

MG3670B
Digital Modulation
Signal Generator
Operation Manual

Second Edition

Measuring Instruments Division
Measurement Group

ANRITSU CORPORATION

JAN.
1995

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MG3670B Digital Modulation Signal Generator
Operation Manual

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Printed in Japan

MG3670B
Digital Modulation
Signal Generator
Operation Manual
(Panel Operating Instructions)

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WARNING

- *The protective earth terminal of this instrument must be connected to ground. The three-core power cord supplied with the instrument can be plugged into a grounded two pole AC outlet. If no grounded two pole AC outlet is available, the ground pin of the power cord or the earth terminal on the rear panel must be connected to ground before supplying the power to the instrument. Failure to do so could cause dangerous or possibly fatal electric shocks.*
- *Replacing fuses with the power cord still plugged into an AC outlet could also cause electric shocks.*
- *Supplemental explanation about WARNING on the rear panel*

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

} *A supplemental explanation about the WARNING labelled on the rear panel is given in the following:*

Disassembly, adjustment, maintenance, or other access inside this instrument by unqualified personnel should be avoided. Maintenance of this instrument should be performed only by Anritsu trained service personnel who are familiar with the risks 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.

■ SAFETY CONSIDERATIONS:

Anritsu uses the following labels to identify safety precautions which should be followed to prevent personal injury or product damage. Please familiarize yourself with them before operating this product.

Labels used in this manual:

WARNING

Indicates that the procedure could result in personal injury if not correctly performed. Do not proceed before you fully understand the explanation given with this symbol and meet the required conditions.

CAUTION

Indicates that the operating procedure could result in damage to the product if not correctly performed. Do not proceed before you fully understand the explanation given with this symbol and meet the required conditions.

Labels or symbols used on / in the product:

高压危険
DANGER
HIGH VOLTAGE

: This warning symbol (red color) indicates that the operator should not touch the labeled location. Servicing should only be performed by qualified personnel.



: This symbol indicates hazardous voltages. Be careful (not used in this instrument).



: This international caution symbol indicates that the operator should refer to the operation manual before beginning a procedure.



: This symbol indicates an earth (ground) terminal. The product should be grounded via the earth terminal if a three prong power cord is not used.

■ Disposal:

The MG3670B contains semiconductors containing arsenic compounds, a mercurial timer, and fluorinated graphite lithium batteries. When disposing of the MG3670B, be sure to handle it according to the regional regulations.

CERTIFICATION

ANRITSU CORPORATION certifies that this instrument has been thoroughly tested and inspected, and found to meet published specifications prior to shipping.

Anritsu further certifies that its calibration measurements are based on the Japanese Electrotechnical Laboratory and Radio Research Laboratory standards.

WARRANTY

All parts of this product are warranted by Anritsu Corporation of Japan against defects in material or workmanship for a period of one year from the date of delivery.

In the event of a defect occurring during the warranty period, Anritsu Corporation will repair or replace this product within a reasonable period of time after notification, free-of-charge, provided that: it is returned to Anritsu; has not been misused; has not been damaged by an act of God; and that the user has followed the instructions in the operation manual.

Any unauthorized modification, repair, or attempt to repair, will render this warranty void.

This warranty is effective only for the original purchaser of this product and is not transferable if it is resold.

ALL OTHER EXPRESSED WARRANTIES ARE DISCLAIMED AND ALL IMPLIED WARRANTIES FOR THIS PRODUCT, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. IN NO EVENT SHALL ANRITSU CORPORATION BE LIABLE TO THE CUSTOMER FOR ANY DAMAGES, INCLUDING LOST PROFITS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES, ARISING OUT OF THE USE OR INABILITY TO USE THIS PRODUCT.

All requests for repair or replacement under this warranty must be made as soon as possible after the defect has been noticed and must be directed to Anritsu Corporation or its representative in your area.

'IBM' is a registered trademark of the IBM Corporation.
'HP' is a registered trademark of the Hewlett-Packard Company.
'NEC' is a registered trademark of the NEC Corporation.

MEMORY BACK-UP BATTERY REPLACEMENT

The power for memory back-up is supplied by a Poly-carbomonofluoride Lithium Battery. This battery should only be replaced by a battery of the same type; since replacement can only be made by Anritsu, contact the nearest Anritsu representative when replacement is required.

STORAGE MEDIUM

This equipment stores data and programs using backed - up memories . Data and programs may be lost due to improper use or failure.

ANRITSU CANNOT COMPENSATE FOR ANY MEMORY LOSS.

Please pay careful attention to the following points.

(Backed-up memory)

- Isolate the memory from static electricity.

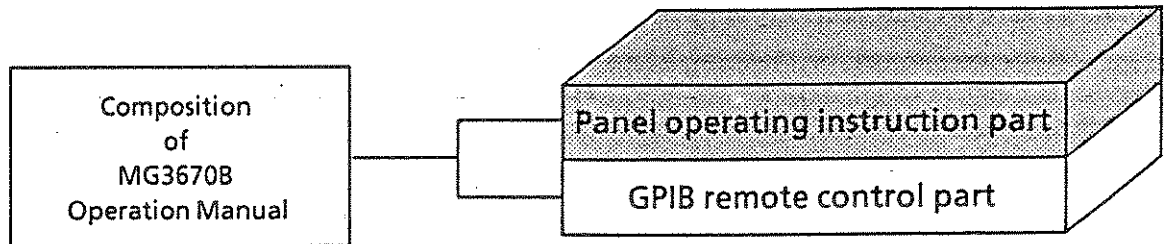
Note: The battery life is about 7 years. Early battery replacement is recommended.

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ABOUT THIS MANUAL

(1) Composition of MG3670B Operation Manuals

The MG3670B Digital Modulation Signal Generator operation manual of the standard type is composed of the following two parts. Use them properly according to the usage purpose.



Panel operating instruction part:

Panel Operating Instructions: Provides information on the MG3670B outline, preparation before use, panel description, basic operation, performance tests, calibration, storage / transportation, and quick reference for screen transition and error messages.

GPIB remote control part:

Provides information on the MG3670B remote control which conforms with IEEE488.2 standards. To assist creating GPIB programs, this manual gives examples of N88 BASIC language programs that run on the NEC PC9800 series of personal computers.

The operation manuals of the MG0301C ($\pi/4$ DQPSK Modulation Unit) and the MG0302A (GMSK Modulation Unit) are prepared and sold separately. The operations of the MG0303B (Burst Function Unit) are explained in each the MG0301C/MG0302A operation manual description related to the burst function.

(2) GPIB Basic Guide (sold separately)

The GPIB Basic Guide is sold separately in addition to the above GPIB operation manual. It is composed of two parts: GPIB Basic Knowledge, and GPIB Control statements in the ANRITSU PACKET V BASIC.

Precautions on Combination of Extension Units

Always use the following combination when the $\pi/4$ DQPSK modulation unit and burst function unit are used in combination. For any other combinations, performance is not guaranteed.

- Combination of MG0301A and MG0303A
- Combination of MG0301B and MG0303B

When the MG0302A is used in combination with the MG0303B, version up is required for certain MG0302A. Be sure to check necessity of version up before operation using the following procedure.

Step	Procedure
1	Turn power of the MG3670B off.
2	Install MG0302A to the MG3670B. For the installation procedure, refer to Section 2 of the MG0302A Operation Manual. Even if other modulation and burst function units are kept installed simultaneously, there is no trouble.
3	Turn power of the MG3670B on.
4	Press the [F6: etc] key.
5	Press the [F5: Setup/Parameter Memory] key.
6	Press the [F3: Interface Setup] key.
7	Check the GMSK modulation unit name indicated and take the necessary action, if needed. (1) No version up is required when indication is as shown below: <div style="text-align: center;"><p>Unit <input type="checkbox"/></p><div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"><p>MG0302A GMSK</p></div></div>
	(2) Version up is required when indication is as shown below. So, contact an Anritsu office or its representative in your area. <div style="text-align: center;"><p>Unit <input type="checkbox"/></p><div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"><p>GMSK</p></div></div>

Note: For checking the current combination of the extension units, operate steps 1 and 3 through 6 above.
For $\pi/4$ DQPSK modulation unit: Judge as model A if no model (MG0301B or MG0301C) is indicated.
For burst function unit: A model (MG0303A or MG0303B) is indicated.

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SECTION 1 GENERAL

This section outlines the MG3670B Digital Modulation Signal Generator and explains the composition of this manual, the configuration of the MG3670B with the standard accessories, the expansion unit/options, optional accessories, and peripherals for expanding the MG3670B capabilities, and the specifications.

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SECTION 1 GENERAL

1.1 Product Outline

The MG3670B is a Digital Modulation Signal Generator equipped with a high-performance quadrature modulator. It outputs the signals needed to develop, test and evaluate digital mobile communications equipment and related devices.

The MG3670B covers the frequency range from 300 kHz to 2.25 GHz, and provides a stable and precise output level as well as spectral purity up to a maximum output of +13 dBm, even with modulation. In addition, it provides 50 Ω /CMOS level modes, and level-balance/offset adjustment functions for the I/Q input signals in the wide frequency range. It also provides a superior vector error less than 1.8% rms up to +5 dBm for outputting various digital modulation signals.

To better meet users' needs, expansion units enable flexible configuration of a digital modulation signal generator suited to different mobile communication systems. The MG3670B can be combined with up to four expansion units simultaneously, including the MG0301B $\pi/4$ DQPSK Modulation Unit, the MG0302A GMSK Modulation Unit, and the MG0303B Burst Function Unit.

The MG0301B/MG0302A modulation units have a continuous data generator capable of generating arbitrarily-programmable data signals and band-limiting filters, as well as CCITT-specification PN9/PN15-stage PRBS signals, and they can output I/Q baseband signals.

The MG0303B Burst Function Unit uses the frame and slot configuration stipulated by various communication systems, and has a modulation pattern generator function and a function for ramp control of carrier burst signals. It can also handle data editing and scrambling.

Installing the MG0301B and MG0303B enables use with communication systems including Japan digital cordless telephones (PHP: Personal Handy Phone), Japan's mobile telephones (PDC: Personal Digital Cellular), North-American mobile telephones (NADC: North-American Digital Cellular Systems) and terrestrial flight telephone services (TFTS). And by mounting the MG0302A and MG0303B, a single system can generate the digital modulated burst signals needed for tests conforming to communication systems including European mobile telephones (GSM: Global System for Mobile Telecommunication), portable telephones (PCN: Personal Communication Network) and European digital cordless telephones (CT2: Cordless Telephone Second Generation).

1.2 Composition of Operation Manual

This operation manual is composed of eight sections and two appendixes. Each section is outlined below.

Section composition	Explanation
SECTION 1 GENERAL	Provides information about product outline, composition of manual, equipment configuration with standard accessories, options, optional accessories, peripherals, and MG3670B specifications
SECTION 2 PREPARATIONS BEFORE MEASUREMENT	Provides information about all preparations to be performed before using MG3670B (before power-on)
SECTION 3 PANEL LAYOUT AND OPERATION OUTLINE	Provides information about locations and functions of front- and rear-panel keys, connectors, rotary knob, and indicators, etc.
SECTION 4 PANEL OPERATING INSTRUCTIONS	Provides information about detailed manual operation methods
SECTION 5 MEASUREMENT	Provides information about typical measurement examples for the digital mobile radio.
SECTION 6 PERFORMANCE TESTS	Provides information about equipment required for executing MG3670B performance tests, setup, and procedure of performance tests
SECTION 7 CALIBRATION	Provides information about equipment required for executing MG3670B calibration, setup, and procedure of calibration
SECTION 8 STORAGE AND TRANSPORTATIONS	Provides information about regular care and long-term storage as well as repacking and transportation
APPENDIX A SCREEN TRANSITION	Provides information about screen menu transition of setting items and function keys
APPENDIX B ERROR MESSAGES	Provides information about list of error messages.

1.3 Equipment Configuration

This paragraph describes the configuration of the MG3670B Spectrum Analyzer with standard accessories and the expansion units/options to expand the functions.

1.3.1 Standard configuration

The table below shows the configuration of the MG3670B with the standard accessories.

Table 1-1 Standard Composition

Item	Model / Order No.	Name	Qty.	Remarks
Main instrument	MG3670B	Digital Modulation Signal Generator	1	
Accessories	J0576B	Coaxial cable	1	Approx. 1 m (N-P-5D-2W-N-P)
	J0127A	Coaxial cable	1	Approx. 1 m (BNC-P-RG-58A/U-BNC-P)
	J0017F	Power cord	1	Approx. 2.5 m
	B0325	GPIO shield cap	1	
	F0014 (6.3A) or F0012 (3.15A)	Fuse	2	For 100 V system or For 200 V system
	W0689AE	Operation manual	1 set	<ul style="list-style-type: none"> • Panel operating instruction part • GPIO remote control part

1.3.2 Expansion Units / Options

The table below shows the expansion units / options for the MG3670B which are sold separately.

Table 1-2 Expansion Units / Options

Modulation units for Communication Systems:

Model No.	Name	System to be used
MG0301C	$\pi/4$ DQPSK Modulation Unit	PDC, PHP, NADC, TFTS, PDC_H
MG0302A	GMSK Modulation Unit	GSM, PCN, CT2
MG0305A	GFSK Modulation Unit	DECT

Burst Function Unit: used with the modulation units for Communication Systems

Model No.	Name	System to be used
MG0303B	Burst Function Unit	PDC, PHP, NADC, TFTS, PDC_H, GSM, PCN, CT2

Options for reference crystal oscillator:

Option No.	Name	Aging rate
01	Reference crystal oscillator	5×10^{-9} / day
02	Reference crystal oscillator	2×10^{-9} / day
03	Reference crystal oscillator	5×10^{-10} / day

1.4 Optional Accessories and Peripherals

The following table shows the optional accessories and peripherals for the MG3670B which are all sold separately.

Table 1-3 Optional Accessories

Model † / Order No. †	Name †	Remarks
J0127C	Coaxial cable	Approx. 0.5 m (BNC-P · RG-58A / U · BNC-P)
J0003A	Coaxial cable	Approx. 1 m (SMA-P·Special 3D-2W·SMA-P)
J0004	Coaxial adapter	N-P · SMA-J
J0007	GPIB cable	Approx. 1 m (408JE-101)
J0008	GPIB cable	Approx. 2 m (408JE-102)
B0329D	Protective cover	
B0331D	Front handle	2 pcs / set
B0332	Coupling plate	4 pcs / set
B0333D	Rack mounting kit	
B0334D	Carrying case	Protective cover, with casters

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

Table 1-4 Peripherals

Model † / Order No. †	Name †	Remarks
MS8604A	Digital Mobile Radio Transmitter Tester	100 kHz to 8.5 GHz
ME2627A / B	Digital Modulation Analyzer	10 MHz to 2.7 GHz
MD1620B	Signaling Tester	PDC, 800 MHz
MN3101A	Digital MCA Modulation Adaptor	M16QAM modulation
MD6420A	Data Transmission Analyzer	50 bps to 10 Mbps
MP1201C	Error Rate Tester	40 Hz to 100 kHz
MS2602A	Spectrum Analyzer	100 Hz to 8.5 GHz
MG3633A	Synthesized Signal Generator	10 kHz to 2.7 GHz

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

1.5 Specifications

The MG3670B and its option specifications are listed in the following table.

1.5.1 MG3670B specifications

The MG3670B specifications are listed in Table 1-5.

Table 1-5 MG3670B Specifications (1/2)

Carrier frequency	Frequency range	300 kHz to 2250 MHz			
	Accuracy	Depends on installed reference oscillator†1			
	Internal reference oscillator	Frequency: 10 MHz Start-up characteristics: $\leq 1 \times 10^{-7}$ /day (after 30-min. warm-up) $\leq 5 \times 10^{-8}$ /day (after 60-min. warm-up) Aging rate: $\leq 2 \times 10^{-8}$ /day (after 24-h warm-up) Temperature characteristics: $\leq \pm 5 \times 10^{-8}$ (0 to 50 °C)			
	External reference input	10 MHz or 13 MHz (± 10 ppm), 2 to 5 Vp-p, BNC connector (rear panel)			
	Reference output	10 MHz, 2 to 5 Vp-p, BNC connector (rear panel)			
Output	Level range	-143 to +13 dBm (resolution: 0.1 dB)			
	Frequency response	$\leq \pm 1$ dB (at 0 dBm output)			
	Level accuracy	Output level/frequency	≤ 1000 MHz	> 1000 MHz	
		-33 to +13 dBm	± 1 dB	± 2 dB	
		-123 to -33.1 dBm	± 1.5 dB	± 2 dB	
		-136 to -123.1 dBm	± 3 dB	± 4 dB	
	Impedance	50 Ω , N-type connector			
Continuously variable level	Continuously-variable output over 18 dB range (+6 to -12 dB) in 0.1 dB steps within upper and lower limits of any output level				
Level unit selection	dBm, dB μ , μ V, mV, V (dB μ , μ V, mV, and V allow terminate/open voltage to be displayed.)				
Interference radiation	$\leq 1 \mu$ V (at $\leq +5$ dBm carrier output, and for a 50 Ω -terminated voltage when measured with a two-turn 25 mm diameter loop antenna at a point which is 25 mm away from the frame except rear panel)				
Signal purity	Spurious	At $\leq +5$ dBm output: ≤ -65 dBc (≥ 100 kHz offset, $\leq \pm 100$ MHz bandwidth) ≤ -50 dBc (≥ 100 kHz offset, full band) ≤ -30 dBc (harmonics)			
	SSB phase noise	≤ -120 dBc/Hz (100 kHz offset, carrier wave)			

†1 Internal reference oscillator accuracy: 2×10^{-8} /day (23° \pm 5 °C), calibrated after 24-h operation

Table 1-5 MG3670B Specifications (2/2)

Digital modulation	Internal modulation	Depends on installed modulation unit (MG0301C, MG0302A)
	External modulation	Any modulation using I/Q input signal Input frequency: DC to 1.2 MHz Input level: For 50 Ω , 500 mVrms: $\sqrt{I^2+Q^2} \leq 0.5$ Vrms and $\sqrt{I^2+Q^2} \leq 0.75$ Vp-p For CMOS: Range between 10% and 100% of $\sqrt{I^2+Q^2} \leq 0.5$ Vrms and $\sqrt{I^2+Q^2} \leq 0.75$ Vp-p Vector error: $\leq 1.8\%$ rms (I/Q input level: 0.5 Vrms/50 Ω , at $\leq +5$ dBm output)
	I/Q output	Outputs I/Q signal at internal modulation (MG0301C or MG0302A installed)
Pulse modulation	Input	TTL level, BNC connector, polarity selectable
	On/off ratio	≥ 40 dB (at ≥ 0 dBm output)
	Transition time	≤ 2 μ s, minimum pulse width: 10 μ s
Memory function	Frequency memory	1000 carrier frequencies (store and recall)
	Parameter memory	100 panel settings (store and recall)
Other functions	Relative display	Carrier frequency, output level
	I/Q signal adjustment	Offset, balance, phase (only output) of I/Q input/output signal
	Backup	Last settings stored at power-off
	Reverse power protection	Maximum reverse input power: 50 W (< 1000 MHz), 25 W (≥ 1000 MHz), ± 50 V (DC)
	GPIB	All functions except power switch and panel lock switch controlled Interface function: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0, and E2
General	Ambient temperature, rated range	0 to 50 $^{\circ}$ C
	Power	85 to 132/170 to 250 Vac (switchable), 47.5 to 63 Hz, ≤ 550 VA
	Dimensions and mass	221.5 (H) \times 426 (W) \times 451 (D) mm, ≤ 27 kg

1.5.2 MG3670B option specifications

The reference-crystal-oscillator specifications of the MG3670B option are listed in Table 1-6.

Table 1-6 Reference-Crystal-Oscillator Option Specifications

Item	Reference-Crystal-Oscillator Option No.		
	Option 01	Option 02	Option 03
Start-up characteristics	7×10^{-8} / day (after 30-min. operation) 3×10^{-8} / day (after 60-min. operation)	2×10^{-8} / day (after 60 min. operation)	<hr style="width: 10%; margin: auto;"/>
Aging rate	5×10^{-9} / day (after 24-h operation)	2×10^{-9} / day (after 24-h operation)	5×10^{-10} / day (after 48-h operation)
Temperature characteristics (0 to 50 °C)	$\pm 5 \times 10^{-8}$ / day	$\pm 1.5 \times 10^{-8}$ / day	$\pm 5 \times 10^{-9}$ / day

SECTION 2 PREPARATIONS BEFORE USE

Read the preparations and safety procedures that should be performed before using the Modulation Signal Generator. The safety procedures are to prevent the risk of injury to damage to the equipment. Insure that you understand the contents of the pre-operation using the MG3670B.

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SECTION 2

PREPARATIONS REQUIRED

(The following information is for informational purposes only and should not be used as a substitute for the actual contract documents. The contract documents contain the complete and final terms and conditions of the contract.)

CLASSIFICATION

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SECTION 2 PREPARATIONS BEFORE USE

2.1 Installation Site and Environmental Conditions

2.1.1 Locations to be avoided

The MG3670B operates normally at temperatures from 0 to 50 °C. However, for the best performance, the following locations should be avoided.

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

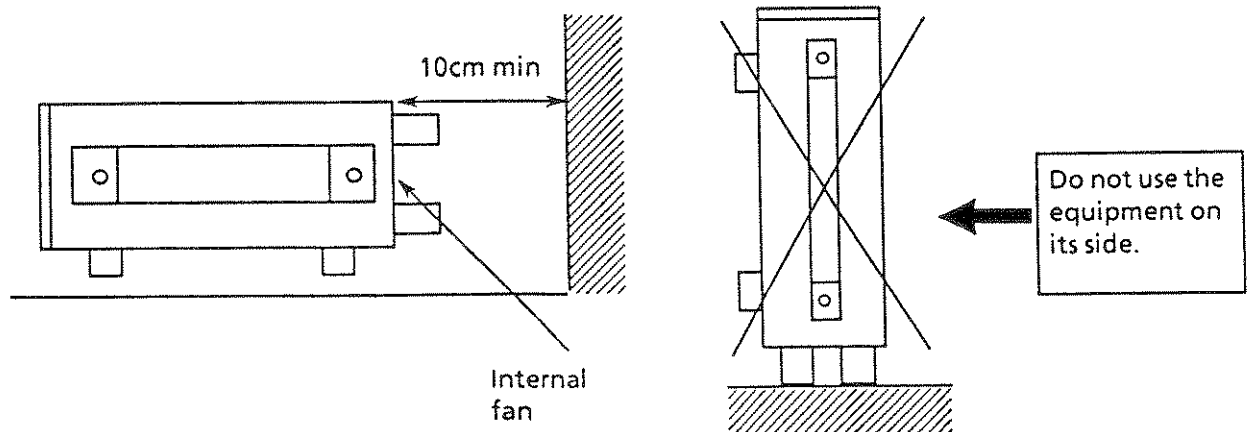
In addition to meeting the above conditions, to insure long-term trouble-free operation, the equipment should be used at room temperature and in a location where the power supply voltage does not fluctuate greatly.

CAUTION

If the MG3670B 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 MG3670B on until it has been allowed to dry out sufficiently.

2.1.2 Fan clearance

To suppress any internal temperature increase, the MG3670B 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.



2.2 Safety Measures

This paragraph explains the safety procedures which should be followed under all circumstances not to counter the risk of an accidental electric shock, damage to the equipment or a major operation interruption.

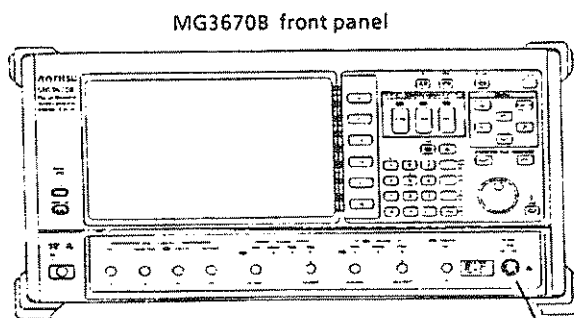
2.2.1 Power-on

WARNING

- *Before power-on:* The MG3670B must be connected to protective ground. If the power is switched on without taking this countermeasure, there is a risk of receiving an accidental electric shock. In addition, it is essential to check the power supply voltage. If an abnormal voltage that exceeds the specified value is input, there is an accidental risk of damage to the MG3670B and fire.
- *During power-on:* To maintain the MG3670B, sometimes it is necessary to make internal checks and adjustments with the top, bottom or side covers removed while power is supplied. Very-high, dangerous voltages are used in the MG3670B; if insufficient care is taken, there is a risk of an accidental electric shock being received or of damage to the equipment. To maintain the MG3670B, request service by a service personnel who has received the required training.

In the following, special notes on safety procedures are extracted from sections other than Section 2. To prevent accidents, read this section together with the related sections before beginning operation.

2.2.2 Maximum reverse power to RF Output connector



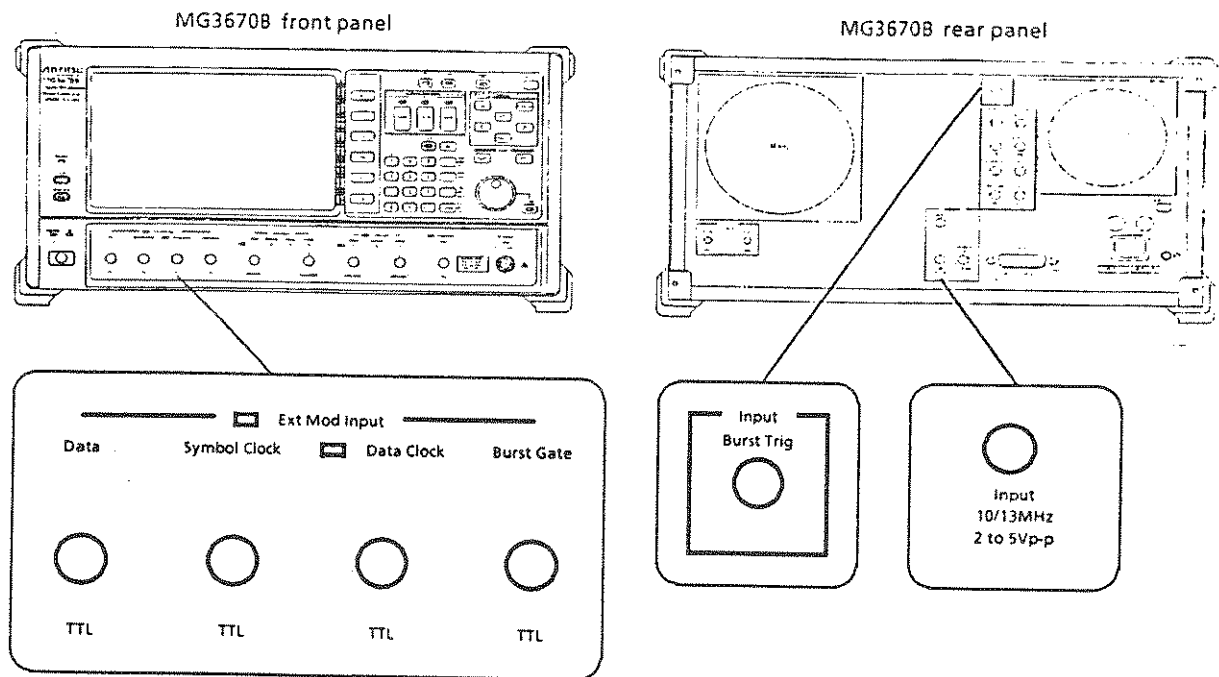
CAUTION

Do not apply a reverse power exceeding DC 50 V, 25 watt (≥ 1 GHz), or 50 watt (< 1 GHz) to the RF Output connector. The RF Output connector is not protected against such excessive reverse power, and the circuit may be burned.

RF Output
50 Ω
0.3-2250MHz



2.2.3 Maximum power to external pattern and reference input connectors



CAUTION

Do not apply a power exceeding TTL level to the six input connectors of Data/Symbol Clock/Data Clock/Burst Gate/Burst Trig Input/Ref Input. These input connectors are not protected against the power exceeding TTL level, and the circuit may be burned.

2.3 Preparations before Power-on

To operate the MG3670B normally, it requires a single phase ac power source of 85 to 132 Vac for 100 Vac system or 170 to 250 Vac for the 200 Vac system, and 47.5 to 63 Hz.

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 ratings 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 MG3670B.

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

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

WARNING

Disassembly, adjustment, maintenance, or other access inside this instrument by unqualified personnel should be avoided. Maintenance of this instrument should be performed only by Anritsu trained service personnel who are familiar with the risks 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 possibly of damage to precision components.

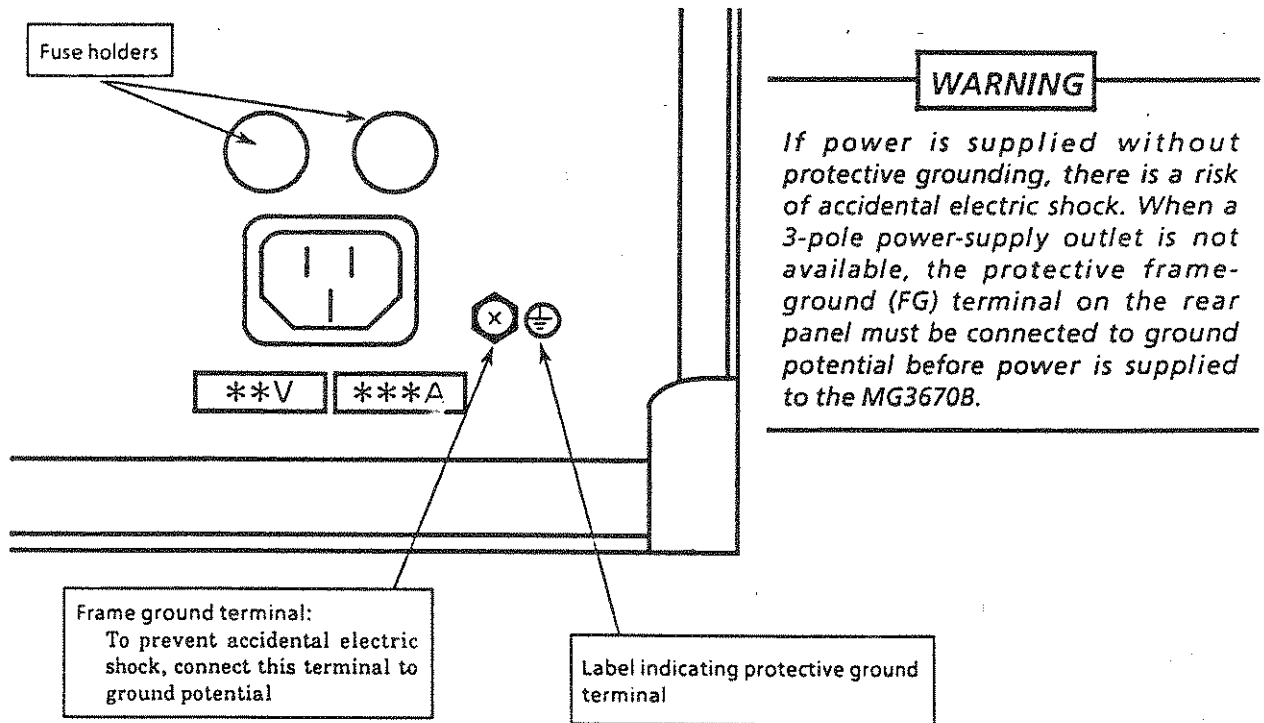
Always follow the instructions on the following pages.

