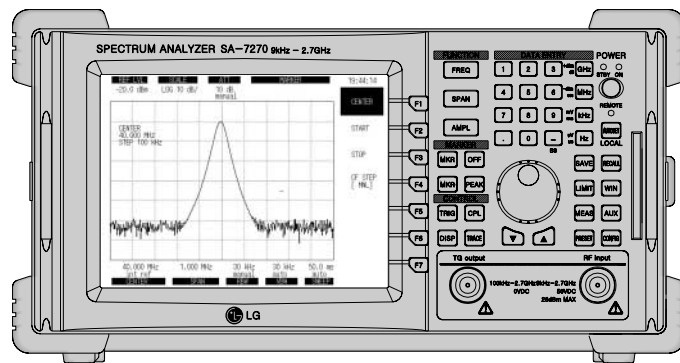




SA-7270

Spectrum Analyzer
9KHz-2.7GHz



 **LG이노텍주식회사**

SA-7270

1



가



:
(WARNING)

가

:
(CAUTION)

가

: ()
(GND)



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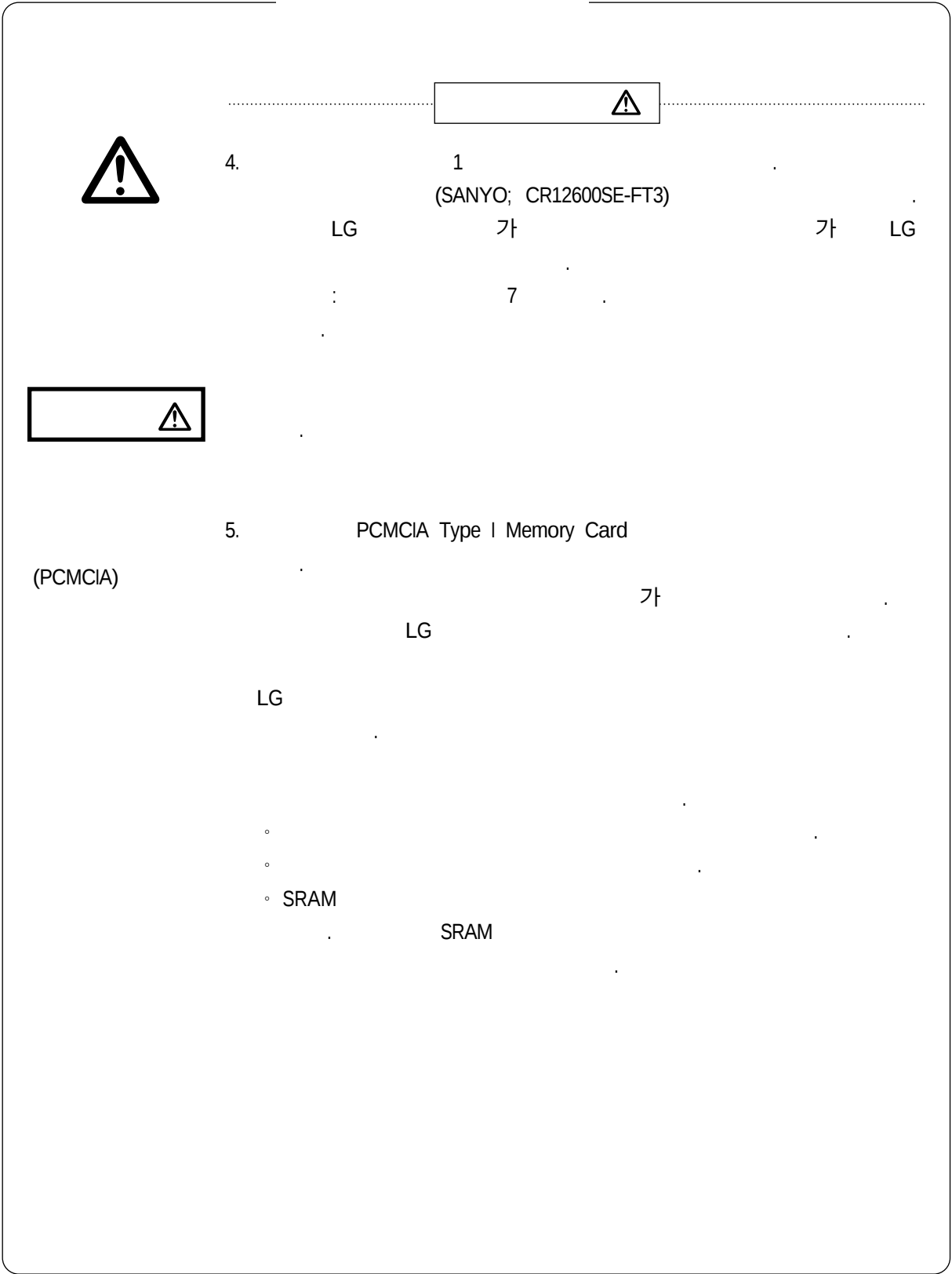
RF	50VDC
TG	0VDC

TG 0VDC

RF +26dBm
가 +26dBm 50VDC RF

가 : +26dBm , 50VDC RF







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sweep time 1,000 ,
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Detection

(500)

detector

Detector

- ° POS PEAK
- ° SAMPLE AVERAGE
- ° NORMAL
- ° SAMPLE
- (.....)
- ° POS PEAK SAMPLE
- (.....)

Detection 가 , Detection

Declaration of Conformity

according to ISO/IEC Guide 22 & EN45014

Manufacturer's Name : LG Innotek Co.,Ltd.

Manufacturer's Address : 133, Gondan Dong, Gumi city
Gyeongsanbuk Do, 730-030
R.O.K

Declares that the product :

Product Name : Spectrum Analyzer

Model Number : SA - 7270

Date : Dec. 15. 1998

Conforms to the following product specification :

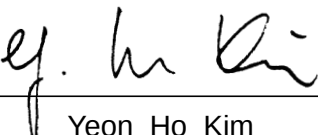
EMC : EN 61000-3-2 : 1995
EN 61000-3-3 : 1995
EN 55011 : 1991 Class A
EN 50082-1 : 1997
(EN 61000-4-2 : 1995, EN 61000-4-3 : 1995,
EN 61000-4-4 : 1995, EN 61000-4-5 : 1995,
EN 61000-4-6 : 1996, EN 61000-4-8 : 1993,
EN 61000-4-11 : 1994, ENV50204 : 1995)
Certified by KOREA TOKIN EMC

Safety : EN 61010-1 : 1993 + A2 : 1995
Certified by TÜV Rheinland

Supplementary Information :

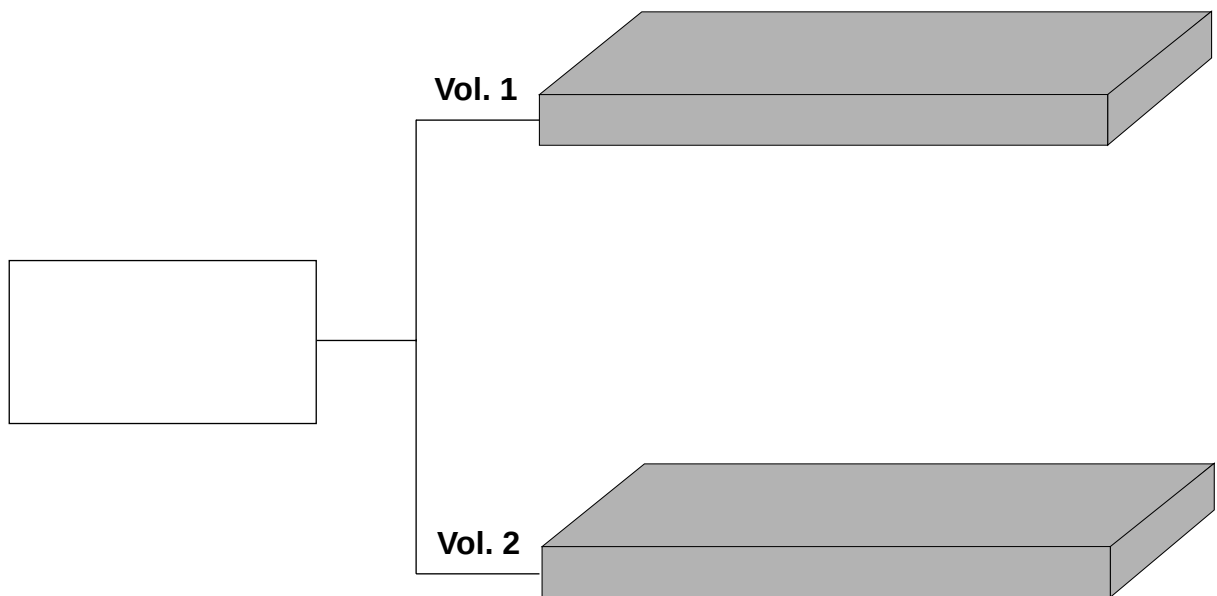
The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

Gumi, Gyeong-buk
Location


Yeon Ho Kim
Quality Assurance Manager

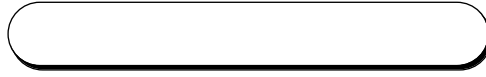
(1) SA-7270
SA-7270

가 .



: SA-7270 , , , , , .

: RS-232C, GPIB , .



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		11
1		1 - 1
		1 - 3
		1 - 4
		1 - 5
		1 - 7
2		2 - 1
		2 - 3
		2 - 3
		2 - 3
		2 - 3
		2 - 4
		2 - 4
RF		2 - 5
		2 - 6
		2 - 7
		2 - 8
	()	2 - 10
AC/DC	()	2 - 11
DC	()	2 - 12
DC	()	2 - 13
3		3 - 1
		3 - 3
/		3 - 3
I/O		3 - 10
IEEE - 488 GPIB		3 - 11
RS - 232C		3 - 12
		3 - 13
DC		3 - 14
4		4 - 1
		4 - 3

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6	6 - 1
.....	6 - 3
.....	6 - 4
.....	6 - 6
.....	6 - 6
.....	6 - 8
.....	6 - 11
(RBW), ,	6 - 14
.....	6 - 20
.....	6 - 22
.....	6 - 24
.....	6 - 30
.....	6 - 32



		6 - 35
2		6 - 37
		6 - 39
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		6 - 46
		6 - 48
VSWR		6 - 50

7		7 - 1
		7 - 3
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SA - 7270

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SA - 7270 (“ ”)

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LCD

SA - 7270

9kHz

2.7GHz

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calibration

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, LOG/LIN

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RBW, 가

reference level

calibration

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가

controller

MEASURE

가

■ Application

- AM/FM

- /

- , CATV, TV

-

SA - 7270

HS-7270	High Stability Oscillator	: $\leq 0.2\text{ppm}$
PC-7270	PCMCIA	PCMCIA Ver. 2.0 Type I, 1 Slot
AD-7270	AC, DC Power	100VAC - 240VAC(T7A 1) 13VDC - 20VDC
QP-7270	QP Detector	QP B QP C&D
TG-7270	Tracking Generator	100kHz to 2.7GHz 0dBm to - 70dBm

+



SA - 7270

BT-7270		Ni-Cd, 14.4V DC, 7AH ()
SB-7270	가	
CA-7270	Connectors and cable assembly	

+

: 15

1.0 FREQUENCY

- 1.1 Tuning Range: 9 kHz to 2.7 GHz.
- 1.2 Tuning Resolution: 1 Hz Minimum
- 1.3 Frequency Span Width: 100Hz/div to 270 MHz/div
in 1, 2, 5 step selections (auto selected) plus ZERO SPAN, and FULL Span (9 kHz to 2.7 GHz).
Manual selection of start, stop, and span.
- 1.4 Span Accuracy $\pm 3\%$ of the indicated Span Width.
- 1.5 Readout Accuracy: Span Accuracy + Frequency
Standard Accuracy + 50% of RBW.
- 1.6 Frequency Counter:
 - 1.6.1 Resolution: 1 kHz, 100 Hz, 10 Hz, 1 Hz ()
 - 1.6.2 Accuracy: $\pm$ (Resolution frequency error (maker frequency accuracy + counter resolution ± 1 count)
 - 1.6.3 Sensitivity: ≤ -70 dBm (50kHz ~ 2.7 GHz)
- 1.7 Stability
 - 1.7.1 Residual FM: <100 Hzp - p 200ms @ 1 kHz RBW, 1 kHz VBW
(P - P in 20 ms)
 - 1.7.2 Noise Sidebands: -90 dBc/Hz @ 10 kHz offset

2.0 AMPLITUDE

- 2.1 Measurement Range: $+20$ to -105 dBm
- 2.2 Average Displayed Noise Level: 50 kHz to 100 kHz ≤ -80 dBm
100 kHz to 1 MHz ≤ -100 dBm
1 MHz to 2.7 GHz ≤ -105 dBm
(300 Hz RBW, 10 Hz Video Filter)
- 2.3 1 dB Compression Point: -10 dBm 100 kHz to 2.7 GHz (0dB attenuation)
- 2.4 Displayed Range: 80 dB in 10 dB/div log scale.
40 dB in 5 dB/div log scale.
16 dB in 2 dB/div log scale.
8 dB in 1 dB/div log scale.
8 divisions with linear amplitude scale.
- 2.5 Amplitude Units:
 - 2.5.1 Log Scale Mode: dBmV or dBm units.
 - 2.5.2 Linear Scale Mode: V(uV, mV, etc.), or dBV(dBmV only)
 - 2.5.3 Quasi Peak Enabled: dBuV, dBmV, or dBm only

2.6	Display Linearity:	5 or 10 dB/div, ± 0.15 dB/dB, $\leq \pm 1.5$ dB over 8 divisions. 1 or 2 dB/div, ± 0.5 dB over 8 divisions. Linear, (10% of Reference Level over 8 divisions
2.7	Frequency Response:	- 3.0~ +1 dB, 9 kHz to 10 MHz, ± 1.5 dB, 10 MHz to 2.7 GHz (10 dB RF Attenuation)
2.8	Attenuator:	
	2.8.1 Range:	0 to 50 dB, Selected manually or automatically coupled to reference level.
	2.8.2 Resolution:	10 dB steps.
	2.8.3 Accuracy:	50 kHz to 2.7 GHz, ± 0.5 dB/step up to 1 dB maximum
2.9	Reference Level:	
	2.9.1 Accuracy:	± 1.5 dB (50 kHz to 2.7 GHz)
	2.9.2 Range:	- 110 dBm to +30 dBm with 300 Hz filter using 1dB/div scale
	2.9.3 Resolution:	0.1 dB Step minimum
2.10	Residual Spurious	≤ -85 dBm (input terminated, 0 dB attenuation)
2.11	Harmonic Distortion:	≤ -60 dBc, -40 dBm input, 0 dB attenuation.
2.12	Intermodulation Distortion:	≤ -70 dBc, 100MHz to 2.7 GH, -30 dBm input (3rd order) 10dB attenuation ≤ -60 dBc, 1MHz to 100MHz, -30 dBm input
2.13	Other Input Related Spurious:	≤ -60 dBc, 10MHz to 2.7 GH, -30 dBm input
2.14	Resolution Bandwidth:	
	2.14.1 Selections:	300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz
	2.14.2 Accuracy:	$\leq \pm 20\%$
	2.14.3 Selectivity:	60 dB/3 dB ratio <15:1 60 dB/6 dB ratio <12:1; 9 kHz & 120 kHz (Quasi Peak Option).
	2.14.4 Switching Error:	± 1.0 dB (3kHz Reference RBW)
2.15	Video Bandwidth Selection:	10 Hz to 1 MHz in 1 - 3 - 10 steps plus None.

3.0	SWEEP:		
3.1	Rate:	50 ms to 1000 sec in 1 - 2 - 5 sequence, 5 ms to 20 sec (ZERO SPAN)	
3.1.1	Sweep Rate Accuracy:	20%, <100msec 10%, for all other sweep rates	
3.2	Trigger:		
3.2.1	Source:	External (rear), Line, Video	
3.2.2	Modes:	FreeRun, Single.	
3.2.3	Coupling:	DC.	
3.2.4	Bandwidth:	Selectable: Flat, 5 Hz HPF, or 100 kHz LPF (- 3dB Nominal, measured at External Input)	
3.2.5	External Rear Level:	TTL Level	
3.2.6	Delay:	± one sweep time	
4.0	DISPLAY		
4.1	Type:	(7.4 ") Monochrome STN LCD	
4.2	Digital Resolution:	640 H x 480 V active display area	
4.3	Marker Modes:	peak Search, Peak Track, Delta Marker, 1/Delta Marker, Marker Track; Marker to Center, Marker to Reference (2 markers maximum)	
5.0	MEMORY		
5.1	Trace Storage:	20 stored traces including user defined traces and test limits.	
5.2	Setup Storage:	10 operational states.	
5.3	Display Traces at One Time	2 Traces	
6.0	INPUTS		
6.1	RF Input:		
6.1.1	Connector:	Type N Female, 50ohm nominal.	
6.1.2	VSWR:	150kHz to 2.7 GHz, VSWR<1.5:1. (with 10 dB Input attenuation)	
6.1.3	Maximum Input Level:	50 Vdc, + 26 dBm (with 30 dB attenuation)	
6.1.4	LO Emissions	≤ - 70 dBm (with 10 dB attenuation)	
7.0	OUTPUTS		
7.1	IF Output	10.7 MHz, Nominal	
7.2	Video Output	0 to 5V DC	
8.0	FREQUENCY STANDARD	<u>STANDARD</u>	<u>HIGH STABILITY OPTION</u>
8.1	Temperature Stability:	± 2ppm	± 0.1 ppm
8.2	Aging:	± 1 ppm/year	± 0.1 ppm/year

- 9.0 EXTERNAL REFERENCE Switchable between Internal/External
- 9.1 Connector: BNC female connector.
- 9.2 Input level - 5 dBm to + 15 dBm
- 9.3 Output Level 10 MHz @ + 5 dBm nominal
- 10.0 IEEE - 488 (GPIB) INTERFACE
- 10.1 Conforms to: IEEE - Standard 488 - 1987.
- 10.2 Implemented Subsets: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, C0, LE0, TE0
- 11.0 RS - 232C INTERFACE
- 11.1 Type: Null Modem (Duplex Virtual Hardware Handshaking)
- 11.2 Baud Rate: 600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19.2 kbps
- 11.3 Parity Check: Odd, Even or None.
- 11.4 Data Length: 7 bits, 8 bits.
- 11.5 Stop Bits: 1 bit, 2 bits.
- 12.0 PRINTER
- 12.1 Drivers: PCL3
- 12.2 Connection: Standard 25 Pin female D - Sub Parallel Printer.

13.0 QUASI - PEAK OPTION

SELECTED BANDWIDTH	RECOMMENDED FREQUENCY RANGE	CHARGE TIME (ms)	DISCHARGE TIME (ms)	DISPLAY TIME (ms)
9 kHz	150 kHz to 30 MHz	1 ± 20%	160 ± 20%	160 ± 20%
120 kHz	30 MHz to 1GHz	1 ± 20%	550 ± 20%	100 ± 20%

14.0 GENERAL CHARACTERISTICS

- 14.1 Dimensions: 13.75((350 mm) wide (Including handle)
7.15((185 mm) high
14.75((381 mm) deep
- 14.2 Weight: 18.0lb(8.2 kg) without options
- 14.3 Warm - up Time: 15 minutes for specified accuracy.
- 14.4 Power Requirements(standards)
- 14.4.1 Source Voltage and Frequency 100 - 240 VAC at 50/60Hz
- 14.4.2 Power Consumption: 60 watts maximum (without options)

14.5 Power Requirements(Optional AC/DC power supply: AD - 7270)

- 

14.6 Fuse requirements

- | | |
|-------------------------|---|
| 14.6.1 F1 and F2 | |
| 14.6.1.1 100 to 120 VAC | 3.15A, 250V, Type T |
| 14.6.1.2 220 to 240 VAC | 3.15A, 250V, Type T |
| 14.6.1.3 13 - 21 VDC | 7A, Type S(Optional AC/DC Power Supply) |

14.7 Environmental Range

- | | |
|------------------------------|--|
| 14.7.1 Use | Indoors |
| 14.7.2 Operating Temperature | 0 to 40 |
| 14.7.3 Storage Temperature | - 20 to 70 |
| 14.7.4 Temperature/Humidity: | Meets MIL - T - 28800E for Type 2, Class 5, non -
condensing (85% operating, 90% storage) |
| 14.7.5 Vibration/Shock: | Meets MIL - T - 28800E for Type 2, Class 5 |
| 14.7.6 Altitude: | Operation up to 3,000 meters
Non - operational up to 40,000 feet. |

14.8	Product Safety	Complies with EN61010 - 1
------	----------------	---------------------------

- 14.8.1 Supplemental Environmental Conditions
- 14.8.1.1 Main Supply Voltage Fluctuations: $\leq \pm 10\%$ of the nominal voltage
- 14.8.1.2 Transient Overvoltage: According to Installation Category II
- 14.8.1.3 Pollution Degree: 2

14.9 RF Emissions and immunity

- | | |
|---------------------|--|
| 14.9.1 RF emissions | Complies with EN 55011 : 1991, Class A |
| 14.9.2 RF Immunity | Complies with EN 50082 - 1 : 1997 |

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SA - 7270

SA - 7270

GPIB

GPIB

/

Vol 2.

		2 - 3
		2 - 3
		2 - 3
		2 - 4
		2 - 4
RF		2 - 5
		2 - 6
		2 - 7
		2 - 8
	()	2 - 10
AC/DC	()	2 - 11
DC	()	2 - 12
DC	()	2 - 13

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SA - 7270

0 ~ 40

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- 가
- 가
- 가

SA - 7270

SA - 7270

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SA - 7270

10 cm

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10cm



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SA - 7270

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SA - 7270

SA - 7270

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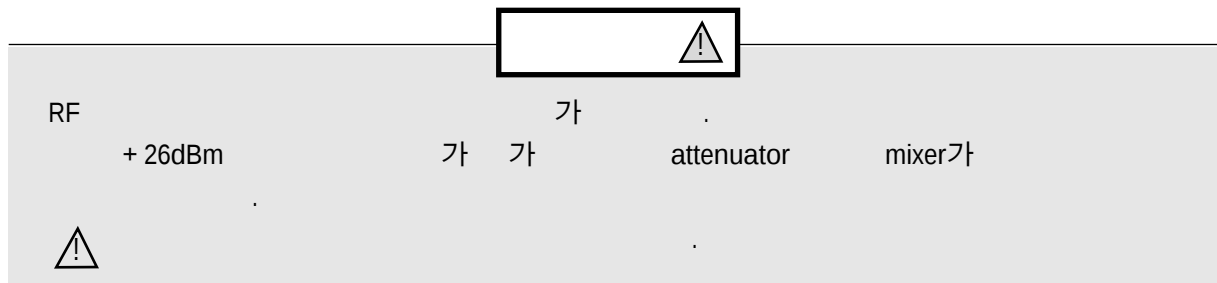
LG

RF

: 9kHz to 2.7GHz

: N RF

+ 26 dBm



SA - 7270 100VAC ~ 240VAC () 47 ~ 63Hz AC

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가 SA - 7270

WARNING



TO AVOID ELECTRIC SHOCK
THE PROTECTIVE GROUNDING CONDUCTOR
MUST BE CONNECTED TO GROUND.
DO NOT REMOVE COVERS.
REFER SERVICING TO QUALIFIED PERSONNEL.

CAUTION



FOR CONTINUED FIRE PROTECTION
REPLACE ONLY WITH SPECIFIED
TYPE AND RATED FUSE.



LG

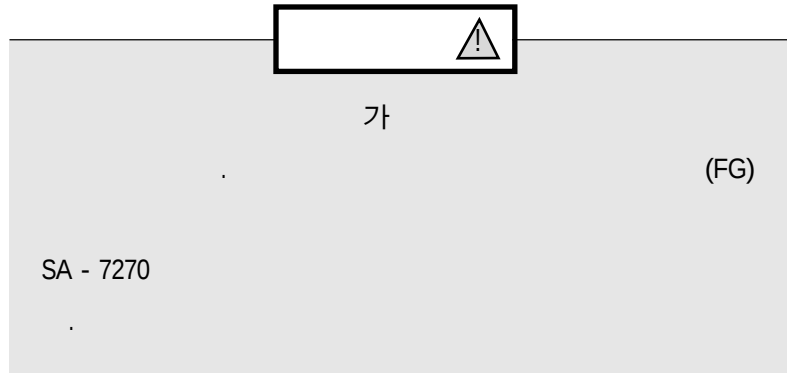
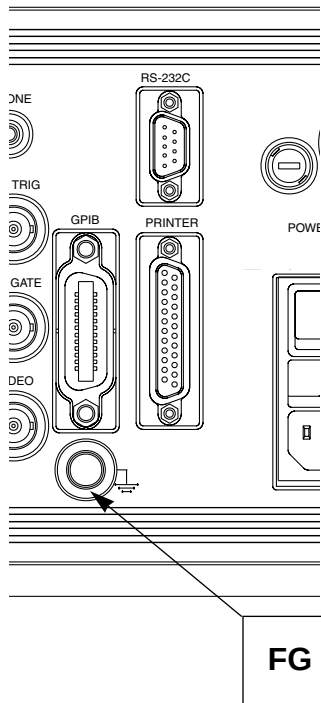
가

(FG)

AC

가

(FG)





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. SA - 7270

T3.15A

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1

()

STBY

()

OFF

2

3

()

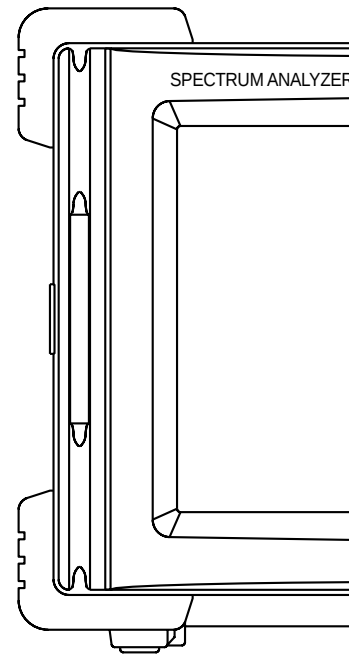
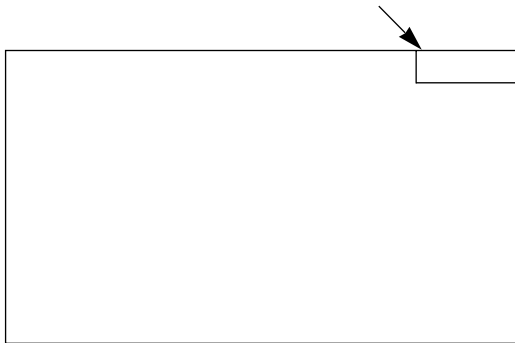
4



, MS - DOS Format

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SA - 7270 .

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가 , . (.)

