



$rac{1}{10}$ test equipment rental services

When you rent Test Equipment from TDC, we want you to know that you will have a dedicated personal service from start to finish. Our Customer Service team is here to support you throughout your rental period.

TDC are independent specialists promoting all high quality manufacturers and instrument types. Equipment can be delivered Next Day or Same Day to suit your requirements.

When you are finished, simply contact us to arrange your equipment collection or alternatively you can despatch it back to us – we make it easy.

RENTING FROM TDC JUST MAKES SENSE

By using TDC Test Equipment Rental Solutions, you benefit from our extensive rental inventory that is second to none. We constantly refresh our equipment range with branded equipment manufacturers such as Megger, FLUKE, Chauvin Arnoux, OMICRON, FLIR, b2 HVA, Agilent Technologies, Dranetz BMI, Fujikura, JDSU, Ametek Jofra, GE DRUCK, RAE Systems, TSI Airflow, Rohde & Schwarz, NORBAR, PANAMETRICS, Tektronix and many more.

You can utilise our rental equipment to suit your own requirements, from one week to as many months as you need. You only pay for what you use down to the day. Renting with TDC is straightforward and easy. Our expert Sales and Applications Engineers will find the best solution to suit your application.

Delivery & Collection is arranged by us - we make it hassle free and easy.

TDC 6 POINT RENTAL GUARANTEE OUR REPUTATION MATTERS



SAME DAY DISPATCH

Many of our customers operate to very strict deadlines. Providing the order is placed and confirmed before 3pm, your equipment will be despatched the same day.



OUALITY

All Equipment is checked prior to dispatch to ensure it is servicable and in safe working order. Certification checks are standard.



SUPPORT

We will provide you with enough information to make an informed choice of the correct equipment required for your application.



PRICE

We offer a simple price match promise. We'll match any genuine competitor quote.



CUSTOMER SERVICE

We can promise that throughout your rental period, we will do our utmost to provide you with the best customer service. All information we provide is in good faith and free of charge. We will provide a quote for any consultancy or professional advice that may be required.



REPUTATION

We know we are only as good as our last job. We don't just want regular customers - we want to build loyal customers.













For all enquiries, please contact: Gordon Thow (Test Equipment Rental Manager)

t: +44 (0)1224 710077 e: gordon.thow@tdcaberdeen.co.uk w: www.TDCaberdeen.co.uk











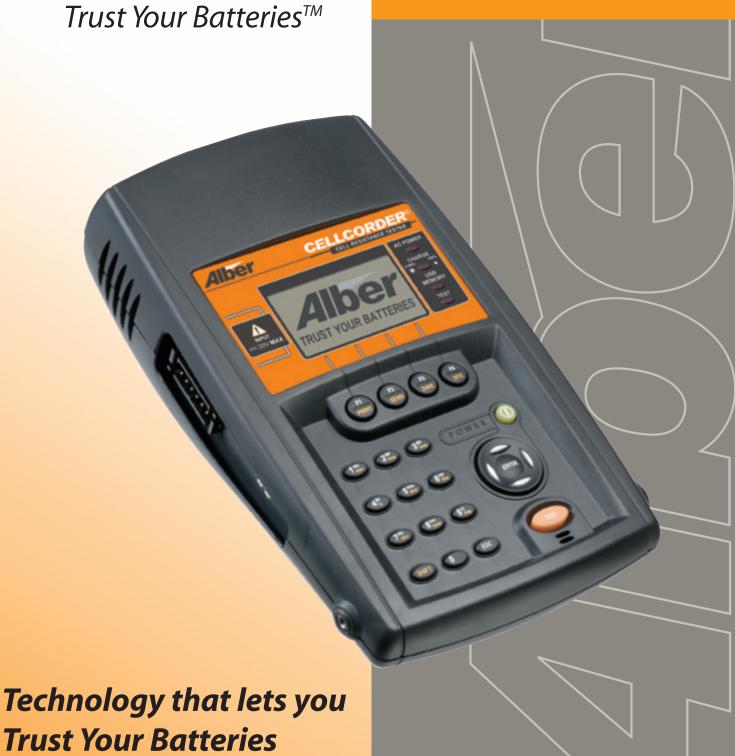
TEST EQUIPMENT RENTAL SERVICES

CRT400 Battery Cell Tester

Datasheet/Quick Start Guide/Measurement Probes



CRT-400 Cell Resistance Tester



www.alber.com



Trust Your Batteries™



The Cellcorder® CRT-400 Cell Resistance Tester was specially designed to strictly comply with IEEE standards for testing batteries.