2.3.1 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 MG3670B 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.

2.3.2 Replacing fuse

WARNING

- *If the fuses are replaced while power is being 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 MG3670B 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.*
-

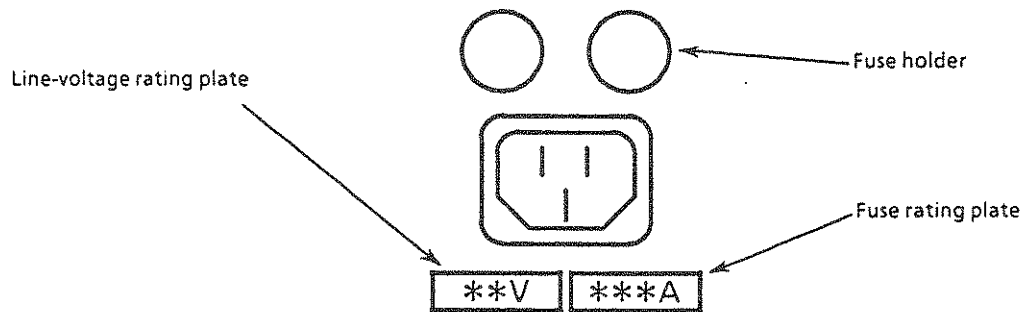
CAUTION

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 for the fuses to blow may be too long.*
 - *If the voltage and current rating of the fuses is incorrect, when an abnormality occurs again, the fuses may not blow with a consequent risk of damage to the equipment by fire.*
-

The MG3670B with standard accessories has two spare *** A fuses. The fuses are mounted in the fuse holder as shown in the figure below and must be replaced if they blow. If the fuses must be replaced, locate and remedy the cause before replacing the blown fuses. In addition to this fuse replacement, make sure that each item shown in the table below is properly selected for the power supply system.

Power supply system	VOLTAGE SELECT	Line-voltage rating plate	Fuse rating plate	Fuse rating	Fuse name	Model/Order No.
100 Vac	AC 85-132V	85 – 132V	T 6.3 A	6.3 A, 250V	T6.3A250V	F0014
200 Vac	AC 170-250V	170 – 250V	T 3.15 A	3.15 A, 250V	T3.15A250V	F0012



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 Standby 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.

2.4 Installation

2.4.1 Rack mounting

The B0333D Rack Mounting Kit (sold separately, Table 1-3) is required to mount the MG3670B in a rack.

The installation method is included in the rack mount kit diagram.

2.4.2 Stacking

When stacking several MG3670Bs or stacking the MG3670B with equipment of the same width as the MG3670B, the B0332 Coupling Plate (sold separately, Table 1-3) are required.

SECTION 3

PANEL LAYOUT AND OPERATION OUTLINE

This section describes the layout, function and operation of the keys, connectors and indicators on the front and rear panels of the MG3670B Digital Modulation Signal Generator. For detailed operating instructions of this instrument, see Section 4.

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3.1.4	Panel layout diagram	3-8
3.2	Outline of Operation	3-11

REVISIONS
PAGE LAYOUT AND OPERATION OUTLINE

The following information is provided for the purpose of...
The information is provided for the purpose of...
The information is provided for the purpose of...

TECHNICAL DESCRIPTION

The technical description of the...
The technical description of the...
The technical description of the...
The technical description of the...
The technical description of the...

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Keys and Rotary Knob on the Front Panel (2/3)

No.	Key		Functional description
	Type (marking)	Attribute	
5	Preset	Momentary	<ul style="list-style-type: none"> ● Key that initializes the parameter settings
6	Local	Momentary	<ul style="list-style-type: none"> ● Key that switches MG3670B from GPIB remote mode to local mode ● The remote LED lights in the GPIB remote mode
7	Panel Lock	Momentary	<ul style="list-style-type: none"> ● Key that engages/disengages the panel lock ● The LED lights when the panel lock is engaged
8	Cursor keys	—	<ul style="list-style-type: none"> ● Keys used in selecting the item to be set on the display screen and in manipulating a window
	Set	Momentary	<ul style="list-style-type: none"> ● Key that opens/closes a window and validates a data input
	Cancel	Momentary	<ul style="list-style-type: none"> ● Key that closes a window (cancels a data input)
	^, v, >, <	Repeat	<ul style="list-style-type: none"> ● Keys that move the cursor on the display screen and in the window screen
9	Data entry keys		<ul style="list-style-type: none"> ● Keys that are used in inputting data
	0,1,2,3,4,5,6,7, 8,9,A,B,C,D,E,F, ,./+/-	Momentary	<ul style="list-style-type: none"> ● Numeric and data keys used in inputting data; to input any of letters A to F, SHIFT must be turned on.
	BS	Repeat	<ul style="list-style-type: none"> ● Key used in correcting or deleting numeric data entered using the numeric keys
	Shift	Momentary	<ul style="list-style-type: none"> ● Key that selects the function of a shiftable key; the LED indicator lights when shift is on.
	Unit keys	—	<ul style="list-style-type: none"> ● Keys that validate data that has been entered using the numeric keys
	[GHz/dBm/dB]	Momentary	<ul style="list-style-type: none"> ● Validates a data input having a GHz/dBu/dB unit
	[MHz/dB,μsec]	Momentary	<ul style="list-style-type: none"> ● Validates a data input having a MHz/dBu/sec unit
	[kHz/mV/msec]	Momentary	<ul style="list-style-type: none"> ● Validates a data input having a kHz/mV/msec unit
	[Hz/μV/μsec/ Enter]	Momentary	<ul style="list-style-type: none"> ● Validates a data input having a Hz/μV/μsec unit ● Validates a data input having no unit system
	Step (^, v)	Repeat	<ul style="list-style-type: none"> ● Key that increments or decrements numeric data ● [^] increments, while [v] decrements numeric data.
Hold	Momentary	<ul style="list-style-type: none"> ● Key that enables/disables the encoder ● The LED indicator lights when the encoder is disabled. However, if a window is open, the encoder remains in activated condition even if disabled. 	

SECTION 3

PANEL LAYOUT AND OPERATION OUTLINE

3.1 Panel Layout

The front and rear panel illustrations are shown in Figs. 3-1 and 3-2 on page 3-8 in this operation manual. Controls and connector descriptions have index numbers that are linked to the panel illustrations. The following tables describe the functions of the keys, switches, LED indicators and connectors on the MG3670B front and rear panels.

3.1.1 Keys and rotary knob on the front panel

The types, attributes and functions of the keys and rotary knob located on the front panel are explained below.

Keys and Rotary Knob on the Front Panel (1/3)

No.	Key		Functional description
	Type (marking)	Attribute	
1	Main function keys	—	<ul style="list-style-type: none"> • Group of keys used in selecting the function to be set
	Freq	Momentary	<ul style="list-style-type: none"> • Key that selects the carrier frequency setting mode • The frequency setting function mode indicator LED lights when this key is pressed
	Level	Momentary	<ul style="list-style-type: none"> • Key that selects the output level setting mode • The output level setting mode indicator LED lights when this key is pressed
	Mod	Momentary	<ul style="list-style-type: none"> • Key that selects the modulation parameter setting mode • The modulation parameter setting mode indicator LED lights when this key is pressed. (When this key is pressed, modulation is switched ON.)
2	RF Off	Momentary	<ul style="list-style-type: none"> • Key that switches the output on and off • The LED indicator lights when the output is off
3	Mod On	Momentary	<ul style="list-style-type: none"> • Key that switches modulation on and off • The LED indicator lights when modulation is on
4	Display Off	Momentary	<ul style="list-style-type: none"> • Key that switches the display on and off • The LED indicator lights when the display is off. Under this condition, leakage power from the panel is decreased.

Keys and Rotary Knob on the Front Panel (3/3)

No.	Key		Functional description
	Type (marking)	Attribute	
10	Function keys (F1,F2,F3,F4,F5,F6)	Momentary	<ul style="list-style-type: none"> • Keys that select and execute the menu displayed on the right side of the display screen • An '*' at the right end of a key label indicates that the key has a lower hierarchy key label and an '→' indicates that the screen will switch to another one if the key is pressed.
11	Rotary knob	—	<ul style="list-style-type: none"> • Knob used in inputting data • Numeric data increases with a clockwise rotation and decreases with a counter-clockwise rotation
12	Power switch	Momentary	<ul style="list-style-type: none"> • Switch that sets the power to standby or ON when the LINE ON/OFF switch on the rear panel is on. When the power is set to standby, only the reference oscillator is supplied with power.

3.1.2 Connectors and controls on the front panel

Connectors and Controls on the Front Panel (1/1)

No.	Connector and control marking	Functional description
13	Ext Mod Input	<ul style="list-style-type: none"> Inputs external TTL level signals required for external modulation. The LED indicator lights when modulation data or the modulation data clock is externally fed.
	Data	<ul style="list-style-type: none"> Inputs external modulation data signals
	Symbol Clock	<ul style="list-style-type: none"> Inputs external modulation symbol clock signals
	Data Clock	<ul style="list-style-type: none"> Inputs external modulation data clock signals. The LED indicator lights when the correct signal is fed.
	Burst Gate	<ul style="list-style-type: none"> Inputs external modulation burst gate signals
14	I/Q Output	<ul style="list-style-type: none"> Output adjustment and output connector for the internally generated I/Q signal When the I/Q OUTPUT adjustment is on, the LED indicator lights to indicate that the output can be adjusted.
	Offset	<ul style="list-style-type: none"> Adjusts the offset of the I/Q signal
	Balance	<ul style="list-style-type: none"> Adjusts the balance of the I/Q signal
	Phase	<ul style="list-style-type: none"> Adjusts the phase of the I/Q signal
	I, Q	<ul style="list-style-type: none"> Outputs the I/Q signal (50/600 Ω)
15	I/Q Input	<ul style="list-style-type: none"> Input adjustment and input connector for the external I/Q signal. When the I/Q signal is externally fed, the I/Q INPUT LED indicator lights. When the I/Q Input adjustment is on, the LED lights to indicate that the input can be adjusted.
	Offset	<ul style="list-style-type: none"> Adjusts the offset of the I/Q signal
	Balance	<ul style="list-style-type: none"> Adjusts the balance of the I/Q signal
	I, Q	<ul style="list-style-type: none"> Inputs the I/Q signal (50/100 kΩ)
16	Pulse Mod Input	<ul style="list-style-type: none"> Connector for feeding a TTL pulse modulation signal; when the pulse modulation signal is fed externally, the LED indicator lights.
17	RF Output 50 Ω 0.3-2250 MHz	<ul style="list-style-type: none"> Connector for outputting the RF signal Provided with a reverse-power protection circuit

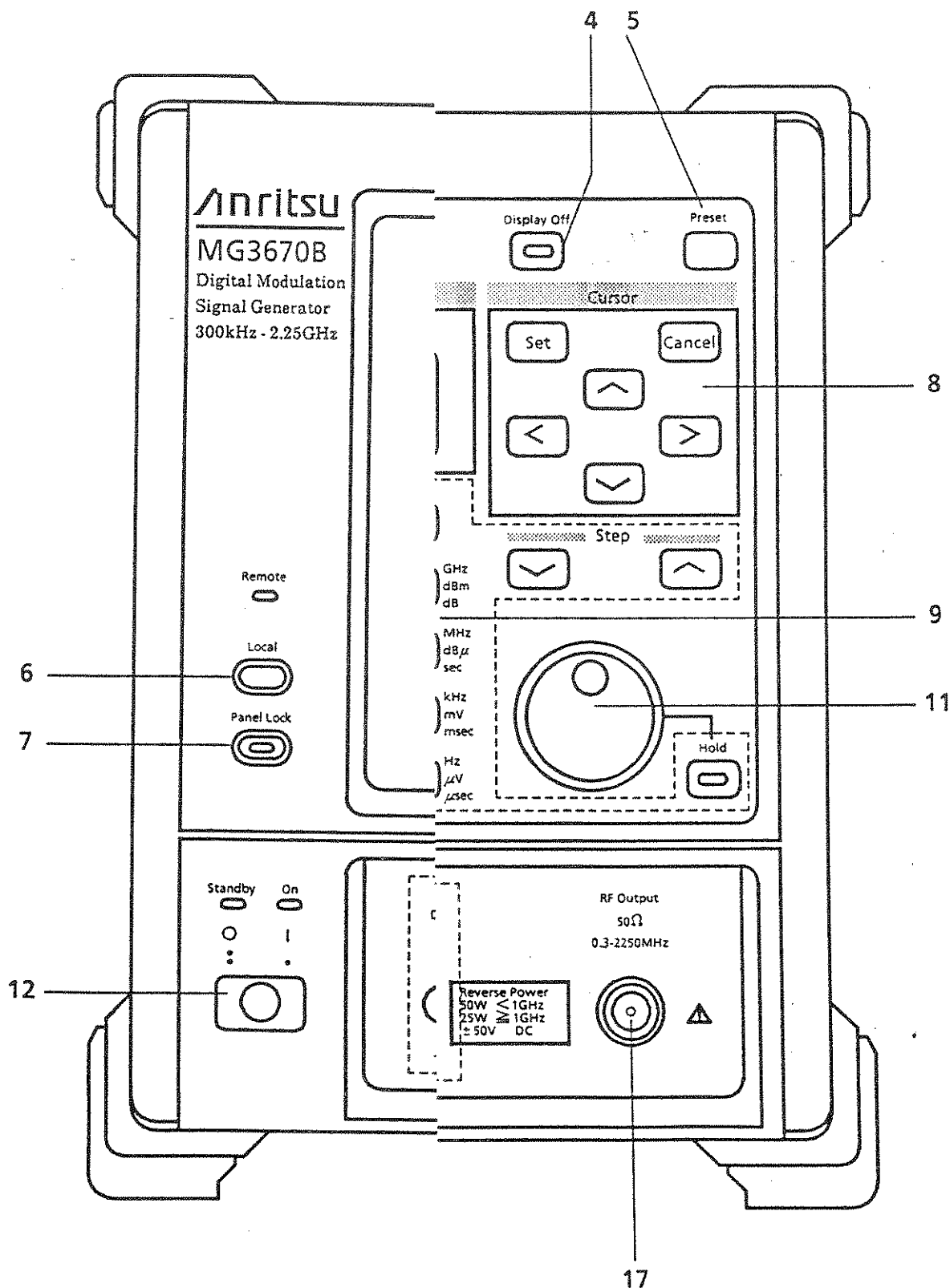
3.1.3 Rear panel layout

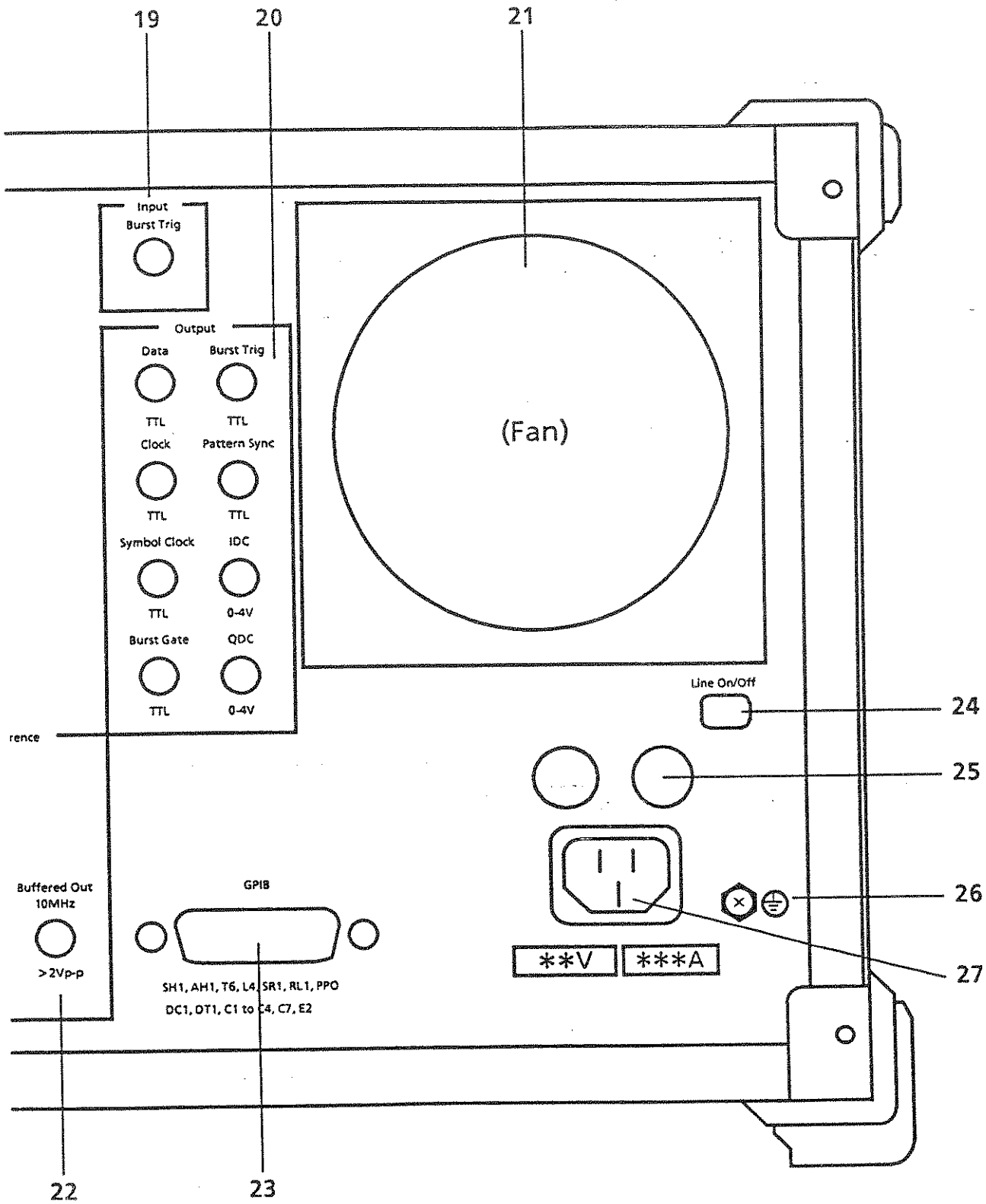
Rear Panel Layout (1/1)

No.	Marking	Functional description
18	Local 1.5GHz Output / Input	● Output connector for the internal local signal and input connector for the external local signal. Normally, these two connectors are connected with a U-link.
19	Input Burst Trig	● Input connector for the external burst trigger signals
20	Output	● Output connector for monitoring the internal modulation signals (TTL level except for I/Q DC signal)
	Data	● Output connector for the modulation data signal
	Clock	● Output connector for the clock signal
	Symbol Clock	● Output connector for the symbol clock signal
	Burst Gate	● Output connector for the burst gate signal
	Burst Trig	● Output connector for the burst trigger signal
	Pattern Sync	● Output connector for the modulation pattern synchronous signal
	I DC	● Output connector for the I signal (DC), (600 Ω)
Q DC	● Output connector for the Q signal (DC), (600Ω)	
21	Fan	● Internal cooling fan
22	Reference	● Output connector for the internal reference signal (10 MHz) and input connector for external reference signals. Normally, the Output and the Input connectors are connected with a U-link.
	Output	● Output connector for the internal reference signal (10 MHz)
	Input	● Input connector for external reference signals (10/13 MHz)
	Buffered Out	● General purpose buffered output connector for the reference signal (10 MHz) used
23	GPIB	● GPIB connector; when the GPIB cable is not connected, cover this connector with the attenuation cap to prevent power leakage.
24	Line On / Off	● Switches the power on and off. If this switch is off, the power cannot be switched on even if the power switch on the front panel is turned on.
25	Fuse	● Power fuse; use only fuses with the specified rating to ensure safety.
26	Chassis ground terminal	● Two-core power cords must be connected to ground to ensure safety
27	Power inlet	● Use only voltage supplies with the specified rating in order to ensure safety

3.1.4 Panel layout diagram

Figures 3-1 and 3-2 illustrate the the MG3670B front and rear panels .





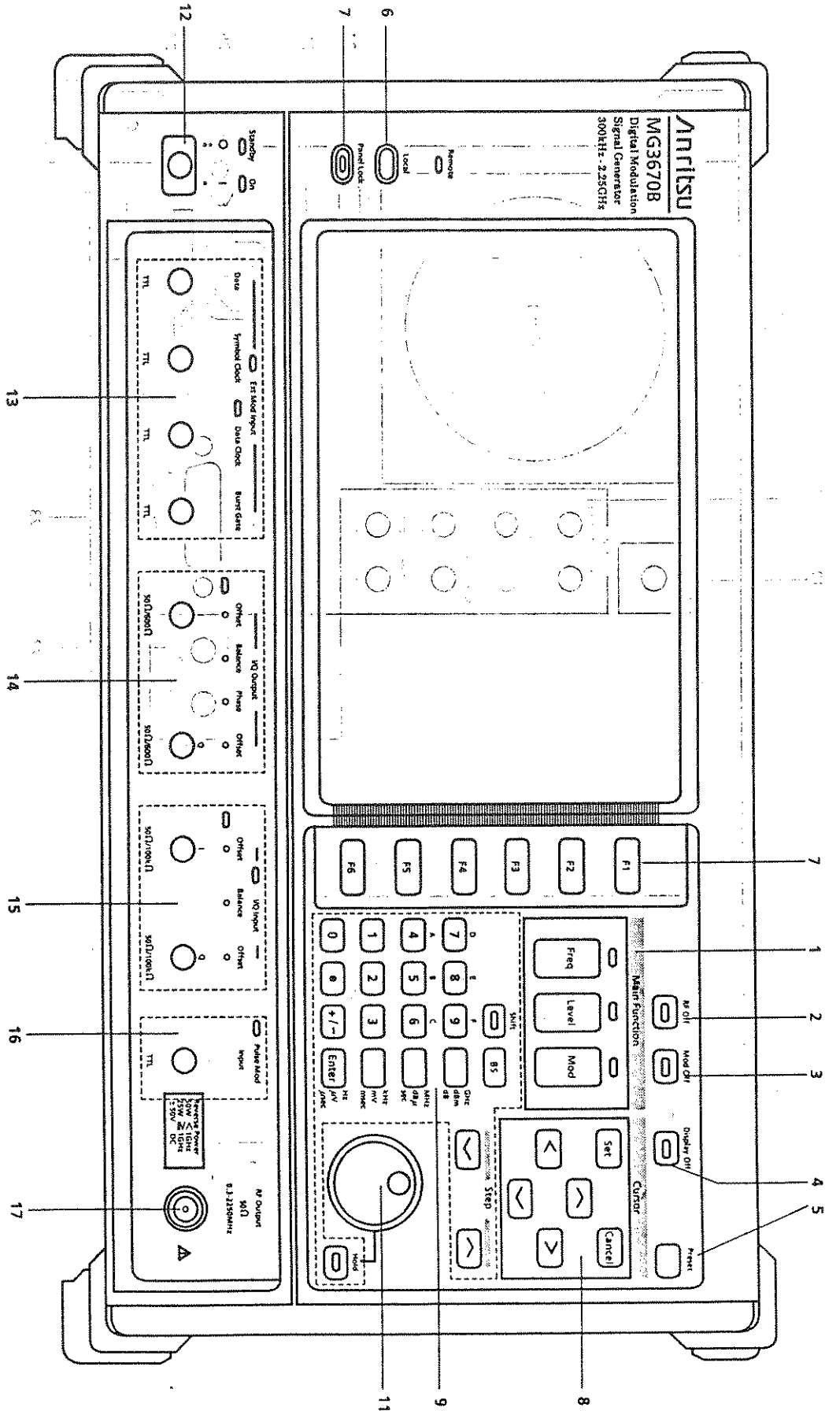


Fig. 3-1 Front Panel

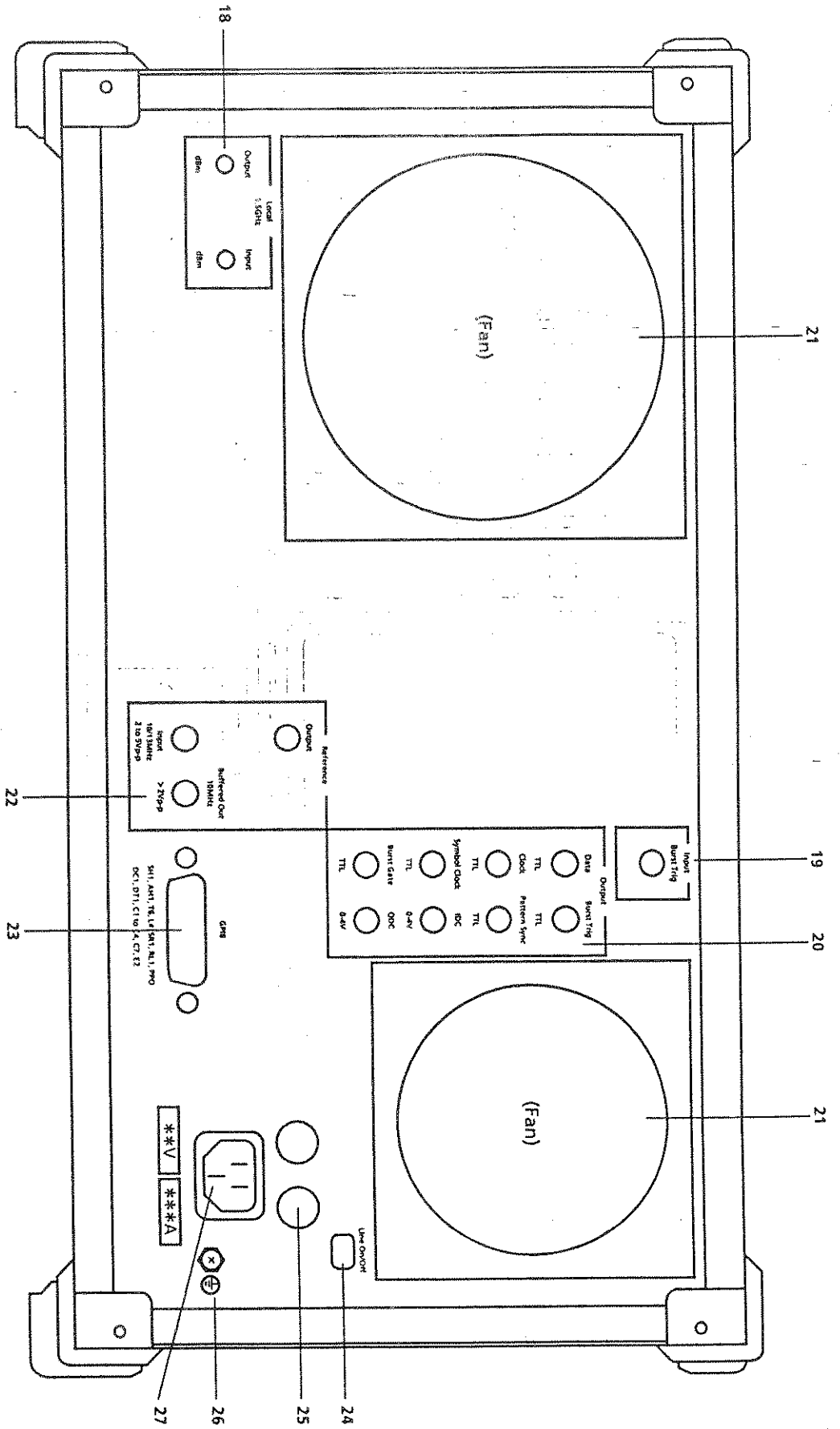


Fig. 3-2 Rear Panel

3.2 Outline of Operation

The MG3670B digital modulation signal generator is operated based on the display shown on its screen. The screen transition diagram is shown on page 3-11. The settings made in each screen are outlined below.

Note: See Section 4 for details on how to operate the MG3670B digital modulation signal generator. Appendix A 'Screen Transition' shows the screen flow as well as the setting items and function keys of each screen.

(1) Parameter setting screen:

- Frequency setting mode Sets the frequency.
Set items: Frequency, incremental step, offset, display resolution
Display mode: Offset, relative
Memory: Stores, recalls and deletes up to 1,000 frequency settings
- Output level setting mode Sets the output level.
Set items: Output level incremental step, offset, display resolution, display unit
Display mode: Offset, relative
Output mode: Normal mode, continuous variable mode (18 dB width)
- Modulation parameter setting mode Sets the modulation parameter.
Items set: I/Q signal source, system, filter, burst, pattern, burst trigger and others (setting items depend on the system.)
- Screen transition mode Switches to the IF/RF setup screen, baseband setup screen, interface setup screen, setup screen, hardware check screen and the parameter save/recall/delete/list screen.

(2) Burst internal modulation data setting screen:

- Item set: Slot frame pattern
- Memory: Up to 100 sets of modulation data can be stored, deleted and displayed in each system.

