NRTS-2
Network Relay Test System

- **Built-in relay test adapters to reduce setup time and improve productivity**
- **Controls and instrumentation conveniently located for ease of operation**
- **Complete with computer and software for automatic tests**

DESCRIPTION

The NRTS-2 Network Relay Test System consists of the necessary single-phase and three-phase ac current and voltage sources to calibrate network relays accurately and efficiently.

The system is designed to accommodate General Electric types CAN, CAL, CHN, CHL and SSNPR, Westinghouse types BN, CNJ, CN-33 and MPCR for both CM and CMD protectors, and various models of ETI, Cutler-Hammer and Tempo relays for General Electric and Westinghouse network protectors.

APPLICATIONS

The sources used to provide the network voltage, reverse current and overvoltage is the PULSAR® Universal Test System. Precision transformers are incorporated to scale the PULSAR outputs to low values where necessary for providing reverse currents and reclose voltages.

The electrical restraint voltage supply and seal-in current supply for CAN and CHN relays are conventional sources using variable transformers and the appropriate output transformers.

Mounting sockets for the various General Electric and Westinghouse relays to be tested are mounted and connected to appropriate switches that will interface with the current and voltage supplies.

The sources and test sockets are mounted in a dual-bay console with a work surface designed for operator convenience.

Operation of the computer does not require the operator to be highly trained in computers. The test console can be operated manually if desired.

Specifically designed to simplify testing and calibration of network relays, the test system also can be used to test and calibrate other types of protective relays.

The PULSAR is ideal for performing tests such as pickup, reach, angle of maximum torque and impedance diagrams on complex single-phase and three-phase relays such as distance, power, reverse power, power directional, loss of field, loss of excitation and directional overcurrent.

In addition, it can be used to conduct pickup and timing tests on overcurrent, overcurrent with voltage restraint, current balance, voltage, differential, thermal and pilot wire relays.

Other applications include testing synchronizing, reverse power and harmonic restraint relays.

Additional applications include use as a variable power supply in testing transducers, measuring instruments, watthour meters and other devices requiring three-phase potentials, currents and/or phase-shifting capabilities.

For additional information regarding the PULSAR test set, refer to catalog entry for PULSAR.

Semi-automatic and Manual Testing of Network Relays

The most often-performed tests on network relays are reverse current (trip test) and reclose or overvoltage (closing test). These two tests can be done easily in the semi-automatic test mode.

Other tests, which are not done on a regular or daily basis are performed with ease in the manual mode. Such tests are discussed in greater detail in the section on manual tests. The semi-automatic reverse current and reclose tests are discussed in detail below.

Semi-automatic Tests

Ready-to-run, fully integrated test programs provide a step-by-step procedure for the test technician to follow when testing a specific type of relay.

The program will instruct the test technician on proper switch positions for various relays. As part of the semi-automatic test routine, the program will ask the test technician to insert the relay's settings and then will use the appropriate formulas to automatically calculate the proper values to be used in the test sequence.

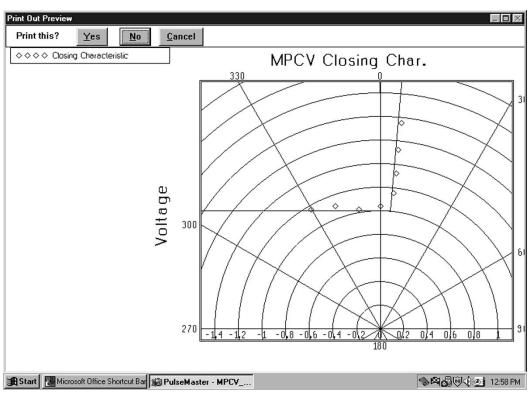
The test programs also include the relay manufacturer's tolerances and will identify test results that are out of tolerance. Test specifications and tolerances may be changed at any time through the use of a function key and a password.

The two tests performed in the automatic test mode are reverse current (trip test) and reclose (closing test). Polar plots of the trip and close characteristics may be performed by the computer.

Reverse current (trip test): The relay test technician will load the appropriate test program. The program will instruct the test technician to install the relay into the appropriate test fixture.

Next, the program will instruct the test technician to switch the selector switches to the appropriate positions. The test system will perform the trip test and indicate if the relay is within manufacturers' specifications.

Polar plot (trip test): Several trip tests are performed at various angles and then a polar plot of the trip characteristic is made. Actual trip points are super-imposed on the theoretical trip characteristic for comparison. This test is normally performed during acceptance testing or after rebuilding.



Closing characteristic for Cutler Hammer MPCV relay (Relay settings shown are 1.0 Volts at 0° and phasing angle set to - 5°).

Reclose (closing test): As in the trip test, the test technician will load the appropriate program. If the program has been previously loaded to conduct the trip test, it will only be necessary to select the next test sequence on the menu.

Once again the computer will instruct the operator to install the relay and position the appropriate selector switches to their proper positions.

The test system will perform the close test and will indicate if the relay is within manufacturer's specifications.

Polar plot (closing test): Several reclose tests are performed at various angles, then a polar plot of the close characteristic is made. Actual close points are superimposed on the theoretical close characteristic for comparison. This test is normally performed during acceptance testing or after rebuilding.

Manual Tests

Numerous tests can be conducted in the manual and semi-automatic modes of operation.

Some of the manual tests listed below may be conducted as part of a normal preventive maintenance program or as part of an acceptance test program:

- Overvoltage (close) tests
- Reverse current (trip) tests
- Testing right-hand, seal-in elements on GE types CAN and CHN relays
- Testing left-hand, seal-in elements on GE types CAN and CHN relays
- Reverse current (trip test) with electrical restraint on GE types CAN and CHN relays

FEATURES AND BENEFITS

Many standard features are incorporated in Model NRTS-2 to reduce setup time, simplify testing and increase accuracy.

