

LSA-30/132/265
Signal Analyzer
Operation Manual
Ver 1.6

Read this manual before using the equipment.

his manual before using the equipment.
Keep this manual with the equipment



Safety Symbols

Where these symbols or indications appear on the equipment or in this manual, they have the following meanings.



WARNING. *Risk of hazard which cause injury to human body or danger to life, If a WARNING appears on the equipment, and in this manual, do not proceed until its suitable conditions are understood and met*



CAUTION. *Risk of hazard that caused fire or serious damage to the equipment or other equipment. Do not proceed until its suitable conditions are met.*



GROUND. *Ground terminal to chassis (earth).*

For Symbols

WARNING



1. ALWAYS refer to the operation manual when working near locations at which the alert mark shown on the left is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced. Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.



2. When supplying power to this equipment, connect the accessory 3-pin power cord to a 3-pin grounded power outlet. If a grounded 3-pin outlet is not available, use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock and equipment damage.

Repair

WARNING



3. The user cannot repair this equipment. DO NOT attempt to open the cabinet or to disassemble internal parts. Only trained service personnel or staff from your sales representative with knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to internal parts.

Falling Over

4. This equipment should be used in the correct position, If the cabinet is turned on its side, etc., it will be unstable and may be damaged if it falls over as a result of receiving a slight mechanical shock.

For Symbols

CAUTION



Cleaning

1. Keep the power supply and cooling fan free of dust.
 - Clean the power inlet regularly. If dust accumulates around the power pins, there is a risk of fire.
 - Keep the cooling fan clean so that the ventilation holes are not obstructed. If the ventilation is obstructed, the cabinet may overheat and catch fire.

Check Terminal

CAUTION



2. The ratings of RF input/output connector.
 - Maximum DC voltage ratings :
RF Input connector : 0 VDC
 - Maximum RF power ratings :
RF Input power : +30 dBm
 - NEVER input $>+30$ dBm or >0 VDC power to RF Input.
 - Excessive power may damage the internal circuits.

Replacing Memory Backup Battery

3. A Primary Lithium Battery supplies the power for CMOS backup. This battery should only be replaced by a battery of the same type (TADIRAN : TL-5151); since we can only make replacement, contact the nearest us representative when replacement is required.

Note : The battery life is about 7 years. Early battery replacement is recommended

CAUTION



Do not throw the battery away but dispose of it according to your country's requirement

For Symbols

CAUTION



Storage
Medium

- This equipment stores data using hard disk. Hard Disk may be damage due to strong vibration or improper electrical shock. If you want to exchange damaged hard disk, connect the nearest our agency.

Adjustment and Delete of Important files : This product has basic program in the hard disk (C:\Program Files). If you adjust or delete the window basic folder, improper system operation is occurring. System damages by users mistake is compensated for yours.

CAUTION



We CANNOT COMPENSATE FOR ANY IMPROPER USE.

Product Damage
Precaution

- Use Proper Power Source** : Do not operate this product from a power source that applies more than the specified voltage.

Provide Proper Ventilation : To prevent product overheating, maintain proper ventilation.

Do Not Operate With Suspected Failures : If you suspect there is damage to this product, have it inspected by qualified service personnel.

CAUTION



Do Not Attempt To Operate If Protection May Be Impaired : If the equipment appears damaged or operated abnormally, protection may be impaired. Do not attempt to operate the equipment under these conditions. Refer all questions of proper equipment operation to qualified service personnel

For Symbols

CAUTION



Place-related
Warning

6. **Object and Liquid Entry** : Never push objects of any kind into equipment through openings as they may touch dangerous voltage points or short out parts that could result in a fire or electric shock. Never spill liquid of any kind on the equipment. Do not use this equipment near water– for example, near a bathtub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool, and the like. Keep the equipment away from damp air, water and dust. Unexpected trouble may be caused when the equipment is placed in a damp or dusty place.

CAUTION



Flammable and Explosive Substance : Avoid using this equipment where there are gases, and where there are flammable and explosive substances in the immediate vicinity.

Unstable Location : Do not place this equipment on an unstable cart, stand, tripod, bracket, or table. This equipment may fall, causing serious injury to a person, and serious damage to the equipment. Do not place or use the equipment in a place subject to vibration.

Warranty

We will repair this equipment free of charge if a malfunction occurs within 2 years after shipment due to a manufacturing fault, provided that warranty is rendered void under any or all of the following conditions.

- The fault is outside the scope of the warranty conditions described in the operation manual.
- The fault is due to wrong operation, misuse, or unauthorized modification or repair of the equipment by the customer.
- The fault is due to severe usage clearly exceeding normal usage.
- The fault is due to improper or insufficient maintenance by the customer.
- The fault is due to natural disaster including fire, flooding and earthquake, etc.
- The fault is due to use of non-specified peripheral equipment, peripheral parts, consumables, etc.
- The fault is due to use of non-specified power supply or in non-specified installation location.

In addition, this warranty is valid only for the original equipment purchaser. It is not transferable if the equipment is resold.

We will not accept liability for equipment faults due to unforeseen and unusual circumstances, nor for faults due to mishandling by the customer.

Front Panel Power Switch

If the equipment is in the standby state, the front power switch of this equipment turns on the power when it is pressed.

If the switch is pressed continuously for about 5 seconds in the power off state, the equipment enters the standby state to prevent malfunction caused by accidental touching.

In the power on state, if the power plug is removed from the outlet, then reinserted, the power will not be turned on. Also, if the line is disconnected due to momentary power supply interruption or power failure, the power will not be turned on even when power is restored.

This is to prevent incorrect data from being acquired when the line is disconnected and reconnected.

For example, if the sweep is 1.000 seconds and data acquisition requires a long time, momentary power supply interruption (power failure) might occur during measurement and the line could be recovered automatically to power on. In such a case, the equipment may mistake incorrect data for correct data without recognizing the momentary power supply interruption.

If this equipment enters the standby state due to momentary power supply interruption or power failure, check the state of the measuring system and press the front power switch to restore power to this equipment.

Caution) Unusual power off may be the cause of damage to hard disk in the system or instruments. Recommend the stable power supply.

DETECTION MODE

This equipment is a signal analyzer, which uses a digital storage system. The signal analyzer makes level measurements in frequency steps obtained by dividing the frequency span by the number of measurement data points (551~8192). Because of this operation it is desired to use the following detector modes associated with the appropriate measurements.

Measurement	Detector mode
○ Normal signal	POS PEAK
○ Random noise	SAMPLE OR AVERAGE
○ Pulsed noise	NORMAL
○ Occupied frequency bandwidth	SAMPLE
(for analog communication systems)	
○ Occupied frequency bandwidth	POS PEAK or SAMPLE
(for digital communication systems)	

When a detection mode is specified as one of the measurement methods, make the measurement in the specified detection mode.

China RoHS Substance Declaration Table

部件名称 Part Name	有毒有害物质 Toxic or hazardous substances and elements					
	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr(VI))	多溴联苯 Polybrominated Biphenyls (PBB)	多溴二苯醚 Polybrominated Biphenyls (PBB)
印刷电路板组件 (Printed Circuit Assembly)	X	X	X	X	X	X
射频托盘组件 (RF Module Assembly)	X	X	X	X	X	X
单体框架组件 (Main Frame Assembly)	X	X	X	X	X	X
液晶显示 (Display)	X	X	X	O	X	X
机械硬件 (Mechanical Hardware)	X	O	X	X	X	X
电源 (Power Supply)	X	X	X	X	X	X
金属片 (Metal Chassis)	X	O	O	X	O	O
光驱 (ODD)	X	O	X	O	O	O
塑料部件 (Plastic Parts)	X	O	X	O	X	X
电缆组件 (Cable & Wire)	X	O	X	O	X	X
附属品 (Accessory)	X	X	X	X	X	X

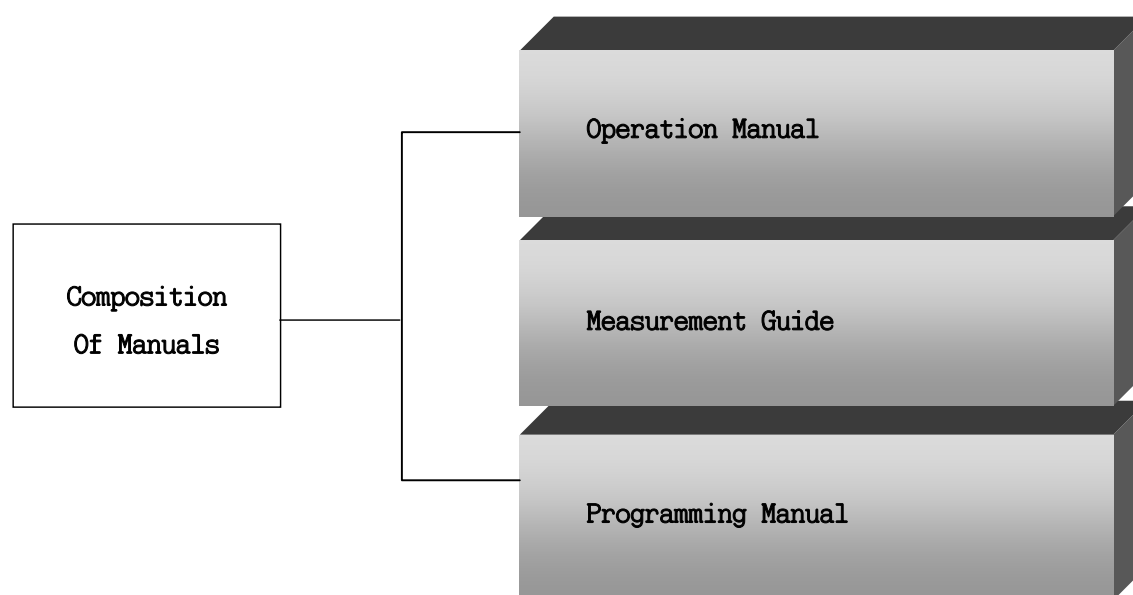
O: 表明该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006标准规定的限量要求之下。
O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement specified in SJ/T11363-2006.

X: 表明该有毒有害物质至少在该部件的某一均质材料中的含量均在SJ/T11363-2006标准规定的限量要求。
X: Indicates that this toxic or hazardous substance contained in at least one of the homogenous materials used for this part is above the limit requirement specified in SJ/T11363-2006.

ABOUT THIS MANUAL

Composition of SIGNAL ANALYZER Manuals

The Signal analyzer manuals of the standard type are composed of the following three parts.



Operation Manual : Provides information on the SIGNAL ANALYZER outline. Preparation before use, panel description, Operation procedure, soft-key menu and performance tests.

Measurement Guide : Provides basic measurements with examples of typical measurements.

Programming Manual : Provides information on RS-232C remote control, GPIB remote control and sample programs.

COMPOSITION OF OPERATION MANUAL

This Manual is composed of 8 sections. The profile of each section is shown below.

Section Composition	Explanation
SECTION 1 GENERAL	Product outline, options, applicable parts, peripheral devices, and specifications
SECTION 2 PREPARATIONS BEFORE USE	Operations to be accomplished before applying power
SECTION 3 PANEL DESCRIPTION	Description of the front and rear panels
SECTION 4 MENU TREE	Description of the soft-key menu
SECTION 5 OPERATION PROCEDURES	Operation procedures for operation guide
SECTION 6 PERFORMANCE TESTS	Tests used for checking performance
SECTION 7 STORAGE AND TRANSPORTATION	Cautions on storage and transportation
SECTION 8 SYSTEM RESTORATION	OS restoration and Installation Vaccine

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SECTION 1

GENERAL

This section outlines the SIGNAL ANALYZER (henceforth called “Equipment”) and explains the composition of this manual, the configuration of the equipment with the options, the optional accessories, peripherals for expanding the equipment capabilities, and the equipment specifications.

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SECTION 1 GENERAL

PRODUCT OUTLINE

The equipment is a portable type signal analyzer suited for signal analysis of radio equipment where the efficiency of frequency usage is increased and equipment is increasingly speeded and digitized.

The equipment adopts the synthesizer local system and can cover all frequencies from 3 Hz to 3 GHz/13.2 GHz/26.5 GHz(SIGNAL ANALYZER) excellent in basic performance such as distortion, frequency/level accuracy, and easy operation, by following the display of the soft-key menu screen.

Cost performance with rich options is excellent to cover with various applications.

Equipped with high accuracy calibration signals and an attenuator, it can accurately calibrate switching errors of LOG/LIN scales, various resolution bandwidth, variable reference level, etc.

Since frequency response data is corrected by built in calibration data, allowing high-accuracy level measurement for a wide range.

This unit provides the MEASURE function that can perform measurement of various applications without requiring the intervention of external controllers. Therefore, the performance evaluation of radio equipment can be easily done in terms of frequency, noise, occupied frequency bandwidth, etc.

