MS2661N
Spectrum Analyzer
Operation Manual
Vol. 1
(Basic Operating instructions)

Fourth Edition

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

ANRITSU CORPORATION

Document No.: M-W1813AE-4.0

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Insure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following five symbols may not be used on all Anritsu equipment. In addition, there may be other labels attached to products which are not shown in the diagrams in this manual.

Symbols used in manual

DANGER ⚠ This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

WARNING ⚠ This indicates a hazardous procedure that could result in serious injury or death if not performed properly.

CAUTION ⚠ This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

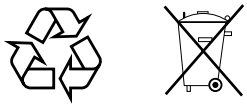
The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Insure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.

This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.

This indicates warning or caution. The contents are indicated symbolically in or near the triangle.

This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.

MS2661N
Spectrum Analyzer
Operation Manual Vol. 1 (Basic Operating Instructions)

1 July 1996 (First Edition)
10 May 2004 (Fourth Edition)

For Safety

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. Measurement Categories
   This instrument is designed for Measurement category I (CAT I). Don't use this instrument at the locations of measurement categories from CAT II to CAT IV.
   In order to secure the safety of the user making measurements, IEC 61010 clarifies the range of use of instruments by classifying the location of measurement into measurement categories from I to IV.
   The category outline is as follows:
   Measurement category I (CAT I):
   Secondary circuits of a device connected to an outlet via a power transformer etc.
   Measurement category II (CAT II):
   Primary circuits of a device with a power cord (portable tools, home appliance etc.) connected to an outlet.
   Measurement category III (CAT III):
   Primary circuits of a device (fixed equipment) to which power is directly supplied from the power distribution panel, and circuits from the distribution panel to outlets.
   Measurement category IV (CAT IV):
   All building service-line entrance circuits through the integrating wattmeter and primary circuit breaker (power distribution panel).

or

3. When supplying power to this equipment, connect the accessory 3-pin power cord to a grounded outlet. If a grounded outlet is not available, before supplying power to the equipment, 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.

For Safety

WARNING ⚠

Repair

WARNING ⚠

4. This equipment cannot be repaired by the user. DO NOT attempt to open the cabinet or to disassemble internal parts. Only Anritsu-trained service personnel or staff from your sales representative with a 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 precision parts.

Falling Over

5. 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.
   And also DO NOT use this equipment in the position where the power switch operation is difficult.

For Safety

CAUTION ⚠

Replacing Fuse

CAUTION ⚠

1. Before Replacing the fuses, ALWAYS remove the power cord from the poweroutlet and replace the blown fuses. ALWAYS use new fuses of the type and rating specified on the fuse marking on the rear panel of the cabinet.

   T5A indicates a time-lag fuse.

   There is risk of receiving a fatal electric shock if the fuses are replaced with the power cord connected.

Cleaning

2. 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

3. • Maximum DC voltage ratings:
     RF Input 0 Vdc
     TG Output 0 Vdc
   • Maximum AC power ratings:
     RF Input ±30 dBm
     TG Output ±20 dBm
   • NEVER input a >±30 dBm and >0 Vdc power to RF Input.
   • NEVER input a >±20 dBm and >0 Vdc reverse power to TG Output.
   • Excessive power may damage the internal circuits.

For Safety

CAUTION ⚠

Replacing Memory Back-up Battery

This equipment uses a Poly-carbomonofluoride lithium battery to back-up the memory. This battery must be replaced by a service engineer when it has reached the end of its useful life; contact the Anritsu sales section or your nearest representative.

Note: The battery used in this equipment has a maximum useful life of 7 years. It should be replaced before this period has elapsed.

External Storage Media

This equipment stores data and programs using Memory card.
Data and programs may be lost due to improper use or failure.
ANRITSU therefore recommends that you back-up the memory.

ANRITSU CANNOT COMPENSATE FOR ANY MEMORY LOSS.

Please pay careful attention to the following points.

- Do not remove the memory card from equipment being accessed.
- Isolate the card from static electricity.
- The back-up battery in the SRAM memory card has a limited life; replace the battery periodically.

For replacing the battery, see page 2-15 of the Operation Manual Vol. 1.

Equipment Certificate

Anritsu Corporation certifies that this equipment was tested before shipment using calibrated measuring instruments with direct traceability to public testing organizations recognized by national research laboratories including the National Institute of Advanced Industrial Science and Technology, and the Communications Research Laboratory, and was found to meet the published specifications.

Anritsu Warranty

Anritsu Corporation will repair this equipment free-of-charge if a malfunction occurs within 1 year after shipment due to a manufacturing fault, provided that this 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 mishandling, 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, earthquake, etc.
- The fault is due to use of non-specified peripheral equipment, peripheral parts, consumables, etc.
- The fault is due to use of a non-specified power supply or in a 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.

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

Anritsu Corporation Contact

If this equipment develops a fault, contact Anritsu Service and Sales offices at the address at the end of paper-edition manual or the separate file of CD-edition manual.

Front Panel Power Switch

To prevent malfunction caused by accidental touching, the front power switch of this equipment turns on the power if it is pressed continuously for about one second in the standby state. If the switch is pressed continuously for one second in the power-on state, the equipment enters the standby state.

In the power-on state, if the power plug is removed from the outlet, then reinserted into it, the power will not be turned on. Also, if the lines is disconnected due to momentary power supply interruption or power failure, the power will not be turned on (enters the standby state) even if the line is recovered.

This is because this equipment enters the standby state and prevents incorrect data from being acquired when the line has to be disconnected and reconnected.

For example, if the sweep time 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.

Further, if this equipment is built into a system and the system power has to be disconnected then reconnected, the power for this equipment must also be restored by pressing the front power switch.

Consequently, if this equipment is built into remote monitoring systems that use MODEMs, the standby function of this equipment must be modified.

ABOUT DETECTION MODE

This instrument is a spectrum analyzer which uses a digital storage system. The spectrum analyzer makes level measurements in frequency steps obtained by dividing the frequency span by the number of measurement data points (501). This method of measurement cannot detect the signal peak level if the spectrum of a received signal is narrower than these frequency steps.
To resolve this problem, this instrument usually operates in positive peak detection mode and normal detection mode. In the positive peak detection mode, the highest level within the frequency range between the sample points can be held and traced. In the normal detection mode, both the positive peak and the negative peak can be traced.
Positive peak detection mode should be used for almost all measurements including normal signal level measurement, pulsed noise analysis, and others. It is impossible to measure the signal level accurately in sample detection mode or in negative peak detection mode.
Use of sample detection mode is restricted to random noise measurement, occupied frequency bandwidth measurement for analog communication systems, and adjacent-channel leakage power measurement, etc.

Measurement	item
• Normal signal	POS PEAK
• Random noise	SAMPLE
• Pulsed noise	NORMAL (POSI-NEG)
• Occupied frequency bandwidth, adjacent-channel leakage power (for analog communication systems)	SAMPLE
• Occupied frequency bandwidth, adjacent-channel leakage power (for digital communication systems)	POS PEAK or SAMPLE

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

Notes On Export Management

This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.
Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.
When you dispose of export-controlled items, the products/manuals are needed to be broken/shredded so as not to be unlawfully used for military purpose.

C-tick Conformity marking

Anritsu affixes the C-tick marking on the following product (s) in accordance with the regulation to indicate that they conform with the EMC framework of Australia/New Zealand.

C-tick marking

1. Product Model

Model: MS2661N Spectrum Analyzer

2. Applied Standards

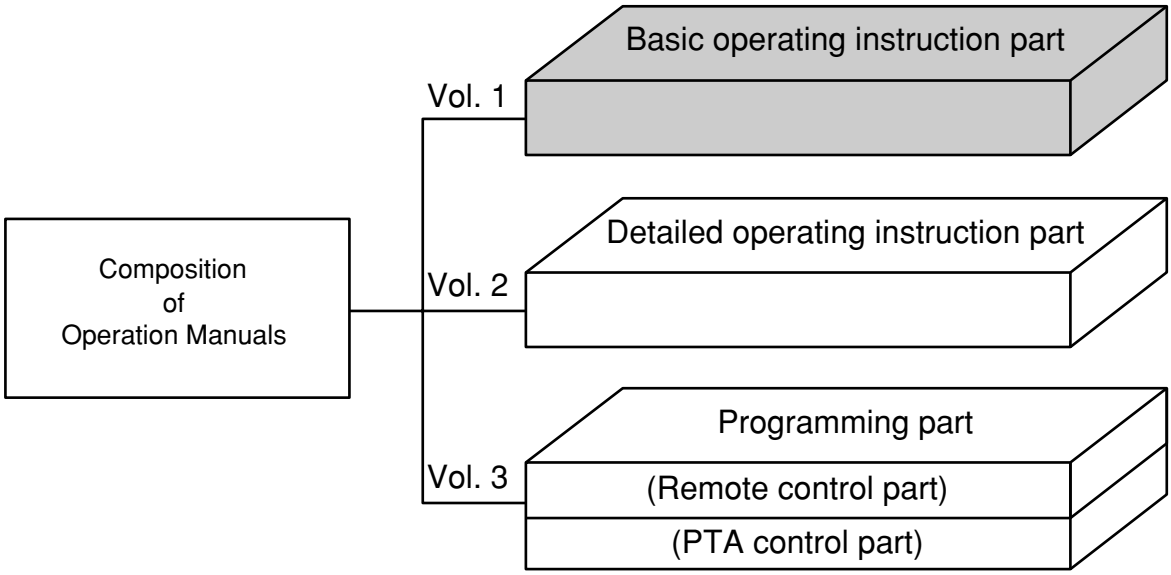
EMC: Emission:

AS/NZS 2064.1/2 (ISM, Group 1, Class A equipment)

ABOUT THIS MANUAL

(1) Composition of MS2661N Operation Manuals

The MS2661N Spectrum Analyzer operation manuals of the standard type are composed of the following three documents. Use them properly according to the usage purpose.



Basic operating instruction part: Basic Operating Instructions: Provides information on the MS2661N outline, preparation before use, panel description, basic operation, soft-key menu and performance tests.

Detailed operating instruction part: Detailed Operating Instructions: Provides information on the detailed panel operating instructions on MS2661N that expand on the basic operation and soft-key menu in the Basic Operating Instruction Part.

Programming part: Composed of the Remote Control Part and PTA Control Part. The Remote Control Part provides information on RS-232C remote control, GPIB remote control and sample programs, while the PTA Control Part describes about PTA operation and PTL commands.

TABLE OF CONTENTS

SECTION 1
GENERAL

This section outlines the MS2661N Spectrum Analyzer and explains the composition of this manual, the configuration of the MS2661N with the standard accessories, the options, the optional accessories, and peripherals for expanding the MS2661N capabilities, and the MS2661N specifications.

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SECTION 1
GENERAL

Product Outline

The MS2661N (henceforth called "this unit") is a portable type color LCD spectrum analyzer suited for signal analysis of radio equipment where the efficiency of frequency usage is increased and equipment are increasingly speeded and digitized.
Adopts the synthesizer local system and can cover a frequency range of 100 Hz to 3 GHz.
Excellent in basic performance such as C/N, distortion, frequency/level accuracy, and easily operable following the display of the soft-key menu screen.

Equipped with high-accuracy calibration signals and an attenuator, it can accurately calibrate switching errors of LOG/LIN scales, resolution bandwidth, reference level, etc. Since frequency response is corrected by built-in calibration data, it allows high-accuracy level measurement for a wide range.
As the switching of waveforms between frequency domain and time domain can be done by a touch and two waveforms are simultaneously displayed, signal analysis of both domains can be done efficiently. Moreover, our original zone marker function and multi-marker function (up to 10 markers) are also special mention.

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, adjacent channel leakage power, etc.
In addition, as the template measurement of burst mean power and burst waveform are also available, it is suited for evaluating the performance of digital radio equipment.

■ Applications

The MS2661N Spectrum Analyzer can be used for wide range of applications such as development, adjustment, inspection, and maintenance of electronic parts and equipment in the following fields:

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

Composition of Operation Manual

This Operation Manual is composed of 7 sections and appendixes A and B. The profile of each section is shown below.

Section conposition	Explanation
SECTION 1 GENERAL	Product outline, standard configuration, options, applicable parts, peripheral devices, and specifications
SECTION 2 PREPARATIONS BEFORE USE	Operations to be done before applying power
SECTION 3 PANEL DESCRIPTION	Description about the front and rear panels
SECTION 4 SOFT-KEY MENU	Description using a soft-key menu
SECTION 5 BASIC OPERATION PROCEDURE	Basic operation procedures for operation guide
SECTION 6 PERFORMANCE TESTS	Tests used for checking performance
SECTION 7 STORAGE AND TRANSPORTATION	Cautions on storage and transportation
APPENDIX A	MS2661N FRONT AND REAR PANEL LAYOUT
APPENDIX B	BLOCK DIAGRAM

Equipment Configuration

This paragraph describes the configuration of the MS2661N Spectrum Analyzer with standard accessories and the various options to expand the functions.

Standard configuration

The table below shows the configuration of the MS2661N with the standard accessories.

Standard Composition

Item	Model / Order NO.	Name	Qty.	Rmarks
Main instrument	MS2661N	Spectrum Analyzer	1	
Accessories	J0071	Power cord	1	Approx. 2.5 m
	F0013	Fuse	2	T5 A 250 V
	W1813AE	Operation manual	1	Vol-1, 2, 3
	W1813BE	Service manual	1	

Optional Accessories and Peripherals

The following table shows the optional accessories and peripherals for MS2661N which are all sold separately.

Optional Accesories

Model † - Order No. †	Name	Remarks
J0561	Coaxial cord, 1 m	N-P-5W•5D-2W•N-P-5W
J0104A	Coaxial cord, 1 m	BNC-P•RG-55 / U•N-P-5W
JS256G3-C-13	256 kB memory card	Meets PCMCIA Ver. 2.0 Type I
JS512G3-C-13	512 kB memory card	Meets PCMCIA Ver. 2.0 Type I
JS1024G3-C-13	1024 kB memory card	Meets PCMCIA Ver. 2.0 Type I
JS2048G3-C-13	2048 kB memory card	Meets PCMCIA Ver. 2.0 Type I
B0329G	Protective cover	3 / 4 MW4U
B0395B	Rack mount kit (IEC)	
B0391A	Carring case (hard type)	With casters
B0391B	Carring case (hard type)	Without casters
MP612A	RF Fuse Holder	DC to 1000 MHz, 50 Ω (N)
MP613A	Fuse Element	For MP612A
MA8601A	DC Block Adaptor	50 Ω
MA1621A	50 Ω → 75 Ω Impedance Transformer	9 kHz to 3 GHz, with DC block capacitor (allowable voltage: 100 V)
MP614A	50 Ω ←→ 75 Ω Impedance Transformer	10 to 1200 MHz (transformer type)
J0063	Fixed attenuator for high power	30 dB (10 W, DC to 12.4 GHz)
J0395	Fixed attenuator for high power	30 dB (10 W, DC to 9 GHz)
MP640A	Branch	40 dB, DC to 1700 MHz
MP654A	Branch	30 dB, 0.8 to 3 GHz
MP520C	CM Directional Coupler	25 to 500 MHz, 50 Ω (N)
MP520D	CM Directional Coupler	25 to 1000 MHz, 50 Ω (N)
MP526A	High Pass Filter	60-MHz band
MP526B	High Pass Filter	150-MHz band
MP526C	High Pass Filter	250-MHz band
MP526D	High Pass Filter	400-MHz band
MP526G	High Pass Filter	27-MHz band
J0007	GPIB cable, 1 m	408JE-101
J0008	GPIB cable, 2 m	408JE-102
J0743A	RS-232C cable, 1 m	For IBM PC / AT or compatible, D-sub 9 pins
J0742A	RS-232C cable, 1 m	For Printer, D-sub 25 pins

† Please specify the model / order number, name, and quantity when ordering.

Specifications

MS2661N specifications are listed in the following table.

Frequency	Frequency range		100 Hz to 3.0 GHz
	Frequency accuracy	Indicated frequency	Resolution: A digit in 5 hundredths of span (1 Hz min.), but fractions are rounded Accuracy: ± ((Indicated frequency × reference frequncy accuracy) + resolution band width × 15% + span × 5% + 50 Hz)
		Marker frequency	Resolution: 0.2% of span, fractions are rounded Accuracy: Normal marker is identical to the indicated frequency accuracy. Delta marker is identical to the span accuracy.
	Frequency measurement†		Resolution: 1 Hz, 10 Hz, 100 Hz, and 1 kHz Accuracy: Indicated frequency × reference frequency accuracy ± 1 count (at S/N of > 20 dB)
	Span	Setting range	0 Hz, and 100 Hz to 3.0 GHz
		Accuracy	±5%
	Resolution bandwidth (3 dB BW)	Setting range	10 Hz to 3 MHz, 1/3 sequence Can be set manually or automatically coupled with span
		Accuracy	±20% (RBW 30 Hz to 300 kHz) ±30% (RBW 10 Hz) ±25% (RBW 1 MHz)
	Video bandwidth (VBW)		1 Hz to 3 MHz, 1/3 sequence and through Can be set manually or automatically coupled with resolution bandwidth
	Signal Purity and stability	Noise sidebands	≤ –100 dBc/Hz (30 kHz offset, RBW 1 kHz)
		Frequency drift	At constant ambient temperature one hour after power-on ≤ 50 Hz/min. (at 100 kHz ≤ span, sweep time ≤ 100 s)
	Reference oscillator	Frequency	10 MHz
		Starting characteristics	$\leq 5 \times 10^{-8}$ (10 minutes after power-on, referred to the frequency after 24-hour warm-up)
		Aging rate	$\leq 1 \times 10^{-7}$/year (referred to the frequency 24-hour warm-up after power-on) $\leq 2 \times 10^{-8}$/day
		Temperature characteristic	$\pm 5 \times 10^{-8}$ (referred to the frequency at 25°C, in the range of 0° to 50°C)

† Counts the frequency at the peak point in the zone

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Amplitude	Level measurement	Measurement range	Average noise level to +30 dBm
		Residual response	≤ –90 dBm (at 200 kHz to 3.0 GHz, 0 dB input attenuator) ≤ –65 dBm (at 100 Hz to 500 Hz, 0 dB input attenuator) ≤ –85 dBm (at 500 Hz to 200 kHz, 0 dB input attenuator)
	Reference level	Setting range	LOG: –100 to +30 dBm (or equivalent level) LIN: 224 µV to 7.07V
		Unit	LOG: dBm, dBµV, dBmV, V, dBµV (emf), W LIN: V
		Input attenuator setting range	0 to 70 dB, 10 dB step Can be set manually or automatically coupled with reference level
		Input attenuator switching deviation	±2.0 dB (10 to 60 dB referred to the attenuator of 10 dB)
	Frequency response		±1.5 dB At 10 to 60dB input attenuator,
	Screen display	Graticule	10 div (during single scale) LOG (/div): 10 dB, 5 dB, 2 dB, 1 dB LIN (/div): 10%, 5%, 2%, 1%
		Linearity	After calibration LOG: ±0.5 dB (0 to –20 dB, resolution bandwidth ≤ 1 MHz) ±1 dB (0 to –70 dB, resolution bandwidth ≤ 100 kHz) ±1.5 dB (0 to –85 dB, resolution bandwidth ≤ 10 kHz)
		Marker level resolution	LOG: 0.1 dB LIN: 0.2% (compared to reference level)
	Spurious response	Second harmonic distortion	≤ –60 dBc (at 100 Hz to 900 MHz input frequencies, mixer input level –40 dBm †1)
		Two-signal third-intermodulation distortion	At two signal frequency difference of ≥ 50 kHz and mixer input level of –30 dBm ≤ –64 dBc (at 100 Hz to 10 MHz input frequency) ≤ –70 dBc (at 10 MHz to 3.0 GHz input frequency)
	1 dB gain compression		At input level to mixer, ≥ –5 dBm
Tracking Generator	Frequency range		9 kHz to 3.0 GHz
	Output range		0 to –60 dBm resolution : 0.1 dB
	Flatness		±2.25 dB (referenced to the output of 100MHz, 0 dBm setting)
	Residual FM		≤ 50 Hz_{p-p}
	Output impedance		50 ohm nominal Type N VSWR ≤ 2:1
	Spurious outputs		≤ –20dB

†1 Mixer input level = input level (dBm) – input attenuator (dB)

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General electrical specifications	Sweep	Sweep time	Frequency domain	Setting range: 20 msec to 1000 sec Can be set manually or automatically coupled with span, resolution bandwidth, and video bandwidth Accuracy: ±15% (20 msec to 100 sec)
			Time domain	Setting range: 12.5 µsec to 1000 sec Accuracy: ±1% (100 µsec to 100 sec)
		Sweep mode		CONTINUOUS, SINGLE
		Trigger Switch		FREE RUN, TRIGGERED
		Trigger Source	External	Trigger level ±10 V (0.1 V resolution) TTL Trigger slope Rise/Fall Connector BNC Impedance 1 kΩ ±5%
			Video	Trigger level –100 dB to 0 dB (log scale, 1 dB resolution) 0 to 100% (lin scale, 1% resolution) Trigger slope Rise/Fall
			Wide IF Video	High/Mid/Low
			Line	47 to 63 Hz
	Detection mode			POS PEAK, SAMPLE, NEG PEAK, NORMAL (POS-NEG)
	Display			5.7 inch Color TFT-LCD Display items: Graticule, Waveform, Setting parameters, Operation menus, Title
	Display function			Trace A: Displays frequency spectrum Trace B: Displays frequency spectrum Trace Time: Displays the time axis waveform at center frequency Trace A/B: Displays Trace A and B simultaneously, simultaneous sweep of same frequency, alternate sweep of independent frequencies Trace A/BG: Displays simultaneously both the band to be observed (background) and the signal band (foreground) chosen by the Zone marker out of the BG band Trace A/Time: Displays simultaneously both the frequency spectrum and the time axis waveform at the center frequency of the frequency spectrum Trace Move/Calculate: A→B, B→A, A↔B, A+B→A, A–B→A, A–B+DL→A
	Storage function			NORMAL VIEW MAX HOLD (displays the maximum envelope) MIN HOLD (displays the minimum envelope) AVERAGE (displays average value) CUMULATIVE (displays cumulative waveform) OVER WRITE (displays waveform overwritten)
	Input connector			N–J, 50 Ω VSWR ≤ 1.5 (input attenuator ≥ 10 dB)
	Auxiliary input/output terminal		REF INPUT	10 MHz ±10 Hz, –10 dBm to +2 dBm, 50 Ω (BNC connector)
			BUFFERED OUTPUT	10 MHz, 0 dBm, 50 Ω (BNC connector)

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Function	Signal search		AUTO TUNE, PEAK→CF, PEAK→REF, SCROLL
	Zone marker		NORMAL, DELTA
	Marker→		MARKER →CF, MARKER→REF MARKER→CF STEP SIZE, Δ MARKER→SPAN ZONE→SPAN
	Peak search		PEAK, NEXT PEAK, MIN DIP, NEXT DIP
	Multi marker		HIGHEST 10, HARMONICS, MANUAL SET
	Measure (calculation)		Noise level measurement (dBm/Hz, dBm/ch) C/N measurement (dBc/Hz, dBc/ch) Occupied frequency bandwidth measurement Adjacent-channel leakage power measurement Burst-in average power measurement Template (limit lines) comparison measurement Mask (limit lines) comparison measurement
	Memoty card interface		PCM CIA Ver 2.0, 2 slots Saves/recalls setting conditions and waveform data. Uploads/downloads PTA programs. Accesses SRAM, EPROM and flash EEPROM (writes to SRAM only). Supports cards up to 2 Mbytes.
	Save/recall		Can save and recall setting conditions and waveform data to and from internal registers (max. 12) and external memory cards (max. 99).
	Direct plotting		Can hard-copy screen data via RS232C or GPIB (compatible models only).
	GPIB	Functions	Meets IEEE488.2. Can be controlled as device from extemal computer (excluding power switch). Or can control extemal equipment as controller.
		Interface	SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C1, C2, C3, C4, C28
Environmental	Temperature		0˚ to 50˚C (operating), –40˚ to +71˚C (not operating)
	Humidity		MIL-PRF-28800F, Class 3
	Vibration		MIL-PRF-28800F, Class 3
	Pulse shock		MIL-PRF-28800F, Class 3
	Drop test		MIL-PRF-28800F, Class 3
	Dripproof		MIL-PRF-28800F, Class 3
EMC	Conducted interference		CISPR11 Class A, 150 kHz to 30 MHz
	Radiated interference		CISPR11 Class A, 30 MHz to 1000 MHz
	Radiated susceptibility		IEC1000-4-3 (test condition: 3 v/m, 80 MHz to 1000 MHz, 80%, 1 kHz, AM

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Dimension		177 (H), 320 (W), 351 (D) mm
Weight		≤ 15 kg
Power requirements	115 Vac operation	85 to 132 V, 3.0 A rms max, 47.5 to 63Hz, 380Hz to 420Hz
	230 Vac operation	170 to 250 V, 1.5 A rms max, 47.5 to 63 Hz
Maximum power consumption		≤ 250 W

The specifications above are applicable to system settings and auto-sweep time of high level accuracy mode.

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SECTION 2
PREPARATIONS BEFORE USE

This section explains the preparations and safety procedures that should be performed before using the MS2661N Spectrum Analyzer. The safety procedures are to prevent the risk of injury to the operator and damage to the equipment. Insure that you understand the contents of the pre-operation preparations before using the MS2661N.
For connecting the GPIB cable and setting the GPIB address, see the Remote Control part of the separate Operation Manual Vol.3.

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SECTION 2
PREPARATIONS BEFORE USE

Unpacking

Remove the MS2661N and accessories after undoing the packing case. Save the packing case and spacers, etc. if it might be reshipped again sometime. The standard MS2661N consists of the following items. If any part is missing or if the MS2661N has been damaged in transport, contact your sales representative immediately.

Table 2-1 List of Parts and Accessories

Item	Model/Order No.	Name	Qty.	Remarks
Main instrument	MS2661N	Spectrum Analyzer	1	
Accessories	J0017	Power cord	1	Approx. 2.5 m
	F0013	Fuse	2	T5A250V
	W1813AE	Operation manual	1	Vol-1, 2, 3
	W1813BE	Service manual	1	

Note: Refer to the factory packing lists for the parts and accessories when there are special specifications.

Installation

Locations to be avoided

The MS2661N operates normally at temperatures from 0 to 50 °C. However, for the best performance, the following locations should be avoided.

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

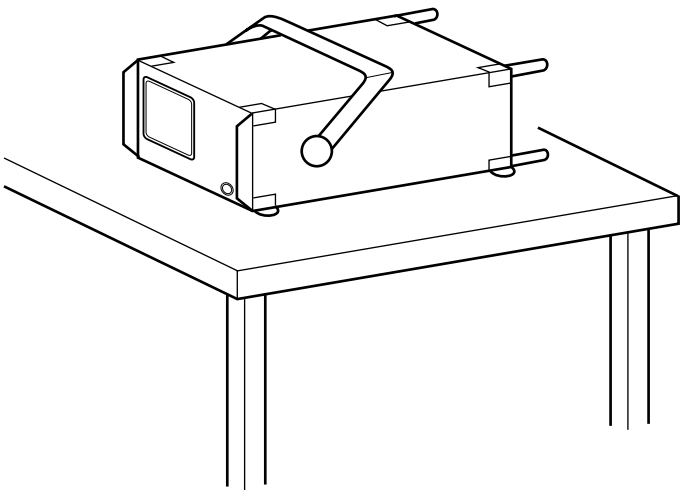
In addition to meeting the above conditions, to insure long-term trouble-free operation, the equipment should be used at room temperature and in a location where the power supply voltage does not fluctuate greatly.

CAUTION ⚠

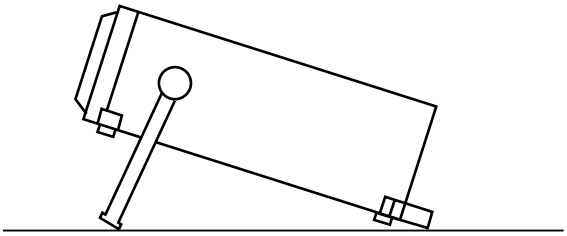
If the MS2661N is used at normal temperatures after it has been used or stored for a long time at low temperatures, there is a risk of short-circuiting caused by condensation. To prevent this risk, do not turn the MS2661N on until it has been allowed to dry out sufficiently.

Positioning

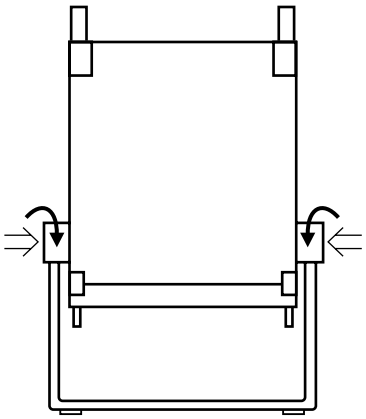
Position the MS2661N horizontally on a flat surface such as a table.



If necessary, use the tilt handle as shown below to improve the viewing angle.

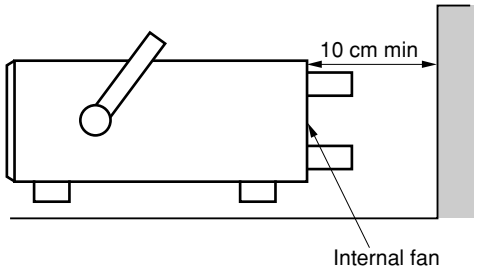


Push the pivots of the handle inward and rotate it until it clicks into the new position.



CAUTION ⚠

To suppress any internal temperature increase, the MS2661N 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 the wall, nearby equipment or obstructions so that fan ventilation is not blocked.



Rack mounting

The B0395B Rack Mount Kit (sold separately) is required to mount the MS2661N in a rack. The installation method is included in the rack mount kit diagram.

Preparation Before Power-on

The MS2661N operates normally when it is connected to an 85 to 132 Vac/47.5 to 63Hz, 380 to 420 Hz, or 170 to 250 Vac (automatic voltage change) 47.5 to 63 Hz AC power supply. To prevent the following problems, take the necessary procedures described on the following pages before power is supplied.

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

Note:
- *The voltage and current rating are indicated on the rear panel when the instrument is shipped from the factory.*
- *In this manual, the power supply voltage and current ratings are represented by ** Vac and *** A,respectively.*

To protect the operator, the following WARNING and CAUTION notices are attached to the rear panel of the MS2661N.

WARNING ⚠
NO OPERATOR SERVICE-
ABLE PARTS INSIDE.
REFER SERVICING TO
QUALIFIED PERSONNEL.

CAUTION ⚠
FOR CONTINUED FIRE
PRORECTION REPLACE
ONLY WITH SPECIFIED
TYPE AND RATED FUSE.

WARNING ⚠

Disassembly, adjustment, maintenance, or other access inside this instrument by unqualified personal should be avoided. Maintenance of this instrument should be performed only by Anritsu trained service personnel who are familliar with the risk involved of fire and electric shock. Potentially lethal voltages existing inside this instrument, 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.

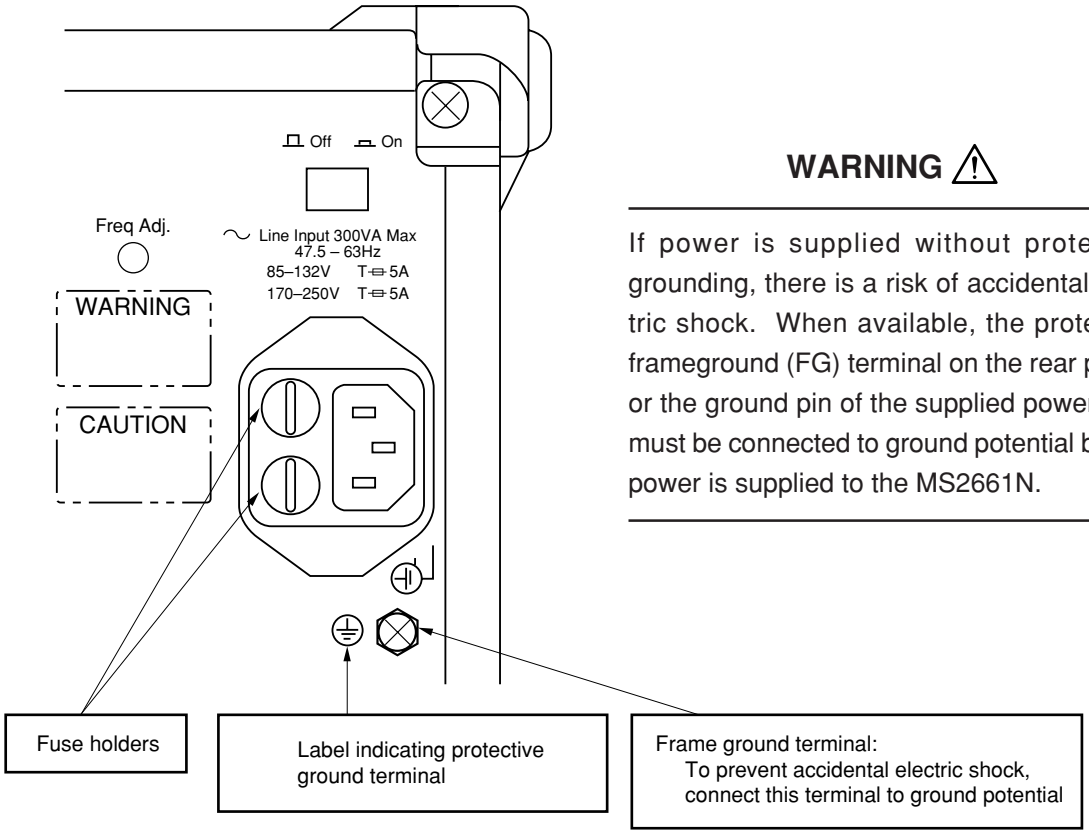
Protective grounding

(1) Grounding with 3-pole power outlet

When connecting to a 3-pole (grounded, 2-pole type) AC power-supply outlet, the frame of the MS2661N is connected to ground potential. As a result, it is not necessary to connect the FG terminal to ground.

(2) Grounding with frame ground (FG) terminal

When there is no 3-pole AC power-supply outlet, the protective frame-ground (FG) terminal on the rear panel must be connected directly to ground potential.



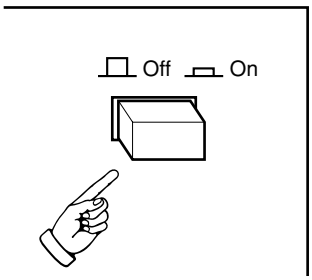
WARNING ⚠

If power is supplied without protective grounding, there is a risk of accidental electric shock. When available, the protective frameground (FG) terminal on the rear panel, or the ground pin of the supplied power cord must be connected to ground potential before power is supplied to the MS2661N.

