CONTENTS
Shipment and Acceptance .................................................. 1
Safety Information ................................................................ 2
Description ........................................................................ 2
Specifications ....................................................................... 3
Description and Use of Operating Controls ...................... 4
Operating Procedures ........................................................ 5
  Testing In-Service Control ................................................ 5
  Battery Tests ................................................................... 5
  Control Tests .................................................................. 6
  Recloser Tests ............................................................... 10
Appendixes .......................................................................... 11

SHIPMENT AND ACCEPTANCE
This test set is completely assembled, inspected, adjusted, and tested at the factory. It is in good condition when accepted by the carrier for shipment. Upon receipt, inspect the test set thoroughly for damage and loss of parts incurred during shipment. If damage or loss is discovered, file a claim immediately with the carrier.
Cooper Power Systems products meet or exceed all applicable industry standards relating to product safety. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Cooper Power Systems employees involved in product design, manufacture, marketing, and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high voltage lines and equipment and support our “Safety For Life” mission.

SAFETY INFORMATION

Safety Instructions

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians, who are familiar with this equipment should install, operate, and service it.

A competent technician has these qualifications:

- thoroughly familiar with these instructions.
- trained in industry-accepted high- and low-voltage safe operating practices and procedures.
- trained and authorized to energize, de-energize, clear, and ground power distribution equipment.
- trained in the care and use of protective equipment such as flash clothing, safety glasses, face shield, hard hat, rubber gloves, hotstick, etc.

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

Hazard Statement Definitions

This manual may contain four types of hazard statements:

**DANGER:** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

**CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in equipment damage only.

**WARNING:** Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling or maintenance can result in death, severe personal injury, and equipment damage.

**WARNING:** This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply may result in death, severe personal injury and equipment damage.

**WARNING:** Power distribution equipment must be selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install or maintain this equipment can result in death, severe personal injury, and equipment damage.
**DESCRIPTION**

The Kyle Type MET electronic recloser control tester (Figure 1) is designed specifically for testing Type ME Form 2, Form 3, Form 3A, Form 4A and Form 4C controls. The tester has the capability to check the following:

1. Battery voltage (load and no load).
2. Battery charge and discharge rates.
3. Minimum-trip current, phase and ground (low range to 5 amp ground).
4. Operating sequence.
5. Control response time (phase and ground trip).
6. Reclosing time.
7. Reset time.
8. Electrical operation of recloser.
9. Various accessory functions through simulation of the conditions under which they operate.

The self-contained unit is compactly packaged in a sturdy, weather-proof carrying case with a detachable front cover. Cables for connecting the recloser, electronic control, and control battery to the tester are supplied with the tester and stored in the carrying case along with spare fuses and bulbs for panel lights. No other external equipment or accessories are required when using the tester.

The tester can check operation of the electronic recloser control and also can check the electrical operation of the recloser (provided reclosing power is available at the recloser). However, the control cannot operate the recloser through the tester.

A recloser-simulator circuit is built into the tester to simulate recloser operation (indicated by red and green lights on the tester panel) and to simulate the response time of the recloser mechanism to trip and close signals. The recloser simulator provides a 2-1/2-cycles time delay to duplicate the interrupting time of a Type RE recloser in response to a trip signal from the control when recloser clearing time tests are being conducted. It also provides a time delay of approximately 30 cycles to duplicate the response time of a Type RE or WE recloser to a reclosing signal from the control when reclosing time tests are being conducted.

**SPECIFICATIONS**

**Input**

115 Vac, 50/60 Hz, single phase (fused for two amp) with 15-ft power cord and a three wire grounding plug.

240 Vac 50/60 Hz, single phase (fused for one amp) with 15-ft power cord with no plug attached, is available as an accessory.

**Output**

0—3000 mA continuously adjustable from front panel of tester.

**Instrumentation**

1. **DC METER**
   Edgewise panel meter with two-in. horizontal scale; accuracy ±5% full scale; panel switched ranges: 0—4/40 mA, 0—40 V.

2. **AC METER**
   Edgewise panel meter with two-in. horizontal scale; accuracy ±5% full scale; panel switched ranges: 0—30/100/1000/3000 mA.
   
   **NOTE:** Jacks on the tester panel provide the means for connecting an external ammeter into the circuit. They may be used for calibrating the internal meter or if different scales or greater accuracy is desired.

3. **TIMER**
   LCD readout digital clock timer, 000.000 to 999.999 seconds in 0.001-second increments; with manual and automatic reset; accuracy ±0.001% ±1 digit.

**Interconnecting Cables**

1. 15-ft cable for connecting electronic control to tester.
2. 15-ft extension cable for connecting end of recloser cable to tester.
3. 15-ft cable for directly connecting control-panel battery terminals to tester.
   
   **NOTE:** Connector terminations on all cables are polarized to assure proper interconnection. An internal buzzer will sound if a mismatch between grounds on the ME control and the MET tester exists.

**AC Power Cord**

15-ft three-wire power cord with groundable power plug

**Carrying Case**

Tester is packaged in a sturdy Formica covered carrying case with removable front cover; has provisions for storing power cord, interconnecting cables, and spare fuses and bulbs.

