SECTION 1
INTRODUCTION

1.1 DISTINCTIVE CHARACTERISTICS

- 3ϕ sourcing and fault simulation in a single compact unit
- Full ramping capability of all outputs available under manual control
- Manual or computer-controlled testing in static and dynamic modes. All functions can be computer-controlled via standard RS-232C interface
- Single knob adjust of ϕ-ϕ and 3ϕ voltage, current, phase and frequency
- External current input mode for testing high burden relays
- Programmable prefault, fault and postfault conditions
- Reconstructs pre-recorded fault waveforms for re-creating fault events
- Integrated measurement of time, voltage, current, phase and frequency
- Unique, easy-to-use start and stop trigger inputs
- Dual current and harmonic current mode
- Built-in front panel menu for advanced features

1.2 GENERAL DESCRIPTION

The MTS-1700 Series Universal Protective Relay Test System is an integrated relay test system designed for standard testing of polyphase and single-phase relays. It can perform static and complex dynamic testing of relays, as well as fault playback, (regeneration of digitized fault waveforms).

Controlled sourcing of 3-phase voltage and a single phase current is provided internally. Complete programmability of amplitude, phase and frequency of the 3ϕ voltage and single-phase current outputs is provided. Measurement of all output parameters as well as start/stop timing are available via front panel control. The MTS-1710 is particularly designed for simulation of three phase system faults. Advanced fault simulation capabilities such as frequency, voltage, current and phase ramping are standard. Full control of all functions via the RS-232C computer interface paves the way for automated testing of many types of protection relays.

The fault playback capabilities of this unique field instrument will link field testing back to protective system engineering. It allows engineers to subject relays to predicted characteristic faults (based on computer simulation models) or abnormal faults and analyze their performance before implementation. Furthermore, when actual faults do occur, digital fault records can be reconstructed using the MTS-1710 to re-subject the relay (in the field) to the fault events. Analysis of these tests can lead to modifying relay settings or other protective circuitry to prevent future problems.

1.3 APPLICATIONS

1.3.1 Standard Applications

- Static and dynamic testing and calibration of virtually all protective relays including:

Over/undercurrent	Over/undervoltage
Impedance/Distance	MHO
Under/overfrequency	Frequency rate-of-change
Directional overcurrent	Line Differential
Synchrocheck	Motor protection
Transformer differential	Reverse power
Volts-per-Hertz	Time overcurrent
Out-of-step	Loss of excitation
Reclosing/synchronizing	DC time delay/auxiliary
Multi-function distance	Negative sequence

- On panel testing of relay systems, in both static and dynamic modes
- 3ϕ transducer testing/calibration
  Voltage, current, phase, frequency, Watt, VAR transducers
- Power swing (out-of-step) simulation/testing
- Circuit breaker timing

1.3.2 Fault Playback Applications

- Playback of digital fault records or relay event reports into relays and relay systems for fault and mis-operation analysis
- Fault simulation, harmonic sourcing and transient simulation for relay and relay system testing
  - Inrush current simulation/testing (including DC offset)
  - Ground resistance testing
  - Reconstruction of multiple and evolved faults
- Digital fault recorder testing
- Playback of EMTP output waveforms to relays and relay systems for simulation of hypothetical or predicted system faults
- Simulation of non-zero source impedance for testing impedance relays. (Performed with the assistance of EMTP simulation output)
- Generation of user defined power waveforms for relay sensitivity testing
- Testing of pilot wire relaying systems
- Power system modelling
- Relay qualification and acceptance testing