ADVANTEST

ADVANTEST CORPORATION

R3267/73

Spectrum Analyzer

Maintenance Manual

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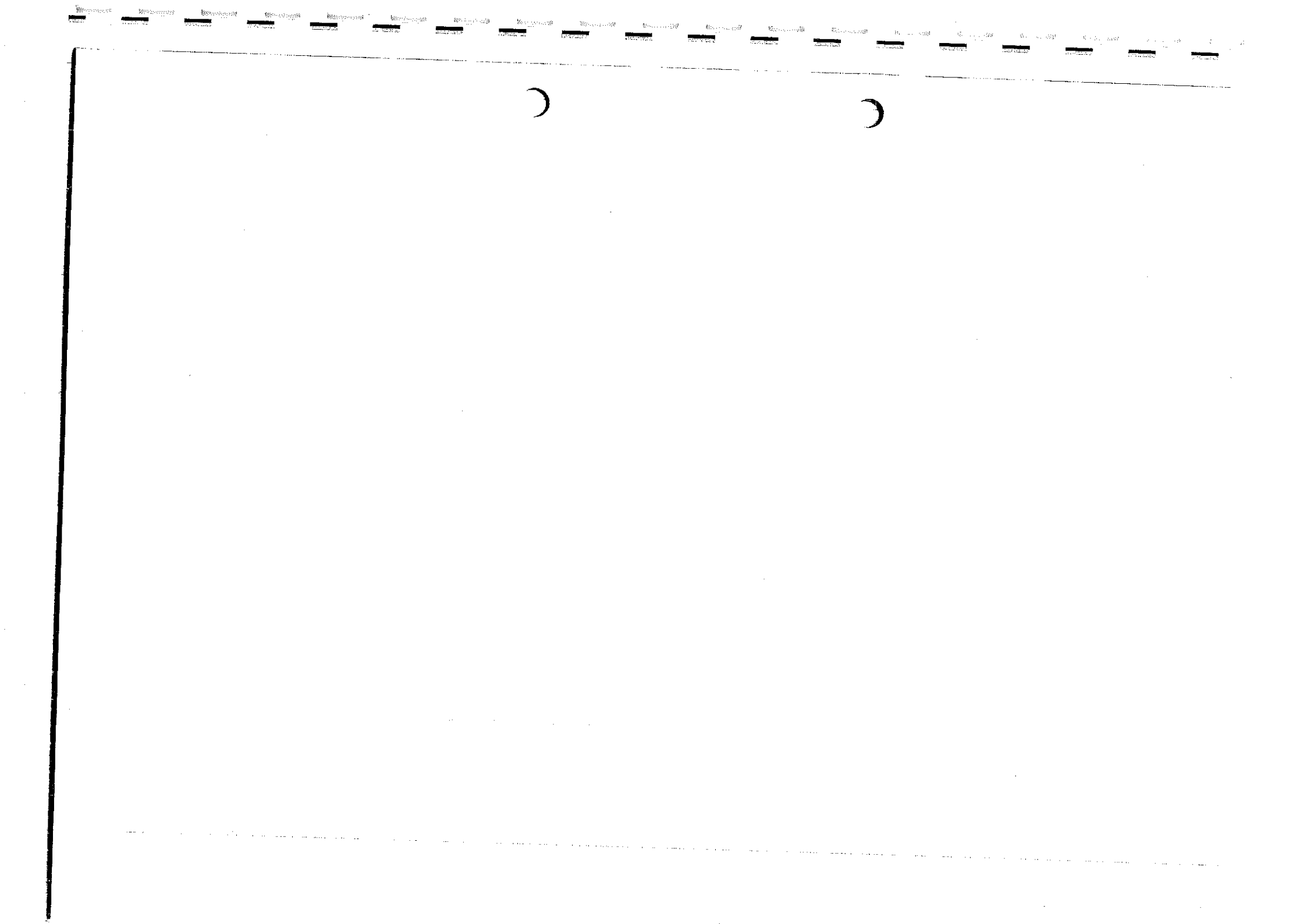


Safety Summary

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.
- Be sure to plug the power cable into an electrical outlet which has a safety ground terminal. Grounding will be defeated if you use an extension cord which does not include a safety 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 objects on top of this 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.

■ 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 sol der).

Example : fluorescent tubes, batteries

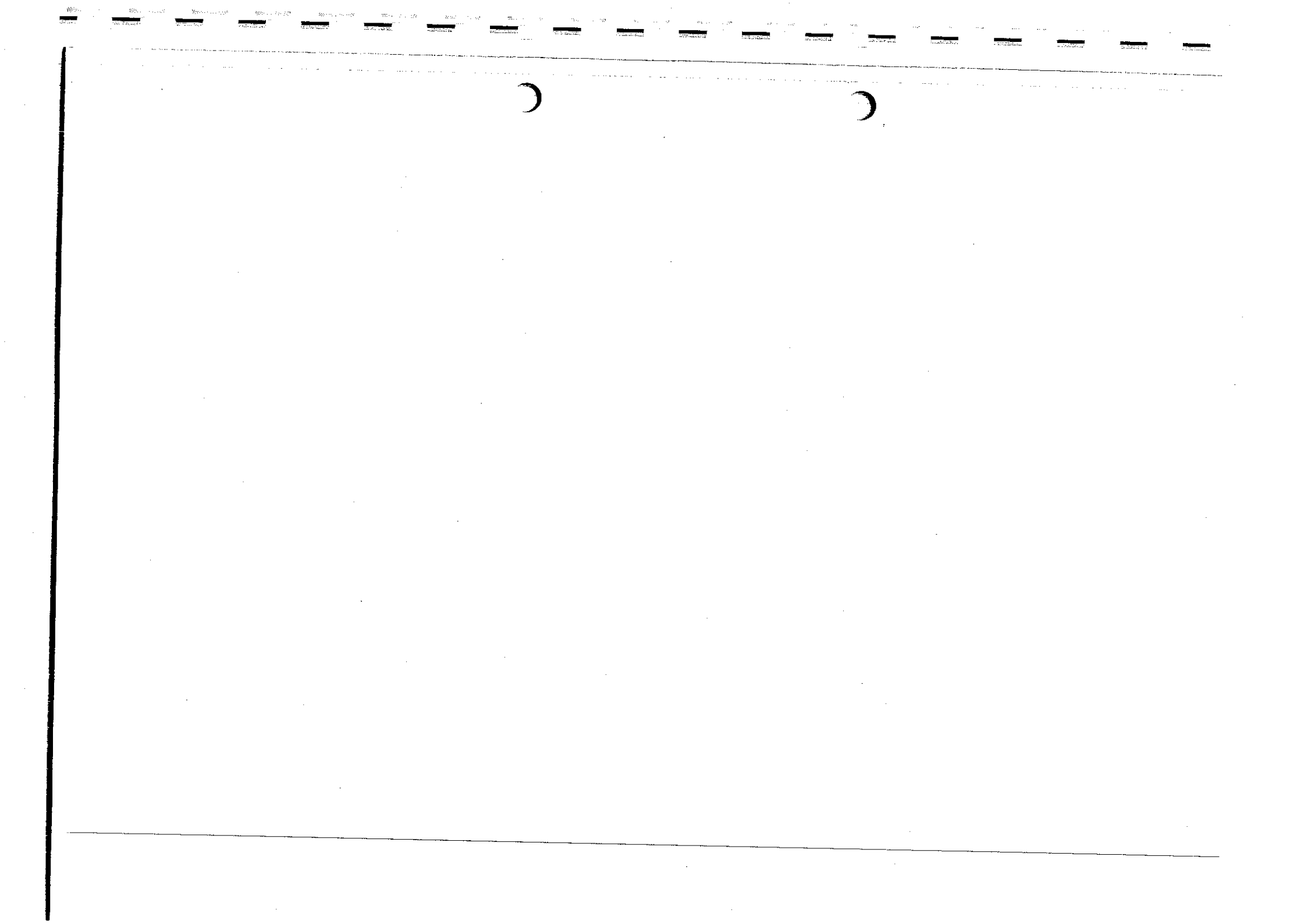
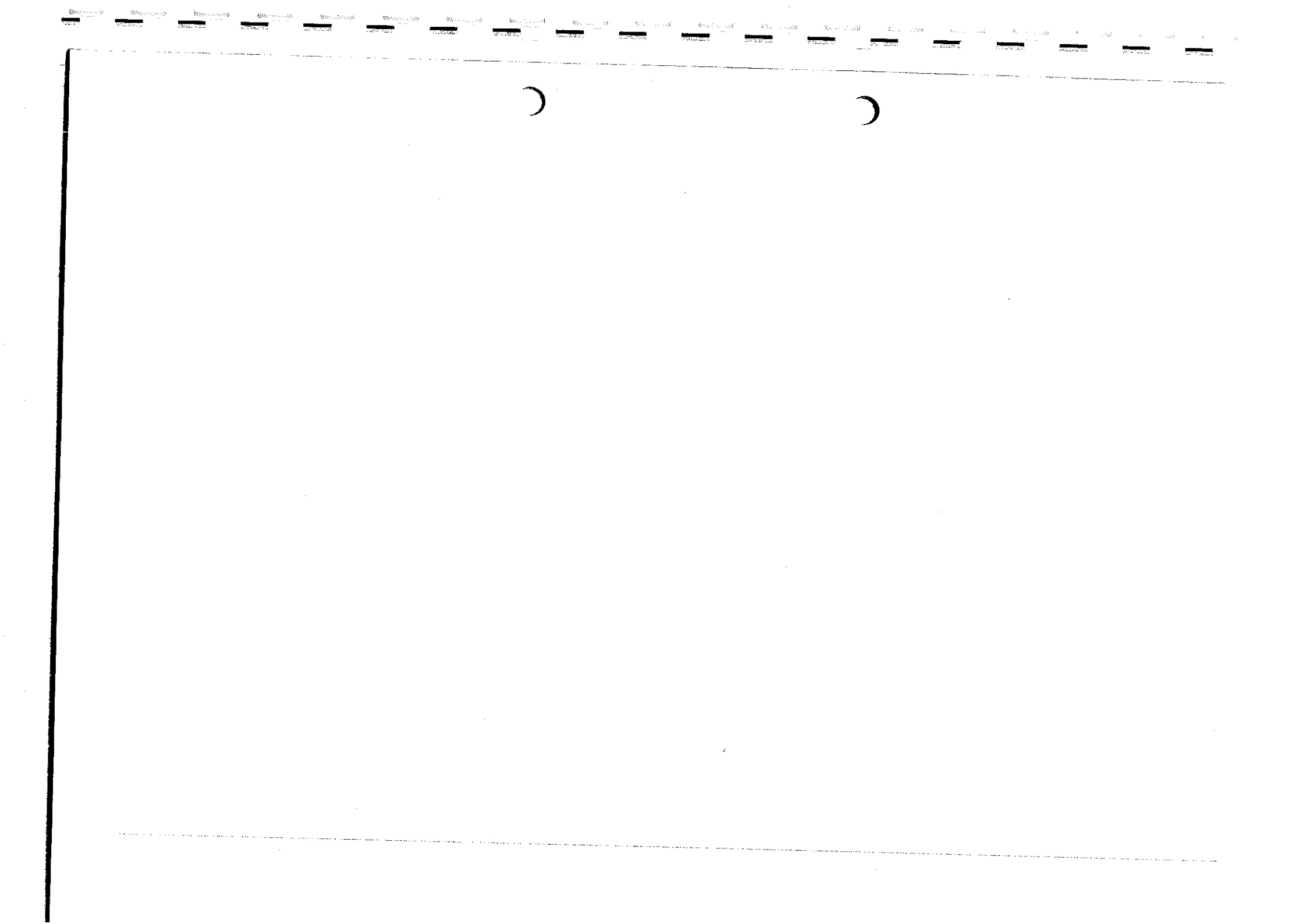


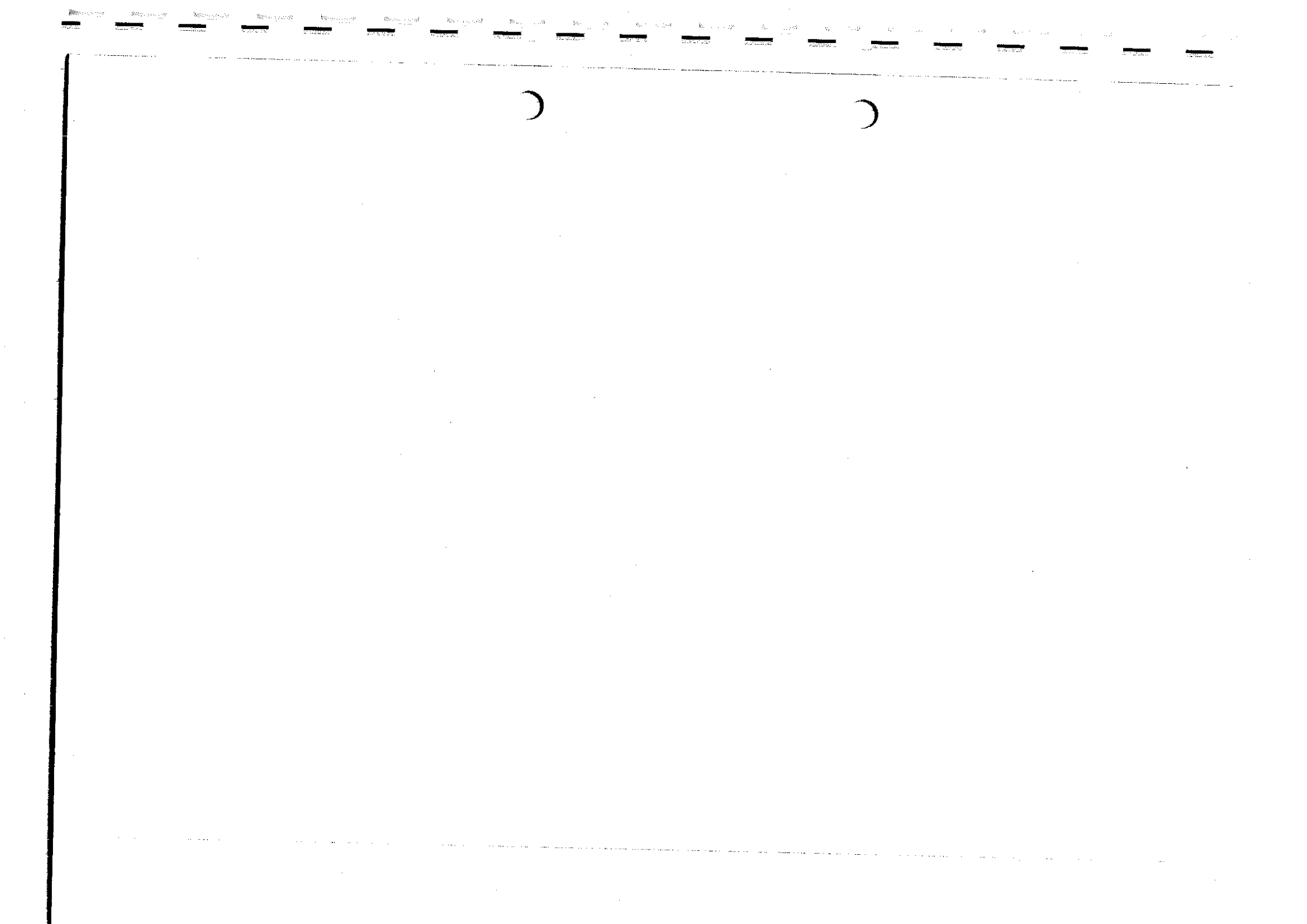
TABLE OF CONTENTS



LIST OF ILLUSTRATIONS

List of Illustrations

LIST OF TABLES



1 GENERAL INFORMATION

This chapter contains following information,
1.1 Introduction
1.2 Outline of product
1.3 Specification
1.4 Service concept
1.5 Test equipment required for Performance verification

1.1 Introduction

This manual provides information to perform assembly level troubleshooting including Digital Modulation Analysis Option 01 and W-CDMA Analysis Option 62 of R3267 and R3273 Spectrum Analyzer.
Included removal/Installation procedure of instrument's printed circuit board or module assemblies and a parts list.
This manual intend to use by service trained personnel only.

Detailed operation and programming information is excluded from this manual.
Including only sufficient information for service purpose. For more detailed operation information, refer to the R3267 and R3273 Spectrum Analyzer operation manual.

WARNING ***The information in this manual is for use of Service Trained Personnel only. To avoid electrical shock, to do not perform any procedures in this manual or do any servicing to the R3267 and R3273, unless you are qualified to do so.***

This manual has information the following six chapters.

1 GENERAL INFORMATION

It provides this manual description, a belief products information, Specification and Test equipment required for performance verification.

2 THEORY OF OPERATION

It provides the theory of operation base on boards and modules basis, which are replaceable.

3 PERFORMANCE VERIFICATION

It provides the procedures for performance verification and performance verification record sheet.

4 ADJUSTMENT

It provides the adjustment procedures for instruments, in case of required adjustment.

5 TROUBLESHOOTING

It provides the preventive maintenance procedures and the diagnostic procedures.
Include the removal of defective board or module and installation procedures.

6 REPLACEABLE PARTS LIST

It provide the replaceable parts list.

1.2 Outline of product

R3267 and R3273 features are as follows;

(1) High Frequency and Wide Bandwidth Measurements

Frequency Range:	R3267	100 Hz to 8 GHz
	R3273	100 Hz to 26.5 GHz
Resolution Bandwidth:	10 Hz to 10 MHz	
Span Accuracy:	± 1 % or better (for all spans)	

(2) High Dynamic Range Measurements

Dynamic Range:	-154 dBc/Hz(2 GHz band, typical)
	70 dB or better(5 MHz offset, typical) for WCDMA ACP measurement
Outstanding Signal Purity:	-113 dBc/Hz (10 kHz offset)
Input Attenuator:	75 dB in 5 dB steps (R3267)
1 dB Gain Compression:	0 dB
3rd Intermodulation Distortion:	-80 dBc or less

(3) High Speed Measurement

Trace Update Rate:	Up to 20 times/sec
	1 µsec fast zero span.

(4) Simplified, Automated Measurement for Mobile Communications.

ACP (Adjacent Channel Leakage Power) measurement
OBW (Occupied Bandwidth) measurement
Channel and total power measurement
Harmonics measurement
Spurious emission measurement
2-trace simultaneous measurement
Delayed sweep/Gated sweep function
Peak list function
Noise/Hz measurement
XdB down measurement
%AM measurement
Hz resolution frequency counter

(5) Simple Connectivity

6.5-inch TFT color LCD
7.5-inch MS-DOS compatible floppy disk drive
Standard I/O interface for integration: GPIB, RS232 and VGA.

1.3 Specification

1.3.1 R3267 Specifications

(1) Frequency

<table>
<tr><th>Characteristics</th><th>Description</th></tr>
<tr><td>Frequency range:</td><td>100 Hz to 8 GHz
<table>
<tr><th>Frequency</th><th>Frequency band</th><th>Harmonic order N</th></tr>
<tr><td>100 Hz to 3.5 GHz</td><td>0</td><td>1</td></tr>
<tr><td>1.6 GHz to 3.5 GHz</td><td>1</td><td>1</td></tr>
<tr><td>3.5 GHz to 7 GHz</td><td>2</td><td>1</td></tr>
<tr><td>6.9 GHz to 8 GHz</td><td>3</td><td>1</td></tr>
<tr><td colspan="3">Built-in YIG tuning pre-selector at 1.6 GHz to 8 GHz</td></tr>
</table></td></tr>
<tr><td>Frequency reading accuracy:</td><td>± (Frequency reading × Frequency reference accuracy + Span × Span accuracy + 0.15 × Resolution bandwidth+ 10 Hz)</td></tr>
<tr><td>Marker frequency counter
(SPAN < 1 GHz)
Accuracy (S/N > 25 dB):
Delta counter:
Resolution:</td><td>
± (Marker frequency × Frequency reference accuracy + 5 Hz × N + 1LSD)
± (ΔFrequency × Frequency reference accuracy + 10 Hz × N + 2LSD)
1 Hz to 1 kHz</td></tr>
<tr><td>Reference frequency source stability
Aging:

Temperature stability:

A warm-up (Nominal):</td><td>
$\pm 3 \times 10^{-8}$/day $\pm 1 \times 10^{-7}$/year
$\pm 5 \times 10^{-9}$/day $\pm 8 \times 10^{-8}$/year (OPT21)
$\pm 1 \times 10^{-7}$ } Temperature range: 0 to 40°C in reference
$\pm 5 \times 10^{-8}$ (OPT21) } to the frequency measured at 25°C ±2°C
$\pm 5 \times 10^{-8}$/3 min (In reference to the frequency measured 60 min. after the power-on)</td></tr>
<tr><td>Frequency stability
Residual FM (ZERO span):
Drift:</td><td>
< 3 Hz × Np-p/0.1 sec
Same as the reference source (After a warm-up of 60 min.)</td></tr>
<tr><td>Signal purity:
(dBc/Hz)</td><td>
<table>
<tr><th>Offset
Frequency</th><th>1 kHz</th><th>10 kHz</th><th>100 kHz</th><th>1 MHz</th></tr>
<tr><td>100 Hz to 1 GHz</td><td>-100</td><td>-113</td><td>-118</td><td>-135</td></tr>
<tr><td>1 GHz to 2.6 GHz</td><td>-100</td><td>-110</td><td>-118</td><td>-135</td></tr>
<tr><td>2.6 GHz to 8 GHz</td><td>-98</td><td>-108</td><td>-112</td><td>-135</td></tr>
</table></td></tr>
<tr><td>Frequency span
Range:
Accuracy:</td><td>
200 Hz to 8 GHz, ZERO SPAN
± 1 %</td></tr>
</table>

Characteristics	Description
Resolution bandwidth (3 dB)	
Range:	10 Hz to 10 MHz (1, 3, 10 sequences), 5 MHz
Accuracy:	±25 %: RBW = 3 MHz, 5 MHz ±15 %: RBW = 100 Hz to 1 MHz ±25 % (25°C ±10°C): RBW = 30 Hz
Selectivity:	<15:1 (RBW = 100 Hz to 5 MHz) <20:1 (RBW = 30 Hz)
Video bandwidth	
Range:	1 Hz, 10 MHz (1, 3, 10 sequences), 5 MHz
Frequency sweep	
Sweep time:	
Zero span:	1 µsec to 1000 sec
Span > 0 Hz:	20 msec to 1000 sec
Accuracy:	±3 %
Trigger:	Free Run, line, video, external, IF
Gated sweep	
Gate position:	100 nsec to 1 sec
Resolution:	100 nsec
Gate width:	1 µsec to 1 sec
Resolution:	100 nsec
Trigger:	IF (Mixer input is -40 dBm or more) External trigger or External gate
Delayed sweep	
Delay time:	100 nsec to 1 sec
Resolution:	100 nsec

(2) Amplitude Range

Characteristics	Description
Measurement range:	+30 dBm to Average noise level
Maximum safe input	
Average continuous power (Input ATT > 10 dB):	+30 dBm (1W)
DC input:	0V (DC signal must not be applied)
Display range	10 × 10Div
Log:	10, 5, 2, 1, 0.5 dB/Div
Linear:	10 % of reference level/Div
Reference level range	
Log:	-140 dBm to +60 dBm (in 0.1 dB steps)
Linear:	22.4nV to 223V (steps of about 1 % of full scale)
Input attenuation range	0 to 75 dB (5 dB steps)

(3) Dynamic Range

<table>
<tr><th>Characteristics</th><th>Description</th></tr>
<tr><td>Average noise level
Resolution bandwidth 100 Hz
Input attenuation 0 dB
Video bandwidth 1 Hz</td><td>
<table>
<tr><th>Frequency</th><th>Frequency band</th><th>Average noise level</th></tr>
<tr><td>1 kHz</td><td>0</td><td>-90 dBm</td></tr>
<tr><td>10 kHz</td><td>0</td><td>-100 dBm</td></tr>
<tr><td>100 kHz</td><td>0</td><td>-101 dBm</td></tr>
<tr><td>1 MHz</td><td>0</td><td>-125 dBm</td></tr>
<tr><td>10 MHz to 3.5 GHz</td><td>0</td><td>-(130 - f (GHz)) dBm</td></tr>
<tr><td>1.6 GHz to 3.5 GHz</td><td>1</td><td>-125 dBm</td></tr>
<tr><td>3.5 GHz to 7.0 GHz</td><td>2</td><td>-125 dBm</td></tr>
<tr><td>6.9 GHz to 8.0 GHz</td><td>3</td><td>-125 dBm</td></tr>
</table>
</td></tr>
<tr><td>1 dB gain compression:</td><td>10 MHz to 100 MHz -3 dBm
100 MHz to 8 GHz 0 dBm</td></tr>
</table>

(4) Spurious Response

<table>
<tr><th>Characteristics</th><th>Description</th></tr>
<tr><td>2nd order harmonic distortion</td><td>
<table>
<tr><th></th><th>Frequency range</th><th>Frequency band</th><th>Mixer level</th></tr>
<tr><td>< -70 dBc</td><td>10 MHz to 3.5 GHz</td><td>0</td><td>-30 dBm</td></tr>
<tr><td>< -90 dBc</td><td>> 1.6 GHz</td><td>1, 2, 3</td><td>-10 dBm</td></tr>
</table>
</td></tr>
<tr><td>2 signal 3rd order harmonic distortion</td><td>
<table>
<tr><th></th><th>Frequency range</th><th>Frequency band</th><th>Mixer level</th></tr>
<tr><td>< -70 dBc</td><td>10 MHz to 100 MHz</td><td>0</td><td>-30 dBm</td></tr>
<tr><td>< -80 dBc</td><td>100 Hz to 1 GHz</td><td>0</td><td>-30 dBm</td></tr>
<tr><td>< -85 dBc</td><td>1 GHz to 3.5 GHz</td><td>0</td><td>-30 dBm</td></tr>
<tr><td>< -90 dBc</td><td>1.6 GHz to 8 GHz</td><td>1, 2, 3</td><td>-30 dBm</td></tr>
</table>
</td></tr>
<tr><td>Image/multiple/out-band response</td><td>
<table>
<tr><th></th><th>Frequency range</th></tr>
<tr><td>< -70 dBc</td><td>10 MHz to 8 GHz</td></tr>
</table>
</td></tr>
</table>

Characteristics	Description
Residual response (no input, input ATT 0 dB, 50 Ω termination)	

	Frequency range
< -100 dBm	1 MHz to 3.5 GHz
< -90 dBm	300 kHz to 8 GHz

(5) Amplitude Accuracy

Characteristics	Description
Frequency response (with an input attenuation of 10 dB, band 1, 2 or 3 is automatically tuned on the pre-selector):	
Flatness within the bands (Relative values)	
Complementary error due to band switching	±0.5 dB
For a 30 MHz calibration signal	100 Hz to 8.0 GHz±3.0 dB
Calibration signal accuracy (30 MHz):	-10 dBm ± 0.3 dB
IF gain error (After automatic calibration):	0 dBm to -50 dBm ± 0.5 dB 0 dBm to -80 dBm ± 0.7 dB
Scale display accuracy (after automatic calibration)	
Log:	0 dB to -90 dB ±0.85 dB max ±0.2 dB/1 dB
Linear:	± 5 % of reference level
Input attenuation switching error (in reference to 10 dB, at 15 dB to 75 dB)	100 Hz to 8 GHz ± 1.1 dB/5 dB steps, 2.0 dB max
Resolution bandwidth switching error (Resolution bandwidth in reference to 300 kHz, after automatic calibration):	<±0.3 dB (RBW = 100 Hz to 5 MHz) <±1.0 dB (RBW = 30 Hz)

Frequency band	Frequency range
0	100 Hz to 3.5 GHz±1.5 dB
0	50 MHz to 2.6 GHz±1.0 dB
1	1.6 GHz to 3.5 GHz±1.5 dB
2	3.5 GHz to 7.0 GHz±1.5 dB
3	6.9 GHz to 8.0 GHz±1.5 dB

(6) Input and Output

Characteristics	Description
RF input Connector: Impedance: VSWR (Input ATT ≥ 10 dB setting frequency):	 N-type female 50 Ω (nominal) < 1.5: 1 (< 3.5 GHz) (nominal) < 2.1: 1 (> 3.5 GHz) (nominal)
Calibration signal output Connector: Frequency: Impedance: Amplitude:	 BNC female, front panel 30 MHz × (1 ± frequency reference accuracy) 50 Ω (nominal) -10 dBm ± 0.3 dB
10 MHz frequency reference output Connector: Impedance: Frequency accuracy: Amplitude range:	 BNC female, rear panel 50 Ω (nominal) 10 MHz × frequency reference accuracy 0 dBm ± 5 dB
10 MHz frequency reference input Connector: Impedance: Amplitude range:	 BNC female, rear panel 50 Ω (nominal) -5 dBm to +5 dBm
Probe power supply:	± 12.6V (100mA) (nominal)
21.4 MHz, IF output Connector: Impedance:	 BNC female, rear panel 50 Ω (nominal)
421.4 MHz, IF output Connector: Impedance:	 BNC female, rear panel 50 Ω (nominal)
Video output Connector:	 VGA (15 pins, female), rear panel 640 × 480 dots (equivalent to VGA)
X axis output Connector: Impedance: Amplitude:	 BNC female, rear panel 1 kΩ (nominal), DC coupled About -5V to +5V
Y axis output Connector: Impedance: Amplitude:	 BNC female, rear panel 220Ω (nominal) About 2V for full scale (with 10 dB/div)
External trigger input Connector: Impedance: Trigger level:	 BNC female, rear panel 10 kΩ (nominal), DC coupled TTL level

Characteristics	Description
External gate input	
Connector:	BNC female, rear panel
Impedance:	10 kΩ (nominal), DC coupled
Stops sweeping:	While a TTL output is at LOW level.
Allowed to sweep:	While a TTL output is at HIGH level.
Trigger output	
Connector:	BNC female, rear panel
Amplitude:	TTL level
Audio output (demodulation audio)*	
Connector:	Small-type monophonic jack, front panel
Power output:	0.2W max, 32Ω (nominal)
I/O interface	
GPIB:	IEEE-488 bus connector, rear panel
RS232:	D-SUB 9pins, rear panel
Printer:	D-SUB 25pins, rear panel
Extended I/O port:	D-SUB 25pins, rear panel
FDD:	3.5 inch floppy disk drive
Direct print:	Output with ESC/P, PCL, ESC/P raster commands

*: option

(7) General Specifications

Characteristics	Description
Temperature	
Operating environment range	0°C to +50°C
Storage environment range	-20°C to +60°C
Relative humidity	85 % or less (Without condensation)
AC input power source	Automatic switching to 100 VAC or 200 VAC For 100 VAC: 100 to 120 VAC, 50 or 60 Hz For 200 VAC: 220 to 240 VAC, 50 or 60 Hz
Power consumption	300 VA or below
Mass	18 kg or less (not including options, accessories, etc.)
Dimensions	Approximately 178(H) × 355(W) × 423.5(D)mm (rear feet and connectors are not included in above dimensions)

1.3.2 R3273 Specifications

(1) Frequency

<table>
<tr><th>Characteristics</th><th>Description</th></tr>
<tr><td>Frequency range:</td><td>100 Hz to 26.5 GHz
18 GHz to 60 GHz (external mixer used, synchonizable with up to 325 GHz)
<table>
<tr><th>Frequency</th><th>Frequency band</th><th>Harmonic order N</th></tr>
<tr><td>100 Hz to 3.5 GHz</td><td>0</td><td>1</td></tr>
<tr><td>3.5 GHz to 7.5 GHz</td><td>1</td><td>1</td></tr>
<tr><td>7.4 GHz to 15.4 GHz</td><td>2</td><td>2</td></tr>
<tr><td>15.2 GHz to 26.5 GHz</td><td>3</td><td>4</td></tr>
<tr><td colspan="3">Built-in YIG tuning pre-selector at 3.5 GHz to 26.5 GHz</td></tr>
</table></td></tr>
<tr><td>Frequency reading accuracy:</td><td>± (Frequency reading × Frequency reference accuracy + Span × Span accuracy + 0.15 × Resolution bandwidth+ 10 Hz)</td></tr>
<tr><td>Marker frequency counter
(SPAN < 1 GHz)
Accuracy (S/N > 25 dB):
Delta counter:
Resolution:</td><td>± (Marker frequency × Frequency reference accuracy + 5 Hz × N + 1LSD)
± (ΔFrequency × Frequency reference accuracy + 10 Hz × N + 2LSD)
1 Hz to 1 kHz</td></tr>
<tr><td>Reference frequency source stability
Aging:

Temperature stability:

