




Digital Circuit Breaker Analyzer

Easy to Use; Available with 3, 6, or 12 Dry-Contact Inputs

CBT-6500

amperis

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The CBT-6500 S2 is an inexpensive, easy to use, stand-alone, microprocessor-driven EHV circuit-breaker analyzer. The CBT-6500 S2 is available in models with either 3 (CBT-6500-3 S2), 6 (CBT-6500-6 S2), or 12 (CBT-6500-12 S2) drycontact inputs. The CBT-6500 S2 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 CBT-6500 S2's timing window is selectable between 1-second, 10-second, or 20-second periods. The 10-second and 20-second timing windows are ideal for timing long duration events such as circuit-switcher contact testing.

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 milliseconds and cycles.

Voltage Monitoring Inputs

One analog voltage input channel is dedicated to monitoring a circuit-breaker's DC power supply or coil voltage (0 - 255 volts, DC or peak AC). One digital voltage input channel is dedicated to detecting the voltage on/off status (presence or absence) of an A/B switch.

Trip/Close Current Monitoring

A built-in Hall-effect current sensor records the Trip/Close current level and duration. The breaker's operating-coil current waveform duration (effectively, a performance "fingerprint" or "current profile") can be used as a diagnostic tool for analyzing a breaker's performance.

Breaker Stroke and Velocity

Three digital travel transducer channels are available on the CBT-6500 S2 for measuring circuit-breaker velocity, stroke, over-travel, and bounceback. Unlike other transducer types, the digital transducer requires neither calibration nor setup.

"Slow-Close" Test

The "slow-close" test feature is a very useful tool for accurately measuring contact-travel during circuit maintenance, especially when the circuitbreaker contact motion is slowly jacked through the stroke by manual operation. A table of the "slow-close" test results can be printed on the built-in thermal printer.

Breaker Initiate Features

A built-in solid-state initiate device is used to operate a breaker from the CBT-6500 S2. The operational modes include Open, Close, Open - Close, Close - Open, and Open - Close - Open. Multiple operations, such as Open - Close and Open - Close - Open, can be initiated by using programmable delay time or by sensing a breaker's contact condition.

Internal Test Record Storage

The CBT-6500 S2 can store up to 200 test records in Flash EEPROM. Test records can be retrieved and printed on the built-in thermal printer, or they can be transferred to a PC via the unit's RS-232C or USB interface.

Computer Interface

The CBT-6500 S2 can be computer-controlled via its RS-232C or USB interface. A Windows® XP/Vista-based Breaker-Analysis software application is provided with each unit. Using this software, circuit-breakers can be timed from the PC. Test records can be retrieved from the CBT-6500 S2 and then stored on the PC for future analysis and report generation. Additionally, test records can be exported in Microsoft® Excel format for further analysis.

Diagnostic Capabilities

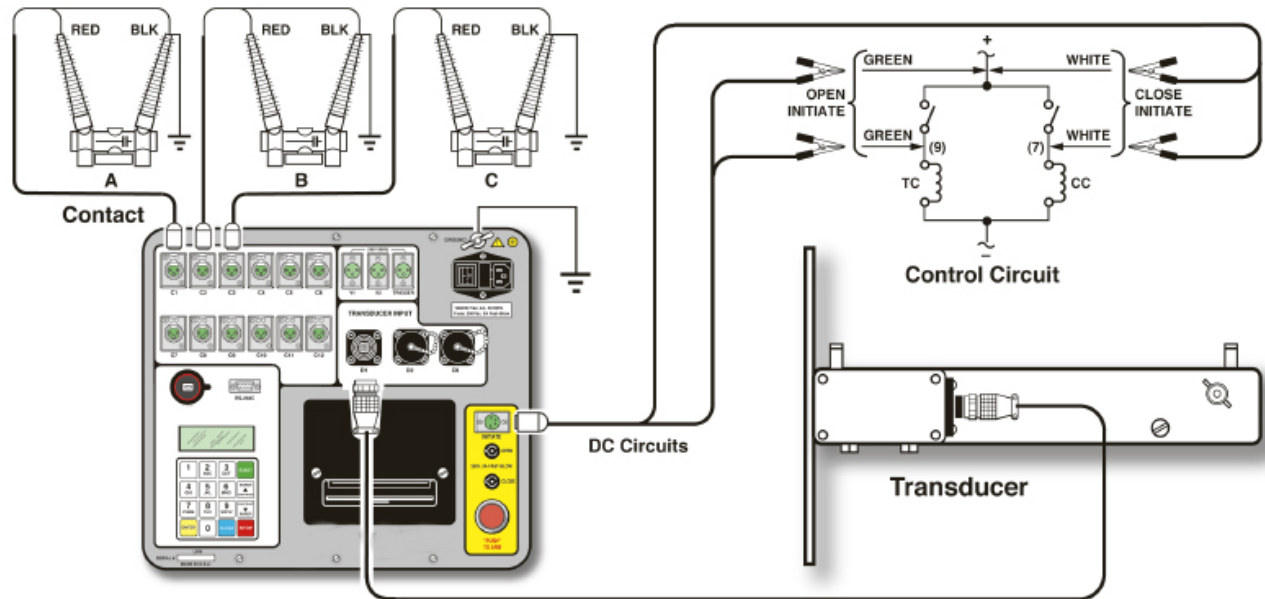
The CBT-6500 S2 can perform diagnostics on its internal electronics. Diagnostics can be performed to verify contact cable connections and to test the travel transducer's electronics.