When a battery is tested, the measurements will be affected by several factors.

- Online tests are subject to ripple (AC noise) from the charger or inverters.
- Batteries have a natural capacitance that will influence the accuracy of the readings.
- The size of the test current directly relates to the accuracy of the measurement.

With Albér's patented technology, the Cellcorder's DC resistance test is not influenced by these factors. The Cellcorder continues to outperform the competitive AC testing instruments by producing repeatable results in all environments.

This well-proven and patented DC resistance test completely eliminates the guess work when trying to find the weakest link.

Advantages and Features

- Measures and records the three critical parameters: cell voltage and internal battery resistance as well as intercell resistance
- Patented Internal Resistance measurements detect. failing cells before they become a problem
- Bluetooth® Capable audible voice status during testing and data transfer to your PC
- USB Flash Drive easy data transfer to your PC
- Battery Analysis Software identifies problem cells, creates reports and archives data
- IrDA allows wireless communication with PC and the DMA-35N Hydrometer
- Tests batteries from 0-16V
- Includes new battery test clamps with multiple jaw options
- Lighted, interchangeable spike probes with test status



durable carrying case, voltage probes, resistance leads, USB flash drive, AC charger, data trending and analysis software, and user manual.

Everything required to get started in one case from Albér! The Battery Analysis Software helps you identify bad cells, generate descriptive reports and archive data. Measurements are stored and presented to allow trending. This makes it possible to detect early performance degradation in individual battery cells.

The New CELLCORDER®

at a glance. Lightweight, rugged and durable. Special features includes easy operation, Bluetooth option, USB data storage, and new lighted spike probes. The Cellcorder comes complete with a

ınce Tester



methodologies. Attendees who complete the Stationary Battery Basics seminar receive CEU's (Continuing Education Units). Albér also offers seminars adjusted to company needs and presented on-site.

CELLCORDER® CRT-400 Cell Resistance Tester Specifications*

"There is NO better way to detect early signs of battery degradation than the patented internal resistance method from Albér. Years of experience and millions of measurements on batteries of different sizes and designs validate this statement."

Physical

Dimensions H 305mm (12") x W 178mm (7") x D 76mm (3")

Weight 1.5Kg (3.4lb)

Keypad Rubber keys with polyurethane coating

Display

Type LCD - STN Reflective Viewing Area 2.619" x 1.309" Resolution Graphics LCD 128 x 64

Viewing Angle 40°

Backlight White LED

Memory

USB Flash Drive Type

Storage Capability 1 MB per 71 strings with 256 cells

Data Retention 10 years

Communication

Infrared PC Interface for data transfer

Physical IrDA compliant for printer interface

Bluetooth PC interface for data transfer

Earpiece interface for voice test status



Battery

4 cell - 8800 mAh lithium ion Type

Voltage 4 2V Charge Time 8 hrs

AC Adapter

Input Voltage 90 - 264 VAC **Output Voltage** 5 VDC **Output Current** 4.0 Amps 47 - 63 HZ Frequency

Environmental

Temperature Range:

0° - 40°C (32° - 104°F) Operating -20° - 60°C (-20° - 140°F) Storage

For extended periods <25° (<77°F) **Humidity Range** 0% to 80% RH (non-condensing) at 0° - 31°C

0% to 50% RH (non-condensing) at 32° - 40°C

Insulation Category II Pollution Degree 2

Altitude 0 to 2000 meters above sea level

Input	Test Current	Resistance Resolution ± 0.1% of reading	Voltage Resolution	Intercell Range/Resolution
2V	50A	± 5μΩ	0.1% - ± 1mV	$2m\Omega \pm 2\mu\Omega$
4-6V	25-30A	± 25μΩ	0.1% - ± 3mV	$3.3 \mathrm{m}\Omega \pm 5 \mu\Omega$
8-12V	30-35A	\pm 75μ Ω	0.1% - ± 6mV	5m Ω ± 10μ Ω
16V	5A	± 400μΩ	0.1% - ± 10mV	20m $Ω ± 20μΩ$

Warranty **Ordering Information** 1-year limited warranty

1000-056 Cellcorder including software, carrying case, USB Flash drive, battery charger,

cables, test and voltage leads.