**Dimension**

9-1/2 in. high, 21 in. wide, 13-1/4 in. deep overall.

**Weight (Approximately.)**

Net 33 lb; shipping 37 lb.
DESCRIPTION AND USE OF OPERATING CONTROLS

Table 1 lists and describes the operating controls and instrumentation of the tester. All the devices are mounted on the front panel and are keyed to Figure 2, a close-up view of the front panel. Reference designations are labeled on the front panel of the tester.

### TABLE 1

<table>
<thead>
<tr>
<th>Index No (Fig 2)</th>
<th>Reference Designation</th>
<th>Description</th>
<th>Purpose and Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S-1</td>
<td>Power Switch</td>
<td>Energizes AC input to tester.</td>
</tr>
<tr>
<td>2</td>
<td>S-6</td>
<td>Power Fuse (2A-250 V Type AGC)</td>
<td>Protects power input circuits.</td>
</tr>
<tr>
<td>3</td>
<td>S-7</td>
<td>Battery Load Test Switch</td>
<td>Selects the dc Meter scale.</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>Meter Fuse (2A-250 V Type AGC)</td>
<td>Checks battery voltage under load.</td>
</tr>
<tr>
<td>6</td>
<td>S-8</td>
<td>Dc Meter</td>
<td>Protects dc Meter.</td>
</tr>
<tr>
<td>7</td>
<td>S-9</td>
<td>Battery Test Terminals</td>
<td>Measures dc voltage or current.</td>
</tr>
<tr>
<td>8</td>
<td>S-10</td>
<td>Recloser Cable Receptacle</td>
<td>Interface for battery test cable.</td>
</tr>
<tr>
<td>9</td>
<td>S-11</td>
<td>Recloser Test Switch</td>
<td>Interface for recloser test cable.</td>
</tr>
<tr>
<td>10</td>
<td>S-12</td>
<td>Recloser Simulator—Open Light</td>
<td>Operates recloser electrically.</td>
</tr>
<tr>
<td>11</td>
<td>S-13</td>
<td>Recloser Simulator—Closed Light</td>
<td>Indicates a closed recloser during control testing.</td>
</tr>
<tr>
<td>12</td>
<td>S-14</td>
<td>Timer</td>
<td>Measures time of test.</td>
</tr>
<tr>
<td>13</td>
<td>S-15</td>
<td>Timer Reset Button</td>
<td>Resets timer back to zero after timing operation.</td>
</tr>
<tr>
<td>14</td>
<td>S-16</td>
<td>Control Cable Receptacle</td>
<td>Interface for control test cable.</td>
</tr>
<tr>
<td>15</td>
<td>S-17</td>
<td>External Ammeter Jacks</td>
<td>Connects external ammeter to tester.</td>
</tr>
<tr>
<td>16</td>
<td>MA-1</td>
<td>Ac Ammeter</td>
<td>Measures ac test current.</td>
</tr>
<tr>
<td>17</td>
<td>S-18</td>
<td>Ammeter Range Switch</td>
<td>Selects ac Ammeter scale.</td>
</tr>
<tr>
<td>18</td>
<td>S-19</td>
<td>Fault-Current Adjust</td>
<td>Determines test-current level.</td>
</tr>
<tr>
<td>19</td>
<td>S-20</td>
<td>Fault-Current Switch</td>
<td>Allows presetting fault currents and applies test current to control.</td>
</tr>
<tr>
<td>20</td>
<td>S-21</td>
<td>Time Selector Switch</td>
<td>Selects control function to be checked.</td>
</tr>
<tr>
<td>21</td>
<td>S-22</td>
<td>Phase Selector Switch</td>
<td>Selects the phase to be tested.</td>
</tr>
<tr>
<td>22</td>
<td>S-23</td>
<td>Low-Ground Trip—Normal Switch</td>
<td>Tests ground minimum-trip levels down to 5.8 amps.</td>
</tr>
<tr>
<td>23</td>
<td>S-24</td>
<td>Display Mode Switch</td>
<td>Continuous: Display shows time as it is accumulated.</td>
</tr>
<tr>
<td>24</td>
<td>Auto Reset Switch</td>
<td>Display Mode Switch</td>
<td>Update: Display shows time at end of each interval.</td>
</tr>
</tbody>
</table>

**Figure 2.**

Tester controls and instrumentation (See Table 1 for parts identification).
OPERATING PROCEDURES
The tester operating procedures have been grouped into:
1. Battery tests.
2. Control tests.
3. Recloser test.

Each group of tests is preceded by an INITIAL CONDITIONS paragraph which specifies required settings for both the control and tester. Make sure both are set to the INITIAL CONDITIONS before starting. Upon completion of testing, return the control settings to the desired operating conditions before returning the control to service.

CAUTION: To avoid electrical/ shock and possible equipment damage, the following grounding precautions must be observed.

Tester
The third-wire grounding pin of the plug on the input power cord must be grounded securely. Use a three-wire grounded-outlet receptacle which conforms to the latest electrical code. If a plug adapter is used, be sure to ground the pigtail lead securely.

Control
Make sure that the cabinet of the control is securely grounded to an earth ground.

