DIGITMR S2 PC

digital circuit breaker analyzer

Vanguard Instruments Company, Inc.
www.vanguard-instruments.com

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The Vanguard DIGITMR S2 PC is an inexpensive, easy to use digital circuit breaker analyzer that is designed to be used with a PC. This inexpensive analyzer offers the most cost-effective method for testing circuit breakers. It can fully analyze a circuit-breaker's performance by testing the contact time, stroke, velocity, over-travel, and contact wipe. Contact-motion analysis can be performed for all breaker contact operations (Open, Close, Open – Close, Close – Open, and Open – Close – Open). The DIGITMR S2 PC offers three dry-contact channels (for timing circuit breaker main and insertion resistor contacts), one digital transducer channel (to monitor CB contact motion), and two voltage monitoring channels.

"On-line" Timing Mode Option

An optional "on-line" timing mode is available for the DIGITMR S2 PC. In this mode, the DIGITMR S2 PC captures the breaker's trip or close time, the trip/close coil current "fingerprint," and the battery supply voltage while the breaker is still in service. The trip/close time is derived from the time of trip, or close coil initiation, to the breaker's bushing current breaker-make as detected by an AC clamp-on current sensing probe.

The "on-line" timing mode can detect a breaker's operating conditions with little or no down time. In this mode, the first trip operation time of the breaker is captured. If a breaker has been in service for a long period of time and sitting in close position, the first trip time of the breaker may be slow possibly due to a sticky mechanism. The "on-line" mode is very useful in such cases because traditional breaker timing may not detect this condition since several operations may have occurred before the first timing test is conducted.

CB Analysis Software

The DIGITMR S2 PC comes with the Windows®-based Vanguard Circuit Breaker Analyzer Series 2 (VCBA S2) software. This software is used to perform circuit breaker timing tests from the PC and to create test plans for specific circuit breakers.

A test plan comprises of all circuit breaker performance specifications (Stroke, Velocity, and Contact Time). When a test plan is used to perform a test, the DIGITMR S2 PC compares the test results with the circuit breaker's performance defined in the test plan to generate a "Pass/Fail" report.

Open/Close Coil Current Monitoring

A built-in Hall-Effect current sensor records the circuit breaker's operating coil current amplitude and duration. The circuit breakers' operating-coil waveforms (effectively, a performance "fingerprint" or "current profile") can be used as a diagnostic tool for analyzing a circuit breaker's performance.

DIGITMR™ SERIES 2PC

outstanding features

- inexpensive
- PC-controlled
- optional "on-line" timing mode
- small and light-weight

ordering information

Part number **DIGITMR S2 PC**	DIGITMR S2 PC, cables, and PC software
Part number **DIGITMR S2 PC-CASE**	DIGITMR S2 PC shipping case
Part number **DIGITMR S2 PC-ONLINE TIMING**	DIGITMR S2 PC on-line timing mode option
Part number **Paper-TP4**	thermal printer paper

DIGITMR S2 PC Controls & Indicators

1

Contact Timing Inputs

Dry-contact input channels are used for timing circuit-breaker contacts. Each contact input channel can detect main contact and insertion-resistor contact times in milli-seconds and cycles. Three contact timing channels are available on the DIGITMR S2 PC.

2

Breaker Stroke and Velocity

One digital transducer input channel is available to measure circuit breaker contact stroke, velocity, over-travel, and bounce-back. With the use of a Vanguard digital travel transducer, no set-up calibration is required before testing. A special feature is also available to "Slow-Close" test a circuit breaker and obtain test results. An optional Resistor Transducer Adapter Device can be used to interface with any resistor transducer.

3

Voltage Monitoring Input

One analog input channel, designated as (V1), is dedicated to monitoring the substation DC supply or coil voltage (0-255 Volts, DC or peak AC). A second voltage input channel, designated as V2, is dedicated to detecting voltage On/Off status (presence or absence). This input can be used to monitor the status of an A/B switch.

