

**MP1763C**  
**Pulse Pattern Generator**  
**Operation Manual**  
**(Function/Operation)**

**Ninth Edition**

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

**ANRITSU CORPORATION**

# 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.

MP1763C  
Pulse Pattern Generator  
Operation Manual (Function/Operation)

1 April 2001 (First Edition)  
15 September 2006 (Ninth Edition)

Copyright © 2001-2006, ANRITSU CORPORATION.

All rights reserved. No part of this manual may be reproduced without the prior written permission of the publisher.

The contents of this manual may be changed without prior notice.

Printed in Japan

# For Safety

## WARNING



1. ALWAYS refer to the operation manual when working near locations at which the alert mark shown on the left is attached. If the 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.

2. IEC 61010 Standard

The IEC 61010 standard specifies four categories to ensure that an instrument is used only at locations where it is safe to make measurements. This instrument is designed for measurement category I (CAT I). DO NOT use this instrument at locations specified as category II, III, or IV as defined below.

Measurement category I (CAT I):

Secondary circuits of a device that is not directly connected to a power outlet.

Measurement category II (CAT II):

Primary circuits of a device that is directly connected to a power outlet, e.g., portable tools or home appliance.

Measurement category III (CAT III):

Primary circuits of a device (fixed equipment) to which power is supplied directly from the distribution panel, and circuits running from the distribution panel to power outlet.

Measurement category IV (CAT IV):

Building service-line entrance circuits, and circuits running from the service-line entrance to the meter or primary circuit breaker (distribution panel).



3. To ensure that the instrument 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.

# For Safety

## WARNING

### Repair

WARNING 

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

### Calibration



5. 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. If the performance-guarantee seal is broken by you or a third party, the performance of the equipment cannot be guaranteed.

### Falling Over

6. 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.

### Battery Fluid

7. 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.

# For Safety

## CAUTION

### Fuse Replacement

CAUTION 

1. Always remove the mains power cable from the power outlet before replacing blown fuses. There is a risk of electric shock if fuses are replaced with the power cable connected. Always use new fuses of the type and rating specified on the rear panel of the instrument. There is a risk of fire if a fuse of a different rating is used.

T6.3A indicates a time-lag fuse.

### Cleaning

2. Keep the power supply and cooling fan free of dust.
  - Clean the power inlet regularly. If dust accumulates around the power pins, there is a risk of fire.
  - Keep the cooling fan clean so that the ventilation holes are not obstructed. If the ventilation is obstructed, the cabinet may overheat and catch fire.
3. Use two or more people to lift and move this equipment, or use a trolley. There is a risk of back injury, if this equipment is lifted by one person.

 CAUTION/注意

>18kg

HEAVY WEIGHT/重量物

# 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 pulse tester while it is being accessed.
- The memory card may be damaged by static electric charges.
- The back-up battery in SRAM memory cards has a finite life. Replace the battery periodically. For details, refer to the explanation on the memory card later in this manual.

### **Floppy Disk**

Do not place in a dusty area.

Clean the magnetic head periodically to ensure normal operation.

Refer to the section on cleaning the head later in this manual.

## **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, under the condition that this warranty is void when:

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

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

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

## **Anritsu Corporation Contact**

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.

## Lifetime of Parts

---

The life span of certain parts used in this instrument is determined by the operating time or the power-on time. Due consideration should be given to the life spans of these parts when performing continuous operation over an extended period. These parts must be replaced at the customer's expense even if within the guaranteed period described in Warranty at the beginning of this manual. For details on life span, refer to the corresponding section in this manual.

## FOR CALIFORNIA USA ONLY

---

This product contains a CR Coin Lithium Battery which contains Perchlorate Material – special handling may apply; See [www.dtsc.ca.gov/hazardouswaste/perchlorate](http://www.dtsc.ca.gov/hazardouswaste/perchlorate)

## 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.

# 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: MP1763C Pulse Pattern Generator

### 2. Applied Directive

EMC: Council Directive 89/336/EEC

LVD: Council Directive 73/23/EEC

### 3. Applied Standards

- EMC:Emission: EN 61326: 1997 + A1: 1998 + A2: 2001 + A3: 2003 (Class A)

Immunity: EN 61326: 1997 + A1: 1998 + A2: 2001 + A3: 2003 (Annex A)

	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 61000-4-11 (V dip/short)	B

\*: 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.

Harmonic current emissions:

EN 61000-3-2: 2000 (Class A equipment)

- LVD: EN 61010-1: 2001 (Pollution Degree 2)

# C-tick Conformity Marking

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

## C-tick marking



### 1. Product Model

Model: MP1763C Pulse Pattern Generator

### 2. Applied Standards

EMC: Emission: EN 61326: 1997 + A1: 1998 + A2: 2001 + A3: 2003  
(ISM, Group 1, Class A equipment)

# Power Line Fuse Protection

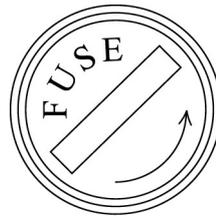
For safety, Anritsu products have either one or two fuses in the AC power lines as requested by the customer when ordering.

**Single fuse:** A fuse is inserted in one of the AC power lines.

**Double fuse:** A fuse is inserted in each of the AC power lines.

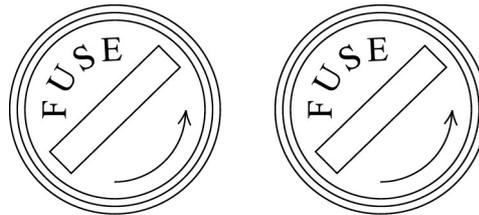
Example 1: An example of the single fuse is shown below:

**Fuse Holder**



Example 2: An example of the double fuse is shown below:

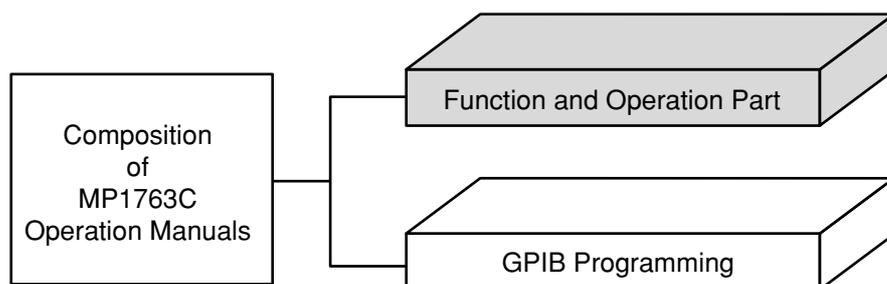
**Fuse Holders**



## Composition of MP1763C Operation Manuals

The MP1763C Pulse Pattern Generator operation manuals are composed of the following two documents.

Use them properly according to the usage purpose.



**Function and Operation Part:** These outline the MP1763C, and describes the preparations before use, the panels, specifications, performances, functions, and operation procedures.

**GPIB Programming:** The MP1763C GPIB conforms to IEEE488.2. Remote control by GPIB is explained based on IEEE488.2. An application program example using the HP9000 series HP-BASIC and Quick Basic of Microsoft Corporation are also provided.

## Title of Contents

<b>For Safety</b> .....	<b>iii</b>
<b>SECTION 1 GENERAL</b> .....	<b>1-1</b>
1.1 Features .....	1-1
1.2 Specifications .....	1-2
1.3 Composition .....	1-8
<b>SECTION 2 PREPARATIONS</b> .....	<b>2-1</b>
2.1 Environmental Conditions of Installation Site .....	2-1
2.2 Safety Measures .....	2-1
2.3 Power Connection .....	2-2
2.3.1 Power Requirements .....	2-2
2.3.2 Connecting the Power Cord .....	2-2
2.4 Damage Prevention Measures .....	2-3
<b>SECTION 3 DESCRIPTION OF PANELS AND CONNECTORS</b> .....	<b>3-1</b>
3.1 FRONT PANEL .....	3-2
3.2 REAR PANEL .....	3-4
<b>SECTION 4 OPERATING INSTRUCTIONS</b> .....	<b>4-1</b>
4.1 Internal Clock Generator Frequency Setting (OPTION 01) .....	4-1
4.2 Generation Pattern Setting .....	4-3
4.2.1 Logic modification .....	4-4
4.2.2 Alternate pattern setting .....	4-4
4.2.3 DATA pattern setting .....	4-6
4.2.4 ZERO SUBSTITUTION .....	4-7
4.2.5 Pseudo random pattern setting .....	4-8
4.2.6 ERROR addition .....	4-9
4.2.7 Tracking .....	4-10
4.2.8 Pattern SYNC. position .....	4-11
4.3 Output Interface .....	4-13
4.3.1 DUMMY terminal voltage switching .....	4-14
4.3.2 Amplitude, offset, and delay setting .....	4-15
4.3.3 Duty adjustment .....	4-17
4.3.4 Cross point adjustment .....	4-17
4.3.5 Offset voltage setting range .....	4-18
4.4 MEMORY (Floppy Disk) .....	4-22

4.4.1	File save .....	4-23
4.4.2	File recall .....	4-24
4.4.3	Disk formatting .....	4-24
4.4.4	File deletion .....	4-25
4.4.5	Error messages .....	4-25
4.4.6	Floppy disk .....	4-26
4.4.7	Floppy disk precautions .....	4-26
4.5	Parameters initialization .....	4-27
4.6	Functions of the FUNCTION Switch .....	4-28
<b>SECTION 5</b>	<b>PRINCIPLES OF OPERATION .....</b>	<b>5-1</b>
5.1	Pseudorandom Pattern (PRBS Pattern) .....	5-1
5.2	Pattern Synchronized Output Period .....	5-3
5.2.1	Pseudorandom pattern .....	5-3
5.2.2	Programmable pattern .....	5-3
5.3	Bit shift for Alternate A/B select timing .....	5-4
<b>SECTION 6</b>	<b>PERFORMANCE TEST .....</b>	<b>6-1</b>
6.1	Test Equipment .....	6-1
6.2	Error Measurement .....	6-1
6.3	Test Method .....	6-2
6.4	Waveform Check .....	6-3
6.5	Check Items .....	6-3
<b>SECTION 7</b>	<b>MAINTENANCE .....</b>	<b>7-1</b>
7.1	Daily Maintenance .....	7-1
7.2	Storage Precautions .....	7-1
7.3	Transportation .....	7-1
7.4	Calibration .....	7-2
7.5	Disposal .....	7-2
<b>SECTION 8</b>	<b>TROUBLESHOOTING AND REPAIR .....</b>	<b>8-1</b>
8.1	Before Considering Trouble .....	8-1
8.2	Fuse Replacement .....	8-2
<b>APPENDIX A</b>	<b>PERFORMANCE TEST REPORT SHEET .....</b>	<b>A-1</b>
<b>INDEX</b>	<b>.....</b>	<b>Index-1</b>



# SECTION 1

## GENERAL

### 1.1 Features

The MP1763C Pulse Pattern Generator has two data output channels (DATA and  $\overline{\text{DATA}}$ ) and three clock output channels (CLOCK1,  $\overline{\text{CLOCK1}}$ , CLOCK2). The MP1763C is used with the MP1764A/C Error Detector to test high-speed digital communication systems and high-speed semiconductors. It operates over the 50 MHz to 12.5 GHz frequency range and generates four pulse patterns: alternate, programmable, zero substitution, and pseudorandom. Programmable DATA pattern can generate data up to 8 M bits and send six STM-64 (OC192) frames.

There are also seven  $2^N-1$  (N=7, 9, 11, 15, 20, 23, 31) pseudorandom patterns. The pseudorandom pattern mark ratio can be selected from among 0/8, 1/8, 1/4, 1/2,  $\overline{1/2}$ , 3/4,  $\overline{7/8}$ , and 8/8. Both 50  $\Omega$  GND and ECL outputs are supported. The offset and level can be varied. The clock (CLOCK1,  $\overline{\text{CLOCK1}}$ ) delay can also be adjusted by  $\pm 500$ ps in 1ps steps.

Section 1 GENERAL

1.2 Specifications

Operation frequency range	Internal Clock (OPTION 01)		0.05 to 12.5 GHz																								
	External Clock		0.05 to 12.5 GHz																								
Pattern generation	PRBS	Pattern length	$2^N - 1$ (N=7,9,11,15,20,23,31)																								
		Mark ratio	1/2,1/4,1/8,0/8 (1/2,3/4,7/8,8/8 also possible by logic inversion)																								
		Number of "AND bit" shifts when setting mark ratio	1 bit or 3 bits (Selectable using rear panel DIP switch)																								
	Zero substitution		Continuous 0 pattern can be inserted up to pattern length -1. Patterns: $2^7$ , $2^9$ , $2^{11}$ , $2^{15}$																								
	DATA	DATA length	2 to 8388608 bits 2 to 65536 : Step 1 bit 65536 to 131072 : Step 2 bits 131072 to 262144 : Step 4 bits 262144 to 524288 : Step 8 bits 524288 to 1048576 : Step 16 bits 1048576 to 2097152 : Step 32 bits 2097152 to 4194304 : Step 64 bits 4194304 to 8388608 : Step 128 bits																								
		Edit function	All 0 / All 1 / Page 0 / Page 1																								
	Alternate pattern		Number of patterns A and B to be output can be specified. Patterns A and B must be the same length.																								
		Output control	Internal/external switchable																								
		A/B switching	A/B each 1 to 127 times/step 1																								
		DATA length	128 to 4194304 bits/step 128 bits																								
Edit function		All 0 / All 1 / page 0 / page 1																									
Logic inversion	Positive / Negative switching possible [PRBS] <table style="width: 100%; text-align: center;"> <tr> <td colspan="2">Positive</td> <td colspan="2">Negative</td> </tr> <tr> <td>H</td> <td>“ 0 ”</td> <td>H</td> <td>“ 1 ”</td> </tr> <tr> <td>L</td> <td>“ 1 ”</td> <td>L</td> <td>“ 0 ”</td> </tr> </table> [PRGM] <table style="width: 100%; text-align: center;"> <tr> <td colspan="2">Positive</td> <td colspan="2">Negative</td> </tr> <tr> <td>H</td> <td>“ 1 ”</td> <td>H</td> <td>“ 0 ”</td> </tr> <tr> <td>L</td> <td>“ 0 ”</td> <td>L</td> <td>“ 1 ”</td> </tr> </table>			Positive		Negative		H	“ 0 ”	H	“ 1 ”	L	“ 1 ”	L	“ 0 ”	Positive		Negative		H	“ 1 ”	H	“ 0 ”	L	“ 0 ”	L	“ 1 ”
Positive		Negative																									
H	“ 0 ”	H	“ 1 ”																								
L	“ 1 ”	L	“ 0 ”																								
Positive		Negative																									
H	“ 1 ”	H	“ 0 ”																								
L	“ 0 ”	L	“ 1 ”																								

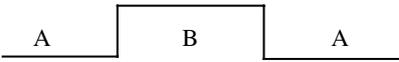
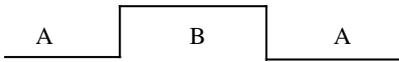
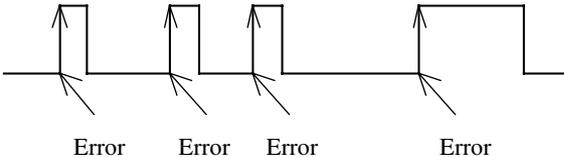
## 1.2 Specifications

Pattern generation	Error insertion	Internal	Error ratio	$1 \times 10^{-n}$ or single (n = 4, 5, 6, 7, 8, 9)	
			Insertion position	Insertion possible at any one of 32 channels (Rear panel switch)	
		External	Error injection	Error insertion by rising edge of external signal input	
			Insertion position	Insertion possible at any one of 32 channels (Rear panel switch)	
			DISABLE function	Error insertion when external signal input level is "H"	
			Error ratio	$1 \times 10^{-n}$ or single (n = 4, 5, 6, 7, 8, 9)	
		Insertion position	Insertion possible at any one of 32 channels (Rear panel switch)		
	Gating input	DATA is set to "0" while external signal input level is "L".			
External Clock Input	Frequency range	0.05 to 12.5 GHz			
	Input level	0.4 to 2.5 Vp-p			
	Input waveform	0.05 to 0.5 GHz : Square wave only > 0.5 GHz: Sine wave or square wave (duty 50 %)			
	Input impedance	50 $\Omega$			
	Connector	SMA			
Clock output	Number of outputs		CLOCK1/CLOCK $\bar{1}$ , CLOCK2 3 systems		
	CLOCK1 / CLOCK $\bar{1}$	Delay range		$\pm 500$ ps/1 ps step	
		Amplitude		0.25 to 2.0 Vp-p/Step 2 mV Setting error: $\pm 15\%$ (1.5 to 2.0 Vp-p), $\pm 25\%$ (0.5 to 1.5 Vp-p), $\pm 100$ mV(0.25 to 0.5 Vp-p)	
		Offset		-2.0 to 2.0 V (VOH) /Step 1 mV Setting error: $\pm 15\%$ or $\pm 15\%$ of Amplitude, and $\pm 100$ mV, whichever is larger	
		Rise/fall times (10%–90%)		$\geq 8$ GHz 1.5 to 2 Vp-p 35 ps or less $< 8$ GHz 1.5 to 2 Vp-p 50 ps or less $\geq 8$ GHz 1.0 to 1.5 Vp-p 40 ps or less $< 8$ GHz 1.0 to 1.5 Vp-p 55 ps or less $\geq 8$ GHz 0.25 to 1.0 Vp-p 45 ps or less $< 8$ GHz 0.25 to 1.0 Vp-p 60 ps or less	
		Waveform distortion		15 % or less or 150 mV, whichever is larger	
		Duty ratio adjust function		Duty ratio can be adjusted by semifixed variable resistor	
		Load impedance		50 $\Omega$ (with back termination)	
		Termination		50 $\Omega$ /GND, 50 $\Omega$ /–2 V	
		Connector		APC-3.5	
		CLOCK2	Output level		VOH : 0 $\pm$ 200 mV Amplitude: 1 Vp-p $\pm 35\%$
	Load impedance		50 $\Omega$ (without back termination)		
	Connector		SMA		