■ Application

This unit is useful for the production, building and maintenance of electronic equipment and devices for the following.

- AM/FM radio equipment
- Digital cellular telephone/cordless telephone
- Satellite broadcasting and TV equipment
- Small capacity microwave equipment
- Wireless LAN equipment

EQUIPMENT CONFIGURATION

This paragraph describes the configuration of the equipment with the various options to expand the functions.

Options

The table below shows the options for the equipment which are sold separately.

Model Number	Name	Remarks
	Tracking Generator WLAN Analyzer Phase Noise Analyzer Connector & Cable Assembly	

※ Please specify the model number, name, and quantity when ordering.

SPECIFICATIONS

NOTE : A fifteen minutes warm up time shall apply.

1. **Electrical Specifications**
2. **General Characteristics**
3. **Environmental Specifications**
4. **Safety & EMC Specifications**

$\leq -55\text{dBm}$ (@ $3\text{GHz} < \text{freq} < 13.2\text{GHz}$, span < 3MHz)
 $\leq -50\text{dBm}$ (@ $13.2\text{GHz} < \text{freq} < 26.5\text{GHz}$, span < 3MHz)

1.4 Frequency SPAN

1.4.1 Range : 1 Hz/Div to FULL SPAN.
ZERO SPAN

1.4.2 Accuracy : $\leq \pm 1\%$

1.5 Stability

1.5.1 Residual FM : $\leq 10 \times N \text{ Hz}_{P-P}$, 1s

1.5.2 Noise Sidebands : -112 / -115 (spec/typical@ center frequency=10KHz)

1.6 Frequency Ref. Accuracy

1.6.1 Temperature : $\leq \pm 0.1 \text{ ppm}$

1.6.2 Aging per year : $\leq \pm 0.3 \text{ ppm}$

2.0 Amplitude

2.1 Measurement : +30 dBm to DANL

2.2 Displayed Average Noise Level

$\leq -120 \text{ dBm}$, 10kHz ~ 100kHz
 $\leq -125 \text{ dBm}$, 100kHz ~ 300kHz
 $\leq -132 \text{ dBm}$, 300kHz ~ 500kHz
 $\leq -137 \text{ dBm}$, 500kHz ~ 700kHz
 $\leq -142 \text{ dBm}$, 700kHz ~ 10MHz
 $\leq -147 \text{ dBm}$, 10MHz ~ 2GHz
 $\leq -146 \text{ dBm}$, 2GHz ~ 6.4GHz
 $\leq -143 \text{ dBm}$, 6.4GHz ~ 18GHz
 $\leq -138 \text{ dBm}$, 18GHz ~ 22GHz
 $\leq -136 \text{ dBm}$, 22GHz ~ 24GHz
 $\leq -133 \text{ dBm}$, 24GHz ~ 26.5GHz

2.3 1dB Compression Point : 0 dBm @ Input RF ATT 0 dB (100MHz~ 3GHz)

2.4 Displayed Range : -5 dBm @ Input RF ATT 0 dB (3GHz~ 26.5GHz)
0.1~1 dB/Div (@ 0.1dB step)
1~20 dB/Div (@ 1 dB step)
10 divisions with Linear scale

2.5 Amplitude Units

2.5.1 LOG Display Mode : dBm, dBmV, dB μ V, dBpW, Volts, Watts, Amps.

2.5.2 LINEAR Display Mode : V(mV, μ V) , pW, nW.

2.6 Display Linearity

2.6.1 LOG Mode : $\leq \pm 0.1$ dB (@ Input mixer level ≤ -20 dBm)
 $\leq \pm 0.13$ dB (@ -20 dBm < Input mixer level ≤ -10 dBm)

2.6.2 LINEAR Mode : $\leq \pm 5\%$ of Ref. Level over 10 divisions

2.7 Frequency Response : ± 0.5 dB, 1 MHz ~ 3.0GHz
 ± 1.0 dB, 3.0GHz ~ 6.4GHz
 ± 1.5 dB, 6.4GHz ~ 13.2GHz
 ± 2.0 dB, 13.2GHz ~ 22GHz
 ± 2.5 dB, 22GHz ~ 26.5GHz
@ 10 dB RF attenuation, room temperature(20°C ~ 30°C)

2.8 Attenuator

2.8.1 Range : 0 to 55 dB (Manual or Auto)

2.8.2 Resolution : 5 dB steps

2.8.3 Accuracy : ± 0.5 dB @ 100MHz (LSA-30)
 ± 0.5 dB @ Freq.<13.2GHz (LSA-132, LSA-265)
 ± 0.8 dB @ <13.2GHz<Freq.<26.5GHz (LSA-132, LSA-265))

2.9 Reference Level

2.9.1 Range : +30 dBm to -170 dBm, 0.1 dB step [Log Scale]
7.07nV ~ 7.07 V, 1% step [Linear Scale]

2.9.2 Accuracy : 0 dB

2.10 Residual Spurious : ≤ -95 dBc @ $1\text{MHz} < \text{Frequency} < 26.5\text{GHz}$
(Input terminated , 0 dB attenuator)

2.11 Harmonic Distortion : ≤ -60 dBc , -30 dBm input (0 dB Attenuator)

2.12 Intermodulation Distortion : $\leq +13$ dBm , Frequency < 100 MHz
(-30 dBm input, 0 dB attenuation)
 $\leq +15$ dBm , 100 MHz $< \text{Frequency} < 26.5\text{GHz}$
(-30 dBm input, 0 dB attenuation)

2.13 Other Input Related Spurious : ≤ -60 dBc, -30 dBm input

2.14 Resolution Bandwidth

2.14.1 Selections : 30Hz to 5MHz (1-2-3-5 steps)

2.14.2 Accuracy : $\leq \pm 1.5\%$ @ 500Hz ~ 500KHz
 $\leq \pm 6\%$ @ 1MHz ~ 5MHz

2.14.3 Selectivity : $< 5:1$ (60 dB / 3 dB)

2.14.4 Switching Error : $\leq \pm 0.05$ dB refer to 5 kHz RBW

2.15 Video Filter

2.15.1 Selections : 1Hz to 3MHz (1-2-3-5 steps)

2.16 FFT Filter

2.16.1 Selections : 1Hz to 300Hz (1-2-3-5 steps)

2.16.2 Accuracy : $\leq 1\%$

2.16.3 Selectivity : $< 4.5:1$ (60 dB / 3 dB)

3.0 Sweep

3.1 Rate : 10 ms to 2000 sec (SPAN $\geq 10\text{Hz}$)
1 μs to 2000 sec (@ ZERO SPAN)

3.2 Accuracy	:	$\leq \pm 0.5 \%$
3.3 Data Points	:	101 to 8192 points (SPAN \geq 10Hz) 3 to 8192 points (@ ZERO SPAN)
3.4 Trigger		
3.4.1 Source	:	Free Run, Video, Line, External (Rear Panel)
3.4.2 Mode	:	Post trigger, Pre trigger
4.0 Display		
4.1 Type	:	10.4" Color TFT LCD
4.2 Resolution	:	800(horizontal) X 600(vertical) pixels
5.0 Inputs		
5.1 RF Input		
5.1.1 Connector	:	N Female, 50 ohm (3 GHz, 13.2 GHz) APC 2.92mm (26.5GHz)
5.1.2 VSWR	:	$\leq 1.5 : 1$ (10MHz < Freq. < 3GHz @ 10 dB ATT) $\leq 1.8 : 1$ (3GHz < Freq. < 13.2GHz @ 10 dB ATT) $\leq 2.0 : 1$ (13.2GHz < Freq. < 26.5GHz @ 10 dB ATT)
6.0 Outputs		
6.1 IF Output	:	21.4 MHz (3rd IF), 421.4 MHz (2nd IF)
6.2 1 st LO Output	:	3321.4MHz~6821.4MHz
6.3 Cal Signal Output	:	100MHz , -20dBm \pm 1.0dB @ 50 Ω Impedance
6.4 SWP Gate Output	:	0 ~ 5VDC (TTL level)
6.5 Power Probe	:	3 Pin connector (+15VDC, -12 VDC, GND)
7.0 Internal Memory	:	40G bytes (size of memory)
8.0 AM Demodulation		
8.1 Demodulation Range	:	100%
8.2 Input Level Range	:	-60 dBm ~ 0 dBm

9.0 FM Demodulation

- 9.1 Deviation Range : $\leq 100\text{KHz}$
- 9.2 Input Level Range : $-60\text{ dBm} \sim 0\text{ dBm}$

10.0 External Trigger Input

- 10.1 Connector : BNC female, Rear Panel
- 10.2 Impedance : 10 Kohm (nominal)
- 10.3 Trigger Level : TTL Level

11.0 Serial Interface

- 11.1 Type : RS-232C
- 11.2 Connector : 9 Pin D-Sub Male

12.0 GPIB Interface

- 12.1 Interface : SH1. AH1. T6. L4. SR1. RL1. PP0. DC1. E2, LEO. TEO
- 12.2 Specifications : IEEE-Standard 488.2

13.0 LAN Interface

- 13.1 Interface : 10/100 Base/T. RJ45

14.0 USB Interface

- 14.1 Specifications : USB 1.1 or 2.0

15.0 External Reference

- 15.1 Frequency : 10MHz
- 15.2 Level : -5 dBm to $+15\text{ dBm}$ (@ Input Level)
 $+5\text{ dBm}$ (@ Output Level)
- 15.3 Connector : BNC female

16.0 Printer

-
- 16.1 Function : Output data to printer
16.2 Connector : 25 pin, female D-Sub for parallel printer

2. General Characteristics

- 1.0 Dimensions : 430mm x 222mm x 467mm [Without handles and down-feet]
485mm x 240mm x 489mm [With handles and down-feet]
- 2.0 Weight : 18 Kg. (LSA-30)
19.5 Kg (LSA-132, LSA-265)
- 3.0 Power Requirements (standard)
- 3.1 Source Voltage and Frequency : 100 to 240VAC, 50/60Hz
- 3.2 Power Consumption : 240 Watts Maximum (without option)
- 4.0 Warm-up Time : 15 minutes

3. Environmental Specifications

- 1.0 Temperature Range
- 1.1 Storage : -40°C to +71°C
- 1.2 Operating : 0°C to +50°C
- 2.0 Humidity
- 2.1 Spec : MIL-PRF-28800F (Class 3)
- 3.0 Shock & Vibration
- 3.1 Spec : MIL-PRF-28800F (Class 3)
- 4.0 Altitude : Storage and Operation up to 4600 meters

4. Safety & EMC Specifications

1.0 Safety : EN61010-1

1.1 Main Supply Voltage Fluctuations : Nominal Voltage $\pm 10\%$

2.0 EMC : EN 61326 RF Emission Class A Immunity Table 1 and Performance
Criterion B

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SECTION 2 PREPARATIONS BEFORE USE

This section explains the preparations and safety procedures that should be performed before using the equipment. The safety procedures are to prevent the risk of injury to the operator and damage to the equipment.

Ensure that you understand the contents of the pre-operation preparations before using the equipment.

For connecting the GPIB cable and setting the GPIB address, see the remote control operation in Programming Manual.

TABLE OF CONTENTS

INSTALLATION SITE AND ENVIRONMENTAL CONDITIONS -----	2-3
Locations to Be Avoided -----	2-3
SAFETY MEASURES -----	2-4
Power On -----	2-4
Input Level to RF Input -----	2-5
PREPARATIONS BEFORE POWER ON -----	2-6
Protective Grounding -----	2-7
Method for removing EMC Noise-----	2-8

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SECTION 2 PREPARATIONS BEFORE USE

INSTALLATION SITE AND ENVIRONMENTAL CONDITIONS

Locations to Be Avoided

The equipment operates normally at temperatures from 0 to 50°C. However, for best performance, the following situations should be avoided.

- Where there is severe vibration.
- Where the humidity is high.
- Where the equipment will be exposed to direct sunlight.
- Where the equipment will be exposed to active gases.
-

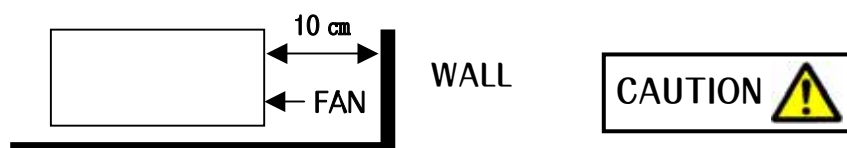
In addition to meeting the above conditions, to ensure long term trouble free operation, the equipment should be used at room temperature and in a location where the power supply voltage does not fluctuate greatly.

CAUTION

If the equipment is used at normal temperatures after it has been used or stored for a long time at low temperatures, there is a risk of short circuiting caused by condensation.