4

Circuit Breaker Initiate Feature

A built-in solid-state initiate device is used to operate the circuit breaker from the DIGITMR S2 PC. Operational modes include Open, Close, Open-Close, Close-Open, and Open-Close-Open. Multiple operations such as Open-Close, Close-Open, and Open-Close-Open can be initiated using a programmable delay or by sensing the circuit breaker's contact condition.

5

Computer Interface

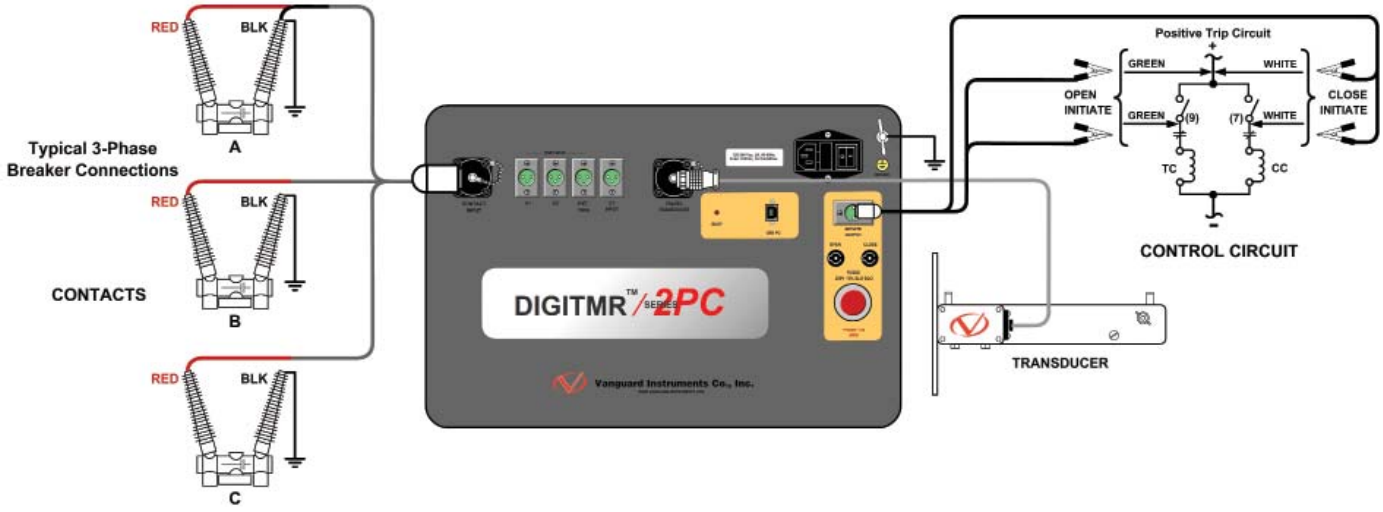
One USB interface port and an optional Bluetooth interface is available for computer-control. Vanguard's Windows®-based Circuit Breaker Analyzer Series 2 (VCBA S2) software is included with each DIGITMR S2 PC. The software can be used to control the unit, review test records, and create circuit breaker test plans. Test records can be exported to PDF, Excel, and XML format. All future software updates can be downloaded from the Vanguard web site at no additional charge.

6

CT Input

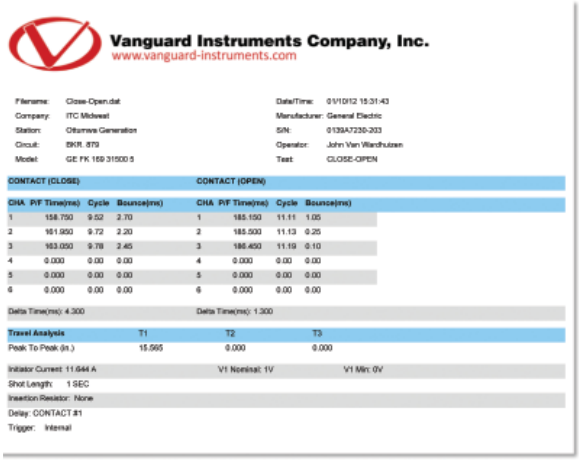
One non-contact AC current sensor is used to monitor circuit breaker on-line current for the "on-line" timing mode.