Connecting the power supply

- Make sure that the power switch on the upper-right corner of the rear panel is in the Off position before connecting the power cord to the AC outlet.

  If not Off, push the power switch on the rear panel to Off.

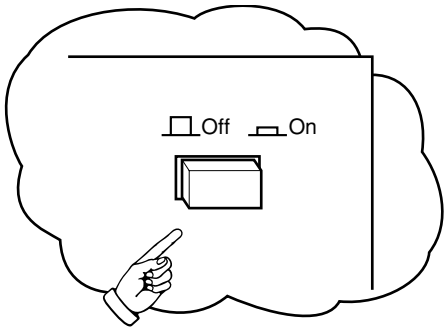


- Connect the attached power cord to the AC power inlet at the rear of the MS2661N, and connect the other end to the AC outlet.

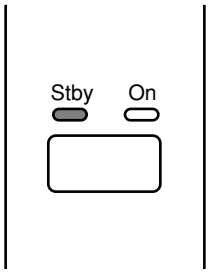
Power On

Standby

- After connecting the MS2661N to the AC outlet, press the power switch on the upper-right corner of the rear panel to turn on the MS2661N.



The MS2661N enters standby mode, and the “stby” indicator (green) on the left side of the front panel comes on.



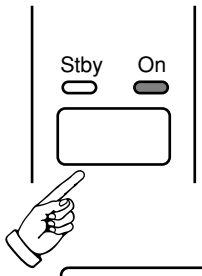
In standby mode the MS2661N supplies power only to the internal reference oscillator.

The frequency of the reference crystal oscillator is unstable immediately after the power is on. This instability will adversely affect the accuracy of the frequency or narrow-span measurements.

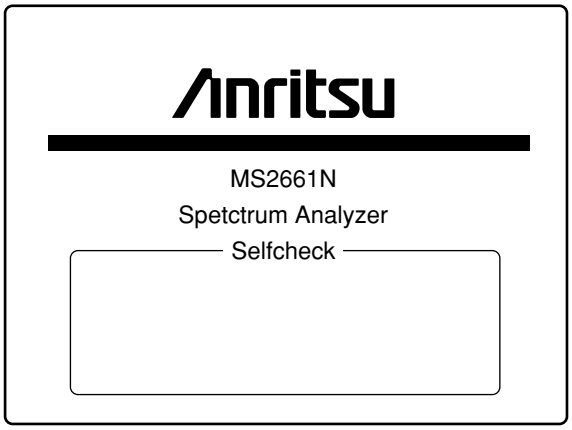
In standby mode after the power is on, power is applied only to the reference crystal oscillator so that the frequency of the reference crystal oscillator stabilizes.

Power-on

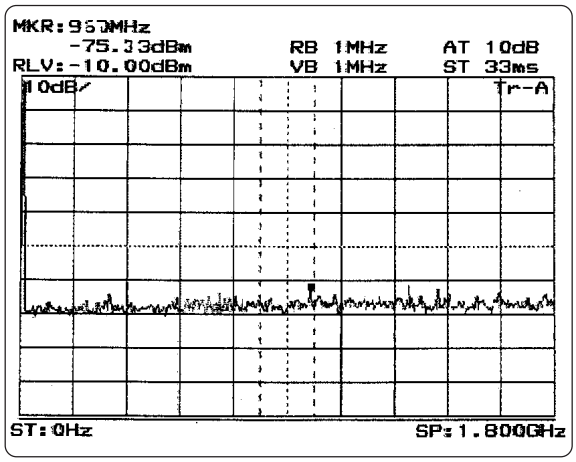
Press the power switch on the left side of the front panel for one second or more in standby mode to turn on the power of the MS2661N.



The “stby” indicator goes off, the “On” indicator (orange) comes on, then power is supplied to the MS2661N.



The power-on screen is displayed for about 40 seconds.



A waveform screen is displayed.

For parameter settings at the factory shipment, see Appendix-A in the Operation Manual Vol.3 “Programming (Remote Control)”.

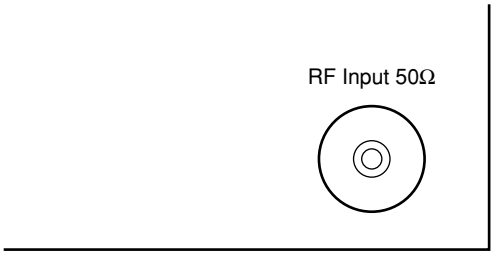
Normally, the parameters immediately after the power-on depend on the state immediately before the last power-off. To turn on the power with other parameter settings, see para. 9.5 “Condition Setting at Power-on” in the Operation Manual Vol.2.

WARNING ⚠

• During power-on	To maintain the MS2661N, sometimes it is necessary to make internal checks and adjustments with the covers removed while power is supplied. Very-high, dangerous voltages are used in the MS2661N, if insufficient care is taken, there is a risk of a accidential electric shock being received or of damage to the equipment. To maintain the MS2661N, request service by a service personnel who has received the required training.

Connecting to Device Under Test

Connect the signals to be measured to the RF connector using a coaxial cable (J0561, N-P-5W•5D2W•N-P-5W).



Fully insert the cable jack into the RF Input connector.

Frequency range: 100 Hz to 3 GHz

Measurement level: Apply the measured signal with average noise level of up to +30 dBm to the N-type connector RF Input of 50 Ω input impedance.

CAUTION ⚠

The RF input circuit is not protected against excessive power. If a signal exceeding +30 dBm and 0V DC between measured terminal and ground is applied, the input attenuator and input mixer may be burned. ⚠ is a warning mark to prevent such damage.

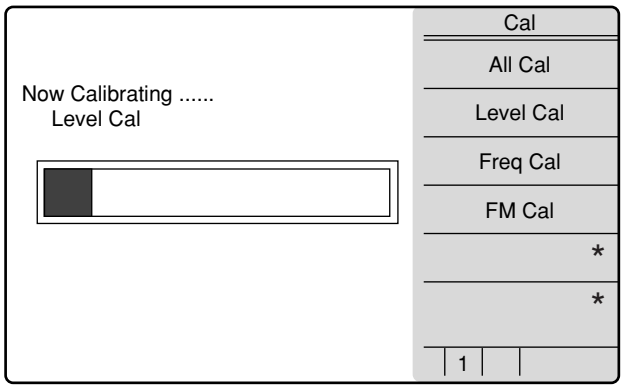
Internal Calibration

Perform internal calibration to maintain the measurement accuracy of the MS2661N within the specifications.

Immediately after the power-on, the performance is unstable due to internal temperature variations. Wait for about 20 minutes or more after the power-on, then perform “All Cal”.

Cal

Shift → 0 → All Cal



The Cal screen is displayed during calibration.

Internal calibration takes about four minutes.

If the MS2661N is used in a thermally stable environment such as an office, after the first internal calibration; there is no need to perform internal calibration, repeatedly. If there is a big change in the temperature, perform an internal calibration.

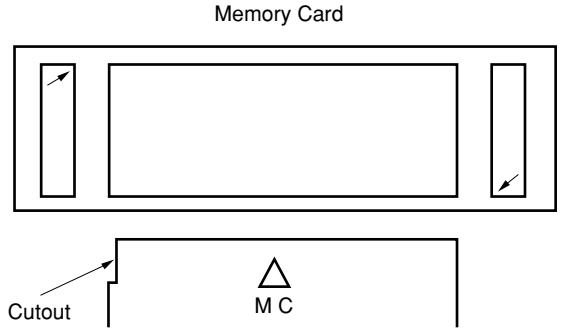
Using the Memory Card

The save/recall functions can be used to save/recall parameter and waveform data to/from the memory card.

See para. 1.3 for the memory card to be used.
When a new memory card used to save any file, format it beforehand to MS-DOS.
When saving data to a memory card; confirm that the write-protect switch of the card is set at the NOT-PROTECTED side, and then install it to the MS2661N. (For the setting method, see the operation manual of the card.)

- Installing Memory Card

  Install the memory card to the MS2661N, with the cutout of the card at the position as shown below. Two card can be installed at the upper and lower sides.



- Removing Memory Card

  Push the left eject button to remove the memory card at the upper side.
  Push the right eject button to remove the memory card at the lower side.

- Replacing Battery of Memory Card

  Memory card has a battery. When the battery life ends, the saved data is erased. Replace the battery before the life end. (For the battery life and replacing method, see the operation manual of the card.)

Using the RS-232C Interface

See Section 2 in the Operation Manual Vol.3 “Programming (Remote Control)”.

Using the GPIB Interface

See Section 2 in the Operation Manual Vol.3 “Programming (Remote Control)”.

Reprogramming

The software of the MS2661N is stored in a ROM (read only memory) installed when the MS2661N is shipped from the factory. Therefore, it is unnecessary to load the software in the MS2661N.

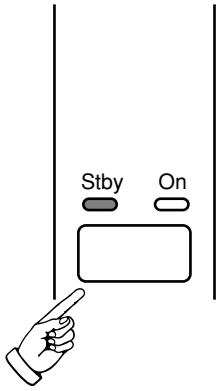
Also, the frequency response of each the MS2661N is checked when the equipment is shipped from the factory, and the correction values are written into the ROM. Therefore, it is unnecessary to load the correction values.

The data and program shown below can be set to correct the measured values and perform the automated measurement. For details, refer to the following sections:

- To set the frequency-response correction factor : See Sections 2/3/4 in the Operation Manual Vol.2.
- To set the template/mask limitation line : See Section 13 in the Operation Manual Vol.2.
- To register data in the user defined menu : See Section 12 in the Operation Manual Vol.2.
- To load and execute the PTA (personal test automation) program : See the PTA control part in the Operation Manual Vol.3.

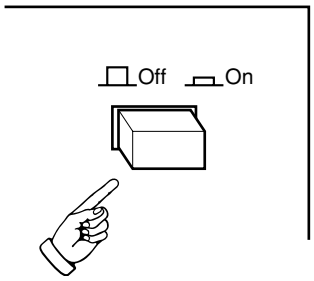
Power-off

Press the power switch on the front panel for one second or more while the power is on to set the MS2661N in standby mode.



The “ON” indicator goes off, the “stby” indicator comes on, and the screen becomes blank.

When the MS2661N will be reused in the same environment, leave the MS2661N in the standby mode. If the MS2661N is not used for a long time or is moved/stored, press the power switch on the rear panel to off.



Replacing Fuse

The MS2661N with standard accessories has two spare 5 A fuses. The fuses are mounted in the fuse holder and must be replaced if they blow. If the fuses must be replaced, locate and remedy the cause before replacing the blown fuses.

WARNING ⚠

- If the fuses are replaced while power is supplied, there is a serious risk of electric shock. Before replacing the fuses, set the power switch to OFF and remove the power cord from the power outlet.
- If power is supplied without protective grounding, there is a risk of accidental electric shock. In addition, if the AC power supply voltage is unsuitable, there is a risk of the internal circuits of the MS2661N being damaged by the abnormal voltage. Before supplying power again after changing the fuses, check that the protective grounding described previously is still connected, and check that the AC power supply voltage is suitable. Then, set the power switch to ON.

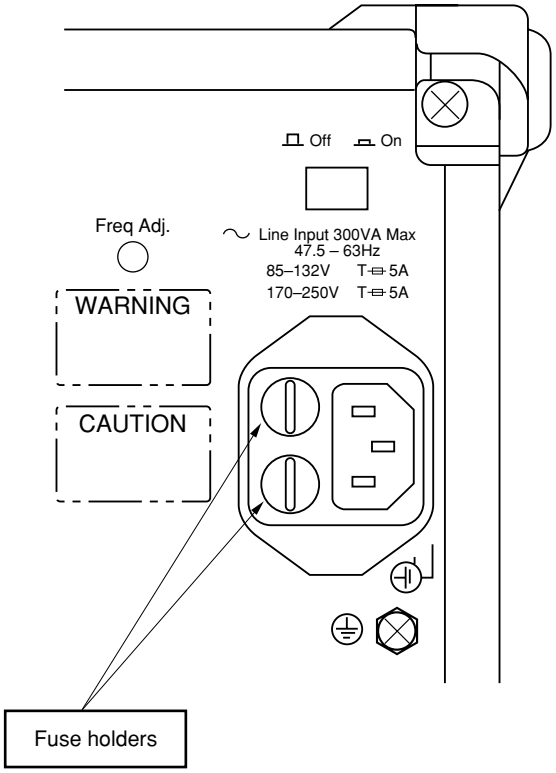
CAUTION ⚠

When there are no supplied spare fuses, the replacement fuses must have the same rated voltage and current as the fuses in the fuse holders.

- If the replacement fuses are not of the same type, they may not fit correctly, there may be a faulty connection, or the time taken to for the fuses to blow may be too long.
- When an abnormality occurs again, if the voltage and current rating of the fuses is incorrect, the fuses may not blow with a consequent risk of damage to the equipment by fire.

After performing the safety procedures described on the preceding page, replace the fuses according to the following procedure.

Step	Procedure
1	Set the front-panel [Power] switch to Stby and the rear-panel [Line] switch to OFF. Then, remove the power cord from the power-supply outlet.
2	Use a flat-bladed screwdriver to turn the fuse-holder cap counterclockwise. The cap and fuse are removed as a unit from the fuse holder.
3	Remove the fuse from the fuse cap and replace it with a spare fuse. (The direction does not matter.)
4	Return the fuse cap with fuse to the fuse holder and fasten it by turning it clockwise with the flat-bladed screwdriver.



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SECTION 3

PANEL DESCRIPTION

In thi s section, the front and rear panels are described about the case in which all the options are attached to.

TABLE OF CONTENTS

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SECTION 3
PANEL DESCRIPTION

In this section, the front and rear panels (Figs. 3-1 and 3-2) are described about the case in which all the options are attached to.

Table of Front Panel Features

No.	Panel Making	Explanation of Function
1	(LCD)	This is a 5.7 ” color TFT liquid crystal display (LCD). It displays the trace waveforms, the parameter settings, the values of marker, and the soft menu keys, etc.
2	Menu On / Off	This toggles the soft-key menu display On / Off.
3	F 1 - F 6	These are the soft keys for selecting the soft-key menus linked to the panel key operation.
4	More	This displays the next page of soft-key menus.
5	Freq / Ampl	This is the frequency and level parameter data input section. [Frequency] Sets frequency. [Span] Sets frequency span. [Amplitude] Sets reference level. [– > CF] Sets peak level signal frequency on screen to center frequency. [– > Ref] Sets peak level on screen to reference level.
6	Marker	This section is related to operation of marker functions. [Marker] Sets marker. [Multi Mkr] Sets multimarkers. Press this key after pressing the [Shift] key. [Peak Search] Moves marker to currently-displayed peak level. [Marker – >] Sets paramater according to marker value. Press this key after pressing the [Shift] key.
7	User	This is a user-dedicated key which users can specify.

No.	Panel Making	Explanation of Function
8	Single	This sets the sweep mode. [Single] Executes single sweep. [Continuous] Executes continuous sweeping. Press this key after pressing the [Shift] key. The initial default is continuous sweeping.
9	Recall	This executes recall / save. [Recall] Reads measurement parameters and waveform data from internal memory or memory card. [Save] Saves measurement parameters and waveform data to internal memory or memory card.
10	Measure	This menu is for performing the various application measurements including frequency measurement, noise measurement, adjacent-channel leakage power measurement, etc.
11	TG	This sets the tracking generator function.)
12	Display	This section is for selecting the trace waveform. Normally, in the frequency domain, up to two trace waveforms can be displayed. The zero-span (Time Domain) mode is selected simply by pressing the [Time] key. [A, B] Displays trace A or B waveform in frequency domain. [A/B, A/BG] Displays trace A and B waveforms simultaneously, or displays trace A and BG (background frequency spectrum including trace A) simultaneously. [Time] Switches to zero span (Time domain) mode to display time domain waveforms. [A/Time] Displays trace A and the time domain waveform simultaneously.
13	Trig / Gate	This sets the trigger/gate and TV-image monitoring functions. [Trig/Gate] Sets the sweep-start trigger and gate(to control wave-form-data write timing) functions. [TV Monitor] Don't use in MS2661N.
14	Coupled Function	This sets the RBW, VBW, sweep time and input attenuator.
15	Entry	These keys set the numeric data, units and special functions.

No.	Panel Making	Explanation of Function
		[Rotary knob] Used for moving marker and inputting data. [∨, ∧] Increments and decrements input data. [Shift] To execute panel functions indicated by blue letters, press this key and then press the blue-lettered key. [BS] Backspace key for correcting input mistakes. [0-9, . , +/–] Numeric-data setting keys. [GHz, MHz, kHz, Hz] Units keys for frequency, level, time, etc.
16	Preset	This sets the measurement parameters to the default values.
17	Local	This changes the remote status to the local status.
18	Copy	This outputs a hard copy of the screen to a printer or plotter.
19	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 for about 1 second. The equipment is returned to the Stby condition from the power-on condition when the key is pressed again for about 1 second.
20	Memory Card	This is the slot to set memory cards which save/load the waveform data and measurement parameters etc. Up to two plug-in memory card can be used.
21	RF Inout	This is the RF input connector.
22	TG Output	This is the tracking generator output connector.

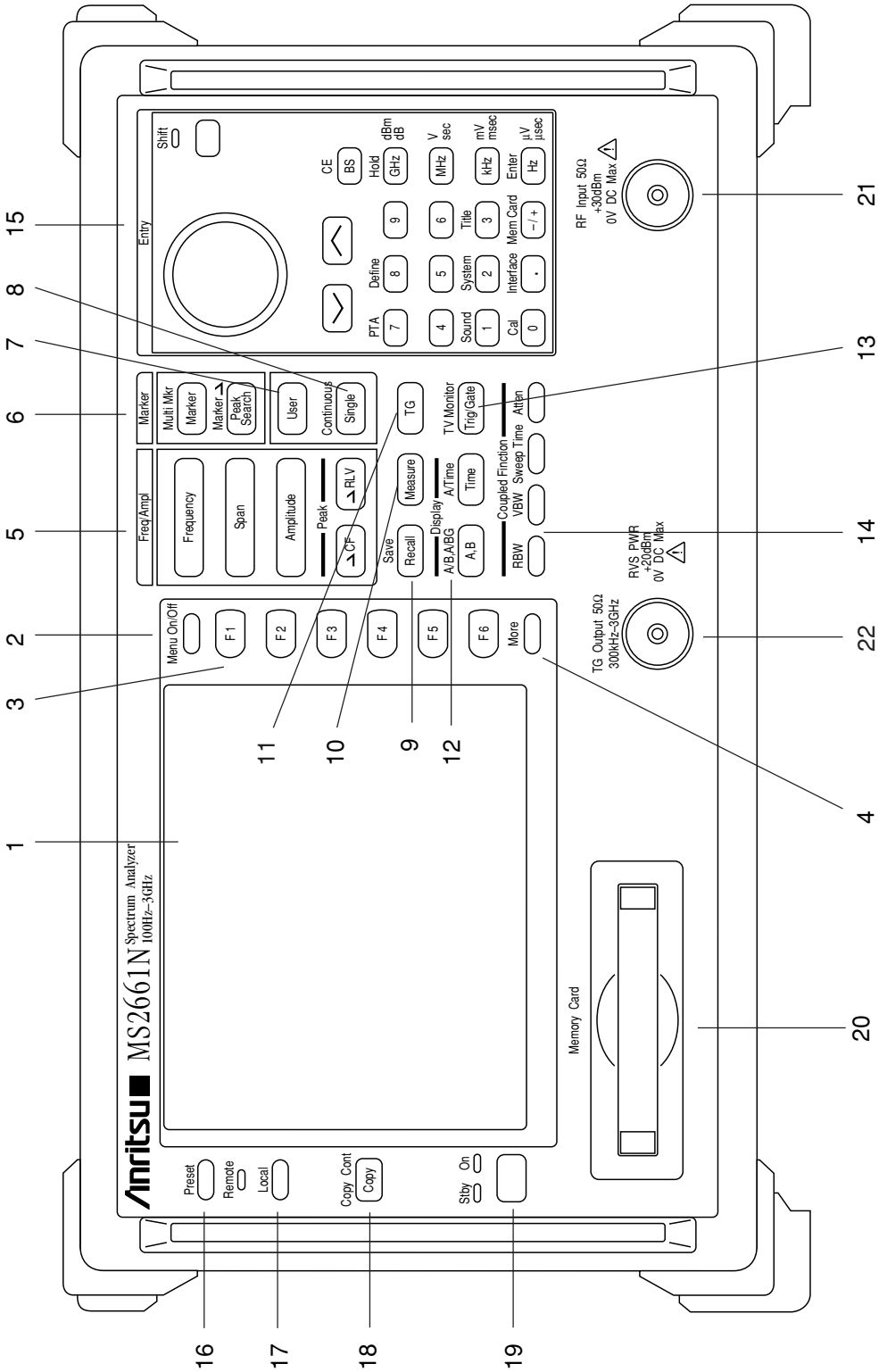

Fig. 3-1 Front Panel

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No.	Panel Making	Explanation of Function
50	(Fan)	This is the cooling fan for ventilating internally-generated heat. Leave a clearance of at least 10 cm around the fan.
51	10 MHz STD	This is the input connector for an external reference crystal oscillator. When an external reference signal is input, the equipment switches automatically from the internal signal to the external signal.
55	Off / On	This is the AC line power switch.
56	(Inlet)	This is the fused AC power inlet to which the supplied power cord is connected. It contains two time-lag fuses.
57	(Ground Terminal)	Connect this frame ground terminal to ground to prevent risk of an accidental electric shock.
58	RS-232C	This is the RS-232C connector. Connect it to an external system controller or printer, etc.
59	GPIB	This connector is for use with a GPIB interface. It is connected to an external system controller, or a printer etc.
60	Trig/Gate In (±10 V)	This is a input connector for external trigger/gate signal.

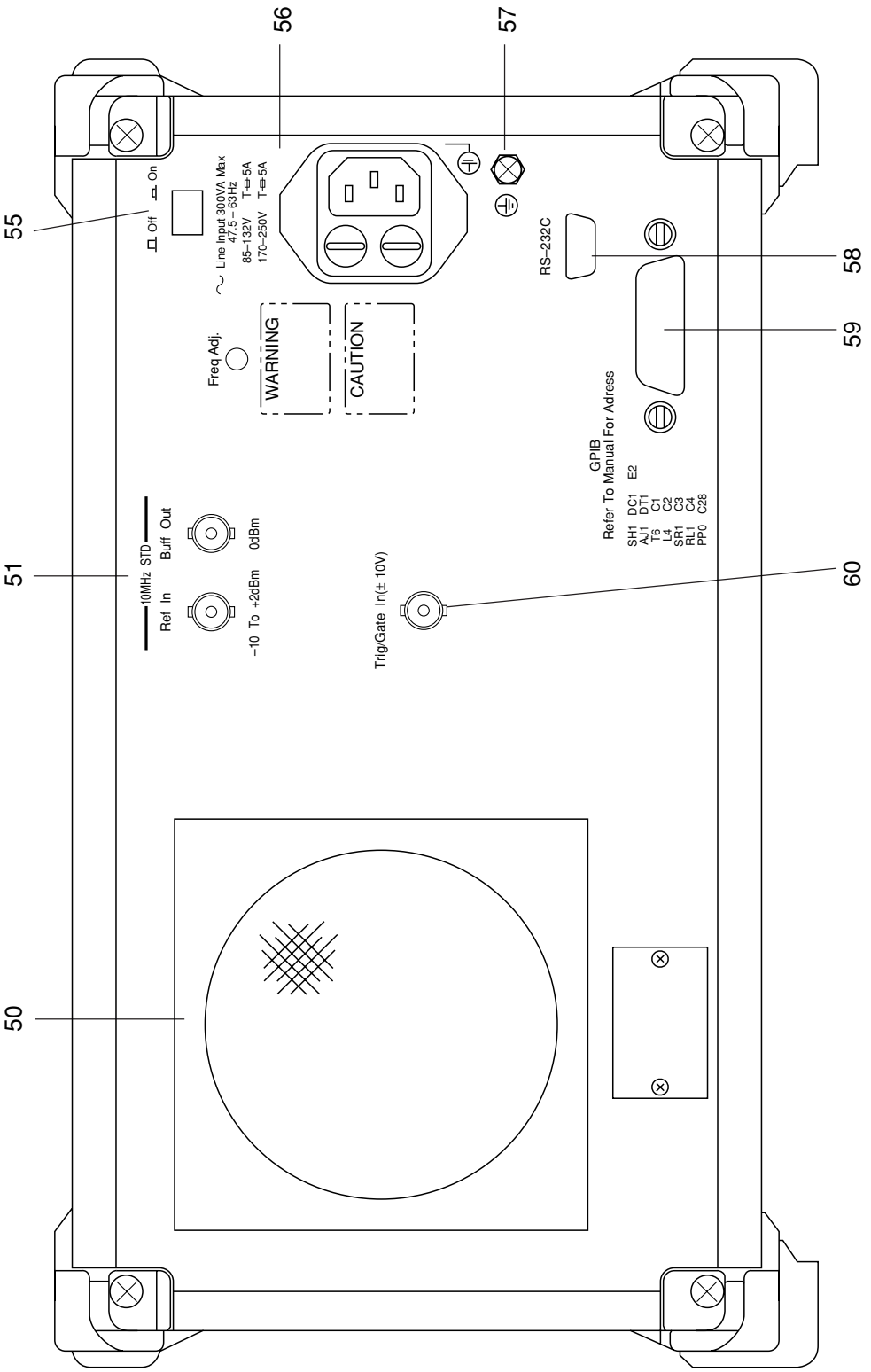


Fig. 3-2 Rear Panel

Description of Screen Display

Display items on the screen are explained in the 4 types.

1. Common display item --- commonly displayed items
2. Frequency-domain display item --- displayed items in frequency domain trace
3. Time-domain display item --- displayed items in time domain trace (zero span mode)
4. Menu display items --- displayed items at soft-key menus

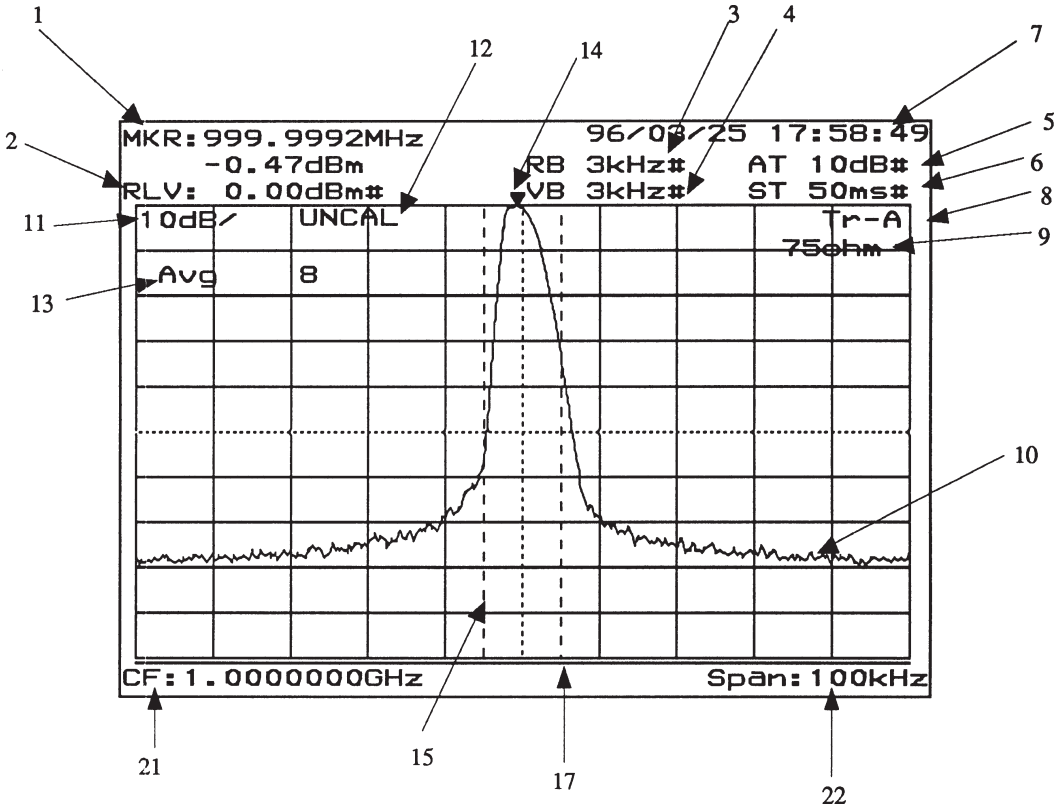
- Common display item
  1. Marker value
  2. Reference level
     When the reference level offset is on, # is appended.
  3. Resolution band width (RBW)
     When the RBW is Manual, # is appended.
     When the Couple mode is Independent, t is appended in time domain mode.
  4. Video band width (VBW)
     When the VBW is Manual, # is appended.
     When the Couple mode is Independent, t is appended in time domain mode.
  5. Attenuator
     When the Attenuator is Manual, # is appended.
  6. Sweep time
     When the Sweep time is Manual, # is appended.
  7. Time or title
     Time is updated in 1-sec period.
  8. Trace name
  9. Input impedance
     When the input impedance is 75Ω, 75Ohm is displayed.
     When the input impedance is 50Ω, nothing are displayed.
  10. Trace
  11. Y-scale range
      Displays the setting contents of the Y-axis scale range.
  12. UNCAL indicator
      When the relation among Span/RBW/VBW/Sweep-time is UNCAL(the measurement error of the level and frequency is large because of too short sweep time), UNCAL is displayed.
      When it is not UNCAL state, nothing are displayed.
  13. Average/hold count
      Displays the current sweep time when Storage mode is Averaging and Max-hold/Min-hold.
      When the Storage mode is others, nothing are displayed.

14. Current marker
    Displays ▼ at maximum or minimum point within the Marker zone. The frequency in frequency domain (time in time domain) and level are displayed at the item of the 1 Marker, above.
15. Marker zone
    Displays the Marker zone with a dotted rectangular. When the Zone width is spot, it becomes a dotted line.
16. Reference marker
    In the Delta marker mode, the Reference marker is displayed with □ .
17. Sweep marker
    Real-time-displays the point where the sweep completed.

- Frequency-domain display item
  21. Center frequency
      In Start/Stop frequency mode, Start frequency is displayed.
  22. Frequency span
      In Start/Stop frequency mode, Stop frequency is displayed.

- Time-domain display item
  31. Trigger level indicator
      When the Trigger source is Video, the set Trigger level is displayed on screen.
  32. Trigger point indicator
      When the Delay time is minus value, the Trigger-signal input point(0) is displayed on screen.
  33. Delay time
      When the Trigger function is not used, 0 is displayed.
  34. Time span
  35. Tuned frequency

- Menu display items
  41. Menu set (or group of menus) title
  42. Menu title
  43. Menu page number
      When a few Menus exist on the same layer, the Menu page is displayed with a tag.
  44. Lower menu mark
      The current Menu is not the top; this mark(vertical line along the side of the Menu display) is displayed, and F6 soft-key menu becomes “return”.
  45. Lower-menu existing mark
      When the lower menu exists below the current menu, * is appended at the top right of the current menu label.


