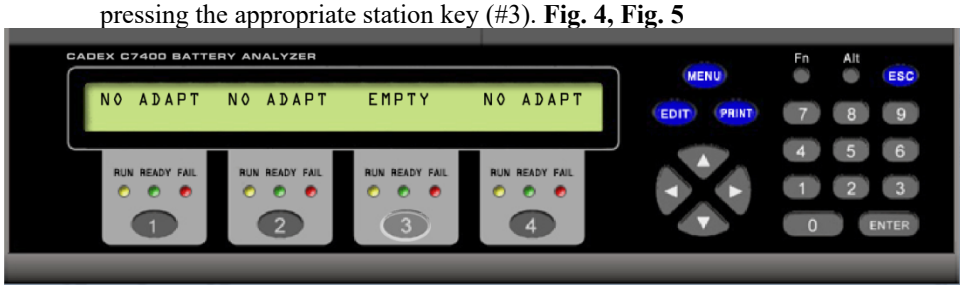


Figure 4

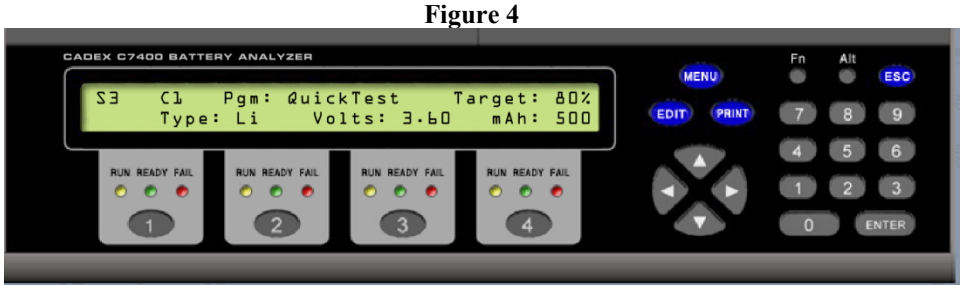


Figure 5

8. There can be a maximum of 10 C-Codes per battery adapter. Use the Up and Down arrow keys to choose program. See list below. **Fig. 6**