A warm-up (Nominal):</td><td>
$\pm 3 \times 10^{-8}$/day $\pm 1 \times 10^{-7}$/year
$\pm 5 \times 10^{-9}$/day $\pm 8 \times 10^{-8}$/year (OPT21)
$\pm 1 \times 10^{-7}$ } Temperature range: 0 to 40°C in reference
$\pm 5 \times 10^{-8}$ (OPT21) } to the frequency measured at 25°C ±2°C
$\pm 5 \times 10^{-8}$/3 min (In reference to the frequency measured 60 min. after the power-on)</td></tr>
<tr><td>Frequency stability
Residual FM:
Drift:</td><td>< 3 Hz × Np-p/0.1 sec
Same as the reference source (After a warm-up of 60 min.)</td></tr>
<tr><td>Signal purity:
(dBc/Hz)</td><td>
<table>
<tr><th>Offset
Frequency</th><th>1 kHz</th><th>10 kHz</th><th>100 kHz</th><th>1 MHz</th></tr>
<tr><td>100 Hz to 1 GHz</td><td>-100</td><td>-113</td><td>-118</td><td>-135</td></tr>
<tr><td>1 GHz to 2.6 GHz</td><td>-100</td><td>-110</td><td>-118</td><td>-135</td></tr>
<tr><td>2.6 GHz to 7.5 GHz</td><td>-98</td><td>-108</td><td>-112</td><td>-135</td></tr>
<tr><td>7.4 GHz to 15.4 GHz</td><td>-89</td><td>-102</td><td>-106</td><td>-129</td></tr>
<tr><td>15.2 GHz to 26.5 GHz</td><td>-83</td><td>-96</td><td>-100</td><td>-123</td></tr>
</table></td></tr>
<tr><td>Frequency span
Range:
Accuracy:</td><td>200 Hz to 26.5 GHz, ZERO SPAN
± 1 %</td></tr>
</table>

Characteristics	Description
Resolution bandwidth (3 dB)	
Range:	10 Hz to 10 MHz (1, 3, 10 sequences), 5 MHz
Accuracy:	±25 %: RBW = 3 MHz, 5 MHz ±15 %: RBW = 100 Hz to 1 MHz ±25 % (25°C ±10°C): RBW = 30 Hz
Selectivity:	<15:1 (RBW = 100 Hz to 5 MHz) <20:1 (RBW = 30 Hz)
Video bandwidth	
Range:	1 Hz to 10 MHz (1, 3, 10 sequences), 5 MHz
Frequency sweep	
Sweep time:	
Zero span:	1 µsec to 1000 sec
Span > 0 Hz:	20 msec to 1000 sec
Accuracy:	±3 %
Trigger:	Free-run, line, video, external, IF
Gated sweep	
Gate position:	100 nsec to 1 sec
Resolution:	100 nsec
Gate width:	1 µsec to 1 sec
Resolution:	100 nsec
Trigger:	IF (Mixer input is -40 dBm or more) External trigger or External gate
Delayed sweep	
Delay time:	100 ns to 1 s
Resolution:	100 ns

(2) Amplitude Range

Characteristics	Description
Measurement range	+30 dBm to Average noise level
Maximum safe input	
Average continuous power (Input ATT > 10 dB):	+30 dBm (1W)
DC input:	0V (DC signal must not be applied)
Display range	10 × 10Div
Log:	10, 5, 2, 1, 0.5 dB/Div
Linear:	10 % of reference level/Div
Reference level range	
Log:	-140 dBm to +60 dBm (in 0.1 dB steps)
Linear:	22.4nV to 223V (steps of about 1 % of full scale)
Input attenuation range	0 to 70 dB (10 dB steps)

(3) Dynamic Range

<table>
<tr><th>Characteristics</th><th>Description</th></tr>
<tr><td>Average noise level
Resolution bandwidth 100 Hz
Input attenuation 0 dB
Video bandwidth 1 Hz</td><td>
<table>
<tr><th>Frequency</th><th>Frequency band</th><th>Average noise level</th></tr>
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<tr><td>100 kHz</td><td>0</td><td>-101 dBm</td></tr>
<tr><td>1 MHz</td><td>0</td><td>-125 dBm</td></tr>
<tr><td>10 MHz to 3.5 GHz</td><td>0</td><td>-(130 - f (GHz)) dBm</td></tr>
<tr><td>3.5 GHz to 7.5 GHz</td><td>1</td><td>-125 dBm</td></tr>
<tr><td>7.4 GHz to 15.4 GHz</td><td>2</td><td>-122 dBm</td></tr>
<tr><td>15.2 GHz to 22.0 GHz</td><td>3</td><td>-120 dBm</td></tr>
<tr><td>22.0 GHz to 26.5 GHz</td><td>3</td><td>-117 dBm</td></tr>
</table>
</td></tr>
<tr><td>1 dB gain compression:</td><td>10 MHz to 100 MHz -3 dBm
100 MHz to 3.5 GHz 0 dBm
3.5 GHz to 7.5 GHz -10 dBm
7.5 GHz to 26.5 GHz -3 dBm</td></tr>
</table>

(4) Spurious Response

<table>
<tr><th>Characteristics</th><th>Description</th></tr>
<tr><td>2nd order harmonic distortion</td><td>
<table>
<tr><th></th><th>Frequency range</th><th>Frequency band</th><th>Mixer level</th></tr>
<tr><td>< -70 dBc</td><td>10 MHz to 3.5 GHz</td><td>0</td><td>-30 dBm</td></tr>
<tr><td>< -100 dBc</td><td>> 3.5 GHz</td><td>1, 2, 3</td><td>-10 dBm</td></tr>
</table>
</td></tr>
<tr><td>2 signal 3rd order harmonic distortion</td><td>
<table>
<tr><th></th><th>Frequency range</th><th>Mixer level</th></tr>
<tr><td>< -70 dBc</td><td>10 MHz to 100 MHz</td><td>-30 dBm</td></tr>
<tr><td>< -80 dBc</td><td>100 MHz to 1 GHz</td><td>-30 dBm</td></tr>
<tr><td>< -85 dBc</td><td>1 GHz to 3.5 GHz</td><td>-30 dBm</td></tr>
<tr><td>< -70 dBc</td><td>3.5 GHz to 7.5 GHz</td><td>-30 dBm</td></tr>
<tr><td>< -75 dBc</td><td>7.5 GHz to 26.5 GHz</td><td>-30 dBm</td></tr>
</table>
</td></tr>
</table>

1.3 Specification

<table>
<tr><th>Characteristics</th><th>Description</th></tr>
<tr><td>Image/multiple/out-band response</td><td>
<table>
<tr><th></th><th>Frequency range</th></tr>
<tr><td>< -70 dBc</td><td>10 MHz to 18 GHz</td></tr>
<tr><td>< -60 dBc</td><td>10 MHz to 23 GHz</td></tr>
<tr><td>< -50 dBc</td><td>10 MHz to 26.5 GHz</td></tr>
</table>
</td></tr>
<tr><td>Residual response (no input, input ATT 0 dB, 50 Ω termination)</td><td>
<table>
<tr><th></th><th>Frequency range</th></tr>
<tr><td>< -100 dBm</td><td>1 MHz to 3.5 GHz</td></tr>
<tr><td>< -90 dBc</td><td>300 kHz to 26.5 GHz</td></tr>
</table>
</td></tr>
</table>

(5) Amplitude Accuracy

<table>
<tr><th>Characteristics</th><th>Description</th></tr>
<tr><td>Frequency response (with an input attenuation of 10 dB, band 1, 2 or 3 is automatically tuned on the pre-selector):
Flatness within the bands

Relative values

Complementary error due to band switching

For a 30 MHz calibration signal</td><td><table>
<tr><th>Frequency band</th><th>Frequency range</th></tr>
<tr><td>0</td><td>100 Hz to 3.5 GHz±1.5 dB</td></tr>
<tr><td>0</td><td>50 MHz to 2.6 GHz±1.0 dB</td></tr>
<tr><td>1</td><td>3.5 GHz to 7.5 GHz±1.5 dB</td></tr>
<tr><td>2</td><td>7.4 GHz to 15.4 GHz±3.5 dB</td></tr>
<tr><td>3</td><td>15.4 GHz to 26.5 GHz±4.0 dB</td></tr>
</table>±0.5 dB

100 Hz to 26.5 GHz±5.0 dB</td></tr>
<tr><td>Calibration signal accuracy (30 MHz):</td><td>-10 dBm ± 0.3 dB</td></tr>
<tr><td>IF gain error (After automatic calibration):</td><td>0 dBm to -50 dBm ± 0.5 dB
0 dBm to -80 dBm ± 0.7 dB</td></tr>
<tr><td>Scale display accuracy (after automatic calibration)
Log:

Linear:</td><td>
0 dB to -90 dB
±0.85 dB max
±0.2 dB/1 dB
± 5 % of reference level</td></tr>
<tr><td>Input attenuation switching error (in reference to 10 dB, at 20 dB to 70 dB)</td><td>100 Hz to 12.4 GHz ± 1.1 dB/10 dB steps, 2.0 dB max
12.4 Hz to 18 GHz ± 1.3 dB/10 dB steps, 2.5 dB max
18 GHz to 26.5 GHz ± 1.8 dB/10 dB steps, 3.5 dB max</td></tr>
<tr><td>Resolution bandwidth switching error (Resolution bandwidth in reference to 300 kHz, after automatic calibration):</td><td><±0.3 dB (RBW = 100 Hz to 5 MHz)
<±1.0 dB (RBW = 30 Hz)</td></tr>
</table>

(6) Input and Output

Characteristics	Description
RF input	
Connector:	N-type female (can be converted to SMA)
Impedance:	50 Ω (nominal)
VSWR (Input ATT ≥ 10 dB):	< 1.5: 1 (< 3.5 GHz) (nominal) < 2.1: 1 (> 3.5 GHz) (nominal)
Calibration signal output	
Connector:	BNC female, front panel
Frequency:	30 MHz × (1 ± frequency reference accuracy)
Impedance:	50 Ω (nominal)
Amplitude:	-10 dBm ± 0.3 dB
10 MHz frequency reference output	
Connector:	BNC female, rear panel
Impedance:	50 Ω (nominal)
Frequency accuracy:	10 MHz × frequency reference accuracy
Amplitude range:	0 dBm ± 5 dB
10 MHz frequency reference input	
Connector:	BNC female, rear panel
Impedance:	50 Ω (nominal)
Amplitude range:	0 dBm ± 5 dB
Probe power supply:	± 12.6V (100mA) (nominal)
21.4 MHz, IF output	
Connector:	BNC female, rear panel
Impedance:	50 Ω (nominal)
421.4 MHz, IF output	
Connector:	BNC female, rear panel
Impedance:	50 Ω (nominal)
1st LO output	
Connector:	SMA female, front panel
Impedance:	50 Ω (nominal)
Frequency range:	3.921 GHz to 7.921 GHz
Amplitude:	> +10 dBm
Video output	
Connector:	VGA (15 pins, female), rear panel 640 × 480 dots (equivalent to VGA)
X axis output	
Connector:	BNC female, rear panel
Impedance:	1 kΩ (nominal), DC coupled
Amplitude:	About -5V to +5V
Y axis output	
Connector:	BNC female, rear panel
Impedance:	220Ω (nominal)
Amplitude:	About 2V for full scale (with 10 dB/div)

Characteristics	Description
External trigger input Connector: Impedance: Trigger level:	 BNC female, rear panel 10 kΩ (nominal), DC coupled TTL level
External gate input Connector: Impedance: Stops sweeping: Allowed to sweep:	 BNC female, rear panel 10 kΩ (nominal), DC coupled While a TTL output is at LOW level. While a TTL output is at HIGH level.
Trigger output Connector: Amplitude:	 BNC female, rear panel TTL level
Audio output (demodulation audio)* Connector: Power output:	 Small-type monophonic jack, front panel 0.2W max, 32Ω (nominal)
I/O interface GPIB: RS232: Printer: Extended I/O port: FDD:	 IEEE-488 bus connector, rear panel D-SUB 9pins, rear panel D-SUB 25pins, rear panel D-SUB 25pins, rear panel 3.5 inch floppy disk drive
Direct print:	Output with ESC/P, PCL, ESC/P raster commands

*: option

(7) General Specifications

Characteristics	Description
Temperature Operating environment range Storage environment range Relative humidity	 0°C to +50°C -20°C to +60°C 85 % or less (Without condensation)
AC input power source	Automatic switching to 100 VAC or 200 VAC For 100 VAC: 100 to 120 VAC, 50 or 60 Hz For 200 VAC: 220 to 240 VAC, 50 or 60 Hz
Power consumption	300 VA or below
Mass	18 kg or less (not including options, accessories, etc.)
Dimensions	Approximately 178(H) × 355(W) × 423.5(D)mm (rear feet and connectors are not included in above dimensions)

1.4 Service concept

The troubleshooting concept of this manual is based on error message displayed and self test result approach.

1.5 Test equipment required for Performance verification

Table 1-1 lists the recommended equipment for performance verification including equipment for W-CDMA Digital Modulation Analysis function.
Any equipment that meets the critical specifications given in the table can be substituted for the recommended models.

The table also lists the recommended equipment for analyzer's adjustment procedures.

Table 1-1 Test Equipment for Performance Verification

No	Description	Critical Specification	Manufacturer	Recommended model	Usage	Notes
1	Frequency Standard	Output Frequency: 10 MHz Output Level: 1Vp-p or more Stability: 5 x 10exp -10/day or more	Advantest	R3031	P.V, Adj.	Freq.STD
2	Frequency Counter	Frequency Range: Over 10 MHz Resolution: 0.1 Hz, 9digits Input Sensivity: 70mVrms or better	Advantest	R5372	P.V, Adj.	Freq.CNT
3	Frequency Differential Meter	Input Frequency: 100 kHz (±0.25 %), 1 MHz (±0.25 %), 2 MHz (±0.50 %), 5 MHz (±0.50 %) Input Voltage: 0.5 to 10.0 Vrms	Tremetrics	Model527E	P.V,Adj.	FDM
4	Signal Generator	Frequency Range: 10 MHz to 18 GHz Output Level: Frequency Stability: 1 x 10exp-6/year	Rohde & Schwartz	SMP02 with OptionB11	P.V	SG1
5	Signal Generator	Frequency Range: 10 MHz to 27 GHz Output Level: +10 dBm to -5 dBm Frequency Stability: 1 x 10 exp-6/year	Rohde & Schwartz	SMP03 with Option B11	P.V	SG2

No	Description	Critical Specification	Manufacturer	Recommended model	Usage	Notes
6	Signal Generator	Frequency Range: 10 MHz to 2.7 GHz Output Level: 0 dBm to -30 dBm Residual SSB, Phase Noise @ 1kHz offset: < -115 dBc @ 10kHz offset: < -125 dBc @ 100kHz offset: < -130 dBc	HP	HP8663A	P.V	SG3
7	Function Generator	Frequency Range: 11 MHz to 20 MHz Output Level: +13 dBm to -10 dBm Frequency Stability: 1 x 10 exp-6/year Squrewave Generation required		HP3325B	P.V	SG4
8	RF Power Meter /RF Power Sensor	Frequency Range: 10 MHz to 26.5 GHz Measurement Power Range: +10 dBm to -30 dBm	Rohde & Schwartz	NRVS / NRVS-Z52	P.V	PM/PS
9	Step Attenuater	Frequency Range: DC to 18 GHz Attenuation: 0 dB to 12 dB by 1 dB step Accuracy: 0.1 dB		HP8494H	P.V	ATT1
10	Step Attenuater	Frequency Range: DC to 18 GHz Attenuation: 0 dB to 70 dB by 10 dB step Accuracy: 0.1 dB		HP8495H	P.V	ATT2
11	Attenuater Driver			HP11713A	P.V	
12	Terminator	Impeadance: 50Ω Type: N(m)	Rohde & Schwartz	RNA	P.V	
13	Fixed Attenuator	Attenuation:3 dB Impedance:50 Ω Type:SMA(m)-SMA(f)	Advantest	DEE-000685-1	P.V	ATT3
14	Fixed Attenuator	Attenuation:20 dB Impedance:50 Ω Type: SMA(m)-SMA(f)	Advantest	DEE-000480-1	P.V	ATT4

1.5 Test equipment required for Performance verification

No	Description	Critical Specification	Manufacturer	Recommended model	Usage	Notes
15	Power Splitter	Frequency Range: 10 MHz to 26.5 GHz, Impedance:50Ω Type: SMA(f)-SMA(f)-SMA(f)	Weinshel	1579	P.V	
16	Power Divider	Frequency Range: 20 MHz to 1.5 GHz Isolation: >18 dB	Merrimac	DDUL-20A-100	P.V	Divider1
17	Power Divider	Frequency Range: 2 GHz to 18 GHz Isolation: >18 dB	Merrimac	DDUL-24M-10G	P.V	Divider2
18	Low Pass Filter	Cut off: 2.2 GHz Attenuation at 3 GHz: >40 dB Attenuation at 3.8 GHz: >80 dB	Advantest	DEE-001172-1	P.V	L.P.F
19	BNC-BNC Cable	Impedance: 50Ω Type: BNC(m)-BNC(m)	Advantest	MI-09	P.V	
20	SMA-SMA Cable	Impedance:50Ω Type: SMA(m)-SMA(m)	Advantest	A01002	P.V	
21	Adapter	Impedance: 50Ω Type: N(m)-SMA(f)	Advantest	HRM-554S	P.V	
22	Adapter	Impedance:50Ω Type: SMA(f)-SMA(f)	Advantest	HRM-501	P.V	
23	Adapter	Impedance:50Ω Type: N(f)-BNC(m)	Advantest	NJ-BNCP	P.V	
24	Adapter	Impedance:50Ω Type: N(m)-BNC(f)	Advantest	JUG-201A-U	P.V	
Additional equipment for W-CDMA Digital Modulation Analysis.(Option 62)						
25	Arbitaray Waveform Generator	Output Channel: 4ch	Tektronix	AWG2021	P.V	SG5
26	IQ Modulation Signal Generator	Frequency Range: 30 MHz to 3 GHz IQ Modulation Bandwidth: >5 MHz EVM: <2 %	Rohde & Schwartz	SMIQ03 with W-CDMA option	P.V	SG6

Output level of SG5 and input range, DC offset level of SG6 must be matched.
IQ input level of SG5 and IQ output of SG6 must be matched.

2 THEORY OF OPERATION

2.1 Introduction

This chapter provides theory of operation of R3267 and R3273.

R3267 and R3273 are spectrum analyzer that consists of RF Block, IF Block, LOG/AD Block, SYNTESIZER Block, CPU Block, Power Supply Block, Key board and Display Block, Modulation Analysis Block Option 01(hereafter MOD Block), which are replaceable.
Difference between R3267 and R3273 is RF Block. Rest of the blocks are hardware compatible.
Describe theory of operation for both of RF Block and other Blocks.
Detailed components-level circuit theory is not provided.
Simplified Block diagrams is shown in Figure 2-1.

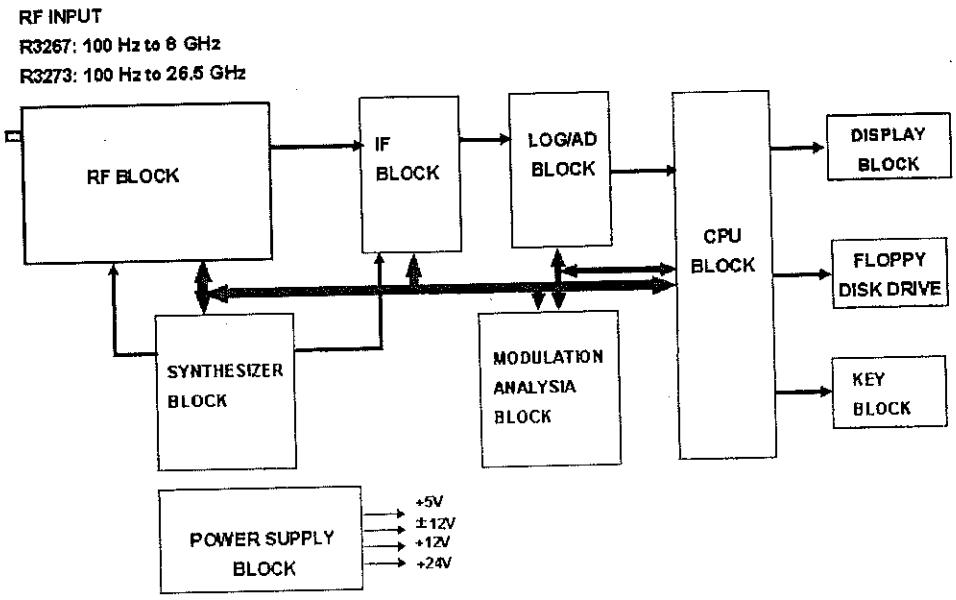


Figure 2-1 Block Diagram of R3267 and R3273

2.2 RF Block

2.2.1 RF Block of R3267

2.2.1.1 Overview

RF Block is a frequency converter.
The input signal frequency range is 100Hz to 8GHz. After signal becomes 21.4MHz IF signal.

RF Block has two ways of circuit depends on measurement frequency range.

- Frequency range: 100Hz to 3.5GHz.
- Frequency range: 1.6GHz to 8GHz.

RF Block consists of RF/IO circuit, RF input attenuator, Pre-selector, the two Local oscillators, mixer diodes and amplifiers.
Pre-selector is activated frequency above 1.6GHz.

RF/IO is controlled 1st local oscillator such as oscillation frequency, pre-selector and frequency sweep. Frequency reference oscillator is located in this Block.

2.2.2 Signal analysis flow

(1) Frequency range: 100Hz to 3.5GHz Band

The input signal goes through RF input programmable attenuator, which has attenuation 0dB to 75dB by 5dB step.
The signal of RF input attenuator is fed through 1st mixer diode to convert 1st IF signal (4231.4MHz) with 1st local oscillator signal (4GHz to 8GHz).
Then goes through low pass filter and band pass filter to eliminate unnecessary signal.
The 1st IF signal goes through 2nd mixer circuit to convert 2nd IF signal (421.4MHz) with 2nd local oscillator (3810MHz).

2nd IF signal goes through 3rd mixer to convert 3rd IF (21.4MHz) signal with 400MHz signal, which is generated by using 200MHz signal supplied from SYNTHESIZER Block.

1st local oscillator and 2nd local oscillator has phase locked loop circuit to stabilized its oscillation frequency.

(2) Frequency range:1.6GHz to 8GHz Band

The difference between 100Hz to 3.5GHz band and 1.6GHz to 8GHz band is frequency converter circuit.
It has Pre-selector to eliminate signal such as image and multiple response of input signal and mixer diode.
YTF is controlled by synchronously with the spectrum analyzer tuning frequency.

The input signal goes through RF input programmable attenuator, which has attenuation 0dB to 70dB by 10dB step.
After RF input attenuator, the signal goes through 1st mixer (High band mixer) to convert to 1st IF signal(421.4MHz) with 1st local oscillator(4GHz to 8GHz).

The 1st IF signal goes through low pass filter, then pass through band pass filter,which is used in 100Hz to 3.5GHz band commonly.

This 1st IF signal goes through to 3rd mixer to convert to 3rd IF signal(21.4MHz).

The 3rd IF signal goes into IF Block.

2.2.3 RF Block of R3273

2.2.3.1 Overview

RF Block is a frequency converter.
The input signal frequency range is 100Hz to 26.5GHz. After signal converted becomes 21.4MHz IF signal.

RF Block has two ways of circuit depends on measurement frequency range.

- Frequency range: 100Hz to 3.5GHz.
- Frequency range: 3.5GHz to 7.5GHz.
- Frequency range: 7.4GHz to 15.4GHz
- Frequency range: 15.2GHz to 26.5GHz

RF Block consists of RF/IO circuit, RF input attenuator, Pre-selector, the two Local oscillators, mixer diodes and amplifiers.
Pre-selector is activated frequency above 3.5GHz.
Frequency range:7.4GHz to 15.4GHz and 15.2GHz to 26.5GHz is used method of harmonics signal mixing.

RF/IO is controlled 1st local oscillator such as oscillation frequency and frequency sweep. Frequency referenced oscillator is located in this Block.

2.2.4 Signal analysis flow

(1) Frequency range: 100Hz to 3.5GHz Band

The input signal goes through RF input programmable attenuator, which has attenuation 0dB to 70dB by 10dB step.
The signal of RF input attenuator is fed through 1st mixer diode to convert 1st IF signal (4231.4MHz) with 1st local oscillator signal (4GHz to 8GHz).
Then goes through low pass filter and band pass filter to eliminate unnecessary signal.
The 1st IF signal goes through 2nd mixer circuit to convert 2nd IF signal (421.4MHz) with 2nd local oscillator (3810MHz).

2nd IF signal goes through 3rd mixer to convert 3rd IF (21.4MHz) signal with 400MHz signal, which is generated by using 200MHz signal supplied from SYNTHESIZER Block.

1st local oscillator and 2nd local oscillator has phase locked loop circuit to stabilized its oscillation frequency.

(2) Frequency range:3.5GHz above

The difference between 100Hz to 3.5GHz band and frequency above 3.5GHz band is frequency converter circuit.
It is used 2nd and 4th harmonics signal (8GHz to 16GHz and 16GHz to 32GHz) of YTO for 1st Local signal.
It has Pre-selector to eliminate signal such as image and multiple response of input signal and mixer diode.
YTF is controlled by synchronously with the spectrum analyzer tuning frequency.
The input signal goes through RF input programmable attenuator, which has attenuation 0dB to 70dB by 10dB step.
After RF input attenuator, the signal goes through 1st mixer (High band mixer) to convert to 1st IF signal(421.4MHz) with 1st local oscillator(8GHz to 16GHz and 16GHz to 32GHz).

The 1st IF signal goes through low pass filter, then pass through band pass filter,which is used in 100Hz to 3.5GHz band commonly.

This 1st IF signal goes through to 3rd mixer to convert to 3rd IF signal(21.4MHz).

The 3rd IF 21.4MHz signal goes into IF Block.

2.3 IF Block

The 3rd IF signal from RF Block is fed into IF Block.
IF Block consists of LC filters, piezoelectric resonator filters and crystal filters.
They specify resolution bandwidth characteristics 10Hz to 10MHz(1,3, or 10 sequences),5MHz and step amplifiers with a 0.1dB step to specify the reference level.

For the RBW 300kHz to 10MHz use LC filter.
For the RBW 3kHz to 100kHz use piezoelectric filter.
For the RBW 10Hz to 1kHz use crystal filter.

After the 3rd IF signal filtered, the signal is fed into LOG/AD Block.
When digital modulation analysis function(Option01) is installed, the 3rd IF signal is fed into the Modulation Analysis Block.

2.4 LOG/AD Block

After the 3rd IF signal characterized for RBW, the signal is fed into logarithm(LOG) amplifier, which provides a 100dB dynamic range in log display mode.
Under linear display mode, the signal is fed through the linear amplifier and detector circuit.
After the signal is detected, the signal is digitized by A/D converter.
The digitized signal is fed into CPU Block.

2.5 CPU Block

It consist of CPU main processor, Graphic processor and its peripheral circuit, such as GPIB interface, RS232 Interface, Floppy Disk Drive and display.

On the CPU Block compute the digitized signal for the display

2.6 SYNTHESIZER Block

This Block generates calibration signal on the front panel and reference signals for phase locked loop circuits in RF Block.
It is consists of YTO PLL, SAMP PLL, 200MHz PLL and DDS PLL circuits.

2.7 MOD Block

This block enable to analyze digital modulation signal such as W-CDMA, GSM/DECT(DCS1800/1900 included), cdmaone(IS-95) and PDC/PHS/IS-136.
Type of the digital modulation analyzed is depend on the software option installed.

This block consists of down converter block, IF Local PLL block, Sampling clock PLL block, IQ input block, Anti-aliasing filter block and DSP block.

The 3rd IF signal is fed into down converter block. The signal is down converted with a local signal, which generate on the IF local PLL block.

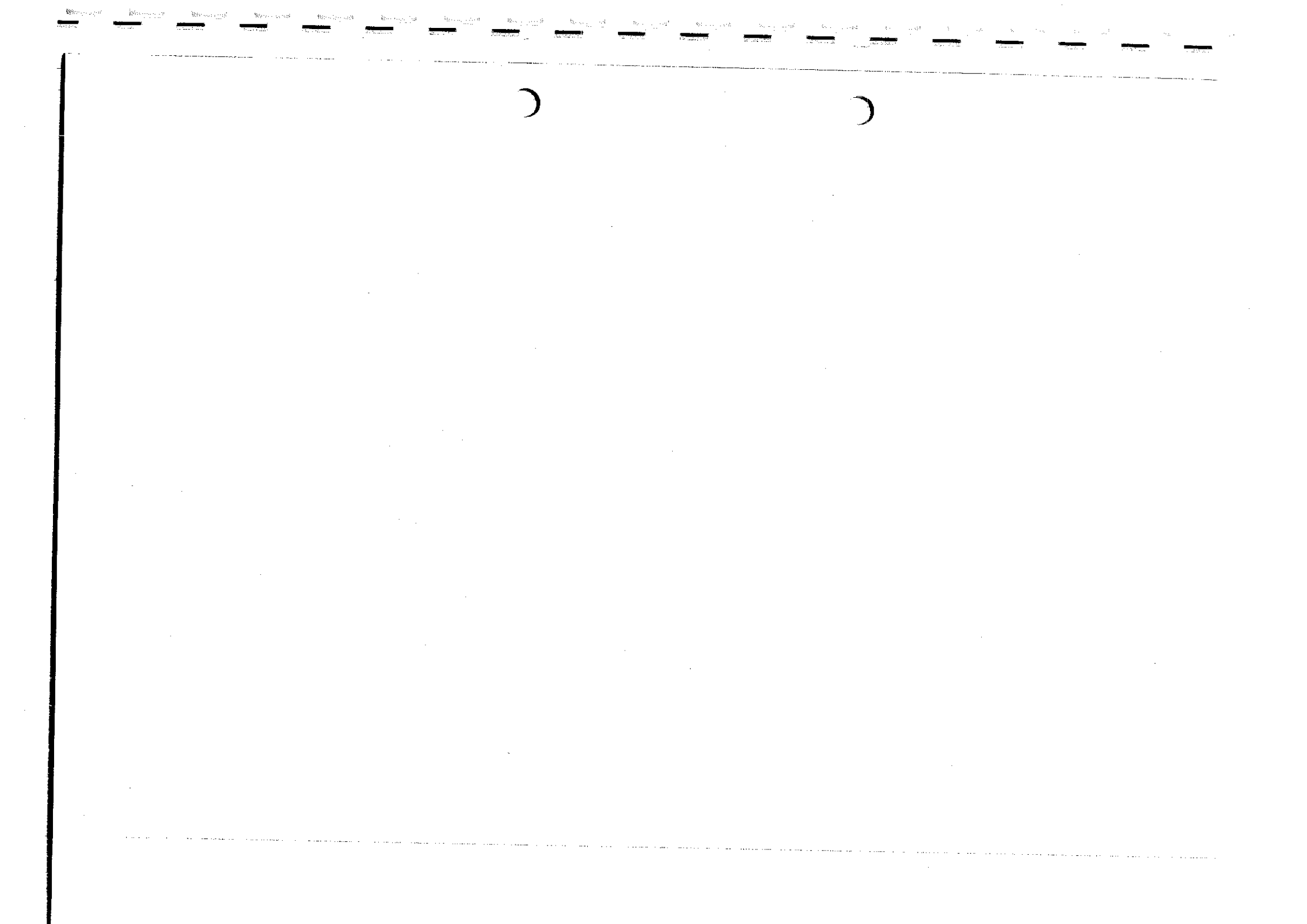
After the signal converted, the signal fed into antialiasing filter and A/D converter to digitize the signal. The signal digitized is fed into DSP to compute the signal for modulation accuracy.

2.8 Display Block

Display Block has 6.5 inches color TFT display.

2.9 Power Supply Block

Power supply Block uses switching power supply unit.
It allows to connect 90VAC to 250VAC directly.
It generates +5V, ± 12V, +12V and +24V.



3 PERFORMANCE VERIFICATION

3.1 General

(1) Introduction

This chapter provides performance verification procedures item by item as listed in Table 3-1. Additional performance verification items are listed in Table 3-2 for W-CDMA digital modulation analysis with Option62.

Table 3-1 Performance Verification Items

No.	Items	Applicable Model	
		R3267	R3273
1	Reference Oscillator Accuracy	O	O
2	CAL OUT Amplitude Accuracy	O	O
3	Displayed Average Noise	O	O
4	RBW Switching Error	O	O
5	RBW Accuracy	O	O
6	Attenuator Switching Accuracy	O	O
7	IF Gain uncertainty	O	O
8	Scale Fidelity	O	O
9	Residual FM	O	O
10	Noise sideband	O	O
11	Image, Multiple, Out of Band Spurious	O	O
12	Frequency Read Out Accuracy	O	O
13	Second Harmonic Distortion	O	O
14	Frequency Response	O	O
15	Span Accuracy	O	O
16	Third Intermodulation Distortion	O	O
17	Gain Compression	O	O
18	Sweep Time Accuracy	O	O
19	Residual Response	O	O

Table 3-2 Additional Performance Verification Items

No.	Meaurement Mode	Input	Test Item
1	BTS	RF	Carrier Frequency Accuracy Waveform Quality Accuracy Modulation Accuracy Code Domain Power Accuracy
2	MS	RF	Carrier Frequency Accuracy Waveform Quality Accuracy Modulation Accuracy
3	QPSK	RF	Carrier Frequency Accuracy Waveform Quality Accuracy Modulation Accuracy
4	BTS	IQ	Waveform Quality Accuracy Modulation Accuracy Code Domain Power Accuracy
5	MS	IQ	Waveform Quality Accuracy Modulation Accuracy
6	QPSK	IQ	Waveform Quality Accuracy Modulation Accuracy

(2) Test Equipment

The table of recommended test equipment in the General Information lists the equipment needed to perform all of the performance test.
Equipment lists for individual tests are provided in each performance verification.

(3) Calibration Cycle

The performance verifications should be used to check the spectrum analyzer against its specifications every one year recommended.
The reference oscillator must be adjusted and checked at the same time.
Refer to the "Internal Frequency Reference Adjustment" in the chapter 4.

