MP1862A
56G/64Gbit/s DEMUX
Operation Manual

Second Edition

- For safety and warning information, please read this manual before attempting to use the equipment.
- Additional safety and warning information is provided in the MP1800A Signal Quality Analyzer Installation Guide and the MT1810A 4 Slot Chassis Installation Guide. Please also refer to one of these documents before using 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.
For Safety

⚠️ WARNING

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

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

Electric Shock

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

Repair

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

**WARNING**

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

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

CAUTION

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

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

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

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

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

Anritsu Warranty

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

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

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

Anritsu Corporation shall assume no liability for injury or financial loss of the customer due to the use of or a failure to be able to use this equipment.
Note:
For the purpose of this Warranty, "unusual environment" means use:
- In places of direct sunlight
- In dusty places
- Outdoors
- In liquids, such as water, oil, or organic solvents, and medical fluids, or places where these liquids may adhere
- In salty air or in places where chemically active gases (sulfur dioxide, hydrogen sulfide, chlorine, ammonia, nitrogen dioxide, or hydrogen chloride etc.) are present
- In places where high-intensity static electric charges or electromagnetic fields are present
- In places where abnormal power voltages (high or low) or instantaneous power failures occur
- In places where condensation occurs
- In the presence of lubricating oil mists
- In places at an altitude of more than 2,000 m
- In the presence of frequent vibration or mechanical shock, such as in cars, ships, or airplanes

Anritsu Corporation Contact

In the event of 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.
Crossed-out Wheeled Bin Symbol

Equipment marked with the Crossed-out Wheeled Bin Symbol complies with council directive 2012/19/EC (the "WEEE Directive") in European Union.

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

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

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

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

3. Limitation of Liability
   a. If a fault (bug) is discovered in this Software, preventing operation as described in the operation manual or specifications whether or not the customer uses this software as described in the manual, Anritsu shall at its own discretion, fix the bug, or exchange the software, or suggest a workaround, free-of-charge. However, notwithstanding the above, the following items shall be excluded from repair and warranty.
      i) If this Software is deemed to be used for purposes not described in the operation manual or specifications.
      ii) If this Software is used in conjunction with other non-Anritsu-approved software.
      iii) Recovery of lost or damaged data.
      iv) If this Software or the Equipment has been modified, repaired, or otherwise altered without Anritsu's prior approval.
      v) For any other reasons out of Anritsu's direct control and responsibility, such as but not limited to, natural disasters, software virus infections, etc.
   b. Expenses incurred for transport, hotel, daily allowance, etc., for on-site repairs by Anritsu engineers necessitated by the above faults shall be borne by you.
   c. The warranty period for faults listed in article 3a above covered by this EULA shall be either 6 months from the date of purchase of this Software or 30 days after the date of repair, whichever is longer.
4. **Export Restrictions**  
You may not use or otherwise export or re-export directly or indirectly this Software except as authorized by Japanese and United States law. In particular, this software may not be exported or re-exported (a) into any Japanese or US embargoed countries or (b) to anyone on the Japanese or US Treasury Department’s list of Specially Designated Nationals or the US Department of Commerce Denied Persons List or Entity List. By using this Software, you warrant that you are not located in any such country or on any such list. You also agree that you will not use this Software for any purposes prohibited by Japanese and US law, including, without limitation, the development, design and manufacture or production of missiles or nuclear, chemical or biological weapons of mass destruction.

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

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

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

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

9. **Court of Jurisdiction**  
This EULA shall be interpreted in accordance with Japanese law and any disputes that cannot be resolved by negotiation described in Article 8 shall be settled by the Japanese courts.
**Protection Against Computer Virus Infections**

Prior to the software installation
Before installing this software or any other software recommended or approved by Anritsu, run a virus scan on your computer, including removable media (e.g. USB memory stick and CF memory card) you want to connect to your computer.

When using this software and connecting with the measuring instrument
- **Copying files and data**
  - On your computer, do not save any copies other than the following:
    - Files and data provided by Anritsu
    - Files created by this software
    - Files specified in this document
  - Before copying these files and/or data, run a virus scan, including removable media (e.g. USB memory stick and CF memory card).
- **Connecting to network**
  - Connect your computer to the network that provides adequate protection against computer viruses.

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**Cautions on Proper Operation of Software**

This software may not operate normally if any of the following operations are performed on your computer:
- Simultaneously running any software other than that recommended or approved by Anritsu
- Closing the lid (Laptop computer)
- Turning on the screen saver function
- Turning on the battery-power saving function (Laptop computer)

For how to turn off the functions, refer to the operation manual that came with your computer.
Cautions against computer virus infection

- Copying files and data
  Only files that have been provided directly from Anritsu or generated using Anritsu equipment should be copied to the instrument. All other required files should be transferred by means of USB or CompactFlash media after undergoing a thorough virus check.

- Adding software
  Do not download or install software that has not been specifically recommended or licensed by Anritsu.

- Network connections
  Ensure that the network has sufficient anti-virus security protection in place.
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: MP1862A 56G/64Gbit/s DEMUX

2. Applied Directive and Standards
   LVD: Directive 2006/95/EC

3. Applied Standards
   • EMC: Emission: EN 61326-1: 2013 (Class A)
     Immunity: EN 61326-1: 2013 (Table 2)

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

   *: Performance Criteria
   A: The equipment shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.
B: The equipment shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

Harmonic current emissions:
No limits apply to this equipment with an active input power under 75 W.

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

4. Authorized representative
Name: Murray Coleman
Head of Customer Service EMEA
ANRITSU EMEA Ltd.
Address, city: 200 Capability Green, Luton
Bedfordshire, LU1 3LU
Country: United Kingdom
C-Tick Conformity Marking

Anritsu affixes the C-Tick 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

![C-Tick Marking](Image)

1. **Product Model**
   - Model: MP1862A 56G/64Gbit/s DEMUX

2. **Applied Directive and Standards**
   - EMC: Emission: EN 61326-1: 2013 (Class A equipment)
About This Manual

A testing system combining an MP1800A Signal Quality Analyzer or MT1810A 4 Slot Chassis mainframe, module(s), and control software is called a Signal Quality Analyzer Series. The operation manuals of the Signal Quality Analyzer Series consist of separate documents for the installation guide, the mainframe, remote control operation, module(s), and control software, as shown below.

- **Installation Guide**: Installation guide from module installation to the start of use. The Installation Guide varies depending on the mainframe used.
- **Mainframe Operation Manual**: Describes basic operations of the mainframe. The Mainframe Operation Manual varies depending on the mainframe used.
- **Remote Control Operation Manual**: Describes remote control using the GPIB interface and LAN interface.
- **Module Operation Manual**: Operation manual for the module. The Module Operation Manual varies depending on the module(s) used.
- **MP1862A 56G/64Gbit/s DEMUX**: Describes how the MP1862A is configured as well as how to operate and maintain it.
- **Control Software Operation Manual**: Operation manual of the software that controls the Signal Quality Analyzer Series.
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Chapter 1  Overview

This chapter provides an overview of the MP1862A 56G/64Gbit/s DEMUX (hereinafter, referred to as “MP1862A”).

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1.1 Product Overview

The MP1862A can be used with a plug-in module that can be built into a Signal Quality Analyzer Series mainframe. This equipment measures each of the PRBS, DATA, Zero-Substitution, and Mixed patterns in the operating frequency range 8 to 64.2 Gbit/s using a combination of the MU183040A/B 32Gbit/s Error Detector and the MU183041A/B 32Gbit/s 4ch Error Detector (hereafter MU18304xA/B).

Various option configurations are available for the MP1862A. This module is therefore useful for research, development, and production of various types of digital communication equipment, modules, and devices.

The features of the MP1862A are as follows:

- Operating rates: 8 to 56.2 Gbit/s (64.2Gbit/s using additional options)
- Divides input data signal into 1:2
- Capable of measuring PRBS, Data, Zero-Substitution, Mixed, and Sequence patterns (when used with MU18304xA/B).
- Supports analysis of 8 to 64.2 Gbit/s input data such as Eye/Bathtub (When used with MU18304xA/B)
- Supports future use by installing options.
- Controlled by MX180000A Control Software when either MP1800A or controller PC connected
1.2 Product Composition

1.2.1 Standard composition

Table 1.2.1-1 show the standard composition of the MP1862A.

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>Product name</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mainframe</td>
<td>MP1862A</td>
<td>56 G/64 Gbit/s DEMUX</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Accessories</td>
<td>J1657A</td>
<td>Coaxial cable (1 m, K Connector)</td>
<td>2</td>
<td>Data Output1/2</td>
</tr>
<tr>
<td></td>
<td>J1668A</td>
<td>Coaxial Cable (0.8 m, K connector)</td>
<td>1</td>
<td>1/2 Clock Output</td>
</tr>
<tr>
<td></td>
<td>J1654A</td>
<td>U Link Cable B</td>
<td>1</td>
<td>Delayed Clock Output to Mux Clock Input</td>
</tr>
<tr>
<td></td>
<td>J1363A</td>
<td>Protection cap</td>
<td>2</td>
<td>Data Input/XData Input</td>
</tr>
<tr>
<td></td>
<td>41V-6</td>
<td>Precision fixed attenuator 6 dB</td>
<td>2</td>
<td>Data Input/XData Input</td>
</tr>
<tr>
<td></td>
<td>J1632A</td>
<td>Terminator</td>
<td>5</td>
<td>Clock Output 1/2 Clock Output</td>
</tr>
<tr>
<td></td>
<td>J1341A</td>
<td>Open</td>
<td>1</td>
<td>External Clock Input</td>
</tr>
<tr>
<td></td>
<td>J1475A</td>
<td>USB cable</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Z1312A</td>
<td>AC adapter</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>G0342A</td>
<td>ESD Discharger</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Power cord 2.5m</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Z0897A</td>
<td>MP1800A Manual CD</td>
<td>1</td>
<td>CD-ROM version</td>
</tr>
<tr>
<td></td>
<td>Z0918A</td>
<td>MX1800000A Software CD</td>
<td>1</td>
<td>CD-ROM</td>
</tr>
</tbody>
</table>
Chapter 1  Overview

1.2.2 Options

Table 1.2.2-1 shows the options for the MP1862A. Table 1.2.2-2 shows the accessories for the MP1862A. All options are sold separately.

<table>
<thead>
<tr>
<th>Model name</th>
<th>Product name</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP1862A-x01</td>
<td>64Gbit/s Extension</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

Option name format is as follows:

- Indicates function.
- This value is recognized by the mainframe.
- Anritsu management number.
- This value is not recognized by the mainframe.

1.2.3 Application parts

Table 1.2.3-1 shows the application parts for the MP1862A. All application parts are sold separately.

<table>
<thead>
<tr>
<th>Model</th>
<th>Product name</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1600A</td>
<td>Skew match pair cable (0.2 m, V connector)</td>
<td>Cable for measurement</td>
</tr>
<tr>
<td>J1656A</td>
<td>Coaxial cable set (MP1861A-MP1862A)</td>
<td>Two (a pair) for jitter tolerance measurement</td>
</tr>
<tr>
<td>J1646A</td>
<td>Passive Equalizer 6 dB (V connector)</td>
<td></td>
</tr>
<tr>
<td>Z0306A</td>
<td>Wrist strap</td>
<td></td>
</tr>
<tr>
<td>J1678A</td>
<td>ESD Protection Adapter-K</td>
<td>K connector</td>
</tr>
<tr>
<td>J1679A</td>
<td>ESD Protection Adapter-V</td>
<td>V connector</td>
</tr>
</tbody>
</table>
## 1.3 Specifications

### 1.3.1 Specifications for MP1862A

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating Bit Rate</strong></td>
<td>8 to 56.2 Gbit/s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 to 64.2 Gbit/s (when MP1862A-x01 installed)</td>
<td></td>
</tr>
<tr>
<td><strong>External Clock Input</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Input</td>
<td>1 (Ext. Clock Input)</td>
<td>To input a half-rate clock from the <strong>Clock Output</strong> connector of MP1861A.</td>
</tr>
<tr>
<td>Frequency</td>
<td>4 to 28.1 GHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 to 32.1 GHz (when MP1862A-x01 installed)</td>
<td></td>
</tr>
<tr>
<td>Amplitude</td>
<td>0.3 to 1.0 Vp-p</td>
<td></td>
</tr>
<tr>
<td>Termination</td>
<td>50 Ω/AC</td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>K (f.)</td>
<td></td>
</tr>
<tr>
<td><strong>Data Output</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Output</td>
<td>2 (Data Output 1, Data Output 2)</td>
<td>To MU18304xA/B Data Input</td>
</tr>
<tr>
<td>Level</td>
<td>0/–0.4 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H: –0.1 to +0.1 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L: –0.6 to –0.3V</td>
<td></td>
</tr>
<tr>
<td>Termination</td>
<td>50 Ω/GND</td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>K (f.)</td>
<td></td>
</tr>
<tr>
<td><strong>1/2 Clock Output</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Output</td>
<td>1 (1/2 Clock Output)</td>
<td>To output to the <strong>Clock Input</strong> connector of MU18304xA/B. Output frequency: Half of the frequency input to the <strong>Ext Clk Input</strong> connector.</td>
</tr>
<tr>
<td>Frequency</td>
<td>2 to 14.05 GHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 to 16.05 GHz (when MP1862A-x01 installed)</td>
<td></td>
</tr>
<tr>
<td>Amplitude</td>
<td>0.3 to 1.0 Vp-p</td>
<td></td>
</tr>
<tr>
<td>Termination</td>
<td>50 Ω/AC</td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>SMA (f.)</td>
<td></td>
</tr>
<tr>
<td><strong>Clock Output</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Output</td>
<td>1 (Clock Output)</td>
<td>To be terminated into 50 Ω when not in use. Output frequency: The same as the frequency input to the <strong>Ext Clk Input</strong> connector.</td>
</tr>
<tr>
<td>Frequency</td>
<td>4 to 28.1 GHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 to 32.1 GHz (when MP1862A-x01 installed)</td>
<td></td>
</tr>
<tr>
<td>Amplitude</td>
<td>0.4 to 1.0 Vp-p</td>
<td></td>
</tr>
<tr>
<td>Termination</td>
<td>50 Ω/AC</td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>K (f.)</td>
<td></td>
</tr>
</tbody>
</table>
Table 1.3.1-1 Specifications for MP1862A (Cont’d)

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Buffered Clock Output</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Output</td>
<td>1 (Buffered Clock Output)</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>4 to 28.1 GHz</td>
<td>To be terminated into 50 Ω when not in use.</td>
</tr>
<tr>
<td></td>
<td>4 to 32.1 GHz (when MP1862A-x01 installed)</td>
<td></td>
</tr>
<tr>
<td>Amplitude</td>
<td>0.2 to 1.0 Vp-p</td>
<td></td>
</tr>
<tr>
<td>Termination</td>
<td>50 Ω/AC</td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>K (f.)</td>
<td></td>
</tr>
<tr>
<td><strong>Delayed Clock Output</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Output</td>
<td>1 (Delayed Clock Output)</td>
<td>To output the clock having the 1x, 2x or 4x frequency of the clock input to the External Clock Input connector.</td>
</tr>
<tr>
<td>Frequency</td>
<td>4 to 28.1 GHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 to 32.1 GHz (when MP1862A-x01 installed)</td>
<td></td>
</tr>
<tr>
<td>Amplitude</td>
<td>0.2 to 1.0 Vp-p</td>
<td></td>
</tr>
<tr>
<td>Termination</td>
<td>50 Ω/AC</td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>K (f.)</td>
<td></td>
</tr>
<tr>
<td><strong>Demux Clock Input</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Input</td>
<td>1 (Demux Clock Input)</td>
<td>To be connected to the Delayed Clock Output connector.</td>
</tr>
<tr>
<td>Frequency</td>
<td>4 to 28.1 GHz</td>
<td>To output the clock having the 1x, 2x or 4x frequency of the clock input to the External Clock Input connector.</td>
</tr>
<tr>
<td></td>
<td>4 to 32.1 GHz (when MP1862A-x01 installed)</td>
<td></td>
</tr>
<tr>
<td>Amplitude</td>
<td>0.2 to 1.0 Vp-p</td>
<td></td>
</tr>
<tr>
<td>Termination</td>
<td>50 Ω/AC</td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>K (f.)</td>
<td></td>
</tr>
</tbody>
</table>
### Table 1.3.1-1 Specifications for MP1862A (Cont’d)

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Input</td>
<td>Number of Input 2 (Data/Input) (Differential)</td>
<td></td>
</tr>
<tr>
<td>Input Conditions</td>
<td>Selectable from Single-ended 50 Ω, Differential 50 Ω, or Differential 100 Ω Data or XData can be set to input for Single-ended interface. Tracking, Independent, or Alternate can be set for Differential Interface. When setting to Alternate, Data-XData or XData-Data can be set. (Only when absolute difference between Data Threshold and XData Threshold is 3.0 V or less)</td>
<td></td>
</tr>
<tr>
<td>Input Format</td>
<td>NRZ</td>
<td></td>
</tr>
<tr>
<td>Amplitude</td>
<td>0.125 to 1.0 Vp-p*1, *5</td>
<td></td>
</tr>
<tr>
<td>Threshold</td>
<td>–3.5 to +3.3 V /1 mV step. Data and XData can be set separately. Absolute difference between Data Threshold and XData Threshold: 3.0 V or less</td>
<td></td>
</tr>
<tr>
<td>Input Sensitivity</td>
<td>**Typ.25mV, **≤<a href="mailto:40mV@56.2Gbit">40mV@56.2Gbit</a>/s **<a href="mailto:Typ.30mV@64.2Gbit">Typ.30mV@64.2Gbit</a>/s <strong>8</strong></td>
<td></td>
</tr>
<tr>
<td>Phase Margin</td>
<td>Typ. 200 deg*7, *8</td>
<td></td>
</tr>
<tr>
<td>Termination Voltage</td>
<td>When Variable is selected for Termination: –2.5 to +3.5 V /0.01V step</td>
<td></td>
</tr>
<tr>
<td>Connector Voltage</td>
<td>V (f.)</td>
<td></td>
</tr>
</tbody>
</table>

*1: Defined based on the condition where Single-ended 50 Ω is selected.
*2: Defined under the following test pattern conditions:
  - PRBS2^31–1
  - Mark Ratio1/2
*3: Defined in the temperature range of 20 to 30°C.
*4: Defined by looping back a signal through J1600A coaxial cable, 41V-6 fixed attenuator, and MP1861A.
*5: The input amplitude corresponds to the operating range of the Auto Search and Auto Measurement functions, and the lower limit for the input amplitude is defined by Eye Height.
*6: This is determined by Eye Height.
*7: The output amplitude must be that of MP1861A + ATT with an error rate being “1E–9” or lower in the following measuring system (a sampling oscilloscope with more than 70 GHz bandwidth is used for output amplitude observations).
*7: At a bit rate of 56.2 Gbit/s

*8: At a bit rate of 64.2 Gbit/s (with MP1862A-x01 installed)
Table 1.3.1-1 Specifications for MP1862A (Cont'd)

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| Jitter tolerance *2,*7,*8 When interacting with MU18304xA/B | This item is defined under the following conditions:  
  • Bit rate: 56.2 Gbit/s  
    64.2 Gbit/s *8  
  • Pattern: PRBS2^31-1  
  • Temperature: 20 to 30°C  
  • Loopback connection with MP1861A  
  The following shall be applied simultaneously by using MU181500B:  
  • SSC with a 5300 ppm amplitude  
  • RJ of 0.3 UI  
  Modulation frequency:  
    56.2 Gbit/s: Up to 250 MHz  
    64.2 Gbit/s: Up to 150 MHz |  
| Clock Phase Variability | Phase Setting Range | −1000 to +1000 mUI/4 mUI Step  
| Phase Setting Error | Typ. ±50 mUIp-p (≤ 56.2 Gbit/s)*9  
Typ. ±50 mUIp-p (> 56.2 Gbit/s, when MP1862A-x01 installed)*9 |  
| mUI-ps Conversion | Provided |  
| Calibration | Provided (When jitter modulation is off) |  
| Relative 0 | Provided |  
| Jitter Input | Provided |  

*9: The values are specified, assuming an oscilloscope with a linearity of less than 200 fs will be used.
### Table 1.3.1-1 Specifications for MP1862A (Cont’d)

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto Measurement *5, *10</td>
<td>Auto Search, Eye Margin, Eye Diagram, Bathtub</td>
<td></td>
</tr>
<tr>
<td>BER Measurement Results</td>
<td>To be displayed on screen.</td>
<td></td>
</tr>
<tr>
<td>Control interface</td>
<td>USB 2.0 or 1.1 Type B × 1</td>
<td></td>
</tr>
<tr>
<td>Channel setting</td>
<td>Can be selected from CH1 to CH4.</td>
<td></td>
</tr>
<tr>
<td>Power (AC adapter)</td>
<td>Input voltage AC 100 to 240 V *11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Input frequency 50 to 60 Hz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Output power DC 19 V, 7.9A (Max)</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>DC 19 V, 4 A</td>
<td></td>
</tr>
<tr>
<td>Dimension (Excluding protrusions)</td>
<td>90.9 mm (H), 120 mm (W), 140 mm (D)</td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>5.0 kg or less</td>
<td></td>
</tr>
<tr>
<td>Environmental Performance</td>
<td>Operation Temperature +15 to +35°C (ambient temperature of equipment)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Storage Temperature –20 to +60°C</td>
<td></td>
</tr>
</tbody>
</table>

*10: The Auto Search function obtains a point in the vicinity of the following as an optimum point:
- \((V_{oh} + V_{ol}) / 2\) in voltage direction
- \((P_1 + P_2) / 2\) in phase direction

The Auto Search function runs normally on a signal observed by an oscilloscope if there is no sample point within ±62 mV in voltage direction from the auto search point.

To execute the Auto Search function if Differential 50 Ω or Differential 100 Ω is selected in the Input Condition box of the Data area, input a signal by AC coupling.

![Diagram showing Auto Search point and 62 mV offset](image)

*11: Operating voltage: within the range of +10% to −15% from the rated voltage

---

**Chapter 1  Overview**

1-10.
Chapter 2 Before Use

This chapter describes preparation required before using MP1862A.

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   2.1.2 Clearance from Fan............................................. 2-2
   2.1.3 Power Connection ............................................ 2-3
   2.1.4 Usage Patterns of MP1862A ............................ 2-4
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   2.3.2 Updating Software .......................................... 2-21
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2.1 Preparation Before Use

This section explains the installation position of the mainframe and how to turn on the power.

2.1.1 Environmental Conditions of Installation Site

The MP1862A operates in the temperature range from 15 to 35°C. Avoid using it under any of the following environment conditions that may cause failure.

- Strong vibrations
- High humidity or dust
- Direct sunlight
- Chemically active gases
- Substantial temperature changes

*Note:*
Condensation may form inside of the MP1862A if it is moved to a warm location after operating for a long time in a cool location. In such a case, be sure to wait until the MP1862A becomes completely dry before turning on the power. Doing so with condensation present may cause a short circuit and damage the MP1862A.

2.1.2 Clearance from Fan

A cooling fan is provided on the sides of the MP1862A. Install the MP1862A at least 10 cm away from walls, peripheral devices, or the like to prevent blockage of ventilation. Insufficient ventilation may cause the internal temperature to rise, resulting in failure.
2.1.3 Power Connection

This section describes the procedures for supplying power.

Use a supplied AC adapter. If AC adapter other than the supplied one is used, the MP1862A may be damaged.

Connect the shielded connector from the AC adapter to the rear panel connector of the MP1862A. Refer to Figure 2.1.3-1.

![Figure 2.1.3-1 Rear Panel of MP1862A](image)

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 an earth terminal.

**WARNING**

If the power cord is connected without grounding MP1862A, there is a risk of receiving a fatal electric shock. In addition, the peripheral devices connected to MP1862A may be damaged.

When connecting to the power supply, DO NOT connect to an outlet without a ground terminal. Also, avoid using electrical equipment such as an extension cord or a transformer.
2.1.4 Usage Patterns of MP1862A

This section describes the two ways to control MP1862A and how to connect to MP1800A or control PC.

MP1862A is controlled via the MX180000A Control Software installed to MP1800A or control PC. When connecting MP1862A to MP1800A (control PC), use the standard accessory USB cable.

(1) Connecting MP1800A:
Connect the USB connector (type A) to the front panel or rear panel of MP1800A, and then connect the USB connector (type B) to MP1862A.

![Figure 2.1.4-1 Connecting to MP1800A](image)

To connect two MP1862As to MP1800A, connect them to the USB connectors (type A) on MP1800A's front panel.

MP1862As may not be able to function properly if one of them is connected to the USB connector on MP1800's rear panel. To connect more than two MP1862As, connect a USB hub to the front or rear panel of MP1800A, and then connect each of MP1862As to MP1800A via the USB hub.
2.1 Preparation Before Use

Figure 2.1.4-2 Connecting Multiple MP186xAs to MP1800A
(2) Connecting to control PC:

Connect the USB connector (type A) to PC, and then connect the USB connector (type B) to the MP1862A.

![Figure 2.1.4-3  Connecting to Control PC](image)

Note the following when connecting two MP186xA s to control PC:

- For PC with multiple USB connectors, connect to the USB connector with the same USB controller, as shown below. It may not function normally if connecting to the connector with different USB controller.
- If the number of USB connectors on the Control PC is not enough, use a USB hub.

**Note:**

Anritsu is not responsible for the proper functioning of all USB hubs.
2.1 Preparation Before Use

Using other USB devices
Refer to the following for how to use commercially available USB devices when MP1862A is in use.

Connect the USB device before starting the MP1800A; do not connect or disconnect USB devices while using the MX180000A Control Software. In addition, only read measurement data using a USB device after exiting the MX180000A Control Software (closing selector screen).

Use a PC that meets or exceeds the following specifications.
Table 2.1.4-1  Required Specifications for Control PC (For Windows XP)

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatibility</td>
<td>IBM·PC or compatible PC</td>
</tr>
<tr>
<td>CPU</td>
<td>Pentium4 processor and 1.6 GHz or higher</td>
</tr>
<tr>
<td>OS</td>
<td>Windows XP Version 2002 Service Pack 2</td>
</tr>
<tr>
<td>Memory</td>
<td>≥ 512 MB</td>
</tr>
<tr>
<td>Monitor resolution</td>
<td>800 × 600 dots or more</td>
</tr>
<tr>
<td>Display color</td>
<td>≥ 256 colors</td>
</tr>
<tr>
<td>CD-ROM driver</td>
<td>Required when installing the software package</td>
</tr>
<tr>
<td>Hard Disk</td>
<td>Required free disk space for installing the software package: At least 200 MB</td>
</tr>
<tr>
<td>USB Interface</td>
<td>USB 2.0 or USB 1.1</td>
</tr>
</tbody>
</table>
Table 2.1.4-2  Required Specifications for Control PC (For Windows 7)

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatibility</td>
<td>IBM·PC or compatible PC</td>
</tr>
<tr>
<td>CPU</td>
<td>1 GHz or faster 32-bit (x86) or 64-bit (x64) processor</td>
</tr>
<tr>
<td>OS</td>
<td>Windows 7 Professional/Enterprise/Ultimate</td>
</tr>
<tr>
<td>Memory</td>
<td>32-bit: 1 GB RAM&lt;br&gt;64-bit: 2 GB RAM</td>
</tr>
<tr>
<td>Monitor resolution</td>
<td>800 × 600 dots or more</td>
</tr>
<tr>
<td>Display color</td>
<td>≥ 256 colors</td>
</tr>
<tr>
<td>CD-ROM driver</td>
<td>Required when installing the software package</td>
</tr>
<tr>
<td>Hard Disk</td>
<td>Required free disk space for installing the software package: At least 200 MB</td>
</tr>
<tr>
<td>USB Interface</td>
<td>10 BASE-T or 100 BASE-TX</td>
</tr>
</tbody>
</table>

The MP1862A will not operate normally when performing the following operations and functions on the PC while the MX180000A is operating.

(1) Running another application at same time
(2) Closing lid of laptop PC
(3) Running screen saver
(4) Running battery save function

Read the PC instruction manual to switch off the screen saver and battery save functions described in items (3) and (4) above.

**Note:**
Operation is not assured even with PCs meeting the specifications outlined in Table 2.1.4-1 or Table 2.1.4-2.
2.2 Getting Started with MX180000A

This section explains how to install the software and how to start and exit MX180000A.

2.2.1 Installing MX180000A

Note the following procedure when installing software for the MP1862A in the MP1800A or remote PC.
The following examples show the case when the software is installed in the MP1800A. For the general software installation procedures, refer to the MP1800A Installation Guide (W2747AE) or MT1810A Installation Guide (W2748AE).

(1) When the general procedures are followed by the installer, the confirmation dialog is displayed. Press Yes to start installation.

![Confirmation Dialog of USB Driver Installation (1)](image)

(2) For Windows 7, a confirmation dialog box is displayed to ask if you want to install Anritsu Corporation Universal Serial BUS Controller. Click Yes to continue installation. Click Continue Anyway to continue installation.
(3) For Windows XP, when the screen shown in Figure 2.2.1-2 is displayed, click **Continue Anyway** to continue.

![Figure 2.2.1-2 Confirmation Dialog of USB Driver Installation (2)](image)

**Note:**

The screen as shown in Figure 2.2.1-1 may not be displayed on the front page. If software installations take a long time, check that the screen as shown in Figure 2.2.1-1 is hidden at the back of the other screen.

(4) The following window is displayed when the installation completes normally. Click **Finish** to end the installation procedure.

![Figure 2.2.1-3 Completing Installation](image)
When the MP1862A is connected to the MP1800A or remote PC after software installation, install the driver using the following procedures. The following example show when the MP1862A is connected to the MP1800A.

(1) Connect the MP1800A and MP1862A using an USB cable. For Windows 7, the driver is installed automatically. For Windows XP, perform the step 2 to 5 to install the driver.

(2) The Found New Hardware Wizard screen is displayed to confirm windows update. Select No, not this time and press Next.

(3) Select Install the software automatically and press Next.
2.2 Getting Started with MX180000A

(4) Figure 2.2.1-6 is displayed when the hardware is found. Press **Continue Anyway** to continue the installation procedures.

![Hardware Installation]

(5) Click **Finish** to end the installation procedure.

![Completing Installation]
If the installed driver is no longer needed, uninstall it as follows.

(1) Select **Start** menu → **Control Panel**, and then open the Control Panel.

(2) Double-click **Add/Remove Programs** in the Control Panel.

(3) Select **Anritsu USB Device Driver** from the list and click **Remove** to start the uninstallation.

![Figure 2.2.1-8  Removing USB Driver](image-url)
2.2.2 Starting MX180000A

When connecting to MP1800A:
(1) Connect the MP1862A and MP1800A as explained in Section 2.1.4.
(2) Connect the AC adapter to the P1862A and set the power switch to ON.
The LED lights green while power is on.
(3) When the MP1800A is turned on, Windows boots and the MX180000A starts automatically. Select [Main application] on the selector screen.
(4) The MP1862A control screen is displayed.

When connecting to control PC
(1) Connect the MP1862A and control PC as explained in Section 2.1.4.
(2) Connect the AC adapter to the MP1862A and set the power switch to ON.
The LED lights green while power is on.
(3) Start the MX180000A controller PC and select Main application on the selector screen.
(4) The MP1862A control screen is displayed.