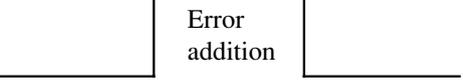
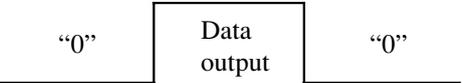
Section 1 GENERAL

DATA output	Output waveform	NRZ
	Number of outputs	DATA, $\overline{\text{DATA}}$ 2 systems independence
	Amplitude	0.25 to 2.0 Vp-p/Step 2 mV Setting error: $\pm 15\%$ or $\pm 100$ mV, whichever is larger
	Offset voltage	-2.0 to 2.0 V (VOH) /Step 1 mV Setting error: $\pm 15\%$ or $\pm 15\%$ of Amplitude, and $\pm 100$ mV, whichever is larger
	DATA/ $\overline{\text{DATA}}$ Tracking	Amplitude and offset of DATA and $\overline{\text{DATA}}$ can be set to the same value.
	Rise / fall time	$\geq 5$ GHz, amplitude 1 to 2 Vp-p 35 ps or less (10-90 %) $\geq 5$ GHz, amplitude 0.5 to 1 Vp-p 40 ps or less (10-90 %) $\geq 5$ GHz, amplitude 0.25 to 0.5 Vp-p 45 ps or less (10-90 %) < 5 GHz 45 ps or less (10-90 %)
	Pattern jitter	20 ps or less (p-p)
	Waveform distortion	15 % or less, or 150 mV or less, whichever is larger. (0-peak)
	Termination	50 $\Omega$ /GND, 50 $\Omega$ /-2 V
	Load impedance	50 $\Omega$ (with back termination)
	Connector	APC-3.5
Output phase	<p style="text-align: right;"> <math> t1  \leq 30</math> ps  <math> t2  \leq 30</math> ps  <math> t3  \leq 30</math> ps  <math> t4  \leq 30</math> ps         </p> <p>CLOCK1/<math>\overline{\text{CLOCK1}}</math> delay set to 0 ps</p>	

## 1.2 Specifications

1/8 output	Number of output	8 data outputs, 1 clock output
	Data polarity	Same as 1/1 DATA
	Output level	ECL (H: $-0.9 \pm 0.25$ V, L: $-1.75 \pm 0.25$ V)
	Rise / fall time	300 ps or less (20-80 %)
	Pattern jitter	100 ps or less (p-p)
	Waveform distortion	15 % or less
	Skew	150 ps or less (relative to falling edge of 1/8 clock)
	Output bit rate	1/8 of fundamental frequency
	Load impedance	50 $\Omega$
	Connector	SMA
Sync. output		Switching of 1/64 CLOCK, Fixed position pattern sync, and Variable position pattern sync.
	Output level	$V_{OH}$ : $0 \pm 200$ mV      Amplitude: $1 V_{p-p} \pm 20$ %
	Load impedance	50 $\Omega$
	Connector	SMA
Alternate pattern A/B switching input		ALTN patterns A/B switching controlled by external signal 
	Minimum pulse width	$\frac{1}{\text{Fundamental frequency}} \times \text{Data length}$
	Input level	ECL (H: $-0.9 \pm 0.2$ V, L: $-1.75 \pm 0.2$ V)
	Input impedance	50 $\Omega$
	Connector	SMA
Alternate pattern A/B switching output		ALTN patterns A/B switching signal output 
	Output level	ECL (H: $-0.9 \pm 0.2$ V, L: $-1.75 \pm 0.2$ V)
	Output impedance	50 $\Omega$
	Connector	SMA
Error injection input		Error inserted at rising edge by external signal 
	Minimum pulse width	$\frac{1}{\text{Fundamental frequency}} \times 128$
	Input level	0/-1 V
	Input impedance	50 $\Omega$
	Connector	SMA

## Section 1 GENERAL

Error Disable input		Error ON/OFF controlled by external input signal  Error rate can be selected over this range
	Input level	0/-1 V
	Input impedance	50 Ω
	Connector	SMA
External Gating input		Output data control by external signal 
	Minimum pulse width	$\frac{1}{\text{Fundamental frequency}} \times 128$
	Input level	0/-1 V
	Input impedance	50 Ω
	Connector	SMA
Parameter memory	Medium	3.5 inch FD, 2HD, 2DD by 3 mode support
	Format	MS-DOS format (IBM-PC/NEC-PC selectable by rear panel DIP switch)
	Stored data	Programmable pattern/others
	Mode switching	Format, save, recall, resave, delete, search
Display	Display switching	VOH, VTH, VOL switchable
	Panel lock	Disables all keys other than power switch.
External control	GPIB interface for one system	
GPIB	GPIB connector for external control	
Initialization	Inirialized by Local + Power on	
Operating temperature range	0 to 50 °C	
Insulation resistance	2 MΩ or more at 500 V	
Dielectric strength	1.5 kV, for 1 minute	
Power requirement	100 V system: 85 to 132 V                      200 V system: 170 to 264 V Frequency 47.5 to 63 Hz 400 VA or less	
Dimensions & weight	221.5H×426W×451D, 33 kg or less	

## 1.2 Specifications

Option-01	Name	Internal synthesizer
	Frequency range	0.05 to 12.5 GHz
	Output level	0.5 to 2.3 V <sub>p-p</sub>
	Resolution	1 kHz/1 MHz (switchable)
	Frequency accuracy	1ppm (* When synchronized with external signal, accuracy is determined by external signal.)
	Reference signal	10 MHz (internal/external switchable)
	Signal purity	SSB phase noise (10 kHz offset, bandwidth 1 Hz)  <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">0.05</div> <div style="text-align: center;">≤ Freq. &lt; 2.0 GHz</div> <div style="text-align: right;">-90 dBc</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">2.0</div> <div style="text-align: center;">≤ Freq. &lt; 4.0 GHz</div> <div style="text-align: right;">-85 dBc</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">4.0</div> <div style="text-align: center;">≤ Freq. &lt; 8.0 GHz</div> <div style="text-align: right;">-80 dBc</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">8.0</div> <div style="text-align: center;">≤ Freq. &lt;10.0 GHz</div> <div style="text-align: right;">-75 dBc</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">10.0</div> <div style="text-align: center;">≤ Freq. ≤12.5 GHz</div> <div style="text-align: right;">-70 dBc</div> </div>
	Spurious radiation	At Internal synthesizer output terminal Nonharmonic -60 dBc or less (off carrier 10 kHz or more) Power supply -40 dBc or less
	Load impedance	50 Ω
	Connector	SMA
Option-03 *	Name	1/4 SPEED OUTPUT
	Number of output	4 data outputs, 1 clock output
	Output bit rate	1/4 of fundamental frequency
	Data polarity	Same as 1/1 DATA
	Termination	50 Ω/GND, 50 Ω/-2 V
	Amplitude	0.5 to 2.0 V <sub>p-p</sub> /Step 2 mV Setting error: ±15% or ±100 mV, whichever is larger
	Offset voltage	-1.5 to +1.5 V (V <sub>OH</sub> )/Step 1 mV Setting error: ±15 % or ±15 % of Amplitude, and ±100 mV, whichever is larger
	Rise/fall time	150 ps or less (20-80 %)
	Pattern jitter	100 ps or less (p-p)
	Waveform distortion	15 % or less
	Skew	The 1/4 data cross point is within ±100 ps relative to the falling edge of the 1/4 clock.
	Output impedance	50 Ω
Connector	SMA	

\* When OPTION 03 is installed, there is no 1/8 output.

## Section 1 GENERAL

### 1.3 Composition

The standard composition of the MP1763C Pulse Pattern Generator is shown in Table 1.3-1.

**Table 1.3-1 MP1763C Standard Composition**

Item	No.	Name	Qty	Remarks
Main Unit	MP1763C	Pulse Pattern Generator	1	
Options	MP1763C-01	Internal synthesizer	(1)	
	MP1763C-03	1/4 speed output	(1)	
Accessories	J0500A	Semi-rigid cable (50 cm)	2	SMA-P•SX-36•SMA-P
	J0672D	Semi-rigid cable (7 cm)	(1)	Provided when Option-01 is installed.
	J0672F	Semi-rigid cable (10 cm)	1	For terminal connection
	J0496	APC-3.5 J-J connector	4	
	J0693A	Coaxial cable (1 m)	1	HRM202B•Special 3D2W•HRM202B
	J0008	GPIB cable	1	408JE-102 (2 m)
		Shield power cord	1	
	F0014	Fuse	1	T6.3 A
	B0021	Front cover	1	
	Z0168	3.5-inch floppy disk • Formatted (PN23 layer-equivalent pattern is written) • Formatted	1 1	2HD (1.44 MB)
	Z0306A	Wrist strap	1	
	W1848AE	Operation Manual	1	
	W1849AE	GPIB Operation Manual	1	
	Z0481	12.5G/3.2G BERTS application software demo	1	
	Application Parts	MB24B	Caster	(1)
J0500B		Semi-rigid cable (1 m)	(1)	SMA-P•SX-36•SMA-P
J0322A		Coaxial cable (0.5 m)	(1)	11SMA•SUCOFLEX104•SMA
J0322B		Coaxial cable (1 m)	(1)	11SMA•SUCOFLEX104•SMA
J0498		Coaxial cable (0.5 m)	(1)	APC3.5-P•Double-shield coaxial cable•APC3.5-P
J0499		Coaxial cable (1 m)	(1)	APC3.5-P•Double-shield coaxial cable•APC3.5-P
J0007		GPIB connection cable	(1)	
Z0054		3.5-inch floppy disk	(1)	2DD
B0163		Portable quilting	(1)	
B0413A		Protective carrying case	(1)	
Z0292		Synthesizer stacking base	(1)	
Z0044		Rack mount kit 1MW/5U	(1)	2 pcs/set
Z0416	3.5-inch head-cleaning disk	(1)	For head-cleaning of 3.5-inch FDD	
Peripheral Equipment	68347B	Synthesized reference signal generator (10 M to 20 GHz)	(1)	68100A/69100A series 68000A/69000A series

## SECTION 2 PREPARATIONS

### 2.1 Environmental Conditions of Installation Site

Do not use and store the instrument in the following locations:

- where vibrations are severe.
- where it is damp or dusty.
- where there is exposure to direct sunlight.
- where there is exposure to active gases.

Long-term storage at high temperatures will shorten the life of the internal battery. Store the instrument below normal room temperature.

Operating temperature range	0 to 50 °C
Storage temperature range	-20 to 60 °C

### 2.2 Safety Measures

- Use the attached power cord to connect the AC power supply. Ground the ground terminal of the power cord or the frame ground terminal on the rear panel of the instrument.
- When changing the fuse, always use a fuse of the same rating. (See the fuse replacement item.)
- If the instrument is operated at room temperature after being used or stored for a long time at low temperature, condensation may occur and cause short-circuiting. To prevent this, do not turn the power on until the instrument completely dry.

## Section 2 PREPARATIONS

### 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.

Voltage range	Frequency
85 to 132 V	47.5 to 63 Hz
170 to 264 V	47.5 to 63 Hz

Changeover between 100 and 200 V systems is made automatically.

### **CAUTION**

---

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

---

#### 2.3.2 Connecting the Power Cord

Check that the power switch on the front panel is turned off.

Insert the power plug into an outlet, and connect the other end to the power inlet on the rear panel. To ensure that the instrument is earthed, always use the supplied 3-pin power cord, and insert the plug into an outlet with a earth terminal.

### **WARNING**

---

**If the power cord is connected without the instrument earthed, there is a risk of receiving a fatal electric shock. In addition, the peripheral devices connected to the instrument may be damaged.**

**When connecting to the power supply, DO NOT connect to an outlet without a earth terminal. Also, avoid using electrical equipment such as an extension cord or a transformer.**

---

### **CAUTION**

---

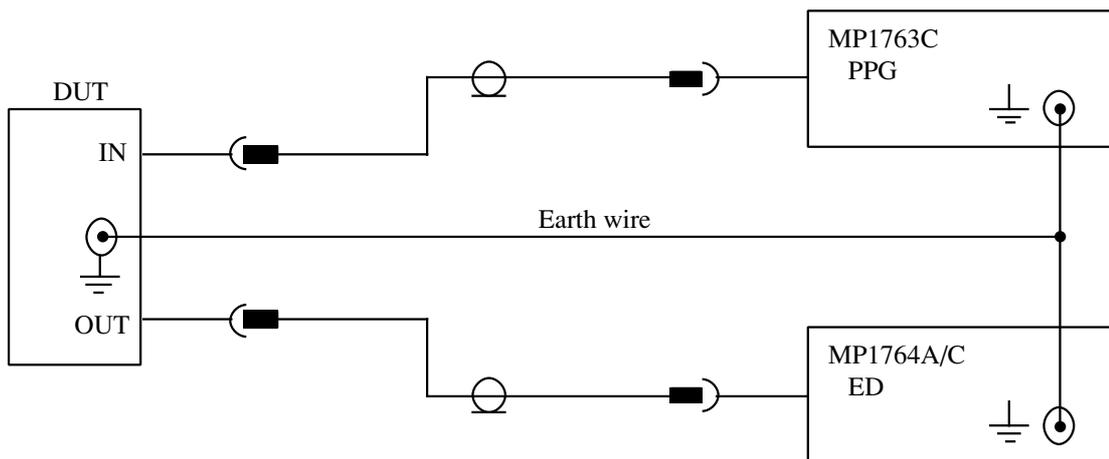
**If an emergency arises causing the instrument to fail or malfunction, disconnect the instrument from the power supply by either turning off the power switch on the front panel or by pulling out the power cord or the power inlet. When installing the instrument, place the instrument so that an operator may easily operate the main switch.**

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

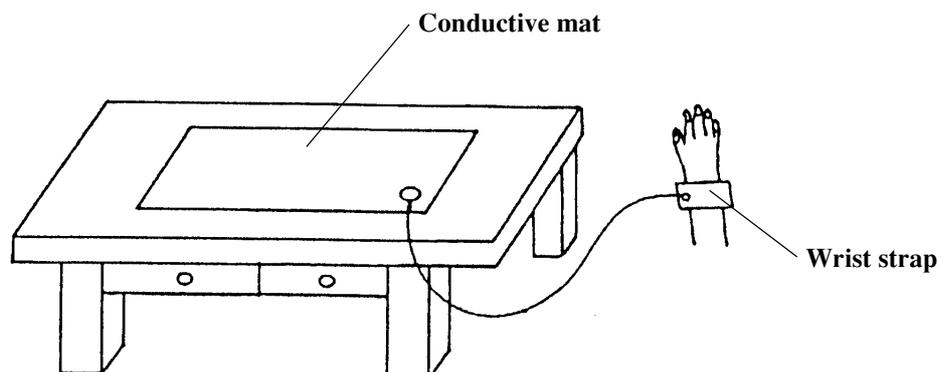
---

## 2.4 Damage Prevention Measures

- Do not apply an excessive voltage when inputting the signal to this instrument. The circuits may be destroyed.
- Terminate the output with  $50\ \Omega$ . Do not feed current to the output. The load must be a  $50\ \Omega$  pure resistor terminated at ground potential.
- Before connecting the input and output terminals, ground the other equipment (including test circuits) with a ground wire. (Static electric countermeasure)
- The outer and inner conductors of the coaxial cable may be charged as a capacitor. Therefore, discharge them with a piece of metal before using the cable.
- This instrument contains hybrid ICs and other important circuits and parts. These parts are extremely vulnerable to static electricity. Therefore, never remove the bottom cover.
- The hybrid ICs inside this instrument are hermetically sealed. Never break this seal. If the hybrid ICs are unsealed and the instrument deteriorates performance as specified, note that the maintenance may be refused.
- Ventilation holes are drilled into the bottom cover. Be careful not to block the ventilation.



