ADVANTEST.

ADVANTEST CORPORATION

R3753H Series

Network Analyzer

Operation Manual

MANUAL NUMBER FOE-8324176C00

Applicable models

R3753AH
R3753BH
R3753EH

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
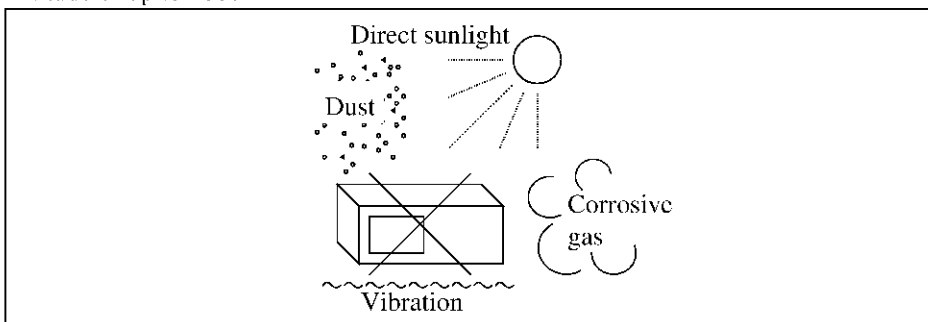- Altitude of up to 2000 m

Figure-1 Environmental Conditions
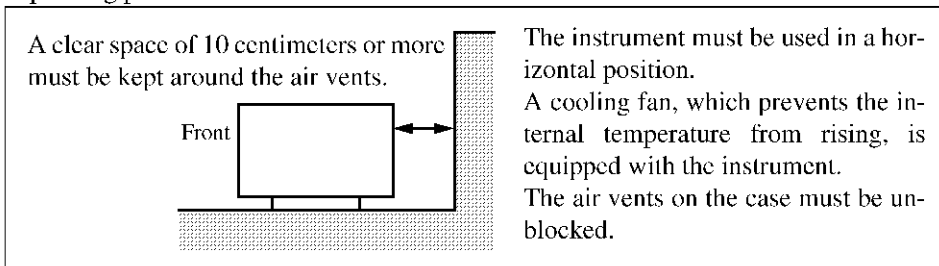
- Operating position

A clear space of 10 centimeters or more must be kept around the air vents.

Front

The instrument must be used in a horizontal position.
A cooling fan, which prevents the internal temperature from rising, is equipped with the instrument.
The air vents on the case must be unblocked.

Figure-2 Operating Position

- Storage position

Front

This instrument should be stored in a horizontal position.
When placed in a vertical (upright) position for storage or transportation, ensure the instrument is stable and secure.

-Ensure the instrument is stable.
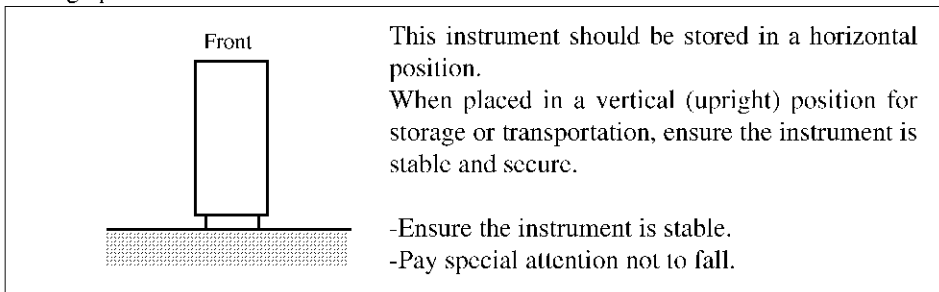-Pay special attention not to fall.

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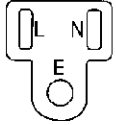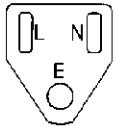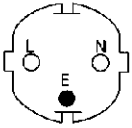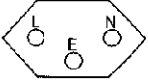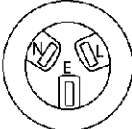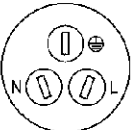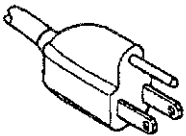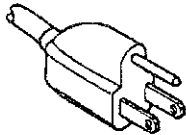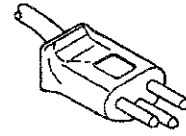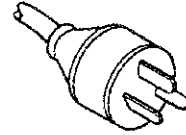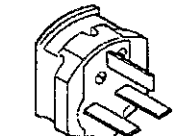
Plug configuration	Standards	Rating, color and length	Model number (Option number)
	PSE: Japan Electrical Appliance and Material Safety Law	125 V at 7 A Black 2 m (6 ft)	Straight: A01402 Angled: A01412
	UL: United States of America CSA: Canada	125 V at 7 A Black 2 m (6 ft)	Straight: A01403 (Option 95)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

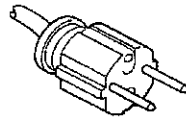Order power cable options by Model number.

	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

<In the Beginning>

This manual explains all processes from the acceptance to actually operation of network analyzer R3753H series. The manual of three volumes related about the R3753H series is shown in the following.

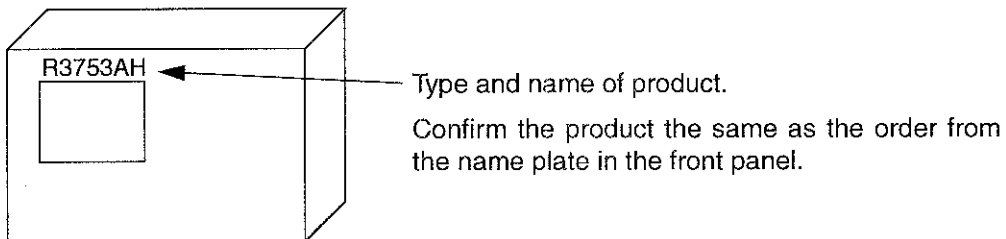| Manual	Outline	Remarks
1. R3753H Series Network Analyzer Operation Manual (this manual)	This manual explains the following related to the R3753H series. • Operation methods • Functions and their descriptions • Measurement method • Other information	Standard attachment
2. R3752/53H Series Network Analyzer Programming Manual (separate volume)	GPIB and built-in BASIC are explained.	Standard attachment
3. R3752/53/64/65/66/ 67H Series Network Analyzer Programming Guide (separate volume)	The creation and execution of BASIC program with the editor are explained.	Standard attachment

<Caution>

ADVANTEST reserves the right to change the contents of this manual and other product information without notice.

Do not reproduce or reprint all or part of this manual without the permission of ADVANTEST Corporation. The address and the telephone number of ADVANTEST Corporation are described in the end of this manual. Refer to the inquiry and so forth.

<Confirmation of Product and Attachment>

When you open packing, confirms the following in the beginning.
If any flaw, damage and shortage in the product or the attachment, etc., is found, contact the nearest dealer or the sales and support office.

(1)   Product main unit

Type and name of product.

Confirm the product the same as the order from the name plate in the front panel.

(2)   Standard attachment lists.

Note: Order the addition of the attachment etc. with type name or stock No.

Name of articles	Type name	Parts code	Quantity	Remarks
Power cable	A01402	DCB-DD2428X01	1	3 pins plug
		JCD-AL003EX03	1[*1]	AC adapter
BNC-BNC cable	——	DCB-FF4894X01	2	30cm
	——	DCB-FF4894X04	1[*3]	60cm
BNC through connector	BNC-A-JJ	JCF-AB001EX05	1	
Fuse	——	DFT-AA6R3A	2	T6.3A/250V
Operation Manual	——	JR3753H	1[*2]	Japanese
	——	ER3753H		English
Programming Manual	——	JR3752/53H (PM)	1[*2]	Japanese
	——	ER3752/53H (PM)		English
Programming Guide	——	JR3752/64H (PG)	1[*2]	Japanese
	——	ER3752/64H (PG)		English
Editor install disk	——	PR37670001-FK	1	HD 1.44M bytes
Sample program disk	——	PR37670003-FJ	1	DD 720K bytes

*Note: [*1] : The AC adaptor is a standard attachment only to Japan-domestic.*
*[*2] : Japanese or English is one volume.*
*[*3] : Don't be attached to model R3753EH.*

<How to read this manual>

(1)   Organization of this manual

Configuration		Remarks
Preface	In the beginning. Confirmation of the product and components.	Necessary to read before the first use of R3753H series.
Contents	The configuration and the page of description.	Use it to find needed information easily.
1.	Necessary information before begins to measure-installation, setup, cleaning, transportation and storage. The general remarks	
2.	Explanation of front/rear panel and display screen. Name, functions and operations of front/rear panel components. Contents of display screen	The usage of R3753H series can be understood by reading it through.
3.	Basic operating guidelines Actual example of operation	
4.	Function descriptions	It is a chapter of practice.
5.	Performance test Method of confirming performance of catalog spec. of R3753H series	Refer if necessary.
6.	Specifications Technical information and general information	
7.	Error message	
Appendix	Initial setting Soft key menu list Externals figures	
Index	Associated word and the description page	Use it to find needed information easily.
Others	External figures.	Use it to find the outer dimensions.

(2)   Mark of caution level in this manual.

DANGER!
Uses it for the case with the possibility of the body trouble and the death.

WARNING!
Uses for the remarks concerned with the safety of the body.

CAUTION!
Uses for the remarks of the damage or fire of the machine equipment, or for the restriction of use.

REFERENCE
Information helpful to you.

Note: Uses to explain for the supplementation.

(3)   Distinction of panel key and soft key in this manual.

Panel key:

(Example)   **[MENU], [SPAN]**

Soft key:

(Example)   *{△MODE MENU}, {△MODE OFF}*

(4)   This manual has the page attaching the sign of (*) to the upper right of the pagination.

The sign of (*) informs the final page of each chapter.
(Pagination: Page number in the margin is called "pagination".)

TABLE OF CONTENTS

1   GETTING STARTED

1.1   About the R3753H Series

1.1.1   Product Description

R3753H series is the 500MHz vector network analyzer, which has newly been designed based on a concept "an optimum tool for each application".

We have fully pursued high throughput such as 0.1ms/points high-speed measurement at a resolution bandwidth (RBW) of 10kHz, 115dB wide dynamic-range measurement, and two-device simultaneous measurement with two-channel/four-trace display. Also, we have added the program sweeping function that can freely change the resolution bandwidth (RBW), output level, and input attenuator during sweep operation for each segment.

Since the R3753H series employs semiconductor switches for changing the output level and for switching the input attenuator, it allows the optimum high-speed level sweeping for the drive level test of the oscillator.

With the built-in BASIC controller, a high-speed ATE system can be easily configured with no external controller for processes from adjustment to inspection.

<Features>

(1)   High throughput

- 0.1ms/point high-speed frequency sweeping and 5ms short blanking time
  When two-channel /four-trace (magnitude/phase) and RBW 10kHz
- 0.1ms/point high-speed level sweeping
  High speed and long life using semiconductor switches

(2)   Wide dynamic range

- With automatic switching of input attenuator, 115dB wide dynamic range
  High speed and long life using semiconductor switches for switching input attenuator

(3)   Program sweeping function

- For each segment, allows setting of frequency, output level, input attenuator, RBW and settling time.

(4)   MS-DOS format disk

- By using an MS-DOS personal computer, it is possible to easily create programs and analyze data because of the disk conformed to MS-DOS format standard.
- Three modes of storage capacity available (DD 720KB, HD 1.2MB and HD 1.44MB)

1.1.2 Overview

(1)   Signal source

The range of signal output is 5Hz to 500MHz and the range of output power is +21dBm to -63dBm.

(2)   Receiver

Signals in the receiver flow as follows:

①   5Hz to 500MHz input signal is converted into 820kHz 1st IF signal by the 1st Mixer and transferred to the 2nd Mixer.

②   The 1st IF signal is converted into 20kHz 2nd IF signal by the 2nd Mixer and output to the A/D circuit.

③   The A/D-converted data is calculated at a high speed by the digital signal processor (DSP) and displayed on the display.
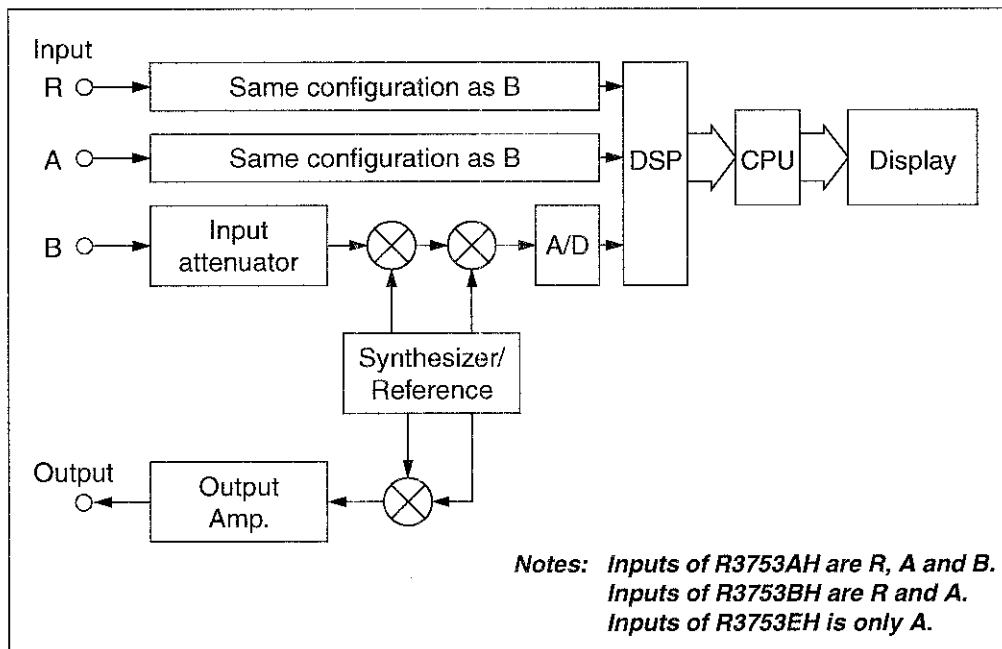
Figure 1-1 Diagram of Receiver

1.1.3 Data Flow

The signal input in the receiver is processed according to the following flow:
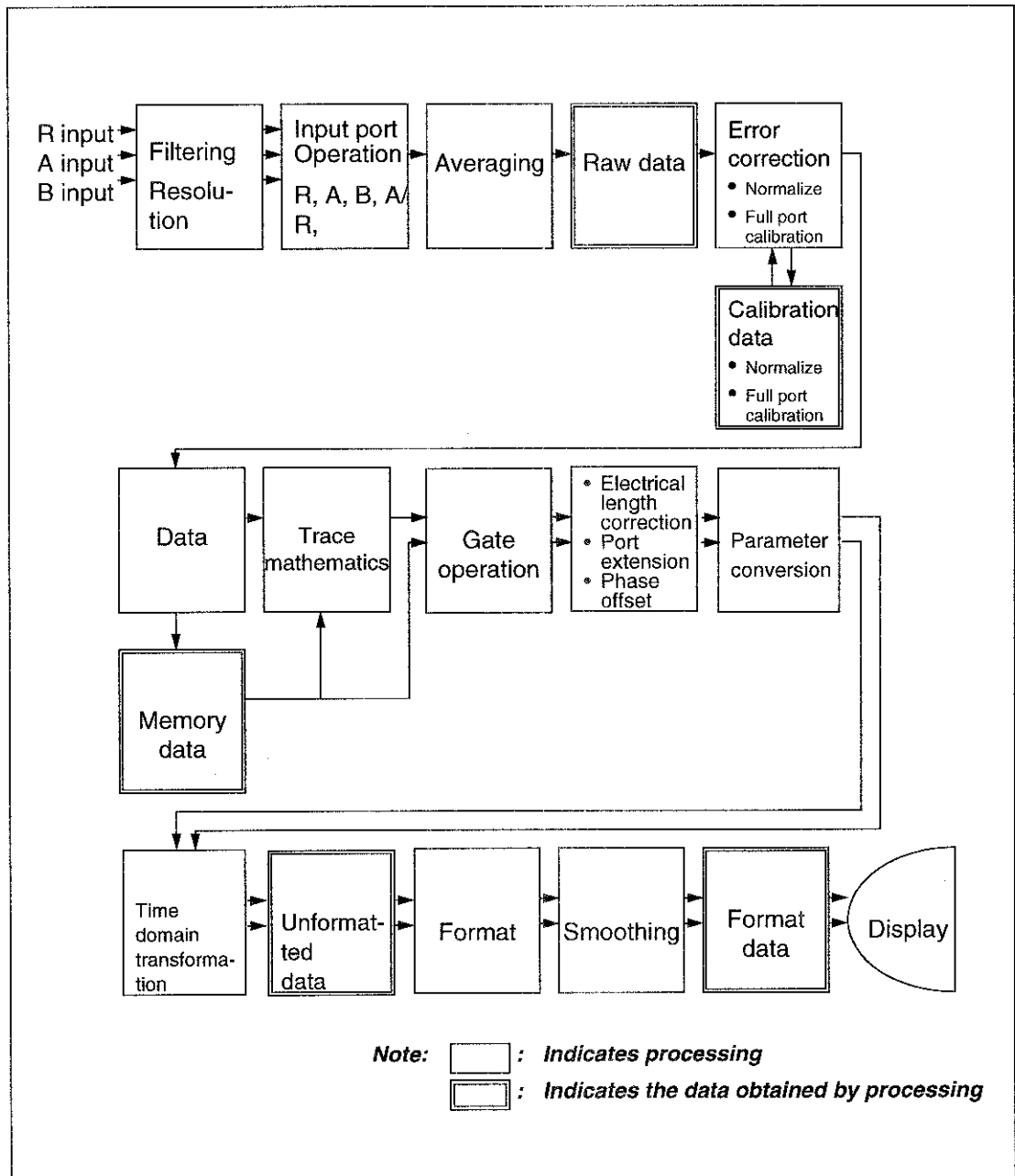
Figure 1-2 Data Flow

1.2   Environmental Conditions

* Operating Environment
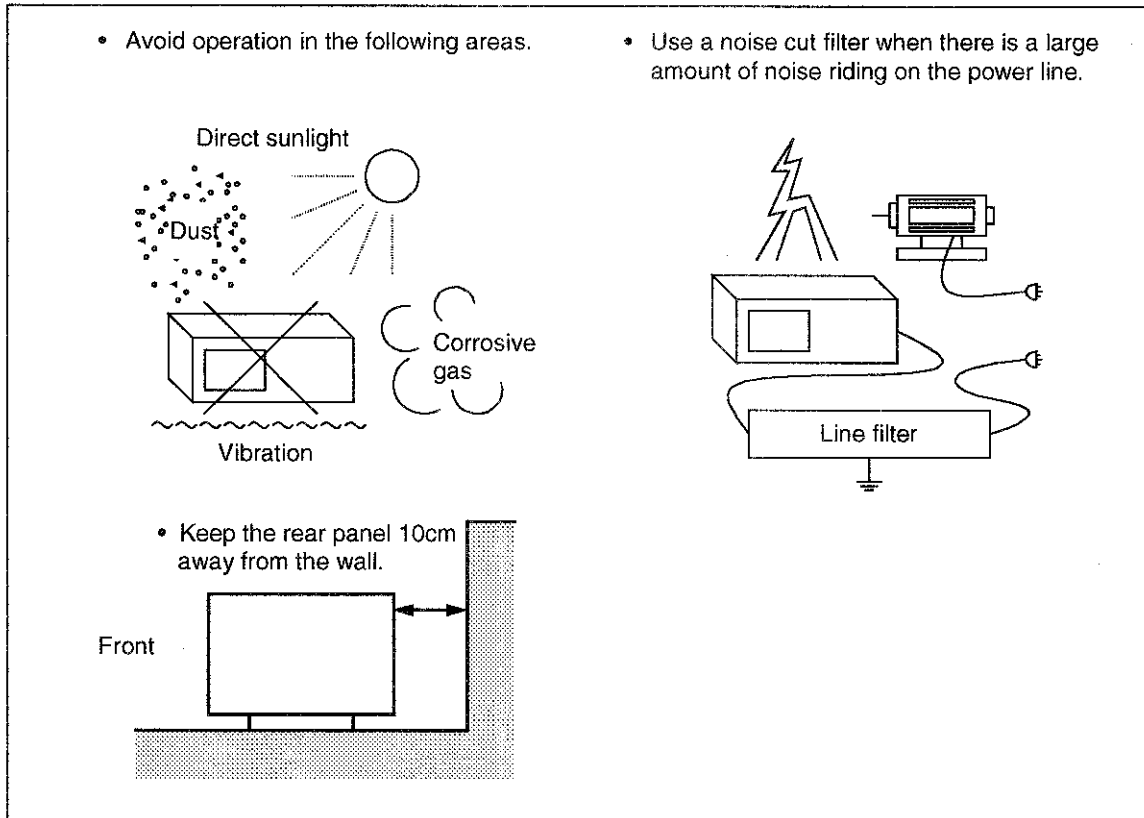
Figure 1-3 Operating Environment

The R3753H series should be installed in an area which satisfies the following conditions:

* Ambient temperature: 0°C to +50°C (operating temperature)

* Relative humidity: RH 85% or less (no condensation)

* An area free from corrosive gas

* An area away form direct sunlight

* A dust-free area

* An area free from vibrations

* A low noise area
  Although the R3753H series has been designed to withstand a certain amount of noise riding on the AC power line, it should be used in an area of low noise. Use a noise cut filter when ambient noise is unavoidable.

* Installation position
  The R3753H series has an air outlet hole on its rear panel. Never block or plug the hole, as the resulting internal temperature rise will affect measurement accuracy.

1.3 Power Supply Description

1.3.1 Power Supply Specifications

WARNING!
Safely use R3753H series according to the power requirement.
R3753H series might be damaged in the case not following the power requirement.

The power requirement of R3753H series is shown in the following.
Use the power supply by which the power requirement of R3753H series is satisfied.

Input Voltage	$100V_{AC}$ operation	$200V_{AC}$ operation
	AC100V - 120V	AC220V - 240V
Frequency	48Hz - 66Hz	
Fuse	T6.3A/250V	
Power consumption	300VA or less	

* This input voltage is automatically changed between $100V_{AC}$ system and $200V_{AC}$ system. The above input voltage is the standard of the R3753H series. The available range of the AC power is 90-132V and 198-250V.

1.3.2 Replacing the Power Fuse

WARNING!
Use the power fuse of the standard by which power supply voltage is satisfied.

The power fuse is located in the power connector on the rear panel.
Check or replace the power fuse as follows.

To take out the fuse in the power connector on the rear panel.

Use Only With A 250V Fuse

Draw it out by using the minus driver.

To restore the fuse after confirmed or exchanged.

Standard of fuse T6.3A/250V
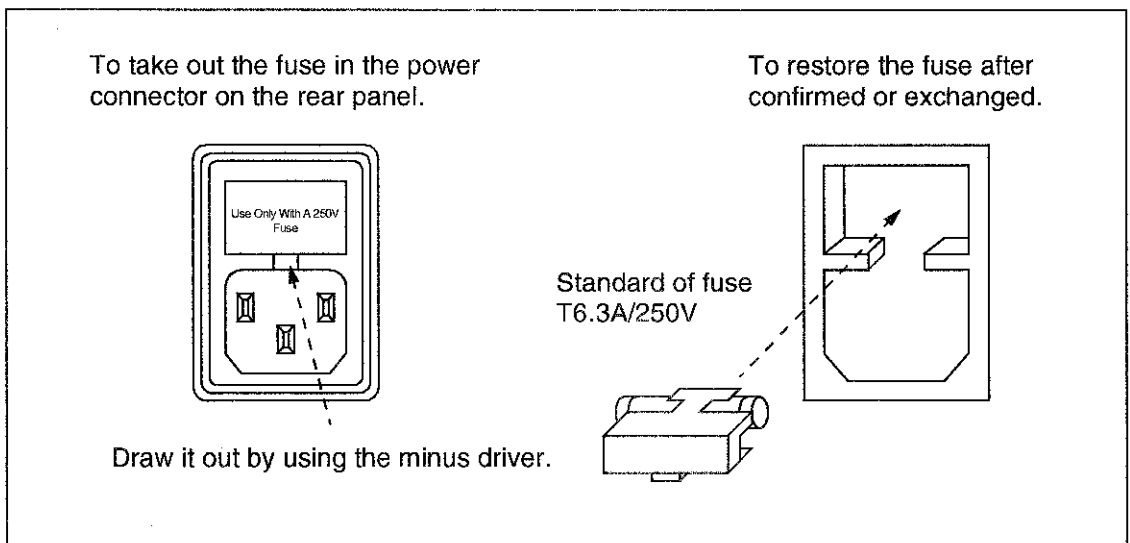
Figure 1-4 Check or Replace of Fuse

1.3.3   Connection the Power Cable

WARNING!
1. *Power cable*
   * *Use power cable of the attachment for prevention electric shock and fire.*
     A standard attachment conforms to The Low on Electrical Appliances of Japan.
   * *Use power cable in accordance with the safety standard of the country for use excluding Japan.*
   * *When you connect power cable with the outlet, turn off the power switch.*
   * *When you pull out power cable from the outlet, have the plug.*

2. *Protective earth*
   * *Connect the power plug cable with the power outlet which has the protective earth terminal.*
   * *If the code for the extension without the protective earth terminal is used, the protective earth will become invalid.*
   * *Case in which use of AC adapter (Three pins to two pins conversion adapter), connect the earth pin of the adapter to the earth of the outlet, or connect ground terminal of the rear panel with the earth of the outside, and ground it to the earth.*

(1)   Power plug and cable

Since 3-core power receptacles are rare in Japan, a 3-pin to 2-pin adaptor (AC adapter) is attached to the R3753H series. Be sure to connect the ground pin of the adapter to the ground line when connecting the power cable to a receptacle with this conversion adapter.

To AC power receptacle   AC adapter
                                Ground pin
                                Power cable with 3-pin plug
                                To the instrument
Connect this pin to the ground line
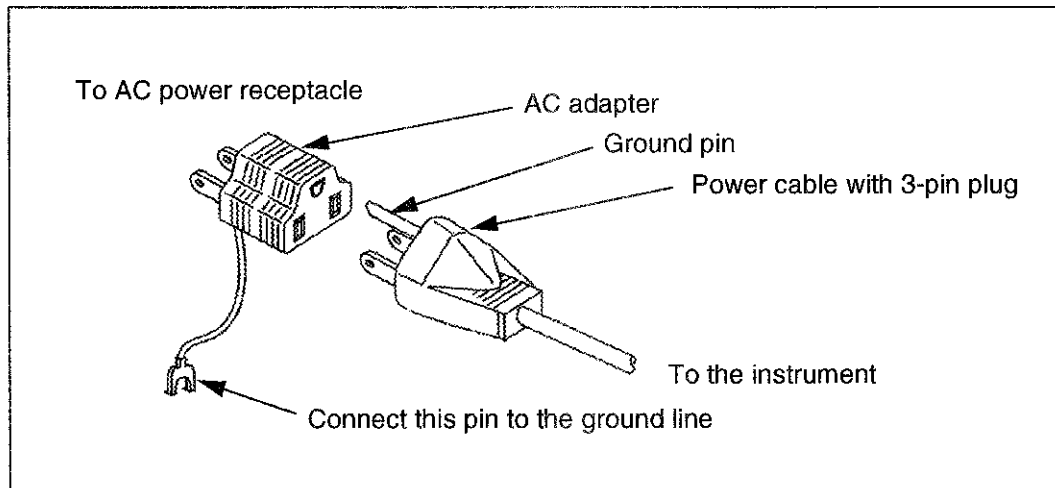
Figure 1-5 Power Cable and AC Adapter

(2)   Power plug for overseas use

A separately-sold plug for overseas use is available. For more information, contact ADVANTEST's Service Department.

1.4 FET Probe

(1) Setup
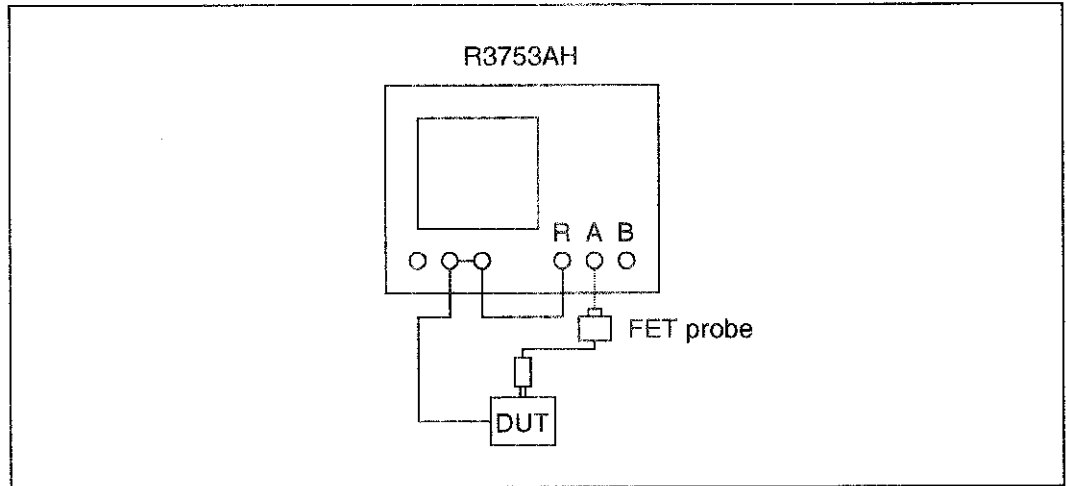
Figure 1-6 Connecting FET Probe to R3753AH (Case of measurement)

(2) Usage precautions

The stability and repeatability of the measurement value are affected by the ground of FET probe tip.
The input impedance of the FET probe is listed in the following Table. In high frequency, it is necessary to consider the effect of parallel capacitance.

Model name	Input impedance	Remarks
P6201 type	100kHz ± 1% parallel 3.0PF Attenuator head 1MΩ ± 1%, 1.5PF or less in parallel.	DC to 900MHz Manufactured by SONY Tektronix
P6202A type	10MΩ ±2% Approx. 2PF Approx. 4PF with the optional coupling cap	DC to 500MHz Manufactured by SONY Tektronix

(3) Calibration method

Operation procedure

① Connect the FET probe to the measurement circuit reference point.
② Select the calibration menu of the R3753H series to normalize the frequency characteristic probe.
③ Connect the FET probe to the point to be measured, then perform the measurement.

Note: *When measuring the point in high frequency, note that the data repeatability will be changed by the ground condition of the FET probe tip.*

1.5 System Setup Cautions

1.5.1 Notes on the Use of Parallel I/O Ports

(1) In +5V power output from parallel I/O port, maximum current capacity is 100mA.
Use it within 100mA.

(2) In +5V power output from parallel I/O port, there is a fuse.
The fuse fuses with the over current of 100mA or more.
In the case with which the fuse fuses, contact to the nearest dealer or the sales and support offices.

(3) Use the shield cable for the cable for parallel I/O port. (to prevent malfunction by noise)

(4) The standard of the cable for the radiation test of R3753H series is MO-27.

(5) Cautions of wiring
Do not bundle I/O cable and the AC line.

1.5.2 Notes on the Use of Serial I/O Ports

(1) The length of the cable used for serial I/O port is 15m or less.

(2) Use the shield cable for the cable for serial I/O port. (to prevent malfunction by noise)

(3) The standard of the cable used for the radiation test of R3753H series is A01235.

(4) Cautions of wiring upper
Do not bundle I/O cable and the AC line.

1.6 Input Signal Level Overload Cautions

A maximum level that can be measured at the input part is 0dBm. (When an input attenuator is set to 20dB)
If a signal with its level 0dBm and more is added to the input, some messages are displayed.

(1) If a signal with its level 0dBm or more and with its frequency 100kHz or more is added to the input, "Overload" is displayed.
When a signal with its level less than 0dBm and with its frequency less than 100kHz is added to the input, "Overload" is also displayed. However, the signal measurement is correctly carried out.

(2) If a signal having much more level than (1) is added to the input, "Overload Trip" is displayed and the input impedance is automatically switched to 1MΩ.
Decrease the input level and then release the trip.
(The level in which the input impedance is switched to 1MΩ depends on the input frequency.)

1.7 Cautions in Setting Up an Output Power

It is possible to set the output power in the range of -63dBm to +21dBm, but a 20dB attenuator is connected by an internal input relay at -43.1dBm or more.
The operating life of this relay is rated at one million times.
Take care of the operating life if the relay is continuously switched.
The relay switch does not work in the output power range of +21dBm to -43.0dBm and of -43.1dBm to -63.0dBm.

1.8 Cleaning, Storage and Transportation

(1) Cleaning

Wipe the dirt of R3753H series off with a soft cloth (or wet cloth). At this time, attend to the following points.
- Do not remain the fluff of the cloth and do not soak water into the internal of R3753H series.
- Do not use an organic solvent (for example, benzene and acetone, etc.) which changes plastics in quality.

(2) Storage

The cases in which R3753H series is not used for a long time, cover with the vinyl cover or put in the cardboard box and prevent dust. Keep it in a dry place where dust and direct sunshine were prevented.
Storage temperature: -20°C to +60°C

(3) Transportation

When you transport R3753H series, pack it equally to the first packing material or any more.

Packing procedure.

① Wrap R3753H series itself with cushion material and put in the cardboard box.

② After putting attachment, put cushion again.

③ Shut the lid of the cardboard box. Fix the outside with the string or tape.

1.9 Notes on Use

(1) Before starting the measurement

When turning on the power, don't connect DUT.
Before starting the measurement, check to see the output power level.

(2) Removing of case

Do not open the case to one except service man of our company.

(3) When abnormality occurs

When smoke rises from R3753H series, smell nastily, or hear unusual sound feel, turn off the power switch. Pull out power cable from the outlet. And contact to our company.
The address and the telephone number of our company are in the end of this manual.

(4) Electromagnetic interference

High frequency noise of the small power is generated at R3753H series use.
Therefore, electromagnetic interference is generated to the television or the radio by an improper installation and use of R3753H series.
If the power of R3753H series is turned off, and the electromagnetic interference is reduced, then R3753H series is the cause of it.
Prevent electromagnetic interference by the following procedure.
* Change the direction of antenna of the television or the radio.
* Place R3753H series the other side of the television or the radio.
* Place R3753H series away from the television or the radio.
* Use another line of power source for the television or the radio than R3753H series.

2   PANEL DESCRIPTION

The front-panel is explained in section 2.1.
The front-panel screen-display is explained in section 2.2.
The rear-panel is explained in section 2.3.

2.1   Front Panel Descriptions
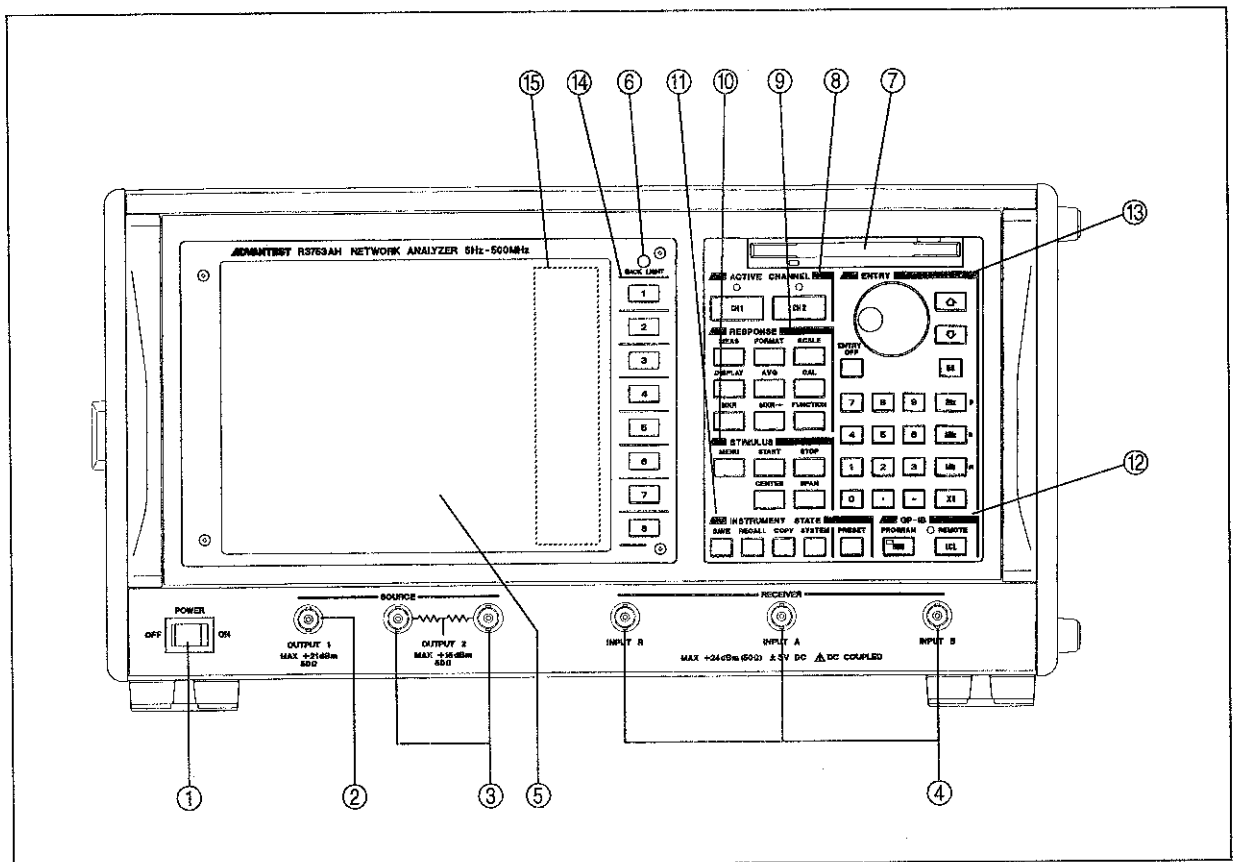
Figure 2-1 Front-Panel Descriptions (R3753AH)

(1 of 2)

No.	Name	Description
①	POWER switch	Turns on or off the power supply of the R3753H series.
②	SIGNAL SOURCE OUTPUT connector (OUTPUT1)	Single output The OUTPUT connector is used to perform a measurement by connecting 3-branch power splitter for absolute measurement or 2-device measurement.
③	SIGNAL SOURCE OUTPUT connector (OUTPUT2)	Power splitter output
④	RECEIVER SECTION INPUT connector INPUT R INPUT A INPUT B	The INPUT connector is used for reference input and measurement input. *Note: The input connector differs according to models.* R3753AH: INPUT A, B, R R3753BH: INPUT A, R R3753EH: INPUT A
⑤	LCD display	Displays measurement data, setting conditions and other informations.
⑥	BACK LIGHT	Selects the back light ON/OFF of LCD display.
⑦	Floppy disk drive	Stores a program and measurement data. Three modes of storage capacity (DD: 720KB, HD: 1.2MB, HD: 1.44MB).
⑧	ACTIVE CHANNEL block	The ACTIVE CHANNEL block is used to select an active channel between independently two measurement channels. After selecting, functions to be operated are effective to the selected active channel.
⑨	RESPONSE block	The RESPONSE block is used to set measurement conditions of receiver section, data display and data analysis.
⑩	STIMULUS block	The STIMULUS block is used to set frequencies, level and sweep conditions of signal source.
⑪	INSTRUMENT STATE block	The INSTRUMENT STATE block is used set the system functions which have no concern with the measurement.
⑫	GPIB block	The GPIB block is used to set a GPIB and controller functions.

(2 of 2)

No.	Name	Description
⑬	ENTRY block	The ENTRY block is used to input numeric data and to move a marker.
⑭	Soft keys	Selects the soft key menu described in ⑮ in each function block.
⑮	Soft key menu	Displays each function menu. To select a menu, use the soft key described in ⑭.

2.2　Screen Display Descriptions
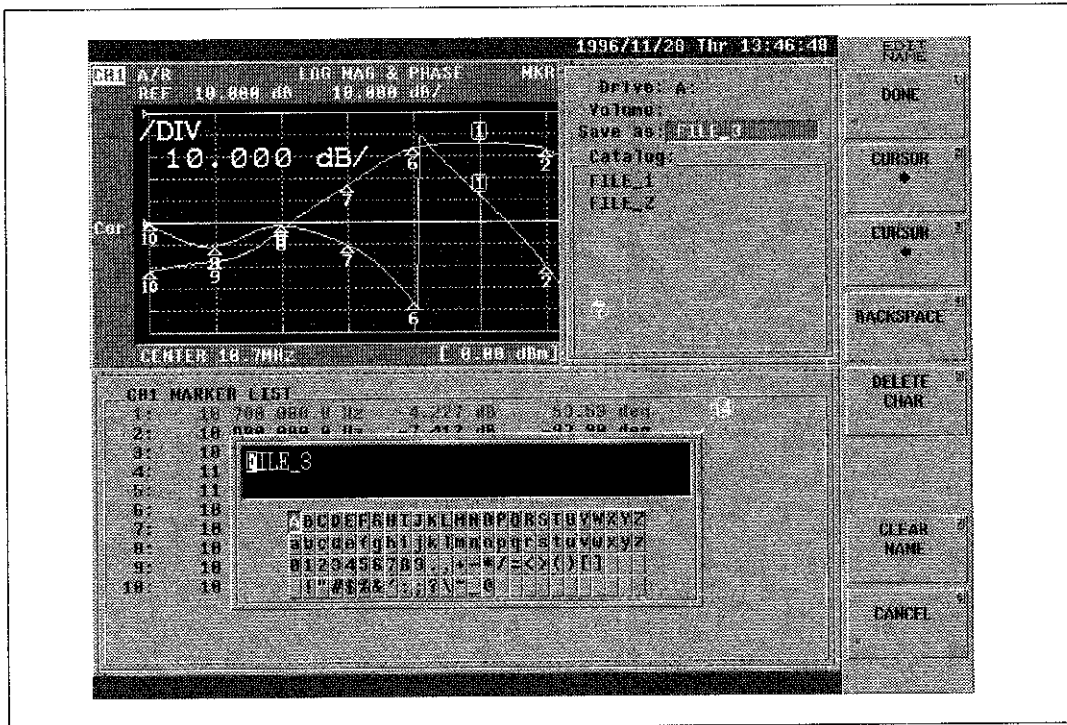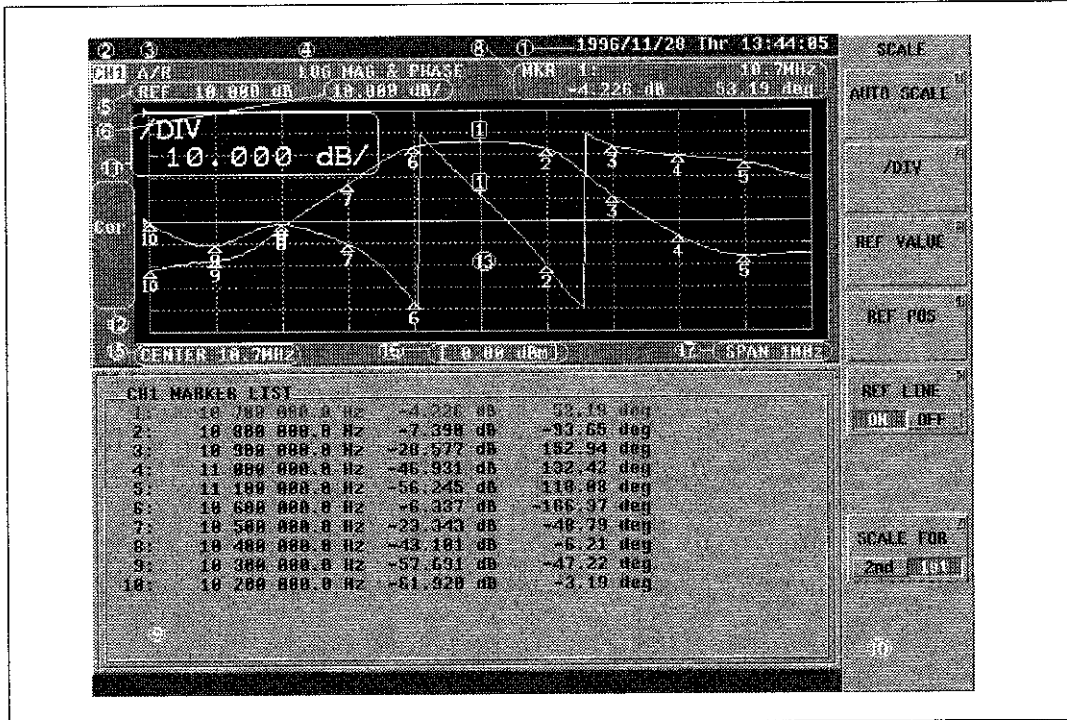
Figure 2-2 Screen Display Descriptions

No.	Name	Description
①	Real time clock	Displays year, month, date and time.
②	Channel	Displays a channel number.
③	INPUT port	Displays an input port.
④	Format	Displays data format (format data).
⑤	Scale reference	Displays a reference value of display coordinate. The reference position is displayed by using ▷ mark.
⑥	Scale/DIV	Displays one scale value of display coordinate.
⑦	Load menu	Displays files in this area when loading program from the disk drive.
⑧	Active marker	Displays an active marker value.
⑨	Marker list	Displays a marker list.
⑩	Soft key menu	Displays a soft key menu.
⑪	Active area	Displays items selected by panel keys or soft keys and those input values.
⑫	Status area	Displays status which shows an operating state of the R3753H series.
⑬	Trace display area	Displays measurement data.
⑭	Label window	Displays character lists used for a label and a register name.
⑮	Start/Center	Displays the start/center of signal source.
⑯	Power/CW	Displays the power/CW of signal source.
⑰	Stop/Span	Displays the stop/span of signal source.

2.3 Rear Panel Descriptions

- R3753AH

- R3753BH/EH
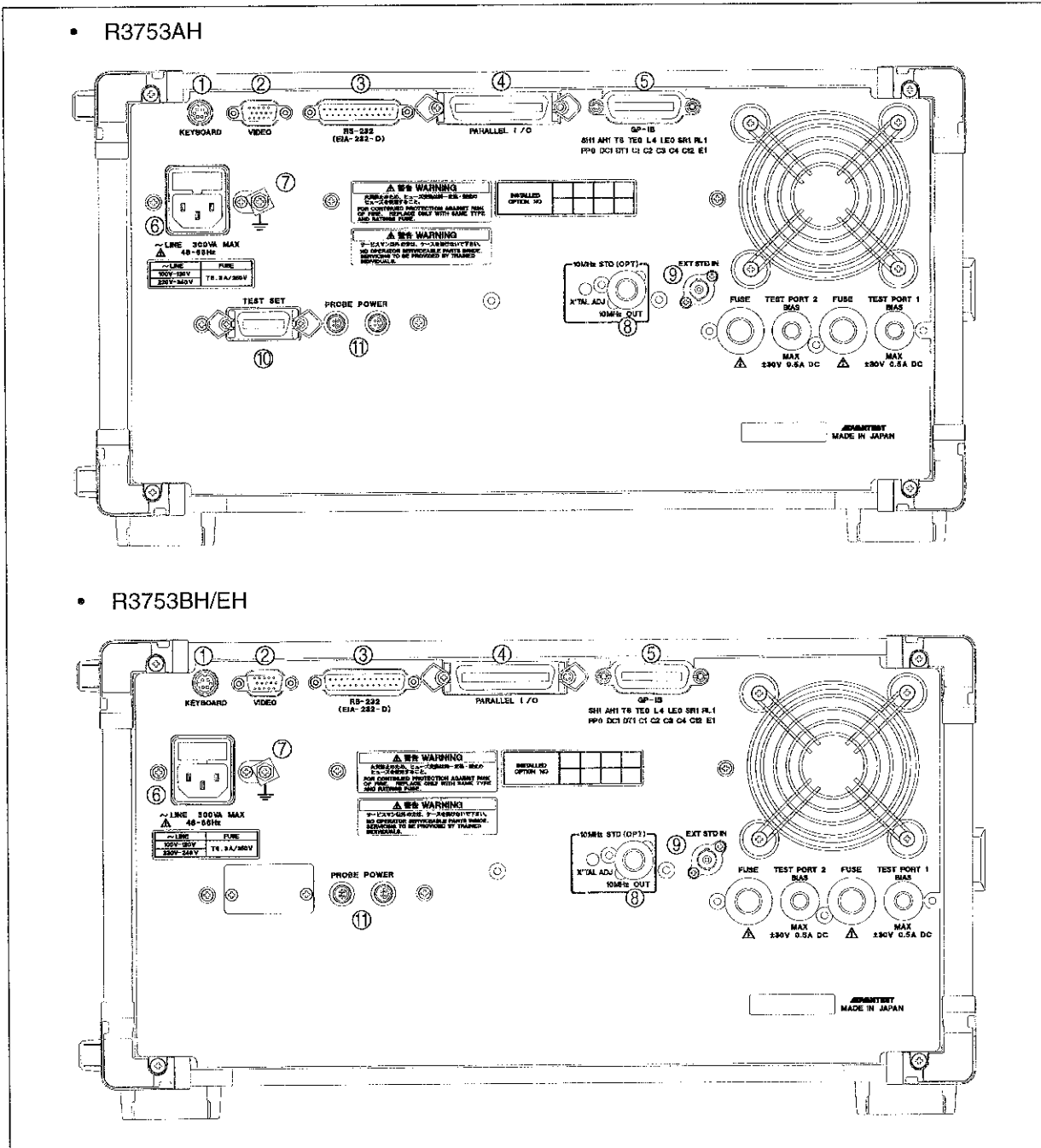
Figure 2-3 Rear Panel Descriptions

No.	Name	Description
①	KEYBOARD INPUT connector	The KEYBOARD INPUT connector is used to connect a keyboard belonging to IBM-PC/AT or PS/2 series. An external keyboard can be used to input a label name, a saving register name and a BASIC text.
②	VIDEO SIGNAL output	Video signal output correspondence to VGA (15-pin).
③	SERIAL I/O	Input/output connector conformed to RS-232 standard.
④	PARALLEL I/O connector	The I/O port connector is used to communicate peripheral devices such as an automatic machine and a foot switch. (Output: 8-bit 2 systems, Input/output: 4-bit 2 systems) EXT TRIGGER input (Negative logic, pulse width: 1 μs or more, 18-pin terminal) **Note: Use shielded cables for connection (to prevent malfunction by noise).**
⑤	GPIB connector	The GPIB connector is used to remotely control an external peripheral devices and to be remotely controlled by an external controller.
⑥	AC POWER connector	The AC POWER connector has three-pin structure includes an earth pin. To remove a power fuse, pull out the upper cover.
⑦	Ground terminal	The ground terminal is used to ground the R3753H series only when three-pin connector or two-pin adapter for power cable cannot be used.
⑧	High stability reference frequency output connector (option 20)	This connector is used to output a high stability reference frequency when the option 20 is installed.
⑨	External reference frequency input connector	This connector is used to input a reference frequency from an external device. Input frequency : 1, 2, 5, 10MHz, 0dBm or more Input frequency accuracy : Within ±10ppm
⑩	TEST SET connector (R3753AH)	Connector for connecting S parameter test-set.
⑪	PROBE POWER connector	Connector for probe power ± 15V output

3   BASIC OPERATING GUIDELINES

This section explains basic key operation for beginners, containing specific examples.

3.1   Basic Operation

3.1.1   Basic Key Operation

(1)   Functional blocks on front panel

The front panel keys are grouped into six functional blocks as shown below. With a combination of these blocks, the R3753H series is operated.

- ACTIVE CHANNEL block   : The R3753H series has two measurement channels. The block is used to select an active channel which can be set or changed. (See section 4.1.)

- ENTRY block   : Enters a numeric value for the selected function. (See section 4.2.)

- STIMULUS block   : Selects the settings for the signal source. (See section 4.3.)

- RESPONSE block   : Selects the settings of the receiver and the setting of the conditions of the display. (See section 4.4.)

- INSTRUMENT STATE block : Selects the system settings such as save/recall and hard copy. (See section 4.8.)

- GPIB block   : Selects the settings of the controller and the GPIB. (See section 4.9.)

When the key of each block mentioned above is pressed, the item (Soft key menu) corresponding to the function is displayed on a right side of the display screen.

(2)   Key operation

Two types of key operations are available for the R3753H series as follows :

- When a numeric value is required to be entered :

    [Panel key] → *{Soft key}* → **[ENTRY block]**

- When only soft key menus are required for selection :

    [Panel key] → *{Soft key}*

    If some key is pressed for more than about 0.5 second, the pressed key is entered repetitively.
    However, pressing more than two keys or more at the same time brings nothing.

(3)　Configuration of soft key menu

The soft key menu has two or more pages and hierarchic structures.

- Two or more-page's soft key menus that are:

When *{More 1/2}* is pushed, the menu will move to the next page.
When *{More 2/2}* is pushed, the menu will return to the page of former.

- Soft key menu of hierarchic structure:　When *{Return}* is pushed, the menu will return to the previous layer menu.

(4)　Front panel key

Each function of the front panel key is explained in the briefly here. Refer to chapter 4. for details of each function.

①　ACTIVE CHANNEL block
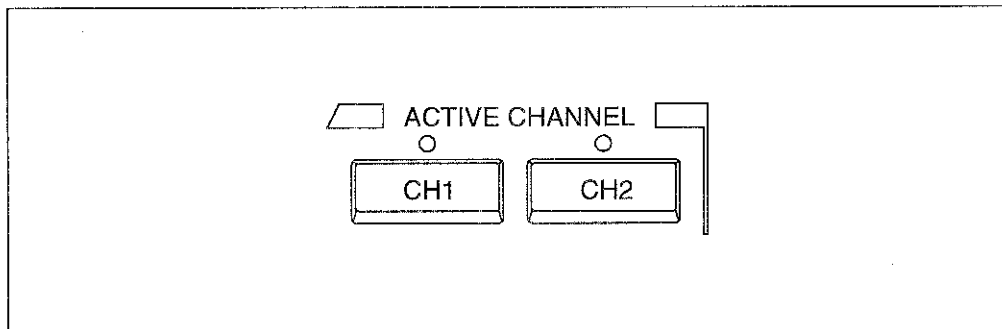
R3753H series can measure the reflection and transmission characteristics of the devices at the same time. Moreover, simultaneous measurement by a different frequency can be done.
R3753H series has two measurement channels. Therefore, measurement and the data display for each channel can be done independently.
In the ACTIVE CHANNEL block, which channel is set to the active channel is selected. The active channel is a channel that can set various conditions such as measurement and data displays. That is, the function depend on the channel is effective only to the active channel. LED is lit to the current active channel.

[CH1] :　The channel 1 is set to the active channel.

[CH2] :　The channel 2 is set to the active channel.

The signal source can interlock between channels. In this case, the condition set in the active channel is also set to other channel automatically.

② ENTRY block
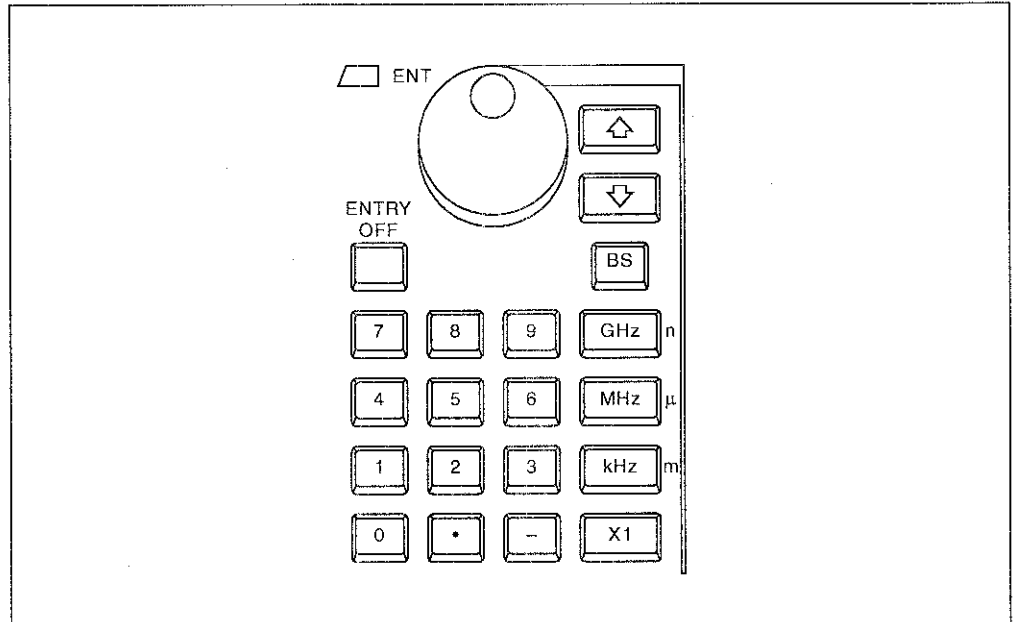
In the ENTRY block, data entry and the change are done to the function selected with the **[Panel key]** and the *{Soft key}*.
Moreover, this is used to set and to change the marker.

Numeric keys:	**[0]** to **[9]**	; It is a ten-key.
	[.]	; It is a decimal point key.
	[-]	; It is a minus sign key.
	[BS]	; It is a back space key.
	[ENTRY OFF]	; It is an entry off key. All numerical data under input is deleted. And input request is canceled.

> *Note:* **After operation of a numeric key.**
> **Press the unit key.**

Unit keys:	**[GHz]** n	; It is giga/nano unit keys.
	[MHz] μ	; It is mega/micro unit key.
	[kHz] m	; It is of kilo/milli unit key.
	[X1]	; Base unit key. It is used in the case of base unit or not provided unit. (dB, dBm, degree, seconds and Hz etc.)

| Step keys: | [↑] to [↓] | ; The set value is changed by a specific step size. After operation of the step key, the unit input is unnecessary. |

| Data knob: | ◯ | ; The set value is continuously changed. After operation of the data knob, the unit input is unnecessary. |

③ STIMULUS block
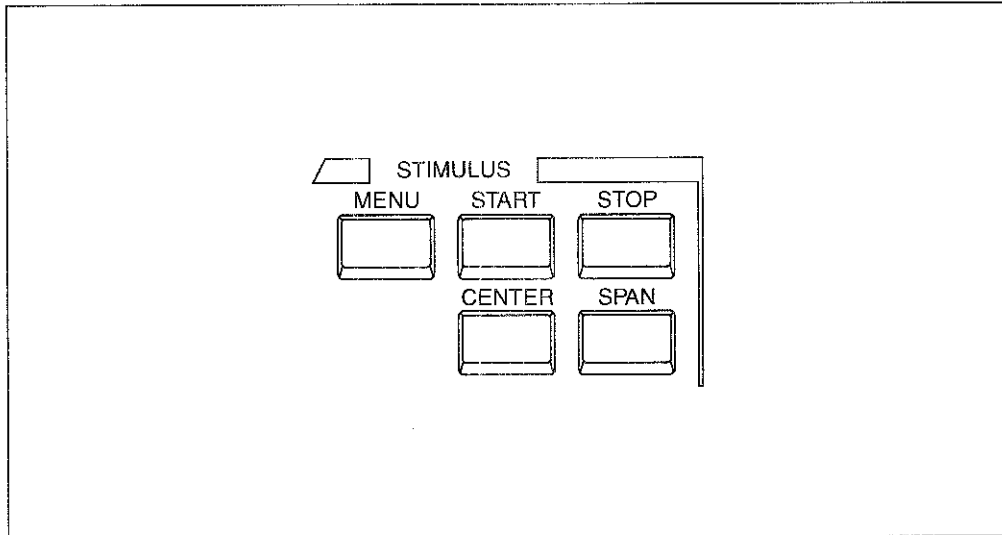
In the STIMULUS block, the condition in the signal sources such as the frequency range, the power level setting, the sweep type, sweep time and the sweep resolution is set. Moreover, attenuator of S parameter test set can be set when S parameter test set is connected.

[MENU] : The output level, sweep time, the sweep type and the sweep resolution, etc. are set.

[START] : The start of the sweep is set.
As for the case of the frequency sweep, the frequency is set. And as for the case of the power sweep, power is set.

[STOP] : The stop of the sweep is set.
As for the case of the frequency sweep, the frequency is set. And as for the case of the power sweep, power is set.

[CENTER] : The center of the sweep is set. As for the case of the frequency sweep, the frequency is set.

[SPAN] : Span of the sweep is set. As for the case of the frequency sweep, the frequency is set.

The range of the sweep is set with **[START]**, **[STOP]**, **[CENTER]** and **[SPAN]**.
Other setting is set by the signal source menu called with **[MENU]**.

④ RESPONSE block
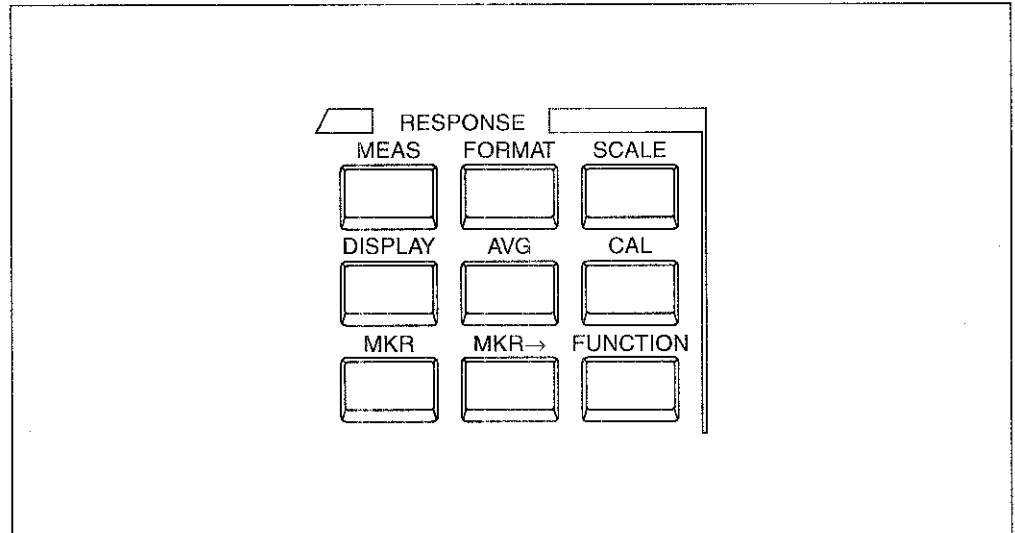
In the RESPONSE block, the measurement condition in the receiver section, the measurement parameter, the measurement format, the display format and the marker of the active channel are set.

[MEAS] : The input port and the measurement parameter are set.

[FORMAT] : The format of measured data is set.

[SCALE] : Coordinate axis of the display is set.

[DISPLAY] : Two channels simultaneous display, trace conversion and the label input are set.

[AVG] : Data average, smoothing and resolution bandwidth are set.

[CAL] : The calibration function is set.

[MKR] : The marker is set.

[MKR→] : The analysis by the marker is set.

[FUNCTION] : Input attenuator and impedance in the receiver section are set.

⑤ INSTRUMENT STATE block
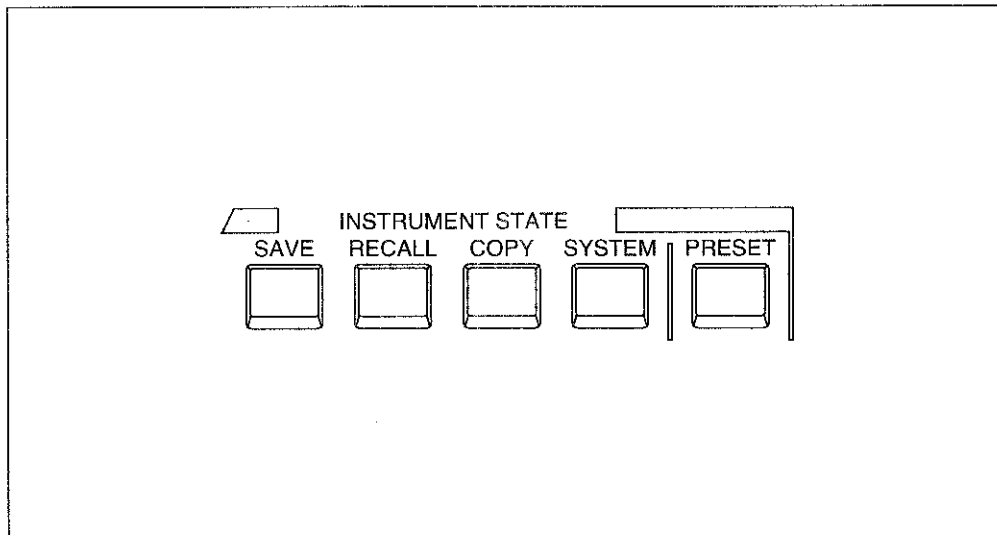
In the INSTRUMENT STATE block, the system control functions that have no effect to the measured data are set.
The displays of the date and time, the limit line test, the saving and the recall, and the hard copies are included in the system control function.

[SAVE] : Setting state and the calibration data of R3753H series are saved.

[RECALL] : Setting state and the calibration data of R3753H series are recalled.

[COPY] : The measurement trace is output to the plotter or measured data are printed.

[SYSTEM] : The display of the date and time are set.

[PRESET] : The setting state of R3753H series is initialized.

⑥ GPIB block
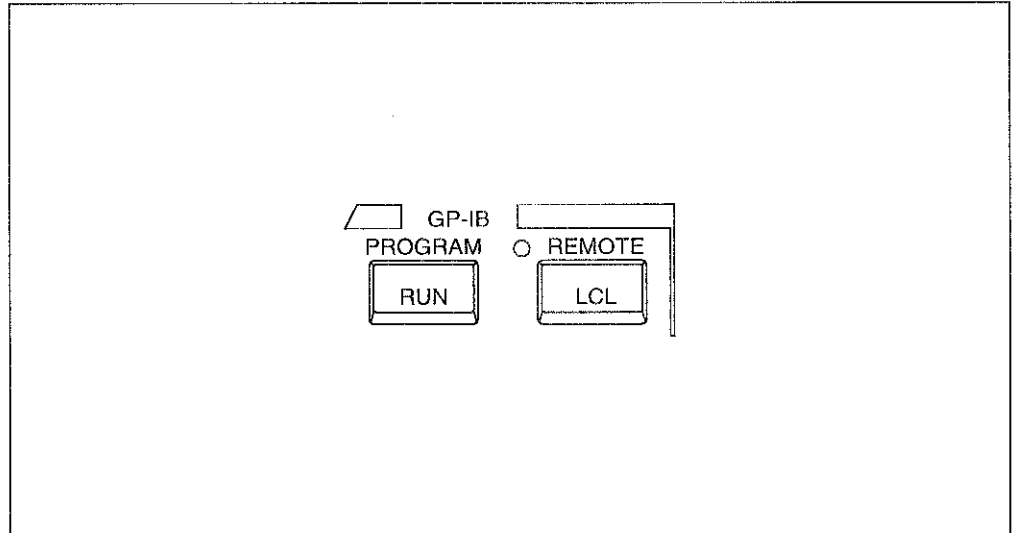
In the GPIB block, the BASIC controller function, GPIB-bus and the GPIB address are set. Refer to the programming manual of the separate volume for programming.

PROGRAM
[RUN]   : The BASIC controller function is called.

REMOTE
[LCL]   : GPIB is set.
The operation of all panel keys are invalid when R3753H series is in remote status by GPIB.
If this key is pressed, R3753H series will become local status. And the operation of the panel key becomes possible.
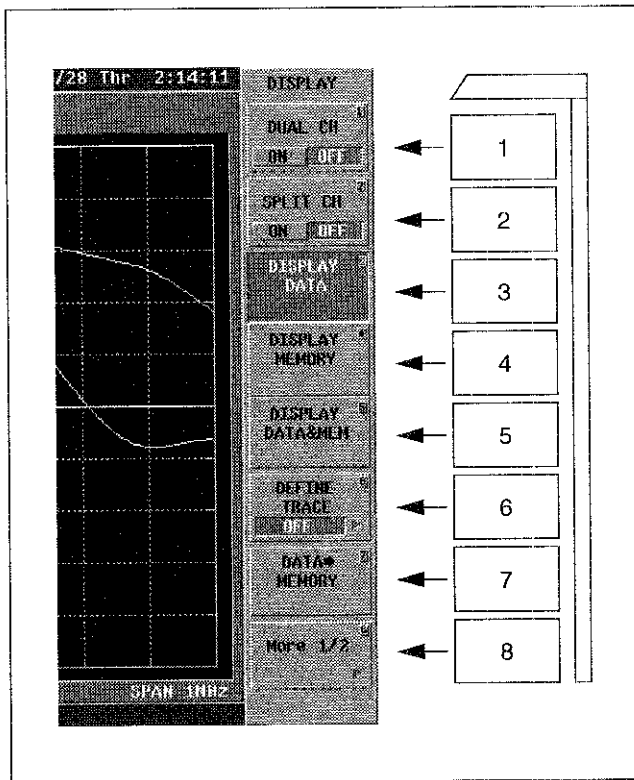
(5)   Soft key

When the panel key is pressed, a set item corresponding to the function of the key will be displayed.

Those items can be chosen with the corresponding soft key.

(A left figure is an example of the soft key displayed when the DISPLAY key in the RESPONSE block is pressed. The display and the key of the figure correspond as shown.)

Figure 3-1 Soft key

3.1.2 Example of Basic Key Operation

Basic key operation of R3753H series is explained here by the example of measuring the pass characteristic and the phase characteristic of the filter.
The characteristic impedance of the measured filter is assumed the nominal value 50 Ω.

(1) Setup

In the case of R3753AH/BH, the filter is connected between the OUTPUT2 connector and INPUT A connector (Refer to Figure 3-2 (a)) by the cables.
In the case of R3753EH, the filter is connected between the OUTPUT1 connector and INPUT A connector (Refer to Figure 3-2 (b)) by the cables.

DUT: Device Under Test (Sample)

(a) R3753AH/BH   (b) R3753EH
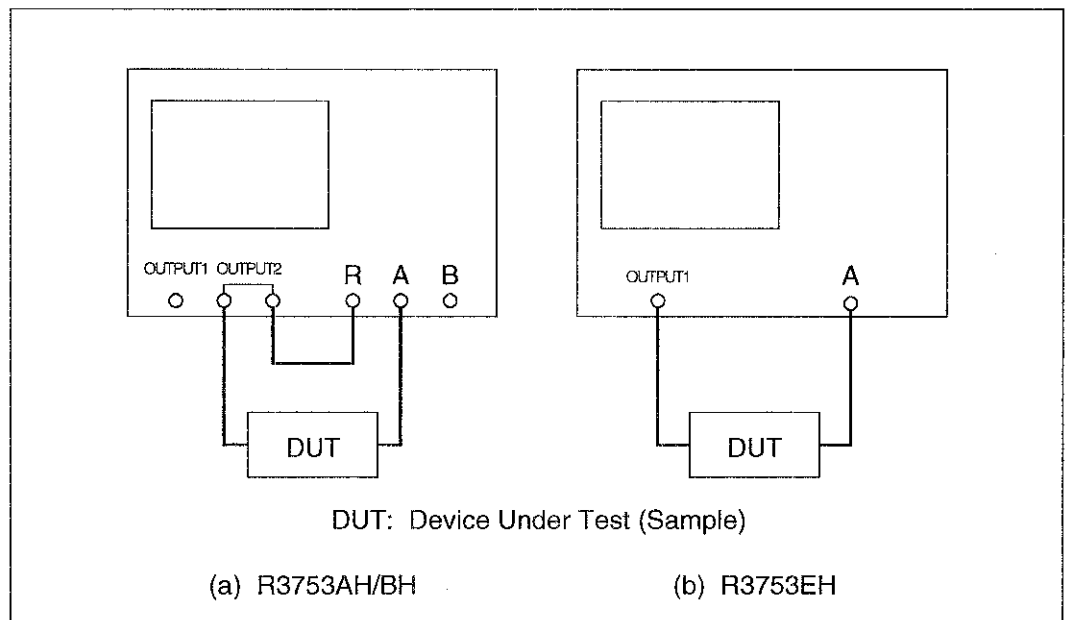
Figure 3-2 Setup (Connection of DUT)

(2) Presetting

[PRESET] is pressed. And R3753H series is made an initial state.
Refer to the section A.1 for the initial setting.

(3) Frequency setting of signal source

Set the frequency of the signal source according to the characteristic of the filter. The band pass filter of 10.7MHz is measured here. Therefore the following are set.

[CENTER] → [1] → [0] → [.] → [7] → [MHz]

[SPAN] → [1] → [MHz]

The trace shown in the following figure is displayed by the above-mentioned operation.
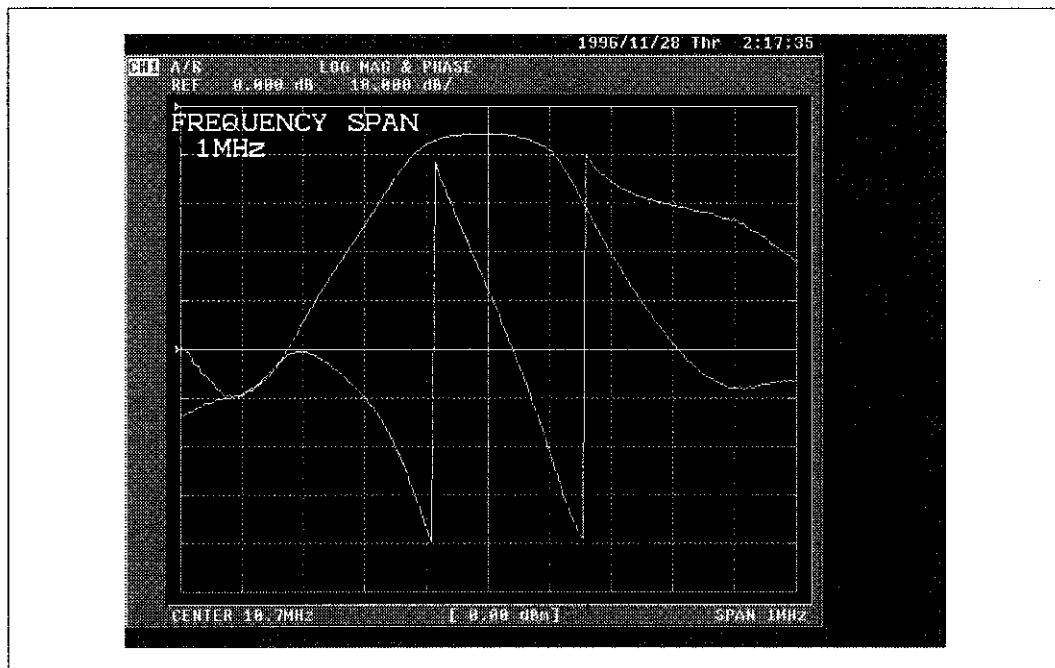
Figure 3-3

Next, the display coordinates are optimized to the display trace.
The current FORMAT is two traces displays of LOG MAG & PHASE. (The first trace: LOG MAG, the second trace: PHASE) AUTO SCALE is executed for each trace. (Automatic setting of display coordinates)

[SCALE]	Confirm SCALE FOR of the display menu is in 1st (the first trace) when the SCALE key is pressed.
{AUTO SCALE}	
{SCALE FOR 2nd/1st}	(2nd (the second trace) is selected)
{AUTO SCALE}	

The trace is displayed as shown in the following figure by the above-mentioned operation.
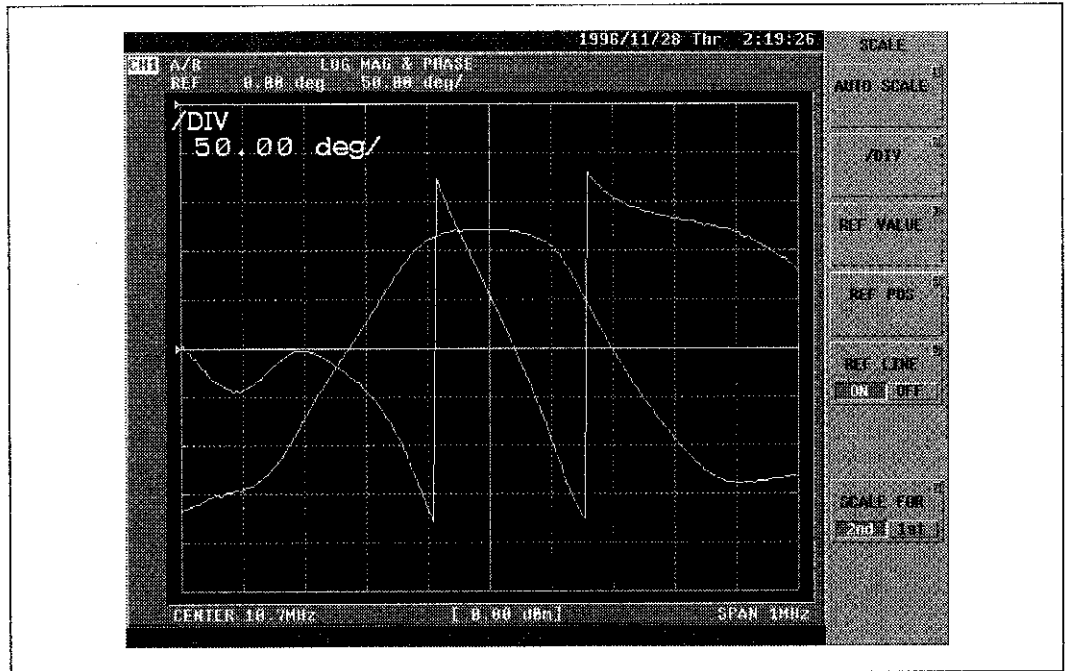
Figure 3-4

(4)   Display of marker

Measured value of each point can be directly read by the marker display.