To prevent this risk, do not turn the equipment on until it has been allowed to dry out sufficiently.

To suppress any internal temperature increase, the equipment has a fan on the rear panel. As shown in the diagram below, leave a gap of at least 10 cm between the rear panel and wall, nearby equipment or obstructions so that fan ventilation is not blocked.



SAFETY MEASURES

This paragraph explains the safety procedures, which should be followed under all circumstances to prevent the risk of an accidental electric shock, damage to the equipment or a major operation interruption.

Power On



- Before Power on The equipment must be connected to protective ground. If the power is switched on without taking this precaution, there is a risk of receiving an accidental electric shock. In addition, it is essential to check the power source voltage. If an abnormal voltage that exceeds the specified value is input, there is accidental risk of damage to the equipment and fire.

In the following, special notes on safety procedures are extracted from sections other than section 2.

To prevent accidents, read this section together with the related sections before beginning operation.

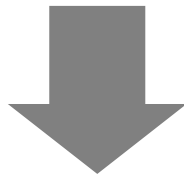
By pushing the front switch in the equipment, change the stand-by state to active state. The equipment using window operation system has initial window booting display and operates the equipment after finishing the window booting.

(* If the equipment doesn't start automatically normal, you click the HSA icon in the display twice)

Input Level to RF Input

Frequency range : 3 Hz to 3.0 GHz
3 Hz to 13.2 GHz
3 Hz to 26.5 GHz

Measurement level : The maximum signal level that can be applied to the RF input connector is +30 dBm.



WARNING

The RF Input circuit is not protected against excessive power.

If a signal exceeding +30 dBm is applied, the input attenuator and internal circuit will be damaged.



Do not input over 0 VDC to the RF input connector

PREPARATIONS BEFORE POWER ON

The equipment operates normally when it is connected to an 100 VAC to 250 VAC (automatic voltage selected automatically) 50/60 Hz AC power supply. To prevent the following, take the necessary procedures described on the following pages before power is supplied.

- Accidental electric shock.
- Damage caused by abnormal voltage.
- Ground current problems.

To protect the operator, the following WARNING and CAUTION notices are attached to the rear panel of the equipment.

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.

WARNING

Disassembly, adjustment, maintenance, or other access inside this equipment is to be performed qualified personnel only. Maintenance of this equipment should be performed only by trained service personnel who are familiar with the risk involved of fire and electric shock. Potentially lethal voltages existing inside this equipment, if contacted accidentally, may result in personal injury or death, or in the possibility of damage to precision components.

Always follow the instructions on the following pages.

Protective Grounding

Grounding with frame ground (FG) terminal

When there is no grounded AC power-supply outlet, the protective frame ground (FG) terminal on the rear panel must be connected directly to ground potential.



WARNING 

If power is applied without protective grounding, there is a risk of accidental electric shock. The protective frame ground (FG) terminal on the rear frame, or the ground pin of the supplied power cord must be connected to ground potential before power is supplied to the equipment.

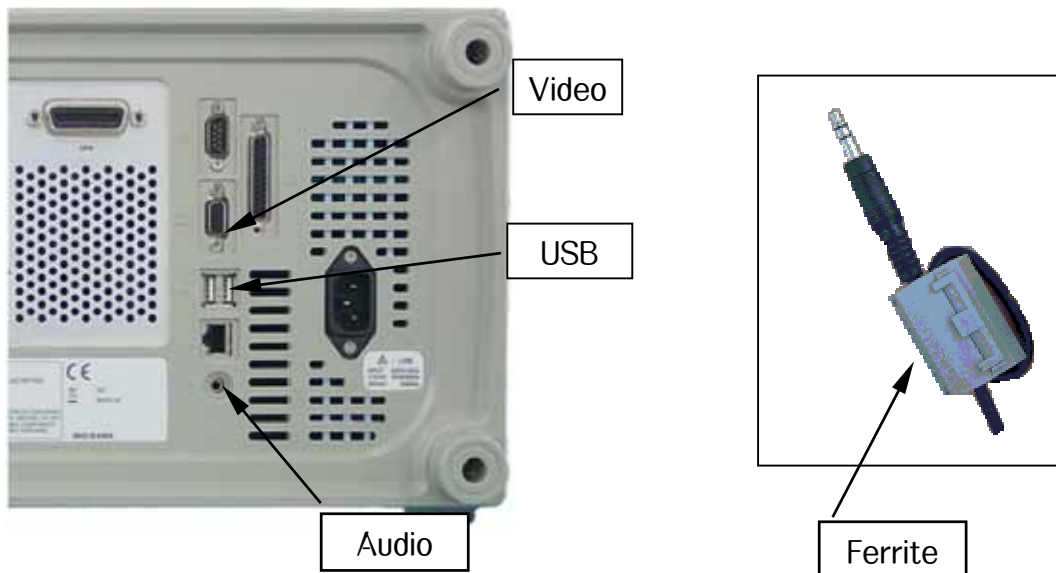
Method for removing EMC Noise

Using Audio outlet

If you want to use Audio output outlet in the rear panel, you must use the Audio line with ferrite core.

Using both USB and Video output outlet

If you want to use both USB and Video output outlet in the rear panel, you must use the USB or Video cable with ferrite core (cramp type)



SECTION 3 PANEL DESCRIPTION

In this section the front and rear panels are described.

TABLE OF CONTENTS

TABLE OF FRONT AND REAR PANEL FEATURES -----	3-3
TABLE OF I/O CONNECTORS -----	3-9
GPIB CONNECTOR -----	3-11
RS-232C CONNECTOR -----	3-12
PRINTER CONNECTOR -----	3-13
EXT VGA CONNECTOR -----	3-14
PROBE POWER CONNECTOR -----	3-15
KEYBOARD CONNECTOR -----	3-16
MOUSE CONNECTOR -----	3-17
USB CONNECTOR -----	3-18
ETHERNET CONNECTOR -----	3-19

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SECTION 3 PANEL DESCRIPTION

In this section, the front and rear panels are described.

- Fig. 3-1 Front panel
- Fig. 3-2 Rear panel

In this manual, the key on the front panel is called as a hard key and it is expressed as boxed letter. In case of the key of menu(F1 ~ F8) is called as a soft key and it is expressed as italic.

Example] FREQ *Center*

TABLE OF FRONT AND REAR PANEL FEATURES

NO	Panel Marking	Explanation of Function
①	LCD	This is a liquid crystal display. It displays the trace of waveforms, the parameter settings, the value of marker, and the soft menu keys, etc.
②	F1 ~ F8 ESC, NEXT	These are the soft keys for selecting the soft key menus linked to the panel key operation.
③	FUNCTION	
	FREQ	This is input section of the frequency parameter data.
	SPAN	This is input section of the span parameter data.
	AMPL	This is input section of the amplitude parameter data.
	MEASURE	This key sets the measurement functions.
	Control	This key sets the selected measurement functions.

NO	Panel Marking	Explanation of Function
④	CONTROL	
	In/Out	This key sets the coupling method.
	Display	This key sets the display functions, etc.
	Trace	This key selects the trace waveform and video average mode.
	Limit	This key sets the limit line functions.
	Trigger	This key sets the trigger functions.
	Couple	This key sets the detection mode.
	BW	This key sets the RBW, VBW.
	AUX	This key sets the auxiliary functions, such as FM/AM demodulation, audio control, etc.
	Tune	This key is used for auto tuning function.
	Source	This key selects the signal source.
⑤	SWEEP	
	Single	One sweep is executed by pressing this key.
	Sweep	This key sets the sweep time as well as the number of data.

NO	Panel Marking	Explanation of Function
⑥	SYSTEM	
	System	This key sets the configuration of system.
	Preset	This sets the measurement parameters to the default values. Also calibration menus are included under this key.
	Mode	This key alters a variety of measurement modes.
	Setup	This key sets the environment pursuant to measurement modes.
	File	This key manages the file.
	Save	This key is used for saving the waveforms status and limit lines.
	Print	This key is used for printing.
	Help	This key offers a fundamental explanation of each key.
⑦	MARKER	
	Marker	This key sets the marker.
	Mkr →	This key sets the marker value to a specified parameter.
	Peak	This key is related to the peak search function.
	Func	This key sets the function which related with a marker.

NO	Panel Marking	Explanation of Function
⑧	SCROLL NOB	This key is used for scrolling the parameters.
⑨	STEP KEY	These keys are used for up/down the parameters.
⑩	RF INPUT	This is the RF input connector.
⑪	PROBE	This is for RF probe power.
⑫	POWER DATA ENTRY	This key is used for setting the numeric data and moving the cursor.
		[<-] (Backspace-key) This key is used for adjusting the wrong input data.
		[0...9, '.', '+/-' , 'ENTER'] Numeric data setting key.
⑬		This is an output of Tracking Generator. (Option)
⑭	TGOUT	This is a input connector of 2 nd IF input signal
⑮	2 nd IF In	This is an output of 1 st local oscillator signal
⑯	1 st LO Out	This is an output connector of the calibration signal.
⑰	CAL. OUT	This is an output of audio signal
⑱	PHONE	This is a connector for USB equipments.
⑲	Front USB	This is a connector for mouse.
⑳	MOUSE	This is a connector for Keyboard.
㉑	KEYBOARD STBY/ON	This is the power switch. It can be used when the back panel power switch is on. The power on condition is fetched from the STBY condition when the key is pressed momentary. The equipment is returned to the STBY condition from the power on condition when the key is pressed again for about 1 second.
㉒	CD-ROM	This equipment is used for reading the CD-R.

NO	Panel Marking	Explanation of Function
②③	REF IN 10MHz	This is an input connector for reference frequency. When external reference signal connected to this connector, the present condition is displayed on the top of right side on display panel.
②④	REF OUT 10MHz	This is an output connector for reference frequency. When other equipment is used with this signal analyzer, the output signal of this connector is used for reference signal.
②⑤	3 rd IF OUT	This is an output connector for 3 rd IF signal.
②⑥	2 nd IF OUT	This is an output connector for 2 nd IF signal.
②⑦	GPIB	This is for use with the GPIB interface. It is the connector to an external system controller.
②⑧	EXT VGA	This is VGA output for external monitor.
②⑨	RS-232C	This is the RS-232C connector. Connect it to system controller.
③①	PRINTER	This is for use with the printer.
③②	Inlet	This is the fused AC power inlet to which the supplied power-cord is connected.
③③	ETHERNET	This is an Ethernet connector for network connection.
③④	Audio	This is an audio output of sound which made in main processor board.
③⑤	Rear USB	This is a connector for USB equipment.
③⑥	EXT TRIG	This is an input connector for the external trigger.
③⑦	SWP GATE	This is an output connector for Sweep Gate signal.
③⑧	FG	This is the frame ground terminal.
③⑨	FAN	This is the cooling fan ventilating internally generated heat. Leave a clearance of a 10 cm around the fan.

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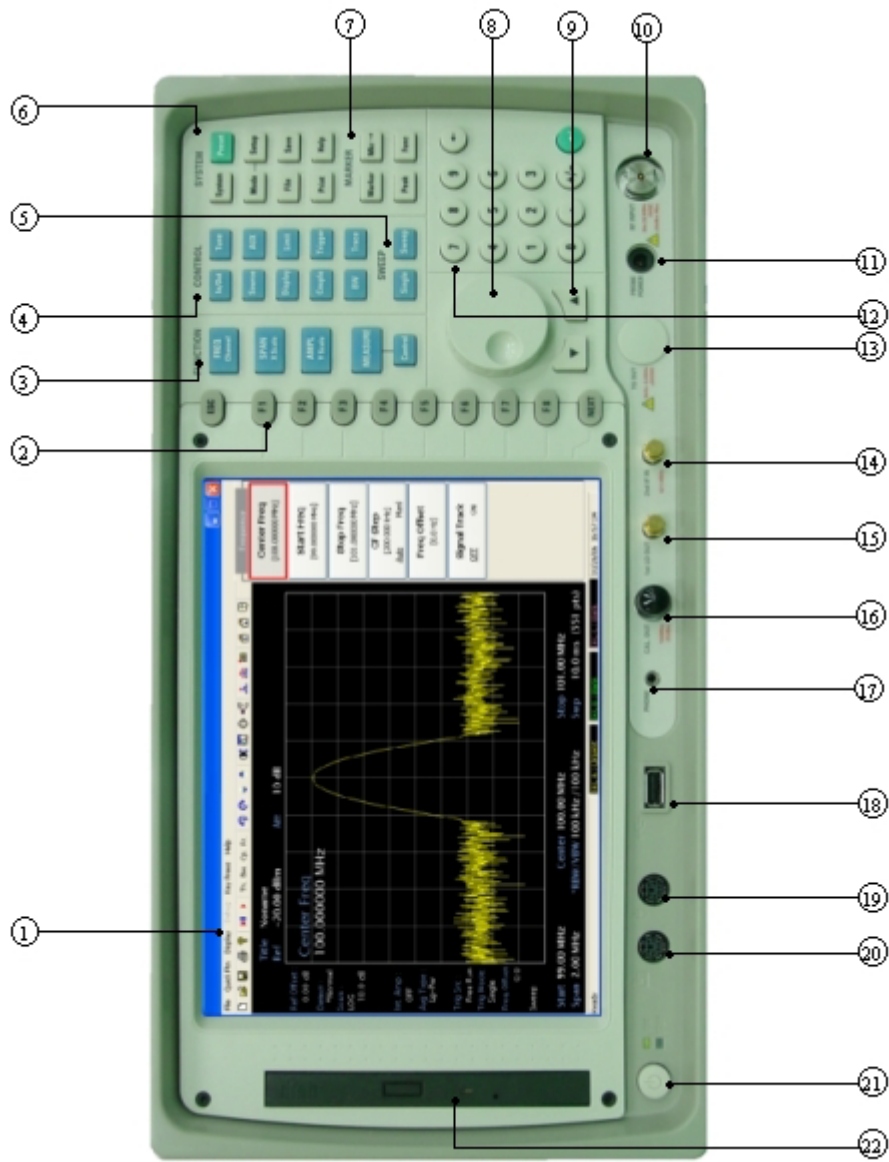


