ADVANTEST®

ADVANTEST CORPORATION

INSTRUCTION MANUAL

TR14321 Sweep Generator Plug-in

MANUAL NUMBER OEH00 911

Before reselling to other corporations or re-exporting to other countries, you are required to obtain permission from both the Japanese Government under its Export Control Act and the U.S. Government under its Export Control Law.

Printed in Japan

LIST OF RELATED MANUALS

Manual No.	Manual Name	Remarks
TR4623	Scalar Network Analyzer Instruction Manual	

TR14321
SWEEP GENERATOR PLUG-IN
INSTRUCTION MANUAL

TABLE OF CONTENTS

1. GENERAL DESCRIPTION

This instruction manual will describe basic operation method of Sweep Generator Plug-in TR14321, plugged in Scalar Network Analyzer TR4623. In this chapter, how to use this instruction manual, general introduction of this product, and set-up procedure for this product prior to use will be described. Be sure to read this instruction manual before operating.

1.1 How to Use This Instruction Manual

The composition of this manual is shown in Figure 1-1. This manual has been edited for users who have a basic knowledge and experience of electric measuring equipment. If you are not experienced in handling this type of equipment, please read this manual from the beginning.

If you are accustomed to handling analyzers, read through the Functional Explanation in Chapter 3. However, this chapter describes general notes, so that please operate after check.

Some basic knowledge of programming may be required to understand Chapter 4, "Programming with GPIB".
Moreover, if this equipment is out of order, refer to Chapter 5, "Diagnosis of Defects".

NOTE

The soft key menu is indicated by enclosing with dotted line so that it is distinguished from function key.
Example of soft key menu : [CENTER FREQ]

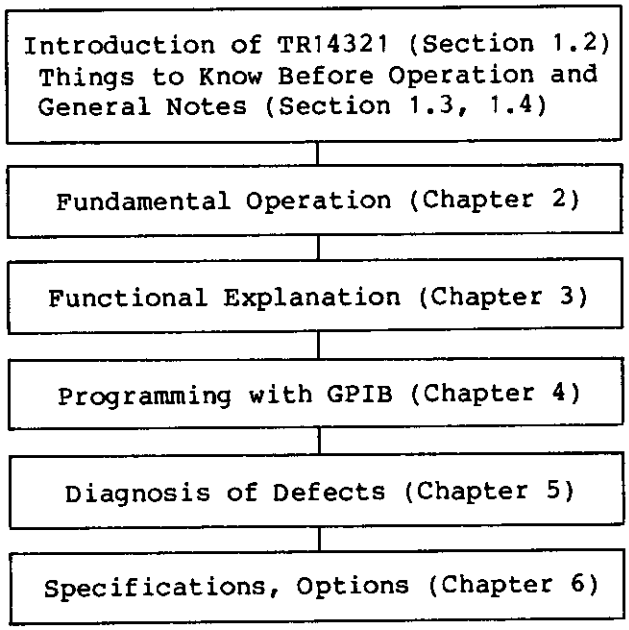


Figure 1 - 1 Composition of This Manual

1.2 TR14321 Product Overview

TR14321 is Sweep Generator covering in the range of 1MHz to 2GHz, plugged in Scalar Network Analyzer TR4623. This equipment mounts a built-in frequency counter of maximum resolution of 1kHz and obtains high precision signal with few residual FM.

- Plug-in method does not need troublesome wiring work. TR14321 can be used in combination with TR4623.
- Frequency specified by a marker can be read by the frequency counter in high precision.
- As all operation is accomplished through TR4623, the system may be composed with making the most of high operationality of TR4623.
- According to ADVANTEST's unique YTO technique, stable signal with few residual FM can be obtained.

1.3 Before Using the Sweep Generator Plug-in

1.3.1 Inspection of Appearance and Accessories

Upon receiving TR14321, first visually inspect appearance of this equipment if there is no flaw or damage caused transport.
Then check the standard accessories and make sure their quantities and specifications match with Table 1-1.
If any flaw, damage, or shortage of accessories is found, contact your nearest ADVANTEST representative.

Request to User : When ordering add-on accessories and the like, be good enough to stipulate the model (or stock No.) concerned.

Table 1 - 1 TR14321 Standard Accessories

Description	Model	Stock No.	Qty.	Remarks
Convertible Adapter	JUG-201A-U	JCF-AF001Ex03	1	Standard
	BA-A165	CF-AF001Ex04		Option 10
Instruction Manual	-	JTR14321	1	Japanese manual
	-	ETR14321		English manual

1.3.2 Operating Environment and Precautions

(1) Do not use this equipment in places subject to dust, corrosive gas, or direct sunlight or excessive vibration.
The ambient temperature should lie within the 0°C to 40°C (32°F to 104°F) range at a relative humidity within the 20% to 80% range (no mist).

(2) Ventilation
Ventilation, mounting this equipment to TR4623, performs inhaling from both (right and left) sides and exhaling through a fan mounted on the rear panel. Therefore, it is advisable not to place anything behind close to the equipment for ventilation.
Do not place objects on the top of the unit.

(3) This equipment has been designed after due consideration of noise in AC power line. However, avoid using this equipment in noisy environment as much as possible. If AC power line has superimposed noise, use of a noise filter is recommended.

1.3.3 Option 10

The output impedance is changed to 75Ω in this option. With this option, the following items are changed:

(1) Output Connector

Type N Nominal output impedance 75Ω
Output V.S.W.R : Less than 1.5 (1MHz to 1GHz)
Output V.S.W.R : Less than 1.7 (1GHz to 2GHz)

(2) Output Leveling Range (for 75 series)

+13dBm to -7dBm (Option 06 is equipped)
+11dBm to -57dBm (Option 06 is not equipped)

(3) Standard Accessaries

N-BNC conversion adapter (75Ω)

CAUTION

Note that if 50Ω series connector (male) is connected to this output connector, the output connector may be damaged.

1.4 Set-up

When measuring combined with TR4623 Scalar Network Analyzer, it is necessary to connect with an external detector or a wave detector. The detecter has four connection types according to measurement conditions.

1.4.1 Connection to the Main Frame, TR4623

Mount this equipment after removing blank panels from the front and the rear of the main frame.
At first, check power supply for OFF, and remove a blank panel from the front.
Pull a lock knob out shown in Figure 1-2, raise up the blank panel, then lower in the oblique direction to remove the panel.