[MKR]

3.1 Basic Operation

The marker is displayed as shown in the figure below by the above-mentioned operation.
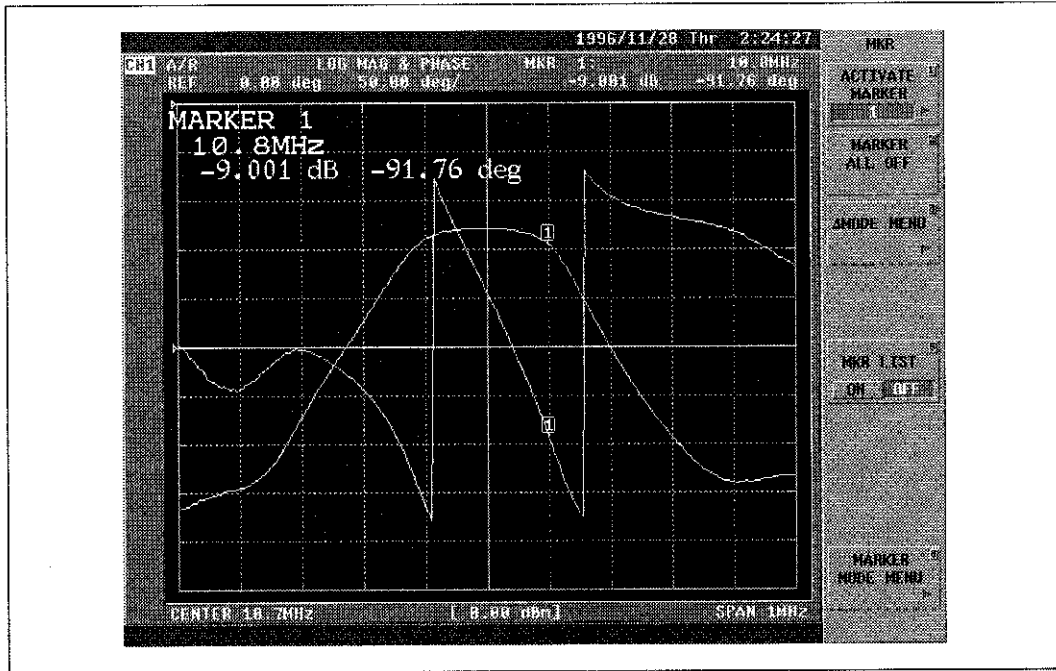
Figure 3-5

3.2 Measurement Method Example

A basic operation method is explained here by the example of measuring the actual band pass filter (BPF) and crystal resonator.
The measurement method examples are shown as follows.

1. Filter Measurement

2. Phase Measurement

3. Group Delay Measurement

4. Narrow-band and Wide-band Measurements

5. Logarithmic Magnitude and Phase Measurements

6. Logarithmic Magnitude and Group Delay Measurements

7. Linear Magnitude and Phase Measurements

8. Dual Channel Simultaneous Display Measurement

9. Reflection Characteristic Measurement

10. Crystal Resonator Measurement

11. Multi-marker Measurement

12. Delta Marker Measurement

13. Delta Section Marker Measurement

14. Marker Analysis Measurement

15. Marker Coupling and Interpolation Measurements

16. Program Sweep Measurement

17. Ceramic Oscillator Resonance and Antiresonance Point Measurements

18. Measured Data Plotter Output

19. Using the Save/Recall Registor

20. Saving to Floppy Disks

21. Crystal Resonator Impedance Measurement

All screen displays here are displays of R3753AH.

3.2.1   Filter Measurement

The operation method of filter analysis is explained here by the example of measuring the band pass filter of center frequency 21.4MHz.

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② The measurement format is made a magnitude (Logarithmic display).

[FORMAT] → *{LOG MAG}*

③ Set center frequency and span.

[CENTER] → **[2]** → **[1]** → **[.]** → **[4]** → **[MHz]**

[SPAN] → **[5]** → **[0]** → **[kHz]**

④ Make the condition of through and calibrate the frequency characteristic.

First of all, remove the DUT. And instead, connect the short adapter. Under such a condition, execute normalization.

[CAL] → *{NORMALIZE (THRU)}*

The display is shown in the figure below. The CORRECT key automatically turns on.
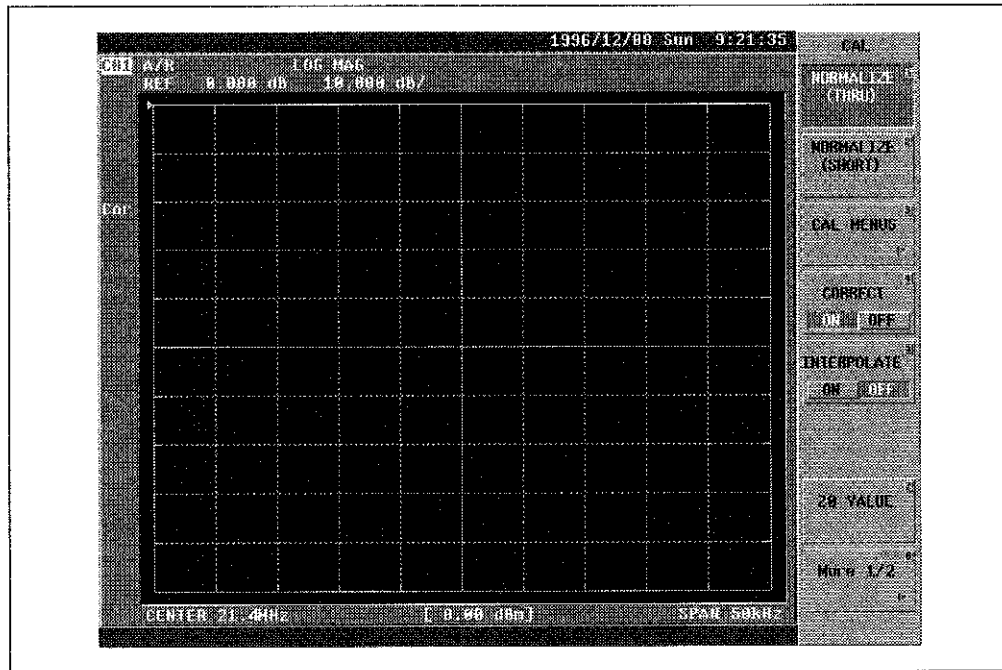
Figure 3-6

After ending, the connection will be returned to DUT (Filter).

⑤ Adjust the scale of the trace display. The display comes to see easily.

[SCALE] → *{AUTO SCALE}*

The display is shown in the figure below.
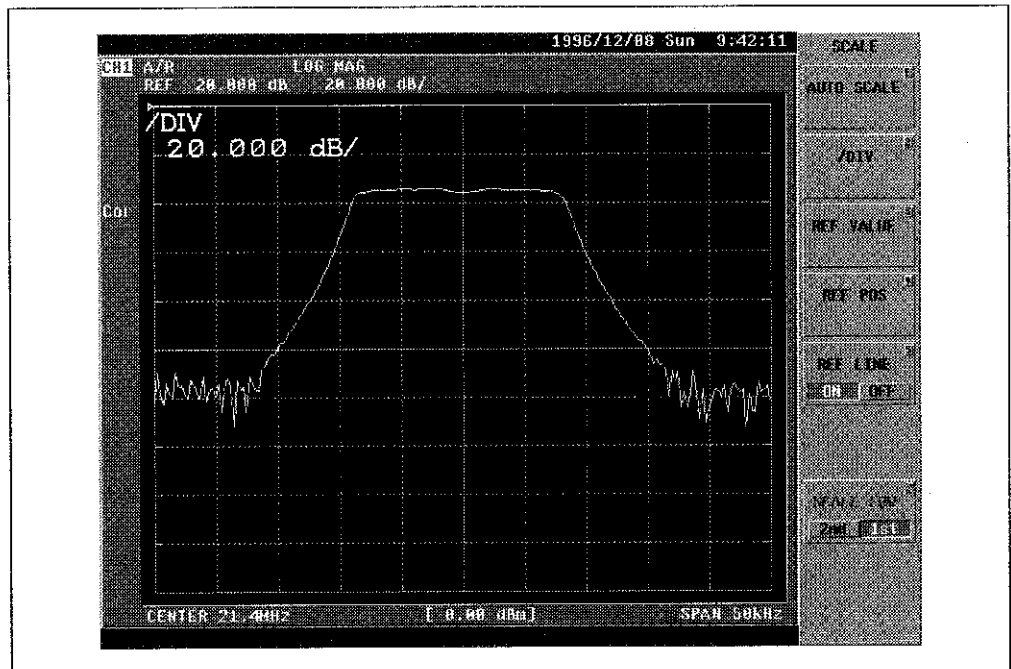
Figure 3-7

⑥ It is measurement of bandwidth of 3dB.

The marker is set. And the filter analysis function is started.

[MKR →] → *{MKR SEARCH [ ] }*→ *{FLTR ANAL}* → *{FLTR ANAL ON/OFF}*

The screen display is shown in the figure below. Measured bandwidth is shown on the trace by the arrow (↓).
The analysis result is displayed.
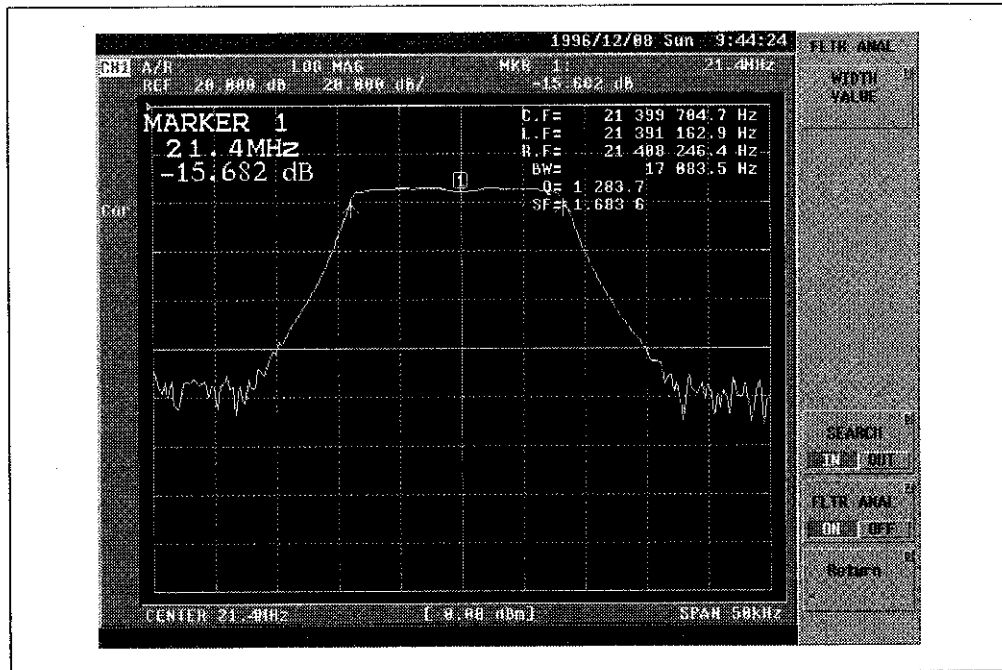
Figure 3-8

⑦ It is measurement of bandwidth of 6dB.

WIDTH VALUE (searched bandwidth) is changed from 3dB (initial value) to 6dB.

{WIDTH VALUE} → **[6]** → **[X1]**

The display is shown in the figure below.
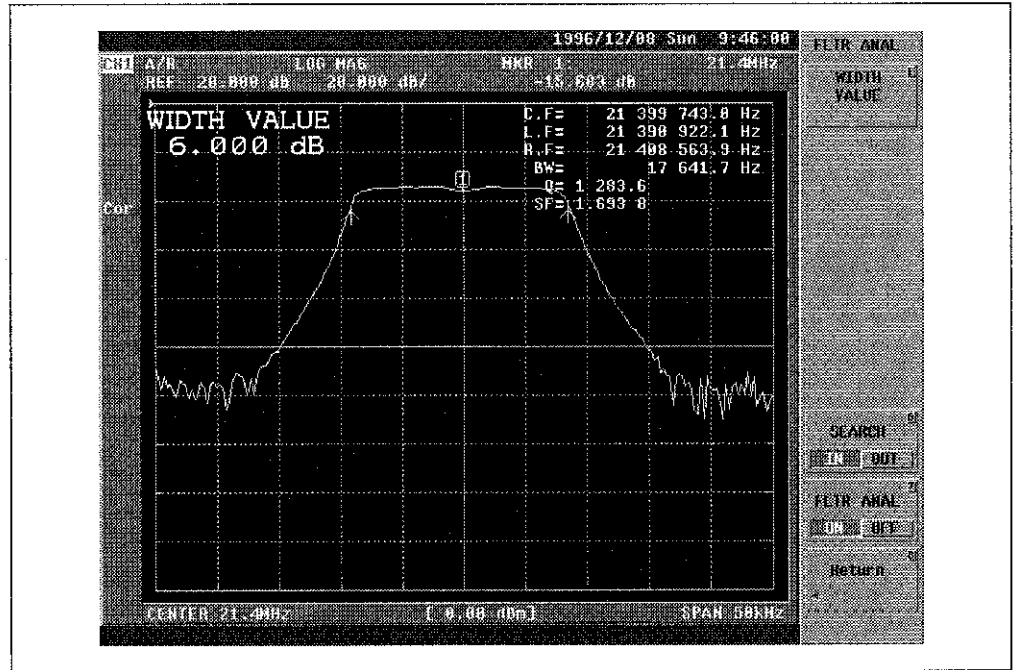
Figure 3-9

3.2.2 Phase Measurement

The method of measuring the phase is explained here by the example of the band pass filter of center frequency 10.7MHz as well as the preceding clause.

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② The measurement format is made a phase display.

[FORMAT] → *{PHASE}*

③ Set center frequency and span.

[CENTER] → **[1]** → **[0]** → **[.]** → **[7]** → **[MHz]**
[SPAN] → **[1]** → **[MHz]**

④ Calibrate the frequency characteristic.

Operate similarly by the item ④ of sub-section 3.2.1 (measurement of filter).
The display becomes an usual phase display as shown in the figure below.
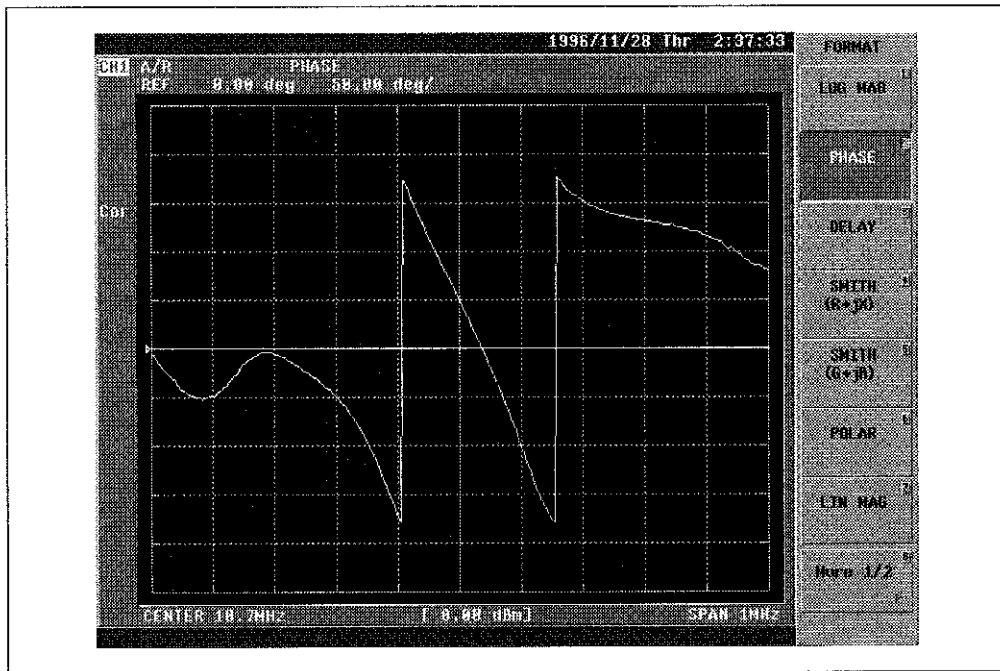
Figure 3-10

⑤ Make it to the phase extension display.

[FORMAT] → *{More 1/2}* → *{PHASE - ∞, + ∞}*

The display is shown in the figure below.
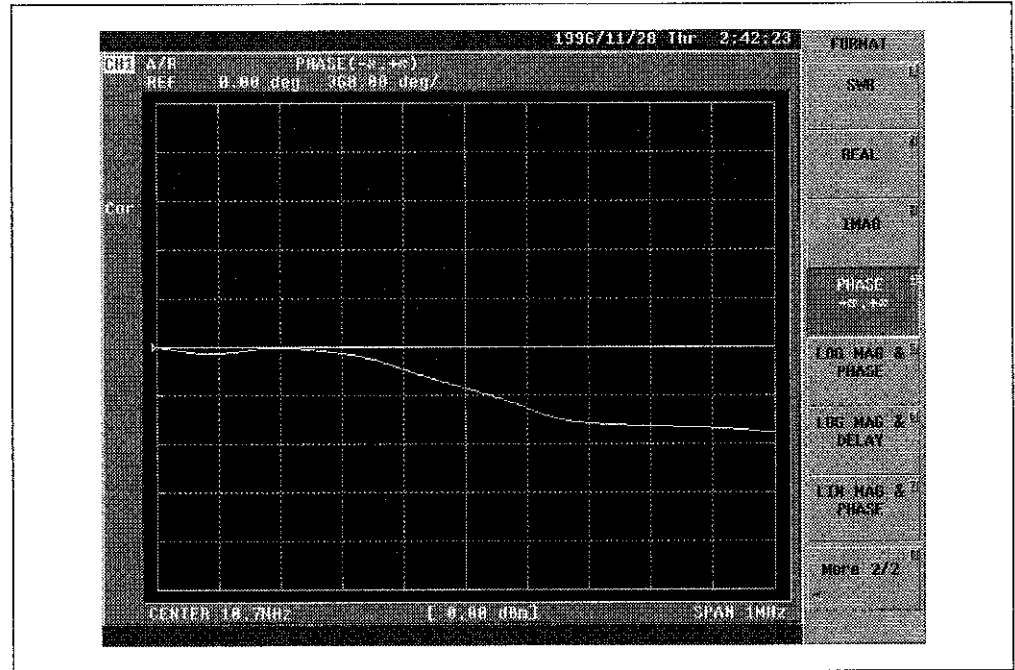
Figure 3-11

3.2.3 Group Delay Measurement

The method of measuring the group delay is explained here by the example of the band pass filter of center frequency 10.7MHz as well as the preceding clause.

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② The measurement format is made a group delay display.

[FORMAT] → *{DELAY}*

③ Set center frequency and span.

[CENTER] → **[1]** → **[0]** → **[.]** → **[7]** → **[MHz]**
[SPAN] → **[1]** → **[MHz]**

④ Calibrate the frequency characteristic.

Operate similarly by the item ④ of sub-section 3.2.1 (measurement of filter).

⑤ Adjust the scale of the display trace. The display comes to see easily.

[SCALE] → *{AUTO SCALE}*

The display is shown in the figure below.
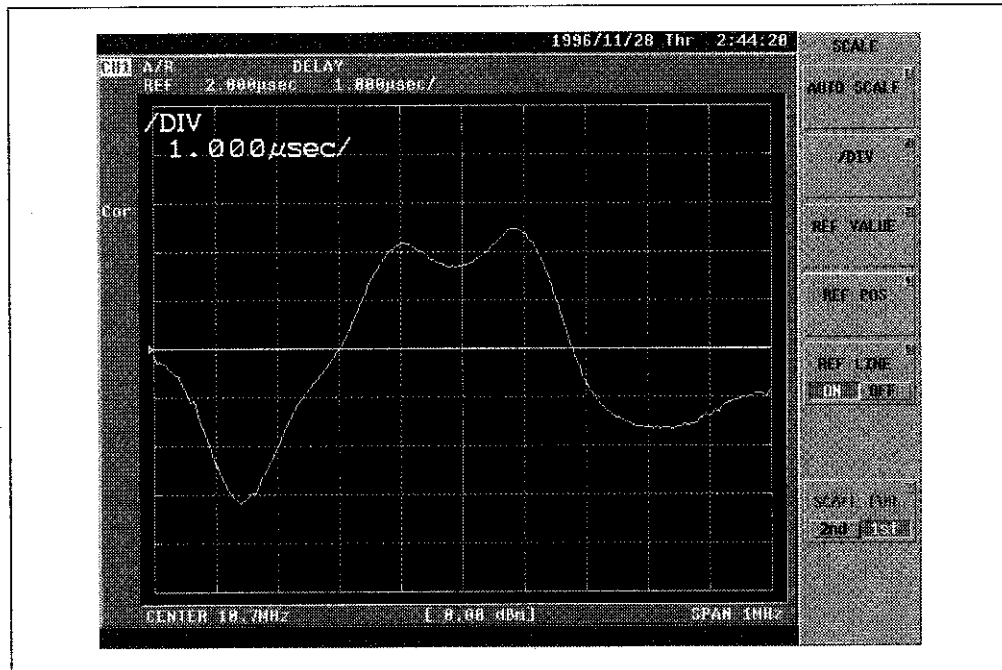
Figure 3-12

⑥ The aperture of the group delay is changed to 20 percent.

[AVG] → *{GROUP DELAY APERTURE}* → **[2]** → **[0]** → **[X1]**

The display is shown in the figure below.
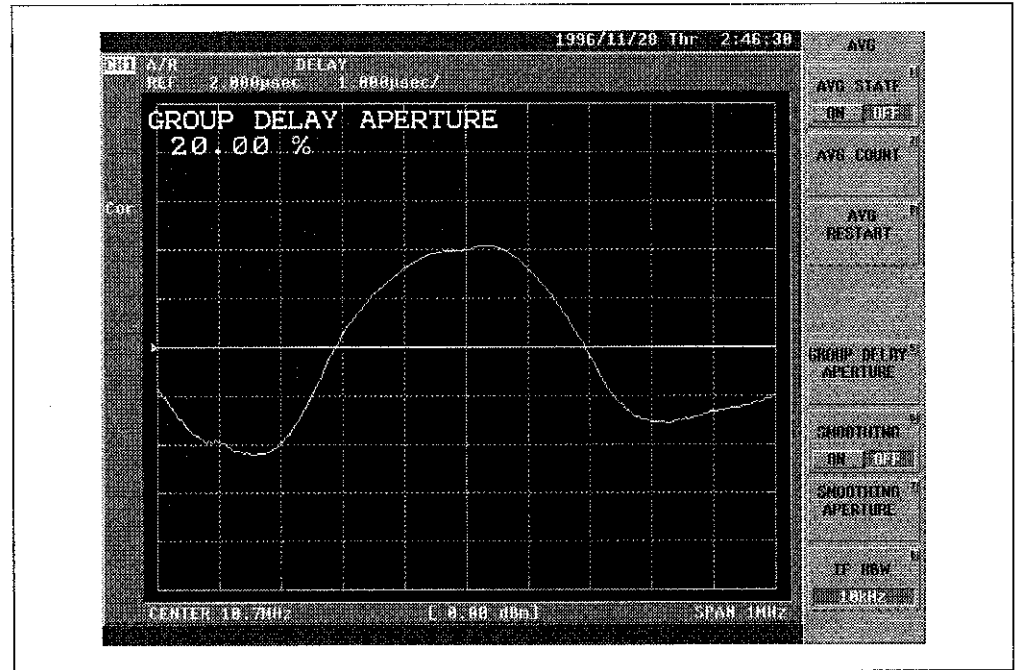
Figure 3-13

3.2.4 Narrow-band and Wide-band Measurements

The operation methods of setting for the difference measuring condition to the channel 1 and 2 is explained here by the example of the band pass filter of center frequency 10.7MHz.

① Setup (filter connection) and presetting (Refer to sub-sections 3.1.2 and Figure 3-2).

② Make the measuring condition of the channel 1 and 2 set independence.

[MENU] → *{COUPLED CH ON/OFF}*

③ Set frequency range of the channel 1.

[CENTER] → **[1]** → **[0]** → **[.]** → **[7]** → **[MHz]**
[SPAN] → **[1]** → **[MHz]**

④ Set frequency range of the channel 2.
[CH2]
[CENTER] → **[1]** → **[0]** → **[.]** → **[7]** → **[MHz]**
[SPAN] → **[0]** → **[.]** → **[5]** → **[MHz]**

⑤ Calibrate the frequency characteristic of the channel 1.

First of all, connect the short adapter instead of DUT.
Under such a condition, normalize is done.

[CH1] → **[CAL]** → *{NORMALIZE (THRU)}*

⑥ Calibrate frequency characteristic of the channel 2 similarly.

[CH2] → *{NORMALIZE (THRU)}*

After ending, return the connection to DUT (filter).

⑦ Two channels are made a simultaneous display.

[DISPLAY] → *{DUAL CH ON/OFF}*

The display is shown in the figure below.
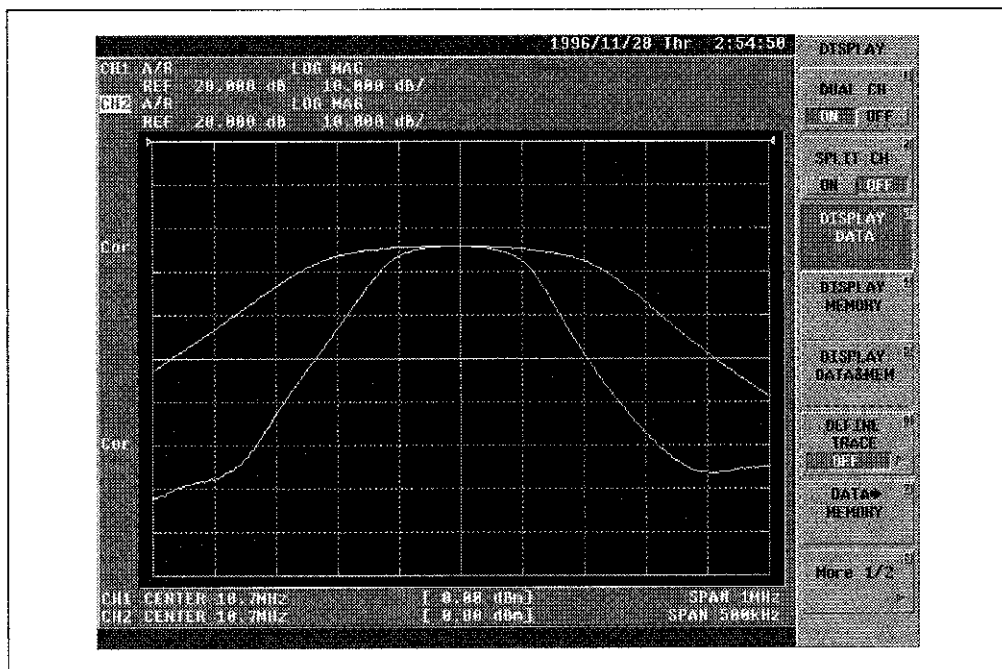
Figure 3-14

⑧ The display is divided into the 2 of up and down.

{SPLIT CH ON/OFF}

The display is shown in the figure below.
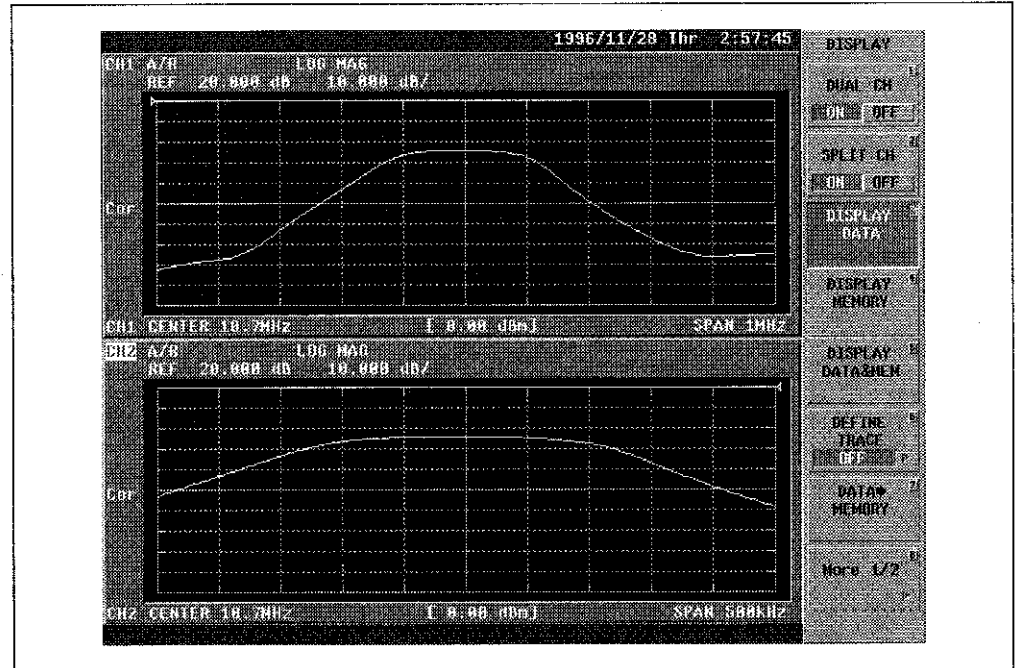
Figure 3-15

3.2.5   Logarithmic Magnitude and Phase Measurements

The measurement method of the logarithmic magnitude and the phase of two traces simultaneously displayed is explained here by the example of the band pass filter of center frequency 10.7MHz.

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② Set center frequency and span.

[CENTER] → **[1]** → **[0]** → **[.]** → **[7]** → **[MHz]**

[SPAN] → **[1]** → **[MHz]**

③ Calibrate the frequency characteristic.

Operate similarly by the item ④ of sub-section 3.2.1 (measurement of filter).

④ Change the scale of the display trace.

When such two traces are simultaneously displayed by format, which trace is changed can be selected with SCALE FOR.
The scale of first trace (logarithmic magnitude) is changed.

[SCALE] → {AUTO SCALE}

The display is shown in the figure below.
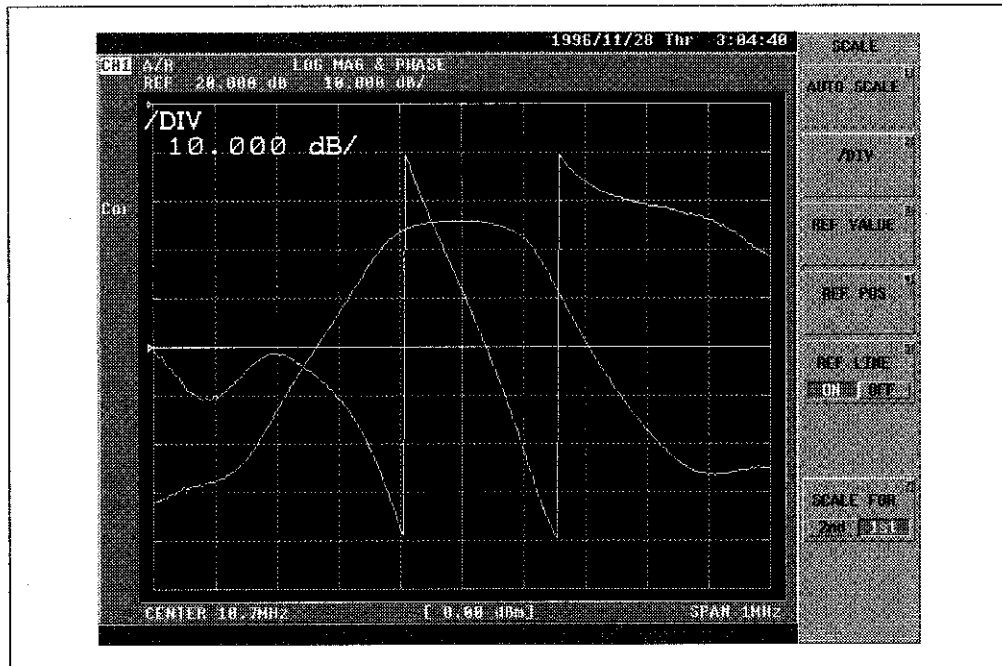
Figure 3-16

⑤ To change scale of the second trace (phase), 2nd is selected with SCALE FOR.

{SCALE FOR 2nd/1st}

The display is shown in the figure below.
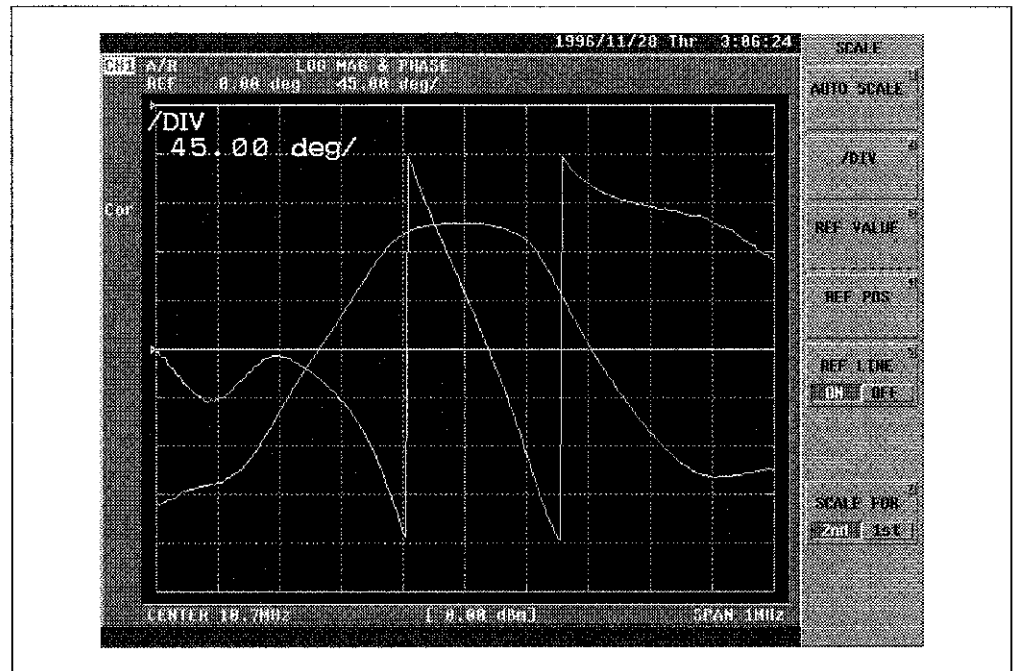
Figure 3-17

3.2.6 Logarithmic Magnitude and Group Delay Measurements

The measurement method for the logarithmic magnitude and the group delay by which two traces are simultaneously displayed is explained here by the example of the band pass filter of center frequency 10.7MHz.

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② Set center frequency and span.

[CENTER] → **[1]** → **[0]** → **[.]** → **[7]** → **[MHz]**

[SPAN] → **[1]** → **[MHz]**

③ Calibrate the frequency characteristic.

Operate similarly by the item ④ of sub-section 3.2.1 (measurement of filter).

④ Set the format in measurement to the logarithmic magnitude/the group delay.

[FORMAT] → *{More 1/2}* → *{LOG MAG & DELAY}*

⑤ The scale of the first trace (logarithmic magnitude) is changed.

[SCALE] → {AUTO SCALE}

The display is shown in the figure below.
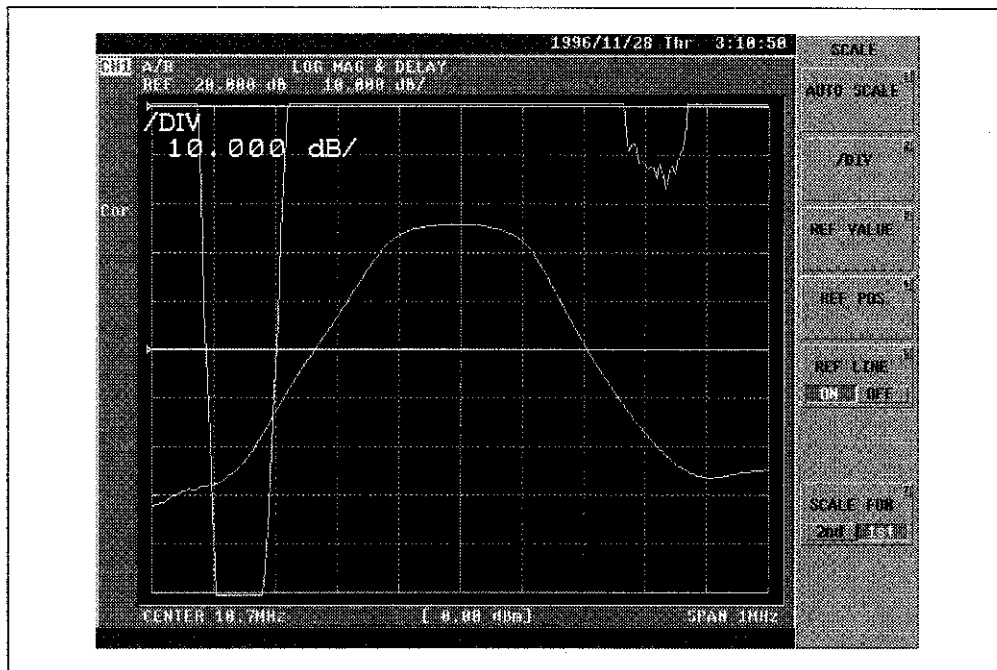
Figure 3-18

⑥ The scale of the second trace (group delay) is changed.

{SCALE FOR 2nd/1st} → {AUTO SCALE}

The display is shown in the figure below.
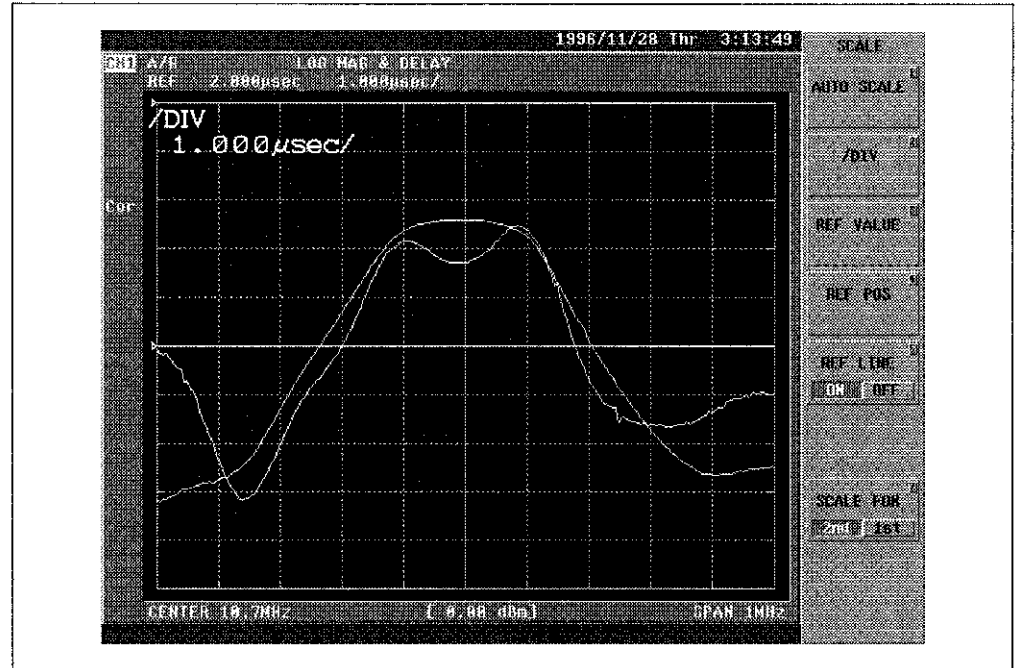
Figure 3-19

3.2.7 Linear Magnitude and Phase Measurements

The measurement method for the linear magnitude and the phase by which two traces are simultaneously displayed is explained here by the example of the band pass filter of center frequency 10.7MHz.

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② Set center frequency and span.

[CENTER] → **[1]** → **[0]** → **[.]** → **[7]** → **[MHz]**

[SPAN] → **[1]** → **[MHz]**

③ Calibrate the frequency characteristic.

Operate similarly by the item ④ of sub-section 3.2.1 (measurement of filter).

④ The measurement format is set to the linear magnitude/the phase.

[FORMAT] → *{More 1/2}* → *{LIN MAG & PHASE}*

⑤ The scale of the first trace (linear magnitude) is changed.

[SCALE] → *{AUTO SCALE}*

The display is shown in the figure below.
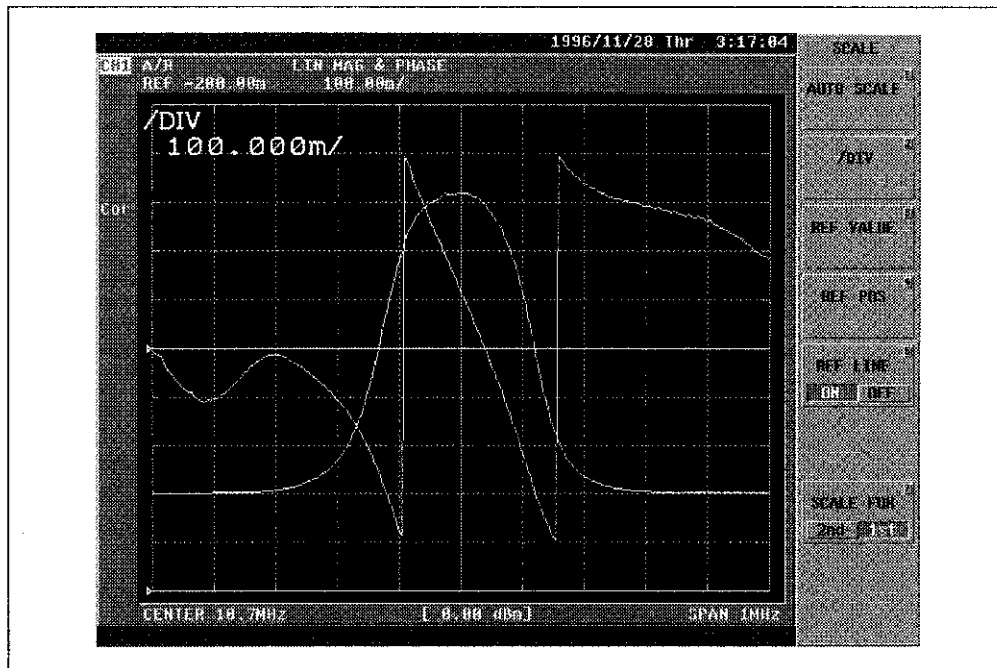
Figure 3-20

⑥ To change scale of the second trace, 2nd is selected with SCALE FOR for the second trace (phase).

{SCALE FOR 2nd/1st}

The display is shown in the figure below.
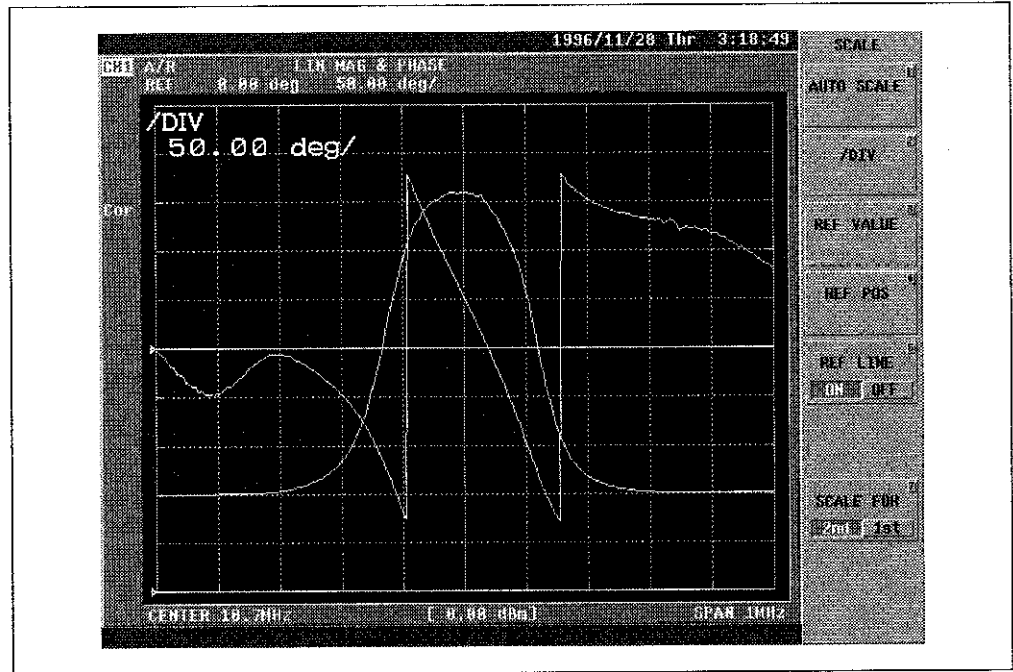
Figure 3-21

3.2.8 Dual Channel Simultaneous Display Measurement

The operation method of simultaneously display of the channel 1 and 2 is explained here by the example of the band pass filter of center frequency 10.7MHz.

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② Set center frequency and span. The channels 1 and 2 are interlocked.

[CENTER] → **[1]** → **[0]** → **[.]** → **[7]** → **[MHz]**

[SPAN] → **[1]** → **[MHz]**

③ Calibrate the frequency characteristic. Each channel should be calibrated.
First of all, the short adapter is connected instead of DUT. Under such a condition, normalization is done.

[CAL] → *{NORMALIZE(THRU)}* → **[CH2]** → *{NORMALIZE(THRU)}* → **[CH1]**

After ending, return the connection to DUT (filter).

④ Make it to dual channel simultaneous display.

[DISPLAY] → *{DUAL CH ON/OFF}* → *{SPLIT CH ON/OFF}*

⑤ In dual channel simultaneous display, the operation of the format and the scale, etc. are done to the active channel independently.
The channel 1 is made a magnitude format. And the scale is changed.

[CH1] → **[FORMAT]** → *{LOG MAG}* → **[SCALE]** → *{AUTO SCALE}*

The channel 2 is made a phase format.

[CH2] → **[FORMAT]** → *{PHASE}*

The display is shown in the figure below. This corresponds to measurement of logarithmic magnitude and phase of sub-section 3.2.5.
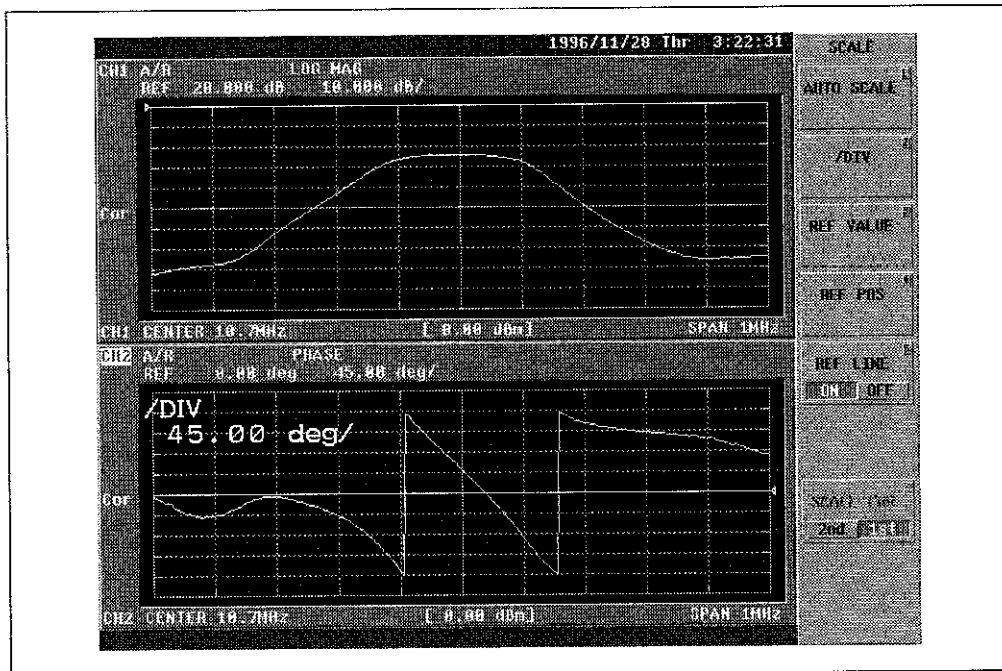
Figure 3-22

⑥   The channel 2 is made a group delay format.

{DELAY} → **[SCALE]** → *{AUTO SCALE}*

The display is shown in the figure below. This corresponds to measurement of lagarithmic magnitude and group delay of sub-section 3.2.6.
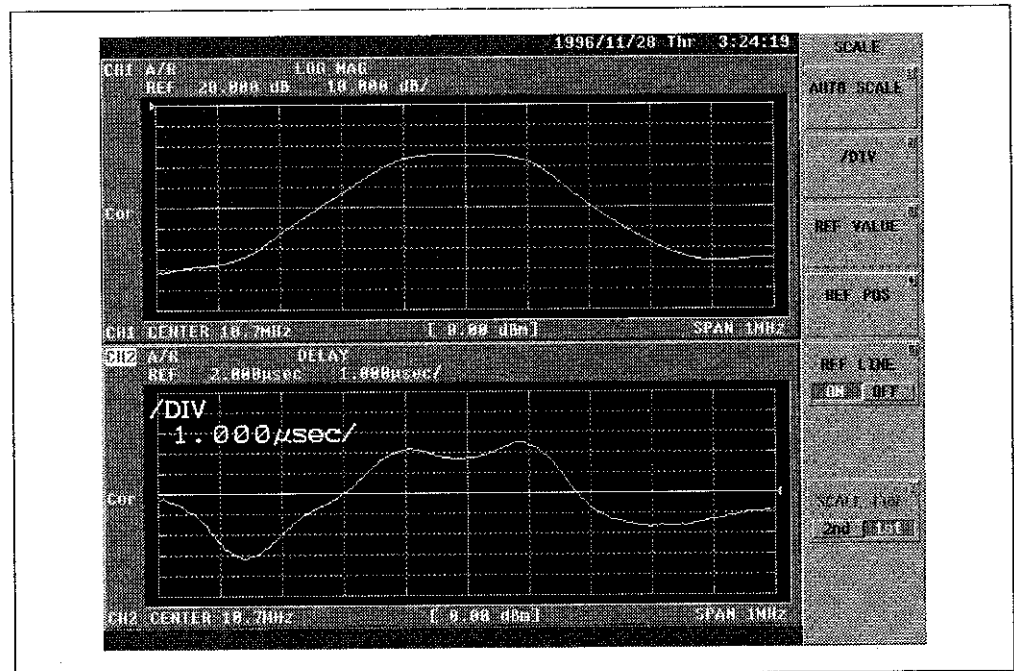
Figure 3-23

⑦   The channel 2 is made a phase. And the channel 1 is made a linear magnitude.

[FORMAT] → *{PHASE}*

[CH1] → *{LIN MAG}* → **[SCALE]** → *{AUTO SCALE}*

The display is shown in the figure below. This corresponds to the measurement of linear magnitude and phase of sub-section 3.2.7.
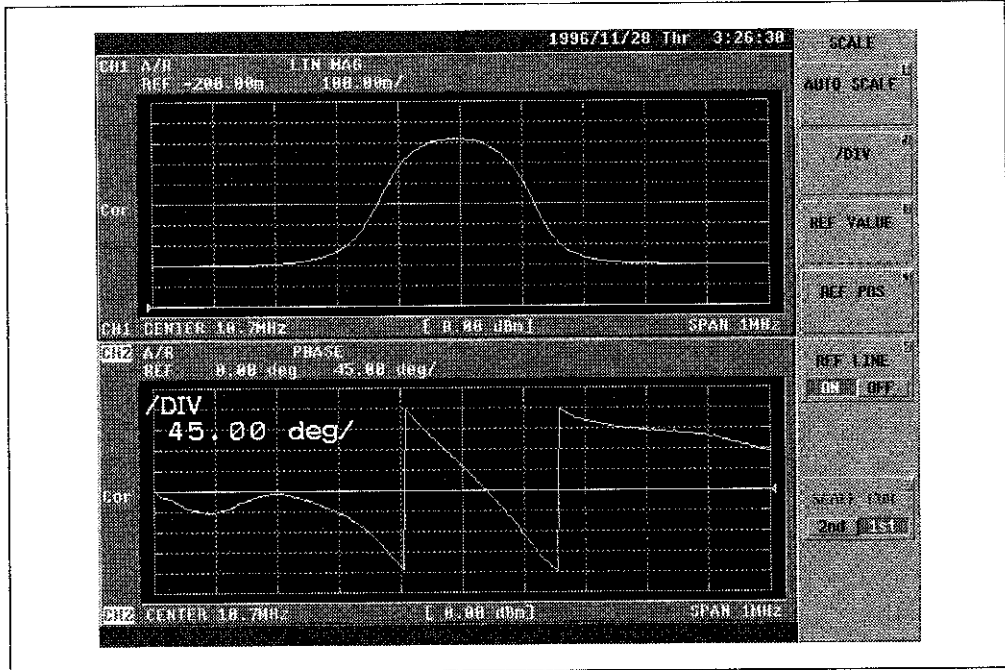
Figure 3-24

3.2.9 Reflection Characteristic Measurement

The measurement method of the reflection characteristic is explained here by the example of the band pass filter of center frequency 385MHz.

① Setup it (bridge connection) and presetting. Use a directional bridge and ZRB2VAR-52 for the bridge.

② Set frequency range of measurement.

   [CENTER] → **[3]** → **[8]** → **[5]** → **[MHz]**

   [SPAN] → **[5]** → **[0]** → **[MHz]**

③ Calibrate as follows.

   Call one port full calibration menu.

   [CAL] → *{CAL MENUS}* → *{1PORT FULL CAL}*

④ The open standard is connected with the test port of the bridge. And the calibration data is acquired.

{OPEN}

The display is shown in the figure below.
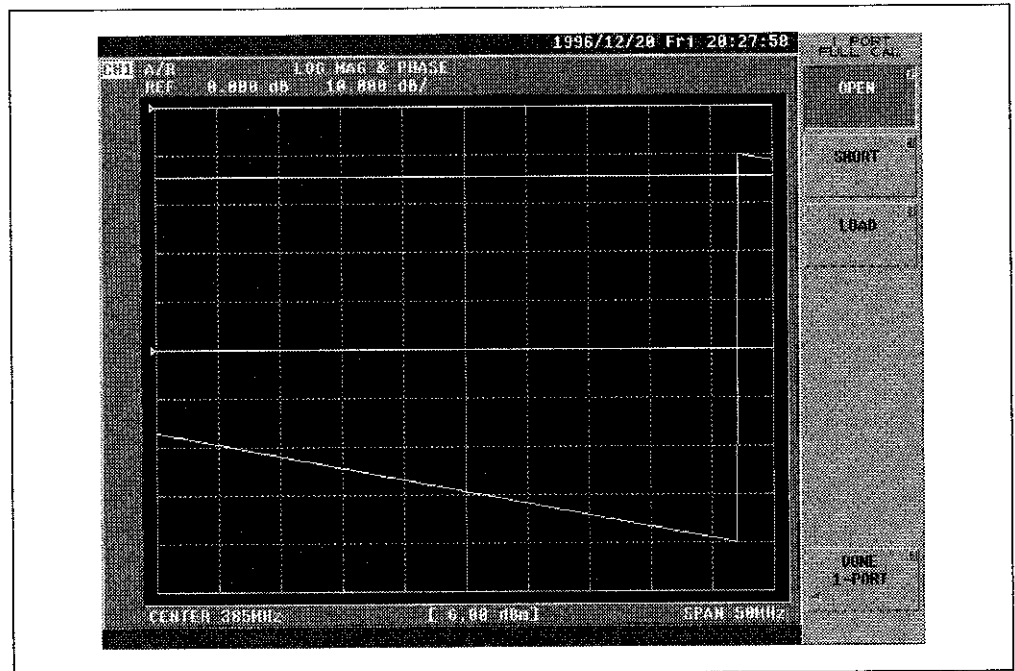
Figure 3-25

⑤ Short standard is connected with the test port of the bridge. And the calibration data is acquired.

{SHORT}

The display is shown in the figure below.
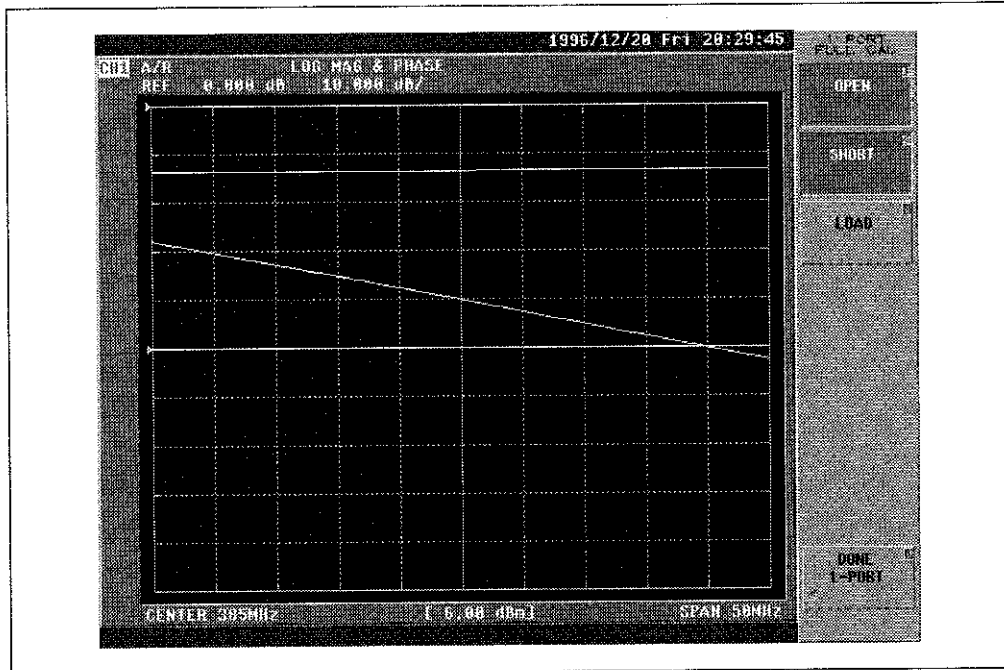
Figure 3-26

⑥ Load standard is connected with the test port of the bridge. And the calibration data
is acquired.

{LOAD}

The display is shown in the figure below.
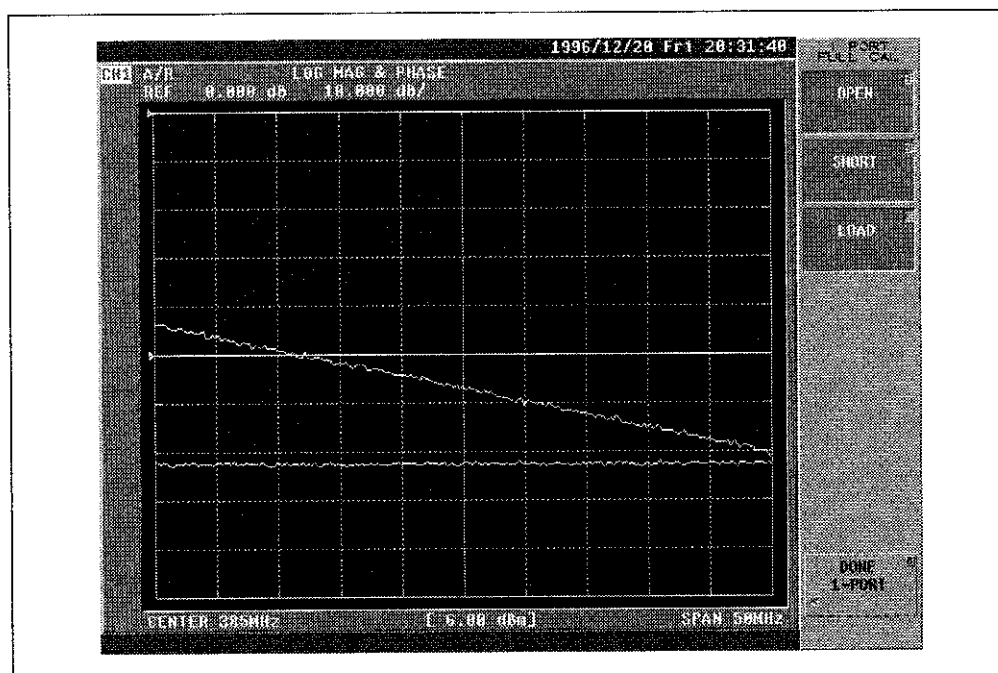
Figure 3-27

⑦ The calibration is ended.

{DONE 1-PORT}

The calibration data becomes automatically effective.

3.2 Measurement Method Example

⑧ DUT (Filter) is connected with the test port of the bridge.

(a) R3753AH/BH   (b) R3753EH
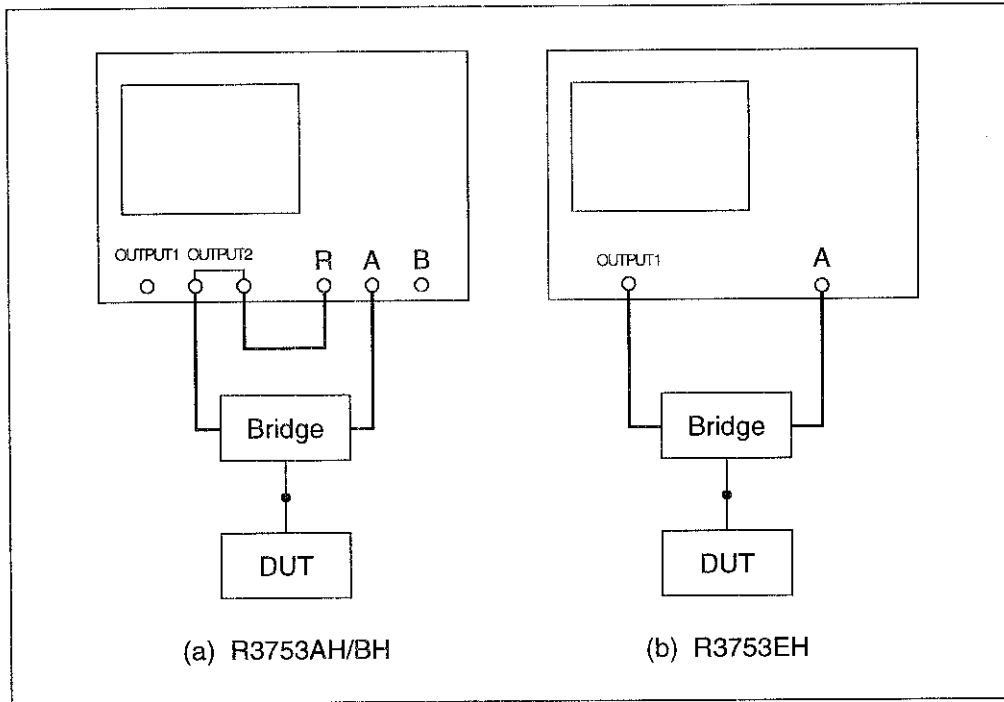
Figure 3-28

⑨ Adjust the scale of the display trace (Logarithmic magnitude). The display trace comes
to see easily.

[SCALE] → *{AUTO SCALE}*

The display is shown in the figure below.
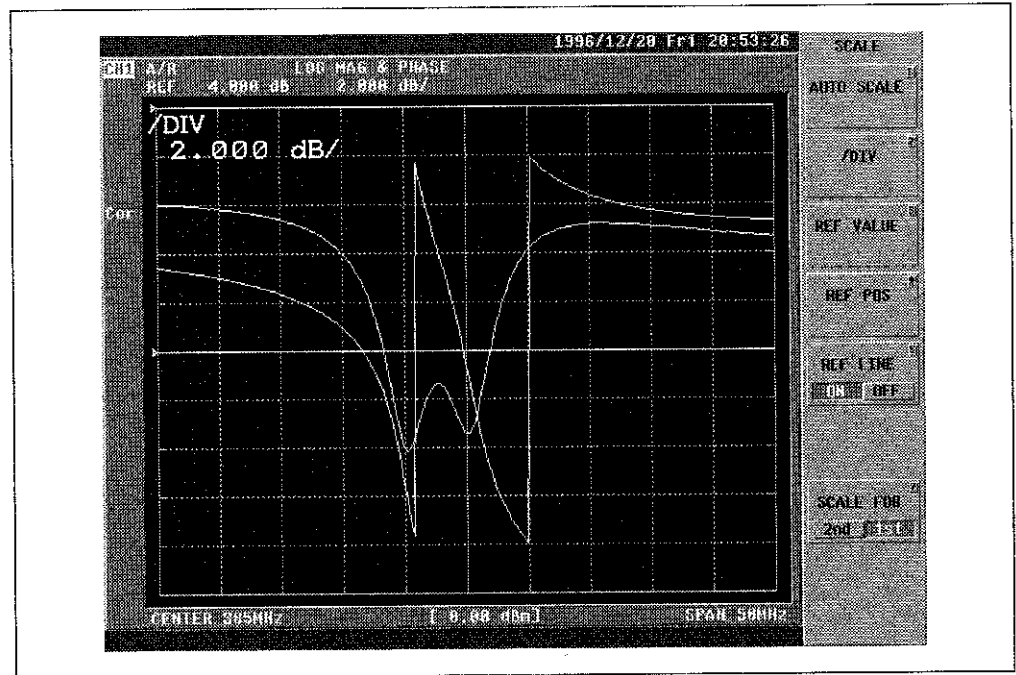
Figure 3-29

⑩ Measured data is displayed in Smith chart.

[FORMAT] → *{SMITH (R+jX)}*

3.2 Measurement Method Example

The display is shown in the figure below.

Figure 3-30

⑪ Measured data is displayed in the admittance chart.

{SMITH (G+jB)}

The display is shown in the figure below.
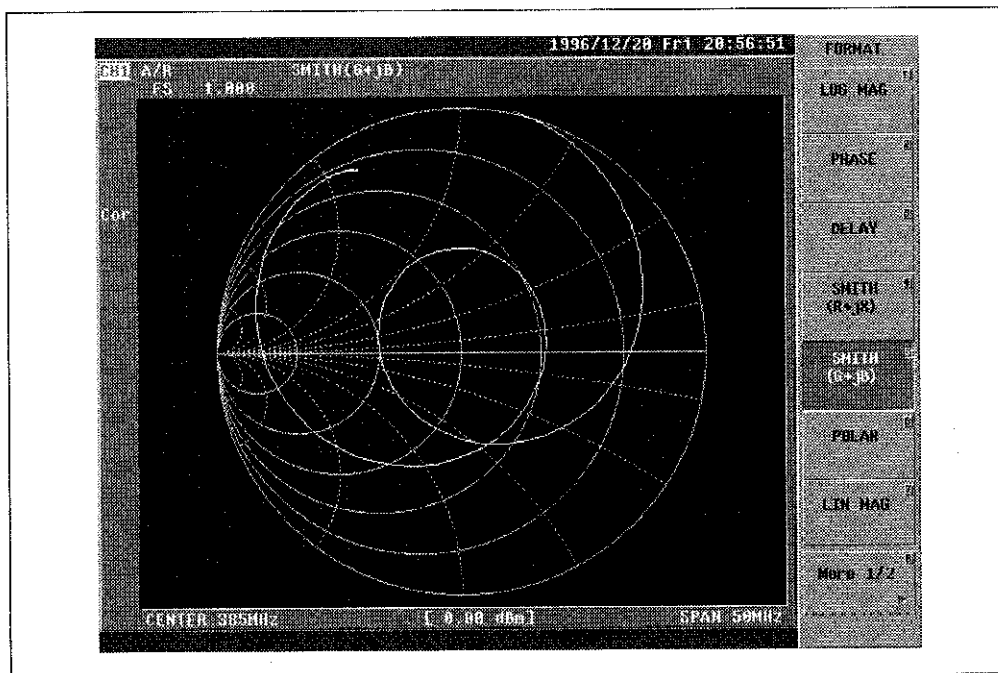
Figure 3-31

⑫ Measured data is displayed in the polar coordinates (Polar).

{POLAR}

The display is shown in the figure below.
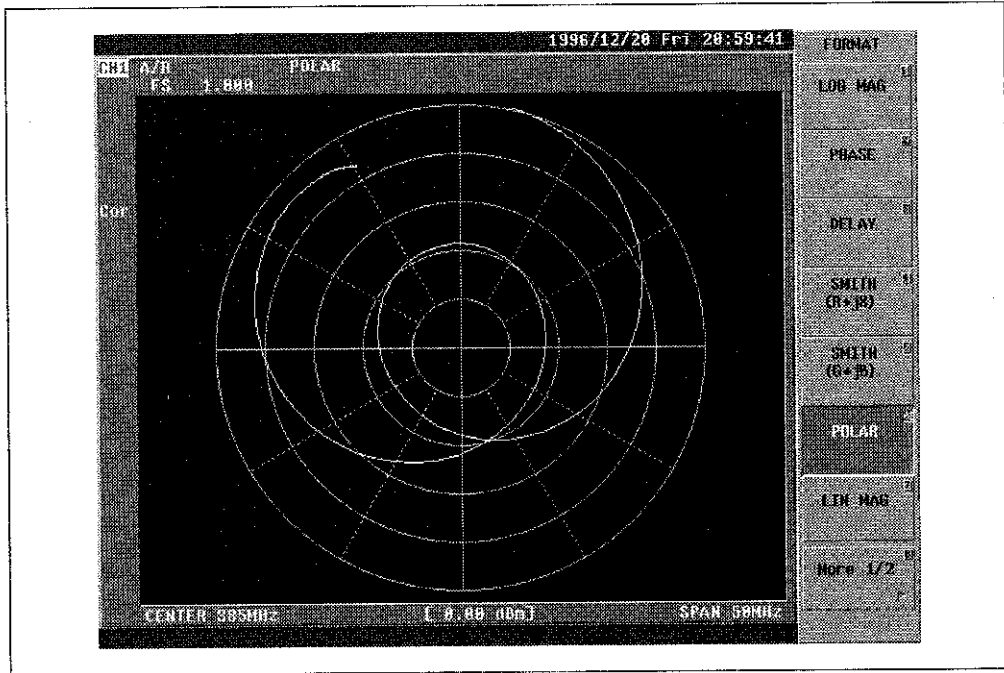
Figure 3-32

⑬ The scale is changed.

[SCALE] → **[.]** → **[5]** → **[X1]**

The display is shown in the figure below.
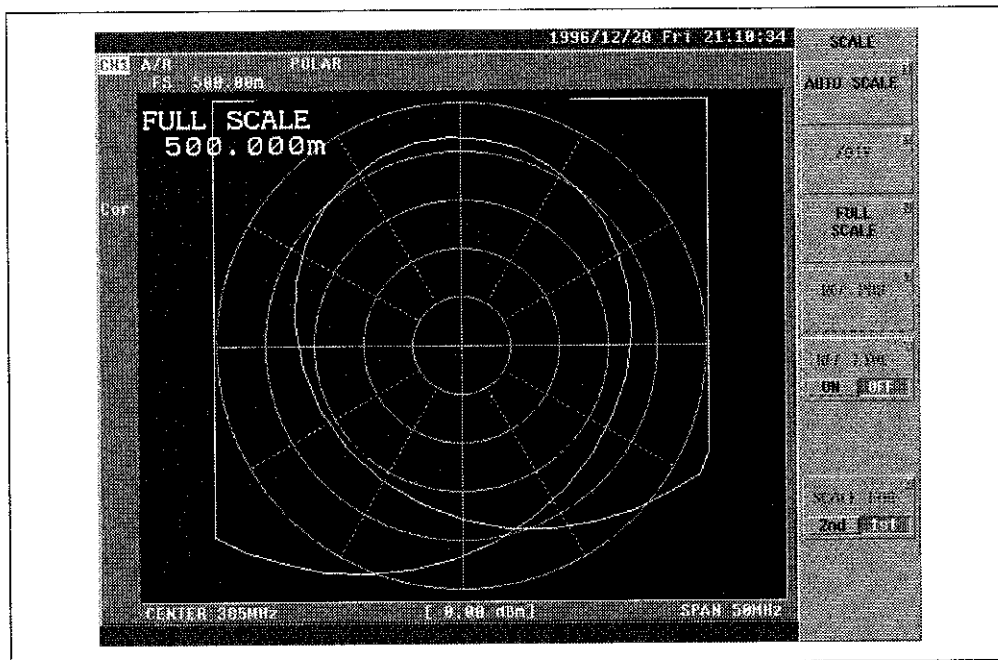
Figure 3-33

[2] → [X1]

The display is shown in the figure below.
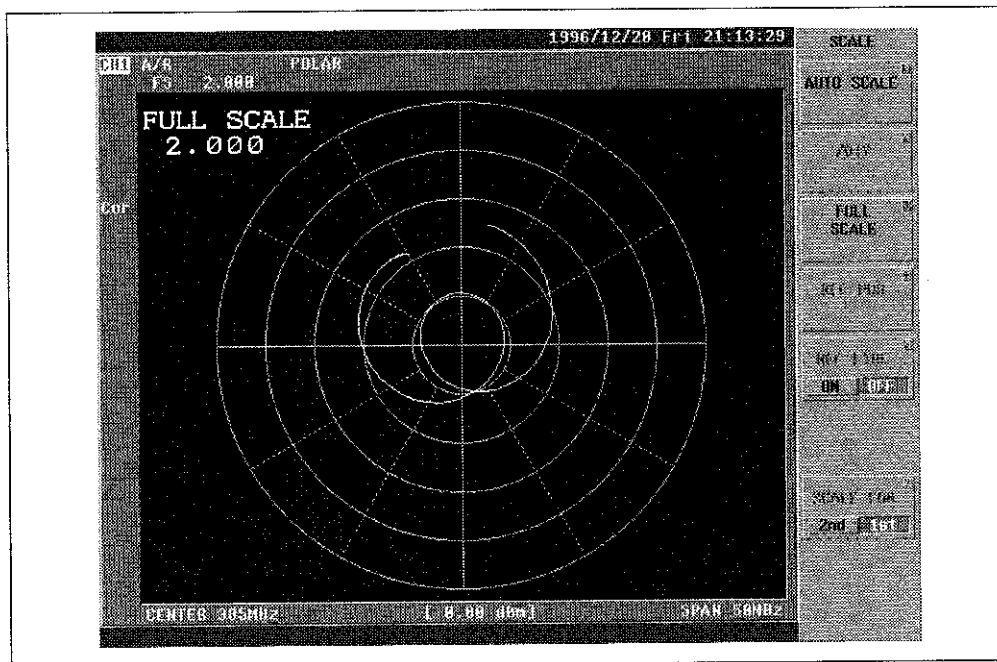
Figure 3-34

3.2.10 Crystal Resonator Measurement

The measurement method the crystal resonator is explained here by the example of the crystal of 42MHz in which π network is used.

① Setup it (π network jig connection). Preset it. Use the PIC-001 π network jig for the π network jig.

② Connect crystal to the test port of the π network jig.

(a) R3753AH/BH   (b) R3753EH
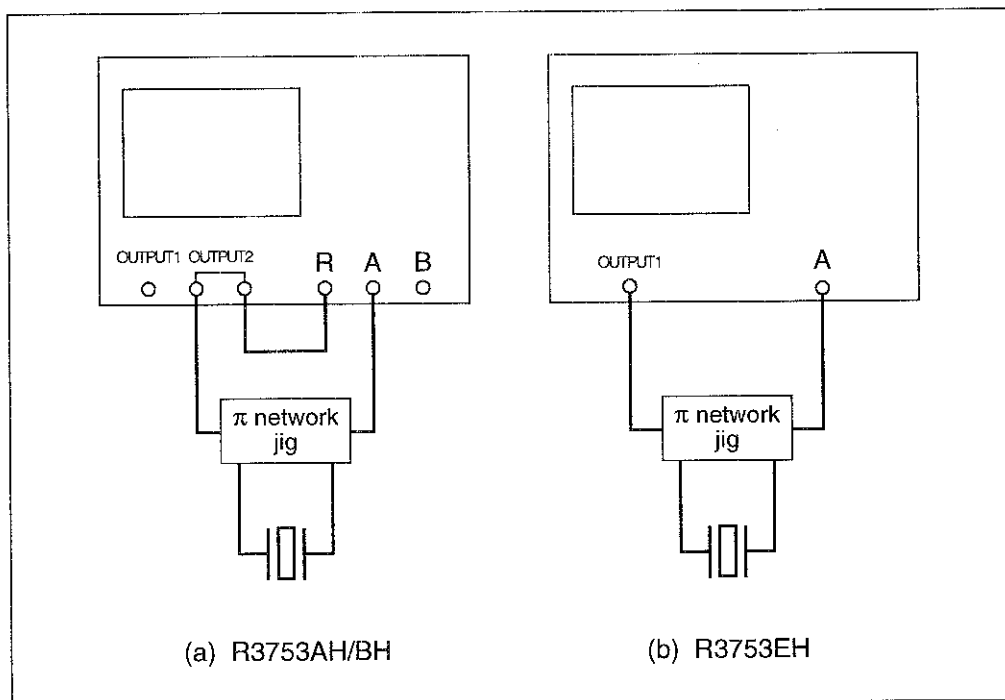
Figure 3-35

③ Set center frequency and span.

[CENTER] → [4] → [2] → [MHz]
[SPAN] → [5] → [kHz]

④ The resonance point (Magnitude maximum point) is found by using the marker search function.

[MKR→] → *{MKR SEARCH [   ] }* → *{MAX}*

The display is shown in the figure below.
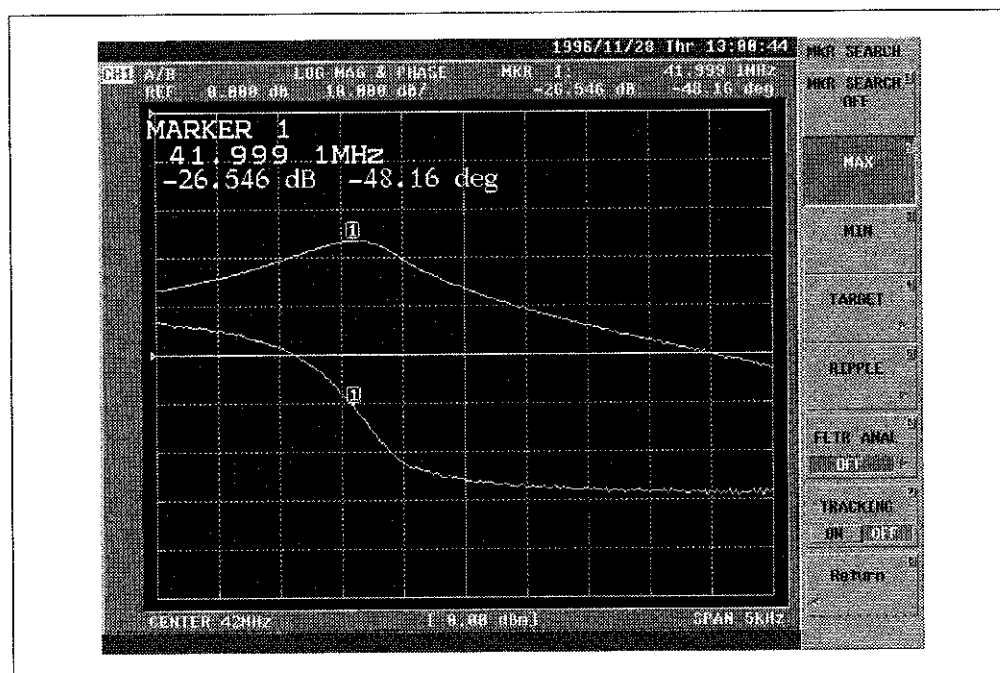
Figure 3-36

⑤ The resonance point is made a center frequency.