MKR:999.9992MHz
-0.47dBm
RLV: 0.00dBm#
96/03/25 17:58:49
RB 3kHz#
VB 3kHz#
AT 10dB#
ST 50ms#
10dB/
UNCAL
Tr-A
75ohm
Avg
8
CF:1.0000000GHz
Span:100kHz
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3
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5
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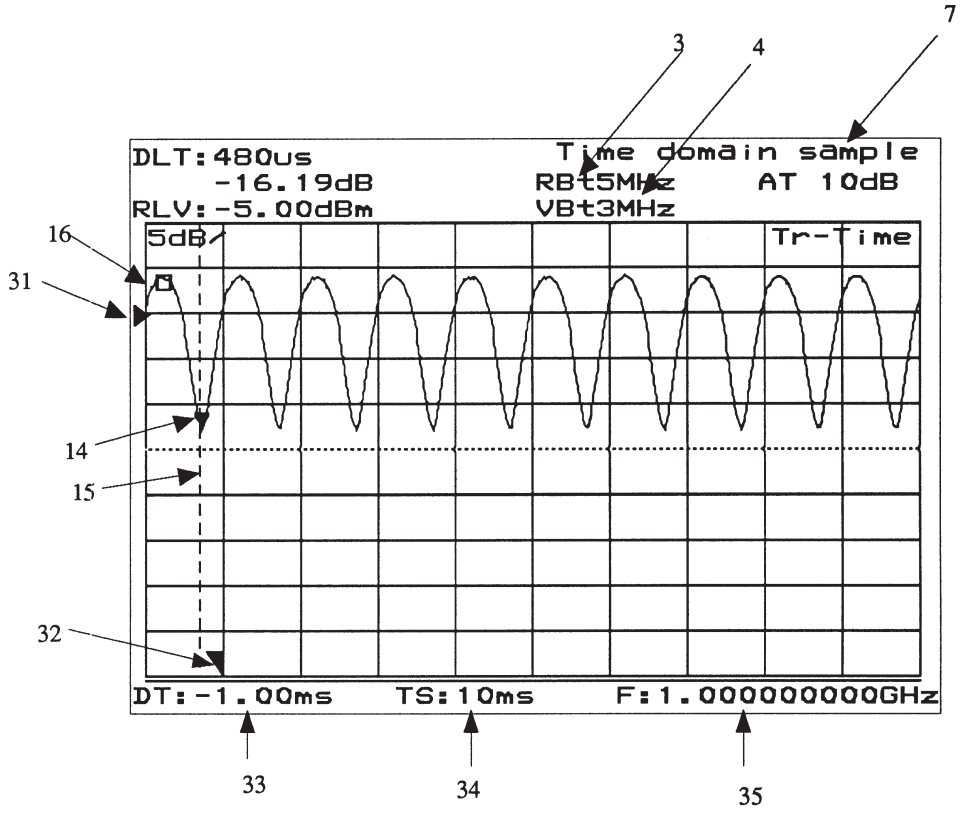
DLT:480us
-16.19dB
RLV:-5.00dBm
Time domain sample
RBt5MHz
VBt3MHz
AT 10dB
5dB/
Tr-Time
DT:-1.00ms
TS:10ms
F:1.000000000GHz
3
4
7
14
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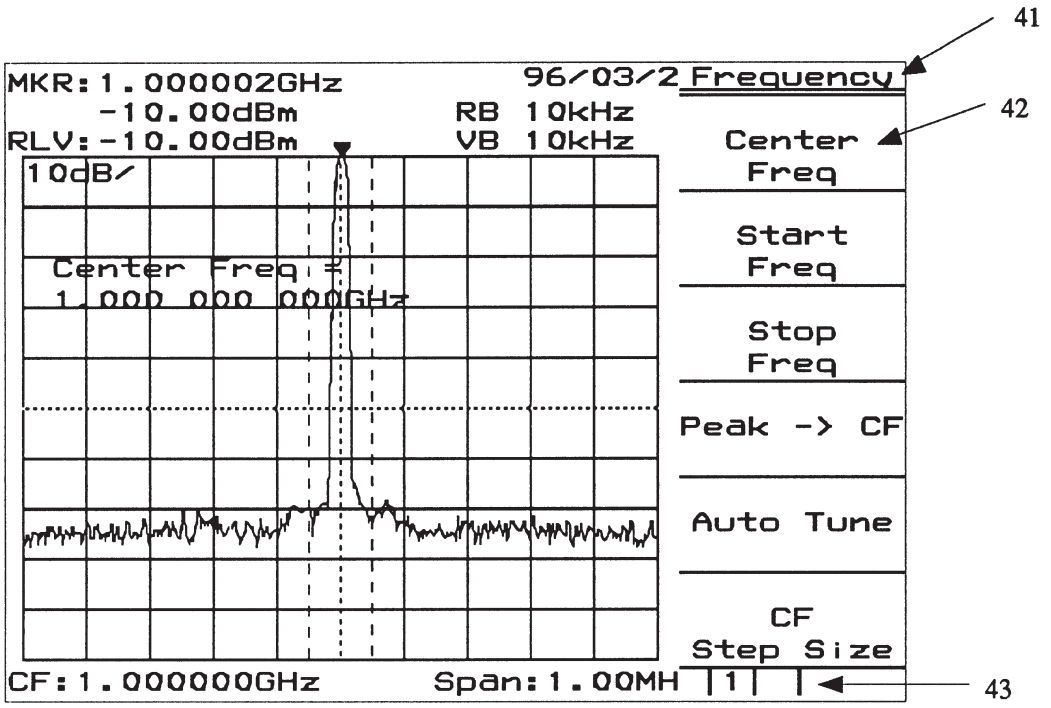
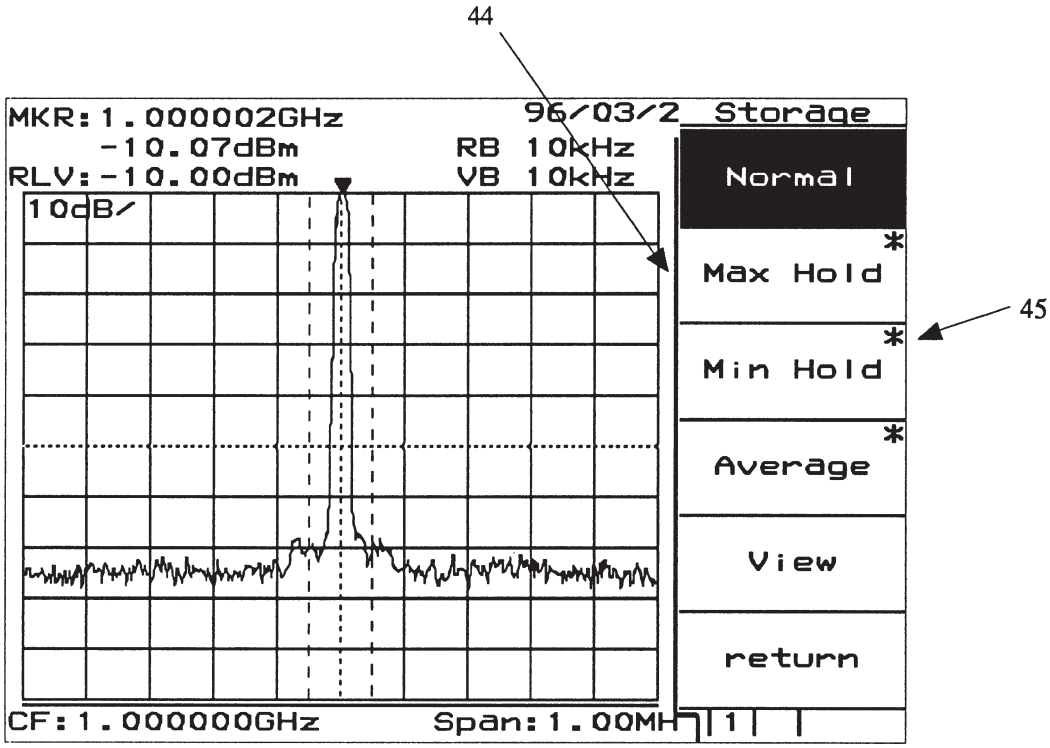

41
42
43
MKR: 1.000002GHz
-10.00dBm
RLV: -10.00dBm
96/03/2 Frequency
RB 10kHz
VB 10kHz
10dB/
Center Freq =
1.000 000 000GHz
Center Freq
Start Freq
Stop Freq
Peak -> CF
Auto Tune
CF Step Size
CF: 1.000000GHz
Span: 1.00MH
1


44
45
MKR: 1.000002GHz
-10.07dBm
RLV: -10.00dBm
96/03/2 Storage
RB 10kHz
VB 10kHz
10dB/
Normal
Max Hold
Min Hold
Average
View
return
CF: 1.000000GHz
Span: 1.00MH
1

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SECTION 4
SOFT-KEY MENU

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

TABLE OF CONTENTS

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SECTION 4
SOFT-KEY MENU

In this section, soft-key menu functions and its hierarchical system are described using a tree.
Matters to be noted about the tree are shown below.

(1) Panel Key indicates a hard key on the front panel.

(2) Top menus are the menus at the top level which are displayed on the screen when the panel key is pressed. Lower menus indicates other menus below the top menus.

(3) When a soft key with an appended asterisk (*) is pressed in these menus, the menu moves to the lower menu indicated by the arrow symbol (→). However, if any not-supported-function soft key in an Option is pressed, an error message is displayed.

(4) When the Return key is pressed at a lower menu, the next-higher menu is returned.

(5) Menus with more than six items are split into several pages.

(6) The menu page construction and currently-displayed page are indicated in the lower part of the menu. To move to the next page, press the [More] key.

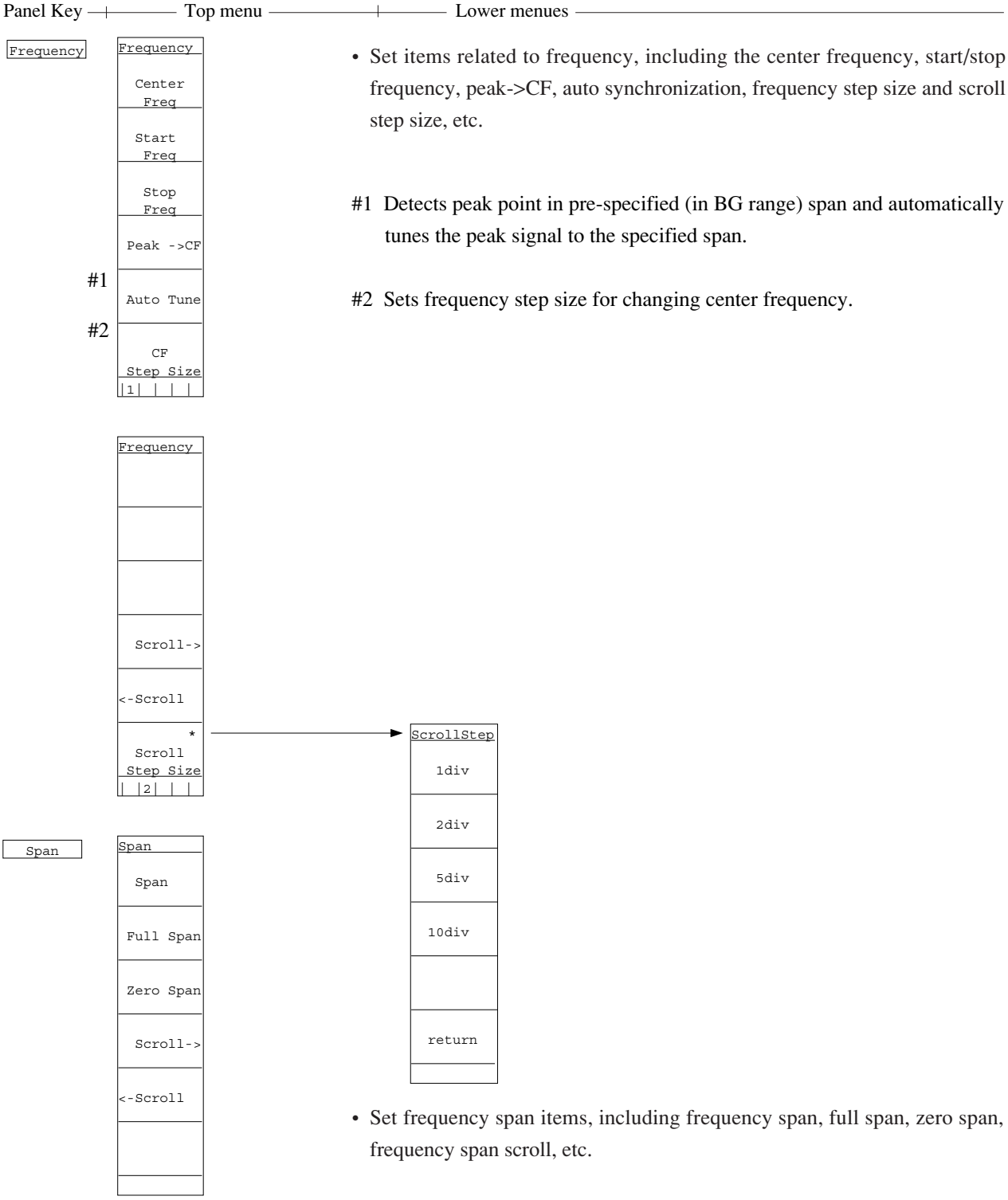
(7) Panel keys and soft keys prefixed by a sharp symbol (#) at the left of the menu frame, give an outline explanation of the function.

(8) The menu with ! mark cannot be used on the MS2661N.

Soft-key Menu List

Menu Tree

Menu Tree (1 /27)



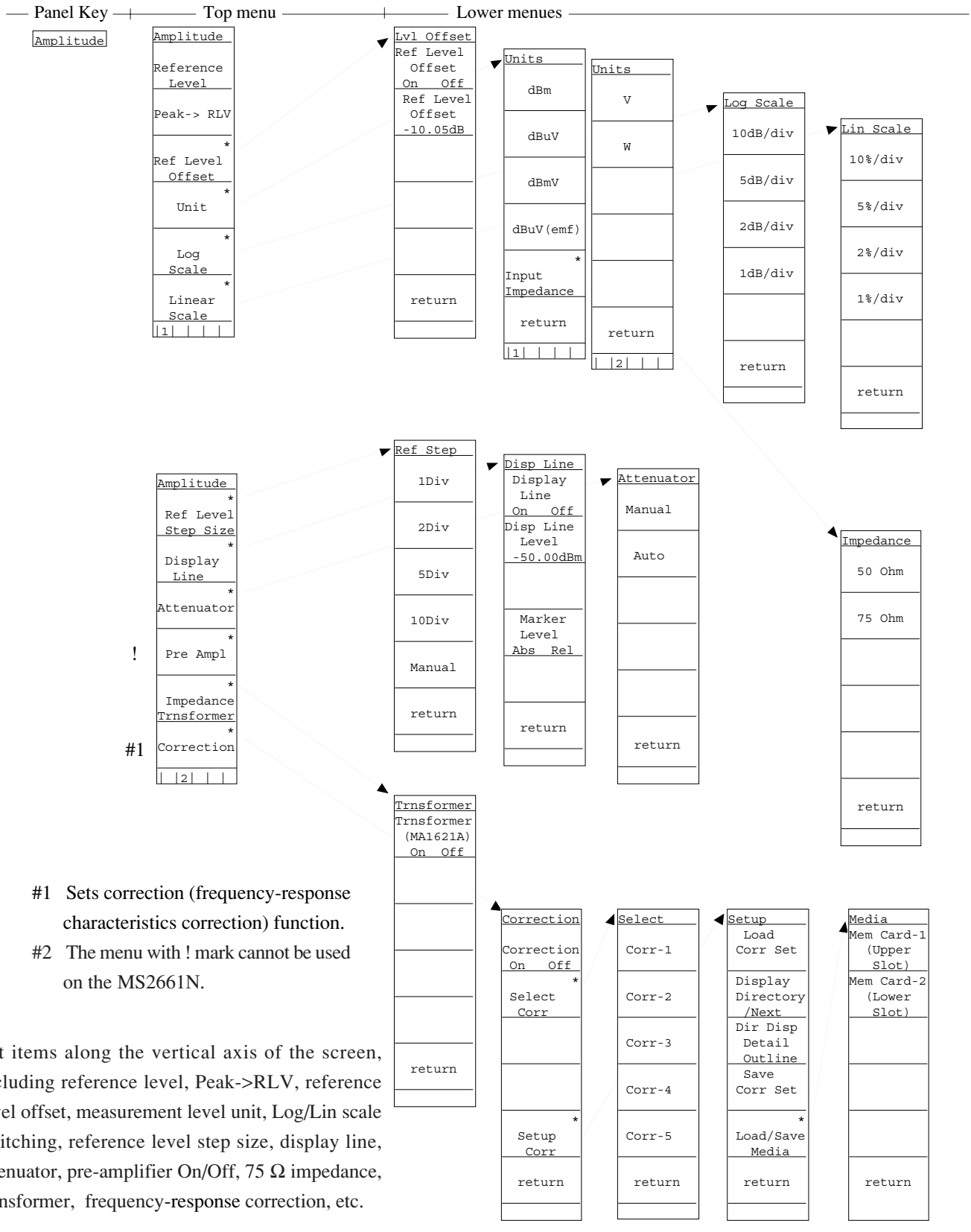
- Set items related to frequency, including the center frequency, start/stop frequency, peak->CF, auto synchronization, frequency step size and scroll step size, etc.

#1 Detects peak point in pre-specified (in BG range) span and automatically tunes the peak signal to the specified span.

#2 Sets frequency step size for changing center frequency.

- Set frequency span items, including frequency span, full span, zero span, frequency span scroll, etc.

Menu Tree (2/27)



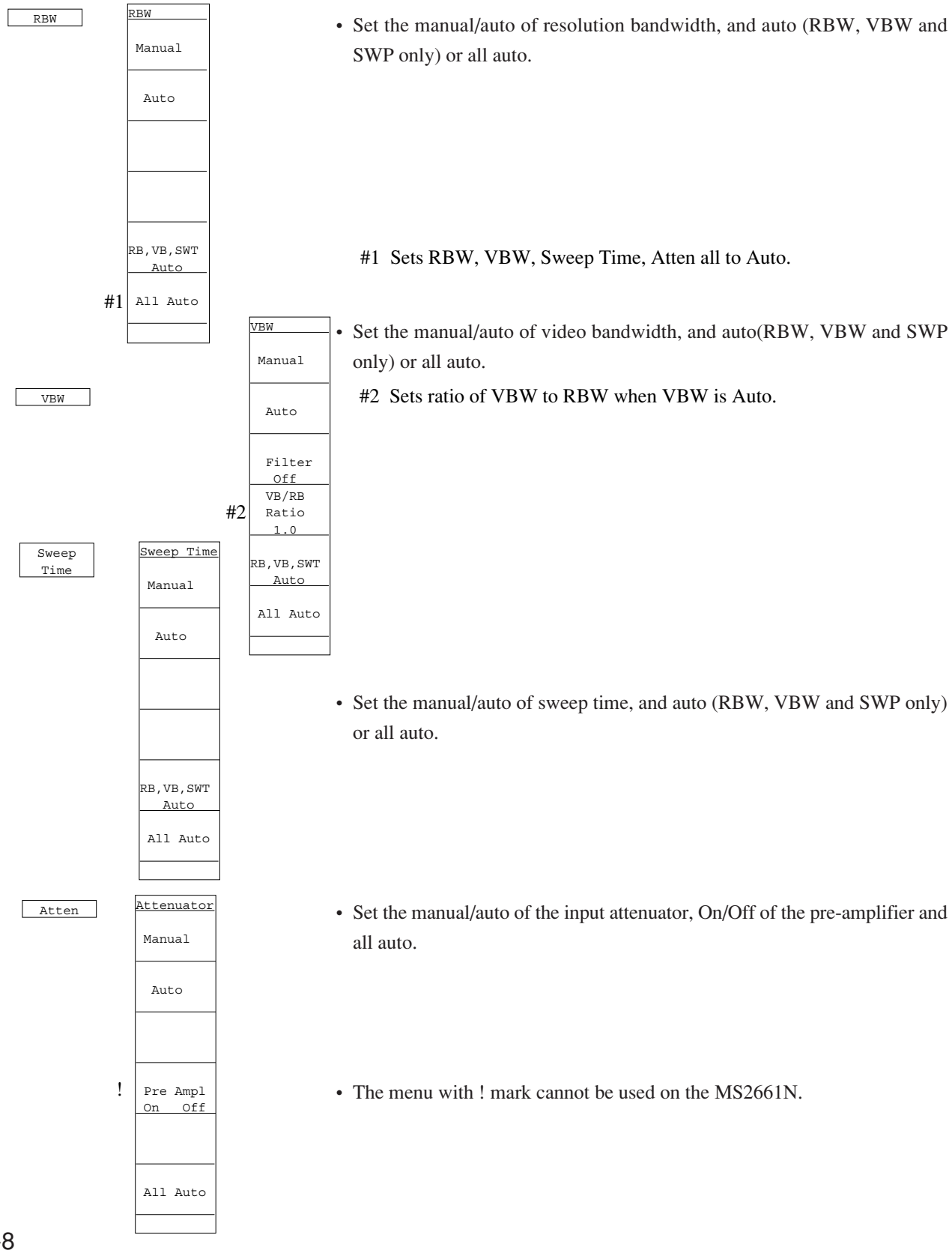
#1 Sets correction (frequency-response characteristics correction) function.

#2 The menu with ! mark cannot be used on the MS2661N.

- Set items along the vertical axis of the screen, including reference level, Peak->RLV, reference level offset, measurement level unit, Log/Lin scale switching, reference level step size, display line, attenuator, pre-amplifier On/Off, 75 Ω impedance, transformer, frequency-response correction, etc.

Menu Tree (3/27)

Panel Key — Top menu — Lower menues



- Set the manual/auto of resolution bandwidth, and auto (RBW, VBW and SWP only) or all auto.

#1 Sets RBW, VBW, Sweep Time, Atten all to Auto.

- Set the manual/auto of video bandwidth, and auto(RBW, VBW and SWP only) or all auto.

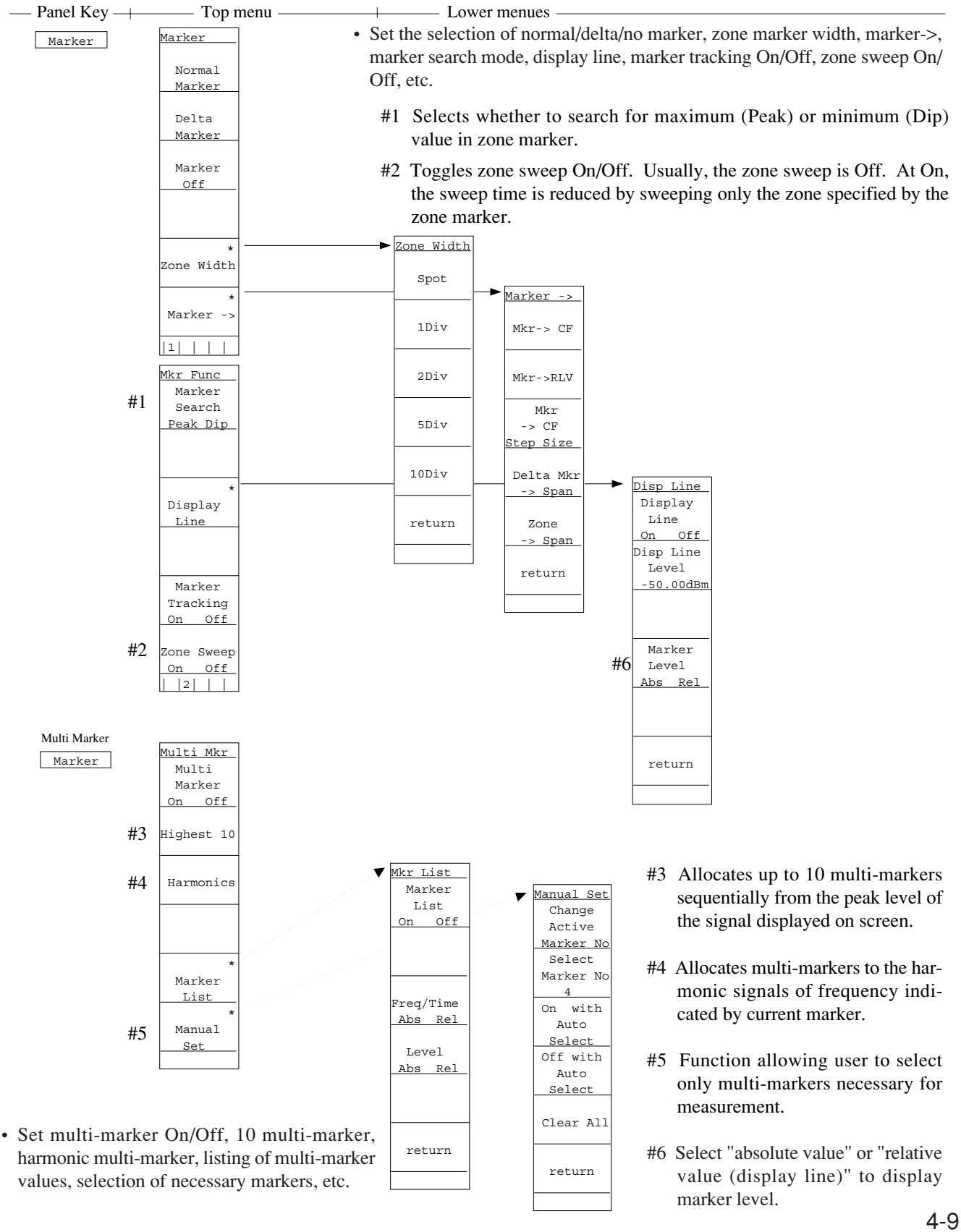
#2 Sets ratio of VBW to RBW when VBW is Auto.

- Set the manual/auto of sweep time, and auto (RBW, VBW and SWP only) or all auto.

- Set the manual/auto of the input attenuator, On/Off of the pre-amplifier and all auto.

- The menu with ! mark cannot be used on the MS2661N.

Menu Tree (4/27)



- Set the selection of normal/delta/no marker, zone marker width, marker->, marker search mode, display line, marker tracking On/Off, zone sweep On/Off, etc.

  #1 Selects whether to search for maximum (Peak) or minimum (Dip) value in zone marker.

  #2 Toggles zone sweep On/Off. Usually, the zone sweep is Off. At On, the sweep time is reduced by sweeping only the zone specified by the zone marker.

- Set multi-marker On/Off, 10 multi-marker, harmonic multi-marker, listing of multi-marker values, selection of necessary markers, etc.

  #3 Allocates up to 10 multi-markers sequentially from the peak level of the signal displayed on screen.

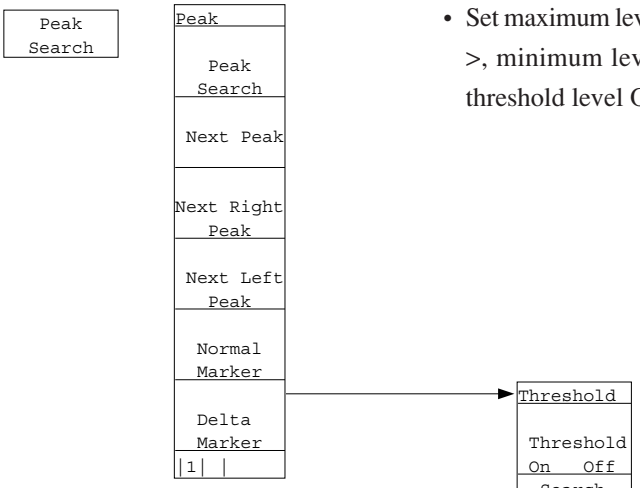
  #4 Allocates multi-markers to the harmonic signals of frequency indicated by current marker.

  #5 Function allowing user to select only multi-markers necessary for measurement.

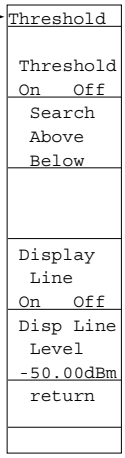
  #6 Select "absolute value" or "relative value (display line)" to display marker level.

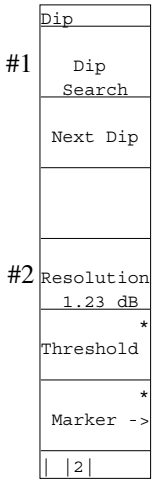
Menu Tree (5 /27)

Panel Key — Top menu — Lower menues



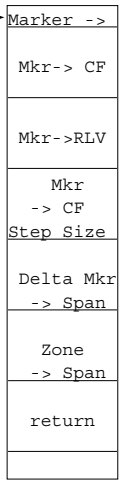
- Set maximum level search, next peak, next right peak, next left peak, Marker->, minimum level search, next minimum level, search level resolution, threshold level On/Off, etc.



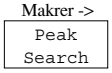


#1 Searches for minimum (Dip) level.

#2 Sets peak-search level resolution.

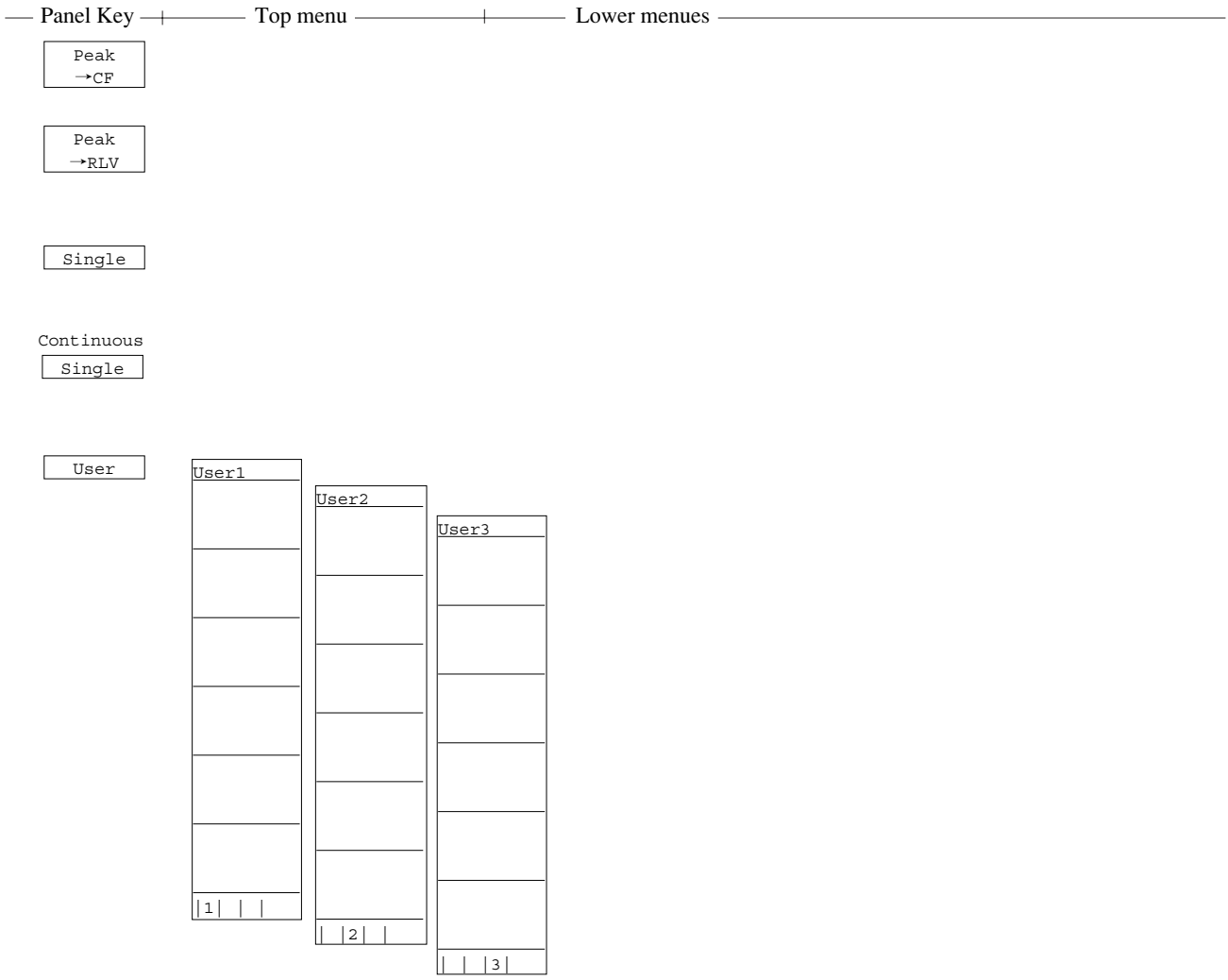


Makrer ->



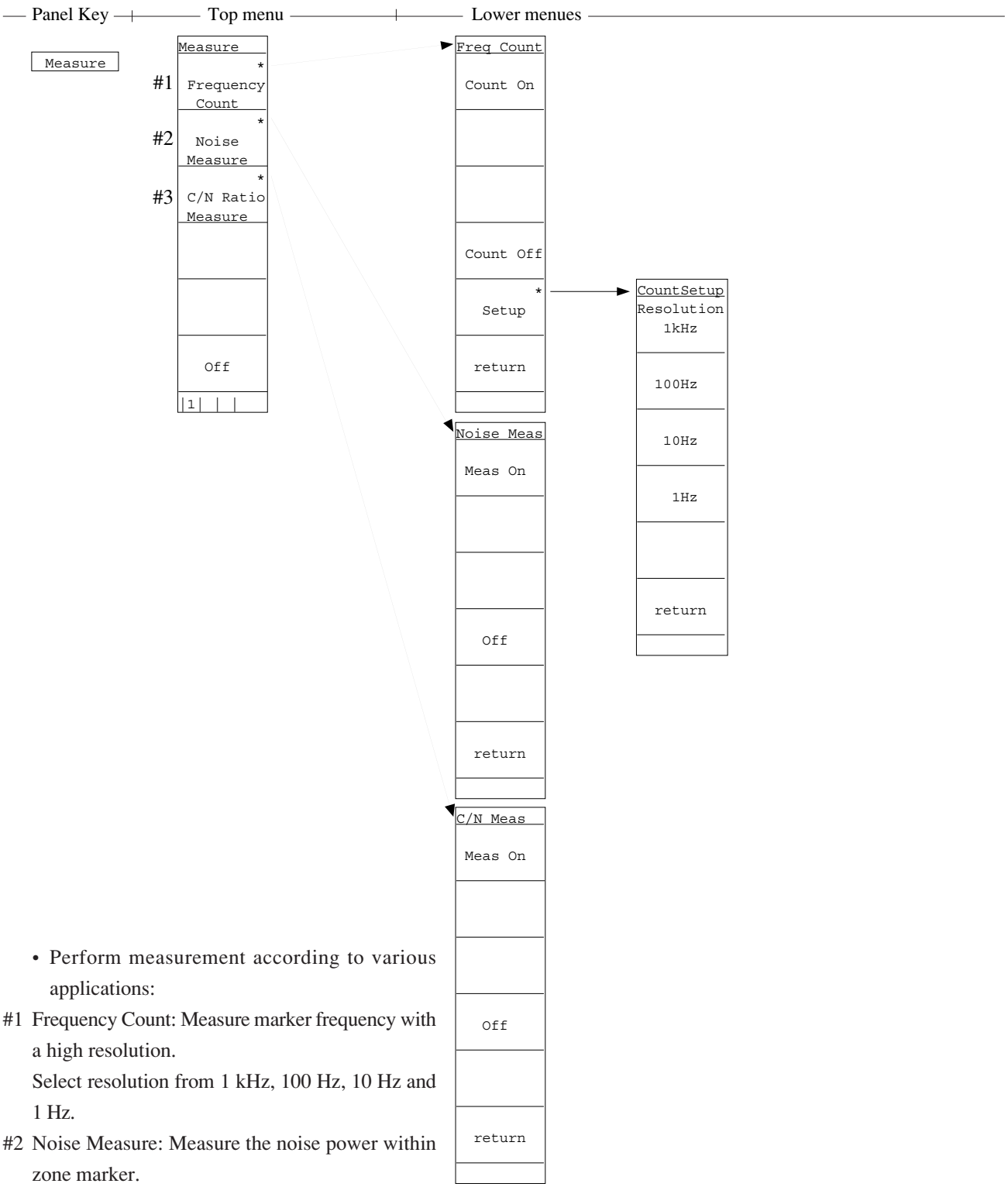
- Set marker value -> center frequency, marker value -> reference level, marker value -> CF step size, delta marker-> span, zone marker -> span, etc.

Menu Tree (6/27)



- The soft-key menu defined by the user is displayed. (See "User Define".)