If the control is equipped with an accessory which requires 120- or 240 Vac power, make sure that the grounded leg of the input power source is connected to the grounded input terminal in the control. (Older controls without ac surge protection may have neither terminal grounded. Controls with surge modules very likely have one line grounded.) Verify grounding of each terminal before applying ac power.

If a mismatch between grounds on the ME control and the MET tester exists when the ME control is energized with ac voltage, a buzzer within the MET Tester will sound. Correct the problem immediately before proceeding.

Testing In-Service Control
A recloser control can be taken out of service for testing and placed back into service without de-energizing the recloser and interrupting the system. However, during the time the control is out of service, system fault protection is lost.

CAUTION: In order to prevent possible mis-operation (unintentional operation) of the recloser the control must be removed from service prior to preforming any maintenance, testing or programming changes.

TO REMOVE THE CONTROL FROM SERVICE
1. Place the Ground Trip switch to "BLOCK."
2. Disconnect the recloser interconnecting cable at the receptacle on the bottom of the control cabinet.

WARNING: If the recloser is energized while the control cable is disconnected the CT secondaries may generate dangerous voltages. Contact with high voltage can cause serious injury or death.

TO PLACE THE CONTROL BACK IN SERVICE
1. Make sure the Ground Trip switch is in BLOCK.
2. Check that the battery is connected and all control settings and plugs are correct, or programmed, as applicable.

3. All recloser controls other than Type Form 4A and Form 4B: operate the Manual Control switch to CLOSE to make sure the control is in the home position; verify by placing the test switch to LOCKOUT TEST; the Lockout Indicator lamp should not light.
4. Reconnect the recloser interconnecting cable to the receptacle on the bottom of the control cabinet.
5. Place the Ground Trip switch to NORMAL.

Battery Tests
Form 2 and Form 3 family controls only.

The left side of the tester contains the metering and associated switches for checking the battery and battery-charging circuits. The battery test cable provided with the tester is capable of checking battery voltage on all Form 3 and Form 3A controls equipped with either two- or three-battery test-terminal posts. For earlier Form 3 controls (with two-battery test-terminal posts), a special battery test cable—capable of checking both battery voltage and battery charge/discharge rates—is available as an accessory. With the addition of adapters to the special battery test cable, the battery voltage and charge/discharge rates of all Form 2 controls (no separable battery plug and receptacle) can also be checked. The adapters are included with the accessory test cable.

Instructions for using the special battery test cable and adapters are included in Appendix B, page 13.

INITIAL CONDITIONS
Control:
Battery connected and control in lockout (verify with the Lockout Test switch and/or Lockout Indicator, as applicable); battery charging circuit de-energized. Refer to the applicable control Installation Manual for specific information to de-energize the battery charging circuit.

Tester:
Test Selector switch (S6) in BATT. VOLTS—40V; Power switch (S1) OFF; power cord plugged into outlet (see CAUTION at beginning of OPERATING PROCEDURES section).

BATTERY VOLTAGE
1. Plug the battery test cable, furnished with the tester, into the BATT. TEST terminals on the tester and the battery terminals on the control.

NOTE: The spacing between the battery test-terminal posts on the tester is intentionally staggered to assure proper connection of the test cable plug. Make sure all three pins on the plug are properly seated in the three terminal posts.

The bar extension on the side of the plug at the other end of the battery test cable assures proper connection of the cable to the three-battery test-terminal posts on the electronic control. If the control is equipped with only two terminal posts, plug in the test cable with the two pins farthest from the bar extension engaged (Figure 3).

2. Read the open circuit voltage of the battery on the dc meter. A fully charged Form 2, Form 3 or Form 3A battery will normally read 26—28 volts.

3. Depress Battery Load Test switch (S7) for about two seconds (or just long enough to read the meter). For a fully charged Form 2, Form 3 or Form 3A battery, the voltage should not drop more than 3 volts from the open circuit voltage. (Typical drop will be 1.5 to 2 volts).
Type MET Electronic Recloser Control Tester

BATTERY DISCHARGE AND CHARGE RATES
The MET tester can be used to measure battery discharge and charge rates on Form 2, Form 3 and Form 3A controls only.

1. Connect the control to the tester with the proper test cable and energize the tester ON-OFF switch S1 to ON. Disconnect the jumper between the current (⇐⇒⇒) terminals on controls equipped with three test terminals.

2. Move the manual control switch on the electronic control panel to CLOSE and release. The target above the switch will show red.

3. Turn Test Selector Switch S6 to DISCHARGE—(4 MA) and measure the battery drain. Normal quiescent battery drain measures 1.5 to 2.0 mA. Certain accessories can increase this nominal value above 4 mA. (See Table 2 in Appendix A).

NOTE: The 15-mA charging rate specified in Steps 4A, 4B, and 4C is a nominal value based on a 27-volt battery and rated input parameters (e.g., 120 or 240 Vac with potential chargers or 40-amp line current with recloser CT charger). Even under these standard conditions, a variation of ±2 mA may be observed in the charging rate.

4. Control Tests

A. If the electronic control is equipped with a 115-Vac battery charger, turn Test Selector Switch S6 to CHARGE—(40 MA) and energize the charger circuit. The charging rate should be approximately 15 mA minus the discharge rate measured in Step 3.

