



Advanced Test Equipment Rentals
www.atecorp.com 800-404-ATEC (2832)

Battery testing with TORKEL and the new BVM (Battery Voltage Monitor)

**Launch Nov
2011**



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Ohmic measurement and Capacity testing

- Ohmic – fast way to find fault and sometimes even the type of fault
= Megger BITE series
- Capacity testing if strange/suspect values from ohmic test
= Megger TORCEL series



Standards

- **Flooded (open, vented) Lead Acid batteries**
- *IEEE 450*
- *IEC 896-1*

- **VRLA batteries (Valve Regulate Lead Acid)**
- *IEEE 1188-1996*
- *IEC 896-2*

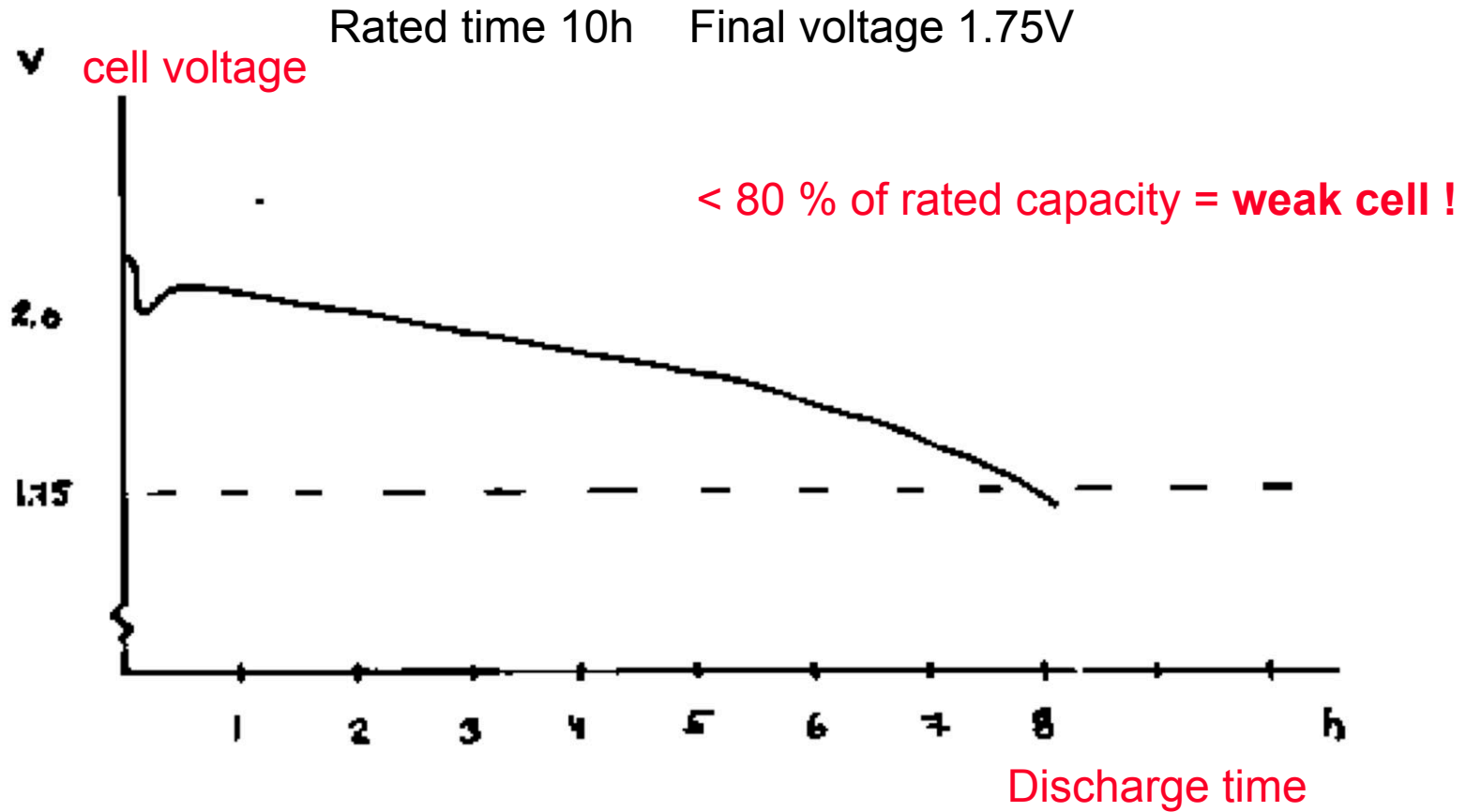


- Increase life time (replace bad cell, NOT the whole battery)
- Be sure that the battery keeps it's specification.
- Predict failures (specifically the bad cells)
- Measure all 24, 60 or 120 Cells at the same time = Possibility to compare cells with each others.
- Less risk that the battery is replaced too early – Save Money
- Warranty (just before end date & claims) – Save Money

To get a complete picture of the battery condition both the Torkel and the volt logger is needed.