{Return} → *{MARKER → CENTER}*

The display is shown in the figure below.

Figure 3-37

⑥ Calibrate the frequency characteristic.

Connect the through (Short) to the test port of the π network jig.

(a) R3753AH/BH   (b) R3753EH
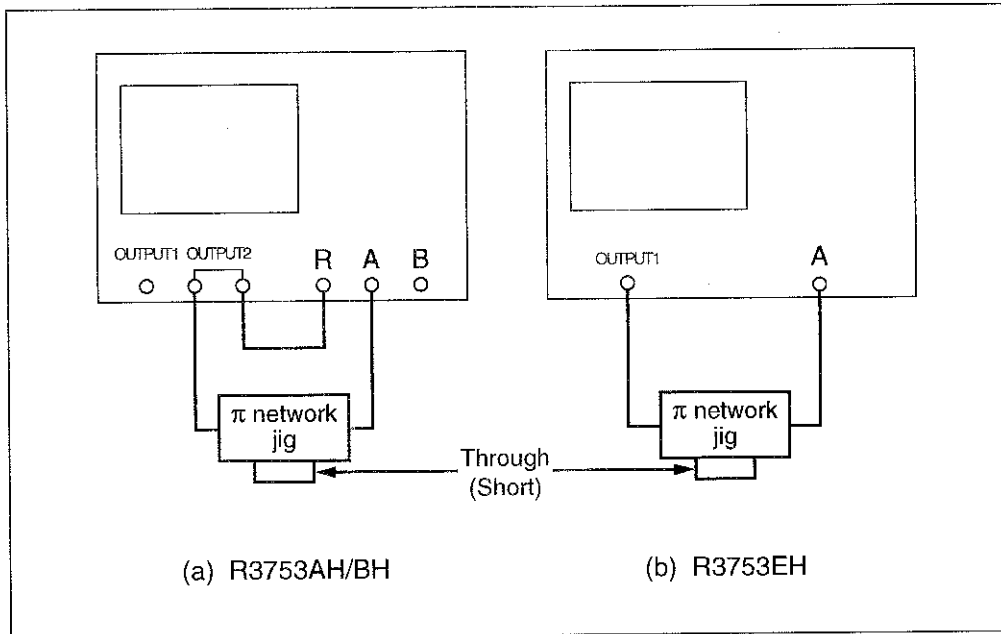
Figure 3-38

Normalization is done.

[CAL] → {NORMALIZE (THRU)}

The display is shown in the figure below.
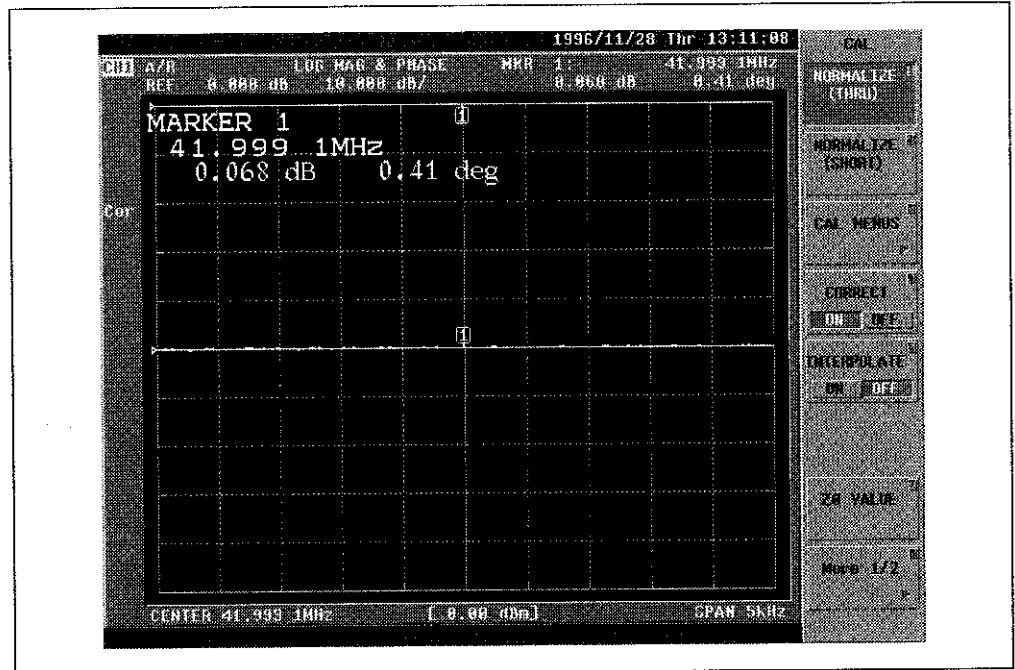
Figure 3-39

Connect crystal to the test port of the π network jig again.

⑦ Set the object of the scale change to the second trace (Phase). As a result, the operation of the marker becomes effective for the second trace.

[SCALE] → {SCALE FOR 2nd/1st}

⑧ The search for phase 0 is executed.

[MKR→] → {MKR SEARCH [   ]} → {TARGET} → {0°}

The display is shown in the figure below.

Figure 3-40

⑨ The search for specified phase (45 degree) is executed.

{TARGET} → **[4]** → **[5]** → **[X1]**

The display is shown in the figure below.
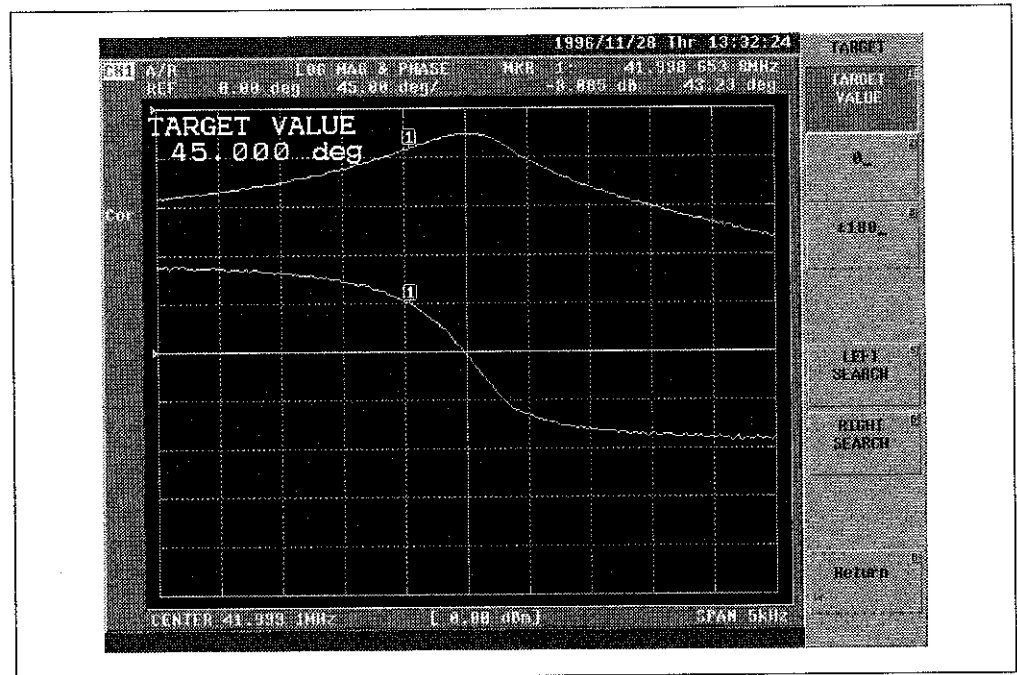
Figure 3-41

3.2.11 Multi-marker Measurement

The method of operation of multi-marker is explained here by example of band pass filter measurement of center frequency 10.7MHz.

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② Set center frequency and span.

   [CENTER] → **[1]** → **[0]** → **[.]** → **[7]** → **[MHz]**

   [SPAN] → **[1]** → **[MHz]**

③ Calibrate the frequency characteristic.

   Operate similarly by the item ④ of sub-section 3.2.1 (Measurement of filter).

④ Multi-marker is displayed. The marker of 10 maximums a channel can be displayed.

[MKR]

{ACTIVATE MARKER [*] } → {MARKER 2} → [↑]*

{MARKER 3} → [↑] → [↑]

{MARKER 4} → [↑] → [↑] → [↑]

{MARKER 5} → [↑] → [↑] → [↑] → [↑]

{More 1/2} → {MARKER 6} → [↓]

{MARKER 7} → [↓] → [↓]

{MARKER 8} → [↓] → [↓] → [↓]

{MARKER 9} → [↓] → [↓] → [↓] → [↓]

{MARKER 10} → [↓] → [↓] → [↓] → [↓] → [↓]

The display is shown in the figure below.
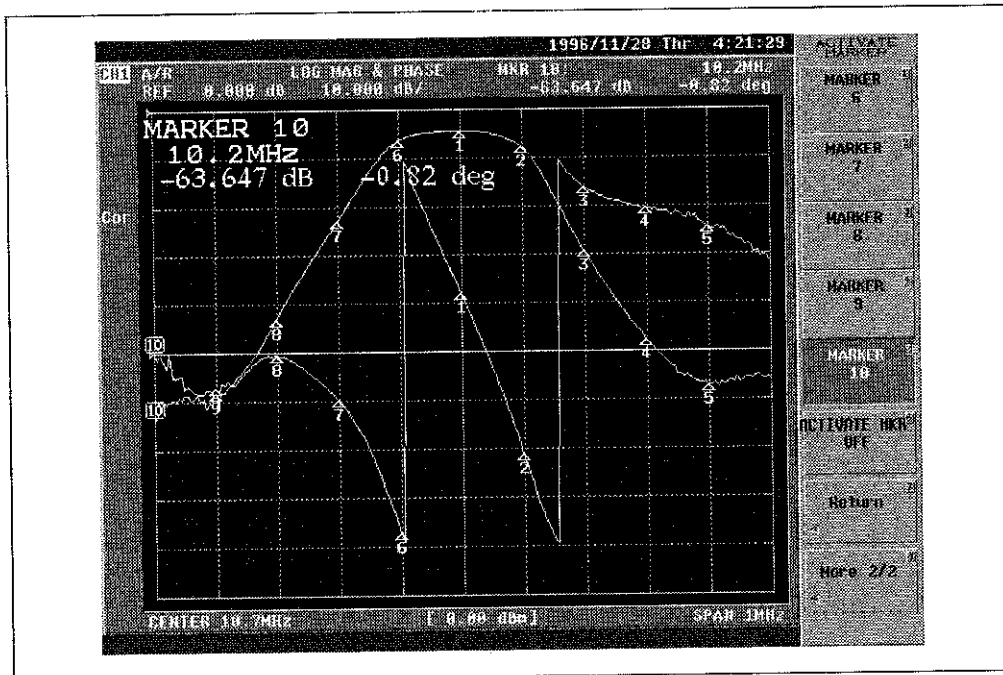
Figure 3-42

⑤ The marker list is displayed to read the data of all markers.

{Return} → {MKR LIST ON/OFF}

The marker list is displayed as shown in the figure below by the above-mentioned operation.
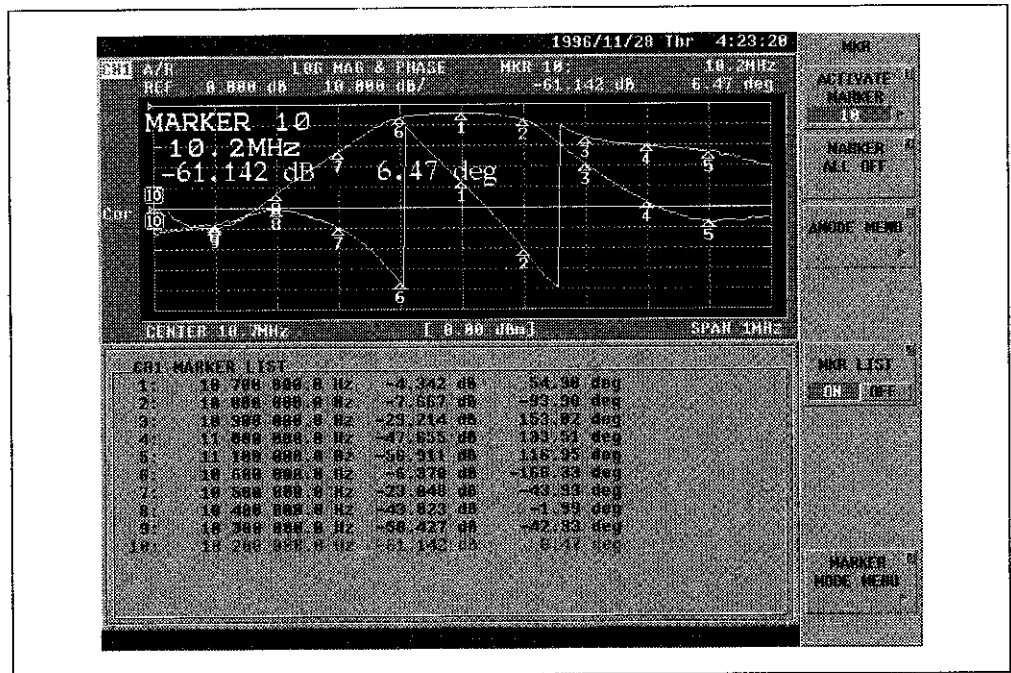
Figure 3-43

3.2.12 Delta Marker Measurement

The operation method for the delta marker is explained here by the example of the band pass filter of center frequency 43MHz.

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② Make the measurement format a magnitude (Logarithmic display).

[FORMAT] → *{LOG MAG}*

③ Set center frequency and span.

[CENTER] → **[4]** → **[3]** → **[MHz]**

[SPAN] → **[1]** → **[0]** → **[MHz]**

④ Adjust the scale of the display trace. The display becomes to see easily.

[SCALE] → *{AUTO SCALE}*

⑤ The difference of the value between two points is measured with a reference marker.

[MKR] → **[↓]** → **[↓]** → *{ΔMODE MENU}* → *{ΔREF = ΔMKR}*

The reference marker appears at the current active marker position. The reference marker is displayed by a red * sign.
The active marker is moved.

[4] → **[3]** → **[MHz]**

The display is shown in the figure below. The difference of the value of both markers is displayed in the active marker area.
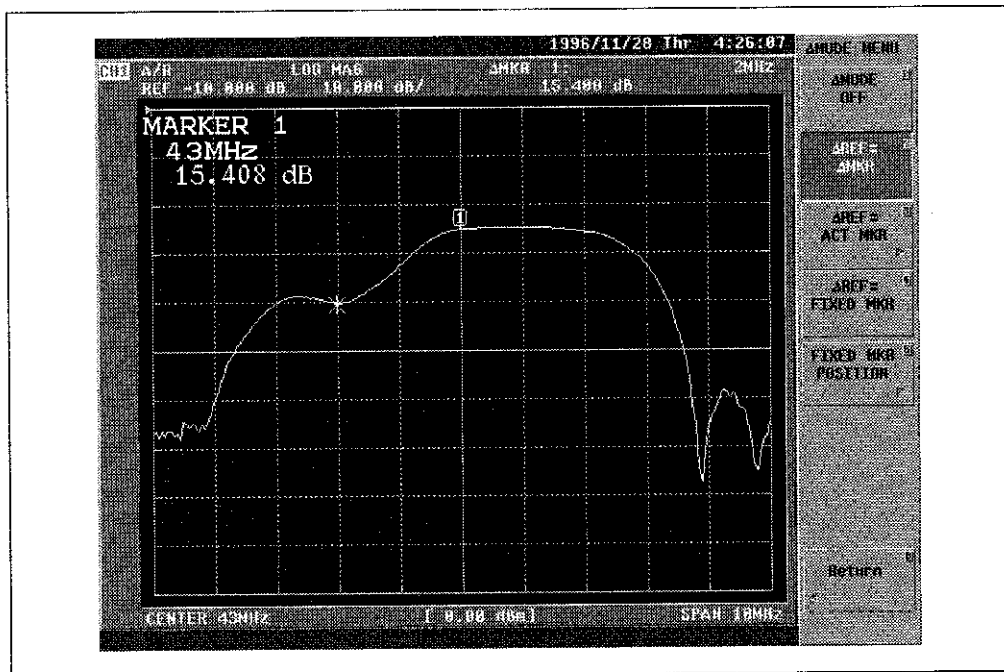
Figure 3-44

⑥ The difference of the value between two points is measured by using the comparison between markers.

{ΔMODE OFF} → *{ΔREF = ACT MKR}*

{ACTIVATE MARKER [   ]} → *{MARKER 2}* → *[↓]* → *[↓]* → *{MARKER 1}* → *{Return}*

{COMPARE MARKER 2}

The display is shown in the figure below. The difference of the value of both markers is displayed in the active marker area.
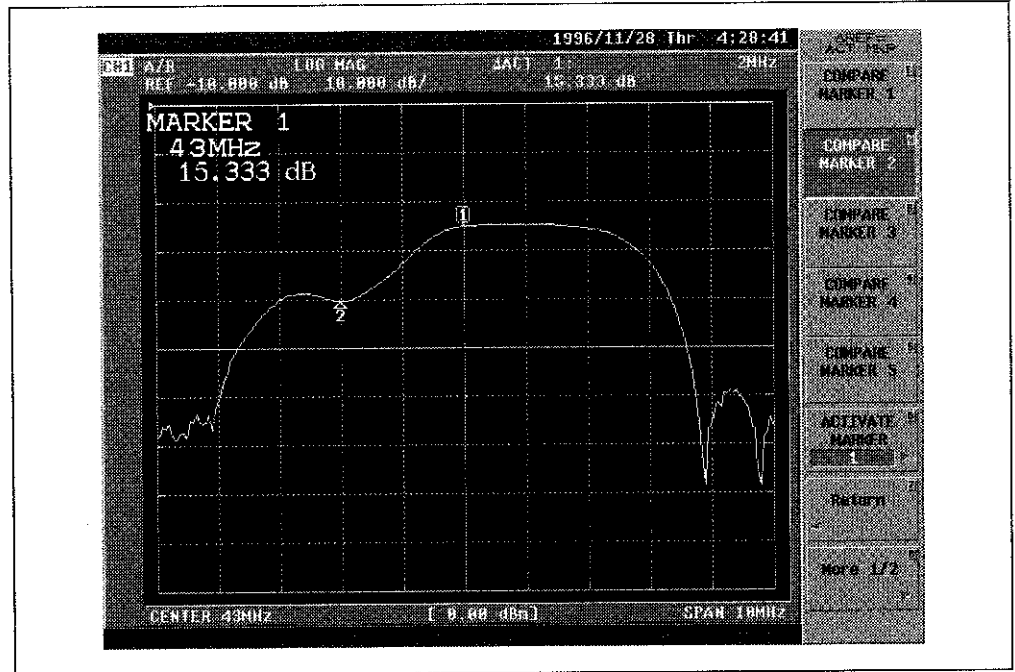
Figure 3-45

⑦ The difference between two points is measured with a fixed marker.

{Return} → {ΔREF = FIXED MKR}

The fixed marker appears at the center of the screen. The fixed marker is shown by a red ◇ sign. And it can be fixed to an arbitrary position without any relation to the trace. The position of the fixed marker is moved.

{FIXED MKR POSITION} → {FIXED MKR VALUE} → [-] → [1] → [0] → [X1]

The fixed marker moves to the position of -10dB of vertical axis. The display is shown in the figure below. The difference between the fixed marker value and the active marker value is displayed in the active marker area.
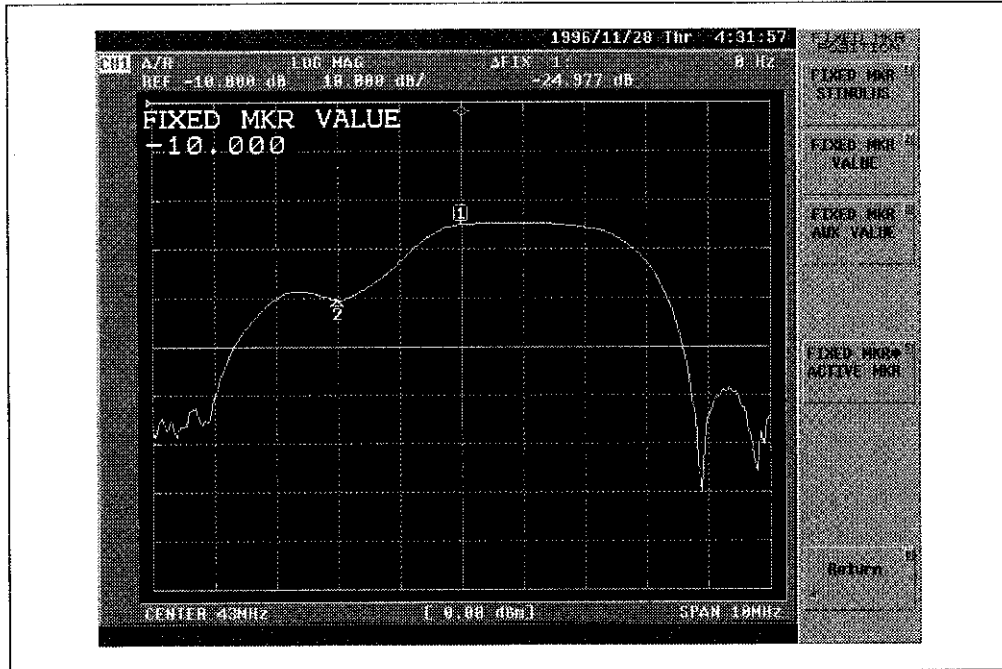
Figure 3-46

3.2.13 Delta Section Marker Measurement

The partial (Delta section) analysis operation method is explained here by the example of the band pass filter of center frequency 43MHz.

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② The measurement format is made a magnitude (Logarithmic display).

[FORMAT] → {LOG MAG}

③ Set center frequency and span.

[CENTER] → [4] → [3] → [MHz]
[SPAN] → [1] → [0] → [MHz]

④ Adjust the scale of the display trace. The display becomes to see easily.

[SCALE] → {AUTO SCALE}

⑤ The delta section is specified.

The marker 1 is moved to a suitable position with the data knob.

[MKR] ⟲

The reference marker is set to the position of the marker 1.

{ΔMODE MENU} → *{ΔREF=ΔMKR}*

The marker 1 is moved to a suitable position again with the data knob.

⟲

The display is shown in the figure below. The area between the reference marker and the marker 1 becomes a delta section.
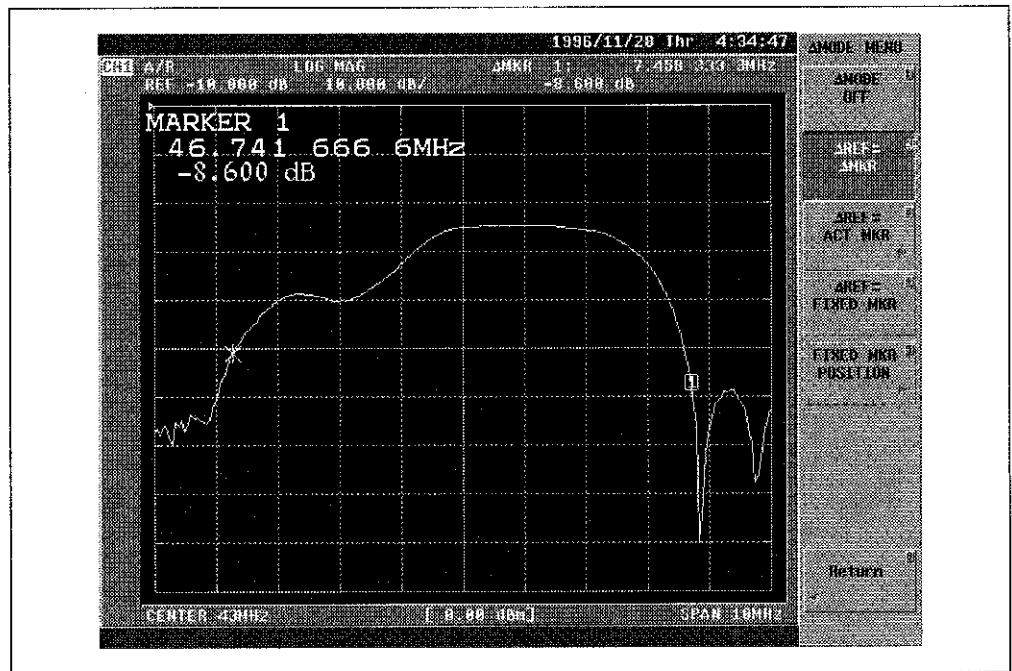
Figure 3-47

⑥ The delta section is specified within the range of a partial analysis.

[MKR→] → *{PART SRCH [   ] }* → *{SET RANGE}*

⑦ A partial analysis is enabled.

{PART SRCH ON/OFF}

The display is shown in the figure below.
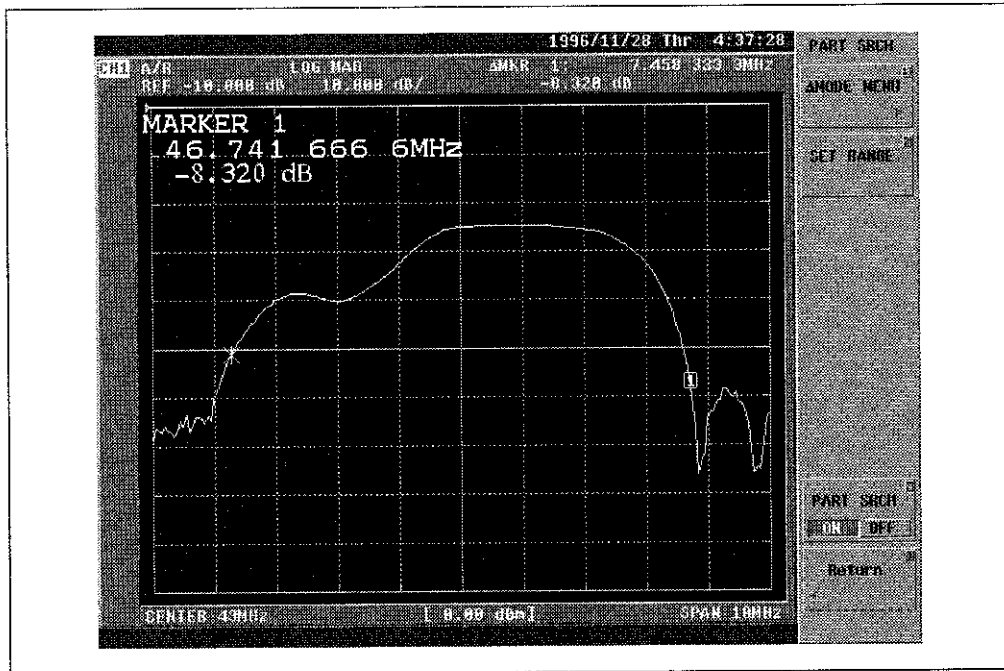
Figure 3-48

⑧ The maximum value in the delta section is searched.

{Return} → {MKR SRCH [   ]} → {MAX}

The display is shown in the figure below.
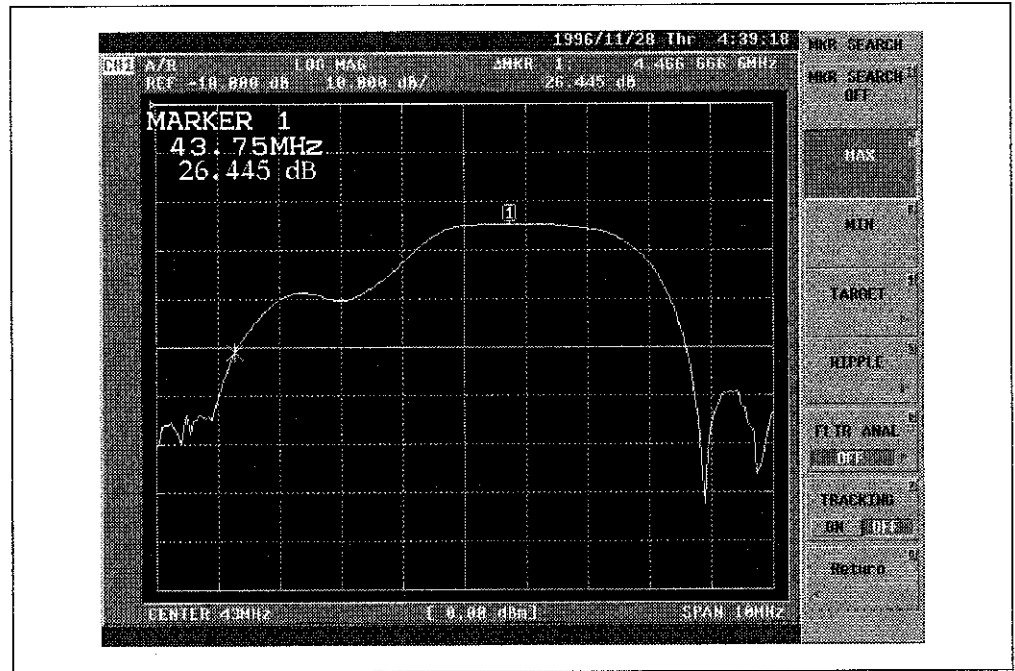
Figure 3-49

⑨ Minimum value in the delta section is searched.

{MIN}

The display is shown in the figure below.
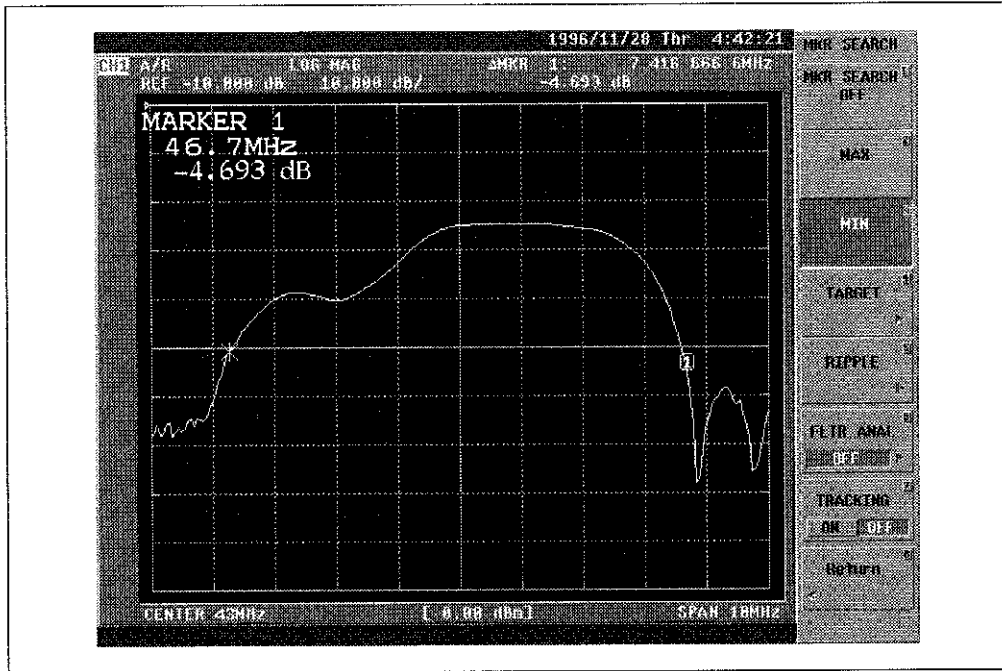
Figure 3-50

⑩ The ripple in the delta section is searched.

$\{RIPPLE\} \rightarrow \{\Delta MAX\cap\text{-}MIN\cup\}$

The reference marker moves to a minimum point in the local minimum peak. And the active marker moves to the point of the maximum in the local maximum peak.
The display is shown in the figure below. The difference of the value of both markers is displayed in the active marker area.
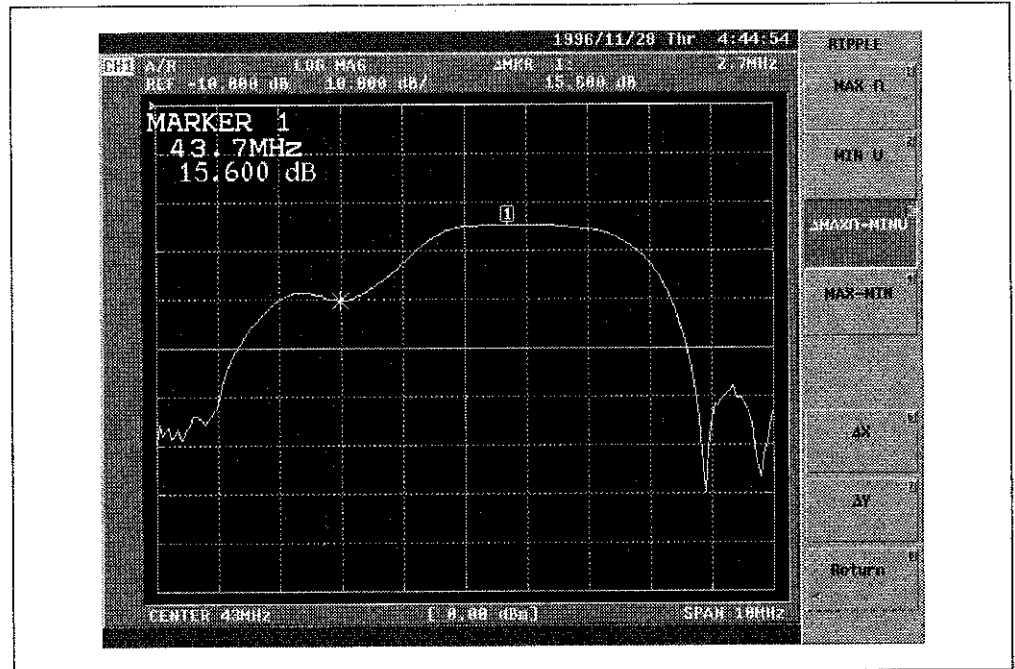
Figure 3-51

3.2.14 Marker Analysis Measurement

The method of operation of the marker → is explained here by the example the band pass filter measurement of center frequency 43MHz .

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② Set center frequency and span.

[CENTER] → [4] → [3] → [MHz]

[SPAN] → [1] → [0] → [MHz]

③ The magnitude maximum point is searched by displaying the marker.

[MKR →]

{MKR SEARCH [   ] } → {MAX}

The display is shown in the figure below by the above-mentioned operation.
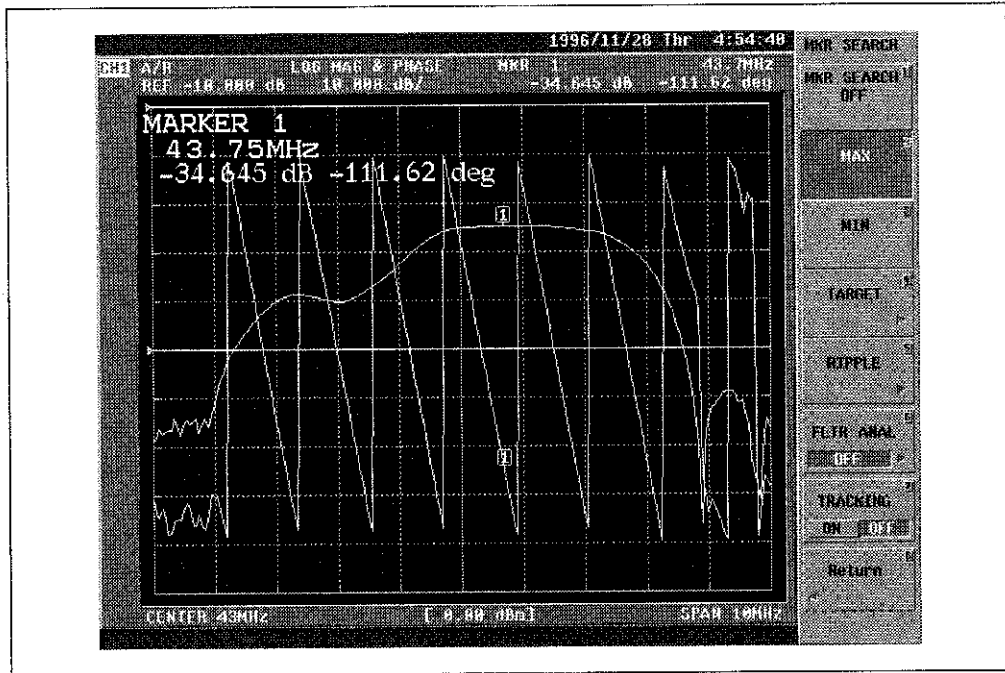
Figure 3-52

④ The center frequency is set to the marker value by the marker →.

{Return}

{MARKER → CENTER}

The display is shown in the figure below by the above-mentioned operation.
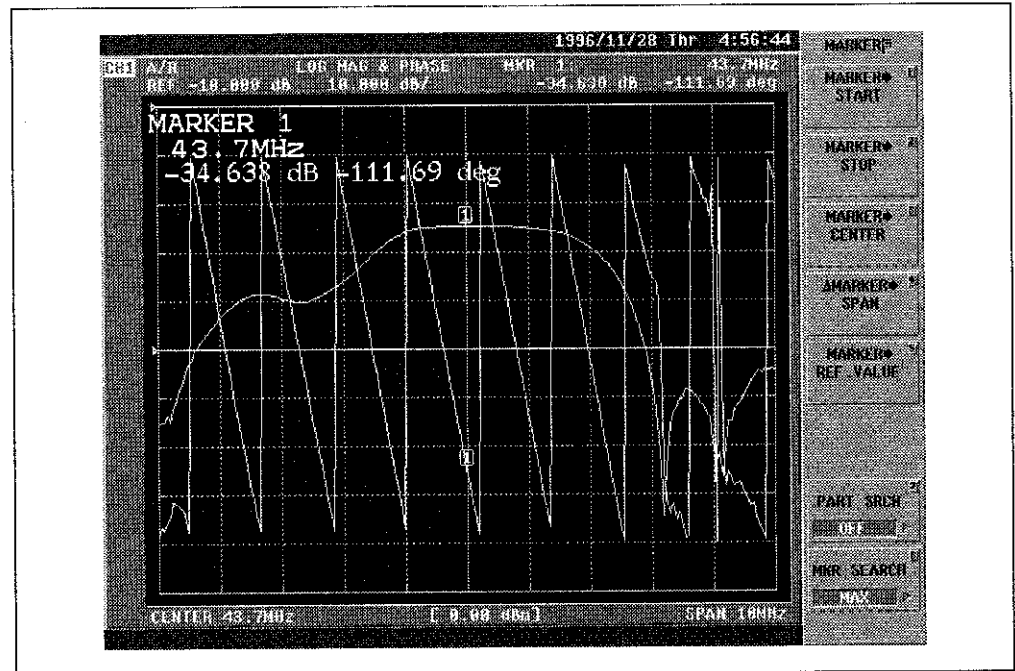
Figure 3-53

⑤ Span is expanded by the marker →. From 40MHz to 46MHz is displayed here.

[4] → **[0]** → **[MHz]** : The active marker is moved to 40MHz.

[MKR] → {ΔMODE MENU} → {ΔREF = ΔMKR}

[4] → **[6]** → **[MHz]** : The active marker is moved to 46MHz.

[MKR →] → {ΔMARKER → SPAN}

The display is shown in the figure below by the above-mentioned operation.
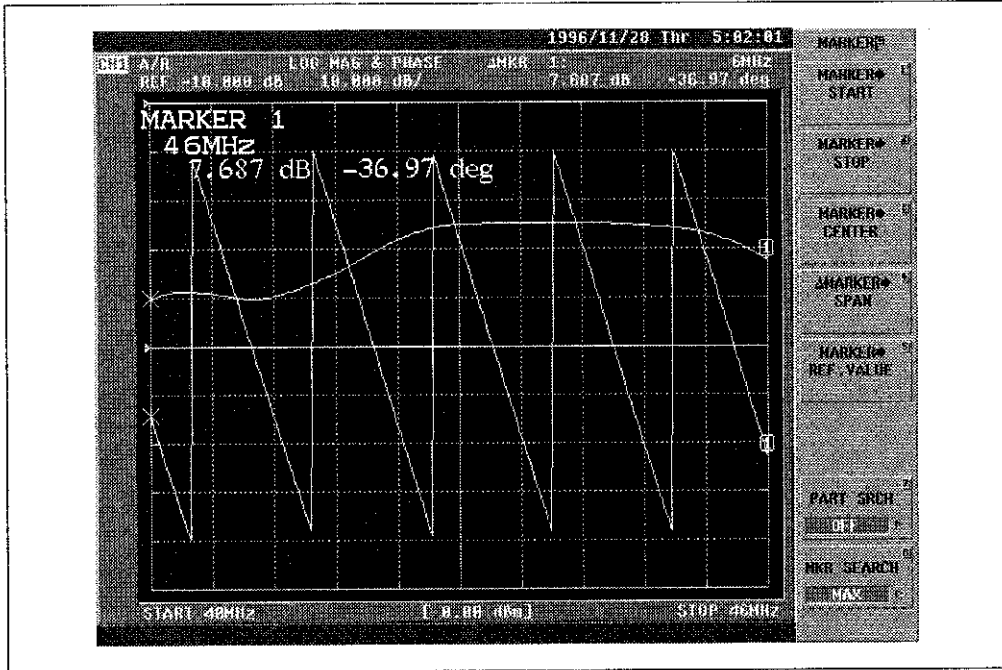
Figure 3-54

The section specified with the delta marker is displayed.

3.2.15 Marker Coupling and Interpolation Measurements

This section explains how to use the Interpolation Marker and Marker coupling, showing the measurement of the band-pass filter of which the center frequency is 43MHz.

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② Set center frequency and span.

[CENTER] → [4] → [3] → [MHz]

[SPAN] → [1] → [0] → [MHz]

③ Make the format of the channel 1 a magnitude (Logarithmic display).

[FORMAT] → {LOG MAG}

④ Set the active channel to the channel 2. Make the format of the channel 2 a phase.

[CH2]

{PHASE}

⑤ The active channel is returned to the channel 1. And both channels are displayed simultaneously.

[CH1]

[DISPLAY] → {DUAL CH ON/OFF} → {SPLIT CH ON/OFF}

⑥ The marker is displayed and moved to 42.125MHz.

[MKR] → **[4]** → **[2]** → **[.]** → **[1]** → **[2]** → **[5]** → **[MHz]**

⑦ The marker mode menu is displayed.

{MARKER MODE MENU}

The display is shown in the figure below by the above-mentioned operation.
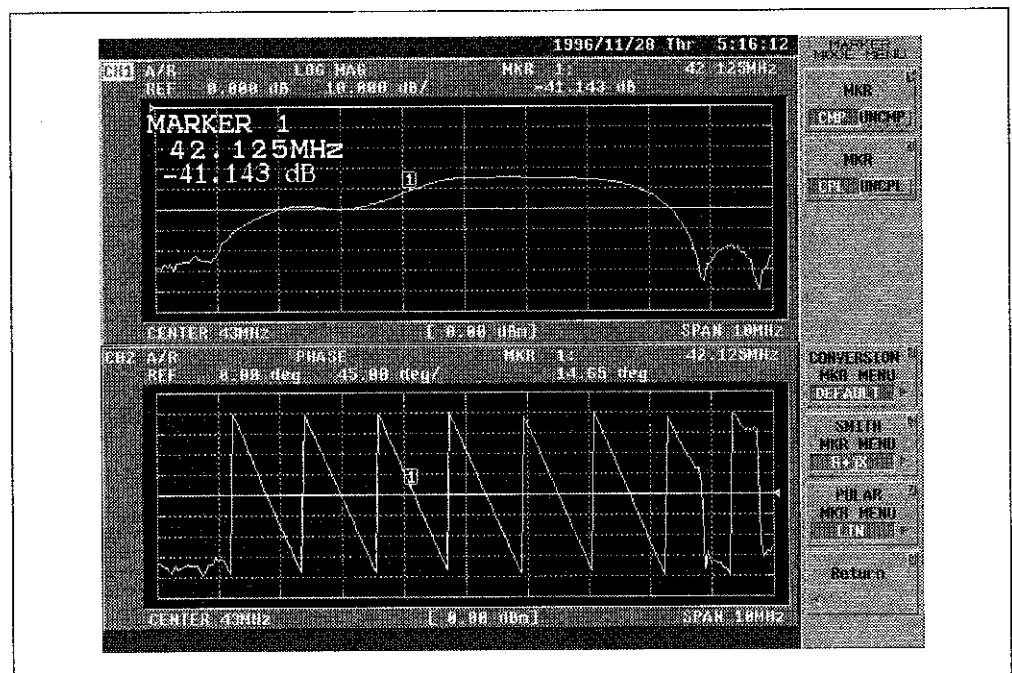
Figure 3-55

MKR CMP (Marker compensation mode) is selected. Therefore, the marker is interpolated. As a result, the value not on the measurement point is displayed by using the value on interpolation point.
Moreover, because MKR CPL (Marker coupling mode) is selected when the marker of the channel 1 moves, the marker of the channel 2 will move according to it.

⑧ Setting MKR UNCMP (Marker un-compensation mode). Move the marker to 42.125MHz.

{MKR CMP/UNCMP}

[4] → [2] → [.] → [1] → [2] → [5] → [MHz]

The display is shown in the figure below by the above-mentioned operation.
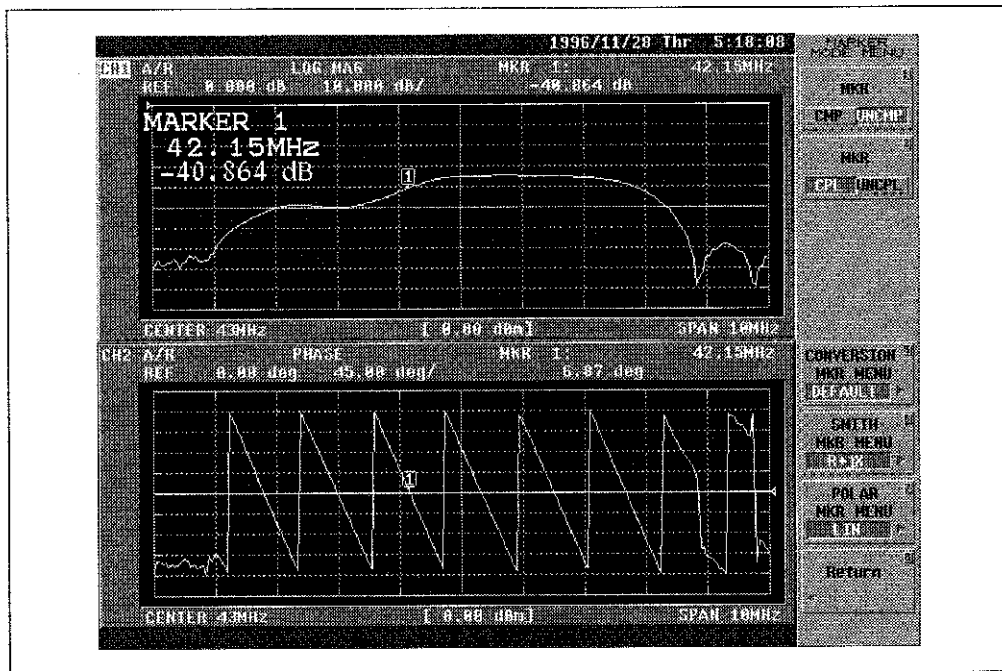
Figure 3-56

When MKR UNCMP (Marker compensation mode) is selected, the marker moves to 42.15MHz with the actually measured point because the marker will not be interpolated.

⑨ Set it in MKR UNCPL (Markers uncouple mode). Move the marker.

{MKR CPL/UNCPL}

The display is shown in the figure below by the above-mentioned operation.
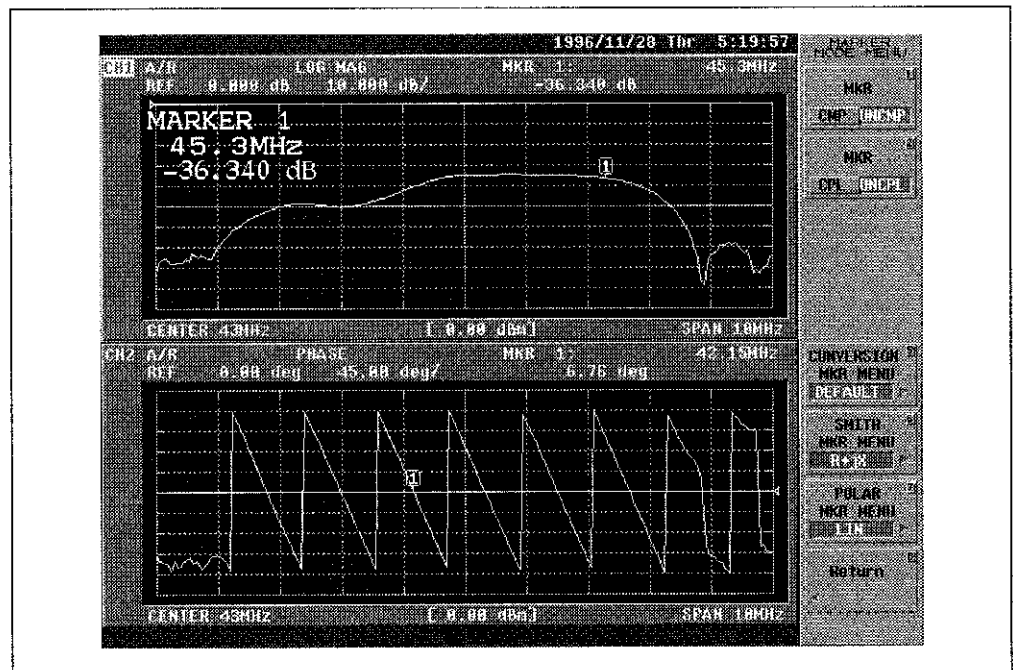
Figure 3-57

MKR UNCPL (Markers uncouple mode) is selected. Therefore the coupling of the marker is not done, and the marker on each channel moves independently.

3.2.16 Program Sweep Measurement

The program sweep method of operation is explained here by the example of the band pass filter measurement of center frequency 21.4MHz.

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② The measurement format is made a magnitude (Logarithmic display).

[FORMAT] → *{LOG MAG}*

③ Set center frequency and span.

[CENTER] → **[2]** → **[1]** → **[.]** → **[4]** → **[MHz]**
[SPAN] → **[1]** → **[0]** → **[0]** → **[MHz]**

④ Set the scale (Display coordinates). Set the value of the reference to -20dBm here.

[SCALE] → *{REF VALUE}* → **[-]** → **[2]** → **[0]** → **[X1]**

The display is shown in the figure below by the above-mentioned operation.
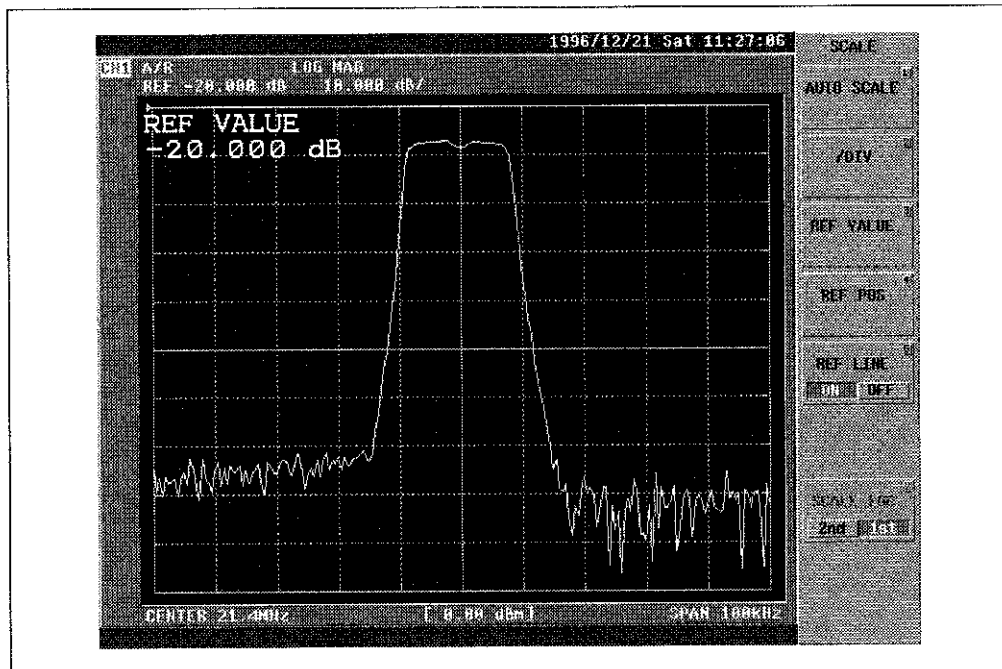
Figure 3-58

Next, specific frequency range of this filter is expanded and is measured by using the program sweep.
Three parts of 21.360MHz to 21.390MHz, 21.392MHz to 21.408MHz, 21.410MHz to 21.440MHz are expanded and are measured here.
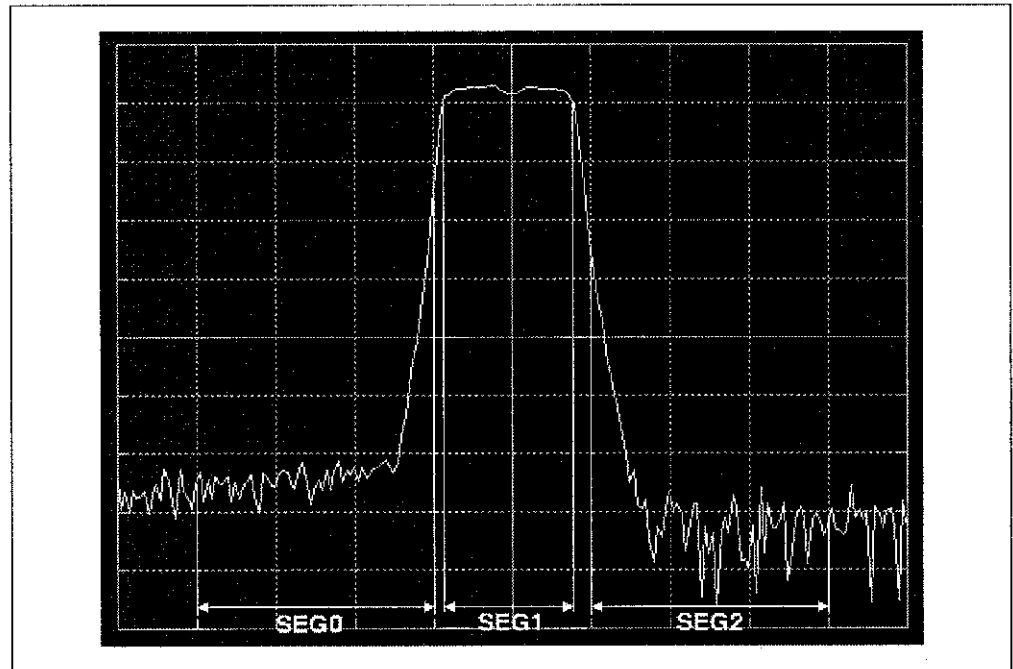
Figure 3-59

⑤ Each set value of the program sweep is edited. The data is set here in the three segments of 0, 1 and 2 separately.

[MENU] → {SWEEP TYPE [   ] } → {EDIT PROG SWEEP}

{SEGMENT NUMBER} → [0] → [X1]

{START} → [2] → [1] → [.] → [3] → [6] → [0] → [MHz]

{STOP} → [2] → [1] → [.] → [3] → [9] → [0] → [MHz]

{POINT} → [2] → [0] → [0] → [X1]

{SEGMENT NUMBER} → [1] → [X1]

{START} → [2] → [1] → [.] → [3] → [9] → [2] → [MHz]

{STOP} → [2] → [1] → [.] → [4] → [0] → [8] → [MHz]

{POINT} → [2] → [0] → [0] → [X1]

{SEGMENT NUMBER} → [2] → [X1]

{START} → [2] → [1] → [.] → [4] → [1] → [0] → [MHz]

{STOP} → [2] → [1] → [.] → [4] → [4] → [0] → [MHz]

{POINT} → [2] → [0] → [0] → [X1]

⑥ Set the sweep type to the program sweep.

{Return} → *{PROGRAM SWEEP}*

The display is shown in the figure below by the above-mentioned operation.
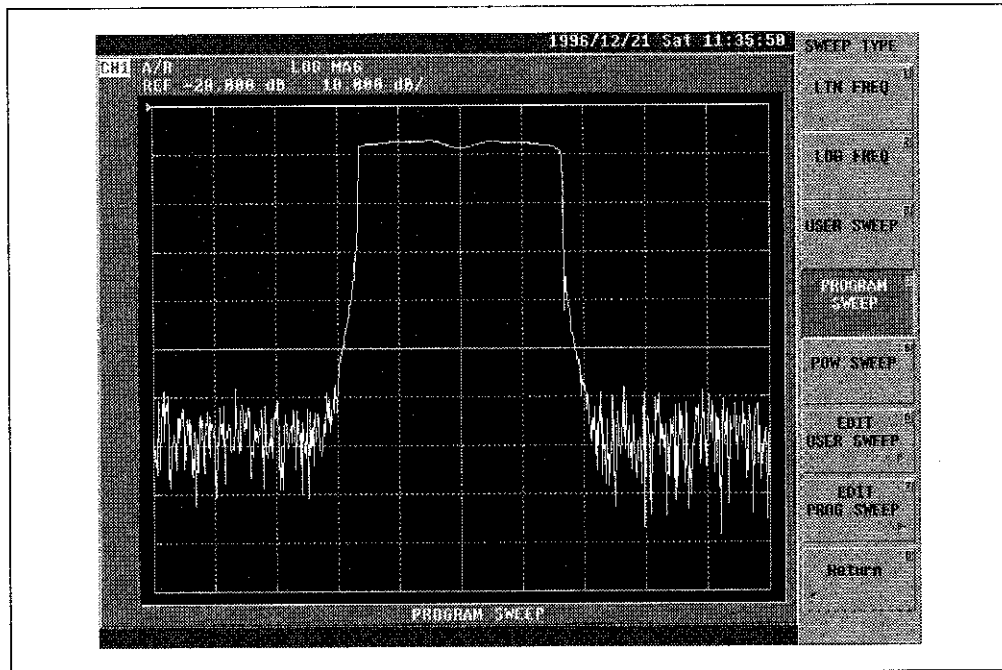
Figure 3-60

⑦ Output level and resolution bandwidth of segment 0 are changed.

{EDIT PROG SWEEP}

{SEGMENT NUMBER} → **[0]** → **[X1]**

{More 1/2}

{SEGMENT POWER} → **[5]** → **[.]** → **[0]** → **[X1]**

{IF RBW [   ]} → **[1]** → **[kHz]**

{Return}

{PROGRAM SWEEP}

The display is shown in the figure below by the above-mentioned operation.
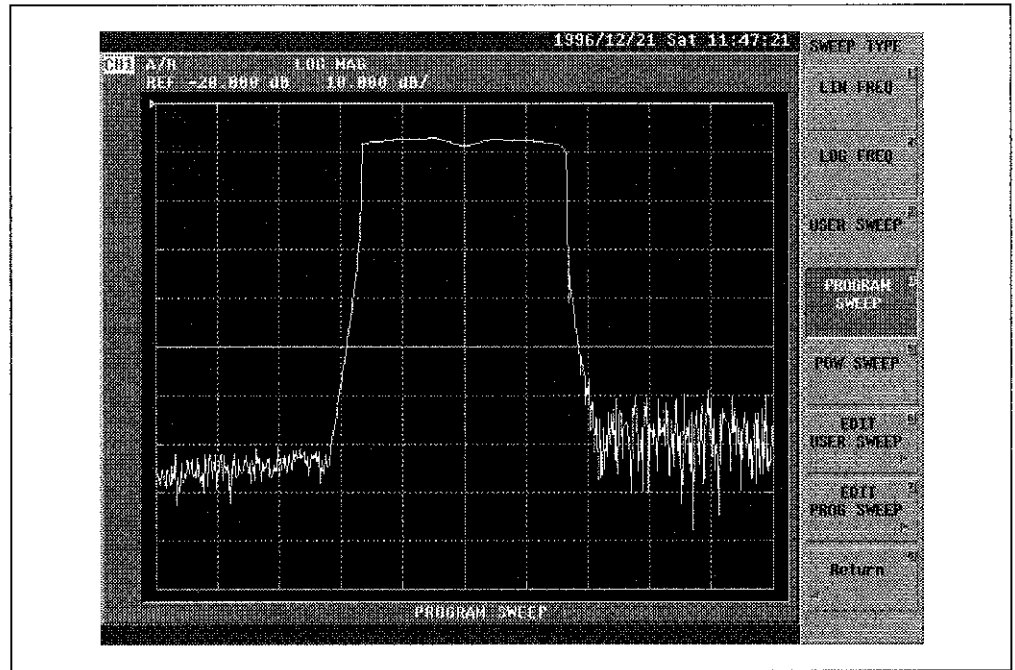
Figure 3-61
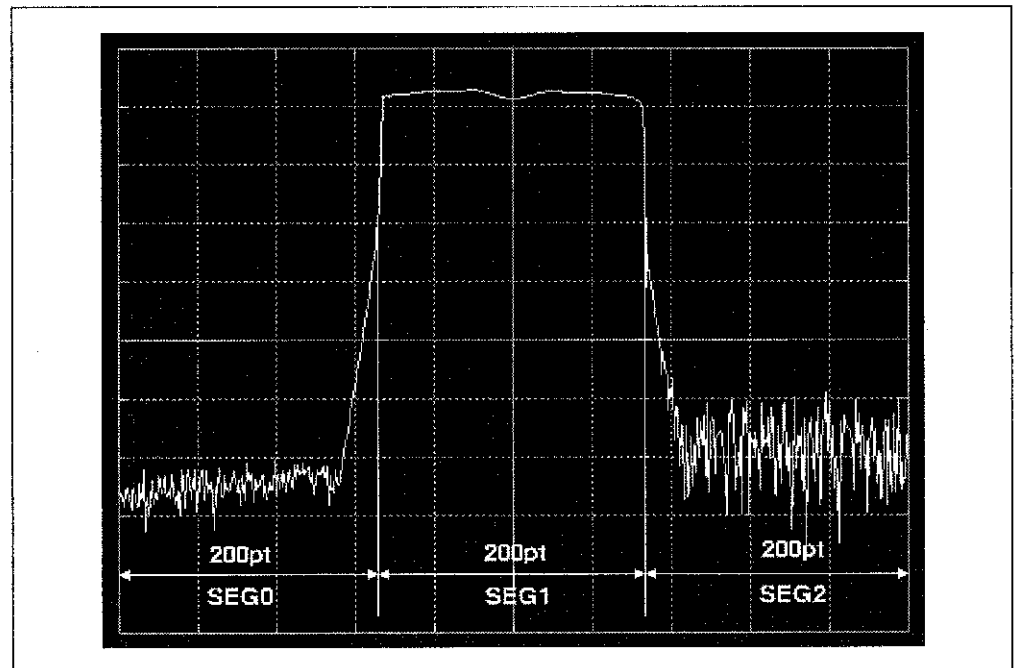
Figure 3-62

The data of each segment is edited and shows the result in the following.

SEG	START	STOP	POWER	IF RBW	POINT
0	21.360MHz	21.390MHz	5.0dBm	1kHz	200
1	21.392MHz	21.408MHz	0.0dBm	10kHz	200
2	21.410MHz	21.440MHz	0.0dBm	10kHz	200

3.2.17 Ceramic Oscillator Resonance and Antiresonance Point Measurements

The resonance point and antiresonance point of ceramic oscillator (f=42.0MHz) are measured here by the transmission measurement.

① Setup (π network jig connection).

The PIC-001 π network jig is used.

② Connect crystal to the test port of the π network jig.

(a) R3753AH/BH   (b) R3753EH
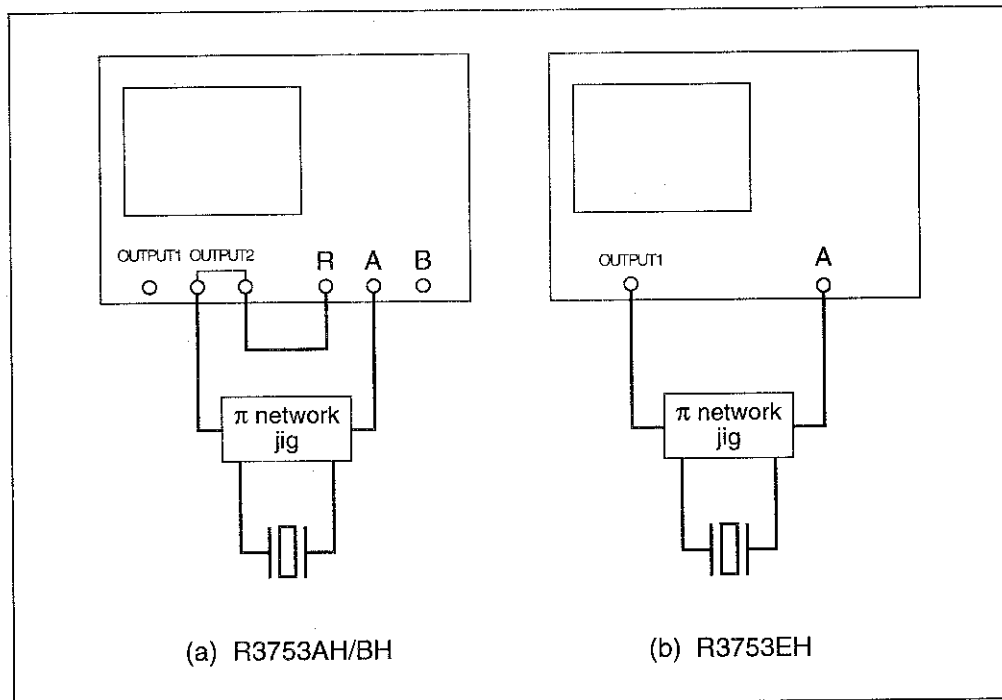
Figure 3-63

③ Set center frequency and span.

[CENTER] → [4] → [2] → [MHz]

[SPAN] → [2] → [0] → [kHz]

④ Set resolution bandwidth. At this time, sweep time is automatically set.

[AVG] → *{IF RBW [   ]}* → **[1]** → **[kHz]**

⑤ Calibrate frequency characteristic.

Connect the through (Short) to the test port of the π network jig.
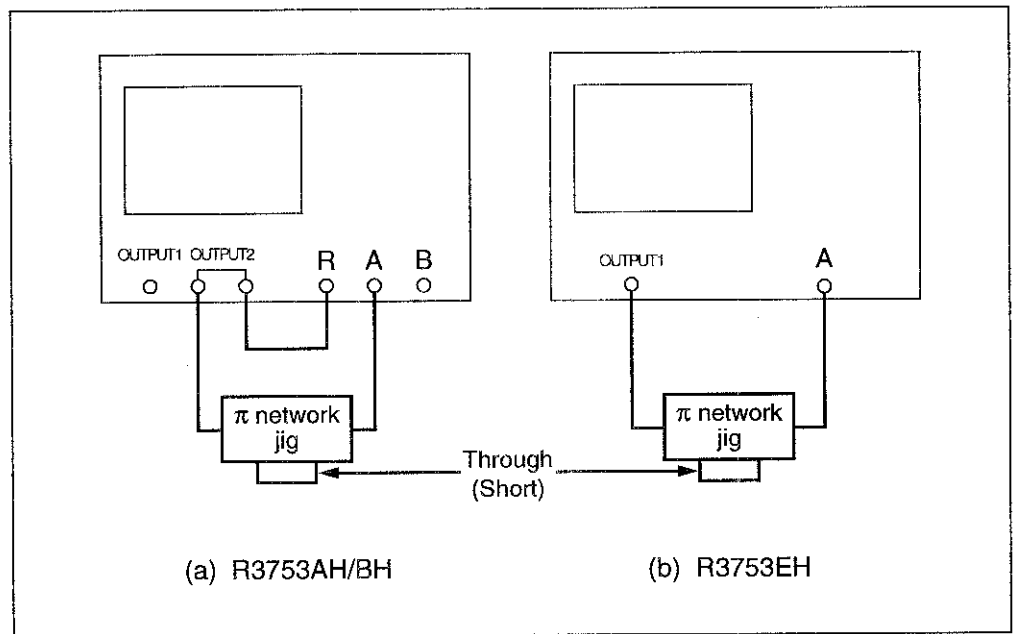
Figure 3-64

[CAL] → *{NORMALIZE (THRU)}*

After ending, return it to the connection of ①.

⑥ Set the characteristic impedance of the π network jig. The characteristic impedance of the device used is 12.5Ω at this time. Set this value.

[MEAS] → *{CONVERSION [OFF]}* → *{Z0 VALUE}* → **[1]** → **[2]** → **[.]** → **[5]** → **[X1]**

⑦ Select the impedance conversion by the transmission measurement.

{Z (TRANS)}

⑧ Adjust the scale of the display trace (Logarithmic magnitude). The display becomes to see easily.

[SCALE] → *{AUTO SCALE}*

⑨ The marker is displayed to read the measured value directly. The marker data display modes are changed.

[MKR] → *{MKR MODE MENU}*

{CONVERSION MKR MENU [   ]} → *{LIN MKR}*

Display screen is shown in the figure below by the above-mentioned operation.
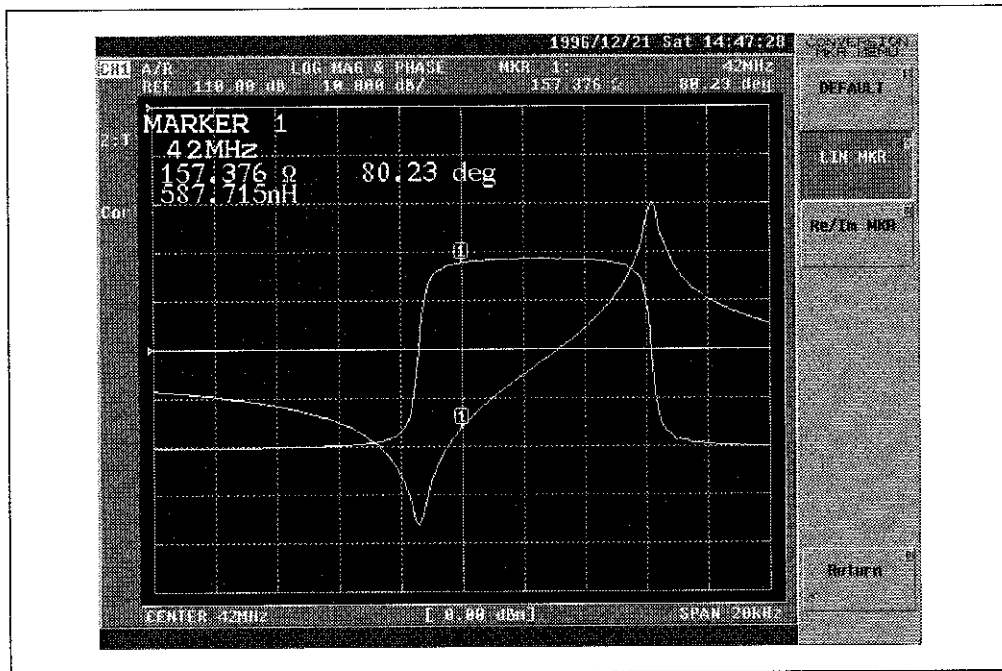
Figure 3-65

Thus, when the impedance conversion is selected, impedance and the phase can be read directly by using the marker.

⑩ The search for the phase 0° is executed to search the resonance point.

[MKR →] → *{MKR SEARCH [   ]}*

{TARGET} → *{0°}*

⑪ Display of marker 2. The search for the phase 0° is executed to search antiresonance point.

[MKR] → *{Return}* → *{Return}*

{ACTIVATE MARKER [   ]} → *{MARKER 2}*

[MKR →] → *{0°}* → *{RIGHT SEARCH}*

⑫ The marker list is displayed to read the values of both marker directly at the same time.

[MKR] → *{Return}* → *{MKR LIST ON/OFF}*

The display is shown in the figure below by the above-mentioned operation.
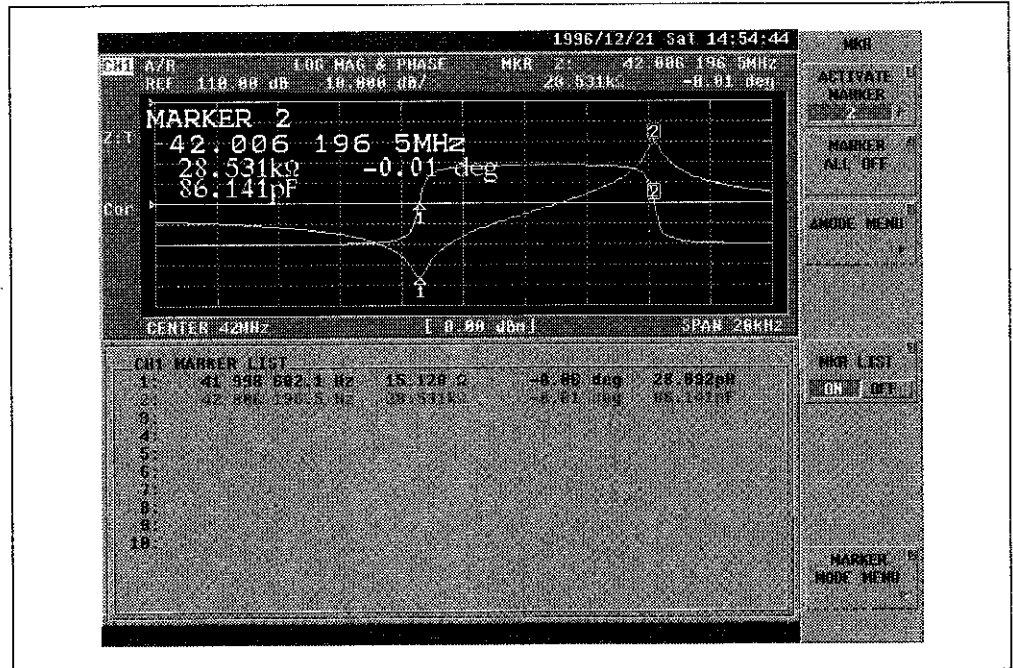
Figure 3-66

⑬ Admittance conversion by the transmission measurement is selected.

[MEAS] → *{Y (TRANS)}*

⑭ Adjust the scale of the display trace (Logarithmic magnitude). The display becomes to see easily.

[SCALE] → *{AUTO SCALE}*

⑮ Specify the marker 1 for the active marker. The search for the phase 0° is executed to search the resonance point.

[MKR] → *{ACTIVATE MARKER [   ] }* → *{MARKER 1}*
[MKR →] → *{0°}*

⑯ Specify the marker 2 for the active marker.. The search for the phase 0° is executed to search antiresonance point.

[MKR] → {MARKER 2}

[MKR →] → {0°} → {RIGHT SEARCH}

Display screen is shown in the figure below by the above-mentioned operation.
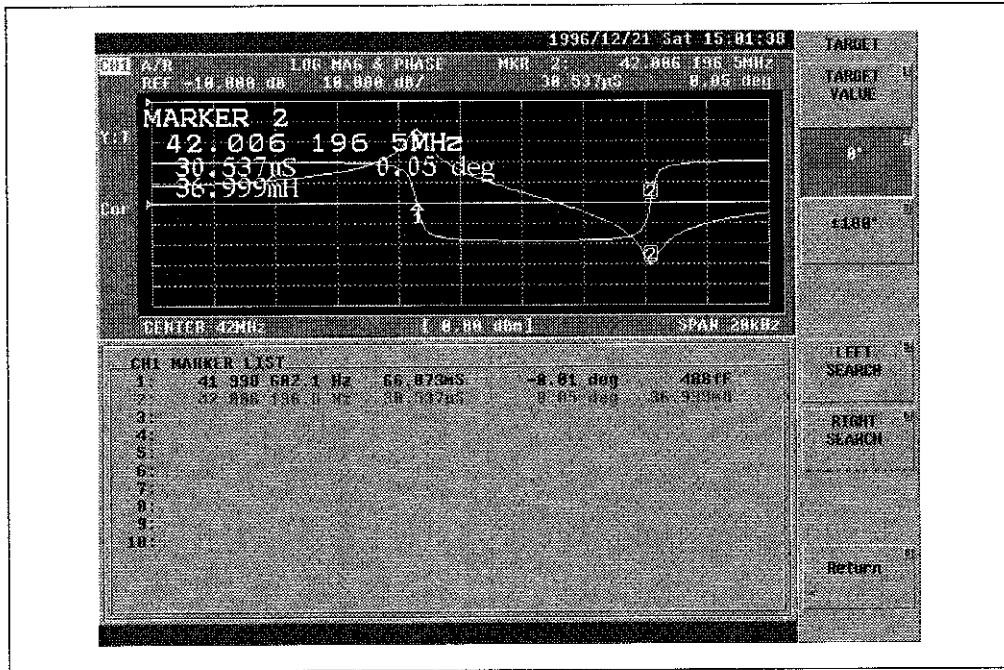
Figure 3-67

3.2.18 Measured Data Plotter Output

The output method to the plotter of measured data is explained here by the example the band pass filter measurement of 385MHz.
The plotter assumes HP mode and the address to be set 5.

