T&R Test Equipment Ltd

OPERATING AND MAINTENANCE MANUAL

Product: ***High Voltage AC Test Set***

Type: *KV30-40*
KV15-18

DESIGNED AND MANUFACTURED BY:

T & R Test Equipment Limited

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GENERAL SAFETY STATEMENT

The following safety precautions should be reviewed to avoid injury to the user and damage to the product (and other products connected to it). To avoid potential hazards only use this product as specified.

Only suitably qualified personnel should use this equipment. Servicing of this product should only be carried out by suitably qualified service personnel.

Hazardous voltages and currents are present on the outputs of this unit.

To Avoid Fire Hazards and Personal Injury

Use the correct power supply lead. Only use a suitably rated and approved power supply lead for the country of use.

Ensure that systems that the unit is to be connected to are dead.

Do not connect and disconnect leads whilst outputs are switched on.

Ensure that the product is grounded. To avoid electric shock it is essential that the grounding conductor is connected to the earth ground. If an additional earth terminal is provided on the equipment that may be connected to a local earth. Ensure that the product is properly grounded before making any connections to inputs or outputs.

Terminal ratings must be observed to prevent fire hazards and risk of injury to the operator. Consult the product manual for ratings information before making connections to any terminal.

It is ESSENTIAL to consult the product manual for rating information before making any connection to a terminal or terminal group marked with a warning triangle.

Only use fuses of a type and rating specified for this product.

Do not operate the unit out of its case or with any covers or panels removed.

Do not touch exposed connections and components when power is present.

Do not operate the product if any damage is suspected. Refer the unit to qualified service personnel to be checked.

Do not operate the unit in wet or damp conditions

Do not operate the unit in an explosive atmosphere

If any further queries occur regarding the usage and maintenance of the equipment detailed in this manual, please refer these to the supplier of the equipment in the first case or to:

T & R Test Equipment Limited

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1. DESCRIPTION OF EQUIPMENT

1.1 Electrical Specification

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1.1 Electrical Specification

1.1.1 The supply voltage will be as follows:

220/240V 1 phase 50/60Hz+10%
115V 1 phase 50/60Hz +10% -6%

1.1.2 The minimum supply requirements are 1200VA:

1.1.3 The output voltage, current and duty cycle are as follows:

Output Voltage	**Output Current 1**	**Output**	**Current 2**
KV30-40	30kV	20mA	40mA
KV15-80	15kV	40mA	80mA

Output current 1 is the continuous current rating.
Output current 2 is based on a duty cycle of 5 minutes ON load followed by 15 minutes OFF load.

1.1.4 One side of the high voltage transformer output is connected to the earth system of the equipment.

1.1.5 System Interlock:

The equipment is fitted with a zero volt interlock system on the controlling regulator. This interlock prevents the output being energised unless the controlling regulator is in the minimum output position.

1.1.6 An earthing hook is provided which is stored in the lid of the test set.

1.2 Output Voltage Control

1.2.1 The output is controlled from zero by means of a regulating transformer. The transformer is operated by means of a control knob which is located on the front panel of the control unit. To increase the output voltage the knob is turned in a clockwise direction.

1.3 Overload Protection

1.3.1 The equipment is fitted with fixed and variable overload protection circuits as standard.

1.3.2 **Fixed overload**

The fixed overload protection system senses any rapid increase in the load current which exceeds approximately 120% of the full load current in the high voltage circuit. The circuit will respond more quickly to low impedance faults.

1.3.3 **Variable overload**

The variable overload protection system senses current changes in the high voltage circuit. The trip level is adjusted by means of a selector switch on the front panel of the control unit. The switch allows the level to be adjusted from 10-110% of normal full current in eleven steps.

The circuit will activate when the load current exceeds that set by the trip level selector switch.

The circuit will respond to more slowly changing levels of load current.

IMPORTANT NOTE: The variable overload trip circuit does not limit the output current on short circuit.

1.4 Metering

1.4.1 The equipment is provided with the following metering:

a. A moving coil dual range kilovoltmeter monitoring the output voltage from the equipment.

b. A moving coil single range milliammeter monitoring the secondary current of the high voltage transformer.

1.5 Construction

1.5.1 The equipment is housed in a robust case with recessed carrying handles. All the controls and metering are located on the front panel together with all external connections.