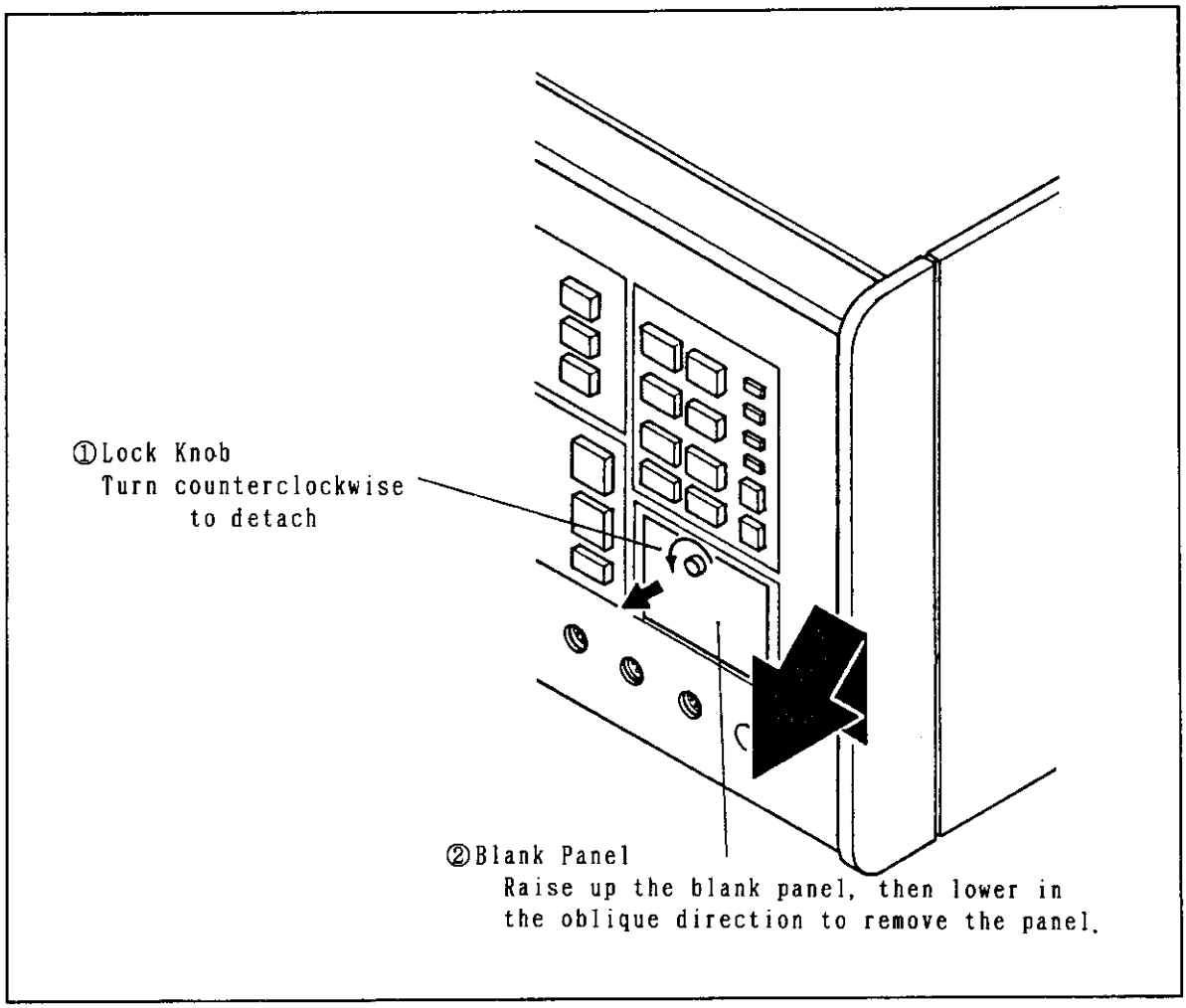


Figure 1 - 2 Connection to the Main Frame of TR4623 (1)

Next step, remove a blank panel at the rear. Detach knob to remove the blank panel to this side.

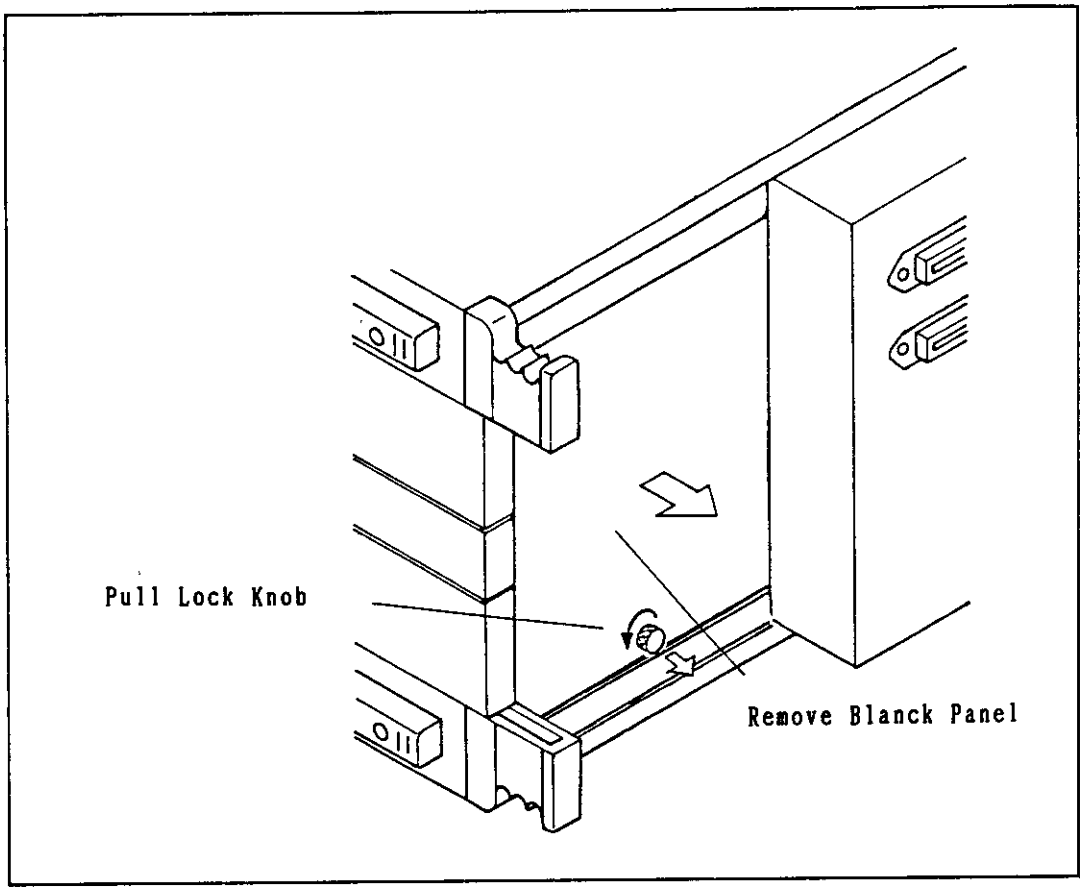


Figure 1 - 3 Connection to the Main Frame of TR4623 (2)

Mount this equipment slowly into the rear of TR4623 after removing this blank panel. Push TR14321 into the main frame of TR4623 untill aligning the faces of both front panels and fix two knobs up.

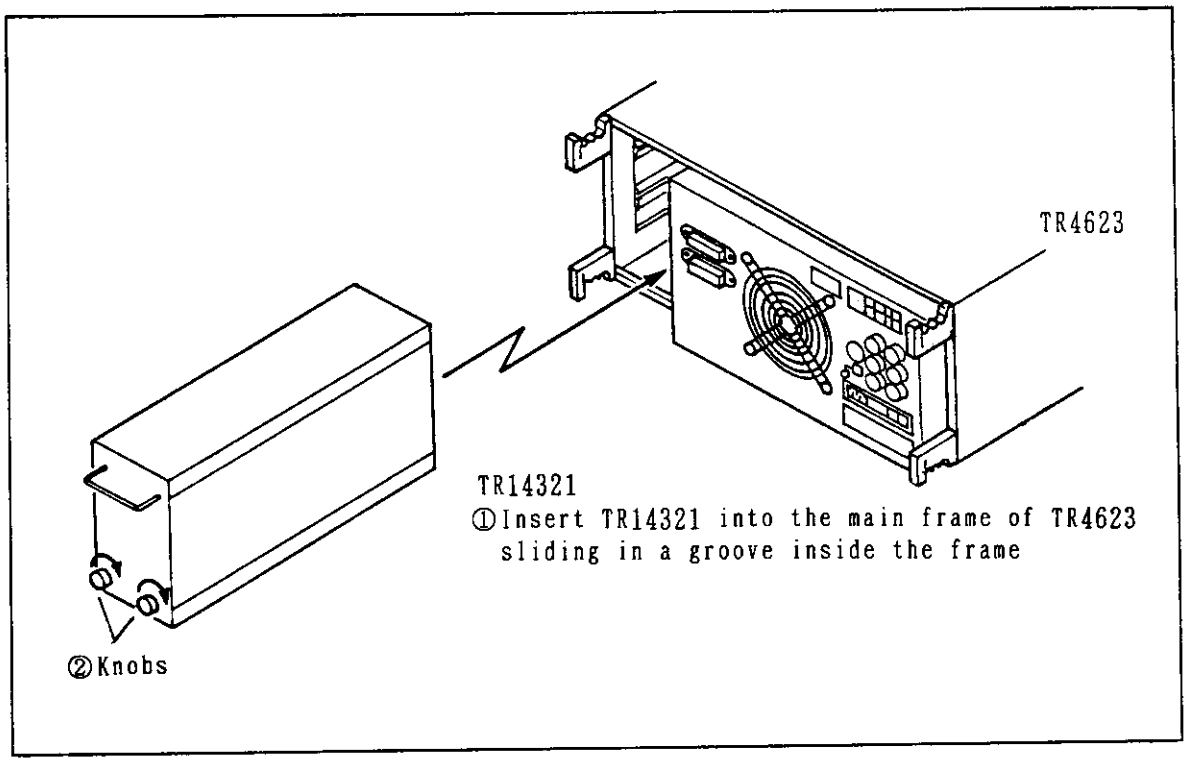
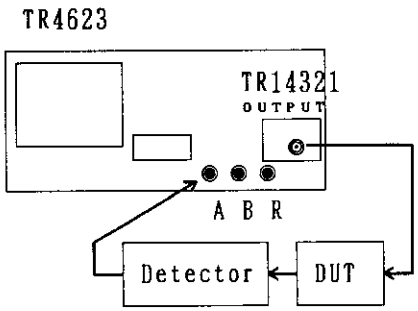