Menu Tree (7/27)



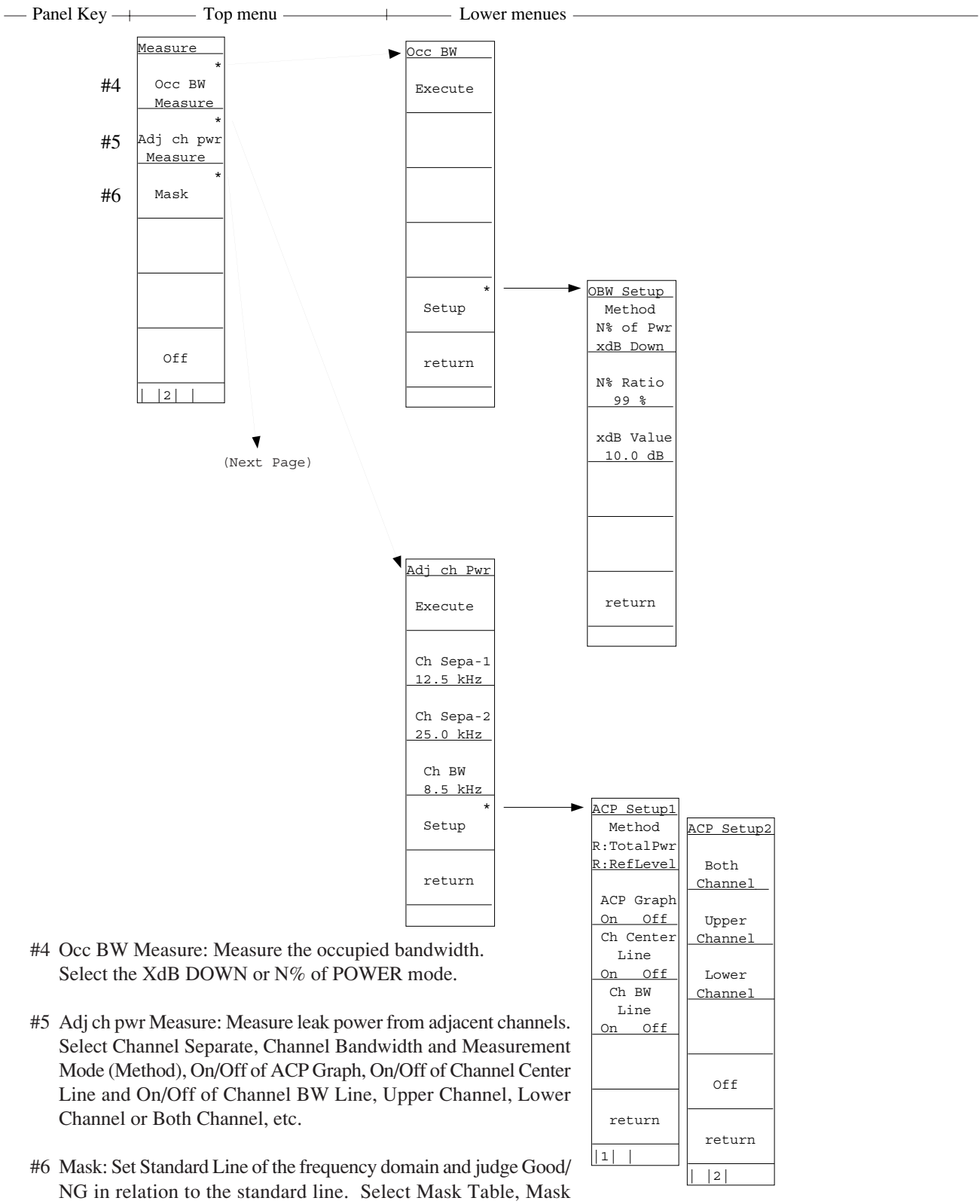
- Perform measurement according to various applications:

#1 Frequency Count: Measure marker frequency with a high resolution.
Select resolution from 1 kHz, 100 Hz, 10 Hz and 1 Hz.

#2 Noise Measure: Measure the noise power within zone marker.

#3 C/N Ratio Measure: Measure the ratio of carrier signal and noise power. Reference marker of the delta marker shall be set to the carrier, and marker's zone width specifies the power measured.

Menu Tree (8/27)

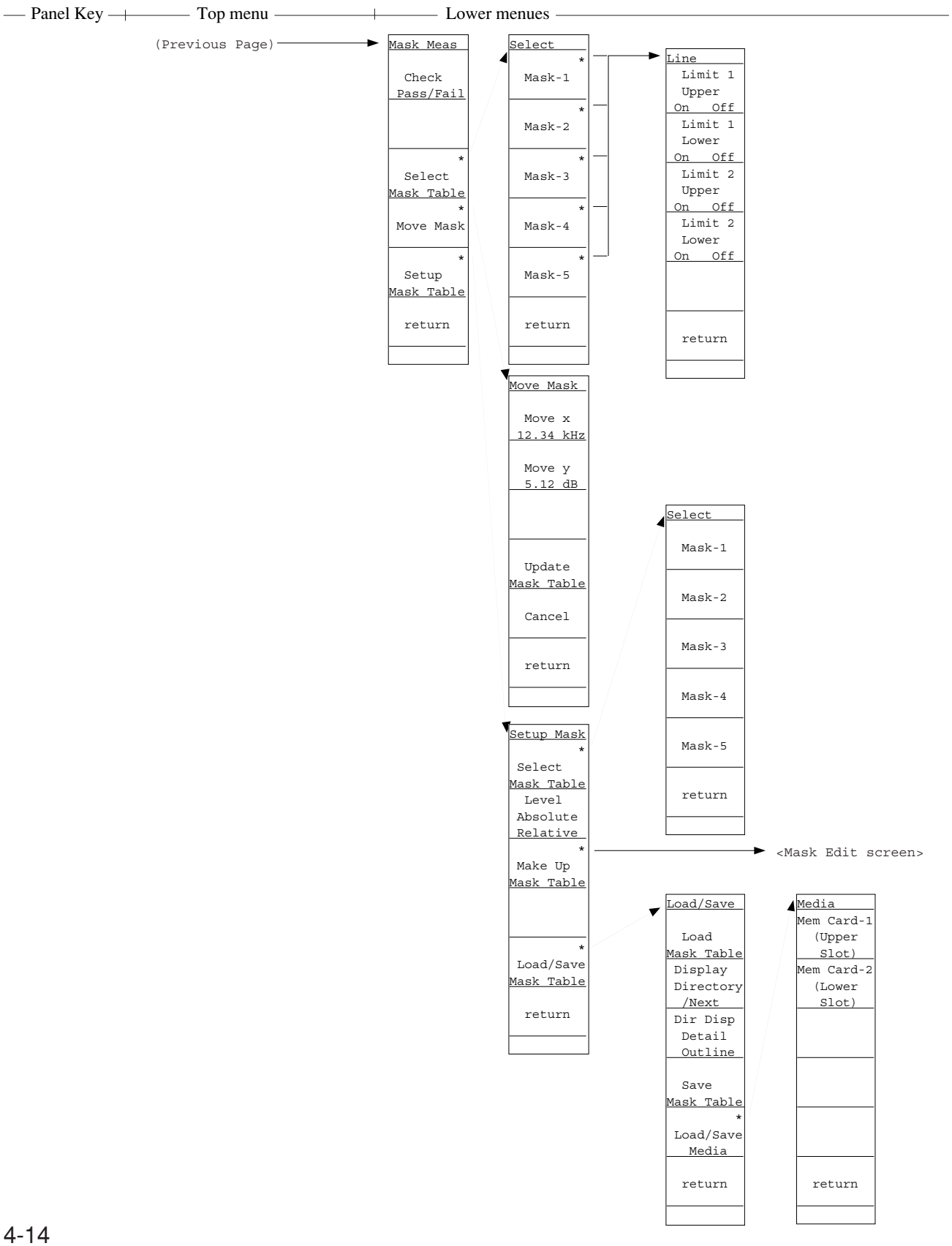


#4 Occ BW Measure: Measure the occupied bandwidth. Select the XdB DOWN or N% of POWER mode.

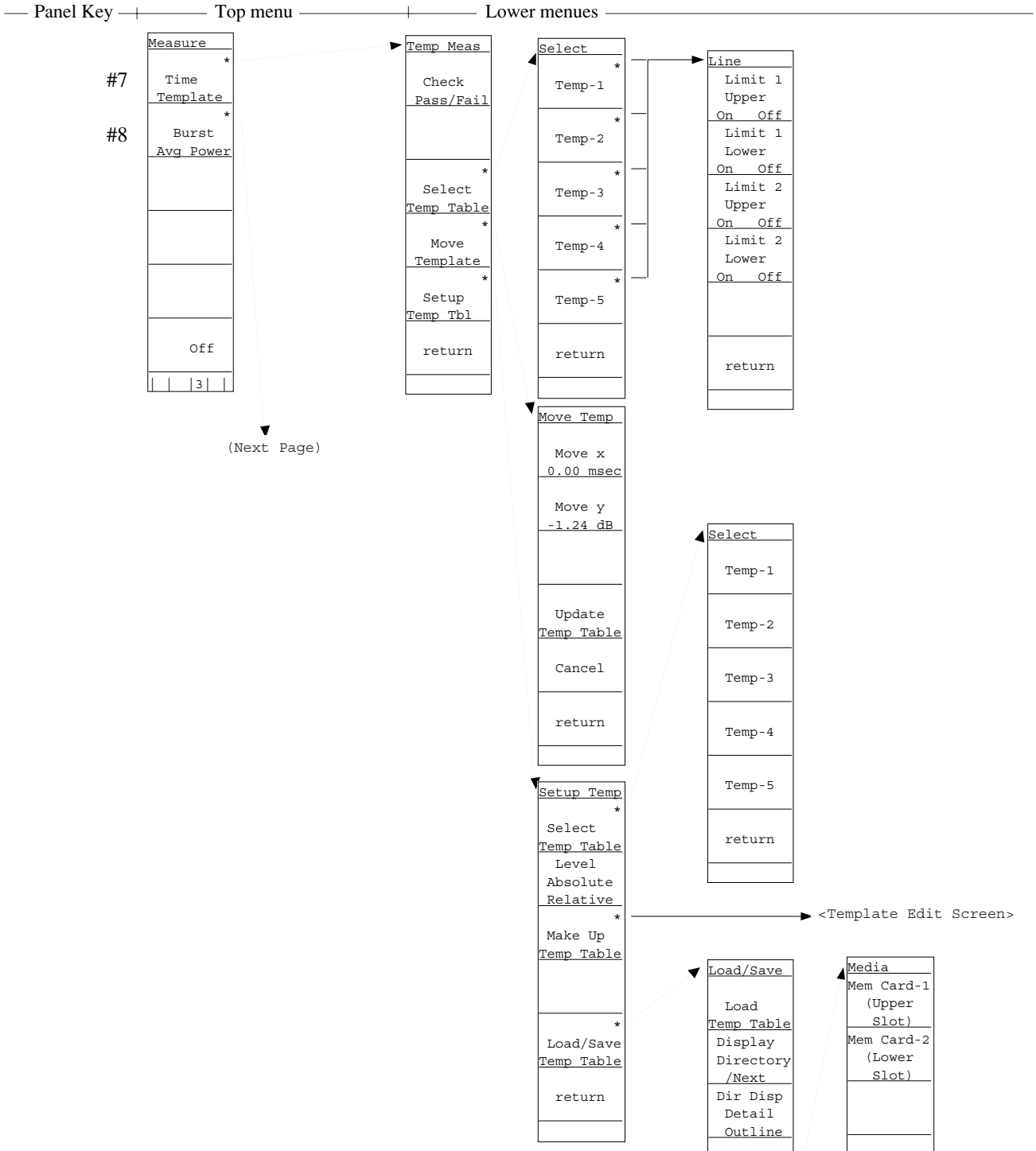
#5 Adj ch pwr Measure: Measure leak power from adjacent channels. Select Channel Separate, Channel Bandwidth and Measurement Mode (Method), On/Off of ACP Graph, On/Off of Channel Center Line and On/Off of Channel BW Line, Upper Channel, Lower Channel or Both Channel, etc.

#6 Mask: Set Standard Line of the frequency domain and judge Good/ NG in relation to the standard line. Select Mask Table, Mask Movement, Measurement Mode, Mask Table Preparation, Load/ Save of Mask Table, etc.

Menu Tree (9/27)



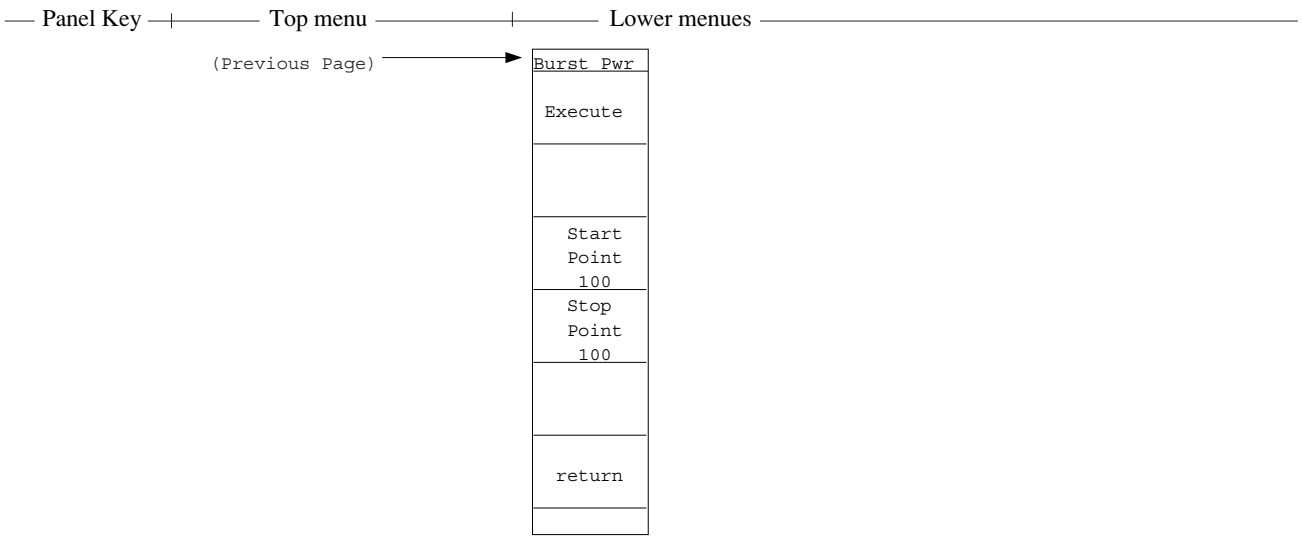
Menu Tree (10/27)



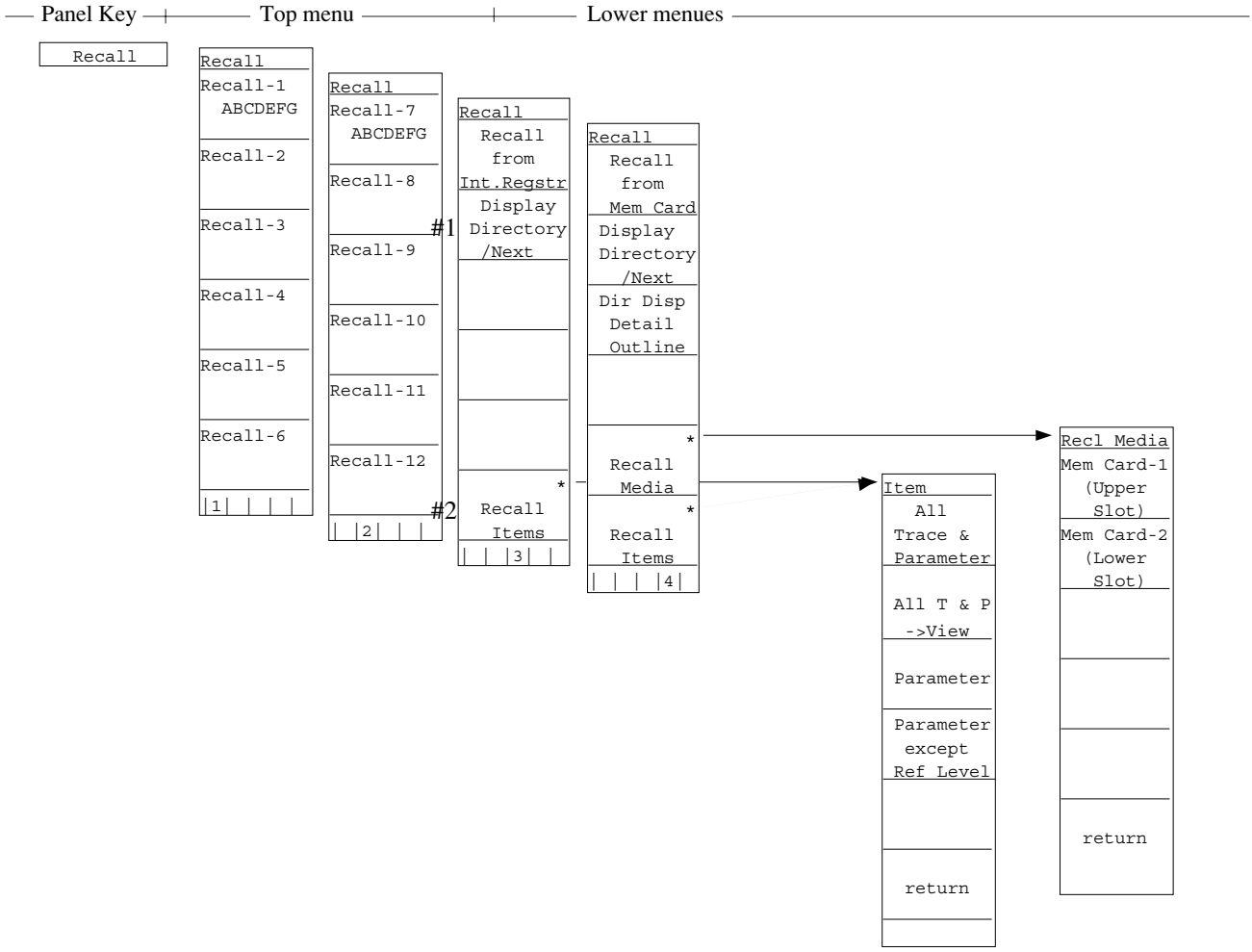
#7 Time Template: Set Standard Line of the time domain and judge Good/NG in relation to the standard line. Select Template Table, Template Movement, Measurement Mode, Template Table Preparation, Load/Save of Mask Table, etc.

#8 Burst Avg Power: Measure the mean power of burst signals in the time domain. Select the start/end points.

Menu Tree (11/27)



Menu Tree (12/27)

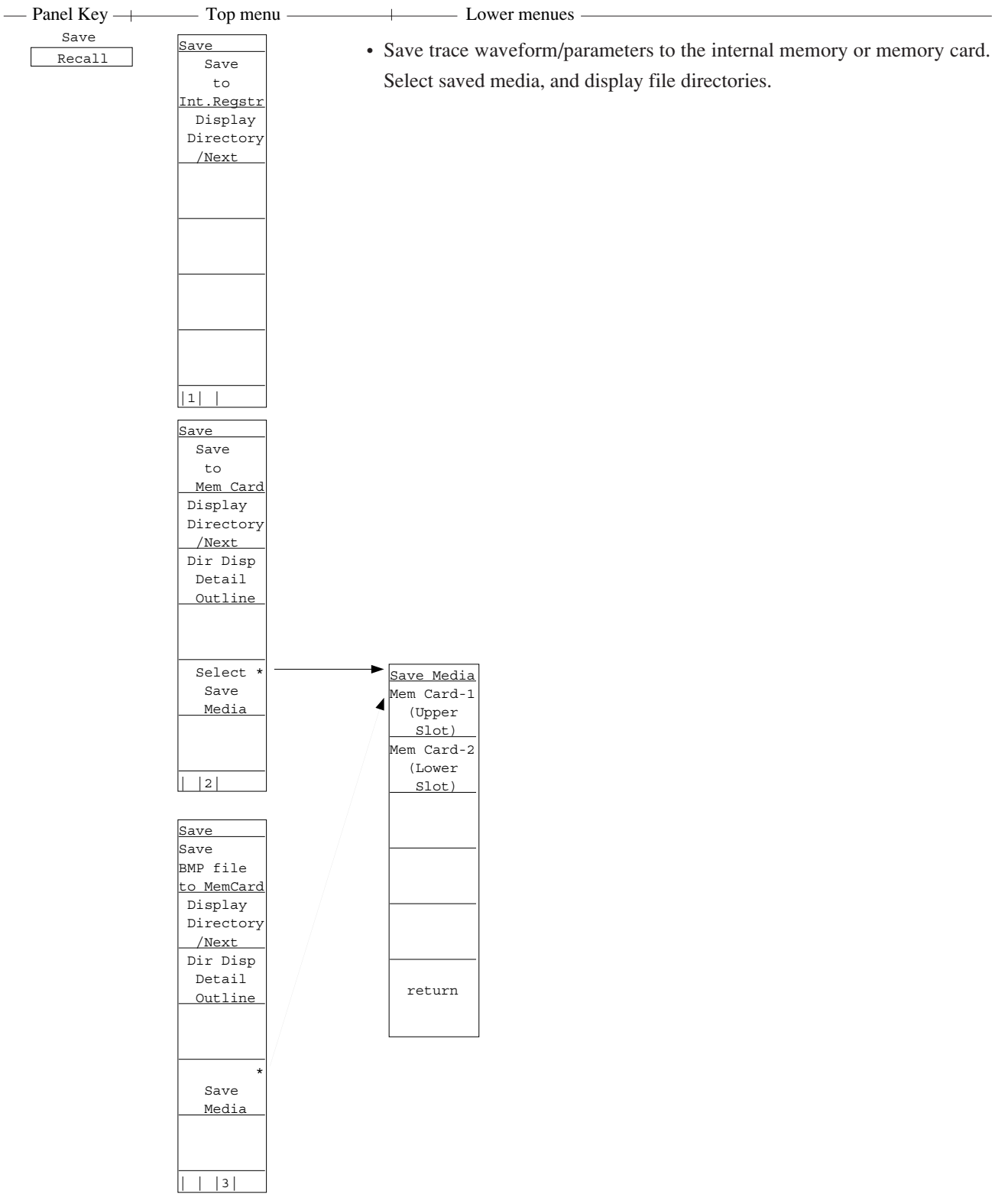


- Read out trace waveform/parameters from the internal memory or memory card.
  Select recall addresses and media/items, and display file directories.

  #1 Displays list of internal-register directories.

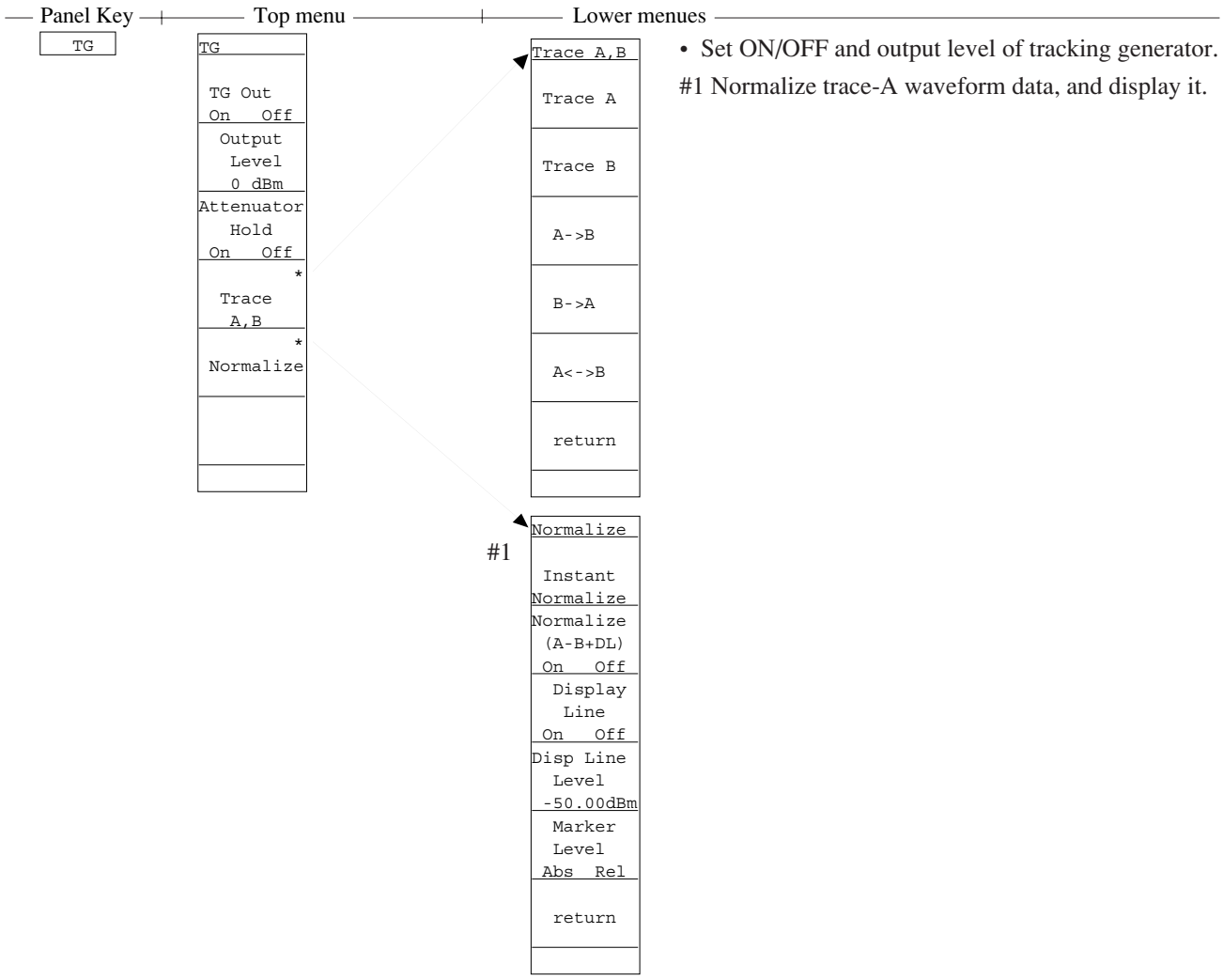
  #2 Specifies items to be recalled
  (trace waveform, parameter, etc.).

Menu Tree (13/27)



- Save trace waveform/parameters to the internal memory or memory card. Select saved media, and display file directories.

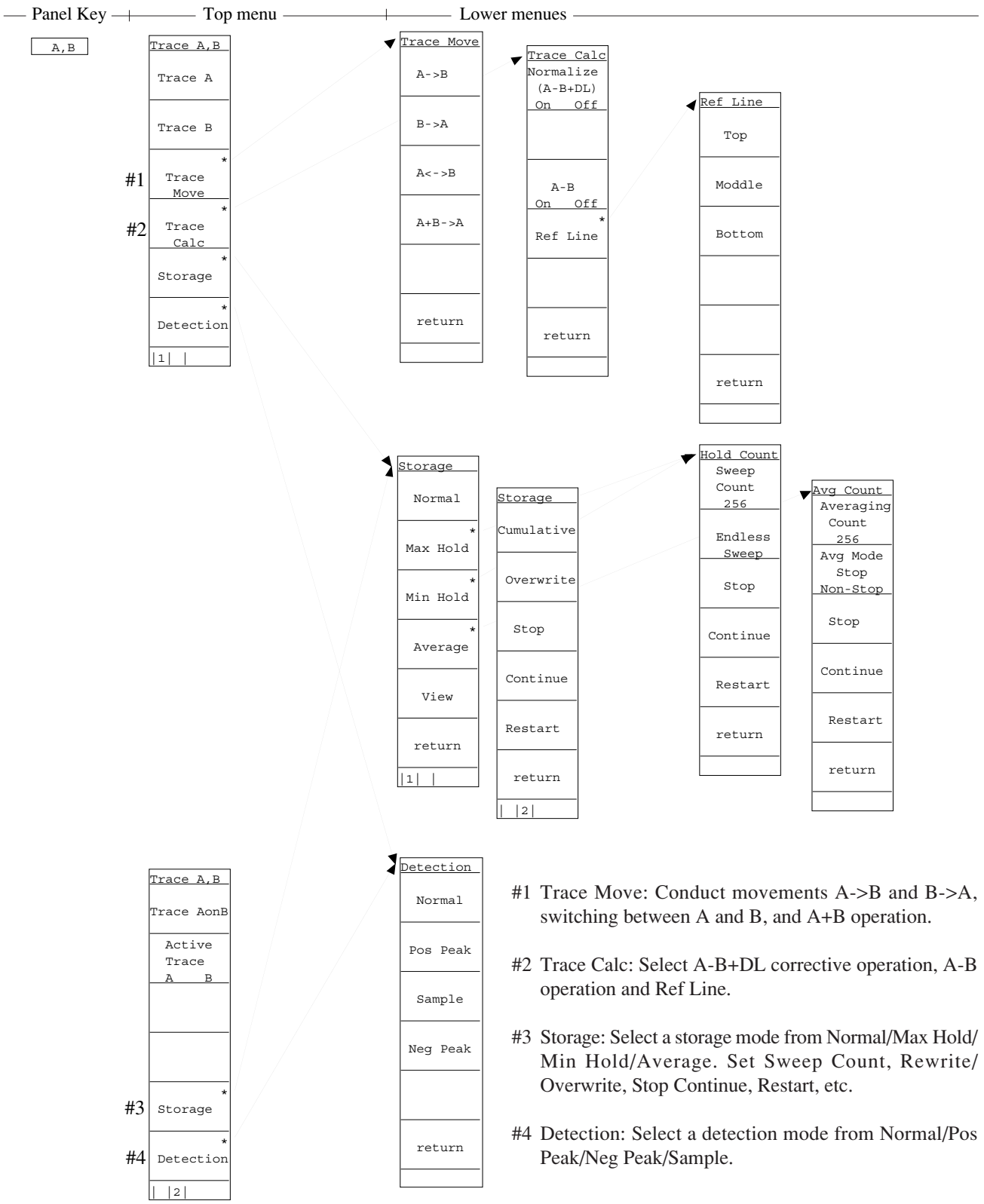
Menu Tree (14/27)



• Set ON/OFF and output level of tracking generator.

#1 Normalize trace-A waveform data, and display it.

Menu Tree (15/27)



#1 Trace Move: Conduct movements A->B and B->A, switching between A and B, and A+B operation.

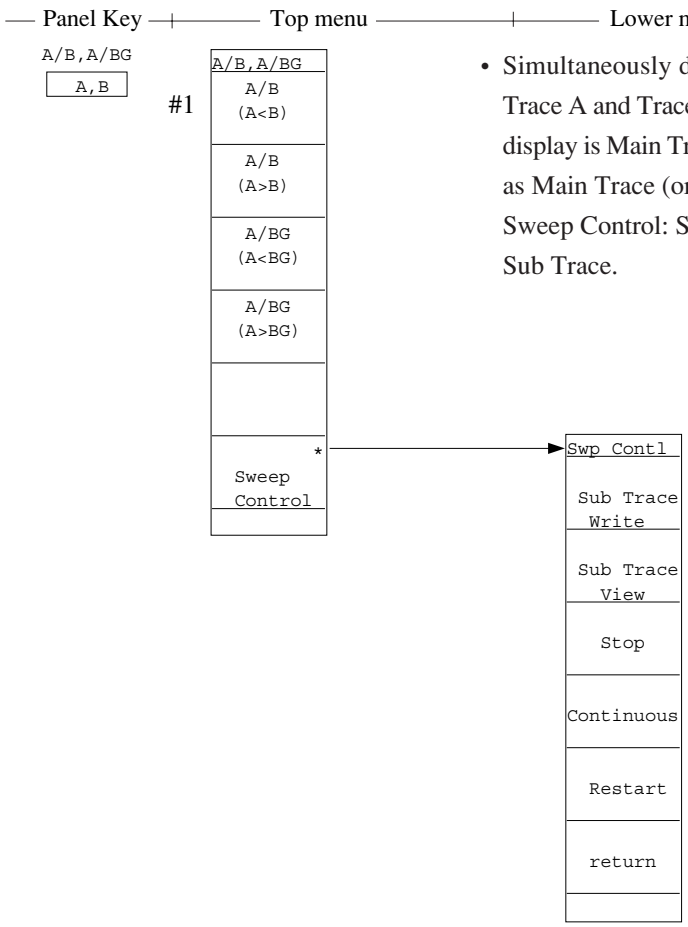
#2 Trace Calc: Select A-B+DL corrective operation, A-B operation and Ref Line.

#3 Storage: Select a storage mode from Normal/Max Hold/ Min Hold/Average. Set Sweep Count, Rewrite/ Overwrite, Stop Continue, Restart, etc.

#4 Detection: Select a detection mode from Normal/Pos Peak/Neg Peak/Sample.

- Select Trace A/B, movement between Trace A/B, sum/difference operation between Trace A/B and Ref Line, and designate the storage and detection modes and Active Trace.

Menu Tree (16/27)



- Simultaneously display two waveforms, namely Trace A and Trace B or Trace A and Trace BG (peripheral spectrum containing Trace A). The large display is Main Trace and the small one is Sub Trace; select which to display as Main Trace (or Sub Trace).
  Sweep Control: Set Stop/Continuous/Restart for sweep and Stop/Write for Sub Trace.

#1 Displays two traces A and B simultaneously at top and bottom of screen. The trace-B display is the larger at this time.

Menu Tree (17/27)

Panel Key — Top menu — Lower menues

Time

Trace Time
Delay Time 10.0 ms
Time Span 200 us
Trigger Freerun Triggered
* Trigger Source
* Storage
* Detection
|1| |

- Set to the zero-span time domain display. Set Time Span, Trigger, Trigger Source, Storage, Detection and FM Monitor On/Off, and select Expand (waveform).

Source (Same as "Trigger Source" menu in Trig/Gate key)

Storage (Same as "Strage Mode" menu in A,B key)

Detection (Same as "Det Mode" menu in A,B key)

Trace Time
! * FM Monitor
#1 * Expand
| |2|

Expand
Zone Start Point 100
Zone Span Point 50
Expand Zone On Off
Expand On Off
return

#1 Zooms in time-domain waveform display.

