

ANRITSU

MH676A
Multiplexer

MH677A
Demultiplexer

OPERATION MANUAL

OPERATION MANUAL
MH676A MULTIPLEXER
MH677A DEMULTIPLEXER

CERTIFICATION

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

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

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All parts of this product are warranted by Anritsu Corporation of Japan against defects in material or workmanship for a period of one year from the date of delivery. In the event of a defect occurring during the warranty period, Anritsu Corporation will repair or replace this product within a reasonable period of time after notification, free-of-charge, provided that: it is returned to Anritsu; has not been misused; has not been damaged by an act of God; and that the user has followed the instructions in the operation manual.

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

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

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

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CAUTION

Since the MH676A and MH677A input and output circuits use field-effect transistors (FETs), faults can be caused by static electricity or overvoltage.

Before using this measuring equipment, make sure the following conditions have been met and then connect the measuring cable to the device under test and the observation devices for measurement.

- (1) Ground the ground terminal of the ME522A transmitter and receiver and the ground terminal of the power cable.
- (2) Ground the device under test and the observation devices connected to the MH676A and MH677A.

In addition, always discharge static electricity from your body before touching the I/O cable during experiments.

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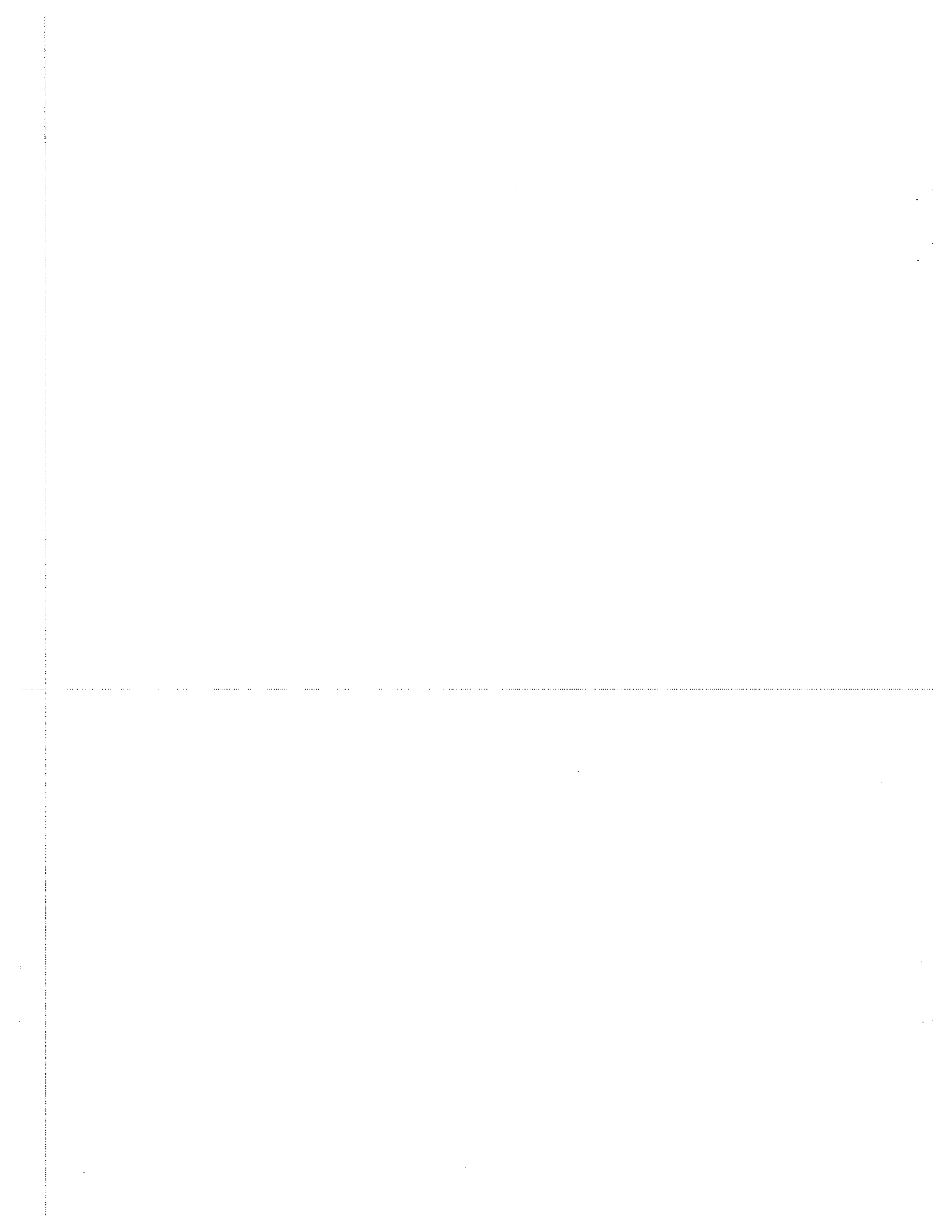
SECTION 1

GENERAL

The MH676A Multiplexer and MH677A Demultiplexer are suitable for measuring and developing high-speed digital systems of 700 Mb/s to 1.4 Gb/s as well as for testing high-speed GaAs FET and GaAs ICs, and LD optical devices. The MH676A Multiplexer receives clock signals of 350 Mb/s to 700 Mb/s and data signals from the ME522A Error Rate Measuring Equipment transmitter. The speed of these signals is doubled, so that clock and data signals of 700 Mb/s to 1.4 Gb/s are transmitted.

The MH677A Demultiplexer receives clock and data signals of 700 Mb/s to 1.4 Gb/s from the measured system. The speed of these signals is halved so that clock/ and data signals of 350 Mb/s to 700 Mb/s are transmitted.

The MH676A is mounted in the ME522A transmitter and the MH677A in the ME522A receiver.



SECTION 2

COMPOSITION AND SPECIFICATIONS

2.1 Composition

Tables 2-1 and 2-2 show the composition of the MH676A Multiplexer and MH677A Demultiplexer.

Table 2-1 MH676A Multiplexer Composition

	Item	Qty.	Remarks
Unit	MH676A Multiplexer	1	
Accessories	Coaxial Cable	3	BNC-P [] — $\frac{\text{RG-58A/U}}{0.4 \text{ m}}$ — [] BNC-P
	Semirigid Cable	2	SMA [] — $\frac{\text{UT-141A}}{0.5 \text{ m}}$ — [] SMA
	N-P•SMA-J conversion connector	2	
	Fuse	3 sets	MF51NN250V2ADC01: 3 MF51NN250V0.5ADC01: 2
	Operation manual	1	

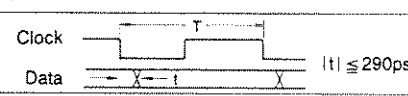
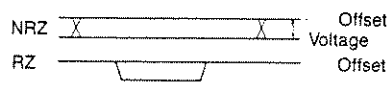
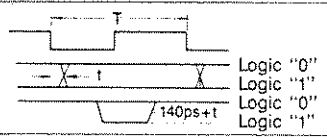
Table 2-2. MH677A Demultiplexer Composition

	Item	Qty.	Remarks
Unit	MH677A Demultiplexer	1	
Accessories	Coaxial Cable	2	BNP-P [] — $\frac{\text{RG-58A/U}}{0.4 \text{ m}}$ — [] BNC-P
	Semirigid Cable	2	SMA [] — $\frac{\text{UT-141A}}{0.5 \text{ m}}$ — [] SMA
	N-P•SMA-J conversion connector	2	
	Fuse	3 sets	MF51NN250V2ADC01: 3 MF51NN250V0.5ADC01: 2
	Operation manual	1	

2.2 Specifications

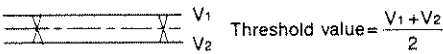
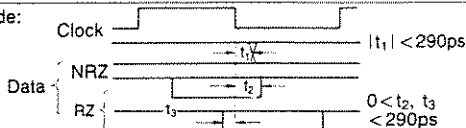
Tables 2-3 and 2-4 list the specifications of the MH676A Multiplexer and MH677A Demultiplexer.

Table 2-3 MH676A Multiplexer Specifications

Input	Operating frequency		350MHz to 700MHz	
	Clock	Waveform	Clock: RZ (Duty: 45 to 55% or less), data: NRZ	
		Data 1	Level	0/ -1V \pm 0.1V or less
	Data 2	Phase		
Termination, connector		50 Ω , BNC		
Output	Operating frequency		Frequency which is two times as large as input clock	
	Clock	Waveform	Clock: RZ*, Data: NRZ, RZ* (*Duty: 45 to 55% or less)	
		Data	Voltage	1 to +3V/0.05V step (however, indication is made in a step of 0.1V)
		Offset	-1 to +4V/0.05V step (however, indication is made in a 0.1V step)	
				
Level error		Voltage and offset within the larger one of set value \pm 10% or \pm 0.15V		
Phase Logic				
Load, connector		50 Ω , N		
Remote control	Interface	GP-IB (Standard provision, IEEE Std. 488-1978) RS-232C (Option)		
	Details of control	Possible to set all switches		
Dimensions and weight		215H, 95W, 446Dmm, 5kg or less		
Ambient temperature, rated range of use		0 to 50°C		

Option 12: RS-232C

Table 2-4 MH677A Demultiplexer Specifications

Input	Operating frequency		700MHz to 1.4GHz
	Clock	Waveform	Clock: RZ*, Data: NRZ, RZ* (*Duty: 45 to 55% or less)
	Data	Voltage	1 to 3V
		Offset	-1 to +4V
		Threshold value (Data)	-2.5 to +3.5V/0.05V step (however, indication is made in a 0.1V step)  $\text{Threshold value} = \frac{V_1 + V_2}{2}$
		Adjustment on phases (Clock)	+500 to -500 ps, variable in step
		Phases between clock and data	When the abovementioned phase adjustment is made: 
	Termination, connector	50Ω, N	
Output	Operating frequency		1/2 Frequency of input clock (350MHz to 700MHz)
	Clock	Waveform	Clock: RZ (Duty: 45 to 55% or less), Data: NRZ
	Data 1 Data 2	Level	0/-1V ±0.1V or less
	Load, connector	50Ω, BNC	
Remote control	Interface	GP-IB (Standard provision, IEEE Std. 488-1978) RS-232C (Option)	
	Details of control	Possible to set all switches	
Dimensions and weight			215H, 95W, 446Dmm, 5kg or less
Ambient temperature, rated range of use			0 to 50°C

Option 13: RS-232C

SECTION 3

OPERATION

3.1 Power Supply

Power for each of the MH676A Multiplexer and MH677A Demultiplexer is supplied from the ME522A transmitter and the ME522A receiver, respectively.

The ME522A transmitter and receiver operate normally on 100 Vac $\pm 10\%$, 50/60 Hz.

CAUTIONS

Note the following precautions when using the ME522A transmitter and receiver.

1. Be sure to ground the \perp terminal on the rear panel of the unit or the ground terminal of the power supply cord to avoid accidental electrical shocks.
 2. Make sure the power switch of the unit is OFF and disconnect the power cord from the supply outlet whenever replacing fuses.
 3. Be sure the power switch of the unit is OFF whenever mounting or demounting the MH676A multiplexer or the MH677A demultiplexer on or from the ME522A transmitter or receiver.
-

3.2 Operating and Storage Conditions

The MH676A multiplexer and the MH677A demultiplexer are designed to operate normally in an ambient temperatures range of 0° to 50°C. Do not use or store the instrument in locations:

1. where vibrations are severe
2. where it is damp or dusty
3. where there is exposure to direct sunlight and
4. where there is exposure to active gases.