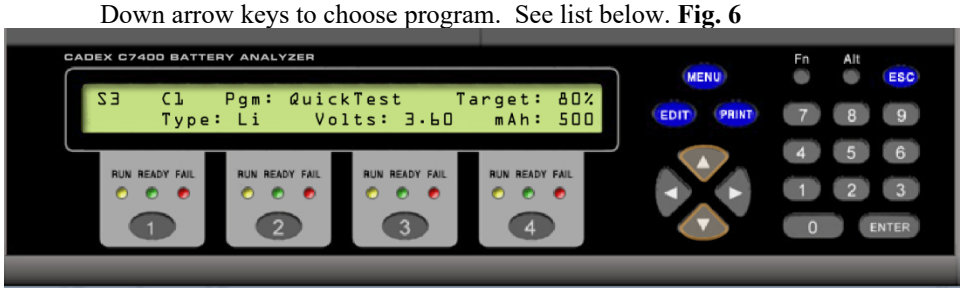


Figure 6

- C2- Prime
- C3- Auto
- C4- Charge
- C6- LifeCycle
- C7- Custom
- C8- OhmTest

- C9- RunTime
- C10- Boost

9. Once the C-Code has been selected, you can then modify a number of options associated with the C-Code. These include its associated Service Program, the Target Capacity or its C-Code Parameters. Any changes to these options will be retained in the adapter, even if removed.
10. There are 4 Basic Programs, 9 Advanced Programs (including user-programmable Custom Programs) and One Override Program. Each program serves a special battery need.
11. **Basic Program 2- Prime-** Prepares a new battery for field use by cycling until peak capacity is reached. The last 5 capacity readings are shown on the LCD.
12. **Basic Program 3- Auto-** Exercises nickel-based batteries and applies recondition if the target capacity cannot be met. The LCD displays the initial capacity, the capacity before recondition and the improved final capacity.
13. **Basic Program 4-Charge-** Applies fast charge; no capacity reading taken.
14. **Advanced Program 1- Self DCH**- Tests self-discharge of a battery by calculating the capacity loss during a set time. Allow ample time to complete.
15. **Advanced Program 2- LifeCycle**- Cycles battery until capacity drops below set target. Keeps score of the number of charge/discharge cycles completed.
16. **Advanced Program 3- DCJOnly-** Discharges battery to the end-of-discharge threshold, then the programs stops. Recommended for battery storage.
17. **Advanced Program 4- ExtPrime-** Applies a 16-hour trickle charge, followed by Prime.
18. **Advanced Program 5-OhmTest-** Measures internal battery resistance. The measurement is taken at the lowest resistance during charging.
19. **Advanced Program 6- RunTime-** Simulated digital discharge load. Allows setting of 3 different discharge levels, which repeat during discharge.
20. **Advanced Program 9-Custom-** Allows setting of unique cycle sequences composed of charge, discharge, recondition, trickle charge or any combination, including rest periods and repeats. The analyzer offers 4 independent custom programs.
21. **Override Program- Boost-** Wakes up batteries if the voltage is too low. The program applies a gentle charge to activate the protection circuit on Li-ion. Boost also works on nickel-based batteries. When the critical terminal voltage is reached, Boost automatically switches to the selected Service Program.
22. Now select a service program
23. Click on the "Edit Key" to begin editing the options for this C-Code. The display cursor will flash next to the Service Program field. **Fig. 7**

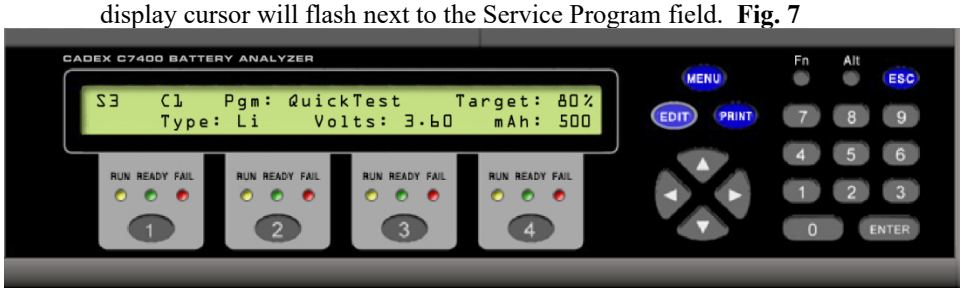


Figure 7

24. Next use the Up and Down Arrow Keys to scroll through the available Service Programs. **Fig. 8**

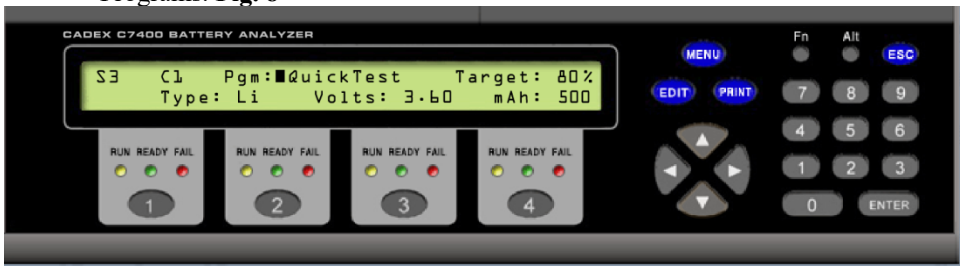


Figure 8

25. **Target Capacity Settings-** You can also change the Target Capacity located to the right of the Program. Standard Target Capacity settings are as follows:
    - 90%-100%- Critical applications requiring top performing batteries. Fewer batteries will pass.
    - 80%- Recommended nominal setting.
    - 60%-70%- Less stringent applications; more batteries will pass.

Note: The Target Capacity does not affect the charge level; the batteries are always fully charged.

26. **Selecting a Target Capacity**- To highlight the Target Capacity field, click the Right Arrow Key, which will move the cursor from the previously selected Service Program field. **Fig. 9**

