ADVANTEST®

ADVANTEST CORPORATION

TR17302
Shield Material
Evaluator
Operation Manual

MANUAL NUMBER FOE-8335004B01

Printed in Japan

Safety Summary

To ensure thorough understanding of all functions and to ensure efficient use of this instrument, please read the manual carefully before using. Note that Advantest bears absolutely no responsibility for the result of operations caused due to incorrect or inappropriate use of this instrument.

If the equipment is used in a manner not specified by Advantest, the protection provided by the equipment may be impaired.

- **Warning Labels**

  Warning labels are applied to Advantest products in locations where specific dangers exist. Pay careful attention to these labels during handling. Do not remove or tear these labels. If you have any questions regarding warning labels, please ask your nearest Advantest dealer. Our address and phone number are listed at the end of this manual.

  Symbols of those warning labels are shown below together with their meaning.

  DANGER: Indicates an imminently hazardous situation which will result in death or serious personal injury.

  WARNING: Indicates a potentially hazardous situation which will result in death or serious personal injury.

  CAUTION: Indicates a potentially hazardous situation which will result in personal injury or a damage to property including the product.

- **Basic Precautions**

  Please observe the following precautions to prevent fire, burn, electric shock, and personal injury.

  - Use a power cable rated for the voltage in question. Be sure however to use a power cable conforming to safety standards of your nation when using a product overseas.
  - When inserting the plug into the electrical outlet, first turn the power switch OFF and then insert the plug as far as it will go.
  - When removing the plug from the electrical outlet, first turn the power switch OFF and then pull it out by gripping the plug. Do not pull on the power cable itself. Make sure your hands are dry at this time.
  - Before turning on the power, be sure to check that the supply voltage matches the voltage requirements of the instrument.
  - Connect the power cable to a power outlet that is connected to a protected ground terminal. Grounding will be defeated if you use an extension cord which does not include a protected ground terminal.
  - Be sure to use fuses rated for the voltage in question.
  - Do not use this instrument with the case open.
  - Do not place anything on the product and do not apply excessive pressure to the product. Also, do not place flower pots or other containers containing liquid such as chemicals near this

product.

- When the product has ventilation outlets, do not stick or drop metal or easily flammable objects into the ventilation outlets.
- When using the product on a cart, fix it with belts to avoid its drop.
- When connecting the product to peripheral equipment, turn the power off.

- **Caution Symbols Used Within this Manual**

Symbols indicating items requiring caution which are used in this manual are shown below together with their meaning.

DANGER: Indicates an item where there is a danger of serious personal injury (death or serious injury).

WARNING: Indicates an item relating to personal safety or health.

CAUTION: Indicates an item relating to possible damage to the product or instrument or relating to a restriction on operation.

- **Safety Marks on the Product**

The following safety marks can be found on Advantest products.

 : ATTENTION - Refer to manual.

 : Protective ground (earth) terminal.

 : DANGER - High voltage.

 : CAUTION - Risk of electric shock.

- **Replacing Parts with Limited Life**

The following parts used in the instrument are main parts with limited life.
Replace the parts listed below before their expected lifespan has expired to maintain the performance and function of the instrument.
Note that the estimated lifespan for the parts listed below may be shortened by factors such as the environment where the instrument is stored or used, and how often the instrument is used.
The parts inside are not user-replaceable. For a part replacement, please contact the Advantest sales office for servicing.

Each product may use parts with limited life.
For more information, refer to the section in this document where the parts with limited life are described.

Main Parts with Limited Life

Part name	Life
Unit power supply	5 years
Fan motor	5 years
Electrolytic capacitor	5 years
LCD display	6 years
LCD backlight	2.5 years
Floppy disk drive	5 years
Memory backup battery	5 years

- **Hard Disk Mounted Products**

The operational warnings are listed below.

- Do not move, shock and vibrate the product while the power is turned on.
  Reading or writing data in the hard disk unit is performed with the memory disk turning at a high speed. It is a very delicate process.

- Store and operate the products under the following environmental conditions.
  An area with no sudden temperature changes.
  An area away from shock or vibrations.
  An area free from moisture, dirt, or dust.
  An area away from magnets or an instrument which generates a magnetic field.

- Make back-ups of important data.
  The data stored in the disk may become damaged if the product is mishandled. The hard disc has a limited life span which depends on the operational conditions. Note that there is no guarantee for any loss of data.

- **Precautions when Disposing of this Instrument**

When disposing of harmful substances, be sure dispose of them properly with abiding by the state-provided law.

Harmful substances: (1) PCB (polycarbon biphenyl)
(2) Mercury
(3) Ni-Cd (nickel cadmium)
(4) Other
Items possessing cyan, organic phosphorous and hexadic chromium and items which may leak cadmium or arsenic (excluding lead in solder).