Figure 2.2.2-1 Selector Screen
2.2.3 Exiting MX180000A

When connecting to MP1800A:
(1) Press and hold the power switch on the MP1800A front panel or click the **Shut down** button on the selector screen. After the application are shut down, the MP18000A Power lamp goes off, and then the Standby LED lights up.
(2) Set the MP1862A power switch to OFF.
The LED lights orange, indicating the standby status.

When connecting to control PC:
(1) Close **Main application** to display the selector screen.
(2) Press **Exit** on the selector screen to close the window.
(3) Set the MP1862A power switch to **OFF**.
The LED lights orange, indicating the standby status.

**Notes:**
- To cut the power without following the above procedure, press the MP1862A power switch for more than 10 seconds to enter the standby status.
- Do not disconnect the power cord and AC adapter without first turning off the MP1862A as described above, otherwise the MP1862A may be damaged.
2.2.4 Messages that are displayed when connecting/disconnecting the USB cable

This section describes the messages that are displayed when the USB cable is connected to or disconnected from MP1862A.

When disconnecting the USB connection of this equipment for some unexpected reason, follow the procedure described below to minimize the impact on running applications. However, all the USB disconnection cannot be assured by this operation. Normally, follow the startup and shutdown procedures described in sections 2.2.2 and 2.2.3, respectively.

When USB connection disconnected while application running:
(1) The following dialog screen is displayed when the USB connection is disconnected.

![USB Disconnected](image)

Figure 2.2.4-1 USB Disconnected

(2) The buttons for calling screens are disabled and the screen goes blank. The Data Output and Clock Output are set forcibly to OFF.
(3) The MP1800A module connected to this equipment can still be used.

When USB device connected while application running:
(1) The following USB connection dialog is displayed.

![USB Connection Message](image)

Figure 2.2.4-2 USB Connection Message
(2) If there is a backup file (saved when previous application terminated when connection made), each setting is restored. Each setting is restored when reconnecting previously connected equipment that has been disconnected.

(3) The button for calling screens is enabled and the screen is displayed for use. The Data Output and Clock Output are OFF.

When USB connection disconnected while using Setup utility:
(1) No warning is issued at the instant of disconnection.
(2) If processing is executed when the equipment is already disconnected, a message indicating that the equipment is not connected is displayed.

![USB Disconnection Message](image)

Figure 2.2.4-3   USB Disconnection Message while Setup Utility in Use

(3) The MP1800A module connected to this equipment can still be used.

When USB device connected while using Setup utility:
(1) When a connection is made while using the Setup utility, the equipment is not recognized.
(2) Restart from the selector screen after setting the power OFF and ON and running the Setup utility once more.

---

**CAUTION**

If the connection between MP1862A, MP1800A and controller PC is broken during downloading with the Setup utility, MP1862A may no longer operate normally. NEVER break the connection during downloading.
2.3 Other Usage Methods

This section explains how to check the installed software version, perform software updates, and initialize the settings.

For how to operate the MX180000A, refer to the *MX180000A Signal Quality Analyzer Control Software Operation Manual*.

### 2.3.1 Checking Installed Software Version

The installed software versions can be checked in both Version Information of MX180000A and Setup Utility screen.

**To check in the Version Information screen**

Click **Help** on the main application menu bar, menu, and then click **Version**. In the Version Information screen, you can check the version of the software currently installed.

![Version Information Screen of MX180000A](image)

In the Version Software screen, the software that does not match the installed version is highlighted in yellow. Update the software highlighted in yellow as described in Section 2.3.2. The equipment may not be able to operate normally if it is used without updating the software highlighted in yellow.

**To check in the Setup Utility screen**

To log in to the setup utility, select **Setup utility** in the selector screen that appears when MX180000A is started, and then click **User** in the **Login** box,
On the **Version** tab below, you can check the version of the software currently installed.

![Figure 2.3.1-2  Version Tab of the Setup Utility Screen](image)

On the **Version** tab of the Setup Utility screen, the software that does not match the installed version is highlighted in yellow. Update the software highlighted in yellow as described in Section 2.3.2. The equipment may not be able to operate normally if it is used without updating the software highlighted in yellow.
2.3 Other Usage Methods

2.3.2 Updating Software

The equipment software can be updated from the Setup utility screen.

When installing a new software version, there may sometimes be a mismatch with already installed software and operation is not assured. To solve the problem of mismatched installed software versions, start the Setup utility and click the **Download** tab to display the download files in the downloaded file display field. Put checkmarks in the boxes opposite the files to be upgraded and click the **Load** button to start the download. When download is completed normally, the installed software can be upgraded.

Normally, the installed software is upgraded to the latest version when the **Load** button is clicked.

![Download Screen](image)
## Chapter 2 Before Use

### Table 2.3.2-1 Download Screen

<table>
<thead>
<tr>
<th>No.</th>
<th>Function and Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1]</td>
<td>This displays files that can be downloaded. Versions displayed in the New column are versions of object files offered by the MX180000A SQA control software. Versions displayed in the Current column are the versions of software already installed in the equipment. If there is a mismatch between versions in New and Current, place checkmarks in the boxes and download the new files.</td>
</tr>
<tr>
<td>[2]</td>
<td>These are checkboxes for files to download. When it is necessary to download the latest version (because there are differences between the New and Current versions), the checkbox is marked automatically.</td>
</tr>
<tr>
<td>[3]</td>
<td>This executes download using the MX180000A SQA control software installer. The versions of files saved to the internal hard disk are compared with versions to be downloaded for each module in this equipment, and if there are differences, the files are downloaded.</td>
</tr>
<tr>
<td>[4]</td>
<td>This displays the download slot number and file name.</td>
</tr>
<tr>
<td>[5]</td>
<td>This displays the download status.</td>
</tr>
<tr>
<td>[7]</td>
<td>This quits the setup utility.</td>
</tr>
</tbody>
</table>

**Notes:**
- If the Current version is not displayed and there is no checkmark in the checkbox, put a checkmark in the checkbox and execute download.
- Downloading the FPGA as described below takes about 10 minutes per file. The power must be toggled OFF and ON to enable the update. Set the power to OFF as described in section 2.2.3.

xx in the filename MP186xA_MUX_Opt_Delay_xx_xx_xx.FPGA indicates the version.

---

**CAUTION**

If the connection between MP1862A, MP1800A, and controller PC is broken during downloading with the Setup utility, MP1862A may no longer operate normally. NEVER break the connection during downloading.
2.3.3 Initializing Settings

Click **Initialize** in the File menu of the MX180000A SQA control software to initialize the equipment to the factory defaults. In addition, the equipment settings can be returned to the factory defaults using the Setup utility; start the utility and click the **Help** tab.

![Figure 2.3.3-1 Initializing Settings](image)

When **Execute** in the Initialize group box is clicked, the equipment is initialized to the factory default settings.
2.4 Preventing Damage

Be sure to observe the rating ranges when connecting input and output of the MP1862A. Otherwise, the MP1862A may be damaged.

**CAUTION**

- Do not apply a voltage exceeding the rated voltage of MP1862A. Excessively high input voltage can damage the circuit.

- When output is used at the 50 Ω/GND terminator, never feed any current or input signals to the output.

- As a countermeasure against static electricity, ground other devices to be connected (including experimental circuits) with ground wires before connecting the I/O connector.

- The outer conductor and core of the coaxial cable may become charged as a capacitor. Use any metal to discharge the outer conductor and core before use.

- Never open the MP1862A. If you open it and the MP1862A has failed or sufficient performance cannot be obtained, we may decline to repair the MP1862A.

- The MP1862A has many important circuits and parts including hybrid ICs. These parts are extremely sensitive to static electric charges, so never open the case of the MP1862A.

- To protect the MP1862A from being damaged by static electricity, be sure to observe the following:
  - Spread a conductive sheet on a workbench.
  - Wear a wrist strap connected to the conductive sheet or the frame ground of MP1862A.
Chapter 3 Panel Layout and Connectors

This chapter describes the panels and connectors of MP1862A.

3.1 Panel Layout .......................................................................................... 3-2
   3.1.1 MP1862A Front Panel ................................................................. 3-2
   3.1.2 MP1862A Rear Panel ............................................................... 3-3

3.2 Inter-Module Connection ................................................................. 3-5
   3.2.1 1ch TRx connection ................................................................. 3-7
   3.2.2 2ch Rx connection ................................................................. 3-10
   3.2.3 1ch TRx connection for bathtub jitter
           measurement ................................................................. 3-12
3.1 Panel Layout

3.1.1 MP1862A Front Panel

![Figure 3.1.1-1 MP1862A Front Panel](image)

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| [1] | Data Input connectors  
Data Input connectors | Connectors for inputting differential data signals. Support both differential and single-ended input signals. |
| [2] | Ext. Clock Input connector | Connectors for inputting clock signal used as reference for equipment operation |
| [3] | Clock Output connector | Connector for outputting the same frequency clock as the clock that is input to the **Ext. Clock Input** connector. Terminate into 50 Ω when not in use. |
| [4] | USB Connection LED | Displays status of connection between MP1862A and MP1800A or control PC. The LED is lit when the MP1862A can be controlled. |
| [5] | Power Switch | Switches from ON to Standby. When AC adapter and power code are connected, the switch LED lights orange in the Standby status and green at ON. |
| [6] | Channel number indicators (LEDs) | The lamp of the set channel number illuminates. 1: Blue, 2: Pink, 3: Purple, 4: Orange. Set the channel number with the Channel Setting switch on the rear panel of MP1862A. |
| [7] | Frame ground | To which connects a wrist strap for antistatic measures before using MP1862A. Always wear the wrist strap when using MP1862A. |
### 3.1.2 MP1862A Rear Panel

![Figure 3.1.2-1 MP1862A Rear Panel](image)

#### Table 3.1.2-1 MP1862A Rear Panel Name and Function

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1]</td>
<td>Data Output 1 connectors</td>
<td>Outputs for 1:2 divided Data/Data Input signals</td>
</tr>
<tr>
<td></td>
<td>Data Output 2 connectors</td>
<td>Connector for outputting data signals to the system MU18304xA/B.</td>
</tr>
<tr>
<td>[2]</td>
<td>Delayed Clock Output connector</td>
<td>Connector for outputting the clock signal that is half of frequency of the operating bit rate. Connect to the <strong>Demux Clock Input</strong> connector using the supplied J1654A U-link cable B.</td>
</tr>
<tr>
<td>[3]</td>
<td>Buffered Clock Output connector</td>
<td>Connector for outputting the same frequency clock as the clock that is input to the <strong>Ext. Clock Input</strong> connector. Terminate into $50 , \Omega$ when not in use.</td>
</tr>
<tr>
<td>[4]</td>
<td>1/2 Clock Output connector</td>
<td>Connector for outputting the clock signal (reference clock for MU18304xA/B) that is half of the frequency clock output to the <strong>Delayed Clock Output</strong> connector.</td>
</tr>
<tr>
<td>[5]</td>
<td>Demux Clock Input connector</td>
<td>Connector for inputting the clock signal that is half of frequency of the operating bit rate. Connect to the <strong>Delayed Clock Output</strong> connector using the supplied J1654A U-link cable B.</td>
</tr>
<tr>
<td>[6]</td>
<td>DC Input connectors</td>
<td>Connector for connecting AC adapter supplied as standard accessory Do not use non-Anritsu AC adapters, otherwise there is a risk of damage to the equipment.</td>
</tr>
<tr>
<td>[7]</td>
<td>USB port</td>
<td>Used for connecting MP1800A or controller PC to this equipment Do NOT connect anything other than the MP1800A or controller PC.</td>
</tr>
</tbody>
</table>
### Table 3.1.2-1 MP1862A Rear Panel Name and Function (Cont’d)

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[8]</td>
<td>Channel Setting switch</td>
<td>Sets the channel number of MP1862A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Channel Number</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Make sure the power to MP1862A has been shut off before changing the channel switch settings. The new channel number setting is enabled when powering on the next time.</td>
</tr>
<tr>
<td>[9]</td>
<td>Frame ground</td>
<td>Connector for wrist strap to discharge static electricity. Always wear a wrist strap when using this equipment.</td>
</tr>
</tbody>
</table>
3.2 Inter-Module Connection

This section describes precautions to follow when handling the equipment. Prevent the equipment from being damaged by static electricity.

WARNING

- Do not apply a voltage exceeding the rated voltage of MP1862A. Excessively high input voltage can damage the circuit.

- As an antistatic measure, make sure the other devices (including experimental circuits) be connected with ground wires before connecting the I/O connector.

- Be sure to discharge static electricity from the outer conductors and cores of the coaxial cables by touching them with any metal object before connecting the coaxial cables.

- The power supply voltage rating for the mainframe is shown on the rear panel. Be sure to operate the mainframe within the rated voltage range. The mainframe may be damaged if a voltage out of the rating range is applied.

- To protect the MP1862A from being damaged by static electricity, be sure to observe the following:
  - Spread a conductive sheet on a workbench.
  - Wear a wrist strap connected to the conductive sheet or the frame ground of MP1862A.

- Do not apply excessive force to connectors when removing the cables from MP1862A. Excessive force can degrade the characteristics or cause failures. Be sure to use a torque wrench when connecting/disconnecting the cables. (Recommended torque: 0.9 N-M).
CAUTION

Avoid inputting the signal exceeding the maximum input level of MP1862A when connecting the Data Output connector of MP1861A to the Data Input1 and 2 connectors of MP1862A.

Maximum input level of the Data Input1 and 2 connectors of MP1862A: 1.00 V

Maximum data output level:
- MP1861A-x13: 3.50 Vp-p
- MP1861A-x11: 2.50 Vp-p

The Data Input connector of MP1862A can be damaged if the signal exceeding the maximum input level is input.
3.2 Inter-Module Connection

3.2.1 1ch TRx connection

This section describes a connection example using one MP1862A and one MP1861A 56G/64G MUX (hereafter, MP1861A).

According to the following procedure, connect the equipment as shown in Figure 3.2.1-1.

[Equipment configuration]
MP1862A (this module)
MP1861A
MP1800A
MU183020A-x22/x23+x31
MU183040B
MU181500B
MU181000A
DUT (Device under test)
[Procedure]

1. Connect the **Clock Output** connector of MU181000A and the **Ext. Clock Input** connector of MU181500B by using the J1624A coaxial cable that comes with MU181000A.

2. Connect the **Jittered Clock Output** connector of MU181500B and the **Ext. Clock Input** connector of MU183020A by using the J1624A coaxial cable that comes with MU181500B.

3. Connect the **Data Input1/2** connectors on the rear panel of MP1861A and the **Data Output1/2** connectors of MU183020A respectively by using coaxial cables. The coaxial cables must be one of the following:
   - J1658A coaxial skew match pair cable that comes with MP1861A
   - Coaxial cables that are of the same length

4. Connect the **Clock Output** connector of MU183020A and the **Ext. Clock Input** connector on the rear panel of MP1861A by using the J1652A coaxial cable that comes with MP1861A.

5. Connect the **Delayed Clock Output** and **MUX Clock Input** connectors on the rear panel of MP1861A by using the J1654A cable that comes with MP1862A.

6. Connect the **Data Output** and **Data Output** connectors on the front panel of MP1861A to the DUT by using coaxial cables.

7. Connect the **Clock Output** connector on the front panel of MP1861A and the **Ext. Clock Input** connector on the front panel of MP1862A by using a coaxial cable. On the **Interface** tab of MP1862A, click **Half Rate** in the **Clock Input Band** box.

8. Connect the DUT and the **Data Input** and **Data Input** connectors on the front panel of MP1862A by using coaxial cables.

9. Connect the **Delayed Clock Output** and **DEMUX Clock Input** connectors on the rear panel of MP1862A by using the J1654A cable that comes with MP1862A.

10. Connect the **Data Output1/2** connectors on the rear panel of MP1862A and the **Data Input1/2** connectors of MU183040B respectively by using coaxial cables. The coaxial cables must be one of the following:
    - J1657A coaxial cables that come with MP1862A
    - Coaxial cables that are of the same length

11. Connect the **1/2 Clock Output** connector on the rear panel of MP1862A and the **Ext. Clock Input** connector of MU183040B by using the J1668A coaxial cable that comes with MP1862A.
3.2 Inter-Module Connection

Panel Layout and Connectors

Figure 3.2.1-1 1ch TRx Connection Example
3.2.2 2ch Rx connection

This section describes a connection example using two MP1862As and two MU183040Bs. According to the following procedure, connect the equipment as shown in Figure 3.2.2-1.

[Equipment configuration]
Two MP1862As (this module)
MP1800A
Two MU183040Bs
MU181500B
MU181000A
DUT (Device under test)

[Procedure]

1. Connect the Data Output1/2 connectors on the rear panel of each of two MP1862As and the Data Input1/2 connectors of two MU183040Bs, respectively by using coaxial cables. The coaxial cables must be one of the following:
   • The supplied J1657A coaxial cables
   • Coaxial cables that are of the same length

2. Connect the 1/2 Clock Output connector on the rear panel of MP1862A and the Ext. Clock Input connector of MU183040B by using the supplied J1668A coaxial cable.

3. Connect the Delayed Clock Output and DEMUX Clock Input connectors on the rear panel of MP1862A, by using the J1654A cable that comes with MP1862A.

4. Connect the Data Input and Data Input connectors on the front panel of MP1862A to the DUT by using coaxial cables.

5. To the Ext. Clock Input connector on the front panel of MP1862A, connect the clock signal to be output from a data generator like MP1861A.

Then, on the Interface tab of MP1862A, in the Clock Input Band box, click the option that matches both bit rate and clock rate to be used by MP1862A. For details on how to set the Clock Input Band, refer to 4.4.1 “Input setting items”.

---

Chapter 3  Panel Layout and Connectors

3.10
3.2 Inter-Module Connection

Figure 3.2.2-1  2ch Rx Connection Example
3.2.3 1ch TRx connection for bathtub jitter measurement

This section describes a connection example for performing bathtub jitter measurement by using MP1862A, MP1861A, and MU181500B which is installed to MP1800A.

When performing bathtub jitter measurement, connect the equipment as shown in Figure 3.2.3-1 and according to the procedure below, because a clean clock (clock without jitter modulation) needs to be input to MP1862A.

[Equipment configuration]
MP1862A
MP1861A
MP1800A
MU183020A-x22/x23+x31
MU183040B
MU181500B
MU181000A
DUT (Device under test)

[Procedure]

1. Connect the Clock Output connector of MU181000A and the Ext. Clock Input connector of MU181500B by using the J1624A coaxial cable that comes with MU181000A.

2. Connect the Jittered Clock Output connector of MU181500B and the Ext. Clock Input connector of MU183020A by using the J1624A coaxial cable that comes with MU181500B.

3. Connect the Data Input1/2 connectors on the rear panel of MP1861A and the Data Output1/2 connectors of MU183020A respectively by using coaxial cables. The coaxial cables must be one of the following:
   • J1658A coaxial cables that come with MP1861A
   • Coaxial cables that are of the same length

4. Connect the Clock Output connector of MU183020A and the Ext. Clock Input connector on the rear panel of MP1861A by using the coaxial cable.

5. Connect the Delayed Clock Output and MUX Clock Input connectors on the rear panel of MP1861A by using the J1654A cable that comes with MP1862A.

6. Connect the Data Output and Data Output connectors on the front panel of MP1861A to the DUT by using coaxial cables.

7. Connect the DUT and the Data Input and Data Input connectors on the front panel of MP1862A by using coaxial cables.
8. Connect the Delayed Clock Output and DEMUX Clock Input connectors on the rear panel of MP1862A by using the J1654A cable that comes with MP1862A.

9. Connect the Data Output1/2 connectors on the rear panel of MP1862A and the Data Input1/2 connectors of MU183040B respectively by using coaxial cables. The coaxial cables must be one of the following:
   • J1657A coaxial cables that come with MP1862A
   • Coaxial cables that are of the same length

10. Connect the 1/2 Clock Output connector on the rear panel of MP1862A and the Ext. Clock Input connector of MU183040B by using the J1668A coaxial cable that comes with MP1862A.

11. Connect the Reference Clock Output connector of MU181500B and the Ext. Clock Input connector on the front panel of MP1862A by using a coaxial cable. Then, on the Interface tab of MP1862A, in the Clock Input Band box, click the option that matches both bit rate and clock rate to be used by MP1862A. For details on how to set the Clock Input Band, refer to 4.4.1 “Input setting items”. For bathtub jitter measurement, refer to 4.9 “Bathtub Function”.

[Page Dimensions: 595.2x842.0]
Figure 3.2.3-1  1ch TRx Connection Example (For Bathtub Jitter Measurement)
Chapter 4 Window Operations

This chapter describes the items on each tab of the operation window.

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Configuration of Operation Screen</td>
</tr>
<tr>
<td>4.2</td>
<td>Configuration of the Operation Window</td>
</tr>
<tr>
<td>4.3</td>
<td>Displaying Measurement Results</td>
</tr>
<tr>
<td>4.3.1</td>
<td>Interface setting items</td>
</tr>
<tr>
<td>4.3.2</td>
<td>Error/Alarm Result Displays</td>
</tr>
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<td>Setting Input Interface</td>
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<tr>
<td>4.4.1</td>
<td>Input setting items</td>
</tr>
<tr>
<td>4.4.2</td>
<td>When inputting jitter-modulated signals</td>
</tr>
<tr>
<td>4.5</td>
<td>Executing Auto Search</td>
</tr>
<tr>
<td>4.5.1</td>
<td>Input setting items in Auto Search dialog box</td>
</tr>
<tr>
<td>4.6</td>
<td>Capture Function</td>
</tr>
<tr>
<td>4.7</td>
<td>Eye Margin Measurement</td>
</tr>
<tr>
<td>4.7.1</td>
<td>EyeMargin window</td>
</tr>
<tr>
<td>4.8</td>
<td>Eye Diagram Measurement</td>
</tr>
<tr>
<td>4.8.1</td>
<td>Eye Diagram Screen (Condition Tab)</td>
</tr>
<tr>
<td>4.8.2</td>
<td>Eye Diagram Screen (Diagram Tab)</td>
</tr>
<tr>
<td>4.9</td>
<td>Bathtub Function</td>
</tr>
<tr>
<td>4.9.1</td>
<td>Displaying Bathtub measurement results in Bathtub window</td>
</tr>
<tr>
<td>4.10</td>
<td>Multi Channel Functions</td>
</tr>
<tr>
<td>4.10.1</td>
<td>Combination function</td>
</tr>
<tr>
<td>4.10.2</td>
<td>Combination Setting</td>
</tr>
</tbody>
</table>
Chapter 4  Window Operations

4.1 Configuration of Operation Screen

This section describes the items on the operation window for MP1862A.

![Overall View of Operation Screen](image)

Figure 4.1-1  Overall View of Operation Screen

The operation window is composed of six blocks as shown in Figure 4.1-1. The function of each block is described in Table 4.1-1.
### 4.1 Configuration of Operation Screen

#### Table 4.1-1  Function of Each Block

<table>
<thead>
<tr>
<th>No.</th>
<th>Block</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1]</td>
<td>Menu bar</td>
<td>Selects the setting functions related to the entire device.</td>
</tr>
<tr>
<td>[2]</td>
<td>Module function buttons</td>
<td>Shortcut buttons for the function items common to the connected modules. Users can customize up to 17 pre-defined function buttons according to their own applications. To open the MP1862A operation window, click the <strong>USB DEMUX</strong> button (🔗).</td>
</tr>
<tr>
<td>[3]</td>
<td>Function setting selection tabs</td>
<td>Switches the module operation tab according to the function items.</td>
</tr>
</tbody>
</table>
| [5] | Module common function area        | Contains the following controls for functions specific to the module.  
Start button  
Stop button  
C: Clock Loss LED  
S: Sync Loss LED  
E: Error LED |
Chapter 4  Window Operations

4.2 Configuration of the Operation Window

This section describes the tabs of the operation window for MP1862A.

![Figure 4.2-1  Function Setting Selection Tabs](image)

<table>
<thead>
<tr>
<th>Tab name</th>
<th>Function</th>
</tr>
</thead>
</table>
| Result   | Measurement results are displayed.  
Tab is displayed when the MP1862A and either the MU18304xA or the MU18304xB are installed in the same main frame and 4 ch Combination is executed.  
In addition to the above conditions, the measurement result is displayed when the DEMUX-ED Link button is on. |
| Interface| This sets the Data/Clock input interface. |
| Misc     | Sets whether to operate linked with the MU18304xA/B 32G ED and opens the configuration dialog box for the ED you want to operate linked with MP1862A. |

Up to 4 MP1862As (CH1 to CH4) can be controlled by using one MP1800A or control PC. The operation window can be toggled one after another (CH1 to CH4) by repeatedly clicking the USB DEMUX button.  

<table>
<thead>
<tr>
<th>Channel Number of MP1862A</th>
<th>Name on Title Bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>[USB11] 56G/64G bit/s DEMUX</td>
</tr>
<tr>
<td>2</td>
<td>[USB12] 56G/64G bit/s DEMUX</td>
</tr>
<tr>
<td>3</td>
<td>[USB13] 56G/64G bit/s DEMUX</td>
</tr>
<tr>
<td>4</td>
<td>[USB14] 56G/64G bit/s DEMUX</td>
</tr>
</tbody>
</table>
4.3 Displaying Measurement Results

To display the measurement results, click the Result tab on the operation window. The Result tab consists of the setting area (upper) and the result display area (lower). You can view the measurement results while checking the setting items of the MP1862A.

In the setting area, you can view the settings configured on the Interface tab.
4.3.1 Interface setting items

The setting items are limited by the input conditions set on the Interface tab of the module operation window. For details, refer to 4.4.1 “Input setting items”.

In addition, MP1862A and ED module can be linked depending on the settings using the DEMUX-ED Link button.

![Figure 4.3.1-1 Interface setting items]

[1] The Data or XData input threshold voltage and phase can be changed while checking the measurement results.

[2] This switches the linkage between the MP1862A and ED module. When the DEMUX-ED Link button is on, the measurement result for the ED module is displayed in the result window of the MP1862A. The button status is displayed as Link ON, Link OFF and Unavailable as shown from the left in Figure 4.3.1-2.

![Figure 4.3.1-2 DEMUX-ED Link Button]
4.3 Displaying Measurement Results

4.3.2 Error/Alarm Result Displays

Measurement results are displayed only when both of the following conditions are met:

- MP1862A is connected to MP1800A to which MU183040A/B or MU183041A/B is installed.
- The DEMUX-ED Link button is on.

When the DEMUX-ED Link button is off, hyphens are displayed instead of measurement results. The DEMUX-ED Link button is available only when MU18304xB is in the 2ch Combination state.

In this area, measurement results obtained from MU183040A/B or MU183041A/B are compiled and displayed.

This section explains the measurement results when installing the following mainframe and modules.

- **Mainframe:** MP1862A
  - MP1800A-015
- **Slot4:** MU183040A or MU183040B Data1-2 2ch Combination

![Figure 4.3.2-1 Items when Error/Alarm selected](image)

**Figure 4.3.2-1** Items when Error/Alarm selected
[1] Select the measurement time display type.
   Date&Time: Select to display the current time.

   History Reset: Click to reset the history data of the error/alarm display.

[3] Enable or disable enlarged display of Error/Alarm measurement result.
   Zoom: Toggles zooming of error count, error rate, Clock Alarm generation status, Sync Loss generation status, and error generation status ON/OFF.

   When the enlarged display is disabled (Zoom is not selected), the items shown in Table 4.3.2-1 are displayed in the result display area with Error/Alarm selected.
### Table 4.3.2-1 Configuration of Measurement Result Display window

<table>
<thead>
<tr>
<th>Item</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1]</td>
<td></td>
</tr>
<tr>
<td>ER</td>
<td>Displays the total error rate of MU183040A/B Slot4 Data1-2.</td>
</tr>
<tr>
<td>EC</td>
<td>Displays the total error count of MU183040A/B Slot4 Data1-2.</td>
</tr>
<tr>
<td>%EFI</td>
<td>Displays the total %EFI (Error Free Interval) of MU183040A/B Slot4 Data1-2.</td>
</tr>
<tr>
<td>EI</td>
<td>Displays the total EI (Error Interval) of MU183040A/B Slot4 Data1-2.</td>
</tr>
<tr>
<td>[2]</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>Displays the total frequency of MU183040A/B Slot4 Data1-2.</td>
</tr>
<tr>
<td>Clock Count</td>
<td>Displays the total clock count of MU183040A/B Slot4 Data1-2.</td>
</tr>
<tr>
<td>[3]</td>
<td></td>
</tr>
<tr>
<td>Clock Alarm</td>
<td>Displays the number of clock alarm intervals of MU183040A/B Slot4 Data1-2. Also displays alarms using indicators. Red: Current data Yellow: History data</td>
</tr>
<tr>
<td>Sync Loss</td>
<td>Displays the number of sync loss intervals in MU183040A/B Slot4 Data1-2. Also displays alarms using indicators. Red: Current data Yellow: History data</td>
</tr>
<tr>
<td>Error</td>
<td>Displays the error status of MU183040A/B Slot4 Data1-2.</td>
</tr>
<tr>
<td></td>
<td>Red: Current data</td>
</tr>
<tr>
<td></td>
<td>Yellow: History data</td>
</tr>
</tbody>
</table>
When the enlarged display is set (Zoom is selected), the items shown in Table 4.3.2-2 are displayed in the result display area with Error/Alarm selected.

![Figure 4.3.2-3 Measurement Result Screen Configuration when Selecting Zoom](image)

<table>
<thead>
<tr>
<th>Item</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1] ER</td>
<td>Displays the total error rate of MU183040A/B Slot4 Data1-2.</td>
</tr>
</tbody>
</table>
4.4 Setting Input Interface

To set the Input interface, click the Interface tab on the operation window.

4.4.1 Input setting items

The Interface tab consists of the data setting area (upper) and the clock setting area (lower). The Data signal is input to the Data Input connector of MP1862A and the XData signal is input to the Data Input connector. The following explains the XData settings related to the connector.

Figure 4.4.1-1 Interface Tab
[1] Set the data input conditions.

- When the Input Condition is Differential 50 Ohm
  
  ![Figure 4.4.1-2 Setting Data input conditions]

- When the Input Condition is Single-Ended
  
  ![Figure 4.4.1-2 Setting Data input conditions]

### Table 4.4.1-1  Data input condition setting items (Input Condition)

<table>
<thead>
<tr>
<th>Data input condition setting items</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differential 50 Ohm, Differential 100 Ohm</td>
<td></td>
</tr>
<tr>
<td>Independent</td>
<td>Uses Data and XData as the differential input. Thresholds for Data and XData can be changed independently.</td>
</tr>
<tr>
<td>Tracking</td>
<td>Uses Data and XData as the differential input. The threshold for XData tracks the setting for Data.</td>
</tr>
<tr>
<td>Alternate</td>
<td>Uses Data and XData as the differential input.</td>
</tr>
<tr>
<td>Data-XData</td>
<td>Sets the threshold for the difference between Data and XData, using Data as a reference.</td>
</tr>
<tr>
<td>XData-Data</td>
<td>Sets the threshold for the difference between XData and Data, using XData as a reference.</td>
</tr>
<tr>
<td>Single-Ended</td>
<td></td>
</tr>
<tr>
<td>Data</td>
<td>Uses the Data side as single-ended input.</td>
</tr>
<tr>
<td>XData</td>
<td>Uses the XData side as single-ended input.</td>
</tr>
</tbody>
</table>
4.4 Setting Input Interface

![CAUTION]

Be sure to connect the supplied protection cap (J1363A) to the data input connector you don’t use when the data input condition is set to Single-ended.