DIGITMR S2 PC *connections*



DIGITMR S2 PC *desktop printer output*

Desktop printout of tabulated test results



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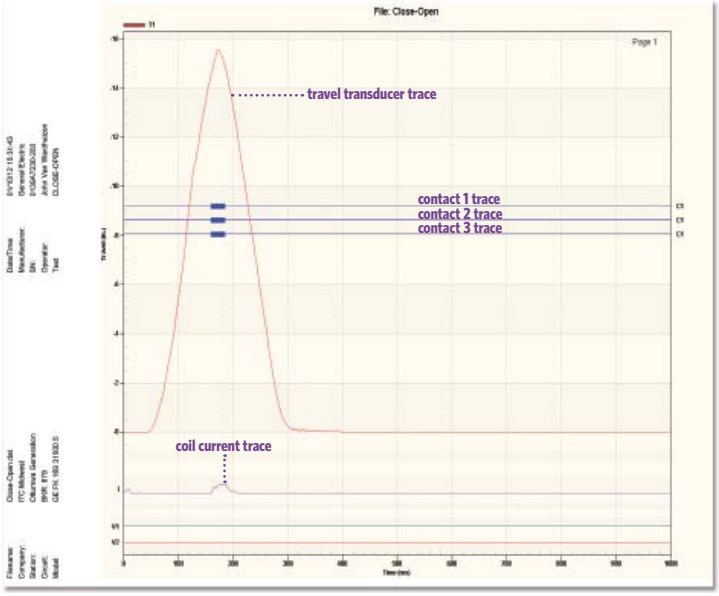
Filename:	Close-Open.dat	Date/Time:	01/10/12 15:31:43
Company:	ITC Midwest	Manufacturer:	General Electric
Station:	Otumwa Generation	S/N:	0139A7230-203
Circuit:	BKR. 879	Operator:	John Van Wandhuizen
Model:	GE FK 169 31500 5	Test:	CLOSE-OPEN

CONTACT (CLOSE)				CONTACT (OPEN)			
CHA	P/F Time(ms)	Cycle	Bounce(ms)	CHA	P/F Time(ms)	Cycle	Bounce(ms)
1	158.750	9.52	2.70	1	185.150	11.11	1.05
2	161.950	9.72	2.20	2	185.500	11.13	0.25
3	163.050	9.78	2.45	3	186.450	11.19	0.10
4	0.000	0.00	0.00	4	0.000	0.00	0.00
5	0.000	0.00	0.00	5	0.000	0.00	0.00
6	0.000	0.00	0.00	6	0.000	0.00	0.00
Delta Time(ms): 4.300				Delta Time(ms): 1.300			

Travel Analysis	T1	T2	T3
Peak To Peak (in.)	15.595	0.000	0.000

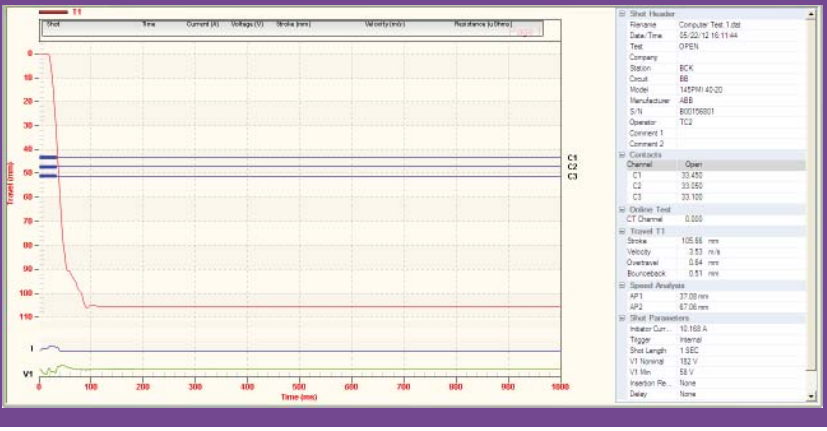
Initiator Current: 11.644 A V1 Nominal: 1V V1 Min: 0V
Shot Length: 1 SEC
Insertion Resistor: None
Delay: CONTACT #1
Trigger: Internal