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② The measurement format is made a magnitude (Logarithmic display).

[FORMAT] → {LOG MAG}

③ Set center frequency and span.

[CENTER] → [3] → [8] → [5] → [MHz]

[SPAN] → [2] → [0] → [0] → [MHz]

④ Adjust the scale of the display trace. The display becomes to see easily.

[SCALE] → *{AUTO SCALE}*

⑤ The marker is displayed and moved to the measurement point.

[MKR]

⑥ R3753H is set to the system controller to use the plotter.

[LCL] → *{SYSTEM CONTROLLER}*

⑦ The GPIB address of the plotter is set.

{SET ADDRESS} → *{ADDRESS PLOTTER}* → **[5]** → **[X1]**

Figure 3-68

⑧ The plotter mode is selected.

According to the mode setting of plotter, plotter mode HP is selected.

[COPY] → *{PRINT/PLOT SETUPS}*

{DEFAULT SETUPS}

{PLOTTER HP/AT}   (HP is selected)

{Return}

⑨ The data output to the plotter is selected. Measured data, the coordinates data, the text data, the marker data and the reference data are made to set it of the output here. The memory data is made to set it of no output. Initial value is all "ON" (Output it). Only the memory data is made "OFF" (Do not output it).

{DEFINE PLOT}

{PLOT MEMORY ON/OFF}   This is turned off.

The display is shown in the figure below by the above-mentioned operation.
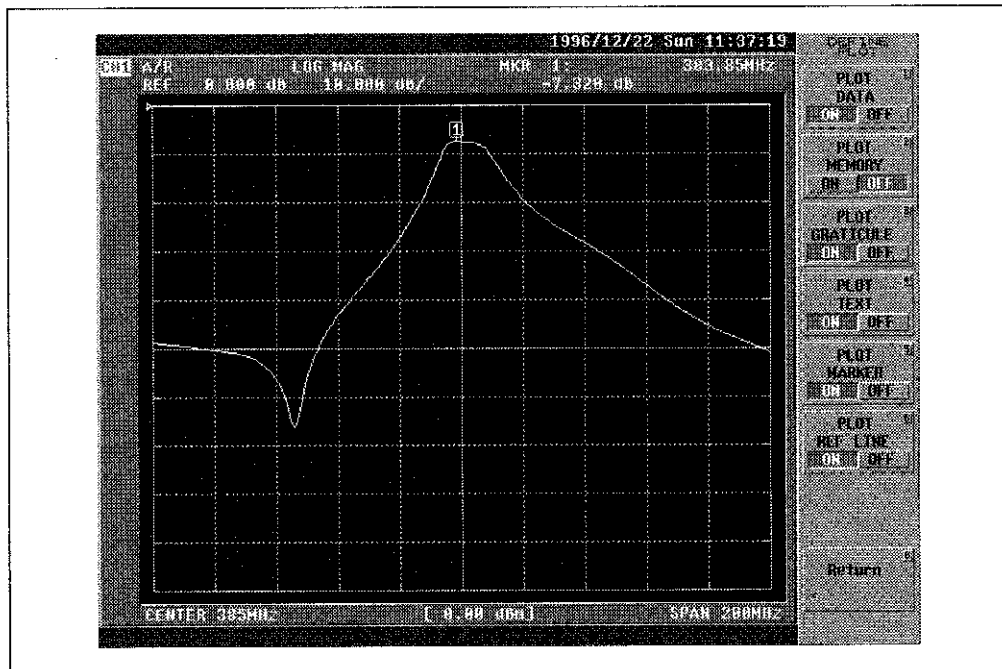
Figure 3-69

⑩ The output is started to the plotter.

{Return} → *{PLOT}*
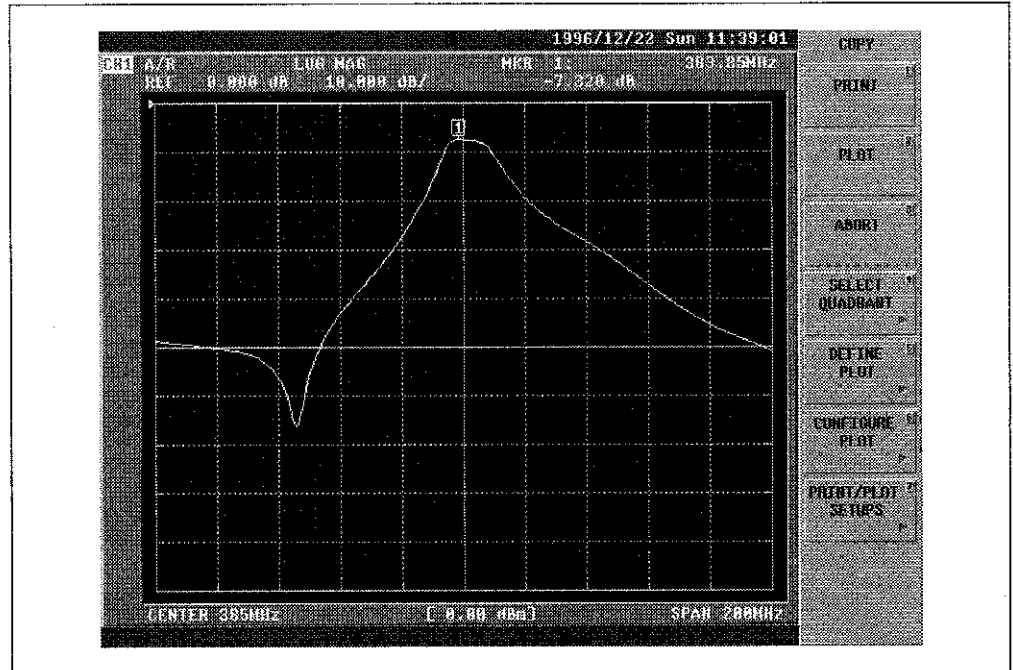
Figure 3-70

The output copy of the plotter is shown in the figure below.
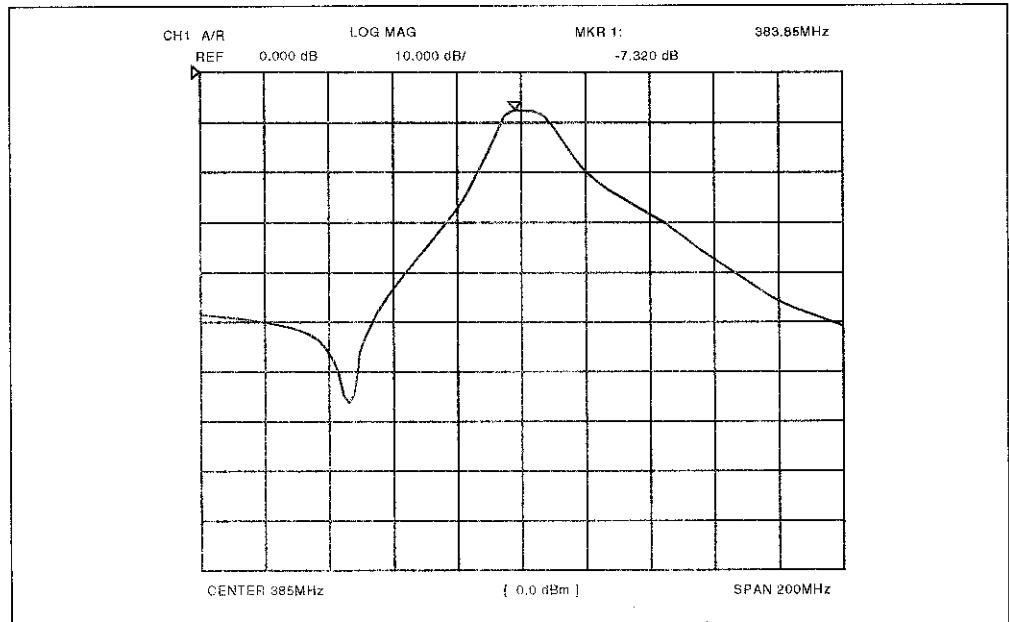
Figure 3-71

Note: *When plotter of HP company is used, the error such as lighting the error lamp will be occasionally displayed even though plotting it normally.*

3.2.19 Using the Save/Recall Register

The method of operation of the storage and reproducing the set value of measurement is explained here in the saving/the recall register by the example the band pass filter measurement of 10.7MHz.

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② Set center frequency and span.

[CENTER] → **[1]** → **[0]** → **[.]** → **[7]** → **[MHz]**

[SPAN] → **[1]** → **[MHz]**

③ Make the measurement format a magnitude (Logarithmic display).

[FORMAT] → *{LOG MAG}*

④ Select the channel 2. Change the format.

[CH2]

[FORMAT] → *{PHASE}*

⑤ Dual-channel is simultaneously displayed.

[DISPLAY] → *{DUAL CH ON/OFF}* → *{SPLIT CH ON/OFF}*

⑥ The marker is displayed.

[MKR] ◎

⑦ The above-mentioned setting is saved with the saving register.

[SAVE] → *{SAVE REGISTER}* → *{SAVE REG-1}*

The display is shown in the figure below by the above-mentioned operation.
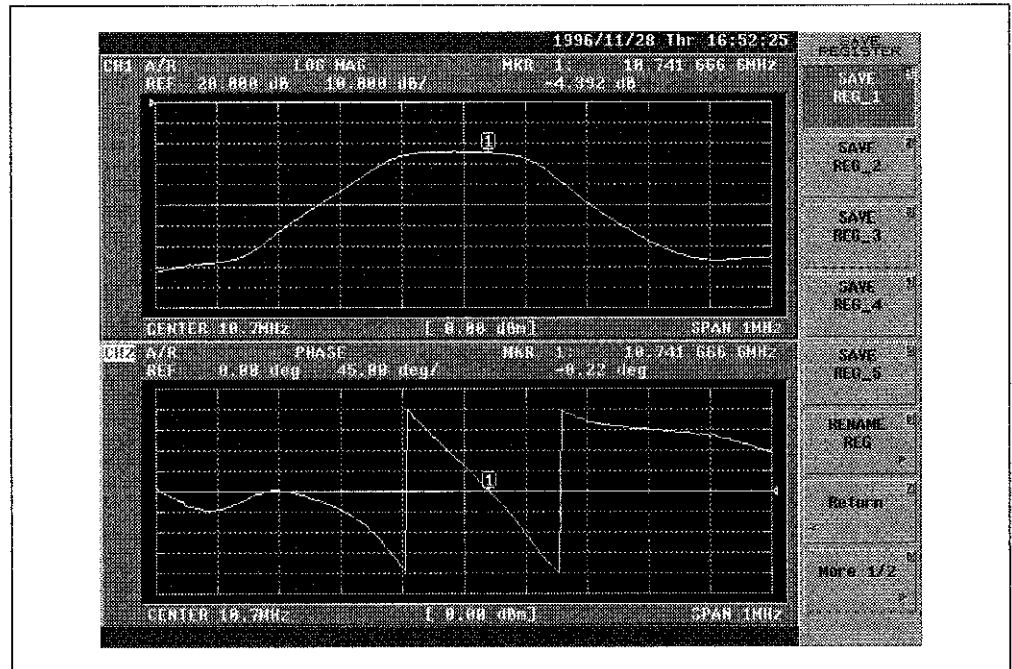
Figure 3-72

Set value storage is completed by the above-mentioned operation.
Next, the saved set value is reproduced.

⑧ Presetting is executed. And setting is initialized.

[PRESET]

⑨ The set value is reproduced by the recall register.

[RECALL] → *{RECALL REG-1}*

The display is shown in the figure below by the above-mentioned operation.
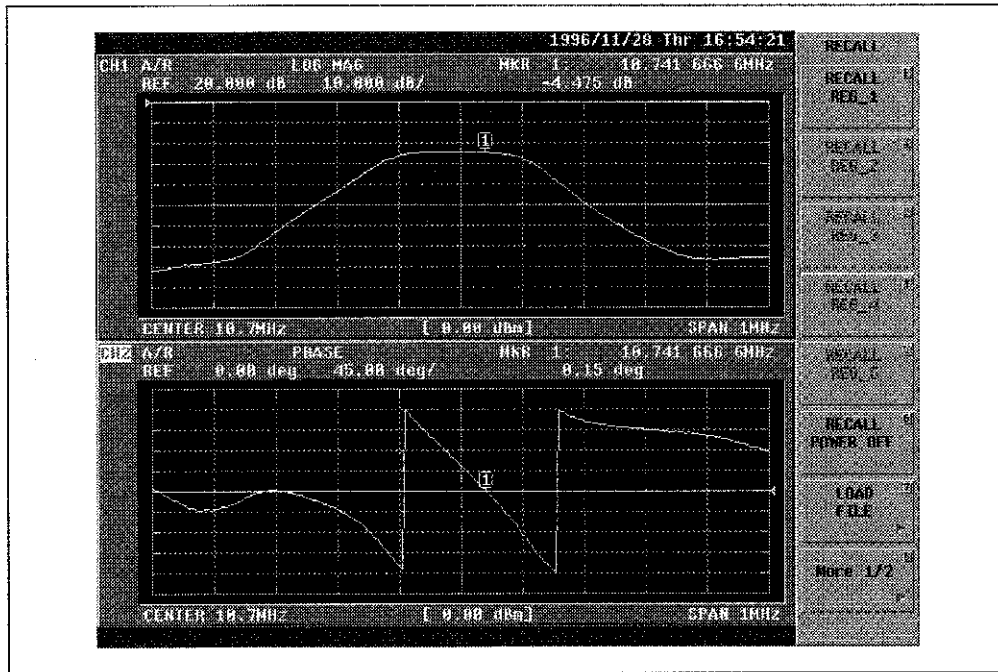
Figure 3-73

When the data has been saved by using the save register function, each data is then saved to the C drive (RAM disk with back up).

3.2.20 Saving to Floppy Disks

The operation method of the storage and reproducing the set value of measurement with the store and loading file is explained here by the example of measuring the band pass filter of 10.7MHz.
In the store/loading file, the data is stored on the floppy disk inserted in A drive.

Note: Prepare the floppy disk that has been formatted. Available format type is DD 720KB, HD 1.2MB or HD 1.44MB.

*   Formatting procedure of floppy disk

   (a)   Insert the floppy disk in the floppy disk drive. The format type in the initial state is DD 720KB or HD 1.2MB (8SECTORS).

   (b)   The floppy disk is formatted according to the following procedures.

   [SAVE] → *{FORMAT DISK}* → *{OK}*

① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

② Set center frequency and span.

[CENTER] → **[1]** → **[0]** → **[.]** → **[7]** → **[MHz]**

[SPAN] → **[1]** → **[MHz]**

③ Calibrate the frequency characteristic as follows.

Connect the short adapter instead of DUT. Under such a condition, R3753H series is normalized.

[CH1] → **[CAL]** → *{NORMALIZE (THRU)}*

[CH2] → **[CAL]** → *{NORMALIZE (THRU)}*

After ending, return the connection to DUT (filter).

④ The channel 1 is mode a magnitude (Logarithmic) display, and channel 2 a phase display.

[CH1]

[FORMAT] → *{LOG MAG}*

[CH2]

[FORMAT] → *{PHASE}*

⑤ Dual-channel is displayed at the same time.

[DISPLAY] → *{DUAL CH ON/OFF}* → *{SPLIT CH ON/OFF}*

⑥ The marker is displayed.

[MKR]

The display is shown in the figure below by the above-mentioned operation.
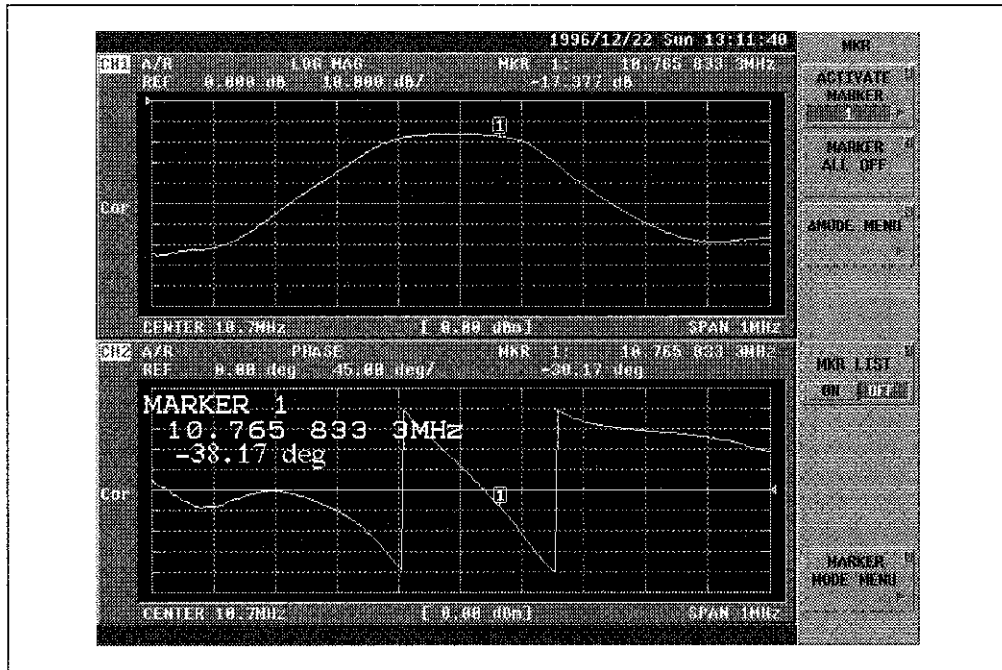
Figure 3-74

⑦ The floppy disk that has been formatted is inserted in A drive. And the store file menu is selected.

(After floppy disk is inserted)

[SAVE] → *{STORE FILE}*

The file list window is displayed here.

⑧ Select the data to be saved. A set condition, the unformatted raw data and the calibration data are saved here.

{DEFINE STORE}

{STATE ON/OFF}

{RAW ARRAY ON/OFF} ⎤ Set them to ON.

{CORR COEF ON/OFF}   When the calibration is executed, this will be
automatically turned on.
{Return}

⑨ The name will be set in the file before the data is saved. This makes retrieval easy.
In the case saved by the file name of default, advance it to the following step ⑩.

{EDIT NAME}

{CLEAR NAME}

◯ or [↑] [↓]   (The cursor is moved to "T")   [X1]

◯ or [↑] [↓]   (The cursor is moved to "E")   [X1]

◯ or [↑] [↓]   (The cursor is moved to "S")   [X1]

◯ or [↑] [↓]   (The cursor is moved to "T")   [X1]

The display is shown in the figure below by the above-mentioned operation.
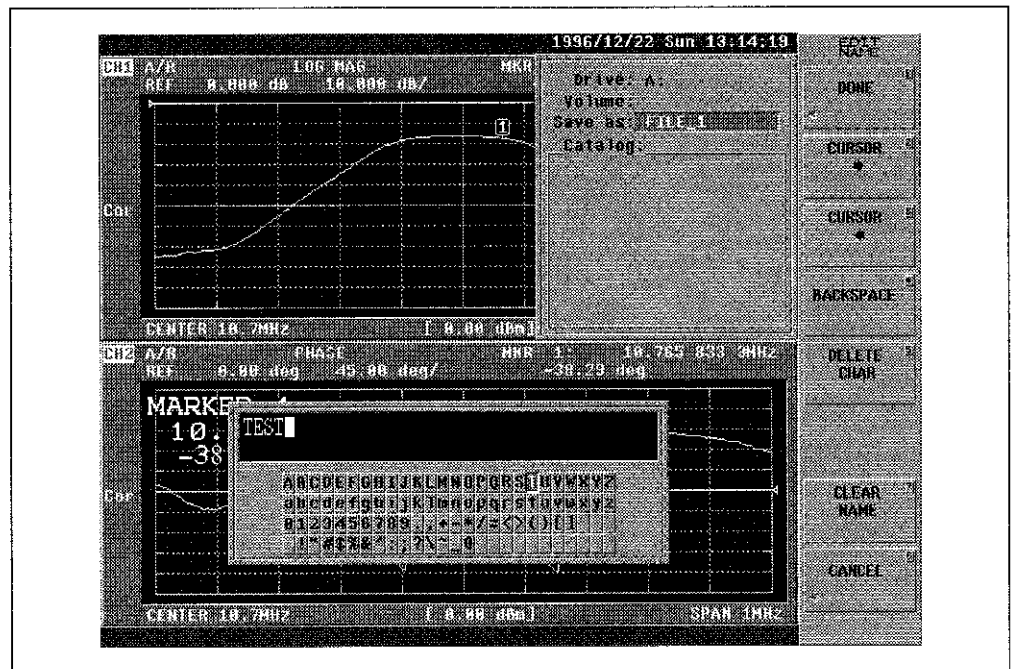
Figure 3-75

{DONE}

⑩ The data is stored.

{STORE}

Saving the data is completed through the above-mentioned operation.
Next, the saved data is reproduced.

⑪ Presetting. The set value is initialized.

[PRESET]

⑫ The storage data is reproduced from the file.

[RECALL] → *{LOAD FILE}*

The file list window is displayed here.

⑬ The file list window is displayed. The reproducing file is selected from the list.
The cursor is moved to the file that reproduces by [↑] or [↓].

[LOAD]

Display screen is shown in the figure below by the above-mentioned operation.
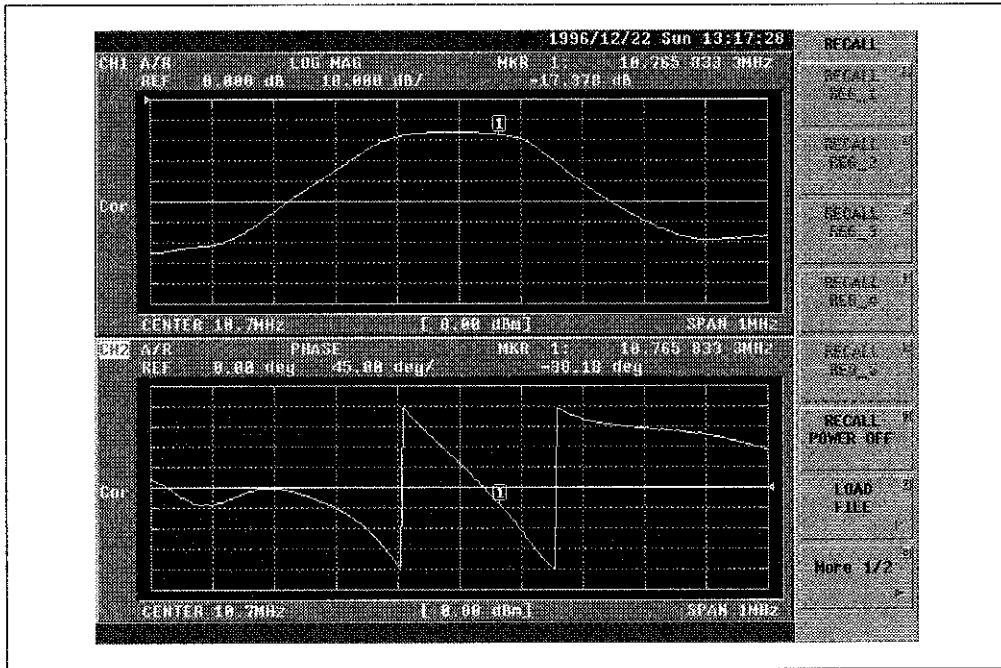
Figure 3-76

After the reproduction ends, the sweep will become a hold status automatically.

Note: About stored measured data

There is three ways in the storage of measured data.

1. RAW ARRAY (raw data)
2. DATA ARRAY (format data)
3. MEM ARRAY (memory data)

Among these, 1. RAW ARRAY and 2. DATA ARRAY saves the display data. The difference of these two data is the following. 1. RAW ARRAY saves the data before the error correction and the trace operation, etc. are processed. On the other hand, 2. DATA ARRAY saves the data on the display.
For instance, when the data saved by RAW ARRAY is reproduced, even if the measurement format is changed, a correct value at the storage can be displayed.
2. In DATA ARRAY, when the display format at the storage is displayed with LOG MAG, a correct value is indicated only by the LOG MAG format.
Refer to the data flow of sub-section 1.1.3 for three data flows.

3.2.21 Crystal Resonator Impedance Measurement

This section explains how to measure a crystal impedance, showing the measurement of 10MHz crystal in which π network is used.

And this section introduces the interpolate function that can make calibration effective under the narrow span setting.

① Connect the π network jig to the R3753H series and perform a preset. The type of the π network jig is PIC-001.

② Attach a crystal to the test port of the π network jig.

(a) R3753AH/BH   (b) R3753EH
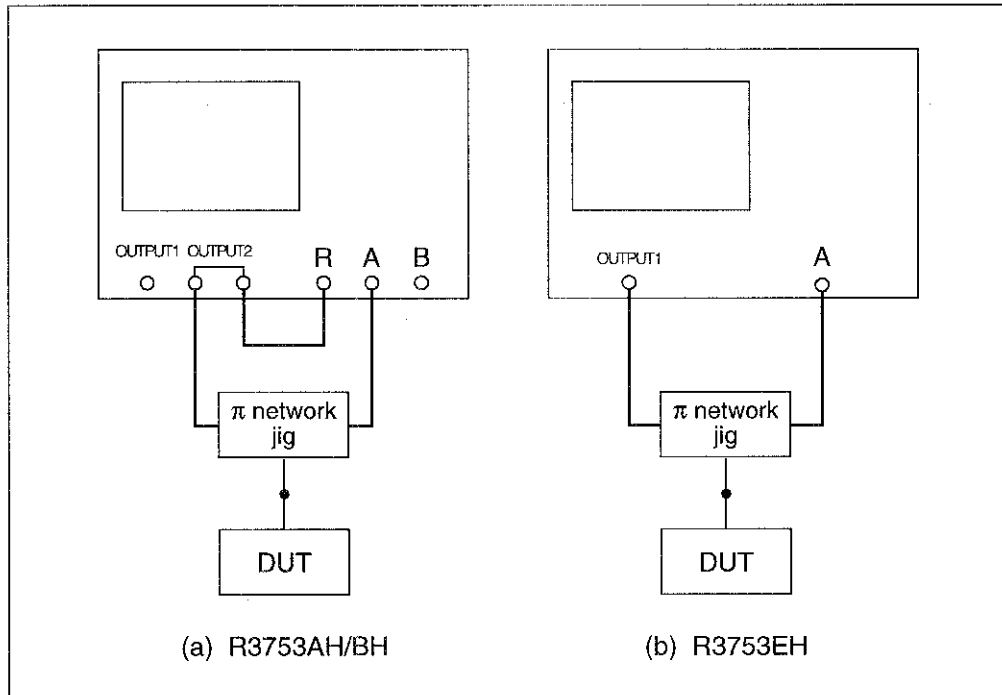
Figure 3-77

③ Set the center frequency and the frequency span.

[CENTER] → **[1]** → **[0]** → **[MHz]**

[SPAN] → **[1]** → **[0]** → **[0]** → **[kHz]**

④ Enter the load standard value (50Ω).

[CAL] → *{Z0 VALUE}* → **[5]** → **[0]** → **[X1]**

⑤ Press **[CAL]** and *{CAL MENUS}* for the transmission full calibration.

The following screen appears with the full calibration menu.
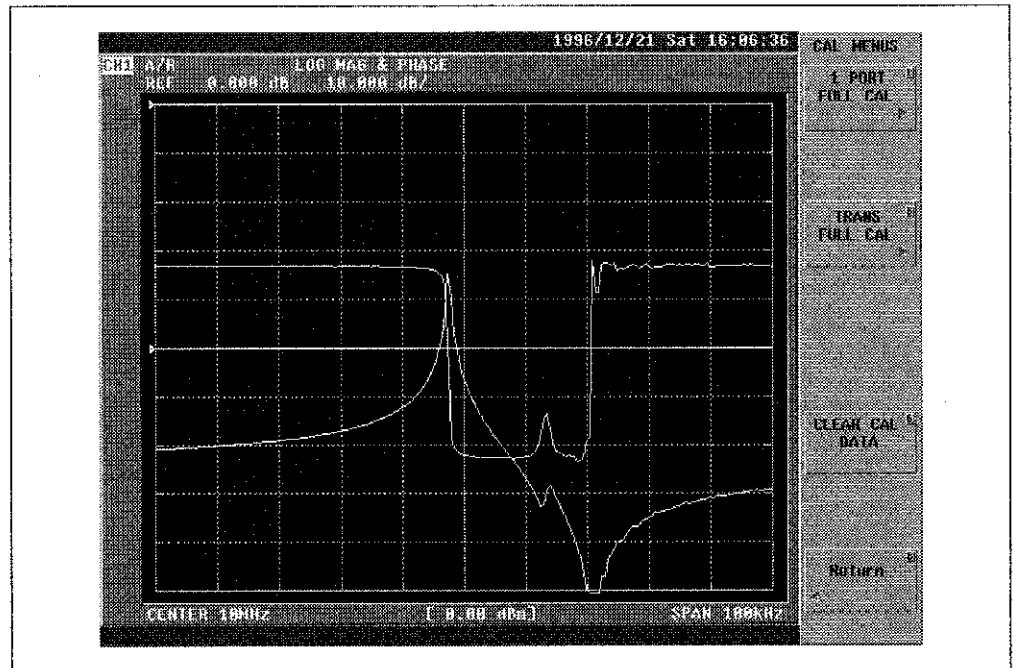
Figure 3-78

⑥ Press *{TRANS FULL CAL}* to perform the calibration. After opening the test port of the π network jig, press *{OPEN}*.
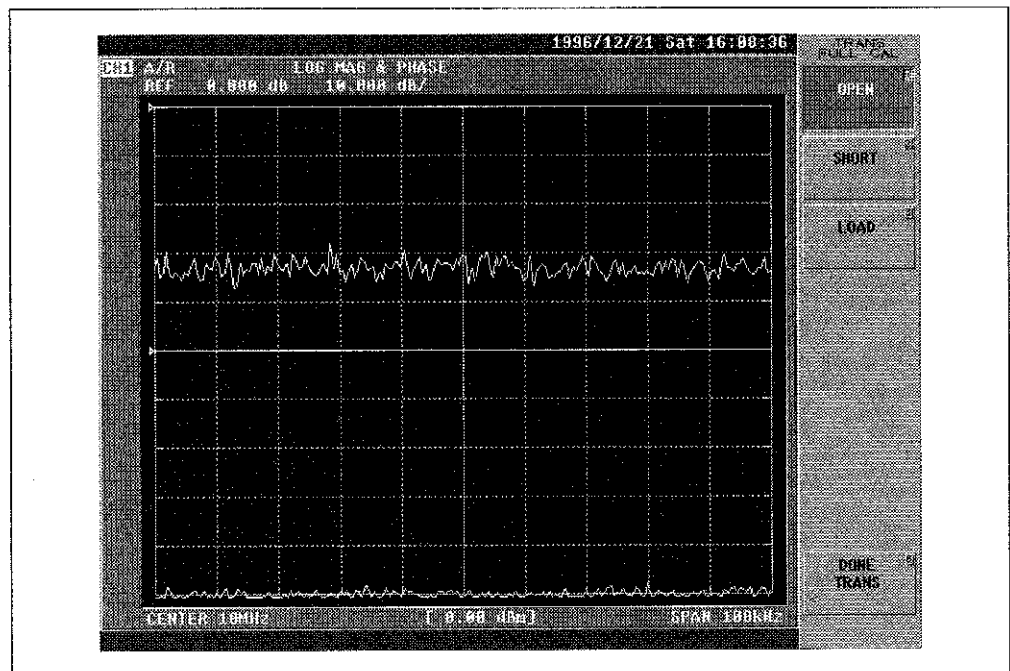
Figure 3-79

3.2 Measurement Example

⑦ Attach the Short standard to the jig and then press *{SHORT}*.
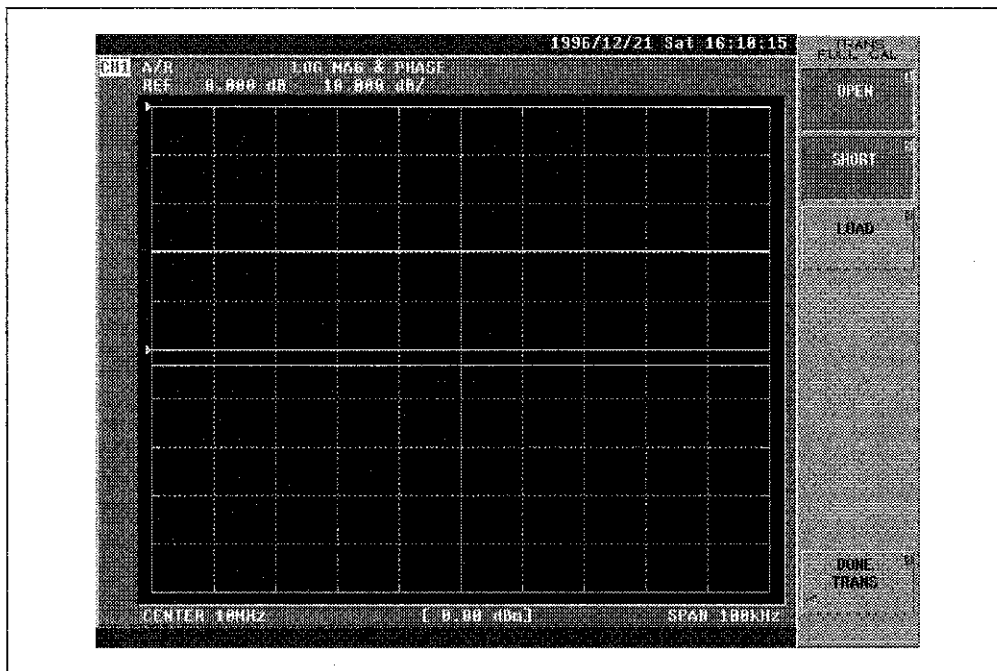
Figure 3-80

⑧ Attach the Load standard (50 Ω) to the jig and then press *{LOAD}*.
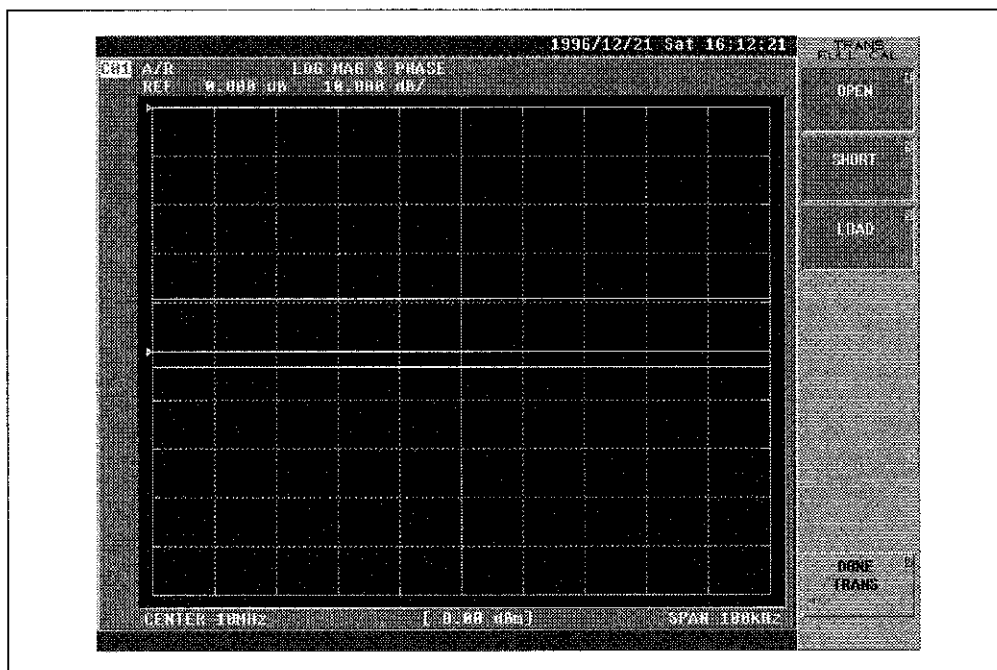
Figure 3-81

⑨ Press {DONE TRANS} and then attach the crystal.

The screen shown in Figure 3-82 appears.
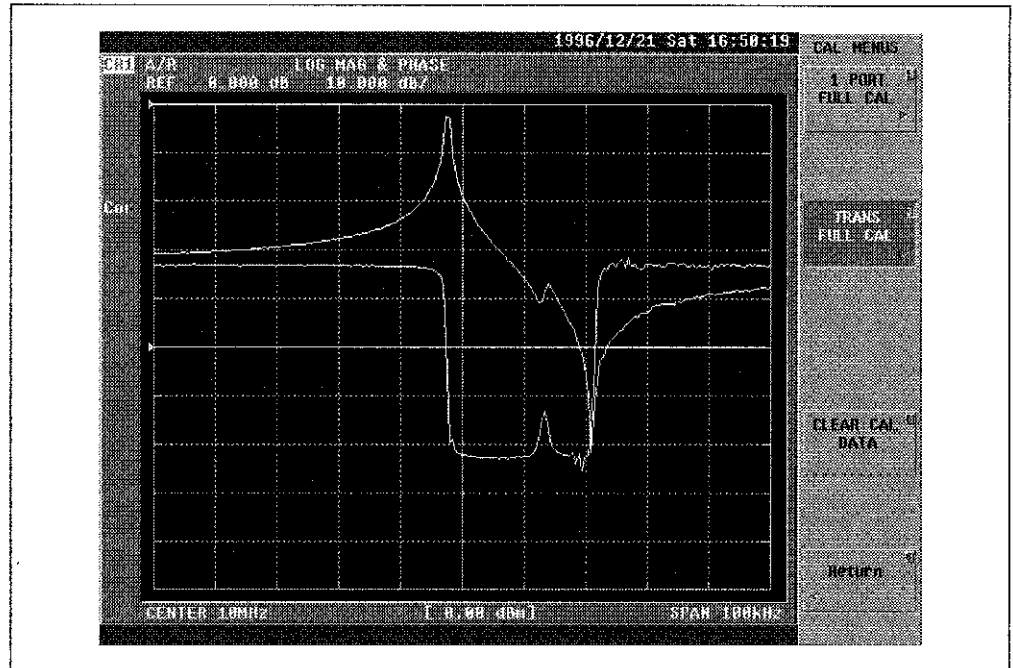
Figure 3-82

⑩ Change the frequency span under the interpolate function and then change the screen to an impedance scale display.

Press **[CAL]** → {INTERPOLATE ON/OFF} to set the interpolate to ON.
Next, press **[SPAN]** → **[2]** → **[0]** → **[kHz]** to make the span narrow.
Then, press **[MEAS]** → {CONVERSION [ ] } → {Z(TRANS)} → **[SCALE]** → {AUTO SCALE}.
The screen shown in Figure 3-83 appears.
"C?" appears on the left side of the screen. "C?" indicates that the previous calibration data was interpolated and used.
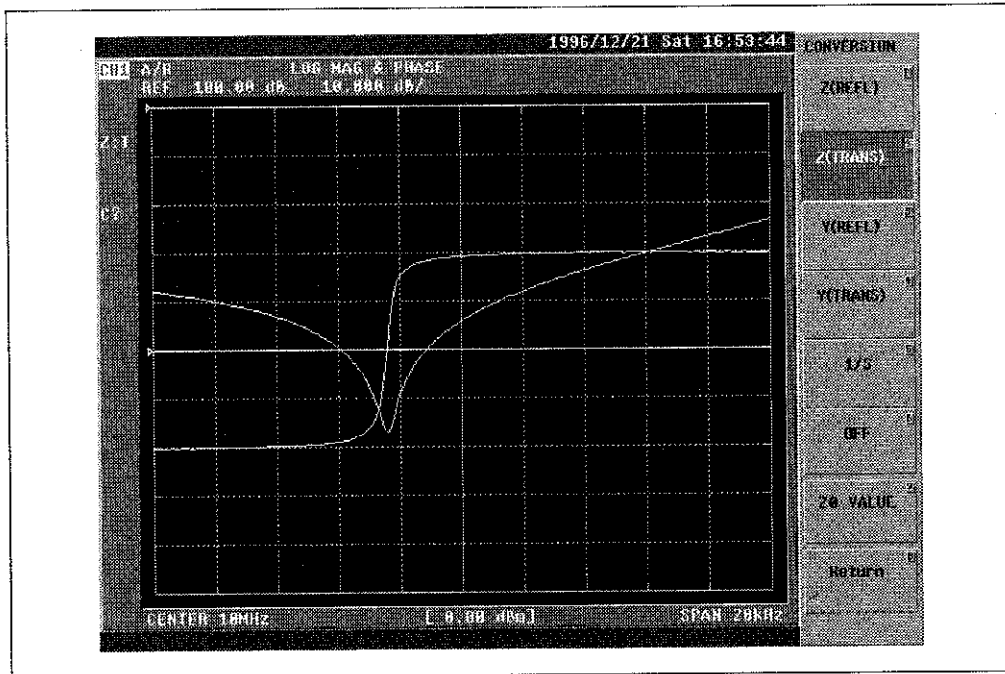
Figure 3-83

3.2.22 GO/NG Measurement Using Limit Line Function

GO/NG of DUT can be judged by using the limit line function of the R3753H series.
Besides the judgement of magnitude, GO/NG of Smith chart and Polar format can be judged.

- The following shows an example of how the limit line of 380MHz band-pass filter is generated.

    Setting procedure

    ① Setup (filter connection) and presetting (Refer to sub-section 3.1.2 and Figure 3-2).

    ② Setup start-frequency and stop-frequency.

    [CENTER] → [3] → [8] → [0] → [MHz]

    [SPAN] → [2] → [0] → [0] → [MHz]

    ③ Set the measurement format to logarithmic magnitude.

    ④ Calibrate the frequency characteristic.

    Remove DUT and connect the through adapter instead.
    Normalize in this state.
    Following the completion of **[CAL]** → *{NORMALIZE (THRU)}*, return the connection to DUT.

The display on the screen is as follows.
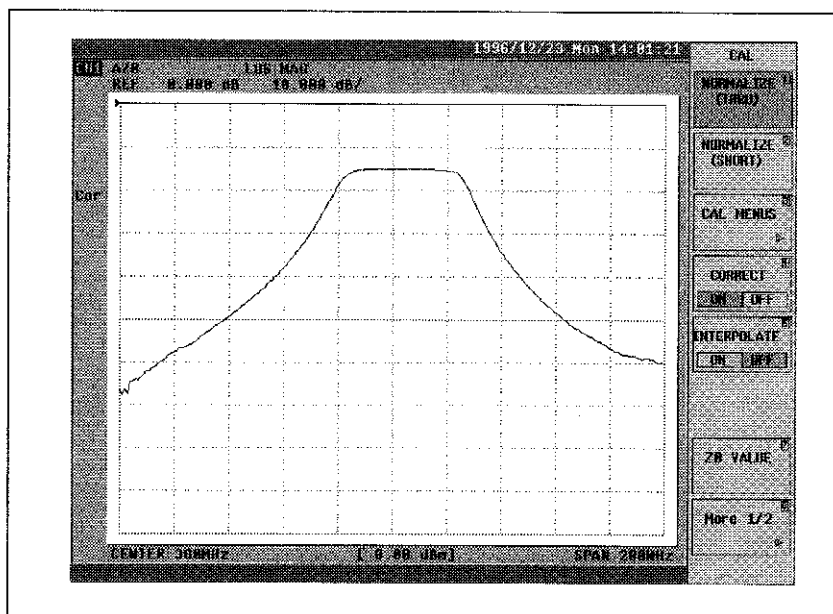
Figure 3-84 Screen before Execution of Limit Line Measurement

⑤ Set limit line.

Limit line is set the upper limit value and the lower limit line for each segment. The segment can be setup to 31 pcs. (0 to 30).

Here generates the limit line of the following table.

SEGMENT No.	0	1	2	3	4
Stimulus value	280MHz	300MHz	365MHz	400MHz	440MHz
Upper limit value	-50dB	-50dB	-10dB	-10dB	-45dB
Lower limit value	-70dB	-70dB	-30dB	-30dB	-65dB

3.2 Measurement Example

The following figure shows the limit lines.
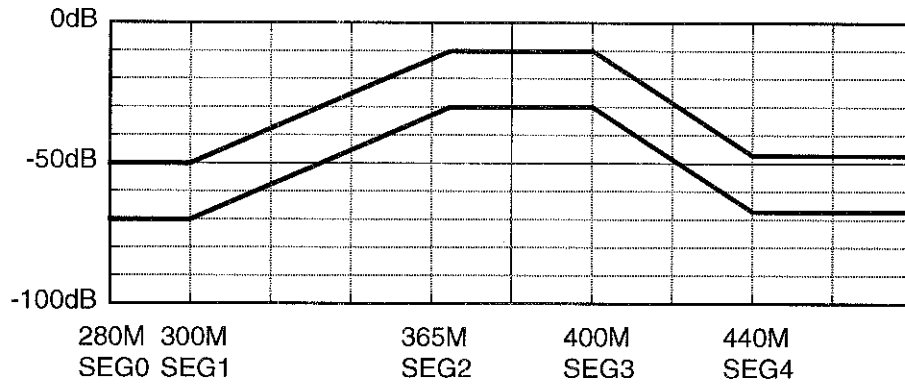
Figure 3-85 Setting of the Limit Line

- Establish the edit mode.

[SYSTEM] → *{LIMIT MENU}* → *{EDIT LIMIT LINE}*

The display on the screen is as follows.
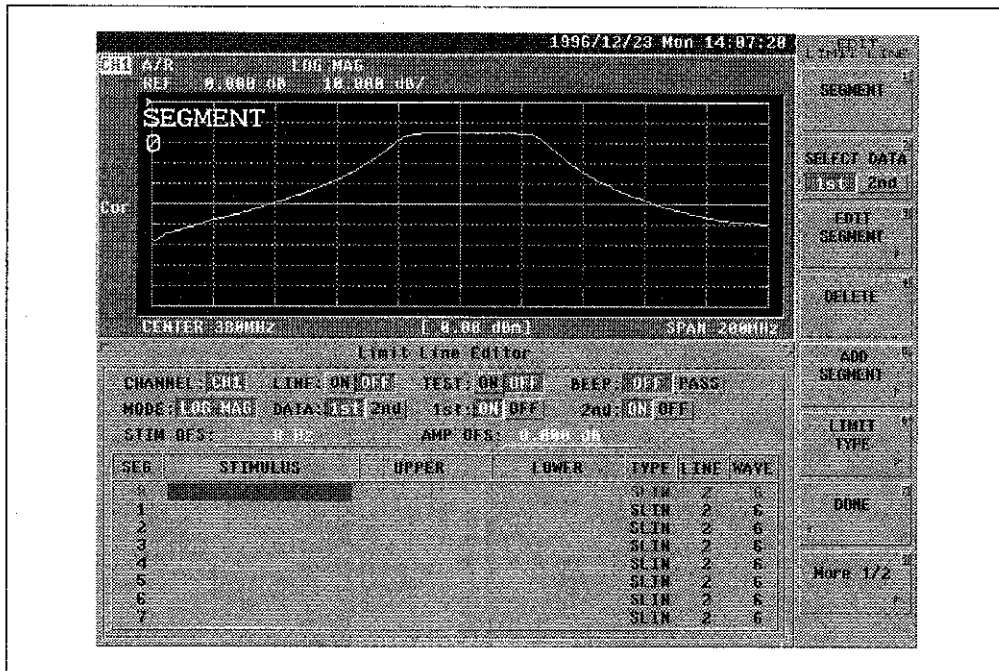
Figure 3-86 Limit Line Editing

• Set each segment.

Setting of segment 0.

SEGMENT 0: {EDIT SEGMENT}

{STIMULUS VALUE} → [2] → [8] → [0] → [MHz]

{UPPER LIMIT} → [-] → [5] → [0] → [X1]

{LOWER LIMIT} → [-] → [7] → [0] → [X1]

{Return}

As the marker can be used with data knob, it's useful to confirm the setting value of each segment.
The display on the screen is as follows.
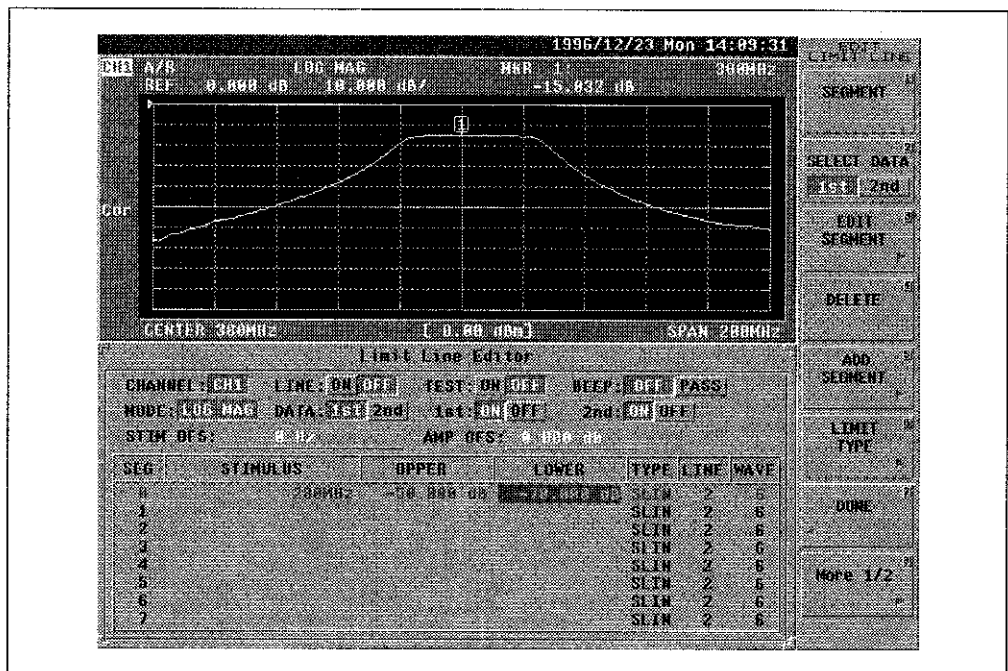
Figure 3-87 Setting of Segment 0

Set segment 1, segment 2, segment 3 and segment 4 in the same way.

SEGMENT 1:   *{ADD SEGMENT}*

                    {STIMULUS VALUE} → [3] → [0] → [0] → **[MHz]**

                    {UPPER LIMIT} → [-] → [5] → [0] → **[X1]**

                    {LOWER LIMIT} → [-] → [7] → [0] → **[X1]** → *{Return}*

SEGMENT 2:   *{ADD SEGMENT}*

                    {STIMULUS VALUE} → [3] → [6] → [5] → **[MHz]**

                    {UPPER LIMIT} → [-] → [1] → [0] → **[X1]**

                    {LOWER LIMIT} → [-] → [3] → [0] → **[X1]** → *{Return}*

SEGMENT 3:   *{ADD SEGMENT}*

                    {STIMULUS VALUE} → [4] → [0] → [0] → **[MHz]**

                    {UPPER LIMIT} → [-] → [1] → [0] → **[X1]**

                    {LOWER LIMIT} → [-] → [3] → [0] → **[X1]** → *{Return}*

SEGMENT 4:   *{ADD SEGMENT}*

                    {STIMULUS VALUE} → [4] → [4] → [0] → **[MHz]**

                    {UPPER LIMIT} → [-] → [4] → [5] → **[X1]**

                    {LOWER LIMIT} → [-] → [6] → [5] → **[X1]** → *{Return}*

The display on the screen is as follows.
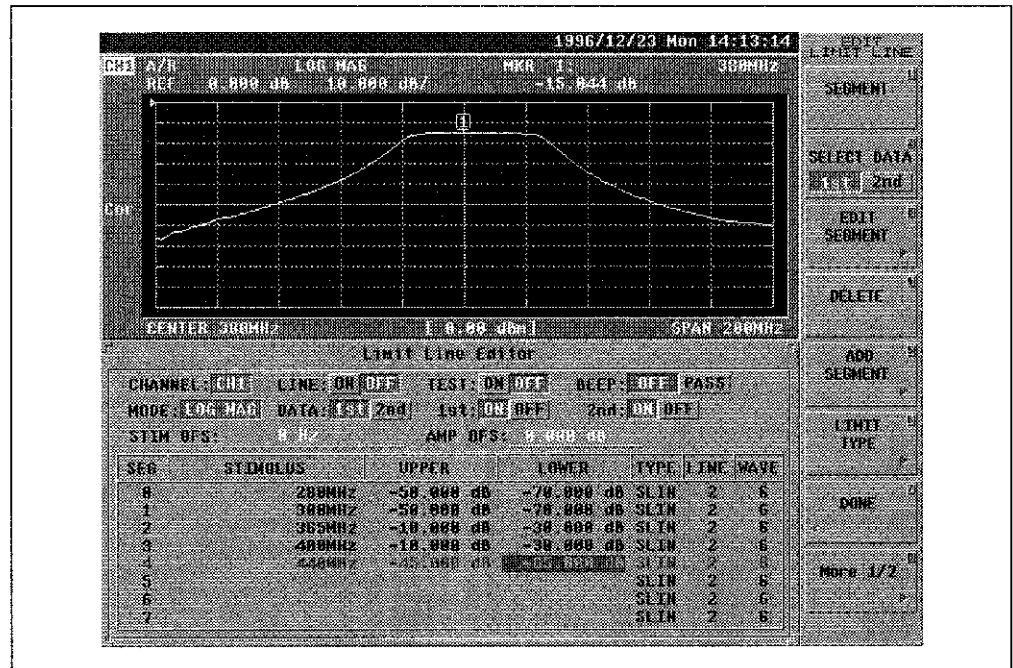
Figure 3-88 Setting of Each Segment

• Select a display type of limit line from the following 3 types for each segment.

[1] SLOPING LINE (SLIN) : Links to the next segment with a straight-line.
[2] FLAT LINE (FLIN) : Links to the next segment with horizontal lines.
[3] SINGLE POINT (SPO) : Shows each segment with a point.

In the above example, the type is not set as it's linked with SLOPING LINE of default.

For example, if you want to set FLAT LINE, operate as follows when the menu returned to the edit menu.

{LINE TYPE} → {FLAT LINE}

Returns to the edit menu of limit line.

{Return}

⑥ Define the setting of limit line and return to the edit menu.

{DONE}

⑦ Switch ON the GO/NG judgement.

{LIMIT TEST ON/OFF}

⑧ Switch ON the limit line display.

{LIMIT LINE ON/OFF}

The display on the screen is as follows.
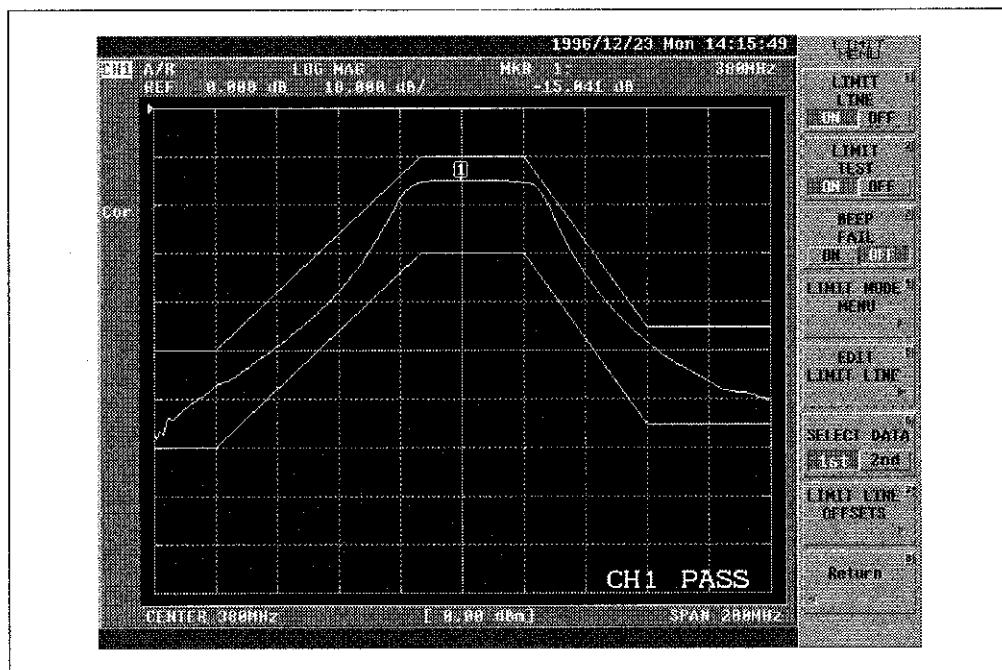
Figure 3-89 Execution of Limit Test

⑨ Change the lower limit values of segment 2 and segment 3 to -20dB.

{EDIT LIMIT LINE}

{SEGMENT} → **[2]** → **[X1]** → *{EDIT SEGMENT}*

{LOWER LIMIT} → **[-]** → **[2]** → **[0]** → **[X1]**

{Return}

{SEGMENT} → **[3]** → **[X1]** → *{EDIT SEGMENT}*

{LOWER LIMIT} → **[-]** → **[2]** → **[0]** → **[X1]**

{Return}

{DONE}

The display on the screen is as follows.
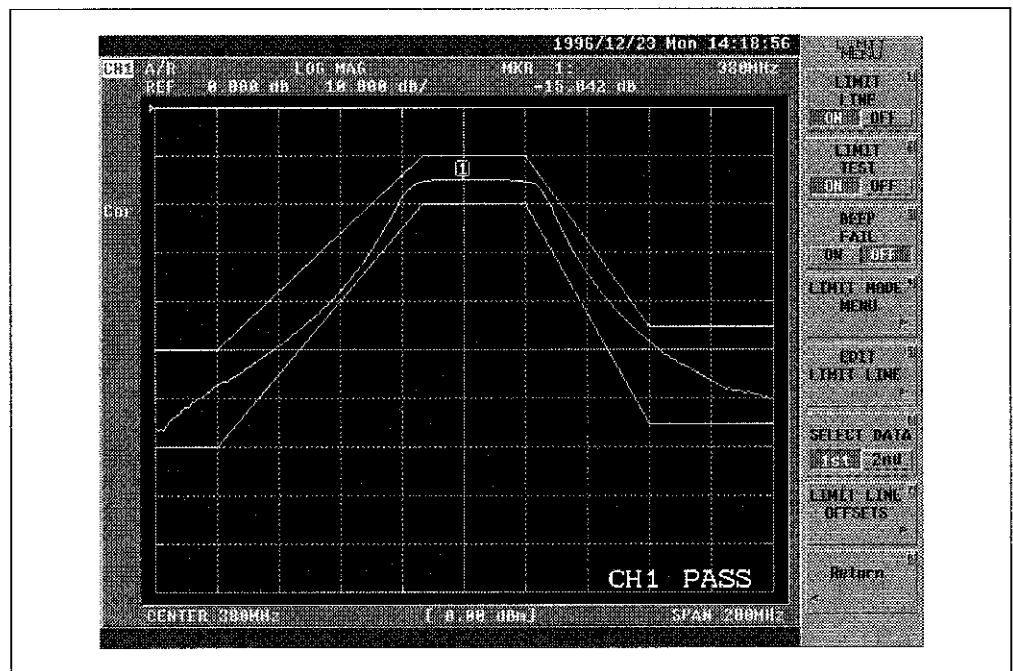
Figure 3-90 Change of Limit Line

4   FUNCTION DESCRIPTIONS

(1)   Functional blocks on front panel

The front panel keys are grouped into six functional blocks as shown below. With a combination of these blocks, the R3753H series is operated.

- ACTIVE CHANNEL block   : The R3753H series has two measurement channels. The block is used to select an active channel which can be set or changed. (See section 4.1.)

- ENTRY block   : Enters a numeric value for the selected function. (See section 4.2.)

- STIMULUS block   : Selects the settings for the signal source. (See section 4.3.)

- RESPONSE block   : Selects the settings of the receiver and the setting of the conditions of the display. (See section 4.4.)

- INSTRUMENT STATE block : Selects the system settings such as save/recall and hard copy. (See section 4.8.)

- GPIB block   : Selects the settings of the controller and the GPIB. (See section 4.9.)

When the key of each block mentioned above is pressed, the item (Soft key menu) corresponding to the function is displayed on a right side of the display screen.

(2)   Key operation

Two types of key operations are available for the R3753H series as follows :

- When a numeric value is required to be entered :

    [Panel key] → *{Soft key}* → **[ENTRY block]**

- When only soft key menus are required for selection :

    [Panel key] → *{Soft key}*

    If some key is pressed for more than about 0.5 second, the pressed key is entered repetitively.
    However, pressing more than two keys or more at the same time brings nothing.

(3)   Structures of soft key menus

The soft key menu has multiple-page structure and hierarchical structure.

- Multiple-page structure type :

    Pressing the *{More 1/2}* moves to next page and pressing the *{More 2/2}* moves to previous page.

- Hierarchical structure type :

    Pressing the *{Return}* to the previous layer menu.

    There are functions that can not be used in a part of R3753H series.
    Menus related to those operations are not displayed.
    Furthermore, the R3753H series checks the connecting condition of the S-parameter set. If the S-parameter set is not connected, the menus related to S-parameter are not displayed.

4.1   ACTIVE CHANNEL Block
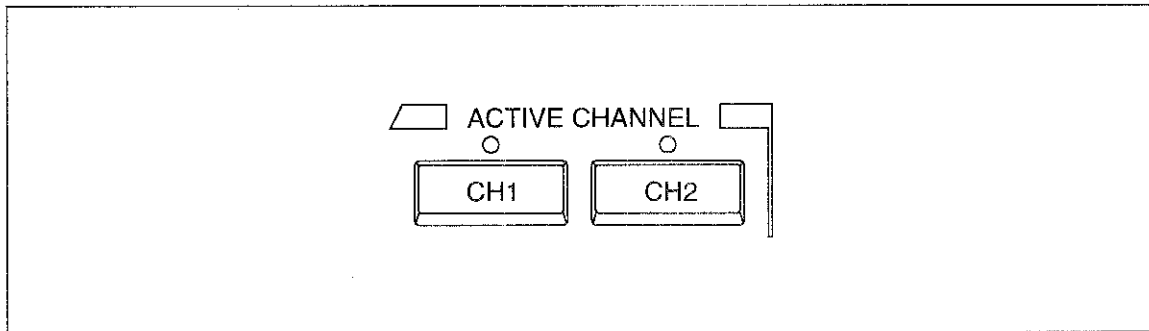
The R3753H series can perform the simultaneous measurement for reflection and transfer characteristics of sample devices or the simultaneous measurement under different frequency conditions. The R3753H series has two measurement channels which can be independently used for measurement and data display. ACTIVE CHANNEL block is used to select which channel will be used for the active channel. The active channel is the channel for which various conditions can be set such as measurement and data display, that is, all the channel dependent functions will apply to the active channel. The channel with its LED lit up is the current active channel.

[CH1] : Sets channel 1 to active channel.

[CH2] : Sets channel 2 to active channel.

The setting of the signal source can be interlocked between channels.
In the case, the condition which has been set to the active channel will be also set to the other channel. (See sub-section 4.3.2.)

4.2 ENTRY Block

ENT

ENTRY OFF

BS

7	8	9	GHz	n
4	5	6	MHz	μ
1	2	3	kHz	m
0	.	–	X1	
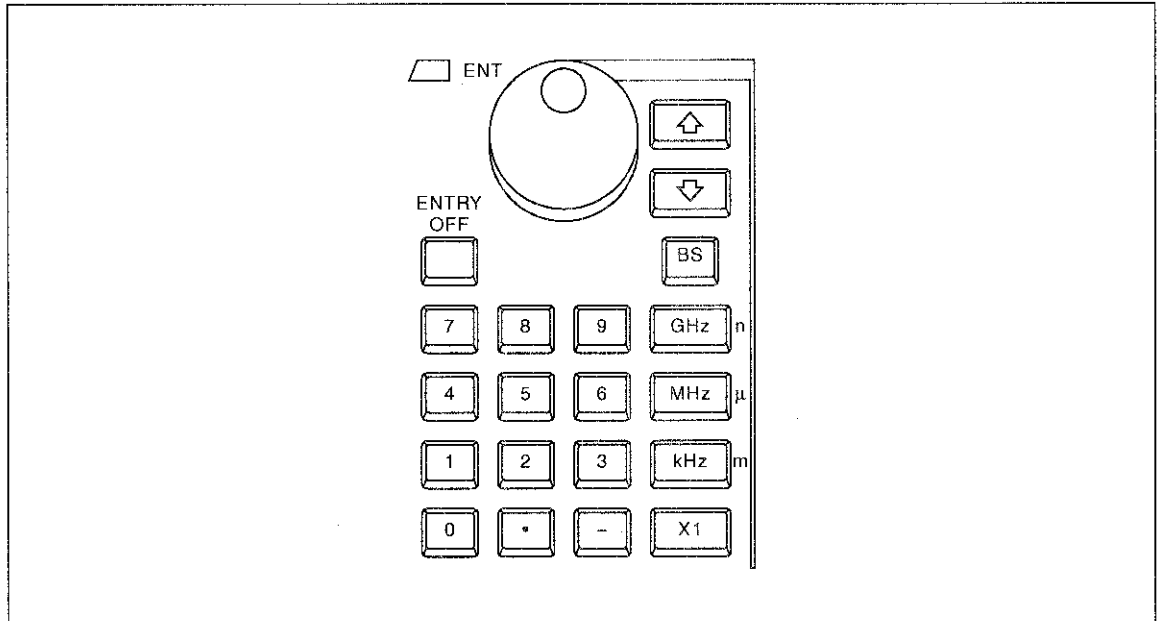
The ENTRY block is used to set data input/change for the selected function by using the **[Panel key]** and *{Soft key}*.

This block is also used to set/change a marker.

Numeric keys : **[0] to [9]**   ; Ten keys.

           [.]   ; Decimal point key.

           [-]   ; Minus sign key.

           [BS]   ; Back space key.

           [ENTRY OFF] ; Entry off key.
                         Clears all numeric data and also cancels an input request.

Note: After numeric key operation, press unit keys.

Input numeric values by using numeric keys, a decimal point key, and a minus sign key. Then, press a unit key after inputting the numeric value.
Pressing the unit key determines the unit of the input numeric values and terminates numeric entry.
Namely the numeric entry is not complete until is specified by pressing a unit key.
While an arrow (→) is being displayed on the left side of the active entry area, the numeric entry does not complete.

The suffix for basic units of "Hz, deg and Ω" is commonly supported by the following unit keys.

Unit keys :   **[GHz]** n ; Giga (10^9)

                 [MHz] μ ; Mega (10^6)

                 [kHz] m ; Kilo (10^3)

                 [X1]   ; (10^0)

The suffix for basic units of "sec and m" or for real values without unit is commonly supported by the following unit keys.

Unit keys :   **[GHz]** n ; Nano (10^{-9})

                 [MHz] μ ; Micro (10^{-6})

                 [kHz] m ; Milli (10^{-3})

                 [X1]   ; (10^0)

If a basic unit other than the above is used, its suffix is not supported.

The **[ENTRY OFF]** key is a toggle switch. When data entry is displayed, if the **[ENTRY OFF]** key is pressed, the current data entry is canceled.
If the **[ENTRY OFF]** key is pressed again, the data entry is displayed.
Once the **[PRESET]** key is pressed or the data entry is canceled by the R3753H series itself, the **[ENTRY OFF]** key can not make the data entry displayed again.

Step keys :   **[↑] to [↓]**   ; Increases or decreases the setting value with the specific step size.
                                     After the step key operation, no unit setting is required.

Data knob : ◯   ; Continuously makes the setting value variable.
                                       After the data knob operation, no unit setting is required.

4.3 STIMULUS Block

This block is used to set the conditions concerning the signal sources such as a frequency range, power level setting, sweep type, sweep time and sweep resolution. When an S parameter test-set is connected, the attenuator setting of the S parameter test-set can be also performed.

[MENU] : Calls the signal source menu to be set such as an output level, sweep time, sweep type, and sweep resolution. (See sub-section 4.3.1.)

[START] : Specifies the sweep start.
Sets each start frequency or start power when the sweep type is a frequency type or power type.

[STOP] : Specifies sweep stop.
Sets each stop frequency or power when the sweep type is a frequency type or power type.

[CENTER] : Specifies the center sweep.
Set center frequency when the sweep type is a frequency type.

[SPAN] : Specifies the sweep span.
Set frequency span when the sweep type is a frequency type.

Set the sweep range by pressing the **[START]**, **[STOP]**, **[CENTER]** or **[SPAN]**.

For the other settings, press the **[MENU]** to call the signal source menu, then perform the setting.

4.3.1 Setting Signal Source

Operation procedure

① Press the **[MENU]** to call the signal source menu.

② Signal source menu

{POWER}   : Calls the power menu used for selecting an output pow-
                               er and an output port. (See step ③.)

{SWEEP TIME}   : Sets the sweep time.
                               When a zero is set, AUTO is selected.
                               When AUTO is set, the minimum sweep time is set
                               according to the sweep frequency range and receiver
                               section resolution bandwidth.

{SWEEP TYPE [   ]}   : Calls the sweep type menu for selecting a sweep type.
                               (See section 4.7.)

{TRIGGER [   ]}   : Calls the trigger menu for selecting a sweep trigger
                               condition. (See step ④.)

{POINTS}   : Sets the number of sweep point. The number of settable
                               points are: 3, 6, 11, 21, 51, 101, 201, 301, 401, 601, 801
                               or 1201 points.

{COUPLED CH ON/OFF} : Selects whether the setting conditions concerning the
                               channels 1 and 2 are same or not. (See sub-section
                               4.3.2.)

{CW FREQ}   : Sets the frequency at power sweep.

{RESTART}   : Restarts the measurement from sweep start.
                               When this key is pressed, the sweep restarts from the
                               start, even if the sweep is uncompleted.

③ Power menu

{OUTPUT 1}   : Sets the output port to OUTPUT1 (single output).

{OUTPUT 2}   : Sets the output port to OUTPUT2 (single output).
                               (Note 1)

{POWER}   : Sets the output level during frequency sweep.

{ATTENUATOR PORT1}   : Sets the PORT1 attenuator of S parameter test-set.
                               (Note 2)

{ATTENUATOR PORT2}   : Sets the PORT2 attenuator of S parameter test-set.
                               (Note 2)

Note1: This is not displayed in R3753EH.

Note2: This can be set only the case with which S parameter test set is connected with
R3753AH.

④ Trigger menu

{CONTINUOUS}   : Continuously performs sweep.

{SINGLE}   : Performs sweep once.
                               If this key is pressed in the middle of a sweep, the meas-
                               urement of the sweep is interrupted and a sweep is re-
                               started.

{HOLD}   : Stops sweep measurement.
                               If this key is pressed in the middle of sweep, immediately
                               sweep is interrupted.

{INT TRIG}   : Automatically starts sweep by an internal source.

{EXT TRIG}   : Starts sweep by an external synchronization signal.
                               The external synchronization signal is input through the
                               parallel I/O connector 18-pin of the rear panel.
                               Negative logic, pulse width: 1 μs or more

{TRIGGER DELAY}   : Sets delay time between receiving the trigger signal and
                               the start of sweep.

4.3.2 Interlocking between Channels

Selects whether the measurement condition concerning the signal source is set at the same condition or independently set in each channel when two-channel simultaneous measurement.

For interlock setting : The conditions which has been set to the active channel will be automatically set to the other channel as same.

For independent setting : Different measuring condition can be set to channel 1 and 2, respectively.

The setting conditions which can be interlocked between channels are shown below:
* Sweep type
* Frequency
* Output level
* Sweep time
* Number of measurement point
* Resolution bandwidth

Operation procedure

① Press the **[MENU]** to call the signal source menu.

② Press the *{COUPLED CH ON/OFF}* to select whether the setting condition concerning the measurement between the channel 1 and channel 2 is set at the same condition or not.

ON : Measures the channel 1 and channel 2 simultaneous at the same condition.
OFF : Measures the channel 1 and channel 2 alternately. (Performs the measurement of channel 1, then channel 2.)

4.4   RESPONSE Block

```
                    ┌──┐ RESPONSE ┌──────────┐
                    │  │          │          │
                    MEAS   FORMAT   SCALE
                   ┌─────┐ ┌─────┐ ┌─────┐
                   │     │ │     │ │     │
                   └─────┘ └─────┘ └─────┘
                   DISPLAY  AVG     CAL
                   ┌─────┐ ┌─────┐ ┌─────┐
                   │     │ │     │ │     │
                   └─────┘ └─────┘ └─────┘
                    MKR    MKR→   FUNCTION
                   ┌─────┐ ┌─────┐ ┌─────┐
                   │     │ │     │ │     │
                   └─────┘ └─────┘ └─────┘
```
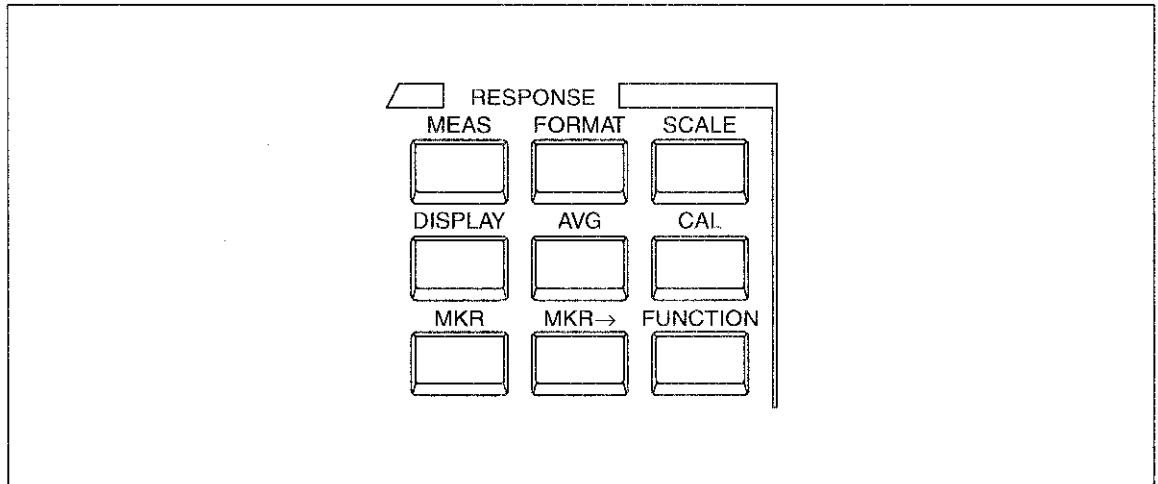
The RESPONSE block is used to set the measurement conditions of receiver section, measurement parameters, measurement format, display format and marker for an active channel.

[MEAS]   : Calls the measurement menu for selecting an input port and measurement parameters. (See sub-section 4.4.1.)

[FORMAT]   : Calls the format menu for selecting the format of measurement data. (See sub-section 4.4.2.)

[SCALE]   : Calls the scale menu for setting the display coordinate axis. (See sub-section 4.4.3.)

[DISPLAY]   : Calls display menu for executing 2-channel simultaneous display, trace operation function and label input. (See sub-section 4.4.4.)

[AVG]   : Calls the average menu for executing data average, smoothing, resolution bandwidth setting. (See sub-section 4.4.8.)

[CAL]   : Calls the calibration menu for setting calibration function. (See section 4.5.)

[MKR]   : Calls the marker menu for setting a marker. (See section 4.6.)

[MKR→]   : Calls the marker search menu for setting analysis by using a marker. (See section 4.6.)

[FUNCTION] : Calls the attenuator menu for selecting a receiver section input attenuator and impedance. (See sub-section 4.4.9.)

4.4.1 Setting Input and Parameter Conversion

Selects the receiver section input port.

The data which is measured in the selected input port is a "complex data". This data is also formatted such as the magnitude, phase, group delay. Data before formatting can be changed to impedance, admittance, reverse S parameter. Also, when the S parameter test-set is connected, perform the selection of S parameter.

Operation procedure

① Press the **[MEAS]** to call the measurement menu.

② Measurement menu

{A/R}	:	Sets the input port to A/R. (Note 2)
{B/R}	:	Sets the input port to B/R. (Note 1)
{A/B}	:	Sets the input port to A/B. (Note 1)
{R}	:	Sets the input port to R. (Note 2)
{A}	:	Sets the input port to A.
{B}	:	Sets the input port to B. (Note 1)
{CONVERSION [ ] }	:	Calls the parameter menu for converting the measured data to an impedance, admittances or reverse S parameters. (See step ③.)
{S PARAMETERS}	:	Calls the S parameter menu for selecting an S parameter. (See step ④.)

Note1: *This is not displayed in R3753BH/EH.*

Note2: *This is not displayed in R3753EH.*

③ Parameter conversion menu

{Z (REFL)} : Executes the impedance conversion by the reflection measurement.
Conversion expression = $\dfrac{1 + \rho}{1 - \rho} \times Z_0$ (Note)

{Z (TRANS)} : Executes the impedance conversion by the transmission measurement.
Conversion expression = $\dfrac{2(1\text{-}T)}{T} \times Z_0$ (Note)

{Y (REFL)} : Executes the admittance conversion by the reflection measurement.
Conversion expression = $\dfrac{1 - \rho}{1 + \rho} \times \dfrac{1}{Z_0}$ (Note)

{Y (TRANS)} : Executes the admittance conversion by the transmission measurement.
Conversion expression = $\dfrac{T}{2(1\text{-}T)} \times \dfrac{1}{Z_0}$ (Note)

{1/S} : Converts the S parameter to the reverse S parameter.
Conversion expression = $\dfrac{1}{S}$ (Note)

{OFF} : Turns off the conversion function.

{Z0 VALUE} : Sets the characteristics impedance.

Note: ρ : **Reflection coefficient**
T : **Gain**
S : **Reflection coefficient or gain**
Z_0 : **Characteristics impedance**

④ S parameter menu

{S11 (A/R) REFL FWD} : Sets to the S_{11} measurement (input reflection coefficient.) (Note)

{S21 (B/R) TRANS FWD} : Sets to the S_{21} measurement (forward direction transfer coefficient.) (Note)

{S12 (A/R) TRANS REV} : Sets to the S_{12} measurement (reverse direction transfer coefficient.) (Note)

{S22 (B/R) REFL REV} : Sets to the S_{22} measurement (output reflection coefficient.) (Note)

{CONVERSION [   ]} : Calls the parameter conversion menu. (See step ③.)

{INPUT PORTS} : Calls the measurement menu. (See step ②.)