Operating while signal is input to the unused connector can cause malfunction.

<table>
<thead>
<tr>
<th>Data Termination setting items</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differential 100Ohm –</td>
<td>When the input connector is open, the midpoint of the Data terminator (50 Ω) and the XData terminator (50 Ω) is connected to the ground through a high resistance for equipment safety.</td>
</tr>
<tr>
<td>Differential 50 Ohm GND</td>
<td>Terminated at 50 Ω/GND</td>
</tr>
<tr>
<td>Single-Ended Variable</td>
<td>Terminates into a setting voltage in the range of 50 Ω/-2.5 to +3.5 V, in 10 mV steps.</td>
</tr>
</tbody>
</table>

![CAUTION]

- Avoid feeding excessively high current to the internal termination resistor of MP1862A. Failure to do so may degrade the performance or cause a malfunction.
- If a differential signal is input to each of the Data and XData connectors when Single-Ended is clicked in the Input Condition box, the threshold margin will be doubled.

<table>
<thead>
<tr>
<th>Setting items</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Threshold XData Threshold</td>
<td>Set in range of –3.500 to +3.300 V in 0.001-V steps. If Differential 50Ohm or Differential 100Ohm is clicked in the Input Condition box, values for Data Threshold and XData Threshold are restricted so that the difference (absolute value) of them can be within 3.000 V.</td>
</tr>
<tr>
<td>Data-XData XData-Data</td>
<td>Set in range of –3.000 to +3.000 in 0.001-V steps.</td>
</tr>
</tbody>
</table>
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[2] Set the Clock input conditions.

![Figure 4.4.1-3  Clock Input Setting](image)

Table 4.4.1-4  Composition of Clock Input Setting Screen

<table>
<thead>
<tr>
<th>Setting items</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clock Input Band</td>
<td>Auto: Sets bit rate of input data and performs measurement automatically</td>
</tr>
<tr>
<td></td>
<td>Manual: Sets bit rate of input data manually</td>
</tr>
<tr>
<td></td>
<td>This setting can be used when measuring Burst data.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clock Input Band</th>
<th>Range of Operation Bitrate</th>
<th>Input Clock Freq value (Display)</th>
<th>Relationship Between Bitrate and Clock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half Rate Clock</td>
<td>8.0 to 64.2Gbit/s</td>
<td>4.0 to 32.1GHz</td>
<td>Operates at a 1/2 clock.</td>
</tr>
<tr>
<td>Quarter Rate Clock</td>
<td>&gt;25 to 50Gbit/s</td>
<td>&gt;6.25 to 12.5GHz</td>
<td>Operates at a 1/4 clock.</td>
</tr>
<tr>
<td>One eighth Rate Clock</td>
<td>&gt;50 to 64.2Gbit/s</td>
<td>&gt;6.25 to 8.025GHz</td>
<td>Operates at a 1/8 clock.</td>
</tr>
</tbody>
</table>
Table 4.4.1-4  Composition of Clock Input Setting Screen (Cont’d)

<table>
<thead>
<tr>
<th>Setting items</th>
<th>Setting items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay</td>
<td>mUI Sets a delay in the range of –1000 to 1000 mUI, in 4 mUI steps. This module operates based on UI units. Increasing the numeric value increases the delay.</td>
</tr>
<tr>
<td></td>
<td>ps Sets a delay in steps of ps units, equivalent to 4 mUI. The setting range is the equivalent to the range of –1000 to 1000 mUI that is converted into ps units. 64 GHz: –15.6 to 15.6 ps 56 GHz: –17.8 to 17.8 ps 25 GHz: –40 to 40 ps When the red frequency counter value range is incorrect, “----” is displayed.</td>
</tr>
<tr>
<td>Calibration</td>
<td>Clicking Calibration executes self calibration. When the alarm indicator on the button is red, calibration should be performed. Sometimes, the delay time may be changed greatly by executing calibration, so take care when performing calibration during measurement.</td>
</tr>
<tr>
<td>Relative</td>
<td>Clicking Relative sets the current delay in 4-mUI steps relative to the reference value of 0 mUI. When Relative is clicked again, the setting is converted from the relative value to the current delay value.</td>
</tr>
<tr>
<td>Jitter Input</td>
<td>Sets whether to input jitter. To perform jitter tolerance test while inputting jitter-modulation applied clock, this button must be ON. Refer to 4.4.2 “When inputting jitter-modulated signals” for details.</td>
</tr>
</tbody>
</table>

Notes:

- When the frequency or the temperature condition is changed, the alarm indicator on Calibration lights, prompting performance of calibration. If calibration is not performed at this time, the error in the phase setting may be greater than at a normal phase setting.

- Values displayed in ps units vary as the frequency changes, because the MP1862A sets phases in mUI units as an internal standard.

- The phase setting accuracy varies depending on the option selected in the Pattern Sequence box of the Misc1 tab for MU183040A/B. If Burst is selected, the phase setting accuracy becomes lower than that of when Repeat is selected.
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- When inputting a jitter-modulated clock while Jitter Input of Delay is OFF, sometimes, the phase becomes unstable.

- When inputting a jitter-modulated clock, if the Delay lamp is lit, sometimes, the phase setting error becomes large.

- When inputting a signal to this module, do not input a voltage exceeding the specified value, otherwise the circuits may be damaged.

- As countermeasure to static electricity, before connecting to an input connector, always ground the other equipment (including test circuit).

- Sometimes, a coaxial cable can accumulate a charge between the outer and inner conductors rather like a capacitor. Always take antistatic measures such as grounding the outer conductor before connecting the cable.

- During Auto Search execution, the delay amount of Delay is always changed in order to drive the clock phase to the optimum point. Therefore, the alarm indicators of Delay and Calibration light up in red continuously. This is not abnormal.
4.4 Setting Input Interface

[3] Select the measurement restart conditions. This can be selected when the MP1862A and either the MU183040A/B or the MU183041A/B are installed in the same main frame, 4 ch Combination is executed, and the **DEMUX-ED Link** button is on.

![Measurement Restart](image)

**Figure 4.4.1-4 Setting Screen for Measurement Restart Conditions**

<table>
<thead>
<tr>
<th>Input setting items</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement Restart</td>
<td>Data Threshold</td>
</tr>
<tr>
<td></td>
<td>Clock Delay</td>
</tr>
</tbody>
</table>

**Table 4.4.1-5 Setting screen for measurement restart conditions**
4.4.2 When inputting jitter-modulated signals

- When executing jitter tolerance test, etc. by inputting jitter-modulated clock, set Jitter Input of Delay to ON to avoid malfunction of Delay caused by excess jitter modulation. (Refer to Figure 4.4.2-1.) When using the MU181000A/B (with Option 001 Jitter Modulation) or MU181500B, set Jitter Input of Delay to ON, and then set Jitter Modulation of the MU181000A/B or MU181500B to ON.
- When executing Calibration of Delay, set jitter modulation of input signal to non-modulation.

![Figure 4.4.2-1  Clock delay setting items](image)

**Notes:**

- When jitter-modulated clock is input while Jitter Input of Delay is set to OFF, the phase may become unstable.
- The Delay lamp may light up when a jitter-modulated clock signal is input. In addition, phase setting error may increase.
- The Delay function has feedback process to improve its setting accuracy at default setting (Jitter Input is set to OFF). However, if Jitter Input is set to ON, the setting accuracy is lowered because the feedback process is stopped.

<table>
<thead>
<tr>
<th>Jitter Input</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>Jitter Tolerance Measurement</td>
</tr>
<tr>
<td></td>
<td>BER measurement when jitter amount applied to clock signal is big.</td>
</tr>
<tr>
<td></td>
<td>(Delay is unstable when Jitter Input is OFF.)</td>
</tr>
<tr>
<td>OFF</td>
<td>Phase margin measurement</td>
</tr>
<tr>
<td></td>
<td>Eye Margin measurement,</td>
</tr>
<tr>
<td></td>
<td>Eye Diagram measurement,</td>
</tr>
<tr>
<td></td>
<td>Bathtub measurement</td>
</tr>
</tbody>
</table>
4.5 Executing Auto Search

The Auto Search function is for optimizing the input Data and XData input signal Threshold voltage and phase. Click the Auto Search module function button to display the Auto Search dialog box. The Auto Search setting items can be set in this dialog box. The Auto Search module function button can be displayed and hidden by selecting Button Menu from the View menu on the menu bar.

When the pointer is located on the Auto Search module function button, Auto Search is displayed for help.

Figure 4.5-1  Auto Search Button

The Auto Search function is available only when all of the following conditions are met:

- MP1862A is connected to MP1800A to which MU183040A/B or MU183041A/B is installed.
- MU18304xA/B is in the 2ch Combination state.
- The DEMUX-ED button is on.

4.5.1 Input setting items in Auto Search dialog box

Figure 4.5.1-1  Auto Search Window

[1] Select the check box for the USB number where Auto Search is to be executed.

To use Auto Search, refer to Section 5.8 “Auto Search” in the MU183040A/B Operation Manual.
4.6 Capture Function

To capture and analyze the input test pattern data, click **Capture** on the **Capture** tab for MU183040A/B or MU183041A/B.

It is possible to perform the Capture analysis using 2ch Combination coupled with the MP1862A.

To use Capture Function, refer to Section 5.5 “Capturing Test Patterns” in the *MU183040A/B Operation Manual.*
4.7 Eye Margin Measurement

At Eye Margin measurement, the phase and threshold voltage margins are measured from the eye diagram input to the MP1862A as follows.

The Eye Margin measurement for 64 Gbit/s input data is available only when all of the following conditions are met:

- MP1862A is connected to MP1800A to which MU183040A/B or MU183041A/B is installed.
- MU18304xA/B is in the 2ch Combination state.
- The DEMUX-ED button is on.

To use the Eye Margin measurement function, click the Auto Measurement module function button, and then select Eye Margin(32G/64G). Refer to the MX180000A Signal Quality Analyzer Control Software Operation Manual for details.
4.7.1 EyeMargin window

Figure 4.7.1-1 shows the EyeMargin window.

[1] Select the check box for the USB number you want to measure.

To use Eye Margin Measurement, refer to Section 5.10 “Auto Adjust” in the MU183040A/B Operation Manual.
4.8 Eye Diagram Measurement

An eye diagram is a means for measuring digital signal quality. It visualizes an open-eye margin two-dimensionally. For example, an eye diagram measurement can be used when it is required to measure the margin in the setting range for the threshold voltage and clock phase of a decision circuit, while quality with an error rate of $E^{-12}$ or lower should be secured. In this event, a contour at an error rate of $E^{-12}$ measured with eye diagram measurement can be obtained as a result. The required quality can be secured in the area inside the contour. Therefore, the wider this area, the higher the signal quality.

![Figure 4.8-1 Schematic Diagram of Eye Diagram Measurement](image)

The Eye Diagram measurement for 64 Gbit/s input data is available only when all of the following conditions are met:
- MP1862A is connected to MP1800A to which MU183040A/B or MU183041A/B is installed.
- MU18304xA/B is in the 2ch Combination state.
- The DEMUX-ED button is on.

To use the Eye Diagram measurement function, click the Auto Measurement module function button, and then select Eye Diagram. See the MX180000A Signal Quality Analyzer Control Software Operation Manual for details.
4.8.1 Eye Diagram Screen (Condition Tab)

Figure 4.8.1-1 shows the Condition tab.

[1] Select the check box for the USB number you want to measure.

To use Eye Diagram, refer to Section 5.11 “Eye Diagram Measurement” in the MU183040A/B Operation Manual.
4.8.2 Eye Diagram Screen (Diagram Tab)

Figure 4.8.2-1 shows the Diagram tab.

[1] Select the USB number you want to measure.

To use Eye Diagram, refer to Section 5.11 “Eye Diagram Measurement” in the MU183040A/B Operation Manual.
4.9 Bathtub Function

The Bathtub measurement for 64 Gbit/s input data is available only when all of the following conditions are met:

- MP1862A is connected to MP1800A to which MU183040A/B or MU183041A/B is installed.
- MU18304xA/B is in the 2ch Combination state.
- The DEMUX-ED button is on.

To use the Bathtub function, click the Auto Measurement module function button, and then click Bathtub. See the MX180000A Signal Quality Analyzer Control Software Operation Manual for details.
4.9 Bathtub Function

4.9.1 Displaying Bathtub measurement results in Bathtub window

![Bathtub Window](image-url)

[1] Opens the **Measurement Target** dialog box, where you can select the Slot or USB number(s) you want to measure.

[2] To perform bathtub jitter measurement, click **MU181500B Reference Clock Input** to display the **Operation Bit Rate**. Connect the equipment, as indicated on the screen or referring to Section 3.2.3. (Clean clock without jitter modulation added must be input to MP1862A.)


Refer to Section 5.12 “Bathtub Function” in the MU183040A/B Operation Manual for the following:

- Bathtub measurement without jitter applied
- How to set the parameters other than [1], [2] and [3] in the Bathtub window
- How to perform bathtub measurement
4.10 Multi Channel Functions

MU183040A/B and MU183041A/B provide the Multi-channel functions that can generate data combining outputs from multiple channels.

The Multi-channel functions include the Combination and Channel Synchronization functions.

Available functions vary depending on model and its option.

Combination Function Types
(1) 4ch Combination: MU183041A/B
(2) 2ch Combination: MU183040A/B-x20, MU183041A/B

<table>
<thead>
<tr>
<th>Model/Option</th>
<th>2ch Combi</th>
<th>4ch Combi</th>
</tr>
</thead>
<tbody>
<tr>
<td>MU183040A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MU183040B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MU183040A-x20</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>MU183040A-x20</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>MU183041A</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>
4.10 Multi Channel Functions

4.10.1 Combination function

The Combination function can synchronize generation or reception of patterns among channels of MU183020A/MU183021A and MU183040A/MU183041A and evaluate 40 Gbit/s application and 100 Gbit/s application.

By combining four 28 Gbit/s channels by the MU183021A, the serial data at 111.8 Gbit/s of OTU4 (Optical channel Transport Unit 4) can be generated.

![Pattern generation timing is controlled and 4:1 MUX](image1)

For combination of 100G 4:1MUX

Select for 100 Gbit/s data measurement using MUX and DEMUX externally.

Pattern reception sync control when measuring 100G data using external DEMUX

![Pattern reception sync control when measuring 100G data using external DEMUX](image2)

For combination of 100G 1:4DEMUX

Figure 4.10.1-1 4ch Combination pattern generation/reception

By combining two channels of 20 Gbit/s data, 40 Gbit/s serial data that is bit rate of 40 GbE or OTU3 can be generated.

Different from the conventional method of combining four 10 Gbit/s data, this function can evaluate multiple DUTs by using a single MP1800A or MT1810A.
Figure 4.10.1-2  2ch Combination pattern generation/reception
4.10 Multi Channel Functions

4.10.2 Combination Setting

The Multi Channel function synthesizes patterns among channels of MU183040A/41A/40B/41B, and enables reception synchronization. This enables the evaluation of the 100 Gbit/s application and 40 Gbit/s application.

Combination Function Types

1. 4ch Combination: MU183041A/B
2. 2ch Combination × 2: MU183041A/B
3. 2ch Combination: MU183041A/B or MU183040A/B·x20

Combination function measures bit error by synthesizing bit sequences that multiple channels receive.

Figure 4.10.2-1 Combination Setting window

[1] Opens the Combination Setting dialog box.

The contents of the dialog box vary, depending on the model or option.

Figure 4.10.2-2 Combination Setting dialog box
Table 4.10.2-1 Screen Layout of Combination Setting

<table>
<thead>
<tr>
<th>Operation setting items</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent</td>
<td>Operates each channel of MU183040A/B or MU183041A/B independently.</td>
</tr>
<tr>
<td>Combination</td>
<td>2ch Synchronizes two channels of MU183040A/B-x20 or MU183041A/B.</td>
</tr>
<tr>
<td></td>
<td>4ch Synchronizes four channels of MU183041A/B.</td>
</tr>
</tbody>
</table>

To confirm the operation settings you made, click **OK**.

By selecting **Combination**, buttons to select channels are displayed in the ED window.
Chapter 5  Use Examples

This chapter provides use examples of measurement using the MP1861A/MP1862A.

5.1 Achieving Error-Free Data Transmission ................. 5-2
5.2 Measuring Optical Transceiver Module ..................... 5-4
5.3 Testing Jitter Tolerance ........................................ 5-6
5.1 Achieving Error-Free Data Transmission

This section describes how to remove all bit errors (achieve an error-free data transmission) with MP1861A and MP1862A placed in an opposite state.

The equipment used in the following example is:

- MP1800A-016: 1
- MU183020A-x01/x23/x31: 1
- MU183040B-x01/x20: 1
- MU181000A: 1
- MU181500B: 1
- MP1861A-x01/x13/x30: 1
- MP1862A-x01: 1

1. Connect MP1800A, MP1861A and MP1862A to the same ground.
2. Connect the power cords of MP1861A, MP1862A and MP1800A.
3. Turn on the power to MP1861A, MP1862A and MP1800A, and then set the measurement conditions as follows:
4. On the menu bar of MX180000A, click the File menu, and then click Initialize to reset all the settings to the factory defaults.
5. Connect the equipment as shown in Figure 5.1-1 “Equipment Connection for Error-Free Check”.
6. In the MU181500B window, click Synthesizer, and then select MU181000A.
7. On the Misc2 tab of MU183020A, select MU181500B in the Clock Source box.
8. On the Misc2 tab of MU183020A, input the operating bit rate in the Bit Rate box.
   The bit rate of the signal output from MP1861A is twice of the bit rate set here.
   Example:
   To output a signal with a bit rate of 60 Gbit/s from MP1861A, input “30” here.
9. On the Misc2 tab of MU183020A, select Fullrate in the Output Clock Rate box.
10. On the Misc2 tab of each MU183020A and MU183040B, click Setting in the Combination Setting area, and then in the Combination Setting dialog box, click Combination, and then select 2ch in the Combination box.
11. On the Pattern tab of each MU183020A and MU183040B, select a test pattern. The selected test pattern is reflected to all the channels.
12. On the **Data Interface** tab of MP1861A, click the **MUX-PPG Link** button.

13. On the **Data Interface** tab of MP1862A, click the **DEMUX-ED Link** button.

14. Turn on the output from MP1861A by click the **Output** module function button or pressing the **Output** key on the front panel of MP1800A.

15. Click the **Auto Search** module function button.

16. In the Auto Search window, select the **USB11 DEMUX** check box in the **Slot/CH** column, and then click **Start**. Refer to Section 4.5 “Executing Auto Search” in the **MP1862A 56G/64G bit/s DEMUX Operation Manual**.

17. Click the **Start** module function button.

18. On the **Result** tab of MP1862A, check the measurement results.

---

**Figure 5.1-1  Equipment Connection for Error-Free Check**
5.2 Measuring Optical Transceiver Module

This section explains how to measure 56G optical devices using the MP1800A and MP1861A/MP1862A.

CAUTION

Check that the output level of the DUT (O/E) matches the data input range for MP1862A. If it is out of range, adjust the input level to MP1862A using an attenuator.

The equipment used in the following example is:

- MP1800A-016: 1
- MU183020A-x01/x23/x31: 1
- MU183040B-x01/x20: 1
- MU181000A: 1
- MU181500B: 1
- MP1861A-x01/x13/x30: 1
- MP1862A-x01: 1

1. Place the equipment in the error-free state according to the procedure in 5.1 “Achieving Error-Free Data Transmission”.
2. Turn off the output from MP1861A by clicking the Output module function button or pressing the Output key on the front panel of MP1800A.
3. On the Data Interface tab of MP1861A, set the data output interface so that it does not exceed the input voltage range of the DUT (E/O).
4. On the Pattern tab of MU183020A, select a test pattern for the Tx side.
   Once a test pattern is set for a channel of MU183020A, the set test pattern is reflected to all the channels.
5. On the Interface tab of MP1862A, set the data input interface so that it can detect the signal output from the DUT (O/E).
   Once a test pattern is set for a channel of MU183040B, the set test pattern is reflected to all the channels.
7. Turn off the power to MP1861A, MP1862A and MP1800A.
8. Connect MP1861A, MP1862A and DUT by using applicable coaxial cables or equivalent.
   Before connecting the DUT, short the cores and outer conductors of the cables by using a thin pointed metal stick such as tweezers.
   Connect the equipment as shown in Figure 5.2-1.
9. Turn on the MP1862A, DUT, MP1861A and MP1800A in order.

**CAUTION**

The DUT may be damaged if a signal line is connected or disconnected while the output is ON. Be sure to turn off the MP1800A and MP1861A before changing the cable connection.

10. On the **Data Interface** tab of MP1861A, select **ON** in the **Data/XData** box.

11. Turn on the output from MP1861A by clicking the **Output** module function button ( ) or pressing the **Output** key on the front panel of MP1800A.

12. Click the **Auto Search** module function button ( ).

13. Click the **Start** module function button ( ).

14. On the **Result** tab of MP1862A, check the measurement results.

15. On the **Data Interface** tab of MP1861A, measure the sensitivity of the DUT (E/O), changing the values in the **Amplitude** and **Offset** boxes.
5.3 Testing Jitter Tolerance

This section describes how to test jitter tolerance by using MP1861A and MP1862A.

The equipment used in the following example is:

- MP1800A-016: 1
- MU183020A-x01/x23/x31: 1
- MU183040B-x01/x20: 1
- MU181000A: 1
- MU181500B: 1
- MP1861A-x01/x13/x30: 1
- MP1862A-x01: 1

1. Place the equipment in the error-free state according to the procedure in 5.1 “Achieving Error-Free Data Transmission”. Be sure to use the cables that come with MP1861A and MP1862A.

2. Turn off the output from MP1861A by clicking the Output module function button or pressing the Output key on the front panel of MP1800A.

3. On the Data Interface tab of MP1861A, set the data output interface so that it does not exceed the input voltage range of the DUT.

4. On the Interface tab of MP1862A, set the data input interface so that it can detect the signal output from the DUT.

5. Connect the Data Output and Data Output connectors of MP1861A to the input connectors of the DUT by using coaxial cables.

6. Connect the Data Input and Data Input connectors of MP1862A to the output connectors of the DUT by using coaxial cables.

7. Adjust the length of the cable used for the Clk Output1/2 connector of MP1861A and the Ext Clk Input connector of MP1862A so that it becomes equivalent to the delay between the Data Output connector of MP1861A and the Data Input connector of MP1862A.

Jitter tolerance may not be tested properly unless the delay length is set properly.

8. On the Data Interface tab of MP1861A, switch the Jitter Input to ON.

9. Turn on the output from MP1861A by clicking the Output module function button or pressing the Output key on the front panel of MP1800A.

10. Click the Auto Measurement module function button.

11. Click Jitter Noise Tolerance Test Software.

For how to use the MX181500A Jitter/Noise Tolerance Test Software,
5.3 Testing Jitter Tolerance

refer to the MX181500A Jitter/Noise Tolerance Test Software Operation Manual.
Chapter 6 Performance Test

This chapter describes the performance testing of the MP1862A.

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6.3 Performance Test Items ............................................... 6-4
  6.3.1 Operating frequency ............................................. 6-4
  6.3.2 Input level .......................................................... 6-6
  6.3.3 Pattern .............................................................. 6-8
  6.3.4 Error detection .................................................. 6-9
Performance tests are executed to check that the major functions of the MP1862A meet the required specifications. Execute performance tests at acceptance inspection, operation check after repair, and periodic (once every six months).
6.2 Devices Required for Performance Tests

Before starting performance tests, warm up the MP1862A and the measuring instruments for at least 30 minutes. Table 6.2-1 shows the devices required for performance tests.

Table 6.2-1 Devices Required for Performance Test

<table>
<thead>
<tr>
<th>Device Name</th>
<th>Required Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse Pattern Generator + MUX (MP1800A-015/016 + MU183020A-x22/x23, x31 + MU181000A/B) MUX (MP1861A) Error Detector (MU183040A/B-x20)</td>
<td>Operating frequency: 8 to 56.2 GHz Data clock phase variable: 2 UI or more</td>
</tr>
<tr>
<td>Pulse Pattern Generator + MUX (MP1800A-015/016 + MU183020A-x01, x22/x23, x31 + MU181000A/B) MUX (MP1861A-x01) Error Detector (MU183040A/B-x01, x20)</td>
<td>Operating frequency: 8 to 64.2 GHz Data clock phase variable: 2 UI or more</td>
</tr>
<tr>
<td>Sampling Oscilloscope</td>
<td>70 GHz or more band</td>
</tr>
</tbody>
</table>

*Note:* Before starting the performance tests, warm up the device under test and the measuring instruments for at least 30 minutes and wait until they become sufficiently stabilized, unless otherwise specified. Additional conditions are required for maximum measurement accuracy: measurements must be performed at room temperature, fluctuations of AC power supply voltage must be small, and noise, vibration, dust, and humidity must be insignificant.
6.3 Performance Test Items

This section describes the following test items.

- Operating frequency range
- Input level
- Pattern
- Error detection

6.3.1 Operating frequency

(1) Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Option</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP1862A</td>
<td>No</td>
<td>4 to 28.1 GHz</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>4 to 32.1 GHz</td>
</tr>
</tbody>
</table>

(2) Connection

Figure 6.3.1-1 shows the connection example using MP1861A, MU183020A (MU183020A-x01, x22/x23, x30), MP1862A, MU183040A/B (MU183040A/B-x01, x20), and MU181000A/B. Before connecting the devices, be sure to use a sampling oscilloscope to check if the frequency and level of the signals output from the MP1862A is proper.
(3) Procedure

1. Connect each measuring instrument using cables as shown in Figure 6.3.1-1.

2. Connect the MP1862A to the MP1800A and switch on the power. Switch on the power of the MP1800A and each measuring instrument and allow them to warm up.

3. On the Misc2 tab of each MU183020A and MU183040B, click Setting, and then in the Combination Setting dialog box, click Combination and then click 2ch. In addition, in the Clock Setting area, click Fullrate in the Output Clock Rate box.

4. Set the parameters as follows, and then perform the Auto Adjust function for Data1 and 2 of MU183040B.

   **Data Interface** tab (MP1861A)
   - Amplitude: 0.5 Vpp
   - Offset: Vth, 0 V

   **Pattern** tab (Each of MU183020A and MU183040B)
   - Test Pattern: PRBS 31
   - Mark Ratio: 1/2

5. Select the Output module function button.

6. Adjust the MP1862A phase and threshold to the optimum values. (Use the auto search function.)

7. Check that no error is detected by the MU183040B.

8. By repeating steps 6 and 7 while varying the operating frequency, check for any error in the rated operating frequency range.
6.3.2 Input level

(1) Specifications

<table>
<thead>
<tr>
<th>Option</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP1862A</td>
<td>Data Input</td>
</tr>
<tr>
<td></td>
<td>XData Input</td>
</tr>
<tr>
<td></td>
<td>Input amplitude: 0.125 to 1.0 Vp-p</td>
</tr>
<tr>
<td></td>
<td>Threshold voltage: –3.5 to +3.3 V</td>
</tr>
</tbody>
</table>

(2) Connection

Refer to Figs. 6.3.1-1 for the connections.

(3) Procedure

1. Connect devices and configure the settings in the same manner as shown in Steps 2 and 3 in Section 6.3.1.
2. Set the output level of MP1861A and threshold voltage of MP1862A as shown in Table 6.3.2-2, turn on the MP1861A output, and then press the Start key on the front panel of MP1800A. Adjust the phase as required to make sure that there is no bit error.

Table 6.3.2-2 Input level test setting when MP1862A is installed

<table>
<thead>
<tr>
<th>No.</th>
<th>MP1821A</th>
<th>MP1862A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Termination</td>
<td>Amplitude [Vp-p]</td>
</tr>
<tr>
<td>1</td>
<td>GND</td>
<td>1.0</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0.25*</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>0.25*</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>1.0</td>
</tr>
</tbody>
</table>

*: To output the signal with an amplitude of 0.25 Vp-p, use the 41V-6 precision fixed attenuator 6 dB (standard accessory) with MP1861A set to 0.5 Vp-p.

Note:

To change the termination conditions, be sure to set MP1861A and MP1862A in the procedure below. Unless the termination conditions are changed to the same values in the following procedure, both of MP1861A and MP1862A may be damaged.

1. Turn off the MP1861A output.
2. Set the termination condition of MP1862A to GND.
3. Change the termination conditions of MP1861A.
4. Set the termination conditions of MP1862A to be the same as MP1861A.
3. Remove the cable from the Data input connectors, and then connect the XData connectors. In the MP1862A input window, select “Single-Ended” - “XData” for Input Condition. Next, set the output level and threshold voltage in the same manner as shown in Steps 2 and check that no error occurs.
6.3.3 Pattern

(1) Patterns to be tested
   - PRBS pattern
   - Zero Substitution pattern

(2) Connection
   See Figure 6.3.1-1 for the device connection.

(3) Procedure
   1. Connect devices and configure the settings in the same manner as shown in Steps 2 and 3 in Section 6.3.1.
   2. Set the output of the MP1861A to ON and press the measurement start button of the MP1862A. Adjust the phase as required, and check that no error occurs.
   3. For both the MU183020A and the MU183040A/B, set the PRBS pattern length to $2^n-1$, changing the value of $n$ to 7, 9, 10, 11, 15, 20, 23, and 31, and check that no error occurs.
   4. For both the MU183020A and the MU183040A/B, set the test pattern to Zero Substitution, then, set Length to $2^n-1$, changing the value of $n$ to 7, 9, 10, 11, 15, 20, and 23, and check that no error occurs. Next, set Length to $2^n$, changing the value of $n$ to 7, 9, 10, 11, 15, 20, and 23, and confirm that no error occurs.
6.3.4 Error detection

(1) Specifications
Error rate: $0.0000 \times 10^{-16}$ to 1.0000
Error count: 0 to $1 \times 10^{16}$
Error free interval (EFI): 0.0000 to 100.0000%
Error interval (EI): 0 to $1 \times 10^{16}$
Clock frequency: 8 to 64.2 GHz, accuracy: ±(10 ppm + 1 kHz)

(2) Connection
See Figure 6.3.1-1 for the device connection.

(3) Procedure
1. Connect devices and configure the settings in the same manner as shown in Steps 2 and 3 in Section 6.3.1.
2. Set the bit rate of MU183020A to 32.1 Gbit/s, turn on the MP1861A output, and then press the Start key on the front panel of MP1800A.
3. On the Error Addition tab of MU183020A, enable (ON) the error addition function, and then make sure that the ER measurement result on the Result tab of MP1862A matches the value set in the Rate box on the Error Addition tab of MU183020A.
4. Set “Single” for error insertion of the MU183020A (set “Single” for Variation in the MU183020A Error Addition tab window). In the Gating field on the MU183040A/B Measurement tab window, set “Single” for Cycle, and set the measurement time to 20 seconds.
5. Press the error insertion Single button of the MU183020A once during the measurement (20 seconds). When the measurement has finished, check that the measurement results are as follows.

Error rate (ER): 1.0000E–12
Error count (EC): 1.0000E–00
Error free interval (%EFI): 99.9900%
Error interval (EI): 1
## Chapter 7 Remote Commands

This chapter provides the MP1862A remote commands.
For the MX180000A remote functions, refer to the *MX180000A Signal Quality Analyzer Control Software Operation Manual Remote Control*.

