

Instruction Manual AVTM550050J
for
TTR[®] Calibration
Reference Transformer
Catalog No. 550050

Megger 

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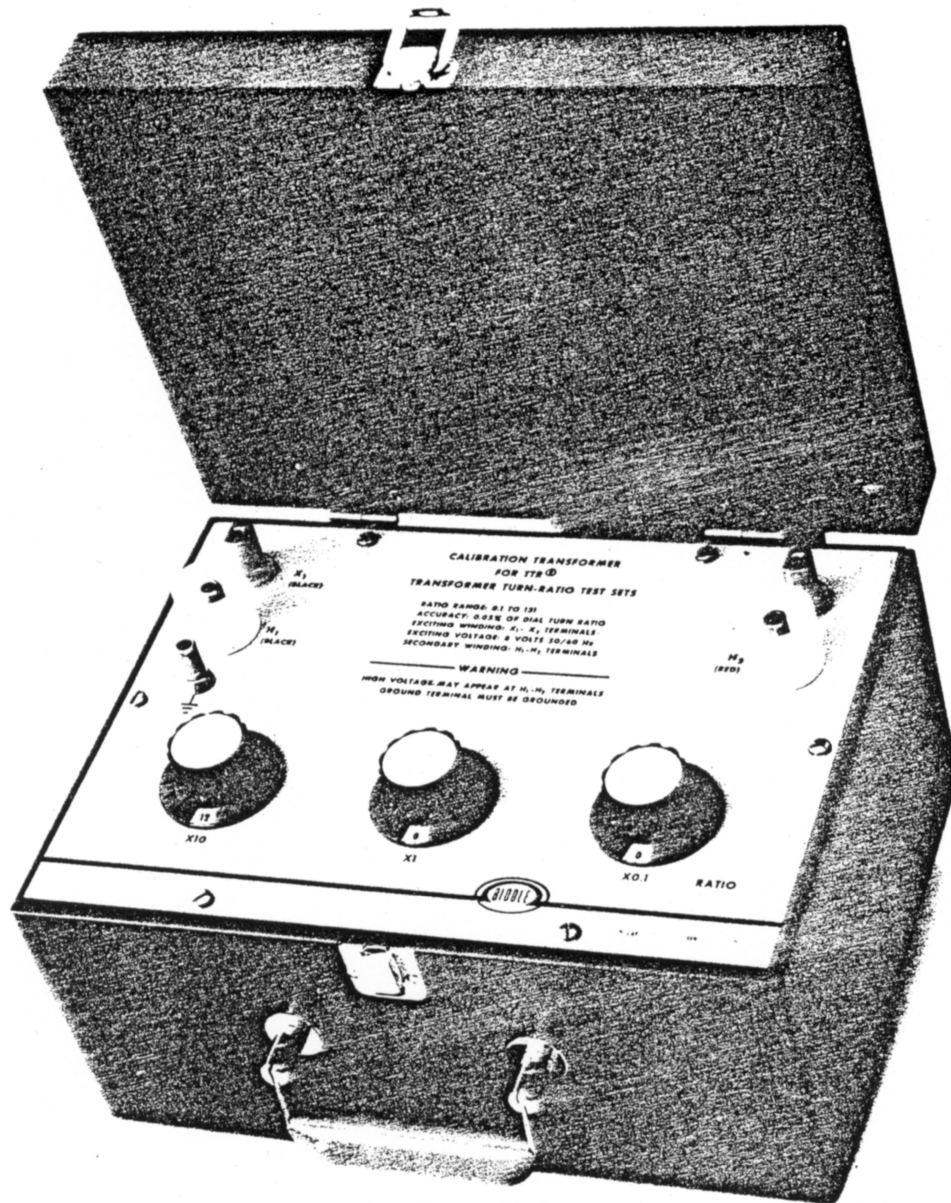


Figure 1: Catalog No. 550050, TTR[®] Calibration Reference Transformer

Section A

DESCRIPTION

This standard has been designed for use as a Reference Transformer for checking the accuracy of the Megger TTR[®] Transformer Turn Ratio Test Sets. The standard is also useful for troubleshooting and repair of a TTR instrument.