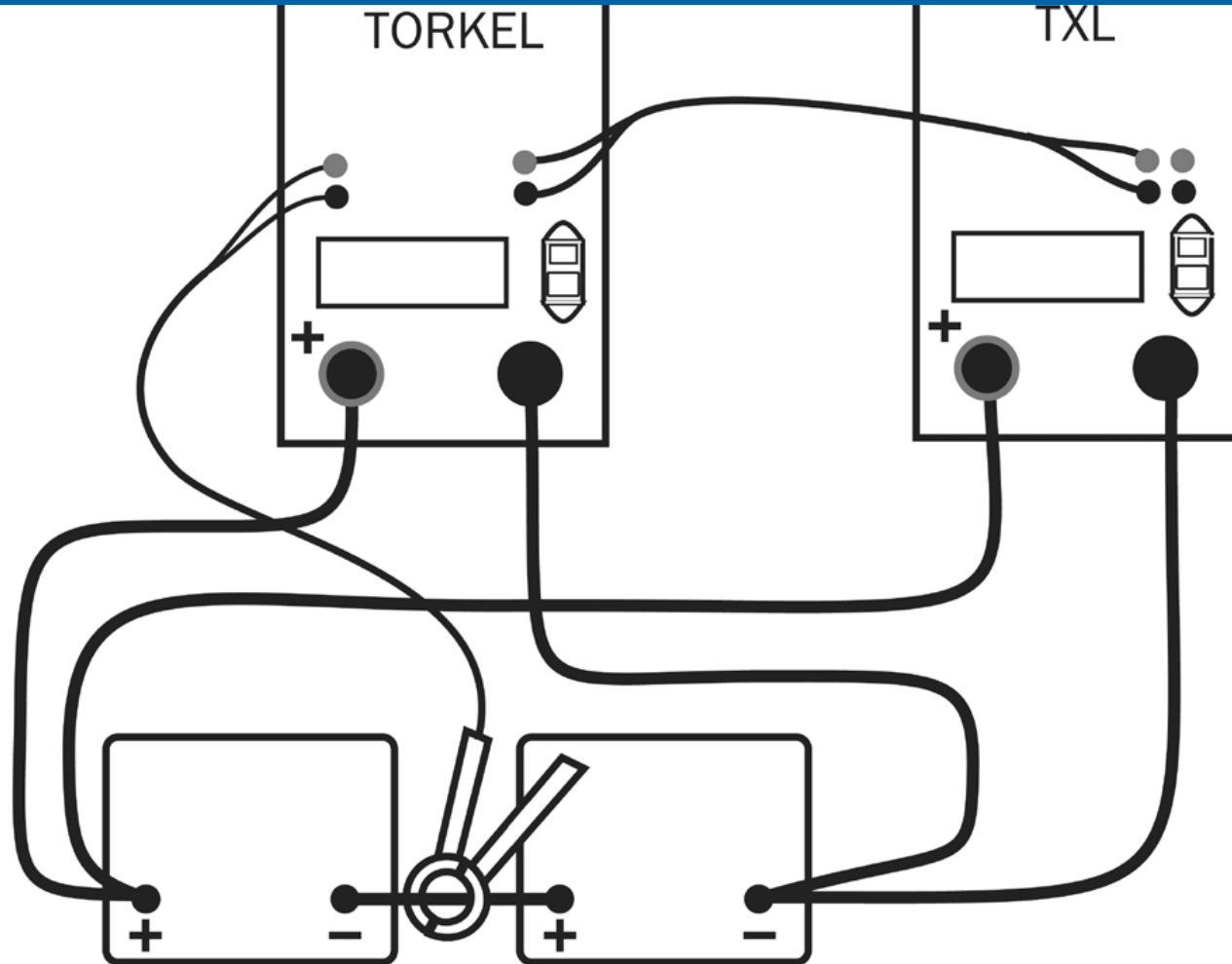


DISCHARGE VOLTAGE CURVES





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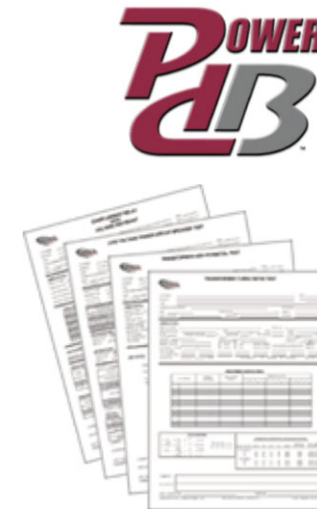
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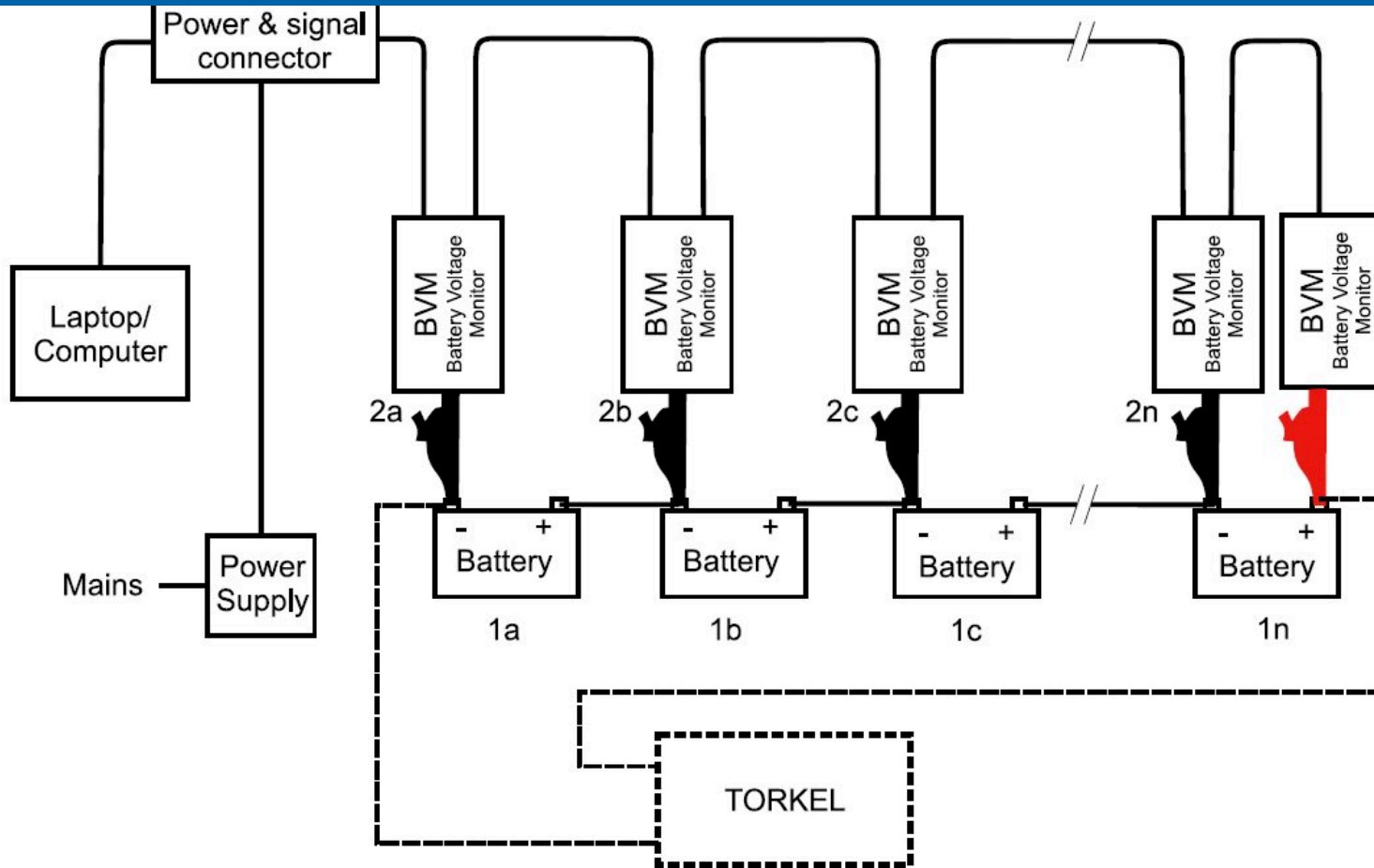
- Discharge at constant current, constant power, constant resistance
- Constant current up to 270 A @ 48 V, 110 A @ 125 V (15 kW)
- Up to 480 V
- Load profile discharge
- Three automatic stop and/or alarm functions: time, voltage and Ah
- Compact and light-weight, only 20 kg (44 lbs)
- Test w/o disconnecting load
- Store test values in TORKEL
- Extra TXL load units available
- TORKEL Win PC software (optional)