Figure 1 - 4 Conncetion to the Main Frame of TR4623 (3)

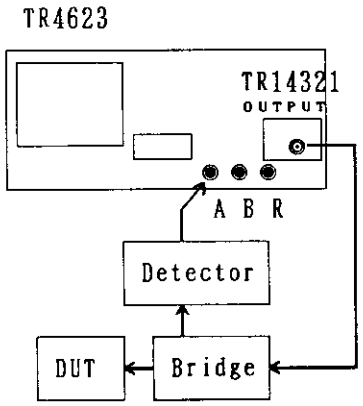
1.4.2 Examples of Detector Connection

① When measuring passage characteristic by single input.



One of any inputs of A/B/R in TR4623 may be used.

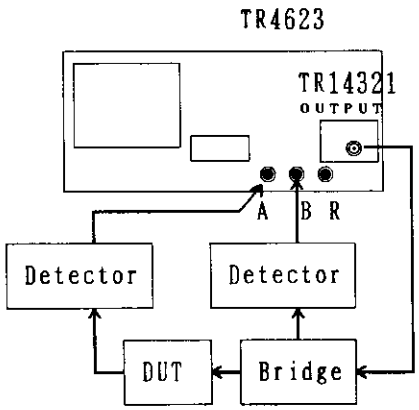
② When measuring reflection characteristic by single input.



One of any inputs of A/B/R in TR4623 may be used.

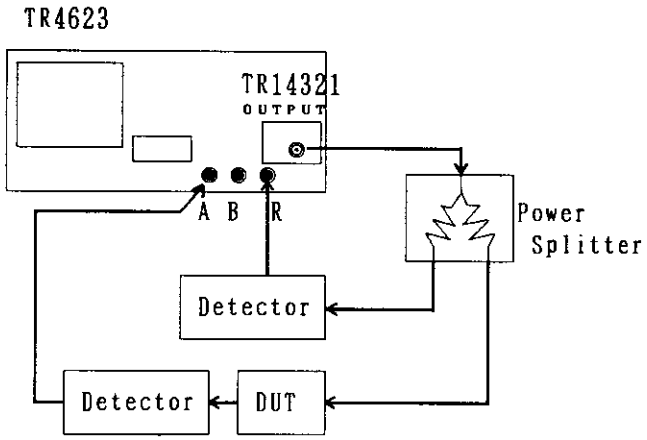
Figure 1 - 5 Examples of Detector Connection (1 of 2)

③ When simultaneously measuring passage and reflection characteristics by two inputs.



One of any inputs of A/B/R in TR4623 may be used.

④ When measuring comparatively.



Connect the detector joined with DUT to input of A or B and another detector to input of R (Reference).

Figure 1 - 5 Examples of Detector Connection (2 of 2)

2. FOR FIRST-TIME USERS

This chapter describes a self-diagnostic test performed during power on sequence, an initial setting condition by PRESET KEY, and how to read the display on CRT screen.
At the end of this chapter, examples of actual measurement will be explained to show the basic key operations for the first-time users on this equipment.

2.1 Power On Operation and Initial Setting

Connect TR4623 to AC power by power cable, and press power switch at the central lower portion of TR4623 to set ON.

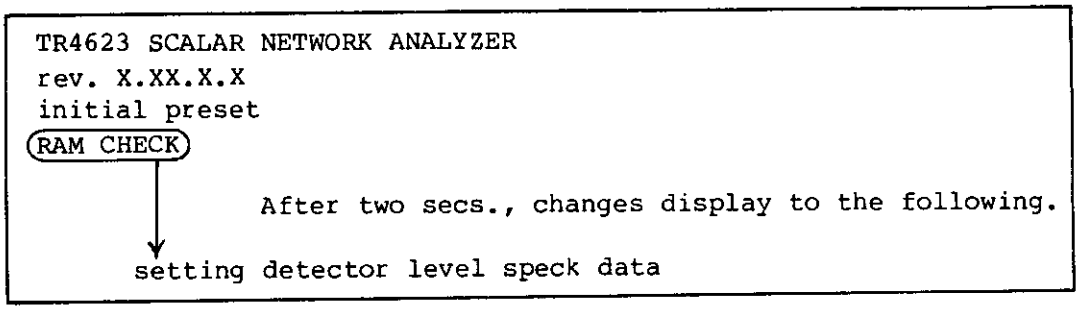
CAUTION

Before powering on, be sure to check correspondence between voltage of AC power and voltage setting of TR4623.

Moreover, warm-up this equipment for approx. 20 minutes to use this equipment within a performance of specifications.

2.1.1 Self-diagnostic Test

During powering-on this equipment, all LEDs illuminate on the panel and a self-diagnostic test is automatically executed.
While an execution of self-diagnostic test, the following display will appear on CRT.



*Should the equipment be left in the power off condition for a long period, it takes approx. 20 secs. for CRT heater to start normal operation. Consequently, during warming-up, there is no indication on CRT display.

After successfully completing self-diagnostic test, GPIB addresses of TR4623 and an external sweeper are displayed showing the ready state. At this time, CH1 is in a measurable condition by the detector connected to A input. (LED illuminates on the key of CH1. Inverse display of "CH1" is highlighted in the channel status display area on the left end of the screen. Input display below the highlighted CH1 shows "A".

2.1.2 Preset

This equipment is forcibly initialized when setting the power switch to ON or pressing PRESET key.

Initial Condition

Active measuring channel	: CH1
Active input connector	: A
Center frequency (CF)	: 1000MHz
Frequency sweep width (SPAN)	: 1000MHz
Output level	: 0dBm
Sweep time	: 200ms, FREE RUN
Marker	: All OFF

2.2 How to Read CRT Display

The following figure instructs how to read CRT display of this equipment. Information for this equipment is displayed in the bottom of CRT screen.

