Figure 1.  
Kyle® Type VXE Electronic Recloser Control Tester.

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SAFETY FOR LIFE

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

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:

• Is thoroughly familiar with these instructions.
• Is trained in industry-accepted high- and low-voltage safe operating practices and procedures.
• Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.
• Is 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.

Safety Instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.

DANGER: Hazardous voltage. Contact with hazardous voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high and low voltage lines and equipment.

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 can 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.
INTRODUCTION

Service Information S280-16-4 provides operating instructions for the Type VXE Electronic Recloser Control Tester. Before operating this unit, carefully read and understand the contents of this manual.

The information contained in this manual is organized into the following major categories: Safety Information, Product Information, Specifications, Description of Tester, and Operating Procedures. Refer to the table of contents for page numbers.

Read This Manual First

Read and understand the contents of this manual and follow all locally approved procedures and safety practices before operating this equipment.

Additional Information

These instructions cannot cover all details or variations in the equipment, procedures, or process described, nor provide directions for meeting every possible contingency during installation, operation, or maintenance. When additional information is desired to satisfy a problem not covered sufficiently for the user's purpose, please contact your Cooper Power Systems Representative.

Acceptance and Initial Inspection

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 missing parts are discovered, file a claim immediately with the carrier.

Handling and Storage

Be careful during handling and storage of the Type VXE Recloser Control Tester to minimize the possibility of damage. If the tester is to be stored for any length of time prior to use, provide a clean, dry storage area.

Quality Standards

The Quality System at the Cooper Power Systems Kyle Distribution Switchgear plant is certified to the following standards:

- ISO 9001, 1994
- CAN/CSA ISO 9001, 1994
- BS EN ISO 9001, 1994
- ANSI/ASQC Q9001, 1994

PRODUCT INFORMATION

Description

The Kyle Type VXE electronic recloser control tester (Figure 1) is designed specifically for testing the Kyle Type VXE electronically controlled vacuum single-phase recloser. The tester has the capability to check the complete the following tests:

- Recloser Tests
- Control Tests
- Battery Test
- Minimum-Trip Test
- Control Operation Test
- Time-Current Curve Characteristics Test
- Minimum Response Time
- Time-Current Curve Characteristics Modifier
- Reclosing Time Test
- Reset Time Test
- Cold Load Time Test
- VXE SCADA Tests

The unit is self-contained and packaged in a carrying case with detachable cover. Control tester, cable, case, power cable, cable interface, SCADA cable, and extender cable are supplied with the tester and stored in the carrying case.

The tester can check the operation of the electronic recloser control and the electrical operation of the recloser with the exception of high voltage closing. 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 LED indicators on the tester panel labeled RECLOSER SIMULATOR) and to simulate the response time of the recloser mechanism to trip and close signals. The RECLOSER SIMULATOR provides a time delay to duplicate the interrupting time of a Type VXE recloser in response to a trip signal from the control when recloser clearing time tests are being conducted.
**Input**

120Vac, 50/60Hz, single phase (fused for two amp) with 10-ft power cord and a three wire grounding plug.

240Vac, 50/60Hz, single phase (fused for one amp) with 10-ft power cord with no plug attached is available as an accessory.

**Output**

0—2000mA continuously adjustable from front panel of tester.

**Instrumentation**

**DC Scale**

An LED scale meter shows the voltage level supplied to the control ranging from 7.0—11.5 volts, in increments of 0.5Vdc, and also displays battery voltage.

**AC Meter**

An LCD display for monitoring fault current is provided which has a ±3% (±5% at 5 amps) tolerance at full scale. Panel switched ranges are: 0—20/200/2000mA.

**Recloser Extender Cable**

Note: Jacks on the tester panel provide the means for connecting an external ammeter into the circuit. They may be used for verifying the internal meter.

**Timer**

An LCD digital clock timer with automatic reset is included with a display ranging from 00.00 to 99.99 seconds in 0.01 second increments. Accuracy is ±1% with the last digit being ±6msec.