Optional Accessories

4200-002 Battery Analysis User's Guide 1000-056BT CRT with Bluetooth option 2025-036 Bluetooth wireless headset **CRT BAS Software** 2027-014 4200-040 CRT Previewer User's Guide 4200-038 CRT User's Guide JAWS (see www.alber.com) 2120-053 A JAWS (see www.alber.com) 2120-056 JAWS (see www.alber.com) 2120-057 2120-0581 JAWS (see www.alber.com) 2025-124 Printer with IRDA interface Spike probe options Various 2030-004 **USB Flash Drive**

Made in U.S.A.

Albér Leads the Way ...

As the only manufacturer offering comprehensive solutions for ALL accepted battery maintenance procedures, Albér continues to set the standard in battery testing and monitoring technology. Our broad range of products provides you every possible solution your business could ever need.



Albércorp

3103 N. Andrews Ave. Extension / Pompano Beach, FL 33064 Phone: 800.851.4632 / Fax: 954.623.6671 Internet: http://www.alber.com / email: sales@alber.com

Battcon International Battery Conference Visit www.battcon.com for details.

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^{*}Specifications subject to change without notice



GELLGORDER®

CRT-400 Cell Resistance Tester



Quick Start Instructions
Operating Instructions

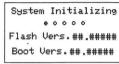
POWERING ON THE CELLCORDER

1. Press and release the green POWER KEY.



2. The firmware version number appears.





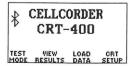
- 3. If readings are in temporary storage, messages appear.
- 4. To save readings, insert the USB device and press YES/F1. Whether you select YES or NO/F2, readings stay in the memory.

Readings are in temporary storage. Save readings to the USB device?

To clear readings from the memory, press YES/F1. Do this if you are starting a new set of readings.

> Do you want to erase the readings from temporary storage?

- 6. To keep readings in memory, press NO/F2. Do this if you are not finished taking readings or want to examine the readings.
- 7. The MAIN MENU appears.



NOTE:

It is highly recommended that the calibration constants are saved to the USB device.

Albércorp. 3103 North Andrews Avenue Extension Pompano Beach, Florida 33064

POWERING OFF THE CELLCORDER

1. Press and hold the green POWER KEY.

POWER



System is now shutting down

System is now shutting down 2

System is now shutting down 1

Release Power Button

- Powering off doesn't automatically delete voltage or resistance readings from the memory.
- If readings are in memory, you will be asked to save them.

Readings are in temporary storage. Save readings to the USB device? Do you want to erase the readings from temporary storage?

YES NO

TAKING VOLTAGE READINGS

 Connect the voltage probes to the Cellcorder and select TEST MODE/F1.

CELLCORDER CRT-400

2. From the Test Mode menu, select F1-VOLTAGE.

F1- Voltage
F2- Resistance
F3- S.G./ Temp.

If "Resume Test" appears, put the probes on the cell.

CELL 001

13.50 Volts
(RESUME TESTING)
DOWN

WARNING

Don't measure voltages greater than 20V DC.

4. If "Stored in Memory" appears, retest the cell or change the cell number by typing a number and pressing ENTER.

CELL 001

13.50 Volts
(STORED IN MEMORY)
DVM RETEST DONE

5. When the unit beeps, remove the probes. The cell number advances automatically to the next cell.



THE CELLCORDER IS ALSO A DIGITAL VOLTMETER (DVM)

1. In the voltage mode, select DVM by pressing the F1 button.

CELL 001

13.50 Volts
(RESUME TESTING)
DONE

- 2. The screen displays the measured voltages.
- 3. Readings are not saved in DVM mode.

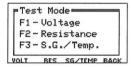
13.50 Volts
WARNING! 20VDC
maximum input

TAKING RESISTANCE READINGS

1. Connect the resistance test leads to the Cellcorder and select TEST MODE/F1.



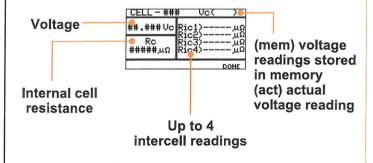
2. From the Test Menu, select F2-Resistance.



