ADVANTEST®

ADVANTEST CORPORATION

R3962/63/64 Series

S Parameter Test Set

Operation Manual

MANUAL NUMBER FOE-8335013B02

Applicable models

-R3962A/B
-R3963A/B
-R3964A/B

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MANUAL CHANGES

ADVANTEST Corporation

Date	September 2, 1999	Manual No.	B02
Manual Name	R3962/63/64 Series Operation Manual	Manual Change No.	EMC-02

To: R3963 and R3964 users

1. The following labels on the front panel have been changed.

Before		After
ANT PORT	→	TEST PORT1
TEST PORT1	→	TEST PORT2
TEST PORT2	→	TEST PORT3

2. CAUTION

The procedure shown below for testing S parameters S11 to S33 dose not operate correctly when used for the R3963 or R3964 Test Set.

[SYSTEM] → {SERVICE MENU} → {OPTIONS} → {DUPLEXER TEST_SET ON}

If the above procedure is used when connected to the R3963 or R3964, you must restart the network analyzer.

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

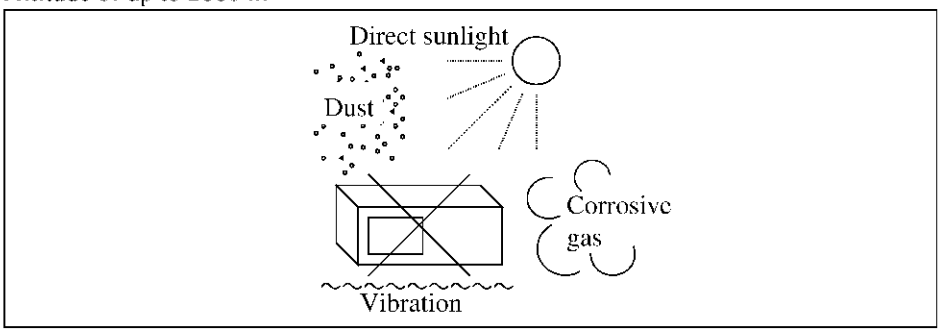


Figure-1 Environmental Conditions

- Operating position

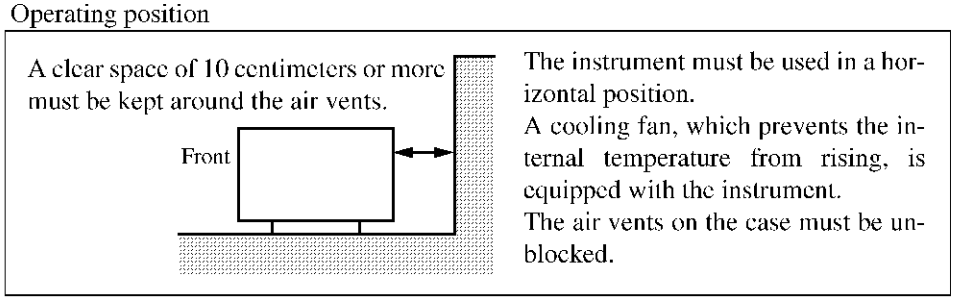


Figure-2 Operating Position

- Storage position

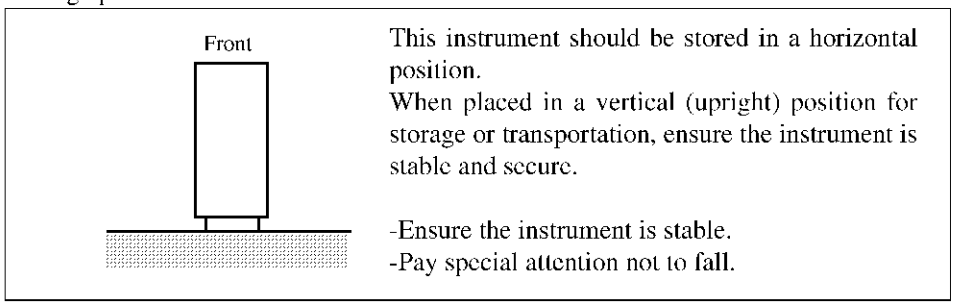


Figure-3 Storage Position

- 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.

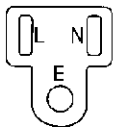
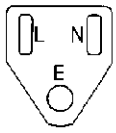
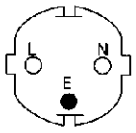
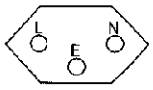
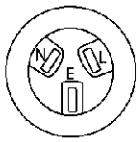
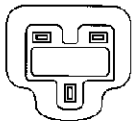
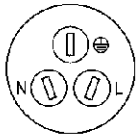
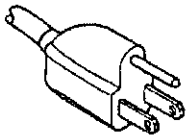
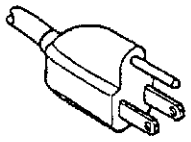
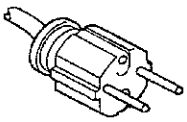
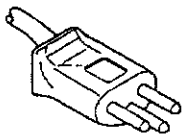
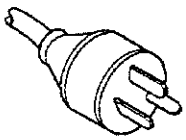
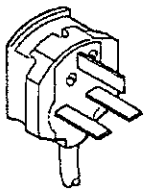
Plug configuration	Standards	Rating, color and length	Model number (Option number)
	PSE: Japan Electrical Appliance and Material Safety Law	125 V at 7 A Black 2 m (6 ft)	Straight: A01402 Angled: A01412
	UL: United States of America CSA: Canada	125 V at 7 A Black 2 m (6 ft)	Straight: A01403 (Option 95) 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 Power Cable Options

There are six power cable options (refer to following table).

Order power cable options by Model number.

	Plug configuration	Standards	Rating, color and length	Model number (Option number)
1		JIS: Japan Law on Electrical Appliances	125 V at 7 A Black 2 m (6 ft)	Straight: A01402 Angled: A01412
2		UL: United States of America CSA: Canada	125 V at 7 A Black 2 m (6 ft)	Straight: A01403 (Option 95) Angled: A01413
3		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
4		SEV: Switzerland	250 V at 6 A Gray 2 m (6 ft)	Straight: A01405 (Option 97) Angled: A01415
5		SAA: Australia, New Zealand	250 V at 6 A Gray 2 m (6 ft)	Straight: A01406 (Option 98) Angled: ---------
6		BS: United Kingdom	250 V at 6 A Black 2 m (6 ft)	Straight: A01407 (Option 99) Angled: A01417

PREFACE

- The manual describes about products outline, detailed procedure of the operation and specifications for the following test set and test adapter.
  S parameter test set : R3962A/B.
  Duplexer test set : R3963A/B.
  Duplexer test adapter : R3964A/B.

- R3962A/B and R3963A/B are available following R3765A and R3767A Network Analyzer.

- R3964A/B is available following R3765C and R3767C Network Analyzer.

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1 OUTLINE

1.1 Products Outline

R3962A/B are S parameter test set which can be connected with R3765A/R3767A Network Analyzer and available to measure the transmission and reflection characteristics for the two ports device.

The transmission and reflection characteristics of foreword direction and reverse direction can be measured simultaneously without disconnecting DUT (device under test) from the test port.
R3963A/B are duplexer test set which can be connected with R3765A/R3767A Network Analyzer and available to measure the transmission and reflection characteristic of the two ports device.

The transmission and reflection characteristic of foreword direction and reverse direction can be measured simultaneously without disconnecting DUT (device under test) from the test port.
R3964A/B are duplexer test set which can be connected with R3765C/R3767C Network Analyzer and available to measure the transmission and reflection characteristic of the two ports device.
The transmission and reflection characteristic of foreword direction and reverse direction can be measured simultaneously without disconnecting DUT (device under test) from the test port.

<NOTE. For proper use of R3963A/B and R3964A/B, following procedure is required>

① Set up COUPLED CH OFF before use.
Set up DUAL CH ON for the display of CH1 and CH2 simultaneously.

② The characteristic between ANT PORT and TEST PORT 1 can be measured by CH1.
The characteristic between ANT PORT and TEST PORT 2 can be measured by CH2.

③ Carry out the calibration between ANT PORT and TEST PORT 1 for CH1.
Carry out the calibration between ANT PORT and TEST PORT 2 for CH2.
The calibration data of the channels is switched in the switching of CH1 and CH2.

1.2 Accessories

Table 1-1 and table 1-2 list the standard accessories shipped with the S parameter test set, Duplexer test set and Duplexer test adapter. If any of the accessories are damaged or missing, contact Advantest Customer Engineering Office, nearest Sales branch or representative. Address and telephone number are mentioned at the end of the manual.

Order accessories by stock number.

Table 1-1 Standard accessories list (R3962A/B and R3963A/B)

Name of accessory	Stock number	Quantity
N-N cable	A01247	3
Control cable (for A type)	A01241	1
Control cable (for B type)	A01281	1

Table 1-2 Standard accessories list (R3964A/B)

Name of accessory	Stock number	Quantity
N-N cable	A01247	2
Control cable (for A type)	A01241	1
Control cable (for B type)	A01281	1

1.3 Option Accessories

Table 1-3 Option accessories

Name of accessory	Type name	Remarks
N type 50 ohms Calibration Kit	Model 9617A3	DC to 18GHz female & male
3.5 mm Calibration kit	Model 9617F3	DC to 18GHz female & male
Conversion adapter 50 ohms	HRM-555S	N (male) to SMA (male)
Conversion adapter 50 ohms	HRM-554S	N (male) to SMA (female)