The Reference Transformer essentially consists of a fixed low voltage winding (primary) and a variable high voltage winding (secondary) whose turns are controlled by three decade switches. The turns ratio range is 0.1 to 131. A turn ratio resolution of 0.1 is provided over the entire range.

The Reference Transformer operates on the principal that the voltage ratio of a transformer, at no load, is almost exactly equal to the true turn ratio. The major source of error is the primary impedance drop due to the magnetizing current. High precision ratios are achieved by exciting the low voltage primary winding at low voltage, by using an alloy core of high permeability, by making the resistance of the primary winding low, and by use of null-balance comparison techniques.

The principal of operation when calibrating a TTR instrument, consists of connecting the primary winding of the Reference Transformer in parallel with the ratio transformer in the TTR instrument and exciting both windings from the TTR instrument voltage source. The secondary windings are connected in series opposition. When the turn ratio of the TTR instrument is adjusted to equal the turn ratio of the Reference Transformer there will be no circulating current in the secondary winding circuit. This is indicated by a null balance of the TTR instrument detector. When in balance both the Reference Transformer and the TTR instrument ratio transformer operate with zero burden. Since the no load voltage ratio of the Reference Transformer is known the voltage ratio of the TTR instrument is also known by comparing dial readings.

Each Reference Transformer is furnished with a Calibration Certificate of turns ratio accuracy which is traceable to National Bureau of Standards.

SECTION B

SAFETY PRECAUTIONS

SAFETY IS THE RESPONSIBILITY OF THE USER

LA SEGURIDAD ES EL CARGO DEL OPERADOR

The Catalog No. 550050 TTR Calibration Reference Transformer contains no source of power and does not present a shock hazard in itself. However, the transformer is normally connected to a source of high voltage electrical energy. All persons making or assisting in the tests must use all practical safety precautions to prevent contact with energized parts of the test equipment and related circuits.

Persons actually engaged in the test must stand clear of all parts of the complete high-voltage circuit, including all connections, unless the set is de-energized and all parts of the test circuit are grounded.

Any persons not directly involved with the work must be kept away from test activities by suitable barriers, barricades or warnings.

Maintain a minimum clearance of 3 feet (90 cm) for personnel and surrounding objects when energizing the Reference Transformer.

Connect the GROUND terminal of the TTR instrument and Reference Transformer to a low impedance earth ground.

If the TTR set is properly operated and all grounds correctly made, no rubber gloves are necessary. As a routine safety procedure, however, some users require the use of rubber gloves, not only in making connections to the high-voltage terminals, but in manipulating the controls. Megger considers this to be an excellent safety practice.

CAUTION

- **STAY CLEAR OF ALL EXPOSED CONNECTIONS AND CONDUCTORS WHILE TEST IS IN PROGRESS.**
- **NEVER CONNECT THE REFERENCE TRANSFORMER TO ENERGIZED EQUIPMENT.**
- **NEVER PERFORM ANY TESTS IN AN EXPLOSIVE ATMOSPHERE.**

The equipment provided should not be used for any purpose except as described in the instruction manual.

SECTION C

RECEIVING INSTRUCTIONS

When your instrument arrives, check the equipment received against the packing list to ensure that all materials are present. Notify Megger of any shortage. Telephone 1-800-723-2861 or 610-676-8578 and ask for the Customer Service Department.

Examine the instrument for damage received in transit. If any damage is discovered, file a claim with the carrier at once and notify Megger or its nearest authorized sales representative, giving a detailed description of the damage observed.

This instrument has been thoroughly tested and inspected to meet rigid inspection specifications before being shipped. It is ready for use when set up as described in Section E.