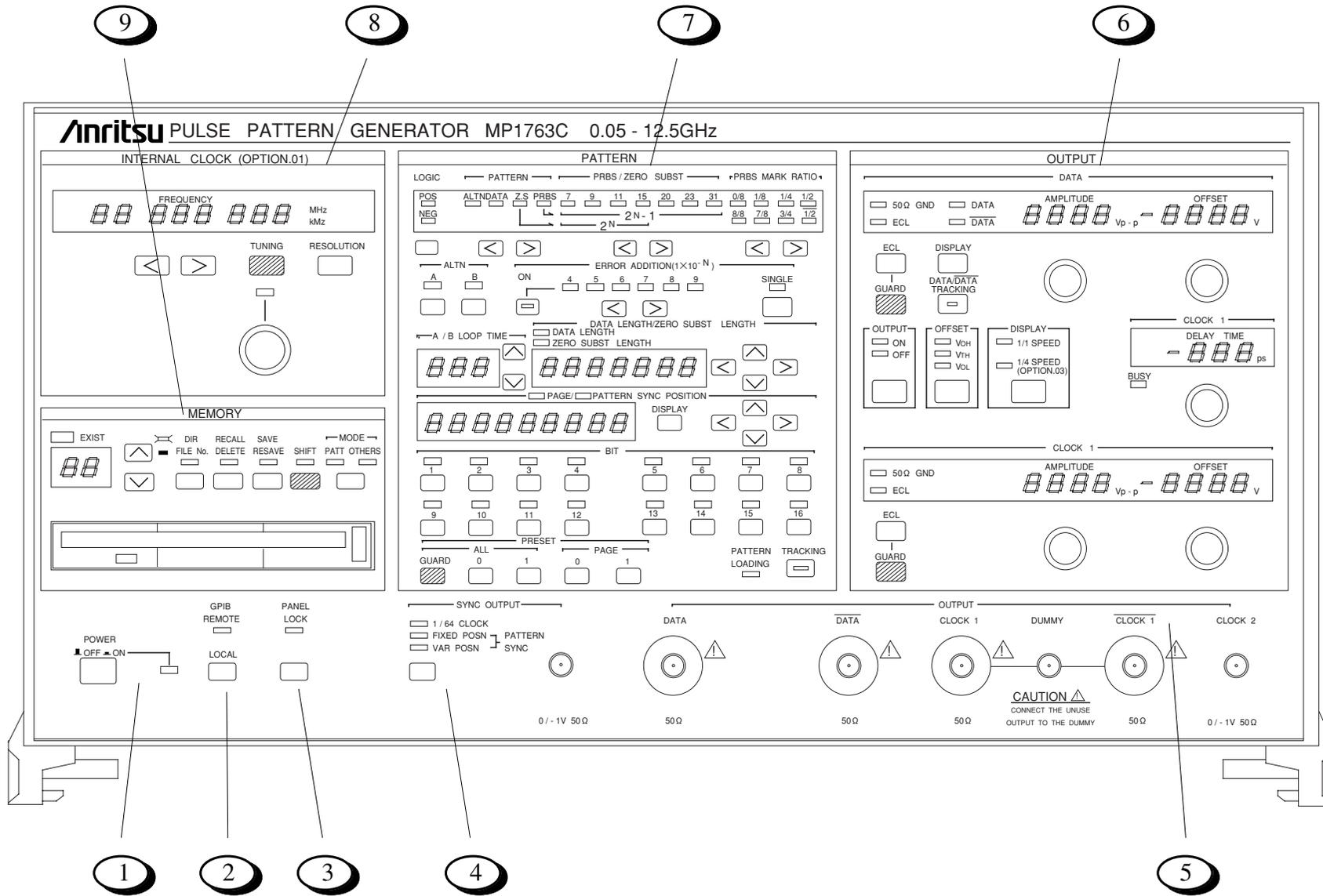
- To protect this instrument against electrostatic damage, place a conductive mat on the work bench, and wear a wrist strap. Connect the other end of the wrist strap to the conductive mat, or the GND terminal of this instrument.



## Section 2 PREPARATIONS

**SECTION 3**  
**DESCRIPTION OF PANELS AND CONNECTORS**

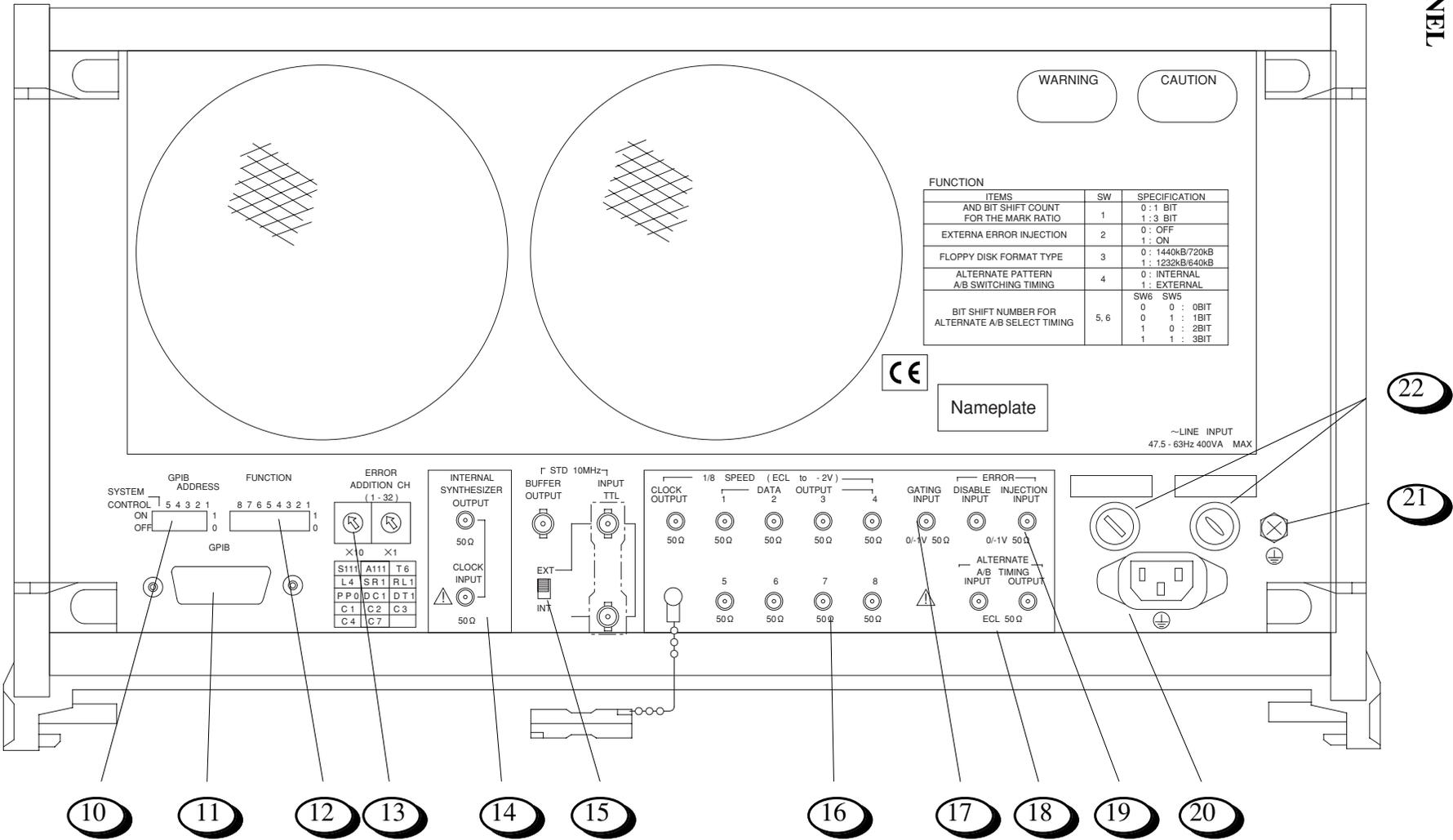
Section 3 DESCRIPTION OF PANELS AND CONNECTORS  
3.1 FRONT PANEL



- 1 Power switch  
 When  , the power is turned on and the LED goes on.  
 When  , the power is turned off.
- 2 LOCAL key  
 Switches from the GPIB REMOTE mode (LED lit) to the LOCAL (key operation possible) mode.  
 In GPIB REMOTE mode, all the keys other than the power switch and LOCAL key are ineffective.
- 3 PANEL LOCK key  
 Panel lock (LED lit) disables all the keys other than the POWER switch and the PANEL LOCK key.
- 4 SYNC OUTPUT keys  
 Select the type of SYNC OUTPUT.  
 1/64 CLOCK: Outputs a CLOCK divided by 64.  
 FIXED POSITION: Outputs a synchronization pulse at a fixed position to the output pattern.  
 VARIABLE POSITION: Shifts the synchronization pulse output position in 16 bits unit.
- 5 Output connectors  
 DATA,  $\overline{\text{DATA}}$  Output.  
 CLOCK1,  $\overline{\text{CLOCK1}}$  Complementary CLOCK output.  
 CLOCK2 Auxiliary clock output.  
 DUMMY Connects the unused side of the complementary output.  
 Note: If the unused side of the complementary output is opened, the output waveform on the side used will be degraded.
- 6 OUTPUT condition block  
 Sets the output level, offset and termination conditions.
- 7 PATTERN setting block  
 Sets the generated pattern type, logic, etc.  
 Performs error addition.
- 8 Frequency setting block  
 Sets the frequency when OPTION 01 installed.
- 9 Floppy disk drive  
 Saves the set pattern and other conditions to a floppy disk.

Section 3 DESCRIPTION OF PANELS AND CONNECTORS

3.2 REAR PANEL



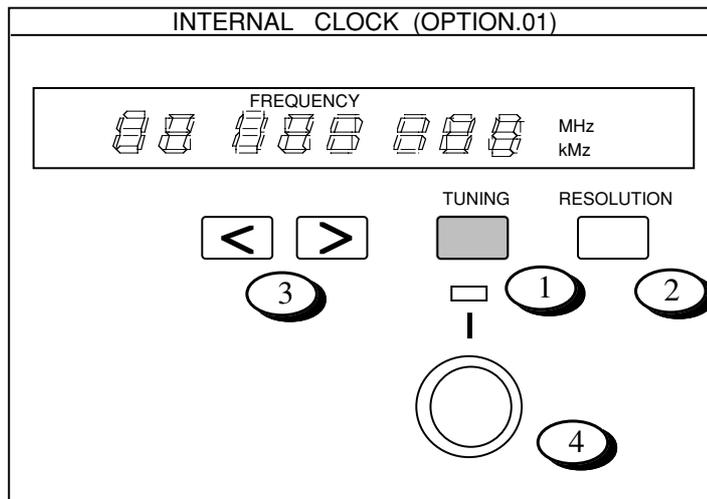
- 10 GPIB address Dip switch SYSTEM CONTROL switch Sets the address when the instrument is remotely controlled by GPIB. It is usually set to  $\begin{matrix} 5 & 4 & 3 & 2 & 1 \\ \square & \square & \square & \square & \square \end{matrix}$ . When this switch is set to 'ON', this instrument control other one.
- 11 GPIB connector Connector for GPIB cable. (The cable is connected when the instrument is remotely controlled by GPIB.)
- 12 FUNCTION Dip switch It is possible to select functions noted rear panel.
- 13 Error ADDITION CH Selects which of the 32 channels an error is to be added.
- 14 INTERNAL SYNTHESIZER OUTPUT  
CLOCK INPUT Internal CLOCK output connector when OPTION 01 installed.  
Clock signal input connector. (When the internal synthesizer is used, this connector is connected to the INT. SYNTH. OUTPUT connector.)
- 15 STD 10 MHz When OPTION 01 (internal synthesizer) is used, synthesizes the other signals and the internal synthesizer.  
10 MHz TTL level
- 16 1/8 SPEED output connector 1/8 DATA and 1/8 CLOCK output connector (ECL level)  
Note: When OPTION 03 (1/4 SPEED OUTPUT) is installed, this connector becomes the 1/4 DATA, 1/4 CLOCK output connector.
- 17 GATING signal input connector 0/-1 V 50  $\Omega$
- 18 Alternate pattern A/B switching Timing I-O connector ECL level 50  $\Omega$
- 19 Error addition control connector 0/-1 V 50  $\Omega$
- 20 Power inlet
- 21 Functional earth terminal Connected to the earth terminal of an instrument connected to this instrument.
- 22 Fuse holder

### **Section 3 DESCRIPTION OF PANELS AND CONNECTORS**

## SECTION 4 OPERATING INSTRUCTIONS

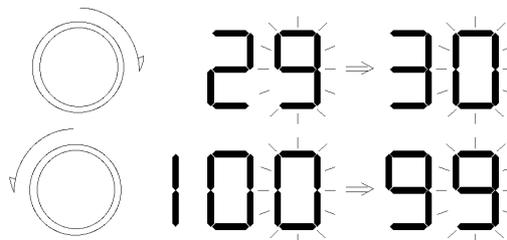
### 4.1 Internal Clock Generator Frequency Setting (OPTION 01)

This section sets the frequency of the internal clock generator when the CLOCK generator (OPTION 01) is used.

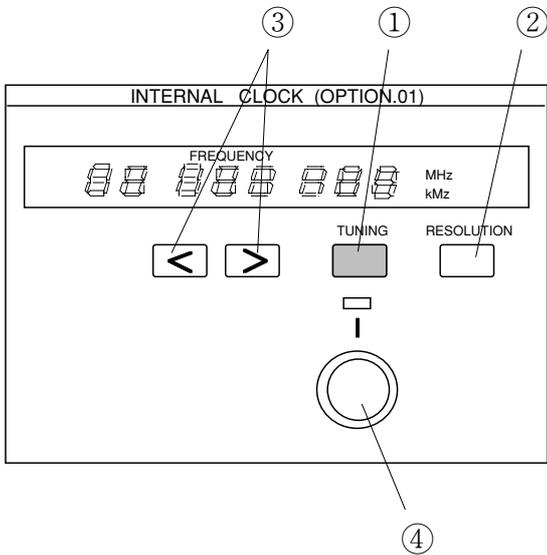


- 1
**TUNING ON/OFF**      The frequency can be changed only when the TUNING LAMP is lit.
- 2
**RESOLUTION**      Used when setting the frequency down to the kHz order. Pressing this key again returns the setting to the MHz order.
- 3
< >
 Select the digit to be changed. The figure of the digit to be changed blinks.
- 4

 Used when changing the blinking digit.  
The figure is carried over.



## Section 4 OPERATING INSTRUCTIONS



- ① Press the TUNING key. The TUNING lamp lights. (The frequency can be changed only when the TUNING lamp is lit.) At this time, the figure of the digit that can currently be changed blinks.
- ② Press the RESOLUTION key and select whether the frequency is to be set in MHz or kHz.  
  
When the frequency can be set down to kHz, an 8-digit number is displayed. (Five digits for MHz.)
- ③ Select the digit to be changed with the   keys. The figure of the digit that can be changed blinks.
- ④ Change the frequency by turning the rotary encoder.

Note: The frequency may not be stable just after the power is turned on. Make a warm-up run for 10 minutes or longer before use.

## CAUTION

---

### Life time of coaxial switches:

This equipment uses built-in coaxial switches, whose average life time is as follows.

Number of switching times: One million times

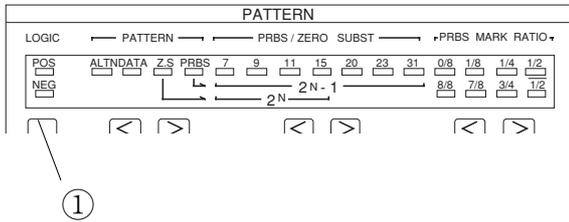
---

## 4.2 Generation Pattern Setting

- |   |                                      |   |
|---|--------------------------------------|---|
| ① | LOGIC                                | Inverts the output pattern logic.   |
| ② | PATTERN                              | Selects the output pattern type.  |
| ③ | PRBS/ZERO SUB                        | Selects the kind of pseudorandom pattern. (If ZERO SUB is selected, the $2^N$ pattern is selected.)   |
| ④ | Mark ratio                           | Selects the output pattern (pseudorandom pattern) mark ratio.   |
| ⑤ | Alternate                            | Selects alternate pattern A or B.   |
| ⑥ | Number of alternate loops            | Sets the number of A or B pattern loops.  |
| ⑦ | DATA length/continuous 0 bits length | Sets the DATA length. For Z.S., sets the continuous 0 bit length.   |
| ⑧ | PAGE/pattern sync position           | Sets the page selection (ALTN/DATA) and pattern synchronization position.   |
| ⑨ | Bit setting                          | Sets the output pattern for each 16 bits.   |
| ⑩ | Bit setting (special)                | Sets all DATA to 0 or 1.  |
| ⑪ | Bit setting (special)                | Sets DATA to 0 or 1 in page units.  |
| ⑫ | Error addition ON/OFF                | Turns error addition on and off.  |
| ⑬ | Error addition rate selection        | Selects the error addition rate.  |
| ⑭ | Single error addition                | In the single error addition mode, one error is added each time this key is pressed.  |
| ⑮ | Tracking ON/OFF                      | When tracking is turned on, the settings of the transmitter and receiver are changed at the same time (the one set as the master is followed by the other). |
| ⑯ | Display switching                    | Selects page display or pattern sync position display.  |

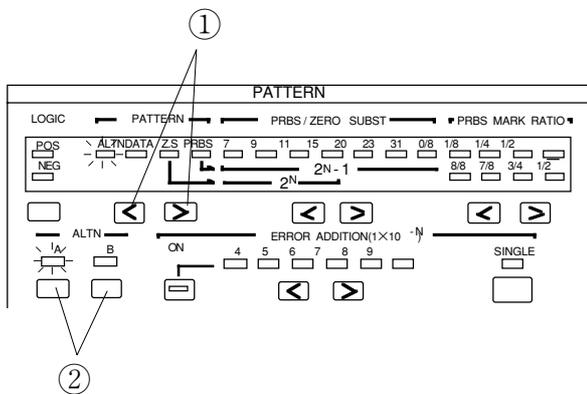
## Section 4 OPERATING INSTRUCTIONS

### 4.2.1 Logic modification



- ① The logic of the set pattern is changed in positive → negative → positive order each time the LOGIC key is pressed. (The set logic is indicated by lighting of a lamp.)