**SPECIFICATIONS**

**Interconnecting Cables**

- 3.05m (10ft.) cable for connecting electronic control to tester.
- 3.05m (10ft.) cable for connecting electronic control with SCADA.
- 3.05m (10ft.) tester to recloser extender cable.

**AC Power Cord**

A 3.05m (10ft) power cord is included.

Note: Connector terminals on all cables are polarized to assure proper interconnection. An internal buzzer will sound if a mismatch between grounds on the VX tester and wall outlet exists.

**Carrying Case**

The tester is packaged in a carrying case with detachable cover, and has a compartment for storing the power cord, interconnecting cables, and spare fuses (spare fuses are not included).

**Dimensions (Approximate)**

**Unit Size (Overall)**

- 254 mm (10 in.) high
- 457mm (18 in.) wide
- 305 mm (12 in.) deep

**Weight (Approximate)**

Net 15 kg (33 lbs.)
DESCRIPTION OF TESTER

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**

Description and Use of Operating Controls, and Identification

<table>
<thead>
<tr>
<th>Index No. (Figure 2)</th>
<th>Description</th>
<th>Purpose and Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power Switch</td>
<td>Energizes AC Input to Tester</td>
</tr>
<tr>
<td>2</td>
<td>Battery Test Button</td>
<td>Checks Battery Voltage Under Load</td>
</tr>
<tr>
<td>3</td>
<td>AC Connection</td>
<td>Connection from Tester to Wall Outlet</td>
</tr>
<tr>
<td>4</td>
<td>Control/Battery Voltage</td>
<td>Measures the Control and Battery Voltage</td>
</tr>
<tr>
<td>5</td>
<td>Control Current Terminals</td>
<td>Terminals for External Meter</td>
</tr>
<tr>
<td>6</td>
<td>Recloser Cable Receptacle</td>
<td>Interface for Recloser Test Cable</td>
</tr>
<tr>
<td>7</td>
<td>Simulated Line Current Display</td>
<td>Measures Simulated Line Current and Displays</td>
</tr>
<tr>
<td>8</td>
<td>Timer</td>
<td>Measures Time of Test</td>
</tr>
<tr>
<td>9</td>
<td>Control Cable Receptacle</td>
<td>Interface for Control Test Cable</td>
</tr>
<tr>
<td>10</td>
<td>SCADA Cable Receptacle</td>
<td>Interface for SCADA Test Cable</td>
</tr>
<tr>
<td>11</td>
<td>Not Lockout LED</td>
<td>Indicates Control Not Locked Out</td>
</tr>
<tr>
<td>12</td>
<td>Reclose Mode LED</td>
<td>Indicates Control in Reclosing Mode</td>
</tr>
<tr>
<td>13</td>
<td>Close LED</td>
<td>Indicates Control is Closed</td>
</tr>
<tr>
<td>14</td>
<td>Lockout LED</td>
<td>Indicates Control is Locked Out</td>
</tr>
<tr>
<td>15</td>
<td>Close W/Cold Load Button</td>
<td>Close Control w/Cold Load via SCADA</td>
</tr>
<tr>
<td>16</td>
<td>Trip and Lockout Button</td>
<td>Trip and Lockout Control via SCADA</td>
</tr>
<tr>
<td>17</td>
<td>External Meter Jacks</td>
<td>Connecting External Meters for Verification</td>
</tr>
<tr>
<td>18</td>
<td>Non-Reclose Switch</td>
<td>Activates/Deactivates Non-Reclose via SCADA</td>
</tr>
<tr>
<td>19</td>
<td>Test Select Switch</td>
<td>Selects use of actual recloser or recloser simulator for testing</td>
</tr>
<tr>
<td>20</td>
<td>Clock Reset Button</td>
<td>Resets Time</td>
</tr>
<tr>
<td>21</td>
<td>Fault Time Select Switch</td>
<td>Reacts on Clearing or Response Curves</td>
</tr>
<tr>
<td>22</td>
<td>Time Select Switch</td>
<td>Select Reclose or Fault Timer</td>
</tr>
<tr>
<td>23</td>
<td>Close Button</td>
<td>Closes Recloser or Control via Tester</td>
</tr>
<tr>
<td>24</td>
<td>Open Button</td>
<td>Opens Recloser or Control via Tester</td>
</tr>
<tr>
<td>25</td>
<td>Fault Switch</td>
<td>Applies a Fault or Calibrates Current</td>
</tr>
<tr>
<td>26</td>
<td>Fault LED</td>
<td>Indicates a Fault Current</td>
</tr>
<tr>
<td>27</td>
<td>Ammeter Range</td>
<td>Selects Range Dial</td>
</tr>
<tr>
<td>28</td>
<td>Current Adjuster</td>
<td>Adjusts Current Level</td>
</tr>
<tr>
<td>29</td>
<td>Control Power Switch</td>
<td>Internal Power Supply for TCC Verification</td>
</tr>
<tr>
<td>30</td>
<td>Meter Fuse (2A-260V)</td>
<td>Protects LED Meter</td>
</tr>
<tr>
<td>31</td>
<td>Close LED</td>
<td>Indicates Recloser or Control Closed</td>
</tr>
<tr>
<td>32</td>
<td>Open LED</td>
<td>Indicates Recloser or Control Open</td>
</tr>
</tbody>
</table>