(3) IF/RF setup screen

- Items set: Reference frequency, output level upper limit, external I/Q signal and its corresponding I/O compensation, pulse modulation

(4) Baseband setup screen

- Items set: Modulation data and data clock, external I/O modulation signal (data, data clock, symbol clock, burst gate), burst trigger I/O signal, pattern synchronous output signal

(5) Interface setup screen

Items set: GPIB address, buzzer,
Display of installed units

(6) Hardware check screen

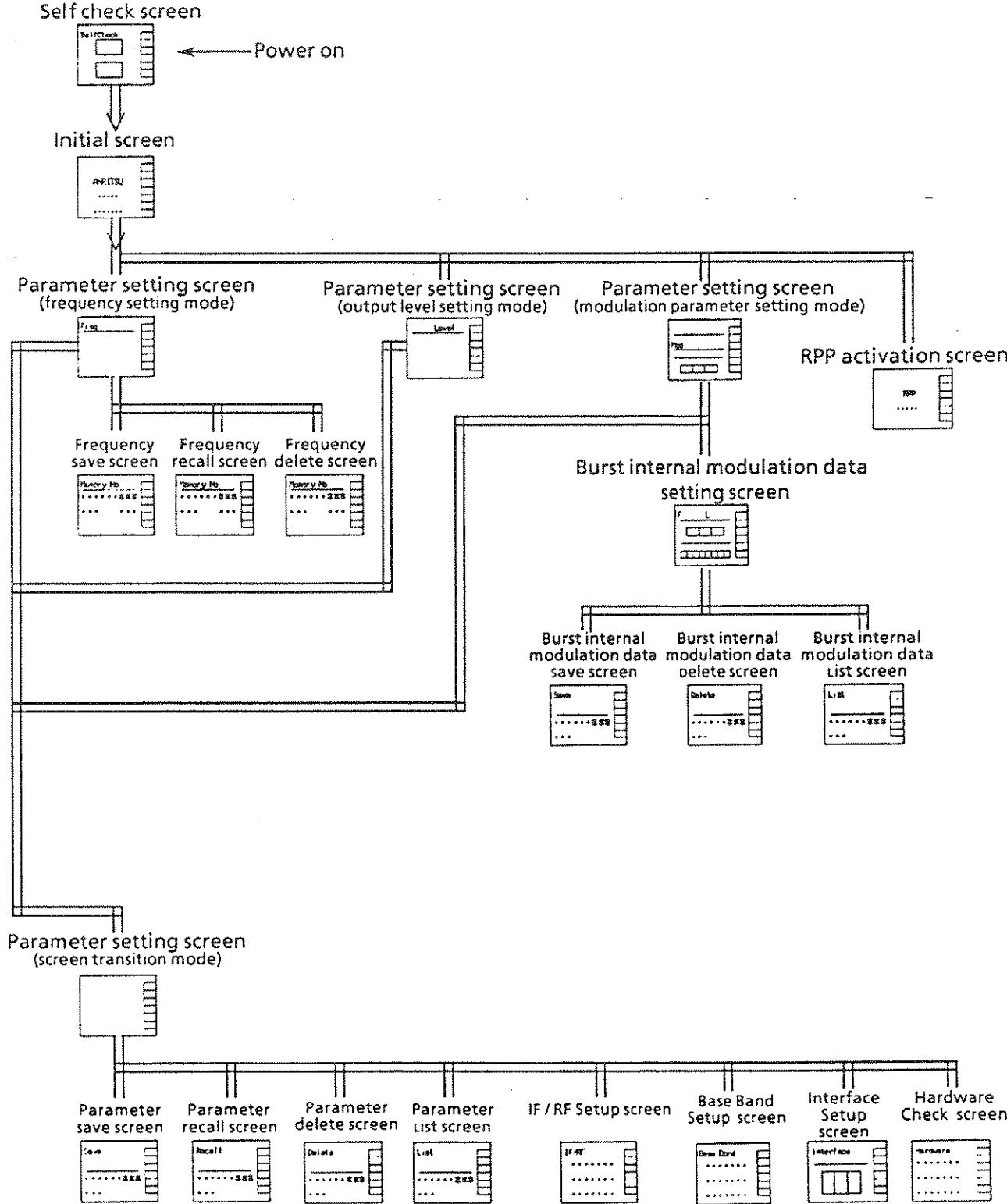
Display of self-check results at power on

(7) Parameter save/recall/delete/list screen

Memory: Stores, recalls, deletes and lists up to 100 parameter combinations set on the front panel.

(8) RPP activation screen . . . This screen is displayed when the reverse power protection (RPP) circuit is activated. In this case, reset the RPP circuit to return the MG3670B Digital Modulation Signal Generator to its previous operating condition.

Screen Transition Diagram



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SECTION 4

PANEL OPERATING INSTRUCTIONS

This section explains the manual operation of the MG3670B Digital modulation Signal Generator. See the Section on "GPIB Remote Operation" for details on remote operation.

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PROPERTY
OPERATING INSTRUCTIONS

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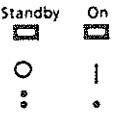

PANEL OPERATING INSTRUCTIONS

4.1 Initial Power On

CAUTION

*If the AC line voltage is unsuitable, the MG3670B may be damaged by an abnormal voltage. Before turning on the power, confirm that the AC line voltage is the rated value ** Vac.*

Switch on the power in accordance with the following procedures:

Step	Action	Verification
1	Verify that the power supply has reached the specified level and that protective grounding has been implemented.	<ul style="list-style-type: none"> ● See paragraphs 2.2 and 2.3.
2	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> Line On/Off  </div> <div> Set the rear-panel Line On/Off switch to On. </div> </div>	<ul style="list-style-type: none"> ● Power is supplied to the thermostatic oven heater of the reference crystal oscillator and the Standby lamp of the power switch on the front panel lights. Leave the MG3670B in this condition for more than 30 minutes to warm it up in order to stabilize the reference crystal oscillator.
3	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> Standby On   </div> <div> Set the front-panel Power Standby/On switch to On. </div> </div>	<ul style="list-style-type: none"> ● The On lamp of the power switch on the front panel lights. Power is then supplied to all circuits.

When the power is switched on, all LEDs are turned on and the main instrument and the units are automatically self-diagnosed. In the Self Check screen, the decision result displays 'Pass' or 'Fail' successively if it is acceptable, or unacceptable, respectively. If either the CPU, ROM or timer of the main instrument fails, or if a part (ASP-1, ASP-2, PANEL) of the PCB is not connected, self-diagnosis stops in the Self Check screen.

If no defects are found, the initial screen (Anritsu, MG3670B display) is displayed for one second and then the parameter setting screen appears. The panel settings return to their conditions before the power was switched off (i.e., preceding settings).

If the power is switched off while pressing the Preset key located in the upper right-hand corner of the front panel, all settings including the memory are initialized. To initialize the panel settings only without initializing, press the Preset key. (See paragraph 4.8).

If power is interrupted momentarily, the settings before power interruption are retained

MG3670B Digital Modulation Signal Generator

Self Check

Main

1. CPU	-----	Pass
2. ACRTC	-----	Pass
3. ROM	-----	Pass
4. RAM	-----	Pass
5. GPIB	-----	Pass
6. TIMER	-----	Pass

Unit

1. MG0303B ROM	----	Pass
2. MG0303B RAM	----	Pass
3. MG0301C ROM	----	Pass
4. MG0302A ROM	----	Pass

<Initial screen>

MG3670B Digital Modulation Signal Generator

Anritsu

MG3670B

DIGITAL MODULATION SIGNAL GENERATOR

4.2 Description of Each Screen

The contents of a screen depend on the settings being made. However, there are some contents that are common to all screens, and these are explained as follows:

(1) Screen layout

In the parameter setting screen, the frequency is displayed on the upper left, the output level on the upper right, the modulation parameter on the lower left and the function keys on the right side of the screen.

(2) Cursor

- The cursor is displayed in reverse-video. However, there is no cursor in GPIB remote mode.
- The cursor can be navigated through items enclosed within '[' and ']'.
• If the cursor is moved and the Set key is pressed, a window will open.

(3) Inputting data

Parameter data are input in window format as shown below.

Step	Procedure
1	Move the cursor to the parameter to be set using the [^], [v], [<], and [>] Cursor keys.
2	Press the Set key to open a window.
3	To input or select a number, use the [^] and [v] Cursor keys, [^] and [v] Step keys, and the rotary knob. To correct an entry, use the BS key to delete the entry and then re-input it.
4	If a ▷ mark is indicated in the window, press the Set or Enter key to advance to a sub-window (window of lower hierarchy) in which data will be set.
5	Press the Set or ENTER key to validate the settings and close the window.
6	To return the setting values to the previous settings and close the window, press the Cancel key.

(4) Function keys

- If an '*' is displayed inside the frame of a function key, press that key to display the sub-function keys (lower hierarchy keys) that belong to it. If an '→' is displayed inside the frame of a function key, press that key to switch from the current screen to another.
- For items having two selections, press the appropriate function key to switch between the two selections.

MG3670B Digital Modulation Signal Generator				Freq
Freq : 1234.567890 MHz	Level : -143.0 dB	Offset Relative	Offset Relative	Incremental Step Value
Ref Freq : 10MHz	EMF Uncal	EMF Uncal	Relative Continuous	Relative None/ Off
Modulation Mode : I.Q Source : [RNYQ]				Frequency → Save
System : [PDC]				Frequency → Recall
Mod : $\pi/4$ DQPSK	Bit Rate : 42.0kbps	Filter : [RNYQ] $\alpha=0.50$ Phase Encode : [Normal]		Frequency → Delete
Burst : [On]	Pattern : [UP TCH]	Trigger : [Int]		etc *

4.3 Setting Carrier Frequency

4.3.1 Setting the carrier frequency

Press the Main Function section Freq key on the front panel to switch to carrier frequency (hereinafter referred to as frequency) setting mode. The Freq key's LED will light and the cursor is displayed in the frequency setting area.

There are three methods of setting the frequency:

- Setting the frequency using the data keys
- Setting the frequency using the rotary knob
- Setting the frequency using [\wedge] and [\vee] Step keys

Frequency setting range 0 to 2.25 GHz
 Minimum frequency resolution 1 Hz
 Initial frequency setting 10 MHz

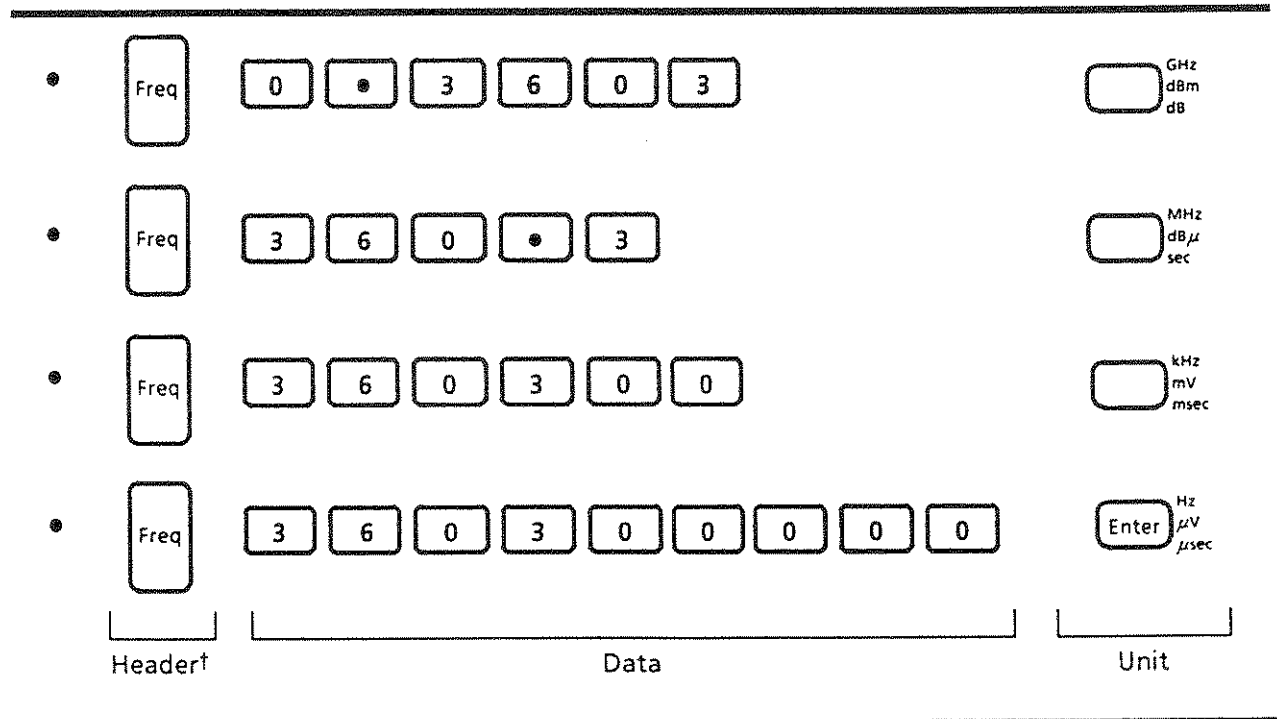
Note: An error occurs if the upper (2.25 GHz) and lower (0 Hz) frequency limits are exceeded. 'Uncal' is indicated when the frequency is set within the 0 to 300 kHz range. The lower frequency limit depends on the system. Refer to the user's manual of each modulation unit.

(1) Setting the frequency using the data keys

When a data key is pressed in the frequency setting mode, the frequency setting window opens and the data entered is echoed back in the window. After data is entered and a unit key is pressed, the set frequency is displayed in the frequency setting field.







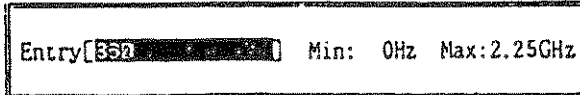





To set the frequency using data keys, follow the procedures below.

Example: Shown below are four key operation methods for setting 360.3 MHz.



† If the Freq key's LED is already lit, there is no need to press the Freq key.

The window display will be as shown below when the second key operation method on the preceding page is used.

Step	Action	Window display
1		Enters the frequency setting mode and lights the Freq key's LED. 
2		If a data key is pressed, the frequency setting window opens and the data entered is echoed back in the window.
3		
4		
5		
6		
7		Press the unit key, and the data entered is validated and the window closes. The frequency displayed will be 360.300000 MHz.

- Notes:
- If the Set key is pressed instead of the unit key, the data entered is treated as Hz.
 - If a number less than 1 Hz is attempted to be set, the number is truncated.
 - An error message is displayed if a frequency beyond the displayed range is attempted to be set. The current frequency setting is then displayed without setting the attempted frequency.





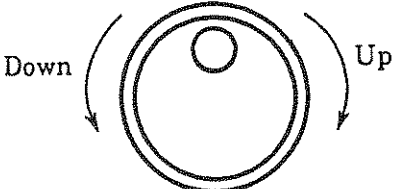
(2) Setting the frequency using the rotary knob

The rotary knob can be used to increment or decrement the frequency by the amount (increment or decrement resolution) set using the [<] and [>] Cursor keys.

The resolution can be set between 1 Hz and 1 GHz. The initial resolution is 1 Hz. The position of the resolution setting column is displayed in reverse video. If the CURSOR keys are held down continuously, the cursor moves one digit at a time.

To set the frequency using the rotary knob, follow the procedures below.

Example: This example sets the frequency to 360.3 MHz and continuously varies the frequency at a resolution of 10 Hz.

Step	Action	Verification
1		Enters the frequency setting mode and lights the Freq key's LED. The cursor is then displayed on the resolution setting column in the frequency setting field.
2		Sets the frequency to 360.3 MHz.
3	Cursor  or  Set the resolution in the frequency setting field to 10 Hz.	The resolution is set to 10Hz.
4		Use of the rotary knob allows the frequency to vary continuously in 10 Hz steps

† If the Freq key's LED is already lit, there is no need to press the Freq key.

Notes: *Disabling the rotary key using the Hold key*

- If the Hold key is pressed, the Hold key's LED lights and the frequency cannot be varied even if the rotary knob is turned.
- If the Hold key is pressed again, the Hold key's LED is turned off and the rotary knob is released from its hold condition.

The hold condition does not change even if other header keys are pressed.

(3) Setting the frequency using the Step key

When the Step key is pressed in the frequency setting mode, the frequency is incremented or decremented by an amount equal to the incremental step frequency that has been set. If the Step key is held down continuously, the frequency is incremented or decremented continuously.

■ Setting the incremental step frequency



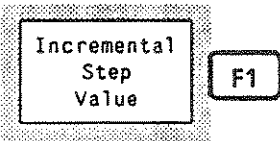



When the 'Incremental Step Value' F1 soft key is pressed in the frequency setting mode, the incremental step frequency setting window opens and the currently set incremental step frequency is displayed.

At this time, set the incremental step frequency using the data and unit keys. If the incremental step frequency is set using the Step key or rotary knob, press the Set key after setting.

Incremental step frequency setting range 1 Hz to 2.25 GHz
 Minimum incremental step frequency resolution 1 Hz
 Initial incremental step frequency setting 1 MHz

To set the frequency using the Step key, follow the procedures below.

Example: This example sets the frequency to 360.3 MHz and increments or decrements the frequency in 12.5 kHz steps.

Step	Action	Verification
1		Enters the frequency setting mode and lights the Freq key's LED.
2		Sets the frequency to 360.3 MHz.
3		Opens the incremental step frequency setting window and displays the current incremental step frequency setting.
4		Sets the incremental step frequency to 12.5 kHz.
5	Press the  Step key.	Increments the frequency by 12.5 kHz to 360.3125 kHz.
6	Press the  Step key.	Decrements the frequency by 12.5 kHz to 360.3 MHz.

† If the Freq key's LED is already lit, there is no need to press the Freq key.

Notes: If the incremental step frequency is entered using the data keys, the incremental step frequency is entered in Hz unit when the Set key is pressed instead of the unit key.

4.3.2 Setting the carrier frequency display mode

Normally, the frequency displayed is the actual frequency value. However, the following modes can be set to change the displayed value.

- Frequency offset mode Mode in which the displayed value and the actual output value differ by an amount referred to as the Offset Value.
- Relative frequency display mode Mode in which the displayed value is relative to a given value

(1) Frequency offset mode

If the 'Offset On/Off' F2 soft key is pressed and switched on in the frequency setting mode, the offset mode is set and Offset is displayed.

At this time, the actual output frequency does not change, but the displayed frequency increases by an amount equal to the offset value.

$$\text{Displayed frequency} = \text{Actual output frequency} + \text{frequency offset value}$$

When the offset mode is on, press the 'Current Frequency' F3 soft key to display the actual output frequency in 1-second intervals for verification.

■ Setting the offset frequency value

When the 'Offset Value' F1 soft key is pressed in the frequency setting mode, the offset frequency setting window opens and the currently set offset frequency is displayed. At this time, set the offset frequency using the data and unit keys.

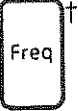
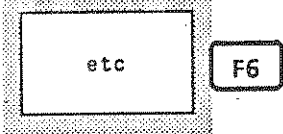



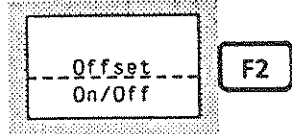
If the offset frequency is set using the Step key or rotary knob, press the Set key after setting.

Offset frequency setting range	- 2.25 to + 2.25 GHz
Minimum offset frequency setting resolution	1 Hz
Initial offset frequency setting value	0 Hz

Notes: ● *If the offset frequency is entered using the data keys, the offset frequency is entered in Hz unit when the Set key is pressed instead of the unit key.*

- 'Current Frequency' F3 soft key appears only at the offset frequency mode.

Example: In this example, the offset frequency is set to 25 kHz and the output frequency to 360.3 MHz. The displayed frequency in offset mode will be 360.325 MHz.

Step	Action	Verification
1		Enters the frequency setting mode and lights the Freq key's LED.
2		Freq menu 2 is displayed. (☞ See Appendix A.)
3		The offset setting window opens and the current offset value is displayed. (☞ See Appendix A.)
4		Set the offset value to 25 kHz.
5		Sets the frequency to 360.3 MHz.
6		The offset mode is set and a frequency of 360.325 MHz is displayed.

† If the Freq key's LED is already lit, there is no need to press the Freq key.

(2) Relative frequency display mode

If the 'Relative On/Off' F2 soft key is pressed and switched on in the frequency setting mode, the relative frequency display mode is set and Relative is displayed. At this time, the frequency value relative to the frequency value before the key was switched on is displayed. A frequency of 0 Hz is displayed immediately after On is set.

When the Relative soft key is on and the relative frequency is varied using the rotary knob or Step key, the actual frequency output is as follows:


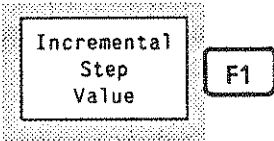




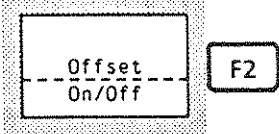

$$\text{Output frequency} = \text{Relative frequency display value} + \text{preceding frequency set to On}$$

When the Relative soft key is on and the frequency is set using the data key, the actual frequency is set and the displayed value is as follows:

$$\text{Relative frequency display value} = \text{output frequency} - \text{preceding frequency set to On}$$

When the relative mode is on, press the 'Current Frequency' F3 soft key to display the actual output frequency in 1-second intervals for verification.

Example: In this example, the incremental step frequency is set to 12.5 kHz and the output frequency to 360.3 MHz. The frequency in relative mode is incremented by 12.5 kHz.

Step	Action	Verification
1		Enters the frequency setting mode and lights the Freq key's LED.
2		The incremental step setting window opens and the current incremental step value is displayed. ( See Appendix A.)
3		Sets the incremental step value to 12.5 kHz. ( See Appendix A.)
4		Sets the frequency to 360.3 MHz.
5		The offset mode is set and a frequency of 0 Hz is displayed.
6	Press the  Step key.	The frequency is incremented by 12.5 kHz and a frequency of 12.5 kHz is displayed.

† If the Freq key's LED is already lit, there is no need to press the Freq key.

4.3.3 Carrier frequency memory

The MG3670B can store, recall and delete as much as 1,000 carrier frequency settings.

The 'Frequency Recall' F4 soft key and the 'Frequency Delete' F5 soft key are displayed for recall and deletion when frequency data are stored.

Memory location number range 0 to 999
 Initial memory location number 0



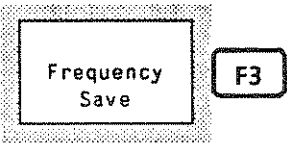

(1) Frequency save (storing a frequency setting)

If the 'Frequency Save' F3 soft key is pressed in the frequency setting mode, the frequency save screen is displayed. Specify the memory location number using the data keys, rotary knob, Step keys or the Cursor keys. Press the Set or Enter key to store the frequency in the specified memory location.

The initial memory location is the currently available memory having the smallest number.

If a frequency setting is already stored in the memory location that was specified, a Yes/No window opens to verify if the current frequency setting will be overwritten or not. The initial value is No. Use the Cursor keys to select Yes and then press the Set key to overwrite the frequency currently stored. After the frequency has been saved, the MG3670B returns to the frequency setting mode.

Example: In this example, the output frequency is set to 360.3 MHz and then saved in memory location number 10.

Step	Action	Verification
1		Enters the frequency setting mode and lights the Freq key's LED.
2		Sets the frequency to 360.3 MHz.
3		The frequency save screen appears.
4		Specifies memory location number 10. (If a frequency setting is already stored in memory location 10, a Yes/No window opens to verify if the current frequency setting will be overwritten or not. The initial value is No. Use the CURSOR keys to select Yes and then press the Set key to overwrite the current frequency setting.)

† If the Freq key's LED is already lit, there is no need to press the Freq key.



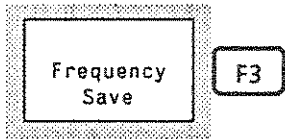

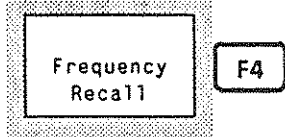

(2) Frequency recall (Retrieving a frequency from memory)

If the 'Frequency Recall' F4 soft key is pressed in the frequency setting mode, the frequency recall screen is displayed. Specify the memory location number using the data keys, rotary knob, Step keys or the Cursor keys. Press the Set or Enter key to retrieve the frequency from the specified memory location.

The initial memory location is the currently saved memory having the smallest number.

If there is no frequency stored in the specified memory location, the cursor moves only to the memory location. After the frequency has been retrieved, the MG3670B returns to the frequency setting mode.

Example: In this example, the output frequency is set to 360.3 MHz, saved into memory location number 10 and then retrieved for confirmation.

Step	Action	Verification
1		Enters the frequency setting mode and lights the Freq key's LED.
2		Sets the frequency to 360.3 MHz.
3		The frequency save screen appears.
4		Specifies memory location number 10. (The frequency is stored into memory location 10 and then the MG3670B returns to the frequency setting mode.)
5		The frequency recall screen appears.
6		Retrieves the frequency stored in memory location 10.

† If the Freq key's LED is already lit, there is no need to press the Freq key.

(3) Frequency Delete (Deleting a frequency from memory)



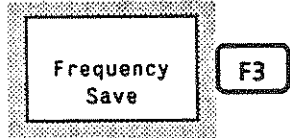

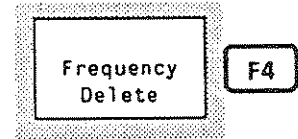

When the ' Frequency Delete ' F5 soft key is pressed in the frequency setting mode, the frequency delete screen appears. Specify the memory location number using the data keys, rotary knob, Step keys or the Cursor keys and then press the Enter or the Set key.

A Yes/No window opens to verify whether to delete the frequency or not. The initial value is No. Use the Cursor keys to select Yes and then press the Set key to delete the frequency.

After the frequency has been deleted, the MG3670B does not return to the frequency setting screen, allowing other frequency settings to be deleted. The initial memory location is the currently saved memory having the smallest number. If there is no frequency stored in the specified memory location, the cursor moves only to that memory location.

When the ' Delete All ' F4 soft key is pressed in the frequency delete screen, ' All ' is displayed in the memory number item and all the frequency settings are displayed in reverse-video. A Yes/No windows opens to verify whether or not to delete all frequency settings. The initial value is No. Use the Cursor keys to select Yes and then press the Set key to delete all of the frequency settings.

Example: In this example, the output frequency is set to 360.3 MHz, saved into memory location number 10 and then deleted.

Step	Action	Verification
1		Enters the frequency setting mode and lights the Freq key's LED.
2		Sets the frequency to 360.3 MHz.
3		The frequency save screen appears.
4		Specifies memory location number 10. (The frequency is stored into memory location 10 and then the MG3670B returns to the frequency setting mode.)
5		The frequency delete screen appears.
6		Specifies memory location number 10. (A Yes/No window opens to verify whether or not to delete the frequency setting. The initial value is No.)

† If the Freq key's LED is already lit, there is no need to press the Freq key.

4.4 Setting Output Level

4.4.1 Setting the output level

Press the Main function section Level key on the front panel to switch to output level setting mode. The Level key's LED will light and the cursor key is displayed in the output level setting area.

There are three methods of setting the output level:

- Setting the output level using the data keys
- Setting the output level using the rotary knob
- Setting the output level using [\wedge] and [\vee] Step keys

Output level setting range -143 to +13 dBm
 Minimum output level setting resolution 0.1 dB
 Initial output level setting -30 dBm

The minimum output level setting resolution is 0.1 dB, regardless of the unit. The table below shows the setting ranges for each output level unit and the minimum resolution for each range.

Unit	Output level	Minimum	
		Display resolution	Output level resolution
dBm	-143.0 to 13.0 dBm	0.1 dB	0.1 dB
dB μ	-30.0 to 126.0 dB μ (-36.0 to 120.0 dB μ) [†]	0.1 dB	0.1 dB
V	2.00 to 1.00 V (1.00)	0.01 V	0.1 dB
mV	999 to 100 mV	1 mV	0.1 dB
	99.9 to 10.0 mV	0.1 mV	0.1 dB
	9.99 to 1.00 mV	0.01 mV	0.1 dB
μ V	999 to 100 μ V	1 μ V	0.1 dB
	99.9 to 10.0 μ V	0.1 μ V	0.1 dB
	9.99 to 1.00 μ V	0.01 μ V	0.1 dB
	0.999 to 0.032 μ V (0.016)	0.001 μ V	0.1 dB

[†] Items enclosed in parentheses represents terminated voltage display.

Notes: • If the output level specified exceeds the upper (13.0 dBm) or lower limit (-143.0 dBm) level defined in the IF/RF setup screen, error occurs.

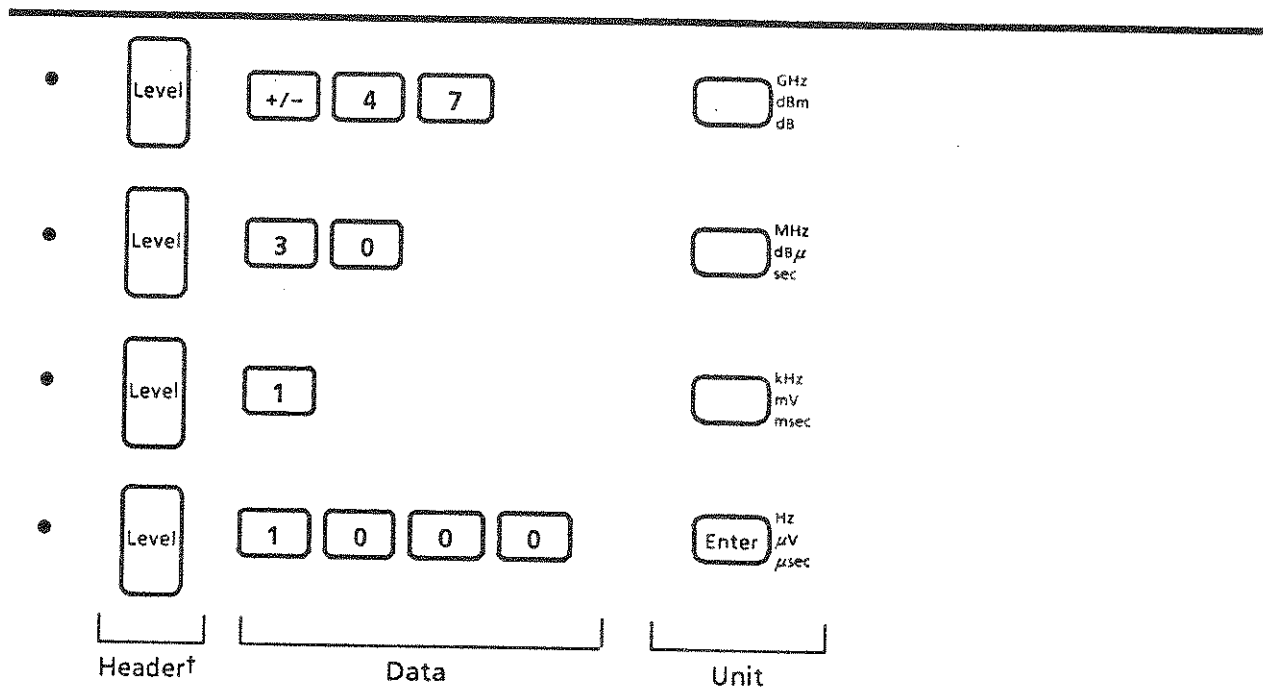
- If the output level is set between -143.0 to -136.1 dBm, "Uncal" is displayed.

