

AVTM550555
Rev. 4
March 2010

Instruction Manual AVTM550555
for
TTR[®] Check Box
Catalog No. 550555

Megger[®]

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Instruction Manual AVTM550555
for
TTR[®] Check Box
Catalog No. 550555

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The information presented in this manual is believed to be adequate for the intended use of the product. If the product or its individual instruments are used for purposes other than those specified herein, confirmation of their validity and suitability must be obtained from Megger. Specifications are subject to change without notice.

WARRANTY

Products supplied by Megger are warranted against 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 must be shipped prepaid and insured. This warranty does not include batteries, lamps, or similar items, where the original manufacturer's warranty shall apply. We make no other warranty. The warranty is void in the event of abuse (failure to follow recommended operating procedures) or failure by the customer to perform specific maintenance as indicated in this manual.

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SECTION 1

Introduction

Receiving Instructions

Check the equipment received against the packing list to ensure that all materials are present. Notify Megger of any shortage at Telephone (610) 676-8500.

Examine the instrument for possible 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.

This instrument has been thoroughly tested and inspected to meet rigid specifications before being shipped. It is ready for use when set up as indicated in this manual.

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General Information

This Check Box has been designed for use as a reference transformer for checking the accuracy of all *electronic* Megger TTR[®]s. The standard is also useful for troubleshooting and repairing the instrument. The Check Box is available with a Calibration Certificate of turns ratio and phase shift accuracy traceable to NIST. NIST is unable to furnish traceability on ratios above 1000.

The standard is essentially a multi-winding toroidal autotransformer that checks the accuracy of ratios of 1:1, 2:1, 5:1, 10:1, 20:1, 50:1, 100:1, 200:1, 500:1, 1000:1, and 2000:1. The standard also checks the accuracy of phase shift measurement. A 2-sided Calibration Report card in the lid of the standard shows the actual readings for the Check Box supplied, operating at 60 Hz or 50 Hz.

The standard operates on the principle that the voltage ratio of a transformer at no load is

INTRODUCTION

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 using a toroidal core of high permeability.

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Section 2

Safety

The Check Box contains no source of power and does not present a shock hazard in itself. However, the standard is normally energized from a TTR[®] test set which could produce 90 V maximum, 50/60 Hz source of electrical energy. All persons making or assisting in tests must use all practical safety precautions to prevent contact with energized parts of the test equipment and related circuits. Persons not directly involved with the tests must be kept away from test activities by suitable barriers, barricades, or warnings.

Connect the GROUND terminal of the TTR[®] test set and Check Box to a low-impedance earth ground.

If the equipment is operated properly and all grounds correctly made, test personnel need not wear rubber gloves. As a routine safety procedure, however, some users require that

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rubber gloves be worn, not only when making connections to high-voltage terminals, but also when manipulating the controls. Megger considers this an excellent safety practice.

- Safety is the responsibility of the user.
- The purpose of the Check Box is limited to use as described in this manual. Do not use the equipment with any ratio meter type equipment other than described.
- Stay clear of all exposed connections and conductors while test is in progress.
- Do not connect the Check Box to energized equipment.
- Do not perform tests in an explosive atmosphere.
- Maintenance must only be performed by qualified personnel who are familiar with the construction and operation of the Check Box and the hazards involved.

Warning and caution notices are used throughout this manual where applicable and

should be strictly observed. They appear in the format shown in the following and are defined as follows:



WARNING

Warning, as used in this manual, is defined as a condition or practice which could result in personal injury or loss of life.



CAUTION

Caution, as used in this manual, is defined as a condition or practice which could result in damage to or destruction of the equipment or apparatus under test.



PROTECTIVE GROUND

Identifies a terminal intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth (ground) electrode.

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Section 3

Specifications

Electrical

Turns ratio range:	1 to 2000
Turns ratio resolution:	1:1, 2:1, 5:1, 10:1, 20:1, 50:1, 100:1, 200:1, 500:1, 1000:1, 2000:1 (nominal)
Turns ratio accuracy:	± 0.1 percent of setting; actual readings are shown on the Calibration Report card in the lid of the standard.
Phase shift accuracy:	± 5 minutes of reading shown on Calibration Report card in lid of the standard.