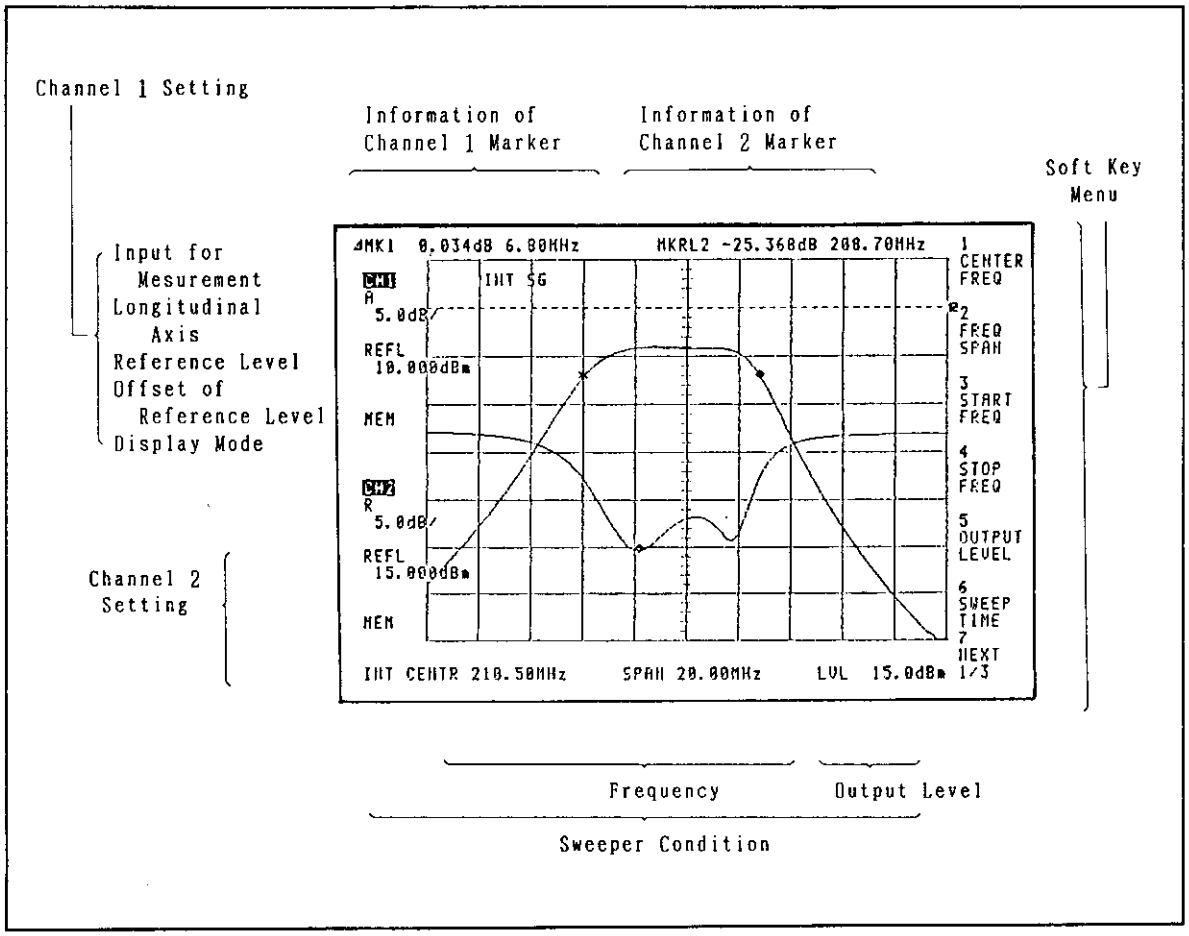


Figure 2 - 1 How to Read CRT Display

2.3 Fundamental Operation

In this section, basic key operations with measurement examples are described for the first-time users of a network analyzer. Since this is outlined explanation, users familiar with this kind measuring need not read this section. Operate this equipment with referring to only Chapters 3 and 4.

2.3.1 Necessary Keys for Fundamental Operation

(1) SWEEPER FUNCTION keys

Select the kinds of signal sources (internal=INT, external=EXT). As for this equipment, select INT and set functions by the soft keys described in the next item.

(2) Soft keys

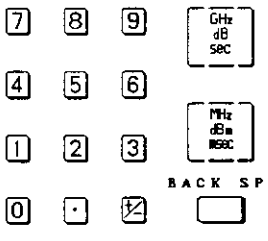
Seven indications arranged lengthways in the right hand side on CRT. According to the items set by FUNCTION key, selectable items from 1 to 7 are displayed in the right hand portion on CRT display. These items can be selected by the corresponding soft keys.

In the following explanation, keys with label letters at the left side of the keys are soft keys such as 

.

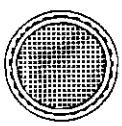
(3) DATA ENTRY keys

After setting a condition ready to input data by FUNCTION keys, etc., use these keys for the items requiring numeric input.

Ten-key 

..... Consists of numeric keys, unit keys, sign key and BACK SP key. Sign key is accepted at any time. BACK SP key deletes the lastly input numeric to correct input data.

Step key  ..... Changes the setting data in 1-2-5 steps or with a preset values (step unit) for functions.

Data knob  ..... Finely adjusts setting data.

When the input data exceeds the maximum settable range, an input error is informed by beep sound for any keys.

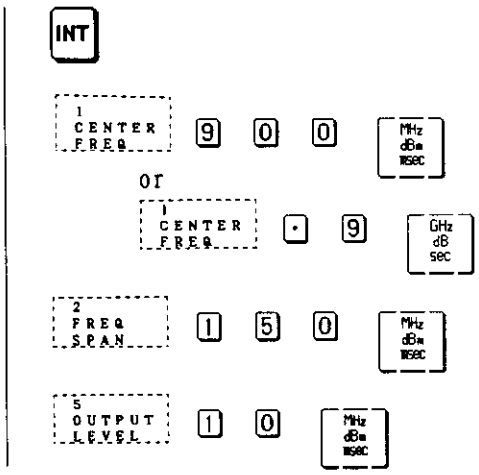
2.3.2 Examples of the Basic Key Operation

This paragraph explains basic key operation of TR4623 relating to this equipment.

(1) Setting Example by Center Frequency and Frequency Sweep Width (SPAN)

Sweeper selection: internal
Center frequency : 900MHz
Span : 150MHz
Output level : +10dBm

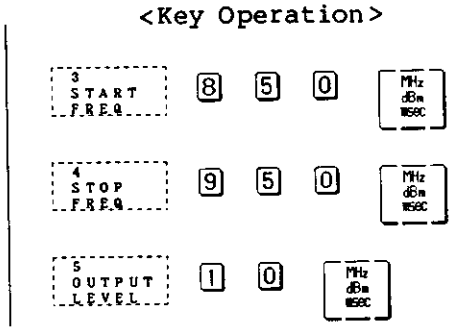
<Key Operation>



(2) Setting Example by Start and Stop Frequency

Start frequency: 850MHz
Stop frequency : 950MHz
Output level : +10dBm

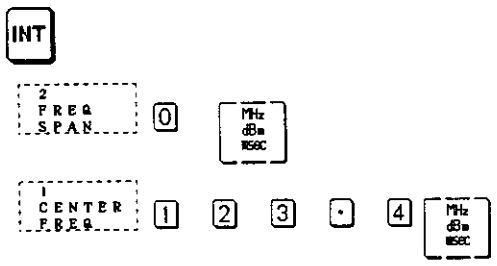
<Key Operation>



(3) Setting Example in CW Mode

CW : 123.4MHz

<Key Operation>



(4) Calibration Procedure (See 3.3.4)

The calibration of frequency is accomplished by the following procedure.

——— "CALIBRATION" is displayed on CRT. After approx. ten seconds, this display will disappear and the calibration is completed.

3. OPERATION OF THE BASIC FUNCTION

The TR14321 is controlled by TR4623, since this equipment is used in combination with TR4623 scalar network analyzer.
This chapter explains only the items relating to TR14321. Therefore, read the "TR4623 INSTRUCTION MANUAL" beforehand.

3.1 Description of the Panel Surface

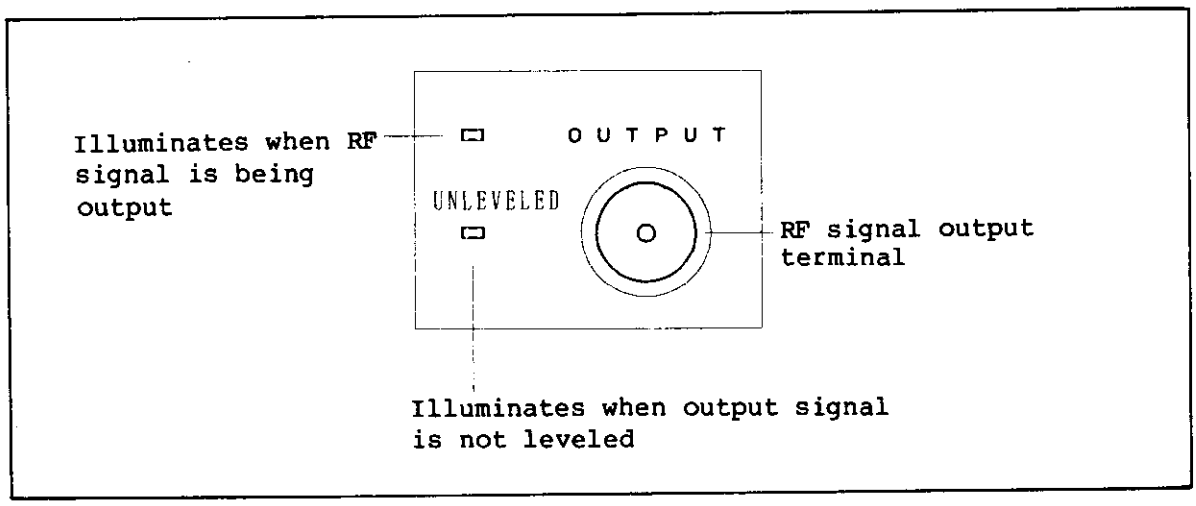


Figure 3 - 1 Description of the Panel Surface

CAUTION

If a signal exceeding +20dBm or ±25VDC is given, output circuit may be damaged because protective circuit is not built in for reverse power of output terminal.