(1) Setting the output level using the data keys

When a data key is pressed in the output level setting mode, the output level setting window opens and the data entered is echoed back in the window. After data is entered and a unit key is pressed, the set output level is displayed in the output level setting field.








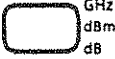
To set the output level using data keys, follow the procedures below.

Example: Shown below are four methods of setting -47 dBm (30 dB μ , 1 mV, 1000μ V) using the data keys.



† If the Level key's LED is already lit, there is no need to press the Level key.

The window display will be as shown below when the first key operation method on the preceding page is used.

Step	Action	Window display
1		Enters the output level setting mode and lights the Level key's LED. 
2		If a data key is pressed, the output level setting window opens and the data entered is echoed back in the window.
3		
4		
5		If the unit key is pressed, the data entered is validated and the window closes. The output level displayed will be -47.0 dBm.

Notes: • If the Set key is pressed instead of the unit key, the unit currently displayed is used.

• If a number less than 0.1 dB is set, the number is truncated.

• An error message is displayed if an output level beyond the displayed range is set. The current output level setting is then displayed without setting the attempted output level.

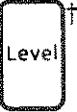



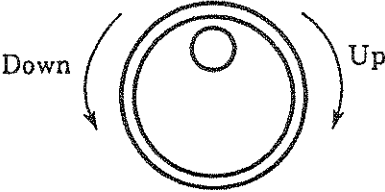
(2) Setting the output level using the rotary knob

The rotary knob can be used to increment or decrement the output level by the amount (increment or decrement resolution) set using the [<] and [>] Cursor keys.

If the Cursor keys are held down continuously, the cursor moves one digit at a time. The initial column is the rightmost column. The position of the resolution setting column is displayed in reverse video.

To set the output level using the rotary knob, follow the procedures below.

Example: This example sets the output level to 30 dB μ and varies the level at a resolution of 1 dB.

Step	Action	Verification
1		Enters the output level setting mode and lights the Level key's LED. The cursor is then displayed on the resolution setting column in the output level setting field.
2		Sets the output level to 30 dB μ .
3	Cursor  or 	Sets the resolution in the output level setting field to 1 dB.
4		Use the rotary knob to vary the output level in a resolution of 1 dB steps.

† If the Level key's LED is already lit, there is no need to press the Level key.

Notes: *Disabling the rotary key using the Hold key:*

- *If the Hold key is pressed, the Hold key's LED lights and the output level cannot be varied even if the rotary knob is turned.*
- *If the Hold key is pressed again, the Hold key's LED is turned off and the rotary knob is released from its hold condition.*

The hold condition does not change even if other header keys are pressed.

(3) Setting the output level using the Step key

When the Step key is pressed in the output level setting mode, the output level is incremented or decremented by an amount equal to the step output level that has been set. If the Step key is held down continuously, the level is incremented or decremented continuously.

■ Setting the incremental step output level



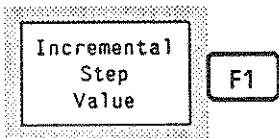



When the 'Incremental Step Value' F1 soft key is pressed in the output level setting mode, the step output level setting window opens and the currently set step output level is displayed. At this time, set the step output level using the data and GHz/dBm/dB unit key.

If the step output level is set using the Step key or the rotary knob, press the GHz/dBm/dB key after setting.

Incremental step output level setting range 0.1 to 156 dB
 Minimum incremental step output level 0.1 dB
 Initial incremental step output level setting 1 dB

To set the output level using the Step key, follow the procedures below.

Example: This example sets the output level to 30 dB μ and increments or decrements it in 1 dB steps.

Step	Action	Verification
1		Enters the output level setting mode and lights the Level key's LED.
2		Sets the output level to 30 dB μ .
3		Opens the step output value setting window and displays the current step output value setting.
4		Sets the step output level to 1 dB.
5	Press the  Step key.	Increments the output level by 1 dB to 31 dB μ .
6	Press the  Step key.	Decrements the frequency by 1 dB to 30 dB μ .

† If the Level key's LED is already lit, there is no need to press the Level key.

Notes: If the incremental step output level is entered using the data keys, the step output level is entered in dB unit. when the Set key is pressed instead of the unit key.

4.4.2 Setting the output level display mode

Normally, the output level displayed is the actual value of the output level. However, the following modes can be set to change the displayed value.

- Level offset mode Mode in which the displayed value and the actual output value differ by an amount referred to as the Offset Value.
- Relative level display mode Mode in which the displayed value is relative to a given value

(1) Level offset mode

If the ' Offset On/Off ' F2 soft key is pressed and switched on in the output level setting mode, the offset mode is set and Offset is displayed.

At this time, the actual output level does not change, but the displayed output level increases by an amount equal to the offset value.

$$\text{Displayed output level} = \text{Actual output level} + \text{output level offset value}$$

When the offset mode is on, press the ' Current Level ' F3 soft key to display the actual output level in 1-second intervals for verification.

■ Setting the output level offset value





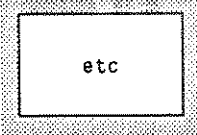

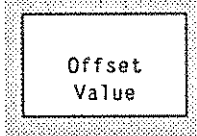





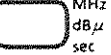
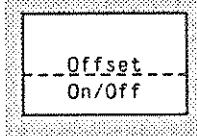

When the ' Offset Value ' F1 soft key is pressed in the output level setting mode, the offset frequency setting window opens and the currently set offset level is displayed. At this time, set the offset level using the data and GHz/dBm/dB keys.

Offset level setting range	- 55.0 to 55.0 dB
Minimum offset level setting resolution	0.1 dB
Initial offset level setting value	0 dB

Notes: ● If the output level offset is entered using the data keys, the offset level is entered in dB unit when the Set key is pressed instead of the unit key.

- ' Current Level ' F3 soft key appears only at the offset level mode.

Example: In this example, the output level offset is set to 3 dB and the output level to 30 dB μ . The displayed output level in offset mode will be 33 dB μ .

Step	Action	Verification
1	   	Enters the output level setting mode and lights the Level key's LED.
2	 	Level menu 2 is displayed. (See Appendix A.)
3	 	The output level offset setting window opens and the current output level offset value is displayed.
4	 	Sets the output level offset value to 3 dB.
5	  	Sets the actual output level to 30 dB μ .
6	 	The offset mode is set and an output level of 33 dB μ is displayed.

† If the Level key's LED is already lit, there is no need to press the Level key.

(2) Relative level display mode

If the 'Relative On/Off' F2 soft key is pressed and switched on in the output level setting mode, the relative level display mode is set and Relative is displayed. 0 dB is displayed immediately after the Relative soft key is switched on.

When the Relative soft key is on and the relative output level is varied using the rotary knob or Step key, the actual output level is as follows:


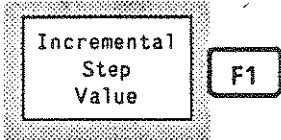


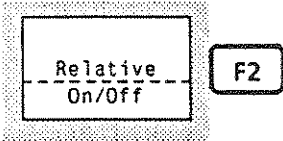

$$\text{Output level} = \text{Relative level display value} + \text{preceding output level set to On}$$

When the Relative soft key is on and the level (relative level) is set using the data key, the actual output level is set and the displayed value is as follows:

$$\text{Relative value} = \text{output frequency} - \text{preceding level set to On}$$

When the relative mode is on, press the 'Current Level' F3 soft key to display the actual output level in 1-second intervals for verification.

Example: In this example, the incremental step value is set to 1 dB and the output level to 30 dB μ . The output level in relative mode is incremented by 3 dB.

Step	Action	Verification
1		Enters the level setting mode and lights the Level key's LED.
2		The incremental step setting window opens and the current incremental step value is displayed. (See Appendix A.)
3		Sets the incremental step value to 1 dB.
4		Sets the output level to 30 dB μ .
5		The relative mode is set and an output level of 0 dB is displayed.
6	Press the  Step key three times	The output level is incremented by 3 dB and an output level of 3 dB is displayed.

† If the Level key's LED is already lit, there is no need to press the Level key.

4.4.3 Switching On / Off the output

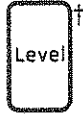





When the RF Off key on the front panel is pressed, the output is switched between On and Off. When the output is switched from Off to On, the output level before it was switched Off is set. The LED Lights with the RF Off key set to Off.

The output can be switched on through any of the following operations:

- Pressing the unit key
- Rotating the rotary knob once
- Clicking the Step key once

The incremental step and offset values can be set even if the output is off.

Example: In this example, the output level is set to 30 dB μ and the output is switched off and then on.

Step	Action	Verification
1	 †	Enters the level setting mode and lights the Level key's LED.
2	  	Sets the output level to 30 dB μ .
3		Switches the output level off.
4		Switches the output level on and outputs 30 dB μ .

† If the Level key's LED is already lit, there is no need to press the Level key.



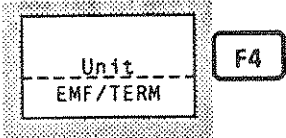
4.4.4 Selecting between open-circuit (EMF) voltage / terminated (TERM) voltage

For output levels in voltage units (dB μ , V, mV, μ V), the 'Unit EMF/TERM' F4 soft key can be used to select between open-circuit (EMF) voltage and terminated (TERM) voltage. When open voltage is selected, EMF is displayed.

This function does not work if the output level is in power unit (dBm) or relative level unit (dB).

- Initial setting Open-circuit (EMF) voltage

Example: This example sets the output level to terminated (TERM) voltage at 1 mV.

Step	Action	Verification
1		Enters the output level setting mode and lights the Level key's LED.
2		Sets the output level to 1 mV.
3		Specifies terminated (TERM) voltage


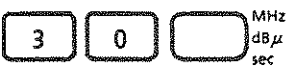
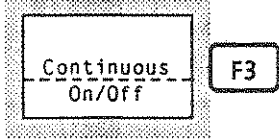
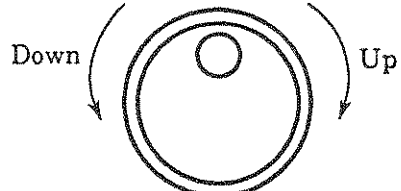
† If the Level key's LED is already lit, there is no need to press the Level key.

4.4.5 Continuous mode

Press the 'Continuous On/Off' soft F3 key to activate continuous mode. In this mode, the rotary knob can be used to continuously vary the output level currently set by -12 to 6 dB (18 dB range) without signal interruption. In this mode, the Step and data keys cannot be used.

● Initial setting Continuous Off

Example: In this example, the output level is set to 30 dB μ and varied within the 36 to 18 dB μ range.

Step	Action	Verification
1		Enters the output level setting mode and lights the Level key's LED.
2		Sets the output level to 30 dB μ .
3		Activate Continuous mode.
4		Varies the output level using the rotary knob.






† If the Level key's LED is already lit, there is no need to press the Level key.

4.4.6 Changing the output level unit

Press the [dBm], [dB μ], [mV] or [μ V] key on the front panel to change the displayed unit of the output level without changing the actual output.

● Initial setting dBm

Example: In this example, the output level is set to 30 dB μ and the unit is changed to dBm.

Step	Action	Verification
1	 †	Enters the output level setting mode and lights the Level key's LED.
2	   <small>MHz dBμ sec</small>	Sets the output level to 30 dB μ (-77 dBm).
3	 <small>GHz dBm dB</small>	Sets the output level unit to dBm. (-77 dBm is displayed.)











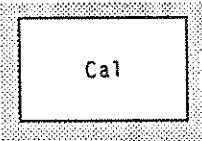

† If the Level key's LED is already lit, there is no need to press the Level key.

4.4.7 Level calibration

The output level can be calibrated by pushing the 'CAL' F5 soft key under the following conditions.

- When modulation is On and the I/Q signal source is external
- When modulation and the burst function are On and the trigger is external
- When modulation and the burst function are On and the data is external
- When pulse modulation is external

Example: In this example, the output level is set to 30 dB μ , modulation is switch on, the external IQ signal is fed and the output level is calibrated.

Step	Action	Verification
1		Enters the output level setting mode and lights the Level key's LED.
2	  	Sets the output level to 30 dB μ .
3		The modulation parameter setting mode is activated.
4		The Source window opens (set to Int).
5	Press the  Cursor key, then  .	Changes Int to Ext and closes window.
6	 	Feeds external I/Q signal.
7	 	Calibrates the output level.

†1 If the Level key's LED is already lit, there is no need to press the Level key.

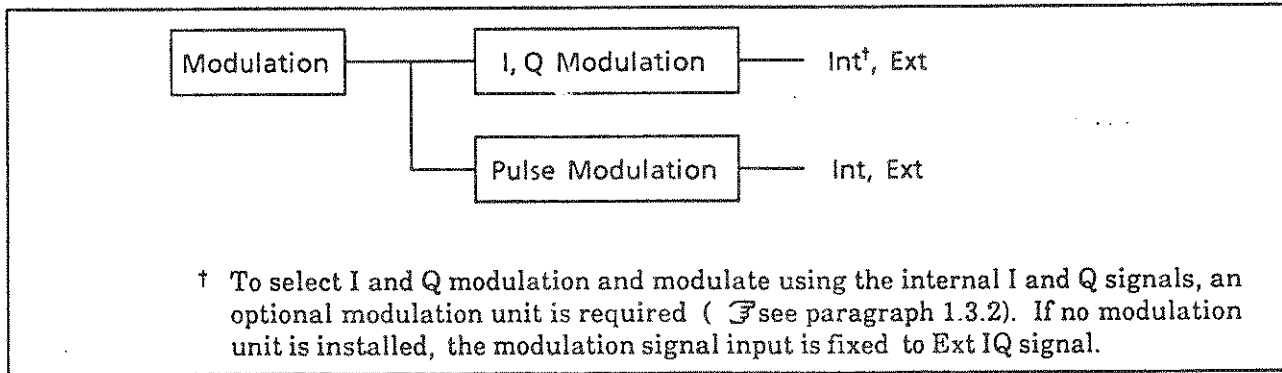
†2 When [Cal: F5] key is pressed, the MG3670B calibrates the RF output level using the internal I/Q signal. When an external I/Q signal is used, input the specified level I/Q signal^{†3} to match the RF output level with the indication.

†3 Set the I/Q signal input level to the value set on the IF/RFSetup menu (see 4.6.1) of the MG3670B. The input level error affects the RF output level error.

4.5 Modulation Settings

The MG3670B provides I, Q modulation, pulse modulation, and simultaneous modulation combining these two modulation methods. However, if Source Int is specified when Burst On is set, pulse modulation using external pulse modulation signals is not possible.

■ Modulation tree structure



4.5.1 Modulation using I and Q signals

There are two methods of feeding I and Q signals to be used for modulation: namely, the external feeding method and the internal feeding method. (Refer to the user's manual of the modulation unit for details on setting Source Int/Ext.) To feed I and Q signals from an external source, use the I and Q input connectors on the front panel.

Note: To modulate using the internal I and Q signals, a modulation unit for generating the I and Q signals is necessary. Refer to the user's manual of the modulation unit for details on how to modulate using the internal I and Q signals..

(1) I and Q signal input level

The input level of the I and Q signals must be adjusted to meet the input and output (I/O) level requirements. The table below shows the appropriate input level for each setting. (See paragraph 4.6.1 for details on how to set the input and output (I/O) levels of the I and Q signals.)

I/O Level Setting and Input Level

Setting	Input level
50 Ω 500 mV selection	$\sqrt{I^2 + Q^2} = 500$ [mVrms], and $\sqrt{I^2 + Q^2} \leq 750$ [mVp-p]
CMOS selection	$\sqrt{(I - \text{Offset})^2 + (Q - \text{Offset})^2} = \text{Amp}$ [mVrms] and $\sqrt{(I - \text{Offset})^2 + (Q - \text{Offset})^2} = (\text{Amp} \times 1.5)$ [mVp-p] Amp: Input level setting (50 to 500 mVrms in 50 mVrms steps) Offset: Offset voltage setting (0 to 4,000 mV in 1 mV steps)

Note: The values of I and Q are terminated voltage values.

Terminating impedance: 50 Ω (when 50 Ω , 500 mVrms is selected)

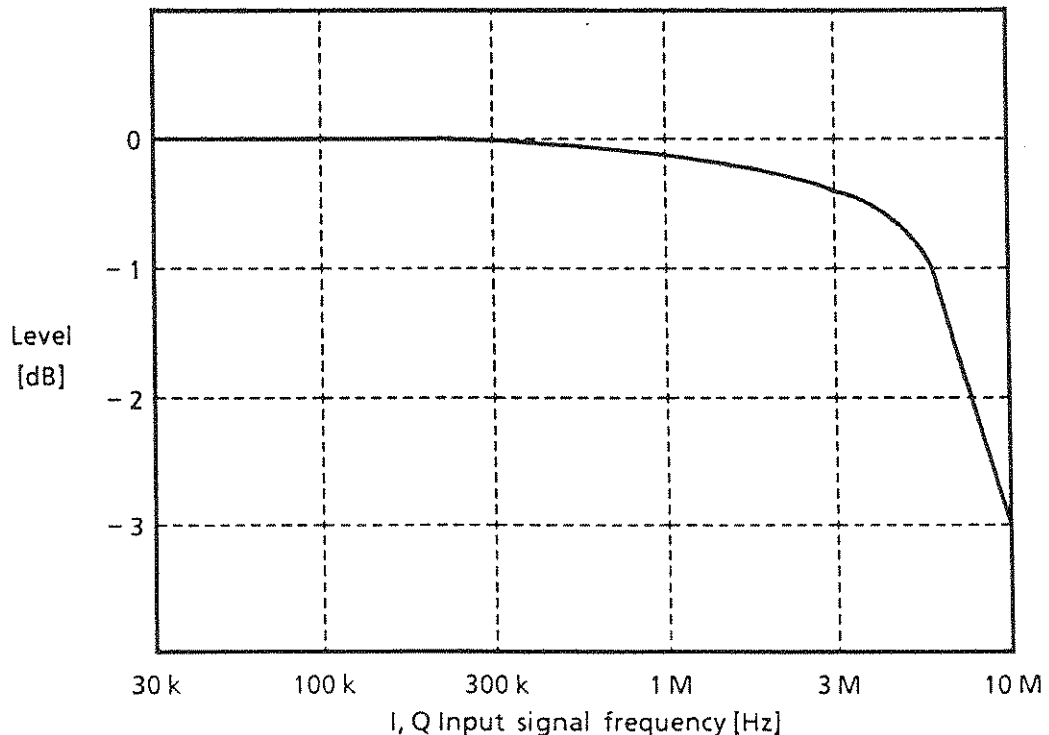
100 k Ω (when CMOS is selected)

The error between I/Q signal input level and set value affects the RF output level error. It is, therefore, required to input an I/Q signal having the same level as the set value in order to obtain the RF output level indicated on the screen.

(2) Frequency of input I/Q signals

The input frequency ranges of I/Q signals from 0 to 1.2 MHz. The graph below shows the relationship between the input frequency and the output level (At 50 Ω , 500 mVrms)

Frequency Response at I/Q External Modulation (Typ. Value)



(3) Balance and offset adjustment functions for the I and Q input signals

When the trimmer function for the I/Q input is switched on, the I/Q input adjustment trimmers on the front panel are activated. (See paragraph 4.6.1 for more details.)

When the I/Q input trimmers on the front panel are activated, they can be twisted to adjust the balance and the offset of the I/Q signal.

■ Balance adjustment function

This function adjusts the amplitude balance of the I/Q signal. The adjustment circuit fixes the amplitude of the Q signal, while the amplitude of the I signal is varied within $\pm 20\%$.

■ Offset adjustment function

This function adjusts the offset voltages of the I and Q signals. The adjustment circuit adds an offset voltage within the ± 0.1 volt range to the input signal.

4.5.2 Pulse modulation

The MG3670B modulates signals using either external (TTL) or internal pulse modulation signals. The internal pulse modulation signal is generated by the burst function unit, hence, if there is no burst unit installed, external pulse modulation signals must be fed. The table below shows the status of the pulse modulation function with respect to the setting.

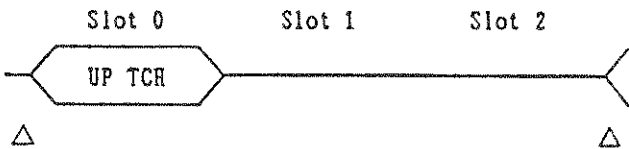
Modulation	Burst	I-Q Modulation	Pulse Modulation	Status of modulation function
On	On	Int	Int†	Pulse modulation using the burst unit
		Ext	Int	Pulse modulation using the burst unit
			Ext	Pulse modulation using externally fed signals
	Off	Int	Int	No pulse modulation
			Ext	Pulse modulation using externally fed signals
		Ext	Int	No pulse modulation
			Ext	Pulse modulation using externally fed signals
			Ext	Pulse modulation using externally fed signals
OFF	—	—	Int	No pulse modulation
			Ext	Pulse modulation using externally fed signals

† When Burst is On and the I/Q signal source is set to Int, the pulse modulation signal source is fixed to Int.

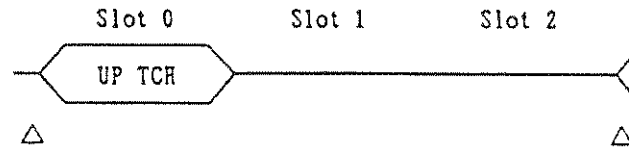
4.6 Setup Using Screen Transition

When the 'Setup/Parameter Memory' F5 soft key is pressed in the parameter setting screen (frequency setting mode, output level setting mode, modulation parameter setting mode), the following screen transition function keys are displayed (screen transition mode). Press any of these keys to switch to any of the setup or parameter memory screens.

The 'Parameter Recall' F2 soft key and the 'Parameter Delete' F3 soft key are displayed for recall or deletion only when there are parameters stored in memory. <Menu 1>

MG3670B Digital Modulation Signal Generator				Function
Freq : 1234.567890 MHz	Level : -143.0 dB	Offset Relative	Offset Relative	IF/RF Setup →
Ref Freq : 10MHz	EMF Uncal			Base Band Setup →
Modulation Mode : I,Q		Source : [Int]		Interface Setup →
System : [PDC]				Hardware Check →
Mod : $\pi/4$ DQPSK	Bit Rate : 42.0kbps			Return →
Filter : [RNYQ] $\alpha=0.50$	Phase Encode : [Normal]			etc *
Burst : [On]				
Pattern : [UP TCH]				
Trigger : [Int]				
				

<Menu 2>

MG3670B Digital Modulation Signal Generator				Function
Freq : 1234.567890 MHz	Level : -143.0 dB	Offset Relative	Offset Relative	Parameter Save →
Ref Freq : 10MHz	EMF Uncal			Parameter Recall →
Modulation Mode : I,Q		Source : [Int]		Parameter Delete →
System : [PDC]				Parameter List →
Mod : $\pi/4$ DQPSK	Bit Rate : 42.0kbps			
Filter : [RNYQ] $\alpha=0.50$	Phase Encode : [Normal]			
Burst : [On]				
Pattern : [UP TCH]				
Trigger : [Int]				
				
				etc *

■ IF/RF setup screen

Screen where the reference frequency, output level upper limit, external I/Q signal and I/O compensation and pulse modulation parameters are set.

■ Baseband setup screen

Screen where windows are used to switch the modulation data and data clocks between internal and external, to select the polarity of the external modulation I/O signals (data, data clock, symbol clock and burst gate signals) and the burst trigger I/O signals, and to set the pattern synchronous output signal parameters.

■ Interface setup screen

Sets the GPIB address and buzzer. This screen also displays the units installed in the main instrument.

■ Hardware check screen

Screen where Pass and Fail are displayed to indicate the results of self-check at power on.

■ Parameter Save/Recall/Delete/List screen

Up to 100 parameter combinations set on the front panel can be stored into memory.

4.6.1 IF / RF setup screen

When the 'IF/RF Setup' F1 soft key is pressed in the screen transition mode of the parameter setting screen, the IF/RF Setup screen shown below appears.

MG3670B Digital Modulation Signal Generator		IF/RF
IF/RF Setup		
Ref Freq	: [10MHz]	
Upper Limited Level	: [On]	
Upper Limited Level Value	: [-30.0dBm]	
I,Q Level	: [CMOS]	
I,Q Level CMOS	: [500mVrms]	
I,Q Level CMOS DC Offset	: [2500mV]	
I,Q Input Trim	: [Off]	
I,Q Output Trim	: [Off]	
Pulse Mod	: [Int]	
Pulse Mod Polarity	: [Positive]	
		Return →

In this screen, windows are used to set the reference frequency, the output level upper limit, output I/Q signals and I/O compensation, and pulse modulation parameters. Each of the setting items are explained below.

(1) Ref Freq

Ref Freq: The reference frequency can be selected between 10 MHz and 13 MHz (externally fed for GSM system).

- Initial reference frequency: 10 MHz

(2) Setting the output level upper limit

(a) Upper Limited Level: The 'Upper Limited Level' is switched On or Off in order to use or not use the upper limit of the output level

- Initial setting: Off

(b) Upper Limited Level Value: This value specifies the maximum output level in dBm, dB μ , mV or μ V. If the Set key is pressed instead of a unit key, dBm is selected as the unit. The 'Upper Limited Level Value' can be set even if the 'Upper Limited Level' is set to Off.

- Setting range: -143.0 to 13.0 dBm
- Initial setting: -10 dBm

(3) I-Q signal settings

The I-Q signal settings is performed to set the input and output (I/O) requirements for the I and Q signals.

- (a) I, Q Level: Sets the I-Q signal level to either 50 Ω 500 mVrms or CMOS.
 - Initial setting: 50 Ω 500 mVrms
- (b) I, Q Level CMOS: Sets the CMOS level when the I-Q signal level has been selected for CMOS.
 - Setting range: 50 to 500 mVrms
 - Setting resolution: 50 mVrms
 - Initial setting: 500 mVrms
- (c) I, Q Level CMOS DC Offset: Sets the CMOS level DC offset value when the I-Q signal level has been selected for CMOS.
 - Setting range: 0 to 4000 mV
 - Setting resolution: 1 mV
 - Initial setting: 2500 mV
- (d) I, Q Input Trim: Sets to On when adjusting the offset/balance of the IQ input signals using the controls on the front panel. When this item is On, the LED on the left side of the controls lights.
 - Initial setting: Off
- (e) I, Q Output Trim: Sets to On when adjusting the offset/balance of the IQ output signals using the controls on the front panel. When this item is On, the LED on the left side of the controls lights.
 - Initial setting: Off

(4) Pulse modulation settings

- (a) Pulse Mod: Sets the pulse modulation source to either internal (Int) or external (Ext).
 - Initial setting: Int
- (b) Pulse Mod Polarity: Sets the polarity of pulse modulation to either Positive or Negative.
 - Initial setting: Positive

4.6.2 Baseband setup screen

When the 'Baseband Setup' F2 soft key is pressed in the screen transition mode of the parameter setting screen, the Base Band Setup screen shown below appears..

MG3670B Digital Modulation Signal Generator		Base Band
Base Band Setup		
Data	: [Int]	
Data Clock	: [Int]	
Ext Mod Input		
Data	: [Positive]	
Data Clock	: [Rise]	
Symbol Clock	: [Rise]	
Burst Gate	: [Positive]	
Ext Mod Output		
Data	: [Positive]	
Data Clock	: [Rise]	
Symbol Clock	: [Rise]	
Burst Gate	: [Positive]	
Burst Trigger Input	: [Rise]	
Burst Trigger Output	: [Rise]	
Pattern Sync Output	: [PN Clock]	
		Return

In this screen, windows are used to set the following items:

■ Setting modulation signal to Int or Ext

Data	Int / Ext	Initial setting: Int
Data Clock	Int / Ext	Initial setting: Int

■ Polarity of external I/O modulation signals

Ext Mod Input		
Data	Positive / Negative	Initial setting: Positive
Data Clock	Rise / Fall	Initial setting: Rise
Symbol Clock	Rise / Fall	Initial setting: Rise
Burst Gate	Positive / Negative	Initial setting: Positive
Ext Mod Output		
Data	Positive / Negative	Initial setting: Positive
Data Clock	Rise / Fall	Initial setting: Rise
Symbol Clock	Rise / Fall	Initial setting: Rise
Burst Gate	Positive / Negative	Initial setting: Positive

■ Polarity of burst trigger I/O signals

Burst Trigger Input	Rise / Fall	Initial setting: Rise
Burst Trigger Output	Rise / Fall	Initial setting: Rise

■ Pattern synchronous output signal

Pattern Sync Output	PN Clock / PN Gate / RF Gate	Initial setting: PN Clock
---------------------	------------------------------	---------------------------

Note: ● The 'Baseband Setup' F2 soft key is not displayed if there is no modulation unit installed.

- *The 'Burst Gate', 'Burst Trigger Input', 'Burst Trigger Output' and 'Pattern Sync Output' items under the 'Ext Mod Input/Output' headings are displayed if burst unit is installed.*
- *If 'Data' is set to Ext, the 'Pattern,' 'Trigger' and 'Trigger Select' items and the 'Pattern Edit' F2 soft key are not displayed in the parameter setting screen.*

4.6.3 Interface setup screen

When the 'Interface Setup' F3 soft key is pressed in the screen transition mode of the parameter setting screen, the Interface Setup screen shown below appears.

MG3670B Digital Modulation Signal Generator		Interface								
Interface Setup										
GPIB Address : [30]										
Buzzer : [On]										
<table border="1"> <thead> <tr> <th>Unit 1</th> <th>Unit 2</th> <th>Unit 3</th> <th>Unit 4</th> </tr> </thead> <tbody> <tr> <td>MG0303B Burst VI</td> <td>MG0301C $\pi/4$ DQPSK</td> <td>MG0302A GMSK</td> <td></td> </tr> </tbody> </table>		Unit 1	Unit 2	Unit 3	Unit 4	MG0303B Burst VI	MG0301C $\pi/4$ DQPSK	MG0302A GMSK		
Unit 1	Unit 2	Unit 3	Unit 4							
MG0303B Burst VI	MG0301C $\pi/4$ DQPSK	MG0302A GMSK								
		Return →								

The GPIB address (0 to 30) and the buzzer (On and Off) are set in this screen using windows. The units installed on the main instrument are also displayed in this screen.

If the buzzer is set to On, a buzzer alarm is sounded when an error occurs.