### 4.2.2 Alternate pattern setting



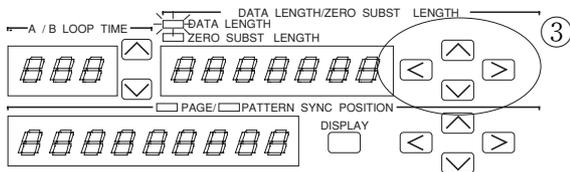
- ① Select ALTN with the keys.

(DATA, Z.S, and PRBS are also selected with these keys.)

ALTN → DATA → Z.S. → PRBS

ALTN ← DATA ← Z.S. ← PRBS

- ② Pattern A and pattern B are selected with this key. Since pattern A is set first, set this key so that the A lamp lights. (It does not matter which pattern is set first.)

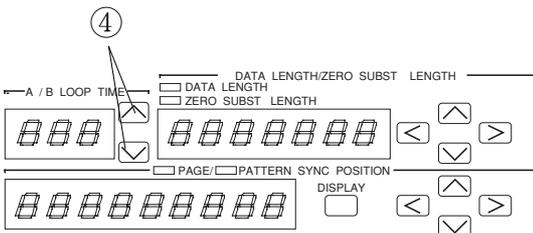


- ③ Set DATA LENGTH with the and keys. This value is common to both patterns A and B.

Select the digit to be set with the keys.

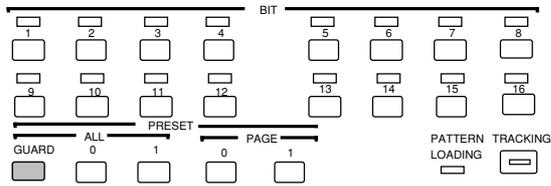
Set DATA LENGTH with the keys.

Set value: 128 to 4,194,304 bits (128-bit steps)



- ④ Set the number of pattern A loops with the keys.

## 4.2 Generation Pattern Setting



Change the BIT value with the button below the LED. When LOGIC is positive, lighting of the LED indicates high level.

Used the PRESET ALL or PAGE key when changing DATA collectively.

PAGE 0 or 1 All BITS of the displayed PAGE are set to 0 or 1.

ALL 0 or 1 Pressing this key while holding down the GUARD key sets all BITS specified by DATA LENGTH to 0 or 1.

Next, set ② in pattern B (turn on the B LED) and set pattern B in the same way as pattern A.

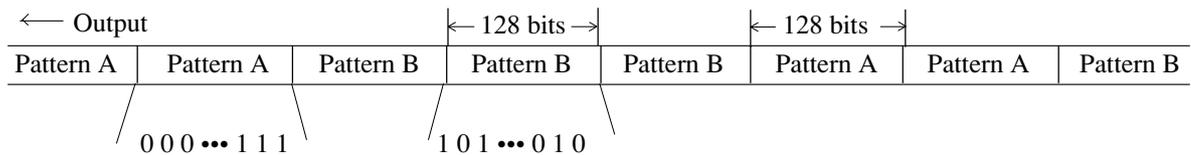
However, do not change DATA LENGTH here because it is shared by A and B. If DATA LENGTH is changed here, DATA LENGTH of pattern A is also changed.

Two patterns, A and B, can be set, and repetition times can be set for each pattern. The data lengths are the same for both patterns.

The following are examples of 128bit patterns:

Pattern A: 0 0 0 ... 1 1 1 Repetition time: 2

Pattern B: 1 0 1 ... 0 1 0 Repetition time: 3



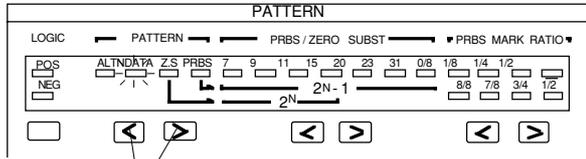
Bit 1 of page is set to the head of the pattern.

Note: The FUNCTION switch on the rear of the instrument can be set to switch between patterns A and B by an external signal. In this case, the A/B LOOP TIME display is turned off and the   keys of ④ are disabled.

In addition, A/B switch-timing bit sift is performed using SW5 and SW6. (See Section 4.6.)

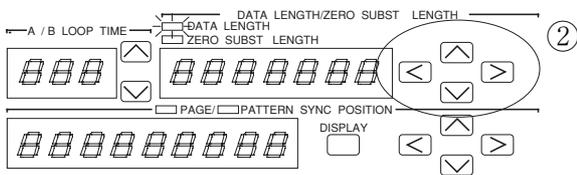
## Section 4 OPERATING INSTRUCTIONS

### 4.2.3 DATA pattern setting



①

① Select DATA with the keys.



②

② Set DATA LENGTH with the and keys.

Select the digit to be set with the keys.

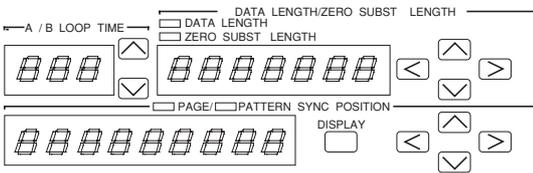
Set DATA LENGTH with the keys.

DATA LENGTH setting steps

2 to 65526: STEP 1 bit

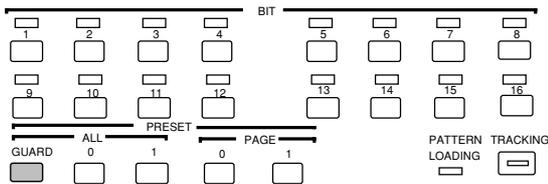
65536 to 131012: STEP 2 bits

See section 1.2, "Functions," for the following.



Set the page that is displayed at the BIT display with the set DATA LENGTH as 16 bits/page. BIT of the displayed page can be changed.

Setting value: 1 to DATA LENGTH/16  
(LENGTH is multiple of 16)  
1 to INT (DATA LENGTH/16)+1  
(LENGTH is not multiple of 16)



Change the BIT value with the button below the LED. When LOGIC is positive, lighting of the LED indicates high level.

Used the PRESET ALL or PAGE key when changing DATA collectively.

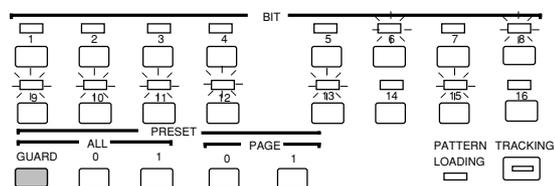
PAGE 0 or 1 All BITs of the displayed PAGE are set to 0 or 1.

ALL 0 or 1 Pressing this key holding down the GUARD key sets all BITs specified by DATA LENGTH to 0 or 1.

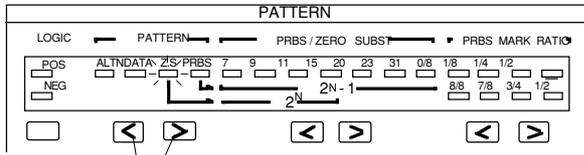
An optional pattern can be output repetitively.

When a 16-bit pattern is set:

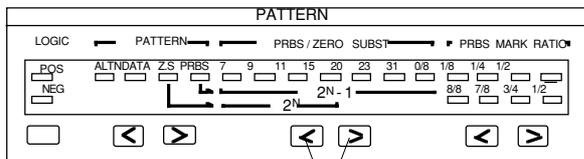
Pattern: 0000010111111010



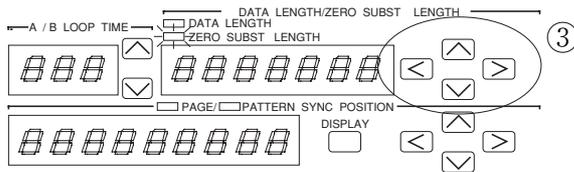
4.2.4 ZERO SUBSTITUTION



① Select Z.S. with the   keys.



② Set the  $2^N$  PATTERN with the   keys. (This PRBS is a pseudo PATTERN with a period of  $2^N$ .)



③ Set the ZERO SUBSTITUTION BIT LENGTH.

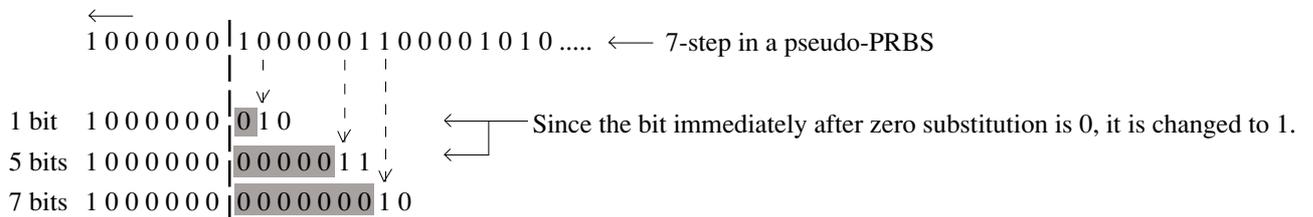
The pattern of bit length logic  $\emptyset$  set here is substituted.  
See below for the substitution method.

Setting: 1 to  $2^N-1$  (N=7, 9, 11 or 15)

A pattern in which one logical bit is added immediately before the longest string of consecutive 1s of a 7, 9, 11, or 15-step in a pseudo-PRBS ( $2^N$  bits: N=7, 9, 11 or 15) is substituted by an all-0s pattern. If the substituted bit is 0, this 0 is changed to 1.

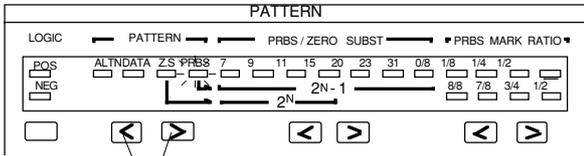
Example) In the case of a 7-step in a pseudo-PRBS

Since the longest string of continuous 0s is  $7 - 1 = 6$ , the zero substitution starts at the next position.

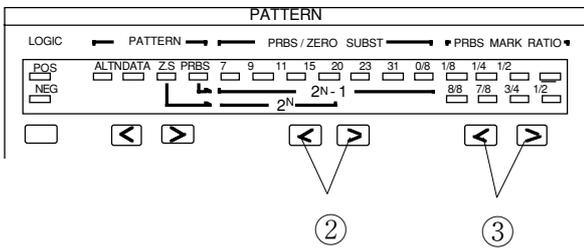


## Section 4 OPERATING INSTRUCTIONS

### 4.2.5 Pseudo random pattern setting



① Select PRBS with the keys.



② Set the number of PRBS steps with the keys.

③ Set the PRBS mark ratio with the keys.

When LOGIC is positive, select the mark ratio from the top row (0/8, 1/8, 1/4, 1/2).

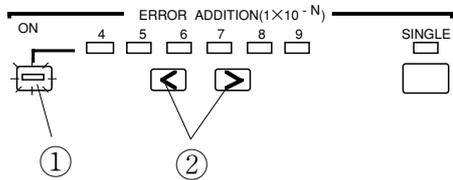
When LOGIC is negative, select the mark ratio from the bottom row (8/8, 7/8, 3/4,  $\overline{1/2}$ ).

If change the logic positive to negative when mark ratio is 1/4, the mark ratio become 3/4.

Patterns generated as explained in Section 5.1 “ Pseudo random patern”. When an optional continuous N-bit pattern is selected in a PRBS pattern having a  $2^N - 1$  cycle, all bit patterns in the same cycle we unique. That is, all other bit arrays except all-1s are provided.

Note: When setting pseudo random pattern, the BIT LEDs light according to the set pattern.

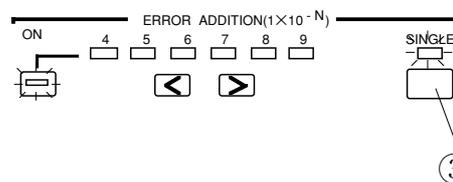
4.2.6 ERROR addition



① Press the key. The LED in the key lights.

② Select the error addition rate with the ◀ ▶ keys.

To add a single error, select the right of the 9 LED using the ▶ key. At this time, the LED does not go on.



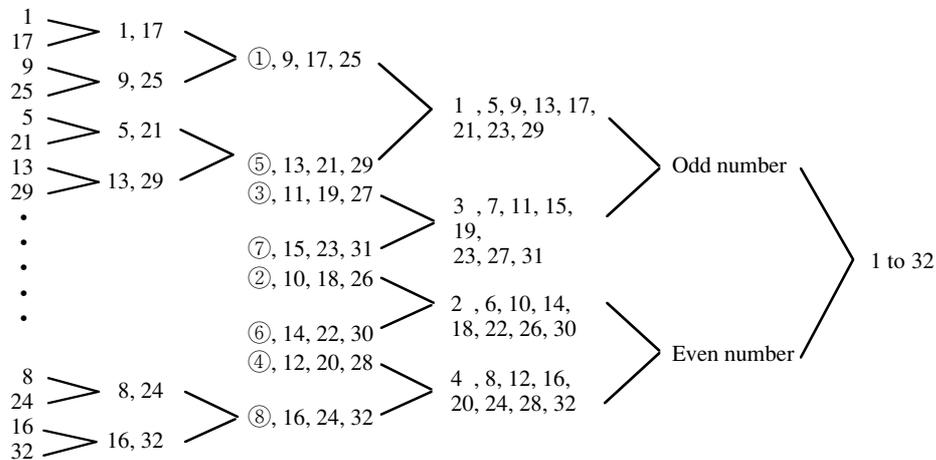
③ The single error adds one error each time the key is pressed. The LED blinks each time a error is added.

Error addition can be inserted for one, and only one, of the 32 routes by using the rotary switch on the rear panel (see below). Therefore, the error multiplied by the output can be added to only one route of the output (1/8 OUTPUT).

Example) When a  $1 \times 10^{-4}$  error is added to one channel, following occurs:

1/8 OUTPUT:  $1 \times 10^{-4} \times 8 (= 8 \times 10^{-4})$  error is added to DATA1.

No error is added to DATA2 to DATA8.



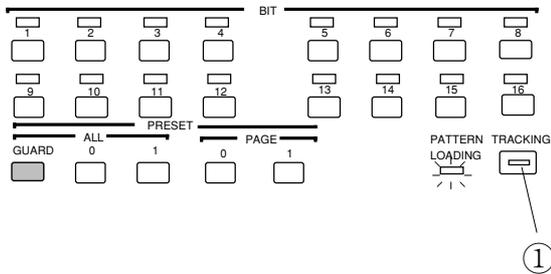
The numbers in circles (○) indicate the output order for 1/8 DATA OUT.

From the above drawing, in 1/8 OUTPUT, if the error insertion channel is 1, 9, 17, or 25, the error is inserted into 1/8 DATAOUT. If the error insertion channel is 5, 13, 21, or 29, the error is inserted into 1/8 DATAOUT 5.

- Notes :
1. When the rotary switch is set to channel 00, an error is added to channel 1.  
When the rotary switch is set to channel 33 to 99, an error is added to channel 32.
  2. When the FUNCTION switch on the rear of the instrument is set for external error injection, the error addition amount cannot be changed. However, the error addition ON/OFF key is enabled.

## Section 4 OPERATING INSTRUCTIONS

### 4.2.7 Tracking



① When the key is pressed, the LED inside the key lights and the instrument enters the tracking mode.

\* When tracking, the MP1763C must be connected to an MP1764A/C by a GPIB.

When the PATTERN LOADING lamp lights, the data is read and the keys are disabled.

Tracking can be performed from both the transmitter and receiver. However, one of them must be set as the master. As a result, tracking cannot be performed concurrently from the transmitter and receiver.

Turn on SYSTEM CONTROL of the Dip switch on the rear of the master instrument to perform tracking. (Turn off SYSTEM CONTROL of the controlled side.)

In addition, set GPIB ADDRESS of the controlled side to GPIB ADDRESS of the master side + 2.

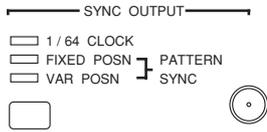


Note: The Dip switch on the rear panel for setting GPIB address is covered with the panel and fasten with screws to decrease the radio active radiation.

To change the address, remove the panel for the setting.

When tracking is on, the setting of the transmitter (or receiver) is changed each time the setting of the receiver (or transmitter) set as the master is changed. Therefore, each time a key is operated on the master side, operation disabled state occurs. (Especially, operation is disabled for more than ten seconds when the bit length of the program is long.) To avoid this condition, turn off tracking before changing the setting of the master side.

4.2.8 Pattern SYNC. position



Select the sync output.

When VARIABLE POSITION is selected, set the SYNC OUT position as described in the following.

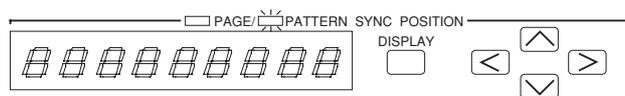
1/64 CLOCK, FIXED POSITION, OR VARIABLE POSITION can be selected.

