MG3700A
Vector Signal Generator
Operation Manual
(Mainframe)

19th Edition

For safety and warning information, please read this manual before attempting to use the equipment.
Keep this manual with the equipment.

ANRITSU CORPORATION

Document No.: M-W2495AE-19.0

Safety Symbols

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

Symbols used in manual

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

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

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

Safety Symbols Used on Equipment and in Manual

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

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

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

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

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

These indicate that the marked part should be recycled.

MG3700A
Vector Signal Generator
Operation Manual

1 December 2004 (First Edition)
28 June 2013 (19th Edition)

For Safety

⚠ WARNING

- ALWAYS refer to the operation manual when working near locations at which the alert mark shown on the left is attached. If the advice in the operation manual is not followed there is a risk of personal injury or reduced equipment performance. The alert mark shown on the left may also be used with other marks and descriptions to indicate other dangers.

- Overvoltage Category
  This equipment complies with overvoltage category II defined in IEC 61010. DO NOT connect this equipment to the power supply of overvoltage category III or IV.

Electric Shock

- To ensure that the equipment is grounded, always use the supplied 3-pin power cord, and insert the plug into an outlet with a ground terminal. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock or causing damage to the internal components.

Repair

WARNING⚠

- Only qualified service personnel with a knowledge of electrical fire and shock hazards should service this equipment. This equipment cannot be repaired by the operator. DO NOT attempt to remove the equipment covers or unit covers or to disassemble internal components. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision components.

Calibration

- The performance-guarantee seal verifies the integrity of the equipment. To ensure the continued integrity of the equipment, only Anritsu service personnel, or service personnel of an Anritsu sales representative, should break this seal to repair or calibrate the equipment. Be careful not to break the seal by opening the equipment or unit covers. If the performance-guarantee seal is broken by you or a third party, the performance of the equipment cannot be guaranteed.

For Safety

⚠ WARNING

Falling Over

- This equipment should always be positioned in the correct manner. If the cabinet is turned on its side, etc., it will be unstable and may be damaged if it falls over as a result of receiving a slight mechanical shock.
  Always set up the equipment in a position where the power switch can be reached without difficulty.

Replacing Battery

- When replacing the battery, use the specified battery and insert it with the correct polarity. If the wrong battery is used, or if the battery is inserted with reversed polarity, there is a risk of explosion causing severe injury or death.

Battery Fluid

- DO NOT short the battery terminals and never attempt to disassemble the battery or dispose of it in a fire. If the battery is damaged by any of these actions, the battery fluid may leak. This fluid is poisonous.
  DO NOT touch the battery fluid, ingest it, or get in your eyes. If it is accidentally ingested, spit it out immediately, rinse your mouth with water and seek medical help. If it enters your eyes accidentally, do not rub your eyes, rinse them with clean running water and seek medical help. If the liquid gets on your skin or clothes, wash it off carefully and thoroughly.

Battery Disposal

- DO NOT expose batteries to heat or fire. Do not expose batteries to fire. This is dangerous and can result in explosions or fire. Heating batteries may cause them to leak or explode.

LCD

- This equipment uses a Liquid Crystal Display (LCD). DO NOT subject the equipment to excessive force or drop it. If the LCD is subjected to strong mechanical shock, it may break and liquid may leak.
  This liquid is very caustic and poisonous.
  DO NOT touch it, ingest it, or get in your eyes. If it is ingested accidentally, spit it out immediately, rinse your mouth with water and seek medical help. If it enters your eyes accidentally, do not rub your eyes, rinse them with clean running water and seek medical help. If the liquid gets on your skin or clothes, wash it off carefully and thoroughly.

For Safety

⚠ CAUTION

Cleaning

- Always remove the main power cable from the power outlet before cleaning dust around the power supply and fan.
  - Clean the power inlet regularly. If dust accumulates around the power pins, there is a risk of fire.
  - Keep the cooling fan clean so that the ventilation holes are not obstructed. If the ventilation is obstructed, the cabinet may overheat and catch fire.

Check Terminal

- Never input a signal of more than the indicated value between the measured terminal and ground. Input of an excessive signal may damage the equipment.

For Safety

⚠ CAUTION

Replacing Memory Back-up Battery

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

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

External Storage Media

This equipment uses memory cards as external storage media for storing data and programs.

If this media is mishandled or becomes faulty, important data may be lost. To prevent this chance occurrence, all important data and programs should be backed-up.

Anritsu will not be held responsible for lost data.

Pay careful attention to the following points.

- Never remove the memory card from the instrument while it is being accessed.
- The memory card may be damaged by static electric charges.
- Anritsu has thoroughly tested all external storage media shipped with this instrument. Users should note that external storage media not shipped with this instrument may not have been tested by Anritsu, thus Anritsu cannot guarantee the performance or suitability of such media.

For Safety

⚠ CAUTION

Hard disk

The equipment is equipped with an internal hard disk from which, as with any hard disk, data may be lost under certain conditions. To prevent this chance occurrence, all important data and programs should be backed-up.

Anritsu will not be held responsible for lost data.

To reduce the possibility of data loss, particular attention should be given to the following points.

- The equipment should only be used within the recommend temperature range, and should not be used in locations where the temperature may fluctuate suddenly.
- Always follow the guidelines to ensure that the equipment is set up in the specified manner.
- Always ensure that the fans at the rear and side of the equipment are not blocked or obstructed in any way.
- Exercise care not to bang or shake the equipment whilst the power is on.
- Never disconnect the mains power at the plug or cut the power at the breaker with the equipment turned on.

Notes on Handling (When Rubidium Reference Oscillator Option is Installed)

Please use the carrying case or the original packing materials when you transport it. Please do not give 5 G or more impact to this product for about 30 minutes after power supply OFF. It causes the rubidium oscillator breakdown.

Because Rubidium Reference Oscillator frequency changes by the magnet, please do not set the one to have the magnetism (more than 0.5 Gauss) such as magnets near it.

Use in a residential environment

This equipment is designed for an industrial environment.
In a residential environment this equipment may cause radio interference in which case the user may be required to take adequate measures.

Use in Corrosive Atmospheres

Exposure to corrosive gases such as hydrogen sulfide, sulfurous acid, and hydrogen chloride will cause faults and failures.
Note that some organic solvents release corrosive gases.

Equipment Certificate

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

Anritsu Warranty

Anritsu Corporation will repair this equipment free-of-charge if a malfunction occurs within one year after shipment due to a manufacturing fault. However, software fixes will be made in accordance with the separate Software End-User License Agreement. Moreover, Anritsu Corporation will deem this warranty void when:

- The fault is outside the scope of the warranty conditions separately described in the operation manual.
- The fault is due to mishandling, misuse, or unauthorized modification or repair of the equipment by the customer.
- The fault is due to severe usage clearly exceeding normal usage.
- The fault is due to improper or insufficient maintenance by the customer.
- The fault is due to natural disaster, including fire, wind, flooding, earthquake, lightning strike, or volcanic ash, etc.
- The fault is due to damage caused by acts of destruction, including civil disturbance, riot, or war, etc.
- The fault is due to explosion, accident, or breakdown of any other machinery, facility, or plant, etc.
- The fault is due to use of non-specified peripheral or applied equipment or parts, or consumables, etc.
- The fault is due to use of a non-specified power supply or in a non-specified installation location.
- The fault is due to use in unusual environments(Note).
- The fault is due to activities or ingress of living organisms, such as insects, spiders, fungus, pollen, or seeds.

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

Anritsu Corporation shall assume no liability for injury or financial loss of the customer due to the use of or a failure to be able to use this equipment.

Note:
For the purpose of this Warranty, "unusual environments" means use:

- In places of direct sunlight
- In dusty places
- Outdoors
- In liquids, such as water, oil, or organic solvents, and medical fluids, or places where these liquids may adhere
- In salty air or in places where chemically active gases (SO_2, H_2S, Cl_2, NH_3, NO_2, or HCl, etc.) are present
- In places where high-intensity static electric charges or electromagnetic fields are present
- In places where abnormal power voltages (high or low) or instantaneous power failures occur
- In places where condensation occurs
- In the presence of lubricating oil mists
- In places at an altitude of more than 2,000 m
- In the presence of frequent vibration or mechanical shock, such as in cars, ships, or airplanes

Anritsu Corporation Contact

In the event that this equipment malfunctions, contact an Anritsu Service and Sales office. Contact information can be found on the last page of the printed version of this manual, and is available in a separate file on the CD version.

Notes On Export Management

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

Trademark and Registered Trademark

IQproducer™ is a registered trademark of Anritsu Corporation.

Cautions against computer virus infection

- Copying files and data
  Only files that have been provided directly from Anritsu or generated using Anritsu equipment should be copied to the instrument.
  All other required files should be transferred by means of USB or CompactFlash media after undergoing a thorough virus check.
- Adding software
  Do not download or install software that has not been specifically recommended or licensed by Anritsu.
- Network connections
  Ensure that the network has sufficient anti-virus security protection in place.

Crossed-out Wheeled Bin Symbol

Equipment marked with the Crossed-out Wheeled Bin Symbol complies with council directive 2002/96/EC (the “WEEE Directive”) in European Union.

For Products placed on the EU market after August 13, 2005, please contact your local Anritsu representative at the end of the product's useful life to arrange disposal in accordance with your initial contract and the local law.

Software End-User License Agreement (EULA)

Please read this Software End-User License Agreement (hereafter this EULA) carefully before using (includes executing, copying, registering, etc.) this software (includes programs, databases, scenarios, etc., used to operate, set, etc., Anritsu electronic equipment). By reading this EULA and using this software, you are agreeing to be bound by the terms of its contents and Anritsu Corporation (hereafter Anritsu) hereby grants you the right to use this Software with the Anritsu-specified equipment (hereafter Equipment) for the purposes set out in this EULA.

1. Grant of License and Limitations

1. Regardless of whether this Software was purchased from or provided free-of-charge by Anritsu, you agree not to rent, lease, lend, or otherwise distribute this Software to third parties and further agree not to disassemble, recompile, reverse engineer, modify, or create derivative works of this Software.
2. You may make one copy of this Software for backup purposes only.
3. You are not permitted to reverse engineer this software.
4. This EULA allows you to install one copy of this Software on one piece of Equipment.

2. Disclaimers

To the extent not prohibited by law, in no event shall Anritsu be liable for personal injury, or any incidental, special, indirect or consequential damages whatsoever, including, without limitation, damages for loss of profits, loss of data, business interruption or any other commercial damages or losses, arising out of or related to your use or inability to use this Software.

3. Limitation of Liability

a. If a fault (bug) is discovered in this Software, preventing operation as described in the operation manual or specifications whether or not the customer uses this software as described in the manual, Anritsu shall at its own discretion, fix the bug, or exchange the software, or suggest a workaround, free-of-charge. However, notwithstanding the above, the following items shall be excluded from repair and warranty.
   i) If this Software is deemed to be used for purposes not described in the operation manual or specifications.
   ii) If this Software is used in conjunction with other non-Anritsu-approved software.
   iii) Recovery of lost or damaged data.
   iv) If this Software or the Equipment has been modified, repaired, or otherwise altered without Anritsu's prior approval.
   v) For any other reasons out of Anritsu's direct control and responsibility, such as but not limited to, natural disasters, software virus infections, etc.

b. Expenses incurred for transport, hotel, daily allowance, etc., for on-site repairs by Anritsu engineers necessitated by the above faults shall be borne by you.

c. The warranty period for faults listed in article 3a above covered by this EULA shall be either 6 months from the date of purchase of this Software or 30 days after the date of repair, whichever is longer.

4. Export Restrictions

You may not use or otherwise export or re-export directly or indirectly this Software except as authorized by Japanese and United States law. In particular, this software may not be exported or re-exported (a) into any Japanese or US embargoed countries or (b) to anyone on the Japanese or US Treasury Department's list of Specially Designated Nationals or the US Department of Commerce Denied Persons List or Entity List. By using this Software, you warrant that you are not located in any such country or on any such list. You also agree that you will not use this Software for any purposes prohibited by Japanese and US law, including, without limitation, the development, design and manufacture or production of missiles or nuclear, chemical or biological weapons of mass destruction.

5. Termination

Anritsu shall deem this EULA terminated if you violate any conditions described herein. This EULA shall also be terminated if the conditions herein cannot be continued for any good reason, such as violation of copyrights, patents, or other laws and ordinances.

6. Reparations

If Anritsu suffers any loss, financial or otherwise, due to your violation of the terms of this EULA, Anritsu shall have the right to seek proportional damages from you.

7. Responsibility after Termination

Upon termination of this EULA in accordance with item 5, you shall cease all use of this Software immediately and shall as directed by Anritsu either destroy or return this Software and any backup copies, full or partial, to Anritsu.

8. Dispute Resolution

If matters of dispute or items not covered by this EULA arise, they shall be resolved by negotiations in good faith between you and Anritsu.

9. Court of Jurisdiction

This EULA shall be interpreted in accordance with Japanese law and any disputes that cannot be resolved by negotiation described in Article 8 shall be settled by the Japanese courts.

CE Conformity Marking

Anritsu affixes the CE conformity marking on the following product(s) in accordance with the Council Directive 93/68/EEC to indicate that they conform to the EMC and LVD directive of the European Union (EU).

CE marking

1. Product Model

Model: MG3700A Vector Signal Generator

2. Applied Directive

EMC: Directive 2004/108/EC

LVD: Directive 2006/95/EC

3. Applied Standards

- EMC: Emission: EN 61326-1: 2006 (Class A)
  Immunity: EN 61326-1: 2006 (Table 2)

	Performance Criteria*
IEC 61000-4-2 (ESD)	B
IEC 61000-4-3 (EMF)	A
IEC 61000-4-4 (Burst)	B
IEC 61000-4-5 (Surge)	B
IEC 61000-4-6 (CRF)	A
IEC 61000-4-8 (RPFMF)	A
IEC 61000-4-11 (V dip/short)	B, C

*: Performance Criteria

A: During testing, normal performance within the specification limits.

B: During testing, temporary degradation, or loss of function or performance which is self-recovering.

C: During testing, temporary degradation, or loss of function or performance which requires operator intervention or system reset occurs.

Harmonic current emissions:
EN 61000-3-2: 2006 +A1:2009 A2:2009
(Class A equipment)
: No limits apply for this equipment with an active input power under 75 W.

- LVD: EN 61010-1: 2010 (Pollution Degree 2)

4. Authorized representative

Name:	Murray Coleman
	Head of Customer Service EMEA
	ANRITSU EMEA Ltd.
Address, city:	200 Capability Green, Luton
	Bedfordshire, LU1 3LU
Country:	United Kingdom

C-tick Conformity Marking

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

C-tick marking

1. Product Model

Model: MG3700A Vector Signal Generator

2. Applied Standards

EMC: Emission: EN 61326-1: 2006 (Class A equipment)

About Eco label

The label shown on the left is attached to Anritsu products meeting our environmental standards.

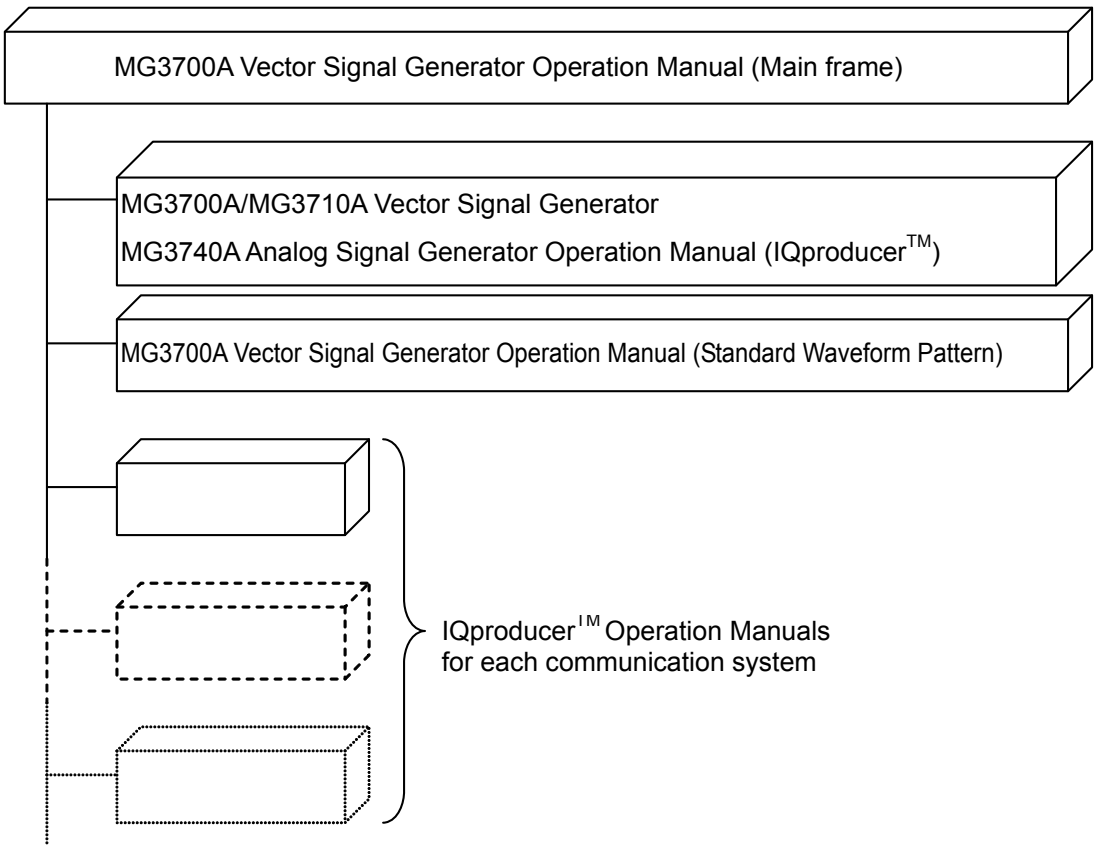
Details about this label and the environmental standards are available on the Anritsu website at http://www.anritsu.com

About This Manual

Composition of Operation Manuals

The operation manuals for the MG3700A Vector Signal Generator are comprised as shown in the figure below.

Details on the software application IQproducer™ and the standard waveform pattern are provided in each operation manual separately. Read them when needed in addition to this manual.



Scope of This Manual

This manual mainly describes operation, maintenance, and remote control of the MG3700A Vector Signal Generator.

Basic functions and the outline of operation are described in Section 3 "Operation."

[ ] in this manual represents front panel keys.

Table of Contents

IV.

Section 1 Outline

This section provides an outline of the product and describes the product composition.

1.1 Outline of Product

The MG3700A (hereafter referred to as "MG3700A") is an arbitrary waveform based vector signal generator useful for a wide range of applications, from R&D to manufacturing of digital mobile communication systems, devices, and equipment.

This equipment has the following features.

- Covered frequency range: 250 kHz to 6000 MHz (with option installed)
- RF modulation bandwidth during internal modulation: 120 MHz
- Internal memory: 512 Msamples (with option installed)

These features allow this equipment to be used for a broad array of applications ranging from major existing mobile communications to next-generation mobile communications.

Moreover, thanks to its large built-in memory capacity, it is capable of switching multiple communication system signals at high speed.

The supplied CD contains application software. This application software allows baseband waveform data generation supporting communication systems, external data conversion, and its transfer to this equipment.

1.2 Product Composition

1.2.1 Standard composition

The table below lists the standard composition of this equipment. After opening the package, confirm that all the products listed below are included in the box. If anything is missing or damaged, contact Anritsu Corporation or one of its distributors.

Table 1.2.1-1 Standard Composition

Item	Model/No.	Product	Q'ty	Remarks
Main unit	MG3700A	Vector signal generator	1	
Accessories		Power cord	1	
	J1276	LAN straight cable	1	Length: 100 mm For connection between Ethernet connector and Junction connector on the rear panel of the MG3700A
	(*1)	CompactFlash*2	1	256 MB or more
	J1254	CompactFlash adapter	1	Conversion adapter for CompactFlash → PC card
	Z0742	MG3700A CD-ROM	1	CD-ROM containing IQproducer™ and operation manuals

*1: See Table 1.2.3-1 “Peripheral Equipment” for the model number.

*2: The operations of the MG3700A are not guaranteed if a compact flash that is neither the supplied one nor the one specified as peripheral equipment is used.

1.2.2 Options

Tables 1.2.2-1 through 1.2.2-3 list the options for this equipment. They are all sold separately.

Table 1.2.2-1 Additional Options at Shipping

Option No.	Product	Remarks
MG3700A-001	Rubidium reference oscillator	$\pm 1 \times 10^{-10}$/month
MG3700A-002	Mechanical attenuator	
MG3700A-011	Upper frequency limit 6 GHz	
MG3700A-021	ARB memory expansion 512 Msamples	512 Msamples
MG3700A-031	High speed BER test function	

Table 1.2.2-2 Additional Options after Shipping

Option No.	Product	Remarks
MG3700A-101	Rubidium reference oscillator retrofit	$\pm 1 \times 10^{-10}$/month
MG3700A-102	Mechanical attenuator retrofit	
MG3700A-103	Electronic attenuator retrofit	
MG3700A-111	Upper frequency limit 6 GHz retrofit	
MG3700A-121	ARB memory expansion 512 Msamples retrofit	512 Msamples
MG3700A-131	High speed BER test function retrofit	

Table 1.2.2-3 Warranty Period Extension Options

Option No.	Product	Remarks
MG3700A-ES210	Extended 2-year warranty service	
MG3700A-ES310	Extended 3-year warranty service	
MG3700A-ES510	Extended 5-year warranty service	

Table 1.2.2-4 lists the application software options supplied with this equipment. They are all sold separately.

Table 1.2.2-4 Software Options

Option No.	Product	Remarks
MX370101A	HSDPA IQproducer™	CD-ROM containing license and operation manual
MX370102A	TDMA IQproducer™	CD-ROM containing license and operation manual
MX370103A	CDMA2000 1xEV-DO IQproducer™	CD-ROM containing license and operation manual
MX370104A	Multi-carrier IQproducer™	CD-ROM containing license and operation manual
MX370105A	Mobile WiMAX IQproducer™	CD-ROM containing license and operation manual
MX370106A	DVB-T/H IQproducer™	CD-ROM containing license and operation manual
MX370107A	Fading IQproducer™	CD-ROM containing license and operation manual
MX370108A	LTE IQproducer™	CD-ROM containing license and operation manual
MX370109A	XG-PHS IQproducer™	CD-ROM containing license and operation manual
MX370110A	LTE TDD IQproducer™	CD-ROM containing license and operation manual
MX370111A	WLAN IQproducer™	CD-ROM containing license and operation manual
MX370112A	TD-SCDMA IQproducer™	CD-ROM containing license and operation manual
MX370001A	TD-SCDMA waveform pattern	DVD containing license and operation manual
MX370002A	Public wireless communication system waveform pattern	CD-ROM containing license and operation manual

1.2.3 Peripheral equipment

Table 1.2.3-1 listed the peripheral equipment for this equipment. They are all sold separately.

Table 1.2.3-1 Peripheral Equipment

Model Name /No.	Product	Remarks
W2495AE	MG3700A Vector Signal Generator Operation Manual (Mainframe)	Printed version
W2496AE	MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)	Printed version
W2539AE	MG3700A Operation Manual (Standard Waveform Pattern)	Printed version
G0141	HDD ASSY	For replacement in case of internal hard disk damage
K240B	Power Divider (K connector)	DC to 26.5 GHz, 50 Ω K-J, 1 Wmax
MA1612A	Four-Point Junction Pad	5 MHz to 3 GHz, N-J
MP752A	Termination	DC to 12.4 GHz, 50 Ω N-P
MA2512A	Bandpass Filter	W-CDMA supported, Pass band: 1.92 to 2.17 GHz
J0576B	Coaxial Cord	Length: Approx. 1 m (N-P•5D-2W•N-P)
J0576D	Coaxial Cord	Length: Approx. 2 m (N-P•5D-2W•N-P)
J0127C	Coaxial Cord	Length: Approx. 0.5 m (BNC-P•RG58A/U•BNC-P)
J0127A	Coaxial Cord	Length: Approx. 1 m (BNC-P•RG58A/U•BNC-P)
J0127B	Coaxial Cord	Length: Approx. 2 m (BNC-P•RG58A/U•BNC-P)
J0322A	Coaxial Cable	DC to 18 GHz, Length: Approx. 0.5 m (SMA-P•50 Ω SUCOFLEX104•SMA-P)
J0322B	Coaxial Cable	DC to 18 GHz, Length: Approx. 1 m (SMA-P•50 Ω SUCOFLEX104•SMA-P)
J0322C	Coaxial Cable	DC to 18 GHz, Length: Approx. 1.5 m (SMA-P•50 Ω SUCOFLEX104•SMA-P)
J0322D	Coaxial Cable	DC to 18 GHz, Length: Approx. 2 m (SMA-P•50 Ω SUCOFLEX104•SMA-P)
J0004	Coaxial Adapter	DC to 12.4 GHz, 50 Ω N-P•SMA-J
J1261B	Shielded Ethernet Cable	Straight cable, length: Approx. 3 m
J1261D	Shielded Ethernet Cable	Cross cable, length: Approx. 3 m

Table 1.2.3-1 Peripheral Equipment (Cont'd)

Model Name /No.	Product	Remarks
J0008	GPIB connection cable	Length: Approx. 2 m
J1277	IQ output conversion adapter	D-SUB → BNC
B0329C	Front Cover 1MW 4U	
B0331C	Front Handle	2 pcs/set
B0332	Joint Plate	4 pcs/set
B0333C	Rack Mount Kit	
B0334C	Carrying Case	Hard type, with protection cover and casters
P0022	CompactFlash	256 MB or more
P0777	Standard Waveform Pattern Upgrading Kit	DVD 5-disc set

Section 2 For Using MG3700A Safely

This section describes items that you should know before using the MG3700A. Be sure to read this section at least once as it contains safety tips and cautions for avoiding equipment failure during use.

2.1 Installation

2.1.1 Installation orientation

Set the MG3700A either horizontally or at an angle using a tilt stand, as shown in the figure below. When it is tilted, do not place any object on the MG3700A.

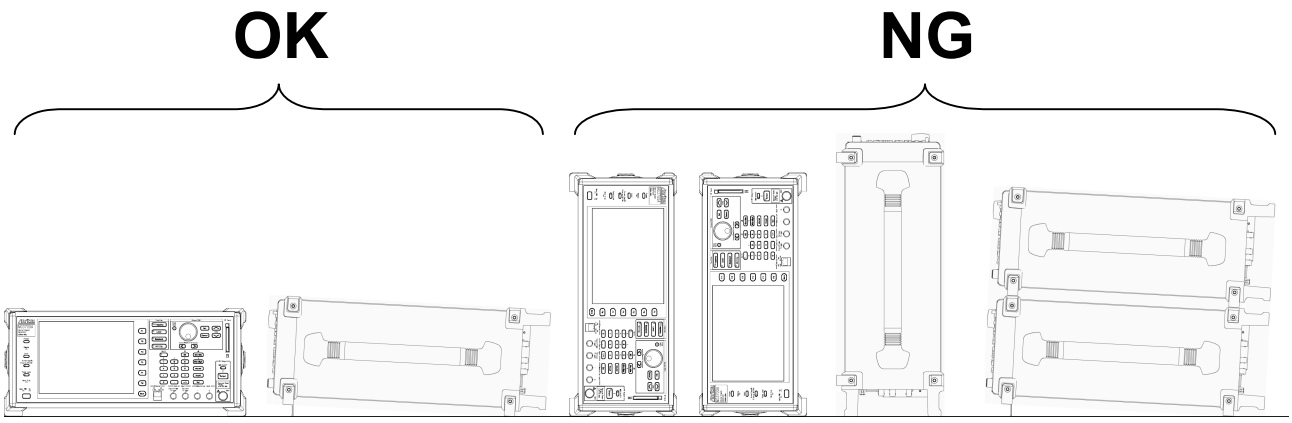


Fig. 2.1.1-1 Installation orientation

⚠ CAUTION

If the MG3700A is not installed in a "OK" direction as above, a small shock may turn it over and harm the user.

2.1.2 Distance from surrounding objects

A fan is installed at the back of the MG3700A to prevent the internal temperature from rising. When installing the MG3700A, be sure to keep its rear and sides at a distance of 10 cm or more from surrounding objects such as walls and peripheral units, to secure sufficient space around the fan.

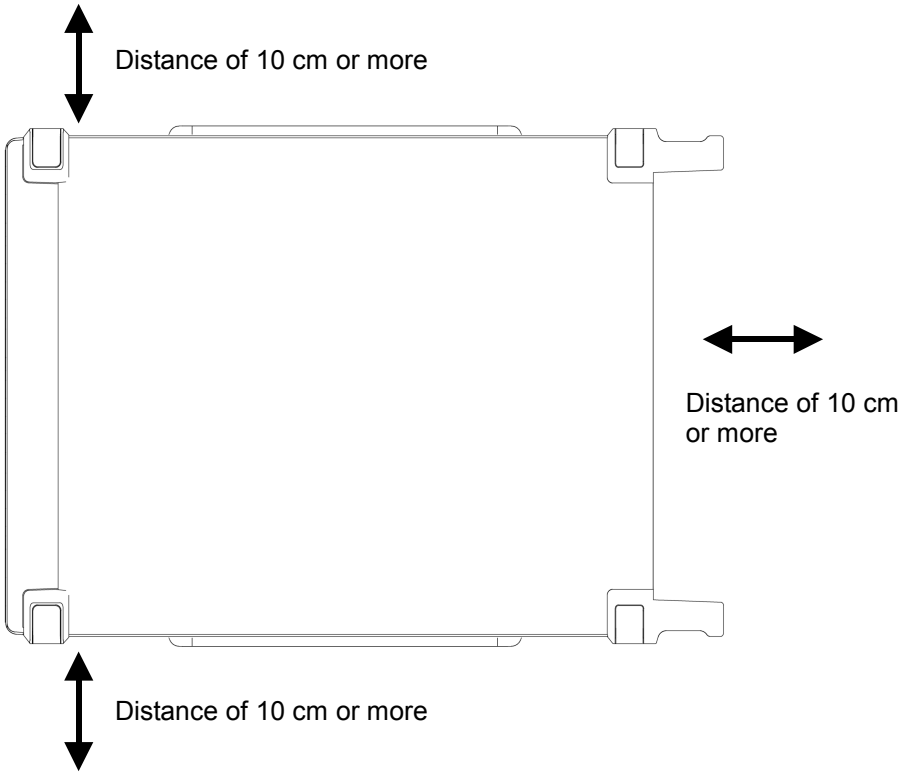


Fig. 2.1.2-1 Distance from surrounding objects

2.1.3 Installation location conditions

The MG3700A can operate in locations with temperatures between 5°C and 45°C, but it should not be used in locations such as the following or failure may result.

- Location with a lot of vibration
- Location with high moisture or a lot of dust
- Location exposed to direct sunlight
- Location where exposure to active gases may occur
- Location where large fluctuations in power voltage occur

2.2 Items to Check Before Use

2.2.1 Safety labels

To ensure the safety of the operator, the WARNING labels shown below are affixed on the back panel. Be sure to observe the instructions on these labels.

WARNING
THIS MEASURING EQUIPMENT IS A PRECISION ELECTRONIC DEVICE THAT CONTAINS HAZARDOUS PARTS, AND THEREFORE MUST NOT BE SERVICED BY THE CUSTOMER.
UNDER NO CIRCUMSTANCES DISASSEMBLE THIS EQUIPMENT.
THIS EQUIPMENT MUST BE SERVICED ONLY BY QUALIFIED SERVICE PERSONNEL.

2.2.2 Reverse power

The MG3700A is not provided with reverse-power protection. Be careful not to apply a reverse current of 1 W or higher (at 300 MHz or more frequency) or 0.25 W or higher (at less than 300 MHz frequency) to the RF output connector. Also, make sure that the DC voltage is not applied even if it is under the above value (1 W or 0.25 W).

2.2.3 Electrostatic

Be careful not to touch the RF output connector center-core wire as this may cause damage due to electrostatic electricity.

2.3 Power Connection

This section describes the procedures for supplying power.

2.3.1 Power Requirements

For normal operation of the instrument, observe the power voltage range described below.

Power source	Voltage range	Frequency
100 Vac system	100 to 120 V	50 to 60 Hz
200 Vac system	200 to 240 V	50 to 60 Hz

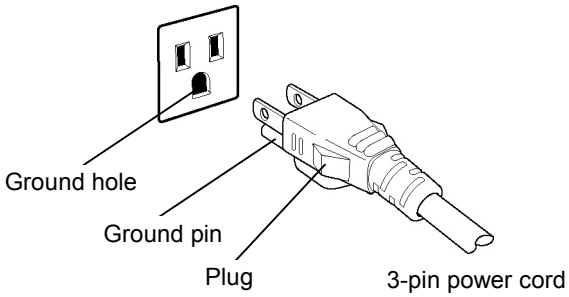
Vac-system changeover is automatically made between 100 Vac and 200 Vac.

⚠ CAUTION

Supplying power exceeding the above range may result in electrical shock, fire, failure, or malfunction.

2.3.2 Connecting the Power Cord

Insert the power plug into a grounded outlet, and connect the other end to the power inlet on the rear panel. To ensure that the instrument is properly grounded, always use the supplied 3-pin power cord.



⚠ WARNING

Always connect the instrument to a properly grounded outlet. Do not use the instrument with an extension cord or transformer that does not have a ground wire.

If the instrument is connected to an ungrounded outlet, there is a risk of receiving a fatal electric shock. In addition, the peripheral devices connected to the instrument may be damaged.

Unless otherwise specified, the signal-connector ground terminal, like an external conductor of the coaxial connector, of the instrument is properly grounded when connecting the power cord to a grounded outlet. Connect the ground terminal of DUT to a ground having the same potential before connecting with the instrument. Failure to do so may result in an electric shock, fire, failure, or malfunction.

⚠ CAUTION

If an emergency arises causing the instrument to fail or malfunction, disconnect the instrument from the power supply by disconnecting either end of the power cord.

When installing the instrument, place the instrument so that an operator may easily connect or disconnect the power cord from the power inlet and outlet. Moreover, DO NOT fix the power cord around the plug and the power inlet with a holding clamp or similar device.

If the instrument is mounted in a rack, a power switch for the rack or a circuit breaker may be used for power disconnection.

It should be noted that, the power switch on the front panel of the instrument is a standby switch, and cannot be used to cut the main power.

Section 3 Operation

This section describes the names of the parts of the MG3700A, the method to set its key parameters, its operation method for modulation and its convenient functions that you should know in order to actually operate the MG3700A. Keys displayed with [ ] are panel keys.

3.1 Names of Parts and Power-Supply On/Off

3.1.1 Names of parts

Names on front panel

This section describes the keys and connectors located on the front panel.

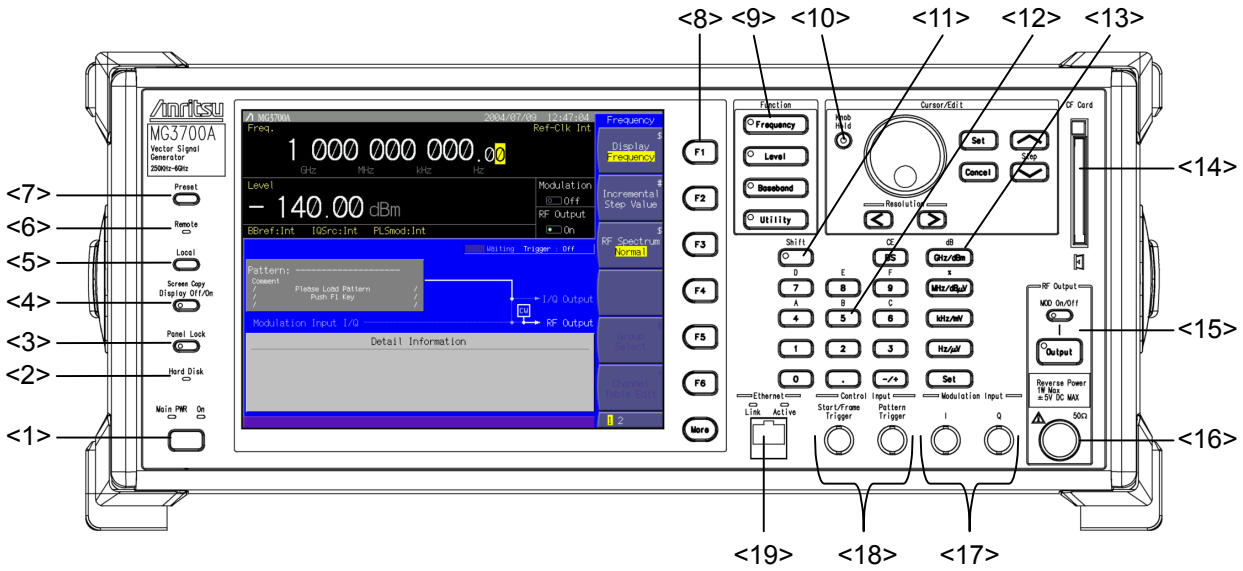


Fig. 3.1.1-1 Front panel

<1> MainPWR On

Power Switch

Switches between the Main Power On state in which AC power is supplied and the Power On state in which the MG3700A is under operation. The [MainPWR] lamp (green) lights up in the Main Power On state, and the [On] lamp (orange) in the Power On state. Press the power switch for a reasonably long duration (for about 2 seconds).

Section 3.1.2 Turning power-supply On/Off

<2> Hard Disk

Hard Disk Lamp

Lights up when access to the MG3700A internal hard disk is in progress.

<3> Panel Lock

Panel Lock Key

Disables operations of all the keys other than Power Switch, Local, and Panel Lock keys. The lamp on this key lights up in red in the panel lock state.

Section 3.10.1 Locking panel

<4> Screen Copy Display Off/On

Display Off/On (Screen Copy) Key

Sets the display On or Off. The lamp on the key lights up in red in the Off state.

Section 3.10.3 Screen display on/off functions

If this key is pressed after Shift is pressed, the display state of the current screen can be copied to a memory card in a bitmap format.

Section 3.10.5 Screen copy

<5> Local

Local Key

Reproduces the local state from the remote state achieved through GPIB or Ethernet, and enables the panel settings.

Section 4 Remote Control

<6> Remote

Remote Lamp

Lights up when the equipment is in the remote state controlled through GPIB or Ethernet.

<7> Preset

Preset Key

Resets the parameters to the initial settings.

Section 3.10.12 Preset

<8>

Soft Function Keys

F1 F2 F3 F4 F5 F6 More

Used for selecting or executing a menu item of the menu displayed on the right of the screen. The menu contents vary with the mode that was selected using a soft or main function key.

The numeric character displayed at the bottom of the menu screen represents the menu page number. The page can be changed using More.

<9>

Frequency Level Baseband Utility

Main Function keys

Used to set or execute the main functions of the MG3700A.

Pressing Frequency sets the frequency parameter setup mode. .

Section 3.3 Setting Frequency

Pressing Level sets the output level setup mode.

Section 3.4 Setting Output Level

Pressing Baseband sets the digital modulation setup mode. .

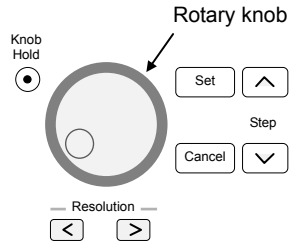
Section 3.5 Setting Modulation Functions

Pressing Utility sets the utility setup mode.

Section 3.6 Utility Functions

Each setup mode belongs to one of the above four main functions.

<10>



Cursor/Edit Keys

The rotary knob and the [^] [v] are used to select an item or change a numeric value. The rotary knob resolution digit can be determined by moving the cursor with the [<] [>].

Pressing [Set] determines the entered or selected data.
Pressing [Cancel] cancels such data.

When the red key lamp is left lit up by pressing [Knob Hold], the rotary knob is disabled.

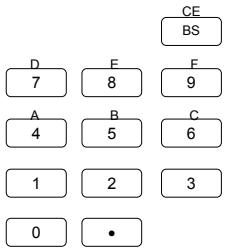
☞ Section 3.10.2 Locking rotary knob

<11> [Shift]

Shift Key

To operate any key to work with a function described in blue characters shown on the panel, first press this key. Then, press the target key after its lamp is illuminated.

<12>



Numeric Keypad

Used to enter numbers on each parameter setup screen.

Pressing [CE BS] deletes the last enter digit or character.

Hexadecimal [A] to [F] can be entered by pressing [A 4] to [F 9] after [Shift].

Following [Shift], press [CE BS] to delete all numeric values and characters that are being entered.

<13>

Unit Keys

Used to determine (finalize) the entered numbers and units after numbers are entered.

[Set], located at the bottom, has the same function as the [Set] cursor/edit key.

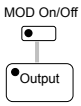
<14>

CF Card Slot

Used to install a baseband waveform file or software, or save a parameter file.
Once a CF card is inserted in the slot, do not attempt to remove it before the message disappears.

☞ Section 3.11 Handling CF Card

<15>



RF Output Control Key

Pressing Output turns on/off the RF signal output. The lamp on the key lights up in green in the output On state.

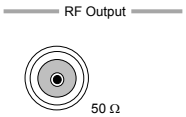
Section 3.4.11 Turning on/off RF output

When the RF output is On, pressing MOD On/Off turns on/off the modulation.

The lamp on the key lights up in green in the modulation On state.

Section 3.5 Setting Modulation Functions

<16>

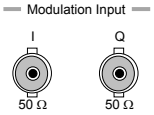


RF Output Connector

Outputs an RF signal.

Section 3.4.11 Turning on/off RF output

<17>

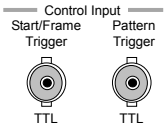


I/Q Input Connectors

Used to input an I and a Q phase signal when performing vector modulation with an external baseband signal.

Section 3.5.5 Vector modulation with external I/Q signal

<18>

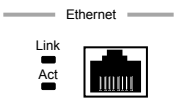


Control Input Connectors

Used to input a start/frame or pattern trigger.

Section 3.5.4 Outputting signal in sync with external trigger signal

<19>



Ethernet connector

Used to connect the MG3700A with the PC.

Either Ethernet connector on the front or that on the rear panel is available.

Refer to Section 4 Remote Control

Note:

To use Ethernet connector on the front panel, connect the two Ethernet connectors ([Ethernet] and [Junction Connector] on the rear panel) using the supplied LAN straight cable.

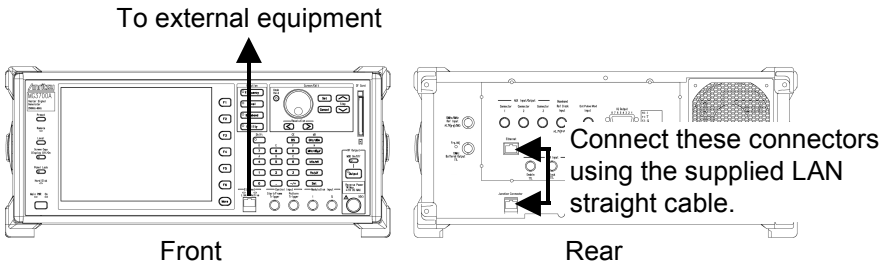


Fig. 3.1.1-2 Connection of Ethernet connectors

Names on rear panel

This section describes the names of the connectors on the rear panel.

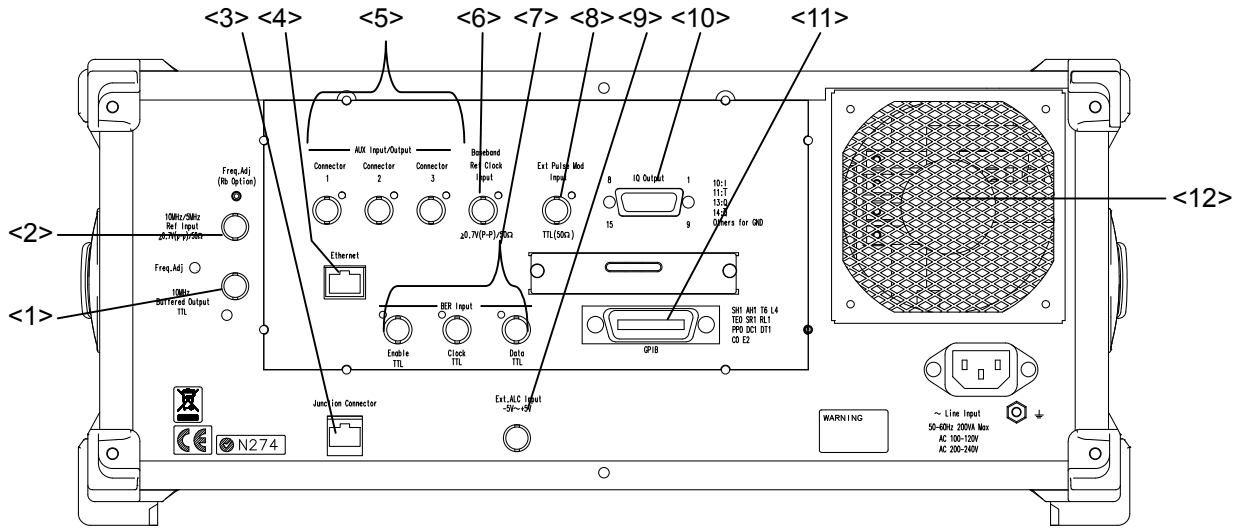
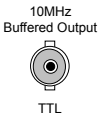


Fig. 3.1.1-3 Rear panel

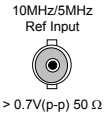
<1>



Reference Frequency Signal Output Connector

Outputs the reference frequency signal (10 MHz) that is inside the MG3700A. Used for synchronizing the frequency of the MG3700A with that of other equipment based on its own reference frequency signal. The reference frequency signal is continuously output in the Power On state.

<2>



Reference Frequency Signal Input Connector

Inputs an external reference frequency signal (10 or 5 MHz). Used for inputting reference frequency signals with an accuracy higher than that of those inside the MG3700A, or for synchronizing the frequency of the MG3700A with that of other equipment based on the reference frequency signal output from other equipment. External input is automatically enabled when an external signal is input. Switching between 10 and 5 MHz is made automatically.

<3> <4>

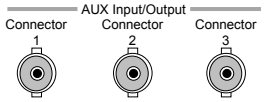
<3> Junction connector

<4> Ethernet connector

Used to connect the MG3700A with the PC.
The Ethernet connector on either on the front or rear panel is available. If the one on the rear panel is used, connect connector <4> to the PC. If the one on the front panel is used, connect [Ethernet] and [Junction Connector] using the supplied LAN straight cable.

Section 4 Remote Control

<5>

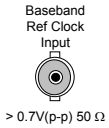


AUX I/O Connectors

Mainly used for marker signal output.

Section 3.5.3 Setting up external input/output

<6>

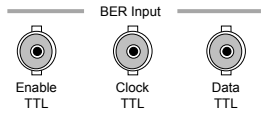


Baseband Reference Clock Signal Input Connector

Inputs a Clock signal that is used as the reference to the sampling clock of the internal arbitrary waveform generator.

Section 3.5.3 Setting up external input/output

<7>



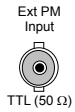
BER Input Connectors

Used for BER measurement.

Section 3.8 BER Measurement Functions
Section 3.9 High Speed BER Measurement Functions When Option031/131 Is Installed

Enable connector	Used to input the BER measurement gate signal.
Clock connector	Used to input the Clock signal being synchronized with the data.
Data connector	Used to input the data.

<8>



External Pulse Modulation Signal Input Connector

Inputs a signal that is used, by the pulse modulation function, to turn on/off the signal output.

Section 3.5.6 Performing pulse modulation

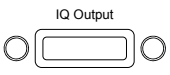
<9>

External ALC Connector

Used to input a DC voltage from the external system to change the output level.

Section 3.4.9 External ALC

<10>



IQ Output Connector

Outputs an I or Q phase baseband signal that has been generated by the arbitrary waveform generator.

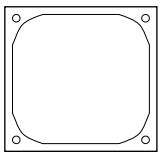
Section 3.5.7 Outputting I/Q signal

<11>

GPIB Connector

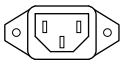
Used to perform external control with GPIB.

Section 4 Remote Control

<12> 

Air Cooling Fan

An air-cooling fan used for preventing the rise in the internal temperature of the MG3700A.

<13> 

AC Inlet

Inlet for supplying power.

<14> 

Functional earth terminal

This is the terminal that is electrically connected to the chassis of the equipment.

3.1.2 Turning power-supply On/Off

Power On

To power on the MG3700A, follow the procedure shown below.

<Procedure>

1. Plug in the jack of the power cord into the AC power inlet on the rear panel. Make sure that it is securely plugged fully into the inlet.
2. Plug in the plug of the power cord into the AC power outlet. The MG3700A main power comes on, causing the green MainPWR lamp to light up.
3. On the front panel, press and hold down the power switch for about 2 seconds. The orange On lamp lights up, and the MG3700A enters the Power-On state.

Power Off

To power off the MG3700A, follow the procedure shown below.

<Procedure>

1. On the front panel, press and hold down the power switch for about 2 seconds. The orange On lamp goes out, the green MainPWR lamp lights up, and the power goes off. The main power is left on.

Note:

If the MG3700A is powered off while access to the hard disk is in progress, the disk may fail. Thus, do not attempt to power off the MG3700A while the Hard Disk lamp (Hard Disk) is on.

Initial Screen

Once the power switch is turned on, all the lamps lights up, except the MainPWR and Hard Disk lamps and the lamps adjacent to the Ethernet connector. The MG3700A self-diagnosis begins automatically. The result of the self-diagnosis is indicated as [Pass] or [Fail] on the self-diagnosis screen.

If the self-diagnosis has detected a fault, it displays [Fail]. In this case, the MG3700A may have failed, and contact the customer service department of Anritsu Corporation.

If the self-diagnosis has detected no fault, it displays [Pass] regarding all the items.

Restoring Parameters

The parameters before the last power-off can be restored after executing self-diagnosis.
In this event, the waveform pattern loaded in the waveform memory at the last power-off is read from the internal hard disk, and is loaded to the waveform memory again.
A progress bar window that indicates the restore operation progress is displayed while loading the waveform pattern to the waveform memory.

If Cancel is pressed while the progress bar window is displayed, the waveform restore operation is cancelled.
If Preset is pressed while the progress bar window is displayed, the waveform restore operation is cancelled and the parameters are returned to the initial settings.

3.1.3 Screen display

After the MG3700A is powered on and the self-diagnosis completes, the basic screen is displayed as below:

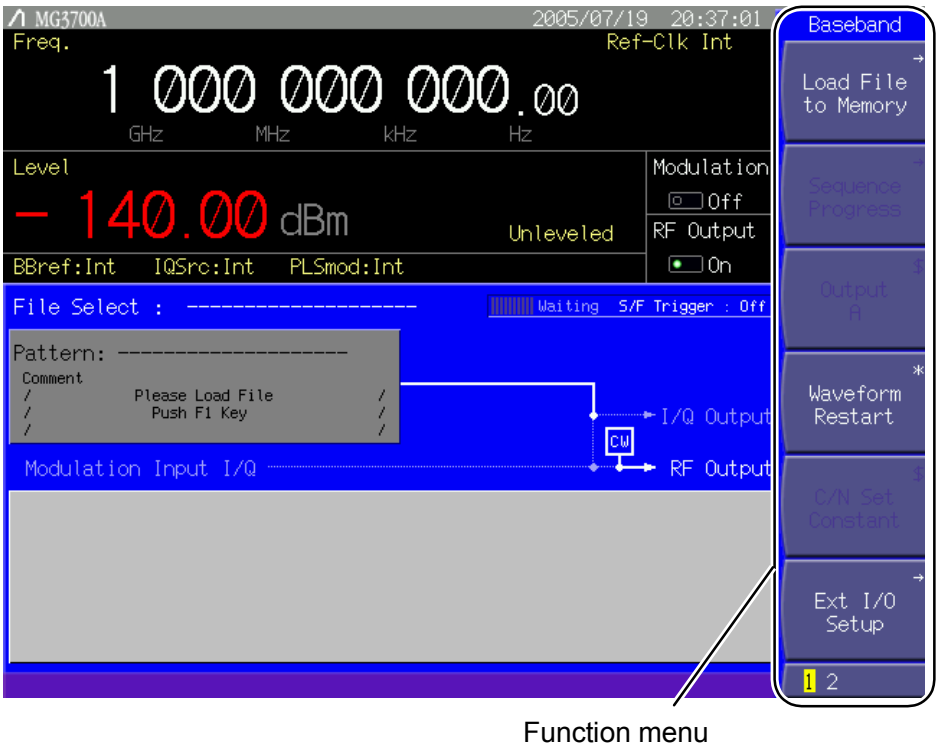


Fig. 3.1.3-1 Basic screen

Function menu

A function menu is displayed on the right of each parameter setup screen. Each function menu contains screen-specific function names.

In each function menu box, the symbol at the upper right represents the action taking place when the associated soft function key is pressed. Its meaning is one of the following:

- No symbol Each time the soft function key is pressed, the selection in the box is switched. The selection is displayed highlighted.

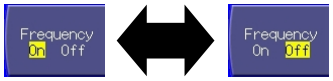


Fig. 3.1.3-2 Soft function key with no symbol

- [$] Each time the soft function key is pressed, the selection in the box is switched between the selections. The contents of the screen are displayed. This display is used if three or more selections are present, or the selected item is long.

Fig. 3.1.3-3 Soft function key with "$"

- [*] Pressing the soft function key performs the contents of the menu item immediately.

Fig. 3.1.3-4 Soft function key with "*"

- [#] Pressing the soft function key displays the setup window.

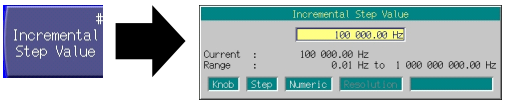


Fig. 3.1.3-5 Soft function key with "#"

- [→] Pressing the soft function key displays the menu details.

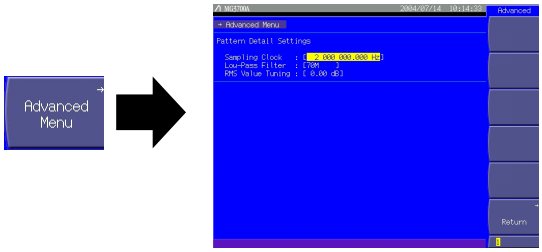


Fig. 3.1.3-6 Soft function key with "→"

The numeric characters at the bottom represent the function menu page number. The currently selected page is highlighted by the cursor, and can be switched by pressing (More).

The grayed out items cannot be selected currently.

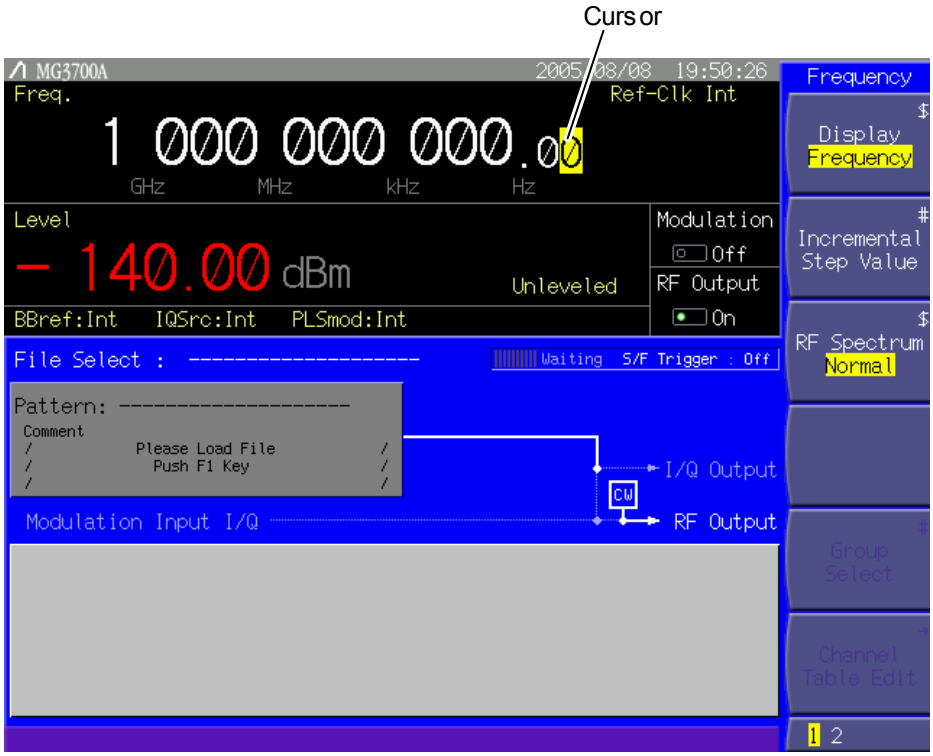


Fig. 3.1.3-7 Frequency setting screen

Cursor

The cursor is displayed with a yellow reverse field that shows the current selection. It is not displayed in any remote control state.

When the frequency or output level has been set, the cursor indicates the rotary knob resolution digit, and can be moved using [<] [>]. Otherwise, it can be moved using a rotary knob or [^] [v].

3.2 Common Setup Operations

Before proceeding to detailed parameter settings, this section describes the operations basics common to all the screens.

3.2.1 Set parameters directly

Main function parameters can be set directly on the displayed screen without opening a window.

Entering a numeric value

When a numeric value is entered using the numeric keypad, a window opens containing the value recently entered. After the entry, press a unit key or [Set] to accept that numeric value and close the window. If [Cancel] is pressed, the entered numeric value is canceled and the window closes with the setting unchanged.

Increasing/Decreasing a numeric value using the rotary knob

Select a resolution digit (displayed highlighted) using [<] [>].
Then, turn the rotary knob clockwise to increase the value, or counterclockwise to decrease it.
The rotary knob allows numeric values to be set in real-time.

Increasing/Decreasing a numeric value using the step keys

A numeric value can be changed by using [^] [v]. The step in which a numeric value is increased/decreased each time a step key is pressed varies according to the parameter. The step keys allow numeric values to be set in real-time.

3.2.2 Opening setup window to set parameters

When a soft function key marked with a [#] is pressed, a setup window is displayed. It appears also when the cursor is moved to a parameter with a [ ] in the main or menu screen and Set is pressed.

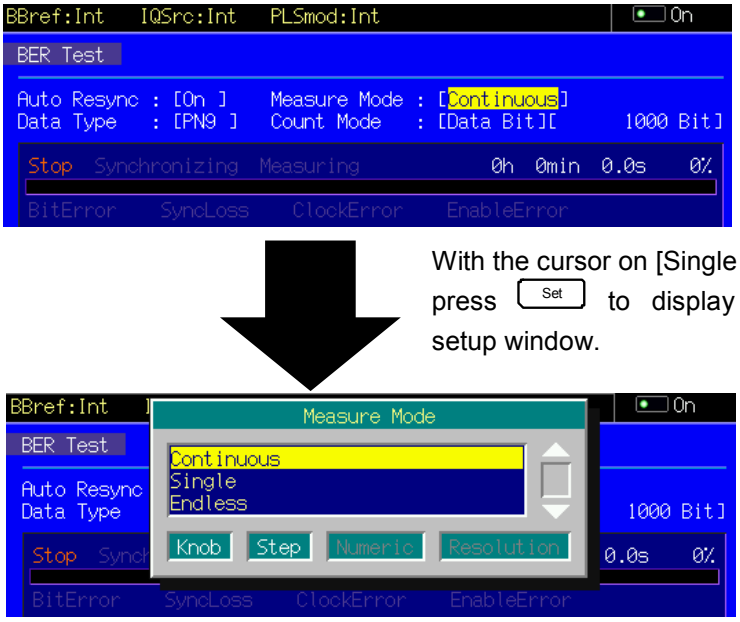


Fig. 3.2.2-1 Opening setup window

The opened window displays the guidance to the types of keys available for setting the parameter, which indicates the disabled ones of the rotary knob, step keys, numeric keypad, and resolution keys).

(1) Entering Numeric Value

Fig. 3.2.2-2 Numeric value entry window

If the setting in the window should be made by entering a numeric value, the numeric value entry box, the current setting, and the valid range are displayed. While the value is being entered using the numeric keypad, the corresponding numeric characters are displayed in the window.
After the entry, press a unit key or [Set] to accept the numeric value and the unit. The window closes.
If [Cancel] is pressed before the entry completes, the value is canceled, and the window closes with the setting unchanged.

The minimum resolution setting is set for each parameter in order to limit the settable minimum value.
If a value less than the minimum resolution setting is entered using the numeric keypad, the MG3700A will process it as follows:

1. Two or more digits below the minimum resolution setting are discarded.
2. A check is made for whether the value is within the valid range. (If it is outside of the range, "Out of Range" is displayed.)
3. One digit below the minimum resolution setting is rounded.

Examples: If the setting range is from 1 to 10 and the minimum resolution setting is 1:

0.9	→	Out of Range
9.5	→	10
9.45	→	9
10.1	→	Out of Range
10.05	→	10

If a value outside the valid setting range is entered using the numeric keypad, "Out of Range" is displayed on the screen. The entered value remains in the text box. Correct it into a valid value within the range by using the numeric keypad and [BS].

The numeric value can also be incremented or decremented using the rotary knob or a step key ([∧] [∨]).
The value is incremented or decremented in steps of the minimum resolution setting regardless of which control is used.

Examples: If the minimum resolution setting is 0.01:

Turning the rotary knob clockwise or pressing [^]:
A numeric value is incremented by 0.01.

Turning the rotary knob counter clockwise or pressing [v]:
A numeric value is decremented by 0.01.

(2) Selecting Item

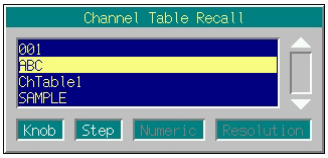


Fig. 3.2.2-3 Item selection window

A window opens with items arranged in a vertical row when it has been set for numeric entry. Among them, the current selection is displayed highlighted.
Turning the rotary knob clockwise or pressing [v] moves down the cursor. Turning the knob counterclockwise or pressing [^] moves up the cursor
After selecting an item, press [Set] to determine the selection and close the window. If [Cancel] is pressed before the selection is determined, it will be canceled. The window closes with the setting unchanged in this case.

(3) Entering Character String

Fig. 3.2.2-4 Character string entry window

If the setting in a window should be made by entering a character string, the text box for character string entry is displayed at the top of the window. In this case, the character palette containing a list of available characters is displayed at the bottom.
The keys available for character string entry are as follows:

Table 3.2.2-1 Keys available for character string entry

Key name	Function
F1 (▷)	Moves the input cursor to the right.
F2 (◁)	Moves the input cursor to the left.
Rotary knob, resolution keys (< >)	Move the character selection cursor horizontally.
Step keys (∧ ∨)	Move the character selection cursor vertically.
Numeric keypad	Used to type a digit (0 to 9), [.], or [–]. To enter an alphabetical character (A to F), first press Shift • and then type the desired one.
F3 (Enter), Set	Overwrites the selected character (with character selection cursor) in the input cursor position.
F4 (Insert)	Inserts the selected character (with character selection cursor) in the input cursor position.
CE BS	Deletes the character preceding the cursor. To delete all the connectors from the text box, first press Shift • and then press this key.
F5 (Delete)	Deletes the character in the input cursor position.
F6 (End), Moving the character selection cursor to End and pressing Set	Determines the contents of the entry in the text box, and then close the window.
Cancel	Cancels the character string entry and close the window.

There are some forbidden characters, which may not be used for any file or host name. If an attempt is made to enter a forbidden character, the contents entered cannot be determined.
The forbidden characters vary with the object of character string entry. For details, refer to individual each section describing character string entry operations.

3.3 Setting Frequency

When the main function key [Frequency] is pressed, the frequency setup mode opens and the cursor is displayed in a frequency display digit on the screen.

Unless otherwise specified, this section assumes that the frequency setup mode has been entered by pressing [Frequency].

Frequency setup range and minimum resolution setting

Frequency setup range: 250 kHz to 3,000 MHz
(250 kHz to 6,000 MHz when the Upper limit frequency 6 GHz is installed)
Frequency minimum resolution setting: 0.01 Hz

If the entered frequency is beyond the upper (3,000 MHz or, or 6,000 MHz if the Upper limit frequency 6 GHz option is installed) or lower limit (250 kHz), it will be unable to set be or determined. An error screen is displayed in this case.

The frequency can be set by using the following:

- Numeric keypad
- Rotary knob
- Step keys

The setup procedure is detailed on the next page.

3.3.1 Display description

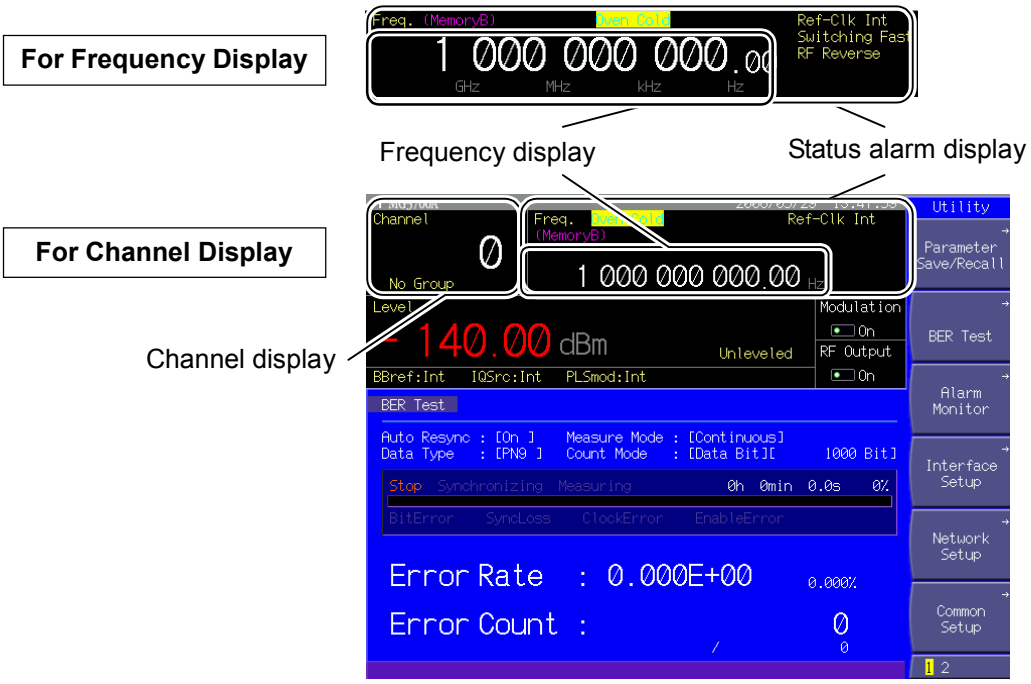


Fig. 3.3.1-1 Frequency setup screen

Screen display in the frequency setup mode is summarized below.

Table 3.3.1-1 Displayed items on frequency setup screen

Display	Description
Frequency display	Displays the currently output frequency.
Channel display	Displays the currently selected channel number.
Status alarm display	Displays the current frequency setting.

Table 3.3.1-2 Description of status display

Actual view	Display	Description
Ref-Clk Int Ref-Clk Ext	Ref-Clk Int / Ref-Clk Ext	Displays whether the source of the reference frequency is internal or external.
Switching Fast	Switching Fast	Appears when the frequency switching speed setting is Fast.
RF Reverse	RF Reverse	Appears when an RF output spectrum is reversed.

Table 3.3.1-3 Description of alarm display

Actual view	Display	Description
	Oven Cold	Indicates that the frequency may be unstable because the MG3700A has just been powered on (within 5 min after power on).
	Alarm	Indicates that when the internal reference clock is enabled, the frequency is not locked (after 5 min from power on).
	Check Ext Clk	Indicates that when the external reference clock is input, the frequency is not locked.

Table 3.3.1-4 Description of offset reference signal

Actual view	Display	Description
	(Edit mode) Memory A/ Memory B (Defined mode) Carrier/Noise	When a waveform file is selected for both Memory A and Memory B, it indicates which waveform's frequency is used as the reference of the frequency offset. Displayed only when a two-signal addition operation is performed, and Mod On and IQ Source: Int. are set. (Refer to Section 3.5.2 (5) "Adding Memories A and B outputs for modulation in Edit mode.")

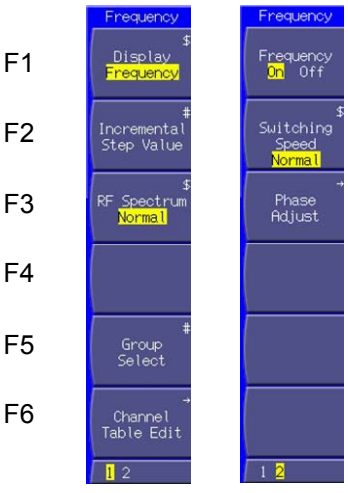


Fig. 3.3.1-2 Function menu

Table 3.3.1-5 Function menu

Page	Key No.	Menu display	Function
1	F1	Display (Frequency/Channel)	Switches between the frequency display only and the channel plus frequency display. (Refer to Section 3.3.5 "Switching frequency/channel display.")
	F2	Incremental (*1) Step Value	Sets the incremental or decremental step value that is implemented by pressing the appropriate step key (∧ ∨) once. (Refer to Section 3.3.4 "Using step keys to set frequency.")
	F3	RF Spectrum (Normal/Reverse)	Reverses an RF output spectrum. (Refer to Section 3.3.10 "Reversing RF signal spectrum.")
	F4		No function
	F5	Group Select (*2)	Selects a channel group. (Refer to Section 3.3.7 "Selecting channel group.")
	F6	Channel Table Edit (*2)	Generate and edit a channel table. (Refer to Section 3.3.6 "Editing Channel Table.")
2	F1	Frequency (*2) (On/Off)	Switches between the frequency show and hide modes when the channel is displayed. (Refer to Section 3.3.9 "Switching frequency between Show and Hide.")
	F2	Switching Speed (Normal/Fast)	Switches the frequency switching speed. (Refer to Section 3.3.11 "Changing frequency switching speed.")
	F3	Phase Adjust	Changes the RF output phase. (Refer to Section 3.3.12 "Changing RF output phase.")
	F4		No function
	F5		No function
	F6		No function

(*1): Displayed only when [Frequency] is set for [Display].
(*2): Displayed only when [Channel] is set for [Display].

3.3.2 Using numeric keypad to set frequency

This section describes the procedure for setting the frequency using the numeric keypad.

Example: Setting the frequency to 360.3 MHz

<Procedure>

1. Press one of the numeric keypad numeric keys (press [3] in this example). The frequency setup window (Freq. Value) opens with numeric character [3] displayed.

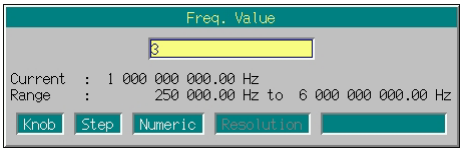


Fig. 3.3.2-1 Frequency setup window

2. Then, press [6], [0], [.], and [3] to display [360.3] in the window.
3. Press [MHz/dBμV]. The numeric value and its unit are determined, and at the same time, the frequency setup window closes. The frequency setup screen displays [360 300 000.00 Hz].

In addition, the frequency is set to 360.3 MHz by the following key operations:

- [0] [.] [3] [6] [0] [3] [GHz/dBm]
- [3] [6] [0] [3] [0] [0] [kHz/mV]
- [3] [6] [0] [3] [0] [0] [0] [0] [0] [Hz/μV]

If [Set] is pressed without pressing a unit key after the numeric value is entered, the value entered in Hz is determined.

All the digits below 0.01 Hz are rounded.

3.3.3 Using rotary knob to set frequency

Use of the rotary knob makes it possible to increment or decrement the numeric value of the resolution digit (cursor position) that has been selected using [<] [>]. To use the rotary knob to set a frequency, follow the procedure below:

Initial setting of resolution digit (cursor position): 0.01 Hz digit

Example: Changing the frequency from the current value (360.3 MHz) to 360.7 MHz in steps of 100 kHz

<Procedure>

1. Move the cursor to the 100 kHz digit using [<] [>]. (Pressing [<] seven times moves it to that digit.)

Fig. 3.3.3-1 Frequency display

2. Turning the rotary knob clockwise increments the frequency in steps of 100 kHz. Turning it counterclockwise decrements the frequency in 100 kHz steps. Turn the knob clockwise in this manner to set the frequency to 360.7 MHz.

3.3.4 Using step keys to set frequency

Use of the [^] [v] makes it possible to increment or decrement the preset frequency.
To use the step keys to set a frequency, follow the procedure below:

Initial setting of frequency step: 100 kHz

Example: Setting the frequency to 360.3 MHz and incrementing or decrementing it in steps of 12.5 kHz

<Procedure>

1. Press [3] [6] [0] [.] [3] [MHz/dBμV] to set the frequency to 360.3 MHz.
2. Press [F2] (Incremental Step Value) to display the frequency step setup window (Incremental Step Value).

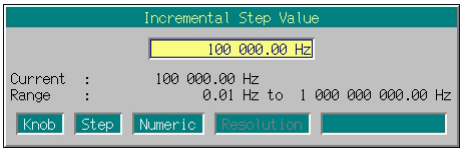


Fig. 3.3.4-1 Frequency step setup window

3. Press [1] [2] [.] [5] [kHz/mV] to set the frequency step to 12.5 kHz. The window closes when the setup completes.
4. Pressing [^] once increments the frequency on the frequency step setup window by 12.5 kHz, being changed to 360.3125 MHz. Pressing [v] once in this state decrements the frequency by 12.5 kHz, being returned to 360.3 MHz. By using [^] [v] in this manner, the frequency can be incremented or decremented in the specified step (12.5 kHz in this example).

3.3.5 Switching frequency/channel display

The MG3700A allows you to assign a channel number to any frequency. Channel setup or edit is enabled only when a channel is displayed. To display a channel, follow the procedure below:

Initial setting of frequency/channel display: Frequency display

Example: Changing the display from Frequency to Channel plus Frequency

<Procedure>

1. Press [F1] (Display) to change the display from [Frequency] to [Channel]. The display is replaced by Channel plus Frequency, and the cursor moves to the channel display.

Fig. 3.3.5-1 Channel display + Frequency display

3.3.6 Editing Channel Table

This function is available only when for channel display.

The channel table edit mode allows you to assign a channel number to any frequency. It also allows you to register as a channel group, channels between which there is a fixed frequency spacing. In addition, up to 19 channel groups can be registered to define the resulting data as a channel table.
To use the channel table edit function, follow the procedure below:

<Procedure>

1. Press F6 (Channel Table Edit) to change the screen to Channel Table Edit.

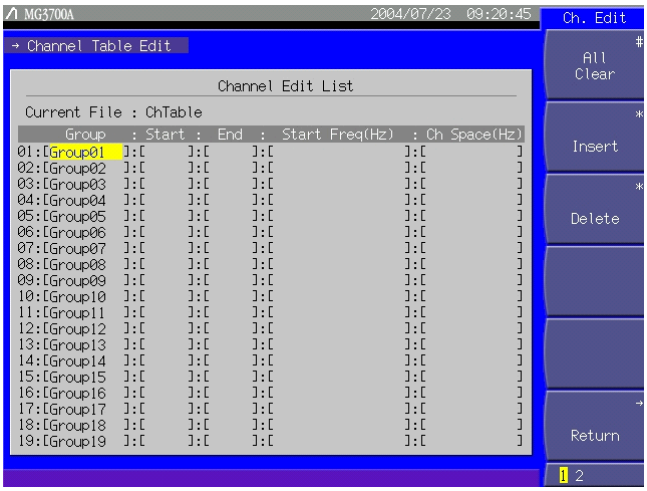


Fig. 3.3.6-1 Channel Table Edit screen

Table 3.3.6-1 Displayed items in Channel Table Edit screen

Display	Description
Group	Name of channel group.
Start	Start channel number of channel group.
End	End channel number of channel group.
Start Freq(Hz)	Frequency of start channel.
Ch Space(Hz)	Frequency spacing between channels.

The following table summarizes the keys available for the Channel Table Edit screen.

Table 3.3.6-2 Keys available for operations in Channel Table Edit screen

Key name			Function
Rotary knob			Moves the cursor horizontally.
Step keys (^) (v)			Moves the cursor vertically.
Set key (Set)			Opens the setup window associated with the window that was selected with the cursor.
Function menu			
Page	Key No.	Menu display	Function
1	F1	All Clear	Clears a channel table.
	F2	Insert	Inserts a blank line in the position specified with the cursor.
	F3	Delete	Deletes the line specified with the cursor.
	F4		No function
	F5		No function
	F6	Return	Exits Channel Table Edit, and returns the view to the channel display screen.
2	F1	Channel Table Recall	Reads data from a saved channel table.
	F2	Channel Table Save	Saves a channel table.
	F3	Channel File Delete	Deletes a saved channel table.
	F4	Media Choice (CF Card / Hard Disk)	Selects either the CF card or internal hard disk as the destination media to save or the source media to read.
	F5		No function
	F6	Return	Exits Channel Table Edit, and returns the view to the channel display screens.

Registering Channel Group

This section describes the procedure for registering a channel group.

Example: Creating a channel group in the first line of a channel table in the following conditions:

- Group name: [802.11b]
- Channels used: 1 to 13
- Frequency of start channel: 2.412 GHz
- Frequency spacing between channels: 5 MHz

(1) Entering group name

Fig. 3.3.6-2 Group name entry window

<Procedure>

1. Move the cursor to the [Group] on the first line.
   In this example, the cursor does not need to be moved, because it is already in the [Group] on the first line when the Channel Table Edit screen opens.
   If you want to select the [Group] on another line or another item, use the rotary knob or [^] [v] to move the cursor.
2. Press [Set] to display the Group Name entry window.
3. Enter the group name.
   The initial setting is [Group 01], which is initially displayed in the text box.
   In this example, the group name is to be set to [802.11b].
   Thus, press [Shift •] first and then [CE BS] to delete all the characters from the text box.
4. Move the character selection cursor to [8] using the rotary knob or [<] [>] [^] [v].
5. Press [Set] to enter [8] in the text box.
6. Enter the remaining characters [0], [2], [.], [1], [1], and [b] in this manner.
7. Once [802.11b] has been entered in the text box, move the character selection cursor to [End] and press [Set]. Now, the entered group name is set.

For details of the keys available for group name entry, refer to "Entering Character String" in Section 3.2.2 "Opening setup window to set parameters." Digits and the decimal point can be entered also with the numeric keypad.

The group name can be set up to 9 characters.

All characters in the character palette are available for any group name.

(2) Entering channel to be used

Fig. 3.3.6-3 Start channel number entry window

<Procedure>

1. First, specify the start channel number.
   Turn the rotary knob clockwise to move the cursor to [Start] on the first line.
2. Press Set to display the numeric value entry window.
3. Enter [1] in the window using the numeric keypad.
4. Press Set to determine the start channel selection. The window closes.

Fig. 3.3.6-4 End channel number entry window

5. Next, specify the end channel number.
   Turn the rotary knob clockwise to move the cursor to [End] on the first line.
6. Press Set to display the numeric value entry window.
7. Enter [13] in the window using the numeric keypad.

8. Press [Set] to determine the end channel selection. The window closes.

> Instead of the numeric keypad, the rotary knob and [^] [v] can be used to set a numeric value in 1-channel units.
>
> Any of values from 1 to 20000 can be set for a channel number.
> The number of the end channel must be greater than that of the start channel, although it may be set to the same number as the start channel.

(3) Entering start channel frequency and frequency spacing

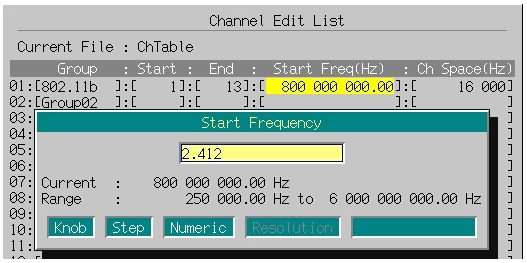


Fig. 3.3.6-5 Start channel frequency entry window

<Procedure>

1. First, set the frequency of the start channel.
   Turn the rotary knob clockwise to move the cursor to [Start Freq] on the first line.
2. Press [Set] to display the start channel frequency setup window (Start Frequency).
3. Press [2] [.] [4] [1] [2] [GHz/dBm] to set the frequency of the start channel to 2.412 GHz. The window closes at the same time the setup completes.

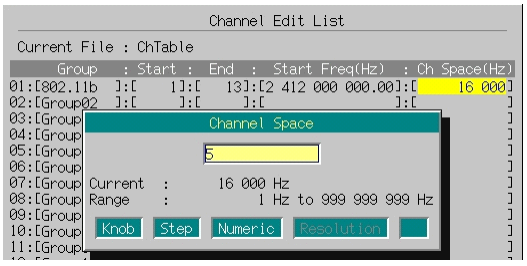


Fig. 3.3.6-6 Frequency spacing entry window

4. Next set the frequency spacing.
   Turn the rotary knob clockwise to move the cursor to [Ch Space] on the first line.
5. Press [Set] to display the frequency spacing setup window (Channel Space).

6. Press [5] [MHz/dBμV] to set the frequency spacing to 5 MHz. The window closes at the same time the setup completes.

> Instead of the numeric keypad, this setting can also be made using the rotary knob or [∧] [∨] in minimum units.
> The setup range for the frequency of the start channel is 250 kHz to 3,000 MHz (6,000 MHz if the Upper frequency limit 6 GHz option is installed). The value can be set up to a 0.01 Hz digit, and any 0.001 Hz and lower digits are rounded.
> The setup range for the failure spacing is 1 to 999,999,999 Hz. The value can be set up to a 1 Hz digit, and any digits of the fraction part are rounded.

Inserting Blank Line in Channel Tables

This function is useful to generate a new channel group between previously generated ones.
To insert a blank line between channel tables, follow the procedure below:

Example: Inserting a blank line onto the second line of the channel table

<Procedure>

1. Press [∨] once to move the cursor to the [Group] on the second line.
2. Press [F2] (Insert) to insert a blank line onto the second line.
   The previous channel group on the second line moves to the third line.
   The ones on the subsequent lines also move to the next lower lines.

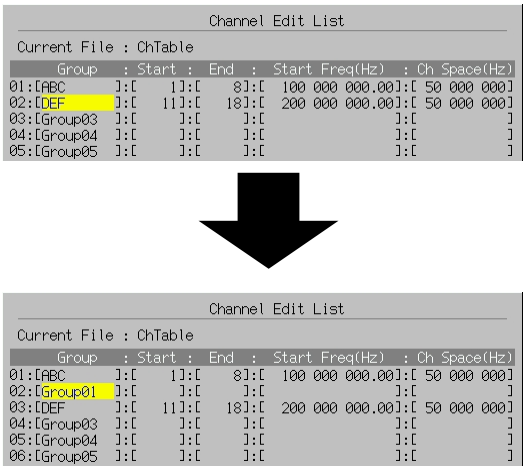


Fig. 3.3.6-7 Inserting blank line

If a blank line is inserted with a channel group registered on the 19th line, the previous channel group on that line is deleted.

Deleting Channel Group

This function deletes an unnecessary channel group.
To delete a channel group, follow the procedure below:

Example: Deleting the channel group from the second line of the channel table

<Procedure>

1. Press [∨] once to move the cursor to the [Group] on the second line.
2. Press [F3] (Delete) to delete the channel group from the second line.
   The previous channel group on the third line moves to the second line.
   The ones on the subsequent lines also move to the next higher lines.

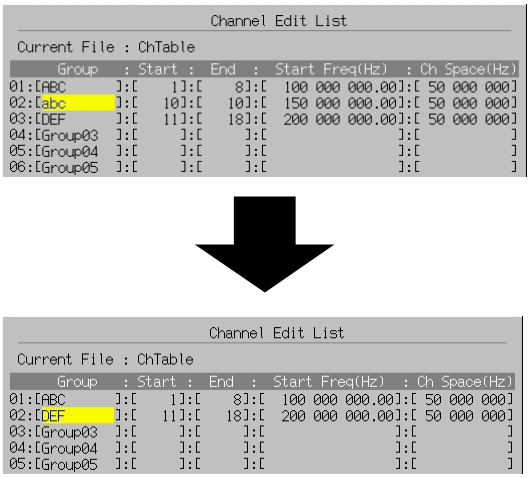


Fig. 3.3.6-8 Deleting Channel Group

Clearing Channel Table Parameters

This function clears the parameters from the channel table.
Follow the procedure below:

<Procedure>

1. Press (F1) (All Clear) to display the confirmation window.

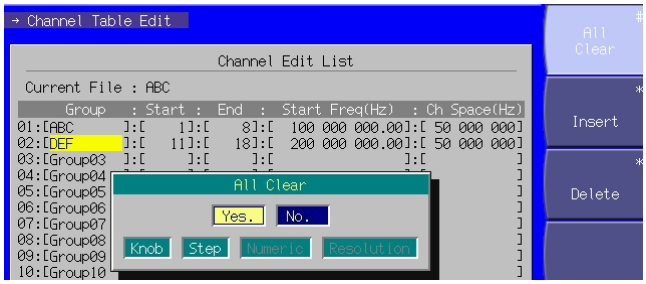


Fig. 3.3.6-9 Deletion confirmation window

2. Move the cursor to [Yes] using the rotary knob or (^), (v), and press (Set). All the parameters are deleted.
   If (Set) is pressed with the cursor on [No], or (Cancel) is pressed, the window closes without deleting any parameters.

Saving Channel Table

After the parameters have been set in the channel table, it can be saved in the CF card or internal hard disk.
To save the channel table, follow the procedure below:

Example: Saving the currently displayed channel table under the file name of [W-LAN]

<Procedure>

1. Press (More) to switch the function menu to the second page.
2. Press (F4) (Media Choice) to select either [CF Card] or [Hard Disk] as the destination.
3. Press (F2) (Channel Table Save) to display the File Name entry window.

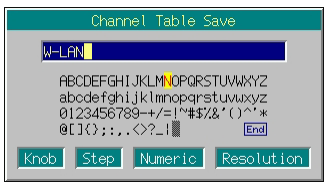


Fig. 3.3.6-10 File name entry window

4. Enter the file name.
   The initial setting is [ChTable] in the text box.
   In this example, the file is to be named [W-LAN]. Thus, first press Shift and then CE BS to delete all characters from the text box.
5. Move the character selection cursor to [W] using the rotary knob or < > ^ v.
6. Press Set to enter [W] in the text box.
7. Enter the remaining characters [-], [L], [A], and [N].
8. Once [W-LAN] has been entered in the text box, move the character selection cursor to End and press Set. Now, the parameter file is saved under the entered file name.

For details of the keys available for file name entry, refer to "Entering Character String" in Section 3.2 "Common Setup Operations."
Digits and the decimal point can be entered also with the numeric keypad.

The MG3700A can handle up to 100 files.

When a file name is entered, its extension is added automatically. You cannot set any optional extension.

Up to 30 characters can be entered for a file name.

The characters below are not available for file names. With any of these included in a file name, it cannot be determined.
' (apostrophe) / : , ; * ? < > | $ ~

If a space or [.] (dot) is placed at the first or last column of the character string, the file name cannot be determined.

Reading Channel Table File

To read a previously saved channel table file, follow the procedure below:

<Procedure>

1. Press (More) to switch the function menu to the second page.
2. Press (F4) (Media Choice) to select either [CF Card] or [Hard Disk] as the source.
3. Press (F1) (Channel Table Recall) to display the file selection window.

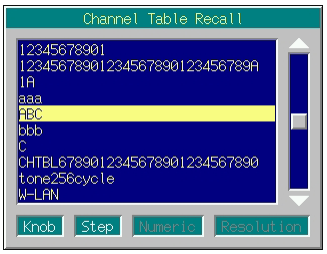


Fig. 3.3.6-11 File selection window

4. Select the desired channel table file to read using the rotary knob or (^) (v).
5. Press (Set) to read the selected channel table file.
   If (Cancel) is pressed, the file selection window closes without reading the channel table file.

The file names are displayed in ascending order of digits and alphabetical characters.

Up to 100 files are displayed in the file selection window. The 101st and subsequent files are not displayed.

If the file name consists of 31 or more characters, the 31st and subsequent characters are not displayed in the file selection window.

If the table contains no file, the “No file to read” message is displayed.

If the CF card slot contains no CF card, the “No memory card” message is displayed. In this case, insert the card, and then press (F1) again.

Deleting Channel Table File

To delete a currently saved channel table file, follow the procedure below:

<Procedure>

1. Press (More) to switch the function menu to the second page.
2. Press (F4) (Media Choice) to select either [CF Card] or [Hard Disk] as the media that contains the desired channel table file to delete.
3. Press (F3) (Channel File Delete) to display the file selection window.
4. Select the desired channel table file to be deleted using the rotary knob or (^) (v).

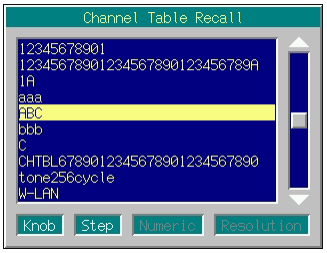


Fig. 3.3.6-12 File selection window

5. Press (Set) to delete the selected channel table file.
   If (Cancel) is pressed, the file selection window closes without deleting the channel table file.

The file names are displayed in ascending order of digits and alphabetical characters.

Up to 100 files are displayed in the file selection window. The 101st and subsequent files are not displayed.

If the file name consists of 31 or more characters, the 31st and subsequent characters are not displayed in the file selection window.

If the table contains no file, the “No file to read” message is displayed.

If the CF card slot contains no CF card, the “No memory card” message is displayed. In this case, insert the card, and then press (F3) again.

3.3.7 Selecting channel group

This function is available only for channel display.

This function selects and displays the channel group being set with Channel Table Edit.

<Procedure>

1. Press [F5] (Group Select) to display the channel group selection window (Group Select).

Fig. 3.3.7-1 Channel group selection window

2. Select the desired channel group using the rotary knob or [^] [v].
3. Press [Set] to move the cursor to the start channel of the selected channel group and close the window. The channel and frequency display screen shows the number and frequency of the start channel. If [Cancel] is pressed, the channel group selection is canceled and the window closes.

3.3.8 Selecting channel

This function is available only for channel display.

This function selects and displays the channel being set with Channel Table Edit.

Using the rotary knob or [^] [v]

Turning the rotary knob clockwise or pressing [^] moves the cursor to a channel with a larger number. Turning the knob counter-clockwise or pressing [v] moves the cursor to a channel with a smaller number. This setting is made on a per-channel basis.

Fig. 3.3.8-1 Channel selection screen

If the rotary knob is turned clockwise or [^] is pressed with the end channel number selected, the cursor moves to the start channel of the next channel group. This rule, however, does not apply to the end channel number of the end channel group.
If the rotary knob is turned counterclockwise or [v] is pressed with the start channel number selected, the cursor moves to the end channel of the previous channel group. This rule, however, does not apply to the start channel number of the start channel group.

Using Numeric Keypad

If the numeric keypad is used for numeric value entry, the entered value is displayed at the same time the window opens. After the entry, the value is determined by pressing [Set], and the window closes.
If [Cancel] is pressed before the value has been entered, the value is canceled. The window closes in the initial state.
If the numeric keypad is used, a channel in the same group as the current channel can only be specified.

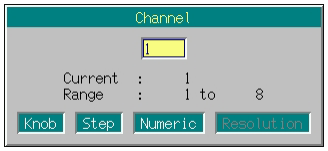


Fig. 3.3.8-2 Channel number entry window

3.3.9 Switching frequency between Show and Hide

This function is available only for channel display.

When a channel number is displayed, the frequency can be hidden. To switch it between Show and Hide, follow the procedure below:

Initial setting of frequency Show/Hide switching: Show

Example: Switching the frequency from Show to Hide

<Procedure>

1. Press (More) to switch the function menu to the second page.
   Press (F1) (Frequency On Off) to switch the frequency from On to Off.
   The frequency display changes to [-- --- --- ---.--Hz].