Among these are:

- Built-in relay test fixtures to reduce setup time and improve productivity
- Switches to simplify and speed changing of test connections and functions
- Controls and instrumentation conveniently located for ease of operation
- Monitoring of contact action by either a panel lamp continuity circuit or an audio tone signal
- PULSAR to provide highly accurate, sinusoidal three-phase current and voltage outputs
- Comes complete with computer and monitor

SPECIFICATIONS

Input
115 V, 1ϕ, 60 Hz, 1500 VA

Output
The sources used to provide network voltage, reverse current and overvoltage are provided by the PULSAR test system.
The electrical restraint voltage supply and seal-in current supply are conventional sources.

AC Current Output
Three 0 to 30 A solid-state current sources use regulated feedback power amplifiers to ensure that the outputs are constant regardless of variations in the input power source or in load-circuit impedance.
They may be used to provide three independent 1f outputs, a 3ϕ output or, by connecting in parallel, the maximum current available can be increased to 60 A (2 units) or to 90 A (3 units) single phase. A fourth current source, 0 to 5 A, is available to perform seal-in tests.
The amplitude of the three solid-state current sources is adjusted by auto-ranging pushbutton controls, with large LED displays of the settings.

Ranges (auto-impedance matched)
0.00 to 30.00 A at 5 V max
0.00 to 15.00 A at 10 V max
0.000 to 3.000 A at 50 V max

Accuracy
Typical: ±0.5% of setting or ±0.1% of range, whichever is greater
Maximum: ±1% of setting or ±0.1% of range, whichever is greater

Current Phase Angle Control
Angle is adjusted by a pushbutton control, with large LED setting display.
Range: 0.00 to 359.0°
Resolution: 0.1°
Accuracy: ±0.2° typical, ±0.5° max. The amplitude of the 0 to 5 A seal-in current is adjusted via a variable autotransformer and by observing the seal-in current on the digital ammeter.

Range
0 to 5 A at 50 V max
For accuracy and resolution, refer to specifications of ammeter.

AC Voltage Outputs
Three 0 to 300 V solid-state voltage sources also use regulated feedback power amplifiers to ensure that the outputs are constant regardless of variations in the input power source or in load-circuit impedance.
They may be used to provide 3f output or, by connecting in series, the output potential of two voltage sources can be summed together to provide 0 to 600 V if the load is not grounded.
A fourth voltage source is available to provide electrical restraint potentials 0 to 240 V, or 0 to 480 V switch-selected.
The amplitude of the three solid-state potential sources is adjusted by auto-ranging pushbutton controls, with large LED displays of the settings.

Ranges (automatic range switching)
0.0 to 300.0 V at 0.33 A max
0.00 to 30.00 V at 2.5 A max

Accuracy
Typical: ±0.5% of setting or ±0.1% of range, whichever is greater
Maximum: ±1% of setting or ±0.1% of range, whichever is greater

Voltage Phase Angle Control
Angle is adjusted by pushbutton control, with large LED setting display.
Range: 0.0 to 359.9°
Resolution: 0.1°
Accuracy: ±0.2° typical, ±0.5° max
Note: The amplitude of the 0- to 240-volt/0 to 480 volt electrical restraint volts is adjusted via a variable autotransformer and by observing the restraint voltage on the digital voltmeter.

Ranges (switch-selected)
0 to 240 V at 1 A max
0 to 480 V at 0.5 A max
For accuracy and resolution, refer to specifications of voltmeter.

INSTRUMENTATION

AC Voltmeter
Solid-state, digital true rms responding instrument indicates electrical restraint voltage.
Digits: $4^{1}/_{2}$

Ranges (autoranging)
0 to 1.9999/19.999/199.99/600.0 V
Overall Voltmeter System Accuracy ±0.5% of range ±1 digit

AC Ammeter
Solid-state, digital, true rms-responding instrument indicates seal-in current.
Digits: $3^{1}/_{2}$

Ranges (autoranging)
0 to 1.999 A
0 to 5.00 A
Overall Ammeter System Accuracy ±0.5% of range ±1 digit
For additional specifications regarding the application and operation of the PULSAR test set, refer to catalog entry for PULSAR.

Test Fixtures
Model NRTS-2 is designed to test both General Electric and Westinghouse network relays.
Due to the inaccessibility of General Electric relay connectors/fixtures (some are no longer made) the customer is required to supply all GE fixtures. Westinghouse fixtures are supplied for Model NRTS-2.

Enclosure
The test console is housed in a custom-designed enclosure with Formica work surface.

Dimensions
69 H x 44.5 W x 22.5 D* in.
(1752 H x 1130 W x 637 D* mm)
*Does not include depth of Formica work surface

Weight
1100 lb (495 kg)

ORDERING INFORMATION

Item	Cat. No.
NRTS-2	Contact Technical Sales

UK
Archcliffe Road Dover
CT17 9EN England
T +44 (0) 1304 502101
F +44 (0) 1304 207342

UNITED STATES
4271 Bronze Way Dallas
TX75237-1017 USA
T 800 723 2861 (USA only)
T +1 214 330 3203
F +1 214 337 3038

OTHER TECHNICAL SALES OFFICES
Valley Forge USA, Toronto CANADA, Mumbai INDIA, Trappes FRANCE, Sydney AUSTRALIA, Madrid SPAIN and the Kingdom of BAHRAIN.

Registered to ISO 9001:2000 Reg no. Q 09290
Registered to ISO 14001 Reg no. EMS 61597
NRTS_2_DS_en_V10
www.megger.com