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<th>Page</th>
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<td>Interface tab</td>
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<td>7.4.4</td>
<td>Bathtub measurement</td>
<td>7-86</td>
</tr>
</tbody>
</table>
Chapter 7  Remote Commands

7.1  Status Commands

This section explains the Alarm/Error status commands for the MP1862A 56G/64Gbit/s DEMUX.

:INSTrument:DEMUX[:EVENT]?

Response  

<table>
<thead>
<tr>
<th>&lt;numeric&gt;</th>
<th>NR1 NUMERIC RESPONSE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 2112</td>
<td>Sum total of the bit of event register (DECIMAL)</td>
</tr>
</tbody>
</table>

Available bit

| 64 (Bit 6) | Delay Busy |
| 2048 (Bit 11) | Delay Calibration Require |

Function

Queries event at 64Gbit/s DEMUX status.

Example

> :INSTrument:DEMUX:EVENt?

Or

> :INSTrument:DEMUX?

< 64

:INSTrument:DEMUX:CONDition?

Response

<table>
<thead>
<tr>
<th>&lt;numeric&gt;</th>
<th>NR1 NUMERIC RESPONSE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 2112</td>
<td>Sum total of the bit of condition register (DECIMAL)</td>
</tr>
</tbody>
</table>

Available bit

| 64 (Bit 6) | Delay Busy |
| 2048 (Bit 11) | Delay Calibration Require |

Function

Queries condition at 64Gbit/s DEMUX status.

Example

> :INSTrument:DEMUX:CONDition?

< 64

:INSTrument:DEMUX:PTRansition <numeric>

Parameter

<table>
<thead>
<tr>
<th>&lt;numeric&gt;</th>
<th>DECIMAL NUMERIC PROGRAM DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 2112</td>
<td>Sum total of the bit of transition filter (DECIMAL)</td>
</tr>
</tbody>
</table>

Available bit

| 64 (Bit 6) | Delay Busy |
| 2048 (Bit 11) | Delay Calibration Require |

Function

Sets the transition filter (positive transition) of the 64Gbit/s DEMUX status.

Example

To set the transition filter (positive transition) of the 64Gbit/s DEMUX status to 1:

> :INSTrument:DEMUX:PTRansition 64
### 7.1 Status Commands

#### :INSTrument:DEMUX:PTRansition?

**Response**  
<numeric>=<NR1 NUMERIC RESPONSE DATA>  
0 to 2112  Sum total of the bit of transition filter (DECIMAL)

**Function**  
Queries the condition of the transition filter (positive transition) of the 64Gbit/s DEMUX status.

**Example**  
> :INSTrument:DEMUX:PTRansition?  
< 64

#### :INSTrument:DEMUX:NTRansition <numeric>

**Parameter**  
<numeric>=<DECIMAL NUMERIC PROGRAM DATA>  
0 to 2112  Sum total of the bit of transition filter (DECIMAL)  
Available bit  
64 (Bit 6)  Delay Busy  
2048 (Bit 11)  Delay Calibration Require

**Function**  
Sets the transition filter (negative transition) of the 64Gbit/s DEMUX status.

**Example**  
To set the transition filter (negative transition) of the 64Gbit/s DEMUX status to 1:  
> :INSTrument:DEMUX:NTRansition 64

#### :INSTrument:DEMUX:NTRansition?

**Response**  
<numeric>=<NR1 NUMERIC RESPONSE DATA>  
0 to 2112  Sum total of the bit of transition filter (DECIMAL)

**Function**  
Queries the transition filter (negative transition) of the 64Gbit/s DEMUX status.

**Example**  
> :INSTrument:DEMUX:NTRansition?  
< 64

#### :INSTrument:DEMUX:RESet

**Function**  
Initializes event at 64Gbit/s DEMUX status.

**Example**  
> :INSTrument:DEMUX:RESet
Chapter 7  Remote Commands

7.2  Common Commands

7.2.1  Configuration Commands

Table 7.2.1-1  Configuration Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1]</td>
<td>Setting for USB unit number</td>
<td>:USB:ID</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:USB:ID?</td>
</tr>
<tr>
<td>[2]</td>
<td>Setting the auto measurement function to be operated</td>
<td>:SYSTem:CFUNction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SYSTem:CFUNction?</td>
</tr>
<tr>
<td>[6]</td>
<td></td>
<td>CND?</td>
</tr>
<tr>
<td>[7]</td>
<td>Query for system error</td>
<td>:SYSTem:INFormation:ERRor?</td>
</tr>
<tr>
<td>[8]</td>
<td></td>
<td>INF?</td>
</tr>
<tr>
<td>[9]</td>
<td>Query for mainframe information</td>
<td>:SYSTem:UNIT?</td>
</tr>
<tr>
<td>[10]</td>
<td></td>
<td>UNT?</td>
</tr>
</tbody>
</table>

:USB:ID <usb number>

Parameter  
<usb_number>=<DECIMAL NUMERIC PROGRAM DATA>

11  USB number 11 (Channel 1)
12  USB number 12 (Channel 2)
13  USB number 13 (Channel 3)
14  USB number 14 (Channel 4)

Function  
Sets MP1862A to be controlled using USB number.

Example  
> :USB:ID 11

:USB:ID?

Response  
<usb_number>=< NR1 NUMERIC RESPONSE DATA >

11 to 14  USB number 11 to 14(Channel 1 to 4)

Function  
Queries the USB number of the MP1862A being operated.

Example  
> :USB:ID?
> 11

Note:  
In order to remote control the module mounted in MP1800A/MP1810A after remote controlling MP1862A with this command, use :UENTry:ID, :MODule:ID to switch the target unit to MP1800A.

7.2 Common Commands

**:SYSTem:CFUNction <function>*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Off</td>
</tr>
<tr>
<td>ASE32</td>
<td>Auto Search (MU183040A/41A/40B/41B, MP1862A)</td>
</tr>
<tr>
<td>EMAR32</td>
<td>Eye Margin measurement (MU183040A/41A/40B/41B, MP1862A)</td>
</tr>
<tr>
<td>EDI32</td>
<td>Eye Diagram measurement (MU183040A/41A/40B/41B, MP1862A)</td>
</tr>
<tr>
<td>BTUB32</td>
<td>Bathtub measurement (MU183040A/41A/40B/41B, MP1862A)</td>
</tr>
<tr>
<td>AADJ32</td>
<td>Auto Adjust (MU183040A/41A/40B/41B)</td>
</tr>
<tr>
<td>QAN32</td>
<td>Q measurement (MU183040A/41A/40B/41B)</td>
</tr>
</tbody>
</table>

**Note:** If set to Off, the previous interface settings are restored.

**Function**
Sets the auto measurement function you want to operate.

**Example**
To set the common function you want to operate to Auto Search (32G/64G):

> :SYSTem:CFUNction ASE32

**Compatibility**
Incompatible with existing models.

**:SYSTem:CFUNction?*

<table>
<thead>
<tr>
<th>Response</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Off</td>
</tr>
<tr>
<td>ASE32</td>
<td>Auto Search (MU183040A/41A/40B/41B, MP1862A)</td>
</tr>
<tr>
<td>EMAR32</td>
<td>Eye Margin measurement (MU183040A/41A/40B/41B, MP1862A)</td>
</tr>
<tr>
<td>EDI32</td>
<td>Eye Diagram measurement (MU183040A/41A/40B/41B, MP1862A)</td>
</tr>
<tr>
<td>BTUB32</td>
<td>Bathtub measurement (MU183040A/41A/40B/41B, MP1862A)</td>
</tr>
<tr>
<td>AADJ32</td>
<td>Auto Adjust (MU183040A/41A/40B/41B)</td>
</tr>
<tr>
<td>QAN32</td>
<td>Q measurement (MU183040A/41A/40B/41B)</td>
</tr>
</tbody>
</table>

**Function**
Queries the auto measurement function being operated.

**Example**
> :SYSTem:CFUNction?
< ASE32

**Compatibility**
Incompatible with existing models.
## :DISPlay:ACTive <unit>,<slot>[,<tab>]

### Parameter

- `<unit>`: `<DECIMAL NUMERIC PROGRAM DATA>`
  - 1 to 4: Mainframe No.1 to 4
    - When installing the MT1810A, the mainframe No. is specified.
    - When using the MP1800A, No.1 is fixed.
  - 0: When specifying a USB module (MP1825B/MP1821A/MP1822A/MP1861A/MP1862A)

- `<slot>`: `<DECIMAL NUMERIC PROGRAM DATA>`
  - 1 to 6: Slot No.1 to 6
    - When using the MP1800A, the slot No. is 1 to 6.
    - When using the MT1810A, the slot No. is 1 to 4.
  - 1 to 14: USB No.1 to 14
    - When using a USB module (`<unit>=0`), set the USB No.1 to 14.

- `<tab>`: `<DECIMAL NUMERIC PROGRAM DATA>`
  - 1 to X: Tab ID No.1 to X
    - When `[,<tab>]` is omitted, 1 is specified.
    - Tab ID is set to No.1 at the left side dialog, and then the tab ID No. is set to 2, 3, 4...toward the right side.
    - The maximum number (X) of the tab ID varies depending on the module options.

### Function

Displays the specified module screen to the front.

**Note:**

This command is not available if the measurement result display processing is set to Off.

To use the measurement result display processing, set it to On with the `:SYSTem:DISPlay:RESult ON` command.

### Example

To display the **Interface** tab of MP1862A:

(When MP1862A is connected to USB11)

```
> :DISP:ACT 0,11,1
```

### Compatibility

Incompatible with existing models.
7.2 Common Commands

:SYStem:CONDition:USB?

Response

```
<usb1>,...,<usb127>=<STRING RESPONSE DATA>
```

“XXXX” Model Name Example: MP1861A

Refer to Table 7.2.1-2 “Option character correspondence table”.

Function Queries USB module model name.

Example

```
> :SYSTem:CONDition:USB?
< MP1861A, MP1862A, NONE, NONE,..., NONE
```

Table 7.2.1-2 Option Character Correspondence Table

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Option Number</th>
<th>Option Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP1861A 56G/64Gbit/s MUX</td>
<td>OPTx01</td>
<td>64Gbit/s Extension</td>
</tr>
<tr>
<td></td>
<td>OPTx11</td>
<td>Data Output(0.5 to 2.5 Vp-p)</td>
</tr>
<tr>
<td></td>
<td>OPTx13</td>
<td>Data Output (0.5 to 3.5 Vp-p)</td>
</tr>
<tr>
<td></td>
<td>OPTx30</td>
<td>Variable Data Delay</td>
</tr>
<tr>
<td>MP1862A 56G/64Gbit/s DEMUX</td>
<td>OPTx01</td>
<td>64Gbit/s Extension</td>
</tr>
</tbody>
</table>

:SYStem:CONDi?tion?

Response

```
"<mainframe>, <slot x>,..., <usb x>,..., <usb 127>"
```

<mainframe> Previous function omitted

<slot x> Previous function omitted

<usb x>=<module>,<serial>,<fpga1>[,<fpga2>],[<boot>],[<application>],[<opt>]

x indicates a USB number. The USB number is 1 to 127.

Table 7.2.1-2 Module Name Example: MP1861A

Refer to Table 7.2.1-2 “Option Character Correspondence Table”.

Note:

NONE is output if no option is installed.

<serial>=<STRING RESPONSE DATA>

```
XXXXXXXXXXX 0000000000 to 9999999999
```

Serial number

Note:

"----------" is output if no module is installed.

<fpga1>[,<fpga2>,......]=<STRING RESPONSE DATA>

```
XXXX.XX.XX 1.00.00 to 9999.99.99
```

FPGA version

<boot>=<STRING RESPONSE DATA>

```
XXXX.XX.XX 1.00.00 to 9999.99.99
```

Logic Boot version
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Note:
"-------------" is output if Logic boot is not installed.

\[\text{<application>=<STRING RESPONSE DATA>}\]

XXXX.XX.XX  1.00.00 to 9999.99.99
Logic Application version

Note:
"-------------" is output if Logic Application is not installed.

\[\text{<opt>=<STRING RESPONSE DATA>}\]

XXXXXX/XXXXX  Option number
OPTXXX

Note:
All installed options are output. NONE is output if no option is installed.

Function
Queries the software status of the MP1861A.

Example
> :SYSTem:CONDition?
<
6201234567,1.00.00,1.00.20,OPT302,1.00.00,1.00.00,OPT12,OPT14,
MU181000A,6201234568,1.00.00,1.00.00,1.00.00,OPT101,
MU181020A,6201234569,1.00.00,1.00.00,1.00.00,OPT001,OPT220,
MU181040A,6201234571,1.00.00,1.00.00,1.00.00,OPT002,OPT220
MP1861A,6201234571,1.00.00,1.00.00,1.00.00,OPT002,OPT030
## 7.2 Common Commands

### CND?

**Response**

- `<mainframe>,<slot1>,...,<slot644>,<usb1>,...,<usb1274>`
- `<mainframe>` Previous function omitted
- `<slotx>` Previous function omitted
- `<usb x>=<module>,<serial>,<fpga1>[,<fpga2>],<boot>,<application>,<opt>`
  - `x` indicates a USB number. The USB number is 1 to 127.
- `<module>=<STRING RESPONSE DATA>`
  - `XXXXXXXXX (FIX9)` Refer to Table 7.2.1-2 “Option Character Correspondence Table”.
  - **Note:** NONE is output if no module is installed.
- `<serial>=<STRING RESPONSE DATA>`
  - `XXXXXXXXX (FIX10)` 0000000000 to 9999999999
  - Serial number
  - **Note:** “---------” is output if no module is installed.
- `<fpga1>[,<fpga2>,.....]=<STRING RESPONSE DATA>`
  - `XXXX.XX.XX (FIX10)` 1.00.00 to 9999.99.99
  - FPGA version
- `<boot>=<STRING RESPONSE DATA>`
  - `XXXX.XX.XX (FIX10)` 1.00.00 to 9999.99.99
  - Logic Boot version
  - **Note:** “---------” is output if Logic boot is not installed.
- `<application>=<STRING RESPONSE DATA>`
  - `XXXX.XX.XX (FIX10)` 1.00.00 to 9999.99.99
  - Logic Application version
  - **Note:** “---------” is output if Logic Application is not installed.
- `<opt>=<STRING RESPONSE DATA>`
  - `XXXXXX (FIX6)` Option number
  - `OPTXXX:`
  - **Note:** All installed options are output.
  - NONE is output if no option is installed.

**Function**

Queries the software status of the MP1861A.

**Example**

```
> CND?
< CND 6201234567, 1.00.00, 1.00.20, OPT301, OPT302, 1.00.00, 1.00.00, OPT 12,
..., MP1861A, 6201234571, 1.00.00, 1.00.00, 1.00.00, OPT002,
```
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OPT030

:SYSTem:INFormation:ERRor? <unit>[,<usb>]

Parameter
<unit>=<DECIMAL NUMERIC PROGRAM DATA>
1 to 4  1 to 4/1 Step
*<unit> must be set to 1 when querying USB.
<usb>=<DECIMAL NUMERIC PROGRAM DATA>
1 to 127  1 to 127/1 Step

Response
<numeric>=<NR1 NUMERIC RESPONSE DATA>
0  NONE
1  PLL Unlock
2  Temperature
3  Fan

All the system errors that have currently occurred are displayed, delimited with a comma (,).

Function
Queries the System Error contents.

Example
> :SYSTem:INFormation:ERRor? 1,1
< 1, 2, 3 (when a system error has occurred for PLL Unlock, Temperature, or Fan)
< 0 (when no system error has occurred)

INF? <unit>[,<usb>]

Parameter
<unit>=<DECIMAL NUMERIC PROGRAM DATA>
1 to 4  Mainframe number
*<unit> must be set to 1 when querying USB.
<usb>=<DECIMAL NUMERIC PROGRAM DATA>
1 to 127  USB Mainframe number

Response
<numeric> =
<DEFINITE LENGTH ARBITRARY BLOCK RESPONSE DATA>
#B0000  NONE
#B100  PLL Unlock
#B0100  Temperature
#B0010  Fan
#B0001  Overcurrent

Function
Queries the content of the system error that has currently occurred.

Example
To query the System Error contents using one mainframe:
> INF? 1
< INF #B1000
7.2 Common Commands

:SYSTem:UNIT? <numeric>[,<usb>]

Parameter

Parameter

<numeric>=<NR1 NUMERIC PROGRAM DATA>
1 to 4     Mainframe number
"1" for the MP1800A, "1 to 4" for the MT1810A.

<numeric>=<NR1 NUMERIC PROGRAM DATA>
1 to 127   Mainframe number

Response

<unit>,<serial>,<mver>,<hver>,<opt1>,<sbver>,<saver>,<opt2>

<unit>=<STRING RESPONSE DATA>

XXXXXXXXXX  Model name  Example: MP1861A
See Table 7.2.1-2 “Option Character Correspondence Table”.

Note:
NONE is output if no module is installed.

<serial>=<STRING RESPONSE DATA>

XXXXXXXXXX  0000000000 to 9999999999
Mainframe serial number

Note:
Alphabetic characters may be included.

<mver>=<STRING RESPONSE DATA>

XXXX.XX.XX   1.00.00 to 9999.99.99
Main application software version

<hver>=<STRING RESPONSE DATA>

XXXX.XX.XX   1.00.00 to 9999.99.99
Mainframe hardware version

<opt1>=<STRING RESPONSE DATA>

OPTXXX       For option number, see Table 7.1.1-2 “Option character correspondence table”.

Note:
All installed options are output.
NONE is output if no option is installed.

<sbver>=<STRING RESPONSE DATA>

XXXX.XX.XX   1.00.00 to 9999.99.99
Sub application software version
(Boot part)

<saver>=<STRING RESPONSE DATA>

XXXX.XX.XX   1.00.00 to 9999.99.99
Sub application software version
(Application part)

<opt2>=<STRING RESPONSE DATA>
Chapter 7  Remote Commands

Function  Queries the mainframe information including model and serial number.

Example  To query the mainframe information including model and serial number for USB1:

> :SYSTem:UNIT? 1,7
<
"MP1861A,6201234568,1.00.00,1.00.00,OPT301,1.00.00,1.00.00"

UNT? <numeric>[,<usb>]

Parameter  
<nemonic>=<NR1 NUMERIC PROGRAM DATA>
1 to 4  Mainframe number
"1" for the MP1800A, "1 to 4" for the MT1810A when querying USB.
<nemonic>=<NR1 NUMERIC PROGRAM DATA>
1 to 127  Mainframe number

Response  
<mainframe>,
<mainframe>=<module>,<serial>,<mver>,<hver>,<opt1>,<sbver>,
<saver>,<opt2>
[unit]=<STRING RESPONSE DATA>

XXXXXXXXXX  Model name  Example: MP1800A and MT1810A
Refer to Table 7.2.1-2 “Option Character Correspondence Table”.

Note:  
NONE is output if no module is installed.

<serial>=<STRING RESPONSE DATA>
XXXXXXXXXX  0000000000 to 9999999999
Mainframe serial number

Note:  
Alphabetic characters may be included.

<mver>=<STRING RESPONSE DATA>
XXXX.XX.XX  1.00.00 to 9999.99.99
Main application software version

<hver>=<STRING RESPONSE DATA>
XXXX.XX.XX  1.00.00 to 9999.99.99
Mainframe hardware version

<opt1>=<STRING RESPONSE DATA>
OPTXXX  Option number
Refer to Table 7.2.1-2 “Option Character Correspondence Table”.

Note:  
All installed options are output.
NONE is output if no option is installed.
7.2 Common Commands

<sver>=<STRING RESPONSE DATA>
XXXX.XX.XX 1.00.00 to 9999.99.99
    Sub application software version
    (Boot part)
<saver>=<STRING RESPONSE DATA>
XXXX.XX.XX 1.00.00 to 9999.99.99
    Sub application software version
    (Application part)

Function
Queries the mainframe information including model and serial number.

Example
To query the USB7 information:
> UNT? 1,7
< MP1861A,6201234568,1.00.00,1.00.00,OPT01,1.00.00,1.00.00
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7.2.2 File menu commands

Table 7.2.2-1  File Menu Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Open</td>
<td>:SYSTem:MMEMory:DEMux:RECall</td>
</tr>
<tr>
<td>2</td>
<td>Save</td>
<td>:SYSTem:MMEMory:DEMux:STORe</td>
</tr>
<tr>
<td>3</td>
<td>Print</td>
<td>:SYSTem:PRINt:DEMux</td>
</tr>
</tbody>
</table>

**:SYSTem:MMEMory:DEMUX:RECall <file_name>**

Parameter

- `<file_name>`: STRING PROGRAM DATA
  - `"<drv>:\[<dir>]\<file>"`
  - `<drv>` = C,D,E,F
  - `<dir>` = `<dir1>\<dir2>\...` (Omitted for the root directory)
  - `<file>` = File name

Function

Opens DEMUX setting data.

Example

> :SYSTem:MMEMory:DEMux:RECall "C:\Test\example"

**:SYSTem:MMEMory:DEMUX:STORe<file_name>,<data_type>,<file_type>**

Parameter

- `<file_name>`: STRING PROGRAM DATA
  - `"<drv>:\[<dir>]\<file>"`
  - `<drv>` = C,D,E,F
  - `<dir>` = `<dir1>\<dir2>\...` (Omitted for the root directory)
  - `<file>` = File name
- `<data_type>`: CHARACTER PROGRAM DATA
  - UDX  56G DEMUX Setup
  - UER  56G DEMUX Error • Alarm Result
- `<file_type>`: CHARACTER PROGRAM DATA
  - BIN  Binary file
  - CSV  CSV file
  - TXT  Text file

Function

Saves DEMUX setting data.

*Note:*

The settings will not be read from the saved file if the file name is changed.

Example

To specify save destination for all setting files and save them with a comment and measurement result data:

> :SYSTem:MMEMory:DEMux:STORe "C:\Test\example",UMX,TXT
### :SYSTem:PRINt:DEMux

<table>
<thead>
<tr>
<th>Parameter</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Function</strong></td>
<td>Prints DEMUX measurement result data.</td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td>&gt; :SYSTem:PRINt:DEMux</td>
</tr>
</tbody>
</table>
7.3 64G DEMUX Commands

7.3.1 Interface tab

7.3.1.1 Data setting commands

Figure 7.3.1.1-1  Data Area of the Interface Tab
### Table 7.3.1.1-1 Data Interface Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1]</td>
<td>Input Condition</td>
<td>:DEMUX:DATA:INTerface</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DEMUX:DATA:INTerface?</td>
</tr>
<tr>
<td>[2]</td>
<td>No label (Differential type setting)</td>
<td>:DEMUX:DATA:DIFFerential</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DEMUX:DATA:DIFFerential?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DEMUX:DATA:SINGle?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DEMUX:DATA:THReshold?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DEMUX:DATA:DIFFerential:BASis?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DEMUX:DATA:DIFFerential:THReshold?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DEMUX:DATA:TERMination?</td>
</tr>
<tr>
<td>[8]</td>
<td>No label (Termination voltage setting)</td>
<td>:DEMUX:DATA:TLEVel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DEMUX:DATA:TLEVel?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SYSTem:LINK:DEMuxed?</td>
</tr>
</tbody>
</table>
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:DEMux:DATA:INTerface <input>

Parameter  
<input>=<CHARACTER PROGRAM DATA>
SINGLE Single Ended
DIF50ohm Differential 50 Ω
DIF100ohm Differential 100 Ω

Function Sets data input interface.
Example To set Data Interface interface to single connection:
> :DEMux:DATA:INTerface SINGLE
Compatibility Compatible with MU182040A and MU182041A.

:DEMux:DATA:INTerface?

Response <interface>=<CHARACTER RESPONSE DATA>
SING, DIF50, DIF100

Function Queries data input interface.
Example To query Data Interface interface:
> :DEMux:DATA:INTerface?
< SING
Compatibility Compatible with MU182040A and MU182041A.

:DEMux:DATA:DIFFerential <item>

Parameter <item>=<CHARACTER PROGRAM DATA>
INDependent Data/Xdata independent setting
TRACKing Data/Xdata common setting
ALTernate Data/Xdata differential setting

Function Sets the differential type when the data input interface is differential.
Example To set the differential type for Data1 Interface to Independent:
> :DEMux:DATA:DIFFerential INDependent
Compatibility Compatible with MU182040A and MU182041A.

:DEMux:DATA:DIFFerential?

Response <item>=<CHARACTER RESPONSE DATA>
IND, TRAC, ALT

Function Queries the differential type when the data input interface is set to Differential.
Example To query the differential type for Data1 Interface:
> :DEMux:DATA:DIFFerential?
< IND
Compatibility Compatible with MU182040A and MU182041A.
7.3 64G DEMUX Commands

:DEMux:DATA:SINGle <item>

Parameter

<table>
<thead>
<tr>
<th>&lt;item&gt;</th>
<th>CHARACTER PROGRAM DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA</td>
<td>Data is selected</td>
</tr>
<tr>
<td>XDATa</td>
<td>XData is selected</td>
</tr>
</tbody>
</table>

Function
Sets input port for Single data input.

Example
To set Data Interface input port to data:

> :DEMux:DATA:SINGle DATA

Compatibility
Compatible with MU182040A and MU182041A.

:DEMux:DATA:SINGle?

Response

<table>
<thead>
<tr>
<th>&lt;item&gt;</th>
<th>CHARACTER RESPONSE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA</td>
<td>Data is selected</td>
</tr>
<tr>
<td>XDAT</td>
<td>XData is selected</td>
</tr>
</tbody>
</table>

Function
Queries input port for Single data input.

Example
To query Data Interface input port:

> :DEMux:DATA:SINGle?
< DATA

Compatibility
Compatible with MU182040A and MU182041A.

:DEMux:DATA:THReshold <port>,<numeric>

Parameter

<table>
<thead>
<tr>
<th>&lt;port&gt;</th>
<th>CHARACTER PROGRAM DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA, XDATa (At Single, input the selected port.)</td>
<td></td>
</tr>
<tr>
<td>&lt;numeric&gt;</td>
<td>DECIMAL NUMERIC PROGRAM DATA</td>
</tr>
<tr>
<td>–3.500 to 3.300</td>
<td>–3.500 to 3.300 V/0.001 V Step</td>
</tr>
</tbody>
</table>

Function
Sets date input threshold value for specific port.

Example
To set threshold value for Data1 Interface input port to –0.5 V:

> :DEMux:DATA:THReshold DATA,–0.5

Compatibility
Compatible with MU182040A and MU182041A.

:DEMux:DATA:THReshold? <port>

Parameter

<table>
<thead>
<tr>
<th>&lt;port&gt;</th>
<th>CHARACTER PROGRAM DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA, XDATa (At Single, input the selected port.)</td>
<td></td>
</tr>
</tbody>
</table>

Response

<table>
<thead>
<tr>
<th>&lt;numeric&gt;</th>
<th>NUMERIC RESPONSE DATA</th>
</tr>
</thead>
</table>

Function
Queries date input threshold value for specific port.

Example
To query threshold value for Data Interface input port:

> :DEMux:DATA:THReshold? DATA
< -0.500

Compatibility
Compatible with MU182040A and MU182041A.
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:DEMux:DATA:DIFFerential:BASis <basis>

Parameter  

<table>
<thead>
<tr>
<th>&lt;basis&gt;</th>
<th>Program Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA</td>
<td>Sets the differential reference signal to Data.</td>
</tr>
<tr>
<td>XDAT</td>
<td>Sets the differential reference signal to XData.</td>
</tr>
</tbody>
</table>

Function  
Sets the differential reference signal for the data input threshold value.

Example  
To set the differential reference signal for the threshold for Data Interface to Data:

\[ :\text{DEMux:DATA:DIFFerential:BASis DATA} \]

Compatibility  
Compatible with MU182040A and MU182041A.

:DEMux:DATA:DIFFerential:BASis?

Response  

<table>
<thead>
<tr>
<th>&lt;basis&gt;</th>
<th>Response Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA</td>
<td>Sets the differential reference signal to Data.</td>
</tr>
<tr>
<td>XDAT</td>
<td>Sets the differential reference signal to XData.</td>
</tr>
</tbody>
</table>

Function  
Queries the differential reference signal for the data input threshold value.

Example  
To query the differential reference signal for the threshold for Data Interface:

\[ :\text{DEMux:DATA:DIFFerential:BASis?} \]

< DATA

Compatibility  
Compatible with MU182040A and MU182041A.

:DEMux:DATA:DIFFerential:THReshold <numeric>

Parameter  

<table>
<thead>
<tr>
<th>&lt;numeric&gt;</th>
<th>Program Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>–3.000 to 3.000</td>
<td>–3.000 to 3.000 V/0.001 V Step</td>
</tr>
</tbody>
</table>

Function  
Sets data input threshold value at differential input.

Example  
To set Data Interface differential data input value to –0.250 V:

\[ :\text{DEMux:DATA:DIFFerential:THReshold -0.250} \]

Compatibility  
Compatible with MU182040A and MU182041A.

:DEMux:DATA:DIFFerential:THReshold?

Response  

<table>
<thead>
<tr>
<th>&lt;numeric&gt;</th>
<th>Response Data</th>
</tr>
</thead>
</table>

Function  
Queries data input threshold value at differential input.

Example  
To query Data Interface differential data input value:

\[ :\text{DEMux:DATA:DIFFerential:THReshold?} \]

< -0.250

Compatibility  
Compatible with MU182040A and MU182041A.
7.3 64G DEMUX Commands

:DEMux:DATA:TERmination <term>

Parameter
- <term> = CHARACTER PROGRAM DATA
  - GND: 50 Ω to GND
  - VARIABLE: 50 Ω to Variable Voltage

Function
Sets the data input termination condition.

Example
To set the termination condition of Data Interface to GND:

> :DEMux:DATA:TERmination GND

Compatibility
Compatible with MU182040A and MU182041A.

:DEMux:DATA:TERmination?

Response
- <term> = CHARACTER RESPONSE DATA
  - GND, VAR

Function
Queries the data input termination condition.

Example
To query the termination condition of Data Interface:

> :DEMux:DATA:TERmination?

< GND

Compatibility
Compatible with MU182040A and MU182041A.

:DEMux:DATA:TLEVel <numeric>

Parameter
- <numeric> = DECIMAL NUMERIC PROGRAM DATA
  - –2.50 to 3.50
  - –2.50 to 3.50 V/0.01 V Step

Function
Sets the termination voltage when the input termination condition is set to Variable.

Example
To set the termination voltage to –2.5 when the input termination condition is set to Variable:

> :DEMux:DATA:TLEVel -2.5

Compatibility
Compatible with MU182040A and MU182041A.

:DEMux:DATA:TLEVel?

Response
- <numeric> = NUMERIC RESPONSE DATA

Function
Queries the termination voltage when the input termination condition is set to Variable.

Example
To query the termination voltage when the input termination condition is set to Variable:

> :DEMux:DATA:TLEVel?