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■ New solution: BVM

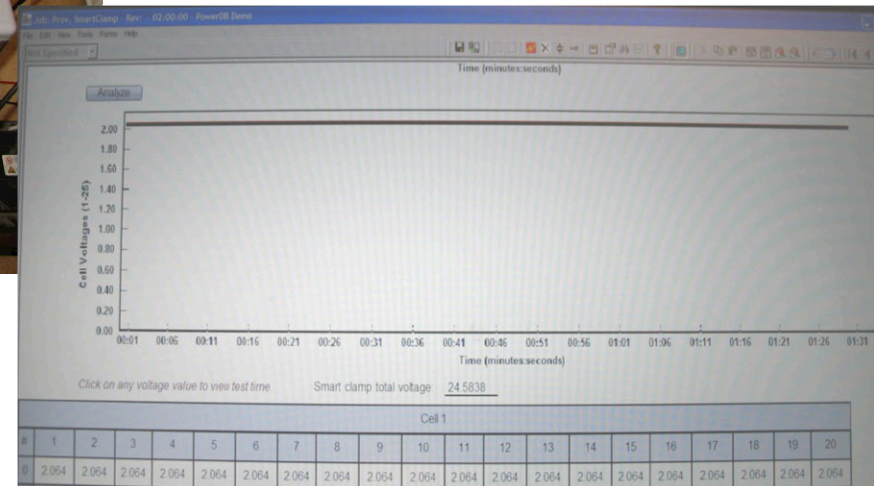




*The last dolphin clip (red) in the chain should be connected to the positive battery pole of the last battery in the bank.
When used together with TORKEL the voltage will be logged through the complete discharge test.*



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- Maximum number of channels: 255
- Voltage ranges: 0-5 VDC and 0-20 VDC
- Resolution: 1.00 mV both ranges
- Accuracy: Better than 0.1% of full scale +/- 0.002VDC
- Maximum battery string voltage: 250 VDC
- Measurement input impedance: 1Meg ohm
- Protection: Over voltage, reverse voltage, voltage transients, ESD
- Operating temperature: 0 – 50 degrees C
- Safety certifications: UL/IEC-61010 pending