1/64 CLOCK: 1/1 CLOCK is divided by 64.

FIXED POSITION: The sync pulse output fixed on page 1 of VARIABLE POSITION is generated.

VARIABLE POSITION: The sync pulse position is shifted by 16 bits every time the PATTERN SYNC POSITION value is changed by one. The page numbers are changed by the PRBS step numbers, and all positions in one cycle can be selected by 16-bit interval.

PRBS	Value of PATTERN SYNC POSITION
$2^7 - 1$	$2^3 = 8$
$2^9 - 1$	$2^5 = 32$
$2^{11} - 1$	$2^7 = 128$
$2^{15} - 1$	$2^{11} = 2048$
$2^{20} - 1$	$2^{16} = 65536$
$2^{23} - 1$	$2^{19} = 524288$
$2^{31} - 1$	$2^{27} = 134217728$

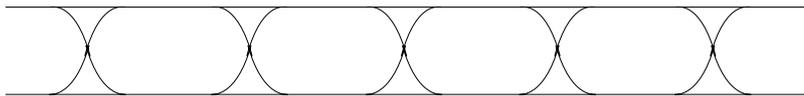


Switch DISPLAY to PATTERN SYNC POSITION, and set the PATTERN SYNC POSITIONS value.

**Section 4 OPERATING INSTRUCTIONS**

When the PRBS DATA output is monitored on a sampling oscilloscope using each synchronization output, the following waveforms are shown:

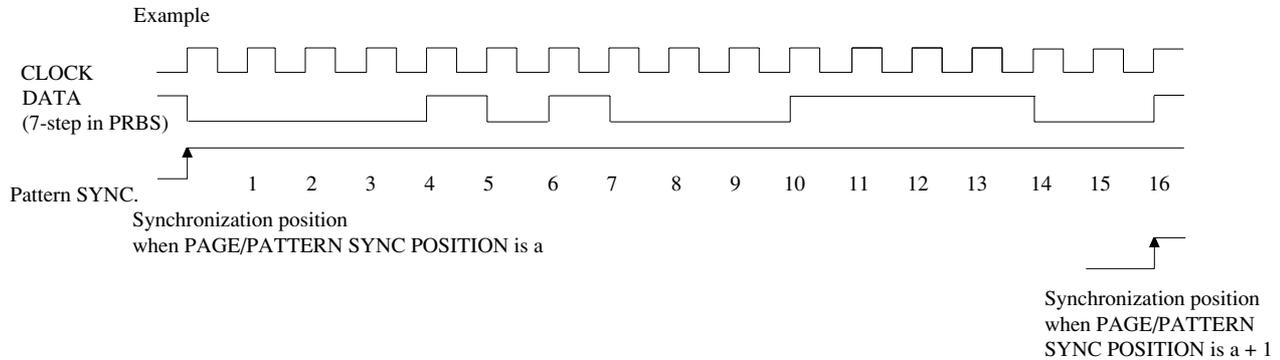
1) 1/64 CLOCK                      Shown as an eye pattern.



2) FIXED POSN                      Shown as a 0 and 1 waveform.  
and VAR POSN

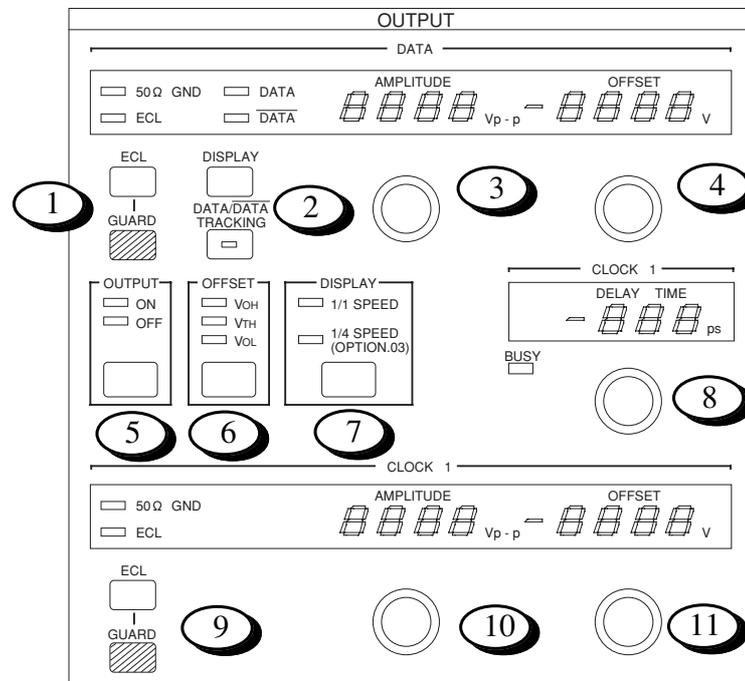


\* At VAR POSN, the synchronization position shifts +16 (or -16) bits each time the PAGE/PATTERN SYNC POSITION value is incremented (or decremented) by 1.



- The above figure is an example. Trigger output at the shown position is not specified.
- At FIXED POSN, the position is fixed to 1 of VAR POSN.

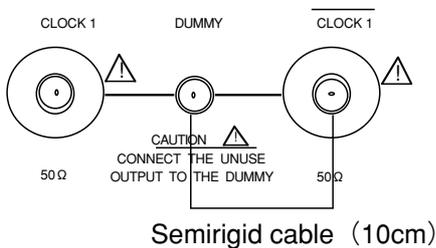
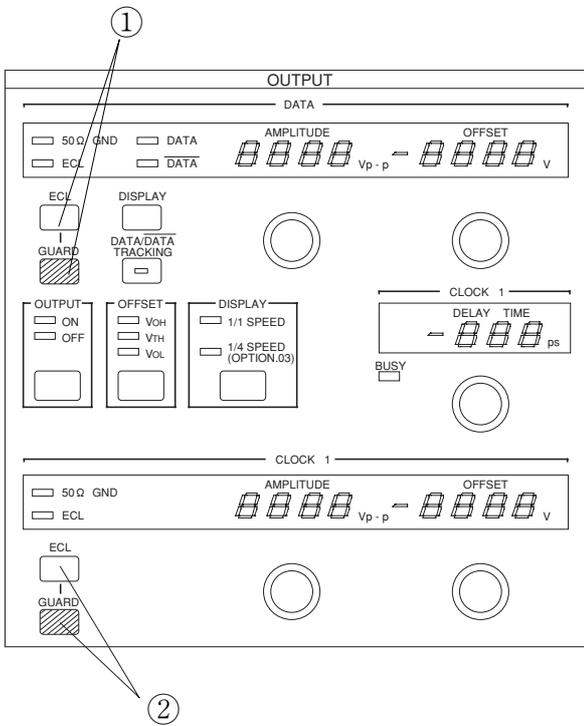
## 4.3 Output Interface



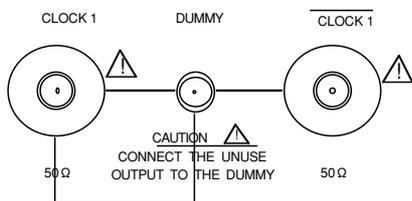
- 1 Termination conditions setting (DATA side)
- 2 DATA/DATA displaying switching and DATA/DATA tracking
- 3 Amplitude (DATA side)
- 4 Offset (DATA side)
- 5 Output ON/OFF
- 6 Offset display standard setting
- 7 1/1 SPEED / 1/4 SPEED display switching
- 8 CLOCK delay
- 9 Termination conditions setting (CLOCK 1 side)
- 10 Amplitude (CLOCK 1 side)
- 11 Offset (CLOCK 1 side)

## Section 4 OPERATING INSTRUCTIONS

### 4.3.1 DUMMY terminal voltage switching



When only **CLOCK 1** output is used



When only **CLOCK 1** output is used

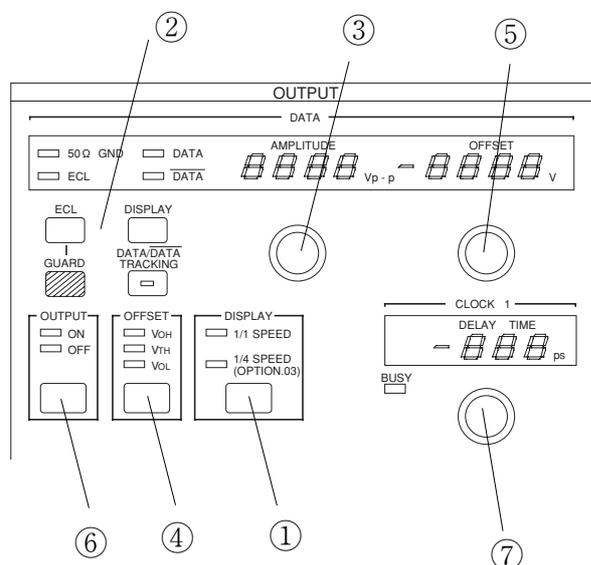
When only one of the **CLOCK 1** and **CLOCK 1** complementary outputs is used, use the attached semirigid cable (10 cm) to connect the unused side to the **DUMMY** terminal.

If the termination condition of the side used is  $50\ \Omega$ , and **GND**, press the **ECL** key while holding down the **GUARD** key of ② to turn on the  $50\ \Omega$  **GND** lamp and set the **DUMMY** terminal voltage to **GND**.

If the termination condition of the side used is **ECL** ( $50\ \Omega$ ,  $-2\ \text{V}$ ), press the **ECL** key while holding down the **GUARD** key of ② to turn on the **ECL** lamp and set the **DUMMY** terminal voltage to  $-2\ \text{V}$ .

- Notes:
1. When both outputs, match their termination conditions. (Setting one to  $50\ \Omega$ , **GND** termination and the other to **ECL** termination is not allowed.)
  2. When only one output is used with  $50\ \Omega$ , and **GND** termination, the unused output can also be connected to a  $50\ \Omega$  terminator instead of **DUMMY**. However, only when one output is used with **ECL** termination, connect the unused output to **DUMMY**.
  3. When the termination condition is switched from  $50\ \Omega$  **GND** to **ECL**, amplitude  $0.8\text{V}_{\text{p-p}}$  and offset  $-0.9\text{V}$  ( $V_{\text{OH}}$ ) are automatically set.
  4. Since the **DATA** and **DATA** outputs are in dependent, connection to the **DUMMY** terminal is unnecessary.
  5. If a commercially available **ECL** terminator is used to measure the output waveform, waveform distortion (ringing) may be observed. This phenomenon depends on the characteristics of the **ECL** terminator and does not mean that the output of this equipment contains waveform distortion.

4.3.2 Amplitude, offset, and delay setting

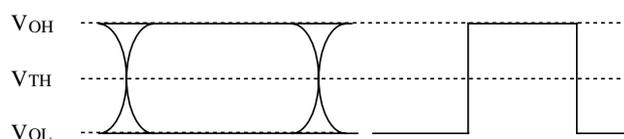


① When you want to set front panel DATA/ $\overline{\text{DATA}}$  output and CLOCK 1/ $\overline{\text{CLOCK 1}}$  output, switch to 1/1 SPEED. When you want to set rear panel 1/4 SPEED OUTPUT (OPTION), switch to 1/4 SPEED.

② Switches whether the  $\overline{\text{DATA}}$  output or  $\overline{\text{DATA}}$  output is set. When DATA/ $\overline{\text{DATA}}$  TRACKING is turned on, the  $\overline{\text{DATA}}$  output amplitude and offset become the same as the DATA output set value.

③ Set Amplitude to the desired value by turning the rotary encoder.

④ Set the offset standard value.



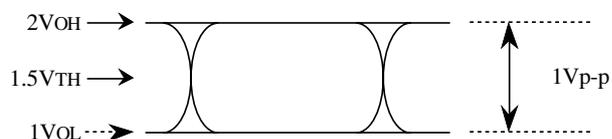
$V_{OH}$ : Output 'High Level' is made the standard.

$V_{TH}$ : The output level center value is made the standard.

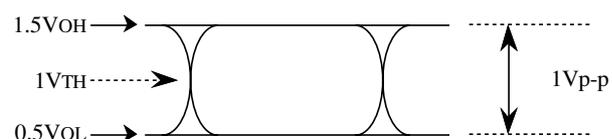
$V_{OL}$ : Output "Low Level" is made the standard.

⑤ Set the offset value. This value shows the value of the reference specified in ④.

The waveform is as follows when the amplitude is 1 V<sub>p-p</sub> and the offset is 1 V<sub>OL</sub>.



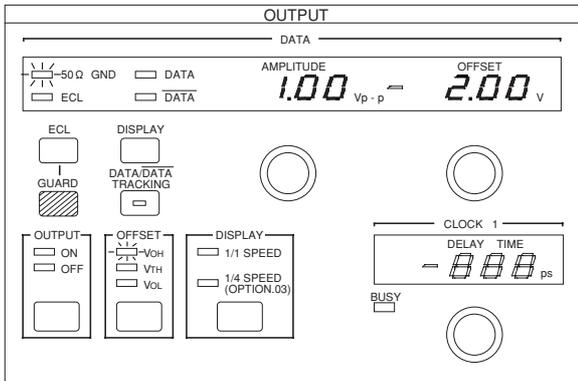
If the offset is changed to 1 V<sub>TH</sub> in the above condition:



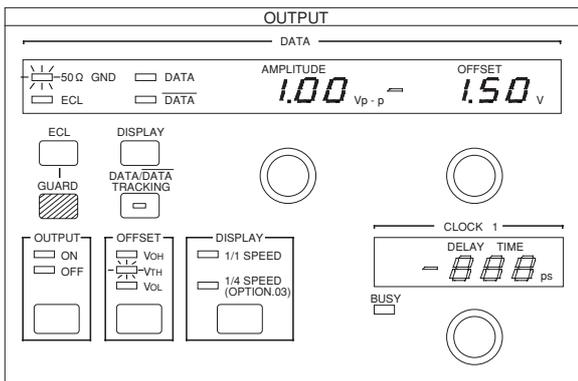
Set CLOCK in the same way. The offset reference is shared by DATA and CLOCK.

**Section 4 OPERATING INSTRUCTIONS**

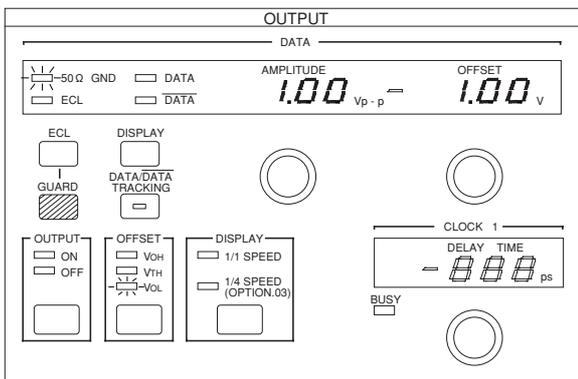
\* When the setting of ④ is changed, the actual waveform and output do not change. Only the displayed value changes (see the figure below).



AMPLITUDE 1 V<sub>p-p</sub>  
 OFFSEET 2 V<sub>OH</sub>

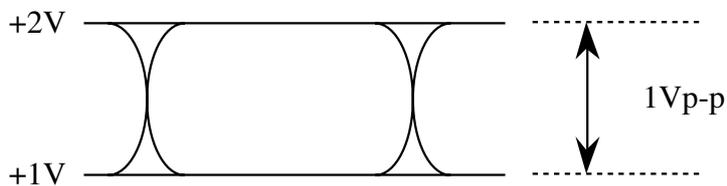


If V<sub>OH</sub> is changed to V<sub>TH</sub>:  
 AMPLITUDE 1 V<sub>p-p</sub>  
 OFFSEET 1.5 V<sub>TH</sub>



If V<sub>OH</sub> is changed to V<sub>OL</sub>:  
 AMPLITUDE 1 V<sub>p-p</sub>  
 OFFSEET 1 V<sub>OL</sub>

The output waveform is as follows for any of the above three settings:



### 4.3 Output Interface

⑥ Set the output to ON.

Note 1: When output was turned off, the actual DATA, DATA, CLOCK 1, CLOCK 1, 1/4 DATA, and 1/4 CLOCK output amplitude becomes 0Vp-p, and the offset becomes 0V.

Note 2: Since the output circuit is not opened even when the output is turned off, do not apply an external voltage to the output terminals of this instrument.

⑦ Set the clock delay.

## CAUTION

---

**Life time of phase shifters:**

**This equipment uses built-in phase shifters, whose average life time is as follows.**

**Number of shifting times at -500 ps to +500 ps full scale: 100 thousands times**

---

### 4.3.3 Duty adjustment

Fine adjustment of the  $\overline{\text{CLOCK1}}/\overline{\text{CLOCK1}}$  duty can be done using the control on the side of the instrument. The duty depends on the frequency, If the frequency is changed, monitor the waveform by sampling etc. and measure the duty again.

### 4.3.4 Cross point adjustment

Fine adjustment of the  $\overline{\text{DATA}}/\overline{\text{DATA}}$  cross point can be done using the control on the rear of the instrument.