Figure 2.
Kyle® Type VXE Tester Front Panel.
OPERATING PROCEDURES

Recloser Tests
Circuitry is provided to activate the trip and close circuit of the recloser from the tester.

IMPORTANT: After the OPEN or CLOSE button is pressed, the capacitor must fully recharge (approximately ten seconds) before the OPEN or CLOSE button can be pressed again. If the OPEN or CLOSE button is pressed before the LED indicator returns to 10.0 (NORMAL), the tester will not respond.

Initial Conditions of Tester
1. Set the MAIN POWER switch to the ON position.
2. Set all switches (except MAIN POWER) and controls to the OFF position.
3. Place the TEST SELECT switch in the RECLOSER position when testing the recloser.
4. CONTROL POWER switch is in the ON position.

IMPORTANT: The RECLOSER STATUS LED will not illuminate to indicate the recloser is CLOSED during a Recloser test.

Units with Low Voltage Close Accessory
1. Closing-coil voltage needs to be provided at the recloser for the recloser to operate.
2. Connect the elbow plug of the recloser test cable to the recloser receptacle on tester and the other end to the recloser.
3. By pressing the RECLOSER buttons labeled CLOSE and OPEN, the recloser can now be CLOSED and OPENED.
4. The recloser is operating properly when the contacts CLOSE and OPEN.

IMPORTANT: The RECLOSER STATUS LED will not illuminate to indicate the recloser is CLOSED during a Recloser Test.

Units with Line to Ground Closing Coils
1. Connect the elbow plug of the recloser test cable (furnished with the tester) to the recloser receptacle on the tester and the other end to the recloser.
2. Manually close the recloser using the manual operating tool.
3. The recloser can now be opened by pressing the RECLOSER button labeled OPEN. This function can be verified by viewing the contact position indicator on the recloser.

Remove the VXE Recloser and Recloser Control from Service
1. Close the bypass switch.
2. Move the yellow manual operating handle under the sleethood to the OPEN position.
3. Open the source- and load-side disconnect switches
4. Remove the recloser and control from the pole.
5. Disconnect the recloser interconnecting cable from the recloser and control receptacles.

IMPORTANT: The VXE recloser and control must be taken out of service for testing. During the time the control is out of service, system fault protection is lost.

IMPORTANT: The RECLOSER STATUS LED will not illuminate to indicate the recloser is CLOSED during a Recloser test.