NOTE: The Check Box is available with a Calibration Certificate of turns ratio and phase shift accuracy traceable to NIST. NIST is unable to furnish traceability on ratios above 1000.

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Exciting voltage:	90 V maximum, 50/60 Hz
Exciting winding:	H1-H2 terminals
Terminals provided:	H1 and H2: exciting winding X1 and X2: secondary winding Ground

Environmental

Operating temp range:	-20 to 50°C (-5 to 122°F)
Storage temp range:	-50 to 60°C (-60 to 140°F)
Relative humidity:	0 to 90 percent non-condensing (operating) 0 to 95 percent non-condensing (storage)

SPECIFICATIONS

Physical Data

Dimensions:	22.9 x 20.3 x 8.9 cm (9 x 8 x 3.5 in.) approx. including handle
Weight:	1.4 kg (3 lb)
Case:	Impact-resistant plastic with lid and carrying handle.

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Section 4

Controls and Terminals

Figure 4-1 shows the Check Box controls and terminals.

RATIO switch	This switch has 11 ratio settings (1:1, 2:1, 5:1, 10:1, 20:1, 50:1, 100:1, 200:1, 500:1, 1000:1, 2000:1) and an OFF position.
PHASE SHIFT switch	This five-position switch allows setting of $+1.5^\circ$, $+0.15^\circ$, 0, -0.15° , and -1.5° .
Ground Terminal	This binding post allows connection of the standard to earth ground.
H Winding Terminals	High-voltage (H) winding terminals of Check Box. This is the exciting winding and must be connected to the corresponding H test leads of the three-phase TTR [®] test set.

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X Winding
Terminals

Low-voltage (X) winding terminals of Check Box. This winding must be connected to the corresponding X test leads of the three-phase TTR[®] test set.



Figure 4-1: Control Panel

Section 5

Operation

Setup

The operating procedure is based on using the Check Box to check the overall operation and accuracy of the MEGGER Three-Phase TTR[®] Test Set, Catalog No. 550503 series. While the Check Box may be used with other MEGGER TTR[®] Instruments, these instructions are specifically for the 550503 and TTR310. Ensure that the test set is functioning properly before making any calibration checks with the Check Box. Follow all safety precautions. Refer to Section 2.

1. Place the TTR[®] test set and the Check Box on a level bench or other suitable support.

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2. Position the TTR[®] test set at least 60 cm (2 ft) away from the Check Box.
3. Use suitable protective barriers, barricades, for the setup.
4. Connect the wing nut ground terminal of the TTR[®] test set to a low-impedance earth ground using the 15-ft ground lead supplied with the TTR[®] test set.
5. Connect the ground terminal of the Check Box to the ground terminal of the TTR[®] test set using #18 AWG or heavier conductor.
6. Using the two conductor H and X test leads supplied with the TTR[®] test set, connect to the respective H and X winding receptacles of the TTR[®] test set.
7. Connect the clips marked H1 and H2 of the test leads to the corresponding terminals on the Check Box.

8. Connect the clips marked X1 and X2 of the test leads to the corresponding terminals on the Check Box.
9. With the TTR[®] POWER switch switched off, plug input power cord into TTR[®] panel receptacle and into three-wire grounded power outlet.



WARNING

Never interchange connections between the high (H) and low (X) voltage terminals of the Check Box. Failure to observe proper connections will result in a safety hazard and may result in damage to the TTR[®] test set or Check Box.

Operation

Proceed only after fully understanding Section 2, Safety, and setting up the test set as described. Use the keypad on the front panel of the TTR[®] to enter selections from the TTR[®] menus and screen displays. Refer to the TTR[®] instruction manual.

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1. Switch TTR[®] POWER switch on. Ensure that the TTR[®] test set performs a successful self-check of the test set display, calibration, and operation before proceeding.
2. After successful self-check, the MAIN MENU screen will be displayed. Press 4 to select SYSTEM SETUP MENU.
3. Press 3, select ANSI standard, and press ENT. Then press 4, select 80 V and press ENT. Press 6 to return to the MAIN MENU screen.
4. Press 1 on the MAIN MENU and the QUICK TEST SETUP screen will appear. Press 2, then 1, then ENT.