AC/DC ()

AC/DC

AC DC

가

AC 100VAC ~ 240VAC, 47 ~ 63Hz
 DC 13VDC ~ 21VDC
 14.4V DC, 7AH

1

AC

DC

AC

AC

DC

AC/DC

DC

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가



AC가

DC

가

DC

(BT - 7270)

DC ()

DC 7A, 250V T



1	STBY	OFF	
2			
3	()		
4			

DC ()



1. SA-7270 Battery Connector BT-7270 Battery DC Power supply
2. Battery Off
3. Battery ()



<STEP 1> box



<STEP 2> battery cable BT-7270



<STEP 3> cable battery soft carrying case



<STEP 4> DC jack battery cable
connector

3

/

/		3 - 3
I/O		3 - 10
IEEE - 488 GPIB		3 - 11
RS - 232C		3 - 12
		3 - 13
DC		3 - 14

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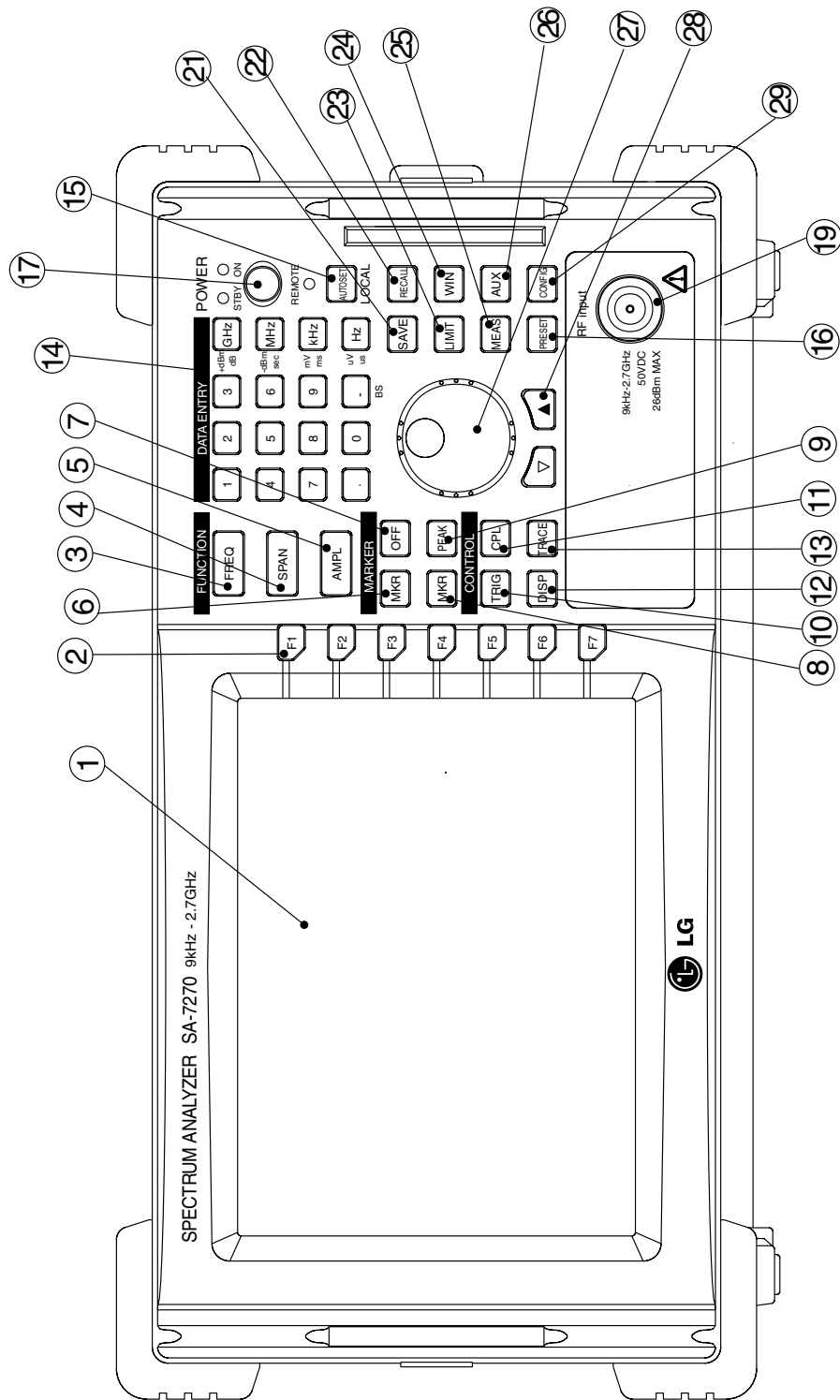
-	3 - 1	-	3 - 2	(	)
-	3 - 3	-	3 - 4	(	)

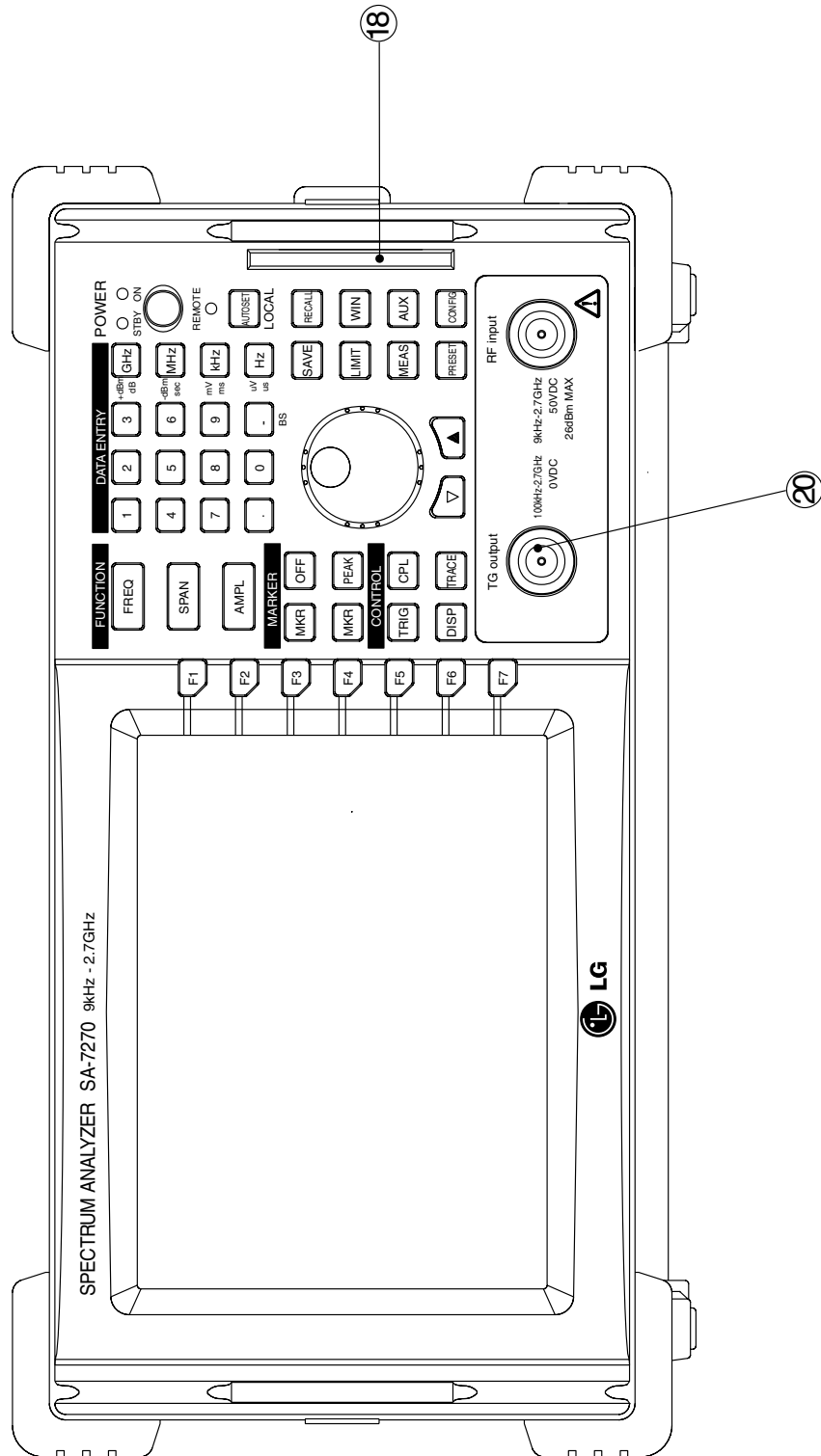
/

1	(LCD)	7.4 "	VGA	LCD	.	,	,
2	F1-F7						
3	FREQ						
4	SPAN	SPAN	.				
5	AMPL						
6	MKR	Normal Marker	.				
7	OFF	Marker off	.				
8	MKR >	Marker shift					
9	PEAK	Peak marker					
10	TRIG	Trigger	.				
11	CPL	RBW, VBW, sweep time	.				
12	DISP		.				
13	TRACE	Trace , detect, , video average	.				
14	DATA	[Scroll Knob] Marker	.				
	Entry	[,] 가/	.				
		[BS] Backspace	.				
		[0..9, +, -]	.				
		[GHz, MHz, kHz, Hz] , ,	.				
		[Hz] Enter	.				
15	AUTOSET		.				
	[LOCAL]	, LED					

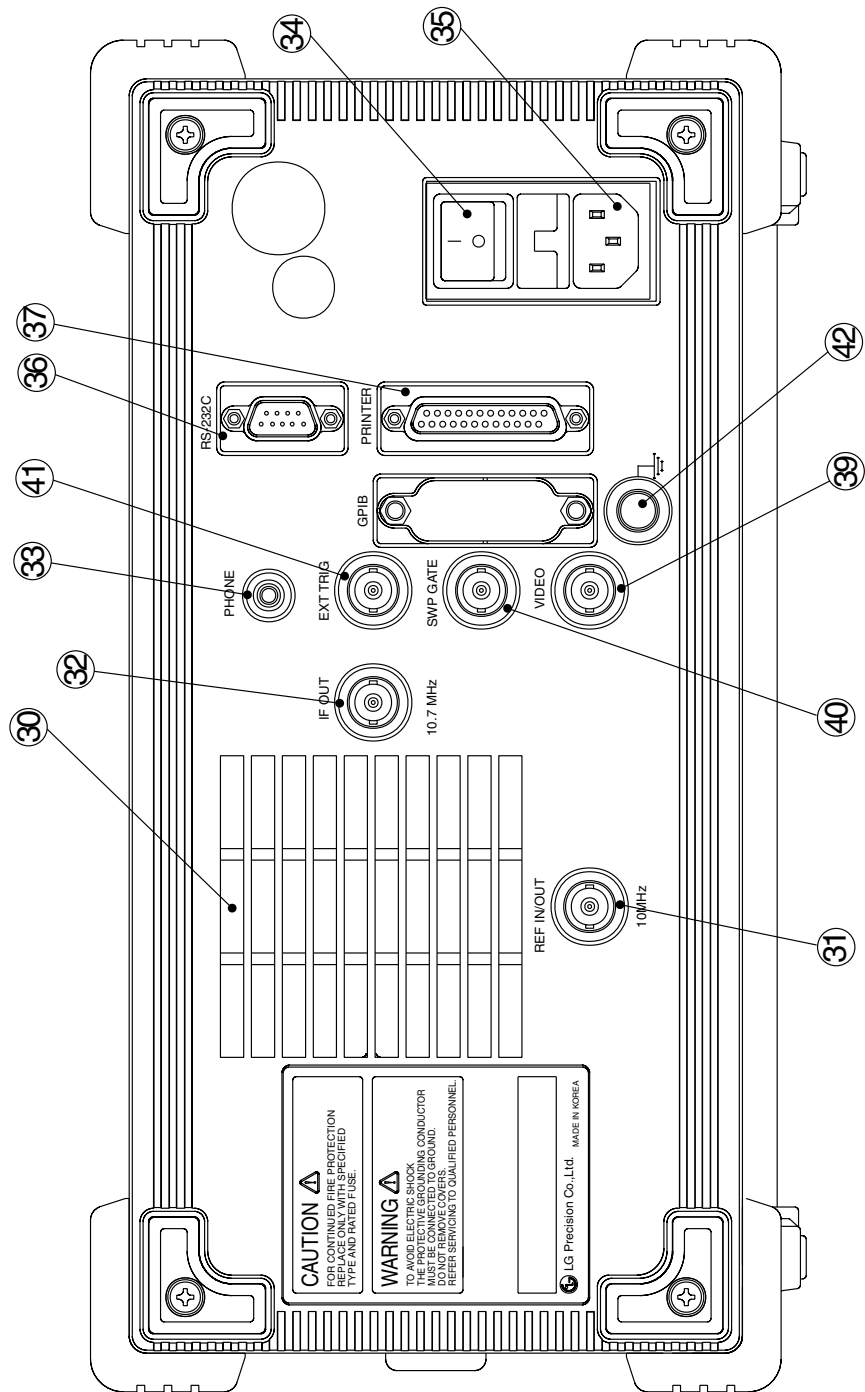
16	PRESET	Calibration	.
17	STBY/ON	가	.
	STBY		1
	STBY		
18	Memory Card	/	
	(	)	
19	RF Input	RF	
20	TG Output	Tracking Generator	
	(	)	
21	SAVE	, limit line	
22	RECALL	, limit line	
23	LIMIT	Limit line	
24	WIN		
25	MEAS		
26	AUX	(FM/AM , ,)	
27	SCROLL	(SCROLL)	
	KNOB		
28	UP/DOWN	UP/DOWN	
29	CONFIG		
30	(Fan)		
31	EXT REF	/ , 가	,
	IN/OUT	가	Port .
32	IF OUT	IF . RBW	
33	Phone	.	
34	Off/On	AC ().	
35	(inlet)	AC ().	

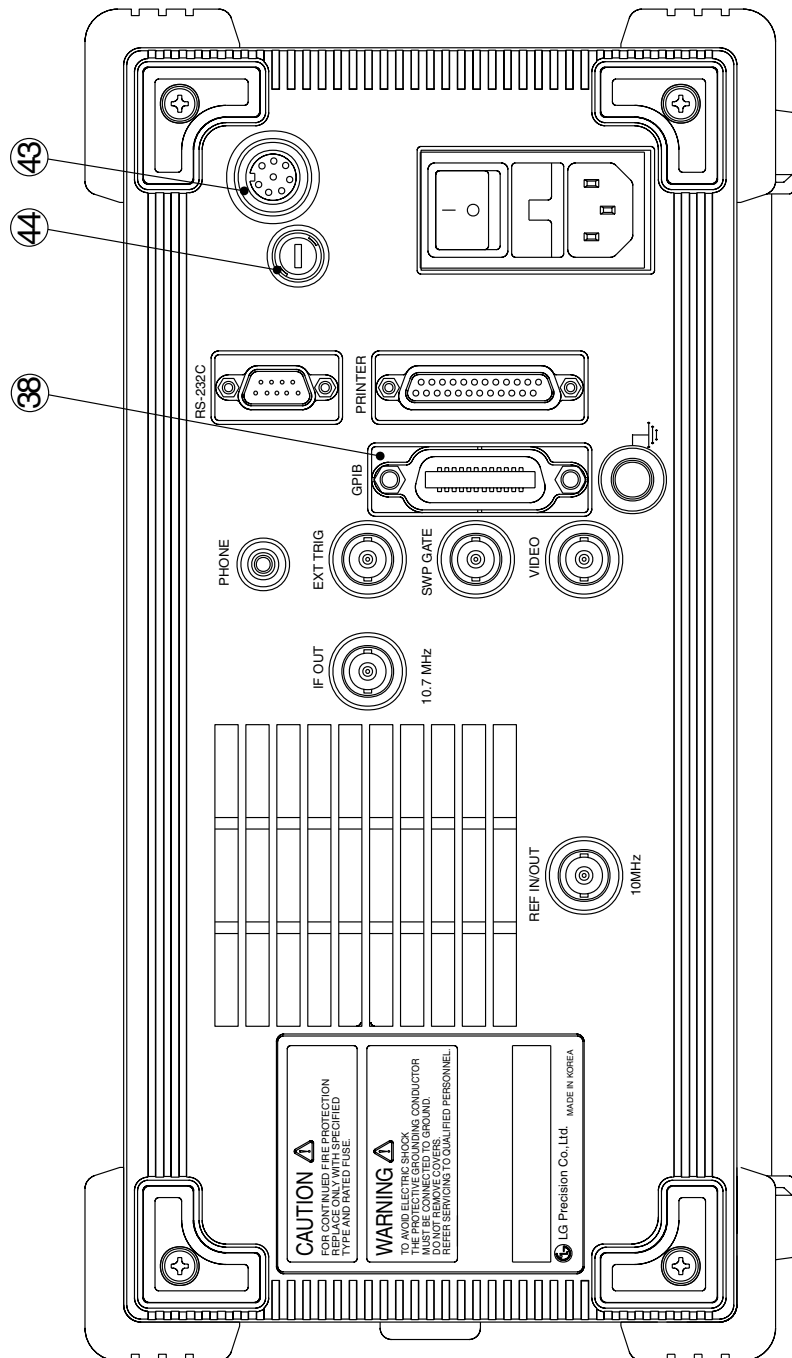
36	RS-232C	RS - 232C	.
37	Printer		
38	GPIB		
39	Video Out	Video	
40	Swp Gate	sweep	
41	Ext Trig		
42	(FG)		
43	DC INPUT	DC	(.)
44	FUSE	DC	(.)





3 - 2 ()





I/O

		/	
AC	IEC 320		AC
RF	Type N Female		RF
Tracking Generator	Type N Female		RF
Trigger	BNC Female		
Sweep Gate	BNC Female		
Video	BNC Female		
/	BNC Female	/	IN:10MHz OUT:10MHz
IF	BNC Female		10.7 MHz
IEEE-488 GPIB	24-Pin Champ	/	Pin-Out (2)
	25-Pin, D-sub Female		Pin-Out (4)
RS-232C	9-Pin, D-sub male	/	Pin-Out (3)

1. I/O

IEEE - 488 GPIB

IEEE - 488 GPIB

ANSI/IEEE

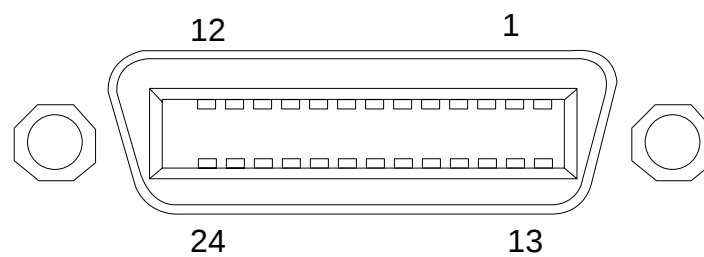
488.2 - 1987

.

1	DIO 1	13	DIO 5
2	DIO 2	14	DIO 6
3	DIO 3	15	DIO 7
4	DIO 4	16	DIO 8
5	EQI	17	REN
6	DAV	18	Ground
7	NRFD	19	Ground
8	NDAC	20	Ground
9	IFC	21	Ground
10	SRQ	22	Ground
11	ATN	23	Ground
12	Ground	24	Ground

2. IEEE - 488 GPIB

Pin - Out



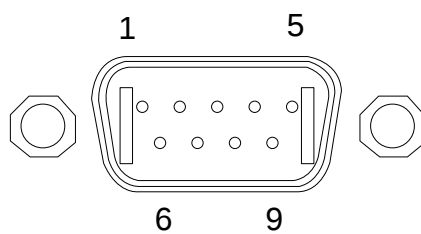
3 - 5. IEEE - 488 GPIB

RS - 232

1	DCD
2	RXD
3	TXD
4	DTR
5	Ground
6	DSR
7	RTS
8	CTS
9	RI(NC)

3. RS-232C

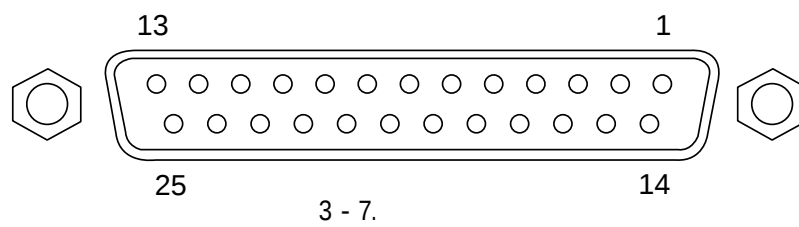
Pin - Out



3 - 6. RS - 232C

1	$\overline{\text{STB}}$
2	PD0
3	PD1
4	PD2
5	PD3
6	PD4
7	PD5
8	PD6
9	PD7
10	$\overline{\text{ACK}}$
11	BUSY
12	PE
13	SLCT
14	$\overline{\text{AFD}}$
15	$\overline{\text{ERROR}}$
16	$\overline{\text{INIT}}$
17	$\overline{\text{SLIN}}$
18	Ground
19	Ground
20	Ground
21	Ground
22	Ground
23	Ground
24	Ground
25	Ground

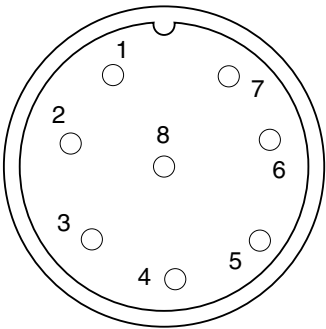
4. Pin - Out



DC

1	LED-Anode
2	Battery +
3	Battery +
4	Battery +
5	Battery-
6	Battery-
7	LED-Cathode
8	Battery-

5. DC Pin - Out



3 - 8. DC ()

4

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SAVE, RECALL	4 - 8
CONFIG	4 - 9
MEAS	4 - 10
AUX, LIMIT, WIN, AUTOSET	4 - 11
PRESET	4 - 12

< >

4

가 .

(1) hard key 가 .

(2) SOFT MENU 1 . SOFT MENU 2 SOFT
MENU 1 가 .

(3) SOFT MENU 2 Return SOFT MENU 1 .

--

Soft Menu 1

Soft Menu 2

FREQ

CENTER
START
STOP
CF STEP [AUTO/MNL]

SPAN

SPAN WIDTH
FULL SPAN
ZERO SPAN
LAST SPAN
ZOOM IN
ZOOM OUT

AMPL

REF LEVEL
ATTEN[AUTO/MNL]
LOG
LINEAR
SCALE..
UNIT..
REF LVL OFFSET

10dB/DIV
5dB/DIV
2dB/DIV
1dB/DIV
RETURN

dBm
dBmV
dBuV
VOLTS
WATTS
RETURN

Soft Menu 1

Soft Menu 2

MKR

MARKER NORMAL

MARKER Δ DELTAMARKER 1/ Δ

PEAK SEARCH

OFF

[BLANK]

MKR >

MKR CF

MKR REF LVL

MKR CF STEP

MKR ZOOM IN

MKR ZOOM OUT

*** Normal marker status** Δ MKR CF Δ MKR CF STEP Δ MKR SPAN

MKR ZOOM IN

MKR ZOOM OUT

*** Delta marker status****PEAK**

MKR CF

MKR REF LVL

NEXT PEAK

PEAK LEFT

PEAK RIGHT

MKR TRK[ON/OFF]

MKR NOISE[ON/OFF]

Soft Menu 2

CLR & WRT A[B]
MAX HOLD A[B]
VIEW A[B]
BLANK A[B]
SELECT B[A]
AVERAGE..
MORE..

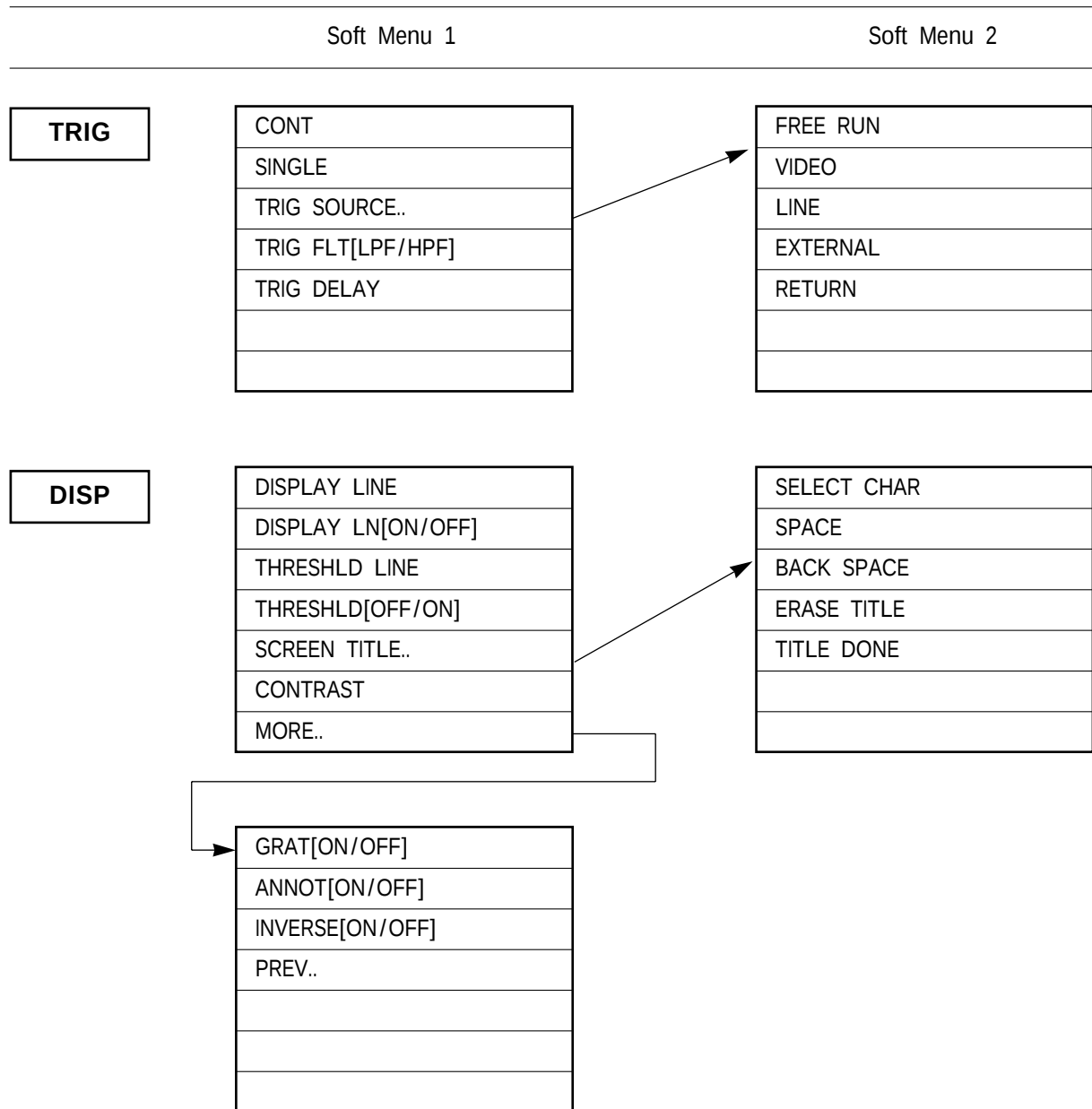
AVERAGE[ON/OFF]
COUNT[XX](2 ~ 256)
CYCLE[ON/OFF]
STOP
CONTINUE
RESET
RETURN

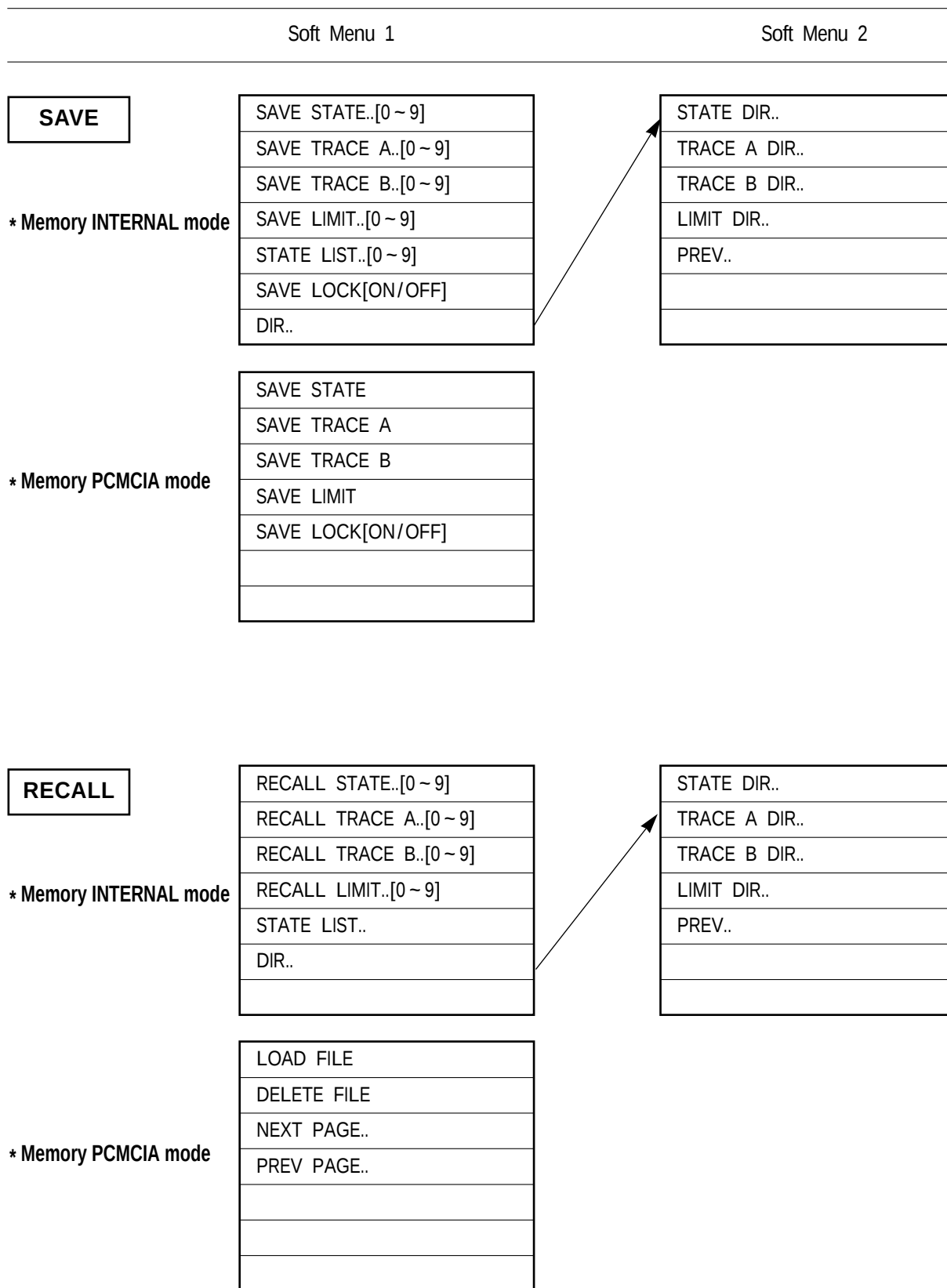
A diagram of a stack. It consists of a vertical column of rectangular cells. The top three cells are labeled DETECT.., MATH.., and PREV.. from top to bottom. An arrow points to the DETECT.. cell from the left, indicating it is the top of the stack. The cells below are empty, representing the rest of the stack structure.

