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TESTER, INSULATION, TYPE IT30, CT587/1

TECHNICAL HANDBOOK - DATA SUMMARY

EMERGENCY IDENTITY

Tester, Insulation, Type IT30, CT587/1 (Miles Hivolt Ltd, Type IT30).  
Catalogue Reference: 24/625-99-104-104 (EMERs T & N I 440-449).

WARNING

This instrument generates extremely high voltages which are fed manually by probe to the equipment under test. A serious electric shock hazard will exist unless care is taken in its operation.

ROLE

For use in REME Field Intermediate and Base workshops for high voltage insulation resistance testing. Replaces Test Set, Insulation, 40kV, CT9 Equipment, 24/625-99-104-104 (EMERs T & N I 440-449).

DESCRIPTION

A portable high voltage insulation test set for the non-destructive testing of materials and components. Insulation resistance is calculated from voltage and current reading meters, which measure currents down to a fraction of a microamp at voltages up to 40kV. Four ranges of resistance are provided for selection by four push-button current range decade switches. Solid state miniaturised circuitry is used in both the electronic and EHT generator sections of the instrument, which incorporates an internal discharge path, current overload reset trip switch and external interlock safety system. The EHT output is variable over two ranges, 5kV and 40kV, fed to separate output sockets. Special connector leads with probe terminations are provided for the application and discharge of voltages. The equipment is powered at 230V dc from a mains power supply unit (psu), which plugs into a recess in the main frame.

PHYSICAL DATA

<u>Instrument</u> (c/w psu)	Height	5.1/4 in	(135mm)
	Width	17.1/2 in	(445mm)
	Depth	11 in	(280mm)
	Weight	28 lb	(12.7kg)
<u>Test Set</u>	Weight	38.1/2 lb	Complete with all test leads and housed in leather carrying case. (17.5kg)

CLIMATIC RANGE

+35°C to -40°C As per ASME Climatic and Durability test report Apr 70

PACKAGING DATA

Normal commercial trade packaging.

Issue 1, Aug 76, (Rev)

INITIAL SETTING UP

10. As the instrument is a high voltage device, the following initial setting up instructions should be strictly adhered to:-

- a. Ensure that the mains supply lead is disconnected from the mains input PLUG (PL5/M) on the psu (this is located in a recess on the left hand side of the instrument).
- b. Set the VOLTAGE SELECTOR PLUG (PL/A) on the front of the psu to the correct voltage setting for the available mains supply.
- c. Press and release to the OFF position all press button control switches on the front panel of the instrument.
- d. Turn the variable EHT control (R205, 10 turn helipot) fully anticlockwise to the zero output position.
- e. Securely screw on the two metal safety caps to the 5kV and 30kV output sockets.
- f. Remove the INTERLOCK jack plug from socket (JS1) and retain in safe keeping.
- g. Connect one of the two EARTH terminals with heavy gauge wire to a good earth (ground point). The other terminal is for use during tests.
- h. Connect the mains supply lead to the mains input plug (PL5/M) on the psu and connect the instrument to the mains supply.
- i. Press the POWER ON switch on the front panel. Lamp (LP1, white) will illuminate indicating that the instrument is now under power.
- j. Press the POWER OFF switch and observe that the POWER ON switch is released and that Lamp (LP1 white) goes out.
- k. Leave the instrument switched off as above before continuing with the Use of Equipment details that follow.

USE OF EQUIPMENTUse of connectors

11. INTERLOCK jack plug. The removal of the INTERLOCK jack plug from the instrument by the operator will help to prevent unauthorized use of the equipment and also the accidental application of high voltage to the system should one of the EHT ranges be inadvertently selected during the preliminary stages of the test procedures.

12. EHT leads. The operator has the choice of two leads for applying the EHT test voltage to the specimen. They are:

- a. The unterminated EHT lead - Cable assembly, RF, 5595-99-620-9582. This can be terminated to suit the test point, and is used in conjunction with a separate jack plug (shorted) provided for activating the interlock.

13. Discharge Probe. The Discharge Probe - Lead, test 6625-99-620-956A - is an arcing probe, for use only after tests on the specimen are completed and the instrument is switched OFF. The probe lead terminal is connected to the second EARTH terminal on the front panel of the instrument and the probe tip is then firmly applied to the 'live' side of the specimen. This will effectively remove any charge voltage that may be retained due to the presence of high voltage capacitors in the system, and ensure that specimen is electrically dead and safe to handle.

Normal operating procedure

14. WARNING. Owing to the use of solid state circuitry throughout the instrument, the IT10 high voltage insulation tester requires no warm up time and is ready for immediate use upon switch ON. The equipment therefore need not be switched on only when tests are actually being carried out, and for safety reasons should always be switched OFF between tests or for long periods of inactivity during any test.

15. Preliminary checks

a. Check that all test specimens are electrically dead (ie the mains supply has been disconnected or internal batteries removed).

b. On the insulation tester, check that

(1) The white POWER light is out.