< -2.5

Compatibility
Compatible with MU182040A and MU182041A.
### :SYSTem:LINK:DEMuxed <boolean>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>&lt;boolean&gt;=&lt;BOOLEAN PROGRAM DATA&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OFF or 0, On or 1</td>
</tr>
<tr>
<td>Function</td>
<td>Sets link between 64G DEMUX and 32G ED ON/OFF.</td>
</tr>
<tr>
<td>Example</td>
<td>To set link between 64G DEMUX and 32G ED to ON:</td>
</tr>
<tr>
<td></td>
<td>&gt; :SYSTem:LINK:DEMuxed ON</td>
</tr>
<tr>
<td>Compatibility</td>
<td>No backwards compatibility</td>
</tr>
</tbody>
</table>

### :SYSTem:LINK:DEMuxed?

<table>
<thead>
<tr>
<th>Response</th>
<th>&lt;numeric&gt;=&lt;NR1 NUMERIC RESPONSE DATA&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0  Link between 64G DEMUX and 32G ED OFF</td>
</tr>
<tr>
<td></td>
<td>1  Link between 64G DEMUX and 32G ED ON</td>
</tr>
<tr>
<td>Function</td>
<td>Queries link between 56G DEMUX and 4ch ED ON/OFF.</td>
</tr>
<tr>
<td>Example</td>
<td>&gt; :SYSTem:LINK:DEMuxed?</td>
</tr>
<tr>
<td></td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Compatibility</td>
<td>No backwards compatibility</td>
</tr>
</tbody>
</table>
7.3.1.2 Clock setting commands

Figure 7.3.1.2-1 Clock Area of the Interface Tab
### Table 7.3.1.2-1  Clock Interface Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>:DEMUX:GLOCK:SELection?</td>
</tr>
<tr>
<td>[2]</td>
<td>Delay (mUI units)</td>
<td>:DEMUX:GLOCK:UIDelay</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DEMUX:GLOCK:UIDelay?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DEMUX:GLOCK:PDDELay?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DEMUX:GLOCK:RELative?</td>
</tr>
<tr>
<td></td>
<td>(Settings of relative values)</td>
<td>:DEMUX:GLOCK:RDELay?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DEMUX:GLOCK:JINPut?</td>
</tr>
<tr>
<td>[8]</td>
<td>Clock Input Band Switch</td>
<td>:DEMUX:GLOCK:RAND</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DEMUX:GLOCK:RAND?</td>
</tr>
</tbody>
</table>
7.3 64G DEMUX Commands

[:DEMux:CLOCK:SELection <sel>]

Parameter  
\(<\text{sel}> = \langle\text{CHARACTER PROGRAM DATA}\rangle\>

EXTernal  
External Clock

Function  
Sets clock input type.

Example  
To set Data Interface clock input type to external clock:

\(> \ :\text{DEMux:}\text{CLOCK:SELection EXTernal}\)

Compatibility  
Compatible with MU182040A and MU182041A.

[:DEMux:CLOCK:SELection?]

Response  
\(<\text{sel}> = \langle\text{CHARACTER RESPONSE DATA}\rangle\>

EXT  
External Clock

Example  
To query Data Interface clock input type:

\(> \ :\text{DEMux:}\text{CLOCK:SELection}\?)

< EXT

Compatibility  
Compatible with MU182040A and MU182041A.

[:DEMux:CLOCK:UIDelay<numeric>]

Parameter  
\(<\text{numeric}> = \langle\text{DECIMAL NUMERIC PROGRAM DATA}\rangle\>

\(-1000\) to \(1000\)  
\(-1000\) to \(1000\)mUI/4mUI Step

Function  
Sets clock input phase variation in mUI units.

Example  
To set Data Interface clock phase variation to \(-1000\) mUI:

\(> \ :\text{DEMux:}\text{CLOCK:UIDelay} -1000\)

Compatibility  
Compatible with MU182040A and MU182041A.

[:DEMux:CLOCK:UIDelay?]

Parameter  
\(<\text{interface}> = \langle\text{DECIMAL NUMERIC PROGRAM DATA}\rangle\>

Response  
\(<\text{numeric}> = \langle\text{NR1 NUMERIC RESPONSE DATA}\rangle\>

Function  
Queries clock input phase variation in mUI units.

Example  
To query Data Interface clock phase variation in mUI units:

\(> \ :\text{DEMux:}\text{CLOCK:UIDelay}\?)

< \(-1000\)

Compatibility  
Compatible with MU182040A and MU182041A.
### :DEMux:CLOCk:PDELay<numeric>

**Parameter**
- `<numeric>`: `<DECIMAL NUMERIC PROGRAM DATA>`
- 
  - –20 to 20: –20 to 20 ps/0.08ps Steps (at 50 GHz)
  - –17.85 to 17.85: –17.85 to 17.85 ps/0.08ps Steps (at 56 GHz)
  - –15.62 to 15.62: –15.62 to 15.62 ps/0.08ps Steps (at 64 GHz)

  Converted from the calculated frequency value, based on the setting resolution of mUI.

**Function**
- Sets the variable clock input phase in ps units. The value specified in ps units may not be set exactly due to resolution. In this event, the most approximate value is set.

**Example**
- To set the variable clock phase of Data Interface to –40 ps:
  
  ```
  > :DEMux:CLOCk:PDELay -40
  ```

**Compatibility**
- Compatible with MU182040A and MU182041A.

### :DEMux:CLOCk:PDELay?

**Parameter**
- `<interface>`: `<DECIMAL NUMERIC PROGRAM DATA>`

**Response**
- `<numeric>`: `<NR1 NUMERIC RESPONSE DATA>`

**Function**
- Queries clock input phase variation and units.

**Example**
- To query Data Interface clock phase variation in ps units:
  
  ```
  > :DEMux:CLOCk:PDELay?
  < -40
  ```

**Compatibility**
- Compatible with MU182040A and MU182041A.

### :DEMux:CLOCk:CALibration

**Parameter**
- `<interface>`: `<DECIMAL NUMERIC PROGRAM DATA>`

**Function**
- Calibrates input clock phase setting.

**Example**
- To calibrate Data Interface input clock phase setting:
  
  ```
  > :DEMux:CLOCk:CALibration
  ```

**Compatibility**
- Compatible with MU182040A and MU182041A.

### :DEMux:CLOCk:RELative <boolean>

**Parameter**
- `<boolean>`: `<BOOLEAN PROGRAM DATA>`
  - 0 or OFF: Reference OFF
  - 1 or ON: Reference ON

**Function**
- Sets clock input phase variation reference ON/OFF.

**Example**
- To set Data Interface clock input phase variation reference to ON:
  
  ```
  > :DEMux:CLOCk:RELative ON
  ```

**Compatibility**
- Compatible with MU182040A and MU182041A.
### :DEMux:CLK:RELative? [<interface>]

**Response**

- `<boolean>`: `<NR1 NUMERIC RESPONSE DATA>`
  - 0: Reference OFF
  - 1: Reference ON

**Function**
Queries clock input phase variation reference setting.

**Example**
To query Data Interface clock input phase variation reference:

```
> :DEMux:CLK:RELative?
< 1
```

**Compatibility**
Compatible with MU182040A and MU182041A.

### :DEMux:CLK:RDELay <numeric>,<unit>

**Parameter**

- `<numeric>`: `<DECIMAL NUMERIC PROGRAM DATA>`
  - (mUI units) –2000 to 2000
  - (ps units) –2000 to 2000 mUI /4 mUI Step

- `<unit>`: `<CHARACTER PROGRAM DATA>`
  - UI: mUI units
  - PS: ps units (The ps unit is selected when `<unit>` is omitted.)

**Function**
Sets clock input phase variation reference value and units.

Setting is performed as an increment from the reference value.

The specified value may not be exactly set as is when the ps unit is set, due to the limitation of the setting resolution.

The value is adjusted to the most approximate value and set in this event.

**Example**
To set Data Interface clock phase variation reference to –1000 mUI:

```
> :DEMux:CLK:RDELay -1000,UI
```

**Compatibility**
Compatible with MU182040A and MU182041A.

### :DEMux:CLK:RDELay? [<unit>]

**Parameter**

- `<unit>`: `<CHARACTER PROGRAM DATA>`
  - UI: mUI units
  - PS: ps units (The ps unit is selected when `<unit>` is omitted.)

**Response**

- `<numeric>`: `<NR1 NUMERIC RESPONSE DATA>`

**Function**
Queries clock input phase variation reference value and units.

**Example**
To query Data Interface clock phase variation reference UI units:

```
> :DEMux:CLK:RDELay? UI
< -1000
```

**Compatibility**
Compatible with MU182040A and MU182041A.
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:DEMux:CLOCk:JINPut <boolean>

Parameter  
<boolean>=<BOOLEAN PROGRAM DATA>
0 or OFF  Jitter Input OFF
1 or ON  Jitter Input ON

Function  
Sets Jitter Input ON/OFF.

Example  
To set Data Interface Jitter Input to ON:
> :DEMux:Clock:JINPut ON

Compatibility  
Compatible with MU182040A and MU182041A.

:DEMux:CLOCk:JINPut?

Response  
<nNumeric>=<NR1 NUMERIC RESPONSE DATA>
0  Jitter Input OFF
1  Jitter Input ON

Function  
Queries Jitter Input ON/OFF.

Example  
To query Data Interface Jitter Input ON/OFF:
> :DEMux:CLOCk:JINPut?
< 1

Compatibility  
Compatible with MU182040A and MU182041A.

:DEMux:CLOCk:BAND <sw>

Parameter  
<sw>=<CHARACTER PROGRAM DATA>
HALFrate  Half Clock Rate
QUATerrate  Quarter Clock Rate
EIGHthrate  1/8 Clock Rate

Function  
Switches Clock Input Band Switch.

Example  
To switch Data Interface Clock Input Band Switch to Half:
> :DEMux:Clock:BAND HALF

Compatibility  
Incompatible with existing models.

:DEMux:CLOCk:BAND?

Response  
<nNumeric>=<NR1 NUMERIC RESPONSE DATA>
HALFrate  Half Clock Rate
QUATerrate  Quarter Clock Rate
EIGHthrate  1/8 Clock Rate

Function  
Queries Clock Input Band Switch.

Example  
To query Data Interface Clock Input Band Switch:
> :DEMux:CLOCk:BAND?
< HALF

Compatibility  
Incompatible with existing models.
7.3.1.3 Measurement Restart setting commands

Figure 7.3.1.3-1  Measurement Restart Area of the Interface Tab

Table 7.3.1.3-1  Measurement Restart Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>:DEMux:MEASure:MREStart?</td>
</tr>
</tbody>
</table>
Chapter 7  Remote Commands

:DEMux:MEASure:MREStart <data>,<clock>

Parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;data&gt;</td>
<td>BOOLEAN PROGRAM DATA</td>
</tr>
<tr>
<td></td>
<td>0 or OFF</td>
</tr>
<tr>
<td></td>
<td>1 or ON</td>
</tr>
<tr>
<td>&lt;clock&gt;</td>
<td>BOOLEAN PROGRAM DATA</td>
</tr>
<tr>
<td></td>
<td>0 or OFF</td>
</tr>
<tr>
<td></td>
<td>1 or ON</td>
</tr>
</tbody>
</table>

Function
Sets measurement restart conditions.

Example
To set Data Interface measurement restart conditions:
> :DEMux:MEASure:MREStart 0,0

Compatibility
Compatible with MU182040A and MU182041A.

:DEMux:MEASure:MREStart?

Response

<table>
<thead>
<tr>
<th>Response</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;data&gt;</td>
<td>NR1 NUMERIC RESPONSE DATA</td>
</tr>
<tr>
<td>&lt;clock&gt;</td>
<td>NR1 NUMERIC RESPONSE DATA</td>
</tr>
<tr>
<td>0</td>
<td>Measurement restart OFF</td>
</tr>
<tr>
<td>1</td>
<td>Measurement restart ON</td>
</tr>
</tbody>
</table>

Function
Queries measurement restart conditions.

Example
To query Data Interface measurement restart conditions:
> :DEMux:MEASure:MREStart?
< 0,0

Compatibility
Compatible with MU182040A and MU182041A.
7.3 64G DEMUX Commands

7.3.2 Result tab

7.3.2.1 Result setting commands

Figure 7.3.2.1-1 Result Tab
### Chapter 7  Remote Commands

#### Table 7.3.2.1-1  Result Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1]</td>
<td>Start</td>
<td>:DEMux:MEASure:STARt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DEMux:RESult:ZOOM?</td>
</tr>
<tr>
<td>[6]</td>
<td>No label (Query measurement data of error alarm)</td>
<td>:DEMux:CALCulate:DATA:EALarm?</td>
</tr>
<tr>
<td>[7]</td>
<td>No label (Query window items)</td>
<td>:DEMux:CALCulate:DATA:MONitor?</td>
</tr>
</tbody>
</table>

### :DEMux:MEASure:STARt

**Function**
Starting MP1862A BER measurement in same unit and restarts during measurement.

**Example**
To start MP1862A BER measurement in same unit:

```
> :DEMux:MEASure:STARt
```

**Compatibility**
Compatible with MU182040A and MU182041A.

### :DEMux:MEASure:STOP

**Function**
Stops MP1862A BER measurement in same unit.

**Example**
To stop MP1862A BER measurement in same unit:

```
> :DEMux:MEASure:STOP
```

**Compatibility**
Compatible with MU182040A and MU182041A.

### :DEMux:MEASure:EALarm:STATe?

**Response**
\[ <\text{numeric}> = \text{NR1 NUMERIC RESPONSE DATA} >
\begin{align*}
0 & \quad \text{Stopped} \\
1 & \quad \text{Measuring}
\end{align*}

**Function**
Queries measurement progress at MP1862A bit error or alarm in same unit.

**Example**

```
> :DEMux:MEASure:EALarm:STATe?
< 0
```

**Compatibility**
Compatible with MU182040A and MU182041A.
7.3 64G DEMUX Commands

:DEMux:RESult:ZOOM <boolean>

Parameter  
<boolean>=<BOOLEAN PROGRAM DATA>
0 or OFF  Zoom out display
1 or ON  Zoom in display

Function  
Sets zooming for measured results display ON/OFF

Example  
To set zooming for measured results display to ON:
> :DEMux:RESult:ZOOM ON

Compatibility  
Compatible with MU182040A and MU182041A.

:DEMux:RESult:ZOOM?

Response  
<nemonic>=<NR1 NUMERIC RESPONSE DATA>
0  Zoom out display
1  Zoom in display

Function  
Queries zooming for measured results display ON/OFF.

Example  
> :DEMux:RESult:ZOOM?
< 1

Compatibility  
Compatible with MU182040A and MU182041A.

:DEMux:RESult:EALarm:HRESet

Function  
Resets measured results display history.

Example  
> :DEMux:RESult:EALarm:HRESet

Compatibility  
Compatible with MU182040A and MU182041A.
Chapter 7  Remote Commands

:DEMux:CALCulate:DATA:EALarm? <string>

Parameter  
<string>=<STRING PROGRAM DATA>
"CURRent:<result>"  Current data
"LAST:<result>"  Measurement end data
Refer to Table 7.3.2.1-3 for the <result> contents.

Response  
<string>=<STRING RESPONSE DATA>

Table 7.3.2.1-2  Response Format

<table>
<thead>
<tr>
<th>Form</th>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form1</td>
<td>&quot;XXXXXXX&quot;</td>
<td>For 0 to 9999999</td>
</tr>
<tr>
<td></td>
<td>&quot;X.XXXEXXX&quot;</td>
<td>For 1.0000E07 to 9.9999E16</td>
</tr>
<tr>
<td></td>
<td>&quot;.......&quot;</td>
<td>When no data corresponds to the query</td>
</tr>
<tr>
<td>Form2</td>
<td>&quot;X.XXXE-XX&quot;</td>
<td>For 0.0000E-16 to 1.0000E00</td>
</tr>
<tr>
<td></td>
<td>&quot;.......&quot;</td>
<td>When no data corresponds to the query</td>
</tr>
<tr>
<td>Form3</td>
<td>&quot;XXX.XXXXX&quot;</td>
<td>For 0.0000 to 100.000</td>
</tr>
<tr>
<td></td>
<td>&quot;.......&quot;</td>
<td>When no data corresponds to the query</td>
</tr>
<tr>
<td>Form4</td>
<td>&quot;XXXXXXXXXXX&quot;</td>
<td>For 0 to MAX(Hz)</td>
</tr>
<tr>
<td></td>
<td>&quot;.......&quot;</td>
<td>When no data corresponds to the query</td>
</tr>
<tr>
<td>Form5</td>
<td>&quot;XX.XXX.XX.XXX&quot;</td>
<td>For -4.000 to +4.000(V)</td>
</tr>
<tr>
<td></td>
<td>&quot;.......&quot;</td>
<td>When no data corresponds to the query</td>
</tr>
<tr>
<td>Form6</td>
<td>&quot;xxxxx.xxx.xx&quot;</td>
<td>mUI units, ps units</td>
</tr>
<tr>
<td></td>
<td>&quot;.......&quot;</td>
<td>When no data corresponds to the query</td>
</tr>
</tbody>
</table>

Function  Queries measured data for parameter.

Example  To query the total error rate of the current data

< ":0.0000E-16"

Compatibility  Compatible with MU182040A and MU182041A.

Table 7.3.2.1-3  Parameter

<table>
<thead>
<tr>
<th>Form</th>
<th>&lt;result&gt;</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error Rate</td>
<td>Total ER:TOTal</td>
<td>Form2</td>
</tr>
<tr>
<td></td>
<td>INS ER:INSertion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OMI ER:OMISSion</td>
<td></td>
</tr>
<tr>
<td>Error Count</td>
<td>Total EC:TOTal</td>
<td>Form1</td>
</tr>
<tr>
<td></td>
<td>INS EC:INSertion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OMI EC:OMISSion</td>
<td></td>
</tr>
<tr>
<td>%EFI</td>
<td>Total EFI:TOTal</td>
<td>Form3</td>
</tr>
<tr>
<td>EI</td>
<td>Total EI:TOTal</td>
<td>Form1</td>
</tr>
<tr>
<td>Frequency (kHz)</td>
<td>FREQuency</td>
<td>Form4</td>
</tr>
<tr>
<td>Clock Count</td>
<td>CC:TOTal</td>
<td>Form1</td>
</tr>
<tr>
<td>Clock Alarm</td>
<td>AINTerval:CALarm</td>
<td>Form1</td>
</tr>
<tr>
<td>Sync Loss</td>
<td>AINTerval:PSLoss</td>
<td>Form1</td>
</tr>
</tbody>
</table>
7.3 64G DEMUX Commands

:DEMux:CALCulate:DATA:MONitor? <item>

Parameter  
<item>=<STRING PROGRAM DATA>  
"BIT:TOTal"  Bit Error (Total Error)  
"PSLoss"  Pattern Sync Loss  
"CALarm"  Clock Alarm  

Response  
<string>=<STRING RESPONSE DATA>

<table>
<thead>
<tr>
<th>Form</th>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form1</td>
<td>&quot;Occur&quot;</td>
<td>When an alarm occurs</td>
</tr>
<tr>
<td></td>
<td>&quot;Not Occur&quot;</td>
<td>When no alarm occurs</td>
</tr>
<tr>
<td></td>
<td>&quot;------&quot;</td>
<td>When no data corresponds to the query</td>
</tr>
</tbody>
</table>

Function  
Queries real-time occurrence status of monitor items specified by parameters.

Example  
To query Bit Error occurrence status:  
< "Occur"

Compatibility  
Compatible with MU182040A and MU182041A.
7.3.3 Misc tab

Table 7.3.3-1 Misc Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
</table>

:SYSTem:LINK:DEMuxed:INFO?

**Response**

```
<sw>=<CHARACTER RESPONSE DATA>
"<unit>:<slot> <module> <data>"
```

- `<unit>`: 1 to 4 (Unit No. 1 to 4)
- `<slot>`: 1 to 6 (Slot No. 1 to 6)
- `<module>`: MU183040A/B, MU183041A/B
- `<data>`: Data1-2 or Data3-4

**Function**

Queries the information of the 32G ED that operates linked with the 64G DEMUX.

**Example**

```
> :SYSTem:LINK:DEMuxed:INFO?
< "1:1 MU183040A Data1-2"
```

**Compatibility**

Incompatible with existing models.
7.4 Automatic Measurement Commands

This section describes only the MP1862A measurement application commands that are changed from MU183040A/B. For details on the auto measurement functions, refer to the MU183040A/B Operation Manual. Make sure to specify the auto measurement function you want to operate with the :SYSTem:CFUNction command before executing an auto measurement command. For details on the :SYSTem:CFUNction command, refer to Section 7.2.1 “Configuration Commands”.

7.4.1 Auto Search

Before using a command described in this section, make sure to set Auto Search with the following command:

:SYSTem:CFUNction ASE32

![Auto Search Window](image)
Table 7.4.1-1  Auto Search Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:ASEarch:SMODe?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:ASEarch:MODE?</td>
</tr>
<tr>
<td>[5]</td>
<td>No label (Query for function state)</td>
<td>:SENSe:MEASure:ASEarch:STATe?</td>
</tr>
<tr>
<td>[8]</td>
<td>Slot Select</td>
<td>:SENSe:MEASure:ASEarch:SELSlot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:ASEarch:SELSlot?</td>
</tr>
<tr>
<td>[9]</td>
<td>No label (Query for slot state)</td>
<td>:SENSe:MEASure:ASEarch:SLOT?</td>
</tr>
<tr>
<td>[10]</td>
<td>No label (Query for auto search results)</td>
<td>:CALCulate:DATA:ASEarch?</td>
</tr>
</tbody>
</table>

:SENSe:MEASure:ASEarch:SMODe <mode>

Parameter  
<mode>=<CHARACTER PROGRAM DATA>
FINE    Fine mode
COARse  Coarse mode

Function     
Sets the Auto Search mode.

Example      
To set the Auto Search mode to Fine:
> :SENSe:MEASure:ASEarch:SMODe FINE

Compatibility  
Compatible with MU183040A/B.

:SENSe:MEASure:ASEarch:SMODe?

Response  
<mode>=<CHARACTER RESPONSE DATA>
FINE, COAR

Function     
Queries the Auto Search mode.

Example      
> :SENSe:MEASure:ASEarch:SMODe?
  < FINE

Compatibility  
Compatible with MU183040A/B.
### :SENSe:MEASure:ASEarch:MODE <mode>

**Parameter**

- `<mode>`={CHARACTER PROGRAM DATA}
  - PTHReshold  Phase & Threshold
  -THRReshold  Threshold
  -PHASe  Phase

**Function**

Sets the execution item of Auto Search.

**Example**

To set the execution item of Auto Search to Phase & Threshold:

> :SENSe:MEASure:ASEarch:MODE PTHReshold

**Compatibility**

Compatible with MU183040A/B.

### :SENSe:MEASure:ASEarch:MODE?

**Response**

- `<mode>`={CHARACTER RESPONSE DATA}
  - PTHR  Phase & Threshold
  - THR  Threshold
  - PHAS  Phase

**Function**

Queries the execution item of Auto Search.

**Example**

> :SENSe:MEASure:ASEarch:MODE?

< PTHR

**Compatibility**

Compatible with the MP1632C.

### :SENSe:MEASure:ASEarch:STARt

**Function**

Starts the Auto Search function.

**Example**

> :SENSe:MEASure:ASEarch:STARt

**Compatibility**

Compatible with the MP1632C.

### :SENSe:MEASure:ASEarch:STOP

**Function**

Stops the Auto Search function.

**Example**

> :SENSe:MEASure:ASEarch:STOP

**Compatibility**

Compatible with the MP1632C.

### :SENSe:MEASure:ASEarch:STATe?

**Response**

- `<boolean>`={NR1 NUMERIC RESPONSE DATA}
  - 1  Started
  - 0  Stopped
  - −1  Auto Search failure (when any slot has failed)

**Function**

Queries the Auto Search function state.

**Example**

> :SENSe:MEASure:ASEarch:STATe?

< 1

**Compatibility**

Compatible with the MP1632C.
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:SENSE:MEASure:ASEarch:SLASet

Function  Sets Auto Search execution for all slots to ON.
Example  > :SENSe:MEASure:ASEarch:SLASet
Compatibility  Incompatible with existing models.

:SENSE:MEASure:ASEarch:SLAReset

Function  Sets Auto Search execution for all slots to OFF.
Example  > :SENSe:MEASure:ASEarch:SLAReset
Compatibility  Incompatible with existing models.

:SENSE:MEASure:ASEarch:SELSlot

Parameter  <slot>=<CHARACTER PROGRAM DATA>
SLOT1 to SLOT6  Slots No. 1 to No. 6
1 to 6 when using the MP1800A, 1 to 4 when using the MT1810A
USB11 to USB14  USB No.11 to 14
<intface>=<DECIMAL NUMERIC PROGRAM DATA>
1 to 4  Data1 to 4
<boolean>=<BOOLEAN PROGRAM DATA>
ON, 1    Auto Search ON
OFF, 0    Auto Search OFF
[unit]=<DECIMAL NUMERIC PROGRAM DATA>
1 to 4  Mainframe Nos. 1 to 4

Function  Selects the slot for execution of Auto Search.
Example  To set Auto Search of USB No.11 to ON:
> :SENSe:MEASure:ASEarch:SELSlot USB11,1,ON
Compatibility  Incompatible with existing models. (The parameters are different.)
## 7.4 Automatic Measurement Commands

**:SENSe:MEASure:ASEarch:SELSlot? <slot>,<interface>[,<unit>]**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;slot&gt;</td>
<td>CHARACTER PROGRAM DATA</td>
</tr>
<tr>
<td>SLOT1 to SLOT6</td>
<td>Slots No. 1 to No. 6</td>
</tr>
<tr>
<td>1 to 6 when using the MP1800A, 1 to 4 when using the MT1810A</td>
<td></td>
</tr>
<tr>
<td>USB11 to USB14</td>
<td>USB No.11 to 14</td>
</tr>
<tr>
<td>&lt;interface&gt;</td>
<td>DECIMAL NUMERIC PROGRAM DATA</td>
</tr>
<tr>
<td>1 to 4</td>
<td>Data1 to 4</td>
</tr>
<tr>
<td>[&lt;unit&gt;]=</td>
<td>DECIMAL NUMERIC PROGRAM DATA</td>
</tr>
<tr>
<td>1 to 4</td>
<td>Mainframe Nos. 1 to 4</td>
</tr>
</tbody>
</table>

When using two or more MT1810A units in serial connection, specify the mainframe number. Can be omitted. Mainframe No. 1 is specified when omitted.

<table>
<thead>
<tr>
<th>Response</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;boolean&gt;</td>
<td>NR1 NUMERIC RESPONSE DATA</td>
</tr>
<tr>
<td>1</td>
<td>ON</td>
</tr>
<tr>
<td>0</td>
<td>OFF</td>
</tr>
</tbody>
</table>

**Function**
Queries the ON/OFF state of Auto Search for each slot.

**Example**
To query the ON/OFF state of Auto Search for USB No.11:

```
> :SENSe:MEASure:ASEarch:SELSlot? USB11,1
< 1
```

**Compatibility**
Incompatible with existing models. (The parameters are different.)

---

**:SENSe:MEASure:ASEarch:SLOT? <slot>,[<unit>]**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;slot&gt;</td>
<td>CHARACTER PROGRAM DATA</td>
</tr>
<tr>
<td>SLOT1 to SLOT6</td>
<td>Slots No. 1 to No. 6</td>
</tr>
<tr>
<td>1 to 6 when using the MP1800A, 1 to 4 when using the MT1810A</td>
<td></td>
</tr>
<tr>
<td>USB11 to USB14</td>
<td>USB No.11 to 14</td>
</tr>
<tr>
<td>[&lt;unit&gt;]</td>
<td>DECIMAL NUMERIC PROGRAM DATA</td>
</tr>
<tr>
<td>1 to 4</td>
<td>Mainframe Nos. 1 to 4</td>
</tr>
</tbody>
</table>

When using two or more MT1810A units in serial connection, specify the mainframe number. Can be omitted. Mainframe No. 1 is specified when omitted.

<table>
<thead>
<tr>
<th>Response</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;interface&gt;</td>
<td>NR1 NUMERIC RESPONSE DATA</td>
</tr>
<tr>
<td>1 to 4</td>
<td>Data1 to 4</td>
</tr>
</tbody>
</table>

**Note:**
The interface numbers of all the data interfaces to which the Auto Search function can be executed are returned in a comma-separated string. 1 is returned if Auto Search for an MP1862A is ON. If all the targets are OFF, “Parameter Error” is returned.

**Function**
Queries the data interface(s) to which the Auto Search function can be executed.

**Example**
To query the data interface(s) to which the Auto Search function for USB
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No.11 can be executed:
> :SENSe:MEASure:ASEarch:SLOT? USB11
< 1

Compatibility  Incompatible with existing models.

:CALCulate:DATA:ASEarch? <slot>,<interface>[,<unit>]

Parameter  

- <slot> = <CHARACTER PROGRAM DATA>  
  SLOT1 to SLOT6  Slots No. 1 to No. 6  
  1 to 6 when using the MP1800A, 1 to 4 when using the MT1810A  
  USB11 to USB14  USB No.11 to 14

- <interface> = <DECIMAL NUMERIC PROGRAM DATA>  
  1 to 4  Data1 to 4

- [<unit>] = <DECIMAL NUMERIC PROGRAM DATA>  
  1 to 4  Mainframe Nos. 1 to 4

When using two or more MT1810A units in serial connection, specify the mainframe number.
Can be omitted. Mainframe No. 1 is specified when omitted.

Response  

- <data>,<xdata>,<delay>,<numeric1>,<numeric2>,<numeric3>,<numeric4>  
  "Done"  Normal termination  
  "Fail"  Abnormal termination  
  "----"  Not executed

- <numeric1>,<numeric2> = <NR2 NUMERIC RESPONSE DATA>  
  -3.500 to 3.300  -3.500 to 3.300 V/Step 0.001 V

- <numeric3> = <NR1 NUMERIC RESPONSE DATA>  
  -1000 to 1000  -1000 to 1000 mUI/Step 1 mUI

- <numeric4> = <NR2 NUMERIC RESPONSE DATA>  
  -xxx.xx to xxx.xx ps (This value is converted from mUI units.)

Function  Queries the Auto Search results.

Example  To query the Auto Search results of USB No.11:
> :CALCulate:DATA:ASEarch? USB11,1
< "Done", "Done", "Done", 1.000, 1.100, -500, 50.00
< "Done", "Done", "----", 1.000, 1.100, 0, 0.00 (When not executed in the Phase direction)

Compatibility  Incompatible with existing models. (The parameters are different.)
7.4.2 Eye Margin Measurement

This section describes the commands for Eye Margin measurement.

7.4.2.1 Measurement setting commands

![EyeMargin Window]

Figure 7.4.2.1-1 EyeMargin Window
### Table 7.4.2.1-1  Eye Margin Measurement Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:EMARgin:MARGin:SLOT?</td>
</tr>
<tr>
<td>[6]</td>
<td>No label (Query for measurement state)</td>
<td>:SENSe:MEASure:EMARgin:STATe?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:EMARgin:MARGin:THReshold?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:EMARgin:MARGin:RESolution?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:EMARgin:MARGin:ASEarch?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:EMARgin:TIME?</td>
</tr>
<tr>
<td>[12]</td>
<td>Query for measurement start time</td>
<td>:SENSe:MEASure:EMARgin:STAr?</td>
</tr>
<tr>
<td>[14]</td>
<td>Query for measurement result</td>
<td>:CALCulate:DATA:EMARgin?</td>
</tr>
<tr>
<td>[15]</td>
<td>No label (Query for measurement status)</td>
<td>:CALCulate:DATA:EMARgin:STATus?</td>
</tr>
</tbody>
</table>

---

### :SENSe:MEASure:EMARgin:MARGin:ASLot

**Function**
Selects all Eye Margin measurement slots to be set to ON.

**Example**

> :SENSe:MEASure:EMARgin:MARGin:ASLot

**Compatibility**
Incompatible with existing models.

### :SENSe:MEASure:EMARgin:MARGin:RSLot

**Function**
Selects all Eye Margin measurement slots to be set to OFF.

**Example**

> :SENSe:MEASure:EMARgin:MARGin:RSLot

**Compatibility**
Incompatible with existing models.
7.4 Automatic Measurement Commands

:SENSe:MEASure:EMARgin:MARGin:SLOT
<slot>,<interface>[,<boolean>[,[<unit>]]]

Parameter

- **<slot>** = CHARACTER PROGRAM DATA
  - SLOT1 to SLOT6: Slots No. 1 to No. 6
  - 1 to 6 when using the MP1800A, 1 to 4 when using the MT1810A
  - USB11 to USB14: USB No.11 to 14

- **<interface>** = DECIMAL NUMERIC PROGRAM DATA
  - 1 to 4: Data1 to 4
  - Fixed to 1 if using a USB module.