Example: fluorescent tubes, batteries

Environmental Conditions

This instrument should be only be used in an area which satisfies the following conditions:

- An area free from corrosive gas
- An area away from direct sunlight
- A dust-free area
- An area free from vibrations
- Altitude of up to 2000 m

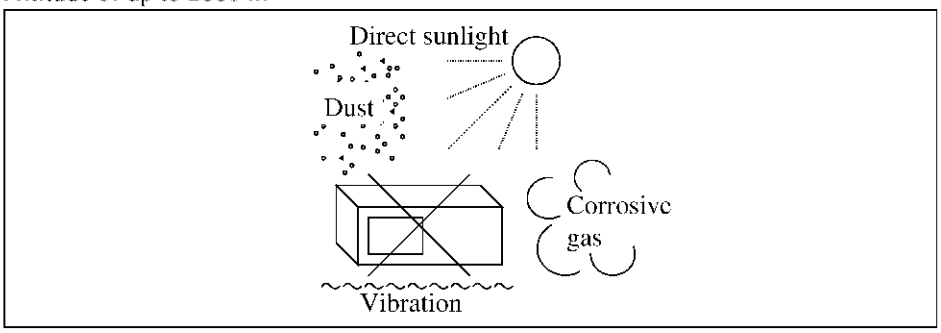


Figure-1 Environmental Conditions

- Operating position

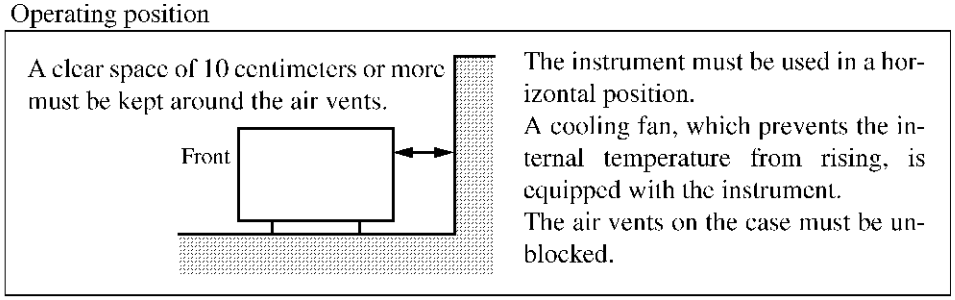


Figure-2 Operating Position

- Storage position

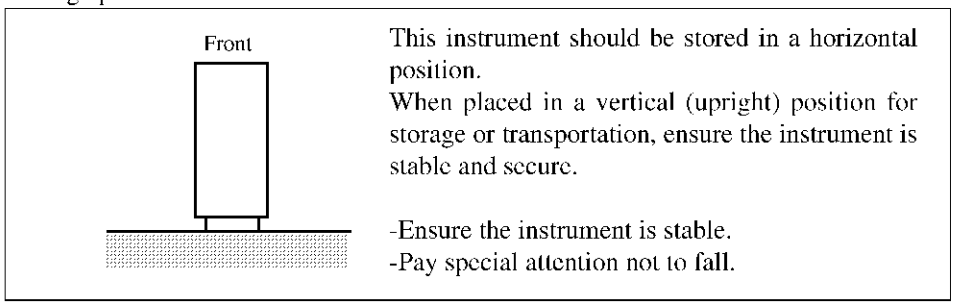


Figure-3 Storage Position

- The classification of the transient over-voltage, which exists typically in the main power supply, and the pollution degree is defined by IEC61010-1 and described below.

  Impulse withstand voltage (over-voltage) category II defined by IEC60364-4-443

  Pollution Degree 2

Types of Power Cable

Replace any references to the power cable type, according to the following table, with the appropriate power cable type for your country.

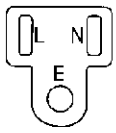
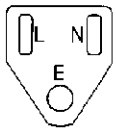
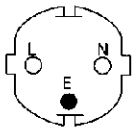
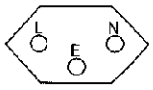
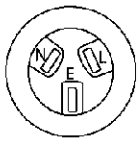
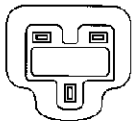
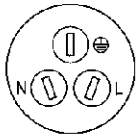
Plug configuration	Standards	Rating, color and length	Model number (Option number)
	PSE: Japan Electrical Appliance and Material Safety Law	125 V at 7 A Black 2 m (6 ft)	Straight: A01402 Angled: A01412
	UL: United States of America CSA: Canada	125 V at 7 A Black 2 m (6 ft)	Straight: A01403 (Option 95) Angled: A01413
	CEE: Europe DEMKO: Denmark NEMKO: Norway VDE: Germany KEMA: The Netherlands CEBEC: Belgium OVE: Austria FIMKO: Finland SEMKO: Sweden	250 V at 6 A Gray 2 m (6 ft)	Straight: A01404 (Option 96) Angled: A01414
	SEV: Switzerland	250 V at 6 A Gray 2 m (6 ft)	Straight: A01405 (Option 97) Angled: A01415
	SAA: Australia, New Zealand	250 V at 6 A Gray 2 m (6 ft)	Straight: A01406 (Option 98) Angled: ---------
	BS: United Kingdom	250 V at 6 A Black 2 m (6 ft)	Straight: A01407 (Option 99) Angled: A01417
	CCC:China	250 V at 10 A Black 2 m (6 ft)	Straight: A114009 (Option 94) Angled: A114109