A/Time
Time

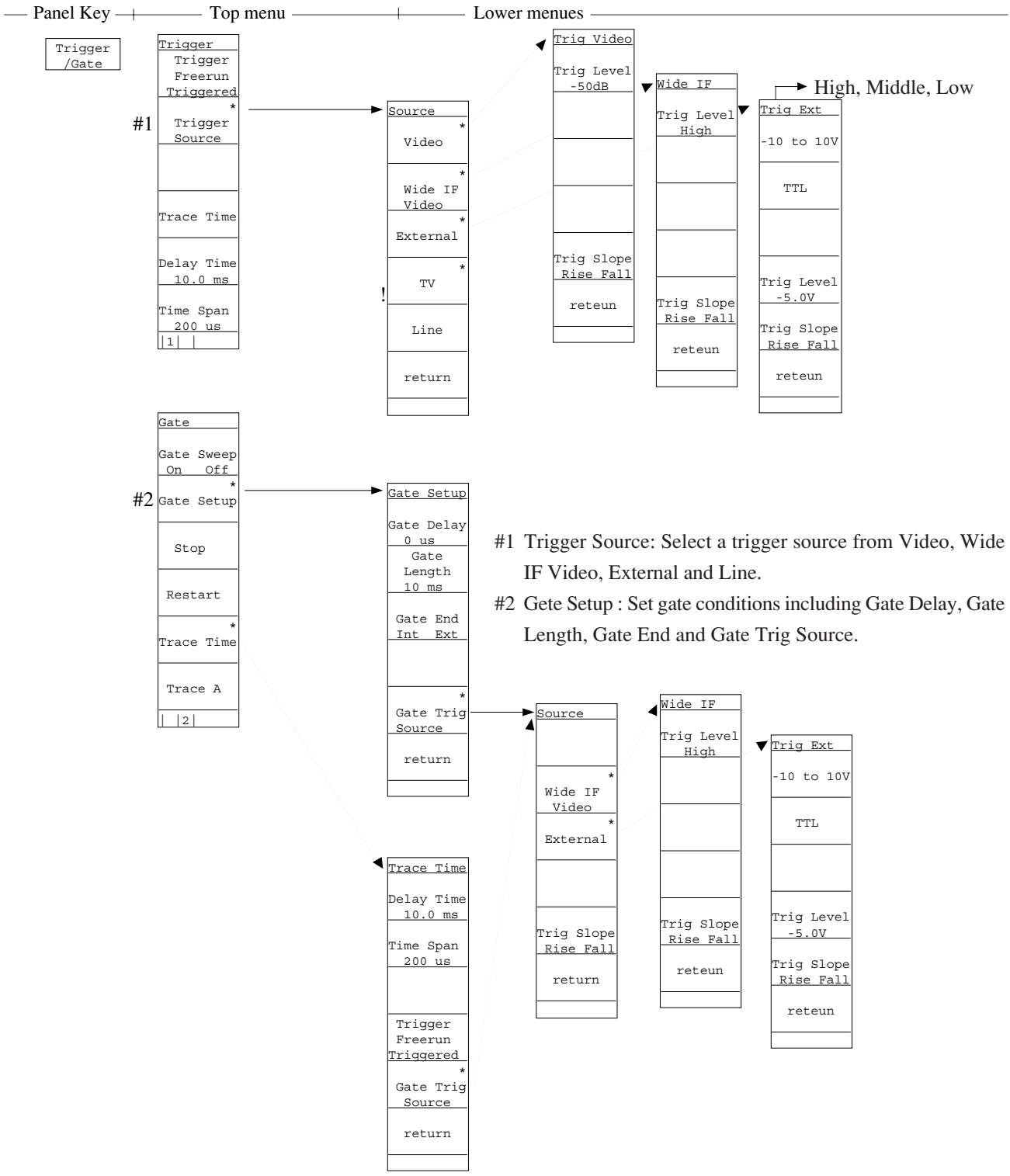
A/Time
#2 A/Time (A<Time)
A/Time (A>Time)
* Sweep Control

Swp Contl
Sub Trace Write
Sub Trace View
Stop
Continuous
Restart
return

#2 Displays trace-A waveforms in frequency domain and time domain simultaneously at top and bottom of screen. The time-domain display is the larger at this time.

- Simultaneously display waveforms of Trace a and Time Domain. Which to display as Main Trace (or Sub Trace) can be selected.

Menu Tree (18/27)



#1 Trigger Source: Select a trigger source from Video, Wide IF Video, External and Line.

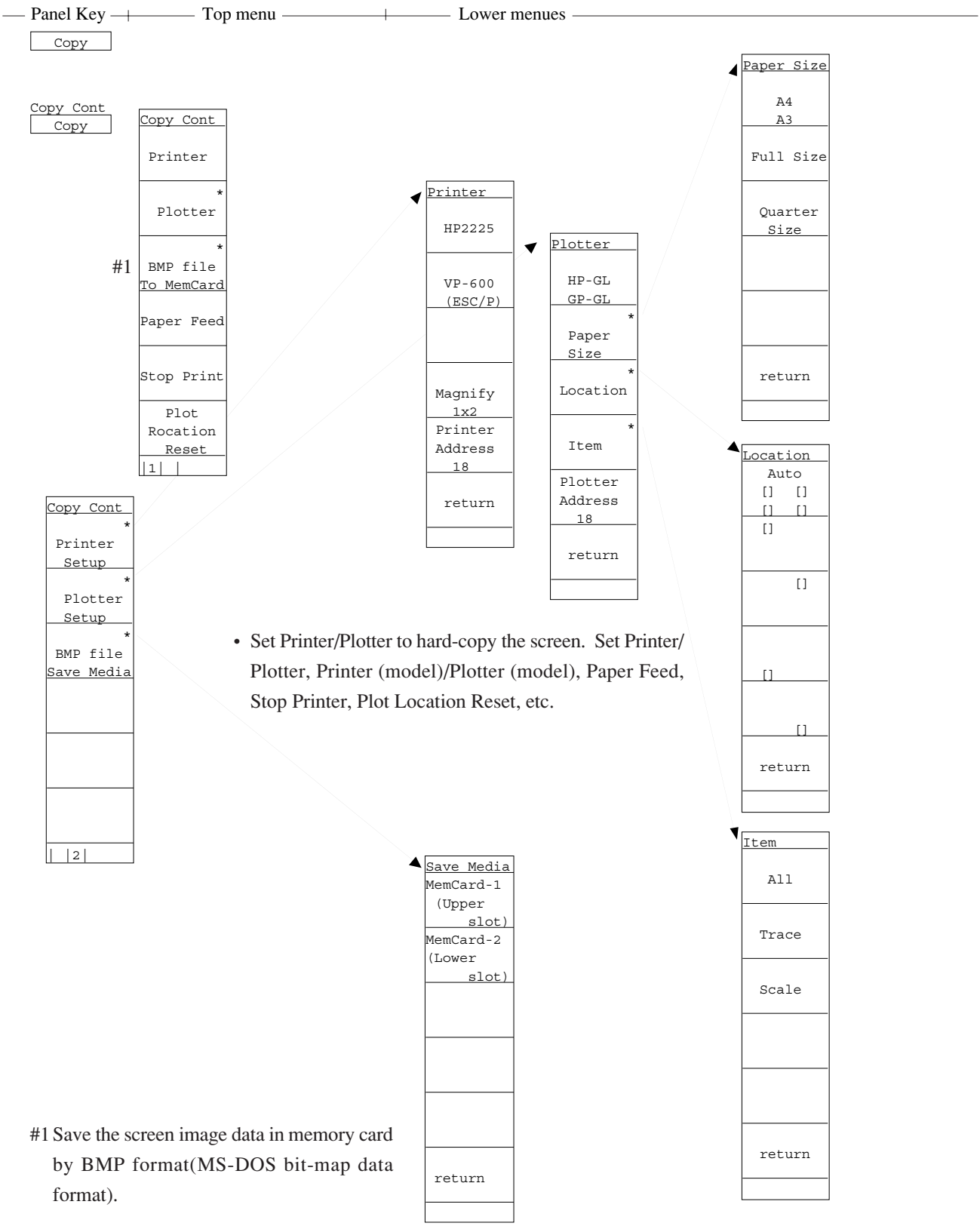
#2 Gete Setup : Set gate conditions including Gate Delay, Gate Length, Gate End and Gate Trig Source.

- Set gate functions for controlling the sweep start trigger and the writing of waveform data. Set the trigger mode, trigger source, trace time, delay time and time span. Select On/Off, Stop and Restart of Gate Sweep.

Menu Tree (19/27)

Panel Key	Top menu	Lower menues
!	TV Monitor Trig/Gate	

Menu Tree (20/27)



- Set Printer/Plotter to hard-copy the screen. Set Printer/Plotter, Printer (model)/Plotter (model), Paper Feed, Stop Printer, Plot Location Reset, etc.

#1 Save the screen image data in memory card by BMP format(MS-DOS bit-map data format).

Menu Tree (21/27)

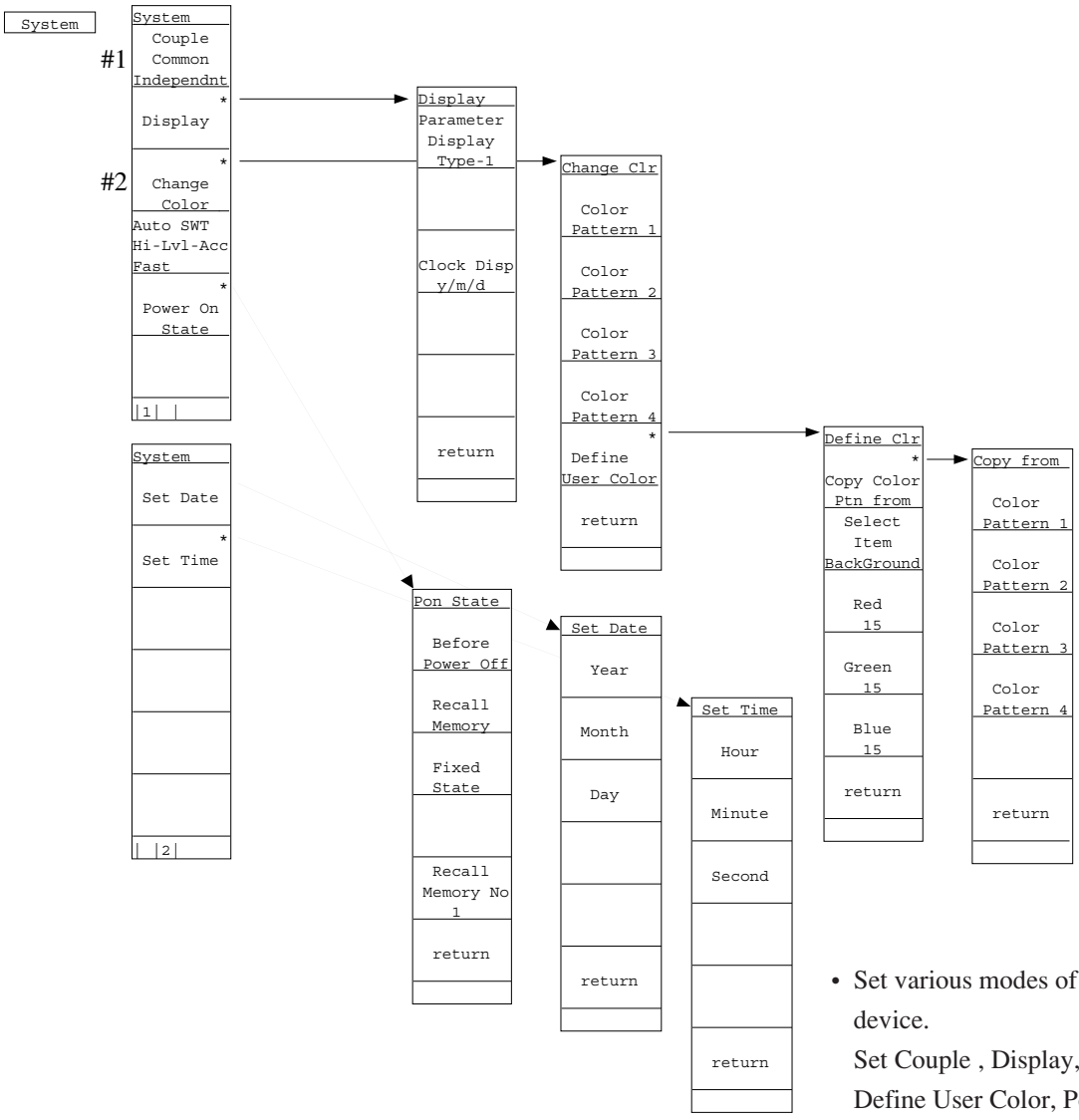
Panel Key — Top menu — Lower menues

! Sound

- The menu with ! mark cannot be used on the MS2661N.

#1 Sets whether the coupled settings for RBW, VBW, etc., in frequency and time domain, independent or common.

#2 Changes screen color pattern.



- Set various modes of systems of this device.
  Set Couple , Display, Color Pattern, Define User Color, Power On State, etc.

Menu Tree (22/27)

Panel Key	Top menu	Lower menues
Cal	Cal	• Execute calibration. Select an item from All Cal, Level Cal and Freq Cal.

Cal

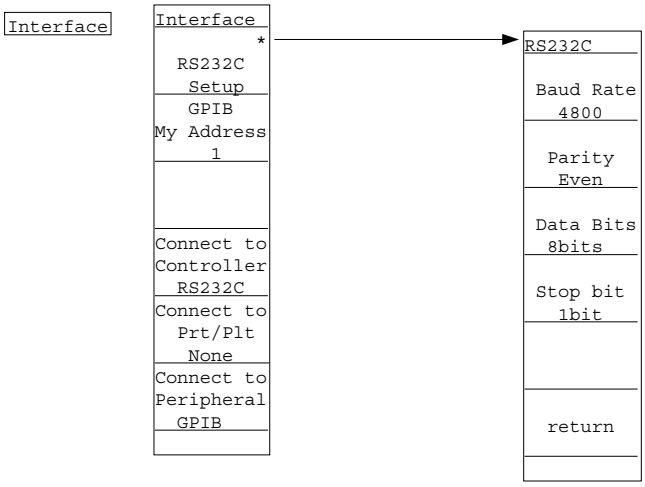
Cal
All Cal
Level Cal
Freq Cal
FM Cal
* Preslctr Tuning

Cal
Freq Cal On Off
* Cal Status → <Calibration status screen>
* Mainte- nance

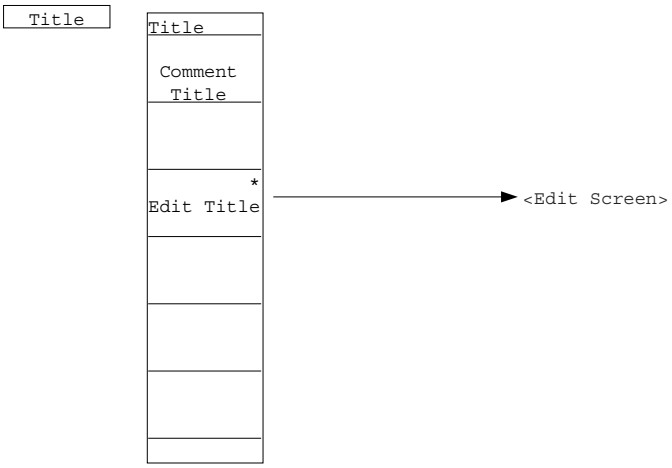
Menu Tree (23/27)

Panel Key — Top menu — Lower menues

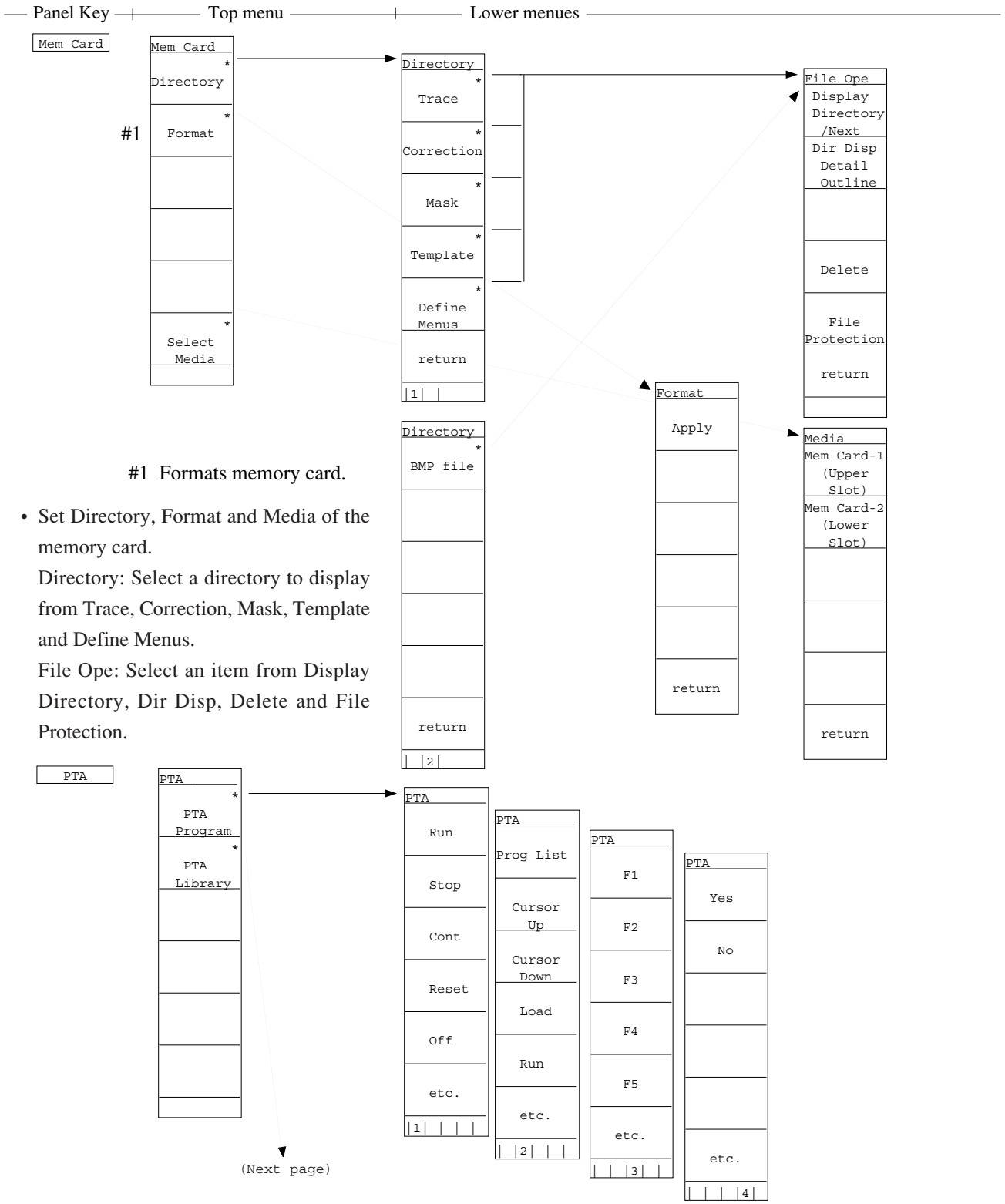
- Set interfaces for external devices to connect. Select RS232C, or GPIB, and set the RS232C interface, GPIB address, etc.



- Input a title to display on the screen.



Menu Tree (24/27)

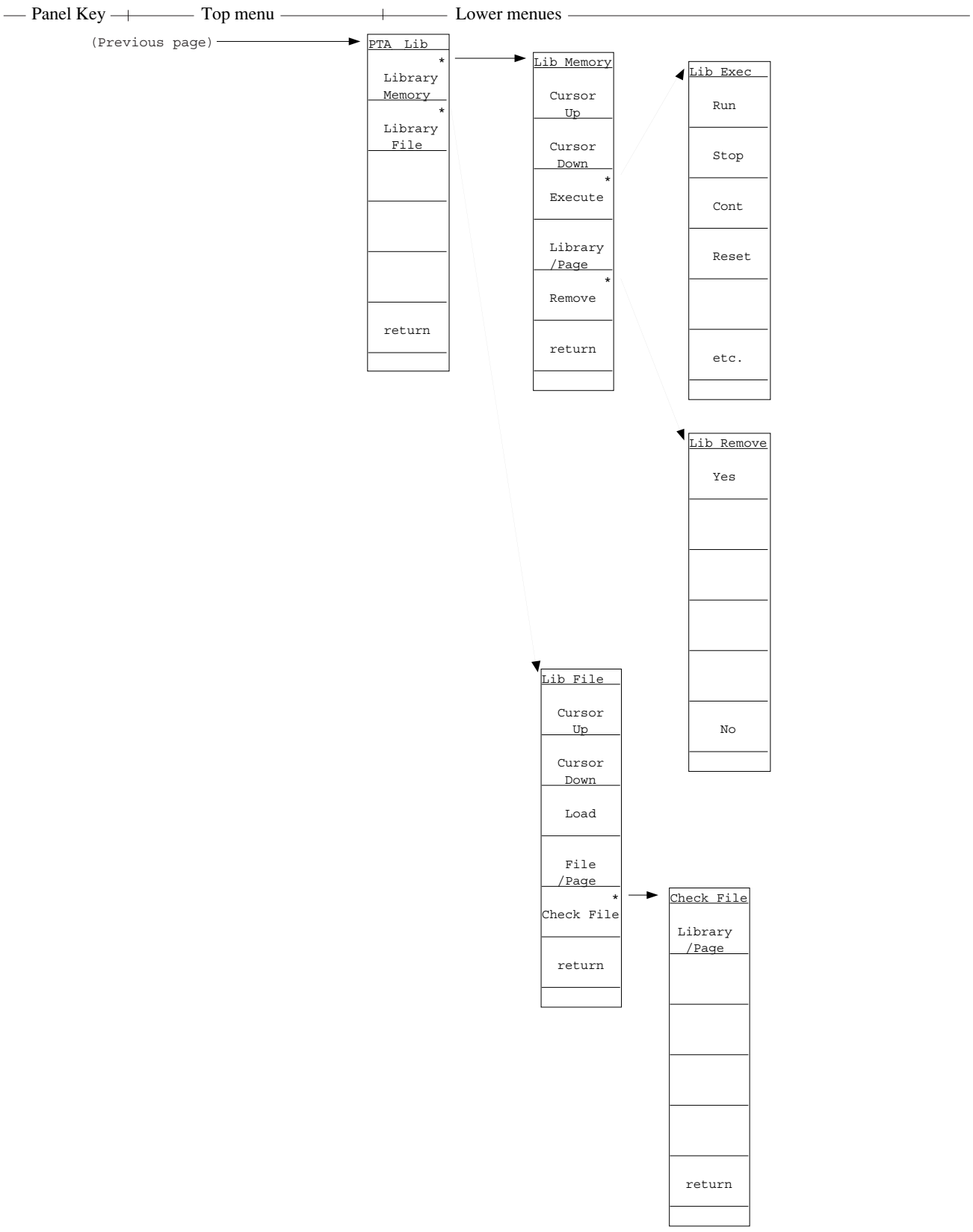


#1 Formats memory card.

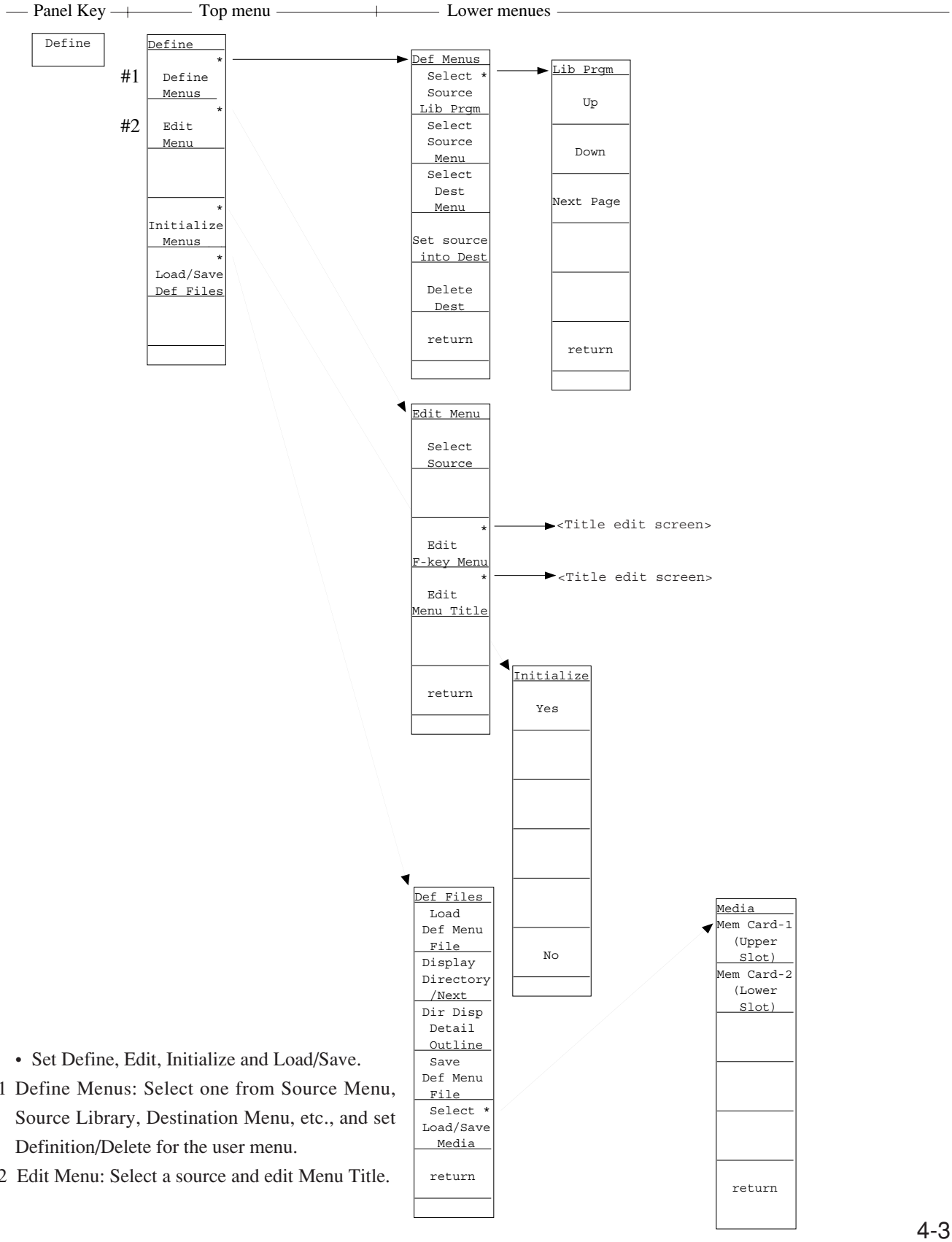
- Set Directory, Format and Media of the memory card.
  Directory: Select a directory to display from Trace, Correction, Mask, Template and Define Menus.
  File Ope: Select an item from Display Directory, Dir Disp, Delete and File Protection.

- Set PTA (personal test automation) that can build an auto measurement system without requiring external controllers.
  PTA Program: Select one from Run, Stop, Cont Reset, Prog List, Load, etc.
  PTA Library: Select one from Display/Run for the library program and Load/Check for the library file.

Menu Tree (25/27)



Menu Tree (26/27)



- Set Define, Edit, Initialize and Load/Save.

#1 Define Menus: Select one from Source Menu, Source Library, Destination Menu, etc., and set Definition/Delete for the user menu.

#2 Edit Menu: Select a source and edit Menu Title.

Menu Tree (27/27)

Panel Key	Top menu	Lower menues
Preset	Preset	Preset All
		Preset Sweep controll
		Preset Trace Parameters
		Preset Level Parameters
		Preset Freq/Time Parameters

- Initialize measurement parameters. Select one from All, Sweep, Trace, Level and Frequ/Time.

Hold

Local

SECTION 5
BASIC OPERATION PROCEDURE

TABLE OF CONTENTS

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SECTION 5
BASIC OPERATION PROCEDURE

The basic operation procedure of this equipment are explained here. The operations are listed on the right. Also, the explanation willl advance assuming that a 500 MHz signal is applied to the input connector. Please read this manual while operating this equipment.

([ ] : Panel key, ___ : Soft key)

<Actual operations>

(1) Signal display
   1) Turn the power on,
   2) set the signal to the center of the screen, and
   3) enlarge and display the signal.

(2) Marker operation
   Check of the zone marker function.
   The "marker → CF" function check.

(3) "Measure" function check

(4) Screen hard copy

Signal Display

Turn the power on

Press the AC line power switch on the rear panel, then press the power switch (0) on the front panel. In this case, continue pressing the power switch for one second or more.

Press [Preset] key.

Press Preset All Parameters key in the menu.

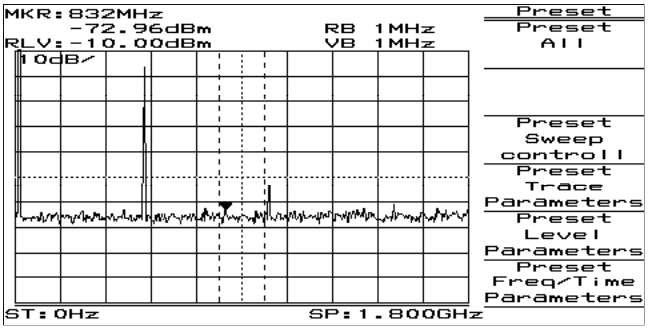

Fig. 5-1

The power is turned on/off only when the power switch is pressed for one second or more. This prevents the power from being turned on/off easily by mistake.

When [panel] key (hard key) is pressed, the related soft key menu is displayed.

Partial resettings are enabled. This resetting includes only the display-related resetting or the resetting of special modes such as zone sweep.

Set the signal to the center of the screen

Press [Frequency] key.

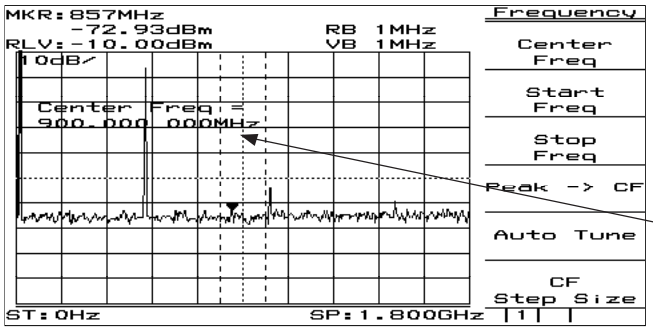

Fig. 5-2

When pressing Frequency, Span, Amplitude or Coupled Function key(s) which is used frequently, Center Frequency, Span, Reference Level, RBW or VBW function is selected and numeric value for the function can be entered into Entry area. This reduce key operation times.

This display section is called Entry area. Selecting the menu displays the current set value of the parameter. The set value can be changed by entering data in Entry area.

Press [Menu On/Off] key

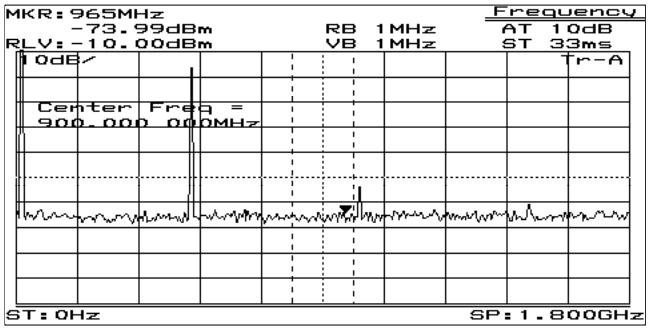

Fig. 5-3

The display of the soft key menu can be switched on/off using [Menu On/Off] key. When the menu disappears, the scale is enlarged. Also, when the menu is displayed, the scale is reduced.

Press [Menu On/Off] key to return to previous screen.
Use the ten-key pad (numeric keys) to enter 500 MHz.

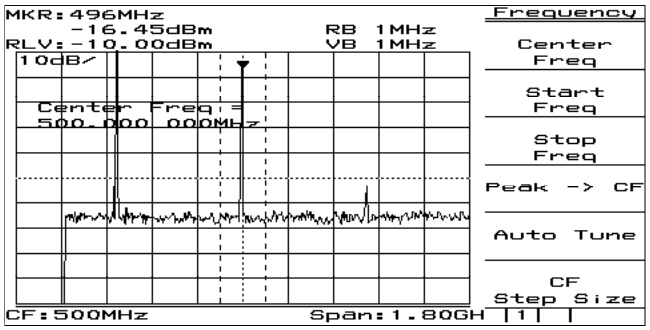

Fig. 5-4

The following three methods to input numeric values to parameters are provided: direct input by the ten-key pad (numeric keys), up/down keys, and rotary knob.

Enlarge and display the signal

Press [Span] key , then press the [V] down key several times to enlarge the signal display.

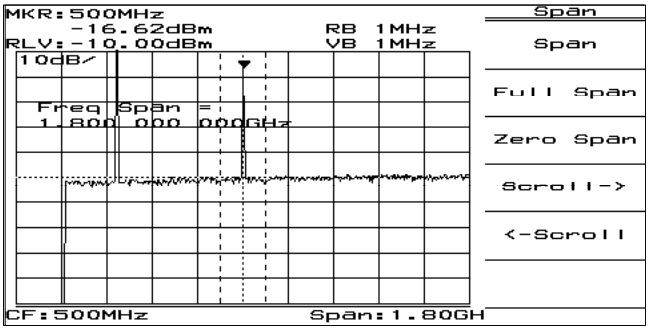

Fig. 5-5

Marker Operation

Here, checks that the signal frequency and level are displayed in a marker display area. The zone marker automatically fetches the highest level signal within the zone and displays the frequency and level.

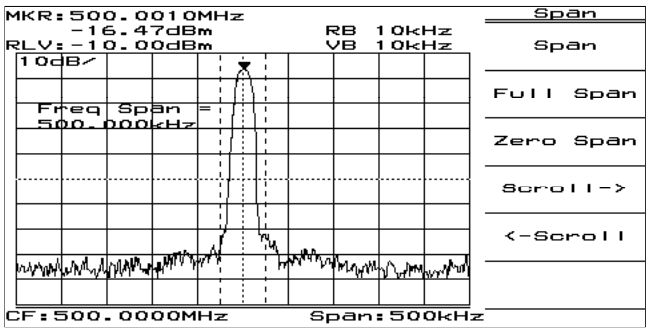

Fig. 5-6

To check Marker → CF function, shift the signal from the center intentionally.
Press [Frequency] key and [More] key in order, and then Scroll → key two times.

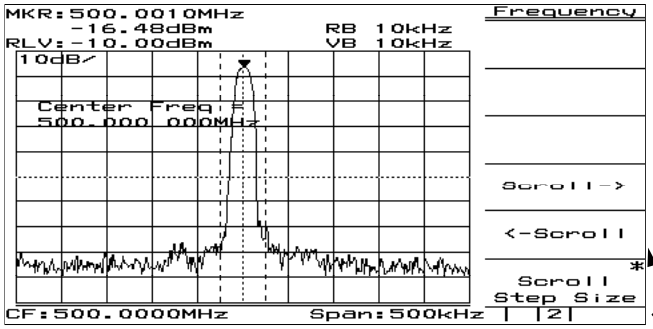

Fig. 5-7

The soft key menu marked by an asterisk(*) on the upper right indicates that the menu can further be opened by pressing the key. Adversely, the soft key menu not marked indicates that the menu cannot be opened any more, so to speak, the end of menu opening.

The following items can easily be checked by the soft key menu tab: How many pages of the soft key menu being displayed currently are there?, and what page is displayed now?

To turn over the page, press [More] key.

Press Peak Search key.