2. OPERATION

2.1 Connections

2.2 Front Panel Functions

2.3 Method of Operation

2.1 **Connections** (See Figure 1)

2.1.1 The input lead on the control unit should be connected to a suitable three pin plug.

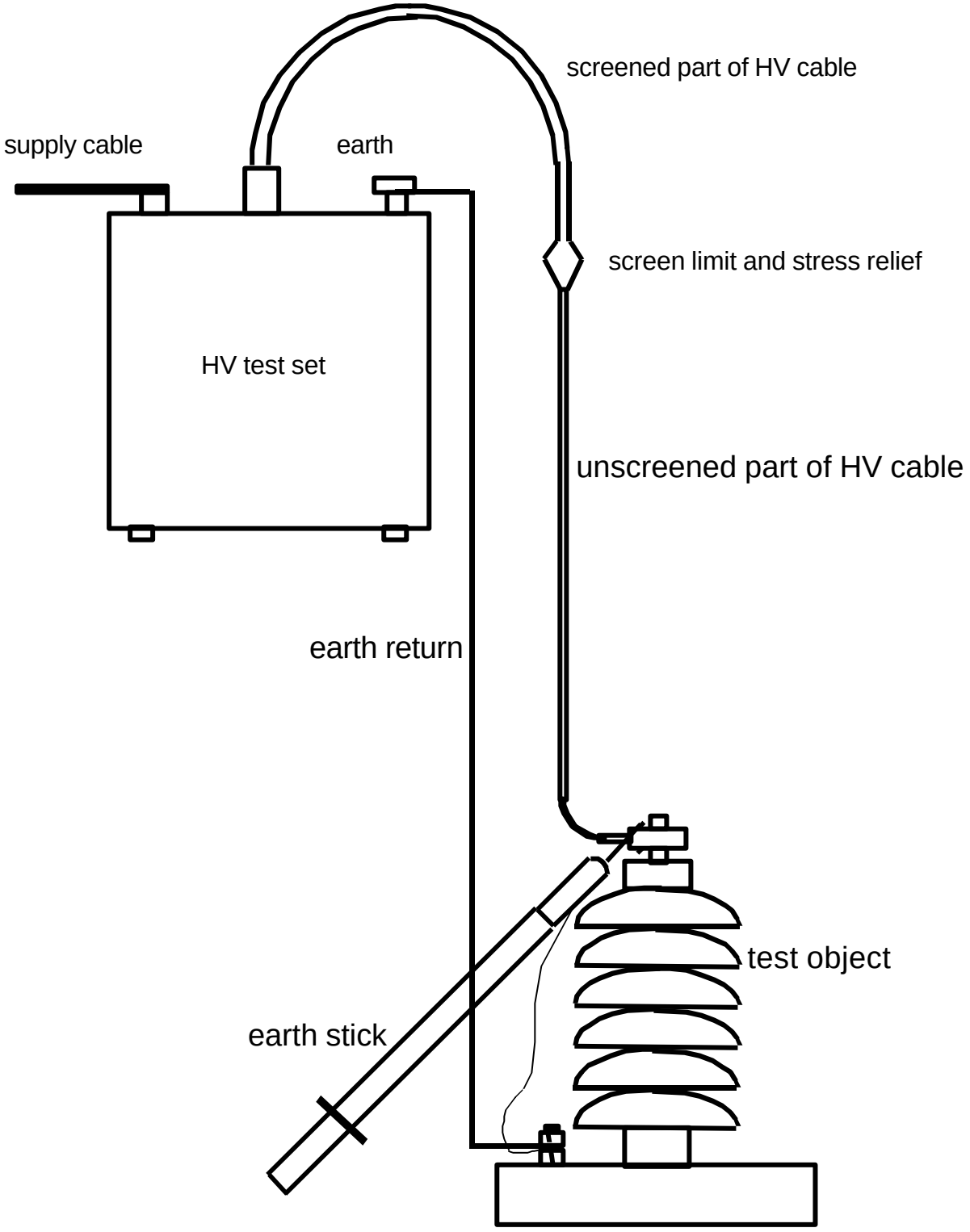
2.1.2 Connect the earth lead from a reliable efficient earth to the earth terminal on the equipment.

2.1.3 Connect the earth hook lead to the earth terminal on the test set and place the hook on the test object's high voltage terminal.

2.1.4 IMPORTANT

The output cable is only partially screened. it is therefore essential that the minimum clearance of 20cm be maintained around the unscreened portion of the output cable. (See **Figure 1**)

Figure 1 Connection showing earthed test object – before start of test



IMPORTANT: There must be 20cm minimum clearance between the unscreened section of HV output cable and earth.