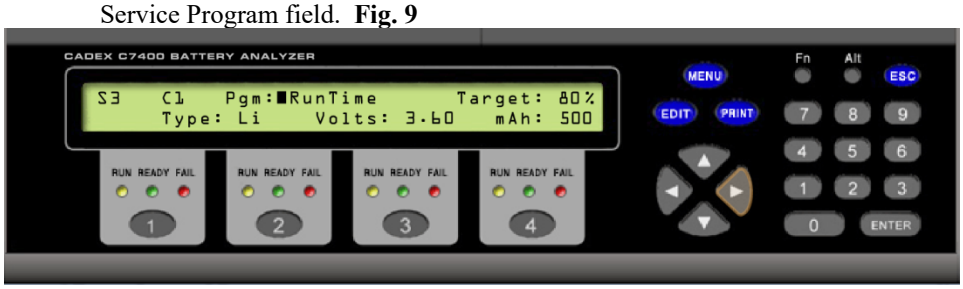


Figure 9

27. Now use the Up and Down Arrow Keys to change the Target Capacity Setting. **Fig. 10**

Figure 10

28. **C-Code Parameters-** Next change several C-Code parameters. This includes battery chemistry ('Type'), the voltage ('Volts'), and capacity ('mAh').
29. First change battery chemistry, click on the Right Arrow Key to move the cursor from the Target Capacity field. **Fig. 11**

Figure 11

30. Then use the Up and Down Arrow Keys to change the Battery Chemistry Setting. **Fig. 12**

Figure 12

31. **Selecting a Voltage-** To highlight the Voltage field, click the Right Arrow Key, this will move the cursor from the Battery Chemistry field. **Fig. 13**

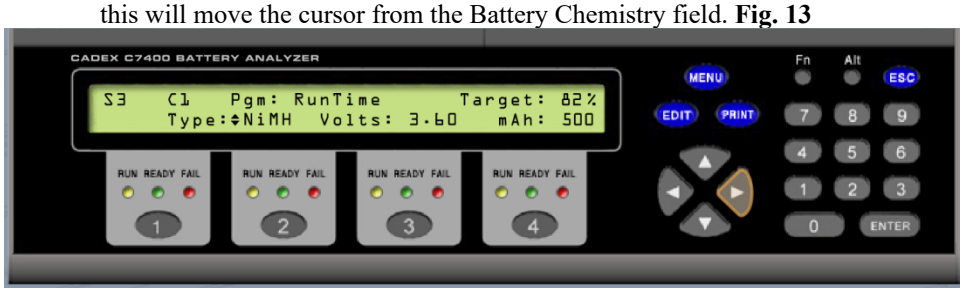


Figure 13

32. Then use the Up and Down Arrow Keys to change the Voltage setting. **Fig. 14**

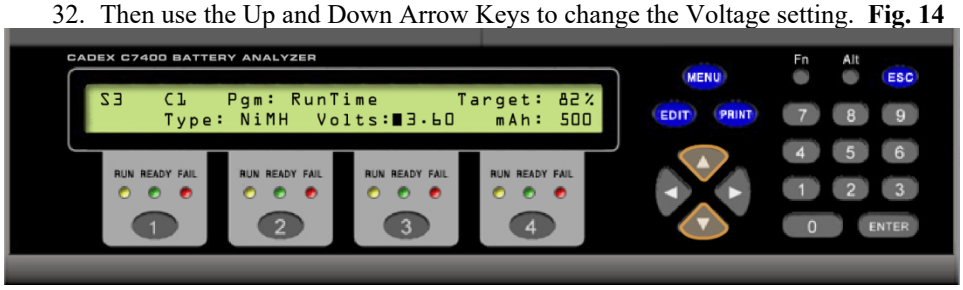


Figure 14

33. **Selecting A Capacity (mAh)-** To highlight the Capacity field, click the Right Arrow Key, this will move the cursor from the Voltage field. **Fig. 15**

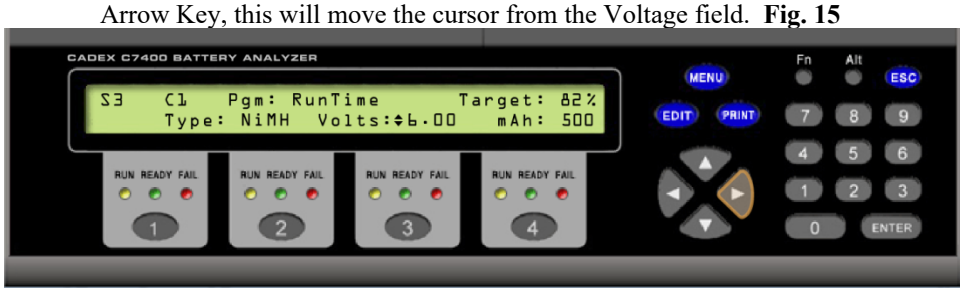


Figure 15

34. Next use the Up and Down Arrow Keys to change the Capacity Setting. **Fig. 16**

Figure 16

35. **Confirm Changes-** When finished making changes, click on the Enter Key to select the changes that were made. **Fig. 17**