3. Select the AMP HOUR rate/F2 of the cell being tested. Specify the number of INTERCELL connections/F3 per cell.



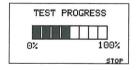
Select TEST/F1.



No VFloat Readings Exist. Now What?

If "No VFloat readings exist. Are you sure you want to continue?" appears, choose NO/F2, read voltage, then resume resistance testing. Reading voltage before resistance results in more accurate voltage readings because skewing is not a factor. If you choose YES/F1, voltage and resistance are read concurrently. Concurrent readings are subject to the skewing effect.

5. Connect the leads to the cell. See lower left for some examples; refer to manual for more details. Press the orange Test button. The display shows test progress.



- 6. When the unit beeps, remove the probes. When leads are moved, the cell number advances automatically to the next cell.
- 7. When finished testing, press the DONE/F4 button.

	- 40
	- W
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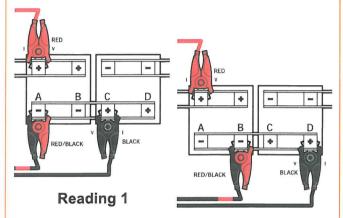
CONNECTING THE RESISTANCE LEADS

These figures show connections for dual post cells.

Take two readings.

Read with the intercell leads connected from terminal posts A to C.

Then read with the intercell leads connected from terminal posts B to D.

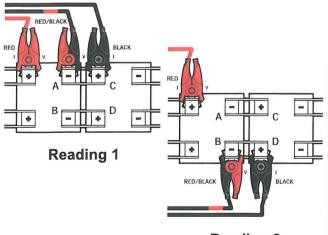


Reading 2

Take two readings.

Read with the intercell leads connected from terminal posts A to C.

Then read with the intercell leads connected from terminal posts B to D.

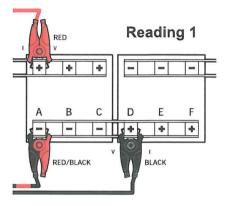


Reading 2

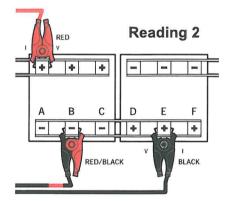
These figures show connections for triple post cells.

Take three readings.

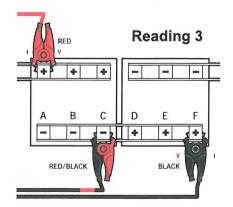
Read with the intercell leads connected from terminal posts A to D.



Then read with the intercell leads connnected from terminal posts B to E.



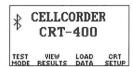
Then read with the intercell leads connnected from terminal posts C to F.



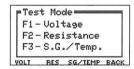
TRANSFERRING SPECIFIC GRAVITY AND TEMPERATURE READINGS

SAVING THE READINGS

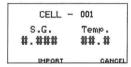
- On the CRT-400, select a cell data file to transfer SG and Temp readings into. This can be readings that already exist in memory or you can open a previously saved set of readings from the USB device.
- 2. From the Main Menu, select TEST MODE/F1.



3. From the Test Mode menu, select F3-S.G./Temp.



4. From the SG/TEMP screen, select IMPORT by pressing F2.



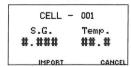
5. On the Data Module, select a channel (A-H) of data to transfer.

```
On hydrometer
memory module,
select string (A-H)
and align IR ports.
```

- 6. Align the Data Module and CRT-400 IR port.
- 7. On the CRT-400 press F2 for CONTINUE.



8. When transfer is done, the S.G./Temp. value from Cell 1 appears.



Select IMPORT/F2 to save the file to the USB device.

Saving new data readings to the USB

- Make sure the Cellcorder has been charged properly.
- 2. The USB device may be placed into the left side USB port on the Cellcorder before or after the Cellcorder is powered on.
- 3. Connect the test leads to the Cellcorder and select F1-TEST MODE.
- 4. The F1, F2 or F3 buttons may be selected on the Cellcorder to perform the necessary tests.
- Follow the prompts on the Cellcorder's LCD accordingly.
- 6. WHEN PROMPTED TO SAVE READINGS TO THE USB DEVICE SELECT YES/F1.
- 7. Follow the prompts and enter the file name and select SAVE/F2.
- 8. If the file already exists, a WARNING displays, asking for overwrite confirmation. Press F1 to overwrite the file or F2 to enter a new file name.

The USB device now has stored the new data.