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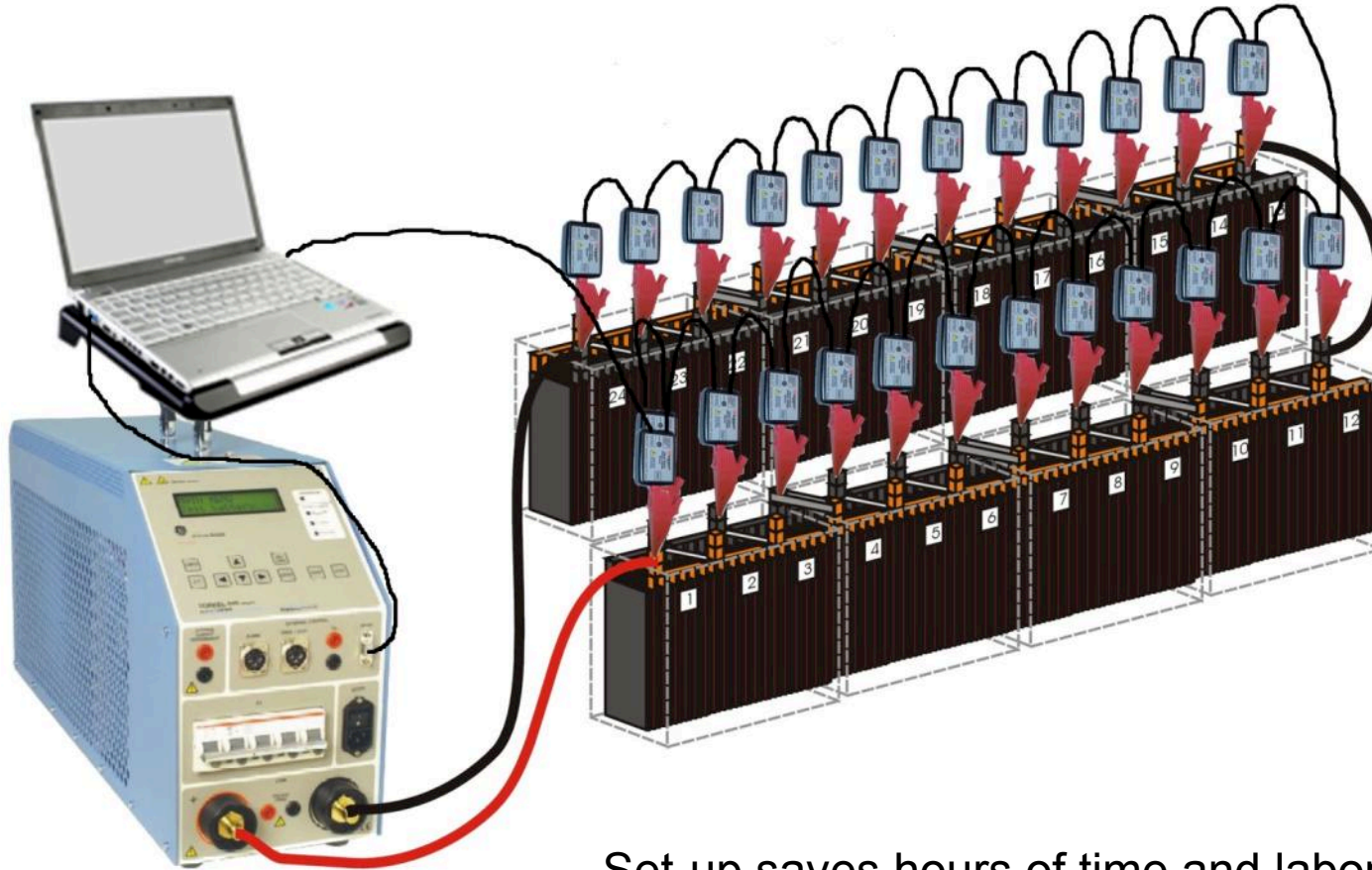


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Set-up saves hours of time and labor!