2 DESCRIPTION OF THE FRONT AND REAR PANEL

2.1 Description of the Front Panel

(1) R3962A/B

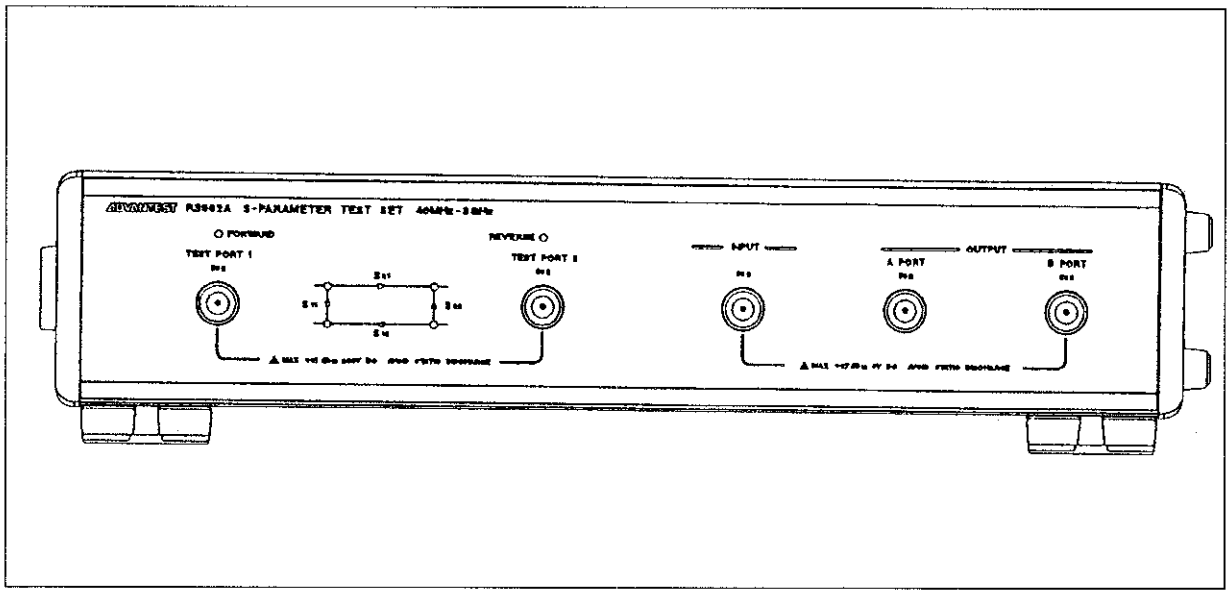


Figure 2-1 Front panel of R3962A

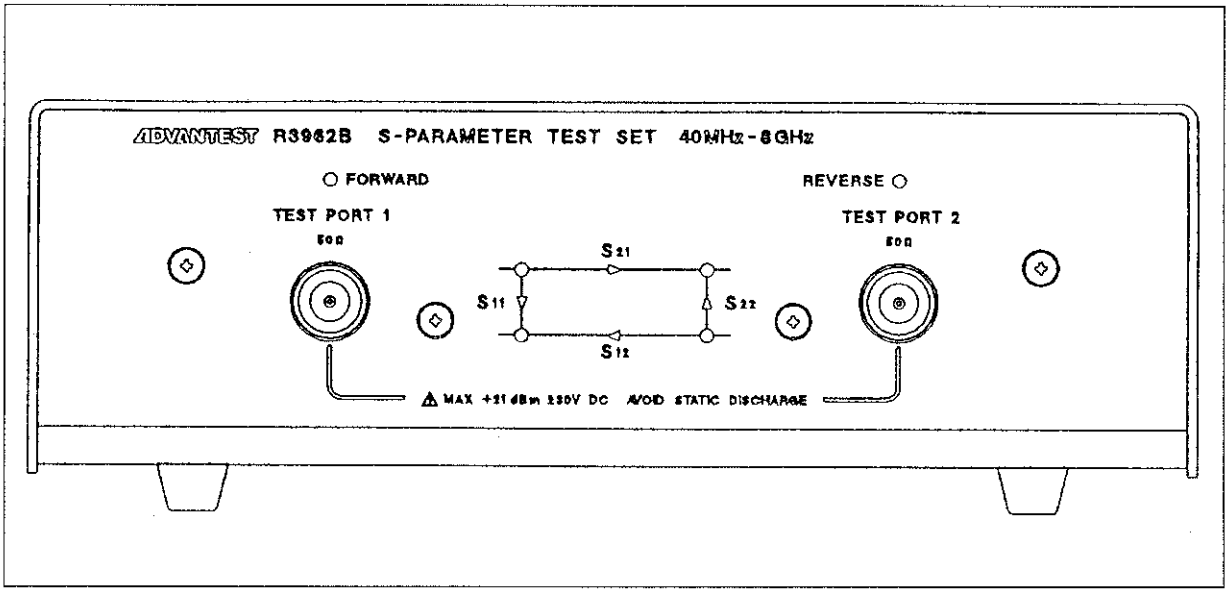


Figure 2-2 Front panel of R3962B

(2) R3963A/B

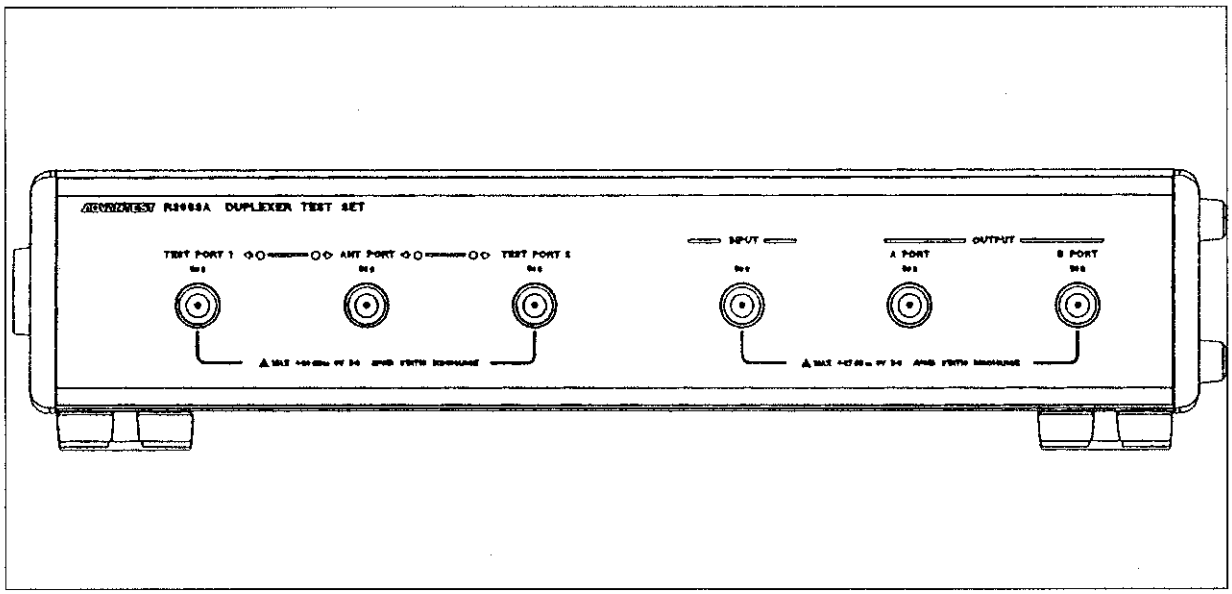


Figure 2-3 Front panel of R3963A

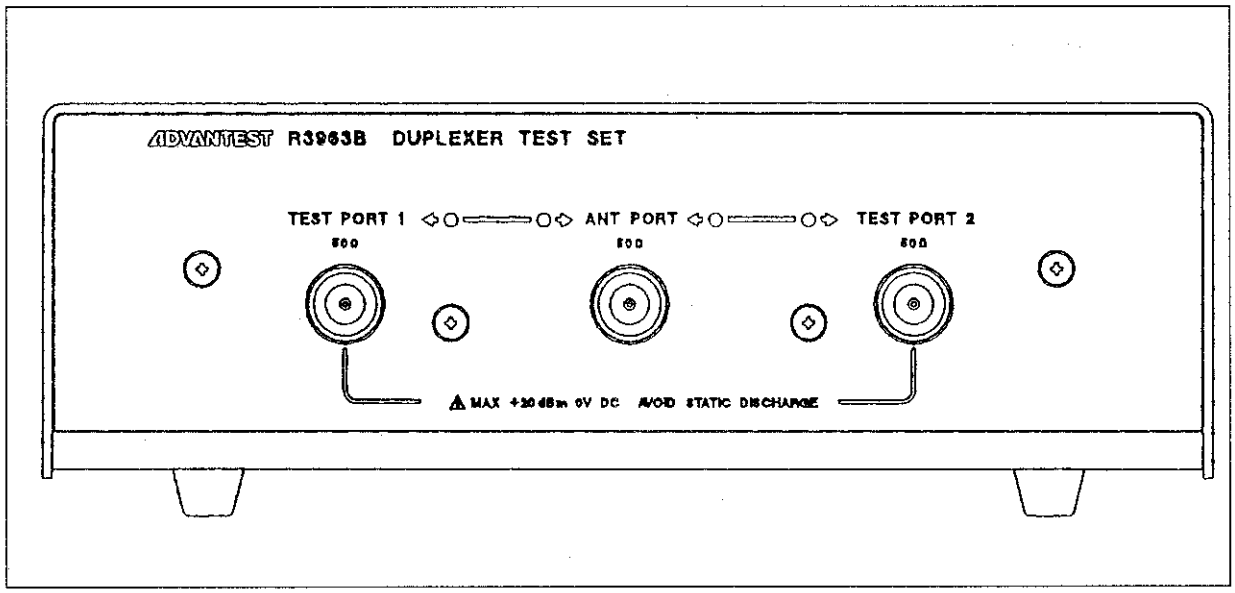


Figure 2-4 Front panel of R3963B

(3) R3964A/B

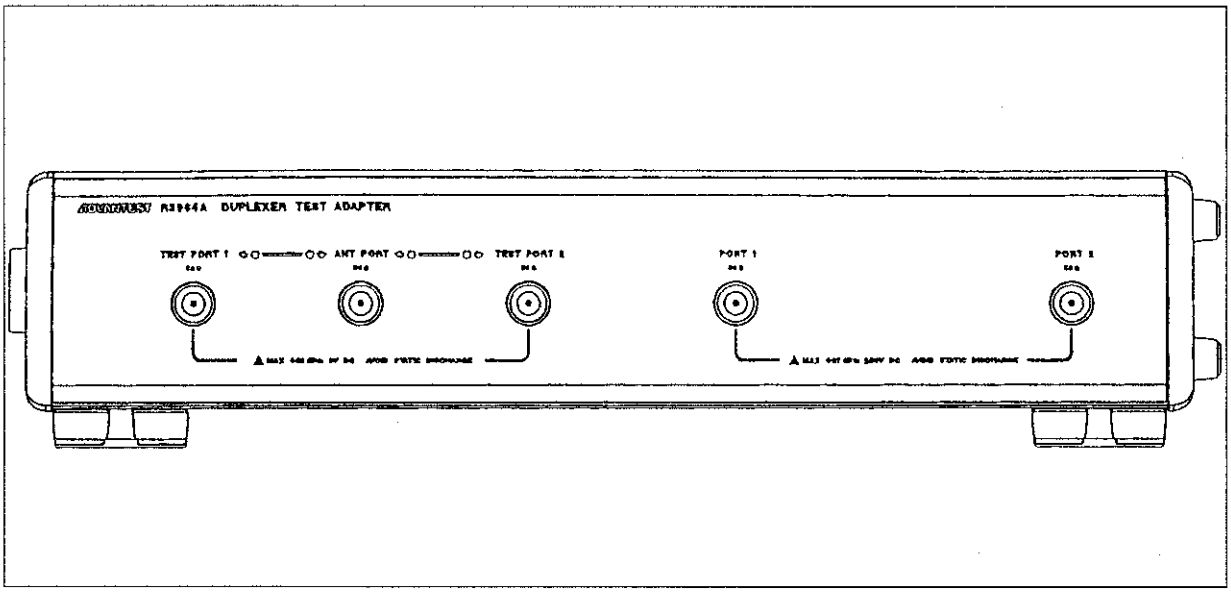


Figure 2-5 Front panel of R3964A

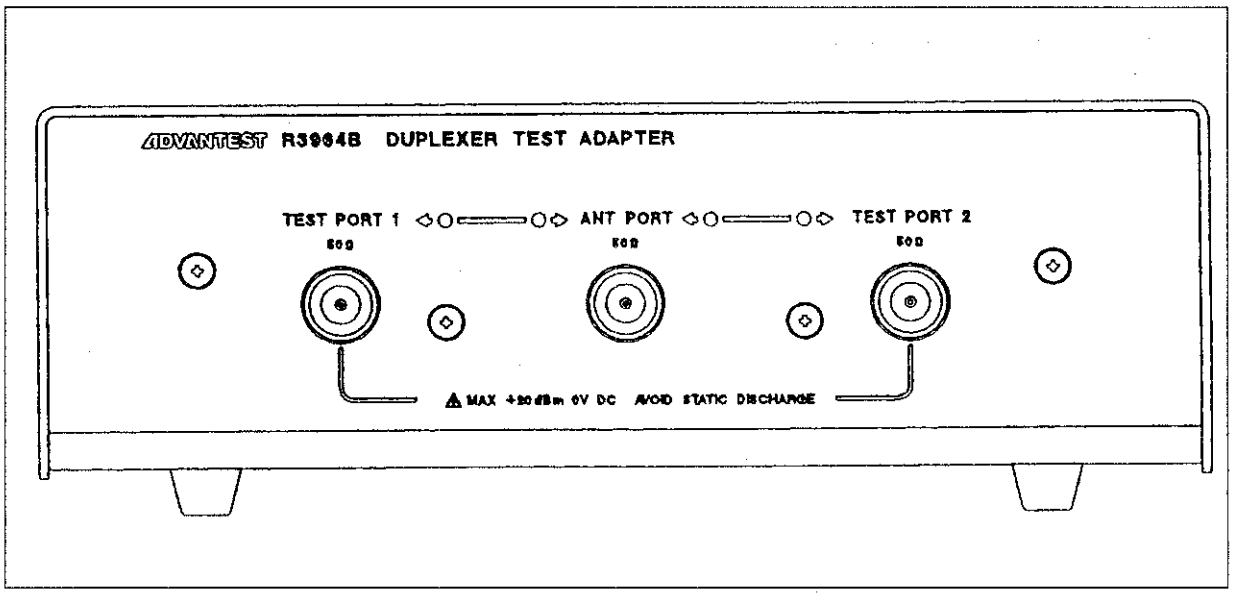


Figure 2-6 Front panel of R3964B

2.2 Description of the Rear Panel

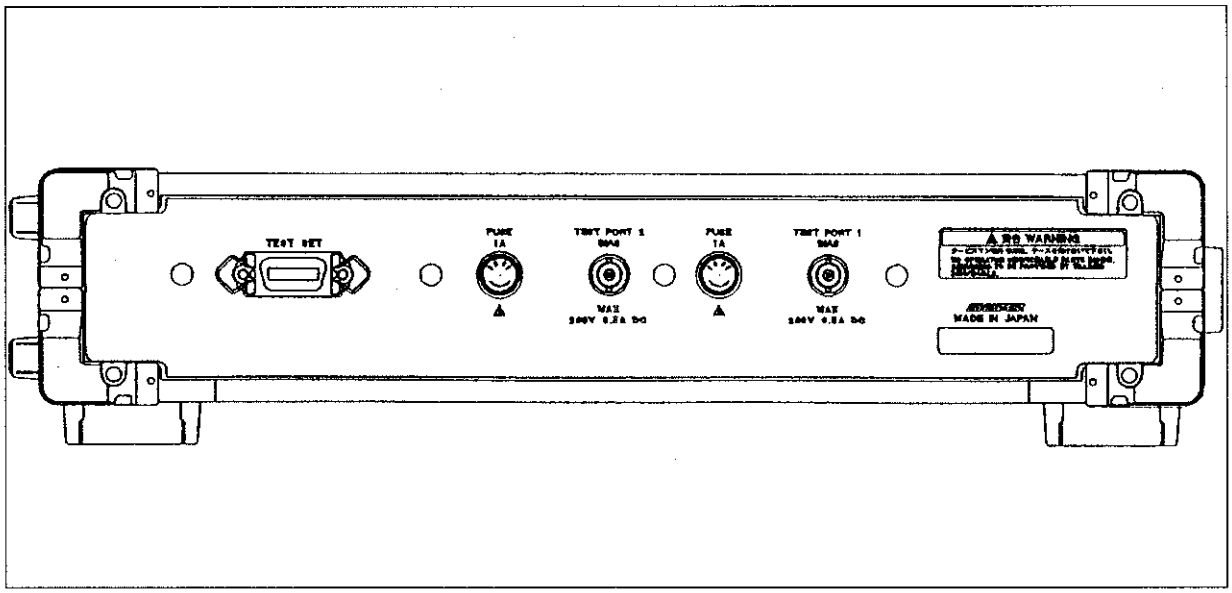


Figure 2-7 Rear panel of R3962A, R3963A and R3964A

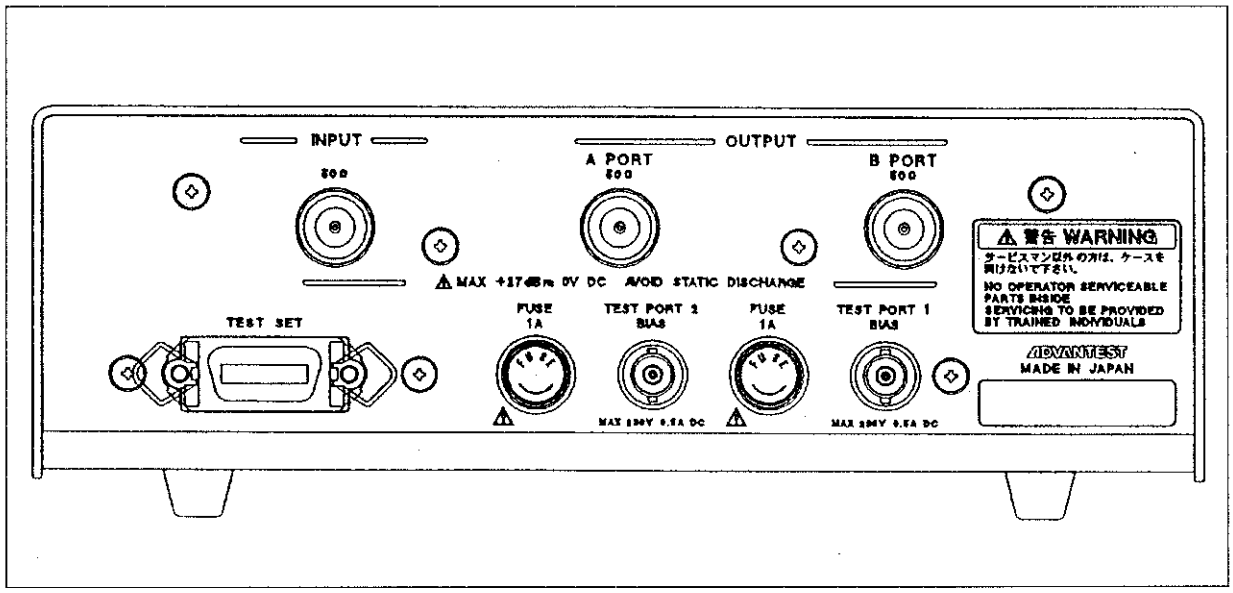


Figure 2-8 Rear panel of R3962B

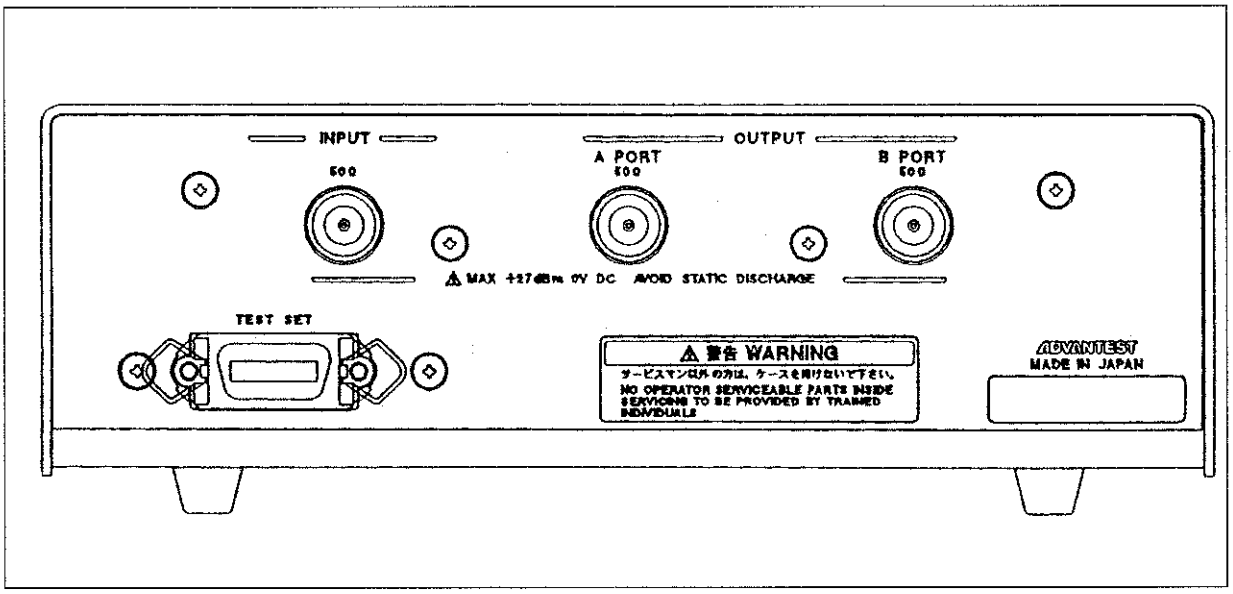


Figure 2-9 Rear panel of R3963B

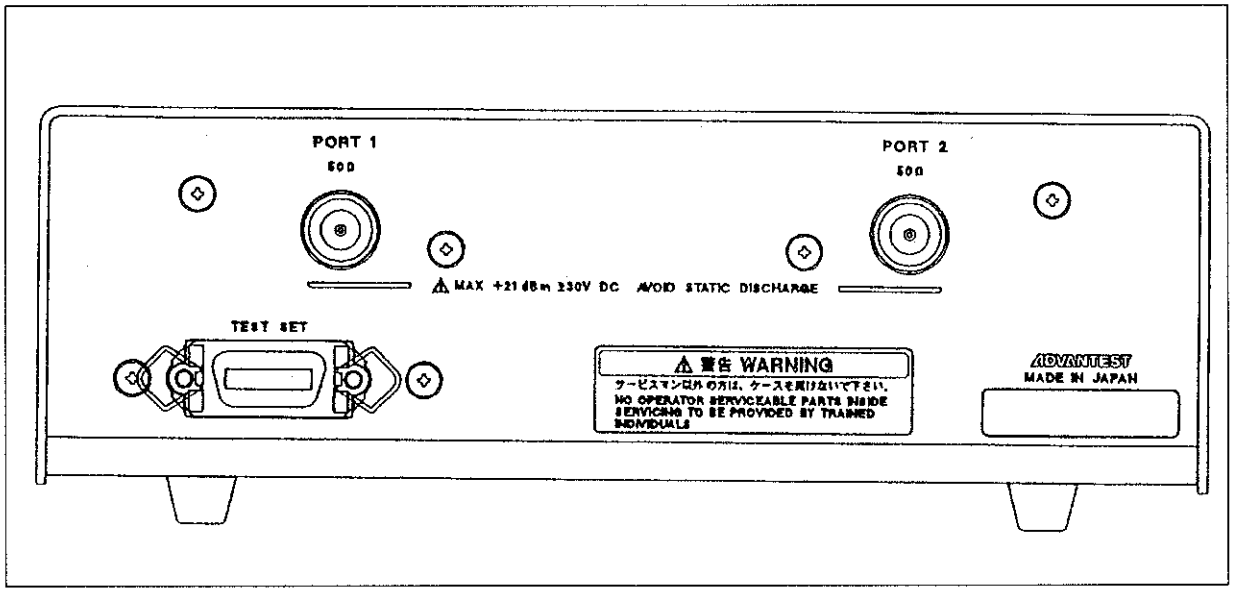


Figure 2-10 Rear panel of R3964B

3 CONNECTION WITH THE NETWORK ANALYZER

R3962A/B and R3963A/B can be connected with R3765A/R3767A.
R3964A/B can be connected with R3765C/R3767C.

3.1 Connection on the Front Panel Side

(1) R3962A/B, R3963A/B

N-N cables of accessories are connected as follows.

R3962A/B, R3963A/B		R3765A/R3767A	Cable for use
INPUT	———	SOURCE	A01247
A PORT	———	A PORT	A01247
B PORT	———	B PORT	A01247

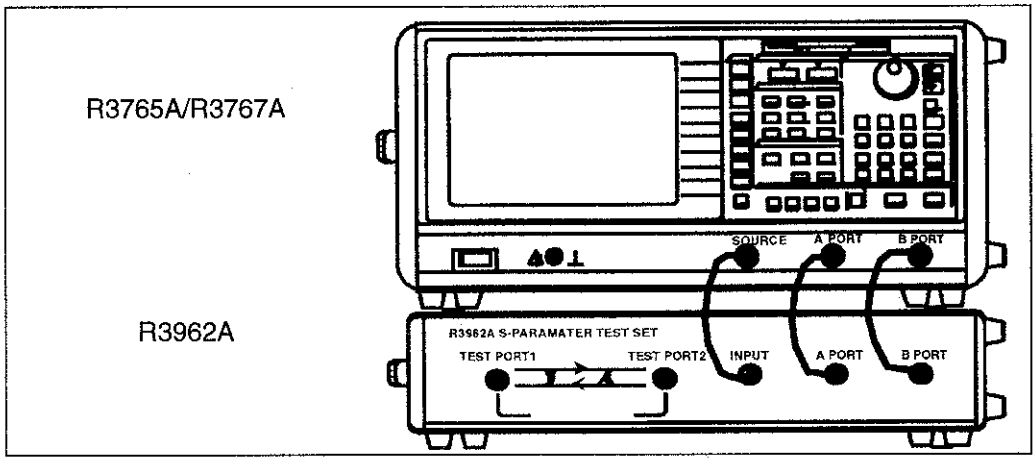


Figure 3-1 Connection for the front panel of R3962A

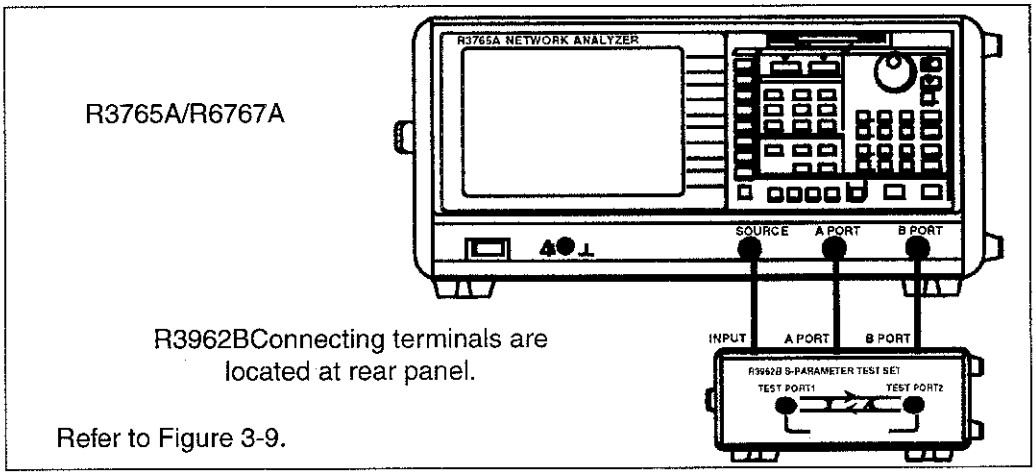


Figure 3-2 Connection for the front panel of R3962B

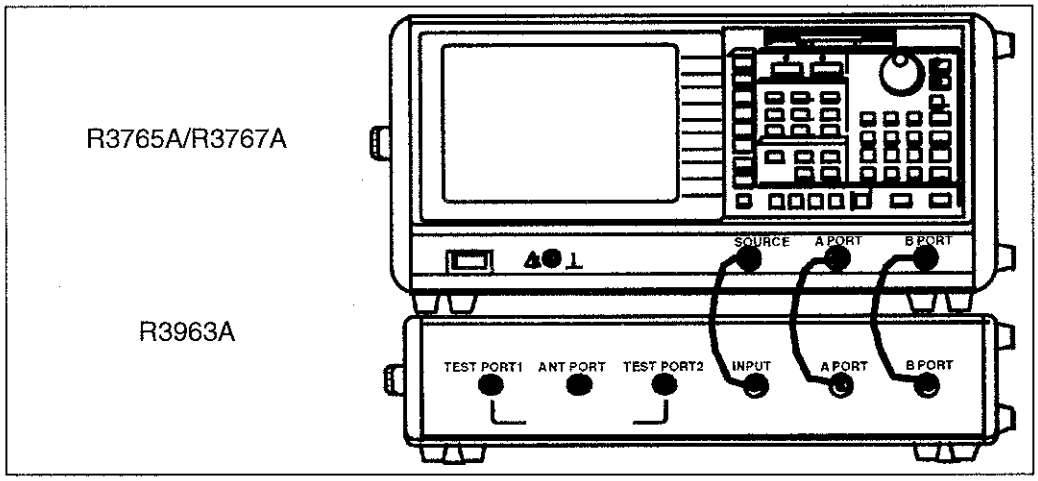


Figure 3-3 Connection for the front panel of R3963A

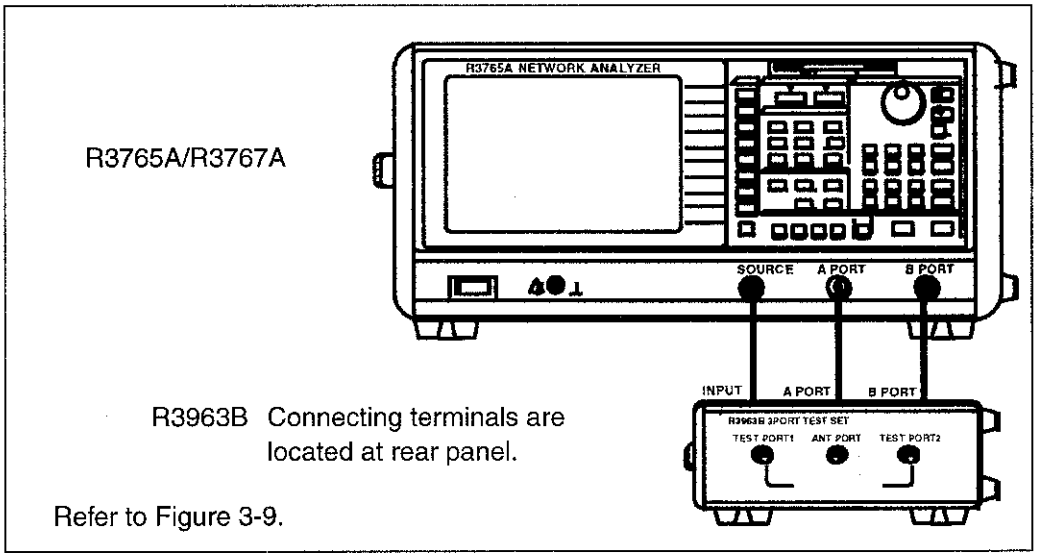


Figure 3-4 Connection for the front panel of R3963B

(2) R3964A/B

R3964A/B		R3765C/R3767C	Cable for use
PORT1	●——●	TEST PORT1	A01247
PORT2	●——●	TEST PORT2	A01247

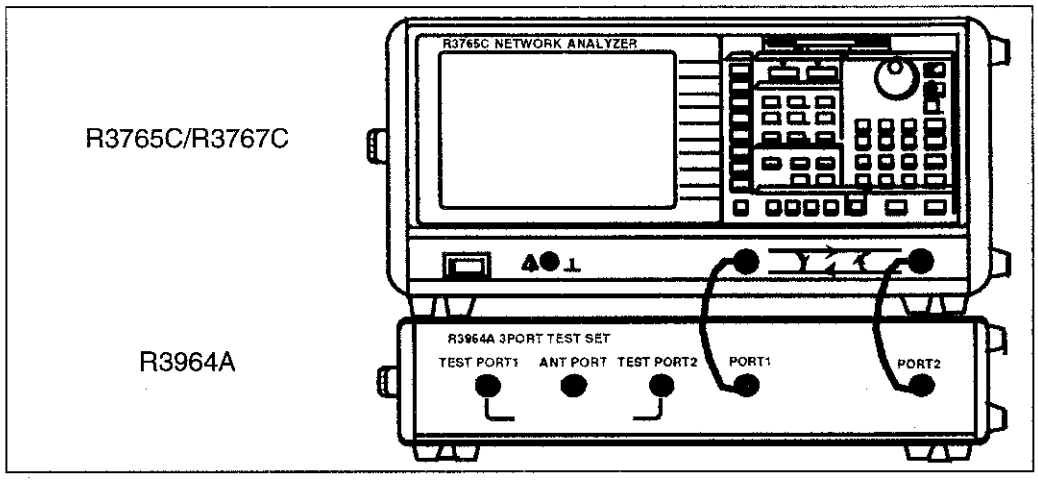
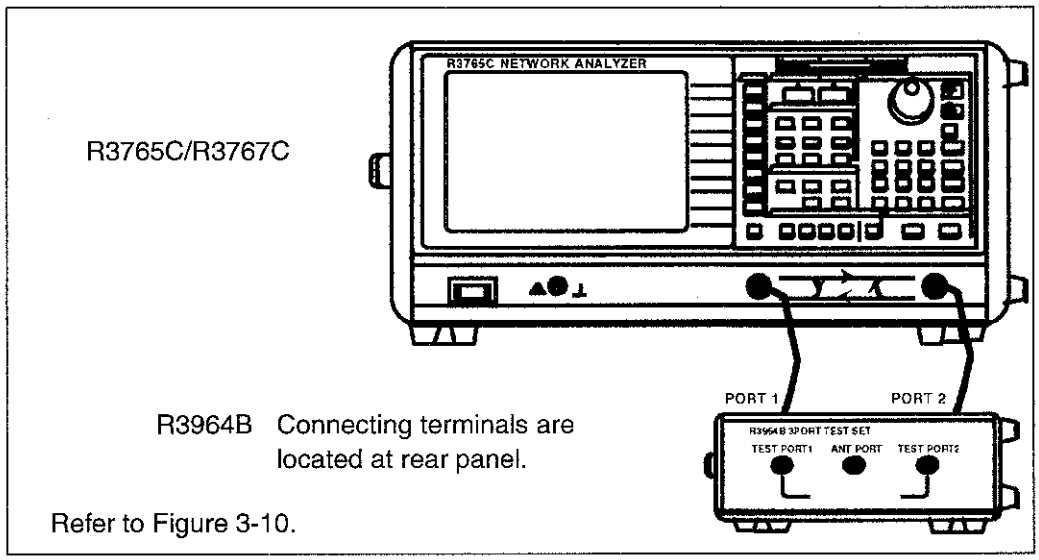


Figure 3-5 Connection for the front panel of R3964A



R3964B Connecting terminals are located at rear panel.

Refer to Figure 3-10.

Figure 3-6 Connection for the front panel of R3964B

3.2 Connection on the Rear Panel Side

(1) R3962A/63A/64A

A control cable (A01241) of accessories are connected as follows.

This instrument (A type)	R3765A/C,/R3767A/C
TO NETWORK ANALYZER	TEST SET

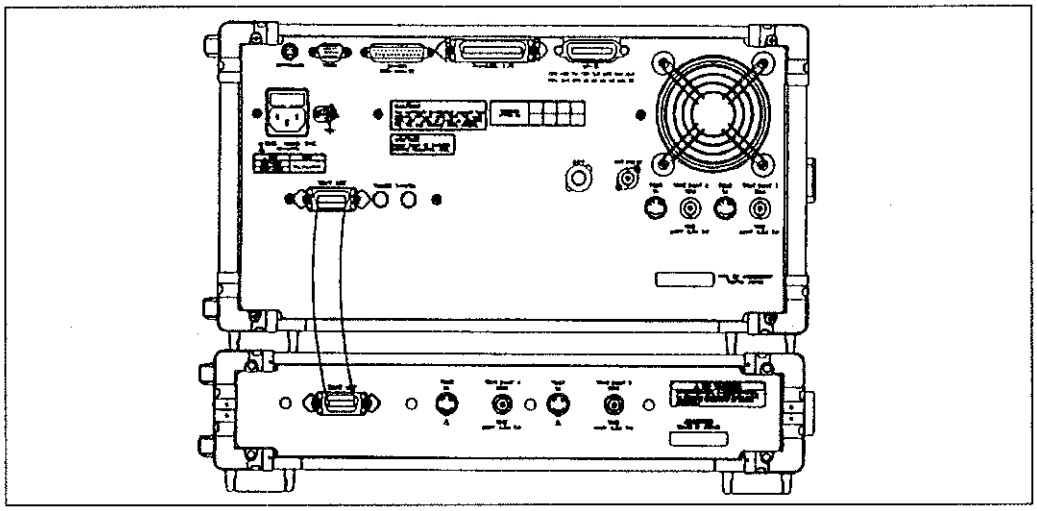


Figure 3-7 Connection for the rear panel side of A type

(2) R3962B/63B/64B

① Control cable (A01281) of accessories are connected as follows.

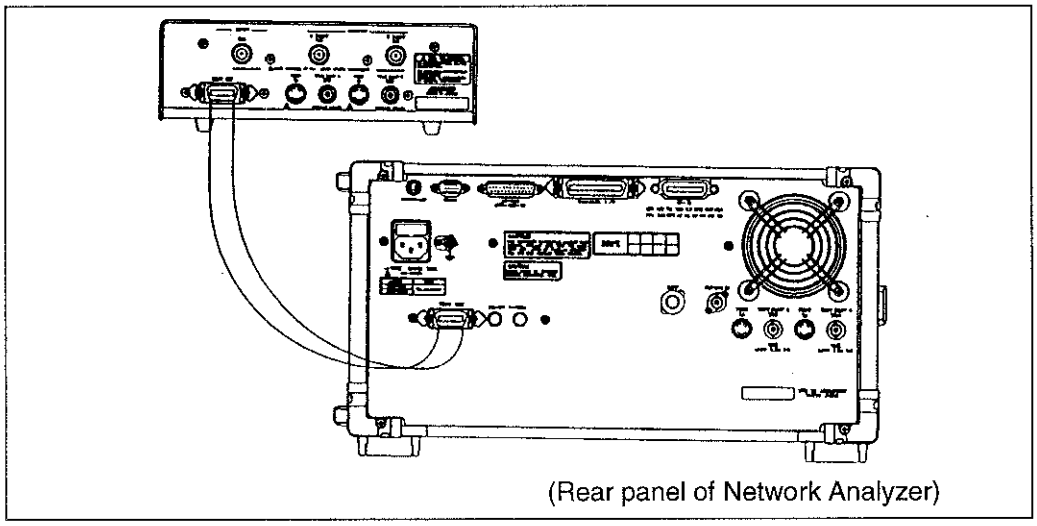


Figure 3-8 Connection 1 for the rear panel side of B type

② N-N cables (A01247) of accessories are connected as follows.

②-1 For R3962B/63B

R3962B/R3963B	R3965A/R3767A
TO NETWORK ANALYZER ●——●	TEST SET

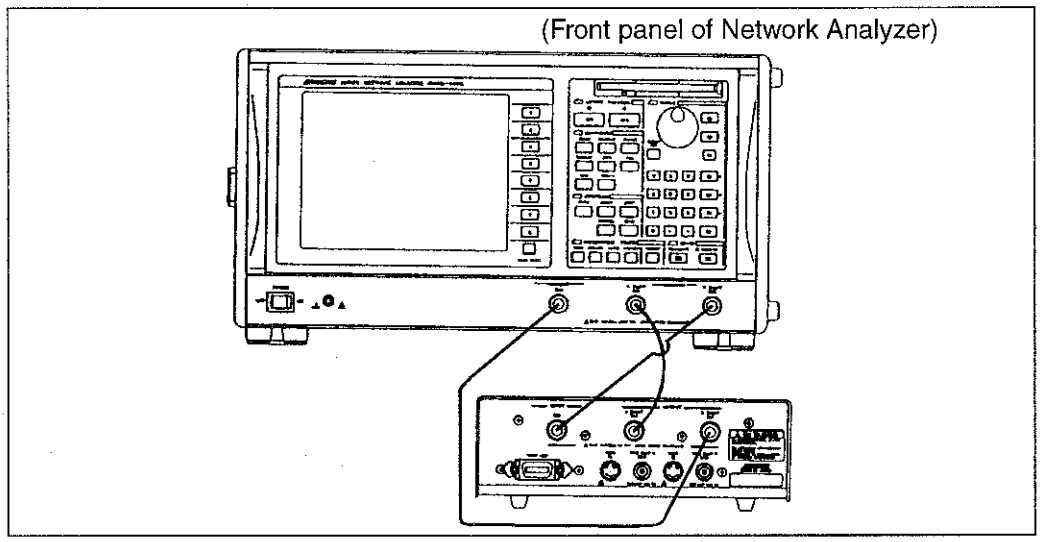


Figure 3-9 Connection 2 for the rear panel side of R3962B/R3963B

②-2 For R3964B

R3964B	R3765C/R3767C
TO NETWORK ANALYZER ●——●	TEST SET

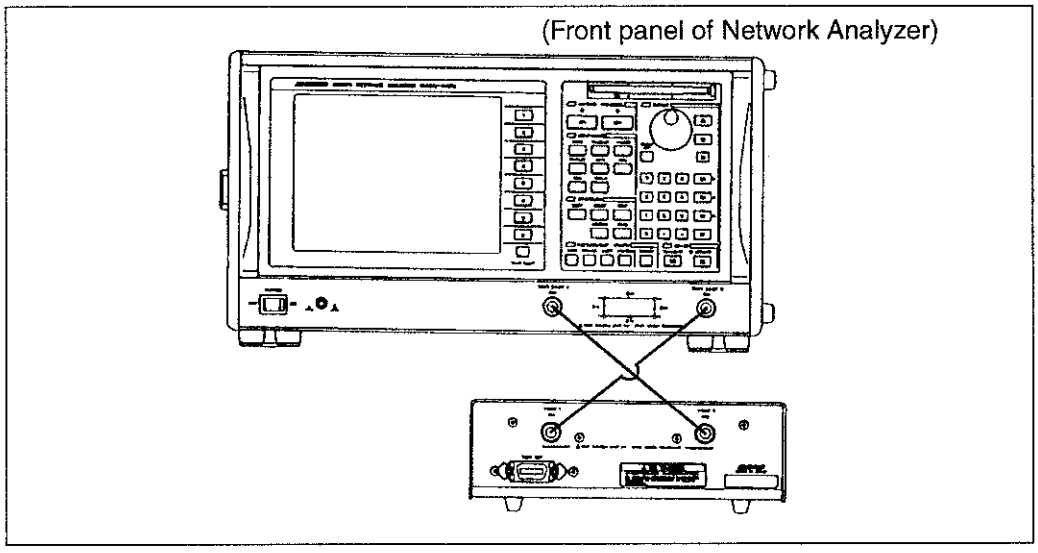


Figure 3-10 Connection 2 for the rear panel side of R3964B

4 MEASUREMENT

4.1 Outline of the Measurement

Note. ***Use 50 ohms calibration kit and the cables for the measurement. When the calibration is executed, set up the type of the calibration kit and FEMAL/MAL (polarity) before measurement.***

(1) R3962A/B

Select S parameter for the measurement by MEAS key.