Fig 3-1. Front Panel

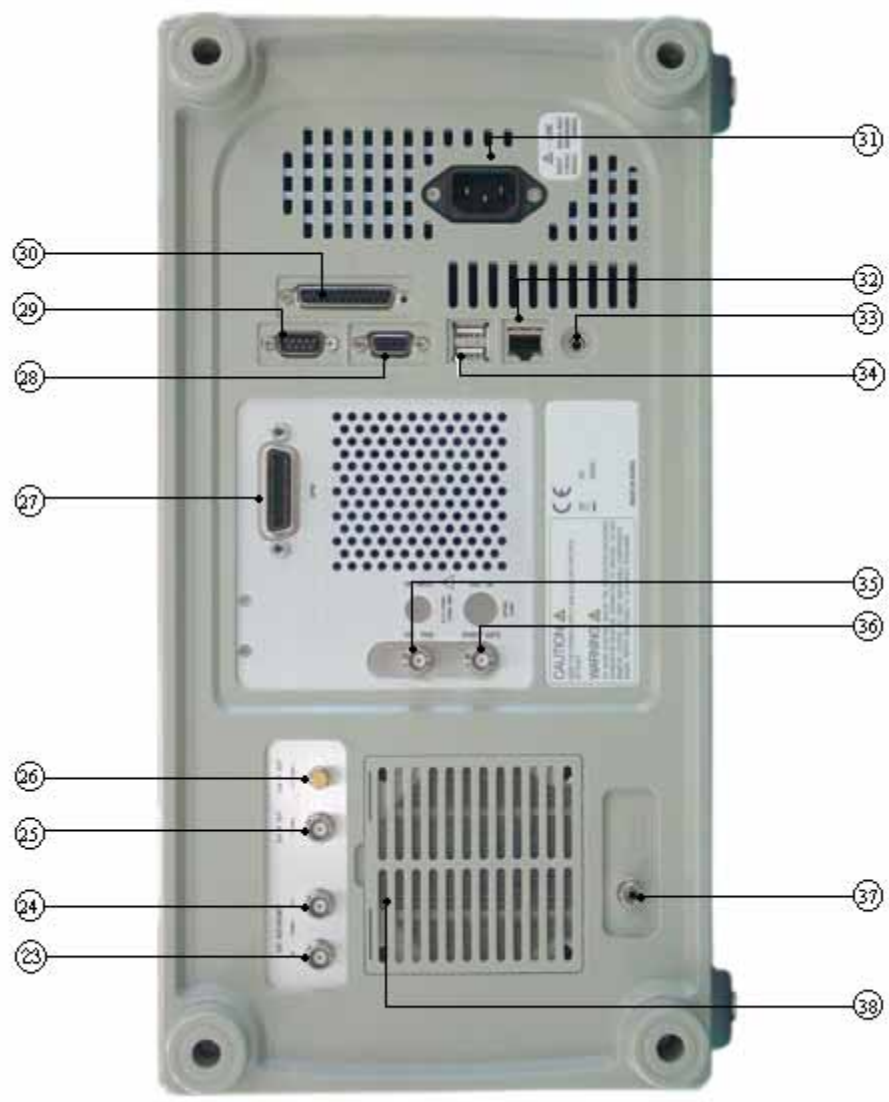


Fig 3-2. Rear Panel

TABLE OF I/O CONNECTORS

CONNECTOR	TYPE	IN/OUT	SIGNAL	LOCATION
AC INPUT	IEC 320 Socket	Input	AC Power	Rear 31
RF INPUT	Type N Female (2.92mm Female)	Input	3 Hz ~ 3.0GHz/13.2GHz/26.5GHz	Front 19
CAL. OUT	BNC Female	Output	20 MHz	Front 16
EXT TRIG	BNC Female	Input	TTL LEVEL	Rear 35
SWP GATE	BNC Female	Output	TTL LEVEL	Rear 36
1 st LO OUT	SMA Female	Output	3321.4 ~ 6821.4MHz 10 dBm	Front 15
2 nd IF IN	SMA Female	Input	421.4 MHz	Front 14
2 nd IF OUT	SMA Female	Output	421.4 MHz 0 dBm	Rear 26
3 rd IF OUT	BNC Female	Output	21.4MHz 3dBm	Rear 25
REF IN	BNC Female	Input	10 MHz	Rear 23
REF OUT	BNC Female	Output	10 MHz	Rear 24
GPIB	24-Pin Champ	In/Out	Refer to Pin Spec (Table 2)	Rear 27
PRINTER	25-Pin, D-sub Female	Output	Refer to screen print data Specification (Table 4)	Rear 30
RS-232C	9-Pin, D-sub Male	In/Out	Refer to Pin Specification (Table 3)	Rear 29
ETHERNET	10/100 Base-T	In/Out	Refer to Pin Specification (Table 10)	Rear 32
USB	USB 2.0 Support	In/Out	Refer to Pin Specification (Table 9)	Front 18 Rear 34

Keyboard	PS/2	Input	Refer to Pin Specification (Table 7)	Front ⑳
Mouse	PS/2	Input	Refer to Pin Specification (Table 8)	Front ⑲
EXT VGA	15-Pin, D-sub Female	Output	Refer to Pin Specification (Table 5)	Rear ㉘

Table 1. I/O Connector

GPIB CONNECTOR

The IEEE-488 GPIB Connector complies with ANSI/IEEE Standard 488.2-1987.

PIN NUMBER	SIGNAL	PIN NUMBER	SIGNAL
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

Table 2. Pin-Out for IEEE-488 GPIB Connector

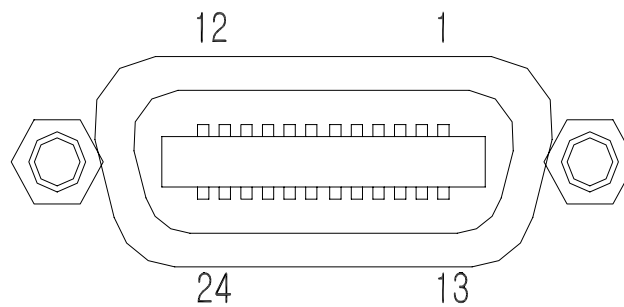


Figure 3-3. IEEE-488 GPIB Connector

RS-232C CONNECTOR

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

Table 3. Pin-Out for RS-232C Connector

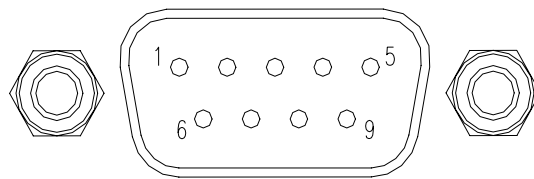


Figure 3-4. RS-232C Connector

PRINTER CONNECTOR

PIN NUMBER	SIGNAL
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

Table 4. Pin-Out for PRINTER Connector

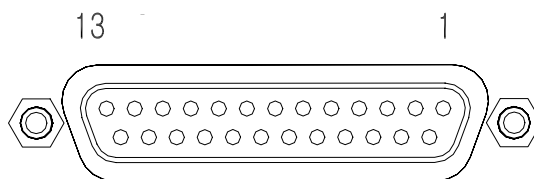


Figure 3-5. PRINTER Connector

EXT VGA CONNECTOR

PIN NUMBER	SIGNAL
1	RED
2	GREEN
3	BLUE
4	ID2
5	GND
6	RGND
7	GGND
8	BGND
9	KEY
10	SGND
11	ID0
12	ID1 or SDA
13	HSYNC or CSYNC
14	VSYNC
15	ID3 or SCL

Table 5. Pin-Out for EXT VGA Connector

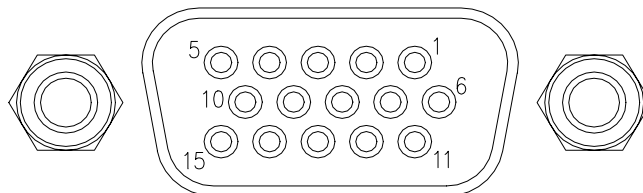


Figure 3-6. EXT VGA Connector

PROBE POWER CONNECTOR

PIN NUMBER	Voltage	Current
1	+15 V \pm 10 %	200 mA
2	-12 V \pm 10 %	100 mA
3	GND	

Table 6. Pin-Out for PROBE POWER Connector

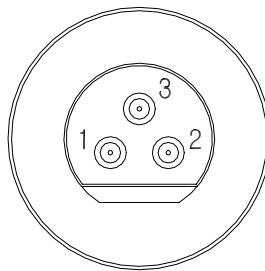


Figure 3-7. PROBE POWER Connector

KEYBOARD CONNECTOR

PIN NUMBER	Signal
1	KBD DATA
2	NC
3	GND
4	VCC
5	KBD CLOCK
6	NC

Table 7. Pin-Out for KEYBOARD

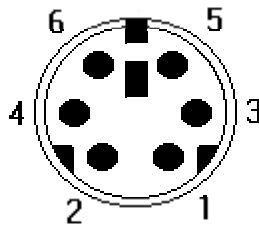


Figure 3-8. KEYBOARD CONNECTOR

MOUSE CONNECTOR

PIN NUMBER	Signal
1	MOUSE DATA
2	NC
3	GND
4	VCC
5	MOUSE CLOCK
6	NC

Table 8. Pin-Out for MOUSE

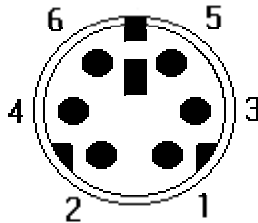


Figure 3-9. MOUSE CONNECTOR

USB CONNECTOR

PIN NUMBER	Signal
1	USB VCC
2	DATA-
3	DATA+
4	USB GND

Table 9. Pin-Out for USB

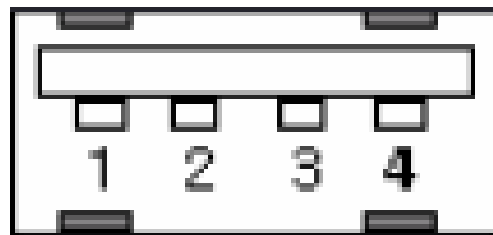


Figure 3-10. USB Connector

ETHERNET CONNECTOR

PIN NUMBER	Signal
1	TX+
2	TX-
3	RX+
4	NC
5	NC
6	RX-
7	NC
8	NC

Table 10. Pin-Out for ETHERNET

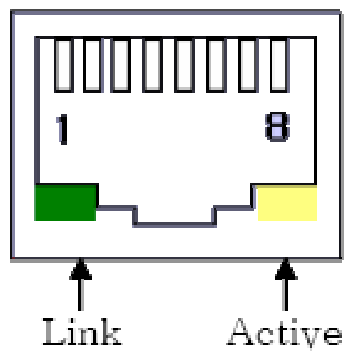


Figure 3-11. ETHERNET CONNECTOR

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SECTION 4 MENU TREE

TABLE OF CONTENTS

MENU TREE -----	4-4
FREQ, SPAN, AMPL -----	4-4
MEASURE, Control -----	4-6
In/Out, Display -----	4-11
Trace, Trigger -----	4-12
Limit, Couple -----	4-13
BW -----	4-14
AUX, Source -----	4-15
Sweep, System -----	4-16
Preset -----	4-18
File -----	4-19
Marker, Mkr → -----	4-20
Peak, Func -----	4-21