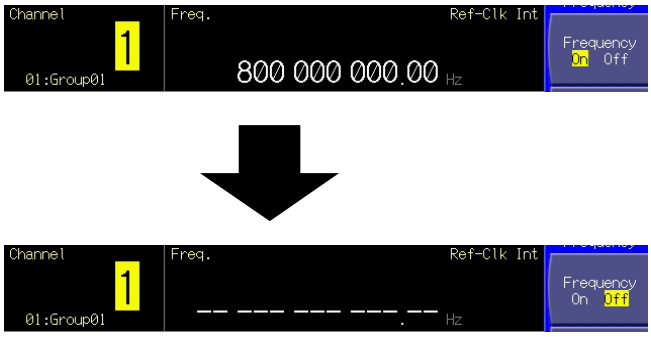


Fig. 3.3.9-1 Frequency display (Show)/non display (Hide)

3.3.10 Reversing RF signal spectrum

This function reverses an RF signal spectrum when the modulation is On.

To reverse an RF signal spectrum, follow the procedure below:

Example: Reversing and restoring an RF signal spectrum

<Procedure>

1. Press F3 (RF Spectrum) to switch the mode from [Normal] to [Reverse].
   "RF Reverse" is displayed on the right of the frequency display to indicate that the RF signal spectrum is reversed.

Fig. 3.3.10-1 RF Reverse display

2. Press F3 (RF Spectrum) again to switch back the mode from [Reverse] to [Normal].

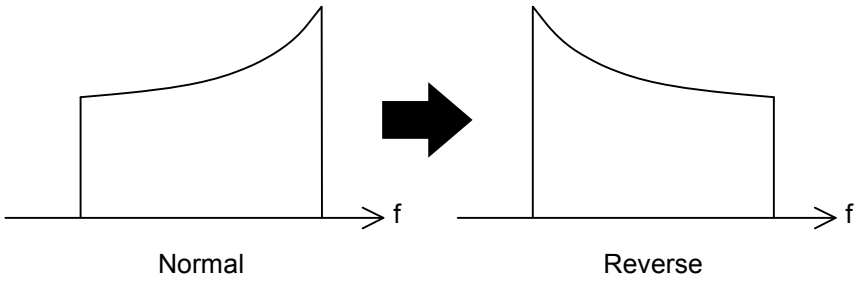


Fig. 3.3.10-2 RF spectrum status (in the case of other than a 2-signal addition)

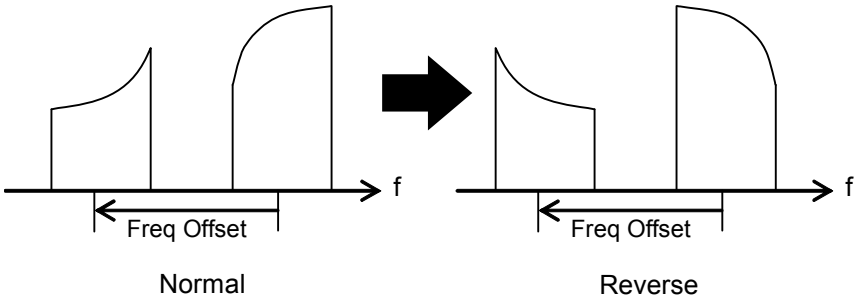


Fig. 3.3.10-3 RF spectrum status (in the case of a 2-signal addition)

3.3.11 Changing frequency switching speed

The frequency switching speed can be changed by switching the loop characteristic of the MG3700A PLL synthesizer circuit.

Normal: For an offset frequency of 50 kHz or more, this mode offers phase noise performance not less than that of the Fast mode. Suitable for ordinary communication.

Fast: The frequency switching speed becomes faster and the adjacent phase noises are improved in this mode. Suitable for narrow-band communications.

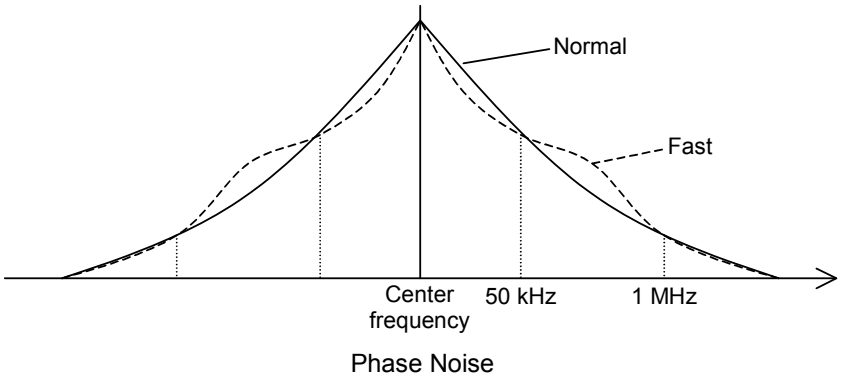
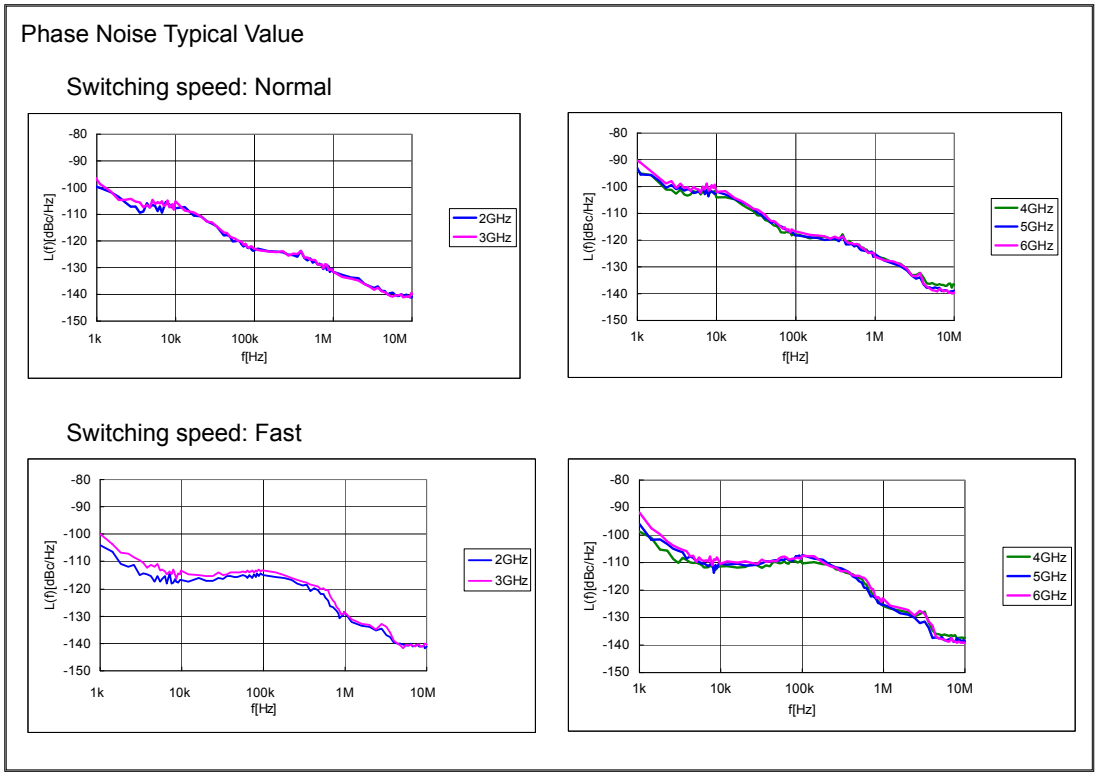


Fig. 3.3.11-1 Phase noise



To change the frequency switching speed, follow the procedure below:

Example: Switching the frequency switching speed to Fast, and then returning it to Normal

<Procedure>

1. Press More to switch the function menu to the second page.
   Press F2 (Switching Speed) to switch the mode from [Normal] to [Fast].
   The "Switching Fast" message is displayed on the right of the frequency display to indicate that the frequency switching speed has switched to Fast.
2. Press F2 again to switch back the mode from [Fast] to [Normal].

3.3.12 Changing RF output phase

The phase of RF signals can be changed.

Fig. 3.3.12-1 RF Phase Adjust screen

Press More to switch the function menu to the second page.
Pressing F3 (Phase Adjust) allows you to make various settings for phases.
Use the cursor to select the desired item to set. Then, press Set to display the setup window associated with that item.

The following are details that can be set in this menu:

<1> Phase

Sets the RF output phase.

Range: –179.9° to 180.0°
Minimum resolution setting: 0.1°

3.4 Setting Output Level

When the Level main function key is pressed, the output level setup mode opens. The cursor is displayed in a digit in the output level display.

Unless otherwise specified, this section assumes that Level was pressed and the output level setup mode has opened.

The output level can be set by the following:

- Numeric keypad
- Rotary knob
- Step keys

The setup procedures are detailed on the next page and later.

Output Level range and setting step

The output level setup range is as follows:

Table 3.4-1 Output level setting range

Unit	Usually	If mechanical attenuator (option) is installed
Power unit	–140 to +13 dBm	–140 to +19 dBm
Voltage unit (open circuit voltage display)	–26.99 to +126.01 dBμV	–26.99 to +132.01 dBμV
Voltage unit (terminated voltage display)	–33.01 to +119.99 dBμV	–33.01 to +125.99 dBμV

Output level setting minimum resolution: 0.01 dB

If the output level is beyond the upper (+13, or +19 dBm if a mechanical attenuator is installed) or lower limit (–140 dBm), it will be unable to set or determined. An error screen is displayed in this case.

If the output level is set with a value outside the guaranteed range, which depends on the modulation condition and frequency (+6.01 dBm or more during CW), the "Unleveled" message is displayed. The performance is no longer able to be guaranteed in this case.

The performance guarantee range of the output level is as follows:

Table 3.4-2 Output level performance guarantee range (during CW)

Frequency	Usually	When mechanical attenuator (option) is installed
250 kHz ≤ f < 25 MHz	–120 to –1 dBm	–120 to +10 dBm
25 MHz ≤ f≤ 3 GHz	–136 to +6 dBm	–136 to +10 dBm
3 GHz < f ≤6 GHz (when option is used)	–127 to +3 dBm	–127 to +7 dBm

Table 3.4-3 Performance guarantee range for output level error with CW during vector modulation (with waveform pattern RMS value (for each I/Q single phase) = 1157 to 1634)

Frequency	Usually	When mechanical attenuator (option) is installed
50 MHz ≤ f≤ 3 GHz	Up to +2 dBm	Up to +7 dBm
3 GHz < f≤ 6 GHz	Up to –1 dBm	Up to +4 dBm

To display the cause of the fact that the output level is outside of the performance guarantee range, press F4 (Unleveled Detail) to switch the function menu to the second page by pressing More when [Unleveled] is displayed.

3.4.1 Display description

This section describes the screen display in the output level setup mode.

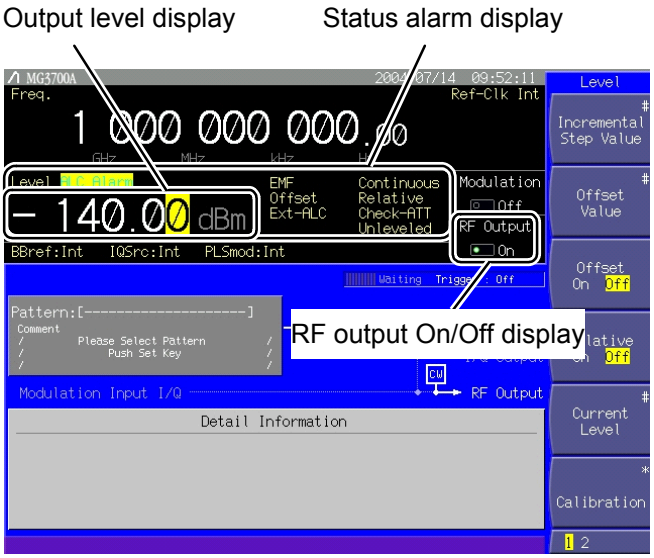


Fig. 3.4.1-1 Output level setup screen

Table 3.4.1-1 Displayed items on output level setup screen

Display	Description
Output level display	Displays the currently set output level.
Status alarm display	Displays the current state and warning on the output level setting.
RF output On/Off display	Displays the RF output On/Off state.

Table 3.4.1-2 Description of status display

Actual view	Display	Description
EMF Term	EMF/Term	When the output level is voltage display, this displays whether the voltage display is open circuit or termination.
Continuous	Continuous	Operation in the Continuous mode.
Offset	Offset	Offset level display.
Relative	Relative	Relative level display.
Ext-ALC	Ext-ALC	Displayed if the external ALC is enabled.
Check-ATT	Check-ATT (*1)	Displayed if one or more attenuators have operated 20 million times. This can be hidden using the Check-ATT display On/Off function. (Refer to Section 3.10.8 "Check-ATT display On/Off function.") It is recommended to check the output level accuracy when Check-ATT is displayed.
Unleveled	Unleveled	Displayed if the current output level is outside of the performance guarantee range.
Out Of Range	Out Of Range	Displayed if the current output level is equal to or less than the lower limit of the setting range (except for the sequence mode).

(*1): Displayed only when the mechanical attenuator (option) is installed.

Table 3.4.1-3 Description of alarm display

Actual view	Display	Description
ALC Alarm	ALC Alarm	Indicates that the output level is not a predetermined value.

Table 3.4.1-4 Description of output level display color

Actual color view	State	Description
− 128.00	Normal state	The output level is displayed in white in the normal state.
− 128.00	Unleveled state	The output level is displayed in red if it exceeds the accuracy guarantee range. (Refer to Section 3.4.12 “Examining causes of Unleveled display.”)
− 128.00	Continuous On state	The output level is displayed in green when Continuous is On (Continuous mode). (Refer to Section 3.4.8 “Using Continuous mode.”)
− 128.00	Sequence state	The output level is displayed in blue when the following conditions are met in the sequence operation. • IQ Source: Int • Mod On • When a combination file for sequence mode is selected and a continuous operation where the level automatically changes is performed. (Refer to Section 3.5.2 (3) “Performing continuous operation in Defined mode.”)

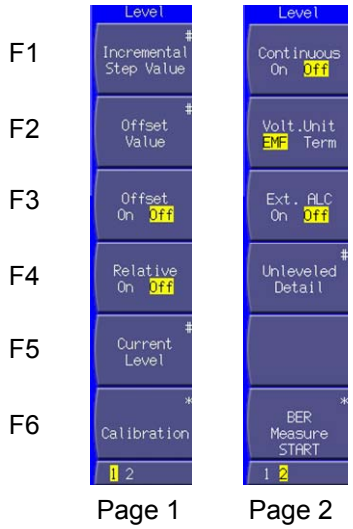


Fig. 3.4.1-2 Function menu

Table 3.4.1-5 Function menu

Page	Key No.	Menu display	Function
1	F1	Incremental Step Value	Sets the incremental or decremental value (of the output level) that is used when a step key (∧ ∨) is pressed (refer to Section 3.4.4 "Using step keys to change output level").
	F2	Offset Value	Sets the output level offset value (refer to Section 3.4.5 "Setting output level offset").
	F3	Offset (On/Off)	Switches the offset function (refer to Section 3.4.5 "Setting output level offset").
	F4	Relative (On/Off)	Switches the relative output level display (refer to Section 3.4.6 "Displaying relative level").
	F5	Current Level	Displays the RF output level (used to set the offset or display the relative level).
	F6	Calibration	Calibrates the output level (refer to Section 3.4.10 "Calibrating Level").
2	F1	Continuous (On/Off)	Switches the Continuous mode (refer to Section 3.4.8 "Using Continuous mode").
	F2	Volt Unit (*1) (EMF/Term)	Switches the voltage display between open circuit and termination (refer to Section 3.4.7 "Selecting voltage display mode").
	F3	Ext. ALC (On/Off)	Switches the external ALC (refer to Section 3.4.9 "External ALC").
	F4	Unleveled Detail (*2)	Displays the cause of the fact that the output level is outside of the performance guarantee range (refer to Section 3.4.12 "Examining causes of unleveled display").
	F5		No function
	F6	BER Measure Start	Starts BER measurement (refer to Sections 3.8 "BER Measurement Functions" and 3.9 "High Speed BER Measurement Functions When Option031/131 Is Installed").

(*1): Displayed only when the output level is in voltage units (dBμV).
(*2): Displayed only when the output level is outside of the performance guarantee range (Unleveled).

3.4.2 Using numeric keypad to set output level

To set the output level using the numeric keypad, follow the procedure below:

Example: Setting the output level to –47 dBm

<Procedure>

1. Press one of the numeric keypad keys (first [–/+] in this example) to display the Level Value window. A [-] is displayed in the window at the same time. Each time [–/+] is pressed, switching between [+] (not shown) and [-] takes place. If a [–] is not viewed, press [–/+] again to show it.

Fig. 3.4.2-1 Output level setup window

2. Then, press [4] [7] to display [–47] in the window.
3. Press [GHz/dBm] to determine the numeric value and unit. The Level Value window closes at the same time. The output level setup screen displays the output level as [–47.00 dBm].

The output level setup allows you to set or display numeric values in power (dBm) or voltage units (dBμV).

- [–/+] [1] [2] [.] [3] [MHz/dBμV]..... –12.3 dBμV is set.

If the unit is defined as voltage (dBμV), any value will be set as an open circuit voltage.

For the voltage unit (dBμV), switching can be made between the open circuit and terminated voltage display (refer to Section 3.4.7 “Selecting voltage display mode”).

If only the unit key is pressed without entering any value, the output level is displayed in units associated with the pressed key. If unit-to-unit conversion is made repeatedly, the value displayed may vary slightly because of error in calculation.

If [Set] is pressed instead of the unit key after entry of a numeric value, it is determined in dBm.

Any digit smaller than the 0.01 dB is rounded.

3.4.3 Using rotary knob to change output level

Use of the rotary knob makes it possible to increment or decrement a numeric value of the resolution digit (in cursor position) that has been selected using [<] [>]. To set the output level using the rotary knob, follow the procedure below:

Initial setting of resolution digit (cursor position): 0.01 dB digit

Example: Changing the output level from the current value, –47 dBm, to –37 dBm in steps of 1 dB

<Procedure>

1. Move the cursor to the 1 dB digit using [<] [>]. (Pressing [<] twice moves the cursor to that digit).

Fig. 3.4.3-1 Output level display

2. Turning the rotary knob clockwise increments the frequency in steps of 1 dB.
   Turning the knob counter-clockwise decrements the frequency in steps of 1 dB.
   Turn the rotary knob clockwise in this way to set the output level to –37 dBm.

3.4.4 Using step keys to change output level

Use of [∧] [∨] makes it possible to increment or decrement the output level in steps of the preset output level.
To set the output level using the step keys, follow the procedure below:

Initial setting of output level step: 1 dB

Example: Setting the output level to –47 dBm, and increment or decrement it in steps of 6 dB

<Procedure>

1. Press [–/+] [4] [7] [GHz/dBm] to set the output level to –47 dBm.
2. Press [F1] (Incremental Step Value) to display the output level step setup window (Incremental Step Value).

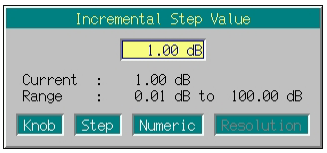


Fig. 3.4.4-1 Output level step setup window

3. Press [6] [GHz/dBm] to set the level step to 6 dB. The window closes at the same time the setup completes.
4. In the output level setup screen, pressing [∧] increments the output level by 6 dB to –41 dBm. Pressing [∨] in this state returns the output level by 6 dB to –47 dBm.
   The output level can be incremented or decremented in steps of 6 dB by using [∧] [∨] in this manner.

3.4.5 Setting output level offset

The output level offset setting function offsets the SG output level by the offset level and displays the resulting level on the screen.
This function is useful to compensate the attenuation of a cable connected to the SG output.

[Resulting output level] = [SG output level] + [Offset level]

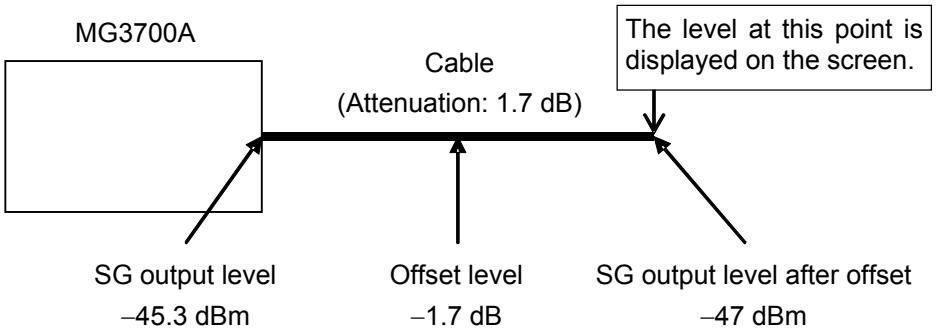


Fig. 3.4.5-1 Outline of offset level

Offset level setup range: –50 to +50 dB
Offset level setting minimum resolution: 0.01 dB

To set the offset level, follow the procedure below:

Example: Setting the offset level to –1.7 dB and the output level after offset –47 dBm

<Procedure>

1. Press F2 (Offset Value) to display the offset level setup window (Offset Value).

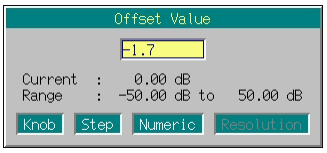


Fig. 3.4.5-2 Offset level setup window

2. Press –/+ 1 . 7 dB GHz/dBm to set the offset level to –1.7 dB. The window closes at the same time the setup completes.
3. Press F3 (Offset On Off) to turn On the offset mode, unless the cursor is moved to the On portion.
   On the right of the output level display, “Offset” is displayed to indicate the offset setting state.

4. Press [−/+] [4] [7] [GHz/dBm] to set the output level to −47 dBm.
   Value [−47.00 dBm] is displayed on the screen.
   At this time, the level of the signal actually being output from SG is −45.3 dBm.

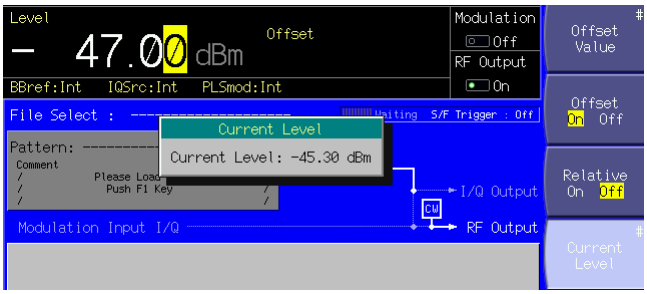


Fig. 3.4.5-3 Output level confirmation window

To view the SG output level, press [F5] (Current Level). The currently output level is displayed in the window, which disappears by pressing any key.
The output level can also be set using the rotary knob or [∧] [∨] in steps of 0.01 dB.

3.4.6 Displaying relative level

The relative output level display function displays the output level as the relative value in relation to the reference output level 0 dB.

[SG output level] =
[Display level]+ [Output level for change to relative level display]

To set the relative level display, follow the procedure below:

Example: Increasing the level by 7.5 dB in relation to –47 dBm

<Procedure>

1. Press [–/+] [4] [7] [GHz/dBm] to set the output level to –47 dBm.
2. Press [F3] (Relative On Off) to turn On relative level display. The MG3700A enters the relative level display mode with the current output level (–47 dBm) as the reference level. The displayed output level, [–47.00 dBm], changes to [+0.00 dB].
   In addition, on the right of the output level display, "Relative" is displayed to indicate that the relative level is currently displayed.

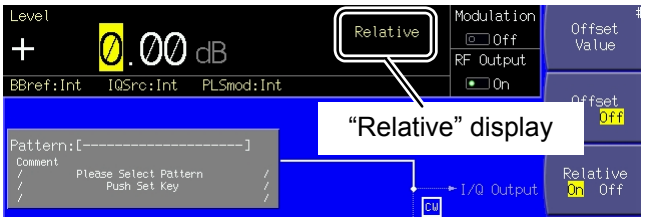


Fig. 3.4.6-1 "Relative" display

3. Press [7] [·] [5] [dB GHz/dBm] to set the relative level to 7.5 dB. Although the level displayed is [7.50 dB], the level actually output from SG is –47 dBm + 7.5 dB, i.e., –39.5 dBm.

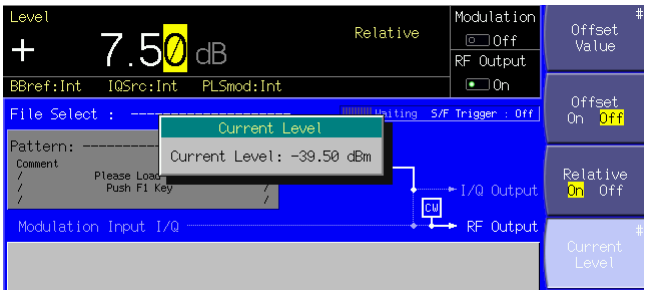


Fig. 3.4.6-2 Output level confirmation window

To view the SG output level, press (F5) (Current Level). The currently output level is displayed in the window, which disappears by pressing any key.
The relative level can also be set using the rotary knob or the step keys ([∧] [∨]) in the same manner as normal output level setting.

3.4.7 Selecting voltage display mode

This function is available only when the output level is displayed in voltage units (dBμV).

If the output level is in voltage units (dBμV), either the open circuit or terminated voltage display can be selected.

To switch the display between open circuit and termination, follow the procedure below:

Initial setting of voltage display mode Open circuit voltage display

Example: Setting the output level to 30 dBμV in open circuit voltage display, and then switching it to terminated voltage display

<Procedure>

1. Press [3] [0] [MHz/dBμV] to set the output level to 30 dBμV. On the right of the output level display, "EMF" (abbreviation of Electro Motive Force) is displayed to indicate open circuit voltage display.

Fig. 3.4.7-1 "EMF" display

2. Press (More) to switch the function menu to the second page. Press (F2) (Volt. Unit) to move the cursor from the open circuit voltage display (EMF) to the terminated voltage display (Term).
3. The output level display changes to the terminated voltage display, [23.98 dBμV]. On the right of the output level display, [Term] is displayed to indicate terminated voltage display.

Fig. 3.4.7-2 "Term" display

3.4.8 Using Continuous mode

* Both the Continuous mode and external ALC cannot be used concurrently.

To adjust the RF output level, the MG3700A contains a programmable step attenuator, which causes a signal loss during output level adjustment. The Continuous mode is used if such a signal loss is problematic during the measurement In this mode, operation of the programmable step attenuator is fixed, and the level can be adjusted continuously in the –10 to +3 dB range only with a high-resolution setting electronic attenuator.

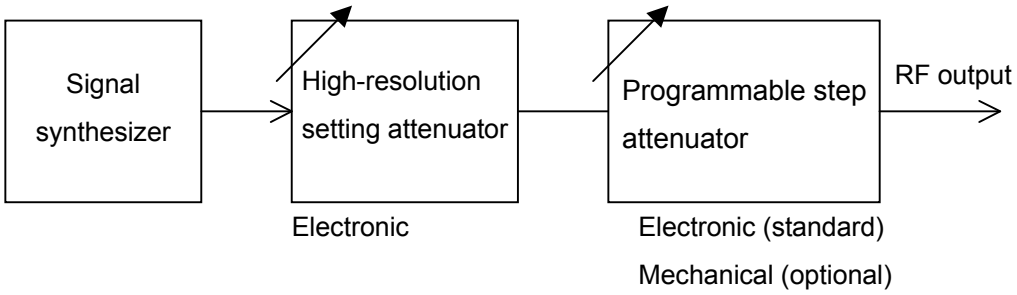


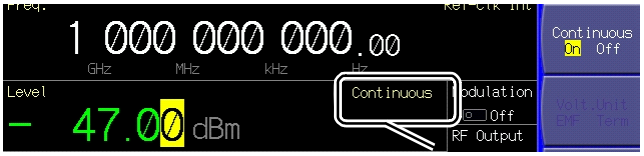
Fig. 3.4.8-1 Outline of MG3700A attenuator

To set the Continuous mode, follow the procedure below:

Example: Using the Continuous mode for adjustment with -47 dBm as the reference

<Procedure>

1. Press [–/+] [4] [7] [GHz/dBm] to set the output level to –47 dBm.
2. Press [More] to switch the function menu to the second page. Press [F1] (continuous On Off) to turn On the Continuous mode. On the right of the output level, "Continuous" is displayed to indicate that the current mode is Continuous. In the Continuous mode, the values are displayed in green.



"Continuous" display

Fig. 3.4.8-2 "Continuous" display

3. Turning the rotary knob clockwise increments the value up to –44 dBm. Turning it counter-clockwise decrements the value down to –57 dBm.

In the Continuous mode, the output level can be set in the –10 to +3 dB range relative to the level at which the Continuous mode was turned On. Any of the rotary knob, numeric keypad, and step keys can be used for this purpose.
If the Continuous mode is turned On when the external ALC input is On, the external ALC goes Off.

3.4.9 External ALC

*** Both the Continuous mode and external ALC cannot be used concurrently.**

The MG3700A allows ALC (Automatic Level Control) to be applied based on the result of external level detection. To enable external ALC input, follow the procedure below

<Procedure>

1. Press (More) to switch the function menu to the second page.
   Press (F3) (Ext. ALC On Off) to turn On the external ALC input.
   On the right of the output level, "Ext-ALC" is displayed to indicate that the external ALC input is enabled.

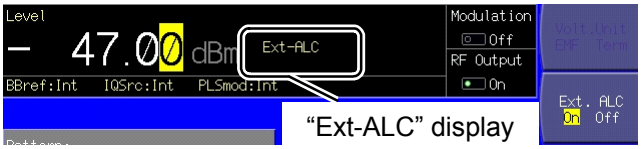


Fig. 3.4.9-1 "Ext-ALC" display

2. Input a DC voltage to the rear Ext. ALC Input connector.

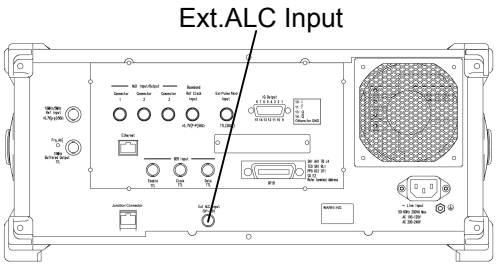


Fig. 3.4.9-2 Ext. ALC Input connector

If the external ALC input is turned On while the Continuous mode is On, the Continuous mode goes Off.

Input sensitivity: –3 dB/V typ. (around 0 dB)
Input voltage range: ±5 V
Variable range: +3/–8 dB typ.

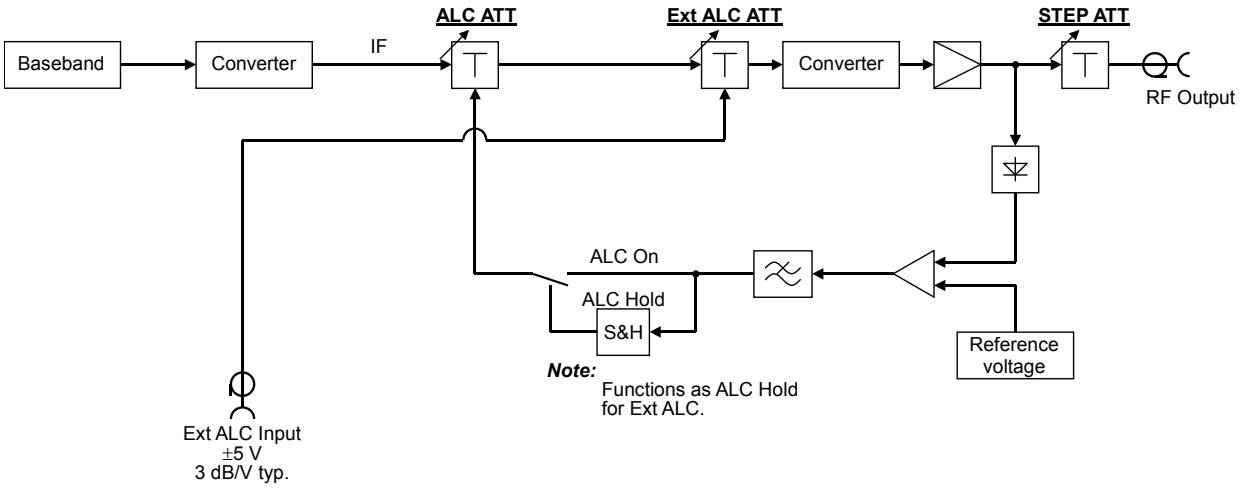


Fig. 3.4.9-3 Block diagram of MG3700A ALC circuit

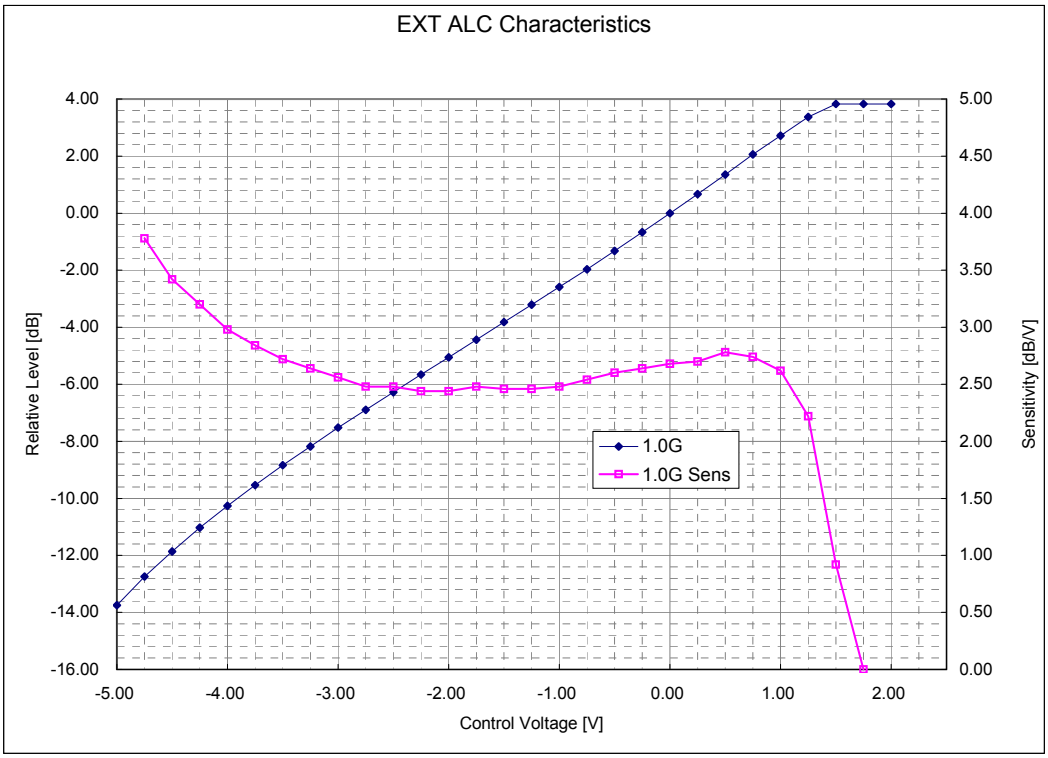


Fig. 3.4.9-4 Output level relative to control voltage and level sensitivity

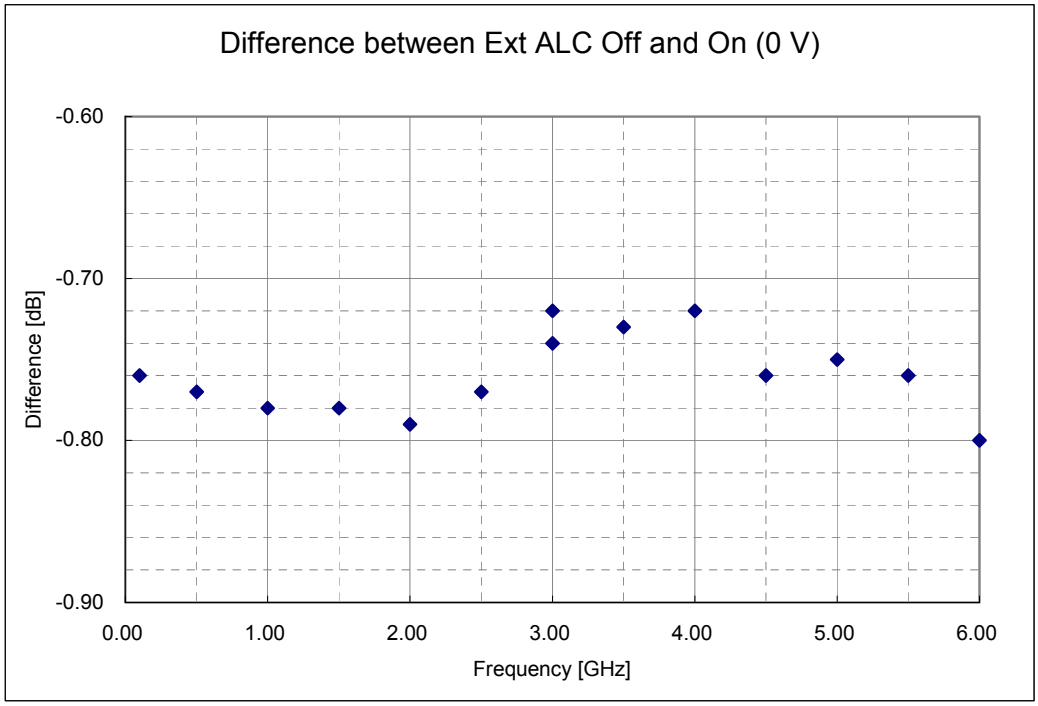


Fig. 3.4.9-5 Output level difference between external ALC Off and On (Control voltage at external ALC On: 0 V)

3.4.10 Calibrating level

The MG3700A continually outputs signals at stable level because the ALC loop circuit is used. However, this circuit is held in any of the following cases:

- When the Continuous mode is in use
- When the external ALC input is enabled
- During vector modulation

Even for the above cases, the level is calibrated automatically when one of the followings is performed:

- Changing the frequency
- Changing the output level
- Selecting a pattern that has a different effective value

If the MG3700A is used with the same settings for a long time, level calibration is useful to remove temperature drifts.
By pressing F6 (Calibration), the output level can be calibrated.

The calibration complete within 100 ms after F6 (Calibration) is pressed, although the exact time varies with the conditions.

3.4.11 Turning on/off RF output

By pressing Output on the front panel, the RF output can be turned On or Off.
Once the RF output goes On, the green key lamp lights up and the currently set signal is output.

Note:
It is recommended that the setting process of the MG3700A parameters be completed, with the RF output Off, before the RF output be turned On. This prevents damage of the measured object that is connected to the RF output.

To set RF output On/Off, follow the procedure below:

Example: Turning Off and then On the RF output

<Procedure>

1. Press Output to turn Off the RF output. (The lamp goes out.)
2. Press Output again to turn On the RF output. The signal is output at the currently displayed output level. (The lamp comes On.)

The RF output On/Off display is also on the right of the output level.

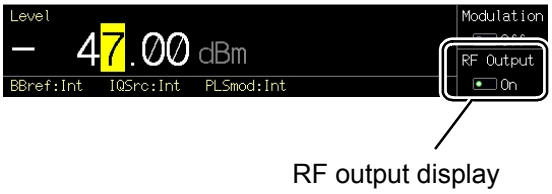


Fig. 3.4.11-1 RF output display

3.4.12 Examining causes of Unleveled display

This function displays the cause(s) of the fact that the output level is outside of the performance guarantee range. To view it, press (More) to switch the function menu to the second page with the output level outside the performance guarantee range ("Unleveled" is displayed), and then press (F4) (Unleveled Detail).

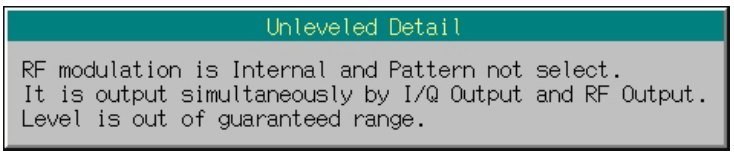


Fig. 3.4.12-1 Unleveled cause display window

The following messages are displayed to indicate the cause(s):

Table 3.4.12-1 Messages for Unleveled cause

Message	Description
Level is out of guaranteed range.	The output level is outside of the performance guarantee range.
RF modulation is Internal and Pattern not select.	With the waveform pattern not selected, the internal modulation has been set On.
It is output simultaneously by I/Q Output and RF Output.	Internal modulated waves are being output concurrently from RF and I/Q Output.

If two or more causes have occurred, they are all displayed.

3.5 Setting Modulation Functions

Press the [Baseband] main function key to open the digital modulation setup mode. The key lamp lights up.

Digital modulation can be set up on this screen.
Unless otherwise specified, this section assumes that the digital modulation setup mode has been entered by pressing [Baseband].

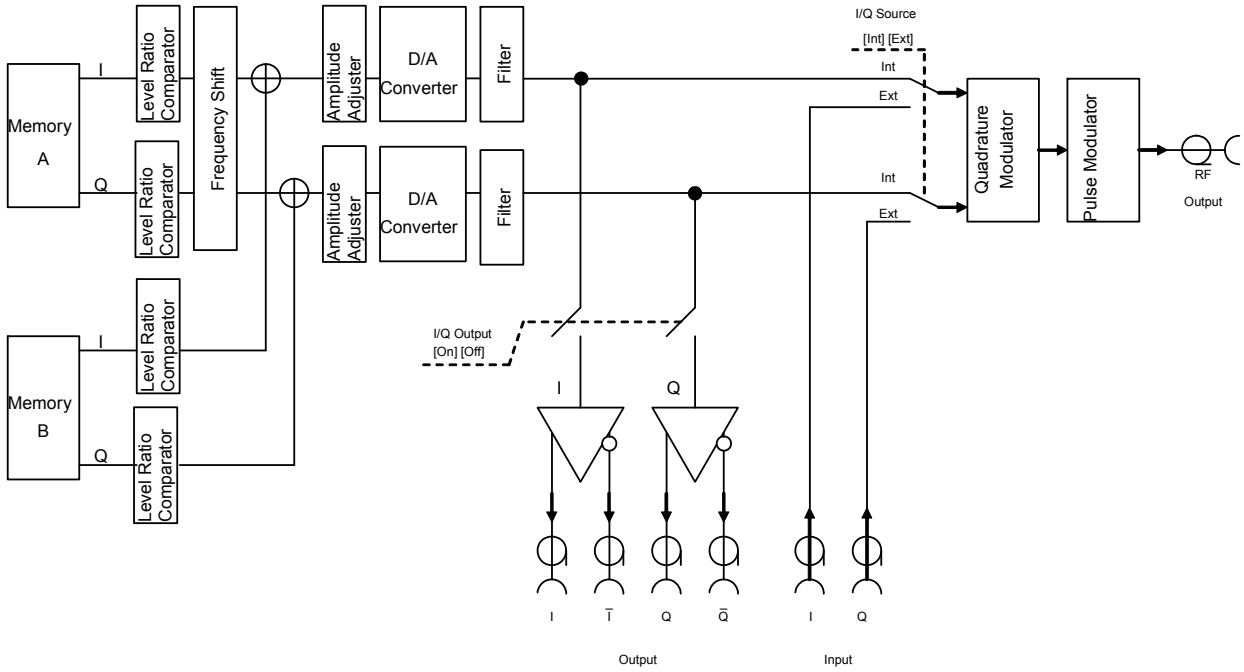


Fig. 3.5-1 Outline of MG3700A modulation circuit

The modulation signal flow is switched, and the type of the signal from the RF output is determined based on digital modulation setup mode I/Q Source, Pulse Modulation Source, and [MOD On/Off] on the panel.

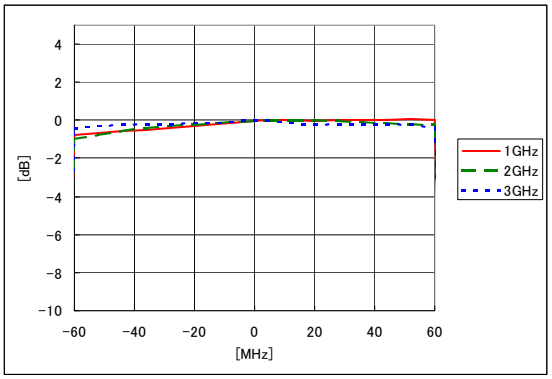
The following table summarizes the I/Q signal output and digital modulation states associated with the settings:

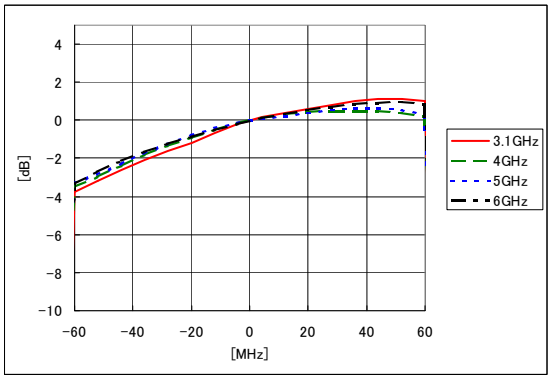
Table 3.5-1 Digital modulation setup state and signal output

Setting			Output signal	
I/Q Output	**Mod On/Off**	**I/Q Source**	**I/Q Output**	**RF Output**
[Off]	[Off]	[Int], [Ext]	No output	CW
	[On]	[Ext]		External vector modulation
		[Int]		Internal vector modulation
[On]	[Off]	[Int], [Ext]	Internal I/Q signal	CW
	[On]	[Ext]		External vector modulation*
		[Int]		Internal vector modulation*

* If both I/Q Output and Mod On/Off are [On], the RF output level is not guaranteed.

Typical Value of Modulation Frequency Characteristic





3.5.1 Display description

This section describes the screen display in the digital modulation setup mode.

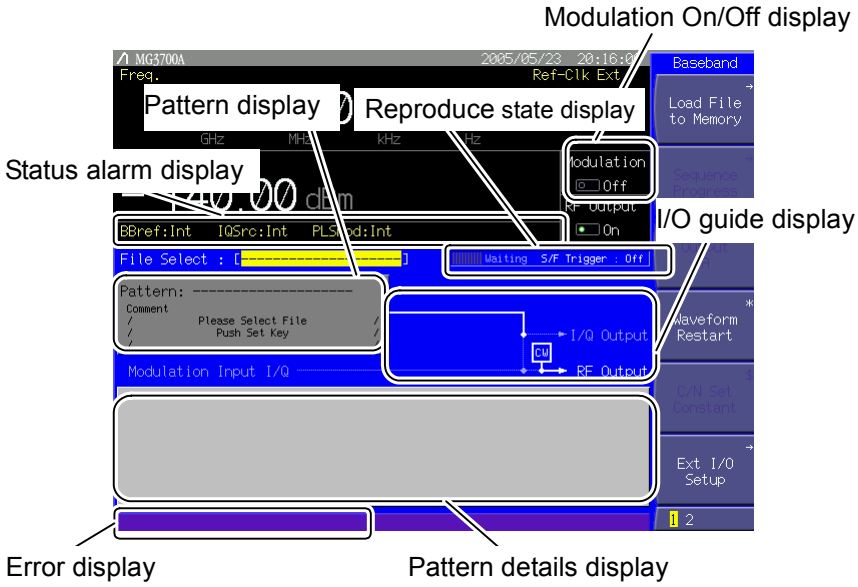


Fig. 3.5.1-1 Digital modulation setup screen

Table 3.5.1-1 Displayed items on digital modulation setup screen

Display	Description
Pattern display	Displays the currently selected pattern.
Pattern details display	Displays the contents of the text file attached to the pattern.
Modulation On/Off display	Displays the modulation On/Off state.
Status alarm display	Displays the state and warning of the current baseband settings.
Reproduce state display	Displays the pattern reproduce state
I/O guide display	Displays the On/Off and modulation states of the outputs.
Error display	Displays an error if it occurs when the pattern is selected.

Table 3.5.1-2 Description of status display

Actual view	Display	Description
BBref:Int	BBref (Int/Ext)	Displays the source of the reference clock for the baseband (internal or external).
IQSrc:Int	IQSrc (Int/Ext)	Displays the I/Q signal source (internal or external).
PLSmod:Int	PLSmod (Int/Ext/Off)	Displays the pulse modulation state (internal signal modulation, external signal modulation, or pulse modulation Off).

Table 3.5.1-3 Description of alarm display

Actual view	Display	Description
BBref Alarm	BBref Alarm	Displayed if the source of the baseband reference clock is internal, and indicates that the internal reference clock is unstable.
Check Ext BBref	Check Ext BBref	Displayed if the source of the baseband reference clock is external, and indicates that the external reference clock is unstable.

Table 3.5.1-4 Description of alarm display

Actual view	Display	Description
Mismatched Sampling Clock	Mismatched Sampling Clock	Displayed when the sampling clock of the waveform pattern selected for Memory A differs from that of the waveform pattern selected for Memory B in the Edit mode. Note that the MG3700A operates as follows when this warning is displayed: • Operates with the sampling clock of the waveform pattern selected for Memory A. • Since the waveform pattern selected for Memory B operates with a sampling clock different from its original sampling clock, it will be output in an abnormal band width. When adding waveform patterns having a different sampling clock to output, convert their sampling clocks to the same clock by using the Adjust Rate function of the Multi-Carrier IQproducer™, which is sold separately.

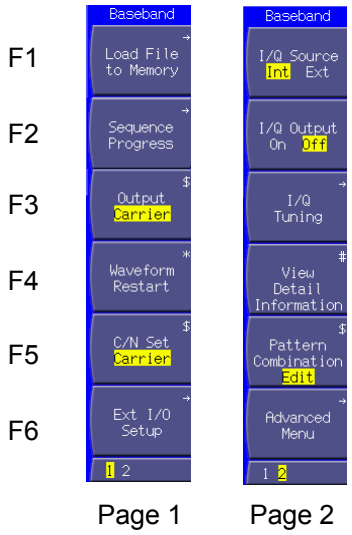


Fig. 3.5.1-2 Function menu

Table 3.5.1-5 Function menu

Page	Key No.	Menu display	Function
1	F1	Load File to Memory	Displays a waveform file loading screen. (Refer to Section 3.5.2 (1) "Loading waveform file in memory.")
	F2	Sequence Progress (*1)	Displays the Sequence Progress screen. (Refer to Section 3.5.2 (3) "Performing continuous operation in Defined mode.")
	F3	Output (*2) (Carrier/Noise/C&N)	Selects a waveform pattern output from two memories. (Refer to Section 3.5.2 (5) "Adding Memories A and B outputs for modulation in Edit mode.")
		Output (*2) (A/B/A&B)	
	F4	Waveform Restart	Re-outputs the waveform pattern, beginning at the head. (Refer to Section 3.5.2 (6) "Pattern output settings.")
		Sequence Restart (*1)	Re-outputs from the first element. (Refer to Section 3.5.2 (3) "Performing continuous operation in Defined mode.")
	F5	C/N Set (*2) (Carrier/Noise/Constant)	Selects the destination to which the changed output level ratio is applied. (Refer to Section 3.5.2 (5) "Adding Memories A and B outputs for modulation in Edit mode.")
		A/B Set (*2) (A/B/Constant)	
	F6	Ext I/O Setup	Sets the external I/O. (Refer to Section 3.5.3 "Setting up external input/output," Section 3.5.4 "Outputting signal in sync with external trigger signal," and Section 3.5.6 "Performing pulse modulation.")

Table 3.5.1-5 Function menu (Cont'd)

Page	Key No.	Menu display	Function
2	F1	I/Q Source (Int/Ext)	Switches the I/Q signal source. (Refer to Section 3.5.5 "Vector modulation with external I/Q signal.")
	F2	I/Q Output (On/Off)	Switches the I/Q output to external. (Refer to Section 3.5.7 "Outputting I/Q signal.")
	F3	I/Q Tuning	Adjusts the I/Q output voltage. (Refer to Section 3.5.7 "Outputting I/Q signal.")
	F4	View Detail Information (*3)	Displays the contents of the text file attached to the pattern file. (Refer to Section 3.5.2 (4) "Outputting pattern loaded in Memory A for modulation in Edit mode" and Section 3.5.2 (5) "Adding Memories A and B outputs for modulation in Edit mode.")
	F5	Pattern Combination (Defined/Edit)	Switches between the Defined and Edit modes. (Refer to Section 3.5.2 "Using waveform pattern for modulation.")
	F6	Advanced Menu	Sets other modulation-related conditions. (Refer to Section 3.5.2 (6) "Pattern output settings.")

(*1): Displayed only when a combination file that sets the sequence mode is selected.

(*2): Displayed only when the output level of Memories A and B can be set. In the Defined mode, Carrier, Noise, and C&N are displayed. In the Edit mode, A, B, and A&B are displayed.

(*3): Displayed only in the Edit mode.

3.5.2 Using waveform pattern for modulation

The MG3700A is capable of reproducing a waveform pattern and performing vector modulation with that pattern.

Waveform patterns are stored in the pattern files on the MG3700A internal hard disk. A folder that contains patterns classified by type is called a package.

To reproduce a waveform pattern, first you must load the package pattern (stored on the internal hard disk) in a waveform memory (or memories). The MG3700A contains two installed waveform memories in 2-channel (I and Q) configuration; the package pattern is loaded in one or both of them.

Next, select the one of the patterns that have been loaded in the waveform memory or memories. One pattern can be selected from each of Memories A and B. The pattern from either Memory A or B is output; alternatively, a pattern is Added from those in Memories A and B, and output.

Also, files called “combination files” are stored in a package. A combination of patterns to be output is defined and parameters such as the output level ratio are stored in a combination file. When a combination file is selected, a pattern is output in accordance with the settings in the combination file, so that you do not have to select a pattern for each memory.

The mode in which either a combination file is selected, or a pattern file is selected for either Memory A or B, to output the pattern according to the settings in the file, is called the Defined mode.
The mode in which patterns are separately selected for Memories A and B, and the output level ratio and other parameters are set on the digital modulation setup screen, is called the Edit mode.

Pattern files and combination files are collectively referred to as a waveform file, and both terms are used for the MG3700A with no distinction.

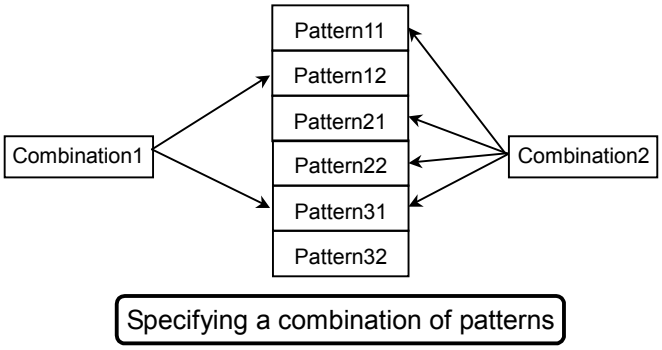


Fig. 3.5.2-1 Relationship between pattern file and combination file

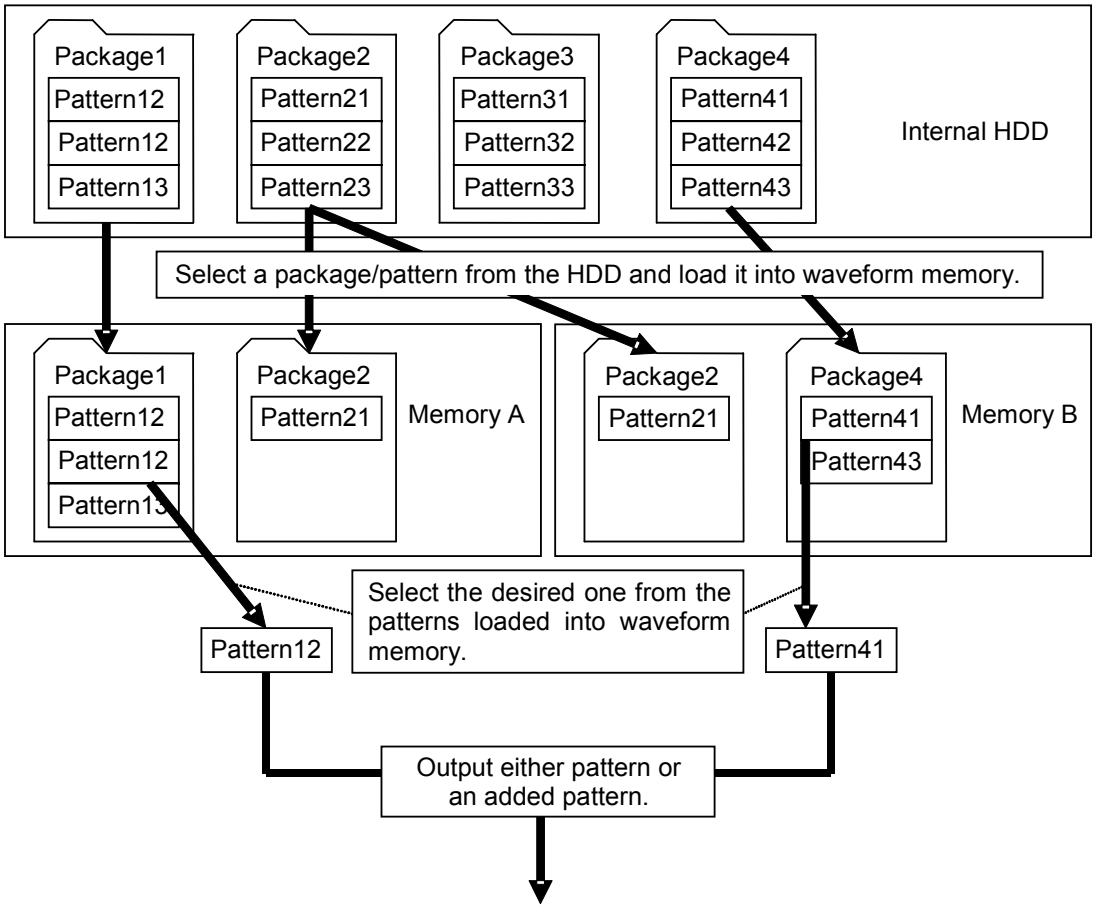


Fig. 3.5.2-2 Outline of waveform pattern output

To add a new package pattern to the internal hard disk, you have the following options:

- Using the CF card
- Using the IQproducer™ software, included with the MG3700A, to transfer the pattern from an external PC.

For using IQproducer™ for the transfer, refer to the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual IQproducer™

(1) Loading waveform file in memory

> ***Note:***
>
> To load waveform pattern files in memory, the license files associated with the patterns must be installed. For installing the license files, refer to "Installing Waveform Pattern License File" in Section 3.10.10 "Installation."

Pressing [F1] (Load File to Memory) opens the waveform file load screen. On this screen, waveform files stored on the internal hard disk are loaded into memory integrated in the MG3700A; in addition, the loaded waveform files can be edited and copied/deleted to/from the hard disk.

Unless otherwise specified, this section assumes that the waveform file load screen is displayed.

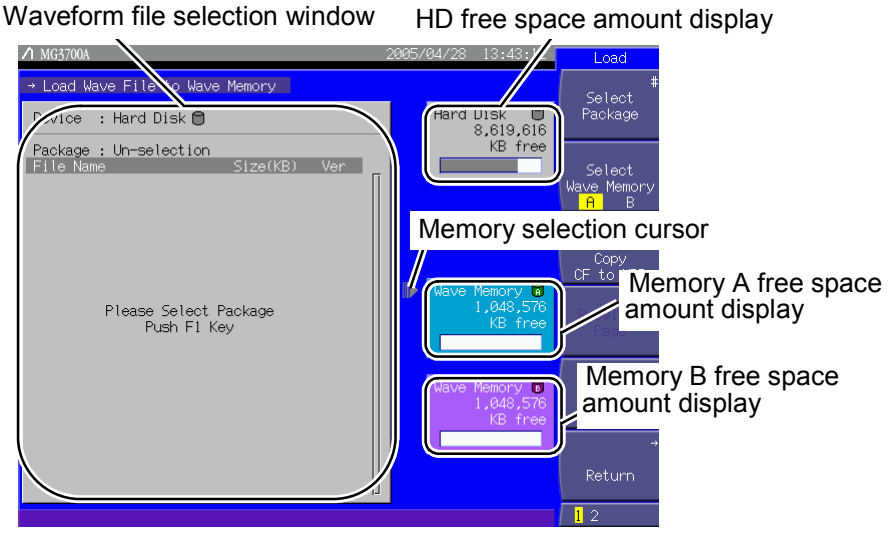


Fig. 3.5.2-3 Waveform file load screen

Table 3.5.2-1 Displayed items on waveform file load screen

Display	Description
Waveform file selection window	Displays waveform files.
HD free space amount display	Displays the free space amount on the internal hard disk.
Memory A free space amount display	Displays the free space amount in Memory A.
Memory B free space amount display	Displays the free space amount in Memory B.
Memory selection cursor	Displays the memory (A or B) that contains the currently displayed pattern.

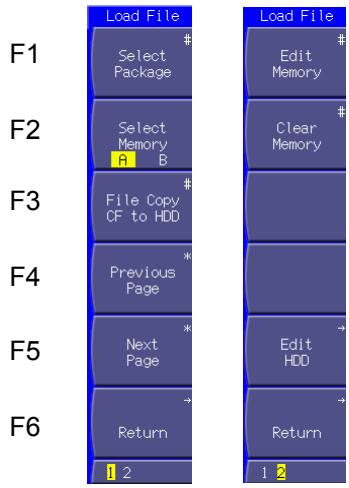


Fig. 3.5.2-4 Function menu

Table 3.5.2-2 Function menu

Page	Key No.	Menu display	Function
1	F1	Select Package	Selects the package containing the waveform file.
	F2	Select Memory (A/B)	Selects a memory in which to load the waveform file.
	F3	File Copy CF to HDD	Copies the waveform file from the CF card to the internal hard disk.
	F4	Previous Page (*1)	Switches the waveform file selection window view to the previous page.
	F5	Next Page (*1)	Switches the waveform file selection window view to the next page.
	F6	Return	Closes the waveform file load screen, and returns to the digital modulation setup screen.
2	F1	Edit Memory (*2)	Deletes a pattern loaded in memory, or displays comments.
	F2	Clear Memory (*2)	Deletes all patterns loaded in memory.
	F3		No function
	F4		No function
	F5	Edit HDD	Edits the waveform file stored in the internal hard disk.
	F6	Return	Closes the waveform file load screen, and returns to the digital modulation setup screen.

(*1): Displayed only when the selected package contains many waveform files, and some of them are hidden outside the waveform file selection window.

(*2): Displayed only when one or more patterns are loaded in memory.

Loading Waveform File in Memory

Example: Loading a waveform file in memory

<Procedure>

1. Press F2 (Select Memory) to select the memory in which the pattern file is to be loaded. To load the pattern file in memory A, set this item to "A." Set this item to "B" to load the pattern file in memory B. When a combination file is selected as the waveform file, the pattern is output as specified in the file, regardless of which memory is selected.
2. Press F1 (Select Package) to display the package selection window (Select Package).

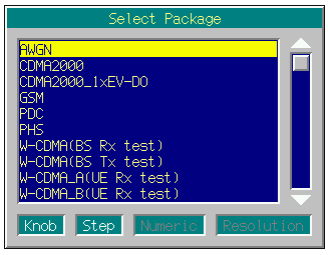


Fig. 3.5.2-5 Package selection window

3. Select a package using the rotary knob or ^ v, and determine the selection by pressing Set.
4. The waveform file selection window is displayed, listing the waveform files included in the selected package. Select the desired waveform file to be loaded in memory using the rotary knob or ^ v. Then, determine the selection by pressing Set.
   If [*** ALL Load ***] is selected at this time, all the waveform files in the package will be loaded in memory.

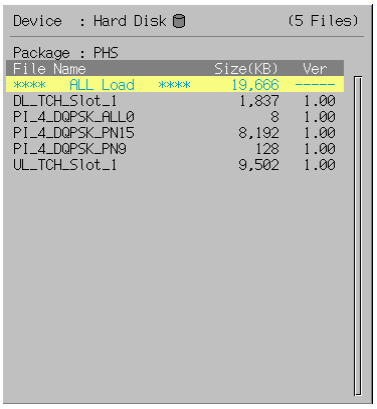


Fig. 3.5.2-6 Waveform file selection window

5. The progress bar window is displayed while loading the waveform file. The waveform file loading operation is canceled if Cancel is pressed while the progress bar window is displayed.
6. Press F6 (Return) to return to the digital modulation setup screen.

Note:

Any waveform file loaded in memory cannot be copied to the hard disk.

The contents of memory are deleted when the power shuts off accidentally, or due to another failure. Take care so that the waveform files in use are not deleted from the hard disk.

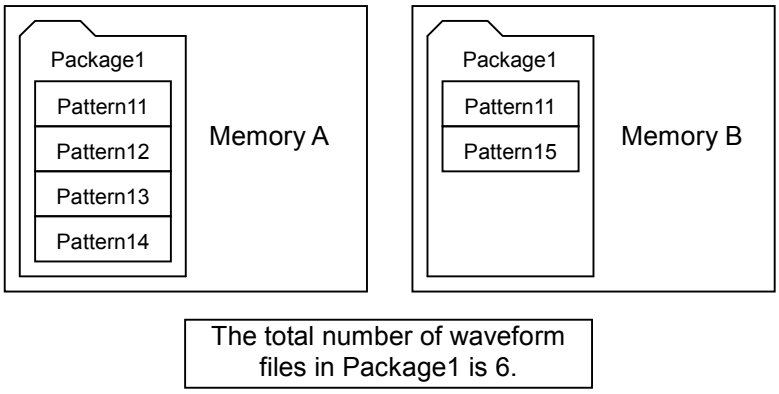
-

To load a long pattern data file, i.e., a pattern file larger than the capacity of Memory A, use both of Memories A and B. Note that a long pattern data file can be loaded only in the Defined mode.

When a long pattern data file is selected, the following message is displayed: "Pattern size is too large. Delete all loaded pattern and load (*pattern name*). OK?". If Set is pressed with the cursor placed on [Yes], all the contents currently loaded in Memories A and B are deleted The selected pattern file is loaded, beginning at the head of Memory A, and the part overflowing from it is loaded in Memory B.

Up to 4,096 pattern files can be loaded in each of Memories A and B.
Up to 2,000 combination files can be can be loaded in each of Memories A and B.
Up to a total of 100 packages can be loaded in Memories A and B.

Up to 100 waveform files can be contained in a package. If the same package exists in both Memories A and B, the number of waveform files shall be the total number of them loaded in the two memories, with the same waveform file counted once in each of the memories.



Deleting Waveform File from Memory

Comments about a waveform file loaded in memory can be displayed, or a waveform file or package can be deleted from memory.
To add a pattern file whose size is larger than the free area capacity in memory, it is necessary to delete some previously loaded pattern files using this function, in order to increase the free space capacity.

<Procedure>

1. Press (More) to switch the function menu to the second page. Then, Press (F1) (Edit Memory). The packages loaded in the memories are listed in the selection window.
2. Select the package that contains the desired package or waveform file to be deleted, using the rotary knob or (^) (v). Then, determine the selection by pressing (Set).
3. The waveform files contained in the selected package are listed in the waveform file selection window.
   A new window opens from the waveform file load screen. The waveform files are listed in the new window.

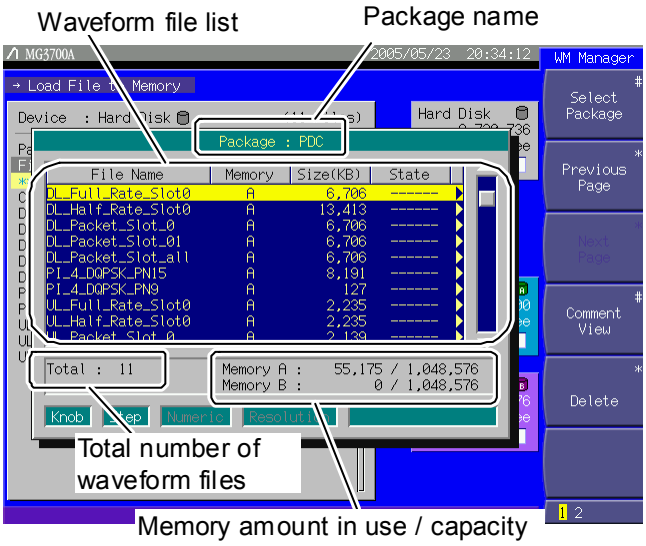


Fig. 3.5.2-7 Waveform file selection window

Table 3.5.2-3 Displayed items in waveform file selection window

Display	Description
Package name	Displays the name of the currently selected package.
Waveform file list	Lists the waveform files contained in the package.
Total number of waveform files	Displays the total number of waveform files contained in the package.
Memory amount in use/capacity	Displays the total size of the patterns loaded in Memories A and B, and the memory capacities.

The waveform file list contains the waveform file names, memories, sizes, and states. "Active" in the "State" column indicates that the waveform file has been selected for use in modulation.

Table 3.5.2-4 Function Menu

Page	Key No.	Menu display	Function
1	F1	Select Package	Selects a package currently loaded in memory.
	F2	Previous Page (*1)	Returns the waveform file selection window view to the previous page.
	F3	Next Page (*1)	Advances the waveform file selection window view to the next page.
	F4	Comment View	Displays comments about the waveform file.
	F5	Delete	Deletes the currently selected waveform file from the memory.
	F6		No function
2	F1	Clear Memory	Deletes all the packages and waveform files loaded in the memory.
	F2	Top Page (*1)	Jumps the waveform file selection window view to the top page.
	F3	Last Page (*1)	Jumps the waveform file selection window view to the last page.
	F4		No function
	F5		No function
	F6		No function

(*1): Displayed only when the selected package contains many waveform files, and some of them are hidden outside the waveform file selection window.

To close the waveform file selection window, press Set or Cancel.

Deleting Waveform File from Memory

<Procedure>

1. Select the desired waveform file to be deleted using the rotary knob or [^] [v].
2. When a pattern file is selected:
   Press [F5] (Delete) to display the confirmation window. (When the selected pattern file is specified in the combination file that is loaded in the memory, a message indicates this appears.) Move the cursor to [Yes] and then press [Set] to delete the currently selected pattern file from the memory. (The combination file in which the deleted pattern file is specified is also deleted from the memory.)
   When a combination file is selected:
   Press [F5] (Delete) to display the confirmation window. Move the cursor to [Yes] and then press [Set]. A confirmation window for whether to delete the pattern files specified in the selected combination file appears. Move the cursor to [Yes] and press [Set] to delete the combination file and all pattern files specified in it. To delete only the combination file, move the cursor to [No] and then press [Set].

If the package contains many waveform files and some of them are hidden outside the window, [F2] (Previous Page), [F3] (Next Page), [F2] (Top Page), and [F3] (Last Page), the last two of which are on the second page, can be used to show the hidden ones. Use of these keys allows you to switch the waveform file list page quickly.

Even when this function is used to clear the contents of memory, the packages and waveform files stored on the internal hard disk are not deleted.

Deleting All Loaded Packages and Patterns from Memory

<Procedure>

1. Press More to switch the function menu to the second page.
   Press F1 (Clear Memory) to display the confirmation window.
2. Move the cursor to [Yes] and press Set to delete all of the loaded waveform files from the memory.

> Pressing F2 (Clear Memory) on the second page of the function menu in the waveform file load screen also deletes all of the waveform files loaded in the memory.
>
> Even when this function is used to clear the contents of memory, the packages and waveform files stored on the internal hard disk are not deleted.

Copying Waveform File(s) from CF Card to Internal Hard Disk

This function copies a waveform file(s) to the MG3700A internal hard disk by using the CF card.
Follow the procedure below:

<Procedure>

1. Insert into the MG3700A card slot the CF card containing packages and waveform files.
2. Press F3 (File Copy CF to HDD) to load the file information from the CF card. Do not remove the card from the slot during the process.
3. The package selection window is displayed.
   Select the desired package using the rotary knob or ∧ ∨.
   Determine the selection by pressing Set.

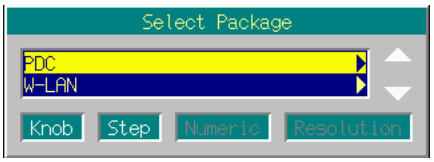


Fig. 3.5.2-8 Package selection window

4. The waveform file selection window is displayed, listing the waveform files contained in the selected package. Select the desired waveform file to be copied to the internal hard disk using the rotary knob or [^] [v].
   Then, determine the selection by pressing [Set].
   If [*** ALL Install ***] is selected, all the waveform files in the package will be copied to the internal hard disk.

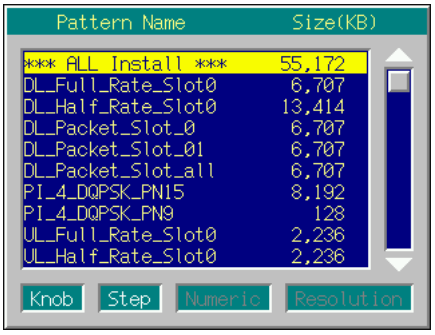


Fig. 3.5.2-9 Waveform file selection window

Note:

A combination file cannot be loaded in memory just by copying it to the internal hard disk where the pattern files specified in the combination file do not exist.

Do not power off the MG3700A during the waveform file copy process.

The MG3700A can handle up to 100 waveform files.

Deleting Waveform File(s) from Internal Hard Disk

This function deletes a waveform file(s) stored on the internal hard disk. Follow the procedure below:

<Procedure>

1. Press More to switch the function menu to the second page. Then, press F5 (Edit HDD) to set the internal hard disk edit screen.
2. Press F1 (Select Package) to display the package selection window. Then select the package containing the desired waveform file to be deleted using the rotary knob or ^ v. Then, determine the selection by pressing Set.

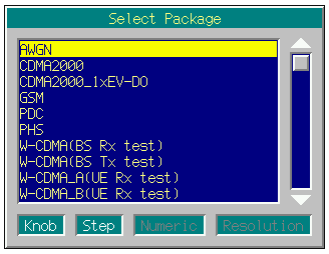


Fig. 3.5.2-10 Package selection window

3. The waveform file selection window is displayed, listing the waveform files contained in the selected package. Select the desired waveform file to be deleted using the rotary knob or ^ v.

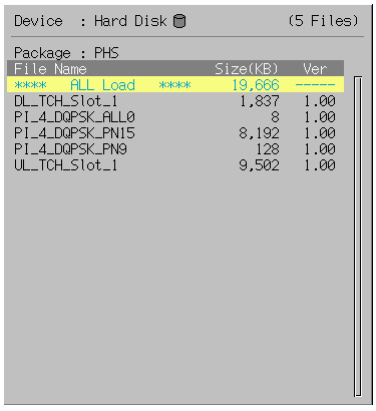


Fig. 3.5.2-11 Waveform file selection window

4. Press F2 (Delete File) to display the confirmation window. Move the cursor to [Yes] and press Set to delete the currently selected waveform file from the internal hard disk.

Note:

If a pattern file that is specified in the combination file is deleted, the combination file cannot be loaded in the memory.
Do not power off the MG3700A during the waveform file delete process.
Note that the waveform files deleted from the internal hard disk cannot be restored.

Deleting Package from Internal Hard Disk

This function deletes a package contained on the MG3700A internal hard disk.
Follow the procedure below:

<Procedure>

1. Press More to switch the function menu to the second page. Then, press F5 (Edit HDD) to set the internal hard disk edit screen.
2. Press F3 (Delete Package) to display the package selection window. Select the desired package to be deleted using the rotary knob or ∧ ∨. Then, determine the selection by pressing Set.

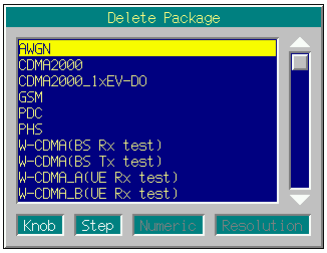


Fig. 3.5.2-12 Package selection window

3. The confirmation window is displayed. Move the cursor to [Yes] and press Set to delete the currently selected package from the internal hard disk.

Note:

A package shown in the waveform file selection window cannot be deleted.
Do not power off the MG3700A during the package deletion process.
When a package is deleted, all the waveform files contained in it are deleted.
Note that the waveform files and packages deleted from the internal hard disk cannot be restored.

(2) Perform modulation in Defined mode

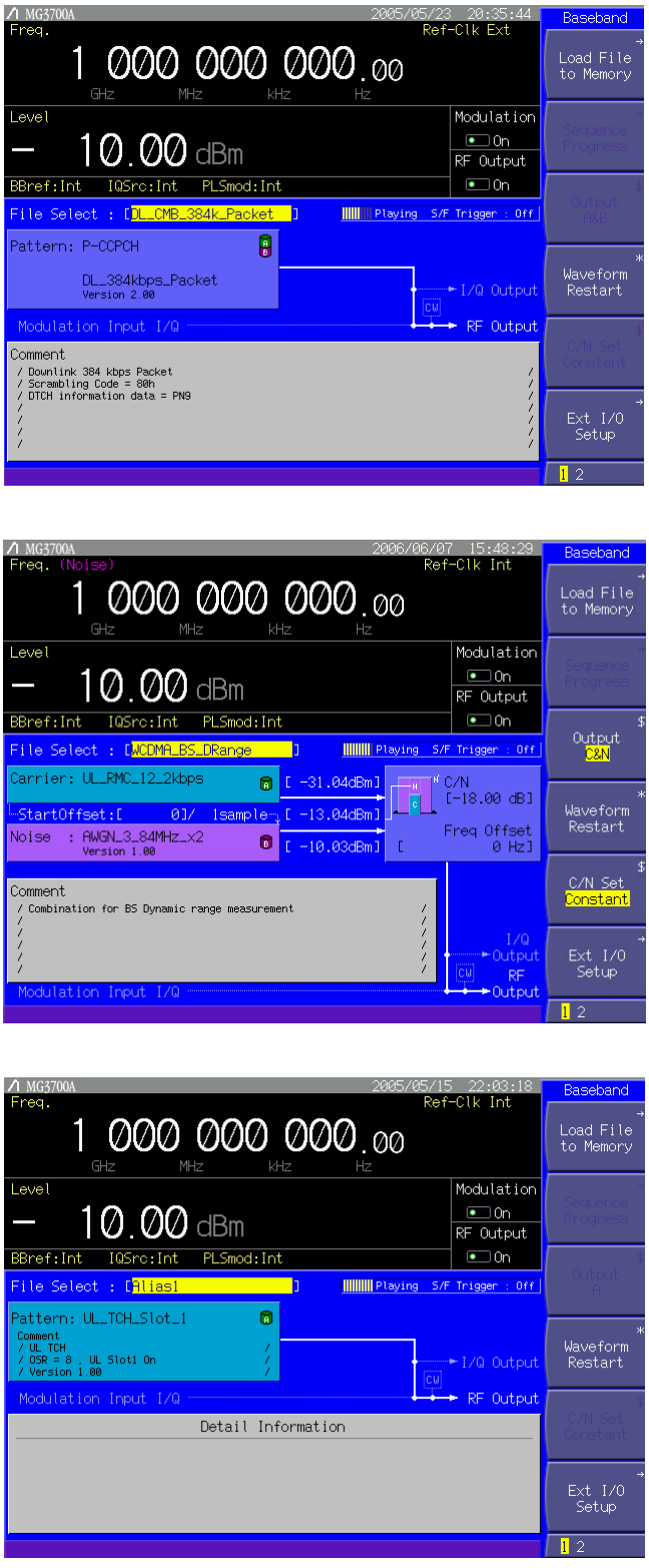


Fig. 3.5.2-13 Screens in Defined mode

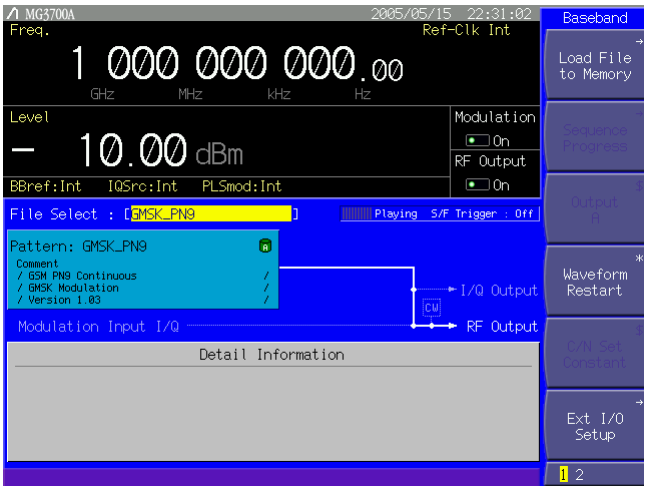


Fig. 3.5.2-13 Screens in Defined mode (Cont'd)

In the Defined mode, the display on the digital modulation setup screen varies depending on the contents of the selected waveform file.
Basically, it is not required that parameters such as the output level ratio be set, since a pattern is output in accordance with the settings in the selected waveform file in this mode.
The Defined mode is useful for simple evaluation of the adjacent channel selectivity and the sensitivity in the AWGN added status.
Follow the procedure below:

Example: Selecting a waveform file and outputting a pattern in Defined mode

<Procedure>

1. Load the waveform files into the memory according to the instructions in Section 3.5.2 (1) "Loading waveform file in memory."
2. Press (More) to switch the function menu to the second page. Then, press (F5) (Pattern Combination) to set [Defined].
3. The cursor is placed on [File Select: [----------]] in the digital modulation setup screen. Press (Set) to display the package selection window that lists the packages currently loaded in the memory.
4. Select the package and press (Set). The waveform files contained in the selected package are listed.
   Select a desired waveform file to be used, and then press (Set) to determine the selection.
   The name of the selected waveform pattern is displayed in [Pattern : [----------]], with its information under this field. The output level ratio, frequency offset, and other parameters are also displayed as set in the selected waveform file.

5. Press MOD On/Off . The green key lamp lights up and vector modulation starts.
6. When changing the output level, offset reference signal, frequency offset, and/or other parameters for patterns in the memory, follow the instructions described in Section 3.5.2 (5) "Adding Memories A and B outputs for modulation in Edit mode."

(3) Performing continuous operation in Defined mode

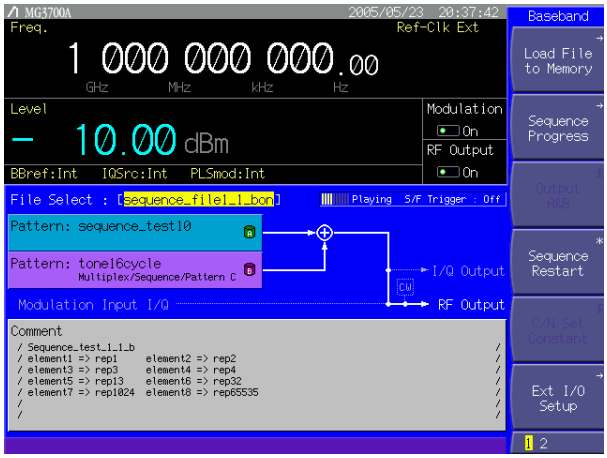


Fig. 3.5.2-14 Screen in sequence mode

When a combination file that defines continuous operations is selected in the Defined mode, the sequence mode is set. In the sequence mode, a continuous operation in which a waveform pattern and the output level are changed automatically is available. It is also possible to stop continuous operation and switch to manual operation. Refer to the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual IQproducer™ for details on combination files for the sequence mode that defines continuous operations.
Follow the procedure below:

Example: Performing continuous operation in sequence mode

<Procedure>

1. Load combination files (for sequence mode) into the memory according to the instructions in Section 3.5.2 (1) "Loading waveform file in memory."
2. Press More to switch the function menu to the second page. Then, press F5 (Pattern Combination) to set [Defined].
3. The cursor is placed on [File Select: [----------]] in the digital modulation setup screen. Press Set to display the package selection window that lists the packages currently loaded in the memory.

4. Select the package and press Set. The waveform files contained in the selected package are listed.
   Select a desired combination file for sequence mode, and then press Set to determine the selection.
   The names of patterns defined by the selected combination file are displayed in [Pattern : [----------]].

5. Press MOD On/Off. The green key lamp lights up, and vector modulation and continuous operation start simultaneously.
   The continuous operation can be resumed from the beginning by pressing F4 (Sequence Restart) on the first page of the function menu.

6. Pressing F1 (Sequence Progress) on the first page of the function menu displays the sequence progress screen, in which the continuous operation progress can be checked. The blinking element indicates the pattern that is currently output. The operation for the element is repeated for the number of times specified in Repeat, based on the waveform pattern data length of each element as a basic unit.
   When F1 (Next Pattern) is pressed, the target element is switched to the next one regardless of the specified repetition time.

   When the function key F3 (Play Mode) on the sequence progress screen is pressed and [Manual] is set, the continuous operation is switched to the manual operation. In this event, the blinking element is operated infinitely. Press F1 (Next Pattern) to move to the next element.

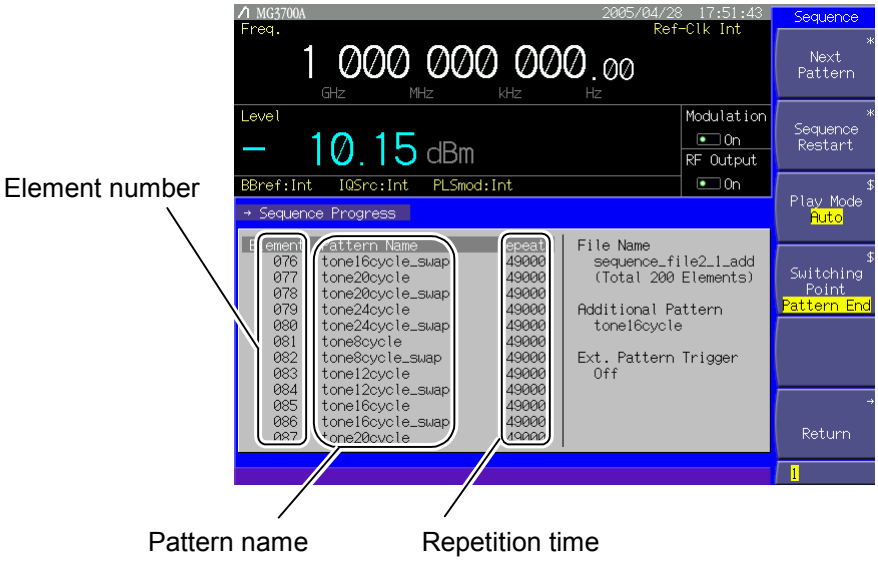


Fig. 3.5.2-15 Sequence progress screen

Table 3.5.2-5 Function Menu

Page	Key No.	Menu display	Function
1	F1	Next Pattern	Moves to the next element.
	F2	Sequence Restart	Resumes the sequence operation.
	F3	Play Mode (Auto/Manual)	Selects whether to perform continuous operations automatically or manually.
	F4	Switching Point (Pattern End/Frame End)	Selects the switching time to move to the next element.
	F5		No function
	F6	Return	Exits the sequence progress screen, and returns the sequence mode screen.

Some combination files for the sequence mode may stop the operation when the main function is transited by pressing a main function key.

(1) If there is an element for which the relative level ratio is not set to 0 dB:
When a main function key [Frequency] or [Level] is pressed during a sequence operation, the sequence operation is stopped temporally. It is resumed from the element at which operation has stopped, by pressing [Baseband].

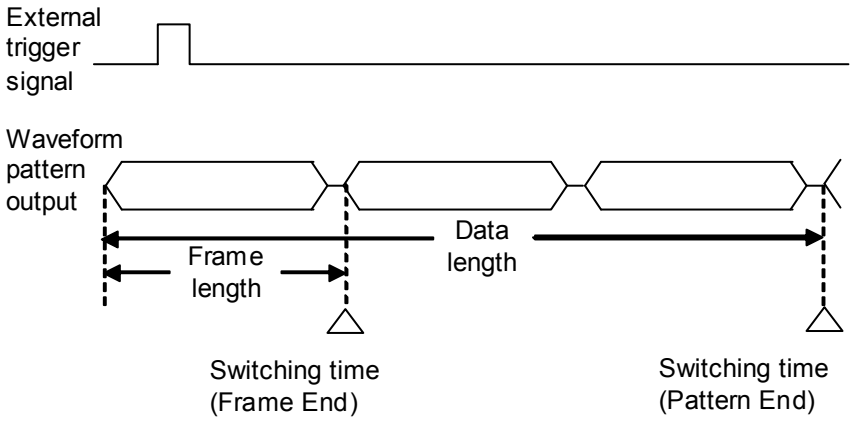
(2) When the relative level ratio of all the elements is set to 0 dB:
In this event, the sequence operation continues even if a main function key such as [Frequency] or [Level] is pressed during a sequence operation.

During a sequence operation, Sampling Clock (refer to "Pattern-Related Detailed Settings" in Section 3.5.2 (6) "Pattern output settings") and I/Q Output Level Trimming (refer to "Adjusting I/Q Signal Output" in Section 3.5.7 "Outputting I/Q signal") settings cannot be changed. Also, note that the Continuous mode (refer to Section 3.4.8 "Using Continuous mode") is always Off during a sequence operation.

The output level display differs between when vector modulation is On or Off. When vector modulation is On, the output level of each element is displayed. When vector modulation is Off, the maximum output level among all elements is displayed.

When Pattern Trigger is set to Trigger: [ON], Edge: [Rise(Fall)] (refer to Section 3.5.3 "Setting up external input/output" for details) and an external trigger is input to the Pattern Trigger connector on the front panel of the MG3700A (refer to Section 3.5.4 "Outputting signal in sync with external trigger signal" for details), the target element is switched to the next one at the rising (or falling) of the trigger signal.

When the function key F4 (Switching Point) on the sequence progress screen is pressed to set [Pattern End], the switching time to the next element by pressing F1 (Next Pattern) or by an external trigger uses the waveform pattern data length of each element as a basic unit. At this time, when [Frame End] is set instead of [Pattern End], the basic unit is the waveform pattern frame length of each element.



The function of the function key F2 (Sequence Restart) on the sequence progress screen is the same as that of the function key F4 (Sequence Restart) on the first page of the function menu in the sequence mode screen.

(4) Outputting pattern loaded in Memory A for modulation in Edit mode

In the Edit mode, modulation is performed by selecting a pattern file (not a combination file). A pattern is selected for each memory and is output. The following describes how to output a pattern loaded in Memory A. Follow the procedure below:

<Procedure>

1. Load the waveform pattern files into the memory according to the instructions in Section 3.5.2 (1) "Loading waveform file in memory."
2. Press More to switch the function menu to the second page. Then, press F5 (Pattern Combination) to set [Edit].
3. Press More to switch the function menu to the first page. Then, press F3 (Output) to set [A]. The selection switches each time F3 is pressed, among [A], [B], and [A&B].
4. After the waveform pattern files have been loaded in the memory, the cursor is placed on [Pattern : [----------]] in the digital modulation setup screen. Press Set to display the package selection window to display the package currently loaded in the memory.

5. Select the package and press [Set]. The pattern files contained in the selected package are listed.
   Select the pattern file that is to be used for a modulation signal. Then, determine the selection by pressing [Set].
   The name of the selected pattern file is displayed in [Pattern : [----------]] with its information under this field.

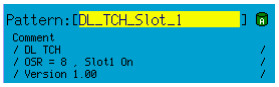


Fig. 3.5.2-16 Pattern information

6. Press [MOD On/Off]. The green key lamp lights up and vector modulation starts.
   The contents of the text file attached to the pattern file can be viewed by pressing [More] to switch the function menu to the second page and then pressing [F2] (View Detail Information).

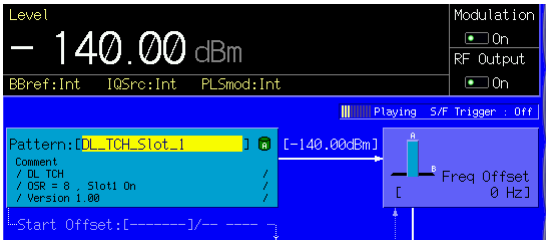


Fig. 3.5.2-17 Pattern output state

Once the pattern is selected in Step 4 above, the package selection window will no longer be displayed; instead, the waveform pattern selection window will appear. To re-select a package, press [F1] (Select Package) to display the package selection window.

If vector modulation begins when no pattern has been selected, the output level will always be outside of the performance guarantee range ([Unleveled] display).