MEAS	Measurement
S11	Reflection characteristic of TEST PORT 1
S21	Transmission characteristic from TEST PORT 1 to TEST PORT 2
S12	Transmission characteristic from TEST PORT 2 to TEST PORT 1
S22	Reflection characteristic of TEST PORT 2

(2) R3963A/B, R3964A/B

Select S parameter for the measurement by CH1, CH2 key and MEAS key.

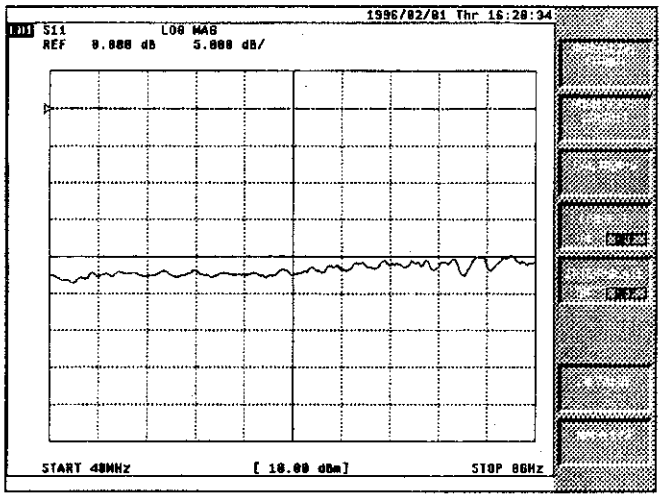
	MEAS	Measurement
CH1	S11	Reflection characteristic of ANT PORT
	S21	Transmission characteristic from ANT PORT to TEST PORT 1
	S12	Transmission characteristic from TEST PORT 1 to ANT PORT
	S22	Reflection characteristic of TEST PORT 1
CH2	S11	Reflection characteristic of ANT PORT
	S21	Transmission characteristic from ANT PORT to TEST PORT 2
	S12	Transmission characteristic from TEST PORT 2 to ANT PORT
	S22	Reflection characteristic of TEST PORT 2

The calibration of each between ANT PORT and TEST PORT 1 by CH1 and between ANT PORT and TEST PORT 2 by CH2 is available.
First, set up COUPLED CH OFF then perform the calibration between ANT PORT and TEST PORT by CH1.
Next, perform the calibration between ANT PORT and TEST PORT 2 by CH2.

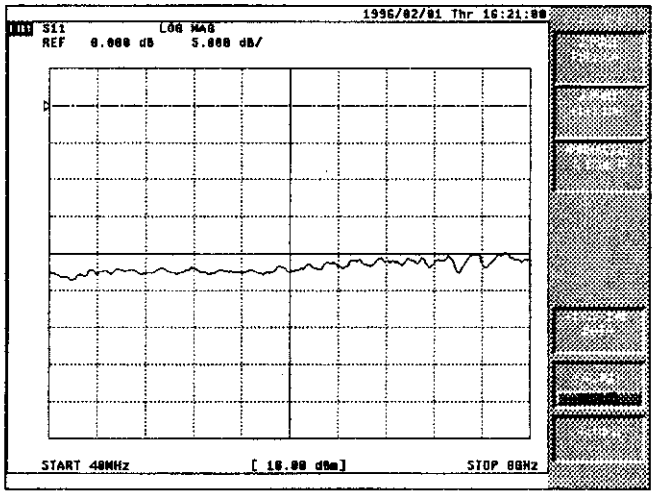
4.2 Sample Measurement

Using by dupelexer test set R3963A/B, procedure performing two port full calibration between ANT PORT and TEST PORT 1 and measurement for the DUT is explained.

Measurement

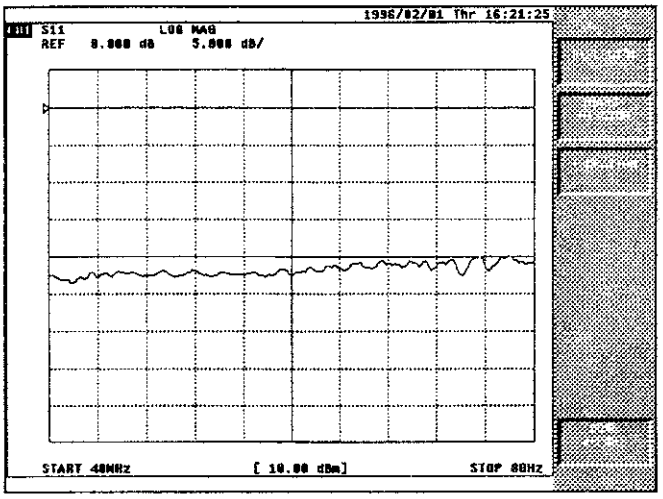


① Press CAL .

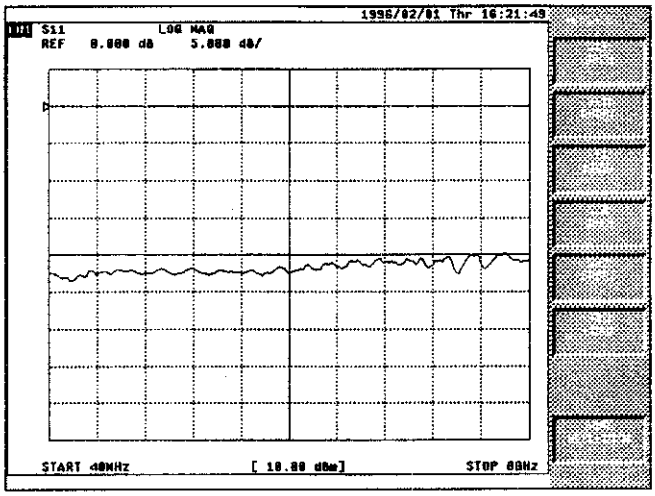


② Press CAL MENUS .

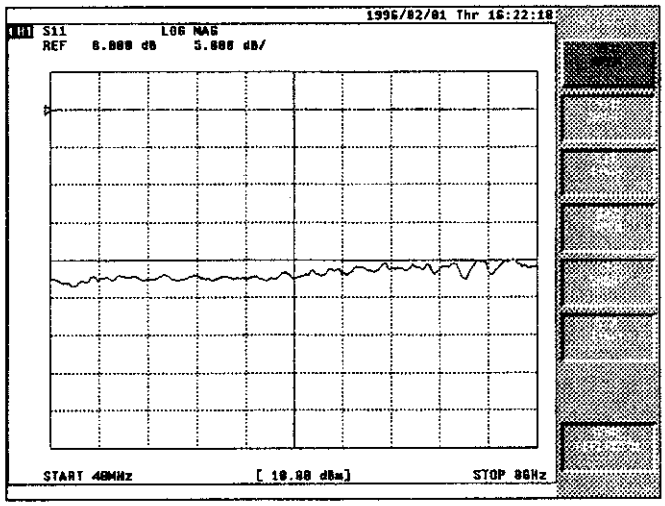
Continue



③ Press 2PORT FULLCAL .



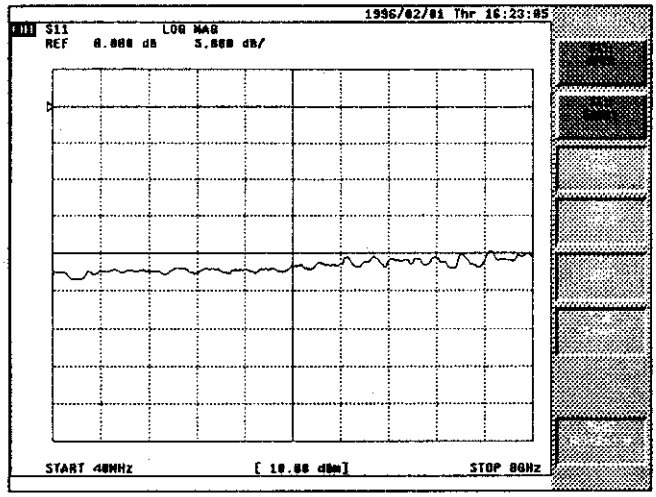
④ Press REFLECT'N .



⑤ Connect the open standard to the ANT PORT and press S11: OPEN .

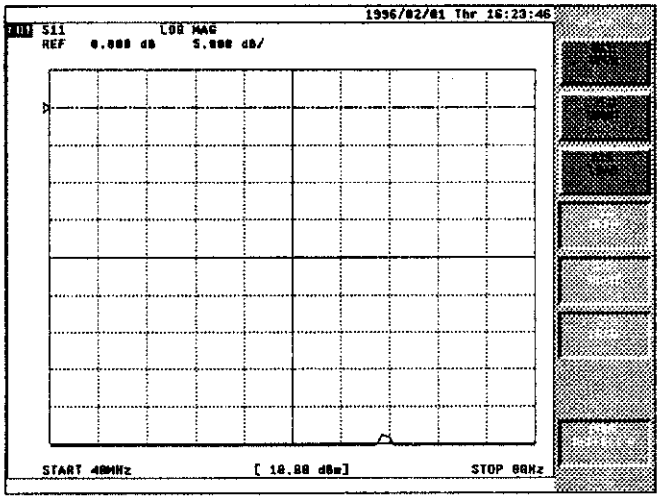
Message of "wait for sweep" is displayed and data is gathered.
This message is disappeared then the data gathering is completed.

Continue



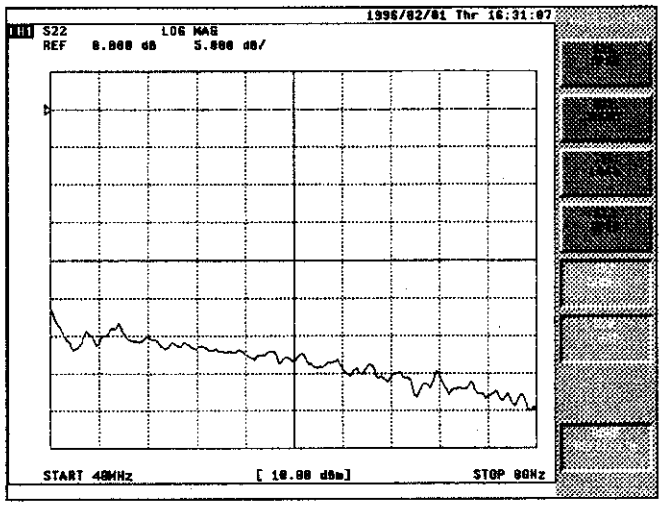
⑥ Connect the short standard to the ANT PORT and press [S11: SHORT].

Message of "wait for sweep" is displayed and data is gathered.
This message is disappeared then the data gathering is completed.



⑦ Connect the load standard to the ANT PORT and press [S11: LOAD].

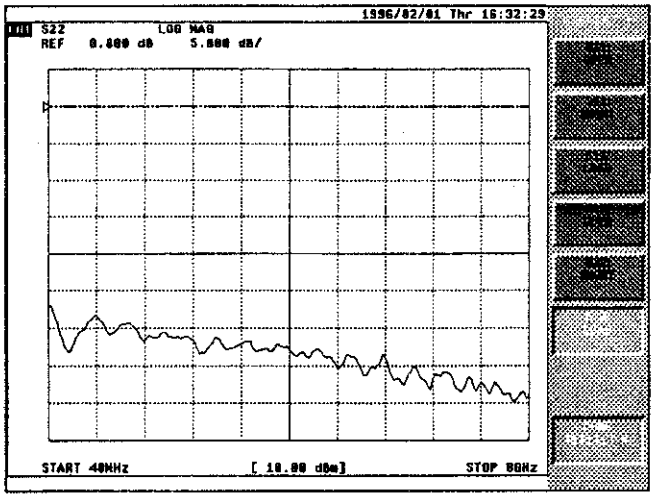
Message of "wait for sweep" is displayed and data is gathered.
This message is disappeared then the data gathering is completed.



⑧ Connect the open standard to the TEST PORT 1 and press [S22: OPEN].

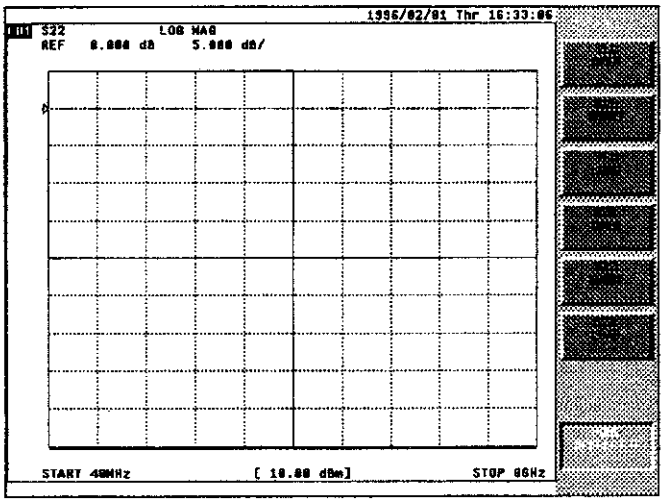
Message of "wait for sweep" is displayed and data is gathered.
This message is disappeared then the data gathering is completed.

Continue



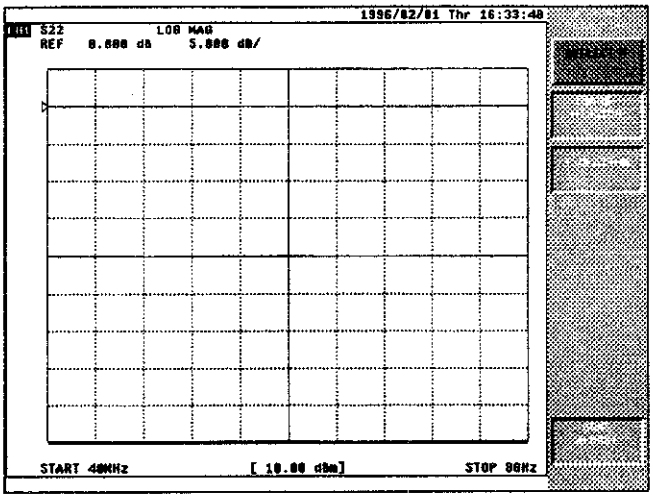
⑨ Connect the short standard to the TEST PORT 1 and press [S22: SHORT].

Message of "wait for sweep" is displayed and data is gathered.
This message is disappeared then the data gathering is completed.



⑩ Connect the load standard to the TEST PORT 1 and press [S22: LOAD].

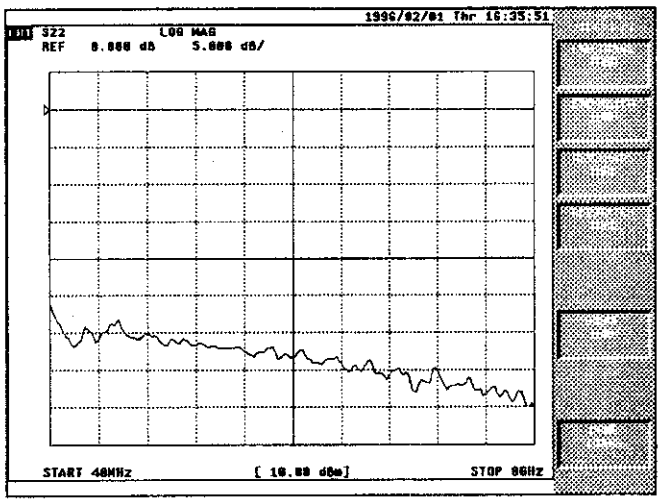
Message of "wait for sweep" is displayed and data is gathered.
This message is disappeared then the data gathering is completed.



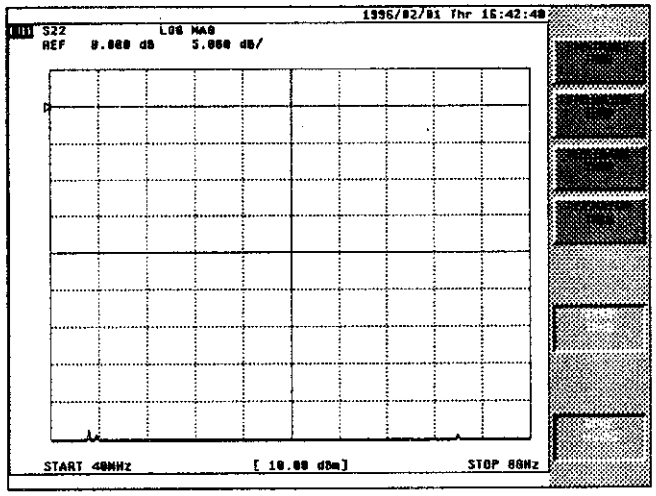
⑪ Press [DONE REFLECTION].

Gathering the reflection data is completed.

Continue

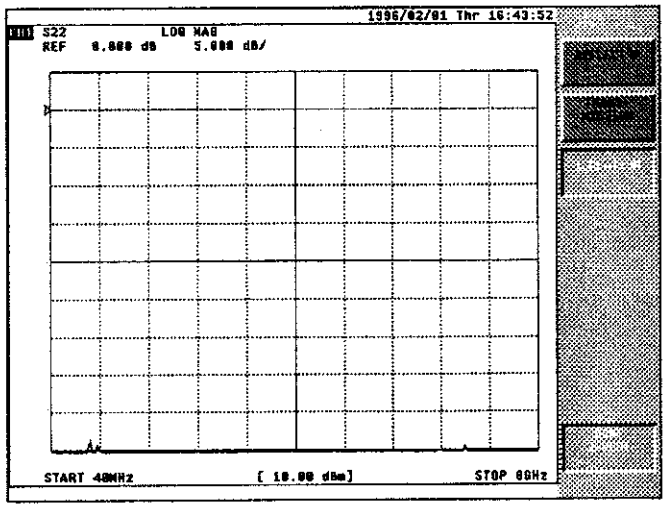


⑫ Press TRNS-MISSION.



⑬ Set through condition between ANT PORT and TEST PORT 1 and press GROUP THRU.

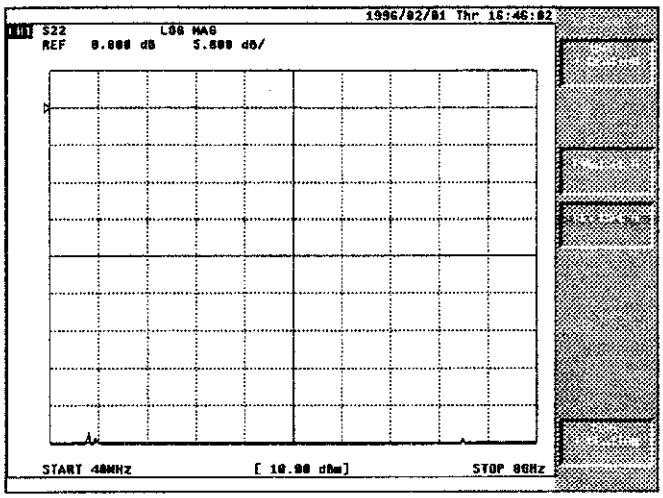
Message of "wait for sweep" is displayed and data is gathered.
This message is disappeared then the data gathering is completed.



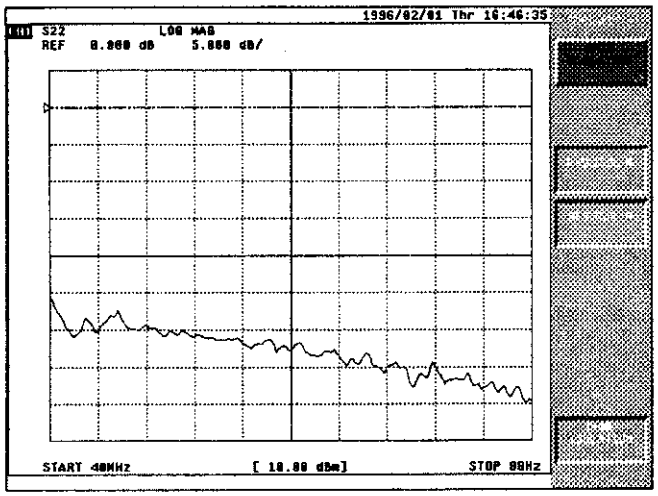
⑭ Press DONE TRNS.

Gathering the transmission data is completed.

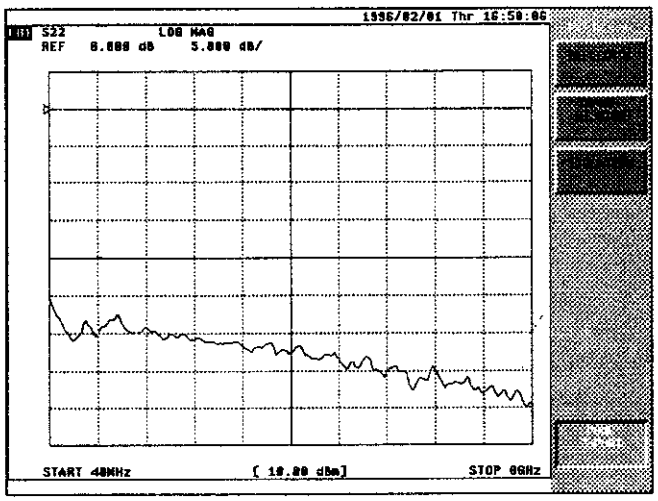
Continue



⑮ Press ISOLATION .



⑯ Isolation menu has two functions which are non gathering and gathering the isolation data.



⑰-1When the isolation data is not gathered,

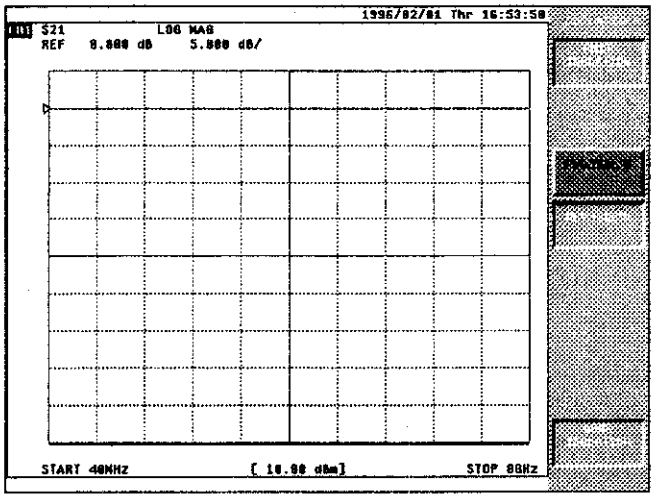
a) Press OMIT ISOLATION .

(Set up infinity for the isolation data.)

b) Press DONE ISOLATION .

(Gathering the isolation data is completed.)

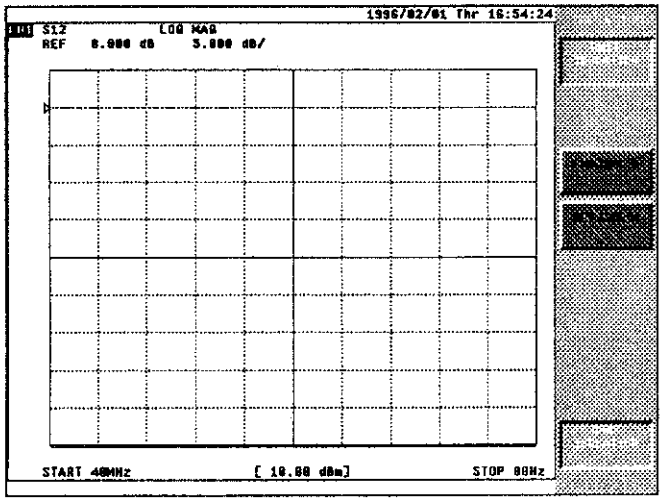
Continue



⑰-2 In case the isolation data is gathered.