Note: This is displayed and can be set by only when S parameter test set is connected with R3753AH.

4.4.2 Display Data Format

Formats the measurement data. Data is displayed as the type formatted.

Operation procedure

① Press the **[FORMAT]** to call the format menu.

② Format menu

- Format menu (1 of 2)

{LOG MAG}	:	Sets to the logarithmic magnitude display.
{PHASE}	:	Sets to the phase display. The display is changed to the loop back display in ±180°.
{DELAY}	:	Sets to the group delay display.
{SMITH (R+jX)}	:	Sets to the Smith chart.
{SMITH (G+jB)}	:	Sets to the admittance chart.
{POLAR}	:	Sets to the polar coordinates display.
{LIN MAG}	:	Sets to the linear magnitude.

- Format menu (2 of 2)

{SWR}	:	Sets to the SWR (standing wave ratio) display.
{REAL}	:	Sets to the measurement data real display.
{IMAG}	:	Sets to the measurement data imaginary display.
{PHASE $-\infty$, $+\infty$}	:	Sets to the continuous phase display. The phase is changed to the no loopback display in ±180° based on the one point data.
{LOG MAG & PHASE}:		Sets to the simultaneous display with logarithmic magnitude and phase.
{LOG MAG & DELAY}:		Sets to the simultaneous display with logarithmic magnitude and group delay.
{LIN MAG & PHASE} :		Sets to the simultaneous display with linear magnitude and phase.

4.4.3   Setting Display Coordinate Scale

The coordinate in accordance with selected format is displayed on the screen.
The coordinate scale is changed on the scale menu.

Operation procedure

① Press the **[SCALE]** to call the scale menu.

② Scale menu

{AUTO SCALE}	:	Automatically sets the display coordinate to be an optimize value for display trace.
{/DIV}	:	For the cartesian format, sets the value of the vertical axis 1 scale.
{REF VALUE}	:	Sets the reference position value of the display coordinate.
{REF POS}	:	Specifies the reference position of the display coordinate.
{REF LINE ON/OFF}	:	Selects ON/OFF of the reference position display.
{FULL SCALE}	:	Sets a full scale value for a smith chart and polar coordinate display.
{SCALE FOR 2nd/1st}:		Selects a preferred trace in displaying two traces simultaneously.

4.4.4 Split-Screen Display and Display Selection Information

The 2-channel simultaneous display can be performed.
The selection of trace data, the coordinate display ON/OFF, the label input can be performed.

Operation procedure

① Press the [DISPLAY] to call the display menu.

② Display menu

- Display menu (1 of 2)

  {DUAL CH ON/OFF} : Selects ON/OFF of the 2-channel simultaneous display.

  {SPLIT CH ON/OFF} : Selects ON/OFF of the split-screen (upper/lower) display.
  When the split-screen is selected, upper screen for channel 1 and lower screen for channel 2 are set.

  {DISPLAY DATA} : Displays the measurement data only.

  {DISPLAY MEMORY} : Displays the memory data only.

  {DISPLAY DATA & MEM} : Displays both the measurement data and memory data.

  {DEFINE TRACE [ ]} : Calls the trace operation menu.
  Perform the fundamental arithmetic operation between measurement data and memory data in the trace operation. (See sub-section 4.4.5.)

  {DATA → MEMORY} : Sets the measurement data to the memory.

- Display menu (2 of 2)

  {GRATICULE ON/OFF} : Selects ON/OFF of the coordinate display.

  {LABEL} : Calls the label menu for entering the label. (See sub-section 4.4.6.)

  {COLOR} : Sets the color of traces and markers for each channel. (See sub-section 4.4.7.)

  {DEFAULT COLOR} : Changes all color settings back to their defaults.

4.4.5 TRACE Operation

The trace operation is used to execute fundamental arithmetic operation between the measurement data and memory data.

Operation procedure

① Press the **[DISPLAY]** to call the display menu.

② Press the *{DEFINE TRACE [   ]}* to call the trace operation menu.

③ Trace operation menu

{DATA/MEM} : Executes the division of measurement data and memory data, then displays the result as the measurement data.

{DATA-MEM} : Executes the subtraction of measurement data and memory data, then displays the result as the measurement data.

*{DATA*MEM}* : Executes the multiplication of measurement data and memory data, then displays the result as the measurement data.

{DATA+MEM} : Executes the addition of measurement data and memory data, then displays the result as the measurement data.

{OFF}   : Cancels the operation (calculation).

4.4.6 Label input

An annotation of measurement data and so on is input as a label.
Maximum 64 characters can be input.

Operation procedure

① Press the **[DISPLAY]** to call the display menu.

② Press the *{More 1/2}*.

③ Press the *{LABEL}* to call the label window and label menu.

④ Label menu (Select the character of label menu by using the data knob, and press the **[X1]**.)

{DONE}	:	Completes the label input.
{CURSOR →}	:	Shifts the cursor indicating the label input position to the right.
{CURSOR ←}	:	Shifts the cursor indicating the label input position to the left.
{BACK SPACE}	:	Backspaces.
{DELETE CHAR}	:	Deletes one character.
{CLEAR LINE}	:	Deletes all characters.
{CANCEL}	:	Cancels the edit.
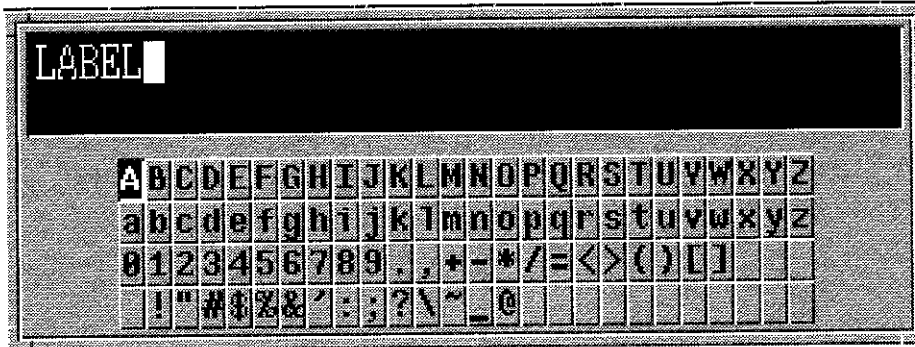
Figure 4-1 Label Window Display

4.4.7 Colors Settings

The following explains how to set the colors of traces and markers for each channel.

Operation procedure

① Press the **[DISPLAY]** to call the display menu.

Press the *{More 1/2}*.

Press the *{COLOR}* to call the color menu.

{DEFAULT COLOR} : Changes all color settings to their default values.

② Color menu

- Color menu (1 of 3)

  {1ST TRACE} : Sets the color of the first trace for the active channel.
  When this function is selected, the RGB menu is displayed.

  {2ND TRACE} : Sets the color of the second trace for the active channel.
  When this function is selected, the RGB menu is displayed.

  {1ST MARKER} : Sets the color of the normal marker on the first trace for the active channel.
  When this function is selected, the RGB menu is displayed.

  {2ND MARKER} : Sets the color of the normal marker on the second trace for the active channel.
  When this function is selected, the RGB menu is displayed.

  {REF LINE} : Sets the color of the reference line for the active channel.
  When this function is selected, the RGB menu is displayed.

  {ACTIVE MARKER}: Sets the color of the active marker for the active channel.
  When this function is selected, the RGB menu is displayed.

- Color menu (2 of 3)

  {SCREEN} : Sets the screen color.
  When this function is selected, the RGB menu is displayed.

  {GRID FD} : Sets the color of the grid of coordinates display.
  When this function is selected, the RGB menu is displayed.

  {GRID BG} : Sets the background color of the trace display area.
  When this function is selected, the RGB menu is displayed.

  {WINDOW BG} : Sets the box color of the trace display window.
  When this function is selected, the RGB menu is displayed.

  {SWEEP MARKER}: Displays the color of the sweep indicator.
  When this function is selected, the RGB menu is displayed.

- Color menu (3 of 3)

{ANNOTATION} : Sets the color of the channel name being displayed on the box of the trace display window and the color of the annotation such as stimulus data.
When this function is selected, the RGB menu is displayed.

{CLOCK} : Sets the color of the date and clock display at the top right-hand corner of the screen.
When this function is selected, the RGB menu is displayed.

{LABEL} : Sets the color of the label display.
When this function is selected, the RGB menu is displayed.

{OVERLAY TEXT} : Sets the color of the overlay text displayed in the active area.
When this function is selected, the RGB menu is displayed.

{BASIC TEXT} : Sets the color of the BASIC TEXT.
When this function is selected, the RGB menu is displayed.

③ RGB menu

Determines the color of each item by the proportions of R(Red), G(Green) and B(Blue). Each value of RGB can be set in the range 0 to 255.
A setting of 0 for each value is displayed as black while a setting of 255 for each value is displayed as white.

{RED} : Performs the setting of RED.

{GREEN} : Performs the setting of GREEN.

{BLUE} : Performs the setting of BLUE.

The changed value is stored in the environmental file of the system.
It is valid in turning on the power next time.

4.4.8 Averaging/Smoothing and Resolution Bandwidth

Averaging (time average) and smoothing (moving average) are provided as the function which statistically reduces random errors that cannot be reproduced. Narrow resolution bandwidth will reduce noise component, thus decreasing random errors. However, the case will increase the sweeping time.

Operation procedure

① Press the **[AVG]** to call the average menu.

② Average menu

{AVG STATE ON/OFF} : Selects ON/OFF of averaging. (Note 1)

{AVG COUNT} : Sets the number of times for averaging. (Note 1)

{AVG RESTART} : Resets the averaging and restarts at the average time 1. (Note 1)

{GROUP DELAY APERTURE}

: Sets the aperture for group delay measurement. The aperture should be considered in the same manner as the smoothing aperture. (Note 1)

{SMOOTHING ON/OFF}: Selects ON/OFF of smoothing. (Note 1)

{SMOOTHING APERTURE}

: Sets the smoothing aperture. (Note 1)

{IF RBW [   ]} : Sets the resolution bandwidth. If "0" is set, it is set to AUTO which automatically sets the bandwidth according to the measurement frequency.

Resolution bandwidth	Maximum sweeping per point
10kHz	0.1ms/POINT
3kHz	0.35ms/POINT
1kHz	1.0ms/POINT
300Hz	3.5ms/POINT
100Hz	10ms/POINT
30Hz	35ms/POINT
10Hz	100ms/POINT
3Hz	350ms/POINT

When IF RBW AUTO function is selected, the resolution bandwidth is not defined uniquely by the range of sweeping frequency. This automatically switches the resolution bandwidth according to the frequency under sweeping.

When AUTO is set, the resolution bandwidth as the figure below is selected and is measured automatically corresponding to the frequency of the measurement point.

Measurement frequency	Bandwidth of resolution
5Hz to 300Hz	3Hz
300Hz to 1kHz	10Hz
1kHz to 3kHz	30Hz
3kHz to 10kHz	100Hz
10kHz to 30kHz	300Hz
30kHz to 100kHz	1kHz
100kHz to 300kHz	3kHz
300kHz to 500MHz	10kHz

Note: *In the averaging function, the measured data are averaged with time weight before formatting it. Since vector quantity is averaged, there also is an effect that reduces the noise level.*

The smoothing obtains the moving average between adjacent pieces of formatted data. Since scaler quantity is averaged, the noise width is reduced but the noise level will not be reduced.

- *Averaging process*

$$\overline{Y}(n) = \frac{n-1}{n} \times \overline{Y}(n\text{-}1) + \frac{1}{n} \times Y(n) \quad (n \le N)$$

$$\overline{Y}(n) = \frac{N-1}{N} \times \overline{Y}(n\text{-}1) + \frac{1}{N} \times Y(n) \quad (n > N)$$

$\overline{Y}(n)$: *nth averaged data*
$Y(n)$: *nth data not averaged yet*
N : *Number of times for averaging*

• **Smoothing process**

$$\overline{D}(n) = \frac{D(n-m) + \cdots + D(n) + \cdots + D(n+m)}{2m+1}$$

$\overline{D}(n)$: nth format data already smoothed
$D(n)$: nth format data not smoothed yet
$2m$: Smoothing aperture

The aperture for the setting value is obtained using the following equation :

$$Aperture <2m> = \frac{(measurement\ points) - 1}{100} \times <value>$$

That equation means that the aperture is set by the percentage for the number of the measurement points. Even if the number of the measurement points has been changed, the setting value of the aperture will be maintained and the aperture <2m> will be calculated again by the number of the measurement points after the change.

(Example)

Number of measurement points : 101 (Point)

$$Aperture:\ 2\ (\%) \rightarrow Aperture\ (2m) = \frac{101 - 1}{100} \times 2 = 2$$

$$\begin{array}{ccccc} & n-1 & n & n+1 & \\ Measurement\ points: \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc \\ & \underline{\qquad\qquad\qquad} & & & \end{array}$$

Aperture (2m) = 2
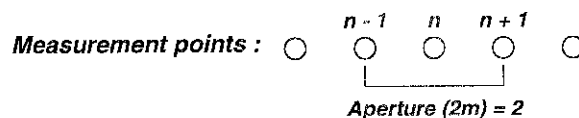
4.4.9 Selecting Input Attenuator and Input Impedance

The input attenuator and impedance are selected. Two types of input attenuators are provided: 0dB and 20dB. These attenuator values determine a maximum value and a noise level of the input power. To set the measurement dynamic range to the maximum value, it is required to set the attenuator value to an optimum value according to the input power.

Since the value is automatically set to the optimum value according to the input power when the attenuator is set to AUTO, the maximum dynamic range will be obtained. Typical values are as follows:

Note: *If the input power exceeds a maximum permissible input level, "over load trip" is displayed and the input impedance is forcefully switched to 1 MΩ.*

Attenuator	Maximum input power	Noise level	Dynamic range
0dB	-20dBm	-115dBm	95dB
20dB	0dBm	-95dBm	95dB
AUTO	0dBm	-115dBm	115dB

Operation procedure

① Press the **[FUNCTION]** to call the attenuator menu.

② Attenuator menu

{R ch : ATT [ ]}	: Calls the menu which selects the R input attenuator. (See step ③.) (Note 2)
{R ch : IMP 1MΩ/50Ω}	: Sets the R input impedance to 50Ω or 1MΩ. (Note 2)
{A ch : ATT [ ]}	: Calls the menu which selects the A input attenuator. (See step ③.)
{A ch : IMP 1MΩ/50Ω}	: Sets the A input impedance to 50Ω or 1MΩ.
{B ch : ATT [ ]}	: Calls the menu which selects the B input attenuator. (See step ③.) (Note 1)
{B ch : IMP 1MΩ/50Ω}	: Sets the B input impedance to 50Ω or 1MΩ. (Note 1)
{CLEAR TRIP}	: Cancels the case where an over input has forcibly set the impedance to 1MΩ.

Note1: *This is not displayed in R3753BH/EH.*

Note2: *This is not displayed in R3753EH.*

③ Attenuator selection menu

{INPUT ATT AUTO}	: Automatically sets an optimum value according to an input power.
{INPUT ATT 0dB}	: Sets to 0dB.
{INPUT ATT 20dB}	: Sets to 20dB.

4.5 Calibration

There are five types of calibration methods to reduce the system errors, as follows:

* Normalizing .... ① (See sub-section 4.5.1.)
* 1-port full calibration .... ② (See sub-section 4.5.2.)
* Transmission full calibration .... ③ (See sub-section 4.5.3.)
* Averaging .... ④ (See sub-section 4.4.8.)
* Smoothing .... ⑤ (See sub-section 4.4.8.)

The methods of ①, ② and ③ are used to remove error factors which can be reproduced. These methods measure the standard whose real value has been known. The result is used to obtain the real value of the measurement according to the error model.

The methods of ④ and ⑤ are used to statistically reduce random errors by obtaining the time average and moving average respectively.

Note: *The calibration methods of ①, ② and ③ can not be performed simultaneously. Since the methods of ④ and ⑤ can be independently operated, they can be performed simultaneously.*

4.5.1 Normalizing

Calibrates the frequency characteristics of the magnitude and phase. This method can be easily performed but cannot obtain a high accuracy.

(1) For measuring transmission

Calibrates the frequency characteristics including that on the connection cable and connector by connecting the through standard with the condition where any sample is removed.

(2) For measuring reflection

An open standard or a short standard can be selected for the calibration standard. The frequency characteristics is calibrated in the reflection measurement by connecting the calibration standard.

Both the open standard and short standard are full reflection and the phase for the short standard is shifted by 180°.

For the open standard, make sure that the reflection measurement port is actually made open. For example, the calibration can be made when the measurement port is open (unloading condition) without the open standard for a calibrated N type connector.

However, if the open capacity is uncertain or if the open condition cannot be obtained because the measurement port is the line on the base board, the short standard should be used or the calibration should be made with the line made short.

4.5.2 One Port Full Calibration

Calibrates the directivity, source match, and frequency tracking in the reflection measurement. This method highly accurately measures the reflection of a one port device or a two port device whose one end is terminated.

Note: **Three kinds of calibration standards are required as follows:**
- **Open standard**
- **Short standard**
- **Load standard**

The signal flow graph below shows the error model.

$$E_D \quad : \text{ Directivity}$$
$$E_S \quad : \text{ Source match}$$
$$E_r \quad : \text{ Frequency tracking}$$
$$S_{11M} \quad : \text{ Measured data (before calibration)}$$
$$S_{11A} \quad : \text{ Actual data}$$

$$S_{11M} = E_D + \frac{S_{11A} E_r}{1 - E_S S_{11A}}$$
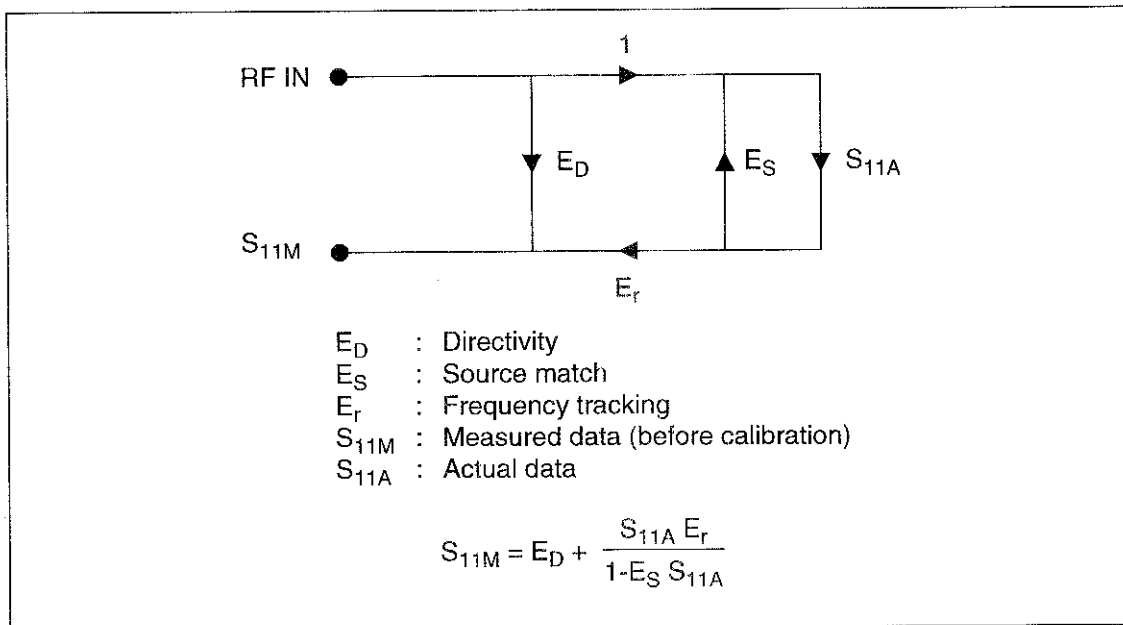
Directivity : The directivity connector/bridge which is used for the reflection measurement detects the reflection signal from the sample device.
However, it actually detects not only the reflection signal but also a few incidence signals.
The limitation where the reflection signal and the incidence signal can be separated is called a "directivity".

Source match : The reflection signal from the sample device reflects at the signal source and is injected in the sample to make errors. The reflection coefficient at that signal source is called a "source match".

Frequency tracking : Is the frequency characteristics of the measurement system including the cable and connector.

4.5.3 Transmission Full Calibration

In transmission measurement, transmission full calibration brings higher accuracy measurement than transmission-line normalization.

This calibration can cancel errors caused by the measurement system including cables and the fixture.

Transmission parameter conversion would bring much more accuracy to the impedance measurement.

For calibration, the following standards are required.

- Short standard
- Load standard

4.5.4 Calibration Method

(1) Normalizing (transmission)

Operation procedure

① Setup the R3753H series to the transmission measurement.

② Connect a through standard between the measurement ports.

③ Press the **[CAL]** to call the calibration menu.

④ Press the *{NORMALIZE (THRU)}*.
The message "Wait for Sweep" is displayed and the calibration data are obtained. The calibration is completed when the message disappears. (Note)

⑤ Connects a sample to perform the measurement.

(2) Normalizing (reflection)

Operation procedure

① Setup the R3753H series to the reflection measurement.

② Connect a open standard or a short standard to the measurement ports.

③ Press the **[CAL]** to call the calibration menu.

④ When the open standard is used, then press the *{NORMALIZE (THRU)}*.
When the short standard is used, then press the *{NORMALIZE (SHORT)}*.
The message "Wait for Sweep" is displayed and the calibration data are obtained. The calibration ends when the message disappears. (Note)

⑤ Connects a sample to perform the measurement.

Note: Do not move the R3753H series, the cable, the connector, the stand and others when the message is displayed.

(3) 1-port full calibration

Operating procedure

① Sets the R3753H series to the reflection measurement.

② Press the **[CAL]** to call the calibration menu.

③ Press the {CAL MENUS} to call the full calibration selection menu.

④ Press the {1PORT FULL CAL} to select the 1-port full calibration selection menu, and call the 1-port full calibration menu.

⑤ Connect the open standard to the measurement port and press the {OPEN}.
The message "Wait for Sweep" is displayed and the calibration data are obtained. The calibration is completed when the message disappears. (Note)

⑥ Connect the short standard to the measurement port and press the {SHORT}.
The message "Wait for Sweep" is displayed and the calibration data are obtained. The calibration is completed when the message disappears. (Note)

⑦ Connect the load standard to the measurement port and press the {LOAD}.
The message "Wait for Sweep" is displayed and the calibration data are obtained. The calibration is completed when the message disappears. (Note)

⑧ Press the {DONE 1-PORT} to complete the 1-port full calibration.

⑨ Connect a sample to perform the measurement.

Note: Do not move the R3753H series, the cable, the connector, the standard and others when the message is displayed.

CAUTION!
1. When calibration data has already been obtained, set the calibration setting to OFF and clear the data, then restart the calibration. The full calibration operation cannot be performed to prevent the calibration data loss by miss operation during the calibration or if the data existed. (See sub-section 4.5.7.)

2. Each calibration data can be obtained again before pressing the {DONE 1-PORT}.

(4) Transmission full calibration

Operation procedure

① Setting the R3753H series for transmission measurement.

② Press **[CAL]** to call the calibration menu.

③ Press *{Z0 VALUE}* and enter the impedance of the load standard.

④ Press *{CAL MENUS}* to call the calibration selection menu.

⑤ Press *{TRANS FULL CAL}* to select the transmission full calibration. The transmission full calibration menu is invoked.

⑥ Open the test port (by connecting nothing) and press *{OPEN}*.
The R3753H series shows the message, "Wait for Sweep" and starts to obtain calibration data. When the message disappears, the R3753H series completes the data acquisition. (Note.)

⑦ Connect the Short standard to the test port and press *{SHORT}*.
The R3753H series shows the message, "Wait for Sweep" and starts to obtain calibration data. When the message disappears, the R3753H series completes the data acquisition. (Note.)

⑧ Connect the Load standard to the test port and press *{LOAD}*.
The R3753H series shows the message, "Wait for Sweep" and starts to obtain calibration data. When the message disappears, the R3753H series completes the data acquisition. (Note.)

⑨ Press *{DONE TRANS}* to complete the transmission full calibration.

⑩ Connect a test sample and start the measurement.

Note: **Do not move the R3753H series, the cable, the connector, the standard and others when the message is displayed.**

CAUTION!
1. *When calibration data has already been obtained, set the calibration setting to OFF and clear the data, then restart the calibration. The full calibration operation cannot be performed to prevent the calibration data loss by miss operation during the calibration or if the data existed. (See sub-section 4.5.7.)*

2. *Each calibration data can be obtained again before pressing the {DONE IMPEDANCE}.*

4.5.5 Interpolating Calibration Data

When the stimulus shown below is changed with *{INTERPOLATE ON/OFF}* is on, the calibration data is interpolated.

- Sweep range (to be calibrated)
- Sweep type (under constraints) (Note)
- Number of sweep points

Note: **Combinations of sweep types that can be interpolated.** (○*: possible,* ×*: impossible*)

Sweep type under calibration / Current sweep type	Linear sweep	Logarith-mic sweep	User sweep	Program sweep	Power sweep
Linear sweep	○	×	×	×	×
Logarithmic sweep	○	○	×	×	×
User sweep	○	×	×	×	×
Program sweep	○	×	×	×	×
Power sweep	○ *1	×	×	×	○ *2

*1: A value sought as CW frequency among the calibration frequency range is used as calibration data of all points.
*2: When CW frequency is equal, calibration data is interpolated with the output level.

(Status signs)

Calibration status is shown on the side of the screen as follows.

Normal correction	"Cor"
Interpolated correction	"C?"
Abnormal correction	"C!"

Normal correction	:	All setting conditions are the same as that of the calibration.
Interpolated correction	:	Setting conditions differs from that of the calibration, however, are being interpolated.
Abnormal correction	:	Setting conditions differs from that of the calibration, and are not being interpolated. The last calibration data has been used.

CAUTION!
When interpolation is impossible, when frequency range is out of calibrated range, or when "INTERPOLATE OFF" is set, "C!" is displayed. In this case, the last calibration data has been used.
When the settings are changed as shown below, however, the correction becomes disabled. In this case, correction can not be enabled.

(1) The number of points is changed and the sweep range is changed out of the calibrated range.
(2) The combination, × shown in the last table is used.
*(3) CW frequency is changed out of the calibrated range under *1 of the last table.*

4.5.6 Extending Measurement Reference Plane

Is the function which moves the calibration plane to the end of the cable when the extension cable is connected to the test port after calibration. The function calibrates the addition of the electrical length, assuming that the cable having no loss completely has been added. That is, it obtains the phase characteristics only for a sample by calibrating the phase shift for the addition.

- Electrical length correction
  Corrects the electrical length which has been set to the measurement data. The measurement port type is not identified. It can be used not only for correction but also measuring the electrical length of the cable. Also, it can be used to measure flatness of the phase by removing phase change due to the electrical length of the actual sample.

- Port extension
  Measurement is made, assuming that the extension cable with the electrical length already set is connected to the measurement port. That is, the electrical length already set is automatically calibrated according to the change of the measurement port. For example, if a calibration value 10ns is set to the port 1 and a value 20ns is set to the port 2 when S parameter test-set is used, the calibration is automatically made as follows:

  For S_{11} measurement: (PORT 1) × 2 = 20ns
  For S_{21} measurement: (PORT 1) + (PORT 2) = 30ns

- Phase offset
  This function does not calibrate the electrical length. It adds a constant phase value as an offset regardless of the frequency.

- Phase Slope
  This function corrects and displays slope of the data measured by phase measurement.
  The phase of the stop frequency is corrected by an input value with reference to the phase of the start frequency.

- Velocity factor (V_f)
  Sets the velocity factor value to be used to calculate the electrical length. The initial setting is $V_f = 1$.

$$V_f = \frac{1}{\sqrt{\varepsilon_R}}$$

Phase offset value/correction value Φ (deg) $= \dfrac{L}{c} \times \dfrac{1}{V_f} \times f \times 360$

$$= S \times f \times 360$$

V_f : Velocity factor
L : Electrical length (distance)
c : Light speed
S : Electrical length (time)
f : Frequency
ε_R : Relative permittivity

Operation procedure

The 1 of 2 and 2 of 2 in the calibration menu includes the menu with which the reference plane is extended.

① Press the **[CAL]** to call the calibration menu (1 of 2).

{PORT EXTENSION}   : Calls the port extension menu. (See step ④.)

② Press the {More 1/2} to call the calibration menu (2 of 2).

③ Calibration menu (2 of 2)

{ELEC DELAY ON/OFF}   : Selects ON/OFF of the electrical length correction.

{ELECTRICAL DELAY}   : Sets the correction value for the electrical length in a unit of time.

{ELECTRICAL LENGTH}   : Sets the correction value for the electrical length in a unit of distance.

{VELOCITY FACTOR}   : Sets the velocity factor value.

{PHASE OFFSET VALUE} : Sets the phase offset value.

{PHASE SLOPE}   : Sets the phase slope value.

④ Port extension menu

{EXTENSION ON/OFF}   : Selects ON/OFF of the port extension.

{EXTENSION INPUT R}   : Sets the value of the input port R extension by time. (Note 2)

{EXTENSION INPUT A}   : Sets the value of the input port A extension by time.

{EXTENSION INPUT B}   : Sets the value of the input port B extension by time. (Note 1)

{EXTENSION PORT 1}   : Sets the value of the S parameter test-set port 1 extension by time. (Note 3)

{EXTENSION PORT 2}   : Sets the value of the S parameter test-set port 2 extension by time. (Note 3)

Note1:   *This is not displayed in R3753BH/EH.*

Note2:   *This is not displayed in R3753EH.*

Note3:   *This can be set only the case with which S parameter test set is connected with R3753AH.*

4.5.7 Calibration Data Clear

Once the calibration operation is executed, the *{CORRECT ON/OFF}* which indicates the calibration being executed is set to ON. For re-calibration, the calibration data must be cleared.

Note: The re-calibration operations differs between the normalize and the full calibration.

(1)   For normalize

Whether calibrated or not, the data is re-calibrated by pressing the *{NORMALIZE}*.

Note: The normalize calibration data is overwritten by the re-calibration operation so that the function for clearing the calibration data is not provided.

(2)   For full calibration

If the full-port calibration data has already existed, whether the calibration is effective or not, the re-calibration cannot be executed. To re-calibrate the data, clear the data.
The calibration data cannot be cleared during calibration being effective to prevent miss operation.

Operation procedure

①   Press the **[CAL]** to call the calibration menu.

②   Sets the *{CORRECT ON/OFF}* to OFF.

③   Press the *{CAL MENUS}* to call the full-calibration selection menu.

④   Press the *{CLEAR CAL DATA}* to clear the calibration data.

⑤   Select any one of 1-port/2-port full calibration and enter the calibration operation.

CAUTION!
If the {CORRECT ON/OFF} is set to OFF, unless the calibration data is not cleared, the calibration can be set to ON again.

4.6   Marker Function

The value of the data displayed can be read out with the marker. Also, the marker can find out the maximum or minimum value and change the settings of the signal source and the display.
Up to ten markers can be set for each channel and one of them is set to the active marker. The change of the marker setting is made to the active marker. The values on active marker is displayed on the screen. Also, the marker list function can display all the values on other markers than the active marker at the same time.

[MKR]   : Calls a marker menu to set a marker.

[MKR →] : Calls a marker search menu for a marker analysis.

An active marker and a normal marker are shown in the following.

Active marker   Normal marker
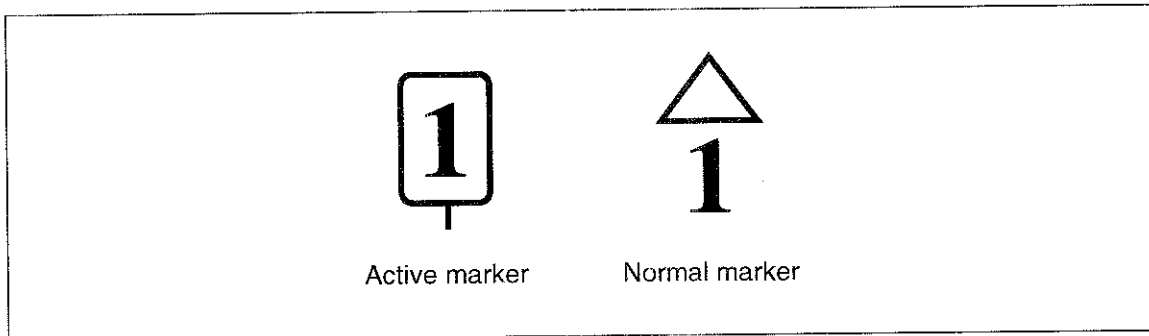
4.6.1 Setting Marker

Up to ten markers can be set for each channel and the marker which is displayed at the marker area on the screen is called an "active marker".
This function sets the active marker or changes the marker already set.

Operation procedure

① Press the **[MKR]** to call the marker menu.

② Press the *{ACTIVATE MARKER [   ] }* to call the active marker menu.

③ Active marker menu

- Active marker menu (1 of 2)

  {MARKER 1}   : Sets the marker 1 for the active marker.

  {MARKER 2}   : Sets the marker 2 for the active marker.

  {MARKER 3}   : Sets the marker 3 for the active marker.

  {MARKER 4}   : Sets the marker 4 for the active marker.

  {MARKER 5}   : Sets the marker 5 for the active marker.

  {ACTIVATE MKR OFF} : Sets off only the active marker.
  If plural markers are set, a marker of the smallest number becomes an active marker.

Only when a marker frequency is displayed in the active area, its marker is controlled with the ten - key and the UP/DOWN key.

- Active marker menu (2 of 2)

  {MARKER 6}   : Sets the marker 6 for the active marker.

  {MARKER 7}   : Sets the marker 7 for the active marker.

  {MARKER 8}   : Sets the marker 8 for the active marker.

  {MARKER 9}   : Sets the marker 9 for the active marker.

  {MARKER 10}   : Sets the marker 10 for the active marker.

  {ACTIVATE MKR OFF} : Sets off only the active marker.

4.6.2 Marker Coupling between Channels

The R3753H series has two channels. The function is used to select if the markers are inter-locked between the channels or not.

"Marker interlock between channels" means that the marker which has been set for the active channel is automatically set for the non-active channel regardless of ON/OFF of the dual channel display. "Non-interlock" means that the markers are made to independently operate for each channel.

Operation procedure

① Press the **[MKR]** to call the marker menu.

② Press the *{MARKER MODE MENU}* to call the marker mode menu.

③ Press the *{MKR CPL/UNCPL}* to select the marker coupling between the channels.

CPL   : Coupling ON (interlock between channels)
UNCPL : Coupling OFF (non interlock between channels)

If sweep type satisfies the following conditions, even if the MKR CPL is specified, a marker is not coupled.

• When the sweep type of either of CH1/2 is set to the USER SWEEP or the PROG SWEEP.
• When both a frequency sweep and a level sweep are set simultaneously.
• When CH 1/2 is set to the zero span mode.

<For MKR UNCPL>

<For MKR CPL>
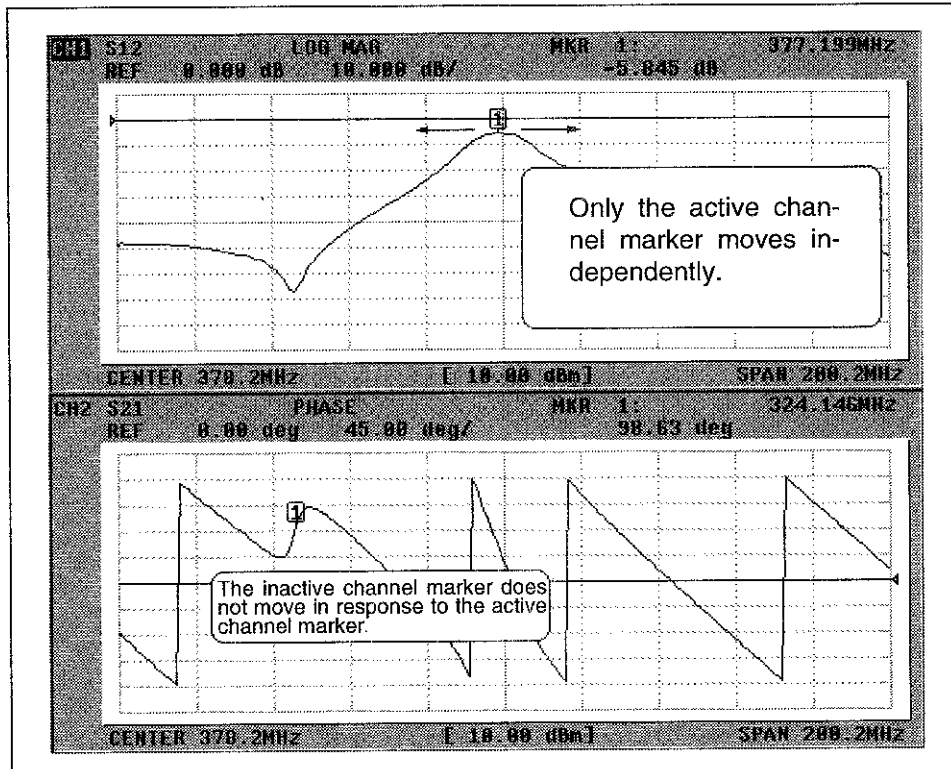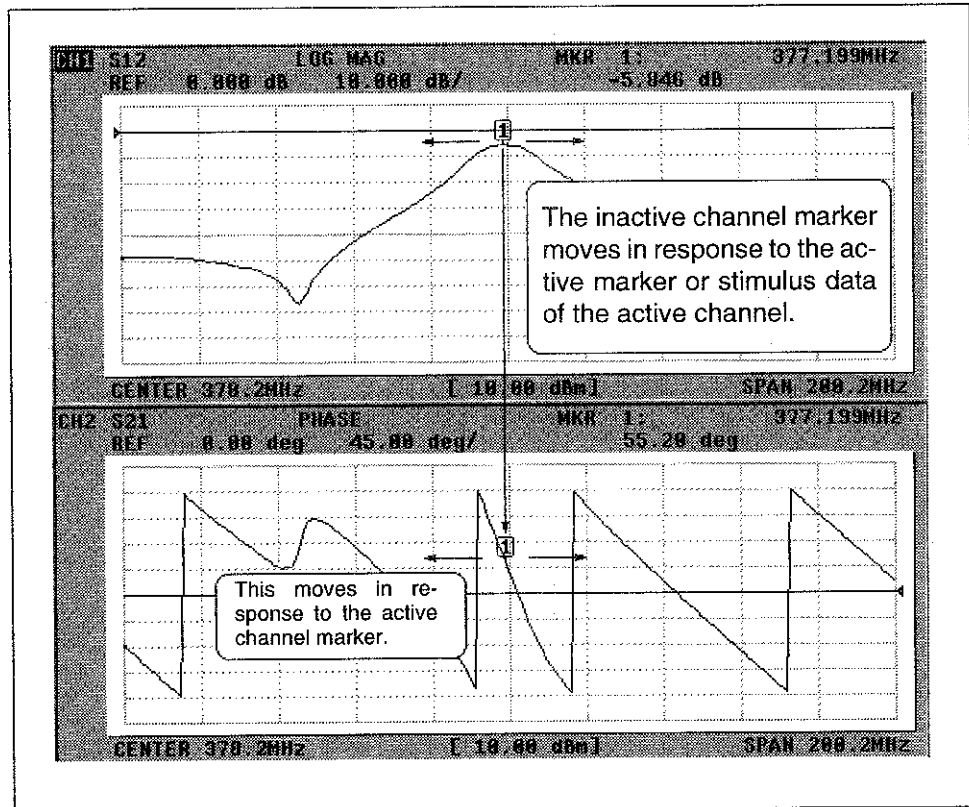
4.6.3 Interpolation Between Measurement Points

The marker can be assigned to either of one mode that sets markers and reads data of each marker by interpolating linearly between measurement points and another mode that sets markers to only actual measurement points.

Operation procedure

① Press the **[MKR]** to call the marker menu.

② Press the *{MARKER MODE MENU}* to call the marker mode menu.

③ Interpolation between measurement points is selected by *{MKR CMP/UNCMP}*.

CMP   :   Interpolation (compensation) ON
UNCMP :   Interpolation (compensation) OFF

When the sweep type is set to USER SWEEP/PROG SWEEP, even if CMP is selected, the interpolation possibly don't work depending on the number of set points.

Measurement point (n)

Measurement point (n + 1)

Measurement point interval
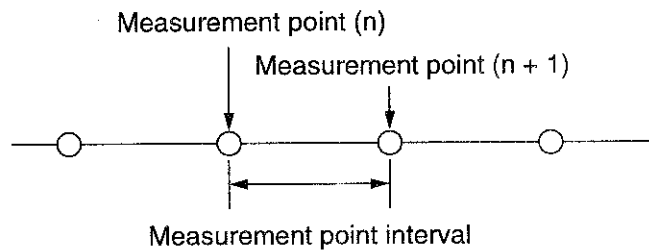
4.6.4 Displaying Marker Read out Value

The marker value displayed on the screen always indicates the active marker. To display other than that marker, use the marker list function to list all set markers at a time.

Operation procedure

① Press the **[MKR]** to call the marker menu.

② Press the *{MKR LIST ON/OFF}* to select ON/OFF of the marker list display.

4.6.5 Delta-Marker Function

The delta-marker function is used to find out the difference between the active marker and the specified marker. Three kinds of modes are available depending on the marker to be specified, as follows:

- ΔMKR mode : Obtains the difference between the child marker and the active marker by setting the child marker to the position of the active marker. The difference between the current position and the previous position (child marker) can be obtained by moving the active marker.

- ACT MKR mode : Obtains the difference between the active marker and the other marker.

- FIXED MKR mode : Obtains the difference between the active marker and the fixed marker by freely setting the fixed marker regardless of the trace data. The fixed marker is set with the stimulus and response values.
  That is, the fixed marker is always fixed to the position of specified stimulus and response values regardless of the trace data.

The response values for the other markers including the child marker are on the trace data.
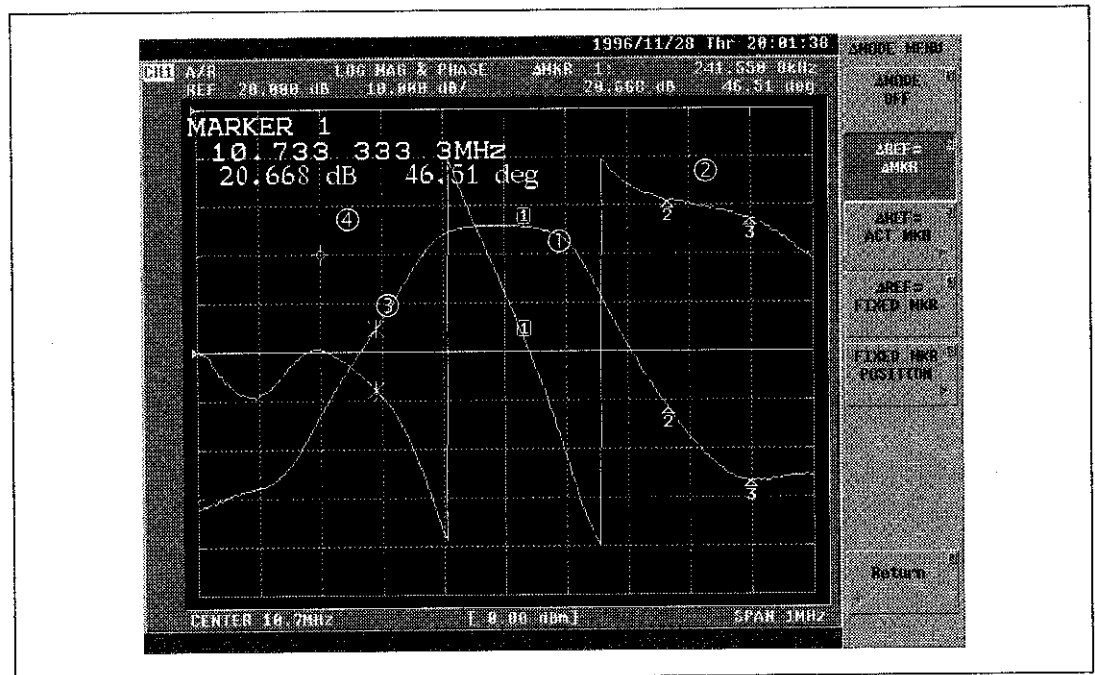
ΔREF = ΔMKR : The delta value of active marker ① and the child marker ③ is measured.

ΔREF = ACT MKR : The delta values of active marker ① and compare marker ② is measured.

ΔREF = FIXED MKR : The delta value of active marker ① and the Fixed marker ④ is measured.

Operation procedure

① Press the **[MKR]** to call the marker menu.

② Press the *{Δ MODE MENU}* to call the delta-mode menu.

③ Delta mode menu

{Δ MODE OFF}	: Sets OFF the delta mode.
{Δ REF = Δ MKR}	: Selects the ΔMKR mode. (See step ④.)
{Δ REF = ACT MKR}	: Selects the ACT MKR mode to call the ACT MKR menu. (See step ⑤.)
{Δ REF = FIXED MKR}	: Selects the FIXED MKR mode.
{FIXED MKR POSITION}	: Calls the FIXED MKR setting menu. (See step ⑥.)

④ For ΔMKR mode

Pressing the *{Δ REF = Δ MKR}* in step ③ causes the child marker (*) to be displayed on the active marker position and the result to be displayed at the active area on the screen.
Since the active marker setting can be changed, obtain the data by moving the active marker using the data knob.

⑤ For ACT MKR mode

Pressing the *{Δ REF = ACT MKR}* in step ③ calls the ACT MKR menu. Set the marker for comparison. Since the menu has also the key to change the active marker, it is possible to change the active marker without returning to the **[MKR]**.

• ACT MKR menu (1 of 2)

{COMPARE MARKER 1}	: Changes the marker for comparison to the marker 1.
{COMPARE MARKER 2}	: Changes the marker for comparison to the marker 2.
{COMPARE MARKER 3}	: Changes the marker for comparison to the marker 3.
{COMPARE MARKER 4}	: Changes the marker for comparison to the marker 4.
{COMPARE MARKER 5}	: Changes the marker for comparison to the marker 5.
{ACTIVATE MARKER [ ]}	: Calls the active marker selection menu. (See sub-section 4.6.1.)

- ACT MKR menu (2 of 2)

  {COMPARE MARKER 6} : Changes the marker for comparison to the marker 6.

  {COMPARE MARKER 7} : Changes the marker for comparison to the marker 7.

  {COMPARE MARKER 8} : Changes the marker for comparison to the marker 8.

  {COMPARE MARKER 9} : Changes the marker for comparison to the marker 9.

  {COMPARE MARKER 10} : Changes the marker for comparison to the marker 10.

  {ACTIVATE MARKER [ ]} : Calls the active marker selection menu. (See sub-section 4.6.1.)

⑥ For FIXED MKR mode

Pressing the {Δ REF = FIXED MKR} in step ③ displays the difference between the active MKR and the FIXED MKR (◇) on the active area of the screen.
To set the FIXED MKR position, press the {FIXED MKR POSITION} on the same menu to call the FIXED MKR setting menu.

- FIXED MKR setting menu

  {FIXED MKR STIMULUS} : Sets the FIXED MKR stimulus value.

  {FIXED MKR VALUE} : For the Smith chart and polar display, sets the FIXED MKR response value (real part).

  {FIXED MKR AUX VALUE} : For the Smith chart and polar display, sets the FIXED MKR response value (imaginary part).

  {FIXED MKR → ACTIVE MKR} : Sets the FIXED MKR to the active marker position.

If changing the stimulus reference value or others cause the fixed marker to move outside the screen, the fixed marker is not displayed.
The fixed marker can be displayed and set even if the delta mode is off.
If a parameter other than "1/S" has been set to CONVERSION ON in the parameter conversion menu, the fixed marker can not be set nor displayed.

Note: FIXED MKR STIMULUS/VALUE/AUX VALUE can be set only with the ten-key.

4.6.6　Marker Menu during Impedance Measurement

To read the impedance directly by the marker during parameter conversion or impedance measurement, the marker menu can be selected from three modes (parameter conversion, Smith chart display, or polar display).

① Press the **[MKR]** to call the marker menu.

② Press the *{MARKER MODE MENU}* to call the marker mode menu.

③ Marker mode menu

{CONVERSION MKR MENU [ ]}

　　　　　　　　　　: Calls the conversion marker menu which sets the marker data display mode during the parameter conversion. (See step ④.)

{SMITH MKR MENU [ ]} : Calls the Smith marker menu which sets the marker data display mode during the Smith chart display. (See step ⑤.)

{POLAR MKR MENU [ ]}: Calls the menu which sets the marker data display mode during the polar display. (See step ⑥.)

④ Conversion marker menu

{DEFAULT}　　　　　　　: Displays the value corresponding to the data format.

{LIN MKR}　　　　　　　: Displays the liner magnitude value and the phase value.
When a format is selected except SMITH and POLAR in the format menu, if SMOOTHING is set to ON, a correct value cannot be obtained.

{Re/Im MKR}　　　　　　: Displays the complex data.
When a format is selected except SMITH and POLAR in the format menu, if SMOOTHING is set to ON, a correct value cannot be obtained.

⑤ Smith marker menu

{LIN MKR}   : Displays the liner magnitude value and the phase value.

{LOG MKR}   : Displays the logarithmic magnitude value and the phase value.

{Re/Im MKR}   : Displays the complex data.

{R+jX MKR}   : Displays the complex impedance.

{G+jB MKR}   : Displays the complex admittance.

{Z0 VALUE}   : Sets the characteristic impedance.

⑥ Polar marker menu

{LIN MKR}   : Displays the liner magnitude value and the phase value.

{LOG MKR}   : Displays the logarithmic magnitude value and the phase value.

{Re/Im MKR}   : Displays the complex data.

{Z0 VALUE}   : Sets the characteristic impedance.

4.6.7 Marker Analysis Function

The marker analysis function has the search functions for obtaining the values such as maximum value and minimum value.
This function also provide the functions to change the signal source and the display scale setting by the marker value.

The following items are provided for search functions:
- Maximum value
- Minimum value
- Phase : 0°
- Phase : ±180°
- Specified response value (amplitude, phase)
- Filter analysis (bandwidth, Q, shaping factor)

To perform the analysis operation, two modes are provided. Select any one of the mode for only one execution, or the mode for repeating every sweeping. The analysis area is selected the all measurement area, or the part search mode performing within the area specified by the marker delta mode.

CAUTION!
Even if a parameter other than "1/S" is set in the parameter conversion menu and also "LIN MKR, Re/Im MKR" is set in the conversion marker menu, data specified in the format menu is searched. (However, for a smith chart and a polar display, LOG MAG type of data is searched.)

    Operation procedure

① Press the **[MKR →]** to call the marker search menu.

② Maker search menu (This menu is used to change the signal source or the display scale.)

{MARKER → START}	: Changes the sweep-start value of the signal source to the active marker position.
{MARKER → STOP}	: Changes the sweep-stop value of the signal source to the active marker position.
{MARKER → CENTER}	: Changes the sweep-center value of the signal source to the active marker position.
{△MARKER → SPAN}	: Changes the span of the signal source to the area specified by the △ MARKER.
{MARKER → REF. VALUE}	: Changes the reference value of the display scale to the response value of the active marker.
{PART SRCH [ ] }	: Calls the part search menu. (See step ⑧.)
{MKR SARCH [ ] }	: Calls the search menu. (See step ③.)

③ Search menu

{MKR SEARCH OFF}   : The search function is released.

{MAX}   : Moves the active marker to the maximum value position.
If SMITH or POLAR is set in the format menu, the active marker moves to the maximum value position of LOG MAG type of data.
However, if SMOOTHING is set to ON, the active marker does not move to a correct data.

{MIN}   : Moves the active marker to the minimum value position.
If SMITH or POLAR is set in the format menu, the active marker moves to the minimum value position of LOG MAG type of data.
However, if SMOOTHING is set to ON, the active marker does not move to a correct data.

{TARGET}   : Calls the target menu which searches the specified value. (See step ④.)

{RIPPLE}   : Calls the ripple menu which searches the ripple. (See step ⑤.)

{FLTR ANAL}   : Calls the filter analysis menu. (See step ⑥.)

{TRACKING ON/OFF}   : Selects the function for searching every sweep.
OFF : Searches one time.
ON : Searches every sweep. When ON is selected, the search is performed on the search menu, and the search is repeated/executed every sweep.

④ Target menu

{TARGET VALUE} : Searches the specified value (response value).
If SMITH or POLAR is set in the format menu, LOG MAG type of data is searched as TARGET VALUE.
However, if SMOOTHING is set to ON, the active marker does not move to a correct data.

{0°} : Searches the phase 0°.
The phase data is surely searched without regard to any format.
if SMOOTHING is set to ON, the active marker does not move to a correct data.

{±180°} : Searches the phase180°.
The phase data is surely searched without regard to any format.
if SMOOTHING is set to ON, the active marker does not move to a correct data.

{LEFT SEARCH} : Searches specified value of left side from current marker position.

{RIGHT SEARCH} : Searches specified value of right side from current marker position.

Note: TARGET VALUE can be specified only with the ten-key.

⑤ Ripple menu

{MAX ∩}   : Searches for the maximum of local maximum peak values.
                  (Note)

{MIN ∪}   : Searches for the minimum of local minimum peak values.
                  (Note)

{Δ MAX∩-MIN∪}   : Calculates the difference between the maximum of local
                  maximum peak values and the minimum of local minimum peak
                  values.
                  Moves the active marker to the position of the maximum of local
                  maximum peak values and moves the delta marker (other than
                  FIXED MKR) to the position of the minimum of local minimum
                  peak values.
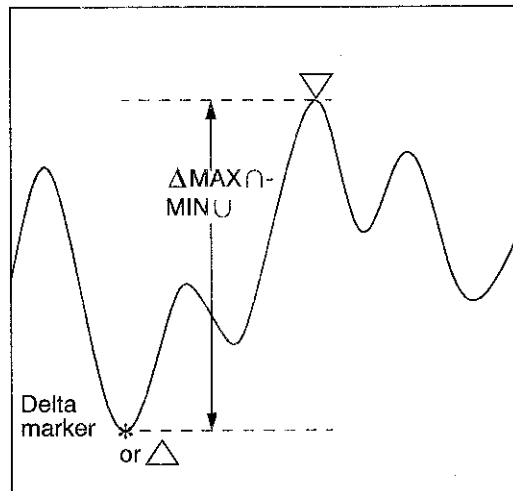
{MAX-MIN}   : Calculates the difference between a maximum value and a
                  minimum value.
                  Moves the active marker to the position of the maximum of local
                  maximum peak values and moves the delta marker (other than
                  FIXED MKR) to the position of the minimum peak values.

{ΔX}   : Specifies the detecting sensitivity for the ripple search.
                  The differential coefficient ΔX is specified here.
                  Specify a ratio, regarding the full scale of the horizontal axis as
                  100%.

{ΔY}   : Specifies the detecting sensitivity for the ripple search.
                  The differential coefficient ΔY is specified here.
                  * ΔX and ΔY are specified only with the ten-key.

Note: *If SMITH or POLAR is set in the format menu, LOG MAG type of data is searched.*
          However, if SMOOTHING is set to ON, a correct data cannot be searched.

How to obtain ripple (local maximum peak value)

To obtain ripple value under the detecting sensitivity $\Delta Y/\Delta X$, search for a point (a) where the gradient (Y/X) of the trace is larger than $\Delta Y/\Delta X$.
Next, search a point (d) where the reverse gradient (Y/X) of the trace is larger than $\Delta Y/\Delta X$. Then the maximum value between (a) and (d) is obtained as a local maximum peak value.
A local minimum peak value can be obtained by reversing the polarity of $\Delta Y/\Delta X$ in the above procedure.
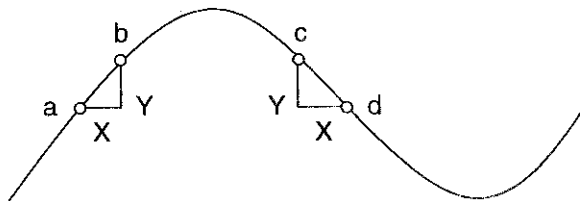
⑥   Filter analysis menu

{WIDTH VALUE}	: Specifies the maximum loss when determining the pass band. Specifies the loss (X dB) from the level reference point.
{FILTER TYPE BAND/NOTC}	: Selects the filter type. BAND : Analyzes a band pass filter. NOTC : Analyzes a notch filter.
{SEARCH FROM [ ]}	: To the search reference menu.
{DISPLAY MODE ABS/REL}	: Selects the way in which the bandwidth is displayed. ABS : Displays the bandwidth using two absolute values (i.e., the lower and higher frequencies). REL : Displays the bandwidth relative to the center frequency.
{SEARCH IN/OUT}	: Selects the direction to be searched on the stimulus axis. IN : Searches outward from the search reference point. OUT : Searches inward to the reference point.
{FILTER ANAL ON/OFF}	: Turns the measurement and its result display ON or OFF. When ON, this function starts the measurement and displays the result. C. F : Displays the center frequency of the bandwidth specified by the loss (X dB) from the level reference point. L.F : In ABS mode, this displays the left frequency of the bandwidth (the low frequency pointed by the ↑ marker). In REL mode, this displays the difference

between the left frequency of the band-
width and the center frequency.

R.F : In ABS mode, this displays the right fre-
quency of the bandwidth (the high fre-
quency pointed by the ↑ marker).
In REL mode, this displays the difference be-
tween the right frequency of the bandwidth and
the center frequency.

BW : Bandwidth

Q : Q factor

SF : Shaping factor

*Note: When the format type is set except LOG MAG,
MAG&PHASE/LOG, and MAG&DELAY, if SMOOTH-
ING is set to ON, a correct data cannot be
searched.*

⑦ Search reference menu

Selects the reference point when analyzing filters (Note 1).

{ACTIVE MARKER} : Makes the active marker the level reference point.

{MAXIMUM VALUE} : Makes the minimum loss point the level reference point.

{REFERENCE LINE} : Makes the reference line the level reference point (Note 2).

*Note 1: Each search reference (which is composed of the stimulus axis and the level axis) specified
by the search reference menu is as follows:*

	MAX reference		Active marker		Reference line	
	Stimulus axis	Level axis	Stimulus axis	Level axis	Stimulus axis	Level axis
Band pass filter analysis	Active Mkr	MAX	Active Mkr	Active Mkr	Active Mkr	Ref Line
Notch filter analysis	Active Mkr	MAX	MIN	Active Mkr	Active Mkr	Ref Line

MAX : Minimum loss point/MIN : Maximum loss point/Active Mkr : Active marker/
Ref Line : Reference line

For example, when MAX reference has been selected for a band pass filter analysis,
the search reference point on the stimulus axis is the Active marker; the search refer-
ence point on the level axis is the MAX (the minimum loss point).

*Note 2: The Reference Line reference can be selected only when the FORMAT is specified as LOG
MAG, LOG MAG&PHASE or LOG MAG&DELAY.*

<Examples of the result of filter analysis>

Q factor is calculated from a bandwidth B.W' where data is 3dB off a minimum loss value of the measured data, and the center frequency C.F' in the bandwidth B.W'.

$$Q = \frac{C.F'}{B.W'}$$

Shaping factor is calculated from a bandwidth B.W' where data is 3dB off minimum loss value of the measured data, and a bandwidth B.W'' where data is 60dB off the minimum loss value.

$$S.F = \frac{B.W''}{B.W'}$$

The stimulus and level reference points used to calculate the Q and Shaping factors are unaffected regardless of the level reference points which are set by the {SEARCH FROM [ ]} key.

	Stimulus reference	Level reference
Band pass filter analysis	MAX	MAX
Notch filter analysis	MIN	MAX

Analysis methods for each setting are described as follows:
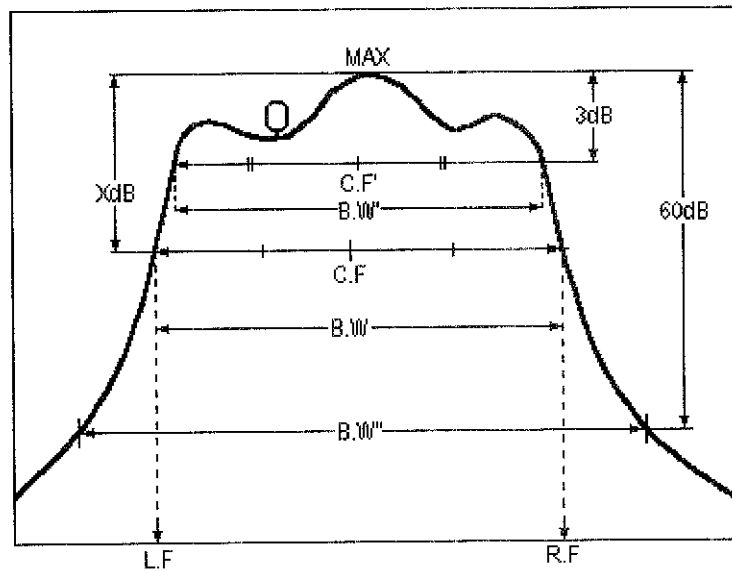
Figure 4-2 Band Pass Filter Analysis/MAX Reference
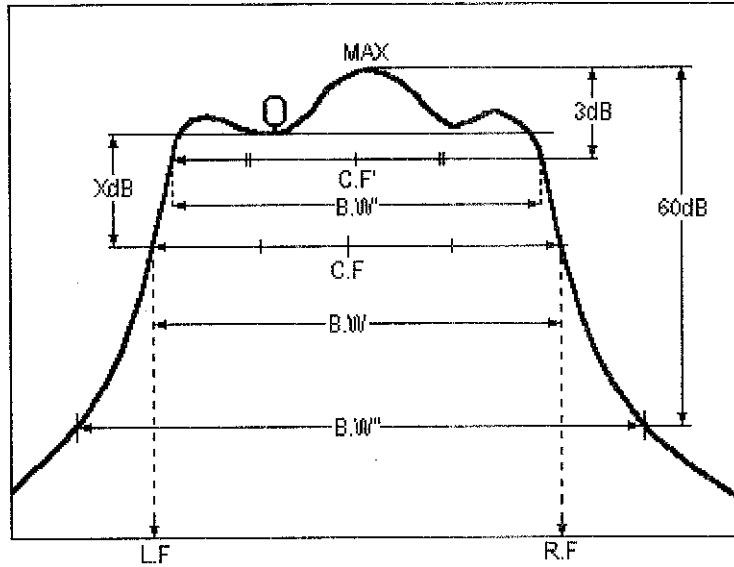
Figure 4-3 Band Pass Filter Analysis/Active Marker Reference
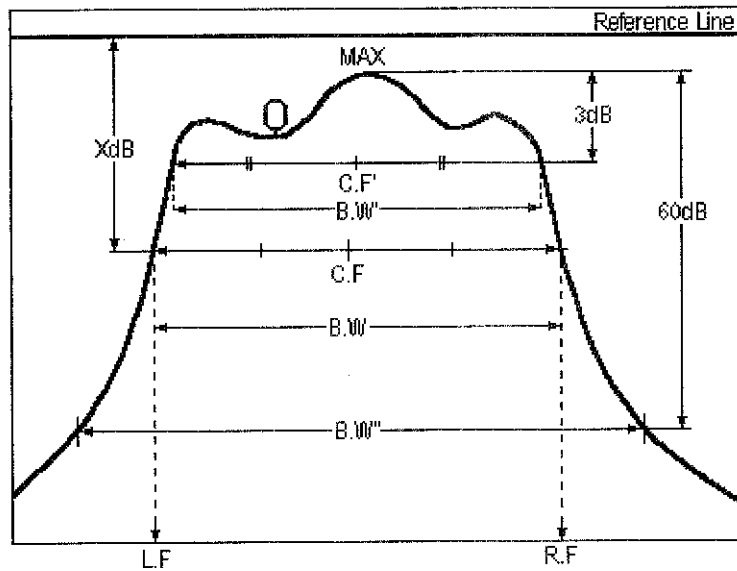
Figure 4-4 Band Pass Filter Analysis/Reference Line Reference
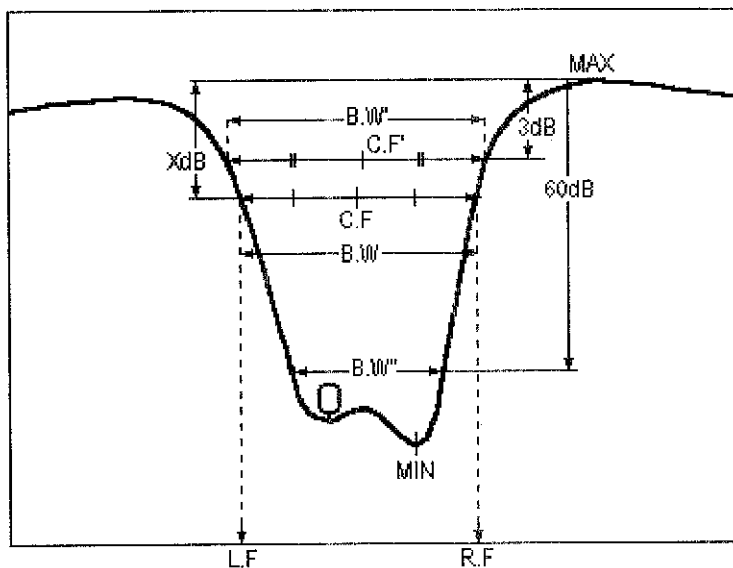
Figure 4-5 Notch Filter Analysis/MAX Reference
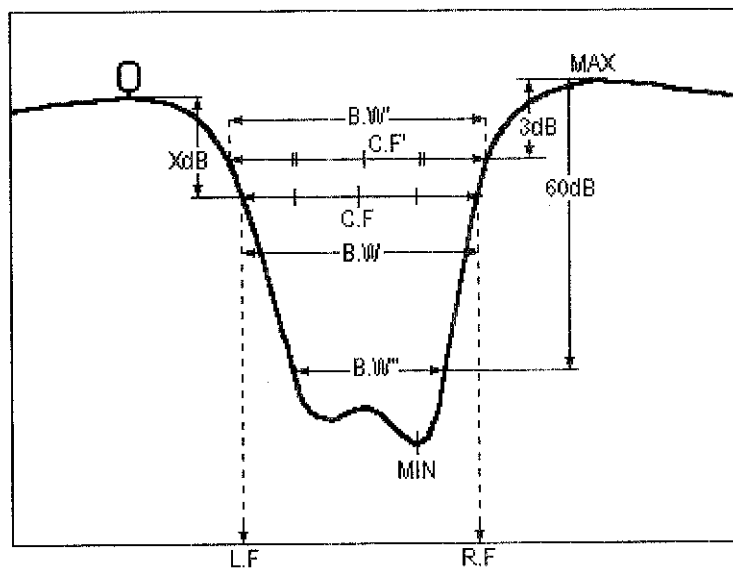
Figure 4-6 Notch Filter Analysis/Active Marker Reference
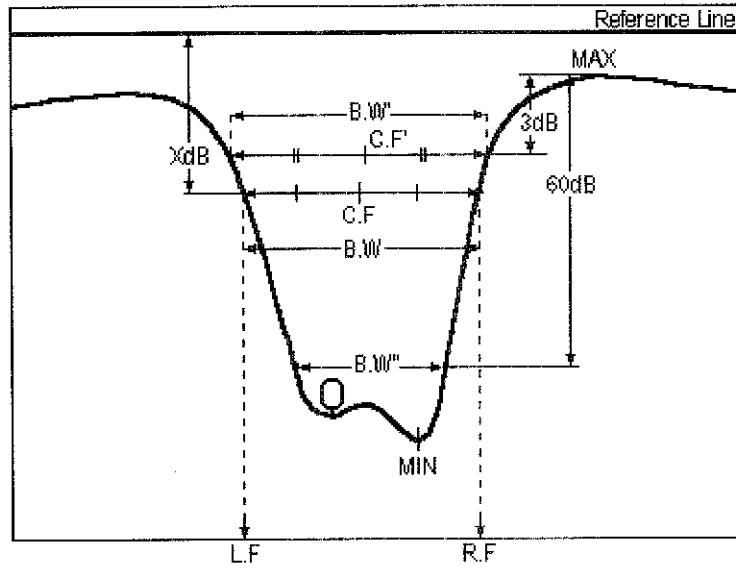
Figure 4-7 Notch Filter Analysis/Reference Line Reference

<Example of filter analysis execution>
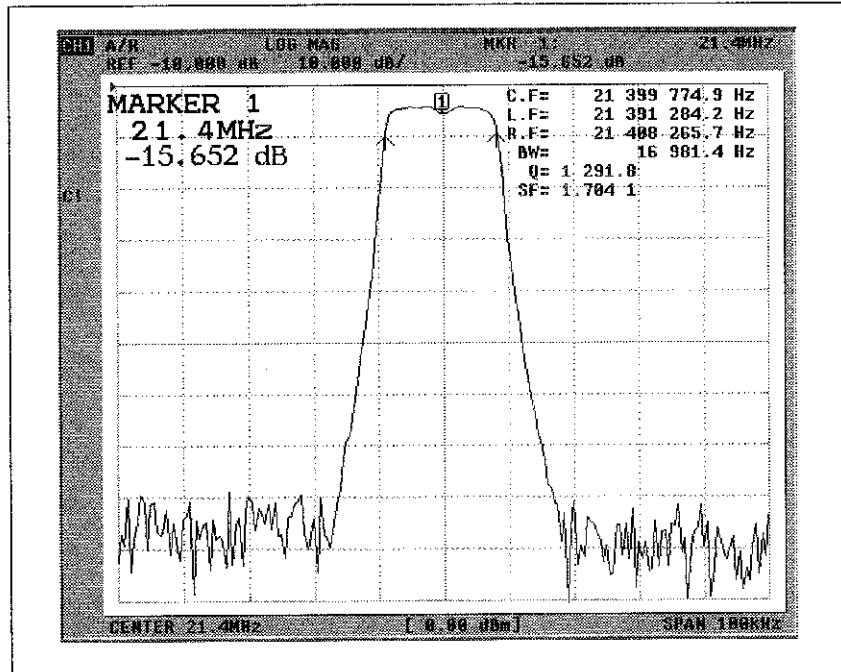
⑧ Part search menu   (This menu is used to search specified area instead of the whole measurement area for the analysis to obtain the maximum value, minimum value and so on.)

{Δ MODE MENU}   : Calls the Δ marker mode menu. (See sub-section 4.6.5.)

{SET RANGE}   : Sets partially search range which was set at Δ marker mode.

{STATISTICS ON/OFF} : Sets the statistical analysis function.
                      The statistical analysis function calculates the average, standard deviation and peak to peak for the range specified by the part search (for the entire measurement range when the part search is turned OFF). The measurement result will be displayed on the right of the measurement screen.

{PART SRCH ON/OFF} : Selects ON/OFF of the part search.
                      ON : Part search
                      OFF : All search

Measurement example by MAX search
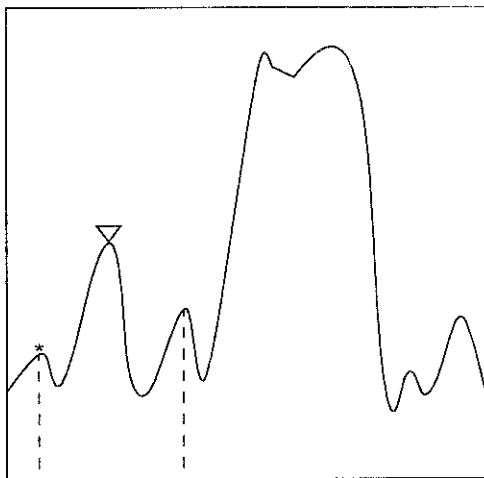
At OFF
Searches a maximum response value within measurement frequency.

At ON
Set a range specified with Δ marker as a partial search range with SET RANGE. Then set PART SRCH to ON and a marker begins to search the maximum value in the set range.

A range specified with Δ marker.

4.7 Sweep

The following five types are provided for sweeping the signal source.

- Linear frequency sweep : The frequency sweep between measurement points is performed in equal steps linearly.

- Log (logarithmic) frequency sweep
  : The frequency sweep between measurement points is performed in logarithmic step.

- User frequency sweep : By the user frequency sweep, measurement points are divided into maximum 30 segments, and frequency range is set to each segment.
  For example, if the segments are set in the stop area, pass area, twofold pass area of the band pass filter, then high data throughput can be obtained because of no sweeping in unnecessary area.

- Program sweep : By the program sweep, measurement points are divided into maximum 30 segments, and frequency range is set to each segment. Other than frequency, the output level, receiver section resolution bandwidth, settling time, and attenuator can be set in every segments. The optimum sweep condition can be set, including throughput and dynamic range.

- Power sweep : The power sweep is used for level characteristic measurement.

4.7.1 Setting Sweep Type

Operation procedure

① Press the **[MENU]** to call the signal source menu.

② Press the {SWEEP TYPE [   ]} to call the sweep type menu.

③ Sweep type menu

{LIN FREQ}	: Sets to the liner frequency sweep.
{LOG FREQ}	: Sets to the log (logarithmic) frequency sweep.
{USER SWEEP}	: Sets to the user frequency sweep.
{PROGRAM SWEEP}	: Sets to the program sweep.
{POW SWEEP}	: Sets to the power sweep.
{EDIT USER SWEEP}	: Calls the segment editing menu of the user frequency sweep. (See sub-section 4.7.2.)
{EDIT PROG SWEEP}	: Calls the segment editing menu of the program sweep. (See sub-section 4.7.3.)

Sweep area settings for the linear frequency sweep, log frequency sweep and power sweep are performed with **[START]**, **[STOP]**, **[CENTER]** or **[SPAN]**.

For the user frequency sweep and program sweep, set the sweep area on each segment editing menu.

CAUTION!
If USER SWEEP or PROGRAM SWEEP is set, input segments are detected and arranged internally in increasing order of frequency.
If STOP frequency of a segment is higher than START frequency of the next segment in the arranged segments, an error occurs.

4.7.2 Editing Segment of User Frequency Sweep

Operation procedure

① Press the **[MENU]** to call the signal source menu.

② Press the *{SWEEP TYPE [   ]}* to call the sweep type menu.

③ Press the *{EDIT USER SWEEP}* to call the user frequency sweep segment editing menu.

④ User frequency sweep segment editing menu

{SEGMENT: NUMBER}	: Specifies the segment number in the range of 0 to 29.
{START}	: Sets the start frequency of the specified segment.
{STOP}	: Sets the stop frequency of the specified segment.
{FREQ}	: Sets the frequency of the specified point when the number of points of the specified segment is set to 1. Reversely, if this frequency is set, then the number of points automatically becomes 1.
{POINT}	: Sets the number of points of the specified segment.
{CLEAR SEG}	: Clears the specified segment.
{CLEAR ALL SEG}	: Clears all segments.

CAUTION!
1. *If the same segment number is edited on the segment editing menu of the program sweep, then the user frequency segment is also changed. (Segment holds the program sweep in common.)*

2. *The total number of points of each segment by user frequency sweep cannot exceed 1201 points. (The maximum number of measurement points is 1201 points.)*

4.7.3 Editing Segment of Program Sweep

Operation procedure

① Press the **[MENU]** to call the signal source menu.

② Press the {SWEEP TYPE [   ]} to call the sweep type menu.

③ Press the {EDIT PROG SWEEP} to call the program sweep segment editing menu.

④ Program sweep segment editing menu

- Program sweep segment editing menu (1 of 2)

  {SEGMENT: NUMBER}   : Specifies the segment number in the range of 0 to 29.

  {START}   : Sets the start frequency of the specified segment.

  {STOP}   : Sets the stop frequency of the specified segment.

  {POINT}   : Sets the point number of the specified segment.

  {CLEAR SEG}   : Clears the specified segment.

  {CLEAR ALL SEG}   : Clears all segments.

- Program sweep segment editing menu (2 of 2)

  {SEGMENT: POWER}   : Sets the output level of the specified segment.

  {IF RBW}   : Sets the receiver section resolution bandwidth of the specified segment.

  {SETTLING TIME}   : Sets the settling time of the specified segment.

  {R ATT 0dB/20dB}   : Sets the R input attenuator of the specified segment. (Note 2)

  {A ATT 0dB/20dB}   : Sets the A input attenuator of the specified segment.

  {B ATT 0dB/20dB}   : Sets the B input attenuator of the specified segment. (Note 1)

Note1: This is not displayed in R3753BH/EH.
Note2: This is not displayed in R3753EH.

CAUTION!
1.   If the same segment number is edited on the segment editing menu of the program sweep, then the user frequency segment is also changed. (Segment holds the program sweep in common.)

2.   The total number of points of each segment by program sweep cannot exceed 1201 points. (The maximum number of measurement points is 1201 points.)