NOTE:

DO NOT REMOVE THE USB DEVICE WHILE ACCESSING DATA, i.e. TESTING, WRITING TO A FILE, READING INFORMATION etc.

The USB MEMORY INDICATOR light is on when the USB device is in use.
Double-check this indicator before removing the USB device.

WARNING

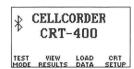
Readings cleared from Cellcorder temporary storage cannot be retrieved unless they've been saved to the USB device or PC.

LOADING THE READINGS

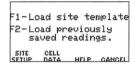
BLUETOOTH® (BT) OPERATION

Loading readings from the USB device.

1. Insert a USB device with readings into the Cellcorder. From the Main Menu, select F3-LOAD DATA.



Next select F2-CELL DATA.



3. SELECT-F2 the file from the list provided.



Recommended Steps to SAVE CAL-K

The CAL-K are calibration constants that are utilized for calibration correction during calibration. In the event these constants are lost, they can be restored easily.

It is highly recommended that the calibration constants are saved to the USB device.

To save the constants, make sure the CRT is powered on.

Select SHIFT, then the number 7 from the keypad.

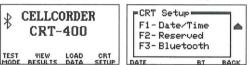
Enter the password, '1234' and push ENTER. Select Calibration by pressing the number 1 on the keypad.

Choose CAL-K by selecting F2.

Select F2 once again to confirm the BACKUP. Enter a File Name and select F2 to SAVE.

Using the BT headset

- 1. Make sure the CRT and the BT headset have been charged properly.
- 2. Power the BT headset on.
- 3. Power the CRT on.
 The CRT attempts to connect to the last used BT device when powered on.
- Select CRT SETUP/F4 and use the ▼down arrow key to go to F3-Bluetooth, press F3.



5. A message displays, "Checking for Bluetooth option." All stored BTdevices will display automatically, use the arrow keys to select the desired device and press F2 to CONNECT.



- 6. When connecting to a new BT headset
 - a. Press F1-NEW
 - b. Now press F1-Headset
 - c. Place BT device in discovery mode.
 - d. Press F2 to CONTINUE.
 - e. When BT devices are found, a list is populated, use the arrow keys to select the desired device and press F1.
- 7. Once the BT headset and CRT are paired, press F1-TEST MODE.
- 8. Choose the desired test by pressing either F1, F2 or F3.



Place the BT headset on your ear for test status information.



FILES USED BY THE CRT-400 CELLCORDER AND BATTERY ANALYSIS SYSTEM (BAS) PROGRAM

There are many file types used with the Cellcorder and BAS program, and they are fully described in the user's guides. This section describes the two most common.

.CDF Cell Data File -

Created by the CRT-400 when saving readings to the USB device. It is the transport file that gets data from the CRT-400 to the computer. This file contains one set or multiple sets (if in multi-string mode) of readings for a complete string of batteries. The Battery Analysis System (BAS) program imports this file into an ADF file.

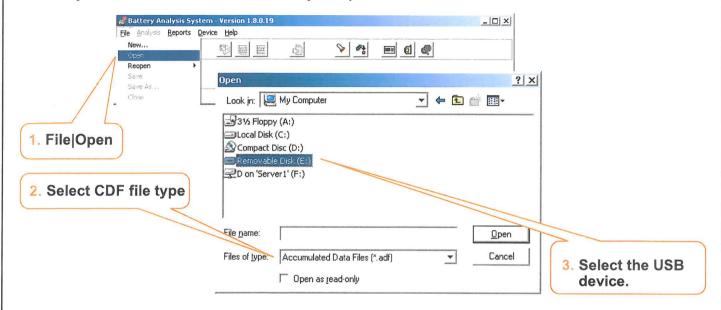
.ADF Accumulated Data File -

Contains sets of readings that were imported from CDF files. One ADF file can contain many CDF files from the same string. This gives the BAS program the ability to trend over many sets (different dates) of data. Create one ADF file for each string or one battery with parallel strings. Every time readings are taken for that string, import the data in the CDF file into the ADF file.

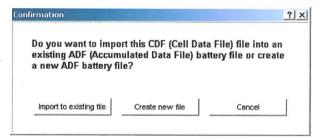


IMPORTING A CDF FILE INTO AN ADF FILE

To import a CDF file into an ADF file, select File|Open. In the Open dialog box at File Type, select Cellcorder Data File (*.cdf) from the drop-down list, then navigate to the USB flash hard drive which is normally labeled 'Removable Disk' under My Computer.