3.2 Soft Key Functions

Each function of TR4623 is set with the function keys and soft keys. Depressing the function key displays up to seven settable items (soft key menu) in the right end of CRT screen.
There are the following five key operations for selecting and setting these items. Figure 3-2 summarizes these operations.

① Key operation requiring numeric data entry

- Currently set parameter and data are displayed in the upper left hand portion (active function area) of CRT screen.

② Key operation directly selecting the settable item currently displayed.

③ Key operation cyclically changing the settable items each time the soft key is depressed

- The currently set item is displayed by inverted display.

④ Key operation shifting into a sub menu.

- Whole the soft key menu is changed.

⑤ Key operation transferring to the second page (or returning to the first page)

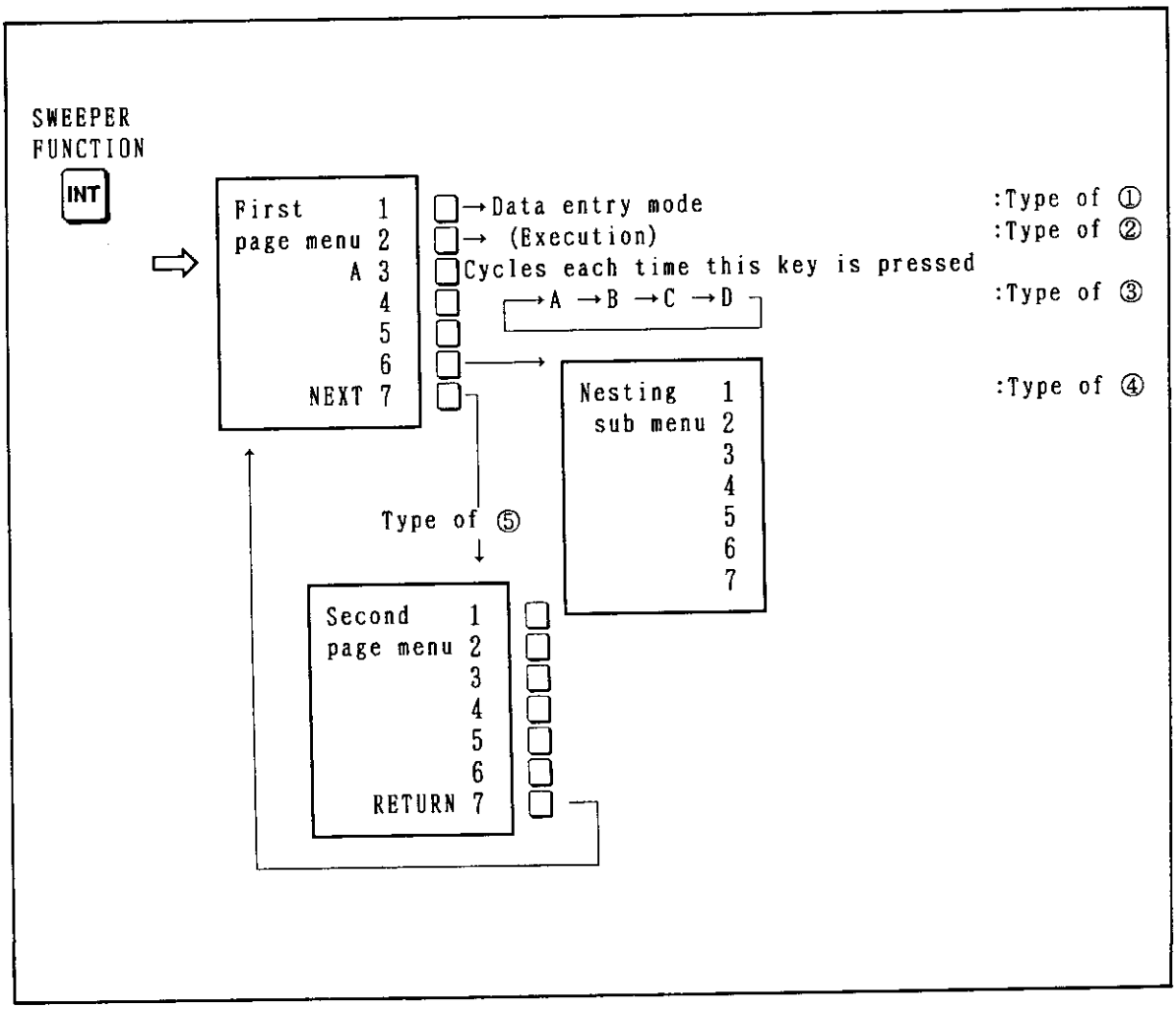


Figure 3 - 2 Structure of the Soft Key Menus

3.3 Setting of the Basic Functions

All signals of TR14321 signal sources are set by using the TR4623 panel functions. When setting the condition of sweeper signal, first select the internal (INT) or external (EXT) signal source.

Depress [INT] to use TR14321. When either INT or EXT signal is selected, the set data of frequency and output level is always displayed in the lower part of CRT screen.

Function keys and soft key menus

SWEEPER
FUNCTION
[INT] →

1 CENTER FREQ	... Sets the center frequency	... Refer to 3.3.1
2 FREQ SPAN	... Sets the frequency span	... Refer to 3.3.1
3 START FREQ	... Sets the start frequency	... Refer to 3.3.1
4 STOP FREQ	... Sets the stop frequency	... Refer to 3.3.1
5 OUTPUT LEVEL	... Sets the output level	... Refer to (2)
6 SWEEP TIME	... Sets the sweep time	... Refer to (3)
7 NEXT 1/3	... Transfers to the second page	

* The selected items are inversely displayed.

1:SWP & TRIG MENU	... Sweep trigger selecting menu ..... Refer to 3.3.5
2:FqMKR CONT ON/OFF	..... Refer to 3.3.3 (3)
3:FREQ MARKER M1→M5	... Sets the sweeper marker ..... Refer to 3.3.3 (1) (M1 to M5)
4:FREQ MARKER M6→M10	... Sets the sweeper marker ..... Refer to 3.3.3 (1) (M6 to M10)
5 f_CAL	... Calibration ..... Refer to 3.3.4
6:RdMKR COUNT ON/OFF	... Specifies counter mode of readout marker ..... Refer to 3.3.3 (2)
7 RETURN 2/3	... Returns to the first page

3.3.1 Analog Frequency Sweeping

(1) Setting of the frequency

Frequency setting is possible in any mode of center frequency/ frequency span or start/stop frequency. The set data is automatically calculated and substituted when the mode changed.
When setting the frequency, enter the center frequency data with the data entry key (ten-key, step key and data knob key) after depressing 1 to 4 of soft keys to be ready for data entry.

Frequency can be set between 0.5MHz to 2020MHz. The start frequency should not exceed the stop frequency.
When the value of out of range is entered, error message appears and sweeping is stopped. But input value is preserved, and error is released and sweeping is started when correct value is set.

Example of error

When start frequency is set 500MHz and stop frequency is set 1500MHz, set [1 CENTER FREQ] [2] [0] [0] [MHz dBm msec] . Error message appears and sweeping stops, since the start frequency exceeds 0.5MHz.

Sweeping is re-started by changing the center frequency ([1 CENTER FREQ] [8] [0] [0] [MHz dBm msec]) or span ([2 FREQ SPAN] [1] [5] [0] [MHz dBm msec]) to release the error.