4.6.4 Hardware check screen

When the 'Hardware Check' F4 soft key is pressed in the screen transition mode of the parameter setting screen, the results of the self-check performed at power on are displayed as shown below. 'Pass' is displayed if acceptable and 'Fail' if unacceptable.

MG3670B Digital Modulation Signal Generator		Hard Check
Hardware Check		
Main		
CPU	: Pass	
ACRTC	: Pass	
ROM	: Pass	
RAM	: Pass	
GPIB	: Pass	
TIMER	: Pass	
Unit		
MG0303B ROM	: Pass	
MG0303B RAM	: Pass	
MG0301C ROM	: Pass	
MG0302A ROM	: Pass	
		Return →

4.6.5 Storing, recalling, deleting and listing the front panel setting parameters

When the 'Parameter Save' F1, 'Parameter Recall' F2, 'Parameter Delete' F3 or 'Parameter List' F4 key is pressed in the screen transition mode of the parameter setting screen, the Parameter Save, Parameter recall, Parameter Delete or Parameter List screens shown below appears and up to 100 (0 to 99) combinations of parameters set on the panel can be stored, retrieved, deleted or listed.

Memory location number range 0 to 99
 Initial memory location number 0

Note : • The 'Parameter Recall' F2 and 'Parameter Delete' F3 soft keys are displayed for recall and deletion only when there are parameters stored in memory.

- When the contents of the 0 to 49 memory location numbers are displayed, the 'Next Page' F1 soft key appears to display the contents of the 50 to 99 memory location numbers; when the contents of the 50 to 99 memory location numbers are displayed, the 'Last Page' F2 soft key appears to display the contents of the 0 to 49 memory location numbers.

(a) Parameter save



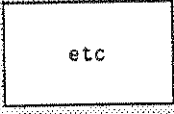

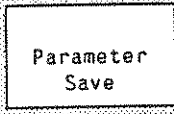



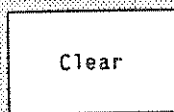

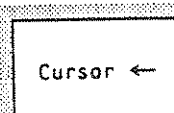

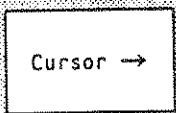

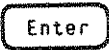
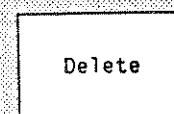


In the parameter setting screen, if the 'Setup/Parameter Memory' F5, 'Etc' F6 and 'Parameter Save' F1 keys are sequentially pressed, the Parameter Save screen appears. Specify the memory location number using the data keys, rotary knob, Step keys or the cursor keys and then press the Set or Enter key to save the parameters currently set.

To store, specify the title up to eight characters long. If no title is specified, ***** is displayed in the title field.

Shown below is an example of a parameter save screen and its contents.

MG3670B Digital Modulation Signal Generator					Save
Parameter Save					Last Page
Memory No. [00]		Title :			
					Next Page
					Title *
No: Title	No: Title	No: Title	No: Title	No: Title	
0: TEST-1	10:	20:	30:	40: *****	
1: *****	11:	21:	31:	41: *****	
2:	12:	22:	32:	42: *****	
3:	13:	23:	33:	43:	
4:	14:	24:	34:	44:	
5:	15:	25:	35:	45:	
6:	16:	26:	36:	46:	
7:	17:	27:	37:	47:	
8:	18:	28:	38:	48:	
9:	19:	29:	39:	49:	Return →

Example 1: Gives the title 'Anritsu' to the parameters setting parameter memory.

Step	Action	Verification
1	 	Switches to screen transition menu 1 from any of the frequency setting mode/output level setting mode/modulation parameter setting mode in the parameter setting screen.
2	 	Switches to screen transition menu 2.
3	 	Switches to parameter save screen.
4	 	Opens the window for setting the title.
5	 	Deletes the old title.
6	  ,  	Sets the position within the title field where the title will be entered.
7	Cursor keys or rotary knob	Selects the characters to be used for the title from the title character list.
8		Enters the selected character in the Entry field.
9	 	Deletes an incorrect entry.
10	Repeat steps 6, 7 and 8 to enter Anritsu in the title field.	
11		Closes the window after completing entry of the title. (After this, specify the memory location number where to store the parameters.)

Note: Each time the BS key on the panel is pressed, the character before the cursor in the Entry field is erased one-by-one.

MG3670B Digital Modulation Signal Generator

Parameter Save
Memory No. [1] Title :

Entry[TEST-]

ABCDEFGHIJKLMNOPQRSTUVWXYZ
 abcdefghijklmnopqrstuvwxyz
 0123456789+/-!"#\$%&'()*~¥
 @[]{};:..<>?_!

No:	Title	No:	Title	No:	Title	No:	Title	No:	Title
0:		10:		20:		30:		40:	
1:		11:		21:		31:		41:	
2:		12:		22:		32:		42:	
3:		13:		23:		33:		43:	
4:		14:		24:		34:		44:	
5:		15:		25:		35:		45:	
6:		16:		26:		36:		46:	
7:		17:		27:		37:		47:	
8:		18:		28:		38:		48:	
9:		19:		29:		39:		49:	

Title

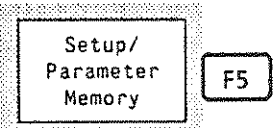

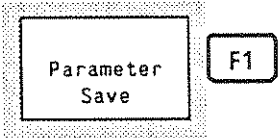

Cursor←

Cursor→

Delete

Clear

Example 2: Stores the parameters currently set on the panel in memory location 10.

Step	Action	Verification
1		Switches to screen transition menu 1 from any of the frequency setting mode/output level setting mode/modulation parameter setting mode in the parameter setting screen.
2		Switches to screen transition menu 2.
3		Switches to parameter save screen.
4		Specifies memory location 10. (At this point, the parameters currently set on the panel are stored in memory location 10 and then returns to the previous status [i.e., frequency setting mode, output level setting mode or modulation parameter setting mode]).

(b) Parameter Recall

To retrieve a combination of parameters stored into memory and set them into the MG3670B, specify the memory location number (0 to 99) using the data keys, rotary knob, Step keys or cursor keys. If no parameter data is stored in the specified memory, the cursor moves to that memory location without doing anything. ***** is displayed in the title field if no title has been specified.

(c) Parameter Delete

- To delete a combination of parameter settings from memory, specify the memory location number using the data keys, rotary knob, Step keys or cursor keys. A Yes/No window appears to verify whether or not to delete the parameter settings. The initial setting is No. Specify Yes to delete the parameter settings.
- After the parameters are deleted, the screen remains unchanged, hence, another parameter combination can be deleted.
- If the 'Delete All' F4 soft key is pressed, 'ALL' is displayed in the 'Memory No.' field and all titles are displayed in reverse-video. A Yes/No window opens for verification. The initial setting is No. Specify Yes to delete the entire parameter memory.

(d) Parameter List

- If the memory location number (0 to 99) is specified using the data keys, rotary knob, Step keys or the cursor keys, the parameter settings stored in that memory location are displayed on five separate pages.

- (1 / 5) Frequency
- (2 / 5) Level
- (3 / 5) Modulation
- (4 / 5) IF / RF
- (5 / 5) Base band

<Frequency List>

MG3670B Digital Modulation Signal Generator		List																																																				
Parameter List Memory No. [70]		[]																																																				
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">No:</th> <th style="text-align: left;">Ti</th> </tr> </thead> <tbody> <tr><td>0:</td><td>TE</td></tr> <tr><td>1:</td><td>TE</td></tr> <tr><td>2:</td><td>TE</td></tr> <tr><td>3:</td><td></td></tr> <tr><td>4:</td><td></td></tr> <tr><td>10:</td><td></td></tr> <tr><td>11:</td><td></td></tr> <tr><td>12:</td><td></td></tr> <tr><td>13:</td><td></td></tr> <tr><td>14:</td><td></td></tr> </tbody> </table>	No:	Ti	0:	TE	1:	TE	2:	TE	3:		4:		10:		11:		12:		13:		14:		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Title</td> <td style="width: 50%;">: TEST-1 (1/5)</td> </tr> <tr> <td colspan="2">Frequency</td> </tr> <tr> <td>Frequency</td> <td>: 1.5GHz</td> </tr> <tr> <td>Incremental Step Value</td> <td>: 10MHz</td> </tr> <tr> <td>Resolution</td> <td>: 1GHz</td> </tr> <tr> <td>Relative</td> <td>: Off</td> </tr> <tr> <td>Offset</td> <td>: On</td> </tr> <tr> <td>Offset Value</td> <td>: 1MHz</td> </tr> </table>	Title	: TEST-1 (1/5)	Frequency		Frequency	: 1.5GHz	Incremental Step Value	: 10MHz	Resolution	: 1GHz	Relative	: Off	Offset	: On	Offset Value	: 1MHz	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%;">tle</td> </tr> <tr> <td>*****</td> <td>[]</td> </tr> <tr> <td>*****</td> <td>[]</td> </tr> <tr> <td>*****</td> <td>[]</td> </tr> <tr> <td></td> <td>[]</td> </tr> <tr> <td></td> <td>[]</td> </tr> <tr> <td></td> <td>[]</td> </tr> </table>		tle	*****	[]	*****	[]	*****	[]		[]		[]		[]
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<Modulation List>

MG3670B Digital Modulation Signal Generator		List	
Parameter List Memory No. [70]		Last Page	
Title : TEST-1 (3/5)		Next Page	
Modulation : On			
I,Q Source : Int			
System : PDC			
Mod : $\pi/4$ DQPSK			
Filter : RNYQ			
No: Ti	Phase Encode : Normal	tle	
	Burst : On	*****	
0: TE	Pattern : UP TCH	*****	
1: TE	Trigger : Int	*****	
2: TE			
3:	Knob Hold : Off		
4:			
10:	Interface		
11:	Buzzer : On		
12:			
13:			
14:			

<IF/RF List>

MG3670B Digital Modulation Signal Generator		List	
Parameter List Memory No. [70]		Last Page	
Title : TEST-1 (4/5)		Next Page	
IF/RF			
Ref Freq : 10MHz			
Upper Limited : On			
Upper Limited Level : -30.0dBm			
I,Q Level : CMOS			
No: Ti	I,Q Level CMOS : 0.1Vrms	tle	
	I,Q Level CMOS DC Offset : 2500mV	*****	
0: TE	Pulse Mod : Int	*****	
1: TE	Pulse Mod Polarity : Positive	*****	
2: TE			
3:			
4:			
10:			
11:			
12:			
13:			
14:			

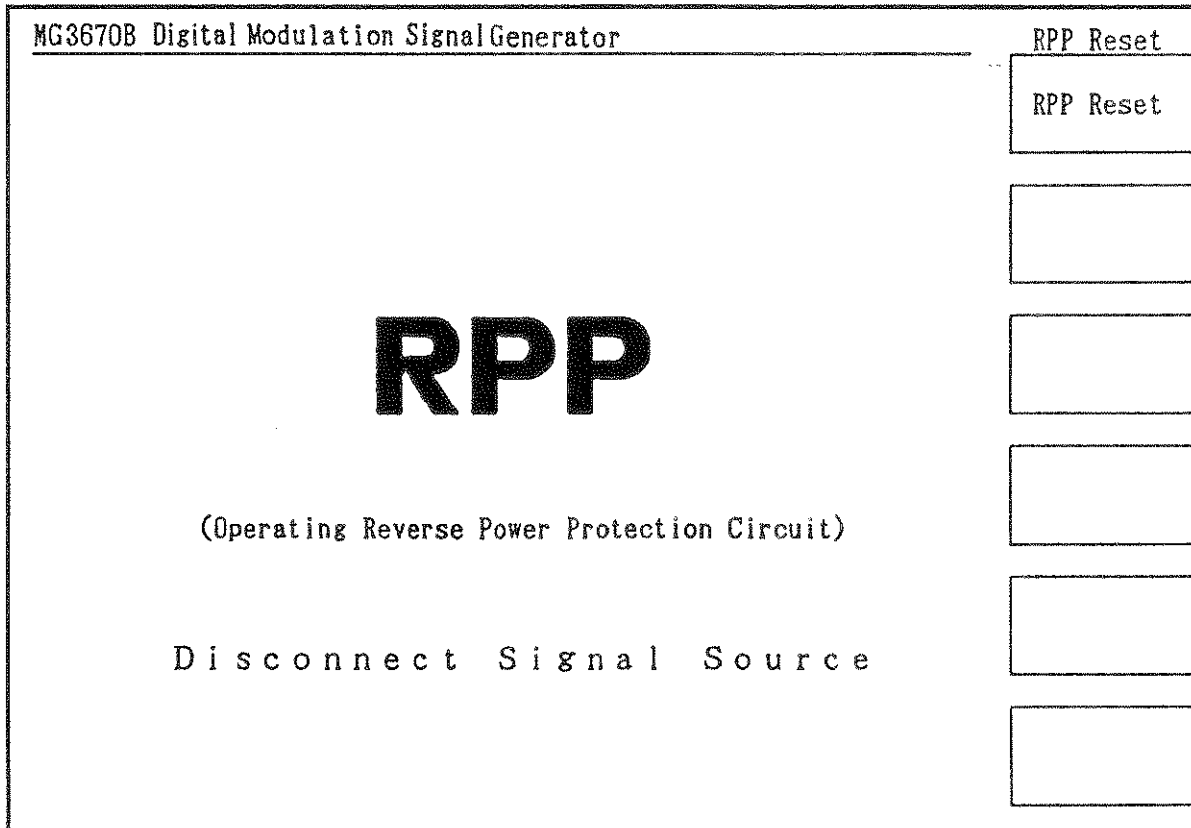
<Base Band List>

MG3670B Digital Modulation Signal Generator		List
Parameter List		Last Page
Memory No. [10]		
Title : TEST-1 (5/5)		
Base Band		
Data : Int		
Data Clock : Int		
Ext Mod Input		
Data : Positive		
No: Ti	Data Clock : Rise	tle
	Symbol Clock : Rise	
0: TE	Burst Gate : Positive	*****
1: TE	Ext Mod Output	*****
2: TE	Data : Positive	*****
3:	Data Clock : Rise	
4:	Symbol Clock : Rise	
10:	Burst Gate : Positive	
11:	Burst Trigger Input : Rise	
12:	Burst Trigger output : Rise	
13:	Pattern Sync Output : PN Clock	
14:		

4.7 Reverse Power Protection Function

The MG3670B is equipped with a reverse power protection circuit (RPP) that automatically disconnects the internal circuits to protect them from damage when a large amount of reverse power is applied to the RF Output connector. When the RPP circuit works, the RPP activation screen shown below appears and the buzzer is sounded. At this time, only the 'RPP Reset' F1 soft key functions. Immediately disconnect the unit from the input power. When the 'RPP Reset' F1 soft key is pressed, the RPP circuit is reset and the MG3670B returns to its previous condition.

The buzzer is sounded when the RPP circuit is activated even if the buzzer has been set to Off.



- Notes :**
- The RPP circuit uses a mechanical switch. Therefore, repeated application of power to this switch may cause deterioration of its contacts. Avoid application of reverse power, as much as possible.
 - Never reset the RPP circuit while reverse power is applied. This may cause damage to the RPP circuit.
 - The RPP circuit can protect internal circuit against reverse power surges of up to $\pm 50\text{Vdc}$, 50 W (up to 1 GHz), and 25 W (1 to 2.1 GHz). Never apply a reverse power exceeding these limits.
 - Since the RF Output connector is opened while the RPP circuit is operating, care should be taken not to damage the transmitter or the device under test.

4.8 Initialization Function

When the Preset key on the front panel is pressed, the following parameters are initialized and the parameter setting screen (frequency setting mode) appears. The data stored in memory remains unchanged.

To clear the contents of memory, reset the power while holding down the Preset key.

■ The contents of preset items:

Group	Preset item	Initial setting data
Frequency	Frequency	10 MHz
	Incremental step frequency	1 MHz
	Frequency resolution	1 Hz
	Relative frequency display mode	Off
	Frequency offset mode	Off
	Frequency offset value	0 Hz
Output	Output level	-30 dBm
	Incremental step output level	1 dB
	Output level resolution	0.1 dB
	Continuous mode	Off
	Relative level display mode	Off
	Output level (On / Off)	On
	Output level offset mode	Off
	Output level offset value	Off
	Open-circuit / terminated voltage display	Open-circuit voltage display
Modulation	Modulation	Off
	I/Q signal input (Modulation mode source)	I/Q INT
	Baseband filter	Root Nyquist
	Burst function	Off
	Pattern	PN9
	Burst trigger input	Int (PHP is selected for system)
	Burst trigger select	Uplink

Group	Preset item	Initial setting data
IF/RF settings	Reference frequency	10 MHz
	Output level upper limit	- 10 dBm
	Output level upper limit (On/Off)	Off
	I/Q LEVEL	50 Ω 500 mVrms CMOS 50 mVrms CMOS DC Offset 2500 mV
	I/Q trim setting	Input: Off Output: Off
	Pulse modulation	Pulse Modulation: Int Pulse Modulation Polarity: Positive
Baseband settings	Data	Int
	Data Clock	Int
	IEXT Mod Input	Data: Positive Data Clock: Rise Symbol Clock: Rise Burst Gate: Positive
	EXT Mod Output	Data: Positive Data Clock: Rise Symbol Clock: Rise Burst Gate: Positive Burst Trigger Input: Rise Burst Trigger Output: Rise Pattern Sync Output: PN Clock Panel lock: Released Buzzer On/Off: On Display On/Off: On Rotary knob hold On/Off: Off

Note: The modulation parameter settings differ on each modulation unit. For details, refer to the user's manual of your modulation unit. The MG0301C $\pi/4$ DQPSK modulation unit is used in this manual for explanation example.

4.9 Panel Lock Function

When the Panel Lock key on the front panel is pressed, all keys including the rotary knob are disabled and only the power switch, Local key and Panel Lock key remains functional. Press the Panel Lock key again to release the panel lock.

The Panel Lock key's LED lights when the panel is in locked condition.

4.10 Panel Display On/Off Function

When the Display Off key on the front panel is pressed, the screen display is turned off. When the screen display is off, all keys including the rotary knob are disabled and only the power switch, Local key and Display Off key remains functional. This feature reduces generation of interference waves from the display. (GPIB is activated.) Press the Display Off key again to turn on the display. The Display Off key's LED lights when the display is off.

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SECTION 5 MEASUREMENT

This section describes demodulator evaluation measurement, DUT error rate measurement, and receiver evaluation measurements (including receiver sensitivity (static), receiver sensitivity (fading), adjacent channel selectivity, intermodulation characteristics, and spurious response) as typical measurement examples using the MG3670B Digital Modulation Signal Generator.

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5.3	Receiver Evaluation measurements	5-6
5.3.1	Receiver sensitivity (static)	5-6
5.3.2	Receiver sensitivity (fading) measurement	5-7
5.3.3	Adjacent channel selectivity measurement	5-9
5.3.4	Intermodulation characteristics measurement	5-10
5.3.5	Spurious response measurement	5-11

CLASSIFICATION

The information contained in this document is classified as follows: [Illegible text]

CLASSIFICATION

[Illegible text]

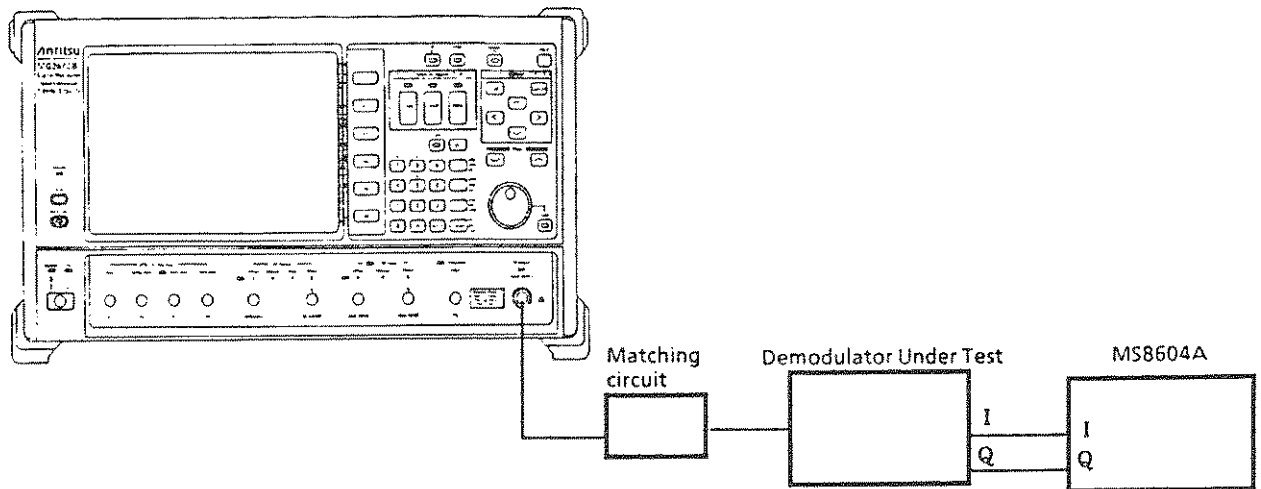
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SECTION 5 MEASUREMENT

5.1 Demodulator Evaluation Measurement

The performance of the $\pi/4$ DQPSK demodulator is tested by evaluating the demodulator I-Q signal outputs with the use of the I and Q signal input function^{f2} of MS8604A^{f1}.

(1) Setup



(2) Measurement procedure

Step	Procedure
1	For instance, set the MG3670B output frequency and level to 1500 MHz and 0 dBm, respectively.
2	Set the MG3670B system to PDC ^{f3} , and connect the MG3670B RF output to the input of the Demodulator to be tested through the matching circuit. Use the matching circuit to match the output and input levels.
3	Connect the MS8604A I and Q inputs to the I and Q outputs of the Demodulator to be tested, respectively.
4	Set the MG3670B to the desired pattern. Set to PN9 or PN15 when burst = OFF.
5	Set the MG3670B to the constellation measurement mode to enable the observation of signal trace and modulation accuracy.
6	Change the MG3670B pattern or frequency to evaluate its performance.

^{f1} PDC software (option 11) is needed for the MS8604A.

^{f2} I-Q input (option 03) is needed for the MS8604A.

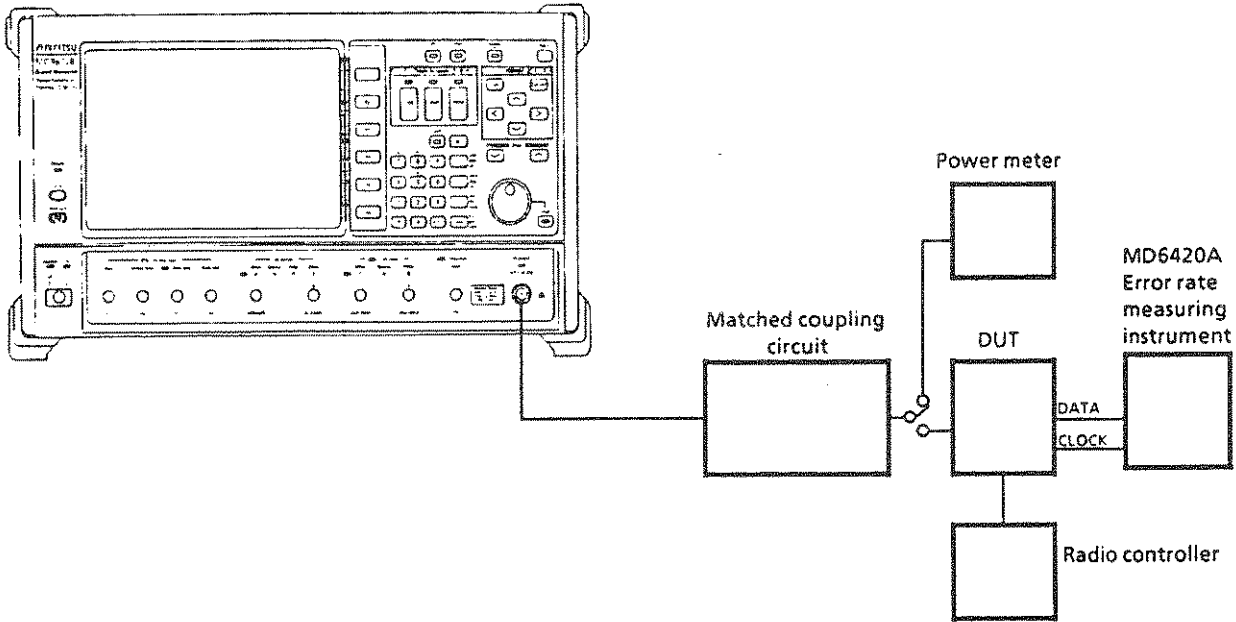
^{f3} MG0301C $\pi/4$ DQPSK modulation unit is needed for the MG3670B.

5.2 DUT Error Rate Measurement

This measurement evaluates the bit errors in the data detected by the demodulator under test using the PN9 standard encoding test signal incorporated in the MG3670B. (A modulation unit for DUT^{†1} is needed for the MG3670B.)

For this measurement, the demodulator under test must have a control mode for receiving a continuous wave.

(1) Setup



(2) Measurement procedure

Step	Procedure
1	Set the MG3670B to the frequency to be tested.
2	Set the MG3670B to the proper system for the DUT. (The modulation unit ^{†2} for that system is needed.)
3	Set the MG3670B pattern to PN9.
4	Apply the MG3670B RF Output signal to the power meter through the matched coupling circuit, and adjust the output level from MG3670B so that the sensitivity test level is obtained.
5	Set the DUT to a mode that can communicate with a continuous wave from the radio controller.

^{†1} DUT: Device Under Test

^{†2} The MG0301C $\pi/4$ DQPSK modulation unit is compatible with the PDC, PHP, NADC, TFTS and PDC_H systems.
The MG0302A GMSK modulation unit is compatible with the CT2, GSM and PCN systems.

Step	Procedure
6	Apply the output from the matched coupling circuit to the DUT to operate it. Supply the DATA and CLOCK demodulated by the DUT to the RD and RT connectors of the MD0626 Interface Unit plugged in the MD6420 rear panel, respectively.
7	Set the MD6420A reception timing. Select 'RT' mode if output is produced by sampling the data at the falling edge of the clock from the DUT; Select ' $\overline{\text{RT}}$ ' mode if output is produced by sampling the data at the rising edge of the clock from the DUT.
8	Set the MD6420A PATTERN to $2^9 - 1$ (PN9)NORMAL.
9	Press the MD6420A MEAS key to measure bit error rate.
10	If necessary, make a simulation test measurement by varying the output level of the MG3670B.

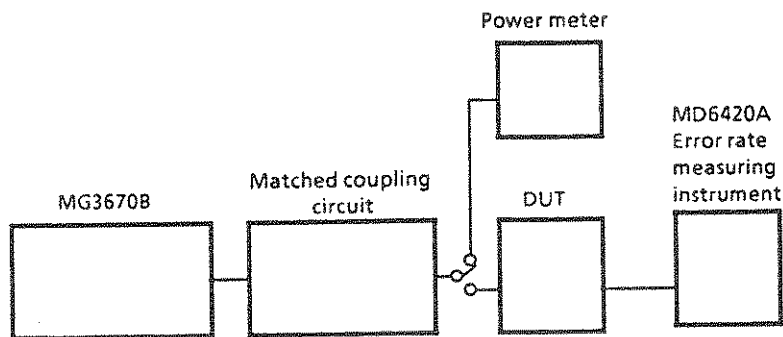
5.3 Receiver Evaluation measurements

The following evaluation measurements can be performed for receivers:

- Receiver sensitivity (static)
- Receiver sensitivity (fading)
- Adjacent channel selectivity
- Intermodulation characteristics
- Spurious response

5.3.1 Receiver sensitivity (static)

(1) Setup



(2) Measurement procedure

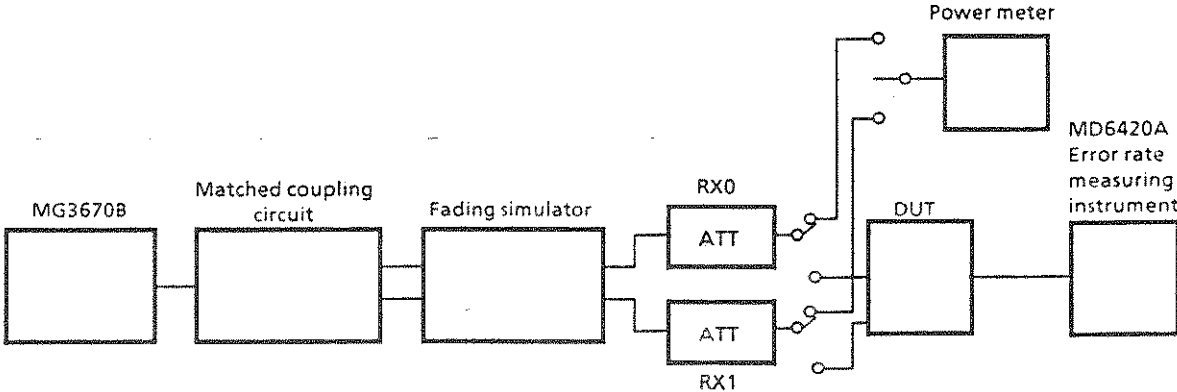
Step	Procedure										
1	Set the MG3670B as follows: <table style="width: 100%; border: none;"> <tr> <td style="width: 60%;">Frequency</td> <td>Frequency to be tested</td> </tr> <tr> <td>Output level</td> <td>Off</td> </tr> <tr> <td>Modulation: Burst</td> <td>On</td> </tr> <tr> <td style="padding-left: 20px;">User data transfer channel TCH</td> <td>PN9</td> </tr> <tr> <td style="padding-left: 20px;">Other than TCH channel</td> <td>Specific pattern necessary for communications</td> </tr> </table>	Frequency	Frequency to be tested	Output level	Off	Modulation: Burst	On	User data transfer channel TCH	PN9	Other than TCH channel	Specific pattern necessary for communications
Frequency	Frequency to be tested										
Output level	Off										
Modulation: Burst	On										
User data transfer channel TCH	PN9										
Other than TCH channel	Specific pattern necessary for communications										
2	Set the receiver to the test frequency. Use the user data transfer channel TCH for the demodulated data.										
3	Measure the MG3670B output level with a power meter and adjust it to the standard sensitivity level (static).										
4	Operate the switch to apply signals to the receiver to be tested.										
5	Accumulate the bit strings of the user data transfer channel TCH and measure the error rate for 2,556 bits or more using the MD6420A. Verify that the measured error rate is within standard										

* Use the burst trigger signal to synchronize the burst wave output timing of the MG3670B with that of the testing equipment. For details, refer to the section on the trigger function of MG0301C or MG0302A Operation Manual.