(4) Performance Verification Record Sheets

The performance verification record sheets at the end of this chapter is provided the value measured in each performance verification.
The test record lists test specification and acceptable limits.
Recommend that make a copy of this table, record the complete test results on the copy, and keep the copy for calibration test record.
This record could prove invaluable in tracking gradual changes in test result over long periods of the time.

It is provided for R3267 and R3273 separately.

(5) Performance Verification Procedures

Typeface conventions used in this manual.

- Panel keys and soft keys are printed in a contrasting typestyle to make them stand out form the text as follows:

  Panel keys: Boldface type Example: **FREQ, FORMAT**
  Soft keys: Boldface and Italic Example: ***Center***, ***Trace Detector***

- When a series of key operations are described using a comma between two keys.

- There are various soft menus used to switch between two states such as ON/OFF and AUTO/MNL.
  For example, when turning off the ***Display ON/OFF*** function, the annotation " ***Display ON/OFF***(OFF)" is used.
  When switching the ***RBW AUTO/MNL*** function to MNL, the annotation "***RBW AUTO/MNL***(MNL)" is used.

3.2 Procedures of Performance Verification

3.2.1 10MHz Reference Output Accuracy

(1) Description

The 30MHz CAL OUT signal measured to verify the 10MHz reference signal accuracy.
The CAL OUT signal uses the 10MHz signal as a reference.
Verification will be done using frequency counter and frequency standard.

CAUTION: ***If the frequency reference of R3267/3273 is set to EXT, perform 15 minutes warm up operation after instrument preset.***

---

(2) Specification

Frequency: < 1 x 10 exp -7
< 1 x 10 exp -8 (Option 21 Installed)

(3) Equipment Used

Frequency Counter	Freq. CNT
Frequency Standard	Freq. STD

(4) Setup

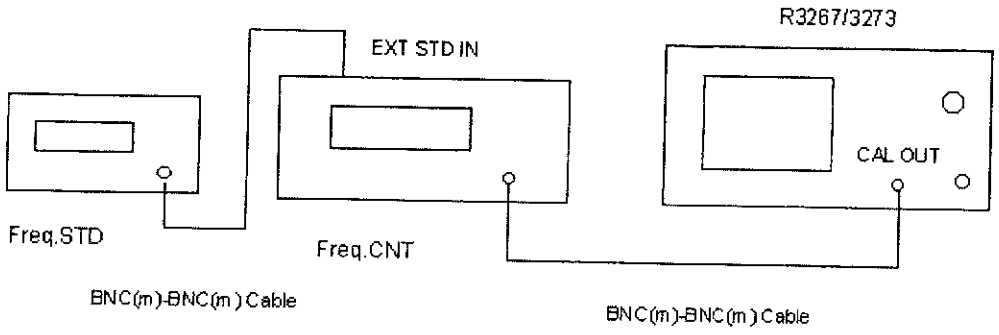


Figure 3-1 Setup for Frequency Reference Accuracy Test

(5) Procedure

1. Connect equipment shown as Figure1.
2. Set Freq.CNT controls as follows:

Input	B
Gate Time	0.1sec.
Frequency STD	EXT.

3. Preset R3267/3273

4. Wait for the Freq. CNT to settle.

5. Read and record the Freq.CNT display on the performance verification record sheet.

3.2.2 Calibrator Amplitude Accuracy

(1) Description

The amplitude accuracy of the analyzer's CAL OUT signal is checked for -10dm± 0.3dB.

(2) Specification

Calibration Signal Output Level Accuracy
-10dBm ± 0.3dB

(3) Equipment Used

RF Power Meter	P.M
PF Power Sensor	P.S
Adapter	N(f)-BNC(m)
	N(m)-SMA(f) 1pc

(4) Setup

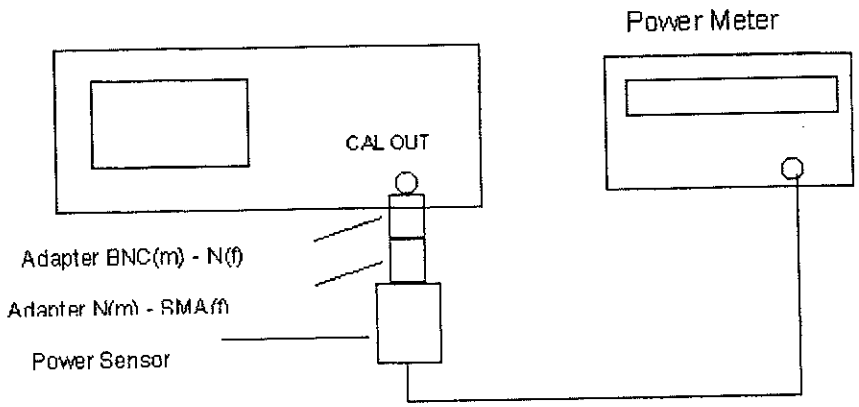


Figure 3-2 Setup of CAL OUT Level Accuracy Test

(5) Procedure

1. Perform ZERO and calibration of P.M

2. Set correction data at 30MHz to P.M.

3. Connect Sensor through an adapter directly to the R3267/3273's CAL. OUTPUT connector.

4. Read P.M display and record it on performance verification record sheet.

3.2.3 Displayed Average Noise Level

(1) Description

This test measures the displayed average noise level in all frequency.
The spectrum analyzer's input is terminated in 50 ohms.
In Frequency Band 0, the test first measures the average noise at several discrete frequencies in a zero span. For the rest of Frequency Band 0, and all other bands, the test tunes the analyzer frequency across the band, uses the marker to locate the frequency with the highest response, then reads the average noise in a zero span.

(2) Specification

Apply for R3267

Frequency	Frequency Band	Average Noise Level
1kHz	0	-90dBm
10kHz	0	-100dBm
100kHz	0	-101dBm
1MHz	0	-125dBm
10MHz to 3.5GHz	0	-130 - f(GHz)dBm
1.6GHz to 3.5GHz	1	-125dBm
3.5GHz to 7.0GHz	2	-125dBm
6.9GHz to 8.0GHz	3	-125dBm

Apply for R3273

Frequency	Frequency Band	Average Noise Level
1kHz	0	-90dBm
10kHz	0	-100dBm
100kHz	0	-101dBm
1MHz	0	-125dBm
10MHz to 3.5GHz	0	-130 - f(GHz)dBm
3.5GHz to 7.5GHz	1	-125dBm
7.4GHz to 15.4GHz	2	-125dBm
15.2GHz to 26.5GHz	3	-125dBm

(3) Equipment Used

Terminator 50ohm

(4) Setup

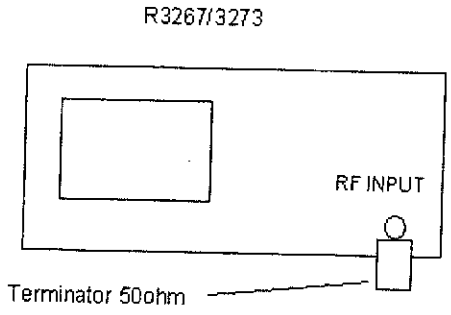


Figure 3-3 Setup of Displayed Average Noise Level Test

(5) Procedure

1. Connect Terminator to INPUT of R3267/3273.

For frequency band 0

2. After preset R3267/3273, set R3267/3273 controls as follows:

Center Frequency	1kHz
Span	Zero
RF Attenuator	0dB
Reference Level	-60dBm
RBW	30Hz
VBW	1Hz
Sweep Time	1sec

3. Set R3267/3273 to AVG mode and AVG times to 10 times as follows:

   Press **A**, ***AVERAGE A***, **1**, **0** and **Hz**.

4. After average has completed, set R3267/3273 to peak search mode to capture the highest noise signal by pressing **SRCH**.

5. Record the level of peak search marker on the performance check sheet.

6. Set R3267/3273 controls as follows:

Center Frequency	10kHz
RBW	100Hz

7. Repeat steps 4. through 6. for each Center Frequency setting listed on Table 3-3.

Table 3-3 Center Frequency Setting for Displayed Average Noise Level

Center Frequency
100 kHz
1 MHz
10.1 MHz
101 MHz
501 MHz
1001 MHz
1.5 GHz
2.0 GHz
2.5 GHz
3.0 GHz
3.5 GHz

For frequency band 1

8. After preset R3267/3273, set R3267/3273 controls as follows:

Start Frequency	3.501GHz
Stop Frequency	8GHz For the R3273 Stop frequency is set to 7.5GHz
Input Attenuator	0dB
Reference Level	-40dBm
RBW	3MHz
VBW	100kHz

9. Set R3267/3273 to AVG mode and AVG times to 10 times as follows:

   Press **A**, ***AVERAGE A***, **1**, **0** and **Hz**.

10. After average has completed, set R3267/3273 to peak search marker mode to capture the highest noise signal by pressing **SRCH**.

    Then set ***MKR→***, ***MKR→CF***, ***A*** and ***WRITE A***.

11. Set R3267/3273 controls as follows:

Span	Zero
Reference Level	-60dBm
RBW	100Hz
VBW	1Hz
Sweep Time	1sec
Sweep Mode	SINGLE

12. Press **SINGLE** for single sweep.

13. After single sweep has completed, set R3267/3273 to peak search marker mode **SRCH** to capture the highest noise signal.

14. Record the level of peak search marker reading on the performance verification record sheet.

Following procedures are applied for R3273 only

15. Repeat steps 8 through 14 for each frequency setting on Table 3-4.

Table 3-4 Start and Stop Frequencies Setting for R3273

Start Frequency	Stop Frequency
7.501 GHz	15.4 GHz
15.201 GHz	22.0 GHz
22.0 GHz	26.5 GHz

3.2.4 Resolution Bandwidth Switching Uncertainty

(1) Description

This set utilizes the internal Cal. Signal for measuring the switching uncertainty between resolution bandwidth. At each resolution bandwidth setting, the displayed amplitude variation of the signal in measured using delta marker mode.
All measurements are reference to the 300kHz bandwidth.

(2) Specification

Reference to 300kHz RBW after auto calibration
< ± 0.3dB 100Hz to 10MHz
< ± 1.0B 30Hz

(3) Equipment Used

Adapter	N(m)-BNC (f)
Cable	BNC (m)-BNC (m)

(4) Setup

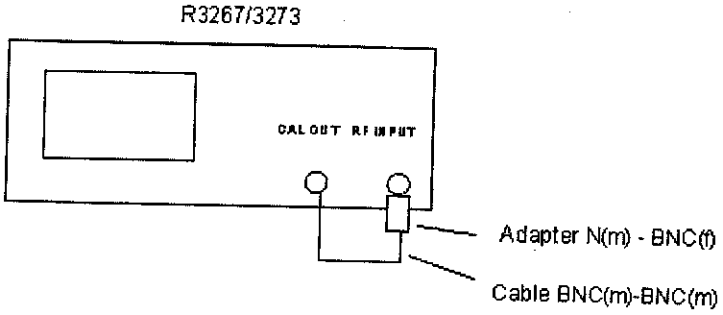


Figure 3-4 Setup of RBW Switching Uncertainty

(5) Procedure

1. Connect the CAL OUT and the INPUT by adapter N(m)-BNC(f) and cable BNC (m)-BNC (m).

2. After preset R3267/3273, press as follows to perform auto calibration function.

   SHIFT, **7(CAL)**, ***Cal Each Item*** and ***RBW SWITCH***

3. After RBW SWITCH auto calibration has completed, set R3267/3273 controls as follows:

Center Frequency	30MHz
Span	1MHz
Reference Level	-5dBm
dB/div	1dB/div
RBW	300kHz
Sweep Mode	SINGLE

4. Press **SINGLE** for single sweep.

5. After single sweep has completed. press **SRCH** to capture signal peak.

6. Operate as follows to set fixed marker mode to ON.

   MKR and ***Fixed Marker ON/OFF***(ON)

7. Set the RBW and span to the value listed in Table 3-5.

8. Press **SINGLE** for single sweep.

9. After single sweep has completed, press **SRCH** to capture signal peak.

10. Record the level of the delta marker on the performance verification record sheet.

11. Repeat steps 7. through 10. for each RBW and span setting listed in Table 3-5.

Table 3-5 Setting of RBW Switching Uncertainty Test

RBW Setting	Frequency Span
10 MHz	15 MHz
5 MHz	8 MHz
3 MHz	5 MHz
1 MHz	2 MHz
100 kHz	200 kHz
30 kHz	50 kHz
10 kHz	20 kHz
3 kHz	5 kHz
1 kHz	2 kHz
300 Hz	500 Hz
100 Hz	200 Hz
30 Hz	200 Hz

3.2.5 Resolution Bandwidth Accuracy and Selectivity

(1) Description

This test measures the 3 dB down of RBW accuracy and selectivity.
Selectivity is specified the 3dB and the 60dB down bandwidth of RBW.
To measure bandwidth of RBW, use continuous XdB down marker function.

(2) Specification

Range:	10Hz to 3MHz, 5MHz, 10MHz(1,3,10 sequence)
Accuracy:	± 15% (RBW 100Hz to 1MHz)
	± 25% (RBW 30Hz, 3MHz, 5MHz)
Selectivity:	<15:1 (RBW 100Hz to 5MHz)
	<20:1 (RBW 30Hz)

(3) Equipment Used

Adapter	N (m)-BNC (f)
Cable	BNC (m)-BNC (m)

(4) Setup

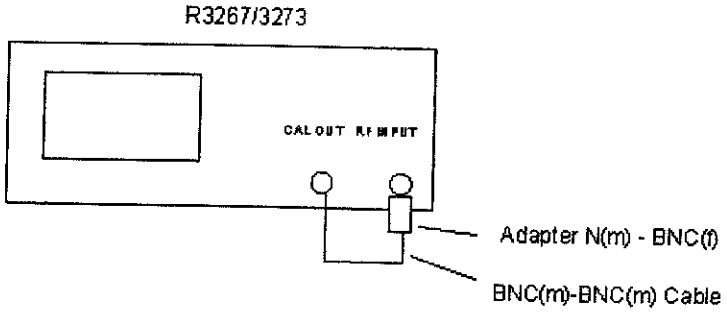


Figure 3-5 Setup of RBW Accuracy and Selectivity Test

(5) Procedure

Accuracy of RBW

1. Connect CAL OUT signal and INPUT using N (m)-BNC (f) adapter and BNC (m)-BNC (m) cable.

2. After preset, set R3267/3273 controls as follows;

Center Frequency	30MHz
Span	10MHz
Reference Level	-5dBm
dB/div	1dB/div
Sweep Mode	SINGLE
Trace Detector	Sample
	(Press **A**, ***Trace A Detector*** and ***Sample***.)

3. Set R3267/3273 to continuous XdB down marker mode as follows:

   MEAS, ***X dB Down***, ***X dB down***, ***3dB and Continual Down ON/OFF***(ON)

4. Set RBW of R3267/3273 to 3MHz,then press **SINGLE** for single sweep.

5. After single sweep has completed, set peak search marker mode to capture signal peak by **SRCH**.

6. Record the frequency of the X dB down marker reading on the performance verification record sheet.

7. Repeat steps 4. through 6. for each RBW and frequency span setting listed in Table 3-6.

Table 3-6 Setting of RBW and Span for 3dB Down Width Measurement

RBW Setting	Frequency Span
5 MHz	10 MHz
1 MHz	5 MHz
300 kHz	500 kHz
100 kHz	200 kHz
30 kHz	50 kHz
10 kHz	20 kHz
3 kHz	5 kHz
1 kHz	2 kHz
300 Hz	500 Hz
100 Hz	200 Hz
30 Hz	200 Hz

Selectivity

8. After preset R3267/3273, set R3267/3273 controls as follows:

Center Frequency	30MHz
Span	50MHz
VBW	10kHz
Trace Detector	Sample (Press A, ***Trace Detector*** and ***Sample***.)
Sweep Mode	SINGLE

9. Set R3267/3273 to continuous XdB down marker mode as follows

   MEAS, X dB Down, X dB down, 60dB and **Continual Down ON/OFF**(ON)

10. Set RBW of R3267/3273 to 3MHz, then press **SINGLE** for single sweep.

11. After single sweep has completed, set peak search marker mode to capture signal peak by **SRCH**.

12. Record the frequency of the X dB down marker reading on the performance check sheet.

13. Repeat steps 10. through 12. for each RBW and frequency span setting listed on Table 3-7.

Table 3-7 Setting of RBW and Span for 60dB Down Width Measurement

RBW Setting	Frequency Span Setting
5 MHz	100 MHz
1 MHz	20 MHz
300 kHz	5 MHz
100 kHz	1 MHz
30 kHz	500 kHz
10 kHz	200 kHz
3 kHz	50 kHz
1 kHz	20 kHz
300 Hz	5 kHz
100 Hz	2 kHz
30 Hz	1 kHz

14. Calculate selectivity for each RBW using the following formula, then record its result on performance verification record sheet.

Selectivity = (60dB down width data) / (3dB down width data)

3.2.6 IF Gain Uncertainty

(1) Description

This test measures IF gain error in resolution bandwidth 1MHz, 3kHz and 300kHz.
The input signal level is decreased by external attenuator as the R3267/3273's reference level is decreased (IF gain increased).
Since the signal level is decreased in precise steps, any error between the reference level and the signal level is caused by analyzer's IF gain.
To measure IF gain error, use Fixed marker mode in Delta marker function.
The frequency synthesizer is phase-locked to the analyzer's 10MHz reference.

(2) Specification

±0.5dB	0dBm to -50dBm
± 0.7dB	0dBm to -80dBm

(3) Equipment Used

Signal Generator	SG4
1dB Step Attenuator	ATT1
10dB Step Attenuator	ATT2
Attenuator/Switch Driver	HP11713A
RF Cable	BNC(m)-BNC(m)
Adapter	N(m)-BNC(f)

(4) Setup

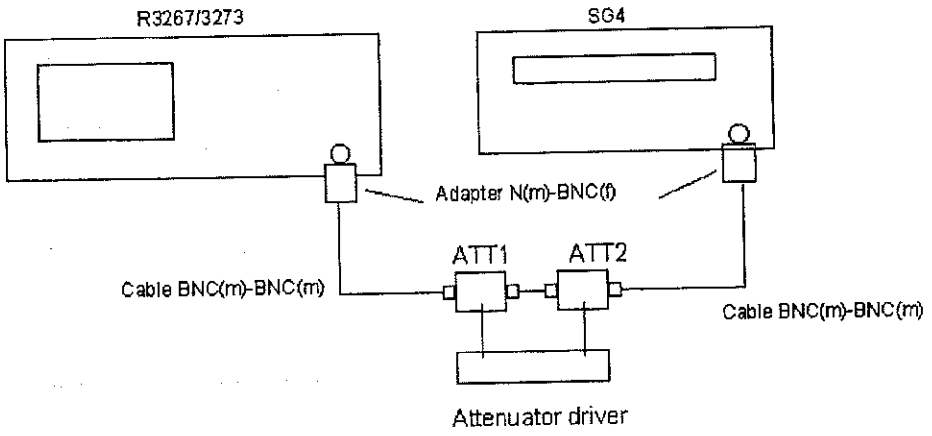


Figure 3-6 Setup of IF Gain Fidelity Test

(5) Procedure

1. Connect CAL OUT signal to INPUT using N(m)-BNC(f) adapter and BNC(m)-BNC(m) cable.
2. Execute AUTO CAL function.
3. After AUTO CAL function has completed, connect equipment as shown in Figure 3-6.
4. Set the SG5 controls as follows:

Frequency	11MHz
Output Level	-5dBm
10MHz Reference	External

5. Set value of ATT1 and ATT2 to 0dB.

6. After preset R3267/3273, set R3267/3273 controls as follows:

Center Frequency	11MHz
Span	Zero
Reference Level	0dBm
dB/div	1dB/div
RBW	1MHz
VBW	1Hz

7. Adjust the SG5 output level to place the signal 5dB below the R3267/3273's reference level.

8. Set R3267/3273 to **SINGLE** for single sweep mode.

9. Press **SINGLE** for single sweep.

10. After single sweep has completed, press **SRCH** to capture signal peak, and record the marker reading as reference value on the performance verification record sheet.

11. Set Fixed marker mode, as follows:

    MKR, ***Delta Marker*** and ***Fixed Marker ON/OFF***(ON)

12. Increase attenuation of ATT1 to 1dB, and decrease R3267/3273's reference level to 1dBm.

13. Press **SINGLE** for single sweep.

14. After single sweep has completed, press **SRCH** to capture signal peak.

15. Record the level of delta marker reading on the performance verification record sheet.

16. Repeat steps 12 through 14 for each attenuation level setting listed in Table 3-8.

Table 3-8 Setting of 1dB Step IF Gain Error Measurement

Step Attenuator	Reference Level
2 dB	-2 dBm
3 dB	-3 dBm
4 dB	-4 dBm
5 dB	-5 dBm
6 dB	-6 dBm
7 dB	-7 dBm
8 dB	-8 dBm
9 dB	-9 dBm
10 dB	-10 dBm

17. After preset R3267/3273, set R3267/3273 controls as follows:

Center Frequency	11MHz
Span	Zero
Reference Level	0dBm
dB/div	10dB/div
RBW	1MHz
VBW	1Hz

18. Adjust the SG4 output level to place the signal 5dB below the R3267/3273's reference level.

19. Set R3267/3273 to **SINGLE** for single sweep mode.

20. Press **SINGLE** for single sweep.

21. After single sweep has completed, press **SRCH** to capture signal peak, and record the marker reading as reference value on the performance verification record sheet.

22. Set Fixed marker mode, as follows:

    MKR, ***Delta Marker*** and ***Fixed MarkerON/OFF***(ON)

23. Increase attenuation of ATT2 to 10dB, and decrease R3267/3273's reference level to -10dBm.

24. Press **SINGLE** for single sweep.

25. After single sweep has completed, press **SRCH** to capture signal peak.

26. Record the level of Delta Marker reading on the performance verification record sheet.

27. Repeat step 24. through 26. for each attenuation level setting listed in Table 3-9.

Table 3-9 Setting of 10dB Step IF Gain Uncertainty Measurement

Step Attenuator	Reference Level
20 dB	-20dBm
30 dB	-30dBm
40 dB	-40dBm
50 dB	-50dBm
60 dB	-60dBm
70 dB	-70dBm
80 dB	-80dBm

* For RBW=3kHz setting, it is not required to measure at -80dBm of the reference level.

28. Repeat steps 5. through 27. for each RBW and Y-AXIS setting listed in Table 3-10.

Table 3-10 Setting of RBW and Y Axis for IF Gain Uncertainty Measurement

RBW Setting	Y Axis
3 kHz	1 dB/div
300 kHz	0.5 dB/div

3.2.7 Input Attenuator Switching Accuracy

(1) Description

This test measures the input attenuator's switching accuracy over the full 75dB range for R3267 and 70dB for R3273.
Also measure Step-to Step switching accuracy as incremental error.
The number of frequency measured point at 4GHz for R3267, and three points at 4GHz, 15GHz and 18GHz for the R3273.
The signal generator is phase-locked to the 10MHz reference of R3267/3273.
The input attenuator switching accuracy is referenced to 10dB attenuator setting.
Pre-selector tuning is required.

IF Gain uncertainty is measured when the resolution bandwidth is set to 3kHz and the result is filled in the IF Gain uncertainty of the performance verification record sheet.

(2) Specification

With reference to 10dB input attenuation, in the range 20dB to 70dB.

Apply for R3267
<± 1.1dB/10 dB step, ±2.0dB Max.,Frequency Range: 100Hz to 8GHz.

Apply for R3273
<± 1.1 dB/10dB step, ± 2.0dB Max Frequency Range: 100Hz to 12.4GHz
<± 1.3 dB/10dB step, ± 2.5dB Max Frequency Range: 12.4GHz to 18GHz
<± 1.8dB/10dB step, ± 3.5dB Max Frequency Range: 18GHz to 26.5GHz

(3) Equipment Used

Signal Generator	SG1
RF Cable	SMA(m)-SMA(m)
RF Cable	BNC(m)-BNC(m)
Adapter	N(m)-SMA(f)

(4) Setup

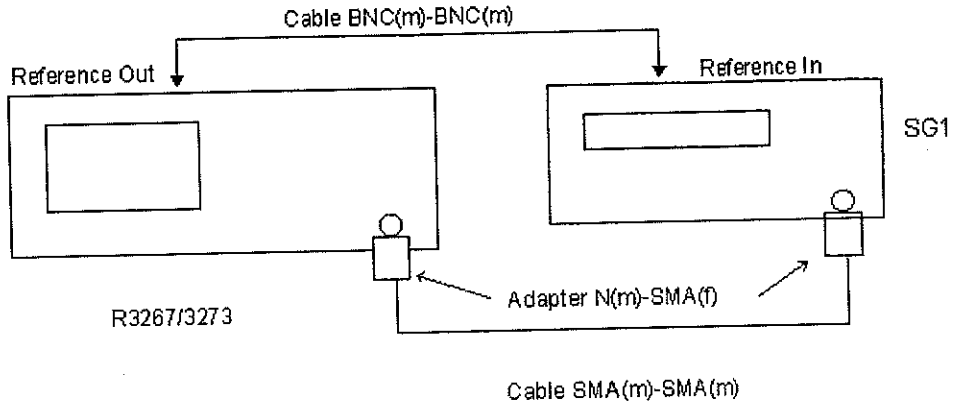


Figure 3-7 Setup of Input Attenuator Switching Accuracy Test

(5) Procedure

1. Connect equipment as shown in Figure 3-7.

2. Set SG1 controls as follows:

Frequency	4GHz
Output Level	-5dBm

3. After preset R3267/3273, set R3267/3273 controls as follows:

Center Frequency	4GHz
Span	10kHz
Reference Level	0dBm
dB/div	1dB/div

RBW	3kHz
VBW	10Hz
Sweep Time	1sec

4. To tune pre-selector, on the R3267/3273 press controls as follows:

   FREQ, ***more1/2***, ***Presel Tune*** and ***Auto Tune***

5. After pre-selector tuning has completed, adjust signal generator output level so that the trace peak meets 5 divisions below the reference level.

6. Press **SINGLE** for single sweep.

7. After single sweep has completed, press **SRCH** to capture the signal peak.

8. Record the level of peak search marker reading as the reference value on the performance verification record sheet.

9. Increment input attenuator by 10dB.

10. Press **SINGLE** for single sweep.

11. After single sweep has completed, press **SRCH** to capture the signal peak.

12. Read the level of the peak search marker reading.

13. Calculate the actual switching error reference value by following formula. And record the result on the performance verification record sheet.

    Actual Marker reading = (Reference Value measured in step 8.) - (Marker level measured in the step 12.) - (IF gain error)

14. Repeat steps 9. through 13. for each attenuation setting listed in Table 3-11.

Table 3-11 Setting of Input Attenuator Switching Accuracy Test

R3267/3273 Attenuator (dB)	Referenc Level (dBm)	IF Gain(dB)
10	0	0
20	-10	10
30	-20	20
40	-30	30
50	-40	40
60	-50	50
70	-60	60

15. Calculate the step-to-step accuracy as described in the following steps and record the result in the performance verification record sheet.

Step to step Accuracy Calculation

16. For the 20dB ATT setting, switching accuracy becomes step-to-step accuracy.

17. For the 30, 40, 50, 60 and 70dB ATT settings, subtract the 10dB down ATT switching accuracy from the current ATT switching accuracy.

Following procedures are applied for R3273 only.

18. Repeat steps 2 through 13 for each attenuator setting listed in Table 3-12 at center frequency 15GHz and 18GHz.

Table 3-12 Setting of Input Attenuator Switching Accuracy Test for Center Frequency at 15GHz and 18GHz

Center Frequency at 15GHz and 18GHz		
R3267/3273 Attenuator (dB)	Reference Level (dBm)	IF Gain (dB)
10	0	0
20	-10	10
30	-20	20
40	-30	30
50	-40	40
60	-50	50
70	-60	60

3.2.8 Scale Fidelity

(1) Description

The 10 dB/div, 1 dB/div, and linear scales are tested for fidelity. The 10 dB/div scale is tested in RBW setting of 3kHz.
The 1dB/div scale is tested in RES BW setting of 1MHz.
A signal is set to the reference level for each scale. As the signal amplitude is decreased using external step attenuator, the displayed signal amplitude is compared to the reference level.
Incremental log fidelity is calculated from the cumulative log fidelity data.
The spectrum analyzer provides the 10MHz reference to the signal generator.

(2) Specification

Log Scale Fidelity	± 0.2dB/ 1dB ± 0.85dB over 0 to 90dB range
Linear Scale Fidelity	± 5% of reference level

(3) Equipment used

Signal Generator	SG4
1dB Step Attenuator	ATT1
10dB Step Attenuator	ATT2
Attenuator/Switch Driver	HP11713A
RF Cable	BNC(m)-BNC(m)
Adapter	N(m)-BNC(f)

(4) Setup

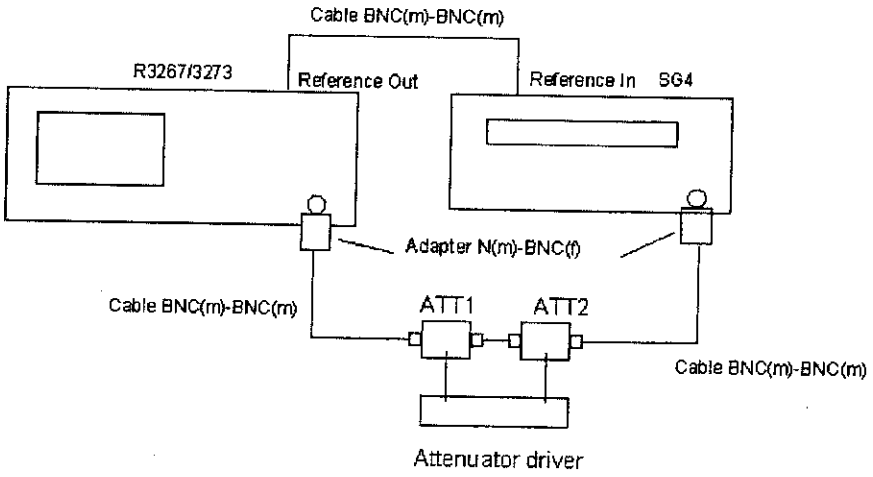


Figure 3-8 Setup for Scale Fidelity Test

(5) Procedure

1. Connect equipment as shown in Figure 3-8.
2. On theSG4, set the controls as follows:

Frequency	11MHz
Output Level	0dBm

3. On the R3267/3273, after preset, set the R3267/3273 controls as follows:

Center Frequency	11MHz
Span	0Hz
Reference Level	0dBm
RBW	1MHz
VBW	1Hz
dB/div	1dB/div

4. Set the value of ATT1 and ATT2 to 0dB.
5. On the R3267/3273, press **MKR** to put marker on the trace.

6. On the SG4, adjust the output level so that the marker reading is 0.0dBm ± 0.01dB.

7. On the R3267/3273, press **SINGLE** for single sweep.

8. On the R3267/3273, press **MKR**, ***Delta Marker***, ***Fixed Marker ON/OFF***(ON) to set fixed marker mode.

9. Lower external step attenuator by 1dB.

10. Press **SINGLE** for single sweep.

11. Record the level of fixed marker level in the Measured Data column in the performance verification data sheet.

    Calculate the incremental error by following formula and record the result in the Incremental Error in the column in the performance verification record sheet.

    Incremental Error = (Current delta marker level)-(previous delta marker level) +1dB

12. Repeat steps 9. through 11. each value of external step attenuator is listed in the Table 3-13.

Table 3-13 Setting for 1dB Scale Fidelity Test

Setting		Test Data
RBW (Hz)	External Attenuator (dB)	dB from Reference Level (dBm)
1M	0	0
	1	-1.0
	2	-2.0
	3	-3.0
	4	-4.0
	5	-5.0
	6	-6.0
	7	-7.0
	8	-8.0
	9	-9.0
	10	-10.0

13. On the R3267/3273, after preset, set controls as follows:

Center Frequency	11MHz
Span	0Hz
Reference Level	0dBm
RBW	3kHz
VBW	1Hz
dB/div	10dB/div

14. Set the value of ATT1 and ATT2 to 0dB.

15. On the R3267/3273, press **MKR** to put marker on the trace.

16. On theSG4, adjust the output level so that the marker reading is 0.0dBm ± 0.01dB.

17. On the R3267/3273, press **SINGLE** for single sweep.

18. On the R3267/3273, press **MKR**, ***Delta Marker*** and ***Fixed Marker ON/OFF***(ON) to set fixed marker mode.

19. Lower external step attenuator by 10dB.

20. Press **SINGLE** for single sweep.

21. Record the level of fixed marker level in the Measured Data column in the performance verification record sheet.

    Calculate the incremental error by following formula and record the result in the Incremental Error in the column in the performance verification record sheet.

    Incremental Error = (Current delta marker level)-(previous delta marker level) +10dB

22. Repeat steps 9 through 11 for each value of external step attenuator is listed in the Table 3-14.

Table 3-14 Setting for 10dB Step Scale Fidelity Test

Setting		Test Data
RBW (Hz)	External Attenuator (dB)	dB from Reference Level (dBm)
3k	0	0
	10	-10.0
	20	-2.0
	30	-3.0
	40	-4.0
	50	-5.0
	60	-6.0
	70	-7.0
	80	-8.0
	90	-9.0

Linear Scale Fidelity

23. On the signal generator, set controls as follows:

    Frequency 11MHz
    Output Level 0dBm

24. Set the value of ATT1 and ATT2 to 0dB.

25. On the R3267/3273, after preset, set controls as follows:

    Center Frequency 11MHz
    Span 10kHz
    Reference Level 0dB
    RBW 1kHz
    VBW 1kHz
    Attenuator 20dB

26. On the R3267/3273, press as follows, to set vertical display mode to Linear x1.

    LEVEL, ***Linear*** and ***x1***

27. On the R3267/3273, press as follows to set continuous peak search mode.

    MKR, ***Peak*** and ***Continuous Peak ON/OFF***(ON)

28. Precisely set signal generator output level to the R3267/3273 reference level while reading the marker level on the screen.