Section 4 OPERATING INSTRUCTIONS

4.3.5 Offset voltage setting range

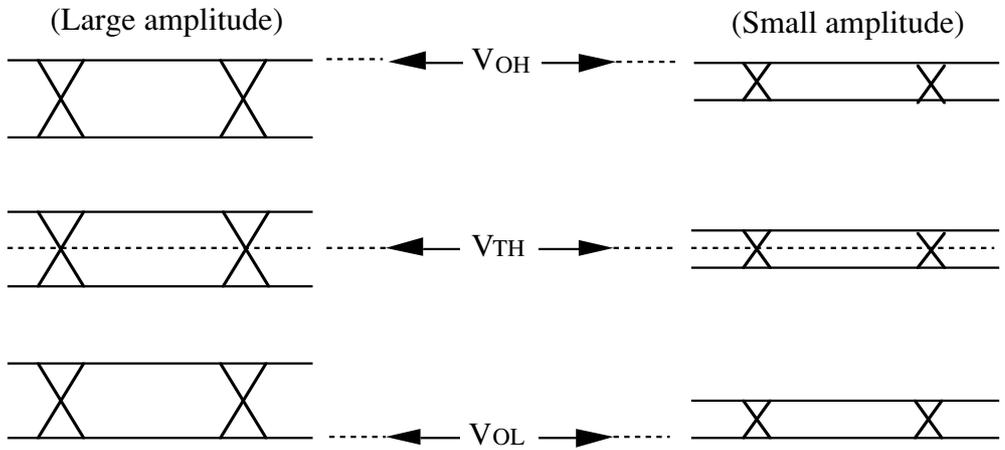


Fig. 4.3.5-1 Offset Reference Value and Amplitude Change

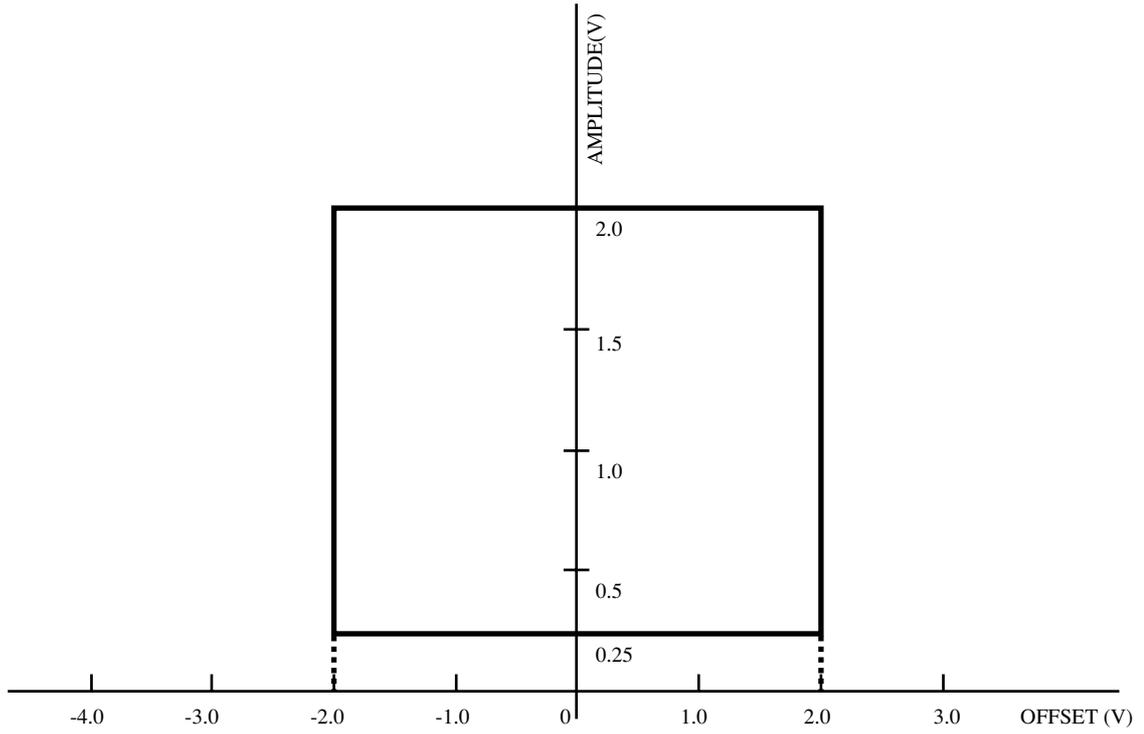
Note: Since the offset-voltage upper and lower limit values are limited by  $V_{OH}$  ( $-2.0\text{ V} \leq V_{OH} \leq +2.0\text{ V}$ ), when  $V_{TH}$  or  $V_{OL}$  are set, the amplitude is limited at a certain value and may not change further.

Example: If  $V_{OL}$  is set at +1.00 V offset voltage and if there is a signal with amplitude 0.5 Vp-p added, that amplitude can only be increased to 1.0 Vp-p.

This is because their superposition after the increase would be meeting the maximum allowable level +2.00 V.

Figures 4.3.5-2 to 4.3.5-4 show the relationships between amplitude and offset-voltage settable ranges at three offset references.

• Offset reference:  $V_{OH}$



**Fig. 4.3.5-2 Amplitude and Offset Voltage Setting Range Corresponding to Offset Reference Value**

Section 4 OPERATING INSTRUCTIONS

• Offset reference:  $V_{TH}$

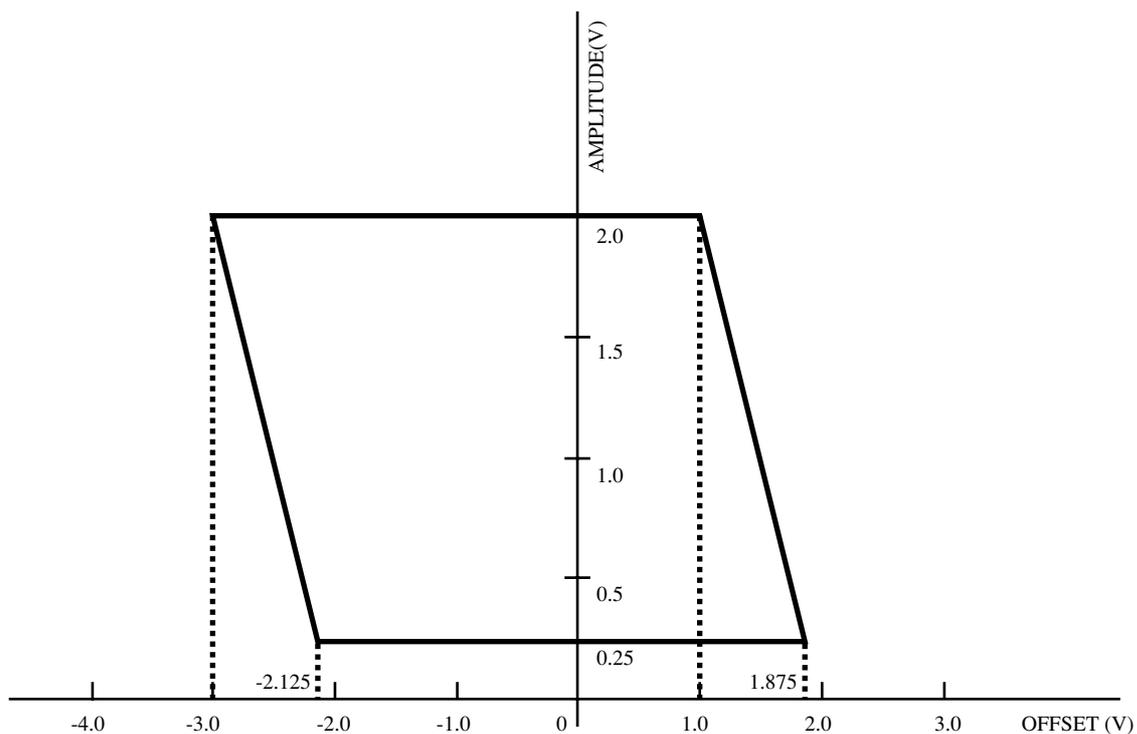
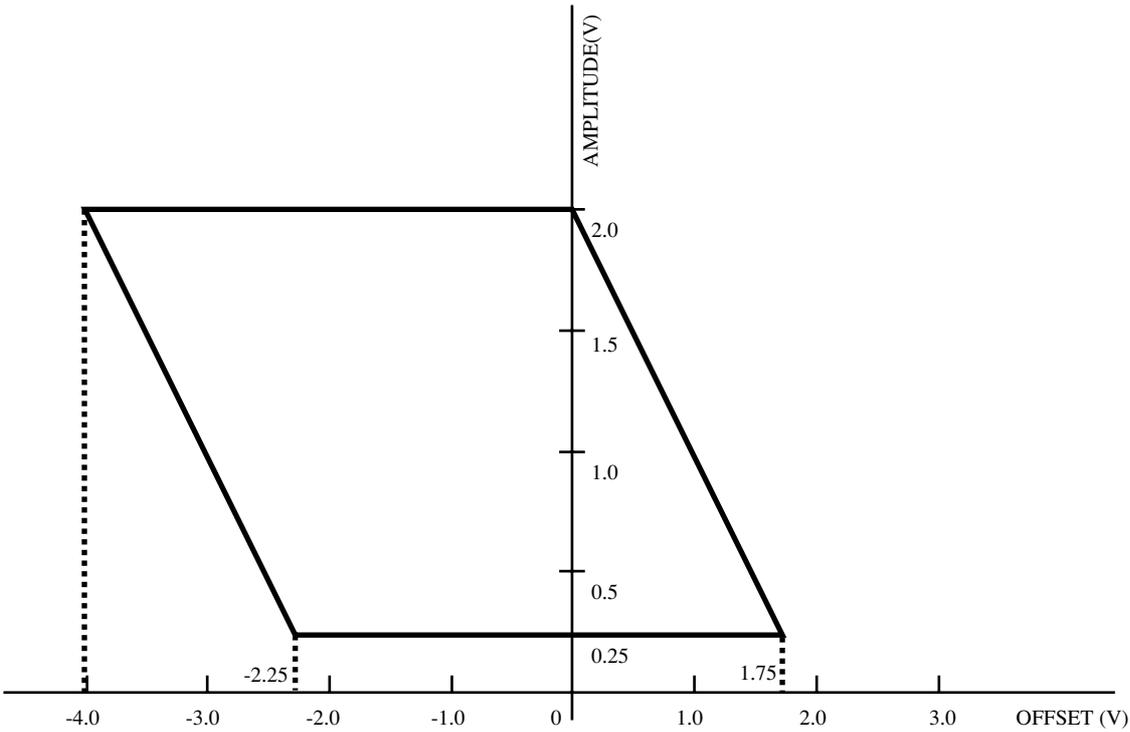


Fig. 4.3.5-3 Amplitude and Offset Voltage Setting Range Corresponding to Offset Reference Value

4.3 Output Interface

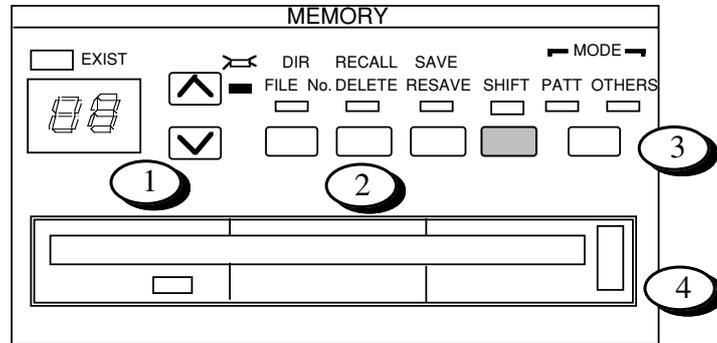
- Offset reference:  $V_{OL}$



**Fig. 4.3.5-4** Amplitude and Offset Voltage Setting Range Corresponding to Offset Reference Value

## Section 4 OPERATING INSTRUCTIONS

### 4.4 MEMORY (Floppy Disk)



1 File No. selection

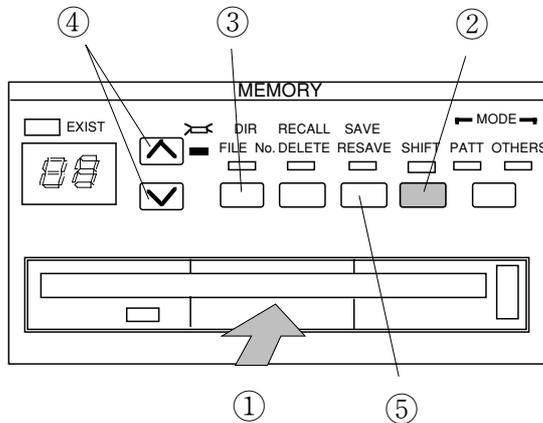
2 File control

3 Mode selection

4 Eject

## 4.4 MEMORY (Floppy Disk)

### 4.4.1 File save



- ① Insert a formatted floppy disk (2HD, 2DD) into the floppy disk drive. (For a description of how to format a floppy disk, see section 4.4.3 “Disk formatting”.)
- ② Select the PATT or OTHERS mode.  
PATT mode: The contents set at section 4.2 are saved.  
OTHERS mode: Contents other than PATT are saved.
- ③ Light the File No. LED by pressing the DIR/File No. key.
- ④ Set the file name (00-99) with the keys.
- ⑤ Save the file by pressing the SAVE key.

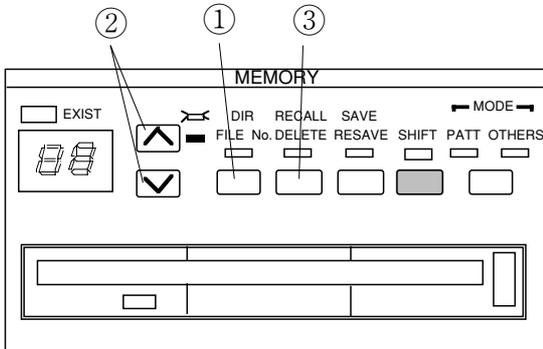
\* If another file was previously saved under the same file name, the current file cannot be saved with the SAVE key. If the old file is unnecessary, a new file can be saved by pressing the shift key to switch to the shift mode, then pressing the SAVE key (resave). If the old file is necessary, change the file name and save the file.

Note: If the floppy disk does not have sufficient free space for the size of the file to be re-saved, the file cannot be re-saved. In this case, delete the file to be re-saved from the floppy disk.

A file larger than 720k cannot be re-saved to a floppy disk formatted as 1.44M.

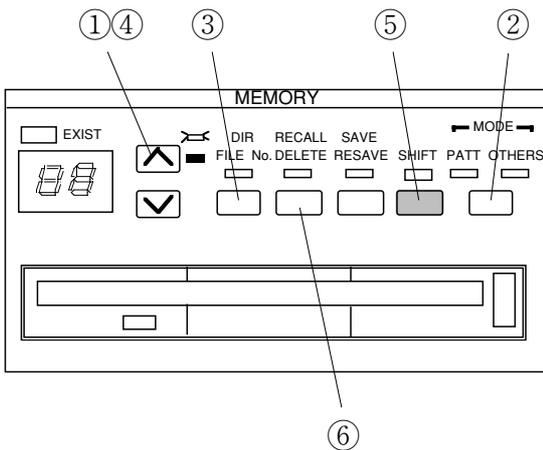
## Section 4 OPERATING INSTRUCTIONS

### 4.4.2 File recall



- ① Insert the floppy disk into the floppy disk drive and select the DIR mode. If the floppy disk is changed, always execute a DIR command.
- ② Check whether there is a file on the disk by pressing the keys. If there is a file on the disk, only that file name is displayed. However, if there is no file on the disk, “- -” is displayed.
- ③ Call the contents of the file by pressing the RECALL key.

### 4.4.3 Disk formatting

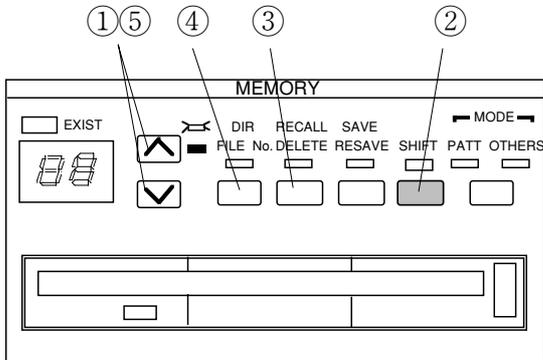


- ① Insert a unformatted disk into the floppy disk drive.
- ② Don't care. (Both PATT and OTHERS mode are possible).
- ③ Select the FILE No. mode.
- ④ Display “Fr” by holding down the key.  
(Fr follows 99)
- ⑤ Select the SHIFT mode.
- ⑥ When the DELETE key is pressed, formatting begins.

Note: The FUNCTION switch on the rear of the instrument can be used for switching the format between 1440 KB/720 KB and 1232 KB/640 KB.

## 4.4 MEMORY (Floppy Disk)

### 4.4.4 File deletion



- ① Insert the floppy disk into the floppy disk drive and select the file name to be deleted.
- ② Press the SHIFT key.
- ③ Delete the file with the displayed file name by pressing the DELETE key.
- ④ (Verification)  
Execute a DIR command.
- ⑤ Verify that the file name deleted is not displayed by pressing the keys.

### 4.4.5 Error messages

When a floppy disk error occurs, error codes E0 to E9 are displayed on the file name display. For the error codes, see Table 4.4.5-1 “Error Messages”. An error message can be cleared by pressing the keys.