WARNING: Hazardous voltage. De-energize switchgear before attempting to disconnect control cable from control. Failure to do so may result in contact with high voltage pulse (300V peak) from the CT protection circuit. Failure to de-energize the switchgear can result in contact with high voltage, which will cause death or severe personal injury.

WARNING: Hazardous voltage. If the recloser is energized while the control cable is disconnected, the CT secondaries can generate high voltage. Contact with high voltage can cause severe personal injury or death.

CAUTION: Recloser misoperation. The control must be removed from service prior to performing any maintenance, testing, or programming changes. Failure to comply can result in misoperation (unintentional operation) of the recloser.

Tester operating procedures have been grouped into the following categories:
- Recloser Tests
- Control Tests
- VXE SCADA Tests

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.

IMPORTANT: The VXE recloser and control must be taken out of service for testing. During the time the control is out of service, system fault protection is lost.
4. To verify the reclosing circuit is functioning, press the RECLOSER button labeled CLOSE. Connect a digital multi-meter from the source side bushing to the ground lug to measure resistance. Compare the reading on the meter to the values in Table 2.

   **Note:** After under-voltage lockout time has elapsed, the yellow operating handle will drop.

### TABLE 2
Closing Coil Resistance Table

<table>
<thead>
<tr>
<th>Voltage (kV)</th>
<th>Nominal Resistance (ohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4</td>
<td>8.4 ohms</td>
</tr>
<tr>
<td>4.16-4.8</td>
<td>31.0 ohms</td>
</tr>
<tr>
<td>6.0</td>
<td>66.5 ohms</td>
</tr>
<tr>
<td>7.2-7.62</td>
<td>85.0 ohms</td>
</tr>
<tr>
<td>8.0-8.82</td>
<td>96.0 ohms</td>
</tr>
<tr>
<td>11.5</td>
<td>212.0 ohms</td>
</tr>
<tr>
<td>12.0-13.2</td>
<td>225.0 ohms</td>
</tr>
<tr>
<td>14.4</td>
<td>310.0 ohms</td>
</tr>
</tbody>
</table>

### Control Tests

The VXE test panel contains instrumentation for checking the operation of the Type VXE electronic control. Test current generated by the tester simulates the output of the recloser’s current-sensing bushing transformers.

The VXE recloser contains a 1000:1 bushing current transformer under the head of the recloser. The test current in milliamps will be equivalent to the recloser current in amps in a direct 1:1 ratio. For example, to simulate a 200A fault current, the tester output is adjusted to 200mA.

### Initial Conditions

**IMPORTANT:** The VXE Recloser must be disconnected from the VXE Tester prior to conducting any VXE Control tests.

- **Control:**
  1. The battery is connected and control is Locked Out. The Lockout Indicator is located at the bottom of the control (indicator should be orange for Lockout).
  2. Control settings programmed for desired operating conditions.
  3. Control TCCs are correct for the desired coordination conditions.
  4. Cold Load Pick-up OFF, minimum response ENABLED, and TCC modifiers OFF.

- **Tester:**
  1. Power cord plugged into a 115Vac grounded outlet.
  2. Cabinet of electronic control under test also grounded.
  3. Control connected to tester receptacle labeled TO CONTROL with the appropriate test cable.
  4. Connect the SCADA accessory in the control (if applicable) to the receptacle labeled TO SCADA with the appropriate test cable.
  5. Set all switches and dials in their OFF or extreme counterclockwise position (see Figure 2 for switch locations).
  6. Energize the tester by setting the MAIN POWER switch to ON.
  7. Set the CONTROL POWER switch in the ON position. It should read 9.5-10.5 volts under the CONTROL VOLTAGE heading.
  8. Set the TEST SELECT switch to the SIMULATOR position.
  9. Depress the BATTERY TEST push button for approximately two (2) seconds, or until the LED scale drops to the normal battery level (8.5 volts) and then recovers to a normal control voltage level (9.5-10.5 volts).