29. On the R3267/3273, press **SINGLE** for single sweep.

30. Read the level value displayed on the signal generator and set the value as the reference value(Ref.).

31. Then set the signal generator level to the 0.92dB lower than the reference value.

32. On the R3267/3273, press **SINGLE** for single sweep.

33. Read the marker level and record it in the performance verification record sheet.

34. Repeat steps 30. through 32. for each value listed in Table 3-15.

Table 3-15 Setting of Linear Scale Fidelity Test

Input Siganl Level		Divede from Reference Level
(dB, Norminal)	(mV, Norminal)	
0(Ref)	223.60	0
-0.92	201.24	1
-1.94	178.88	2
-3.10	156.52	3
-4.44	134.16	4
-6.02	111.80	5
-7.96	89.44	6
-10.46	67.08	7
-19.98	44.72	8
-20.00	22.36	9

3.2.9 Residual FM

(1) Description

This test measures the inherent short term instability of the spectrum analyzer. A stable signal is applied to the spectrum analyzer input. The analyzer is set to zero span and the signal is slope detected on the skirt of the RES BW. Any instability in the spectrum analyzer's Local Oscillator system is transferred to the IF in the mixing process.
The test determines the slope of IF filter in Hz/dB and measures the signal amplitude variation caused by the residual FM. Multiplying these two values residual FM in Hz.

(2) Specification

Residual FM:	< 3Hz x N p-p/0.1 sec
N:	Harmonics Order

(3) Equipment Used

Signal Generator	SG3
RF Cable	SMA(m)-SMA(m)

(4) Setup

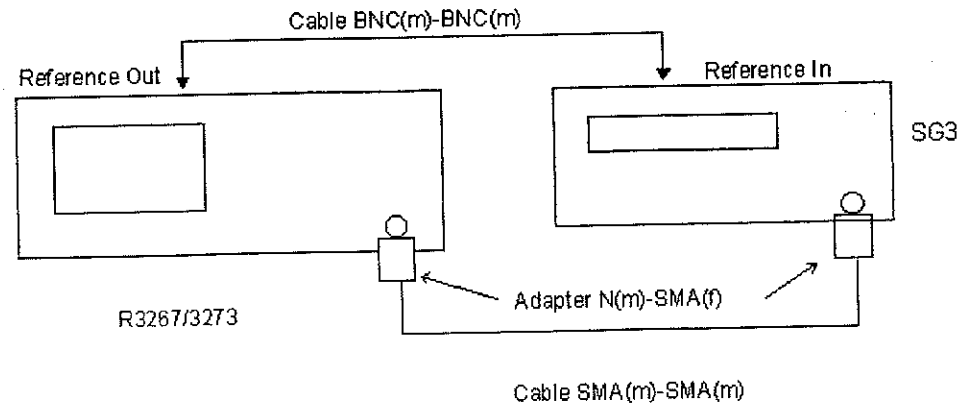


Figure 3-9 Setup of Residual FM Test

(5) Procedure

Determining the IF filter slope

1. Connect the equipment as shown in Figure 3-9
2. On the SG3, set controls as follows:

Frequency	2.5GHz
Output Level	-10 dBm

3. On the R3267/3273, after preset, set controls as follows:

Center Frequency	2.5GHz
Span	100kHz

4. Press **SRCH** to capture signal peak, then press as follow to set signal track mode to on.

   MKR, ***more 1/2*** and ***Signal Track ON/OFF***(ON)

5. Set R3267/3273 controls as follows:

Span	1kHz
RBW	30Hz

6. Press as follows to set signal track mode to off.

   MKR, ***more 1/2*** and ***Signal Track ON/OFF***(OFF)

7. Set R3267/3273 controls as follows:

Reference Level	-5dBm
dB/div	1dB/div
Span	200Hz

8. Press **SRCH** to capture signal peak.
   Press as follows to set signal peak to reference level.

   MKR→ and ***MKR→REF***

9. Press **SINGLE** for single sweep.

10. Press as follows to set delta marker mode to ON.

    MKR, ***Delta Marker*** and ***Delta Marker ON/OFF***(ON)

11. On the R3267/3273, rotate data knob clockwise until the marker reads -3dB ± 0.1dB.

12. Press as follows to set delta marker mode to ON.

    MKR, ***Delta Marker*** and ***Delta Marker ON/OFF***(ON)

13. On the R3267/3273, rotate data knob clockwise until the marker reads -6dB ± 0.1dB.

14. Record the frequency and the level of the delta marker reading on the performance verification record sheet.

15. Calculate the slope using the following formula on the performance verification record sheet.

    Slope = (the frequency of the delta marker reading)/ (the level of the delta marker reading)

Measuring Residual FM

16. On the R3267/3273, press **REPEAT** for continuous sweep.

17. Set R3267/3273 controls as follows:

Span	Zero
Sweep Time	100msec

18. Press **FREQ** and rotate data knob clockwise to place trace displayed peak about six division below reference level.

19. Press **SINGLE** to set single sweep mode.

20. Press as follows to set peak search mode and delta marker mode.

    SRCH, ***MKR*** and ***Delta Marker***

21. Press as follows to capture minimum peak signal.

    SRCH and ***Min Peak***

22. Record the level of delta marker reading as Delta Level on the performance verification record sheet.

Calculation residual FM

23. Calculate the Residual FM using the following formula,
    Residual FM [Hz] = Slope [Hz/dB] x Delta Level[dB]
    Record the result on the performance verification record sheet.

3.2.10 Noise Sidebands

(1) Description

The noise sidebands of a 1.0GHz, 0dBm signal is measured at offsets of 1kHz, 10kHz, 100kHz and 1MHz from the carrier.
Since the measurement is made for each of 1kHz, 10kHz, 100kHz and 1MHz offset frequency, set the span 2.5kHz, 25kHz, 250kHz and 2.5MHz.
The noise marker (dBc/Hz) and averaging functions are used to average the noise sidebands at each offset.

(2) Specification

R3267			
Offset	f ≤ 2.6GHz	f > 2.6GHz	Span
1 kHz	< -100 dBc/Hz	< -95 dBc/Hz	≤ 150 kHz
10 kHz	< -110 dBc/Hz	<108 dBc/Hz	≤ 150 kHz
100 kHz	< -118 dBc/Hz	< -112 dBc/Hz	150 kHz < Span ≤ 2MHz
1 MHz	< -135 dBc/Hz	< -135 dBc/Hz	> 2MHz

R3273			
Offset	f ≤ 2.6GHz	2.6 GHz ≤ f < 7.5GHz	Span
1 kHz	< -89 dBc/Hz	< -83 dBc/Hz	≤ 150 kHz
10 kHz	< -102 dBc/Hz	< -96 dBc/Hz	≤ 150 kHz
100 kHz	< -106 dBc/Hz	< -100 dBc/Hz	150 kHz < Span ≤ 2MHz
1 MHz	< -129 dBc/Hz	< -123 dBc/Hz	> 2MHz

R3273			
Offset	7.4 GHz ≤ f< 15.4 GHz	15.2 GHz ≤ f < 26.5 GHz	Span
1 kHz	< -89 dBc/Hz	< -83 dBc/Hz	≤ 150 kHz
10 kHz	< -102 dBc/Hz	< -96 dBc/Hz	≤ 150 kHz
100 kHz	< -106 dBc/Hz	< -100 dBc/Hz	150 kHz < Span ≤ 2MHz
1 MHz	< -129 dBc/Hz	< -123 dBc/Hz	> 2MHz

(3) Equipment Used

Signal Generator	SG3
RF Cable	SMA(m)-SMA(m)
RF Cable	BNC(m)-BNC(m)
Adapter	N(m)-SMA(f)

(4) Setup

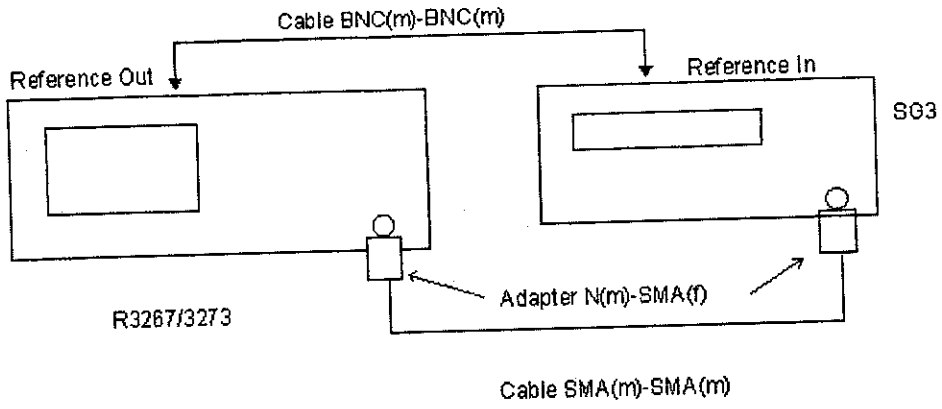


Figure 3-10 Setup of Noise Sidebands Test

(5) Procedure

1. Connect equipment as shown in Figure 3-10.
2. Set SG3 controls as follows:

Frequency	1 GHz
Output Level	-5 dBm

3. After preset R3267/3273, set R3267/3273 controls as follows:

Center Frequency	1 GHz
Span	250 kHz

4. On the R3267/3273, press as follows:

   SRCH, MKR→, ***MKR→REF, SRCH, MEAS, NOISE/Hz*** and ***dBc/Hz***

5. Put the noise marker at 100kHz offset using data knob or press 1,0,0, kHz.
6. Set the reference level by 20dB and press as follows to perform averaging for 20 samples:

   A, ***Average A***, **2**, **0** and **Hz(ENTR)**

7. Record the level of marker reading on the performance verification record sheet.

8. Repeat steps 3. through 6. for each frequency setting listed in Table 3-16.

Table 3-16 R3267/3273 Setting of Noise Sidebands Measurement

Center Frequency (Hz)	Span (Hz)	Offset Frequency (Hz)
1GHz	2.5 k	1 k
	25 k	10 k
	250 k	100 k
	2.5 M	1000 k

3.2.11 Image, Multiple, and Out-of-Band Responses

(1) Description

Image, multiple, and out-of-band responses are tested in all frequency bands. A signal is applied to the signal analyzer's INPUT 50 ohm, then a reference amplitude measurement is made. The signal source is then tuned to a frequency which causes either an image, multiple, or out-of-band response. The amplitude displayed on the spectrum analyzer is measured and recorded.

(2) Specification

Applied for R3267
< -70dBc: 10MHz to 8GHz

Applied for R3273
< -70 dBc: 10MHz to 18GHz Band
< -60dBc: 10MHz to 23 GHz Band
< -50 dBc: 10MHz to 26.5GHz Band

(3) Equipment Used

Signal Generator	SG2
RF POWER METER	P.M
RF Power Sensor	P.S
Power Splitter	1579
RF Cable	SMA(m)-SMA(m)
Adapter	SMA(m)-SMA(f)

(4) Setup

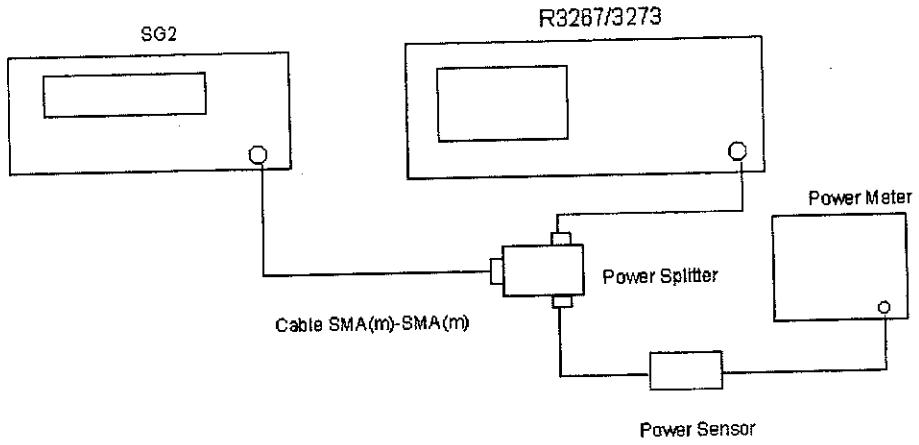


Figure 3-11 Setup of a Image, Multiple, Out of Band Spurious Test

(5) Procedure

1. Perform the zeroing and calibration of RF POWER METER with RF Power Sensor.
   Set into dBm mode, after calibration has completed.
2. Set a correction data of RF POWER METER to 2GHz.
3. Connect equiRF Power Meterent as shown in Figure 3-11.
4. Set SG3 controls as follows:

Frequency	2GHz
Output Level	0dBm

5. After preset R3267/3273, set R3267/3273 controls as follows:

Center Frequency	2GHz
Span	5MHz
RBW	100kHz
VBW	300Hz

6. Adjust the output level of the signal generator so that RF POWER METER reading is 0dBm ± 0.1dB.
7. On the R3267/3273 press **SINGLE** for setting single sweep mode.
8. After single sweep has completed, on the R3267/3273 press **SRCH** to capture signal peak.
9. Set R3267/3273 to Fixed Marker mode, press as follows:

MKR, ***Delta Marker*** and ***Fixed Marker ON/OFF***(ON)

10. On the R3267/3273, press as follows:

    REPEAT, SRCH, ***FREQ, 1/2 more, Presel Tune,*** and ***Auto Tune***.

    This procedure apply
    for center frequency above 1.6GHz of R3267 and center frequency above 3.5GHz of R3273.

11. Set signal generator control as follow:

    Frequency 1957.159MHz

12. Set correction data of RF POWER METER for frequency 1.96GHz

13. On the R3267/3273, press **SINGLE** for single sweep.

14. After single sweep has completed, on the R3267/3273 press **SRCH** to capture signal peak.

15. Record the Delta marker reading on the performance verification record sheet.

16. Repeat steps 10. through 15. for each frequency listed Table 3-17.

Table 3-17 Setting of Image, Multiple, Out of Band Measurement

Center Frequency	Frequency of Signal Generator	Correction Data for RF Power Meter
2 GHz	1157.159 MHz	1.16 GHz
2 GHz	10.462.841 MHz	10.46 GHz
2 GHz	8231.4205 MHz	8.23 GHz

17. Repeat steps 4. through 16. for each frequency setting listed in Table 3-18.

Table 3-18 Setting of Image, Multiple, Out of Band Spurious Test

Center Frequency	Frequency of Signal Generator	Correction data for RF Power Meter
7.0GHz	7.842.841MHz	7.84GHz
8.0GHz	4632.131MHz	4.63GHz
8.0GHz	3789.29MHz	3.79GHz

Following procedure is applied for R3273 only.

18. Repeat steps 4. through 16. for each frequency setting in listed in Table 3-19.

Table 3-19 Setting of Image, Multiple, Out of Band Spurious Test

Center Frequency of R3273	Frequency of Signal Generator	Correction Data for RF Power Meter
5.5GHz	6342.841MHz	6.34GHz
5.5GHz	11421.421MHz	11.4GHz
5.5GHz	17342.841MHz	17.3GHz
5.5GHz	23267.262MHz	23.3GHz
12.0GHz	12842.841MHz	12.8GHz
12.0GHz	5789.29MHz	5.79GHz
12.0GHz	18210.71MHz	18.2GHz
12.0GHz	24421.421MHz	24.4GHz
21.0GHz	21842.841MHz	21.8GHz
21.0GHz	6719.053MHz	6.72GHz
21.0GHz	13859.527MHz	13.9GHz
24.4GHz	25242.841MHz	25.2GHz
24.4GHz	5783.935MHz	5.78GHz
24.4GHz	11989.29MHz	12.0GHz
24.4GHz	18194.645MHz	18.2GHz

3.2.12 Accuracy of Frequency Readout and Frequency Count Marker

(1) Description

The accuracy of the spectrum analyzer frequency readout and frequency count marker is tested with an input signal of known frequency.
Test at the points 2GHz, 5GHz, 11GHz and 18GHz. The points 11GHz and 18GHz are applied for R3273 only.
For the points of frequencies above 5GHz are required to tune pre-selector peak.

(2) Specification

Accuracy of Frequency Readout
±(Center Frequency × Frequency Reference Accuracy + Frequency span × Frequency Span Accuracy + 0.15 × Resolution band width + 10Hz)

Span Accuracy $< \pm 1\%$

Accuracy of Frequency Counter Marker
±(Marker Frequency × Frequency Reference Accuracy + 5 Hz × N + 1 LSD)
Span < 1GHz
S/N >25 dB
N: Band

(3) Equipment used

Frequency Standard	Freq.STD
Signal Generator	SG2
RF Cable	BNC(m)-BNC(m)
RF Cable	SMA(m)-SMA(m)
Adapter	N(m)-SMA(f)

(4) Setup

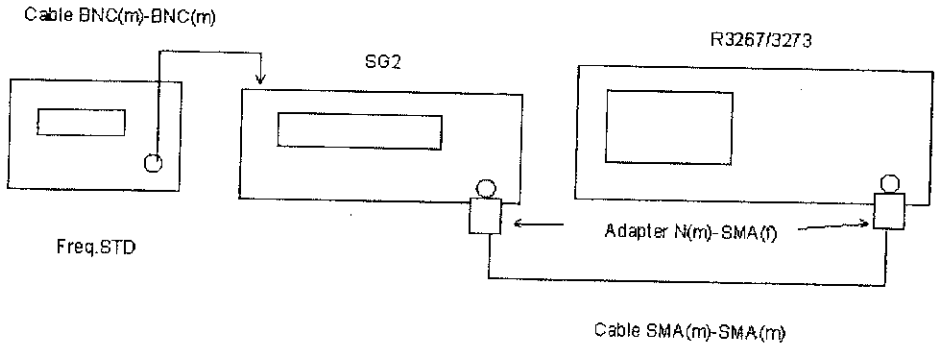


Figure 3-12 Setup of a Frequency Readout Accuracy and Frequency Counter Marker Test

(5) Procedure

1. Connect equipment as shown in Figure 3-12.
2. Set the signal generator controls as follows:

Frequency	2GHz
Output Level	-10dBm
10MHz Reference	External

3. After preset R3267/3273, set R3267/3273 controls as follows:

Center Frequency	2GHz
Span	1MHz

4. On the R3267/3273, press as follows to tune pre-selector peak for the frequency above 5GHz.

   REPEAT, SRCH, FREQ, *more1/2*, *Presel Tune* and ***Auto Tune***

5. After tuning has completed, on the R3267/3273, press **SINGLE** for single sweep
6. On the R3267/3273, press **SRCH** to capture signal peak.
7. Record the frequency of marker reading on the performance verification record sheet.
8. Repeat steps 2 through 6 for each frequency setting listed in Table 3-20.

Table 3-20 Setting of Frequency Readout Accuracy Test

Setting of Signal Generator	Setting of R3267/3273		Setting of Signal Generator	Applied for R3273 only	
Frequency	Center Frequency	Span	Frequency	Center Frequency	Span
2 GHz	2 GHz	1 MHz	11 GHz	11 GHz	1 MHz
		10 MHz			10 MHz
		20 MHz			20 MHz
		50 MHz			50 MHz
		100 MHz			100 MHz
		2 GHz			2 GHz

3.2.12 Accuracy of Frequency Readout and Frequency Count Marker

Setting of Signal Generator	Setting of R3267/3273		Setting of Signal Generator	Applied for R3273 only	
Frequency	Center Frequency	Span	Frequency	Center Frequency	Span
5 GHz	5 GHz	1 MHz	18 GHz	18 GHz	1 MHz
		10 MHz			10 MHz
		20 MHz			20 MHz
		50 MHz			50 MHz
		100 MHz			100 MHz
		2 GHz			2 GHz

Frequency Counter Marker Accuracy

9. On the signal generator, set controls as follows:

Frequency	2GHz
Output Level	-10dBm
10MHz Reference	External

10. On the R3267/3273, set R3267/3273 controls as follows:

Center Frequency	2GHz
Span	1MHz

11. On the R3267/3273, press as follows to tune pre-selector peak for the frequency above 5GHz

    REPEAT, **SRCH**, **FREQ**, ***more1/2***, ***Presel Tune*** and ***Auto Tune***

12. Press as follows to set frequency counter mode.

    MEAS, ***Counter***, ***Resolution 1Hz*** and ***Counter ON/OFF*** (ON)

13. On the R3267/3273, press SINGLE for single sweep.

14. Press SRCH to capture signal peak.

15. Record the frequency of the counter reading on the performance verification data sheet.

16. Repeat steps 9 through 16 for each setting listed in Table 3-21.

Table 3-21 Setting for Frequency Counter Marker Accuracy

Setting of Signal Generator	Setting of R3267/3273	
Frequency	Center Frequency	Span
2GHz	2GHz	1MHz
5GHz	5GHz	1MHz
11GHz	11GHz	1MHz
18GHz	18GHz	1MHz

3.2.13 Second Harmonic Distortion

(1) Description

A synthesized signal generator and low-pass filter provide the signal for measuring second harmonic distortion. The low-pass filter eliminates any harmonic distortion originating at the signal source. The R3267/3273 frequency response is calibrated.
The signal generator is phase-locked to the spectrum analyzer's 10MHz reference.
Test will be done the points of 1.5GHz and 3.8GHz as fundamental signal.
To measure second harmonics distortion, use Fixed Marker in Delta Marker function.

(2) Specification

Apply for R3267
< -70dBc:(Fundamental Frequency 10MHz to 1.75GHz, -30dBm mixer input level)
< -90dBc:(Fundamental Frequency > 1.75GHz, -10dBm mixer input level) at 3.5GHz Pre-selector Band
< -90dBc:(Fundamental Frequency > 800MHz,-10dBm mixer input level) at 1.6GHz Pre-selector Band

Apply for R3273
< -70dBc:(Fundamental Frequency 10MHz to 3.5GHz, -30dBm mixer input level)
< -100dBc:(Fundamental Frequency > 1.7GHz,-10dBm mixer input level)

(3) Equipment Used

Signal Generator	SG1
RF Power Meter	P.M
RF Power Sensor	P.S
Power Splitter	1579
2GHz Low-pass Filter	L.P.F
RF Cable	SMA(m)-SMA(m)
RF Cable	BNC(m)-BNC(m)
Adapter	N(m)-SMA(f)

(4) Setup

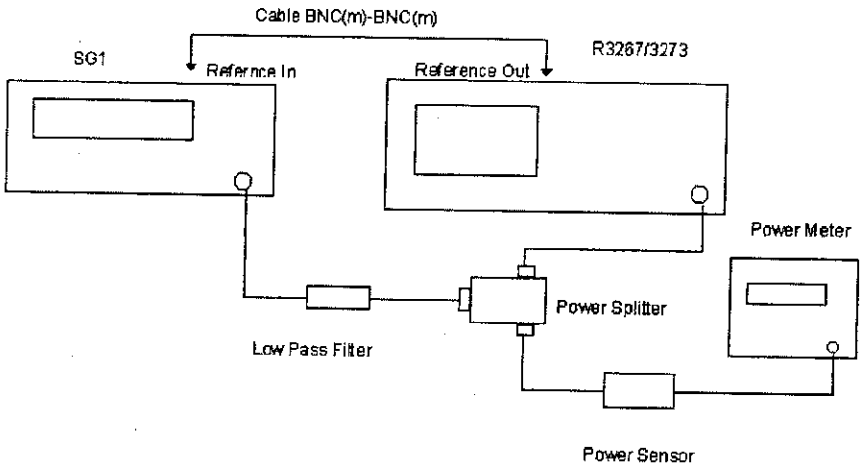


Figure 3-13 Setup of a Second Harmonics Distortion Test

(5) Procedure

1. Perform the zeroing and calibration of RF Power Meter with RF Power Sensor. Set into dBm mode, after calibration has done.

2. Set a correction data of RF power meter to 1.5GHz.

3. Connect equipment as shown in Figure 3-13.

4. Set signal generator controls as follows:

Frequency	1.5GHz
Output Level	0dBm
10MHz Reference	External

5. After preset R3267/3273, set R3267/3273 controls as follows:

Center Frequency	1.5GHz
Span	10kHz
Attenuator	20dB
Reference Level	-10dBm
VBW	30Hz

6. Adjust output level of signal generator so that the power meter reading is -10dBm ± 0.09dB.

7. Set R3267/3273 to single sweep mode, press **SINGLE** for single sweep.

8. After single sweep has completed, press **SRCH** to capture signal peak.

9. Press as follows to set R3267/3273 Fixed Marker to ON.

   MKR, ***Delta Marker*** and ***Fixed Marker ON/OFF***(ON)

10. Set R3267/3273's Center Frequency to 3GHz.

11. Press **SINGLE** for single sweep.

12. Press **SRCH** to capture signal peak.

13. Record the level of the delta marker reading on the performance verification record sheet.

Measurement for 3.6GHz or higher band

14. Remove the low-pass filter and connect the RF cable between SG1 and the R3267/3273.

15. Set SG1controls as follows:

Frequency	3.8GHz
Output Level	-10dBm

16. After preset R3267/3273, set R3267/3273 controls as follows:

Center Frequency	3.8GHz
Span	500kHz

17. Press as follows to tune pre-selector peak.

    SRCH, FREQ, ***more1/2, Presel Tune*** and ***Auto Tune***

18. After auto tuning has completed, set SG1 controls as follows:

Frequency	1.9GHz
Output Level	0dBm

19. Reconnect signal generator as shown in Figure 13.

20. Set a correction data of RF power meter to 1.9GHz.

21. Adjust output level of signal generator so that power meter reading is -10dBm ±0.09dB.

22. Set R3267/3273 controls as follows:

Center Frequency	1.9GHz
Span	1kHz

23. Press as follows to set R3267/3273 Fixed Marker to ON.

    MKR, Delta Marker and ***Fixed Marker ON/OFF***(ON)

24. Set R3267/3273 controls as follows

Center Frequency	3.8GHz
Reference Level	-40dBm

25. Press as follows to set R3267/3273 to average mode for 20 samples.

    A, *Average A*, 2, 0 and **Hz(ENTER)**

26. After average has completed, press **SRCH** to capture signal peak.

27. Record the level of the delta marker reading on the performance verification record sheet.

3.2.14 Frequency Response

(1) Description

The output of the signal generator is fed through a power splitter to a power sensor, then to the spectrum analyzer. The signal generator's power level is adjusted at 30MHz to place the displayed signal at the center horizontal graticule line of the spectrum analyzer. The power meter is placed in RATIO mode. At each new signal generator frequency and spectrum analyzer center frequency, the signal generator's power level is adjusted to place the signal at the center horizontal graticule line. The RF power meter displays the inverse of the frequency response relative to the signal of CAL OUT. The signal generator is phase locked to the R3267/3273's 10MHz reference.

(2) Specification

Apply for R3267

± 1.5dB	Frequency Range: 100Hz to 3.5GHz
± 1.0dB	Frequency Range: 50MHz to 2.6GHz
± 1.5dB	Frequency Range: 1.6GHz to 3.5GHz
± 1.5dB	Frequency Range:3.5GHz to 7.0GHz
± 1.5dB	Frequency Range: 6.9GHz to 8.0GHz

Frequency response relative to the CAL OUT (30MHz): < ± 3.0dB
Band Switching Error : < ± 0.3dB

Apply for R3273

± 1.5dB	Frequency Range: 100Hz to 3.5GHz
± 1.0dB	Frequency Range: 50MHz to 2.6GHz
± 1.5dB	Frequency Range: 3.5GHz to 7.5GHz
± 3.5dB	Frequency Range: 7.4GHz to 15.4GHz
± 4.0dB	Frequency Range: 15.4GHz to 26.5GHz

Frequency response relative to the CAL OUT (30MHz): < ± 5.0dB
Band Switching Error : < ± 0.3dB

(3) Equipment Used

Signal Generator	SG2
RF Power Meter	P.M
RF Power Sensor	NRVZ52
Power Splitter	1579
RF Cable	SMA(m)-SMA(m)
RF Cable	BNC(m)-BNC(m)

(4) Setup

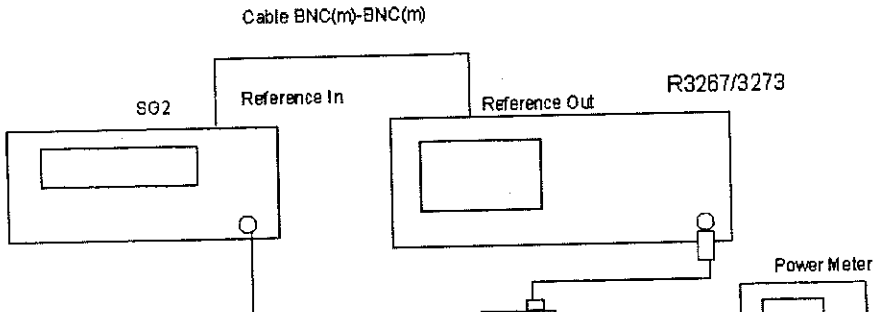


Figure 3-14 Setup of Frequency Response Test

(5) Procedure

1. Perform the zeroing and calibration of RF Power Meter with RF Power Sensor. Set into dBm mode, after calibration has done.
2. Connect equipment as shown in Figure 3-14.
3. On theSG2, set the SG2 controls as follows:

Frequency	30MHz
Frequency Step	100MHz
Output Level	-4dBm

4. On the R3267/3273, after preset, set R3267/3273 controls as follows:

Center Frequency	30MHz
Center Frequency Step	100MHz
Span	40MHz
Reference Level	-5dBm
dB/div	1 dB/div
RBW	3MHz
VBW	1kHz

5. Press **SRCH** and ***Continuous Peak*** to set continuos peak search mode.

6. Adjust signal generator output level so that reading of peak search marker is -10dBm ± 0.09dB.

7. On the RF power meter, set correction data for 30MHz and relative measurement mode.

Measuring frequency response in the frequency range: 100Hz to 3.5GHz

8. Set frequency of SG2 to 100MHz

9. On the R3267/3273, set center frequency to 100MHz.

10. On the RF power meter, set correction data for 100MHz.

11. Adjust output level of SG2 so that reading of peak search marker is -10dBm ± 0.09dB.

12. Record the display of RF power meter reading with reverse sign in performance verification record sheet.

13. On the R3267/3273, press **FREQ** and Δ to increase center frequency by 100MHz step.

14. On the SG2, increment the frequency of output by 100MHz.

15. On the RF power meter, set the correction data for the frequency by 100MHz step.

16. Repeat steps 11. through 15. for every center frequency by 100MHz step up the center frequency to 3.5GHz listed in performance verification record sheet.

17. Calculation of In-Band Flatness for frequency range 100Hz to 3.5GHz

(1) Enter the most positive value from performance verification record sheet.

Measured Value dB

The absolute value of this number should be less than 3dB for R3267.
The absolute value of this number should be less than 5dB for R3273

(2) Enter the most negative value from performance verification record sheet.

Measured Value dB

The absolute value of this number should be less than 3dB for R3267.
The absolute value of this number should be less than 5dB for R3273

(3) Subtract (2) from (1) then record on the performance verification record sheet as peak to peak deviation.
The result should be less than 3.0dB for R3267 and R3273.
Record the result on the performance verification record sheet as peak to peak deviation.

18. Calculation of In-Band Flatness for frequency range 50MHz to 2.6GHz

(1) Enter the most positive value from performance verification record sheet between 100MHz to 2.6GHz.

Measured Value dB

The absolute value of this number should be less than 3dB for R3267.
The absolute value of this number should be less than 5dB for R3273

(2) Enter the most negative value from performance verification record sheet between 100MHz and 2.6GHz.

Measured Value dB

(3) Subtract (2) from (1) then record on the performance verification record sheet as peak to peak deviation.
The result should be less than 3.0dB for R3267 and R3273.

Measuring frequency response in the frequency range 3.5GHz to 7.5GHz

For testing this frequency range, pre selector tune is required.

19. On the R3267/3273, set center frequency to 3.6GHz.

20. On the SG2, set the frequency to 3.6GHz.

21. On the RF power meter set the correction data for 3.6GHz.

22. On the R3267/3273, press as follows to tune the pre selector.

FREQ, ***more1/2***, ***Presel Tune*** and ***Auto Tune***.

23. After the auto tuning has completed, adjust SG2 output level so that the marker reading is -10.0dBm ±0.09dB.

24. Record the display of RF power meter reading with reverse sign in performance verification data sheet.

25. On the R3267/3273, press FREQ and Δ to set center frequency by 100MHz step.

26. On the SG2, increment the frequency of output by 100MHz.

27. On the RF power meter, set the correction data for the frequency by 100MHz step.

28. Repeat steps 22. through 27. for every center frequency by 100MHz step up the center frequency to 7.5GHz listed in performance verification record sheet.

29. Calculation of In-Band Flatness for frequency range 3.5GHz to 7.5GHz

(1) Enter the most positive value from performance verification record sheet.

Measured Value dB

The absolute value of this number should be less than 3dB for R3267.
The absolute value of this number should be less than 5dB for R3273

(2) Enter the most negative value from performance verification record sheet.