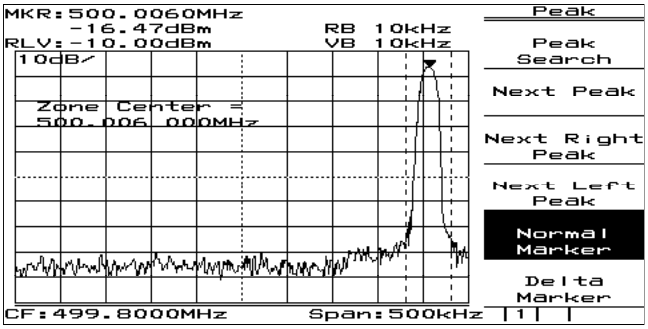

Fig. 5-8

*Advanced operation memo: It is convenient that the page can also be turned over by repeatedly pressing the panel key. This method is used when key(s), such as [Measure] key, has a number of pages. Besides, the Freq/Ampl and Marker-related keys do not turn over the page by repeatedly pressing the panel key. For these keys, because the first page is important specially, it should always be displayed when the panel key is pressed.

The marker fetches the signal.

Press [More] key.

Press Marker → key.

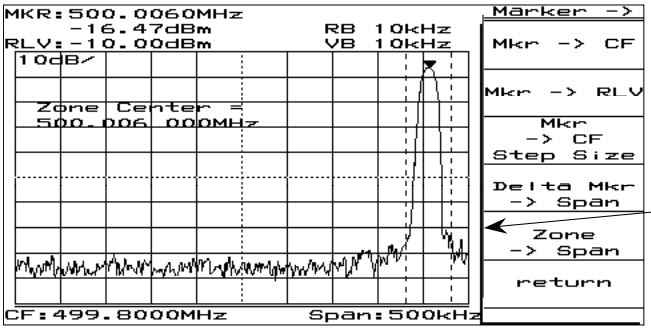

Fig. 5-9

When the soft key menu with * is pressed, the lower menu of function related to the menu is further displayed.
In this case, as shown in the figure on the left, the thick line is displayed at the left of the soft key menu. This indicates that the lower menu is displayed.

Press marker → CF key.

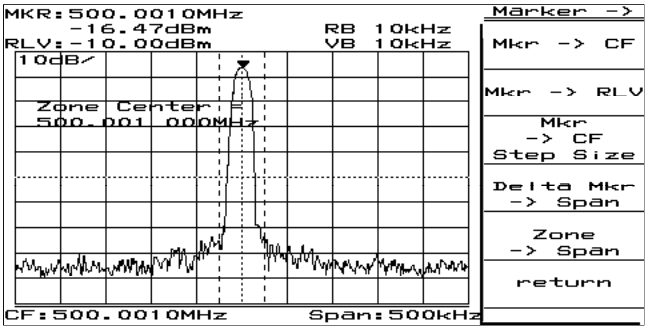

Fig. 5-10

The page opened by pressing the soft key can return to the preceding page by the return key. Besides, it can be checked that which soft key menu was pressed previously to open the current menu, as the menu title is displayed on the upper row of the soft key.

Here, return to the screen of Fig. 5-7 and ensure that the screen changes to that of Fig. 5-10 only by pressing the [→CF] key.

"Measure" Function Check

Press [Preset] key and Preset All Parameters key in order.
Press [Peak Search] key.
If the zero beat signal level (local feed though) is larger than the signal level and the marker fetches the zero beat level, press "Next peak" key and put the marker on the signal.

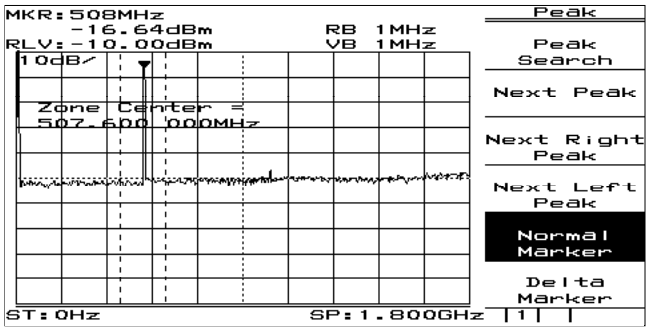

Fig. 5-11

Press the [Measure] key and Frequency Count key to set the function of high accuracy frequency measurement of the marker points.
Then, press the Count On key and start measurement.

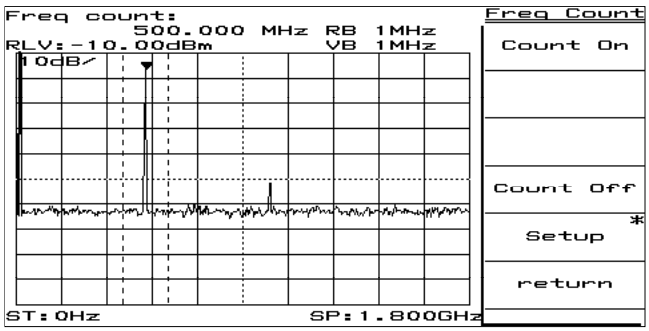

Fig. 5-12

The soft-key menu display can be switched On/Off by the [Menu On/Off] key.
However, keys that condition setting is not possible unless a menu is On unconditionally make the soft-key menu display On when pressing a panel key.

From the screen after executing measurement, press another panel key and change parameters, and then, pressing again the [Measure] key will automatically return to the menu of this screen and not to page 1 of the menu (page learning function).
It is a useful function when repeating measurement.

The frequency of marker points is displayed at the top left of the screen.
Incidentally, the internal counter correctly operates even at the full span condition, so an operation to reduce frequency span otherwise required is not necessary in this model.

Screen Hard Copy

The screen can be hard-copied with the VP-600 printer (Epson) via an RS-232C interface, and the procedures are described below:

1) As illustrated below, connect the RS-232C connector and printer with an attached RS-232C cable.

2) Press the [Copy] key, and the currently displayed screen is hard-copied.
If the printed copy is improper, check if the RS-232C interface is correctly set in the following sequence.

3) Press the [Shift] key and then the [Interface] key.

4) Press the Connect to Controller key several times to get None on the display, and press the Connect to Prt/Plt key several times and get RS-232C on the display.
Now the printer can be operated with RS-232C.

5) Press the RS-232C Setup key and set so that (or check if) the the setting of RS-232C interface is the same between the main body and printer.
(For the setting/checking of the RS-232C interface on the printer side, refer to the instruction manual of the printer.)

6) Press the [Shift] key and then the [Copy Cont] key.

7) Press the Printer/Plotter key and select Printer.

8) Press the Printer Setup key, and then press the VP-600 key.

9) Press the Magnify key several times and make the display 1 × 1.

10) Press the [Copy] key, and the currently displayed screen is hard-copied.

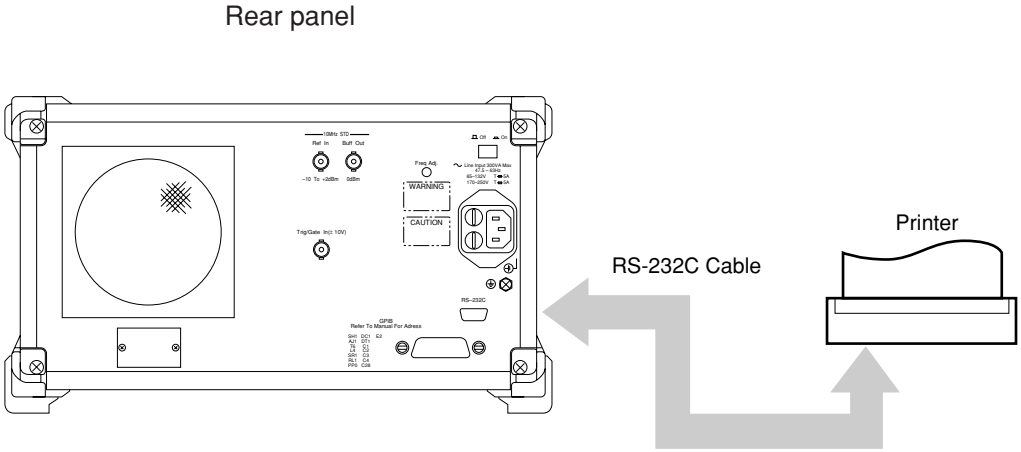

Fig. 5-13

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SECTION 6
PERFORMANCE TESTS

In this chapter, measuring instruments, setup and operations necessary for conducting performance tests of MS2661N are described.

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SECTION 6 PERFORMANCE TESTS

Requirement for Performance Tests

Performance tests are used as preventive maintenance to prevent degradation of the MS2661N performance before it occurs.
Use the performance tests whenever necessary such as at acceptance and periodic inspection of the MS2661N and to verify performance after repair. Execute the performance tests listed below to verify the MS2661N performance at acceptance inspection, periodic inspection and after repair.

- Reference oscillator frequency stability
- Center frequency display accuracy
- Frequency span display accuracy
- Resolution bandwidth and selectivity
- Sideband noise level
- Frequency measurement accuracy
- Amplitude display linearity
- Frequency response
- Second harmonic distortion
- Input attenuator switching error
- Sweep time and time span accuracy
- TG output level

Execute the performance tests at regular intervals as preventive maintenance for important evaluation items. We recommend that the performance be inspected regularly once or twice a year.

If the specifications are not met at the performance tests, please contact Anritsu Corporation.

Instruments Required for Performance Test

A list of instruments required for performance test is shown below.

Instruments Required for Performance Test (1/2)

Recommended instrument name (Model name)	Required Performance †	Test item
Synthesized signal generator (MG3633A)	• Frequency range 10 MHz to 3 GHz Resolution of 1 Hz possible • Output level range –20 to 0 dBm Resolution of 0.1 dB possible • SSB phase noise ≤130 dBc / Hz (at 10 kHz offset) • Second harmonic ≤30 dBc • Amplitude modulation (0% to 100%, 0.1 to 400 Hz) possible • External reference input (10 MHz) possible	Frequency-span display accuracy Resolution bandwidth, selectivity Sideband noise Amplitude display linearity Second-harmonic distortion Input-attenuator switching error Sweep-time and time-span accuracy
Attenuator (MN510C)	• Frequency 100 MHz • Maximum attenuation 70 dB (resolution 0.1 dB) possible with calibrated data	Amplitude display linearity Input-attenuator switching error

† Extracts part of performance which can cover the measurement range of the test item.

Instruments Required for Performance Test (2/2)

Recommended instrument name (Model name)	Required Performance †	Test item
Power meter (ML4803A)	• Main instrument accuracy ±0.02 dB • Frequency range 100 kHz to 3 GHz (depending on the power sensor type)	Frequency response Input-attenuator switching error TG output level
Power sensor (MA4601A)	• Frequency range 100 kHz to 3 GHz • Measurement power range –30 to +10 dBm • Input connector N type	Frequency response Input-attenuator switching error TG output level
Low-pass filter (M-238C) (SAGE L20CA072)	• Attenuation ≥70 dB (at frequency: 2 × (10 MHz and 1 GHz))	Second-harmonic distortion
Frequency counter (MF1601A)	10 MHz measurement possible Number of display digits: 10 • External reference input (10 MHz) possible	Reference-oscillator frequency stability
Frequency standard	• Frequency 10 MHz • Stability $\leq 1 \times 10^{-9}$/day	Reference-oscillator frequency stability

† Extracts part of performance which can cover the measurement range of the test item.

Performance Test

The warm-up time depends on the test item. For test item other than oscillator frequency, warm-up the equipment for at least for thirty minutes and test the performance after the MS2661N stabilizes completely. Also, begin measurement after taking the warm-up time of the calibration instrument into full consideration. In addition, the test must be conducted at room temperature; there must be little AC power supply voltage fluctuation, and no noise, vibration, dust, humidity, etc.

Reference oscillator frequency stability

The 10 MHz reference oscillator is tested for frequency stability.
Stability is determined by measuring frequency variation after 24 hours and after 48 hours of power on at ambient temperatures of 0°C and 50°C.

(1) Specifications

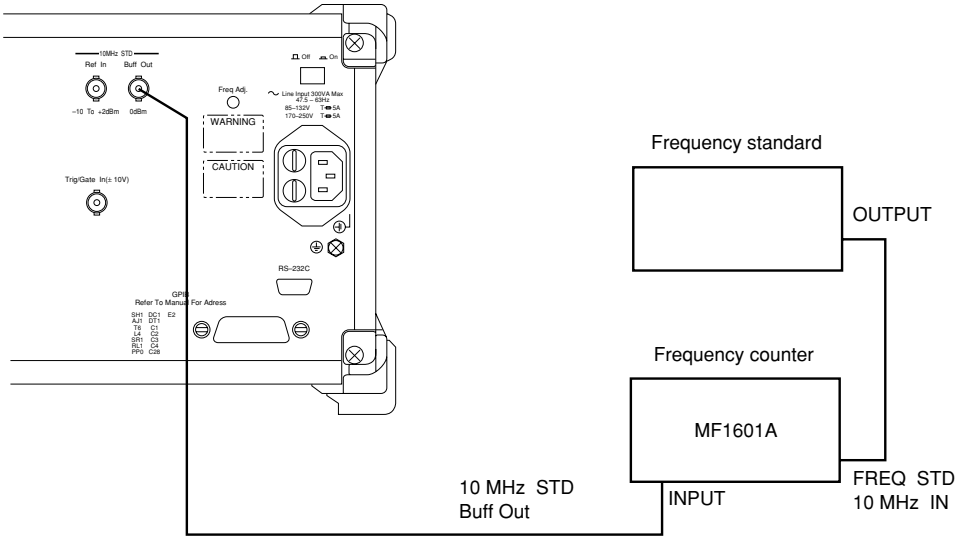
■ Reference oscillator

- Frequency: 10 MHz
- Aging rate: $\leq \pm 2 \times 10^{-8}$ / day
  After 24 hour warm-up at 25˚C ± 5˚C
- Temperature stability: $\leq \pm 5 \times 10^{-8}$ at 0 and 50˚C referred to frequency at 25˚C

(2) Test instruments

- Frequency counter: MF1601A
- Frequency standard: with stability of $\leq \pm 1 \times 10^{-9}$ / day

(3) Setup



Reference Oscillator Frequency Stability Test

(4) Procedure

Aging rate / day: Test this at the ambient temperature ±2 °C in a vibration-free place.

Step	Procedure
1	Set the changeover switch (FREQ STD: INT / EXT) on the MF1601A counter rear panel to EXT.
2	Set the AC line power supply switch on the MS2661N rear panel to On and then the Power switch on the MS2661N front panel to On.
3	Measure the frequency using the counter with 0.1 Hz resolution after 24 hours have passed after turning the power ON.
4	Measure the frequency using the counter after 24 more hours have passed from the step 3 measurement.
5	Calculate the stability by using the following equation. $$\text{Frequency stability} = \frac{(\text{2nd reading of the counter}) - (\text{1st reading of the counter})}{(\text{1st reading of the counter})}$$

Temperature stability: Test this performance in a vibration-free constant-temperature chamber.

Step	Procedure
1	Set up the MS2661N in a constant-temperature chamber at 25˚C in the same setup.
2	Set the LINE and Power switches on the MS2661N to On and wait until the MS2661N internal temperature stabilizes (approx. 1.5 hours after the chamber temperature stabilizes).
3	When the internal temperature stabilizes, measure the frequency by using the counter with 0.1 Hz resolution.
4	Change the chamber temperature to 50˚C.
5	When the chamber temperature and the MS2661N internal temperature re-stabilize, measure the frequency by using the counter.
6	Calculate the stability by using the following equation. $$\text{Frequency stability} = \frac{(\text{counter reading at } 50°C) - (\text{counter reading at } 25°C)}{(\text{counter reading at } 25°C)}$$
7	Change the chamber temperature to 0˚C and repeat steps 5 and 6.

Center frequency readout accuracy

Add the known frequency which serves as the center frequency reference to the MS2661N as shown in the figure below and set CF (same value as the known reference frequency) and SPAN. At this time, check that the difference between the reading of the marker readout frequency (thick arrow in the figure) of the center frequency peak point, and the CF set value is ≤ ± (Center frequency accuracy).

As shown in the figure, the Synthesized Signal Generator uses the signal source phase-locked with the same accuracy as the 10 MHz reference oscillator of the MS2661N.

(1) Specifications

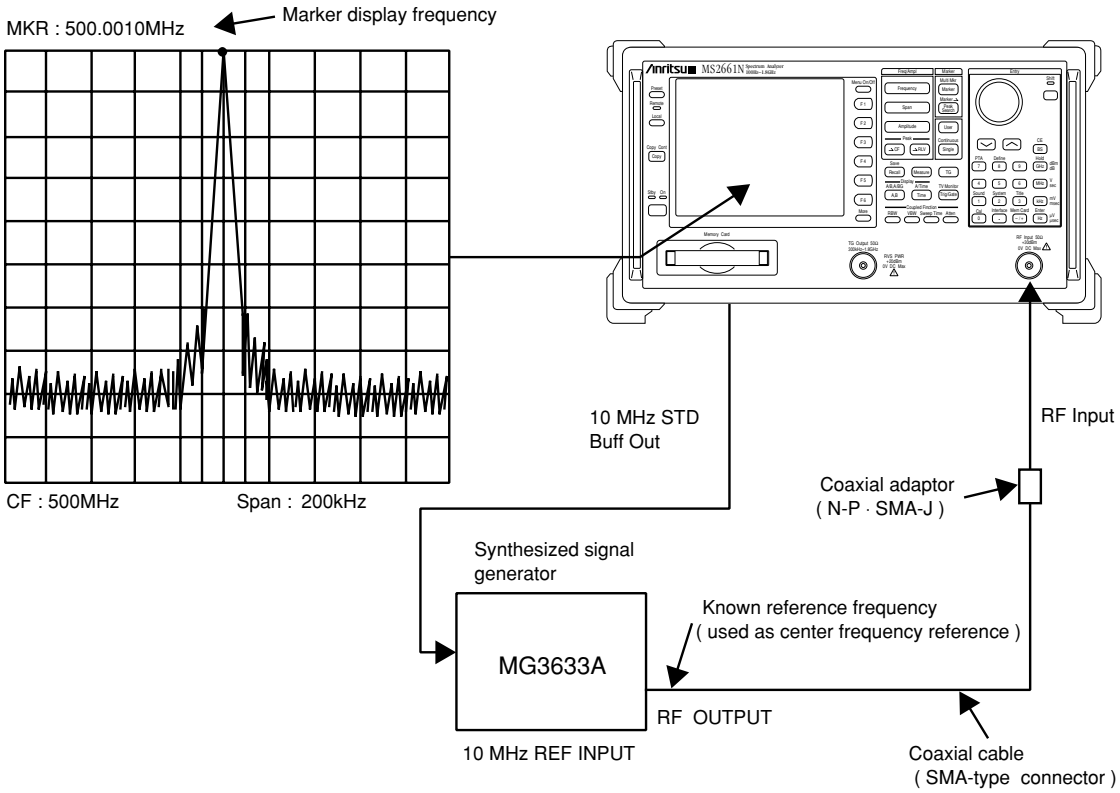
- Center frequency accuracy: ± (Indicated frequency × reference frequency accuracy + resolution band width × 15% + span × 5% +15 kHz) ; ✻ Span ≥2 MHz

  ± (Indicated frequency × reference frequency accuracy + resolution band width × 15% + span × 5% +25 Hz) ; ✻ Span <2 MHz

(2) Test instruments

- Synthesized signal generator: MG3633A

(3) Setup



Center-Frequency Readout-Accuracy Test

(4) Precautions

Set the signal generator output level to approx –10 to –20 dBm.

(5) Procedure

Step	Procedure
1	Press the MS2661N [Preset] key, and then Preset All key.
2	Operate Freq Cal.
3	Set the signal generator output frequency equal to the center frequency (500 MHz) in the following table.
4	Set the MS2661N to the center frequency in the following table.
5	Set the span (10 kHz) that corresponds to the center frequency (500 MHz) in the table by using the numeric/unit keys.
6	Read the marker frequency (indicated by thick arrow in the figure on the previous page) and check that the value is within the range between the maximum and minimum values shown in the following table.
7	Repeat steps 3 to 6 for other combination of the center frequency and span according to the combinations shown in the following table.

Center frequency display accuracy test

Signal generator	Center frequency	Span frequency	Center frequency		
			Minimum value	Maker value	Maximam value
500 MHz	500 MHz	10 kHz (RBW:100 Hz)	499.999 46		500.000 54
		200 kHz (RBW:3 kHz)	499.989 525		500.010 475
		100 MHz (RBW:300 kHz)	494.940 00		505.060 00

Frequency span readout accuracy

Using the setup shown in the figure below, set the frequencies corresponding the 1st and 9th division from the left side of the screen scale with the SG. The frequency difference between the peak levels at the 1st and 9th divisions is equal to the frequency span × 0.8.

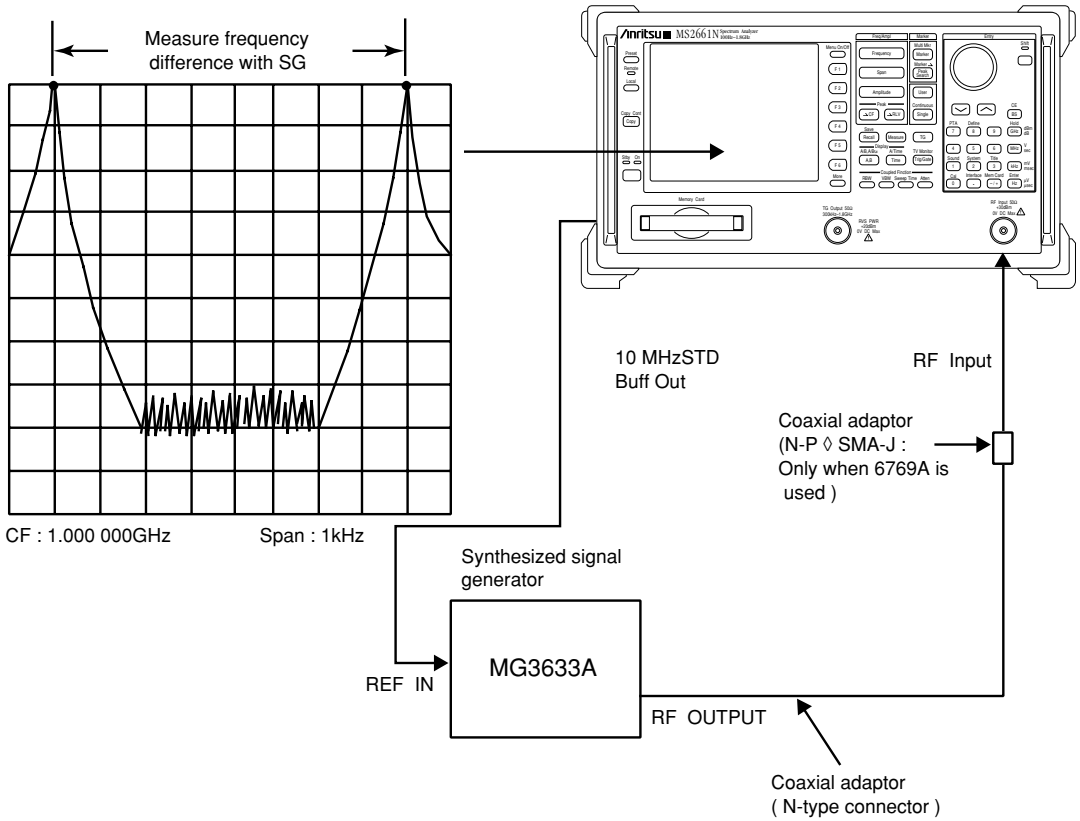
(1) Specifications

- Frequency span accuracy: ±5%

(2) Test instrument

- Synthesized signal generator: MG3633A

(3) Setup



Frequency Readout Accuracy Test

(4) Precautions

Set the signal generator output level to approx. 0 to –10 dBm.

(5) Procedure

Step	Procedure
1	Press the [Preset] key, and then Preset All key.
2	Operate Freq Cal.
3	Connect the MG3633A output to the MS2661N RF Input.
4	Set the MS2661N as shown below: Span ..... 2 kHz Center Freq ..... 1000 MHz
5	Set the MG3633A output frequency to the f_1 frequency (999.9992 MHz) shown in the table on the next page.
6	Adjust the MG3633A output frequency to set the spectrum peak at the 1st division from the left end of the screen scale. Remember the frequency as f_1' .
7	After setting the MG3633A output frequency to the f_2 frequency (1000.0008 MHz), adjust it to set the spectrum peak at the 9th division. Remember the frequency as f_2'.
8	Calculate ($f_2' - f_1'$) / 0.8 and check that the value is within the specified range (minimum to maximum values) shown in the table on the next page.
9	Repeat steps 4 through 8 for each frequency span with 1 GHz center frequency shown in the table on the next page.

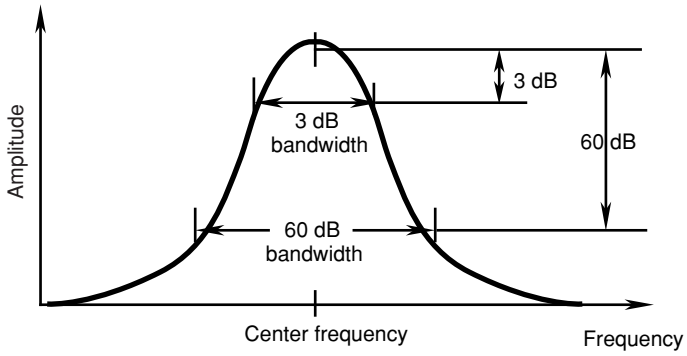
Frequency-Span Readout-Accuracy Test

MS2661N		Signal generator		Span		
Center frequency	Span	f_1	f_2	Minimum value	$\frac{f_2' - f_1'}{8}$	Maximum value
1 GHz	2 kHz	999.9992 MHz	1000.0008 MHz	1.9 kHz		2.1 kHz
	20 kHz	999.992 MHz	1000.008 MHz	19 kHz		21 kHz
	200 kHz	999.92 MHz	1000.08 MHz	190 kHz		210 kHz
	2 MHz	999.2 MHz	1000.8 MHz	1.9 MHz		2.1 MHz
	10 MHz	996 MHz	1004 MHz	9.5 MHz		10.5 MHz
	100 MHz	960 MHz	1040 MHz	95 MHz		105 MHz
	1.8 GHz	280 MHz	1.72 GHz	1.71 GHz		1.89 GHz

Resolution bandwidth (RBW)

If there are two input signals with the frequency difference corresponding to 3 dB bandwidth (of IF final stage), these signals can be resolved as two spectrum waveforms.

This is called the resolution bandwidth.



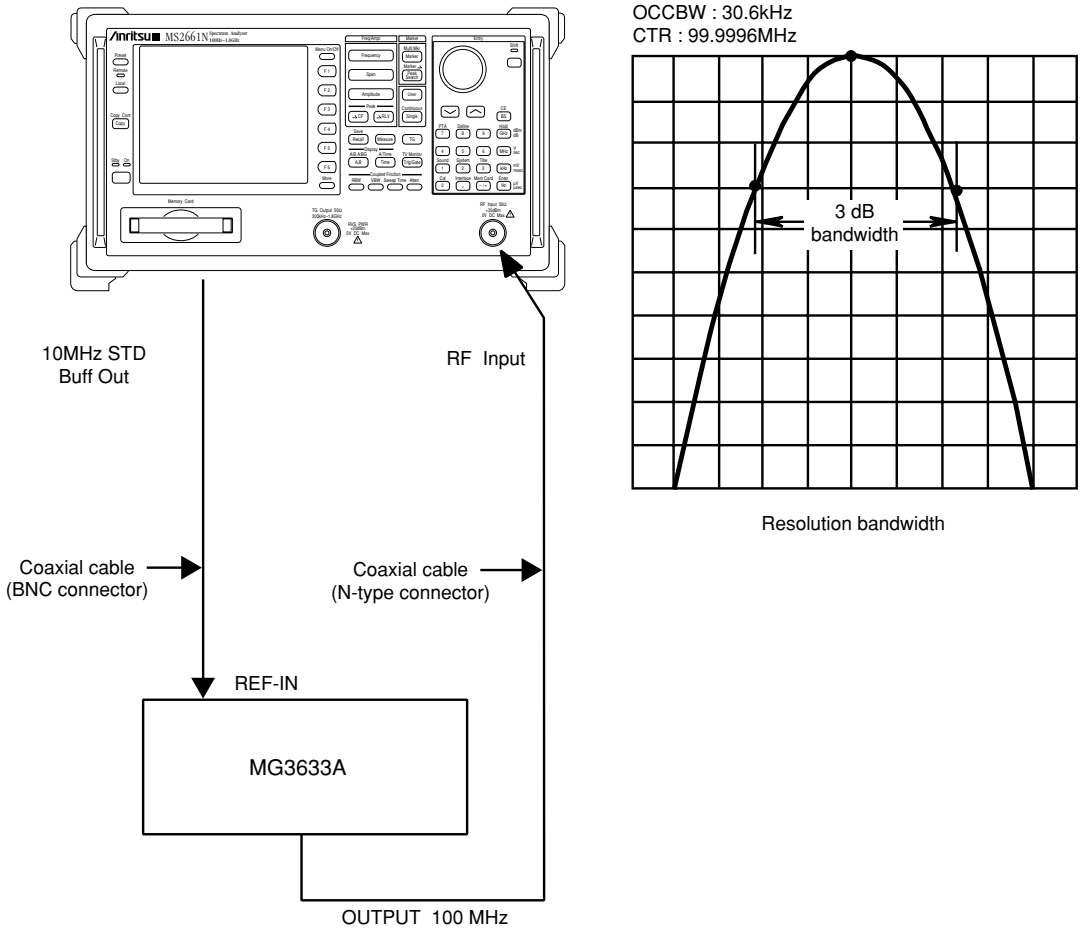
(1) Specifications

- Resolution bandwidth accuracy: ±20% (RBW = 30 Hz to 300 kHz)
  ±30% (RBW = 10 Hz)
  ±25% (RBW = 1 MHz)

(2) Test instrument

- Synthesized signal generator: MG3633A

(3) Setup

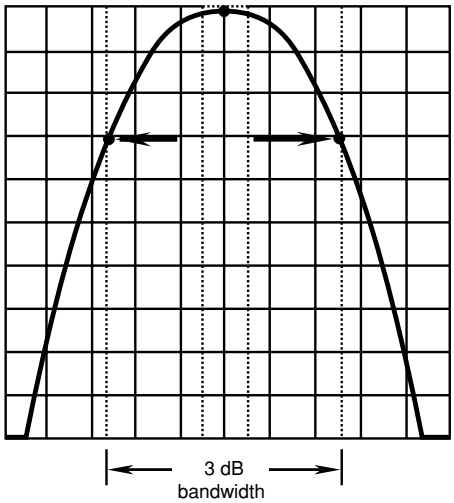


Resolution Bandwidth Test

(4) Procedure

Resolution bandwidth accuracy

Step	Procedure
1	Press the [Preset] key, and then Preset All key.
2	Perform all calibration (ALL CAL: Refer to SECTION 8 in the Detailed Operating Instruction Part of the separate operation manual).
3	Set the MS2661N as shown below: Center Freq ..... 100 MHz Span ..... 5 MHz RBW (MANUAL) ..... 1 MHz Scale ..... LOG 1 dB / div
4	Press the [→ RLV] key and match the peak of the signal trace to the top line (REF LEVEL) on the screen.
5	Press the [Signal] key to execute a single sweep, then check that the single sweep has been completed.
6	After pressing the Measure key, operate Occ BW Measure and Setup and display the setup menu of occupied frequency bandwidth measurement.
7	Select XdB Down and set it to 3 dB.
8	Press Return to return to the Occ BW Measure menu, and then press Execute.
9	The 3 dB resolution bandwidth value is displayed in the upper left-hand corner of the screen. Fill in this value in the table on the next page.
10	Repeat steps 3 to 9 for the frequencies other than the resolution bandwidth 1 MHz and the frequency span 5 MHz according to the combinations of resolution bandwidth and frequency span shown in the table on the next page.



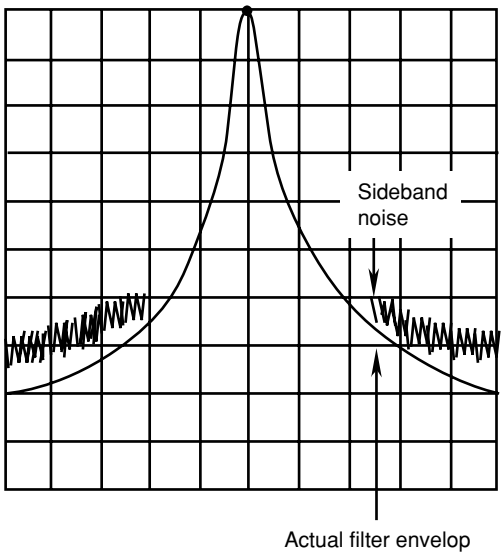
Bandwidth Measurement

Resolution Bandwidth (3 dB)

Resolution bandwidth	Frequency span	3 dB bandwidth
1 MHz	5 MHz	_____
300 kHz	500 kHz	_____
100 kHz	200 kHz	_____
30 kHz	50 kHz	_____
10 kHz	20 kHz	_____
3 kHz	5 kHz	_____
1 kHz	2 kHz	_____
300 Hz	500 Hz	_____
100 Hz	200 Hz	_____
30 Hz	100 Hz	_____
10 Hz	100 Hz	_____

Sideband noise

When the resolution bandwidth is set to a fixed value and a signal that has far less sideband-noise level than the equipment to be tested (MS2661N) is input, check the level of the noise as compared to the peak signal (dBc) at the specified frequency away from the peak.



Since the average value is measured for noise level, use a video filter for measurement.

This sideband noise is a spectrum response which is modulated by the internal noise of the MS2661N. If this response is large, the actual filter envelope is masked by the noise as shown, which makes measurement impossible.