If these instruments are operated at room temperature after being used or stored for a long period at low temperature, condensation may occur and cause short-circuiting. To prevent this do not turn the power on until the instruments are completely dry.

3.3 Termination and Maximum Input Levels

If the MH676A and MH677A outputs are terminated by procedures other than those specified in paragraph 2.2, their output circuits may be damaged.

If signals exceeding the specified levels described in paragraph 2.2 are applied to the MH676A and MH677A inputs, their input circuits may be damaged.

3.4 Explanation of Controls

Figure 3-1 and Table 3-1 show the functions of the MH676A Multiplexer, and Fig. 3-2 and Table 3-2 show the functions of the MH677A Demultiplexer.

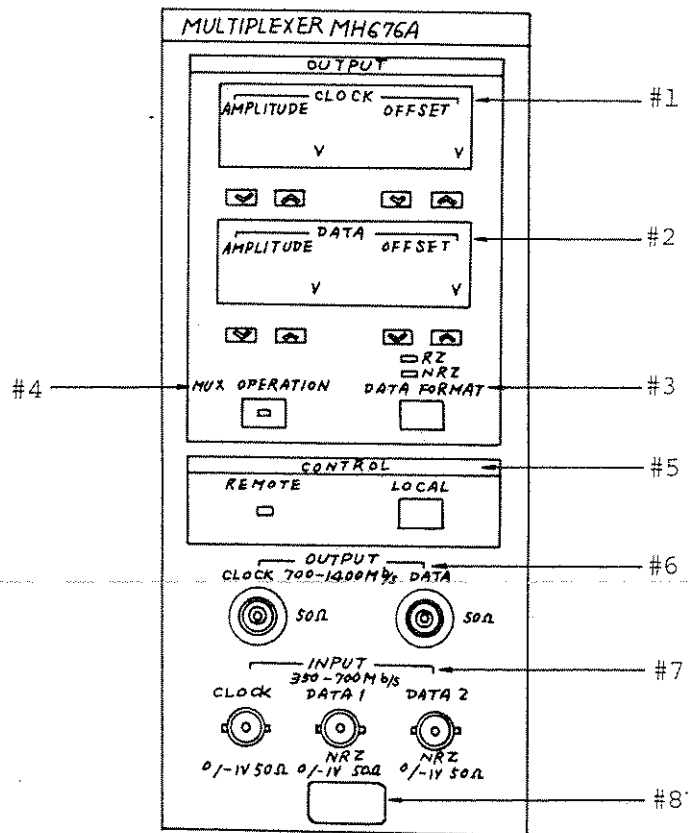


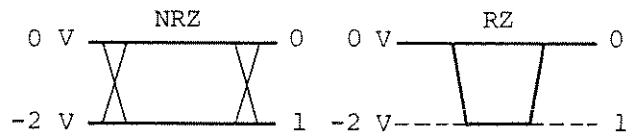
Fig. 3-1 MH676A Multiplexer Front Panel

Table 3-1 MH676A Multiplexer Front Panel

No.	Label	Explanation
#1	OUTPUT CLOCK AMPLITUDE OFFSET	Displays the clock output amplitude and offset. They are set with the [∇] and [∧] keys. The amplitude and offset can be set in 0.05 V steps, but are displayed in 0.1 V steps.
#2	OUTPUT DATA AMPLITUDE OFFSET	Displays the data output amplitude and offset. They are set with the [∇] and [∧] keys. The amplitude and offset can be set in 0.05 V steps, but they are displayed in 0.1 V steps.

#3 OUTPUT DATA FORMAT
RZ
NRZ

Switches the data output waveforms.



The above examples show an amplitude of 2 V and an offset of 0 V.

#4 MUX OPERATION

If the pattern settings of the ME522A transmitter are programmable words (A, B, C, 1/N and \bar{A} , \bar{B} , \bar{C} , $\bar{N-1/N}$) and the switch is turned ON, the DATA1 and DATA2 outputs of the transmitter change to patterns for the multiplexer operation*. The ALT D/E programmable word pattern cannot be used for the multiplexer operation *. The PRBS pattern can be used for the multiplexer operation * regardless of whether the switch is ON or OFF.

* Multiplexer operation

DATA1 input	A	B	C	D	E	
DATA2 input	A'	B'	C'	D'	E'	
DATA output	A	A' B	B' C	C' D	D' E	E'

The DATA output pattern is the same pattern set in the transmitter; the frequency speed is doubled.

Table 3-1 MH676A Multiplexer Front Panel (Continued)

No.	Label	Explanation
#5	CONTROL	The REMOTE lamp is on when the MH676A is externally controlled by a GP-IB or RS-232C interface.
#6	OUTPUT CLOCK DATA	These are clock and data output connectors. To connect the measured system, use the shortest possible cable with good high frequency characteristics.
#7	INPUT CLOCK DATA1 DATA2	These are clock and DATA1, 2 input connectors. Connect to the transmitter output connector by using the provided 0.4 m coaxial cable.
#8		Unit demount grip. Pull out the unit with this handle.

Note: All switches are disabled when the PANEL LOCK of the ME522A transmitter is ON.

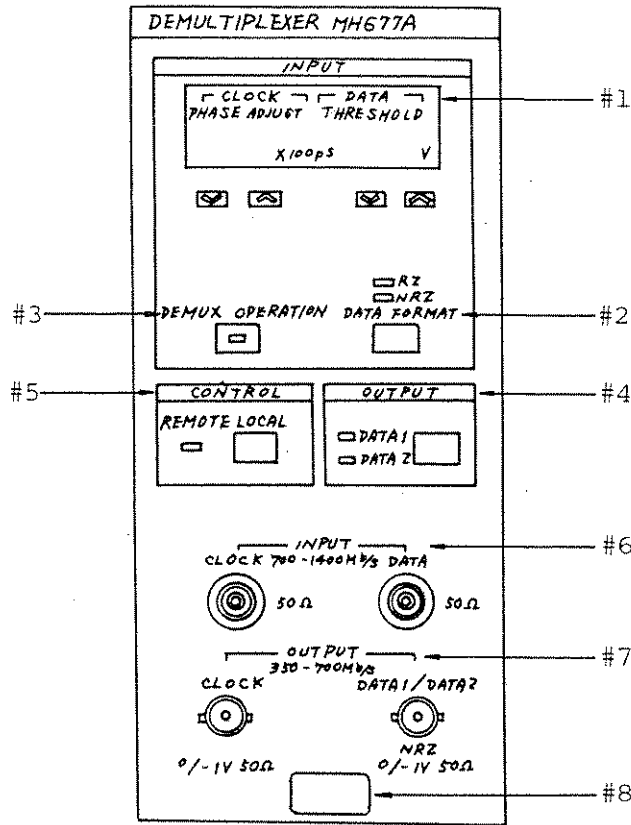


Fig. 3-2 MH677A Demultiplexer Front Panel

Table 3-2 MH677A Demultiplexer Front Panel

No.	Label	Explanation
#1	INPUT CLOCK PHASE ADJUST DATA THRESHOLD	Adjusts the phase between the clock and data inputs. Matches the threshold that suits the data input amplitude and offset. It can be set in 0.05 V steps, but is displayed in 0.1 V steps.
		<p>If the data inputs are V_1 and V_2, the V_{TH} threshold is calculated as follows:</p> $V_{TH} = \frac{V_1 + V_2}{2}$

Table 3-2 MH677A Demultiplexer Front Panel (Continued)

No.	Label	Explanation																																							
#2	INPUT DATA FORMAT RZ NRZ	Sets to match the data input waveform																																							
#3	DEMUX OPERATION	<p>If the pattern settings of the ME522A receiver are programmable words (A, B, C, 1/N and A, B, C N-1/N), errors cannot be detected unless the switch is ON.</p> <p>This is because the receiver comparative pattern is not switched to the demultiplexer operation * pattern. For the PRBS pattern, errors can be detected regardless of whether the switch is ON or OFF.</p>																																							
		* Demultiplexer operation																																							
		<table border="1" style="margin-left: 40px;"> <tr> <td style="padding-right: 10px;">DATA input</td> <td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td><td>I</td><td>J</td><td>K</td><td>L</td> </tr> <tr> <td>DATA1 output</td> <td>A</td><td>C</td><td>E</td><td>G</td><td>I</td><td>K</td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>DATA2 output</td> <td></td><td>B</td><td>D</td><td>F</td><td>H</td><td>J</td><td>L</td><td></td><td></td><td></td><td></td><td></td> </tr> </table>	DATA input	A	B	C	D	E	F	G	H	I	J	K	L	DATA1 output	A	C	E	G	I	K							DATA2 output		B	D	F	H	J	L					
DATA input	A	B	C	D	E	F	G	H	I	J	K	L																													
DATA1 output	A	C	E	G	I	K																																			
DATA2 output		B	D	F	H	J	L																																		
		The DATA input is converted to DATA1 and DATA2 of half the frequency speed.																																							
#4	OUTPUT DATA1 DATA2	Switches the DATA output from the DATA1/DATA2 OUTPUT terminal.																																							
#5	CONTROL	The REMOTE lamp is on when the MH677A is externally controlled by a GP-IB or RS-232C interface.																																							
#6	INPUT CLOCK DATA	These are clock and data input connectors. To connect the measured system, use the shortest possible cable with good high frequency characteristics.																																							

Table 3-2 MH677A Demultiplexer Front Panel (Continued)

No.	Label	Explanation
#7	OUTPUT CLOCK DATA1/ DATA2	These are clock and DATA1/DATA2 output connectors. Connect to the receiver input connector by using the provided 0.4 m coaxial cable.
#8		Unit demount grip. Pull out the unit with this handle.

Note: All switches are rendered ineffective when the PANEL LOCK of the ME522A receiver is ON.

3.5 Operation

When the ME522A transmitter and receiver are switched ON, the MH676A and MH677A test the transmitter and receiver lamps and then test the other lamps.

After the lamps are tested, the panel is set to the state it was in before the test.

To initialize the MH676A, hold down the LOCAL key and turn ON the power. Fig. 3-3 shows initialization.