(5) Adding Memories A and B outputs for modulation in Edit mode

When adding two patterns in the Edit mode, the output levels for Memories A and B, and start offset, and frequency offset can be specified on the screen.

This section describes the operating procedure that is used to add two signals of the same frequency for the purpose of AWGN addition. It also describes the procedure that is used to add an offset between the frequencies of the two signals.

- Output level — Specifies the output level of each pattern.
  It is possible to set the level for each of Memories A and B separately.
  The output level difference between Memories A and B can also be set, up to 80 dB in steps of 0.01 dB.
  Output level difference between
  Memories A and B: 0 to 80 dB
  Minimum setting resolution: 0.01 dB

- Start offset — Offset the reproduction start timing of patterns in each of Memories A and B. Useful to output the same pattern from Memories A and B and decrease the correlation between the two.
  For the setup procedure, refer to "Setting Start Offset and Adding Pattern" in Section 3.5.2 (6) "Pattern output settings".

- Frequency offset — Offsets the center frequency for Memory A based on the frequency of the waveform in Memory B.
  Used to measure the adjacent channel selectivity or other related attributes by setting an offset between the frequencies of two signals.
  The setting range of the frequency offset varies depending on the sampling clock and bandwidth of the pattern in Memory A.
  Minimum resolution setting: 1 Hz
  To offset the center frequency for Memory B based on the frequency of the waveform in Memory A, change the offset reference signal setting to Memory B.
  Refer to "Pattern-Related Detailed Settings" in Section 3.5.2 (6) "Pattern output settings" for details.

Adding Two Signals at Same Frequency in Edit Mode

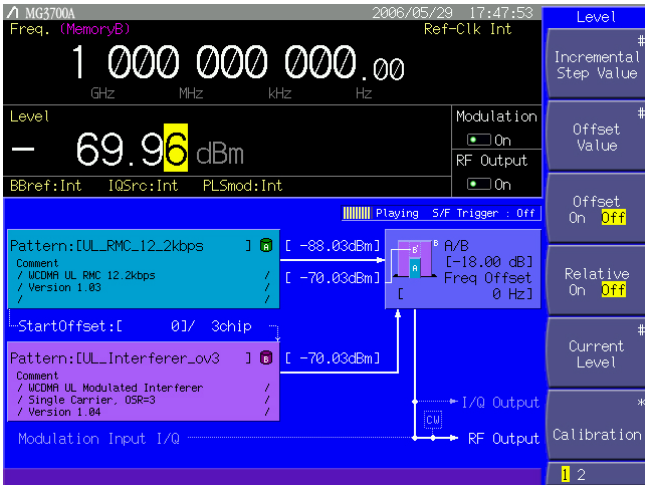
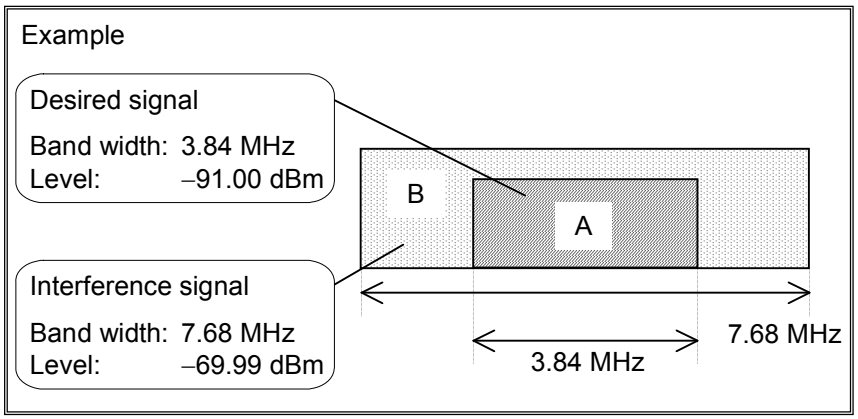


Fig. 3.5.2-18 Adding two signals for output

To set the center frequencies of two patterns to the same value, set the frequency offset to 0 Hz. This function is useful to output the transmission signal pattern from Memory A and Additive White Gaussian Noise (AWGN) from Memory B so that the receiving performance of the equipment can be measured.



Follow the procedure below:

Example: Adding pattern files loaded in Memories A and B by using the same frequency

<Procedure>

1. Load the waveform pattern files into the memory according to the instructions in Section 3.5.2 (1) "Loading waveform file in memory."
2. Press More to switch the function menu to the second page. Then, press F5 (Pattern Combination) to set [Edit].
3. Press More to switch the function menu to the first page. Then, press F3 (Output) to select the memory from which patterns are

output. Press F3 twice to select [A&B] since patterns are desired to be output from two memories in this example.

4. The cursor is placed on [Pattern : [----------]] in the digital modulation setup screen. Press Set to display the package selection window to display the packages currently loaded in the memory.

5. Select the package and press Set. The waveform files contained in the selected package are listed.
   Select the pattern file that is to be used for modulation. Then, determine the selection by pressing Set.
   The name of the selected pattern file is displayed in [Pattern : [----------]] with its information under this field.
   Perform Steps 4 and 5 for each of Memories A and B

6. Next, set the output level for each of Memories A and B.
   Move the cursor to [dBm] or [dBμV] on the right of the pattern, and press Set. The output level setup window is displayed. Then press any key on the numeric keypad to display the output level setup window. Determine the numeric value using the numeric keypad, rotary knob, or step keys.

   When GHz/dBm is pressed after a numeric value is entered in the output level setup window, the value is determined in dBm units. When MHz/dBμV is pressed, the value unit is determined in dBμV units. When the unit is changed, the units of the RF output level and the output levels for A, B, and B' are also changed in conjunction with the changed unit. When Set is pressed after a numeric value is entered, the value is determined in the currently-selected unit.
   When the value is set in dBμV units, it is possible to switch the voltage display between the open circuit voltage display and the terminated voltage display. Refer to Section 3.4.7 "Selecting voltage display mode" for details.

   When a numeric value is entered in the direct input mode window, it is set in the currently-selected units.

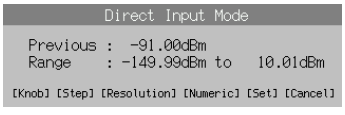


Fig. 3.5.2-19 Direct input window

Fig. 3.5.2-20 Output level setup window

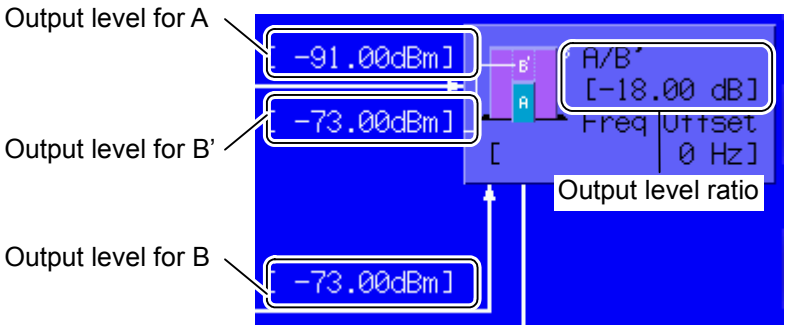


Fig. 3.5.2-21 Output level display (in dBm units)

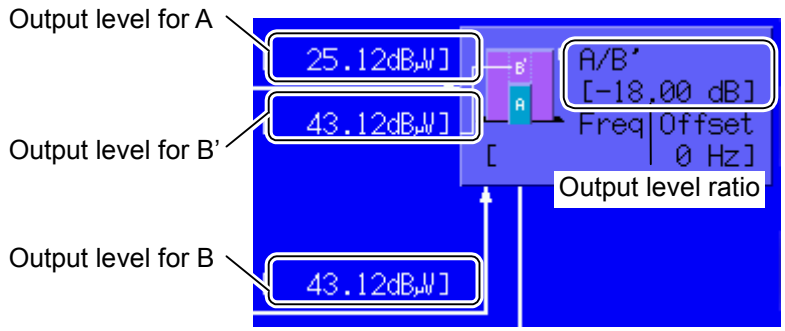


Fig. 3.5.2-22 Output level display (in dBμV units)

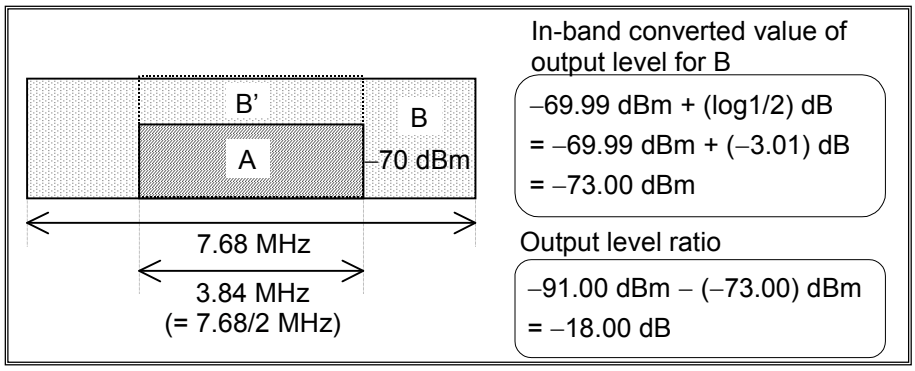
The output level for B' is displayed between the output levels for A and B. B' indicates the level that is obtained by converting the band of the pattern selected for B into the signal band of A. It can be set in steps of 0.01 dB.

The ratio of B' to B varies depending on the band characteristic of the AWGN pattern used.

The output level ratio (A/B') is displayed on the right of the figure that indicates the spectrum of A and B.
It can be set in steps of 0.01 dB. Note, however, that the output levels change in a different manner depending on the setting of F5 (A/B Set) on the first page of the function menu, if the output level ratio is changed.
When [A] is set, the output level for Memory B is fixed and the RF output level and the output level for Memory A are changed. When [B] is set, the output level for Memory A is fixed and the RF output level and the output level for Memory B are changed. When [Constant] is set, the output levels for Memory A and B are changed without changing the RF output level.
The RF output level may be displayed on the screen as lower than –140.00 dBm according to the set output level ratio, but a level lower than –140.00 dBm is never actually output.

In addition, when AWGN is added, the output level ratio indicates the ratio of the output level for the desired signal to the in-band converted value of the AWGN output level.

Example: For a waveform pattern with band A = 3.84 MHz, band B = 7.68 MHz, and B/B' = 3.01 dB, if the output level for Memory A = –91.00 dBm and that for Memory B = –69.99 dBm, then –73 dBm is displayed for B' and –18.00 dB is displayed for the output level ratio.



7. Press MOD On/Off . The green key lamp lights up and vector modulation starts.
   The contents of the text file attached with the pattern files of Memories A and B can be viewed by pressing More to switch the function menu to the second page and then pressing F2 (View Detail Information).

If F3 (Output) is pressed, the output changes in the following order: only pattern A, only pattern A, and then both patterns A and B synthesized.

In the Defined mode, the figure on the output level display window that reflects the values set by F3 (Output), F5 (A/B Set), and the spectrum is displayed with parameters C (Carrier), N (Noise), and N'. These parameters C, N, and N' correspond to A, B', and B in the Edit mode, respectively.

Once a pattern is selected in Step 4 above, the package selection window will no longer be displayed; instead, the waveform file selection window will appear.
To re-select a package, press F1 (Select Package) to display the package selection window.

If no pattern has been selected, the output level follows the setting in output level setup mode, rather than the A or B setting. In this case, the output level is always displayed as being outside of the performance guarantee range ([Unleveled] display).

Making Frequencies of Two Signals Have Offsets in Edit mode

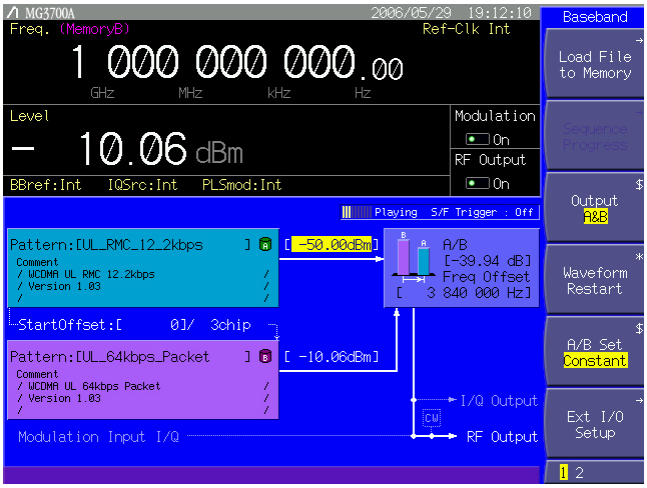
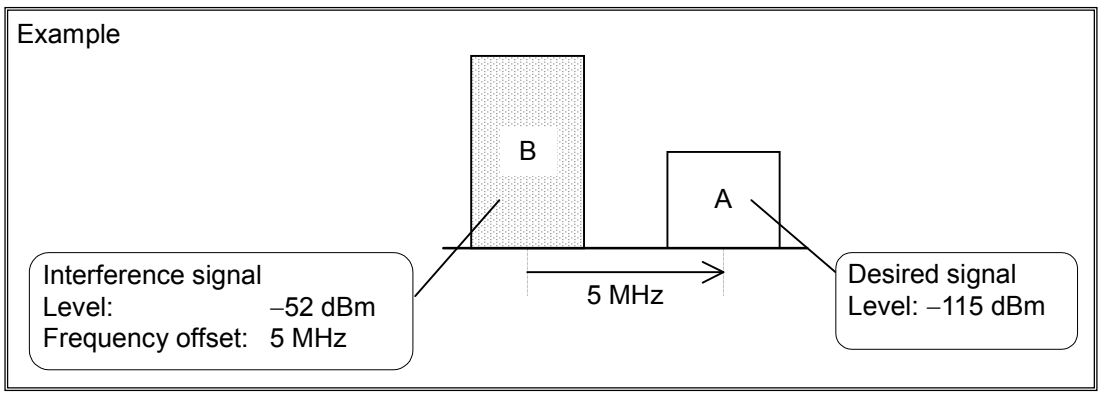


Fig. 3.5.2-23 Offset output

To offset the center frequencies of two patterns, set the frequency offset to any numeric value. This function is useful to output the transmission signal pattern from Memory A and the interference signal (generated from the adjacent channel) from Memory B to measure the receiving performance of the equipment.



The above figure is an example of when the offset reference is Memory B. It is possible to change the offset reference to Memory A. Refer to "Pattern-Related Detailed Settings" in Section 3.5.2 (6) "Pattern output settings" for details.

Follow the procedure below:

Example: Adding Memories A and B pattern files at different frequencies

<Procedure>

1. Load the waveform pattern files into the memory according to the instructions in Section 3.5.2 (1) "Loading waveform file in memory."
2. Press More to switch the function menu to the second page. Then, press F5 (Pattern Combination) to set [Edit].
3. Press More to switch the function menu to the first page. Then, press F3 (Output) to select the memory from which patterns are output. Press F3 twice to select [A&B] since patterns are desired to be output from two memories in this example.
4. The cursor is placed on [Pattern : [----------]] in the digital modulation setup screen. Press Set to display the package selection window to display the packages currently loaded in the memory.
5. Select the package and press Set. The waveform files contained in the selected package are listed.
   Select the pattern file that is to be used for modulation. Then, determine the selection by pressing Set.
   The name of the selected pattern file is displayed in [Pattern : [----------]] with its information under this field.

Perform Steps 4 and 5 for each of Memories A and B.

6. Next, set the frequency offset between A and B.
   Move the cursor to [Freq Offset : [ ]Hz], and press Set to display the direct input window. Then press any key on the numeric keypad to display the frequency offset setup window.
   Determine the numeric value using the numeric keypad, rotary knob, or step keys.

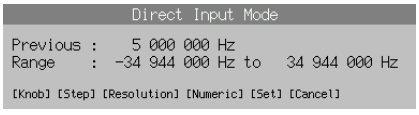


Fig. 3.5.2-24 Direct input window

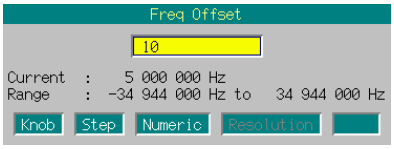


Fig. 3.5.2-25 Frequency offset setup window

Refer to "Pattern-Related Detailed Settings" in Section 3.5.2 (6) "Pattern output settings" for how to change the frequency offset reference signal.

7. Next, set the output level for each of A and B or the output level. The setting method is the same as that described in "Adding Two Signals at Same Frequency in Edit Mode" above.

   When the frequency offset is not "0," the display of the output level for B' disappears and the output level ratio is the ratio of A to B.

8. Press MOD On/Off . The green key lamp lights up and vector modulation starts.
   The contents of the text file attached to the pattern files of Memories A and B can be viewed by pressing More to switch the function menu to the second page and then pressing F4 (View Detail Information).

To avoid carrier leaks, set the desired signal in Memory A and the interference signal in Memory B.

If F3 (Output) is pressed, the output changes in the following order: only pattern A, only pattern B, and then both patterns A and B synthesized.

In the Defined mode, the figure on the output level display window that reflects the values set by F3 (Output), F5 (A/B Set), and the spectrum is displayed with parameters C (Carrier), N (Noise), and N'. These parameters C, N, and N' correspond to A, B', and B in the Edit mode, respectively.

Once a pattern is selected in Step 4 above, the package selection window will no longer be displayed; instead, the waveform file selection window will appear.
To re-select a package, press F1 (Select Package) to display the package selection window.

If no pattern has been selected, the output level follows the setting in output level setup mode, rather than the A or B setting. In this case, the output level is always displayed as being outside of the performance guarantee range ([Unleveled] display).

(6) Pattern output settings

This section describes operations to the operating procedure basics required for pattern output that are exception detailed in the previous sections. This section also describes settings to which close attention should be paid.

Re-outputting Pattern Beginning at Head

When the tail of the waveform pattern is reached, control automatically returns to the head and the data is output repeatedly if no trigger signal is input from the external system.
By pressing F4 (Wave Form Restart), the waveform pattern can be re-output, beginning at the head, at any time. In the sequence mode, however, pressing F4 (Sequence Restart) restarts continuous operation from the first element. (Refer to Section 3.5.2 (3) "Performing continuous operation in Defined mode.")

Switching I/Q Signal Source

To output an internal vector modulation signal by means of a pattern, you must set up the I/Q signal source for the internal signal.
The I/Q signal source setting can be examined from [IQSrc: (Int/Ext)] in the status display.
By default, this setting is displayed as [IQSrc: Int], which indicates that the vector modulation should be performed by means of an internal signal. If it is displayed as [IQSrc: Ext], press More to switch the function menu to the second page, and then press F1 (I/Q Source) to switch from [Ext] to [Int].

When Modulation Signal is Burst

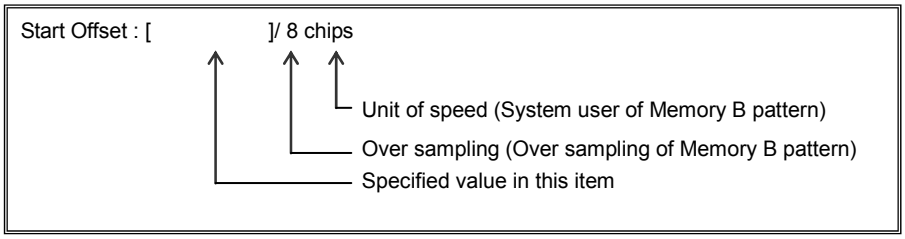
When the waveform pattern in use is a burst wave, set the Pulse Mod. setting parameter to [Int].

Outputting Memory B Pattern for modulation

In Section 3.5.2 (4), a pattern (loaded in Memory A) was output, and the procedure for performing the modulation was described. A pattern loaded in Memory B can be output for modulation using the same procedure as Section 3.5.2 (4) "Outputting pattern loaded in Memory A for modulation in Edit mode."
In addition, if patterns have been loaded in both of Memories A and B, any pattern in these memories can be selected.

Setting Start Offset and Adding Patterns

This function offsets the reproduce start timings for the patterns when adding and outputting Memories A and B pattern.
To output the same pattern from Memories A and B and decrease the correlation between the two, adjust this value.
Set this for a pattern in Memory B.
The display on the screen is as follows:



Range: 0 to (Number of sampling data items of pattern – 1)
or 0 to 9,999,999 (whichever is the smaller)
Minimum resolution setting: 1

<Setup procedure>

Move the cursor to [Start Offset : [ ]] between patterns A and B, and then press Set to display the direct input window. Then press any key on the numeric keypad to display the start offset setting window.
Determine the numeric value using the numeric keypad, rotary knob or step key.
When the rotary knob or step keys are used, the setting is made in steps of one unit.

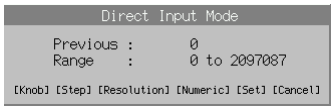


Fig. 3.5.2-26 Direct input window

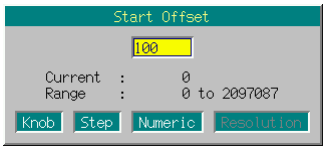


Fig. 3.5.2-27 Start offset setup window

Pattern-Related Detailed Settings

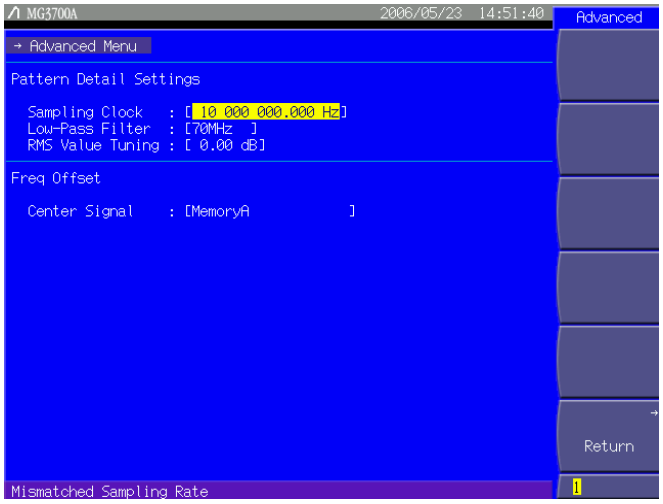


Fig. 3.5.2-28 Advanced Menu screen

Press (More) to switch the function menu to the second page.
Pressing (F6) (Advanced Menu) allows you to make various settings for pattern output.
Use the cursor to select the desired item to set. Then, press (Set) to display the setup window associated with that item.

The following are details that can be set in this menu:

<1> Sampling Clock

Sets pattern output sampling clock.
Range: 20 kHz to 160 MHz
Minimum resolution setting: 0.001 Hz

<2> Low-Pass Filter

Sets the type of low pass filter.
The value of the low pass filter used can be selected from the following:
100 kHz, 300 kHz, 1 MHz, 3 MHz, 10 MHz, 30 MHz, 70 MHz, Through, and Auto

<3> RMS Value Tuning

Adjusts the amplitude value that is to be input to the D/A converter.
Useful to optimize an output signal by eliminating skews from it.
Range: –8.00 to 8.00 dB
Minimum resolution setting: 0.01 dB

<4> Center Signal

Select a signal to be used as the frequency offset reference.

In the Edit mode

Memory A: Frequency offset is set based on Memory A.

Memory B: Frequency offset is set based on Memory B.

In the Defined mode

Carrier: Same as "Memory A" in the Edit mode.

Noise: Same as "Memory B" in the Edit mode.

The Sampling Clock or Low-Pass Filter setting is initialized when the waveform pattern is re-selected.

The [Sampling Clock] or [Low-Pass Filter] settings follow those for the selected pattern. They follow the Pattern A setting if a pattern has been selected and output for both A and B.

If the RMS has changed, the output level performance guaranteed upper limit may change.

Table 3.5.2-6 Output level performance guaranteed upper limit

Frequency		For standard configuration	With mechanical attenuator (option) installed
50 MHz ≤ f ≤ 3 GHz	When RMS is increased ($\chi > 0$)	+2 dBm	+7 dBm
	When RMS is decreased ($\chi < 0$)	+2 + χ dBm	+7 + χ dBm
3 GHz < f ≤ 6 GHz (if Upper limit frequency 6 GHz option is installed)	When RMS is increased ($\chi > 0$)	–1 dBm	+4 dBm
	When RMS is decreased ($\chi < 0$)	–1 + χ dBm	+4 + χ dBm

χ: RMS, waveform pattern RMS value (for each I/Q single phase) = 1634

Even if the RMS is increased relative to the reference value during modulation, the output level performance guaranteed upper limit will not change.

Example: When f = 1 GHz and the RMS = reference value + 3 dB;
Upper limit: +2 dBm

If the RMS is decreased relative to the reference value during modulation, the upper limit will drop by the decrease.

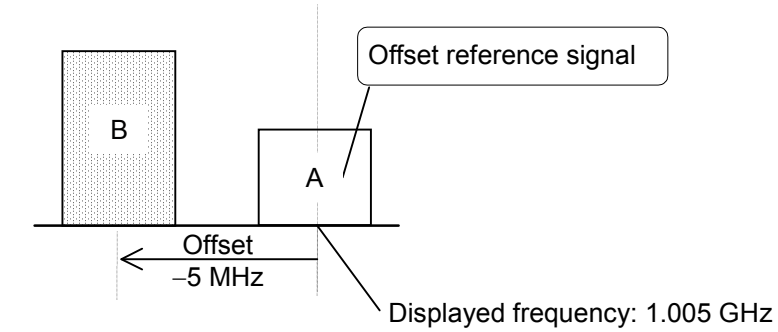
Example: When f = 1 GHz and the RMS = reference value – 3 dB;
Upper limit: +2 – 3 = –1 dBm

Detailed operations when the frequency offset reference signal is set to Memory A

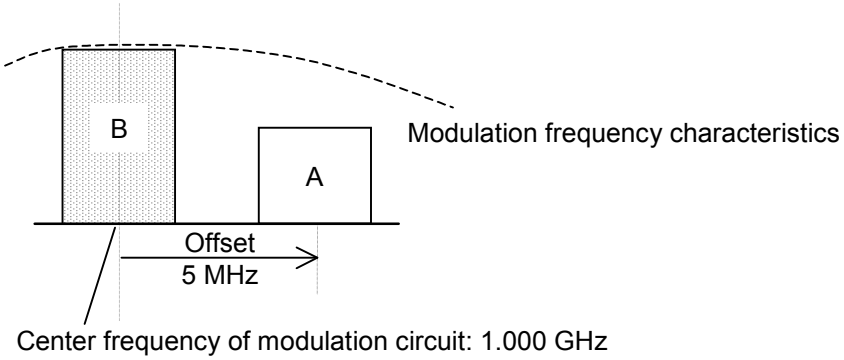
The modulation circuit of the MG3700A has a function to shift the frequency on the Memory A side based on Memory B, but does not have a function to shift the frequency on the Memory B side. However, a pseudo operation to shift the frequency on the Memory B side based on Memory A is implemented by software. (See Fig. 3.5-1 Outline of MG3700A modulation circuit.)

When the frequency offset reference signal is set to "Memory A", the frequency of Memory A is displayed on the screen, but the center frequency of the modulation circuit is that of Memory B. In other words, the frequency displayed on the screen differs from the center frequency of the modulation circuit. (When the frequency offset reference signal is set to "Memory B", however, the frequency displayed on the screen matches the center frequency of the modulation circuit.) Therefore, the modulation frequency characteristics also have an affect on the signals on the Memory A side when the frequency offset reference signal is set to "Memory A."

Display state when offset reference signal is Memory A



Internal state when offset reference signal is Memory A



When the frequency offset reference signal is set to “Memory A”, the frequency setting range is limited according to the offset amount. If the set frequency value exceeds the frequency setting range due to the change of the frequency offset value or the reference signal, the frequency value is automatically adjusted so that it falls within the setting range. When a frequency value is automatically changed, the warning message “Center Frequency Shifted” is displayed.

3.5.3 Setting up external input/output

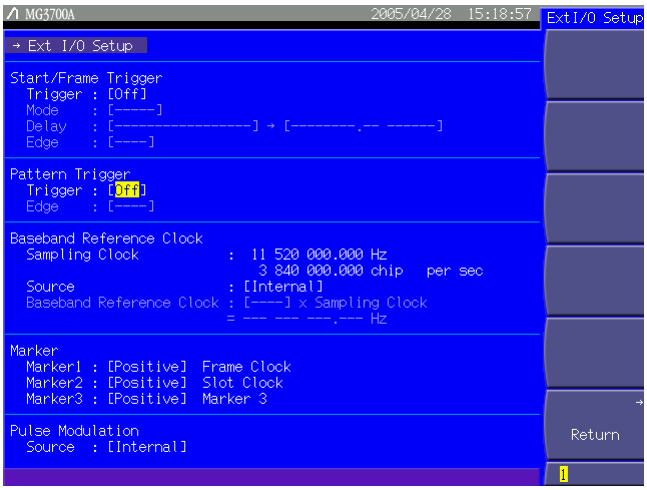


Fig. 3.5.3-1 External I/O setup screen

Pressing F6 (Ext I/O Setup) allows you to set up the input and/or output that will be used for modulation or pattern reproduction.
Select the desired item to be set using the cursor. Then, press Set to display the setup window associated with that item.
The settings that can be made in this menu are as follows:

- Start/Frame Trigger
  Used to link waveform pattern reproducing operation to trigger input from the external system. For details of operation against triggers, refer to Section 3.5.4 "Outputting signal in sync with external trigger signal."

<1> Trigger (On/Off)
Enables the trigger input incoming from the external system.

The following are all enabled only when Trigger is set to [On].

<2> Mode (Start/Frame)
Selects whether the trigger be used as a start or frame trigger.

<3> Delay
Sets the trigger delay time.

Range: Depends on the selected pattern.

Minimum resolution setting:

When 20 kHz ≤ Sampling clock ≤ 20 MHz: 0.25 samples
When 20 MHz < Sampling clock ≤ 160 MHz: 1.00 sample

Set a value on a per-sample basis. The field on the right of this setting indicates the value converted in units of display speed in that pattern. If Delay = 0, the signal will be output one frame later, relative to the trigger input from the external system. The

accuracy of Delay setting is ±(1 sample + 10 ns).
A delay value can also be entered in the display speed units.

<4> Edge (Rise/Fall)
Sets the trigger detection edges, and switches between the rising and falling operations.

When the Mode or Delay setting is changed, the pattern operation will restart and await trigger inputs from the external system.

- Pattern Trigger
  Used in the sequence mode to switch an element. Refer to Section 3.5.4 "Outputting signal in sync with external trigger signal" for details.

<1> Trigger (On/Off)
Enables the trigger input incoming from the external system, used in the sequence mode.

<2> Edge (Rise/Fall)
Set the trigger detection edge from rising or falling (enabled only when Trigger is set to [On]).

- Baseband Reference Clock
  Sets up the reference clock of the MG3700A's internal arbitrary waveform generator.

<1> Source (Internal/External)
For the reference clock of the internal arbitrary waveform generator, select either the same reference signal source that is used for the carrier or the signal that is input to the baseband reference clock signal input connector.
If [Internal] is selected for Source, the same reference signal source that is used for the carriage will be used. The signal from this signal source will be a 10 or 5 MHz external input signal that will be input to the 10 MHz internal reference oscillator or the reference frequency signal input connector (Ref Input).
If [External] is selected for Source, the input signal to the baseband reference clock signal input connector (Baseband Ref Clock Input) will be used as the signal from the reference signal source.

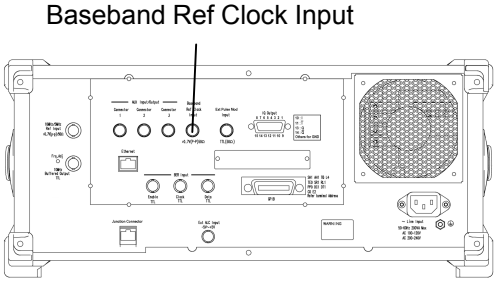


Fig. 3.5.3-2 Baseband reference clock input connector

The following are all enabled only when [External] is selected for Source:

<2> Baseband Reference Clock

Determined from the currently set sampling clock and the factor that is set here.

[Reference clock] = [Sampling clock] × [Factor]

↑ To be set here.

The selectable factor range varies with the sampling clock value.

Table 3.5.3-1 Selectable factor range

Sampling clock (Hz)	Baseband Reference Clock setting								
	16	8	4	2	1	1/2	1/4	1/8	1/16
20 k ≤ f < 24 k	✓	✓	✓	✓	✓				
24 k ≤ f < 48 k	✓	✓	✓	✓	✓	✓			
48 k ≤ f < 96 k	✓	✓	✓	✓	✓	✓	✓		
96 k ≤ f <192 k	✓	✓	✓	✓	✓	✓	✓	✓	
192 k ≤ f < 2.5 M	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.5 M ≤ f < 5 M		✓	✓	✓	✓	✓	✓	✓	✓
5 M ≤ f < 10 M			✓	✓	✓	✓	✓	✓	✓
10 M ≤ f < 20 M				✓	✓	✓	✓	✓	✓
20 M ≤ f < 40 M					✓	✓	✓	✓	✓
40 M ≤ f < 80 M						✓	✓	✓	✓
80 M ≤ f ≤160 M							✓	✓	✓

The sampling clock will be the value that has been set in [Advanced Menu] (refer to Section 3.5.2 (6) "Pattern output settings").

- Marker

When outputting a waveform pattern from the MG3700A, the MG3700A outputs markers such as the clock and gate signals. The output signals vary with the waveform pattern. This section on the screen allows you to set the marker outputs.

<1> Markers 1 to 3 (Positive/Negative)

Determines the marker connector output logic.
Each field on the right displays the output connector name specified in the waveform pattern file.
If a waveform pattern has been selected for each of Memories A and B, information about the pattern loaded to Memory A is used.
The marker signals are output from the AUX Input/Output Connectors on the rear panel.

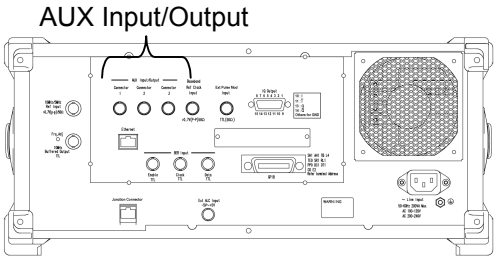


Fig. 3.5.3-3 AUX input/output connector

- Pulse Modulation
  (Refer to Section 3.5.6 “Performing pulse modulation.”)

3.5.4 Outputting signal in sync with external trigger signal

The MG3700A can output a waveform pattern in sync with a trigger signal incoming from the external system. Either of two signals can be selected for the external trigger signal. One is StartTrigger, which specifies the output start position of the waveform pattern. The other is FrameTrigger, which specifies the output timing for each of the bursts when a burst signal is selected. The external trigger signal is input to the Start/Frame Trigger connector on the front panel.
In the sequence mode, the element switching timing can be specified by inputting an external trigger signal to the Pattern Trigger Input connector.

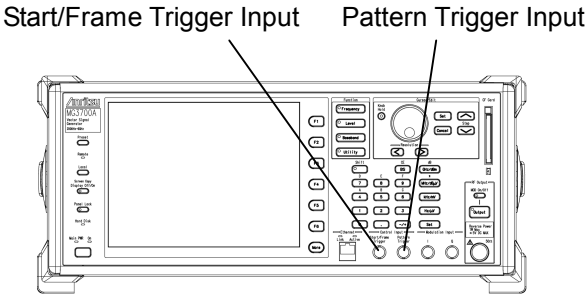


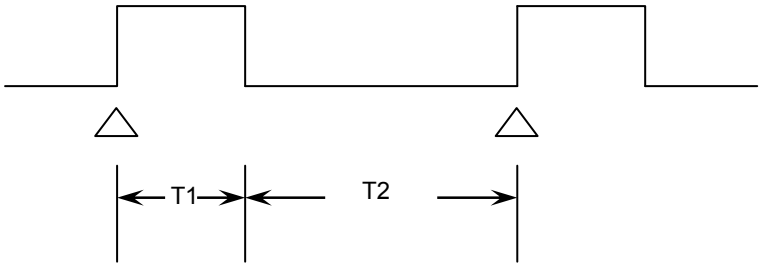
Fig. 3.5.4-1 External trigger input connectors

External trigger signal input conditions

Input level: TTL level
Polarity: Rise or Fall can be selected.
Waveform: The figure below shows a waveform for the falling edge.

T1: 40 ns or more
T2: 40 ns or more

Standard values T1 and T2 vary with the drive current impedance of the outputting source, the quality and length of the cable connected to the MG3700A.



StartTrigger Operation

The Start Trigger operation starts output according to the rising timing of the first external trigger signal after the waveform pattern is selected. Any trigger signal being input at the second time or later will be disabled. The relationship between the external trigger signal and the waveform pattern output can be set in the Delay field. If Delay is set to [0], output of the waveform pattern delays by the one-frame period (relative to the rise of the external trigger signal) that depends on the waveform pattern. For setting Delay, refer to Section 3.5.3 "Setting up external input/output."
*: One-frame period refers to the following value:

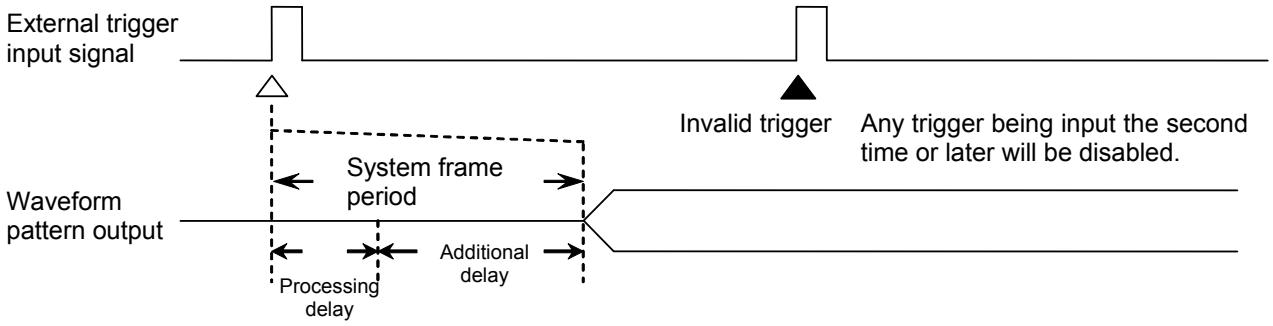
(1) If the waveform pattern was generated using the IQproducer™ Convert function
The number of samples of one frame is determined according to the Frame Length(L_f) and Gap Length(L_g) settings of Burst Setting. One-frame period indicates the number of samples within one frame, which equals $L_f + L_g$.
For example, if over sampling data of four times of W-CDMA is to be converted, set the following:
Frame Length = 3.84×10^6 [sample/s] × 0.01 [s] × 4 [over sample ratio]
= 153600
For details, refer to Section 4.5.4, "Editing data on Convert screen" in the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual IQproducer™.

(2) If the waveform pattern is generated using each signal generation application, which is an IQproducer™ option
The frame length matching each communication system is set automatically. In this case, the L_f and L_g values vary as follows, depending on whether your system is using continuous or burst signals.

• If the system is using continuous signals
L_f = The number of samples of one frame for the system is set.
L_g = 0 is set.

• If the system is using burst signals
L_f = The number of samples of one slot or frame is set.
L_g = [Number of samples of one frame] - [number of samples of one slot] or 0 is set.
Although details of the above depend on the system, in any case the

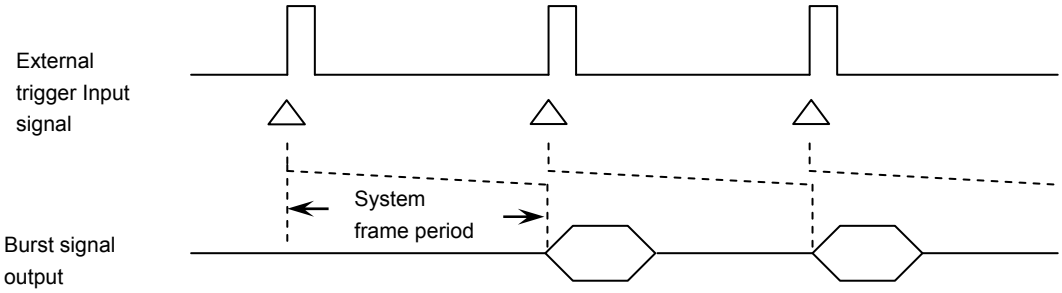
resulting value is the number of samples of one frame where the value of [$L_f + L_g$] is determined depending on the system.



- If Delay is set to 0, some delay is internally added to the processing delay that is generated during the period from trigger input to output of the waveform pattern (additional delay), and the signal is output late by one frame period.
- The frame period varies with the system. Refer to the operation manual about the currently selected waveform pattern.

FrameTrigger Operation

The FrameTrigger operation outputs one burst of the waveform pattern according to the rising timing of the external trigger signal. The relationship between the external trigger signal and the waveform pattern output is the same as StartTrigger. The following figure shows operation that takes place when the external trigger signal is input with the frame period, with Delay set to [0].



If the input period of the external trigger signal is N samples shorter than the frame period, it is masked to be a disabled trigger. A burst signal matching the trigger signal cannot be obtained in this case.

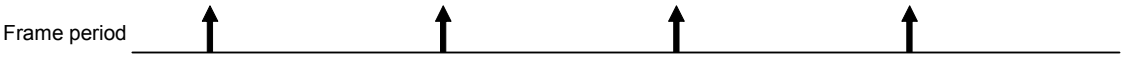
$N\ [samples] = (L_f + L_g) - (L_f + 1)$

* For L_f and L_g, refer to the "StartTrigger Operation" description.
* If Delay is set to the positive side, the frame period will increase by the number of samples set in Delay.
* The maximum value of N (Nmax) can be calculated from the expression shown below, in accordance with the interpolation ratio (IPLR) that is determined by the sampling clock (fs).
* If N exceeds Nmax as the result of the above expression, assign Nmax to it.

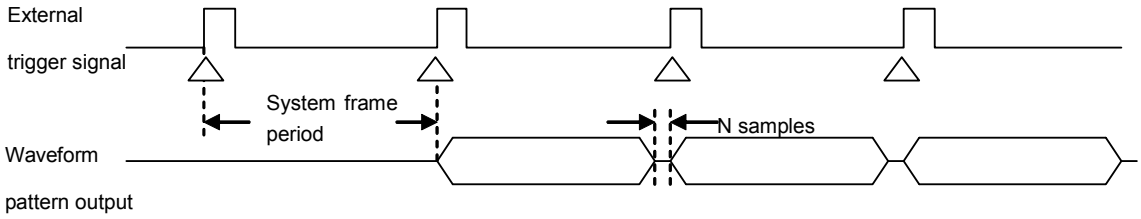
$Nmax = 28/IPLR$

IPLR: Power of 2 (2^n) that meets $160\ MHz \geq IPLR \times fs > 80\ MHz$ (n is an integer greater than 2)
If fs is larger than 20 MHz, however, IPLR is 1.

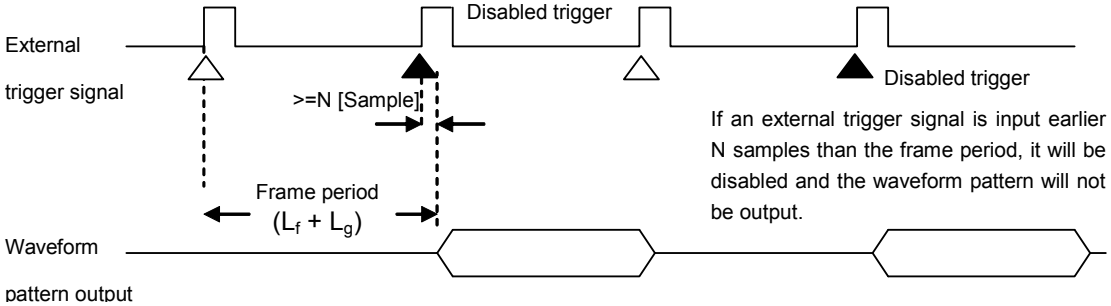
For example, suppose that $L_f = 140$ symbols, $L_g = 280$ symbols, and the sampling clock is 50 MHz. In this case, because the right-hand side of the N formula above exceeds Nmax, N = 28. If a trigger signal is input with a period 28 samples shorter than the frame period ($L_f + L_g$), it will be disabled.



If the period of the external trigger signal is proper

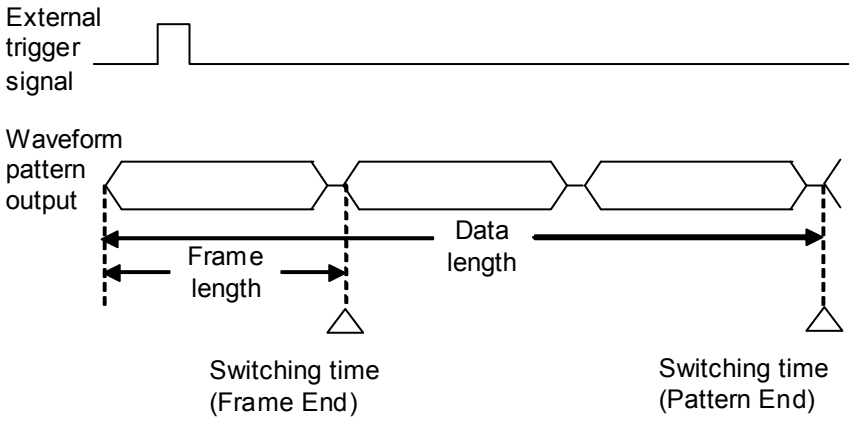


If the period of the external trigger signal is short



Pattern Trigger Operation

Pattern Trigger is an external trigger used to switch between elements in the sequence mode. When the function key F4 (Switching Point) is pressed and [Pattern End] is set on the Sequence Progress screen (refer to Section 3.5.2 (3) "Performing continuous operation in Defined mode,") the waveform pattern data length of each element is used as a basic unit for the switching time to the next element. When [Frame End] is set, switching to the next element is performed using the waveform pattern frame length of each element as a basic unit.



3.5.5 Vector modulation with external I/Q signal

This section describes the procedure for setting vector modulation with an external I/Q signal.

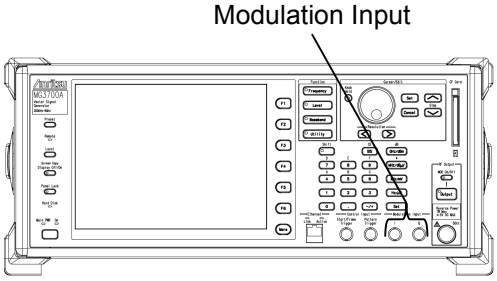


Fig. 3.5.5-1 External I/Q signal input connector

The I/Q signal input connector is internally 50Ω terminated. When the effective voltage of $\sqrt{I^2+Q^2}$ is 0.5 V in 50Ω terminated state, an RF signal matching the output level setting is output. To perform vector modulation actually, input an I/Q signal that causes the effective voltage of $\sqrt{I^2+Q^2}$ to be 0.5 V.
In addition, input the maximum values of the I/Q signal in the ±5 V range.

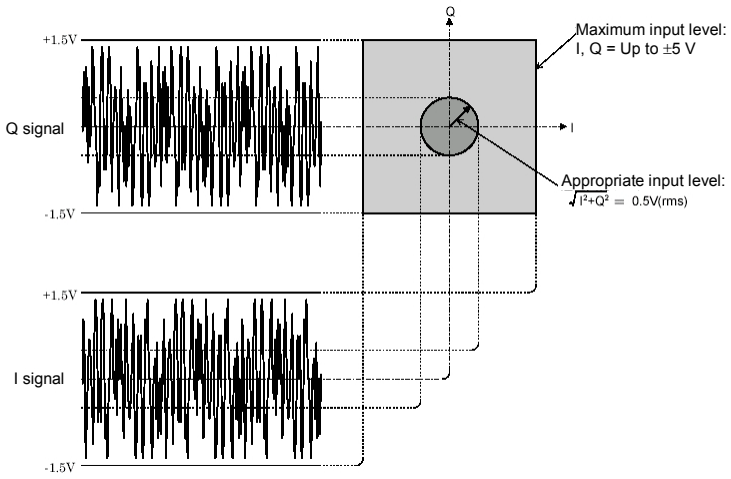


Fig. 3.5.5-2 Input level of I/Q signal

Example: Performing vector modulation with an external I/Q signal

<Procedure>

1. Press (More) to switch the function menu to the second page.
   Press (F1) (I/Q Source) to switch from [Int] to [Ext].
   [Modulation Input I/Q] is enabled on the digital modulation setup screen.

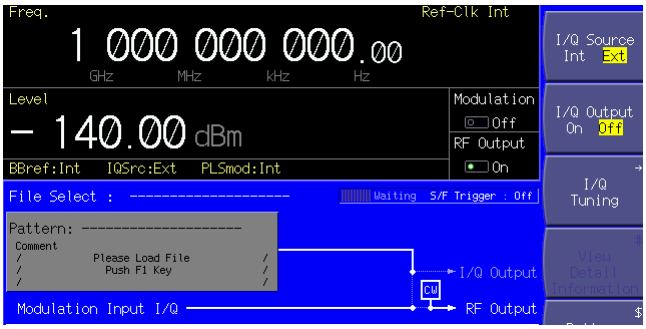


Fig. 3.5.5-3 External I/Q signal input status

2. Press (Output) to turn On the RF output.
3. Press (MOD On/Off) . The green key lamp lights up and vector modulation starts.
   [Modulation Input I/Q] and [RF Out] are connected through a bright line.

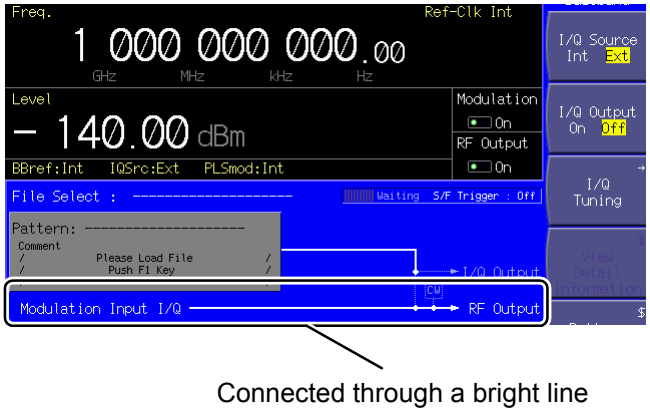


Fig. 3.5.5-4 External I/Q signal modulation status

If an external I/Q signal is used for modulation, the output level matches the displayed level when an I/Q signal where $\sqrt{I^2+Q^2}$ = 0.5 V is input.

3.5.6 Performing pulse modulation

For pulse modulation, use an internal or external signal.
By default, the MG3700A is designed to use an internal signal to perform pulse modulation. It is possible to modify so that an external signal is used for the modulation, or no pulse modulation is performed.

Using Internal Signal

This function is useful to load patterns for pulse modulation. When an internal signal is generated, the pulse modulator is controlled by the pulse modulation control bit (RF Gate), which has been added to the waveform pattern. For details, refer to Section 4.5.6 "Input file format" in the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual IQproducer™.
To set up pulse modulation with an internal signal, follow the procedure below:

Example: Using an internal signal for pulse modulation

<Procedure>

1. By default, [PLSmod : Int] is left displayed in the status display, indicating that the pulse modulation source is an internal signal. If it is not displayed, perform Steps 2 to 5 below to switch the pulse modulation source to an internal signal.
2. Press F6 (Ext I/O Setup) to display the external I/O setup screen.

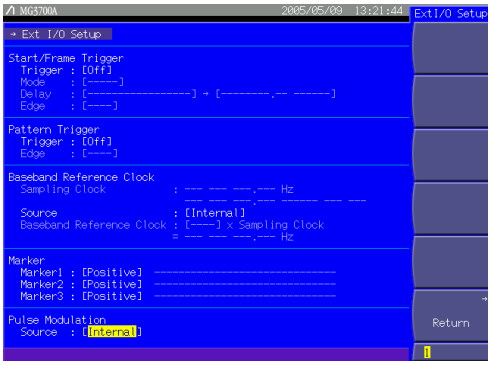


Fig. 3.5.6-1 External I/O setup screen

3. Move the cursor to [Source : [ ]] in [Pulse Modulation] using the rotary knob or ^ v.
   Press Set to display the source selection window (Pulse Modulation Source).

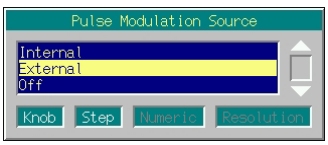


Fig. 3.5.6-2 Source selection window

4. Move the cursor to [Internal] using the rotary knob or [^] [v]. Then, determine the selection by pressing [Set].
5. Press [F6] (Return) to complete the setup.
6. Press [Output] turn On the RF output.
7. Press [MOD On/Off]. The green key lamp lights up and pulse modulation with the internal signal starts.

Using External Signal

To use an external signal for pulse modulation, follow the procedure below:

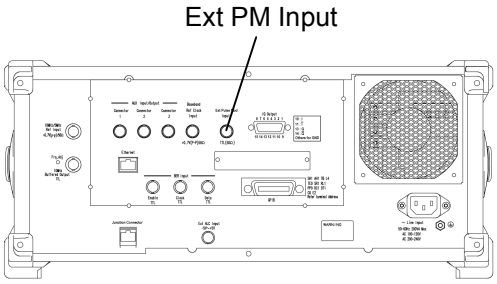


Fig. 3.5.6-3 External pulse modulation signal input connector

The external input impedance is fixed to 50 Ω, and the pulse modulation polarity is fixed to [Positive]. That is, if the external modulation signal is at the High level, the RF signal is output; if it is at the Low level, that signal is not output.
The threshold by which to determine the level (High or Low) is 1 V.

Example: Using an internal signal for pulse modulation

<Procedure>

1. Press [F6] (Ext I/O Setup) to display the external I/O setup screen.

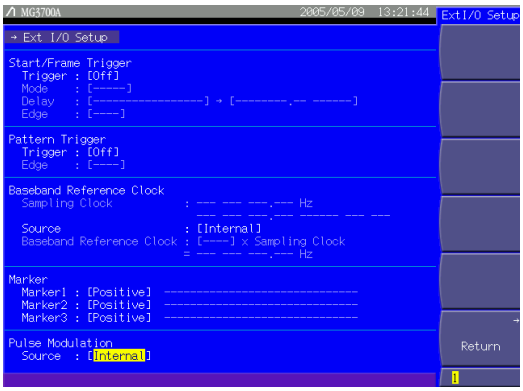


Fig. 3.5.6-4 External I/O setup screen

2. Move the cursor to [Source : [ ]] in [Pulse Modulation] using the rotary knob or [∧] [∨].
   Press [Set] to display the source selection window (Pulse Modulation Source).

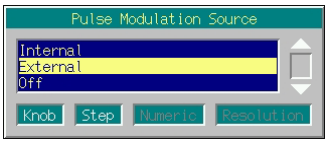


Fig. 3.5.6-5 Source selection window

3. Move the cursor from [Internal] to [External] using the rotary knob or [∧] [∨]. Then, determine the selection by pressing [Set].
4. Press [F6] (Return) to complete the setup.
5. Press [Output] to turn On the RF output.

If an external IQproducer signal is used for modulation, the output level matches the displayed level when an I/Q signal where $\sqrt{I^2+Q^2}$ = 0.5 V is input.

Disabling Pulse Modulation

To turn Off the pulse modulation, follow the procedure below:

Example: Performing modulation without pulse modulation

<Procedure>

1. Press [F6] (Ext I/O Setup) to display the external I/O setup screen.

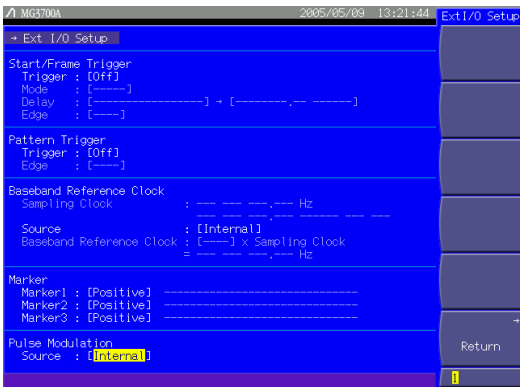


Fig. 3.5.6-6 External I/O setup screen

2. Move the cursor to [Source : [ ]] in [Pulse Modulation] using the rotary knob or [^] [v].
   Press [Set] to display the source selection window (Pulse Modulation Source).

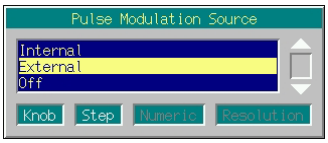


Fig. 3.5.6-7 Source selection window

3. Move the cursor to [Off] using the rotary knob or [^] [v]. Then, determine the selection by pressing [Set].
4. Press [F6] (Return) to complete the setup.
5. Press [Output] to turn On the RF output.
6. Press [MOD On/Off]. The green key lamp lights up and modulation starts without pulse modulation.

3.5.7 Outputting I/Q signal

An I/Q signal generated in the digital modulation unit can be output from the I/Q signal output connector on the rear panel. To set up I/Q signal output, follow the procedure below:

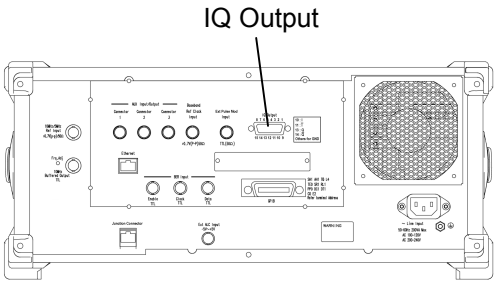


Fig. 3.5.7-1 I/Q signal output connector

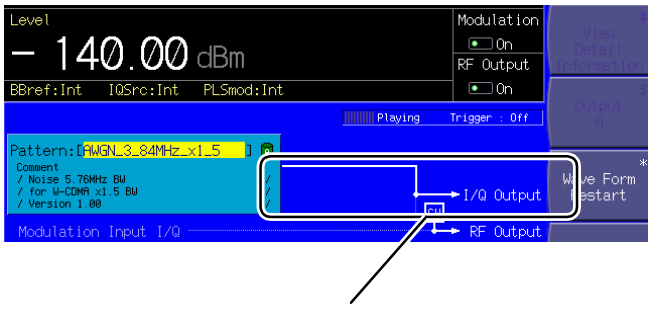
Example: Outputting an I/Q signal from the I/Q signal connector

Note:

If the MG3700A is powered on with the I/Q signal output On, a DC voltage signal at approximately +1 V is output for several dozen microseconds during the power on process. Do not power on the MG3700A when a device with low withstanding pressure remains connected to the I/Q signal output.

<Procedure>

1. Press More to switch the function menu to the second page.
   Press F2 (I/Q Output) to switch from [Off] to [On].
   The pattern and [I/Q Out] are connected through a bright line.



Connected through a bright line

Fig. 3.5.7-2 I/Q signal output status

Note:

If the I/Q signal and RF outputs are turned On simultaneously while internal modulation is in progress, the output level will always go outside of the performance guarantee range ([Unleveled] display).

Adjusting I/Q Signal Output

This function allows you to adjust the I/Q signal output voltage and DC offset.
The output voltage must be set with the ratio (%) to the output voltage that has been defined in the digital modulation unit setting.

Such voltage must all be displayed as open circuit voltage.

Output voltage / DC offset range

Output voltage range	0.0 to 120.0%
Minimum resolution setting	0.1%
In-phase DC offset range	–1.00 to 3.00 V
Minimum resolution setting	10 mV
Differential DC offset range	–50.00 to 50.00 mV
Minimum resolution setting	50 μV

Any fraction not less than 25 μV is rounded up, and any fraction less than 25 μV is rounded down.

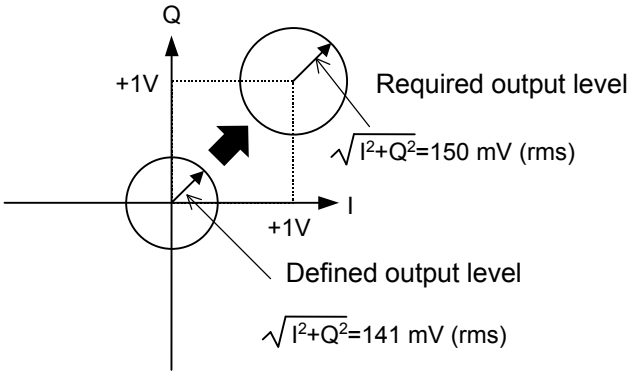


Fig. 3.5.7-3 Image of adjusting I/Q signal output

Example: Selecting the I/Q signal output voltage to 150 mV (rms), the in-phase DC output level to +1 V, and the differential DC output level to 0.5 mV
The output voltage defined in the waveform pattern setting is defined as 141 mV (rms).

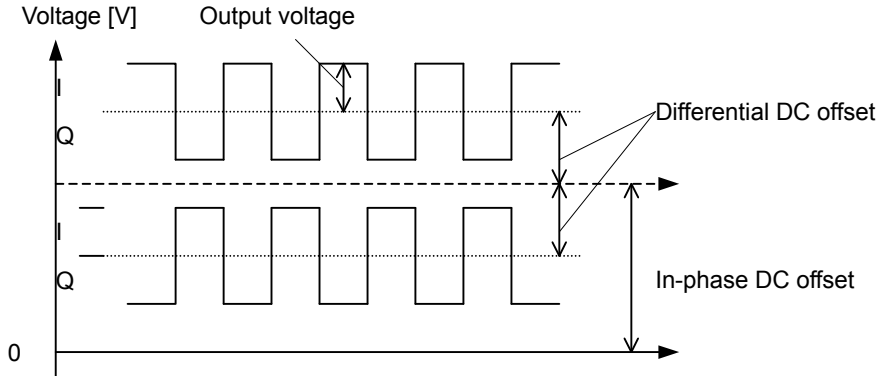


Fig. 3.5.7-4 Image of I/Q signal output

Fig. 3.5.7-5 I/Q signal output setup screen

<Procedure>

1. Press [More] to switch the function menu to the second page.
   Press [F3] (I/Q Tuning) to display the I/Q signal output setup screen.
2. Move the reverse cursor to [I Output Level Trimming].
3. Type the numeric value [106] (150/141 × 100 = 106[%]) using the numeric keypad.
4. Press [% MHz/dBμV] or [Set] to determine the numeric value. The window closes.
   Once the numeric value has changed, the output voltage value on the right of it also changes.
5. Also, set the value of [Q Output Level Trimming] to 106% in the same manner.
6. Move the reverse current to [I Common Offset].
7. Type [1] using the numeric keypad.
8. Press [Set] to determine the numeric value as 1 V. The window closes.
9. Also set the value of [Q Common Offset] in the same manner.
10. Move the reverse cursor to [I Differential Offset].
11. Type numeric value [0.5] using the numeric keypad.
12. Press [Set] to determine the numeric value as 0.5 mV. The window closes.
13. Also set the value of [Q Differential Offset] to 0.5 mV in the same manner.
14. Press [F6] (Return) to complete the I/Q signal output setup.

If a numeric value was typed using the numeric keypad, [Hz/μV] and [kHz/mV], as well as [Set], can be used to determine it. The unit of the numeric value labeled on the key top (μV or mV) is added to the determined numeric value.

3.6 Utility Functions

Pressing the Utility main function key opens the utility setup mode. This mode allows you to save or read parameters, set up the BER measurement, and make various settings related networking and other functions.

This section describes the function menu used in utility setup mode. The functions of the menus are detailed in Section 3.7 and later.

3.6.1 Display description

This section describes screen display in the utility setup mode.

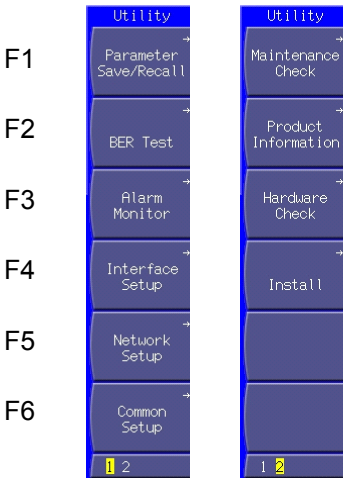


Fig. 3.6.1-1 Function menu

Table 3.6.1-1 Function menu

Page	Key No.	Menu display	Function
1	F1	Parameter Save/Recall	Saves or reads parameters (refer to Section 3.7 "Saving/Reading Parameters").
	F2	BER Test	Performs bit error rate (BER) measurement (refer to Sections 3.8 "BER Measurement Functions" and 3.9 "High Speed BER Measurement Functions When Option031/131 Is Installed").
	F3	Alarm Monitor	Displays the status in which an alarm occurred (refer to Section 3.10.4 "Alarm display").
	F4	Interface Setup	Sets up the remote functions (refer to Section 4 "Remote Control").
	F5	Network Setup	Sets up the networking-related items (refer to Section 4 "Remote Control").
	F6	Common Setup	Sets up the other functions (refer to Section 3.10 "Convenient Functions").
2	F1	Maintenance Check	Displays the utilization of operation time and options (refer to Section 3.10.9 "Displaying miscellaneous information").
	F2	Product Information	Displays information about the product and the installed options (refer to Section 3.10.9 "Displaying miscellaneous information").
	F3	Hardware Check	Displays the results of self-diagnosis (refer to Section 3.10.9 "Displaying miscellaneous information").
	F4	Install	Installs firmware or a license file (refer to Section 3.10.10 "Installation").
	F5		No function
	F6		No function

3.7 Saving/Reading Parameters

The MG3700A can save the frequencies, output levels, modulation parameters, and other data in the CF card or internal hard disk. It can also Recall (read) or Delete them from there.

This function can save the following settings:

Table 3.7-1 Items saved in parameter file (1 of 2)

Frequency setup mode	Frequency setting Selected channel Frequency step setting Frequency switching speed setting RF spectrum setting Frequency display/channel display switching setting Channel table Channel display frequency display On/Off
Output level setup mode	Output level setting value (including unit) Level step setting Offset On/Off Offset Relative level display On/Off Relative level display reference level Open circuit voltage display/terminated voltage switching External ALC On/Off RF output On/Off
Digital mode setup mode	Modulation On/Off Waveform file loaded in memory Selection of the waveform file used for modulation Edit/Defined mode switching Output memory selection Memories A and B output levels Start offset Frequency offset Output level ratio Reflection destination for output level ratio changes Sequence operation status (in the sequence mode) Element switching timing (in the sequence mode) I/Q source internal/external switching I/Q output On/Off Ext I/O Setup settings I/Q Tuning settings Advanced Menu settings
Save/read parameters	Selection of destination/source media

Table 3.7-1 Items saved in parameter file (2 of 2)

BER measure mode	[When Option031/131 is not installed] Input signal polarity setting Auto Resync function, measurement mode, measurement termination condition, measurement time, measurement bit count, data type setting Selection of destination media of measurement results [When Option031/131 is installed] Settings for various input signals, including polarity, threshold level, delay, and input impedance Auto Resync function, measurement mode, measurement termination condition, measurement bit count, measurement error bit count, data type setting PN Fix setting User-defined pattern setting Selection of destination media of measurement results
Others	Selection of destination media of alarm display history Common Setup settings (except date/time) Selection of firmware and license file destination media source

This function does not save the following:

- Contents in progress of data input
- Remote state
- Contents in progress of GPIB data transfer
- Screen transition
- Main function selection state
- Continuous mode On/Off (turned Off during read)
- RF output phase (set to 0 during read)
- Clock
- BER measurement Operation/Stop state (set to Stop)
- BER measurement log
- Current alarm
- Panel lock, rotary knob lock, screen display On/Off
- Interface Setup and Network Setup settings
- Element number during a sequence mode operation (the first element will be restored.)
- ATT Warning On/Off (the current setting will be retained after read.)

The contents of parameter files are in text format.
Two or more MG3700A units can accept data transferred from an external PC.
For the instructions on the transfer, refer to the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual IQproducer™.

3.7.1 Saving parameters

The set up parameters can be saved to the CF card or internal hard disk by using the Saving/Reading Parameters function in utility setup mode. To save the parameters, follow the procedure below:

Example: Saving the currently displayed parameters in a new file named [ABC]

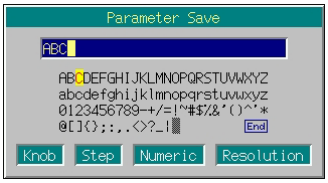


Fig. 3.7.1-1 File name entry window

<Procedure>

1. Press the Utility main function key to switch to the utility setup mode.
2. Press F1 (Parameter Save/Read) to display the Parameter Save/Read menu.
3. Press F4 (Media Choice) to select either CF Card or Hard Disk as the data media.
4. Press F2 (Parameter Save) to display the file name entry window (Parameter Save).
5. Enter the file name.
   The initial setting is [apm***] in the text box (*** is the date and time the File Name window opened).
   In this example, the file is desired to be named [ABC]. Thus, first press Shift and CE BS in order. Then, delete all the characters from the text box.
6. Move the character selection cursor to [A] using the rotary knob or < > ^ v.
7. Press Set to enter [A] in the text box.
8. Enter the remaining characters [B] and [C] in the same manner.
9. Once [ABC] has been entered in the text box, move the character selection cursor to End and press Set. The parameter file is saved under the entered file name.

Note:

Do not power off the MG3700A while saving is in operation. If you power it off, the parameter file may break.

For details of the keys available for file name entry, refer to "Entering Character String" in Section 3.2.2 "Opening setup window to set parameters." Digits and the decimal point can be entered also with the numeric keypad.

The MG3700A can handle up to 100 files.

When a file name is entered, its extension is added automatically. You cannot set any optional extension.

Up to 30 characters can be entered for a file name.

The characters below are not available for file names. With any of these included in a file name, it cannot be determined.
' (apostrophe) / : , ; * ? < > | $ ~

If a space or [.] (dot) is placed at the first or last column of the character string, the file name cannot be determined.

3.7.2 Reading parameter file

This function reads a saved parameter file from the CF card or internal hard disk.

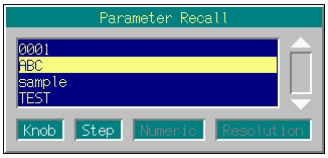


Fig. 3.7.2-1 Parameter file selection window

<Procedure>

1. Press the Utility main function key to open the utility setup mode.
2. Press F1 (Parameter Save/Recall) to display the Parameter Save/Recall menu.
3. Press F4 (Media Choice) to select either the CF Card or Hard Disk as the source media that contains the desired parameter file.
4. Press F1 (Parameter Recall) to display the parameter file selection window (Parameter Recall).
5. Select the desired parameter file to be read using the rotary knob or ∧ ∨.

6. Press [Set] to read the selected parameter file.
   If [Cancel] is pressed, read of the parameter file is canceled and the parameter file selection window closes.
7. In the parameter file reading operation, the progress bar window is displayed while the waveform pattern file is being loaded from the MG3700A internal hard disk to the waveform memory.
   If [Cancel] is pressed while the progress bar window is displayed, parameter file reading operation is cancelled and the statuses before starting parameter file reading are restored.
   If [Cancel] is pressed during this restore operation, the parameters at the time when the operation is interrupted (i.e., when [Cancel] is pressed) are restored.

Note:

Do not power off the MG3700A while the parameter file is being read. If you do so, the MG3700A may be powered on next time with the parameters unstable.

The file names are displayed in ascending order of numbers and alphabetical characters

Up to 100 files are displayed in the parameter file selection window. The 101st and subsequent files are not displayed.

Any file whose name consists of 33 characters or more is not displayed in the parameter file selection window.

If no file exists in the media, the “No file to read” message is displayed.

If the CF card slot contains no CF card, the “No memory card” message is displayed. In this case, insert the card, and then press [F1] again.

Parameter save files generated with the MG3700A can usually be read in another MG3700A. However, pay attention to the versions of the firmware installed in the MG3700A's. If the version of the firmware of the MG3700A that is to read the parameter file is older than that of the MG3700A that has saved the file in the media, normal file read will fail.

The following message is displayed if a parameter file that was saved with an MG3700A unit with Option031/131 (high speed BER test function) installed is read in an MG3700A unit without Option031/131: “Option Setting : Different BER configuration.”

In this event, the parameters that are not for BER measurement can be read, but the parameters for BER measurement are initialized.
The same operation is performed if a parameter file that was saved with an MG3700A unit without Option031/131 is read in an MG3700A unit with Option031/131 installed.

3.7.3 Deleting parameter file

This function deletes a parameter file from the CF card or internal hard disk.

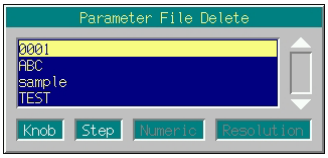


Fig. 3.7.3-1 Parameter file selection window

<Procedure>

1. Press the Utility main function key to open the utility setup mode.
2. Press F1 (Parameter Save/Recall) to display the Parameter Save/Recall menu.
3. Press F4 (Media Choice) to select either the CF Card or Hard Disk as the source media that contains the desired parameter file.
4. Press F3 (Parameter File Delete) to display the parameter file selection window (Parameter File Delete).
5. Select the desired parameter file to be deleted using the rotary knob or ^ v.
6. Press Set to delete the selected parameter file.
   If Cancel is pressed, deletion of the parameter file is canceled and the parameter file selection window closes.

The file names are displayed in ascending order of digits and alphabetical characters.

Up to 100 files are displayed in the parameter file selection window. The 101st and subsequent files are not displayed.

Any file whose name consists of 33 characters or more is not displayed in the file selection window.

If no file exists in the media, the “No file to read” message is displayed.

If the CF card slot contains no CF card, the “No memory card” message is displayed. In this case, insert the card, and then press F3 again.

3.8 BER Measurement Functions

The MG3700A can measure the bit error rate (BER) of a signal incoming from the external system.
By pressing Utility and then F2 (BER Test), the MG3700A can be switched to the BER measure mode.

This section describes the BER measurement functions provided as standard. Refer to Section 3.9 "High Speed BER Measurement Functions When Option031/31 Is Installed" for the MG3700A with Option031/131 (high speed BER test function) installed.

Unless otherwise specified, this section assumes that the MG3700A has been switched to the BER measure mode.

3.8.1 About BER measurement functions

The MG3700A BER measurement functions are as listed below:

Input signals
: Data, Clock, and Enable (Polarity inversion is enabled.)

Input level
: 0 to 5 V

Input threshold level
: Conforms to the TTL threshold voltage (0.8 to 2.4 V).

Input bit rate
: 1 kbps to 20 Mbps

Measured pattern
: PN9, PN11, PN15, PN20, PN23, ALL0, ALL1, and repetition of 0/1

Measurement time
: 0.1 to 359,999.0 seconds (99 hours, 59 minutes, 59 seconds)
  Although the value must be set in seconds, the elapsed time is displayed in hours/minutes/seconds in the progress state display.
  The measurement time includes Off intervals during which the Enable signal is Off.

Resolution of measurement time
: 0.1 second.

Measurement bit count

1000 to 4294967295 bits ($2^{32} - 1$ bits)

The maximum value can be set as the measurement bit count is ($2^{32} - 1$ bits).

In the CountMode: Time or MeasureMode: Endless, however, counting continues until the set measurement time or the maximum measurement time elapse even when ($2^{32} - 1$ bits) is exceeded.

Operation modes

Auto Resync: On, Off

Measurement Mode: Continuous, Single, Endless

Count Mode: Data Bit, Time

Synchronization conditions

PN9, 11, 15, 20, 23: No error occurs for continuous (50 + PN stage count) bits

ALL0, ALL1, and repetition of 0/1: No error occurs for continuous 48 bits

Synchronization probability

The condition required for the MG3700A to synchronize with a PN signal is that no error occurs for continuous (50 + PN stage count) bits. The table below lists the probabilities that no error will occur for continuous (50 + PN stage count) bits for a PN signal that includes random errors. These probabilities thus can be referred to as the probabilities that the MG3700A synchronizes with a PN signal at a certain error rate in one cycle.

Table 3.8.1-1 Probabilities MG3700A Synchronizes with PN Signal

PN stage counts / Error rate of PN signal (%)	PN9	PN15	PN23
10	0.22	0.11	0.046
3	17.1	13.8	10.8
1	55.8	52.0	48.0
0.1	94.4	93.7	93.0

SyncLoss detection condition

If errors occurred in six bits out of 64-bit data, it is judged as SyncLoss and the measurement is stopped. However, SyncLoss detection is not executed if Auto Resync is set to Off.

Maximum burst Off time

80 ms

If this time is exceeded, the MG3700A regards this as a clock or enable error, stopping the measurement. (When Auto Resync is set to Off, measurement is continued even when Clock Error or Enable Error is detected.)

3.8.2 Display description

This section describes the display items of the BER measurement functions.

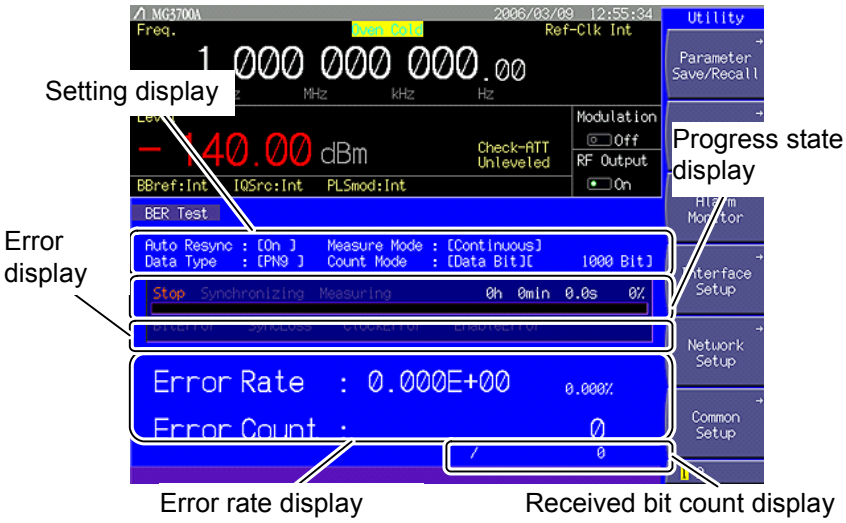


Fig. 3.8.2-1 BER measurement mode

Table 3.8.2-1 Displayed items in BER measurement mode

Display	Description
Setting display	Displays the measure mode and data type settings.
Progress state display	Displays the measurement elapsed time and progress state.
Error display	Displays details of an error when it occurs.
Error rate display	Displays the rate of error and the number of error bits.
Received bit count display	Displays the number of measured bits.

Table 3.8.2-2 Description of errors

Display	Description
ErrorBit	An error bit was encountered.
SyncLoss	Errors occurred in six bits out of 64-bit data.
ClockError	Input clock signal failure.
EnableError	Input enable signal failure.

Table 3.8.2-3 Error rate display

Display	Description
ErrorRate	Rate of error.
ErrorCount	Number of error bits.

ErrorRate display

ErrorRate may be displayed in either floating-point form or fixed-point percentage, which complies with the following rules:

Floating-point display

With the maximum significant to the 1/0000th digits rounded, the digits down to 1/1000th digits are displayed.

Example: For 0.00978495
→ Displayed as 9.785e-03.

Fixed-point percentage display

The value is displayed in percentage. With the fourth digit of the fraction part rounded, the digits down to the third digit of the fraction part are displayed.

Example: For 0.00978495
→ Displayed as 0.978%.

Before no BER measurement has been performed, the error rate, error count, and received bits count are all displayed as 0.

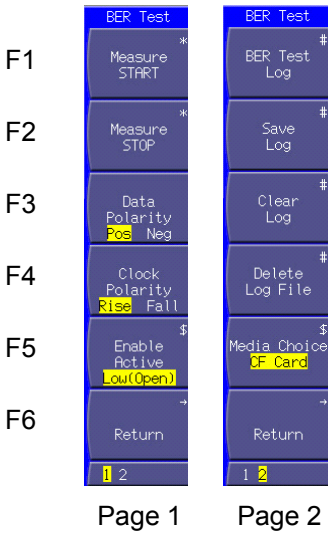


Fig. 3.8.2-2 Function menu

Table 3.8.2-4 Function menu

Page	Key No.	Menu display	Function
1	F1	Measure START	Starts the BER measurement.
	F2	Measure STOP	Stops the BER measurement.
	F3	Data Polarity (Pos/Neg)	Switches the Data signal polarity.
	F4	Clock Polarity (Rise/Fall)	Switches the Clock signal polarity.
	F5	Enable Active (High/Low (Open))	Switches the Enable signal polarity.
	F6	Return	Returns the view to the utility setup screen.
2	F1	BER Test Log (*1)	Displays the result of the previous BER measurement.
	F2	Save Log (*1)	Saves the BER measurement result in a file.
	F3	Clear Log (*1)	Deletes the BER measurement result.
	F4	Delete Log File	Deletes a file in which BER measurement result logs are saved.
	F5	Media Choice (CF Card / Hard Disk)	Selects the destination in which to save the BER measurement results.
	F6	Return	Returns the view to the utility setup screen.

(*1): Displayed only when a BER measurement result log exists.

3.8.3 Connecting MG3700A to external system

To perform the BER measurement, you must input signals from the external system. They can be input from the [BER Input] connectors on the rear panel.

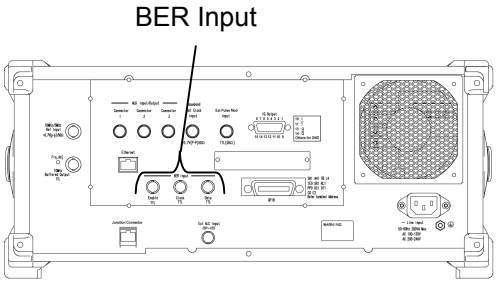


Fig. 3.8.3-1 BER measurement input connector

BER Input consists of the following three terminals:

- Enable connector Inputs the gate (enable) signal.
- Clock connector Inputs a clock signal that is generated in sync with Data.
- Data connector Inputs the data signal.

If the enable signal is not used, leave the Enable connector unconnected, and set “Enable Active” to “Low (Open)”.

3.8.4 Performing BER measurement

This function makes the BER measurement settings, and performs the measurement.
Follow the procedure below:

<Procedure>

1. Input the signals from the external system according to the instructions in Section 3.8.3 “Connecting MG3700A to external system.”
2. Select the operation mode when an error is detected. Move the cursor to [Auto Resync:[ ]] and then press Set to display the operation mode selection window.

   One of the following two types can be selected for the operation mode:

   - On When SyncLoss, ClockError or EnableError is detected, stops measurement (for Single or Endless) or performs continuous measurement (for Continuous).
   - Off Does not detect SyncLoss. When ClockError or EnableError is detected, an error display occurs and measurement is continued.

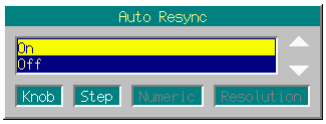


Fig. 3.8.4-1 Operation mode selection window

3. Select the BER measure mode.
   Move the cursor to [Measure Mode : [ ]], then and press Set.
   The measurement mode selection window (Measure Mode) is displayed.
   One of the following three types can be selected for the measure mode:

   - Continuous Performs the measurement continuously at the set time interval or set bit count.
   - Single Performs the measurement for the set time or set bit count.
   - Endless Performs the measurement for the maximum time that can be set (99 hours, 59 minutes, 59 seconds).

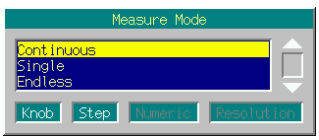


Fig. 3.8.4-2 Measurement mode selection window

4. Select the measurement termination condition.
   Move the cursor to [Count Mode:[ ]] and then press Set to display the measurement termination condition selection window.

   One of the following two types can be selected for the measurement termination condition:

   Data Bit Specify measurement bit count.
   Time Specify measurement time.

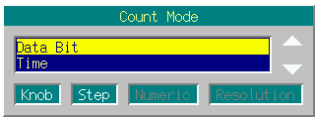


Fig. 3.8.4-3 Measurement termination condition selection window

5. Set the measurement bit count.
   When Count Mode is set to DataBit, [[DataBit][Bit]] is displayed. Move the cursor to [Bit] and then press Set to display the measurement bit count setting window. Set the measurement bit count using the numeric keypad, rotary knob, or ^ v. The measurement is stopped when the accumulated measurement bit count reaches the set bit count (except Continuous mode).

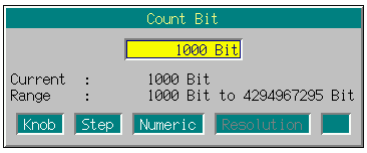


Fig. 3.8.4-4 Measurement bit count setting window

- Range: 1000 to 4294967295 bits

For the MG3700A, measurement bit count (valid bit count) is restricted by the frequency to be used due to its performance.

When the set bit count is BitCount [bit] and clock frequency is Clock [Hz], measurement is stopped within the range of measurement bit count shown below:

BitCount to BitCount + Clock × 1.2 × 10^{-2}

For example, when the clock frequency is 1 MHz, measurement is stopped within the range from “65535” to “77535” even when “65535 bits” is set.

6. Set the measurement time.
   When Count Mode is set to Time, [[Time][sec]] is displayed. Move the cursor to [sec], and then press Set. The measurement time setup window (Measure Time) is displayed.

Set the measurement time using the rotary knob, rotary knob, or [^] [v].

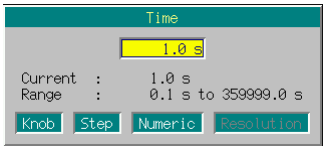


Fig. 3.8.4-5 Measurement time setup window

- Range: 0.1 to 359999.0 seconds (including Enable signal Off intervals)
- Minimum resolution setting: 0.1 seconds

7. Select the data type.
   Move the cursor to [Data Type : [ ]], and then press [Set].
   The data type selection window (Data Type) is displayed, in which the pattern to be used in the measurement can be selected.

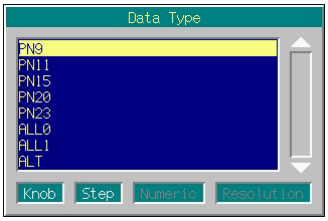


Fig. 3.8.4-6 Data type selection window

   The following patterns can be selected:
   PN9, PN11, PN15, PN20, PN23, ALL0, ALL1, and ALT
   ALT indicates a repetition pattern of 0 and 1.

8. Select the input signal polarity.
   The following keys are available for polarity selection:
   - [F3] Selects the Data signal polarity.
   - [F4] Selects the Clock signal polarity.
   - [F5] Selects the Enable signal polarity

9. Press [F1] (Measure START) to start the BER measurement.
   If [F2] (Measure STOP) is pressed while the BER measurement is in progress, the operation is stopped.
   Operation termination conditions differ according to the operation mode.

Table 3.8.4-1 Operation termination conditions for BER measurement

Auto Resync / BER Mode	On	Off
Single	• SyncLoss • ClockError • EnableError • The set time expired or the set bit count exceeded.	• The set time expired or the set bit count exceeded.
Continuous	None	None
Endless	• SyncLoss • ClockError • EnableError • The maximum measurement time expired.	• The maximum measurement time expired.

Measurement is stopped when setting parameters (all modes).

Note:

When Auto Resync is set to On, the time of expiration after which the Enable signal goes Off must be within 80 msec. When no Clock signal is input for a time longer than 80 msec or the Enable signal goes Off, Clock Error or EnableError occurs. In this event, perform measurement with Auto Resync Off.

If a file is transferred using IQproducer™ while the BER measurement is in progress, the measurement result will not be guaranteed.

Even if the view moves to another screen while the BER measurement is in progress, the measurement continues.

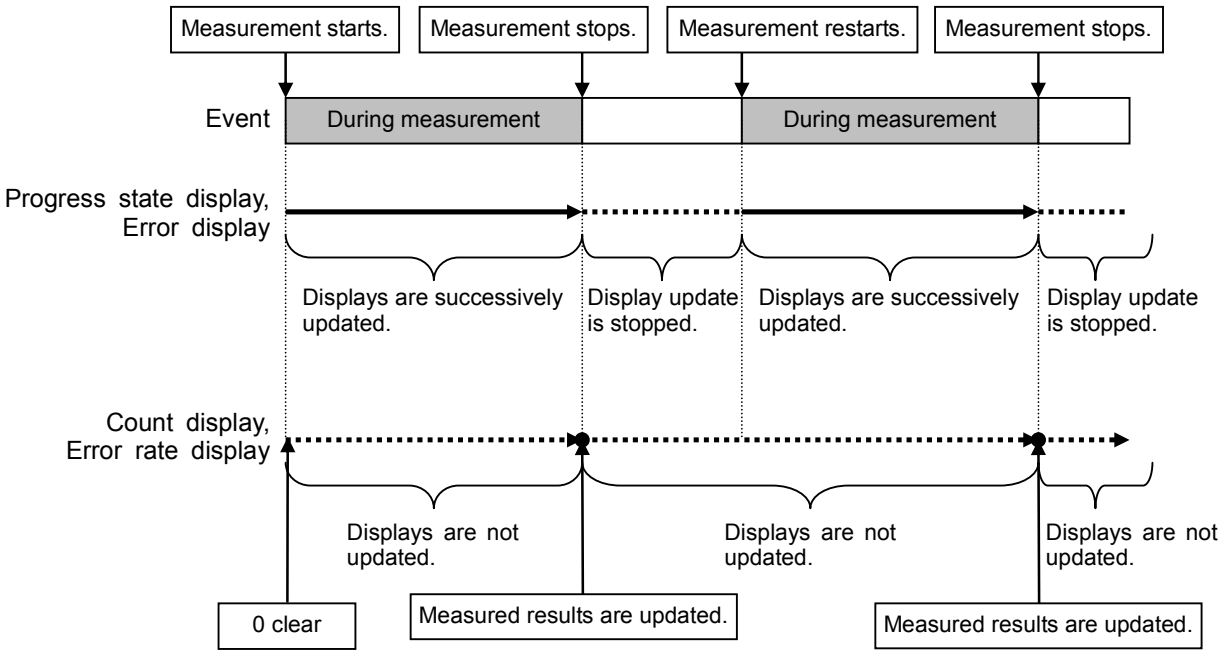
If the MG3700A is powered off while the BER measurement is in progress, the measurement will remain stopped.

Display in each BER measurement mode

The following figures show the difference in the measurement display among BER measurement modes. For the progress state and error rate display during measurement, see Fig. 3.8.2-1 "BER Test screen."

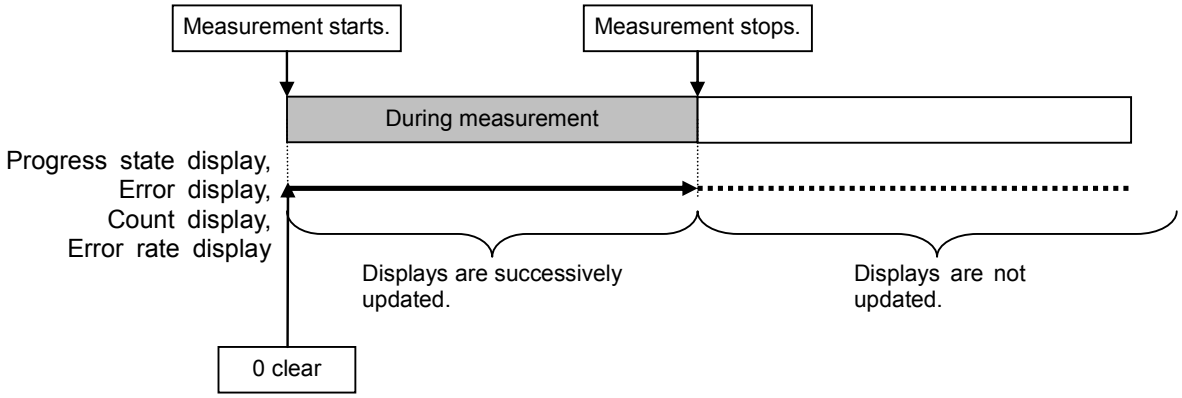
Measurement Mode: Continuous

Only the progress state display is updated during measurement. When the measurement is completed, the measured result is updated and the measurement then starts again.



Measurement Mode: Single and Endless

The received bit count, error bit count, error rate, and progress state displays are updated as needed during measurement. When the measurement is completed, the display update is stopped.

