

**MULTI-AMP[®]
 EPOCH-40[™]**

- Microprocessor-based digital timer
- DC voltage source
- DC current source

Dynamic Timer and DC Relay Test Set

DESCRIPTION

The Multi-Amp[®] EPOCH-40[®] test set combines regulated dc voltage and current sources, a microprocessor-based digital timer and a special potential switching circuit. It was designed to provide a rugged, portable timer and auxiliary dc voltage and current unit. The EPOCH-40 can be used with other members of the EPOCH[®] family.

The timer is used to measure the elapsed time of operation of the relay under test. It incorporates start and stop gates to monitor the contact opening or closure, the "firing" of a trip circuit SCR and the application or removal of an ac or dc voltage signal.

Appropriate circuitry is also provided to measure the dropout or pickup time of dc voltage-operated auxiliary and timing relays. In addition, the timer can be used to test breakers by timing the opening or closing contacts, trip-free operating time or duration of contact bounce.

The variable dc current source is used to verify the proper operation of dc targets, seal-in units and operation indicators. The variable dc voltage source is provided for use with dc auxiliary relays or as a logic supply for relays requiring a dc logic voltage.

APPLICATIONS

When the EPOCH-40 is combined with the Multi-Amp EPOCH-10[®], electromechanical or solid-state relays can be easily tested. The EPOCH-10 and EPOCH-40 combination can be used to perform timing tests on many commonly used relays. The table below is a brief listing of the different types of relays by device number that a single EPOCH-40 can be used to test.

Start and Stop Gates

The timer can be used independently or in conjunction with the EPOCH-10. It incorporates two identical, independent start and stop gate circuits that permit simple switch selection of the desired operating modes. When used with the EPOCH-10 relay test set, the start gate of the timer is connected to

the TIMER START binding posts of the EPOCH-10, and the timer is then initiated simultaneously with the output of the test set. Because they are completely solid-state, no error, other than that included in the overall accuracy specifications, is introduced by the start and stop gates. The following modes are provided for both the start gate and the stop gate:

- Dry contact closure (N.O. DRY CONTACTS): Timer starts or stops at the closure of a normally open contact or upon conduction through a semiconductor device such as an SCR, triac or transistor.
- Dry contact open (N.C. DRY CONTACTS): Timer starts or stops at the opening of a normally closed contact or when conduction through a semiconductor device such as an SCR, triac or transistor is interrupted.

IEEE Device Number	Relay Types	Specity
2	Time Delay Starting Relay	One EPOCH-40
37/76	DC Under/Overcurrent Relay	
82	DC Reclosing Relay	
94	Tripping Relay	
27/59	DC Under/Overvoltage Relay	

- Application of ac or dc potential (VOLTAGE APPLIED): Timer starts or stops when an ac potential (5 to 300 volts rms) or dc potential (5 to 300 volts) is applied.
- Removal of ac or dc potential (VOLTAGE REMOVED): Timer starts or stops when an ac potential (60 to 300 volts rms) or dc potential (5 to 300 volts) is removed.

START Latch

When on, the START latch allows timing to be initiated by any start gate and to be stopped only by the selected stop gate. When off, the START latch allows timing to be initiated by any start gate and to be stopped when that start gate is reversed (such as when timing the closing and opening of a single contact as in measuring the trip-free operating time of a circuit breaker).

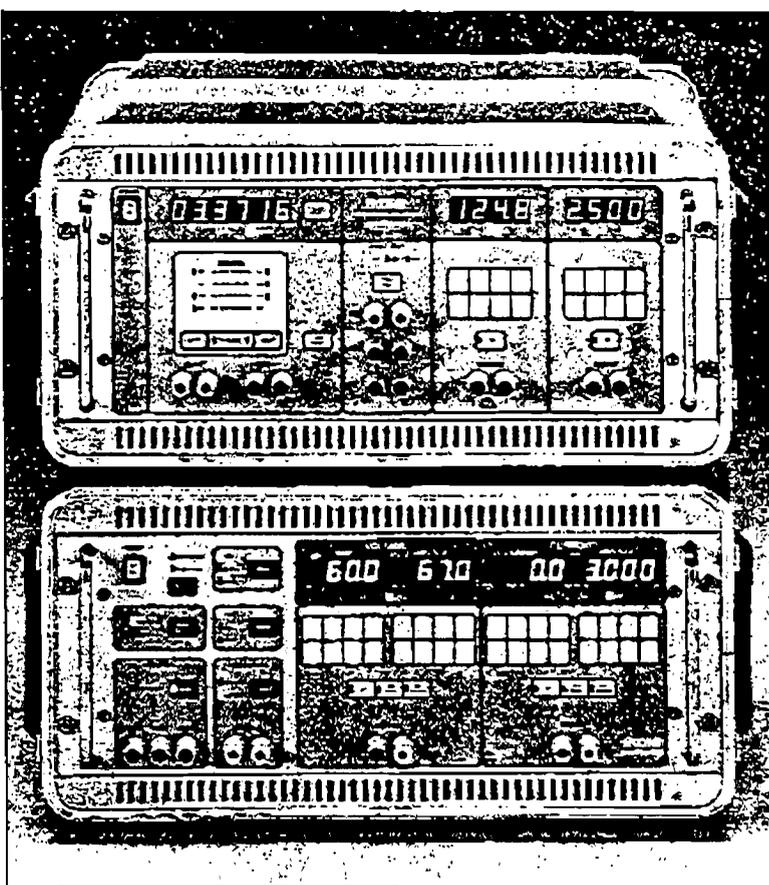
STOP Latch

When on, the STOP latch allows timing to be stopped at the first operation of any stop gate (thus ignoring contact bounce, for example). When off, the STOP latch allows timing to be stopped by any stop gate and then restarted if the stop gate reverses (provided a start gate is still energized) and then stopped again when the gate reverses again.