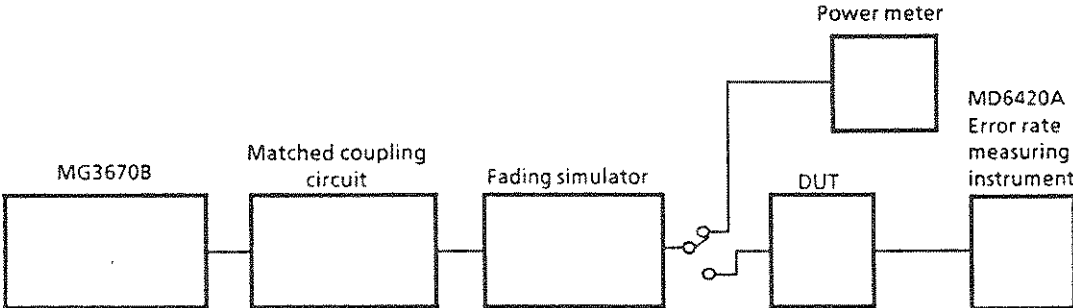
5.3.2 Receiver sensitivity (fading) measurement

(1) Setup

(a) With diversity



(b) Without diversity

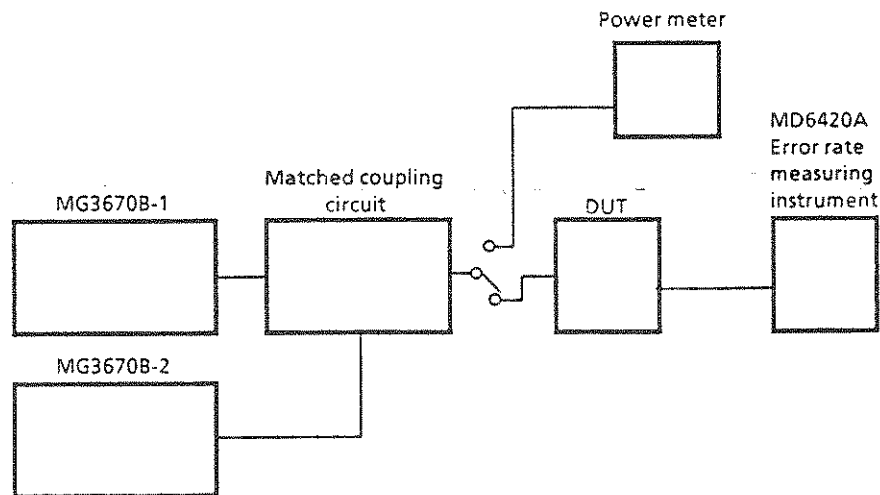


(2) Measurement procedure

Step	Procedure										
1	Set the MG3670B as follows: <table style="width: 100%; border: none;"> <tr> <td style="width: 60%;">Frequency</td> <td style="width: 40%;">Frequency to be tested</td> </tr> <tr> <td>Output level</td> <td>Off</td> </tr> <tr> <td>Modulation: Burst</td> <td>On</td> </tr> <tr> <td style="padding-left: 20px;">User data transfer channel TCH</td> <td>PN9</td> </tr> <tr> <td style="padding-left: 20px;">Other than TCH channel</td> <td>Specific pattern necessary for communications</td> </tr> </table>	Frequency	Frequency to be tested	Output level	Off	Modulation: Burst	On	User data transfer channel TCH	PN9	Other than TCH channel	Specific pattern necessary for communications
Frequency	Frequency to be tested										
Output level	Off										
Modulation: Burst	On										
User data transfer channel TCH	PN9										
Other than TCH channel	Specific pattern necessary for communications										
2	Set the fading simulator to Rayleigh fading for a maximum Doppler frequency of 40 Hz (IEC Pub. 489-6 Appendix C).										
3	Set the receiver to the test frequency. Use the user data transfer channel TCH for the demodulated data.										
4	Measure the MG3670B output level with a power meter and adjust it to the standard sensitivity level (center value when fading).										
5	Operate the switch to apply signals to the receiver to be tested.										
6	Using the MD6420A, accumulate the bit strings of the user data transfer channel TCH and measure the error rate for 2,556 bits or $[43,200 \times \text{bit rate (bps)}] / [\text{velocity of travel (kph)} \times \text{test frequency (MHz)}]$, whichever is bigger (Where bit rate = 42,000). Verify that the measured error rate is within standard.										

5.3.3 Adjacent channel selectivity measurement

(1) Setup

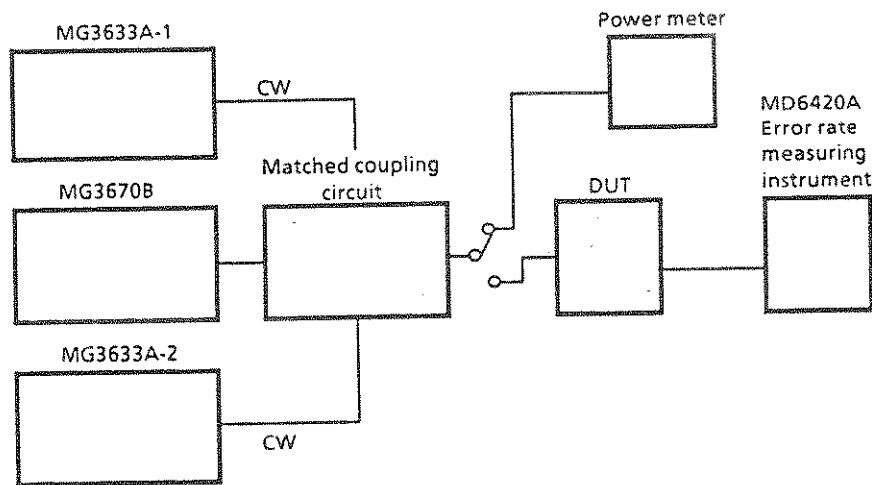


(2) Measurement procedure

Step	Procedure
1	Set the MG3670B-1 as follows: Frequency Frequency to be tested Output level Off Modulation: Burst On User data transfer channel TCH PN9 Other than TCH channel Specific pattern necessary for communications
2	Set the MG3670B-2 as follows: Frequency Adjacent channel frequency Output level Off Modulation: Burst Off Pattern PN15
3	Measure the MG3670B-1 output level with a power meter and adjust it to [Standard sensitivity level + 3 dB].
4	Measure the MG3670B-2 output level with a power meter and adjust it to [(Standard sensitivity level + 3 dB) + (Standard adjacent channel selectivity) dB].
5	Operate the switch to apply signals to the receiver to be tested.
6	Using the MD6420A, accumulate the bit strings of the user data transfer channel TCH and measure the error rate for 2,556 bits or more. Verify that the measured error rate is within standard (1×10^{-2}).

5.3.4 Intermodulation characteristics measurement

(1) Setup

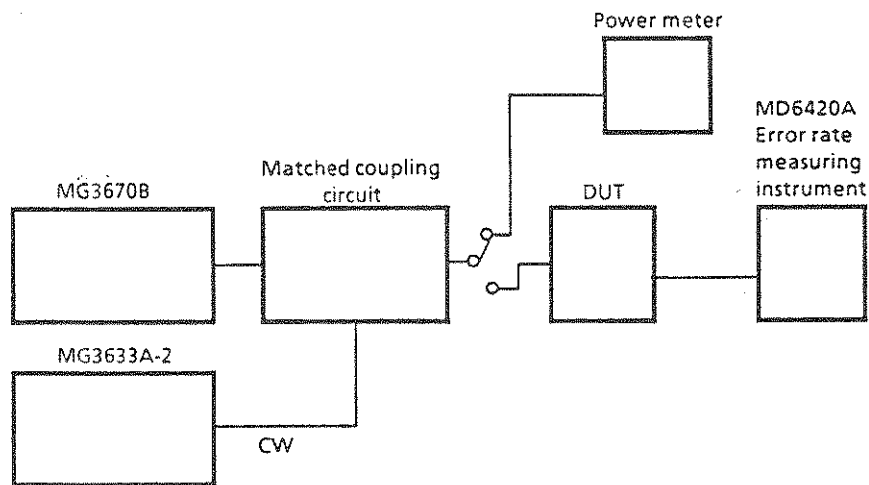


(2) Measurement procedure

Step	Procedure
1	Set the MG3670B as follows: Frequency Frequency to be tested Output level Off Modulation: Burst On User data transfer channel TCH PN9 Other than TCH channel Specific pattern necessary for communications
2	Set the MG3633A-1 as follows: Frequency Frequency to be tested + 100 kHz (or - 100 kHz) Output level Off Modulation Off (CW)
3	Set the MG3633A-2 as follows: Frequency Frequency to be tested + 200 kHz (or - 200 kHz) Output level Off Modulation Off (CW)
4	Set the receiver to the test frequency. Use the user data transfer channel TCH for the demodulated data.
5	Measure the MG3670B output level with a power meter and adjust it to [Standard sensitivity level + 3 dB].
6	Measure the output levels of MG3633A-1 and MG3633A-2 with a power meter and adjust them to [(Standard sensitivity level + 3 dB) + (Standard intermodulation characteristic value) dB].
7	Operate the switch to apply signals to the receiver to be tested.
8	Using the MD6420A, accumulate the bit strings of the user data transfer channel TCH and measure the error rate for 2,556 bits or more. Verify that the measured error rate is within standard (1×10^{-2}).

5.3.5 Spurious response measurement

(1) Setup



(2) Measurement procedure

Step	Procedure
1	Set the MG3670B as follows: Frequency Frequency to be tested Output level Off Modulation: Burst On User data transfer channel TCH PN9 Other than TCH channel Specific pattern necessary for communications
2	Set the MG3633A as follows: Frequency Spurious frequency Output level Off Modulation Off (CW)
3	Set the receiver to the test frequency. Use the user data transfer channel TCH for the demodulated data.
4	Measure the MG3670B output level with a power meter and adjust it to [Standard sensitivity level + 3 dB].
5	Measure the output levels of MG3633A-1 and MG3633A-2 with a power meter and adjust them to [(Standard sensitivity level + 3 dB) + (Standard spurious response) dB].
6	Operate the switch to apply signals to the receiver to be tested.
7	Using the MD6420A, accumulate the bit strings of the user data transfer channel TCH and measure the error rate for 2,556 bits or more. Verify that the measured error rate is within standard (1×10^{-2}).

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SECTION 6 PERFORMANCE TESTS

This section lists the equipment required for performing the performance tests, and explains each setup and the performance test items.

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SECTION 6 PERFORMANCE TESTS

6.1 Performance Tests Requirement

Performance tests are performed as preventive maintenance to prevent performance deterioration. Performance tests are required at acceptance inspection, periodic inspection, and post-repair performance verification. Execute the performance tests listed below at these times.

- Carrier frequency
- Output level frequency response
- Output level accuracy
- Spurious
- Modulation accuracy

Execute performance tests periodically as preventive maintenance for important items. They should be executed at least once or twice a year to check performance. Contact the ANRITSU service department if the MG3670B fails to meet the specifications during performance tests.

6.2 Instruments Required for Performance Tests

The table below lists the measuring instruments required for the performance tests.

Table 6-1 Instruments for Performance Tests

Recommended instrument (Anritsu model)	Required performance [†]	Test items
Power meter (ML4803A) Power sensor (MA4601A)	100 kHz to 3 GHz – 20 to + 10 dBm	● Output level accuracy ● Output level frequency response
Spectrum analyzer (MS2602A)	100 kHz to 8.5 GHz	● Spurious
Frequency counter (MF1603A)	100 kHz to 3 GHz 1 Hz resolution	● Frequency
Digital mobile radio transmitter tester (MS8604A)	Vector error: less than 1.8%	● Modulation accuracy ($\pi/4$ DQPSK modulation)
Digital modulation waveform analyzer (ME2627/B)	Phase error: less than 2° rms	● Modulation accuracy (GMSK modulation)

[†] Only part of the performance that covers the test item measurement range is extracted.

6.3 Performance Tests

Before executing the performance tests explained on the following pages, unless otherwise specified, the instrument under test and all the other measuring instruments must be warmed-up for at least 30 minutes so the test is executed under stable conditions. To measure at the highest accuracy, the tests must be performed at room temperature, ac power-supply voltage fluctuations must be minimized, and there must be no problems with noise, vibration, dust, and humidity, etc.

6.3.1 Carrier frequency

Check the carrier frequency.

(1) Test specifications

- Frequency range 300 kHz to 2250 MHz
- Measurement resolution 1 Hz

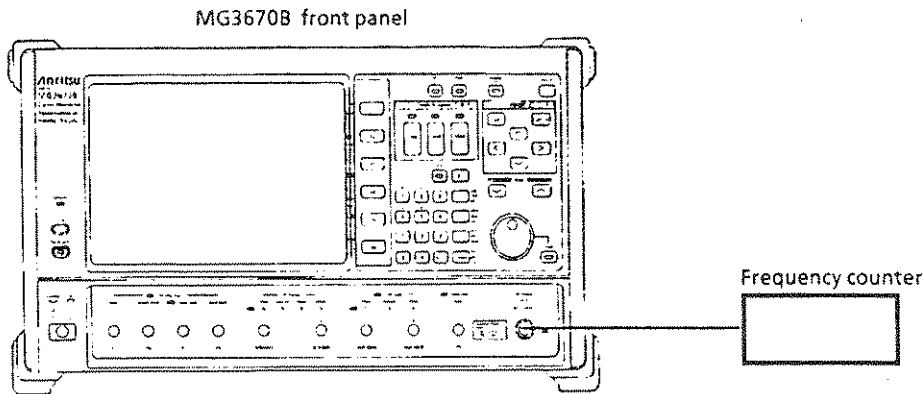
(2) Test instrument

- Frequency counter MF1603A

(3) Test precautions

The counter may read the frequency with ± 1 count error included.

(4) Setup



(5) Test procedure

Step	Procedure
1	Set the MG3670B to the frequency to be measured and set the output level to 0 dBm, modulation Off.
2	Check if the set measurement frequency of the MG3670 and the frequency indicated by the counter are equal.
3	Repeat steps 1 and 2 using another frequency setting.

Output level accuracy

Specifications

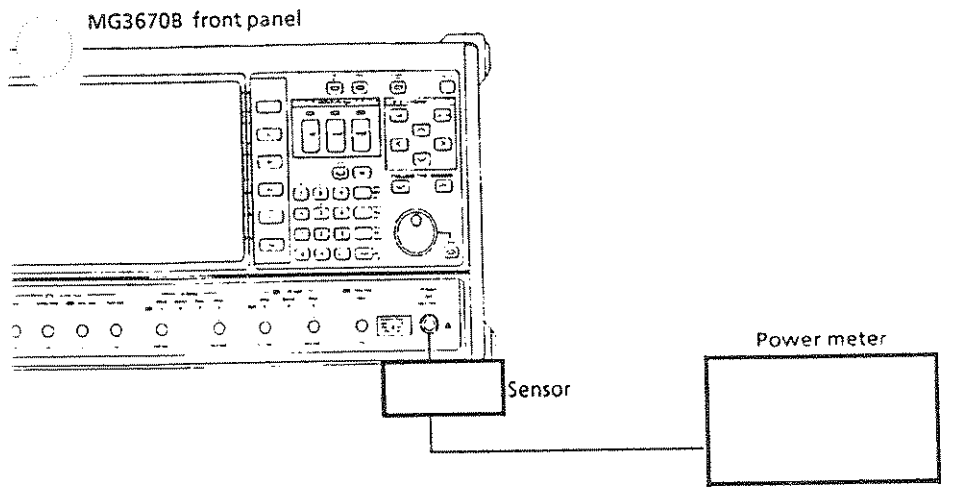
Output level	≤ 1GHz	> 1GHz
-33 to +13 dBm	± 1 dB	± 2 dB
+13 to -33.1 dBm	± 1.5 dB	± 2 dB
-33 to -123.1 dBm	± 3 dB	± 4 dB

Instrument

Power meter ML4803A
 Sensor MA4601A

Precautions

The power meter sensor must be directly connected to the output connector of the MG3670B.



Procedure

Procedure

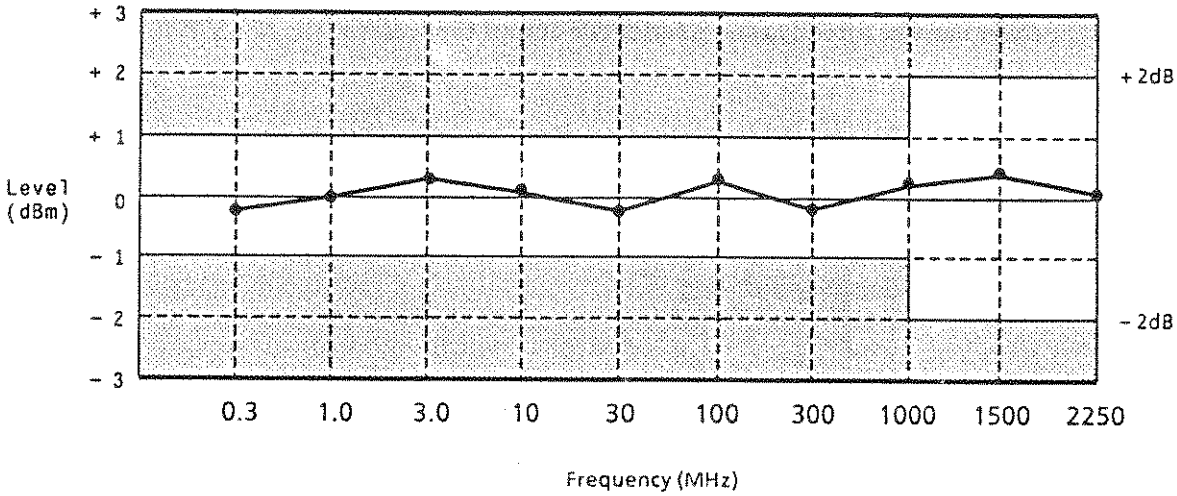
- 1. Turn the RF off key of the MG3670B to Off.
- 2. Adjust the power meter and calibrate the sensor sensitivity.
- 3. Set the MG3670B output level to the desired value (for instance, 0 dBm)

Step	Procedure
------	-----------

4 Set the MG3670B to the frequency to be measured (for example, as the table below).

Freq(GHz)	0.3	1.0	3.0	10	30	100	300	1000	1500	2250
Output level (dBm)										
Deviation from 0 dBm (dB)	-									

- 5 Set the calibration factor of the power meter sensor and read the MG3670B output level.
- 6 Obtain the deviation between the read value and 0 dBm and enter it in the above table.
- 7 Repeat steps 4 through 6, and check that the deviation from - 10 dBm is within ± 1 dB ($f \leq 1$ GHz), ± 2 dB ($f > 1$ GHz).



6.3.3 Output level frequency response

(1) Test specifications

- Within ± 1 dB (at 0 dBm output)

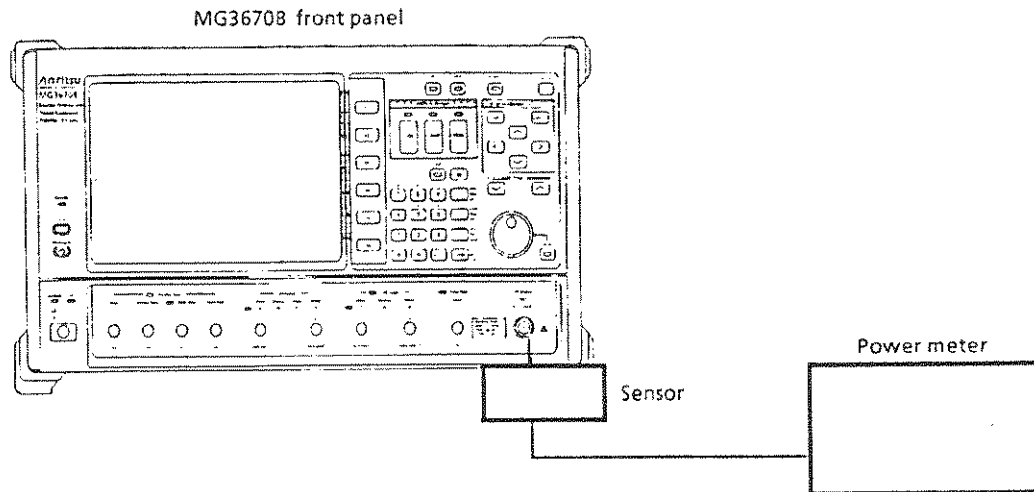
(2) Test instrument

- Power meter ML4803A
- Power sensor MA4601A

(3) Test precautions

The power meter sensor must be directly connected to the output connector of the MG3670B.

(4) Setup



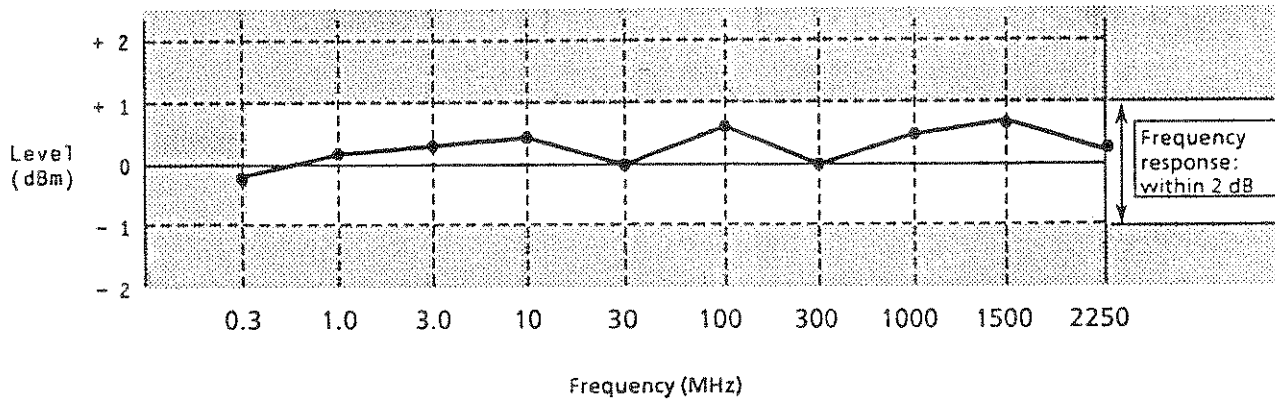
(5) Test procedure

Step	Procedure
1	Set the RF off key of the MG3670B to Off.
2	Zero-adjust the power meter and calibrate the sensor sensitivity.
3	Set the MG3670B output level to 0 dBm.
4	Record the power meter reading each time the MG3670B output frequency is changed as in the table below.

Frequency(MHz)	0.3	1.0	3.0	10	30	100	300	1000	1500	2250
Level(dBm)										

Step	Procedure
------	-----------

- 5 Check that the difference between the maximum and minimum output level values are within 2 dB (± 1 dB).



6.3.4 Spurious

(1) Test specifications

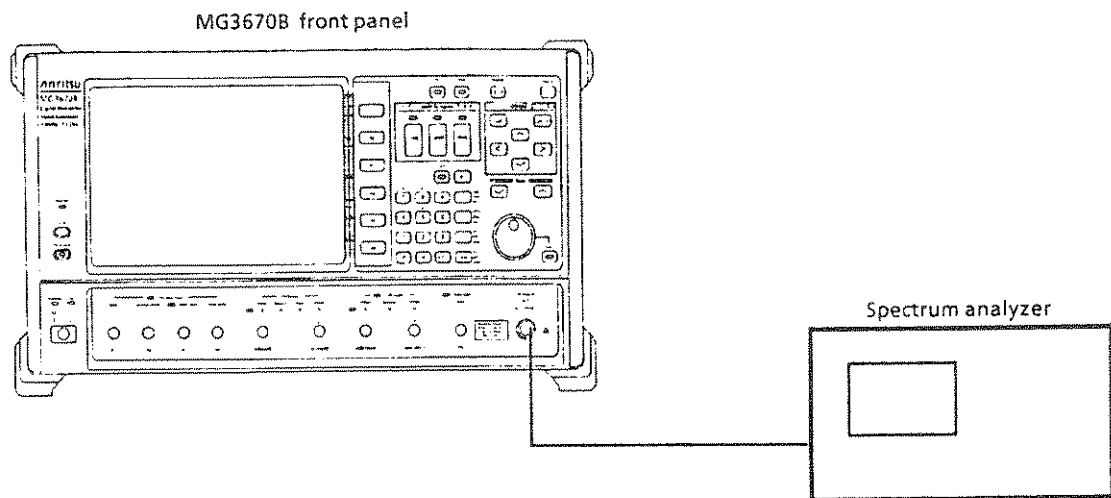
At modulation off and $\leq +5$ dBm output

- Harmonics: ≤ -30 dBc
- Non-harmonics: ≤ -65 dBc (≥ 100 kHz offset, $\leq \pm 100$ MHz bandwidth)
 ≤ -50 dBc (≥ 100 kHz offset, full band)

(2) Test instrument

- Spectrum analyzer MS2602A

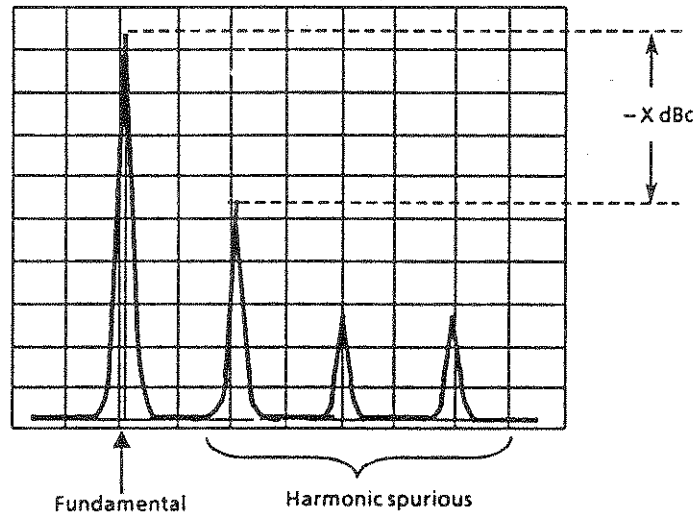
(3) Setup



(4) Test procedure: Harmonic spurious measurement

Step	Procedure
1	Set the Mod Off key of the MG3670B to Off.
2	Set the MG3670B output level to the desired measurement value (for example, 0 dBm).
3	Set the MG3670B frequency to the frequency to be measured.

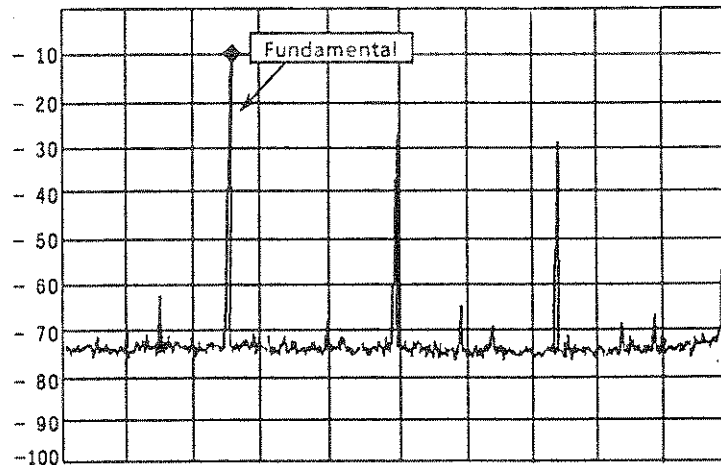
Step	Procedure
4	Set the spectrum analyzer start frequency, stop frequency, span, etc., to suitable values so that the level differences between the fundamental frequency and the harmonics can be measured at the same time, as shown in the figure below.



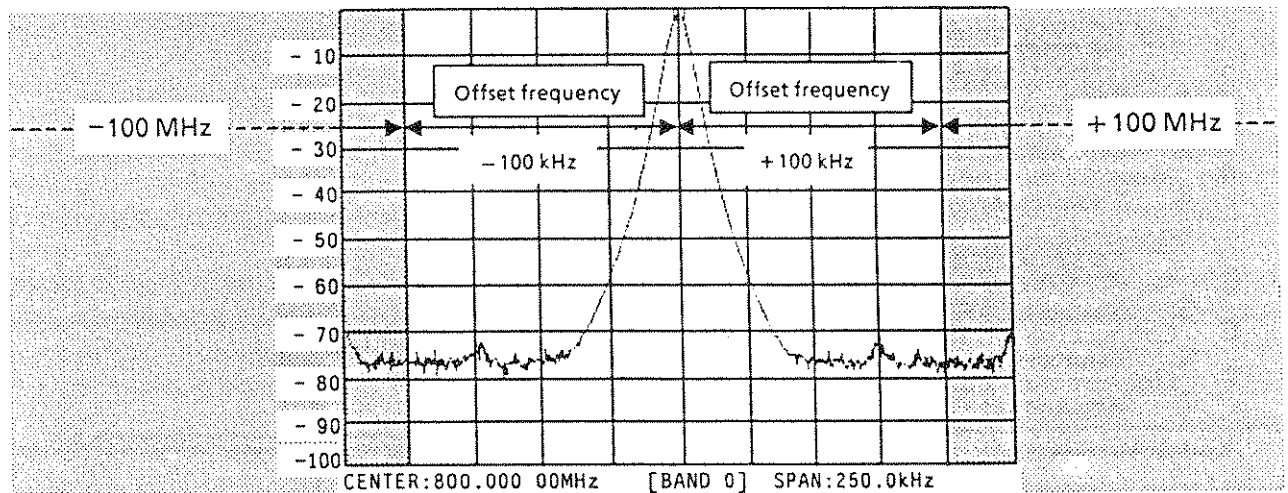
- 5 Match the fundamental wave level to the reference level.
 - 6 Set the analyzer to the delta-marker mode and position the current marker to the highest-level harmonic wave. Check that the level difference is < -30 dBc.
-

(5) Test procedure: Non-harmonic spurious measurement

Step	Procedure
1	Set the Mod Off key of the MG3670B to Off.
2	Set the MG3670B output level to the desired measurement value (for example, 0 dBm).
3	Select the desired frequency to be measured (fundamental frequency), and set the MG3670B output frequency.
4	Match the fundamental wave level to the reference level.



- 5 Set the spectrum analyzer to delta marker mode. Move the current marker to the non-harmonic component having the highest level of the ± 100 kHz to ± 100 MHz offset frequency range and check if the level difference is ≤ -65 dBc. As shown in the figure below, measurements are made within the ± 100 kHz to ± 100 MHz offset frequency range.