TABLE OF CONTENTS

1. OUTLINE ..... 1 - 1
1.1 Outline of Product ..... 1 - 1
1.2 Before Operation ..... 1 - 2
1.2.1 Checking Product Appearance and Accessories ..... 1 - 2
1.2.2 Preparation and Cautions ..... 1 - 3

2. TESTING METHOD ..... 2 - 1
2.1 Installation of Test Material ..... 2 - 1
2.2 Connecting Method ..... 2 - 2
2.2.1 Connection to Spectrum Analyzer (TR4172) Incorporating Tracking Generator ..... 2 - 2
2.2.2 Connection to Spectrum Analyzer Without Tracking Generator ..... 2 - 3
2.3 Testing Method ..... 2 - 4

3. PERFORMANCE ..... 3 - 1
3.1 Standard ..... 3 - 1

LIST OF FIGURES

No.	Title	Page
2 - 1	Adapter for Installing Test Material	2 - 1
2 - 2	Connection to TR4172	2 - 2
2 - 3	Connection to the Spectrum Analyzer Without Incorporating a Tracking Generator	2 - 3
2 - 4	Example of Testing Shield Effect	2 - 4
2 - 5	Setting REF. LEVEL	2 - 5
2 - 6	Normalized Basic Waveform	2 - 6
2 - 7	Example of Testing the Shield Effect (2)	2 - 6

LIST OF TABLES

No.	Title	Page
1 - 1	Accessories	1 - 2

1. OUTLINE

1.1 Outline of Product

The TR17302 Shield Material Evaluator tests the shield effect of conductive plastic shield material in magnetic and electrical fields.

This unit differs from the TR17301 Shield Material Evaluator in structure, having two TEM cells for transmission and reception.

TR17302 also tests the shield effect in distant fields using the TEM cell with 377 ohms of impedance. Having two TEM cells, TR17302 can test without effecting outside radio waves.

Therefore, the unit must not be shielded.

Due to the short distance between magnetic or electrical field source and shield material, the results tested by this unit are not applicable to EMI shield. However, they are applicable to shield of distant field radio waves.

1.2 Before Operation

This chapter describes the product, and preparations or cautions for normally operating the product.

1.2.1 Checking Product Appearance and Accessories

Check the product for damage caused during transportation. Check the quantity and specification of accessories.

Please contact our CE department (in the CE center in Yokohama), nearest service office, or agency if the product is damaged or accessories are missing. Addresses and telephone numbers are listed on the last page.

Table 1 - 1 Accessories

Product name	Model name	Stock No.	Quantity	Remarks
BNC-N converter	JUG-201A/U	JCF-AF001Ex03	2	
SMA-N converter	HRM-554S	JCF-AA001Jx36	2	
Terminating set	HRM-601A	DEE-000052	2	
Input cable	MI-09	DCB-FF0392	2	
Adapter	150mm x 150mm testing adapter	-	1	
Hexagon wrench	M3	-	1	
Operation manual	-	J17302	1	Japanese version
	-	E17302		English version

* Please inform us of the model name for additional order of accessories.

1.2.2 Preparation and Cautions

(1) The test material must be well-grounded. Poor grounding may decrease the shield effect and reproduction of data.

(2) To set grounding impedance less than impedance in the test material (to lessen grounding resistance), apply conductive coating. That makes it easy to ground the test material and to obtain stable testing.

(3) TR17302 consists of two cells at the upper and lower positions. Secure these cells firmly for the test, otherwise the ground current may leak.

(4) Input/output cables must not be parallel. Otherwise, radiation between cables can occur when testing material with great shield effect.

(5) For more sensitive testing, the pre-amplifier (option 02 for TR4172) is used.

(6) Use the attached testing adapter when obtaining data on the same test material with TR17301.

2. TESTING METHOD

This chapter explains the method of connecting TR17302 to other units, and the testing method.