### Battery Test

The VXE tester contains a LED scale, an associated switch, and a pushbutton for checking the battery power under load.

- 1. With the CONTROL POWER switch in the OFF position the battery should read normal on the BATTERY VOLTAGE scale.
- 2. Depress the BATTERY TEST push button for approximately two (2) seconds.
- 3. If the LED scale indicates at or below the replace level (7.0V or less), the control battery should be replaced.

### Minimum-Trip Test

Check the minimum-trip current setting of the control as follows:

1. Check the control and tester settings as specified under **Control Tests / Initial Conditions** section.
   
   **Note:** The lockout indicator is located on the bottom of the control:
   - Orange = Lockout
   - Black = Not Locked Out

2. Check that the control is programmed for at least one fast trip operation.

3. Set the AMMETER RANGE dial to the appropriate range for the trip current to be used (above minimum trip).

4. Push the CLOSE button located in the RECLOSER SIMULATOR box.
   
   **Note:** The simulator will CLOSE, the green OPEN LED indicator will turn off, and the red CLOSE LED indicator will illuminate.

5. Apply fault current by placing the FAULT SWITCH to the FAULT position.

6. Advance the CURRENT ADJUST dial from zero (0) while observing the current recorded by the SIMULATED LINE CURRENT LCD display at the point where the tester indicates a trip operation.

7. Set FAULT SWITCH to OFF and record minimum trip value.
   
   **Note:** Allow programmed reset time to elapse before further testing.
Control Operation Test (TCC1 and Lockout)

Check the programmed sequence of operation of the control for both TCC1 and LOCKOUT with a permanent fault and proceed as follows:

1. Check that the control and tester settings are as specified under Control Tests / Initial Conditions section.
2. Set the AMMETER RANGE dial to the appropriate range for the trip current to be used (above minimum trip).
3. Press the CLOSE button in the RECLOSER SIMULATOR box to close the control.
   Note: The simulator will CLOSE; the green OPEN LED indicators will turn off, and the red CLOSE LED indicators will illuminate.
4. Hold the FAULT SWITCH to CALIBRATE, advance the CURRENT ADJUST dial to approximately 125—150% of the minimum trip rating.
5. Return the FAULT SWITCH to the OFF position.
   Note: Allow programmed reset time to elapse before further testing.
6. Set the TIME SELECT switch to FAULT.
7. Set the FAULT SWITCH to FAULT and compare the number of TCC1 and LOCKOUT operations with the programming of the electronic control.
8. Return the control and tester settings to initial conditions before proceeding to the next test.

Time Current Curve Characteristics Test

Control response time and the recloser-clearing time can be checked by setting the TIME SELECT switch in the appropriate position. In the CLEARING position, the trip time will include a delay of approximately .03 second, to respond to the trip signal from the electronic control.

To check the time-current characteristics, check that the control and tester settings are as specified under Control Tests / Initial Conditions section and proceed as follows:

1. Set the FAULT-TIME SELECT switch to either RESPONSE or CLEARING as appropriate.
2. Set the TIME SELECT switch to FAULT.
3. Set the AMMETER RANGE dial to the appropriate range for the current at any point on the TCC curve greater than minimum trip.
4. Press the CLOSE button located in the RECLOSER SIMULATOR box.
   Note: Confirm that control power switch is ON before proceeding with test.
5. Hold the FAULT SWITCH to CALIBRATE and advance the CURRENT ADJUST dial until the ammeter indicates the desired value from step 3 (minimum trip level or greater).
6. Reset the timer by pressing the CLOCK RESET button.
7. Set the FAULT SWITCH to FAULT and record the response or clearing times for each operation to LOCKOUT after lockout has been reached.
   Note: Set longer reclose times to allow time to read the clock record time.
8. Set the FAULT SWITCH to OFF and verify that the timing is correct from Service Publication R280-91-16 Type VX6 Time-Current Curves. Repeat steps 3, 4, 5, 6, and 7 with different simulated current levels, (200%, 400%, and 1000% of minimum trip setting). Be certain to use the proper curve for response or clearing.
Minimum Response Time