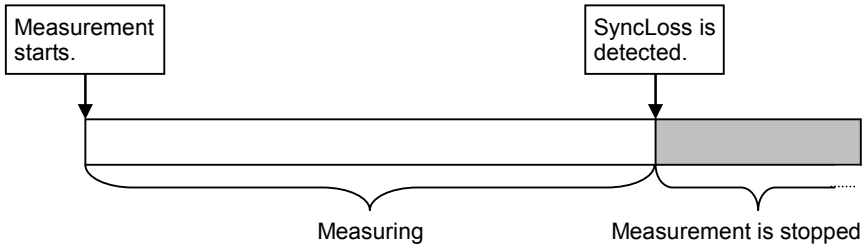


The differences between the Auto Resync operation supported in the MG3700A and the Auto Sync operation supported in the MP1201C and MD6420A are described below.

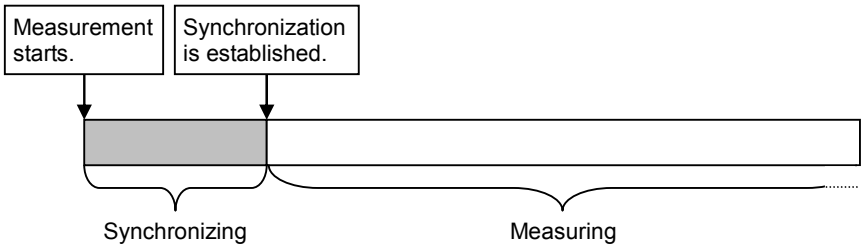
Details on Auto Resync operation

The Auto Resync operation used by the BER measurement function is as follows.

When Auto Resync is set to On:
The measurement is performed assuming that the synchronization is established at the start of measurement. If SyncLoss is detected during measurement, the measurement is stopped.



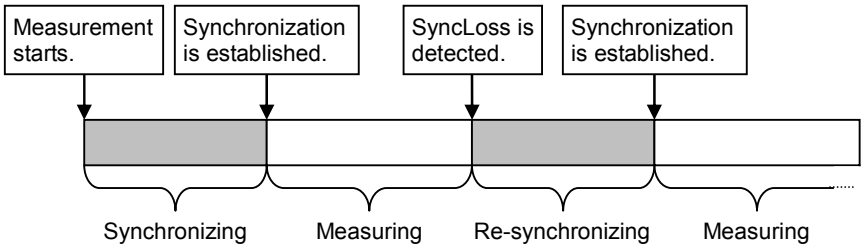
When Auto Resync is set to Off:
Synchronization is executed at the start of measurement, and the measurement is started when the synchronization is established. SyncLoss is not detected during measurement.



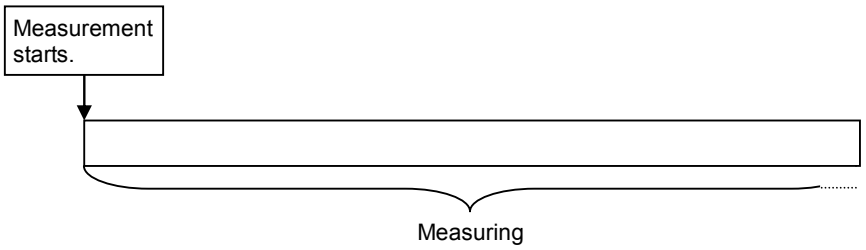
Details on Auto Sync operation

The Auto Sync operation supported in the MP1201C and MD6420A is as follows.

When Auto Sync is set to On:
Synchronization is executed at the start of measurement, and the measurement is started when the synchronization is established. If SyncLoss is detected during measurement, resynchronization is automatically executed.



When Auto Sync is set to Off:
Measurement is performed on the assumption that synchronization was established at the start of measurement. SyncLoss is not detected during measurement.



Note:

To obtain a BER curve, set Auto Sync On so as to establish synchronization with superior S/N, and then change Auto Sync to Off and start measurement while changing S/N.

3.8.5 Displaying BER measurement log

This function displays the result of a previous BER measurement, and can also save it in a file.

Displaying BER Measurement Log

Press (More) to switch to the second page, and then press (F1) (BERT Log). The measurement result log is displayed.
Up to 100 items of log can be displayed, beginning with the latest.

The display format is as follows:

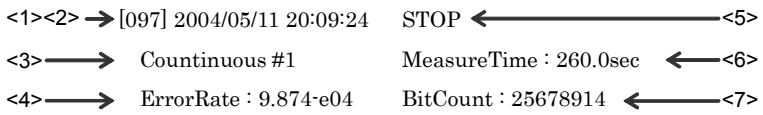


Fig. 3.8.5-1 BER measurement log display example

Table 3.8.5-1 Displayed items in BER measurement log

No.	Display item	Description
<1>	Number	Displays the log number. Assigned in descending order, beginning with the latest measurement.
<2>	Date/Time	Displays the date and time that the measurement ended.
<3>	Measure Mode	Displays the mode in which the measurement was performed. In the Continuous mode, measurement count is also displayed.
<4>	Error Rate	Displays the result of error rate measurement.
<5>	Cause of Termination	Displays the cause of termination.
<6>	Measure Time	Displays the time (seconds) for which the measurement was performed.
<7>	Bit Count	Displays the number of measured bits.

Table 3.8.5-2 Display items of Cause of Termination

Display	Description
OK	The measurement terminated normally when the set time was expired or the set measurement bit count was exceeded.
STOP	The measurement stopped because F1 (Measurement Start/Stop) was pressed, or a parameter was set.
SyncLoss	Errors occurred in six bits out of 64-bit data.
ClockError	Input clock signal failure.
EnableError	Input enable signal failure.

Deleting BER Measurement Log

Press More to switch to the second page, and then press F3 (Clear Log) to delete the log.
The log is also deleted when the MG3700A is turned off.

Saving BER Measurement Log in File

This function saves the log of the measurement result in a text file.
To save a log file, follow the procedure:

Example: Saving the measurement result log under a file name of [ABC]

<Procedure>

1. Press More to switch the function menu to the second page.
2. Press F5 (Media Choice) to select either the CF Card or Hard Disk as the destination media.
3. Press F2 (Save Log) to display the file name entry window (Save Log).

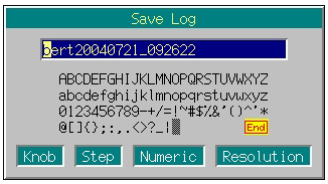


Fig. 3.8.5-2 File name entry window

4. Enter the file name.
   The initial setting is [bert***] in the text box. (*** represents the date and time the File Name window opened.)
   In this example, the file is desired to be named [ABC]. Thus, first press Shift • and CE BS in order. Then, delete all the characters from the text box.

5. Move the character selection cursor to [A] using the rotary knob or [<] [>] [^] [v].
6. Press [Set] to enter [A] in the text box.
7. Enter the remaining characters [B] and [C] in the same manner.
8. Once [ABC] has been entered in the text box, move the character selection cursor to [End] and press [Set]. The log file is saved under the entered file name.

For details of the keys available for file name entry, refer to "Entering Character String" in Section 3.2.2 "Opening setup window to set parameters." Digits and the decimal point can be entered also with the numeric keypad.

When a file name is entered, its extension is added automatically. You cannot set any optional extension.

Up to 30 characters can be entered for a file name.

The characters below are not available for file names with any of these included in a file name, it cannot be determined.
' (apostrophe) / : , ; * ? < > | $ ~

If a space or [.] (dot) is placed at the first or last column of the character string, the file name cannot be determined.

Deleting Log File

This function deletes a log file saved in the CF card or on the internal hard disk.

<Procedure>

1. Press More to switch the function menu to the second page.
2. Press F5 (Media Choice) to select either the CF Card or Hard Disk as the source media that contains the desired log file to be deleted.
3. Press F4 (Delete Log File) to display the file selection window.
4. Select the desired log file to be deleted using the rotary knob or step keys ^ v.
5. Press Set to delete the selected log file.
6. If Cancel is pressed, the file selection window closes without deleting the log file.

The file names are displayed in ascending order of digits and alphabetical characters

Up to 100 files are displayed in the file selection window. The 101st and subsequent files are not displayed.

Any file whose name consists of 33 characters or more is not displayed in the file selection window.

If the media contains no log file, the “No file to read” message is displayed.

If the CF card slot contains no CF card, the “No memory card” message is displayed. In this case, insert the card, and then press F4 again.

3.9 High Speed BER Measurement Functions When Option031/131 Is Installed

The MG3700A can measure the bit error rate (BER) of a signal incoming from the external system.
By pressing Utility and then F2 (BER Test), the MG3700A can be switched to the BER measure mode.

This section describes the BER measurement functions for the MG3700A with Option031 (high speed BER test function) installed. Refer to Section 3.8 "BER Measurement Functions" for the MG3700A without Option031.

There are two types of high speed BER test function options:
Additional option at shipment: MG3700A-031
Retrofit option: MG3700A-131
These are collectively referred to as "Option031" in this section.

Unless otherwise specified, this section assumes that the MG3700A has been switched to the BER measure mode.

3.9.1 About BER measurement functions

The MG3700A BER measurement functions with Option031 installed are as listed below:

Input signals
Data, Clock, and Enable (Polarity inversion is enabled.)

Input level
0 to 5 V

Input threshold level
0.20 to 3.00 V (in 0.05-V steps)

Input impedance
50 Ω, high impedance

Input timing adjustable range
–1 to 15 clocks (The timing of Data and Enable for the input clock can be adjusted.)

Input bit rate
100 bps to 120 Mbps

Measured pattern

PN9, PN11, PN15, PN20, PN23, ALL0, ALL1, repetition of 0/1, PN9Fix, PN11Fix, PN15Fix, PN20Fix, PN23Fix, and user-defined pattern

Measurement bit count

1000 to 4294967295 bits ($2^{32} - 1$ bit)

Measurement error bit count

1 to 2147483647 bits ($2^{31} - 1$ bit)

The maximum value can be set as the measurement error bit count is ($2^{31} - 1$ bit). If the Count Mode is set to Data, however, error bit counting continues even when ($2^{31} - 1$ bit) is exceeded.

Operation modes

Auto Resync:	On, Off
Measurement Mode:	Continuous, Single, Endless
Count Mode:	Data, Error

Synchronization conditions

The synchronization conditions differ depending on the measured pattern.

PN9, 11, 15, 20, 23:	No error occurs for continuous (PN stage count × 2) bits
ALL0, ALL1, and repetition of 0/1:	No error occurs for continuous 10 bits
PN_Fix pattern:	See Section 3.9.6.
User-defined pattern:	No error occurs during the period that is set for synchronization judgment.

Synchronization probability

The condition required for the MG3700A to synchronize with a PN signal is that no error occurs for continuous (PN stage count × 2) bits. The table below lists the probabilities that no error will occur for continuous (PN stage count × 2) bits for a PN signal that includes random errors. These probabilities thus can be referred to as the probabilities that the MG3700A synchronizes with a PN signal at a certain error rate in one cycle.

Table 3.9.1-1 Probabilities MG3700A Synchronizes with PN Signal

PN stage counts / Error rate of PN signal (%)	PN9	PN15	PN23
10	15.0	4.2	0.79
3	57.8	40.1	24.6
1	83.5	74.0	63.0
0.1	98.2	97.0	95.5

SyncLoss detection condition

The SyncLoss detection condition can be changed. However, SyncLoss detection is not executed if Auto Resync is set to Off.

3.9.2 Display description

This section describes the display items of the BER measurement functions.

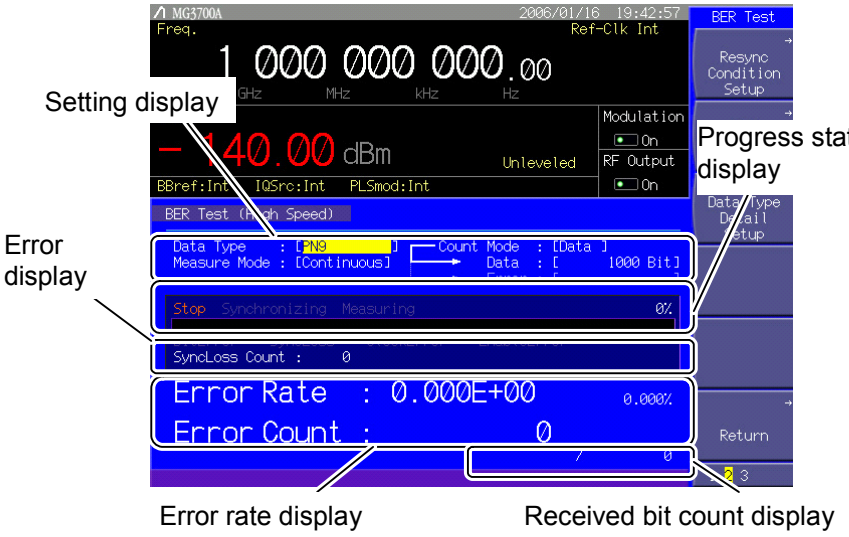


Fig. 3.9.2-1 BER Test screen

Table 3.9.2-1 Displayed items in BER measurement mode

Display	Description
Setting display	Displays the measure mode and data type settings.
Progress state display	Displays the measurement progress state and overflow occurrence state.
Error display	Displays details of an error when it occurs.
Error rate display	Displays the rate of error and the number of error bits.
Received bit count display	Displays the number of measured bits.

Table 3.9.2-2 Description of errors

Display	Description
ErrorBit	An error bit was encountered.
SyncLoss	SyncLoss error occurred.
ClockError	Input signal failure
EnableError	Input enable signal failure
SyncLoss Count	Number of SyncLoss errors occurred

Table 3.9.2-3 Description of other errors

Display	Description
OverflowDataCount	The number of received bits exceeds the maximum value ($2^{32} - 1$ bits).
OverflowSyncLoss	The number of SyncLoss errors exceeds the maximum value (65535).
AbnormalCount	The BER measuring circuit is malfunctioning. Refer to Section 3.9.8 "Setting input interface" for details.

Table 3.9.2-4 Error rate display

Display	Description
ErrorRate	Rate of error.
ErrorCount	Number of error bits.

ErrorRate display

ErrorRate may be displayed in either floating-point form or fixed-point percentage, which complies with the following rules:

Floating-point display

With the maximum significant to the 1/0000th digits rounded, the digits down to 1/1000th digits are displayed.

Example: For 0.00978495
→ Displayed as 9.785e-03.

Fixed-point percentage display

The value is displayed in percentage. With the fourth digit of the fraction part rounded, the digits down to the third digit of the fraction part are displayed.

Example: For 0.00978495
→ Displayed as 0.978%.

Before no BER measurement has been performed, the error rate, error count, and received bits count are all displayed as 0.

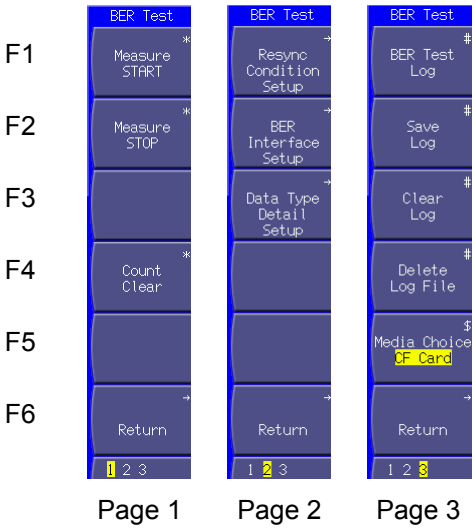


Fig. 3.9.2-2 Function menu

Table 3.9.2-5 Function menu

Page	Key No.	Menu display	Function
1	F1	Measure START(*1)	Starts the BER measurement.
	F2	Measure STOP	Stops the BER measurement.
	F3		No function
	F4	Count Clear	Clears the measurement bit count and measurement error bit count.
	F5		No function
	F6	Return	Returns the view to the utility setup screen.
2	F1	Resync Condition Setup	Configures the settings related to automatic resynchronization. (Refer to Section 3.9.5 “Setting automatic resynchronization function.”)
	F2	BER Interface Setup	Configures the settings related to BER measurement interface. (Refer to Section 3.9.8 “Setting input interface.”)
	F3	Data Type Detail Setup	Configures the settings related to PN_Fix patterns and user-defined patterns. (Refer to Section 3.9.6 “Setting PN_Fix pattern.”) (Refer to Section 3.9.7 “Setting user-defined pattern.”)
	F4		No function
	F5		No function
	F6	Return	Returns the view to the utility setup screen.

Table 3.9.2-5 Function menu (cont'd)

Page	Key No.	Menu display	Function
3	F1	BER Test Log (*2)	Displays the result of the previous BER measurement.
	F2	Save Log (*2)	Saves the BER measurement result in a file.
	F3	Clear Log (*2)	Deletes the BER measurement result.
	F4	Delete Log File	Deletes a file in which BER measurement result logs are saved.
	F5	Media Choice (CF Card / Hard Disk)	Selects the destination to save the BER measurement results.
	F6	Return	Returns the view to the utility setup screen.

(*1): A button that functions in the same way is also provided on the Output level setup screen.
(*2): Displayed only when a BER measurement result log exists.

3.9.3 Connecting MG3700A to external system

To perform the BER measurement, you must input signals from the external system. They can be input from the [BER Input] connectors on the rear panel.

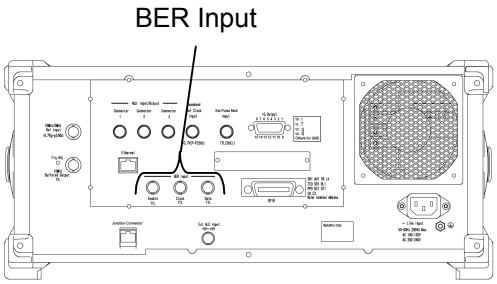


Fig. 3.9.3-1 BER measurement input connector

BER Input consists of the following three terminals:

- Enable connector Inputs the gate (enable) signal.
- Clock connector Inputs a clock signal that is generated in sync with Data.
- Data connector Inputs the data signal.

If the enable signal is not used, set "Enable Active" to "Disable".

Change the settings of the MG3700A in accordance with the specifications of the input signal (refer to Section 3.9.8 "Setting input interface").

3.9.4 Performing BER measurement

This function makes the BER measurement settings, and performs the measurement.
Follow the procedure below:

<Procedure>

1. Input the signals from the external system according to the instructions in Section 3.9.3 “Connecting MG3700A to external system.”
2. Select the data type.
   Move the cursor to [Data Type:[ ]] and then press Set. The data type selection window is then displayed, in which the pattern to be used in measurement can be selected.

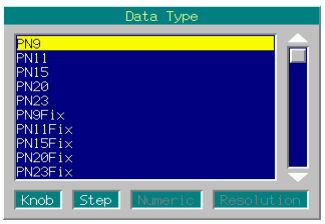


Fig. 3.9.4-1 Data type selection window

   The following patterns can be selected.
   PN9, PN11, PN15, PN20, PN23,
   PN9Fix, PN11Fix, PN15Fix, PN20Fix, PN23Fix,
   ALL0, ALL1, ALT(0/1), UserDefine

   ALT(0/1) indicates a repetition pattern of 0 and 1.

   For details on PN_Fix and UserDefine, refer to the following section respectively:
   Section 3.9.6 “Setting PN_Fix pattern” for PN_Fix
   Section 3.9.7 “Setting user-defined pattern” for UserDefine

3. Select the BER measure mode.
   Move the cursor to [Measure Mode : [ ]], then and press Set.
   The measurement mode selection window (Measure Mode) is displayed.
   One of the following three types can be selected for the measure mode:
   - Continuous Performs the measurement continuously for the set bit count or set error bit count.
   - Single Performs the measurement for the set bit count or set error bit count.
   - Endless Performs the measurement for 4294967295 bits.

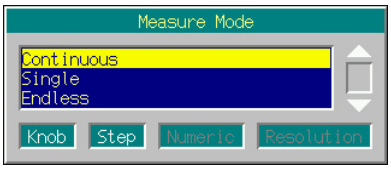


Fig. 3.9.4-2 Measurement mode selection window

When "Endless" is selected for the measurement mode, the count mode (Count Mode), data bit (Data), and error bit (Error) setting items disappear.

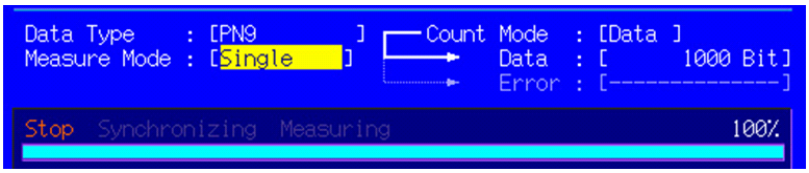


Fig. 3.9.4-3 When Single or Continuous is selected

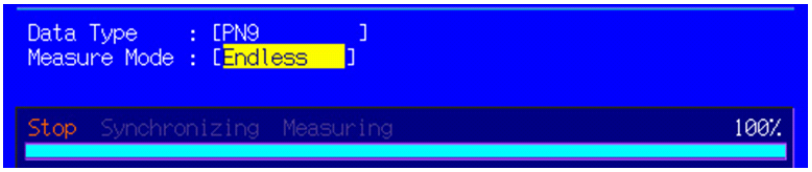


Fig. 3.9.4-4 When Endless is selected

4. Select the measurement termination condition.
   This operation is not required when "Endless" is selected for the measurement mode.
   When "Single" or "Continuous" is selected for the measurement mode, move the cursor to [Count Mode:[ ]] and then press Set to display the measurement termination condition selection window.

   Either of the following two types can be selected for the measurement termination condition:

   Data Specify measurement bit count.
   Error Specify measurement error bit count.

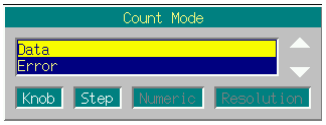


Fig. 3.9.4-5 Measurement termination condition selection window

5. Set the measurement bit count.
   This operation is not required when “Endless” is selected for the measurement mode.
   When “Single” or “Continuous” is selected for the measurement mode and Count Mode is set to Data, the value in “[[Data][Bit]]” can be changed. Move the cursor to [Bit] and then press Set to display the measurement bit count setting window. Set the measurement bit count using the numeric keypad, rotary knob, or ∧ ∨. The measurement is stopped when the accumulated measurement bit count reaches the set bit count.

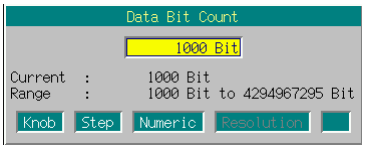


Fig. 3.9.4-6 Measurement bit count setting window

- Range: 1000 to 4294967295 bits

6. Set the measurement error bit count.
   This operation is not required when “Endless” is selected for the measurement mode.
   When “Single” or “Continuous” is selected for the measurement mode and Count Mode is set to Error, the value in “[[Error][Bit]]” can be changed. Move the cursor to [Bit] and then press Set to display the measurement error bit count setting window. Set the measurement error bit count using the numeric keypad, rotary knob, or ∧ ∨. The measurement is stopped when the accumulated measurement error bit count reaches the set bit count.

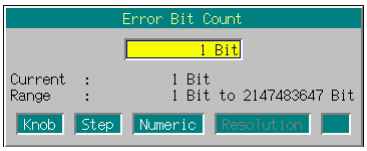


Fig. 3.9.4-7 Measurement error bit count setting window

- Range: 1 to 2147483647 bits

7. Configure the settings for the automatic resynchronization function.
   The automatic resynchronization function can be enabled/disabled, and the SyncLoss error judgment condition can be set.
   Refer to Section 3.9.5 “Setting automatic resynchronization function” for details on the settings.

8. Press F1 (Measure START) to start the BER measurement.
   If F2 (Measure STOP) is pressed while the BER measurement is in progress, the operation is stopped.
   Operation termination conditions differ according to the operation mode.

Table 3.9.4-1 Operation termination conditions for BER measurement (Single)

Auto Resync / Count Mode	On	Off
Data	• The accumulated measurement bit count reaches the set measurement bit count. • The SyncLoss error count reaches the maximum value (65535).	• The accumulated measurement bit count reaches the set measurement bit count.
Error	• The accumulated measurement error bit count reaches the set measurement error bit count. • The accumulated measurement bit count reaches the maximum value ($2^{32} - 1$ bits). • The SyncLoss error count reaches the maximum value (65535).	• The accumulated measurement error bit count reaches the set measurement error bit count. • The accumulated measurement bit count reaches the maximum value ($2^{32} - 1$ bits).

Measurement is stopped when setting parameters (except for BER Interface Setup).

If a condition listed in Table 3.9.4-1 above is met in the Continuous measurement mode, the measurement is once stopped and then started again.

The measurement continues even if the view moves to another screen while the BER measurement is in progress.

If the MG3700A is powered off while the BER measurement is in progress, the measurement will remain stopped.

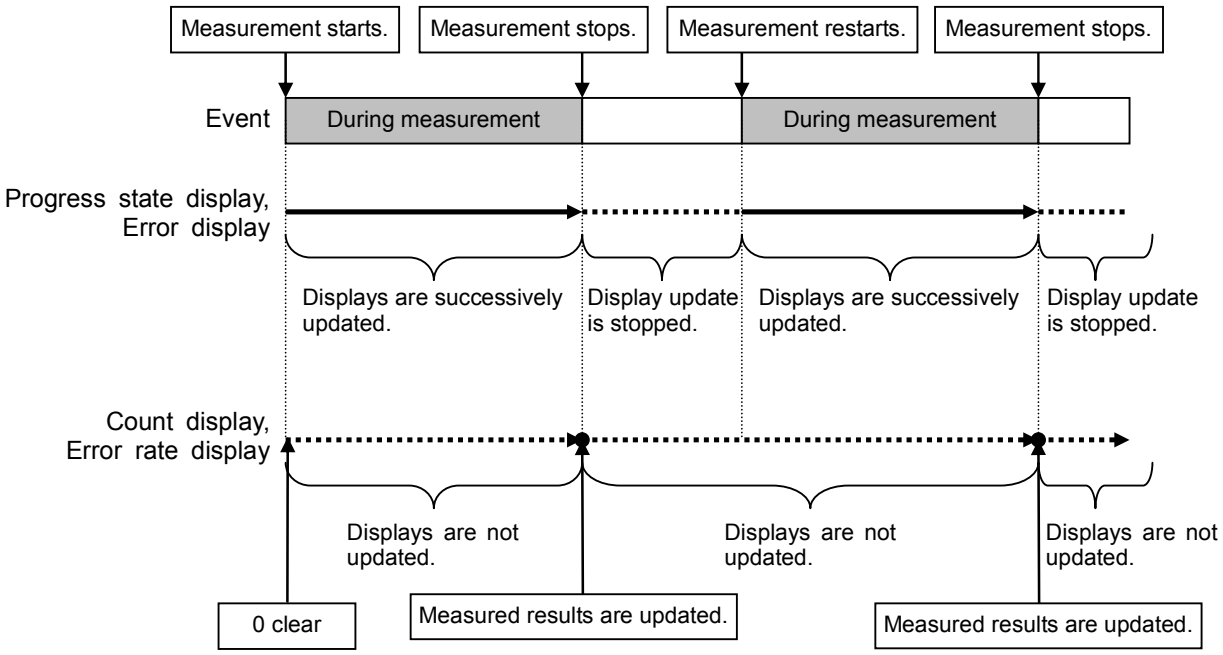
When measurement is started with a 120 Mbps signal, the upper limit of the measurement bit count is reached about 35.8 seconds (max.) later, and the measurement is stopped.

Display in each BER measurement mode

The following figures show the difference in the measurement display among BER measurement modes. For the progress state and error rate display during measurement, see Fig. 3.9.2-1 BER Test screen.

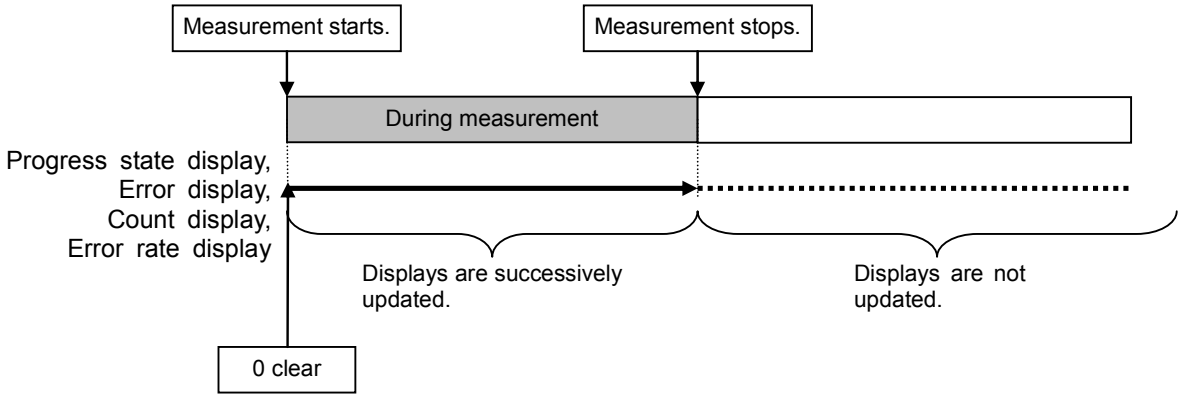
Measurement Mode: Continuous

Only the progress state display is updated during measurement. When the measurement is completed, the measured result is updated and the measurement then starts again.



Measurement Mode: Single and Endless

The received bit count, error bit count, error rate, and progress state displays are updated as needed during measurement. When the measurement is completed, the display update is stopped.



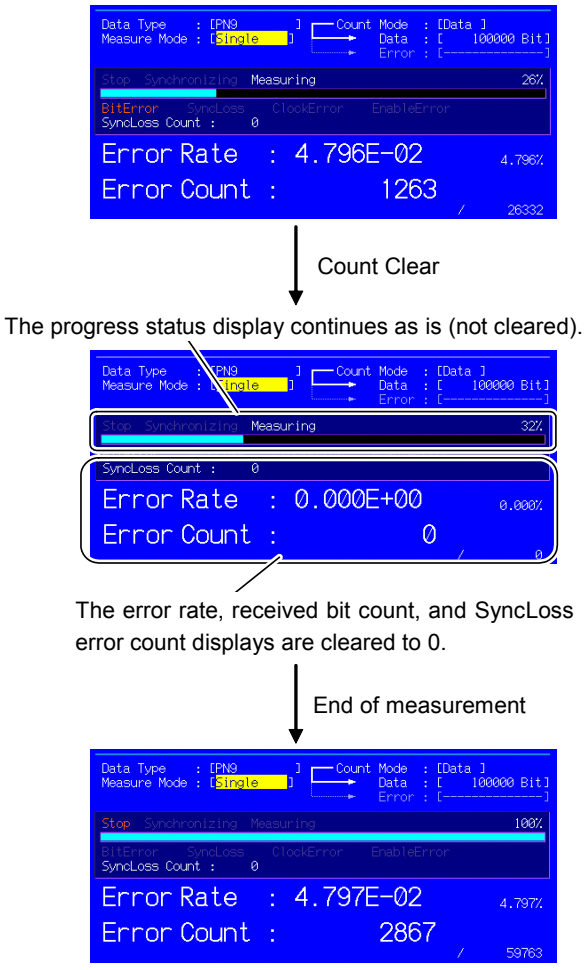
Count Clear operation

The operation when F4 (Count Clear) is pressed is described below. The Count Clear operation is disabled when Continuous is selected for the measurement mode.

During measurement (Synchronizing or Measuring):

The received bit count, error rate, and SyncLoss count are cleared during measurement while the synchronization state is held. The progress state display is not cleared. Therefore, if Count Clear is executed during measurement, the received bit count at the end of the measurement is smaller than the set measurement bit count. The same applies to the error bit count.

The Count Clear operations during measurement are recorded in a log. At this time, the error rate when the Count Clear is started is recorded.



When measurement is stopped (Stop):

The received bit count, error rate, and progress state displays are cleared. The Count Clear operations are not recorded in a log.

3.9.5 Setting automatic resynchronization function

This section describes the settings of the automatic resynchronization function for BER measurement.

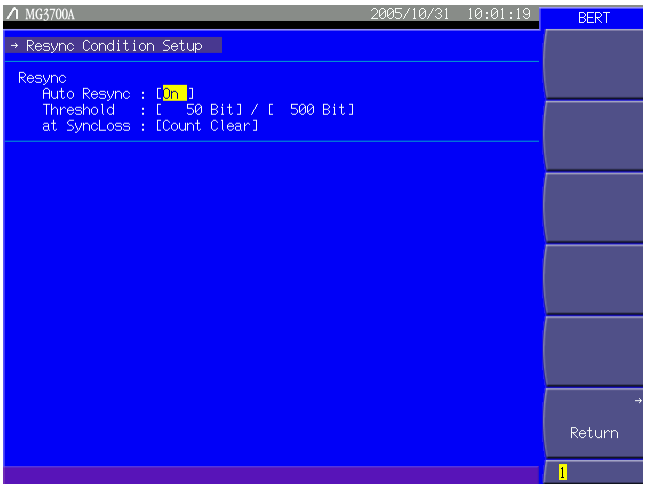


Fig. 3.9.5-1 Resync Condition Setup screen

Press (More) to switch the function menu to the second page.
Pressing (F1) (Resync Condition Setup) allows you to make various settings of the automatic resynchronization function.
Use the cursor to select the desired item to set. Then, press (Set) to display the setup window associated with that item.

The following are details that can be set in this menu:

<1> Auto Resync

Sets the resynchronization operation when SyncLoss occurs.

On SyncLoss detection is executed. Resynchronization is automatically performed when SyncLoss occurs.

Off SyncLoss detection is not executed.

The items below are enabled only when Auto Resync is set to On.

<2> Threshold

Sets the SyncLoss detection conditions When X bits out of Y bits are errors, it is judged as SyncLoss. The values of X and Y can be set here.

Range of X (numerator): 1 to (Y/2) bits.

Range of Y (denominator): 500, 5000, 50000 bits.

Any value within the setting range can be set for X, while one of the three preset value should be set for Y.

<3> at SyncLoss

Sets whether to clear the measurement bit count when SyncLoss occurs.

Count Clear: The measurement bit count is cleared to 0 at SyncLoss.

Count Keep: The measurement bit count is retained at SyncLoss.

Details on Auto Resync setting

The differences in the operation according to the setting of Auto Resync are described below.

When Auto Resync is set to On

If the number of occurred errors reaches the value set in Threshold when the synchronization is established, it is judged as SyncLoss, the measurement is stopped, and resynchronization is executed.
When 200/500 (default) is set for Threshold, for example, SyncLoss is not detected and the measurement continues until the number of error bits out of 500 bits reaches 200.

When a signal at a high error rate is measured, it is possible to suppress the detection of SyncLoss for block errors due to fading, by setting a larger Threshold value, such as 200/500.

When a signal at a low error rate is measured, it is possible to detect SyncLoss quickly in response to error occurrence and to execute resynchronization, by setting a smaller Threshold value, such as 50/500.

When Auto Resync is set to Off

SyncLoss detection is not executed during measurement.
When a signal at a high error rate is measured, the measurement is performed without interruption with this setting. Note, however, that the clock and data may be out of synchronization when the clock is not regenerated on the DUT side. In such a case, set Auto Resync to On for measurement.

The correspondence between the error rate of the measurement target and the recommended settings is shown in the table below.

Table 3.9.5-1 Error rate of measurement target and recommended setting

Settings / Error rate of measurement target	Auto Resync: On		Auto Resync: Off
	Threshold value: 50/500	Threshold value: 200/500	
Lower than 0.3%	Optimum	Applicable	Applicable
0.3% or higher	Not recommended	Optimum	Applicable

Optimum: Most suitable setting
Applicable: Measurement is possible with this setting.
Not Recommended: SyncLoss may occur frequently with this setting.

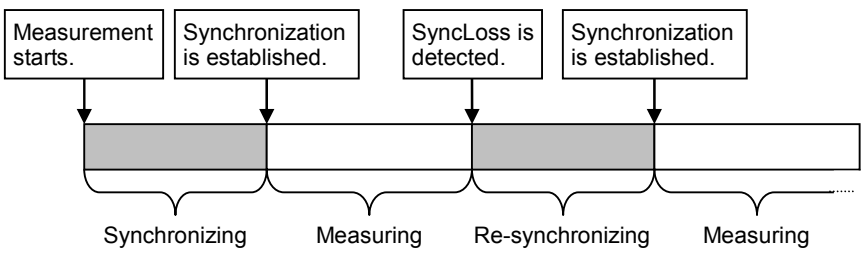
Reference:
Threshold setting value for the MP1201C: 200/512
Threshold default setting value for the MD6402A: 200/512
Threshold setting value for the BER function of the MT8820A (WCDMA): 23/64

The differences between the Auto Resync operation supported in the MG3700A and the Auto Sync operation supported in the MP1201C and MD6420A are described below.

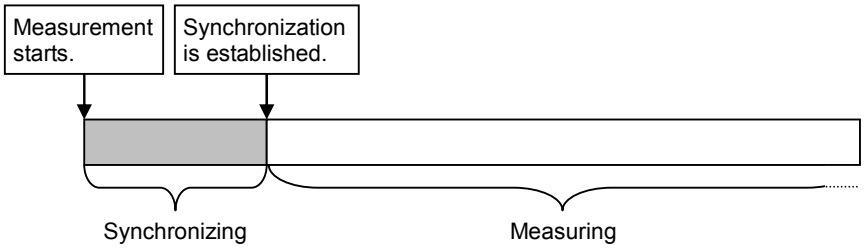
Details on Auto Resync operation

The Auto Resync operation supported in the MG3700A is as follows.

When Auto Resync is set to On:
Synchronization is executed at the start of measurement, and the measurement is started when the synchronization is established. If SyncLoss is detected during measurement, resynchronization is automatically executed.



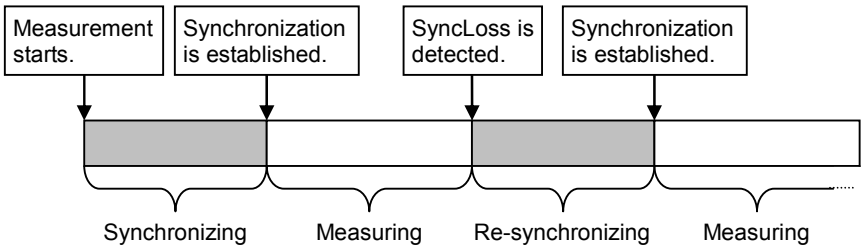
When Auto Resync is set to Off:
Synchronization is executed at the start of measurement, and the measurement is started when the synchronization is established. SyncLoss is not detected during measurement.



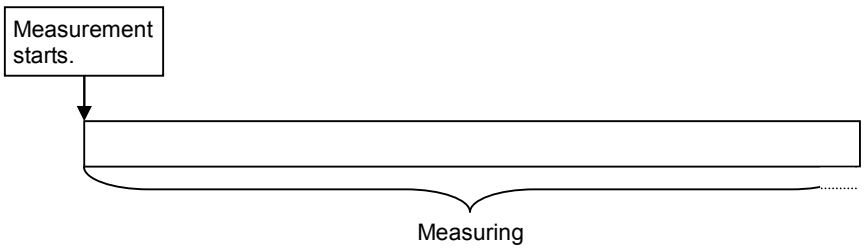
Details on Auto Sync operation

The Auto Sync operation supported in the MP1201C and MD6420A is as follows.

When Auto Sync is set to On:
Synchronization is executed at the start of measurement, and the measurement is started when the synchronization is established. If SyncLoss is detected during measurement, resynchronization is automatically executed.



When Auto Sync is set to Off:
Measurement is performed on the assumption that synchronization was established at the start of measurement. SyncLoss is not detected during measurement.



Note:

To obtain a BER curve, set Auto Sync On so as to establish synchronization with superior S/N, and then change Auto Sync to Off and start measurement while changing S/N.

3.9.6 Setting PN_Fix pattern

The MG3700A with Option031 installed can use special PN patterns called “PN_Fix pattern” for BER measurement.

The PN_Fix pattern is a pattern that consists of repetition of PN patterns and an incomplete PN pattern shorter than one period.

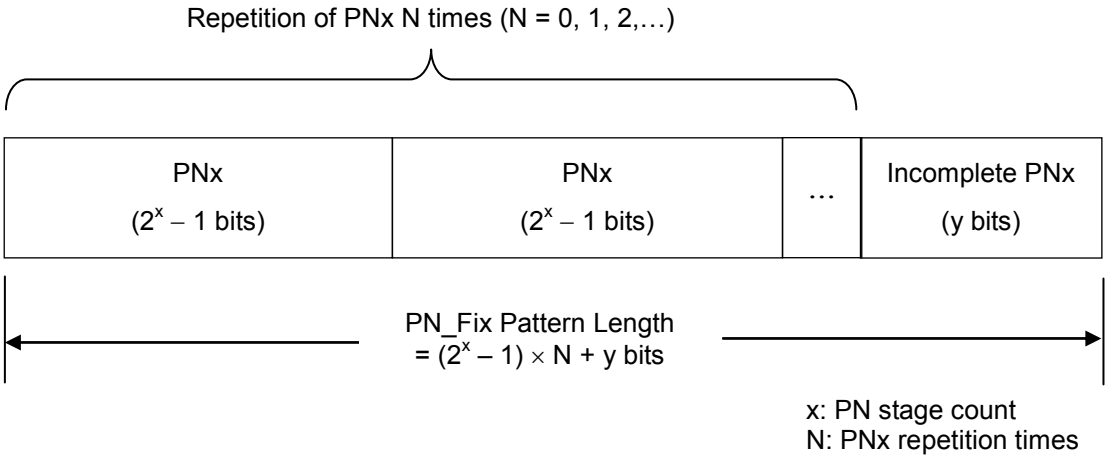


Fig. 3.9.6-1 PN_Fix pattern example

Setting PN_Fix pattern

To use a PN_Fix pattern, set PN9Fix, PN11Fix, PN15Fix, PN20Fix, or PN23Fix for Data Type in the BER Test screen.

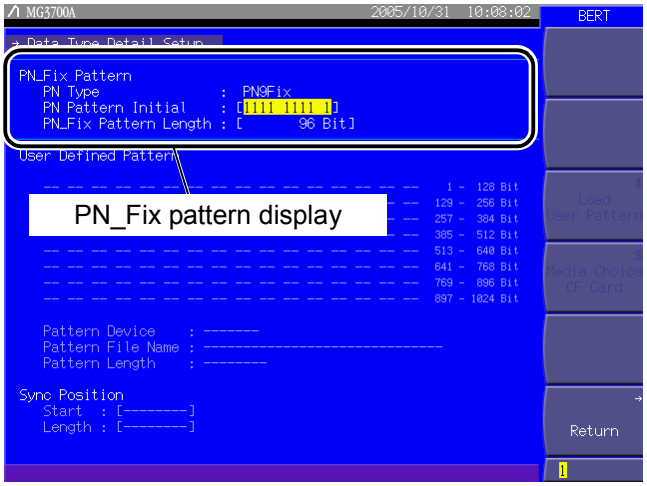


Fig. 3.9.6-2 Data Type Detail Setup screen

After the data type is selected, press More to switch the function menu to the second page.
Pressing F3 (Data Type Detail Setup) allows you to make various settings of the PN_Fix pattern for BER measurement.
Use the cursor to select the desired item to set. Then, press Set to display the setup window associated with that item.

The following are details that can be set in this menu:

<1> PN Pattern Initial

Sets the initial bit pattern of the PN_Fix pattern.

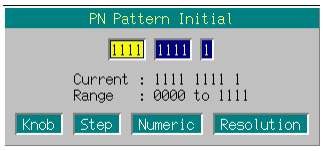


Fig. 3.9.6-3 PN Pattern Initial window

Enter the initial bit pattern of the PN_Fix pattern. The PN Pattern Initial window contains numeric entry cells in which 4-bit data can be entered each. Enter decimal values from 0000 to 1111 into each cell. At this time, if the settable bit count is not a multiple of 4, the number of digits in the rightmost cell becomes less than 4 bits.

Enter numeric values using the 0 and 1 keys on the numeric keypad, rotary knob, or ^ v. The cursor can be moved between the numeric entry cells using < >.
When numeric values are entered, press Set. The entered values are determined and the PN Pattern Initial window is closed.

The settable bit count varies depending on the selected PN type:

PN9Fix: 9 bits
PN11Fix: 11 bits
PN15Fix: 15 bits
PN20Fix: 20 bits
PN23Fix: 23 bits

<2> PN_Fix Pattern Length

Sets the entire length of the PN_Fix pattern.

Range: 96 to 134217729 bits

Synchronization establishing condition for PN_Fix pattern

The synchronization establishing conditions for the PN_Fix pattern is described below.
In the description below, x is assumed as “PN stage count” (x = 9 for PN9).

The synchronization establishment is performed in the following three steps:

[1] Synchronization is established with the PN pattern if no error has been detected for (x × 2) bits.

[2] The last bit of the PNxFix pattern is detected from the set initial bit pattern length of the PN pattern.

[3] Synchronization is established with the entire PN_Fix pattern if no error has been detected for x bits beginning with the head of the PN_Fix pattern.

Fig. 3.9.6-4 below shows a synchronization establishment sequence for the PN9Fix pattern as an example.

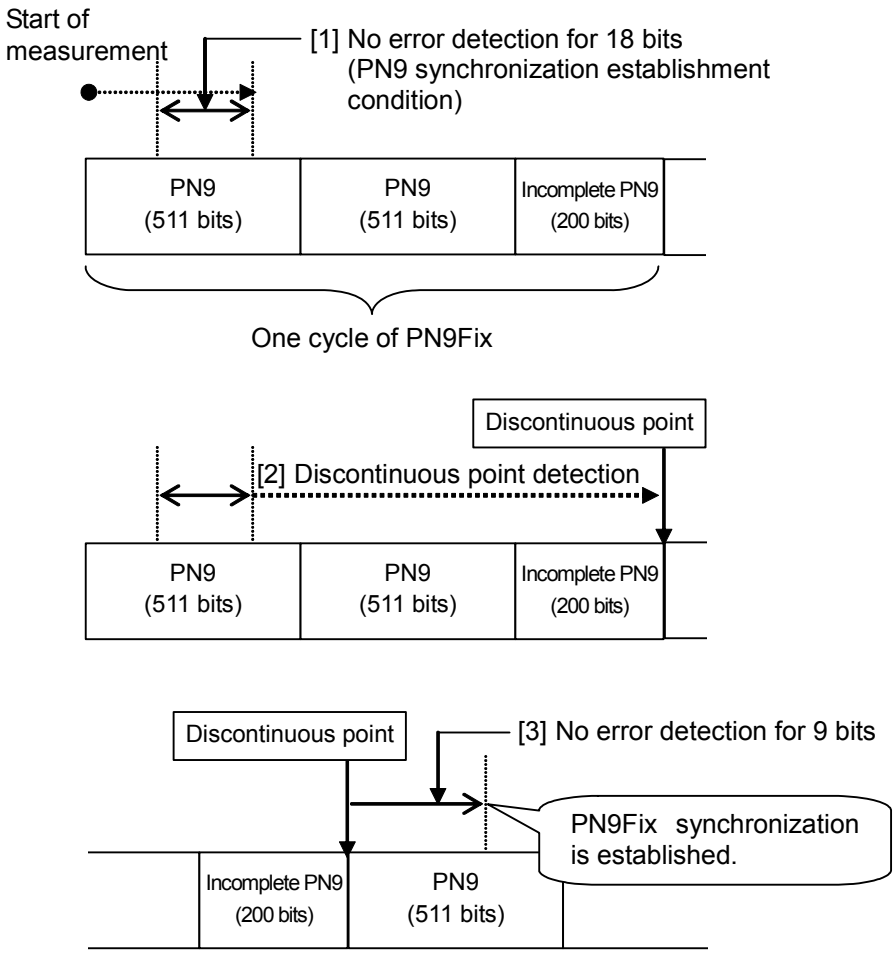


Fig. 3.9.6-4 Synchronization establishment sequence for PN9Fix pattern

PN_Fix pattern use example

A specific example of using a PN_Fix pattern is described below.

The following is described on the assumption that the frame format in a communication system is configured with fixed bits A (10 bits) and communication channels B (1000 bits) as shown in Fig. 3.9.6-5 below.
If PN9 is used for the communication channel, the bit count per frame (1000 bits) does not match the PN9 period (511 bits). In this event, therefore, a period of 511 frames is required so as to retain the continuity of the PN9 signal of the communication channel.
In the case of a signal generator that uses an arbitrary waveform generator such as the MG3700A, however, the number of patterns that can be stored in the waveform memory may decrease or exceed the capacity of the waveform memory if the number of samples of the waveform pattern becomes larger due to increase of the number of frames, as described above.

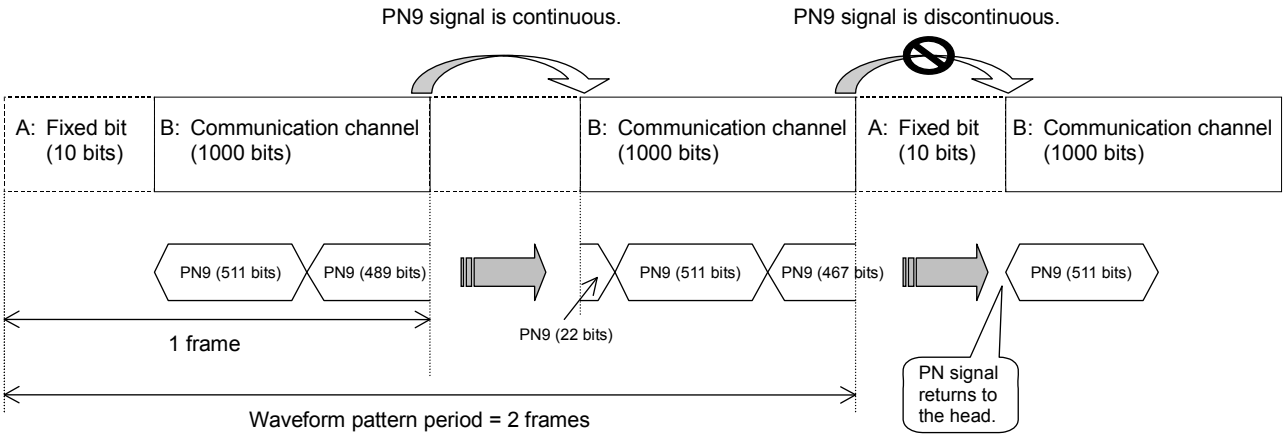


Fig. 3.9.6-5 PN9Fix pattern example

In such a case, use a signal with a short period, such as two-frame period generated by the IQproducer™, and select PNFix for the data type (see Fig. 3.9.6-6 below). BER measurement can then be performed even for signals whose continuity of the PN9 signal is lost in the middle of a frame, as shown in Fig. 3.9.6-5 above.
Refer to the operation manual for each IQproducer™ for how to set the PN_Fix signal for the IQproducer™.

Note, however, that the random nature of a pseudo random signal may partially be lost during measurement using a PN_Fix signal.

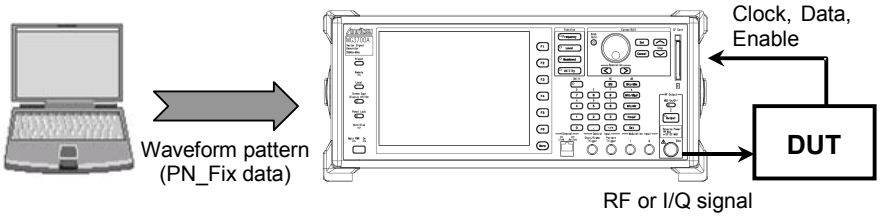


Fig. 3.9.6-6 BER measurement using PN_Fix data

3.9.7 Setting user-defined pattern

The MG3700A with Option031 installed can use patterns that are created by the user (user-defined pattern) for BER measurement.

The user-defined pattern is an arbitrary binary number string with a bit length of 8 to 1024 bits.

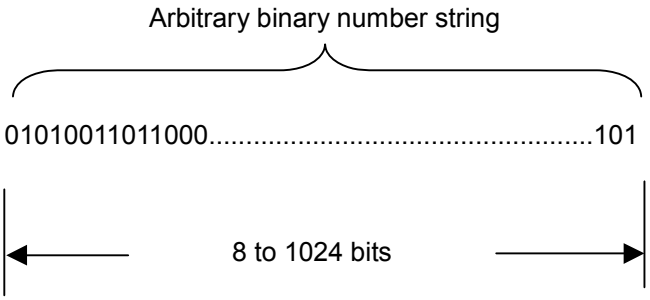


Fig. 3.9.7-1 User-defined pattern example

Create a user-defined pattern on a PC or another device and save it in text file format. Next, load the created file from the CF card or the MG3700A internal hard disk. The file extension must be "*.bpn."

Setting user-defined pattern

To use a user-defined pattern, set UserDefine for Data Type in the BER Test screen.

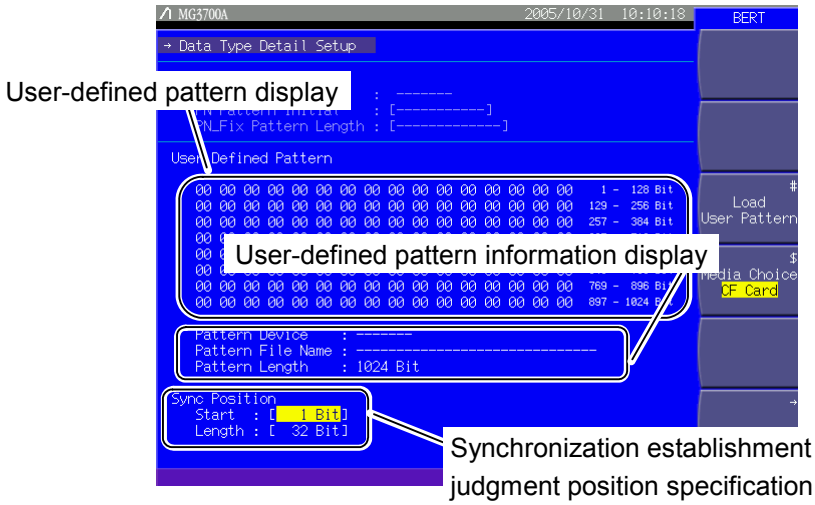


Fig. 3.9.7-2 Data Type Detail Setup screen

After the data type is selected, press More to switch the function menu to the second page.
Pressing F3 (Data Type Detail Setup) allows you to make various settings of the user-defined pattern for BER measurement.
Use the cursor to select the desired item to set. Then, press Set to display the setup window associated with that item.

Table 3.9.7-1 Displayed items in Data Type Detail Setup screen

Display	Description
User-defined pattern display	Displays the contents of the loaded user-defined pattern. User-defined patterns are displayed in hexadecimal.
User-defined pattern information display	Displays the following items of the loaded user-defined pattern: • Load source media • File name • Pattern length
Synchronization establishment judgment position specification	Specify the position used for judging synchronization establishment.

Table 3.9.7-2 Function menu

Page	Key No.	Menu display	Function
1	F1		No function
	F2		No function
	F3	Load User Pattern	Loads a user-defined pattern from the CF card or the MG3700A internal hard disk.
	F4	Media Choice (CF Card / Hard Disk)	Selects either the CF card or the MG3700A built-in hard disk as the source media from which a user-defined pattern is to be loaded.
	F5		No function
	F6	Return	Returns the view to the BER Test screen.

Loading user-defined pattern

To load a user-defined pattern, follow the procedure shown below.

<Procedure>

1. Press F4 (Media Choice) to select either the CF Card (CF card) or Hard Disk (MG3700A internal hard disk) as the source media that contains the desired user-defined pattern file.
2. Press F3 (Load User Pattern) to display the file selection window (Load User Pattern).

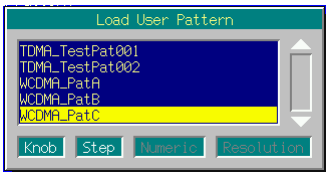


Fig. 3.9.7-3 File selection window

3. Select the desired user-defined pattern file to be loaded using the rotary knob or ∧ ∨.
4. Press Set to load the selected user-defined pattern file.
   If Cancel is pressed, loading of the user-defined pattern file is canceled and the file selection window closes.

Only files whose extension is ".bpn" are displayed in the file selection window (Load User Pattern).

User-defined pattern files must be stored in one of these folders:

- Root directory of the CF card
- "OPT_BER_PATTERN" folder in the CF card
- "OPT_BER_PATTERN" folder in the MG3700A internal hard disk

If user-defined pattern files exist in both the root directory and the "OPT_BER_PATTERN" folder of the CF card, a window will be displayed prompting you to select the load source folder.

Transfer of user-defined patterns to the hard disk is performed by operating the IQproducer™ on an external PC. Refer to the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual IQproducer™ for details on how to operate the IQproducer™.

The file names are displayed in ascending order of numbers and alphabetical characters

Up to 100 files are displayed in the file selection window. The 101st and subsequent files are not displayed.

Up to 32 characters can be used to the file name. Any file whose name consists of 33 characters or more cannot be loaded.

If no user-defined pattern file exists in the media, the "No file to read" message is displayed.

If the CF card slot contains no CF card, the "No memory card" message is displayed. In this case, insert the card, and then press F1 again.

Note that the contents of the loaded user-defined pattern file are displayed in hexadecimal on the data Type Detail Setup screen, while user-defined patterns are described in binary.

Either of the following messages will be displayed if the length of the user-defined pattern is out of the range supported by the MG3700A.

- If shorter than 8 bits: "Bit pattern is too short."
- If longer than 1024 bits: "Bit pattern is too long."

The error message "Illegal character exist." will be displayed if the user-defined pattern file contains a character other than "0", "1", a line feed character.

Setting synchronization establishing condition for user-defined pattern

When the user-defined pattern is loaded, set the synchronization establishing conditions.
As the conditions, set the start bit and the length of the part to be used for judging the synchronization establishment. If no error was detected in the specified part, it is judged that synchronization is established.

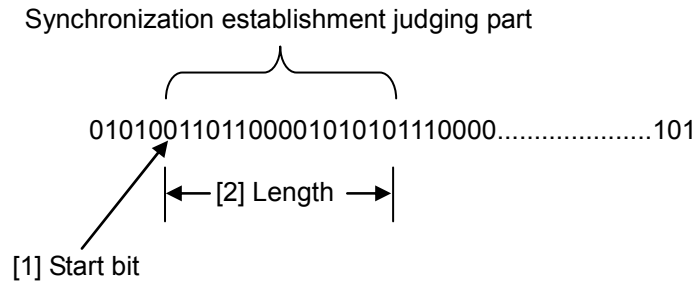


Fig. 3.9.7-4 Setting part for judging synchronization establishment

<Procedure>

1. Set the start bit of the part for judging the synchronization establishment.
   Move the cursor to [Start: [ ]] and then press Set to display the window for setting the start bit of the part for judging synchronization establishment (Sync Position Start).
   Set the start bit using the numeric keypad, rotary knob, or ^ v.

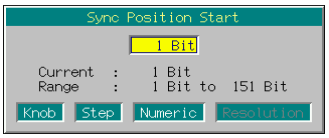


Fig. 3.9.7-5 Sync Position Start window

   Range: 1 to the length of the user-defined pattern

2. Set the length of the part for judging the synchronization establishment.
   Move the cursor to [Length: [ ]] and then press Set to display the window for setting the length of the part for judging synchronization establishment (Sync Position Length).
   Set the part length using the numeric keypad, rotary knob, or ^ v.

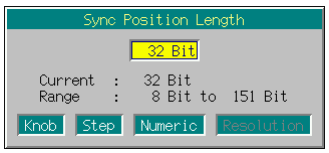


Fig. 3.9.7-6 Sync Position Length window

   Range: 8 to the length of the user-defined pattern

Format of user-defined pattern file

The conditions required for the files to be loaded into the MG3700A as a user-defined pattern are as follows:

- The file extension is ".bpn."
- The file must be a text format file consisting of "0", "1", and/or line feed characters.
- The number of characters excluding line feed characters is 8 to 1024.

The following shows examples of the file that can be loaded.

Example 1:
00100111011000110000111101

Example 2:
00000000
11111111
01010101
00001111

3.9.8 Setting input interface

Fig. 3.9.8-1 Input interface setup screen (BER Interface Setup)

On the BER Test screen, switch the function menu to the second page. Pressing F2 (BER Interface Setup) allows you to make various settings for the input interface used for BER measurement.
Use the cursor to select the desired item to set. Then, press Set to display the setup window associated with that item. The settings for the input interface can be configured without stopping the measurement.

The following are details that can be set in this menu:

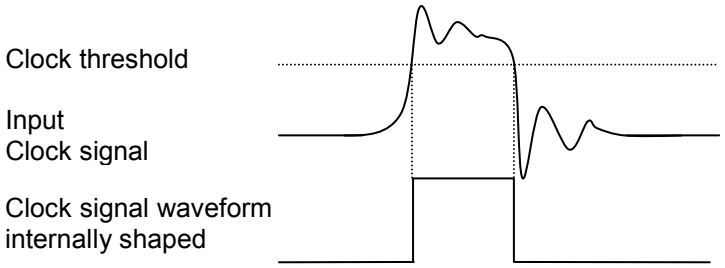
- Input Impedance (50 Ω/Hi-Z)
  Sets the input impedance from 50 Ω and high impedance. This setting commonly applies to the Clock, Data, and Enable connectors.
- Clock Edge (Rise/Fall)
  Sets the Clock signal detection edge from the rising edge and the falling edge.
- Clock Threshold
  Sets the threshold level for detecting the Clock signal edge.
  Range: 0.2 to 3.0 V
- Data Polarity (Positive/Negative)
  Sets the logic of the Data signal from positive and negative.
- Data Threshold
  Sets the threshold level for the Data signal.
  Range: 0.2 to 3.0 V

- Data Delay
  Sets the Data signal capturing timing in relation to the Clock signal.
  Range: –1 to +15 clocks
  When Data Delay > 0, the phase of the Data signal gets behind other signals.
  When Data Delay < 0, the phase of the Data signal comes before other signals.
- Enable Active (Disable/High/Low)
  Sets the logic of the Enable signal from high active, low active, and unuse.
- Enable Threshold
  Sets the threshold level for the Enable signal.
  Range: 0.2 to 3.0 V
- Enable Delay
  Sets the Enable signal capturing timing in relation to the Clock signal.
  Range: –1 to +15 clocks
  When Enable Delay > 0, the phase of the Enable signal lags other signals.
  When Enable Delay < 0, the phase of the Enable signal precedes other signals.

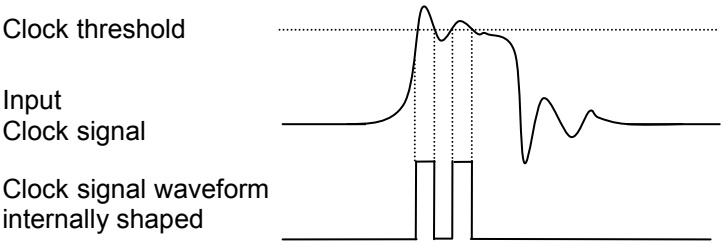
Note:

If an improper value is set for Input Impedance or Clock Threshold above, the Clock signal waveform after waveform shaping may be wrong, causing malfunctions of the internal BER measuring circuit. Since the measurement is stopped if the BER measuring circuit malfunctions, it is therefore required to check the values set for Input Impedance and Clock Threshold and set proper values.

When Clock Threshold and Input Impedance are set properly:



When Clock Threshold and Input Impedance are not set properly:



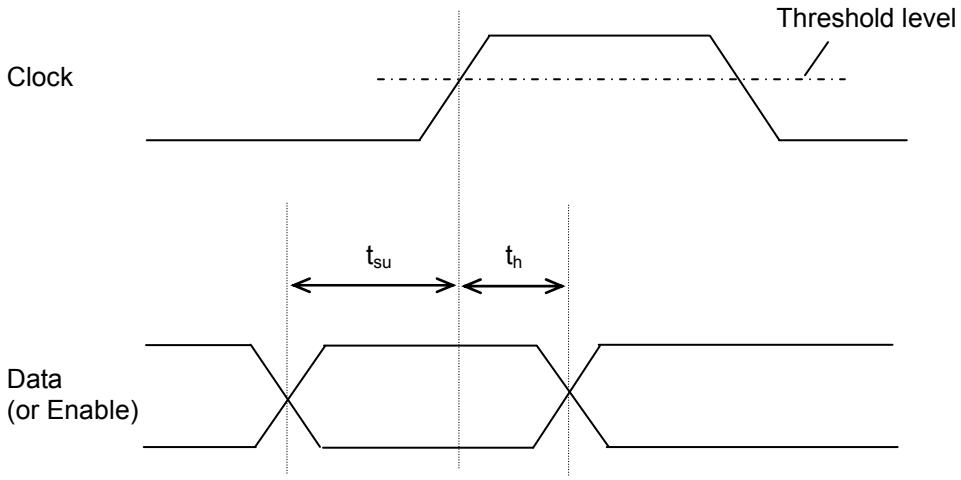
The BER Interface Setup screen provides the same operations as those on the first page of the function menu on the BER Test screen. The table below lists the operations available from the function menu on the BER Interface Setup screen.

Table 3.9.8-1 Function menu

Page	Key No.	Menu display	Function
1	F1	Measure START	Starts the BER measurement.
	F2	Measure STOP	Stops the BER measurement.
	F3		No function
	F4	Count Clear	Clears the measurement bit count and measurement error bit count.
	F5		No function
	F6	Return	Returns the view to the utility setup screen.

Input signal timing

The following figure shows the input timing of the Data and Enable signals in relation to the Clock signal, when Clock Edge is set to Rise. Be sure to input the Data and Enable signals that satisfy t_{su} and t_h in this figure.



Symbol	Description	Minimum Value
t_{su}	Input setup time to Clock	3.0 ns (typ.)
t_h	Input hold time from Clock	0.5 ns (typ.)

3.9.9 Displaying BER measurement log

This function displays the result of a previous BER measurement, and can also save it in a file.

Displaying BER Measurement Log

Press (More) to switch to the third page, and then press (F1) (BER Test Log). The measurement result log is displayed.
Up to 100 items of log can be displayed, beginning with the latest.

The display format is as follows:

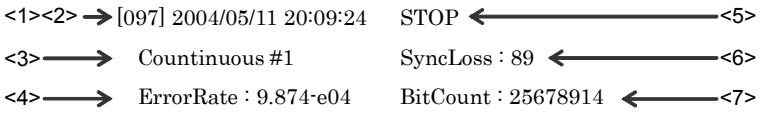


Fig. 3.9.9-1 BER measurement log display example

Table 3.9.9-1 Displayed items in BER measurement log

No.	Display item	Description
<1>	Number	Displays the log number. Assigned in descending order, beginning with the latest measurement.
<2>	Date/Time	Displays the date and time that the measurement ended.
<3>	Measure Mode	Displays the mode in which the measurement was performed. In the Continuous mode, measurement count is also displayed.
<4>	Error Rate	Displays the result of error rate measurement.
<5>	Cause of Termination	Displays the cause of termination.
<6>	SyncLoss	Displays the number of SyncLoss errors (only when Auto Resync is set to On).
<7>	Bit Count	Displays the number of measured bits.

Table 3.9.9-2 Display items of Cause of Termination

Display	Description
OK	The measurement terminated normally when the set measurement bit count or the set measurement error bit count was exceeded.
STOP	The measurement stopped because F2 (Measure Stop) was pressed, or a parameter was set.
OVERFLOW_ DATA COUNT	The measurement stopped because the measurement bit count exceeded the maximum value.
OVERFLOW_ SYNCLOSS	The measurement stopped because the number of SyncLoss errors exceeded the maximum value.
ABNORMAL_ COUNT	The measurement stopped because the BER measuring circuit is malfunctioning.
CLEAR	Indicates that the measured values are cleared because the Count Clear button is pressed. This does not indicate the stop of measurement.

Deleting BER Measurement Log

Press More to switch to the third page, and then press F3 (Clear Log) to delete the log.
The log is also deleted when the MG3700A is turned off.

Saving BER Measurement Log in File

This function saves the log of the measurement result in a text file.
To save a log file, follow the procedure:

Example: Saving the measurement result log under a file name of [ABC]

<Procedure>

1. Press More to switch the function menu to the third page.
2. Press F5 (Media Choice) to select either the CF Card or Hard Disk as the destination media.
3. Press F2 (Save Log) to display the file name entry window (Save Log).

Fig. 3.9.9-2 File name entry window

4. Enter the file name.
   The initial setting is [bert***] in the text box. (*** represents the date and time the File Name window opened.)
   In this example, the file is desired to be named [ABC]. Thus, first press Shift • and CE BS in order. Then, delete all the characters from the text box.
5. Move the character selection cursor to [A] using the rotary knob or < > ^ v.
6. Press Set to enter [A] in the text box.
7. Enter the remaining characters [B] and [C] in the same manner.
8. Once [ABC] has been entered in the text box, move the character selection cursor to End and press Set. The log file is saved under the entered file name.

For details of the keys available for file name entry, refer to "Entering Character String" in Section 3.2.2 "Opening setup window to set parameters." Digits and the decimal point can be entered also with the numeric keypad.

When a file name is entered, its extension is added automatically. You cannot set any optional extension.

Up to 30 characters can be entered for a file name.

The characters below are not available for file names with any of these included in a file name, it cannot be determined.
' (apostrophe) / : , ; * ? < > | $ ~

If a space or [.] (dot) is placed at the first or last column of the character string, the file name cannot be determined.

Deleting Log File

This function deletes a log file saved in the CF card or on the internal hard disk.

<Procedure>

1. Press More to switch the function menu to the third page.
2. Press F5 (Media Choice) to select either the CF Card or Hard Disk as the source media that contains the desired log file to be deleted.
3. Press F4 (Delete Log File) to display the file selection window.
4. Select the desired log file to be deleted using the rotary knob or step keys ^ v.
5. Press Set to delete the selected log file.
6. If Cancel is pressed, the file selection window closes without deleting the log file.

The file names are displayed in ascending order of digits and alphabetical characters

Up to 100 files are displayed in the file selection window. The 101st and subsequent files are not displayed.

Any file whose name consists of 33 characters or more is not displayed in the file selection window.

If the media contains no log file, the “No file to read” message is displayed.

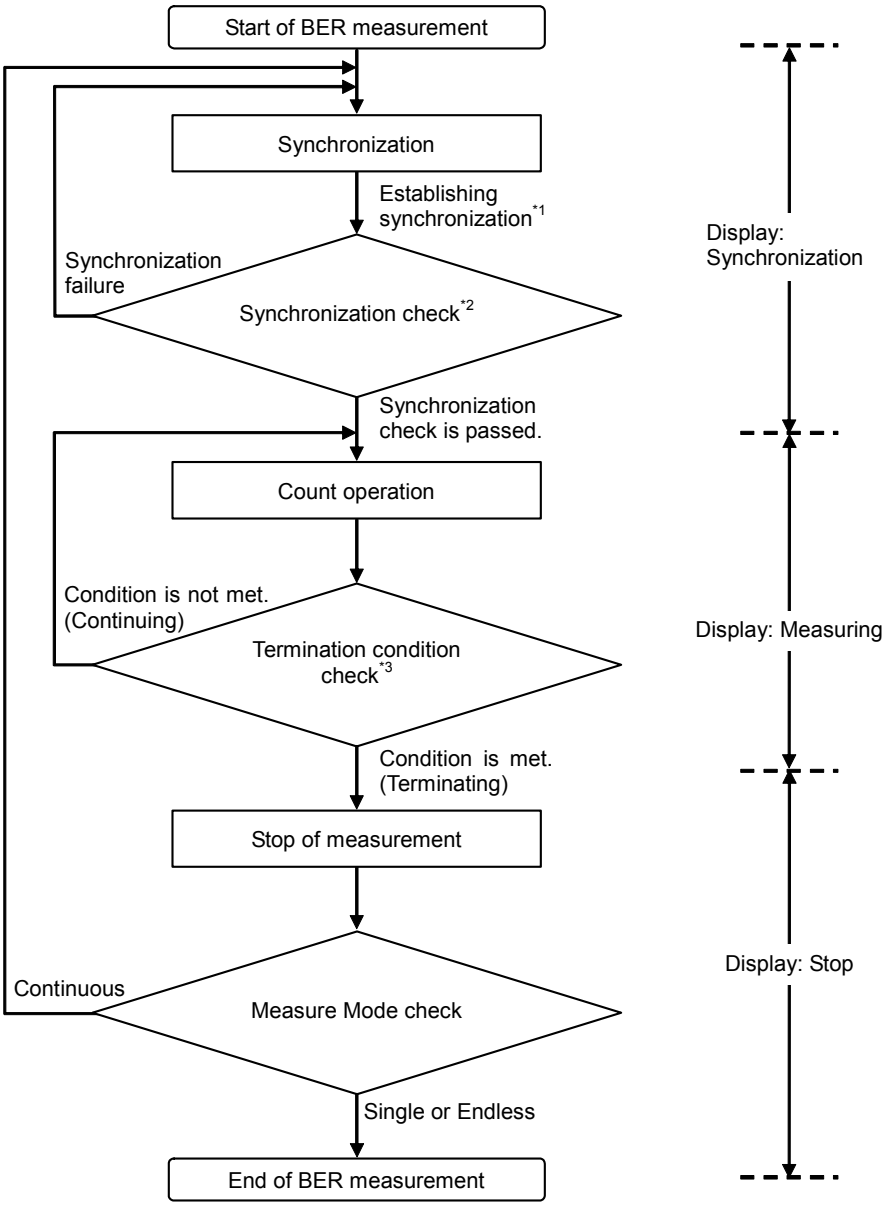
If the CF card slot contains no CF card, the “No memory card” message is displayed. In this case, insert the card, and then press F4 again.

3.9.10 Overview of BER measurement operation

This section describes the BER measurement operation from synchronization to measurement termination.

When Auto Resync is set to Off

The following flowchart summarizes the BER measurement operation when Auto Resync is set to Off. In this mode, the error rate is checked immediately after synchronization in order to judge whether the synchronization is correctly established. If the error rate is 30% or higher, it is judged as a synchronization failure, and re-synchronization is executed.



*1: The error rate is not checked if the measurement is terminated with a measurement bit count of less than 1000 bits. The measured values may be incorrect in this event.

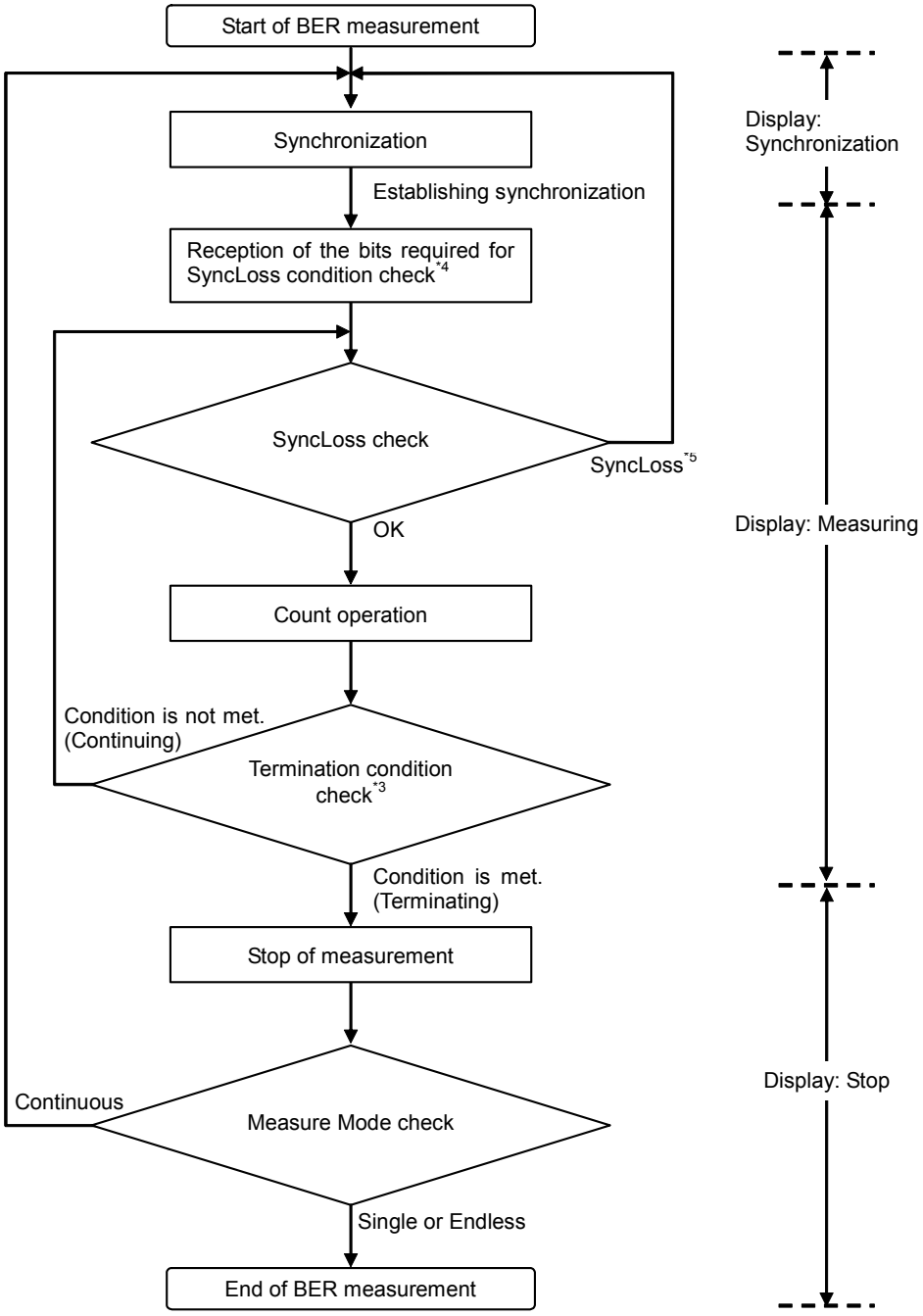
*2: If the error rate when the measurement bit count reaches 1000 bits is 30% or higher, it is judged as a synchronization failure.

*3: The measurement termination conditions are as follows:

- The accumulated measurement bit count or measurement error bit count reaches the set bit count.
- The measurement bit count exceeds the maximum value.
- The number of SyncLoss errors exceeds the maximum value.

When Auto Resync is set to On

The following flowchart summarizes the BER measurement operation when Auto Resync is set to On. In this mode, resynchronization is automatically executed when SyncLoss occurs.



*3: The measurement termination conditions are as follows:

- The accumulated measurement bit count or measurement error bit count reaches the set bit count.
- The measurement bit count exceeds the maximum value.
- The number of SyncLoss errors exceeds the maximum value.

*4: The SyncLoss condition check is not executed until the number of received bits reaches as the dominator of the SyncLoss threshold set in [Threshold] on the Resync Condition Setup screen. Therefore, it may take some time to start the count operation after synchronization is established.

*5: The operation after occurrence of SyncLoss is performed according to the setting specified in “at SyncLoss” on the Resync Condition Setup screen.

3.10 Convenient Functions

3.10.1 Locking panel

The panel lock function disables all the keys, except for the front-panel power switch, Local, and Panel Lock keys. With the panel locked, you can perform measurement tasks with confidence, because the settings are protected from alteration that is due to inadvertent pressing of a key.

Pressing Panel Lock causes the key lamp to light up, placing the MG3700A in panel locked state.

If Panel Lock is pressed while a setup window is open, the view returns to the initial screen where the window did not opened yet. All the keys are disabled in this case.

Press Panel Lock again to unlock the panel with the key lamp going off.

3.10.2 Locking rotary knob

Press Knob Hold on the left of the rotary knob. With the key lamp going on, the rotary knob is locked. With the knob locked, you can perform measurement tasks with confidence, because no numeric values can change even though a key is touched inadvertently.
While the rotary knob is left locked, the cursor on the screen is smaller than usual.

Press Knob Hold again to unlock the rotary knob with the key lamp going off.

3.10.3 Screen display on/off functions

To reduce electromagnetic waves emitted from the display screen, you can blank out the display.

Press Screen Copy Display Off/On on the front panel. The key lamp lights up, and the screen display blanks out.

While the display screen is out, all the keys, except for the power switch and the Local and Panel Lock keys are disabled.

Press Screen Copy Display Off/On again to restore the screen display with the key lamp going off.

3.10.4 Alarm display

When an error occurs during equipment operation, the MG3700A displays an alarm indicating information about the error. The alarm display history can be saved in the CF card or on the internal hard disk. By performing the following steps, the function menu is switched to the alarm display function.

<Procedure>

1. Press the Utility main function key to switch to the utility setup mode.
2. Press F3 (Alarm Monitor) to display the following alarm display menu.

Table 3.10.4-1 Function Menu

Page	Key No.	Menu display	Function
1	F1	Display Current Alarm	Displays the cursor alarm.
	F2	Save Alarm History	Saves the alarm display history.
	F3	Media Choice (CF Card / Hard Disk)	Selects either the CF card or internal hard disk as the destination media for the display history.
	F4		No function
	F5		No function
	F6	Return	Exits alarm display.

Displaying Alarms

Press F1 (Display Current Alarm) to display the current alarm(s).
If no alarm has occurred, "No Alarm" is displayed.
Alarm display details are described below:

Table 3.10.4-2 Description of alarm display

Display	Description
Internal Ref CLK Unlock	Displayed when the internal reference clock is unstable 5 min later after the MG3700A is powered on.
ALC Alarm	Displayed when a failure is detected regarding operation of the ALC circuit.
BB Ref CLK Unlock	Displayed when the internal reference clock used for baseband is unstable.

Saving Alarm Display History

This function saves an alarm display history in a text file.

Press [F3] (Media Choice) to select the destination. Then, press [F2] (Save Alarm History) to display the confirmation window. Move the cursor to [Yes] and press [Set] to save the history in the file.

Up to 100 display histories can be saved.

The file is named [Alarm***.txt], and cannot be renamed. (*** represents the date and time [F2] was pressed.)

If a file with the same name already exists, the new file is saved by overwriting.

3.10.5 Screen copy

This function copies the current screen image in a bit-mapped format in the CF card or on the internal hard disk. To copy the screen image, follow the procedure below:

Setting Up Screen Copy

<Procedure>

1. Press the [Utility] main function key to switch to the utility setup mode.
2. Press [F6] (Common Setup) to open the common setup screen.
3. Move the cursor to [Screen Copy] using the rotary knob or [∧] [∨].
4. Move the cursor to [Media Choice], and press [Set] to open the image file saving destination selection window (Select Media). Select either CF card or Hard Disk as the destination media using the rotary knob or [∧] [∨]. Then, determine the selection by pressing [Set].
5. Move the cursor onto [Bitmap Setup], and press [Set]. The bitmap setup window (Set Bitmap) is displayed. Select either Color or Gray Scale for the image file to save. For this selection, use the rotary knob or [∧] [∨], and then determine the selection by pressing [Set].
6. Press [F6] (Return) to complete the setup.

Performing Screen Copy

<Procedure>

1. Display the screen the image of which is desired to be copied.
2. Press Shift and then Screen Copy Display Off/On. The screen image is copied in a bitmap file in the selected destination media.

   On completion, the window displays the file name.

Fig. 3.10.5-1 Saving file name display window

Image files are automatically named [SG000.BMP], [SG001.BMP], [SG002.BMP], and so on, in order. Next to [SG999.BMP], the file name returns to [SG000.BMP].

3.10.6 Turning on/off buzzer

This function turns On/Off the buzzer, which indicates a warning when erroneous operation is made.
To turn On/Off the buzzer, follow the procedure below:

<Procedure>

1. Press the Utility main function key to switch to the utility setup mode.
2. Press F6 (Common Setup) to open the common setup screen.
3. Move the cursor to [Buzzer] using the rotary knob or ∧ ∨.
4. Press Set to display the item selection window (Select Item). Select either On or Off using the rotary knob or ∧ ∨. Then, determine the selection by pressing Set.
5. Press F6 (Return) to close the common setup screen.

3.10.7 Setting date/time

The MG3700A has an internal clock that displays the current date and time.
To set the date and time, follow the procedure below:

<Procedure>

1. Press the Utility main function key to switch to the utility setup mode.
2. Press F6 (Common Setup) to open the common setup screen.

3. Move the cursor to [Time Set] using the rotary knob or [^] [v]. The following can be set in [Time Set]:
   - Year Year
   - Month Month
   - Day Date
   - Hour Hours
   - Minute Minutes
   - Second Seconds
4. Press [Set] to display the Numeric Value window. Enter the numeric value using the rotary knob or [^] [v]. Then, determine the selection by pressing [Set].
5. Press [F6] (Return) to close the common setup screen.

3.10.8 Check-ATT display On/Off function

When one or more mechanical attenuators (optional) have operated 20 million times, "Check-ATT" is displayed on the screen. This display can be hidden using the Check-ATT display On/Off function. This setting is retained even after initialization (preset, preset power on, and installation of firmware), because it is saved in a nonvolatile memory.

To turn on/off this function, follow the procedure below:

<Procedure>

1. Press the [Utility] main function key to switch to the utility setup mode.
2. Press [F6] (Common Setup) to open the common setup screen.
3. Move the cursor to [ATT Warning (Over 20million Times)] using the rotary knob or [^] [v].
4. Press [Set] to display the Item selection window. Set On or Off using the rotary knob or [^] [v]. Then, determine the selection by pressing [Set].
5. Press [F6] (Return) to close the common setup screen.

3.10.9 Displaying miscellaneous information

This function displays the MG3700A operation time, the product vector information, the self-diagnosis, and other information.
To display miscellaneous information, first press Utility to switch to the utility setup mode.

Displaying Operation Time

Press More to switch the function menu to the second page. Then, press F1 (Maintenance Check) to display the Maintenance Check window. In addition to the MG3700A operation time, this window displays the switching count of the mechanical attenuator (option).

Displaying Product Information

Press More to switch to the second page. Then, press F2 (Product Information) to display the Product Information window. In addition to the MG3700A model name, model number, serial number, this window displays the names of the currently installed options.

Displaying Result of Self-diagnosis

Press More to switch to the second page. Then, press F3 (Hardware Check) to display the Hardware Check window. In addition to the result of the power-on time self-diagnosis, this window displays the version information about the components of the MG3700A body.
When Option031/131 is installed, it is also possible to display the diagnosis results of Option031, as well as its version information, by pressing F1 (Option Hardware Check).

3.10.10 Installation

This function installs firmware or a waveform pattern license file in the MG3700A.

Installation Mode

To install firmware or a waveform pattern log file in the MG3700A, the MG3700A installation mode must be opened.
To open the installation mode, follow the procedure below:

<Procedure>

1. Press Utility to switch to the utility setup mode.
2. Press More to switch the function menu to the second page. Then, press F4 (Install) to open the installation mode.

Table 3.10.10-1 Function Menu

Page	Key No.	Menu display	Function
1	F1	Firmware Install	Displays the Firmware Install window.
	F2	Waveform Data License Install	Displays the Waveform Data License Install window.
	F3		No function
	F4		No function
	F5		No function
	F6	Return	Exits the installation mode, and returns the mode to utility setup.

Installing Firmware

This function can install a firmware version that has been upgraded. Press F1 (Firmware Install) to display the firmware installation screen. It displays the MG3700A initial program loader (IPL), the operation software, and the FPGA versions of the components.
By updating the firmware, the operation software and the FPGA versions of the components can be upgraded.
To install firmware, follow the procedure below:

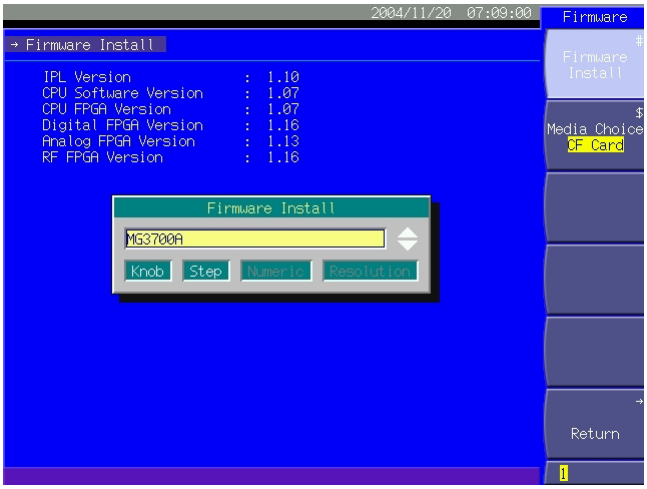


Fig. 3.10.10-1 Firmware installation screen

<Procedure>

1. Press F2 (Media Choice) to select either CF Card or Hard Disk as the media containing the Firmware.
2. Press F1 (Firmware Install) to display the file selection window. Select the desired firmware to install, and then press Set.
3. The installation confirmation displays the "Do you install firmware?" message. Move the cursor to [Yes] and press Set to start the installation.
4. On completion, the MG3700A is automatically powered on 5 seconds later.

Note:

When a new firmware version is installed, the parameters are initialized to the initial settings. To restore them to the previous settings, you must have saved the parameters before upgrading, and (after installation) read them into the MG3700A.

The firmware stored in the [FIRMWARE] folder in the root folder of the media specified in Step 1 can be installed. The firmware consists of the following six types of files, which are stored in the [FIRMWARE] folder.

- ***.inf
- ***.mca
- ***.mcb
- ***.mcd
- ***.mcr
- ***.dsg

Transfer of the firmware to the hard disk is performed by operating the IQproducer™ on an external PC. Refer to the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual IQproducer™ for details on how to operate the IQproducer™.

If the installation confirmation window displays the "Firmware becomes old version, but Install?" message, this indicates that the firmware version you are installing is older than the existing version. If you want to install the older version, move the cursor to [Yes] and press Set to start the installation.

Once the installation starts, do not attempt to remove the CF card or power off the MG3700A until the installation completes and the system restarts automatically.

Installing Waveform Pattern License File

To use waveform patterns on the MG3700A, you must have installed the log file associated with the patterns.

Press F2 (Waveform Data License Install) to display the Waveform Data License Install window. On this screen, the Wave data License Information window lists the licenses.

To install the log files, follow the procedure below:

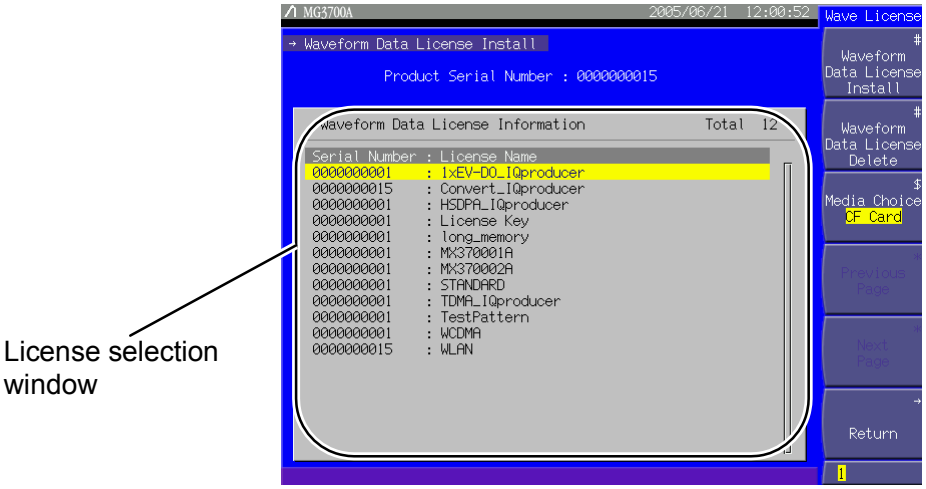


Fig. 3.10.10-2 License file installation screen

<Procedure>

1. Press F3 (Media Choice) to select either CF Card or Hard Disk as the media containing the license file.
2. Press F1 (Waveform Data License Install) to display the license file selection window (License Key).