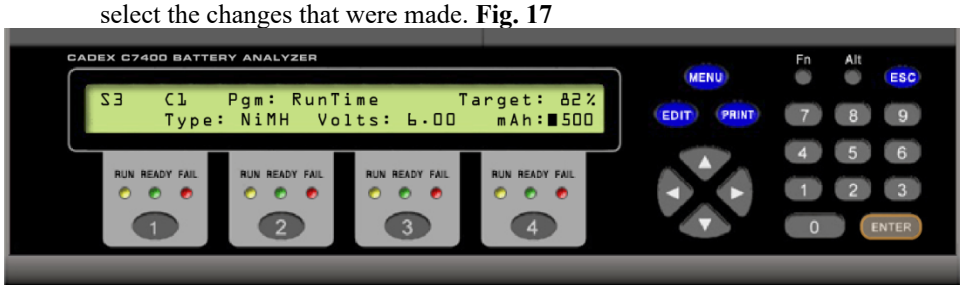


Figure 17

36. A confirmation screen will appear asking you to confirm these changes.

37. Scroll between ‘Yes’ or ‘No’ using the Up and Down Arrow Keys and click on the ‘Enter’ key while on ‘Yes’ will confirm the changes and save them in the adapter **Fig. 18**

Figure 18

38. Changes Accepted will show on the screen. **Fig. 19**

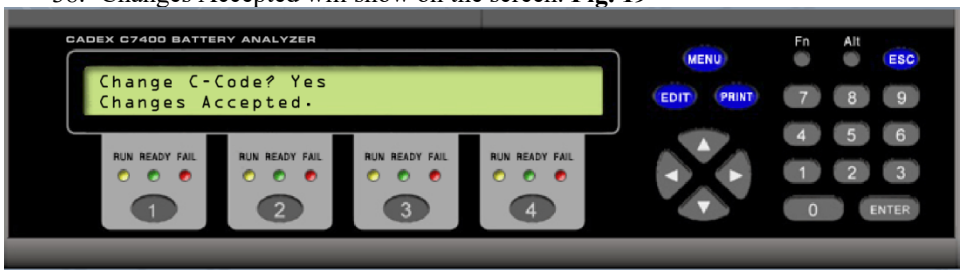


Figure 19

39. Clicking the enter key while on ‘No’, or hitting the Esc Key at any point will return you to the settings screen where you can continue to make further changes to the different settings.
40. Now you are ready to analyze a battery.
41. **Inserting a Battery-** Insert the battery into the adapter. **Fig. 20**

Figure 20

42. **Verify Settings-** Verify the settings before you start servicing the battery.
43. Click the Enter Key once will bring up your selected settings. **Fig. 21**

Figure 21

44. This can be edited by clicking the Edit Key and then following the steps outlined in the above instructions.
45. Click the Enter Key once more will start servicing the inserted battery. **Fig 21A**

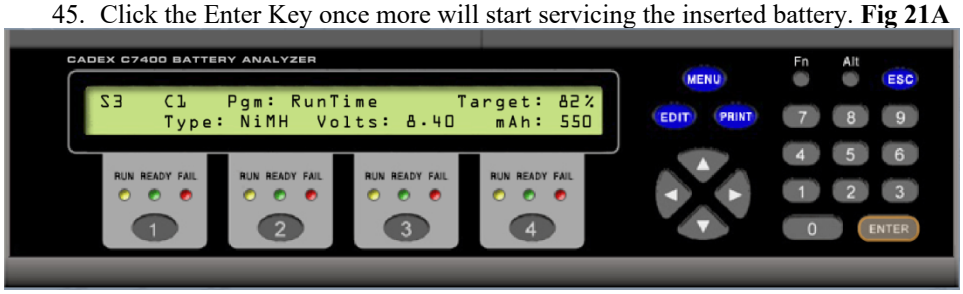


Figure 21A

46. When ready, click the Enter Key twice to begin servicing the battery and move to the next step.
47. **Serving**- During servicing, the yellow Run Light stays lit. Running time can vary depending on the battery and parameters specified. **Fig. 22**