User Interface

The CBT-6500 S2 features a back-lit LCD screen (20 characters by 4 lines) that is viewable in both bright sunlight and low-light levels. A rugged, 16-key, membrane keypad is used to control the unit.

Built-in Thermal Printer

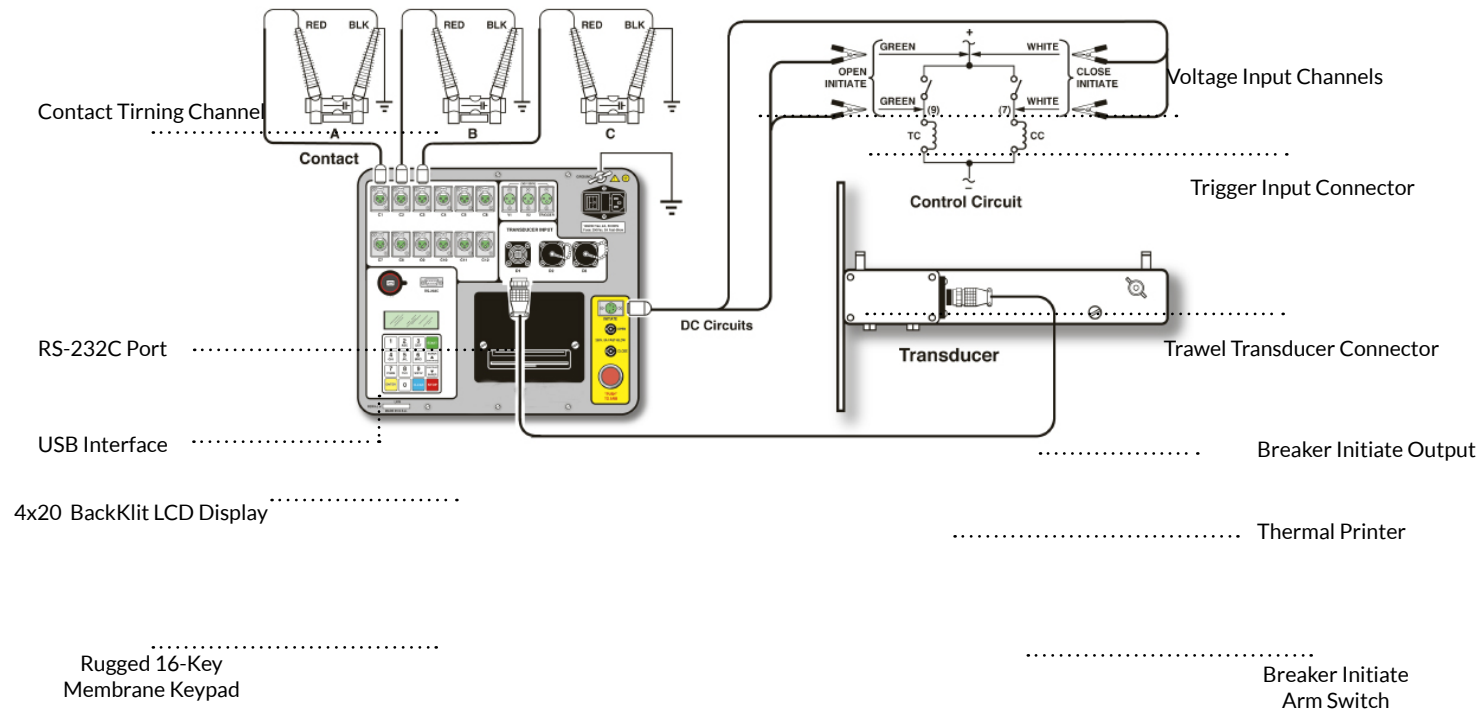
The CBT-6500 S2's built-in 4.5-inch wide thermal printer can print the breaker contact analysis results in both tabular and graphic formats.