2.1 Installation of Test Material

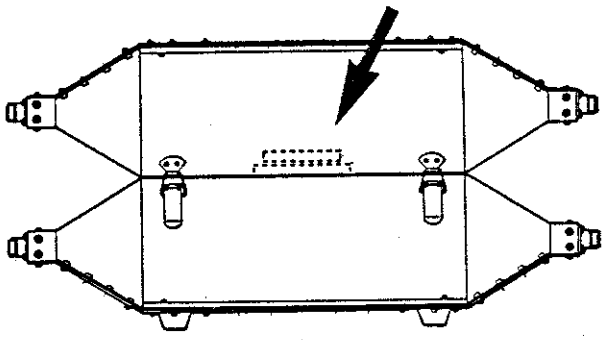


Figure 2 - 1 Adapter for Installing Test Material

As already mentioned, two TEM cells are incorporated in this unit. An adapter to install test material is housed in the center of the lower cell. Unfasten the bolt, and remove the upper cover. Install the test material so that the rectangular packing can contact the material's edge.

The upper and lower packing contacts the material when the upper cover is installed. Therefore, bolts must not be firmly fastened.

The material is caught between the upper and lower cells, so that thin material such as foil can be used as is.

The edge of the material is grounded, so conductive layers must be exposed to the edge. Conductive coating stabilizes the grounding at high frequency.

2.2 Connecting Method

This section describes the method of connecting this unit to a spectrum analyzer incorporating a tracking generator, and the method of connecting it to a spectrum analyzer without a tracking generator.

The following describes the method of connecting the spectrum analyzer TR4172 manufactured by ADVANTEST.

2.2.1 Connection to Spectrum Analyzer (TR4172) Incorporating Tracking Generator

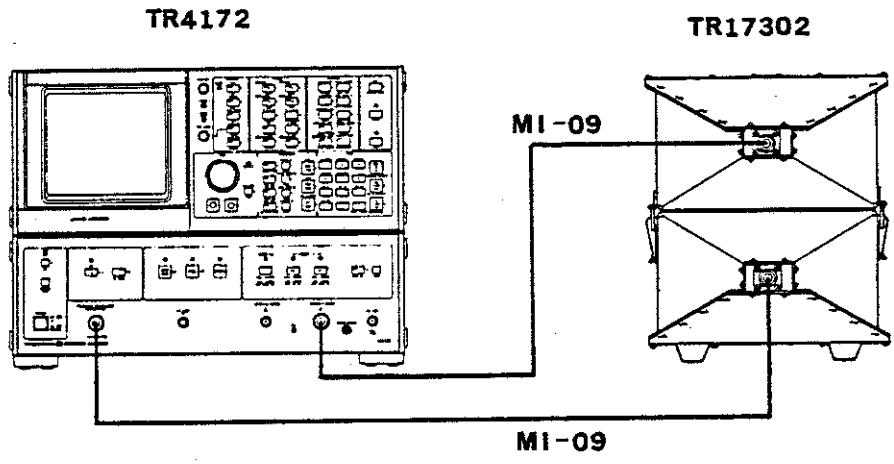


Figure 2 - 2 Connection to TR4172

First, decide which of the two cells to use as the oscillation cell and which as the reception cell. (The lower cell is used for oscillation in Figure 2-2.)

The input pin of the oscillation cell is connected to the output pin of the tracking generator of spectrum analyzer using the input cable M1-09 and the BNC-N converter. In this case, either of the two pins of the oscillation cell can be used for the input pin. The other pin is terminated at 50Ω using the attached SMA-N converter and terminating unit.

The output pin of the reception cell is connected to the input pin of the spectrum analyzer. Either of the two pins of the reception cell can be used for the output pin. The other pin is terminated at 50Ω using the attached SMA-N converter and terminating unit.

To prevent signals leaking from cables, the two input/output cables must not be in parallel and adequate distance must be allowed between them.