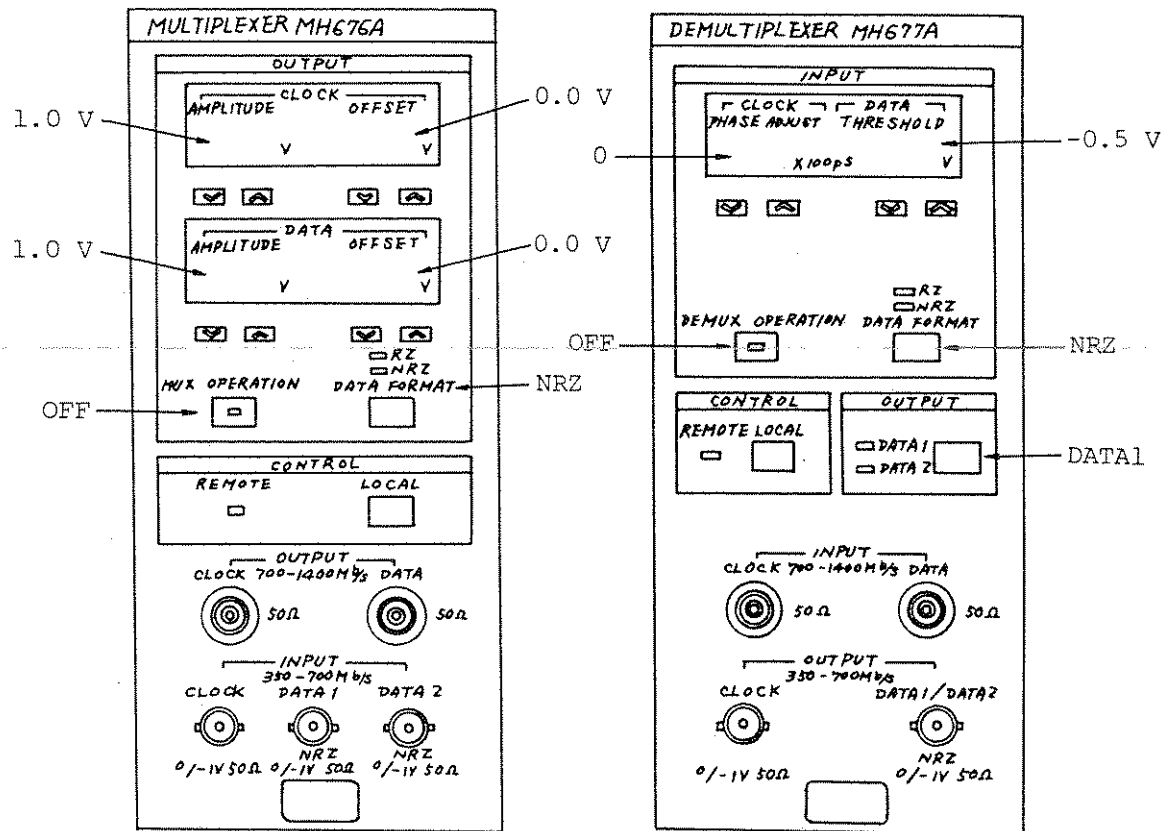


Fig. 3-3 Panel Initialization

3.6 Mounting and Demounting the Unit

1. Remove cover #5 from the housing of the ME522A transmitter and receiver, where the units are mounted, by removing the top plate and removing the screws at the top and bottom as shown in Fig. 3-4.

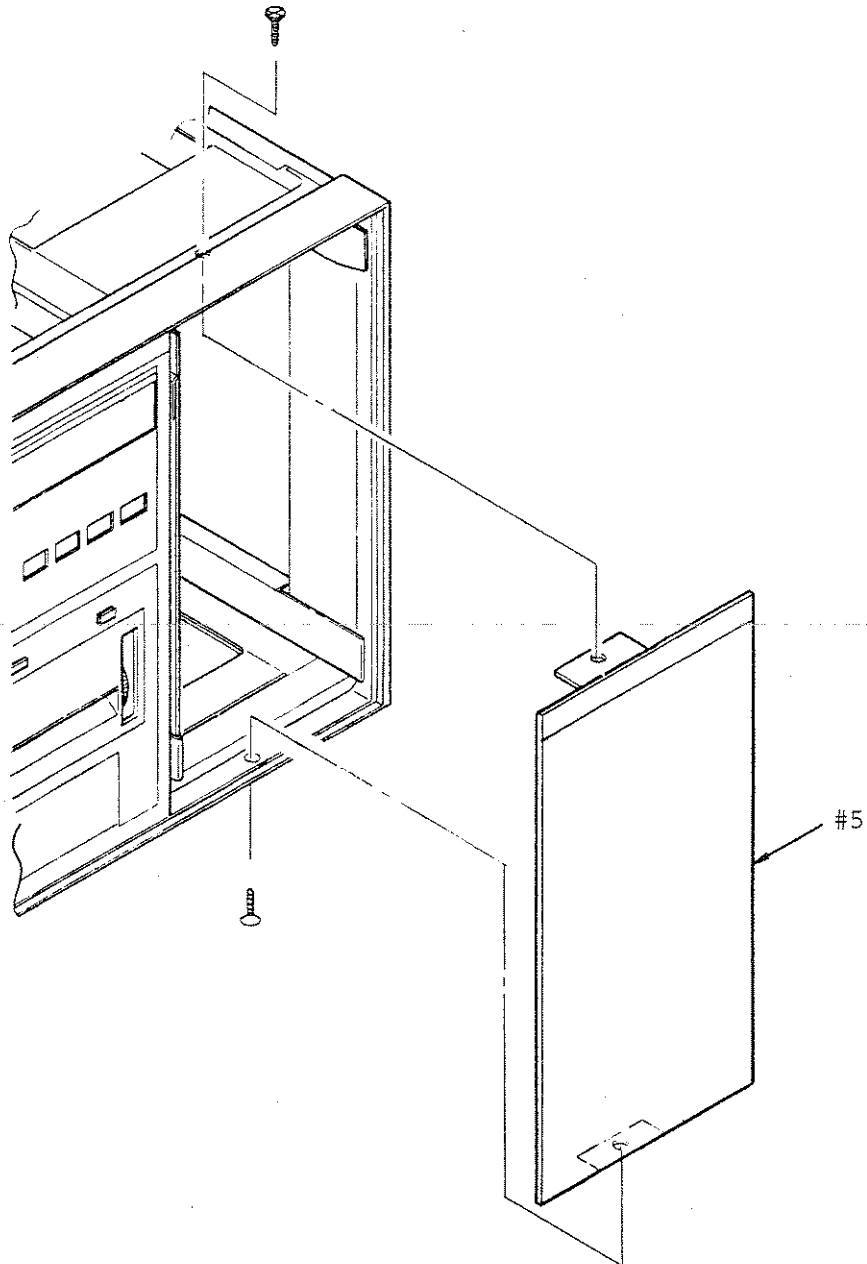


Fig. 3-4 Cover Removal

2. Remove rear cover #6 of the ME522A transmitter and receiver, by unscrewing the three screws as shown in Fig. 3-5.

Note:

Before the MH676A and MH677A are mounted, ensure that cover #6 has been removed.

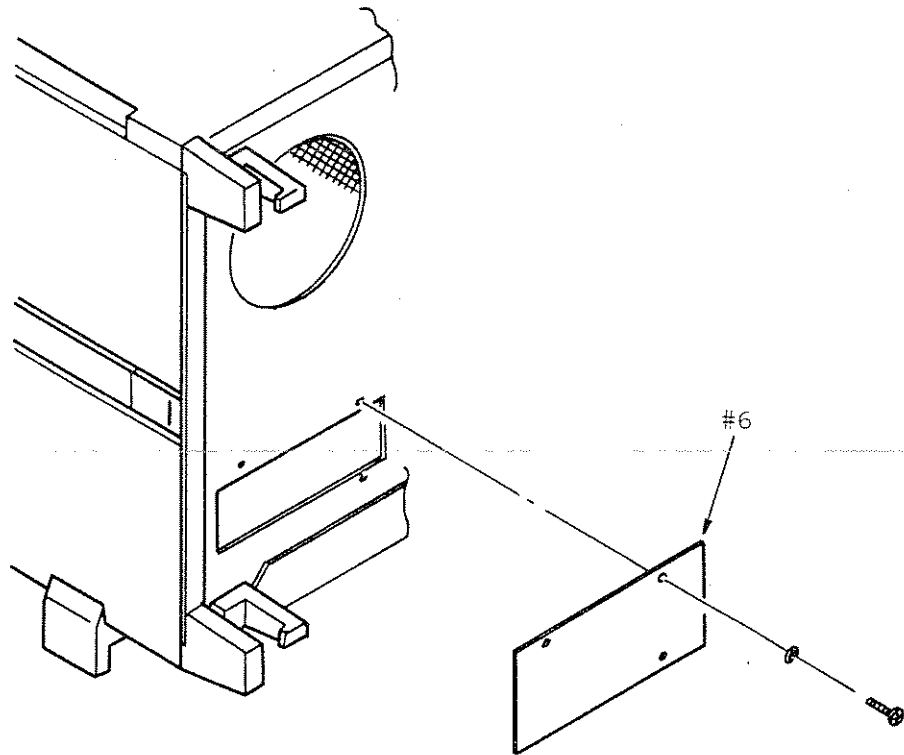


Fig. 3-5 Rear Cover Removal

3. To mount a unit in the ME522A transmitter or receiver, align the groove on the unit top cover with the mainframe guide mould as shown in Fig. 3-6, and push the unit straight into the mainframe compartment until a click is heard.

To demount the unit, pull it straight out using grip #4 of the unit.