(2) Setting of the output level

When changing the output level, depress [5 FREQ SAPN] and enter the data with the data entry key. Output level can be set up to +20dBm. When the output level setting exceeds the ability of leveling range, UNLEVELED LED in the front panel illuminates and "UNCAL" of warning message appears in the CRT screen. If the output level is beyond the limit of leveling output (+15dBm, (+13dBm with option 06)), harmonics, non-harmonics, and output frequency characteristics is not guaranteed. The initial value is set 0dBm.

(3) Setting of the sweep time

Sweep time is entered with data entry key after depressing [6 SWEEP TIME] .
Though the input is possible between 50ms to 100s, the shortest sweep time is decided by horizontal resolution of TR4623. Refer to TR4623 INSTRUCTION MANUAL (3.5.8 (7)). The initial value is 200ms.

3.3.2 Setting of the CW Frequency

Set the sweep width 0 to get the CW frequency, since TR14321 operates in analog frequency sweeping mode.

After entering [2 FREQ SPAN], [0] and [MHz dBm MSEC], set the CW frequency with [1 CENTER FREQ] and data entry keys.

3.3.3 Setting of the Marker

TR14321 has ten frequency markers (M1 to M10). These markers read the frequency of specific point by built-in counter. This counter can be activated with read out marker of TR4623.
When a reading out readout of the counters is performed using any markers, sweeping is temporarily stopped at the marker point.

(1) Setting of the frequency marker

When setting the marker, depress either of [1 M1 ON/OFF] to [5 M5 ON/OFF] or [1 M6 ON/OFF] to [5 M10 ON/OFF]. The marker is generated and the point (frequency) can be set with data entry key. The frequency read by the counter is displayed on the CRT screen.

To release the marker, depress [6 OFF] after setting the marker to be released in the data settable state.

(2) Counter mode specification of readout marker

Frequency readout accuracy may be improved by setting TR4623 readout marker to counter mode.
Counter mode can be set by pressing [6:RdMKR COUNT ON/OFF] to be ON. (On is in reversed highlight.)
To release counter mode, set the key to OFF. (OFF is in reversed highlight.)
Calibration (FCAL (Refer to 3.3.4)) must be done before measuring frequency in counter mode.

(3) Designation of frequency mode count mode

The frequency read-out accuracy increases by specifying the frequency marker to count mode.
The count mode is specified by [2:FdMKR COUNT ON/OFF].
"ON" is initially set.

3.3.4 Calibration

Depressing [5 FCAL] calibrates the frequency. "CALIBRATING" is displayed for the duration of about ten seconds, then calibration is finished. During the operation, signal is set about 40MHz. After calibraiton, the signal returns to the value set before calibration. The calibration is required when a power is turned on or operating conditions such as ambient temperature has been changed.

3.3.5 Setting of the Sweep Trigger Mode

Sweep trigger mode can be set by [1 TRIGER FR RUN] in the sweep trigger selecting menu. Each time pressing this key, FRee RUN, SINGLE sweep, EXTernal TRiGger and LINe TRiGger is selected in turn.

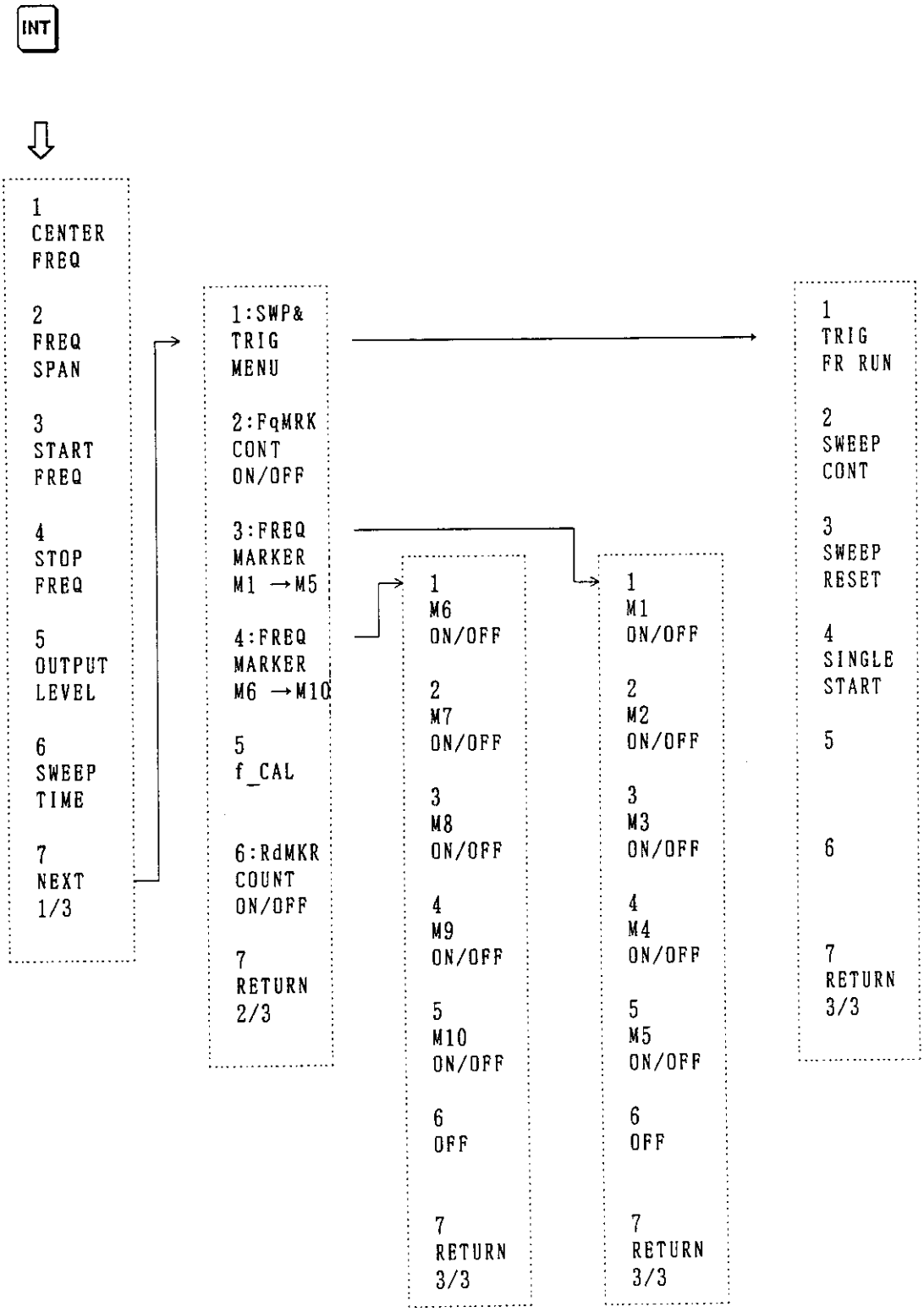
Depressing [2 SWEEP CONT] to temporarily stop a sweeping. Each time this key is pressed, CONTinue and STOP is selected alternately. Use [3 SWEEP RESET] to reset the sweep. The sweep is compulsorily reset even if the sweep is in stop state.
When SINGLE sweep is selected in the trigger mode, sweeping is started by [4 SINGLE START] except when the sweep is in stop state.

CAUTION

When [4 SINGLE START] is selected with external controller or built-in controller if the trigger mode is "SINGLE", and the sweep time is more than 1.1 sec., secure approximately 100 msec. For time interval from completion of sweeping to execution of [4 SINGLE START].

If this interval is not secured, sweeping may not start.

3.3.6 List of the Soft Key Menus



4. GPIB PROGRAMMING

TR14321 is set by GPIB through TR4623. This chapter shows the all GPIB codes, list of the mode strings and example of the programmings. For further description, refer to TR4623 INSTRUCTION MANUAL.