- **<boolean>** = BOOLEAN PROGRAM DATA
  - ON or 1
  - OFF or 0

- **<unit>** = DECIMAL NUMERIC PROGRAM DATA
  - 1 to 4: Mainframe Nos. 1 to 4
  - When using two or more MT1810A units in serial connection, specify the mainframe number.
  - Can be omitted. Mainframe No. 1 is specified when omitted.

Function
Selects the Eye Margin measurement slot.

Example
To set Eye Margin measurement of USB No.11 to ON:
> :SENSe:MEASure:EMARgin:MARGin:SLOT USB11,1,ON

Compatibility
Incompatible with existing models.

:SENSe:MEASure:EMARgin:MARGin:SLOT? <slot>,<interface>[,<boolean>[,[<unit>]]]

Parameter

- **<slot>** = CHARACTER PROGRAM DATA
  - SLOT1 to SLOT6: Slots No. 1 to No. 6
  - 1 to 6 when using the MP1800A, 1 to 4 when using the MT1810A
  - USB11 to USB14: USB No.11 to 14

- **<interface>** = DECIMAL NUMERIC PROGRAM DATA
  - 1 to 4: Data1 to 4
  - Fixed to 1 if using a USB module

- **<boolean>** = BOOLEAN PROGRAM DATA
  - ON or 1
  - OFF or 0

- **<unit>** = DECIMAL NUMERIC PROGRAM DATA
  - 1 to 4: Mainframe Nos. 1 to 4
  - When using two or more MT1810A units in serial connection, specify the mainframe number.
  - Can be omitted. Mainframe No. 1 is specified when omitted.

Response

- **<boolean>** = NR1 NUMERIC RESPONSE DATA
  - 1: ON
  - 0: OFF

Function
Queries whether the specified slot is subject to Eye Margin measurement.

Example
To query whether USB No.11 is subject to measurement:
> :SENSe:MEASure:EMARgin:MARGin:SLOT? USB11,1
< 1

Compatibility
Incompatible with existing models.
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:SENSe:MEASure:STARt

Function Starts the Eye Margin measurement.
Example > :SENSe:MEASure:STARt
Compatibility Incompatible with existing models.

:SENSe:MEASure:STOP

Function Stops the Eye Margin measurement.
Example > :SENSe:MEASure:STOP
Compatibility Incompatible with existing models.

:SENSe:MEASure:EMARgin:STATe?

Response <boolean>=<NR1 NUMERIC RESPONSE DATA>
1  Starts measurement
0  Stops measurement
–1  Measurement failure
Function Queries the Eye Margin measurement state.
Example > :SENSe:MEASure:EMARgin:STATe?
< 1
Compatibility Compatible with the MP1632C.

:SENSe:MEASure:EMARgin:MARGin:THReshold <thre>

Parameter <thre>=<CHARACTER PROGRAM DATA>
E_3 to E_12  1E–3 to 1E–12/1 Step
Function Sets the threshold value that is to be the boundary of the Eye Margin measurement margin.
Example To set the threshold value that is to be the Eye Margin measurement margin to 1E–4:
> :SENSe:MEASure:EMARgin:MARGin:THReshold E_4
Compatibility Compatible with the MP1632C.

:SENSe:MEASure:EMARgin:MARGin:THReshold?

Response <thre>=<CHARACTER RESPONSE DATA>
E_3 to E_12  1E–3 to 1E–12
Function Queries the threshold value that is to be the boundary of the Eye Margin measurement margin.
Example > :SENSe:MEASure:EMARgin:MARGin:THReshold?
< E_4
Compatibility Compatible with the MP1632C.
7.4 Automatic Measurement Commands

**:SENSe:MEASure:EMARgin:MARGin:RESolution** `<type>`

- **Parameter**
  - `<type>`: `<CHARACTER PROGRAM DATA>`
  - `FINE`: Fine mode
  - `COARse`: Coarse mode

- **Function**
  Sets the accuracy of the error ratio for the Eye Margin measurement.

- **Example**
  To set the accuracy of the error ratio for the Eye Margin measurement to the Fine mode:
  ```
  > :SENSe:MEASure:EMARgin:MARGin:RESolution FINE
  ```

- **Compatibility**
  Compatible with the MP1632C.

**:SENSe:MEASure:EMARgin:MARGin:RESolution?**

- **Response**
  `<type>`: `<CHARACTER RESPONSE DATA>`
  - `FINE`, `COAR`:

- **Function**
  Queries the accuracy of the error ratio for the Eye Margin measurement.

- **Example**
  ```
  > :SENSe:MEASure:EMARgin:MARGin:RESolution?
  < FINE
  ```

- **Compatibility**
  Compatible with the MP1632C.

**:SENSe:MEASure:EMARgin:MARGin:ASEarch** `<boolean>[,<mode>]`

- **Parameter**
  - `<boolean>`: `<BOOLEAN PROGRAM DATA>`
    - `ON` or `1`: Auto Search ON
    - `OFF` or `0`: Auto Search OFF
  - `<mode>`: `<DECIMAL NUMERIC PROGRAM DATA>`
    - `1`: Coarse
    - `2`: Fine

- **Note:**
  `<mode>` can be omitted. Coarse is specified when omitted.

- **Function**
  Selects whether to perform Auto Search upon start of the Eye Margin measurement.

- **Example**
  To set Auto Search upon start of the Eye Margin measurement to ON:
  ```
  > :SENSe:MEASure:EMARgin:MARGin:ASEarch ON
  ```

- **Compatibility**
  Incompatible with existing models.
### :SENSe:MEASure:EMARgin:MARGin:ASEarch?

<table>
<thead>
<tr>
<th>Response</th>
<th>&lt;boolean&gt;=&lt;NR1 NUMERIC RESPONSE DATA&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>OFF</td>
</tr>
<tr>
<td>1</td>
<td>ON (Coarse)</td>
</tr>
<tr>
<td>2</td>
<td>ON (Fine)</td>
</tr>
</tbody>
</table>

**Function**
Queries whether to perform Auto Search upon start of the Eye Margin measurement.

**Example**
> :SENSe:MEASure:EMARgin:MARGin:ASEarch?
< 1

**Compatibility**
Incompatible with existing models.

### :SENSe:MEASure:EMARgin:TIME <type>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>&lt;type&gt;=&lt;CHARACTER PROGRAM DATA&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTIMe</td>
<td>Displays the current date and time.</td>
</tr>
<tr>
<td>STARt</td>
<td>Displays the measurement start time.</td>
</tr>
<tr>
<td>ELAPsed</td>
<td>Displays the elapsed time based on the measurement period.</td>
</tr>
</tbody>
</table>

**Function**
Selects the Eye Margin measurement time display type.

**Example**
To set the Eye Margin measurement time display type to measurement start time (Start Time):
> :SENSe:MEASure:EMARgin:TIME STARt

**Compatibility**
Compatible with the MP1632C.

### :SENSe:MEASure:EMARgin:TIME?

<table>
<thead>
<tr>
<th>Response</th>
<th>&lt;type&gt;=&lt;CHARACTER RESPONSE DATA&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTIMe</td>
<td>Displays the current date and time.</td>
</tr>
<tr>
<td>STARt</td>
<td>Displays the measurement start time.</td>
</tr>
<tr>
<td>ELAPsed</td>
<td>Displays the elapsed time based on the measurement period.</td>
</tr>
</tbody>
</table>

**Function**
Queries the Eye Margin measurement time display type.

**Example**
> :SENSe:MEASure:EMARgin:TIME?
< STAR

**Compatibility**
Compatible with the MP1632C.
7.4 Automatic Measurement Commands

:SENSe:MEASure:EMARgin:DTIMe?

<table>
<thead>
<tr>
<th>Response</th>
<th>&lt;year&gt; = &lt;NR1 NUMERIC RESPONSE DATA&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000 to 2036 Year 2000 to 2036</td>
</tr>
<tr>
<td></td>
<td>&lt;month&gt; = &lt;NR1 NUMERIC RESPONSE DATA&gt;</td>
</tr>
<tr>
<td></td>
<td>1 to 12 January to December</td>
</tr>
<tr>
<td></td>
<td>&lt;day&gt; = &lt;NR1 NUMERIC RESPONSE DATA&gt;</td>
</tr>
<tr>
<td></td>
<td>1 to 31 1st to 31st</td>
</tr>
<tr>
<td></td>
<td>&lt;hour&gt; = &lt;NR1 NUMERIC RESPONSE DATA&gt;</td>
</tr>
<tr>
<td></td>
<td>0 to 23 0 to 23 hours</td>
</tr>
<tr>
<td></td>
<td>&lt;minute&gt; = &lt;NR1 NUMERIC RESPONSE DATA&gt;</td>
</tr>
<tr>
<td></td>
<td>0 to 59 0 to 59 minutes</td>
</tr>
<tr>
<td></td>
<td>&lt;second&gt; = &lt;NR1 NUMERIC RESPONSE DATA&gt;</td>
</tr>
<tr>
<td></td>
<td>0 to 59 0 to 59 seconds</td>
</tr>
</tbody>
</table>

Function
Queries the current date and time during Eye Margin measurement.

Example
> :SENSe:MEASure:EMARgin:DTIMe?
< 2012,4,1,23,59,59

Compatibility
Incompatible with existing models.

:SENSe:MEASure:EMARgin:STARt?

<table>
<thead>
<tr>
<th>Response</th>
<th>&lt;year&gt; = &lt;NR1 NUMERIC RESPONSE DATA&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0, 2000 to 2036 Year 2000 to 2036</td>
</tr>
<tr>
<td></td>
<td>&lt;month&gt; = &lt;NR1 NUMERIC RESPONSE DATA&gt;</td>
</tr>
<tr>
<td></td>
<td>0 to 12 January to December</td>
</tr>
<tr>
<td></td>
<td>&lt;day&gt; = &lt;NR1 NUMERIC RESPONSE DATA&gt;</td>
</tr>
<tr>
<td></td>
<td>0 to 31 1st to 31st</td>
</tr>
<tr>
<td></td>
<td>&lt;hour&gt; = &lt;NR1 NUMERIC RESPONSE DATA&gt;</td>
</tr>
<tr>
<td></td>
<td>0 to 23 0 to 23 hours</td>
</tr>
<tr>
<td></td>
<td>&lt;minute&gt; = &lt;NR1 NUMERIC RESPONSE DATA&gt;</td>
</tr>
<tr>
<td></td>
<td>0 to 59 0 to 59 minutes</td>
</tr>
<tr>
<td></td>
<td>&lt;second&gt; = &lt;NR1 NUMERIC RESPONSE DATA&gt;</td>
</tr>
<tr>
<td></td>
<td>0 to 59 0 to 59 seconds</td>
</tr>
</tbody>
</table>

Note:
The following is output when no measurement is performed:
< 0,0,0,0,0,0

Function
Queries the Eye Margin measurement start time.

Example
> :SENSe:MEASure:EMARgin:STARt?
< 2012,4,1,23,59,59

Compatibility
Compatible with the MP1632C.
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:SENSe:MEASure:EMARgin:ELAPsed?

Response  
0, 1 to 99  0 to 99 days  
0 to 23  0 to 23 hours  
0 to 59  0 to 59 minutes  
0 to 59  0 to 59 seconds

Note:  
The following is output when no measurement is performed: 
< 0,0,0,0

Function  
Queries the Eye Margin measurement elapsed time (Elapsed Time).

Example  
> :SENSe:MEASure:EMARgin:ELAPsed?  
< 99,23,59,59

Compatibility  
Compatible with the MP1632C.

:CALCulate:DATA:EMARgin? <slot>,<interface>,<string>[,<unit>]

Parameter  
<slot>=<CHARACTER PROGRAM DATA>  
SLOT1 to SLOT6  Slots No. 1 to No. 6  
1 to 6 when using the MP1800A, 1 to 4 when using the MT1810A  
USB11 to USB14  USB No.11 to 14

<interface>=<DECIMAL NUMERIC PROGRAM DATA>  
1 to 4  Data1 to 4  
Fixed to 1 if using a USB module

<string>=<STRING PROGRAM DATA>  
For details on <string>, refer to Table 7.4.2.1-2.

[unit]=<DECIMAL NUMERIC PROGRAM DATA>  
1 to 4  Mainframe Nos. 1 to 4  
When using two or more MT1810A units in serial connection, specify the mainframe number.

Can be omitted. Mainframe No. 1 is specified when omitted.

<table>
<thead>
<tr>
<th>Item</th>
<th>&lt;string&gt;</th>
<th>Response form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase margin</td>
<td>&quot;PHASe&quot;</td>
<td>Form1</td>
</tr>
<tr>
<td>Threshold margin</td>
<td>&quot;THReshold&quot;</td>
<td>Form2</td>
</tr>
<tr>
<td>Period</td>
<td>&quot;PERiod&quot;</td>
<td>Form1</td>
</tr>
</tbody>
</table>

Table 7.4.2.1-2  Eye Margin Measurement Items <string>

Response  
<string>=<STRING RESPONSE DATA>  
For details on the measurement data <result>, refer to the table below.
### 7.4 Automatic Measurement Commands

#### Table 7.4.2-1-3  Eye Margin Measurement Results <result>

<table>
<thead>
<tr>
<th>Form</th>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form1</td>
<td>&quot; XXXX&quot;</td>
<td>For 0 to MAX (mUI/ps) Displays in the selected unit.</td>
</tr>
<tr>
<td>Phase type</td>
<td>&quot;Failed&quot;</td>
<td>For measurement failure</td>
</tr>
<tr>
<td></td>
<td>&quot;-----&quot;</td>
<td>When no data corresponds to the query.</td>
</tr>
<tr>
<td>Form2</td>
<td>&quot; XXXX&quot;</td>
<td>0 to MAX (mVpp)</td>
</tr>
<tr>
<td>Threshold type</td>
<td>&quot;Failed&quot;</td>
<td>For measurement failure</td>
</tr>
<tr>
<td></td>
<td>&quot;-----&quot;</td>
<td>When no data corresponds to the query.</td>
</tr>
</tbody>
</table>

**Function**  Queries the Eye Margin measurement results.

**Example**  To query the Eye Margin measurement results of USB No.11:
> ::CALCulate::DATA::EMARgin? USB11, 1, "THReshold"
< " 0"

**Compatibility**  Incompatible with existing models.

### :CALCulate::DATA::EMARgin::STATus?

**Response**  

<table>
<thead>
<tr>
<th>&lt;string&gt;=&lt;STRING RESPONSE DATA&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;&quot;</td>
</tr>
<tr>
<td>&quot;Sync Loss&quot;</td>
</tr>
<tr>
<td>&quot;Clock Loss&quot;</td>
</tr>
<tr>
<td>&quot;Out of range&quot;</td>
</tr>
<tr>
<td>&quot;Illegal Error&quot;</td>
</tr>
<tr>
<td>&quot;Meas. Threshold exceeded&quot;</td>
</tr>
</tbody>
</table>

**Note:**  When two or more alarms have occurred, they are displayed in the following order:

- Illegal Error
- Clock Loss
- Sync Loss
- Out of range

**Function**  Queries the Eye Margin measurement status.

**Example**  
> :CALCulate::DATA::EMARgin::STATus?  
< "Sync Loss"

**Compatibility**  Incompatible with existing models.
Chapter 7  Remote Commands

7.4.2.2 File menu setting commands

Table 7.4.2.2-1 File Menu Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
</table>

**:SYSTem:MMEMory:MARGin:RECall <file_name>**

Parameter

- `<file_name>` = STRING PROGRAM DATA
- "<drv>:\[<dir>]<file>
- `<drv>` = C,D,E,F
- `<dir>` = `<dir1>`\<dir2>\...(Omitted for the root directory)
- `<file>` = File Name

Function

Opens the Eye Margin measurement result data.

Example

> :SYSTem:MMEMory:MARGin:RECall "C:\Test\example"

Compatibility

Incompatible with existing models.

**:SYSTem:MMEMory:MARGin:STORe <file_name>,<file_type>**

Parameter

- `<file_name>` = STRING PROGRAM DATA
- "<drv>:\[<dir>]<file>
- `<drv>` = C,D,E,F
- `<dir>` = `<dir1>`\<dir2>\...(Omitted for the root directory)
- `<file>` = File Name
- `<file_type>` = CHARACTER PROGRAM DATA
  - BIN  Binary file
  - CSV  CSV file
  - TXT  Text file

Function

Saves the Eye Margin measurement result data.

Note:

The settings will not be read from the saved file if the file name is changed.

Example

To save the Eye Margin measurement result data by specifying the save destination, file name, and file format:

> :SYSTem:MMEMory:MARGin:STORe "C:\Test\example",TXT

Compatibility

Incompatible with existing models.
7.4 Automatic Measurement Commands

7.4.3 Eye Diagram Measurement

This section describes the commands for Eye Diagram measurement. Commands are described for each tab.

![EyeDiagram Window](image)

Figure 7.4.3-1 EyeDiagram Window

7.4.3.1 Condition setting commands

![Condition Tab](image)

Figure 7.4.3.1-1 Condition Tab
### Table 7.4.3.1-1  Condition Tab Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDIagram:TABSelect?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:EDIagram:DIAGram:SLOT?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:EDIagram:MTEst:SLOT?</td>
</tr>
<tr>
<td></td>
<td>Measurement</td>
<td>:SENSe:MEASure:EDIagram:DIAGram:TRANsition?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:EDIagram:DIAGram:TYPE?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:EDIagram:DIAGram:ASEarch?</td>
</tr>
</tbody>
</table>

**:DISPlay:RESult:EDIagram:TABSelect <tab>**

Parameter: `<tab>=<CHARACTER PROGRAM DATA>`
- **CONDition**: Condition tab
- **DIAGram**: Diagram tab
- **MASKedit**: Mask Edit tab

Function: Switches the Eye Diagram measurement tab display.

Example: To display the Eye Diagram measurement Condition tab:

```
> :DISPlay:RESult:EDIagram:TABSelect CONDition
```

Compatibility: Incompatible with existing models.

**:DISPlay:RESult:EDIagram:TABSelect?**

Response: `<tab>=<CHARACTER RESPONSE DATA>`
- **COND, DIAG, MASK**

Function: Queries the Eye Diagram measurement tab display.

Example: To display the Eye Diagram measurement tab display.

```
> :DISPlay:RESult:EDIagram:TABSelect?
< COND
```

Compatibility: Incompatible with existing models.
### 7.4 Automatic Measurement Commands

**:SENSe:MEASure:EDIagram:DIAGram:SLOT**

```
<slot>,<interface>,<boolean>[,<unit>]
```

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;slot&gt;</td>
<td>CHARACTER PROGRAM DATA</td>
</tr>
<tr>
<td>SLOT1 to SLOT6</td>
<td>Slots. No. 1 to No. 6</td>
</tr>
<tr>
<td>1 to 6</td>
<td>when using the MP1800A, 1 to 4 when using the MT1810A</td>
</tr>
<tr>
<td>USB11 to USB14</td>
<td>USB No. 11 to 14</td>
</tr>
<tr>
<td>&lt;interface&gt;</td>
<td>DECIMAL NUMERIC PROGRAM DATA</td>
</tr>
<tr>
<td>1 to 4</td>
<td>Data 1 to 4</td>
</tr>
<tr>
<td>Fixed to 1</td>
<td>if using a USB module</td>
</tr>
<tr>
<td>&lt;boolean&gt;</td>
<td>BOOLEAN PROGRAM DATA</td>
</tr>
<tr>
<td>ON or 1</td>
<td>Eye Diagram measurement ON</td>
</tr>
<tr>
<td>OFF or 0</td>
<td>Eye Diagram measurement OFF</td>
</tr>
<tr>
<td>[&lt;unit&gt;]</td>
<td>DECIMAL NUMERIC PROGRAM DATA</td>
</tr>
<tr>
<td>1 to 4</td>
<td>Mainframe Nos. 1 to 4</td>
</tr>
<tr>
<td>Can be omitted.</td>
<td>Mainframe No. 1 is specified when omitted.</td>
</tr>
</tbody>
</table>

**Function**
Selects the Eye Diagram measurement slot.

**Example**
To set USB No.11 as a target of Eye Diagram measurement:
```
> :SENSe:MEASure:EDIagram:DIAGram:SLOT USB11,1,ON
```

**Compatibility**
Incompatible with existing models.

---

**:SENSe:MEASure:EDIagram:DIAGram:SLOT?**

```
<slot>,<interface>[,<unit>]
```

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;slot&gt;</td>
<td>CHARACTER PROGRAM DATA</td>
</tr>
<tr>
<td>SLOT1 to SLOT6</td>
<td>Slots. No. 1 to No. 6</td>
</tr>
<tr>
<td>1 to 6</td>
<td>when using the MP1800A, 1 to 4 when using the MT1810A</td>
</tr>
<tr>
<td>USB11 to USB14</td>
<td>USB No. 11 to 14</td>
</tr>
<tr>
<td>&lt;interface&gt;</td>
<td>DECIMAL NUMERIC PROGRAM DATA</td>
</tr>
<tr>
<td>1 to 4</td>
<td>Data 1 to 4</td>
</tr>
<tr>
<td>Fixed to 1</td>
<td>if using a USB module</td>
</tr>
<tr>
<td>[&lt;unit&gt;]</td>
<td>DECIMAL NUMERIC PROGRAM DATA</td>
</tr>
<tr>
<td>1 to 4</td>
<td>Mainframe Nos. 1 to 4</td>
</tr>
<tr>
<td>Can be omitted.</td>
<td>Mainframe No. 1 is specified when omitted.</td>
</tr>
</tbody>
</table>

**Response**
```
<boolean>=<NR1 NUMERIC RESPONSE DATA>
```

<table>
<thead>
<tr>
<th>&lt;boolean&gt;</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON or 1</td>
<td>Eye Diagram measurement ON</td>
</tr>
<tr>
<td>OFF or 0</td>
<td>Eye Diagram measurement OFF</td>
</tr>
</tbody>
</table>

**Function**
Queries whether the specified slot is targeted for the Eye Diagram measurement.

**Example**
To query whether USB No.11 is subject to measurement:
```
> :SENSe:MEASure:EDIagram:DIAGram:SLOT? USB11,1
```
### Chapter 7  Remote Commands

#### Compatibility
Incompatible with existing models.

>:SENSe:MEASure:EDiagram:MTESt:SLOT
  <slot>,<interface>[,<boolean>[,<unit>]]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| <slot>    | SLOT1 to SLOT6  Slots No. 1 to No. 6 1 to 6 when using the MP1800A, 1 to 4 when using the MT1810A USB11 to USB14  USB No.11 to 14 |<boolean>=<BOOLEAN PROGRAM DATA>
ON or 1   Mask Test measurement ON
OFF or 0  Mask Test measurement OFF |
| <unit>    | Mainframe Nos. 1 to 4 When using two or more MT1810A units in serial connection, specify the mainframe number. Can be omitted. Mainframe No. 1 is specified when omitted. |

Function
Selects the Mask Test measurement slot.

Example
To set USB No. 11 as a target of Mask Test measurement:
> :SENSe:MEASure:EDiagram:MTESt:SLOT USB11,1,ON

Compatibility
Incompatible with existing models.

**:SENSe:MEASure:EDiagram:MTESt:SLOT? <slot>,<interface>[,<boolean>[,<unit>]]**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| <slot>    | SLOT1 to SLOT6  Slots No. 1 to No. 6 1 to 6 when using the MP1800A, 1 to 4 when using the MT1810A USB11 to USB14  USB No.11 to 14 |<boolean>=<NR1 NUMERIC RESPONSE DATA>
1   ON
0   OFF |
| <unit>    | Mainframe Nos. 1 to 4 When using two or more MT1810A units in serial connection, specify the mainframe number. Can be omitted. Mainframe No. 1 is specified when omitted. |

Response
Queries whether the specified slot is targeted for the Mask Test.
7.4 Automatic Measurement Commands

Example
To query whether the slot 1, Data 1 is targeted for the Mask Test measurement:

```
> :SENSe:MEASure:EDIagram:MTESt:SLOT? SLOT1,1
< 1
```

Compatibility
Incompatible with existing models.

:SENSe:MEASure:EDIagram:DIAGram:TRANsition <type>

Parameter
```
<type>={CHARACTER PROGRAM DATA>
OFF
TRANSition Transition
NONTran Non Transition
```

Function
Sets Transition/Non Transition error detection.

Example
To set to Transition error detection:

```
> :SENSe:MEASure:EDIagram:DIAGram:TRANsition TRANSition
```

Compatibility
Incompatible with existing models.

:SENSe:MEASure:EDIagram:DIAGram:TRANsition?

Response
```
<type>={CHARACTER RESPONSE DATA>
OFF
```

Function
Queries the Transition/Non Transition error detection setting state.

Example
```
> :SENSe:MEASure:EDIagram:DIAGram:TRANsition?
< OFF
```

Compatibility
Incompatible with existing models.

:SENSe:MEASure:EDIagram:DIAGram:TYPE <type>

Parameter
```
<type>={CHARACTER PROGRAM DATA>
POINt8  8 Point
POINt16 16 Point
POINt32 32 Point
POINt64 64 Point
POINt128 128 Point
```

Function
Sets the number of measurement points during Eye Diagram measurement.

Example
To set the number of measurement points during Eye Diagram measurement to 8 points:

```
> :SENSe:MEASure:EDIagram:DIAGram:TYPE POINt8
```

Compatibility
Incompatible with existing models.
Chapter 7  Remote Commands

:SENSe:MEASure:EDiagram:DIAGram:TYPE?

Response  
<type>=<CHARACTER RESPONSE DATA>
POIN8, POIN16, POIN32, POIN64, POIN128

Function  
Queries the number of measurement points during Eye Diagram measurement.

Example  
> :SENSe:MEASure:EDiagram:DIAGram:TYPE?
< POIN8

Compatibility  
Incompatible with existing models.

:SENSe:MEASure:EDiagram:DIAGram:ASEarch <setting>[,<mode>]

Parameter  
<setting>=<BOOLEAN PROGRAM DATA>
ON or 1  Auto Search ON
OFF or 0  Auto Search OFF

<mode>=<DECIMAL NUMERIC PROGRAM DATA>
1  Coarse
2  Fine

Note:  
<mode> can be omitted. Coarse is specified when omitted.

Function  
Selects whether to execute Auto Search when starting the Eye Diagram Measurement.

Example  
To set Auto Search to On when starting the Eye Diagram Measurement:
> :SENSe:MEASure:EDiagram:DIAGram:ASEarch ON,2

Compatibility  
Incompatible with existing models.

:SENSe:MEASure:EDiagram:DIAGram:ASEarch?

Response  
<setting>=<NR1 NUMERIC RESPONSE DATA>
0  OFF
1  ON (Coarse)
2  ON (Fine)

Function  
Queries whether to execute Auto Search when starting the Eye Diagram Measurement.

Example  
> :SENSe:MEASure:EDiagram:DIAGram:ASEarch?
< 2

Compatibility  
Incompatible with existing models.
7.4.3.2 Diagram setting commands

This section describes the commands for the respective areas of the **Diagram** tab.

![Diagram Tab](image)
### Table 7.4.3.2.1-1  Graph Display Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1]</td>
<td>No label (Result display slot setting)</td>
<td>:DISPlay:RESult:EDIagram:SLOT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDIagram:SLOT?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDIagram:TEMPLate:SELect?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDIagram:TEMPLate:THReshold?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDIagram:SCALE:VOLTage?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDIagram:SCALE:PHASE?</td>
</tr>
</tbody>
</table>
7.4 Automatic Measurement Commands

`:DISPlay:RESult:EDiagram:SLOT <slot>,<interface>[,<unit>]`

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>&lt;slot&gt;</code>=&lt;CHARACTER PROGRAM DATA&gt;</td>
<td>SLOT1 to SLOT6 Slots No. 1 to No. 6 1 to 6 when using the MP1800A, 1 to 4 when using the MT1810A USB11 to USB14 USB No.11 to 14</td>
</tr>
<tr>
<td><code>&lt;interface&gt;</code>=&lt;DECIMAL NUMERIC PROGRAM DATA&gt;</td>
<td>1 to 4 Data1 to 4 Fixed to 1 if using a USB module</td>
</tr>
<tr>
<td><code>[&lt;unit&gt;]</code>=&lt;DECIMAL NUMERIC PROGRAM DATA&gt;</td>
<td>1 to 4 Mainframe Nos. 1 to 4 When using two or more MT1810A units in serial connection, specify the mainframe number. Can be omitted. Mainframe No. 1 is specified when omitted. USB11 to USB14 USB No.11 to 14 Fixed to 1 if using a USB module</td>
</tr>
</tbody>
</table>

**Function**
Selects the Eye Diagram result display target slot.

**Example**
To set the Eye Diagram result display target slot to slot No. 1, Data 1:

```
> :DISPlay:RESult:EDiagram:SLOT SLOT1,1
```

**Compatibility**
Incompatible with existing models.

`:DISPlay:RESult:EDiagram:SLOT? [<unit>]`

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>[&lt;unit&gt;]</code>=&lt;DECIMAL NUMERIC PROGRAM DATA&gt;</td>
<td>1 to 4 Mainframe Nos. 1 to 4 When using two or more MT1810A units in serial connection, specify the mainframe number. Can be omitted. Mainframe No. 1 is specified when omitted. USB11 to USB14 USB No.11 to 14 Fixed to 1 if using a USB module</td>
</tr>
</tbody>
</table>

**Response**

| `<slot>`=<CHARACTER RESPONSE DATA> | SLOT1 to SLOT6 Slots No. 1 to No. 6 |
| `<interface>`=<NR1 NUMERIC PROGRAM DATA> | 1 to 4 Data1 to 4 |

**Function**
Queries the Eye Diagram result display target slot.

**Example**

```
> :DISPlay:RESult:EDiagram:SLOT?
< SLOT1,1
```

**Compatibility**
Incompatible with existing models.
### :DISPlay:RESult:EDiagram:TEMPLate:SELect <type>

**Parameter**

- `<type>`: CHARACTER PROGRAM DATA
- E1: Edit1
- E2: Edit2
- E3: Edit3
- E4: Edit4

**Function**

Sets the mask pattern for performing the Eye Diagram mask test.

**Example**

To set the mask pattern for performing the Eye Diagram mask test to Edit2:

```
> :DISPlay:RESult:EDiagram:TEMPLate:SELect E2
```

**Compatibility**

Incompatible with existing models.

### :DISPlay:RESult:EDiagram:TEMPLate:SELect?

**Response**

- `<type>`: CHARACTER RESPONSE DATA
- E1, E2, E3, E4

**Function**

Queries the mask pattern for performing the Eye Diagram mask test.