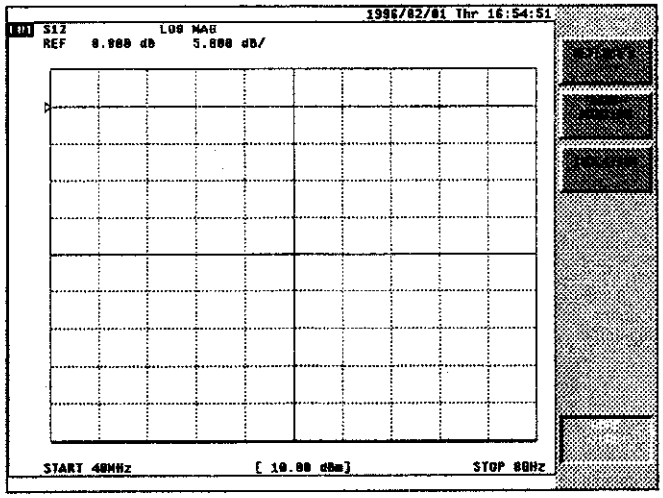
a) Connect load standard to the ANT PORT and TEST PORT 1 and press FWD.ISON .

Message of "wait for sweep" is displayed and data is gathered.
This message is disappeared then the data gathering is completed.



b) Press REV.ISON .

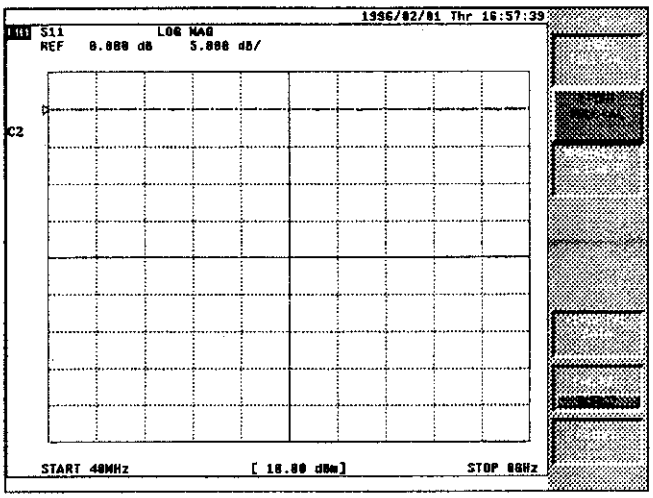
Message of "wait for sweep" is displayed and data is gathered.
This message is disappeared then the data gathering is completed.



⑱ Press DONE ISOLATION .

(Gathering the isolation data is completed.)

Continue



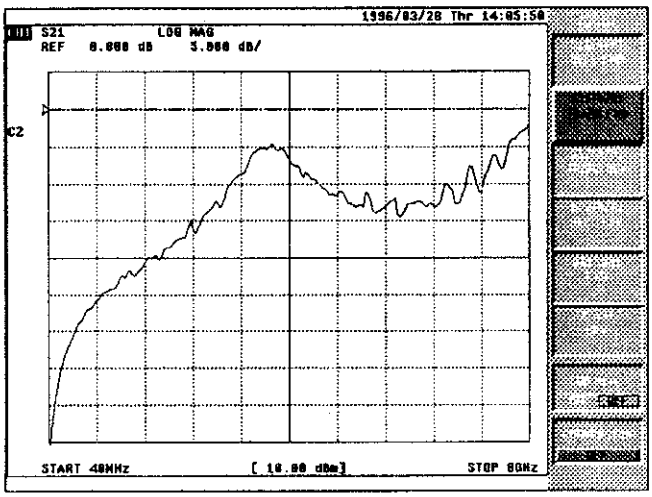
⑲ Press DONE / 2-PORT .

(Two port full calibration is completed.)

When set up data is stored,

Press SAVE .

Refer to the explanation of (SAVE) item in the operation manual of R3765A/C and R3767A/C for the operation of after save.



⑳ Connect DUT then it can be measured.

Note) ***S11, S21, S12 and S22 are available after 2 port full calibration but the calibration is not available for A/R, B/R, A/B, R, A and B.***

Completion

5 PRINCIPLE OPERATION

5.1 R3962A/B

(1) Reflection characteristic.

When S11 is set, the input signal from the <INPUT> is pass through the measurement circuit 1 and is output to the <TEST PORT1>. When S22 is set, the input signal is pass through the measurement circuit 2 and is output to the <TEST PORT 2>.

Reflection component from the < TEST PORT 1> is pass through the measurement circuit 3 and is output to the <A PORT>.
Reflection component from the < TEST PORT 2> is pass through the measurement circuit 4 and is output to the <B PORT>.

Network Analyzer measures the ratio of the signal from <A PORT> or <B PORT> to the incident signal and displays the reflection characteristic.

(2) Transmission characteristic.

When S21 is set, the input signal from the <INPUT> is pass through the measurement circuit 5 and is output to the <B PORT>. When S12 is set, the input signal is pass through the measurement circuit 5 and is output to the <A PORT>.

Network Analyzer measures the signal from <A PORT> or <B PORT> and displays the transmission characteristic.

Measurement circuit	1	③ → ⑪ → ⑫ → ⑨ → ⑦
	2	③ → ⑪ → ⑩ → ④ → ⑥
	3	⑦ → ⑧ → ②
	4	⑥ → ⑤ → ①
	5	③ → ⑪ → ⑫ → ⑨ → ⑦ → (DUT) → ⑥ → ⑤ → ①
	6	③ → ⑪ → ⑩ → ④ → ⑥ → (DUT) → ⑦ → ⑧ → ②

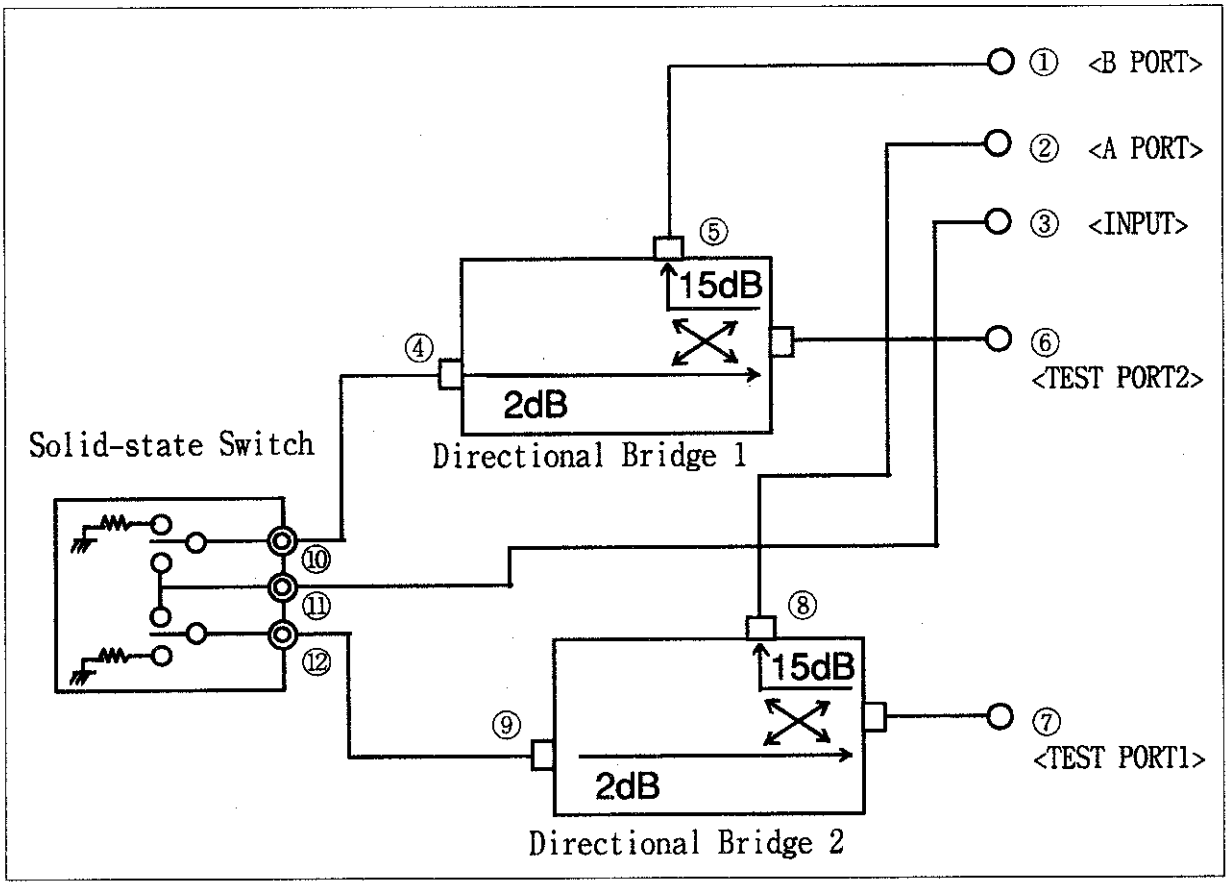


Figure 5-1 Principle operation of R3962A/B

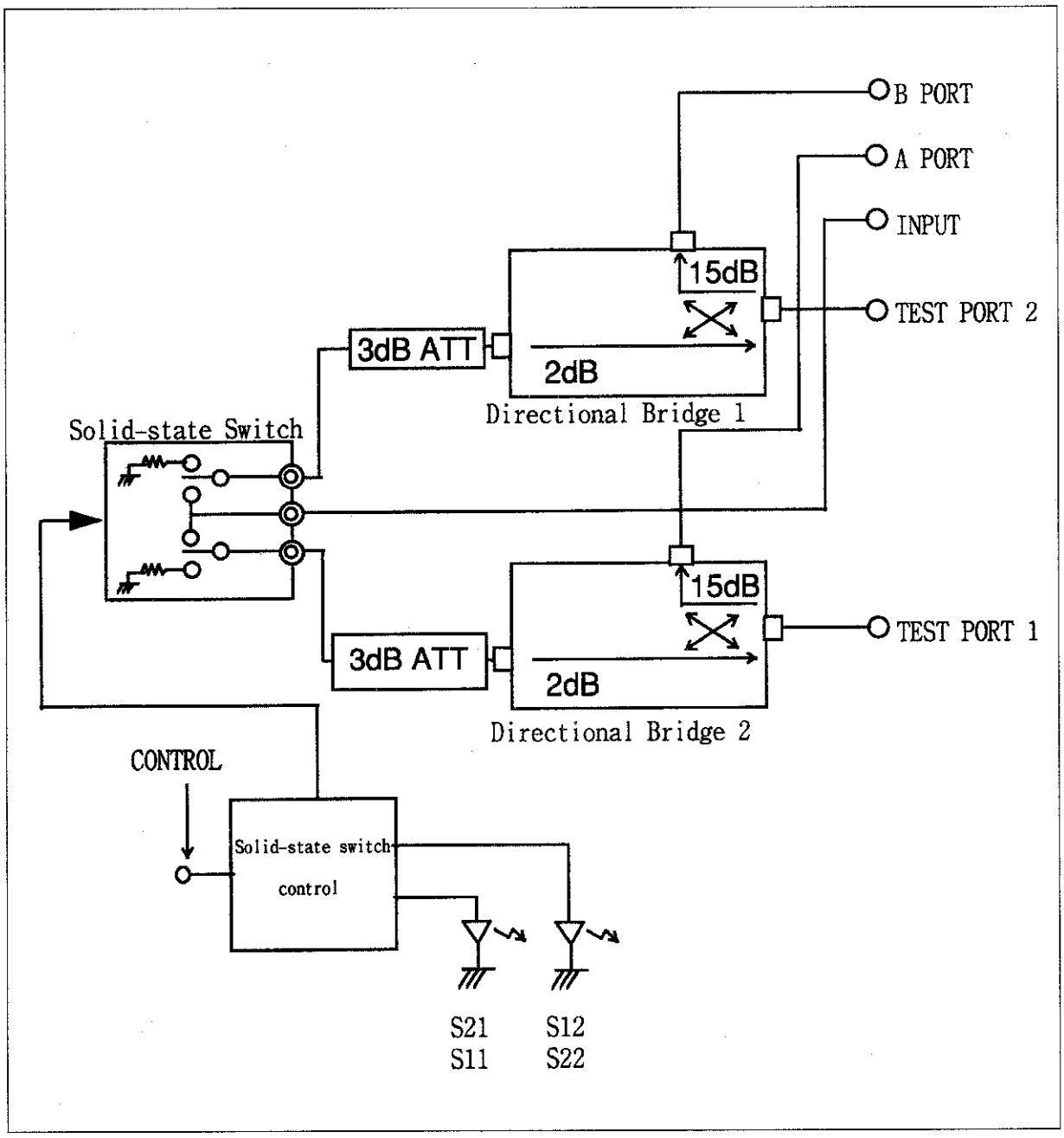


Figure 5-2 Block diagram of R3962A/B

5.2 R3963A/B

(1) Reflection characteristic.

When S11 of CH1 and CH2 are set, the input signal from the <INPUT> is pass through the measurement circuit 1 and is output to the <ANT PORT>.
When S22 of CH1 is set, the input signal is pass through the measurement circuit 2 and is output to the <TEST PORT 1>. When S22 of CH2 is set, the input signal is pass through the measurement circuit 3 and is output to the <TEST PORT 2>.

Reflection component from the < ANT PORT> is pass through the measurement circuit 4 and is output to the <A PORT>.
Reflection component from the < TEST PORT 1> is pass through the measurement circuit 5 and is output to the <B PORT>.
Reflection component from the < TEST PORT 2> is pass through the measurement circuit 6 and is output to the <B PORT>.

Network Analyzer measures the signal from <A PORT> or <B PORT> and displays the reflection characteristic.

(2) Transmission characteristic.

When S21 of CH1 is set, the input signal from the <INPUT> is pass through the measurement circuit 7 and is output to the <B PORT>.
When S12 of CH1 is set, the input signal is pass through the measurement circuit 8 and is output to the <A PORT>.
When S21 of CH2 is set, the input signal is pass through the measurement circuit 9 and is output to the <B PORT>.
When S12 of CH2 is set, the input signal is pass through the measurement circuit 10 and is output to the <A PORT>.

Network Analyzer measures the signal from <A PORT> or <B PORT> and displays the transmission characteristic.

Measurement circuit	1	③ → ⑭ → ⑮ → ⑩ → ⑪ → ⑤
	2	③ → ⑭ → ⑬ → ⑦ → ⑧ → ⑰ → ⑱ → ⑥
	3	③ → ⑭ → ⑬ → ⑦ → ⑧ → ⑰ → ⑯ → ④
	4	⑤ → ⑪ → ⑫ → ②
	5	⑥ → ⑱ → ⑰ → ⑧ → ⑨ → ①
	6	④ → ⑯ → ⑰ → ⑧ → ⑨ → ①
	7	③ → ⑭ → ⑮ → ⑩ → ⑪ → ⑤ → (DUT) → ⑥ → ⑱ → ⑰ → ⑧ → ⑨ → ①
	8	③ → ⑭ → ⑬ → ⑦ → ⑧ → ⑰ → ⑱ → ⑥ → (DUT) → ⑤ → ⑪ → ⑫ → ②
	9	③ → ⑭ → ⑮ → ⑩ → ⑪ → ⑤ → (DUT) → ④ → ⑯ → ⑰ → ⑧ → ⑨ → ①
	10	③ → ⑭ → ⑬ → ⑦ → ⑧ → ⑰ → ⑯ → ④ → (DUT) → ⑤ → ⑪ → ⑫ → ②

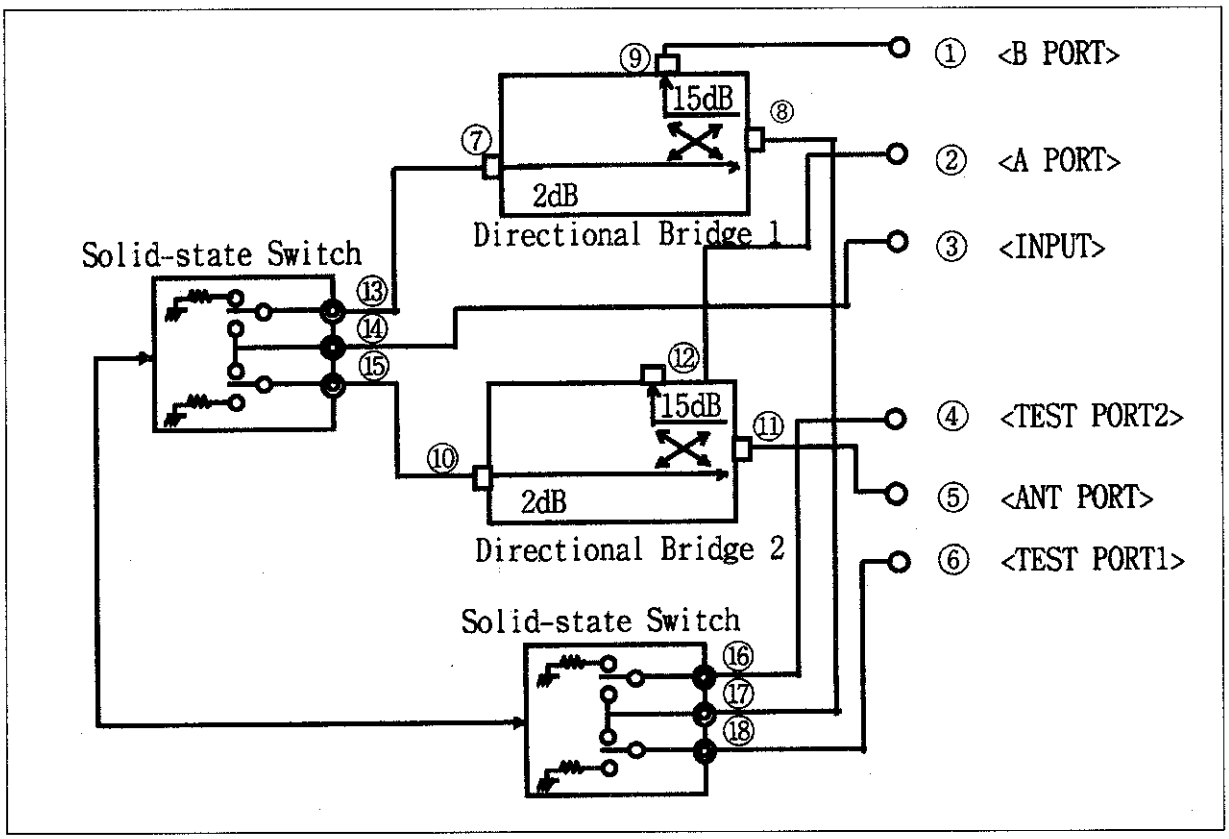


Figure 5-3 Principle operation of R3963A/B

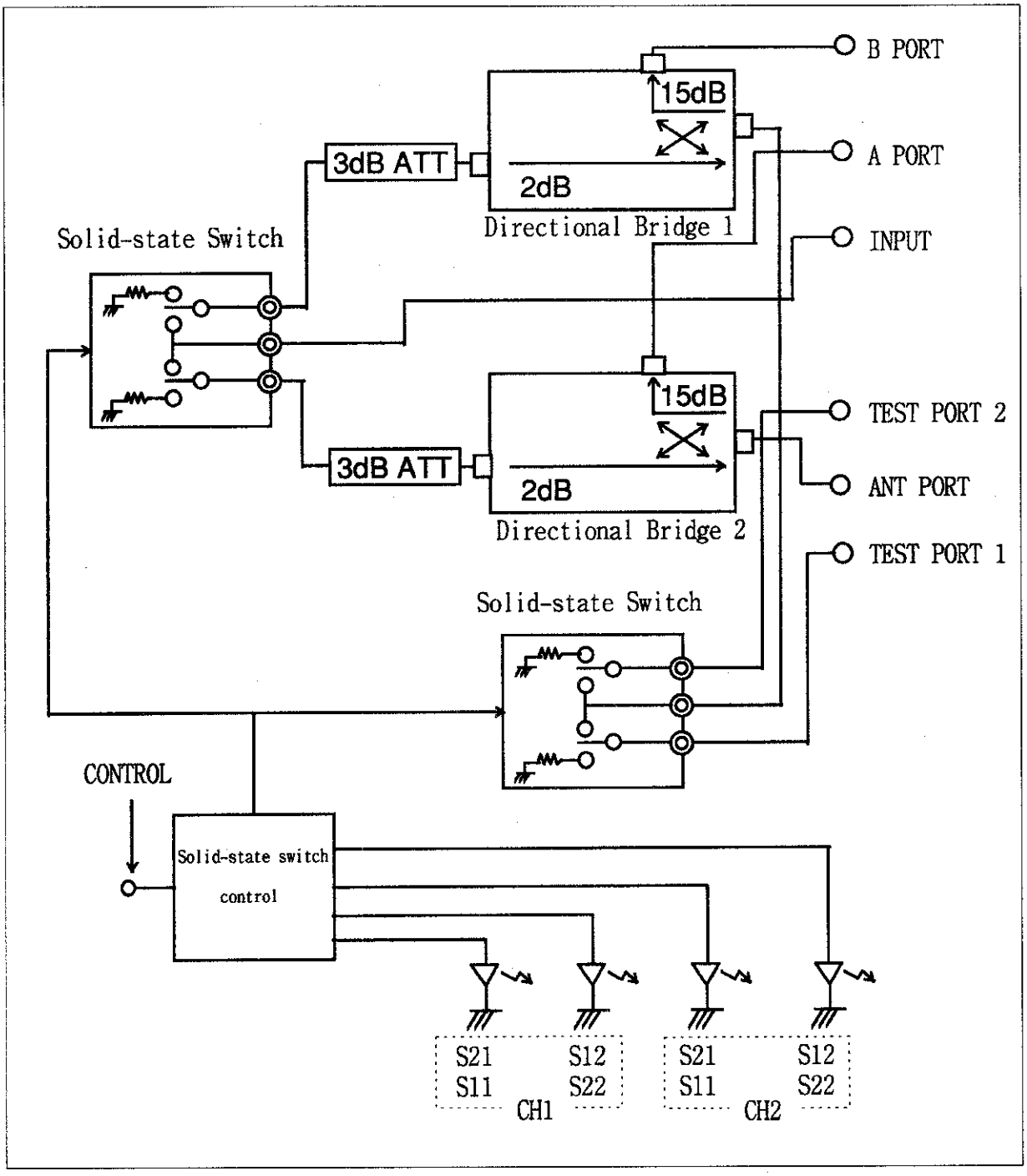


Figure 5-4 Block diagram of R3963A/B

5.3 R3964A/B

(1) Reflection characteristic.

When S11 of CH1 and CH2 are set, the input signal from the <PORT 1> is pass through the measurement circuit 1 and is output to the <ANT PORT>.
When S22 of CH1 is set, the input signal from <PORT 2> is pass through the measurement circuit 2 and is output to the <TEST PORT 1>.
When S22 of CH2 is set, the input signal is pass through the measurement circuit 3 and is output to the <TEST PORT 2>.

Reflection component from the < ANT PORT> is pass through the measurement circuit 4 and is output to the <PORT 1>.
Reflection component from the < TEST PORT 1> is pass through the measurement circuit 5 and is output to the <PORT 2>.
Reflection component from the < TEST PORT 2> is pass through the measurement circuit 6 and is output to the <PORT 2>.

Network Analyzer measures the signal from <PORT 1> or <PORT 2> and displays the reflection characteristic.

(2) Transmission characteristic.

When S21 of CH1 is set, the input signal from the <PORT 1> is pass through the measurement circuit 7 and is output to the <PORT 2>. When S12 of CH2 is set, the input signal is pass through the measurement circuit 8 and is output to the <PORT 2>.

When S12 of CH1 is set, the input signal is pass through the measurement circuit 9 and is output to the <PORT 1>.
When S12 of CH2 is set, the input signal is pass through the measurement circuit 10 and is output to the <PORT 1>.

Network Analyzer measures the signal from <PORT 1> or <PORT 2> and displays the transmission characteristic.