SPECIFICATIONS

TYPE	Portable circuit-breaker analyzer
PHYSICAL SPECIFICATIONS	16"W x 11"H x 14" D (40.6 cm x 29.9 cm x 35.6 cm); Weight: less than 25 lbs (11.3 kg)
INPUT POWER	100 – 120 Vac or 200 – 240 Vac (selectable), 50/60Hz
DRY-CONTACT INPUTS	3, 6 or 12 dry input channels (depending on model). Each channel detects main and insertion-resistor contacts
TIMING WINDOWS	1-second, 10-seconds, or 20-seconds
TIMING RESOLUTIONS	±50 micro-seconds @ 1-second duration, ±500 micro-seconds @ 10-second duration, ±1.0 milli-seconds @ 20-second duration
TIMING ACCURACY	0.05% of reading ±0.05 ms @ 1-second duration
DRY-CONTACT CHANNEL PROTECTION	All contact inputs are grounded until test; input channels are protected against static discharge
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 – 300V, DC or peak AC
VOLTAGE SENSING INPUT RANGE	V1: analog input; 0 – 255V DC or peak AC; Sensitivity ±1V V2: voltage presence/absence detector input; 30 – 300V DC or peak AC
BREAKER OPERATIONS	Initiate Open, Close, Open – Close, Close – Open, Open – Close – Open
BREAKER INITIATE CAPACITY	30A, 250Vac/dc max
INITIATE CURRENT READING RANGE	One, non-contact, Hall-effect sensor, 0 – 20 amp range, dc to 5Khz
TRAVEL TRANSDUCER INPUTS	3 digital travel transducer channels; Linear range, 0.0 – 60.0 in (±0.01 in); Rotary range: 0 – 360 degrees (±0.36 degrees)
CONTACT TRAVEL POINT DIFFERENCE	Measures "slow-close" contact-point distances; results can be printed
DISPLAY	Back-lit LCD Screen (20 characters by 4 lines); viewable in bright sunlight and low-light levels
PRINTER	Built-in 4.5-inch wide thermal printer can print both graphic contact travel waveforms and tabulated test results
INTERNAL TEST RECORD STORAGE	Stores up to 200 test records
COMPUTER INTERFACES	One RS-232C port, One USB port
PC SOFTWARE	Windows® XP/Vista-based Breaker-Analysis software is included with purchase price
SAFETY	Designed to meet UL 6101A-1 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	2,000m (6,562 ft) to full safety specifications
OPTIONS	Transportation case (available for the CBT-6500 S2 and the 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.



CBT-6500

Graphic and Tabulated Printouts

CIRCUIT BREAKER TIMING REPORT

File: 14-03-2018 08:00:00 Test: 14-03-2018

Company: Vanguard Instruments Co., Inc. Model: 14-AP300000
 Contact: Service: 878
 Operator: H4
 Comments:

TEST: OPEN

CONTACT	OPEN	TRIP	CYCLE	RETRAKE (ms)	TRIP (ms)
1	0.300	2.47	0.30	0.01	
2	0.300	2.30	0.30	0.04	
3	0.300	2.34	0.30	0.05	
4	0.300	0.30	0.30	0.05	
5	0.300	0.30	0.30	0.05	
6	0.300	0.30	0.30	0.05	

Data Retention: 4.550 (P/F) = P

DT CHANNEL ANALYSE: 0.800 (ms)

TRIP ANALYSE

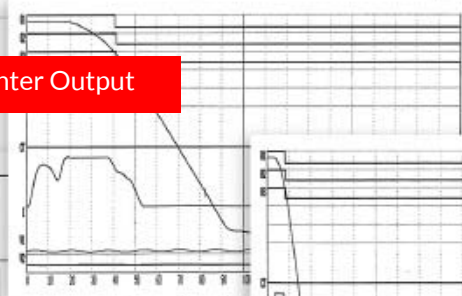
TRIP	T2	T3	T4	T5	T6
1	0.01	1.04	0.104	0.01	
2	0.01	1.04	0.104	0.01	
3	0.01	0.01	0.01	0.01	
4	0.01	0.01	0.01	0.01	
5	0.01	0.01	0.01	0.01	
6	0.01	0.01	0.01	0.01	