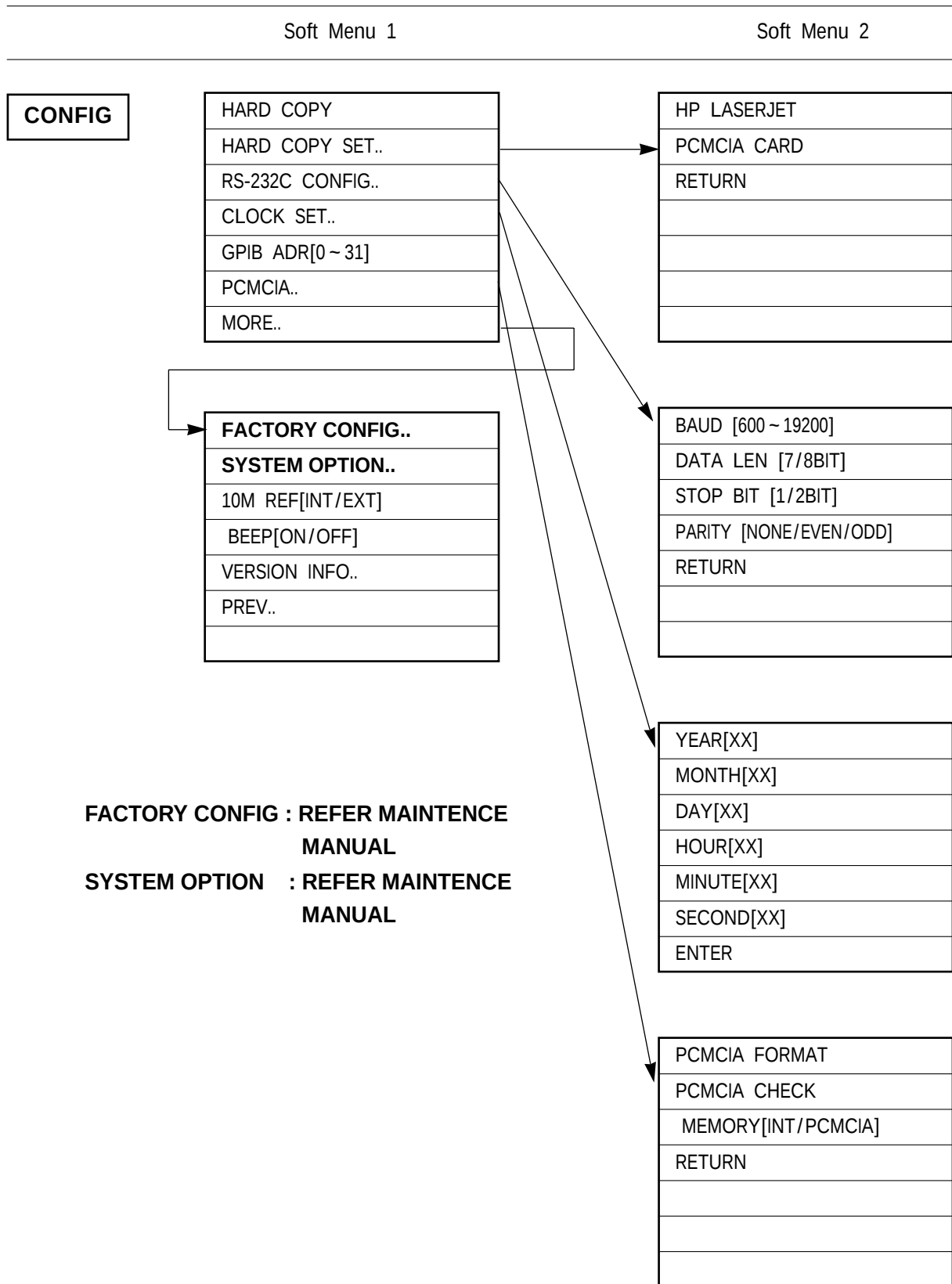
NORMAL
SAMPLE
POS PEAK
NEG PEAK
AVERAGE
RETURN

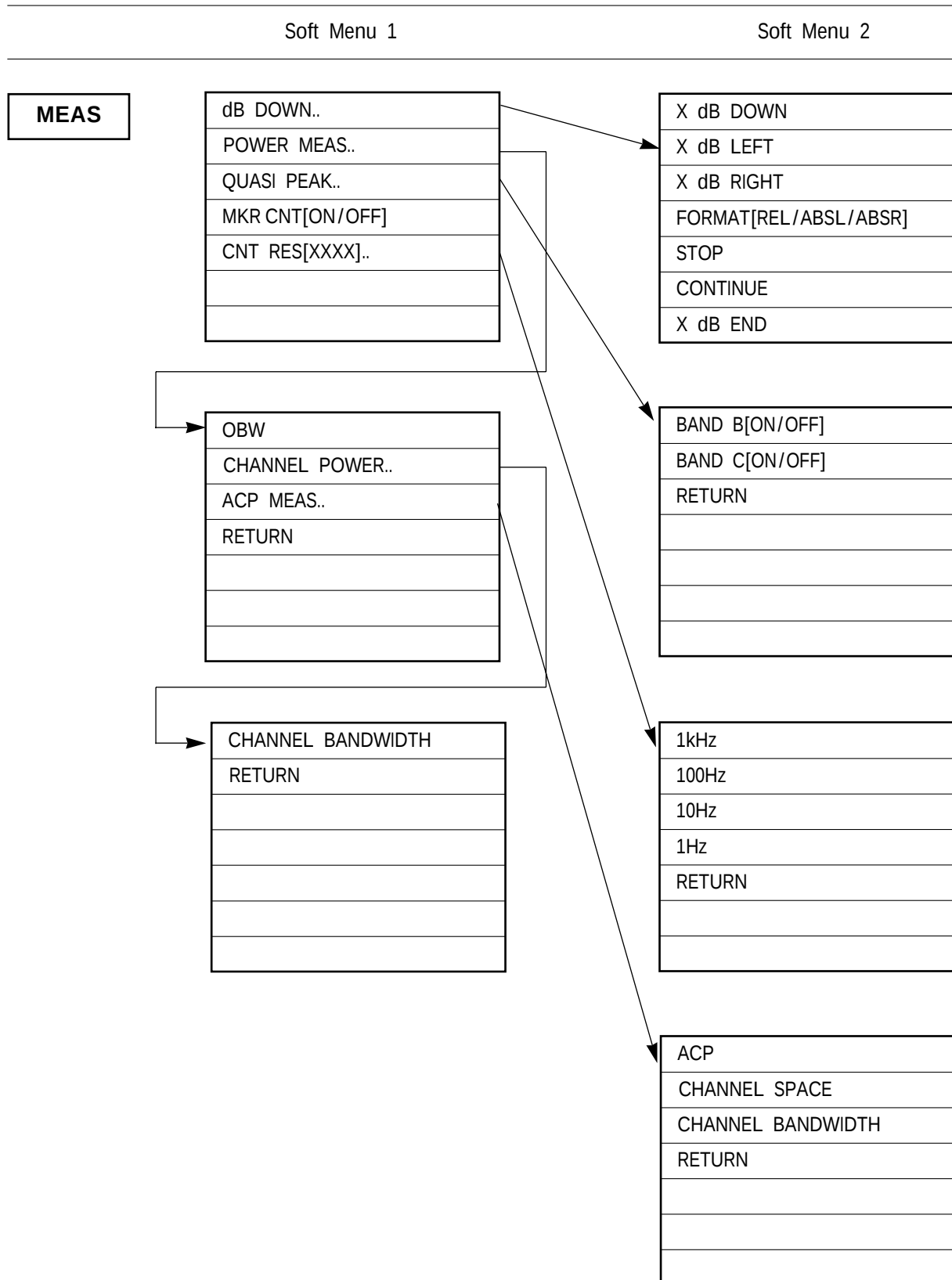
A-B	A
B-DL	B
A + B	A
A-B + DL	A
A EXCH B	
RETURN	

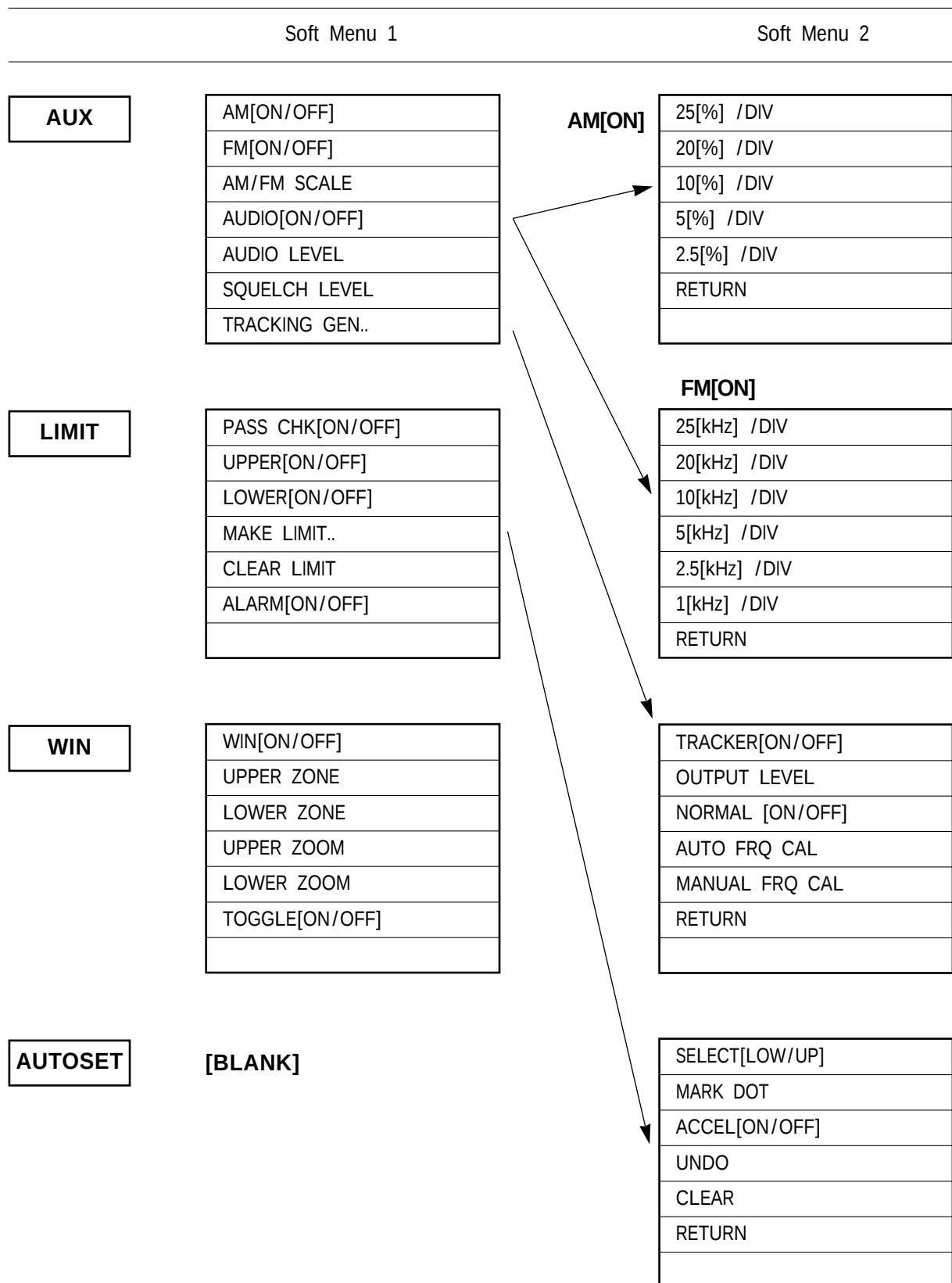
ALL AUTO
RBW
RBW[AUTO/MNL]
VBW
VBW[AUTO/MNL]
SWEEP TIME
SWP TIME[AUTO/MNL]

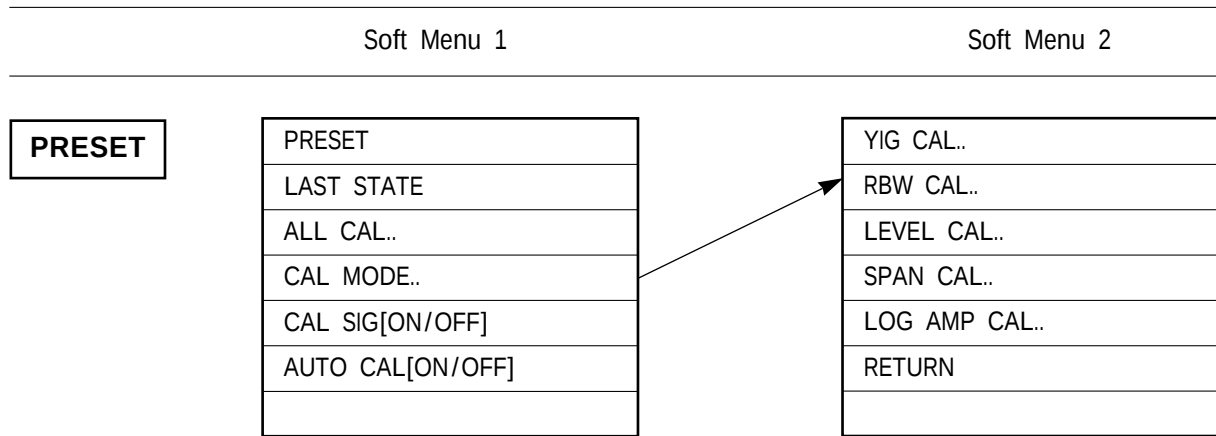












5

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5

FREQ/SPAN FUNCTIONS

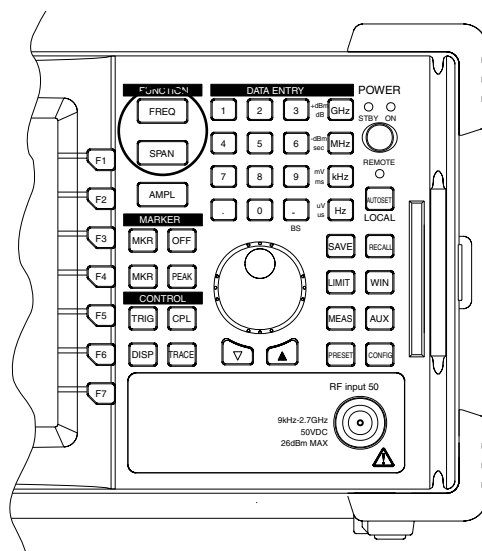
SA - 7270

- Center Frequency - Span Mode
 - Start Frequency - Stop Frequency Mode
- / 0 Hz 2.7GHz

FREQ

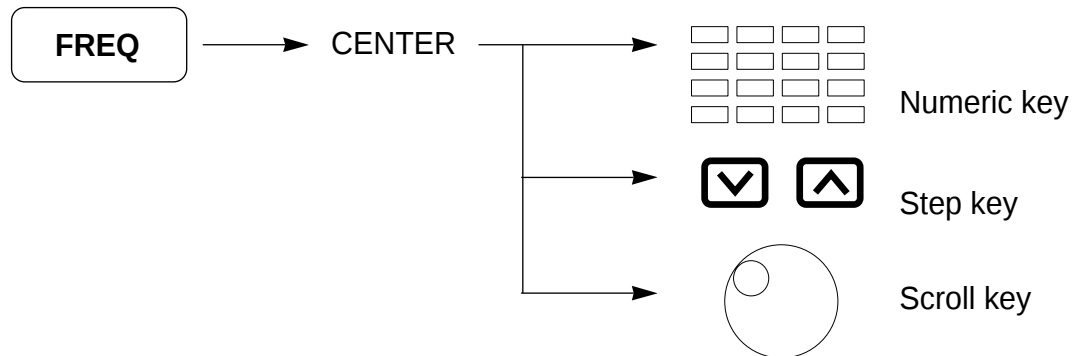
SPAN

span



Center - Span Data

- (1) Center
Center



STEP Up/Down STEP span 1/10
SCROLL STEP span 1/500

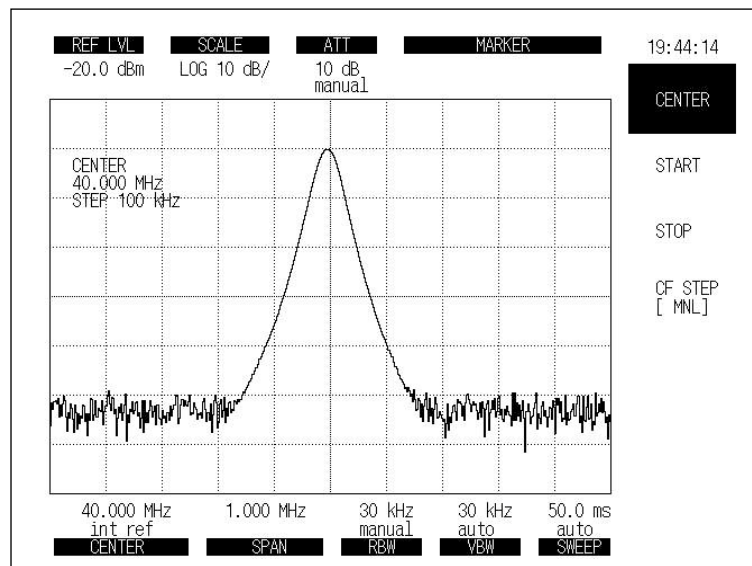
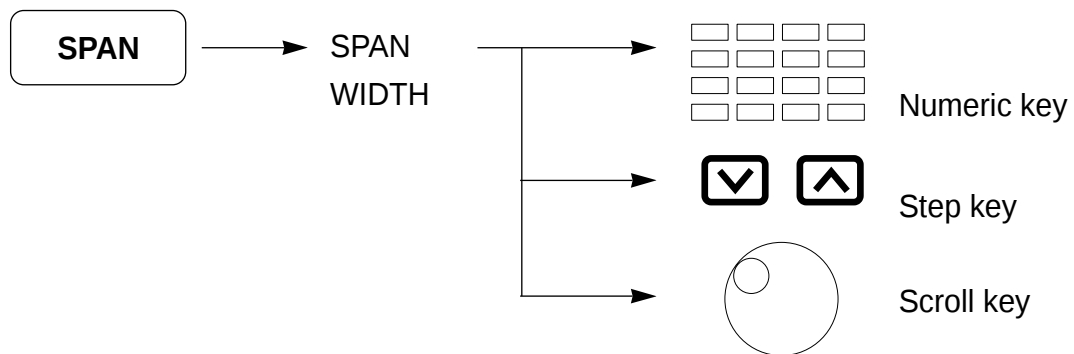


Fig 5 - 1. Center

(2) Span
Span



STEP Up/Down span 1,2,5 step ; 1k, 2k, 5k,,100k, 200k, 500k....
 SCROLL STEP 1/500

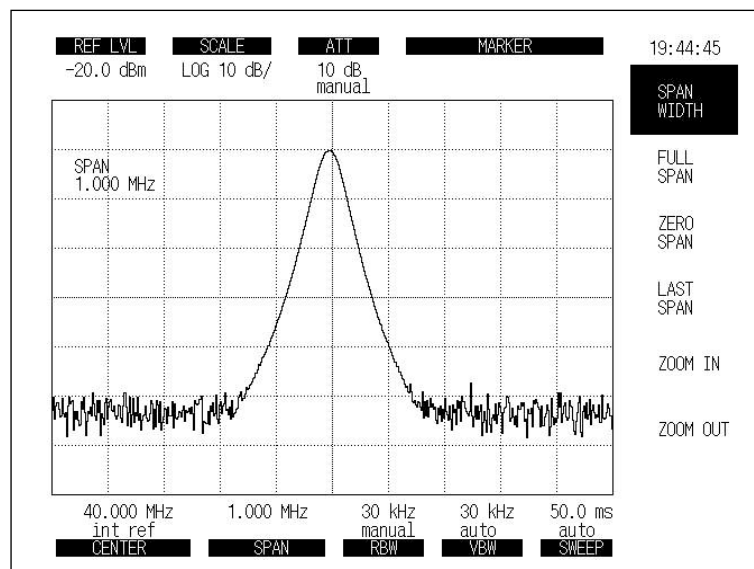
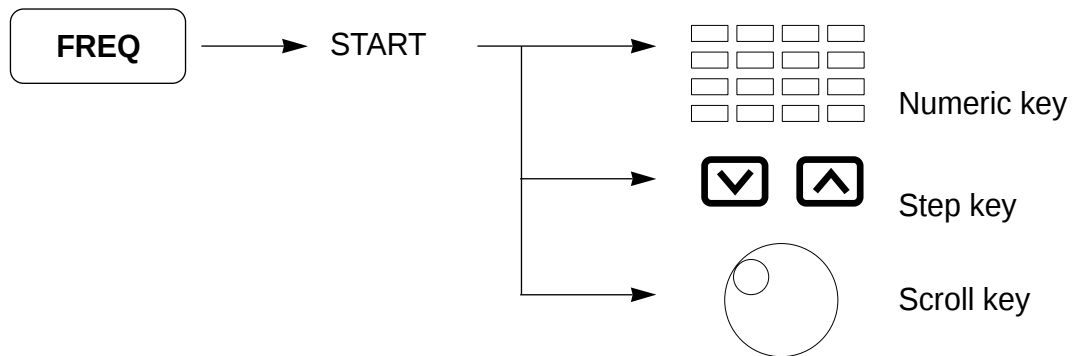


Fig 5 - 2 Span Width

Start - Stop Freq Data

- (1) Start
Start



STEP Up/Down STEP span 1/10
SCROLL STEP span 1/500

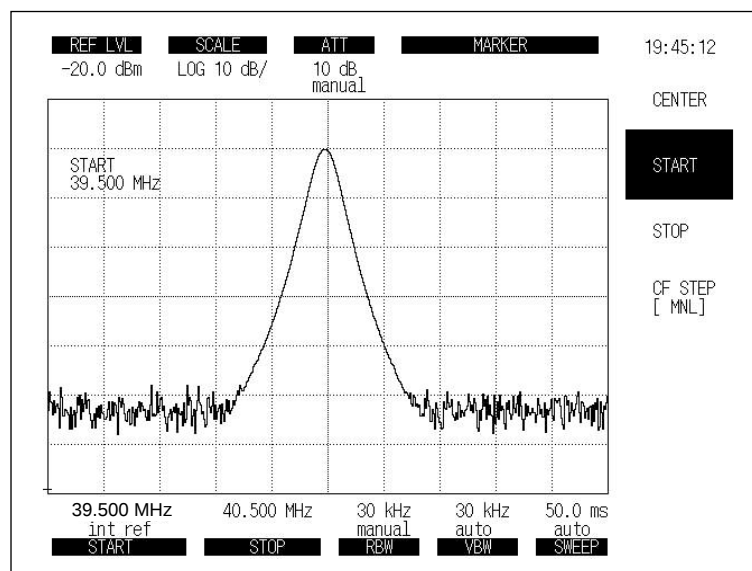
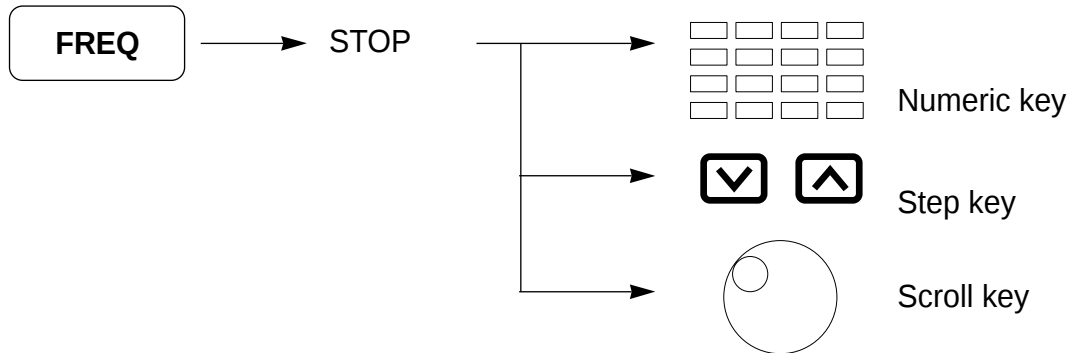


Fig 5 - 3. Start

(2) Stop
Stop



STEP Up/Down STEP span 1/10
 SCROLL STEP span 1/500
 : STEP Up/Down center start/stop 가
 . start/stop span

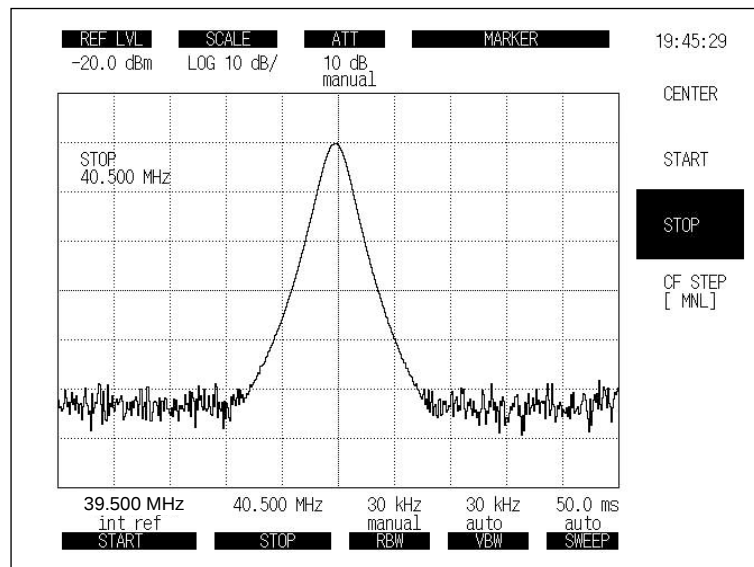
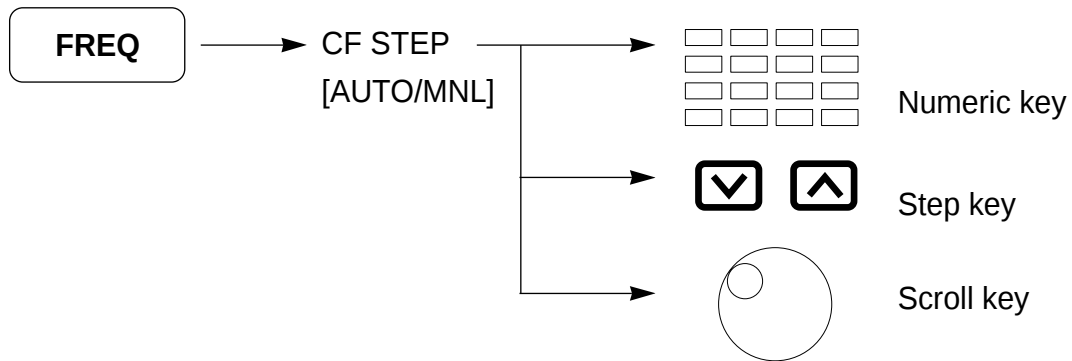


Fig 5 - 4. Stop

CF Step Size

Center STEP SIZE STEP Up/Down
STEP SIZE



CF STEP CF STEP 가 AUTO MNL

CF STEP MNL (manual) STEP Numeric Key
CF STEP [AUTO/MNL] " AUTO " CF STEP SIZE span 1/10

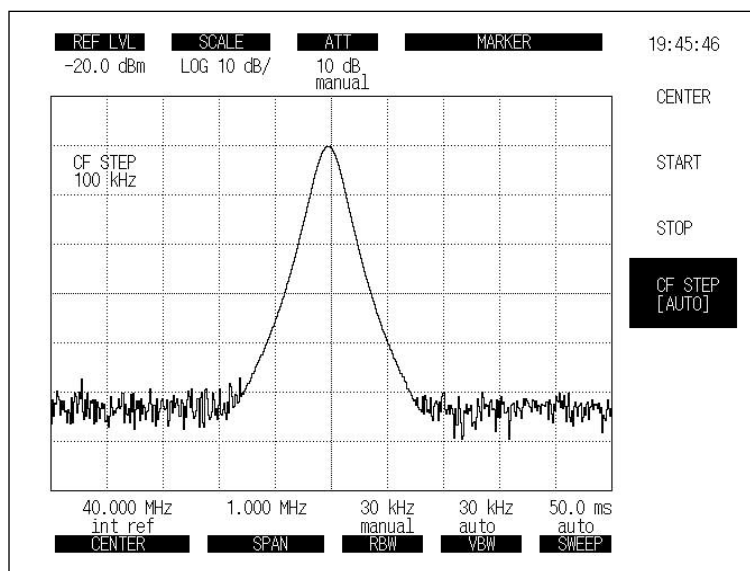


Fig 5 - 5. CF Step

Full Span

Full Span

SA - 7270

SPAN

FULL SPAN

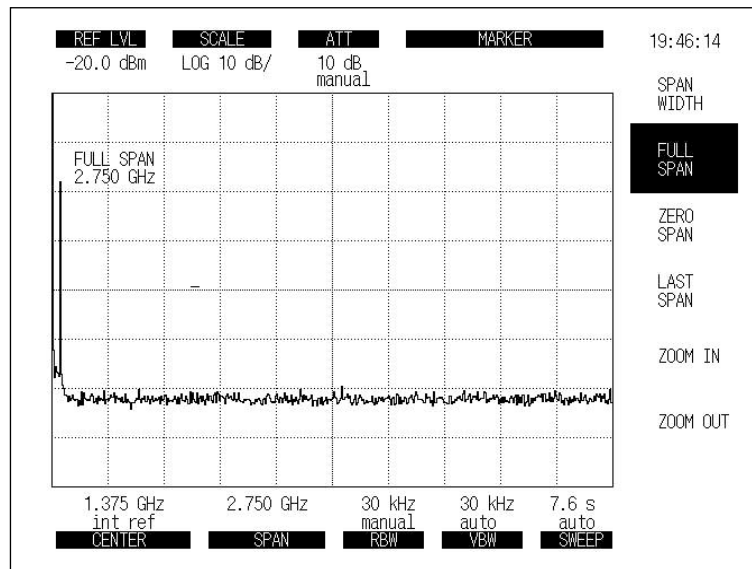


Fig 5 - 6. Full Span

Zero Span

SA - 7270 span 0 Hz
 가
 / edge가 /
 SA - 7270가 Zero Span (span = 0Hz)

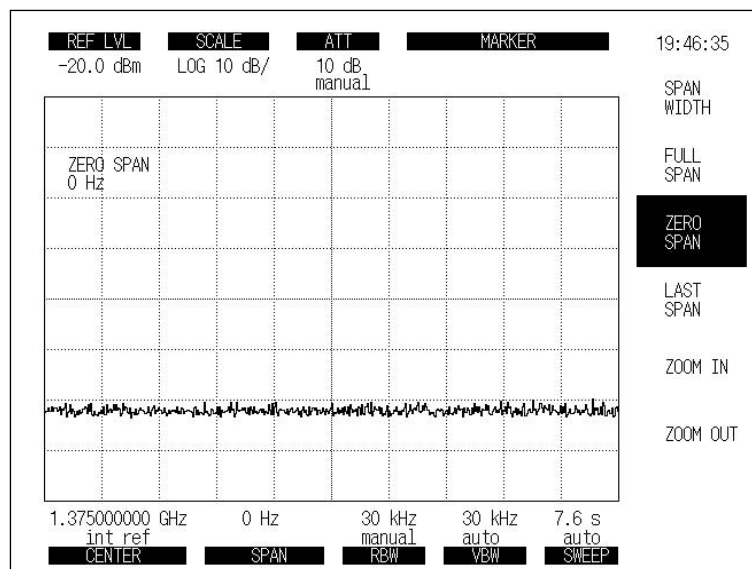
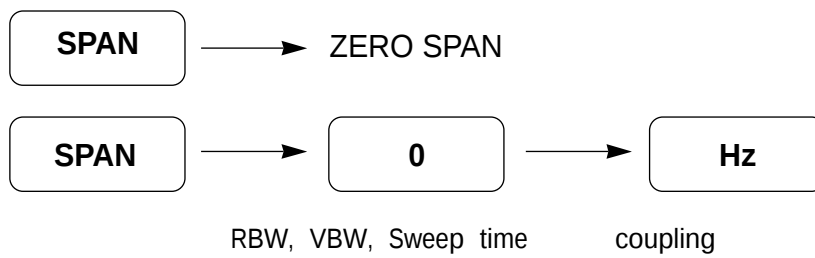
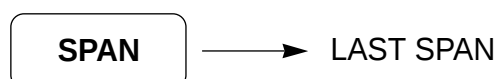