Fig. 3.10.10-3 License file selection window

3. Select the desired license file to be installed using the rotary knob or ^ v.

4. Press [Set] to start the installation of the selected license file.

> Up to 100 licenses can be installed.
>
> Create a [WAVE_LICENSE] folder in the root directory of the device selected in Step 1, and store the license file(s) in it.
>
> To install a license file from the hard disk, you must have transferred it from the external PC to the MG3700A by using IQproducer™. For working with IQproducer™, refer to the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual IQproducer™.

Deleting License File

This function deletes a license file installed in the MG3700A.
To delete a license file, follow the procedure below:

<Procedure>

1. Select the desired license to be deleted, from those listed in the license file selection window, using the rotary knob or [∧] [∨].
2. Press [F2] (Waveform Data License Delete) to display the confirmation window.

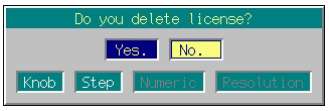


Fig. 3.10.10-4 Deletion confirmation window

3. Move the cursor to [Yes], and press [Set] to delete the selected license.

> To cancel the delete process, press [Cancel], or move the cursor to [No], and press [Set].

3.10.11 Backup function

When the MG3700A is powered off, the current settings are backed up in internal memory. When the MG3700A is powered on next time, the initial settings before power off are restored.
The backed up settings are as follows:

Table 3.10.11-1 Backup target items (1 of 2)

Frequency setup mode	Frequency settings Selected channels Frequency step setting Frequency switching speed setting RF spectrum setting Frequency display/channel display switching setting Channel table Frequency display On/Off when channels are displayed
Output level setup mode	Output level setting (including unit) Level step setting Offset On/Off Offset Relative level display On/Off Relative level display reference level Open circuit voltage display/terminated voltage setting External ALC On/Off RF output On/Off
Digital modulation setup mode	Modulation On/Off Waveform file loaded in memory Selection of waveform file used for modulation Edit/Defined mode switching Selection of output memory Output levels for Memories A and B Start offset Frequency offset Output level ratio Reflection destination for output level ratio changes Sequence operation status (in the sequence mode) Element switching timing (in the sequence mode) Detail Info display I/Q source internal/external switching I/Q output On/Off Ext I/O Setup settings I/Q Tuning settings Advanced Menu settings

Table 3.10.11-2 Backup target items (2 of 2)

Save/read parameters	Selection of destination/source media
BER measure mode	[When Option031/131 is not installed] Input signal polarity setting Auto Resync function, measurement mode, measurement termination condition, measurement time, measurement bit count, data type setting Selection of destination media of measurement results [When Option031/131 is installed] Settings for various input signals, including polarity, threshold level, delay, and input impedance Auto Resync function, measurement mode, measurement termination condition, measurement bit count, measurement error bit count, data type setting PN Fix setting User-defined pattern setting Selection of destination media of measurement results
Others	Panel lock On/Off Rotary knob lock On/Off Screen display On/Off Selection of destination media of alarm display history Interface Setup settings Network Setup settings Common Setup settings (except date/time settings) Selection of destination media for firmware and license files

Backup is not supported for the following items:

- Contents in progress of data input
- Remote state
- Contents in progress of GPIB data transfer
- Screen transition
- Main function selection state. (Immediately after powered on, the MG3700A always opens the baseband setup mode.)
- Continuous mode On/Off. (Always reset to Off.)
- RF output phase (Always reset to 0.)
- Timer (Working also while the main power is off.)
- Operating/stopping state of BER measurement. (Placed in stopping state.)
- BER measurement log
- Current alarm
- Element number during a sequence mode operation (the first element will be restored.)

3.10.12 Preset

Press Preset to display the following confirmation window. Move the cursor on [Yes] and press Set. The MG3700A settings are restored to those listed in Appendix C. (Note that the setting of the Check-ATT display On/Off function is not initialized.)

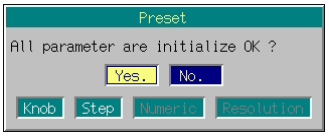


Fig. 3.10.12-1 Preset confirmation window

3.10.13 Preset power on

When the MG3700A is powered off, power on the MG3700A while holding down Preset. All the MG3700A settings return to the factory defaults. (Note that the setting of the Check-ATT display On/Off function is not initialized.)

Note:

Note that this operation clears all the saved contents of memory. Do not perform preset power-on unless it is unavoidable to resolve the problem.

3.11 Handling CF Card

This section describes how to handle the CF card, which you need to use when saving a parameter file or installing a license file.

3.11.1 Requirements for use of CF card

To use the CF card with the MG3700A, observe the following:

<Procedure>

1. Only the following files may be stored in the CF card:
   - Files and folders generated with the MG3700A main unit
   - Anritsu-supplied files and folders to be installed in the MG3700A
   - Files and folders generated with Anritsu-supplied application software for use in the MG3700A

2. Each folder may contain up to 100 files with the same extension or up to 100 folders.
3. Do not change the folder and file names.
4. Do not attempt to remove the CF card or power off the MG3700A in any of the following cases:
   - Immediately after the CF card is inserted into the card slot (While a message of "Don't remove card. Now configuring…" is displayed)
   - File saving to the CF card is in progress.
   - Data read or deletion from the CF card is in progress.

5. For storing the CF card, refer to Section 6.1.4 "Storing CF cards."
6. The supported file system is FAT.
7. Do not save a file and/or folder with a Japanese file/folder name (i.e., using 2-byte characters).

If the CF card is not used without conforming to the above requirements, Anritsu Corporation does not guarantee the operation.

It is recommended to use a supplied CF card (Model P0022).

3.11.2 CF card directory configuration

The following are the directory configuration of the CF card used with the MG3700A and the types of the files to be saved in the folder:

+--[IPL]	IPL data
+--[FIRMWARE]	Firmware
+--[SCREEN_IMAGE]	Screen-copied BMP image file
+--[PACKAGE]	Waveform pattern or package
+--[CHANNEL]	Saved channel table file
+--[APM]	Saved parameter file
+--[WAVE_LICENSE]	License file of waveform patterns
+--[SGLOG]	Log of the MG3700A
+--[ALARMLOG]	Saved alarm display log file
+--[BERTLOG]	Saved BER measurement log file
+--[OPT BER PATTERN]	User-defined pattern file for BER measurement (only when Option031/131 is installed)

Section 4 Remote Control

This section describes the remote control of the MG3700A.

4.1 Overview

The MG3700A supports a GPIB interface (IEEE Standard 488.2-1987) and Ethernet (100Base-TX) interface so it can team up with an external controller to automate measurement tasks.

The remote control facility of the MG3700A includes the followings:

- Controlling of all functions, except for the power switch, the Local key, and the Panel Lock key
- Reading of all the status and settings
- Setting of GPIB addresses from the panel
- Enabling interrupts and serial polls (GPIB)
- Selecting of the use of the interface from the panel
- Building an automatic measurement system in conjunction with an external controller and any other measuring instruments

When the MG3700A is remotely controlled, there are the following restrictions on the control interface:

- The GPIB interface and Ethernet cannot be used simultaneously.
- The interface that is used for the remote connection first takes precedence.

4.2 Setting Up System

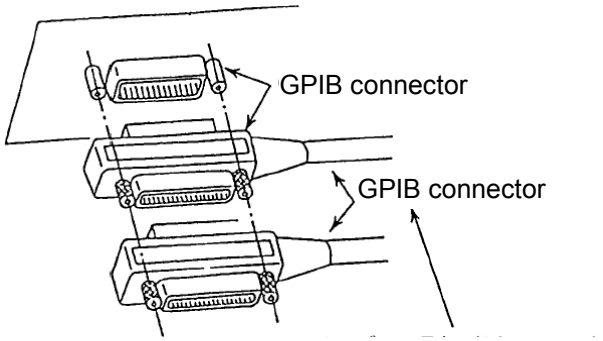
4.2.1 Connecting devices using GPIB cables

Connect the GPIB connector on the rear panel of the MG3700A and that of an external device using a GPIB cable.

Note:

Be sure to connect the GPIB cable before turning the MG3700A power on.

Up to 15 devices including the controller can be connected into one system. Be sure to abide by the conditions shown below when connecting devices.



Total cable length:	Up to 20m
Cable length between devices:	Up to 4 m
Number of devices that can be connected:	Up to 15

Fig. 4.2.1-1 GPIB cable connection

Setting GPIB interface conditions

Press Utility and F4 (Interface Setup) to open the Interface Setup screen. Set GPIB interface conditions on this screen.
Move the cursor to the item to be set and press Set to open the setup window for that item..

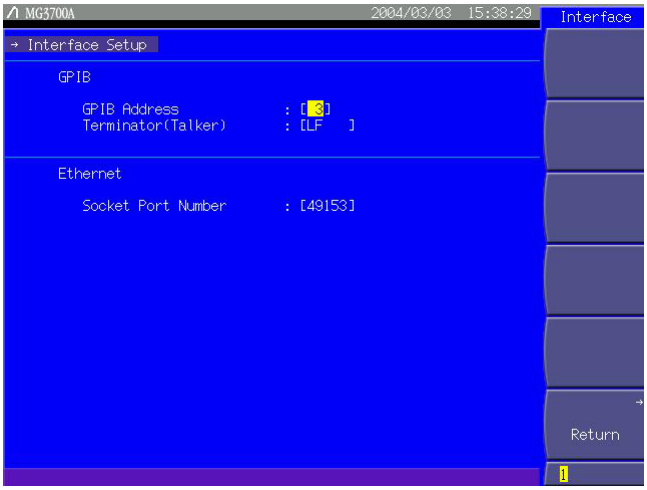


Fig. 4.2.1-2 Interface Setup screen (for GPIB interface conditions)

The table below lists the items that can be set up on this window.

Table 4.2.1-1 GPIB interface setup items

Item	Description
GPIB Address	Set an arbitrary address. Setting range: 0 to 30
Terminator (Talker) (LF / CR/LF)	Set a terminator for a talker.

4.2.2 Example of system setup with GPIB

Host computer control

The MG3700A and a waveform analyzer (such as the Anritsu transmitter tester MS8608A) can be controlled from a host computer via the GPIB interface to build a system that tests the performance of devices under test.

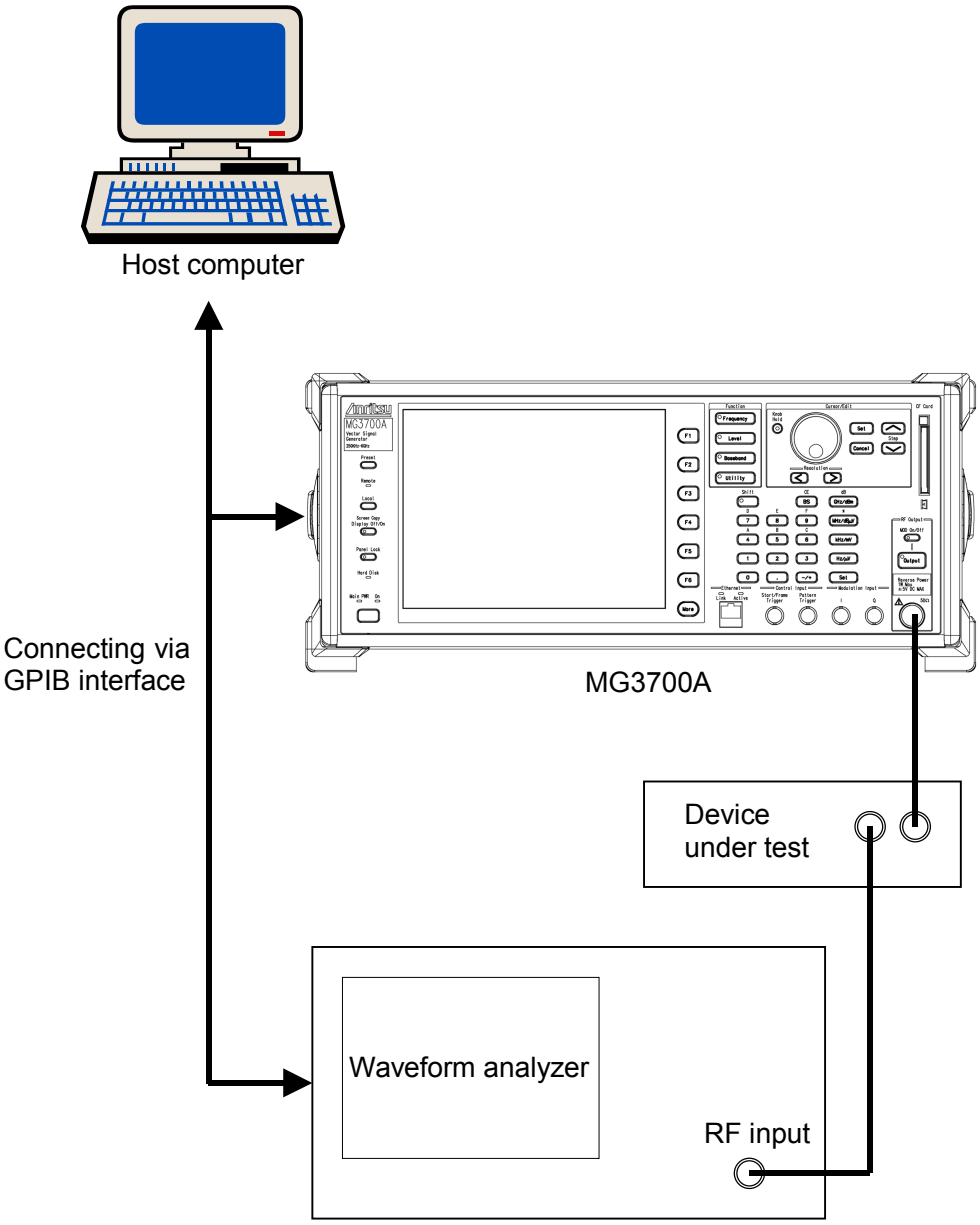


Fig. 4.2.2-1 System Setup Example

4.2.3 Connecting devices via Ethernet

Connect the Ethernet connector on the rear panel of the MG3700A and the Ethernet connector of an external device, such as a PC, to each other using a LAN cable. The MG3700A has one Ethernet connector on the front panel and on the rear panel each. The way external devices are connected to the MG3700A differs depending on which connector is used and how many external devices are connected to the MG3700A.

Note:

Do not connect to the LAN until the network setup completes.

Using Ethernet connector on rear panel

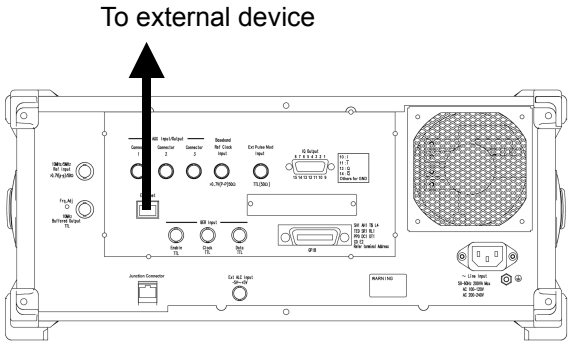


Fig. 4.2.3-1 Connection using connector on rear panel

Connect to external devices via the Ethernet connector on the rear panel.

Using Ethernet connector on front panel

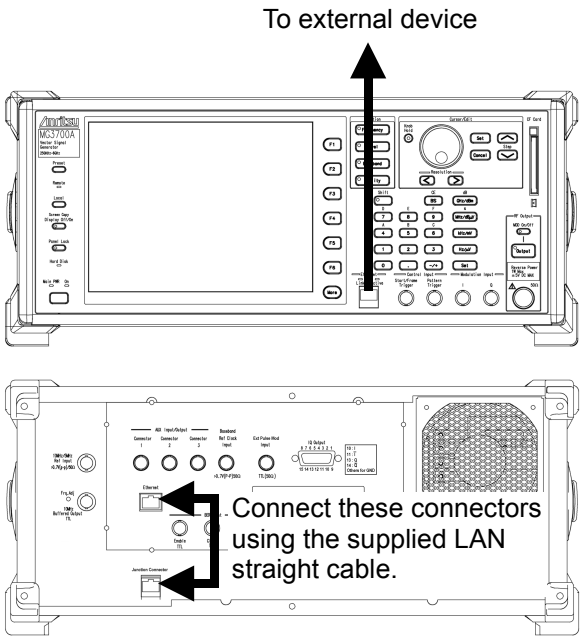


Fig. 4.2.3-2 Connection using connector on front panel

<Procedure>

1. Connect Ethernet connector and Junction Connector on the rear panel using the supplied LAN straight cable.
2. Connect to an external device via the Ethernet connector on the front panel.

Connecting MG3700A and one external device

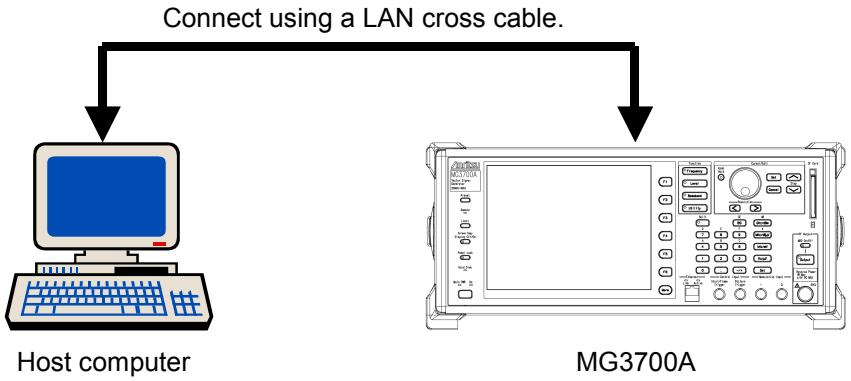


Fig. 4.2.3-3 Connection of MG3700A and one external device

Connect the MG3700A Ethernet connector and the Ethernet connector of an external device, such as a computer, to each other using a LAN cross-cable.

Connecting several MG3700A units and external devices (three or more devices in total)

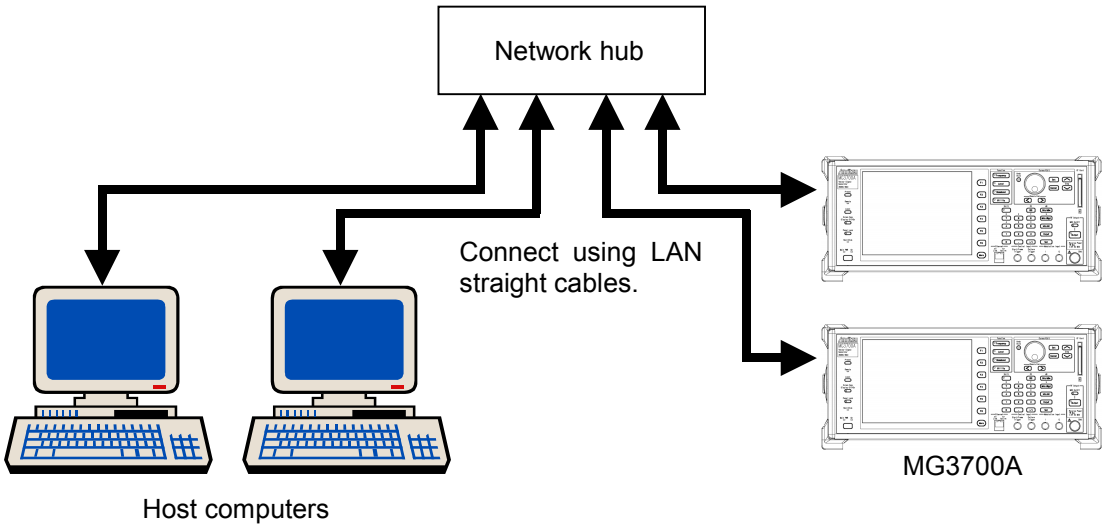


Fig. 4.2.3-4 Connection of several MG3700A units and external devices

Connect the MG3700A Ethernet connector to the network hub using a LAN straight cable. Likewise, connect the Ethernet connector of each external device to the network hub using a LAN straight cable.

Note:

External devices may experience difficulty for communicating with the MG3700A depending on the status of the communications between the external devices. LAN cross-cabling connection is recommended to ensure communications stability.

Setting Ethernet conditions

Press Utility and then F4 (Interface Setup) to open the Interface Setup screen. Set Ethernet conditions on this screen.
Move the cursor to the item to be set and press Set to open the setup window for that item.

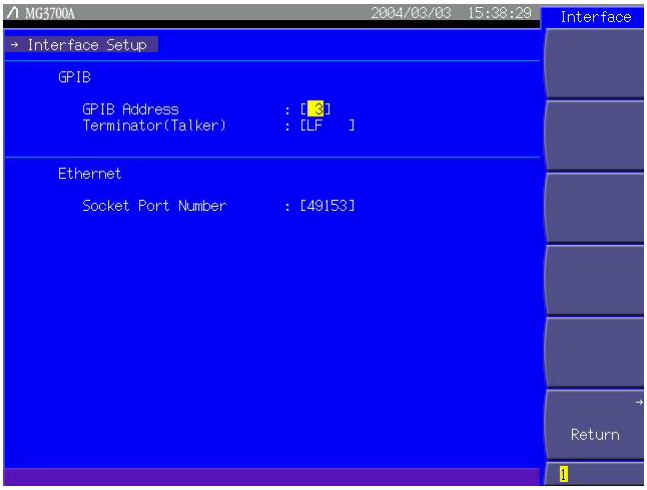


Fig. 4.2.3-5 Interface Setup screen (for Ethernet conditions)

The table below lists the item that can be set up on this window.

Table 4.2.3-1 Ethernet setup item

Item	Description
Socket Port Number	Specify the TCP/IP port used to remote-control the MG3700A on an Ethernet interface. Setting range: 49152 to 65535

Setting network conditions

Press Utility and then F5 (Network Setup) to open the Network Setup screen. Set network conditions on this screen.
Move the cursor to the item to be set and press Set to open the setup window for that item.

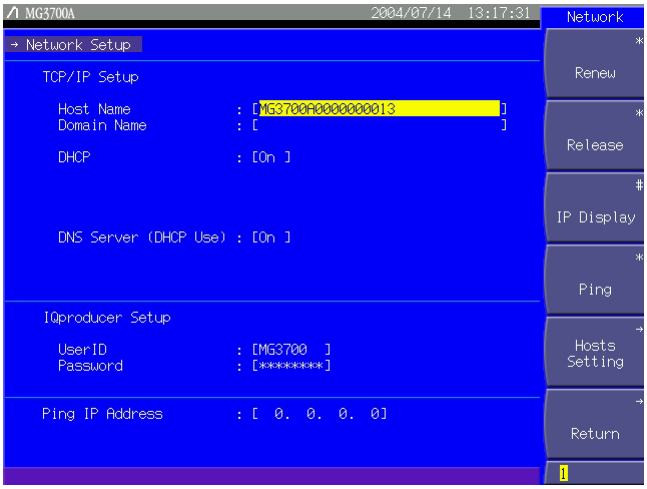


Fig. 4.2.3-6 Network Setup screen

The table below lists the items that can be set up on this window.

Table 4.2.3-2 Network setup items

Item	Description
Host Name	Set the host name of the MG3700A.
Domain Name	Set the domain name of the MG3700A.
DHCP (On/Off)	Set whether to obtain an IP address from the DHCP server automatically or not.
DNS Server (DHCP Use) (On/Off)	Set whether to obtain DNS server information from the DHCP server automatically or not.
User ID	Set the user ID that allows IQproducer™ connection.
Password	Set the password of the user ID that allows IQproducer™ connection.
Ping IP Address	Set a ping IP address.

(1) Host Name

Fig. 4.2.3-7 Host name entry window

Set the host name of the MG3700A.
Up to 30 characters can be entered.
The characters that can be entered are a to z, A to Z, 0 to 9, and "-" (hyphen).
The setup cannot be completed if any other character is entered.
The host name cannot consist of numeric alone.

(2) Domain Name

Fig. 4.2.3-8 Domain name entry window

Set the domain name of the MG3700A.
Up to 30 characters can be entered.
The characters that can be entered are a to z, A to Z, 0 to 9, "-" (hyphen), and "." (dot).
The setup cannot be completed if any other character is entered.

(3) DHCP

Set whether to obtain an IP address from a DHCP (Dynamic Host Configuration Protocol) server automatically or not.
When this is set to [On] and [Set] is pressed, the IP address is obtained automatically from the DHCP server.
When this is set to [Off]; the IP Address, Subnet Mask and Default Gateway will be displayed.

The DHCP used by the MG3700A complies with RFC2131. (A Windows 2000 server is recommended for the DHCP server.)

The DHCP option parameters used when the MG3800A requests the DHCP server for resources are listed in Table 4.2.3-3.

Be sure to ask your network administrator when connecting the MG3700A to the LAN.

Note that the MG3700A does not support Dynamic DNS.

Table 4.2.3-3 DHCP option parameters

Name	Number
Subnet mask	01
Default router	03
DNS server	06 (only when DNS Server (DHCP Use) is On)
Host name	12
DNS domain name	15
Broadcast address	28
Client identifier	61

(4) IP Address, Subnet Mask, Default Gateway

These items are displayed only when DHCP is set to Off.

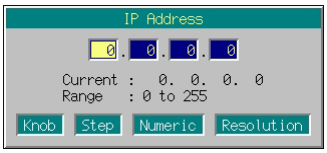


Fig. 4.2.3-9 IP address entry window

Set an IP address, a subnet mask and a default gateway for the MG3700A.
Each parameter consists of four numeric entry cells separated by a dot (.). Enter a numeric value between 0 and 255 in each cell.

Use the numeric keypad, the rotary knob or [^] [v] to enter numeric values. Navigate from one numeric entry cell to the next using the [<] [>].
After entering a numeric value, press [Set] to determine the set numeric value and close the window.

(5) DNS Server (DHCP Use)

This item is displayed only when DHCP is set to On.
Set whether to obtain DNS server information from a DHCP server automatically or not.
When this is set to [On] and Set is pressed to ask the DHCP server, the DNS server information is obtained automatically from the DHCP server.
When this is set to [Off], the DNS Primary Address and DNS Secondary Address fields will be displayed.

(6) DNS Primary Address, DNS Secondary Address

This item is displayed when DHCP or DNS Server (DHCP Use) is set to Off.

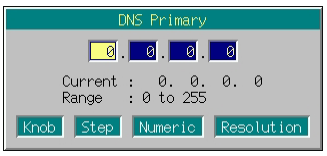


Fig. 4.2.3-10 DNS primary address entry window

Set the primary address and secondary address for the DNS server. Each address consists of four numeric entry cells separated by a dot (.). Enter a numeric value between 0 and 255 in each cell. The numeric value entry procedure is similar to that for <4> IP Address, Subnet Mask, Default Gateway above.

(7) User ID

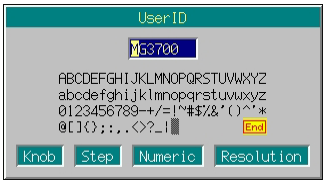


Fig. 4.2.3-11 User ID entry window

Set the user ID that allows IQproducer™ connection.
Up to eight characters can be entered.

(8) Password

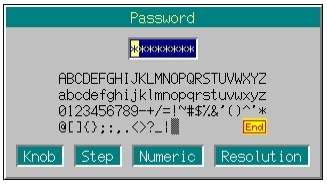


Fig. 4.2.3-12 Password entry window

Set the password of user ID that allows IQproducer™ connection. The password must be eight characters long. Any other character length would not complete the setup.
When characters are entered, they are not displayed and echoed back as a string of asterisks (*) on the screen, instead.

(9) Ping IP Address

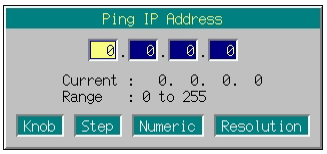


Fig. 4.2.3-13 Ping IP address entry window

Sets a IP address for Ping.
A ping IP address consists of four numeric entry cells separated by a dot (.). Enter a numeric value between 0 and 255 in each cell. The numeric value entry procedure is similar to that for <4> IP Address, Subnet Mask, Default Gateway above.

When the Host Name, Domain Name, User ID, or Password item is selected, a character string entry window opens. For a description of the keys used for character string entered in this window, see "Entering Character String" in Section 3.2.2 "Opening setup window to set parameters." Numeric and the decimal point may also be entered using the numeric keypad.

Table 4.2.3-4 Function Menu

Page	Key No.	Menu	Function
1	F1	Renew	Obtains the IP address.
	F2	Release	Releases the IP address.
	F3	IP Display	Displays the current IP address, the subnet mask, gateway, and MAC address.
	F4	Ping	Diagnoses the TCP/IP network.
	F5		
	F6	Return	Exits the network setup.

(1) Renew

This function is enabled only when DHCP is set to On by Network Setup.
The IP address is obtained from the DHCP server automatically.
The message "Now Getting IP Information" is displayed while the IP address is being obtained.
This function obtains the following items:
IP Address, Subnet Mask, Default Gateway
DNS Address (when DNS Server (DHCP Use) is set to On)
When an IP address has been obtained successfully, a listing of the IP information obtained is displayed.

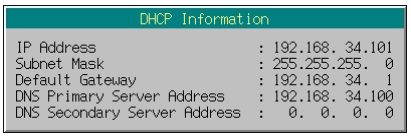


Fig. 4.2.3-14 IP information display window

(2) Release

This function is enabled only when DHCP is set to On by Network Setup.
The IP address that has been obtained is released.
The message "Released IP address" is displayed when the IP address is released.
This function releases the following items:
IP Address, Subnet Mask, Default Gateway, DNS Address

(3) IP Display

Displays the current IP address, subnet mask, gateway, MAC address, and DNS server address.

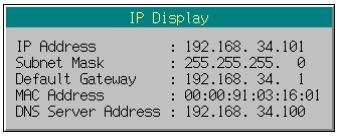


Fig. 4.2.3-15 IP information display window

(4) Ping

The TCP/IP network connected to the MG3700A is diagnosed. Packets are transmitted to the host specified by the ping IP address. During execution, the message "Now Executing Ping…" is displayed. A success or failure message is displayed depending on the response from the transmission destination.

Success Failure

Fig. 4.2.3-16 Ping result display window

Success (response from the destination available):	"xxx.xxx.xxx.xxx is alive"
Failure (no response from the destination):	"No answer from xxx.xxx.xxx.xxx" (xxx.xxx.xxx.xxx denotes the IP address of the destination.)

Setting up IP with DHCP Off

If a DCHP server does not exist on your LAN or a cross-cable is used to connect the MG3700A to a PC, it is necessary to set the IP address manually.

When a cross-cable is used for connection

When the MG3700A is connected to a PC using a cross cable, set the IP address in the procedure given below.

Sample operation: Setting the IP addresses and subnet masks for the MG3700A and the PC as shown in the table below. It is assumed that the PC runs on Windows 2000 or Windows XP

Table 4.2.3-5 IP address/subnet mask settings

	MG3700A	PC
IP address	192.168.34.3	192.168.34.2
Subnet mask	255.255.255.0	255.255.255.0

(1) Setting up IP address for PC

<Procedure>

1. Set the IP address for the PC first.
   Select [Network Connections] from the Control Panel and double-click the [Local Area Connection] icon.
2. Click the [Properties] button at the bottom of the Local Area Connection Status window to open the Local Area Connection Properties window. And then double-click [Internet Protocol (TCP/IP)].

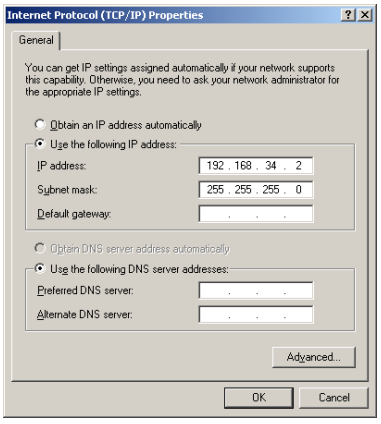


Fig. 4.2.3-17 Internet Protocol (TCP/IP) Properties window

3. Click the "Use the following IP address" radio button to enable the entry to IP address, Subnet mask, and Default gateway fields.

4. Click the [IP address] text box to enter the IP address in it by keyboard.
   Entry 192.168.34.2 in this event.
5. Click the [Subnet Mask text box to let the numeric value of 255.255.255.0 enter it automatically. There is no need to make changes to this numeric value.
6. Click OK to exit IP address setup for the PC.

(2) Setting up IP address for MG3700A

7. Set the IP address for the MG3700A.
   Press [Utility] and then [F5] (Network Setup) to open the Network Setup screen.
8. Move the cursor to "DHCP: [ ]" and press [Set] to open the DHCP On/Off selection window. Select [Off] and press [Set] to display the IP Address, Subnet Mask, and Default Gateway fields.
9. Set the IP address.
   Move the cursor to "IP Address: [ ]" and press [Set] to open the IP address entry window.

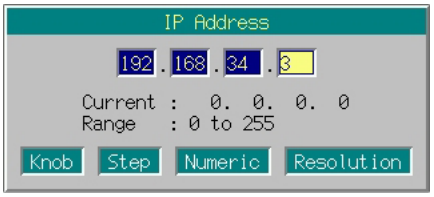


Fig. 4.2.3-18 IP address entry window

Enter a numeric value using the numeric keypad. Navigate from one numeric entry cell to the next using the [<][>]. In this example, press keys as follows:

[1] [9] [2] [>] [1] [6] [8] [>] [3] [4] [>] [3] [Set]

10. When the IP address is entered, Subnet Mask: [255.255.255.0] is entered automatically. There is no need to make changes to this numeric value.
11. Press the [F6] (Return) to exit the network setup.
12. The MG3700A should be restarted before connecting to a PC using a cross cable with DHCP Off.
    Hold down the power switch on the front panel for about 2 seconds to turn the MG3700A off. Then hold down the power switch for about 2 seconds again to turn it on.

Notes on setting numeric values are as follows:

The last digits (rightmost numeric entry cell) of the IP address for the MG3700A must be different from that for the PC.
The same subnet mask must be assigned for the MG3700A and the PC.
There is not need to set a default gateway and a DNS server.

The setup procedure given above assumes that the PC runs on Windows 2000 or Windows XP. With any other OS (such as Windows 95/98/Me), the IP address setup procedure should vary.

If the PC runs on Windows 2000 or Windows XP, a user who is entitled as an administrator must be at work. If the message "Some of the controls on this property sheet are disabled because you do not have sufficient right to access or change them" is displayed when the [Properties] button is clicked in Step 2, log on the system again with a user having an administrator's right.

Connecting to multiple PCs

Ask your network administrator when connecting the MG3700A to the LAN (in which a DHCP server does not exist) to communicate with multiple PCs.

4.2.4 Transmitting/receiving remote commands

- GPIB interface
  The method for transmitting/receiving commands via the GPIB interface varies depending on the manufacturer and board. Refer to the operation manual for the GPIB interface used.
- Ethernet
  Establish socket connection with the port specified in "Socket Port Number" on the Interface Setup screen. Commands are transmitted/received using the established socket connection.
  Affix a line code (LF or CR+LF) to the last of the command to be transmitted.
  How to establish socket connection differs according to the OS of the PC and the development language. Refer to the materials for the OS and/or development language of your environment.

4.2.5 Exiting remote state

To enable panel operation of the MG3700A after remote controlling via GPIB or Ethernet, press Local to set the local control mode.

When GPIB or Ethernet connection has disconnected from the PC, the Remote lamp on the MG3700A does not goes off but remains on. To set the local control mode, press Local to exit the remote state.

4.3 Initialization

IEEE488.2 classifies the process of initializing a GPIB system into three levels and defines them as bus initialization, message exchange initialization, and device initialization. It also requires the devices to be initialized to predefined status when they are powered on. Details are given in the table below.

Table 4.3-1 Initialization level

Level	Kind of initialization	Summary	Level combination and sequence
1	Bus initialization	Initializes the interface functions of all the devices connected to the bus by issuing an IFC Message from the controller.	Can be used with other levels, but level 1 initialization must be executed before level 2 initialization.
2	Message exchange initialization	Initializes Message exchanges on all devices on the GPIB interface with GPIB bus command DCL (Device Clear) or on a selected device with GPIB bus command SDC (Sleeted Device Clear) and disables the function of reporting of the end of operations to the controller.	Can be used with other levels, but level 2 initialization must be executed before level 3 initialization.
3	Device initialization	*Resets a selected device on the GPIB interface to the status specific to that device, regardless of its past usage with the *RST command.	Can be used with other levels, but level 3 initialization must be executed before level 1 and 2 initializations.

The discussions below focus on the commands used to execute level 1, 2, and 3 initializations and the resulting items initialized and the known status to which devices are initialized when powered on.

Note:

Do not execute initialization using the IFC, DCL, or SDC command immediately after sending a command.

4.3.1 Initializing bus with IFC commands

Explanation

IFC commands initialize the interface functions of all the devices connected to the GPIB bus line. Initialization of the interface functions is used for initializing the status (talker, listener, etc.) of the interface functions of the devices that have been configured by the controller. In the table below, the functions marked by ○ are initialized in their entirety; the functions marked by △ are initialized in part.

Table 4.3.1-1 Bus initialization with IFC commands

No	Function	Symbol	IFC initialization
1	Source handshaking	SH	○
2	Acceptor handshaking	AH	○
3	Talker or extended talker	T or TE	○
4	Listener or extended listener	L or LT	○
5	Service request	SR	△
6	Remote local	RL	
7	Parallel poll	PP	
8	Device clear	DC	
9	Device trigger	DT	
10	Controller	C	○

The initialization of the device by IFC commands does not affect the operation status of the devices (such as frequency setting and lamp on/off states).

Use example

Use examples depend on the computer and the program being run. Refer to the relevant user's documentation.

4.3.2 Initializing message exchanges with DCL and SDC bus commands

Explanation

Initializes Message exchanges on all devices on the GPIB interface having a specified select code or on a selected device.

Items of Message exchanges that are initialized

When this equipment receives DCL and SDC bus commands, it carries out the following functions:

<1> Input buffer and output queue:.... Cleared, along with the MAV bit.

<2> Parser, executive, and response generator Reset.

<3> Device commands containing *RST .... All commands that interfere with the execution of these commands are cleared.

<4> *OPC command processing ..... Devices are put into the OCIS (Operation Complete Command Idle State) state. The Operation Complete bit cannot be set in the Standard Event Status register as a consequence.

<5> *OPC? query processing ..... Devices are put into the OQIS (Operation Complete Query Idle State) state. The Operation Complete bit can be set to 1 in the output queue as a consequence.

<6> Device function ..... All portions pertaining to Message exchanges are kept idle. The device continues to wait for Messages from the controller.

Use example

Use examples depend on the computer and the program being run. Refer to the relevant user's documentation.

Note:

The execution of DCL and SDC bus commands does not affect the following:

- Current device settings and data that has been saved
- Front panel status
- Status of status bytes other than the MAV bit
- Ongoing operations of devices

4.3.3 Initializing devices with *RST command

Format *RST

Explanation One of the IEEE488.2 common commands, the *RST (Reset) command gives Level 3 initialization to a device.
The *RST (Reset) command is used to initialize the MG3700A to a predefined status.

Note:

The execution of the *RST command does not affect the followings:

- IEEE488.1 interface status
- Device address (this equipment's GPIB address)
- Output queue
- Service Request Enable register
- Standard Event Status Enable register
- Power-on-Status-Clear flag
- Calibration data affecting specifications of the MG3700A.
- Setup parameters pertaining, for example, to the control of external equipment

Application example Use examples depend on the computer and the program being run. Refer to the relevant user's documentation.

4.3.4 Status in which MG3700A goes into when powered on

The MG3700A, when powered on, goes into the following status:

<1> The device is set in the status in which it was when it was last turned off. The MG3700A, however, is reset to its defaults (see Appendix C) when it is turned on while holding down Preset on the front panel.

<2> The input buffer and output queue are cleared.

<3> The parser, executive, and response generator are reset.

<4> The MG3700A is put into the OCIS (Operation Complete Command Idle State) state.

<5> The MG3700A is put into the OQIS (Operation Complete Query Idle State) state.

<6> The standard Event Status register and the Standard Event Status Enable register are cleared. Events are recorded after they are cleared.

4.4 Status Structure

The Status Byte (STB) that is transmitted to the controller complies with the IEEE488.1 standard. Its bit string, called a "status summary message," provides summary information about the current data placed in a register or queue.

4.4.1 IEEE488.2 standard status model

The standard model of the status structure defined by IEEE488.2 is shown below.

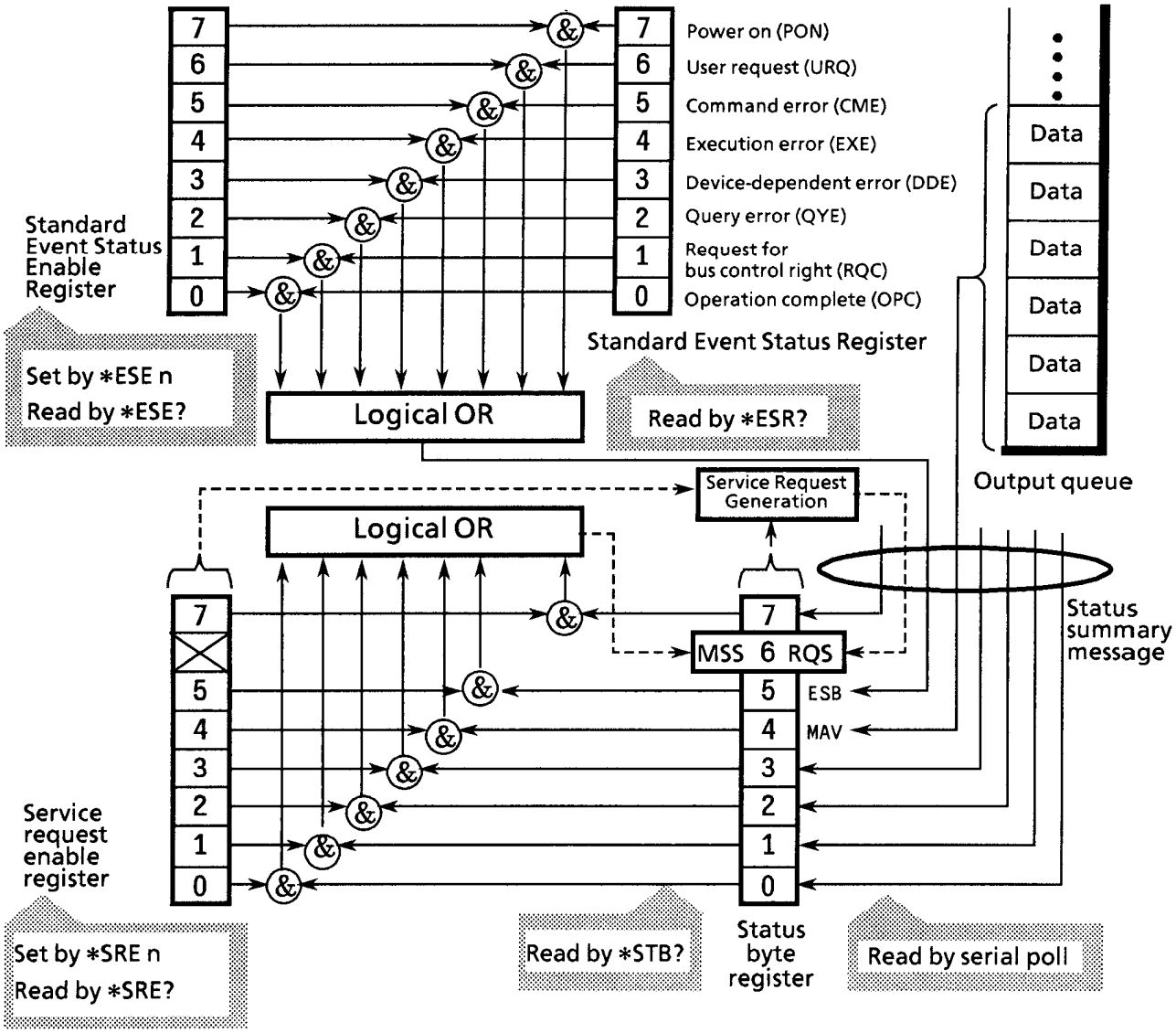


Fig. 4.4.1-1 IEEE488.2 standard status model

In the status model, an IEEE488.1 status byte is used as the lowest-level status, which consists of seven summary Message bits that are supplied from an upper status structure. The status data structure is organized into a register model and a queue model to generate these summary Message bits.

Table 4.4.1-1 Register models and queue models

Register model	Queue model
A set of registers used to keep a record of the events and conditions that have been encountered in the device. Its structure is built of an Event Status register and an Event Status Enable register. If their AND operation results in non-zero, the corresponding bit of the status byte is set to 1; otherwise, it is set to 0. If their OR operation results in 1, the corresponding summary bit is set to 1; otherwise, it is set to 0.	A queue used to keep a sequential record of status or information. In the queue structure, a bit is set to 1 only if data exists at the corresponding position in the queue; otherwise, a bit is 0.

On the basis of the register model and the queue model thus explained, the standard model in the IEEE488.2 status data structure is assembled of two kinds of register models and one queue model.

<1> Standard Event Status register and Event Status Enable register

<2> Status Byte register and Standard Event Enable register

<3> Output queue

Table 4.4.1-2 Register models and queue models of IEEE488.2 standard status

Standard Event Status register	Status Byte Register	Output Queue
The Standard Event Status register is structured in the register model described above. Among all the events that the device may encounter, this register holds bits that represent eight kinds of standard events: <1> power-on, <2> user request, <3> command error, <4> execution error, <5> device-dependent error, <6> query error, <7> bus control request, and <8> operation complete. Bit 6 (DIO6) of the Status Byte Register works as an OR output bit to report an Event Summary Bit (ESB) summary Message.	The Status Byte register holds an RQS bit seven summary Message bits from the status data structure. Bit 6 (DIO7) of the Service Request Enable register is system-reserved as an RQS bit to report a service request to the external controller. The mechanism of this SRQ conforms to the specifications of IEEE488.1.	The Output Queue is structured in the queue model described above. Bit 4 (DIO5) of the Status Byte Register works as a Message Available (MAV) summary Message to report the availability of data in the output buffer.

4.4.2 Status Byte (STB) register

The STB register consists of an STB device and an RQS (or MSS) Message.

ESB and MAV summary Messages

The ESB and MAV summary Messages are described below.

ESB summary Message

The ESB (Event Summary Bit) summary Message is a Message defined by IEEE488.2. It is reported by STB register bit 5. The ESB summary Message is set to 1 when any one of the bits registered in the Standard Event Status register is set to 1 where event occurrence is enabled. The ESB summary bit is in turn set to 0 when none of the events registered in the Status Event Status register occur where event occurrence is enabled.

MAV summary Message

The MAV (Message Available) summary Message is a Message defined by IEEE488.2. It is reported by STB register bit 4. This bit indicates whether the output queue is empty or not. It is used by the device to synchronize Message exchanges with the controller. For example, the controller might transmit a query command to the device and wait for MAV to be set to 1. If reading from the output queue is begun without first checking MAV, all system bus actions are deferred until the device responds.

4.4.3 Device-dependent summary messages

Bit 0, bit 1, and bit 7 are not used in MG3700A, but bits 2 and 3 are used as Event Status register summary bits. The Status Byte register is described below.

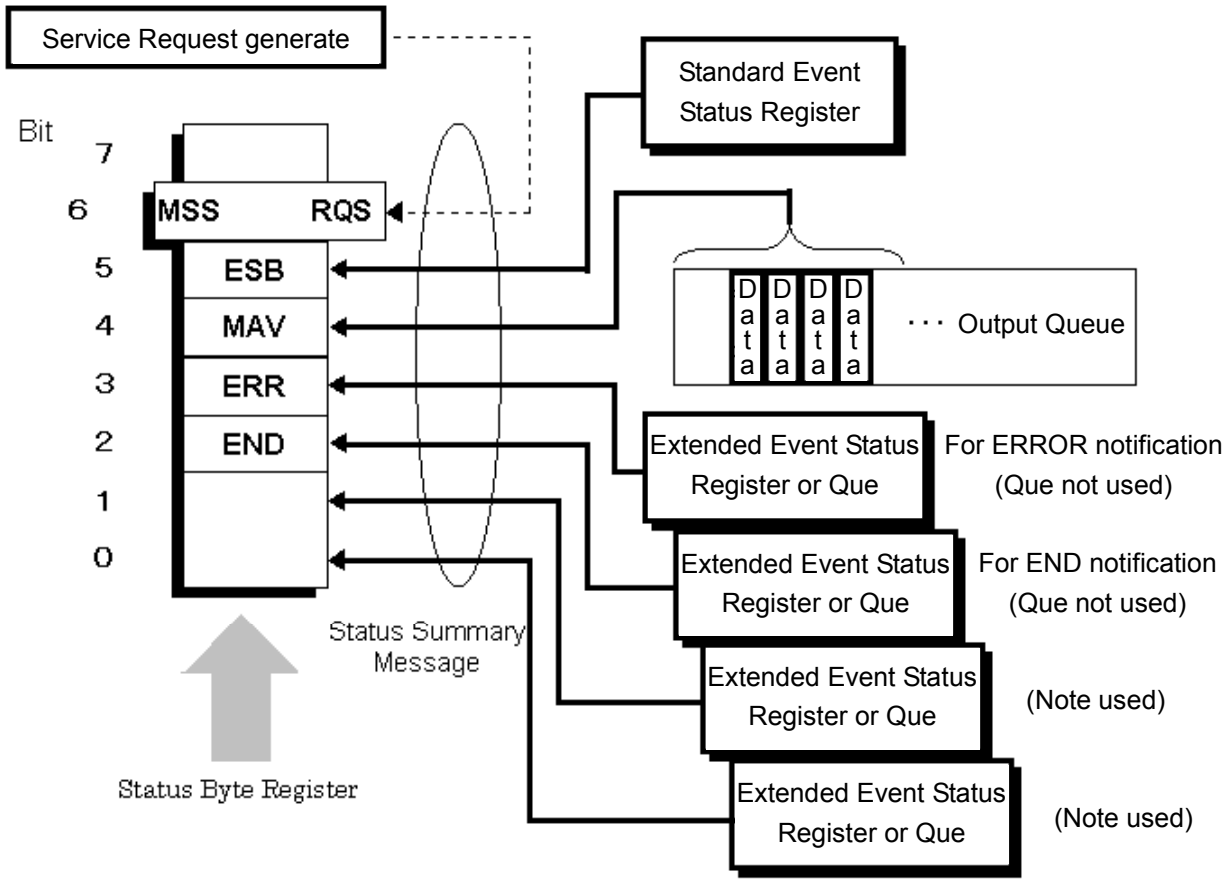


Fig. 4.4.3-1 Status byte register

4.4.4 Reading and clearing STB register

The STB register is read by serial polling or by using an *STB? query. Either way, an STB Message as defined by IEEE488.1 is read, but the value that is transmitted to bit 6 (position) varies with each method used. The STB register can be cleared using the *CLS command.

Use Serial Polling to Read STB Register

If serial polling is implemented under IEEE488.1, a 7-bit status byte and an RQS Message bit based on IEEE488.1 are returned. Serial polling does not alter the value of the status byte. The device will set the RQS Message bit to 0 immediately on polling.

Use an *STB Common Query to Read STB Register

Issuing an *STB common query causes the device to transmit a response Message, in the integer format, comprising the MSS (Master Summary Status) Message in the STB register. Hence, a response to *STB? matches one to serial polling, except that an MSS summary Message appears at the bit 6 position, instead of an RQS Message.

Define *MSS (Master Summary Status)

The MSS Message indicates that the device has at least one service request condition. The MSS Message appears at the bit 6 position as a device response to an *STB query, but not as a response to serial polling. It must not be viewed as part of the IEEE488.1 status byte. MSS is built by totally ORing the bits of the STB register and the SRQ Enable (SRE) register with one another.

Use the *CLS Common Command to Clear STB Register

The *CLS common command clears the entire status structure and also summary Messages responding to it. The execution of *CLS does not affect the settings of the enable registers.

4.4.5 Service Request (SRQ) enable operation

Bits 0 to 7 of the Service Request Enable (SRE) register control whether the corresponding bits of the STB register will generate an SRQ or not. The SRB register bits are associated with the STB register bits. If the STB register bit associated with a SRE register bit that is 1 is set to 1, the device sets the RQS bit to 1, issuing a service request to the controller.

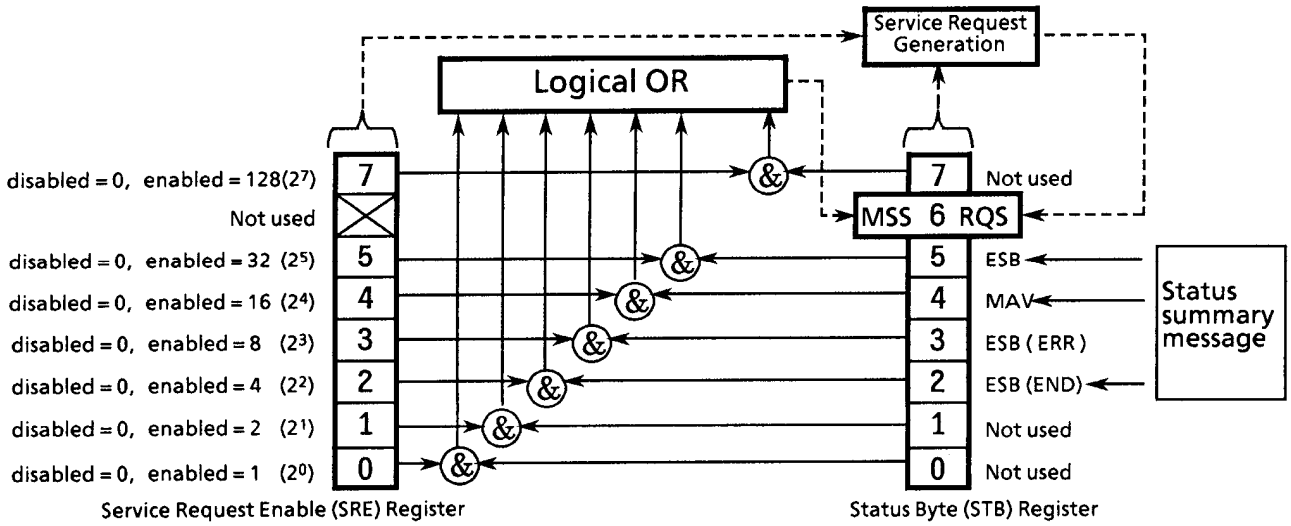


Fig. 4.4.5-1 Service Request (SRQ) enable operation

Read from SRE register

The SRE register is read from using an *SRE? common query. A response Message to this query is given as an integer between 0 and 255, equaling the sum of the values of the SRE register bits.

Update SRE register

The SRE register is written to using an *SRE common command with an integer between 0 and 255 as a parameter and with the SRE register bits being set to 0 or 1. The value of bit 6 is ignored.

4.4.6 Standard Event Status register

Bit definitions of Standard Event Status register

The operations of the Standard Event Status register are shown below.

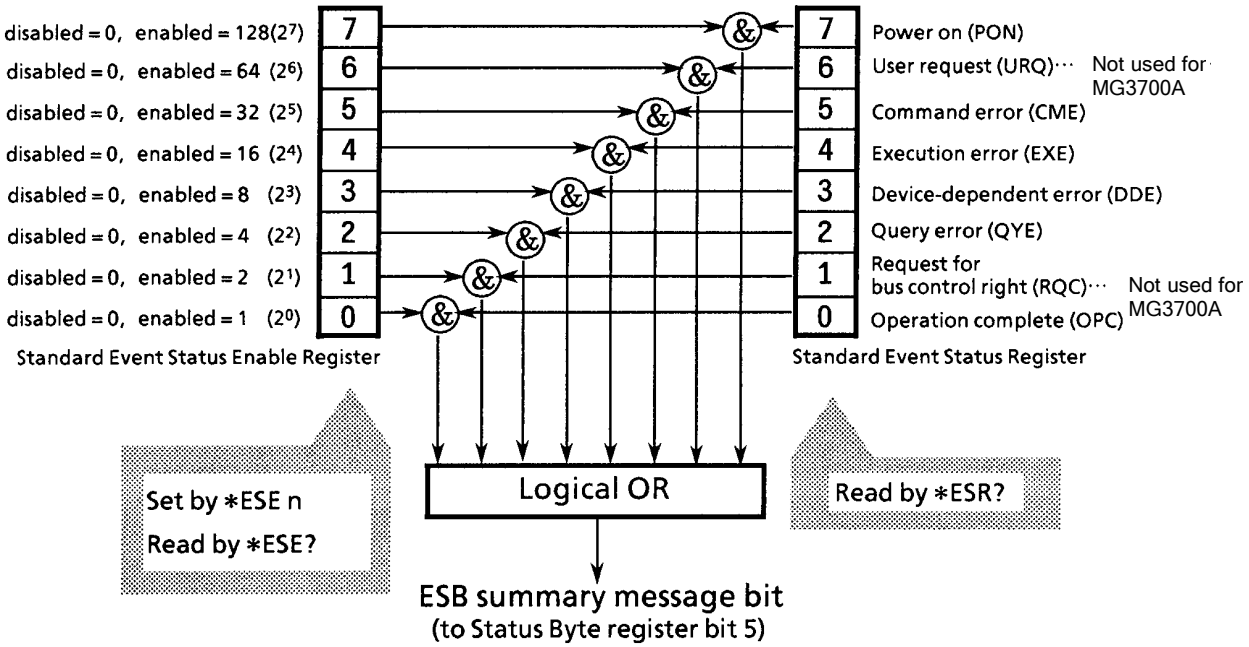


Fig. 4.4.6-1 Standard event status register

The Standard Event Status Enable (ESE) register specifies which bit of the Event Status register will cause a summary Message to become true when it is set.

Table 4.4.6-1 Bit events

bit	Event name	Explanation
7	Power-on (PON)	Power transition from Off to On
6	Not used	—
5	Command error (CME)	Illegal program Message or misspelled command received
4	Execution error (EXE)	Legal yet unexecutable program Message received
3	Device-dependent error (DDE)	Error caused by a condition other than CME, EXE, and QYE (such as a parameter error)
2	Query error (QYE)	Attempt to read data from the output queue when it is empty or queued data lost before it is read
1	Not used	—
0	Operation complete (OPC)	Set to 1 when the MG3700A has processed the *OPC command.

Reading from, writing to, and clearing Standard Event Status register

Table 4.4.6-2 Reading from, writing to, and clearing Standard Event Status register

Read	This register is read from using an *ESR? common query. It is cleared when read from. A response Message is given as a binary-weighted sum of the event bits to a decimal integer.
Write	Except for clear, this register cannot be written externally.
Clear	This register is cleared when: <1> The *CLS command is received. <2> The power is turned on (bit 7 is turned on, with all other bits being cleared to 0). <3> An event is read in response to an *ESR? query command.

Reading from, writing to, and clearing Standard Event Status Enable register

Table 4.4.6-3 Reading from, writing to, and clearing Standard Event Status Enable register

Read	This register is read from using an *ESE? common query. A response Message is given as a binary-weighted sum of the event bits to a decimal integer.
Write	This register is written to using an *ESE common command.
Clear	<1> An *ESE command with a data value of 0 is received. <2> The power is turned on. The contents of the Standard Event Status Enable register are not affected by the following: <1> IEEE488.1 device clear function state changes <2> Receipt of an *RST common command <3> Receipt of a *CLS common command

4.4.7 Extended Event Status Register

The MG3700A has bit 0, bit 1, and bit 7 unused and has bits 2 and 3 assigned as an END and an ERR summary bit for use as status summary bits that are available from the extended register model.

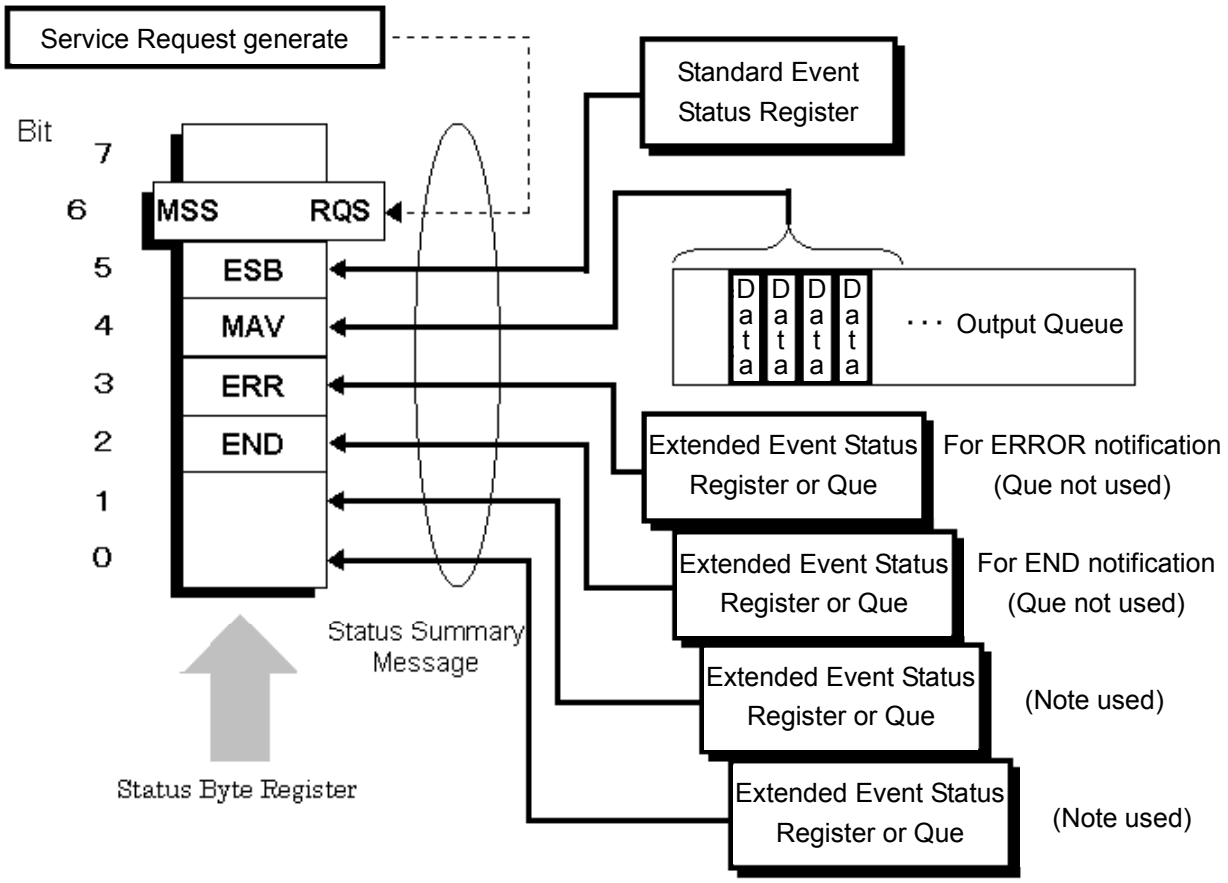


Fig. 4.4.7-1 Extended event status register

Bit definitions of ERR Event Status register

The operations of the ERR Event Status register are shown below.

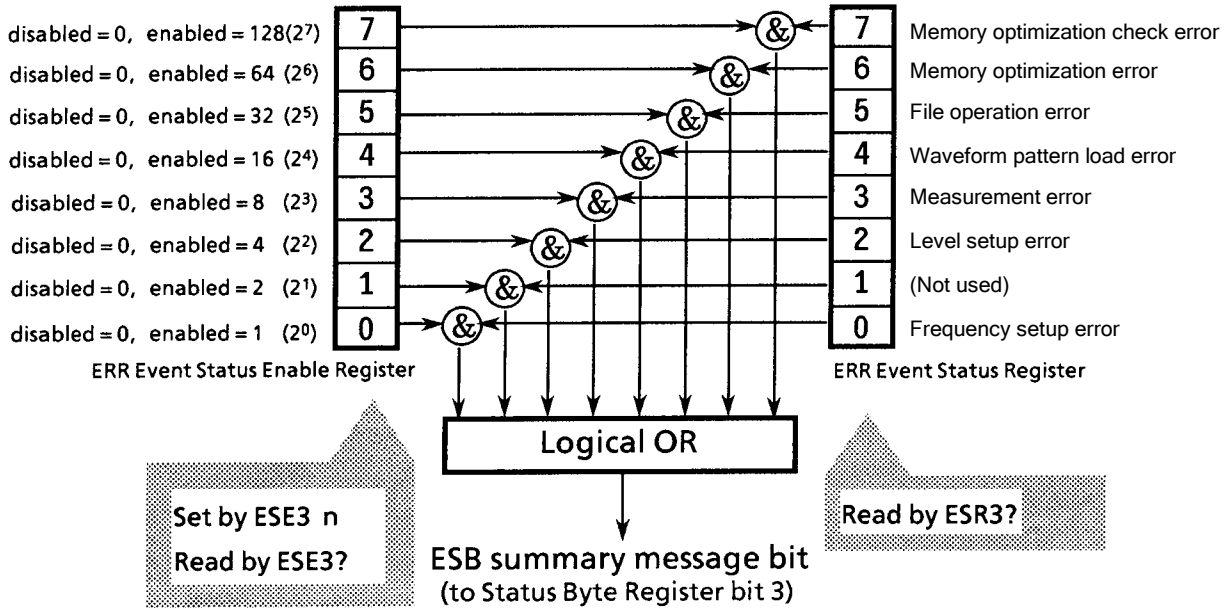


Fig. 4.4.7-2 Reading from, writing to, and clearing standard event status enable register

The ERR Event Status Enable register (on the left of the figure above) specifies which bit of the Event Status register will cause a summary Message to become true when it is set.

Table 4.4.7-1 Bit events

bit	Event name	Explanation
7	Memory optimization check error	Set to 1 when an error occurs during a waveform memory optimization check.
6	Memory optimization error	Set to 1 when an error occurs during a waveform memory optimizing operation.
5	File operation error	Set to 1 when an error occurs during an internal file operation.
4	Waveform pattern load error	Set to 1 when an error occurs while loading a waveform pattern.
3	Measurement error	Set to 1 when an error occurs during measurement.
2	Level setup error	Set to 1 when an error occurs during an output level setup operation.
1	Not used	Not used
0	Frequency setup error	Set to 1 when an error occurs during a frequency setup operation.

Bit definitions of END Event Status register

The operations and event bit names of the END Event Status register are shown below.

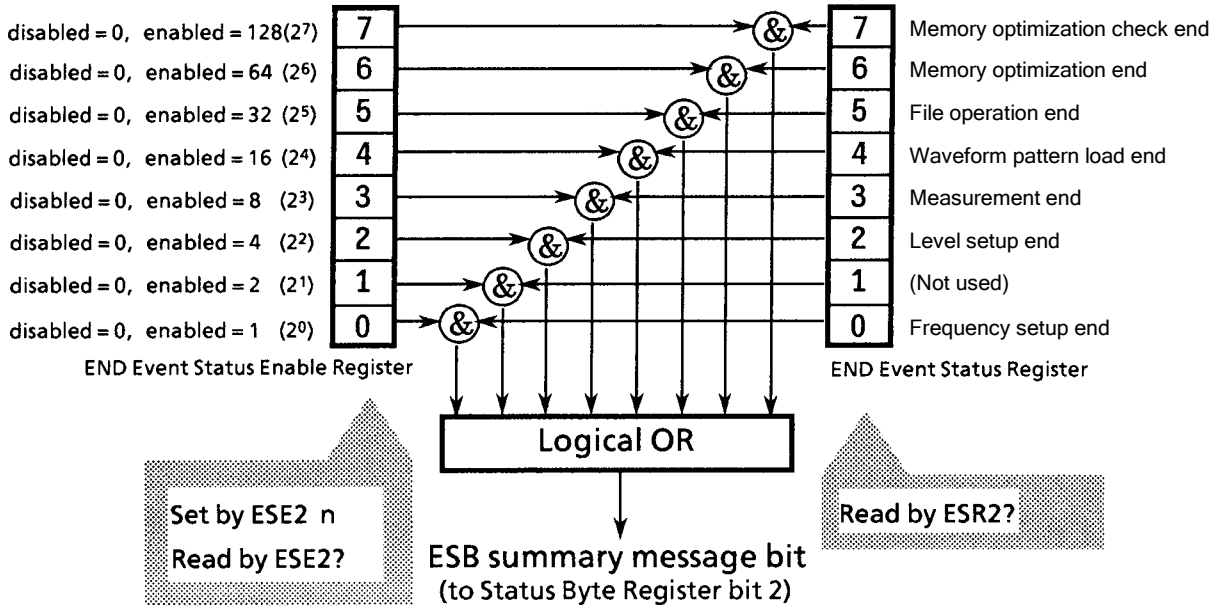


Fig. 4.4.7-3 END event status register

The END Event Status Enable register (on the left of the figure above) specifies which bit of the Event Status register will cause a summary Message to become true when it is set.

Table 4.4.7-2 Bit events

bit	Event name	Explanation
7	Memory optimization check end	Set to 1 when a waveform memory optimization check has ended.
6	Memory optimization end	Set to 1 when a waveform memory optimizing operation has ended.
5	File operation end	Set to 1 when an internal file operation has ended.
4	Waveform pattern load end	Set to 1 when a waveform pattern loading operation has ended.
3	Measurement end	Set to 1 when measurement has ended.
2	Level setup end	Set to 1 when an output level setup operation has ended.
1	Not used	Not used
0	Frequency setup end	Set to 1 when a frequency setup operation has ended.

Reading from, writing to, and clearing Extended Event Status register

Table 4.4.7-3 Reading from, writing to, and clearing extended event status register

Read	This register is read from using an ESR2? or *ESR3? common query. It is cleared when read from. A response Message is given as a binary-weighted sum of the event bits to a decimal integer.
Write	This register cannot be written to externally except that it is cleared.
Clear	This register is cleared when: <1> The *CLS command is received. <2> The power is turned on. <3> An event is read in response to an *ESR? query command.

Reading from, writing to, and clearing Extended Event Status Enable register

Table 4.4.7-4 Reading from, writing to, and clearing extended event status enable register

Read	This register is read from using an ESE2? or ESE3? query. A response Message is given as a binary-weighted sum of the event bits to a decimal integer.
Write	This register is written to using an *ESE2 or ESE3 program command. Since register bits 0 to 7 are weighted to 1, 2, 4, 8, 16, 32, 64 and 128, respectively, write data is transmitted in the form of an integer representing a sum total of the desired bit digits.
Clear	This register is cleared when: <1> An ESE2 or ESE3 program command with a data value of 0 is received. <2> The power is turned on. The contents of the Extended Event Status Enable register are not affected by the following: <1> IEEE488.1 device clear function state changes <2> Receipt of an *RST common command <3> Receipt of a *CLS common command

4.4.8 Synchronizing MG3700A with controller

Because the MG3700A handles specified program Messages each as a sequential command (completing each command before proceeding to process the next), one-to-one synchronization between the MG3700A and the controller does not require special consideration.

In order for the controller to be able to control multiple devices while keeping them synchronized, it is necessary to let the MG3700A complete all the commands that have been given to it before transmitting commands to other devices.

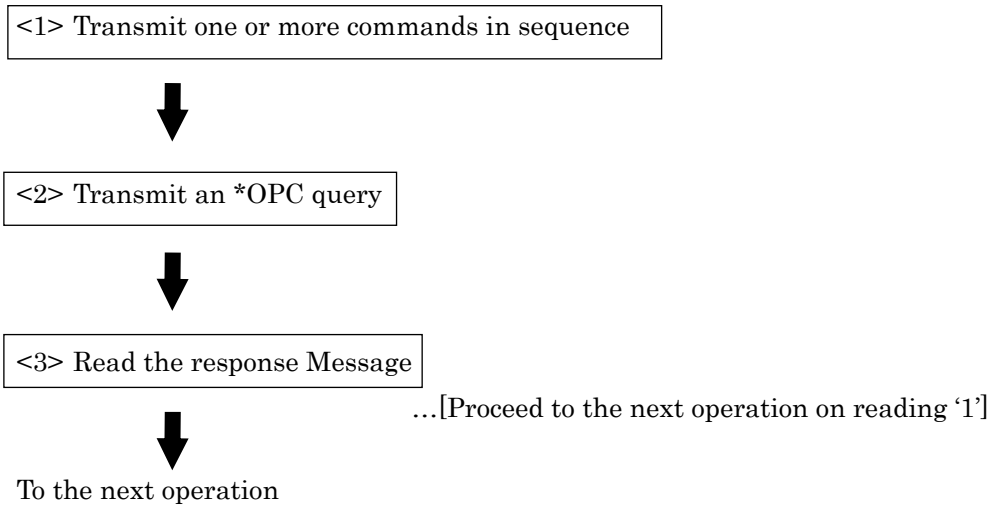
There are two ways to achieve synchronism between the MG3700A and the controller as follows:

<1> *OPC query response wait
<2> *OPC SRQ interrupt wait

*OPC query response wait

the MG3700A generates '1' as a response Message when it has executed an *OPC query. The controller achieves synchronism by waiting for the arrival of this response Message.

Controller program



*OPC service request wait

the MG3700A sets the Operation complete bit (bit 0) of the Standard Event Status register when it has executed an *OPC command. The controller achieves synchronism by waiting for the arrival of an SRQ interrupt.

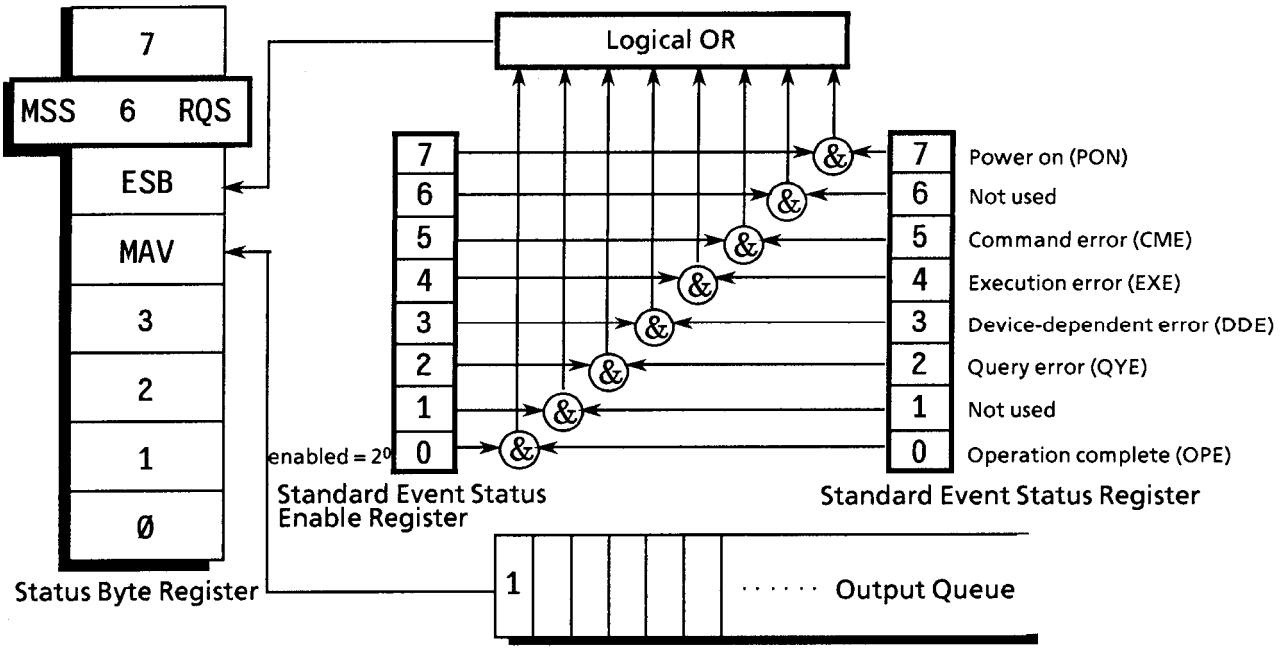


Fig. 4.4.8-1 *OPC service request wait

Controller program

<1> Set bit 2^0 of the Standard Event Status Enable register to Enable.

↓

<2> Set bit 2^5 of the Service Request Enable register to Enable.

↓

<3> Let the device (the MG3700A) execute a specified operation.

↓

<4> Transmit an *OPC command.

↓

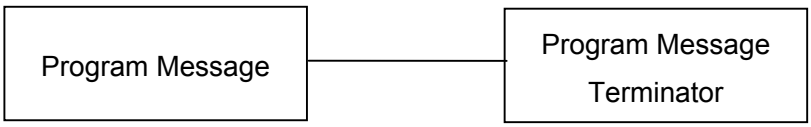
<5> Wait for an SRQ interrupt to occur (ESB summary Message)

4.5 Device Message Details

4.5.1 Program message formats

Among all device Messages, those that are transmitted from the controller to the MG3700A are called “program Messages”. Program Messages fall into two groups: program commands, which set or specify instrument parameters, and program queries, which request for parameters and measurement results.

An example of transmitting a program Message from a controller program to this equipment with a PRINT or any other statement is shown below.

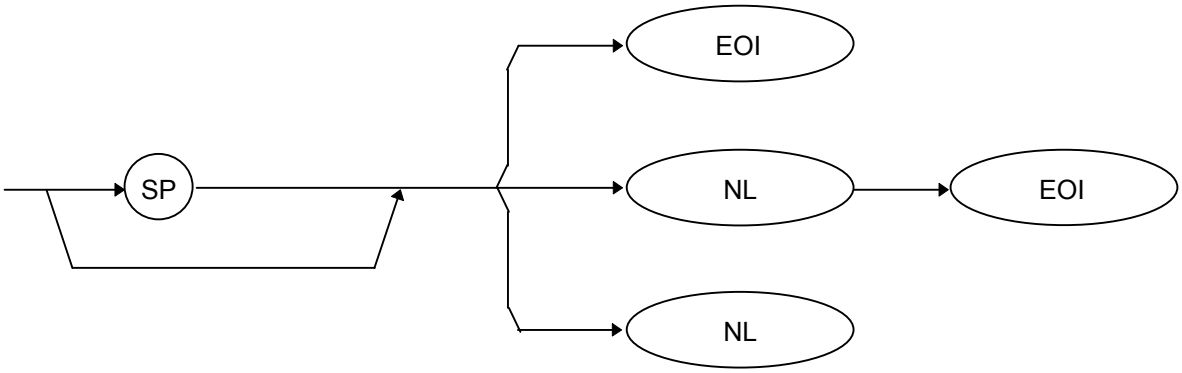


PRINT @1;”FREQ 1GHZ”

Program message

A program message, when transmitted from the controller to this instrument, is terminated by a specified terminator.

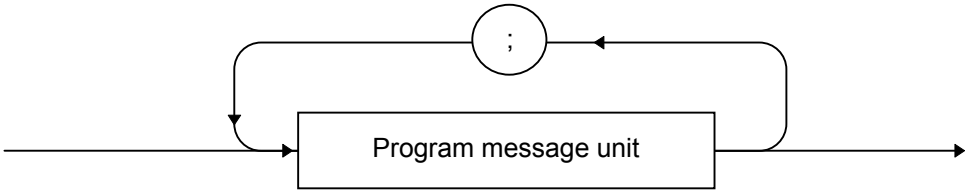
Program Message Terminator



NL: New Line, also called Line Feed (LF).

CR (Carriage Return) is ignored without being processed as a terminator.

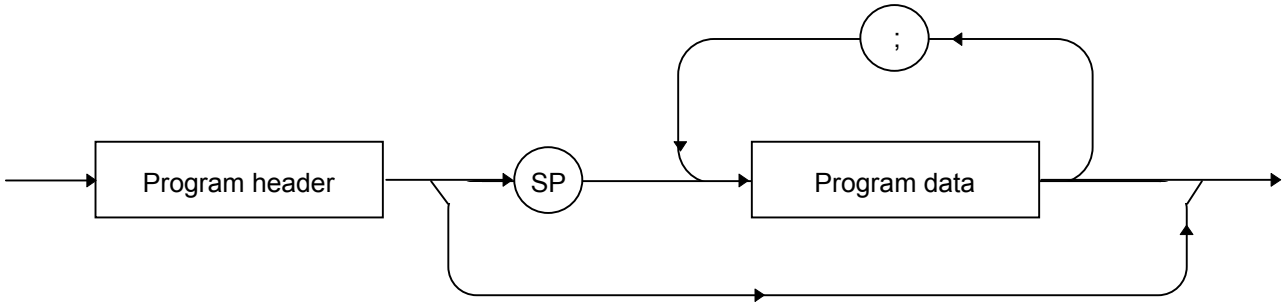
Program message



<Example>
PRINT @1; "FREQ 1GHZ; OLVL 0DBM"

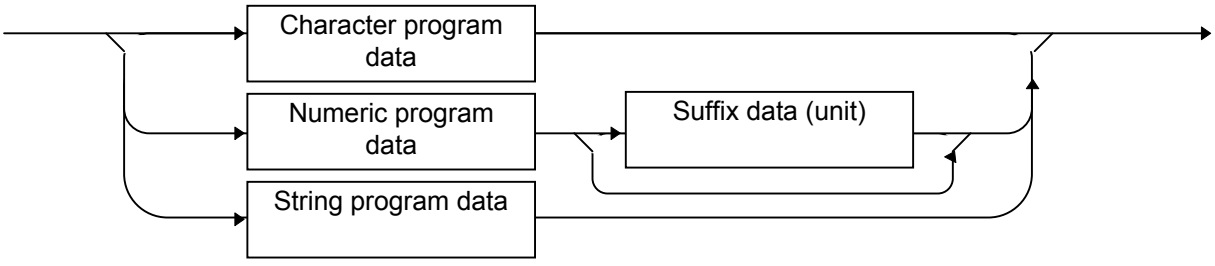
Multiple commands can be transmitted separately by separating them with semicolons (;).

Program message unit



The program header of each IEEE488.2 common command begins with an asterisk (*). The program header of each program query (query) generally ends with a question mark (?).

Program data



Character program data

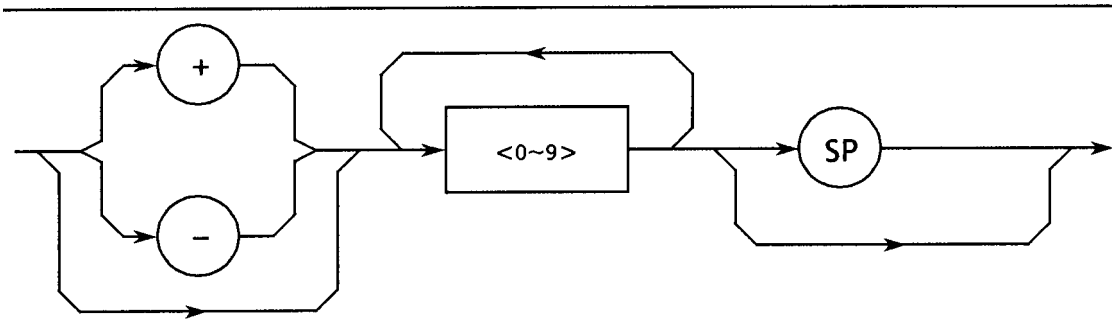
Defined strings of data are composed of any of the alphabetical lower case and upper case characters A to Z, the digits 0 through 9, and the underscore (_).

<Examples>
VDSPL TERM:Sets the output level voltage for display as a terminating voltage.
HEAD OFF: Attaches no header to the response Message.

Numeric program data

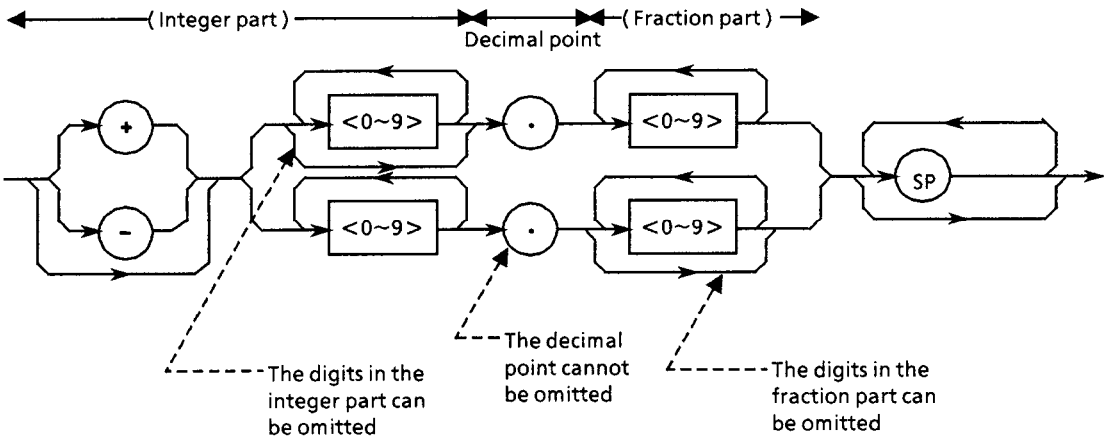
Numeric program data is grouped into four types: integral (NR1), fixed-point decimal (NR2), floating-point decimal (NR3), and hexadecimal.

Integral (NR1)



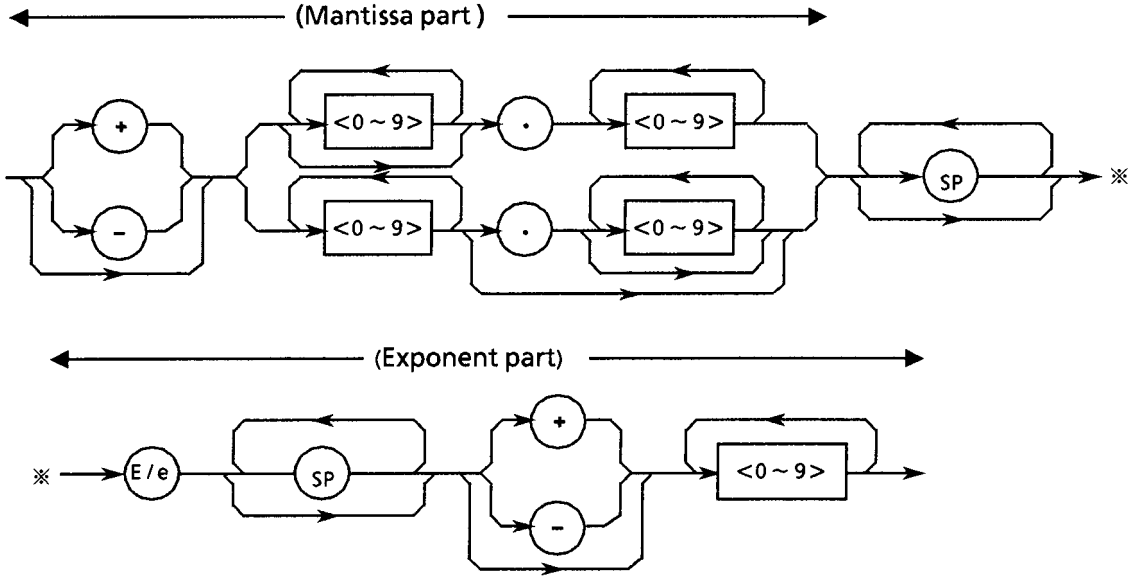
- Integral data can have leading zeros (e.g., 005, +005, –20).
- No space is allowed between a sign (+ or –) and the numeric value that follows it.
- The + sign can be omitted (e.g., 005, +005, –20).

Fixed-point decimal (NR2)



- An integer is represented in the integral part.
- No space is allowed between a digit and the decimal point that follows it.
- The + sign can be omitted.
- The digit 0 in the integral part may be omitted.
- Any number of zeros may precede the numeric value in the integral part (e.g., –0.5, +.204, –5).

Floating-point decimal (NR3)



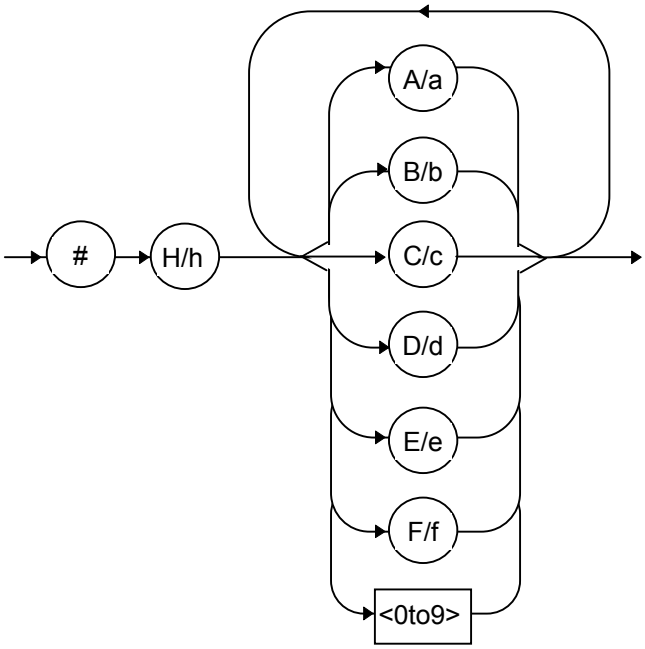
- E denotes raising to the power of 10, or the exponent part.
- Spaces are allowed both before and after, only before or only after E/e.
- A numeric value is required in the mantissa part.
- The + sign can be omitted (from both the mantissa and exponent parts).

<Examples>

$-22.34E+6 \rightarrow -22.34 \times 10^{6}$ (= –22340000)

$5.3e\text{-}4 \rightarrow 5.3 \times 10^{-4}$ (= 0.00053)

Hexadecimal data

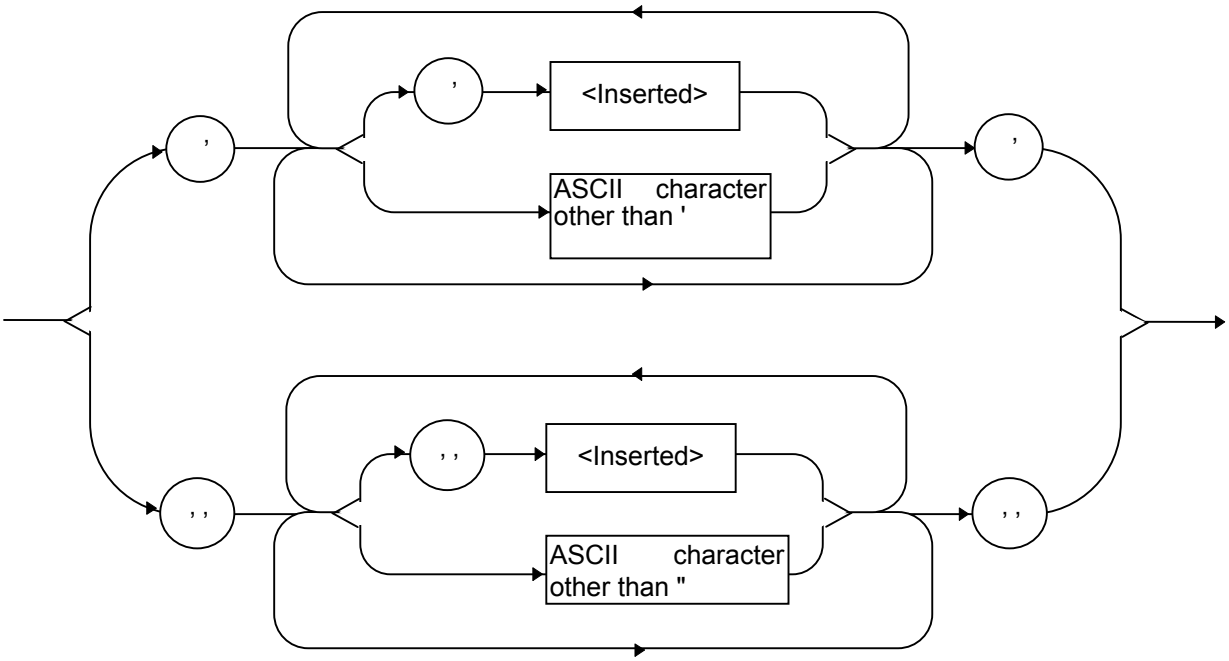


Suffix data

The table below lists the suffixes that are used in the MG3700A.