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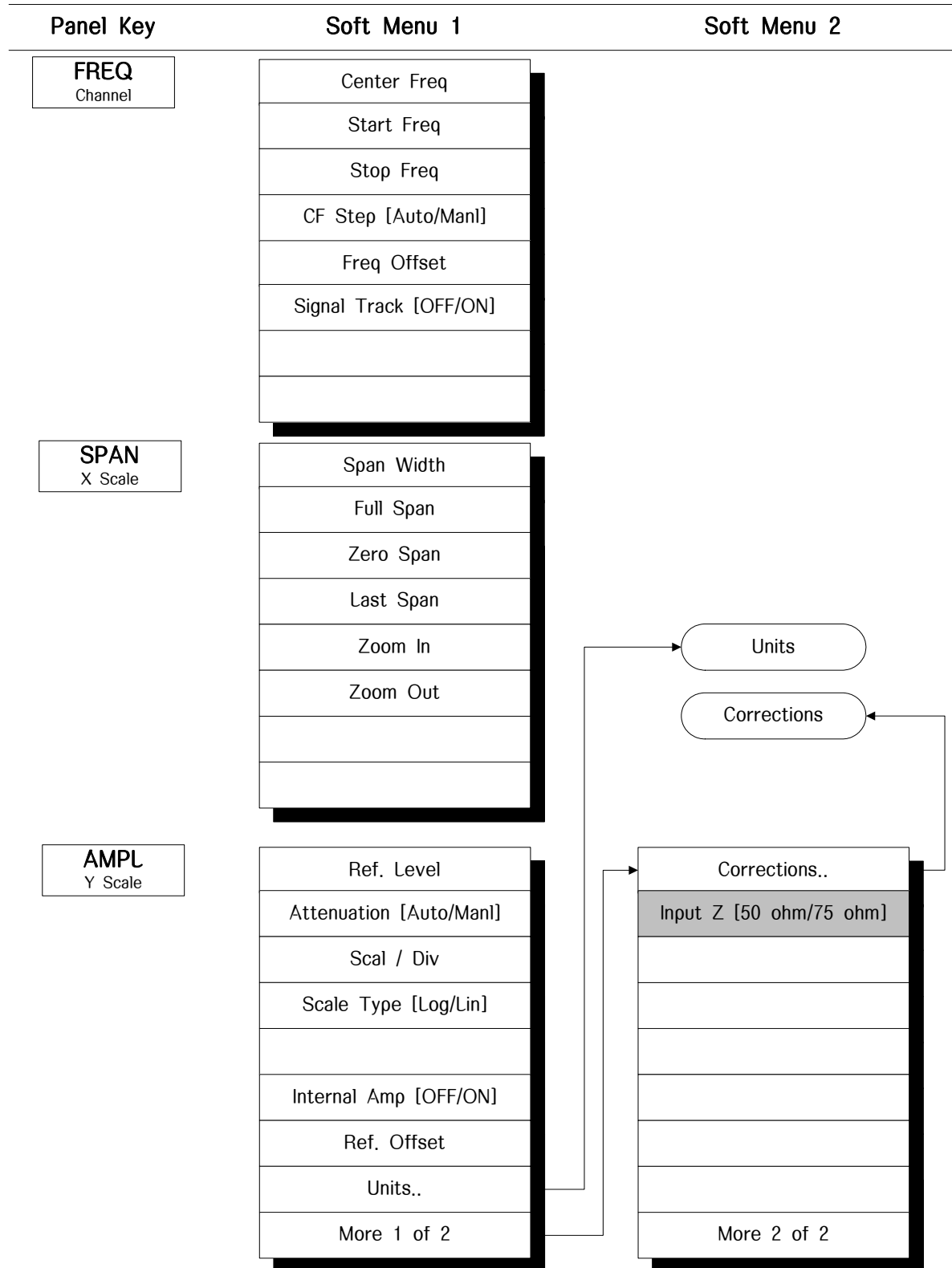
SECTION 4 MENU TREE

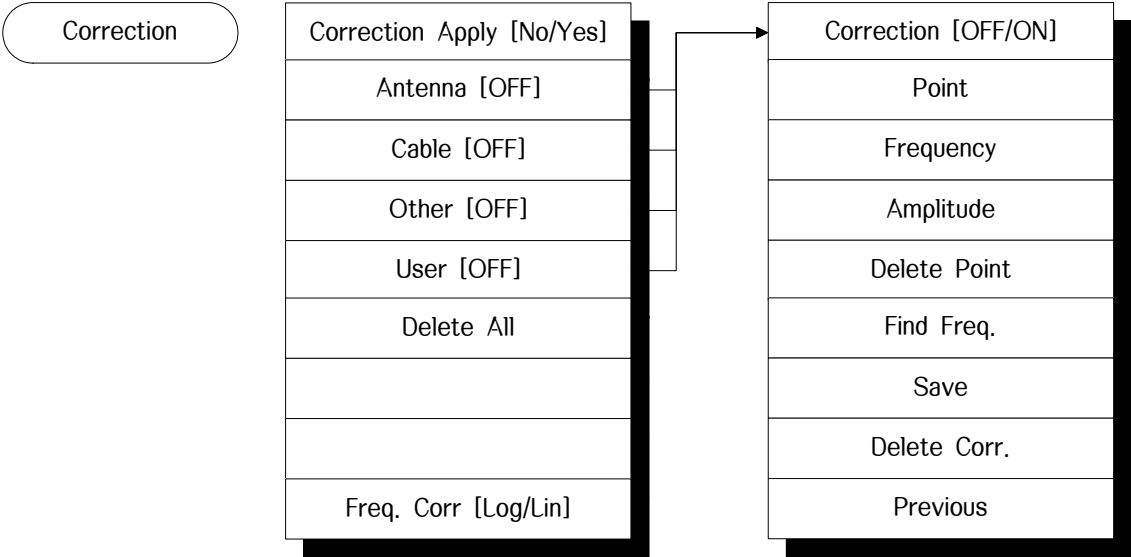
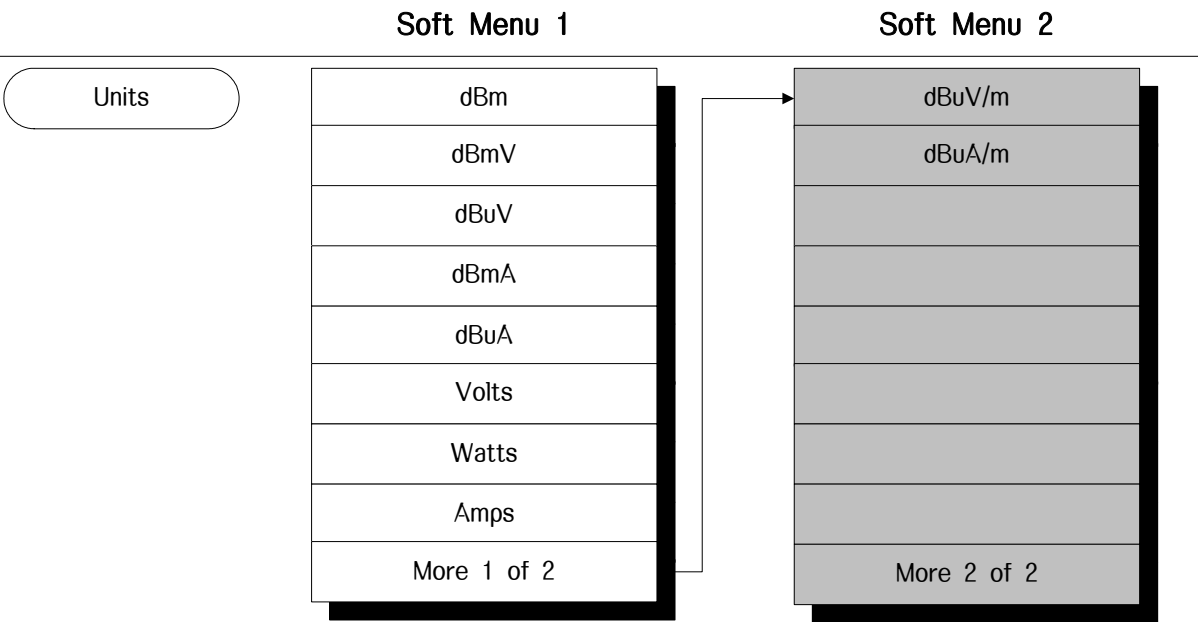
In this section, soft menu functions and its system hierarchy are described using a menu tree.

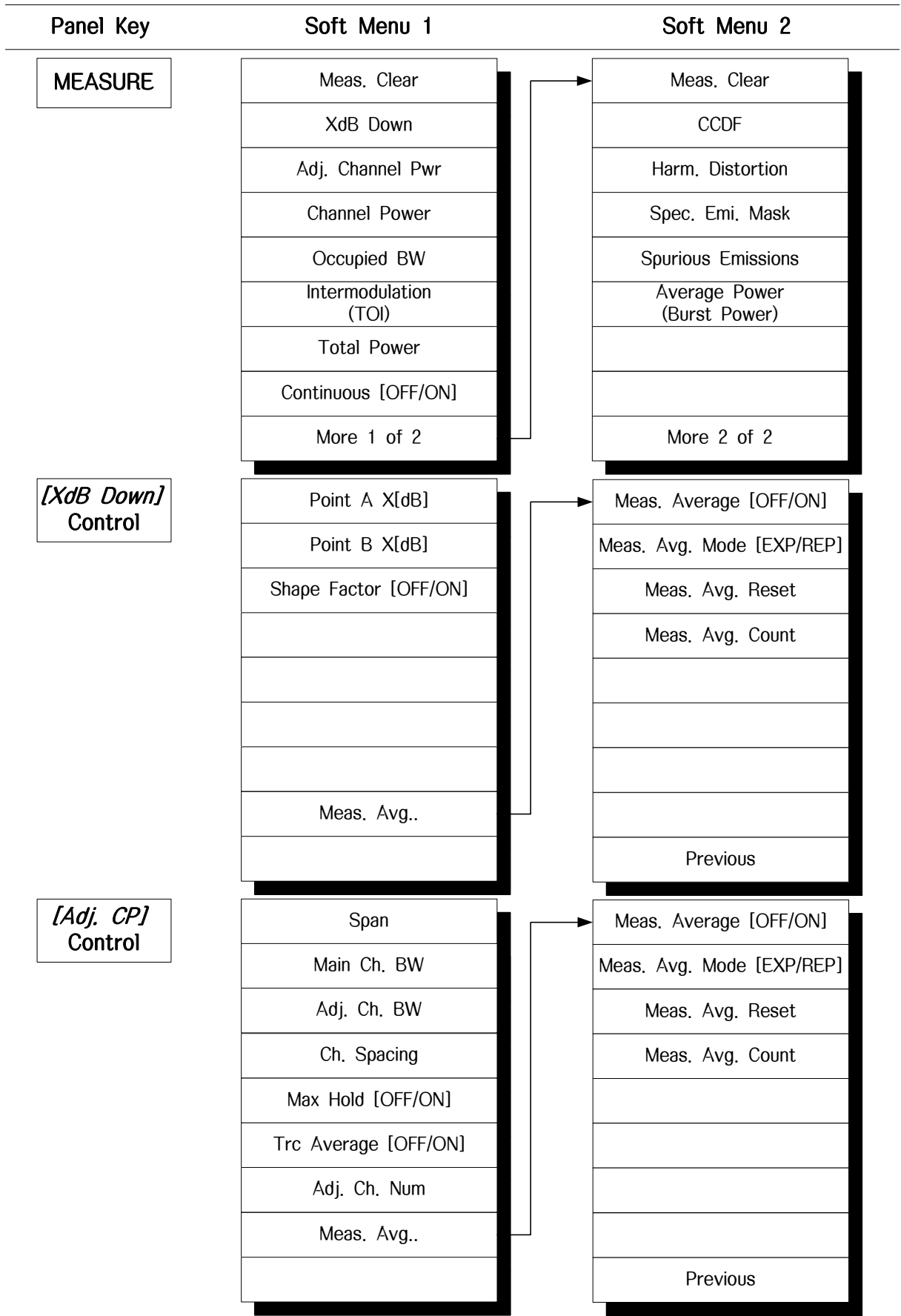
Contents to noted about the tree are shown below