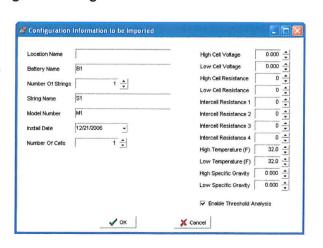


In the Confirmation dialog box, click Import to Existing File or Create New File. Both buttons refer to an ADF file. If this is the first time importing, click Create New File and then, each time you take additional readings for that string, click Import to Existing File and select the appropriate previously-created ADF file.



If you select Import to Existing File, navigate to the desired ADF file and select it. The new data will be added to the existing data as a new read date when viewing the readings.

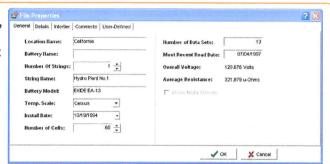
If you select Create New File, the Configuration Information dialog box appears. This box can be configured using the CRT-400 template setup or with the configurator in the program. You can change or add information at this time or later using File|Properties.



VIEWING BATTERY FILE PROPERTIES

This page describes the five File Properties pages, which you may use to edit battery data. Open a file, then click File|Properties. You must click File|Save to save changes.

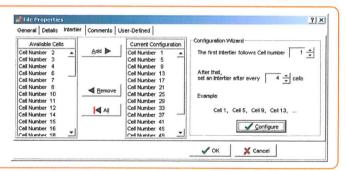
The General page edits details such as battery name, model, location, and install date. Temperature scale and number of cells affects the battery data file. Edit the Location Name, Battery Name, String Name, and Battery Model in these boxes. You cannot have identical battery names under the same location name or identical string names under the same battery name.



The Details page displays a table of values for all cells with data. Columns display cell number, cell voltage, internal resistance, intercell R1 to R4 resistance, temperature, and specific gravity. This list view can display cell data in colors based on threshold values, and intertier cell data in bold.



The Intertier page manually or automatically marks cells in a battery as intertier cells to indicate they are on the boundary of an intertier connection. By convention, only the cell with the lower cell number is marked. For example, if Cell 10 is the last cell of one tier and connected to Cell 11, which is the first cell of the next tier, only Cell 10 is marked as an intertier cell.



The Comments page has a text editor for typing comments, such as the date and type of readings taken or when connectors were cleaned. The Select a New Read Date dialog box lets you associate comments with a read date. To save a Comments page as a template, click the Save As New Comment Template button.

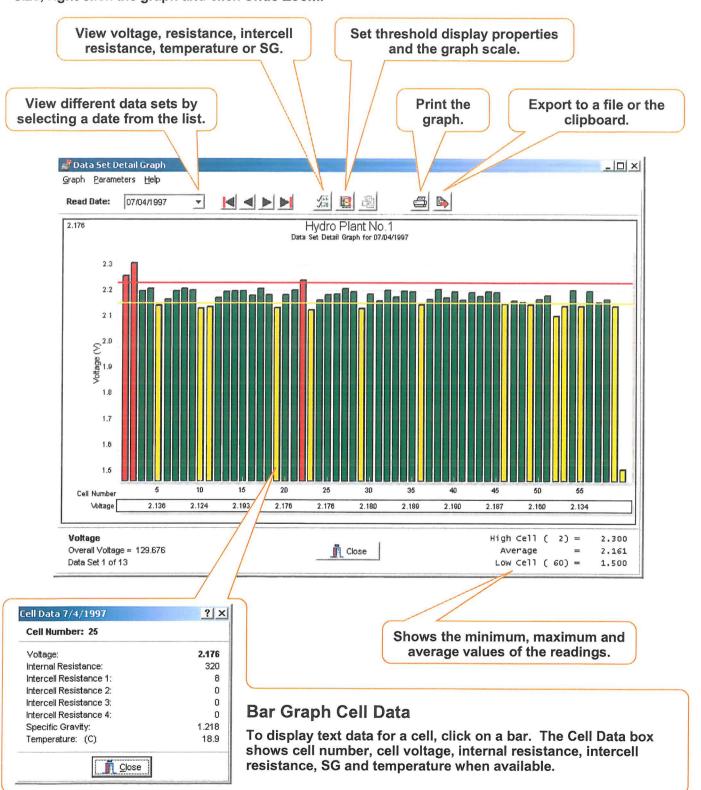


Use the User-Defined page to list reference notes. The notes, which can be included in reports, might identify pilot cells or equipment such as chargers.