Measurement circuit	1	② → ④
	2	① → ⑦ → ⑧ → ⑤
	3	① → ⑦ → ⑥ → ③
	4	④ → ②
	5	⑤ → ⑧ → ⑦ → ①
	6	③ → ⑥ → ⑦ → ①
	7	② → ④ → (DUT) → ⑤ → ⑧ → ⑦ → ①
	8	② → ④ → (DUT) → ③ → ⑥ → ⑦ → ①
	9	① → ⑦ → ⑧ → ⑤ → (DUT) → ④ → ②
	10	① → ⑦ → ⑥ → ③ → (DUT) → ④ → ②

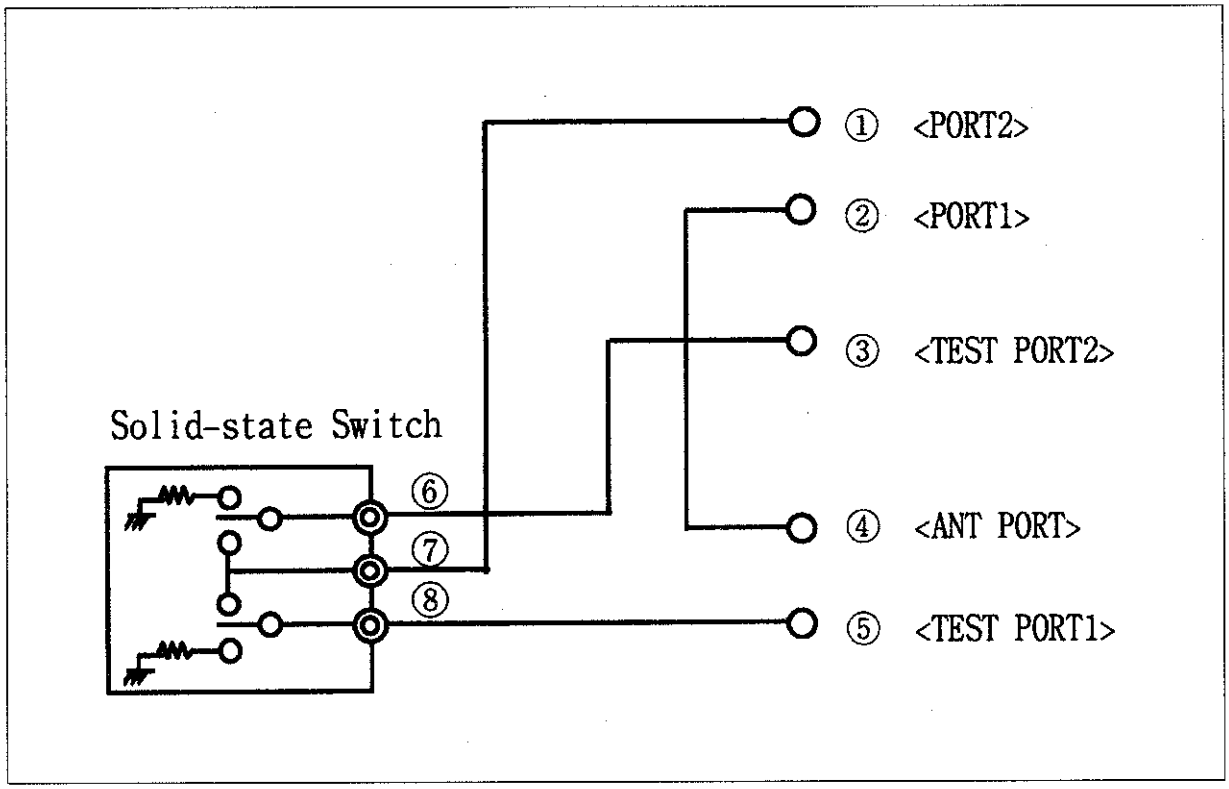


Figure 5-5 Principle operation of R3964A/B

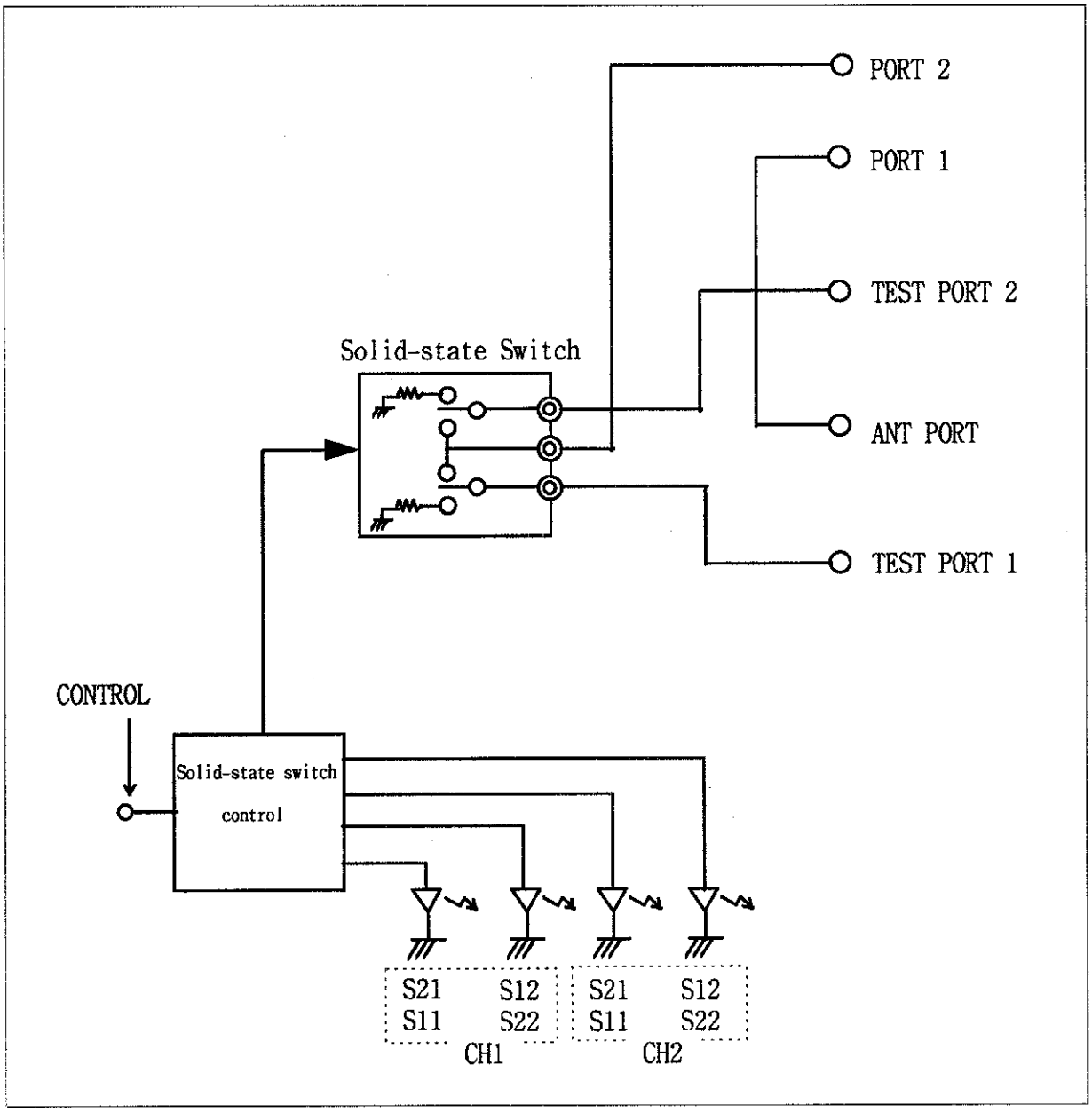


Figure 5-6 Block diagram of R3964A/B

6 PERFORMANCE TEST

6.1 Preparation for the Performance Test

(1) Warming up.

It is necessary to wait over 60 minutes for preheat after power on then execute the performance test.
First, press PRESET key for initialize then start the each performance test.

(2) Preparation of the measurement devices.

Following table lists the measurement devices for the each performance test.

Test item	Measurement devices	Remark
Directivity	Calibration kit	Subchapter 6.2: only for R3962A/B and R3963A/B
Test port load match	Calibration kit RF cable (TEST CABLE)	Subchapter 6.3: only for R3962A/B and R3963A/B
Frequency characteristic	Calibration kit RF cable (TEST CABLE)	Subchapter 6.4: only for R3962A/B and R3963A/B
Insertion loss	RF cable (TEST CABLE) Conversion adapter	Subchapter 6.5: for R3962A/B, R3963A/B and R3964A/B
Isolation	Calibration kit RF cable (TEST CABLE) Conversion adapter	Subchapter 6.6: for R3962A/B, R3963A/B and R3964A/B

Calibration kit : R3962A/63A/64A → Model 9617A3 (18GHz, N connector)
R3962B/63B/64B → Model 9617F3 (18GHz, 3.5mm connector)

RF cable : Use the proper cable for frequency characteristic (about 0.25 dB/GHz).
: Use N connector cable for R3962A, R3963A and R3964A.
: Use SMA connector for R3962B, R3963B and R3964B.

Conversion adapter : HRM-554S
Prepare the adapter which converts SMA from the port of Network Analyzer in the measurement of R3962B, R3963B and R3964B.

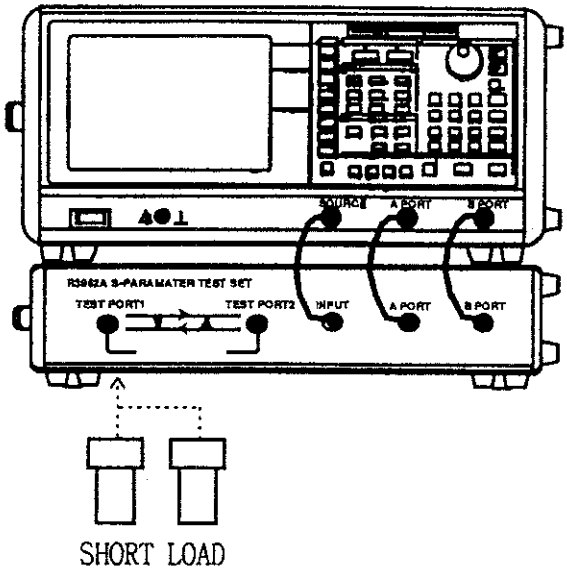
(3) General information.

- AC power voltage 90V to 250V.
  Power frequency 48 to 66 Hz.
- Turn OFF POWER switch for connection of power cable.
- Test condition of environment temperature , humidity and other.
  Temperature range: +25 degree C ±5 degree C.
  Relative humidity: Less than RH 80%.
  Do not operate the place in the dust, vibration, noise, wet or damp conditions.

6.2 Directivity

(1) R3962A/B.

① Connect with the Network Analyzer for set up the performance test.



② Execute normalize (SHORT) of TEST PORT 1.

②-1 [CH1] [MEAS] [S11 (A/R) REFL FWD]

②-2 Connect short standard to TEST PORT 1.

②-3 [CAL] [NORMALIZE (SHORT)]

③ Connect load standard to TEST PORT 1 and read out the measurement value of the directivity by marker from the wave form data.

Check out	Directivity of TEST PORT 1	40MHz to 2.6GHz	Less than 30 dB.
		2.6GHz to 3.8GHz	Less than 26 dB.
		3.8GHz to 8.0GHz	Less than 22 dB.

④ Execute normalize (SHORT) of TEST PORT 2.

④-1 [MEAS] [S22 (A/R) REFL REV]

④-2 Connect short standard to TEST PORT 2.

④-3 [CAL] [NORMALIZE (SHORT)]

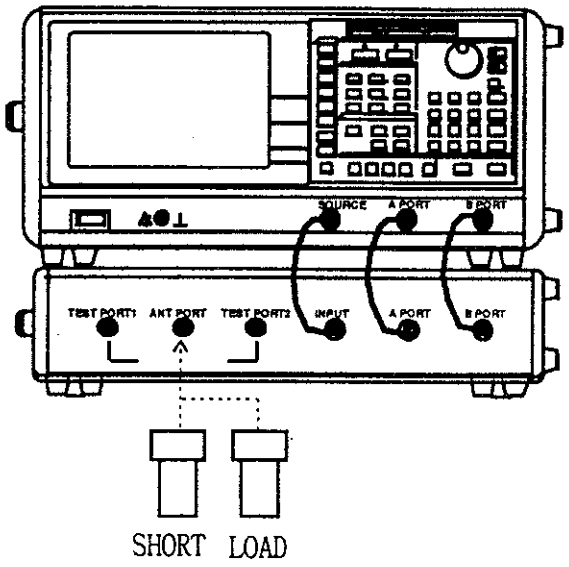
⑤ Connect load standard to TEST PORT 2 and read out the measurement value of the directivity by marker from the wave form data.

[Check out] Directivity of TEST PORT 2

40MHz to 2.6GHz	Less than 30 dB
2.6GHz to 3.8GHz	Less than 26 dB
3.8GHz to 8.0GHz	Less than 22 dB

(2) R3963A/B

① Connect with the Network Analyzer for set up the performance test.



② Execute normalize (SHORT) of ANT PORT.

②-1 [CH1] [MEAS] [S11 (A/R) REFL FWD]

②-2 Connect short standard to ANT PORT.

②-3 [CAL] [NORMALIZE (SHORT)]

③ Connect load standard to ANT PORT and read out the measurement value of the directivity by marker from the wave form data.

[Check out] Directivity of ANT PORT

40MHz to 2.6GHz	Typical 30 dB
2.6GHz to 3.8GHz	Typical 29 dB
3.8GHz to 8.0GHz	Typical 25 dB

④ Execute normalize (SHORT) of TEST PORT 1.

④-1 [CH1] [MEAS] [S22 (B/R) REFL REV]

④-2 Connect short standard to TEST PORT 1.

④-3 [CAL] [NORMALIZE (SHORT)]

⑤ Connect load standard to TEST PORT 1 and read out the measurement value of the directivity by marker from the wave form data.

[Check out]	Directivity of TEST PORT 1	40MHz to 2.6GHz	Typical 15 dB
		2.6GHz to 3.8GHz	Typical 20 dB
		3.8GHz to 8.0GHz	Typical 8 dB

⑥ Execute normalize (SHORT) of TEST PORT 2.

⑥-1 [CH2] [MEAS] [S22 (B/R) REFL REV]

⑥-2 Connect short standard to TEST PORT 2.

⑥-3 [CAL] [NORMALIZE (SHORT)]

⑦ Connect load standard to TEST PORT 2 and read out the measurement value of the by marker from the wave form data.

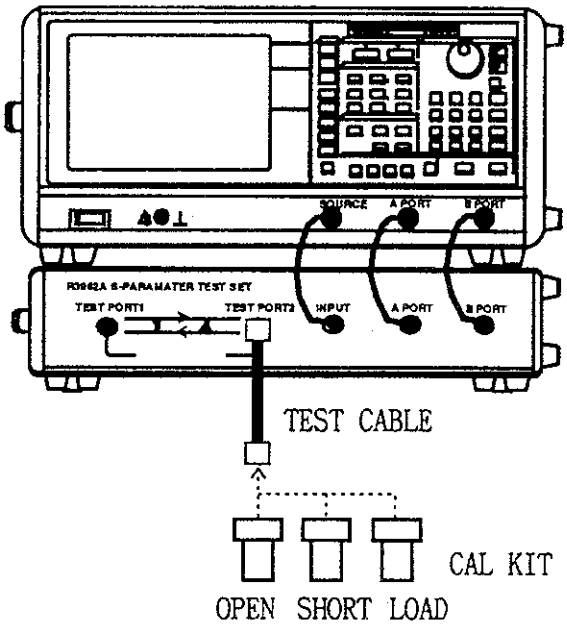
[Check out]	Directivity of TEST PORT 2	40MHz to 2.6GHz	Typical 15 dB
		2.6GHz to 3.8GHz	Typical 20 dB
		3.8GHz to 8.0GHz	Typical 8 dB

6.3 Test Port Load Match

(1) R3962A/B

① Connect with the Network Analyzer for set up the performance test.

② Connect test cable to TEST PORT 2 and execute 1 PORT FULL CAL.



②-1 [CH1] [MEAS] [S22 (B/R) REFL REV]

②-2 [CAL] [CAL MENUS] [1 PORT FULL CAL]

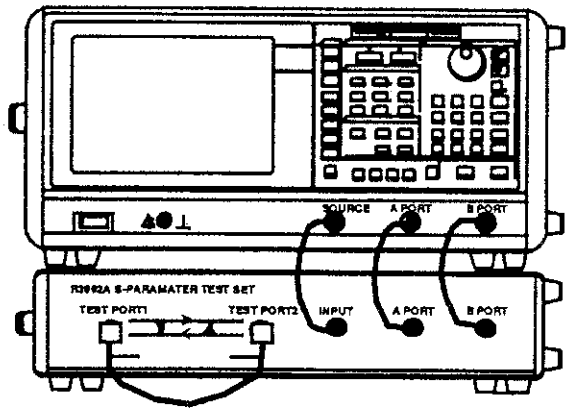
②-3 Connect open standard to test cable and press [OPEN] key.

②-4 Connect short standard to test cable and press [SHORT] key.

②-5 Connect load standard to test cable and press [LOAD] key.

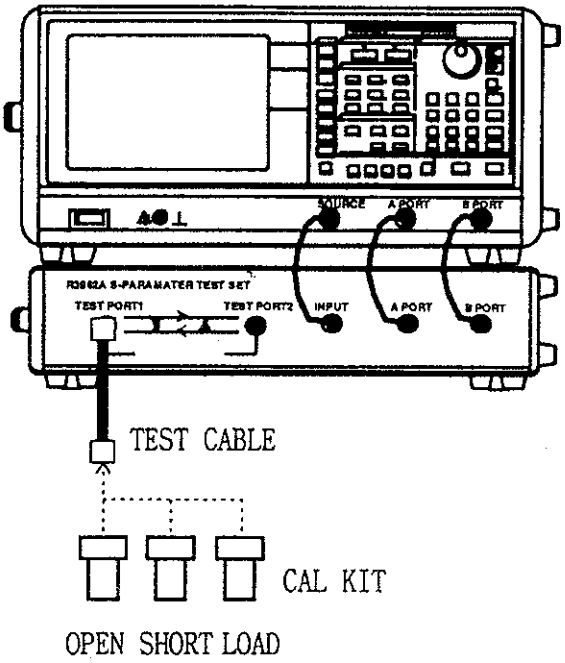
②-6 Press [DONE 1-PORT]

③ Connect test cable to TEST PORT 1 and read out the measurement value of the test port load match by marker from the wave form data.



Check out	Load match of TEST PORT 1	40MHz to 2.6GHz	Less than 18 dB
		2.6GHz to 3.8GHz	Less than 16 dB
		3.8GHz to 8.0GHz	Less than 14 dB

④ Connect test cable to TEST PORT 1 and execute 1 PORT FULL CAL.



④-1 CH1 | MEAS | S11 (A/R) REFL FWD

④-2 CAL | CAL MENUS | 1 PORT FULL CAL

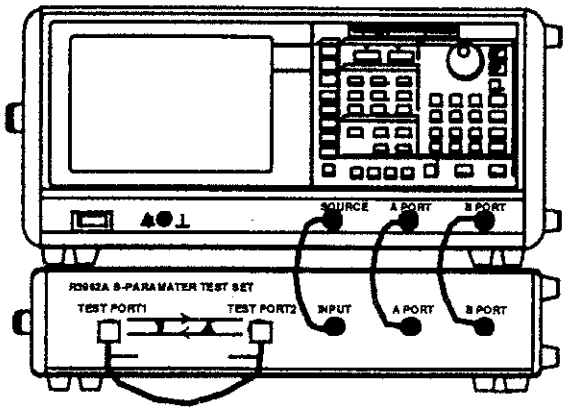
④-3 Connect open standard to test cable and press OPEN key.

④-4 Connect short standard to test cable and press SHORT key.

④-5 Connect load standard to test cable and press LOAD key.

④-6 Press DONE 1-PORT

⑤ Connect test cable to TEST PORT 2 and read out the measurement value of the test port load match by marker from the wave form data.

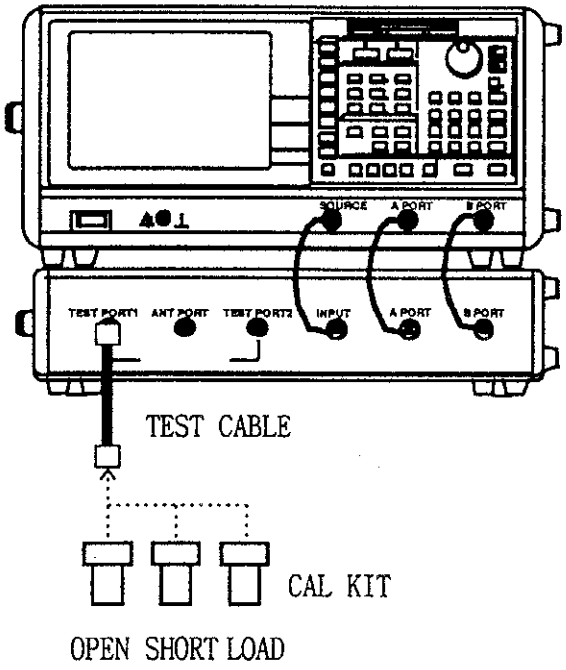


Check out Load match of TEST PORT 2 40MHz to 2.6GHz Less than 18 dB
2.6GHz to 3.8GHz Less than 16 dB
3.8GHz to 8.0GHz Less than 14 dB

(2) R3963A/B

① Connect with the Network Analyzer for set up the performance test.

② Connect test cable to TEST PORT 1 and execute 1 PORT FULL CAL.



②-1 [CH1] [MEAS] [S22 (B/R) REFL REV]

②-2 [CAL] [CAL MENUS] [1 PORT FULL CAL]

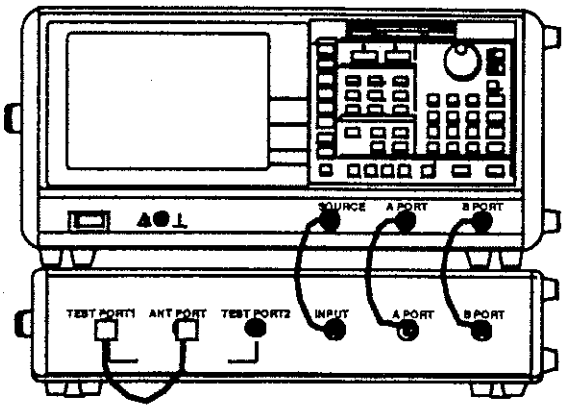
②-3 Connect open standard to test cable and press [OPEN] key.

②-4 Connect short standard to test cable and press [SHORT] key.

②-5 Connect load standard to test cable and press [LOAD] key.

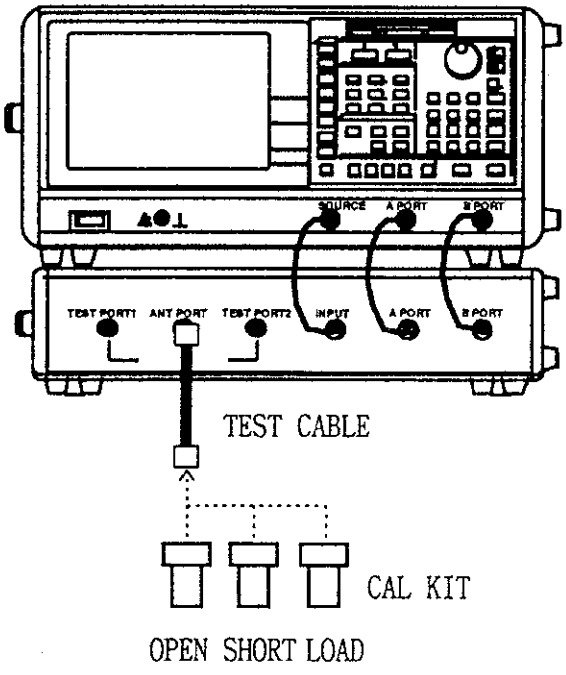
②-6 Press [DONE 1-PORT]

③ Connect test cable to ANT PORT and read out the measurement value of the test port load match by marker from the wave form data.



Check out	Load match of ANT PORT	40MHz to 2.6GHz	Typical 25 dB
		2.6GHz to 3.8GHz	Typical 20 dB
		3.8GHz to 8.0GHz	Typical 14 dB

④ Connect test cable to ANT PORT and execute 1 PORT FULL CAL.



④-1 CH1 | MEAS | S11 (A/R) REFL FWD

④-2 CAL | CAL MENUS | 1 PORT FULL CAL

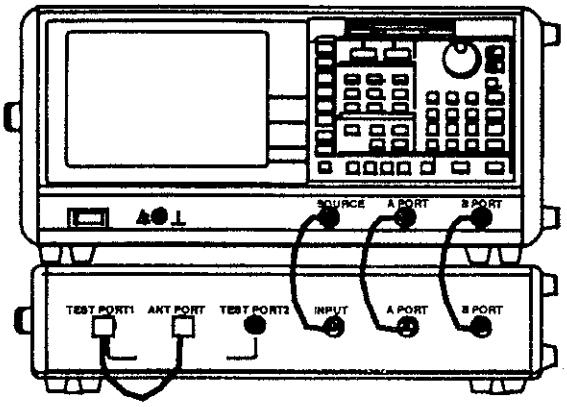
④-3 Connect open standard to test cable and press OPEN key.

④-4 Connect short standard to test cable and press SHORT key.

④-5 Connect load standard to test cable and press LOAD key.

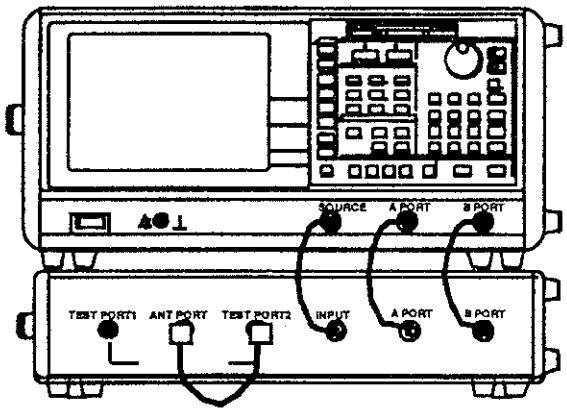
④-6 Press DONE 1-PORT

⑤ Connect test cable to TEST PORT 1 and read out the measurement value of the test port load match by marker from the wave form data.



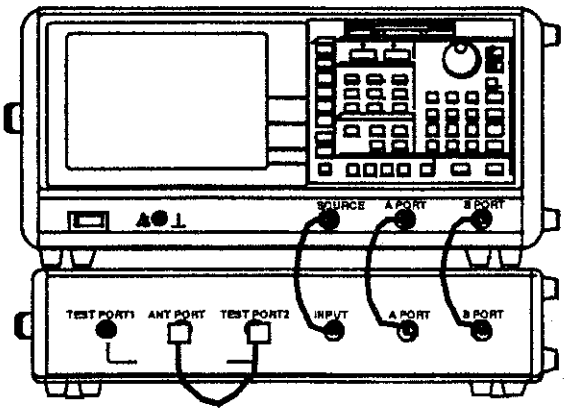
Check out	Load match TEST PORT 1	40MHz to 2.6GHz	Typical 18 dB
		2.6GHz to 3.8GHz	Typical 20 dB
		3.8GHz to 8.0GHz	Typical 14 dB

⑥ Connect test cable to TEST PORT 2.