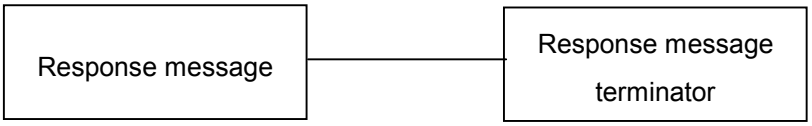
Category	Unit	Suffix Code
Frequency	GHz MHz kHz Hz	GHZ, GZ MHZ, MZ kHz, KZ HZ
Output level	dB dBm dBμV V mV μV mW aW μW nW pW fW	DB DBM DBU V MV UV MW AW UW NW PW FW
Bit count	bit Kbit (1×10^3) Mbit (1×10^6) Gbit (1×10^9)	BIT KBIT MBIT GBIT
Deviation (angle)	rad deg	RAD DEG

String program data

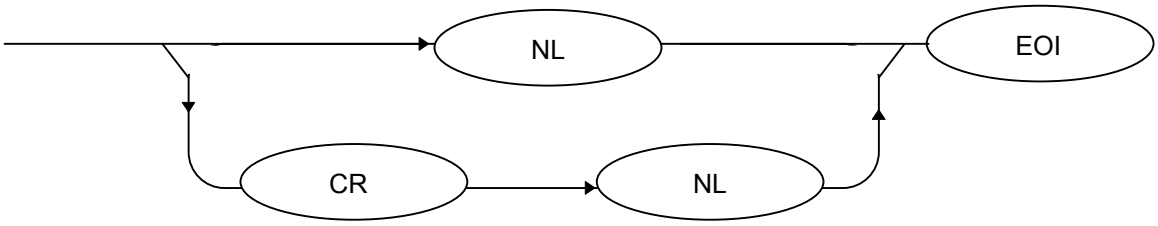


4.5.2 Response message formats

The formats in which the controller transmits response Messages from the MG3700A by way of INPUT and other statements are described below.

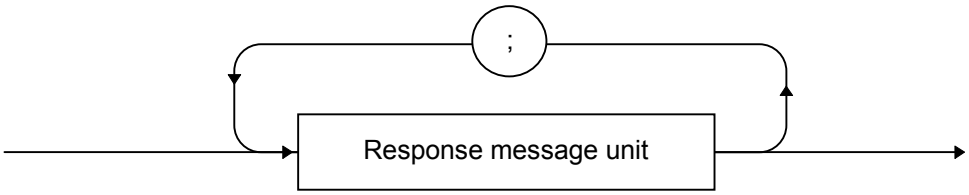


Response Message Terminator



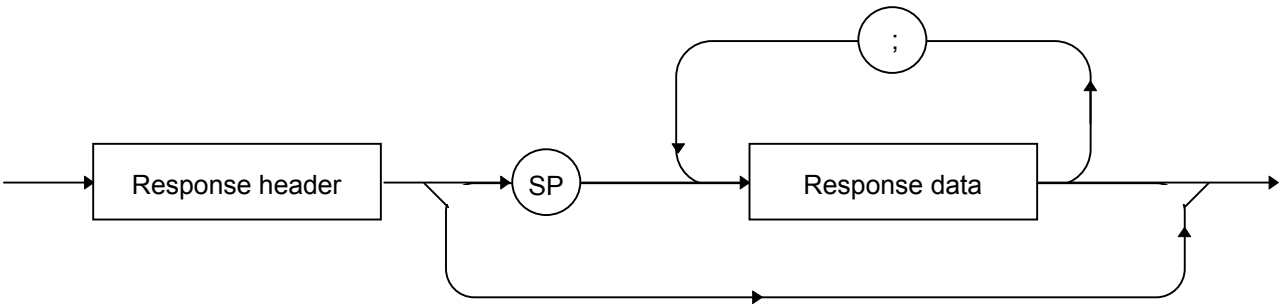
Use a TRM command to specify whether a response Message or a terminator is used.

Response message



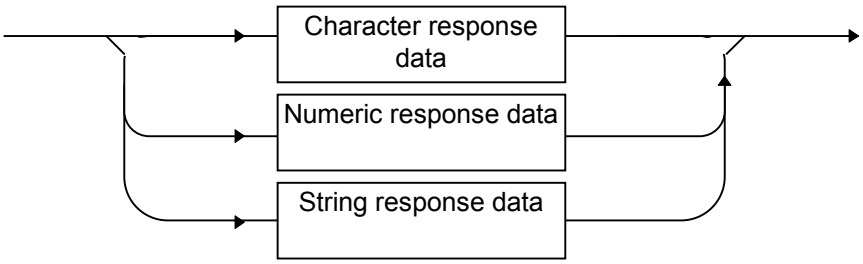
A response Message is composed of one or more response Message units to one or more program queries issued with one PRINT statement.

Normal response message unit



Use a Head command to specify whether Header exists or not.

Response data

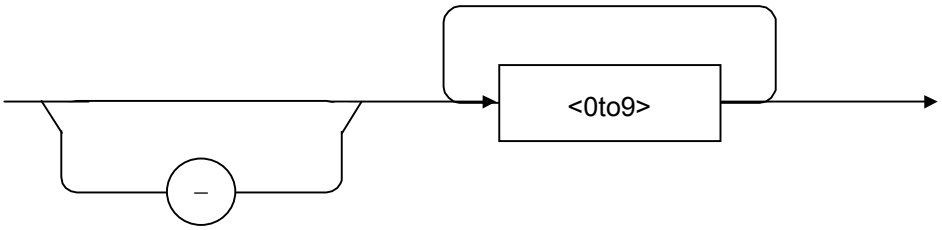


Character response data

Defined strings of data are composed of any of the alphabetical lower case and upper case characters A to Z, the digits 0 through 9, and the underscore (_).

Numeric response data

Integer (NR1)

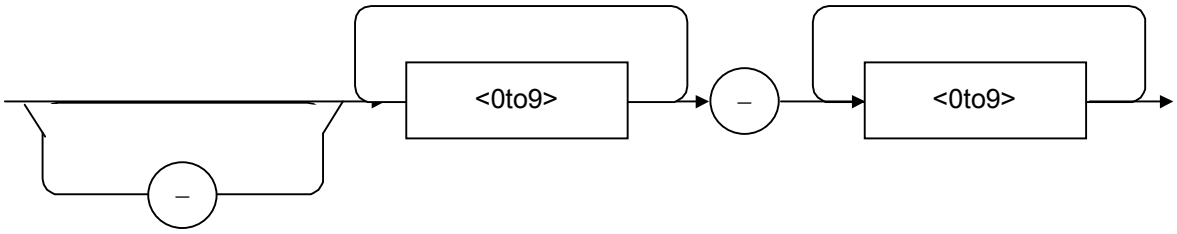


- The leading digit must be non-zero.

<Example>

123, –1234

Fixed-point decimal (NR2)

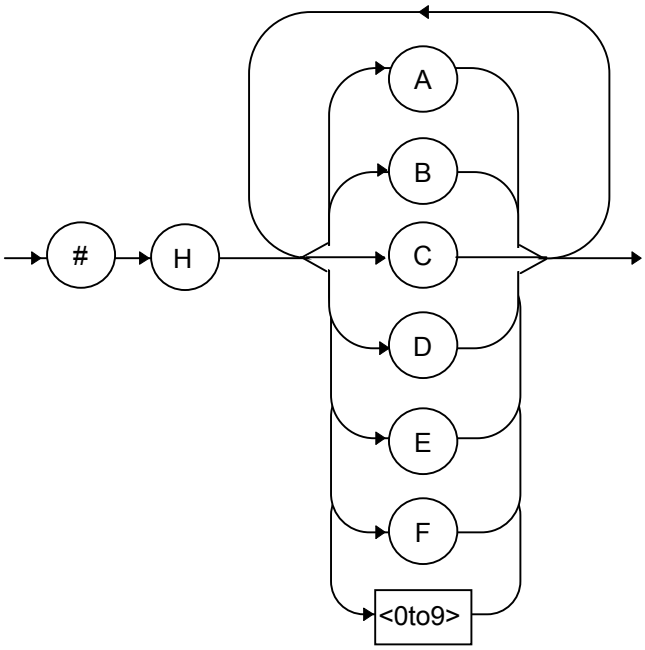


- The leading digit must be non-zero.
- A fixed-point decimal number having a value of 0 in its decimal place is output as an integer.

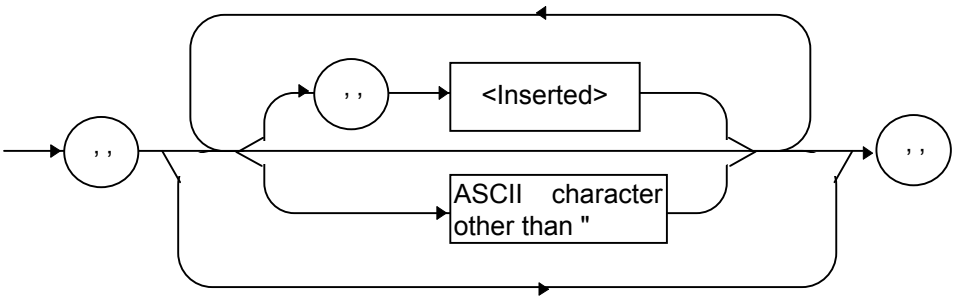
<Example>

12.34, –12.345

Hexadecimal data



String response data



4.5.3 Common commands and supported commands

The table below lists the 39 kinds of common commands that are defined by the IEEE488.2 standard. The commands marked by a double circle are IEEE488.2 commands used with the MG3700A.

Mnemonic	Full command name	IEEE488.2 default	Supported command
*AAD	Accept Address Command	Optional	
*CAL?	Calibration Query	Optional	
*CLS	Clear Status Command	Required	◎
*DDT	Define Device Trigger Command	Optional	
*DDT?	Define Device Trigger Query	Optional	
*DLF	Disable Listener Function Command	Optional	
*DMC	Define Macro Command	Optional	
*EMC	Enable Macro Command	Optional	
*EMC?	Enable Macro Query	Required	◎
*ESE	Standard Event Status Enable Command	Required	◎
*ESE?	Standard Event Status Enable Query	Required	◎
*ESR?	Standard Event Status Register Query	Optional	
*GMC?	Get Macro Contents Query	Required	◎
*IDN?	Identification Query	Optional	
*IST	Individual Status Query	Optional	
*LMC?	Learn Macro Query	Optional	
*LRN?	Learn Device Setup Query	Required	◎
*OPC	Operation Complete Command	Required	◎
*OPC?	Operation Complete Query	Optional	
*OPT?	Option Identification Query	Required if not C0	◎ (to be supported in future)
*PCB	Pass Control Back Command	Optional	
*PMC	Purge Macro Command	Optional	
*PRE	Parallel Poll Register Enable Command	Optional	
*PRE?	Parallel Poll Register Enable Query	Optional	
*PSC	Power On Status Clear Command	Optional	
*PSC?	Power On Status Clear Query	Optional	
*PUD	Protected User Data Command	Optional	
*PUD?	Protected User Data Query	Optional	
*RCL	Recall Command	Optional	
*RDT	Resource Description Transfer Command	Optional	
*RDT?	Resource Description Transfer Query	Optional	
*RST	Reset Command	Required	◎
*SAV	Save Command	Optional	
*SRE	Service Request Enable Command	Required	◎
*SRE?	Service Request Enable Query	Required	◎
*STB?	Read Status Byte Query	Required	◎
*TRG	Trigger Command	Required if DT1	◎
*TST?	Self Test (diagnosis) Query	Required	◎
*WAI	Wait to Continue Command	Required	◎

Note:

All IEEE488.2 common commands always begin with an asterisk (*).

4.5.4 Common commands classified by function

The table below lists the IEEE488.2 common commands supported by the MG3700A as classified by function.

Group	Function	Mnemonic
System data	Provides information dependent on a device connected to the GPIB system (such as its manufacturer's name, model name, and serial number).	*IDN?
Internal action	Controls the internal action of a device. <1> Level 3 device reset <2> Internal device self-testing (diagnosis) and error detection	*RST *TST?
Synchronization	Achieves synchronism between the MG3700A and controller in the following ways: <1> Service request wait <2> The MG3700A output queue response wait <3> Forced sequential execution	*OPC *OPC? *TRG *WAI
Status and event	The status byte consists of a 7-bit summary Message, the individual summary bits of which are available from the Standard Event Register, the output queue, and the Extended Event register or extended queue. Three commands and four queries are supported to set, clear, enable, disable, and query these registers and the output queue.	*CLS *ESE *ESE? *ESR? *SRE *SRE? *STB?

4.5.5 Common command function definitions

The table below provides a summarized description of the functions of the common commands.

Mnemonic	Argument	Group	Functions
*CLS	–	Status & Event	Clears the Status Byte register.
*ESE	NR1 format	Status & Event	Sets or clears specified bits of the Standard Event Status Enable register.
*ESE?	–	Status & Event	Returns the current value of the Standard Event Status Enable register in the NR1 format (0 to 255).
*ESR?	–	Status & Event	Returns the current value of the Standard Event Status register in the NR1 format.
*IDN?	–	System data	Returns ID information about the product in the following format: "Manufacturer's name, model name, serial number, and firmware version number"
*OPC	–	Synchronization	Sets bit 0 of the Standard Event Status register to 1. (This is because the MG3700A can handle only one command at a time, including an IEEE488.2 common command.)
*OPC?	–	Synchronization	Always returns 1. (This is because the MG3700A can handle only one command at a time, including an IEEE488.2 common command.)
*RST	–	Internal operation	Resets the settings of the product to their defaults (similar in function to the [Preset] key).
*SRE	–	Status & Event	Sets or clears specified bits of the Service Request Enable register.
*SRE?	NR1 format	Status & Event	Returns the current value of the Service Request Enable register in the NR1 format
*STB?	–	Status & Event	Returns the current value of the Status Byte register in the NR1 format.
*TRG	–	Synchronization	No operation
*TST?	–	Internal operation	Returns the result of the power-on selftest (diagnosis for CPU) and information about hardware errors detected in the main machine. If no errors have been detected in either case: 0 If error have been detected in either case: Returns the ORed result of the following in the NR1 format: Lower 8 bits in hexadecimal format: CPU error (FAIL reported by the selftest (diagnosis) Upper 8 bits in hexadecimal format: main frame error (such as UNLOCK)
*WAI	–	Synchronization	No operation. (This is because the MG3700A can handle only one command at a time, including an IEEE488.2 common command.)

4.6 List of Remote Commands by Function

4.6.1 Command and query messages

The header of a command message is expressed in uppercase letters as a reserved word. The header of a query message is ended by a question mark (?). Command and query messages may have multiple arguments delimited from one another by a comma (,). The kinds of arguments that can be used are described below.

<1> Numeric value:	Reserved word
<2> Arguments in lowercase:	
f (frequency):	Numeric data (NR1, NR2, NR3 format)
Suffix code:	GHZ, GZ, MHZ, MZ, kHz, KZ, HZ HZ if no unit is specified.
l (level):	Numeric data (NR1, NR2, NR3 format)
Suffix code:	DB, DBM, DBU, DU, V, MV, UV DBM, MV if no unit is specified.
b (bit):	Numeric data (NR1 format)
Suffix code:	GBIT, MBIT, KBIT, BIT BIT if no unit is specified.
t (time):	Numeric data (NR1, NR2 format)
Suffix code:	S, MS S if no unit is specified.
p (percent):	Numeric data (NR1, NR2 format)
Suffix code:	% (can be omitted)
d (degree of angle):	Numeric data (NR1, NR2 format)
Suffix code:	DEG
n (no-unit integer):	Numeric data (NR1 format)
r (no-unit real):	Numeric data (NR2 format)
e (no-unit real):	Numeric data (NR3 format)
h (no-unit hexadecimal):	Numeric data (hexadecimal)
a (specified string):	Uppercase alphanumeric characters (Reserved word)
s (String):	Alphanumeric character string enclosed with “ ” or ‘ ’.

4.6.2 Command or query message specifications

Remote commands and query messages (originating from external devices) enter the MG3700A through an interface, such as GPIB. If a remote command is successfully received and processed, the MG3700A handles the command in a manner suited to it. When a query message is successfully received and processed, a response message is sent back to the originating external device. When an error occurs while receiving or processing a remote command or query message, an error message is displayed on the screen. For more information about errors, refer to Section 4.6.4 “Error messages.”

If a numeric value is entered into a remote command or query message in a number of digits less than the resolution, it is rounded. For example, if a value of 30.05 is entered into a command argument having one decimal place as an available resolution, it would be treated as 30.1. If –30.05 is entered, it would be treated as –30.1. If 30.04 is entered, it would be treated as 30.0. If –30.04 is entered, it would be treated as –30.0.

4.6.3 Response messages

A response message is a reply to the incoming query message that is returned to an external controller. A response message is represented by a combination of a response header and response data. A response message may have multiple sets of response data delimited from one another by a comma (,). The kinds of response data that can be used are described below.

<1> Numeric value:	Reserved word
<2> Arguments in lowercase:	
f (frequency):	Numeric data (NR1, NR2, NR3 format)
Suffix code:	GHZ, GZ, MHZ, MZ, kHz, KZ, HZ HZ if no unit is specified.
l (level):	Numeric data (NR1, NR2, NR3 format)
Suffix code:	DB, DBM, DBU, DU, V, MV, UV DBM, MV if no unit is specified.
b (bit):	Numeric data (NR1 format)
Suffix code:	GBIT, MBIT, KBIT, BIT BIT if no unit is specified.
t (time):	Numeric data (NR1, NR2 format)
Suffix code:	S, MS S if no unit is specified.
p (percent):	Numeric data (NR1, NR2 format)
Suffix code:	%
d (degree of angle):	Numeric data (NR1, NR2 format)
Suffix code:	DEG
n (no-unit integer):	Numeric data (NR1 format)
r (no-unit real):	Numeric data (NR2 format)
e (no-unit real):	Numeric data (NR3 format)
h (no-unit hexadecimal):	Numeric data (hexadecimal)
a (specified string):	Uppercase alphanumeric characters (Reserved word)
s (String):	Alphanumeric character string enclosed with " " or ' '.

Note:

With header Off, response message header and numeric data suffix code are not output.

4.6.4 Remote error messages

An error message is a message displayed on the screen when a command or query message is received. An error message is represented by a combination of a character string (that represents an error) and the detailed error information. Error messages are displayed in a window that opens in the middle of the screen.

Selecting remote error message display modes

Instructions (on how to select error message display mode when remote control errors occur) are described below.

Items available for selection:

- Normal: An error message window is displayed when an error occurs. The window disappears when the process proceed with the next command (or cleared on appearance of a message from the execution result).

- Remain: An error message window is displayed when an error occurs. The window remains displayed on the screen until the next error occurs (and cleared on appearance of a message from the execution result).

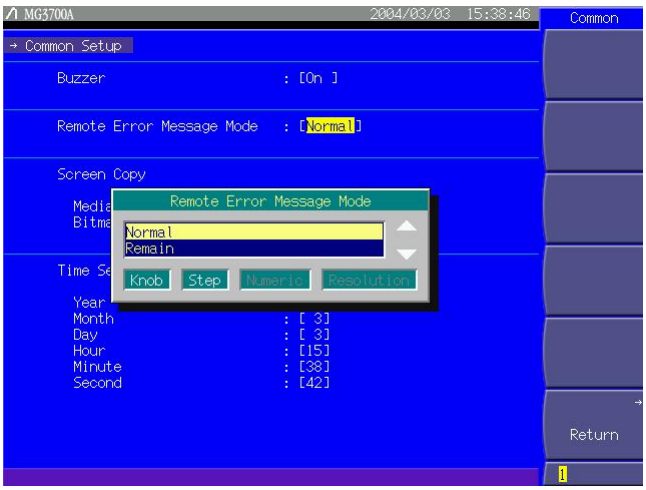


Fig. 4.6.4-1 Error message

<1> Press the main function key [Utility] to switch to the utility setup mode.

<2> Press [F4] (Common Setup) to open the Common Setup screen.

<3> Move the cursor to Remote Error Message Mode using the rotary knob and [^] [v].

<4> Press [Set] to open the item selection window. Then, select an item using the rotary knob or [∧] [∨] and press [Set] to determine the selection.

<5> Press [F6] (Return) to close the Common Setup screen.

4.6.5 Remote error message specifications

Error messages appear in the error window that opens in the middle of the screen when a command or query message is sent. The table below lists the type of supported errors. If multiple errors result from the transmission of one command or query message, only the one having the highest priority order listed in the table is displayed.

The detailed error information identifies the parameters in error or locates where the error has occurred.

Priority	Error message	Error cause
1	Invalid Status	Remote command not executable error
2	Undefined Command	Command-header character-string error
3	Command Error	Command error (such as blanks or a unique-command format error)
4	Insufficient Data	Argument count range error
5	Invalid Parameter	Reserved word argument character-string error
6	Invalid Numeric Data	Numeric argument character-string error
7	Out Of Range	Numeric argument range error
8	No Storage	Specified storage media not found
9	No Files To Read	Specified file is media not found in storage

4.6.6 MG3700A common function device message list

Item		Device messages		
Control item		**Command message**	**Query message**	**Response message**
Display	ON	DSPL *ON*	DSPL?	DSPL *ON*
	OFF	DSPL *OFF*		DSPL *OFF*
GPIB Status: END Enable		ESE2 n n: 0 to 255	ESE2?	n n: 0 to 255
GPIB Status: END		–	ESR2?	n n: 0 to 255
GPIB Status: ERR Enable		ESE3 n n: 0 to 255	ESE3?	n n: 0 to 255
GPIB Status: ERR		–	ESR3?	n n: 0 to 255
Response Message Header	ON	HEAD *ON*	HEAD?	HEAD *ON*
	OFF	HEAD *OFF*		HEAD *OFF*
Rotary Knob Hold	ON	KNOBHOLD *ON*	KNOBHOLD?	KNOBHOLD *ON*
	OFF	KNOBHOLD *OFF*		KNOBHOLD *OFF*
Preset		PRE	–	–
Screen Copy		SCOPY	–	–
Obtain Error Messages		–	ERRMSG?	ERRMSG n,s

4.6.7 Frequency and channel function device message list

Frequency function commands

Item			Device messages		
Control item			Command message	Query message	Response message
Change to Frequency Screen			SCREEN *FREQ_TOP*	SCREEN?	SCREEN *FREQ_TOP*
Frequency Value			FREQ f	FREQ?	FREQ f
Switch Frequency/ Channel Display		FREQ	BPADISP *FREQ*	BPADISP?	BPADISP *FREQ*
		CH	BPADISP *CH*		BPADISP *CH*
Step		Up	FRS *UP*	–	–
		Down	FRS *DN* FRS *DOWN*	– –	– –
Incremental Step Frequency			FIS f	FIS?	FIS f
Frequency Switching Speed		Fast	FREQSWSPEED *FAST*	FREQSWSPEED?	FREQSWSPEED *FAST*
		Normal	FREQSWSPEED *NORMAL*		FREQSWSPEED *NORMAL*
RF Spectrum		Reverse	SPREV *ON* SPREV *REV* SPREV *INV*	SPREV?	SPREV *ON*
		Normal	SPREV *OFF* SPREV *NORMAL*		SPREV *OFF*
Reference Frequency	Internal frequency source		–	REF?	REF *INT*
	External frequency source		–		REF *EXT*
PLL Condition	Normal		–	PLLCOND?	PLLCOND *NORMAL*
	Oven Cold		–		PLLCOND *OVENCOLD*
	Alarm		–		PLLCOND *ALARM*
	Check Ext Ref		–		PLLCOND *CHKEXT*
Change to RF output phase adjustment screen			SCREEN *FREQ_PHASE*	SCREEN?	SCREEN *FREQ_PHASE*
RF output phase			RFPHASE d	RFPHASE?	RFPHASE d

Channel function commands

Item		Device messages		
Control item		**Command message**	**Query message**	**Response message**
Change to Channel Screen		SCREEN *CHAN_TOP*	SCREEN?	SCREEN *CHAN_TOP*
Change to Channel Edit Screen		SCREEN *CHAN_EDIT*	SCREEN?	SCREEN *CHAN_EDIT*
Channel Number Setup		CH n n: Channel No.	CH?	CH n
Channel Steps	Up	CHS *UP*	–	–
	Down	CHS *DN* CHS *DOWN*	– –	– –
Frequency Display	ON	CHFDISP *ON*	CHFDISP?	CHFDISP *ON*
	OFF	CHFDISP *OFF*		CHFDISP *OFF*
Channel Group Setup		CHGRPSEL n	CHGRPSEL?	CHGRPSEL n
Channel Table All Clear		CHTBLALLCLR	–	–
Channel Table Edit		CHTBL n_1,s,n_2,n_3,f_1,f_2 n_1: On-screen line position s: Channel Group n_2: Start Channel n_3: End Channel f_1: Start Frequency f_2: Channel Space	CHTBL? n_1	CHTBL s,n_2,n_3,f_1,f_2
Channel Table Delete		CHTBLDEL n n: Channel No.	–	–
Channel Table File Save		CHFILESAVE s s: File name	–	–
Channel Table File Recall		CHFILERECALL s s: File name	–	–
Obtain Channel Table File Name		–	CHCURFILE?	CHCURFILE s
Select Channel Table Save/Recall Media	HDD	CHMEDIA *HDD*	CHMEDIA?	CHMEDIA *HDD*
	CF	CHMEDIA *CF*	CHMEDIA?	CHMEDIA *CF*

4.6.8 Level function device message list

Item		Device messages		
Control item		Command message	Query message	Response message
Change to Level Function screen		SCREEN *LVL_TOP*	SCREEN?	SCREEN *LVL_TOP*
RF Output Level	On	LVL *ON*	LVL?	LVL *ON*
	Off	LVL *OFF*		LVL *OFF*
Set Output Level		OLVL l	OLVL? a	OLVL l (a)
Level Value Step	UP	OLS *UP*	–	–
	DOWN	OLS *DN* OLS *DOWN*	– –	– –
Switch Level Unit	dBm system	OLU *DBM*	OLU?	OLU *DBM*
	dBμV system	OLU *DBU*		OLU *DBU*
Set Voltage Display	EMF	VDSPL *EMF*	VDSPL?	VDSPL *EMF*
	TERM	VDSPL *TERM*		VDSPL *TERM*
Set Offset Output Level Value		OOS l	OOS?	OOS l
Switch Offset On/Off	On	OOF *ON*	OOF?	OOF *ON*
	Off	OOF *OFF*		OOF *OFF*
Switch Relative Output Level On/Off	On	ORL *ON*	ORL?	ORL *ON*
	Off	ORL *OFF*		ORL *OFF*
Switch Continuous Mode On/Off	On	OCNT *ON*	OCNT?	OCNT *ON*
	Off	OCNT *OFF*		OCNT *OFF*
Incremental Step Level Value		OIS l	OIS?	OIS l
Calibration		CAL	–	–
Reference level at relative output level On		–	ORLR?	–
Relative Output Level (when relative output level On)		ORLV l	ORLV?	ORLV l
Switch to External ALC Mode	On	EXTALC *ON*	EXTALC?	EXTALC *ON*
	Off	EXTALC *OFF*		EXTALC *OFF*
Obtain ALC Status		–	ALCSTT?	ALCSTT *NORMAL*
				ALCSTT *ALCALARM*
Obtain Level Accuracy Status		–	LVLACCSTT?	LVLACCSTT *NORMAL*
				LVLACCSTT *UNLEVELED*
Obtain Attenuator Consumption Check Status		–	ATTCHKSTT?	ATTCHKSTT *NORMAL*
				ATTCHKSTT *ATTCHECK*
Level Output Status		–	LVLSTTLST?	LVLSTTLST a_1,a_2,a_3,a_4,a_5,a_6,a_7

4.6.9 Modulation function device message list

Commands common to all modulation functions

Item	Device messages		
Control item	**Command message**	**Query message**	**Response message**
Change to Modulation Function Top Screen	SCREEN *BB_TOP*	SCREEN?	SCREEN *BB_TOP*
BB Reference Clock Condition	–	BBREFCOND?	BBREFCOND *NORMAL*
			BBREFCOND *UNLOCK*
			BBREFCOND *CHKEXT*

Modulation commands

Item		Device messages		
Control item		**Command message**	**Query message**	**Response message**
Change to Advanced Menu Screen		SCREEN *BB_ADVANCE*	SCREEN?	SCREEN *BB_ADVANCE*
Waveform Restart		DLRES	–	–
Waveform File Selection	WMA	LOADEDFILESEL *WMA*,s_1,s_2 s_1: Package name s_2: Waveform file name	LOADEDFILESEL? *WMA*	LOADEDFILESEL (PAT) s_1,s_2
	WMB	LOADEDFILESEL *WMB*, s_1,s_2	LOADEDFILESEL? *WMB*	
	LONG	LOADEDFILESEL *LONG*, s_1,s_2	LOADEDFILESEL? *LONG*	
	COMB	LOADEDFILESEL *COMB*, s_1,s_2	LOADEDFILESEL? *COMB*	
		PAT (same function as LOADEDFILESEL)	PAT? (same function as LOADEDFILESEL?)	
Pattern Addition	Edit (Add)	PATCOMBMODE *EDIT* PATADD *ADD*	PATCOMBMODE? PATADD?	PATCOMBMODE *EDIT* PATADD *ADD*
	Defined (Single)	PATCOMBMODE *DEFINED* PATADD *SINGLE*		PATCOMBMODE *DEFINED* PATADD *SINGLE*
Start Offset		PATSOF n	PATSOF?	PATSOF n
Pattern (WM (A)) Level		PATWMALVL l	PATWMALVL?	PATWMALVL l
Pattern (WM (B)) Level		PATWMBLVL l	PATWMBLVL?	PATWMBLVL l
Pattern (WM (B')) Level		PATWMBDLVL l	PATWMBDLVL?	PATWMBDLVL l

Modulation commands (continued)

Item		Device messages		
Control item		Command message	Query message	Response message
Output WMA, WMB	WMA	PATWMOUT *WMA*	PATWMOUT?	PATWMOUT *WMA*
	WMB	PATWMOUT *WMB*	PATWMOUT?	PATWMOUT *WMB*
	WMA&B	PATWMOUT *WMAB*	PATWMOUT?	PATWMOUT *WMAB*
A/B (C/N) output ratio setting target specification	WMA	POWRATIOTARGET *WMA*	POWRATIOTARGET?	POWRATIOTARGET *WMA*
	WMB	POWRATIOTARGET *WMB*	POWRATIOTARGET?	POWRATIOTARGET *WMB*
	CONSTANT	POWRATIOTARGET *CONSTANT*	POWRATIOTARGET?	POWRATIOTARGET *CONSTANT*
A/B (C/N) output ratio		PATWMPOWRATIO l l: Output ratio	PATWMPOWRATIO?	PATWMPOWRATIO l
Waveform Memory Frequency Offset		PATWMFOF f	PATWMFOF?	PATWMFOF f
		PATWMAFOF f (same function as PATWMFOF)	PATWMAFOF? (same function as PATWMFOF?)	PATWMAFOF f
Pattern Running Status	Stop	–	PATRUNSTT?	PATRUNSTT *STOP*
	Play	–	PATRUNSTT?	PATRUNSTT *PLAY*
Sampling Clock		SAMPLINGCLK f	SAMPLINGCLK?	SAMPLINGCLK f
Low Pass Filter		LPF a a: See LPF command description.	LPF?	LPF a
Waveform RMS Value		RMSVAL l	RMSVAL?	RMSVAL l
Center Signal	WMA	CENTERSIG *WMA*	CENTERSIG?	CENTERSIG *WMA*
	WMB	CENTERSIG *WMB*		CENTERSIG *WMB*
Modulation	On	DMOD *ON*	DMOD?	DMOD *ON*
	Off	DMOD *OFF*		DMOD *OFF*
IQ Source	INT	IQSRC *INT*	IQSRC?	IQSRC *INT*
	EXT	IQSRC *EXT*		IQSRC *EXT*
IQ Source (MG3670 compatible)	INT	MODE *INT*	MODE?	MODE *INT*
	EXT	MODE *EXT*		MODE *EXT*
IQ output	On	IQOUT *ON*	IQOUT?	IQOUT *ON*
	Off	IQOUT *OFF*		IQOUT *OFF*
Sampling Clock Mismatch Warning Status	Match	–	SMPLCLKMATCH?	SMPLCLKMATCH MATCH
	Mismatch	–		SMPLCLKMATCH MISMATCH

Load Pattern commands

Item		Device message		
Control item		**Command message**	**Query message**	**Response message**
Change to Load Pattern to Memory Screen		SCREEN *BB_LOADPT*	SCREEN?	SCREEN *BB_LOADPT*
Load Waveform File to Memory	WMA	LDFILE *WMA*,s_1,s_2 s_1: Package name s_2: Waveform file name	LDFILE? *WMA*,s_1,s_2 s_1: Package name s_2: Waveform file name	LDFILE(LDPAT) *EXIST*
	WMB	LDFILE *WMB*,s_1,s_2	LDFILE? *WMB*,s_1,s_2	LDFILE(LDPAT) *EXIST_LONG*
	LONG	LDFILE *LONG*,s_1,s_2	LDFILE? *LONG*,s_1,s_2	LDFILE(LDPAT) *ENABLE*
	COMB	LDFILE *COMB*,s_1,s_2	LDFILE? *COMB*,s_1,s_2	LDFILE(LDPAT) *ENABLE_LONG*
		LDPAT (same function as LDFILE)	LDPAT? (same function as LDFILE?)	LDFILE(LDPAT) *NEED_LICENSE*
				LDFILE(LDPAT) *NEED_OPTIMIZE*
				LDFILE(LDPAT) *NO_PATTERN_HDD*
				LDFILE(LDPAT) *DELETE_PATTERN*
				LDFILE(LDPAT) *TOO_LARGE_SIZE*
				LDPAT *DELETE_ALL*
				LDFILE(LDPAT) *NOT_LONG_PATTERN*
				LDPAT NO_USE_WMB
				LDFILE(LDPAT) *CHANGE_SINGLE_MODE*
				LDPAT *DISABLE_LOAD*
				LDFILE(LDPAT) *INVALID_VERSION*
				LDFILE(LDPAT) *FILE_ERROR*
				LDFILE(LDPAT) *NO_COMBINATION_FILE_HDD*
				LDFILE(LDPAT) *COMBINATION_FILE_OVER*
				LDFILE(LDPAT) *NOT_EXIST_PATTERN_A*
				LDFILE(LDPAT) *NOT_EXIST_PATTERN_B*
				LDFILE(LDPAT) *FILE_ERROR*
				LDFILE(LDPAT) *NOT_EXIST_PATTERN_AB*

Load Pattern commands (continued)

Item	Device message		
Control item	**Command message**	**Query message**	**Response message**
Load Waveform File to Memory (Cont'd)			LDFILE(LDPAT) *WVI_FILE_ERROR*
			LDFILE(LDPAT) *WVC_FILE_ERROR*
			LDFILE(LDPAT) *SEQ_FILE_DO_NOT_SUPPORT*
			LDFILE(LDPAT) *PATTERN_OVER_ON_WM*
			LDFILE(LDPAT) *PACKAGE_OVER_ON_WMA*
			LDFILE(LDPAT) *PATTERN_OVER_ON_PACKAGE*
			LDFILE(LDPAT) *COMBINATION_FILE_OVER_ON_PACKAGE*
			LDFILE(LDPAT) *PACKAGE_OVER_ON_COMBINATION_MEMORY*
			LDFILE(LDPAT) *PATTERN_A_IS_LARGER_THAN_WMA*
			LDFILE(LDPAT) *PATTERN_B_IS_LAGER_THAN_WMB*
			LDFILE(LDPAT) *PATTERN_B_IS_WRONG_DATA_WIDTH*
			LDFILE(LDPAT) *PATTERN_AB_FIR_PARAM_MISMATCH*
Obtain Information Whether Combination File for Sequence Mode Can Be Loaded	SEQFILELDCHK s_1,s_2 s_1: Package name s_2: Name of combination file for the sequence mode	SEQFILELDCHK?	SEQFILELDCHK *CHECKING*
			SEQFILELDCHK *NEED_CHECK*
			SEQFILELDCHK *DELETE_PATTERN*
			SEQFILELDCHK *ENABLE*
			SEQFILELDCHK *NO_SEQUENCE_FILE_HDD*
			SEQFILELDCHK *NOT_SEQUENCE_FILE*
			SEQFILELDCHK *SEQUENCE_FILE_OVER*

Load Pattern commands (continued)

Item	Device message		
Control item	**Command message**	**Query message**	**Response message**
Obtain Information Whether Combination File for Sequence Mode Can Be Loaded (Cont'd)			SEQFILELDCHK *NOT_EXIST_PATTERN_A*
			SEQFILELDCHK *NOT_EXIST_PATTERN_B*
			SEQFILELDCHK *NOT_EXIST_PATTERN_AB*
			SEQFILELDCHK *SEQ_FILE_ELEMENT_PARAM_MISMATCH*
			SEQFILELDCHK *SEQUENCE_FILE_ERROR*
			SEQFILELDCHK *SEQ_LEVEL_RATIO_GAP_OVER*
			SEQFILELDCHK *TOO_LARGE_SIZE*
			SEQFILELDCHK *PATTERN_A_IS_LARGER_THAN_WMA*
			SEQFILELDCHK *PATTERN_A_IS_LARGER_THAN_WMB*
Cancel Waveform Loading to Memory	LDCANCEL	–	–
Obtain Name of Loaded Waveform File	–	LOADEDFILENAME? WMA,n n: Index No. in waveform memory	LOADEDFILENAME (PATNAME) s_1,s_2 s_1: Package name s_2: Waveform file name
		LOADEDFILENAME? WMB,n	
		LOADEDFILENAME? COMB,n	
		PATNAME? (same function as LOADEDFILENAME?)	
Obtain Number of Loaded Files	–	LOADEDFILENUM? WMA	LOADEDFILENUM n n: Number of files that are loaded in the waveform memory
		LOADEDFILENUM? WMB	
		LOADEDFILENUM? LONG	
		LOADEDFILENUM? COMB	

Load Pattern commands (continued)

Item		Device messages		
Control item		**Command message**	**Query message**	**Response message**
Copy Waveform Files from CF Card to Hard Disk		CFTOHDD s_1,s_2 s_1: Package name s_2: Pattern name	–	–
Delete Waveform Files from Memory	WMA	DELFILEWM *WMA*,s_1,s_2 s_1: Package name s_2: Waveform file name	–	–
	WMB	DELFILEWM *WMB*,s_1,s_2		
	LONG	DELFILEWM *LONG*,s_1,s_2		
	COMB	DELFILEWM *COMB*,s_1,s_2		
	ALL	DELFILEWM *ALL*		
		DELPATWM (same function as DELFILEWM)		
Obtain Number of Waveform Files on Memory		–	PATNUM? *WMA*	PATNUM n
			PATNUM? *WMB*	
			PATNUM? *LONG*	
			PATNUM? *COMB*	
Obtain Memory Free Space		–	WMSPC? *WMA*	WMSPC n_1,n_2,n_3
			WMSPC? *WMB*	
Optimize Memory	A	WMOPTIMIZE *WMA*	–	–
	B	WMOPTIMIZE *WMB*	–	–
Check Memory Optimization	A	WMOPTCHK *WMA*	WMOPTCHK? *WMA*	WMOPTCHK *ENABLE* WMOPTCHK *REMV_PATTERN* WMOPTCHK *NEED_CHECK* WMOPTCHK *ERROR* WMOPTCHK *CHECKING* WMOPTCHK *NO_PATTERN* WMOPTCHK *NO_NEED_OPTIMIZE*
	B	WMOPTCHK *WMB*	WMOPTCHK? *WMB*	
Cancel Memory Optimization		WMOPTCANCEL	–	–
Obtain Hard Disk Space Information		–	HDDSPC?	HDDSPC n_1,n_2 n_1: Total size of hard disk space n_2: Size of free hard disk space

Load Pattern commands (continued)

Item	Device messages		
Control item	**Command message**	**Query message**	**Response message**
Obtain Name of Pattern File Belonging to Combination File on Hard Disk	–	COMBPAT? s_1,s_2,WMA s_1: Package name s_2: Combination file name	COMBPAT s_1,s_2
		COMBPAT? s_1,s_2,WMB	
Obtain Total Size of Pattern Files That Belong to A Combination File	–	COMBTOTALSIZE? s_1,s_2 s_1: Package name s_2: Combination file name	COMBTOTALSIZE n_1,n_2 n_1: Total size of pattern files in waveform memory A n_2: Total size of pattern files in waveform memory B
Obtain Number of Elements Belonging to Combination File for Sequence Mode on Hard Disk	–	SEQELMNUM? s_1,s_2 s_1: Package name s_2: Combination file name	SEQELMNUM n n: Number of elements
Obtain Name of Element Belonging to Combination File for Sequence Mode on Hard Disk	–	SEQELMNAME? s_1,s_2,n s_1: Package name s_2: File name n: Element No.	SEQELMNAME s_1,s_2
Obtain Element Number of Pattern Being Reproduced in Sequence	–	SEQCURRENTELM?	SEQCURRENTELM n
Obtain Version of Pattern File on Hard Disk	–	FILEVER? s_1,s_2 s_1: Package name s_2: Pattern file name	FILEVER s

Ext I/O Setup commands

Item		Device messages		
Control item		Command message	Query message	Response message
Change to Ext I/O Setup Screen		SCREEN *BB_IOSETUP*	SCREEN?	SCREEN *BB_IOSETUP*
Start/Frame Trigger	On	SFTRG *ON*	SFTRG?	SFTRG *ON*
	Off	SFTRG *OFF*		SFTRG *OFF*
Start/Frame Trigger Mode	START	SFTRGMODE *START*	SFTRGMODE?	SFTRGMODE *START*
	FRAME	SFTRGMODE *FRAME*		SFTRGMODE *FRAME*
Start/Frame Trigger Source	INT	STGS *INT*	STGS?	STGS *INT*
	START	STGS *EXTSTA* STGS *EXT*		STGS *EXTSTA*
	FRAME	STGS *EXTFRM*		STGS *EXTFRM*
Start/Frame Trigger Delay		STDLY n	STDLY?	STDLY n
Start/Frame Trigger Delay (specified in conversion unit)		STDLYSYM n	STDLYSYM?	STDLYSYM n
Start/Frame Trigger Edge	RISE	EIST *RISE*	EIST?	EIST *RISE*
	FALL	EIST *FALL*		EIST *FALL*
BB Reference Clock Source	INT	REFCLKSRC *INT*	REFCLKSRC?	REFCLKSRC *INT*
	EXT	REFCLKSRC *EXT*		REFCLKSRC *EXT*
Pattern Trigger On/Off	ON	PATTRG *ON*	PATTRG?	PATTRG *ON*
	OFF	PATTRG *OFF*		PATTRG *OFF*
Pattern Trigger Edge Switch	RISE	PATTRGEDGE *RISE*	PATTRGEDGE?	PATTRGEDGE *RISE*
	FALL	PATTRGEDGE *FALL*		PATTRGEDGE *FALL*
BB Reference Clock	1/16	REFCLKVAL *SIXTEENTH*	REFCLKVAL?	REFCLKVAL *SIXTEENTH*
	1/8	REFCLKVAL *EIGHTH*		REFCLKVAL *EIGHTH*
	1/4	REFCLKVAL *QUARTER*		REFCLKVAL *QUARTER*
	1/2	REFCLKVAL *HALF*		REFCLKVAL *HALF*
	1	REFCLKVAL *1*		REFCLKVAL *1*
	2	REFCLKVAL *2*		REFCLKVAL *2*
	4	REFCLKVAL *4*		REFCLKVAL *4*
	8	REFCLKVAL *8*		REFCLKVAL *8*
	16	REFCLKVAL *16*		REFCLKVAL *16*
Marker Polarity		MARKERPOL n,a n: Marker a: *POS/NEG*	MARKERPOL? n	MARKERPOL n,a
Pulse Modulation Source	INT	PMO *INT*	PMO?	PMO *INT*
	EXT	PMO *EXT*		PMO *EXT*
	OFF	PMO *OFF*		PMO *OFF*

I/Q Tuning commands

Item		Device messages		
Control item		**Command message**	**Query message**	**Response message**
Change to I/Q Tuning Screen		SCREEN *BB_IQTUNING*	SCREEN?	SCREEN *BB_IQTUNING*
I Output Level Trimming		IOLTR p	IOLTR?	IOLTR p
Q Output Level Trimming		QOLTR p	QOLTR?	QOLTR p
I Common Offset		ICOMOS l	ICOMOS?	ICOMOS l
Q Common Offset		QCOMOS l	QCOMOS?	QCOMOS l
I Differential Offset		IDIFFOS l	IDIFFOS?	IDIFFOS l
Q Differential Offset		QDIFFOS l	QDIFFOS?	QDIFFOS l

Edit HDD commands

Item		Device messages		
Control item		**Command message**	**Query message**	**Response message**
Change to Edit HDD Screen		SCREEN *BB_EDITHDD*	SCREEN?	SCREEN *BB_EDITHDD*
Delete Waveform Files from Hard Disk		DELFILEHDD s_1,s_2 s_1: Package name s_2: Waveform file name DELPATHDD (same function as DELFILEHDD)	–	–

Sequence Progress commands

Item		Device messages		
Control item		**Command message**	**Query message**	**Response message**
Change to Sequence Progress Screen		SCREEN *BB_PROGRESS*	SCREEN?	SCREEN *BB_PROGRESS*
Sequence Next Pattern		SEQNEXTPAT	–	–
Sequence Restart		SEQRESTART	–	–
Set Sequence Play Mode	AUTO	SEQPLAYMODE *AUTO*	SEQPLAYMODE?	SEQPLAYMODE *AUTO*
	MANUAL	SEQPLAYMODE *MANUAL*		SEQPLAYMODE *MANUAL*
Set Sequence Switching Point	PAT_END	SEQSWPOINT *PAT_END*	SEQSWPOINT?	SEQSWPOINT *PAT_END*
	FRAME_ END	SEQSWPOINT *FRAME_END*		SEQSWPOINT *FRAME_END*

4.6.10 Main utility function device message list

Command common to all utility functions

Item	Device messages		
Control item	**Command message**	**Query message**	**Response message**
Change to Utility Function Top Screen	SCREEN *UTIL_TOP*	SCREEN?	SCREEN *UTIL_TOP*

Parameter save/recall commands

Item		Device message		
Control item		**Command Message**	**Query Message**	**Response Message**
Change to Parameter Save/Recall Screen		SCREEN *UTIL_PARAMSR*	SCREEN?	SCREEN *UTIL_PARAMSR*
Parameter Save		PRMSAV s s: AMP file name	–	–
Parameter Recall		PRMREC s s: AMP file name	–	–
Parameter File Delete		PRMDEL s s: AMP file name	–	–
Obtain parameter list		–	PRMLST?	PRMLST $s_1,s_2,s_3,\ldots,s_{99},s_{100}$ s_1 to s_{100}: AMP file name
Select Save/Recall Media	HDD	PRMMEDIA *HDD*	PRMMEDIA?	PRMMEDIA *HDD*
	CF	PRMMEDIA *CF*		PRMMEDIA *CF*

BER Measurement Commands
(STD: Standard BER measurement function; Op31: Option031/131)

Item	Device messages			Supported by:	
Control item	**Command message**	**Query message**	**Response message**	**STD**	**Op31**
Change to BER Test Screen	SCREEN *UTIL_BERT*	SCREEN?	SCREEN *UTIL_BERT*	√	√
Change to BER Interface Setup Screen	SCREEN *UTIL_BER_IO*	SCREEN?	SCREEN *UTIL_BER_IO*	–	√
Change to Resync Condition Setup Screen	SCREEN *UTIL_BER_RESYNC*	SCREEN?	SCREEN *UTIL_BER_RESYNC*	–	√
Start BER Measurement	BERSTART	–	–	√	√
Stop BER Measurement	BERSTOP	–	–	√	√
Clear BER Measurement Bit Count	BERCOUNTCLR	–	–	–	√

BER Measurement Commands (continued)

Item		Device messages			Supported by:	
Control item		Command message	Query message	Response message	STD	Op31
Set Data Polarity	POS	BERDATA *POS*	BERDATA?	BERDATA *POS*	√	√
	NEG	BERDATA *NEG*		BERDATA *NEG*	√	√
Set Clock Polarity	RISE	BERCLK *RISE*	BERCLK?	BERCLK *RISE*	√	√
	FALL	BERCLK *FALL*		BERCLK *FALL*	√	√
Set Enable Polarity	High	BERENBL *POS*	BERENBL?	BERENBL *POS*	√	√
	Low	BERENBL *NEG*		BERENBL *NEG*	√	√
	Disable	BERENBL *DISABLE*		BERENBL *DISABLE*	–	√
Set Data Signal Threshold Level		BERDATATHLD l l: Threshold level	BERDATATHLD?	BERDATATHLD l l: Threshold level	–	√
Set Clock Signal Threshold Level		BERCLKTHLD l l: Threshold level	BERCLKTHLD?	BERCLKTHLD l l: Threshold level	–	√
Set Enable Signal Threshold Level		BERENBLTHLD l l: Threshold level	BERENBLTHLD?	BERENBLTHLD l l: Threshold level	–	√
Set Data Delay		BERDATADELAY n n: Delay	BERDATADELAY?	BERDATADELAY n n: Delay	–	√
Set Enable Delay		BERENBLDELAY n n: Delay	BERENBLDELAY?	BERENBLDELAY n n: Delay	–	√
Input Impedance	Hi-Z	BERINZ *HIZ*	BERINZ?	BERINZ *HIZ*	–	√
	50 Ω	BERINZ *50*		BERINZ *50*	–	√
Select BER Measurement Log Media	HDD	BERMEDIA *HDD*	BERMEDIA?	BERMEDIA *HDD*	√	√
	CF	BERMEDIA *CF*		BERMEDIA *CF*	√	√
Auto Resync	ON	BERAUTORESYNC *ON*	BERAUTORESYNC?	BERAUTORESYNC *ON*	√	√
	OFF	BERAUTORESYNC *OFF*		BERAUTORESYNC *OFF*	√	√
Set Measurement Mode	SINGLE	BERMODE *SINGLE*	BERMODE?	BERMODE *SINGLE*	√	√
	CONTINUOUS	BERMODE *CONTINUOUS*		BERMODE *CONTINUOUS*	√	√
	ENDLESS	BERMODE *ENDLESS*		BERMODE *ENDLESS*	√	√

BER Measurement Commands (continued)

Item		Device messages			Supported by:	
Control item		Command message	Query message	Response message	STD	Op31
Set Measurement Termination Condition	Measurement time	BERCOUNTMODE *TIME*	BERCOUNTMODE?	BERCOUNTMODE *TIME*	√	–
	Measurement bit count	BERCOUNTMODE *DATABIT*		BERCOUNTMODE *DATABIT*	√	√
	Measurement error bit count	BERCOUNTMODE *ERRORBIT*		BERCOUNTMODE *ERRORBIT*	–	√
Set Measurement Time		BERTIME n n: Measuring time	BERTIME?	BERTIME n	√	–
Set Measurement Bit Count		BERBIT b b: Measurement bit count	BERBIT?	BERBIT b	√	√
Set Measurement Error Bit Count		BERERRORBIT b b: Measurement error bit count	BERERRORBIT?	BERERRORBIT b b: Measurement error bit count	–	√
Log Output		BERLOG s s: Log file name	–	–	√	√
Log Clear		BERLOGCLEAR	–	–	√	√
Log File Delete		BERLOGFILEDEL s	–	–	√	√
Set PN Type	PN9	BERTYPE *PN9*	BERTYPE?	BERTYPE *PN9*	√	√
	PN11	BERTYPE *PN11*		BERTYPE *PN11*	√	√
	PN15	BERTYPE *PN15*		BERTYPE *PN15*	√	√
	PN20	BERTYPE *PN20*		BERTYPE *PN20*	√	√
	PN23	BERTYPE *PN23*		BERTYPE *PN23*	√	√
	ALL0	BERTYPE *ALL0*		BERTYPE *ALL0*	√	√
	ALL1	BERTYPE *ALL1*		BERTYPE *ALL1*	√	√
	ALT	BERTYPE *ALT*		BERTYPE *ALT*	√	√
	PN9Fix	BERTYPE *PN9FIX*		BERTYPE *PN9FIX*	–	√
	PN11Fix	BERTYPE *PN11FIX*		BERTYPE *PN11FIX*	–	√
	PN15Fix	BERTYPE *PN15FIX*		BERTYPE *PN15FIX*	–	√
	PN20Fix	BERTYPE *PN20FIX*		BERTYPE *PN20FIX*	–	√
	PN23Fix	BERTYPE *PN23FIX*		BERTYPE *PN23FIX*	–	√
	User Define	BERTYPE USERPATTERN		BERTYPE USERPATTERN	–	√

BER Measurement Commands (continued)

Item		Device messages			Supported by:	
Control item		Command message	Query message	Response message	STD	Op31
Receive Bit		–	RCVBIT?	RCVBIT n n: Number of bits	√	√
Bit Error Count		–	BITERR?	BITERR n n: Number of bit errors	√	√
Bit Error Rate		–	BER? *EP*	BER p p: Error rate	√	√
			BER? *ER*	BER e e: Error rate	√	√
SyncLoss Count		–	BERSYNCLOSS?	BERSYNCLOSS n n: Number of SyncLoss errors	–	√
Set SyncLoss Detection Threshold Value		BERSYNCLOSSTHLD n,a n: Numerator of threshold a: Denominator of threshold	BERSYNCLOSSTHLD?	BERSYNCLOSSTHLD n,a n: Numerator of threshold a: Denominator of threshold	–	√
Set Count Operation at SyncLoss Detection	Clear	BERSYNCLOSSACT *COUNT_ CLEAR*	BERSYNCLOSSACT?	BERSYNCLOSSACT *COUNT CLEAR*	–	√
	Keep	BERSYNCLOSSACT *COUNT_KEEP*		BERSYNCLOSSACT *COUNT KEEP*	–	√
Obtain Measurement Status		–	BERSTATUS?	BERSTATUS *EXEC*	√	√
				BERSTATUS *SYNCHRONIZING*	√	√
				BERSTATUS *STOP*	√	√
				BERSTATUS *ERROR*	√	√
Obtain Measurement Error Status		–	BERERROR?	BERERROR *NONE*	√	√
				BERERROR *SYNCLOSS*	√	√
				BERERROR *CLOCKERROR*	√	√
				BERERROR *ENABLEERROR*	√	√

BER Measurement Commands (continued)

Item	Device messages			Supported by:	
Control item	**Command message**	**Query message**	**Response message**	**STD**	**Op31**
Obtain Measurement Stop Status	–	BERSTOPSTATUS?	BERSTOPSTATUS *STOP_NORMAL*	–	√
			BERSTOPSTATUS *STOP_OVERFLOW_DATACOUNT*	–	√
			BERSTOPSTATUS *STOP_OVERFLOW_SYNCLOSS*	–	√
			BERSTOPSTATUS *STOP_ABNORMAL_COUNT*	–	√
			BERSTOPSTATUS *EXEC*	–	√
			BERSTOPSTATUS *SYNCHRONIZAING*	–	√
Obtain Measured Results and Status	–	BERRESULT? *EP*	BERRESULT p,n_1,n_2,a_1,a_2 p: Error count n_1: Number of bit counts n_2: Number of error counts a_1: Measurement state a_2: Error cause	√	√
		BERRESULT? *ER*	BERRESULT e,n_1,n_2,a_1,a_2 e: Error count n_1: Number of bit counts n_2: Number of error counts a_1: Measurement state a_2: Error cause	√	√

BER Measurement Commands (continued)

Item	Device messages			Supported by:	
Control item	**Command message**	**Query message**	**Response message**	**STD**	**Op31**
Obtain Measured Results and Status (continued)	–	BERRESULT? *EP_WSYNCLOSS*	BERRESULT p,n_1,n_2,n_3,a_1,a_2 p: Error count n_1: Number of bit counts n_2: Number of error counts n_3: Number of SyncLoss errors a_1: Measurement state a_2: Error cause	–	√
		BERRESULT? *ER_WSYNCLOSS*	BERRESULT e,n_1,n_2,n_3,a_1,a_2 e: Error count n_1: Number of bit counts n_2: Number of error counts n_3: Number of SyncLoss errors a_1: Measurement state a_2: Error cause	–	√

BER Measurement Data Type Detail Setup Commands (Dedicated to Option031/131)

Item	Device messages		
Control item	**Command message**	**Query message**	**Response message**
Change to Data Type Detail Setup Screen	SCREEN *UTIL_BER_DETAIL*	SCREEN?	SCREEN *UTIL_BER_DETAIL*
Initial Value of PN Pattern Used in PN Fix	BERPNINITIAL n n: Initial value	BERPNINITIAL?	BERPNINITIAL n n: Initial value
Length of One Cycle of Pattern Used in PN Fix	BERPNFIXLENG n n: Length of one cycle	BERPNFIXLENG?	BERPNFIXLENG n n: Length of one cycle
Specify Start Bit of Part Used for Synchronization Judgment in User Defined Pattern	BERSYNCSTARTPOS n n: Start bit	BERSYNCSTARTPOS?	BERSYNCSTARTPOS n n: Start bit
Specify Length of Part Used for Synchronization Judgment in User Defined Pattern	BERSYNCLENG n n: Length	BERSYNCLENG?	BERSYNCLENG n n: Length

BER Measurement Data Type Detail Setup Commands (continued)

Item	Device messages		
Control item	**Command message**	**Query message**	**Response message**
Specify User Defined Pattern Loading Source Media	BERLOADMEDIA a a: CF, CFROOT, HDD	BERLOADMEDIA?	BERLOADMEDIA a a: CF, CFROOT, HDD
User Pattern File List	–	BERUSERPATLST?	BERUSERPATLST s_1,s_2,s_3,…,s_{99},s_{100} s_1 to s_{100}: User pattern file name
Load User Defined Pattern	BERLOADUSERPAT s s: User defined pattern file name	–	–
Name of Current User Defined Pattern File	–	BERUSERPAT?	BERUSERPAT s,a s: User defined pattern file name a: CF, CFROOT, HDD
Bit Length of Current User Defined Pattern File	–	BERUSERPATLENG?	BERUSERPATLENG n n: Bit length

Alarm Monitor Commands

Item		Device messages		
Control item		**Command message**	**Query message**	**Response message**
Change to Alarm Monitor Screen		SCREEN *UTIL_ALARMMON*	SCREEN?	SCREEN *UTIL_ALARMMON*
Alarm Monitor		–	ALMMONITOR?	ALMMONITOR n n: Alarm bit
Alarm History Output		ALMLOG s s: File name	–	–
Select Alarm History Output Media	HDD	ALMMEDIA *HDD*	ALMMEDIA?	ALMMEDIA *HDD*
	CF	ALMMEDIA *CF*		ALMMEDIA *CF*

Interface Setup commands

Item		Device messages		
Control item		**Command message**	**Query message**	**Response message**
Change to Interface Setup Screen		SCREEN *UTIL_IFSET*	SCREEN?	SCREEN *UTIL_IFSET*
GPIB Terminator (Talker)	LF	TRM *0* TRM *LF*	TRM?	TRM *LF*
	CR/LF	TRM *1* TRM *CRLF*		TRM *CRLF*

Network Setup commands

Item		Device messages		
Control item		**Command message**	**Query message**	**Response message**
Change to Network Setup Screen		SCREEN *UTIL_NETSET*	SCREEN?	SCREEN *UTIL_NETSET*
Host Name		HOSTNAME s s: Host name	HOSTNAME?	HOSTNAME s
Domain Name		DOMAINNAME s s: Domain name	DOMAINNAME?	DOMAINNAME s
DHCP	On	DHCP *ON*	DHCP?	DHCP *ON*
	Off	DHCP *OFF*		DHCP *OFF*
IP Address		IPAD n_1,n_2,n_3,n_4 n_1 to n_4: IP address	IPAD?	IPAD n_1,n_2,n_3,n_4
Subnet Mask		SUBNET n_1,n_2,n_3,n_4 n_1 to n_4: Subnet mask	SUBNET?	SUBNET n_1,n_2,n_3,n_4
DNS (DHCP Use)	On	DNSAUTO *ON*	DNSAUTO?	DNSAUTO *ON*
	Off	DNSAUTO *OFF*		DNSAUTO *OFF*
DNS Primary Address		DNS1AD n_1,n_2,n_3,n_4 n_1 to n_4: DNS address	DNS1AD?	DNS1AD n_1,n_2,n_3,n_4
DNS Secondary Address		DNS2AD n_1,n_2,n_3,n_4 n_1 to n_4: DNS address	DNS2AD?	DNS2AD n_1,n_2,n_3,n_4
Default Gateway		GATEWAY n_1,n_2,n_3,n_4 n_1 to n_4: Gateway address	GATEWAY?	GATEWAY n_1,n_2,n_3,n_4
IQproducer™ UserID		IQPROID s s: ID	IQPROID?	IQPROID s
IQproducer™ Password		IQPROPASWD s s: Password	–	–
IP Address Renew		IPRENEW	–	–
IP Address Release		IPRELEASE	–	–
MAC Address		–	MACAD?	MACAD h_1,h_2,h_3,h_4,h_5,h_6 h_1 to h_6: MAC address

Common Setup Commands

Item		Device messages		
Control item		**Command message**	**Query message**	**Response message**
Change to Common Setup Screen		SCREEN *UTIL_COMSET*	SCREEN?	SCREEN *UTIL_COMSET*
Buzzer	On	BUZ *ON*	BUZ?	BUZ *ON*
	Off	BUZ *OFF*		BUZ *OFF*
Remote Error Message Mode	Normal	REMDISP *NORMAL*	REMDISP?	REMDISP *NORMAL*
	Remain	REMDISP *REMA*		REMDISP *REMA*
Screen Copy Media	HDD	SCRCPYMEDIA *HDD*	SCRCPYMEDIA?	SCRCPYMEDIA *HDD*
	CF	SCRCPYMEDIA *CF*		SCRCPYMEDIA *CF*
Bitmap Setup	Color	BITMAPS *COLOR*	BITMAPS?	BITMAPS *COLOR*
	Gray Scale	BITMAPS *GRAY*		BITMAPS *GRAY*
Time Set		TIMESET n_1,n_2,n_3,n_4,n_5,n_6 n_1 to n_6: Time setting	TIMESET?	TIMESET n_1,n_2,n_3,n_4,n_5,n_6
Attenuator-check display	On	ATTCHKDISP ON	ATTCHKDISP?	ATTCHKDISP ON
	Off	ATTCHKDISP OFF		ATTCHKDISP OFF

Maintenance Check Commands

Item	Device messages		
Control item	**Command message**	**Query message**	**Response message**
Change to Maintenance Check Screen	SCREEN *UTIL_MNTCHK*	SCREEN?	SCREEN *UTIL_MNTCHK*
ATT Count	–	ATTT?	ATTT $n_1,n_2,n_3,n_4,n_5,n_6,n_7,n_8$ n_1 to n_8: Number of actuations
Running Time	–	RUNT?	RUNT n n: Running time

Hardware Check commands

Item	Device messages		
Control item	**Command message**	**Query message**	**Response message**
Change to Hardware Check Screen	SCREEN *UTIL_HDCHK*	SCREEN?	SCREEN *UTIL_HDCHK*
Change to Option Hardware Check Screen	SCREEN *UTIL_HDCHK_OPT*	SCREEN?	SCREEN *UTIL_HDCHK_OPT*
Hardware Check	–	HWC?	HWC a_1,a_2,a_3 a_1: CPU Pass/Fail result a_2: IF Pass/Fail result a_3: RF Pass/Fail result
Hardware Check (Option031/131 (High Speed BER Test Function))	–	HWCBER?	HWCBER a a: Pass/Fail result
CPU Board Serial Number Information	–	SERNUMCPU?	SERNUMCPU s s: Serial number
CPU Board Version Information	–	BOARDCPUVER?	BOARDCPUVER s s: Version number
CPU FPGA Version Information	–	FPGACPUVER?	FPGACPUVER s s: Version number
IPL Version Information	–	IPLVER?	IPLVER s s: Version number
CPU Software Version Information	–	SOFTCPUVER?	SOFTCPUVER s s: Version number
IF Board Serial Number Information	–	SERNUMIF?	SERNUMIF s s: Serial number
IF Board Version Information	–	BOARDIFVER?	BOARDIFVER s s: Version number
Baseband FPGA (Digital) Version Information	–	FPGADIGVER?	FPGADIGVER s s: Version number
Baseband FPGA (Analog) Version Information	–	FPGAANAVER?	FPGAANAVER s s: Version number
RF Board Serial Number Information	–	SERNUMRF?	SERNUMRF s s: Serial number
RF Board Version Information	–	BOARDRFVER?	BOARDRFVER s s: Version number
RF FPGA Version Information	–	FPGARFVER?	FPGARFVER s s: Version number
Key Encoder Version Information	–	KEYENCVER?	KEYENCVER s s: Version number

Hardware Check commands (continued)

Item	Device messages		
Control item	**Command message**	**Query message**	**Response message**
Option031/131 (High Speed BER Test Function) Serial Number Information	–	SERNUMBER?	SERNUMBER s s: Serial number
Option031/131 (High Speed BER Test Function) Board Version Information	–	BOARDBERVER?	BOARDBERVER s s: Version number
Option031/131 (High Speed BER Test Function) FPGA Version Information	–	FPGABERVER?	FPGABERVER s s: Version number

Product Information Commands

Item	Device messages		
Control item	**Command message**	**Query message**	**Response message**
Change to Product Information Screen	SCREEN *UTIL_PRDINF*	SCREEN?	SCREEN *UTIL_PRDINF*
Product Type	–	PTYPE?	PTYPE s s: Product type
Product Model	–	PMODEL?	PMODEL s s: Product model
Serial Number	–	SERNUM?	SERNUM s s: Serial number
Option Information	–	OPT? n n: Option number	OPT *On* OPT *Off*

Install commands

Item		Device messages		
Control item		**Command message**	**Query message**	**Response message**
Change to Install screen		SCREEN *UTIL_INSTTOP*	SCREEN?	SCREEN *UTIL_INSTTOP*
Change to Firmware Install Screen		SCREEN *UTIL_INSTFRM*	SCREEN?	SCREEN *UTIL_INSTFRM*
Change to Waveform Data License Install Screen		SCREEN *UTIL_INSTWV*	SCREEN?	SCREEN *UTIL_INSTWV*
Firmware Install		FIRMINST s s: File name	–	–
Install Source Media	HDD	INSTMEDIA *HDD*	INSTMEDIA?	INSTMEDIA *HDD*
	CF	INSTMEDIA *CF*		INSTMEDIA *CF*
Waveform Data License Number		–	WVKEYNUM?	WVKEYNUM n n: Number of licenses
Waveform Data License Name		–	WVKEYNAME? n n: License index	WVKEYNAME s s: License name
Waveform Data License Version		–	WVKEYVER? s	WVKEYVER s s: License version
Waveform Data License Install Source Media	HDD	WVINSTMEDIA *HDD*	WVINSTMEDIA?	WVINSTMEDIA *HDD*
	CF	WVINSTMEDIA *CF*		WVINSTMEDIA *CF*

Restrictions in sequence mode

(1) The following commands are valid only in the sequence mode.
SEQNEXTPAT, SEQRESTART, SEQPLAYMODE, SEQSWPOINT

(2) The following commands cannot be used in the sequence mode.
CAL, EXTALC, PATWMALVL, PATWMBLVL, PATWMBDLVL, SAMPLINGCLK, IOLTR, QOLTR, OCNT

(3) When any of the following commands is executed in the sequence mode, the sequential operation starts from the beginning.
DLRES, LDFILE, SAMPLINGCLK, LPF, RMSVAL, DMOD, IQSRC(MODE), IQOUT, SFTRG, STGS, STDLY, STDLYSYM, EIST, REFCLKSRC, PATTRG, PATTRGEDGE, REFCLKVAL, PMO

4.7 Device Message Details in Alphabetical Order

How to read the command table

FREQ

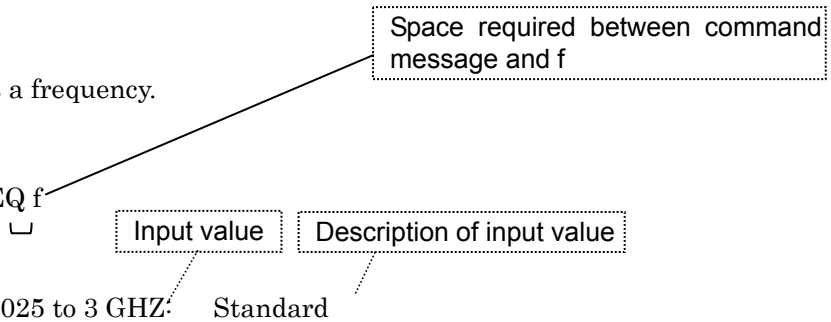
Frequency

Function

Sets a frequency.

Command Message

FREQ␣f



Value of f

0.00025 to 3 GHZ: Standard
0.25 to 3000 MHZ
250 to 3000000 kHz
250000 to 3000000000 HZ

0.00025 to 6 GHZ: Upper frequency limit 6 GHz (option) installed
0.25 to 6000 MHZ
250 to 6000000 kHz
250000 to 6000000000 HZ

Query Message

FREQ?

Response Message

FREQ f

Use Example

FREQ 123MHZ

*CLS

Clear Status Command

Function

Clears the Status Byte register.

Command Message

*CLS

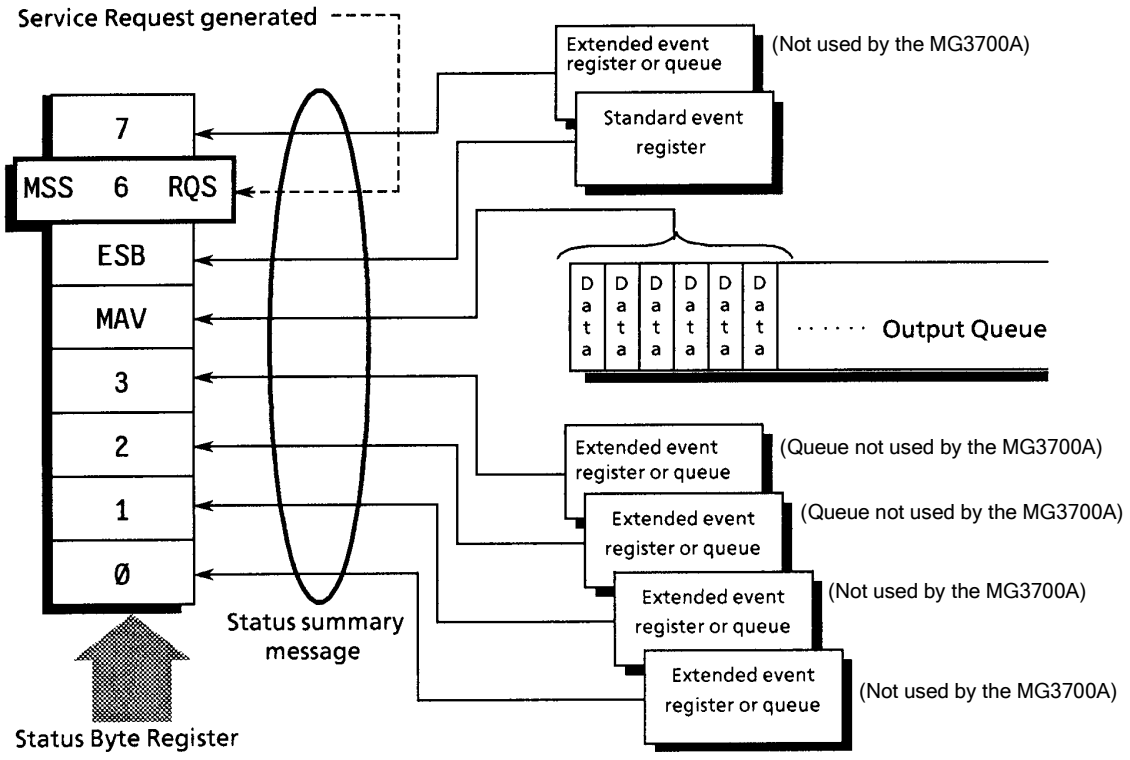
Explanation

The execution of the CLS common command message clears all status data (namely, event registers and queues), except for the output queue and the MAV summary message, and also clears the associated summary messages.

If the *CLS command is transmitted after a program terminator or before a query message unit element, all the status bytes are cleared. Consequently, the output queue is cleared of all unread messages, too. The settings of the enable registers are not affected by the execution of *CLS.

Use Example

*CLS



*ESE

Standard Event Status Enable Command

Function

Sets or clears the Standard Event Status Enable register.

Command Message

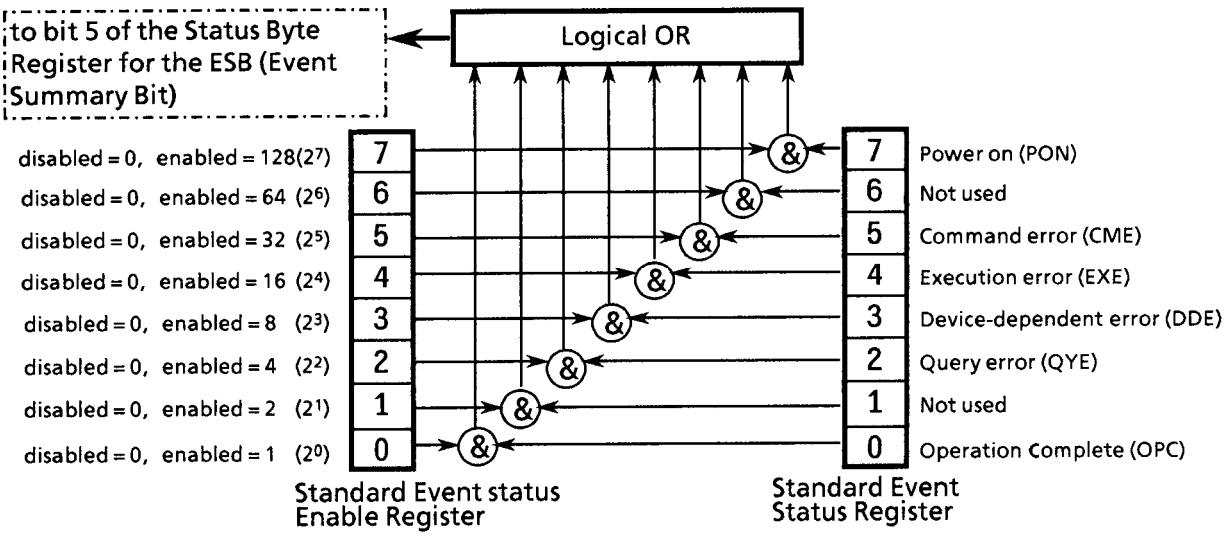
*ESE

Explanation

Of the values of $2^0 = 1$, $2^1 = 2$, $2^2 = 4$, $2^3 = 8$, $2^4 = 16$, $2^5 = 32$, $2^6 = 64$, $2^7 = 128$ associated with bits 0, 1, 2, 3, 4, 5, 6 and 7 of the Standard Event Status Enable register, the sum total (of the bit values of the bits chosen to be enabled) provides the program data. Bit positions (of the bits that are disabled) have a value of 0.

Use Example

*ESE 40 Controller → MG3700A
Enable CMD (bit 5) and RQC (bit 3).



*ESE?

Standard Event Status Enable Query

Function

Returns the current value of the Standard Event Status Enable register.

Query Message

*ESE?

Explanation

Returns the current value of the Standard Event Status Enable register in the NR1 format.

Response Message

NR1 = 0 to 255

Use Example

*ESE? Controller → MG3700A

*ESR?

Standard Event Status Register Query

Function

Returns the current value of the Standard Event Status register.

Command Message

*ESR?

Explanation

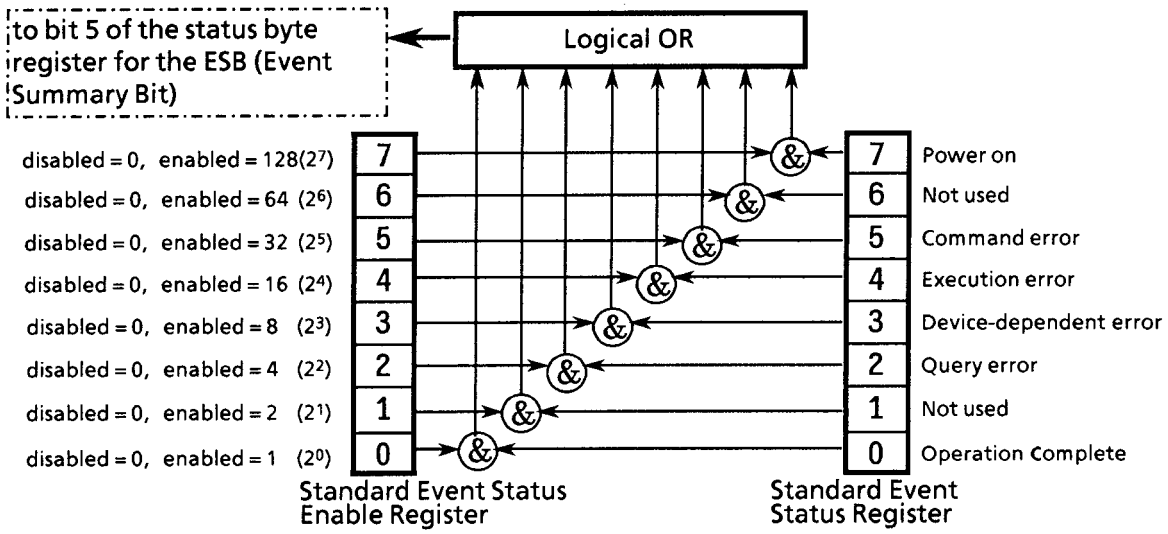
Returns the current value of the Standard Event Status register in the NR1 format. NR1 provides the sum total (of the bit values associated with the bits of $2^0 = 1$, $2^1 = 2$, $2^2 = 4$, $2^3 = 8$, $2^4 = 16$, $2^5 = 32$, $2^6 = 64$ and $2^7 = 128$ corresponding to the bits 0, 1, 2, 3, 4, 5, 6 and 7 of the Standard Event Status register that are enabled by the Standard Event Status Enable register). This register is cleared when a response (for example, row 40) is read.

Response Message

NR1 = 0 to 255

Use Example

*ESR? Controller → MG3700A
3 MG3700A → Controller



*IDN?

Identification Query

Function

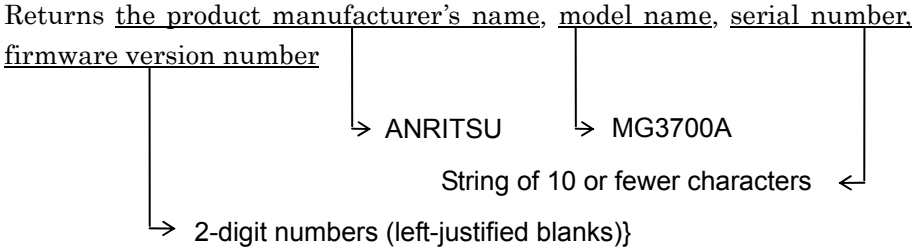
Returns product identification information, including the manufacturer' name and model name.

Command Message

*IDN?

Explanation

Returns the product manufacturer's name, model name, serial number, firmware version number



A response message consists of four fields shown above is returned.

<1> Field 1 Manufacturer's name (ANRITSU for Anritsu Corporation)
<2> Field 2 Model name (MG3700A for this equipment)
<3> Field 3 Serial number (10 or fewer digits)
<4> Field 4 CPU software version number
(1.00 to 99.99 with the MG3700A. This is equivalent to that for the query SOFTCPUVER?)

Response Message

A response message consists of four comma-separated fields shown above is transmitted as ASCII string data.
<Field 1>, <Field 2>, <Field 3>, <Field 4>

In the example given in the explanation above:
ANRITSU, MG3700A, Serial number, **.**

The maximum allowable response message length is 72 characters.

Use Example

*IDN? Controller → MG3700A
ANRITSU,MG3700A,0123456789,2.11 MG3700A → Controller

*OPC

Operation Complete Command

Function

Sets bit 0 of the Standard Event Status register to 1 when device operations complete.

Command Message

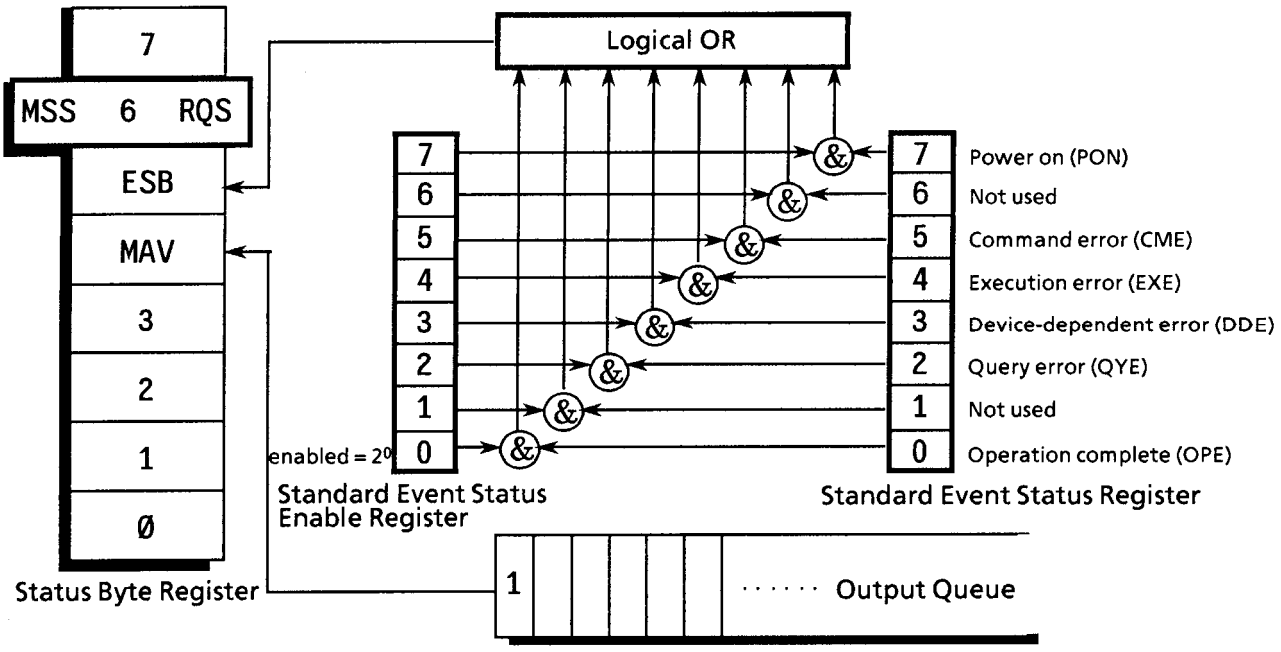
*OPC

Explanation

When all selected device operations complete, bit 0 of the Standard Event Status register (Operation End Bit) is set to 1. This command is an overlapping command.

Use Example

*OPC



*OPC?

Operation Complete Query

Function

Writes “1” to the output queue at the completion of device operations.

Command Message

*OPC?

Explanation

The *OPC? query writes “1” to the output queue when all selected device operations have ended and continues to wait for the generation of a MAV summary message.

Response Message

A “1” ASCII coded byte of 31hex is returned as numeric data in the NR1 format.

Use Example

*OPC?	Controller → MG3700A
1	MG3700A → Controller

*RST

Reset Command

Function

Resets a device to a level 3 state.

Command Message

*RST

Explanation

The *RST (Reset) command resets a device to a level 3 initial state. The items that are reset to level 3 are described below.

The *RST command reset device-specific functionality and status to a given known initial state regardless of their histories.

Note:

The execution of the *RST command does not affect the followings:

- IEEE488.1 interface status
- Device address
- Output queue
- Service Request Enable register
- Standard Event Status Enable register
- Structural data that affects device specifications

Use Example

*RST Controller → MG3700A

*SRE

Service Request Enable Command

Function

Sets the bits of the Service Request Enable register to 1.

Command Message

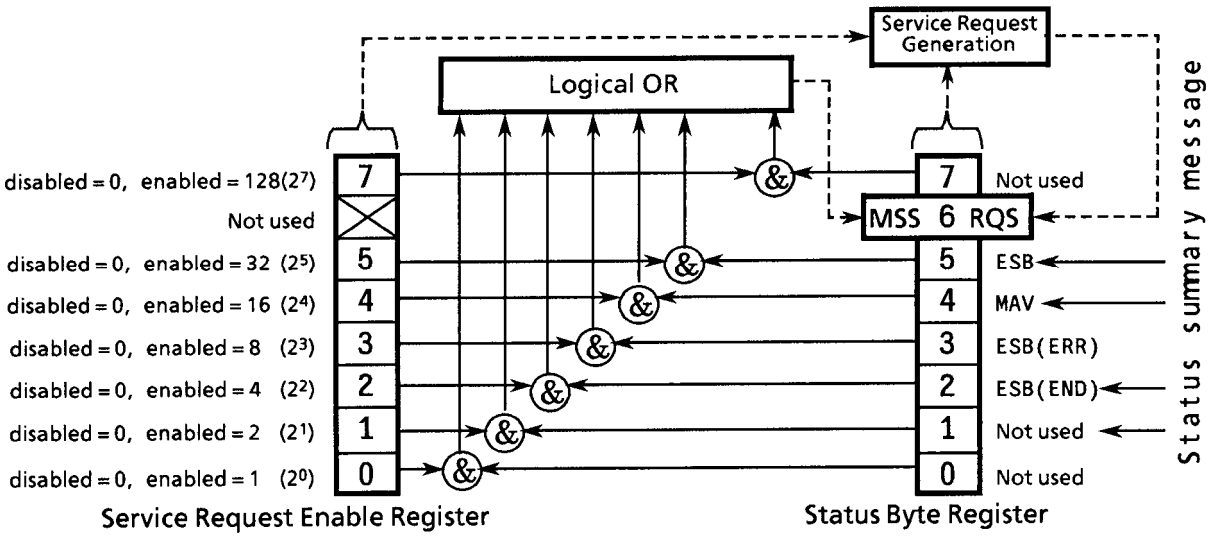
*SRE

Explanation

Of the fit values of $2^0 = 1$, $2^1 = 2$, $2^2 = 4$, $2^3 = 8$, $2^4 = 16$, $2^5 = 32$, $2^6 = 64$, $2^7 = 128$ associated with bits 0, 1, 2, 3, 4, 5, 6 and 7 of the Service Request Enable register, the sum total (of the bit values of the bits selected to be enabled) provides the program data. Bit positions of the bits that are disabled have a value of 0.

Use Example

*SRE 48 Controller → MG3700A
Enable ESB (bit 5) and MAV (bit 4).



*SRE?

Service Request Enable Query

Function

Returns the current value of the Service Request Enable register.

Command Message

*SRE?

Explanation

The *SRE? query returns the binary-weighted sum total (of the bit values of the Service Request Enable registers) as numeric response data in the NR1 format.

Response Message

NR1 ranges from 0 to 64 and from 128 to 191 because NR1 = bit 6 cannot be set.

Use Example

*SRE? Controller → MG3700A
48 MG3700A → Controller
(Sample run of *SRE)

*STB?

Read Status Byte Command

Function

Returns the current value of the Status Byte, including the MSS bit.

Command Message

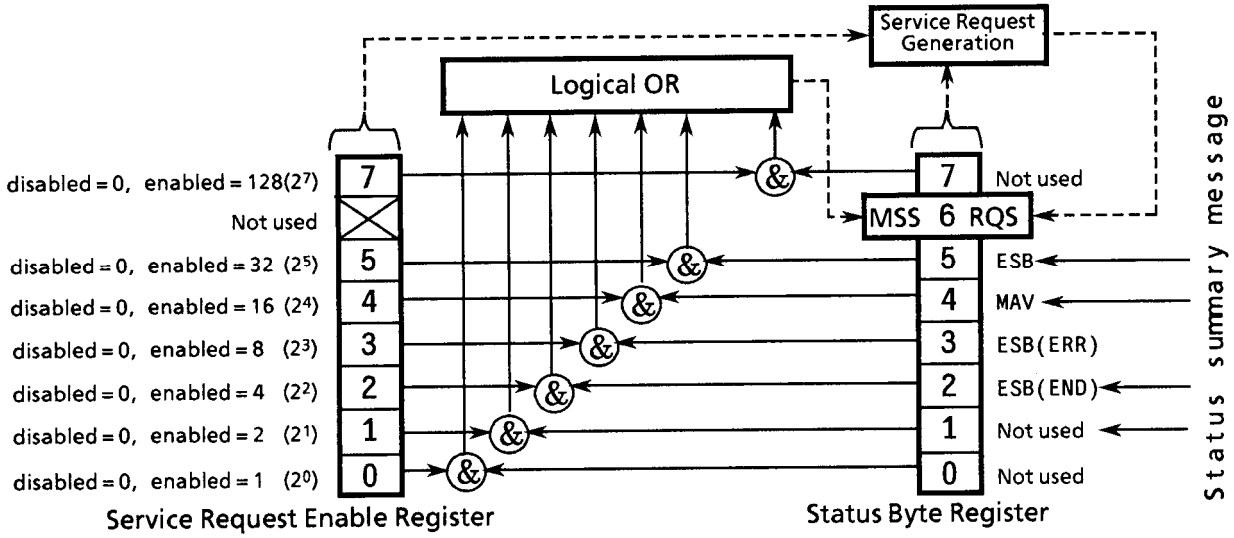
*STB?

Explanation

The STB? query returns the binary-weighted sum total (of the bit values of Status Byte register and the MSS summary message) as numeric response data in the NR1 format.

Response Message

The response message is an integer response data of 0 to 255 in the NR1, giving a sum total of the bit values of the Status Byte register. Bits 0 to 5 and bit 7 are weighted for 1, 2, 4, 8, 16, 32 and 128 and the MSS (Master Summary Status) bit is weighed for 64. MSS indicates that there is at least one cause of a service request. The conditions of the MG3700A Status Byte register are listed in the table below.



Bit	Bit weight	Bit name	Status Byte register condition	
7	128	–	0 = Not used	
6	64	MSS	0 = Service not requested	1 = Service requested
5	32	ESB	0 = Event status not occurring	1 = Event status occurring
4	16	MAV	0 = No data placed in the output queue	1 = Data placed in the output queue
3	8	ESB (ERR)	0 = Event status not occurring	1 = Event status occurring
2	4	ESB (END)	0 = Event status not occurring	1 = Event status occurring
1	2	–	0 = Not used	
0	1	–	0 = Not used	

Use Example

*STB Controller → MG3700A

4 MG3700A → Controller (END event occurring)

*TRG

Trigger Control

Function

Requests the execution of a trigger.

Command Message

*TRG

Explanation

The *TRG command executes a trigger input operation. The MG3700A performs no operation.

Use Example

*TRG Controller → MG3700A

*TST?

Self Test Query

Function

Runs an internal selftest (diagnosis) and returns resultant error information.

Command Message

*TST?

Explanation

The TST? query runs a selftest within a device. The test result is placed in the output queue to indicate whether the test has completed without encountering errors. The execution of the selftest does not require operator intervention. With the MG3700A, the command returns the result of a selftest run at power-on time and information about hardware faults detected during its operation. If an error occurs at a bit, the bit is set to 1. The scope of the selftest run by the MG3700A is described below.

Response Message

The response message is numeric data in the NR1 format.
Data range = 0 to 65535

NR1 = 0..... No error has been encountered during the test.
NR1 ≠ 0..... Errors have been encountered during the test.

If the response described below is returned:
514 = 512 + 2 denotes that an unlock is detected in the synthesizer PLL and flash memory errors in the power-on selftest is also detected.

Power-on CPU test	+1 on error
Power-on flash memory test	+2 on error
Power-on SDRAM test	+4 on error
Power-on SRAM test	+8 on error
Present status of reference frequency oscillator PLL operation	+256 on unlock detection
Present status of synthesizer PLL operation	+512 on unlock detection
Present status of baseband reference clock PLL operation	+1024 on unlock detention
Present status of ALC operation	+2048 on error

Use Example

*TST?	Controller → MG3700A
256	MG3700A → Controller (hardware error)

*WAI

Wait-to-Continue Command

Function

Leaves a command queued if the device is still executing a preceding command.