Check that the minimum response time of the control is operating correctly. The following settings need to be made to the control:

1. Set the MINIMUM TRIP dip switch (S1) recloser control to a level of 100A.
2. Set the MINIMUM RESPONSE ENABLE dip switch (S4) recloser control, so only the first operation is affected by the minimum response time.
3. Set the MINIMUM RESPONSE TIME dip switch (S5) recloser control to a time of 100ms.

Check the minimum response time of the control, by checking that the tester settings are as specified under Control Tests / Initial Conditions section and proceed as follows:

1. Set the AMMETER RANGE dial to the 2000A range.
2. Press the CLOSE button located in the recloser simulator box.
   Note: The simulator will CLOSE almost immediately; the green OPEN LED indicator will turn off, and the red CLOSE LED indicator will illuminate.
3. Hold the FAULT SWITCH to CALIBRATE and advance the CURRENT ADJUST dial until the SIMULATED LINE CURRENT LED indicates 150% of minimum trip.
4. Set TIME SELECT switch to FAULT.
5. Reset the timer by pressing the CLOCK RESET button.
6. Set the FAULT SWITCH to FAULT and record the time, which is similar to the TCC1 curve at 150% of minimum trip.
7. Repeat steps 1-6, with 300% of minimum trip current level from step 2.
   Note: The time recorded should equal the time of the minimum response time setting from the control.
8. Repeat steps 1-7 on the different operations in the LOCKOUT sequence as needed.

Time-Current Curve Characteristics Modifier

Check that the TCC modifier of the control is operating in a correct manner. The following setting needs to be made to the control:

Note: Confirm that control power switch is ON before proceeding with test.

1. Set the TCC MODIFIER dip switch (S6) on the VXE recloser control, set one of the three (3) modified curves for the TCC1 curve.

To check the TCC modifier of the control, the tester settings are as specified under Control Tests / Initial Conditions section and proceed as follows:

1. Set the FAULT-TIME SELECT switch to either RESPONSE or CLEARING as appropriate.
2. Set the TIME SELECT switch to FAULT.
3. Set the AMMETER RANGE dial to the appropriate range for the current at any point on the TCC curve.
4. Push the CLOSE button located in the RECLOSER SIMULATOR box.
   Note: The simulator will CLOSE almost immediately; the green OPEN LED indicator will turn off, and the red CLOSE LED indicator will illuminate.
5. Hold the FAULT SWITCH in CALIBRATE, and advance the CURRENT ADJUST dial until the ammeter indicates the desired value from step 3 (minimum trip level or greater).
6. Reset the timer by pressing the CLOCK RESET button.
7. Set the FAULT SWITCH to FAULT and record the response or clearing times for each operation.
8. Set the FAULT SWITCH to OFF, and verify that the timings are correct from Service Publication R280-91-16 Type VXE Time-Current Curves. Repeat steps 3 thru 7 with different current levels, (200%, 400%, and 1000% of minimum-trip setting).
Reclosing Time Test
The recloser simulator has a built-in time delay of approximately one-half second before the reclosing signal from the electronic control is implemented. This simulates the mechanical operating time of the Type VXE recloser.