4.7 Sweep

<Example of program sweep execution>

Here is an example how the program sweep is applied to the trace on the screen.
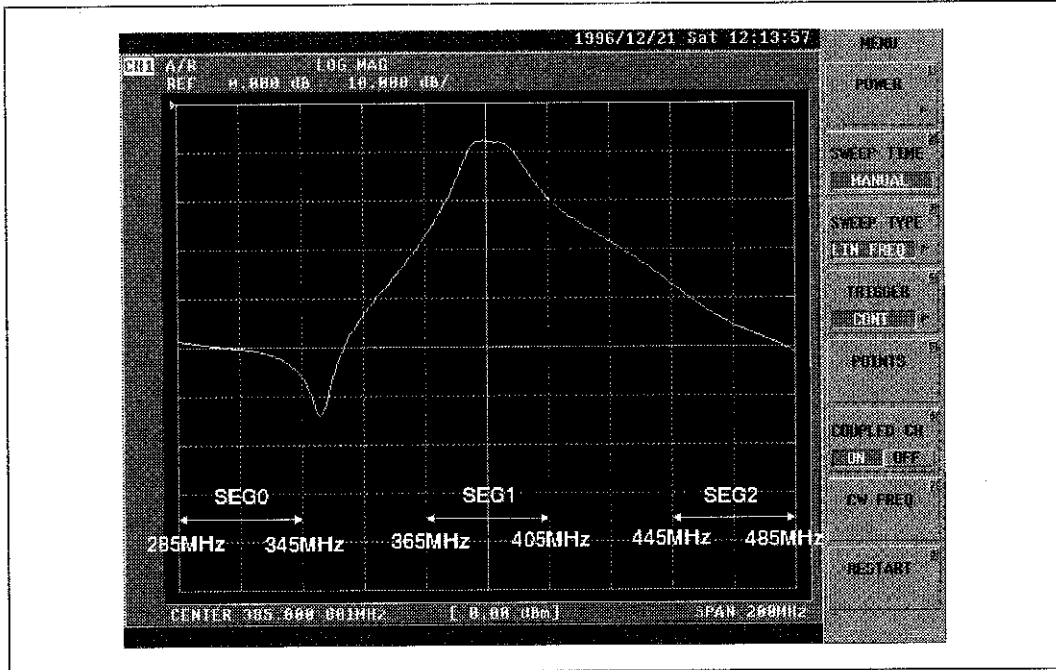
SEG	START	STOP	POWER	IF RBW	POINT
0	285MHz	345MHz	0.5dBm	1kHz	200
1	365MHz	405MHz	0.0dBm	10kHz	200
2	445MHz	485MHz	0.0dBm	10kHz	200

Each segment is edited as shown like the above-mentioned.
The result of execution is shown in the following.
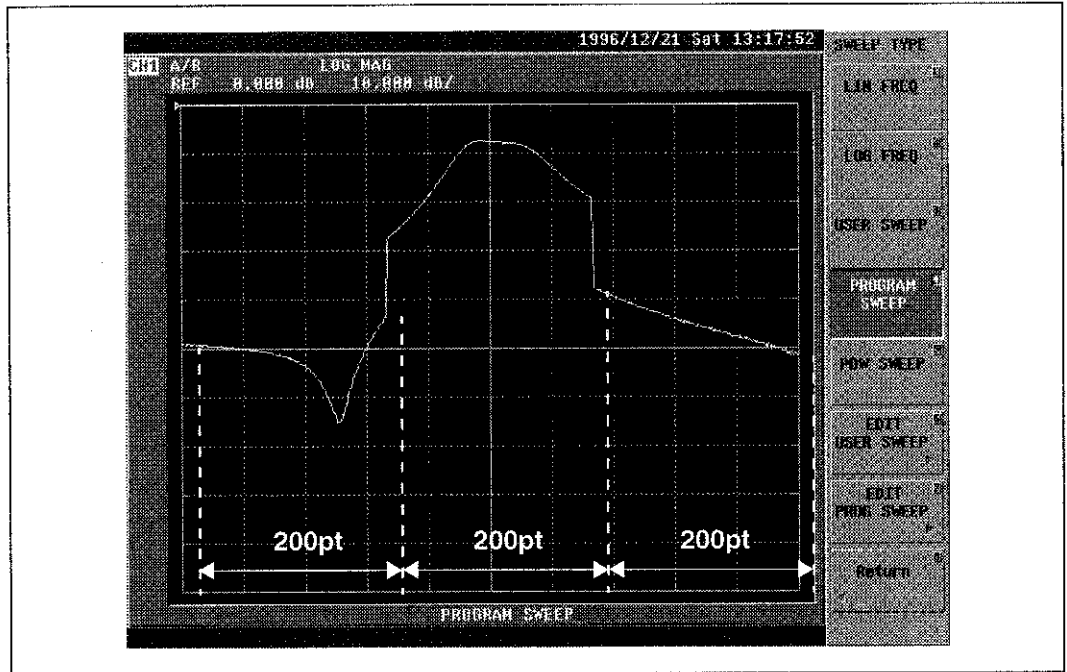
4.8   INSTRUMENT STATE Block
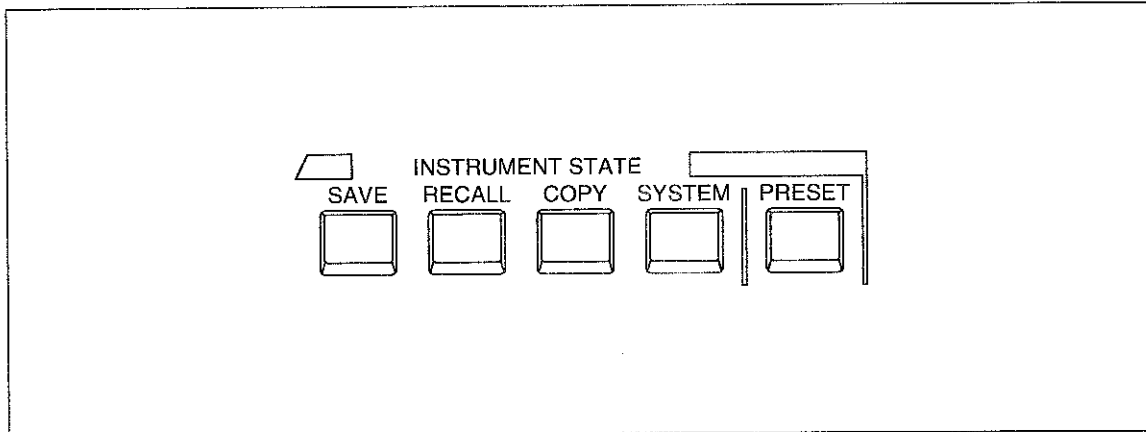
The INSTRUMENT STATE block is used to set the system control functions which have no concern with the measurement. The functions are provided such as a time/date set, limit-line test, save/recall, and hard copy.

[SAVE] : Calls the save menu to save such as a setting data and calibration data of the R3753H series. (See section 4.10.)

[RECALL] : Calls the recall menu to recall such as a setting data and calibration data of the R3753H series. (See section 4.10.)

[COPY] : Calls the copy menu to execute the hard copy of screen for a plotter/printer. (See section 4.11.)

[SYSTEM] : Calls the system menu to set such as an internal disk and date/time display. (See sub-section 4.8.1.)

[PRESET] : Initializes the settings of the R3753H series.

4.8.1 System Menu

Operation procedure

① Press the **[SYSTEM]** to call the system menu.

② System menu

{SYSTEM DRIVE} : Calls the system for selecting a drive to be used and format type of the disk. (See step ③.)

{SET CLOCK} : Calls the real-time clock menu for setting a date/time. (See step ⑥.)

{LIMIT MENU} : Calls the limit menu. (See sub-section 4.8.2.)

{FUNCTION} : Calls the function menu. (See step ⑦.)

{SET KEYBOARD 101/106} : Switches between the 101-type English keyboard and the 106-type Japanese keyboard.

{FIRMWARE REVISION} : Displays a version.

③ System drive menu

{DEFAULT DRIVE} : Calls the default drive menu. (See step ④.)
A drive selected on this menu is set as a current drive when power is turned on.

{FORMAT TYPE} : Calls the disk format menu for selecting a initialize format type. (See step ⑤.)

④ Default drive menu

{A:} : Select the drive A.
Floppy disk drive

{B:} : Select the drive B.
RAM disk drive (Without backup)

{C:} : Select the drive C.
RAM disk drive (With backup)

{D:} : Select the drive D.
ROM disk drive (Read only)

⑤ Disk format menu

{1.2MB 8 SECTORS} : Specifies the 1.2Mbyte 8 sectors per track when initializing a 2HD floppy disk. (Same as NEC PC98 series, 2HD floppy disk format)

{1.2MB 15 SECTORS} : Specifies the 1.2Mbyte 15 sectors per track when initializing a 2HD floppy disk. (Same as TOSHIBA J3100 series, 2HD floppy disk format)

{1.44MB 18 SECTORS} : Specifies the 1.44Mbyte 18 sectors per track when initializing a 2HD floppy disk. (Same as IBM PC series, 2HD floppy disk format)

⑥ Real-time clock menu

{YEAR} : Sets an year.

{MONTH} : Sets a month.

{DAY} : Sets a date.

{HOUR} : Sets an hour.

{MINUTE} : Sets a minute.

{SECOND} : Sets a second.

⑦ Function menu

{CDMA IF FILTER} : Calls the CDMA IF filter analysis menu. (See sub-section 4.8.3.)

4.8.2 Limit Function

This function defines the segment for the measurement data, sets the upper limit and the lower limit for the segment, and judges pass/fail comparing with the data.

The limit can be set in each channel (CH1 and CH2) independently.

How to output the pass/fail judgement is as follows.

* PASS or FAIL is displayed on the screen.
* The beep can be set. When the limit test passes or fails, the beep sounds.
* Displays the trace in the Fail section with red.
* In the case of fail, sets Limit Fail Summary-Bit of Questionable Status Register.
* In the case of fail, set LOW Status on the parallel I/O port of the rear panel.

* Limit Menu

The setting and the explanation

① Press **[SYSTEM]** to call the system menu.

② Press *{LIMIT MENU}* to call the limit menu. (See step ③.)

③ Limit menu

{LIMIT LINE ON/OFF} : Selects ON or OFF in the display of limit line.
When the limit line is set and this is in the state of ON, the limit line is displayed to compare the measurement data on the scale.
The displays of the limit line are different depending on DISPLAY FORMAT and LIMIT TYPE of the segment.
In the format of rectangular coordinate, ∧ and ∨ marks or lines (straight lines or horizontal lines) are put between break points of each segment.
In the polar coordinates, circle or straight line showing the angle is described.

{LIMIT TEST ON/OFF} : Selects ON/OFF of the limit test.
Under the limit test ON, the limit values and the data set at each measurement point are compared.
The limit test is performed when the data was updated during sweeping or after swept, or when the limit test was set to ON for the first time.

{BEEP [   ]}   : Calls the beep mode menu and sets the beep for the limit test. (See step ④.)

{LIMIT MODE MENU} : Calls the limit mode menu to control the limit test mode and select the limit type of polar coordinate format. (See step ⑤.)

{EDIT LIMIT LINE}   : Calls the edit limit menu (1 of 2) to display the list (Limit Table Window) of limit line segment in the lower half of the display to change the limit setting. (See step ⑥.)

{SELECT DATA 1ST/2ND}
                        : Switches the judgement parameter to operate.
2 parameters per channel can be specified for the judgement parameter.
In the display format of the rectangular coordinates, they corresponds to the first trace and the second trace.
In the display format of polar coordinates, they corresponds to the judgement parameters selected in LIMIT MODE MENU.

{LIMIT LINE OFFSETS}: Calls the offset limit menu to adjust the stimulus value and the response value of the limit. (See step ⑪.)

④ Beep mode menu

{OFF}   : Turns the beep off for the limit test.

{FAIL}   : Sounds the beep when the limit test detects Fail.

{PASS}   : Sounds the beep when the limit test detects Pass.

{BEEP TONE}   : Selects the beep tone from 0 to 7.
ZERO indicates the lowest tone and the beep tone is proportional to the numeric value of 0 to 7.

⑤ Limit mode menu

{1ST DATA ON/OFF} : Sets the first parameter ON/OFF.
Judgement of the first parameter limit is performed when the LIMIT TEST is set to ON and also the 1ST DATA is set to ON.

{2ND DATA ON/OFF} : Sets the second parameter ON/OFF.

Judgement of the second parameter limit is performed when the LIMIT TEST is set to ON and also the 2ND DATA is set to ON.

But the judgement is not performed if effective 2nd trace data does not exist in the state the display format of polar coordinates selected.

{MAG DATA LIN/LOG} : The limit test of Smith chart and polar display is judged with MAG and PHASE.

Select whether this judgement is performed with LIN (linear scale) or LOG (logarithmic scale) of MAG DATA. (Default setting is LOG.)

This soft menu is effective only when the format (See subsection 4.4.2.) is of Smith chart or polar display.

⑥ Edit limit menu (1 of 2)

{SEGMENT} : Selects a segment number to edit.

Up to 31 segments can be set with starting number 0.

Up to 7 segments can be displayed at a time and scroll-displayed on the Limit Table Window.

When no segment was set, 0 is displayed on the active area, and in other cases, the next number to the last specified segment is displayed.

But soon after the edit limit menu is called, the largest number of the set segments is displayed.

Also, the segment number is not updated after the last segment was set.

{SELECT DATA 1ST/2ND}

: Switches the judgement parameter to operate.

2 parameters per channel can be specified for the judgement parameter.

In the display format of the rectangular coordinates, they corresponds to the first trace and the second trace.

In the display format of the polar coordinates, they corresponds to the judgement parameters selected in LIMIT MODE MENU.

{EDIT SEGMENT} : Calls the edit segment menu to set and change the stimulus value and upper/lower limit value of the specified segment. (See step ⑧.)

If the Limit Table is empty, the segment with initial setting is displayed.

Also, if an empty segment exists between the largest current set segment and the specified segment, the specified segment number is ignored.

In this case, the operation is the same as ADD SEGMENT soft key operation.

{DELETE}   : Deletes the segment shown with cursor.
                             But if the specified segment is empty, this operation is
                             ignored.

{ADD SEGMENT}   : Calls the edit segment menu to add a new segment at the
                             end of the Limit Table. In the new segment, initial value is
                             inputted. The initial value is the setting of segment which
                             was selected at SEGMENT and shown with cursor.

{LIMIT TYPE}   : Calls the limit type menu to select current segment type
                             selected with cursor. (See step ⑩.)

{DONE}   : Sorts the input segments in ascending stimulus order and
                             returns to the limit menu.
                             The updated limit becomes effective by pressing DONE soft
                             key.

{More 1/2}   : Calls the edit limit menu (2 of 2). (See step ⑦.)

⑦ Edit limit menu (2 of 2)

{LIMIT LINE ON/OFF} : Selects ON or OFF of the limit line display.
                       When the limit line is set and this is in the state of ON, the
                       limit line is displayed to compare the measurement data on
                       the scale.
                       The displays of the limit line are different depending on
                       DISPLAY FORMAT and LIMIT TYPE of the segment.
                       In the format of rectangular coordinates, ∧ and ∨ marks or
                       lines (straight lines or horizontal lines) are put between the
                       break points of each segment.
                       In polar coordinate, circle or straight line showing the angle
                       is described.

{LIMIT TEST ON/OFF} : Selects ON/OFF of the limit test.
                       Under the limit line ON, the limit values and the data set at
                       each measurement point are compared.
                       The limit test is performed when the data was updated dur-
                       ing sweeping or after swept, or when the limit test was set
                       to ON for the first time.

{BEEP [   ]}   : Calls the beep mode menu to set the beep for the limit test.
                             (See step ④.)

{MAG DATA LIN/LOG} : The limit test of Smith chart and polar display is judged with
                      MAG and PHASE.
                      Select whether this judgement is performed with LIN (linear
                      scale) or LOG (logarithmic scale). (Default setting is with
                      LOG.)
                      This soft menu is effective only when the format (See sub-
                      section 4.4.2.) is of Smith chart or polar display.

{LIMIT MODE MENU} : Calls the limit mode menu to control the limit test mode and
                     select the limit type of polar coordinates format. (See step
                     ⑤.)

{LIMIT LINE OFFSETS}

        : Calls the offset limit menu to adjust the stimulus value and the response value of the limit. (See step ⑪.)

{CLEAR LIST}   : Calls the clear limit menu to clear all the segments in the Limit Table. (See step ⑨.)

⑧ Edit segment menu

{STIMULUS VALUE} : Sets stimulus value of the segment with ENTRY block.

{MARKER TO STIMULUS}

        : Sets stimulus value of the segment to the active marker position.
         Turning the data knob moves the active marker right and left.

{UPPER LIMIT}   : Sets the upper limit value of the segment.
         It is necessary to set both values, upper limit and lower limit. If the upper limit value is not required, set an extreme large value for the upper limit value.
         Pressing UPPER LIMIT or LOWER LIMIT soft key changes limit values displayed on the screen into upper/lower expression, even if they are set with middle/delta values.
         If a value smaller than the lower limit is input for the upper limit value or the reverse, the same values are set for both the limit values.

{LOWER LIMIT}   : Sets the lower limit value of the segment.
         It is necessary to set both values, upper limit and lower limit. If the lower limit value is not required, set an extreme small value for the lower limit value.

{DELTA LIMIT}   : Sets the limit width of the segment.
         The limit range is expressed with the center value set by {MIDDLE VALUE}.
         For example, to set the pass area within -5dB ± 3dB, enter -5dB as the center value and 6dB as the delta value.
         Pressing MIDDLE LIMIT or DELTA LIMIT soft key changes limit values displayed on the screen into upper/lower expression, even if they are set with delta/middle values.

{MIDDLE VALUE} : Sets the middle value of DELTA LIMIT.

{MARKER TO MIDDLE}

        : Sets the middle value to the active marker position.

⑨ Clear limit menu

{CLEAR LIST YES} : Clears the Limit Table and returns to the edit limit menu.

{CLEAR LIST NO}   : Returns to the edit limit menu without clearing the Limit Table.

⑩ Limit type menu

{SLOPING LINE}   : Connects to the limit value of the next segment with a sloped line.
For the final segment, horizontal lines are drawn to the largest point of stimulus.
For the display format of polar coordinates, the limit value is fixed up to the next segment break point.
In this case, the result is the same as flat line.
The slope line segment is displayed with SLIN in the Limit Table.

{FLAT LINE}   : Horizontal lines are drawn up to the next segment break point.
The limit value is fixed up to the next segment if the next segment has different limit value.
For the final segment, horizontal lines are drawn to the largest point of stimulus.
Flat line segment is displayed with FLIN in the Limit Table.

{SINGLE POINT}   : The judgement is performed at a single stimulus point.
The upper limit is displayed with $\vee$ on the display, and the lower limit is displayed with $\wedge$.
The single point segment can be used for the terminal of flat line or sloping line.
Single point segment is displayed with SPO in the Limit Table.

{LIMIT COLOR}   : Sets line color.
Color-to-setup number relationship is as follows.
2 ; Red
3 ; Purple
4 ; Green
5 ; Blue
6 ; Yellow
7 ; White

{WAVE COLOR}   : Sets trace data color in Pass section.
The relationship of color-to-setup number is the same as above *{LIMIT COLOR}*.

⑪ Offset limit menu

{STIMULUS OFFSET} : Adds/subtracts offset value to/from stimulus value of all segments.
Input offset value by using ENTRY block.

{AMPLITUDE OFFSET}
    : Adds/subtracts offset value to/from amplitude value of all segments.
Input offset value by using ENTRY block.

{MARKER TO AMP. OFS}
    : Sets offset value of amplitude value by using the active marker.

4.8.3 CDMA IF Filter Analysis Function

This function is suitable for measuring the characteristics of CDMA IF filter.

(1) Gate function of the CDMA IF filter

Obtains the frequency characteristics specifying the defined range of the filter delay time.

(2) Magnitude analysis function of the CDMA IF filter

The items to be analyzed are as follows:

- Center frequency: The center frequency between the two frequencies from which each magnitude is attenuated by the specified value from the peak value.

- Pass bandwidth :   The frequency band between the two frequencies from which each magnitude is attenuated by the specified value from the peak value.

- Insertion loss   :   The peak value

- Ripple within the pass band :
                      The difference between the peak and lowest local minimum values.

- Guaranteed attenuation :
                      Lower value between the left and right values obtained by calculating the difference between the insertion loss and the value whose frequency is obtained either by adding the specified frequency to the center frequency (right side) or by subtracting the specified frequency from the center frequency (left side).

(3) Phase analysis function of the CDMA IF filter

Calculates the phase linearity of the IF filter.

Operation procedure:

① Press the **[SYSTEM]**, then press the {FUNCTION} to call the function menu.

Press the {CDMA IF FILTER} to call the CDMA IF filter analysis menu.

② CDMA IF filter analysis menu

Each channel can be set individually.

{CDMA IF GATE [ ]}   : Calls the CDMA IF filter analysis menu (see ③).

{CDMA FILTER ANALYSIS [ ]}: Calls the CDMA IF filter magnitude analysis menu (see ⑤).

{CDMA PHASE LINEARITY [ ]}: Turns the CDMA phase linearity analysis ON or OFF. This function calculates phase linearity in compliance with the standards of the CDMA IF filter. The CDMA phase linearity analysis cannot be performed at the same time as the phase linearity analysis.

{PHASE LINEARITY [ ]}   : Calls the Phase linearity analysis menu (see ⑥).

③ CDMA IF filter gate menu

Each channel can be set individually.

{CDMA IF GATE ON/OFF}	: Toggles the CDMA IF filter gate function ON or OFF. The CDMA IF GATE cannot be ON together with the gate function of the time domain transformation function.
{CDMA GATE START [ ]}	: Sets the start time of the CDMA IF filter gate.
{CDMA GATE STOP [ ]}	: Sets the stop time of the CDMA IF filter gate.
{GATE SHAPE [ ]}	: Calls the CDMA IF filter gate shape menu (see ④).

④ CDMA IF filter gate shape menu

Each channel can be set individually.

{MAXIMUM}	: Specifies the 4-term Blackman-Harris type. The maximum attenuation can be obtained.
{WIDE}	: Specifies the 3-term Blackman-Harris type.
{NORMAL}	: Specifies the 2-term Hamming type.
{MINIMUM}	: Specifies the rectangular type.
{CDMA IF}	: Specifies a type which is optimized for the CDMA IF filter.

⑤ CDMA IF filter magnitude menu

{CDMA FILTER ANALYSIS [ ]}: Turns the magnitude analysis function ON or OFF. When this function is turned ON, the following analysis results are displayed:

Note: This function cannot be used with the filter analysis of marker analysis function or the statistical analysis function.

C. F	: Displays the center frequency between the pass bandwidth specified by the loss from the peak value.
B. W	: Displays the pass bandwidth.
I. L	: Displays the insertion loss (the peak value).
RPL	: The difference between the peak and lowest local minimum values.
ATTN1	: Displays the guaranteed attenuation. The range calculated by comparing the points where the addition to and the subtraction from the CF of ATTN FREQ1 intersects the trace. These points are then used to calculate range between them and the I.L. The shorter of these two ranges is designated as ATTN1.
ATTN2	: Displays the guaranteed attenuation. The range calculated by comparing the points where the addition to and the subtraction from the CF of ATTN FREQ2 intersects the trace. These points are then used to calculate range between them and the I.L. The shorter of these two ranges is designated as ATTN2.

P. L : When the phase analysis function (CDMA IF filter analysis) is ON, the phase linearity is calculated and the result is displayed.

{WIDTH VALUE} : Specifies the bandwidth to be searched using the loss (X dB) from the peak value.

{ATTN FREQ1} : Specifies the first frequency for the guaranteed attenuation measurement. The guaranteed attenuation is not measured when this frequency is set to 0 (zero) (as the guaranteed attenuation measurement is set to OFF).

{ATTN FREQ2} : Specifies the second frequency for the guaranteed attenuation measurement. The guaranteed attenuation is not measured when this frequency is set to 0 (zero) (as the guaranteed attenuation measurement is set to OFF)

⑥ Phase linearity analysis menu

{PHASE LINEARITY ON/OFF}: Turns the Phase linearity analysis ON or OFF.

Note: **The phase linearity analysis cannot be performed at the same time as the CDMA phase linearity analysis.**

{PARTIAL ON/OFF} : Turns the partial definition analysis ON or OFF. When this function is set to ON, the phase linearity is analyzed for the section specified by the {SET RANGE} (which is in the partial menu under the marker search menu). When set to OFF, the phase linearity is analyzed for the full measurement range.

<Example of CDMA IF Filter Analysis>
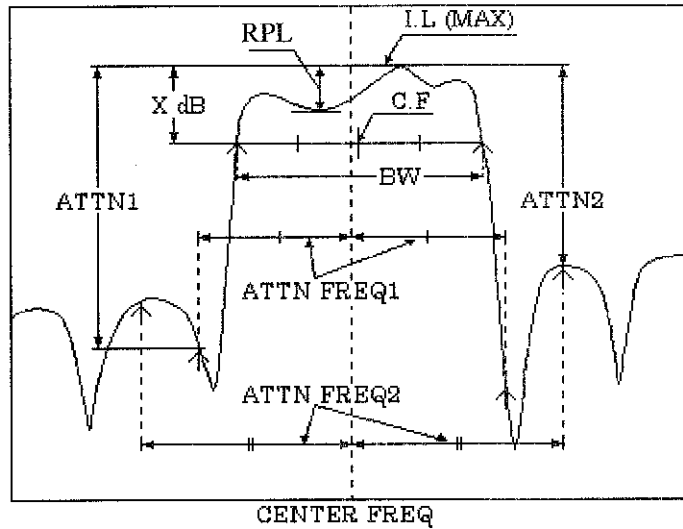
An example of CDMA IF Filter Analysis is shown above. The C.F, B.W, I.L and RPL are obtained using the loss (X dB) specified by {WIDTH VALUE}. When one of these has been calculated, the pass band is displayed with the ↑ marker.

In addition, the ATTN1 and 2 values are obtained as follows: After setting the C.F the user sets the ATTN FREQ1. The analyzer then subtracts the ATTN FREQ1 from the C.F and calculates the point where this range intersects the trace. It then calculates the point where the addition of the ATTN FREQ1 to the C.F intersects the trace, then calculates the range from these points to the I.L. Finally, these two points are compared, and the shorter one is designated as ATTN1. ATTN2 is calculated in the same way and both are indicated by ↑ markers on the display.

4.9 GPIB Block
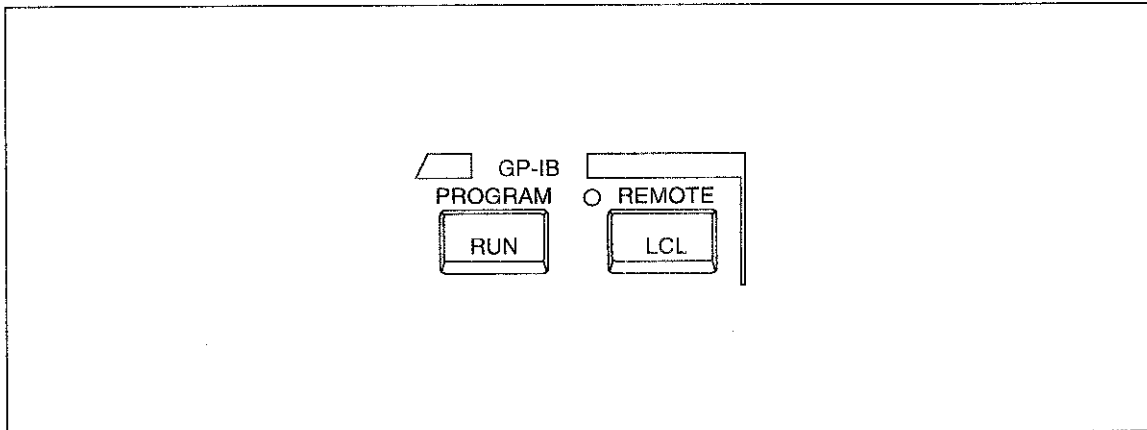
The GPIB block is used to set the BASIC controller function, GPIB bus and GPIB address. For procedure how to create a program, refer to the programming manual of the separate volume.

PROGRAM
  [RUN]   : Call the BASIC controller menu. (See sub-section 4.9.1.)

REMOTE
  [LCL]   : Calls the GPIB menu. (See sub-section 4.9.2.)
           Moreover, when R3753H is in the remote state by GPIB, it return back to the local state by pressing the key.

> *Note: The operation key of all the panel key becomes disable in the remote state except this key.*

4.9.1 Controller Menu

Operation procedure

① Press the **[RUN]** to call the controller menu.

② Controller menu

{RUN}	: Starts a program.
{LOAD MENU}	: Displays a file list and calls the load menu. (See step ③.)
{LIST}	: Displays a program list.
{CLS}	: Clears the text display on the screen.
{CONT}	: Restarts a program from the next line immediately after program pauses.
{STOP}	: Stops a program.

③ Load menu

{LOAD}	: Loads the file specified by the cursor. After loading, the screen gets back to the controller menu. (See step ②.)
{CURSOR ↑ }	: Shifts up the cursor used for specifying a file.
{CURSOR ↓ }	: Shifts down the cursor used for specifying a file.
{DRIVE CHANGE}	: Calls the drive menu to change the current drive. (See step ④.)

④ Drive menu

{A:}	: Select the drive A. Floppy disk drive
{B:}	: Select the drive B. RAM disk drive (without backup)
{C:}	: Select the drive C. RAM disk drive (with backup)
{D:}	: Select the drive D. ROM disk drive (Read only)

4.9.2 GPIB Menu

Operation procedure

① Press the **[LCL]** to call the GPIB menu.

② GPIB menu

{SYSTEM CONTROLLER}	: Sets the R3753H series to the system controller.
{TALKER LISTENER}	: Sets the R3753H series to the talker/listener.
{SET ADDRESSES}	: Calls the address menu used for setting the GPIB address. (See step ③.)

③ Address menu

{ADDRESS R3753H}	: Sets the GPIB address of the R3753H series.
{ADDRESS PLOTTER}	: Sets the GPIB address of the plotter.
{ADDRESS PRINTER}	: Sets the GPIB address of the printer.

4.10 Save/Recall

By using an internal disk, the R3753H series setting and the data saving/recalling (store/read) can be performed.
The following two methods for saving data are provided in accordance with informations to be saved and an internal disk.

- Save register: Saves the R3753H series setting and calibration data into RAM disk (Drive C).

- Store file : Store the R3753H series setting, calibration data and measurement data on a floppy disk.
  All informations   ; Drive A (floppy disk)

4.10.1 Selection of Save Type

Operation procedure

① Press the **[SAVE]** to call the save menu.

② Save menu

{SAVE REGISTER}	: Calls the save register menu. (See sub-section 4.10.2.)
{CLEAR REGISTER}	: Calls the clear register menu used for clearing the stored save register. (See sub-section 4.10.6.)
{STORE FILE}	: Calls the store file menu used for storing files or setting file names. (See sub-section 4.10.3.) The file list (Figure 4-2) will be displayed on the screen.
{PURGE FILE}	: Calls the purge file menu used for clearing the stored file. (See sub-section 4.10.7.) The file list (Figure 4-2) will be displayed on the screen.
{FORMAT DISK}	: Initializes a floppy disk inserted in drive A.

Note: *Before STORE FILE or PURGE FILE is executed, be sure to insert a formatted floppy disk to the drive.*

Drive name
Volume label
File name for saving
Stored file list
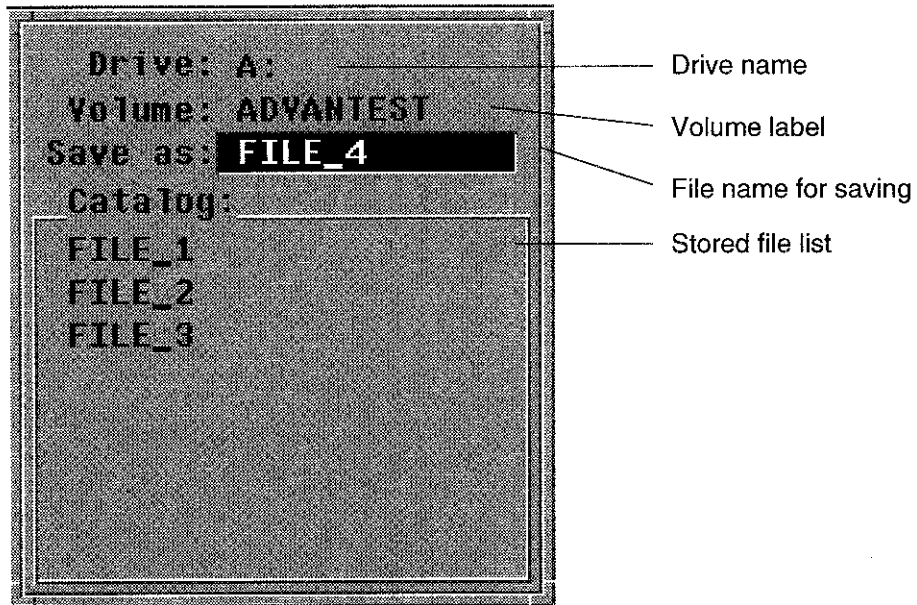
Figure 4-8 File List Display

4.10.2 Executing the Save Register Function

Using the save register function, a maximum of 20 sets of measurement conditions and measurement data can be saved in the built-in memory in this network analyzer (each save register function saves a set of measurement conditions and measurement data).

The data is saved as a file in the built-in memory whose capacity is 1880 kB. Therefore, the total data cannot exceed this limit (this memory is shared with the C drive). If the total data exceeds its capacity, the data will not be saved (even if there is a register whose data has not yet been saved). In this case, the user must first erase the data already saved, then try to save them again.

Note: *When storing data into the saved register, execute the save register operation after erasing data on the clear register menu. (See sub-section 4.10.7.)*

Operation procedure

① Press the **[SAVE]** to call the save menu.

② Press the *{SAVE REGISTER}* to call the save register menu.

③ Save register menu

• Save register menu (1 of 4)

{SAVE REG-1}	: Saves the settings, calibration data and memory trace data into the register 1.
{SAVE REG-2}	: Saves the settings, calibration data and memory trace data into the register 2.

{SAVE REG-3}   : Saves the settings, calibration data and memory trace data into the register 3.

{SAVE REG-4}   : Saves the settings, calibration data and memory trace data into the register 4.

{SAVE REG-5}   : Saves the settings, calibration data and memory trace data into the register 5.

{RENAME REG}   : Calls the name editing menu used to define a register name. (See sub-section 4.10.4.)

• Save register menu (2 of 4)

{SAVE REG-6}   : Saves the settings, calibration data and memory trace data into the register 6.

{SAVE REG-7}   : Saves the settings, calibration data and memory trace data into the register 7.

{SAVE REG-8}   : Saves the settings, calibration data and memory trace data into the register 8.

{SAVE REG-9}   : Saves the settings, calibration data and memory trace data into the register 9.

{SAVE REG-10}   : Saves the settings, calibration data and memory trace data into the register 10.

{RENAME REG}   : Calls the name editing menu used to define a register name. (See sub-section 4.10.4.)

• Save register menu (3 of 4)

{SAVE REG-11}   : Saves the settings, calibration data and memory trace data into the register 11.

{SAVE REG-12}   : Saves the settings, calibration data and memory trace data into the register 12.

{SAVE REG-13}   : Saves the settings, calibration data and memory trace data into the register 13.

{SAVE REG-14}   : Saves the settings, calibration data and memory trace data into the register 14.

{SAVE REG-15}   : Saves the settings, calibration data and memory trace data into the register 15.

{RENAME REG}   : Calls the name editing menu used to define a register name. (See sub-section 4.10.4.)

• Save register menu (4 of 4)

{SAVE REG-16}   : Saves the settings, calibration data and memory trace data into the register 16.

{SAVE REG-17}   : Saves the settings, calibration data and memory trace data into the register 17.

{SAVE REG-18}   : Saves the settings, calibration data and memory trace data into the register 18.

{SAVE REG-19}   : Saves the settings, calibration data and memory trace data into the register 19.

{SAVE REG-20}   : Saves the settings, calibration data and memory trace data into the register 20.

{RENAME REG}   : Calls the name editing menu used to define a register name. (See sub-section 4.10.4.)

4.10.3 Executing Store File

Operation procedure

① Press the [SAVE] to call the save menu.

② Press the {STORE FILE} to call the store file menu.

③ Store file menu

{STORE}   : Stores the setting data and calibration data as a file name for storing.

{ROLL ↑}   : ⎤
{ROLL ↓}   : ⎦ Shifts the cursor up/down of the saved file list.

{DEFINE STORE}   : Calls the file data menu used to select informations to be stored. (See step ④.)

{EDIT NAME}   : Calls the character editing menu to define the file name for storing.

{NAME ↑}   : ⎤
{NAME ↓}   : ⎦ Shifts the cursor up/down of the flie name for storing.

{CANCEL}   : Cancels the file store.

④ File data menu (When ON is selected, the data is stored.)

{STATE ON/OFF}   : Store setting condition.

{RAW ARRAY ON/OFF}: Store the raw data before formatting.

{CORR COEF ON/OFF} : Store the calibration data.
When the calibration is performed, ON is automatically selected.

{DATA ARRAY ON/OFF}
    : Stores the formatted data.

{MEM ARRAY ON/OFF}: Stores the memory data.

4.10.4 Setting Register Name

The register name is used so that it can be searched easily. When recalling, the register is called as the named resister set.

Operation procedure

① Press the **[SAVE]** to call the save menu.

② Press the *{SAVE REGISTER}* to call the save register menu.

③ Press the *{RENAME REG}* to display the label window and calls the name editing menu.

④ Name editing menu

{EDIT NAME}	:	Displays the label window (Figure 4-9) and calls the character editing menu. (See step ⑤.)
{CURSOR ↑}	: ⎤	Shifts the cursor up/down of the register list (Figure 4-10)
{CURSOR ↓}	: ⎦	The register name of the cursor position can be edited.

⑤ Character editing menu

{DONE}	:	Completes editing.
{CURSOR →}	:	Shifts the label cursor right.
{CURSOR ←}	:	Shifts the label cursor left.
{BACKSPACE}	:	Executes the back space operation.
{DELETE CHAR}	:	Deletes the character of the cursor position.
{CLEAR NAME}	:	Clears all the characters (names).
{CANCEL}	:	Cancels editing.
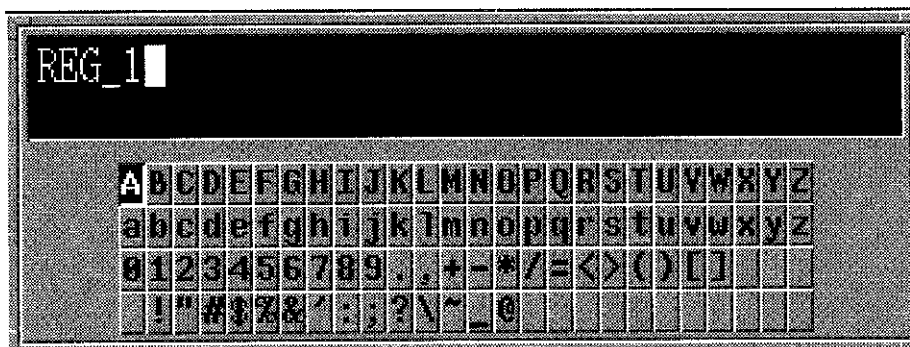
Figure 4-9 Label Window Display
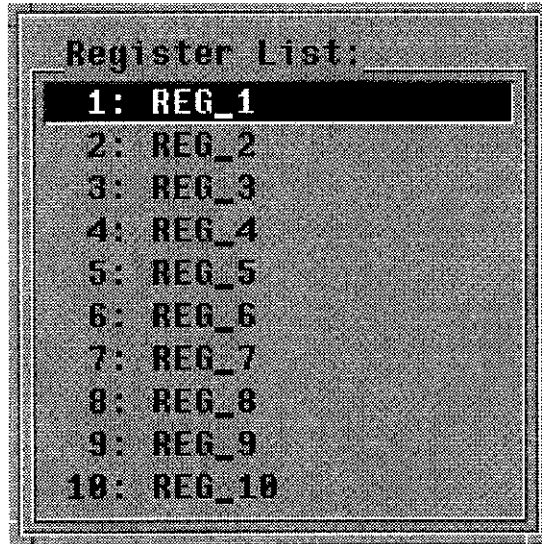
Figure 4-10 Register List Display

4.10.5 Setting File Name

The file name is used so that it can be searched easily. When recalling, the file is called as the named file set.

Operation procedure

① Press the **[SAVE]** to call the save menu.

② Press the *{STORE FILE}* to call the store file menu.

③ Press the *{NAME ↑}, {NAME ↓}* to select a desired file name.

④ Press the *{EDIT NAME}* to display the label window and calls the character editing menu.

⑤ Character menu

{DONE}	:	Completes editing.
{CURSOR →}	:	Shifts the label cursor right.
{CURSOR ←}	:	Shifts the label cursor left.
{BACKSPACE}	:	Executes the back space operation.
{DELETE CHAR}	:	Deletes the character of the cursor position.
{CLEAR NAME}	:	Clears all the characters (names).
{CANCEL}	:	Cancels editing.

4.10.6 Clearing Saved Register

Clears registers. When the register name is defined, the defined name is displayed on the menu.

Operation procedure

① Press the **[SAVE]** to call the save menu.

② Press the *{CLEAR REGISTER}* to call the clear register menu.

③ Clear register menu

- Clear register menu (1 of 4)

{CLEAR REG-1}	:	Clears the register 1.
{CLEAR REG-2}	:	Clears the register 2.
{CLEAR REG-3}	:	Clears the register 3.
{CLEAR REG-4}	:	Clears the register 4.
{CLEAR REG-5}	:	Clears the register 5.

- Clear register menu (2 of 4)

{CLEAR REG-6}	:	Clears the register 6.
{CLEAR REG-7}	:	Clears the register 7.
{CLEAR REG-8}	:	Clears the register 8.
{CLEAR REG-9}	:	Clears the register 9.
{CLEAR REG-10}	:	Clears the register 10.

- Clear register menu (3 of 4)

{CLEAR REG-11}	:	Clears the register 11.
{CLEAR REG-12}	:	Clears the register 12.
{CLEAR REG-13}	:	Clears the register 13.
{CLEAR REG-14}	:	Clears the register 14.
{CLEAR REG-15}	:	Clears the register 15.

- Clear register menu (4 of 4)

{CLEAR REG-16}	:	Clears the register 16.
{CLEAR REG-17}	:	Clears the register 17.
{CLEAR REG-18}	:	Clears the register 18.
{CLEAR REG-19}	:	Clears the register 19.
{CLEAR REG-20}	:	Clears the register 20.

4.10.7 Purging Stored File

Purges files. When the file name is defined, the defined name is displayed on the menu.

Operation procedure

① Press the **[SAVE]** to call the save menu.

② Press the {PURGE FILE} to call the purge file menu.

③ Purges files menu

{PURGE}	:	Purges the file.
{CURSOR ↑}	:	⎤ Shifts the cursor up/down of file list.
{CURSOR ↓}	:	⎦ The file of the cursor position can be purged.

4.10.8 Executing Recall

Recalls register or file. When the register/file name is defined, the defined name is displayed on the menu.

    Operation procedure

    ① Press the **[RECALL]** to call the recall menu.

    ② Recall menu

        • Recall menu (1 of 4)

            {RECALL REG-1}   :   Recalls the setting data, calibration data and memory trace data saved in the register 1.

            {RECALL REG-2}   :   Recalls the setting data, calibration data and memory trace data saved in the register 2.

            {RECALL REG-3}   :   Recalls the setting data, calibration data and memory trace data saved in the register 3.

            {RECALL REG-4}   :   Recalls the setting data, calibration data and memory trace data saved in the register 4.

            {RECALL REG-5}   :   Recalls the setting data, calibration data and memory trace data saved in the register 5.

            {RECALL POWER OFF}

                       :   The settings are stored automatically when the power of the R3753H series is turned off. When the power is turned on again, the data is set to the initial state. By pressing this key, the stored data is read again.

            {LOAD FILE}   :   Calls the load file menu used to load the all informations stored in the file. (See step ③ or Figure 4-8.)

        • Recall menu (2 of 4)

            {RECALL REG-6}   :   Recalls the setting data, calibration data and memory trace data saved in the register 6.

            {RECALL REG-7}   :   Recalls the setting data, calibration data and memory trace data saved in the register 7.

            {RECALL REG-8}   :   Recalls the setting data, calibration data and memory trace data saved in the register 8.

            {RECALL REG-9}   :   Recalls the setting data, calibration data and memory trace data saved in the register 9.

            {RECALL REG-10}   :   Recalls the setting data, calibration data and memory trace data saved in the register 10.

            {RECALL POWER OFF}

                       :   The settings are stored automatically when the power is turned off. When the power is turned on again, the data is set to the initial state. By pressing this key, the stored data is read again.

{LOAD FILE}   :   Calls the load file menu used to load the all informations stored in the file. (See step ③ or Figure 4-8.)

- Recall menu (3 of 4)

  {RECALL REG-11}   :   Recalls the setting data, calibration data and memory trace data saved in the register 11.

  {RECALL REG-12}   :   Recalls the setting data, calibration data and memory trace data saved in the register 12.

  {RECALL REG-13}   :   Recalls the setting data, calibration data and memory trace data saved in the register 13.

  {RECALL REG-14}   :   Recalls the setting data, calibration data and memory trace data saved in the register 14.

  {RECALL REG-15}   :   Recalls the setting data, calibration data and memory trace data saved in the register 15.

  {RECALL POWER OFF}

           :   The settings are stored automatically when the power is turned off. When the power is turned on again, the data is set to the initial state. By pressing this key, the stored data is read again.

  {LOAD FILE}   :   Calls the load file menu used to load the all informations stored in the file. (See step ③ or Figure 4-8.)

- Recall menu (4 of 4)

  {RECALL REG-16}   :   Recalls the setting data, calibration data and memory trace data saved in the register 16.

  {RECALL REG-17}   :   Recalls the setting data, calibration data and memory trace data saved in the register 17.

  {RECALL REG-18}   :   Recalls the setting data, calibration data and memory trace data saved in the register 18.

  {RECALL REG-19}   :   Recalls the setting data, calibration data and memory trace data saved in the register 19.

  {RECALL REG-20}   :   Recalls the setting data, calibration data and memory trace data saved in the register 20.

  {RECALL POWER OFF}

           :   The settings are stored automatically when the power is turned off. When the power is turned on again, the data is set to the initial state. By pressing this key, the stored data is read again.

  {LOAD FILE}   :   Calls the load file menu used to load the all informations stored in the file. (See step ③ or Figure 4-8.)

Note: ***Before LOAD FILE is executed, be sure to insert a formatted floppy disk to the drive.***

③ Load file menu

{LOAD}	:	Loads all informations stored in the file.
{CURSOR ↑}	: ⎤	Shifts the cursor up/down of file list.
{CURSOR ↓}	: ⎦	The file of the cursor position can be recalled.
{Return}	:	Makes the control return to the recall menu.

Note: **If a file stored with *RAW ARRAY* or *DATA ARRAY ON* is loaded, the sweep becomes *HOLD* without reservation.**

4.11 Hard Copy

Data output can be performed directly to peripheral devices such as a graphic printer and a plotter. GPIB is used for plotter, and GPIB or RS-232 is used for printer. The bitmap file can be output to the floppy disk. Set the R3753H series as a system controller on the GPIB block, furthermore, specify the GPIB address of the printer or the plotter. (See section 4.9.)

Operation procedure

① Press the **[COPY]** to call the save menu.

② Copy menu

{PRINT}	:	Executes hard copy for printer.
{PLOT}	:	Executes hard copy for plotter. (Note)
{ABORT}	:	Aborts the hard copy operation. Continued operation cannot be performed.
{SELECT QUADRANT}	:	Calls the plot scale menu used to select the size and location of the hard copy. (See sub-section 4.11.1.)
{DEFINE PLOT}	:	Calls the plot data menu used to define the items for hard copy operation. (See sub-section 4.11.2.)
{CONFIGURE PLOT}	:	Calls the plotter pen menu used to select pen number and data-line type to be used. (See sub-section 4.11.3)
{PRINT/PLOT SETUP}	:	Calls the setup menu used to set up the setting of printer or plotter. (See sub-section 4.11.4.)

Note: *In using the plotter of HP company, the indication of the error such as error lamp lighting will be occasionally done.*

4.11.1 Setting Plot Scale

Specifies the output position and the size for plotting on A4 size paper.

Operation procedure

① Press the **[COPY]** to call the copy menu.

② Press the *{SELECT QUADRANT}* to call the plot scale menu.

③ Plot scale menu

{FULL PAGE}	:	Selects the plot scale to output one data on A4 size paper with full page.
{LEFT}	:	Selects the plot scale to output data to the left position by dividing A4 size paper into two blocks.
{RIGHT}	:	Selects the plot scale to output data to the right position by dividing A4 size paper into two blocks.

{LEFT UPPER}   : Selects the plot scale to output data to the upper left position by dividing A4 size paper into four blocks.

{LEFT LOWER}   : Selects the plot scale to output data to the lower left position by dividing A4 size paper into four blocks.

{RIGHT UPPER}   : Selects the plot scale to output data to the upper right position by dividing A4 size paper into four blocks.

{RIGHT LOWER}   : Selects the plot scale to output data to the lower right position by dividing A4 size paper into four blocks.

(Hard copy example)

Full page	Divided into 2 blocks	Divided into 4 blocks
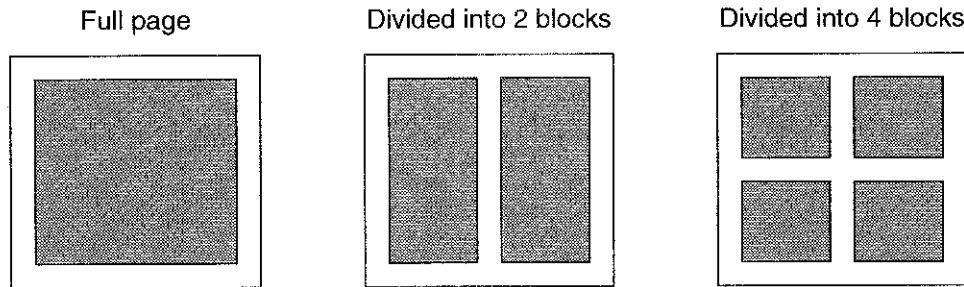
4.11.2 Selecting Plot Data

Selects items to be hard-copied.

Since the items to be set in this menu are independent to the channels, they are set to the active channel only.

Operation procedure

① Press the **[COPY]** to call the copy menu.

② Press the {DEFINE PLOT} to call the plot data menu.

③ Plot data menu

{PLOT DATA ON/OFF}   : Sets ON/OFF of the measurement data output.

{PLOT MEMORY ON/OFF}
               : Sets ON/OFF of the memory data output.

{PLOT GRATICULE ON/OFF}
               : Sets ON/OFF of the coordinate output.

{PLOT TEXT ON/OFF}   : Sets ON/OFF of the text data output.

{PLOT MARKER ON/OFF}
               : Sets ON/OFF of the marker data output.

{PLOT REF LINE ON/OFF}
               : Sets ON/OFF of the reference line output.

Note: *When both the text data output and the marker data output are set to ON, the output of the marker list and filter analysis result is also set.*

4.11.3 Specifying Pen

Selects the pen number and line type to be used.

Operation procedure

① Press the **[COPY]** to call the copy menu.

② Press the *{CONFIGURE PLOT}* to call the plotter pen menu.

③ Plotter pen menu

{PEN NUM DATA} : Specifies the pen number of the measurement data.

{PEN NUM MEMORY} : Specifies the pen number of the memory data.

{PEN NUM GRATICULE} : Specifies are pen number of the coordinate data.

{PEN NUM TEXT} : Specifies the pen number of the text data.

{PEN NUM MARKER} : Specifies the pen number of the marker data.

{LINE TYPE DATA} : Selects the line type of the measurement data.

{LINE TYPE MEMORY} : Selects the line type of the memory data.

- The selection of the line type is as follows.
  0 : Solid line
  1 : Dotted line
  2 : Dashed line
  3 : Chain line

4.11.4 Plotter Setup

Selects the pen number and line type to be used.

Operation procedure

① Press the **[COPY]** to call the copy menu.

② Press the *{PRINT/PLOT SETUPS}* to call the setup menu.

③ Setup menu

{PRINTER} : See sub-section 4.11.5.

{PRINT SPEED FAST/SLOW}
 : See sub-section 4.11.5.

{PLOT LABEL ON/OFF} : Selects ON/OFF of the label and real-time clock output.

{PLOT P. TXT ON/OFF} : Sets ON/OFF of output of the characters which have been written on the screen using the controller function.

{DEFAULT SETUPS} : Returns all the copy menu to the initial settings.

{PLOTTER HP/AT} : Selects the HP or AT plotter.

Note: *In using the plotter of HP company, the indication of the error such as error lamp lighting will be occasionally done.*

④ Setting R9833 DIP switches

The DIP switches should be set to the standard values as shown in Figure 4-11. These switched are used to set the initial conditions at powering on and the interface conditions.
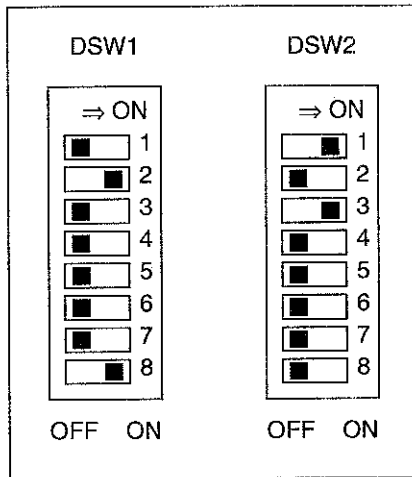
DSW1 : HP mode when SW No. 8 is ON. FP-GL mode when SW No. 8 is OFF. (In AT mode, it is required to set OFF SW No. 8 and ON SW No. 4.) (See Table 4-1.)

DSW2 : Sets the plotter address to 5. (See Table 4-2.)

Figure 4-11 Setting DIP Switches

Table 4-1 DSW1 Function

SW No.	Functions (ON = 1)			Standards
1 to 3	Paper size setting (SW3 = 0)		(SW3 = 1)	SW1 = 0 SW2 = 1 SW3 = 0 A4 long side way

SW1	SW2	ISO/JIS	ANSI
0	0	A3 maximum width and depth	B maximum width and depth
1	0	A3 long vertical way direction filling up	B long vertical way direction filling up
0	1	A4 long side way direction filling up	A long side way direction filling up
1	1	A4 long vertical way direction filling up	A long vertical way direction filling up

SW No.	Functions (ON = 1)	Standards
4	Setting rotational coordinates 1 : rotational coordinates ON	0
5	Selection of unit length for step number 0 : normal 1 : switch	0
6	Paper detection disable 0 : with paper detection function 1 : not with paper detection function	0
7	Switching input buffer capacity 1 : maximum (12KB) 0 : 1KB	0
8	FP-GL-I/FP-GL-II select 1 : FP-GL-I 0 : FP-GL-II	1

Table 4-2 DSW2 Function

SW No.	Functions (ON = 1)	Standards
1 to 5	Setting plotter address: defines the device address with all bits. Bit structure | SW5 | SW4 | SW3 | SW2 | SW1 | Address 31 is for listen only mode.	SW1 = 1 SW2 = 1 SW3 = 1 SW4 = 1 SW5 = 1
6	Selection of EOI signal control 0 : EOI disabled 1 : EOI enabled However, available only when using FP-GL-II. Not defined for FP-GL-I.	0
7	Not defined	0
8	Selection of reduced drawing mode (only when using FP-GL-II). 1 : Selects reduced drawing mode (0.9 time)	0

If EOI signal is set to ON (enable) and EOI terminal receives "L" when using FP-GL-II, the plotter operates in the same manner as the terminator.

When the plotter sends data, EOI terminal is set to "L" at the same time as it outputs the last "LF" code of sending data.

If the reduced drawing mode is selected when using FP-GL-II, the plotter outputs the drawing being reduced to 0.9 time, based on the global origin. Then, the actual size of the valid drawing range is not changed and the range to be specified by the program is extended.

4.11.5 Printer Setup

Setting a printer.

Operation procedure

① Press [**COPY**] to call the copy menu.

② Press {PRINT/PLOT SETUPS} to call the setup menu.

③ Setup menu

{PRINTER}   : Selects a printer.

{PRINT SPEED FAST/SLOW}
                : Switches print speeds. In the printer of EPSON, setting FAST makes the screen smaller.

{PLOT LABEL ON/OFF} : See sub-section 4.11.4.

{PLOT P.TXT ON/OFF} : See sub-section 4.11.4.

{DEFAULT SETUPS}   : See sub-section 4.11.4.

{PLOTTER HP/AT}   : See sub-section 4.11.4.

④ Printer menu

{HP ThinkJet}   : Selects a Hewlett Packard-made ThinkJet.

{EPSON ESC/P}   : Selects a printer which supports the printer control code EPSON ESC/P J83 or J84 of the Seiko-Epson's 24-dot printer.
If the printer supports both the RS-232 and GPIB interfaces, the printer can be connected using either the RS-232 or GPIB cable (Note1).

{PCL}   : Selects a printer which supports the Hewlett Packard printer control code PCL. Color printing, however, is not available since this code does not support color ink.
If the printer supports both the RS-232 and GPIB interfaces, the printer can be connected using either the RS-232 or GPIB cable (Note2).

{BITMAP FILE}   : Screen data can be saved to a floppy disk after converting it into Window 3.1 bitmap format files.
The bitmap files are saved one by one to the floppy disk, after each file has been given its filename (such as PRINT000.BMP, PRINT001.BMP, etc.). Each file is 300 kB, and up to four files can be stored on a floppy disk.

{PRINTER PORT GPIB} : Outputs the screen data via the GPIB.

{PRINTER PORT RS-232} : Outputs the screen data via the RS-232

Note1: Do not connect a Centronix-made printer to the parallel port on the R3753H series network analyzer because the power supply pin arrangement is different from that of the Centronix-made printer.

Note2: *Verify that the CTS control is available when a serial-interface printer is used. In addition, neither the XON nor XOFF control are supported by the network analyzer. When using the XON or XOFF control, there is a possibility that satisfactory print quality will not result due to its transfer speed.*

4.12 Communication with Peripheral Devices

As standard, the R3753H series is equipped with the parallel I/O interface and RS-232 interface as well as the GPIB interface. With these interfaces, it can communicate with peripherals.

- Parallel I/O : Used for communication with peripheral devices such as the handler. (See sub-section 4.12.1.)

- RS-232 : Used for the hard copy output of the screen (See sub-section 4.11.5.), or printed output of internal BASIC. (See sub-section 4.12.2.)

4.12.1 Parallel I/O Port

(1) Outline

The parallel I/O port is the input/output port to communicate with the handler or peripherals. Use always the shield cable for the connection.
The parallel I/O connector on the back panel is used for communication. Figure 4-7 shows the internal pin assignment and signals of the connector. These I/O port is controlled with ENTER and OUTPUT commands.

- Input/output port
  There are two output ports and two input/output ports, as follows:
  - Port only for output : A port : 8-bit width

    B port : 8-bit width
  - Input/output port : C port : 4-bit width

    D port : 4-bit width

- Port C status output, port D status output
  Shows the settings of the input of the input/output ports C and D. It is low when C or D port is set to input, it is high when it is set to output.

- Write strobe output for output port
  By generating a negative pulse on the write strobe output, it shows a data is output to some port.
  Figure below shows the timing chart of the write strobe output and data output.
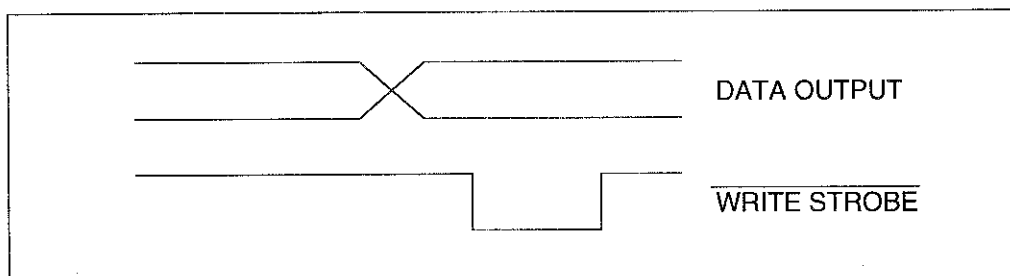
Figure 4-12 Timing Chart of WRITE STROBE

- INPUT 1
  By entering a negative pulse on the INPUT 1, the OUTPUT 1 and 2 are set to LOW. The pulse width of the input signal to be entered in the INPUT 1 should be more than 1 μs.

- OUTPUT 1 and 2
  These two signal lines are the latch output terminals set to LOW when a negative pulse is entered on the INPUT 1. It can be set to LOW or HIGH with the BASIC command (OUTPUT).

- PASS/FAIL output
  Generates LOW when the result of the limit test is PASS and HIGH when the result is FAIL. This function is available only when the limit test function is ON.

- Write strobe output for PASS/FAIL output
  When the limit test result is output to the PASS/FAIL output line, generates a negative pulse.

- SWEEP END
  When the R3753H series finishes the sweeping, generates a negative pulse with a width of 10 μs.

- +5V output
  +5V output is provided for the external device. The maximum current to be supplied is 100mA. This line has a fuse which will be blown when overcurrent flows for circuit protection. The blown fuse needs to be replaced.

- EXT TRIG input
  By entering a negative pulse on this line, it is possible to trigger the sweep of measurement. The pulse width should be at least 1 μs. The sweeping starts at the trailing edge of the pulse. When this signal line is used, the trigger mode should be set to external source.
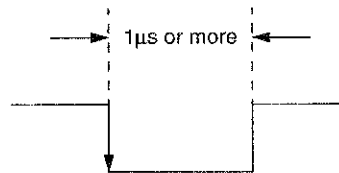
1μs or more

(2)　Connector Internal Pin Assigned and Signal Standard

Pin No.	Signal name	Function
1	GND	Ground
2	INPUT 1	Negative logic pulse input of TTL level (width: 1 μs or more)
3	OUTPUT 1	Negative logic latch output of TTL level
4	OUTPUT 2	Negative logic latch output of TTL level
5	Output port A0	Negative logic latch output of TTL level
6	Output port A1	Negative logic latch output of TTL level
7	Output port A2	Negative logic latch output of TTL level
8	Output port A3	Negative logic latch output of TTL level
9	Output port A4	Negative logic latch output of TTL level
10	Output port A5	Negative logic latch output of TTL level
11	Output port A6	Negative logic latch output of TTL level
12	Output port A7	Negative logic latch output of TTL level
13	Output port B0	Negative logic latch output of TTL level
14	Output port B1	Negative logic latch output of TTL level
15	Output port B2	Negative logic latch output of TTL level
16	Output port B3	Negative logic latch output of TTL level
17	Output port B4	Negative logic latch output of TTL level
18	EXT TRIG	EXTERNAL TRIGGER input (width: 1 μs or more), negative logic
19	Output port B5	Negative logic latch output of TTL level
20	Output port B6	Negative logic latch output of TTL level
21	Output port B7	Negative logic latch output of TTL level
22	Input/output port C0	Negative logic state input/latch output of TTL level
23	Input/output port C1	Negative logic state input/latch output of TTL level
24	Input/output port C2	Negative logic state input/latch output of TTL level
25	Input/output port C3	Negative logic state input/latch output of TTL level
26	Input/output port D0	Negative logic state input/latch output of TTL level
27	Input/output port D1	Negative logic state input/latch output of TTL level
28	Input/output port D2	Negative logic state input/latch output of TTL level
29	Input/output port D3	Negative logic state input/latch output of TTL level
30	Port C status	TTL level, Input mode: LOW, Output mode: HIGH
31	Port D status	TTL level, Input mode: LOW, Output mode: HIGH
32	Write strobe signal	TTL level, Negative logic, Pulse output
33	PASS/FAIL signal	TTL level, PASS: LOW, FAIL: HIGH, latch output
34	SWEEP END signal	TTL level, Negative logic, Pulse output (width: 10 μs or more)
35	+5V	+5V ± 10%, 100mA MAX
36	Write strobe signal (PASS/FAIL)	TTL level, Negative logic, Pulse output
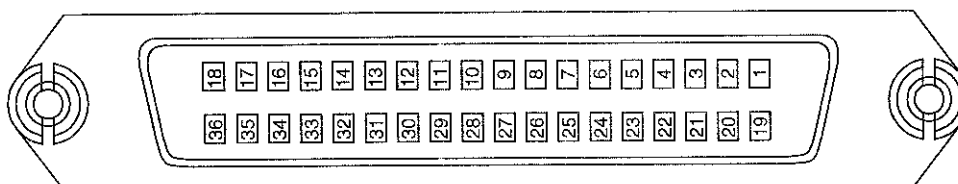
Figure 4-13 36-pin Connector Internal Pin Assignment and Signal
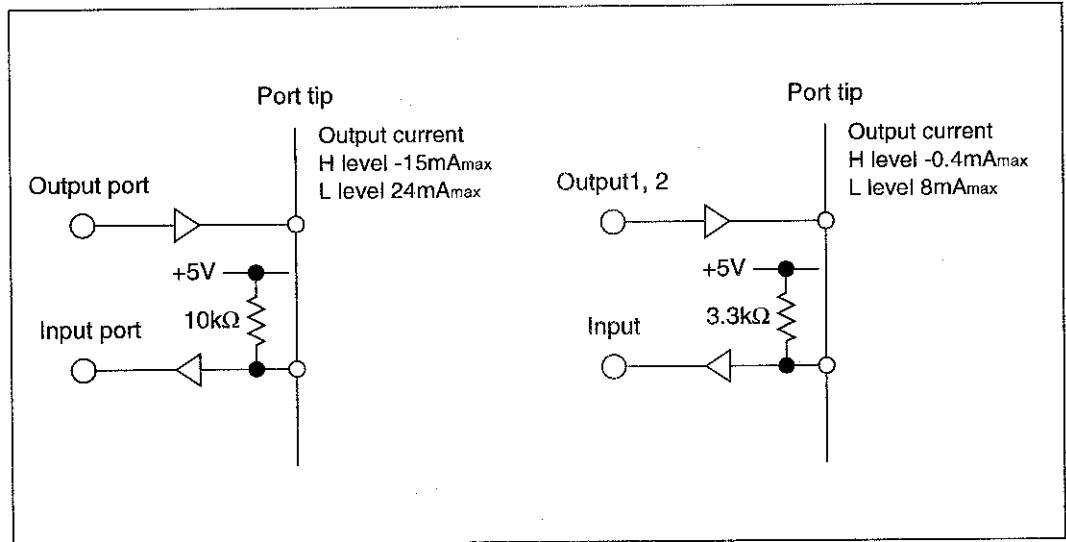
(3)   Mode setting of port

Command	Output port	Input port
OUTPUT 36 ; 16	A, B,C, D	
OUTPUT 36 ; 17	A, B, D	C
OUTPUT 36 ; 18	A, B, C	D
OUTPUT 36 ; 19	A, B	C, D

To use a parallel I/O port, first set the mode setting of port. The combination of the setting command and the input/output port is referred the above table.

Example :
    10 OUTPUT 36;19
    20 OUTPUT 33;255
    30 ENTER   37;A
      ⋮

Set the output port for port A and port B, and the input port for port C and port D.

(4)   Each port operation method

Describes the operation method by built-in BASIC.
OUTPUT statement (for output) and ENTER statement (for input) are used for data input/ output.
In the BASIC command (OUTPUT and ENTER statements), each port is distinguished by the address used in the statement.

(a) BASIC format

OUTPUT (address) ; (output data)
ENTER (address) ; [variable]
                          (Input data are assigned to specified variable.)

(b) Address and data range

Address	Port to be used
33	Port A (Output only: OUTPUT statement only)
34	Port B (Output only: OUTPUT statement only)
35	Port C (Input/output: ENTER, OUTPUT)
36	Port D (Input/output: ENTER, OUTPUT)
37	Port C, D (Input/output: ENTER, OUTPUT)

- OUTPUT 33, 34, 37

  OUTPUT x x ; 0 to 255 (8-bit)

- OUTPUT 35, 36

  OUTPUT x x ; 0 to 15 (4-bit)

  Note: The OUTPUT 35 concerns with the Set/Reset of Flip Flop.

- ENTER 35, 36

  ENTER x x ; numeric variable (4-bit) (Data from 0 to 15 are assigned.)

- ENTER 37

  ENTER 37 ; numeric variable (8-bit) (Data from 0 to 255 are assigned.)

(5)   INPUT 1, OUTPUT 1 and OUTPUT 2 Terminals

By combining with the signal lines of INPUT 1, OUTPUT 1 and OUTPUT 2, convenient functions are provided to easily control external devices.
The functions are; function which sets two latch outputs of OUTPUTs 1 and 2 to LOW by pulse input to INPUT 1, and function which detects the state of OUTPUT 1 by INPUT 1.
Also, the state of OUTPUTs 1 and 2 can be controlled by OUTPUT command.

(a) Setting and Resetting of OUTPUT 1 and OUTPUT 2

The following four types are provided for set/reset as follows:

- Setting OUTPUT 1   : OUTPUT 35 ; 16
- Setting OUTPUT 2   : OUTPUT 35 ; 48
- Resetting OUTPUT 1 : OUTPUT 35 ; 80
- Resetting OUTPUT 2 : OUTPUT 35 ; 112

(b) INPUT 1 (external input)

The state of OUTPUT 1 can be observed by INPUT 1 using ENTER statement.

ENTER 34; (numeric variable)

If 1 is assigned to the numeric variable, OUTPUT 1 is ON (Low level: negative logic), if 0, OUTPUT 1 is OFF (High level).

Example : 10 OUTPUT 36 ; 16
           20 ENTER 34 ; A
           30 IF A<> 1 THEN GOTO 20
           40 OUTPUT 33 ; 1
               ⋮

By observing the state of OUTPUT 1, if OUTPUT 1 is set to ON, then 1 is output to the port A.

① Examples of INPUT 1, OUTPUT 1 and OUTPUT 2

< When program is executed by trigger switch: >

- Circuit example
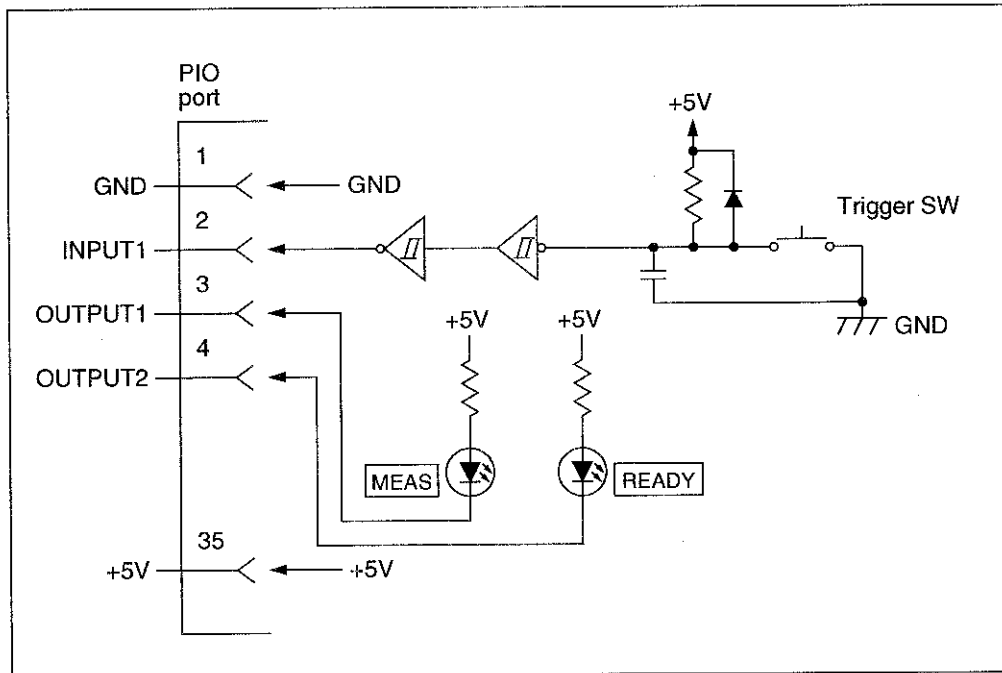
- Program example

Waiting time for measurement: Represents **[READY]**.
During measurement operation: Represents **[MEAS]**.

10	OUTPUT 35 ; 80	
20	OUTPUT 35 ; 112	**[READY]**, **[MEAS]** turns OFF.
⋮		Network analyzer initial setup
100	OUTPUT 35 ; 48	**[READY]** turns ON.
110	ENTER 34 ; A	
120	IF A < > 1 THEN GOTO 110	Recognition of Trigger SW
130	OUTPUT 35 ; 112	**[READY]** turns OFF.
⋮		
⋮		Measurement routine
500	OUTPUT 35 ; 80	**[MEAS]** turns OFF.
510	GOTO 100	When repeating the measurement
520	STOP	

② Usage example of output ports A and B

< When LED is used for selecting devices (when port A is used): >

• Circuit example
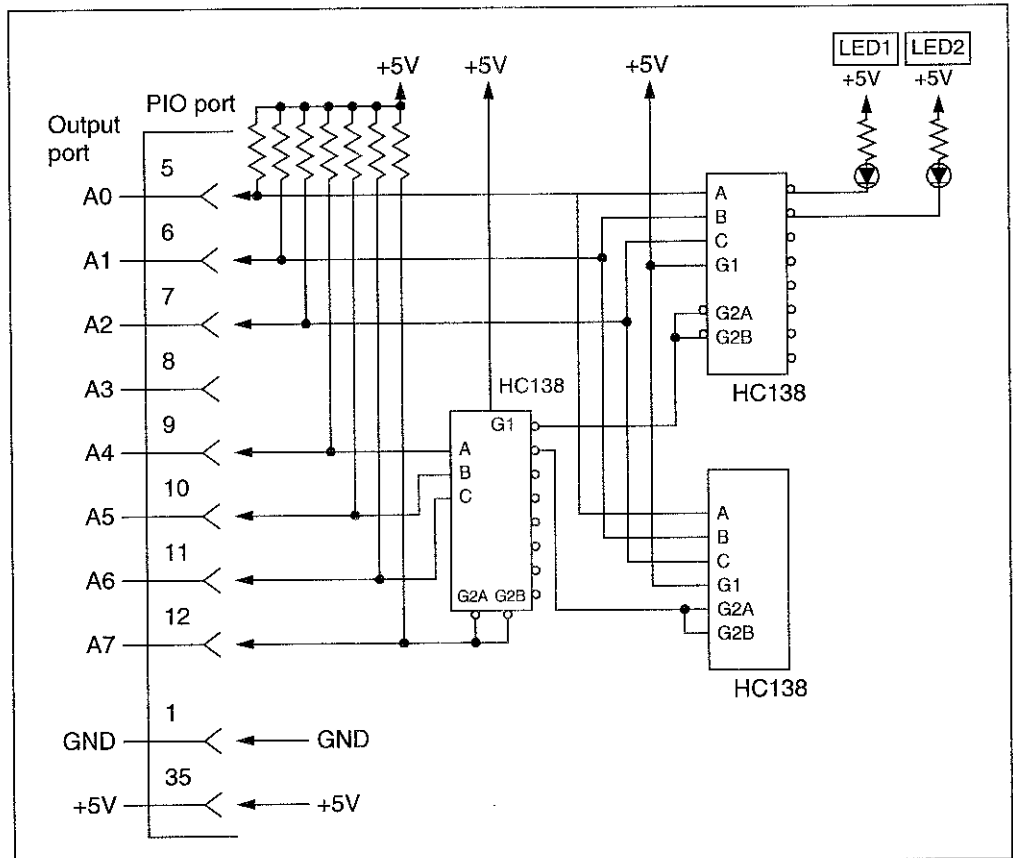
• Program example

10	OUTPUT 36 ; 16	Defines ports A, B, C and D as output port.
20	OUTPUT 33 ; 0	Initializes LED.
30		
⋮		Measurement and judgment
⋮		(measurement variable: A
⋮		judgement range: JED0 to JED1, JED1 to JED2 ...)
500	IF A > = JED0 AND A < JED1 THEN OUTPUT 33 ; 0xFF	
	(When JED0 to JED1, lights up LED 1.)	
510	IF A > = JED1 AND A < JED2 THEN OUTPUT 33 ; 0xFF	
	(When JED1 to JED2, lights up LED 2.)	
⋮		
800	GOTO 30	
810	STOP	

③ Usage example of input/output ports C and D

< Example to change routine whether bit 0 of I/O port C is 0 or 1 >

• Circuit example
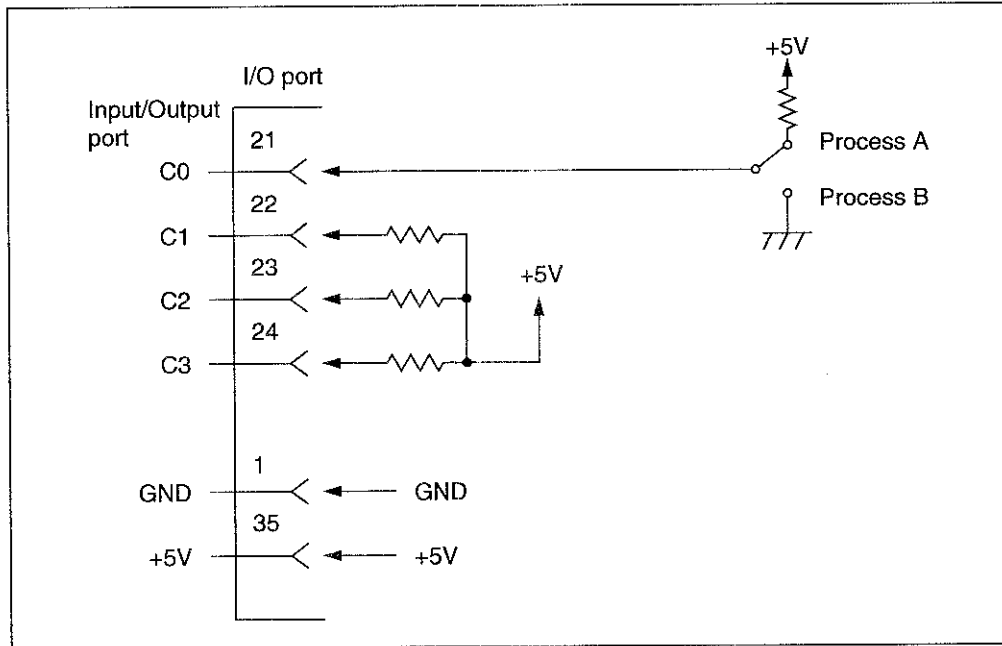
• Program example (Check the port C by pressing **[Trigger SW]** in example ①.)

10	OUTPUT 36 ; 19	Defines ports A and B as output port.
20	OUTPUT 35 ; 80	Defines ports C and D as input port.
30	OUTPUT 35 ; 112	
⋮		Network analyzer initial setup
100	*TRIG	
110	ENTER 34 ; A	
120	IF A < > 1 THEN GOTO *TRIG	
130	ENTER 35 ; B	Obtains value of port C.
140	IF B = 1 THEN GOTO *ROUT_B	
150	*ROUT_A	
⋮		Process A
490	GOTO *TRIG	
500	*ROUT_B	
⋮		Process B
900	GOTO *TRIG	
910	STOP	

4.12.2 RS-232 Interface

The R3753H series is equipped with an RS-232 interface as a standard. Therefore, data such as measurement and analysis data can be output to an RS-232 printer.