Desktop printout of graphic test results



Computer control and analysis with included VCBA S2 Software

The DIGITMR S2 PC comes with the Vanguard Circuit Breaker Analysis Series 2 (VCBA S2) PC software. The VCBA S2 software can be used to retrieve timing records from the DIGITMR S2 PC, analyze retrieved records, view test results in graphic format, generate timing reports, create breaker test plans, transfer breaker test plans to the DIGITMR S2 PC, and control the unit from the PC to perform timing tests. The software can also be used to print test results to a desktop printer.



DIGITMR S2 PC specifications

type	portable digital circuit-breaker analyzer
physical specifications	18½"W x 14"H x 7"D (47.0 cm x 35.7cm x 17.6 cm); Weight: 16 lbs (7.3 kg)
input power	3 Amps, 100 – 240 Vac, 50/60 Hz
dry-contact inputs	3 dry-contact channels; each channel detects main contact and insertion resistor contact
timing windows	1 second, 10 seconds, or 20 seconds
timing resolutions	±50 micro-seconds @ 1 sec. duration, ±500 micro-seconds @ 10 sec. duration, ±1.0 milli-seconds @ 20 sec. duration
timing accuracy	0.05% of reading ±0.1 milli-seconds @ 1 second duration
dry-contact detection range	closed: less than 20 ohms; open: greater than 5,000 ohms
resistor detection range	50 – 5,000 ohms
trigger input voltage	open/close: 30 – 300 V, DC or peak AC
voltage sensing input range	V1: analog input; 0 – 255 V DC or peak AC; sensitivity ±1 V V2: voltage presence/absence detector input; 30 – 300 V DC or peak AC
breaker operations	Initiate Open, Close, Open-Close, Close-Open, Open-Close-Open
breaker initiate capacity	30A, 250 Vac/dc max
initiate current reading range	one, non-contact, Hall-effect sensor, 0 – 20 amp range, dc to 5 Khz
digital travel transducer input	1 digital travel transducer channel; linear range: 0.0 – 60.0 in (±0.005 in) rotary range: 0 – 360 degrees (±0.006 degrees)
contact travel point difference	measures "slow-close" contact-point distances; results can be printed
CT current sensor	one, non-contact, 0–100A
internal test record storage	stores up to 200 test records and 100 test plans
computer interfaces	one USB port, optional Bluetooth interface
pc software	Windows®-based Circuit Breaker Analysis Series 2 (VCBA S2) software included with purchase price. Software updates available at no additional charge
safety	designed to meet UL/IEC 61010 and CAN/CSA C22.2 No. 1010.1-92 standards
environment	Operating: -10°C to +50°C (+15°F to +122°F); Storage: -30°C to +70°C (-22°F to +158°F)
humidity	90% RH @ 40°C (104°F) non-condensing
altitude	2,000 m (6,562 ft) to full safety specifications
cables	furnished with full set of test leads (including 20-foot contact leads and 30-foot contact lead extensions)
options	transportation case (available for the DIGITMR S2 and travel transducers)
warranty	one year on parts and labor

NOTE : the above specifications are valid at nominal voltage and ambient temperature of +25°C (+77°F). Specifications are subject to change without notice.