**Table 4.4.5-1 Error Messages**

Error	Error contents
E0	Media error (formatting, media error)
E1	Write protection error (protection error when writing)
E2	File full (insufficient writing space)
E3	File not found (specified file not found when reading)
E4	File exists error (saving of same file attempted)
E5	Write error (write-disabled error)
E6	Read error (read-disabled error)
E7	File type, File error (file type or file contents error)
E8	FD error (other errors)
E9	Hardware error (hardware trouble error)

## Section 4 OPERATING INSTRUCTIONS

### 4.4.6 Floppy disk

(a) Disk type

The floppy disk is formatted in standard MS-DOS format provided by the MS-DOS file handler. The formatted floppy disk is data disk type. This is because the MS-DOS file handler does not copy the MS-DOS system. A system disk containing the MS-DOS system can also be used to store data.

(b) Volume label

A volume label is added when the floppy disk is formatted.

Volume label: MP1763A

This volume label is provided to identify the floppy disk.

(c) File structure

- Directory structure

Root directory only.

- File name, extender

The file name and extender have the following format:

File name	TTXX
	↑ └ 00 to 99 (file name)
Extender	PTN: Pattern file
	OTH: Parameter file other than pattern file

(Example) TT99.PTN  
              TT01.OTH

(d) Data format

As a rule, the data stored on a floppy disk is not released.

Therefore, operation is not guaranteed even when data was generated and modified by using a personal computer controlled by MS-DOS. However, checking the file directory and copying of files are no problem.

(e) Compatibility

It is possible for MP1763C PPG to use 'PTN' file mode by MP1764A/C ED. 'OTH' file is not used.

It is impossible for MP1763C to read file made by old type PPG, for example MP1701B, MP1608A and MP1652A.

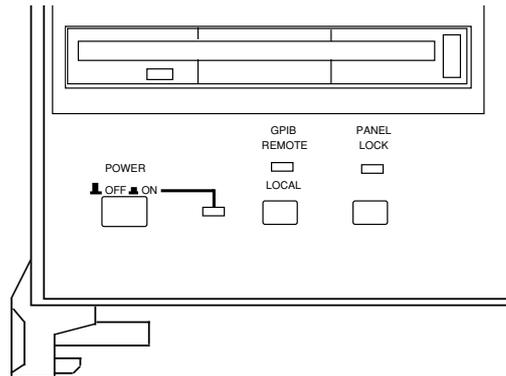
### 4.4.7 Floppy disk precautions

- Do not remove a floppy disk from the floppy disk drive while it is being accessed.
- Observe the specified environmental conditions and do not use the floppy disk in dusty places.
- Clean head of floppy disk drive with 3.5 inch head cleaning disk set regularly.
- Do not place a magnetized object near the floppy disk and do not bend the floppy disk.
- Files saved by the MP1763C Pulse Pattern Generator cannot be loaded into other models.

### 4.5 Parameters initialization

When returning the pattern type, amplitude, offset voltage, and other parameters to the factory shipment state, turn on the power switch while pressing the LOCAL key.

This initializes the parameters. The initialization state is shown in Table 4.5-1.



**Table 4.5-1 Initialization State**

Item	Initial setting
FREQUENCY	12, 500 MHz
TUNING	ON
MEMORY	00 (PTN mode, FILE NO. mode)
PATTERN	PRBS $2^{15}-1$ , MARK RATIO 1/2
LOGIC	POS
ERR ADDITION	OFF
OFFSET	VOH
DATA TERM	GND
DATA AMPLITUDE	1.0 V <sub>p-p</sub>
DATA OFFSET	0V
CLOCK TERM	GND
CLOCK AMPLITUDE	1.0 V <sub>p-p</sub>
CLOCK OFFSET	0V
CLOCK DELAY	0ps
OUTPUT	OFF
DISPLAY	1/1 SPEED

## Section 4 OPERATING INSTRUCTIONS

### 4.6 Functions of the FUNCTION Switch

Table 4.6-1 lists the functions of the FUNCTION switch on the rear of the instrument.

**Table 4.6-1 Functions of the FUNCTION Switch**

SW	Item	Function
1	AND bit shift count for the mark ratio	0: 1 bit 1: 3 bits
2	External error injection	0: OFF 1: ON
3	Floppy disk format type	0: 1440/720KB 1: 1232/640KB
4	Alternate pattern A/B switching timing	0: INTERNAL 1: EXTERNAL
5, 6	Bit shift number for Alternate A/B select timing	SW6 SW5 0 0 : 0 BIT 0 1 : 1 BIT 1 0 : 2 BIT 1 1 : 3 BIT

Note: The FUNCTION switch on the rear panel is covered with the panel and fasten with screws to decrease the radio active radiation.

To change the FUNCTION switch, remove the panel for the setting.

## SECTION 5

### PRINCIPLES OF OPERATION

#### 5.1 Pseudorandom Pattern (PRBS Pattern)

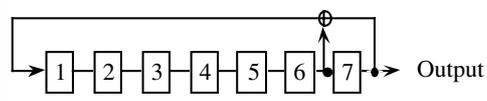
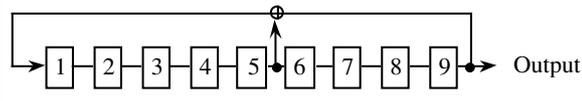
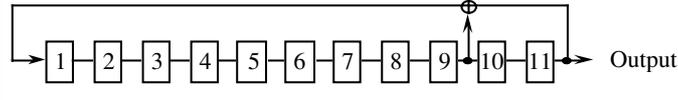
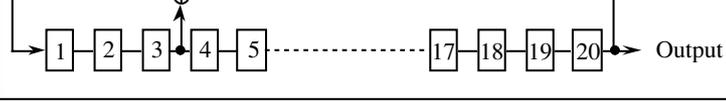
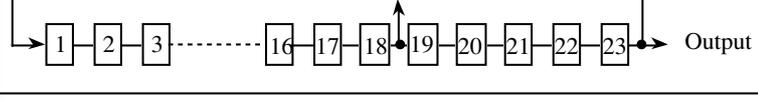
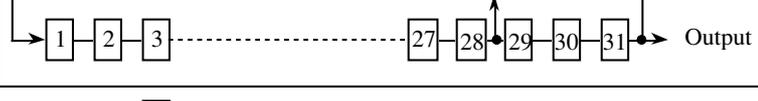
The principle of pseudorandom pattern generation is shown in Table 5.1-1. The pseudorandom pattern is represented by the Nth-order generation polynomial shown in Table 5.1-1. One period is  $2^N-1$ . A PRBS pattern with a  $2^N-1$  period produces one N bits continuous “1” pattern per period.

When LOGIC is set to POS (positive logic), PRBS pattern output level “1” corresponds to low level and “0” corresponds to High level.

The PRBS pattern mark ratio is generated by the block shown in Fig. 5.1-1. There are four mark ratios of 1/2, 1/4, 1/8, and 0/8 (all 0). For 1/4 and 1/8, 1-bit shift or 3 bit shift can be selected using the Dip switch on the rear of the instrument, depending on the generation method (see section 4.6, “Functions of the FUNCTION Switch”).

When the rear panel 1/8 SPEED output is a PRBS pattern, a pattern is produced train as shown in Fig. 5.1-2.

**Table 5.1-1 Principle of Pseudorandom Pattern Generation**

Period	Generation polynomial	Pattern generation block diagram
$2^7 - 1$	$1 + X^6 + X^7$	
$2^9 - 1$	$1 + X^5 + X^9$	
$2^{11} - 1$	$1 + X^9 + X^{11}$	
$2^{15} - 1$	$1 + X^{14} + X^{15}$	
$2^{20} - 1$	$1 + X^3 + X^{20}$	
$2^{23} - 1$	$1 + X^{18} + X^{23}$	
$2^{31} - 1$	$1 + X^{28} + X^{31}$	

[ N ] : Shift register

⊕ : Exclusive-OR

Section 5 PRINCIPLES OF OPERATION

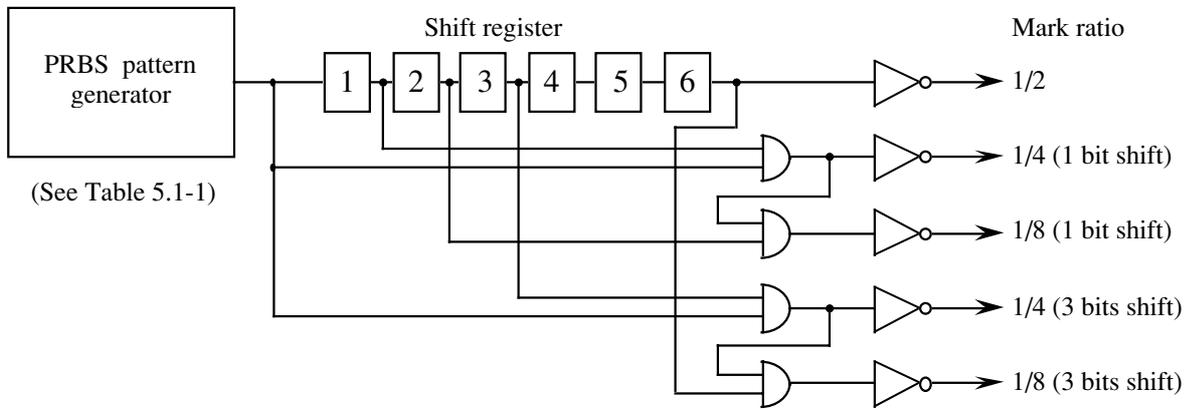


Fig. 5.1-1 Mark Ratio 1/4, 1/8 Pattern Generator

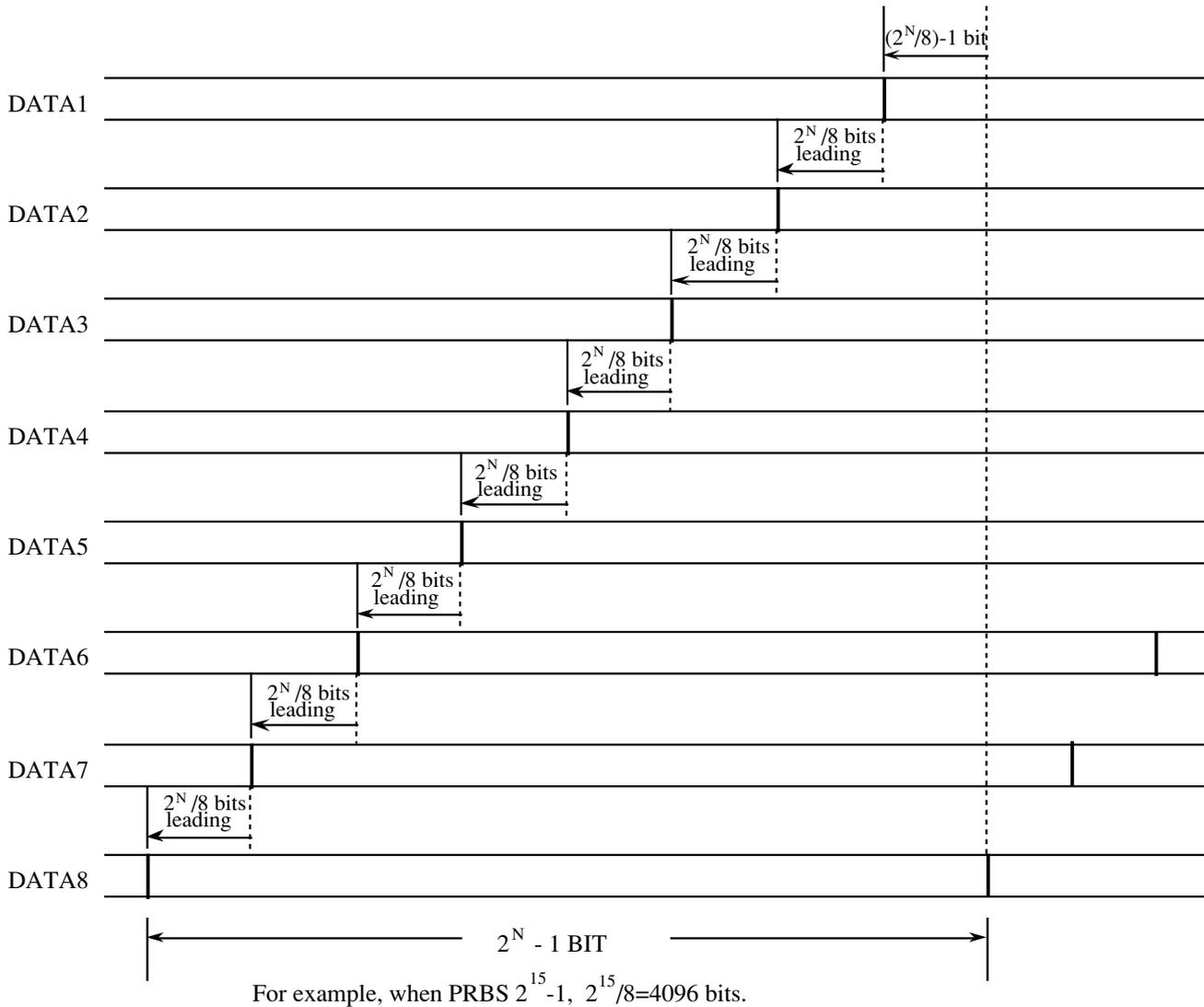


Fig. 5.1-2 Example of Pseudorandom Pattern

## 5.2 Pattern Synchronized Output Period

### 5.2.1 Pseudorandom pattern

$$\text{Period} = \frac{1}{(\text{set frequency})} \times (2^N - 1) \times 128$$

$$N=7, 9, 11, 15, 20, 23, 31$$

$$\text{(Where pulse width} = \frac{1}{(\text{set frequency})} \times 64, \text{ plus pulse)}$$

### 5.2.2 Programmable pattern

(1) Data pattern, alternate pattern

(a) Data length = 65536 or less

$$\text{Period} = \frac{1}{(\text{set frequency})} \times (\text{least common multiple between 128 and data length})$$

(Example 1) Data length = 8

$$\text{Period} = \frac{1}{(\text{set frequency})} \times 128$$

(Example 2) Data length = 10

$$\text{Period} = \frac{1}{(\text{set frequency})} \times 640$$

(b) Data length > 65536

$$\text{Period} = \frac{1}{(\text{set frequency})} \times (\text{data length})$$

(2) Zero sub pattern

$$\text{Period} = \frac{1}{(\text{set frequency})} \times 2^N \quad N=7, 9, 11, 15$$

(3) Pulse width

For any of the programmable patterns above, the pulse width =  $\frac{1}{(\text{set frequency})} \times 64$ . The output signal polarity is plus pulse.

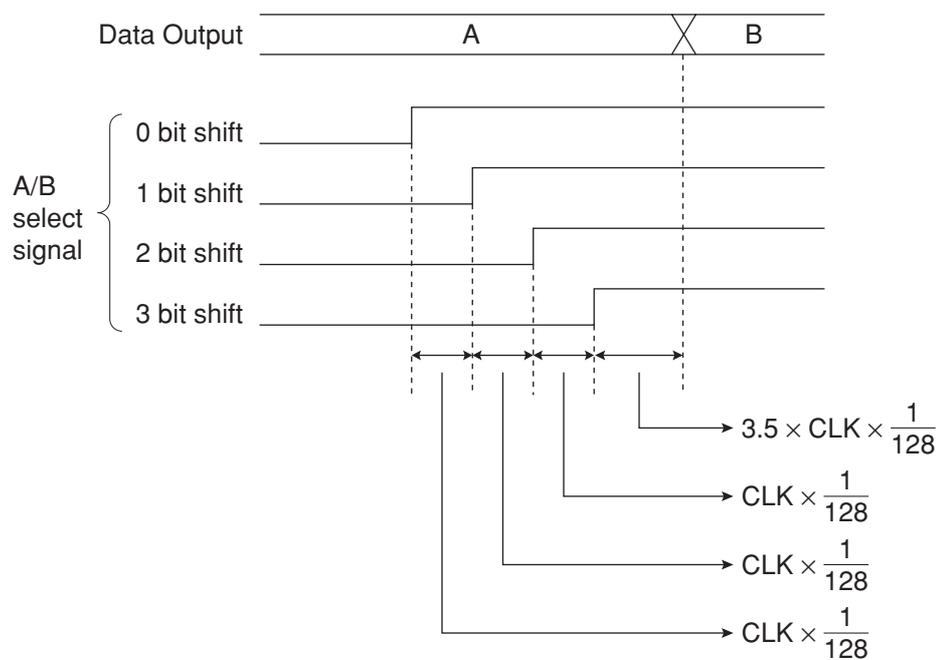
Note: For the alternate pattern, the synchronization output is output in basic data length units. As a result, when the data output is monitored on a sampling oscilloscope, patterns A and B are shown overlapping.

To prevent patterns A and B from overlapping, connect A/B TIMING OUTPUT on the rear of the instrument to the trigger of the oscilloscope through an ECL terminator.

## Section 5 PRINCIPLES OF OPERATION

### 5.3 Bit shift for Alternate A/B select timing

A timing between Alternate pattern A/B select signal and Data output can be selected using the Dip switch on the rear of the instrument, and its selection step is one 128th of setting frequency.