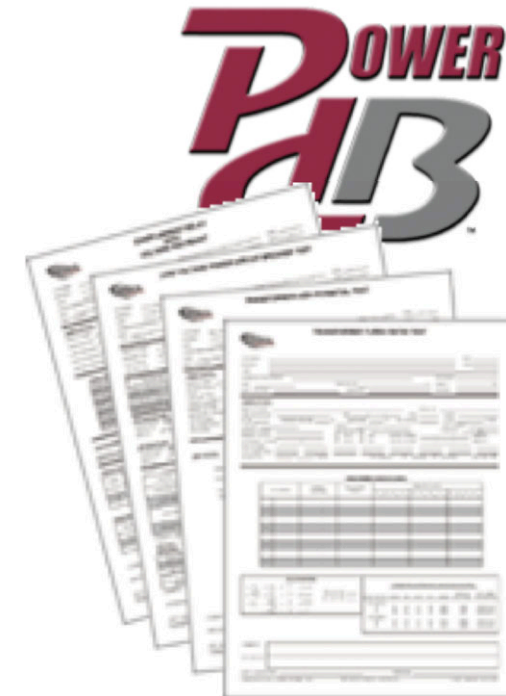
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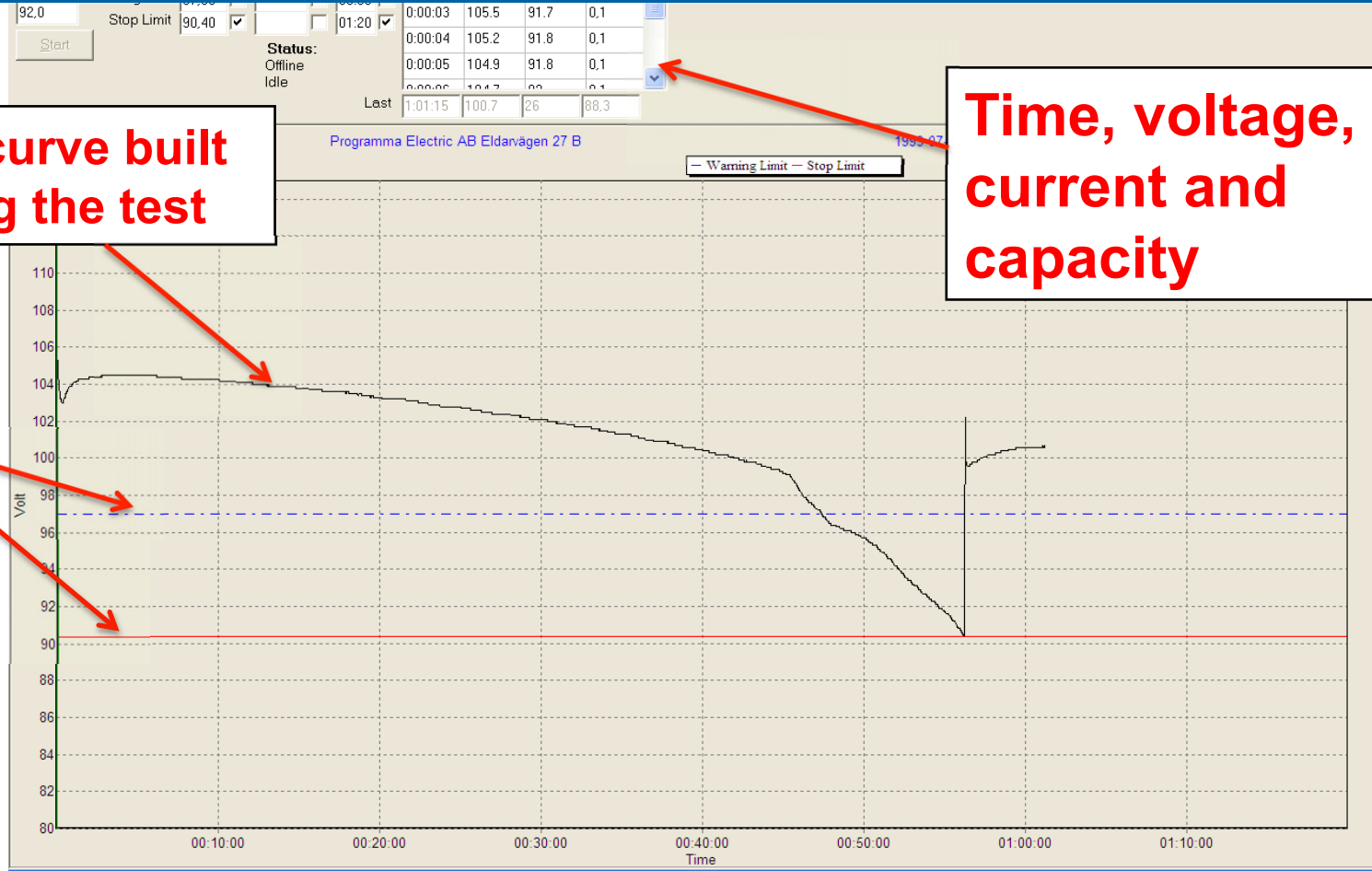
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Voltage curve built up during the test