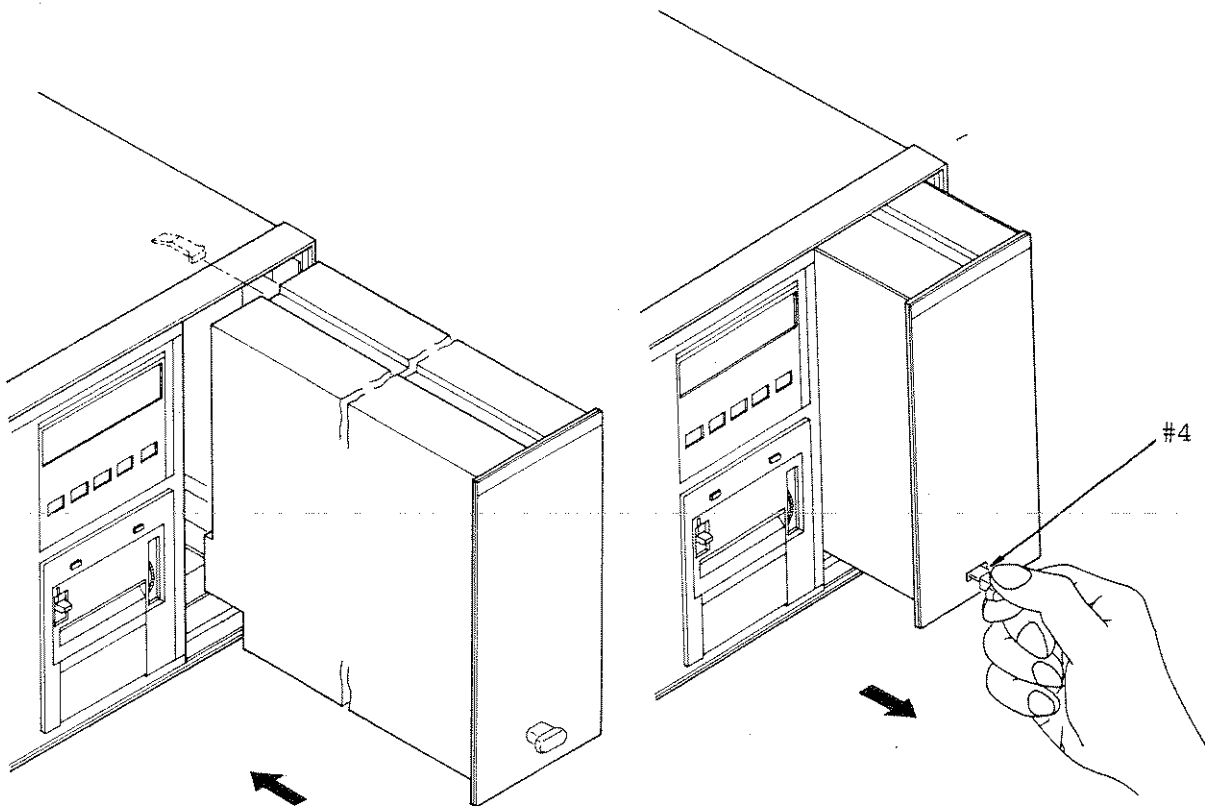


Fig. 3-6 Mounting and Demounting the Unit

3.7 Measurement

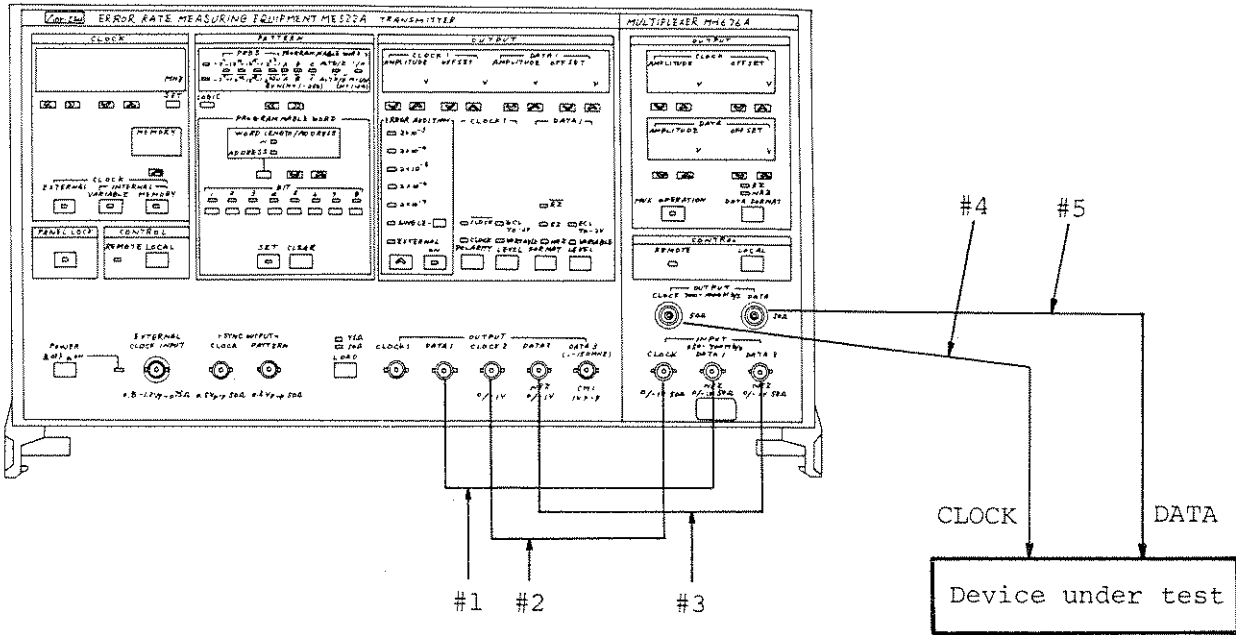
Before starting a measurement, confirm that the ground terminals of the ME522A transmitter and receiver, the measuring system and observation equipment are grounded.

3.7.1 Setup

Figure 3-7 shows the setup for connecting the ME522A transmitter and MH676A.

ME522A transmitter

MH676A



ME522A receiver

MH677A

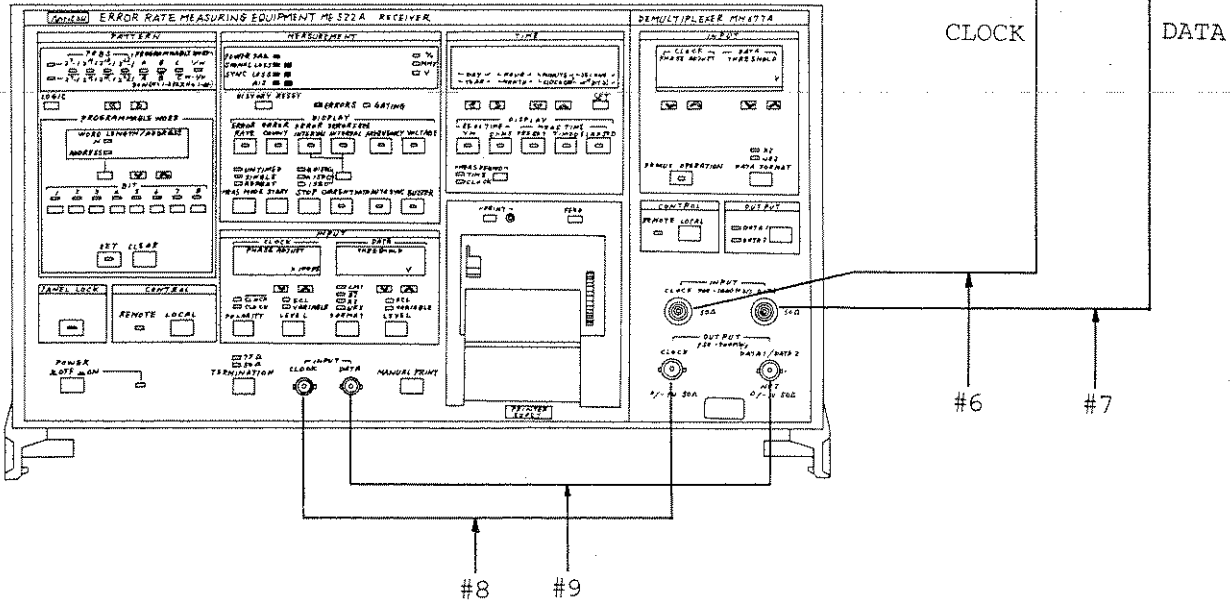


Fig. 3-7 Setup

Table 3-3 Connection Cables

No.	Cable name	Remarks
#1	BNC-P•RG-58A/U•BNC, 50Ω	Use the supplied accessories or their equivalent.
#2	BNC-P•RG-58A/U•BNC, 50Ω	Use the supplied accessories or their equivalent.
#3	BNC-P•RG-58A/U•BNC, 50Ω	Use the supplied accessories or their equivalent.
#4	SMA•UT-141A•SMA, 50Ω	Use the supplied accessories or their equivalent.
#5	SMA•UT-141A•SMA, 50Ω	Use the supplied accessories or their equivalent.
#6	SMA•UT-141A•SMA, 50Ω	Use the supplied accessories or their equivalent.
#7	SMA•UT-141A•SMA, 50Ω	Use the supplied accessories or their equivalent.
#8	BNC-P•RG-58A/U•BNC, 50Ω	Use the supplied accessories or their equivalent.
#9	BNC-P•RG-58A/U•BNC, 50Ω	Use the supplied accessories or their equivalent.

Notes:

1. Use 50 Ω impedance cables.
2. Use cables of the same length for #1 to #3 and for #8 and #9.
3. For #4 to #7, use a cable with good high frequency characteristics that is as short as possible. Long cables may cause the waveform to deteriorate.

3.7.2 Panel Setting

Refer to the ME522A Operation Manual for the operations of the ME522A transmitter and receiver in the following explanation.

Note:

Before setting the panel, confirm that the [PANEL LOCK] key (#6 in Fig. 3-4 and #7 in Fig. 3-5) is OFF. The panel cannot be set when it is ON.

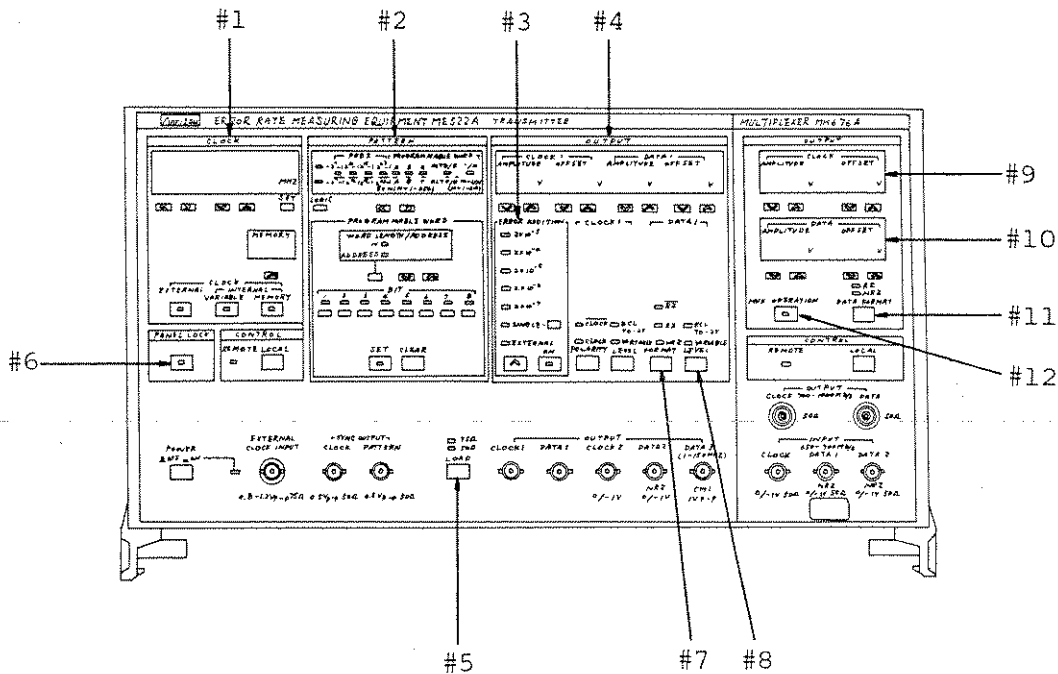


Fig. 3-8 ME522A Transmitter and MH676A

Table 3-4 ME522A Transmitter and MH676A Panel Setting

No.	Label	Setting
#1	CLOCK	Set within the range of 350 to 700 MHz.
#2	PATTERN	Set with PRBS and programmable words except ALT D/E and \bar{D}/E .

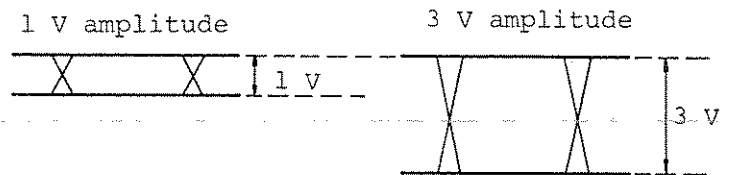
Table 3-4 ME522A Transmitter and MH676A Panel Setting
(Continued)

No.	Label	Setting
#3	ERROR ADDITION	Set OFF except when checking the measurement for normal execution or for checking the measured system.
#4	OUTPUT	The CLOCK1 output can be used as a clock input for the MH676A, but it is easier to use the CLOCK2 output because the level and waveform are fixed for the unit; consequently, no setting is required. Set the DATA1 output with VARIABLE for LEVEL #8, NRZ for FORMAT #7, 1 V for AMPLITUDE, and 0 V for OFFSET.

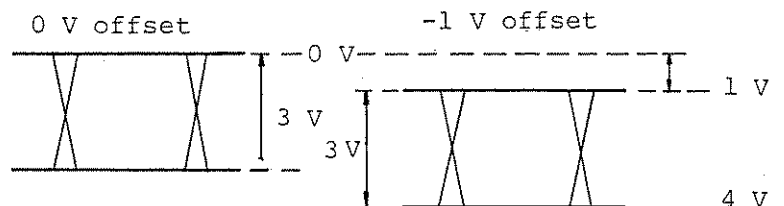
#5 LOAD Set to 50 Ω .

#9 OUTPUT Set to match the input level of the measured object interface.
#10 CLOCK DATA

AMPLITUDE



OFFSET (3 V amplitude)



Both AMPLITUDE and OFFSET are changeable in 0.05 V steps with the [\wedge] and [\vee] keys. The displays are, however, in 0.1 V steps.