## SECTION 6

### PERFORMANCE TEST

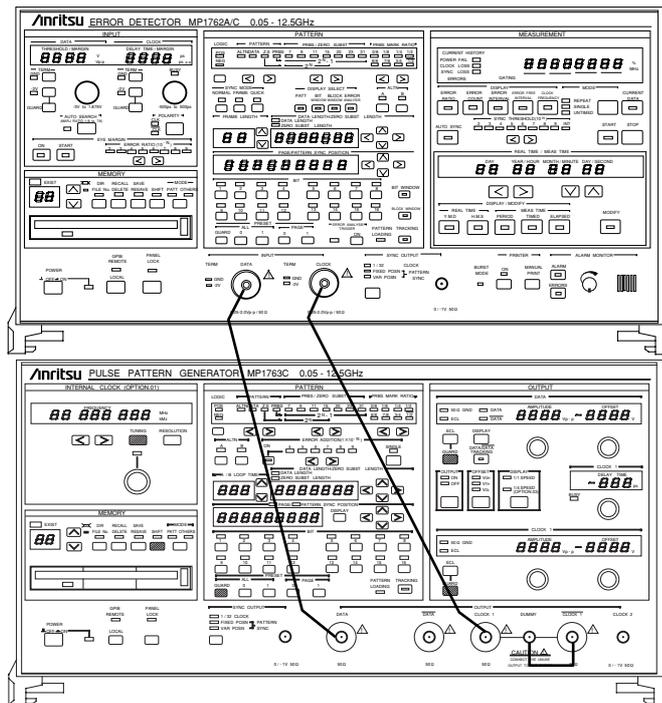
#### 6.1 Test Equipment

- Error detector (12.5 GHz or more measurement possible)
  - Sampling oscilloscope (bandwidth 50 GHz or more)
  - Clock generator (capable of covering the 0.05 to 12.5 GHz range)
- \* no need when OPTION 01 is installed.

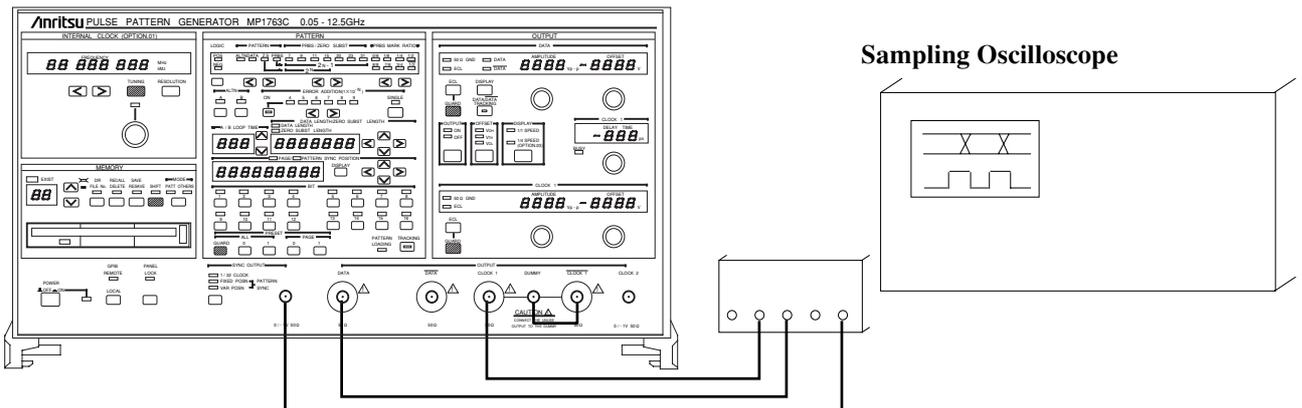
#### 6.2 Error Measurement

Setup

- (1) Error measurement setup



- (2) Wave form monitor setup



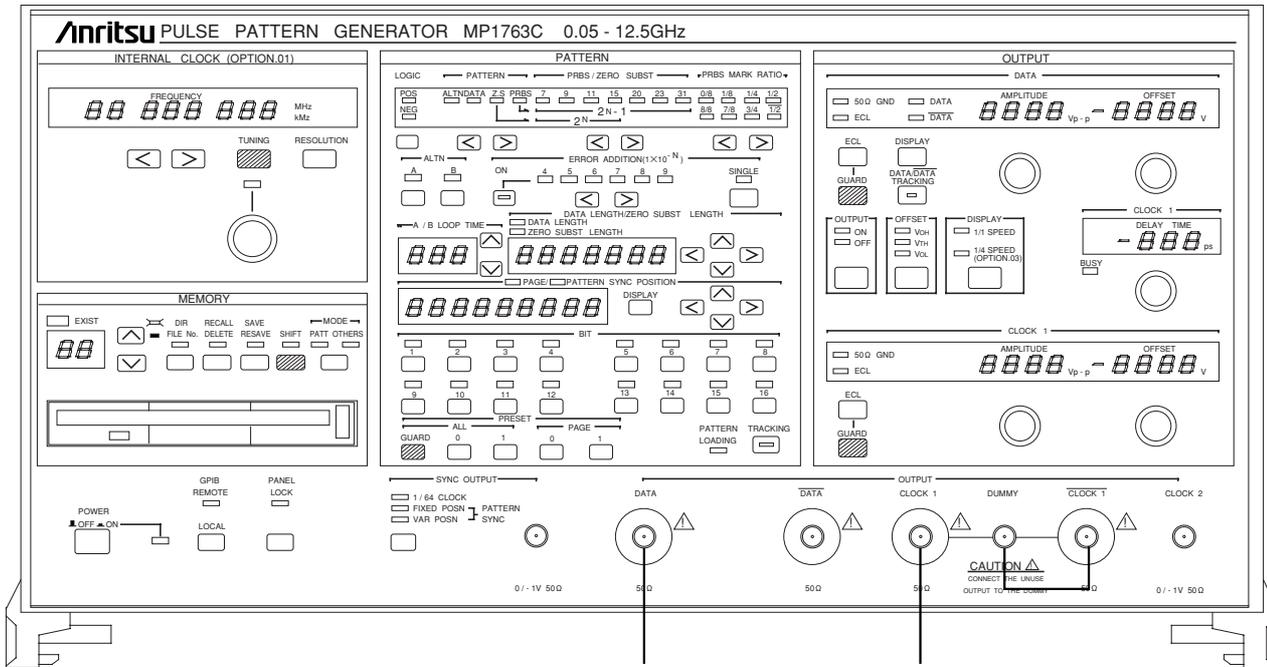
## Section 6 PERFORMANCE TEST

### 6.3 Test Method

Connect the MP1763C DATA and CLOCK1 connectors to the error detector as shown in 6.2-(1).

Set Error Free at the setting shown below.

Pattern	LOGIC		POS
	PRBS		$2^{31}-1$
	Mark ratio		1/2
Output	DATA	amplitude	0.5 V <sub>p-p</sub>
		offset	0 V <sub>p-p</sub>
Output	CLOCK	amplitude	0.5 V <sub>p-p</sub>
		offset	0.0 V <sub>OH</sub>
		Delay	0 ps



**Fig. 6.3-1 Connection of front panel**

Set the Error Detector to the same conditions as the MP1763C or set the margin to maximum. Confirm that the following points are Error Free:

Frequency	50 MHz, 1 GHz, 3 GHz, 5 GHz, 12.5 GHz
Amplitude	0.25 V <sub>p-p</sub> , 2.0 V <sub>p-p</sub>
Offset	0V <sub>OH</sub> , -V <sub>OH</sub> , +2 V <sub>OH</sub>
Mark ratio	1/2, 1/8, 1/2, 7/8

Check DATA and CLOCK1 in the same way. However, since CLOCK is inverted, invert the detector CLOCK polarity.

## 6.5 Check Items

Check the 1/8 SPEED output with the connection shown at the below.

Pattern	LOGIC	POS
	PRBS	$2^{31}-1$
	Mark ratio	1/2

Check all the outputs with the connections DATA1 → DATA2 → - - - → DATA8.

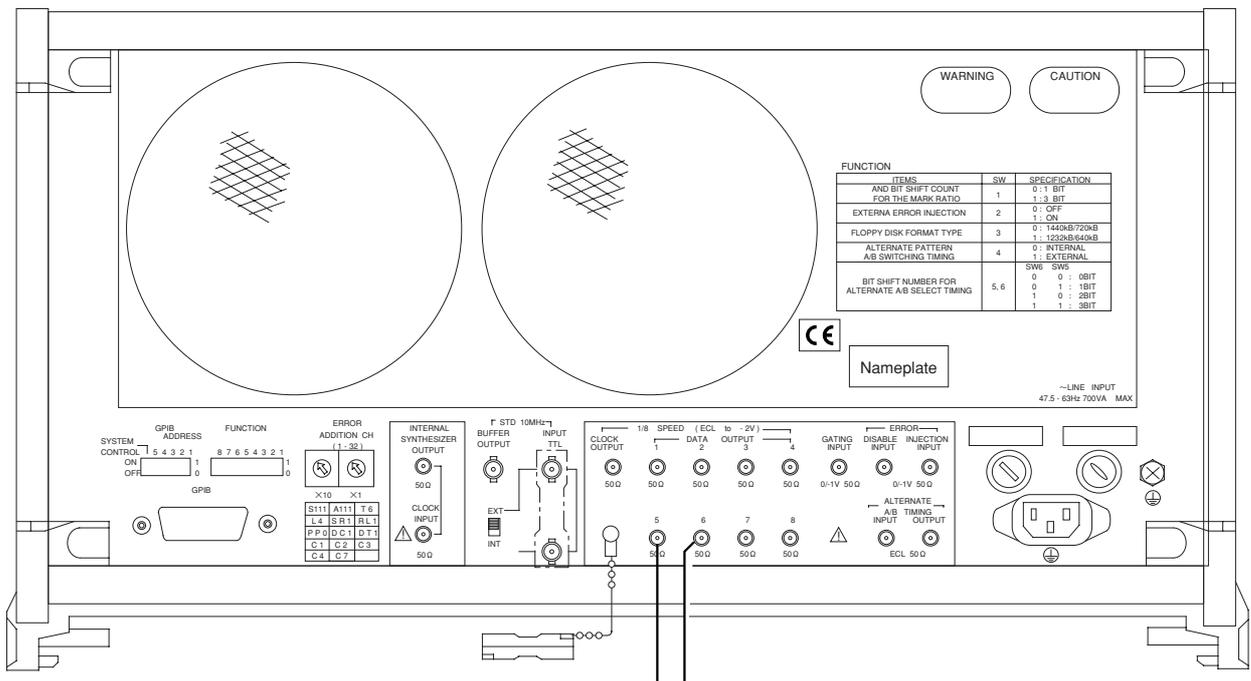


Fig. 6.3-2 Connection of rear panel

## 6.4 Waveform Check

Connect the MP1763C and sampling oscilloscope in accordance with 6.2-(2).

Check the DATA, DATA, CLOCK, and CLOCK1 waveforms.

Pattern	LOGIC	POS	
	PRBS	$2^{31}-1$	
	Mark ratio	1/2	
Output	DATA	amplitude	2.0 V <sub>p-p</sub>
	(CLOCK)	offset	0 V <sub>OH</sub>

## 6.5 Check Items

Use a sampling oscilloscope to check that the amplitude, offset, rise, fall time, duty (CLOCK), and jitter (DATA) are within the specifications.

\* When measuring the jitter, use the divided 1/CLOCK as the sync trigger.

**Section 6 PERFORMANCE TEST**

## SECTION 7 MAINTENANCE

### 7.1 Daily Maintenance

- Wipe external dirt with a cloth soaked in a diluted neutral detergent.
- Remove dust or specks by using a vacuum cleaner.
- Periodically clean the FDD head by using a 3.5-inch head-cleaning disk.
- If any loosened screws for attached parts are found, secure by using the specified tool.

### 7.2 Storage Precautions

- (1) Store the unit after removing any dirt or dust.
  
- (2) Do not store the unit in a place with a temperature of over +60 °C, under –20 °C, or with humidity of over 85 %.
  
- (3) Do not store the unit in a place where it may be exposed to direct sunlight or dust.
  
- (4) Do not store the unit in a place where it may be exposed to dew and active gas.
  
- (5) Do not store the unit in a place where it may be oxidized or exposed to strong vibrations.

- **Recommended storage conditions**

When the unit is stored for a long period, we recommend observing the following conditions in addition to those discussed above:

1. Temperature : 5 to 30 °C
2. Humidity : 40 to 75 %
3. Place where the temperature and humidity are stable throughout the day.

### 7.3 Transportation

When transporting the unit, use the original packing material, if available. If not available, follow the packing procedures shown below. Wear clean gloves and handle equipment gently, so as not to scratch or dent them.

- (1) Wipe off dirt or dust on the unit surface with a dry cloth.
- (2) Check for loosened or missing screws.
- (3) Protect structural projections or any parts that can be easily damaged and cover the equipment with a polyethylene sheet. Cover with moisture-proof material.
- (4) Put the covered equipment into a cardboard box and close with adhesive tape. Place into a wood box, or other, according to the distance or method of transportation.
- (5) During transportation, keep the unit in the environmental conditions specified in “7.2 Storage Precautions”.

## **Section 7 MAINTENANCE**

### **7.4 Calibration**

Calibration of this unit should not be performed by other than Anritsu Corporation. We recommend yearly routine calibration to maintain performance.

### **7.5 Disposal**

This equipment uses chemical compound semiconductors including arsenic and a fluoridated graphite lithium battery to back-up the memory. Be sure to follow the rules on disposal for each country and/or local government.

## SECTION 8

### TROUBLESHOOTING AND REPAIR

#### 8.1 Before Considering Trouble

If the instrument is not operating properly for some reason, check it as follows:

- **Power is not turned on**

Is the power cord loose ? → Plug in firmly.

↓

Is the fuse blown ? → Replace the fuse.

- **Synchronization is not established.**

Are the transmit and receive interfaces the same ? → Check the set values and set them to the correct values.  
(Termination conditions, output level, offset, etc.)

↓

Is the connection cable normal ? → Change the cable.

↓

Initialize the instrument. (Transmitter and receiver)  
Set the receiver the same as the transmitter.

- **Error added**

Is the cable loose ? → Retighten the connector.

↓

Is Error addition OFF ? → Set Error addition to OFF.

↓

Are the phase margin and bias margin sufficient? → Adjust so that the phase and offset are suitably cut.

- **The output waveform is distorted.**

Is the cable loose ? → Retighten the connector.

↓

Is the CLOCK1 outputs terminated ? → use the attached cable to connect the outputs to the DUMMY terminal.

↓

Are cables and connectors that have good high frequency characteristics being used ? → Use cables and connectors that have good high frequency characteristics.

## Section 8 TROUBLESHOOTING AND REPAIR

- **Floppy disk drive is not used.**

Is the floppy disk normal ?

→ Use the normal floppy disk.

↓

Is the head of floppy disk drive dusty ?

→ Clean head of floppy disk drive with 3.5 inch head cleaning disk set.

If the problem cannot be found from the above check items, contact the service section of Anritsu.

### 8.2 Fuse Replacement

Turn off the power switch, then disconnect the power cable plugged into the AC power inlet. Next, open the AC power fuse holder cover and replace the fuse with a spare.

## APPENDIX A

### PERFORMANCE TEST REPORT SHEET

Name : MP1763C Pulse Pattern Generator  
 Serial No. : \_\_\_\_\_  
 Ambient Temperature : \_\_\_\_\_ °C  
 Relative humidity : \_\_\_\_\_ %

• Output Test

Conditions	Criteria	Results
For Data and Clock1		
50 MHz	Error-free for each: Amplitude: 0.25, 2.0 V <sub>p-p</sub> Offset: -2, 0, +2 V <sub>OH</sub> Mark ratio: 1/2, 1/8, 1/2 and 7/8	
1 GHz	Same as above	
3 GHz	Same as above	
5 GHz	Same as above	
12.5 GHz	Same as above	
For /Data and /Clock1		
50 MHz	Error-free for each: Amplitude: 0.25, 2.0 V <sub>p-p</sub> Offset: -2, 0, +2 V <sub>OH</sub> Mark ratio: 1/2, 1/8, 1/2 and 7/8	
1 GHz	Same as above	
3 GHz	Same as above	
5 GHz	Same as above	
12.5 GHz	Same as above	

• 1/8 SPEED Output Test

Data	Criteria	Results
1	A waveform conforming to specifications in “1.2 Function” is output.	
2	Same as above	
3	Same as above	
4	Same as above	
5	Same as above	
6	Same as above	
7	Same as above	
8	Same as above	

• Waveform Confirmation Test

Conditions	Criteria	Results
DATA	A waveform conforming to specifications in “1.2 Function” is output.	
/DATA	Same as above	
CLOCK1	Same as above	
/CLOCK1	Same as above	

**APPENDIX A PERFORMANCE TEST REPORT SHEET**

## INDEX

Cross point adjust .....	4-17
Duty adjust .....	4-17
Tracking .....	4-10
Error insertion .....	4-9
Alternate pattern .....	4-4
Pseudo random pattern .....	5-1
Zero-replacing pattern .....	4-7
Data pattern .....	4-6
Pattern synchronization output .....	4-11

**INDEX**

**INDEX-2.**