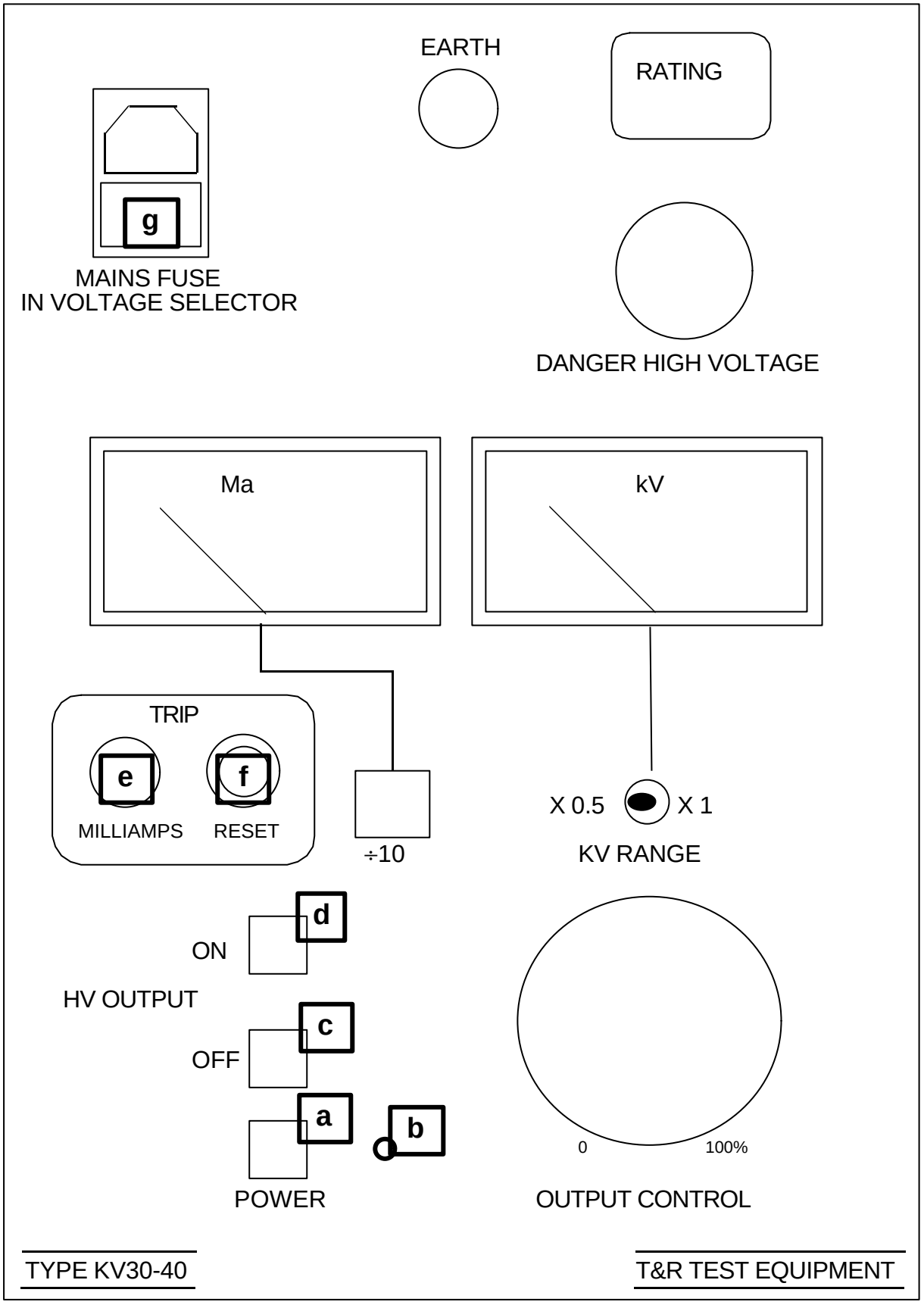
Note:-The test object is shown earthed via the earth stick as it should be between tests and before any adjustment to the test object. The earth stick should be removed from the test object before the test, and replaced after the test is complete.

2.2 Front Panel Control Functions

2.2.1

ITEM		FUNCTION
a.	Power ON/OFF switch Key operated	To isolate equipment from the mains supply.
b.	Power ON lamp	To indicate that the supply is connected to the equipment, power switch is closed and the supply fuse is intact.
c.	H V OFF illuminated push-button (Green)	Indicates HV output is OFF when lit. Switches OFF HV output when pressed.
d.	HV ON illuminated push-button (Red)	Indicates HV output is ON when lit. Switches ON HV output when pressed.
e.	Trip level mA switch	Selects output current trip level in mA.
f.	Trip reset illuminated push-button (Amber)	Indicates variable overload circuit has activated when lit. Resets and arms circuit when pressed.
g.	Supply voltage selector	Selects desired input supply voltage either 240V, 220V or 115V.
h.	Interlock 24V~ (Option)	User interlock socket 24V~, see **Section 1.1.5**

Front Panel Layout



2.3 Method of Operation

2.3. 1 Connect the equipment as described in **Section 2.1**.

2.3. 2 Remove the power switch operating key before connecting the equipment to the main supply. This will ensure the equipment is in the OFF position as the key is only removable in that position. The key is trapped in the ON position.

2.3. 3 Once the equipment is connected to the main supply the key operated switch can be moved to the ON position. The following will now occur:

a. Power ON lamp will be lit
b. HV OFF lamp will be lit
c. The variable overload reset lamp will be lit

2.3. 4 Press the variable overload reset push-button thus arming the circuit. The indicator lamp in the reset push-button will go out thus indicating that the circuit is armed.