4.1 GPIB Codes

Table 4 - 1 Command Code of the Function Key

SWEEPER FUNCTION KEYS	
INTERNAL SG	ISG
EXTERNAL SG	ESG

FUNCTION KEYS	
CH1	CH1
CH2	CH2
INPUT	INP
DISPLAY	DSP
SCALE	SL
CAL	CAL
REF. POSITION	RFP
REF. LEVEL	RL
AVERAGE	AVG
MARKER →	MFS
MARKER	MK

SOFT KEYS	
SOFT KEY 1	SF1
SOFT KEY 2	SF2
SOFT KEY 3	SF3
SOFT KEY 4	SF4
SOFT KEY 5	SF5
SOFT KEY 6	SF6
SOFT KEY 7	SF7

INTENSITY KEYS	
UP	ITU
DOWN	ITD

DATA ENTRY KEYS			
0	0	-	-
1	1	BK SP	BS
2	2	GHz/dB/sec	GZorDB
3	3	MHz/dBm	orSC
4	4	/msec	MZorDM
5	5		orMS
6	6	STEP KEY ⇧	CU
7	7	⇩	CD
8	8	DATA KNOB	FD
9	9	DOWN	FU
.	.	UP	

INSTRUMENT STATE KEYS			
SHIFT	SH	PANEL LOCK	PLK
SAVE	SV	f	FN
RECALL	RC	PRESET	IP
HELP	HLP P	LOCAL	LC
PLOTTER	PLT T		

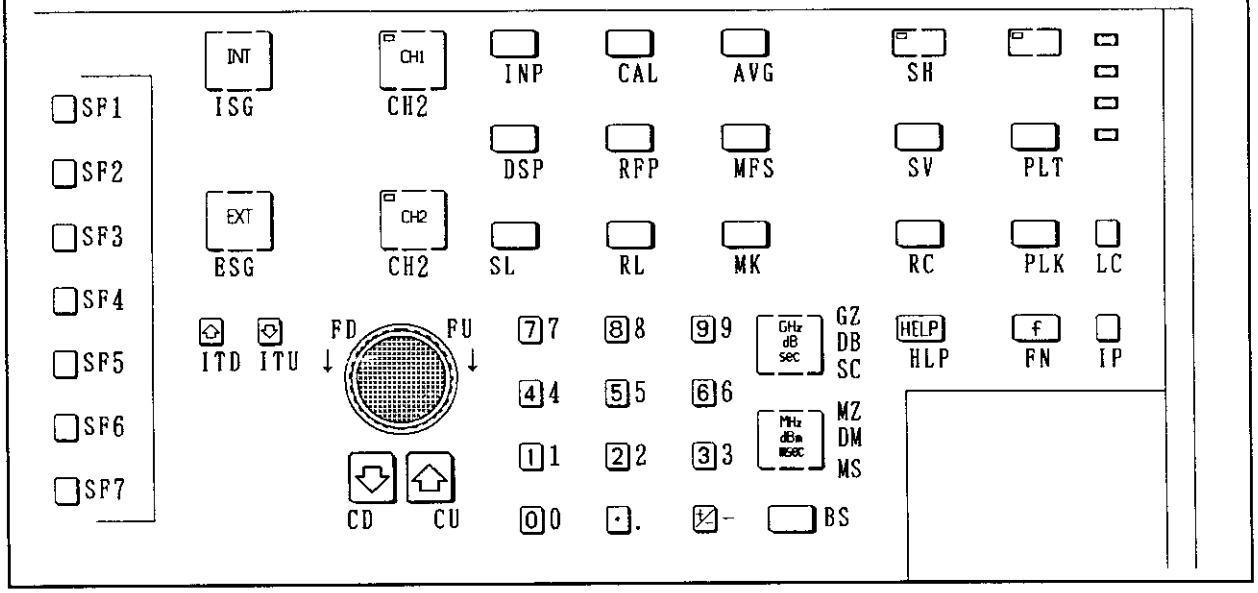


Table 4 - 2 Command Code of the Soft Key

INTERNAL SIGNAL GENERATOR	
ISG. CENTER FREQ.	ICF
ISG. SPAN	ISP
ISG. START	IFA
ISG. STOP	IFB
ISG. OUTPUT LEVEL	IOL
ISG. SWEEP TIME	ISW
MARKER 1	SM1
MARKER 2	SM2
MARKER 3	SM3
MARKER 4	SM4
MARKER 5	SM5
MARKER 6	SM6
MARKER 7	SM7
MARKER 8	SM8
MARKER 9	SM9
MARKER 10	SM10

Table 4 - 3 OP Paramter Codes (1 of 2)

Code	Header	Parameter to be output
SM1	SM1	Frequency marker 1
SM2	SM2	Frequency marker 2
SM3	SM3	Frequency marker 3
SM4	SM4	Frequency marker 4
SM5	SM5	Frequency marker 5
SM6	SM6	Frequency marker 6
SM7	SM7	Frequency marker 7
SM8	SM8	Frequency marker 8
SM9	SM9	Frequency marker 9
SMA	SMA	Frequency marker 10
M1W1	M1W1	Level of the CH1 WRITE waveform at frequency marker 1
M2W1	M2W1	Level of the CH1 WRITE waveform at frequency marker 2
M3W1	M3W1	Level of the CH1 WRITE waveform at frequency marker 3
M4W1	M4W1	Level of the CH1 WRITE waveform at frequency marker 4
M5W1	M5W1	Level of the CH1 WRITE waveform at frequency marker 5
M6W1	M6W1	Level of the CH1 WRITE waveform at frequency marker 6
M7W1	M7W1	Level of the CH1 WRITE waveform at frequency marker 7
M8W1	M8W1	Level of the CH1 WRITE waveform at frequency marker 8
M9W1	M9W1	Level of the CH1 WRITE waveform at frequency marker 9
MAW1	MAW1	Level of the CH1 WRITE waveform at frequency marker 10
M1M1	M1M1	Level of the CH1 MEM waveform at frequency marker 1
M2M1	M2M1	Level of the CH1 MEM waveform at frequency marker 2
M3M1	M3M1	Level of the CH1 MEM waveform at frequency marker 3
M4M1	M4M1	Level of the CH1 MEM waveform at frequency marker 4
M5M1	M5M1	Level of the CH1 MEM waveform at frequency marker 5
M6M1	M6M1	Level of the CH1 MEM waveform at frequency marker 6
M7M1	M7M1	Level of the CH1 MEM waveform at frequency marker 7
M8M1	M8M1	Level of the CH1 MEM waveform at frequency marker 8
M9M1	M9M1	Level of the CH1 MEM waveform at frequency marker 9
MAM1	MAM1	Level of the CH1 MEM waveform at frequency marker 10

Table 4 - 3 OP Paramter Codes (2 of 2)

Code	Header	Parameter to be output
M1W2	M1W2	Level of the CH2 WRITE waveform at frequency marker 1
M2W2	M2W2	Level of the CH2 WRITE waveform at frequency marker 2
M3W2	M3W2	Level of the CH2 WRITE waveform at frequency marker 3
M4W2	M4W2	Level of the CH2 WRITE waveform at frequency marker 4
M5W2	M5W2	Level of the CH2 WRITE waveform at frequency marker 5
M6W2	M6W2	Level of the CH2 WRITE waveform at frequency marker 6
M7W2	M7W2	Level of the CH2 WRITE waveform at frequency marker 7
M8W2	M8W2	Level of the CH2 WRITE waveform at frequency marker 8
M9W2	M9W2	Level of the CH2 WRITE waveform at frequency marker 9
MAW2	MAW2	Level of the CH2 WRITE waveform at frequency marker 10
M1M2	M1M2	Level of the CH2 MEM waveform at frequency marker 1
M2M2	M2M2	Level of the CH2 MEM waveform at frequency marker 2
M3M2	M3M2	Level of the CH2 MEM waveform at frequency marker 3
M4M2	M4M2	Level of the CH2 MEM waveform at frequency marker 4
M5M2	M5M2	Level of the CH2 MEM waveform at frequency marker 5
M6M2	M6M2	Level of the CH2 MEM waveform at frequency marker 6
M7M2	M7M2	Level of the CH2 MEM waveform at frequency marker 7
M8M2	M8M2	Level of the CH2 MEM waveform at frequency marker 8
M9M2	M9M2	Level of the CH2 MEM waveform at frequency marker 9
MAM2	MAM2	Level of the CH2 MEM waveform at frequency marker 10
ICF	ICF	Center frequency of the built-in signal source
ISP	ISP	Frequency span of the built-in signal source
IFA	IFA	Start frequency of the built-in signal source
IFB	IFB	Stop frequency of the built-in signal source
IOL	IOL	Output level of the built-in signal source
ISW	ISW	Sweep time of the built-in signal source

5. INSPECTION AND STORAGE

5.1 Failure Diagnosis

When any failures are reported on your equipment, check the following items before you request for repair. If the failure cannot be recovered by the following procedure, contact your nearest ADVANTEST representative. For its address and telephone number, see the back of this manual. Note that ADVANTEST, if involved with handling, charges for repairs even in the range of the following items.