**Example**

```
> :DISPlay:RESult:EDiagram:TEMPLate:SELect?
< E2
```

**Compatibility**

Incompatible with existing models.

### :DISPlay:RESult:EDiagram:TEMPLate:THReshold <thre>

**Parameter**

- `<thre>`: CHARACTER PROGRAM DATA
- E_3 to E_12: 1E–3 to 1E–12/1 Step

**Function**

Sets the Error Threshold for performing the Eye Diagram mask test.

**Example**

To set the Error Threshold for performing the Eye Diagram mask test to E–3:

```
> :DISPlay:RESult:EDiagram:TEMPLate:THReshold E_3
```

**Compatibility**

Incompatible with existing models.

### :DISPlay:RESult:EDiagram:TEMPLate:THReshold?

**Response**

- `<thre>`: CHARACTER RESPONSE DATA

**Function**

Queries the Error Threshold for performing the Eye Diagram mask test.

**Example**

```
> :DISPlay:RESult:EDiagram:TEMPLate:THReshold?
< E_3
```

**Compatibility**

Incompatible with existing models.

### :DISPlay:RESult:EDiagram:SCALe:ASCale

**Function**

Automatically adjusts the Eye Diagram measurement graph scale.

**Example**

```
> :DISPlay:RESult:EDiagram:SCALe:ASCale
```

**Compatibility**

Incompatible with existing models.
7.4 Automatic Measurement Commands

:DISPlay:RESult:EDiagram:SCALe:VOLTage <max>,<step>

Parameter
- `<max>`=<DECIMAL NUMERIC PROGRAM DATA>
  - –3.990 to 4.000 V/0.001 V Step
- `<step>`=<DECIMAL NUMERIC PROGRAM DATA>
  - 0.001 to 0.800 V/0.001 V Step

Function
Sets the maximum value in the direction of the Threshold of the Eye Diagram graph, and the grid resolution.

Example
To set the maximum value in the direction of the Threshold of the Eye Diagram graph to 4.000 V, and the grid resolution to 0.800 V:

```plaintext
> :DISPlay:RESult:EDiagram:SCALe:VOLTage 4.000,0.800
```

Compatibility
Incompatible with existing models.

:DISPlay:RESult:EDiagram:SCALe:VOLTage?

Response
- `<max>`=<NR2 NUMERIC RESPONSE DATA>
  - –3.990 to 4.000 V
- `<step>`=<NR2 NUMERIC RESPONSE DATA>
  - 0.001 to 0.800 V

Function
Queries the maximum value in the direction of the Threshold of the Eye Diagram graph, and the grid resolution.

Example
To query the maximum value:

```plaintext
> :DISPlay:RESult:EDiagram:SCALe:VOLTage?
< 4.000,0.800
```

Compatibility
Incompatible with existing models.

:DISPlay:RESult:EDiagram:SCALe:PHASe <max>,<step>

Parameter
- `<max>`=<DECIMAL NUMERIC PROGRAM DATA>
  - –990 to 1000 mUI/1 mUI Step
- `<step>`=<DECIMAL NUMERIC PROGRAM DATA>
  - 1 to 200 mUI/1 mUI Step

Function
Sets the maximum value in the direction of the Phase of the Eye Diagram graph, and the grid resolution.

Example
To set the maximum value in the direction of the Phase of the Eye Diagram graph to 1000, and the grid resolution to 10 mUI:

```plaintext
> :DISPlay:RESult:EDiagram:SCALe:PHASe 1000,10
```

Compatibility
Incompatible with existing models.
### :DISPlay:RESult:EDIagram:SCALe:PHASe?

<table>
<thead>
<tr>
<th>Response</th>
<th>$&lt;\text{max}&gt;=(\text{NR1 NUMERIC RESPONSE DATA})$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$&lt;\text{step}&gt;=(\text{NR1 NUMERIC RESPONSE DATA})$</td>
</tr>
</tbody>
</table>

The maximum value and grid resolution in the phase direction are returned, with separated by a comma (,).

<table>
<thead>
<tr>
<th>Function</th>
<th>Queries the maximum value in the direction of the Phase of the Eye Diagram graph, and the grid resolution.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Example</th>
<th>$&gt;:\text{DISPlay:RESult:EDIagram:SCALe:PHASe}?\n&lt;1000,10$</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Compatibility</th>
<th>Incompatible with existing models.</th>
</tr>
</thead>
</table>
7.4 Automatic Measurement Commands

7.4.3.2.2 Condition setting commands

Figure 7.4.3.2.2-1 Condition Tab (Actual)
Figure 7.4.3.2.2-2 Condition Tab (Estimate)
### 7.4 Automatic Measurement Commands

#### Table 7.4.3.2.2-1  Graph Display Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDiagram:DIAGram:TABSelect?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:EDiagram:DIAGram:THReshold?</td>
</tr>
<tr>
<td></td>
<td>Meas reset All</td>
<td>:SENSe:MEASure:EDiagram:DIAGram:ATHReshold</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDiagram:ERATe?</td>
</tr>
<tr>
<td></td>
<td>Display reset All</td>
<td>:DISPlay:RESult:EDiagram:AERate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DISPlay:RESult:EDiagram:EERate?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDiagram:DISPlay:MASK?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDiagram:ESTimate?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:EDiagram:DIAGram:BTHReshold?</td>
</tr>
<tr>
<td></td>
<td>Query for measurement result</td>
<td>:CALCulate:DATA:DIAGram?</td>
</tr>
</tbody>
</table>

---

**:DISPlay:RESult:EDiagram:DIAGram:TABSelect <tab>**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>&lt;tab&gt;=&gt;&lt;CHARACTER PROGRAM DATA&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONDition</td>
<td>Condition tab</td>
</tr>
<tr>
<td>RESult</td>
<td>Result tab</td>
</tr>
</tbody>
</table>

Function: Switches the tab display within the Diagram tab.

Example: To display the Result tab within the Diagram tab:

```
> :DISPlay:RESult:EDiagram:DIAGram:TABSelect RESult
```

Compatibility: Incompatible with existing models.

---

**:DISPlay:RESult:EDiagram:DIAGram:TABSelect?**

<table>
<thead>
<tr>
<th>Response</th>
<th>&lt;tab&gt;=&gt;&lt;CHARACTER RESPONSE DATA&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>COND, RES</td>
<td></td>
</tr>
</tbody>
</table>

Function: Queries the tab selected in the Diagram tab.

Example: To display the Result tab within the Diagram tab:

```
> :DISPlay:RESult:EDiagram:DIAGram:TABSelect?
< COND
```

Compatibility: Incompatible with existing models.
Chapter 7  Remote Commands

:SENSe:MEASure:EDiagram:DIAGram:THReshold <thre>,<boolean>

Parameter
<type>=<CHARACTER PROGRAM DATA>
E_3 to E_12  1E–3 to 1E–12/1 Step
<boolean>=<BOOLEAN PROGRAM DATA>
ON or 1  Selects ON
OFF or 0  Selects OFF

Function
Sets the Eye Diagram measurement target error rate.

Example
To set the Eye Diagram measurement target error rate to 1E–12:

> :SENSe:MEASure:EDiagram:DIAGram:THReshold E_12,ON

Compatibility
Incompatible with existing models.

:SENSe:MEASure:EDiagram:DIAGram:THReshold?

Response
?type=<CHARACTER RESPONSE DATA>
E_3 to E_12  1E–3 to 1E–12
NONE  When all OFF

Function
Queries the Eye Diagram measurement target error rate.

Example

> :SENSe:MEASure:EDiagram:DIAGram:THReshold?
< E_3,E_10,E_12

Compatibility
Incompatible with existing models.

:SENSe:MEASure:EDiagram:DIAGram:ATHReshold <boolean>

Parameter
<boolean>=<BOOLEAN PROGRAM DATA>
ON or 1  Sets all ON
OFF or 0  Sets all OFF

Function
Sets all Eye Diagram measurement target error rates to be ON or OFF.

Example
To set all Eye Diagram measurement target error rates to be ON:

> :SENSe:MEASure:EDiagram:DIAGram:ATHReshold ON

Compatibility
Incompatible with existing models.

:DISPlay:RESult:EDIagram:ERATe <thre>,<boolean>

Parameter
?type=<CHARACTER PROGRAM DATA>
E_3 to E_17  1E–3 to 1E–17/1 Step
<boolean>=<BOOLEAN PROGRAM DATA>
ON or 1  Display select ON
OFF or 0  Display select OFF

Function
Sets the target error rate of the Eye Diagram measurement result display.

Example
To set the target error rate of the Eye Diagram measurement result display to 1E–12:

> :DISPlay:RESult:EDIagram:ERATe E_12,1
Compatibility
Incompatible with existing models.

:DISPlay:RESult:EDIagram:ERAtE?

<table>
<thead>
<tr>
<th>Response</th>
<th>&lt;type&gt;=&lt;CHARACTER RESPONSE DATA&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E_3 to E_17</td>
</tr>
<tr>
<td></td>
<td>1E–3 to 1E–17</td>
</tr>
<tr>
<td></td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td>When all OFF</td>
</tr>
<tr>
<td></td>
<td>The selected threshold is delimited with a comma (,) and returned.</td>
</tr>
</tbody>
</table>

Function
Queries the target error rate of the Eye Diagram measurement result display.

Example
>:DISPlay:RESult:EDlagram:ERAtE?
< NONE

Compatibility
Incompatible with existing models.

:DISPlay:RESult:EDlagram:AERate <boolean>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>&lt;boolean&gt;=&lt;BOOLEAN PROGRAM DATA&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ON or 1</td>
</tr>
<tr>
<td></td>
<td>Sets all ON</td>
</tr>
<tr>
<td></td>
<td>OFF or 0</td>
</tr>
<tr>
<td></td>
<td>Sets all OFF</td>
</tr>
</tbody>
</table>

Function
Sets all target error rates of the Eye Diagram measurement result display to be ON or OFF.

Example
To set all target error rates of the Eye Diagram measurement result display to be ON:
>:DISPlay:RESult:EDlagram:AERate 1

Compatibility
Incompatible with existing models.

:DISPlay:RESult:EDlagram:EERate <numeric>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>&lt;numeric&gt;=&lt;DECIMAL PROGRAM DATA&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13 to 199</td>
</tr>
<tr>
<td></td>
<td>1E–13 to 1E–199/1 Step</td>
</tr>
<tr>
<td></td>
<td>Up to five parameters can be set, delimited with a comma (,).</td>
</tr>
</tbody>
</table>

Function
Sets the result display error rate in Estimate measurement from E–13 to E–199.

Example
To display the result display error rate in Estimate measurement for 1E–15, 1E–100, 1E–150, 1E–199, and 1E–180:
>:DISPlay:RESult:EDlagram:EERate 15,100,150,199,180

Compatibility
Incompatible with existing models.
### :DISPlay:RESult:EDIagram:EERate?

**Response**

<table>
<thead>
<tr>
<th>numeric</th>
<th>NR1 NUMERIC RESPONSE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 to 199</td>
<td>1E–13 to 1E–199</td>
</tr>
</tbody>
</table>

Returns five responses, delimited with a comma (,).

**Function**

Queries the result display error rate setting in Estimate measurement from E–13 to E–199.

**Example**

```
>:DISPlay:RESult:EDIagram:EERate?
<15,100,150,199,180
```

**Compatibility**

Incompatible with existing models.

---

### :DISPlay:RESult:EDIagram:DISPlay:MASK <boolean>

**Parameter**

<table>
<thead>
<tr>
<th>boolean</th>
<th>BOOLEAN PROGRAM DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON or 1</td>
<td>Display</td>
</tr>
<tr>
<td>OFF or 0</td>
<td>Clear</td>
</tr>
</tbody>
</table>

**Function**

Selects between displaying and clearing the mask test result during Eye Diagram measurement.

**Example**

To display the mask test result during Eye Diagram measurement:

```
>:DISPlay:RESult:EDIagram:DISPlay:MASK ON
```

**Compatibility**

Incompatible with existing models.

---

### :DISPlay:RESult:EDIagram:DISPlay:MASK?

**Response**

<table>
<thead>
<tr>
<th>boolean</th>
<th>NR1 NUMERIC RESPONSE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Display</td>
</tr>
<tr>
<td>0</td>
<td>Clear</td>
</tr>
</tbody>
</table>

**Function**

Queries the setting whether to display or clear the mask test result during Eye Diagram measurement.

**Example**

```
>:DISPlay:RESult:EDIagram:DISPlay:MASK?
< 1
```

**Compatibility**

Incompatible with existing models.

---

### :DISPlay:RESult:EDIagram:ESTimate <type>

**Parameter**

<table>
<thead>
<tr>
<th>type</th>
<th>CHARACTER PROGRAM DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTual</td>
<td>Actual measurement</td>
</tr>
<tr>
<td>ESTimate</td>
<td>Estimate measurement</td>
</tr>
</tbody>
</table>

**Note:**

The Estimate measurement cannot be selected when the number of measurement points is set to 8.

**Function**

Selects between Actual and Estimate measurement during Eye Diagram measurement.
7.4 Automatic Measurement Commands

Example
To set Actual measurement during Eye Diagram measurement:
> :DISPlay:RESult:EDIagram:ESTimate ACTual

Compatibility
Incompatible with existing models.

:DISPlay:RESult:EDIagram:ESTimate?

Response
<type>=<CHARACTER RESPONSE DATA>
ACT  Actual measurement
EST  Estimate measurement

Function
Queries the Actual/Estimate measurement state during Eye Diagram measurement.

Example
> :DISPlay:RESult:EDIagram:ESTimate?
< ACT

Compatibility
Incompatible with existing models.

:SENSe:MEASure:EDIagram:DIAGram:BTHReshold <upper>,<lower>

Parameter
<upper>=<CHARACTER PROGRAM DATA>
E_3 to E_7  1E–3 to 1E–7/1 Step
<lower>=<CHARACTER PROGRAM DATA>
E_7 to E_12  1E–7 to E–12/1 Step

Note:
The difference between the <upper> and <lower> value must be at least 3.

Function
Sets the reference error rate during Eye Diagram Estimate.

Example
To set the reference error rate during Eye Diagram Estimate to E–3 and E–12:
> :SENSe:MEASure:EDIagram:DIAGram:BTHReshold E_3,E_12

Compatibility
Incompatible with existing models.

:SENSe:MEASure:EDIagram:DIAGram:BTHReshold?

Response
<upper>=<CHARACTER RESPONSE DATA>
E_3 to E_7  1E–3 to 1E–7
<lower>=<CHARACTER RESPONSE DATA>
E_7 to E_12  1E–7 to E–12

Function
Queries the reference error rate during Eye Diagram Estimate.

Example
> :SENSe:MEASure:EDIagram:DIAGram:BTHReshold?
< E_3,E_12

Compatibility
Incompatible with existing models.
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`:SENSe:MEASure:EDiagram:DIAGram:POINt? <slot>,<interface>,<thre>[,<unit>]`

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;slot&gt;</td>
<td>SLOT1 to SLOT6, USB11 to USB14</td>
</tr>
<tr>
<td>&lt;interface&gt;</td>
<td>1 to 4, fixed to 1 if using a USB module</td>
</tr>
<tr>
<td>&lt;thre&gt;</td>
<td>E_3 to E_12, 1E–3 to 1E–12, Mainframe Nos. 1 to 4</td>
</tr>
<tr>
<td>&lt;unit&gt;</td>
<td>1 to 4, Mainframe Nos. 1 to 4, can be omitted, Mainframe No. 1 specified when omitted</td>
</tr>
</tbody>
</table>

**Response**

| <numeric> | 1 to 128, returns a valid point, 0 when all points are invalid |

**Function**

Queries the valid points in each threshold during the Eye Diagram measurement for a specific slot.

**Example**

To query the valid points in slot No. 1 during measurement with threshold E–3:

```
> :SENSe:MEASure:EDiagram:DIAGram:POINt? USB11,1,E_3
< 1,2,3,4,128
```

**Compatibility**

Incompatible with existing models.
7.4 Automatic Measurement Commands

`:CALCulate:DATA:DIAGram? <slot>,<interface>,<string>[,<unit>]`

**Parameter**

- `<slot>`: `<CHARACTER PROGRAM DATA>`
  - SLOT1 to SLOT6: Slots No. 1 to No. 6
  - USB11 to USB14: USB No.11 to 14

- `<interface>`: `<DECIMAL NUMERIC PROGRAM DATA>`
  - 1 to 4: Data1 to 4
  - Fixed to 1 if using a USB module

- `<string>`: `<STRING PROGRAM DATA>`
  - `<result>`: Measurement data
    - For details on `<result>`, refer to Table 7.12.10.2.2-3.
  - `<unit>`: `<DECIMAL NUMERIC PROGRAM DATA>`
    - 1 to 4: Mainframe Nos. 1 to 4
    - When using two or more MT1810A units in serial connection, specify the mainframe number.
    - Can be omitted. Mainframe No. 1 is specified when omitted.

**Response**

- `<string>`: `<STRING RESPONSE DATA>`

**Table 7.4.3.2.2-2 Response Format**

<table>
<thead>
<tr>
<th>Type</th>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form1 Eye Map type</td>
<td>“XXXXX,YYYYY”</td>
<td>XXXXX: Phase (mUI or ps) Displayed in the selected unit. YYYYY: Threshold (mV)</td>
</tr>
<tr>
<td></td>
<td>“-----,-----”</td>
<td>When no data corresponds to the query</td>
</tr>
</tbody>
</table>

**Function**

Queries the Eye Diagram measurement results of the specified slot and point.

**Table 7.4.3.2.2-3 Eye Diagram Measurement Items <result>**

<table>
<thead>
<tr>
<th>Item</th>
<th>&lt;result&gt;</th>
<th>Response Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Map type</td>
<td></td>
<td>Form1</td>
</tr>
<tr>
<td>1E−3</td>
<td>“MAP:E_3:POIn1”,...,”MAP:E_3:POIn128”</td>
<td></td>
</tr>
<tr>
<td>1E−4</td>
<td>“MAP:E_4:POIn1”,...,”MAP:E_4:POIn18”</td>
<td></td>
</tr>
<tr>
<td>1E−11</td>
<td>“MAP:E_11:POIn1”,...,”MAP:E_11:POIn128”</td>
<td></td>
</tr>
<tr>
<td>1E−12</td>
<td>“MAP:E_12:POIn1”,...,”MAP:E_12:POIn128”</td>
<td></td>
</tr>
</tbody>
</table>

**Example**

To query the Eye Diagram measurement results of USB No.11 and E-3 point:

`:CALCulate:DATA:DIAGram? SLOT1, 2,"MAP:E_3:POIn1" <" 100, 1000"`

**Compatibility**

Incompatible with existing models.
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:CALCulate:DATA:EDIagram:MASK? <slot>,<interface>[,<unit>]

Parameter

<slot>=<CHARACTER PROGRAM DATA>
SLOT1 to SLOT6  Slots No. 1 to No. 6
USB11 to USB14  USB No.11 to 14

<interface>=<DECIMAL NUMERIC PROGRAM DATA>
1 to 4   Data 1 to 4
Fixed to 1 if using a USB module

[<unit>]=<DECIMAL NUMERIC PROGRAM DATA>
1 to 4   Mainframe No. 1 to 4
When using two or more MT1810A units in serial connection, specify the
mainframe number.
Can be omitted. Mainframe No. 1 is specified when omitted.

Response

<string>=<STRING RESPONSE DATA>

Table 7.4.3.2.2-4  Response Format

<table>
<thead>
<tr>
<th>Form</th>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
</table>
| Form1  | "XX,Y,Y,Y...Y" | XX: Pass,Failure  
| EyeResult type |        | Y: 1 to 32 (NG mask point)  
|         |        | Note: Multiple NGs are delimited with a comma (,) and returned for the corresponding number of NGs. |
|        | "--.--" | When no data corresponds to the query. |

Function

Queries the measurement result of the Eye Diagram Mask Test.

Example

To query the Mask Test result of USB No.11:

>:CALCulate:DATA:EDIagram:MASK? "USB11,1"

"Failure,1,2,3,4,32"

"Pass"
7.4 Automatic Measurement Commands

7.4.3.3 Diagram (Status) setting commands

![Diagram Tab (Start and Stop Buttons and Status Display)](image)

Figure 7.4.3.3-1  Diagram Tab (Start and Stop Buttons and Status Display)

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>[6]</td>
<td>Query for measurement start time</td>
<td>:SENSe:MEASure:EDIagram:STARt?</td>
</tr>
<tr>
<td>[7]</td>
<td>Query for measurement elapsed time</td>
<td>:SENSe:MEASure:EDIagram:ELAPsed?</td>
</tr>
<tr>
<td>[8]</td>
<td>Query for measurement status</td>
<td>:CALCulate:DATA:EDIagram:STATus?</td>
</tr>
</tbody>
</table>
Chapter 7  Remote Commands

:SENSe:MEASure:EDIagram:DIAGram:STARt
Function Starts the Eye Diagram measurement.
Example > :SENSe:MEASure:EDIagram:DIAGram:STARt
Compatibility Incompatible with existing models.

:SENSe:MEASure:EDIagram:DIAGram:STOP
Function Stops the Eye Diagram measurement.
Example > :SENSe:MEASure:EDIagram:DIAGram:STOP
Compatibility Incompatible with existing models.

:SENSe:MEASure:EDIagram:STATe?
Response <numeric>=<NR1 NUMERIC RESPONSE DATA>
1 Measurement has been started.
0 Measurement has been stopped.
-1 Measurement has failed.
Function Queries the Eye Diagram measurement status.
Example > :SENSe:MEASure:EDIagram:STATe?
< 1
Compatibility Incompatible with existing models.

:SENSe:MEASure:EDIagram:TIME <type>
Parameter <type>=<CHARACTER PROGRAM DATA>
DTIMe Current date and time
STARt Measurement start time
ELAPsed Elapsed time based on the measurement period
Function Selects the Eye Diagram measurement time display type.
Example To set the Eye Diagram measurement time display type to measurement start time (Start Time):
> :SENSe:MEASure:EDIagram:TIME STARt
Compatibility Incompatible with existing models.

:SENSe:MEASure:EDIagram:TIME?
Response <type>=<CHARACTER RESPONSE DATA>
DTIMe Current date and time
STARt Measurement start time
ELAPsed Elapsed time based on the measurement period
Function Queries the Eye Diagram measurement time display type.
Example > :SENSe:MEASure:EDIagram:TIME?
< STAR
Compatibility Incompatible with existing models.
7.4 Automatic Measurement Commands

:SENSe:MEASure:EDIagram:DTIMe?

Response

\[ <\text{year}>=<\text{NR1 NUMERIC RESPONSE DATA}> \]
2000 to 2036 Year 2000 to 2036
\[ <\text{month}> = <\text{NR1 NUMERIC RESPONSE DATA}> \]
1 to 12 January to December
\[ <\text{day}> = <\text{NR1 NUMERIC RESPONSE DATA}> \]
1 to 31 1st to 31st
\[ <\text{hour}> = <\text{NR1 NUMERIC RESPONSE DATA}> \]
0 to 23 0 to 23 hours
\[ <\text{minute}> = <\text{NR1 NUMERIC RESPONSE DATA}> \]
0 to 59 0 to 59 minutes
\[ <\text{second}> = <\text{NR1 NUMERIC RESPONSE DATA}> \]
0 to 59 0 to 59 seconds

Function
Queries the current date and time during Eye Diagram measurement.

Example
\[ > :\text{SENSe:MEASure:EDIagram:DTIMe}? \]
\[ < 2012, 4, 1, 23, 59, 59 \]

Compatibility
Incompatible with existing models.

:SENSe:MEASure:EDIagram:STARt?

Response

\[ <\text{year}>=<\text{NR1 NUMERIC RESPONSE DATA}> \]
0, 2000 to 2036 Year 2000 to 2036
\[ <\text{month}> = <\text{NR1 NUMERIC RESPONSE DATA}> \]
0 to 12 January to December
\[ <\text{day}> = <\text{NR1 NUMERIC RESPONSE DATA}> \]
0 to 31 1st to 31st
\[ <\text{hour}> = <\text{NR1 NUMERIC RESPONSE DATA}> \]
0 to 23 0 to 23 hours
\[ <\text{minute}> = <\text{NR1 NUMERIC RESPONSE DATA}> \]
0 to 59 0 to 59 minutes
\[ <\text{second}> = <\text{NR1 NUMERIC RESPONSE DATA}> \]
0 to 59 0 to 59 seconds

Note:
The following is output when no measurement is performed:
\[ < 0,0,0,0,0,0 \]

Function
Queries the Eye Diagram measurement start time (Start Time).

Example
\[ > :\text{SENSe:MEASure:EDIagram:STARt}? \]
\[ < 2012, 4, 1, 23, 59, 59 \]

Compatibility
Incompatible with existing models.
Chapter 7  Remote Commands

:*SENSe:MEASure:EDIagram:ELAPsed?*

**Response**

- **<day>=<NR1 NUMERIC RESPONSE DATA>**
  - 0, 1 to 99  0 to 99 days
- **<hour>=<NR1 NUMERIC RESPONSE DATA>**
  - 0 to 23  0 to 23 hours
- **<minute> = <NR1 NUMERIC RESPONSE DATA>**
  - 0 to 59  0 to 59 minutes
- **<second> = <NR1 NUMERIC RESPONSE DATA>**
  - 0 to 59  0 to 59 seconds

**Note:**

The following is output when no measurement is performed:

0,0,0,0

**Function**

Queries the Eye Diagram measurement elapsed time (Elapsed Time).

**Example**

```plaintext
> :SENSe:MEASure:EDIagram:ELAPsed?
< 99,23,59,59
```

**Compatibility**

Incompatible with existing models.

:*CALCulate:DATA:EDIagram:STATus?*

**Response**

- **<string>=<STRING RESPONSE DATA>**
  - " "  When no alarm exists
  - "Sync Loss"  Sync Loss
  - "Clock Loss"  Clock Loss
  - "Out of range"  Out of range
  - "Illegal Error"  Illegal Error
  - "Meas. Threshold exceeded"  Number of errors exceeds the target rate

**Note:**

If two or more alarms have occurred, the one with the highest priority is returned:

Illegal Error > Clock Loss > Sync Loss > Out or range

**Function**

Queries the status condition during Eye Diagram measurement.

**Example**

```plaintext
> :CALCulate:DATA:EDIagram:STATus?
< "Sync Loss"
```

**Compatibility**

Incompatible with existing models.
7.4 Automatic Measurement Commands

7.4.3.4 Mask Edit setting commands

![Figure 7.4.3.4-1 Mask Edit Tab]

Table 7.4.3.4-1 Mask Edit Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDIagram:TEMPlate:PATTern?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDIagram:TEMPlate:ASCale?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDIagram:TEMPlate:SCALE?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDIagram:TEMPlate:PSCale?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:EDIagram:TEMPlate:EDIT?</td>
</tr>
</tbody>
</table>
Chapter 7  Remote Commands

:DISPlay:RESult:EDIagram:TEMPLate:PATTern <type>

Parameter       <type>=<CHARACTER PROGRAM DATA>
                E1    Edit1
                E2    Edit2
                E3    Edit3
                E4    Edit4
Function         Sets the pattern to be edited during Eye Diagram measurement.
Example          To set the pattern to be edited during Eye Diagram measurement to Edit4:
                > :DISPlay:RESult:EDIagram:TEMPLate:PATTern E4
Compatibility    Incompatible with existing models.

:DISPlay:RESult:EDIagram:TEMPLate:PATTern?

Response        <type>=<CHARACTER RESPONSE DATA>
                E1, E2, E3, E4
Function         Queries the pattern that was edited during Eye Diagram measurement.
Example          > :DISPlay:RESult:EDIagram:TEMPLate:PATTern?
                < E4
Compatibility    Incompatible with existing models.

:DISPlay:RESult:EDIagram:TEMPLate:ASCale

Function         Executes automatic adjustment of the Mask Edit measurement graph scale.
Example          > :DISPlay:RESult:EDIagram:TEMPLate:ASCale
Compatibility    Incompatible with existing models.

:DISPlay:RESult:EDIagram:TEMPLate:SCALe <max>,<step>

Parameter        <max>=<DECIMAL NUMERIC PROGRAM DATA>
                –3.990 to 4.000  –3.990 to 4.000 V/0.001 V Step
                1 to 800       1 to 800 mV/1 mV Step
<step>=<DECIMAL NUMERIC PROGRAM DATA>
Function         Sets the maximum value and the grid resolution in the direction of the
                Threshold of the Mask Edit graph.
Example          To set the maximum value and the grid resolution in the direction of the
                Threshold of the Mask Edit graph to 4.000 V and 800 mV, respectively:
                > :DISPlay:RESult:EDIagram:TEMPLate:SCALe 4.000,800
Compatibility    Incompatible with existing models.
7.4 Automatic Measurement Commands

`:DISPlay:RESult:EDiagram:TEMPLate:SCALE?`

Response
<max> = <NR2 NUMERIC RESPONSE DATA>
<step> = <NR2 NUMERIC RESPONSE DATA>

Function
Queries the maximum value and the grid resolution in the direction of the Threshold of the Mask Edit graph.

Example
> :DISPlay:RESult:EDiagram:TEMPLate:SCALE?
< 4000,800

Compatibility
Incompatible with existing models.

`:DISPlay:RESult:EDiagram:TEMPLate:PSCALE <max>,<step>`

Parameter
<max> = <DECIMAL NUMERIC PROGRAM DATA>
-990 to 1000  -990 to 1000 mUI/1 mUI Step
<step> = <DECIMAL NUMERIC PROGRAM DATA>
1 to 200  1 to 200 mUI/1 mUI Step

Function
Sets the maximum value and the grid resolution in the direction of the Phase of the Mask Edit graph.

Example
To set the maximum value and the grid resolution in the direction of the Phase of the Mask Edit graph to 1000 and 10 mUI, respectively:
> :DISPlay:RESult:EDiagram:TEMPLate:PSCALE 1000,10

Compatibility
Incompatible with existing models.

`:DISPlay:RESult:EDiagram:TEMPLate:PSCALE?`

Response
<max> = <NR2 NUMERIC RESPONSE DATA>
<step> = <NR2 NUMERIC RESPONSE DATA>

Function
Queries the maximum value and the grid resolution in the direction of the Phase of the Mask Edit graph.

Example
> :DISPlay:RESult:EDiagram:TEMPLate:PSCALE?
< 1000,10

Compatibility
Incompatible with existing models.

`:DISPlay:RESult:EDiagram:TEMPLate:SAMPle <string>`

Parameter
<string> = <STRING PROGRAM DATA>
"<drv>:\[<dir>]<file>"  
<drv> = C,D,E,F  
<dir>=<dir1>\<dir2>\...(Omitted for the root directory)  
<file> = File name

Function
Loads the selected sample pattern to the Edit Pattern.

Example
> :DISPlay:RESult:EDiagram:TEMPLate:SAMPle
"C:\Test\sample.MSK"

Compatibility
Incompatible with existing models.
Chapter 7  Remote Commands

:DISPLAY:RESULT:EDiagram:TEMPLATE:PNUMber?

Response  
<nemonic>=<NR1 NUMERIC RESPONSE DATA>
0 to 32  0 to 32 points

Function  Queries the number of Mask points.

Example  
> :DISPLAY:RESULT:EDiagram:TEMPLATE:PNUMber?
< 0

Compatibility  Incompatible with existing models.