Fig 5 - 7. Zero Span

Span 가

Span



Zoom In/ Zoom Out

ZOOM IN span 1/2 1kHz
 ZOOM OUT span 2 center
 full span
 center

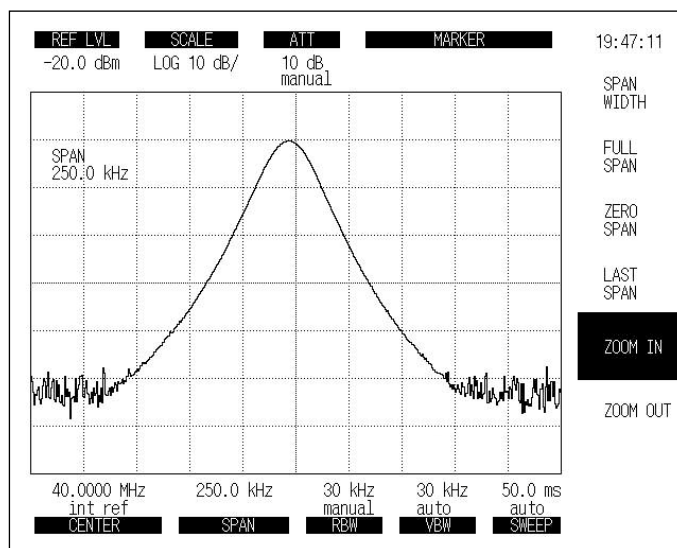
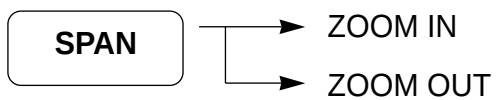


Fig 5 - 8. Zoom In

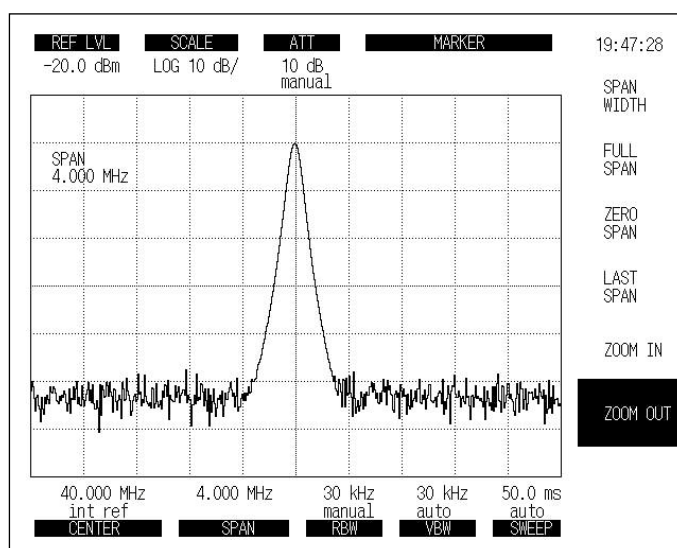
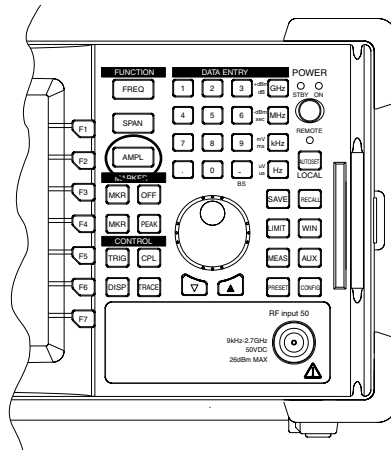


Fig 5 - 9. Zoom Out

AMPLITUDE FUNCTIONS

AMPL



Log/Linear Detector

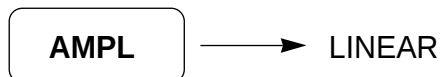
Log

Linear

(1) Log detector



(2) Linear detector



Log Linear , reference level

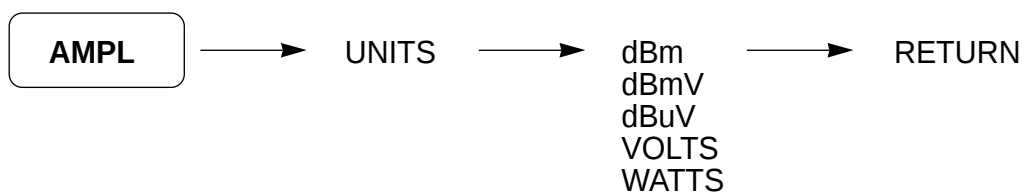
Amplitude Unit

Log SA - 7270 가

• : dBm, dBmV, dBuV, VOLTS, WATTS.

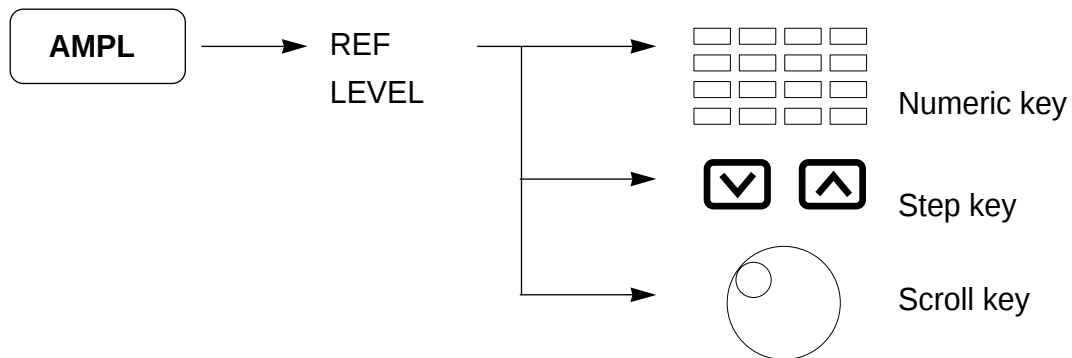
Linear

Volts



Reference Level

Reference level () .

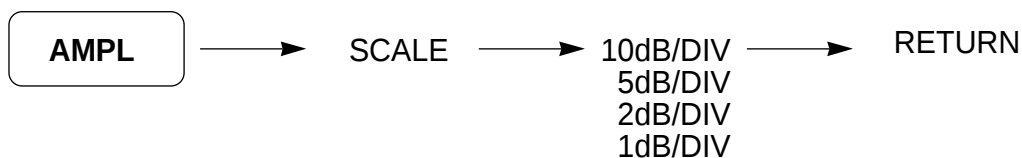


STEP 1division .
 Scroll STEP 0.1 dB .

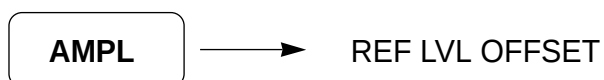
Amplitude Scale

Log SA - 7270 : 10 dB/, 5 dB/, 2dB/, 1dB/.
 Linear SA - 7270 Full Scale .

◦ Log



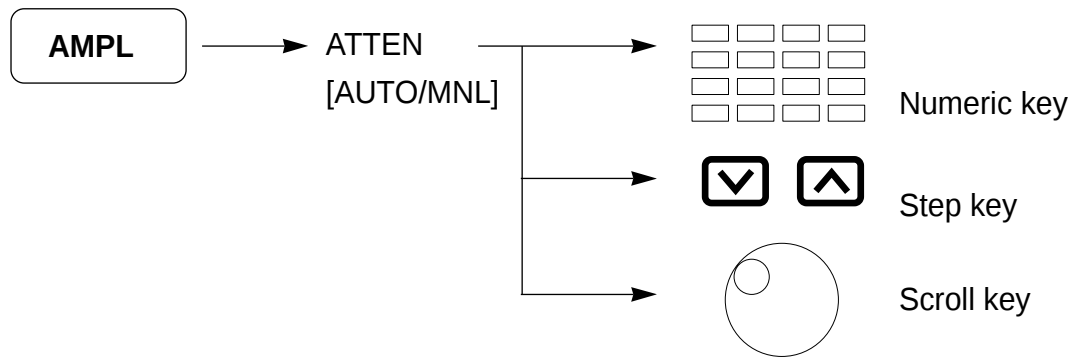
Reference Level Offset



Reference Level Offset (amplitude level) (reference level, marker
 amplitude...) . Spectrum Analyzer
 gain/loss .
 +10 dB , dB 가 . reference level offset -10 dB ~
 " R " .

Input Attenuation

Input attenuator



ATTEN ATTN [AUTO MNL]가
 ATTEN MNL (manual) STEP Numeric, STEP, Scroll
 ATTEN " AUTO "가 Input Attenuator

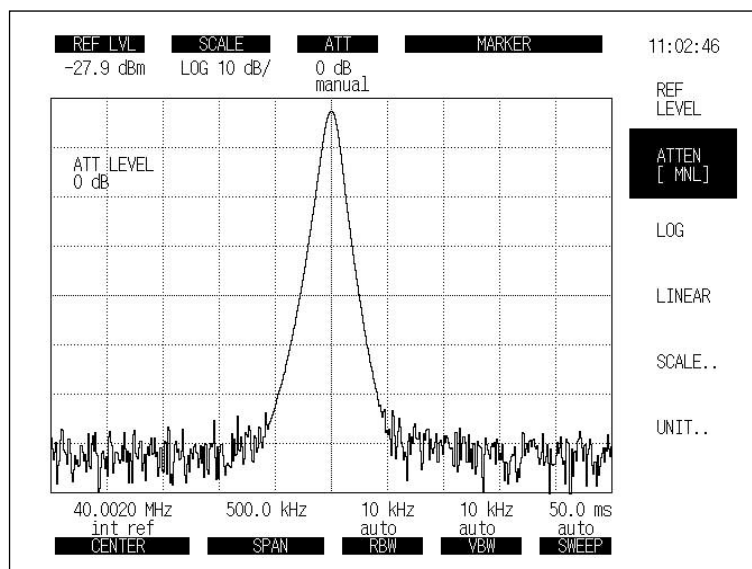


Fig 5 - 10.

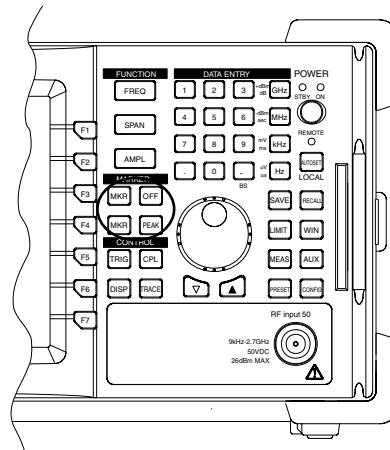
MARKER FUNCTIONS

Marker

MKR Normal Marker

OFF

Marker



Marker Position

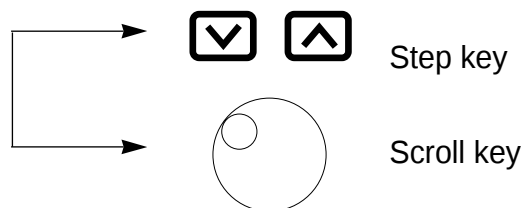
Marker 1 division step

STEP Up/Down

Up STEP Marker

, Down STEP

Scroll STEP span 1/500



Normal Marker

Normal Marker center ' ' Marker

Normal Marker ON 가 Marker

Normal Marker가 OFF Normal Marker ON

MKR

→ **MARKER NORMAL**

Normal Marker

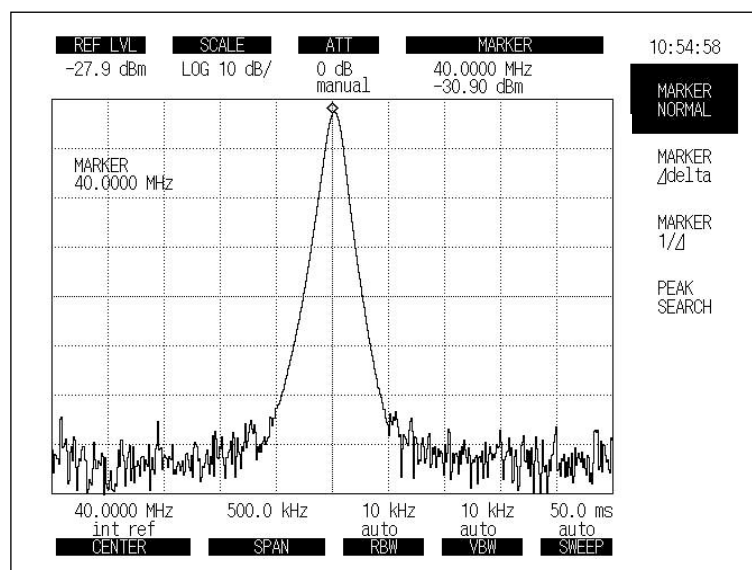


Fig 5 - 11. Normal Marker

Delta Marker

Delta Marker가 ON , Marker Marker ()
 가 . Normal Marker가 Marker, Normal Marker ()
)가
 Marker Normal Marker 가 Delta . Delta Marker
 Marker ' ' .
 Delta Marker ON .

MKR

MARKER DELTA

Delta Marker DELTA MARKER Marker Marker
 , Marker Delta Marker .

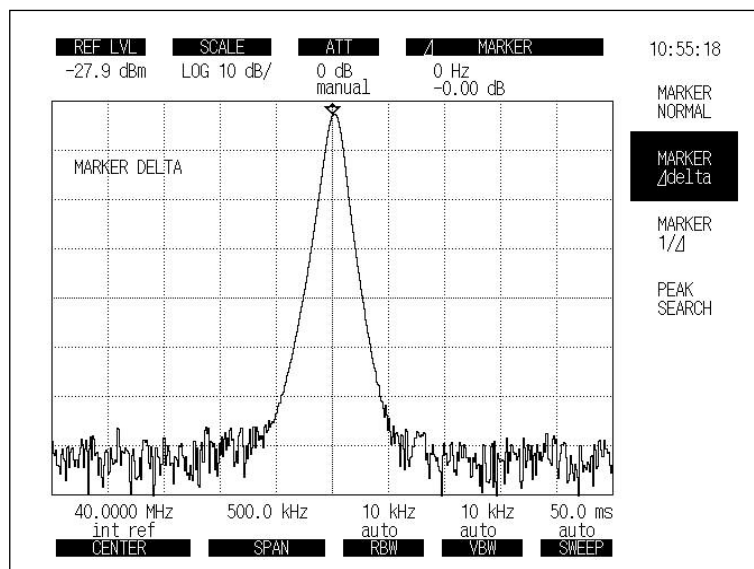


Fig 5 - 12. Delta Marker

Marker Off

Marker Marker .

OFF

PEAK SEARCH FUNCTIONS

SA - 7270 가 Marker Search :

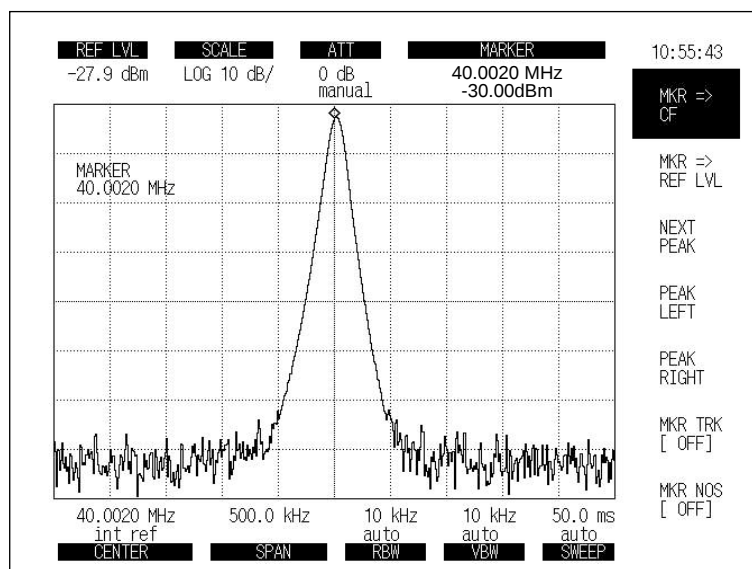
- Peak Search
- Next Peak Search
- Next Right Peak Search
- Next Left Peak Search

Peak Search

Peak Search 가 Marker

Peak Search

PEAK



5 - 13. Peak Search

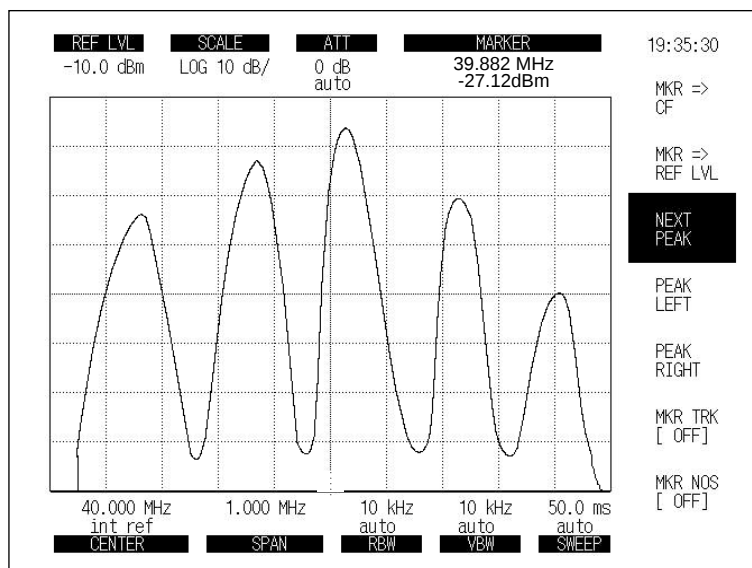
Next Peak Search

Next Peak Search Marker Peak Relative Marker
 . (Peak가 .)
 Next Peak .

PEAK

→ NEXT PEAK

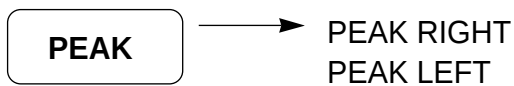
Next Peak Search Marker가 Peak .



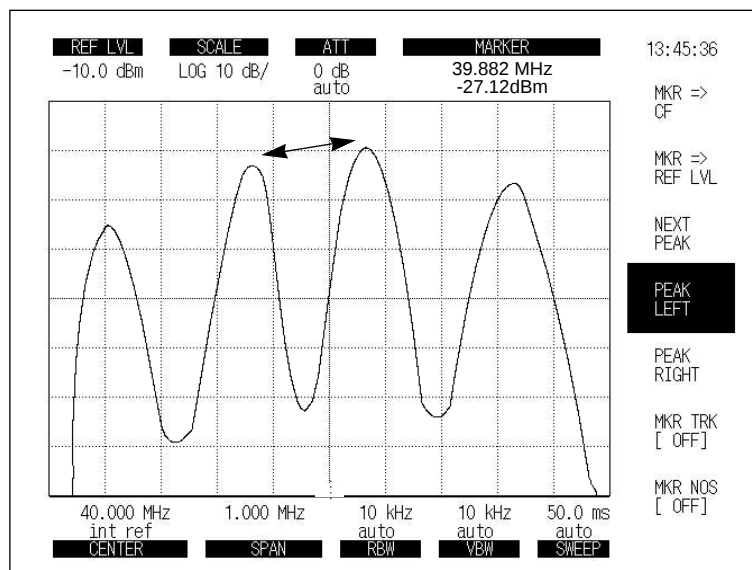
5 - 14. Next Peak Search

Peak Left Search / Peak Right Search

PEAK LEFT Search PEAK RIGHT Search Marker
 Peak Marker
 PEAK LEFT Search PEAK RIGHT Search



PEAK LEFT Search PEAK RIGHT Search
 Peak Marker가 Peak

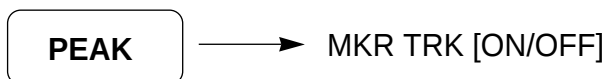


5 - 15. Next Peak Search[/]

Marker Track

Marker Track ON 가 ()

Marker Track :



Marker Track ON OFF

Marker Noise

Marker Noise가 ON , Marker Noise Power가 .
Noise Power RBW Noise .
Detector SAMPLE .
Marker Noise .
1) Delta Marker .
2) offset Noise Marker .
PEAK → MKR NOS [ON/OFF]
Marker Noise가 ON OFF .

Marker	Parameter
--------	-----------

Marker

Marker

가

- MKR -> CF : Marker center
- MKR -> REF LVL : Marker reference level
- MKR -> CF STEP : Marker center STEP
- Δ MKR -> CF : Δ Marker center
- Δ MKR -> CF STEP : Δ Marker center STEP
- Δ MKR -> Span : Δ Marker Span

(zero span)

MKR ->REF LVL

Marker	Parameter
--------	-----------

Marker

center

reference level

MARKER Shift

:

MKR >

→ MKR -> CF
MKR -> REF LVL

MKR -> CF STEP/ MKR DELTA -> CF STEP

Marker center step size . (step Up/down)

MKR >

→ MKR -> CF STEP

Step Up/Down center 가 , center
STEP Size Marker
(harmonic)

Δ MKR -> SPAN

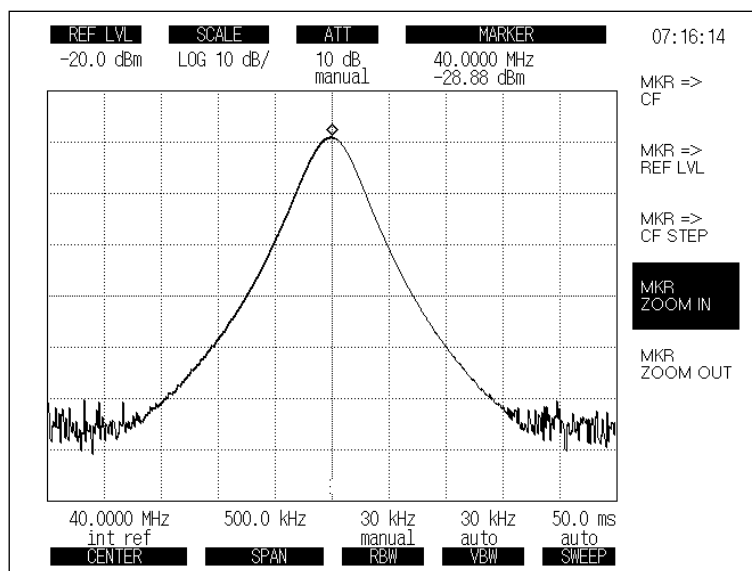
Δ Marker stop Δ Marker Marker Marker
start stop

MKR ZOOM IN / ZOOM OUT

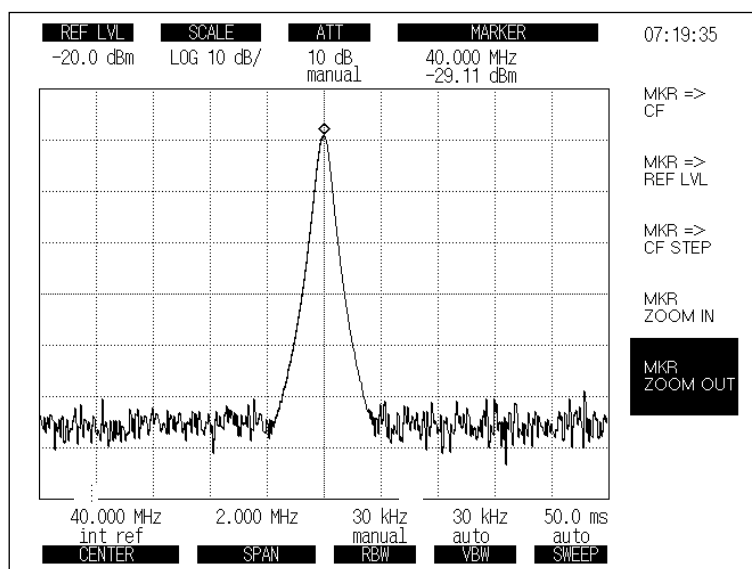
Marker 가 center

MKR ZOOM IN Span

MKR ZOOM OUT Span



5-16. Marker Zoom In



5-17. Marker Zoom Out

AUTOSET

AUTOSET

Peak

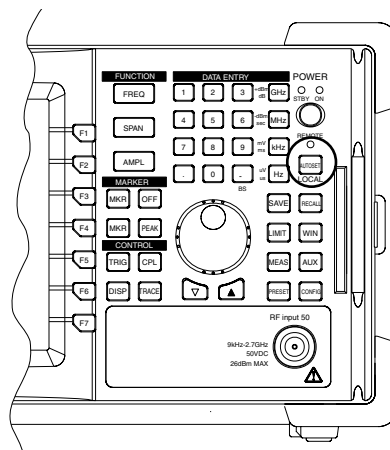
Remote LED가

Remote

Local

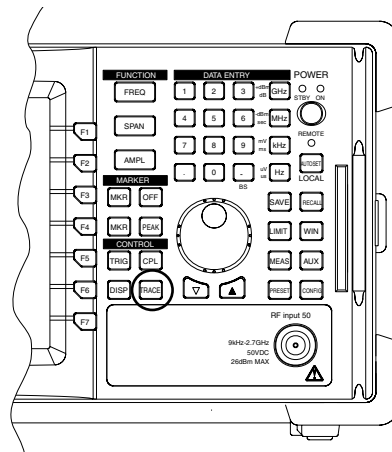
AUTOSET

- : 1. AUTOSET 6MHz 2.7GHz .
2. RBW, VBW, SWEEP TIME, ATT .
3. Normal Marker가 center .
4. AUTOSET Span 1MHz .