2.2.2 Connection to Spectrum Analyzer Without Tracking Generator

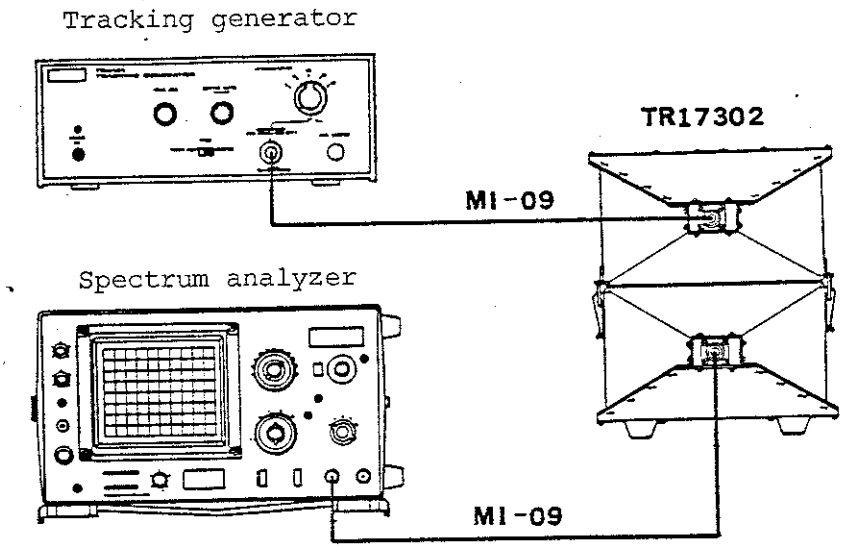


Figure 2 - 3 Connection to the Spectrum Analyzer Without Incorporating a Tracking Generator

The tracking generator or signal generator is used for an oscillator when this unit is connected to the spectrum analyzer that does not have a tracking generator. (See Figure 2-3.) See 2.2.1 for the connecting procedure.

2.3 Testing Method

This section describes the method of connecting this unit to the TR4172 spectrum analyzer.

After connection as shown in Figure 2-2, set TR4172 as below, without installing the material.

(1) Set the testing frequency range. Normally, the central frequency (CENT. FREQ.) is 500MHz, and the frequency span (FREQ. SPAN) is 100MHz.

(2) Set the attenuator level of the tracking generator (T.G. LEVEL) and the input attenuator value (INPUT ATT.) to 0dB. In this case, the receiving signal level is used for the basic level.

(3) Set RES. BW.

RES. BW (RESOLUTION BANDWIDTH), which displays the signal selectivity of the spectrum analyzer, is set depending on the shield effect of the test material. Please observe the following instructions.

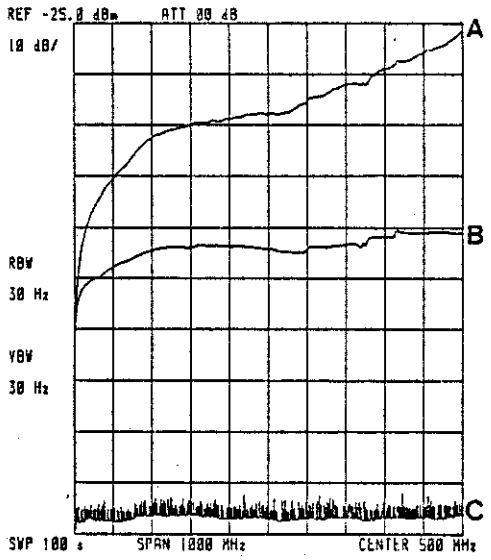


Figure 2 - 4 Example of Testing Shield Effect

In Figure 2-4, waveforms B and C are output by a difference in shield features as the basic level of waveform A.

The signal level is sufficiently high as compared with testing floor noise, so RES. BW can be set larger.

Testing floor noise is made in waveform C, so the output level increases by setting RES. BW greater. Therefore, RES. BW is normally set to 30Hz or 100Hz.

Note that setting RES. BW small for waveform C means that SWEEP TIME must be long.

The expected 1dB is considered to be sufficient when RES. BW is 100Hz and sweep time is 10 sec. or more at a frequency span of 100MHz.

Sweep time for TR4172 automatically increases as RES. BW decreases, but it is too long for shield effect testing. Press the SWEEP TIME switch, and set sweep time at 1 to 10 sec. for manual input. In this case, set a long sweep time if the "UNCAL" message is displayed. When a dynamic range of 50dB or greater is required, a long sweep time is set according to the setting of RES. BW from 100Hz to 10Hz.

(4) Set REF. LEVEL (REFERENCE LEVEL)

Set REF. LEVEL so that the peak of the basic level can reach the top of the graph as shown in Figure 2-5.

TR4172 has normalization features, which directly read the shield effect.

