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# National Grid

## Schedule of Site Commissioning Tests

## REL 352/TC-10B Unit Feeder Protection

SCT 20.16.4  
Issue 2  
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## NATIONAL GRID

### SCHEDULE OF SITE COMMISSIONING TESTS

#### SCT 20.16.4 SITE COMMISSIONING TESTS FOR REL 352/TC-10B

Station:  Circuit:

Contractor:  Contractor's Number:

National Grid Contract Number:

**NOTE:** All tests contained with this SCT are to be carried out in accordance with the corresponding sections contained within SCT 01 – Guidance Notes for Site Commissioning Tests on Protection, Measuring, Control, Alarm and Indication Equipment.

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## REL 352/TC-10B UNIT FEEDER PROTECTION

### 1 REL 352/TC-10B INFORMATION

#### REL 352

Serial Number

Rating In

Vn

Vaux

CAT. NO.

Software Version

#### TC-10B

Serial Number

Rating Vaux

CAT. NO.

Receiver Firmware Version

Checkback Firmware Version

### 2 CIRCUIT INFORMATION

Voltage (kV)

Calculated Line Charging Current (A)

CT Ratio

VT Ratio

### 3 CALIBRATED TEST EQUIPMENT

|                                       | Manufacturer and Type | Serial No | Date Last Calibrated | Date Next Calibration Due |
|---------------------------------------|-----------------------|-----------|----------------------|---------------------------|
| High Impedance Selective Level Meter  |                       |           |                      |                           |
| Frequency Counter                     |                       |           |                      |                           |
| Signal Generator                      |                       |           |                      |                           |
| Ammeter or Multimeter                 |                       |           |                      |                           |
| Non-Inductive Resistor, 75 Ohms, 10 W |                       |           |                      |                           |
| Secondary Injection Test Set          |                       |           |                      |                           |
|                                       |                       |           |                      |                           |

Note: The ohmic value of the 75 ohms dummy load should be within 71 and 79 Ohms, i.e. a tolerance less than  $\pm 5\%$ .

## 4 WIRING

The tests below should be performed on all wiring where the cubicle has been wired on site and on any connections made at the site.

### 4.1 Insulation Tests on General and Cubicle Wiring

(See SCT 20.4.1)

### 4.2 Relay Connection and Cubicle Wiring Checked To:

Schematic Diagram No and Rev .....

Wiring Diagram No and Rev .....

## 5 INITIAL CHECKS

Read page 37 and 137 of REL 352 Manual 40-201.9B for Caution Notices.

Check that the package inserted in the gap between the bottom of TC-10B and top of REL 352 is removed.

Before energisation, check that the auxiliary supply voltage is as stated on the rating plate and is connected with the correct polarity.

Check that the A.C. current and voltage ratings of REL 352 are correct.

Before energisation, set the jumpers on TC-10B according to the setting sheet provided by National Grid. Confirm that the Jumpers are correctly set for the D.C. supply voltage.

Check that on TC-10B Keying Module, the JU7 set to START and JU8 set to OUT.

Check that on TC-10B Checkback Module, the DIP switch S1, S2, S3 and S4 are set to Off, i.e. "Custom Settings Enabled".

Before energisation, set the jumpers on REL352 according to the setting sheet provided by National Grid. Confirm that the Jumpers are correctly set for the D.C. supply voltage.

Check that the General Start contact on REL352 (Terminal TB2-13 and TB2-14) is connected in series with Keying Stop input on TC-10B (Terminal TB4-3 and TB4-4).

Before energisation, check that the relay inoperative alarm contacts (terminal TB 4-5, TB 4-6 on REL 352, and TB 7-3, TB 7-4 on TC-10B) are closed, and on application of the D.C. supply to REL 352 and TC-10B, the contacts are open.

## 6 APPLICATION OF SETTINGS

### 6.1 Apply Settings to REL 352

Check that the software version displayed on REL352 is 1.12.

Apply service settings to REL 352 (Refer REL 352 manual 40-201.9B, section J, page 161).

### 6.2 Apply Settings to TC-10B Universal Checkback Module

On the Universal Checkback Module, with the DIP switch S1, S2, S3 and S4 set to Off, i.e. "Custom Settings Enabled", apply service settings to TC-10B Universal Checkback Module.

Switch off TC-10B and then Switch On. Confirm that the settings applied on the Checkback Module are correct against National Grid's setting sheet.

Confirm that the setting BASE and WINDOW on Checkback Module is set to 400 (ms) and 100 (+/- ms) respectively.

Set the setting "Checkback Period" to a temporary value of 8 hours to prevent initiation of a checkback test during commissioning.

## 7 TC-10B TESTS (REFER TO TC-10B SYSTEM MANUAL CC44-VER03)

### 7.1 Firmware Version

Confirm that Checkback Module firmware version is 2.04.