#11	DATA FORMAT	Set the output data formats in NRZ or RZ.
#12	MUX OPERATION	Set the multiplexer operation (see #4 of Table 3-1) to ON.

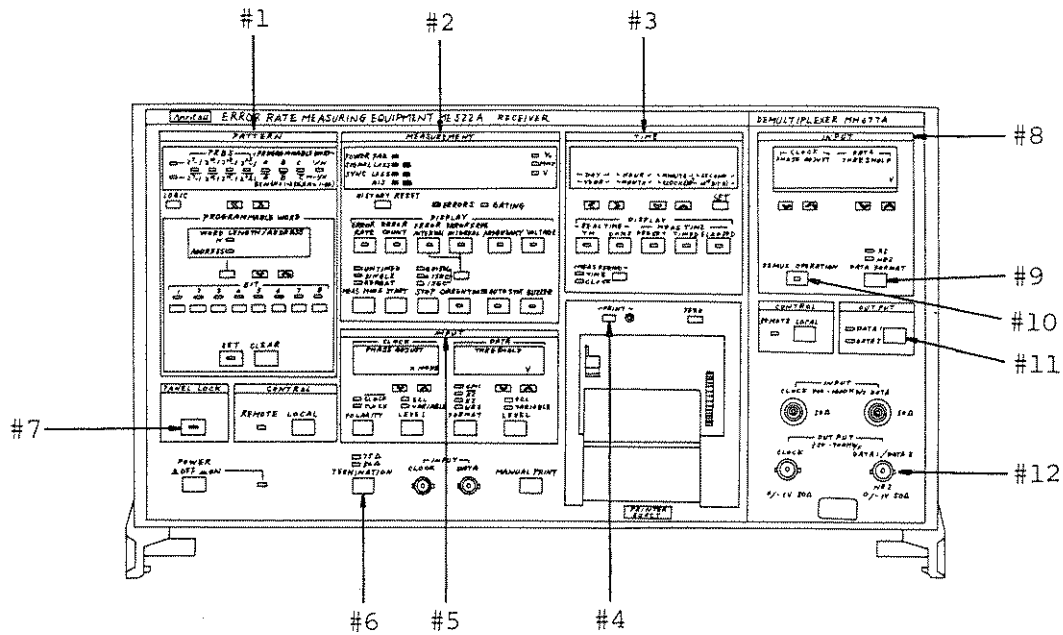


Fig. 3-9 ME522A Receiver and MH677A

Table 3-5 ME522A Receiver and MH677A Panel Setting

No.	Label	Setting
#1	PATTERN	Set to the same pattern as the transmitter.
#2	MEASUREMENT	Set the DISPLAY, ERROR INTERVAL, MEAS MODE, CURRENT DATA and AUTO SYNC, and start measuring by pressing the [START] key.
#3	TIME	Set the REAL-TIME, MEAS TIME, and MEAS PERIOD.
#4	PRINT	Set to ON for printing the measured results and alarm descriptions.
#5	INPUT	Set to match the MH677A output interface as follows:
	DATA	Set FORMAT to NRZ, LEVEL to VARIABLE and THRESHOLD to -0.5 V.
	CLOCK	Set the LEVEL to VARIABLE, and POLARITY to CLOCK when the MH677A OUTPUT is DATA1 and to CLOCK for DATA2. Set the PHASE ADJUST to 0 x 100 ps.

Table 3-5 ME522A Receiver and MH677A Panel Setting
(Continued)

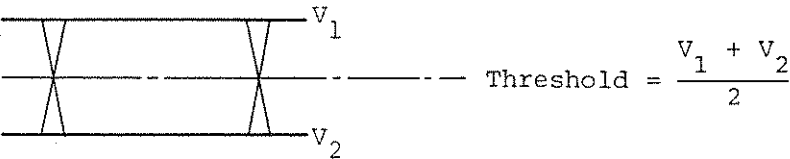
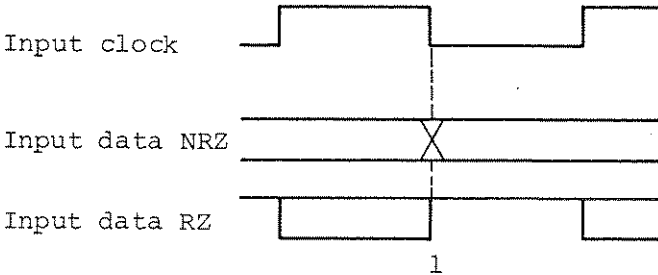
No.	Label	Setting
#6	TERMINATION	Set to 50 Ω
#8	INPUT	Set to match the output interface of the measured device as follows:
	DATA	Set FORMAT #9 to NRZ or RZ and the THRESHOLD to the input data threshold.
		
	CLOCK	<p>Operates for an input signal of an amplitude of 1 to 3 V and offset of -1 to +4 V. Use the PHASE ADJUST to set the phase between the input clock and input data to the most appropriate position. In this case, operate [\wedge] [\vee] keys of the PHASE ADJUST so that the error indication of the ME522A receiver becomes minimum. The " - " display of the PHASE ADJUST is an indication for advancing the input clock. The most appropriate phase for the PHASE ADJUST "0" display is as follows:</p>
		

Table 3-5 ME522A Receiver and MH677A Panel Setting
(Continued)

No.	Label	Setting
#10	DEMUX OPERATION	Set the demultiplexer operation (See #3 of Table 3-2) to ON.
#11	OUTPUT DATA1 DATA2	Set the DATA output from the DATA1/DATA2 output terminal #12 and select the DATA to be measured from the ME522A receiver.
		Note: If DATA1 and DATA2 are switched, the ME522A receiver <u>CLOCK POLARITY</u> must always be switched to <u>CLOCK</u> and <u>CLOCK</u> . (See #3 in Table 3-2 and #5 in Table 3-5.)

SECTION 4
PERFORMANCE CHECK

4.1 Introduction

Performance is checked to confirm that the MH676A and MH677A satisfy the specifications.

This section lists the equipment required for the performance check and explains how each test is conducted.

4.2 Equipment Required for the Performance Check

Table 4-1 lists the equipment required for the performance check.

Table 4-1 Equipment Required for Performance Check

Equipment	Required performance
Sampling oscilloscope	Frequency range: DC to ≥ 10 GHz Input impedance: 50Ω
20 dB pad SMA connector	50Ω series

4.3 Performance Check

Warm up the devices for about 10 minutes before they are tested.

4.3.1 MH676A Multiplexer

(1) Clock and data output checks

(a) Specifications

Operation frequency:

Twice the frequency of the input clock
(700 MHz to 1.4 GHz)

Waveform:

Clock --- RZ*

Data --- NRZ and RZ*

(* Duty factor: 45% to 55%)

Amplitude voltage:

1 to 3 V/0.05 V steps (displayed in 0.1 V steps)

Offset voltage:

-1 to +4 V/0.05 V steps (displayed in 0.1 V steps)

Level error:

$\pm 10\%$ of the set values of the amplitude and offset voltages or ± 0.15 V, whichever is greater.

(b) Setup

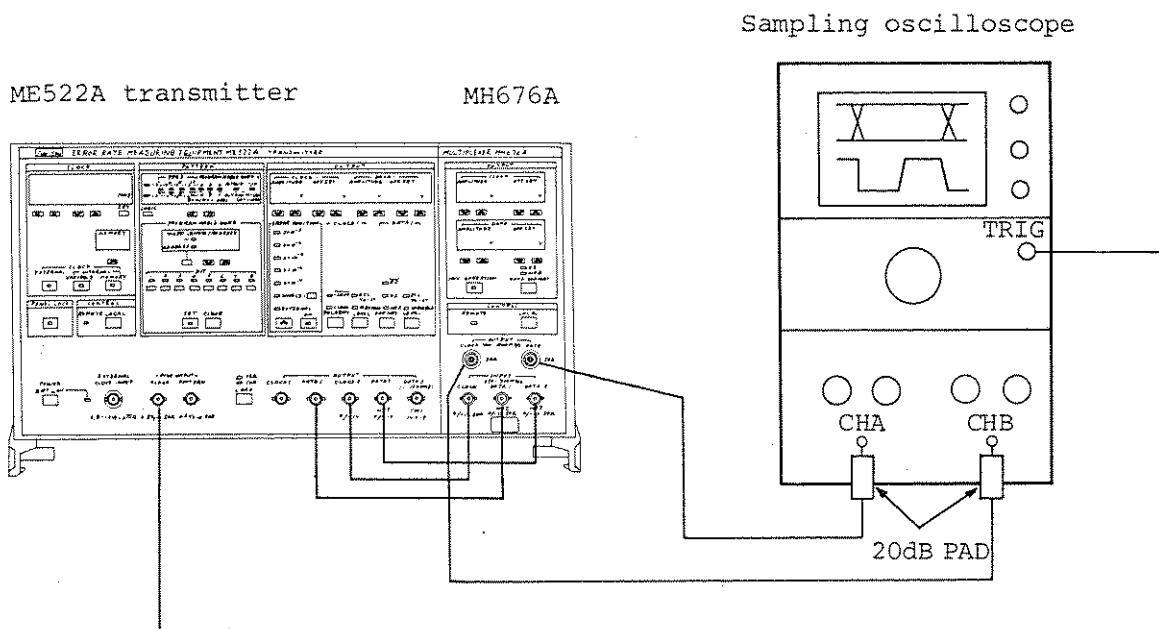


Fig. 4-1 Clock and Data Output Checks

(c) Procedure

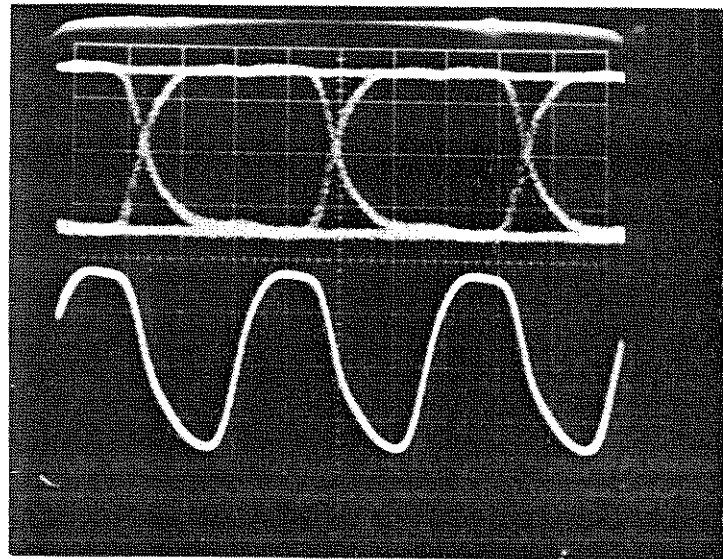
Step	Procedure
1	Set up as shown in Fig. 4-1. Use only 50 Ω impedance series connection cables. To connect the ME522A transmitter and MH676A, use the supplied coaxial cable (0.4 m). To connect CHA and CHB, use the supplied semirigid cable of the same length, or use a cable with good high frequency characteristics, that is as short as possible. A long cable may cause the waveform to deteriorate.