General Details Intertier Cor	mments User	-Defined				?	
Read Date: General	•			± 5	3		
Field Name		Field	Contents	7			
User 10 name			Contents10				
User 3 name	Contents 3						
User 2 name	Contents 2						
4					- 1		
		_	1		1		
		✓ Oł		X Cano	el		

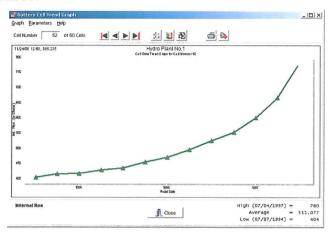
VIEWING BATTERY READINGS

To show a graph of an ADF battery file: Click File|Open on the main menu and select a file name, then click Analysis|Data Set|Detail. To enlarge a graph area, drag a rectangle across it. To return to normal size, right click the graph and click Undo Zoom.



TRENDING A PARAMETER OVER TIME

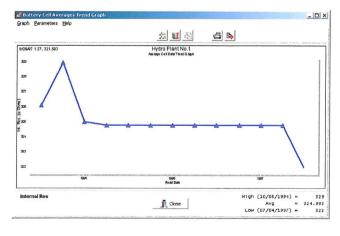
Tremding a specific parameter can help identify a problem. Open a file with at least two data sets and click the View Battery Data Set Graphs button. Click a cell in the graph, then click Parameters|Trend|Cells. Click the Select Which Parameters Appear in Graph button. On the Data Subsets box, select Internal Resistance only. A Battery Cell Trend Graph displays the cell values over time. Click a data point or date to display details in the Cell Data box. If the box does not appear, enable it under File|Preferences.



TRENDING A PARAMETER AVERAGE OVER TIME

Trending a parameter average helps identify inconsistencies in a battery system, and trending internal resistance averages helps determine a battery's end of life. The average summaries on the internal resistance screen are calculated to reduce false averages. The calculation eliminates cells above or below the true average by 25%, and then recalculates a new Modified Average.

Open a file with at least two Data Sets and click the View Battery Data Set Graphs button. Click a cell in the graph, then click Parameters|Trend|Cell Averages. Click the Select Which Parameters Appear in Graph button. On the Data Subsets box, select Internal Resistance only. A Battery Cell Averages Trend Graph displays internal resistance over time. Click a data point or date to display details in the Cell Data box.

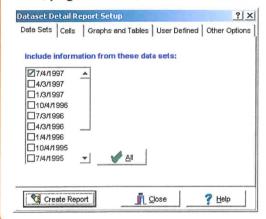


GENERATING REPORTS

The BAS Report Generator creates five reports: a Detail, Comparison, Threshold Deviation, Cell Trend, and Cell Average Trend Report with lists, graphs or both. Click Create Report after setup. View saved reports using the Archive Reader. Buttons on report pages change view size, print, and save as a ZRF archive file. To save the text portion as a text file, select TXT in the Save As Type field.

Data Set Detail

This report creates lists and graphs of selected Data Sets. Reports|Data Set|Detail opens five setup pages: Data Sets selects sets of readings to include. Cells identifies cell range. Graphs and Tables includes tabular or graph information. User Defined defines user fields and comments. Other Options offers title, date, time, page number, size and footer.



Data Set Comparison Report

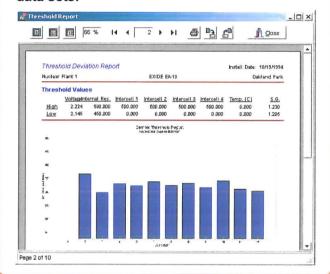
This report compares selected data sets referenced to one data set. Click Reports|Data Set|Comparison. All data set dates except the reference can be in one report.

Cell Trend Report

This report creates a tabular list of selected data sets with respect to time. Click Reports|Trend|Cells.

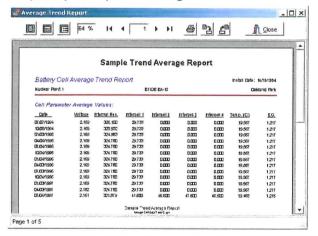
Threshold Deviation Report

The Data Set Threshold Report creates a list that shows threshold violations of selected data sets.