SECTION D

SPECIFICATIONS

| | |
|-------------------------|--|
| Turns ratio range: | 0.1 to 131 |
| Turns ratio resolution: | 0.1 |
| Turns ratio accuracy: | ±0.05% of dial setting |
| Exciting voltage: | 8 volts nominal at 50/60 Hz |
| Terminals provided: | |
| X1 (black) & X2 (red): | Exciting winding |
| H1 (black) & H2 (red): | Secondary winding |
| Ground: | |
| Enclosure: | Top panel is aluminum with off white enamel finish. Case, with removable hinged lid and carrying handle, is of durable polycarbonate plastic with blue texture finish. |
| Dimensions: | 13" L x 9 1/4" W x 7" H (33 x 23.5 x 17.8 cm) |
| Weight: | 19 lbs (8.6 kg) |

SECTION E

OPERATION

1. GENERAL

The operating procedure is based on using the Reference Transformer to check the overall operation and accuracy of a hand-cranked generator type TTR Transformer Turn Ratio Test Set. The procedure is essentially the same when checking TTR instruments which are energized from an external power source.

A complete preliminary performance check should always be performed on a TTR set prior to making any calibration checks. This will insure that the TTR set is functioning properly. The TTR preliminary check is listed in Section B of the TTR instruction manual.

2. SETTING UP THE STANDARD

Figure 3 shows the test set-up arrangement.

- a. Place the TTR set and Reference Transformer on a bench or other support in such a position that the TTR instrument crank can be operated without discomfort.
- b. Position the TTR set at least 3 feet (90 cm) away from the Reference Transformer.
- c. Use suitable protective barriers, barricades or warnings for the set-up.
- d. Connect the GROUND terminal of the TTR instrument and Reference Transformer to a low impedance earth ground.
- e. Connect the four test leads of the TTR set to the four terminals of the Reference Transformer. The Reference Transformer terminal identification matches the leads of the TTR set. The low voltage terminals "X1 (black)" and "X2 (red)" on the Reference Transformer have heavy brass tabs for easy, positive connection to the lead clamps from the TTR set. The high voltage terminals "H1 (black)" and "H2 (red)" on the Reference Transformer are insulated brass studs designed to easily accommodate the heavy spring of the TTR leads.

3. OPERATING PROCEDURE

- a. Set the turns ratio on the Reference Transformer Decade Switches to the initial setting as called out in Table 1.
- b. Operate the TTR set to achieve a null balance in the normal way as called out in the TTR instruction manual. Record reading on a worksheet as illustrated in Table 1.
- c. Obtain readings on the TTR set for the remainder of turn ratio settings on the Reference Transformer as indicated in Table 1. Record all readings.
- d. The readings for a new instrument should be within the tolerances indicated in the table. Circle all readings which are out-of-tolerance in red.

CAUTION

The TTR Calibration Reference Transformer must not be used with AC excitation voltages greater than 12 volts RMS applied across X1-X2 terminals.

Any use on DC circuits will void the calibration certification.

- e. De-energize the TTR set in the normal manner between readings and when the calibration check is completed.