⑥-1 | CH2 | MEAS | S11 (A/R) REFL FWD |

⑦ Read out the value of the test port load match by marker from the wave form data.



Check out	Load match TEST PORT 2	40MHz to 2.6GHz	Typical 18 dB
		2.6GHz to 3.8GHz	Typical 20 dB
		3.8GHz to 8.0GHz	Typical 14 dB

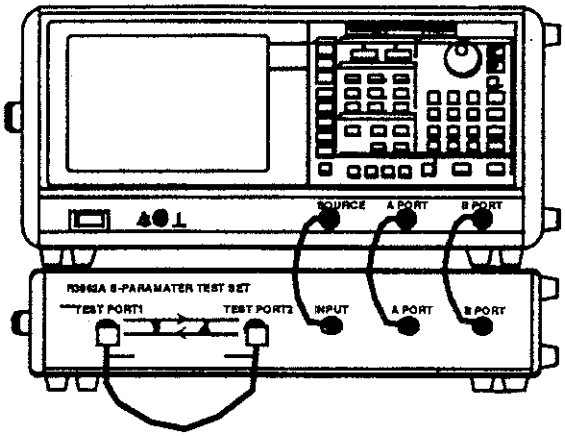
6.4 Frequency characteristic

6.4.1 Transmission amplitude characteristic

(1) R3962A/B

① Connect with the Network Analyzer for set up the performance test.

② Connect test cable between TEST PORT 1 and TEST PORT 2.



②-1 [CH1] [MEAS] [S21 (B/R) TRNS FWD]

②-2 [SCALE] [AUTO SCALE]

③ Read out the frequency characteristic by marker from the wave form data.

③-1 [MKR →] [MKR SEARCH [ ]] [RIPPLE] [MAX-MIN]

③-2 Transmission amplitude characteristic between TEST PORT 1 and TEST PORT 2 is displayed in the marker value.

Check out	Transmission amplitude characteristic between TEST PORT 1 and TEST PORT 2	Typical 3 dBp-p

④ Change set up for the measurement of the frequency characteristic between TEST PORT 2 and TEST PORT 1.

④-1 [MEAS] [S12 (A/R) TRNS REV]

④-2 [SCALE] [AUTO SCALE]

⑤ Read out the frequency characteristic by marker from the wave form data.

⑤-1 MKR → | MKR SEARCH [ ] | RIPPLE | MAX-MIN

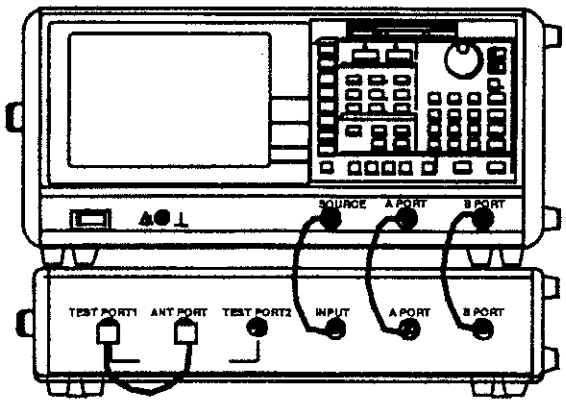
⑤-2 Transmission amplitude characteristic between TEST PORT 2 and TEST PORT 1 is displayed in the marker value.

Check out — Transmission amplitude characteristic between TEST PORT 2 and TEST PORT 1 — Typical 3 dBp-p

(2) R3963A/B

① Connect with the Network Analyzer for set up the performance test.

② Connect test cable between ANT PORT and TEST PORT 1.



②-1 MEAS | S21 (A/R) TRNS FWD

②-2 SCALE | AUTO SCALE

③ Read out the frequency characteristic by marker from the wave form data.

③-1 MKR → | MKR SEARCH [ ] | RIPPLE | MAX-MIN

③-2 Transmission amplitude characteristic between ANT PORT and TEST PORT 1 is displayed in the marker value.

Check out — Transmission amplitude characteristic between ANT PORT and TEST PORT 1 — Typical 3 dBp-p

④ Change set up for the measurement of the frequency characteristic between TEST PORT 1 and ANT PORT.

④-1 [MEAS] [S12 (A/R) TRNS REV]

④-2 [SCALE] [AUTO SCALE]

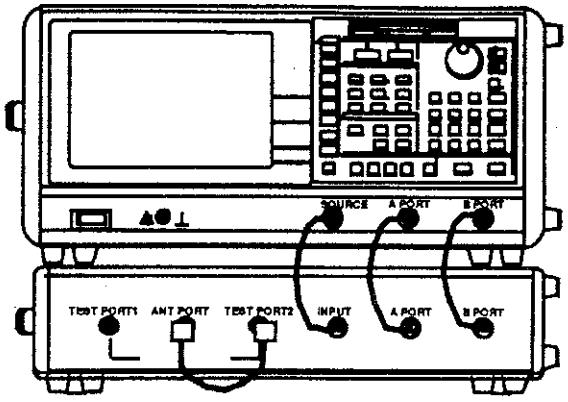
⑤ Read out the frequency characteristic by marker from the wave form data.

⑤-1 [MKR →] [MKR SEARCH [ ]] [RIPPLE] [MAX-MIN]

⑤-2 Transmission amplitude characteristic between TEST PORT 1 and ANT PORT is displayed in the marker value is displayed.

[Check out]	Transmission amplitude characteristic between TEST PORT 1 and ANT PORT	Typical 3 dBp-p

⑥ Connect test cable between TEST PORT 2 and ANT PORT.



⑥-1 [CH2] [MEAS] [S21 (B/R) TRNS FWD]

⑥-2 [SCALE] [AUTO SCALE]

⑦ Read out the frequency characteristic by marker from the wave form data.

⑦-1 [MKR →] [MKR SEARCH [ ]] [RIPPLE] [MAX-MIN]

⑦-2 Transmission amplitude characteristic between ANT PORT and TEST PORT 2 is displayed in the marker value.

Check out	Transmission amplitude characteristic between ANT PORT and TEST PORT 2	Typical 3 dBp-p

⑧ Change set up for the measurement of the frequency characteristic between TEST PORT 2 and ANT PORT.

⑧-1 MEAS | S12 (A/R) TRNS REV

⑧-2 SCALE | AUTO SCALE

⑨ Read out the frequency characteristic by marker from the wave form data.

⑨-1 MKR → | MKR SEARCH [ ] | RIPPLE | MAX-MIN

⑨-2 Transmission amplitude characteristic between TEST PORT 2 and ANT PORT is displayed in the marker value.

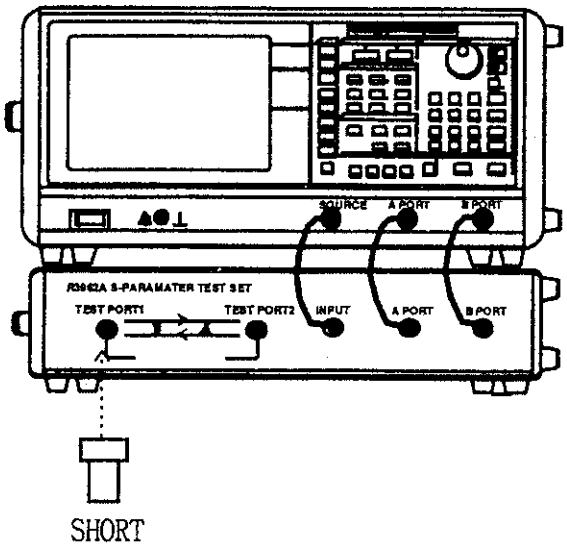
Check out	Transmission amplitude characteristic between TEST PORT 2 and ANT PORT	Typical 3 dBp-p

6.4.2 Reflection amplitude characteristic

(1) R3962A/B

① Connect with the Network Analyzer for set up the performance test.

② Connect short standard to TEST PORT 1.



②-1 [CH1] [MEAS] [S11 (A/R) REFL FWD]

②-2 [SCALE] [AUTO SCALE]

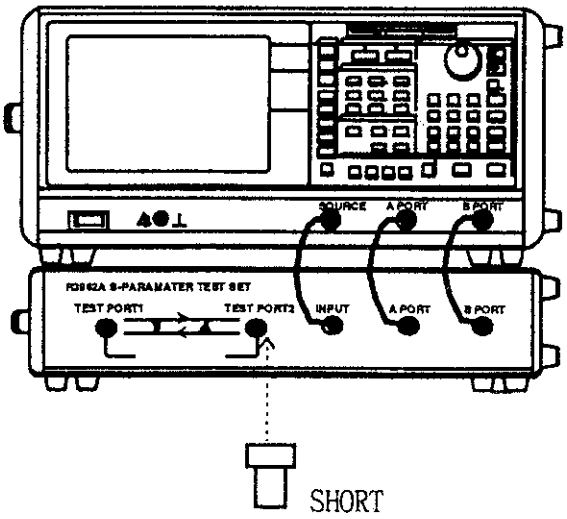
③ Read out the frequency characteristic by marker from the wave form data.

③-1 [MKR →] [MKR SEARCH] [ ] [RIPPLE] [MAX-MIN]

③-2 Frequency characteristic of TEST PORT 1 is displayed in the marker value.

Check out Reflection amplitude characteristic of TEST PORT 1 Typical 4 dBp-p

④ Connect short standard to TEST PORT 2.



④-1 [CH1] [MEAS] [S22 (B/R) REFL REV]

④-2 [SCALE] [AUTO SCALE]

⑤ Read out the frequency characteristic by marker from the wave form data.

⑤-1 [MKR →] [MKR SEARCH] [ ] [RIPPLE] [MAX-MIN]

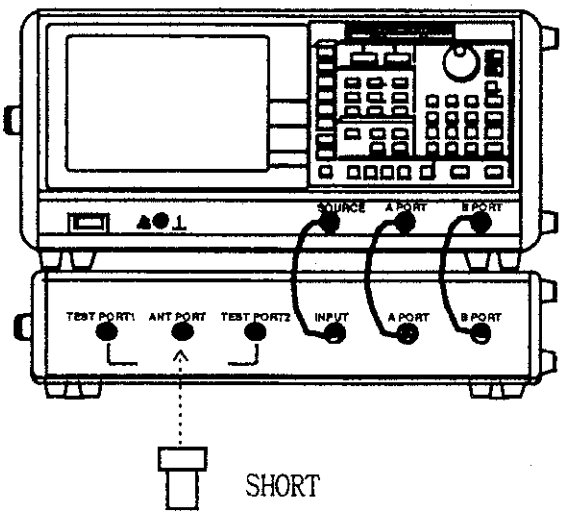
⑤-2 Frequency characteristic of TEST PORT 2 is displayed in the marker value.

Check out Reflection amplitude characteristic of TEST PORT 2 Typical 4 dBp-p

(2) R3963A/B

① Connect with the Network Analyzer for set up the performance test.

② Connect short standard to ANT PORT.



②-1 CH1 | MEAS | S11 (A/R) REFL RWD

②-2 SCALE | AUTO SCALE

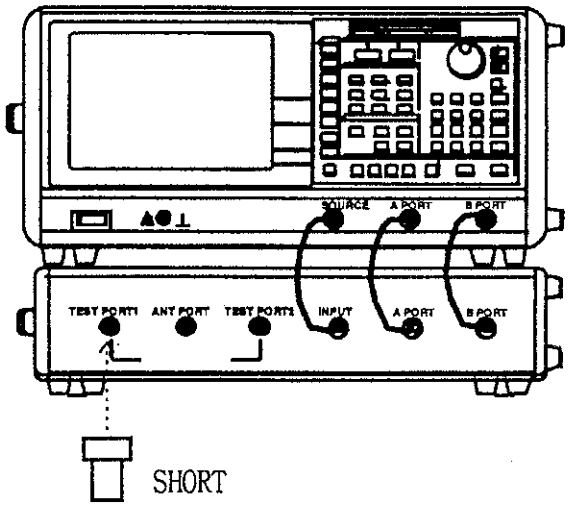
③ Read out the frequency characteristic by marker from the wave form data.

③-1 MKR → | MKR SEARCH [ ] | RIPPLE | MAX-MIN

③-2 Frequency characteristic of ANT PORT is displayed in the marker value.

Check out Reflection amplitude characteristic of ANT PORT Typical 4 dBp-p

④ Connect short standard to TEST PORT 1.



④-1 [CH1] [MEAS] [S22 (B/R) REFL REV]

④-2 [SCALE] [AUTO SCALE]

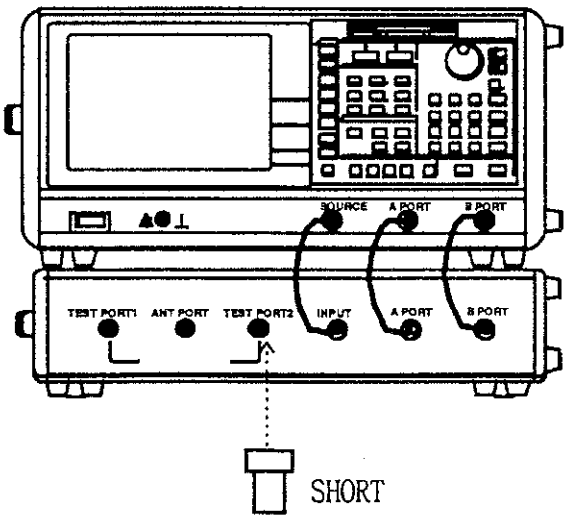
⑤ Read out the frequency characteristic by marker from the wave form data.

⑤-1 [MKR →] [MKR SEARCH [ ]] [RIPPLE] [MAX-MIN]

⑤-2 Frequency characteristic of TEST PORT 1 is displayed in the marker value.

[Check out] Reflection amplitude characteristic of TEST PORT 1 Typical 6 dBp-p

⑥ Connect short standard to TEST PORT 2.



⑥-1 [CH2] [MEAS] [S22 (B/R) REFL REV]

⑥-2 [SCALE] [AUTO SCALE]

⑦ Read out the frequency characteristic by marker from the wave form data.

⑦-1 [MKR →] [MKR SEARCH [ ]] [RIPPLE] [MAX-MIN]

⑦-2 Frequency characteristic of TEST PORT 2 is displayed in the marker value.

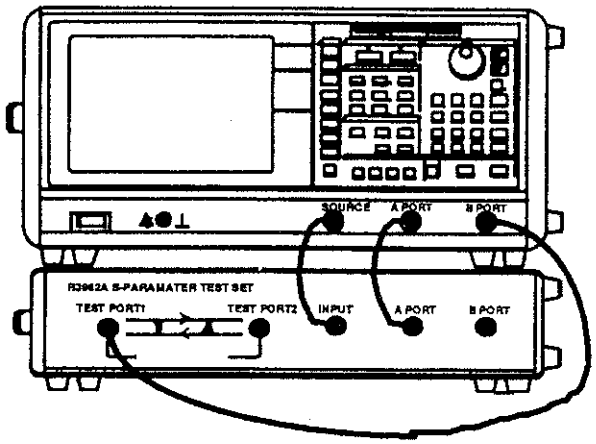
[Check out] Reflection amplitude characteristic of TEST PORT 2 Typical 6 dBp-p

6.5 Insertion loss

(1) R3962A/B

① Connect with the Network Analyzer for set up the performance test.

② Change the connection using by the test cable as shown figure below.



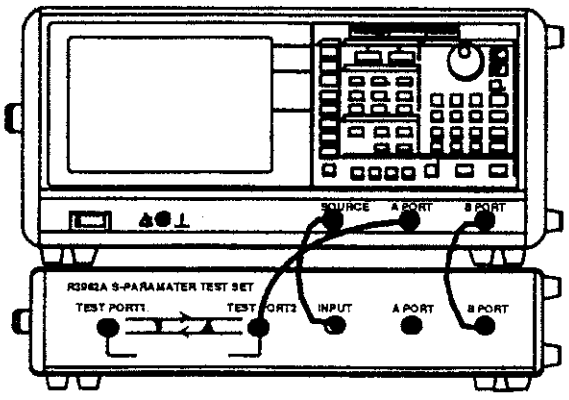
②-1 | CH1 | MEAS | S21 (B/R) TRNS FWD |

②-2 | SCALE | AUTO SCALE |

③ Read out the insertion loss between INPUT and TEST PORT 1 by marker from the wave form data.

| Check out | Insertion loss between INPUT and TEST PORT 1 | Typical 9 dB |

④ Change the cable connection as shown figure below.



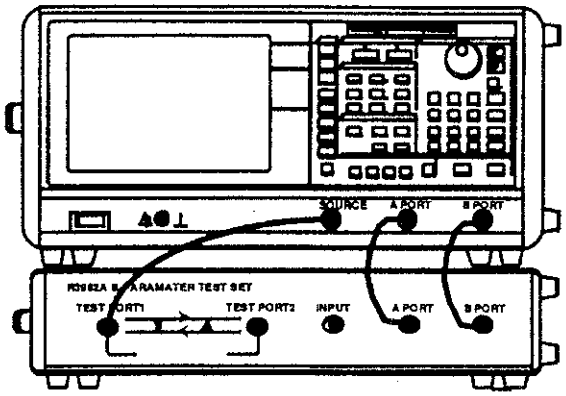
④-1 | MEAS | S12 (A/R) TRNS REV |

④-2 SCALE | AUTO SCALE

⑤ Read out the insertion loss between INPUT and TEST PORT 2 by marker from the wave form data.

Check out | Insertion loss between INPUT and TEST PORT 2 | Typical 9 dB

⑥ Change the cable connection as shown figure below.



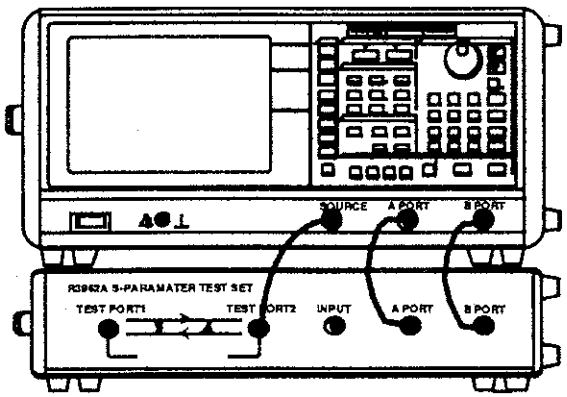
⑥-1 MEAS | S11 (A/R) REFL FWD

⑥-2 SCALE | AUTO SCALE

⑦ Read out the insertion loss between TEST PORT 1 and A PORT by marker from the wave form data.

Check out | Insertion loss between TEST PORT 1 and A PORT | Typical 15 dB

⑧ Change the cable connection as shown figure below.



⑧-1 [MEAS] [S22 (B/R) REFL REV]

⑧-2 [SCALE] [AUTO SCALE]

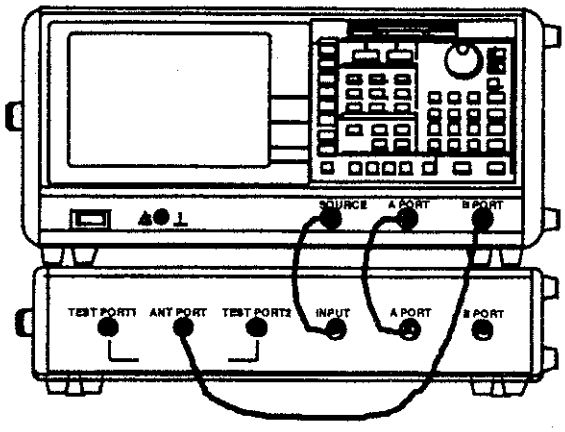
⑨ Read out the insertion loss between TEST PORT 2 and B PORT by marker from the wave form data.

[Check out] Insertion loss between TEST PORT 2 and B PORT Typical 15 dB

(2) R3963A/B

① Connect with the Network Analyzer for set up the performance test.

② Change the cable connection as shown figure below.



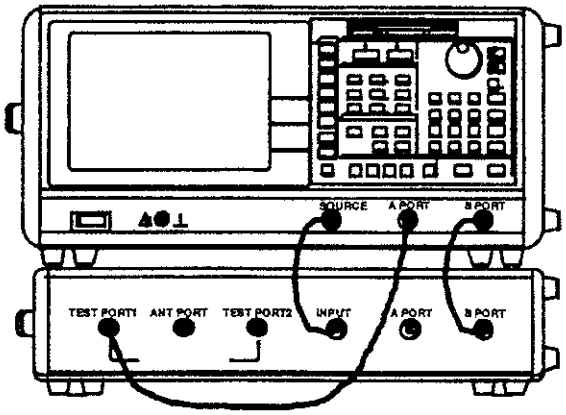
②-1 [CH1] [MEAS] [S21 (B/R) TRNS FWD]

②-2 [SCALE] [AUTO SCALE]

③ Read out the insertion loss between INPUT and ANT PORT by marker from the wave form data.

[Check out] Insertion loss between INPUT and ANT PORT Typical 9 dB

④ Change the cable connection as shown figure below.



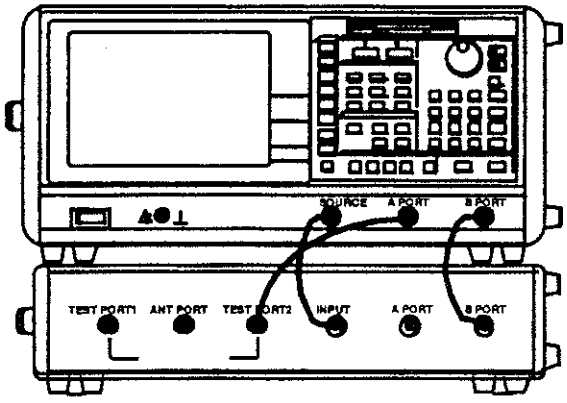
④-1 [CH1] [MEAS] [S12 (A/R) TRNS REV]

④-2 [SCALE] [AUTO SCALE]

⑤ Read out the insertion loss between INPUT and TEST PORT 1 by marker from the wave form data.

[Check out] Insertion loss between INPUT and TEST PORT 1 Typical 12 dB

⑥ Change the cable connection as shown figure below.



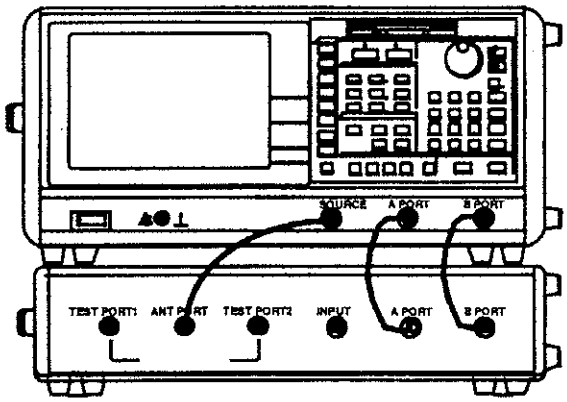
⑥-1 [CH2] [MEAS] [S12 (A/R) TRNS REV]

⑥-2 [SCALE] [AUTO SCALE]

⑦ Read out the insertion loss between INPUT and TEST PORT 2 by marker from the wave form data.

Check out	Insertion loss between INPUT and TEST PORT 2	Typical 12 dB

⑧ Change the cable connection as shown figure below.



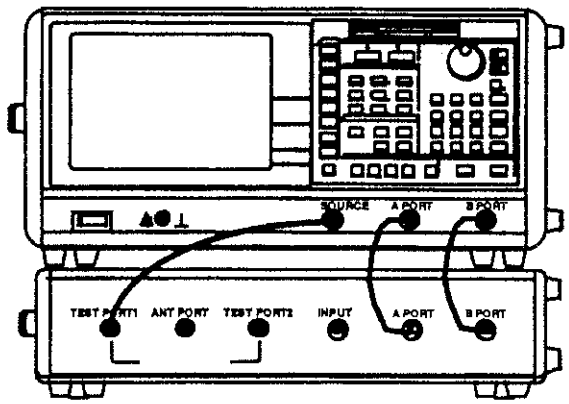
⑧-1 | CH1 | MEAS | S11 (A/R) REFL FWD |

⑧-2 | SCALE | AUTO SCALE |

⑨ Read out the insertion loss between ANT PORT and A PORT by marker from the wave form data.

Check out	Insertion loss between ANT PORT and A PORT	Typical 15 dB

⑩ Change the cable connection as shown figure below.



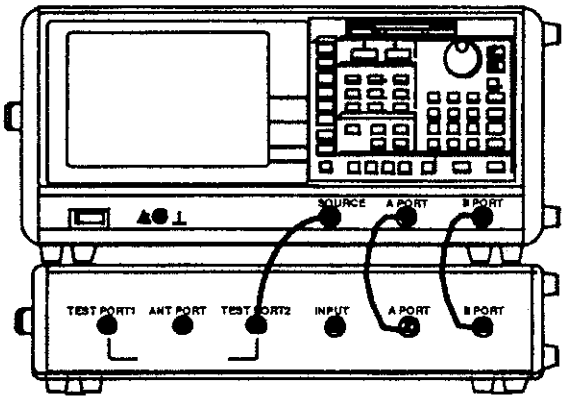
⑩-1 [CH1] [MEAS] [S22 (B/R) REFL REV]

⑩-2 [SCALE] [AUTO SCALE]

⑪ Read out the insertion loss between TEST PORT 1 and B PORT by marker from the wave form data.

[Check out] Insertion loss between TEST PORT 1 and B PORT Typical 18 dB

⑫ Change the cable connection as shown figure below.