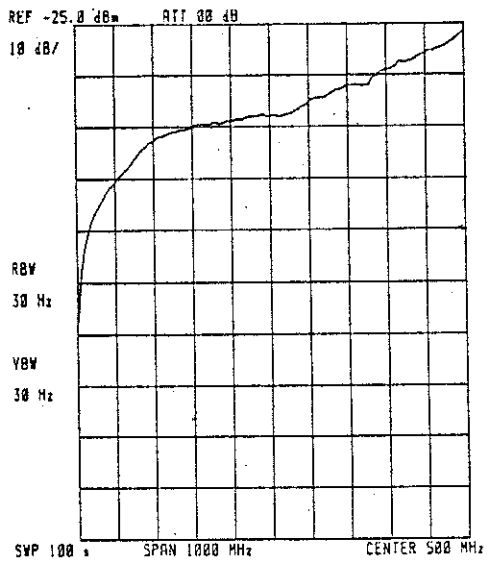


Figure 2 - 5 Setting REF. LEVEL

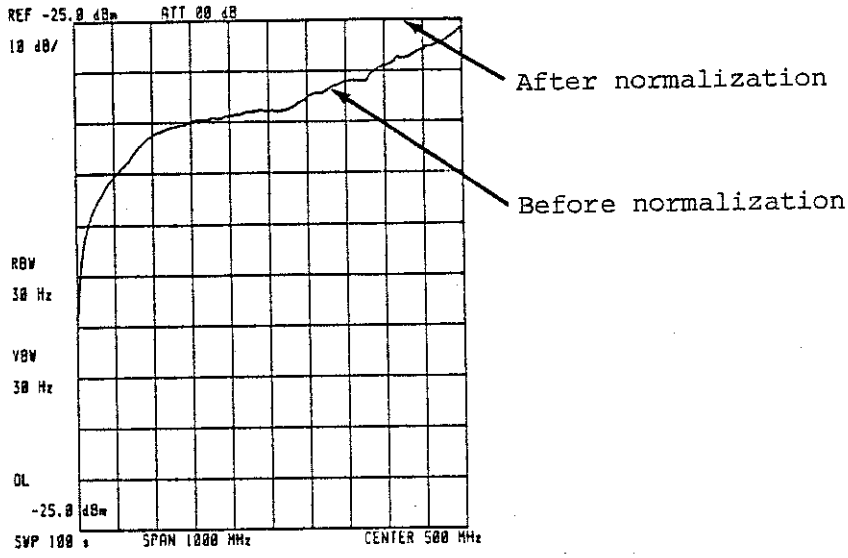


Figure 2 - 6 Normalized Basic Waveform

After the above setting, the test material is installed in accordance with Section 2-2. The difference between the reception signal level and basic signal level is the value of shield effect for the test material. (See Figure 2-7.)

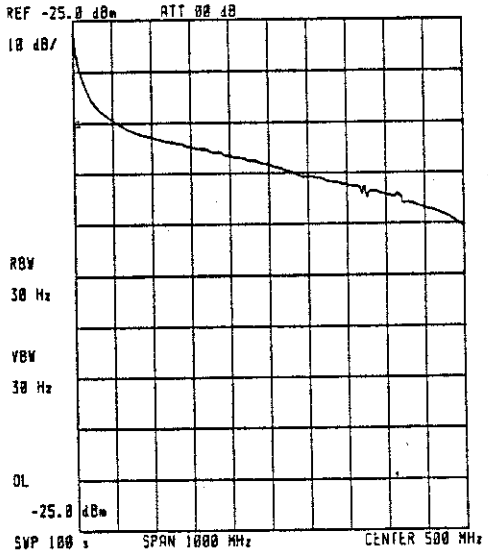
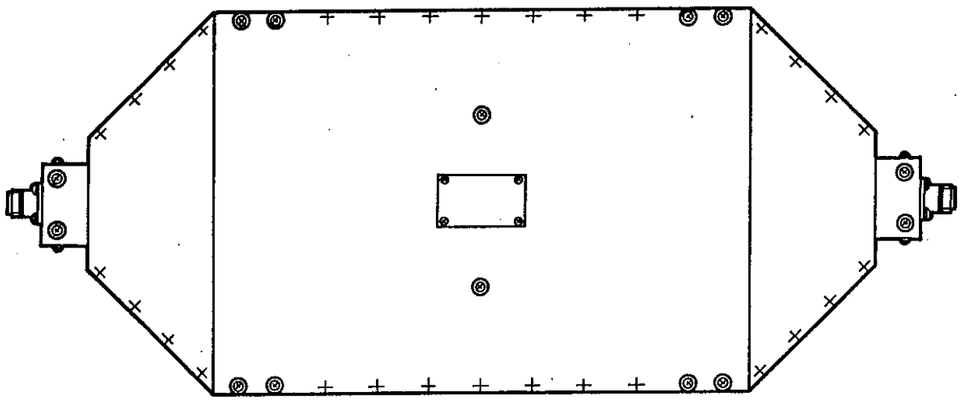


Figure 2 - 7 Example of Testing the Shield Effect (2)