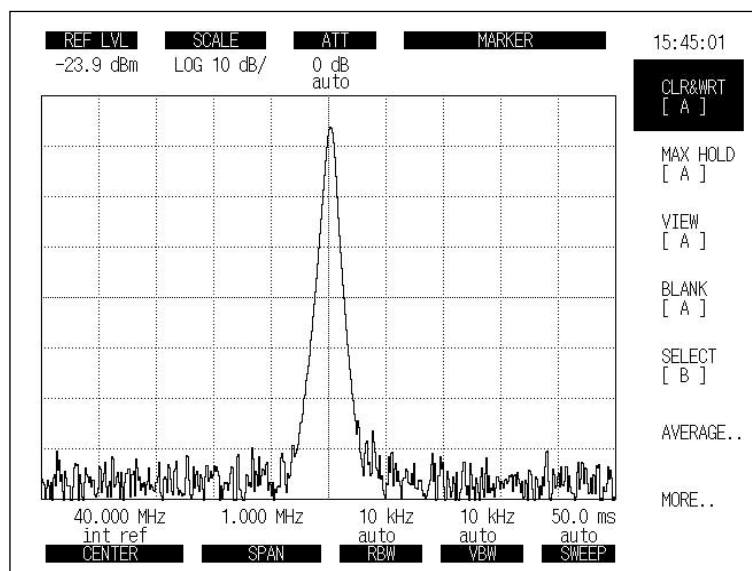
TRACE FUNCTIONS

TRACE trace



TRACE

가



5-18. Trace

Select Trace

Trace A B
Trace memory

TRACE → SELECT B[A]

CLR & WRT A[B]

Trace 가

TRACE → CLR & WRT A[B]

MAX HOLD A[B]

Sweep 가

MAX HOLD

TRACE → MAX HOLD A[B]

VIEW A[B]

A[B] Trace write
A[B]
가 CLR&WRT

TRACE → VIEW A[B]

BLANK A[B]

Trace
VIEW Trace가

TRACE → BLANK A[B]

Computation

Trace math :

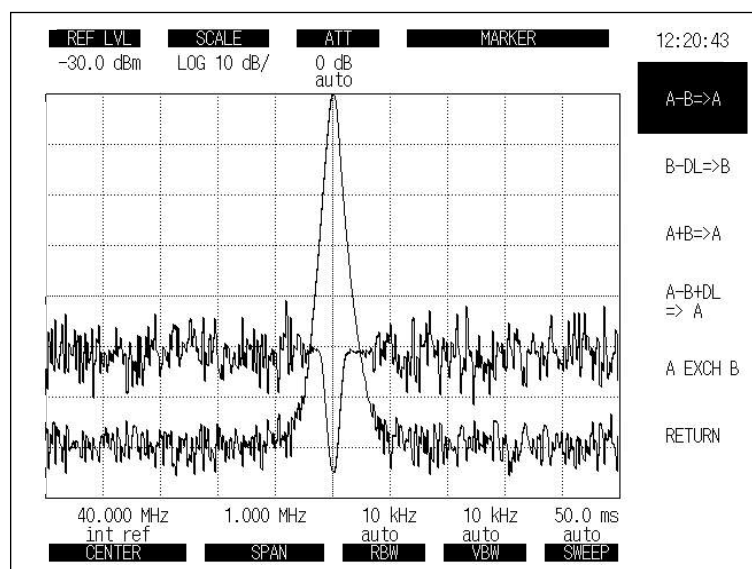
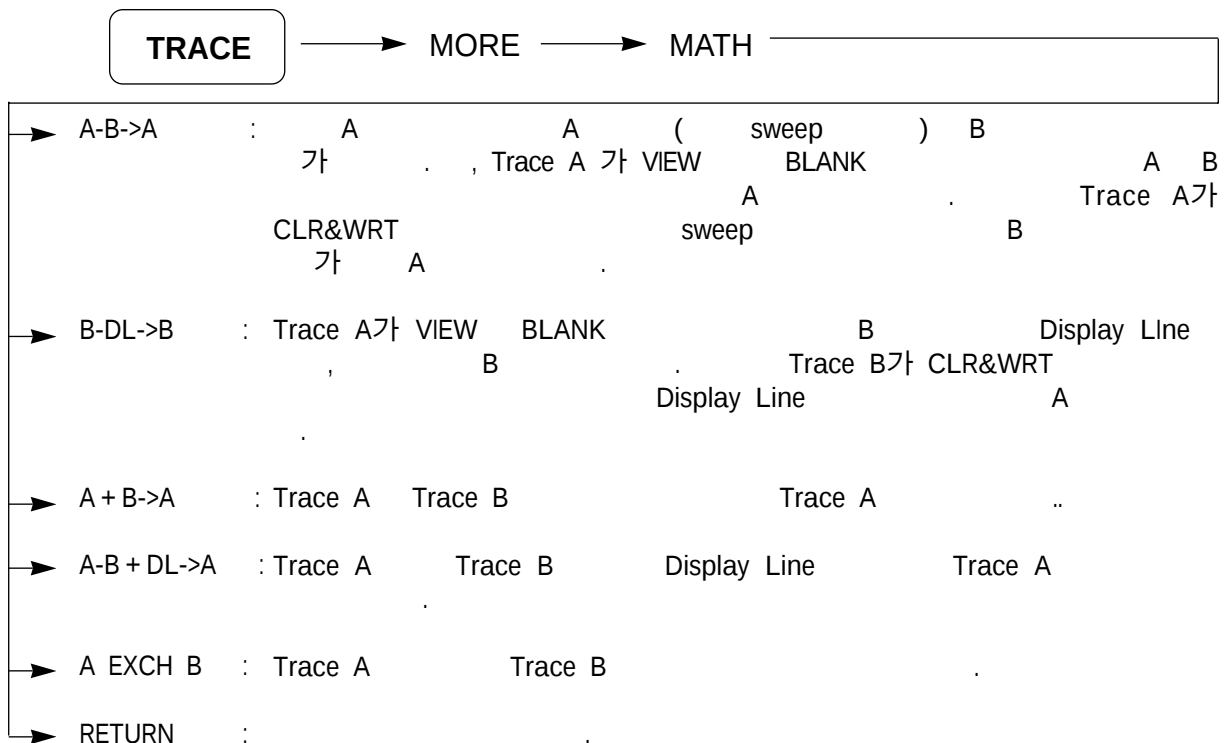


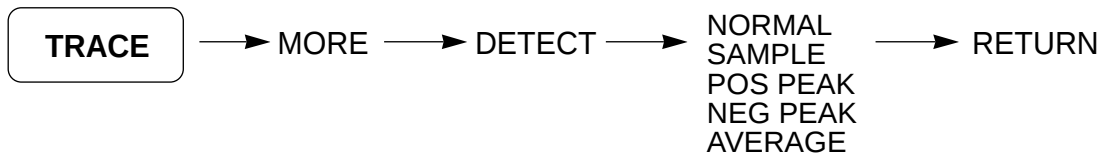
Fig 5-19. Trace Computation

Detection Mode

SA - 7270

가 detector 가

- NORMAL
- SAMPLE
- POS PEAK
- NEG PEAK
- AVERAGE



Video

SA - 7270 oversampling

RBW가

(Normal) detection

POS PEAK - NEG PEAK detection

가

가

NORMAL detection

가

detection

detection

SAMPLE detection

Trace

SAMPLE detection

noise

POS PEAK detection

Trace

NEG PEAK detection

Trace

NEG PEAK detection

envelope

AVERAGE detection

video

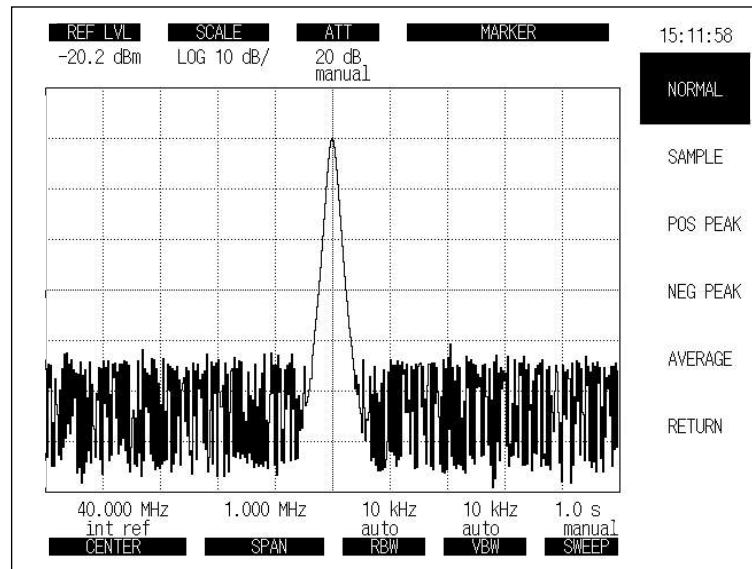
Trace Averaging

sweep

AVERAGE detection

POS Peak

NEG Peak



5-20. Detection Mode

Averaging Function

Average sweep 가
Average count sweep
Average :

S/N ()

TRACE

→ **AVERAGE**

→ AVERAGE [ON/OFF] : Average toggle ON/OFF
→ COUNT : Average count 2 256
Numeric , STEP , Scroll
→ CYCLE [ON/OFF] : Average count NON STOP/STOP
→ STOP : Average - sweeping
→ CONTINUE : STOP
→ RESET : Trace Average
→ RETURN :

Average Count Numeric Unit count
default 8
Video Average Average video sweep
time (VBW) Trace
sweep
Video (VBW) sweep sweep가
가
Video sweep

The diagram illustrates the front panel of the HP 8594A, a handheld spectrum analyzer. The controls are organized into several functional groups:

- Function Keys:** FREQ, SPAN, AMPL.
- Data Entry:** A numeric keypad (1-9, 0, DEL) for entering frequency and other numerical values.
- Power Controls:** STBY (Standby), ON (Power On), REMOTE (Remote Control), RESET, and LOCAL (Local Control) buttons.
- Marker Controls:** MKR (Marker), OFF (Off), and PEAK (Peak) buttons.
- Control Keys:** TRIG (Trigger), CPL (Cursor Position), DISP (Display), and TRACE (Trace) buttons.
- Rotary Knob:** A large central rotary knob for navigating through the instrument's menu system.
- RF Input:** A BNC connector for the RF input, labeled with the specifications: 9MHz-2.75GHz, 50VDC, 25dBm MAX.

A red circle highlights the **DISP** button, indicating its importance in the context of the document.

OFF Display Line



STEP Up/Down STEP 1 division
 Scroll STEP 0.1 dB

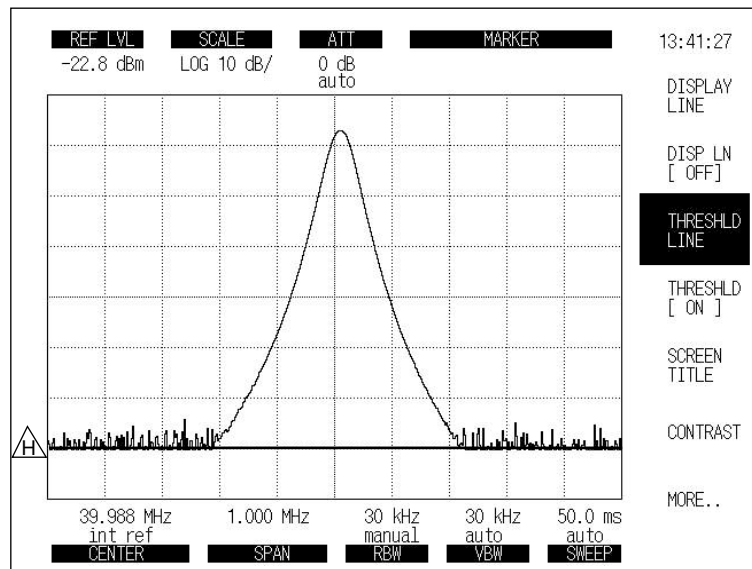
Threshold line

Threshold Line line .
 line Numeric , STEP , Scroll reference level level
 OFF , Threshold Line .

DISP

THRESHLD LINE
 THRESHLD LN[ON/OFF]

STEP Up/Down STEP 1 division .
 Scroll STEP 0.1 dB .

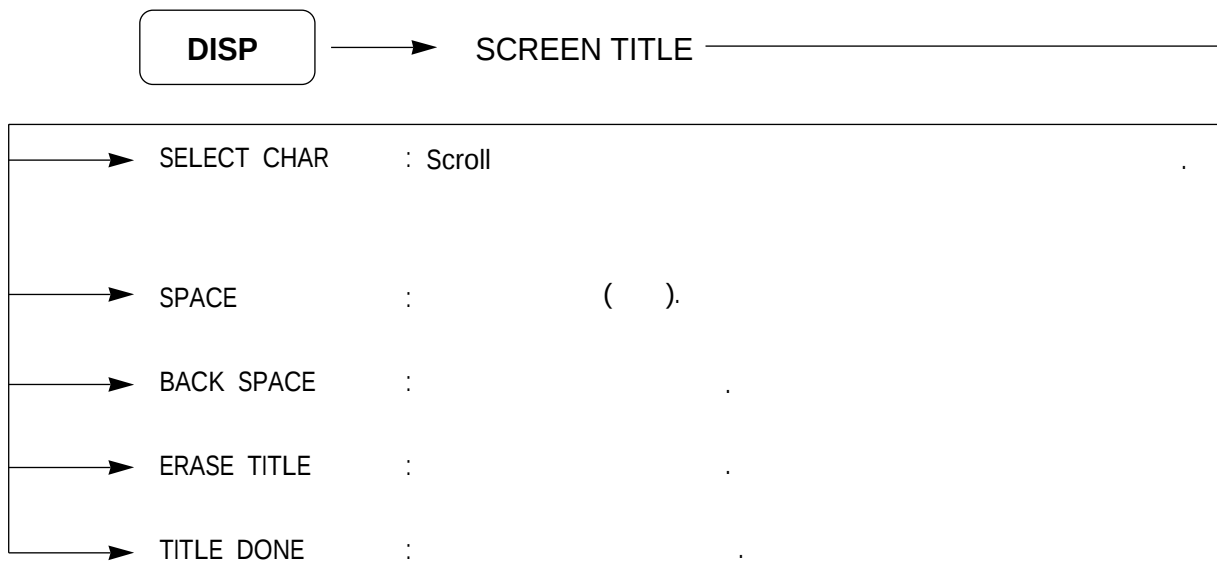


5-21. Display Function

Screen Title

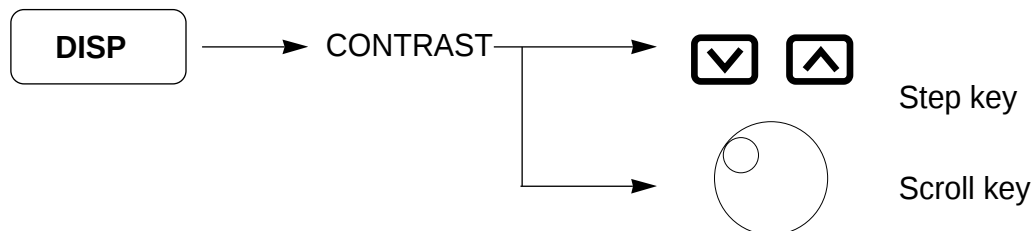
SCREEN TITLE

가



Contrast()

LCD contrast



LCD contrast

STEP Down

Scroll

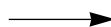
LCD contrast

STEP Up

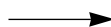
Scroll

GRAT [ON / OFF]

graticule toggle ON/OFF .
graticule :

DISP

MORE

GRAT
[ON/OFF]**ANNO[ON / OFF]**

annotation toggle ON/OFF .
annotation :

DISP

MORE

ANNO
[ON/OFF]

Annotation :

T : Triggered Mode

S : Single Sweep Mode

INVERSE [ON/OFF]

, toggle ON/OFF .
:

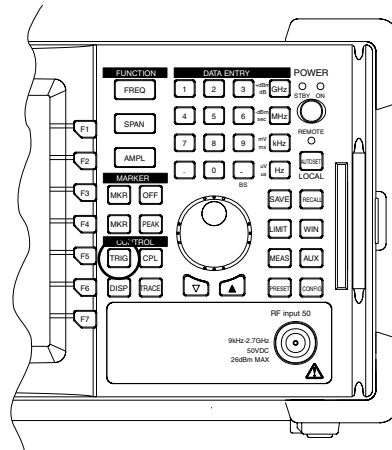
DISP

MORE

INVERSE
[ON/OFF]

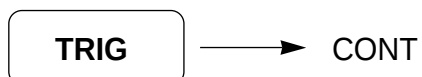
TRIGGER FUNCTIONS

TRIG trigger



Continuous Sweep Mode

Trigger 가 FREE RUN sweep
 Trigger 가 Triggered (trigger FREE RUN), trigger
 sweep가
 Continuous Sweep :



Single Sweep Mode

trigger 가 FREE RUN SINGLE sweep가
 trigger 가 Triggered (trigger FREE RUN) trigger
 sweep가
 Single Sweep :

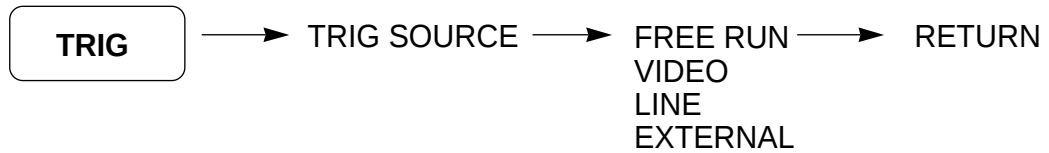


Triggered Mode

SA - 7270 trigger FREE RUN TRIGGER
Trigger VIDEO, LINE EXTERNAL trigger

Trigger Source

TRIGGER SOURCE :

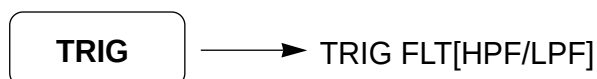


Trigger Filter

SA - 7270 trigger trigger 가 : High Pass Filter Low Pass Filter.
Low Pass Filter.

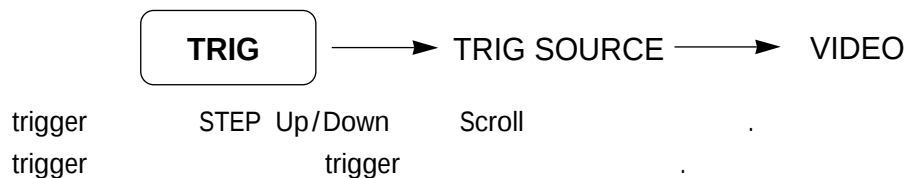
- LPF cutoff frequency : 100kHz
- HPF cutoff frequency : 5 Hz

TRIGGER FILTER



Trigger Level

VIDEO(ZERO SPAN) trigger 가 , trigger detected positive
leading edge sweep
trigger :



Line Trigger

AC

sweep . Line trigger
 trigger trigger Line trigger

External Trigger

trigger

sweep
 positive leading edge

Sweep

EXT TRIG

trigger TTL

Trigger Delay

Trigger 가 (trigger VIDEO, EXT LINE) trigger

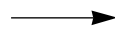
trigger

SA - 7270 가 trigger (display) delay time

: TRIGGER DELAY Zero - SPAN

Delay time

TRIG



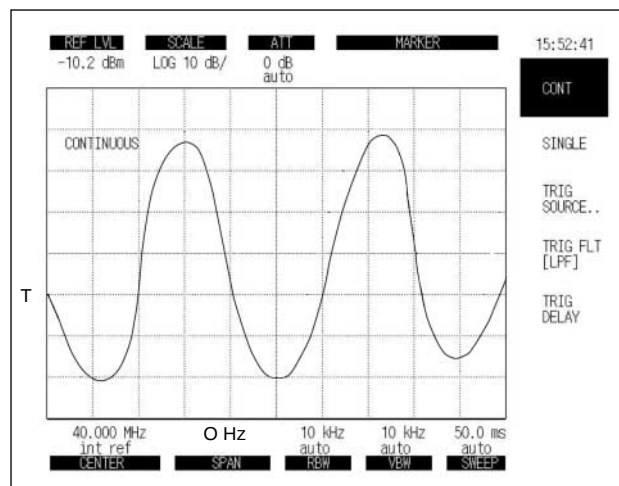
TRIG DELAY

Delay time Numeric , Scroll , STEP Up/Down

Zero - SPAN

Delay Time Pre - Trigger 가

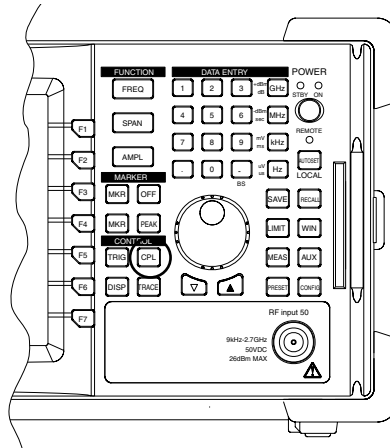
Delay Time Post - trigger 가



5-22. Trigger

COUPLED FUNCTIONS

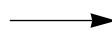
A - 7270 RBW, VBW, Sweep Time, Input Attenuation 가
 AUTO 가 Auto 가 : CPL AMPL.



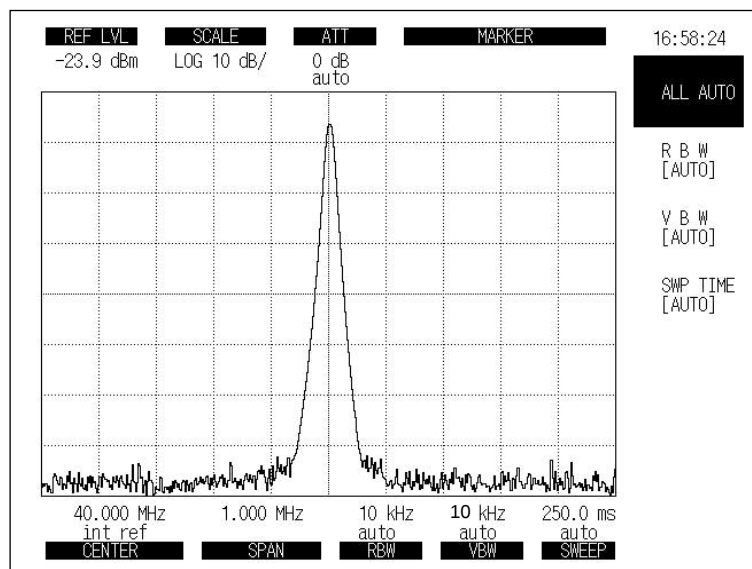
All Auto Function

Coupled 가 가 Auto Manual
 Auto

CPL



ALL AUTO



5-23. Couple

RBW and Sweep Time

(1) Auto

RBW, Sweep Time, VBW 가 Auto 가 Span .

Auto Setting Sweep Time Range :

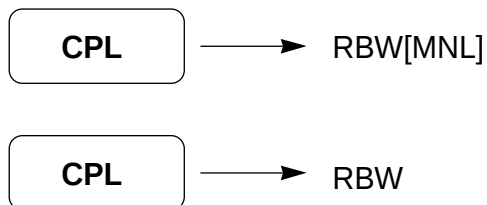
- Lower limit range : 50msec
- Upper limit range : 1000sec

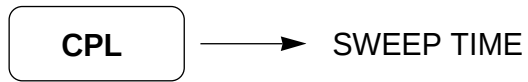
Span RBW, VBW, Sweep Time .

FREQUENCY SPAN	RBW	VBW	SWEEP TIME
1kHz ~ 9.9kHz	300Hz	300Hz	Sweep time sweep time SPAN, RBW, VBW .
10kHz ~ 99.9kHz	1kHz	1kHz	
100kHz ~ 299.9kHz	3kHz	3kHz	
300kHz ~ 999kHz	10kHz	10kHz	
1MHz ~ 1.99MHz	10kHz	10kHz	
2MHz ~ 4.99MHz	30kHz	30kHz	
5MHz ~ 5.99MHz	30kHz	30kHz	
6MHz ~ 19.99MHz	100kHz	100kHz	
20MHz ~ 59.9MHz	300kHz	300kHz	
60MHz ~ 199.9MHz	1MHz	1MHz	
200MHz	3MHz	1MHz	

(2) Manual

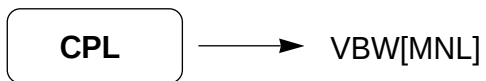
RBW/Sweep Time Manual :





Video Bandwidth(VBW)

VBW :



(1) Auto

VBW가 AUTO

VBW RBW

(2) Manual

RBW

VBW

noise

VBW

Manual

VBW

[10Hz, 30Hz, 100Hz, 300Hz, 1KHz, 3KHz, 10KHz, 30KHz, 100KHz, 300KHz, 1MHz, NONE]

: $VBW \geq RBW$

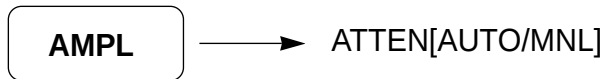
noise

sweep

가 가

Input Attenuator

Input attenuator :



(1) Auto

Auto가 reference level .

	Attenuation Auto
+ 30dBm ~ + 20.1dBm	50
+ 20dBm ~ + 10.1dBm	40
+ 10dBm ~ 0.1dBm	30
0dBm ~ - 9.9dBm	20
- 10dBm ~ - 19.9dBm	10
- 20dBm ~ - 110dBm	0

2)

가 reference level

, (gain compression)

high accuracy

, noise

AUTO

input attenuator .

input attenuator

:

	Attenuation Manual Level
+ 30dBm ~ - 60dBm	50
+ 30dBm ~ - 70dBm	40
+ 20dBm ~ - 80dBm	30
+ 10dBm ~ - 90dBm	20
0dBm ~ - 100dBm	10
- 10dBm ~ - 110dBm	0

RF

- 10dBm

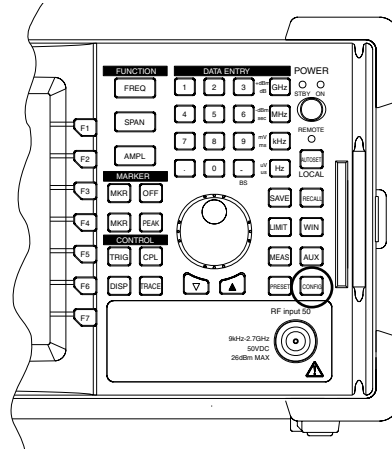
input attenuator .

CONFIGURATION

SA - 7270

CONFIG

configuration



Hard Copy

CONFIG

HARD COPY

Printer type

SA - 7270

- HP Laser Jet Printer
- PCMCIA (BMP FILE SAVE) -

CONFIG

HARD COPY SET

HP LASERJET

RETURN

PCMCIA

RS-232C Configuration

RS - 232C
RS - 233C

CONFIG

→ RS-232C CONFIG

→ BAUD RATE : (baud rate) . (: 19200bps)
→ DATA LENGTH : . (: 8bit)
→ STOP BIT : . (: 1 bit)
→ PARITY BIT : . (:)
→ RETURN :

GPIO Address

GPIO configuration

GPIO STEP Scroll

CONFIG

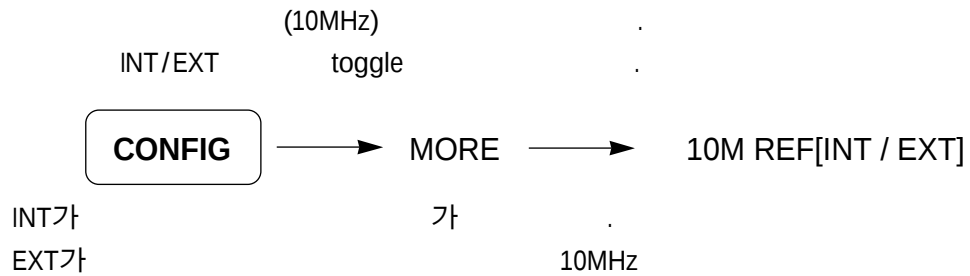
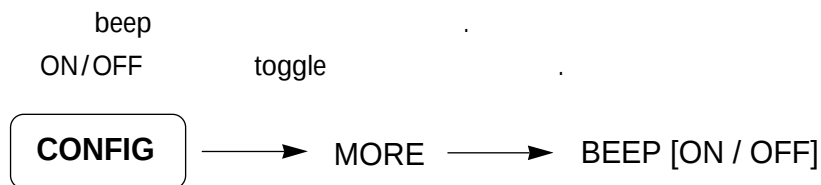
→ GPIO [XX] (0~31)

Clock Set

CONFIG

→ CLOCK SET

→ YEAR[XX] : Scroll STEP . (1996 ~ 2095)
→ MONTH[XX] : Scroll STEP . (1 ~ 12)
→ DAY[XX] : Scroll STEP . (1 ~ 31)
→ HOUR[XX] : Scroll STEP . (0 ~ 23)
→ MINUTE[XX] : Scroll STEP . (0 ~ 59)
→ SECOND[XX] : Scroll STEP . (0 ~ 59)
→ ENTER

10M REF [INT / EXT]**BEEP [ON / OFF]****Version information**

(F5) Software

PCMCIA Memory Card Function (option)

PCMCIA

/ , , (BMP)

:

- 1) PCMCIA Release 2.0 I .
- 2) : SRAM type 가 :
- 3) Format type
MS - DOS format
- 4) :
64kB, 128kB, 256kB, 512kB, 1MB, 2MB

format

format

- (1) Format (write protect) 가 (write available) .
: 가 가
- (2) .
- (3) format :

CONFIG

PCMCIA

- ➔ PCMCIA FORMAT : format
- ➔ FORMAT CHECK :
- ➔ MEMORY[INT/PCMCIA] :
- ➔ RETURN

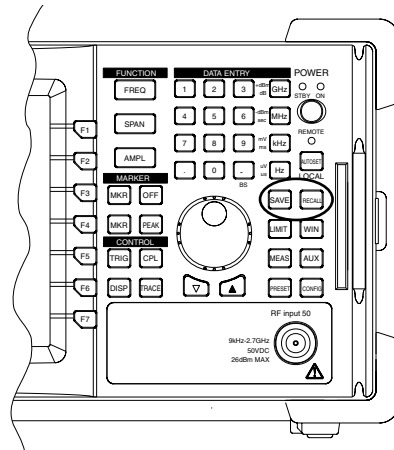
SAVE AND RECALL FUNCTIONS

SA - 7270

(Parameters)

(Trace)

()



Internal Register

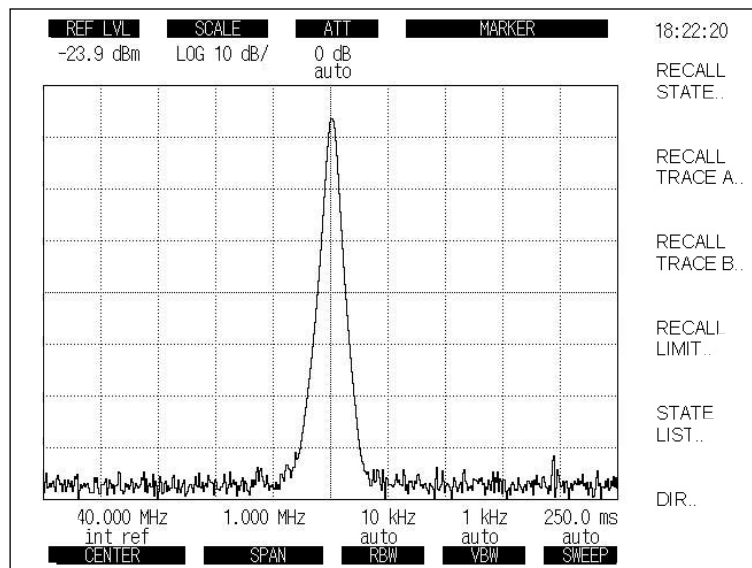
SA - 7270

Battery

(RAM)

