

### SCOPE

This test procedure covers the testing and maintenance of the GE PVD bus differential relay. Refer to IL GEK-45405 for testing support information and component level identification.

### DESCRIPTION

The GE PVD is a single-phase, high-speed, high-impedance electro-mechanical relay that provides instantaneous bus differential protection using two plunger-type units: the high-impedance voltage-operated unit (87L) and the low impedance current-operated unit (87H). The 87H is protected against overvoltage by a stack of thyrite elements. Three PVD relays and a lockout relay are required for combined phase and ground fault protection of a three phase bus.

### TOOLS, EQUIPMENT, AND MATERIALS

- One variable ac voltage/current source Variable dc current source
- One variable dc voltage/current source
- Multimeter with milliamp dc current monitoring capability

### INSPECTION

1. Take the cover off the relay, taking care to not shake or jar the relay or other relays around it.
2. Pull the relay connecting plugs to disable the trip circuit and remove the current inputs and lift the relay out of the case.
3. Visually check the relay for any obvious problems and clean the relay thoroughly.
4. Burnish the surfaces of all contacts, making sure to remove any tarnish.
5. Check that all relay connections are tight.
6. Check that the gap between the upper stationary contact and the moving contact is 3/64-inch with the normally closed lower contact just touching. Check that the normally closed contact has a wipe of 1/32-inch.
7. After setting the contact gap, check that the plungers move freely.

A common problem with PVD relays is that the plungers tend to stick and interfere with pickup and dropout functions. Any maintenance should always include checking the plungers to be sure they are clean and move freely.

### TESTING THE 87L UNIT

1. Connect the variable ac voltage source to Terminals 5 and 6. Monitor contact continuity at Terminals 1 and 2.

**CAUTION:** The continuous voltage rating of the 87L resonant circuit is 150 V; exceeding this limit continuously may cause damage. **Do not** apply continuous voltage above 150 V.

2. Initiate test voltage higher than the expected operating voltage. Initiate voltage at successively lower levels until the relay fails to respond. Record the preceding voltage level as the pickup point.

If the measured pickup level varies more than 3% (+/-) from the desired pickup level adjust the pickup voltage.

**NOTE:** The pickup voltage is adjusted by moving the armature vertically on the threaded shaft of the plunger unit. Moving the armature down increases pickup voltage; moving it up decreases pickup voltage.

### TESTING THE 87L UNIT

1. Connect the variable ac current source to Terminals 3 and 4. Monitor contact continuity at Terminals 1 and 2.
2. Initiate current to the 87H unit; continue initiating current at successively higher levels until the unit just picks up.

If the measured pickup level varies more than 3% (+/-) from the pickup level of the setting in ASPEN, adjust the pickup current.

**NOTE:** The pickup current is adjusted by moving the armature vertically on the threaded shaft of the instantaneous unit. Moving the armature down increases pickup current; moving it up decreases pickup current.

### TESTING THE THYRITE UNIT

1. Set the dc voltage to 120V and check the reading with a multimeter.

**NOTE:** Any deviation in voltage input will impact the current flow in Step 3 by a factor of five. For example, a 3% deviation in voltage input will cause a current flow deviation of 15%.

2. Connect the dc ammeter in series with the voltage output.
3. Apply the 120 Vdc to Terminals 3 and 6.
4. Check the current flow through the thyrite unit.

**NOTE:** The current for the single-stack thyrite unit should be between 0.005 and 0.12 Adc; the current for the double-stack thyrite unit should be between 0.10 and 0.24 Adc.

Current that does not meet specification may indicate thyrite degradation or failure.

### TESTING THE TARGET AND SEAL IN

1. Determine whether the relay is set for 0.2 amps or 2 amps by observing the tap block in the front of the target unit.
2. Pick up the target unit manually; ensure that the contacts have 1/32-inch wiper and that the target latches properly when the contacts pick up.

If necessary, adjust the target unit so the target latches properly when the unit picks up.

3. Connect the variable dc current source to Terminals 1 and 2.
4. Manually pick up the plunger on the 87L unit and raise the dc current until the target unit just picks up; verify that the target latches properly.

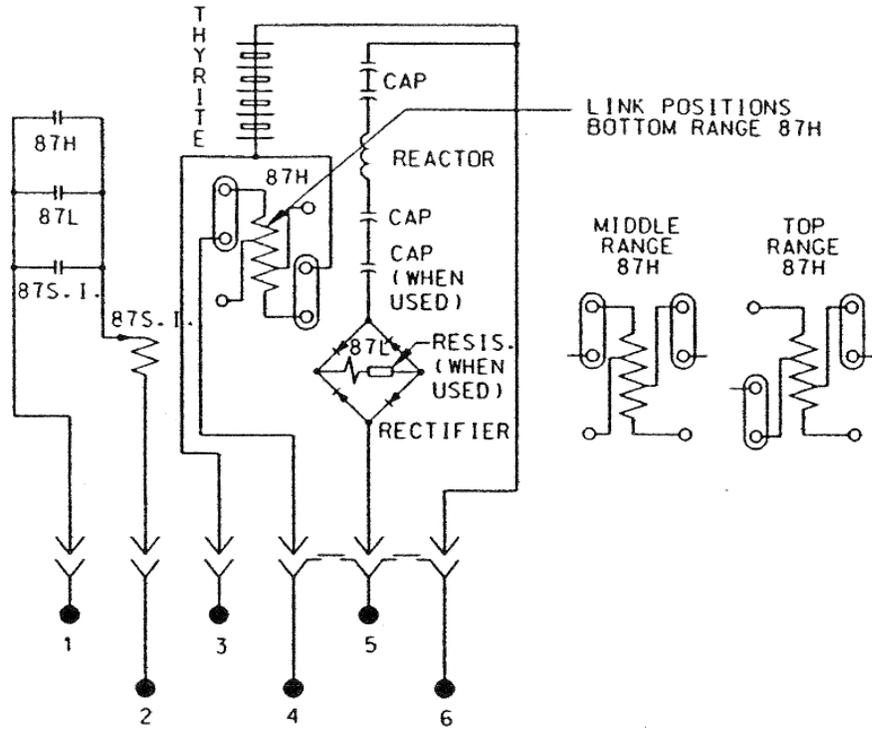
**NOTE:** For the 0.2 amp setting, the pickup should be between 0.15 and 0.195 Adc. For the 2.0 amp setting, the pickup should be between 1.50 and 1.950 Adc.

5. Release the plunger on the 87L unit and verify that the target unit remains sealed in.
6. Lower the dc current until the target unit drops out.

**NOTE:** The dropout current should be no lower than 25% of the seal-in tap (0.05 for the 0.2 setting, 0.5 for the 2.0 setting).

7. Repeat Steps 3 through 5 for the 87H unit.

**Figure 1**  
PVD with single stack thyrite and adjustable range 87H



**Figure 2**  
PVD with double stack thyrite