B. If power for the battery charger is supplied by a bushing-current transformer on the recloser (Type RE and WE reclosers) the following procedure may be used to check the charging rate.

NOTE: A minimum of 40 amps line current through Phase B of the recloser is required to power the battery charger. This may be obtained from normal line-current flow through an on-line recloser, or in the case of a recloser removed from service, by manually closing the recloser and applying a low-voltage, high-current ac power supply across Phase B.

(1) Using the interconnecting cables supplied with the tester, connect both the control and recloser to the appropriate receptacles on the tester.

(2) With the recloser closed and a minimum of 40 amps flowing through Phase B, turn Test Selector Switch S6 to CHARGE—(40 MA). The meter should read approximately 15 mA minus the discharge rate measured in Step 3.

C. If power for the battery charger is supplied from a 230-Vac source in the operator cabinet of the motor driven reclosers, proceed as follows:

(1) Using the interconnecting cables supplied with the tester, connect both the control and the recloser to the appropriate receptacles on the tester.

(2) Energize the operator cabinet of the recloser with 230-Vac power and turn Test Selector Switch S6 to CHARGE—(40 MA). The meter should read approximately 15 mA minus the discharge rate measured in Step 3.

5. Disconnect the test cable and reconnect the jumper link between the⇐⇒⇒ terminals on the control panel.

INITIAL CONDITIONS

Control:
1. Battery connected and control in lockout (verify with the Lockout Test switch and/or Lockout Indicator, as applicable).
2. Non-reclosing switch in NORMAL RECLosing position
3. Ground Trip switch in NORMAL position.
4. Control settings programmed for desired operating conditions.
2. **Control settings:**

   1. Check that the control and tester settings are as specified under INITIAL CONDITIONS.
   2. Set the control Ground Trip switch to BLOCK to disable the ground-trip function while checking phase-trip operation.
   3. Energize the tester by placing the ON/OFF Power switch S1 to ON. The green Recloser Simulator-Open lamp will light.
   4. Set the Ammeter Range switch S4 to the milliamp range equivalent to the programmed phase minimum trip level.
   5. While holding the Fault Current switch S2 in CALIBRATE, advance the Fault Current Adjust control TR1 to approximately 125—150% of the minimum trip rating. Release S2.
   6. Set the Time Selector switch S3 to RECLOSER CLEARING, place Display Mode switch, S11, to UPDATE and the Auto Reset switch, S12, to ON. Reset the timer.
   7. Move the Manual Control switch to CLOSE and release. The simulator will close in approximately 3/4 second; green OPEN light off, red CLOSED light on.
   8. Set the Fault Current switch S2 to TEST and compare the number of fast and delayed operations to lockout with the actual settings of the electronic control.
   9. Return the control and tester settings to INITIAL CONDITIONS; Form 3 family controls, remove the shorting jumper from across the A-phase-trip resistor; Form 4 family controls, re-program the phase minimum trip level to its original level.

**IMPORTANT:** Form 2 and Form 3 family controls—when checking the minimum trip for either phase or ground on controls equipped with the sequence-coordination accessory, remove both fast TCC timing plugs to prevent the sequence relay from inadvertently advancing without tripping the recloser simulator.

### MINIMUM-TRIP TEST (PHASE)

To check the phase minimum-trip-current setting of the control, proceed as follows:

1. Check that the control and tester settings are as specified under INITIAL CONDITIONS.
2. Form 3 family controls only: to prevent overshooting while raising the test current to the minimum-trip level, remove the timing plug from socket 1 to provide instantaneous trip.
3. Check to make sure that the control is programmed for at least one fast phase trip operation.
4. Set the control switches to GROUND TRIP BLOCK to disable the ground trip function and to NON-RECLOSING to provide one shot to lockout.
5. Energize the tester by setting the ON/OFF Power switch S1 to ON. The green Recloser Simulator-Open lamp will light.
6. Set the Ammeter Range switch S4 to the appropriate range for the expected minimum-trip current.
7. Move the Manual Control switch to CLOSE and release. The simulator will close in approximately 3/4 second; green OPEN light off, red CLOSED light on.
8. Apply fault current.
   
   A. Form 2 and Form 3 family controls: Set Fault Current switch S2 to TEST and advance Fault-Current Adjust control TR1 from 0 while observing the ac Ammeter reading.

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**TESTER:**

1. All switches and controls in their OFF or extreme counterclockwise position, except Test Selector switch S6 in BATT. VOLTS—(40 V).
2. Power cord plugged into a 115-Vac grounded outlet. See CAUTION at beginning of OPERATING PROCEDURES section.
3. Cabinet of electronic control under test also grounded.
4. Control connected to tester with the elbow plug of the appropriate test cable at the tester. 

   **NOTE:** If it is desired to monitor battery voltage during the control tests, connect the battery to the tester with the appropriate test cable.