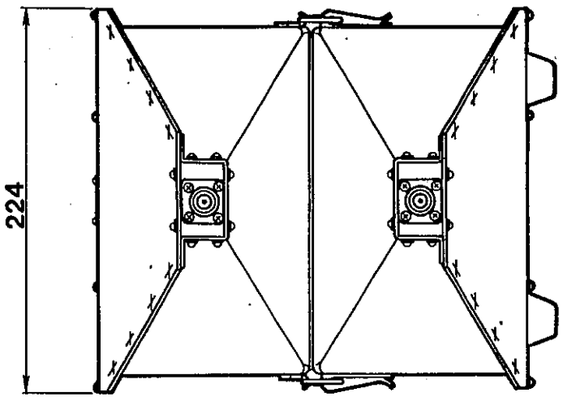
3. PERFORMANCE

3.1 Standard

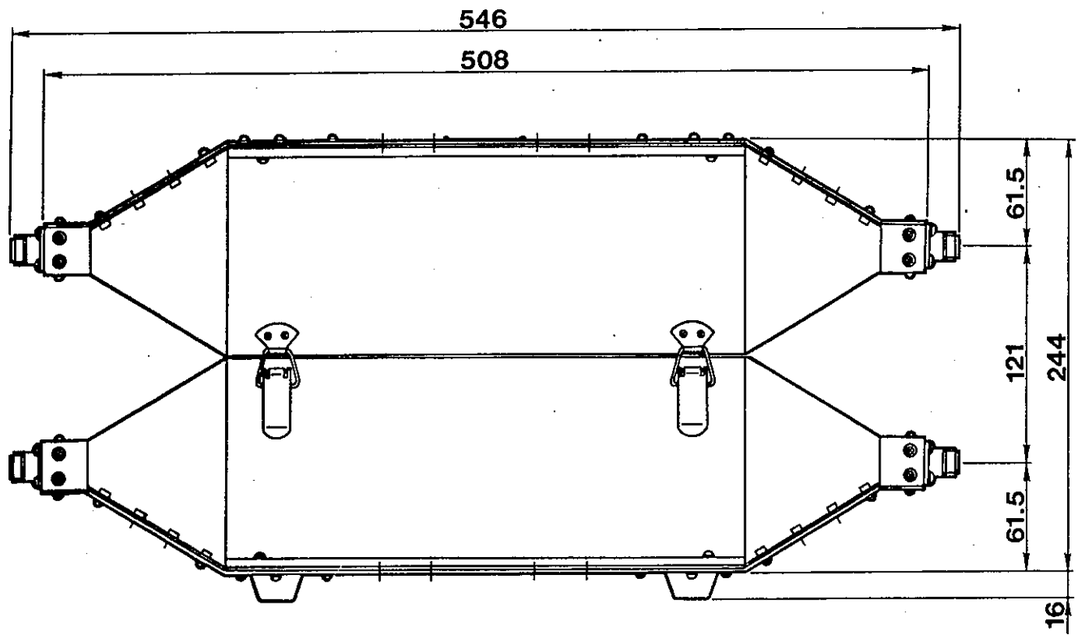
Frequency range	:	10MHz to 1,000MHz	
Testing dynamic range	:	10MHz to 100MHz	40dB or greater
		100MHz to 1,000MHz	50dB or greater (together with TR4172 for use)
Input/output pin	:	N type	
Input/output adapters	:	BNC-N converter (JUG-201A/U Hirose Electric Co., Ltd.)	
		SMA-N converter (HRM-554S Hirose Electric Co., Ltd.)	
Input/output impedance	:	About 50Ω	
Testing specimen dimensions	:	(150mm + 1mm) x (50mm + 1mm) rectangle, 5mm thickness or less	
Outside dimensions	:	About 230(W) x 250(H) x 510(D)mm	
Weight	:	About 5kg	



TOP VIEW



SIDE VIEW



FRONT VIEW

Unit : mm

TR17302
EXTERNAL VIEW

IMPORTANT INFORMATION FOR ADVANTEST SOFTWARE

PLEASE READ CAREFULLY: This is an important notice for the software defined herein. Computer programs including any additions, modifications and updates thereof, operation manuals, and related materials provided by Advantest (hereafter referred to as "SOFTWARE"), included in or used with hardware produced by Advantest (hereafter referred to as "PRODUCTS").

SOFTWARE License

All rights in and to the SOFTWARE (including, but not limited to, copyright) shall be and remain vested in Advantest. Advantest hereby grants you a license to use the SOFTWARE only on or with Advantest PRODUCTS.

Restrictions

(1) You may not use the SOFTWARE for any purpose other than for the use of the PRODUCTS.
(2) You may not copy, modify, or change, all or any part of, the SOFTWARE without permission from Advantest.
(3) You may not reverse engineer, de-compile, or disassemble, all or any part of, the SOFTWARE.

Liability

Advantest shall have no liability (1) for any PRODUCT failures, which may arise out of any misuse (misuse is deemed to be use of the SOFTWARE for purposes other than it's intended use) of the SOFTWARE. (2) For any dispute between you and any third party for any reason whatsoever including, but not limited to, infringement of intellectual property rights.