The RS-232 interface defines mechanical and electrical characteristics of interface for connecting between data terminal and data communication device standardized by Electronic Industries Association (EIA).

Refer to "Regulation" for details.

(1) Connection connector and signal table

Connection connector :   25-pin D-sub connector (male type)
Signal table :

Pin No.	Signal name	Description
1	FG	Frame ground
2	TxD	Transmit data
3	RxD	Receive data
4	RTS	Request to send
5	CTS	Clear to send
6	DSR	Data set ready
7	SG	Signal ground
20	DTR	Data terminal ready

(2) Printer output method

The LLIST or LPRINT command is used to output to the RS-232 printer by the R3753H series. The setting such as a baud rate is defined by the CONTROL command.
Refer to "Programming manual" for details.
LLIST   : Outputs BASIC program to the printer.
LPRINT   : Outputs the contents of character strings, numeric values and variables.
CONTROL : Sets the values such as a baud rate, character length and others.

Setting values at power-on
    Baud rate   : 9600 baud
    Character length : 8 bits
    Parity   : None
    Stop bit   : 1 bit

5 PERFORMANCE TEST

This chapter describes testing procedures designed to maintain this analyzer's efficiency.
For items not covered in this chapter, contact ADVANTEST.

5.1 Preparing for a Performance Test

(1) Warm up

Warm up the R3753H series for at least 30 minutes before executing the performance test.

(2) Preparing measurement instruments

The following measurement instruments are required to perform the test items as shown in Table 5-1.

Table 5-1 Required Measurement Instruments for Performance Test (1 of 2)

Test items	Measurement instrument		Remarks
1. Frequency accuracy and range	• Counter Frequency: 5Hz to 500MHz Display: 7 digits or more Accuracy: 0.1ppm or less	Model R5372 (to 18GHz) or Model R5373 (to 26GHz) (Manufactured by ADVANTEST)	Refer to section 5.2
	• BNC-BNC cable		
2. Output/ Input level and flat-ness	• Power meter Frequency: 100kHz to 500MHz Power range: -63dBm to +21dBm	HP436A (HP437B) (HP438A) (Calibrated under the national standard)	Refer to section 5.3
	• Power sensor Frequency: 100kHz to 500MHz Power range: -63dBm to +21dBm	HP8482A	
3. Output level linearity	• Power meter Frequency: 100kHz to 500MHz Power range: -63dBm to +21dBm	HP436A (HP437B) (HP438A) (Calibrated under the national standard)	Refer to section 5.4
	• Power sensor Frequency: 100kHz to 500MHz Power range: -63dBm to +21dBm	HP8482A	

Table 5-1 Required Measurement Instruments for Performance Test (2 of 2)

Test items	Measurement instrument		Remarks
4. Spectral purity (Phase noise)	• Spectrum analyzer 100Hz to 500MHz	R3265A (to 8GHz) (Manufactured by ADVANTEST)	Refer to section 5.5
	• BNC cable		
	• N-BNC conversion connector		
5. Input return loss	• Network analyzer 300kHz to 500MHz	R3763B (to 3GHz) (Manufactured by ADVANTEST)	Refer to section 5.6
	• Calibration kit	MODEL9617K3 (Recommended by ADVANTEST)	
	• BNC cable (60cm or less)		
	• N-BNC conversion connector		
6. Input level accuracy (Absolute value measurement)	• Power meter Frequency: 50MHz Power range: -10dBm to +10dBm	HP436A (HP437B) (HP438A) (Calibrated under the national standard)	Refer to section 5.7
	• BNC cable (60cm or less)		
7. Input level accuracy (Absolute value measurement)	• BNC cable × 2 (60cm or less)		Refer to section 5.8
10. Crosstalk	• BNC terminator		Refer to section 5.11
	• BNC cable (60cm or less)		

(3) General note

• Use an AC power source having a voltage of 100V to 120V, 220V to 240V and a frequency of 48Hz to 66Hz.

• Connect the power supply cable only after turning off the power switch.

• The R3753H series should be free from dust, vibration and noise and be tested under the following conditions:
Temperature   : 25°C ± 5°C
Relative humidity : 80%RH or less

5.2 Frequency Accuracy and Range

Testing procedure

① Setup the R3753H series as shown in the figure below.
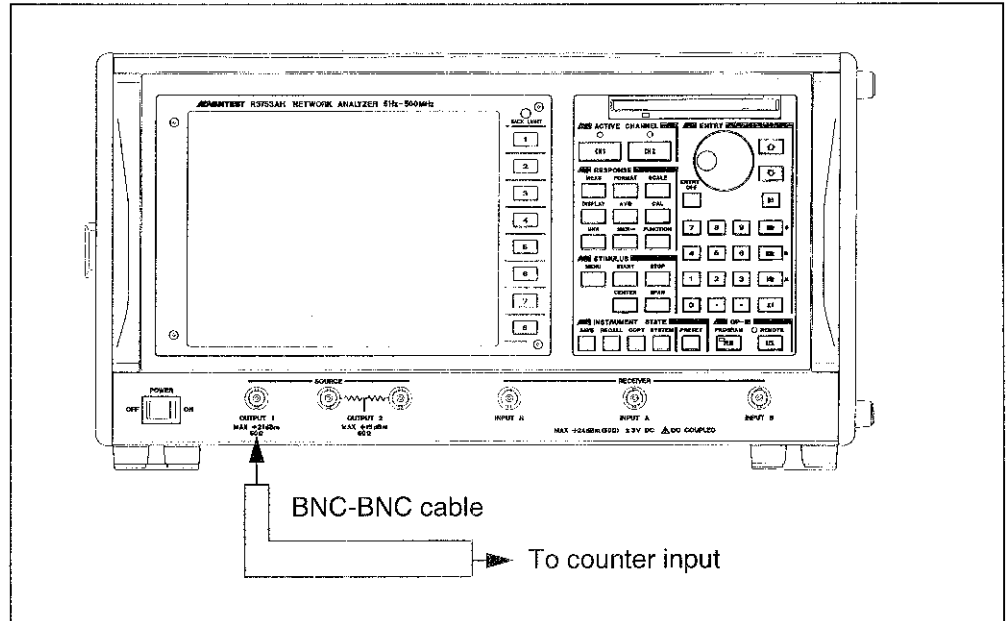
Figure 5-1 Frequency Accuracy and Range

② Set the R3753H series as follows.

Span : 0Hz
Sweep mode : SINGLE
Output port : OUTPUT1

③ Change any center frequency in the range of 5Hz to 500MHz.

④ Check that the counter read frequency < center frequency ± center frequency × 20 × 10^{-6}

Example: When the center frequency is at 10MHz, the range is 10MHz ± 200Hz (that is between 9,999,800Hz and 10,000,200Hz).

5.3 Output Level Accuracy and Flatness

Testing procedure

(1) Setup the R3753H series as shown in the figure below.

Power sensor
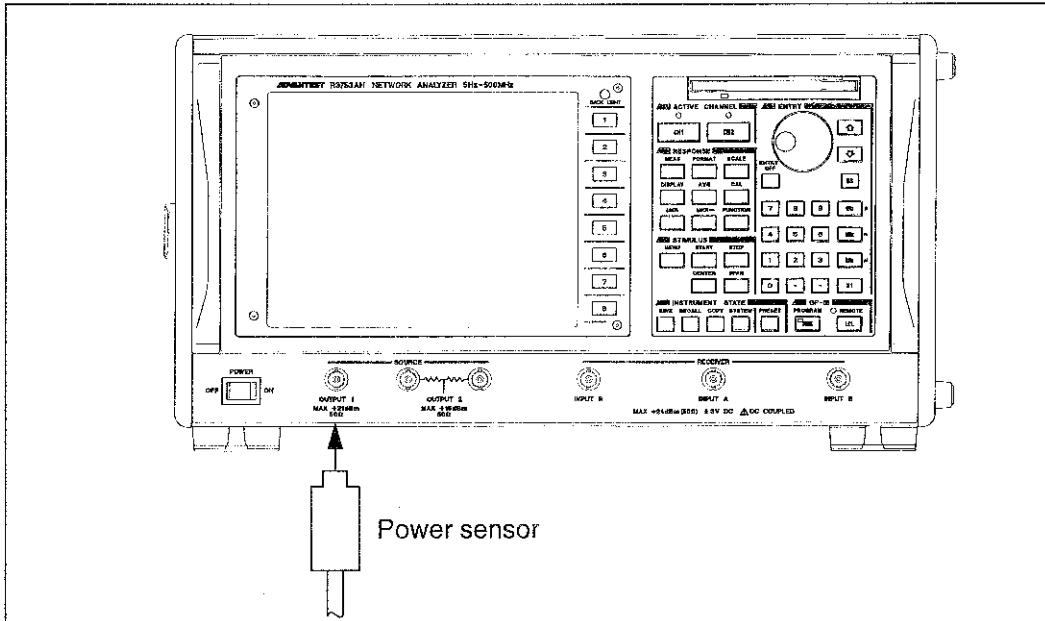
Figure 5-2 Output Level Accuracy and Flatness

(2) Output level accuracy

① Perform the ZERO calibration for the power meter.

② Set the R3753H series as follows.

Center frequency : 50MHz
Span : 0Hz
Output level : 0dBm
Output port : OUTPUT1

③ Connect the power sensor to the output terminal and perform the measurement.
Note: The calibration factor should be set to 50MHz.

④ Check the output level accuracy of ±0.5dB at 0dBm and 50MHz.

(3)   Flatness

① Perform the ZERO calibration for the power meter.

② Set the R3753H series as follows.

Center frequency	: 50MHz
Span	: 0Hz
Output level	: 0dBm

③ Press the **[REL]** key on the power meter and set it to 0dB (ratio measurement mode).

④ The span and the output level are fixed. Change the center frequency and read data from the power meter.

Note: *Use the calibration factor at the center frequency.*

⑤ Check that the Flatness of 0dBm is as follows.

5Hz to 100kHz	: ± 4.0dB
100kHz to 1MHz	: ± 2.0dB
1MHz to 300MHz	: ± 1.5dB
300MHz to 500MHz	: ± 2.0dB

5.4   Output Level Linearity

Testing procedure

① Perform the ZERO calibration for the power meter.

② Set the R3753H series as follows.

Center frequency	: 50MHz
Span	: 0Hz
Output level	: 0dBm
Output port	: OUTPUT1

③ Connect the power sensor to the output terminal as shown in the figure below.

Power sensor
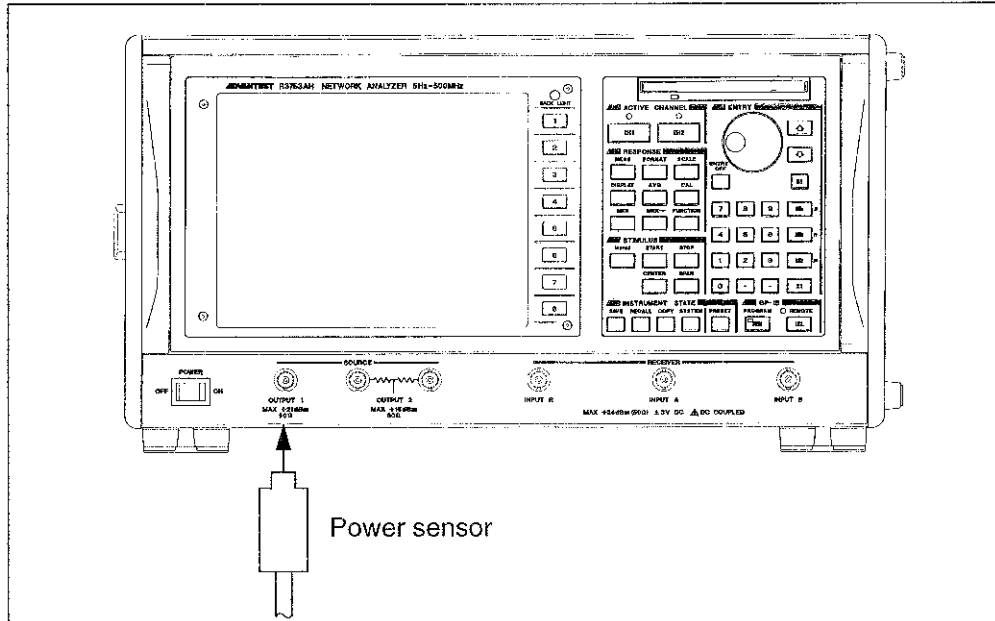
Figure 5-3 Output Level Linearity

④ Press the **[REL]** key on the power meter and set it to 0dB (ratio test mode).

⑤ Obtain the linearity data when the output level is changed.

Note: *The calibration factor should be set to 50MHz.*

⑥ Check that the output level linearity of 0dBm is as follows.

+21dBm to -35dBm : ± 0.5dB
-35dBm to -63dBm : ± 1.5dB

5.5   Spectrum Purity (Phase Noise)

Testing procedure

①   In order to measure the spectrum purity, connect the R3753H series and the spectrum analyzer, R3265A as shown in Figure 5-4.
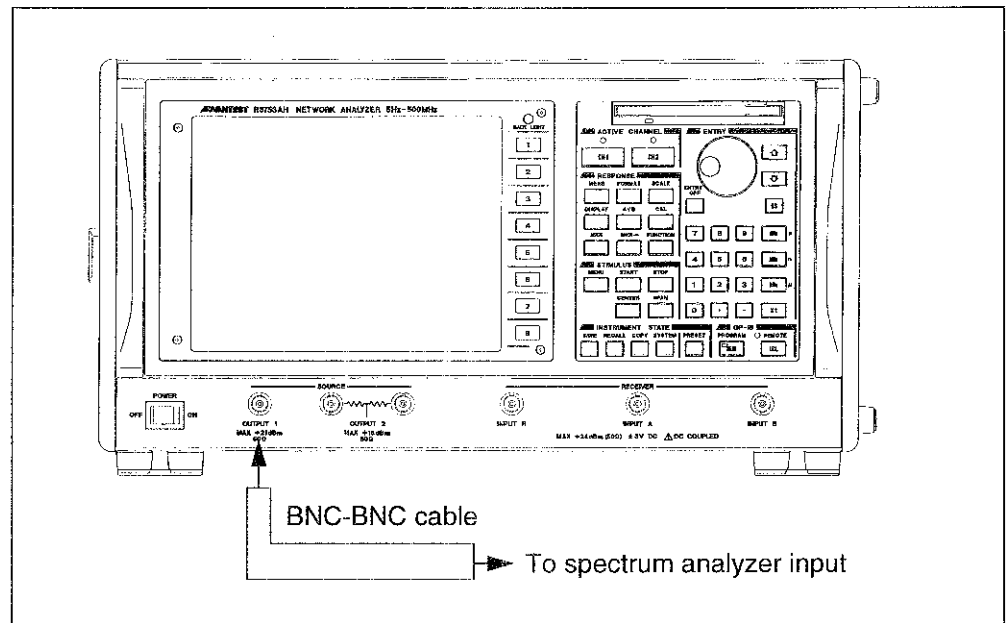
Figure 5-4

②   Set the R3753H series as follows. (Other settings should be left at default values.)

Span frequency	: 0Hz
Sweep mode	: SINGLE
Output port	: OUTPUT1

③   Change any center frequency in the measurement range of the spectrum analyzer. (Setting range: 5Hz to 500MHz)

④   Set the spectrum analyzer as follows.

Center frequency	: Center frequency set to the R3753H series
Span frequency	: 50kHz
Resolution band width	: 1kHz
Average	: 32

⑤   After performing a peak search to get the MAX data, use the Delta Marker function to obtain the value at a point of +10kHz higher.
(Obtain a difference between the MAX value and the data at a point of +10kHz higher.)

⑥   Check {(readout of the difference) - 30} dBc/Hz < -75dBc/Hz.

5.6 Input Return Loss

Testing procedure

① In order to measure the input return loss, connect the network analyzer, R3763B as shown in Figure 5-5.
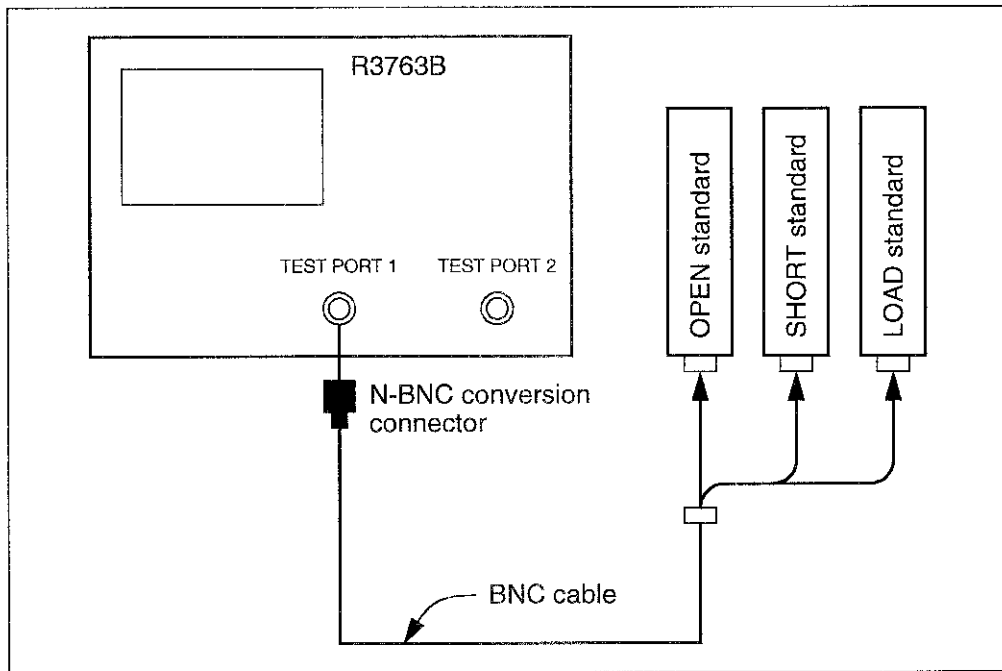
Figure 5-5

② When performing measurements, set the R3763B as follows.
(Other settings should be left at default values.)

Start frequency : 300kHz
Stop frequency : 500MHz
Measure : S11
Resolution band width : 100Hz

③ Perform the 1PORT FULL calibration.

(a) Press the **[CAL]** → {CAL MENU} → {1PORT FULL CAL} button.
(b) Connect the Open standard at the end of the BNC cable and press the {OPEN} button.
(c) Connect the Short standard at the end of the BNC cable and press the {SHORT} button.
(d) Connect the Load standard at the end of the BNC cable and press the {LOAD} button.
(e) Press the {DONE 1-PORT} key.

④ Connect R3763B to the Input Port A of the R3753H series with the BNC cable as shown in the figure below.

BNC-BNC cable

To the network analyzer performing the measurement
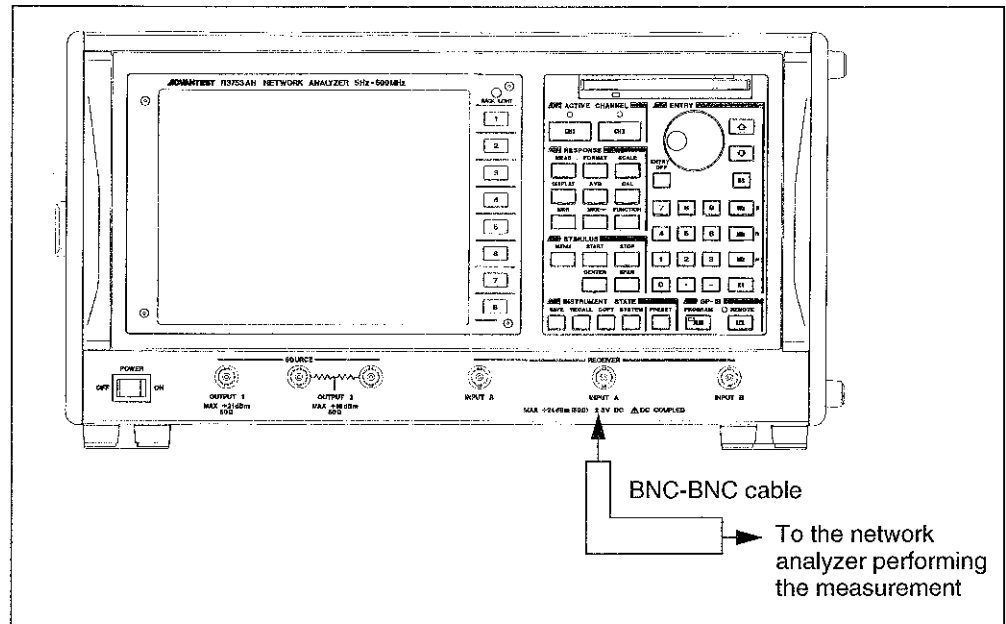
Figure 5-6

⑤ Set the R3753H series as follows.
(Other settings should be left at default values.)

Center frequency   : 10kHz
Span frequency   : 0Hz
Input attenuator   : 20dB
Sweep mode   : SINGLE (This setting should be made last.)

⑥ When the input return loss is to be measured, check that the readout of the R3763B is as follows.

Maximum value between 5Hz and 300MHz < -23dB
Maximum value between 300MHz and 500MHz < -20dB

⑦ Set the R3753H series as follows and sweep once using the SINGLE sweep mode.

Input attenuator :   0dB

⑧ When the input return loss is being measured, check that the readout of the R3763B is as follows.

Maximum value between 5Hz and 300MHz < -20dB
Maximum value between 300MHz and 500MHz < -15dB

⑨ For model R3753AH, perform the same tasks for the Input Port R and the Input Port B.
For model R3753BH, perform the same tasks for the Input Port R.

5.7 Input Level Accuracy (Absolute value measurement)

Testing procedure

① Perform the ZERO calibration for the power meter.

② Setup the R3753H series as shown in the figure below.

Power sensor
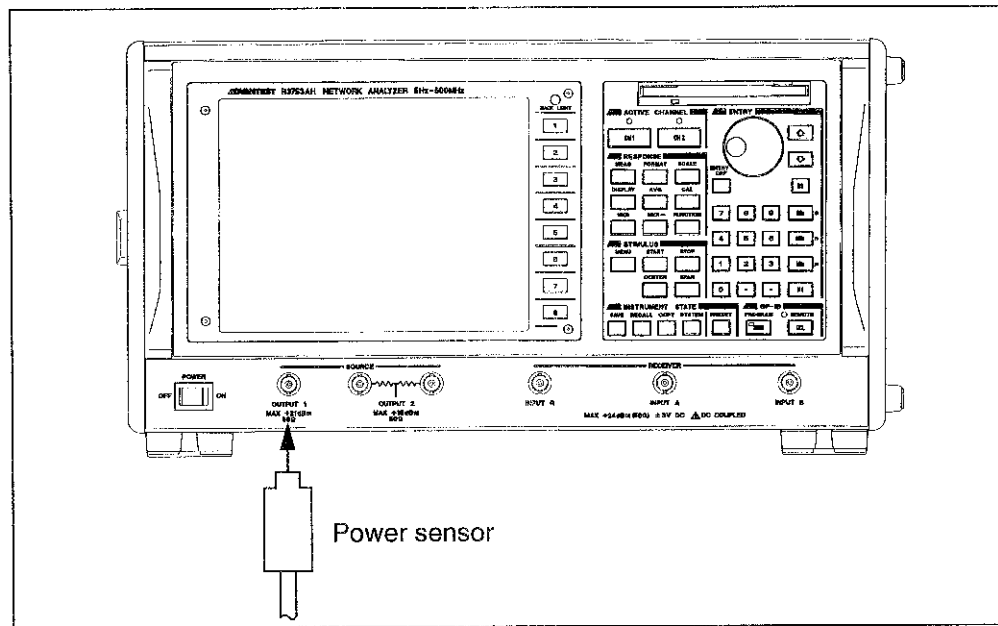
Figure 5-7

③ Set the R3753H series as follows.
(Other settings should be left at default values.)

Center frequency   : 50MHz
Span frequency   : 0Hz
Output level   : 0dBm
Output port   : OUTPUT1
Input port   : A
Resolution band width : 1kHz
Format   : LOGMAG
Sweep mode   : SINGLE

④ Connect the power sensor to the OUT1 and perform the measurement.

Note: The calibration factor should be set to 50MHz.

Connect OUT1 and Ach with the BNC cable as shown in the figure below.
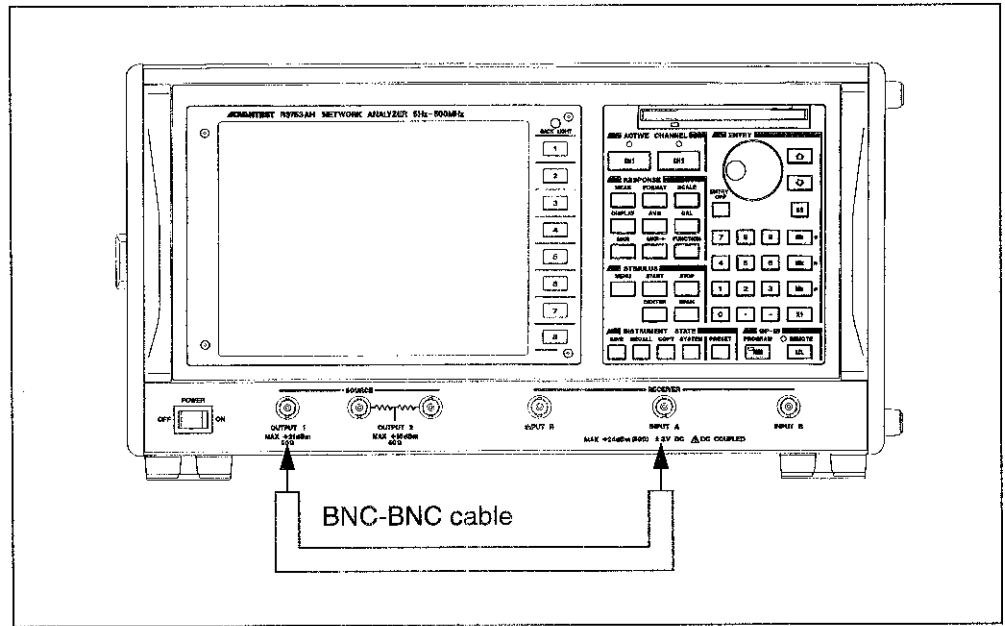
Figure 5-8

⑤ Sweep the frequency once using the SINGLE sweep mode and then read the measurement value by using the Marker.

⑥ <Check> : [(Measurement value by using the Marker) - (Measurement Value by using the Power meter)] : ± 0.5dB

⑦ For model R3753AH, connect the OUTPUT1 with the Rch in the same way and perform the measurement of Rch. And again connect the OUTPUT1 with the Bch and perform the measurement of Bch.
For model R3753BH, connect the OUT1 with the Rch in the same way and perform the measurement of Rch.

5.8 Input Level Accuracy (Relative value measurement) ------ Only for model R3753AH/BH

Testing procedure

① Connect the two BNC cables to the R3753H series as shown in the figure below.
(Use the cables that have the same length and the identical characteristics.)

Two BNC-BNC cables
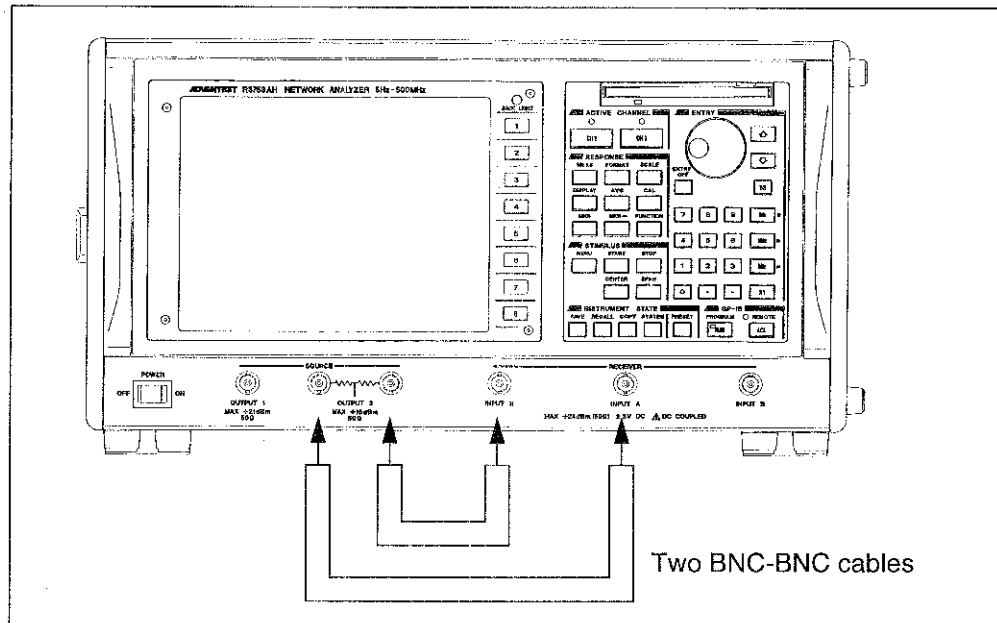
Figure 5-9

② Set the R3753H series as follows.

Center frequency	:	50MHz
Span frequency	:	0Hz
Output level	:	0dBm
Output port	:	OUTPUT2
Format	:	LOGMAG
Input port	:	A/R
Resolution band width	:	1kHz

③ Read the measurement value by using the Marker.

④ <Check> : Measurement value by using the Marker : ± 0.5dB

⑤ For model R3753AH, change the Input port to the Input B/R and A/B and perform the measurement in the same way and check it.

5.9 Noise Floor

Testing procedure (Describes the procedure about the Input Port A.)

① Nothing should be connected to the R3753H series.

② Set the R3753H series as follows.

Output level	: 0dBm
Number of the measurement points	
	: 1201
Smoothing	: ON
Smoothing aperture	: 5%
Input port	: A
Format	: LOGMAG
Input attenuator	: 100kHz or less 0dBm
	100kHz or more AUTO

③ Set the frequency range and the resolution band width as follows.

Start frequency	: 200kHz
Stop frequency	: 500kHz
Resolution band width	: 10kHz

④ Sweep the frequency once using the SINGLE sweep mode.
Sum up the results of measurement data from the first point to the 1201th point and divide it by 1201.

$$\text{Noise floor} = \frac{\text{MEAS (1)} + \text{MEAS (2)} + \cdots + \text{MEAS (1201)}}{1201}$$

MEAS (n) : the measurement data at the nth point

⑤ <Check> : The noise floor (dB) ≤ -90(dBm)

⑥ Change the frequency range as follows.

Start frequency	: 500kHz
Stop frequency	: 300MHz

⑦ Perform the same calculation described in the step ④.

⑧ <Check> : The noise floor (dBm) ≤ -105(dBm)

⑨ Set the frequency range as follows.

Start frequency : 300MHz
Stop frequency : 500MHz

⑩ Perform the same calculation described in the step ④.

⑪ <Check> : The noise floor (dBm) ≤ -105(dBm)

⑫ Change the resolution band width to 3k, 1k, 300, 100Hz and check that these satisfy the specs in each frequency range.
The value of the noise floor at each frequency range and the resolution band width is shown in the table below.

RBW / FREQ	10kHz	3kHz	1kHz	300Hz	100Hz
minf to 500kHz	minf = 200kHz -90dBm	minf = 60kHz -95dBm	minf = 20kHz -100dBm	minf = 6kHz -100dBm	minf = 2kHz -100dBm
500kHz to 300MHz	-105dBm	-110dBm	-115dBm	-115dBm	-115dBm
300MHz to 500MHz	-105dBm	-110dBm	-110dBm	-110dBm	-110dBm

⑬ For model R3753AH, perform the same tasks for the Input Port R and the Input Port B.
For model R3753BH, perform the same tasks for the Input Port R.

5.10 Crosstalk (between the input and output)

Testing procedure

① Nothing should be connected to the R3753H series.

② Set the R3753H series as follows.
(Other settings should be left at default values.)

Output level   : 15dBm
Number of measurement points
                        : 1201
Smoothing   : ON
Smoothing aperture   : 5%
Input port   : A
Format   : LOGMAG
Input attenuator   : 100kHz or less   : 0dBm
                           100kHz or more : AUTO
Resolution band width   : 100Hz

③ Set the frequency range as follows.

Start frequency   : 20kHz
Stop frequency   : 500kHz

④ Sweep the frequency once using the SINGLE sweep mode and obtain the data by using MAX search.

⑤ <Check> : [15(dBm) - the measurement value (dBm)] :   105dB or more

⑥ Perform the same tasks and check that they satisfy the specs in the frequency range described below.

<Check> :   When 500kHz to 300MHz,
            [15(dBm) - the measurement value (dBm)] :   110dB or more

            When 300MHz to 500MHz,
            [15(dBm) - the measurement value (dBm)] :   105dB or more

⑦ For model R3753AH, perform the same tasks for the Input Port R and the Input Port B.
For model R3753BH, perform the same tasks for the Input Port R.

5.11 Crosstalk (between the inputs) ----- Only for model R3753AH/BH

Testing procedure

① Connect the BNC cable to the R3753H series as shown in the figure below.
And connect the BNC terminator to the R3753H series as shown in the figure below.

BNC-BNC cable   BNC terminator
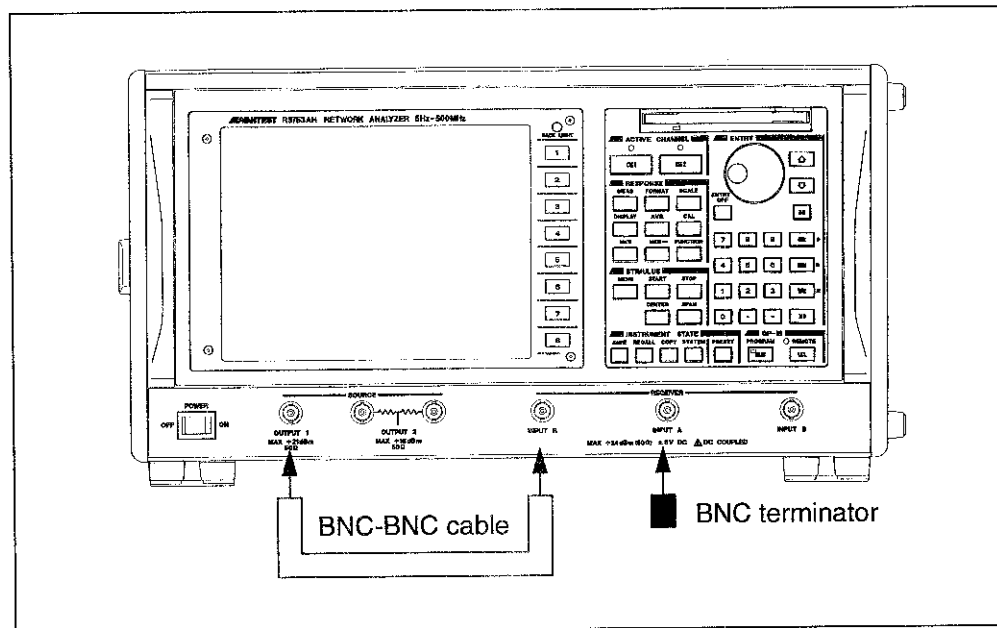
Figure 5-10

② Set the R3753H series as follows. (Other settings should be left at default values.)

Output level	: 0dBm
Output port	: OUTPUT1
Input port	: A/R
Format	: LOGMAG
Number of measurement points	
	: 1201
Smoothing	: ON
Smoothing aperture	: 5%

③ Set the frequency range, the resolution band width and the input attenuator as follows.

Start frequency	: 20kHz
Stop frequency	: 500kHz
Resolution band width	: 30Hz
Input attenuator	: Rch AUTO
	Ach 0dB

④ Sweep the frequency once using the SINGLE sweep mode and obtain the data by using MAX search.

⑤ <Check> : When 20kHz to 500kHz,
                    (- the measurement value) : 105dB or more

⑥ Set the frequency range, the resolution band width and the input attenuator as follows.

Start frequency	: 500kHz
Stop frequency	: 300MHz
Resolution band width	: 100Hz
Input attenuator	: Rch AUTO
	Ach AUTO

⑦ Sweep the frequency once using the SINGLE sweep mode and obtain the data by using MAX search.

⑧ <Check> : When 500kHz to 300MHz,
                    (- the measurement value) : 115dB or more

⑨ Set the frequency range, the resolution band width and the input attenuator as follows.

Start frequency	: 300MHz
Stop frequency	: 500MHz
Resolution band width	: 100Hz
Input attenuator	: Rch AUTO
	Ach AUTO

⑩ Sweep the frequency once using the SINGLE sweep mode and obtain the data by using MAX search.

⑪ <Check> : When 300MHz to 500MHz,
                    (- the measurement value) : 110dB or more

⑫ For model R3753AH, execute the B/R measurement and the A/B measurement, referring to the above steps.

- When executing the B/R measurement, connect the BNC terminator to Bch and connect the BNC cable to Rch.

- When executing the A/B measurement, connect the BNC terminator to Ach and connect the BNC cable to Bch.

When performing the measurements, set the input attenuator as described in the table below.

Frequency range	B/R measurement	A/B measurement
20kHz to 500kHz	R : AUTO B : 0dB	B : AUTO A : 0dB
500kHz to 300MHz	R : AUTO B : AUTO	B : AUTO A : AUTO
300MHz to 500MHz	R : AUTO B : AUTO	B : AUTO A : AUTO

6 SPECIFICATIONS

Note: *If there is no other description, these specifications are guaranteed in the temperature range of 25°C ± 5°C*

(1) Measurement function

Measurement channel	2 channels (4 trace display)	
Measurement parameter	A/R, B/R, A/B, R, A, B A/R, R, A A	(R3752AH, R3753AH) (R3752BH, R3753BH) (R3752EH, R3753EH)
Measurement format	R3753H series	R3752H series
Rectangular display	Log/Linear magnitude, Phase, Group delay, the real part and the imaginary part of a complex parameter IZI, R, X (When performing the measurement of the Impedance conversion) IYI, G, B (When performing the measurement of the Admittance conversion) Phase extension display	
Smith chart	The marker provides readouts of Log/linear amplitude, Phase, the real part + the imaginary part, R + jX, G + jB	
Pole coordinate display	The marker provides readouts of Log/linear amplitude, Phase, the real part + the imaginary part	

6 SPECIFICATIONS

(2)   Source characteristics

Frequency characteristic Range Resolution Stability Accuracy	5Hz to 500MHz 0.1Hz $\pm 5 \times 10^{-6}$/Day (25 $\pm$ 5°C) $\pm$20ppm (25 $\pm$ 5°C)

Output power characteristic
Range
Resolution
Accuracy
Linearity
 	
Flatness
 	
Impedance
	+21dBm to -63dBm (Output port 1)
	0.1dB
	$\pm$0.5dB (0dBm, 50MHz, 25 $\pm$ 5°C)
	(50MHz, 25 $\pm$ 5°C)
	
	   | +21dBm to -35dBm | $\pm$0.5dB |
	   | -35dBm to -63dBm | $\pm$1.5dB |
	
	(0dBm, 25 $\pm$ 5°C)
	
	   | 5Hz to 100kHz | $\pm$4.0dB |
	   | 100kHz to 1MHz | $\pm$2.0dB |
	   | 1MHz to 300MHz | $\pm$1.5dB |
	   | 300MHz to 500MHz | $\pm$2.0dB |
	
	(Output port 1)
	Nominal 50Ω
	Return loss 13dB or more (0dBm, typical)

Spectral purity Harmonic distortion Non-harmonic spurious signal Phase noise	(25 $\pm$ 5°C) $\leq$ -20dBc $\leq$ the bigger one of -30dBc or -70dBm $\leq$ -75dBc/Hz (10kHz offset)
Sweep characteristics Sweep parameter Range Range setting Sweep type Sweep time Measuring point Sweep trigger Sweep mode Dual sweep Alternate sweep	Frequency, Signal level Frequency sweep: Same as the Frequency characteristics Level sweep: +21dBm to -43dBm Start/Stop or Center/Span Linear sweep and logarithmic sweep, available for a user- specified segment, level sweep 0.1ms/point (RBW 10kHz) 3, 6, 11, 21, 51, 101, 201, 301, 401, 601, 801, 1201 points Repeat, Single, External Sweeps frequency for each channel in the same frequency range. Sweeps frequency for each channel in different sweep ways and different frequency ranges.

Output format	
Output	Single, Dual: (R3752AH/BH, R3753AH/BH) Single: (R3752EH, R3753EH)
Connector	Type BNC female, 50Ω
Power splitter	R3752AH/BH, R3753AH/BH only
(Output port 2)	
Insertion loss	6dB (typical)
Amplitude tracking	<100MHz 0.1dB (typical) ≥100MHz 0.2dB (typical)
Phase tracking	1° (typical)
Equivalent output SWR	<100MHz 1.2 (typical) ≥100MHz 1.4 (typical)

(3) Receiver characteristics

Input characteristics Input channel	3cH (R3752AH, R3753AH) 2cH (R3752BH, R3753BH) 1cH (R3752EH, R3753EH)
Frequency range	5Hz to 500MHz
Impedance	Nominal: 50Ω, 1MΩ/20pF or less

Return loss

(25 ±5°C)

	ATT 0dB	ATT 20dB
< 300MHz	> 20dB	> 23dB
≥ 300MHz	> 15dB	> 20dB

Maximum input level

Input impedance	ATT 0dB	ATT 20dB
50Ω	-20dBm	0dBm
1MΩ	22.4mV	224mV

Input damage level	50Ω +23dBm, 0VDC 1MΩ ±3V

Noise level (ATT AUTO (for 100kHz or less, ATT = 0dB) at 25 ± 5°C)

	RWB 10kHz	3kHz	1kHz	300Hz	100Hz
5Hz to 500kHz	min f 200kHz -90dBm	min f 60kHz -95dBm	min f 20kHz -100dBm	min f 6kHz -100dBm	min f 2kHz -100dBm
500kHz to 300MHz	-105dBm	-110dBm	-115dBm	-115dBm	-115dBm
300MHz to 500MHz	-105dBm	-110dBm	-110dBm	-110dBm	-110dBm

Resolution band width (RBW)	10kHz to 3Hz (1, 3 steps)

Input crosstalk (25 ± 5°C)

ATT 0dB, RBW 30Hz (R3752AH/BH, R3753AH/BH)

20kHz to 500kHz	105dB
500kHz to 300MHz	115dB
300MHz to 500MHz	110dB

6 SPECIFICATIONS

Source crosstalk (25 ± 5°C)	(at +15dBm output level, ATT = 0dB)	
	20kHz to 500kHz	105dB
	500kHz to 300MHz	110dB
	300MHz to 500MHz	105dB
Input connector	Type BNC female, 50Ω	

Automatic offset calibration
  Normalize function
 	
  Electrical length correction
 	
  Range
	Reduces the frequency characteristics of a measurement system
	Equivalent electric length or group delay time can be added to the measured phase and group delay time.
	-3 × 10^{9}m to +3 × 10^{9}m or +10sec to -10sec	

Magnitude characteristic
  Relative characteristic
    Measurement range
    Display resolution
    Accuracy

(R3752AH/BH, R3753AH/BH)
0 ±115dB (RBW 1kHz, ATT AUTO)
0.001dB/div
±0.5dB (50MHz at 25 ± 5°C, input 50Ω, maximum input level)

    Frequency response

(25 ± 5°C)

50Ω	5Hz to 100MHz	1dB P-P
	100MHz to 300MHz	2dB P-P
	300MHz to 500MHz	3dB P-P
1MΩ	5Hz to 1kHz	5dB P-P
	1kHz to 100MHz	1.5dB P-P

Dynamic accuracy

(25 ± 5°C, RBW 3Hz, Frequency ≥ 1kHz, ATT= 20dB)

0 to -10dBm	±0.10dB
-10 to -60dBm	±0.05dB
-60 to -70dBm	±0.10dB
-70 to -80dBm	±0.30dB
-80 to -90dBm	±0.90dB

Absolute characteristic Measurement range	(RBW 1kHz)

0dBm to -115dBm	ATT AUTO
0dBm to -95dBm	ATT 20dB
-20dBm to -115dBm	ATT 0dB

Display resolution
Accuracy

Frequency response

0.001dB/div
±0.5dB (50MHz at 25 ± 5°C, input 50Ω, maximum input level)
(25 ± 5°C)

50Ω	5Hz to 10kHz	4dB P-P
	10kHz to 300MHz	2dB P-P
	300MHz to 500MHz	3dB P-P
1MΩ	5Hz to 1kHz	10dB P-P
	1kHz to 100MHz	1.5dB P-P

Dynamic accuracy

(R3752EH, R3753EH)
(25 ± 5°C, RBW 3Hz, Frequency ≥ 1kHz, ATT= 20dB)

0 to -10dBm	±0.4dB
-10 to -60dBm	±0.1dB
-60 to -70dBm	±0.2dB
-70 to -80dBm	±0.6dB

Phase characteristic
Relative characteristic
Measurement range

Display resolution
Frequency response

(R3752AH/BH, R3753AH/BH)
±180° (The phase extending function enables the display to trace data over ±180° continuously.)
0.01°
(25 ± 5°C, when attenuation value is the same)

50Ω	5Hz to 100MHz	5° P-P
	100MHz to 300MHz	15° P-P
	300MHz to 500MHz	20° P-P
1MΩ	5Hz to 1kHz	20° P-P
	1kHz to 100MHz	10° P-P

Dynamic accuracy

(25 ± 5°C, RBW 3Hz, Frequency ≥ 1kHz, ATT= 20dB)

0 to -10dBm	±1.0°
-10 to -50dBm	±0.3°
-50 to -60dBm	±0.5°
-60 to -70dBm	±1.0°
-70 to -80dBm	±3.0°
-80 to -90dBm	±8.0°

Absolute characteristic Measurement range Dynamic accuracy	(R3752EH, R3753EH) ±180° (The phase extending function enables the display to trace data over ±180° continuously.) (25 ± 5°C, RBW 3Hz, Frequency ≥ 1kHz, ATT= 20dB)

0 to -10dBm	±3.0°
-10 to -50dBm	±1.5°
-50 to -60dBm	±2.0°
-60 to -70dBm	±2.4°
-70 to -80dBm	±3.6°

Delay characteristic Range Measurement range Group delay resolution Aperture frequency Accuracy	The following formula is used to determine the range. $r = \dfrac{\Delta\phi}{360 \times \Delta f}$ $\Delta\phi$: Phase Δf : Aperture frequency (Hz) 1ps to 250s 1ps 0.01% to 50% of the specified span frequency $\dfrac{\text{Phase accuracy}}{360 \times \text{Aperture frequency (Hz)}}$

(4) Error calibration function

Normalize	Corrects the Frequency response (of Amplitude, Phase) in the Transmission measurement.
One port calibration	Corrects the errors caused by the bridge directivity, the Frequency response and the Source match in the Reflection measurement. Short, Open and Load standards are required for the error correction.
Data averaging	Averages the data (vector values) at each sweep. The averaging number can be set between 2 to 999.
Transmission full calibration	The transmission normalize enables the high accuracy measurement on transmission measurement. The Short and Load standards are required for the error correction.

(5) Connection with external instruments

Signal output for an external display	15 pin D-SUB connector (VGA)
GP-IB data output and Remote control	IEEE488 applicable
Parallel I/O output	TTL level, 8-bit output (Two ports) 4-bit input and output (Two ports)
Serial port	RS-232 compatible
Keyboard	IBM PC-AT compatible
External reference frequency input	Applicable input signal is Frequency: 1, 2, 5, 10MHz ± 10ppm, 0dBm (50Ω) or more

(6) Display section

R3752H series
  Indicator
  Resolution
  Display mode
	fluorescent display tube, Green
	256 × 64 dots
	Character display, 32 × 8 characters

R3753H series
  Indicator
  Resolution
  Display mode
 	
  Display format
 	
  Measurement condition display
  Position of Reference line
  Auto scale
 	
  Brightness
	8.4inch TFT color LCD
	640 × 480 dots
	Rectangular log/Linear coordinates, Polar coordinate, Smith chart (Impedance/Admittance display)
	Single Channel Display, Dual Channel Display (which shows plural traces together or respectively.)
	Start/Stop, Center/Span, Scale/DIV, Reference level, Marker value, Soft key function, Warning message
	The top (100%) to the bottom (0%) of the vertical axis
	Optimizes the reference value and the scale to show the traced data best in the screen.
	The back-light can be turned on/off.

(7)　Marker function (R3753H series)

Marker display	The readout of the Marker can be converted to the display value conformed to the measurement format.
Multi marker	Ten markers can be set for each channel, respectively.
Delta marker	Any one of the ten markers can be specified as a reference marker and can measure the delta value between a movable marker and the reference marker.
Marker couple	The marker of each channel can be set as a coupling marker or an independent marker.
Analysis of arbitrary specified zone	The marker search function can be performed in a segment specified by the delta marker function.
MKR search	MAX search, MIN search, NEXT search
Marker tracking	Performs the search for each sweep.
Target search	Calculates a XdB-down Band width, a Center frequency, Q value and so on. It is also possible to search the frequency of the phase 0° or the frequency band of $\pm X°$.
MKR $\rightarrow$	MKR $\rightarrow$ the reference value, MKR $\rightarrow$ START, MKR $\rightarrow$ STOP, MKR $\rightarrow$ CENTER
Limit line function	

(8)　Instruments state function

Save register	The setting condition and the CAL data can be saved in the internal memory which is keeping backup.
Data save/recall	Each kind of data can be stored by using a floppy disk which is standard.

(9)　Programming function

BASIC controller function	Controls this R3753H series itself and instruments equipped with GPIB interface functions. This is a built-in standard controller function.
Built-in function	Enables the high speed analysis of the measurement data.
FDD function	MS-DOS format compatible. Recording capacity:　DD 720kB HD 1.2MB, 1.44MB

(10) General specification

Operating conditions	
When disk drive is in operation	Temperature: +5°C to +40°C Humidity (without condensation): 80% or less
When disk drive is not in operation	Temperature: 0°C to +50°C Humidity (without condensation): 80% or less
Non-operating conditions	-20°C to +60°C
Power supply	AC100V to 120V, AC220V to 240V at 50Hz/60Hz Automatically switched to the AC100 family or the AC200V family.
Power consumption	300VA or less
Cabinet dimensions R3752H series R3753H series	about 424mm(W) × 132mm(H) × 400mm(D) about 424mm(W) × 200mm(H) × 400mm(D)
Mass R3752H series R3753H series	12kg or less 15kg or less

7 ERROR MESSAGES

This chapter explains the error messages displayed on the screen.
Error messages are classified into the following groups.

7.1 Hardware trouble
7.2 Overloading an input part
7.3 Notice of hardware information
7.4 Operating error
7.5 Warning of internal set, change, etc.
7.6 Completion operating condition messages

These error message are displayed as following.

* Error messages are left displayed on the fixed position. In other words, the error message is displayed over the former message, and the latest message remains on the screen.

* The error message does not disappear until some panel key is pressed. However, the messages in section 7.1 and 7.2 disappear if the R3753H series is returned to the correct state.

* The message of section of 7.4 to 7.6 are not displayed in GPIB operation (also including an internal BASIC operation).

Note: → *marks explain supplemental remarks of error message list and problem-solving methods.*

7.1 Hardware Trouble

LOCAL #1 Unlock.
LOCAL #2 Unlock.

    LOCAL has been unlocked.

SYNTHE Unlock.

    SYNTHE has been unlocked.

VCXO Unlock.

    VCXO has been unlocked.

    →   If these error message appear, call the nearest dealer or sales-and-support office.

7.2 Overloading an Input Part

<u>Ach Overload.</u>
<u>Bch Overload.</u>
<u>Rch Overload.</u>

A signal exceeding a maximum permissible level has been input to the channel.

→ Check the input signal level.

<u>Ach Overload Trip.</u>
<u>Bch Overload Trip.</u>
<u>Rch Overload Trip.</u>

A signal exceeding a maximum permissible level has been input to the displayed channel. Then a protection circuit has started.

→ Check the input signal level. Then release the trip state by executing CLEAR TRIP.

7.3 Notice of Hardware Information

<u>External Standard In.</u>

An external reference signal has been input.

<u>External Trigger ignored.</u>

An input external trigger was ignored. (That does not mean a prohibiting state.)

→ An external trigger (PIO-18pin) has been input in a state of not waiting for the external trigger.
The state of waiting for the external trigger is the state of waiting for sweep in the external trigger mode (that is, in a state that TRIGGER[CONT] or TRIGGER[SINGLE] on the panel). If next trigger pulse is input during a sweep in using an external trigger source, the above error occurs.
Check the trigger setting and the specification of an external trigger signal.

7.4 Operating Error

Already Memorized.

Memorizing calibration data which {DONE} operation was already executed was attempted.

→ Clear the already-memorized calibration data with {CLEAR CAL DATA}.

Calibration aborted.

Memorizing calibration data was aborted.

→ While calibration data is being memorized, if the setting is changed, the calibration is aborted.
Do not change the setting until the calibration is finished.

Calibration data not found.

CORRECT ON was executed without memorized calibration data.

→ Memorize the calibration data.

Can't ... When CORRECT ON.

To memorize calibration data or to execute {CLEAR CAL DATA} was attempted in the state of CORRECT ON.

→ Choose CORRECT OFF.

Can't ... When PROG-SWEEP.

To set the number of points or to clear segments was attempted in the state of program sweep.

→ Specify a sweep type other than PROGRAM SWEEP and USER SWEEP.

Can't ... When USER-SWEEP.

To set the number of points or to clear segments was attempted in the state of user frequency sweep.

→ Specify a sweep type other than PROGRAM SWEEP and USER SWEEP.

Can't find plotter !!!

A plotter was not found in a plot output.

→ The plotter is not connected or GPIB address of the plotter is not correct.

Data and Coef not matched.

To execute CORRECT ON was attempted under a condition differing from a measurement condition where correction data was obtained.

→   Specify the same measurement condition where the correction data was obtained.

Data and Memory not matched.

A trace operation (DATA/MEM, etc.) or a memory trace display (DISPLAY MEMORY, DISPLAY DATA&MEM) was specified under a condition differing from a measurement condition where a memory trace was obtained.

→   Specify the measurement condition where the memory trace was obtained.

Disk not found

Data in a floppy disk was not able to be read with the {LOAD MENU}, {STORE FILE} or {LOAD FILE} key in R3753H series.

→   The floppy disk has some scratches or has not be formatted or inserted. Check the floppy disk.

Duplicate name

The same name that has already been edited or a reserved name is input with the [SAVE] → {STORE FILE} → {EDIT NAME} key in this order in R3753H series.

→   Input a different name.

File load error.

An error occurred in a {LOAD FILE} execution.

→   Something is wrong with the floppy disk, or a file other than files stored in the R3753H series was specified. Check the floppy disk.

File store error

An error occurred in a {STORE FILE} execution.

→   The floppy disk has no available space, or the floppy disk is not formatted or is in a write-protect state. Check the floppy disk.

Formatting failure

Something was wrong in the formatting operation.

→   The floppy disk has some scratches or is in a write-protect state. Check the floppy disk.

Illegal PROG-SWEEP points.

With the number of total points of all segments being less than 3 or more than 1201, the program sweep was specified.

→ Specify the number of the segment point again.

Illegal USER-SWEEP points.

With the number of total points of all segments being less than 3 or more than 1201, the user frequency sweep was specified.

→ Specify the number of the segment point again.

Memory not found.

A trace operation (DATA/MEM, etc.) or a memory trace display (DISPLAY MEMORY, DISPLAY DATA&MEM) was specified, with a memory trace not stored.

→ Obtain the memory trace.

None Controller

A plot output was specified not in system controller mode.

→ Set to the system controller mode.

Now plotting !!!

Another plot output was specified in the course of executing a plot output.

→ Until the current plot output is completed, the following plot can not be executed. Wait until the current plot output is completed.

Please set 1-trace FORMAT

With the measurement format two traces (LOGMAG&PHASE, LOGMAG&DELAY, LOGMAG& PHASE), the memory trace display (DISPLAY MEMORY, DISPLAY DATA&MEM) was specified.

→ The memory trace display is invalid with the measurement format two traces.
Set the measurement format to one trace (other than LOGMAG&PHASE, LOGMAG& DELAY or LOGMAG&PHASE).

Register recall error.

An error occurred in recalling a register.

→ A register that had not been saved was specified or the resister was broken by some factor. Clear the resister with {CLEAR REG} and save again.

7.4 Operating Error

Register save error.

An error occurred in saving a register.

→ Available space is not in C: drive.
    Delete unnecessary files.

Segment #x error.

The PROGRAM SWEEP or USER SWEEP was specified in a state that STOP FREQ of the Xth segment is higher than START FREQ of the following segment.

→ Specify the frequency of the Xth segment again.

Segment not entered.

The PROGRAM SWEEP or USER SWEEP was specified without setting any segment.

→ Specify the segment.

Some STD not memorized.

To execute the {DONE} operation was attempted without obtaining all related calibration data.

→ Obtain all calibration data.

7.5 Warning of Internal Set, Change, etc.

CH1 INPUT-MEAS changed.
CH2 INPUT-MEAS changed.

The INPUT MEAS setting at the channel 1 or channel 2 was internally changed.

→ When a S-parameter test set is connected, a INPUT MEAS setting that a Forward direction and Reverse direction of the S-parameter test set, respectively, are simultaneously assigned to either CH1 or CH2 is invalid for a dual sweep (DUAL CH ON, COUPLE CH on). These messages are displayed when the above setting is executed.

When above message is displayed, the direction assigned to the channel described in the message is internally made the same direction as the other channel has been assigned to in INPUT MEAS setting. (Settings of reflection or transmission measurement are not changed.)

CORRECT turned off.

The CORRECT setting was internally altered to OFF.

→ The measuring condition in which the correction data was obtained must be the same as the current measuring condition in the correcting measurement (CORRECT ON). Therefore, when the number of points or a sweep type is altered in a state of CORRECT ON, this message is displayed and CORRECT OFF is set.

CORR or MEM can't be saved.

The correction data or memory trace data was not able to be saved in executing SAVE REGISTER.

→ The correction data or memory trace data is saved in B: drive with SAVE REGISTER. If available space is not in B: drive, this message is displayed. (However, the setting condition of the R3753H series is saved.) Clear unnecessary register.

Data file can't be stored.

The trace data (RAW, COEF, MEM, DATA) was not able to be saved with STORE FILE.

→ Available space is not in A: drive (floppy disk). (However, the setting condition of the R3753H series is saved.) Clear unnecessary file or use another floppy disk.

Display Mode changed.

The display mode setting was internally altered to DISPLAY DATA.

→ A measuring condition in which the memory trace was obtained must be the same as the current measuring condition and the measuring format must be set to one trace in the memory trace display mode (DISPLAY MEMORY, DISPLAY DATA&MEM).
Therefore, when the number of points or the sweep type is altered in a state that the memory trace is displayed, or when the measuring format is set to two traces (LOG-MAG&PHASE, LOGMAG&DELAY, LINMAG&PHASE), this message is displayed and the display mode is altered to DISPLAY DATA.

Overwrite

Data is being written over an already-existing file with STORE FILE.

→ Specify a different file name to prevent to write over.

Sweep time increased.

The setting of the sweep time was internally altered and the sweep time was increased.

→ The minimum setting of the sweep time depends on the RBW setting or others. When the sweep time is set to AUTO, this message is not displayed.
Therefore, when the sweep time is not set to AUTO, if this message is displayed by altering the setting of the RBW or and the sweep time is increased.
Afterward, even if the RBW setting is set to the previous setting, the sweep time setting do not be set back to the previous setting.

Trace-Math turned off.

The setting of the trace operation (DATA/MEM and others) was internally altered to OFF.

→ The measuring condition in which the memory trace was obtained must be the same as the current measuring condition in the trace operation.
Therefore, when the number of points or the sweep type was altered with the trace operation executed, this message is displayed and the trace operation is set to OFF.

7.6　Completion Operating Condition Messages

Abort PLOT !!!

The plot output was interrupted by pushing the {ABORT} key, [PRESET] key or [STOP] key.

Clear Completed.

The memorized calibration data was cleared with CLEAR CAL DATA.

Clear Input Trip.

The trip state of the input part was released with CLEAR TRIP.

Formatting now...

The floppy disk is now under formatting.

Formatting complete

Formatting the floppy disk was correctly complete.

Store Completed

A data trace was copied into a memory trace with {DATA → MEMORY}.

Wait for sweep.

A sweep is being executed to obtain the calibration data.

APPENDIX

A.1 Initial Setting

(1) Initial setting

Function	Initialize method	
	Power on or preset	*RST
Stimulus		
Sweep type	Linear frequency sweep	Linear frequency sweep
Continuous sweep	ON	OFF
Trigger source	Internal (FREE RUN)	Internal (FREE RUN)
Trigger delay	OFF (0sec)	OFF (0sec)
Sweep time	30msec (Manual)	120msec (Auto)
Measurement point	201	1201
Start frequency	5Hz	5Hz
Stop frequency	500MHz	500MHz
Center frequency	250.0000025MHz	250.0000025MHz
Frequency span	499.999995MHz	499.999995MHz
Frequency display	Start/Stop	Start/Stop
Fixed frequency of level sweep	100MHz	100MHz
Output level	0dBm	0dBm
Start level	-43dBm	-43dBm
Stoplevel	0dBm	21dBm
Trip	Clear	Clear
Two-channel interlocking	ON	ON
Program sweep segment	All clear	All clear
Output port	Port 2 *1	Port 2 *1
Response		
Dual channel	OFF	OFF
Active channel	1	1
Resolution bandwidth	10kHz	10kHz
Selection item of input port	A/R *2	A/R
Average	OFF (Number of times 16)	OFF (Number of times 16)
Trace operation	NONE	NONE
Conversion	NONE	NONE
Characteristic impedance Z_0	50Ω	50Ω
Measurement format	LOGMAG&PHASE	LOGMAG&PHASE
Group delay aperture	10%	0.01%
Smoothing	OFF (Aperture 10%)	OFF (Aperture 0.01%)
Display	Data	Data
Split/Overlap	Overlap	Overlap
Label	NONE	NONE

*1   Port 1 is used for R3753EH.
*2   A is used for R3753EH.

(2 of 3)

Function	Initialize method	
	Power on or preset	*RST
Calibration		
Correct measurement	OFF	OFF
Calibration data	Clear	Clear
Electrical length correction	OFF (0sec)	OFF (0sec)
Phase offset	OFF (0°)	OFF (0°)
Measurement end extension correction	OFF	OFF
R input	0 sec	0 sec
A input	0 sec	0 sec
B input	0 sec	0 sec
Port 1	0 sec	0 sec
Port 2	0 sec	0 sec
Velocity factor	1	1
The value per division of Y-axis		
Logarithmic magnitude	10dB	10dB
Phase	45°	45°
Group delay	$0.1\,\mu sec$	$0.1\,\mu sec$
Smith chart	—	—
Polar	—	—
Linear magnitude	0.1	0.1
SWR	1	1
Real part	1	1
Imaginary part	1	1
Continuous phase	360°	360°
Reference position		
Logarithmic magnitude	100%	100%
Phase	50%	50%
Group delay	50%	50%
Smith chart	—	—
Polar	—	—
Linear magnitude	0%	0%
SWR	0%	0%
Real part	100%	100%
Imaginary part	100%	100%
Continuous phase	50%	50%

(3 of 3)

Function	Initialize method	
	Power on or preset	*RST
Reference value		
Logarithmic magnitude	0dB	0dB
Phase	0°	0°
Group delay	0sec	0sec
Smith chart	1	1
Polar	1	1
Linear magnitude	0	0
SWR	1	1
Real part	10	10
Imaginary part	10	10
Continuous phase	0°	0°
Input attenuator		
R input	AUTO	AUTO
A input	AUTO	AUTO
B input	ATUO	ATUO
Input impedance		
R input	50Ω	50Ω
A input	50Ω	50Ω
B input	50Ω	50Ω
CDMA IF filter analysis		
CDMA IF filter gate function	OFF	OFF
CDMA IF filter gate start time	0sec	0sec
CDMA IF filter gate stop time	6μsec	6μsec
CDMA IF filter gate shape	CDMA IF	CDMA IF
CDMA IF filter magnitude analysis	OFF	OFF
Search attenuation	6dB	6dB
Guaranteed attenuation		
measurement First frequency	900kHz	900kHz
Second frequency	1.2MHz	1.2MHz
Phase linearity analysis	OFF	OFF

(2)   Setting backup memory (factory default settings)

GPIB address	11
System controller/Addressable	Addressable
Printer GPIB address	18
Plotter GPIB address	5
Save register	All clear

A.2 Soft Key Menu List

(Note 1) This is not displayed in R3753BH/EH.
(Note 2) This is not displayed in R3753EH.
(Note 3) This can be set only the case with which S parameter test set is connected with R3753AH.

[MENU]

• Signal source menu
POWER
SWEEP TIME[ ]
SWEEP TYPE[ ]
TRIGGER[ ]
POINTS
COUPLED CH ON/OFF
CW FREQ
RESTART

• Power menu
OUTPUT 1
OUTPUT 2(Note 2)
POWER
ATTENUATOR PORT1(Note 3)
ATTENUATOR PORT2(Note 3)
Return

• Sweep type menu
LIN FREQ
LOG FREQ
USER SWEEP
PROGRAM SWEEP
POW SWEEP
EDIT USER SWEEP
EDIT PROG SWEEP
Return

• User frequency sweep segment editing menu
SEGMENT:NUMBER
START
STOP
FREQ
POINT
CLEAR SEG
CLEAR ALL SEG
Return

• Program sweep segment editing menu (1 of 2)
SEGMENT:NUMBER
START
STOP
POINT
CLEAR SEG
CLEAR ALL SEG
Return
More 1/2

• Program sweep segment editing menu (2 of 2)
SEGMENT:POWER
IF RBW
SETTLING TIME
R ATT 0dB/20dB(Note 2)
A ATT 0dB/20dB
B ATT 0dB/20dB(Note 1)
Return
More 2/2

• Trigger menu
CONTINUOUS
SINGLE
HOLD
INT TRIG
EXT TRIG
TRIGGER DELAY
Return

(Note 1) This is not displayed in R3753BH/EH.
(Note 2) This is not displayed in R3753EH.
(Note 3) This can be set only the case with which S parameter test set is connected with R3753AH.

● Scale menu

[SCALE] → AUTO SCALE
/DIV
REF VALUE
REF POS
REF LINE ON/OFF
SCALE FOR 2nd/1st

● Parameter conversion menu
Z(REFL)
Z(TRANS)
Y(REFL)
Y(TRANS)
1/S
OFF
Z0 VALUE
Return

● S parameter menu
S11(A/R)REFL FWD(Note 3)
S21(B/R)TRANS FWD(Note 3)
S12(A/R)TRANS REV(Note 3)
S22(B/R)REFL REV(Note 3)
CONVERSION[
INPUT PORTS

● Measurement menu
[MEAS] → A/R(Note 2)
B/R(Note 1)
A/B(Note 1)
R(Note 2)
A
B(Note 1)
CONVERSION[
S PARAMETERS

● Format menu (2 of 2)
SWR
REAL
IMAG
PHASE-∞,+∞
LOG MAG & PHASE
LOG MAG & DELAY
LIN MAG & PHASE
More 2/2

● Format menu (1 of 2)
[FORMAT] → LOG MAG
PHASE
DELAY
SMITH(R+jX)
SMITH(G+jB)
POLAR
LIN MAG
More 1/2

● Average menu

[AVG] ——→ AVG STATE ON/OFF
AVG COUNT
AVG RESTART
GROUP DELAY APERTURE
SMOOTHING ON/OFF
SMOOTHING APERTURE
IF RBW[ ]

● RGB menu

RED
GREEN
BLUE
Return

● Color menu (3 of 3)

ANNOTATION
CLOCK
LABEL
OVERLAY TEXT
BASIC TEXT
Return
More 3/3

● Color menu (2 of 3)

SCREEN
GRID FG
GRID BG
WINDOW BG
SWEEP MARKER
Return
More 2/3

● Color menu (1 of 3)

1ST TRACE
2ND TRACE
1ST MARKER
2ND MARKER
REF LINE
ACTIVE MARKER
Return
More 1/3

(Note 1) This is not displayed in R3753BH/EH.
(Note 2) This is not displayed in R3753EH.

● Trace operation menu

DATA/MEM
DATA-MEM
DATA*MEM
DATA+MEM
OFF
Return

● Display menu (1 of 2)

[DISPLAY] ——→ DUAL CH ON/OFF
SPLIT CH ON/OFF
DISPLAY DATA
DISPLAY MEMORY
DISPLAY DATA & MEM
DEFINE TRACE[ ]
DATA→MEMORY
More 1/2

● Display menu (2 of 2)

GRATICULE ON/OFF
LABEL
COLOR
More 2/2

● Label menu

DONE
CURSOR →
CURSOR ←
BACKSPACE
DELETE CHAR
CLEAR LINE
CANCEL

● Attenuator selection menu

INPUT ATT AUTO
INPUT ATT 0dB
INPUT ATT 20dB
Return

● Attenuator menu

[FUNCTION] ——→ Rch : ATT[ ](Note 2)
Rch : IMP 1MΩ/50Ω (Note 2)
Ach : ATT[ ]
Ach : IMP 1MΩ/50Ω
Bch : ATT[ ](Note 1)
Bch : IMP 1MΩ/50Ω (Note 1)
CLEAR TRIP

[CAL]

• Calibration menu (1 of 2)
NORMALIZE(THRU)
NORMALIZE(SHORT)
CAL MENUS ─────────
CORRECT ON/OFF
INTERPOLATE ON/OFF
PORT EXTENTION ─────
ZO VALUE
More 1/2

• Calibration menu (2 of 2)
ELEC DELAY ON/OFF
ELECTRICAL DELAY
ELECTRICAL LENGTH
VELOCITY FACTOR
PHASE OFFSET VALUE
PHASE SLOPE
More 2/2

• Full calibration selection menu
1-PORT FULL CAL
TRANS FULL CAL ───
CLEAR CAL DATA
Return

• 1 port full calibration menu
OPEN
SHORT
LOAD
DONE 1-PORT

• 1 port full calibration menu
OPEN
SHORT
LOAD
DONE TRANS

• Port extension menu
EXTENSION ON/OFF
EXTENSION INPUT R(Note 2)
EXTENSION INPUT A
EXTENSION INPUT B(Note 1)
EXTENSION PORT 1(Note 3)
EXTENSION PORT 2(Note 3)
Return

(Note 1) This is not displayed in R3753BH/EH.
(Note 2) This is not displayed in R3753EH.
(Note 3) This can be set only the case with which S parameter test set is
connected with R3753AH.

[MKR]

• Marker menu
ACTIVATE MARKER[ ]
MARKER ALL OFF
Δ MODE MENU
MKR LIST ON/OFF
MARKER MODE MENU

• Active marker menu (1 of 2)
MARKER 1
MARKER 2
MARKER 3
MARKER 4
MARKER 5
ACTIVATE MKR OFF
Return
More 1/2

• Active marker menu (2 of 2)
MARKER 6
MARKER 7
MARKER 8
MARKER 9
MARKER 10
ACTIVATE MKR OFF
Return
More 2/2

• Delta mode menu
Δ MODE OFF
Δ REF= Δ MKR
Δ REF=ACT MKR
Δ REF=FIXED MKR
FIXED MKR POSITION
Return

• ACT MKR menu(1 of 2)
COMPARE MARKER 1
COMPARE MARKER 2
COMPARE MARKER 3
COMPARE MARKER 4
COMPARE MARKER 5
ACTIVATE MARKER[ ]
Return
More 1/2

• ACT MKR menu (2 of 2)
COMPARE MARKER 6
COMPARE MARKER 7
COMPARE MARKER 8
COMPARE MARKER 9
COMPARE MARKER 10
ACTIVATE MARKER[ ]
Return
More 2/2

• FIXED MKR setting menu
FIXED MKR STIMULUS
FIXED MKR VALUE
FIXED MKR AUX VALUE
FIXED MKR→ACTIVE MKR
Return

• Marker mode menu
MKR CMP/UNCMP
MKR CPL/UNCPL
CONVERSION MKR MENU[ ]
SMITH MKR MENU[ ]
POLAR MKR MENU[ ]
Return

• Conversion marker menu
DEFAULT
LIN MKR
Re/Im MKR
Return

• Smith marker menu
LIN MKR
LOG MKR
Re/Im MKR
R+jX MKR
G+jB MKR
Z0 VALUE
Return

• Polar marker menu
LIN MKR
LOG MKR
Re/Im MKR
Z0 VALUE
Return

• Marker search menu

[MKR →]
MARKER → START
MARKER → STOP
MARKER → CENTER
Δ MARKER → SPAN
MARKER → REF.VALUE
PART SRCH[ ]
MKR SEARCH[ ]

• Part search menu
Δ MODE MENU
SET RANGE
STATISTICS
PART SRCH ON/OFF
Return

• Search menu
MKR SEARCH OFF
MAX
MIN
TARGET
RIPPLE
FLTR ANAL
TRACKING ON/OFF
Return

• Target menu
TARGET VALUE
0°
±180°
LEFT SEARCH
RIGHT SEARCH
Return

• Ripple menu
MAX∩
MIN∪
Δ MAX∩-MIN∪
MAX-MIN
ΔX
ΔY
Return

• Filter analysis menu
WIDTH VALUE
FILTER TYPE BAND/NOTC
SEARCH FROM[ ]
DISPLAY MODE ABS/REL
SEARCH IN/OUT
FLTR ANAL ON/OFF
Return

• Search reference menu
ACTIVE MARKER
MAXIMUM VALUE
REFERENCE LINE

A.2 Soft Key Menu List

• Name editing menu
EDIT NAME
CURSOR ↑
CURSOR ↓
Return

• Character editing menu
DONE
CURSOR →
CURSOR ←
BACKSPACE
DELETE CHAR
CLEAR LINE
CANCEL

• Save register menu (4 of 4)
SAVE REG-16
SAVE REG-17
SAVE REG-18
SAVE REG-19
SAVE REG-20
RENAME REG
Return
More 4/4

• Save register menu (3 of 4)
SAVE REG-6
SAVE REG-7
SAVE REG-8
SAVE REG-9
SAVE REG-10
RENAME REG
Return
More 3/4

• Clear register menu (4 of 4)
CLEAR REG-16
CLEAR REG-17
CLEAR REG-18
CLEAR REG-19
CLEAR REG-20
Return
More 4/4

• Clear register menu (3 of 4)
CLEAR REG-11
CLEAR REG-12
CLEAR REG-13
CLEAR REG-14
CLEAR REG-15
Return
More 3/4

• Purge file menu
PURGE
CURSOR ↑
CURSOR ↓
Return

• Save register menu (2 of 4)
SAVE REG-6
SAVE REG-7
SAVE REG-8
SAVE REG-9
SAVE REG-10
RENAME REG
Return
More 2/4

• Clear register menu (2 of 4)
CLEAR REG-6
CLEAR REG-7
CLEAR REG-8
CLEAR REG-9
CLEAR REG-10
Return
More 2/4

• Save register menu (1 of 4)
SAVE REG-1
SAVE REG-2
SAVE REG-3
SAVE REG-4
SAVE REG-5
RENAME REG
Return
More 1/4

• Clear register menu (1 of 4)
CLEAR REG-1
CLEAR REG-2
CLEAR REG-3
CLEAR REG-4
CLEAR REG-5
Return
More 1/4

• File data menu
STATE ON/OFF
RAW ARRAY ON/OFF
CORR COEFY ON/OFF
DATA ARRAY ON/OFF
MEM ARRAY ON/OFF
Return

• Save menu
SAVE REGISTER
CLEAR REGISTER
STORE FILE
PURGE FILE
FORMAT DISK

[SAVE]

• Store file menu
STORE
ROLL ↑
ROLL ↓
DEFINE STORE
EDIT NAME
NAME ↑
NAME ↓
CANCEL

[RECALL] ──→

• Recall menu (1 of 4)
RECALL REG-1
RECALL REG-2
RECALL REG-3
RECALL REG-4
RECALL REG-5
RECALL POWER OFF
LOAD FILE
More 1/4

• Recall menu (2 of 4)
RECALL REG-6
RECALL REG-7
RECALL REG-8
RECALL REG-9
RECALL REG-10
RECALL POWER OFF
LOAD FILE
More 2/4

• Recall menu (3 of 4)
RECALL REG-11
RECALL REG-12
RECALL REG-13
RECALL REG-14
RECALL REG-15
RECALL POWER OFF
LOAD FILE
More 3/4

• Recall menu (4 of 4)
RECALL REG-16
RECALL REG-17
RECALL REG-18
RECALL REG-19
RECALL REG-20
RECALL POWER OFF
LOAD FILE
More 4/4

• Load file menu
LOAD
CURSOR ↑
CURSOR ↓
Return

[COPY]

• Copy menu
PRINT
PLOT
ABORT
SELECT QUADRANT
DEFINE PLOT
CONFIGURE PLOT
PRINT/PLOT SETUPS

• Plot scale menu
FULL PAGE
LEFT
RIGHT
LEFT UPPER
LEFT LOWER
RIGHT UPPER
RIGHT LOWER
Return

• Plot data menu
PLOT DATA ON/OFF
PLOT MEMORY ON/OFF
PLOT GRATICULE ON/OFF
PLOT TEXT ON/OFF
PLOT MARKER ON/OFF
PLOT REF LINE ON/OFF
Return

• Plotter pen menu
PEN NUM DATA
PEN NUM MEMORY
PEN NUM GRATICULE
PEN NUM TEXT
PEN NUM MARKER
LINE TYPE DATA
LINE TYPE MEMORY
Return

• Setup menu
PRINTER
PRINT SPEED FAST/SLOW
PLOT LABEL ON/OFF
PLOT P.TXT ON/OFF
DEFAULT SETUPS
PLOTTER HP/AT
Return

• Printer menu
HP ThinkJet
EPSON ESC/P
HP PCL
BITMAP FILE
PRINTER PORT GPIB
PRINTER PORT RS232C
Return

System menu
[SYSTEM] — SYSTEM DRIVE
SET CLOCK
LIMIT MENU
FUNCTION (to next page)
SET KEYBOARD 101/106
FIRMWARE REVISION

Real time clock menu
YEAR
MONTH
DAY
HOUR
MINUTE
SECOND
Return

System drive menu
DEFAULT DRIVE
FORMAT TYPE
Return

Default drive menu
A:
B:
C:
D:
Return

Disk format menu
1.2MB 8 SECTORS
1.2MB 15 SECTORS
1.44MB 18 SECTORS
Return

Limit menu
LIMIT LINE ON/OFF
LIMIT TEST ON/OFF
BEEP[　]
LIMIT MODE MENU
EDIT LIMIT LINE
SELECT DATA 1ST/2ND
LIMIT LINE OFFSETS
Return

Limit mode menu
1ST DATA ON/OFF
2ND DATA ON/OFF
MAG DATA LIN/LOG
Return

Beep mode menu
OFF
FAIL
PASS
BEEP TONE
Return

Edit limits menu (1 of 2)
SEGMENT
SELECT DATA 1ST/2ND
EDIT SEGMENT
DELETE
ADD SEGMENT
LINE TYPE
DONE
More 1/2

Edit segment menu
STIMULUS VALUE
MARKER TO STIMULUS
UPPER LIMIT
LOWER LIMIT
DELTA LIMIT
MIDDLE VALUE
MARKER TO MIDDLE
Return

Limit type menu
SLOPING LINE
FLAT LINE
SINGLE POINT
LIMIT COLOR
WAVE COLOR
Return

Edit limits menu (2 of 2)
LIMIT LINE ON/OFF
LIMIT TEST ON/FF
BEEP[　]
MAG DATA LIN/LOG
LIMIT MODE MENU
LIMIT LINE OFFSETS
CLEAR LIST
More 2/2

Clear limit menu
CLEAR LIST YES
CLEAR LISR NO

Offset limits menu
STIMULUS OFFSET
AMPLITUDE OFFSET
MARKER TO AMP. OFS
Return

PROGRAM → • Controller menu
[RUN]
RUN
LOAD MENU
LIST
CLS
CONT
STOP

• Load menu
LOAD
CURSOR ↑
CURSOR ↓
DRIVE CHANGE
Return

• Drive menu
A:
B:
C:
D:
Return

REMOTE → • GPIB menu
[LCL]
SYSTEM CONTROLLER
TALKER LISTENER
SET ADDRESSES

• Address menu
ADDRESS R3753
ADDRESS PLOTTER
ADDRESS PRINTER
Return

• System menu (continued)
[FUNCTION]

• Function menu
CDMA IF FILTER

• CDMA IF filter menu
CDMA IF GATE [ ]
CDMA FILTER ANALYSIS [ ]
CDMA PHASE LINEARITY [ ]
PHASE LINEARITY [ ]
Return

• CDMA IF filter analysis menu
CDMA FILTER ANALYSIS [ ]
WIDTH VALUE [ ]
ATTN FREQ1 [ ]
ATTN FREQ2 [ ]
Return

• CDMA IF gate menu
CDMA GATE [ ]
CDMA GATE START [ ]
CDMA GATE STOP [ ]
GATE SHAPE [ ]
Return

• CDMA gate shape menu
MAXIMUM
WIDE
NORMAL
MINIMUM
CDMA IF
Return

• Phase linearity analysis menu
PHASE LINEARITY ON/OFF
PARTIAL ON/OFF
Return

A.3 GPIB Command List for Panel Key/Soft Key

Shows the GPIB command corresponding to the panel key or the soft key. Refer to the separate volume "Programming Manual" for the details of each command.

