2016 Hands on Relay School
Basic Track lab for testing an CO-11 overcurrent relay along with a breaker simulator and a BE1-79A reclosing relay.

Lab 1 - Set and test the CO-11 relay. Wire the CO-11 relay to the breaker simulator to simulate a feeder circuit with a protective relay
Lab 2 - Set the switches and jumpers on BE1-79A relay de-energized on the bench and then power it up and program it.
Lab 3 - Wire the CO-11 and BE1-79A relays to the breaker simulator to simulate a feeder circuit with a protective relay and a reclosing relay. Demonstrate a fuse saving scheme.

Safety Considerations
• Fused 120 VAC is present on the CO-11 when wired to the breaker simulator. All wiring must be done with the breaker simulator unplugged.
• The ICS must be in the 0.2 amp tap when used with the breaker simulator.
• Check resistance from the hot to the neutral prongs of power cord before plugging the power cord in. Resistance should be 400 ohms or greater.
TYPES OF CO RELAYS

1. CO-2  Short Time Curve
2. CO-5  Long Time Curve
3. CO-6  Definite Time Curve
4. CO-7  Moderately Inverse Time Curve
5. CO-8  Inverse Time Curve
6. CO-9  Very Inverse Time Curve
7. CO-11 Extremely Inverse Time Curve

CO RELAY INSTANTANEOUS UNIT
CO RELAY ICS UNIT
Lab 1 – Setting and Testing a CO-11

Cover the following:

**General items**
- Safety
- Removing a relay from service and returning it back into service.
- Physical and visual inspection.
- Tightening screws and cleaning contacts.
- CT current shorting features of the relay and the case.
- Heating effects of testing on an electro-mechanical relay. i.e. do no harm.
- Tolerances

**Induction disk**
- Test pickup (tap and spiral spring tension).
- Test time curve.
- Calibrate time curve (permanent magnet and core plugs).

**ICS**
- Test pickup
- Test seal-in
- Explain the need for a seal in circuit.

**ITT**
- Test pickup

**Connect the CO-11 to the breaker simulator.**
- The ICS target must be on the 0.2A tap.
- The time target will not work properly.
All devices shown front view
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Safety Considerations
• Fused 120 VAC is present on the BE1-79A during programing.

Typical distribution feeder protection with a fuse saving scheme.
SECTION 2 • CONTROLS AND INDICATORS

FRONT PANEL

Front panel controls and indicators are illustrated in Figure 2-1 and described in Table 2-1. The locations and descriptions of Table 2-1 correspond to the locations shown in Figure 2-1.

Table 2-1: Front Panel Control and Indicator Descriptions

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>RS-232 Serial Communication Port. A PC or computer terminal running a terminal emulation program such as Windows® HyperTerminal can be connected to this port so that relay settings can be read or changed. Communication with the SE-1-TRA uses a simple ASCII command language.</td>
</tr>
<tr>
<td>B</td>
<td>Power LED. A lit Power LED indicates that operating power is applied to the relay.</td>
</tr>
<tr>
<td>C</td>
<td>Identification Label: shows relay information such as the sensing head range, power supply type, serial number, and part number.</td>
</tr>
<tr>
<td>D</td>
<td>Lockout LED: When lit, this LED indicates that the relay is in the lockout state.</td>
</tr>
<tr>
<td>E</td>
<td>Sequence LED: A lit Sequence LED indicates any one of the following states: normally closed, normally open, or normally normally closed.</td>
</tr>
<tr>
<td>F</td>
<td>Reset LED: When lit, this LED indicates that the relay is in the reset state.</td>
</tr>
<tr>
<td>G</td>
<td>Reset Pushbutton: Pushing this momentary switch clears the Sequence or Lockout LEDs and restores the relay to its normal state.</td>
</tr>
</tbody>
</table>

9150150908 Rev 0\nSE-1-TRA Controls and Indicators 2-1
SECTION 4 • COMMUNICATION COMMANDS

INTRODUCTION
Communication commands are sent to the BE1-79A through a standard RS-232 (DB-9) connector located on the front panel. The BE1-79A ASCII communication protocol is compatible with readily available terminal/modem software such as the HyperTerminal application provided with the Windows® PC operating system. Information about configuring HyperTerminal and Terminal for communication with the BE1-79A is provided in Appendix B, Terminal Communication.

COMMUNICATION PORT PARAMETERS
The following parameters apply to the BE1-79A communication port:
- Fixed baud rate of 9600
- Data bits fixed at 8
- Parity is fixed at NONE (N)
- Number of stop bits is fixed at 1
- Half-duplex operation is supported

More information about BE1-79A communication interface requirements is provided in Section 5, Installation and Configuration.

Communication settings:
Communication settings are the formal set of conventions specifying the format and relative timing of messages exchanged between two communication terminals. The RS-232 settings are fixed at 9600, 8B, 1E, n, c, and the communication settings of the relay are fixed. See the communication and configuration instructions for communication with the BE1-79A in Appendix B, Terminal Communication.

The SEL C682 cable works with its switch in the DTE position.
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Safety Considerations

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• Check resistance from the hot to the neutral prongs of power cord before plugging the power cord in. Resistance should be 400 ohms or greater.
BREAKER SIMULATOR

SIMPLIFIED SCHEMATIC

FACE PLATE
All devices shown front view