2 Set the ME522A transmitter as follows:

CLOCK	700 or 350 MHz
PATTERN	PRBS $2^{23}-1$
ERROR ADDITION	OFF
LOAD	50 Ω
DATA1 OUTPUT	LEVEL VARIABLE
	AMPLITUDE 1.0 V
	OFFSET 0.0 V

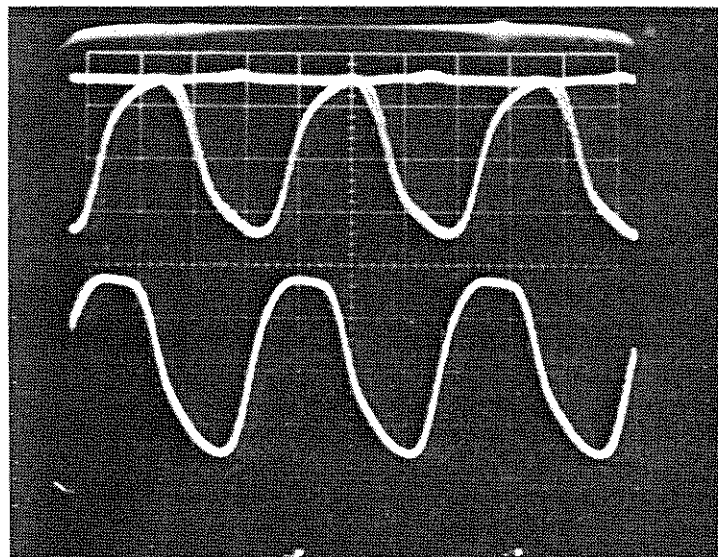
(continued)

Step	Procedure
3	Set the MH676A OUTPUT as follows: CLOCK ----- AMPLITUDE 3.0 V OFFSET 0.0 V DATA ----- AMPLITUDE 3.0 V OFFSET 0.0 V DATA FORMAT ----- NRZ MUX OPERATION ---- ON
4	<u>Clock output and data output (NRZ) checks</u> Confirm that the CLOCK and DATA output waveforms are as shown in Fig. 4-2.
5	<u>Clock output and data output (RZ) checks</u> Confirm that the waveforms are as shown in Fig. 4-3 when the DATA FORMAT is set to RZ.
6	<u>Clock output and data output (RZ) amplitude checks</u> Confirm that the amplitude of the clock or the data output can be varied from 1 to 3 V with the AMPLITUDE [\wedge] and [\vee] keys.
7	<u>Clock and data output offset voltage checks</u> Confirm that the offset voltage can be varied from -1 to +4 V with the clock or data output OFFSET [\wedge] and [\vee] keys. Set the data output FORMAT to NRZ.



High: DATA (NRZ)
 Low : CLOCK
 V: 1 V/div
 H: 200 ps/div

Fig. 4-2 Clock and Data (NRZ) Output Waveforms



High: DATA (RZ)
 Low : CLOCK
 V: 1 V/div
 H: 200 ps/div

Fig. 4-3 Clock and Data (RZ) Output Waveforms

4.3.2 MH677A demultiplexer

(1) Operating frequency check

(a) Specification

700 MHz to 1.4 GHz

(b) Setup

ME522A transmitter

MH676A

ME522A receiver

MH677A

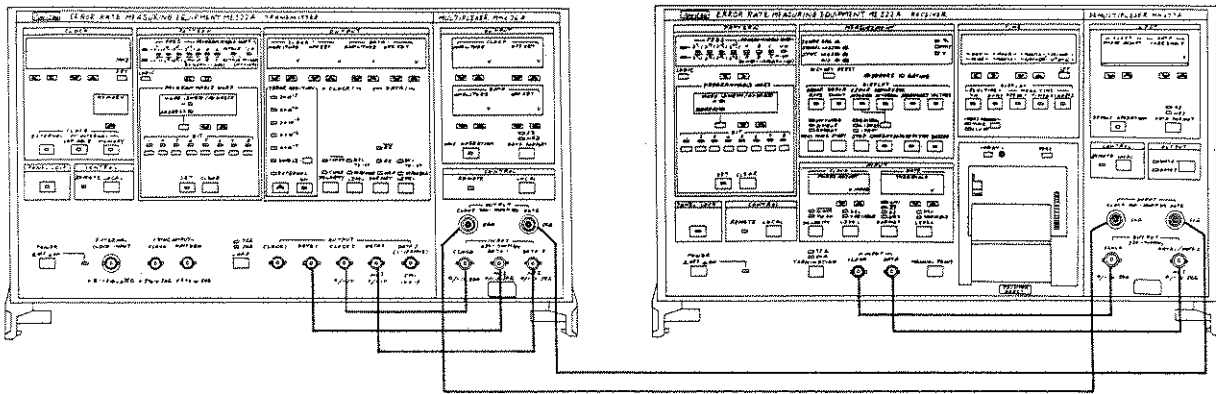


Fig. 4-6 Connections

(c) Procedure

Step	Procedure
1	Set up the ME522A transmitter and MH676A, and the ME522A receiver and MH677A as shown in Fig. 4-6. Use 50 Ω impedance coaxial cable for the setup.

2 Set the MH676A and MH677A as follows:

MH676A		
CLOCK OUTPUT	AMPLITUDE	1.0 V
DATA OUTPUT	OFFSET	0.0 V
MUX OPERATION		ON

(continued)

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

2
(cont.)

MH677A	
CLOCK PHASE ADJUST	0
DATA THRESHOLD	-0.5 V
DEMUX OPERATION	ON

- 3 Set the ME522A transmitter as described in step 2 of procedure (c) in paragraph 4.3.1 (1).
Set the ME522A receiver as follows:

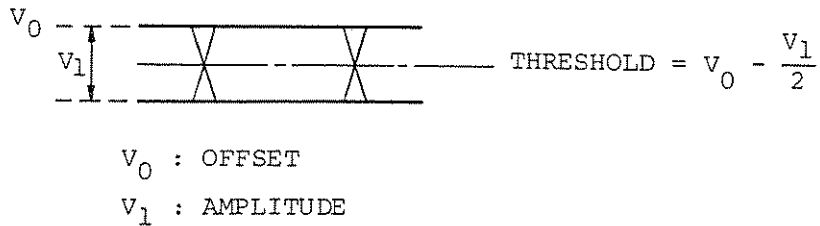
PATTERN	PRBS $2^{23}-1$
DATA FORMAT	NRZ
DATA AND CLOCK LEVEL	VARIABLE
DATA THRESHOLD	-0.5 V
CLOCK POLARITY	CLOCK (when the MH677A data output is DATA1) $\overline{\text{CLOCK}}$ (when the MH677A data output is DATA2)
CLOCK PHASE ADJUST	0
TERMINATION	50 Ω
MEAS MODE	UNTIMED
BUZZER	ON

- 4 Confirm that the ERRORS lamp does not come on in the following settings:
1. When the transmitter frequency is set to 700 MHz or 350 MHz
 2. When the MH676A and MH677A DATA FORMATs are set to NRZ or RZ
-

(2) Input level check

(a) Specification

AMPLITUDE 1 to 3 V
 OFFSET -1 V to +4 V
 THRESHOLD -2.5 V to +3 V



(b) Setup

Set up as shown in Fig. 4-6.

Use 50 Ω impedance coaxial cable for the setup.

(c) Procedure

Step	Procedure
1	Set up and set the devices as described in steps 1 to 3 of procedure (c) in paragraph 4.3.2 (1).

2 Confirm that the ERRORS lamp does not come on in the following settings:

Setting order	MH676A				MH677A	
	DATA OUTPUT			FORMAT	DATA INPUT	
	LEVEL	AMPLITUDE	OFFSET		LEVEL	THRESHOLD
1	VARIABLE	1.0 V	-1.0 V	NRZ	VARIABLE	-1.5 V
2	"	"	"	RZ	"	"
3	"	"	+4.0 V	NRZ	"	+3.5 V
4	"	"	"	RZ	"	"
5	"	3.0 V	-1.0 V	NRZ	"	-2.5 V
6	"	"	"	RZ	"	"

(3) CLOCK input level check

(a) Specifications

AMPLITUDE 1 to 3 V
OFFSET -1 V to +4 V

(b) Setup

Set up as shown in Fig. 4-6.

Use 50 Ω impedance coaxial cable for the setup.

(c) Procedure

Step	Procedure
1	Set up and set the devices as described in steps 1 to 3 of procedure (c) in paragraph 4.3.2 (1).
2	Confirm that the ERRORS lamp does not come on in the following settings:

Setting order	MH676A CLOCK OUTPUT	
	AMPLITUDE	OFFSET
1	1.0 V	-1.0 V
2	1.0 V	+4 V
3	3.0 V	-1 V

(4) Clock and data output checks

(a) Specifications

Operation frequency:

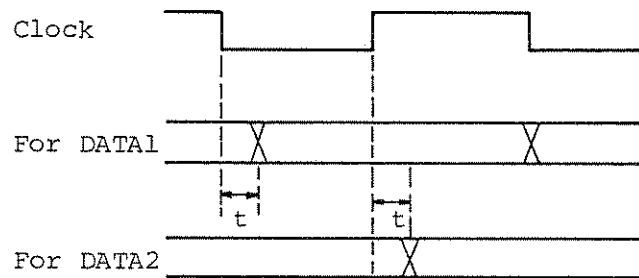
Half of the input clock frequency

Amplitude:

0/-1 V

Phase:

The DATA1/DATA2 output phase when switched to DATA1 or DATA2

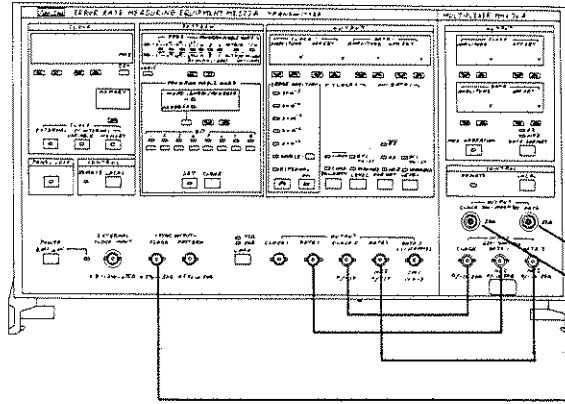


$[t] \leq 290 \text{ ps}$

(b) Setup

ME522A transmitter

MH676A



ME522A receiver

MH677A

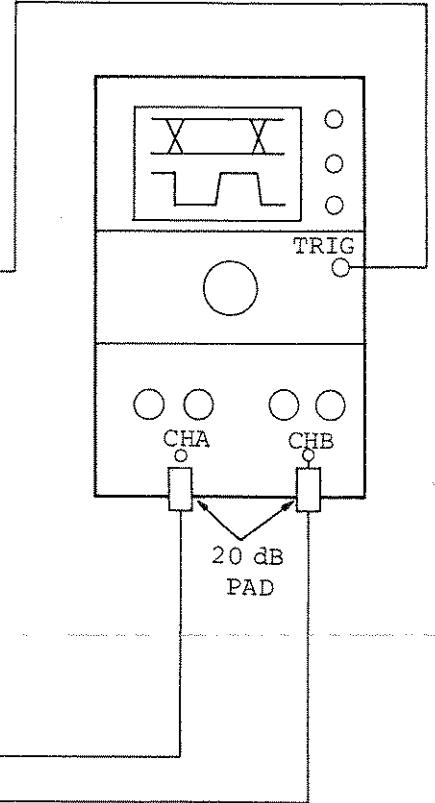
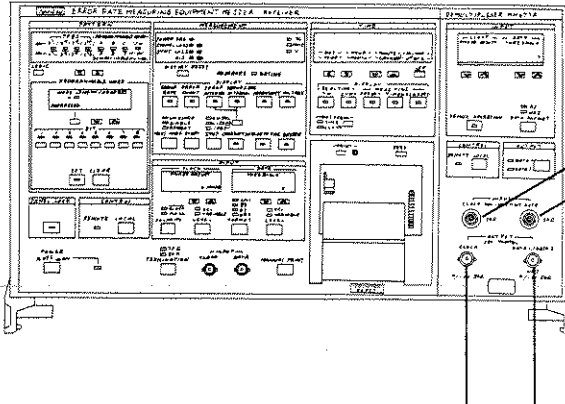


Fig. 4-7 Clock and Data Output Checks

(c) Procedure

Step	Procedure
1	<p>Set up as shown in Fig. 4-7. Use only 50 Ω impedance series connection cables.</p> <p>To connect the ME522A transmitter and MH676A, use the supplied coaxial cable (0.4 m). To connect CHA and CHB, use cables of the same length.</p>
2	<p>Set the ME522A transmitter as set in step 2 of procedure (c) in paragraph 4.3.2 (1). Set the ME676A and MH677A as set in step 2 of procedure (c) in paragraph 4.3.2 (1).</p>
3	<p>Measure the data and clock output levels, and phases with the sampling oscilloscope.</p> <p>Switch DATA1 and DATA2 and measure the data outputs.</p>

SECTION 5

GP-IB

5.1 Intorduction

The general purpose interface bus (GP-IB) of the MH676A and MH677A is an interface that conforms to the IEEE-488 and IEC-625 recommendations.