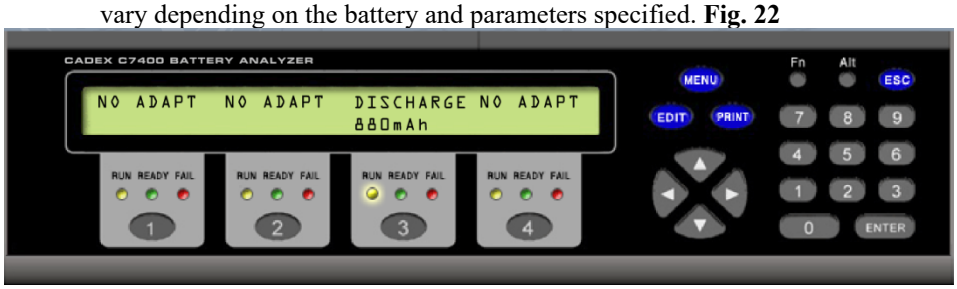


Figure 22

48. When the display reads FINISHED, the battery being service is done. **Fig. 23**

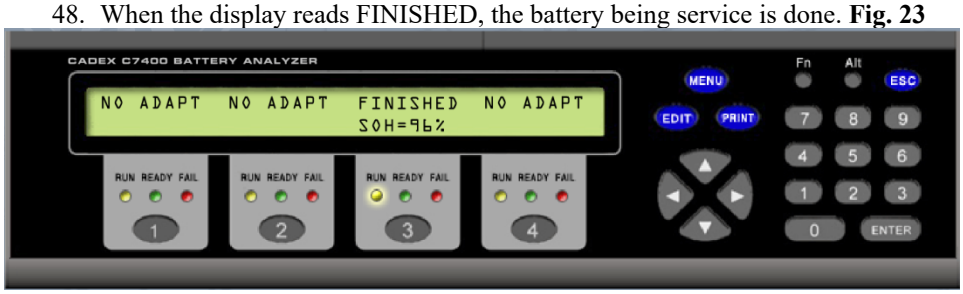


Figure 23

49. **End of Test Screen-** The Ready Light (Green) or Fail Light (Red) will illuminate and the end of test screen will display.
50. The SOH (State of Health) indicates the battery's ability to hold a charge. **Fig. 24**

Figure 24

51. **Detailed Results-** To view detailed test information, click the Station Key for the station where the test was ran (Station Key 3). The test results are indicated in percentage (%) of the nominal battery capacity. **Fig. 25.** The percentage reading flashes during discharge. The figure advances and freezes at the end-of-charge. Multiple percentage readings are shown if the service program calls for several discharge cycles.

Figure 25

52. Other test data include battery voltage, discharge current, internal battery resistance, battery temperature and elapsed time. Temperature is only displayed if a temperature sensor is available on the battery adapter. **Fig. 26**

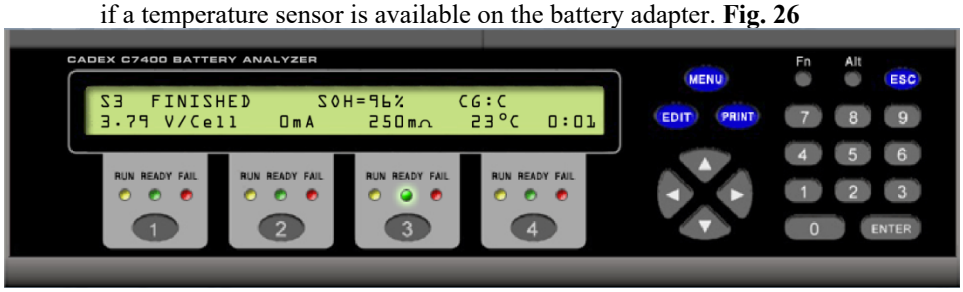


Figure 26

53. **Printing Reports-** Click on the Print Key to print the results in a number of convenient formats including either a Battery Label or a Full Service Report. **Fig. 27**