Malfunction	Cause	Action to be taken
Power is not turned on. LED of [CH1] does not illuminate. Fan motor does not rotate.	The power cable is not firmly inserted into the connector.	Turn off the power switch and reconnect the power cable.
	Power fuse has blown.	Exchange the power fuse.
Scale character is not displayed in the CRT screen, though LED of the [CH1] illuminates.	Intensity is turned down too much.	Adjust the blightness by depressing [INTENSITY].
The waveform does not appear	External sweeping mode has been set.	Depress [INT].
The measured value of the frequency has been inaccuracy.	FCAL has been not executed.	Depress [INT] [NEXT 1/3] [5 FCAL] and calibrate the frequency.
	Marker has not been in counter mode.	Measure the frequency in counter mode. Refer to 3.3.3 (2).
The key operation is ignored.	GPIB remote control mode has been set.	If the program is being executed, interrupt the program and depress [LOCAL].

5.2 Storage

The storage temperature range shold be between -20°C to +60°C. If the instrument is to be left unused for a long period of time, cover it with a vinyl cloth or put it in a carton for storage in a dry place, where it will not be exposed to direct sunlight.

5.3 Shipment

When shipping the TR14321, separate it from TR4623. Use the original packing material or equivalent packing. If the packing material is already lost, use a carton of 5mm or more wall thickness and surround this instrument with buffers inside the carton. After surrounding this instrument with, put the accessories, then the buffers in the carton again, close it, and tie up with strings or tape.

6. SPECIFICATIONS AND OPTIONS

6.1 Specifications

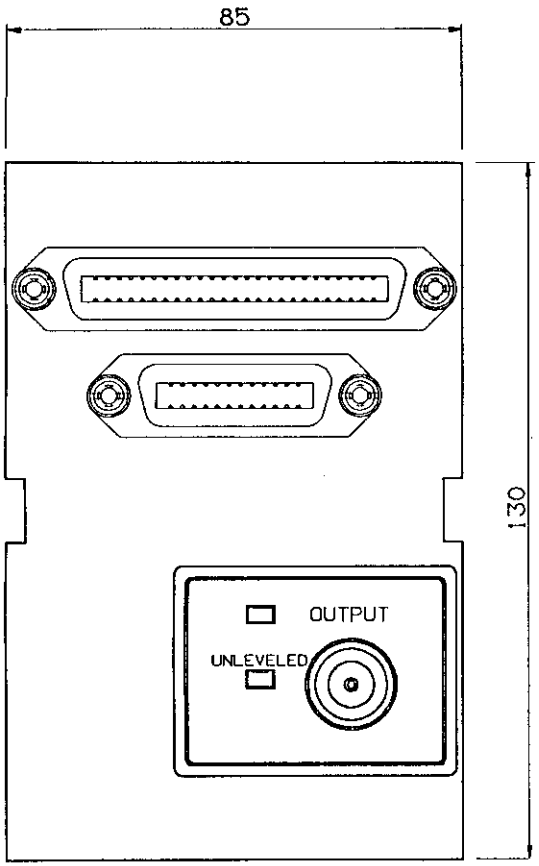
Output frequency range :	1MHz to 2000MHz
Setting resolution :	10kHz
CW frequency accuracy:	(Reference oscillator accuracy) x (setting frequency) ± 5kHz (after calibration)
Frequency sweep width:	LENEAR sweep 200kHz to 2000MHz, ZERO
Frequency sweep width accuracy:	±3% (LIN)
Marker frequency readout accuracy:	(Reference oscillator accuracy) x (frequency readout) ± $\frac{\text{Frequency sweep width}}{\text{Horizontal resolution}}$ + 3 counts * The value set by TR4623 (selectable from 601, 301 and 151points) after calibration in the counter mode.
Reference osillator stability:	
Aging rate:	±3 x 10^{-6}/year
Temperature characteristics:	±1 x 10^{-5} (0°C to + 35°C)
Output level accuracy:	+15dBm* to -7dBm, 0.1dB step +13dBm* to -57dBm (Option 06) * Decreases 2dB with Option 10.
Output frequency characteristics:	±0.7dB ±1.0dB (ATT = 0dB with option 06)
Harmonics:	≧ 30dBc
Non harmonics:	≧ 40dBc
Residual FM:	≦ 3kHz$_{p-p}$, sweep width 10MHz or less
Output connector:	N type, nominal 50Ω, VSWR 1.5 or less
Option 10:	N type, nominal 75Ω VSWR 1.5 or less (1MHz to 1GHz) 1.7 or less (1GHz to 2GHz)
Dimentions:	Approximately 86 (wide) x 137 (high) x 540 (deep) mm
Power consumption:	80VA or less (TR4623 input conversion)
Weight:	6kg or less

6.2 Options

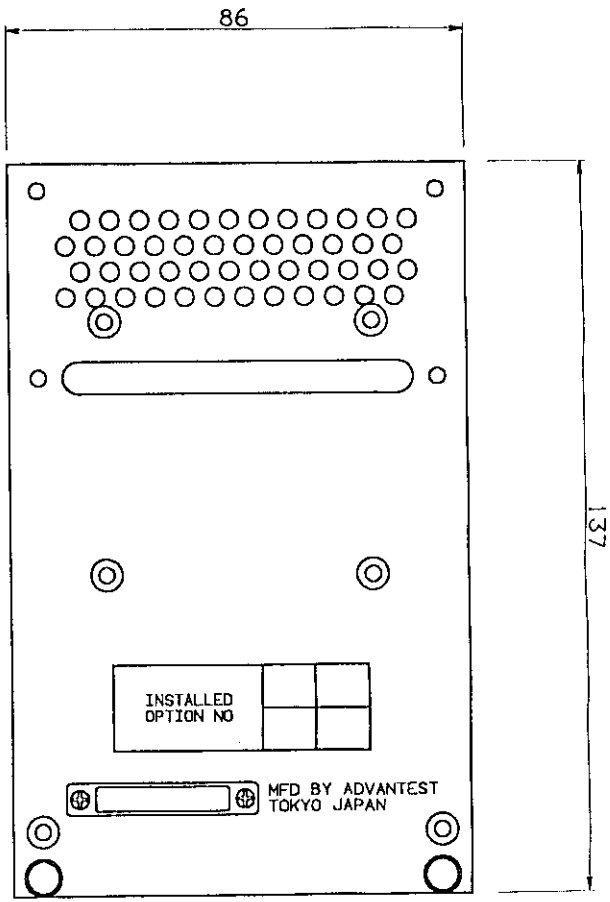
Option:	(Option should be ordered with main unit.)
Option 06:	50dB step attenuator (10dB steps, built-in)
Option 10:	75Ω output impedance

LIST OF FIGURES

LIST OF TABLES



TR14321 FRONT VIEW



TR14321 REAR VIEW

Unit : mm

IMPORTANT INFORMATION FOR ADVANTEST SOFTWARE

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

SOFTWARE License

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

Restrictions

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

Liability

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

LIMITED WARRANTY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CUSTOMER SERVICE DESCRIPTION

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

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

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

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

ADVANTEST

http://www.advantest.co.jp

ADVANTEST CORPORATION
Shin-Marunouchi Center Building, 1-6-2 Marunouchi, Chiyoda-ku, Tokyo 100-0005, Japan
Phone: +81-3-3214-7500