The GP-IB can be used to control all panel keys of the MH676A and MH677A.

5.2 Functions

SH1: Supports all source handshake functions

AH1: Supports all accept handshake functions

T8: Supports talker function and talker release function by MLA (My Listen Address)

L4: Supports listener function and listener release function by MTA (My Talk Address)

~~SR0: No service request function~~

RL1: Supports all remote/local functions

PP0: No parallel polling function

DC0: No device clear function

DT0: No device trigger function

C0: No control function

5.3 Measurement Preparations

5.3.1 Cable connections

Figure 5-1 shows the GP-IB interface connector pin arrangement.

Up to 15 devices can be connected to the GP-IB system, but the connection cable lengths are restricted as follows:

1. The length of a single cable must not exceed 2 meters.
2. The total length of the cables must not exceed 20 meters.

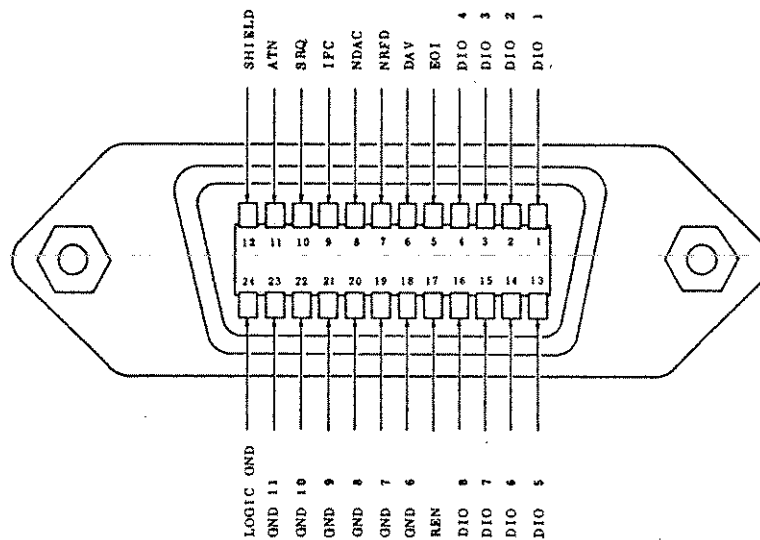


Fig. 5-1 GP-IB Interface Connector Pin Arrangement

5.3.2 Example

Figure 5-2 shows an example using the GP-IB.

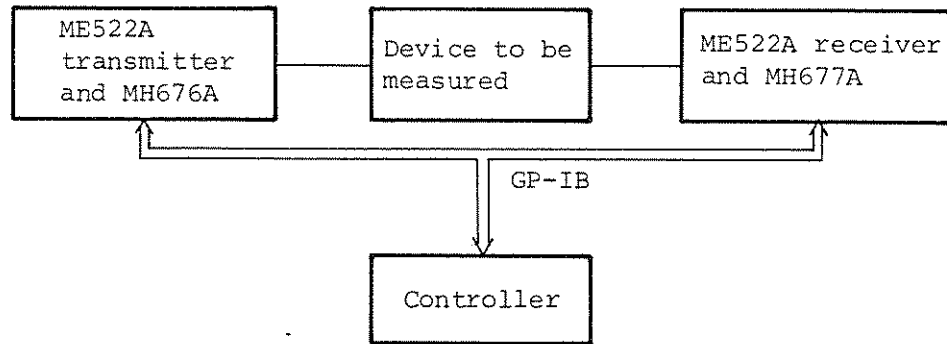


Fig. 5-2 GP-IB Usage

5.3.3 Address setting

An address must be set for the GP-IB to operate a device (equivalent to MH676A and MH677A).

An address can be set with the address switch on each of the MH676A and MH677A rear panels.

The address is read only when the power is turned ON. Therefore, when the address is changed, the power must be turned OFF and then ON again.

Figure 5-3 shows an example on setting an address.

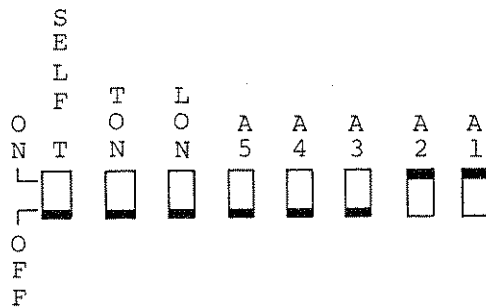


Fig. 5-3 Address Switch

In Figure 5-3, A1 to A5 have the following values:

$$A1: 2^0 = 1$$

$$A2: 2^1 = 2$$

$$A3: 2^2 = 4$$

$$A4: 2^3 = 8$$

$$A5: 2^4 = 16$$

Therefore, the address shown in Fig. 5-3 is 3. The address that can be used for the MH676A and MH677A are from 0 to 29.

Always set the left three bits of the address switch to OFF.

5.4 Panel Setting

The panel setting is explained as follows by using the ANRITSU Packet III as a controller.

The MH676A address is assumed to be 1 and that of MH677A to be 2.

The panel is set as follows:

```
WRITE@101 : "      "  
           ↑  
           (Address-example for MH676A)
```

Codes that correspond to each panel key, (explained later) are entered between the quotation marks.

When two or more codes are entered for setting the panel, separate them with a comma as shown below:

```
WRITE@101 : "    ,    ,    "
```

Tables 5-1 and 5-2 show the corresponding panel keys and codes.

Table 5-1 MH676A Control Codes

Item	Code		Remarks
CLOCK OUTPUT	AMPLITUDE	$\bar{O}CA1.00$ to $\bar{O}CA3.00$. Set the AMPLITUDE and OFFSET in 0.05 V steps.
	OFFSET	$\bar{O}C\bar{O}-1.00$ to $\bar{O}C\bar{O}4.00$	
DATA OUTPUT	NRZ	$\bar{O}DN$. Always set the AMPLITUDE and OFFSET to two decimal places.
	RZ	$\bar{O}DR$	
	AMPLITUDE	$\bar{O}DA1.00$ to $\bar{O}DA3.00$	Example: When the clock AMPLITUDE is 1.5 V, enter as $\bar{O}CA1.50$
	OFFSET	$\bar{O}B\bar{O}-1.00$ to $\bar{O}D\bar{O}4.00$	
MUX OPERATION	ON	UMN	
	OFF	UMF	

Table 5-2 MH677A Control Codes

Item	Code		Remarks
CLOCK INPUT	PHASE ADJUST	ICP-5 to ICP0 to ICP5	
DATA INPUT	NRZ	IDN	. Set the THRESHOLD in 0.05 V steps.
	RZ	IDR	
	THRESHOLD	IDT-2.5 to IDT3.5	. Always set the THRESHOLD to two decimal places.
			Example: When the THRESHOLD is 1.5 V, enter as IDT1.50
DATA OUTPUT	DATA1	$\bar{O}D1$	
	DATA2	$\bar{O}D2$	
DEMUX OPERATION	ON	UDN	
	OFF	UDF	

5.4.1 Panel setting example

(1) Output level setting

To set the clock amplitude to 2 V, clock offset to -0.55 V, data amplitude to 1.25 V, and data offset to +2.4 V, enter as follows:

```
WRITE@101 : "OCA2.00, OC-0.55, ODA1.25, OD2.40"
```

SECTION 6

RS-232C (Option)

6.1 Introduction

The RS-232C interface for the MH676A and MH677A conforms to Electric Industries Association (EIA) standards.

All panel keys of the MH676A and MH677A can be controlled through the RS-232C.

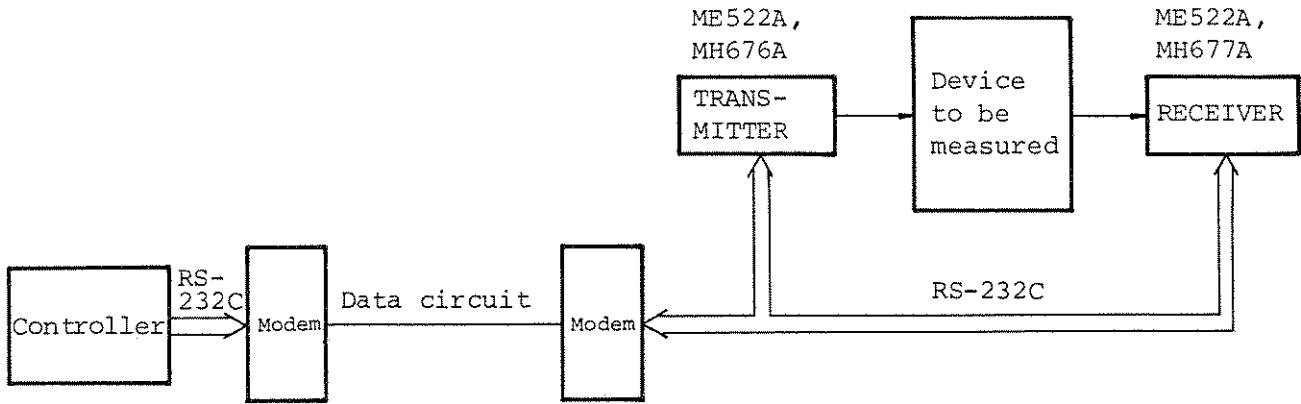
6.2 Functions

Table 6-1 Functions

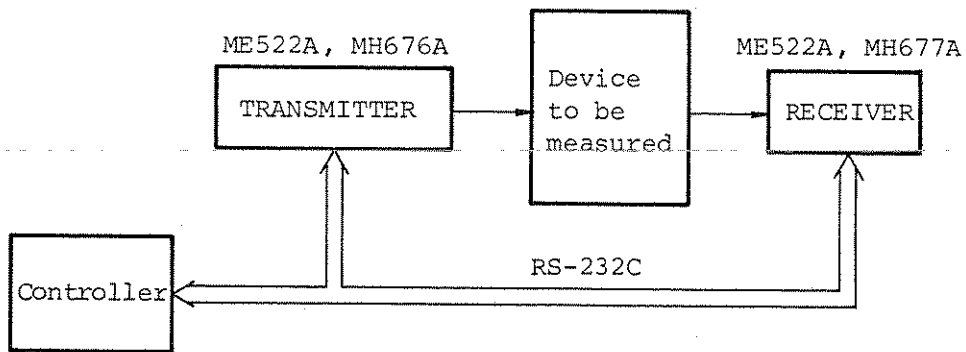
Item	Remarks	Setting at shipment
Interface	Confirms to EIA standards	-
Communication formula	Full duplex Nonsynchronous	-
Baud rate	50, 75, 110, 134.5, 150, 300, 600, 1200 bps	300 bps
Character length	7 bits, 8 bits	7 bits
Parity	Exists, none Even, odd	None
Start bit	1 bit	-
Stop bits	1 bit, 3/2 bits, 2 bits	1 bit
Connector	DB-25P	

6.3 Preparations

Figure 6-1 shows an example using the RS-232C interface.