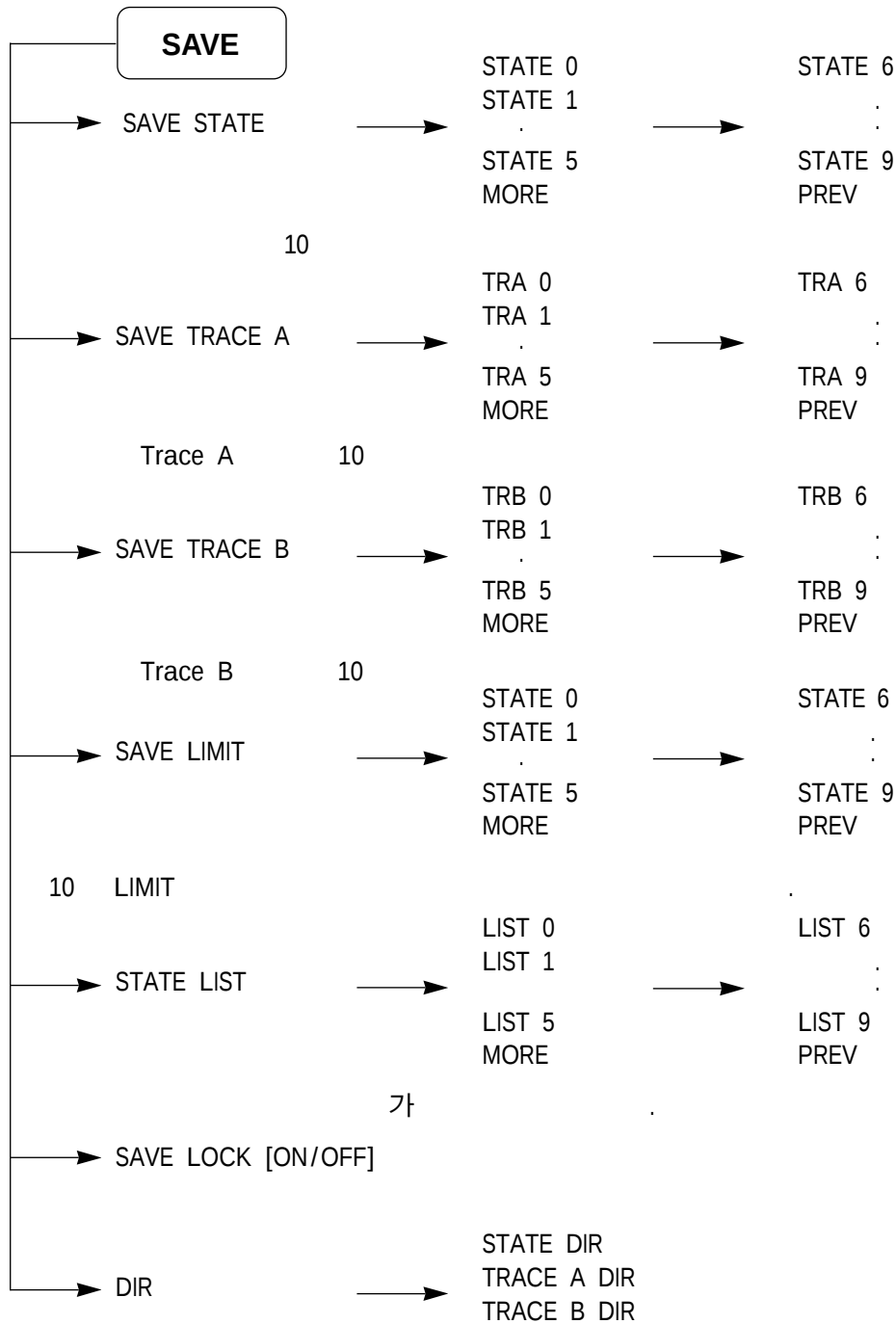
Internal register

- | | |
|----------------------------|------|
| A. Unit setting conditions | : 10 |
| B. Trace A waveform | : 10 |
| C. Trace B waveform | : 10 |
| D. Limit Line | : 10 |



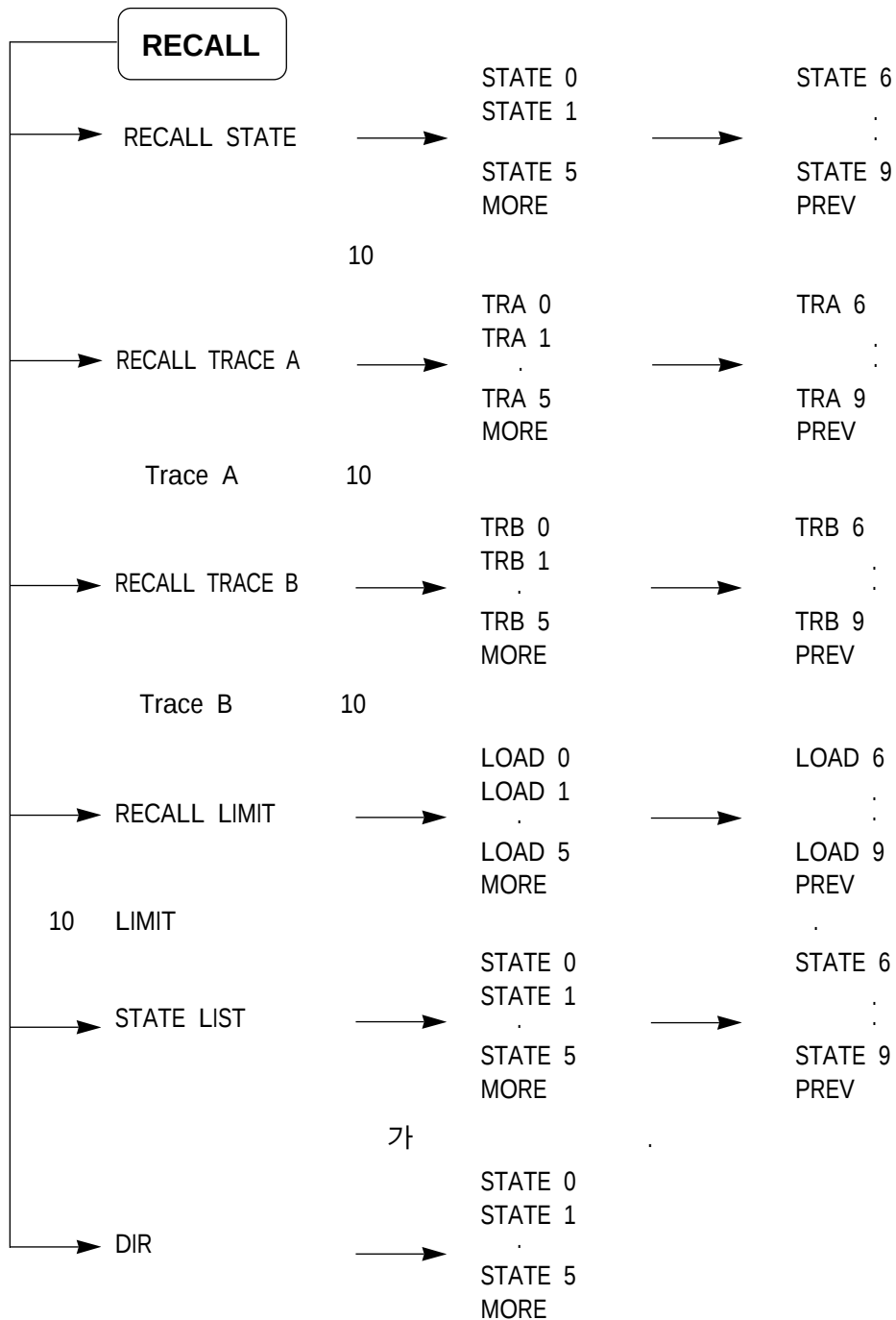
Save Parameters and Waveform

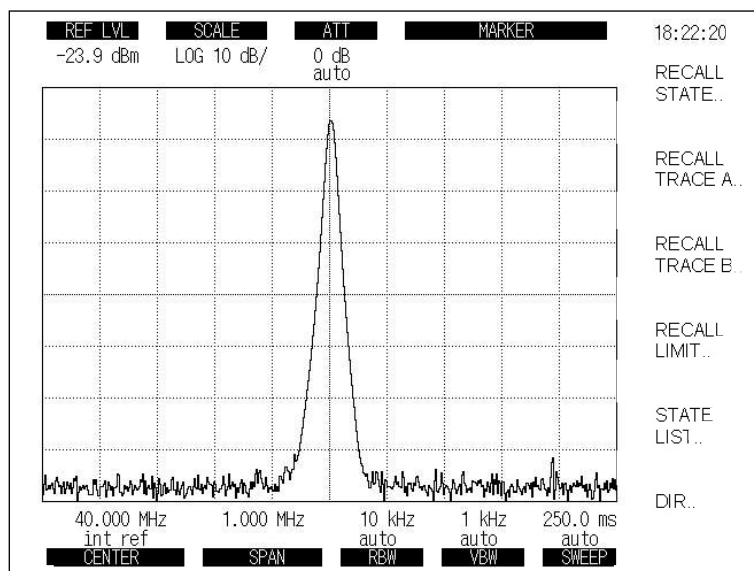
SAVE



Recall Parameters and Waveform

: RECALL



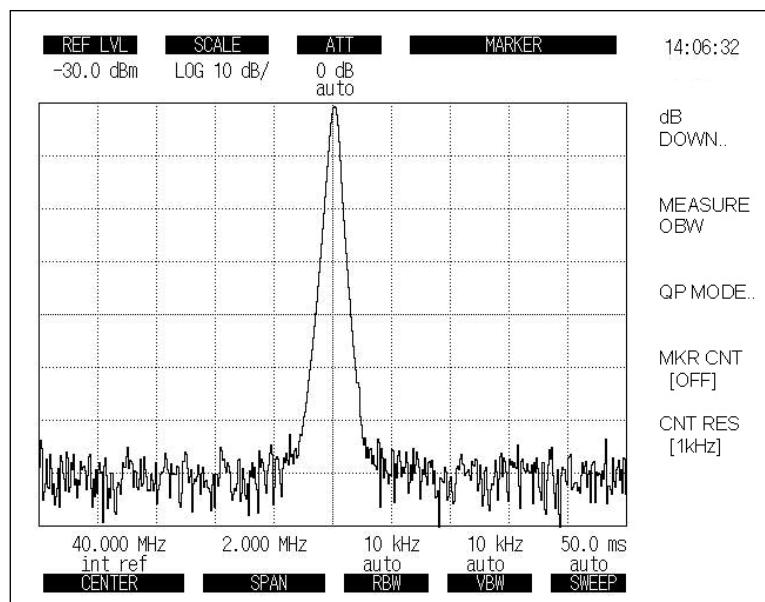
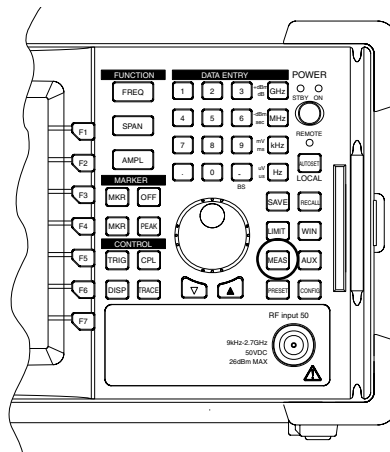


5-25. Recall

MEASUREMENT FUNCTIONS

SA - 7270 가 :

- X dB down measurement
- Occupied bandwidth measurement
- Marker Frequency Counter
- EMC measurement (option)

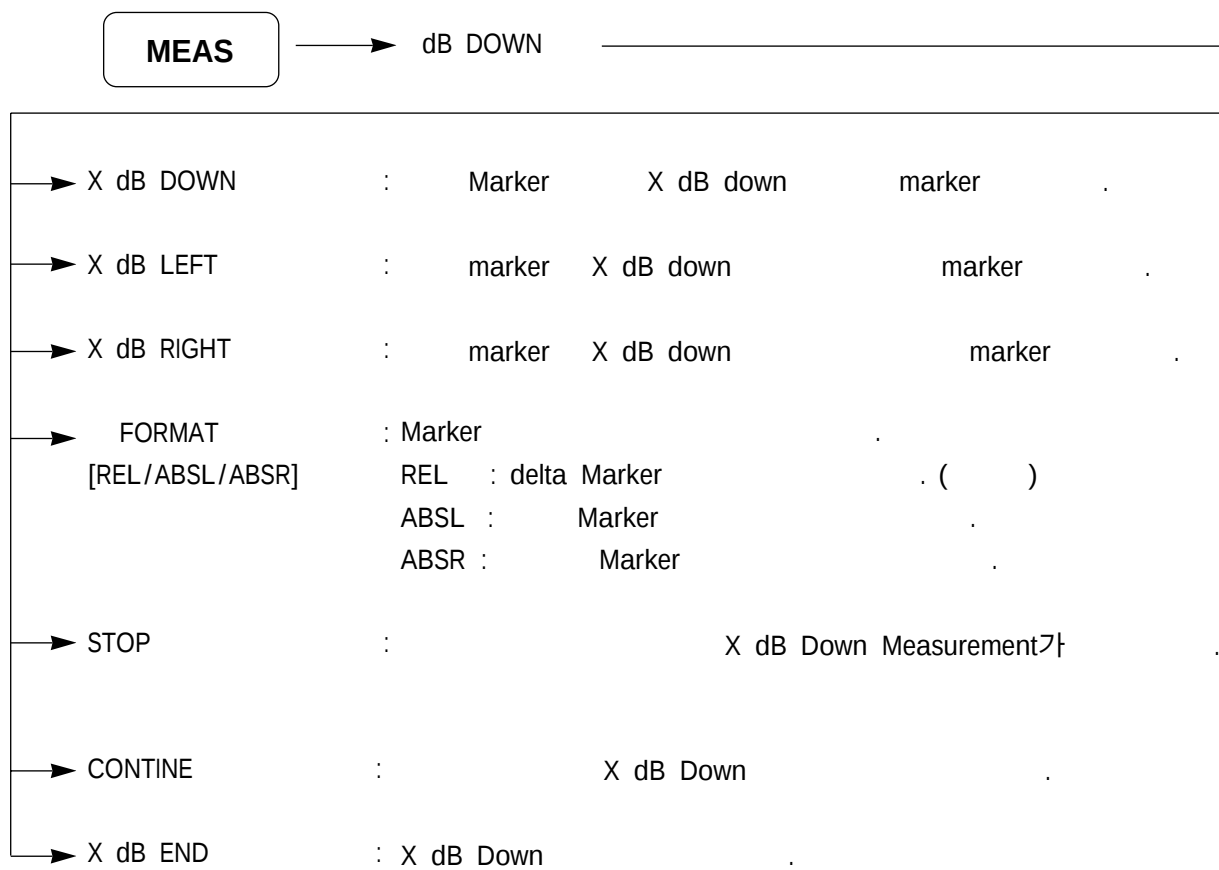


5-26. Measurement

X dB Down Measurement

X dB Down Marker X dB Down (Up) Marker
 () . dB STEP Scroll .
 Default 3dB .

X dB Down



(Occupied power Bandwidth measurement)

(OBW), (Fc), Marker

SA - 7270 OBW 가 10% ,

10% 99.8% 가

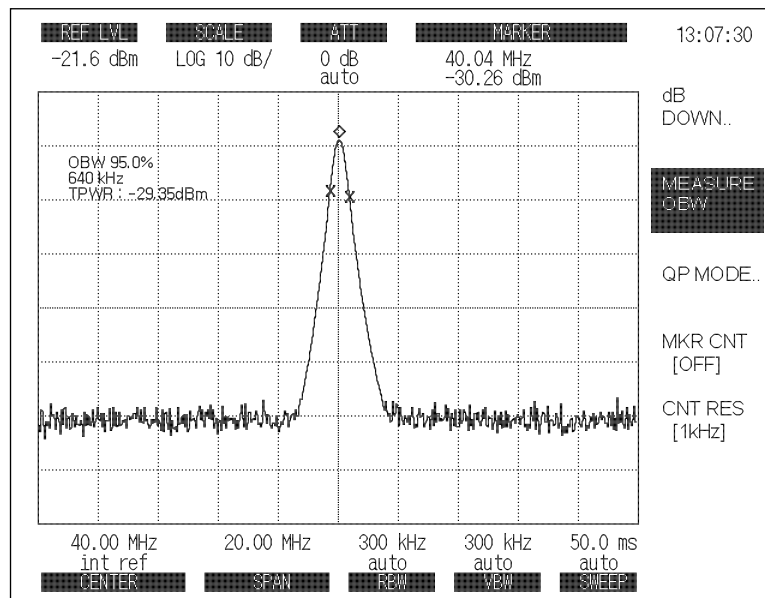
OBW

- (1) Center Normal Marker () , Span
RBW sweep time AUTO
- (2) Detect SAMPLE
- (3) (OBW) :

MEAS

MEASURE OBW

(Fc가)
“ × ” marker가 Marker



5-27. OBW

(4) (%) OBW (10%), (%)
Marker

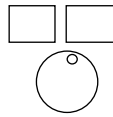
(5) TPWR Total Power

Change Value

1) 10% :

GHz

2)



F2 :MEASURE
OBW

Marker Counter

Marker
Marker

count gate가

MEAS

MKR CNT[ON/OFF]

COUNT 가 ON/OFF

Count resolution

MEAS

CNT RES

1 kHz
100 Hz
10 Hz
1Hz

RETURN

QP EMC Measurement (option)

EMC(Electro Magnetic Compliance) CISPR

Qusi - peak detect

MEAS

QP MODE

BAND B [9kHz]

RETURN

BAND C [120kHz]

Quasi - peak detect

QP detect 가

5dB/DIV

VBW

OFF

Channel Power

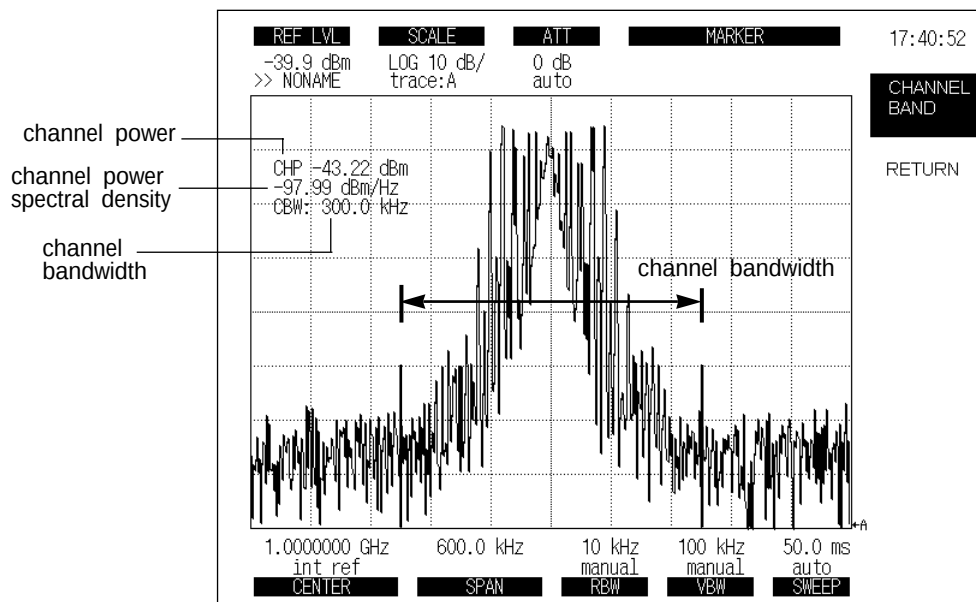
Channel Power center frequency channel bandwidth
power

Channel Power

- (1) channel bandwidth[F1] 가 , channel bandwidth
(sweep)
- (2) step/knob channel bandwidth가 , (sweep)
- (3) detect mode가 sample

Channel Power

- (1) center frequency : channel
- (2) RBW : $RBW < 0.025 \times \text{Channel Bandwidth}$
- (3) VBW : $10 \times RBW$
- (4) Sweep time : AUTO
- (5) SPAN : $SPAN = 2 \times \text{Channel Bandwidth}$
- (6) Detect mode : SAMPLE
- (7) Scale : log mode



5-28. Channel Power

Adjacent Channel Power(ACP)

upper band channel) . ACP (lower band channel,
channel bandwidth/space center frequency

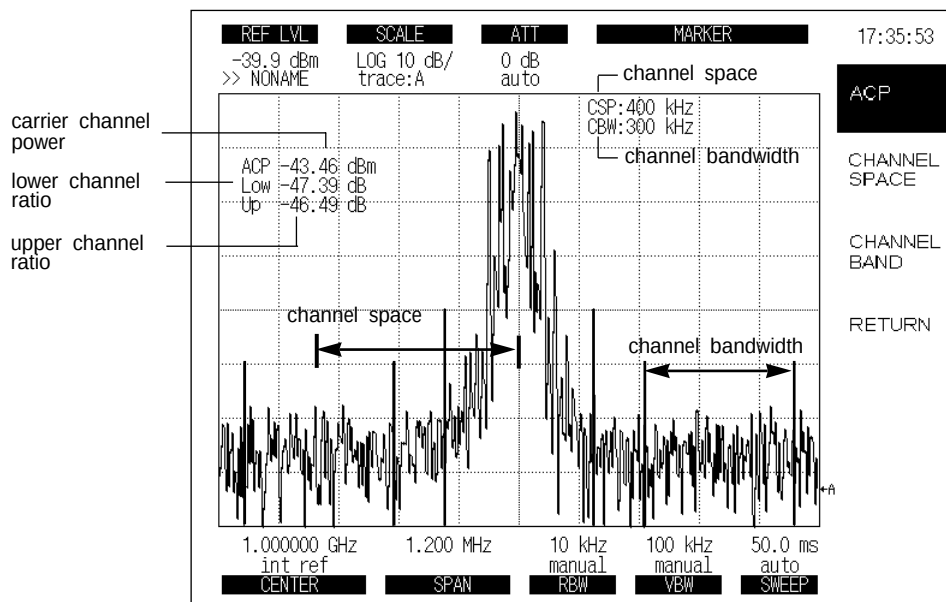
ACP(Adjacent Channel Power)

(1) ACP[F1] , channel bandwidth/space (sweep)

(2) detect mode가 sample

ACP

- (1) center frequency : carrier channel
- (2) RBW : $RBW < 0.025 \times \text{Channel Bandwidth}$
- (3) VBW : $10 \times RBW$
- (4) Sweep time : AUTO
- (5) SPAN : $SPAN > 2 \times \text{Channel Space} + \text{Channel Bandwidth}$
- (6) Scale : log mode

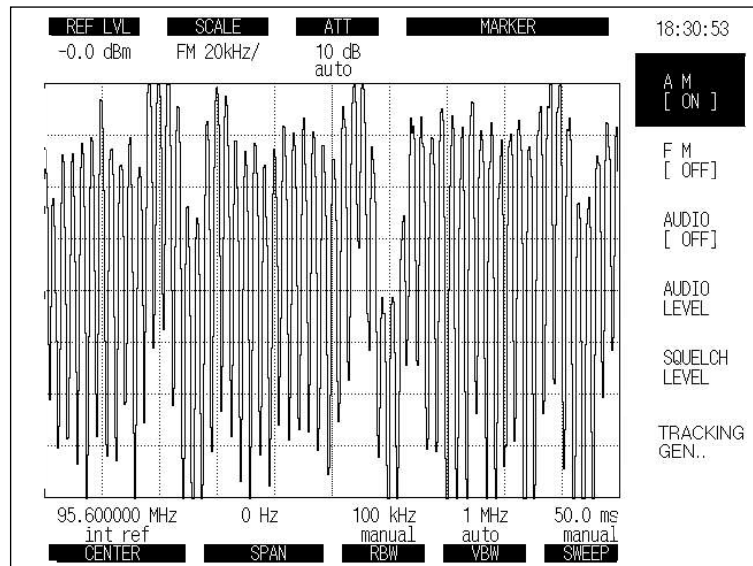
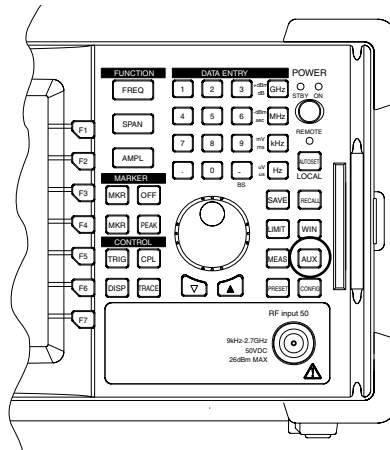


5-29. ACP

DEMODULATION AND AUDIO FUNCTIONS

SA - 7270 demodulation

- AM Demodulation
- FM Demodulation
- Audio ON/OFF, Audio Level Control, Squelch Function
- Tracking Generator ON/OFF, Output level control



5-30. AUX

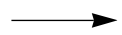
AM Demodulation

AM

center

AM

AUX



AM[ON/OFF]

toggle

AM

ON/OFF

SA - 7270

AM

scale 571

scale

Scale

AUX



AM[ON]



AM/FM SCALE



25[%]/DIV

20[%]/DIV

10[%]/DIV

5[%]/DIV

2.5[%]/DIV

FM Demodulation

FM

center

FM

AUX



FM[ON/OFF]

toggle

FM

ON/OFF

SA - 7270

FM

scale 671

scale

Scale

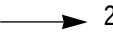
AUX



FM[ON]



AM/FM SCALE



25[kHz]/DIV

20[kHz]/DIV

10[kHz]/DIV

5[kHz]/DIV

2.5[kHz]/DIV

1[kHz]/DIV

Audio Monitor

SA - 7270

AUDIO ON/OFF ON OFF

AUDIO LEVEL STEP Up/Down Scroll

8 (0 ~ 7)

3

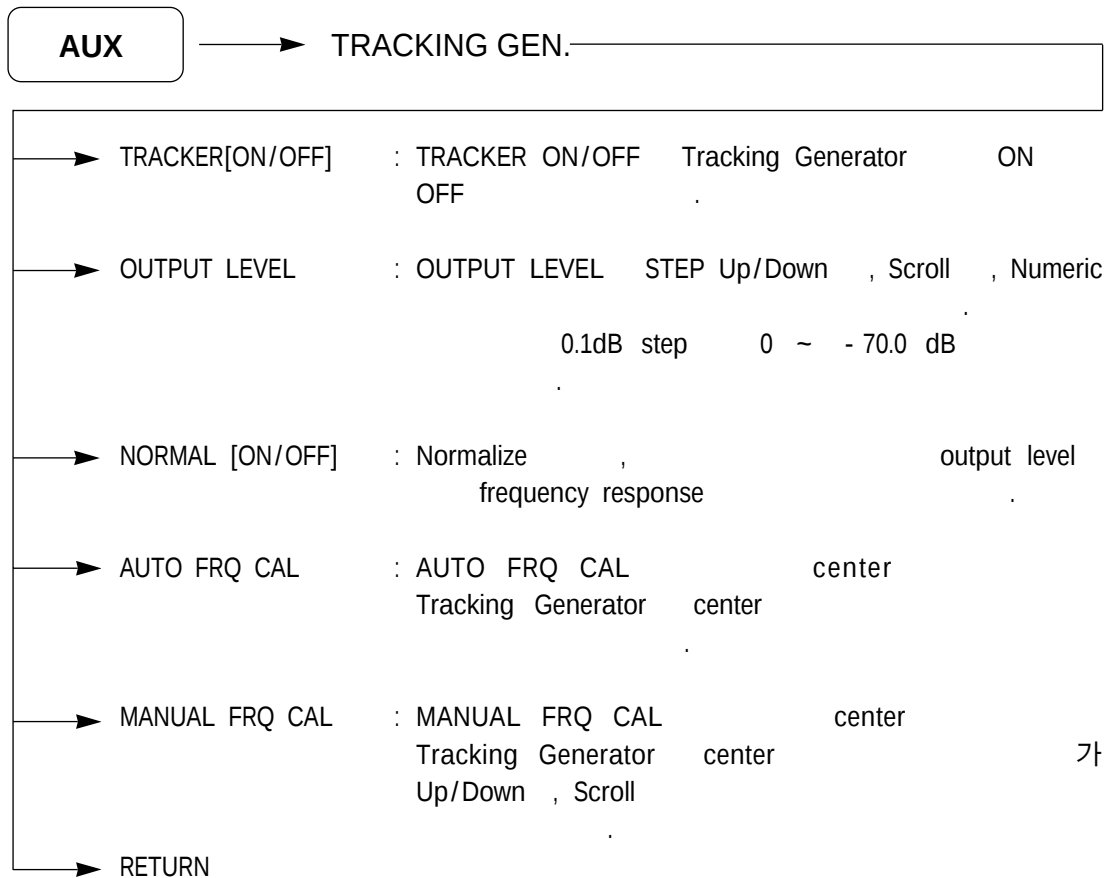
SQUELCH 256 STEP Up/Down

Scroll 127

TRACKING GENERATOR ()

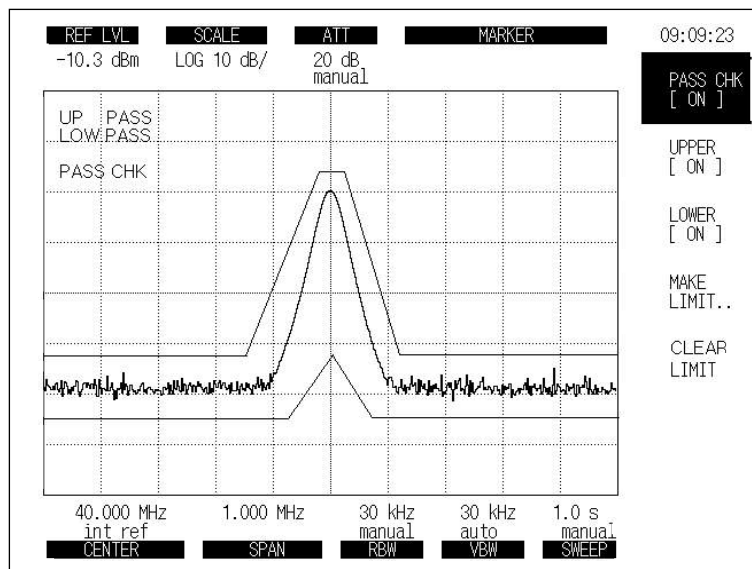
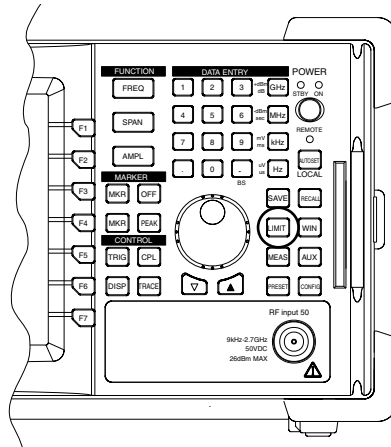
SA - 7270 Tracking Generator

Tracking Generator



LIMIT LINE FUNCTIONS

LIMIT limit line



5-31. Limit Line Function

LIMIT LINE FUNCTION

가 /

LIMIT line
/ :
LIMIT line 가()
가
Up/Down step (Y) LIMIT line
Scroll (X) LIMIT line
LIMIT line :

LIMIT

MAKE LIMIT

→ SELECT[LOW/UP] : /
→ MARK DOT : X Y
→ ACCEL[ON/OFF] : LIMIT line
ON: 1 division, OFF: 1
→ UNDO : Mark dot
→ CLEAR : LIMIT line
→ RETURN :

PASS/FAIL

/ PASS가 FAIL

LIMIT

PASS CHK[ON/OFF]