⑫-1 [CH2] [MEAS] [S22 (B/R) REFL REV]

⑫-2 [SCALE] [AUTO SCALE]

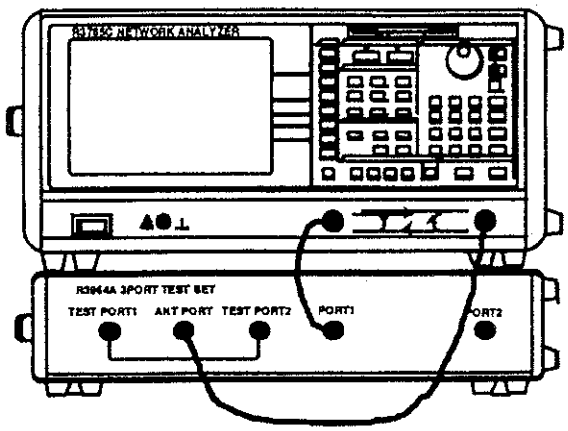
⑬ Read out the insertion loss between TEST PORT 2 and B PORT by marker from the wave form data.

[Check out] Insertion loss between TEST PORT 2 and B PORT Typical 18 dB

(3) R3964A/B

① Connect with the Network Analyzer for set up the performance test.

② Change the cable connection as shown figure below.



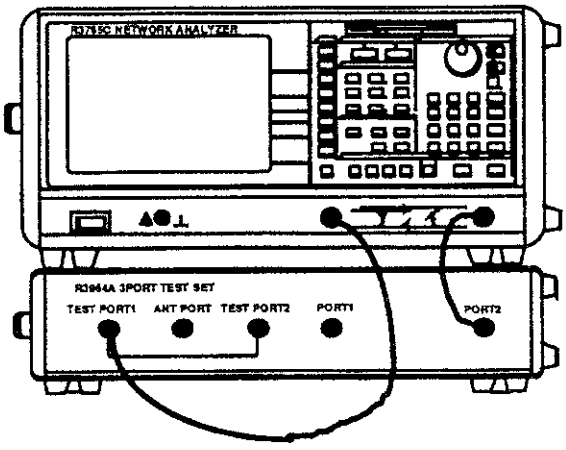
②-1 | CH1 | MEAS | S21 (B/R) TRNS FWD |

②-2 | SCALE | AUTO SCALE |

③ Read out the insertion loss between PORT 1 and ANT PORT by marker from the wave form data.

Check out	Insertion loss between PORT 1 and ANT PORT	Typical 2 dB

④ Change the cable connection as shown figure below.



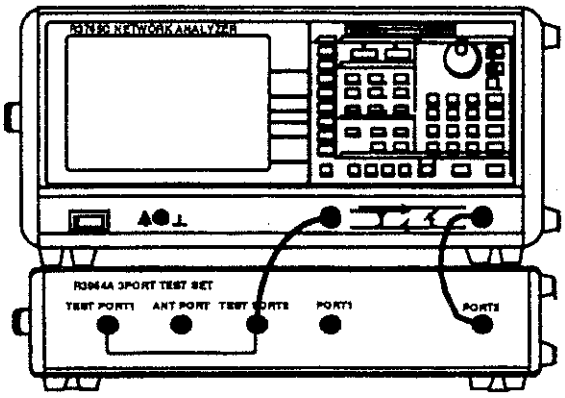
④-1 CH1 | MEAS | S12 (A/R) TRNS REV

④-2 SCALE | AUTO SCALE

⑤ Read out the insertion loss between PORT 2 and TEST PORT 1 by marker from the wave form data.

Check out Insertion loss between PORT 2 and TEST PORT 1 Typical 4 dB

⑥ Change the cable connection as shown figure below.



⑥-1 CH2 | MEAS | S12 (A/R) TRNS REV

⑥-2 SCALE | AUTO SCALE

⑦ Read out the insertion loss between PORT 2 and TEST PORT 2 by marker from the wave form data.

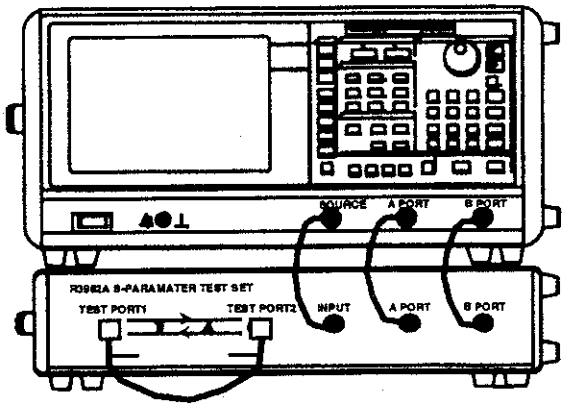
Check out Insertion loss between PORT 2 and TEST PORT 2 Typical 4 dB

6.6 Isolation

(1) R3962A/B

① Connect with the Network Analyzer for set up the performance test.

② Connect test cable between TEST PORT 1 and TEST PORT 2.



②-1 CH1 | MEAS | S21 (B/R) TRNS FWD

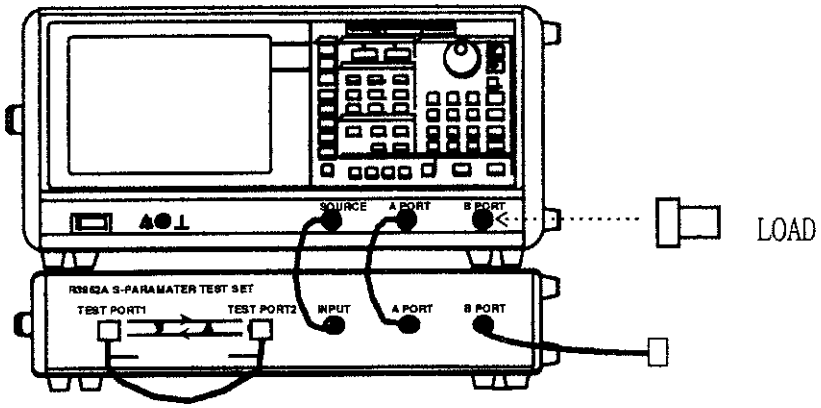
②-2 SCALE | /DIV | 1 | 0 | X1

REF POS | 5 | 0 | X1

REF VALUE | - | 9 | 0 | X1

②-3 CAL | NORMLIZE (THRU)

③ Disconnect connected cable to B PORT of Network Analyzer and connect load standard.



③-1

AVG	AVG COUNT	6	4	X1	AVG STATE ON

④ Average count is displayed at upper left on the screen

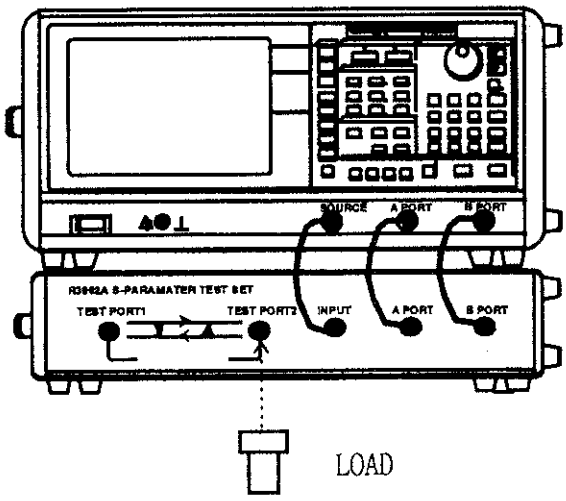
When average count became 64 then execute following set up.

④-1

DISPLAY	DATA → MEMORY	DEFINE TRACE [ ]	DATA — MEMORY

⑤ Connect cable between B PORT of Network Analyzer and B PORT of S Parameter test set.

Disconnect test cable between TEST PORT 1 and TEST PORT 2 and connect load standard to TEST PORT 2.



⑤-1 [AVG] [AVG RESTART]

⑥ When average count became 64 then read out isolation value by marker.

[Check out] Isolation of TEST PORT 1 and TEST PORT 2

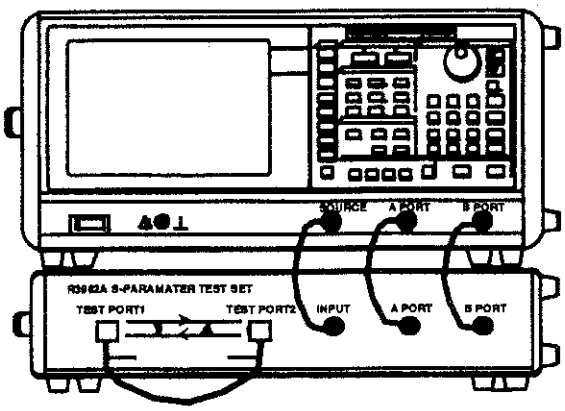
40MHz to 2.6GHz	-90dB
2.6GHz to 3.8GHz	-85dB
3.8GHz to 5GHz	-70dB
5GHz to 8GHz	-60dB

Check out is completed then execute following set up.

⑥-1 [AVG] [AVG STATE OFF]

⑥-2 [DISPLAY] [DEFINE TRACE [DATA-MEN]] [OFF]

⑦ Connect test cable between TEST PORT 1 and TEST PORT 2.



⑦-1 [CH1] [MEAS] [S12 (A/R) TRNS REV]

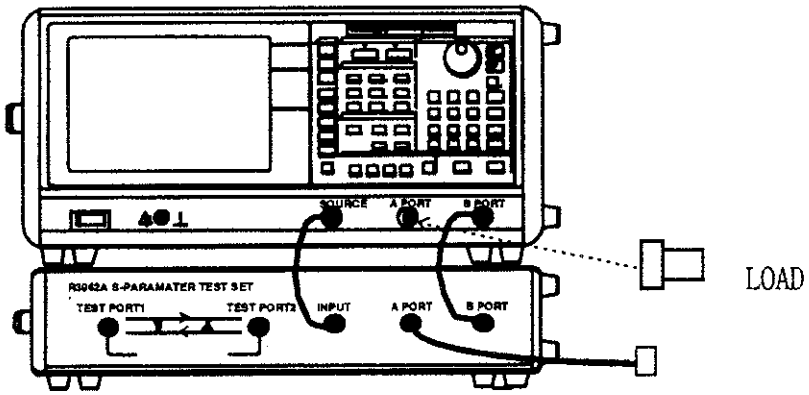
⑦-2 [SCALE] [/DIV] [1] [0] [X1]

[REF POS] [5] [0] [X1]

[REF VALUE] [-] [9] [0] [X1]

⑦-3 [CAL] [NORMLIZE (THRU)]

⑧ Disconnect connected cable to A PORT of Network Analyzer and connect load standard.



⑧-1 [AVG] [AVG STATE ON]

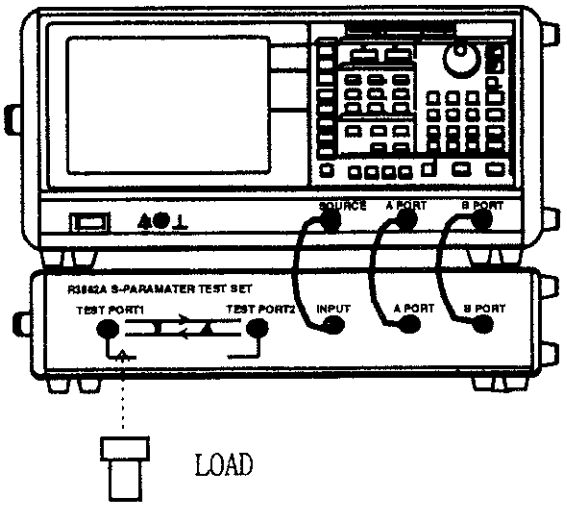
⑨ Average count is displayed at upper left on the screen.

When average count became 64 then execute following set up.

⑨-1 [DISPLAY] [DATA → MEMORY] [DEFINE TRACE [ ]] [DATA — MEMORY]

⑩ Connect cable between A PORT of Network Analyzer and A PORT of S parameter test set.

Disconnect test cable between TEST PORT 1 and TEST PORT 2 and connect load standard to TEST PORT 1.



⑩-1 [AVG] [AVG RESTART]

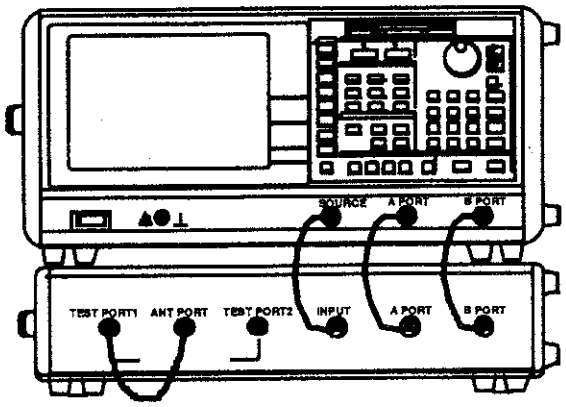
⑪ When average count became 64 then read out isolation value by marker.

Check out	Isolation of TEST PORT 1 and TEST PORT 2	40MHz to 2.6GHz	-90dB
		2.6GHz to 3.8GHz	-85dB
		3.8GHz to 5GHz	-70dB
		5GHz to 8GHz	-60dB

(2) R3963A/B

① Connect with the Network Analyzer for set up the performance test.

② Connect test cable between ANT PORT and TEST PORT 1.



②-1 [CH1] [MEAS] [S21 (B/R)] [TRNS FWD]

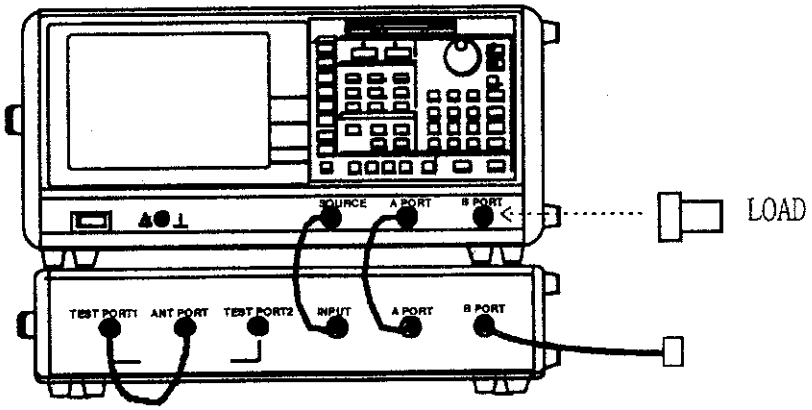
②-2 [SCALE] [/DIV] [1] [0] [X1]

[REF POS] [5] [0] [X1]

[REF VALUE] [-] [9] [0] [X1]

②-3 [CAL] [NORMLIZE (THRU)]

③ Disconnect connected cable to B PORT of Network Analyzer and connect load standard.



③-1 | AVG | AVG COUNT | 6 | 4 | X1 | AVG STATE ON |

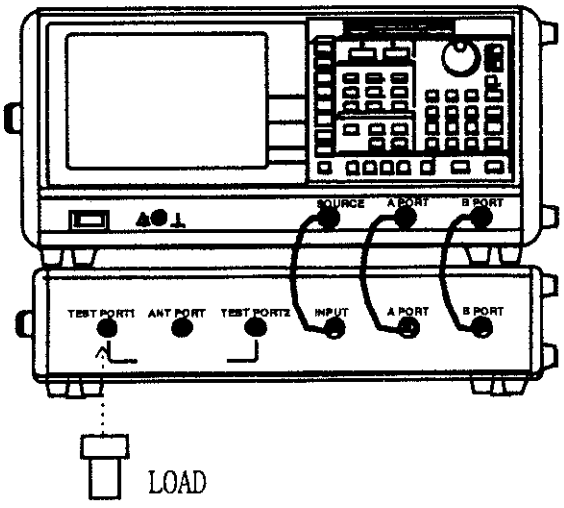
④ Average count is displayed at upper left on the screen.

When average count became 64 then execute following set up.

④-1 | DISPLAY | DATA → MEMORY | DEFINE TRACE [ ] | DATA — MEMORY |

⑤ Connect cable between B PORT of Network Analyzer and B PORT of S Parameter test set.

Disconnect test cable between ANT PORT and TEST PORT 1 and connect load standard to TEST PORT 1.



⑤-1 [AVG] [AVG RESTART]

⑥ When average count became 64 then read out isolation value by marker.

[Check out] Isolation of ANT PORT and TEST PORT 1

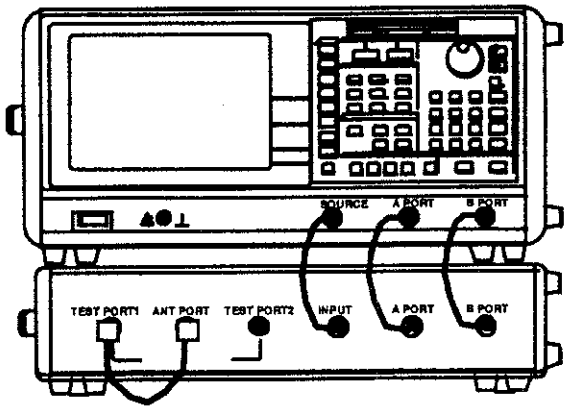
40MHz to 2.6GHz	-90dB
2.6GHz to 3.8GHz	-85dB
3.8GHz to 5GHz	-70dB
5GHz to 8GHz	-60dB

Check out is completed then execute following set up.

⑥-1 [AVG] [AVG STATE OFF]

⑥-2 [DISPLAY] [DEFINE TRACE [DATA-MEN]] [OFF]

⑦ Connect test cable between ANT PORT and TEST PORT 1.



⑦-1 [CH1] [MEAS] [S12 (A/R) TRNS REV]

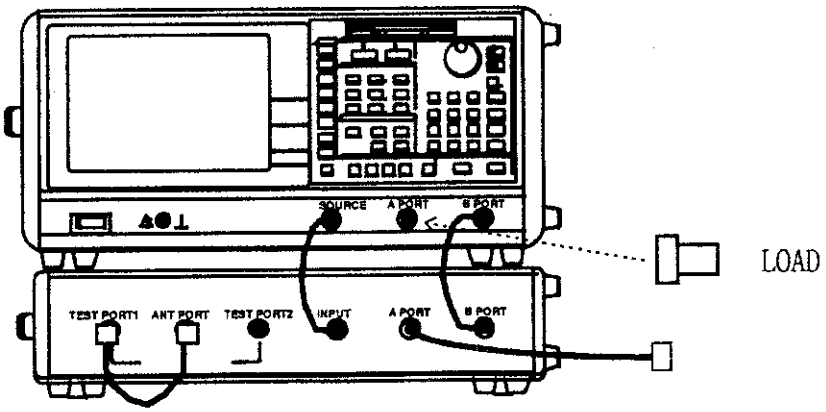
⑦-2 [SCALE] [/DIV] [1] [0] [X1]

[REF POS] [5] [0] [X1]

[REF VALUE] [-] [9] [0] [X1]

⑦-3 | CAL | NORMLIZE (THRU) |

⑧ Disconnect connected cable to A PORT of Network Analyzer and connect load standard.



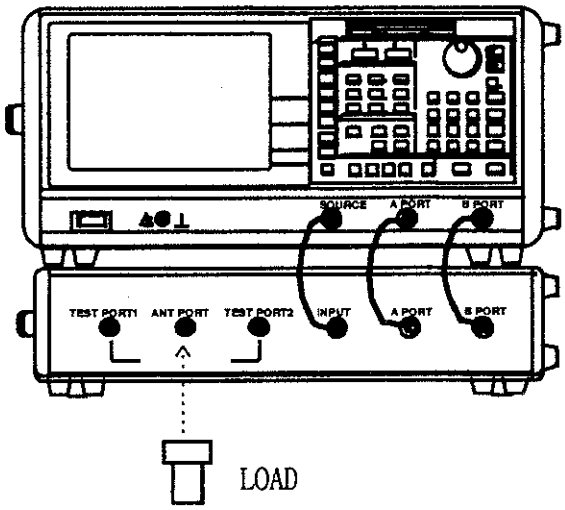
⑧-1 | AVG | AVG STATE ON |

⑨ Average count is displayed at upper left on the screen.
When average count became 64 then execute following set up.

⑨-1 | DISPLAY | DATA → MEMORY | DEFINE TRACE [ ] | DATA — MEMORY |

⑩ Connect cable between A PORT of Network Analyzer and A PORT of S parameter test set.

Disconnect test cable between ANT PORT and TEST PORT 1 and connect load standard to ANT PORT.



⑩-1 [AVG] [AVG RESTART]

⑪ When average count became 64 then read out isolation value by marker.

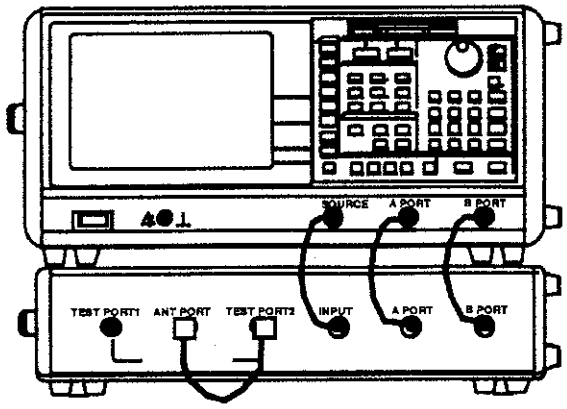
Check out	Isolation of TEST PORT 1 and ANT PORT	40MHz to 2.6GHz	-90dB
		2.6GHz to 3.8GHz	-85dB
		3.8GHz to 5GHz	-70dB
		5GHz to 8GHz	-60dB

Check out is completed then execute following set up.

⑪-1 [AVG] [AVG STATE OFF]

⑪-2 [DISPLAY] [DEFINE TRACE [DATA-MEN]] [OFF]

⑫ Connect test cable between ANT PORT and TEST PORT 2.



⑫-1

CH2	MEAS	S21 (B/R) TRNS FWD

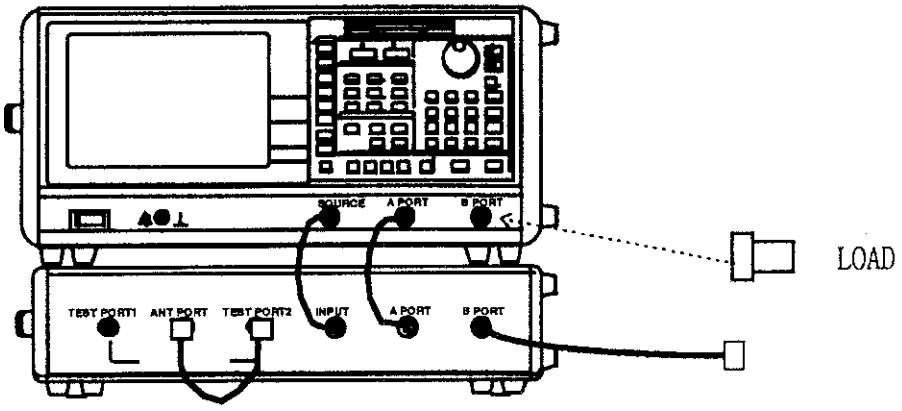
⑫-2

SCALE	/DIV	1	0	X1
REF POS	5	0	X1	
REF VALUE	-	9	0	X1

⑫-3

CAL	NORMLIZE (THRU)

⑬ Disconnect connected cable to B PORT of Network Analyzer and connect load standard.



⑬-1

AVG	AVG COUNT	6	4	X1	AVG STATE ON

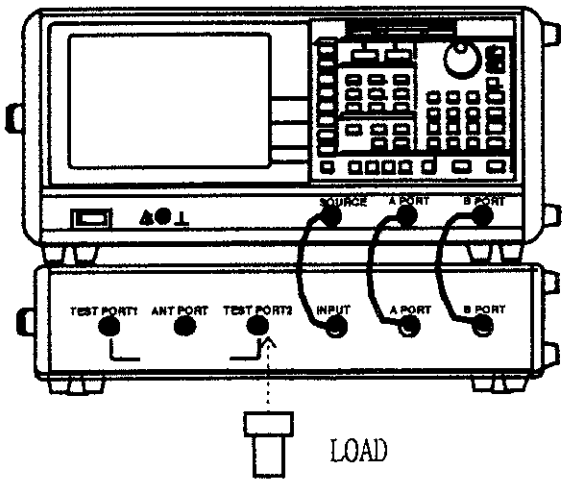
⑭ Average count is displayed at upper left on the screen.

When average count became 64 then execute following set up.

⑭-1 DISPLAY → DATA → MEMORY → DEFINE TRACE [ ] → DATA — MEMORY

⑮ Connect cable between B PORT of Network Analyzer and B PORT of S parameter test set.

Disconnect test cable between ANT PORT and TEST PORT 2 and connect load standard to TEST PORT 2.



⑮-1 AVG → AVG RESTART

⑯ When average count became 64 then read out isolation value by marker.

Check out — Isolation of ANT PORT and TEST PORT 2

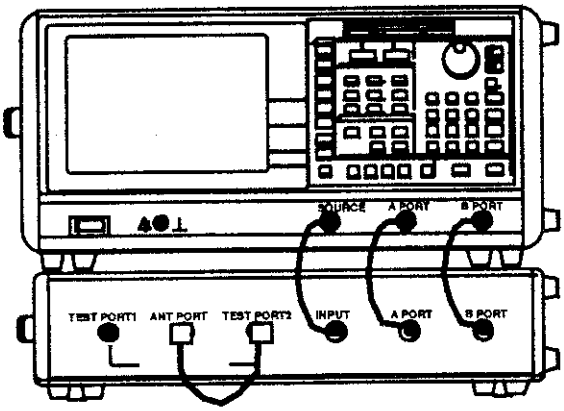
40MHz to 2.6GHz	-90dB
2.6GHz to 3.8GHz	-85dB
3.8GHz to 5GHz	-70dB
5GHz to 8GHz	-60dB

Check out is completed then execute following set up.