LIMITED WARRANTY

1. Unless otherwise specifically agreed by Seller and Purchaser in writing, Advantest will warrant to the Purchaser that during the Warranty Period this Product (other than consumables included in the Product) will be free from defects in material and workmanship and shall conform to the specifications set forth in this Operation Manual.

2. The warranty period for the Product (the "Warranty Period") will be a period of one year commencing on the delivery date of the Product.

3. If the Product is found to be defective during the Warranty Period, Advantest will, at its option and in its sole and absolute discretion, either (a) repair the defective Product or part or component thereof or (b) replace the defective Product or part or component thereof, in either case at Advantest's sole cost and expense.

4. This limited warranty will not apply to defects or damage to the Product or any part or component thereof resulting from any of the following:

   (a) any modifications, maintenance or repairs other than modifications, maintenance or repairs (i) performed by Advantest or (ii) specifically recommended or authorized by Advantest and performed in accordance with Advantest 's instructions;

   (b) any improper or inadequate handling, carriage or storage of the Product by the Purchaser or any third party (other than Advantest or its agents);

   (c) use of the Product under operating conditions or environments different than those specified in the Operation Manual or recommended by Advantest, including, without limitation, (i) instances where the Product has been subjected to physical stress or electrical voltage exceeding the permissible range and (ii) instances where the corrosion of electrical circuits or other deterioration was accelerated by exposure to corrosive gases or dusty environments;

   (d) use of the Product in connection with software, interfaces, products or parts other than software, interfaces, products or parts supplied or recommended by Advantest;

   (e) incorporation in the Product of any parts or components (i) provided by Purchaser or (ii) provided by a third party at the request or direction of Purchaser or due to specifications or designs supplied by Purchaser (including, without limitation, any degradation in performance of such parts or components);

   (f) Advantest's incorporation or use of any specifications or designs supplied by Purchaser;

   (g) the occurrence of an event of force majeure, including, without limitation, fire, explosion, geological change, storm, flood, earthquake, tidal wave, lightning or act of war; or

   (h) any negligent act or omission of the Purchaser or any third party other than Advantest.

5. **EXCEPT TO THE EXTENT EXPRESSLY PROVIDED HEREIN, ADVANTEST HEREBY EXPRESSLY DISCLAIMS, AND THE PURCHASER HEREBY WAIVES, ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, (A) ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND (B) ANY WARRANTY OR REPRESENTATION AS TO THE VALIDITY, SCOPE, EFFECTIVENESS OR USEFULNESS OF ANY TECHNOLOGY OR ANY INVENTION.**

6. **THE REMEDY SET FORTH HEREIN SHALL BE THE SOLE AND EXCLUSIVE REMEDY OF THE PURCHASER FOR BREACH OF WARRANTY WITH RESPECT TO THE PRODUCT.**

7. **ADVANTEST WILL NOT HAVE ANY LIABILITY TO THE PURCHASER FOR ANY INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, INCLUDING, WITHOUT LIMITATION, LOSS OF ANTICIPATED PROFITS OR REVENUES, IN ANY AND ALL CIRCUMSTANCES, EVEN IF ADVANTEST HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES AND WHETHER ARISING OUT OF BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE. TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE.**

8. **OTHER THAN THE REMEDY FOR THE BREACH OF WARRANTY SET FORTH HEREIN, ADVANTEST SHALL NOT BE LIABLE FOR, AND HEREBY DISCLAIMS TO THE FULLEST EXTENT PERMITTED BY LAW ANY LIABILITY FOR, DAMAGES FOR PRODUCT FAILURE OR DEFECT, WHETHER ARISING OUT OF BREACH OF CONTRACT, TORT (INCLUDING, WITHOUT LIMITATION, NEGLEGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE.**

CUSTOMER SERVICE DESCRIPTION

In order to maintain safe and trouble-free operation of the Product and to prevent the incurrence of unnecessary costs and expenses, Advantest recommends a regular preventive maintenance program under its maintenance agreement.

Advantest's maintenance agreement provides the Purchaser on-site and off-site maintenance, parts, maintenance machinery, regular inspections, and telephone support and will last a maximum of ten years from the date the delivery of the Product. For specific details of the services provided under the maintenance agreement, please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest 's sales representatives.

Some of the components and parts of this Product have a limited operating life (such as, electrical and mechanical parts, fan motors, unit power supply, etc.). Accordingly, these components and parts will have to be replaced on a periodic basis. If the operating life of a component or part has expired and such component or part has not been replaced, there is a possibility that the Product will not perform properly. Additionally, if the operating life of a component or part has expired and continued use of such component or part damages the Product, the Product may not be repairable. Please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest's sales representatives to determine the operating life of a specific component or part, as the operating life may vary depending on various factors such as operating condition and usage environment.

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