

# TCM-915S

## Timer-Control-Monitor Unit



- **Fifteen inputs for sequence of events recording with 1 ms accuracy**
- **Nine outputs to simulate circuit breaker, reclose and other devices with 1 ms accuracy**
- **Two or more units can be used simultaneously**
- **Stand alone capability with Windows® based software package**

### DESCRIPTION

The TCM-915S Timer-Control-Monitor Unit is designed to monitor and time inputs, as a sequence of events recorder, and enable the user to conditionally control outputs to simulate circuit breaker, reclose and carrier control operation in a real-time environment.

The unit may be used as a stand-alone instrument, and with the PULSAR®, EPOCH units or other test sources, to monitor and measure the operating times of up to fifteen device inputs change(s)-of-state. In addition, stimuli can be provided by the nine output contacts of the TCM-915S to enable the user to perform a complete operational test.

Communication with the TCM-915S is managed by PulseMonitor™, a Windows® based, user-friendly, control and display software package, via a IEEE-488 General Purpose Interface Bus (GPIB).

When testing protective relays with multiple output and input signals the user can verify, with time stamping, the proper operation of all outputs from the relay during a single test.

For special applications, such as controlling power relays, TTL outputs are available on the rear of the unit.

### APPLICATIONS

Model TCM-915S allows full automation of tests by recording the operating times of multiple outputs during a single test and providing input controls to the device under test.

Typical applications of TCM-915S are: testing modern impedance relay designed for transmission line protection, trigger from GPS 6500 satellite receiver to simultaneously monitor and provide control logic during end-to-end line testing and stand alone test of reclosing relays through its total operation to lockout or reset.

For example, to test a digital impedance relay, inputs could be connected to the output of each zone timer, carrier control, breaker failure, and reclose initiate. The TCM-915S would be connected to the relay inputs for 52a and 52b switches, reclose block, carrier received, etc.

Also, a 52a switch delayed by the tripping time of a simulated circuit breaker would be programmed to change state at a predetermined delay, or change state from the output trip signal of the relay under test.

A simulated fault would be applied to the relay by a PULSAR. The TCM-915S would begin recording time from the incidence of the fault. The outputs to the relay would occur at the predetermined times before, during and after the fault to provide relay control logic.

At the completion of the test, a review of each input and output and the operating time would determine the complete operational characteristic of the relay for the given fault.

Complex states can be detected, monitored and controlled by specifying a particular sequence of input events that in turn can cause a change of state of the output contact. The recorder allows the test technician to verify that a specific sequence of events occurred during a particular test.

The most complex tests can be efficiently configured using the PulseMonitor software. Once a test sequence has been programmed, it can be saved and later reloaded from a file. The TCM-915S can be quickly set up for the defined configuration, allowing the test to be completed in the minimum amount of time

Changes-of-state are displayed in graph form to enable the operator to review the sequence of events quickly and easily.

## FEATURES AND BENEFITS

- Fifteen voltage wet or dry inputs for accurate monitoring of events save time in testing relays with multiple contacts.
- Nine output contacts accurately simulate relay or system inputs in the power system to completely test relays removed from the power system.
- Outputs simulate normally open/normally closed contacts for testing breaker failure schemes.
- Each input/output has an LED indicator. The operator can check the status of each input and output easily.
- Inputs and outputs are accessible from the front of the unit via banana plugs or from the rear via a multi-pin connector. Connections using standard test leads or test connectors are simplified.
- Timing of events can be started by a Group Execute Trigger (GET) of the IEEE-488 bus, an input TTL trigger on the rear panel, or a set of recognized wet or dry monitored inputs. It can be used with Multi-Amp EPOCH or PULSAR relay test systems. It can also be triggered by the GPS6500 satellite receiver for special test applications.
- Outputs can be configured to change state from an input state or a specified time delay after an input or other change of state.
- Provision for conditioned or dynamic testing of relays helps verify a sequence of events during a test.
- Two or more units can be used simultaneously. When the test calls for monitoring or controlling more circuits, additional units can be stacked and synchronized to the same start activity. This provides expandability and flexibility.
- The PulseMonitor software records the inputs and outputs to  $\pm 0.1$  ms resolution. This provides highly accurate monitoring and simulation of the system operation.

## SPECIFICATIONS

### Input Power

Switched, 115/230 V  
 $\pm 10\%$ , 50/60 Hz

### Input Circuits

15 Isolated programmable inputs  
Normally open dry contacts  
Normally closed dry contacts  
Voltage applied  
Voltage removed

**Voltage Range:** 5 to 240 Vdc or 40 to 240 Vac

**Accuracy:**  $\pm 1$  ms or  $\pm 0.005\%$  of reading, whichever is greater

### Output Circuits

9 Isolated Programmable output contacts  
Normally open contacts  
Normally closed contacts

**Contact Rating:** 5 to 200 Vdc at 1 A or 40 to 140 Vac at 1 A

**Accuracy:**  $\pm 1$  ms

### Control

#### IEEE-488 General Purpose Interface Bus

**Trigger Out:** Provides a TTL output timing signal to synchronize the timing of other units.

**Trigger In:** TTL pulse input from another unit or a PULSAR unit synchronizes timing. Minimum pulse width is 50 ms. A dry contact is available, active on closing

### Enclosure

The unit comes mounted in a rugged plastic case for field portability. The tongue and groove lids protect the unit from rain and dust intrusion. A carry handle is located on one side for convenience. The unit is housed in a metal enclosure and may be removed from the transit case for lab use or mounting in a standard 19 inch rack.

### Dimensions

#### Unit Enclosure

3.5 H x 17 W x 14 D in.  
(89 H x 432 W x 356 D mm)

#### Transit Case

4.5 H x 20 W x 17 D in.  
(114 H x 508 W x 414 D mm)

### Net Weight

**TCM-915S:** 7 lb (3.15 kg)

**In Transit Case:** 15.8 lbs (7.11 kg)

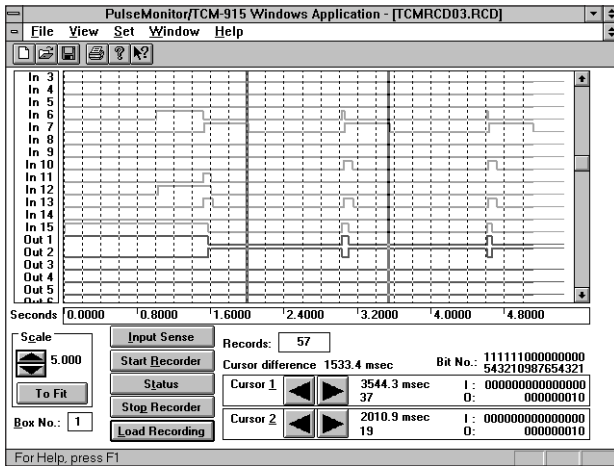


Figure 2: Timing results



Figure 1: Testing Mechanical Reclosing Relay

**ORDERING INFORMATION**

<b>Item (Qty)</b>	<b>Cat. No.</b>
Timer-Control-Monitor Unit	TCM-915S
<b>Included Accessories</b>	
Line cord [1 ea.]	6828
PulseMonitor software	10093
Instruction manual	16390
2 A Input fuse [2 ea.]	15901
1 A Output fuse [5 ea.]	17384
Output connector [2 ea.]	50020
Input connector [2 ea.]	50021
Transit case [1 ea.]	17505

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

**UNITED STATES**  
4271 Bronze Way  
Dallas TX75237-1088 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

**TCM\_915S\_DS\_en\_V10**

[www.megger.com](http://www.megger.com)  
Megger is a registered trademark