ON

LIMIT

UPPER[ON/OFF]

ON

LIMIT

LOWER[ON/OFF]

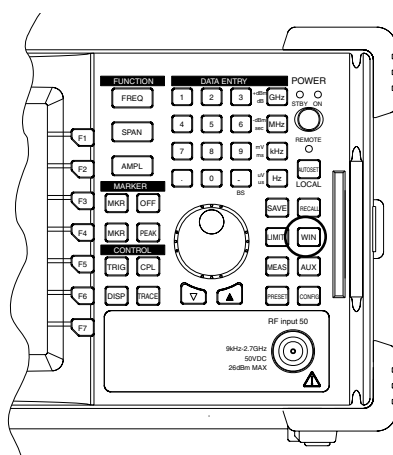
ON PASS - CHECK fail BEEP

LIMIT

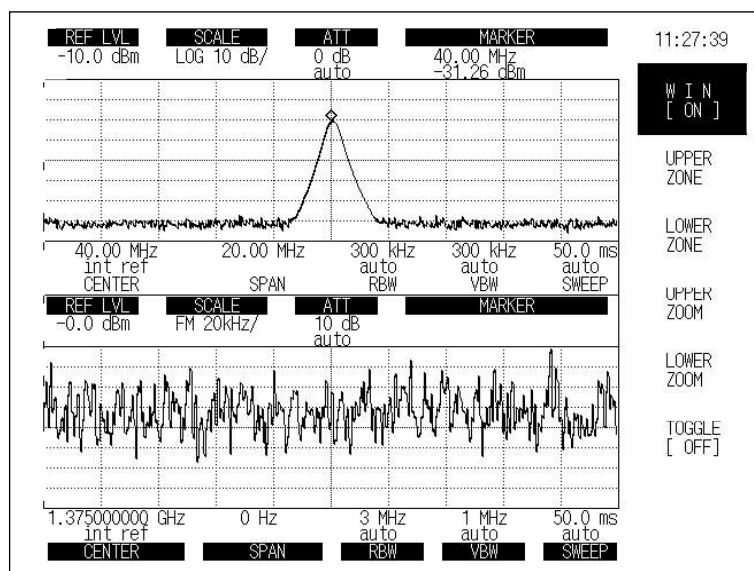
ALARM[ON/OFF]

WINDOW FUNCTIONS

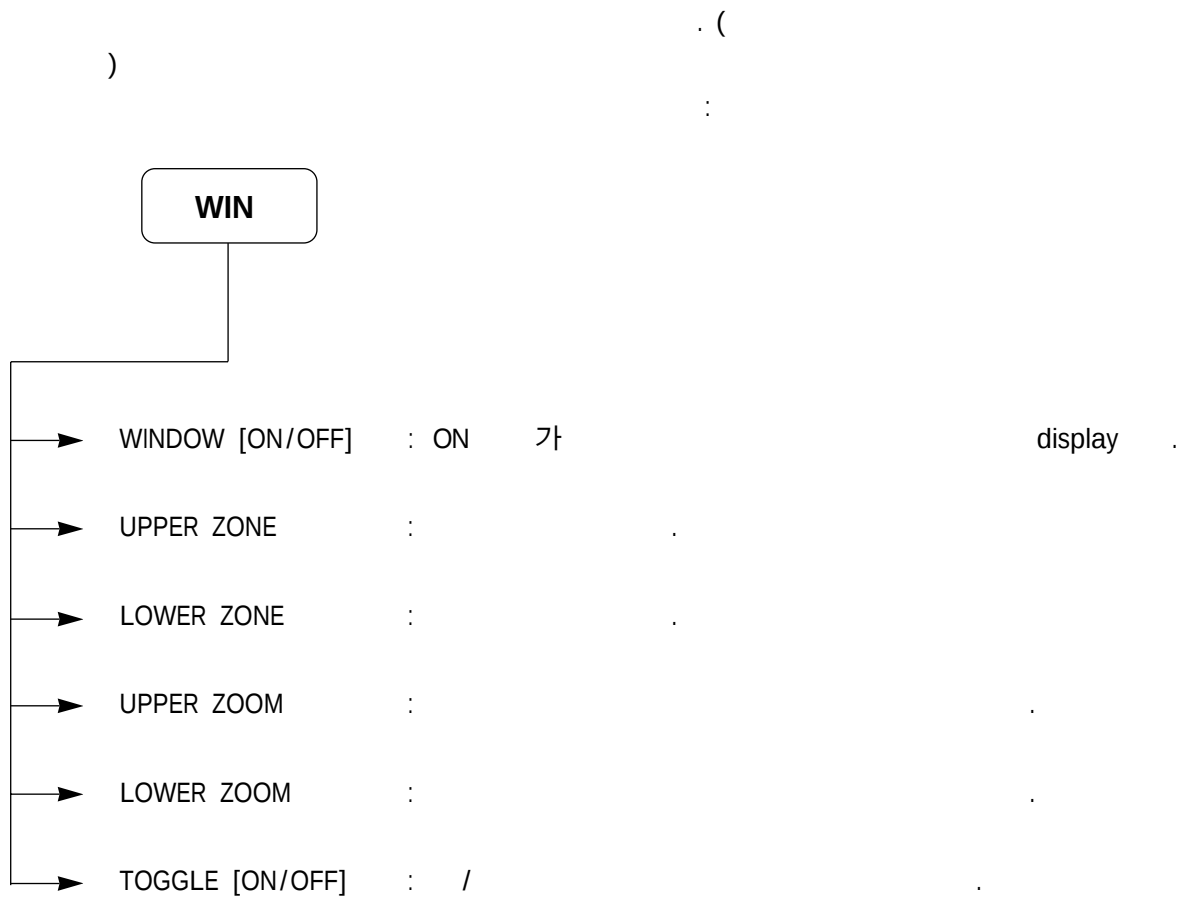
WIN



ON



5-32 Window Function



Preset 가

- PRESET
- LAST STATE
- ALL CAL
- CAL MODE
- CAL SIG [ON/OFF]
- AUTO CAL [ON/OFF]

Preset parameter가

Center Frequency	:	1.375GHz
Frequency Span	:	2.75GHz
Reference Level	:	0 dBm
Detector	:	LOG
Scale	:	10 dB/DIV
Sweep Time	:	50 msec, AUTO mode
RBW	:	3MHz, AUTO mode
VBW	:	1MHz, AUTO mode
ATTEN	:	10 dB, AUTO mode
Trigger	:	Free Run
Marker	:	OFF
Display Line	:	OFF
Threshold Line	:	OFF
Trace Detector Mode	:	POS PEAK
Contrast	:	60%

LAST STATE

LAST STATE parameter가

ALL CAL

ALL CAL system calibration

CAL Mode

CAL MODE system calibration 가

- YIG CAL : YIG tuning curve recalibration
- RBW CAL : drift gain error RBW
- LEVEL CAL : gain error
- SPAN CAL : SPAN attenuator error sweep gain
- LOG AMP CAL : drift LOG amp

CAL SIGNAL

CAL SIGNAL ON , calibration 가
calibration 40MHz, - 30 dBm

AUTO CAL[ON/OFF]

AUTO CAL ON , calibration routine calibration
AUTO CAL OFF

6

가

	.....	6 - 3
	.....	6 - 4
	.....	6 - 6
	.....	6 - 6
Center	.....	6 - 8
Span	.....	6 - 11
(RBW), ,	.....	6 - 14
	.....	6 - 20
	.....	6 - 22
	.....	6 - 24
	.....	6 - 30
	.....	6 - 32
	.....	6 - 35
2	.....	6 - 37
	.....	6 - 39
Residual FM	.....	6 - 41
	.....	6 - 43
Spurious	.....	6 - 46
	.....	6 - 48
VSWR.....	.....	6 - 50

< >

6.1

SA - 7270

-
- Center
- Span
- (RBW),
- ()
-
-
-
-
-
-
-
- Residual FM
-
- Spurious
-
- VSWR

가

. 1

LG

6.2

(1/2)

()			
Synthesized Signal Generator (MG3633A) (HP 8648C)	SSB External reference input	10 kHz ~ 2.7 GHz 1 Hz -20 dBm ~ 0 dBm 0.1 dB ≤ 130 dBc/Hz (10 kHz offset) ≤ 30 dBc 0 % ~ 100 % 0.1 ~ 400 Hz 10 MHz	Frequency-span readout accuracy Resolution Bandwidth , selectivity Sideband noise Amplitude display linearity Reference level accuracy Second harmonic distortion Resolution bandwidth switching error Input Attenuator switching error
Attenuator (Attenuator 1 = HP8494 Attenuator 2 = HP8496)	Attenuation Repeatability Attenuation Repeatability	DC ~ 26.5 GHz 0 ~ 11 dB (1 step) ≤ 0.01 dB (≤ 0.05 dB , 18 ~ 26.5 GHz) DC ~ 26.5 GHz 0 ~ 110 dB (10 step) ≤ 0.01 dB (≤ 0.05 dB , 18 ~ 26.5 GHz)	Amplitude display linearity Input attenuator switching error
Power Meter (HP 437B)	Power resolution	100 kHz ~ 110 GHz -70 dBm ~ 44 dBm 0.001 dB	Frequency response Reference level accuracy Input attenuator switching error
Power sensor (HP8481A)	VSWR(max) Power range	10 MHz ~ 18 GHz 1.4 (10 MHz ~ 30 MHz) 1.18(30 MHz ~ 50 MHz) 1.18(2 GHz ~ 12.4 GHz) -30 dBm ~ +20 dBm	Frequency response Reference level accuracy Input attenuator switching error 1.1(50 MHz ~ 2 GHz) 1.28(12.4 GHz ~ 18 GHz)

(2/2)

()			
Power sensor (HP8481D)	VSWR (max)	10 MHz ~ 18 GHz 1.4 (10 MHz ~ 30 MHz) 1.15(30 MHz ~ 4 GHz) 1. 3(10 GHz ~ 15 GHz) 2. 35(15 GHz ~ 18 GHz)	Frequency response Reference level accuracy Input attenuator switching error 1.2 (4 GHz ~ 10 GHz)
	Power range	-70 dBm ~ -20 dBm	
Power Combiner (HP11636A)		DC ~ 18 GHz 50 Ω	Frequency response Frequency measurement accuracy Reference level accuracy
50 Ω terminator (HP 909F)	VSWR	DC ~ 6 GHz (~ 18 GHz) 1.005 (DC ~ 5 GHz)	Average noise level 1.01 (5 ~ 6 GHz) 1.15 (6 ~ 18 GHz)
Frequency Counter (HP 5350B)	1 Hz ~ 1 MHz 1 Hz 0.1Hz 0.01 Hz 0.001 Hz (Max)	10 Hz ~ 20 GHz 10 MHz ~20 GHz 10 MHz ~ 80 MHz 1 MHz ~ 10 MHz 100 kHz ~ 1 MHz 10 Hz ~ 100 kHz + 7 dBm (N- type) 1 Vrms (BNC-type)[1M Ω] + 25 dBm (N-type) 250 V(dc ~ 5 kHz) 5.5 Vrms (+ 28 dBm)	Reference oscillator frequency stability + 10 dBm (BNC-type)[50 Ω]

가

6.3

SA - 7270

30 warm - up ,
calibration warm - up
AC

Noise, , ,

6.3.1

(10MHz) 0 40

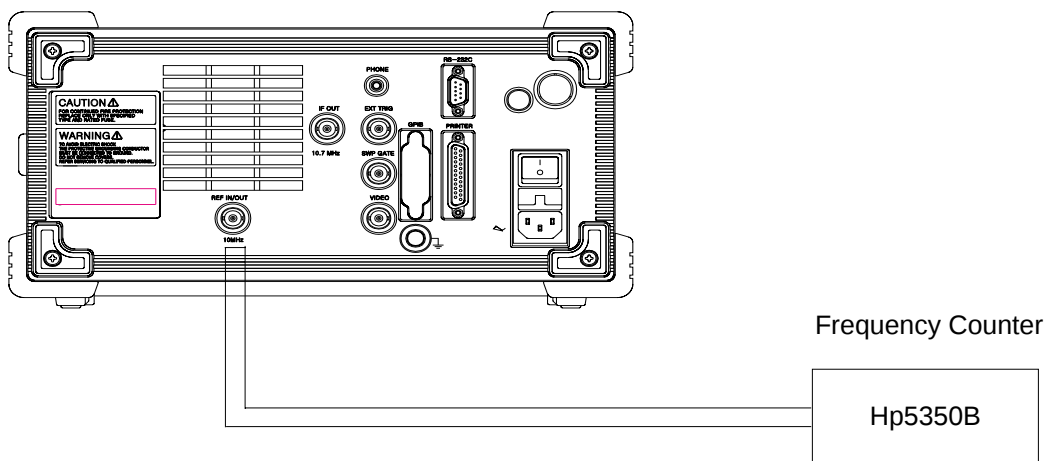
6.3.1.1

- : 10 MHz
- Aging rate : $\leq 1 \times 10^{-6}$ / year
- 25 $\pm$ 5 24
- : 25 0 40 $\leq 2 \times 10^{-6}$

6.3.1.2

- Frequency counter (HP5350B)

6.3.1.3



<Reference Oscillator Frequency Stability Test>

6.3.1.4

6.3.1.4.1 Temperature stability

: 가 .

-
1. 25 SA - 7270 .
 2. SA - 7270 , SA - 7270 가 .
(가 1.5)
 3. 가 0.1Hz 가 .
 4. 40 .
 5. SA - 7270 가 .
 6. .

$$= \frac{(40) - (25)}{(25)}$$

6.3.2.4

1. SA - 7270 , SA - 7270

2. SA - 7270 [PRESET]

3. [PRESET] , [ALL CAL]

4.

Frequency : 1300 MHz

Power : - 10 dBm

5. SA - 7270

center frequency : 1300 MHz

Reference level : 0 dBm

Couple : All Auto

Span : 50 kHz

6. SA - 7270 Attenuator 10dB
7. Marker marker

8. span 4 7

9. center

Center : $\pm (\times$
 $+ \text{Span} \times \text{Span} + 0.5 \times \text{RBW})$
 : 2 ppm
 Span : 3 %

(MG3633A)	SA-7270		(MHz)			
	Span	Center				
: 1300 MHz : - 10 dBm	50 kHz	1300 MHz	1299.9935		1300.0066	
	200kHz		1299.9890		1300.1107	
	1 MHz		1299.9650		1300.0351	
	2 MHz		1299.9350		1300.0651	
	5 MHz		1299.8449		1300.1551	
	10 MHz		1299.6949		1300.3051	
	20 MHz		1299.3949		1300.6051	
	50 MHz		1298.4949		1301.5050	
	100 MHz		1296.9949		1303.0050	
	500 MHz		1284.9949		1315.0050	

6.3.3 Span

system
 division
 division
 Signal Generator.
 $\text{span} \times 0.8$
 division

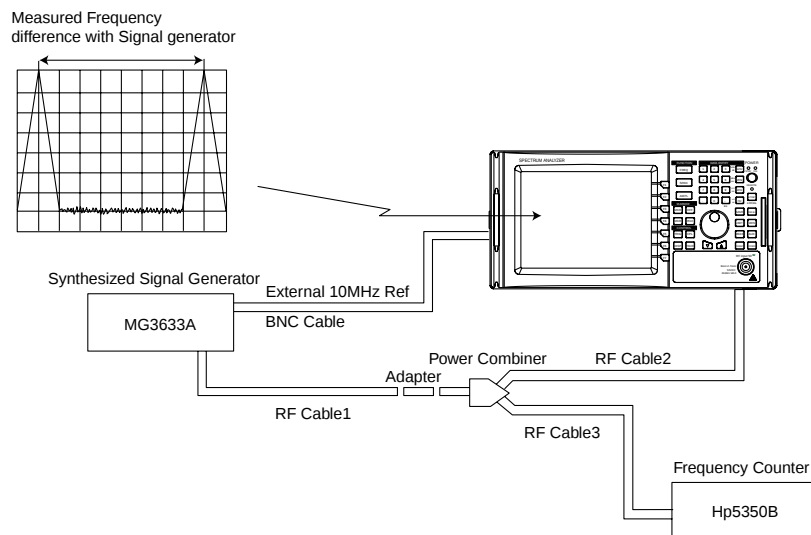
6.3.3.1

- Frequency span : $\pm 3.0\%$

6.3.3.2

- Synthesized Signal Generator : MG3633A [Anritsu]
- Frequency counter : HP5350B
- Power combiner : HP11636A
- RF Cable 1,2,3 : N [male] ~ N[male]
- Adapter : N [female] ~ N[female]
- BNC Cable : BNC[male] ~ BNC [male]

6.3.3.3



<Frequency Span Readout Accuracy>

6.3.3.4

1. SA - 7270 SA - 7270

2. SA - 7270 [PRESET]

3. [PRESET] [ALL CAL]

4.

Frequency : 1300 MHz

Power : - 10 dBm

5. SA - 7270 :

6. SA - 7270 attenuator 10dB .

Center frequency : 1300 MHz

Span : 50 kHz

Reference level : 0 dBm

Couple : All Auto

7. division 가 MG3633A

8. f1 division 가

MG3633A f2 .

9. $(f2 - f1) / (\text{span} \times 0.8)$,

10. span 5 9 .

11. span :

$$= \frac{[(f2) - (f1)] \times 100}{(\text{Span} \times 0.8)}$$

SA-7270		(MHz)				
Center	Span	f1	f2	Span	Span	
1300 MHz	50 kHz			8.5 kHz	51.5 kHz	
	200kHz			194 kHz	206 kHz	
	1 MHz			970 kHz	1.3 MHz	
	2 MHz			1.94 MHz	2.06 MHz	
	5 MHz			4.85 MHz	5.15 MHz	
	10 MHz			9.7 MHz	10.3 MHz	
	20 MHz			19.4 MHz	20.6 MHz	
	50 MHz			48.5 MHz	51.5 MHz	
	100 MHz			97 MHz	103 MHz	
	200 MHz			194 MHz	206 MHz	
	500 MHz			485 MHz	515 MHz	
	1000 MHz			970 MHz	1030 MHz	
	2000 MHz			1940 MHz	2060 MHz	

6.3.4 (RBW), ,
 RBW
 3dB (IF) 가 가
 가
 Selectivity - 60dB RBW(Resolution Bandwidth) - 3dB
 .
 (3dB)
 60dB . 60dB/3dB .
 RBW
 RBW 가 .

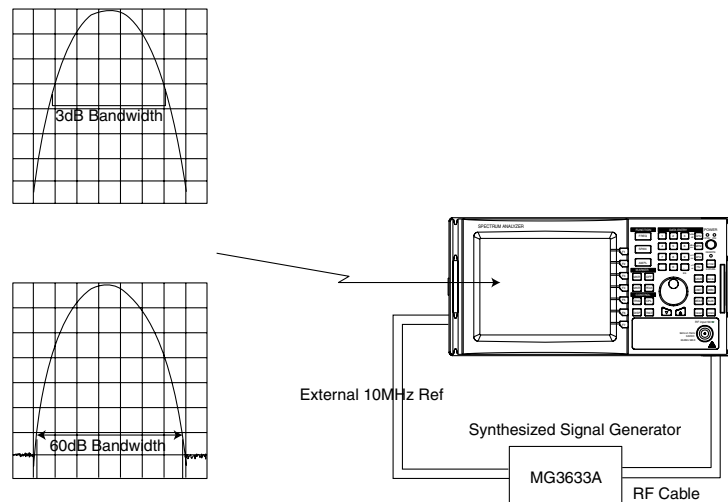
6.3.4.1

- : 3 dB $\leq \pm 20 \%$ (300Hz, 1kHz, 3kHz, 10kHz, 30kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz)
 6 dB $\leq \pm 20 \%$ (9 kHz , 120 kHz)
- (60 dB/3dB) : $\leq 15 : 1$
 (1kHz, 3kHz, 10kHz, 30kHz, 100kHz, 300kHz, 1MHz, 3MHz)
 (60 dB/6dB) : $\leq 12 : 1$
 (9 kHz , 120 kHz)
- : $\leq \pm 1.0$ dB

6.3.4.2

○ Synthesized Signal Generator : MG3633A [Anritsu]

6.3.4.3



<Resolution Bandwidth and Selectivity and Error>

6.3.4.4

6.3.4.4.1 RBW

1. [PRESET]

2. [ALL CAL]

3. SA - 7270 :

center frequency : 100 MHz

Span : 10 MHz

Reference level : - 10 dBm

ATT : Auto

RBW : 3 MHz

Scale : 1 dB/Div

4. Sweep time : Auto
 Synthesized signal generator (MG3633A) :
- Frequency : 100 MHz
- Power : - 15 dB
5. [PEAK] [MKR - >REF] [REF LEVEL]
6. Single sweep [TRIG] [SINGLE] single sweep가
7. [MEAS] [dB DOWN - > X dB DOWN] 3 dB 6 dB
 measure
8. [TRIG] [CONT]
9. RBW
10. RBW 5 9
11. RBW :
- $$= \frac{(\text{RBW} -)}{\text{RBW}}$$

SA-7270		Marker 3dB				
RBW	Span					
300 Hz	10 kHz	240 Hz		360 Hz		
1 kHz	50 kHz	800 Hz		1.2 kHz		
3 kHz	50 kHz	2.4 kHz		3.6 kHz		
9 kHz	50 kHz	7.2 kHz		10.8 kHz		(6 dB BW)
10 kHz	50 kHz	8.0 kHz		12.0 kHz		
30 kHz	50 kHz	24 kHz		36 kHz		
100kHz	200 kHz	80 kHz		120 kHz		
120kHz	300 kHz	96 kHz		144 kHz		(6 dB BW)
300kHz	500 kHz	240 kHz		360 kHz		
1 MHz	5 MHz	800 kHz		1.2 MHz		
3 MHz	10 MHz	2.4 MHz		3.6 MHz		

6.3.4.4.2 RBW

1. [PRESET]

2. [ALL CAL]

3. SA - 7270 :

Center frequency : 100 MHz

Span : 100 MHz

Reference level : - 10 dBm

ATT : Auto

RBW : 3 MHz

Scale : 10 dB/Div

Sweep time : Auto

4. Synthesized signal generator (MG3633A) :

Frequency : 100 MHz

Power : - 10 dBm

5. [PEAK] [MKR - > REF] [REF LEVEL]

6. sweep [TRIG] [SINGLE] sweep가

7. [MEAS] [dB DOWN - > X dB DOWN] 60 dB

8. [TRIG] [CONT] RBW

9. RBW 5 8

10. 3dB (6.3.4.4.1)

11. RBW :

$$= \frac{60 \text{ dB}}{3 \text{ dB} \left(6 \text{ dB} \right)}$$

SA-7270		VBW	3dB BW	60dB BW		
RBW	Span					
300 Hz	10 kHz	10 Hz				
1 kHz	50 kHz	100 Hz				
3 kHz	100 kHz	100 Hz				
9 kHz	200 kHz	100 Hz				(6dB BW)
10 kHz	200 kHz	100 Hz				
30 kHz	1 MHz	100 Hz				
100kHz	10 MHz	100 Hz				
120kHz	10 MHz	100 Hz				(6dB BW)
300kHz	20 MHz	100 Hz				
1 MHz	50 MHz	100 Hz				
3 MHz	100 MHz	100 Hz				

6.3.4.4.3 RBW

1. [PRESET]
2. [ALL CAL]
3. SA - 7270 :

Center frequency	:	100 MHz
Span	:	20 kHz
Reference level	:	- 10 dBm
ATT	:	Auto
RBW	:	30 kHz
Scale	:	10 dB/Div
Sweep time	:	Auto

4. Synthesized signal generator (MG3633A) :

Frequency	:	100 MHz
Power	:	- 15 dBm

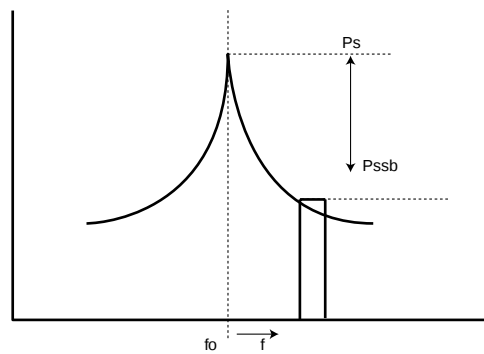
5. [PEAK] [MKR - >CF]
 [MKR - >REF]
6. Marker Δ marker [MRK] [MARKER DELTA]
7. RBW SPAN 8, 9 RBW
 ()
8. [PEAK] Marker
9. Δ marker

RBW		()	
1 kHz	10 kHz		
3 kHz	20 kHz		
9 kHz	50 kHz		
10 kHz	50 kHz		
30 kHz	150 kHz		()
100 kHz	500 kHz		
120 kHz	500 kHz		
300 kHz	1.5 MHz		
1 MHz	5 MHz		
3 MHz	15 MHz		

6.3.5 ()

. Signal Generatore

10dB



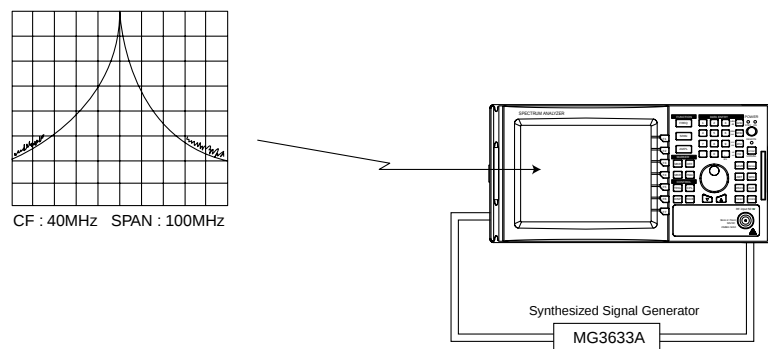
6.3.5.1

○ () : $\leq -90 \text{ dBc / Hz}$ (10 kHz)

6.3.5.2

○ Synthesized signal generator

6.3.5.3



<Sideband Noise>

6.3.5.4

1. [PRESET]

2. [ALL CAL]

3. SA - 7270 :

Center frequency : 2700 MHz

Span : 100 kHz

Reference level : - 30 dBm

ATT : Auto

RBW : 1 kHz

VBW : 30Hz

Scale : 10 dB/div

Sweep time : Auto

4. [PEAK], [MKR - >CF]

[MKR - >REF]

5. sweep [TRIG] [SINGLE] sweep가

6. Marker Δ marker [MRK] [MARKER DELTA]7. Δ marker 10 kHz marker ()

8. (10kHz side)

= (Δ marker) - 10log (RBW/1Hz)

:

10 kHz	-65dBc	-95dBc/Hz

6.3.6

marker point , 20 dB
 20 dB
 . SA - 7270 Frequency Counter COUNT ON

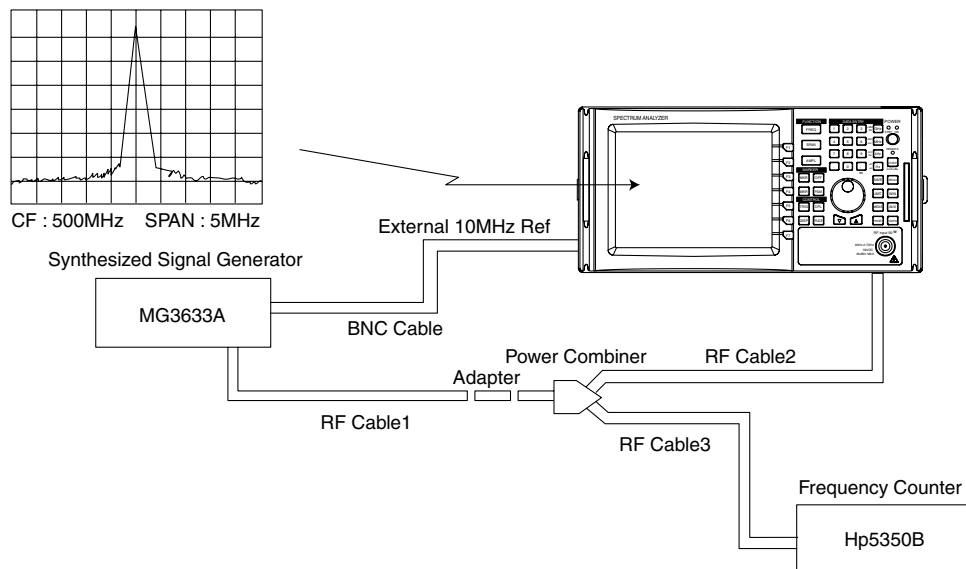
6.3.6.1

- : $\leq (\times \pm (1 \text{ LSB}))$
- : 1Hz, 10Hz, 100Hz, 1KHz
- : - 70 dBm min
- : $\leq \pm 5\text{ppm}$

6.3.6.2

- Synthesized signal generator : MG3633A or equivalent
- Frequency counter : HP5350B
- Power Splitter : HP11636A
- RF cable 1,2,3 : N [male] ~ N [male]
- BNC cable : BNC [male] ~ BNC [male]

6.3.6.3



<Frequency Measurement Accuracy>

6.3.6.4

1. [PRESET]
2. [ALL CAL]
3. SA - 7270 :

Center frequency : 100 MHz

Span : 5 MHz

Couple : All Auto
4. Synthesized signal generator :

Frequency : 100 MHz

Power : - 10 dBm
5. [MKR - > PEAK SEARCH] Frequency Counter ON [MEAS - > MKR COUNT [ON]]
6. Marker [MEAS - > MKR RESOL - > 1 Hz] [RETURN]
7. 10 Hz 100 MHz $\pm 10\text{Hz}$
8. 100 Hz 100 MHz $\pm 100\text{ Hz}$
9. 1 kHz 100 MHz $\pm 1\text{ kHz}$
10. - 70dBm 가

	SA-7270				
	CF		Marker		
100 MHz	100 MHz	1 Hz			$\leq (\times$
		10 Hz			
		100 Hz			$\pm 1\text{ LSB})$
		1000 Hz			
100MHz-70dBm	100MHz	1000Hz			