Measured Value dB

The absolute value of this number should be less than 3dB for R3267.
The absolute value of this number should be less than 5dB for R3273

(3) Subtract (2) from (1) then record on the performance verification record sheet as peak to peak deviation.

The result should be less than 3.0dB for R3267 and R3273.
Record the result on the performance verification record sheet as peak to peak deviation.

Measuring frequency response in the frequency range 7.5GHz to 8GHz apply for R3267
Measuring frequency response in the frequency range 7.5GHz to 15.4GHz apply for R3273

For the frequency range, verify frequency response by 200MHz step.

30. On the R3267/3273, set CF step size to 200MHz.

31. On the R3267/3273, set center frequency to 7.5GHz.

32. On the SG2, set the frequency of output to 7.5GHz.

33. On the RF power meter, set the correction data for 7.5GHz.

34. On the R3267/3273, press as follows to tune the pre selector.

FREQ, ***more1/2***, ***Presel*** and ***Auto Tune***

35. After the auto tuning has completed, adjust SG2 output level so that the marker reading is -10.0dBm ±0.09dB.

36. Record the display of RF power meter reading with reverse sign in performance verification data sheet.

37. On the R3267/3273, press **FREQ** and Δ to set center frequency by 200MHz step.

38. On the SG2, On the SG2, increment the frequency of output by 200MHz.

39. On the RF power meter, set the correction data for the frequency by 200MHz step.

40. For R3267, repeat steps 34. through 39. for every center frequency by 200MHz step up the center frequency to 8GHz listed in performance verification record sheet.

For R3273, repeat t steps 34. through 39. for every center frequency by 200MHz step up the center frequency to 15.4GHz listed in performance verification record sheet.

41. Calculation of In-Band Flatness for frequency range 7.5GHz to 8GHz for R3267

42. Calculation of In-Band Flatness for frequency range 7.5GHz to 15.4GHz for R3273.

(1) Enter the most positive value from performance verification record sheet.

Measured Value dB

The absolute value of this number should be less than 3dB for R3267.
The absolute value of this number should be less than 5dB for R3273

(2) Enter the most negative value from performance verification record sheet.

Measured Value dB

The absolute value of this number should be less than 3dB for R3267.
The absolute value of this number should be less than 5dB for R3273

(3) Subtract (2) from (1) then record on the performance verification record sheet as peak to peak deviation.

The result should be less than 3.0dB for R3267.
The result should be less than 7.0dB for R3273.
Record the result on the performance verification record sheet as peak to peak deviation.

Measuring frequency response in the frequency range 15.4GHz to 26.5Ghz is applied for R3273 only

43. On the R3273, set center frequency to 15.4GHz.

44. On the SG2, set the frequency of output to 15.4GHz.

45. On the RF power meter, set the correction data for 15.4GHz.

46. On the R3273, press as follows to tune pre selector.

FREQ, ***more1/2, Presel*** and ***Auto Tune***

47. After the auto tuning has completed, adjust SG2 output level so that the marker reading is -10.0dBm ±0.09dB.

48. Record the display of RF power meter reading with reverse sign in performance verification data sheet.

49. On the R3273, press **FREQ** and Δ to set center frequency by 200MHz step.

50. On the SG2, increment the frequency of output by 200MHz.

51. On the RF power meter, set the correction data for the frequency by 200MHz step.

52. Repeat step 47. through 51. for every center frequency by 200MHz step up the center frequency to 25.6GHz listed in performance verification record sheet.

53. Calculation of In-Band Flatness for frequency range 15.4GHz to 26.5GHz for R3267

(1) Enter the most positive value from performance verification record sheet.

Measured Value dB

The absolute value of this number should be less than 5.0dB

(2) Enter the most negative value from performance verification record sheet.

Measured Value dB

The absolute value of this number should be less than 5dB.

(3) Subtract (2) from (1) then record on the performance verification record sheet as peak to peak deviation.
The result should be less than 8.0dB.

54. Record the result on the performance verification record sheet as peak to peak deviation.

3.2.15 Frequency Span Accuracy

(1) Description

Set the signal frequency twice with the signal generator and measure the difference between signal frequencies with the analyzer.
Check the span accuracy using the signal frequency difference measured with the Delta marker function.
The signal generator is phase-locked to the analyzer's 10MHz reference.

(2) Specification

< ± 1% of the frequency span setting.

(3) Equipment used

Signal Generator	SG2
RF Cable	SMA(m)-SMA(m)
RF Cable	BNC(m)-BNC(m)
Adapter	N(m)-SMA(f)

(4) Setup

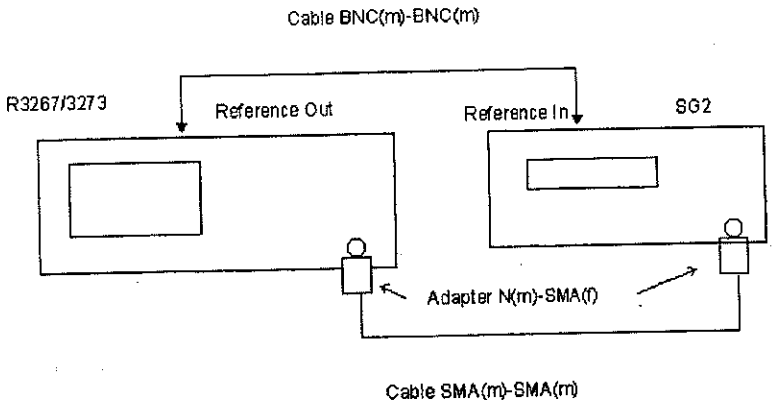


Figure 3-15 Setup of a Frequency Span Accuracy Test

(5) Procedures:

1. Connect equipment as shown in Figure 3-15.
2. On the SG2, set controls as follows:

Output Level	-5dBm
10MHz Reference	External

3. Preset R3267/3273.
4. On the SG2, set controls as follow for 1st frequency.

Frequency	1.999992 GHz

5. On the R3267/3273, set R3267/3273 controls as follows:

Center Frequency	2 GHz
Span	20 kHz

6. Press **SINGLE** for single sweep.
7. After sweep has completed, press **SRCH** to capture signal peak.
8. Press as follows to set delta marker to ON.

   MKR, ***Delta Marker*** and ***Delta Marker ON/OFF*** (ON)

9. On the SG2, set the SG2 as follow for 2nd frequency.

Frequency	2.000008GHz

10. Press **SINGLE** for single sweep.

11. After sweep has completed, press **SRCH** to capture signal peak.

12. Record the frequency of delta marker on the performance verification record sheet.

13. Repeat steps 4. through 12. for each frequency setting listed in Table 3-22.

Table 3-22 Setting of Center and Span Frequencies

1st Frequency of Signal Generator (GHz)	2nd Frequency of Signal Generator (GHz)	Center Frequency (GHz)	Span(Hz)
1.999980	2.000020	2	50 k
1.999940	2.000160	2	400 k
1.9992	2.0008	2	2 M
1.9992	2.0008	2	2.01 M
1.998	2.002	2	5 M
1.996	2.004	2	10 M
1.992	2.008	2	20 M
1.98	2.02	2	50 M
1.96	2.04	2	100 M
1.92	2.08	2	200 M
1.8	2.2	2	500 M
1.6	2.4	2	1 G
1.2	2.8	2	2 G
2.9	6.1	4.5	4 G
1.3	7.7	4.5	8 G

14. Repeat steps 4. through 12. for each frequency setting listed in Table 3-23. It is applied for R3273 only.

Table 3-23 Setting of Center and Span Frequencies for Span Accuracy Test

1st Frequency of Signal Generator (GHz)	2nd Frequency of Signal Generator (GHz)	Center Frequency (GHz)	Span(Hz)
9.996	10.004	10	10 M
9.96	10.04	10	100 M
9.6	10.4	10	1 G
9.2	10.8	10	2 G
16.996	17.004	17	10 M
16.96	17.04	17	100 M
16.6	17.4	17	1 G
16.2	17.8	17	2 G
8	12	10	5 G
6	14	10	10 G
2	18	10	19 G

3.2.16 Third Order Intermodulation Distortion

(1) Description

Two Signal generators provide the signals required for measuring third order intermodulation. It is difficult when the input level is low because of being buried to the noise, to measure the spectrum generated by the distortion. Third ordered inter-modulation is raised by 20dB if the input level is raised by 10dB. Then, examine with mixer input level set in -20dBm after the specification is converted into a value, which is 20dB larger. Here provides procedure at -20dBm for a total mixer input level. The test points of center frequencies are 20.5MHz, 105MHz, 1500MHz, 2000MHz, 3600MHz and 8000MHz.The point of 8000MHz is applied for R3273 only.

(2) Specification

Total mixer input level: -30dBm

Apply for R3267
< -70dBc Frequency Range: 10MHz to 100MHz Band
< -80dBc Frequency Range: 100MHz to 1.0GHz Band
< -85dBc Frequency Range: 1.0GHz to 3.5GHz Band
< -90dBc Frequency Range: 1.6GHz to 8.0GHz Band

Apply for R3273
< -70dBc Frequency Range: 10MHz to 100MHz Band
< -80dBc Frequency Range: 100MHz to 1.0GHz Band
< -85dBc Frequency Range: 3.5GHz to 7.5GHz Band
< -75dBc Frequency Range: 7.5GHz to 26.5GHz Band

(3) Equipment Used

Signal Generator	SG1
Signal Generator	SG2
RF Power Meter	P.M
RF Power Sensor	P.S
Power Divider	Divider1
Power Divider	Divider2
RF Cable	SMA(m)-SMA(m)
Adapter	N(m)-SMA(f)
	SMA(f)-SMA(f)

(4) Setup

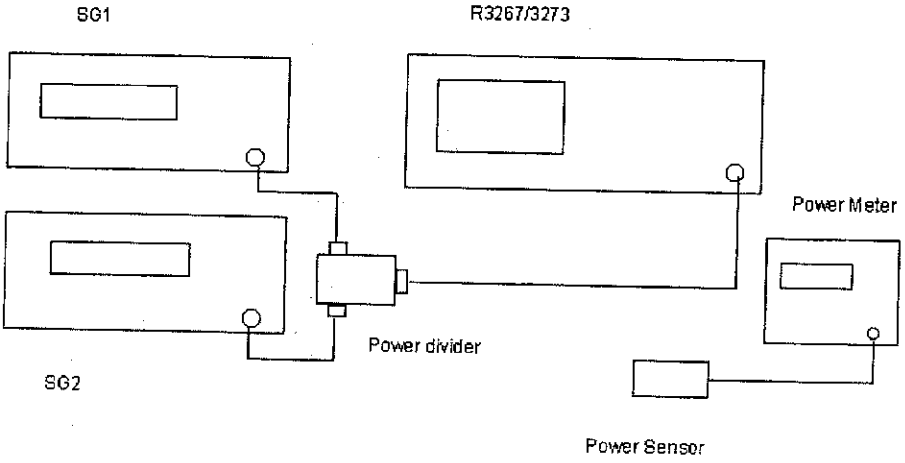


Figure 3-16 Setup of Third Order Intermodulation Test

(5) Procedure

Third Order Intermodulation (< 1GHz)

1. Perform the zeroing and calibration of RF Power Meter with RF Power Sensor. Set into dBm mode, after calibration has done.
2. Set a correction data of RF power meter to 20.5MHz
3. Connect RF power sensor to divider1 output.
4. On the both of signal generator, set controls as follows:

SG2	
Frequency	20.5MHz
Output Level	-10dBm
RF Output	Off

SG1	
Frequency	20.6MHz
Output Level	-10dBm
RF Output	Off

5. Turn RF output on of SG2.
6. Adjust SG2 output level so that RF power meter reading is -10.0dBm ± 0.1dB.
7. Turn RF output off of SG2, and turn RF output on of SG1.
8. Adjust SG1 output level so that RF power meter reading is -10.0dBm ± 0.1dB then turn RF output to off.
9. Remove RF power sensor from divider, then connect R3267/3273 input. After preset R3267/3273, set R3267/3273 controls as follows:

Center Frequency	20.5MHz
Span	1MHz
Attenuator	10dB
Reference Level	-10dBm
RBW	3kHz
VBW	300Hz

10. Turn RF output on for both of signal generator.
11. Press as follows to tune pre-selector.

    FREQ, ***more1/2***, ***Presel Tune*** and ***Auto Tune***

12. On the R3267,this procedures are required for the frequency above 1.6GHz.
13. On the R3273, this procedures are required for the frequency above 3.5GHz.
14. After auto tuning has completed, to set reference level setting to be same as signal peak, operate as follows:

    SRCH, ***MKR→*** and ***Marker →Ref***

15. Set R3267/3273 to 3rd order Measure mode as follows:

    MEAS and **3rd Order Measure**

16. Record the level of delta marker reading in dBc on the performance verification data sheet.
17. Repeat steps 2. through 15. for each frequency setting listed in Table 3-24.

Table 3-24 Setting of Third Order Intermodulation Measurement

Frequency of SG1 (MHz)	Frequency of SG2 (MHz)	Center Frequency (MHz)	VBW (Hz)	Correction Data for P.M.	Power Divider Used
105	105.1	105	300	105MHz	Divider 1
1500	1500.1	1500	300	1.5GHz	Divider 1
2000	2000.1	2000	100	2.0GHz	Divider 2
3600	3600.1	3600	100	3.6GHz	Divider 2

18. Repeat steps 2. through 15. for a frequency setting listed in Table 3-25.

Table 3-25 Setting of Third Order Intermodulation Measurement applied for R3273

Frequency of SG1 (MHz)	Frequency of SG2 (MHz)	Center Frequency (MHz)	VBW(Hz)	Correction Data for P.M.	Power Divider Used
8000	8000.1	8000	100	8GHz	Divider 2

3.2.17 Gain Compression

(1) Description

This test measures the analyzer's gain compression using two signals that are 1 MHz apart. First the test places a -30dBm signal at the input of the R3267/3273(the R3267/3273's reference level is also set to -30dBm).
Then the specified signal level is input to the R3267/3273, overdriving its input. The decrease in the first signal's amplitude (gain compression) caused by the second signal is the measured gain compression.
This test measures gain compression at the point of 10.5MHz, 200.5MHz, 3600.5MHz and 7600.5MHz. Both of 3600.5MHz and 7600.5MHz are required pre-selector tuning.

(2) Specification:

Applied for R3267
< -3dBm (mixer input level): 10 MHz to 100 MHz
< 0dBm (mixer input level): > 100 MHz

Applied for R3273
< -3dBm(mixer input level): 10 MHz to 100 MHz
< 0dBm(mixer input level): 100 MHz to 3.5 GHz
< -10dBm(mixer input level): 3.5 GHz to 7.5 GHz
< -3dBm(mixer input level): 7.5 GHz to 26.5 GHz

15. To tune pre-selector peak, operate R3267/3273 as follows:

    SRCH, FREQ, ***more1/2, Presel Tune*** and ***Auto Tune***

16. After auto tune has completed, set R3267/3273 controls as follows:

dB/div	1dB/div
Reference Level	-30dBm

17. Turn output level off of the SG1

18. Adjust the output level of SG2 for a displayed signal of -30dBm ± 0.1 dB on the R3267/3273 screen.

19. Turn output level on of the SG1.

20. Adjust output level of SG1 until the signal level at 2.5 division in the left hand part on the R3267/3273 screen is lowed by 1dB from -30dBm.

21. Remove the RF cable from the input terminal of R3267/3273, connect RF power sensor there.

22. Set correction data on the RF power meter to 3600.5MHz.

23. Record the level of the RF power meter reading on the performance test data sheet.

24. Repeat steps 14. through 23. for the center frequency 7600.5MHz, as the following setting.

    SG1
    Frequency 7600MHz

    SG2
    Frequency 7601MHz

    R3267/3273 Center Frequency
    7600.5MHz

3.2.18 Sweep Time Accuracy

(1) Description

A low frequency signal (Square Wave) is displayed on the R3267/3273 in ZERO Span mode, and measure the frequency of the displayed signal using Video trigger.

(2) Specification

≤ ± 3% of sweep time setting

(3) Equipment Used

Signal Generator	SG4
RF Cable	BNC(m)-BNC(m)
Adapter	N(m)-BNC(f)

(4) Setup

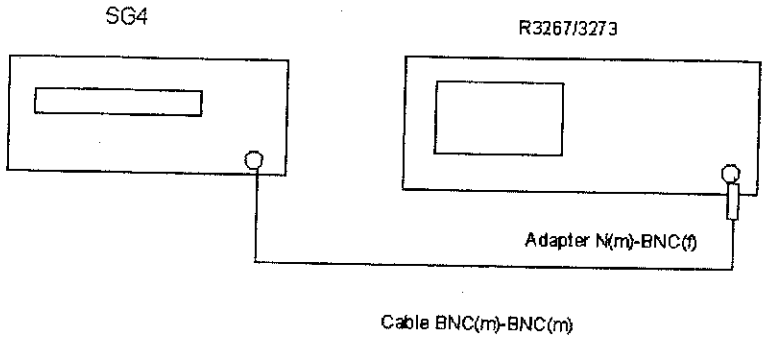


Figure 3-18 Setup of a Sweep Time Accuracy Test

(5) Procedure

1. Connect equipment as shown in Figure 3-18.
2. On the SG4,set SG4 controls as follows:

Frequency	22kHz
Output Level	-10dBm
Wave form	Square

3. After preset R3267/3273, set R3267/3273 controls as follows:

Center Frequency	0MHz
Span	Zero
Reference Level	-10dBm
dB/div	1dB/div
Sweep Time	50&usec

4. On the R3267/3273, press as follows for the measurement.

   SWP, ***Trigger Setup*** and ***Trigger Select***

5. Move the cursor to Source and select VIDEO, + for trigger slope.
6. Press Trigger Level and adjust the trigger level for sweep using data knob.
7. On the R3267/3273, press SINGLE for single sweep.
8. After sweep has completed, press MKR then move it to leading edge on the wave form.

9. Record the time of the marker reading on the performance verification record sheet.

10. Repeat steps 7. through 9. for each sweep time setting listed in Table 3-26.

Table 3-26 Setting of Sweep Time and Signal Generator Frequency

Sweep Time	Frequency of Signal Generator
1 µs	1.1 MHz
2 µs	550 kHz
5 µs	220 kHz
10 µs	110 kHz
20 µs	55 kHz
50 µs	22 kHz
100 µs	11 kHz
200 µs	5.5 kHz
500 µs	2.2 kHz
1 ms	1.1 kHz
2 ms	550 Hz
5 ms	220 Hz
10 ms	110 Hz
20 ms	55 Hz
50 ms	22 Hz
100 ms	11 Hz
200 ms	5.5 Hz
500 ms	2.2 Hz
1 s	1.1 Hz
2 s	0.55 Hz
5 s	0.22 Hz
10 s	0.11 Hz
20 s	0.05 Hz

3.2.19 Residual Response

(1) Description

This test checks for residual responses. Any response located above the display line is measured in a narrow frequency span and RBW. The RF INPUT is terminated in 50 ohm.

(2) Specification

With no signal at input and 0dB input attenuation

Apply for R3267

< -100dBm	Frequency Range: 1MHz to 3.6GHz
< -90dBm	Frequency Range: 300kHz to 8GHz

Apply for R3273

< -100dBm	Frequency Range: 1MHz to 3.5GHz
< -90dBm	Frequency Range: 300kHz to 26.5GHz

(3) Equipment Used

Coaxial 50 ohm termination

Adapters:	Type N to SMA
	Type N to BNC
Cable:	BNC(m)-BNC(m)

(4) Setup

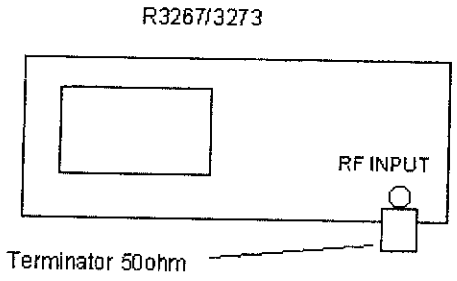


Figure 3-19 Setup of Residual Response Test

(5) Procedure

Frequency Range: 1MHz to 3.5GHz

1. Connect between the CAL OUT and RF INPUT by BNC(m)-BNC(m) cable.

2. After preset R3267/3273, set R3267/3273 controls as follows:

Center Frequency	30MHz
Span	10kHz
Reference Level	-10dBm
RBW	300Hz
Input Attenuator	0dB

3. Press SRCH to capture signal peak.

4. Check that the marker amplitude is within -10.0dBm ±0.3dB.
If it is out of range, press as follows to perform CAL ALL:

SHIFT, 7(CAL) and ***Cal All***

After Cal All has completed, check that the marker amplitude is within -10dBm ± 0.3dB.

5. Remove the BNC(m)-BNC(m) cable and adapter from the INPUT.
Install the Type N to SMA adapter and 50 ohm termination on the INPUT.
After preset R3267/3273, set R3267/3273 controls as follows:

Center frequency	1.3MHz
Span	2MHz
CF Step Size	1.9MHz
Reference Level	-50dBm
ATT	0dB
RBW	10kHz
VBW	300Hz

6. Press **FORMAT**, ***DSP LINE ON/OFF***(ON), **1, 0, 0** and **MHz(-dBm)**.

7. Press **SINGLE** for single sweep.
The noise level should be at least 3dB below the display line. If it is not, it will be necessary to reduce the Span and RBW to reduce the noise level. If the span is reduced, reduce the CF Step to no more than 95% of the Span.

8. If a residual is suspected, press the **SINGLE** again.
A residual response will persist, but a noise peak will not. Record the frequency and amplitude of any responses above the display line.

9. If a response is marginal, verify the response amplitude as follows:

(1) Press **SHIFT, RCL,1**,and **Hz(ENTR)** to save the setting condition.

(2) Press **REPEAT**.

(3) Place the marker on the peak of the response in the question.

(4) Press **MKR→** and ***MKR→CF***.

(5) Press **COUPLE**, ***RBW AUTO/MNL***(MNL) and ***RBW AUTO/MNL***(AUTO).

(6) Continue to reduce the Span until a RBW of 300Hz is reached.

Press **SRCH, MKR→** and ***Marker→CF*** to set peak to center.

(7) Record the frequency and amplitude of any residual response above the display line.

(8) Press **RCL** to recall the setting condition.

10. Check for residuals up to center frequency 3.5GHz using the procedure of step 7. through 9. above. To change the center frequency, then press the **FREQ** and Δ keys.

Residual response in the band 3.5GHz to 7.5GHz

11. Set the R3465/3272 as follows:

Center Frequency	3.525GHz
Span	50MHz
CF Step	47.5MHz
RBW	300kHz
VBW	300Hz

12. Press the **FORMAT**, ***DSP LINE ON/OFF***(ON), **9**, **0** and **MHz(-dBm)** to set display line at -90dBm point.

13. Repeat steps 7. through 10. until the center frequency of 7.425GHz.

3.3 Performance Verification of Digital Modulation Analysis Function (Option62)

3.3.1 Introduction

This section provides the information for verification of digital modulation analysis function, include equipment list and performance verification record sheet at end of this section.

For the performance verification of digital modulation analysis function, it is used arbitrary wave form generator and signal generator which can generate IQ modulation signal.

In case of difficult to generate the signals required for performance verification described in section 3.3.2, section 3.3.4 provides an alternative method.

3.3.2 Specification of Test Signal.

Following the condition is required to generate test signal for verification.
The each specification is based on the W-CDMA mobile communication system experimental specifications (first edition) published by NTT DoCoMo.
Refer to

- Volume 2: Mobile Station Equipment Specifications, Edition 1.1, February 22, 1998.
- Volume 3: Base Station Equipment Specifications, Edition 1.1, March 2. 1998.

(1) Test Signal for Base Transmit Station(BTS)

The specification required for test signal is listed in Table 3-27.
Figure 3-20 is shown timing chart of output signal and trigger signal.

Table 3-27 Specification for BTS Test Signal

No.	Name of Signal	Critical Specification				Usage
1	BTS	Long Code No. 128				BTS measureemnt on RF input BTS measurement on IQ input
		Channel Name	Transmis-sion Rate	Short Code No.	Level	
		Perch	16ksps	#0	-8.44dB	
		DTCH	32ksps	#1	-5.44dB	
		DTCH	32ksps	#14	-5.44dB	
		DTCH	32ksps	#24	-5.44dB	

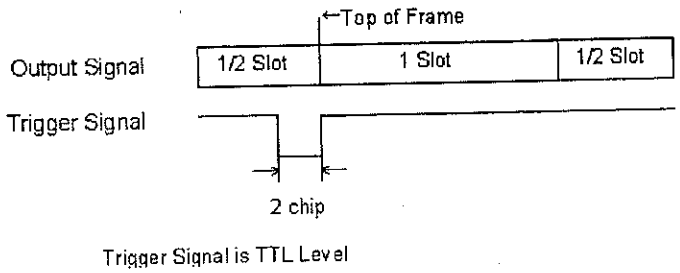


Figure 3-20 Timing Chart of BTS Test Signal

(2) Test Signal for MS and QPSK.

The specification required for the test signal is listed in Table 3-28.
Figure 3-21 is shown timing chart of output signal, SFN and Long code.

Table 3-28 Specification for SFN Test Signal

No.	Name of Signal	Critical Specification				Usage
2	BTS, QPSK	Long Code No. 1				MS measurement on RF input MS measurement on IQ input QPSK measurement on RF input QPSK measurement on IQ input
		Channel Name	Transmis-sion Rate	Short Code No.	Level	
		DTCH	32ksps	#0	0dB	

3.3.2 Specification of Test Signal.

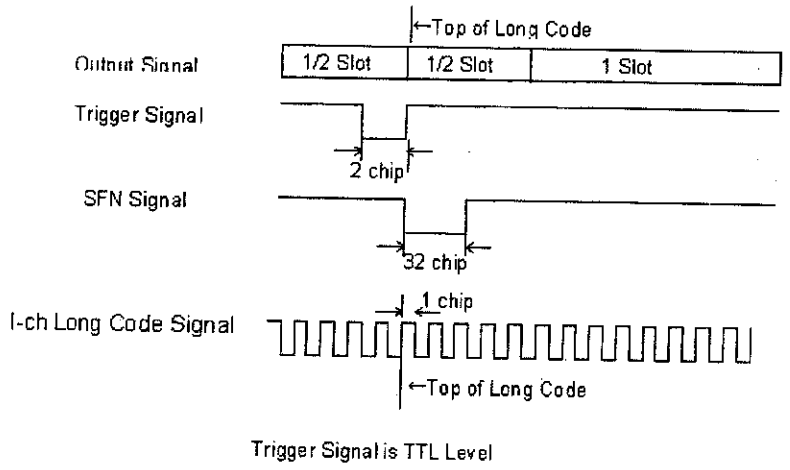


Figure 3-21 Timing Chart of SFN Test Signal

3.3.3 Performance Verification Procedures

3.3.3.1 BTS Measurement on RF Input

(1) Description

Verify Carrier Frequency Accuracy, Waveform Quality Accuracy, Modulation Accuracy and Code Domain Power Accuracy at frequency 2GHz for BTS, RF input.

(2) Specification

Carrier Frequency Accuracy	< ± 90Hz
Wave form Quality Accuracy	> 0.998
Modulation Accuracy	< 3%
Code Domain Power Accuracy	< ± 0.1dB

(3) Equipment Used

Arbitrary Signal Generator	SG5
I/Q Modulation Signal Generator	SG6

(4) Setup

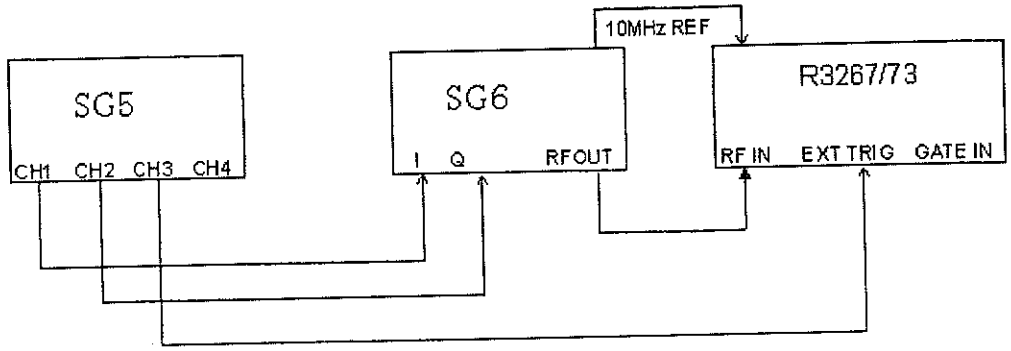


Figure 3-22 Setup of BTS Measurement Test

(5) Procedure

1. Connect equipment is shown as Figure 3-22.
2. On the SG5, set the data to generate the signal complied the requirement, refer to Table 3-27 and Figure 3-20.
3. On the SG5, set output for CH1,CH2 and trigger output for CH3.
4. On the SG6,set controls as follows:

I/Q Modulation	External
Center Frequency	2GHz
Output Level	0dBm

5. On the R3267/3273, set controls as follows:

Center Frequency	2GHz
Input	RF
Measurement Mode	BTS

6. On the R3267/3273, set the parameter referring Figure 3-23.

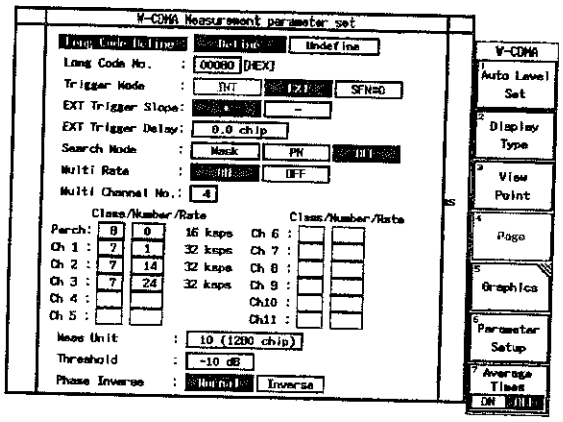


Figure 3-23 Setting of Parameter for W-CDMA Measurement

7. OntheR3267/3273, perform DC CAL and AUTO LEVEL.

8. Press SINGLE for single sweep.

9. Record the result on the performance verification record sheet.

3.3.3.2 MS Measurement on RF Input

(1) Description

Verify MS measurement Carrier Frequency Accuracy, Waveform Quality Accuracy and Modulation Accuracy for MS measurement, RF input.

(2) Specification

Carrier Frequency Accuracy	< ± 90Hz
Waveform Quality Accuracy	> 0.999
Modulation Accuracy	< 3%

(3) Equipment Used

Arbitrary Waveform Generator	SG5
IQ Modulation Signal Generator	SG6

(4) Setup

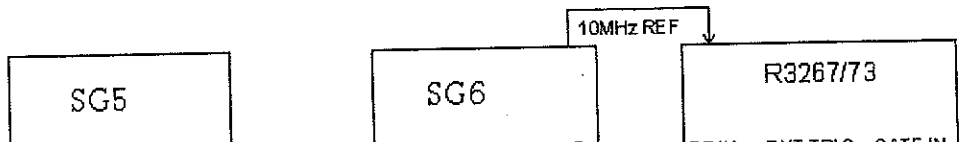


Figure 3-24 Setup of MS Measurement Test

(5) Procedure

1. Connect equipment as shown in Figure 3-24.
2. On the SG5, set the data to generate the signal complied the requirement, refer to Table 3-27 and Figure 3-20.
3. On the SG5, set output for CH1,CH2, trigger output for CH3 and SFN signal for CH4.
4. On the SG6, set controls as follows:

I/Q Modulation	External
Center Frequency	2GHz
Output Level	0dBm

5. On the R3267/3273, set controls as follows:

Center Frequency	2GHz
Input	RF
Measurement Mode	MS

6. On the R3267/3273, set the parameter referring Figure 3-25.

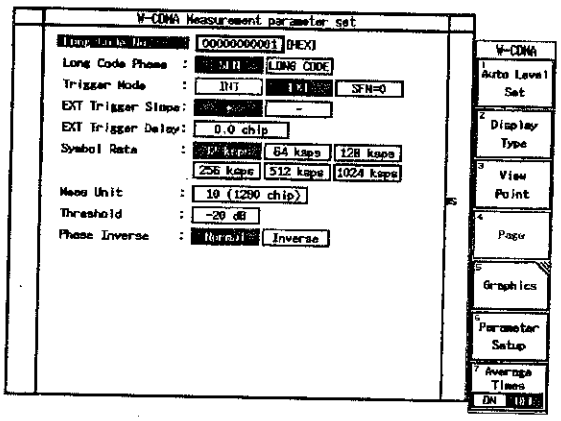


Figure 3-25 Setting of Parameter for W-CDMA Measurement Test

7. OntheR3267/3273, perform DC CAL and AUTO LEVEL.

8. Press **SINGLE** for single sweep.

9. Record the result on the performance verification record sheet.

3.3.3.3 QPSK Measurement on RF Input

(1) Description

Verify Waveform Quality Accuracy, Modulation Accuracy and Code Domain power for QPSK measurement, RF input.