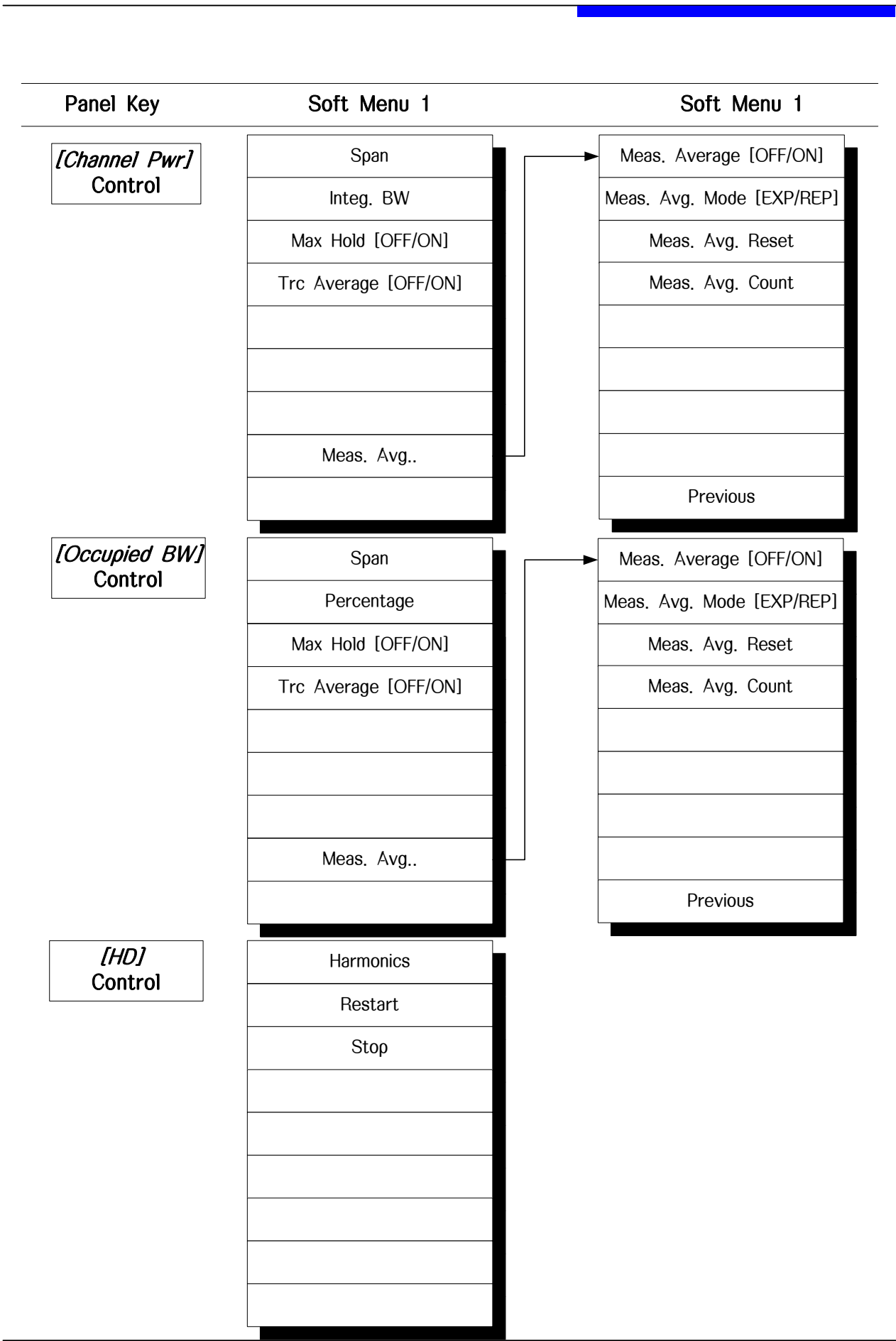
- (1) Panel key indicates a hard key on the panel.
- (2) SOFT MENU 1 are displayed on the screen when the panel key is pressed. SOFT MENU 2 indicates another menu below the SOFT MENU 1.
- (3) When the *Prev.* key is pressed on SOFT MENU 2 keys.
It will go to SOFT MENU 1 menu.
- (4) The menu of disabled option or disabled function key will not operate with white letter on the function menu.