6.3.7

LOG	LINEAR		
	attenuator	RF	가 attenuator
attenuation	Δ marker		

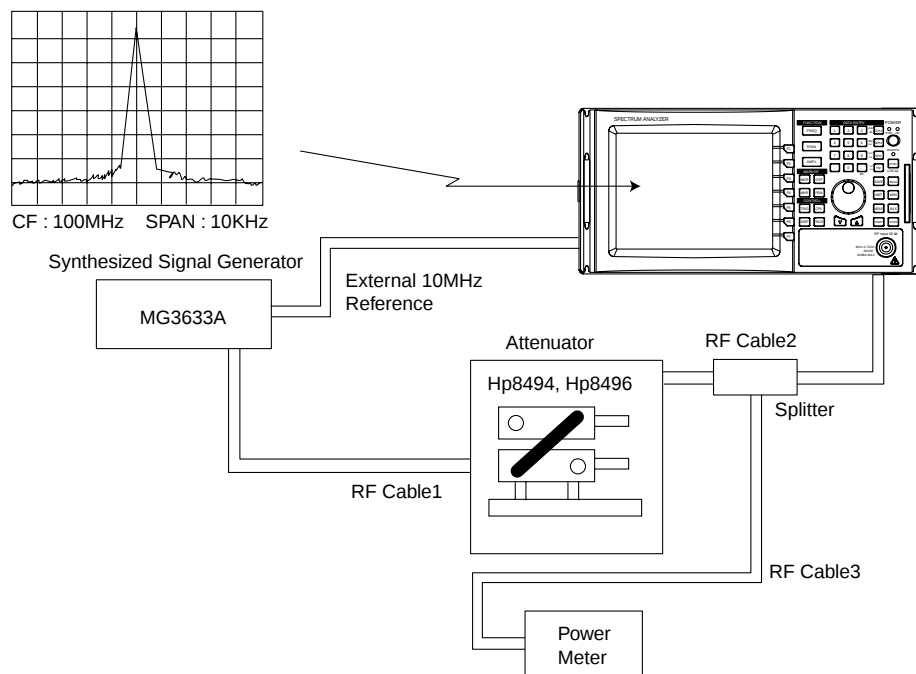
6.3.7.1

- : calibration
- | | | |
|-------------------------|-------------------------|---------------------|
| LOG : $\leq \pm 1.5$ dB | 10 dB / div 8 division | (RBW ≤ 3 kHz) |
| $\leq \pm 1.5$ dB | 5 dB / div 8 division | (RBW ≤ 3 kHz) |
| $\leq \pm 0.5$ dB | 1 2 dB / div 8 division | (RBW ≤ 3 kHz) |
- LINEAR : $\leq \pm 8$ division reference level 10 %

6.3.7.2

- Synthesized Signal generator : MG3633A
- Attenuator : HP 8494 , HP 8496
- RF cable 1,2,3 : N [male] ~ N[male]
- Power meter : HP437B
- Power splitter

6.3.7.3



<Amplitude display linearity>

6.3.7.4

6.3.7.4.1 LOG [10 dB / div , 5 dB / div , 2 dB / div , 1 dB / div]

1. [PRESET]

2. [ALL CAL]

3. SA - 7270 :

Center frequency	:	100 MHz
Reference level	:	10 kHz
Span	:	0 dBm
ATT	:	10 dB
RBW	:	1 kHz
VBW	:	10 Hz
Scale	:	10 dB/div

4. Synthesized signal generator (MG3633A) :

Frequency	:	100 MHz
Power	:	+ 6 dBm

5. [AMPL] [LOG] Log [SCALE - >10dB/div]

6. [PEAK] [MKR - > CF]
[MKR - >REF] Power meter가 0 dBm7. [MKR] [MARKER DELTA] step attenuator [HP8494, HP8496]
10dB 가 Δ marker8. Log Linearity [10 dB/div]
▲ = Attenuator (dB) + Δ marker

9. Log Linearity [5 dB/div , 2 dB/div, 1 dB/div] 5 - 8

Log [10 dB/div]

	Δ Marker (dB)		
(dB)			
0	0	0	
10			
20			
30			
40			
50			
60			
70			
80			

Log [5 dB/div]

	Δ Marker (dB)		
(dB)			
0	0	0	
5			
10			
15			
20			
25			
30			
35			
40			

Log [2 dB/div]

	Δ Marker (dB)		
(dB)			
0	0	0	
2			
4			
6			
8			
10			
12			
14			
16			

Log [1 dB/div]

	Δ Marker (dB)		
(dB)			
0	0	0	
1			
2			
3			
4			
5			
6			
7			
8			

6.3.7.4.2 LINEAR [Full scale]

1. [PRESET] .
2. [ALL CAL] .
3. SA - 7270 :

Center frequency	:	100 MHz
Reference level	:	0 dBm
Span	:	10 kHz
Attenuator	:	10 dBm
RBW	:	1 kHz
VBW	:	10 Hz
Scale	:	10 dB/div
4. Synthesized signal generator (MG3633A) :

Frequency	:	100 MHz
Power	:	0 dBm
5. [AMPL] [LINEAR] linear [AMPL] [UNIT - > VOLT] .
6. [PEAK] [MKR - > CF] [PEAK]
[MKR - > REF] .
7. [MKR] [MARKER DELTA] step attenuator [HP8494, HP8496]
6dB 가 Δ marker .
8. LINEAR Linearity
= attenuator (dB) + Δ marker

LINEAR [full scale]

ATT (dB)	(dB)		
0	0	0	
6			
12			
18			
24			
30			
36			

6.3.8

가

가

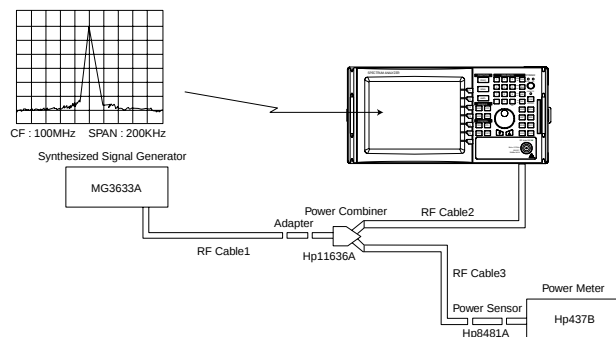
6.3.8.1

- : - 3dB << + 1dB(9kHz ~ 10MHz)
 $\leq \pm 1.5\text{dB}$ (10MHz ~ 2.7 GHz) [@att = 10dB]

6.3.8.2

- Synthesized signal generator : MG3633A
- Power Meter : HP437B
- Power Sensor : HP8481A
- Power splitter : HP11636A
- Adapter : N[female] ~ N [female]
- RF cable 1,2,3 : N[male] ~ N[male]

6.3.8.2



<Frequency Response>

6.3.8.4

6.3.8.4.1 Parameter calibration

1. Power Meter [HP437B] Power sensor [HP8481A]
2. Power sensor Power Meter
3. Power Meter Power REF 0 dBm
4. 0 dBm Cal ADJ 0dBm가
- 5.
6. - 10 dBm
 Synthesized Signal Generator :

Frequency : 100 MHz
Power : - 10 dBm

7. Power meter - 10dBm가
8. [PRESET]
9. [ALL CAL]
10. SA - 7270 :

Center frequency : 100 MHz
Reference level : - 10 dBm
Span : 200kHz
Couple : All Auto

11. [PEAK] [MKR - > CF]
12. power meter
13. = Power meter - SA - 7270 Marker

	Power meter (dBm)	Marker (dBm)		
100 MHz				
300 MHz				
500 MHz				
1000 MHz				
1500 MHz				
2000 MHz				

6.3.9

100MHz

power meter

6.3.9.1

○

:

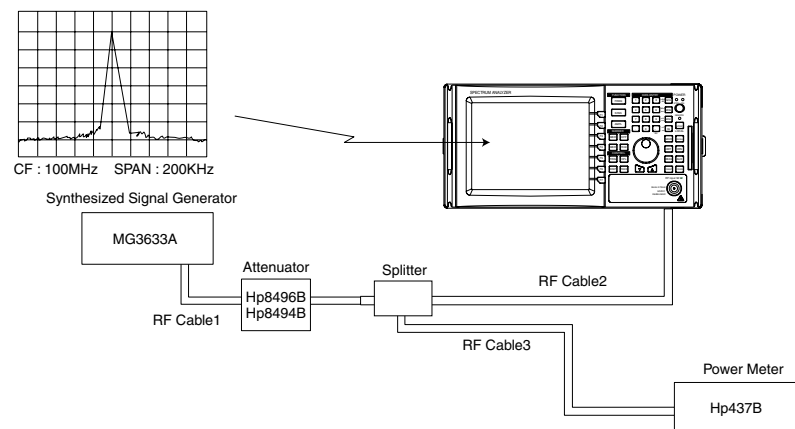
 $\leq \pm 1.5\text{dB}$

(- 100 dBm ~ + 30 dBm, 10dB/div)

6.3.9.2

- Synthesized signal generator : MG3633A
- Power Meter : HP437B
- Power Sensor : HP8481A HP8481D
- Step Attenuator : HP8496B , HP8494B
- RF cable 1,2,3 : N[male] ~ N[male]
- RF splitter

6.3.9.3



<Reference level Accuracy>

6.3.9.4

6.3.9.4.1 Power meter calibration reference calibration

-
1. Power Meter [HP437B] Power sensor [HP8481A]
 2. Power sensor Power Meter
 3. Power Meter Power REF 0 dBm
 4. 0 dBm Cal ADJ 0 dBm가
 - 5.
 6. + 10 dBm
- | | | |
|-----------|---|----------|
| Frequency | : | 100 MHz |
| Power | : | + 10 dBm |
7. [PRESET]
 8. [ALL CAL]
 9. SA - 7270
- | | | |
|------------------|---|---------|
| Center frequency | : | 100 MHz |
| Reference level | : | 0 dBm |
| Span | : | 50kHz |
| RBW | : | 3kHz |
| VBW | : | 10kHz |
| ATT | : | Auto |
10. Signal Generator power meter
 11. [PEAK][MKR - > CF]
 12. Marker
 13. Reference level
- Reference level = Marker - power meter
-

(dBm)	Marker (dBm)	Step (dBm)	
0			
-10			
-20			
-30			
-40			
-50			
-60			
-70			
-80			

6.3.10

6.3.10.1

○

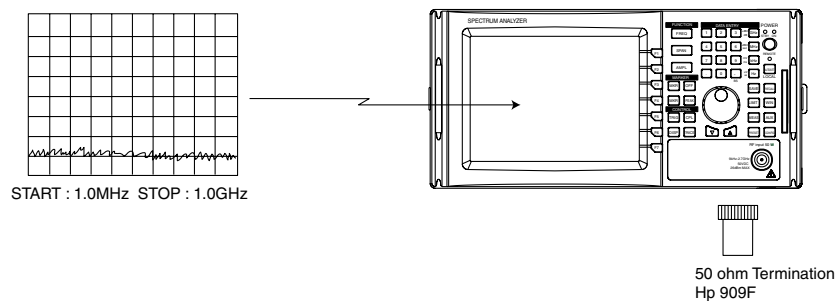
:

- ≤ - 80 dBm (frequency range : 50 kHz ~ 100 kHz)
- ≤ - 100 dBm (frequency range : 100 kHz ~ 1 MHz)
- ≤ - 105 dBm (frequency range : 1 MHz ~ 2.7 GHz)

6.3.10.2

○ 50 Ω terminator : HP 909F

6.3.10.3



<Average Noise level>

6.3.10.4

1. [PRESET]

2. [ALL CAL]

3. SA - 7270 :

Center frequency	:	10 kHz
Span	:	20 kHz
Reference level	:	- 40 dBm
ATT	:	0 dB
RBW	:	300 Hz

VBW : 10 Hz

Detector mode : Average

4. RF 50 Ω

5. [PEAK] [MKR - > CF]

6. SA - 7270

7. [TRACE] [MORE - > AVERAGE - > AVERAGE ON - > COUNT [16]]

8. Average [TRACE] [MORE - > AVERAGING - > CONTINUE]

16 sweep가

9. search [PEAK] marker

Center	Span		
10 kHz			
100 kHz	20kHz		
1 MHz			
2.7GHz			

6.3.11.2

(SA - 7270 [20dB]
 가) SA - 7270 가 , 2
 (LPF) SA - 7270
 가 .

6.3.11.1

○ 2 : $\leq -60\text{dBc}$ @ Input level : -40 dBm

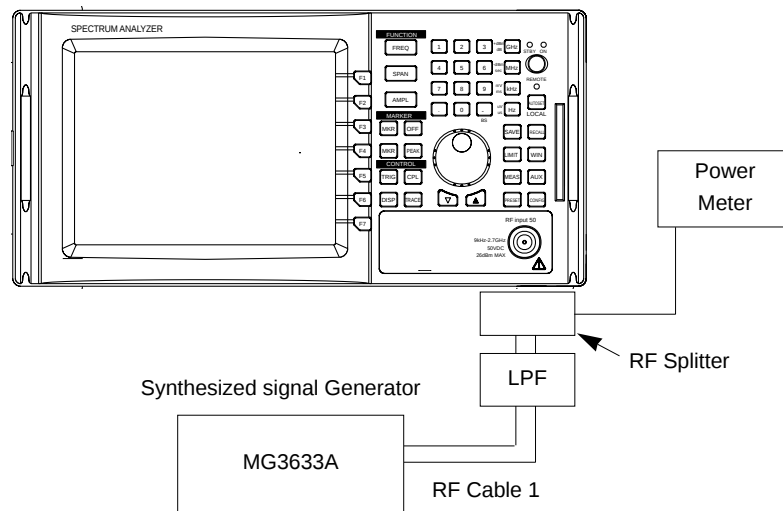
6.3.11.2

- Synthesized Signal generator : MG3633A
- RF cable 1,2,3 : N[male] ~ N[male]
- LPF : 70dB

가

- RF splitter
- RF power meter

6.3.11.3



<Second Harmonic Distortion>

6.3.11.4

1. [PRESET]

2. [ALL CAL]

3. SA - 7270 :

Center frequency	:	95 MHz
Span	:	50 kHz
Reference level	:	- 40 dBm
ATT	:	0 dB
RBW	:	300 Hz
VBW	:	30 Hz
Sweep time	:	Auto

4. Synthesized signal generator :

Frequency	:	95 MHz
Power	:	- 40 dBm

5. SA - 7270 가 - 40dBm가

6. 2 center

7. [PEAK][MKR - > CF] - 40dBm

		2		
		Marker	dBc	
- 40 dBm	95 MHz			190 MHz
	245 MHz			490 MHz
	495 MHz			990 MHz
	995 MHz			1990 MHz
: - 40dBm	95 MHz	- 105dBm	65dBc	190 MHz

6.3.12

RF attenuator가

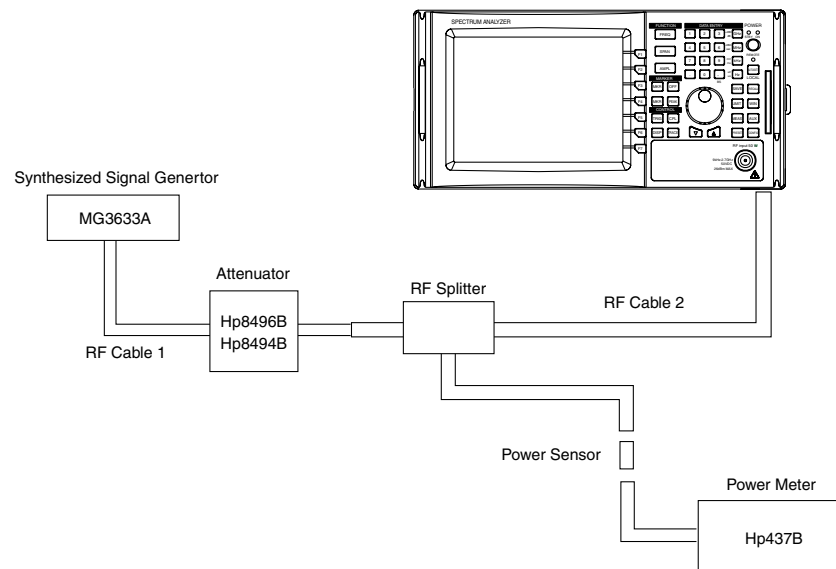
6.3.12.1

- attenuator : $\pm 0.5\text{dB}$ (9kHz ~ 2.7 GHz, total = $\pm 1\text{dB}$ maximum)

6.3.12.2

- Synthesized signal generator : MG3633A
- Step Attenuator : HP8496B , HP8494B
- Power Meter : HP437B
- Power Sensor : HP8481A , HP8481D
- RF Cable 1,2 : N [male] ~ N[male]
- RF Splitter

6.3.12.3



<Input Attenuator Switching Error>

6.3.12.4

6.3.12.4.1 Power meter calibration calibration

1. Power Meter [HP437B] Power sensor [HP8481A]
2. Power sensor Power Meter
3. Power Meter Power REF 0 dBm
4. 0 dBm Cal ADJ 0 dBm가

1. [PRESET]

2. [ALL CAL]

3. SA - 7270 :

Center frequency : 100 MHz

Span : 100 kHz

Reference level : - 50 dBm

RBW : 3 kHz

VBW : 30 Hz

Sweep time : Auto

4. Synthesized signal generator (MG3633A) :

Frequency : 100 MHz

Power : 0 dBm

5. Attenuator HP8496B attenuation 0 dB

6. Power meter - 10 dBm

7. SA - 7270 attenuation 0 dB

8. [PEAK]

Power meter SA - 7270 (calibration factor)
()

9. Attenuator

= Marker -

10. Attenuator 7 - 9

SA-7270		Marker	
	ATT		
-60 dBm	50		
-50 dBm	40		
-40 dBm	30		
-30 dBm	20		
-20 dBm	10		
-10 dBm	0		

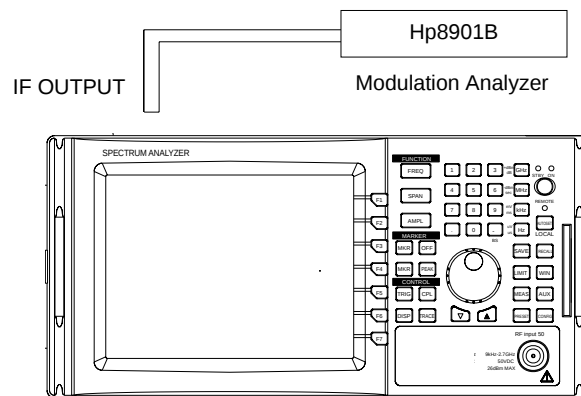
6.3.13 Residual FM

6.3.13.1 : $\leq 100 \text{ Hz(p - p)}$ in 50 ms @ RBW : 1 kHz , VBW : 1 kHz

6.3.13.2

- Modulation Analyzer : HP8901B
- BNC Cable : BNC[male] ~ BNC[male]

6.3.13.3



<Residual FM>

6.3.13.4

-
1. [PRESET] .
 2. [ALL CAL] .
 3. SA - 7270 :

Center frequency	:	40 MHz
Reference level	:	- 10 dBm
Span	:	10 kHz
RBW	:	1 kHz
VBW	:	1 kHz
Sweep time	:	Auto
 4. calibration [40MHz] ON .
 5. 가 [MKR>] [MRK - > CF]
 6. [SPAN] [ZERO SPAN].
 7. Modulation Analyzer IF frequency modulation

6.3.14 (3rd Order Inter - modulation)
(3rd Order Inter - modulation)

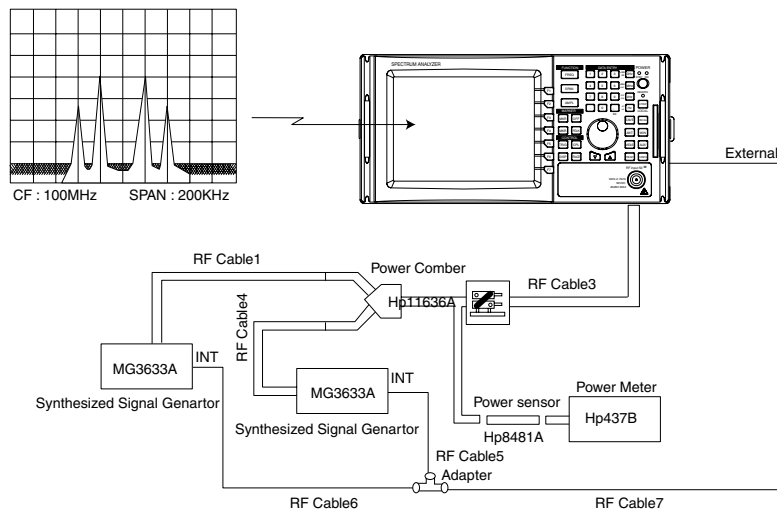
- 30dBm 가

6.3.14.1 : ≤ -70 dBc @ Input : - 30 dBm , Input Att : 10 dB

6.3.14.2 :

- Synthesized Signal Generator 1,2 : MG3633A
- Step Attenuator : HP8494B, HP8496B
- Power Meter : HP437B
- Power Sensor : HP8481A
- Power Combiner : HP11636A
- RF Cable 1,2,3,4 : N [male] ~ N [male]
- RF Cable 5,6,7 : BNC [male] ~ BNC [male]
- Adapter : T - BNC [female]

6.3.14.3



<3rd Order intermodulation>

6.3.14.4

6.3.14.4.1 Power meter

-
1. Power Meter [HP437B] Power sensor [HP8481A] .
 2. Power sensor Power Meter .
 3. Power Meter Power REF 0 dBm .
 4. 0 dBm Cal ADJ 0dBm가 .
 5. Synthesized Signal Generator .

Synthesized signal generator 1

	:	1100.050 MHz
--	---	--------------

POWER	:	- 20 dBm
-------	---	----------

Synthesized signal generator 2

	:	1100.000 MHz
--	---	--------------

POWER	:	- 20 dBm
-------	---	----------

6.3.14.4.2

-
1. [PRESET] .
 2. [ALL CAL] .
 3. SA - 7270 :

Center frequency	:	1100.025 MHz
------------------	---	--------------

Reference level	:	- 10 dBm
-----------------	---	----------

Span	:	5 00 kHz
------	---	----------

ATT	:	0 dBm
-----	---	-------

RBW	:	Auto
-----	---	------

VBW	:	Auto
-----	---	------

Sweep Time	:	Auto
------------	---	------

4. #2 RF OFF . Power meter가 - 20dBm
#1 .
5. #1 RF OFF , #1 RF ON .
6. Power meter가 - 20dBm #2 .
7. RF ON .
8. Marker - 20dBm Normal marker
[PEAK] .
9. [Δ marker] .
10. Marker inter - modulation product .
11. Inter - modulation Δ marker 20dB .
12. Δ marker = 60dB.
inter - modulation = 60 + 20 = 80dB.

6.3.15

(spurious)

SA - 7270 spurious

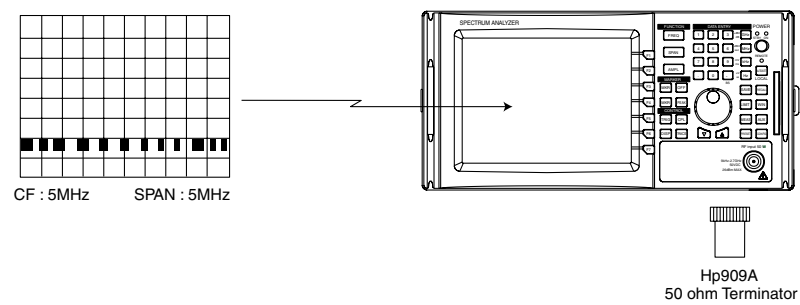
RF 0 dB attenuator가

6.3.15.1 : ≤ -85 dBm @ Input Terminated , Input Att : 0 dB

6.3.15.2

○ 50 ohm Termination : HP 909A

6.3.15.3



<Residual Response>

6.3.15.4

1. [PRESET]

2. [ALL CAL]

3. SA - 7270 :

Center frequency	:	1300 MHz
Span	:	full
Reference level	:	- 40 dBm
ATT	:	0 dB
RBW	:	1 kHz
VBW	:	1 kHz
Sweep Time	:	Auto
Detector Mode	:	POS Peak

4. [DISP] [DISPLAY LN (ON) => DISPLAY LINE]
- 85 dBm
5. [TRIG] [SINGLE] . Sweep가
6. residual display line
7. [MKR] [PEAK SEARCH] marker

Marker (dBm)	SA-7270 (dBm)

6.3.16 (LOCAL Oscillator Emission)

Local emission power

Local emission가 RF

가

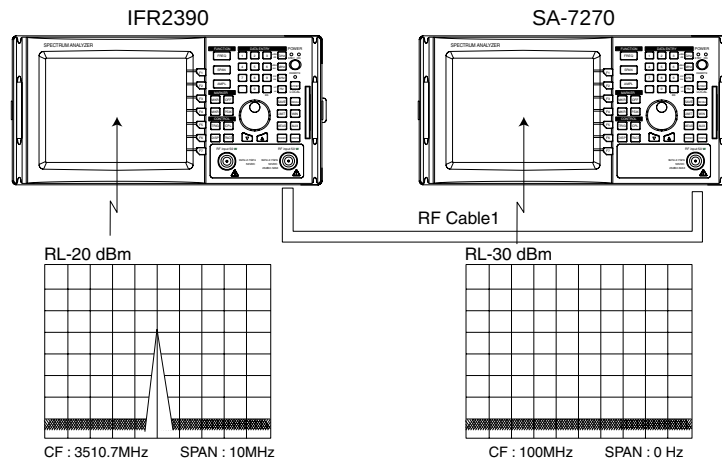
6.3.16.1 : ≤ -70 dBm @ Input Att : 10 dB

6.3.16.2

○ Spectrum Analyzer : IFR - 2390 or equivalent

○ RF Cable : N [male] ~ N [male]

6.3.16.3



<LO Emission>

6.3.16.4

1. [PRESET]

2. [ALL CAL]

3. SA - 7270

:

Center frequency

: 100 MHz

Span

: Zero Span

Reference level

: - 30 dBm

ATT

: 0 dB

4. IFR 2390 :
 Center frequency : 3410.7 MHz + Center Frequency of SA - 7270
 Span : 100 kHz
 Reference level : - 150 dBm
 RBW : 3 kHz
 VBW : 1 kHz
5. IFR 2390 power .
6. SA - 7270 center [FREQ] [CENTER] .
 IFR 2390 center 가 .
7. 5 6 .

SA-7270 Center	(dBm)	SA-7270
100 MHz		≤ -70 dBm
500 MHz		
1000 MHz		
1500 MHz		
2000 MHz		
2500 MHz		

6.3.17 VSWR

VSWR

6.3.17.1 : $\leq 1.5 : 1$ @ input Att : 10 dB 150kHz ~ 2.7GHz

6.3.17.2

○ Network Analyzer 1 : HP 8720D

: 50 MHz ~ 20 GHz

○ Network Analyzer 2 : HP 8751A

: 5 Hz ~ 500 MHz

(S - parameter [HP87511A] : 100 kHz ~ 500 MHz)

○ Calibration Cable : HP 85131 - 60012 [3.5 mm flexible]

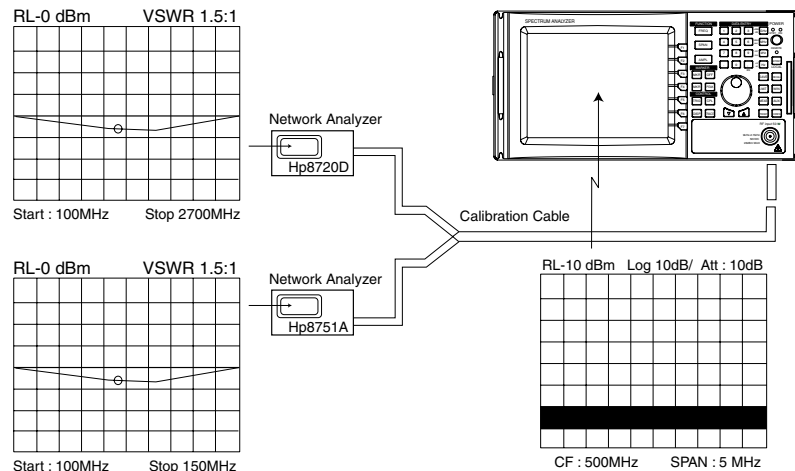
HP 85131 - 60013 [3.5 mm flexible]

○ Calibration Kit : HP85052B [3.5 mm Calibration Kit]

HP 85032B [Type N Calibration Kit]

○ Adapter : SMA [female] ~ N [male]

6.3.17.3



<Input VSWR>

6.3.17.4

1. Network Analyzer

2. SA - 7270 [PRESET]

SA-7270	
$\leq 1.5 : 1$	

7

SA - 7270

1 1 1

.....	7 - 3
.....	7 - 4
.....	7 - 4
.....	7 - 4
.....	7 - 5
.....	7 - 5
.....	7 - 5
.....	7 - 6

< >

7

SA - 7270

, AC

○ :

○ 가

○ 가



, thinner(),

:

가 ,

SA - 7270

(1) SA - 7270

(2) SA - 7270

1)

2)

3)

4) (> 50) (≥ 90%)

- :
- ☐ 0 to 30
 - ☐ 40% to 80%
 - ☐ 24

SA - 7270

LG

,

.

SA - 7270가

:

(1) SA - 7270

.

(2)

,

,

(3)

SA - 7270

,

(4)

,

.

SA - 7270

.

SA - 7270

가 LG

. 가 :

(a)

(b)

(c) 가 ,



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Tel : (02) 2005 - 5282, 5496, 5498
Fax : (02) 2005 - 5499
URL : <http://www.lgp.co.kr>

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Tel : (0546) 469 - 8500, 463 - 9101~10
Fax : (0546) 461 - 8065

A / S

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