Confirm that Receiver firmware version is 2.7.

### 7.2 Transmitter Module Tests

For a two terminal line, set the transmitter frequency as follows:

At end A, set the transmitter frequency =  $f_c + 100$  Hz, where  $f_c$  is the central frequency.  
At end B, set the transmitter frequency =  $f_c - 100$  Hz, where  $f_c$  is the central frequency.

Set the required frequency on transmitter module and note down the frequency set at each end of the circuit:

End A Substation Name \_\_\_\_\_ Transmitter Frequency \_\_\_\_\_  
End B Substation Name \_\_\_\_\_ Transmitter Frequency \_\_\_\_\_

With JU3 on RF Interface Module of TC-10B set to IN (75 ohms Coupler Impedance); connect a non-inductive 75 ohm dummy load to Jack J1 on rear of TC-10B.

Note: The ohmic value of the 75 ohms dummy load should be within 71 and 79 Ohms, i.e. a tolerance less than  $\pm 5\%$ .

Connect a Meter to the following test jacks on 10W PA Module to measure transmitter output level:  
TJ1 Input & TJ2 Common

Press HL pushbutton on keying module and Excess Transmission Lockout Reset pushbutton on transmitter module, check that the reading on the Meter is about 0.274 V (0dBm at 75 ohms reference). If it is not, adjust R13 on the Transmitter Module to achieve a reading of 0.274 V.

Press LL pushbutton on keying module and Excess Transmission Lockout Reset pushbutton on transmitter module, check that the reading on the Meter is about 86.6 mV (-10dBm at 75 ohms reference). If it is not, adjust R12 on the Transmitter Module to achieve a reading of 86.6 mV.

Press HL pushbutton on keying module and Excess Transmission Lockout Reset pushbutton on transmitter module, measure voltage across the 75 ohms dummy load, check that the voltage measured is 27.4 V r.m.s (+40 dBm at 75 ohms reference). If not, adjust the "INPUT LEVEL SET" potential meter on the 10W PA Module to obtain 27.4 V r.m.s.

With High Level (HL) power keyed, output voltage (V) =

Frequency =

Press LL pushbutton on keying module and Excess Transmission Lockout Reset pushbutton on transmitter module, measure voltage across the 75 ohms dummy load, check that the voltage measured is about 8.6 V r.m.s (+30 dBm at 75 ohms reference).

Note: Do NOT adjust the "INPUT LEVEL SET" potential meter for this test.

With Low Level (LL) power keyed, output voltage (V) =

Frequency =

Confirm that the frequency measured is the desired carrier frequency set on TC-10B.

Without carrier keyed, check that the transmitter output is approximately zero volts.

### 7.3 Excess Transmission Alarm

Make sure that a 75  $\Omega$  dummy load is connected to Jack J1 on TC-10B. Transmit a high-level (HL/10 W) power by pressing the HL pushbutton on the Keying Module, confirm that the transmission is cut off in about 3 s and the Excess Transmission Alarm contact closes. If it is not 3 s, set the timer to 3 s and repeat the test.

## 7.4 Checkback Tests

Make sure that a 75  $\Omega$  dummy load is connected to Jack J1 on TC-10B.

Initiate a checkback test by pressing the test pushbutton momentarily on the checkback module.  
Check that:

- (a) A burst of HL carrier is transmitted.
- (b) On failure, the major alarm is illuminated and the alarm contact closes (Reflex test fail to SCS).
- (c) Press Reset on the checkback module, check that the Major alarm LED and contact reset.

## 7.5 Set Receiver Sensitivity for Secondary Injection Tests (Refer to TC-10B Manual CC44-VER03)

Read page 14-5 and 14-6 of TC-10B Manual CC44-VER03 for how to set the Receiver sensitivity and frequency.

Make sure that a 75  $\Omega$  dummy load is connected to Jack J1 on TC-10B.

Press HL pushbutton on the Keying Module to key the Transmitter for high-level (HL/10 W) power and set the receiver frequency, remote and local sensitivity.

Note: set the receiver frequency to the central frequency at both ends.

## 8 REL 352 TESTS (refer to ABB instruction Manual 40-201.9B)

Make sure that a 75  $\Omega$  dummy load is connected to Jack J1 on TC-10B.

### 8.1 Self Check

Carry out the self-check test and check that the "Value" field display is "0" (see ABB Manual section 4.4.2, page 43).

### 8.2 I/O Tests

Refer the instructions in REL 352 manual section 4.4.1.1; exercise relay output contacts tests:

| Relay          | Operated ? |
|----------------|------------|
| TRIP (A, B, C) |            |
| General Start  |            |
| Failure Alarm  |            |
| Trip Alarm     |            |

### 8.3 Metering

On REL 352, change the following settings in order to inhibit keying and tripping:

SFD1 = ITA1  
SFD2 = ITA2  
ITA2 = 5.0 A