Command Message

*WAI

Explanation

The *WAI common command executes an overlapping command as a sequential command.

If a device is capable of starting the execution of a new command received from the controller even while it is executing the operation requested by a preceding command or query, the preceding command or query that is already executing is called an “overlapping command.”

If the *WAI common command is executed next to an overlapping command, the execution of the command that may be received after the overlapping is queued until the overlapping command completes, the same way as with a sequential command.

This command is unnecessary with the MG3700A, because it does not have an overlapping command.

Use Example

*WAI Controller → MG3700A

ALCSTT?

ALC Status

Function

Obtains the alarm status of the level.

Command Message

None

Query Message

ALCSTT?

Response Message

ALCSTT a

Value of a

NORMAL: Normal state
ALCALARM: ALC alarm state

Use Example

ALCSTT?

ALMLOG

Output Alarm History Log File

Function

Saves an alarm monitor log with a specified file name.

Command Message

ALMLOG s

Value of s

String (30 or fewer characters):	File name (extension attached automatically)

Query Message

None

Response Message

None

Use Example

ALMLOG “ALMLOG01”

ALMMEDIA

Media Choice for Alarm Monitor History Log File

Function

Selects the media to which alarm monitor log file is output.

Command Message

ALMMEDIA a

Value of a

HDD: Select the internal hard disk.
CF: Select the CF card.

Query Message

ALMMEDIA?

Response Message

ALMMEDIA a

Use Example

ALMMEDIA HDD

ALMMONITOR?

Alarm Monitor

Function

Returns the message displayed on the alarm monitor by a numeric value.

Command Message

None

Query Message

ALMMONITOR?

Response Message

ALMMONITOR n

Value of n

The response message is numeric data in the NR1 format.

Data range = 0 to 255

The bits associated with specific alarm conditions are set to 1, as follows:

Bit 0: Internal Ref CLK Unlock (Internal reference clock lock error)
Bit 1: Not used
Bit 2: ALC Alarm (ALC circuit fault)
Bit 3: BB Ref CLK Unlock (baseband clock lock error)

Use Example

ALMMONITOR?

ATTCHKDISP

Attenuator-check display

Function

Switches the attenuator operation count warning display on/off.

Command Message

ATTCHKDISP a

Value of a

ON: Warning display on
OFF: Warning display off

Query Message

ATTCHKDISP?

Response Message

ATTCHKDISP a

Use Example

ATTCHKDISP ON

Limitation

This command can be executed only when a mechanical attenuator (option) is installed.

ATTCHKSTT?

Attenuator-check status

Function

Obtains the check status of attenuator consumption.

Command Message

None

Query Message

ATTCHKSTT?

Response Message

ATTCHKSTT a

Value of a

NORMAL: Normal state
ATTCHECK: The attenuator has been exhausted. Check the conditions.

Use Example

ATTCHKSTT?

ATTT?

Attenuator Count

Function

Obtains a count of the number of actuations of each attenuator.

Command Message

None

Query Message

ATTT?

Response Message

ATTT n_1,n_2,n_3,n_4,n_5,n_6,n_7,n_8

Value of n_1

40 dB-A actuations

Value of n_2

40 dB-B actuations

Value of n_3

32 dB actuations

Value of n_4

16 dB actuations

Value of n_5

10 dB actuations

Value of n_6

8 dB actuations

Value of n_7

4 dB actuations

Value of n_8

2 dB actuations

Use Example

ATTT?

Limitation

This command can be executed only when a mechanical attenuator (option) is installed.

BBREFCOND?

Baseband Reference Clock Condition

Function

Obtains the lock status of the baseband reference clock.

Command Message

None

Query Message

BBREFCOND?

Response Message

BBREFCOND a

Value of a

NORMAL: Reference clock lock state
UNLOCK: Reference clock lock error state
CHKEXT: Reference clock lock error state

Use Example

BBREFCOND?

BER?

Bit Error Rate

Function

Obtains the bit error rate determined by the BER measurement function.

Command Message

None

Query Message

BER? a

Value of a

EP: Bit error rate returned in the percent format
ER: Bit error rate in the exponential format

Response Message

BER p
BER e

Value of p

0.0 to 100.0: 0.000 to 100.000%

Value of e

*.**E+**: 0.00E+00 to 1.00E+02

Use Example

BER? EP

BERAUTORESYNC

BER Auto Resync

Function

Selects Auto Resync (automatic resynchronization) during BER measurement On/Off.

Command Message

BERAUTORESYNC a

Value of a

ON: Enables Auto Resync
OFF: Disables Auto Resync

Query Message

BERAUTORESYNC?

Response Message

BERAUTORESYNC a

Use Example

BERAUTORESYNC OFF

BERBIT

BER Bit

Function

Sets the measurement bit count for BER measurement.

Command Message

BERBIT b

Value of b

1 to 4GBIT
1 to 4294MBIT
1 to 4294967KBIT
1000 to 4294967295BIT

Query Message

BERBIT?

Response Message

BERBIT b (in Bit units)

Limitations

- Command message results in an error when Endless is set for the BER measurement mode.
- Query message is valid even when Endless is set for the BER measurement mode.

Use Example

BERBIT 50MBIT

BERCLK

BER Clock Polarity

Function

Sets the clock polarity for BER measurement.

Command Message

BERCLK a

Value of a

RISE: Rise (rising)
FALL: Fall (falling)

Query Message

BERCLK?

Response Message

BERCLK a

Use Example

BERCLK RISE

BERCLKTHLD

BER Clock Threshold

Function

Sets the Clock signal threshold level for BER measurement.

Command Message

BERCLKTHLD l

Value of l

0.50 to 3.00V: 0.50 to 3.00 V, in 0.05 V step

Query Message

BERCLKTHLD?

Response Message

BERCLKTHLD l

Limitation

This command is valid only when Option031/131 is installed.

Use Example

BERCLKTHLD 1.80V

BERCOUNTCLR

BER Counter Clear

Function

Clears the BER measurement count value to 0.

Command Message

BERCOUNTCLR

Query Message

None

Response Message

None

Limitation

This command is valid only when Option031/131 is installed and Single or Endless is set for the BER measurement mode.

Use Example

BERCOUNTCLR

BERCOUNTMODE

BER Count Mode

Function

Selects the termination condition for BER measurement.

Command Message

BERCOUNTMODE a

Value of a

TIME: Measurement terminates when the set time elapsed.
DATABIT: Measurement terminates when the set bit count is exceeded.
ERRORBIT: Measurement terminates when the set error bit count is exceeded.

Query Message

BERCOUNTMODE?

Response Message

BERCOUNTMODE a

Limitation

DATABIT and ERRORBIT are valid when Option031/131 is installed.
TIME and DATABIT are valid when Option031/131 is not installed.

	When Option031/131 is installed	When Option031/131 is not installed
TIME	Not available	Available
DATABIT	Available	Available
ERRORBIT	Available	Not available

Use Example

BERCOUNTMODE DATABIT

BERDATA

BER Data Polarity

Function

Sets the data polarity for BER measurement.

Command Message

BERDATA a

Value of a

POS: Positive (positive polarity)
NEG: Negative (negative polarity)

Query Message

BERDATA?

Response Message

BERDATA a

Use Example

BERDATA POS

BERDATADELAY

BER Data Delay

Function

Specify the delay amount of the Data signal in relation to the Clock signal for BER measurement.

Command Message

BERDATADELAY n

Value of n

–1 to 15: –1 to 15 clocks

Query Message

BERDATADELAY?

Response Message

BERDATADELAY n

Limitation

This command is valid only when Option031/131 is installed.

Use Example

BERDATADELAY 4

BERDATATHLD

BER Data Threshold

Function

Sets the Data signal threshold level for BER measurement.

Command Message

BERDATATHLD l

Value of l

0.50 to 3.00V: 0.50 to 3.00 V, in 0.05 V step

Query Message

BERDATATHLD?

Response Message

BERDATATHLD l

Limitation

This command is valid only when Option031/131 is installed.

Use Example

BERDATATHLD 2.25V

BERENBL

BER Enable Polarity

Function

Sets the polarity of Enable for BER measurement.

Command Message

BERENBL a

Value of a

POS:	High active (positive logic)
NEG:	Low active (negative logic)
DISABLE:	Disables the Enable signal (available only when Option031/131 is installed)

Query Message

BERENBL?

Response Message

BERENBL a

Use Example

BERENBL POS

BERENBLDELAY

BER Enable Delay

Function

Specify the delay amount of the Enable signal in relation to the Clock signal for BER measurement.

Command Message

BERENBLDELAY n

Value of n

–1 to 15: –1 to 15 clocks

Query Message

BERENBLDELAY?

Response Message

BERENBLDELAY n

Limitation

This command is valid only when Option031/131 is installed.

Use Example

BERENBLDELAY 13

BERENBLTHLD

BER Enable Threshold

Function

Sets the Enable signal threshold level for BER measurement.

Command Message

BERENBLTHLD l

Value of l

0.50 to 3.00V: 0.50 to 3.00 V, in 0.05 V step

Query Message

BERENBLTHLD?

Response Message

BERENBLTHLD l

Limitation

This command is valid only when Option031/131 is installed.

Use Example

BERENBLTHLD 0.95V

BERERROR?

BER Error

Function

Obtains the error status of BER measurement.

Command Message

None

Query Message

BERERROR?

Response Message

BERERROR a

Value of a

NONE:	No error
SYNCLOSS:	Sync loss
CLOCKERROR:	Clock signal error
ENABLEERROR:	Enable error

* Order of error priority: Enable error > Clock signal error > Sync loss

Use Example

BERERROR?

BERERRORBIT

BER Error Bit

Function

Sets the measurement error bit count for BER measurement.

Command Message

BERERRORBIT b

Value of b

1 to 2GBIT
1 to 2147MBIT
1 to 2147483KBIT
1000 to 2147483647BIT

Query Message

BERERRORBIT?

Response Message

BERERRORBIT b (in Bit units)

Limitation

This command is valid only when Option031/131 is installed and Single or Continuous is set for the BER measurement mode.

Use Example

BERERRORBIT 4095

BERINZ

BER Impedance

Function

Sets the input impedance of the BER measurement connector.

Command Message

BERINZ a

Value of a

HIZ: High impedance
50: 50 Ω

Query Message

BERINZ?

Response Message

BERINZ a

Limitation

This command is valid only when Option031/131 is installed.

Use Example

BERINZ HIZ

BERLOADMEDIA

User Pattern Source Media

Function

Selects the media from which the user defined pattern file to be used in BER measurement is loaded.

Command Message

BERLOADMEDIA a

Value of a

HDD: The “OPT_BER_PATTERN” folder in the MG3700A internal hard disk is selected as the loading source.

CF: The “OPT_BER_PATTERN” folder in the CF card is selected as the loading source.

CFROOT: The root directory of the CF card is selected as the loading source.

Query Message

BERLOADMEDIA?

Response Message

BERLOADMEDIA a

Limitation

This command is valid only when Option031/131 is installed.

Use Example

BERLOADMEDIA ROOT

BERLOADUSERPAT

BER Load User Pattern

Function

Loads the user defined pattern file to be used in BER measurement.

Command Message

BERLOADUSERPAT s

Value of s

32 or fewer characters: User defined pattern file name (excluding the extension)

Query Message

None

Response Message

None

Limitations

- This command is valid only when Option031/131 is installed.
- Only the files with the extension ".bpn" can be loaded.
- An error is returned if the specified user pattern file does not exist.

Use Example

BERLOADUSERPAT "BITPATTERN01"

BERLOG

Output BER Test Log File

Function

Saves a BER measurement result log with a specified file name.

Command Message

BERLOG s

Value of s

String (30 or fewer characters): File name (extension attached automatically)

Query Message

None

Response Message

None

Use Example

BERLOG “BERLOG01”

BERLOGCLEAR

BER Test Log Clear

Function

Clears the BER measurement result log.

Command Message

BERLOGCLEAR

Query Message

None

Response Message

None

Use Example

BERLOGCLEAR

BERLOGFILEDEL

BER Test Log File Delete

Function

Deletes a saved BER measurement result log file.

Command Message

BERLOGFILEDEL s

Value of s

String (30 or fewer characters): File name (extension not required)

Query Message

None

Response Message

None

Use Example

BERLOGFILEDEL “BERLOG01”

BERMEDIA

BER Media

Function

Selects the media to which BER measurement log file is output.

Command Message

BERMEDIA a

Value of a

HDD: Select the MG3700A internal hard disk to be log output media.
CF: Select the CF card to be log output media.

Query Message

BERMEDIA?

Response Message

BERMEDIA a

Use Example

BERMEDIA HDD

BERMODE

BER Mode

Function

Selects a BER measurement mode.

Command Message

BERMODE a

Value of a

SINGLE:	Selects Single measurement.
CONTINUOUS:	Selects Continuous measurement.
ENDLESS:	Selects Endless measurement.

Query Message

BERMODE?

Response Message

BERMODE a

Limitation

When Endless is specified while Option031/131 is not installed, “CountMode: Time, Time: 359999 sec” is selected.
When Endless is specified while Option031/131 is installed, “CountMode: Data, DataBit: 4294967295” is selected.

Use Example

BERMODE SINGLE

BERPNFIXLENG

BER PN Fix Pattern Cycle Length

Function

Sets the length of the PN Fix pattern when the PN Fix pattern is used for BER measurement.

Command Message

BERPNFIXLENG n

Value of n

96 to 134217728: 96 to 134217728 bits

Query Message

BERPNFIXLENG?

Response Message

BERPNFIXLENG n

Limitation

This command is valid when Option031/131 is installed and PN9Fix, PN11Fix, PN15Fix, PN20Fix, or PN23Fix is selected for Data Type.

Use Example

BERPNFIXLENG 1024

BERPNINITIAL

BER PN Fix Pattern Initial value

Function

Sets the initial value of the PN Fix pattern in decimal when the PN Fix pattern is used for BER measurement.

Command Message

BERPNINITIAL n

Value of n

000000000 to 111111111:	When PN9Fix is selected
00000000000 to 11111111111:	When PN11Fix is selected
000000000000000 to 111111111111111:	When PN15Fix is selected
00000000000000000000 to 11111111111111111111:	When PN20Fix is selected
000000000000000000000000 to 111111111111111111111111:	When PN23Fix is selected

Query Message

BERPNINITIAL?

Response Message

BERPNINITIAL n

Limitation

This command is valid when Option031/131 is installed and PN9Fix, PN11Fix, PN15Fix, PN20Fix, or PN23Fix is selected for Data Type.

Use Example

BERPNINITIAL #B101010101

BERRESULT?

BER Result

Function

Obtains the result and status of BER measurement.

Command Message

None

Query Message

BERRESULT? a

Value of a

EP:	Bit error rate is returned in the percent format
ER:	Bit error rate is returned in the exponential format
EP_WSYNCLOSS:	Bit error rate is returned in the EP format with the SyncLoss count added (available only when Option031/131 is installed).
ER_WSYNCLOSS:	Bit error rate is returned in the ER format with the SyncLoss count added (available only when Option031/131 is installed)

Response Message

BERRESULT p,n_1,n_2,a_1,a_2
BERRESULT e,n_1,n_2,a_1,a_2
BERRESULT p,n_1,n_2,n_3,a_1,a_2
BERRESULT e,n_1,n_2,n_3,a_1,a_2

Value of p

0.0 to 100.0: 0.000 to 100.000%

Value of e

*.**E+**: 0.00E+00 to 1.00E+02

Value of n_1

Bit counts

Value of n_2

Error counts

Value of n_3

SyncLoss count

Value of a_1

[When Option031/131 is not installed]

EXEC:	Under measurement (“Measuring” is displayed on the screen.)
SYNCHRONIZING:	Synchronizing (only when Auto Resync is set to Off)
STOP:	Stopped state
ERROR:	Error state (Stopped state)

[When Option031/131 is installed]

EXEC:	Under measurement (“Measuring” is displayed on the screen.)
SYNCHRONIZING:	Synchronizing
STOP:	Stopped state
ERROR:	Error state (Stopped state)

Value of a_2

NONE:	No error
SYNCLOSS:	Sync loss
CLOCKERROR:	Clock signal error
ENABLEERROR:	Enable error

* Order of error priority: Enable error > Clock signal error > Sync loss

Limitation

When the BER measurement function provided as standard is used, the measurement status does not change within 100 ms from the start of the measurement (BERSTART).

Use Example

BERRESULT? EP

BERSTART

BER Start

Function

Starts BER measurement.

Command Message

BERSTART

Query Message

None

Response Message

None

Limitation

If this command is executed while a session of measurement is already in progress, it closes the current session of measurement and starts a new one immediately.

Use Example

BERSTART

BERSTATUS?

BER Status

Function

Obtains the status of BER measurement.

Command Message

None

Query Message

BERSTATUS?

Response Message

BERSTATUS a

Value of a

[When Option031/131 is not installed]

EXEC:	Under measurement (“Measuring” is displayed on the screen.)
SYNCHRONIZING:	Synchronizing (only when Auto Resync is set to Off)
STOP:	(No error) stopped
ERROR:	(Error) stopped

[When Option031/131 is installed]

EXEC:	Under measurement (“Measuring” is displayed on the screen.)
SYNCHRONIZING:	Synchronizing
STOP:	(No error) stopped
ERROR:	(Error) stopped

Limitations

- The content of the error is obtained using the BERERROR query command.
- When the BER measurement function provided as standard is used, the measurement status does not change within 100 ms from the start of the measurement (BERSTART).

Use Example

BERSTATUS?

BERSTOP

BER Stop

Function

Stops BER measurement.

Command Message

BERSTOP

Query Message

None

Response Message

None

Use Example

BERSTOP

BERSTOPSTATUS?

BER Stop Status

Function

Obtains the BER measurement stop status.

Command Message

None

Query Message

BERSTOPSTATUS?

Response Message

BERSTOPSTATUS a

Value of a

STOP_NORMAL: Measurement is stopped.
STOP_OVERFLOW_DATACOUNT:
Measurement is stopped since the number of received data bits exceeds the maximum value.
STOP_OVERFLOW_SYNCLOSS:
Measurement is stopped since the number of SyncLoss errors exceeds the maximum value.
STOP_ABNORMAL_COUNT:
Measurement is stopped since the BER measuring circuit is malfunctioning.
EXEC: Under measurement (“Measuring” is displayed on the screen.)
SYNCHRONIZING: Synchronizing (only when Auto Resync is set to Off)

Limitation

This command is valid only when Option031/131 is installed.

Use Example

BERSTOPSTATUS?

BERSYNCLENG

Length for Sync on User Pattern

Function

Sets the length of the part used for judging synchronization when a user-defined pattern is used for BER measurement.

Command Message

BERSYNCLENG n

Value of n

8 to (Pattern Length): 8 to (Pattern Length) bits

Query Message

BERSYNCLENG?

Response Message

BERSYNCLENG n

Limitation

This command is valid only when Option031/131 is installed and UserDefine is selected for Data Type.

Use Example

BERSYNCLENG 65

BERSYNCLOSS?

BER Sync Loss Count

Function

Obtains the SyncLoss count.

Command Message

None

Query Message

BERSYNCLOSS?

Response Message

BERSYNCLOSS n

Value of n

0 to 65535

Limitation

This command is valid only when Option031/131 is installed.

Use Example

BERSYNCLOSS?

BERSYNCLOSSACT

BER Count Action at Sync Loss

Function

Sets the bit count operation when SyncLoss is detected.

Command Message

BERSYNCLOSSACT a

Value of a

COUNT_CLEAR: The count value is cleared to 0 when SyncLoss is detected.

COUNT_KEEP: The count value is retained when SyncLoss is detected.

Query Message

BERSYNCLOSSACT?

Response Message

BERSYNCLOSSACT a

Limitation

This command is valid only when Option031/131 is installed and Auto Resync is set to On.

Use Example

BERSYNCLOSSACT COUNT_CLEAR

BERSYNCLOSSTHLD

BER Sync Loss Threshold

Function

Sets the threshold for judging SyncLoss.
When “n” bits out of “a” bits are errors, it is judged as SyncLoss.

Command Message

BERSYNCLOSSTHLD n,a

Value of n

1 to (a/2): 1 to (a/2) bits

Value of a

500: 500 bits
5000: 5000 bits
50000: 50000 bits

Query Message

BERSYNCLOSSTHLD?

Response Message

BERSYNCLOSSTHLD n,a

Limitation

This command is valid only when Option031/131 is installed and Auto Resync is set to On.

Use Example

BERSYNCLOSSTHLD 123,500

BERSYNCSTARTPOS

BER Sync Start Position on User Pattern

Function

Sets the start bit of the part used for judging synchronization when a user-defined pattern is used for BER measurement.

Command Message

BERSYNCSTARTPOS n

Value of n

1 to (Pattern Length): 1 to (Pattern Length) bits

Query Message

BERSYNCSTARTPOS?

Response Message

BERSYNCSTARTPOS n

Limitation

This command is valid only when Option031/131 is installed and UserDefine is selected for Data Type.

Use Example

BERSYNCSTARTPOS 31

BERTIME

BER Time

Function

Sets the BER measurement time (duration).

Command Message

BERTIME n

Value of n

0.1 to 359999.0: Sets a duration of BER measurement (in seconds).

Query Message

BERTIME?

Response Message

BERTIME n

Limitations

- For the selection of Endless measurement, it results in an error with this command message but not with this query message.
- This command is invalid when Option031/131 is installed.

Use Example

BERTIME 5000

BERTYPE

BER Type

Function

Selects the type of data to be uses in BER measurement.

Command Message

BERTYPE a

Value of a

PN9: Selects PN9.
PN11: Selects PN11.
PN15: Selects PN15.
PN20: Selects PN20.
PN23: Selects PN23.
ALL0: Selects ALL0.
ALL1: Selects ALL1.
ALT: Selects “01010101…”
PN9FIX: Selects PN9Fix (available when Option031/131 is installed).
PN11FIX: Selects PN11Fix (available when Option031/131 is installed).
PN15FIX: Selects PN15Fix (available when Option031/131 is installed).
PN20FIX: Selects PN20Fix (available when Option031/131 is installed).
PN23FIX: Selects PN23Fix (available when Option031/131 is installed).
USERPATTERN:
Selects a user defined pattern (available when Option031/131 is installed)

Query Message

BERTYPE?

Response Message

BERTYPE a

Use Example

BERTYPE PN9

BERUSERPAT

BER User Pattern File Name

Function

Obtains the name of the currently-loaded user defined pattern file for BER measurement.

Command Message

None

Query Message

BERUSERPAT?

Response Message

BERUSERPAT s,a

Value of s

32 or fewer characters: User defined pattern file name (excluding extension)

Value of a

HDD: The user defined pattern file was loaded from the "OPT_BER_PATTERN" folder in the MG3700A internal hard disk.

CF: The user defined pattern file was loaded from the "OPT_BER_PATTERN" folder in the CF card.

CFROOT: The user defined pattern file was loaded from the root directory of the CF card.

Limitation

This command is valid only when Option031/131 is installed. NONE is returned when Option031/131 is not installed.

Use Example

BERUSERPAT?

BERUSERPATLENG?

BER User Pattern Length

Function

Obtains the bit length of the currently-loaded user defined pattern file for BER measurement.

Command Message

None

Query Message

BERUSERPATLENG?

Response Message

BERUSERPATLENG n

Value of n

8 to 1024: 8 to 1024 bits

Limitation

This command is valid only when Option031/131 is installed.

Use Example

BERUSERPATLENG?

BERUSERPATLST?

Display BER User Pattern File List

Function

Obtains the list of the user defined pattern files for BER measurement.

Command Message

None

Query Message

BERUSERPATLST?

Response Message

BERUSERPATLST $s_1,s_2,s_3,\ldots,s_{99},s_{100}$

Value of s

32 or fewer characters: Up to 100 existing user defined pattern file names

Limitations

- The command will return "***" if no user defined pattern file exists.
- Response message files are listed in alphabetical order.
- This command is valid only when Option031/131 is installed.

Use Example

BERUSERPATLST?

BITERR?

Bit Error

Function

Obtains the count of bit errors encountered during BER measurement.

Command Message

None

Query Message

BITERR?

Response Message

BITERR n

Value of n

[When Option031/131 is not installed]
0 to $(256^8 - 1)$

[When Option031/131 is installed]
0 to $(2^{32} - 1)$

Use Example

BITERR?

BITMAPS

Bitmap Setup

Function

Specifies the bitmap file saving format.

Command Message

BITMAPS a

Value of a

COLOR: Color
GRAY: Gray scale

Query Message

BITMAPS?

Response Message

BITMAPS a

Use Example

BITMAPS COLOR

BOARDBERVER?

Option031/131 Board Version

Function

Obtains the Option031/131 (high speed BER test function) board version information.

Command Message

None

Query Message

BOARDBERVER?

Response Message

BOARDBERVER s

Value of s

Option031/131 (high speed BER test function) board version information

Limitation

This command is valid only when Option031/131 is installed.

Use Example

BOARDBERVER?

BOARDCPUVER?

CPU Board Version

Function

Obtains the CPU board version information.

Command Message

None

Query Message

BOARDCPUVER?

Response Message

BOARDCPUVER s

Value of s

CPU board version information

Use Example

BOARDCPUVER?

BOARDIFVER?

IF Board Version

Function

Obtains the IF board version information.

Command Message

None

Query Message

BOARDIFVER?

Response Message

BOARDIFVER s

Value of s

IF board version information

Use Example

BOARDIFVER?

BOARDRFVER?

RF Board Version

Function

Obtains the RF board version information.

Command Message

None

Query Message

BOARDRFVER?

Response Message

BOARDRFVER s

Value of s

RF board version information

Use Example

BOARDRFVER?

BPADISP

BPA Display

Function

Switches between frequency display and channel display.

Command Message

BPADISP a

Value of a

FREQ: Frequency (Frequency display)
CH: Channel (Channel display)

Query Message

BPADISP?

Response Message

BPADISP a

Use Example

BPADISP FREQ

BUZ

Buzzer

Function

Sets the built-in buzzer On/Off.

Command Message

BUZ a

Value of a

ON: Internal buzzer On
OFF: Internal buzzer Off

Query Message

BUZ?

Response Message

BUZ a

Use Example

BUZ ON

CAL

Calibration

Function

Executes calibration (output level calibration).

Command Message

CAL

Query Message

None

Response Message

None

Use Example

CAL

CENTERSIG

Select Center Signal

Function

Selects the frequency offset reference signal.

Command Message

CENTERSIG a

Value of a

WMA: Signal at the Memory A side
WMB: Signal at the Memory B side

Query Message

CENTERSIG?

Response Message

CENTERSIG a

Use Example

CENTERSIG WMA

CFTOHDD

Copy Pattern from CF to HDD

Function

Copies a waveform file stored on the CF card to the MG3700A internal hard disk.

Command Message

CFTOHDD s_1,s_2

Value of s_1

31 or fewer characters: Package name
CFROOT: Root directory of CF card

Value of s_2

20 or fewer characters: Waveform file name

Query Message

None

Response Message

None

Limitations

- If s_2 is not specified, all the waveform files (in the package specified by s_1) are copied.
- If the same waveform file already exists in the same package, it is overwritten.
- If CFROOT is specified for s_1, the waveform files stored in the root directory of the CF card are copied.

Use Example

CFTOHDD “WCDMA”,“TEST Pattern 0001”

CH

Channel

Function

Sets a channel number.

Command Message

CH n

Value of n

0 to 20000

Query Message

CH?

Response Message

CH n

Use Example

CH 123

CHCURFILE?

Channel Current File Name

Function

Obtains the file name of the current channel table.

Command Message

None

Query Message

CHCURFILE?

Response Message

CHCURFILE s

Value of s

30 or fewer characters: Current channel table file name

Use Example

CHCURFILE?

CHFDISP

Channel Frequency Display

Function

Sets the frequency display On/Off in channel display mode.

Command Message

CHFDISP a

Value of a

ON: Displays frequency
OFF: Does not display frequency

Query Message

CHFDISP?

Response Message

CHFDISP a

Use Example

CHFDISP ON

CHFILERECALL

Channel Table File RECALL

Function

Reads a channel table file and sets it in the channel table.

Command Message

CHFILERECALL s

Value of s

String (30 or fewer characters): File name

Query Message

None

Response Message

None

Use Example

CHFILERECALL “CHGROUP01”

CHFILESAVE

Channel Table File Save

Function

Saves a channel table with a specified file name.

Command Message

CHFILESAVE s

Value of s

String (30 or fewer characters): File name

Query Message

None

Response Message

None

Use Example

CHFILESAVE “SAVEFILE”

CHGRPSEL

Channel Group Select

Function

Sets a channel table group.

Command Message

CHGRPSEL n

Value of n

1 to 19: On-screen line position

Query Message

CHGRPSEL?

Response Message

CHGRPSEL n

Use Example

CHGRPSEL 1

CHMEDIA

Channel Media

Function

Selects the media to which the channel table is saved.

Command Message

CHMEDIA a

Value of a

HDD: Select the MG3700A internal hard disk.
CF: Select the CF card.

Query Message

CHMEDIA?

Response Message

CHMEDIA a

Use Example

CHMEDIA HDD

CHS

Channel Incremental Step (Up/Down)

Function

Increments/decrements the channel number by one at a time.

Command Message

CHS a

Value of a

UP: Increment the channel number by one.
DN: Decrement the channel number by one.
DOWN: Decrement the channel number by one.

Query Message

None

Response Message

None

Use Example

CHS UP

CHTBL

Channel Table Edit

Function

Edits the channel table.

Command Message

CHTBL n_1,s,n_2,n_3,f_1,f_2

Value of n_1

1 to 19: On-screen line position

Value of s

String (nine or fewer characters): Channel Group

Value of n_2

0 to 20000: Start Channel

Value of n_3

0 to 20000: End Channel

Value of f_1

250000 to 3000000000HZ: Start Frequency (standard)
250 to 3000000kHz
0.25 to 3000MHZ
0.00025 to 3GHZ

250000 to 6000000000HZ: (upper frequency limit 6 GHz (option) installed)
250 to 6000000kHz
0.25 to 6000MHZ
0.00025 to 6GHZ

Value of f_2

1 to 999999999HZ: Channel Space
0.001 to 999999.999kHz
0.000001 to 999.999999MHZ
0.000000001 to 0.999999999GHZ

Query Message

CHTBL? n_1

Value of n_1

1 to 19: On-screen line position

Response Message

CHTBL s,n_2,n_3,f_1,f_2

Use Example

CHTBL 1,“Channel00”,0,1000,1GHZ,1MHZ

CHTBLALLCLR

Channel Table All Clear

Function

Clears all the data of the current channel table.

Command Message

CHTBLALLCLR

Query Message

None

Response Message

None

Use Example

CHTBLALLCLR

CHTBLDEL

Channel Table Delete

Function

Deletes one line of data from the current channel table.

Command Message

CHTBLDEL n

Value of n

1 to 19: On-screen line position

Query Message

None

Response Message

None

Use Example

CHTBLDEL 2

COMBPAT?

Pattern in Combination File

Function

Obtains the name of the pattern file that belongs to a combination file stored in the MG3700A hard disk. This command cannot be used for a combination file for the sequence mode.

Command Message

None

Query Message

COMBPAT? s_1,s_2,a

Value of s_1

Package name

Value of s_2

Combination file name

Value of a

WMA: Waveform memory A
WMB: Waveform memory B

Response Message

COMBPAT s_1,s_2

Value of s_1

Package name (“NONE” is returned if there is no package.)

Value of s_2

Pattern file name (“NONE” is returned if there is no patter file.)

Limitation

This command cannot be used for a combination file for the sequence mode. To obtain the list of elements that belong to a combination file for the sequence mode, use the SEQELMNAME query command.

Use Example

COMBPAT? “WCDMA”,“Test Combination01”,WMA

COMBTOTALSIZE?

Total Size of Combination File

Function

Obtains the total file size of the waveform files that belong to a combination file stored in the MG3700A hard disk.

Command Message

None

Query Message

COMBTOTALSIZE? s_1,s_2

Value of s_1

Package name

Value of s_2

Combination file name

Response Message

COMBTOTALSIZE n_1,n_2

Value of n_1

Total file size of waveform files in waveform memory A (0 is returned if there is no waveform file.)

Value of n_2

Total file size of waveform files in waveform memory B (0 is returned if there is no waveform file.)

Use Example

COMBTOTALSIZE? “WCDMA”,“Test Combination01”

DELFILEHDD

Delete Waveform File from HDD

Function

Deletes waveform files stored in the MG3700A hard disk.

Command Message

DELFILEHDD s_1,s_2

Value of s_1

Package name

Value of s_2

Waveform file name

Query Message

None

Response Message

None

Use Example

DELFILEHDD “WCDMA”,“TEST Pattern01”

DELFILEWM

Delete File from Waveform Memory

Function

Deletes waveform files loaded in waveform memories.

Command Message

DELFILEWM a,s_1,s_2

Value of a

WMA: Waveform memory A
WMB: Waveform memory B
LONG: Long pattern
ALL: Both waveform memories A and B
COMB: Combination file

Value of s_1

Package name

Value of s_2

Waveform file name

Query Message

None

Response Message

None

Limitation

The package name and waveform file name can be omitted when “ALL” is specified. This command cannot delete all the waveform files in WMA or WMB only.

Use Example

DELFILEWM COMB,“WCDMA”,“Combination01”

DELPATHDD

Delete Pattern from HDD

Function

Deletes waveform files stored in the MG3700A hard disk. This command functions in the same manner as DELFILEHDD. Refer to the descriptions for DELFILEHDD for details.

DELPATWM

Delete Pattern from Waveform Memory

Function

Deletes waveform files loaded in waveform memories. This command functions in the same manner as DELFILEWM. Refer to the descriptions for DELFILEWM for details.

DHCP

DHCP (On/Off)

Function

Selects the DHCP facility On/Off.

Command Message

DHCP a

Value of a

ON: Enables DHCP.
OFF: Disables DHCP.

Query Message

DHCP?

Response Message

DHCP a

Limitation

This command is invalid while IP information is being obtained with DHCP On.

Use Example

DHCP ON

DLRES

Waveform Restart

Function

Regenerate a selected pattern from the beginning.

Command Message

DLRES

Query Message

None

Response Message

None

Limitation

In the sequence mode, this command functions in the same manner as SEQRESTART.

Use Example

DLRES

DMOD

Digital Modulation (On/Off)

Function

Sets modulation On/Off.

Command Message

DMOD a

Value of a

ON: Modulation On
OFF: Modulation Off

Query Message

DMOD?

Response Message

DMOD a

Use Example

DMOD ON

DNS1AD

DNS Primary Address

Function

Sets the DNS primary address.

Command Message

DNS1AD n_1,n_2,n_3,n_4

Value of n_1

0 to 255: IP Address

Value of n_2

0 to 255: IP Address

Value of n_3

0 to 255: IP Address

Value of n_4

0 to 255: IP Address

Query Message

DNS1AD?

Response Message

DNS1AD n_1,n_2,n_3,n_4

Use Example

DNS1AD 123,123,123,123

DNS2AD

DNS Secondary Address

Function

Sets the DNS secondary address.

Command Message

DNS2AD n_1,n_2,n_3,n_4

Value of n_1

0 to 255: IP Address

Value of n_2

0 to 255: IP Address

Value of n_3

0 to 255: IP Address

Value of n_4

0 to 255: IP Address

Query Message

DNS2AD?

Response Message

DNS2AD n_1,n_2,n_3,n_4

Use Example

DNS2AD 123,123,123,123

DNSAUTO

DNS Auto Setup

Function

Sets whether to obtain DNS information automatically by the DHCP or not.

Command Message

DNSAUTO a

Value of a

ON: Automatically obtains DNS information by DHCP.
OFF: Does not obtain DNS information by DHCP.

Query Message

DNSAUTO?

Response Message

DNSAUTO a

Limitation

This command is invalid while IP information is being obtained with DHCP On.

Use Example

DNSAUTO ON

DOMAINNAME

Domain Name

Function

Sets a domain name.

Command Message

DOMAINNAME s

Query Message

DOMAINNAME?

Response Message

DOMAINNAME s

Value of s

String (0 to 30 characters): Domain name

Limitation

This command is invalid while IP information is being obtained with DHCP On.

Use Example

DOMAINNAME “anritsu.com”

DSPL

Display (On/Off)

Function

Selects the display On/Off.

Command Message

DSPL a

Value of a

ON: Display On
OFF: Display Off

Query Message

DSPL?

Response Message

DSPL a

Use Example

DSPL ON

EIST

Start/Frame Trigger Input

Function

Selects a start/frame trigger input polarity.

Command Message

EIST a

Value of a

RISE: Rise (rising)
FALL: Fall (falling)

Query Message

EIST?

Response Message

EIST a

Use Example

EIST RISE

ERRMSG?

Get Error Massage

Function

Obtains the last-displayed error message.

Query Message

ERRMSG?

Response Message

ERRMSG n,s

Value of n

Error number. 0 is returned if no error has occurred as yet.

Value of s

Error message. The message “There is no message” is returned if no error has occurred.

Use Example

ERRMSG?

For more information about error messages, refer to Section 4.6.5 “Remote Error message specifications.”

ESE2

Event Status Enable Register (END)

Function

Selects the bit of the event register associated with the END Event Status Enable register that causes bit 2 of the ESB summary message to turn true when it is set.

Command Message

ESE2 n

Value of n

0 to 255

Query Message

ESE2?

Response Message

ESE2 n

ESE3

Event Status Enable Register (ERR)

Function

Selects the bit of the event register associated with the ERR Event Status Enable register that causes bit 3 of the ESB summary message to turn true when it is set.

Command Message

ESE3 n

Value of n

0 to 255

Query Message

ESE3?

Response Message

ESE3 n

Use Example

ESE3 5

ESR2?

Event Status Register (END)

Function

Reads the event bits of the END Event Status register as a binary-weighted sum total. The END Event Status register is reset to 0 after read.

Command Message

None

Query Message

ESR2?

Response Message

ESR2 n

Value of n

0 to 255

ESR3?

Event Status Register (ERR)

Function

Reads the event bits of the ERR Event Status register as a binary-weighted sum total. The ERR Event Status register is reset to 0 after read.

Command Message

None

Query Message

ESR3?

Response Message

ESR3 n

Value of n

0 to 255

Use Example

ESR3?

EXTALC

External ALC Select

Function

Selects the external ALC On/Off.

Command Message

EXTALC a

Value of a

ON: Sets external ALC On.
OFF: Sets external ALC Off.

Query Message

EXTALC?

Response Message

EXTALC a

Use Example

EXTALC ON

FILEVER?

Waveform File Version

Function

Obtains the version of the waveform file stored in the MG3700A hard disk.

Command Message

None

Query Message

FILEVER? s_1,s_2

Value of s_1

Package name

Value of s_2

Waveform file name

Response Message

FILEVER s

Value of s

Version of the waveform file

Use Example

FILEVER? “WCDMA”,“TestWaveform01”

FIRMINST

Firmware Install

Function

Installs firmware.

Command Message

FIRMINST s

Query Message

None

Response Message

None

Value of s

File name

Use Example

FIRMINST “mg3700a”

FIS

Frequency Incremental Step Value

Function

Sets a frequency incremental step value.

Command Message

FIS f

Value of f

0.00000000001 to 1GHZ:	0.0000000001 to 1 GHz
0.00000001 to 1000MHZ:	0.00000001 to 1000 MHz
0.00001 to 1000000KHZ:	0.00001 to 1000000 kHz
0.01 to 1000000000HZ:	0.01 to 1000000000 Hz

Query Message

FIS?

Response Message

FIS f

Use Example

FIS 1KHZ

FPGAANAVER?

Baseband FPGA (Analog) Version

Function

Obtains the baseband FPGA (Analog) version information.

Command Message

None

Query Message

FPGAANAVER?

Response Message

FPGAANAVER s

Value of s

Baseband FPGA (Analog) version information

Use Example

FPGAANAVER?

FPGABERVER?

Option031/131 FPGA Version

Function

Obtains the Option031/131 (high speed BER test function) FPGA version information.

Command Message

None

Query Message

FPGABERVER?

Response Message

FPGABERVER s

Value of s

Option031/131 (high speed BER test function) FPGA version information

Limitation

This command is valid only when Option031/131 is installed.

Use Example

FPGABERVER?

FPGACPUVER?

CPU FPGA Version

Function

Obtains the CPU FPGA version information.

Command Message

None

Query Message

FPGACPUVER?

Response Message

FPGACPUVER s

Value of s

CPU FPGA version information

Use Example

FPGACPUVER?

FPGADIGVER?

Baseband FPGA (Digital) Version

Function

Obtains the baseband FPGA (Digital) version information.

Command Message

None

Query Message

FPGADIGVER?

Response Message

FPGADIGVER s

Value of a

Baseband FPGA (Digital) version information

Use Example

FPGADIGVER?

FPGARFVER?

RF FPGA Version

Function

Obtains the RF FPGA version information.

Command Message

None

Query Message

FPGARFVER?

Response Message

FPGARFVER s

Value of s

RF FPGA version information

Use Example

FPGARFVER?

FREQ

Frequency

Function

Sets a frequency.

Command Message

FREQ f

Value of f

0.00025 to 3GHZ: Standard
0.25 to 3000MHZ
250 to 3000000KHZ
250000 to 3000000000HZ

0.00025 to 6GHZ: Upper frequency limit 6 GHz (option) installed
0.25 to 6000MHZ
250 to 6000000KHZ
250000 to 6000000000HZ

Query Message

FREQ?

Response Message

FREQ f (in Hz units)

Use Example

FREQ 123MHZ

FREQSWSPEED

Freq Switching Speed

Function

Selects the frequency switching speed by selecting the loop characteristics of the PLL synthesizer circuit.

Command Message

FREQSWSPEED a

Value of a

NORMAL: Normal mode (Normal state)
FAST: Fast mode (High-speed switching)

Query Message

FREQSWSPEED?

Response Message

FREQSWSPEED a

Use Example

FREQSWSPEED NORMAL

FRS

Frequency Incremental Step (Up/Down)

Function

Increments or decrements the frequency using an incremental frequency step value.

Command Message

FRS a

Value of a

UP: Increment the frequency in incremental steps.
DN: Decrement the frequency in incremental steps.
DOWN: Decrement the frequency in incremental steps.

Query Message

None

Response Message

None

Use Example

FRS UP

GATEWAY

Default Gateway

Function

Sets the default gateway.

Command Message

GATEWAY n_1,n_2,n_3,n_4

Value of n_1

0 to 255: IP Address

Value of n_2

0 to 255: IP Address

Value of n_3

0 to 255: IP Address

Value of n_4

0 to 255: IP Address

Query Message

GATEWAY?

Response Message

GATEWAY n_1,n_2,n_3,n_4

Use Example

GATEWAY 123,123,123,123

HDDSPC?

Hard Disk Space Information

Function

Obtains information about the size of hard disk free space.

Query Message

HDDSPC?

Value of n_1

0 or later: Total size of hard disk space in Kbytes

Value of n_2

0 or later: Size of free hard disk space in Kbytes

Response Message

HDDSPC n_1,n_2

Use Example

HDDSPC?

HEAD

Response Header (On/Off)

Function

Specifies whether to append (On) a response header or not (Off).

Command Message

HEAD a

Value of a

ON: Appends a response header and a unit to a message.
OFF: Does not append a response header and a unit to a message.

Query Message

HEAD?

Response Message

None

Use Example

HEAD OFF

HOSTNAME

Host Name

Function

Sets a host name.

Command Message

HOSTNAME s

Query Message

HOSTNAME?

Response Message

HOSTNAME s

Value of s

String (1 to 30 characters): Host name

Limitation

This command is invalid while IP information is being obtained with DHCP On.

Use Example

HOSTNAME “anritsu.com”

HWC?

Hardware Check

Function

Obtains the Pass/Fail judgment result of each hardware module.

Command Message

None

Query Message

HWC?

Response Message

HWC a_1,a_2,a_3

Value of a_1

PASS: The CPU Pass/Fail result is Pass.
FAIL: The CPU Pass/Fail result is Fail.

Value of a_2

PASS: The IF Pass/Fail result is Pass.
FAIL: The IF Pass/Fail result is Fail.

Value of a_3

PASS: The RF Pass/Fail result is Pass.
FAIL: The RF Pass/Fail result is Fail.

Use Example

HWC?

HWCBER?

Hardware Check (Option031/131)

Function

Obtains the Pass/Fail judgment result of Option031/131 (high speed BER test function).

Command Message

None

Query Message

HWCBER?

Response Message

HWCBER a

Value of a

PASS: The Option031/131 Pass/Fail result is Pass.
FAIL: The Option031/131 Pass/Fail result is Fail.

Limitation

This command is valid only when Option031/131 is installed.

Use Example

HWCBER?

ICOMOS

I Common Offset

Function

Sets an I-output common-DC offset level.

Command Message

ICOMOS l

Value of l

–1.00 to 3.00V: –1.00 to 3.00 V, in 10 mV step

Query Message

ICOMOS?

Response Message

ICOMOS l

Use Example

ICOMOS 1.25V

IDIFFOS

I differential Offset

Function

Sets an I-output differential-DC offset level.

Command Message

IDIFFOS l

Value of l

–50.00 to 50.00MV: –50.00 to 50.00 mV, in 0.05 mV step

Query Message

IDIFFOS?

Response Message

IDIFFOS l

Use Example

IDIFFOS 36MV

INSTMEDIA

Install Source Media

Function

Selects the source media from which the firmware should be installed.

Command Message

INSTMEDIA a

Value of a

HDD: Install from the MG3700A internal hard disk.
CF: Install from the CF card.

Query Message

INSTMEDIA?

Response Message

INSTMEDIA a

Use Example

INSTMEDIA HDD

IOLTR

I Output Level Trim

Function

Sets an I-output level trimming (adjustment) value.

Command Message

IOLTR p

Value of r

0.0 to 120.0: 0.0 to 120.0%

Query Message

IOLTR?

Response Message

IOLTR p

Limitation

The resolution is 0.1%.

Use Example

IOLTR 57.5

IPAD

IP Address

Function

Sets the IP address.

Command Message

IPAD n_1,n_2,n_3,n_4

Value of n_1

0 to 255: IP Address

Value of n_2

0 to 255: IP Address

Value of n_3

0 to 255: IP Address

Value of n_4

0 to 255: IP Address

Query Message

IPAD?

Response Message

IPAD n_1,n_2,n_3,n_4

Use Example

IPAD 123,123,123,123

IPLVER?

Initial Program Loader Version

Function

Obtains the IPL version information.

Command Message

None

Query Message

IPL?

Response Message

IPLVER s

Value of s

IPL version information

Use Example

IPLVER?

IPRELEASE

IP Address Release

Function

Releases the IP address from DHCP.

Command Message

IPRELEASE

Query Message

None

Response Message

None

Limitation

An error would occur if this command is executed while IP information is being obtained with DHCP On.

Use Example

IPRELEASE

IPRENEW

IP Address Renew

Function

Re-obtains the IP address from the DHCP.

Command Message

IPRENEW

Query Message

None

Response Message

None

Limitation

An error would occur if this command is executed while IP information is being obtained with DHCP On.

Use Example

IPRENEW

IQOUT

I/Q Signal Output On/Off

Function

Selects I/Q signal output On/Off.

Command Message

IQOUT a

Value of a

ON: I/Q signal output On
OFF: I/Q signal output Off

Query Message

IQOUT?

Response Message

IQOUT a

Use Example

IQOUT ON

IQPROID

IQproducer™ Login User ID

Function

Sets the user ID used for IQproducer™ to log in to the MG3700A.

Command Message

IQPROID s

Value of s

String of eight characters: Login user ID

Query Message

IQPROID?

Response Message

IQPROID s

Use Example

IQPROID “USERID00”

IQPROPASWD

Password

Function

Sets the password used for IQproducer™ to log in to the MG3700A.

Command Message

IQPROPASWD s

Value of s

String of eight characters: Login password

Query Message

None

Response Message

None

Use Example

IQPROPASWD “Password”

IQSRC

I/Q Signal Source

Function

Selects a modulation source (I/Q signal source).

Command Message

IQSRC a

Value of a

INT: Internal modulation source
EXT: External I/Q modulation source

Query Message

IQSRC?

Response Message

IQSRC a

Use Example

IQSRC INT

KEYENCVER?

Key Encoder Version

Function

Obtains the Key Encoder version information.

Command Message

None

Query Message

KEYENCVER?

Response Message

KEYENCVER s

Value of s

Key Encoder version information

Use Example

KEYENCVER?

KNOBHOLD

Knob Hold (On/Off)

Function

Selects the rotary knob hold On/Off.

Command Message

KONBHOLD a

Value of a

ON: Rotary knob hold On
OFF: Rotary knob hold Off

Query Message

KNOBHOLD?

Response Message

KNOBHOLD a

Use Example

KNOBHOLD ON

LDCANCEL

Cancel Load Pattern to Waveform Memory

Function

Cancels waveform file loading into a waveform memory.

Command Message

LDCANCEL

Limitation

This command is valid while the progress bar is displayed.
Note, however, that when this command is sent during combination file analysis (when “Finding Package List…” is displayed), cancellation is executed after the analysis.

Use Example

LDPAT “WCDMA”,“TEST Pattern 0001”
LDCANCEL

LDFILE

Load File to Waveform Memory

Function

Loads a waveform file into a waveform memory.

Command Message

LDFILE a,s_1,s_2

Value of a

WMA: Waveform memory A
WMB: Waveform memory B
LONG: Long pattern
COMB: Combination file

Value of s_1

Package name

Value of s_2

Waveform file name

Query Message

LDFILE? a,s_1,s_2

Response Message

LDFILE b

Value of b

EXIST:	The waveform file is loaded in the selected waveform memory.
EXIST_LONG:	The waveform file is loaded as a long pattern.
ENABLE:	Loading of the waveform file is enabled.
ENALBE_LONG:	The waveform file can be loaded as a long pattern.
NEED_OPTIMIZE:	Loading is enabled if the waveform memory is optimized.
NEED_LICENSE:	A license is required.
NO_PATTERN_HDD:	The waveform file selected to be loaded does not exist on the hard disk.
DELETE_PATTERN:	The waveform memory would still be short of free space even if it is optimized, but loading would be enabled if existing waveform files are deleted.

TOO_LARGE_SIZE:	Loading is disabled because the waveform size is larger than the total size of waveform memories A and B.
DELETE_ALL:	The waveform file can be loaded as a long pattern if both waveform memories A and B are cleared.
NOT_LONG_PATTERN:	The waveform file specified as a long pattern is not a long pattern.
NO_USE_WMB:	The waveform file cannot be loaded into waveform memory B.
CHANGE_SINGLE_MODE:	The addition function needs to be turned off.
DISABLE_LOAD:	Loading is disabled because of an internal error or other reasons.
INVALID_VERSION:	The version number does not match.
WVI_FILE_ERROR:	An invalid parameter exists or some parameters do not exist in the pattern file.
FILE_ERROR:	An error occurred while analyzing the pattern file.
NO_COMBINATION_FILE_HDD:	The combination file selected to be loaded does not exist on the hard disk.
COMBINATION_FILE_OVER:	No more combination files can be loaded since the loadable number of combination files will be exceeded.
NOT_EXIST_PATTERN_A:	The waveform file that is specified by a combination file to be loaded from Memory A does not exist on the hard disk.
NOT_EXIST_PATTERN_B:	The waveform file that is specified by a combination file to be loaded from Memory B does not exist on the hard disk.
NOT_EXIST_PATTERN_AB:	Both the waveform files that are specified by a combination file to be loaded from Memories A and B do not exist on the hard disk.
WVC_FILE_ERROR:	An invalid parameter exists or some parameters do not exist in the combination file.
SEQ_FILE_DO_NOT_SUPPORT:	This command does not support the combination file for the sequence mode.

PATTERN_OVER_ON_WM: No more waveform files can be loaded since the loadable number of waveform files for WMA/WMB will be exceeded.

PACKAGE_OVER_ON_WM: No more packages can be loaded since the loadable number of packages for WMA/WMB will be exceeded.

PATTERN_OVER_ON_PACKAGE: No more waveform files can be loaded since the loadable number of waveform files for a package will be exceeded.

COMBINATION_FILE_OVER_ON_PACKAGE: No more combination files can be loaded since the loadable number of combination files for a package will be exceeded.

PACKAGE_OVER_ON_COMBINATION_MEMORY: No more packages can be loaded since the loadable number of packages for a memory will be exceeded.

PATTERN_A_IS_LARGER_THAN_WMA: The size of the waveform file specified to be loaded from Memory A is larger than that of WMA.

PATTERN_B_IS_LARGER_THAN_WMB: The size of the waveform file specified to be loaded from Memory B is larger than that of WMB.

PATTERN_B_IS_WRONG_DATA_WIDTH: The waveform file cannot be loaded into WMB since its data width is not 16 bits.

PATTERN_AB_FIR_PARAM_MISMATCH: The FIR filter setting specified by a waveform file from Memory A is different from that specified by a waveform file from Memory B.

Limitation

If the same waveform file already exists, it is overwritten by the newly loaded waveform file.

Use Example

LDFILE WMA,“WCDMA”,“TEST Pattern 0001”

Remarks

Use bit 4 of the END Event Status register to detect load completion.

LDPAT

Load Pattern to Waveform Memory

Function

Loads a waveform file into a waveform memory. This command functions in the same manner as LDFILE. Refer to the descriptions for LDFILE for details.

LOADEDFILENAME?

Loaded File Name in Waveform Memory

Function

Obtains the name of a waveform file that is loaded in a waveform memory.

Command Message

None

Query Message

LOADEDFILENAME? a,n

Value of a

WMA: Waveform memory A
WMB: Waveform memory B
LONG: Long pattern
COMB: Combination file

Value of n

Index number in a waveform memory

Response Message

LOADEDFILENAME s_1,s_2

Value of s_1

Package name specified by an index number

Value of s_2

Waveform file name specified by an index number

Use Example

LOADEDFILENAME? COMB,0

LOADEDFILENUM?

Total Number of Loaded File Memory

Function

Obtains the number of waveform files loaded in a waveform memory.

Command Message

None

Query Message

LOADEDFILENUM? a

Value of a

WMA: Number of waveform files loaded in waveform memory A
WMB: Number of waveform files loaded in waveform memory B
LONG: Number of long patterns
COMB: Number if combination files

Response Message

LOADEDFILENUM n

Value of n

Number of waveform files loaded in a waveform memory

Use Example

LOADEDFILENUM? COMB

LOADEDFILESEL

Select Loaded Waveform File

Function

Selects a waveform file to be reproduced, from the waveform files loaded in a waveform memory. Waveform files are selected from both waveform memories A and B in the Edit mode.

Command Message

LOADEDFILESEL a,s_1,s_2

Value of a

WMA: Waveform memory A
WMB: Waveform memory B
LONG: Long pattern
COMB: Combination file

Value of s_1

Name of a package loaded in a waveform memory.

Value of s_2

Name of a waveform file loaded in a waveform memory.

Query Message

LOADEDFILESEL? a

Response Message

LOADEDFILESEL s_1,s_2

Limitation

LOADEDFILESEL “NONE”,“NONE” is returned if a waveform file is not selected for the specified waveform memory or if a long pattern is not selected. Specific patterns may not be able to be added in the Edit mode. In this case, the waveform files that have been selected will be deselected. When a combination file for the sequence mode is selected, the Baseband main function automatically set to enter the sequence operation status.

Use Example

LOADEDFILESEL COMB,“W-CDMA(UW Rx test)”,“DL_CMB_ISDN”

LPF

Low Pass Filter

Function

Sets a low-pass filter (LPF).

Command Message

LPF a

Value of a

AUTO:	Automatic setting
THROUGH:	Through (No cutoff)
100kHz:	Cutoff frequency 100 kHz
300kHz:	Cutoff frequency 300 kHz
1MHZ:	Cutoff frequency 1 MHz
3MHZ:	Cutoff frequency 3 MHz
10MHZ:	Cutoff frequency 10 MHz
30MHZ:	Cutoff frequency 30 MHz
70MHZ:	Cutoff frequency 70 MHz

Query Message

LPF?

Response Message

LPF a

Use Example

LPF 30MHZ

LVL

Output Level (On/Off)

Function

Selects RF output On/Off.

Command Message

LVL a

Value of a

ON: RF output On
OFF: RF output Off

Query Message

LVL?

Response Message

LVL a

Use Example

LVL ON

LVLACCSTT?

Level Accuracy status

Function

Obtains the accuracy status of the output level.

Command Message

None

Query Message

LVLACCSTT?

Response Message

LVLACCSTT a

Value of a

NORMAL:	Normal state
UNLEVELED:	The level accuracy is outside the scope of performance warranty.

Use Example

LVLACCSTT?

LVLSTTLST?

Level status list display

Function

Obtains the status of the output level.

Command Message

None

Query Message

LVLSTTLST?

Response Message

LVLSTTLST a_1,a_2,a_3,a_4,a_5,a_6,a_7

Value of a_1

EMF:	Voltage-system unit EMF (Open voltage display)
TERM:	Voltage-system unit Term (Terminated voltage display)

Value of a_2

OFFSETON:	Output level offset mode On
OFFSETOFF:	Output level offset mode Off

Value of a_3

NORMAL:	Normal state
UNLEVELED:	Outside the scope of level accuracy warranty

Value of a_4

INTALC:	Internal ALC state
EXTALC:	External ALC state

Value of a_5

CONTON:	Continuous mode On state
CONTOFF:	Continuous mode Off state

Value of a_6

RELON:	Relative output mode On state
RELOFF:	Relative output mode Off state

Value of a_7

NORMAL:	Attenuator in normal state
ATTCHECK:	The attenuator has been exhausted. Check the condition.

Use Example

LVLSTTLST?

MACAD?

MAC Address

Function

Returns the MAC address used by the MG3700A.

Command Message

None

Query Message

MACAD?

Response Message

MACAD? h_1,h_2,h_3,h_4,h_5,h_6

Value of h_1

00 (h) to FF (h): MAC Address

Value of h_2

00 (h) to FF (h): MAC Address

Value of h_3

00 (h) to FF (h): MAC Address

Value of h_4

00 (h) to FF (h): MAC Address

Value of h_5

00 (h) to FF (h): MAC Address

Value of h_6

00 (h) to FF (h): MAC Address

Use Example

MACAD?

MARKERPOL

Marker Polarity

Function

Selects a marker output polarity.

Command Message

MARKERPOL n,a

Value of n

1 to 3: Markers 1 to 3

Value of a

POS: Positive (positive polarity)
NEG: Negative (negative polarity)

Query Message

MARKERPOL? n

Response Message

MARKERPOL a

Use Example

MARKERPOL 1, POS

MODE

I/Q Signal Source Mode

Function

Selects a modulation source (I/Q signal source).

Command Message

MODE a

Value of a

INT: Internal modulation source
EXT: External I/Q modulation source

Query Message

MODE?

Response Message

MODE a

Use Example

MODE INT

OCNT

Output level Continuous (On/Off)

Function

Selects the Continuous mode On/Off.

Command Message

OCNT a

Value of a

ON: Continuous mode On
OFF: Continuous mode Off

Query Message

OCNT?

Response Message

OCNT a

Use Example

OCNT ON

OIS

Output Level Increment Step Value

Function

Sets an output level incremental step value.

Command Message

OIS l

Value of l

0.01 to 100DB: 0.01 to 100 dB

Query Message

OIS?

Response Message

OIS l

Use Example

OIS 100DB

OLS

Output Level Incremental Step (Up/Down)

Function

Increments/decrements the output level using an incremental step.

Command Message

OLS a

Value of a

UP: Increment the output level in incremental steps.
DN: Decrement the output level in incremental steps.
DOWN: Decrement the output level in incremental steps.

Query Message

None

Response Message

None

Use Example

OLS DOWN

OLU

Output Level Unit

Function

Selects an output level unit.

Command Message

OLU a

Value of a

DBM: Select dBm as the output level unit.
DBU: Select dBμV as the output level unit.

Query Message

OLU?

Response Message

OLU? a

Use Example

OLU DBM

OLVL

Output Level

Function

Sets an output level.

Command Message

OLVL l

Value of l

–190 to 69DBM: –190.00 to 69.00 dBm
–83.01 to 175.99DBU: –83.01 to 175.99 dBμV (when Term is set)
–76.99 to 182.01DBU: –76.99 to 182.01 dBμV (when EMF is set)

Query Message

OLVL? a

Value of a

DBM: Returns the type of output level of the response message.
DBU: DBM is assumed, unless otherwise specified.

Response Message

OLVL l

Limitation

The actual programmable range depends whether a mechanical attenuator (option) is installed or not, and also on the Offset setting and Continuous mode On/Off.

Use Example

OLVL 10.00DBM

• Standard

	dBμV EMF	dBμV Term	dBm
Offset: Off	–26.99 to +126.01	–33.01 to +119.99	–140 to +13
Offset: +50	+23.01 to +176.01	+16.99 to +169.99	–90 to +63
Offset: –50	–76.99 to +76.01	–83.01 to +69.99	–190 to –37

• Mechanical attenuator (option) installed

	dBμV EMF	dBμV Term	dBm
Offset: Off	–26.99 to +132.01	–33.01 to +125.99	–140 to +19
Offset: +50	+23.01 to +182.01	+16.99 to +175.99	–90 to +69
Offset: –50	–76.99 to +82.01	–83.01 to +75.99	–190 to –31

OOF

Output Level Offset (On/Off)

Function

Selects output level offset mode On/Off.

Command Message

OOF a

Value of a

ON: Output level offset mode On
OFF: Output level offset mode Off

Query Message

OOF?

Response Message

OOF a

Use Example

OOF OFF

OOS

Output Level Offset Value

Function

Sets an output level offset value.

Command Message

OOS l

Value of l

–50.00 to 50.00DB: –50.00 to 50.00 dB (in 0.01 dB units)

Query Message

OOS?

Response Message

OOS l

Limitation

This command may not be set to On depending on the output level setting when Output Level Offset is On.

Use Example

OOS 15DB

OPT?

Option Information

Function

Obtains option information about the MG3700A.

Command Message

None

Query Message

OPT? n

Value of n

0 to 99: Option number

Response Message

OPT a

Value of a

ON: The specified option is installed.
OFF: The specified option is not installed.

Use Example

OPT? 1

ORL

Output Level Relative (On/Off)

Function

Sets relative output level display mode On/Off.

Command Message

ORL a

Value of a

ON: Relative output level On
OFF: Relative output level Off

Query Message

ORL?

Response Message

ORL a

Use Example

ORL OFF

ORLR?

Output Level Relative, Reference Value

Function

Retrieves a reference output level when in relative output level display mode (output level immediately before Relative Display Mode is set to On).

Command Message

None

Query Message

ORLR?

Response Message

ORLR l

Value of l

–190 to 69DBM: –190.00 to 69.00 dBm

Use Example

ORLR?

ORLV

Output Level Relative

Function

Sets a screen display output level in relative output level display mode.

Command Message

ORLV l

Query Message

ORLV?

Response Message

ORLV l

Value of l

–259 to 259DB: –259.00 to 259.00 dB

Limitation

The actual programmable range depends whether a mechanical attenuator (option) is installed or not, and also on the offset setting and Continuous mode On/Off.

Use Example

ORLV?

PAT

Select Pattern

Function

Selects a waveform file to be reproduced, from the waveform files loaded in a waveform memory. Waveform files are selected from both waveform memories A and B during addition (Pattern Addition: ADD).

Command Message

PAT a,s_1,s_2

Value of a

WMA: Waveform memory A
WMB: Waveform memory B
LONG: Long pattern
COMB: Combination file

Value of s_1

Name of a package loaded in a waveform memory.

Value of s_2

Name of a waveform file loaded in a waveform memory.

Query Message

PAT? a

Response Message

PAT s_1,s_2

Limitation

PAT "NONE","NONE" is returned if a waveform file is not selected for the specified waveform memory or if a long pattern is not selected. Specific patterns may not be able to be added in the Edit (Add) mode. In this case, the waveform files that have been selected will be deselected.

Use Example

PAT WMB, "WCDMA","Test Pattern2"

PATADD

Pattern Addition

Function

Switches the combination mode.

Command Message

PATADD a

Value of a

SINGLE: Switches to the Defined mode.
ADD: Switches to the Edit mode.

Query Message

PATADD?

Response Message

PATADD a

Limitation

When ADD is specified when a long pattern is loaded in a waveform memory, the long pattern loaded in the waveform memory is deleted and the Edit mode is enabled.

Use Example

PATADD ADD

PATCOMBMODE

Pattern Combination Mode

Function

Switches the combination mode.

Command Message

PATCOMBMODE a

Value of a

DEFINED: Switches to the Defined mode.
EDIT: Switches to the Edit mode.

Query Message

PATCOMBMODE?

Response Message

PATCOMBMODE a

Limitation

When EDIT is specified when a long pattern is loaded in a waveform memory, the long pattern loaded in the waveform memory is deleted and the Edit mode is enabled.

Use Example

PATCOMBMODE EDIT

PATNAME?

Pattern Name in Waveform Memory

Function

Obtains the name of a waveform file that is loaded in a waveform memory. This command functions in the same manner as LOADEDFILENAME? Refer to the descriptions for LOADEDFILENAME? for details.

PATNUM?

Total Number of Waveform Memory

Function

Obtains the number of waveform files loaded in a waveform memory.

Command Message

None

Query Message

PATNUM? a

Value of a

WMA: Number of waveform files loaded in waveform memory A
WMB: Number of waveform files loaded in waveform memory B
LONG: Number of long pattern waveform files
COMB: Number of combination files

Response Message

PATNUM n

Value of n

Number of waveform files loaded in a waveform memory

Use Example

PATNUM? WMA

PATRUNSTT?

Pattern Running Status

Function

Obtains the waveform pattern running status.

Command Message

None

Query Message

PATRUNSTT?

Response Message

PATRUNSTT a

Value of a

STOP: Output stopped
PLAY: Output in progress

Use Example

PATRUNSTT?

PATSOF

Start Offset

Function

Specifies an offset for starting the reproducing of a waveform pattern loaded in waveform memory B in relation to waveform patterns loaded in waveform memory A.

Command Message

PATSOF n

Value of n

0 to (Number of sampling data of patterns loaded in memory B – 1) or 0 to 9,999,999 (whichever is the smaller): Reproduce start offset between two patterns

Query Message

PATSOF?

Response Message

PATSOF n

Use Example

PATSOF 200

PATTRG

Pattern Trigger

Function

Selects On/Off for the pattern trigger.

Command Message

PATTRG a

Value of a

ON: Enables the pattern trigger.
OFF: Disables the pattern trigger.

Query Message

PATTRG?

Response Message

PATTRG a

Use Example

PATTRG ON

PATTRGEDGE

Pattern Trigger Edge

Function

Switches the pattern trigger detection edge.

Command Message

PATTRGEDGE a

Value of a

RISE: Rise
FALL: Fall

Query Message

PATTRGEDGE?

Response Message

PATTRGEDGE a

Use Example

PATTRGEDGE RISE

PATWMAFOF

Waveform Memory A Frequency Offset

Function

Specifies a frequency offset for waveform memory A and waveform memory B.
This command functions in the same manner as PATWMFOF. Refer to the descriptions for PATWMFOF for details.

PATWMALVL

Waveform Memory A Output Level

Function

Sets the output level of waveform memory A when the pattern addition function is On.

Command Message

PATWMALVL l

Value of l

–270.00 to 69.00DBM: –270.00 to 69.00 dBm
–163.01 to 175.99DBU: –163.01 to 175.99 dBμV (when Term is set)
–156.99 to 182.01DBU: –156.99 to 182.01 dBμV (when EMF is set)

Query Message

PATWMALVL? a

Value of a

When omitted: Returns a response in dBm units.
DBM: Returns a response in dBm units.
DBU: Returns a response in dBμV units.

Response Message

PATWMALVL l

Limitations

- An error occurs if the relative ratio of the output level of the waveform memory A to that of waveform memory B is too large.
- The actual setting range varies depending on the mechanical attenuator (option) installation status, set offset value, and On/Off for continuous mode.

Use Example

PATWMALVL –30DBM

For dBm:

	Standard	When Mechanical Attenuator (Option) Installed
Offset: Off	–220 to +13	–220 to +19
Offset: +50	–170 to +63	–170 to +69
Offset: –50	–270 to –37	–270 to –31

For dBμV EMF:

	Standard	When Mechanical Attenuator (Option) Installed
Offset: Off	–106.99 to +126.01	–106.99 to +132.01
Offset: +50	–56.99 to +176.01	–56.99 to +182.01
Offset: –50	–156.99 to +76.01	–156.99 to –82.01

For dBμV Term:

	Standard	When Mechanical Attenuator (Option) Installed
Offset: Off	–113.01 to +119.99	–113.01 to +125.99
Offset: +50	–63.01 to +169.99	–63.01 to +175.99
Offset: –50	–163.01 to +69.99	–163.01 to +75.99

PATWMBDLVL

Waveform Memory B' Output Level

Function

Sets the level of waveform memory B' (N) during two-signal addition.

Command Message

PATWMBDLVL l

Value of l

–290.00 to 69.00DBM: –290.00 to 69.00 dBm
–183.01 to 175.99DBU: –183.01 to 175.99 dBμV (when Term is set)
–176.99 to 182.01DBU: –176.99 to 182.01 dBμV (when EMF is set)
* See the table below for details.

Query Message

PATWMBDLVL? a

Value of a

When omitted: Returns a response in dBm units.
DBM: Returns a response in dBm units.
DBU: Returns a response in dBμV units.

Response Message

PATWMBDLVL l

Limitations

- An error occurs if the relative ratio of the output level of the waveform memory A to that of the waveform memory B is too large.
- The actual setting range varies depending on the mechanical attenuator (option) installation status, set offset value, On/Off for continuous mode, and AWGN conversion value.

Use Example

PATWMBDLVL –30DBM

For dBm:

	Standard		When Mechanical Attenuator (Option) Installed	
	AWGN Conversion Value 0	**AWGN Conversion Value 20**	**AWGN Conversion Value 0**	**AWGN Conversion Value 20**
Offset: Off	–220 to +13	–240 to –7	–220 to +19	–240 to –1
Offset: +50	–170 to +63	–190 to +43	–170 to +69	–190 to +49
Offset: –50	–270 to –37	–290 to –57	–270 to –31	–290 to –51

For dBμV EMF:

	Standard		When Mechanical Attenuator (Option) Installed	
	AWGN Conversion Value 0	AWGN Conversion Value 20	AWGN Conversion Value 0	AWGN Conversion Value 20
Offset: Off	–106.99 to +126.01	–126.99 to +106.01	–106.99 to +132.01	–126.99 to +112.01
Offset: +50	–56.99 to +176.01	–76.99 to +156.01	–56.99 to +182.01	–76.99 to +162.01
Offset: –50	–156.99 to +76.01	–176.99 to +56.01	–156.99 to –82.01	–176.99 to –62.01

For dBμV Term:

	Standard		When Mechanical Attenuator (Option) Installed	
	AWGN Conversion Value 0	AWGN Conversion Value 20	AWGN Conversion Value 0	AWGN Conversion Value 20
Offset: Off	–113.01 to +119.99	–133.01 to +99.99	–113.01 to +125.99	–133.01 to +105.99
Offset: +50	–63.01 to +169.99	–83.01 to +149.99	–63.01 to +175.99	–83.01 to +155.99
Offset: –50	–163.01 to +69.99	–183.01 to +49.99	–163.01 to +75.99	–183.01 to +55.99

PATWMBLVL

Waveform Memory B Output Level

Function

Sets the output level of waveform memory B when the pattern addition function is On.

Command Message

PATWMBLVL l

Value of l

–270.00 to 69.00DBM: –270.00 to 69.00 dBm
–163.01 to 175.99DBU: –163.01 to 175.99 dBμV (when Term is set)
–156.99 to 182.01DBU: –156.99 to 182.01 dBμV (when EMF is set)

Query Message

PATWMBLVL?

Value of a

When omitted: Returns a response in dBm units.
DBM: Returns a response in dBm units.
DBU: Returns a response in dBμV units.

Response Message

PATWMBLVL a

Limitations

- An error occurs if the relative ratio of the output level of the waveform memory A to that of waveform memory B is too large.
- The actual setting range varies depending on the mechanical attenuator (option) installation status, set offset value, and continuous mode On/Off.

Use Example

PATWMBLVL –30DBM

For dBm:

	Standard	**When Mechanical Attenuator (Option) Installed**
Offset: Off	–220 to +13	–220 to +19
Offset: +50	–170 to +63	–170 to +69
Offset: –50	–270 to –37	–270 to –31

For dBμV EMF:

	Standard	When Mechanical Attenuator (Option) Installed
Offset: Off	–106.99 to +126.01	–106.99 to +132.01
Offset: +50	–56.99 to +176.01	–56.99 to +182.01
Offset: –50	–156.99 to +76.01	–156.99 to –82.01

For dBμV Term:

	Standard	When Mechanical Attenuator (Option) Installed
Offset: Off	–113.01 to +119.99	–113.01 to +125.99
Offset: +50	–63.01 to +169.99	–63.01 to +175.99
Offset: –50	–163.01 to +69.99	–163.01 to +75.99

PATWMFOF

Waveform Memory Frequency Offset

Function

Specifies a frequency offset for waveform memory A and waveform memory B.

Command Message

PATWMFOF f

Value of f

The setting range for f varies depending on the selected pattern.

Query Message

PATWMFOF?

Response Message

PATWMFOF f

Use Example

PATWMFOF 10MHZ

PATWMOUT

Output Waveform Memory

Function

Sets waveform memory A and B output On/Off.

Command Message

PATWMOUT a

Value of a

WMA: Sets waveform memory A output On.
WMB: Sets waveform memory B output On.
WMAB: Sets both waveform memory A and B outputs On.

Query Message

PATWMOUT?

Response Message

PATWMOUT a

Use Example

PATWMOUT WMAB

PATWMPOWRATIO

Power Ratio

Function

Sets the A/B (C/N) output ratio.

Command Message

PATWMPOWRATIO l

Value of l

A/B (C/N) output ratio: –80 to +80 dB

Query Message

PATWMPOWRATIO?

Response Message

PATWMPOWRATIO l

Limitation

This command can be executed in the Edit mode, and when the output level ratio can be set on the screen at the time of combination file selection.

Use Example

PATWMPOWRATIO 3

PLLCOND?

PLL Condition

Function

Returns information about the frequency signal that serves as a reference in the MG3700A.

Command Message

None

Query Message

PLLCOND?

Response Message

PLLCOND a

Value of a

OVENCOLD:	Internal frequency source, within 5 minutes of power-on, and lock error state
ALARM:	Internal frequency source lock error state
CHKEXT:	External frequency source lock error state
NORMAL:	Locked state

Use Example

PLLCOND?

PMO

Pulse-Modulation

Function

Selects a pulse modulation signal source.

Command Message

PMO a

Value of a

INT: Internal pulse modulation source
EXT: External pulse modulation source
OFF: Does not execute pulse modulation.

Query Message

PMO?

Response Message

PMO a

Use Example

PMO INT

PMODEL?

Product Model

Function

Obtains the model number of the MG3700A.

Command Message

None

Query Message

PMODEL?

Response Message

PMODEL s

Value of s

MG3700A model number

Use Example

PMODEL?

POWRATIOTARGET

Power Ratio Target

Function

Selects the waveform memory to which the A/B (C/N) output ratio is set.

Command Message

POWRATIOTARGET a

Value of a

WMA:	Waveform memory A (CARRIER)
WMB:	Waveform memory B (NOISE)
CONSTANT:	RF level fixed

Query Message

POWRATIOTARGET?

Response Message

POWRATIOTARGET a

Limitation

This command can be executed in the Edit mode, and when the output level ratio can be set on the screen at the time of combination file selection.

Use Example

POWRATIOTARGET WMA

PRE

Preset

Function

Initializes all the setting items targeted for initialization.

Command Message

PRE

Query Message

None

Response Message

None

Use Example

PRE

PRMDEL

Parameter File Delete

Function

Deletes a specified parameter file.

Command Message

PRMDEL s

Value of s

30 or fewer characters: Parameter file name (excluding the extension)

Query Message

None

Response Message

None

Limitation

An error is returned if the specified parameter file does not exist.

Use Example

PRMDEL “PRM01”

PRMLST?

Display Parameter File List

Function

Obtains a parameter file list.

Command Message

None

Query Message

PRMLST?

Response Message

PRMLST s_1,s_2,s_3,…,s_{99},s_{100}

Value of s

30 or fewer characters: Up to 100 existing parameter file names

Limitations

- The command will return "***" if no parameter file exists.
- Response message files are listed in alphabetical order.

Use Example

PRMLST?

PRMMEDIA

Media Choice for Parameter File

Function

Selects the media to and from which a parameter is read or written.

Command Message

PRMMEDIA a

Value of a

HDD: Selects the MG3700A internal hard disk.
CF: Selects the CF card.

Query Message

PRMMEDIA?

Response Message

PRMMEDIA a

Use Example

PRMMEDIA HDD

PRMREC

Parameter Recall

Function

Reads a specified parameter file.

Command Message

PRMREC s

Value of s

30 or fewer characters: Parameter file name (excluding the extension)

Query Message

None

Response Message

None

Limitations

- The file name is case-insensitive. If inconsistencies exist between the items of the file to read and the MG3700A setup items, parameters are set only if they can, and those that cannot be set are ignored. If any parameters are wanting, their defaults are assumed.
- If a path of waveform file exists among the parameters, the waveform file will also be loaded.

Use Example

PRMREC “PRM01”

PRMSAV

Parameter Save

Function

Saves (outputs) the current setting parameters to a file.

Command Message

PRMSAV s

Value of s

30 or fewer characters: File name (excluding the extension)

Query Message

None

Response Message

None

Limitation

The output parameter file is saved to the media specified by the PRMMEDIA command as file name “(setting).mem.”

Use Example

PRMSAV “PRM01”

PTYPE?

Product type

Function

Obtains the model name of the MG3700A.

Command Message

None

Query Message

PTYPE?

Response Message

PTYPE s

Value of s

MG3700A model name

Use Example

PTYPE?

QCOMOS

Q Common Offset

Function

Sets a Q-output common DC offset level.

Command Message

QCOMOS l

Value of l

–1.00 to 3.00 V: –1.00 to 3.00 V, in 10 mV step

Query Message

QCOMOS?

Response Message

QCOMOS l

Use Example

QCOMOS 1.25V

QDIFFOS

Q differential Offset

Function

Sets a Q-output differential DC offset level.

Command Message

QDIFFOS l

Value of l

–50.00 to 50.00MV: –50.00 to 50.00 mV, in 0.05 mV step

Query Message

QDIFFOS?

Response Message

QDIFFOS l

Use Example

QDIFFOS 36MV

QOLTR

Q Output Level Trim

Function

Sets a Q-output level trimming (adjustment) value.

Command Message

QOLTR p

Value of r

0.0 to 120.0: 0.0 to 120.0%

Query Message

QOLTR?

Response Message

QOLTR p

Limitation

The resolution is 0.1%

Use Example

QOLTR 20.0

RCVBIT?

Received Bit

Function

Obtains a count of the bits received for BER measurement.

Command Message

None

Query Message

RCVBIT?

Response Message

RCVBIT n

Value of n

0 to $(256^8 - 1)$

Use Example

RCVBIT?

REF?

Reference Frequency Source

Function

Returns information about the reference frequency signal of the MG3700A.

Command Message

None

Query Message

REF?

Response Message

REF a

Value of a

INT: Internal reference oscillator
EXT: External reference oscillator

Use Example

REF?

REFCLKSRC

Baseband Reference Clock Source

Function

Selects a baseband reference clock (external or internal).

Command Message

REFCLKSRC a

Value of a

INT: Internal (Internal signal)
EXT: External (External signal)

Query Message

REFCLKSRC?

Response Message

REFCLKSRC a

Use Example

REFCLKSRC INT

REFCLKVAL

Baseband Reference Clock

Function

Selects a reference clock frequency of the baseband supplied from an external source.

Command Message

REFCLKVAL a

Value of a

SIXTEENTH:	Sampling clock × 1/16
EIGHTH:	Sampling clock × 1/8
QUARTER:	Sampling clock × 1/4
HALF:	Sampling clock × 1/2
1:	Sampling clock × 1
2:	Sampling clock × 2
4:	Sampling clock × 4
8:	Sampling clock × 8
16:	Sampling clock × 16

Query Message

REFCLKVAL?

Response Message

REFCLKVAL a

Limitation

The programmable ranges of the baseband reference clock are listed below.

Baseband Reference Clock Programmable Ranges

Sampling Clock [MHz]	Baseband Reference Clock Setting									
	16	8	4	2	1	1/2	1/4	1/8	1/16	
0.02 ≤ f < 0.024	✓	✓	✓	✓	✓					
0.024 ≤ f < 0.048	✓	✓	✓	✓	✓	✓				
0.048 ≤ f < 0.096	✓	✓	✓	✓	✓	✓	✓			
0.096 ≤ f < 0.192	✓	✓	✓	✓	✓	✓	✓	✓		
0.192 ≤ f < 2.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	
2.5 ≤ f < 5		✓	✓	✓	✓	✓	✓	✓	✓	
5 ≤ f < 10			✓	✓	✓	✓	✓	✓	✓	
10 ≤ f < 20				✓	✓	✓	✓	✓	✓	
20 ≤ f < 40					✓	✓	✓	✓	✓	
40 ≤ f < 80						✓	✓	✓	✓	*1
80 ≤ f < 160							✓	✓	✓	*2

*1 Upper limit is 100 MHz when interpolation = 4.

*2 Upper limit is 50 MHz when interpolation = 8.

Use Example

REFCLKVAL HALF

REMDISP

Remote Error Message Display Mode

Function

Selects the error message display mode when a remote control error occurs.

Command Message

REMDISP a

Value of a

NORMAL: Normal (the error message window disappears when the next message is received)

REMA: Remain (the error message window remains displayed even when the next message is received)

Query Message

REMDISP?

Response Message

REMDISP a

Use Example

REMDISP NORMAL

RFPHASE

RF Phase Adjust

Function

Sets the RF output phase.

Command Message

RFPHASE d

Value of d

–179.9 to 180.0DEG: –179.9 to 180.0 degrees, in 0.1-degree steps

Query Message

RFPHASE?

Response Message

RFPHASE d

Use Example

RFPHASE 128.4

RMSVAL

Waveform RMS Value Tuning

Function

Tunes (adjusts) a pattern RMS value.

Command Message

RMSVAL l

Value of l

–8.00 to 8.00DB: –8.00 to 8.00 dB

Query Message

RMSVAL?

Response Message

RMSVAL l

Use Example

RMSVAL 2.00DB

RUNT?

Running Time

Function

Returns the running time of the MG3700A in hours.

Command Message

None

Query Message

RUNT?

Response Message

RUNT n

Value of n

0 to 9999999: Running time (hours)

Use Example

RUNT?

SAMPLINGCLK

Sampling Clock

Function

Sets a baseband sampling clock value.

Command Message

SAMPLINGCLK f

Value of f

0.02 to 160MHZ:	0.02 to 160 MHz
20 to 160000KHZ:	20 to 160000 kHz
20000.00 to 160000000.00HZ:	20000.00 to 160000000.00 Hz

Query Message

SAMPLINGCLK?

Response Message

SAMPLINGCLK f

Use Example

SAMPLINGCLK 49152000.00HZ

SCOPY

Screen Copy

Function

Copies the current screen on display, and saves it as a bitmap file to the specified media (MG3700A internal hard disk or CF card).

Command Message

SCOPY

Query Message

None

Response Message

None

Use Example

SCOPY

SCRCPYMEDIA

Screen Copy Media

Function

Specifies the media to which a screen copy bitmap file is saved.

Command Message

SCRCPYMEDIA a

Value of a

HDD: Saves to a specified path of the MG3700A internal hard disk.
CF: Saves to a specified path of the CF card.

Query Message

SCRCPYMEDIA?

Response Message

SCRCPYMEDIA a

Use Example

SCRCPYMEDIA HDD

SCREEN

Change Screen

Function

Changes the screen to a specified screen.

Command Message

SCREEN a

Value of a

FREQ_TOP:	Frequency Channel Function Frequency screen
FREQ_PHASE:	RF output phase adjustment screen
CHAN_TOP:	Frequency Channel Function Channel screen
CHAN_EDIT:	Frequency Channel Function Channel Edit screen
LVL_TOP:	Level Function screen
BB_TOP:	Modulation function Top screen
BB_ADVANCE:	Modulation function Advanced Menu screen
BB_LOADPT:	Modulation function Load Pattern to Memory screen
BB_LOADFILE:	Modulation function Load Pattern to Memory screen
BB_EDITHDD:	Modulation function Edit HDD screen
BB_PROGRESS:	Modulation function Sequence Progress screen
BB_IOSETUP:	Modulation function Ext I/O Setup screen
BB_IQTUNING:	Modulation function I/Q Tuning screen
UTIL_TOP:	Utility function Top screen
UTIL_PARAMSR:	Utility function Parameter Save/Recall screen
UTIL_ALARMMON:	Utility function Alarm Monitor screen
UTIL_IFSET:	Utility function Interface Setup screen
UTIL_NETSET:	Utility function Network Setup screen
UTIL_COMSET:	Utility function Common Setup screen
UTIL_MNTCHK:	Utility function Maintenance Check screen
UTIL_HDCHK:	Utility function Hardware Check screen
UTIL_HDCHK_OPT:	Utility function Option Hardware Check screen
UTIL_PRDINF:	Utility function Product Information screen
UTIL_INSTTOP:	Utility function Install screen
UTIL_INSTFRM:	Utility function Firmware Install screen
UTIL_INSTWV:	Utility function Waveform Data Install screen
UTIL_BERT:	Utility function BER screen
UTIL_BER_IO:	Utility function BER Interface Setup screen (Available only when Option031/131 is installed.)
UTIL_BER_RESYNC:	Utility function BER Resync Condition Setup screen (Available only when Option031/131 is installed.)
UTIL_BERT_Detail:	Utility function BER Data Type Detail Setup screen (Available only when Option031/131 is installed.)

Query Message

SCREEN?

Response Message

SCREEN a

Use Example

SCREEN FREQ_TOP

SEQCURRENTELM?

Sequence Current Element Number

Function

Obtains the element number that is reproduced in a sequence.

Command Message

None

Query Message

SEQCURRENTELM?

Response Message

SEQCURRENTELM n

Value of a

1 to 200: Element number

Limitation

This command can be executed in the sequence mode only.

Use Example

SEQCURRENTELM?

SEQELMNAME?

Sequence Element Name

Function

Obtains a list of elements that belong to a sequence file.

Command Message

None

Query Message

SEQELMNAME? s_1,s_2,n

Value of s_1

Package name

Value of s_2

Waveform file name

Value of n

n = 0: Returns Add Pattern
n = 1: Returns the pattern file of element No.1
n = 2: Returns the pattern file of element No.2
…
n = 200: Returns the pattern file of element No.200

Response Message

SEQELMNAME s_1,s_2

Value of s_1

Package name (“NONE” is returned if there is no package.)

Value of s_2

Waveform file name (“NONE” is returned if there is no waveform file.)

Limitation

This command can be executed in the sequence mode only.

Use Example

SEQELMNAME? “WCDMA”,“Test Sequence01”,1

SEQELMNUM?

Sequence Element Number

Function

Obtains the number of elements that belong to a combination file for the sequence mode.

Command Message

None

Query Message

SEQELMNUM? s_1,s_2

Value of s_1

Package name

Value of s_2

Combination file name

Response Message

SEQELMNUM n

Value of n

Number of elements

Use Example

SEQELMNUM? “WCDMA”,“Test Sequence01”

SEQFILELDCHK

Loaded Sequence File Check

Function

Obtains information as to whether a combination file for the sequence mode can be loaded.
After executing the check, confirm that the process is complete by using the Extended End Status register, and then execute a query command to confirm the result.

Command Message

SEQFILELDCHK s_1,s_2

Value of s_1

Package name

Value of s_2

Combination file name for sequence mode

Query Message

SEQFILELDCHK?

Response Message

SEQFILELDCHK b

Value of b

CHECKING:	The combination file for the sequence mode is being analyzed.
NEED_CHECK:	The command message needs to be transmitted.
DELETE_PATTERN:	The waveform memory would still be short of free space even if it is optimized, but loading would be enabled if existing waveform files are deleted.
ENABLE:	Loading of the combination file for the sequence mode is enabled.
NO_SEQUENCE_FILE_HDD:	The combination file for the sequence mode selected to be loaded does not exist on the hard disk.
NO_SEQUENCE_FILE:	The selected file is not a combination file for the sequence mode.

SEQUENCE_FILE_OVER: No more combination files for the sequence mode can be loaded since the loadable number of files will be exceeded.

NOT_EXIST_PATTERN_A: The waveform file that is specified by a combination file to be loaded from Memory A does not exist on the hard disk.

NOT_EXIST_PATTERN_B: The waveform file that is specified by a combination file to be loaded from Memory B does not exist on the hard disk.

NOT_EXIST_PATTERN_AB: Both of the waveform files that are specified by a combination file to be loaded from Memories A and B do not exist on the hard disk.

SEQ_FILE_ELEMENT_PARAM_MISMATCH: Among the waveform files that are specified by an element of the combination file for the sequence mode, there is a waveform file that has a different parameter.

SEQUENCE_FILE_ERROR: An invalid parameter exists or some parameters do not exist in the combination file for the sequence mode.

SEQ_LEVEL_RATIO_GAP_OVER: The maximum level ratio settable in the sequence mode is exceeded.

TOO_LARGE_SIZE: The total size of waveform files to be used is larger than the total size of waveform memories A and B.

PATTERN_A_IS_LAGER_THAN_WMA: The size of waveform file to be used is larger than the size of waveform memory A.

PATTERN_A_IS_LAGER_THAN_WMB: The size of waveform file to be used is larger than the size of waveform memory B.

Limitation

If the same waveform file already exists, it is overwritten by the newly loaded waveform file.

Use Example

SEQFILELDCHK “WCDMA”,“TEST Pattern 0001”

SEQNEXTPAT

Sequence Next Pattern

Function

Moves to the next pattern in the sequence mode.

Command Message

SEQNEXTPAT

Query Message

None

Response Message

None

Limitation

This command can be executed in the sequence mode only.

Use Example

SEQNEXTPAT

SEQPLAYMODE

Sequence Play Mode

Function

Switches the operation in the sequence mode.

Command Message

SEQPLAYMODE a

Value of a

AUTO:	Auto mode (sequence is processed automatically)
MANUAL:	Manual mode (sequence is processed by executing the SEQNEXTPAT command)

Query Message

SEQPLAYMODE?

Response Message

SEQPLAYMODE a

Limitation

This command can be executed in the sequence mode only.

Use Example

SEQPLAYMODE AUTO

SEQRESTART

Sequence Restart

Function

Restarts the sequence progress from the beginning.

Command Message

SEQRESTART

Query Message

None

Response Message

None

Limitations

- This command can be executed in the sequence mode only.
- The Baseband main function automatically set to enter the sequence operation status.

Use Example

SEQRESTART

SEQSWPOINT

Sequence Switching Point

Function

Sets the pattern switching timing in the sequence mode.

Command Message

SEQSWPOINT a

Value of a

PAT_END: The pattern is switched to the next one when re-production of the current pattern is completed.

FRAME_END: The pattern is switched to the next one when re-production of the current frame is completed.

Query Message

SEQSWPOINT?

Response Message

SEQSWPOINT a

Limitation

This command can be executed in the sequence mode only.

Use Example

SEQSWPOINT PAT_END

SERNUM?

Serial Number

Function

Obtains the serial number of the MG3700A.

Command Message

None

Query Message

SERNUM?

Response Message

SERNUM s

Value of s

MG3700A serial number

Use Example

SERNUM?

SERNUMBER?

Option031/131 Serial Number

Function

Obtains the serial number of Option031/131 (high speed BER test function).

Command Message

None

Query Message

SERNUMBER?

Response Message

SERNUMBER s

Value of s

Option031/131 (high speed BER test function) serial number (ten or fewer characters)

Limitation

This command is valid only when Option031/131 is installed.