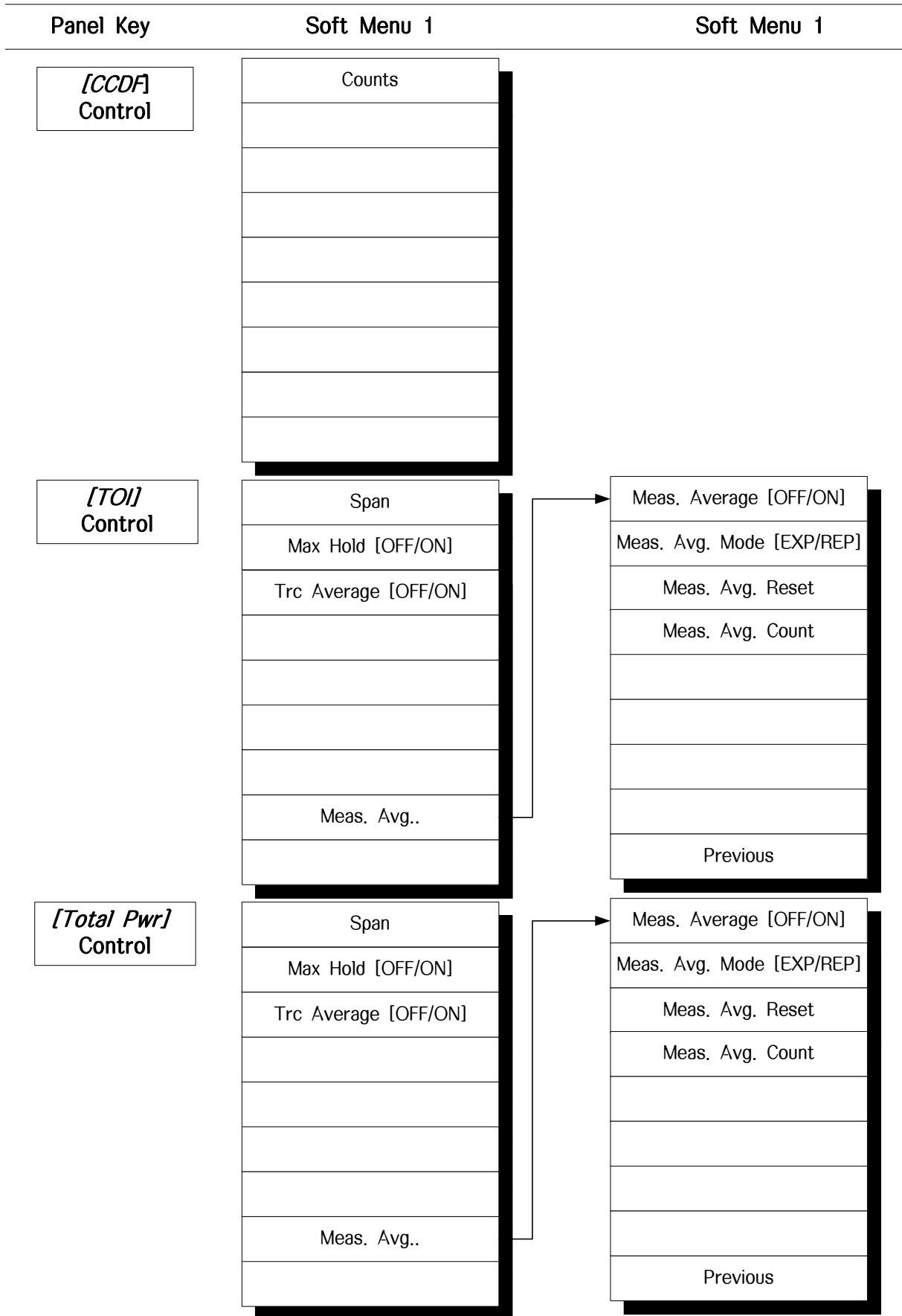
MENU TREE

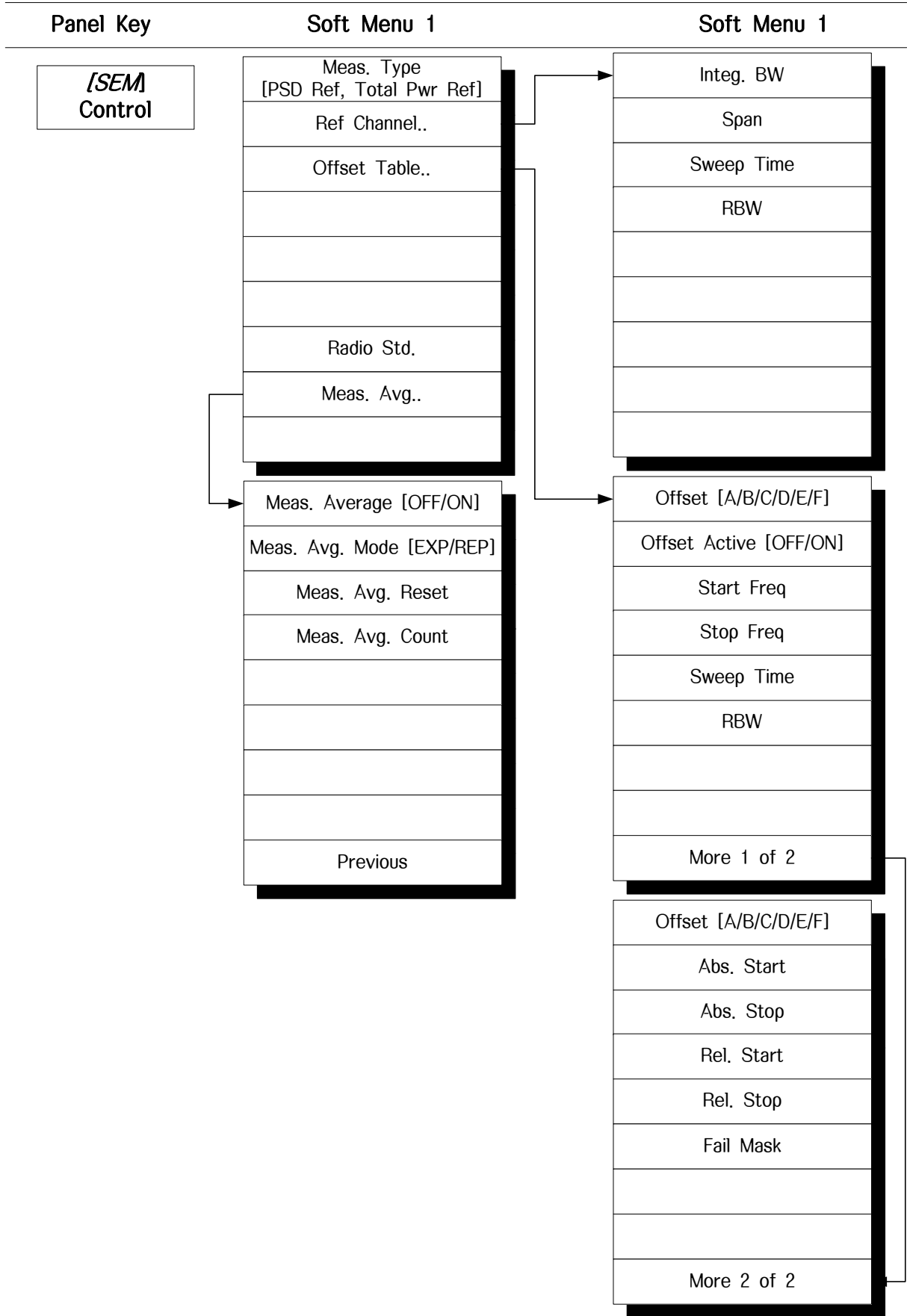


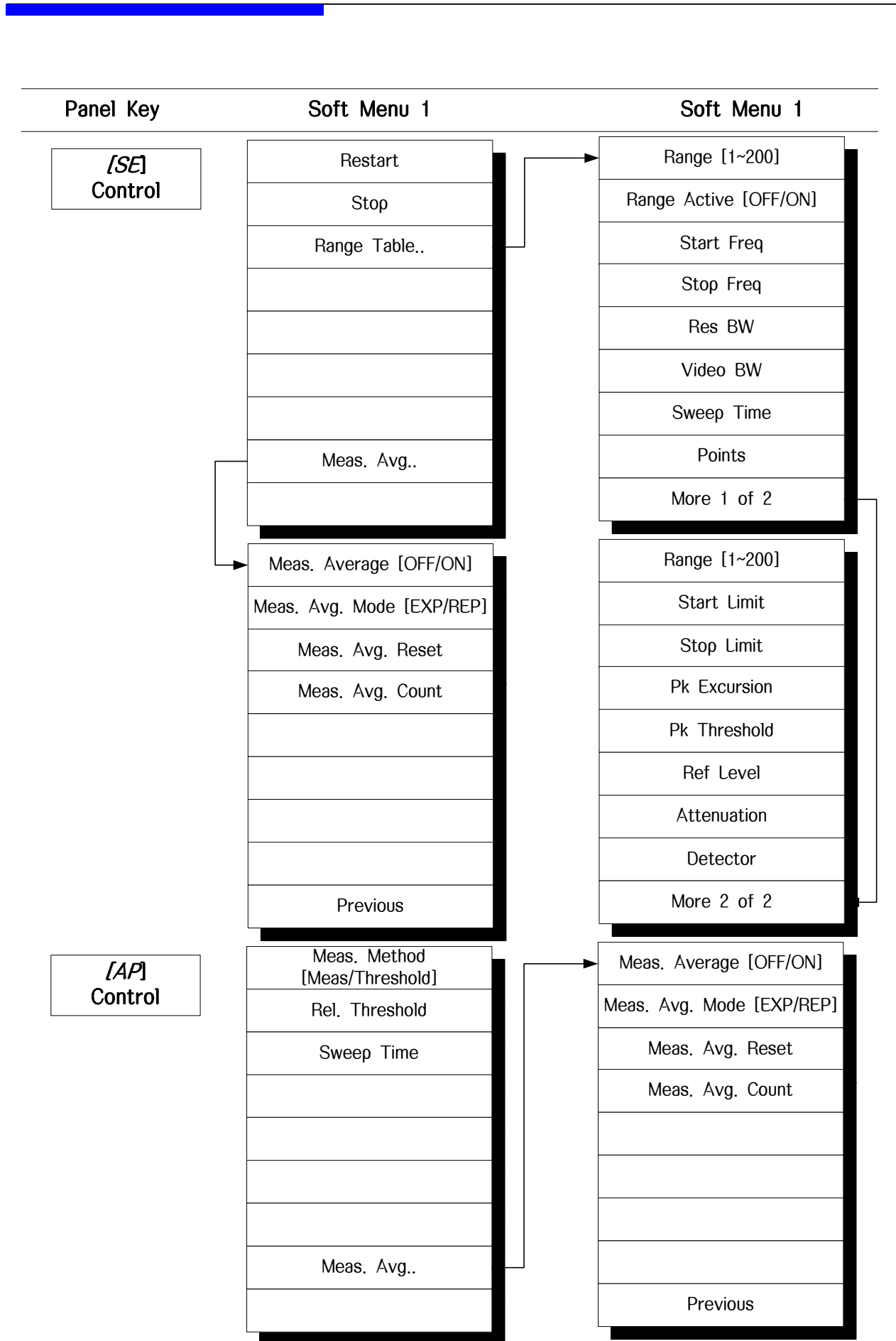












Panel Key	Soft Menu 1	Soft Menu 2
-----------	-------------	-------------

IN/OUT

RF Coupling [AC/DC]
2nd IF In [OFF/ON]
1st LO Out [OFF/ON]

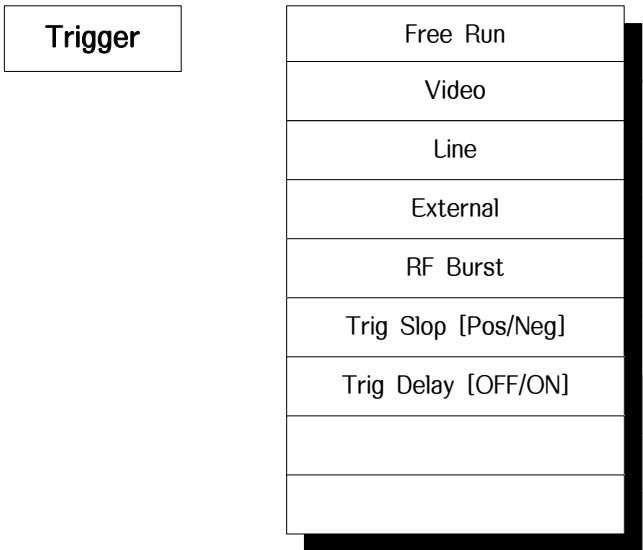
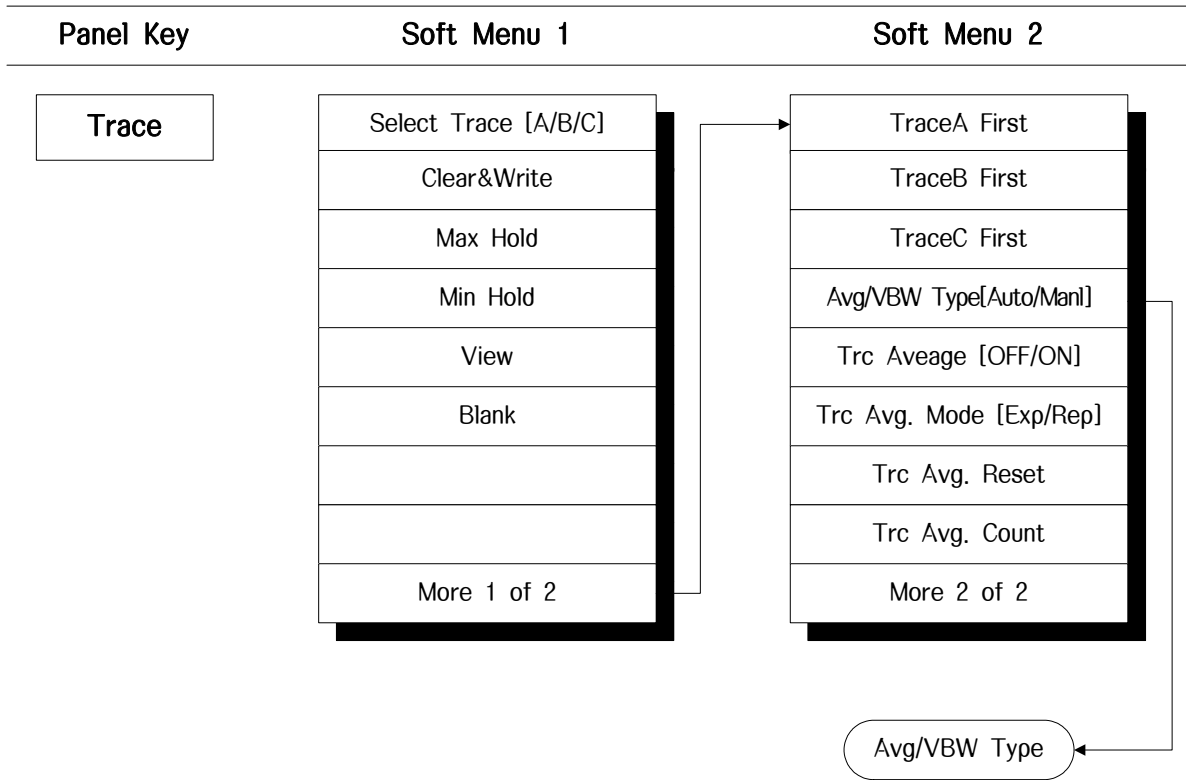
Basic : LSA - 30
Option : LSA - 132/265

Display

Full Screen
Display Value
Display Line [OFF/ON]
Threshold Value
Threshold Line [OFF/ON]
Zoom Center
Zoom Span
Zoom Display [OFF/ON]
More 1 of 2

Screen Title..
White Mode [OFF/ON]
Graticule [OFF/Full/Center]
Annotation [OFF/ON]
Dual Windows [OFF/ON]
Select Window [Top/Bottom]
Text Position [Top/Center/Bottom]
More 2 of 2

Character Box



Panel Key	Soft Menu 1	Soft Menu 2
-----------	-------------	-------------

Limit

- Up Pass Check [OFF/ON]
- Low Pass Check [OFF/ON]
- Make Up Line..
- Make Low Line..
- All Clear
-
-
- Alarm [OFF/ON]
-

- Select [Freq/Amp]
- Insert Line
- Delete Line
- Clear
-
-
-
-
- Previous

Couple

- All Auto
- Detector [Auto/Man]
- Avg/VBW Type [Auto/Man]
-
-
-
-
-
-

- Auto
- Normal
- Average
- Positive Peak
- Sample
- Negative Peak
-
-
-

Avg/VBW



Panel Key	Soft Menu 1	Soft Menu 2
-----------	-------------	-------------

Avg/VBW

Auto
Log-Pwr Avg
Pwr Avg
Voltage Avg

BW

All Auto
RBW [Auto/Manl]
VBW [Auto/Manl]
VBW/RBW
Span/RBW [Auto/Manl]

Panel Key	Soft Menu 1	Soft Menu 2
-----------	-------------	-------------

Aux

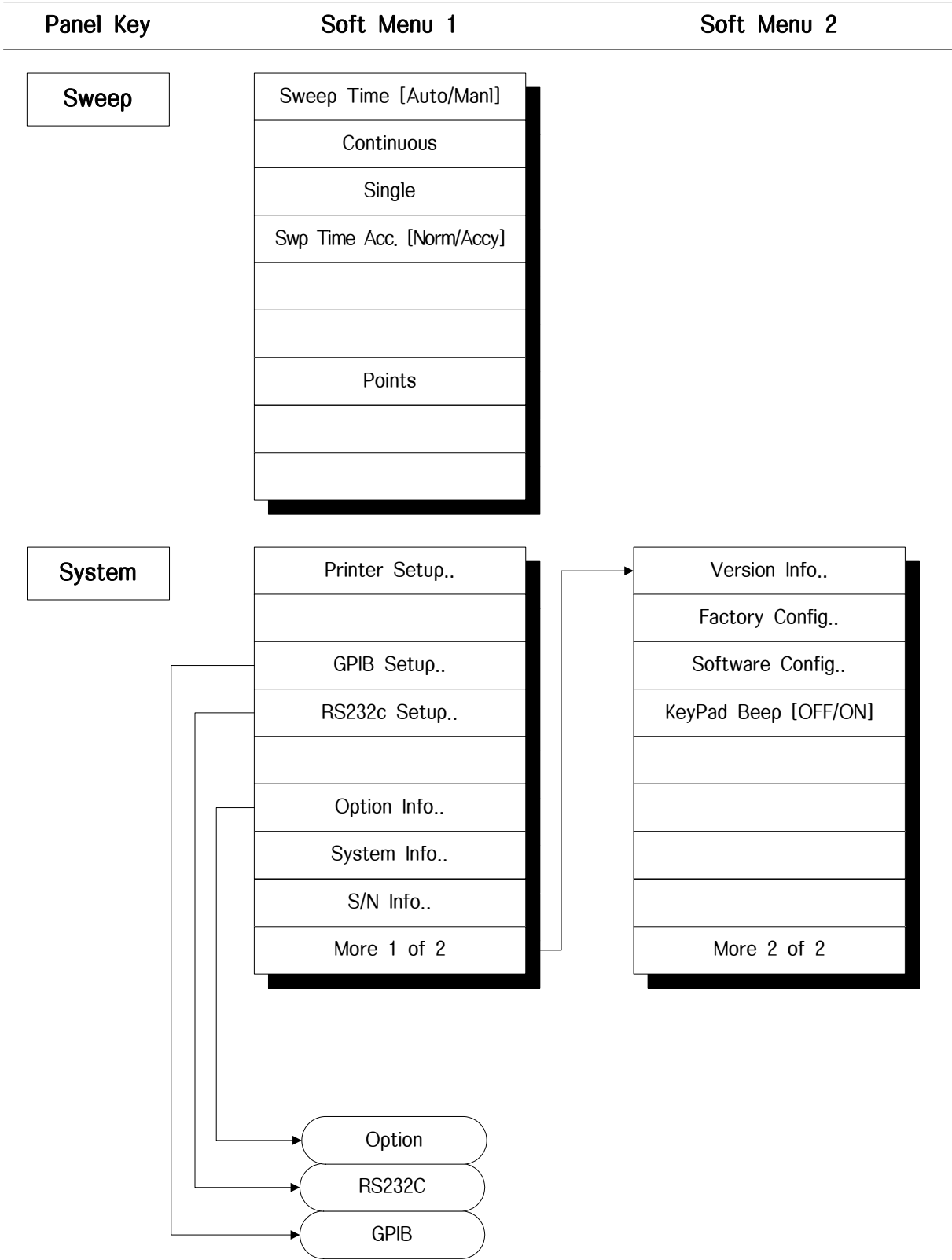
Am Demod. [OFF/ON]
FM Demod. [OFF/ON]
Audio Sound [OFF/ON]
Audio Level

Source

TG

Tracker [OFF/ON]
Output Lvl
Normal [OFF/ON]
Power Swp [OFF/ON]





Panel Key	Soft Menu 1	Soft Menu 2
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RS232C