Figure 27

54. Select and click the station number (#3) to print and click the Enter Key to view the report or lable. **Fig. 28**

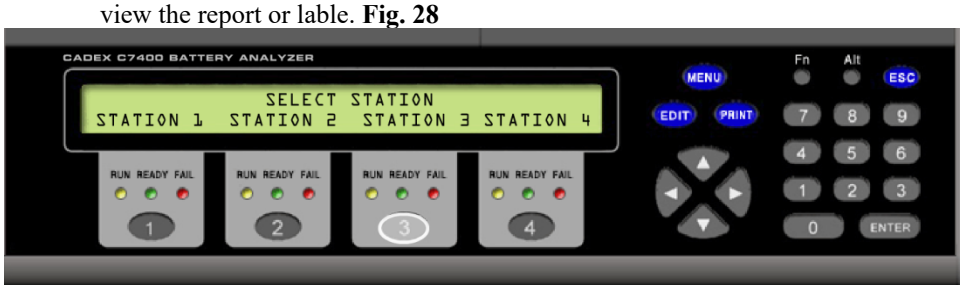


Figure 28

55. Once the battery is finished being serviced, you can print the results in a number of formats including either a Battery Label or a Full Service Report.

	56. Print label or report by clicking on the Print Key. Then select which station to print for. Then use the Up and Down Arrow Keys to select either a Label or a Report. **Fig. 29**  **Figure 29** 57. Once you have chosen which one to print, click on the Enter Key to view report or Label. **Fig. 30**  **Figure 30**
Interpretation of Test Results	
Contraindications of Test Results	
Documentation	
Special Warnings and Cautions	• The "Ready" light on the battery analyzer indicates the selected program has completed successfully.  • Charge cycle is only charge. The "Charge" only program will give you a green light on a completed and successful charge (without errors or caution). The capacity would not be known and displayed as either a 0 or N/A. • The discharge cycle that the analyzers will calculate and display capacity. "Auto" or "Prime" both have a discharge cycle and displays the capacity of the battery. • A Green light using these programs will be a completed program with capacity above the selected target (without errors or caution). Knowing when to replace a battery • A battery should have a capacity of 100%; most packs in the field have less capacity. • With reuse and aging, battery capacity decreases. Replacement should occur at 70-80%. • Replacing batteries too soon increases operational cost; keeping them too long makes the system unreliable. Most packs are kept too long. • Battery maintenance permits balancing cost and risk. Measuring the spare capacity after a mission enables checking the reserve for the unforeseen.
Disposal	

Reprocessing Instructions	
Point of Use	
Preparation for Decontamination	
Disassembly Instructions	

Cleaning – Manual	
Cleaning – Automated	
Disinfection	
Drying	
Maintenance, Inspection, and Testing	Warranty- ● 2-year warranty from the original purchase date. Power Management- ● Batteries on a fully loaded system may go on waiting queue. Will resume when demand moderates. Service Programs- ● 18, grouped into Basic, Advanced and Customer programs. Allow manual and automated service. Charge Method- ● Lithium-ion and lead-acid: constant voltage with current limit. ● Nickel-based: constant current with Reverse Load Charge adjustable from 5-12%. ● Customized charge methods possible. ● Automatic full charge detection, safe termination under all conditions. ● Temperature controlled. Prepare batteries for their initial testing- ● Nickel based batteries typically last for 500-1,000 cycles. ● Nickel-based batteries should be run through the "PRIME" program to prepare them for use. Sometimes running this test multiple times is necessary for fully "form" the battery. ● Lithium-ion batteries should be run through the "AUTO" program to exercise them to ensure they meet minimum performance standards. It is not uncommon for some new batteries to not meet published specifications. ● Both Nickel-based and Lithium batteries should be run through the "AUTO" program to properly recondition them to ensure maximum performance. Discharge Method- ● Constant discharge current to end-of discharge voltage threshold. Power Failure Recovery- ● Recover retains the test date on power failure and resumes when power is restored. Time on power failure and resumption is recorded. Throughput- ● 30-40 batteries/hour- 07-720-0100 ● Fleet of 80 batteries ● 60-80 batteries/hour- 07-740-0100 ● Fleet of 160 batteries ● 60-80 batteries/hour- 07-740-1100 ● Fleet of 160 batteries
Reassembly Instructions	
Packaging	
Sterilization	
Storage	Recommended storage temperature: - 41°F (-20°C)- 159°F (70°C)
Additional Information	Tested and approved by ITS to comply with CSA/UL/CE standards. RoHS and WEEE compliant.
Related Healthmark Products	
Other Product Support Documents	ProSys™ Brochure, ProSys™ Price List
Reference Documents	
Customer Service Contact	Healthmark Industries Company, Inc. 18600 Malyn Blvd. Fraser, MI 48026 1-586-774-7600 healthmark@hmark.com hmark.com