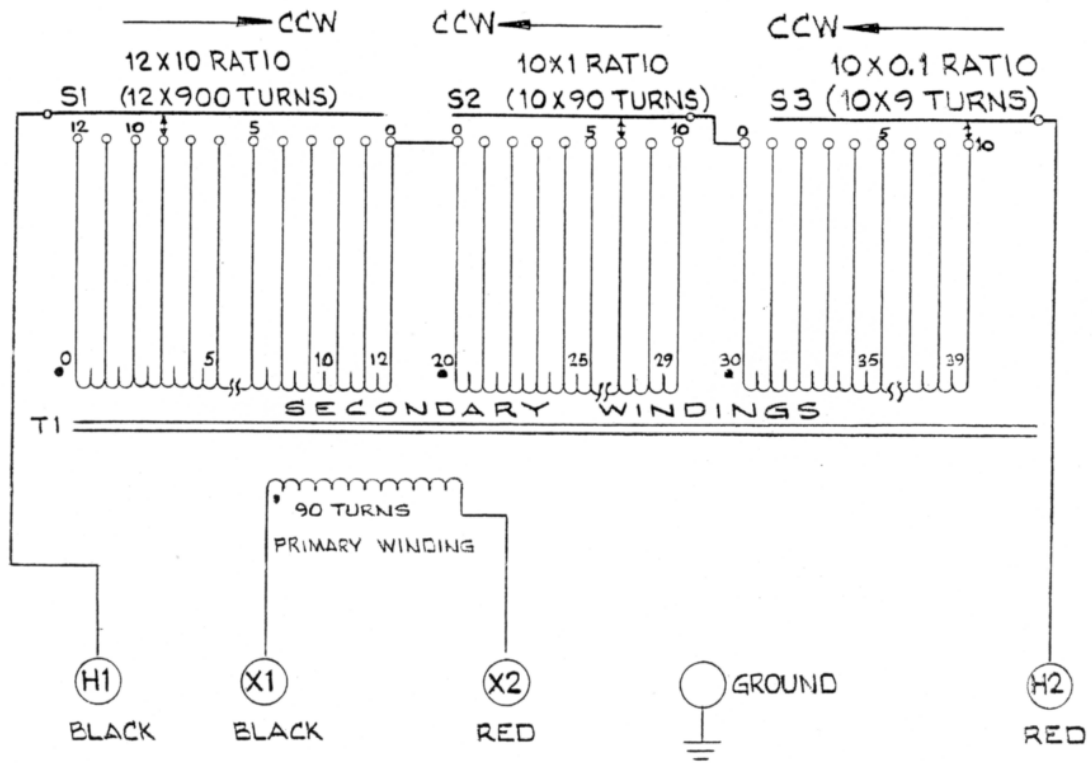


Figure 2: Schematic Diagram No. 550050 TTR, Calibration Reference Transformer

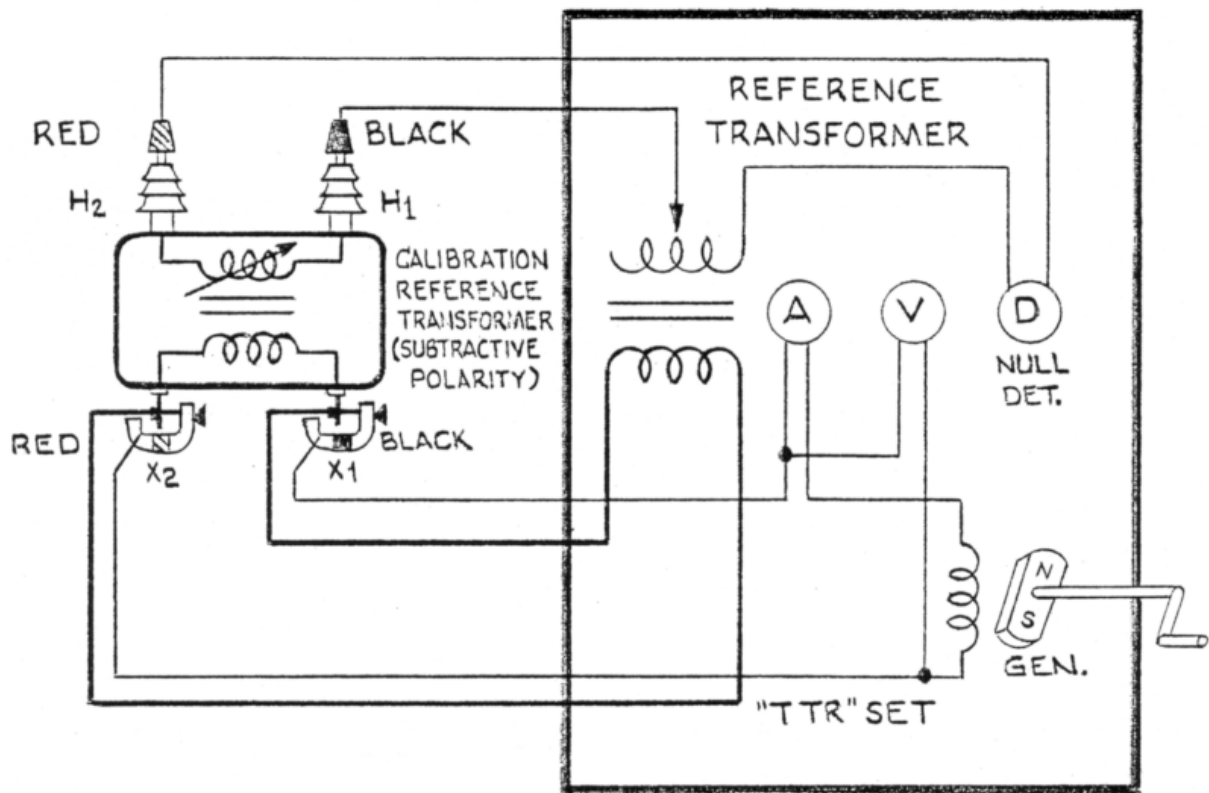


Figure 3: Test Set-up for Calibration Check

TABLE 1

TTR CALIBRATION CHECK

| Excitation Voltage: 8 volts | | | | |
|---|---------------------------------|--|-------------------------|------------------------------|
| REFERENCE TRANSFORMER DIAL SETTING | TTR NOMINAL DIAL SETTING | TTR 4TH DIAL SETTING | TTR DIAL READING | TTR READING TOLERANCE |
| 0.1 | 0.1 | ZERO | | .0995 - .1005 |
| 0.1 | 0.1 | 100 | | .0995 - .1005 |
| 1.0 | 1.0 | -- | | .9995 - 1.0005 |
| 2.0 | 2.0 | -- | | 1.999 - 2.001 |
| 3.0 | 3.0 | -- | | 2.9985 - 3.0015 |
| 4.0 | 4.0 | -- | | 3.998 - 4.002 |
| 5.0 | 5.0 | -- | | 4.9975 - 5.0025 |
| 6.0 | 6.0 | -- | | 5.997 - 6.003 |
| 7.0 | 7.0 | -- | | 6.9965 - 7.0035 |
| 8.0 | 8.0 | -- | | 7.996 - 8.004 |
| 9.0 | 9.0 | -- | | 8.9955 - 9.0045 |
| 10.0 | 10.0 | -- | | 9.995 - 10.005 |
| 11.1 | 11.1 | -- | | 11.095 - 11.105 |
| 22.2 | 22.2 | -- | | 22.19 - 22.21 |
| 33.3 | 33.3 | -- | | 33.285 - 33.315 |
| 44.4 | 44.4 | -- | | 44.38 - 44.42 |
| 55.5 | 55.5 | -- | | 55.47 - 55.53 |
| 66.6 | 66.6 | -- | | 66.565 - 66.635 |