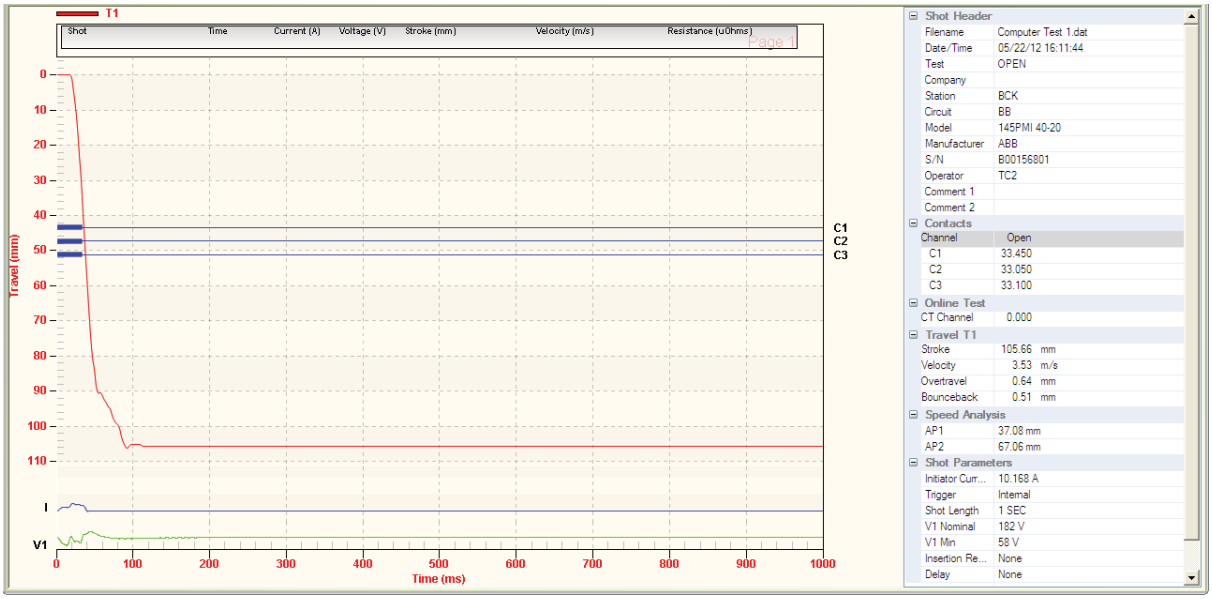
VCBA S2

Vanguard circuit breaker analyzer software

The Vanguard Circuit Breaker Analyzer Series 2 (VCBA S2) Windows®-based software is included with all compatible Vanguard Circuit Breaker Analyzers (CT-6500 S2, CT-7000 S2, CT-7500 S2, CT-8000, DigiTMR S2, DigiTMR S2 PC) at no additional cost. This robust application can be used to control the circuit breaker analyzer from a PC to perform CB timing tests. It can also be used to retrieve test records from the circuit breaker analyzer, analyze timing records, and view test results in tabulated and graphical format. Circuit breaker test plans can also be created and transferred to the circuit breaker analyzer.

Retrieving and Analyzing Test Records

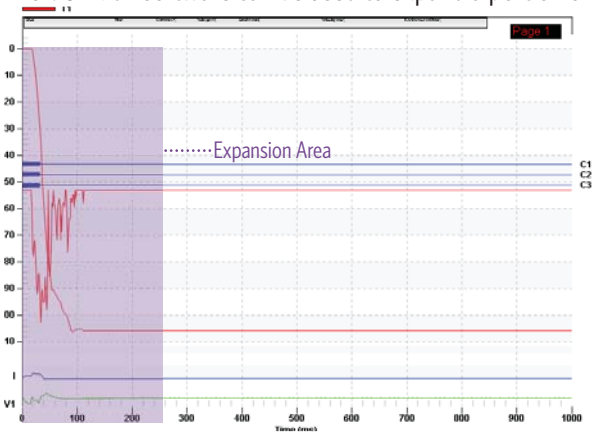
The VCBA S2 software can be used to quickly retrieve test records from a compatible Vanguard circuit breaker analyzer. Test results can be viewed in tabular and graphical format and can be saved on the PC hard drive. Test record header information, such as the company name, station, circuit, operator name, manufacturer, model, and serial number can also be edited.