(2) Specification

Carrier Frequency Accuracy	< ± 90Hz
Waveform Quality Accuracy	> 0.999
Modulation Accuracy	< 3%

(3) Equipment Used

Arbitrary Signal Generator	SG5
I/Q Modulation Signal Generator	SG6

(4) Setup

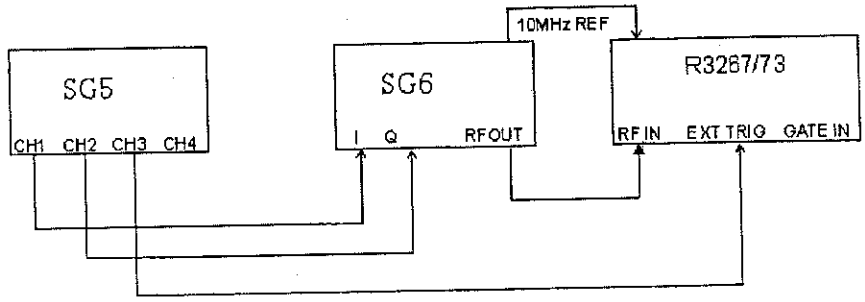


Figure 3-26 Setup of QPSK Measurement Test

(5) Procedure

1. Connect equipment as shown Figure 3-26.
2. On the SG5, set the data to generate the signal complied the requirement, refer to Table 3-28 and Figure 3-21.
3. On the SG5, set output for CH1,CH2 and trigger output for CH3.
4. On the SG6,set controls as follows:

IQ Modulation	External
Center Frequency	2GHz
Output level	0dBm

5. On the R3267/3273, set controls as follows:

Center Frequency	2GHz
Input	RF
Measurement Mode	QPSK

6. On the R3267/3273, set the parameter referring Figure 3-27.

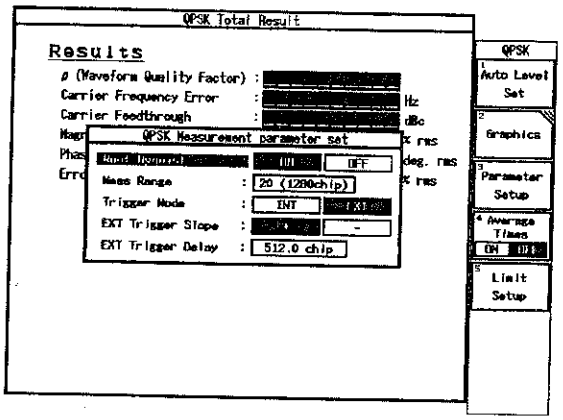


Figure 3-27 Setting of Parameter for W-CDMA Measurement Test

7. On the R3267/3273, perform DC CAL and AUTO LEVEL.
8. Press SINGLE for single sweep.
9. Record the result on the performance verification record sheet.

3.3.3.4 BTS Measurement on IQ Input

(1) Description

Verify Waveform Quality Accuracy, Modulation Accuracy and Code Domain Power Accuracy for BTS measurement, IQ input.

(2) Specification

Modulation Accuracy	< 3%
Equipment Used	
Arbitrary Signal Generator	SG5

(3) Setup

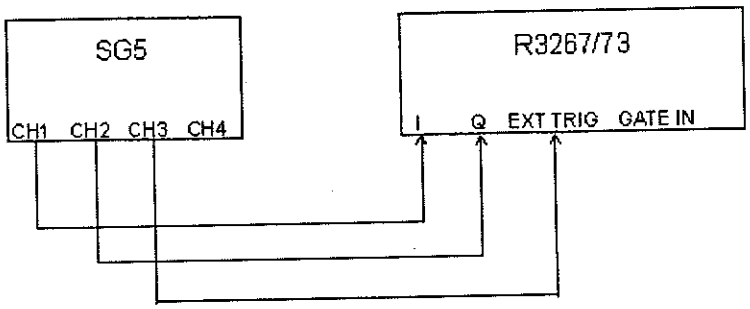


Figure 3-28 Setup of BTS Measurement Test

(4) Procedure

1. Connect equipment as shown Figure 3-28.
2. On the SG5, set the data to generate the signal complied the requirement, refer to Table 3-28 and Figure 3-21.
3. On the SG5, set output for CH1,CH2 and trigger output for CH3.
   Output level set 0.8Vp-p for CH1 and CH2, both signal must be balanced.
4. On the R3267/3273, set controls as follows:

Center Frequency	2GHz
Input	IQ
Measurement Mode	BTS

5. On the R3267/3273, set the parameter referring Figure 3-29.

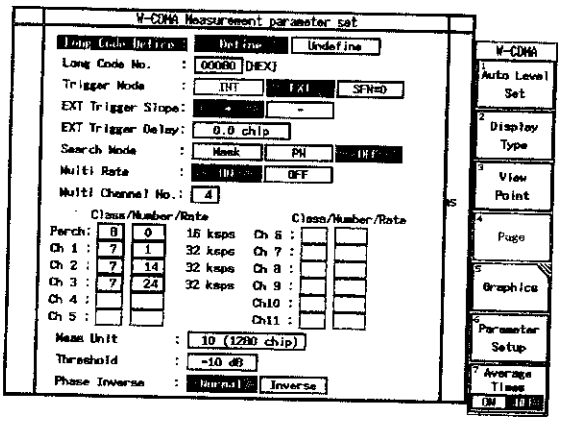


Figure 3-29 Setting of Parameter for W-CDMA Measurement Test

6. On the R3267/3273, perform DC CAL and AUTO LEVEL.
7. Press SINGLE for single sweep.
8. Record the result on the performance verification record sheet.

3.3.3.5 MS Measurement on IQ Input

(1) Description

Verify Waveform Quality Accuracy, Modulation and for MS measurement, IQ input.

(2) Specification

Modulation Accuracy	< 3%

(3) Equipment Used

Arbitrary Signal Generator	SG5

(4) Setup

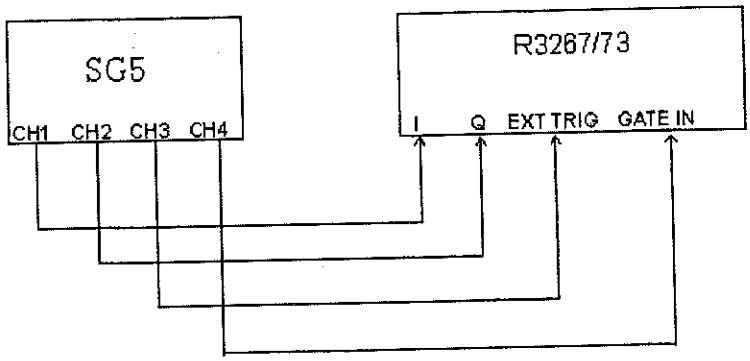


Figure 3-30 Setup of MS Measurement Test

(5) Procedure

1. Connect equipment as shown Figure 3-30.
2. On the SG5, set the data to generate the signal complied the requirement, refer to Table 3-28 and Figure 3-21.
3. On the SG5, set output signal for CH1,CH2, trigger output for CH3 and SFN signal for CH4.
   Output level set 0.8Vp-p for CH1 and CH2, both signal must be balanced.
4. On the R3267/3273, set controls as follows:

Input	IQ
Measurement Mode	MS

5. On the R3267/3273, set the parameter referring Figure 3-31.

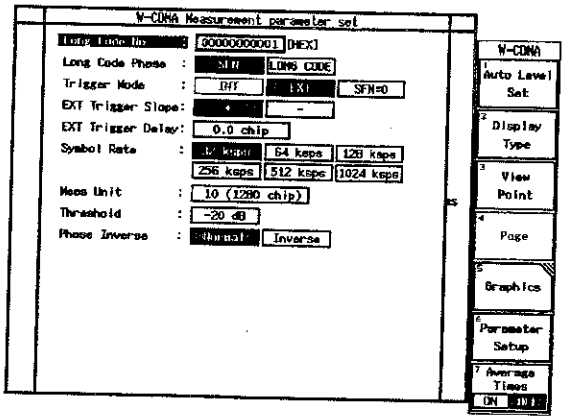


Figure 3-31 Setting of Parameter for W-CDMA Measurement Test

6. On the R3267/3273, perform DC CAL.
7. Press **SINGLE** for single sweep.
8. Record the result on the performance verification record sheet.

3.3.3.6 QPSK Measurement on IQ Input

(1) Description

Verify Waveform Quality Accuracy, Modulation and for QPSK measurement, IQ input.

(2) Specification

Waveform Quality Accuracy	< 0.001
Modulation Accuracy	< 3%

(3) Equipment Used

Arbitrary Signal Generator	SG5

(4) Setup

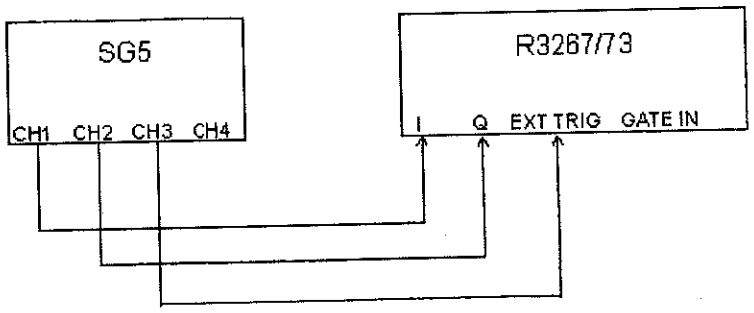


Figure 3-32 Setup of MS Measurement

(5) Procedure

1. Connect equipment as shown Figure 3-32.
2. On the SG5, set the data to generate the signal complied the requirement, refer to Table 3-28 and Figure 3-21.
3. On the SG5, set output signal for CH1,CH2 and trigger output for CH3. Output level set 0.8Vp-p for CH1 and CH2, both signal must be balanced.
4. On the R3267/3273, set controls as follows:

Input	IQ
Measurement Mode	QPSK

5. On the R3267/3273, set the parameter referring Figure 3-33.

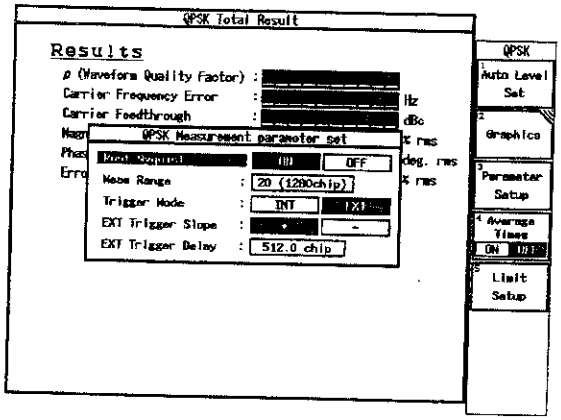


Figure 3-33 Setting of Parameter for W-CDMA Measurement Test

6. On the R3267/3273, perform DC CAL.
7. Press **SINGLE** for single sweep.
8. Record the result on the performance verification record sheet.

3.3.4 Simplified Performance Check Procedure for W-CDMA Measurement

This section provides simplified performance check procedure.

(1) Description

It uses QPSK signal complied W-CDMA specification.

(2) Specification

Carrier Frequency Accuracy	< ± 90 Hz
Waveform Quality Accuracy	> 0.999
Modulation Accuracy	< 3 %

(3) Equipment used

Signal Generator	SG6

(4) Setup

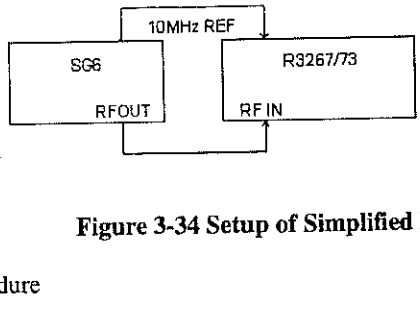


Figure 3-34 Setup of Simplified Performance Check

(5) Procedure

1. Connect equipment as shown Figure 3-34.
2. On the SG6, set controls as follows:

Modulation	QPSK
Symbol Rate	4.096 Msymbol/sec
Filter Type	Nyquist
Roll Off	α=0.22
Frequency	2 GHz
Output Level	0 dBm

On the R3267/3273, set controls as follows:

Center Frequency	2 GHz
Input	RF
Measurement Mode	QPSK

3. On the R3267/3273, set measurement parameter as shown Figure 3-35.

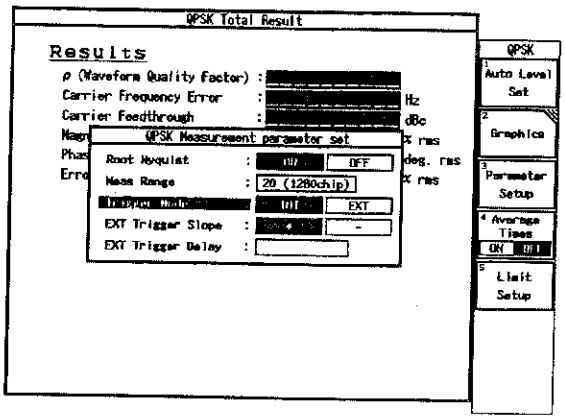


Figure 3-35 Setting of Parameter for Simplified Performance Check

4. On the R3267/3273, perform DC CAL and AUTO LEVEL.
5. On the R3267/3273, press SINGLE for single sweep.
6. Record the result on the performance check record sheet.

3.4 Performance Verification Record Sheet

Performance Verification Record Sheet

Report Number: _____

Customer Name: _____

Address: _____

_____

_____

Description: _____

Model Number: _____

Serial Number: _____

Asset Number: _____

Testing Environment: Temp. _____ °C RH _____ %

Verification Date: _____

Due Date:

Equipment Used:

Model No.	Description	Trace No.	Cal Due Date

Test Officer — Head of Laboratory

Date: — Date:

3.4.1 Performance Verification Record Sheet for R3267

(1) Frequency Reference Output Accuracy

Test Data	Specification			Result
	Min (Hz)	Measured Value	Max (Hz)	Pass/Fail
30MHz	29.999997		30.000003	
30MHz (Option 21)	29.9999997		30.0000003	

(2) Calibration Signal Amplitude Accuracy

Test Data	Specification			Result
	Min (dBm)	Measured Value (dBm)	Max (dBm)	Pass/Fail
-10dBm	-10.3		-9.7	

(3) Displayed Average Noise Level

Center Frequency (Hz)	Specification			Result
	Min (dBm)	Measured Value (dBm)	Max (dBm)	Pass/Fail
1k	N/A		-95.23	
10k	N/A		-100	
100k	N/A		-101	
1.0M	N/A		-125	
10.1M	N/A		-130	
101M	N/A		-129.9	
501M	N/A		-129.5	
1001M	N/A		-129	
1.5G	N/A		-128.5	
2.0G	N/A		-128	
2.5G	N/A		-127.5	
3.0G	N/A		-127	
3.5G	N/A		-126.5	

Center Frequency (Hz)	Specification			Result
	Min (dBm)	Measured Value (dBm)	Max (dBm)	Pass/Fail
3.5G to 8G	NA		-125	

(4) Resolution Bandwidth Switching Uncertainty

Test Data		Specification			Result
RBW (Hz)	Span Set-ting (Hz)	Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
300k	1M	Ref.	0(Ref.)	Ref.	
10M	15M	-0.3		+0.3	
5M	8M	-0.3		+0.3	
3M	5M	-0.3		+0.3	
1M	2M	-0.3		+0.3	
100k	200k	-0.3		+0.3	
30k	50k	-0.3		+0.3	
10k	20k	-0.3		+0.3	
3k	5k	-0.3		+0.3	
1k	2k	-0.3		+0.3	
300	500	-0.3		+0.3	
100	200	-0.3		+0.3	
30	200	-1.0		+1.0	

(5) Resolution Bandwidth Accuracy and Selectivity

- Resolution Bandwidth Accuracy

Test Data		Specification			Result
RBW (Hz)	Span Setting (Hz)	Min (Hz)	Measured Value (Hz)	Max (Hz)	Pass/Fail
5M	10M	3.125M		6.25M	
3M	5M	2.25M		3.75M	
1M	2M	0.850M		1.150M	
300k	500k	255k		345k	
100k	200k	85k		115k	
30k	50k	25.5k		34.5k	
10k	20k	8.5k		11.5k	
3k	5k	2.55k		3.45k	
1k	2k	0.85k		1.15k	
300	500	255		345	
100	200	85		115	
(*1)30	200	22.5		37.5	

*1:The Min and Max. values for RBW 30Hz are those when the temperature is 25°C ± 10°C. Values for other temperature are not specified.

- Resolution Bandwidth Selectivity

Test Data	Span Setting (Hz)	Measured Value (Hz)		Specification			Result
RBW (Hz)		60dB	3dB	Min	Acutual	Max	Pass/Fail
5M	30M			-		15	
3M	25M			-		15	
1M	20M			-		15	
300k	5M			-		15	
100k	1M			-		15	
30k	500k			-		15	
10k	200k			-		15	

Test Data	Span Setting (Hz)	Measured Value (Hz)		Specification			Result
RBW (Hz)		60dB	3dB	Min	Acutual	Max	Pass/Fail
3k	50k			-		15	
1k	20k			-		15	
300	5k			-		15	
100	2k			-		15	
(*1)30	1k			-		20	

(6) IF Gain Uncertainty

Setting		Test Data	Specification			Result
RBW (Hz)	External Attenuator (dB)	Reference Level (dBm)	Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
1M	1	-1.0	-0.5		+0.5	
	2	-2.0	-0.5		+0.5	
	3	-3.0	-0.5		+0.5	
	4	-4.0	-0.5		+0.5	
	5	-5.0	-0.5		+0.5	
	6	-6.0	-0.5		+0.5	
	7	-7.0	-0.5		+0.5	
	8	-8.0	-0.5		+0.5	
	9	-9.0	-0.5		+0.5	
	10	-10.0	-0.5		+0.5	
	20	-20.0	-0.5		+0.5	
	30	-30.0	-0.5		+0.5	
	40	-40.0	-0.5		+0.5	
	50	-50.0	-0.5		+0.5	
	60	-60.0	-0.5		+0.5	
	70	-70.0	-0.7		+0.7	
	80	-80.0	-0.7		+0.7	

3.4.1 Performance Verification Record Sheet for R3267

Setting		Test Data	Specification			Result
RBW (Hz)	External Attenuator(dB)	Reference Level (dBm)	Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
3k	1	-1.0	-0.5		+0.5	
	2	-2.0	-0.5		+0.5	
	3	-3.0	-0.5		+0.5	
	4	-4.0	-0.5		+0.5	
	5	-5.0	-0.5		+0.5	
	6	-6.0	-0.5		+0.5	
	7	-7.0	-0.5		+0.5	
	8	-8.0	-0.5		+0.5	
	9	-9.0	-0.5		+0.5	
	10	-10.0	-0.5		+0.5	
	20	-20.0	-0.5		+0.5	
	30	-30.0	-0.5		+0.5	
	40	-40.0	-0.5		+0.5	
	50	-50.0	-0.5		+0.5	
	60	-60.0	-0.5		+0.5	
	70	-70.0	-0.7		+0.7	
	80	-80.0	-0.7		+0.7	

Setting		Test Data	Specification			Result
RBW (Hz)	External Attenua-tor(dB)	Reference Level (dBm)	Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
300k	1	-1.0	-0.5		+0.5	
	2	-2.0	-0.5		+0.5	
	3	-3.0	-0.5		+0.5	
	4	-4.0	-0.5		+0.5	
	5	-5.0	-0.5		+0.5	
	6	-6.0	-0.5		+0.5	
	7	-7.0	-0.5		+0.5	
	8	-8.0	-0.5		+0.5	
	9	-9.0	-0.5		+0.5	
	10	-10.0	-0.5		+0.5	
	20	-20.0	-0.5		+0.5	
	30	-30.0	-0.5		+0.5	
	40	-40.0	-0.5		+0.5	
	50	-50.0	-0.5		+0.5	
	60	-60.0	-0.5		+0.5	
	70	-70.0	-0.7		+0.7	
	80	-80.0	-0.7		+0.7	

(7) Input Attenuatior Switching Accuracy

- Center Frequency at 4GHz, Reference Value dBm

Setting			Specification					
			Switching Accuracy			Step to step Switching Accuracy		
Input Attenua-tor (dB)	IF Gain (dB)	IF Gain Error (dB)	Min (dB)	Actual (dB)	Max (dB)	Min (dB)	Calculated (dB)	Max (dB)
10	0	0	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)
20	10		-2.0		+2.0	-1.1		+1.1
30	20		-2.0		+2.0	-1.1		+1.1
40	30		-2.0		+2.0	-1.1		+1.1
50	40		-2.0		+2.0	-1.1		+1.1
60	50		-2.0		+2.0	-1.1		+1.1
70	60		-2.0		+2.0	-1.1		+1.1

(8) Scale Fidelity

- 1dB/div Log Scale Fidelity

Test Data		Specification					Result
RBW	dB from Referenced Level (dB)	Signal Level (dBm)	Min (dB)	Measured Value (dB)	Max (dB)	Incremental Error (dB)	Pass/Fail
1MHz	0	0	Reference	Reference	Reference	Reference	
	-1	-1	-1.2		-0.8		
	-2	-2	-2.4		-1.6		
	-3	-3	-3.6		-2.4		
	-4	-4	-4.8		-3.2		
	-5	-5	-6.0		-4.0		
	-6	-6	-7.0		-5.0		
	-7	-7	-8.0		-6.0		
	-8	-8	-9.0		-7.0		
	-9	-9	-10.0		-8.0		
	-10	-10	-11.0		-9.0		

3.4.1 Performance Verification Record Sheet for R3267

- 10dB/div Log Scale Fidelity

Test Data			Specification				Result
RBW	dB from Referenced Level (dB)	Signal Level (dBm)	Min (dB)	Measured Value (dB)	Max (dB)	Incremental Error (dB)	Pass/Fail
3kHz	0	0	Reference	Reference	Reference	Reference	
	-10	-10	-10.85		-9.15		
	-20	-20	-20.85		-19.15		
	-30	-30	-30.85		-29.15		
	-40	-40	-40.85		-39.15		
	-50	-50	-50.85		-49.15		
	-60	-60	-60.85		-59.15		
	-70	-70	-70.85		-69.15		
	-80	-80	-80.85		-79.15		
	-90	-90	-90.85		-89.15		

- Linear Scale Fidelity

Test Data			Specification			Result
Div. From Reference Level	Input Signal Level		Min.(mV)	Measured Value (dB)	Max (mV)	Pass/Fail
	(dBm, Nominal)	(mV, Nominal)				
0	Reference(0)	Ref.(223.6)	Ref.(223.6)		Ref.(223.6)	
1	-0.92	201.24	190.06		212.42	
2	-1.94	178.88	167.7		190.06	
3	-3.10	156.52	145.34		167.7	
4	-4.44	134.16	122.98		145.34	
5	-6.02	111.8	100.62		122.98	
6	-7.96	89.44	78.26		100.62	
7	-10.46	67.08	55.9		78.26	
8	-13.98	44.72	33.54		55.9	
9	-20.00	22.36	11.18		33.54	

(9) Residual FM

Measured Value				Specification			Result
Marker Reading		3dB Slope	FM Deviation	Min (Hz)	Calculated Value (Hz)	Max (Hz)	Pass/Fail
Δ f	Δ level			N/A		3	

(10) Noise Sidebands

Center Frequency (Hz)	Span(Hz) Frequency(Hz)	Offset Frequency (Hz)	Specification		
			Min (dBc/Hz)	Measured Value (dBc/Hz)	Max. (dBc/Hz)
1GHz	2.5k	1 k	N/A		-100
	25k	10 k	N/A		-110
	250k	100 k	N/A		-118
	2.5M	1000 k	N/A		-135

(11) Image, Multiple and Out of Band Spurious

Test Data			Specification			Result
Frequency Range	Center Frequency (GHz)	Frequency of Signall Generator (Hz)	Min (dBc)	Measured Value (dBc)	Max (dBc)	Pass/Fail
100Hz to 3.5GHz	2	1957.159M	N/A			
	2	1157.159M	N/A			
	2	10.462841G	N/A			
	2	8.2314205G	N/A			
3.5GHz to 8GHz	7	7.842841	N/A			
	8	4.632131G	N/A			
	9	3.78929G	N/A			

(12) Frequency Readout Accuracy and Frequency Counter Marker

- Frequency Readout Accuracy

Center Frequency (Hz)	Span	Specification			Result
		Min (GHz)	Measured Value (dBc/Hz)	Max (dBc/Hz)	Pass/Fail
2GHz	1MHz	1.999989		2.000011	
	10MHz	1.99989		2.00011	
	20MHz	1.99976		2.00024	
	50MHz	1.99946		2.00054	
	100MHz	1.9989		2.0011	
	2GHz	1.980		2.020	
5GHz	1MHz	4.999989		5.000011	
	10MHz	4.99989		5.00011	
	20MHz	4.99976		5.00024	
	50MHz	4.99946		5.00054	
	100MHz	4.9989		5.0011	
	2GHz	4.980		5.020	

- Frequency Counter Marker Accuracy

Center Frequency (Hz)	Span	Specification			Result
		Min (GHz)	Measured Value (dBc/Hz)	Max (dBc/Hz)	Pass/Fail
2GHz	1MHz	1.999999794		2.000000206	
5GHz	1MHz	4.999999494		5.000000506	

(13) Second Harmonic Distortion

Frequency Range	Test Data		Specification			Result
	Fundamental	Second Harmonic	Min (dBc)	Measured Value	Max (dBc)	Pass/Fail
10MHz to 1.8GHz	1.5GHz	3.0GHz	N/A		-70	
> 1.6GHz	1.9GHz	3.8GHz	N/A		-90	

(14) Frequency Response

- Frequency Range 100Hz to 3.5GHz

Frequency Range	Test Data (MHz)	Specification			Result
		Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
100Hz to 3.5GHz	100	- 3.0		+3.0	
	200	- 3.0		+3.0	
	300	- 3.0		+3.0	
	400	- 3.0		+3.0	
	500	- 3.0		+3.0	
	600	- 3.0		+3.0	
	700	- 3.0		+3.0	
	800	- 3.0		+3.0	
	900	- 3.0		+3.0	
	1000	- 3.0		+3.0	
	1100	- 3.0		+3.0	
	1200	- 3.0		+3.0	
	1300	- 3.0		+3.0	
	1400	- 3.0		+3.0	
	1500	- 3.0		+3.0	
	1600	- 3.0		+3.0	
	1700	- 3.0		+3.0	
	1800	- 3.0		+3.0	

3.4.1 Performance Verification Record Sheet for R3267

Frequency Range	Test Data (MHz)	Specification			Result
		Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
100Hz to 3.5GHz	1900	- 3.0		+3.0	
	2000	- 3.0		+3.0	
	2100	- 3.0		+3.0	
	2200	- 3.0		+3.0	
	2300	- 3.0		+3.0	
	2400	- 3.0		+3.0	
	2500	- 3.0		+3.0	
	2600	- 3.0		+3.0	
	2700	- 3.0		+3.0	
	2800	- 3.0		+3.0	
	2900	- 3.0		+3.0	
	3000	- 3.0		+3.0	
	3100	- 3.0		+3.0	
	3200	- 3.0		+3.0	
	3300	- 3.0		+3.0	
	3400	- 3.0		+3.0	
	3500	- 3.0		+3.0	
In Band Flatness:100Hz to 3.5GHz		N/A		±3.0dBp-p	
In Band Flatness:2.6GHzHz to 3.5GHz		N/A		±2.0dBp-p	

- Frequency Range 3.5GHz to 7.0GHz

Frequency Range	Test Data (MHz)	Specification			Result
		Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
3.5GHz to 7.0GHz	3.5	- 3.0		+3.0	
	3.7	- 3.0		+3.0	
	3.8	- 3.0		+3.0	
	3.9	- 3.0		+3.0	
	4.0	- 3.0		+3.0	
	4.1	- 3.0		+3.0	
	4.2	- 3.0		+3.0	
	4.3	- 3.0		+3.0	
	4.4	- 3.0		+3.0	
	4.5	- 3.0		+3.0	
	4.6	- 3.0		+3.0	
	4.7	- 3.0		+3.0	
	4.8	- 3.0		+3.0	
	4.9	- 3.0		+3.0	
	5.0	- 3.0		+3.0	
	5.1	- 3.0		+3.0	
	5.2	- 3.0		+3.0	
	5.3	- 3.0		+3.0	
	5.4	- 3.0		+3.0	
	5.6	- 3.0		+3.0	
	5.7	- 3.0		+3.0	
	5.8	- 3.0		+3.0	
	5.9	- 3.0		+3.0	
	6.0	- 3.0		+3.0	
	6.1	- 3.0		+3.0	
	6.2	- 3.0		+3.0	

3.4.1 Performance Verification Record Sheet for R3267

Frequency Range	Test Data (MHz)	Specification			Result
		Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
3.5GHz to 7.0GHz	6.3	- 3.0		+3.0	
	6.4	- 3.0		+3.0	
	6.5	- 3.0		+3.0	
	6.6	- 3.0		+3.0	
	6.7	- 3.0		+3.0	
	6.8	- 3.0		+3.0	
	6.9	- 3.0		+3.0	
In Band Flatness: 3.5GHz to 7.0GHz		N/A		3.0dBp-p	

- Frequency Range7.5GHz to8.0GHz

Frequency Range	Test Data (MHz)	Specification			Result
		Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
7.5GHz to 8.0GHz	7.5	- 3.0		+3.0	
	7.7	- 3.0		+3.0	
	7.9	- 3.0		+3.0	
	8.0	- 3.0		+3.0	
In Band Flatness: 6.9GHz to 8.0GHz		N/A		3.0dBp-p	

(15). Frequency Span Accuracy

Setting		Test Data (Hz)	Specification			Result
Center Frequency (GHz)	Span (Hz)		Min (Hz)	Measured Value (Hz)	Max (Hz)	Pass/Fail
2	20k	16.00k	15.84k		16.16k	
2	50k	40.00k	39.6k		40.4k	
2	400k	320.0k	316.8k		323.2k	
2	2M	1.600M	1.584M		1.616M	
2	5M	4.00M	3.96M		4.04M	
2	10M	8.00M	7.92M		8.08M	
2	20M	16.00M	15.84M		16.16M	
2	50M	40.0M	39.6M		40.4M	
2	100M	80.0M	79.2M		80.8M	
2	200M	160.0M	158.4M		161.6M	
2	500M	400M	396M		404M	
2	1G	800M	792M		808M	
2	2G	1.6000G	1.584G		1.616G	
4.5	4G	3.200G	3.168G		3.232G	
4.5	8G	6.400G	6.336G		6.464G	

(16) Third Order Intermodulation Distortion

Test Data	Specification			Result
Center Frequency (MHz)	Min (dBc)	Measured Value (dBc)	Max (dBc)	Pass/Fail
20.5	N/A		-50	
105	N/A		-60	
1500	N/A		-65	
2000	N/A		-70	
3600	N/A		-70	

(17) Gain Compression

Test Data			Specification			Result
Setting of SG1 (MHz)	Setting of SG2 (MHz)	Center Frequency (MHz)	Min (dBm)	Measured Value (dBm)	Max (dBm)	Pass/Fail
10	11	10.5	-3		N/A	
200	201	200.5	0		N/A	
3600	2601	3600.5	0		N/A	

(18) Sweep Time Accuracy

Sweep Time Setting (s)	Test Data (s)	Specification			Result
		Min (s)	Measured Value (s)	Max (s)	Pass/Fail
1μ	0.909μ	0.882μ		0.936μ	
2μ	1.81μ	1.77μ		1.87μ	
5μ	4.54μ	4.41μ		4.68μ	
10μ	9.09μ	8.82μ		9.36μ	
20μ	18.1μ	17.7μ		18.7μ	
50μ	45.4μ	44.1μ		46.8μ	
100μ	90.9μ	88.2μ		93.6μ	
200μ	181μ	177μ		187μ	
500μ	454μ	441μ		468μ	
1m	909μ	882μ		936μ	
2m	1.81m	1.77m		1.87m	
5m	4.54m	4.41m		4.68m	
10m	9.09m	8.82m		9.36m	
20m	18.1m	17.7m		18.7m	
50m	45.4m	44.1m		46.8m	
100m	90.9m	88.2m		93.6m	
200m	181m	177m		187m	
500m	454m	44.1m		468m	

Sweep Time Setting (s)	Test Data (s)	Specification			Result
		Min (s)	Measured Value (s)	Max (s)	Pass/Fail
1	909m	882m		936m	
2	1.81	1.77		1.87	
5	4.54	4.41		4.68	
10	9.09	8.82		9.36	
20	18.1	17.7		18.7	
50	45.4	44.1		46.8	
100	90.9	88.2		93.6	

(19) Residual response

Test Data	Specification			Result
Frequency Range	Min (dBm)	Measured Data (dBm)	Max (dBm)	Pass/Fail
100Hz to 3.5 GHz	N/A		-100	
3.5GHz to 7.5 GHz	N/A		-90	

3.4.2 Performance Verification Record Sheet for R3273

(1) Frequency Reference Output Accuracy

Test Data	Specification			Result
	Min (Hz)	Measured Value	Max (Hz)	Pass/Fail
30MHz	29.999997		30.000003	
30MHz (Option 21)	29.9999997		30.0000003	

(2) Calibration Signal Amplitude Accuracy

Test Data	Specification			Result
	Min (dBm)	Measured Value (dBm)	Max (dBm)	Pass/Fail
-10dBm	-10.3		-9.7	

(3) Displayed Average Noise Level

Center Frequency (Hz)	Specification			Result
	Min (dBm)	Measured Value (dBm)	Max (dBm)	Pass/Fail
1k	N/A		-95.23	
10k	N/A		-100	
100k	N/A		-101	
1.0M	N/A		-125	
10.1M	N/A		-130	
101M	N/A		-129.9	
501M	N/A		-129.5	
1001M	N/A		-129	
1.5G	N/A		-128.5	
2.0G	N/A		-128	
2.5G	N/A		-127.5	
3.0G	N/A		-127	
3.5G	N/A		-126.5	

Center Frequency (Hz)	Specification			Result
	Min (dBm)	Measured Value (dBm)	Max (dBm)	Pass/Fail
3.5G to 7.5G	N/A		-125	
7.5G to 15.4G	N/A		-122	
7.5G to 15.4G	N/A		-120	
22G to 26.5G	NA		-117	

(4) Resolution Bandwidth Switching Uncertainty

Test Data		Specification			Result
RBW (Hz)	Span Set-ting (Hz)	Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
300k	1M	Ref.	0(Ref.)	Ref.	
10M	15M	-0.3		+0.3	
5M	8M	-0.3		+0.3	
3M	5M	-0.3		+0.3	
1M	2M	-0.3		+0.3	
100k	200k	-0.3		+0.3	
30k	50k	-0.3		+0.3	
10k	20k	-0.3		+0.3	
3k	5k	-0.3		+0.3	
1k	2k	-0.3		+0.3	
300	500	-0.3		+0.3	
100	200	-0.3		+0.3	
30	200	-1.0		+1.0	

(5) Resolution Bandwidth Accuracy and Selectivity

- Resolution Bandwidth Accuracy

Test Data		Specification			Result
RBW (Hz)	Span Setting (Hz)	Min (Hz)	Measured Value (Hz)	Max (Hz)	Pass/Fail
5M	10M	3.125M		6.25M	
3M	5M	2.25M		3.75M	
1M	2M	0.850M		1.150M	
300k	500k	255k		345k	
100k	200k	85k		115k	
30k	50k	25.5k		34.5k	
10k	20k	8.5k		11.5k	
3k	5k	2.55k		3.45k	
1k	2k	0.85k		1.15k	
300	500	255		345	
100	200	85		115	
(*1)30	200	22.5		37.5	

*1:The Min and Max. values for RBW 30Hz are those when the temperature is 25°C ± 10°C. Values for other temperature are not specified.