Moreover, check that the level difference is ≤ -50 dBc across the entire bandwidth exceeding the ± 100 kHz offset frequency.

6.3.5 Modulation accuracy

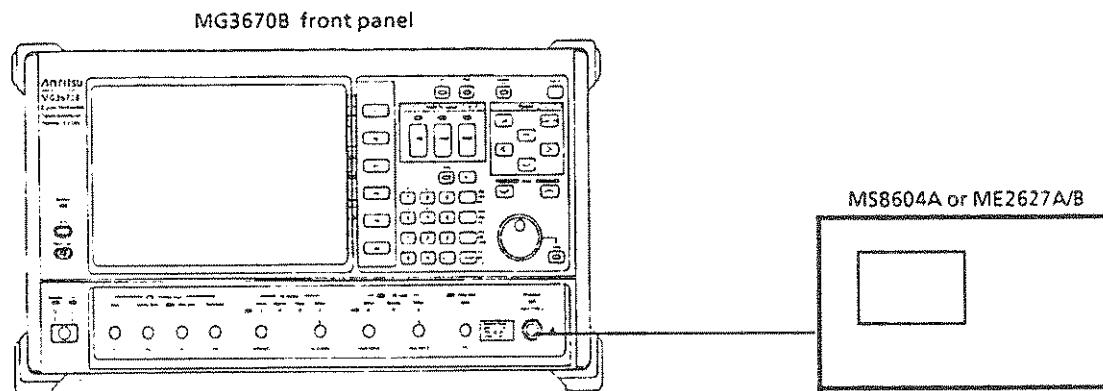
(1) Test specifications

- Modulation accuracy $\pi/4$ DQPSK unit vector error: $\leq 1.8\%$ rms (when output level is ≤ 5 dBm)
GMSK unit phase error: $\leq 5^\circ$ peak (when output level is ≤ 5 dBm)

(2) Test instrument

- Digital modulation waveform analyzer MS8604A
- Digital mobile radio transmitter tester ME2627A/B

(3) Setup



(4) Test procedure

Step	Procedure
1	Set the MG3670B output level to +5 dBm, and set the carrier frequency to the frequency to be measured.
	<u>$\pi/4$ DQPSK modulation unit test</u>
2	Set the MG3670B modulation to ON and the system to PDC.
3	Connect the MG3670 RF Output to the MS8604A RF Input.
4	Measure the modulation accuracy on the MS8604A.
	<u>GMSK modulation unit test</u>
5	Set the MG3670B system to GSM.
6	Connect the MG3670B RF Output to the ME2627A/B digitizer RF Input.
7	Measure the modulation accuracy on the ME2627 A/B.

Note: For information on the operation of the ME2627A/B, refer to the ME262A/B user's manual. For information on the operation of the MS8604A, refer to the MS8604A user's manual. In order to use MS8604A, the optional PDC software (option 11) is necessary.

SECTION 7 CALIBRATION

This section describes the measuring instruments required for calibration of the MG3670B, their setup and the calibration method.

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SECTION 7 CALIBRATION

7.1 Requirement for Calibration

Calibration is carried out to help prevent degradation of performance of the MG3670B. Calibration should be performed periodically even if the MG3670B is operating normally. Calibration should be executed periodically once or twice a year.

Contact Anritsu if the MG3670B fails to meet the specifications during calibration.

7.2 Equipment Required for Calibration

The table below lists the equipment required for calibrating each item.

Table of Equipment Required for Calibration

Equipment	Major specification†	Calibration item
Oscilloscope	Capable of measuring 10 MHz (external trigger possible)	Reference-crystal-oscillator frequency accuracy
Frequency standard	Standard radio-wave receiver or equipment having equivalent function (accuracy better than 1×10^{-9})	Reference-crystal-oscillator frequency accuracy

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

7.3 Calibration

Before executing the MG3670B calibration explained on the following pages, unless otherwise specified, the instruments under calibration and all the other measuring instruments must be warmed-up for at least 30 minutes so that the calibration is executed under stable conditions. To measure at the highest accuracy, calibration must be performed at room temperature, ac power-supply voltage fluctuations must be minimized, and there must be no problems with noise, vibration, dust, and humidity, etc.

7.3.1 Calibrating reference-crystal-oscillator frequency

This paragraph describes the calibration method using an Oscilloscope .

To calibrate the MG3670B, its internal reference oscillator frequency should be calibrated once or twice a year. The stability of the MG3670B reference crystal oscillator is $\pm 2 \times 10^{-8}$ /day. The following describes the method for calibrating the frequency of the reference crystal oscillator by using a reference signal generator generating a reference signal that is either locked to a standard wave, or to a received color-television sub-carrier (signal locked to rubidium atomic standard).

(1) Specifications

Reference crystal oscillator	Frequency	Aging rate	Temperature characteristics
Standard type	10 MHz	2×10^{-8} / day (after 24-h operation)	$\pm 5 \times 10^{-8}$ (0 to 50 °C)
Option 01	10 MHz	5×10^{-9} / day (after 24-h operation)	$\pm 5 \times 10^{-8}$ (0 to 50 °C)
Option 02	10 MHz	2×10^{-9} / day (after 24-h operation)	$\pm 1.5 \times 10^{-8}$ (0 to 50 °C)
Option 03	10 MHz	$\pm 5 \times 10^{-10}$ / day (after 48-h operation)	$\pm 5 \times 10^{-9}$ (0 to 50 °C)

(2) Instruments required for calibration

- Oscilloscope 10 MHz, external trigger possible
- Frequency standard Standard radio wave receiver or equipment having equivalent function (accuracy better than 1×10^{-9})

(3) Setup

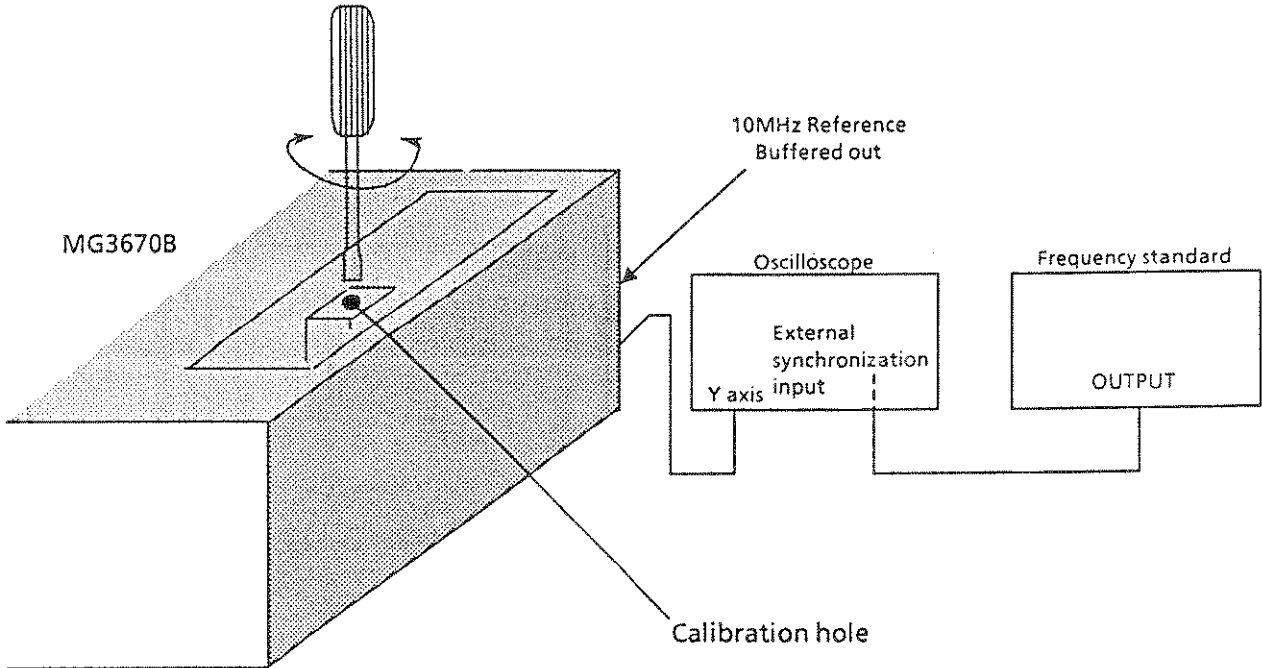
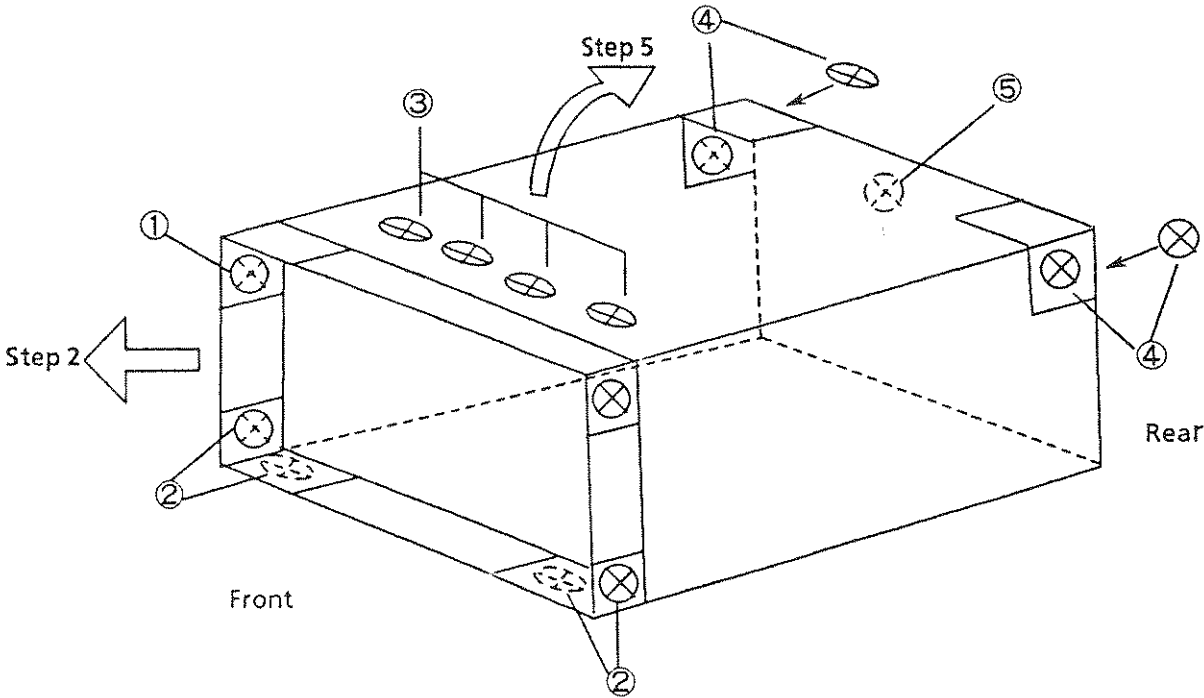


Fig. 7-1 Calibration of reference-crystal-oscillator frequency

Note: Removing the top cover is explained below:



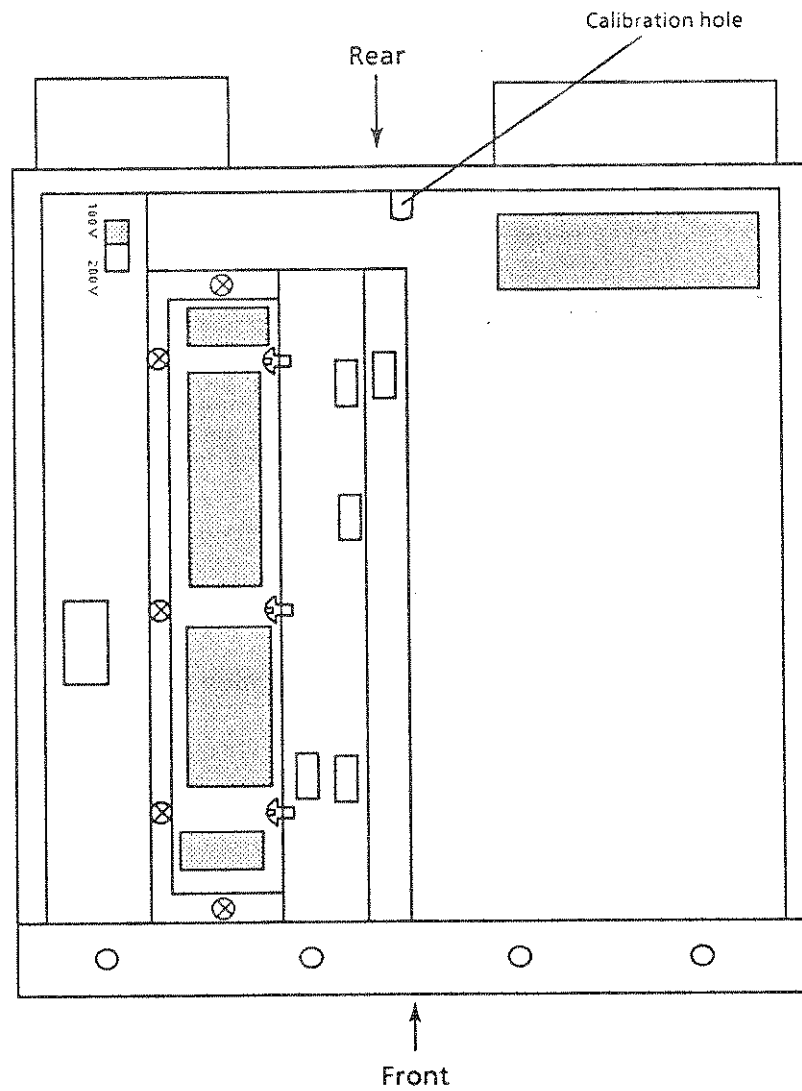


Fig.7-3 Top View after Removing Top Cover

Step	Procedure
1	Remove the screws ①(2pc) and ②(4pc) at the front protectors.
2	Pull out the front section, slowly, by a few cm .
3	Remove the screws ③(4pc) at the front top section.
4	Remove the screws ④(4pc) at rear protectors and ⑤(1pc) at the rear side.
5	Lifting up the front side of the top cover, remove the top cover.

(4) Calibration procedure

Step	Procedure
1	Set-up the equipment as shown in the figure on the previous pages. The ambient temperature should be $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$.
2	Allow the reference crystal oscillator to warm-up for 24 hours by setting the Power switch on the front panel to the Standby position.
3	Then set the Power switch to On.
4	Apply the standard frequency signal to the external synchronization input of the oscilloscope, and the signal output from the Buffered Out connector on the MG3670B rear panel to the Y axis.
5	Adjust the oscilloscope so that the input waveform can be observed. If the input waveform moves right or left on the screen and synchronization is not possible, this means that the frequency of the reference crystal oscillator does not match the standard frequency.
6	Adjust the potentiometer in the calibration hole inside the reference-crystal-oscillator case so that the input waveform stops moving left or right on the oscilloscope screen.

(5) Precautions for Calibration

Applying a standard 10 MHz signal to the oscilloscope Y-axis produces a lissajous waveform. Adjust the reference oscillator frequency so that the waveform becomes a stationary circularity at Step 6.

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SECTION 8 STORAGE AND TRANSPORTATION

This section describes the long-term storage, repacking and transportation of the MG3670B as well as the regular care procedures and the timing.

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8.2.2	Recommended storage precautions	8-3
8.3	Repacking and Transportation	8-4
8.3.1	Repacking	8-4
8.3.2	Transportation	8-4

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8.1 Cleaning Cabinet

Always turn the MG3670B 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 coating, or cause deformation or discoloration.

8.2 Storage Precautions

This paragraph describes the precautions to take for long-term storage of the MG3670B Digital Modulation Generator.

8.2.1 Precautions before storage

- (1) Before storage, wipe dust, finger-marks, and other dirt off the MG3670B.
- (2) Avoid storing the MG3670B 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 ($< -40^{\circ}\text{C}$ or $> 70^{\circ}\text{C}$) or high humidity ($\geq 90\%$).

8.2.2 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

8.3 Repacking and Transportation

The following precautions should be taken if the MG3670B must be returned to Anritsu Corporation for servicing.

8.3.1 Repacking

Use the original packing materials. If the MG3670B is packed in other materials, observe the following packing procedure:

- (1) Wrap the MG3670B in a plastic sheet or similar material.
- (2) Use a cardboard, wooden box, or aluminum case which allows shock-absorbent material to be inserted on all sides of the equipment.
- (3) Use enough shock-absorbent material to protect the MG3670B from shock during transportation and to prevent it from moving in the container.
- (4) Secure the container with packing straps, adhesive tape or bands.

8.3.2 Transportation

Do not subject the MG3670B to severe vibration during transport. It should be transported under the storage conditions recommended in paragraph 8.2.

APPENDIXES

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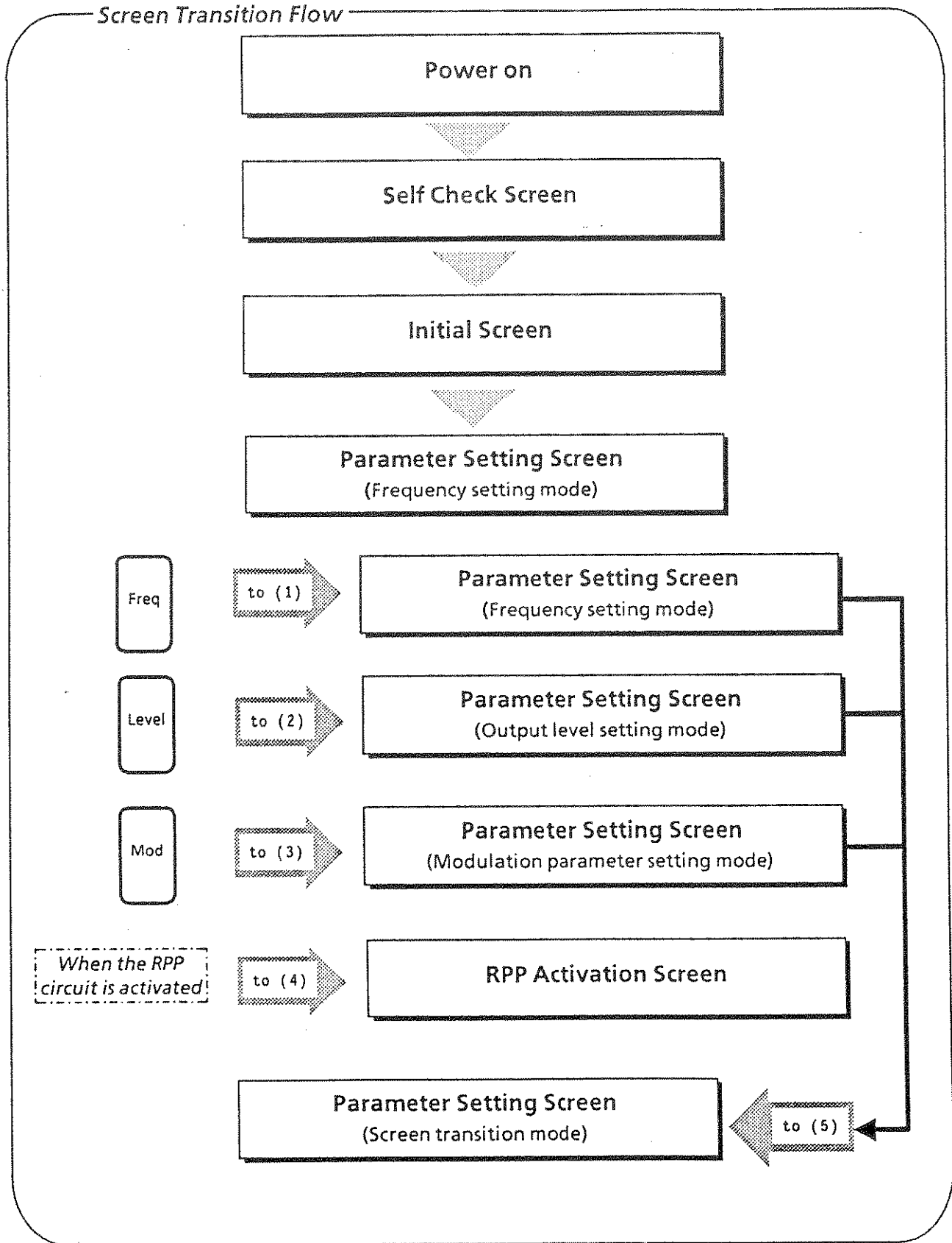
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STATISTICAL

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APPENDIX A SCREEN TRANSITION

This Appendix A summarizes the screen transition of the MG3670B. For detailed descriptions, see Section 3 and Section 4.



(1) Parameter Setting Screen (Frequency setting mode)

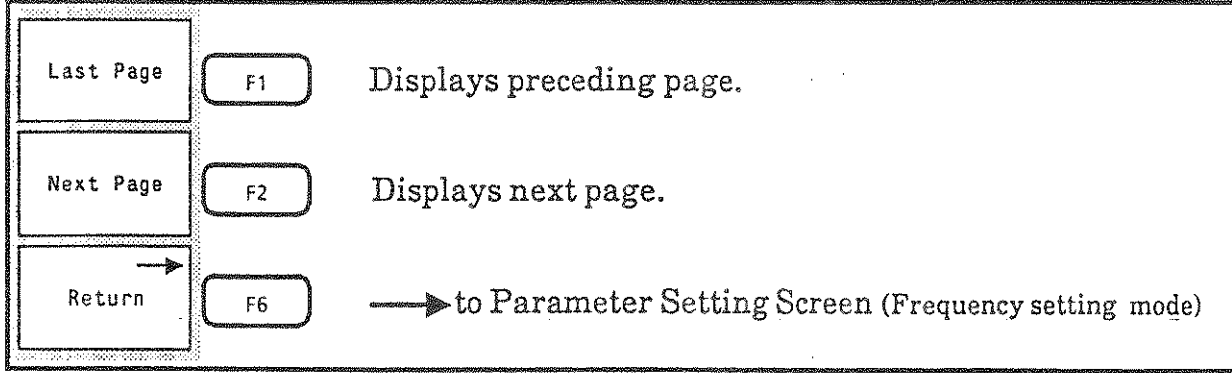
< Menu 1 >

Incremental Step Value	F1	Incremental step frequency
Relative On/Off	F2	Relative frequency display mode (On/Off)
Frequency Save →	F3	→ to Frequency Save Screen
Frequency Recall →	F4	→ to Frequency Recall Screen
Frequency Delete →	F5	→ to Frequency Delete Screen
etc *	F6	→ to Menu 2

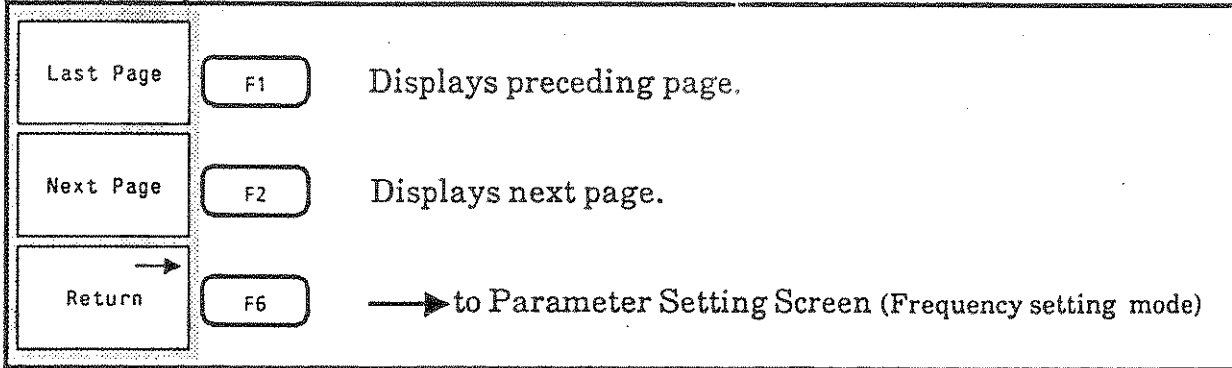
< Menu 2 >

Offset Value	F1	Frequency offset value
Offset On/Off	F2	Frequency offset (On/Off)
Current Frequency	F3	Checks output frequency.
	F4	
Setup/Parameter Memory →	F5	→ to Parameter Setting Screen(Screen transition mode)
etc *	F6	→ to Menu 1

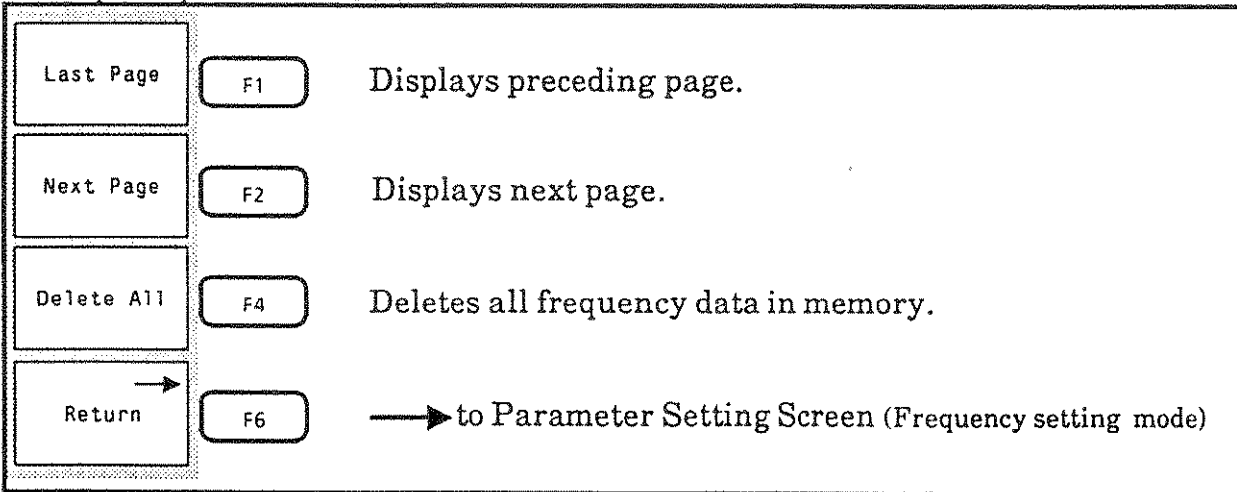
< Frequency Save Screen >



< Frequency Recall Screen >



< Frequency Delete Screen >



(2) Parameter Setting Screen (Output level setting mode)

< Menu 1 >

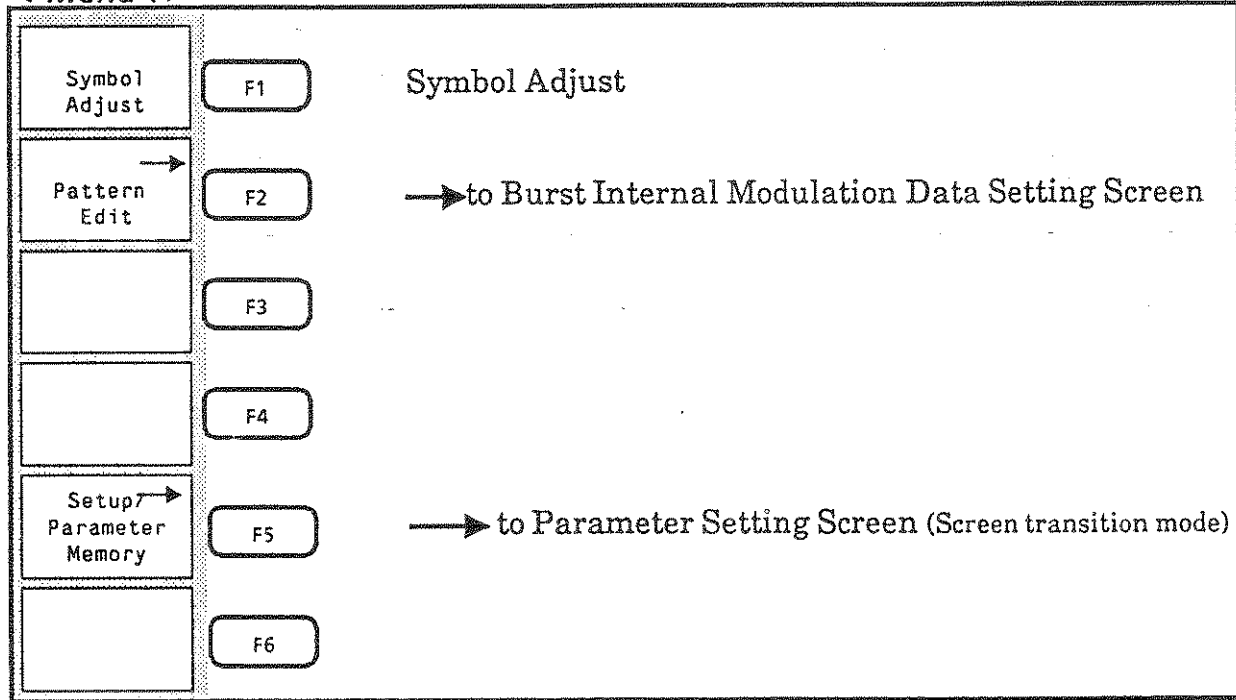
Incremental Step Value	F1	Incremental step output level
Relative On/Off	F2	Relative level display mode (On/Off)
Continuous ON/Off	F3	Continuous mode (On/Off)
Unit EMF/TERM	F4	Displays open-circuit voltage/terminated voltage
Cal	F5	Calibrates output level.
etc *	F6	→ to Menu 2