Cell Average Trend Report

This report creates a tabular list of selected data sets averages with respect to time. Click Reports|Trend|Cell Averages.



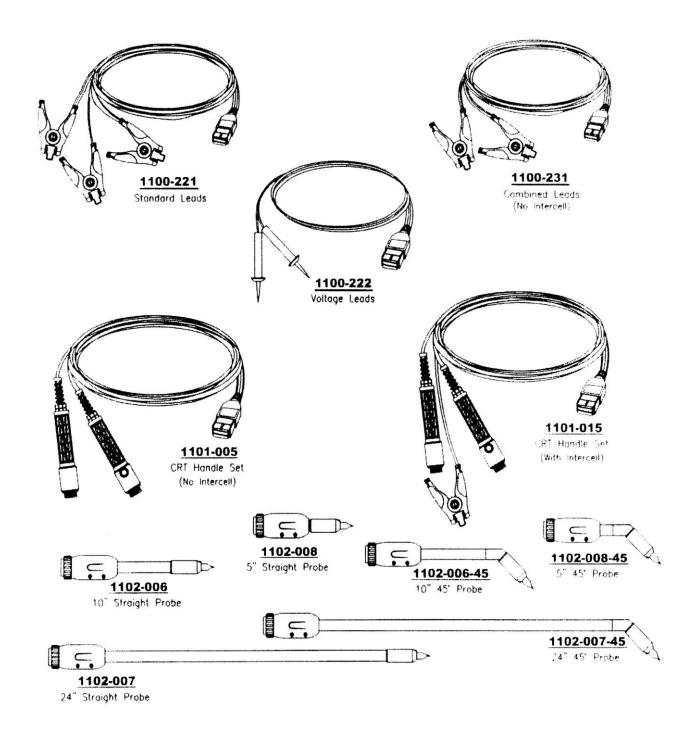
Archive Reader

The Archive Reader displays and prints reports that were generated and saved with the Report Generator. To start the reader, click Reports|Load and open a report file. You may open a previously saved report any time the Archive Reader is on screen. The reader opens CRT-400 ZRF report files and may be downloaded from the Albér Web site: www.alber.com



Electrical, Mechanical and Electronic Engineering

Optional CTL-400 Measurement Probes





















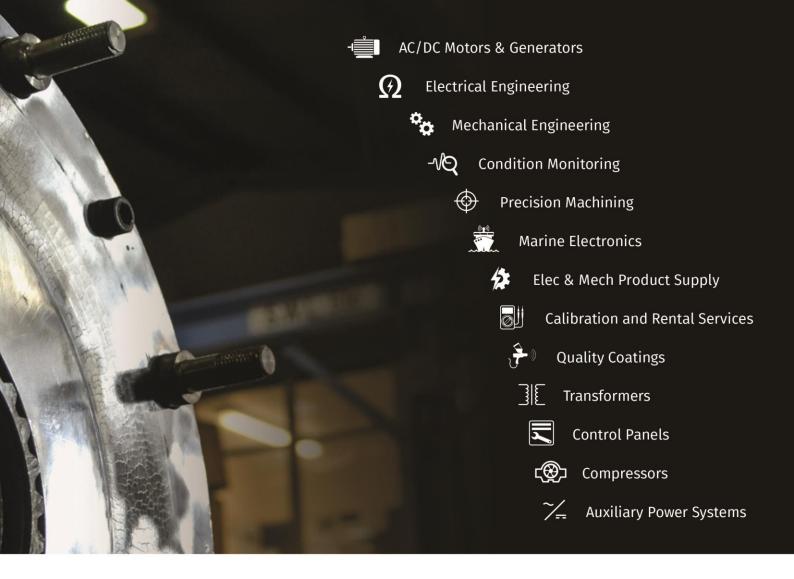








e info@TDCaberdeen.co.uk w www.TDCaberdeen.co.uk



To differentiate our organisation in order to achieve continuous, sustainable growth, TDC endeavours to fully understand and exceed the expectations of our customers, and to work proactively to deliver Engineering Excellence.



t: +44 (0)1224 710077 | e: info@tdcaberdeen.co.uk | w: www.TDCaberdeen.co.uk