| 77.7 | 77.7 | -- | | 77.66 - 77.74 |
| 88.8 | 88.8 | -- | | 88.755 - 88.845 |
| 99.9 | 99.9 | -- | | 99.85 - 99.95 |
| 109.9 | 109.0 | -- | | 109.84 - 109.96 |
| 119.9 | 119.9 | -- | | 119.84 - 119.96 |
| 129.9 | 129.9 | -- | | 129.83 - 129.97 |

SECTION F

MAINTENANCE & CALIBRATION

1. MAINTENANCE

The Calibration Reference Transformer is intended to be used as a Reference Standard and should be treated as a standard. Aside from “good housekeeping” practices no special attention is required. The appearance of the Reference Transformer can be maintained by occasional cleaning as follows:

a. Case and Panel:

Clean with a cloth dampened with detergent and water. Water must not be allowed to penetrate panel holes, as it may adversely affect components on the underside. Household furniture spray wax can also be used to clean the panel. Polish with a soft, dry cloth.

b. Terminal Insulators:

Clean with isopropyl alcohol or denatured alcohol. Stubborn dirt may require cleaning with Xylol which should then be rinsed with alcohol as above.

2. CALIBRATION

A calibration check of the Reference Transformer should be made at least once every 2 years. It is recommended that the Reference Transformer be returned to Megger for this check.