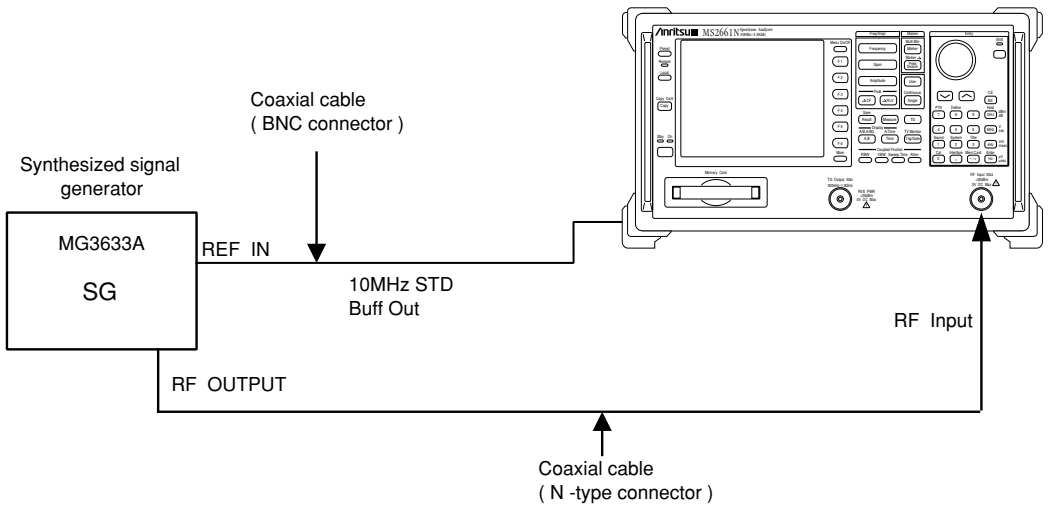
(1) Specifications

• Sideband noise: ≤ – 100 dBc / Hz (Frequency: 1 GHz, 30 kHz offset, RBW: 1 kHz)

(2) Test instruments

• Signal generator: MG3633A Synthesized Signal Generator

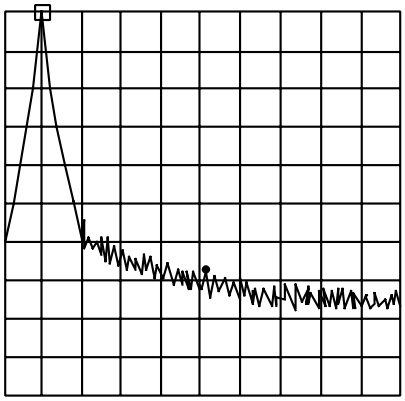
(3) Setup



Sideband Noise Test

(4) Procedure

Step	Procedure
1	Press the [Preset] key, and then Preset All key.
2	Operate All Cal.
3	Set the MG3633A output to 1000 MHz and 0 dBm.
4	Set the MS2651A/MS2661A as shown below: Center Freq ..... 1.000 030 GHz Span ..... 75 kHz Reference Level ..... 0 dBm Attenuator ..... 10 dB RBW ..... 1 kHz VBW ..... 10 Hz DET MODE ..... SAMPLE
5	Press the [Peak Search] key to search for a peak point so that the peak point on the signal trace is included in the zone marker.
6	Press the [→ RLV] key to match the peak of the signal trace to the top line (REF LEVEL) on the screen.
7	After pressing the Measure key, select C/N Ratio Measure.
8	Press the Meas On key to start C/N measurement.
9	Set Zone Width of Marker to Spot.
10	Press the [Marker] key, then turn the rotary knob to move the zone marker to the right so that the zone center frequency is 30.0 kHz.
11	Make sure that the C/N value is –100 dBc/Hz or less.



Sideband Noise Measurement

Frequency measurement accuracy

Set the marker point to the position at least 20 dB higher than the noise (or adjacent interference signal) to operate the built-in counter (Option 03) with the higher-S/N signal, and test the frequency measurement accuracy using Count On mode. (This test cannot be performed without Option 03.)

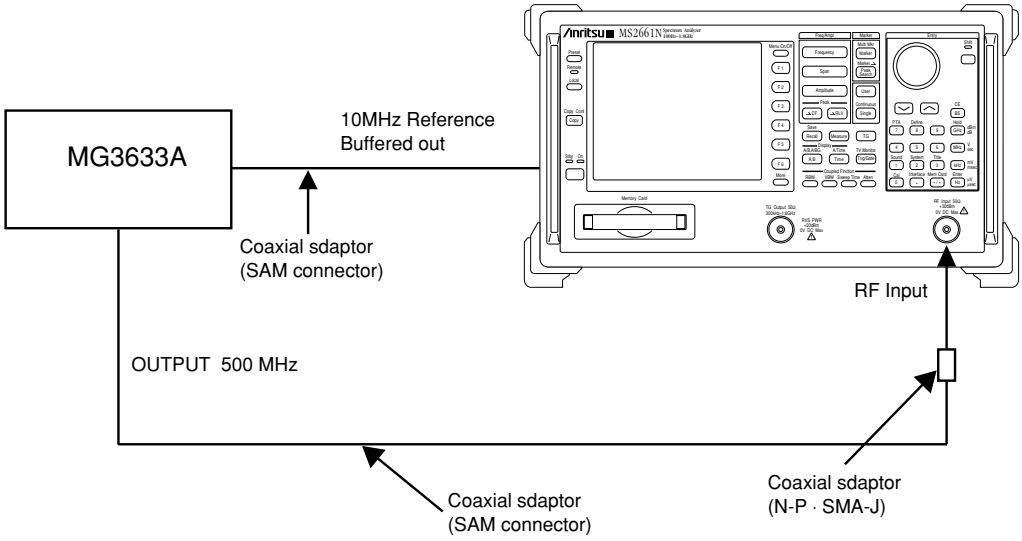
(1) Specifications

- Accuracy: ≤ (Readout frequency × reference oscillator accuracy ± (1 count))
- Resolution: 1 Hz, 10 Hz, 100 Hz, 1 kHz

(2) Test instrument

- Signal generator: MG3633A

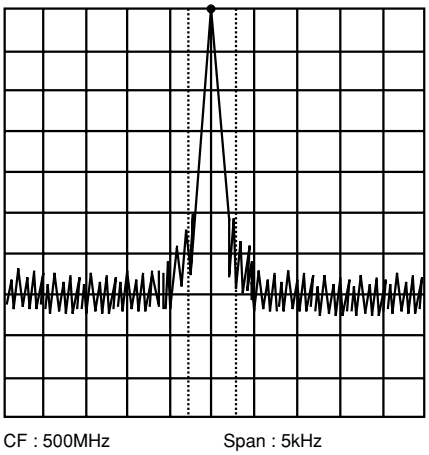
(3) Setup



Frequency Measurement Accuracy Test

(4) Procedure

Step	Procedure
1	Press the [Preset] key, and then Pseset All key.
2	Set the MG3633A to 500 MHz and –10 dBm.
3	Set the MS2661N as shown below: Center Freq ..... 500 MHz Span ..... 5 kHz
4	Press the [Measure] key and set to Frequency Count. Press Setup and set Resolution to 1 Hz. Then, press the Return key and set to Count On.
5	Confirm that the FREQ reading at the upper-left of the screen is the RF INPUT frequency 500 MHz ± 1 Hz or less.
6	Change the counter resolution to 10 Hz and confirm that the Freq reading is 500 MHz ± 10 Hz or less.
7	• Change the counter resolution to 100 Hz and confirm that the Freq reading is 500 MHz ± 100 Hz or less. • Change the counter resolution to 1 kHz and confirm that the Freq reading is 500 MHz ± 1 kHz or less.



Frequency Measurement

Amplitude display linearity

Test the error per vertical graduation for the LOG display. For the LOG display linearity, test that the graduation is equal to the logarithm (dB) of the input signal level.

Input the correct level signal to the RF Input via an external attenuator and calculate the error from the attenuation of the attenuator and the Δ marker reading at the trace waveform peak.

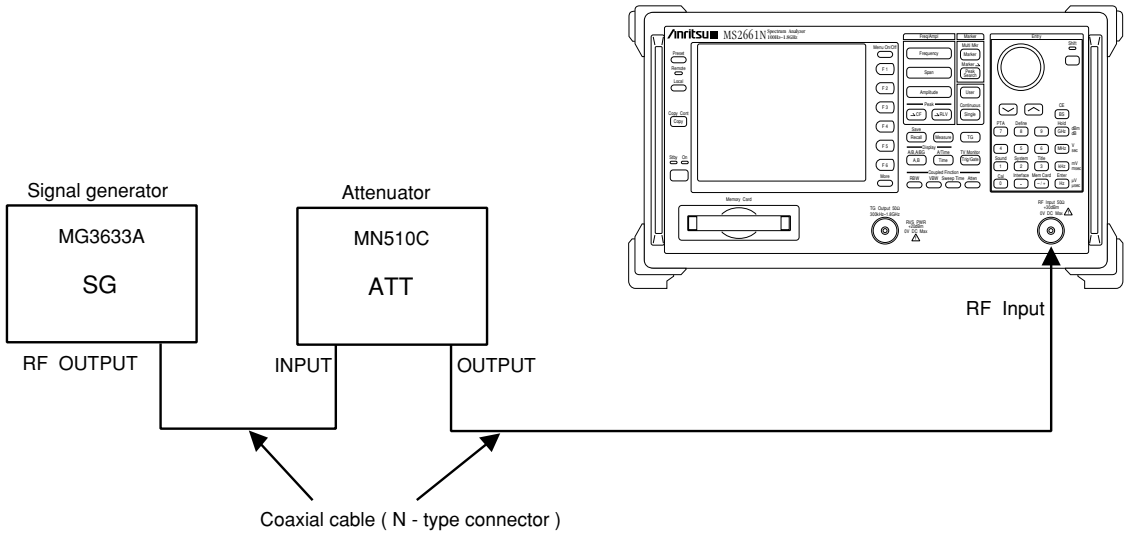
(1) Specifications

- Amplitude display linearity: After automatic calibration
  LOG: ± 1.5 dB for 0 to – 85 dB (RBW ≤ 10 kHz)
  ± 1 dB for 0 to – 70 dB (RBW ≤ 100 kHz)
  ± 0.5 dB for 0 to – 20 (RBW ≤ 1 MHz)

(2) Test instruments

- Signal generator: MG3633A
- Attenuator: MN510C

(3) Setup



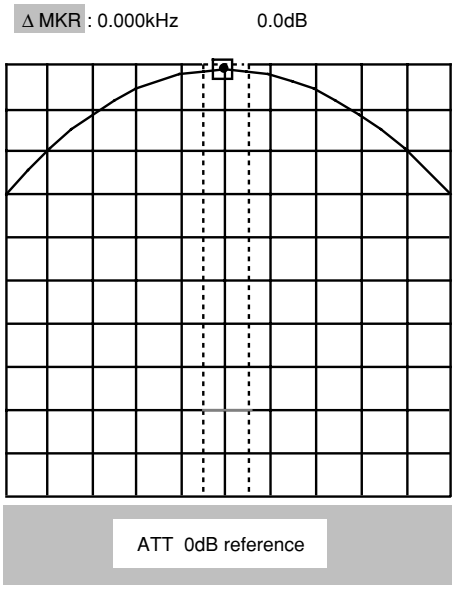
Amplitude Display Linearity Test

(4) Procedure

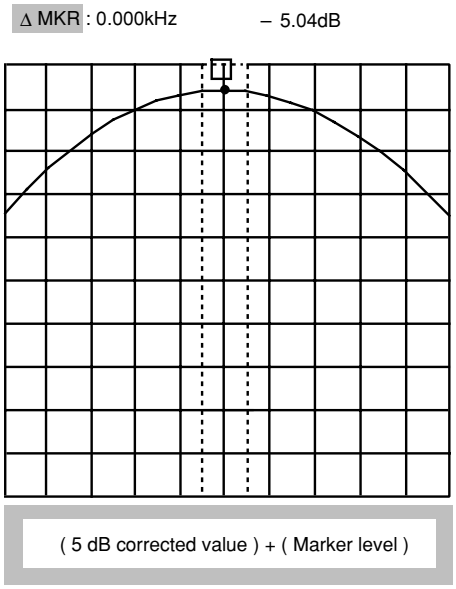
LOG display linearity

Step	Procedure
1	Press the [Preset] key.
2	Operate All Cal.
3	Set the MG3633A to 100 MHz and 0 dBm.
4	Set the MN510C to 0 dB.
5	Set the MS2661N as shown below: Center Freq ..... 100 MHz Span ..... 10 kHz Reference Level ..... 0 dBm Attenuator ..... 10 dB RBW ..... 3 kHz VBW ..... 300 Hz
6	Press the [→ CF] key to set the spectrum waveform peak to the center of the screen.
7	Adjust the MG3633A output level so that the marker level reading is 0.0 dBm.
8	Press the [Marker] key sequentially to set the marker to Δ marker after the sweep is completed.

Step	Procedure
9	As shown on Fig. (b), read the level of the current marker when the MN510C is set at 5dB. An error is determined as calibrated ATT 5 dB value + Δ marker level.
10	Add a marker level corresponding to the calibrated ATT value when the MN510C is set as 10 to 90 DB (with 5 dB steps) and determine the error.



(a) Reference Point Setting



(b) Δ Marker Level when ATT is 5

Log Display Linearity (10 dB / div)

MN510C setting (dB)	A	B	Error (dB)=A+B
	MN510C calibration value (dB)	Δmarker level (dB)	
0	0 (reference)	0 (reference)	0 (reference)
5	_____	_____	_____
10	_____	_____	_____
15	_____	_____	_____
20	_____	_____	_____
25	_____	_____	_____
30	_____	_____	_____
35	_____	_____	_____
40	_____	_____	_____
45	_____	_____	_____
50	_____	_____	_____
55	_____	_____	_____
60	_____	_____	_____
65	_____	_____	_____
70	_____	_____	_____
75	_____	_____	_____
80	_____	_____	_____
85	_____	_____	_____

Frequency response

Generally, when one or more signals with a different frequency but the same amplitude are input, the spectrum analyzer displays the same amplitude for each spectrum on the screen.

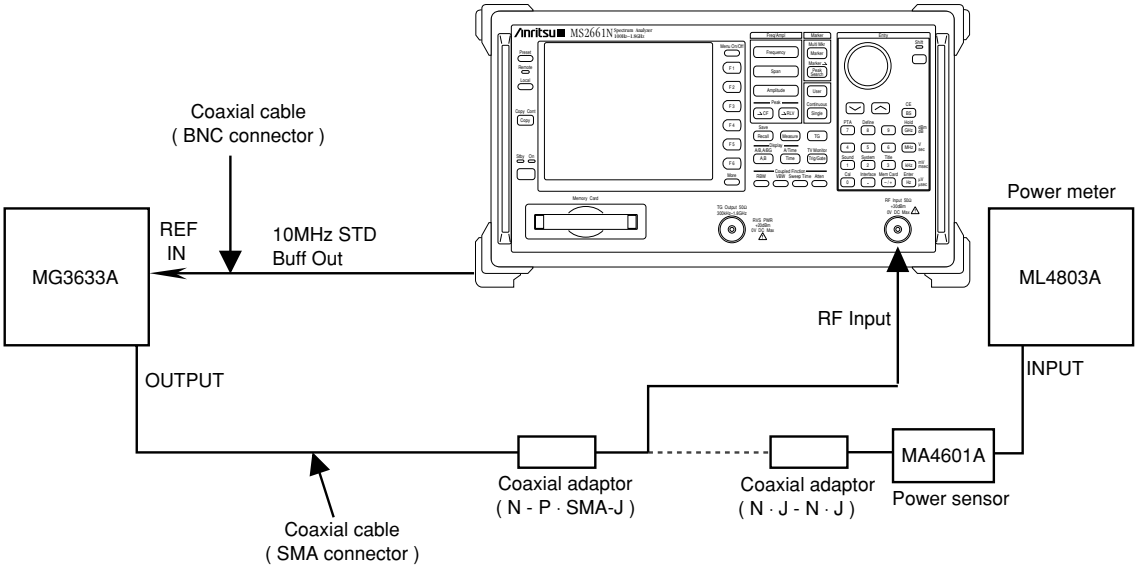
(1) Specifications

- Frequency response: At 100 MHz, input ATT 10 dB to 60 dB
  ± 1.5 dB (100 Hz to 1.8 GHz)

(2) Test instruments

- Signal generator: MG3633A
- Power meter: ML4803A
- Power sensor: MA4601A

(3) Setup



Frequency Response Test

(4) Precautions

This test should be performed after allowing the instrument to warm up for 60 minutes or more.

(5) Procedure

(a) Calibration of signal-generator MG3633A

Step	Procedure
1	Set the MG3633A as shown below: OUTPUT FREQ ..... 100 MHz OUTPUT LEVEL ..... –10 dBm
2	Connect the MG3633A output to the power sensor input with a coaxial cable.
3	Read the power meter display.
4	Change the MG3633A output frequency as shown in the tables on the next page and read the power meter display with level at 100 MHz as reference. This data is the calibration data.

(b) Readout of measured amplitude deviation (frequency response)

Step	Procedure
1	Connect the MG3633A OUTPUT to MS2661N RF Input with a coaxial cable.
2	Press the MS2661N [Preset] key, and then Preset All key.
3	Perform all calibration.
4	Set the MS2661N as shown below: Center Freq ..... 100 MHz Span ..... 200 kHz Reference Level ..... –10 dBm
5	Press the [→ CF] key.
6	Set the marker mode to delta marker.
7	Set the MS2661N center frequency as shown in the tables on the next page, then obtain the deviation from the formula below by reading the delta marker level at each frequency. Deviation = Delta marker level reading – Measurement frequency calibration value

Frequency Response

Frequency	Calibration value (dBm)	Marker level (dB)	Deviation (dB)
100 MHz	0 dB (reference)	0 dB (reference)	0 dB (reference)
200 MHz	_____	_____	_____
500 MHz	_____	_____	_____
1 GHz	_____	_____	_____
1.5 GHz	_____	_____	_____

Second harmonic distortion

Even if a signal without harmonic distortion is input to a spectrum analyzer, the higher harmonics are generated by the analyzer input-mixer non-linearity and are displayed on the screen.

The second harmonic level is the highest harmonic displayed on the MS2661N. The main point of the test is to apply a signal (with a distortion that is lower than the MS2661N internal harmonic distortion [at least 20 dB below]) to the MS2661N and measure the level difference between the fundamental wave and the second harmonic. If a low-distortion signal source cannot be obtained, apply a low-distortion signal to the MS2661N after passing the signal through a low-pass filter (LPF).

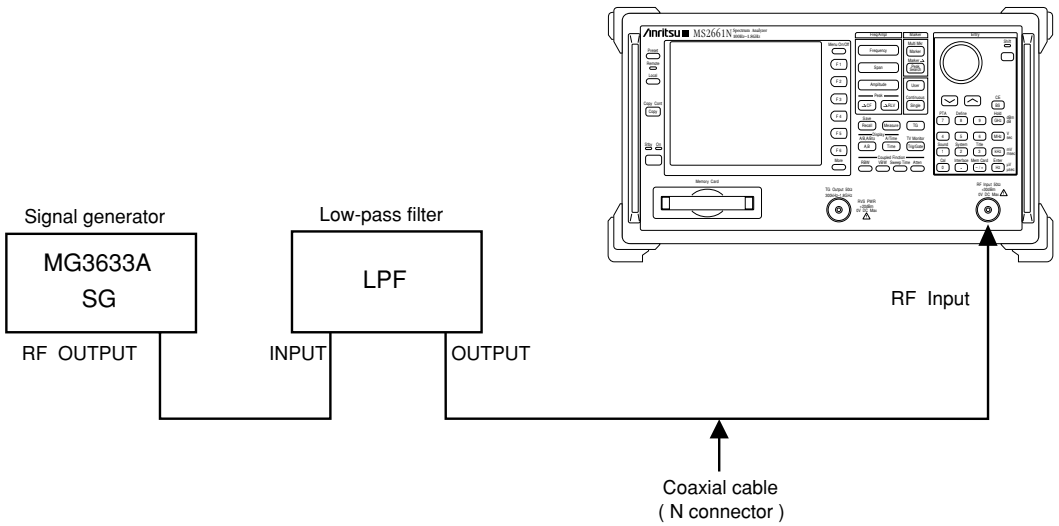
(1) Specifications

- Second harmonic distortion: At mixer input level – 40 dBm:
  ≤ – 60 dBc (input frequency 100 Hz to 900 MHz)

(2) Test instruments

- Signal generator: MG3633A
- LPF: With attenuation of 70 dB or more at twice the fundamental frequencies

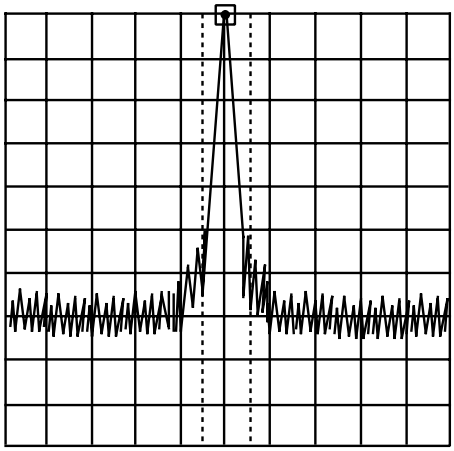
(3) Setup

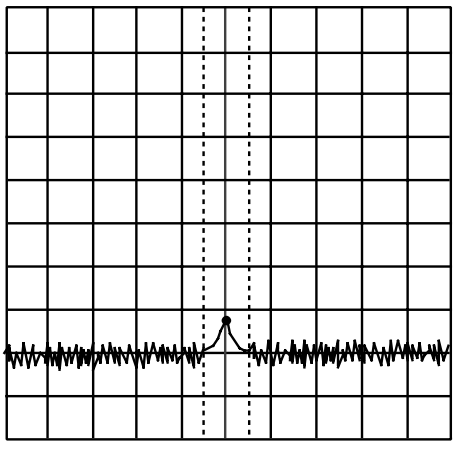


Second Harmonic Distortion Test

(4) Procedure

Step	Procedure
1	Press the [Preset] key, and then Preset All key.
2	Operate All Cal.
3	Set the LPF cut-off frequency to approx. 12.8 MHz.
4	Set the SG output frequency to 10 MHz and the output level to – 40 dBm.
5	Set the MS2661N as shown below: Center Freq ..... 10 MHz Span ..... 10 kHz Reference Level ..... – 40 dBm Attenator ..... 0 dB
6	Adjust the SG output level so that peak of the spectrum waveform is at the REF LEVEL (the top horizontal line of the screen).
7	Move the marker to the peak of the spectrum waveform and make the marker the delta marker.
8	Set the center frequency to twice the fundamental wave frequency to display the second harmonic on the screen. The delta marker reading indicates the level difference betweeen the fundamental wave and the second harmonic. If the level difference is 80 dB or more,set the REF LEVEL to – 60 dBm. Confirm that the ATT set value is 0 dB.





Step	Procedure
9	Set the LPF cut-off frequency to approx. 1.2 GHz.
10	Set the SG as follows: OUTPUT FREQ ..... 900 MHz OUTPUT LEVEL ..... – 40 dBm
11	Set the MS2661N as follows: Center Freq ..... 900 MHz Span ..... 10 kHz Reference Level ..... – 40 dBm Attenutor ..... 0 dB
12	Repeats steps 6 to 8.

Input attenuator switching error

At this point, measure the switching error when the amount of attenuation in the RF input section is switched. When the input attenuator is switched, IF-section step-amplifier gain is switched. To keep this step-amplifier gain constant, the reference level is switched according to the amount of input attenuator attenuation.

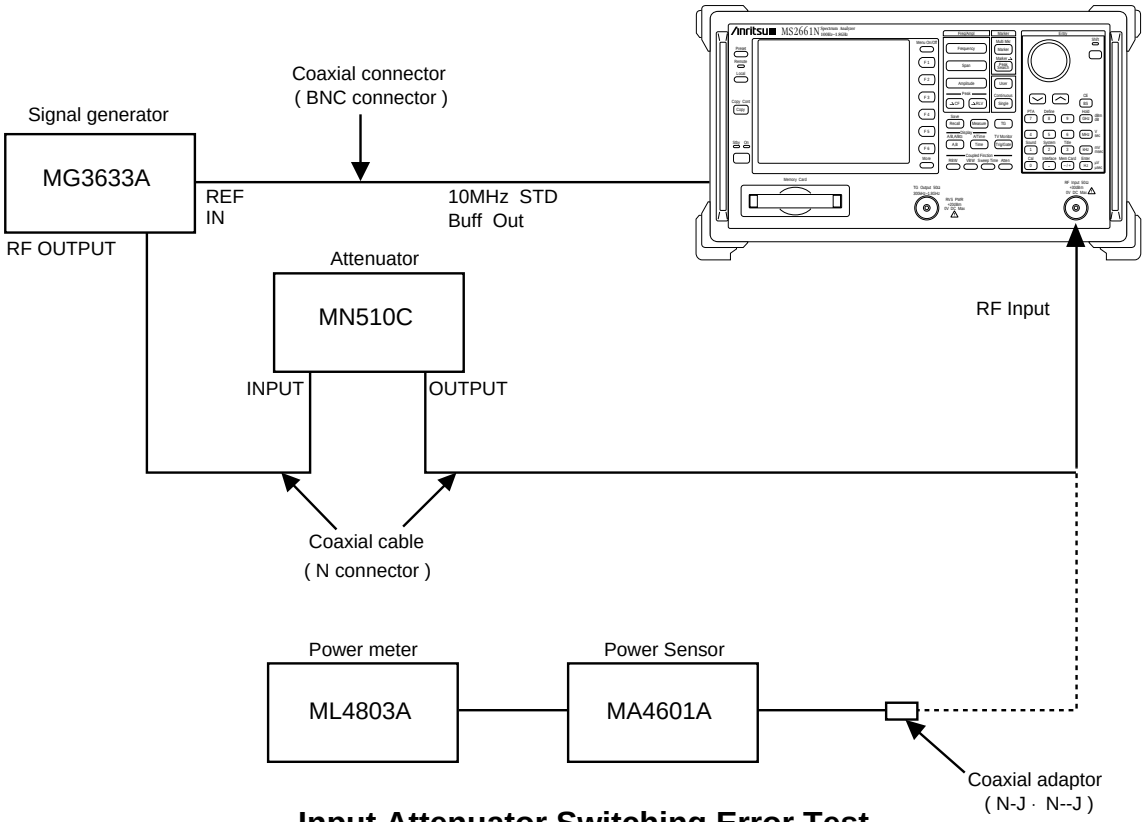
(1) Specifications

- Input attenuator switching error: ± 2.0 dB (at 0 to 60 dB, frequency 100 MHz and input ATT 10 dB)

(2) Test instruments

- Signal generator: MG3633A
- Attenuator: MN510C
- Power meter: ML4803A
- Power sensor: MA4601A

(3) Setup



Input Attenuator Switching Error Test

(4) Procedure

Step	Procedure
1	Press the MS2661N [Preset] key, and then Preset All key.
2	Operate All Cal.
3	Set the MS2661N as shown below: Center Freq ..... 100 MHz Span ..... 200 kHz
4	Set the signal generator MG3633A as shown below: OUTPUT FREQ ..... 100 MHz OUTPUT LEVEL ..... – 10 dBm
5	Set the amount of attenuation of the attenuator MN510C to 0 dB.
6	Connect the output of the attenuator MN510C to the power meter via coaxial cable.
7	Adjust the signal-generator output level so that the indicated value of the power meter is – 10.0 dBm.
8	Connect the coaxial cable of the attenuator output to the MS2661N RF Input.
9	Press the MS2661N [→ CF] key.
10	Set the MS2661N reference level to –10 dBm and attenuation to 60 dB.
11	Read the marker level.
12	Set Reference Level, ATT of this device and the external ATT as shown in the table on the next page, and read the level of each marker.
13	Find the error by the formula below: Error = marker level value – Reference Level – attenuator calibration value
14	Find the deviation by the formula below: Deviation = Error – error when ATT at 10 dB Confirm that the deviation is within ≤ 2.0 dB.

MS2661N setting		MN510C setting	Calibration value of attenuator	Marker level value	Error	Deviation
REF LEVEL	ATT					
– 10 dBm	60 dB	0 dB	dB	dBm	dB	dB
– 20 dBm	50 dB	10 dB	dB	dBm	dB	dB
– 30 dBm	40 dB	20 dB	dB	dBm	dB	dB
– 40 dBm	30 dB	30 dB	dB	dBm	dB	dB
– 50 dBm	20 dB	40 dB	dB	dBm	dB	dB
– 60 dBm	10 dB	50 dB	dB	dBm	dB	0 dB (reference)
– 70 dBm	0 dB	60 dB	dB	dBm	dB	dB

Sweep time and time span accuracy

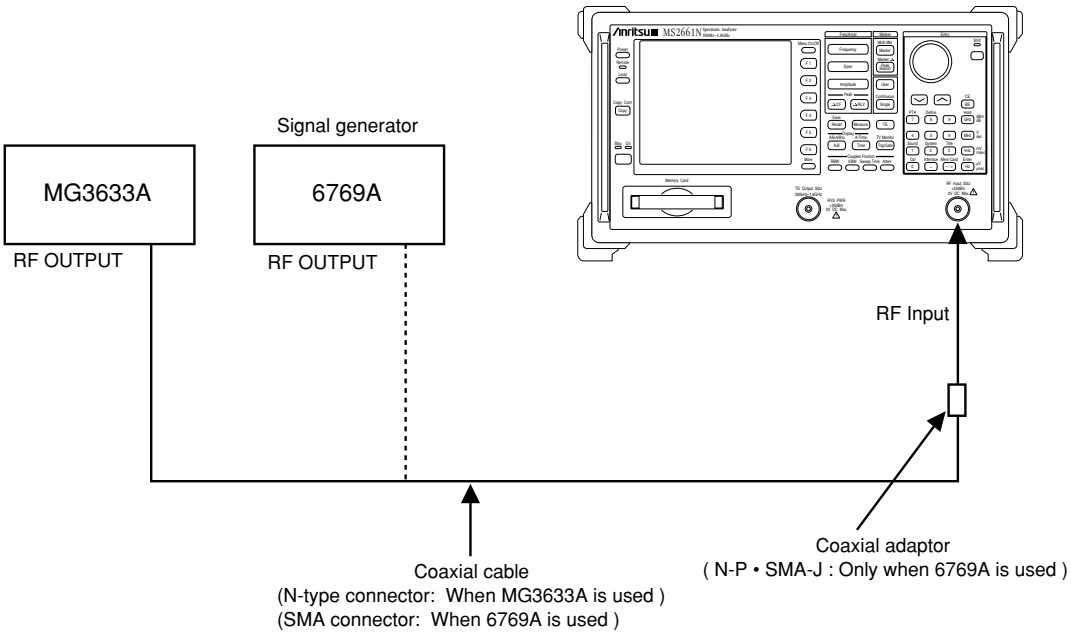
(1) Specifications

- Sweep time accuracy: ± 15% (20 msec to 100 sec)
- Time span accuracy: ± 1% (100µsec to 100sec)

(2) Test instruments

- Signal generator: MG3633A
  Wiltron 6769A

(3) Setup



Sweep Time and Time Span Accuracy

(4) Procedure

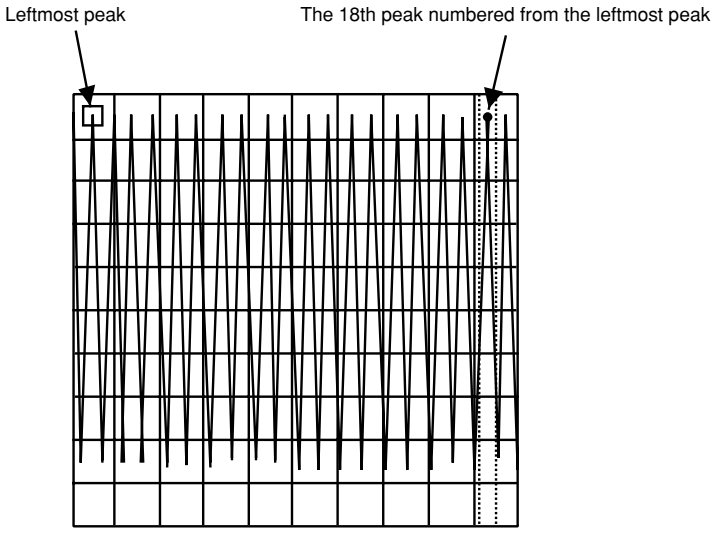
(a) Sweep Time

Step	Procedure
1	Press the MS2661N [Preset] key, and then Preset All key.
2	Operate All Cal.
3	Connect the MG3633A signal generator with the MS2661N as shown in the setup diagram.
4	Set the MS2661N as shown below: CENTER FREQ ..... 100 MHz SPAN ..... 100 Hz SWP TIME ..... 20 msec RBW ..... 1 MHz VBW ..... 1 MHz
5	Set the MG3633A as shown below: OUTPUT FREQ ..... 100 MHz OUTPUT LEVEL ..... – 16 dBm MODULATION ..... AM (INT) 90% MODULATION FREQ ..... 1 kHz
6	Press the [→ RLV] key.
7	Set the MS2661N scale to Linear.
8	Press the [Single] key, then wait until a single sweep execution is completed.
9	Set the MS2661N marker zone width to 5 Hz (Zone Width = 5 Hz).
10	Move the MS2661N marker to the left of the screen using the knob and set the zone marker on the leftmost peak of the sine wave.
11	Setting the MS2661N marker mode to delta marker, move the current marker to the right using the knob. Then set the zone marker to the 18th peak from the leftmost sine wave peak on the screen.
12	Read the time display of the delta marker, which corresponds to 90% of the Sweep Time. Obtain the SWP TIME by the following equation. $\text{SWP TIME} = \text{Setting SWP TIME} \times \frac{\text{delta maker reading}}{1000\ (\text{Hz})}$

Step	Procedure

13 Measure at each setting shown in the table below according to steps 8 to 12.

MS2670A Setting SWP TIME	MG3633A AM modulation frequency	MS2670A SWP TIME	90% of specification min / max
20 msec	1 kHz		15.3 msec / 20.7 msec
200 msec	100 Hz		153 msec / 207 msec
2 sec	10 Hz		1.53 sec / 2.07 sec
20 sec	1 Hz		15.3 sec / 20.7 sec



(b) Time span

Step	Procedure
1	Perform test procedure steps 1 to 8 on the preceding paragraph (a). However, set MODULATION FREQ of the MG3633A to 100 Hz.
2	Set the MS2661N display mode to Time.
3	Set Time Span to 20 msec.
4	Perform steps 8 to 13 of the test procedure on the preceding paragraph (a).

MS2670A time span	MG3633A AM modulation frequency	MS2670A delta marker reading	90% of specification min / max
20 msec	1 kHz		17.82 msec / 18.18 msec
200 msec	100 Hz		178.2 msec / 181.8 msec
2 sec	10 Hz		1.782 sec / 1.818 sec
20 sec	1 Hz		17.82 sec / 18.18 sec

Tracking generator(TG) output level flatness

The output level of the Tracking Generator can be easily tested by inputting the TG output signal to the RF Input connector of the MS2661N.
Here, an accurate method to test the TG output level by using a power meter, is described below.