FEATURES AND BENEFITS

Many standard features are incorporated in each EPOCH-40 to reduce setup time, simplify test procedures and increase accuracy. Among these are:

- Each EPOCH-40 is a self-contained test set and provides variable current variable voltage, timing, control and switching functions.
- Current and voltage settings are each independently incremented by four-digit, raise-and-lower pushbutton controls that automatically increment to the next decade whenever a decade changing value is reached.
- The elapsed time and amplitudes of the output current and voltage are displayed on large, high-intensity LED displays that remain active even when the test set is under automatic computer control.
- Universal operation from a single-phase source of 115/230 volts, 50/60 Hertz
- Audible alarm and display indication is given whenever amplitude of the outputs is in error.



Typical configuration of the Multi-Amp EPOCH-40 (top) and the Multi-Amp EPOCH-10 performing single-phase timing tests.

- A potential switching circuit is provided to eliminate the numerous voltage lead changes required when testing the phase-to-phase element in three-phase distance relays such as the ABB KD and SKD relays.
- Two output current ranges are provided, with a resolution of 0.001 ampere on the low range and 0.005 ampere on the high range.
- Three output potential ranges are provided, with a resolution of 0.02 volt on the low range and 0.1 volt on the two higher ranges.
- Completely compatible with EPOCH units
- The optional IEEE-488 interface will provide the unit with full talker/listener capability for data acquisition purposes and for remote control of all test parameters and control/monitor functions. The GPIB, together with the Multi-Amp command set for automatic

relay testing, MACSART™, provides users with the capability to write their own test programs, implement them through the EPOCH-40 test set and then display, print and store the resulting operating characteristics of the relay.

- Inputs and outputs are overload protected. Should the voltage output be shorted or current channel open circuited, the test set will automatically turn that output off and signal an error indication.
- To simulate the worst field conditions, the EPOCH-40 has been tested in accordance with MIL-STD-810 for temperature, shock and vibration.

SPECIFICATIONS

Input (switch-selected)

115 V/230 V, 1 ϕ , 50/60 Hz

DC Voltage Source

Amplitude is adjusted by autoranging, pushbutton control with large LED display of setting.

Ranges (automatic range-switching)

- 0.0 to 50.00 Vdc at 1 A
- 0.0 to 150.00 Vdc at 1 A
- 0.0 to 300.00 Vdc at 0.5 A

Resolution: Upper two ranges: 0.1;
low range: 0.02

Accuracy: $\pm 1\%$ of reading

DC Current Source

Amplitude is adjusted by autoranging, pushbutton control with large LED display of setting.

Ranges (automatic range-switching)

- 0.000 to 1.000 Adc at 12 V
- 1.000 to 5.000 Adc at 12 V

Resolution: High range: 0.005;
low range: 0.001

Accuracy: $\pm 1\%$ of reading $\pm 0.5\%$ of range

Digital Timer Display

6 digits

Ranges (autoranging)

Ranges are switch-selected in seconds or cycles. Autoranging in the seconds mode, starting at 99.9999 and going up to 9999.99. Autoranging in the cycles mode, starting at 9999.99 and going up to 99999.9 cycles

Accuracy

The overall accuracy of the timer, including start and stop gate error, is: \pm least significant digit or $\pm 0.005\%$ of reading, whichever is greater.

Potential Switching Circuit

This circuit eliminates the numerous voltage circuit test lead changes required when testing the phase-to-phase element on three-phase distance relays such as the ABB KD and SKD series of compensator distance relays.

Temperature

Operating: 32 to 122 $^{\circ}$ F (0 to 50 $^{\circ}$ C)

Reduced duty cycle above 113 $^{\circ}$ F (45 $^{\circ}$ C)

Storage: -13 to 158 $^{\circ}$ F (-25 to 70 $^{\circ}$ C)

Dimensions

With Lids On:

- 10.75 H X 21 W X 24.5 D in.
- 273 H X 533 W X 622 D mm

With Lids Off:

- 10.75 H X 21 W X 18.5 D in.
- 273 H X 533 W X 470 D mm

Weight

- With Lids On:** 54.5 lb (24.7 kg)
- With Lids Off:** 48.5 lb (22.0 kg)

ORDERING INFORMATION

Item	Cat. No.	Item	Cat. No.
EPOCH-40, 230 V		EPOCH-40, 115 V	
Without IEEE-488 GPIB	EPOCH-40-230/STD	Without IEEE-488 GPIB	EPOCH-40-115/STD
With IEEE-488 GPIB	EPOCH-40-230/IEEE	With IEEE-488 GPIB	EPOCH-40-115/IEEE
Standard, rack mounting,		Standard, rack mounting,	
without enclosure	EP40-230/RK	without enclosure	EP40-115/RK
IEEE, rack mounting,		IEEE, rack mounting,	
without enclosure	EP40-230/IEE/RK	without enclosure	EP40-115/IEE/RK
Instruction manual	12125	Instruction manual	12125