(2) The variable EHT control is turned fully anticlockwise.

(3) The Jack plug is removed from the INTERLOCK socket.

16. Earth connections

a. Check that one of the two EARTH terminals of the instrument is connected to a good earth power.

c. Connect the second EARTH terminal of the instrument to the earthy side of the specimen under test.

17. EHT connections. Select the EHT lead more suited to the task in hand and proceed as detailed below for that lead.

a. Unterminated EHT lead

(1) Connect unterminated end of lead by suitable fastener to the live side of specimen under test, and connect high voltage plug end to the appropriate EHT output socket. Blanking cap to remain on socket not in use.

(2) Insert separately retained jack plug (shorted) into INTERLOCK socket (activates interlock)

Charge Probe EHT lead

(1) Connect high voltage plug end of lead to the appropriate EHT output socket. Blanking cap to remain on socket not in use.

- (2) Insert attached jack plug into INTERLOCK socket (Do not operate microswitch on probe handle).
- (3) Hold probe by pistol grip handle and press high voltage tip firmly into contact with 'live' side of specimen under test.
- (4) Depress and hold (make) microswitch on probe handle. Release only after measurements below are completed.

15. Switching on

Select and depress the correct EHT voltage range switch for the EHT output socket in use (5kV or 30kV). Depress the POWER OFF switch. Observe that both the POWER ON (white) and the selected EHT range lamp (green or yellow) illuminate.

16. Voltage and current measurement

- a. Depress the X20 CURRENT RANGE MICROAMPS switch.
- b. Slowly rotate the variable EHT control until the required test voltage is reached. Set and take note of voltage on kV meter, applied to specimen under test.
- c. Observe the current reaching on the  $\mu$ A meter and select the next more sensitive range if the reading is under half scale. Take note of the reading and range used and immediately take the following precautions:
  - (1) If the EHT lead with pistol grip probe is in use, release microswitch on handle of probe to OFF position. Lay probe down safely. DO NOT TOUCH TEST SPECIMEN.
  - (2) If the EHT lead (unterminated) is in use, connected by suitable fastener to test specimen, leave it connected, DO NOT TOUCH TEST SPECIMEN.

Note. If the current exceeds approximately 30% above full scale on the selected range the overload trip circuit will operate and the Reset Trip lamp will illuminate. Once the fault condition is remedied, rotate the EHT control to zero, and reset trip circuit by operating the RESET TRIP button (lamp goes out). Then repeat from para 19 onwards.

20. WARNING. DANGER OF ELECTRIC SHOCK FROM RETAINED CHARGES. DO NOT TOUCH THE TEST SPECIMEN in any way until all switching off and discharge procedures are fully completed as detailed below.

21. Switching OFF

- a. Press the POWER OFF button.
- b. Press and release selected EHT voltage range button.
- c. Turn variable EHT control fully anticlockwise (zero).
- d. Remove jack plug from INTERLOCK socket and retain in safe custody.

23. Discharge Procedures

- a. Connect Discharge Probe lead to EARTH terminal on instrument.
- b. Apply probe tip firmly to 'live' side of specimen on which tests have just been completed.
- c. Ensure specimen is electrically dead and that all high voltage capacitors in the system have been effectively discharged.
- d. Remove EHT lead from equipment and replace blanking cap or EHT output socket.

24. Calculation of insulation resistance. The four RESISTANCE RANGES shown in the table on the front panel of the instrument indicate the insulation resistance value of the ranges when the four current meter decade ranges are calculated at a test voltage of 1kV. Therefore these ranges must be multiplied by the actual test voltage used in kV to obtain the correct insulation resistance reading over the range. The insulation resistance of the specimen under test is therefore calculated according to Ohm's law from the voltage and current readings taken during the test.

Use of GUARD terminal

24. The GUARD terminal is only for use with test specimens that are electrically disconnected from the ground plane (earth). Under these conditions the EHT return current from the accepted earthy side of the specimen under test is fed back directly to the GUARD terminal to complete the EHT circuit; therefore no common mode (ground) currents become associated with the current meter reading and accuracy of measurement is improved. The operation of the GUARD terminal facility is explained in the Technical Note paras 32 to 36.

25. CAUTION. Do NOT CONNECT THE GUARD TERMINAL TO EARTH, or link to EARTH terminal, as this WILL DAMAGE THE INSTRUMENT.

26. Procedure. To measure insulation resistance using the GUARD terminal:

- a. Note the warning given in para 14.
- b. Carry out the normal preliminary checks of para 15.
- c. Connect the test specimen and the instrument as follows:
  - (1) Check that one of the two EARTH terminals is connected to a good earth point, and that there is no other connection to either terminal.
  - (2) Using a high voltage insulated lead, connect the GUARD terminal to the accepted earthy side of the specimen under test.
  - (3) Connect the EHT lead as normally (para 17).
- d. Continue the normal operating procedure as detailed in paras 18 to 23.