TESTING PROCEDURE for SEL 311L DISTANCE and DIFFERENTIAL RELAY
CONTENTS

1. Launching COMMUNICATION and GETTING Setting Parameters from RELAY
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1. Communication
   a. Click ‘AcSELerator QuickSet’ icon in Desktop or from Start menu/All programs/Sel applications/AcSELerator QuickSet.

   b. Then click ‘Communication’

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Date: 03.06.2012
c. Select the type of port and port address.

d. If we know data speed then we can select exact data speed, or otherwise select ‘Auto detect’.

e. Then click ‘OK’.

f. Click ‘Read’ as shown in below to get settings from the relay.
g. TXD and RXD blink because of communication is OK then Transfer Status window also appears

h. After completing of ‘Ymodem Read’ progress setting window will be appeared as shown in next figure.
i. Set CTR Local, CTR_X and CTR_Y if it is used.

j. Set PT RATIO and Frequency

PTR setting: $132kV/115V = 1147.83$
I. Then click ‘Read’ icon to send the modified settings to the relay.

2. Measurement

1. Local measurement
   a. Inject three phase voltage and current as nominal and take measurement from (SEL311 L HMI)
   b. Another method: click ‘Terminal tool’ icon.
   c. To get local measurement Type command as ‘MET B’ at Terminal tool. It is described by the picture below.
2. CHANNEL – X Measurement & CHANNEL – Y Measurement
   
a. Set CH-X and CH-Y to Test mode by the commands which is clearly shown in following figure.

b. Inject 3 phase current, voltage and read data.
3. Differential test

For the Differential test, 2 relays should be connected by direct Fiber optic cable and then 'Internal loop back in not required. If you test differential function in only one relay then proceed as following.

1. Select E87L – Number of Terminals as 2.
2. Set 87LP value and set 87LP2, 87LG OFF.

3. Assign TRIP87 to output contact which is wired to test set.

4. Inject any phase current or 3phase current gradually up to relay will trip.
5. Trip value will be half of the setting value because of Internal Loop Back is enabled.
6. Then set 87LP2 value and make another 2 OFF.
7. Note down the trip value and set 87LG value and make another 2 OFF.
8. Do testing for all phases.
9. Proceed as per test report.

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4. OVERCURRENT TEST

   a. Set over current value and time as follows.

   b. Assign output contact -50P for pick up and 67P1T for time or 51PT for inverse Time.

1. Phase Instantaneous Overcurrent Setting for Definite Time Characteristics.

2. Phase Time Overcurrent Setting for Inverse Time Characteristics.

From manual (C1, C2, C3, C4) curves of Inverse Time Type describes as follows,

C1----- IEC STANDARD INVERSE
C2----- IEC VERY INVERSE
C3----- IEC EXTREMELY INVERSE
C4----- IEC LONG TIME INVERSE
5. DISTANCE TEST

1. Enable phase distance.

2. Open Ground Distance and set Timing values of zones.
3. Configure Output contact as follows.

4. Start distance test for phase-phase fault by FREJA300 as which is explained below.
5. For timing go to Zt and click graph icon and set angle.

6. For 3 phase fault test, select 3phase and start test

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7. Do timing test for 3phase fault as same as phase – phase fault.

8. GROUND DISTANCE TEST ENABLE
   a. Enable GROUND DISTANCE
b. Assign output contact as follows,

c. Start distance test for ground fault.
d. Continue Timing test for Ground fault as follows,

9. SOTF TEST
   a. ENABLE SOTF
   b. CLOEND = 0 CYCLE
   c. 52AEND = 60 CYCLE = 1 SEC
   d. SOTFD = 30 CYCLE = 500 mSec
e. TRSOTF (TRIP Condition) in (LOGIC 1) IS (M2P+Z2G+50P1+52A)
f. Inject Z2G or Z2M (Starting of Z2 ph & ground) and relay will trip by SOTF at time = 22 mSec.
g. IF using binary input for S2A & is active, it will block SOTF & device will trip by Z2 time = 422 mSec as this binary input is high means that CB is open and not manual close.

10. POWER SWING TEST (OUT - OF - STEP)
   a. ENABLE out of step elements
   b. BLOCK (Z1, Z2, Z3) ENABLE
   c. OSBD (Power swing blocking time) = 180 cycle
   d. EOOST (Enable out – of – step Tripping) ------ (INTERNAL = I)
   e. OSTD (out – of – step trip time) = 0.5 cycle
   f. X5 = P (inner) = 46.8 Ω--------- R5 = P (inner ) = 46.8 Ω
   g. X6 = P (outer) = P (inner) + 5 Ω as injection current = 1 A = 51.8 Ω
   h. R6= P (outer) = P (inner) + 5 Ω as injection current = 1 A = 51.8 Ω
i. Output of power swing in trip condition in (LOGIC 1) is (OST)

j. To test power swing, use FREJA RAMP

11. Power swing tripping time

\[ T_1 = \text{Trip time} = 3.892 \text{ Sec} \]
12. **Testing SCHEMES**

1. Select any one of schemes

2. To measure sending time for POTT, DCUB1, DCUB2, DCB use TRIP CONDITION (LOGIC 1), (M2P+Z2G) in output
3. Measure receive time at condition (MZ2+CR) for POTT, DCUB1, DCUB2 use TRIP CONDITION (LOGIC1), (M2PT+Z2GT) in output

4. To measure receive time at condition (MZ2 WITHOUT CR) in DCB use TRIP CONDITION in (LOGIC1) (M2PT+Z2GT) in output