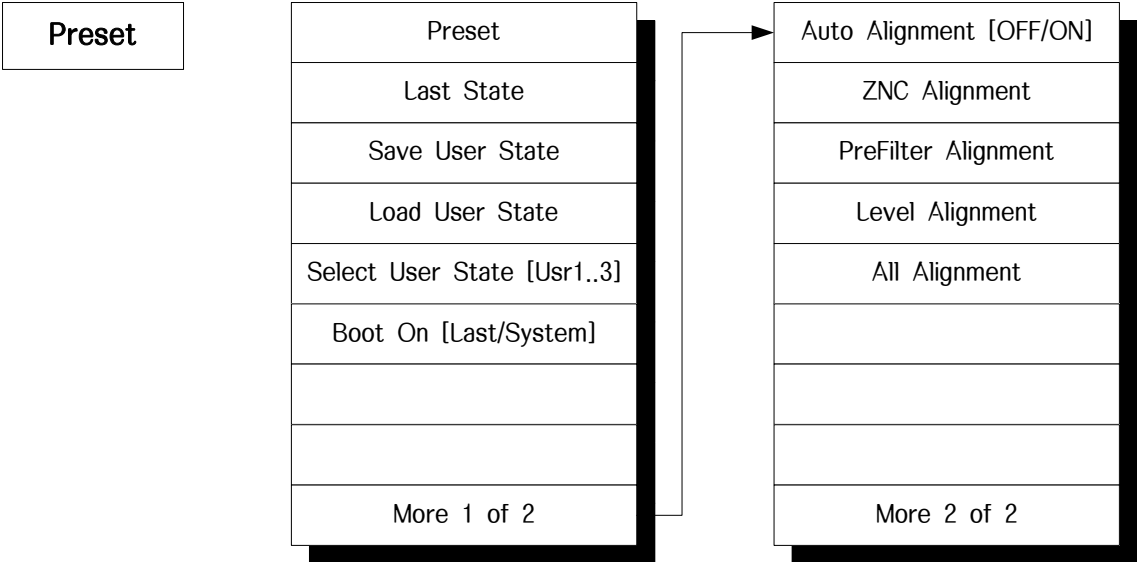
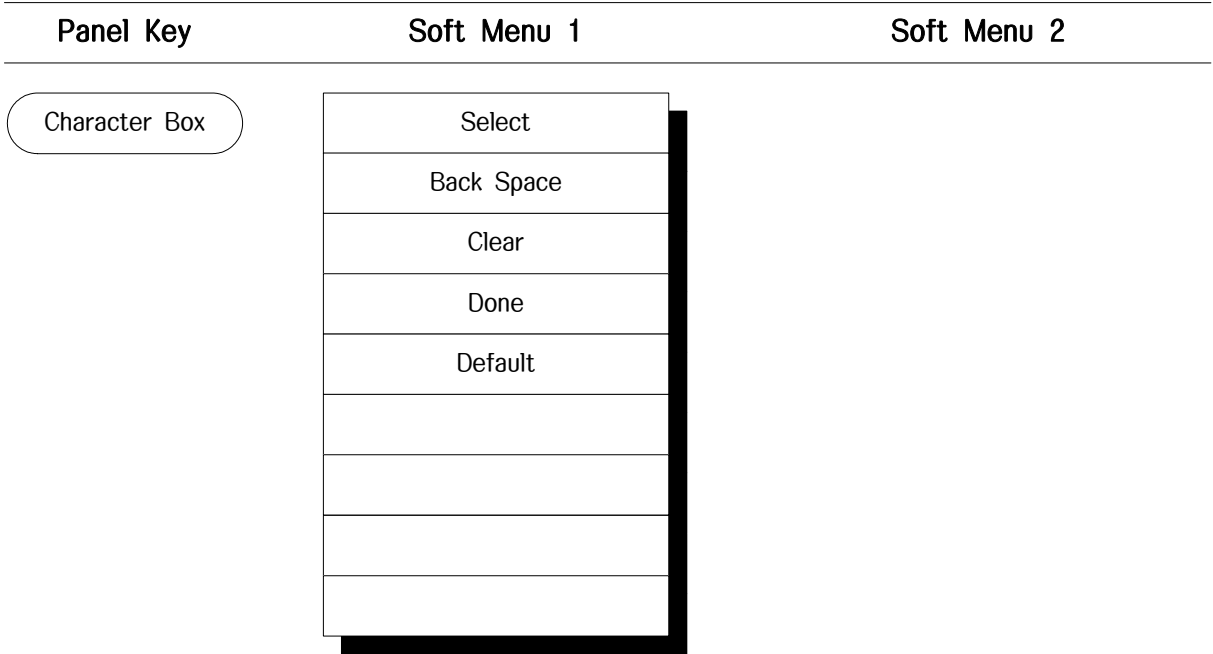
- Baud Rate
- Data Length
- Stop Bit
- Parity Bit
-
-
-
-
- Previous

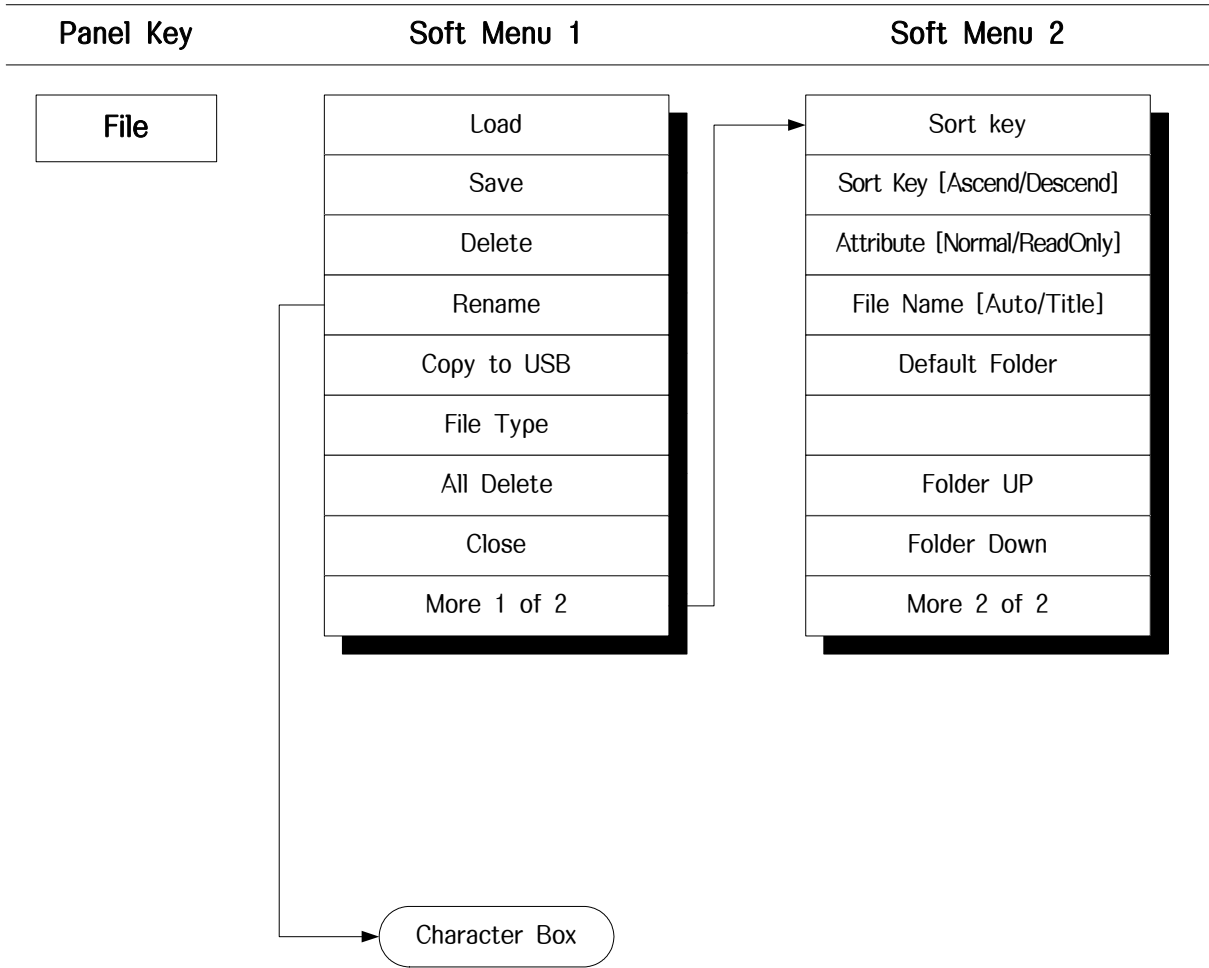
GPIB

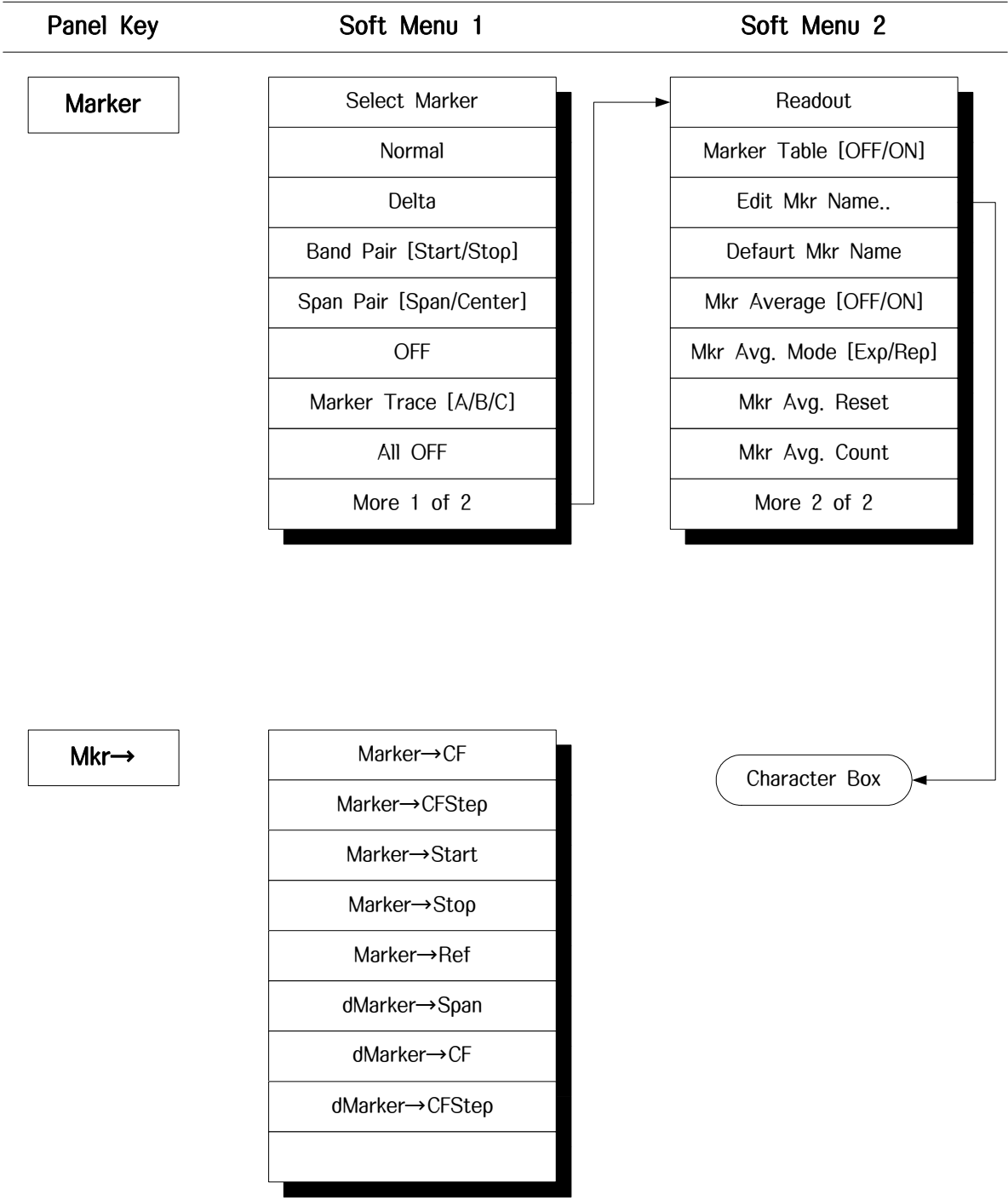
- Set Address
-
-
-
-
-
-
-
- Previous

OPTION

- Installed List
- Option Activate
-
-
-
-
-
-
- Previous







Panel Key	Soft Menu 1	Soft Menu 2
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Peak

- Next Peak
- Next Pk Left
- Next Pk Right
- Min Search
- Pk-Pk Search
- Signal Track [OFF/ON]
- Continuous [OFF/ON]
- Marker->CF
- More 1 of 2

- Multi Pk Number
- Multi Peak
- Multi Pk Trace [A/B/C]
- Search Param..
-
-
-
-
- More 2 of 2

Func

- Marker Noise
- Freq. Counter
- Meas. OFF
-
-
-
-
-
-

- Excursion
- Threshold
- Peak Search [Param/Max]
-
-
-
-
- Previous

<BLANK>