- Resolution Bandwidth Selectivity

Test Data	Span Setting (Hz)	Measured Value (Hz)		Specification			Result
RBW (Hz)		60dB	3dB	Min	Acutual	Max	Pass/Fail
5M	30M			-		15	
3M	25M			-		15	
1M	20M			-		15	
300k	5M			-		15	
100k	1M			-		15	
30k	500k			-		15	
10k	200k			-		15	
3k	50k			-		15	

Test Data	Span Setting (Hz)	Measured Value (Hz)		Specification			Result
RBW (Hz)		60dB	3dB	Min	Acutual	Max	Pass/Fail
1k	20k			-		15	
300	5k			-		15	
100	2k			-		15	
(*1)30	1k			-		20	

*1:The Min and Max. values for RBW 30Hz are those when the temperature is 25°C ± 10°C. Values for other temperature are not specified.

(6) IF Gain Uncertainty

Setting		Test Data	Specification			Result
RBW (Hz)	External Attenua-tor(dB)	Reference Level (dBm)	Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
1M	1	-1.0	-0.5		+0.5	
	2	-2.0	-0.5		+0.5	
	3	-3.0	-0.5		+0.5	
	4	-4.0	-0.5		+0.5	
	5	-5.0	-0.5		+0.5	
	6	-6.0	-0.5		+0.5	
	7	-7.0	-0.5		+0.5	
	8	-8.0	-0.5		+0.5	
	9	-9.0	-0.5		+0.5	
	10	-10.0	-0.5		+0.5	
	20	-20.0	-0.5		+0.5	
	30	-30.0	-0.5		+0.5	
	40	-40.0	-0.5		+0.5	
	50	-50.0	-0.5		+0.5	
	60	-60.0	-0.5		+0.5	
	70	-70.0	-0.7		+0.7	
	80	-80.0	-0.7		+0.7	

3.4.2 Performance Verification Record Sheet for R3273

Setting		Test Data	Specification			Result
RBW (Hz)	External Attenua-tor(dB)	Reference Level (dBm)	Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
3k	1	-1.0	-0.5		+0.5	
	2	-2.0	-0.5		+0.5	
	3	-3.0	-0.5		+0.5	
	4	-4.0	-0.5		+0.5	
	5	-5.0	-0.5		+0.5	
	6	-6.0	-0.5		+0.5	
	7	-7.0	-0.5		+0.5	
	8	-8.0	-0.5		+0.5	
	9	-9.0	-0.5		+0.5	
	10	-10.0	-0.5		+0.5	
	20	-20.0	-0.5		+0.5	
	30	-30.0	-0.5		+0.5	
	40	-40.0	-0.5		+0.5	
	50	-50.0	-0.5		+0.5	
	60	-60.0	-0.5		+0.5	
	70	-70.0	-0.7		+0.7	
	80	-80.0	-0.7		+0.7	

Setting		Test Data	Specification			Result
RBW (Hz)	External Attenuator (dB)	Reference Level (dBm)	Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
300k	1	-1.0	-0.5		+0.5	
	2	-2.0	-0.5		+0.5	
	3	-3.0	-0.5		+0.5	
	4	-4.0	-0.5		+0.5	
	5	-5.0	-0.5		+0.5	
	6	-6.0	-0.5		+0.5	
	7	-7.0	-0.5		+0.5	
	8	-8.0	-0.5		+0.5	
	9	-9.0	-0.5		+0.5	
	10	-10.0	-0.5		+0.5	
	20	-20.0	-0.5		+0.5	
	30	-30.0	-0.5		+0.5	
	40	-40.0	-0.5		+0.5	
	50	-50.0	-0.5		+0.5	
	60	-60.0	-0.5		+0.5	
	70	-70.0	-0.7		+0.7	
	80	-80.0	-0.7		+0.7	

(7) Input Attenuatior Switching Accuracy

- Center Frequency at 4GHz, Reference Value dBm

Setting			Specification					
			Switching Accuracy			Step to step Switching Accuracy		
Input Attenuator (dB)	IF Gain (dB)	IF Gain Error (dB)	Min (dB)	Actual (dB)	Max (dB)	Min (dB)	Calculated (dB)	Max (dB)
10	0	0	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)
20	10		-2.0		+2.0	-1.1		+1.1
30	20		-2.0		+2.0	-1.1		+1.1
40	30		-2.0		+2.0	-1.1		+1.1
50	40		-2.0		+2.0	-1.1		+1.1
60	50		-2.0		+2.0	-1.1		+1.1
70	60		-2.0		+2.0	-1.1		+1.1

- Center Frequency at 15GHz, Reference Value dBm

Setting			Specification					
			Switching Accuracy			Step to step Switching Accuracy		
Input Attenuator (dB)	IF Gain (dB)	IF Gain Error (dB)	Min (dB)	Actual (dB)	Max (dB)	Min (dB)	Calculated (dB)	Max (dB)
10	0	0	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)
20	10		-2.5		+2.5	-1.3		+1.3
30	20		-2.5		+2.5	-1.3		+1.3
40	30		-2.5		+2.5	-1.3		+1.3
50	40		-2.5		+2.5	-1.3		+1.3
60	50		-2.5		+2.5	-1.3		+1.3
70	60		-2.5		+2.5	-1.3		+1.3

- Center Center Frequency at 18GHz, Reference Value dBm

Setting			Specification					
			Switching Accuracy			Step to step Switching Accuracy		
Input Attenuator (dB)	IF Gain (dB)	IF Gain Error (dB)	Min (dB)	Actual (dB)	Max (dB)	Min (dB)	Calculated (dB)	Max (dB)
10	0	0	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)
20	10		-3.5		+3.5	-1.8		+1.8
30	20		-3.5		+3.5	-1.8		+1.8
40	30		-3.5		+3.5	-1.8		+1.8
50	40		-3.5		+3.5	-1.8		+1.8
60	50		-3.5		+3.5	-1.8		+1.8
70	60		-3.5		+3.5	-1.8		+1.8

(8) Scale Fidelity

- 1dB/div Log Scale Fidelity

Test Data		Specification					Result
RBW	dB from Referenced Level (dB)	Signal Level (dBm)	Min (dB)	Measured Value (dB)	Max (dB)	Incremental Error (dB)	Pass/Fail
1MHz	0	0	Ref.	Ref.	Ref.	Ref.	
	-1	-1	-1.2		-0.8		
	-2	-2	-2.4		-1.6		
	-3	-3	-3.6		-2.4		
	-4	-4	-4.8		-3.2		
	-5	-5	-6.0		-4.0		
	-6	-6	-7.0		-5.0		
	-7	-7	-8.0		-6.0		
	-8	-8	-9.0		-7.0		
	-9	-9	-10.0		-8.0		
	-10	-10	-11.0		-9.0		

3.4.2 Performance Verification Record Sheet for R3273

- 10dB/div Log Scale Fidelity

Test Data			Specification				Result
RBW	dB from Referenced Level (dB)	Signal Level (dBm)	Min (dB)	Measured Value (dB)	Max (dB)	Incremental Error (dB)	Pass/Fail
3kHz	0	0	Ref.	Ref.	Ref.	Ref.	
	-10	-10	-10.85		-9.15		
	-20	-20	-20.85		-19.15		
	-30	-30	-30.85		-29.15		
	-40	-40	-40.85		-39.15		
	-50	-50	-50.85		-49.15		
	-60	-60	-60.85		-59.15		
	-70	-70	-70.85		-69.15		
	-80	-80	-80.85		-79.15		
	-90	-90	-90.85		-89.15		

- Linear Scale Fidelity

Test Data			Specification			Result
Div. From Reference Level	Input Signal Level		Min.(mV)	Measured Value (dB)	Max (mV)	Pass/Fail
	(dBm, Nominal)	(mV, Nominal)				
0	Ref.(0)	Ref.(223.6)	Ref.(223.6)	Ref.(223.6)	Ref.(223.6)	
1	-0.92	201.24	190.06		212.42	
2	-1.94	178.88	167.7		190.06	
3	-3.10	156.52	145.34		167.7	
4	-4.44	134.16	122.98		145.34	
5	-6.02	111.8	100.62		122.98	
6	-7.96	89.44	78.26		100.62	
7	-10.46	67.08	55.9		78.26	
8	-13.98	44.72	33.54		55.9	
9	-20.00	22.36	11.18		33.54	

(9) Residual FM

Measured Value				Specification			Result
Marker Reading		3dB Slope	FM Deviation	Min (Hz)	Calculated Value (Hz)	Max (Hz)	Pass/Fail
Δ f	Δ level			N/A		3	

(10) Noise Sidebands

Center Frequency (Hz)	Span(Hz) Frequency(Hz)	Offset Frequency(Hz)	Specification		
			Min (dBc/Hz)	Measured Value (dBc/Hz)	Max. (dBc/Hz)
1GHz	2.5k	1 k	N/A		-100
	25k	10 k	N/A		-110
	250k	100 k	N/A		-118
	2.5M	1000 k	N/A		-135

(11) Image, Multiple and Out of Band Spurious

Test Data			Specification			Result
Frequency Range	Center Frequency (GHz)	Frequency of Signall Generator (Hz)	Min (dBc)	Measured Value (dBc)	Max (dBc)	Pass/Fail
100Hz to 3.5GHz	2	1957.159M	N/A			
	2	1157.159M	N/A			
	2	10.462841G	N/A			
	2	8.2314205G	N/A			
3.5GHz to 7.5GHz	5.5	6.342841G	N/A			
	5.5	11.421421G	N/A			
	5.5	17.342841G	N/A			
	5.5	23.264262G	N/A			

3.4.2 Performance Verification Record Sheet for R3273

Test Data			Specification			Result
Frequency Range	Center Frequency (GHz)	Frequency of Signall Generator (Hz)	Min (dBc)	Measured Value (dBc)	Max (dBc)	Pass/Fail
7.4GHz to 15.4GHz	12	12.842841G	N/A			
	12	5.78929G	N/A			
	12	18.21071G	N/A			
	12	24.421421G	N/A			
15.2GHz to 23.3GHz	21	21.842841G	N/A			
	21	6.719053G	N/A			
	21	13.859527G	N/A			
23GHz to 26.5GHz	24.4	25.242841G	N/A			
	24.4	5.783935G	N/A			
	24.4	11.98929G	N/A			
	24.4	18.194645G	N/A			

(12) Frequency Counter Marker Accuracy

Center Frequency (Hz)	Span	Specification			Result
		Min (GHz)	Measured Value (dBc/Hz)	Max (dBc/Hz)	Pass/Fail
2GHz	1MHz	1.999999794		2.000000206	
5GHz	1MHz	4.999999494		5.000000506	
11GHz	1MHz	10.999998889		11.000001111	
18GHz	1MHz	17.999998184		18.000001816	

(13) Second Harmonic Distortion

Frequency Range	Test Data		Specification			Result
	Fundamental	Second Harmonic	Min (dBc)	Measured Value	Max (dBc)	Pass/Fail
10MHz to 1.8GHz	1.5GHz	3.0GHz	N/A		-70	
> 1.6GHz	1.9GHz	3.8GHz	N/A		-100	

(14) Frequency Response

- Frequency Range 100Hz to 3.5GHz

Frequency Range	Test Data (MHz)	Specification			Result
		Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
100Hz to 3.5GHz	100	- 5.0		+5.0	
	200	- 5.0		+5.0	
	300	- 5.0		+5.0	
	400	- 5.0		+5.0	
	500	- 5.0		+5.0	
	600	- 5.0		+5.0	
	700	- 5.0		+5.0	
	800	- 5.0		+5.0	
	900	- 5.0		+5.0	
	1000	- 5.0		+5.0	
	1100	- 5.0		+5.0	
	1200	- 5.0		+5.0	
	1300	- 5.0		+5.0	
	1400	- 5.0		+5.0	
	1500	- 5.0		+5.0	
	1600	- 5.0		+5.0	
	1700	- 5.0		+5.0	
	1800	- 5.0		+5.0	
	1900	- 5.0		+5.0	
	2000	- 5.0		+5.0	
	2100	- 5.0		+5.0	
	2200	- 5.0		+5.0	
	2300	- 5.0		+5.0	
	2400	- 5.0		+5.0	
	2500	- 5.0		+5.0	

3.4.2 Performance Verification Record Sheet for R3273

Frequency Range	Test Data (MHz)	Specification			Result
		Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
100Hz to 3.5GHz	2600	- 5.0		+5.0	
	2700	- 5.0		+5.0	
	2800	- 5.0		+5.0	
	2900	- 5.0		+5.0	
	3000	- 5.0		+5.0	
	3100	- 5.0		+5.0	
	3200	- 5.0		+5.0	
	3300	- 5.0		+5.0	
	3400	- 5.0		+5.0	
	3500	- 5.0		+5.0	
In Band Falatness:100Hz to 3.5GHz		N/A		3.0dBp-p	
In Band Flatness:50MHz to 2.6GHz		N/A		2.0dBp-p	

- Frequency Range 3.5GHz to 7.5GHz

Frequency Range	Test Data (MHz)	Specification			Result
		Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
3.5GHz to 7.5GHz	3.5	- 5.0		+5.0	
	3.6	- 5.0		+5.0	
	3.7	- 5.0		+5.0	
	3.8	- 5.0		+5.0	
	3.9	- 5.0		+5.0	
	4.0	- 5.0		+5.0	
	4.1	- 5.0		+5.0	
	4.2	- 5.0		+5.0	
	4.3	- 5.0		+5.0	
	4.4	- 5.0		+5.0	
	4.5	- 5.0		+5.0	
	4.6	- 5.0		+5.0	
	4.7	- 5.0		+5.0	
	4.8	- 5.0		+5.0	
	4.9	- 5.0		+5.0	
	5.0	- 5.0		+5.0	
	5.1	- 5.0		+5.0	
	5.2	- 5.0		+5.0	
	5.3	- 5.0		+5.0	
	5.4	- 5.0		+5.0	
	5.6	- 5.0		+5.0	
	5.7	- 5.0		+5.0	
	5.8	- 5.0		+5.0	
	5.9	- 5.0		+5.0	
	6.0	- 5.0		+5.0	
	6.1	- 5.0		+5.0	

3.4.2 Performance Verification Record Sheet for R3273

Frequency Range	Test Data (MHz)	Specification			Result
		Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
3.5GHz to 7.5GHz	6.2	- 5.0		+5.0	
	6.3	- 5.0		+5.0	
	6.4	- 5.0		+5.0	
	6.5	- 5.0		+5.0	
	6.6	- 5.0		+5.0	
	6.7	- 5.0		+5.0	
	6.8	- 5.0		+5.0	
	6.9	- 5.0		+5.0	
	7.0	- 5.0		+5.0	
	7.1	- 5.0		+5.0	
	7.2	- 5.0		+5.0	
	7.3	- 5.0		+5.0	
	7.4	- 5.0		+5.0	
	7.5	- 5.0		+5.0	
In Band Flatness: 3.5GHz to 7.5GHz		N/A		3.0dBp-p	

- Frequency Range 7.4GHz to 15.4GHz

Frequency Range	Test Data (MHz)	Specification			Result
		Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
7.4GHz to 15.4GHz	7.5	- 5.0		+5.0	
	7.7	- 5.0		+5.0	
	7.9	- 5.0		+5.0	
	8.1	- 5.0		+5.0	
	8.3	- 5.0		+5.0	
	8.5	- 5.0		+5.0	
	8.7	- 5.0		+5.0	
	8.9	- 5.0		+5.0	
	9.1	- 5.0		+5.0	
	9.3	- 5.0		+5.0	
	9.5	- 5.0		+5.0	
	9.7	- 5.0		+5.0	
	9.9	- 5.0		+5.0	
	10.1	- 5.0		+5.0	
	10.3	- 5.0		+5.0	
	10.5	- 5.0		+5.0	
	10.7	- 5.0		+5.0	
	10.9	- 5.0		+5.0	
	11.1	- 5.0		+5.0	
	11.3	- 5.0		+5.0	
	11.5	- 5.0		+5.0	
	11.7	- 5.0		+5.0	
	11.9	- 5.0		+5.0	
	12.1	- 5.0		+5.0	
	12.3	- 5.0		+5.0	
	12.5	- 5.0		+5.0	

3.4.2 Performance Verification Record Sheet for R3273

Frequency Range	Test Data (MHz)	Specification			Result
		Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
7.4GHz to 15.4GHz	12.7	- 5.0		+5.0	
	12.9	- 5.0		+5.0	
	13.1	- 5.0		+5.0	
	13.3	- 5.0		+5.0	
	13.5	- 5.0		+5.0	
	13.7	- 5.0		+5.0	
	13.9	- 5.0		+5.0	
	14.1	- 5.0		+5.0	
	14.3	- 5.0		+5.0	
	14.5	- 5.0		+5.0	
	14.7	- 5.0		+5.0	
	14.9	- 5.0		+5.0	
	15.1	- 5.0		+5.0	
	15.3	- 5.0		+5.0	
In Band Flatness: 7.4GHz to 15.4GHz		N/A		7.0dBp-p	

- Frequency Range 7.4GHz to 15.4GHz

Frequency Range	Test Data (MHz)	Specification			Result
		Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
7.4GHz to 15.4GHz	15.4	- 5.0		+5.0	
	15.6	- 5.0		+5.0	
	15.8	- 5.0		+5.0	
	16.0	- 5.0		+5.0	
	16.2	- 5.0		+5.0	
	16.4	- 5.0		+5.0	
	16.6	- 5.0		+5.0	
	16.8	- 5.0		+5.0	
	17.0	- 5.0		+5.0	
	17.2	- 5.0		+5.0	
	17.4	- 5.0		+5.0	
	17.6	- 5.0		+5.0	
	17.8	- 5.0		+5.0	
	18.0	- 5.0		+5.0	
	18.2	- 5.0		+5.0	
	18.4	- 5.0		+5.0	
	18.6	- 5.0		+5.0	
	18.8	- 5.0		+5.0	
	19.0	- 5.0		+5.0	
	19.2	- 5.0		+5.0	
	19.4	- 5.0		+5.0	
	19.6	- 5.0		+5.0	
	19.8	- 5.0		+5.0	
	20.0	- 5.0		+5.0	
	20.2	- 5.0		+5.0	
	20.4	- 5.0		+5.0	

3.4.2 Performance Verification Record Sheet for R3273

Frequency Range	Test Data (MHz)	Specification			Result
		Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
7.4GHz to 15.4GHz	20.6	- 5.0		+5.0	
	20.8	- 5.0		+5.0	
	21.0	- 5.0		+5.0	
	21.2	- 5.0		+5.0	
	21.4	- 5.0		+5.0	
	21.6	- 5.0		+5.0	
	21.8	- 5.0		+5.0	
	22.0	- 5.0		+5.0	
	22.2	- 5.0		+5.0	
	22.4	- 5.0		+5.0	
	22.6	- 5.0		+5.0	
	22.8	- 5.0		+5.0	
	23.0	- 5.0		+5.0	
	23.2	- 5.0		+5.0	
	23.4	- 5.0		+5.0	
	23.6	- 5.0		+5.0	
	23.8	- 5.0		+5.0	
	24.0	- 5.0		+5.0	
	24.2	- 5.0		+5.0	
	24.4	- 5.0		+5.0	
	24.6	- 5.0		+5.0	
	24.8	- 5.0		+5.0	
	25.0	- 5.0		+5.0	
	25.2	- 5.0		+5.0	
	25.4	- 5.0		+5.0	
	25.6	- 5.0		+5.0	
	25.8	- 5.0		+5.0	

Frequency Range	Test Data (MHz)	Specification			Result
		Min (dB)	Measured Value (dB)	Max (dB)	Pass/Fail
7.4GHz to 15.4GHz	26.0	- 5.0		+5.0	
	26.2	- 5.0		+5.0	
	26.4	- 5.0		+5.0	
In Band Flatness: 15.4GHz to 26.4GHz		N/A		8.0dBp-p	

(15) Frequency Span Accuracy

Setting		Test Data (Hz)	Specification			Result
Center Frequency (GHz)	Span (Hz)		Min (Hz)	Measured Value (Hz)	Max (Hz)	Pass/Fail
2	20k	16.00k	15.84k		16.16k	
2	50k	40.00k	39.6k		40.4k	
2	400k	320.0k	316.8k		323.2k	
2	2M	1.600M	1.584M		1.616M	
2	5M	4.00M	3.96M		4.04M	
2	10M	8.00M	7.92M		8.08M	
2	20M	16.00M	15.84M		16.16M	
2	50M	40.0M	39.6M		40.4M	
2	100M	80.0M	79.2M		80.8M	
2	200M	160.0M	158.4M		161.6M	
2	500M	400M	396M		404M	
2	1G	800M	792M		808M	
2	2G	1.6000G	1.584G		1.616G	
4.5	4G	3.200G	3.168G		3.232G	
4.5	8G	6.400G	6.336G		6.464G	
10	10M	8.00M	7.92M		8.08M	
10	100M	80.0M	79.2M		80.8M	
10	1G	800G	792M		808M	

3.4.2 Performance Verification Record Sheet for R3273

Setting		Test Data (Hz)	Specification			Result
Center Frequency (GHz)	Span (Hz)		Min (Hz)	Measured Value (Hz)	Max (Hz)	Pass/Fail
10	2G	1.600G	1.584G		1.616G	
17	10M	8.00M	7.92M		8.08M	
17	100M	80.0M	79.2M		80.8M	
17	1G	800M	792M		808M	
17	2G	1.600G	1.584G		1.616G	
10	5G	4.000G	3.96G		4.04G	
10	10G	8.000G	7.92G		8.08G	
10	19G	15.200G	15.048G		15.352G	

(16) Third Order Intermodulation Distortion

Test Data	Specification			Result
Center Frequency (MHz)	Min.(dBc)	Measured Value(dBc)	Max.(dBc)	Pass/Fail
20.5	N/A		-50	
105	N/A		-60	
1500	N/A		-65	
2000	N/A		-70	
3600	N/A		-70	

(17) Gain Compression

Test Data			Specification			Result
Setting of SG1 (MHz)	Setting of SG2 (MHz)	Center Frequency (MHz)	Min (dBm)	Measured Value (dBm)	Max (dBm)	Pass/Fail
10	11	10.5	-3		N/A	
200	201	200.5	0		N/A	
3600	2601	3600.5	0		N/A	

Test Data			Specification			Result
Setting of SG1 (MHz)	Setting of SG2 (MHz)	Center Frequency (MHz)	Min (dBm)	Measured Value (dBm)	Max (dBm)	Pass/Fail
7600	7601	7600.5	-3		N/A	

(18) Sweep Time Accuracy

Sweep Time Setting (s)	Test Data (s)	Specification			Result
		Min (s)	Measured Value (s)	Max (s)	Pass/Fail
1µ	0.909µ	0.882µ		0.936µ	
2µ	1.81µ	1.77µ		1.87µ	
5µ	4.54µ	4.41µ		4.68µ	
10µ	9.09µ	8.82µ		9.36µ	
20µ	18.1µ	17.7µ		18.7µ	
50µ	45.4µ	44.1µ		46.8µ	
100µ	90.9µ	88.2µ		93.6µ	
200µ	181µ	177µ		187µ	
500µ	454µ	441µ		468µ	
1m	909µ	882µ		936µ	
2m	1.81m	1.77m		1.87m	
5m	4.54m	4.41m		4.68m	
10m	9.09m	8.82m		9.36m	
20m	18.1m	17.7m		18.7m	
50m	45.4m	44.1m		46.8m	
100m	90.9m	88.2m		93.6m	
200m	181m	177m		187m	
500m	454m	441m		468m	
1	909m	882m		936m	
2	1.81	1.77		1.87	
5	4.54	4.41		4.68	

3.4.2 Performance Verification Record Sheet for R3273

Sweep Time Setting (s)	Test Data (s)	Specification			Result
		Min (s)	Measured Value (s)	Max (s)	Pass/Fail
10	9.09	8.82		9.36	
20	18.1	17.7		18.7	
50	45.4	44.1		46.8	
100	90.9	88.2		93.6	

(19) Residual response

Test Data	Specification			Result
Frequency Range	Min (dBm)	Measured Data (dBm)	Max (dBm)	Pass/Fail
100Hz to 3.5 GHz	N/A		-100	
3.5GHz to 7.5 GHz	N/A		-90	

3.4.3 Performance Verification Record Sheet for W-CDMA Measurement

No.	Measurement Mode	Input	Test Item	Specification			Result
				Min.	Measured Value	Max.	Pass/Fail
1	BTS	RF	Carrier Frequency Accuracy	-90 Hz		+90 Hz	
			Waveform Quality Accuracy	0.998		N/A	
			Modulation Accuracy	N/A		3 %	
			Code Domain Power Accuracy				
			Short Code No.=0	-11.54 dB		-11.34 dB	
			Short Code No.=1	-8.54 dB		-8.34 dB	
			Short Code No.=14	-8.54 dB		-8.34 dB	
			Short Code No.=24	-8.54 dB		-8.34 dB	
2	MS	RF	Carrier Frequency Accuracy	-90 Hz		90 Hz	
			Waveform Quality Accuracy	0.999		N/A	
			Modulation Accuracy	N/A		3 %	
3	QPSK	RF	Carrier Frequency Accuracy	-90 Hz		+90 Hz	
			Waveform Quality Accuracy	0.999		N/A	
			Modulation Accuracy	N/A		3 %	
4	BTS	IQ	Modulation Accuracy	N/A		3 %	
5	MS	IQ	Modulation Accuracy	N/A		3 %	
6	QPSK	IQ	Modulation Accuracy	N/A		3 %	

3.4.4 Performance Check Record Sheet for W-CDMA

No.	Items	Specification			Result
		Min.	Measured Value	Max.	Pass/Fail
1	Carrier frequency Accuracy	-90 Hz		+ 90 Hz	
2	Waveform Quality Accuracy	0.999		N/A	
3	Modulation Accuracy	N/A		3 %	

4 ADJUSTMENT

This chapter provides following adjustment procedure.

4.1 Internal Frequency Adjustment Procedure

This section provides adjustment procedure of internal frequency reference.

(1) Description

Adjust internal frequency reference oscillator to meet the specification.
This parameter specifies frequency measurement accuracy.

(2) Specification

± 3 x 10exp-8
± 5 x 10exp-9 (Option 21 installed)

(3) Equipment Used

Frequency Differential Meter: FDM
Frequency Standard: Freq.STD

(4) Setup

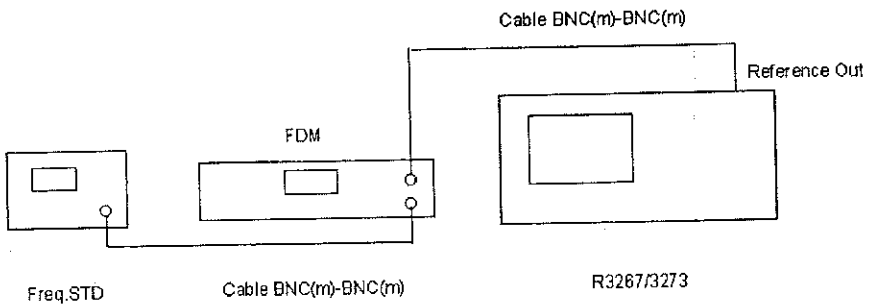


Figure 4-1 Internal Frequency Reference Adjustment Setup

(5) Procedure

1. Connect the equipment as shown in Figure 4-1.
2. Set the frequency differential meter in 10 exp. -8 range.
   (Option 21 installed, set frequency differential meter in 10 exp. -9 range)
3. On the R3267/3273, press as follows to enter internal frequency reference adjust mode.

   SHIFT, 7(CAL), ***more 1/2*** and ***Cal 10MHz Ref***
4. Adjust data using Coarse and Fine keys to meet the specifications.

5. After adjust data, press the store key for saving data.

5 TROUBLESHOOTING

This chapter provides following information,
5.1 Preventive Maintenance
5.2 Preparation
5.3 Diagnostic Procedures
5.4 Replacement Procedures

5.1 Preventive Maintenance

This section provides cleaning procedure of display(TFT) filter.
Cleaning the outer surface of the filter is sufficient.
If after cleaning the outer surface of the filter, the display appears dark or dirty or unfocused, clean the inner surface of display filter and the surface of TFT following procedures.

1. Remove the 2pcs of screws, referring Figure 5-1.

2. Remove the display bezel assembly by pulling out the end that is pivoting it around its left edge until released using thin, flat screwdriver or tweezers by inserting to the hole of screws.

3. Clean the inner surface of display filter and the surface of TFT with a soft cloth dampened water with mild soap.
   Never use any chemical solvent such as benzene, toluene, xylene, aceton for cleaning.

4. Allow the surface to dry and then reassemble the display bezel.

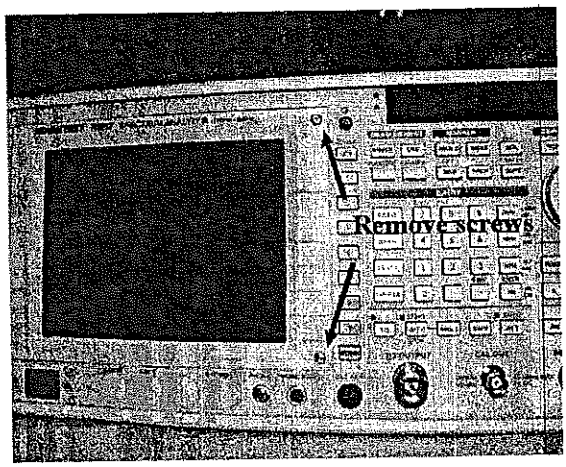


Figure 5-1 Location of Screws Display Bezel Fixed

5.2 Preparation

5.2.1 Introduction

This section provides general information for handling replaceable assemblies.

WARNING	***Only personnel with knowledge of electronic circuitry and awareness with hazards involved should remove and install any printed circuit board assemblies.***

CAUTION	***To prevent equipment circuit damage, always remove the ac line power cord before removing or replacing any assembly.*** ***To prevent static zap of ICs, always observe anti-static techniques when assemblies are handled or serviced.***

5.2.2 General Caution For Handling Replaceable Assemblies (Block)

(1) Static Handling

Static electricity is familiar phenomenon which, except for an occasional Shock, does not seems very serious. However, it has been proven that in the electronics industry electrostatic discharge (ESD) is major cause of component failure. In many cases, the component damaged may not immediately fail, causing low instrument reliability and future repair. ESD damage can occur at static level below human perception. It has also been shown that ESD can affect both passive and active devices.

The following guidelines are the minimum requirements for a static safe service environment.

- The workbench should be equipped with a conductive tablemat. The mat should be grounded to the earth ground through a 1M-ohm resistor. The mat should be equipped with at least one swivel connector for connecting wrist strap.
- All service and handling personnel should wear a conductive wrist strap in contact with bare skin. This strap should be connected to the swivel connector on the conductive tablemat through a 1M ohm resistor.
- All the metal equipment at workstation must be grounded. This includes soldering irons, soldering removers, and equipment stand.
- Only one common ground should be provided at the workstation.
- The workstation should be kept free of nonconductors. No common plastics, polybags, cardboard, cigarette or candy wrappers should be allowed. There should not be rugs or carpet on the floor, shelving, or bench top.
- Only proper containers should be used for shipping, storing or transporting assemblies. This is required on any assembly shipped to ADVANTEST for repair.

(2) Clean Handling

Due to the high performance of the R3267/3273, use the following clean handling techniques when removing and installing assemblies.

- Handle the assemblies only by their edges.
  Be sure to place them on clean workbench away from dirty or dusty conditions.

5.3 Diagnostic Procedures

To isolate failure block for troubleshooting, it uses information of error message displayed and self test function.
Repair will be done as assembly after determines failure block or module by these informations.
This section provides those information and summarized correspondence between the information and failure board or module for assembly level troubleshooting.