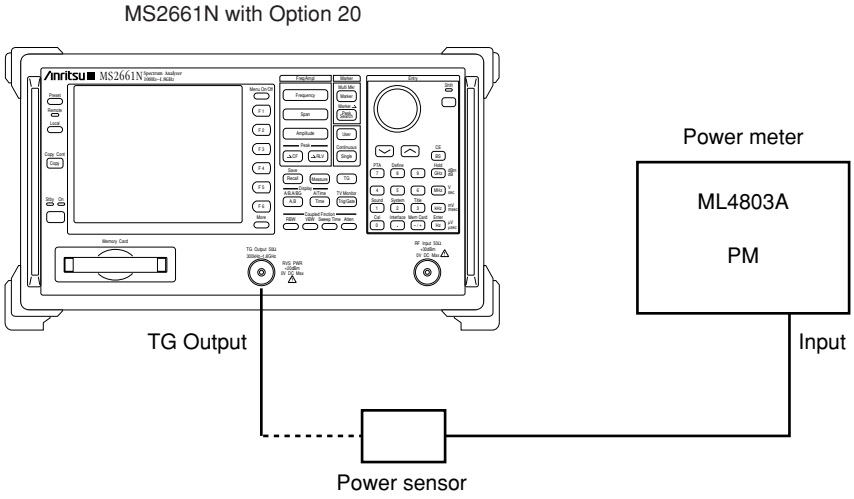
(1) Specifications

Output level flatness: ≤ ±2.25 dB(at output level 0 dBm, referenced to 100 MHz)

(2) Test instrument

- Power meter: ML4803A
- Power sensor: MA4601A

(3) Setup



TG Output Level flatness Test

(4) Procedure

(a) Calibrating ML4803A Power Meter

Step	Procedure
1	Warm-up the ML4803A, then zero-adjust the ML4803A. (Note: Don't connect anything to the power sensor.)
2	Connect the power sensor to the CAL OUTPUT of the ML4803A. Press the [ON] key. After conforming the measured value to be stabilized, press the [ADJ] key for calibration.

(b) Measuring TG output level accuracy

Step	Procedure
1	Press the [Preset] key, and then Preset All key.
2	Connect the power sensor to the TG Output.
3	Set the MS2661N as shown below: Center Freq ---------- 100 MHz Span ---------- 10 MHz
4	Set the TG output level to 0 dBm, and ON.
5	Measure the TG output level with the power meter.
6	Changing the Center Freq of the MS2661N as shown in the table on the next page, repeat the steps 3 to 5 above.

TG Output Level Flatness Test

Output level (dBm)	Frequency(Hz)						
	100k	1M	10M	50M	100M	1G	1.8G
0							
Error					0dB (reference)		

Service

If the MS2661N is damaged or does not operate as specified, contact your nearest Anritsu dealer or business office for repair. When you request repair, provide the following information.

(a) Model name and serial number on rear panel

(b) Fault description

(c) Name of a personnel-in-charge and address for contact when fault confirmed or at a completion of repair

SECTION 7
STORAGE AND TRANSPORTATION

This section describes the long-term storage, repacking and transportation of the MS2661N as well as the regular care procedures and the timing.

TABLE OF CONTENTS

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SECTION 7
STORAGE AND TRANSPORTATION

Cleaning Cabinet

Always turn the MS2661N POWER switch OFF and disconnect the power plug from the ac power inlet before cleaning the cabinet. To clean the external cabinet:

- Use a soft, dry cloth for wiping off.
- Use a cloth moistened with diluted neutral cleaning liquid if the instrument is very dirty or before long-term storage.
  After insuring that the cabinet has been thoroughly dried, use a soft, dry cloth for wiping off.
- If loose screws are found, tighten them with the appropriate tools.

CAUTION ⚠

Never use benzene, thinner, or alcohol to clean the external cabinet; it may damage the coationg, or cause deformation or discoloration.

Storage Precautions

This paragraph describes the precautions to take for long-term storage of the MS2661N SPECTRUM ANALYZER.

Precautions before storage

(1) Before storage, wipe dust, finger-marks, and other dirt off the MS2661N.

(2) Avoid storing the MS2661N where:
   1) It may be exposed to direct sunlight or high dust levels.
   2) It may be exposed to high humidity.
   3) It may be exposed to active gases.
   4) It may be exposed to extreme temperatures ($< -40°C$ or $> 71°C$) or high humidity ($\geq 85\%$).

(3) Remove the memory card from the slot, and store it separately from the main body.

Recommended storage precautions

The recommended storage conditions are as follows:

- Temperature ..... 0 to 30°C
- Humidity ..... 40% to 80%
- Stable temperature and humidity over 24-hour period

Saving the setting parameter and data before storage

The MS2661N back-ups the internal data such as setting parameters with a built-in battery.
The battery life is about 7 years after shipment. If it is feared that the data may be lost because of the battery-life over; save the setting parameter to the memory card, or record them to re-use them after storage.
Early battery replacement is recommended.

Repacking and Transportation

The following precautions should be taken if the MS2661N must be returned to Anritsu Corporation for servicing.

Repacking

Use the original packing materials. If the MS2661N is packed in other materials, observe the following packing procedure:

(1) When repacking, remove all the cables, and unplug the memory card from the slot.
(2) Wrap the MS2661N in a plastic sheet or similar material.
(3) Use a cardboard, wooden box, or aluminum case which allows shock-absorbent material to be inserted on all sides of the equipment.
(4) Use enough shock-absorbent material to protect the MS2661N from shock during transportation and to prevent it from moving in the container.
(5) Secure the container with packing straps, adhesive tape or bands.

Transportation

Do not subject the MS2661N to severe vibration during transport. It should be transported under the storage conditions recommended in the previous page.

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APPENDIXES

TABLE OF CONTENTS

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APPENDIX A
FRONT AND REAR PANEL LAYOUT

This appendix shows the front and rear panel layouts.

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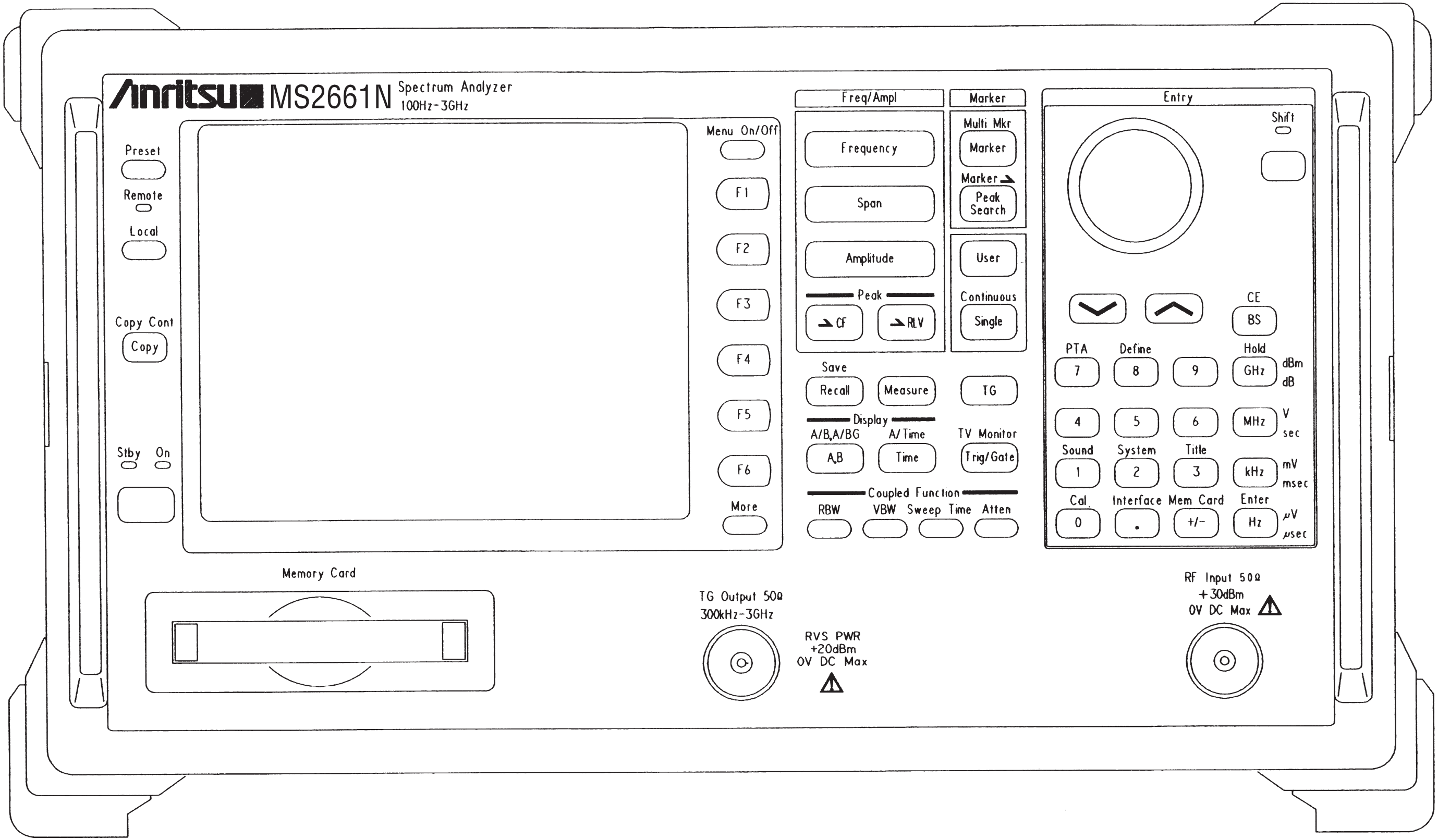
Anritsu MS2661N Spectrum Analyzer 100Hz-3GHz
Preset
Remote
Local
Copy Cont
Copy
Stby On
Menu On/Off
F1
F2
F3
F4
F5
F6
More
Freq/Ampl
Frequency
Span
Amplitude
Peak
CF
RLV
Marker
Multi Mkr
Marker
Marker
Peak Search
User
Continuous
Single
Save
Recall
Measure
TG
Display
A/B,A/BG
A/Time
A,B
Time
TV Monitor
Trig/Gate
Coupled Function
RBW
VBW
Sweep Time
Atten
Entry
Shift
CE
BS
PTA
Define
Hold
7
8
9
GHz
dBm
dB
4
5
6
MHz
V
sec
Sound
System
Title
1
2
3
kHz
mV
msec
Cal
Interface
Mem Card
Enter
0
.
+/-
Hz
µV
µsec
Memory Card
TG Output 50Ω
300kHz-3GHz
RVS PWR
+20dBm
0V DC Max
RF Input 50Ω
+30dBm
0V DC Max

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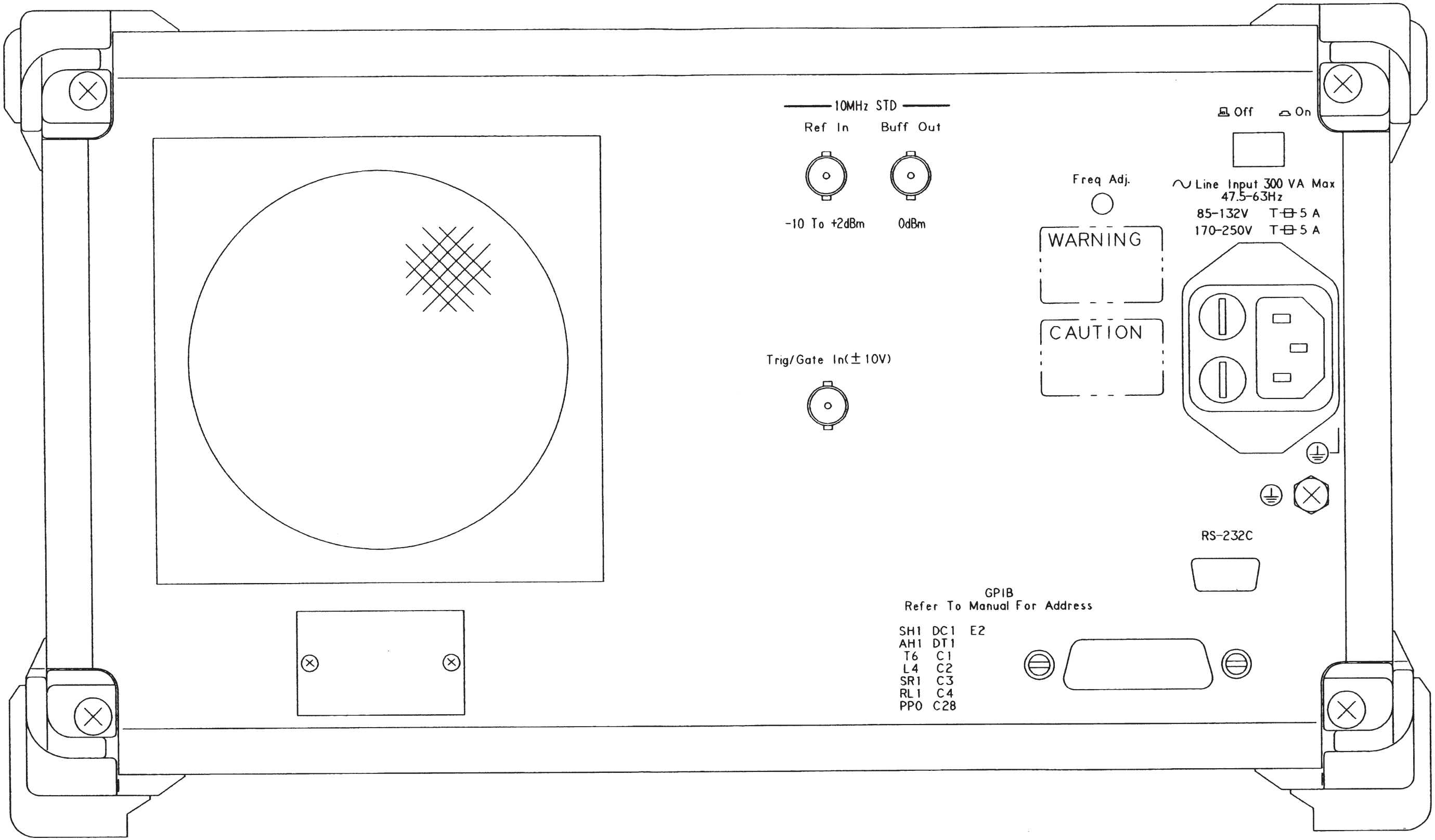
10MHz STD
Ref In
Buff Out
-10 To +2dBm
0dBm
Trig/Gate In(±10V)
Off
On
Freq Adj.
Line Input 300 VA Max
47.5-63Hz
85-132V T-⊟-5 A
170-250V T-⊟-5 A
WARNING
CAUTION
RS-232C
GPIB
Refer To Manual For Address
SH1 DC1 E2
AH1 DT1
T6 C1
L4 C2
SR1 C3
RL1 C4
PP0 C28

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APPENDIX B
BLOCK DIAGRAM

This appendix shows the Block Diagram of the MS2661N.

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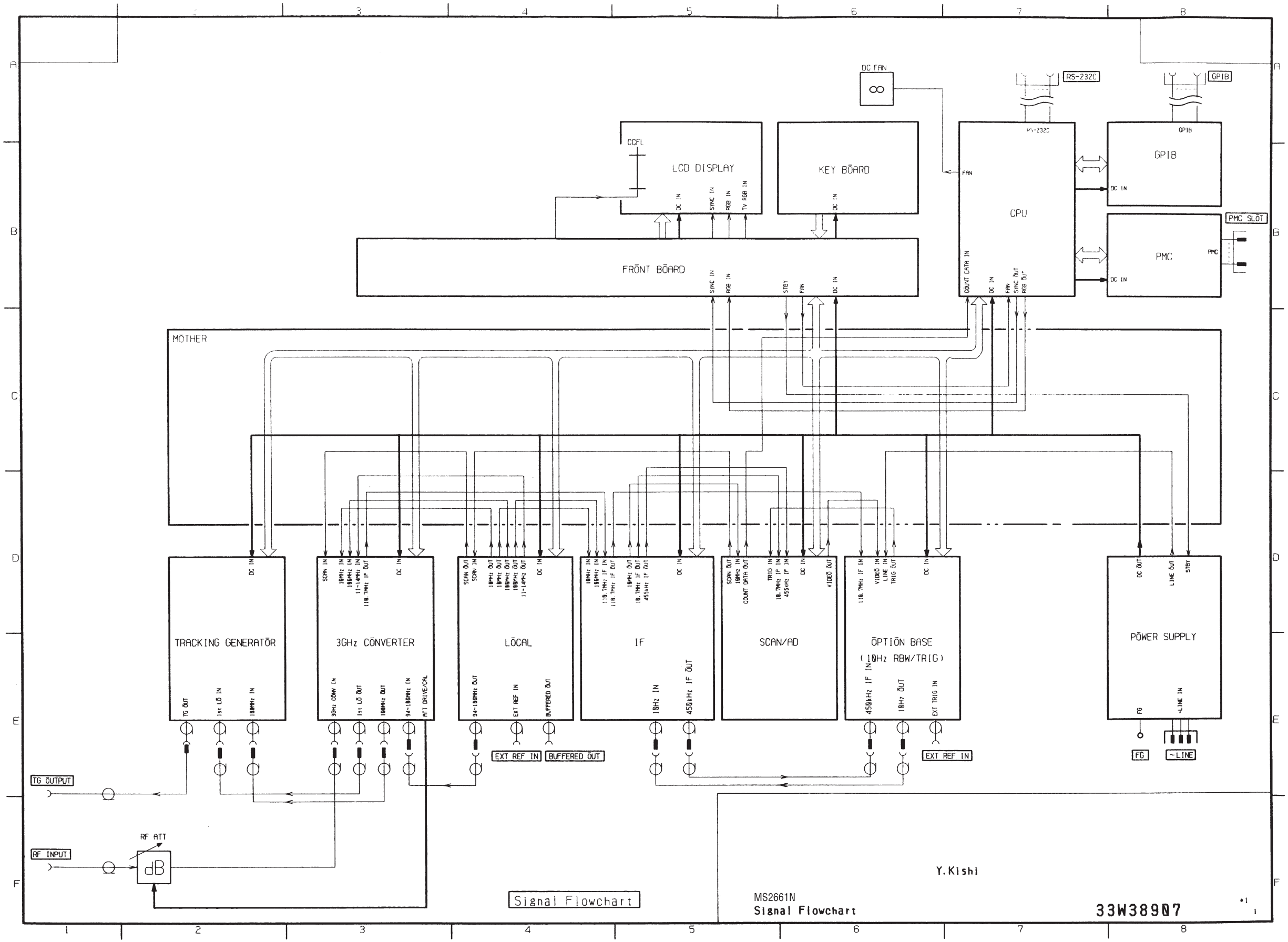
DC FAN
RS-232C
GPIB
CCFL
LCD DISPLAY
KEY BOARD
FRONT BOARD
CPU
GPIB
PMC
PMC SLOT
MOTHER
TRACKING GENERATOR
3GHz CONVERTER
LOCAL
IF
SCAN/AD
OPTION BASE
(10Hz RBW/TRIG)
POWER SUPPLY
TG OUTPUT
RF INPUT
RF ATT
dB
EXT REF IN
BUFFERED OUT
FG
-LINE
Y.Kishi
MS2661N
Signal Flowchart
33W38907
Signal Flowchart

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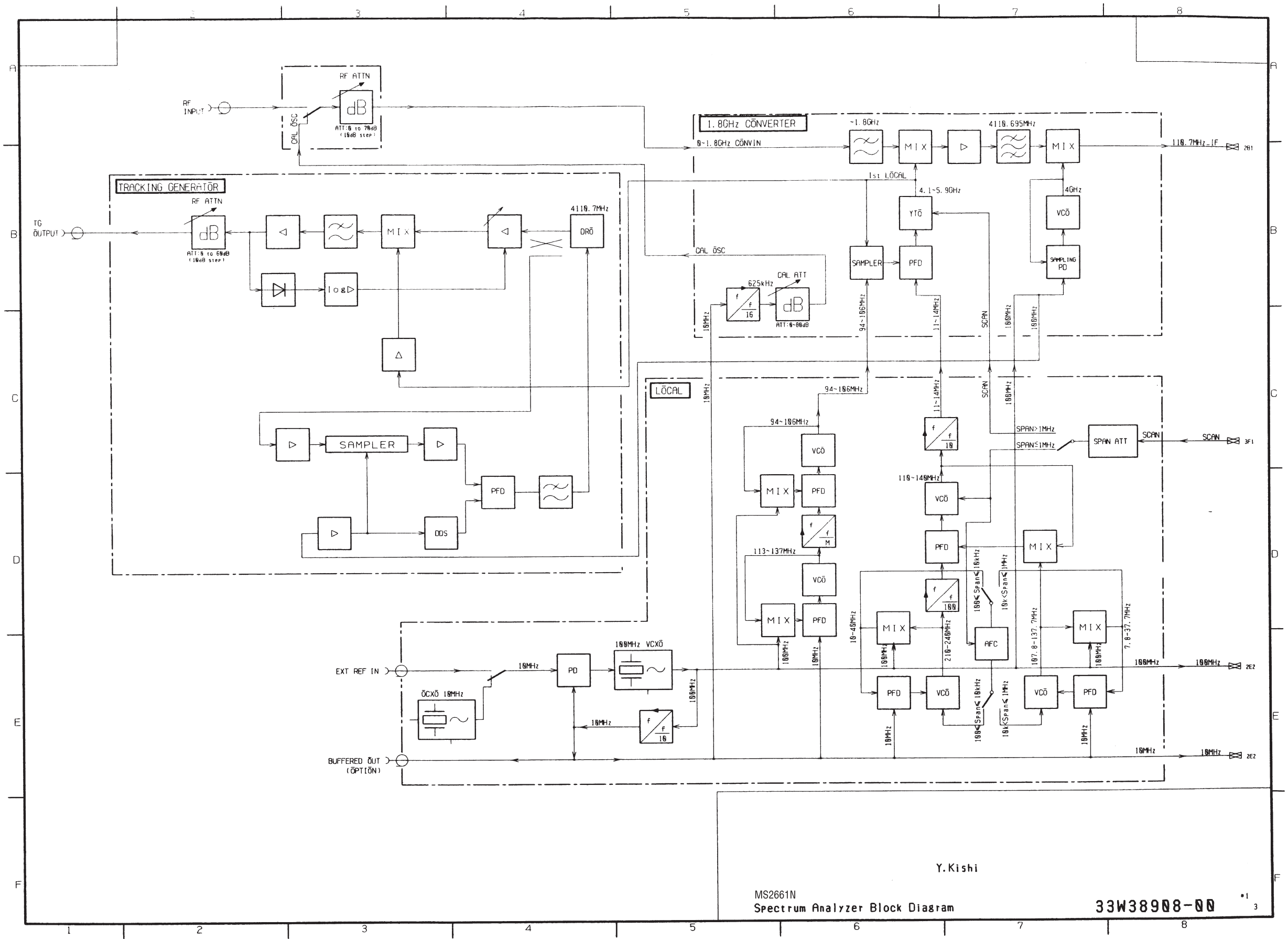
RF INPUT
CAL ÕSC
RF ATTN
ATT:0 to 70dB (10dB step)
1.8GHz CÕNVERTER
0~1.8GHz CÕNVIN
~1.8GHz
MIX
4118.695MHz
1118.7MHz-IF
281
1st LÕCAL
4.1~5.9GHz
YTÕ
4GHz
VCÕ
SAMPLER
PFD
SAMPLING PD
CAL ÕSC
CAL ATT
625kHz
ATT:0-80dB
10MHz
94~186MHz
11~14MHz
SCAN
100MHz
TRACKING GENERATÕR
TG ÕUTPUT
4118.7MHz
DRÕ
log
LÕCAL
SPAN>1MHz
SPAN≤1MHz
SPAN ATT
3F1
118~148MHz
113~137MHz
M
SPAN<10kHz
10k<SPAN<1MHz
AFC
10~48MHz
216~248MHz
107.8~137.7MHz
7.8~37.7MHz
2E2
EXT REF IN
ÕCXÕ 10MHz
100MHz VCXÕ
PD
BUFFERED ÕUT (ÕPTIÕN)
Y.Kishi
MS2661N
Spectrum Analyzer Block Diagram
33W38908-00
*1
3

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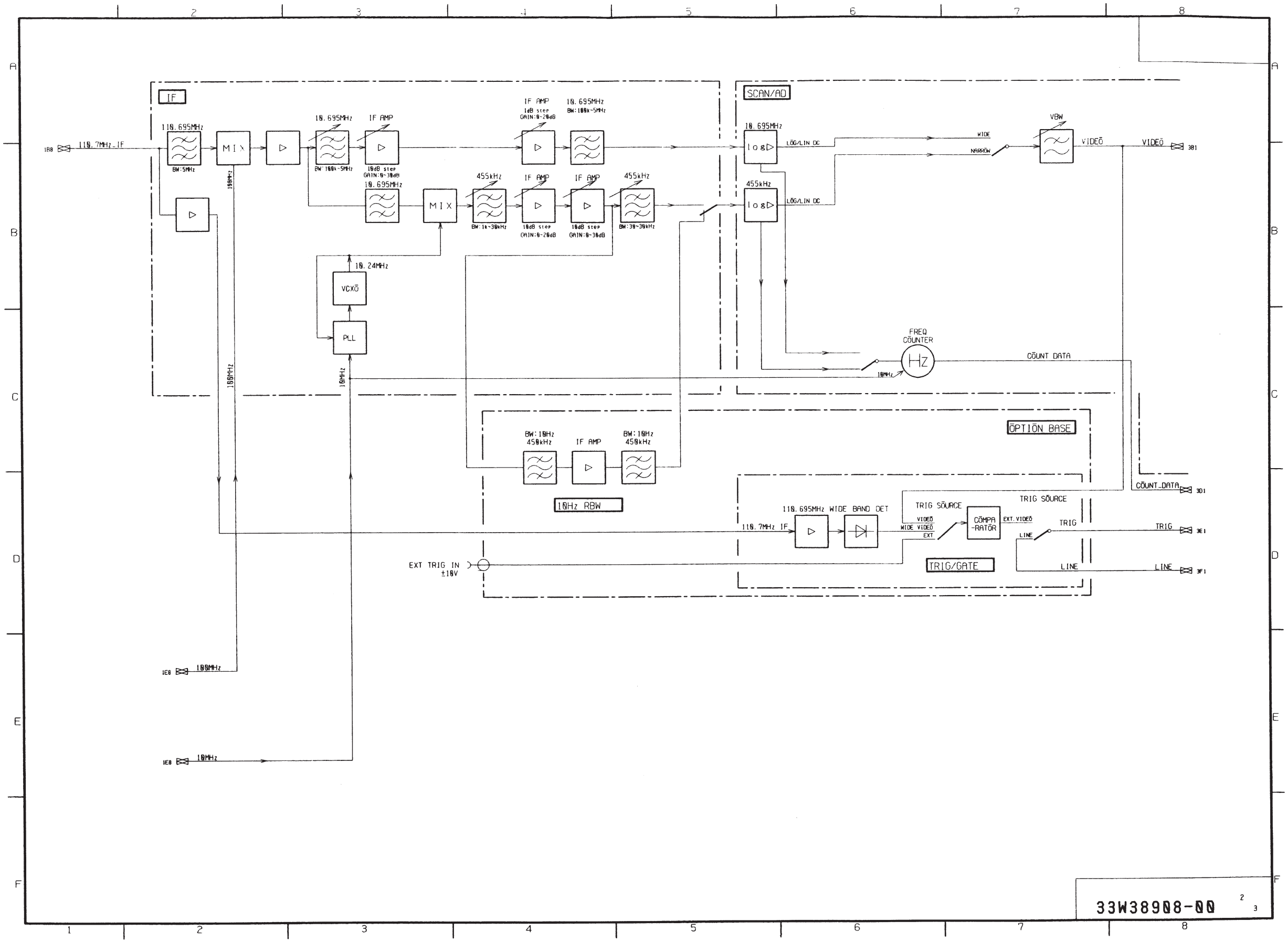
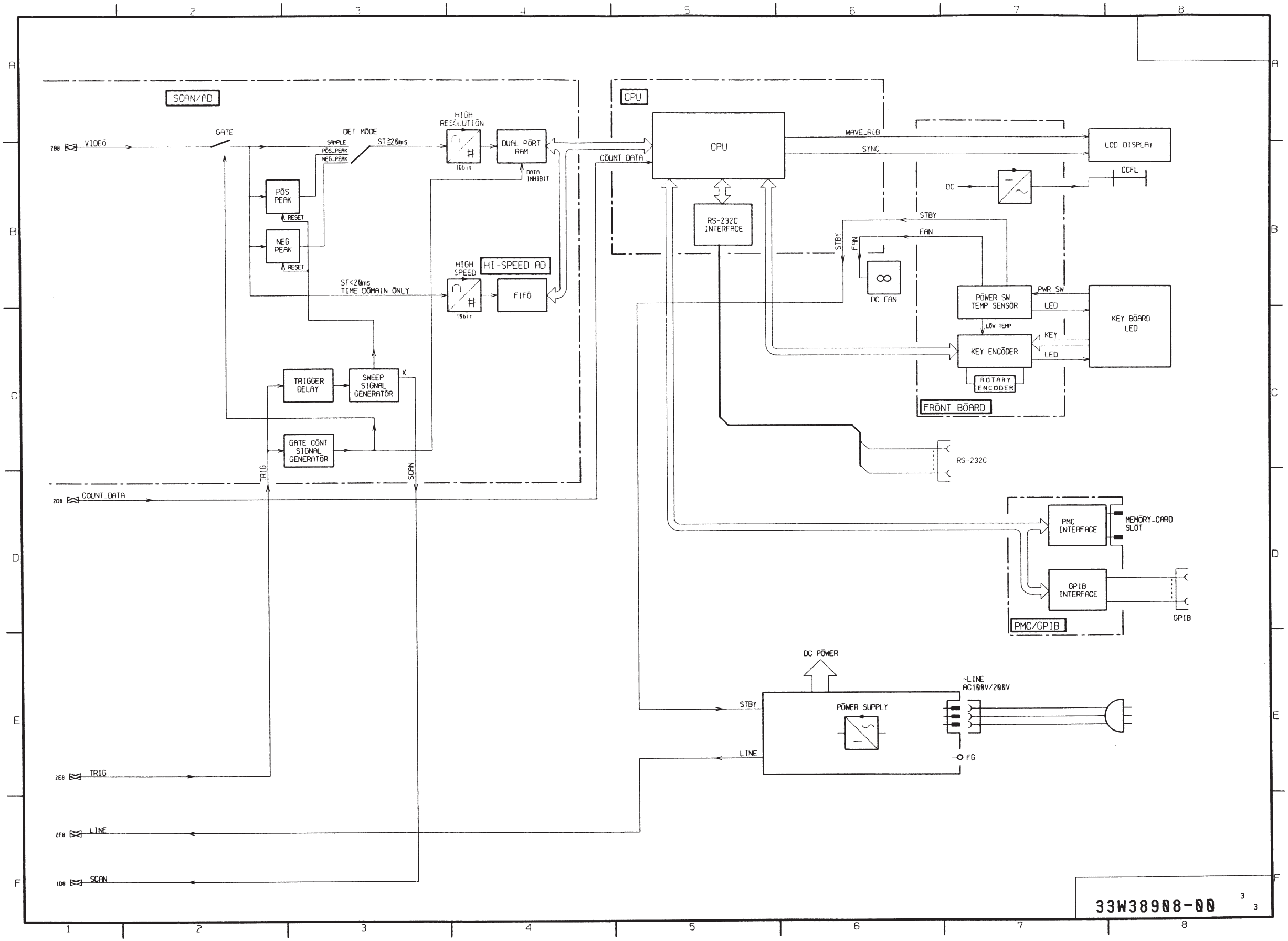

IF
SCAN/AD
ÖPTIÖN BASE
10Hz RBW
TRIG/GATE
118.7MHz_IF
118.695MHz
BW:5MHz
MIX
10.695MHz
BW:100k~5MHz
IF AMP
18dB step
GAIN:0~38dB
IF AMP
1dB step
GAIN:0~26dB
10.695MHz
BW:100k~5MHz
10.695MHz
455kHz
MIX
455kHz
BW:1k~30kHz
IF AMP
18dB step
GAIN:0~26dB
IF AMP
18dB step
GAIN:0~38dB
455kHz
BW:3k~30kHz
10.24MHz
VCXÖ
PLL
10MHz
188MHz
log
LÖG/LIN DC
WIDE
NARRÖW
VBW
VIDEÖ
VIDEÖ
381
455kHz
log
LÖG/LIN DC
FREQ
ÇÖUNTER
HZ
18MHz
ÇÖUNT DATA
ÇÖUNT_DATA
301
BW:10Hz
450kHz
IF AMP
BW:10Hz
450kHz
118.695MHz WIDE BAND DET
118.7MHz IF
TRIG SÖURCE
VIDEÖ
WIDE VIDEÖ
EXT
CÖMPA
-RATÖR
EXT. VIDEÖ
TRIG SÖURCE
TRIG
LINE
TRIG
3E1
LINE
LINE
3F1
EXT TRIG IN
±10V
1A8
118.7MHz_IF
1E8
188MHz
1E8
10MHz
33W38908-00
2
3

(Blank)


SCAN/AD
CPU
VIDEO
GATE
DET MODE
SAMPLE
POS_PEAK
NEG_PEAK
ST≥20ms
HIGH RESOLUTION
16bit
DUAL PORT RAM
DATA INHIBIT
POS PEAK
NEG PEAK
RESET
HIGH SPEED
HI-SPEED AD
ST<20ms
TIME DOMAIN ONLY
FIFO
TRIGGER DELAY
SWEEP SIGNAL GENERATOR
X
GATE CONT SIGNAL GENERATOR
TRIG
SCAN
COUNT_DATA
TRIG
LINE
SCAN
CPU
WAVE_RGB
SYNC
COUNT_DATA
RS-232C INTERFACE
LCD DISPLAY
DC
CCFL
STBY
FAN
DC FAN
POWER SW TEMP SENSOR
PWR SW
LED
LOW TEMP
KEY
LED
KEY BOARD LED
KEY ENCODER
ROTARY ENCODER
FRONT BOARD
RS-232C
PMC INTERFACE
MEMORY_CARD SLOT
GPIB INTERFACE
GPIB
PMC/GPIB
DC POWER
LINE AC100V/200V
STBY
POWER SUPPLY
LINE
FG
33W38908-00
3
3

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