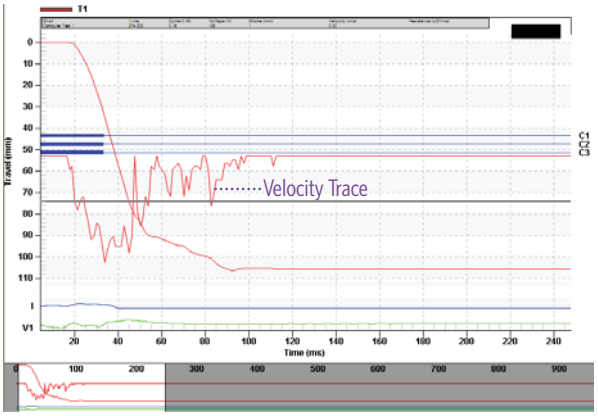
Sample Test Results (OPEN Test)

Getting a Closer View with Graph Expansions

The VCBA S2 software can be used to expand a portion of the graphical test results for more accurate analysis.



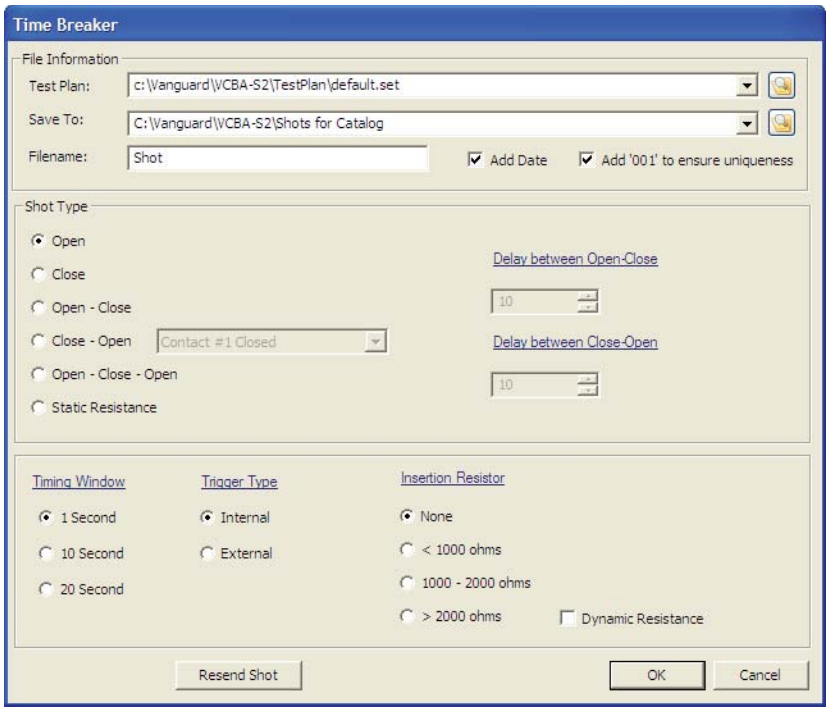
Graphical Test Results



Graphical Test Results Expansion (from 0 to 200ms)