5.3.1 Error Code

R3267 and R3273 check some functional circuit, when it power on and during operation.
Once detect errors, display error message on the display.
Table 5-1 lists error codes, message and action to be taken excluding
operation error.
Take a appropriate action to solve the error.

Table 5-1 Error Code List

Error Code	Message	Action to be taken
28	No Cal signal detected	Perform CAL OUT Level check refere to P.V in Section3-2 CAL Out level Accuracy. If no signal observe replace the RF block.
400	Input ATT Cal failed.	Confirm failure by self test function
401	If Step AMP Cal failed.	Confirm failure by self test function
402	Log Linearity Cal failed.	Confirm failure by self test function
403	Total Gain Cal failed.	Confirm failure by self test function
404	RBW Switching Cal failed.	Confirm failure by self test function
405	Amplitude MAG Cal failed.	Confirm failure by self test function
409	Normanl ADC Cal failed.	Confirm failure by self test function
700	System Error. Cannot allocate the required memory	Replace MOD(Option01) Block
701	System Error. Clock is not operational.	Replace MOD(Option 01) Block
750	HandShake error. Contact qualified engineer.	Replace MOD(Option 01) Block
751	Cannot Detect Mod. DSP board. Contact qualified engineer.	Replace MOD(Option 01) Block

5.3.2 Self test Function.

R3267 and 3273 has self test function to isolate failure as block level.
This section provides information of self test function including operation procedures and correspondence between the result and defective block.
The result displays Pass or Fail.
Once determine defective block, take a removal and installation procedures, which describes in section 5-4 to fix the failure.

(1) Operation Procedures.

1. Connect CAL OUT and INPUT using adapter N(m)-BNC(f) and BNC(m)-BNC(m) cable.

2. Press key as follows to enter self test function.

   CONFIG, ***more1/2*** and Self test

   Then self test function displays as shown in Figure 5-2.

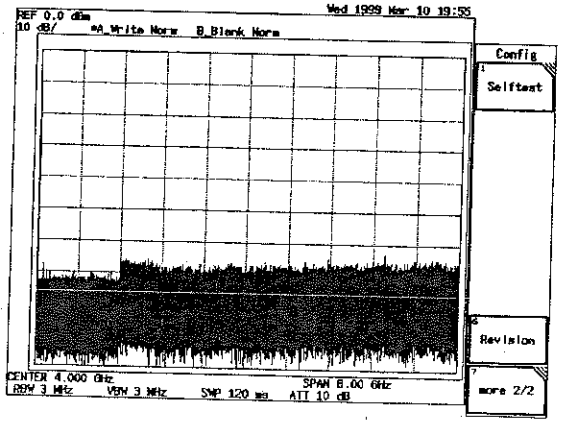


Figure 5-2 Display of Self Test Function.

3. Press ***Execute Self Test*** to execute self test function.

4. The result display is shown in Figure 5-3

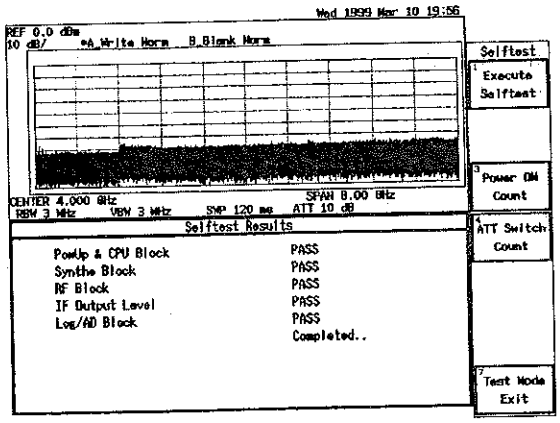


Figure 5-3 Result Display of Self Test Function.

5. To exit self test function, press ***Test Mode Exit***.

(2) Correspondence between the result and defective block.

Table 5-2 lists block tested correspondence between result of fail and defective block. Once determined defective block, take removal and installation procedures, which describes in 5.4 Replacement Procedures.

Table 5-2 Correspondence between Result of Self Test and Defective Block

Disply	Block Tested	Defective Block	Action to be taken	Part Code
PowerUp&CPU Block	CPU Block	CPU Block	Replace CPU Block	BLM-024386
Synthe Block	SYNTE Block	SYNTHE Block	Replace SYN-THE Block	BLM-023098
RF Block	RF Block	RF Block	Replace RF Block	WUN-3267RF for R3267
RF Block	RF Block	RF Block	Replace RF Block	WUN-3273RF for R3273
IF Output Level	IF Block	IF Block	Replace IF Block	BLM-023097
Log/AD Block	Log/AD Block	Log/AD Block	Replace Log/ AD Block	BLM-023096

5.4 Replacement Procedures

Once determined defective block, take following procedures to replace defective block to new one.

5.4.1 Tools Required

Following tools are required for a block removal and installation.

- M4 mm Phillips screw driver x 1pc
- 2 mm hexagon key
- M4 mm Hexagonal box driver

5.4.2 RF Block Removal/Installation Procedures

1. Remove all the connection cables from R3267/3273
2. Stand R3267/3273 on the soft cushion face to down refers to Figure 5-4.
3. Remove 6pcs of screws, and then pull main case off to up side.

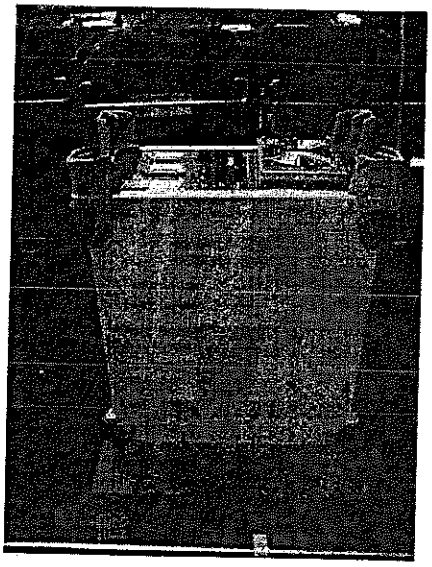


Figure 5-4 Removal of Main Case

4. Remove front frame to remove 4pcs hexagonal head screws on both of right and left sides, referring Figure 5-5.

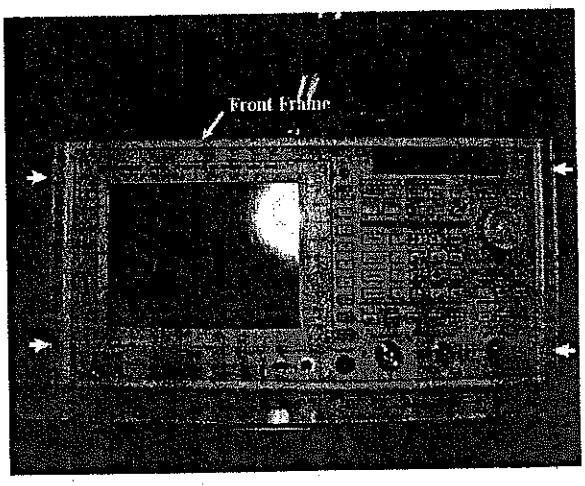


Figure 5-5 Location of Screws

5. Remove front panel to remove 12pcs screws referring Figure 5-6 of the location.

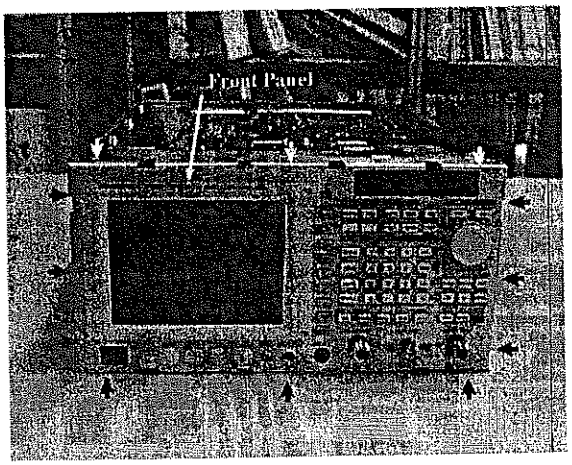


Figure 5-6 Location of Screws

6. Remove board stopper on the side of R3267/3273 to remove cables for RF block, referring Figure 5-7.

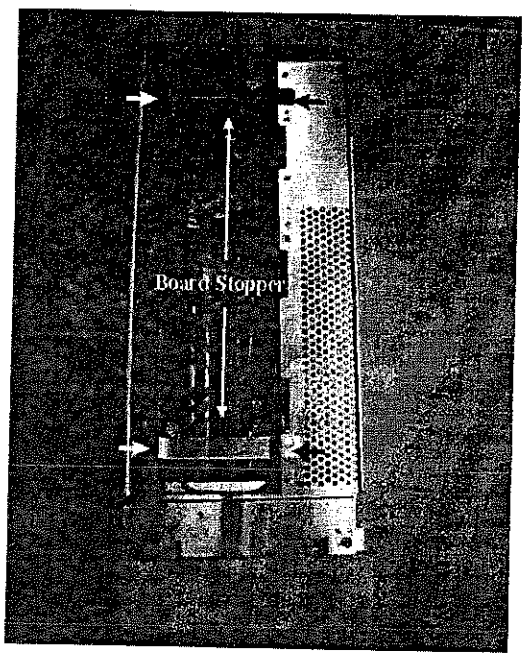


Figure 5-7 Location of Board Stopper

7. After remove cables for RF block, remove 10pcs hexagonal nuts and 8pcs screws, referring Figure 5-8 and Figure 5-9.

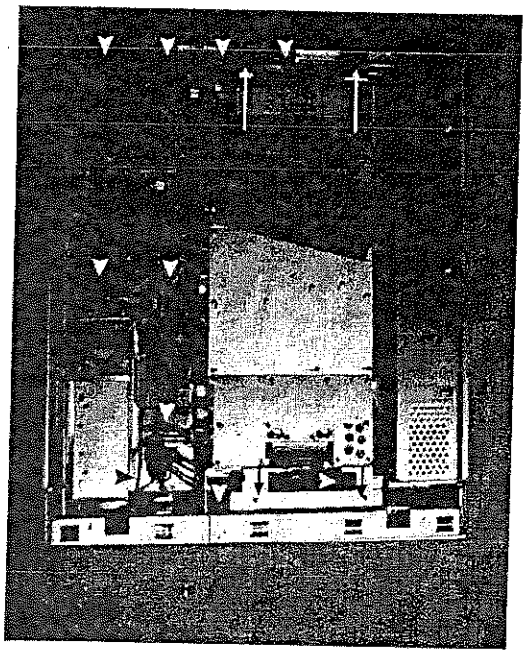


Figure 5-8 Location of Screws

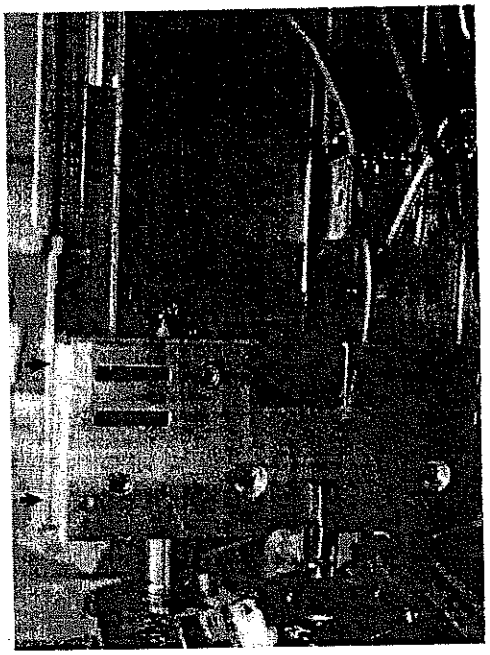


Figure 5-9 Location of Screws

8. After remove screws fixed RF block, push RF block left side to remove from connector on the mother board. Then lift RF block up, referring Figure 5-10.

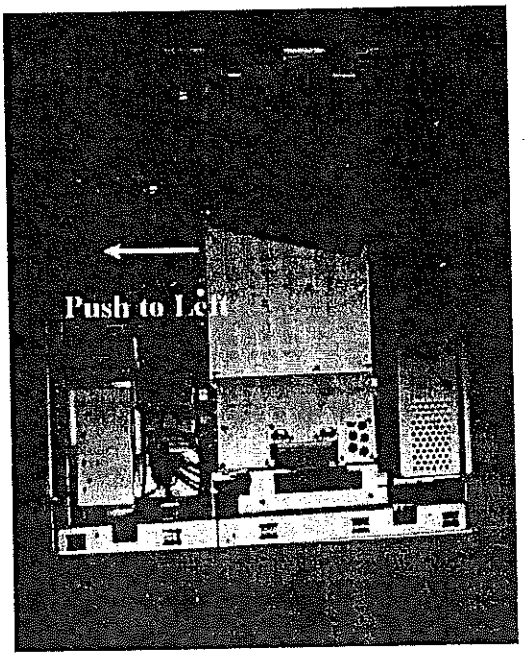


Figure 5-10 Removal of RF Block.

9. Replace defective block to new one, then take reverse procedures to fix RF block back.

5.4.3 IF Block, LOG/AD Block, SYNTHESIZER Block and Digital Modulation Analysis Block Removal/Installation Procedures

1. Remove main case to take the procedures described in section 5.4.2 steps 1. through 3.
2. Remove boards stopper, referring Figure 5-11.
3. Each board location is shown Figure 5-11.
4. Replace defective block to new one.
5. Take reverse procedures to fix back.

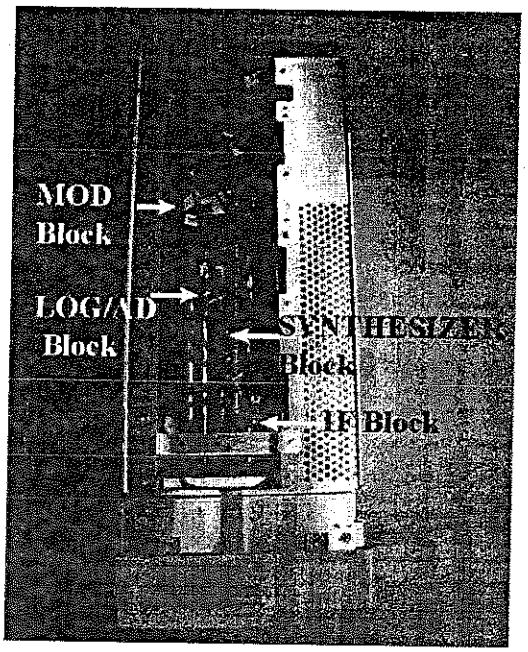


Figure 5-11 Location of the Blocks

5.4.4 Power Supply Block Removal/Installation Procedures

1. Remove main case to take the procedures described in section 5.4.2 steps 1. through 3.
2. Remove 2pcs screws on the rear panel, referring Figure 5-12.

Figure 5-12 Location of Screws

3. Remove 6pcs screws on the top and bottom sides, referring Figure 5-13.

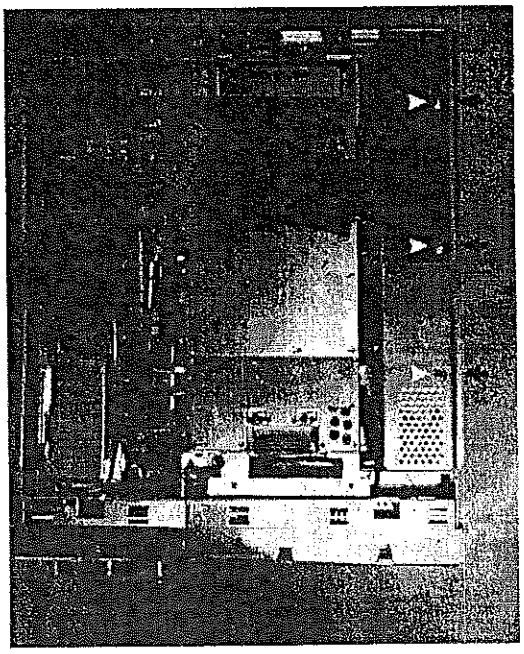


Figure 5-13 Location of Screws

4. Remove connectors of output distribution cables, referring Figure 5-14.

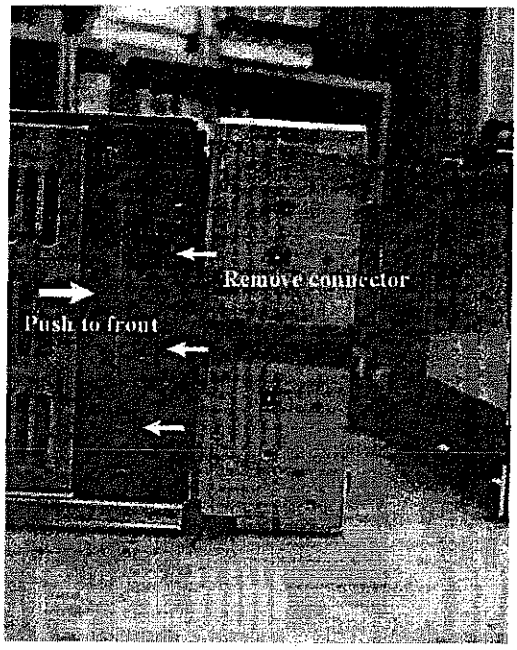


Figure 5-14 Location of Connectors

5. After remove screws and connectors, push power supply block toward to front panel to remove.

6. Replace defective block to new one, then take reverse procedures to fix back.

5.4.5 CPU Block Removal/Installation Procedures

1. Remove main case to take procedures described in section 5.4.2 steps 1. through 3.

2. Remove 4pcs screws to remove rear panel block., referring Figure 5-15.

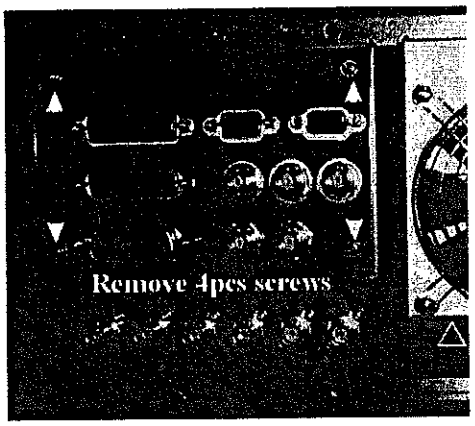


Figure 5-15 Location of Screws

3. Remove 4pcs of RF connectors,2pcs of flat cables and 13pcs screws, referring Figure 5-16.

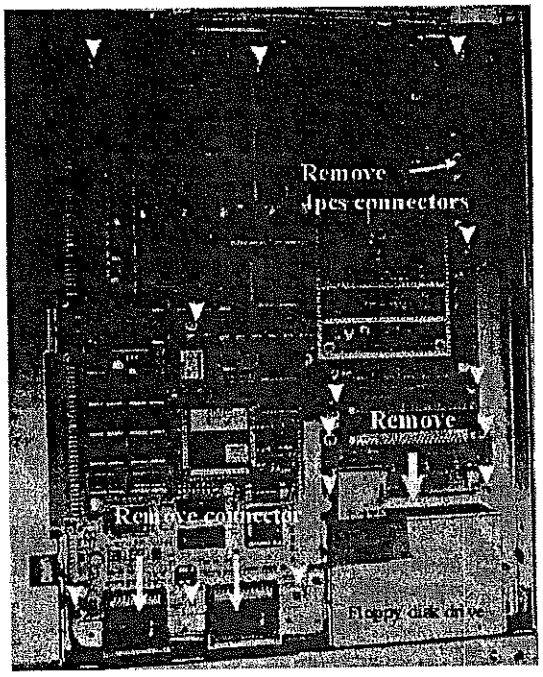


Figure 5-16 Location of Connectors and Screws

4. Replace defective block to new one, then take reverse procedures to fix back.

5.4.6 Floppy Disk Drive Removal/Installation Procedures.

1. Remove main case, front frame and front panel to take procedures described in section 5.4.2 steps 1. through 5.

2. Remove 4pcs screws, referring Figure 5-17.

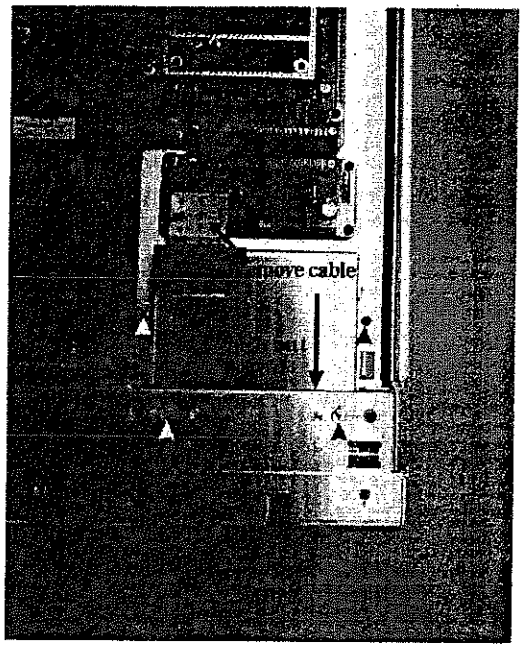


Figure 5-17 Location of Screws

3. After remove screws and cable, push floppy disk drive toward to front for removal.

4. Replace defective unit to new one, then take reverse procedures to fix back.

5.4.7 TFT Display unit Removal/Installation Procedures

1. Remove main case, front frame and front panel to take procedures described in section 5.4.2 steps 1. through 5.

2. After remove front panel, remove 2pcs screws on the front and 2pcs screws on the side, referring Figure 5-18 and Figure 5-19.

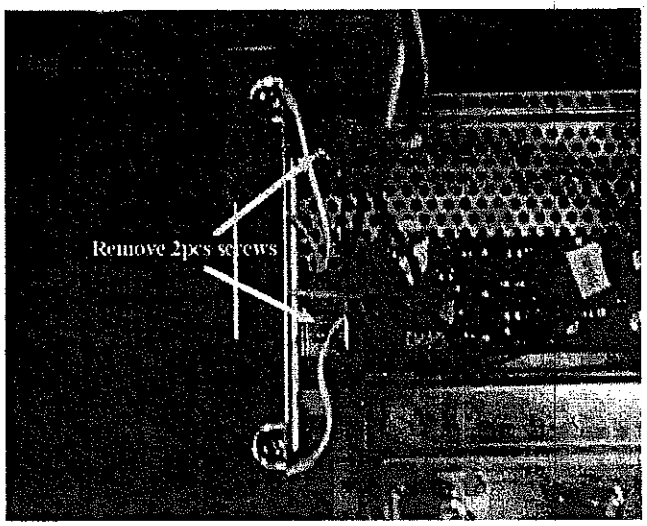


Figure 5-18 Location of Screws

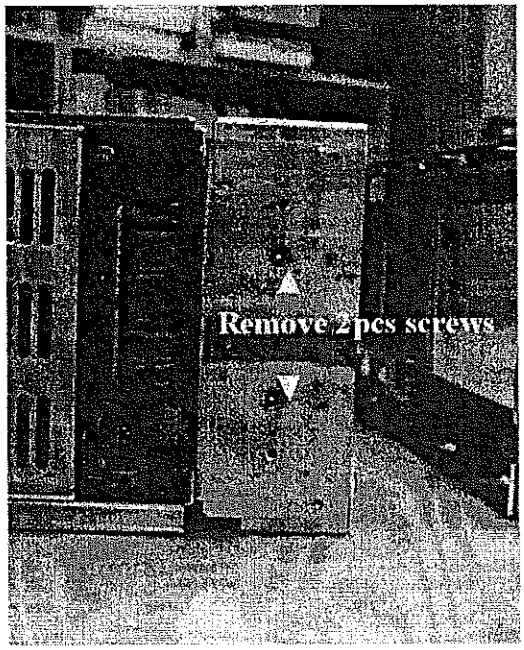


Figure 5-19 Location of Screws

3. After remove TFT display unit, remove connectors for back light of TFT, referring Figure 5-20.

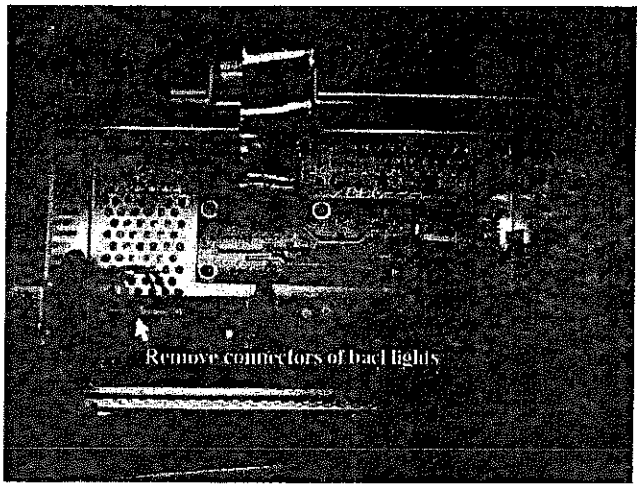


Figure 5-20 Location of Connectors

4. Remove 4pcs screws, referring Figure 5-21.

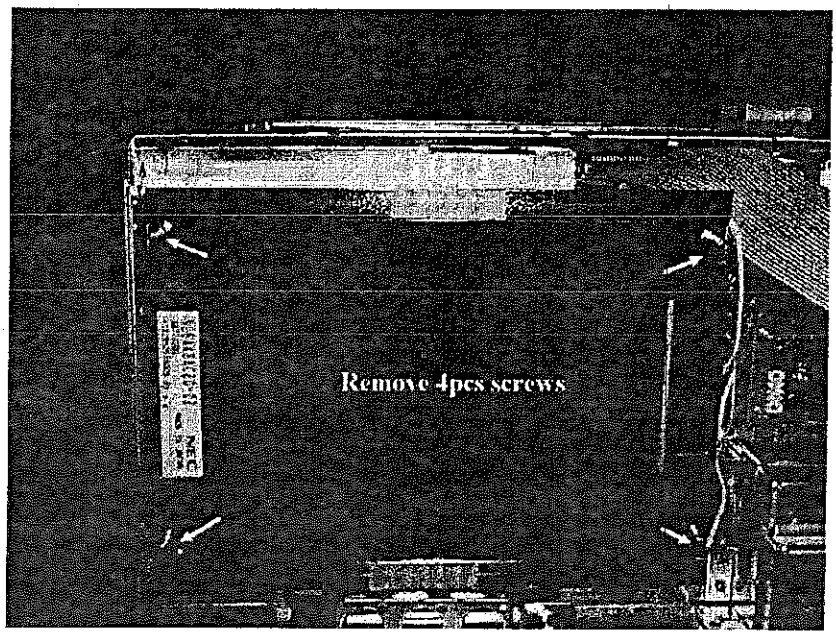


Figure 5-21 Location of Screws

6 REPLACEABLE PARTS LIST

6.1 Introduction

This chapter provides information for ordering replaceable parts.

6.2 Ordering Information

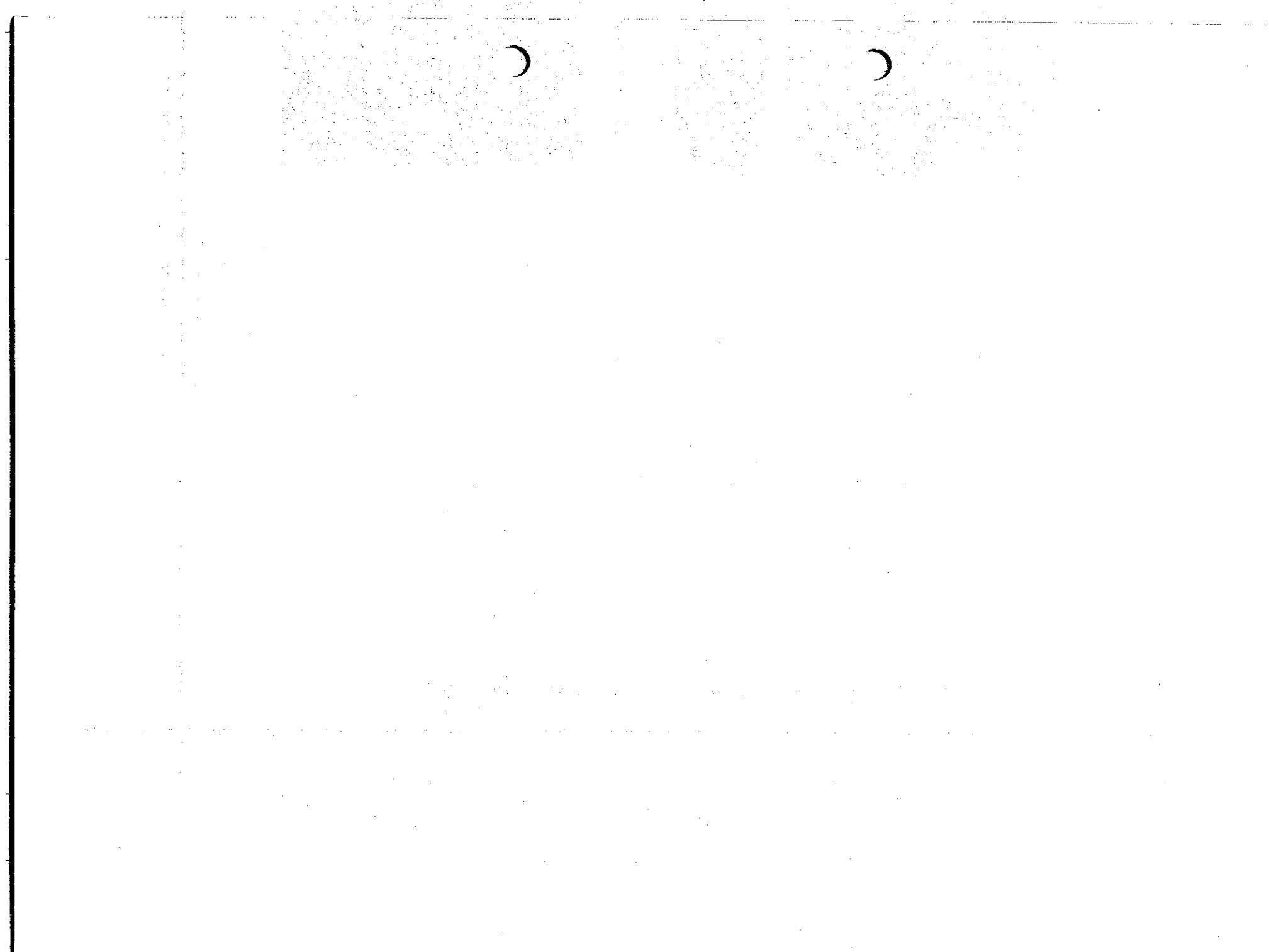
To order a part listed in the replaceable parts list, quote Advantest part number, indicate the description, quantity required, including your Model Number and serial number.
Then address the order to the nearest Advantest office or representatives of Advantest in your region.
The office are listed in back of this manual.

6.3 Replaceable Parts List

The replaceable parts is listed in Table 6-1.
All the parts is for assemble replace without no adjustment.

Table 6-1 Replaceable Parts List

For R3267			For R3273		
No.	Description	Part Code	No.	Description	Part Code
1	SYNTHESIZER Block	BLM-023098	1	SYNTHESIZER Block	BLM-023098
2	IF Block	BLM-020397	2	IF Block	BLM-023097
3	LOG/AD Block	BLM-023096	3	LOG/AD Block	BLM-023096
4	CPU Block	BLM-024386	4	CPU Block	BLM-024386
5	RF Unit	WUN-3267RF	5	RF Unit	WUN-3273RF
6	Power Supply unit	WBL-3267PS	6	Power Supply unit	WBL-3267PS
7	Modulation Block	BLM-024476	7	Modulation Block	BLM-024476
8	Floppy Disk Drive	AAA-05HG5661-1	8	Floppy Disk Drive	AAA-05HG5661-1
9	TFT Display	NLC-000295-1	9	TFT Display	NLC-000295-1
10	Front Frame	MME-H5360A001A-1	10	Front Frame	MME-H5360A001A-1
11	Bezel	MME-6768A002A-2	11	Bezel	MME-F6768A003A-2



WARRANTY

ADVANTEST product is warranted against defects in material and workmanship for a period of one year from the date of delivery to original buyer.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by buyer, unauthorized modification or misuse, accident or abnormal conditions of operations.

No other warranty is expressed or implied. ADVANTEST specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

ADVANTEST shall not be liable for any special incidental or consequential damages, whether in contract, tort or otherwise.

Any and all warranties are revoked if the product is removed from the country in which it was originally purchased.

SERVICE

During the warranty period, ADVANTEST will, at its option, either repair or replace products which prove to be defective.

When trouble occurs, buyer should contact his local supplier or ADVANTEST giving full details of the problem and the model name and serial number.

For the products returned to ADVANTEST for warranty service, buyer shall prepay shipping and transportation charges to ADVANTEST and ADVANTEST shall pay shipping and transportation charges to return the product to buyer. However, buyer shall pay all charges, duties, and taxes incurred in his country for products returned from ADVANTEST.

CLAIM FOR DAMAGE IN SHIPMENT TO ORIGINAL BUYER

The product should be thoroughly inspected immediately upon original delivery to buyer. All material in the container should be checked against the enclosed packing list or the instruction manual alternatively. ADVANTEST will not be responsible for shortage unless notified immediately.

If the product is damaged in any way, a claim should be filed by the buyer with carrier immediately. (To obtain a quotation to repair shipment damage, contact ADVANTEST or the local supplier.) Final claim and negotiations with the carrier must be completed by buyer.

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