**CONTROL OPERATION TEST (PHASE TRIP)**

To check the programmed sequence of operation of the control for a phase fault, proceed as follows:

1. Check that the control and tester settings are as specified under INITIAL CONDITIONS.
2. Set the control Ground Trip switch to BLOCK to disable the ground-trip function while checking phase-trip operation.
3. Energize the tester by placing the ON/OFF Power switch S1 to ON. The green Recloser Simulator-Open lamp will light.
4. Set the Ammeter Range switch S4 to the milliamp range equivalent to the programmed ground-minimum trip level.
5. While holding the Fault Current switch S2 in CALIBRATE, advance the Fault Current Adjust control TR1 to approximately 125—150% of the minimum-trip rating. Release S2.
6. Set the Time Selector switch S3 to RECLOSER CLEARING, place Display Mode switch, S11, to UPDATE and the Auto Reset switch, S12, to ON. Reset the timer.
7. Move the Manual Control switch to CLOSE and release. The simulator will close in approximately 3/4 second; green OPEN light off, red CLOSED light on.
8. Set the Fault Current switch S2 to TEST and compare the number of fast and delayed operations to lockout with the actual settings of the electronic control.
9. Return the control and tester settings to INITIAL CONDITIONS; Form 3 family controls, remove the shorting jumper from across the A-phase-trip resistor; Form 4 family controls, re-program the phase minimum trip level to its original level.

**CONTROL OPERATION TEST (GROUND TRIP)**

To check the programmed sequence of operation of the control for a ground fault, proceed as follows:

1. Check that the control and tester settings are as specified under INITIAL CONDITIONS.
2. Set the control Ground Trip switch to BLOCK to disable the ground-trip function while checking ground-trip operation.
3. Energize the tester by placing the ON/OFF Power switch S1 to ON. The green Recloser Simulator-Open lamp will light.
4. Set the Ammeter Range switch S4 to the milliamp range equivalent to the programmed ground-minimum trip level.
5. While holding the Fault Current switch S2 in CALIBRATE, advance the Fault Current Adjust control TR1 to approximately 125—150% of the minimum-trip rating. Release S2.
6. Set the Time Selector switch S3 to RECLOSER CLEARING, place Display Mode switch, S11, to UPDATE and the Auto Reset switch, S12, to ON. Reset the timer.
7. Move the Manual Control switch to CLOSE and release. The simulator will close in approximately 3/4 second; green OPEN light off, red CLOSED light on.
8. Apply fault current.

   A. Form 2 and Form 3 family controls: Set Fault Current switch S2 to TEST and advance Fault-Current Adjust control TR1 from 0 while observing the ac Ammeter reading.
B. Form 4 family controls: Set Fault Current switch S2 to TEST and advance Fault-Current Adjust control TR1 from 0 while observing the control’s Current Above Minimum Trip indicator, note the current recorded by the Ac Ammeter at the point where the indicator displays.

9. Set Fault-Current switch S2 to OFF.

10. Repeat steps 7, 8, and 9 with Phase Selector Switch S5 set at B and at C to check the other two phase minimum trip levels.

11. Form 3 family controls only: Replace the timing plug in its socket and return the control and tester settings to INITIAL CONDITIONS.

**MINIMUM-TRIP TEST (GROUND)**

To check the ground minimum-trip current setting of the control, proceed as follows:

NOTE: To enable testing the ground-fault circuits of early Form 2 controls (below serial number 1615), a special test hookup is required. See Appendix C.

1. Check that the control and tester settings are as specified under INITIAL CONDITIONS.

2. Control settings.

   A. Form 2, Form 3 and Form 3A controls: place a shorting jumper across the A phase-trip resistor to disable the phase trip function while checking the ground trip operation, and check that Phase Selector switch S5 is also set to A.

   B. Form 4A and Form 4B controls: program the phase minimum trip level to, at minimum, 2 times (200%) the ground minimum trip level.

3. Form 3 family controls only: To prevent overshooting while raising the test current to the minimum-trip level, remove the timing plug from Socket 1 to provide instantaneous trip.

4. Make sure the control is programmed for at least one fast ground trip operation.

5. Set control switch to NON-RECLOSING to provide one-shot-to-lockout operation.

6. Energize the tester by setting the ON/OFF Power switch S1 to ON. The green Recloser Simulator-Open lamp will light.

7. Set the Ammeter Range switch S4 to the appropriate range for the expected minimum-trip current.

8. Set the Low Ground Trip-Normal switch S9 to normal unless the control is programmed to trip at a below 10-amp; then place switch in Low Ground Trip position.

9. Move the Manual Control switch to CLOSE and release. The simulator will close in approximately 3/4 second; green OPEN light off, red CLOSED light on.

10. Apply fault current.

   A. Form 2 and Form 3 family controls: Set Fault Current switch S2 to TEST and advance Fault-Current Adjust control TR1 from 0 while observing the ac Ammeter reading.

   B. Form 4 family controls: Set Fault Current switch S2 to TEST and advance Fault-Current Adjust control TR1 from 0 while observing the control’s Current Above Minimum Trip indicator, note the current recorded by the Ac Ammeter at the point where the indicator displays.

   NOTE: For Form 3 family controls equipped with the Low-Current Ground-Trip accessory, the 5.8-amp minimum-trip resistor should trip at an equivalent test current of 5.0 mA and the 10-amp resistor at an equivalent test current of 9.2 mA when the Low Ground Trip-Normal switch S9 is in the Low Ground Trip position.