⑯-1 AVG → AVG STATE OFF

⑯-2 DISPLAY → DEFINE TRACE [DATA-MEN] → OFF

⑰ Connect test cable between ANT PORT and TEST PORT 2.



⑰-1 | CH2 | MEAS | S12 (A/R) TRNS FWD |

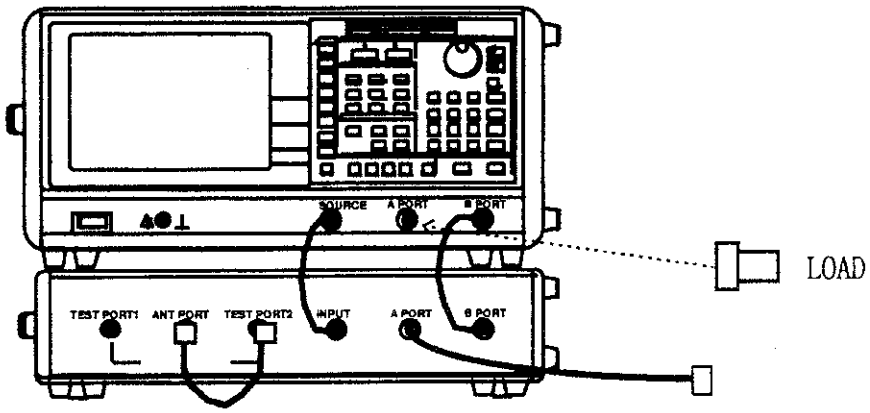
⑰-2 | SCALE | /DIV | 1 | 0 | X1 |

| REF POS | 5 | 0 | X1 |

| REF VALUE | - | 9 | 0 | X1 |

⑰-3 | CAL | NORMLIZE (THRU) |

⑱ Disconnect connected cable to A PORT of Network Analyzer and connect load standard.



⑱-1 | AVG | AVG STATE ON |

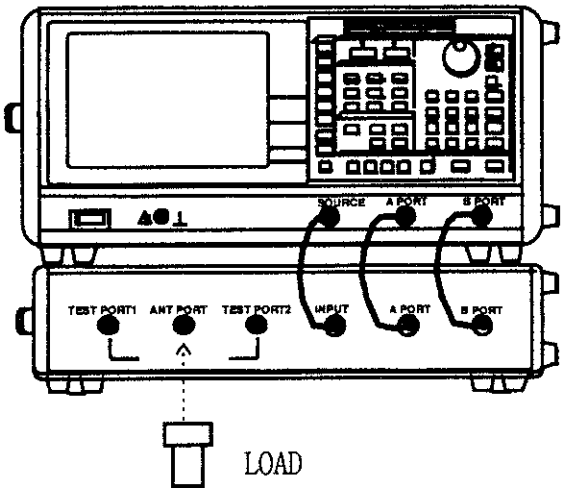
⑲ Average count is displayed at upper left on the screen.

When average count became 64 then execute following set up.

⑲-1 | DISPLAY | DATA → MEMORY | DEFINE TRACE [ ] | DATA — MEMORY |

⑳ Connect cable between A PORT of Network Analyzer and A PORT of S parameter test set

Disconnect test cable between ANT PORT and TEST PORT 2 and connect load standard to ANT PORT.



⑳-1 | AVG | AVG RESTART |

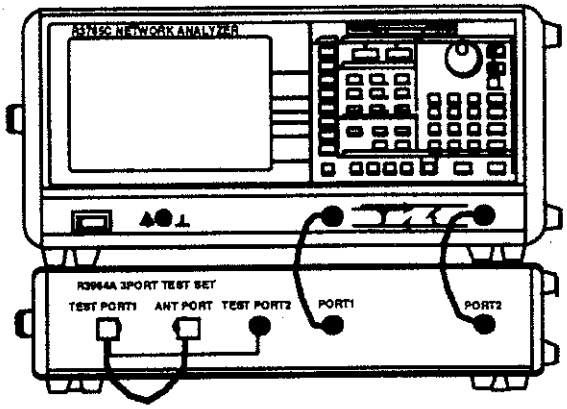
㉑ When average count became 64 then read out isolation value by marker.

Check out	Isolation of TEST PORT 2 and ANT PORT	40MHz to 2.6GHz	-90dB
		2.6GHz to 3.8GHz	-85dB
		3.8GHz to 5GHz	-70dB
		5GHz to 8GHz	-60dB

(3) R3964A/B

① Connect with the Network Analyzer for set up the performance test.

② Connect test cable between ANT PORT and TEST PORT 1.



②-1 CH1 | MEAS | S21 (B/R) TRNS FWD

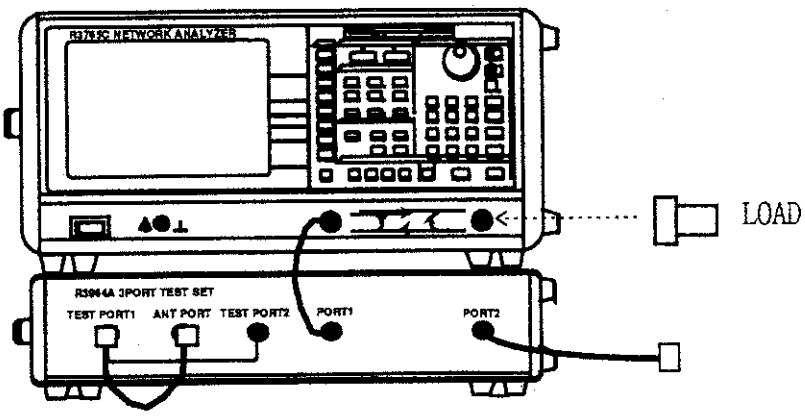
②-2 SCALE | /DIV | 1 | 0 | X1

REF POS | 5 | 0 | X1

REF VALUE | - | 9 | 0 | X1

②-3 CAL | NORMLIZE (THRU)

③ Disconnect connected cable to TEST PORT 2 of Network Analyzer and connect load standard.



③-1 | AVG | AVG COUNT | 6 | 4 | X1 | AVG STATE ON |

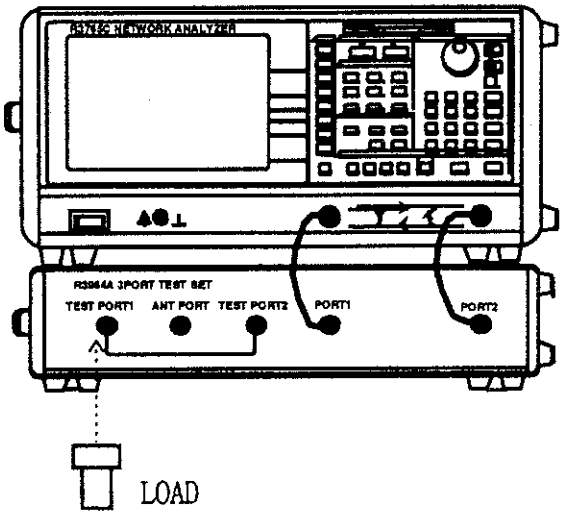
④ Average count is displayed at upper left on the screen.

When average count became 64 then execute following set up.

④-1 | DISPLAY | DATA → MEMORY | DEFINE TRACE [ ] | DATA — MEMORY |

⑤ Connect cable between TEST PORT 2 of Network Analyzer and PORT 2 of S Parameter test set.

Disconnect test cable between ANT PORT and TEST PORT 1 and connect load standard to TEST PORT 1.



⑤-1 | AVG | AVG RESTART |

⑥ When average count became 64 then read out isolation value by marker.

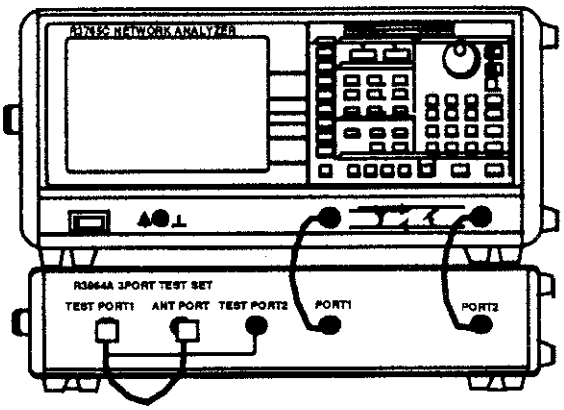
Check out	Isolation of ANT PORT and TEST PORT 1	40MHz to 2.6GHz	-87dB
		2.6GHz to 3.8GHz	-82dB
		3.8GHz to 5GHz	-67dB
		5GHz to 8GHz	-57dB

Check out is completed then execute following set up.

⑥-1 | AVG | AVG STATE OFF |

⑥-2 DISPLAY | DEFINE TRACE [DATA-MEN] | OFF

⑦ Connect test cable between ANT PORT and TEST PORT 1.



⑦-1 CH1 | MEAS | S12 (A/R) TRNS REV

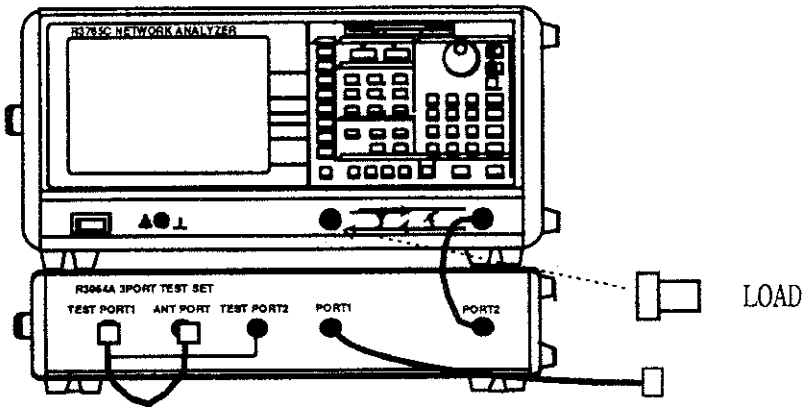
⑦-2 SCALE | /DIV | 1 | 0 | X1

REF POS | 5 | 0 | X1

REF VALUE | - | 9 | 0 | X1

⑦-3 CAL | NORMLIZE (THRU)

⑧ Disconnect connected cable TEST PORT 1 of Network Analyzer and connect load standard.



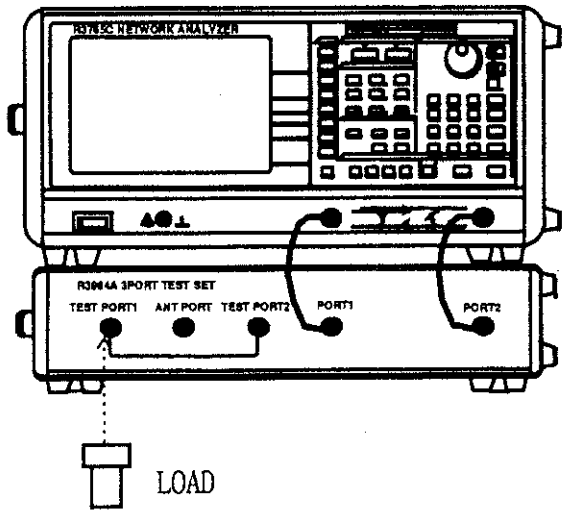
⑧-1 AVG → AVG STATE ON

⑨ Average count is displayed at upper left on the screen.

When average count became 64 then execute following set up.

⑨-1 DISPLAY → DATA → MEMORY → DEFINE TRACE [ ] → DATA — MEMORY

⑩ Connect cable between TEST PORT 1 of Network Analyzer and PORT 1 of S parameter test set. Disconnect test cable between ANT PORT and TEST PORT 1, and connect load standard to TEST PORT 1.



⑩-1 [AVG] [AVG RESTART]

⑪ When average count became 64 then read out isolation value by marker.

[Check out] Isolation of TEST PORT 1 and ANT PORT

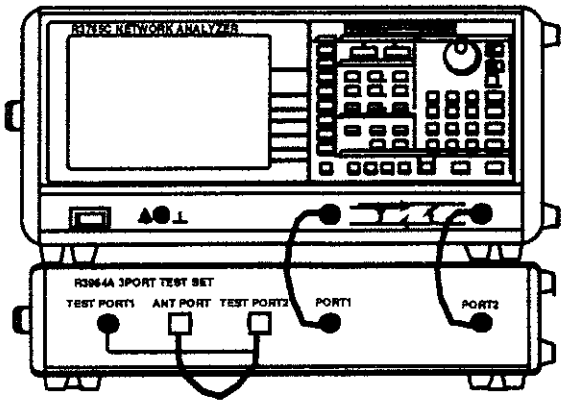
40MHz to 2.6GHz	-87dB
2.6GHz to 3.8GHz	-82dB
3.8GHz to 5GHz	-67dB
5GHz to 8GHz	-57dB

Check out is completed then execute following set up.

⑪-1 [AVG] [AVG STATE OFF]

⑪-2 [DISPLAY] [DEFINE TRACE [DATA-MEN]] [OFF]

⑫ Connect test cable between ANT PORT and TEST PORT 2.



⑫-1 [CH2] [MEAS] [S21 (B/R) TRNS FWD]

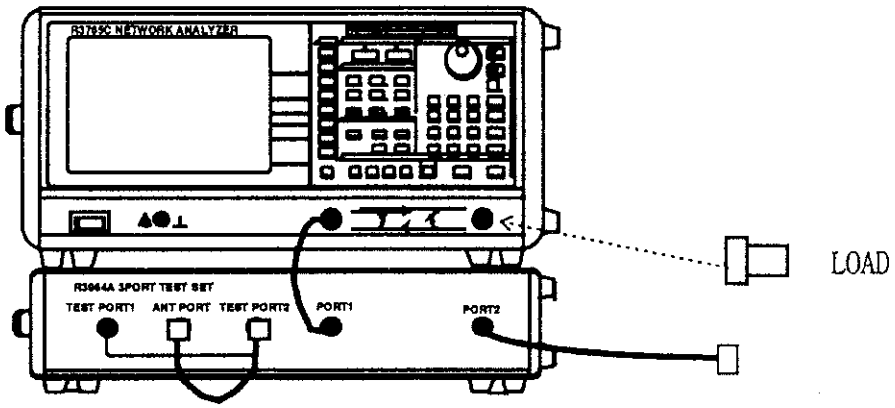
⑫-2 [SCALE] [/DIV] [1] [0] [X1]

[REF POS] [5] [0] [X1]

[REF VALUE] [-] [9] [0] [X1]

⑫-3 [CAL] [NORMLIZE (THRU)]

⑬ Disconnect connected cable TEST PORT 2 of Network Analyzer and connect load standard.



⑬-1

AVG	AVG COUNT	6	4	X1	AVG STATE ON

⑭ Average count is displayed at upper left on the screen.

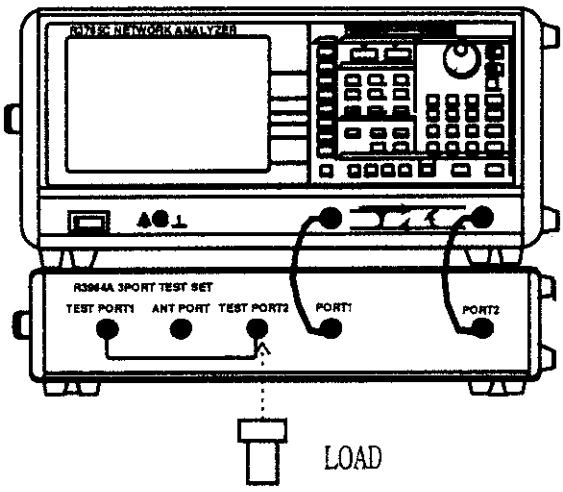
When average count became 64 then execute following set up.

⑭-1

DISPLAY	DATA → MEMORY	DEFINE TRACE [ ]	DATA — MEMORY

⑮ Connect cable between TEST PORT 2 of Network Analyzer and PORT 2 of S parameter test set.

Disconnect test cable between ANT PORT and TEST PORT 2, and connect load standard to TEST PORT 2.



⑮-1 AVG → AVG RESTART

⑯ When average count became 64 then read out isolation value by marker.

Check out — Isolation of ANT PORT and TEST PORT 2

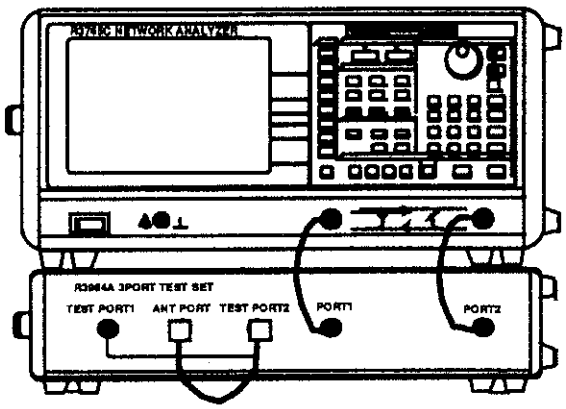
40MHz to 2.6GHz	-87dB
2.6GHz to 3.8GHz	-82dB
3.8GHz to 5GHz	-67dB
5GHz to 8GHz	-57dB

Check out is completed then execute following set up.

⑯-1 AVG → AVG STATE OFF

⑯-2 DISPLAY → DEFINE TRACE [DATA-MEN] → OFF

⑰ Connect test cable between ANT PORT and TEST PORT 2.



⑰-1 CH2 → MEAS → S12 (A/R) TRNS FWD

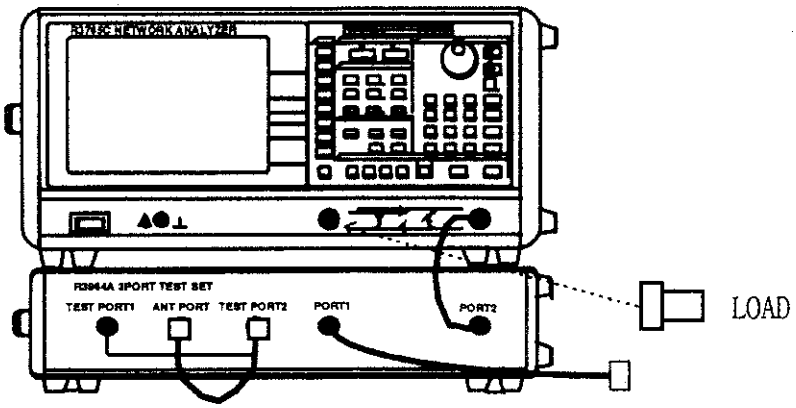
⑰-2 SCALE → /DIV → 1 → 0 → X1

REF POS → 5 → 0 → X1

REF VALUE → - → 9 → 0 → X1

⑰-3 [CAL] [NORMLIZE (THRU)]

⑱ Disconnect connected cable to TEST PORT 1 of Network Analyzer and connect load standard.



⑱-1 [AVG] [AVG STATE ON]

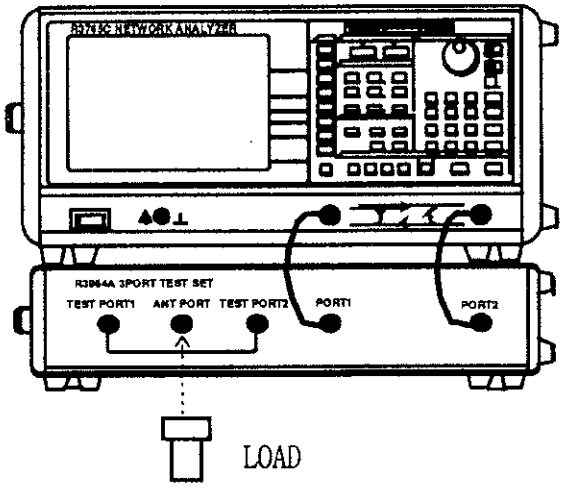
⑲ Average count is displayed at upper left on the screen.

When average count became 64 then execute following set up.

⑲-1 [DISPLAY] [DATA → MEMORY] [DEFINE TRACE [ ]] [DATA — MEMORY]

⑳ Connect cable between TEST PORT 1 of Network Analyzer and PORT 1 of S parameter test set.

Disconnect test cable between ANT PORT and TEST PORT 2, and connect load standard to ANT PORT.



⑳-1 AVG → AVG RESTART

㉑ When average count became 64 then read out isolation value by marker.

Check out	Isolation of TEST PORT 2 and ANT PORT	40MHz to 2.6GHz	-87dB
		2.6GHz to 3.8GHz	-82dB
		3.8GHz to 5GHz	-67dB
		5GHz to 8GHz	-57dB

7 Specifications

7.1 R3962A/B

Items	R3962A/B
Frequency range	40MHz to 8.0GHz
Directivity (25°C±5°C)	30dB (40MHz to 2.6GHz) 26dB (2.6GHz to 3.8GHz) 22dB (3.8GHz to 8.0GHz)
Test port load match (25°C±5°C)	18dB (40MHz to 2.6GHz) 16dB (2.6GHz to 3.8GHz) 14dB (3.8GHz to 8.0GHz)
Frequency characteristic Transmission amplitude TEST PORT1 to TEST PORT2 Reflection amplitude TEST PORT1 TEST PORT2	 Typical 3dBp-p Typical 4dBp-p Typical 4dBp-p
Insertion loss INPUT to TEST PORT1, 2 TEST PORT1 to A PORT TEST PORT2 to B PORT	 Typical 9dB Typical 15dB Typical 15dB
RF damage level	+21dBm max
Maximum port bias	±30VDC, 0.5A (except the R3962B)
Isolation ANT PORT to TEST PORT1 ANT PORT to TEST PORT2	 90dB (40MHz to 2.6GHz) 85dB (2.6GHz to 3.8GHz) 70dB (3.8GHz to 5.0GHz) 60dB (5.0GHz to 8.0GHz)
Operating condition	Temperature 0°C to +50°C Relative humidity 80% or less (Non-condensing)
Storage temperature	-20°C to +60°C
Programming and remote control	All of the functions can be controlled by R3765A or R3767A. GPIB interface of R3765A and R3767A for remote control is in common.
Power	Power is supplied from R 3765A or R3767A
Mass	Less than 5 kg
Dimensions	R3962A: Approximately 424(Width) × 88(Height) × 400(Length) mm R3962B: Approximately 250(Width) × 80(Height) × 165(Length) mm

7.2 R3963A/B

* for 2 port full calibration

Items	R3963A/B
Frequency range	40MHz to 8.0GHz
Directivity (25°C±5°C) ANT PORT TEST PORT1, 2	 Typical 30dB * Typical 40dB (40MHz to 2.6GHz) Typical 29dB * Typical 32dB (2.6GHz to 3.8GHz) Typical 25dB * Typical 26dB (3.8GHz to 8.0GHz) Typical 15dB * Typical 40dB (40MHz to 2.6GHz) Typical 20dB * Typical 32dB (2.6GHz to 3.8GHz) Typical 8dB * Typical 26dB (3.8GHz to 8.0GHz)
Test port load match (25°C±5°C) ANT PORT TEST PORT1, 2	 Typical 25dB * Typical 40dB (40MHz to 2.6GHz) Typical 20dB * Typical 32dB (2.6GHz to 3.8GHz) Typical 14dB * Typical 26dB (3.8GHz to 8.0GHz) Typical 18dB * Typical 40dB (40MHz to 2.6GHz) Typical 20dB * Typical 32dB (2.6GHz to 3.8GHz) Typical 14dB * Typical 26dB (3.8GHz to 8.0GHz)
Frequency characteristic Transmission amplitude ANT PORT → TEST PORT1 ANT PORT → TEST PORT2 Reflection amplitude ANT PORT TEST PORT1 TEST PORT2	 Typical 3dBp-p Typical 3dBp-p Typical 4dBp-p Typical 6dBp-p Typical 6dBp-p
Insertion loss INPUT to ANT PORT INPUT to TEST PORT1, 2 ANT PORT to A PORT TEST PORT1, 2 to B PORT	 Typical 9dB Typical 12dB Typical 15dB Typical 18dB
RF damage level	+20dBm max
Isolation ANT PORT to TEST PORT1 ANT PORT to TEST PORT2	 90dB (40MHz to 2.6GHz) 85dB (2.6GHz to 3.8GHz) 70dB (3.8GHz to 5.0GHz) 60dB (5.0GHz to 8.0GHz)
Operating condition	Temperature 0°C to +50°C Relative humidity 80% or less (Non-condensing)
Storage temperature	-20°C to +60°C
Programming and remit control	All of the functions can be controlled by R3765A or R3767A. GPIB interface of R3765A and R3767A for remote control is in common.
Power	Power is supplied from R 3765A or R3767A
Mass	Less than 5 kg
Dimensions	R3963A: Approximately 424(Width)×88(Height)×400(Length)mm R3963B: Approximately 250(Width)×80(Height)×165(Length)mm

7.3 R3964A/B

Items	R3964A/B
Frequency range	40MHz to 8.0GHz
Insertion loss PORT1 to ANT PORT PORT2 to TEST PORT1 PORT2 to TEST PORT2	 Typical 2dB Typical 4dB Typical 4dB
RF damage level	+20dBm max
Isolation ANT PORT to TEST PORT	 87dB (40MHz to 2.6GHz) 82dB (2.6GHz to 3.8GHz) 67dB (3.8GHz to 5.0GHz) 57dB (5.0GHz to 8.0GHz)
Operating condition	Temperature 0°C to +50°C Relative humidity 80% or less (Non-condensing)
Storage temperature	-20°C to +60°C
Programming and remit control	All of the functions can be controlled by R3765C or R3767C. GPIB interface of R3765C and R3767C for remote control is in common.
Power	Power is supplied from R 3765C or R3767C
Mass	Less than 5 kg
Dimensions	R3964A: Approximately 424(Width) × 88(Height) × 400(Length) mm R3964B: Approximately 250(Width) × 80(Height) × 165(Length) mm

ALPHABETICAL INDEX

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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.

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