Timing a Circuit Breaker with the VCBA S2 Software

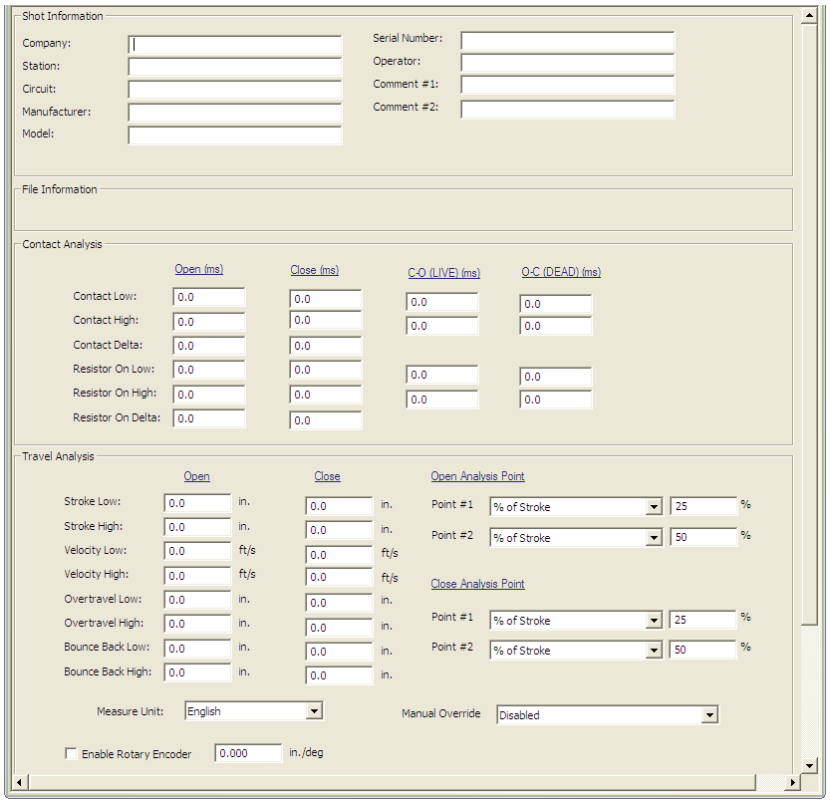
The VCBA-S2 software can be used to control a CB analyzer and run circuit breaker timing tests. The following tests are supported: OPEN, CLOSE, OPEN-CLOSE, CLOSE-OPEN, OPEN-CLOSE-OPEN, and STATIC RESISTANCE. Also, a test plan for a specific breaker can be used with the test. If a test plan is used, the Pass/Fail indicator will be displayed based on the settings in the test plan.



Breaker Testing Parameters

Creating Test Plans for Faster Testing

A circuit breaker test plan is comprised of all circuit-breaker performance specifications (stroke, velocity, and contact time). A test plan can be used to test a circuit breaker. When used with a test record, a Pass/Fail report is generated by comparing the actual performance of the breaker with the specifications in the stored test plan. Test plans can be easily created with the VCBA-S2 software and can be stored on the hard drive or transferred to a CB analyzer.



Creating a Test Plan

Instruments designed and developed by the hearts and minds of utility electricians around the world

Vanguard Instruments Company, (VIC), was founded in 1991. Currently, our 28,000 square-foot facility houses Administration, Design & Engineering, and Manufacturing operations. From its inception, VIC's vision was, and is to develop and manufacture innovative test equipment for use in testing substation EHV circuit breakers and other electrical apparatus.

The first VIC product was a computerized circuitbreaker analyzer, which was a resounding success. It became the forerunner of an entire series of circuitbreaker test equipment. Since its beginning, VIC's product line has expanded to include microcomputer-based, precision micro-ohmmeters, single and three phase transformer winding turns-ratio testers, transformer winding-resistance meters, mega-ohm resistance meters, and a variety of other electrical utility maintenance support products.

VIC's performance-oriented products are well suited for the utility industry. They are rugged, reliable, accurate, user friendly, and most are computer controlled. Computer control, with innovative programming, provides many automated testing functions. VIC's instruments eliminate tedious and time-consuming operations, while providing fast, complex, test-result calculations. Errors are reduced and the need to memorize long sequences of procedural steps is eliminated. Every VIC instrument is competitively priced and is covered by a liberal warranty.

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