11. Return the control and tester settings to INITIAL CONDITIONS; Form 3 family controls, remove the shorting jumper from across the A-phase-trip resistor; Form 4 family controls, re-program the phase minimum trip level to its original level.

**TCC CHECK**

Either the control-response time or the recloser-clearing time can be checked by setting the Time Selector switch to the appropriate position. In the RECLOSE CLEARING position, the trip time will include a delay of approximately 2-1/2 cycles, the time it takes a Type RE or RVE recloser to respond to the trip signal from the electronic control.

Figures 4 and 5, in Appendix A, show the control response and Types RE and RVE clearing TCC curves for some common Form 3A control phase-trip- and ground-trip-timing plugs.

To check the time-current characteristics, check that the control and tester settings are as specified under INITIAL CONDITIONS and proceed as follows:

1. Set the control switch to GROUND TRIP BLOCK to disable the ground trip function while checking the phase trip-timing plugs.

2. Set the Time Selector switch S3 to either CONTROL RESPONSE or RECLOSE CLEARING as appropriate. Place Display Mode switch, S11, to UPDATE and the Auto Reset switch, S12, to ON.

3. Energize the tester by setting the ON/OFF Power switch S1 to ON. The green Recloser Simulator-Open lamp will light.

4. Set the Ammeter Range switch S4 to the appropriate range for the current at the predetermined test point on the TCC curve.

5. While holding the Fault Current switch S2 in CALIBRATE, advance the Fault Current Adjust control TR1 until the ammeter indicates the desired value (minimum trip level, or greater).

6. Move the Manual Control switch to CLOSE and release. The simulator will close in approximately 3/4 second; green OPEN light off, red CLOSED light on.

7. Reset the timer.

8. Set the Fault Current switch S2 to TEST and record the response or clearing times of the phase-trip-timing curve.

9. Set the Fault Current switch S2 to OFF and repeat steps 6, 7, and 8 with Phase Selector switch S5 set at B and at C.

10. Return the Phase Selector switch S5 to A, control Ground Trip switch to NORMAL.

11. Control settings.

   A. Form 2, Form 3 and Form 3A controls: place a shorting jumper across the A phase-trip resistor to disable the phase trip function while checking the ground trip operation, and check that Phase Selector switch S5 is also set to A.

   B. Form 4A and Form 4B controls: program the phase minimum trip level to, at minimum, 2 times (200%) the ground minimum trip level.

12. Repeat steps 4 through 8 and record the response or clear-
ing times of the ground-trip-timing plugs.

13. Return the control and tester settings to INITIAL CONDITIONS; Form 3 family controls, remove the shorting jumper from across the A-phase-trip resistor; Form 4 family controls, re-program the phase minimum trip level to its original level.

RECLOSING TIME TEST
The recloser simulator has a built-in time delay of approximately 30 cycles before the reclosing signal from the electronic control is implemented. This simulates the mechanical operating time of the Types RE and WE reclosers.

To check the reclosing time, check that the control and tester settings are as specified under INITIAL CONDITIONS and proceed as follows:

1. Set the control switch to GROUND TRIP BLOCK to disable the ground trip function while checking the reclose timing.
2. Energize the tester by setting the ON/OFF Power switch S1 to ON. The green Recloser Simulator-Open lamp will light.
3. Set the Ammeter Range switch S4 to the appropriate range for the trip current to be used.
4. While holding the Fault Current switch S2 in CALIBRATE, advance the Fault Current Adjust control TR1 to approximately 125—150% of the minimum-trip value.
5. Move the Manual Control switch to CLOSE and release.
6. Set the Time Selector switch S3 to CONTROL RECLOSE/RESET and reset the timer.
7. Place the Fault Current switch S2 to TEST.
8. When the control has tripped, place the Fault Current switch S2 to OFF. The clock will start timing and when the sequence relay steps around to the first operation, the control trips; immediately turn TR1 to zero before the control recloses the MET tester. The clock will start running when the control trips; immediately turn TR1 to zero before the control recloses the MET tester.
9. Replace the Reclosing Interval Delay plug in its socket and return the control and tester settings to the INITIAL CONDITIONS specified at the beginning of the CONTROL TESTS.

Controls Which Time From Successful Reclose:
Controls equipped with the Reset-From-Successful-Reclose feature; check that the control and tester settings are as specified under INITIAL CONDITIONS and proceed as follows:

1. Program the electronic control for one fast and three delayed operations. The first Reclosing Interval Delay time must be programmed to have a minimum setting of at least two seconds.
2. Set the control switch to GROUND TRIP BLOCK to disable the ground trip function while checking the reset time.
3. Energize the tester by setting the ON/OFF Power switch S1 to ON. The green Recloser Simulator-Open lamp will light.
4. Set the Time Selector switch S3 to CONTROL RESPONSE. Place Display Mode switch, S11, to UPDATE and the Auto Reset switch, S12, to ON; reset the timer.
5. Form 4 family controls only; turn the display on and enter CODE 38. Code 38 displays the sequence state of the control, “0” being home.
6. Set the Ammeter Range switch S4 to the appropriate range for the trip current to be used.
7. Move the Manual Control switch to CLOSE and release. The simulator will close in approximately 3/4 second; green OPEN light off, red CLOSED light on.
8. Reduce the Fault-Current Adjust Control TR1 to zero. Set the Fault Current switch S2 to TEST.
9. Advance the Fault-Current Adjust control TR1 until the control trips; immediately turn TR1 to zero before the control recloses the MET Tester. The clock will start running when the control recloses the MET tester.
10. As soon as the sequence relay resets to home (Form 3 family controls), or the display return to “0” (Form 4 family controls), place the Fault Current switch S2 to OFF and record the time. The time indicated is the reset time.
11. Return the control and tester settings to the INITIAL CONDITIONS specified at the beginning of the CONTROL TESTS, making sure the electronic control is reprogrammed to its operating settings.
Recloser Tests
The control cannot operate the recloser through the Type MET electronic recloser control tester. However, circuitry is provided to trip and close the recloser from the tester with the control battery (providing closing-coil or closing-motor energy is available at the recloser).

INITIAL CONDITIONS

Control
Battery connected and control in lockout (verify with Lockout Test switch and Lockout Indicator lamp).

Tester
All switches and controls in their OFF or extreme counterclockwise position, except Test Selector switch S6 in BATT. VOLTS—(40V).

NOTE: The tester need not be energized for this test. However, the power-line cord should be plugged into a three-wire grounded outlet to ground the front panel of the tester. See CAUTION at beginning of OPERATING PROCEDURES section.

Recloser
Closing power provided at the recloser (either line potential for solenoid closing or 240 Vac for motor closing).

TEST PROCEDURE

1. Plug the battery-test cable, furnished with the tester, into the BATT. TEST TERMINALS on the tester and the battery terminals on the control.
2. Connect the elbow plug of the recloser extension-test cable, furnished with the tester, to the Recloser receptacle on the tester and the other end to the recloser control cable.
3. The recloser can now be closed and tripped by operating the Recloser Test switch S8 either to CLOSE or OPEN. The battery voltage can be monitored on the Dc meter during these operations.

CAUTION: The recloser must be connected to an adequate ground whenever its closing solenoid or closing motor is to be energized.
APPENDIX A–TABLES AND CHARTS

Figure 4 Typical phase-trip TCC curves for Types RE and RVE reclosers .......................................................... 11

Figure 5 Typical ground-trip TCC curves for Types RE and RVE reclosers .......................................................... 11

Table 2 Quiescent Drain of Form 2 and Form 3 Family Control Accessories ............................................. 12

Figure 4. Typical phase-trip TCC curves Type ME Electronic Control, Form 3A.

Figure 5. Typical ground-trip TCC curves Type ME Electronic Control, Form 3A.
<table>
<thead>
<tr>
<th>Accessory Cat. No.</th>
<th>Description</th>
<th>Drain (mA)</th>
<th>Remarks</th>
</tr>
</thead>
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<tr>
<td>KA282ME</td>
<td>Battery Indicating Milliammeter</td>
<td>0</td>
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<tr>
<td>KA287ME</td>
<td>24-Vdc Surge Protector</td>
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<td>KA293ME</td>
<td>Load Current Indicating Meter</td>
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<td>KA304ME*</td>
<td>Reset After Reclose</td>
<td>2.3</td>
<td>For 3-sec. plug.</td>
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<td></td>
<td>0.8</td>
<td>For 10-sec. plug.</td>
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<td>Target—Phase and Ground</td>
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<td>KA316ME</td>
<td>Remote Closing</td>
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<td>KA319ME</td>
<td>One Time Delay to Lockout on Ground</td>
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<td>KA333ME</td>
<td>Blocking of Reclosing</td>
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</tr>
<tr>
<td>KA336ME</td>
<td>Target—Phase and Ground</td>
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<td>KA339ME</td>
<td>Dc Supply Adapter</td>
<td>48-V, 3.5-A Style</td>
<td>6.4</td>
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<td></td>
<td>125-V, 3.5-A Style</td>
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<tr>
<td>KA418ME</td>
<td>Sequence Coordination</td>
<td>48-V, 15-A Style</td>
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<td>KA472ME</td>
<td>Lockout Indicating Contact</td>
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<td>KA498ME</td>
<td>Contact Position Indicator</td>
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<td>KA522ME</td>
<td>Remote Minimum-Trip Doubler</td>
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<tr>
<td>KA531ME</td>
<td>Fuse Elimination</td>
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<td>KA533ME</td>
<td>Dc Supply Adapter</td>
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<td>See KA339ME.</td>
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<td>KA542ME</td>
<td>Heater</td>
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<td>Load-CURRENT Indicator</td>
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<td>KA574ME</td>
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<td>KA577ME</td>
<td>Instantaneous Phase Trip</td>
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<td>Battery Indicating Milliammeter</td>
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<td>KA609ME</td>
<td>Target—Phase and Ground</td>
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<td>KA639ME</td>
<td>Remote Lockout</td>
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<td>KA670ME</td>
<td>Ground Delay Pickup Multiplier</td>
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<td>11</td>
<td>For fast operation.</td>
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<td></td>
<td>For delayed operation.</td>
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<tr>
<td>KA674ME</td>
<td>Ground-Trip Target</td>
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<td>KA689ME</td>
<td>Instantaneous Ground Trip</td>
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<td>KA896ME</td>
<td>Ground Fault Target</td>
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<td>KA1002ME</td>
<td>Manual Minimum-Trip Doubler</td>
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<td>Supervisory contacts closed.</td>
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<td>KA1004ME</td>
<td>Remote Trip</td>
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<td>KA1021ME</td>
<td>High Phase and Ground Protection</td>
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<td>KA1025ME</td>
<td>Targets—Phase Only</td>
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<td>KA1030ME</td>
<td>Targets</td>
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<td>KA1036ME</td>
<td>Instantaneous Lockout—All Multipliers</td>
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<td>If phase disabled.</td>
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<td>KA1119ME</td>
<td>Capacitor Trip Backup</td>
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<td>If accessory active.</td>
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<td>KA1122ME</td>
<td>Capacitor Trip Backup</td>
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<td>If ground disabled.</td>
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<td>KA1163ME</td>
<td>Minimum Response Time</td>
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<td>For any programmed sequence.</td>
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<td>KA2003ME</td>
<td>Remote Close with Cold-Load and Non-Reclose</td>
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<td>KA2035ME2</td>
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<td>Recloser Closed</td>
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<td>KA2039ME2</td>
<td>Recloser Status</td>
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<td>.16</td>
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<td>KA2047ME</td>
<td>Remote Battery Test and Voltage Monitor</td>
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<td>Recloser Open</td>
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<td>KA2070ME2</td>
<td>Remote Close with Cold Load and Recloser Status</td>
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<td>.16</td>
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<td>Recloser Closed</td>
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<td>Supervisory contacts open.</td>
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<td>Supervisory contacts closed.</td>
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<td>KA2071ME</td>
<td>Remote Non-Reclose and Remote Ground Trip Block,</td>
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<td>Supervisory contacts open.</td>
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<td>Supervisory contacts closed.</td>
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<td>KA2072ME</td>
<td>Remote Battery Test and Voltage Monitor</td>
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<td>KA2189ME</td>
<td>Remote Fault Target Indicator</td>
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<td>KA2230ME</td>
<td>Supervisory Selector Switch</td>
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</table>