WARNING

**High voltage will be present.
Treat all terminals of the Check
Box as live.**

5. Press 3 to START TEST. The quick test results will be displayed on the screen.

6. To check the accuracy of ratio readings, set the RATIO switch on the Check Box to the desired setting and the PHASE SHIFT switch to 0.
7. Compare ratio readings on TTR® screen with the readings on the Calibration Report card in the lid of the standard. Ratio readings should be accurate to within $\pm 0.2\%$ (See **Indications** below).
8. To check the accuracy of phase shift readings, set the RATIO switch on the Check Box to OFF and the PHASE SHIFT switch to the desired setting.
9. Press 4 on the quick test results screen to REPEAT TEST.
10. Compare phase shift readings on TTR® screen with the readings on the Calibration Report card in the lid of the standard. Phase shift readings should be accurate to within ± 10 minutes of reading on Calibration Report card (See **Indications** below).

11. When testing is complete, switch POWER switch off, then disconnect all test leads.



CAUTION

The Check Box must not be used with ac excitation voltages greater than 90 V rms applied across the H1-H2 terminals.

Any use on dc circuits, except for troubleshooting resistance checks with a digital multimeter will void the calibration certification.

Indications

The following discussion is for clarification of applying accuracy statements to actual field data.

The TTR[®] Check Box, 550555 is a unit defined as a $\pm 0.1\%$ accurate unit. This basically means that whatever reading MEGGER puts on the calibration sheet will have an uncertainty of $\pm 0.1\%$. Ideally, it would be nice to have the number on the

calibration sheet perfect, but no calibration standard is defined without an uncertainty measure. It is typical in the instrumentation and measurement world to use an uncertainty value with a 95% confidence of being within limits.

With the Check Box uncertainty of $\pm 0.1\%$ and the TTR[®] measurement uncertainty at $\pm 0.1\%$, it should be relatively easy to derive that the overall accuracy of the measurements combining two independent units will be greater than $\pm 0.1\%$. If we use the standard Root Sum of Squares method the data measured will have a 95% confidence level that the readings are $\pm 0.141\%$ accurate. Since the two accuracies are low and the worst case error is still $\pm 0.2\%$, it would be easiest to just say that using a MEGGER 3-Phase TTR[®] with a 550555 Check Box, will have readings within $\pm 0.2\%$. If the readings are outside $\pm 0.2\%$ then the customer should start to consider something wrong with either the Check Box 550555 or the Megger 3-Phase TTR. Values within $\pm 0.2\%$ are acceptable and

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the probability of accurate measurements can be assured. Note that this discussion also applies to the phase shift measurements.

Section 6

Service

Routine Maintenance

The Check Box is sturdily constructed and requires no periodic maintenance. It is to be used like a standard and should be treated as a standard would be treated. An occasional visual inspection and cleaning of the case and control panel is sufficient. The control panel and case can be cleaned with detergent and water. Do not allow water to penetrate panel holes because it may adversely affect internal components. An all-purpose spray cleaner may also be used. Polish with a soft, dry cloth.

Calibration

A calibration check of the Check Box should be made normally every one to two years. It is recommended that the Check Box be returned to Megger for this check.

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Repair

Megger offers a complete repair service and recommends that its customers take advantage of this service in the event of equipment malfunction. Equipment returned for repair should be shipped prepaid and insured and marked for the attention of the Repair Department. Please indicate all pertinent information including problem symptoms and attempted repairs. The catalog number and serial number of the Check Box should be specified. Pack the instrument in a carton (original shipping carton if available) with adequate dunnage in accordance with best commercial practice. Seal the carton with waterproof tape.

An RMA# must be requested from Megger Customer Service and annotated on the return shipping label as shown below.

NOTE: In some countries Authorized Services Centers may be available. Contact Megger for assistance or check our website at www.megger.com.

Ship to:

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Attn: Repair Dept, RMA #

(contact Megger for RMA # - see above)

Valley Forge Corporate Center

2621 Van Buren Avenue

Norristown, PA 19403

U.S.A.

Phone: 1-610-676-8500

or

Attn: Repair Dept, RMA #

(contact Megger for RMA # - see above)

Megger

Archcliffe Road

Dover CT 17 9EN

England

Phone: +44(0) 1304-502-101

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