



Voltage Maintenance Program

Software to Maintain your Laboratory Volt

VoltRef provides the power of automation for maintaining statistical control of the volt in your laboratory. This program controls a low thermal scanner and voltmeter to compare voltage standards using the process recommended by NIST and other national laboratories.

Fully automate voltage measurements with VoltRef to improve your results and reduce labor. Improvements can be achieved by reducing the errors caused by the handling of leads and by increasing the quality and quantity of voltage comparisons. Data Proof provides the ideal solution for laboratories who have three or more voltage references and require sub parts per million accuracy.

Friendly interactive operations include:

- ◆ For both standard cells and solid state references
- ◆ Ten-to-one scaling with 0.2 ppm typical accuracy
- ◆ Prints out complete analysis reports
- ◆ Stores results of measurements
- ◆ Plots graphs of historical data for analysis
- ◆ Delay start and auto repeat for tests
- ◆ Tracks and corrects for voltage drift

The screenshot displays the VoltRef software interface. At the top, there is a menu bar with options: File, Setup, Data Files, Last Readings, Help. Below the menu is a table with columns: Group Code, Group Name, Serial Number, Nominal Temp, Nominal EMF, Scanner Position, Ref. Unit?, and Level: A. The table contains three rows of data:

Group Code	Group Name	Serial Number	Nominal Temp	Nominal EMF	Scanner Position	Ref. Unit?	Level: A
A1	10REF	DP-9812122		10.000	1 2 3	YES	
A2	1uSTD	DP-9812123		1.018	5 6 7 8	YES	
A3	1uREF	DP-9812125	30.0	1.018	9 10 11 12	NO	

Below the table are buttons for 'Prev.', 'Next', and a text input field: 'Select or enter all group codes to check - (i.e. A1,A2):'. There are also buttons for 'START', 'Delay start', and 'Graph Data'. A 'VoltRef' logo is in the bottom right corner of this section.

The middle section shows a diagram of the '160A Opt. 2 or 320A Opt.2 Low Thermal Scanner'. It includes labels for 'Solid State Ref', 'Standard Cells', and 'Volt Meter'. Below the diagram is a 'SCANNER SETUP SCREEN' table:

GROUP	NOMINAL TEMP	NOMINAL FOR REFERENCE	NO. ANY REFERENCE	EMF UNIT/SP
A1 10REF	10.000	2	YES	
A2 1uREF	1.018	3	NO	
A3 1uSTD	1.018	5 6 7 8	YES	

Below the scanner setup screen is a table of measurement results:

1 10REF 1 10STD 1 -31.86 0.08	9 10STD 2 10REF 1 -19.28 0.06
2 10REF 1 10STD 3 -47.47 0.09	
3 10REF 3 10STD 3 -16.59 0.10	
4 10REF 3 10STD 1 31.02 0.03	
5 10REF 2 10STD 2 47.38 0.08	
6 10REF 2 10STD 4 16.52 0.08	
7 10REF 4 10STD 4 -21.16 0.08	
8 10REF 4 10STD 2 -23.17 0.12	
10 10STD 4 10REF 3	
11 10STD 4 10REF 3	
12 10STD 2 10REF 3	
13 10STD 1 10REF 2	
14 10STD 3 10REF 2	
15 10STD 3 10REF 4	
16 10STD 1 10REF 4	

Below the table is a 'GETTING REVERSE READINGS' section with a diagram of the scanner connections. At the bottom, there is a 'GROUP MEAN EMF FOR 10REF' graph showing voltage drift in microvolts over time. The graph includes a linear fit line and statistical data:

GROUP MEAN EMF FOR 10REF

MICROVOLTS

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

1993 MEAN OF Data = 10 000 031.17 Microvolts

STANDARD DEVIATION = 1.51 Volts (0.27 from Slope)

SLOPE = 5.03 Microvolts Per Year

DATA PROOF

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VoltRef Overview

Data Proof software is the industry standard for making precision voltage measurements. Data Proof equipment is maintaining the volt in hundreds of commercial and national laboratories around the world. To make voltage measurements with VoltRef, simply select your groups to test. VoltRef will then create a test design for up to 32 devices, and then take the measurements controlling your voltmeter and low thermal scanner. When the test design is complete you can print a complete analysis, save the results and create graphs of your saved files.

Statistical Analysis

VoltRef creates a test design where your voltage standards are compared in pairs. The small difference between the two units is measured, ten times first in the forward direction and then ten times with the leads reversed. When the design is complete VoltRef computes a least-squares-fit to determine the value for each device. This value is based on the average value of your reference units included in the test. A standard deviation of the measurement is also computed.

Choice of Designs

VoltRef provides a choice of three test designs: 1) *statistically balance* design recommended by NIST and used by the majority of western national laboratories, 2) *favored cell* used by some European national labs, and 3) *ring* design popular in a few Asian countries. (Available only with VoltRef for Windows.)

Flexibility

VoltRef provides convenient to simplify setting up a measurement. Scanner connections and traceable values are all stored so you simply select the groups to test. It only takes a few seconds to accommodate new reference devices that come into your laboratory for calibration. Information for up to 48 groups with six units per group can be stored. VoltRef can measure any voltage up to 50 volts, and is recommended for comparing both standard cells and solid state devices. VoltRef has built in drivers to accommodate most nanovoltmeters.

Ten-To-One Scaling

Special ten-to-one and one-to-ten routines are included to allow comparisons between 1, 1.08 and 10-volt standards. Accuracy of 0.2 ppm can be realized using suitable 8 1/2 digit meters.

Delayed Start

A delayed start routine is included to let you make measurements at a later time without being present. This allows you to run tests at night when your lab is quiet. Up to four different designs can be printed out with choices of repeat intervals, print outs and files to store results. Repeat intervals allow you to automatically take measurements every day, week or any period of your choosing.

Reports and Graphs

A complete analysis of the test can be printed. Historical data can be edited or deleted. Graphs can be created for individual devices or groups. Control limits can be added to graphs for statistical control. Data can also be imported or exported to commercial spread sheets.

Voltage Drift

VoltRef computes the least-squares-straight-line slope of your devices. This aids you in predicting the emf drift for solid state standards. Also the predicted slope and calibration date can be stored for each traceable unit. This information can be used to calculate the predicted emf values for your reference standards each time a test is run.

System Requirements

Computer, 486 or higher, with 8 Mbytes of RAM (12 Mbytes recommended) Windows® 3.1, '95 or NT, and a IEEE-488 (GPIB) bus interface card (not included) (VoltRef runs in TransEra's HWIN with Basic PLUS - runtime versions are included. HWIN Development version is also available to edit VoltRef program code.) **Recommended:** Data Proof Low Thermal Scanner and a suitable nanovoltmeter.

Ordering Information:

VoltRef	For Windows 3.1, Windows 95, Windows NT or higher
Also Available:	
HM900	TransEra GPIB Interface Board
HWIN	TransEra HTBasic for Windows (Development version)

Order Contact:

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