Time, voltage, current and capacity

Limits



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File Graph TORKEL Commands Report Help

Test Method
Constant I
Ampere: 92.0
Warning Limit: 97.00
Stop Limit: 90.40
Start
End Test

Settings
Volt: 97.00
Capacity: []
Time: 00:50
01:20
Status: **Offline**
Idle

Readings

Time	Volt	Current	Capacity
0:00:02	105.8	91.7	0
0:00:03	105.5	91.7	0,1
0:00:04	105.2	91.8	0,1
0:00:05	104.9	91.8	0,1
0:00:06	104.7	92	0,1
Last	1:01:15	100.7	26 88,3

Battery Voltage Monitor
0 - 5V
0 - 20V
Status: **Offline**
Init Scan
Start Scan
End Scan
Warning limit
Stop limit
Connect
Set Sample Rate
Battery Data

Toggle View

Scan no: 11 of 11

Date: 2011-10-04 Time: 09:23:29 Elapsed Time: 0:00:55

Utot: 9.631 V
Average: 1.816 V
Max. point voltage: 1.823 V at no. 2
Min. point voltage: 1.808 V at no. 1

Point	Value
1:	1.808
2:	1.823

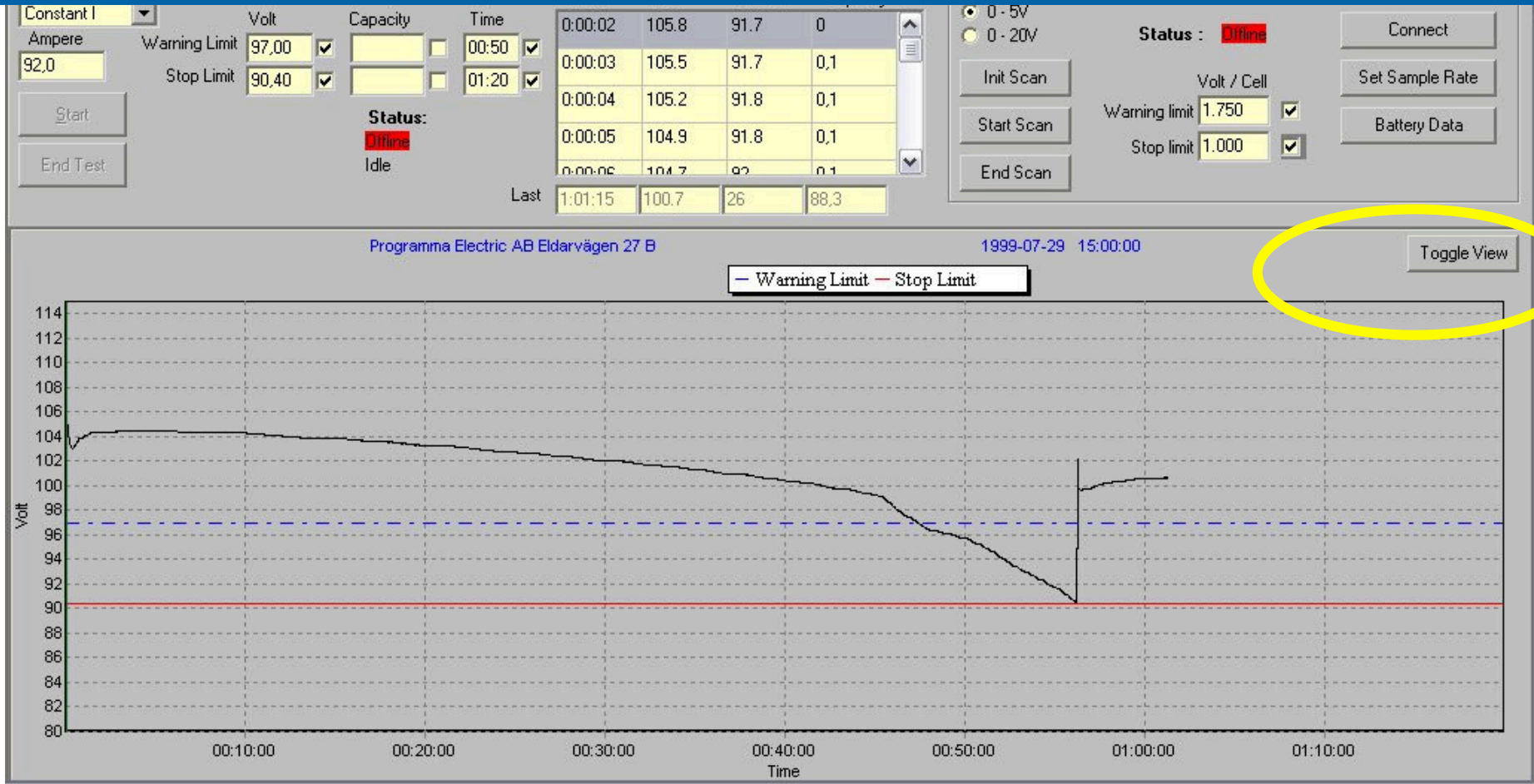
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■ Battery testing in general.