Use Example

SERNUMBER?

SERNUMCPU?

CPU Board Serial Number

Function

Obtains the serial number of the CPU board.

Command Message

None

Query Message

SERNUMCPU?

Response Message

SERNUMCPU s

Value of s

CPU board serial number (10 or fewer characters)

Use Example

SERNUMCPU?

SERNUMIF?

IF Board Serial Number

Function

Obtains the serial number of the IF board.

Command Message

None

Query Message

SERNUMIF?

Response Message

SERNUMIF s

Value of s

IF board serial number (10 or fewer characters)

Use Example

SERNUMIF?

SERNUMRF?

RF Board Serial Number

Function

Obtains the serial number of the RF board.

Command Message

None

Query Message

SERNUMRF?

Response Message

SERNUMRF s

Value of s

RF board serial number (10 or fewer characters)

Use Example

SERNUMRF?

SFTRG

Start/Frame Trigger

Function

Selects the start/frame trigger On/Off.

Command Message

SFTRG a

Value of a

ON: Enables the start/frame trigger.
OFF: Disables the start/frame trigger.

Query Message

SFTRG?

Response Message

SFTRG a

Use Example

SFTRG ON

SFTRGMODE

Start/Frame Trigger Mode

Function

Sets a start/frame trigger mode.

Command Message

SFTRGMODE a

Value of a

START: Start trigger mode
FRAME: Frame trigger mode

Query Message

SFTRGMODE?

Response Message

SFTRGMODE a

Use Example

SFTRGMODE START

SMPLCLKMATCH?

Sampling Clock Alarm Status

Function

Obtains the status of whether the sampling clock of the pattern in waveform memory A matches that of the pattern in waveform memory B in the Edit mode.

Command Message

None

Query Message

SMPLCLKMATCH?

Response Message

SMPLCLKMATCH a

Value of a

MATCH:	The sampling clocks match.
MISMATCH:	The sampling clocks do not match.

Use Example

SMPLCLKMATCH?

SOFTCPUVER?

CPU Software Version

Function

Obtains the CPU software version information.

Command Message

None

Query Message

SOFTCPUVER?

Response Message

SOFTCPUVER s

Value of s

CPU Software version information

Use Example

SOFTCPUVER?

SPREV

RF Spectrum Reverse

Function

Selects spectrum reverse (I- and Q-phase interchange).

Command Message

SPREV a

Value of a

ON:	Spectrum reverse
REV:	Spectrum reverse
INV:	Spectrum reverse
OFF:	Spectrum normal
NORMAL:	Spectrum normal

Query Message

SPREV?

Response Message

SPREV a

Use Example

SPREV ON

STDLY

Start Trigger Delay

Function

Sets a delay in the output timing of the RF signal in sample units.

Command Message

STDLY n

Value of n

The setting range for n varies depending on the selected pattern.

The resolution also varies depending on the currently-selected sampling clock, as follows:
Sampling clock ≤ 20 MHz: 0.25-sample steps
Sampling clock > 20 MHz: 1.00-sample steps

Query Message

STDLY?

Response Message m

STDLY n

Use Example

STDLY 10.25

STDLYSYM

Start Trigger Delay (for Over Rate)

Function

Sets the RF signal output timing, in Symbol or Chip Rate units for each system as determined according to Over Rate.

Command Message

STDLYSYM n

Value of n

The setting range for n varies depending on the selected pattern.

In the same manner as the STDLY command, the resolution also varies depending on the currently-selected sampling clock, as follows:
Sampling clock ≤ 20 MHz: 1 ÷ (OverRate × 4) steps
Sampling clock > 20 MHz: 1 ÷ OverRate steps

Query Message

STDLYSYM?

Response Message

STDLYSYM n

Use Example

STDLYSYM 0.33

STGS

Start/Frame Trigger Source

Function

Sets a start/frame trigger mode.

Command Message

STGS a

Value of a

INT:	Trigger mode Off
EXTSTA, EXT:	Start trigger mode
EXTFRM:	Frame trigger mode

Query Message

STGS?

Response Message

STGS a

Use Example

STGS INT

SUBNET

Subnet Mask

Function

Sets the subnet mask.

Command Message

SUBNET n_1,n_2,n_3,n_4

Value of n_1

0 to 255: IP address

Value of n_2

0 to 255: IP address

Value of n_3

0 to 255: IP address

Value of n_4

0 to 255: IP address

Query Message

SUBNET?

Response Message

SUBNET n_1,n_2,n_3,n_4

Use Example

SUBNET 123,123,123,123

TIMESET

Time Set

Function

Sets the time.

Command Message

TIMESET n_1,n_2,n_3,n_4,n_5,n_6

Value of n_1

2004 to 2099: Year

Value of n_2

1 to 12: Month

Value of n_3

1 to 31: Date

Value of n_4

0 to 23: Hour

Value of n_5

0 to 59: Minute

Value of n_6

0 to 59: Second

Query Message

TIMESET?

Response Message

TIMESET n_1,n_2,n_3,n_4,n_5,n_6

Use Example

TIMESET 2004,12,31,23,59,59

TRM

GPIB Terminator

Function

Selects a response message terminator.

Command Message

TRM a

Value of a

0:	LF
1:	CR/LF
LF:	LF
CRLF:	CR/LF

Query Message

TRM?

Response Message

TRM a

Use Example

TRM 1

VDSPL

Volt Unit for Display

Function

Selects a voltage-system unit.

Command Message

VDSPL a

Value of a

EMF: Voltage-system unit EMF (Open voltage indication)
TERM: Voltage-system unit Term (Terminated voltage indication)

Query Message

VDSPL?

Response Message

VDSPL a

Use Example

VDSPL TERM

WMOPTCANCEL

Optimize Waveform Memory Cancel

Function

Cancels a waveform memory optimization check and the optimization process. Note that the contents of the waveform memory are not restored if this command is received while the optimization process is in progress.

Command Message

WMOPTCANCEL

Use Example

```
WMOPTCHK WMA
WMOPTCANCEL
```

WMOPTCHK

Optimize Waveform Memory

Function

Executes an optimization check on a waveform memory.
After executing the optimization check, confirm that the process is complete by the Extended End Status register and then execute a query command to confirm the result.

Command Message

WMOPTCHK a

Value of a

WMA: Waveform memory A optimization check
WMB: Waveform memory B optimization check

Query Message

WMOPTCHK? a

Response Message

WMOPTCHK b

Value of b

ENABLE:	Optimization is enabled.
REMV_PATTERN:	The waveform files that do not exist on the hard disk are deleted.
NEED_CHK:	An optimization check has not been executed.
ERROR:	An optimization check has ended abnormally.
CHECKING:	Optimization is in progress.
NO_PATTERN:	No waveform files exist on the waveform memory.
NO_NEED_OPTIMIZE:	Optimization is not needed.

Use Example

```
WMOPTCHK WMA
ESR2?
WMOPTCHK? WMA
```

WMOPTIMIZE

Optimize Waveform Memory

Function

Optimizes waveform memories.

Command Message

WMOPTIMIZE a

Value of a

WMA: Optimizes waveform memory A.
WMB: Optimizes waveform memory B.

Use Example

WMOPTIMIZE WMA

WMSPC?

Available Waveform Memory Space

Function

Obtains the size of free space in a waveform memory.

Query Message

WMSPC? a

Value of a

WMA: Waveform memory A capacity information
WMB: Waveform memory B capacity information

Response Message

WMSPC n_1,n_2,n_3

Value of n_1

Size of free space available at present in bytes

Value of n_2

Maximum size of consecutive free space available at present in bytes

Value of n_3

Total size of space in a specified waveform memory in bytes

Use Example

WMSPC? WMA

WVINSTMEDIA

Waveform Data License Install Source Media

Function

Selects the media from which the waveform file license keys are installed.

Command Message

WVINSTMEDIA a

Value of a

HDD: Install from the MG3700A internal hard disk.
CF: Install from a CF card.

Query Message

WVINSTMEDIA?

Response Message

WVINSTMEDIA a

Use Example

WVINSTMEDIA HDD

WVKEYNAME?

Waveform Data License Name

Function

Obtains the name of the installed waveform file license key.

Command Message

None

Query Message

WVKEYNAME? n

Value of n

License key index number (0 or later)

Response Message

WVKEYNAME s

Value of s

License key name

Use Example

WVKEYNAME? 0

WVKEYNUM?

Waveform Data License Number

Function

Obtains the number of the installed waveform file license keys.

Command Message

None

Query Message

WVKEYNUM?

Response Message

WVKEYNUM n

Value of n

Number of license keys

Use Example

WVKEYNUM?

WVKEYVER?

Waveform Data License Version

Function

Obtains the version number of the installed waveform file license keys.

Command Message

None

Query Message

WVKEYVER? s_1

Value of s_1

License key name

Response Message

WVKEYVER s_2

Value of s_2

License key version: 0.00 to 99.99

Use Example

WVKEYVER? WCDMA

Section 5 Performance Test

This section describes the type of measuring equipment required to perform performance testing of the MG3700A as preventive maintenance, how to set them up, the configuration procedure, and the performance test procedure.

5.1 Performance Test Overview

5.1.1 Performance test

Perform the performance test of the MG3700A as preventive maintenance to keep its performance from becoming degraded. Carry out the performance test if verification of the MG3700A performance is required, such as at an inspection, at a scheduled inspection, or after a repair.
If the MG3700A fails to meet the specifications as a result of the performance test, contact the Anritsu Service and Sales office.

⚠ CAUTION

Before proceeding with the performance test, allow the MG3700A and the equipment used for the performance test to warm up at least 30 minutes to fully stabilize. For optimal measuring accuracy, run the MG3700A at room temperature from an AC voltage source (100 Vac to 120 Vac or 200 Vac to 240 Vac) with low fluctuation, in an environment free from noise, vibration, dust, moisture, and other harm

5.1.2 Test item and equipment for MG3700A

The test items and the equipment used for testing each of these items are listed below.

Table 5.1.2-1 Test items and apparatuses

Test Item		Outline	Major Equipment Used (Anritsu Model Name)
Frequency	Frequency	A frequency is set and the output frequency is measured.	Counter (MF2412B)
Output level	Output level frequency characteristics	The absolute accuracy is measured by powermeter (frequency characteristics).	Power meter (ML2437A) Power sensor (MA2421A)
Vector modulation	Vector accuracy	A modulation pattern signal is generated through internal modulation, and the vector accuracy is measured using a transmitter tester.	Transmitter tester (MS8609A) W-CDMA measurement software (MX860901B) Wireless LAN measurement software (MX860930A)

Regularly perform the performance testing as preventive maintenance for items judged to be important. Performing performance tests once or twice a year is recommended.

5.2 Frequency Performance Test

5.2.1 Frequency

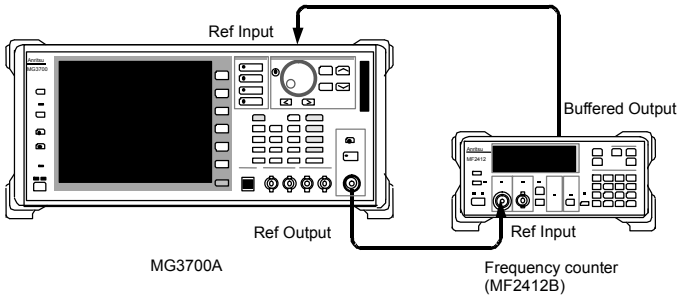
This test consists of setting the frequency of the MG3700A in the range of 250 kHz to 3,000 MHz (when Upper frequency limit 6 GHz option is installed, 250 kHz to 6,000 MHz), and counting the frequency with a counter (Anritsu MF2412B) in order to check that the set frequency is output normally.

Test Specifications

Frequency Range: 250 kHz to 3,000 MHz
(with Upper frequency limit 6 GHz option is installed, 250 kHz to 6,000 MHz)

Frequency setting resolution: 0.01Hz

Connection Diagram



Test Procedure

Set the frequency of the MG3700A in the range of 250 kHz to 3000 MHz (when Upper frequency limit 6 GHz option is installed, 250 kHz to 6000 MHz).

<Procedure>

1. Connect the reference signal output (10 MHz) of the frequency counter to the external reference input connector (Ref Input) of the MG3700A to establish frequency synchronization.
2. Set the measuring resolution of the frequency counter to 10 mHz.
3. Press Preset to preset the MG3700A.
4. Set the output level of the MG3700A to 0 dBm.
5. Set the output frequency of the MG3700A to the [FR(1)] value in Table 5.2.1-1.
6. Check that the frequency set for the MG3700A is the same as the frequency displayed by the frequency counter.
7. Repeat the above measuring sequence, changing the frequency [FR(1)] according to Table 5.2.1-1.

Table 5.2.1-1 Frequency settings

x	FR(x) (MHz)
1	0.250
2	100
3	300
4	600
5	1000
6	1500
7	2000
8	2500
9	3000
10	3000.001
11	3500
12	4000
13	4500
14	5000
15	5500
16	6000

$x \geq 10$ is available only when the Upper limit frequency 6 GHz option is installed.

5.3 Output Level Performance Test

5.3.1 Output level frequency characteristics

Using a power meter (Anritsu ML2437A) and a power sensor (MA2421A), measure the level for each frequency of the MG3700A at the reference level.

The measurement results are the absolute accuracy for the reference level, and the absolute accuracy below the reference level is obtained through combination with the linearity error measurement result at each frequency.

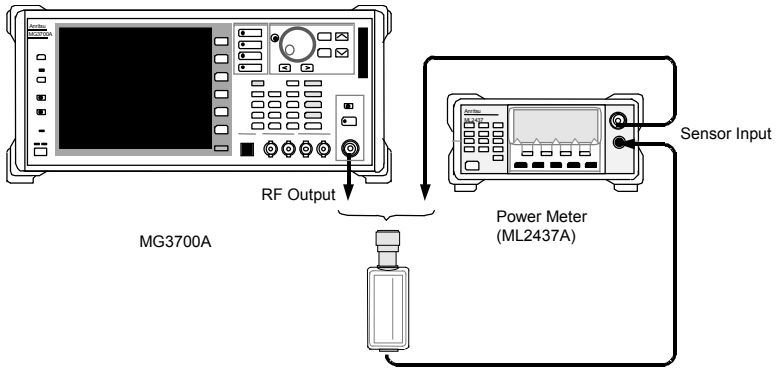
Test Specifications

Absolute accuracy: (23 ±5°C, in CW mode)

Table 5.3.1-1 Test specifications

Configuration	Output Level	Frequency	
		25 to 3000 MHz	3000 to 6000 MHz (when Upper frequency limit 6 GHz option is installed)
Standard	–11 dBm	±0.5 dB	±0.8 dB
When mechanical attenuator option is installed	–7 dBm	±0.5 dB	±0.8 dB

Connection Diagram



Test Procedure

Perform level measurement according to the frequency table shown in Table 5.3.1-2.

<Procedure>

1. Turn on the RF output of the MG3700A.
2. Set the output level of the MG3700A to –11 dBm.
   (When the mechanical attenuator option is installed, set this to –7 dBm.)
3. Execute sensor calibration for the ML2437A (zero point, sensitivity).
4. Set the frequencies of the MG3700A and the ML2437A to the [FR(1)] value in Table 5.3.1-2.
5. Measure the level with the ML2437A.
6. Repeat Step 4, changing the frequency setting [FR(x)] according to Table 5.3.1-2, to obtain measurement values.

Table 5.3.1-2 Frequency settings for absolute accuracy measurement

x	FR (x) (MHz)
1	25
2	100
3	500
4	1000
5	1500
6	2000
7	2500
8	3000
9	3000.001
10	3500
11	4000
12	4500
13	5000
14	5500
15	6000

X ≥ 9 is available only when the Upper limit frequency 6 GHz option is installed.

5.4 Vector Modulation Performance Test

5.4.1 Vector accuracy

This test consists of generating a baseband signal from the internal waveform pattern, and performance the vector modulation with the MG3700A. The vector error of the modulated RF signal is measured with the transmitter tester (MS8609A) to which signal analysis software has been installed.

Test Specifications (23 ±5°C)

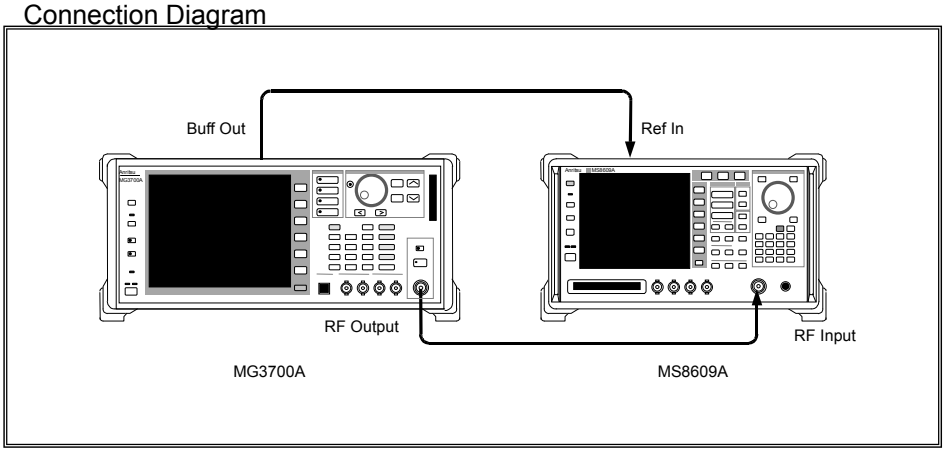
Vector accuracy

≤2% (rms) (Output frequency: 800 to 1000MHz, 1800 to 2400 MHz • At W-CDMA 1code modulation)

≤1% (rms) (Output frequency: 2400 to 2497 MHz, 4900 to 5925 MHz • When using OFDM signal equivalent to IEEE802.11a, 11g)

≤5% (peak) (Output frequency: 2400 to 2497 MHz • When using signal equivalent to IEEE802.11b)

Connection Diagram



Test Procedure (W-CDMA 1code)

<Procedure>

1. Turn on the RF output of the MG3700A and set the output level to –4 dBm.
   (When the mechanical attenuator option is installed, set this to 0 dBm.)
2. Turn on the vector modulation of the MG3700A and perform modulation with the W-CDMA DL_CPICH of the standard waveform pattern.
3. Set the measurement condition according to the waveform pattern of W-CDMA 1 code with the MS8609A mode as TX Tester and System as WCDMA.
4. Set the frequencies of the MG3700A and MS8609A to the [FR(1)] value in Table 5.4.1-1.
5. Measure the vector error with the MS8609A.
6. Repeat Step 3 to obtain the measurement values, changing the frequency setting [FR(x)] according to Table 5.4.1-1.

Test Procedure (WLAN)

<Procedure>

1. Turn on the RF output of the MG3700A and set the output level to –4 dBm.
   (When the mechanical attenuator option is installed, set this to 0 dBm.)
2. Turn on the vector modulation of the MG3700A and perform modulation with WLAN (IEEE802.11a) 11a_OFDM_54Mbps of the standard waveform pattern.
3. Set the measurement condition according to the waveform pattern of WLAN (IEEE802.11a) with the MS8609A mode as TX Tester and System as WCDMA.
4. Set the frequencies of the MG3700A and MS8609A to the [FR(1)] value in Table 5.4.1-2.
5. Measure the vector error with the MS8609A.
6. Repeat measurement changing frequency [FR(x)] according to Table 5.4.1-2.
7. Perform modulation with WLAN (IEEE802.11g) 11g_DSSS_OFDM_54Mbps and WLAN (IEEE802.11b) 11b_DSSS_2Mbps of the standard waveform pattern of the MG3700A and repeat measurements in combination with the measurement conditions for the MS8609A.

Table 5.4.1-1 W-CDMA 1 code modulation accuracy measurement frequencies

x	FR (x) (MHz)
1	800
2	1000
3	1800
4	2000
5	2200
6	2400

Table 5.4.1-2 WLAN modulation accuracy measurement frequencies

x	FR (x) (MHz)
1	2400
2	2497
3	4900
4	5400
5	5925

$x \geq 3$ is available during IEEE802.11a measurement with the Upper limit frequency 6 GHz option installed.

Section 6 Maintenance

This section describes cautions related to daily maintenance, storage, and shipping of the MG3700A, as well as the calibration procedure to be used as preventive maintenance.

6.1 Daily Maintenance and Storage

6.1.1 Daily maintenance

Before daily maintenance of the MG3700A, be sure to turn the power off and unplug it from the AC outlet.

Panel Surface dirt

When surface dirt is noticeable, after the MG3700A has been used in a dusty environment, or when the MG3700A has not been used for an extended period of time, wipe its surface with a cloth moistened in detergent and wrung enough.

Screen surface dirt

If the screen surface is dirty, first wipe it dry with a soft cloth. If the dirt persists, wipe the surface gently with a cloth dipped in detergent and wrung enough.

Loose screws

Use a Phillips screwdriver to tighten screws.

6.1.2 Cautions on storing MG3700A for extended period

Wipe off dust, fingerprint marks, stains, spots, etc. from the surface of the MG3700A before storing it. Avoid storing the MG3700A in these places:

- Places that are exposed to direct sunlight
- Dusty places
- Damp places where condensation may occur on the MG3700A surface
- Places where the MG3700A may be corroded by active gases
- Places where the MG3700A may be oxidized
- Places having temperatures and relative humidity in the following ranges:
  Temperature: –20°C or lower, or +60°C or higher
  Relative humidity: 90% or higher

Recommended storage conditions

It is recommended that the MG3700A be stored in a place that meets the ambient conditions suggested above, plus the following conditions, if it is not to be used for a long period of time:

- Temperature: 0 to 50°C
- Relative humidity: 40 to 80%
- Little temperature and relative humidity variations within one day

6.1.3 Repackaging and shipping

When shipping the MG3700A, consider these instructions:

Recapping

Repack the MG3700A in the packing material (box) in which it had been delivered. If the packing material has been scrapped or damaged, repack the MG3700A in the following manner:

<1> Wrap the unit in vinyl or a similar material.

<2> Procure a corrugated fiberboard box, wooden box, or aluminum box that is large enough to house the instrument and the cushioning material around it.

<3> Put the MG3700A in the box, and then the cushioning material to secure the MG3700A in the box.

<4> Fasten the box firmly with strings, adhesive tapes, or other materials.

Shipping

Shipping the MG3700A with maximum protection against vibration and in compliance with the suggested storage conditions is recommended.

6.1.4 Storing CF cards

Store CF cards at temperatures of 4 to 53°C and relative humidity of 8 to 90% (no condensation). Avoid storing CF cards in places that are:

- Dusty or damp
- Close to magnetic substances
- Exposed to direct sunlight
- Close to heat sources

6.2 Calibration

6.2.1 Calibration

Perform calibration as preventive maintenance to keep the MG3700A's performance from becoming degraded.
Even if the MG3700A is functioning normally, calibrate it periodically to maintain its performance.
Calibrating the MG3700A once or twice a year is recommended.
If the MG3700A fails to meet specifications after calibration, contact the Anritsu Customer Service office.

⚠ CAUTION

Before performing the calibration, allow the MG3700A and the equipment used for the performance test to warm up at least 30 minutes to allow them to fully stabilize. For optimal measuring accuracy, run the MG3700A at the temperature of 23 ±5°C), with low AC voltage fluctuation (100 to 120 Vac or 200 to 240 Vac), in an environment free from noise, vibration, dust, moisture, and other harmful ambient conditions.

6.2.2 Equipment required for Calibration

The following table lists the equipment used to calibrate the MG3700A.

Recommended Equipment	Performance Requirement*	Calibration Item
Oscilloscope	Capable of measuring 10 MHz External triggering available	Reference oscillator frequency accuracy
Frequency standard	Standard radio receiver or equipment with equivalent capability (Accuracy: On the order of 1 × 10^{-9} or better)	Reference oscillator frequency accuracy

*: The above table lists some of the performance characteristics required to cover the measuring ranges of the tests.

6.2.3 Calibrating frequencies with oscilloscope

Use an oscilloscope to calibrate the reference oscillator frequency.
Use a frequency standard radio signal (signal synchronized with a standard radio signal or with a rubidium atomic standard) offering better accuracy than the reference oscillator installed in the MG3700A.

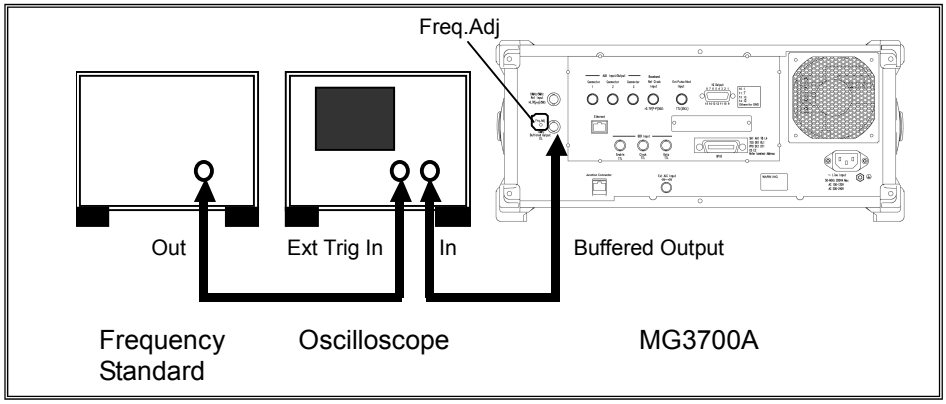
Table 6.2.3-1 Calibration Specifications

Reference Oscillator	Aging Rate	Temperature Stability
Internal reference oscillator	$\pm 1 \times 10^{-7}$/year	$\pm 2 \times 10^{-8}$ (0 to 50°C)

The rubidium reference oscillator (option) does not have a calibration function.

Calibration Procedure

The calibration procedure using an oscilloscope is described below.



<Procedure>

1. Press [Output] to turn off RF output.
2. Connect the reference signal output (Buffered Output) on the rear panel of the MG3700A to the Y-axis input terminal of the oscilloscope.
3. Connect the reference signal output from the frequency standard to the External Trigger Input of the oscilloscope. Press [Output] to turn on RF output.
4. Adjust the oscilloscope to observe the input waveform.
   If the waveform displayed by the oscilloscope is stationary, this means that the frequency of the reference oscillator of the MG3700A is synchronized with the standard frequency and that normal values can be obtained.
   If the displayed waveform swings to the left or right out of sync, this means that the reference oscillator of the MG3700A must be adjusted.

5. To achieve synchronization, adjust the reference oscillator of the MG3700A by turning the trimmer in the Freq.Adj. hole with a precision slot screwdriver.

When the reference signal output connector of the MG3700A is connected to the X-axis input terminal of the oscilloscope, a Lissajous waveform is generated. In this case, adjust the MG3700A reference oscillator to make the Lissajous waveform stationary.

6.3 Replacing Hard Disk

When the internal hard disk of the MG3700A is broken, replace it with a replacement HDD ASSY (sold separately). Anritsu standard waveform pattern at shipment is pre-written on the HDD ASSY. For the waveform pattern that saved by the customer after purchasing this product, write it again after replacing the HDD ASSY. (Be sure to backup important waveform pattern.)

Replacement procedure

* Turn the MG3700A off and unplug it before replacing HDD ASSY. Perform replacement by installing the MG3700A horizontally.

<Procedure>

1. Remove the two HDD ASSY replacement screws on the rear panel by using a Phillips screwdriver.
2. Remove the current HDD ASSY.
3. Insert the new HDD ASSY.
4. Tighten the two HDD ASSY replacement screws on the rear panel by using a Phillips screwdriver.

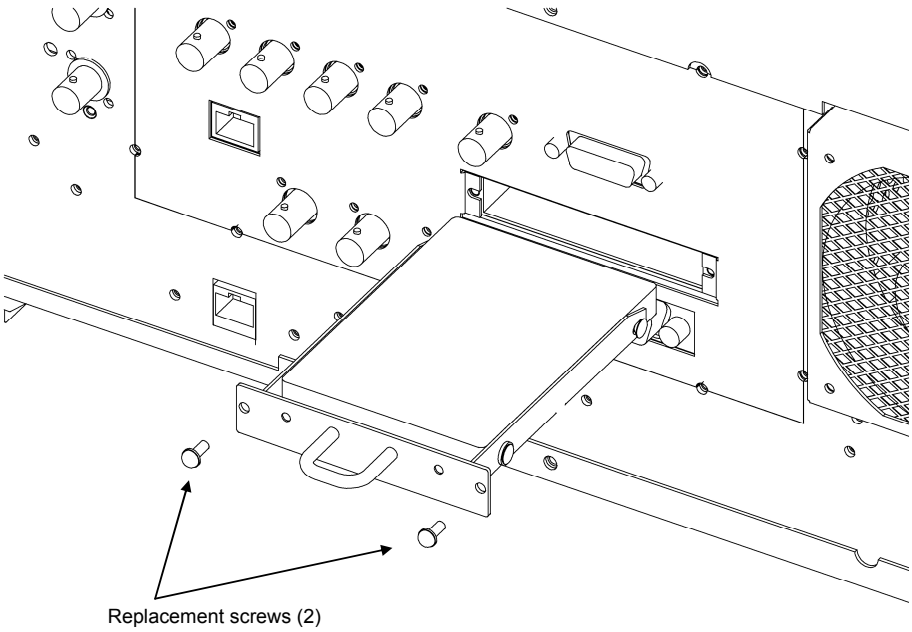


Fig. 6.3-1 Replacing HDD ASSY

Note:

If the Hard Disk lamp on the front panel remains lit after replacing the HDD ASSY, the HDD ASSY may have not been inserted correctly. In this case, turn the MG3700A off and unplug it. Then remove the HDD ASSY and insert it again.

6.4 Troubleshooting

This section describes possible causes and their handling in case the MG3700A does not operate properly. If the problem you encounter is not described in this section or if it is not resolved by the described handling, please contact the Anritsu Service and Sales office.

Table 6.4-1 Troubleshooting

Problem	Possible Causes	Handling
Cannot turn power on.	The power cord is disconnected. The power plug is not inserted all the way in the power outlet.	Correctly connect the power cord.
	The power switch has not been pressed properly.	Press the power switch for 3 or more seconds.
The initialization screen does not terminate even after 2 or more minutes have elapsed after the power is switched on .		Switch off the power immediately and then switch it back on. If this does not solve the problem, immediately switch off the power and contact the Anritsu Service and Sales office.
Nothing is displayed on the screen.	Display Off is selected.	Press Display Off/On to display the screen.
	A command to set off-screen display has been sent via remote control.	Send a command to set on-screen display.
Cannot set parameters.	Panel Lock is selected.	Press Panel Lock to release Panel Lock.
	Knob Hold is selected.	Press Knob Hold to release Knob Hold.
	The remote control mode is selected.	Press Local to switch the mode to the local control mode.
	The parameter is out of range.	Set the parameter within the allowable setting range.
	The setting conditions are not met.	Check the parameter setting conditions.
Cannot find the function menu.	Another menu page is displayed.	Press More to switch pages.
	The displayed mode differs.	Switch to the mode in which the menu you wish to set is displayed.
"Out of Range" is displayed while setting a parameter.	The parameter is out of range.	Set the parameter to a value within the allowable setting range.

Table 6.4-1 Troubleshooting (Cont'd)

Problem	Possible Causes	Handling
Files cannot be saved to the CF card.	Either no CF card is inserted, or the CF card is not correctly inserted.	Correctly insert the CF card in the card slot on the front panel.
	The CF card is not formatted.	Use the CF card after formatting it with a computer. When formatting the CF card, specify the format of the file system as "FAT".
	The file to be overwritten is a read-only file.	From the computer, cancel the read-only status of the file to be overwritten.
Cannot set the remote control mode via GPIB.	Remote control is performed via the Ethernet.	After disconnecting the Ethernet connection and then pressing Local to switch the mode to the local control mode, perform connection again with GPIB.
	The GPIB address is incorrect.	Make the interface setup screen's GPIB address and the controller side's setting match.
	The GPIB cable is not correctly connected.	Correctly connect the cable based on the GPIB network conditions.
	The computer's GPIB board is not correctly set.	Refer to the operation manual of the GPIB board in use.
Cannot set the remote control mode via the Ethernet.	Remote control is performed via GPIB.	After disconnecting the GPIB connection and then pressing Local to switch the mode to the local control mode, perform connection again with the Ethernet.
	The port number is incorrect.	Make the interface setup screen's port number and the computer's setting port number match.
	The LAN cable that is used is the wrong type.	Select the correct cable according to the connection method. (Refer to Section 4.2.3 connecting devices via Ethernet)
	The LAN cable is not correctly connected.	Correctly connect the cable based on the Ethernet network conditions.
	The computer's LAN board is not correctly set up.	Refer to the operation manual of the LAN board in use.
Cannot connect with IQproducer™.	The IP address is incorrect.	Make the network setup screen's IP address and the IQproducer™'s setting IP address match.
	The user ID or password is incorrect.	Make the network setup screen's and the IQproducer™'s settings user ID and password.

Table 6.4-1 Troubleshooting (Cont'd)

Problem	Possible Causes	Handling
Communication via the Ethernet connector on the front panel is not possible.	The Ethernet connector and the Junction connector on the rear panel are not connected.	Connect the two connectors with a straight LAN cable of an accessory.
The cursor is not displayed on the screen in the baseband setup mode.	The waveform pattern is not loaded to the memory.	Load the waveform pattern to the memory. (Refer to Section 3.5.2.1 "Loading waveform pattern to memory.")
Cannot load the waveform pattern to the memory.	The license key has not been installed.	Install the license keys for the respective patterns. (Refer to 3.10.9 "Installation."
No signal is output from the RF output connector.	The RF output has been set Off.	Press Output to set On the RF output.
No modulation signal is output from the RF output connector.	Modulation has been set Off.	Press modulation MOD On/Off to set On RF output.
No modulation signal is output from the I/Q output connector.	I/Q output has been set Off.	Press Baseband to set the digital modulation setup mode, and set On I/Q Output.
BER measurement does not work properly.	The connected connectors are incorrect.	Perform the correct connection according to the type of input signal.
An alarm is indicated. (Except for "Oven Cold")		There is a possibility of failure. Contact the Anritsu Service and Sales office.

Appendix

Electrical Performance

<Conditions>

The following conditions are applied unless otherwise specified.	
Common to CW mode and modulation mode	• Continuous mode: Off • External ALC: Off • Frequency switching speed: Normal • Pulse modulation: Off * Frequencies over 3000 MHz are available when Opt.011/111 (Upper frequency limit 6 GHz option) is installed.
Only during modulation mode	• RMS value for waveform pattern: 1634 to 1157 • Sampling rate: >100 kHz • Waveform memory addition mode: No addition • IQ Output: Off • After CAL execution • During internal modulation

<Frequency>

Parameter	Specification
Range	250 kHz to 3000 MHz When Opt.011/111 (Upper frequency limit 6 GHz option) is installed 250 kHz to 6000 MHz
Resolution	0.01 Hz
Frequency setting/display • Direct setting • Setting by channel	Sets and displays absolute value of frequency. Allocates a channel for frequency. Separate channel table for multiple systems (groups) are possible. Sets and displays the group name and channel number. Simultaneously displays also the corresponding frequency.
Internal reference oscillator • Frequency • Aging rate • Temperature stability • Startup characteristics (23°C) • Frequency • Aging rate • Temperature stability • Startup characteristics (23°C)	 10 MHz $\pm 1 \times 10^{-8}$/day, $\pm 1 \times 10^{-7}$/year $\pm 2 \times 10^{-8}$ (0 to 50°C) $\pm 5 \times 10^{-8}$/5 minutes after power-on, 24 hours after power-on as reference When Opt.001/101 (rubidium reference oscillator) is installed 10 MHz $\pm 1 \times 10^{-10}$/month $\pm 1 \times 10^{-9}$ (0 to 50°C) $\pm 1 \times 10^{-9}$/7 minutes after power-on, 24 hours after power-on as reference

<Frequency (Cont'd)>

Parameter	Specification
External reference input • Frequency • Operation range • Input level • Connector	 5 MHz / 10 MHz (automatic switching) ±1 ppm ≥0.7 V(p-p)/50 Ω (AC coupling) Rear panel, Ref Input, BNC-J connector
Buffer output • Frequency • Output level • Connector	 10 MHz TTL level (DC coupling) Rear panel, Buffered Output, BNC-J connector
Switching time	Time that fits within ±0.1 ppm of last frequency after last command reception with GPIB (however, when the last frequency is 1 GHz or less, within ±100 Hz). When frequency switching speed = Normal: When frequency range before and after change includes 3000 MHz: ≤ 40 ms When frequency range before and after change does not include 3000 MHz and frequency change amount is less than 1 GHz: ≤ 15 ms When frequency range before and after change does not include 3000 MHz and frequency change amount is 1 GHz or more: ≤ 20 ms When frequency switching speed = Fast: When frequency range before and after change includes 3000 MHz: ≤ 40 ms When frequency range before and after change does not include 3000 MHz: ≤ 10 ms When Opt.002/102 (mechanical attenuator) is installed: Independent of frequency switching speed When frequency range before and after change includes 3000 MHz: ≤ 100 ms When frequency range before and after change does not include 3000 MHz: ≤ 80 ms
Phase adjustment • Range • Resolution	 −179.9° to 180.0° 0.1°

<Output level>

Parameter	Specification
Setting range	–140 to +13 dBm When Opt.002/102 (mechanical attenuator) is installed: –140 to +19 dBm
Level setting and display	
• Direct setting	Sets and displays relative value for level.
• Relative value setting	Sets and displays relative value for level. [Current setting value] = [Set input value and display value] + [Setting value when relative value display is selected]
• Current display	Actual output level can be displayed.
• Offset setting	Sets and displays offset value for level. [Output level after offset] = [SG output level] – [Offset level] Offset value range: –50 to +50 dB
• Current display	Actual output level can be displayed.
Unit	
• Power unit	dBm
• Voltage unit	dBμV (terminated voltage display) dBμV (open voltage display)
Resolution	dBm, dBμV unit: 0.01 dB

<Output level (Cont'd)>

<table>
<tr><th>Parameter</th><th>Specification</th></tr>
<tr><td>Accuracy
• Absolute accuracy*</td><td>
In CW mode, at 23°C ±5°C
<table>
<tr><th rowspan="2">Level</th><th colspan="2">Frequency</th></tr>
<tr><th>≥250 kHz,
<25 MHz</th><th>≥25 MHz,
≤3000 MHz</th></tr>
<tr><td>≤+6 dBm
>–1 dBm</td><td></td><td>±0.5 dB</td></tr>
<tr><td>≤–1 dBm
≥–120 dBm</td><td>±0.5 dB typ.</td><td>±0.5 dB</td></tr>
<tr><td><–120 dBm
≥–127 dBm</td><td></td><td>±0.7 dB</td></tr>
<tr><td><–127 dBm
≥–136 dBm</td><td></td><td>±1.5 dB typ.</td></tr>
</table>
<table>
<tr><th rowspan="2">Level</th><th>Frequency</th></tr>
<tr><th>>3000 MHz,
≤6000 MHz</th></tr>
<tr><td>≤+3 dBm
>–1 dBm</td><td>±0.8 dB</td></tr>
<tr><td>≤–1 dBm
≥–120 dBm</td><td>±0.8 dB</td></tr>
<tr><td><–120 dBm
≥–127 dBm</td><td>±2.5 dB typ.</td></tr>
<tr><td><–127 dBm
≥–136 dBm</td><td></td></tr>
</table>
When Opt.002/102 (mechanical attenuator) is installed:
<table>
<tr><th rowspan="2">Level</th><th colspan="2">Frequency</th></tr>
<tr><th>≥250 kHz,
<25 MHz</th><th>≥25 MHz,
≤3000 MHz</th></tr>
<tr><td>≤+10 dBm
≥–100 dBm</td><td>±0.5 dB typ.</td><td>±0.5 dB</td></tr>
<tr><td><–100 dBm
≥–120 dBm</td><td>±0.5 dB typ.</td><td>±0.5 dB</td></tr>
<tr><td><–120 dBm
≥–127 dBm</td><td></td><td>±0.7 dB</td></tr>
<tr><td><–127 dBm
≥–136 dBm</td><td></td><td>±1.5 dB typ.</td></tr>
</table>
<table>
<tr><th rowspan="2">Level</th><th>Frequency</th></tr>
<tr><th>>3000 MHz,
≤6000 MHz</th></tr>
<tr><td>≤+7 dBm
≥–100 dBm</td><td>±0.8 dB</td></tr>
<tr><td><–100 dBm
≥–120 dBm</td><td>±1.0 dB</td></tr>
<tr><td><–120 dBm
≥–127 dBm</td><td>±2.5 dB typ.</td></tr>
<tr><td><–127 dBm
≥–136 dBm</td><td></td></tr>
</table>
</td></tr>
</table>

- Degradation in level accuracy due to temperature changes

250 kHz ≤ f ≤ 3000 MHz
±0.03 dB/°C
3000 MHz < f ≤ 6000 MHz
±0.04 dB/°C
When Opt.002/102 (mechanical attenuator) is installed
250 kHz ≤ f ≤ 3000 MHz
±0.01 dB/°C
3000 MHz < f ≤ 6000 MHz
±0.02 dB/°C

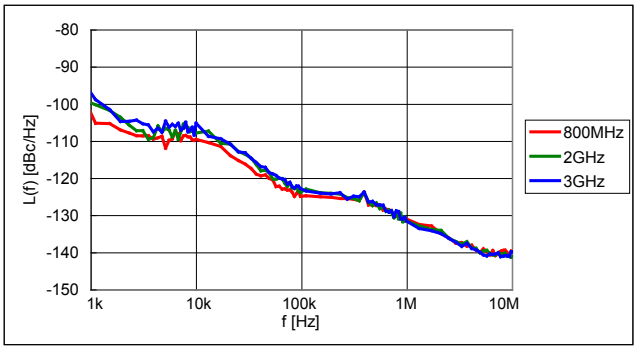
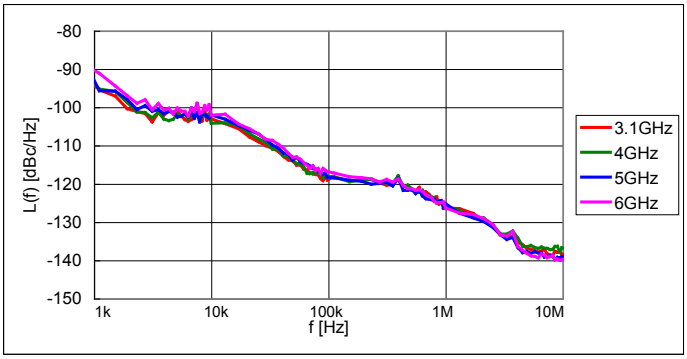
<Output level (Cont'd)>

Parameter	Specification
• Linearity	In CW mode, at 23°C ±5°C, with –11 dBm as reference At –120 dBm to –11 dBm, 25 MHz ≤ f ≤ 3000 MHz: ±0.2 dB typ. At –120 dBm to –11 dBm, 3000 MHz < f ≤ 6000 MHz: ±0.3 dB typ. When Opt.002/102 (mechanical attenuator) is installed In CW mode, with –7 dBm as reference At –120 dBm to –7 dBm, 25 MHz ≤ f ≤ 3000 MHz: ±0.2 dB typ. At –120 dBm to –7 dBm, 3000 MHz < f ≤ 6000 MHz: ±0.3 dB typ.
Switching time	Time until level becomes ±0.1 dB of last level after reception of the last command with GPIB When f <25 MHz: ≤15 ms (Normal mode) ≤10 ms (Continuous mode) When f ≥ 25 MHz: ≤10ms (does not depend on mode) When Opt.002/102 (mechanical attenuator) is installed When f <25 MHz: ≤80ms (Normal mode) ≤10ms (Continuous mode) When f ≥ 25 MHz: ≤80ms (Normal mode) ≤10ms (Continuous mode)

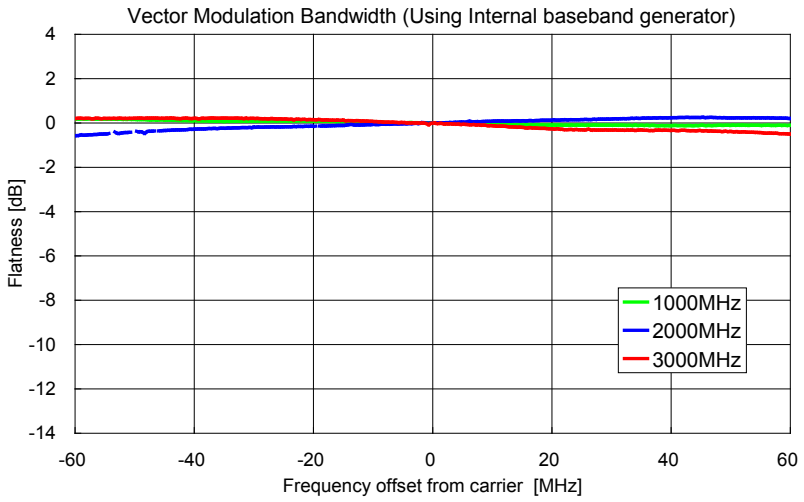
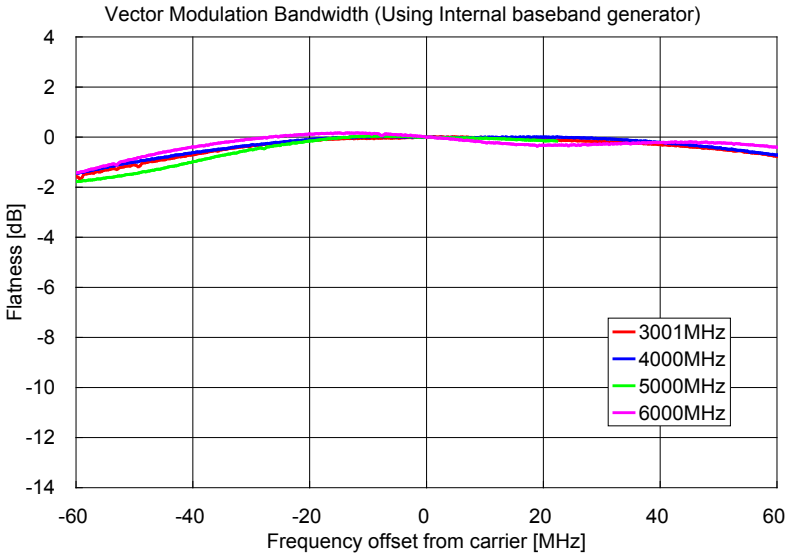
<Output level (Cont'd)>

Parameter	Specification
RF output • Connector • Output impedance • VSWR	 Front panel, RF Output, N-J connector 50 Ω At ≤–11 dBm output: 1.3 (250 kHz ≤ f ≤ 3 GHz) 1.55 (3 GHz < f ≤ 6 GHz) When Opt.002/102 (mechanical attenuator) is installed At ≤–7 dBm output 1.25 (250 kHz ≤ f ≤ 3 GHz) 1.35 (3 GHz < f ≤ 6 GHz)
Maximum reverse input • Reverse input power • Reverse input voltage	 0.25 W (peak) (f < 300 MHz) 1 W (peak) (f ≥ 300 MHz) When Opt.002/102 (mechanical attenuator) is installed 1 W (peak) 0 V
Special setting mode • Continuous mode • External ALC mode • Input sensitivity • Variable range • Input voltage range • Input impedance • Connector	The Continuous mode and external ALC mode are mutually exclusive. The level can be adjusted in the range of +3/–10 dB from the level at the switching to the Continuous mode (reference) in 0.01 dB steps without output interruptions. (The settable upper and lower limit values depend on the setting level range.) The output level is changed according to the DC voltage input from an external device. 3 dB/V +3/–8 dB ±5 V 600 Ω (Nominal value) Rear panel, Ext.ALC, BNC-J connector

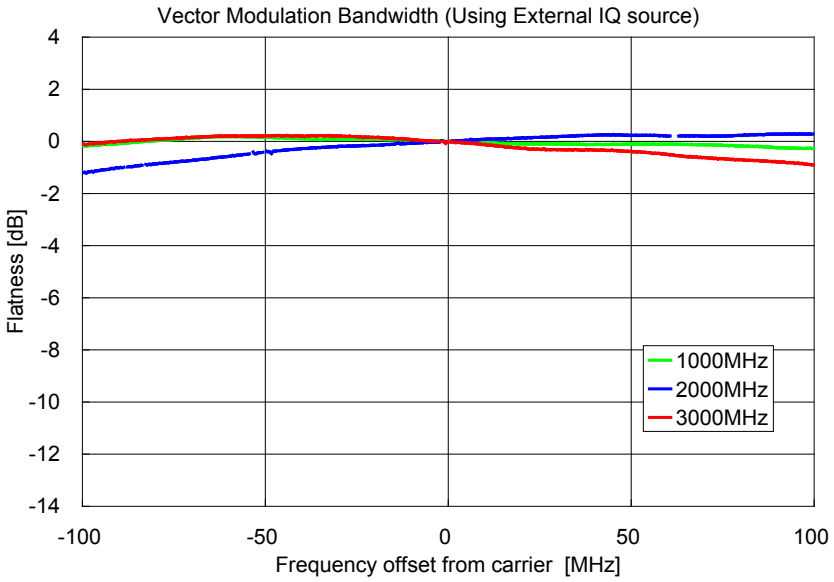
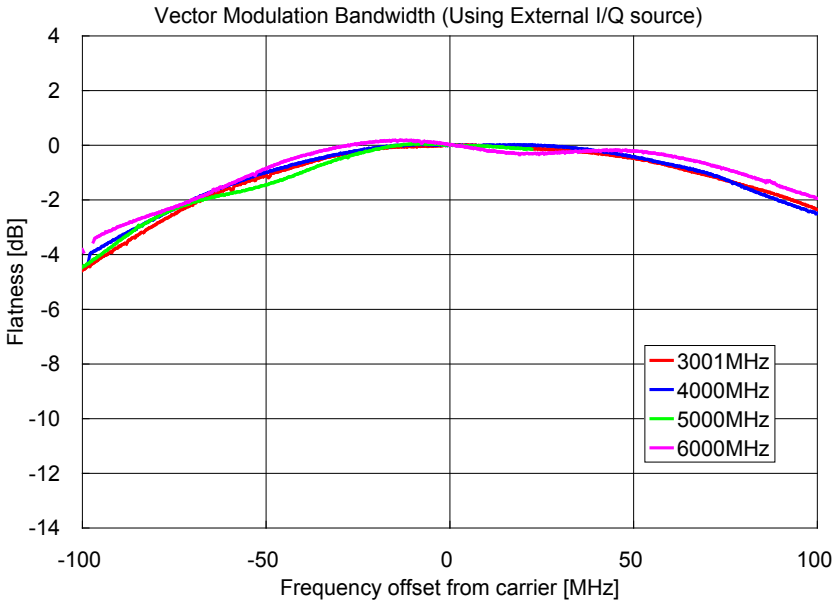
<Signal purity>

Parameter	Specification
Frequency switching speed	Normal: Secures C/N with offset frequency of 50 kHz or higher, and is applicable to general communication use. Fast: Mode for high-speed switching
Spurious • Harmonic • Non-harmonic • Spurious related to power supply	In CW mode, at ≤–1 dBm (when Opt.002/102 (mechanical attenuator) is installed, ≤+3 dBm) At f ≥ 300 MHz (when Opt.002/102 (mechanical attenuator) is installed, f ≥ 250 kHz) <–30 dBc When 25 MHz ≤ f ≤ 3000 MHz is set, at 6000 MHz or lower <–60 dBc However, 2400 MHz cross spurious is excluded. When 3000 MHz < f ≤ 6000 MHz is set, at 6000 MHz or lower <–54 dBc However, 4400 MHz cross spurious is excluded. When 250 kHz ≤ f ≤ 3000 MHz is set <– 50 dBc When 3000 MHz< f ≤ 6000 MHz is set <–44 dBc
SSB phase noise	In CW, Continuous mode: OFF, frequency switching speed: Normal, typical value At 25 MHz ≤ f ≤ 3000 MHz:  At 3000 MHz < f ≤ 6000 MHz: 

<Modulation function>

Parameter	Specification
Vector modulation • Modulation frequency characteristics	Output level: –1 dBm (when Opt.002/102 (mechanical attenuator) is installed, +3 dBm) At sampling rate of 160 MHz and interpolator set to AUTO, typical value At 200 MHz ≤ f ≤ 3 GHz:  At 3 GHz < f ≤ 6 GHz: 

<Modulation function (Cont'd)>

Parameter	Specification
	For external modulation At 200 MHz ≤ f ≤ 3 GHz:  At 3 GHz < f ≤ 6 GHz: 

<Modulation function (Cont'd)>

Parameter	Specification
• Vector accuracy	At 23 ±5°C When W-CDMA (Down link 1code) modulation: Output level: ≤–1 dBm (when Opt.002/102 (mechanical attenuator) is installed, ≤+3 dBm) Output frequency: 800 to 1000 MHz 1800 to 2400 MHz ≤2%(rms), ≤1%(rms) typ. For OFDM equivalent to IEEE802.11a, g: Output level: ≤–4 dBm (when Opt.002/102 (mechanical attenuator) is installed, ≤+0 dBm) Output frequency: 2400 to 2497 MHz 4900 to 5925 MHz ≤1% (rms) For signal equivalent to IEEE802.11b: Output level: ≤–4 dBm (when Opt.002/102 (mechanical attenuator) is installed, ≤+0 dBm) Output frequency: 2400 to 2497 MHz ≤5% (peak)
Level error from CW during vector modulation (ALC HOLD is fixed during vector modulation)	Conditions • When W-CDMA Down link 1-code 1-carrier signal output • In the following level accuracy guaranteed range during modulation 50 MHz ≤ f ≤ 3 GHz: Level ≤ +2 dBm 3 GHz < f ≤ 6 GHz: Level ≤ –1 dBm When Opt.002/102 (mechanical attenuator) is installed 50 MHz ≤ f ≤ 3 GHz: Level ≤ +7 dBm 3 GHz < f ≤ 6 GHz: Level ≤ +4 dBm ±0.2 dB
• Carrier leak	At 23 ±5°C ≤–40 dBc
• Image rejection	At 23 ±5°C, when using complex sine wave of 10 MHz or lower ≤–40 dBc

<Modulation function (Cont'd)>

Parameter	Specification
• ACLR 5 MHz Offset	At 23 ±5°C, When using W-CDMA (Test Model 1 64DPCH of internal waveform) signal At –4 dBm or lower, 800 MHz ≤ f ≤ 1000 MHz, 1800 MHz ≤ f ≤ 2400 MHz –61 dBc/3.84 MHz –63 dBc/3.84MHz typ. When Opt.002/102 (mechanical attenuator) is installed At 0 dBm or lower, 800 MHz ≤ f ≤ 1000 MHz, 1800 MHz ≤ f ≤ 2400 MHz –62 dBc/3.84 MHz –64 dBc/3.84 MHz typ.
• ACLR 10 MHz Offset	At 23 ±5°C, when using W-CDMA (Test Model 1 64DPCH of internal waveform) signal At –1 dBm or lower, 800 MHz ≤ f ≤ 1000 MHz, 1800 MHz ≤ f ≤ 2400 MHz –66 dBc/3.84 MHz typ. When Opt.002/102 (mechanical attenuator) is installed At +3 dBm or lower, 800 MHz ≤ f ≤ 1000 MHz, 1800 MHz ≤ f ≤ 2400 MHz –67 dBc/3.84 MHz typ.
• External modulation	
• Input level	$\sqrt{(I^2 + Q^2)}$ = 0.5 V (rms)
• Maximum input level	–5 V (peak) ≤ I, Q ≤ +5 V (peak)
• Input impedance	50 Ω
• Input connector	Front panel, I/Q Input, BNC-J connector
• Spectrum reversal function	Spectrum reverse is possible by interchanging the I and Q signals during internal modulation. Normal: Normal spectrum output Reverse: Reverse spectrum output
Pulse modulation	
• ON/OFF ratio	>60 dB
• Rising/falling time	<60 ns (10 to 90%)
• Internal modulation	
• Pulse repetition frequency	DC to 1 MHz (at duty = 50%)
• External modulation	
• Input level range	0 to 5 V
• Input level threshold	Approx. 1 V
• Logic	H = signal output/L = signal off
• Input impedance	50 Ω
• Input connector	Rear panel, Ext PM Input, BNC-J connector
• Pulse repetition frequency	DC to 1 MHz (at duty = 50%)

<Arbitrary waveform generation>

Parameter	Specification
Arbitrary waveform generation	The waveform pattern stored on the HDD can be copied to the waveform memory and output.
Waveform resolution	14 bits
LPF	The baseband LPFs have 8 types of cutoff frequencies. They are automatically selected internally, but can also be selected manually. 100 kHz, 300 kHz, 1 MHz, 3 MHz, 10 MHz, 30 MHz, 70 MHz, through
IF level adjustment • Variable range • Resolution	The input level to the quadrature modulator can be adjusted (RMS value). Distortion can be reduced by lowering the level. Floor noise can be improved by raising the level. ±8 dB 0.01 dB
IQ output • Output voltage range • Output voltage magnitude • Magnitude change • Magnitude variable range • Variable step • Accuracy • DC offset adjustment • Common DC offset • Variable range • Resolution • Differential DC offset • Variable range • Resolution • DC offset accuracy • Output connector • Impedance • Connector • Pin assignment	 During output open: Output voltage magnitude + DC offset −3.5 to +3.5 V During output open: I, $\overline{I}$ simultaneous change • Q, $\overline{Q}$ simultaneous change I($\overline{I}$) and Q($\overline{Q}$) change independently. 0 to 120% (when the RMS value for waveform pattern is 1634, 100% = 640 mV (rms)) 0.1% With 1 kHz sine wave, magnitude variable range ≥ 10% ±0.5 dB In open-terminal output voltage −1 to +3 V 10 mV −50 to +50 mV 50 μV ±(5% of absolute value of the set value + 7 mV) 50 Ω Rear panel, I/Q Output (differential), 15-pole D-Sub connector 10: I 13: Q 11: $\overline{I}$ 14: $\overline{Q}$ Others: GND

<Arbitrary waveform generation (Cont'd)>

Parameter	Specification
Marker output	
• Application	During waveform generation, up to three signals, such as a pulse modulation signal (for internal modulation) and frame timing signal, can be output by assigning signals to marker signal bits. The polarity can also be reversed.
• Number of ports	3 ports
• Connector	
• Interface	TTL
• Connector	Rear panel, AUX Input/Output Connectors 1 to 3, BNC-J connector
Baseband Reference clock signal	
• Function	Sampling clock for outputting waveform
• Internal clock signal	
• Range	20 kHz to 160 MHz
• Resolution	0.001 Hz
• External clock input signal	
• Input frequency range	20 kHz to 40 MHz
• Divisional multiplication function	Signals equal to the input frequency multiplied by 1, 2, 4, 8, 16, 1/2, 1/4, 1/8, or 1/16 can be generated internally and used as the sampling clock.
• Input connector	Rear panel, Baseband Reference Clock, BNC-J connector
• Input level	≥0.7 V(p-p) / 50 Ω (AC coupling)
Waveform memory	
• Memory capacity	Two memories: Waveform memory A and waveform memory B 128 Msamples × 2 When Opt.021/121 (ARB memory expansion 512 Msamples option) is installed 256 Msamples × 2
• Number of loadable files	Waveform patterns can be loaded for both waveform memories A and B as 100 packages/waveform memory 100 patterns/package However, the maximum total number of patterns is 4096/waveform memory.
• Minimum number of samples per pattern	1000

<Arbitrary waveform generation (Cont'd)>

Parameter	Specification
• Memory modes	
• Defined mode	Selection of a single waveform pattern to be used in either waveform memory A or B, selection of waveform patterns by a combination file that defines addition of multiple waveform patterns, and the addition level ratio can be set at once in this mode. If a combination file that specifies two or more waveform patterns in waveform memory A is selected, the following sequence operations become enabled. • Selection of pattern switching mode (Auto/Manual) • Selection of pattern switching point (Frame end/Pattern end) • Switching of pattern by an external trigger signal (enabled when the pattern switching mode is Manual) • Restart of sequence • Maximum number of elements: 200 • Minimum number of points per pattern: 1000
• Level ratio setting range	Two-signal level ratio < 80 dB or OFF
• Level setting resolution	0.01 dB
• Frequency offset variable width	±(0.8*Sampling Clock*2^n – Bandwidth) / 2 (n: The maximum integer that satisfies "Sampling Clock*2^n ≤ 80 MHz." It is 0 when the sampling clock is greater than 20 MHz.)
• Frequency setting resolution	1 Hz
	In this mode, two waveform memories can be connected for use as a 256 Msamples long (when Opt.021 is installed, 512 Msamples long) memory.
• Edit mode	One waveform each is selected from waveform memory A and waveform memory B, these two waveforms are added up and then output. Two signal levels, the waveform memory B start offset and frequency offset, can be set.
• Level ratio setting range	Two-signal level ratio < 80 dB or OFF
• Level setting resolution	0.01 dB
• Start offset	The output start position of the first sample of waveform memory B can be changed within the following range. 0 to (waveform memory A sample counts – 1) or 0 to 9,999,999 (whichever has the smallest maximum value)
• Frequency offset variable width	±(0.8*Sampling Clock*2^n – Bandwidth) / 2 (n: The maximum integer that satisfies "Sampling Clock*2^n ≤ 80 MHz." It is 0 when the sampling clock is greater than 20 MHz.)
• Frequency setting resolution	1 Hz

<Arbitrary waveform generation (Cont'd)>

Parameter	Specification
Start/frame trigger	
• Start trigger	Used for starting waveform output.
• Frame trigger	Used to obtain burst timing during burst output. One burst length of data is output at the frame trigger timing, and the next frame trigger is then waited for.
• Input connector	
• Function switching	The connector is used in common for start/frame trigger, through switching.
• Connector	Front panel, Start/Frame Trigger, BNC-J connector
• Input level	TTL
• Logic	The rising or falling polarity can be selected.
Pattern trigger	
• Function	When a waveform pattern for the sequence mode is used, the pattern can be switched upon an external trigger.
• Input connector	
• Connector	Front panel, Pattern Trigger, BNC-J connector
• Input level	TTL
• Logic	The rising or falling polarity can be selected.

<Measurement function>

Parameter	Specification
BER measurement function	BER can be measured for data strings converted to 1s and 0s following demodulation.
• Connector	Rear panel, BER Input, BNC-J connector
• Input level	TTL
• Input signal	Data, Clock, Enable
• Input bit rate	1 kbps to 20 Mbps
• Measurable patterns	PN9, PN11, PN15, PN20, PN23, ALL0, ALL1, repetition of 0/1
• Measurable time	≤359999.0 sec
• Measurable bit count	$\leq 2^{32} - 1$ bits
• Measurement termination condition	Measurement bit count, time
• Auto Resync function	Can be switched between enable/disable.
• Measurement mode	Continuous, Single, Endless
• Display	Status, Error, Sync Loss, Measurement Time, Error Rate, Error Count, Receive Bit Counts
• Polarity reversal function	The Data, Clock, Enable polarities can be reversed.
When Option031/131 (high speed BER test function) is installed	
• Connector	Rear panel, BER Input, BNC-J connector
• Input level	0 to 5 V
• Input threshold level	0.2 to 3.0 V, variable (in 0.05-V steps)
• Input impedance	Can be selected from Hi-Z and 50 Ω.
• Input signal	Data, Clock, Enable
• Input bit rate	100 bps to 120 Mbps
• Measurable patterns	PN9, PN11, PN15, PN20, PN23, ALL0, ALL1, repetition of 0/1, PN9Fix, PN11Fix, PN15Fix, PN20Fix, PN23Fix, UserDefine
• Synchronization establishing condition	PN signal: No error has been detected for (PN stage count × 2) bits PNFix signal: Synchronization with the PN signal is established if no error has been detected for (PN stage count × 2) bits. Next, the cycle and synchronization of the PNFix signal are established if no error has been detected for PN stage count bits begging with the start bit of the PNFix signal. ALL0, ALL1, repetition of 0/1: No error has been detected for 10 bits. UserDefine: No error has been detected for 8 to 1024 bits (variable. The start bit used for synchronization detection can also be selected.
• Re-synchronization judging condition	x/y (Resynchronization is executed if x bits out of y bits are errors.) y (Measurement bit count): Select from 500, 5000, and 50000 bits. x (Error bit count out of y bits): 1 to y/2 bits

<Measurement function (Cont'd)>

Parameter	Specification
• Measurable bit count	$\leq 2^{32} - 1$ bits
• Measurable error bit count	$\leq 2^{31} - 1$ bits
• Measurement termination condition	Measurement bit count, measurement error bit count
• Auto Resync function	Can be switched between enable/disable.
• Count operation at resynchronization	Can be selected from Count Clear and Count Keep.
• Measurement mode	Continuous, Single, Endless
• Display	Status, Error, Sync Loss, Error Rate, Error Count, SyncLoss Count, measurement bit count, OverflowSyncLoss, OverflowDataCount, AbnormalCount
• Polarity reversal function	The Data, Clock, Enable polarities can be reversed.
• Timing adjustment function	–1 to 15 clocks (available for Data and Enable signals only)
• Measured value clear function	It is possible to clear the measured values to 0 with retaining synchronization during BER measurement, and start the measurement again from 0.

<Auxiliary functions>

Parameter	Specification
Memory function • Parameter memory • Memory Target Parameter • Memory capacity • Memory attribute	 All parameters including waveform setting-related information (excluding remote control parameters) 100 sets (but only when there is the required storage capacity in the HDD) The following attribute can be set individually for each memory. • Memory name: Up to 30 one-byte characters and symbols
Backup function • Target items	 Refer to Section 3.10.10 “Backup function.”
Panel lock function • Panel lock • Knob hold	 Disables all key operations except for the front panel’s power switch, the Panel Lock key, and the Local key. Disables the front panel’s rotary knob operation.
Self-diagnosis function • Operation status display • Normal operation status display • Abnormal operation status display • System status display • Usage progress management • Running time • Step attenuator	 In the normal operation status, displays warnings when abnormality occur. The main screen displays occurrences of abnormality, and the details are displayed in the details screen. Operation hints are displayed in the case of items that are likely to be alarms caused by operation mistakes. • Reference Displays the internal/external status • Out-of-guaranteed-range Displayed when the level accuracy guaranteed range has been exceeded. • Frequency Reference unit PLL lock anomaly • Output level ALC Alarm • Digital modulation Baseband Reference Clock Unlock • Remote command error Received remote command error • Temperature abnormality Internal temperature > 70°C • Software version • Hardware version • FPGA version Displays the powered time at power-on. Calculates and displays the number of operations at each step. (Only when Opt.002/102 (mechanical attenuator) is installed)
• Test mode • ROM, RAM check • FPGA config check • Alarm history display	 Performs sum check of the MG3700A main frame’s firmware at activation, and displays warnings when errors occur. Checks for configuration completion of the FPGA at activation. When an alarm has occurred, the alarm status is saved along with the required information. The history of the most recent 100 alarms is saved and this data is retained even if the MG3700A mainframe is powered off and back on again.

<Safety measures>

Parameter	Specification
Forced power-off through temperature monitoring	The internal temperature is monitored and if the temperature rises due to fan failure, the MG3700A mainframe is forcibly powered off.

<Display>

Parameter	Specification
Screen size	8.4 type, 640 × 480 dots, color TFT LCD
ON/OFF setting	The panel display can be turned on and off.
Screen copy	The current display image can be saved as an image to the hard disk or a CF card.
• Image format	Color or gray scale

<Storage>

Parameter	Specification
Type and capacity	HDD: 40 Gbytes or larger
Stored data	Waveform patterns, memory parameters, software, CH table

<External I/O>

Parameter	Specification
GPIB	
• Control target items	All the functions except for the power switch, Local Key and Panel Lock key, can be controlled.
• Interface	SH1, AH1, T6, L4, TE0, SR1, RL1, PP0, DC1, DT1, C0, E2
• Connector	Rear panel, GPIB connector
100BASE-TX Ethernet	
• Function	Waveform pattern transfer and control
• Connector	Rear panel, Ethernet, 8-pole modular jack (Cat.5) The front panel's connector can be used by connecting a U-link cable to the rear panel.
Memory card	
• Function	Waveform patterns, memory parameters, software, channel tables, and other data can be input and output.
• Connector	Front panel, CF card, CF card slot
• Usable media	CompactFlash type memory card (It is recommended to use a supplied CF card(Model P0022).)

<General performance>

Parameter	Specification
Power supply • Rated Voltage • Rated Frequency • Power consumption	 AC 100 to 120 V or 200 to 240 V* 50 to 60 Hz ≤200 VA

*: Operating voltage: within the range of +10% to –15% from the rated voltage (Max. 250 V)

<Environmental performance>

Parameter	Specification
Temperature • Operating temperature • Storage temperature	 5 to 45°C –20 to 60°C
Conducted disturbance	Complying with EN 61326-1: 2006 (Class A)
Radiated disturbance	Complying with EN 61326-1: 2006 (Class A)
Harmonic current emission	Complying with EN 61000-3-2: 2006 +A1:2009 A2:2009 (Class A)
Electrostatic discharge	Complying with EN 61326-1: 2006 (Table 2)
Electromagnetic field immunity	Complying with EN 61326-1: 2006 (Table 2)
Fast transient/burst	Complying with EN 61326-1: 2006 (Table 2)
Surge	Complying with EN 61326-1: 2006 (Table 2)
Conducted RF	Complying with EN 61326-1: 2006 (Table 2)
Power frequency magnetic field	Complying with EN 61326-1: 2006 (Table 2)
Voltage dips/short interruptions	Complying with EN 61326-1: 2006(Table 2)
Vibrations	Complying with MIL-STD-810D

<Dimensions and mass>

Parameter	Specification
Dimensions and mass • Dimensions • Mass	 177 mm × 426 mm × 451 mm (H × W × D) (excluding protrusions) ≤15 kg (excluding options)

Options

<Option001 Rubidium reference oscillator / Option101 Rubidium reference oscillator retrofit>

Parameter	Specification
Model name and product name	MG3700A-001 Rubidium Reference Oscillator MG3700A-101 Rubidium Reference Oscillator Retrofit
Application	Used to generate 10 MHz reference signal to increase frequency stability.

<Option002 Mechanical attenuator / Option102 Mechanical attenuator retrofit>

Parameter	Specification
Model name and product name	MG3700A-002 Mechanical Attenuator MG3700A-102 Mechanical Attenuator Retrofit
Application	Used to change electronic attenuator into mechanical attenuator to improve maximum output level and distortion characteristics.

<Option103 Electronic attenuator retrofit>

Parameter	Specification
Model name and product name	MG3700A-103 Electronic Attenuator Retrofit
Application	Used to change mechanical attenuator into electronic attenuator to improve frequency switching speed and reliability.

<Option011 Upper frequency limit 6 GHz / Option111 Upper frequency limit 6 GHz retrofit>

Parameter	Specification
Model name and product name	MG3700A-011 Upper frequency limit 6 GHz MG3700A-111 Upper frequency limit 6 GHz Retrofit
Application	Used to extend the maximum output frequency from 3 to 6 GHz.

<Option021 ARB memory expansion 512 Msamples / Option121 ARB memory expansion 512 Msamples retrofit>

Parameter	Specification
Model name and product name	MG3700A-021 ARB Memory Expansion 512 Msamples MG3700A-121 ARB Memory Expansion 512 Msamples Retrofit
Application	Used to expand the memory capacity of the ARB unit for arbitrary waveform generation from 128 Msamples × 2 to 256 Msamples × 2.

<Option031 high speed BER test function / Option131 high speed BER test function retrofit>

Parameter	Specification
Model name and product name	MG3700A-031 High Speed BER Test Function MG3700A-131 High Speed BER Test Function Retrofit
Application	Used to add the high speed BER measurement function.

Error Messages

Operational Errors

Message	Description
Out of Range	Out of setting range
This can't be used ***	This function cannot be used due to ***.
because it is Display Frequency Mode	because the Display Frequency Mode is set.
because it is Display Channel Mode	because the Display Channel Mode is set.
because it is Level Unit dBm	because the output level unit is set to dBm.
because it is Not Unleveled	because it is not set to Unleveled.
because it is pattern single mode	because the single pattern output mode is set.
because there is no previous page	because this is the top page.
because there is no next page	because this is the last page.
because package is not selected	because no package is selected.
because waveform file is not selected	because no waveform file is selected.
because there is no pattern data in the waveform memory A(B)	because no pattern data is loaded into the waveform memory A(B).
because it is in Defined Mode	because it is invalid in the Defined mode.
because it is in Edit Mode	because it is invalid in the Edit mode.
because it is in CW Mode	because it is invalid in the CW state.
because it is in External I/Q Mode	because it is invalid in the external I/Q state.
because it is in Sequence Mode	because it is invalid in the Sequence mode.
because it is not in Sequence Mode	because it is valid only in the Sequence mode.
because it is for single pattern	because it is invalid during single pattern selection.
There is no page before this.	This is the first page.
There is no page after this.	This is the last page.
There is no measurement result.	There is no result for BER measurement.

Command Errors

Message	Description
Undefined command	Undefined command
Insufficient data	Number of arguments does not match.
Invalid parameter type	Parameter type does not match.
Invalid separator	Invalid separator code
Invalid numeric data	Invalid numeric value data
Invalid character in number	Invalid character in numeric value data
Invalid unit	Invalid unit character
Invalid parameter	Character string data (reserved word) does not match.
Invalid string format	Invalid STRING format data ("..." or '...')
Invalid block data	Invalid block (Binary) data
String data too long	Character string is too long.
Out of range	Data is out of range.
Program mnemonic too long	Input command length is too long.
Too fewer string	Character string is too short.
Command error	Other error (not described above)

Filing Errors

Message	Description
No memory card	CF card is not inserted.
Bad memory card	CF card is faulty.
No hard disk drive	Hard disk drive is not installed.
Memory card full	CF card is full.
Hard disk drive full	Hard disk is full.
File not found	Cannot find the specified file.
Illegal file name	Illegal filename
Illegal file format	Illegal file format
Illegal file version	Illegal file version
Illegal file operation	Illegal file operation
File read error	File reading failed.
File write error	File writing failed.
Write protected file	Write-protected file
File already exists	The file name is already used.
Invalid file content	Invalid file contents
File creation failed	File creation failed.
File remove failed	File deletion failed.
Directory not found	Cannot find the specified directory.
Directory creation failed	Directory creation failed.
Directory remove failed	Directory deletion failed.
This file is invalid.	Invalid file
There are no Pattern Files into this SG.	Pattern not supported by the SG is included.
Parameter *** had an invalid argument	Set value of *** is invalid.
The software version was not in agreement.	Firmware version does not match.
Failed parameter recall.	Parameter recalling failed.
This file has more than 20 invalid parameters!	This file contains 20 or more invalid values.
Fatal error occurred during processing!	Fatal error occurred during processing.
Failed parameter save.	Parameter saving failed.

Waveform File Errors

Message	Description
Pattern data is not found in wave memory	No pattern data exists in the waveform memory.
Pattern data is not found in HDD	No pattern data exists on the HDD.
Pattern data is not found in CF	No pattern data exists on the CF card.
Pattern information file is not found in HDD	No pattern information file exists on the HDD.
Pattern information file is not found in CF	No pattern information file exists on the CF card.
Wrong pattern information file	Pattern information file is broken.
Pattern information parameter error	Invalid parameter in the pattern information file
Pattern invalid version	Invalid pattern data version
Wrong pattern license	Invalid pattern data license
There is no waveform file which can be loaded	No waveform file that can be loaded exists.
Combination file is not found in memory	No combination file exists in the waveform memory.
Combination file is not found in HDD	No combination file exists on the HDD.
Wrong pattern information parameter used in the combination file	Invalid parameter in the pattern specified by the combination file
Wrong combination file	Combination file is broken.
Shortage of combination file parameter	Some parameters in the combination file are missing.
Wrong combination file parameter	Invalid parameter in the combination file
Free area of waveform memory is not enough	Free space of waveform memory is not sufficient.
Pattern not long pattern	Specified pattern is not a long pattern.
Pattern size is larger than the waveform memory (A+B)	Specified pattern is larger than the waveform memory (A+B).
Delete pattern in the waveform memory (A) before loading	Delete pattern in the waveform memory (A) before loading.
Delete pattern in the waveform memory (B) before loading	Delete pattern in the waveform memory (B) before loading.
Delete pattern in the waveform memory (A+B) before loading	Delete pattern in the waveform memory (A+B) before loading.
FIR 1/2/4 pattern cannot be used in the waveform memory (B)	FIR 1/2/4 pattern cannot be used in the waveform memory (B).
Invalid waveform memory type	Invalid waveform memory type
Pattern data is currently not being loaded	Pattern data is currently not being loaded.
Pattern data is currently not being optimized	Pattern data is currently not being optimized.
Pattern error	Other error (not described above)

Remote Control Errors

Message	Description
Invalid setting, which cannot use DHCP.	DHCP cannot be used due to invalid settings.
Ethernet interface has no IP configuration.	Cannot find the IP settings.
Ethernet interface could not connect to DHCP Server.	Connection to the DHCP server failed.
Unknown host 0.0.0.0	0.0.0.0 is an unknown host.
Not supported address.	The MG3700A does not support the class of this address.
Reserved address.	Reserved address (= cannot be used)
Difference network.	This address is on a different network.
Invalid mask.	Invalid mask value
This mask is not supported net mask.	The mask value is lower than the set class.
Please setup IP address first.	IP address is not yet set.
Network error	Other error (not described above)

Frequency Main Function Errors

Message	Description
Invalid status (Display is in Frequency)	Invalid because Display is set to Frequency.
Invalid status (Display is in Channel)	Invalid because Display is set to Channel.
Invalid status (No Group)	Invalid because no group is registered.
Invalid status (Group not found)	Invalid because the specified group does not exist.
Invalid status (Group name already exists)	Invalid because the group name is already used.
Invalid status (Start Ch. > End Ch.)	Invalid because the set value of End Channel is larger than that of Start Channel.
Frequency function error	Other error (not described above)

Level Main Function Errors

Message	Description
Invalid status (Relative is in OFF state)	Invalid because Relative is set to OFF.
Level function error	Other error (not described above)

Modulation Main Function Errors

Message	Description
Invalid status (Pattern Addition)	Invalid because the Pattern Addition condition does not match.
Invalid status (Output)	Invalid because the Output condition does not match.
Invalid status (Pattern Select)	Invalid because the Pattern Select condition does not match.
Invalid status (Pattern Select A)	Invalid because the Pattern Select A condition does not match.
Invalid status (Pattern Select B)	Invalid because the Pattern Select B condition does not match.
Invalid status (Freq Offset)	Invalid because the Freq Offset condition does not match.
Invalid status (Sampling Clock)	Invalid because the Sampling Clock condition does not match.
Invalid status (Sampling Clock <= Bandwidth)	Invalid because Sampling Clock ≤ Bandwidth.
Invalid status (WM Pattern Count)	Invalid because no pattern is loaded into the waveform memory.
Invalid status (BB Reference Clock Source)	Invalid because the Baseband Reference Clock Source condition does not match.
Invalid status (Combination file)	Invalid because the Combination File condition does not match.
Invalid status (File select)	Invalid because no waveform file is selected.
Invalid status (Edit Mode)	Invalid because it is in the Edit mode.
Invalid status (Sequence stop)	Invalid because the sequence is stopped.
Invalid status (CW Mode)	Invalid because it is in the CW state.
Invalid status (External I/Q Mode)	Invalid because it is in the external I/Q state.
It is sequence file	Invalid since it is a waveform file for the Sequence mode.
It is not sequence file	Invalid since it is not a waveform file for the Sequence mode.
Invalid status (Start/Frame Trigger)	Invalid because the Start/Frame Trigger condition does not match.
Invalid status	Invalid because other condition does not match.
Baseband function Error	Other error (not described above)

Utility Main Function Errors

Message	Description
All parameter memory full	The parameter memory is full.
All parameter memory not found	The specified parameter memory does not exist.
All parameter memory invalid version	The parameter memory version is invalid.
Download failure	Downloading failed.
No target units	The target unit does not exist.
Invalid status (DHCP is in ON state)	Invalid because DHCP is in the ON state.
Invalid status (DHCP is in OFF state)	Invalid because DHCP is in the OFF state.
Invalid status (Now getting IP configuration)	Invalid because the IP address is currently being set.
Invalid status (BER test running)	Invalid because a BER measurement is in progress.
Invalid status (License key does not exist)	Invalid because the license key does not exist.
Invalid status (License key registered full)	Invalid because the number of registered license keys has reached the maximum.
Install failed (Data size)	Invalid because the data size does not match.
Install failed (Check sum)	Invalid because the checksum does not match.
Install failed (update)	An error occurred during updating.
Utility function error	Other error (not described above)
Bit pattern is too short.	The user defined pattern is not read because its length is shorter than 8 bits.
Bit pattern is too long.	The user defined pattern is not read because its length is longer than 1024 bits.
Illegal character exist.	The user defined pattern is not read because it contains a character other than “0”, “1”, or a line feed character.

Installation Errors

Message	Description
Failed IPL install.	IPL installation failed.
Failed firmware install.	Firmware installation failed.
Check sum is wrong.	Invalid checksum
License key registration has reached the maximum.	The number of license keys has reached the maximum.
License key is not registered.	The license key is not registered.

Internal Error

Message	Description
Internal Error Happened!	An internal error occurred.

Hardware Errors (Alarm Display)

Message	Description
Internal Ref CLK Unlock	The internal reference clock is unlocked.
ALC Alarm	ALC circuit is faulty.
BB Ref CLK Unlock	The baseband reference clock is unlocked.

Option Errors

Message	Description
An option isn't carried.(Rubidium Reference)	The rubidium reference oscillator is not installed.
An option isn't carried.(Mechanical ATT)	The mechanical attenuator is not installed.
An option isn't carried.(6GHz Frequency)	The Upper limit frequency 6 GHz option is not installed.
An option isn't carried.(ARB Memory)	The ARB Memory Expansion 512Msamples option is not installed.

Messages

Details on Unleveled Display

Message	Description
Level is out of guaranteed range.	The output level exceeds the performance guaranteed range.
RF modulation is Internal and Pattern not select.	Internal modulation is set to On, but no waveform pattern is selected.
It is output simultaneously by I/Q Output and RF Output.	Internal modulation wave is output simultaneously from both RF Output and I/Q Output.

Display during Execution

Message	Description
It is accessing a memory card. Don't remove a memory card.	The CF card is being accessed. Do not remove the CF card from the card slot.
Pattern file is copying from the memory card. Don't remove a memory card.	Copying the pattern file from the CF card. Do not remove the CF card from the card slot.
Now Loading ...	Loading.
Now Optimizing ...	Executing optimization.
Checking Waveform Memory ...	Checking the memory.
Deleting Package ...	Deleting package.
Finding Package List ...	Finding package list.
Now getting IP configuration ...	Acquiring the IP settings.
Now executing ping ...	Executing the ping command.
Checking version information ...	Checking the version information.
Checking check sum ...	Checking the checksum.
Updating firmware ...	Updating the firmware.
Updating IPL ...	Updating the IPL.
Preparing parameter recall ...	Preparing parameter recall.
Checking parameter file ...	Checking the parameter file.
Checking load pattern ...	Checking the waveform pattern.
Recall save parameter ...	Recalling the parameter file.
Saving parameter ...	Saving the parameters.

Completion Message

Message	Description
Released IP address.	IP address released.
Completed parameter recall.	Parameter recall completed.
Completed parameter save.	Parameter saving completed.
Save SG***.bmp	The screen copy is saved with the name "SG***.bmp"
Completed IPL install. Restart automatically after 5 seconds.	IPL installation completed. The MG3700A automatically restarts after 5 seconds.
Completed firmware install. Restart automatically after 5 seconds.	Firmware installation completed. The MG3700A automatically restarts after 5 seconds.

Confirmation Messages

Message	Description
All parameter are initialize OK?	All parameters are to be initialized. Are you sure?
The long pattern data can't be used in pattern single mode. Delete long pattern data. OK?	The long pattern data cannot be used in the single pattern output mode. Are you sure to delete the long pattern data?
Pattern size too large. Delete all loaded pattern and load *** OK?	The pattern size is too large. Are you sure to delete all patterns loaded into the memory to load *** (pattern name)?
Changed Ethernet interface. Please restart.	The Ethernet interface has been changed. Restart the MG3700A.

Report

Message	Description
Waveform File Load Cancel!	Waveform file loading is canceled.
Waveform File Copy Cancel!	Waveform file copying is canceled.
Delete Package Cancel!	Package deletion is canceled.
Optimize Check Cancel!	Optimization check is canceled.
Restart automatically after 5 seconds.	The MG3700A automatically restarts after 5 seconds.
It recommends installing again strongly!!!	Perform installation again.
Stop IPL install.	IPL installation is interrupted.
Stop firmware install.	Firmware installation is interrupted.
Completed parameter recall. But, this file has following invalid parameters!	Parameter recalling completed. However, this file contains invalid values.
Option setting : Different BER configuration.	The parameters related to BER measurement are initialized because the current Option031/131 configuration differs from that when the parameter file was created.
Center Frequency Shifted	The frequency is automatically shifted.
Mismatched Sampling Clock Sampling clock for Memory B will be changed to sampling clock for Memory A. Signal for memory B is irregular bandwidth.	The sampling clock specified by the pattern in Memory A does not match that specified by the pattern in Memory B. The sampling clock for Memory B will be changed to that specified by the pattern in Memory A, and patterns in Memory B will therefore be output in an irregular bandwidth.

Appendix C Initial Value List

<Frequency Functions>

Frequency	1 GHz
Cursor display digits	0.01 Hz (least significant digit)
Frequency step	100 kHz
Frequency/Channel display	Frequency
RF spectrum	Normal
Frequency switching speed	Normal
RF output phase	0°

<Output Level Main Function>

Output level	–140.00 dBm
Display unit	dBm
Cursor display digit	0.01 dB (least significant digit)
Output level step	1 dB
Offset On/Off	Off
Offset level	0 dB
Relative display On/Off	Off
Continuous On/Off	Off
Voltage unit EMF/Term	EMF
External ALC On/Off	Off
RF output On/Off	On

<Modulation Main Function>

Mod On/Off	Off
Pattern combination	Defined
Output pattern	(Not selected)
I/Q Source Int/Ext	Int
I/Q Output On/Off	Off
Ext I/O Setup	
Start/Frame Trigger	
On/Off	Off
Mode	Start (at Trigger On)
Delay	0 (at Trigger On)
Edge	Rise (at Trigger On)
Pattern Trigger	
On/Off	Off
Edge	Rise (at Trigger On)
Marker1 to 3	Positive
Pulse Mod Source	Internal
I/Q Tuning	
I (Q) Level Trimming	100%
I (Q) Common Offset	0 V
I (Q) Differential Offset	0 mV
Sequence Progress	
Play Mode	Auto
Switching Point	Pattern End

<Save/Read Function>

Saving/reading media	CF Card

<BER Measurement Functions>

Auto Resync	On
Measurement termination condition	Data
Measurement mode	Continuous
Measurement time	1 sec.
Measurement bit count	1000 bits
Data type	PN9
Data polarity Pos/Neg	Pos
Clock polarity Rise/Fall	Rise
Enable polarity High/Low	Low (Open)
Log saving media	CF Card

<BER Measurement Functions (when Option031/131 is installed)>

Data type	PN9
Measurement termination condition	Data
Measurement mode	Continuous
Measurement bit count	1000 bits
Measurement error bit count	1 bit
Auto Resync	On
Threshold	200/500
at SyncLoss	Count Clear
PN Pattern Initial	ALL1
PN_Fix_Pattern_Length	96 bits
User defined pattern	ALL0
Start bit of the part for judging the synchronization establishment	1 bit
Length of the part for judging the synchronization establishment	32 bits
User defined pattern loading source media	CF Card
Input impedance	Hi-Z
Data polarity Pos/Neg	Pos
Data threshold level	2.0 V
Data delay	0 clocks
Clock polarity Rise/Fall	Rise
Clock threshold level	2.0 V
Enable polarity High/Low/Disable	Disable
Enable threshold level	2.0 V
Enable delay	0 clocks
Log saving media	CF Card

<Network Settings>

Interface Setup	
GPIB address	3
Terminator	LF
Ethernet port No.	49153
Network Setup	
Host name	"MG3700A"+Serial No.
Domain name	(Blank)
DHCP On/Off	On
DNS Server (DHCP Use)	On
UserID	MG3700
Password	password
Ping IP Address	0.0.0.0

<Other Functions>

Panel lock On/Off	Off
Knob hold On/Off	Off
Screen display On/Off	On
Alarm saving media	CF Card
Screen copy saving media	CF Card
Bitmap setting	Color
Buzzer On/Off	On
License key reading source media	CF Card
Firmware reading source media	CF Card
Attenuator operation count warning On/Off*	On

*: This setting is not initialized after initialization. The setting is retained after preset, preset power on, or firmware installation has been performed.

Performance Test Report Form

Test Location _____ Report No. _____

_____ Date _____

_____ Test person in charge _____

Equipment Name MG3700A Vector Signal Generator

Serial No. _____ Ambient Temperature _____ ºC

Power Frequency _____ Relative Humidity _____ %

Remarks:

_____

_____

_____

_____

Output Frequency (Section 5.2.1)

Setting	Result	
0.25 MHz	☐ OK	☐ NG
100 MHz	☐ OK	☐ NG
300 MHz	☐ OK	☐ NG
600 MHz	☐ OK	☐ NG
1000 MHz	☐ OK	☐ NG
1500 MHz	☐ OK	☐ NG
2000 MHz	☐ OK	☐ NG
2500 MHz	☐ OK	☐ NG
3000 MHz	☐ OK	☐ NG
3000.001 MHz	☐ OK	☐ NG
3500 MHz	☐ OK	☐ NG
4000 MHz	☐ OK	☐ NG
4500 MHz	☐ OK	☐ NG
5000 MHz	☐ OK	☐ NG
5500 MHz	☐ OK	☐ NG
6000 MHz	☐ OK	☐ NG

* 3000.001 MHz to 6000 MHz are available only when the Upper frequency limit 6 GHz option is installed.

Output Level Frequency Characteristics (Section 5.3.1)

Setting		Minimum Rating	Result	Maximum Rating	Measurement Uncertainty
Frequency	Output Level				
25 MHz	–11 dBm	–11.5 dBm		–10.5 dBm	±0.23 dB
100 MHz	(–7 dBm)	(–7.5 dBm)		(–6.5 dBm)	(±0.18 dB)
500 MHz					
1000 MHz					
1500 MHz					
2000 MHz					
2500 MHz					
3000 MHz					
3000.001 MHz	–11 dBm	–11.8 dBm		–10.2 dBm	±0.3 dB
3500 MHz	(–7 dBm)	(–7.8 dBm)		(–6.2 dBm)	(±0.23 dB)
4000 MHz					
4500 MHz					
5000 MHz					
5500 MHz					
6000 MHz					

* 3000.001 MHz to 6000 MHz are available only when the Upper frequency limit 6 GHz option is installed.

* Values in parentheses indicate the values when the Mechanical attenuator option is installed.

Vector Accuracy (Section 5.4.1)

Setting		Maximum Rating	Result	Measurement Uncertainty
Frequency	Output Level			
800 MHz 1000 MHz 1800 MHz 2000 MHz 2200 MHz 2400 MHz	–1 dBm (+3 dBm)	W-CDMA 1code 2% (rms)		±0.0%
4900 MHz 5400 MHz 5925 MHz	–4 dBm (0 dBm)	802.11a 1% (rms)		±0.0%
2400 MHz 2497 MHz	–4 dBm (0 dBm)	802.11g 1% (rms)		±0.0%
2400 MHz 2497 MHz	–4 dBm (0 dBm)	802.11b 5% (peak)		±0.0%

* 4900 MHz to 5925 MHz are available only when the Upper limit frequency 6 GHz option is installed.

* Values in parentheses of Output Level column indicate the values when the mechanical attenuator is installed.

References are to page numbers.

Symbol and Numbers

A

B

C

D

E

F

G

H

I

L

M

N

O

P

R

S

T

U

V

W