Speed Accuracy
 Paper: 1 x 100 in
 Plot: 1 x 100 in

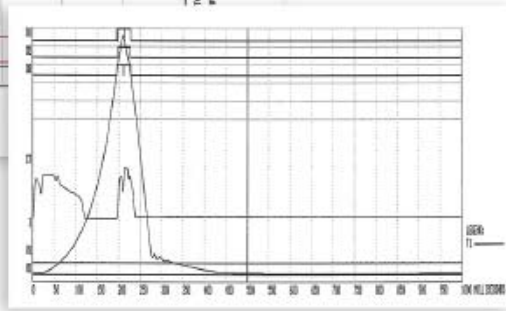
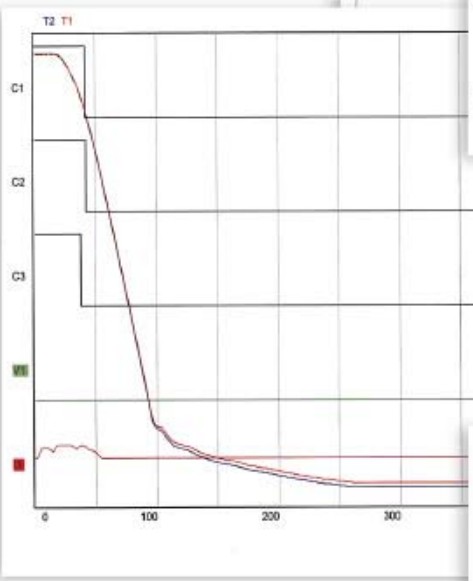
V1 Voltage: 0 V V1 Max: 0 V Indicator Current: 0.140 (amps)

User Length: 500
 Operator: H4
 Date: 14-03-2018
 Trigger: Internal

Built-in Thermal Printer Output



PC Printer Output



BREAKER TIMING RESULTS - 60 Hz

DATE: 14-03-2018 08:00:00

COMPANY: VANGUARD INSTRUMENTS CO., INC.
 CONTACT: SERVICE: 878
 MODEL: 14-AP300000
 OPERATOR: H4

TEST: OPEN

CONTACT	TRIP	CYCLE	RETRAKE	TRIP (ms)
1	0.300	2.47	0.30	0.01
2	0.300	2.30	0.30	0.04
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4	0.300	0.30	0.30	0.05
5	0.300	0.30	0.30	0.05
6	0.300	0.30	0.30	0.05

DT CHANNEL ANALYSE: 0.800 (ms)

TRIP ANALYSE

TRIP	T2	T3	T4	T5	T6
1	0.01	1.04	0.104	0.01	
2	0.01	1.04	0.104	0.01	
3	0.01	0.01	0.01	0.01	
4	0.01	0.01	0.01	0.01	
5	0.01	0.01	0.01	0.01	
6	0.01	0.01	0.01	0.01	

Speed Accuracy
 Paper: 1 x 100 in
 Plot: 1 x 100 in

BREAKER TIMING RESULTS - 60 Hz

DATE: 14-03-2018 08:00:00

COMPANY: VANGUARD INSTRUMENTS CO., INC.
 CONTACT: SERVICE: 878
 MODEL: 14-AP300000
 OPERATOR: H4

TEST: CLOSE

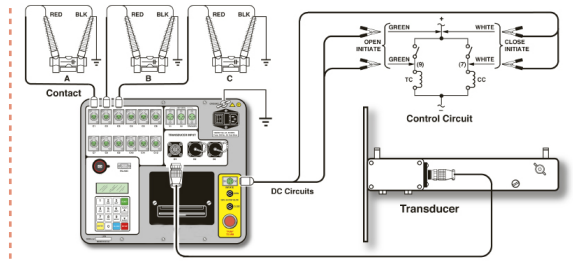
CONTACT	TRIP	CYCLE	RETRAKE	TRIP (ms)
1	0.300	2.47	0.30	0.01
2	0.300	2.30	0.30	0.04
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4	0.300	0.30	0.30	0.05
5	0.300	0.30	0.30	0.05
6	0.300	0.30	0.30	0.05

DT CHANNEL ANALYSE: 0.800 (ms)

TRIP ANALYSE

TRIP	T2	T3	T4	T5	T6
1	0.01	1.04	0.104	0.01	
2	0.01	1.04	0.104	0.01	
3	0.01	0.01	0.01	0.01	
4	0.01	0.01	0.01	0.01	
5	0.01	0.01	0.01	0.01	
6	0.01	0.01	0.01	0.01	

Speed Accuracy
 Paper: 1 x 100 in
 Plot: 1 x 100 in



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