During the discharge test it is important to record all cells in the battery so that it is possible to find a bad cell. It is very common that just one cell is bad and the rest of the cells are in perfect condition. In this case it is important to not replace the whole battery. It is possible to save a lot of money by just replace one cell.

■ Decide test time

The test time depends on:

- Available test time (man hours, allowable downtime)
- Battery size
- Size/capability of the test equipment
- Most common is 5 hours but it can vary from about 20 minutes to 20 hours.



the substation and the battery manufacturers' specification. A common battery specification could be down to 1,65 V but if this value is lower than the lowest allowable voltage in the substation then the substation limit must be used.

■ Decide test current

Check in battery manufacturer table for the actual battery:

Below table shows a typical table for a specified battery. It shows the discharge current for different test times for End voltage 1,8 V/cell. For other End voltages there are other tables.

Test time	1	2	3	5	8	10 h
Capacity Ah @ 1,8 V End voltage /Cell	10	15	20	24	28	30
Discharge Current A	10	7,5	7,3	4,9	3,1	3

Note that the capacity is lower for shorter test times.



current for actual temperature. Cold= lower test current and warm=higher test current.

- Sometimes the capacity is corrected for temperature after the test instead of adjusting the test current in advance.

■ Set the limits in Torkel

- Set the warning limit to a value that will appear just before end of the test.

Example: Test time 5 hours Set the time limit to 4 hours 50 minutes.

- Set the stop limit to a value that will appear just after end of the test.

Example: Test time 5 hours Set the time limit to 5 hours 10 minutes.



the test.

Example: Voltage limit 1,8 V/cell. Set the warning limit to 1,83 V/cell

■ Run the test

- If all cells are above their voltage limits, everything is fine. Just fill in the report.
- If a cell goes below the limit too early then it must be possible to stop the test and short circuit this cell and then continue with the test.
- The BVM will find the bad cells.
- If the whole battery is too low then it has to be replaced. According to the standards it says that “if the battery has less than 80% of its nominal capacity then it must be replaced”.



Dolphin clips, Power & signal connector, Power supply, Connection cables and Carrying case

BVM300

With TORKEL Win software

System of 31 BVM units CJ-59093

BVM600

With TORKEL Win software

System of 61 BVM units CJ-59096

BVM300

With PowerDB software

System of 31 BVM units CJ-59193

BVM600

With PowerDB software

System of 61 BVM units CJ-59196

BVM

Single unit CJ-59090

Exempel of configuration

90 cells:

1xBVM300

+1xBVM600

120 cells:

2x BVM600

128 cells:

2x BVM600

+ 8 single BVM