* Describes depending on the item in the following panel.
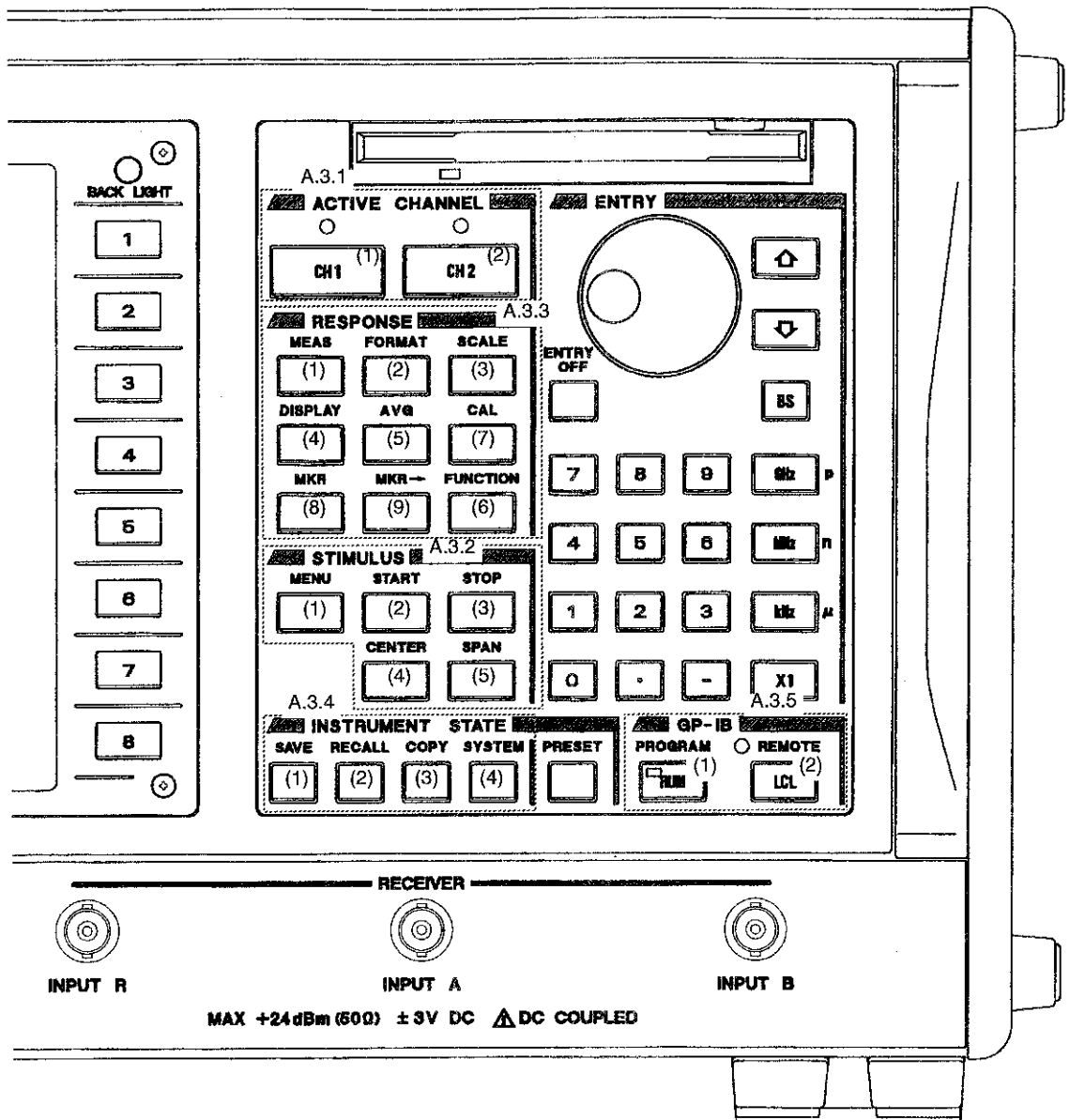
* Explanation of "O"and "N"

O: R3751 command mode
N: R3752/53H command mode

A.3.1 ACTIVE CHANNEL Block

(1) CH1

[CH1]   O : CH1
                                N : DISPlay:ACTive 1

(2) CH2

[CH2]   O : CH2
                                N : DISPlay:ACTive 2

A.3.2 STIMULUS Block

(1) MENU

Signal source menu

{POWER}   Calls the power menu. (See step (1-1).)

{SWEEP TIME}   O : STIME <real>
                                    STIMEAUTO
                                N : [SOURce:]SWEep[<chno>]:TIME <real>
                                    [SOURce:]SWEep[<chno>]:TIME:AUTO <bool>

{SWEEP TYPE[   ]}   Calls the sweep type menu. (See step (1-3).)

{TRIGGER[   ]}   Calls the trigger menu. (See step (1-2).)

{POINTS}   O : M{120l1601l301l201l101l51l21l11l6l3}P / POIN <int>
                                N : [SOURce:]SWEep[<chno>]:POINts <int>

{COUPLED CH ON/OFF}   O : COUPLE <bool>
                                N : [SOURce:]COUPle <bool>

{CW FREQ}   O : CWFREQ <real>
                                N : [SOURce:]FREQuency[<chno>]:CW <real>

{RESTART}   O : MEAS
                                N : ABORt;INITiate[:IMMediate]

(1-1)   Power menu

{OUTPUT 1}   O : PORT1
                                    N : OUTPut1[:STATe] ON

{OUTPUT 2}(Note 1)   O : PORT2
                                    N : OUTPut2[:STATe] ON

{POWER}   O : OUTLEV <real>
                                    N : [SOURce:]POWer[<chno>][:LEVel][:AMPLitude] <real>

{ATTENUATOR PORT 1}   O : ATTP1 <real>
                  (Note 2)   N : OUTPut1:ATTenuation <real>

{ATTENUATOR PORT 2}   O : ATTP2 <real>
                  (Note 2)   N : OUTPut1:ATTenuation <real>

{Return}   Returns to the signal source menu. (See step (1).)

Note1: This is not displayed in R3753EH.

Note2: This can be set only when S parameter test set is connected with R3753AH.

(1-2)   Trigger menu

{CONTINUOUS}   O : CONT ON
                                    N : INITiate:CONTinuous ON

{SINGLE}   O : SINGLE
                                    N : INITiate:CONTinuous OFF;:ABORt;INITiate

{HOLD}   O : SWPHLD
                                    N : INITiate:CONTinuous OFF;:ABORt

{INT TRIG}   O : FREE
                                    N : TRIGger[:SEQuence]:SOURce IMMediate

{EXT TRIG}   O : EXTERN
                                    N : TRIGger[:SEQuence]:SOURce EXTernal

{TRIGGER DELAY}   O : SETLTIME <real>
                                    N : TRIGger[:SEQuence]:DELay <real>

{Return}   Returns to the signal source menu. (See step (1).)

(1-3)   Sweep type menu

{LIN FREQ}   O : LINFREQ
                       N : [SOURce:]FREQuency[<chno>]:MODE SWEep; ⎤ *
                              [SOURce:]SWEep[<chno>]:SPACing LINear   ⎦

{LOG FREQ}   O : LOGFREQ
                       N : [SOURce:]FREQuency[<chno>]:MODE SWep;   ⎤ *
                              [SOURce:]SWEep[<chno>]:SPACing LOGarithmic ⎦
                              *Use these commands together.

{USER SWEEP}   O : USRFSWP
                       N : [SOURce:]PSWeep[<chno>]:MODE FREQuency

{PROGRAM SWEEP}   O : USRARWP
                       N : [SOURce:]PSWeep[<chno>]:MODE ALL

{POW SWEEP}   O : LEVEL
                       N : [SOURce:]POWer[<chno>]:MODE SWEep

{EDIT USER SWEEP}   Calls the user frequency sweep segment editing menu. (See step (1-3-1).)

{EDIT PROG SWEEP}   Calls the program sweep segment editing menu. (See step (1-3-2).)

{Return}   Returns to the signal source menu. (See step (1).)

(1-3-1)   User frequency sweep segment editing menu

{SEGMENT:NUMBER} O : USEG <n>
                   N : (Note)

{START}   O : USTART <start>
                   N : [SOURce:]PSWeep[<chno>]:FREQuency[<n>]<start>[,<stop>]

{STOP}   O : USTOP <stop>
                   N : [SOURce:]PSWeep[<chno>]:FREQuency[<n>]<start>[,<stop>]

{FREQ}   O : UFREQ <real>
                   N : [SOURce:]PSWeep[<chno>]:FREQuency[<n>] <start>

{POINT}   O : UPOINT <int>
                   N : [SOURce:]PSWeep[<chno>]:POINts[<n>] <int>

{CLEAR SEG}   O : There is no GPIB command to be applied.
                   N : [SOURce:]PSWeep[<chno>]:CLEar[<n>]

{CLEAR ALL SEG}   O : USEGCL
                   N : [SOURce:]PSWeep[<chno>]:CLEar[<n>]:ALL

{Return}
<start> and <stop> are <real>.

Note: In the R3752 and R3753 command modes, a segment number must be specified by the
         parameter <n> in the GPIB command.

(1-3-2)　Program sweep segment editing menu (1 of 2)

{SEGMENT:NUMBER}	O	:	USEG <n>
	N	:	(Note)

{START}	O	:	USTART <start> / UFREQ <real>
	N	:	[SOURce:]PSWeep[<chno>]:FREQuency[<n>]<start>[,<stop>]

{STOP}	O	:	USTOP <stop>
	N	:	[SOURce:]PSWeep[<chno>]:FREQuency[<n>]<start>[,<stop>]

{POINT}	O	:	UPOINT <int>
	N	:	[SOURce:]PSWeep[<chno>]:POINts[<n>] <int>

{CLEAR SEG}	O	:	There is no GPIB command to be applied.
	N	:	[SOURce:]PSWeep[<chno>]:CLEar[<n>]

{CLEAR ALL SEG}	O	:	USEGCL
	N	:	[SOURce:]PSWeep[<chno>]:CLEar[<n>]:ALL

{Return}	Returns to the sweep type menu. (See step (1-3).)

{More 1/2}	Calls the program sweep segment editing menu (2 of 2).

<start> and <stop> are real.

Note: In the R3752 and R3753 command modes, a segment number must be specified by the parameter <n> in the GPIB command.

Program sweep segment editing menu (2 of 2)

{SEGMENT:POWER}	O	:	ULEVEL <real>
	N	:	[SOURce:]PSWeep[<chno>]:POWer[<n>] <real>

{IF RBW}	O	:	URBW <int>
	N	:	[SOURce:]PSWeep[<chno>]:BANDwidth[<n>] <int>

{SETTLING TIME}	O	:	USETLT <real>
	N	:	[SOURce:]PSWeep[<chno>]:SETTling[<n>] <real>

{R ATT 0dB/20dB}	O	:	UATTIR <int>
(Note 1)	N	:	[SOURce:]PSWeep[<chno>]:INPut1:ATTenuation[<n>] <int>

{A ATT 0dB/20dB}	O	:	UATTIA <int>
	N	:	[SOURce:]PSWeep[<chno>]:INPut2:ATTenuation[<n>] <int>

{B ATT 0dB/20dB}	O	:	UATTIB <int>
(Note 2)	N	:	[SOURce:]PSWeep[<chno>]:INPut3:ATTenuation[<n>] <int>

{Return}	Returns to the sweep type menu. (See step (1-3).)

{More 2/2}	Calls the program sweep segment editing menu (1 of 2).

Note1: This is not displayed in R3753EH.

Note2: This is not displayed in R3753BH/EH.

A.3 GPIB Command List for Panel Key/Soft Key

(2)　START

[START]　　　　　　　O　:　STARTF <real>
　　　　　　　　　　　　　　STLEVEL <real>
　　　　　　　　　　　N　:　[SOURce:]FREQuency[<chno>]:STARt <real>
　　　　　　　　　　　　　　[SOURce:]POWer[<chno>]:STARt <real>

(3)　STOP

[STOP]　　　　　　　　O　:　STOPF <real>
　　　　　　　　　　　　　　STLEVEL <real>
　　　　　　　　　　　N　:　[SOURce:]FREQuency[<chno>]:STOP <real>
　　　　　　　　　　　　　　[SOURce:]POWer[<chno>]:STOP <real>

(4)　CENTER

[CENTER]　　　　　　　O　:　CENTERF <real>
　　　　　　　　　　　N　:　[SOURce:]FREQuency[<chno>]:CENTer <real>

(5)　SPAN

[SPAN]　　　　　　　　O　:　SPANF <real>
　　　　　　　　　　　N　:　[SOURce:]FREQuency[<chno>]:SPAN <real>

A.3.3 RESPONSE Block

(1) MEAS

Measurement menu

{A/R}(Note 1)   O : ARIN
                               N : [SENSe:]FUNCtion[<chno>][:ON] 'POWer:AC:RATio 2, 1'

{B/R}(Note 2)   O : BRIN
                               N : [SENSe:]FUNCtion[<chno>][:ON] 'POWer:AC:RATio 3, 1'

{A/B}(Note 2)   O : ABIN
                               N : [SENSe:]FUNCtion[<chno>][:ON] 'POWer:AC:RATio 2, 3'

{R}(Note 1)   O : RIN
                               N : [SENSe:]FUNCtion[<chno>][:ON] 'POWer:AC 1'

{A}   O : AIN
                               N : [SENSe:]FUNCtion[<chno>][:ON] 'POWer:AC 2'

{B}(Note 2)   O : BIN
                               N : [SENSe:]FUNCtion[<chno>][:ON] 'POWer:AC 3'

{CONVERSION[   ]}   Calls the parameter conversion menu. (See step (1-1).)

{S PARAMETERS}   Calls S parameter menu. (See step (1-2.)

Note1: *This is not displayed in R3753EH.*

Note2: *This is not displayed in R3753BH/EH.*

A.3 GPIB Command List for Panel Key/Soft Key

(1-1)   Parameter conversion menu

{Z(REFL)}   O : CONVRZ
                              N : CALCulate[<chno>]:TRANsform:IMPedance:TYPE
                                    ZREFlection

{Z(TRANS)}   O : CONVTZ
                              N : CALCulate[<chno>]:TRANsform:IMPedance:TYPE ZTRansmit

{Y(REFL)}   O : CONVRY
                              N : CALCulate[<chno>]:TRANsform:IMPedance:TYPE
                                    YREFlection

{Y(TRANS)}   O : CONVTY
                              N : CALCulate[<chno>]:TRANsform:IMPedance:TYPE YTRansmit

{1/S}   O : CONV1DS
                              N : CALCulate[<chno>]:TRANsform:IMPedance:TYPE INVersion

{OFF}   O : CONVOFF
                              N : CALCulate[<chno>]:TRANsform:IMPedance:TYPE NONE

{Z0 VALUE}   O : SETZ0 <real> / MKRZO {50|75}
                              N : CALCulate[<chno>]:TRANsform:IMPedance:CIMPedance

{Return}   Returns to the measurement menu (See step (1).)

(1-2)   S parameter menu

{S11(A/R)REFL FWD}   O : S11
         (Note)   N : [SENSe:]FUNCtion[<chno>][:ON] POWer:S11

{S21(B/R)TRANS FWD}   O : S21
         (Note)   N : [SENSe:]FUNCtion[<chno>][:ON] POWer:S21

{S12(A/R)TRANS REV}   O : S12
         (Note)   N : [SENSe:]FUNCtion[<chno>][:ON] POWer:S12

{S22(B/R)REFL REV}   O : S22
         (Note)   N : [SENSe:]FUNCtion[<chno>][:ON] POWer:S22

{CONVERSION[   ]}   Calls the parameter conversion menu. (See step (1-1).)

{INPUT PORTS}   Calls the measurement menu. (See step (1).)

Note: This can be set only when S parameter test set is connected with R3753AH.

(2) FORMAT

Format menu (1 of 2)

{LOG MAG}   O : LOGMAG
                     N : CALCulate[<chno>]:FORMat MLOGarithmic

{PHASE}   O : PHASE
                     N : CALCulate[<chno>]:FORMat PHASe

{DELAY}   O : DELAY
                     N : CALCulate[<chno>]:FORMat GDELay

{SMITH(R+jX)}   O : SRJX
                     N : CALCulate[<chno>]:FORMat SCHart

{SMITH(G+jB)}   O : SGJB
                     N : CALCulate[<chno>]:FORMat ISCHart

{POLAR}   O : POLAR
                     N : CALCulate[<chno>]:FORMat POLar

{LIN MAG}   O : LINMAG
                     N : CALCulate[<chno>]:FORMat MLINear

{More 1/2}   Calls the format menu (2 of 2).

Format menu (2 of 2)

{SWR}   O : SWR
                     N : CALCulate[<chno>]:FORMat SWR

{REAL}   O : REAL
                     N : CALCulate[<chno>]:FORMat REAL

{IMAG}   O : IMAG
                     N : CALCulate[<chno>]:FORMat IMAGinary

{PHASE -∞, +∞}   O : UNWRAP
                     N : CALCulate[<chno>]:FORMat UPHase

{LOG MAG & PHASE} O : LOGMP
                     N : CALCulate[<chno>]:FORMat MLOPhase

{LOG MAG & DELAY} O : LOGMD
                     N : CALCulate[<chno>]:FORMat MLODelay

{LIN MAG & PHASE} O : LINMP
                     N : CALCulate[<chno>]:FORMat M LIPhase

{More 2/2}   Calls the format menu (1 of 2).

(3) SCALE

Scale menu

{AUTO SCALE}   O : AUTO
                      N : DISPlay[:WINDow[<chno>]]:Y[<trace>][:SCALe]:AUTO ONCE

{/DIV}   O : SDIV <real>
                      N : DISPlay[:WINDow[<chno>]]:Y[<trace>][:SCALe]:PDIVision

{REF VALUE}   O : REFV
                      N : DISPlay[:WINDow[<chno>]]:Y[<trace>][:SCALe]:REFVel

{REF POS}   O : REFP
                      N : DISPlay[:WINDow[<chno>]]:Y[<trace>][:SCALe]:RPOSition

{REF LINE}   O : REFL <bool>
                      N : DISPlay[:WINDow[<chno>]]:Y[<trace>]RLINe <bool>

{SCALE FOR 2nd/1st}   O : SCALF{1ST|2ND}
                      N : (Note)

<trace>= 0,1,8,9 (0:CH1 TRACE 1st, 1:CH2 TRACE 1st, 8:CH1 TRACE 2nd, 9:CH2 TRACE
          2nd)

Note: In the R3752 and R3753 command modes, a segment number must be specified by the
      parameter <trace> in the GPIB command.

(4) DISPLAY

Display menu (1 of 2)

{DUAL CH ON/OFF}   O : DUAL <bool>
                          N : DISPlay:DUAL <bool>

{SPLIT CH ON/OFF}   O : SPLIT <bool>
                          N : DISPlay:FORMat {ULOWer|FBACk} (See Note.)

{DISPLAY DATA}   O : DISPDATA
                          N : DISPlay[:WINDow[<chno>]]:TRACe:ASSign DATA

{DISPLAY MEMORY}   O : DISPMEM
                          N : DISPlay[:WINDow[<chno>]]:TRACe:ASSign MEMory

{DISPLAY DATA & MEM}   O : DISPDM
                          N : DISPlay[:WINDow[<chno>]]:TRACe:ASSign DMEMory

{DEFINE TRACE[   ]}   Calls the trace operation menu. (See step (4-2).)

{DATA → MEMORY}   O : DTOM
                          N : TRACe[<chno>]:COPY DATA

{More 1/2}   Calls the display menu (2 of 2).

Note: **SPLIT CH:**
       ULOWer;   Split display
       FBACk;   Overlap display

Display menu (2 of 2)

{GRATICULE ON/OFF}   O : GRAT <bool>
                          N : DISPlay[:WINDow[<chno>]]:TRACe:GRATicule[:STATe]
                                <bool>

{LABEL}   Calls the label menu. (See step (4-1).)

{COLOR}   There is no GPIB command to be applied.

{DEFAULT COLOR}   There is no GPIB command to be applied.

{More 2/2}   Calls the display menu (1 of 2).

(4-1)   Label menu

　　　　　{DONE}   O : LABEL <str>
　　　　　　　　　　　　　　　　　　　N : DISPlay[:WINDow[<chno>]]:TEXT[:DATA] {<str>I<block>}

　　　　　{CURSOR→}   There is no GPIB command to be applied.

　　　　　{CURSOR←}   There is no GPIB command to be applied.

　　　　　{BACKSPACE}   There is no GPIB command to be applied.

　　　　　{DELETE CHAR}   There is no GPIB command to be applied.

　　　　　{CLEAR LINE}   There is no GPIB command to be applied.

　　　　　{CANCEL}   Calls the display menu (2 of 2). (See step (4).)

(4-2)   Trace operation menu

　　　　　{DATA/MEM}   O : DISPDDM ON
　　　　　　　　　　　　　　　　　　N : CALCulate[<chno>]:MATH[:EXPRession]:NAME DDM

　　　　　{DATA-MEM}   O : There is no GPIB command to be applied.
　　　　　　　　　　　　　　　　　　N : CALCulate[<chno>]:MATH[:EXPRession]:NAME DSM

　　　　　{DATA*MEM}   O : There is no GPIB command to be applied.
　　　　　　　　　　　　　　　　　　N : CALCulate[<chno>]:MATH[:EXPRession]:NAME DMM

　　　　　{DATA+MEM}   O : There is no GPIB command to be applied.
　　　　　　　　　　　　　　　　　　N : CALCulate[<chno>]:MATH[:EXPRession]:NAME DAM

　　　　　{OFF}   O : DISPDDM OFF
　　　　　　　　　　　　　　　　　　N : CALCulate[<chno>]:MATH[:EXPRession]:NAME NONE

　　　　　{Return}   Returns to the display menu (1 of 2). (See step (4).)

(5) AVG

Average menu

{AVG STATE ON/OFF}   O : AVER <bool>
                          N : [SENSe:]AVERage[<chno>][:STATe] <bool>

{AVG COUNT}   O : AVERFACT <int>/ AVR{2l4l8l16l32l64l128}
                          N : [SENSe:]AVERage[<chno>]:COUNt <int>

{AVG RESTART}   O : AVERREST
                          N : [SENSe:]AVERage[<chno>]:RESTart

{GROUP DELAY APERTURE}O : APERTP <real>
                          N : CALCulate[<chno>]:GDAPerture:APERture <real>

{SMOOTHING ON/OFF}   O : SMOO <bool>
                          N : CALCulate[<chno>]:SMOothing:STATe <bool>

{SMOOTHING APERTURE}   O : SMOOAPER <REAL>
                          N : CALCulate[<chno>]:SMOothing:APERture <real>

{IF RBW[   ]}   O : RBW <int> / RBW{1Kl300l100l30l10}HZ / RBWAUTO
                          N : [SENSe:]BANDwidth[:REsolution] <real>
                                [SENSe:]BANDwidth[:REsolution]:AUTO <bool>

(6)   Function

Attenuator menu

{Rch : ATT[   ]}(Note 1)   Calls the attenuator selection menu. (See step (6-1).)
                                  O : ATTIR <int>/ ATTIRAUTO/ RI{50I1}A{20I0}
                                  N : INPut1:ATTenuation <int>/ INPut1:ATTenuation:AUTO
                                        <bool>

{Rch : IMP 1MΩ/50Ω}(Note 1) O : IMPIR <int>/ RI{50I1}A{20I0}
                                  N : INPut1:IMPedance <int>

{Ach : ATT[   ]}   Calls the attenuator selection menu. (See step (6-1).)
                                  O : ATTIA <int>/ ATTIAAUTO/ AI{50I1}A{20I0}
                                  N : INPut2:ATTenuation <int>/ INPut2:ATTenuation:AUTO
                                        <bool>

{Ach : IMP 1MΩ/50Ω}   O : IMPIA <int>/ AI{50I1}A{20I0}
                                  N : INPut2:IMPedance <int>

{Bch : ATT[   ]}(Note 2)   Calls the attenuator selection menu. (See step (6-1).)
                                  O : ATTIB <int>/ ATTIBAUTO/ BI{50I1}A{20I0}
                                  N : INPut3:ATTenuation <int>/ INPut3:ATTenuation:AUTO
                                        <bool>

{Bch : IMP 1MΩ/50Ω}(Note 2) O : IMPIB <int>/ BI{50I1}A{20I0}
                                  N : INPut3:IMPedance <int>

{CREAR TRIP}   O : CLRTRIP
                                  N : [SENSe:]POWer:AC:PROTection:CLEar

Note1:   This is not displayed in R3753EH.

Note2:   This is not displayed in R3753BH/EH.

(6-1)   Attenuator selection menu

{INPUT ATT AUTO}   O : ATTI{RIAIB}AUTO
                                  N : INPut:ATTenuation:AUTO <bool>

{INPUT ATT 0dB}   O : ATTI{RIAIB} 0
                                  N : INPut[<input>]:ATTenuation 0

{INPUT ATT 20dB}   O : ATTI{RIAIB} 20
                                  N : INPut[<input>]:ATTenuation 20

{Return}   Returns to the attenuator menu. (See step (6).)

<input> = {1I2I3}(1:Rch, 2:Ach, 3:Bch)

(7)   CAL

Calibration menu (1 of 2)

{NORMALIZE(THRU)}   O : NORM ON
                            N : [SENSe:]CORRection[<chno>]:COLLect[:ACQuire]
                                  NORMalize

{NORMALIZE(SHORT)}   O : NORMS ON
                            N : [SENSe:]CORRection[<chno>]:COLLect[:ACQuire]
                                  SNORmalize

{CAL MENU}   Calls the full calibration selection menu. (See step (7-1).)

{CORRECT ON/OFF}   O : CORRECT <bool>
                            N : [SENSe:]CORRection[<chno>]:CSET:STATe <bool>

{INTERPOLATE ON/OFF}   O : INTERPOL <bool>
                            N : [SENSe:]CORRection[<chno>]:CSET:INTerpolate
                                  <bool>

{PORT EXTENSION}   Calls the port extension menu. (See step (7-2).)

{Z0 VALUE}   O : SETZ0 <real> / MKRZO{50I75}
                            N : CALCulate[<chno>]:TRANsform:IMPedance:CIMPedance

{More 1/2}   Calls the calibration menu (2 of 2).

Calibration menu (2 of 2)

{ELEC DELAY ON/OFF}   O : LENGTH <bool>
                            N : [SENSe:]CORRection[<chno>]:EDELay:STATe <bool>

{ELECTRICAL DELAY}   O : ELED
                            N : [SENSe:]CORRection[<chno>]:EDELay[:TIME]

{ELECTRICAL LENGTH}   O : LENGVAL
                            N : [SENSe:]CORRection[<chno>]:EDELay:DISTance

{VELOCITY FACTOR}   O : VELOFACT
                            N : [SENSe:]CORRection[<chno>]:RVELocity:COAX

{PHASE OFFSET VALUE}   O : PHAO
                            N : [SENSe:]CORRection[<chno>]:OFFSet:PHASe

{PHASE SLOPE}   O : PHASL0
                            N : [SENSe:]CORRection[<chno>]:SLOPe:PHASe

{More 2/2}   Calls the calibration menu (1 of 2).

(7-1)　Full calibration selection menu

{1PORT FULL CAL}　　　Calls the 1 port full calibration menu.　(See step (7-1-1).)

{TRANS FULL CAL}　　　Calls the transmission full calibration menu.　(See step (7-1-2).)

{CLEAR CAL DATA}　　　O ：CLEAR
　　　　　　　　　　　　N ：[SENSe:]CORRection[<chno>]:COLLect:DELete

{Return}　　　　　　　Returns to the calibration menu (1 of 2).　(See step (7).)

(7-1-1)　1 port full calibration menu

{OPEN}　　　　　　　O ：OPEN
　　　　　　　　　　　N ：[SENSe:]CORRection:[<chno>]:COLLect[:ACQuire] OPEN

{SHORT}　　　　　　O ：SHORT
　　　　　　　　　　　N ：[SENSe:]CORRection:[<chno>]:COLLect[:ACQuire] SHORt

{LOAD}　　　　　　　O ：LOAD
　　　　　　　　　　　N ：[SENSe:]CORRection:[<chno>]:COLLect[:ACQuire] LOAD

{DONE 1-PORT}　　　O ：DONE / DONE1PORT
　　　　　　　　　　　N ：[SENSe:]CORRection:COLLect:SAVE

(7-1-2)　Impedance calibration menu

{OPEN}　　　　　　　O ：IMPOPEN
　　　　　　　　　　　N ：[SENSe:]CORRection:COLLect[:ACQuire] IOPen

{SHORT}　　　　　　O ：IMPSHORT
　　　　　　　　　　　N ：[SENSe:]CORRection:COLLect[:ACQuire] ISHort

{LOAD}　　　　　　　O ：IMPLD50
　　　　　　　　　　　N ：[SENSe:]CORRection:COLLect[:ACQuire] ILOad50

{DONE TRANS}　　　O ：DONE
　　　　　　　　　　　N ：[SENSe:]CORRection:COLLect:SAVE

(7-2) Port extension menu

{EXTENSION ON/OFF}   O : PORE <bool>
                             N : [SENSe:]CORRection[<chno>]:PEXTension:STATe
                                 <bool>

{EXTENSION INPUT R}   O : EPORTR <real>
        (Note 1)   N : [SENSe:]CORRection[<chno>]:PEXTension:TIME1

{EXTENSION INPUT A}   O : EPORTA
                             N : [SENSe:]CORRection[<chno>]:PEXTension:TIME2

{EXTENSION INPUT B}   O : EPORTB
        (Note 2)   N : [SENSe:]CORRection[<chno>]:PEXTension:TIME3

{EXTENSION PORT 1}   O : EPORT1
        (Note 3)   N : [SENSe:]CORRection[<chno>]:PEXTension:TIME4

{EXTENSION PORT 2}   O : EPORT2
        (Note 3)   N : [SENSe:]CORRection[<chno>]:PEXTension:TIME5

{Return}   Returns to the calibration menu (2 of 2). (See step (7).)

Note1: This is not displayed in R3753EH.

Note2: This is not displayed in R3753BH/EH.

Note3: This can be set only when S parameter test set is connected with R3753AH.

(8)   MKR

Marker menu

{ACTIVATE MARKER[   ]}   Calls the active marker menu (1 of 2). (See step (8-1).)

{MARKER ALL OFF}   O : MKRAOFF
                             N : MARKer[<chno>]:AOFF

{ΔMODE MENU}   Calls the delta mode menu. (See step (8-2).)

{MKR LIST}   O : There is no GPIB command to be applied.
                             N : MARKer[<chno>]:LIST <bool>

{MARKER MODE MENU}   Calls the marker mode menu. (See step (8-3).)

For acquiring the marker data, the following commands can be used.
O :   MKR {1|2|3|4|5|6|7|8|9|10} A?

N :   FETch[<chno>][:MARKer][:ACTivate]?
        FETch[<chno>][:MARKer]:NUMBer<n>?

(8-1)　　Active marker menu (1 of 2)

{MARKER 1}　　　　　　O　:　MKR1A <real>
　　　　　　　　　　　　N　:　MARKer[<chno>]:ACTivate[:NUMBer] 1[,<real>]

{MARKER 2}　　　　　　O　:　MKR2A <real>
　　　　　　　　　　　　N　:　MARKer[<chno>]:ACTivate[:NUMBer] 2[,<real>]

{MARKER 3}　　　　　　O　:　MKR3A <real>
　　　　　　　　　　　　N　:　MARKer[<chno>]:ACTivate[:NUMBer] 3[,<real>]

{MARKER 4}　　　　　　O　:　MKR4A <real>
　　　　　　　　　　　　N　:　MARKer[<chno>]:ACTivate[:NUMBer] 4[,<real>]

{MARKER 5}　　　　　　O　:　MKR5A <real>
　　　　　　　　　　　　N　:　MARKer[<chno>]:ACTivate[:NUMBer] 5[,<real>]

{ACTIVATE MKR OFF}　　O　:　MKROFF
　　　　　　　　　　　　N　:　MARKer[<chno>]:ACTivate:STATe <bool>

{Return}　　　　　　　Returns to the marker menu. (See step (8).)

{More 1/2}　　　　　　Calls the active marker menu (2 of 2).

Active marker menu (2 of 2)

{MARKER 6}　　　　　　O　:　MKR6A <real>
　　　　　　　　　　　　N　:　MARKer[<chno>]:ACTivate[:NUMBer] 6[,<real>]

{MARKER 7}　　　　　　O　:　MKR7A <real>
　　　　　　　　　　　　N　:　MARKer[<chno>]:ACTivate[:NUMBer] 7[,<real>]

{MARKER 8}　　　　　　O　:　MKR8A <real>
　　　　　　　　　　　　N　:　MARKer[<chno>]:ACTivate[:NUMBer] 8[,<real>]

{MARKER 9}　　　　　　O　:　MKR9A <real>
　　　　　　　　　　　　N　:　MARKer[<chno>]:ACTivate[:NUMBer] 9[,<real>]

{MARKER 10}　　　　　O　:　MKR10A <real>
　　　　　　　　　　　　N　:　MARKer[<chno>]:ACTivate[:NUMBer] 10[,<real>]

{ACTIVATE MKR OFF}　　O　:　MKROFF
　　　　　　　　　　　　N　:　MARKer[<chno>]:ACTivate:STATe <bool>

{Return}　　　　　　　Returns to the marker menu. (See step (8).)

{More 2/2}　　　　　　Calls the active marker menu (1 of 2).

(8-2) Delta mode menu

{ΔMODE OFF}   O : DMKROF
                           N : MARKer[<chno>]:DELTa[:MODE] OFF

{ΔREF=ΔMKR}   O : DMKRC
                           N : MARKer[<chno>]:DELTa[:MODE] CHILd

{ΔREF=ACT MKR}   Calls the ACT MKR menu. (See step (8-2-1).)
                           O : DMKRA
                           N : MARKer[<chno>]:DELTa[:MODE] COMPare

{ΔREF=FIXED MKR}   O : DMKRF
                           N : MARKer[<chno>]:DELTa[:MODE] FIXed

{FIXED MKR POSITION}   Calls FIXED MKR setting menu. (See step (8-2-2).)

{Return}   Returns to the marker menu. (See step (8).)

Select the compare marker before setting the delta mode to ΔREF=ACT MKR.
(See ACT MKR menu.)

(8-2-1) ACT MKR menu (1 of 2)

{COMPARE MARKER 1}   O : DMKR1O <real>
                           N : MARKer[<chno>]:DELTa:COMPare 1[,<real>]

{COMPARE MARKER 2}   O : DMKR2O <real>
                           N : MARKer[<chno>]:DELTa:COMPare 2[,<real>]

{COMPARE MARKER 3}   O : DMKR3O <real>
                           N : MARKer[<chno>]:DELTa:COMPare 3[,<real>]

{COMPARE MARKER 4}   O : DMKR4O <real>
                           N : MARKer[<chno>]:DELTa:COMPare 4[,<real>]

{COMPARE MARKER 5}   O : DMKR5O <real>
                           N : MARKer[<chno>]:DELTa:COMPare 5[,<real>]

{ACTIVATE MARKER[   ]}   Calls the active marker menu (1of 2). (See step (8-1).)

{Return}   Returns to the delta mode menu. (See step (8-2).)

{More 1/2}   Calls ACT MKR menu (2 of 2).

ACT MKR menu (2 of 2)

{COMPARE MARKER 6}	O :	DMKR6O <real>
	N :	MARKer[<chno>]:DELTa:COMPare 6[,<real>]
{COMPARE MARKER 7}	O :	DMKR7O <real>
	N :	MARKer[<chno>]:DELTa:COMPare 7[,<real>]
{COMPARE MARKER 8}	O :	DMKR8O <real>
	N :	MARKer[<chno>]:DELTa:COMPare 8[,<real>]
{COMPARE MARKER 9}	O :	DMKR9O <real>
	N :	MARKer[<chno>]:DELTa:COMPare 9[,<real>]
{COMPARE MARKER 10}	O :	DMKR10O <real>
	N :	MARKer[<chno>]:DELTa:COMPare 10[,<real>]

{ACTIVATE MARKER[   ]}   Calls the active marker menu (1of 2). (See step (8-1).)

{Return}   Returns to the delta mode menu. (See step (8-2).)

{More 2/2}   Calls ACT MKR menu (1 of 2).

(8-2-2)   FIXED MKR setting menu

{FIXED MKR STIMULUS}	O :	FMKRS <real>
	N :	MARKer[<chno>]:FIXed:STIMulus <real>
{FIXED MKR VALUE}	O :	FMKRV <real>
	N :	MARKer[<chno>]:FIXed:VALue <real>
{FIXED MKR AUX VALUE}	O :	There is no GPIB command to be applied.
	N :	MARKer[<chno>]:FIXed:AVALue <real>

{FIXED MKR → ACTIVE MKR}

	O :	MKRFIX
	N :	MARKer[<chno>]:LET FIXed

{Return}   Returns to the delta mode menu. (See step (8-2).)

(8-3)   Marker mode menu

{MKR CMP/UNCMP}   O : MKRCMP/ MKRUCMP
                            N : MARKer[<chno>]:COMPensate <bool>

{MKR CPL/UNCPL}   O : MKRCOUP/ MKRUCOUP
                            N : MARKer[<chno>]:COUPle <bool>

{CONVERSION MKR MENU[   ]} Calls the conversion marker menu. (See step (8-3-1).)

{SMITH MKR MENU[   ]}   Calls the smith marker menu. (See step (8-3-2).)

{POLAR MKR MENU[   ]}   Calls the ploar marker menu. (See step (8-3-3).)

{Return}   Returns to the marker menu. (See step (8).)

(8-3-1)   Conversion marker menu

{DEFAULT}   O : ZYMKDFLT
                            N : MARKer[<chno>]:CONVert[:MODE] DEFault

{LIN MKR}   O : ZYMKLIN
                            N : MARKer[<chno>]:CONVert[:MODE] LINear

{Re/Im}   O : ZYMKRI
                            N : MARKer[<chno>]:CONVert[:MODE] RIMaginary

{Return}   Returns to the marker mode menu. (See step (8-3).)

(8-3-2)   Smith marker menu

{LIN MKR}   O : SMKRLIN
                            N : MARKer[<chno>]:SMITh MLINear

{LOG MKR}   O : SMKRLOG
                            N : MARKer[<chno>]:SMITh MLOGarithmic

{Re/Im MKR}   O : SMKRRI
                            N : MARKer[<chno>]:SMITh RIMaginary

{R+jX MKR}   O : SMKRRX
                            N : MARKer[<chno>]:SMITh IMPedance

{G+jB MKR}   O : SMKRGB
                            N : MARKer[<chno>]:SMITh ADMittance

{Z0 VALUE}   O : SETZ0 <real> / MKRZO{50I75}
                            N : CALCulate[<chno>]:TRANsform:IMPedance:CIMPedance

{Return}   Returns to the marker mode menu. (See step (8-3).)

(8-3-3)   Polar marker menu

{LIN MKR}   O : PMKRLIN
                       N : MARKer[<chno>]:POLar MLINear

{LOG MKR}   O : PMKRLOG
                       N : MARKer[<chno>]:POLar MLOGarithmic

{Re/Im MKR}   O : PMKRRI
                       N : MARKer[<chno>]:POLar RIMaginary

{Z0 VALUE}   O : SETZ0 <real> / MKRZO{50|75}
                       N : CALCulate[<chno>]:TRANsform:IMPedance:CIMPedance

{Return}   Returns to the marker mode menu. (See step (8-3).)

(9)   MKR →
       Marker search menu

{MARKER → START}   O : MKRSTAR
                       N : MARKer[<chno>]:LET STARt

{MARKER → STOP}   O : MKRSTOP
                       N : MARKer[<chno>]:LET STOP

{MARKER → CENTER}   O : MKRCENT
                       N : MARKer[<chno>]:LET CENTer

{MARKER → SPAN}   O : MKRSPAN
                       N : MARKer[<chno>]:LET SPAN

{MARKER → REF.VALUE}   O : MKRREF
                       N : MARKer[<chno>]:LET RLEVel

{PART SRCH[   ]}   Calls the partial search menu. (See step (9-1).)

{MKR SEARCH[   ]}   Calls the search menu. (See step (9-2).)

(9-1)   Partial search menu

{ΔMODE MENU}   Calls the delta mode menu. (See step (8-2).)

{SET RANGE}   O : There is no GPIB command to be applied.
                       N : MARKer[<chno>]:SEARch:PARTial:SRANge

{STATISTICS ON/OFF}   O : MKRSTAT <bool>
                       N : *MARKer[<chno>]:STATistics <bool>

{PART SRCH ON/OFF}   O : MKRPART <bool>
                       N : MARKer[<chno>]:SEARch:PARTial[:STATe] <bool>

{Return}   Returns to the marker search menu. (See step (9).)

*Getting the result of analysis.
The followings are available.
O : REPSTAT?
N : FETCh[<chno>]:[:MARKer] :STATistics?

(9-2)   Search menu

{MKR SEARCH OFF}   O : SRCHOFF
                       N : MARKer[<chno>]:SEARch[:MODE] OFF

{MAX}   O : MAXSRCH
                       N : MARKer[<chno>]:SEARch[:MODE] MAX

{MIN}   O : MINSRCH
                       N : MARKer[<chno>]:SEARch[:MODE] MIN

{TARGET}   Calls the target menu. (See step (9-2-1).)
                       O : Not required to specify.
                       N : MARKer[<chno>]:SEARch[:MODE] TARGet

{RIPPLE}   Calls the ripple menu. (See step (9-2-2).)
                       O : DRIPPL1
                       N : MARKer[<chno>]:SEARch[:MODE] RIPPle

{FLTR ANAL}   Calls the filter analysis menu. (See step (9-2-3).)

{TRACKING ON/OFF}   O : MKRTRAC <bool>
                       N : MARKer[<chno>]:SEARch:TRACking <bool>

{Return}   Returns to the marker search menu. (See stpe (9).)

(9-2-1)   Target menu

{TARGET VALUE}   O : There is no command to be applied.
                       N : MARKer[<chno>]:SEARch:TARGet[:MODE] VALue
                             MARKer[<chno>]:SEARch:TARGet:VALue <real>

{0°}   O : ZRPSRCH
                       N : MARKer[<chno>]:SEARch:TARGet[:MODE] ZERO

{±180°}   O : There is no command to be applied.
                       N : MARKer[<chno>]:SEARch:TARGet[:MODE] PI

{LEFT SEARCH}   O : There is no command to be applied.
                       N : MARKer[<chno>]:SEARch:TARGet:LLEFT

{RIGHT SEARCH}   O : There is no command to be applied.
                       N : MARKer[<chno>]:SEARch:TARGet:RIGHt

{Return}   Returns to the search menu. (See step (9-2).)

(9-2-2)   Ripple menu

{MAX⌒}   O : There is no command to be applied.
                              N : MARKer[<chno>]:SEARch:RIPPle[:MODE] MAX

{MIN⌣}   O : There is no command to be applied.
                              N : MARKer[<chno>]:SEARch:RIPPle[:MODE] MIN

{ΔMAX⌒-MIN⌣}   O : DRIPPL1
                              N : MARKer[<chno>]:SEARch:RIPPle[:MODE] BOTH

{MAX-MIN}   O : DMAXMIN
                              N : MARKer[<chno>]:SEARch:RIPPle[:MODE] PPEak

{ΔX}   O : DLTX <real>
                              N : MARKer[<chno>]:SEARch:RIPPle:DX <real>

{ΔY}   O : DLTY <real>
                              N : MARKer[<chno>]:SEARch:RIPPle:DY <real>

{Return}   Returns to the search menu. (See stpe (9-2).)

(9-2-3)   Filter analysis menu

{WIDTH VALUE}   O : T{3|6|60}DB/ T{3|6}DEG/ TXDB <real>/ TXDEG <real>
                              N : MARKer[<chno>]:FANalysis:WIDTh <real>

{FILTER TYPE BAND/NOTC}
                              O : FANABAND/FANANOTCH
                              N : MARKer[<chno>]:FANalysis:TYPE   {BAND|NOTCh}

{SEARCH FROM [   ]}   Calls the search reference menu. (See step (9-2-4).)

{DISPLAY MODE ABS/REL}
                              O : FANAABS/FANAREL
                              N : MARKer[<chno>]:FANalysis:FORMat   {ABSolute|RELative}

{SEARCH IN/OUT}   O : TIN/ TOUT
                              N : MARKer[<chno>]:FANalysis:DIRection {IN|OUT}

{FILTER ANAL ON/OFF}   O : FLTANA <bool>
                              N : MARKer[<chno>]:FANalysis[:STATe] <bool>

{Return}   Returns to the search menu. (See step (9-2).)

The data of filter analysis can be acquired by the following command.

N: FETch[<chno>][:MARKer]:FANalysis?

(9-2-4)   Search reference menu

{ACTIVE MARKER}   O : TREFACT
                      N : MARKer[<chno>]:FANalysis:REFerence   ACTive

{MAXIMUM VALUES}   O : TREFMAX
                      N : MARKer[<chno>]:FANalysis:REFerence   MAXimum

{REFERENCE LINE}   O : TREFREF
                      N : MARKer[<chno>]:FANalysis:REFerence   RLINe

A.3.4 INSTRUMENT STATE Block

(1) SAVE

Save menu

{SAVE REGISTER}	Calls the save register menu (1 of 4). (See step (1-1).)
{CLEAR REGISTER}	Calls the clear register menu (1 of 4). (See step (1-2).)
{STORE FILE}	Calls the store file menu. (See step (1-3).)
{PURGE FILE}	Calls the purge file menu. (See step (1-4).)
{FORMAT DISK}	There is no GPIB command to be applied.

(1-1) Save register menu (1 of 4)

{SAVE REG-1}	O : SAVEREG1
	N : *SAV 1/ REGister:SAVE 1
{SAVE REG-2}	O : SAVEREG2
	N : *SAV 2/ REGister:SAVE 2
{SAVE REG-3}	O : SAVEREG3
	N : *SAV 3/ REGister:SAVE 3
{SAVE REG-4}	O : SAVEREG4
	N : *SAV 4/ REGister:SAVE 4
{SAVE REG-5}	O : SAVEREG5
	N : *SAV 5/ REGister:SAVE 5
{RENAME REG}	There is no GPIB command to be applied.
{Return}	Returns to the save menu. (See step (1).)
{More 1/4}	Calls the save register menu (2 of 4).

Save register menu (2 of 4)

{SAVE REG-6}	O :	SAVEREG6
	N :	*SAV 6/ REGister:SAVE 6
{SAVE REG-7}	O :	SAVEREG7
	N :	*SAV 7/ REGister:SAVE 7
{SAVE REG-8}	O :	SAVEREG8
	N :	*SAV 8/ REGister:SAVE 8
{SAVE REG-9}	O :	SAVEREG9
	N :	*SAV 9/ REGister:SAVE 9
{SAVE REG-10}	O :	SAVEREG10
	N :	*SAV 10/ REGister:SAVE 10

{RENAME REG}   There is no GPIB command to be applied.

{Return}   Returns to the save menu. (See step (1).)

{More 2/4}   Calls the save register menu (3 of 4).

Save register menu (3 of 4)

{SAVE REG-11}	O :	SAVEREG11
	N :	*SAV 11/ REGister:SAVE 11
{SAVE REG-12}	O :	SAVEREG12
	N :	*SAV 12/ REGister:SAVE 12
{SAVE REG-13}	O :	SAVEREG13
	N :	*SAV 13/ REGister:SAVE 13
{SAVE REG-14}	O :	SAVEREG14
	N :	*SAV 14/ REGister:SAVE14
{SAVE REG-15}	O :	SAVEREG15
	N :	*SAV 15/ REGister:SAVE 15

{RENAME REG}   There is no GPIB command to be applied.

{Return}   Returns to the save menu. (See step (1).)

{More 3/4}   Calls the save register menu (4 of 4).

Save register menu (4 of 4)

{SAVE REG-16} O : SAVEREG16
         N : *SAV 16/ REGister:SAVE 16

{SAVE REG-17} O : SAVEREG17
         N : *SAV 17/ REGister:SAVE 17

{SAVE REG-18} O : SAVEREG18
         N : *SAV 18/ REGister:SAVE 18

{SAVE REG-19} O : SAVEREG19
         N : *SAV 19/ REGister:SAVE 19

{SAVE REG-20} O : SAVEREG20
         N : *SAV 20/ REGister:SAVE 20

{RENAME REG} There is no GPIB command to be applied.

{Return}   Returns to the save menu. (See step (1).)

{More 4/4}   Calls the save register menu (1 of 4).

(1-2) Clear register menu (1 of 4)

{CLEAR REG-1} O : CLRREG1
         N : REGister:CLEar 1

{CLEAR REG-2} O : CLRREG2
         N : REGister:CLEar 2

{CLEAR REG-3} O : CLRREG3
         N : REGister:CLEar 3

{CLEAR REG-4} O : CLRREG4
         N : REGister:CLEar 4

{CLEAR REG-5} O : CLRREG5
         N : REGister:CLEar 5

{Return}   Returns to the save menu. (See step (1).)

{More 1/4}   Calls the clear register menu (2 of 4).

Clear register menu (2 of 4)

{CLEAR REG-6}	O :	CLRREG6
	N :	REGister:CLEar 6
{CLEAR REG-7}	O :	CLRREG7
	N :	REGister:CLEar 7
{CLEAR REG-8}	O :	CLRREG8
	N :	REGister:CLEar 8
{CLEAR REG-9}	O :	CLRREG9
	N :	REGister:CLEar 9
{CLEAR REG-10}	O :	CLRREG10
	N :	REGister:CLEar 10
{Return}	Returns to the save menu. (See step (1).)	
{More 2/4}	Calls the clear register menu (3 of 4).	

Clear register menu (3 of 4)

{CLEAR REG-11}	O :	CLRREG11
	N :	REGister:CLEar 11
{CLEAR REG-12}	O :	CLRREG12
	N :	REGister:CLEar 12
{CLEAR REG-13}	O :	CLRREG13
	N :	REGister:CLEar 13
{CLEAR REG-14}	O :	CLRREG14
	N :	REGister:CLEar 14
{CLEAR REG-15}	O :	CLRREG15
	N :	REGister:CLEar 15
{Return}	Returns to the save menu. (See step (1).)	
{More 3/4}	Calls the clear register menu (4 of 4).	

Clear register menu (4 of 4)

{CLEAR REG-16}	O : CLRREG16
	N : REGister:CLEar 16

{CLEAR REG-17}	O : CLRREG17
	N : REGister:CLEar 17

{CLEAR REG-18}	O : CLRREG18
	N : REGister:CLEar 18

{CLEAR REG-19}	O : CLRREG19
	N : REGister:CLEar 19

{CLEAR REG-20}	O : CLRREG20
	N : REGister:CLEar 20

{Return}	Returns to the save menu. (See step (1).)

{More 4/4}	Calls the clear register menu (1 of 4).

(1-3)   Store file menu

{STORE}	O : STFILE <str>
	N : FILE:STORe <str>

{ROLL↑}	There is no GPIB command to be applied.

{ROLL↓}	There is no GPIB command to be applied.

{DEFINE STORE}	Calls the file data menu. (See step (1-3-1).)

{EDIT NAME}	There is no GPIB command to be applied.

{NAME↑}	There is no GPIB command to be applied.

{NAME↓}	There is no GPIB command to be applied.

{CANCEL}	There is no GPIB command to be applied.

<str> in "STORE" is a file name.

(1-3-1)   File data menu

{STATE ON/OFF}   O : DSSTATE <bool>
                                  N : FILE:STATe:CONDition <bool>

{RAY ARRAY ON/OFF}   O : RAWARY <bool>
                                  N : FILE:STATe:RAW <bool>

{CORR COEF ON/OFF}   O : CORARY <bool>
                                  N : FILE:STATe:CORRection <bool>

{DATA ARRAY ON/OFF}   O : DATAARY <bool>
                                  N : FILE:STATe:DATA <bool>

{MEM ARRY ON/OFF}   O : MEMARY <bool>
                                  N : FILE:STATe:MEMory <bool>

{Return}   Returns to the save menu. (See step (1).)

(1-4)   Purge file menu

{PURGE}   O : PURGE <str>
                                  N : FILE:DELete <str>

{CURSOR ↑}   There is no GPIB command to be applied.

{CURSOR ↑}   There is no GPIB command to be applied.

{Return}   Returns to the save menu. (See step (1).)

<str> in "PURGE" is a file name.

(2) RECALL

Recall menu (1 of 4)

{RECALL REG-1}	O	:	RECLREG1
	N	:	*RCL 1/ REGister:RECall 1
{RECALL REG-2}	O	:	RECLREG2
	N	:	*RCL 2/ REGister:RECall 2
{RECALL REG-3}	O	:	RECLREG3
	N	:	*RCL 3/ REGister:RECall 3
{RECALL REG-4}	O	:	RECLREG4
	N	:	*RCL 4/ REGister:RECall 4
{RECALL REG-5}	O	:	RECLREG5
	N	:	*RCL 5/ REGister:RECall 5
{RECALL POWER OFF}	O	:	RECLPOFF
	N	:	*RCL POFF/ REGister:RECall POFF
{LOAD FILE}	O	:	LDFILE <str>
	N	:	FILE:LOAD <str>
{More 1/4}			Calls the recall menu (2 of 4).

<str> in "LOAD FILE" is a file name.

Recall menu (2 of 4)

{RECALL REG-6}	O	:	RECLREG6
	N	:	*RCL 6/ REGister:RECall 6
{RECALL REG-7}	O	:	RECLREG7
	N	:	*RCL 7/ REGister:RECall 7
{RECALL REG-8}	O	:	RECLREG8
	N	:	*RCL 8/ REGister:RECall 8
{RECALL REG-9}	O	:	RECLREG9
	N	:	*RCL 9/ REGister:RECall 9
{RECALL REG-10}	O	:	RECLREG10
	N	:	*RCL 10/ REGister:RECall 10
{RECALL POWER OFF}	O	:	RECLPOFF
	N	:	*RCL POFF/ REGister:RECall POFF
{LOAD FILE}	O	:	LDFILE <str>
	N	:	FILE:LOAD <str>
{More 2/4}			Calls the recall menu (3 of 4).

<str> in "LOAD FILE" is a file name.

Recall menu (3 of 4)

{RECALL REG-11}	O :	RECLREG11
	N :	*RCL 11/ REGister:RECall 11
{RECALL REG-12}	O :	RECLREG12
	N :	*RCL 12/ REGister:RECall 12
{RECALL REG-13}	O :	RECLREG13
	N :	*RCL 13/ REGister:RECall 13
{RECALL REG-14}	O :	RECLREG14
	N :	*RCL 14/ REGister:RECall 14
{RECALL REG-15}	O :	RECLREG15
	N :	*RCL 15/ REGister:RECall 15
{RECALL POWER OFF}	O :	RECLPOFF
	N :	*RCL POFF/ REGister:RECall POFF
{LOAD FILE}	O :	LDFILE <str>
	N :	FILE:LOAD <str>
{More 3/4}		Calls the recall menu (4 of 4).

<str> in "LOAD FILE" is a file name.

Recall menu (4 of 4)

{RECALL REG-16}	O :	RECLREG16
	N :	*RCL 16/ REGister:RE
{RECALL REG-17}	O :	RECLREG17
	N :	*RCL 17/ REGister:RECall 17
{RECALL REG-18}	O :	RECLREG18
	N :	*RCL 18/ REGister:RECall 18
{RECALL REG-19}	O :	RECLREG19
	N :	*RCL 19/ REGister:RECall 19
{RECALL REG-20}	O :	RECLREG20
	N :	*RCL 20/ REGister:RECall 20
{RECALL POWER OFF}	O :	RECLPOFF
	N :	*RCL POFF/ REGister:RECall POFF
{LOAD FILE}	O :	LDFILE <str>
	N :	FILE:LOAD <str>
{More 4/4}		Calls the recall menu (1 of 4).

Call 16

<str> in "LOAD FILE" is a file name.

(3) Copy menu

No GPIB commands are available for the following menus: the Plot scale menu, Plot data menu, Plot pen menu, Setup menu and Printer setting menu.

(4) SYSTEM

System menu

{SYSTEM DRIVE}	There is no GPIB command to be applied.
{SET CLOCK}	Calls the real time clock menu. (See step (4-1).)
{LIMIT MENU}	Calls the limit line menu. (See step (4-2).)
{FUNCTION}	Calls the function menu. (See step (4-3).)
{SET KEYBOARD 101/106}	There is no GPIB command to be applied.
{FIRMWARE REVISION}	O : Equivalent to IDNT? N : Equivalent to *IDN?

(4-1) Real time clock menu

{YEAR}	O : YEAR <int> N : SYSTem:DATE <year>, <month>, <day>
{MONTH}	O : MONTH <int> N : SYSTem:DATE <year>, <month>, <day>
{DAY}	O : DAY <int> N : SYSTem:DATE <year>, <month>, <day>
{HOUR}	O : HOUR <int> N : SYSTem:TIME <hour>, <minute>, <second>
{MINUTE}	O : MINUTE <int> N : SYSTem:TIME <hour>, <minute>, <second>
{SECOND}	O : SECOND <int> N : SYSTem:TIME <hour>, <minute>, <second>
{Return}	Returns to the system menu. (See step (4).)

(4-2)   Limit line menu

(4-2-1)   Limit menu

{LIMIT LINE ON/OFF}   O : LIMITLINE
                            N : DISPlay[:WINDow[<chno>]]:LIMit[pn]:LINE <bool>

{LIMIT TEST ON/OFF}   O : LIMITTEST
                            N : DISPlay[:WINDow[<chno>]]:LIMit[pn][:STATe] <bool>

{BEEP[   ]}   Calls the beep menu.

{LIMIT MODE MENU}   Calls the limit mode menu. (See step (4-2-2).)

{EDIT LIMIT LINE}   Calls the edit limits menu (1of 2). (See step (4-2-3).)

{SELECT DATA 1st/2nd}   O : LPAR<int>
                            N : There is no GPIB command to be applied.

{LIMIT LINE OFFSETS}   Calls the offset limits menu. (See step (4-2-8).)

{Return}   Calls the system menu. (See step (4).)

(4-2-2)   Limit mode menu

{1ST DATA ON/OFF}   O : LIMPAR<bool>
                            N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:PARameter
                                [:STATe] <bool>

{2ND DATA ON/OFF}   O : LIMPAR<bool>
                            N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:PARameter
                                [:STATe] <bool>

{MAG DATA LIN/LOG}   O : LIMSLIN/LIMSLOG   ←Smith display
                                LIMPLIN/LIMPLOG   ←Polar display
                            N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:PARameter
                                :SmithLIMit
                                {LINear|LOGarithmic}   ←Smith display
                                DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:PARameter
                                :PolarLIMit
                                {LINear|LOGarithmic}   ←Polar display

{Return}   Calls the limit menu. (See step (4-2-1).)

(4-2-3)   Edit limits menu (1 of 2)

{SEGMENT}   O : LSEG
                             N : There is no GPIB command to be applied.

{SELECT DATA 1ST/2ND}   O : LIMPAR<int>
                             N : There is no GPIB command to be applied.

{EDIT SEGMENT}   Calls the edit segment menu. (See step (4-2-5).)

{DELETE}   O : There is no GPIB command to be applied.
                             N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:SEGMent<n>
                                   :DELete

{ADD SEGMENT}   O : There is no GPIB command to be applied.
                             N : There is no GPIB command to be applied.

{LINE TYPE}   Calls the limit type menu. (See step (4-2-6).)

{DONE}   O : There is no GPIB command to be applied.
                             N : There is no GPIB command to be applied.

{More 1/2}   Calls the edit limits menu (2 of 2). (See step (4-2-4).)

(4-2-4)   Edit limits menu (2 of 2)

{LIMIT LINE ON/OFF}   O : LIMITLINE
                             N : DISPlay[:WINDow[<chno>]]:LIMit[pn]:LINE <bool>

{LIMIT TEST ON/OFF}   O : LIMITTEST
                             N : DISPlay[:WINDow[<chno>]]:LIMit[pn][:STATe] <bool>

{BEEP[   ]}   Calls the beep menu. (See step (4-2-9).)

{MAG DATA LIN/LOG}   O : LIMSLIN/LIMSLOG   ←Smith display
                                   LIMPLIN/LIMPLOG   ←Polar display
                             N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:PARameter
                                   :SmithLIMit
                                   {LINear|LOGarithmic}   ←Smith display
                                   DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:PARameter
                                   :PolarLIMit
                                   {LINear|LOGarithmic}   ←Polar display

{LIMIT MODE MENU}   Calls the limit mode menu. (See step (4-2-2).)

{LIMIT LINE OFFSETS}   Calls the offset limits menu. (See step (4-2-8).)

{CLEAR LIST}   Calls the clear limit menu. (See step (4-2-6).)

{More 2/2}   Calls the edit limits menu (1 of 2). (See step (4-2-3).)

(4-2-5)   Edit segment menu

{STIMULUS VALUE}   O : LIMS <real>
                         N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:SEGMent<n>
                               :STIMulus <real>

{MARKER TO STIMULUS}   O : There is no GPIB command to be applied.
                         N : There is no GPIB command to be applied.

{UPPER LIMIT}   O : LIMU<real>
                         N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:SEGMent<n>
                               :UPPer <real>

{LOWER LIMIT}   O : LIML<real>
                         N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:SEGMent<n>
                               :LOWer <real>

{DELTA LIMIT}   O : There is no GPIB command to be applied.
                         N : There is no GPIB command to be applied.

{MIDDLE VALUE}   O : There is no GPIB command to be applied.
                         N : There is no GPIB command to be applied.

{MARKER TO MIDDLE}   O : There is no GPIB command to be applied.
                         N : There is no GPIB command to be applied.

{Return}   Calls the edit limits menu (1 of 2). (See step (4-2-3).)

(4-2-6)   Clear limit menu

{YES}   O : LSEGCL
                         N : DISPlay[:WINDow[<chno>]]:LIMlit[<pn>]:CLEar

{NO}   O : There is no GPIB command to be applied.
                         N : There is no GPIB command to be applied.

(4-2-7)   Limit type menu

{SLOPING LINE}   O : LIMTSLP
                                  N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:SEGMent<n>
                                        :TYPE SLINe

{FLAT LINE}   O : LIMTFLT
                                  N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:SEGMent<n>
                                        :TYPE FLINe

{SINGLE POINT}   O : LIMTSP
                                  N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:SEGMent<n>
                                        :TYPE SPOint

{LIMIT COLOR}   O : LIMC<int>
                                  N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:SEGMent<n>
                                        :COLor<int>

{WAVE COLOR}   O : LIMWC<int>
                                  N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:SEGMent<n>
                                        :WCOLor<int>

{Return}   Calls the edit limits menu (1 of 2). (See step (4-2-3).)

(4-2-8)   Offset limits menu

{STIMULUS OFFSET}   O : LIMISTIO<real>
                                  N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:OFFSet
                                        :STIMulus <real>

{AMPLITUDE OFFSET}   O : LIMIAMPO<real>
                                  N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:OFFSet
                                        :AMPLitude <real>

{MARKER TO AMP.OFS}   O : There is no GPIB command to be applied.
                                  N : There is no GPIB command to be applied.

{Return}   Calls the limit menu. (See step (4-2-1).)

(4-2-9)   Beep mode menu

{OFF}   O : FAILBEEP OFF/PASSBEEP OFF
                                 N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:BEEP OFF

{FAIL}   O : FAILBEEP ON
                                 N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:BEEP
                                       :FOR FAIL

{PASS}   O : PASSBEEP ON
                                 N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:BEEP
                                       :FOR PASS

{BEEP TONE}   O : BEEPTONE<int>
                                 N : DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:BEEP
                                       :TONE <int>

{Return}   Calls the limit menu. (See step (4-2-1).)

Getting the result of the limit line judgment.
The followings are available.
For the PASS/FAIL information of all segments
            O :   There is no GPIB command to be applied.
            N :   DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:REPort?

For the PASS/FAIL information of test results
            O :   LIMRES?.
            N :   DISPlay[:WINDow[<chno>]]:LIMit[<pn>]:RESult?

(4-3)   Function menu

{CDMA IF FILTER}   Calls the CDMA IF filter analysis menu. (See step (4-4).)

(4-4)   CDMA IF filter analysis menu

{CDMA IF GATE[   ]}   Calls the CDMA IF gate menu. (See step (4-4-1).)

*{CDMA FILTER ANALYSIS[   ]}*Calls the CDMA filter analysius menu. (See step(4-4-3).)

{CDMA PHASE LINEARITY ON/OFF}
            O :   CDMAPLIN<bool>
            N :   CALCulate[<chno>]:CDMA:PLINearity:STATe   <bool

{PHASE LINEARITY[   ]}   Calls the phase linearity analysis menu.
                                 (See step (4-4-4).)

Getting the result of CDMA phase Linearity analysis.
The followings are available.
            O :   PLINREP?
            N :   FETCh[<chno>]:PLINearity?

(4-4-1)   CDMA IF gate menu

{CDMA GATE ON/OFF}   O : CDMA<bool>
                          N : CALCulate[<chno>]:CDMA:GATE:STATe   <bool>

{CDMA GATE START[   ]}   O : CDMASTAR<real>
                          N : CALCulate[<chno>]:CDMA:GATE:STARt   <real>

{CDMA GATE STOP[   ]}   O : CDMASTOP<real>
                          N : CALCulate[<chno>]:CDMA:GATE:STOP   <real>

{GATE SHAPE[   ]}   Calls the CDMA IF filter gate shape menu. (See step (4-4-2).)

(4-4-2)   CDMA IF filter gate shape menu

{MAXIMUM}   O :   CDMASMAXI
                          N :   CALCulate[<chno>]:CDMA:GATE:WINDow   MAXimum

{WIDE}   O :   CDMSWIDE
                          N :   CALCulate[<chno>]:CDMA:GATE:WINDow   WIDE

{NORMAL}   O :   CDMSNORM
                          N :   CALCulate[<chno>]:CDMA:GATE:WINDow   NORMal

{MINIMUM}   O :   CDMSMINI
                          N :   CALCulate[<chno>]:CDMA:GATE:WINDow   MINimum

{CDMA IF}   O :   CDMSCDMA
                          N :   CALCulate[<chno>]:CDMA:GATE:WINDow   CDMA

(4-4-3)   CDMA filter analysis menu

{CDMA FILTER ANALYSIS ON/OFF}
                          O : CDMAFANA<bool>
                          N : *[1]CALCulate[<chno>]:CDMA:FANalysis:STATe   <bool>

{WIDTH VALUE}   O : CDMATXDB<real>
                N : CALCulate[<chno>]:CDMA:FANalysis:WIDTh   <real>

{ATTN FREQ1}   O : CDMAATTN1<real>
                N : *[2]CALCulate[<chno>]:CDMA:FANalysis:ATTenuation1 <real>

{ATTN FREQ2}   O : CDMAATTN2<real>
                N : *[2]CALCulate[<chno>]:CDMA:FANalysis:ATTenuation2 <real>

*1   Getting the result of the CDMA filter analysis.
     FETCh[<chno>]:CDMA:FANalysis?
*2   The abbreviations are as follows:
     CALC[<chno>]:CDMA:FAN:ATT1<real>
     CALC[<chno>]:CDMA:FAN:ATT2<real>

(4-4-4)   Phase linearity analysis menu

{PHASE LINEARITY ON/OFF}
                                   O : PLINE <bool>
                                   N : CALCulate[<chno>]:PLINearity:STATe   <bool>

{PARTIAL ON/OFF} O : PLINPART<bool>
                              N : CALCulate[<chno>]:PLINearity:PARTial   <bool>

Getting the result of the phase linearity analysis.
The followings are available.
            O : PLINREP?
            N : FETCh[<chno>]:PLINearity?

(5)   PRESET

[PRESET]   O : IP
                                          N : SYSTem:PRESet

A.3.5   GPIB Block

(1)   PROGRAM

[PROGRAM]   There is no GPIB command to be applied to the following menus
                                    which are called by this key.
                                    •   Controller menu
                                    •   Load menu
                                    •   Drive menu

(2)   REMOTE/LCL
        GPIB menu

{SYSTEM CONTROLLER}   There is no GPIB command to be applied.

{TALKER LISTENER}   There is no GPIB command to be applied.

{SET ADDRESS}   Calls the address menu. (See step (2-1).)

(2-1)   Address menu

{ADDRESS R3753}   There is no GPIB command to be applied.

{ADDRESS PLOTTER}   O : ADDRPLOT <int>
                                           N : HCOPy:DEVice:ADDRess <int>

{ADDRESS PRINTER}   There is no GPIB command to be applied.

{Return}   Returns to the GPIB menu. (See step (2).)

⇧ AIR FLOW
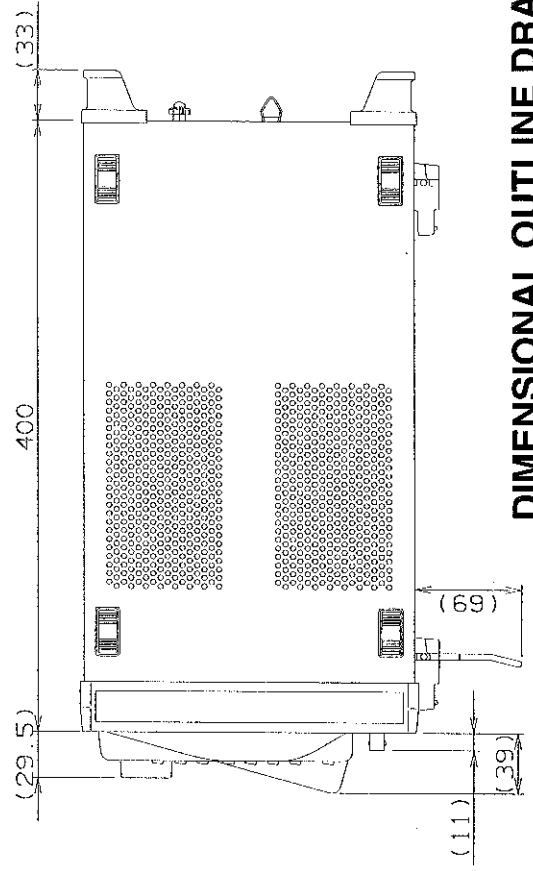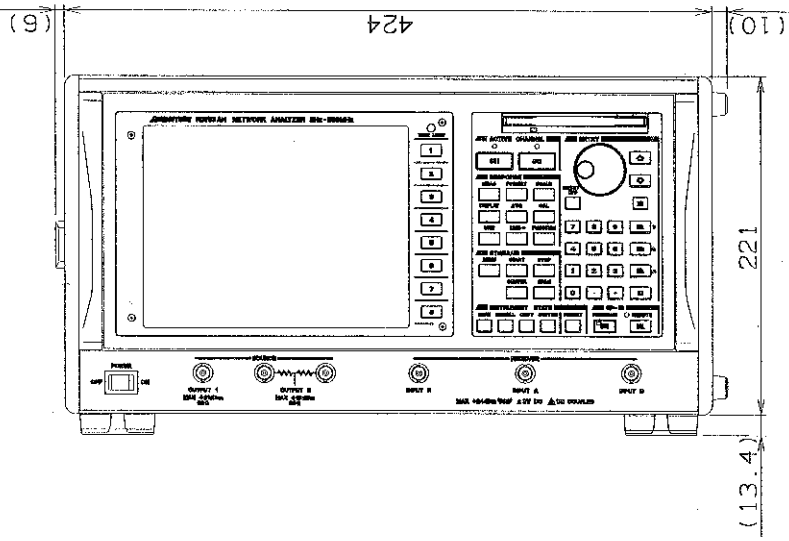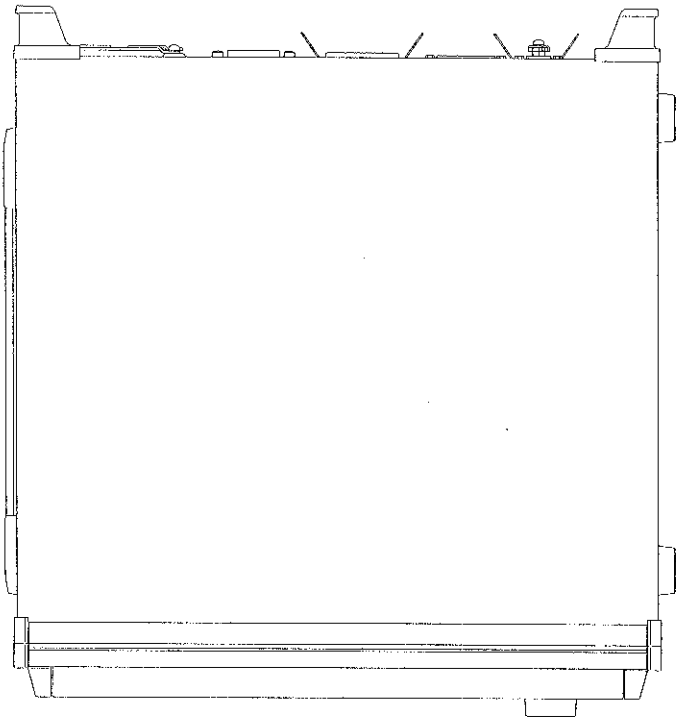
DIMENSIONAL OUTLINE DRAWING

(33)

400

(69)

(29.5)

(39)

(11)

(9)

424

(10)

221

(13.4)

Unit : mm

CAUTION
This drawing shows external dimensions of this instrument.
The difference in products and options used can cause a change in the appearance of the instrument.

ALPHABETICAL INDEX

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

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Restrictions

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(2) You may not copy, modify, or change, all or any part of, the SOFTWARE without permission from Advantest.

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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.

SALES & SUPPORT OFFICES

Advantest Korea Co., Ltd.
22BF, Kyobo KangNam Tower,
1303-22, Seocho-Dong, Seocho-Ku, Seoul #137-070, Korea
Phone: +82-2-532-7071
Fax: +82-2-532-7132

Advantest (Suzhou) Co., Ltd.
Shanghai Branch Office:
Bldg. 6D, NO.1188 Gumei Road, Shanghai, China 201102 P.R.C.
Phone: +86-21-6485-2725
Fax: +86-21-6485-2726

Shanghai Branch Office:
406/F, Ying Building, Quantum Plaza, No. 23 Zhi Chun Road,
Hai Dian District, Beijing,
China 100083
Phone: +86-10-8235-3377
Fax: +86-10-8235-6717

Advantest (Singapore) Pte. Ltd.
438A Alexandra Road, #08-03/06
Alexandra Technopark Singapore 119967
Phone: +65-6274-3100
Fax: +65-6274-4055

Advantest America, Inc.
3201 Scott Boulevard, Suite, Santa Clara, CA 95054, U.S.A
Phone: +1-408-988-7700
Fax: +1-408-987-0691

ROHDE & SCHWARZ Europe GmbH
Mühldorfstraße 15 D-81671 München, Germany
(P.O.B. 80 14 60 D-81614 München, Germany)
Phone: +49-89-4129-13711
Fax: +49-89-4129-13723

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