2.3. 5 Select the desired voltage range on the kV meter and set the desired overload mA trip level.

2.3. 6 Before commencing testing ensure that the regulator is in the fully anticlockwise position.

2.3. 7 Depress HV ON push-button and this will close the internal circuit breaker The HV OFF lamp will extinguish and the HV ON lamp will be lit. The output voltage can now be increased to the desired level as indicated on the kV meter.

2.3. 8 In the event of a test object failure the HV output will be automatically switched off by the protection system.

2.3. 9 When the test is completed, turn the regulator control knob fully anti-clockwise and switch off the HV output and then the main supply.

2.3.10 Before disconnecting the test object ensure the HV connection is grounded using the earthing stick provided.

3. MAINTENANCE

3.1 The switches and contactors should be occasionally examined for signs of wear and contact erosion. Badly eroded contacts should be replaced immediately.

3.2 The voltage regulator should be regularly examined, particularly in respect of the brushes, in order that the latter may be replaced before excessive wear has taken place.

3.3 The intervals between inspection and renewal of the brushes will depend upon the amount of usage. However, it should be remembered that extensive damage to the voltage regulator can result if the brushes are allowed to wear away to such an extent that a loss of brush pressure occurs thus causing arcing.

3.4 The occasional wiping of the regulator track with an alcohol moistened rag is recommended. If however the track is badly corroded it should be cleaned with very fine sand paper ensuring a flat surface is restored. Remove particles with a fine brush and finally cleanse with an alcohol moistened brush.

3.5 The equipment's output cable should be kept clean and inspected regularly for damage. This applies especially to the unscreened portion of the output cable.

3.6 To remove the set from its case. The following procedure must adopted:

a. Remove all four M5 posidrive fixing screws from the underside of the set. (centre of rubber feet)

b. Place the set in the normal operating position, i.e. with the control panel horizontal.

c. Remove all six panel fixing screws.(M6 posidrive screws, nylon washers)

d. Remove the two M6 dome nuts from the lifting positions.

e. Screw on to the exposed threads of the lifting positions the tommy bars provided.

f. The set can now be lifted from the case taking care not to foul the supporting brackets.

4. STANDARD ACCESSORIES

4.1 Spare fuses supplied

a. 1 off **T5A** 1¼ inch
b. 1 off **F10A** 1¼ inch

4.2 The following items are provided with the equipment:

a. Mains input lead.
b. 2 keys (for mains ON/OFF switch).
c. 5 metre earth lead fitted with clip and tag.
d. Type ES30-40 earthing stick.
e. 2 tommy bars.
f. Operating & Maintenance Manual.

5. OVERALL PERFORMANCE SPECIFICATION

5.1 Insulation resistance at 1000V DC

Not less than 10 megohms between mains input and frame.

5.2 Applied voltage test

2kV RMS for 1 minute between mains input and frame

5.3 Accuracy of instruments

KV meter ±1.5% at full scale
mA meter ±1.5% at full scale

5.4 H V Transformer

2.5kV RMS for 1 minute between primary and earth
2.5kV RMS for 1 minute between earthy end of secondary and earth

5.5 Complete Equipment

Over voltage test
Equipment run for 5 minutes at 115% of normal output voltage

Flash over-test
6 flash-overs direct to ground at 100% of normal output voltage

6. CALIBRATION RESULTS

6.1 Equipment Serial Number .....

6.2

Unit Type KV15-80

Range	Equipment's KV meter	Standard KV meter
High Range (x1)	5.0	
	10.0	
	15.0	
Low Range (x0.5)	2.5	
	5.00	
	7.5	

Equipment's mA meter	Standard mA meter
20	
40	
60	
80	
100	

Unit Type KV30-40

Range	Equipment's KV meter	Standard KV meter
High Range (x1)	5.0	
	10.0	
	15.0	
	20.0	
	25.0	
	30.0	
Low Range (x0.5)	2.5	
	5.00	
	7.5	
	10.0	
	12.5	
	15.0	

Equipment's mA meter	Standard mA meter
10	
20	
30	
40	
50	

7. TEST CERTIFICATE

PRODUCT TYPE: ***KV15-80***

PRODUCT SERIAL NUMBER:

TEST PROCEDURE: As routine test sheet:- KV15-80 rts.doc

TESTED BY: .....

PASSED BY: .....

DATE: .....

PRODUCT TYPE: ***KV30-40***

PRODUCT SERIAL NUMBER:

TEST PROCEDURE: As routine test sheet:- KV30-40 rts.doc

TESTED BY: .....

PASSED BY: .....

DATE: .....

. REVISION

Product/Type: High Voltage AC Test Set/KV30-40 & KV15-18
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