< Menu 2 >

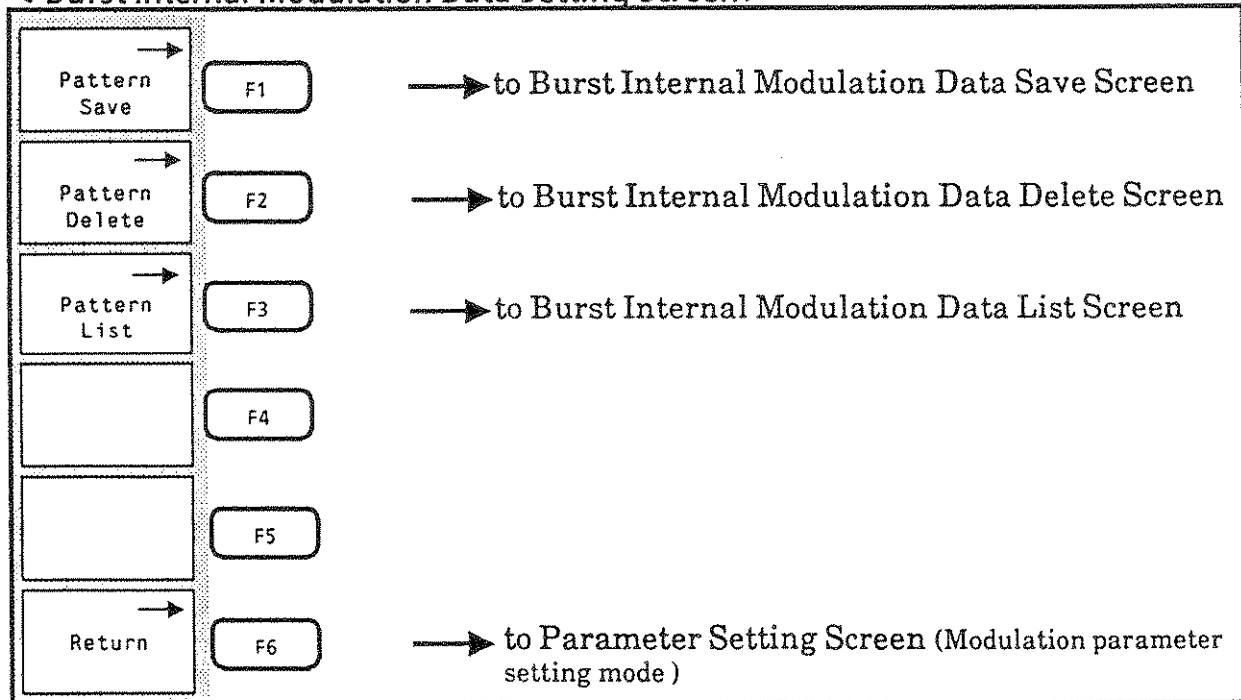
Offset Value	F1	Output level offset value
Offset On/Off	F2	Output level offset (On/Off)
Current Level	F3	Checks output level.
	F4	
Setup → Parameter Memory	F5	→ to Parameter Setting Screen (Screen transition mode)
etc *	F6	→ to Menu 1

(3) Parameter Setting Screen (Modulation parameter setting mode)

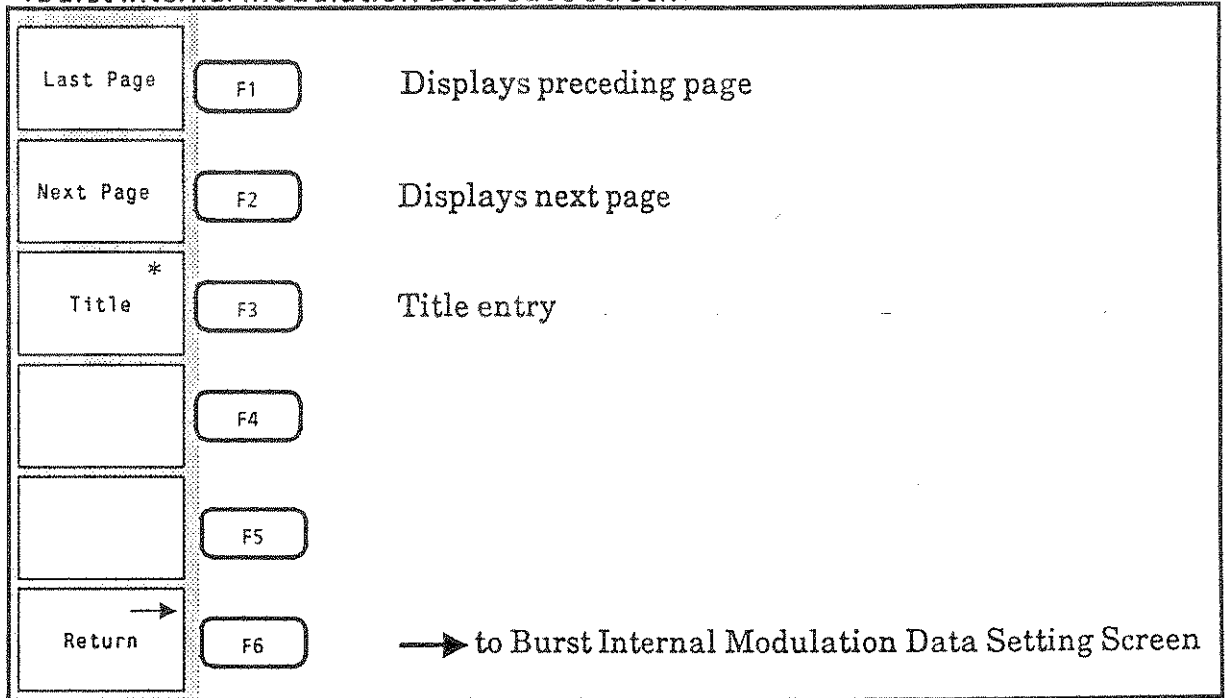
< Menu 1 >



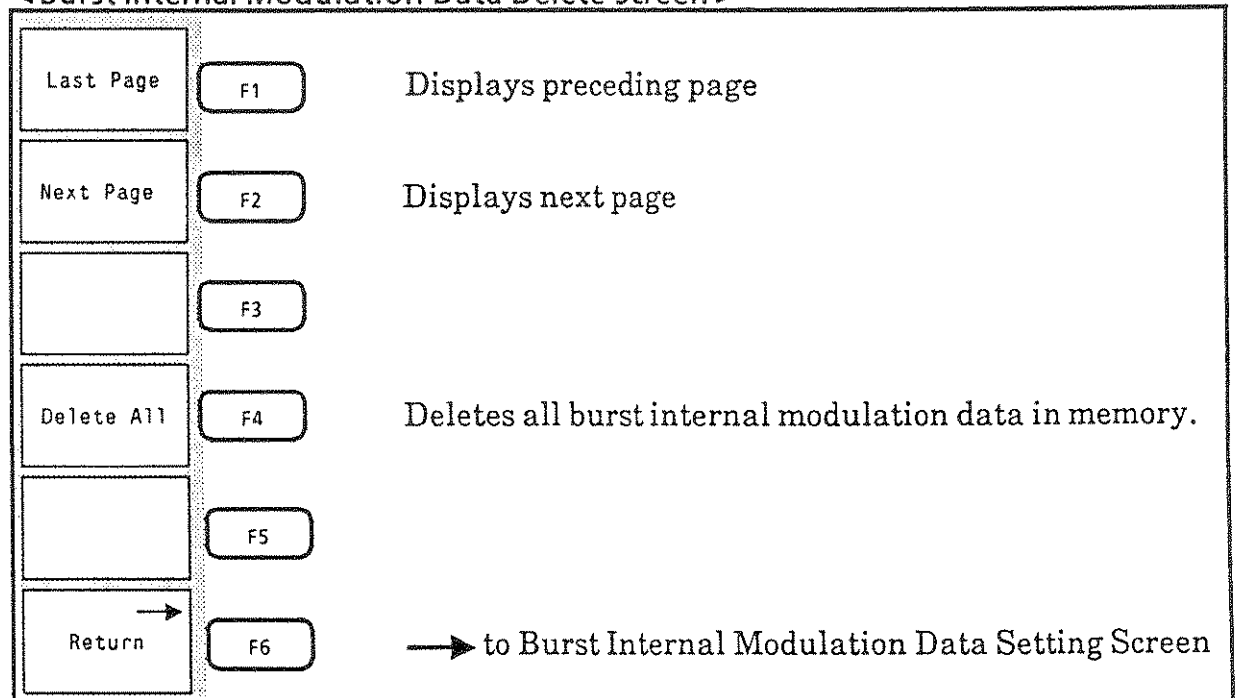
< Burst Internal Modulation Data Setting Screen >



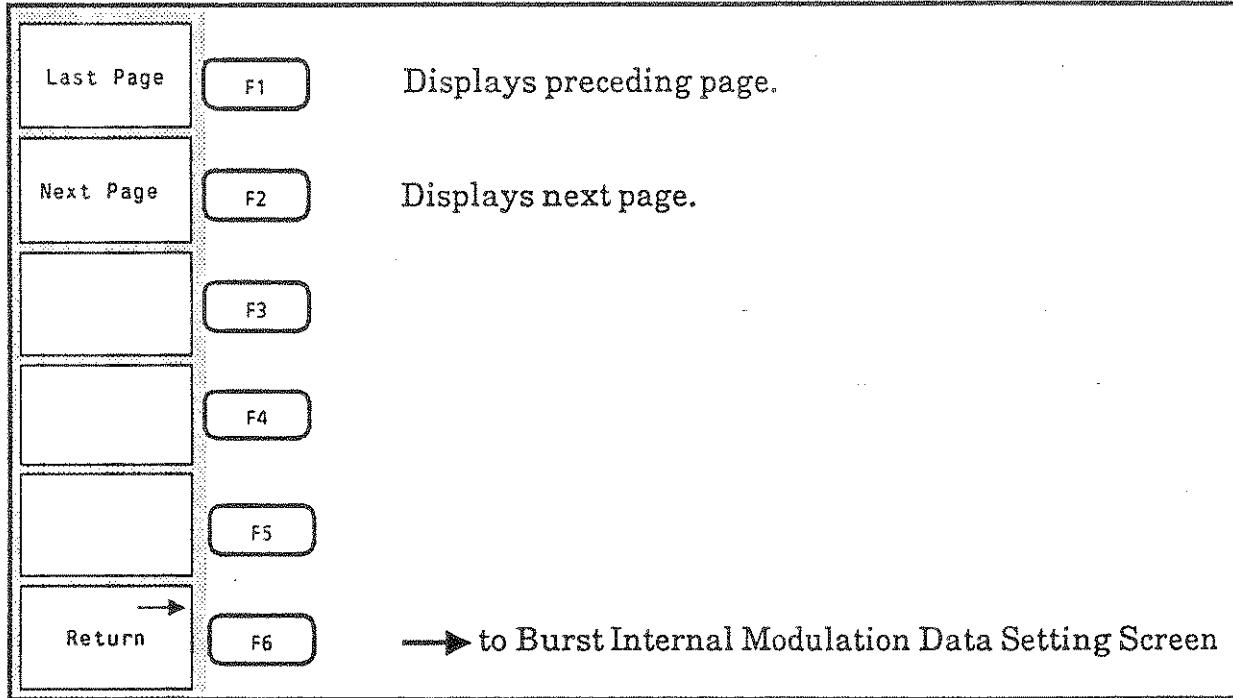
< Burst Internal Modulation Data Save Screen >



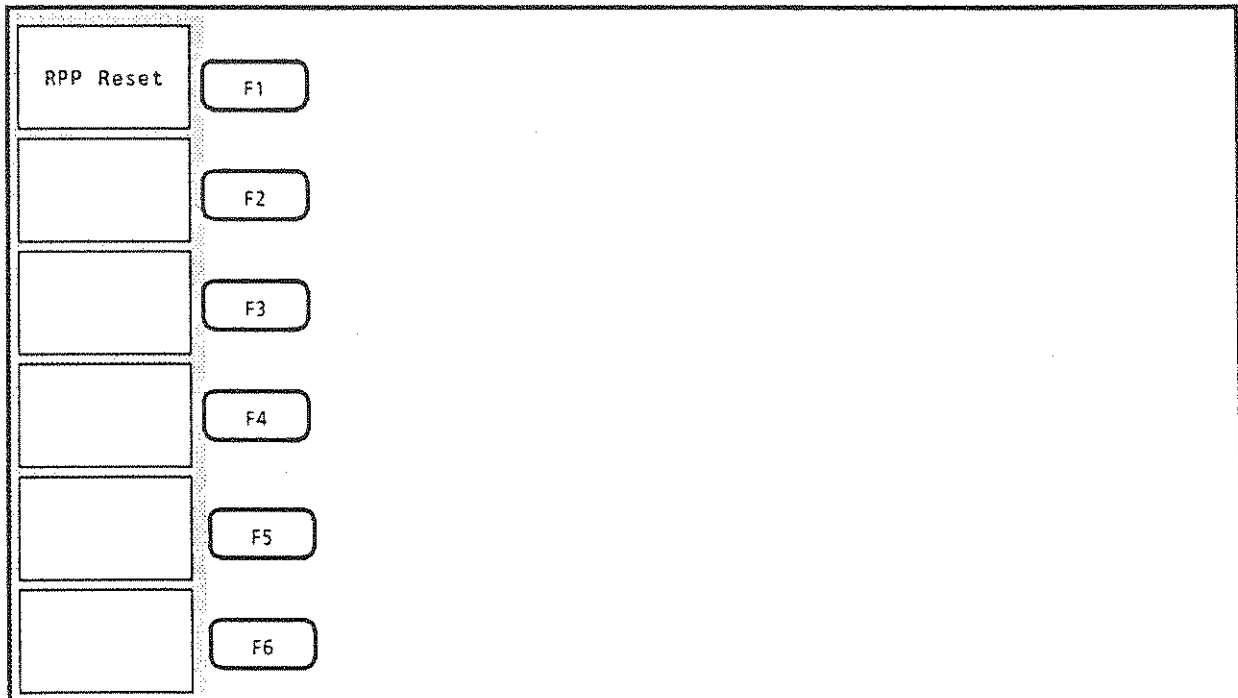
< Burst Internal Modulation Data Delete Screen >



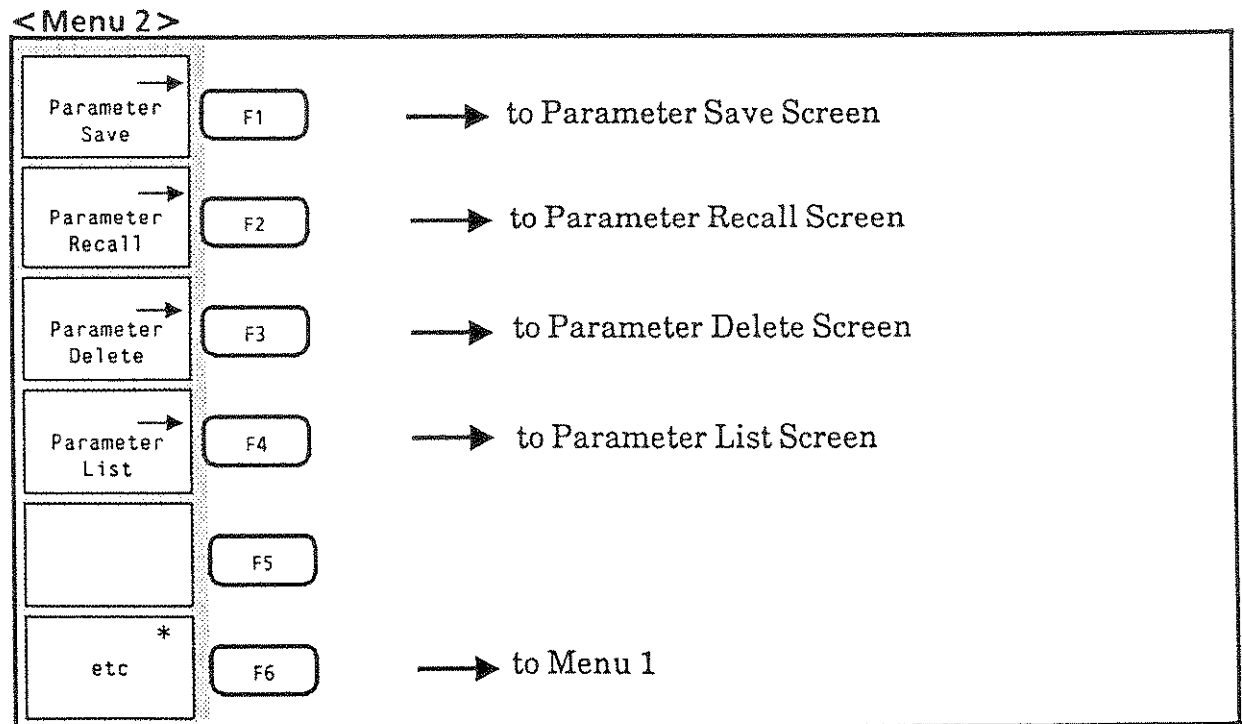
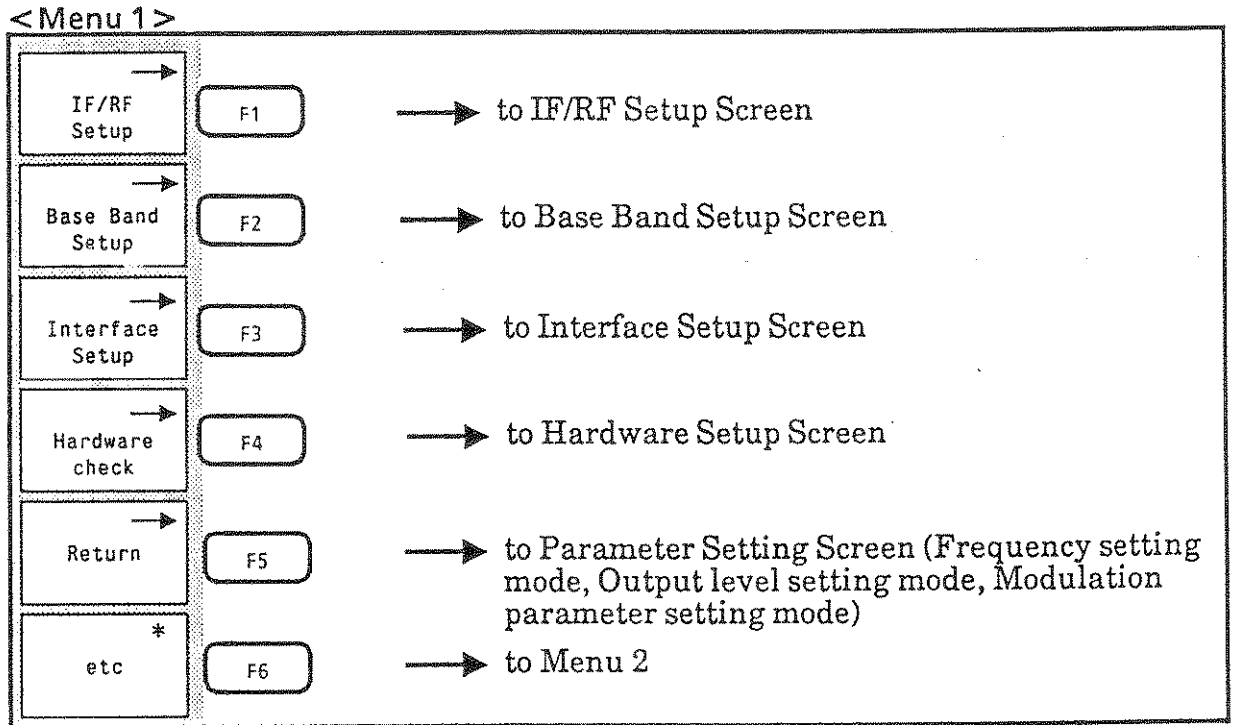
< Burst Internal Modulation Data List Screen >



(4) RPP Activation Screen



(5) Parameter Setting Screen (Screen transition mode)



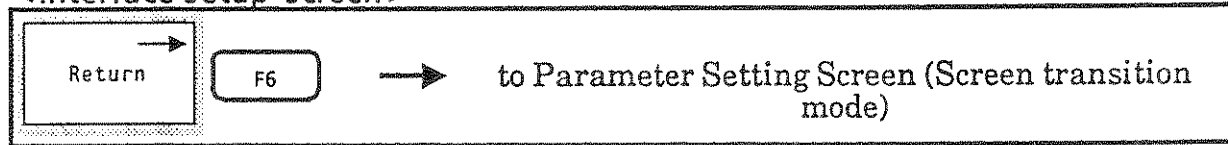
<IF / RF Setup Screen >



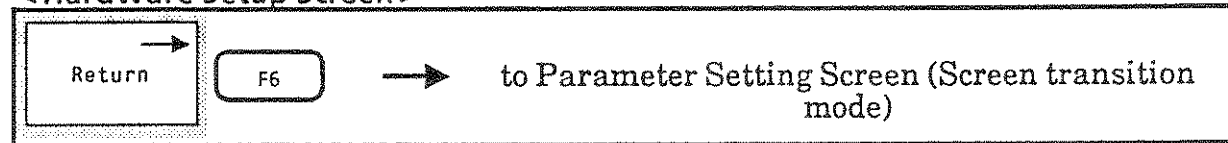
<Base Band Setup Screen >



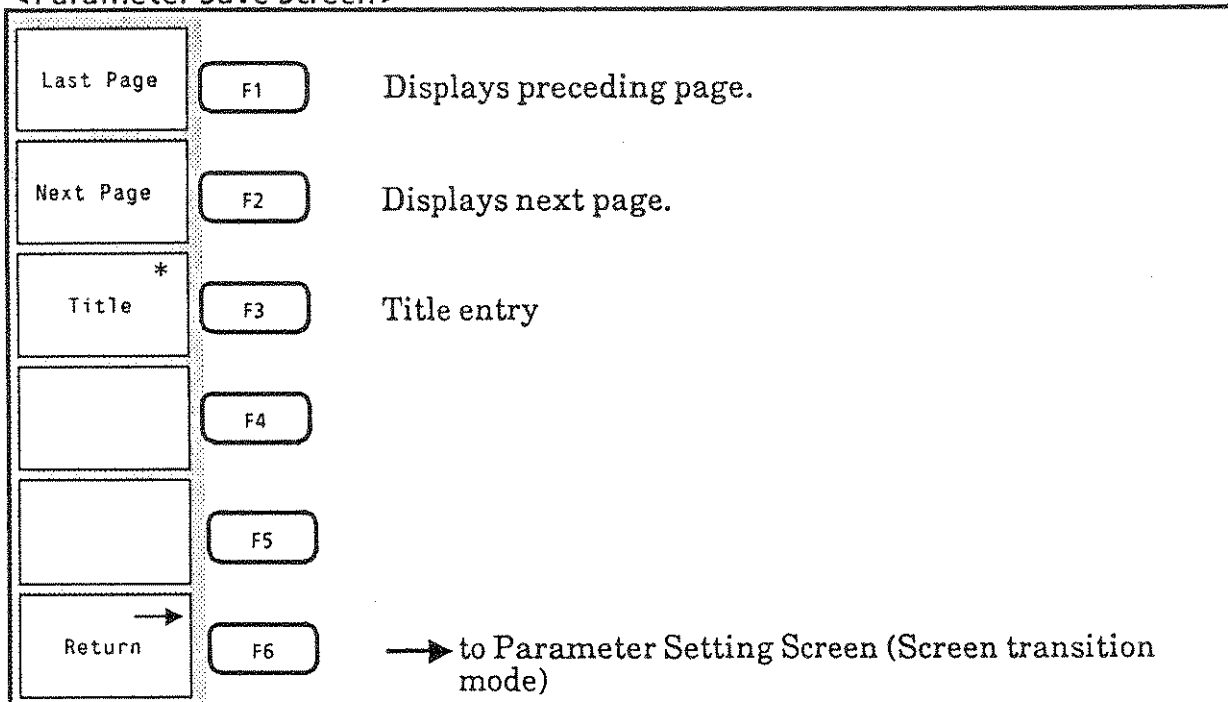
<Interface Setup Screen >



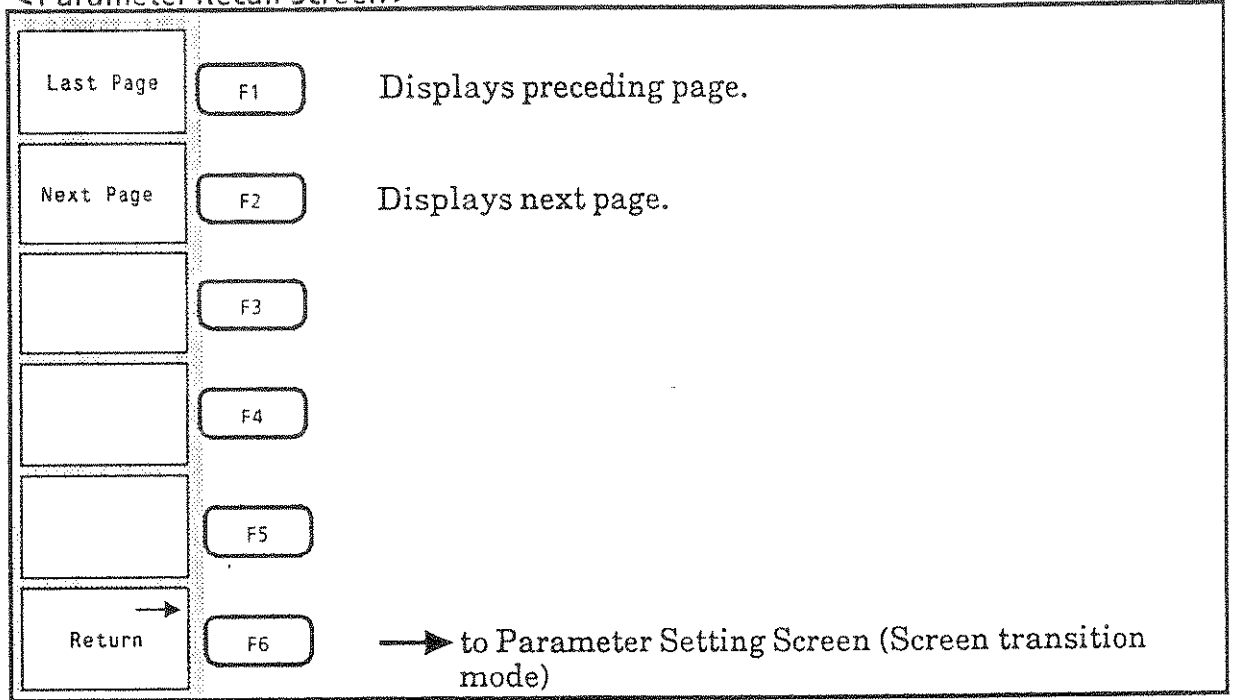
<Hardware Setup Screen >



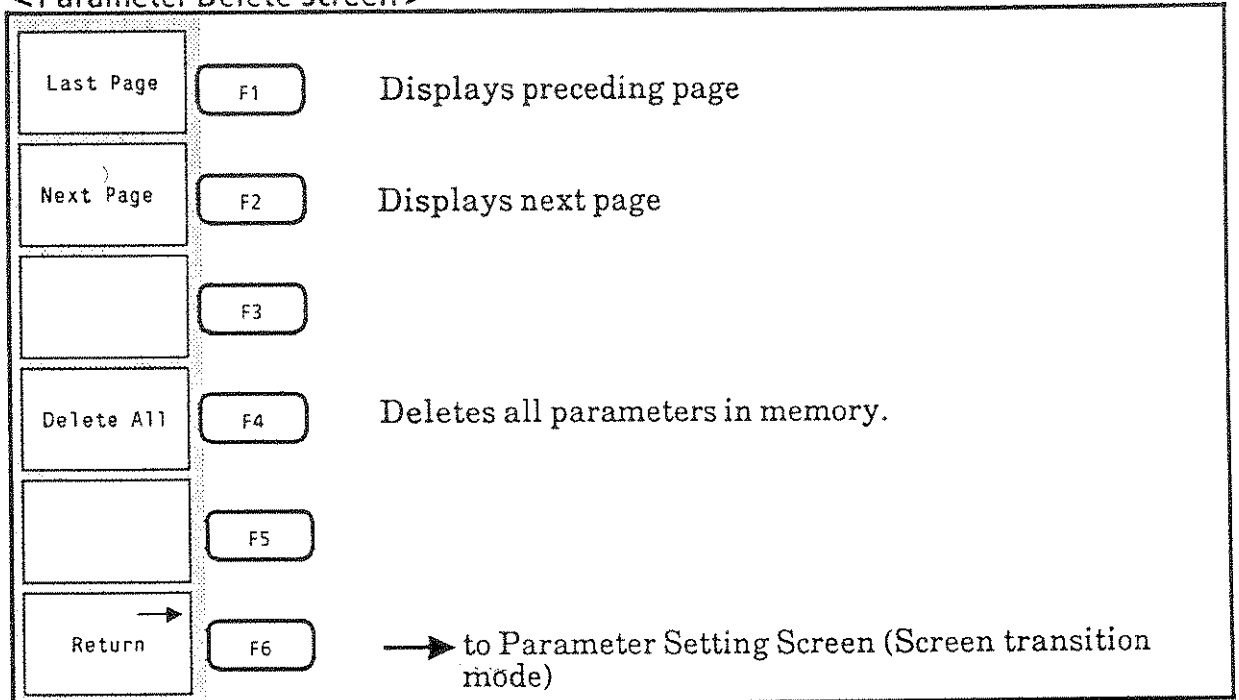
<Parameter Save Screen >



<Parameter Recall Screen>



<Parameter Delete Screen>



< Parameter List Screen >

Last Page	F1	Displays preceding page.
Next Page	F2	Displays next page.
	F3	
	F4	
	F5	
Return →	F6	→ to Parameter Setting Screen (Screen transition mode)

< Title Entry >

Cursor ←	F1	Moves cursor in the arrow mark.
Cursor →	F2	Moves cursor in the arrow mark.
	F3	
Delete	F4	Erases the character on the cursor.
Clear	F5	Clears title entry area..
	F6	

APPENDIX B ERROR MESSAGE

B.1 General

Using buzzer, error message display, and status byte, the MG3670B Digital Modulation Generator warns users the cause of an error generated by improper panel operation or GPIB control. Every error message is displayed reversely at the bottom area of the screen.

B.2 Error Disposal

Any of the disposal below is executed when an error has occurred for improper panel operation or GPIB remote control:

- Sounds the buzzer.
- Displays error message.
- Sets Event Status Register and Status byte.

Error message is cleared when the following measures are taken.

B.2.1 Command error (CME)

MAIN CODE	SUB CODE	Error message
300	1	300 Undefined command
301	1	301 Invalid numeric data
302	1	302 Invalid unit
303	1	303 Insufficient data
310	1	310 Command error

B.2.2 Execution error (EXE)

MAIN CODE	SUB CODE	Error message
400	1	400 Out of range
401	1	401 Invalid string data
402	1	402 String too long
403	1	403 Recall memory error
404	1	404 Memory not found
405	1	405 Insufficient Memory
410	1	410 Execution error

B.2.3 Exception error

MAIN CODE	SUB CODE	Error message
600	1	600 Level uncal
601	1	601 Self check error [†]

[†] The self check error does not set Standard Event Status Register and Status Byte.

(Blank)