(1) Setup with modem



(2) Setup for direct control from the controller

Fig. 6-1 RS-232C Interface Setup

6.3.1 Rear panel setting

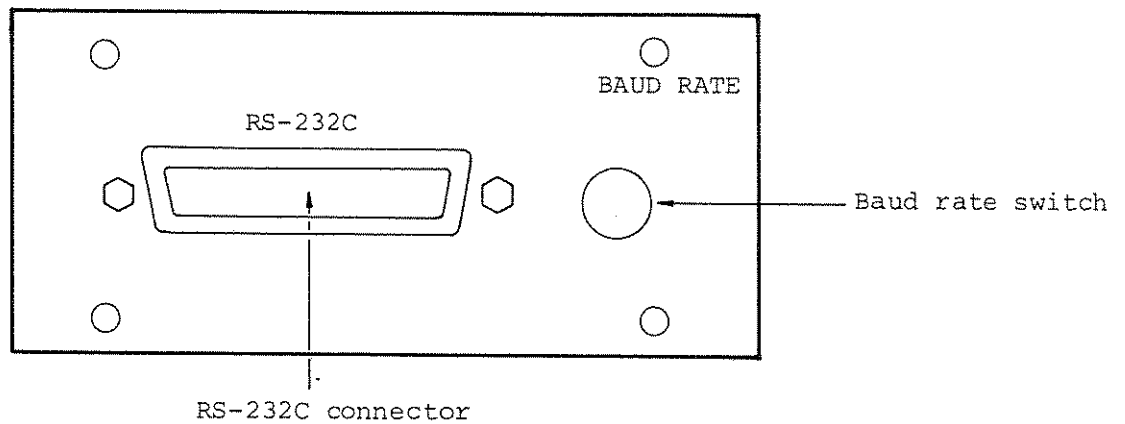


Fig. 6-2 RS-232C Rear Panel

Table 6-2 shows the corresponding baud rate switch numbers and baud rates.

Table 6-2 Correspondence Between Baud Rate Switch Numbers and Baud Rates

Number	0	1	2	3	4	5	6	7	8	9
Baud rate (bps)	50	75	110	134.5	150	300	600	1200	(1800)	(2000)

Note: Do not use numbers 8 and 9.

The MH676A and MH677A read the baud rates only when the power is turned ON. Therefore, whenever the baud rate is changed, turn the power supply OFF and then ON again.

6.3.2 Internal switch setting

Figure 6-3 shows the location of the S2 internal switch.

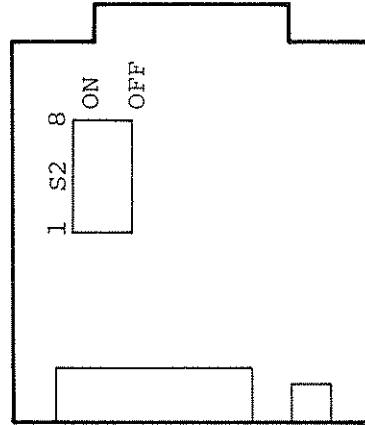


Fig. 6-3 Internal Switch Location

Figure 6-4 shows the internal switch functions.

Bit 1 Character length

OFF: 7 bits

ON: 8 bits

Bit 2 Parity

OFF: No parity

ON: Parity

Bit 3 Parity

OFF: Even parity

ON: Odd parity

Bit 4 and 5 Stop bits

bit 5	bit 4	
OFF	OFF	1 bit
	ON	
ON	OFF	3/2 bit
	ON	2 bits

Fig. 6-4 Internal Switch Functions

6.3.3 Controller setting

To operate the controller with the RS-232C interface, the baud rate and parity set in the RS-232C interface must also be set in the controller.

In the following explanation, the ANRITSU Packet III Personal Technical Computer is used as the controller.

The controller is set as follows:

SET@5 : HVAL (" ")
 ↑ ↑
(Select code) (see Figs. 6-5 and 6-6)

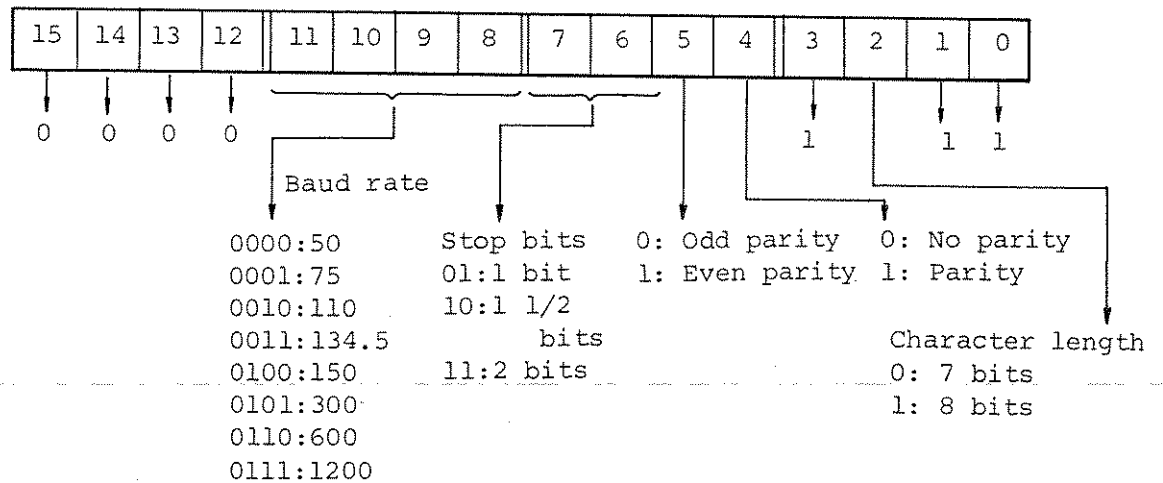


Fig. 6-5 Controller Setting Codes

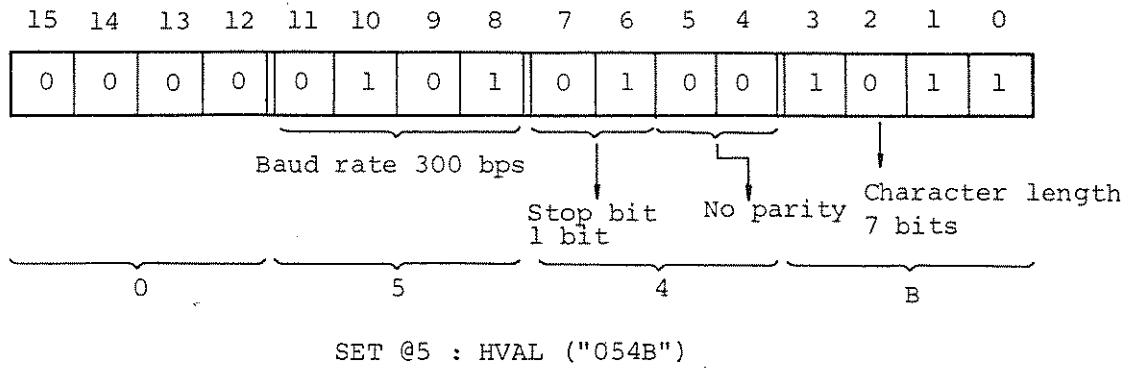


Fig. 6-6 Controller Setting

6.4 Panel Setting

Set the panel as follows:

```

WRITE@5 : "Control code"
      ↑
      (Control code)
  
```

For the MH676A and MH677A control codes, see Tables 5-1 and 5-2, respectively.

6.5 Replacing GP-IB and RS-232C Boards

Before replacing the boards, turn the POWER switch OFF.

6.5.1 Procedure

Figure 6-7 shows the procedures for replacing the GP-IB and RS-232C boards.

1. Remove the 4 screws.
2. Attach the GP-IB cable to the GP-IB board connector, grasp the cable, and pull out the board. To remove the RS-232C board, pull the RS-232C cable in the same way.
3. Align the replacement RS-232C board (or the GP-IB board) with the guide rail and insert it.
4. Put the 4 screws back.

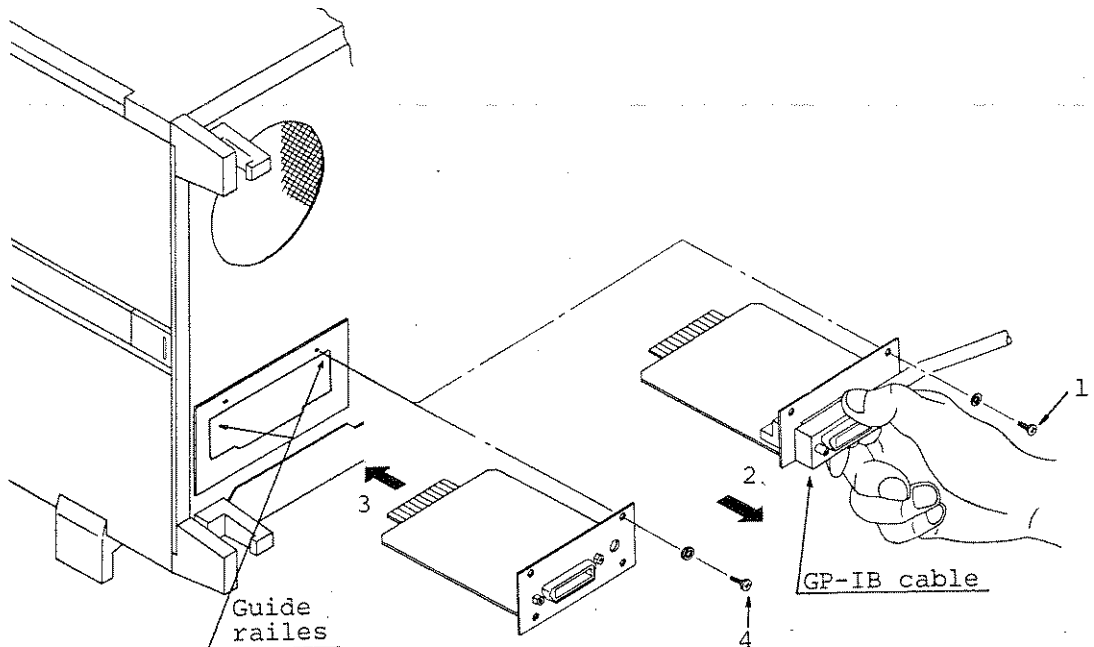


Fig. 6-7 Replacing Board