SECTION G

TROUBLESHOOTING & REPAIRS

1. REPAIRS

Megger maintains a complete instrument repair service. Should this instrument ever require repairs, we recommend it be returned to the factory for repair by our instrument specialists. When contacting our service department, complete information concerning the trouble and any steps taken in attempting repair should be given. The catalog number and serial number of the instrument should also be specified. When returning instruments for repairs, either in or out of warranty, they should be shipped Prepaid and Insured, and marked for the attention of the Repair Department.

2. TROUBLESHOOTING

The following are the recommended tests to be made on a Reference Transformer when locating trouble. The only equipment required is a voltage source of 8 volts at 50/60 Hz and a Digital Multimeter which has an ohms range up to 10K ohms and an AC milliampere range up to 200 mA.

a. Primary Winding Resistance Measurement:

The primary winding resistance is checked by connecting the Digital Multimeter between the X1 and X2 terminals. The resistance value should be approximately 0.09 ohms.

b. Secondary Winding Resistance Measurement:

The secondary winding resistance is checked by connecting the Digital Multimeter between the H1 and H2 terminals.

The values of resistance for each combination of dial settings is shown in the following table:

**SECONDARY RESISTANCE VALUES
REFERENCE TRANSFORMER**

| SWITCH STEP | 1ST* DIAL | 2ND* DIAL | 3RD* DIAL |
|-------------------------------|-----------------------------|-----------------------------|-----------------------------|
| 0 | 0.1 | 0.1 | 0.1 |
| 1 | 90 | 9 | 0.3 |
| 2 | 180 | 18 | 0.5 |
| 3 | 265 | 27 | 0.7 |
| 4 | 350 | 36 | 0.9 |
| 5 | 435 | 45 | 1.1 |
| 6 | 520 | 54 | 1.3 |
| 7 | 600 | 63 | 1.5 |
| 8 | 680 | 72 | 1.7 |
| 9 | 760 | 81 | 1.9 |
| 10 | 840 | 90 | 2.1 |
| 11 | 920 | -- | -- |
| 12 | 1000 | -- | -- |
| *All Other Dials Set at zero. | | | |

c. Magnetizing Current Measurement:

Magnetizing current should be measured as an indication of the condition of the core. At 8 volts 50/60 Hz it is normally about 50 milliamperes. Mechanical abuse of the core will reduce its quality in such a way that magnetizing current will increase. If the magnetizing current is found to be in excess of 100 milliamperes, it is advisable to send the set back to the factory for inspection.

To measure the magnetizing current, connect the 8 volt voltage source to the X1 and X2 terminals of the Reference Transformer with the Digital Milliammeter in series between the voltage source and reference transformer.

SECTION H

FIELD REPLACEABLE PARTS

| PART NO. | DESCRIPTION | |
|-----------------|----------------------|-------------------|
| 13462 | Copper Terminal | (X1, X2) |
| 13463-1 | Insulated Washer | (X1, X2 terminal) |
| 11261 | Insulated Spacer | (X1, X2 terminal) |
| 11166-4 | Binding Post | (H1, H2, Ground) |
| 13469 | Insulator | (H1, H2 terminal) |
| 13463-2 | Insulated Washer | (H1, H2 terminal) |
| 13466-2 | Knob | |
| 13466-3 | Cap for knob | |
| 13467 | Marked Dial for knob | |
| 13466-6 | Index for knob dial | |
| 18845-1 | Carrying case | |
| 550050J | Instruction Manual | |

SECTION I

WARRANTY

All products supplied by Megger are warranted against all defects in material and workmanship for a period of one year following shipment. Our liability is specifically limited to replacing or repairing, at our option, defective equipment. Equipment returned to the factory for repair will be shipped Prepaid and Insured. The warranty does not include batteries, lamps or tubes, where the original manufacturer's warranty shall apply. WE MAKE NO OTHER WARRANTY.

The warranty is void in the event of abuse or failure by the customer to perform specified maintenance indicated in this manual.