* Standard on Form 3A Controls
APPENDIX B
SPECIAL BATTERY-TESTING CABLE AND ADAPTER (CATALOG NO. KA11 14ME)
The special battery-test cable enables the MET tester to check battery voltage and charge/discharge rates of early Form 3 controls (below serial number 10649) which have only two battery-test-terminal posts on the front panel. With the addition of a set of adapters to the special battery-test cable, the battery voltage and charge/discharge rates of all Form 2 controls (which do not have a separable battery plug and receptacle) can also be checked. Color-coded leads and the combination of male and female plugs on the adapters and test cable assure proper polarities when connecting to the test set.

Form 3 Controls Below Serial Number 10649
1. Swing out the front panel of the ME control and disconnect the battery plug from its receptacle.
2. Connect the male CONTROL plug of the special test cable into the battery receptacle in the control.
3. Connect the battery plug into the other (female) plug of the test cable (Figure 6).
4. Connect the other end of the battery test cable to the BATT. TEST TERMINALS on the MET tester. Make sure all three pins of the test cable plug are engaged.
5. Perform the BATTERY TEST procedures as specified on Page 5 of this manual.

All Form 2 Controls
1. Attach both pig tailed-adapter assemblies to the special battery-test cable.
2. Swing out the front panel of the ME control and disconnect the red and black battery leads from the BATTERY (+) and (—) terminals along the bottom edge of the tie board on the back of the front panel.
3. Connect the leads of the adapter on the CONTROL plug to the BATTERY terminals on the tie board.
   A. Male connector (red lead) to (+) terminal.
   B. Female connector (black lead) to (—) terminal.
4. Connect the leads of the adapter on the BATTERY plug to the battery leads.
   A. Female connector (red lead) to (+) terminal.
   B. Male connector (black lead) to (—) terminal.
5. Slip the vinyl sleeves over the connections to insulate against accidental shorts.
6. Connect the other end of the special battery-test cable to the BATT. TEST TERMINALS on the MET tester. Make sure all three pins on the test cable plug are engaged.
7. Follow the BATTERY TEST procedures as specified on Page 5 of this manual.

Figure 6. Special battery-test cable and adapters.
APPENDIX C
TESTING GROUND-TRIP OPERATION OF FORM 2 CONTROLS BELOW SERIAL NUMBER 1615

The following special hookup is required to test the ground-trip operation of Form 2 controls below serial number 1615 (Figure 7).

1. Open the shorting bar across the External Ammeter test jacks on the front panel of the MET tester.

2. Connect a jumper from the left hand jack to the cabinet on the front panel of the ME control.

3. Proceed to Step 1 in the Control Operation Test (Ground Trip) or the Minimum Trip Test (Ground) as applicable. The current measured by the Ac Ammeter on the MET tester will be the equivalent test current entering the ground section of the control.

Figure 7.
Test hookup for Form 2 controls below Serial Number 1615.