Check the reclosing time by assuring the control and tester settings are as specified under Control Tests / Initial Conditions section and proceed as follows:

1. Set the AMMETER RANGE dial to the appropriate range for the trip current to be used (above minimum trip).
2. Press the CLOSE button located in the recloser simulator box.
   Note: The simulator will CLOSE; the green OPEN LED indicator will turn off, and the red CLOSE LED indicator will illuminate.
3. While holding the FAULT SWITCH in CALIBRATE position, advance the CURRENT ADJUST dial to approximately 125—150% of the minimum-trip value.
4. Set TIME SELECT switch to RECLOSE.
5. Reset the timer by pressing the CLOCK RESET button.
6. Set the FAULT SWITCH to FAULT and record the reclosing intervals between each operation to LOCK-OUT.
   Note: If the recloser is set for more than one fast operation, the reclosing time may be difficult to read, especially if the control is programmed with fast reclosing times. For easier recording of the reclosing intervals, set the control for 0 or 1 fast operation.
7. Return the control and tester settings to the initial conditions, before proceeding to the next test.

Reset Time Test
Reset time of a standard VXE Recloser Control is measured from a successful reclose. Set timing starts after any reclose where the current is below minimum trip. Check that the control and tester settings are as specified under Control Tests / Initial Conditions section and proceed as follows:

1. Program the VXE Control with one fast operation, and two (2) operations to lockout.
   Note: The first reclosing interval time must be programmed to have a minimum setting of at least two seconds.
2. Set the AMMETER RANGE dial to the appropriate range for the trip current to be used (above minimum trip).
3. Press the CLOSE button located in the recloser simulator box.
   Note: The simulator will CLOSE almost immediately; the green OPEN LED indicators will turn off, and the red CLOSE LED indicators will illuminate.
4. Hold the FAULT SWITCH to CALIBRATE position, and advance the CURRENT ADJUST dial until the SIMULATED LINE CURRENT LED indicates a current level above minimum trip.
5. Set the FAULT SWITCH to FAULT.
6. Immediately after the VXE Tester has tripped, switch the FAULT SWITCH to the OFF position before the control recloses the VXE Tester.
7. Once the control recloses the VXE Tester, use an independent timer to start timing until the preprogrammed reset time has elapsed.
8. Once the pre-programmed RESET TIME dip switch (S8) on the VXE recloser control has elapsed, set the FAULT SWITCH to FAULT.
   Note: The control will have two (2) operations to LOCK-OUT.
9. Return the control and tester settings to the Control Tests / Initial Conditions section.
   Note: Reprogram the VXE Control to the proper operating setting.

Cold Load Time Test
Verify that the Cold Load Time of the control is operating correctly. Set the control as follows:

1. Set the COLD LOAD TIME dip switch (S9) on the VXE recloser control to 32 seconds with the control in LOCKOUT.
2. Make sure that the control is in a LOCKOUT state.
   To check the COLD LOAD TIME of the control, the tester settings are as specified under Control Tests / Initial Conditions section and proceed as follows:
1. Set the CURRENT ADJUST dial to zero (0).
2. Set TIME SELECT switch to FAULT.
3. Reset the timer by pressing the CLOCK RESET button.
4. Set the FAULT SWITCH to FAULT.
5. Press the CLOSE button located in the RECLOSER SIMULATOR box.
   Note: The simulator will CLOSE, the green OPEN LED indicator will turn off, and the red CLOSE LED indicator will illuminate.
   Note: On SCADA equipped units, the LOCKOUT indicators on the control and tester will remain in LOCKOUT until the COLD LOAD time has elapsed.
6. Once the control and tester lockout indicators turn off, set the TIME SELECT switch to RECLOSE.
   Note: The TIME LCD display will read a value near the COLD LOAD time setting on the control.
   Note: A fault in COLD LOAD mode is one operation to LOCKOUT.
7. Return the control and tester settings to the Initial Conditions.
VXE SCADA Tests

SCADA Accessory

Testing the VXE control SCADA I/O circuit board requires the use of the VXE Tester.

Initial Conditions

**IMPORTANT:** The VXE Recloser must be disconnected from the VXE Tester prior to conducting any VXE Control tests.

1. Using the provided control cable, connect the VXE control to the receptacle labeled TO CONTROL on the VXE Tester.
2. Using the proper cable provided, connect the VXE control SCADA accessory to the receptacle labeled TO SCADA on the VXE Tester.
   - **Note:** The SCADA LOCKOUT LED should be illuminated.
3. Press the RECLOSER SIMULATOR OPEN button.
4. Set TEST SELECT to SIMULATOR.
5. Set FAULT SWITCH to FAULT.

To test the VXE SCADA, proceed with the following steps:

**Note:** When the NON-RECLOSE SELECT is on RECLOSE, SCADA LED indicators read the RECLOSER SIMULATOR status contacts.

1. Momentarily put SCADA NON-RECLOSE to RESET.
   - **Note:** The SCADA RECLOSE-MODE LED indicator should be illuminated.
2. Press the RECLOSER SIMULATOR CLOSE button.
3. Press the SCADA TRIP and LOCKOUT push-button.
   - **Note:** The unit will not TRIP and LOCKOUT unless the recloser simulator is opened first and/or the FAULT SWITCH is set to FAULT.
4. Press SCADA CLOSE WITH COLD LOAD.
   - **A.** The CLOSED STATUS LED will illuminate.
   - **B.** The LOCKOUT LED will remain illuminated until COLD LOAD TIME has elapsed.
   - **C.** Once the Cold Load Pickup Time has elapsed, the LOCKOUT LED will turn off and the NOT LOCKOUT LED will illuminate.
     - **Note:** If no Cold Load Pickup Time is selected, the NOT LOCKOUT LED will immediately illuminate.
5. Momentarily put SCADA NON-RECLOSE to SET, the RECLOSE MODE LED indicator will be off.
6. Momentarily put SCADA NON-RECLOSE to RESET.
   - **Note:** The RECLOSE MODE LED indicator will be ON.

**Testing Current Monitor**

**Note:** To verify the current monitor, the control voltage must be OFF.

1. Put a current meter on a 2mA dc (positive to red post, negative to white post) and OPEN the CURRENT MONITOR jumper.
2. Raise MINIMUM TRIP setting over the test current.
3. Verify that the CONTROL POWER is OFF.
4. Set CURRENT to 150A.
5. The unit should read (150mA dc).
   - **Note:** When the NON-RECLOSE SELECT LED indicator is ON, the NON-RECLOSE status contacts are always OPEN.
6. When CLOSED, the RECLOSE MODE LED indicator will be off.
7. When OPEN, the RECLOSE MODE LED indicator will be off and the unit will be in LOCKOUT.
   - **Note:** When the NON-RECLOSE SELECT is on via RECLOSER, SCADA status will be the recloser status. The SCADA LED indicators of the recloser and the SIMULATOR LED indicators can be out of synchronism.

The simulator CLOSE push-button and SCADA CLOSE WITH COLD LOAD will operate both the recloser and the simulator.

The simulator OPEN button operates ONLY the simulator. The SCADA TRIP and LOCKOUT operates ONLY the recloser, provided that no fault is present.

Press the simulator OPEN or CLOSE button to move the simulator into synchronism with the VXE Recloser.

**Remote Non-Reclose**

1. Set the NON-RECLOSE switch in the SCADA portion of the VXE tester for non-reclose.
   - **Note:** Once this has been completed, the LED labeled RECLOSE MODE should turn off.
2. Check that the control and tester settings are as specified under SCADA Accessory / Initial Conditions.
3. Depress the RECLOSER SIMULATOR CLOSE button.
   - **Note:** The red LED indicator will illuminate.
4. Set the initial range dial to the appropriate range for the current at any point on the TCC curve greater than minimum trip.
5. Hold the FAULT SWITCH to CALIBRATE and advance the current adjust dial until the ammeter indicates the desired value from step 3 (minimum trip level or greater).
6. Set the FAULT SWITCH to FAULT.
   - **Note:** With the recloser in the NON-RECLOSE mode, the recloser should TRIP and LOCKOUT in one operation.