:DISPLAY:RESULT:EDiagram:TEMPLATE:EDIT <point>,<phase>,<voltage>

Parameter  
<point>=<DECIMAL NUMERIC PROGRAM DATA>
1 to 32  1 to 32 points, in 1-point steps
<phase>=<DECIMAL NUMERIC PROGRAM DATA>
–1000 to 1000  –1000 to 1000 mUI/1 mUI Step
<voltage>=<DECIMAL NUMERIC PROGRAM DATA>
–4.000 to 4.000  –4.000 to 4.000 V/0.001 V Step

Function  Sets a Mask point position.

Example  
To set a Mask point position (1 point, 1000 mUI, 4.000 V):
> :DISPLAY:RESULT:EDiagram:TEMPLATE:EDIT 1,1000,4.000

Compatibility  Incompatible with existing models.


Parameter  
<point>=<DECIMAL NUMERIC PROGRAM DATA>
1 to 32  1 to 32 points

Response  
<phase>=<NR1 NUMERIC RESPONSE DATA>
<voltage>=<NR1 NUMERIC RESPONSE DATA>

Function  Queries a Mask point position.

Example  
To query the position of point 1:
> :DISPLAY:RESULT:EDiagram:TEMPLATE:EDIT? 1
< 1000,4.000

Compatibility  Incompatible with existing models.
7.4 Automatic Measurement Commands

:DISPlay:RESult:EDiagram:TEMPlate:PLOT <phase>,<voltage>

Parameter

- `<phase>`=<DECIMAL NUMERIC PROGRAM DATA>
  -1000 to 1000
  -1000 to 1000 mUI/1 mUI Step
- `<voltage>`=<DECIMAL NUMERIC PROGRAM DATA>
  -4000 to 4000
  -4000 to 4000 mV/1 mV Step

Function
Sets a Mask point position.

Example
To set a Mask point position to 1000 mUI (phase), 4000 mV (voltage):

```
> :DISPlay:RESult:EDiagram:TEMPlate:PLOT 1000,4000
```

Compatibility
Incompatible with existing models.

:DISPlay:RESult:EDiagram:TEMPlate:DELeete <pos>

Parameter

- `<pos>`=<DECIMAL NUMERIC PROGRAM DATA>
  1 to 32
  1 to 32 points, in 1-point steps

Function
Deletes the selected Mask point.

Example
To delete Mask point 3:

```
> :DISPlay:RESult:EDiagram:TEMPlate:DELeete 3
```

Compatibility
Incompatible with existing models.

:DISPlay:RESult:EDiagram:TEMPlate:CLEar

Function
Clears the selected Mask pattern.

Example

```
> :DISPlay:RESult:EDiagram:TEMPlate:CLEar
```

Compatibility
Incompatible with existing models.

:DISPlay:RESult:EDiagram:TEMPlate:VERTical

Function
Plots a Mask pattern onto the vertically-symmetric position.

Example

```
> :DISPlay:RESult:EDiagram:TEMPlate:VERTical
```

Compatibility
Incompatible with existing models.

:DISPlay:RESult:EDiagram:TEMPlate:HORizontal

Function
Plots a Mask pattern onto the horizontally-symmetric position.

Example

```
> :DISPlay:RESult:EDiagram:TEMPlate:HORizontal
```

Compatibility
Incompatible with existing models.
Chapter 7  Remote Commands

7.4.3.5 File menu setting commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
</table>

:SYSTem:MMEMory:DIAGram:RECall <file_name>,<file_type>

Parameter

- `<file_name>`=<STRING PROGRAM DATA>
- "<drv>:\[<dir>]<file>"
- `<drv>` = C,D,E,F
- `<dir>`=<dir1><dir2>...(Omitted for the root directory)
- `<file>` = File Name
- `<file_type>`=<CHARACTER PROGRAM DATA>
  - BIN: Binary file
  - TXT: Text (UMP) file

Function
Opens the Eye Diagram measurement result data.

Example

```javascript
> :SYSTem:MMEMory:DIAGram:RECall "C:\Test\example",TXT
```

Compatibility
Incompatible with existing models.
7.4 Automatic Measurement Commands

:SYSTem:MMEMory:DIAGram:STORe
<file_name>,<data_type>,<file_type>

Parameter

<file_name>=<STRING PROGRAM DATA>
"<drv>:\[<dir>]\<file>"
<drv> = C,D,E,F
<dir>=<dir1>\<dir2>\...(Omitted for the root directory)
<file>= File Name
<data_type>=<CHARACTER PROGRAM DATA>
EDG = Eye Diagram Result
UMP = Eye Mask Template File
<file_type>=<CHARACTER PROGRAM DATA>
BIN = Binary file
CSV = CSV file
TXT = Text file

When BIN is selected for <file_type>, the Eye Diagram measurement settings and results are saved, regardless of the setting of <data_type>.
When UMP is selected for <data_type>, select TXT for <file_type>.

Function

Saves the Eye Diagram measurement result data.

Note:
The settings will not be read from the saved file if the file name is changed.

Example

To save the Eye Mask Detail measurement results of the Eye Diagram measurement, by specifying the file format, file name, and save destination:
> :SYSTem:MMEMory:DIAGram:STORe "C:\Test\example",EDG,TXT
7.4.4 Bathtub measurement

This section describes the commands for Bathtub measurement.

Figure 7.4.4-1 Bathtub Window
7.4 Automatic Measurement Commands

7.4.4.1 Measurement setting commands

Table 7.4.4.1-1 Measurement Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1]</td>
<td>Start</td>
<td><code>SENSe:MEASure:BATHtub:STARt</code></td>
</tr>
</tbody>
</table>
Table 7.4.4.1-1 Measurement Setting Commands (Cont’d)

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:BATHtub:RANGE?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:BATHtub:CALRange?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:BATHtub:ASEarch?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:BATHtub:CURRent?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:BATHtub:JCALculation?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:BATHtub:J2Meas?</td>
</tr>
<tr>
<td>[16]</td>
<td>Selection of Slot(s) to be measured</td>
<td>:SENSe:MEASure:BATHtub:SELSlot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:BATHtub:SELSlot?</td>
</tr>
<tr>
<td>[17]</td>
<td>Selection of Slot(s) you want to view measurement results</td>
<td>:SENSe:MEASure:BATHtub:DISPlay</td>
</tr>
<tr>
<td>[18]</td>
<td>Set All</td>
<td>:SENSe:MEASure:BATHtub:SLASet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:BATHtub:REFClock?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:BATHtub:OPERation?</td>
</tr>
</tbody>
</table>

:SENSe:MEASure:BATHtub:START

Function: Starts Bathtub measurement.
Example: > :SENSe:MEASure:BATHtub:START
Compatibility: Incompatible with existing models.

:SENSe:MEASure:BATHtub:STOP

Function: Stops Bathtub measurement.
Example: > :SENSe:MEASure:BATHtub:STOP
Compatibility: Incompatible with existing models.
7.4 Automatic Measurement Commands

:SENSe:MEASure:BATHtub:STATe?

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>&lt;numeric&gt;=&lt;NR1 NUMERIC RESPONSE DATA&gt;</td>
</tr>
<tr>
<td>0</td>
<td>During measurement stop</td>
</tr>
<tr>
<td>1</td>
<td>During measurement</td>
</tr>
</tbody>
</table>

Function
Queries the measurement processing state during Bathtub measurement.

Example
> :SENSe:MEASure:BATHtub:STATe?
< 1

Compatibility
Incompatible with existing models.

:SENSe:MEASure:BATHtub:SELSlot
[slot>,<interface>,<boolean>[,<unit>]]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
<td>&lt;Slot&gt;=&lt;CHARACTER PROGRAM DATA&gt;</td>
</tr>
<tr>
<td>Slot1 to SLOT6</td>
<td>Slots No. 1 to No. 6</td>
</tr>
<tr>
<td>1 to 6 when using the MP1800A, 1 to 4 when using the MT1810A</td>
<td></td>
</tr>
<tr>
<td>USB11 to USB14</td>
<td>USB No.11 to 14</td>
</tr>
<tr>
<td>&lt;interface&gt;=&lt;DECIMAL NUMERIC PROGRAM DATA&gt;</td>
<td>1 to 4 Fixed to 1 if using a USB module</td>
</tr>
<tr>
<td>&lt;boolean&gt;=&lt;BOOLEAN PROGRAM DATA&gt;</td>
<td>ON or 1 ON</td>
</tr>
<tr>
<td>OFF or 0</td>
<td>OFF</td>
</tr>
<tr>
<td>[&lt;unit&gt;]=&lt;DECIMAL NUMERIC PROGRAM DATA&gt;</td>
<td>1 to 4 Mainframe Nos. 1 to 4</td>
</tr>
</tbody>
</table>

When using two or more MT1810A units in serial connection, specify the mainframe number.
Can be omitted. Mainframe No. 1 is specified when omitted.

Function
Selects a slot and data interface combination as a target of Bathtub measurement.

Example
To select USB No.11 as a target of Bathtub measurement:
> :SENSe:MEASure:BATHtub:SELSlot USB11,1,ON

Compatibility
Incompatible with existing models.
Chapter 7  Remote Commands

:SENSe:MEASure:BATHtub:SELSlot? <slot>,<interface> [,<unit>]  

Parameter

- **<Slot>** = <CHARACTER PROGRAM DATA>
  - SLOT1 to SLOT6  Slots No. 1 to No. 6
  - 1 to 6 when using the MP1800A, 1 to 4 when using the MT1810A
  - USB11 to USB14  USB No. 11 to 14
- **<interface>** = <DECIMAL NUMERIC PROGRAM DATA>
  - 1 to 4  Data1 to 4
  - Fixed to 1 if using a USB module
- **[<unit>]** = <DECIMAL NUMERIC PROGRAM DATA>
  - 1 to 4  Mainframe Nos. 1 to 4
  - When using two or more MT1810A units in serial connection, specify the mainframe number.
  - Can be omitted. Mainframe No. 1 is specified when omitted.

Response

- **<boolean>** = <NR1 NUMERIC RESPONSE DATA>
  - 1  ON
  - 0  OFF

Function

Queries whether the specified slot and data interface combination is subject to Bathtub measurement.

Example

To query whether USB No.11 is subject to measurement:

> :SENSe:MEASure:BATHtub:SELSlot? USB11,1

< 1

Compatibility

Incompatible with existing models.

---

:SENSe:MEASure:BATHtub:DISPlay <slot>,<interface> [,<unit>]  

Parameter

- **<Slot>** = <CHARACTER PROGRAM DATA>
  - SLOT1 to SLOT6  Slots No. 1 to No. 6
  - 1 to 6 when using the MP1800A, 1 to 4 when using the MT1810A
  - USB11 to USB14  USB No. 11 to 14
- **<interface>** = <DECIMAL NUMERIC PROGRAM DATA>
  - 1 to 4  Data1 to 4
  - Fixed to 1 if using a USB module
- **[<unit>]** = <DECIMAL NUMERIC PROGRAM DATA>
  - 1 to 4  Mainframe Nos. 1 to 4
  - When using two or more MT1810A units in serial connection, specify the mainframe number.
  - Can be omitted. Mainframe No. 1 is specified when omitted.

Function

Selects a slot and data interface combination you want to view Bathtub measurement results.

Example

To view Bathtub measurement results of USB No.11:

> :SENSe:MEASure:BATHtub:DISPlay USB11,1

< 1

Compatibility

Incompatible with existing models.
7.4 Automatic Measurement Commands

**:SENSe:MEASure:BATHtub:SLASet**

Parameter: None
Function: Sets all Slot and Data Interface combinations as the Bathtub measurement objects.
Example: `> :SENSe:MEASure:BATHtub:SLASet`
Compatibility: Incompatible with existing models.

**:SENSe:MEASure:BATHtub:SLAReset**

Parameter: None
Function: Resets all Slot and Data Interface combinations set as the Bathtub measurement objects.
Example: `> :SENSe:MEASure:BATHtub:SLAReset`
Compatibility: Incompatible with existing models.

**:SENSe:MEASure:BATHtub:REFClock <boolean>**

Parameter: `<boolean>` = `<BOOLEAN PROGRAM DATA>`
Function: Sets whether to use MU181500B Reference Clock in Bathtub measurement.
Example: `Uses MU181500B Reference Clock.`
Compatibility: Incompatible with existing models.

**:SENSe:MEASure:BATHtub:REFClock?**

Response: `<boolean>` = `<NR1 NUMERIC RESPONSE DATA>`
Function: Queries whether to use MU181500B Reference Clock in Bathtub measurement.
Example: `> :SENSe:MEASure:BATHtub:REFClock?`
Compatibility: Incompatible with existing models.
### Chapter 7  Remote Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>:SENse:MEASure:BATHtb:OPERation &lt;numeric&gt;</td>
<td>Sets the operating bit rate for using MU181500B Reference Clock in Bathtub measurement.</td>
<td>To set the operating bit rate to 60.000000 Gbit/s: &gt; :SENse:MEASure:BATHtb:OPERation 60.000000</td>
</tr>
<tr>
<td>:SENse:MEASure:BATHtb:MODE &lt;mode&gt;</td>
<td>Sets the measurement processing mode during Bathtub measurement.</td>
<td>To set the measurement processing mode to Single mode: &gt; :SENse:MEASure:BATHtb:MODE SINGLE</td>
</tr>
</tbody>
</table>

**Parameter**
- <numeric>=<DECIMAL NUMERIC PROGRAM DATA>
- 8.000000 to 64.200000 Gbit/s / 0.000001 Step
- <mode>=<CHARACTER PROGRAM DATA>
- SINGle: Executes measurement once.
- REPeat: Repeats measurement for the specified number of times.
- UNTimed: Repeats measurement until measurement is stopped.

**Response**
- <numeric>=<NR1 NUMERIC RESPONSE DATA>
- 8.000000 to 64.200000
- <mode>=<CHARACTER RESPONSE DATA>
- SING, REP, UNT

**Compatibility**
- Incompatible with existing models.
7.4 Automatic Measurement Commands

:SENSe:MEASure:BATHtub:TIMes <numeric>

Parameter: <numeric>=<DECIMAL NUMERIC PROGRAM DATA>
- 2 to 1000: 2 to 1000 times, in 1-time steps

Function: Sets the number of measurements during Bathtub measurement.

Example:
- To set the number of measurements to 100 times:
  > :SENSe:MEASure:BATHtub:TIMes 100

Compatibility: Incompatible with existing models.

:SENSe:MEASure:BATHtub:TIMes?

Response: <numeric>=<NR1 NUMERIC RESPONSE DATA>

Function: Queries the number of measurements during Bathtub measurement.

Example:
- To query the number of measurements:
  > :SENSe:MEASure:BATHtub:TIMes?
  < 100

Compatibility: Incompatible with existing models.

:SENSe:MEASure:BATHtub:INTerval <numeric>

Parameter: <numeric>=<DECIMAL NUMERIC PROGRAM DATA>
- 0 to 9999: 0 to 9999 s/1 s Step

Function: Sets the measurement interval time during Bathtub measurement.

Example:
- To set the measurement interval time to 50 s:
  > :SENSe:MEASure:BATHtub:INTerval 50

Compatibility: Incompatible with existing models.

:SENSe:MEASure:BATHtub:INTerval?

Response: <numeric>=<NR1 NUMERIC RESPONSE DATA>
- 0 to 9999: 0 to 9999 s

Function: Queries the measurement interval time during Bathtub measurement.

Example:
- To query the measurement interval time:
  > :SENSe:MEASure:BATHtub:INTerval?
  < 50

Compatibility: Incompatible with existing models.
Chapter 7  Remote Commands

**:SENSe:MEASure:BATHtub:DATA <numeric>**

Parameter  
<numeric>=<DECIMAL NUMERIC PROGRAM DATA>  
\(-3.500 \text{ to } 3.300 \)  
\(-3.500 \text{ to } 3.300 \ V / 0.001 \ V \text{ Step} \)  
The range varies according to the option and input interface settings.

Function  
Sets the measurement voltage threshold position during Bathtub measurement.

Example  
To set the measurement voltage threshold position to 0.5 V:  
\( > :\text{SENSe:MEASure:BATHtub:DATA} \ 0.5 \)

Compatibility  
Incompatible with existing models.

**:SENSe:MEASure:BATHtub:DATA?**

Response  
<numeric>=<NR2 NUMERIC RESPONSE DATA>  

Function  
Queries the measurement voltage threshold position during Bathtub measurement.

Example  
\( > :\text{SENSe:MEASure:BATHtub:DATA}? \)  
\( < 0.505 \)

Compatibility  
Incompatible with existing models.

**:SENSe:MEASure:BATHtub:RESolution:MUI <numeric>**

Parameter  
<numeric>=<DECIMAL NUMERIC PROGRAM DATA>  
\(4 \text{ to } 100\)  
\(4 \text{ to } 100 \ \text{mUI} / 4 \ \text{mUI Step} \)

Function  
Sets the Bathtub measurement phase resolution (mUI).

Example  
To set the phase resolution to 10 mUI:  
\( > :\text{SENSe:MEASure:BATHtub:RESolution:MUI} \ 10 \)

Compatibility  
Incompatible with existing models.

**:SENSe:MEASure:BATHtub:RESolution:MUI?**

Response  
<numeric>=<NR1 NUMERIC RESPONSE DATA>  

Function  
Queries the Bathtub measurement phase resolution (mUI).

Example  
\( > :\text{SENSe:MEASure:BATHtub:RESolution:MUI}? \)  
\( < 4 \)

Compatibility  
Incompatible with existing models.

**:SENSe:MEASure:BATHtub:ECOunt <mode>**

Parameter  
<mode>=<CHARACTER PROGRAM DATA>  
FINE  
FINE (Number of error counts: 100)  
COARSe  
Coarse (Number of error counts: 1)

Function  
Sets the minimum error counts of Bathtub measurement.

Example  
To set the minimum error counts to 100:  
\( > :\text{SENSe:MEASure:BATHtub:ECOunt} \ \text{FINE} \)
7.4 Automatic Measurement Commands

>:SENSe:MEASure:BATHtub:ECOunt FINE

Compatibility
Incompatible with existing models.

**:SENSe:MEASure:BATHtub:ECOunt?**

Response
<numeric>=<CHARACTER RESPONSE DATA>
FINE, COAR

Function
Queries the minimum error counts of Bathtub measurement.

Example
>:SENSe:MEASure:BATHtub:ECOunt?
< FINE

Compatibility
Incompatible with existing models.

**:SENSe:MEASure:BATHtub:RANGe <range>**

Parameter
<range>=<CHARACTER PROGRAM DATA>
E_7 to E_14 E–7 to E–14

Function
Sets the lower limit value of measurement error threshold during Bathtub measurement.

Example
To set the lower limit value of measurement error threshold to E–12:
>:SENSe:MEASure:BATHtub:RANGe E_12

Compatibility
Incompatible with existing models.

**:SENSe:MEASure:BATHtub:RANGe?**

Response
<range>=<CHARACTER RESPONSE DATA>

Function
Queries the lower limit value of measurement error threshold during Bathtub measurement.

Example
>:SENSe:MEASure:BATHtub:RANGe?
< E_12

Compatibility
Incompatible with existing models.

**:SENSe:MEASure:BATHtub:CALRange <upper>,<lower>**

Parameter
<upper>=<CHARACTER PROGRAM DATA>
E_3 to E_5 E–3 to E–5
<lower>=<CHARACTER PROGRAM DATA>
E_7 to E_14 E–7 to E–14

Function
Sets the error threshold range during Bathtub measurement recalculation.

Example
To set the error threshold range during recalculation to E–5 to E–10:
>:SENSe:MEASure:BATHtub:CALRange E_5,E_10

Compatibility
Incompatible with existing models.
**Chapter 7  Remote Commands**

**:SENSe:MEASure:BATHtub:CALRange?**

**Response**  <upper>,<lower>=<CHARACTER RESPONSE DATA>

**Function**  Queries the error threshold range during Bathtub measurement recalculation.

**Example**  
> :SENSe:MEASure:BATHtub:CALRange?
< E_5,E_10

**Compatibility**  Incompatible with existing models.

**:SENSe:MEASure:BATHtub:ASEarch**

**Parameter**  <item>=<CHARACTER PROGRAM DATA>

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Auto Search OFF</td>
</tr>
<tr>
<td>PHASE</td>
<td>Phase auto search (Coarse)</td>
</tr>
<tr>
<td>PTHR</td>
<td>Phase &amp; threshold auto search (Coarse)</td>
</tr>
<tr>
<td>FPHase</td>
<td>Phase auto search (Fine)</td>
</tr>
<tr>
<td>FPTHresh</td>
<td>Phase &amp; Threshold auto search (Fine)</td>
</tr>
</tbody>
</table>

**Function**  Sets execution of auto search during Bathtub measurement.

**Example**  
To set the phase auto search ON:
> :SENSe:MEASure:BATHtub:ASEarch PHAS

**Compatibility**  Incompatible with existing models.

**:SENSe:MEASure:BATHtub:ASEarch?**

**Response**  <item>=<CHARACTER RESPONSE DATA>

<table>
<thead>
<tr>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF, PHAS, PTHR, FPH, FPTH</td>
</tr>
</tbody>
</table>

**Function**  Queries the execution of auto search during Bathtub measurement.

**Example**  
> :SENSe:MEASure:BATHtub:ASEarch?
< PHAS

**Compatibility**  Incompatible with existing models.

**:SENSe:MEASure:BATHtub:CURRent <boolean>**

**Parameter**  <boolean>=<BOOLEAN PROGRAM DATA>

<table>
<thead>
<tr>
<th>Boolean</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 or OFF</td>
<td>OFF: Updates at measurement termination.</td>
</tr>
<tr>
<td>1 or ON</td>
<td>ON: Updates every second.</td>
</tr>
</tbody>
</table>

**Function**  Sets the graph display update period during Bathtub measurement.

**Example**  
To set the graph display update timing to every second:
> :SENSe:MEASure:BATHtub:CURRent 1

**Compatibility**  Incompatible with existing models.
### 7.4 Automatic Measurement Commands

**:SENSe:MEASure:BATHtub:CURRent?**

**Response**
<boolean> = NR1 NUMERIC RESPONSE DATA
0, 1

**Function**
Queries the graph display update period during Bathtub measurement.

**Example**
> :SENSe:MEASure:BATHtub:CURRent?
< 1

**Compatibility**
Incompatible with existing models.

**:SENSe:MEASure:BATHtub:JCALculation <setting>**

**Parameter**
<setting> = DECIMAL NUMERIC PROGRAM DATA
7 to 20
E–7 to E–20
Specified as E−n where n: 7 to 20/1 step

**Function**
Sets the error rate used to calculate jitter at Bathtub measurement.

**Example of use**
To set jitter calculation error rate to E–14:
> :SENSe:MEASure:BATHtub:JCALculation 14

**Compatibility**
Incompatible with existing models.

**:SENSe:MEASure:BATHtub:JCALculation?**

**Response**
<setting> = NR1 NUMERIC RESPONSE DATA
7 to 20

**Function**
Queries the error rate used to calculate jitter at Bathtub measurement.

**Example**
> :SENSe:MEASure:BATHtub:JCALculation?
< 14

**Compatibility**
Incompatible with existing models.

**:SENSe:MEASure:BATHtub:J2Meas <mode>**

**Parameter**
<mode> = CHARACTER PROGRAM DATA
ACTual Calculates J2 from BER measurement point.
ESTimate Calculates J2 from Best Fit Line.

**Function**
Selects J2 calculation method.

**Example**
To set J2 calculation method to Actual:
> :SENSe:MEASure:BATHtub:J2Meas ACTual

**Compatibility**
Incompatible with existing models.
### :SENSe:MEASure:BATHtub:J2Meas?

<table>
<thead>
<tr>
<th>Response</th>
<th>&lt;mode&gt;=&lt;CHARACTER RESPONSE DATA&gt; ACT, EST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>Queries J2 calculation method.</td>
</tr>
<tr>
<td>Example</td>
<td>&gt; :SENSe:MEASure:BATHtub:J2Meas?</td>
</tr>
<tr>
<td></td>
<td>&lt; ACT</td>
</tr>
<tr>
<td>Compatibility</td>
<td>Incompatible with existing models.</td>
</tr>
</tbody>
</table>
7.4.4.2 Graph display setting commands

Table 7.4.4.2-1  Graph Display Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:BATHtub:ITEM?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:BATHtub:MNUMber?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:BATHtub:SCALe:HORizontal?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:DISPlay:RESult:BATHtub:SCALe:VERTical?</td>
</tr>
</tbody>
</table>
Chapter 7  Remote Commands

:DISPlay:RESult:BATHtub:ITEM <mode>
Parameter

<mode>=<CHARACTER PROGRAM DATA>
- PBER     Phase vs BER (Y axis Log)
- PLNBER   Phase vs BER (Y axis Log (–Ln))
- HISTogram Histogram
Function  Sets the item to be displayed in the graph during Bathtub measurement.
Example   To set the display item to Histogram:
          > :DISPlay:RESult:BATHtub:ITEM HISTogram
Compatibility  Incompatible with existing models.

:DISPlay:RESult:BATHtub:ITEM?
Response

<mode>=<CHARACTER RESPONSE DATA>
- PBER, PLNB, HIST
Function  Queries the item to be displayed in the graph during Bathtub measurement.
Example   > :DISPlay:RESult:BATHtub:ITEM?
          < HIST
Compatibility  Incompatible with existing models.

:DISPlay:RESult:BATHtub:MNUMber <numeric>
Parameter

<numeric>=<DECIMAL PROGRAM DATA>
- 1 to 1000 Measurement number 1 to 1000 (number of measurements during repeat measurement)
Function  Selects the measurement number for which the Bathtub measurement result is displayed in a graph.
Example   To select the measurement number 100 to display the graph:
          > :DISPlay:RESult:BATHtub:MNUMber 100
Compatibility  Incompatible with existing models.

:DISPlay:RESult:BATHtub:MNUMber?
Response

<numeric>=<NR1 NUMERIC RESPONSE DATA>
Function  Queries the measurement number for which the Bathtub measurement result is displayed in a graph.
Example   > :DISPlay:RESult:BATHtub:MNUMber?
          < 100
Compatibility  Incompatible with existing models.
7.4 Automatic Measurement Commands

**:DISPlay:RESult:BATHtub:SCALe:ASCale**

Function: Automatically adjusts the graph display during Bathtub measurement.

Example: `> :DISPlay:RESult:BATHtub:SCALe:ASCale`

Compatibility: Incompatible with existing models.

**:DISPlay:RESult:BATHtub:SCALe:HORizontal <max>[,<step>]**

Parameter: `<max>,<step>=<DECIMAL NUMERIC PROGRAM DATA>`

<table>
<thead>
<tr>
<th>Form</th>
<th><code>&lt;max&gt;</code></th>
<th><code>&lt;step&gt;</code></th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase type</td>
<td>–900 to 1000 (mUI) /100 mUI Step</td>
<td>10 to 200 (mUI) /10 mUI Step</td>
</tr>
<tr>
<td>Histogram type</td>
<td>16,32,64,128,256</td>
<td>Omitted</td>
</tr>
</tbody>
</table>

Function: Sets the horizontal scale of the graph display during Bathtub measurement. In case of a histogram, `<step>` is omitted.

Example: To set the scale to maximum 800 mUI, in 100-mUI steps:

`> :DISPlay:RESult:BATHtub:SCALe:HORizontal 800,100`

Compatibility: Incompatible with existing models.

**:DISPlay:RESult:BATHtub:SCALe:HORizontal?**

Response: `<max>,<step>=<NR2 NUMERIC RESPONSE DATA>`

Parameters are the same as those for `:DISPlay:RESult:BATHtub:SCALe:HORizontal`. `<step>` is omitted if the measurement item is histogram.

Function: Queries the horizontal scale of the graph display during Bathtub measurement.

Example: `> :DISPlay:RESult:BATHtub:SCALe:HORizontal?`  

`< 800,100`

Compatibility: Incompatible with existing models.
**Chapter 7  Remote Commands**

### :DISPlay:RESult:BATHtub:SCALe:VERTical <max>,<min>

**Parameter**

<max>,<min>=<DECIMAL NUMERIC PROGRAM DATA>

#### Table 7.4.4.2-3  Parameters

<table>
<thead>
<tr>
<th>Form</th>
<th>&lt;max&gt;</th>
<th>&lt;min&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histogram Type</td>
<td>6 to 15 (E+6 to E+15)</td>
<td>Input 0</td>
</tr>
<tr>
<td>Error Rate Type</td>
<td>2 to 7 (E–2 to E–7)</td>
<td>8 to 15 (E–8 to E–15)</td>
</tr>
</tbody>
</table>

**Note:**

In case of the Error Rate type, the difference between the maximum and minimum value must be at least 6, and the value must be an even number.

**Function**

Sets the vertical scale of the graph display during Bathtub measurement.

**Example**

To set the scale during Error Rate type display to maximum E–4 and minimum E–10:

> :DISPlay:RESult:BATHtub:SCALe:VERTical 4,10

**Compatibility**

Incompatible with existing models.

### :DISPlay:RESult:BATHtub:SCALe:VERTical?

**Response**

<min>,<max>=<NR2 NUMERIC RESPONSE DATA>

Parameters are the same as those for :DISPlay:RESult:BATHtub:SCALe:VERTical.

<min> is omitted if the measurement item is histogram.

**Function**

Queries the vertical scale of the graph display during Bathtub measurement.

**Example**

> :DISPlay:RESult:BATHtub:SCALe:VERTical?

< 4,10

**Compatibility**

Incompatible with existing models.
7.4 Automatic Measurement Commands

7.4.4.3 Measurement result and status query commands

Table 7.4.4.3-1 Measurement Result and Status Query Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>:SENSe:MEASure:BATHtub:DTIME?</td>
</tr>
<tr>
<td></td>
<td>start time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>elapsed time</td>
<td></td>
</tr>
</tbody>
</table>

:SENSe:MEASure:BATHtub:DTIME <type>

Parameter

- `<type>`=<CHARACTER PROGRAM DATA>
- DTIME: Displays the current date and time.
- STARt: Displays the measurement start time.
- ELAPsed: Displays the elapsed time based on the measurement period.

Function

Selects the Bathtub measurement time display type.

Example

To set the Bathtub measurement time display type to measurement start time (Start Time):

```plaintext
> :SENSe:MEASure:BATHtub:DTIME STARt
```

Compatibility

Incompatible with existing models.
Chapter 7  Remote Commands

:SENSe:MEASure:BATHtub:DTIME?

Response  
<type>=<CHARACTER RESPONSE DATA>
DTIM, STAR, ELAP

Function  
Queries the Bathtub measurement time display type.

Example  
> :SENSe:MEASure:BATHtub:DTIME?
< STAR

Compatibility  
Incompatible with existing models.

:SENSe:MEASure:BATHtub:TIME:DTIMe?

Response  
<year>=<NR1 NUMERIC RESPONSE DATA>
2000 to 2036  Year 2000 to 2036
<month> = <NR1 NUMERIC RESPONSE DATA>
1 to 12  January to December
<day> = <NR1 NUMERIC RESPONSE DATA>
1 to 31  1st to 31st
<hour> = <NR1 NUMERIC RESPONSE DATA>
0 to 23  0 to 23 hours
<minute> = <NR1 NUMERIC RESPONSE DATA>
0 to 59  0 to 59 minutes
<second> = <NR1 NUMERIC RESPONSE DATA>
0 to 59  0 to 59 seconds

Function  
Queries the current date and time during the Bathtub measurement.

Example  
> :SENSe:MEASure:BATHtub:TIME:DTIMe?
< 2012,12,31,23,59,59

Compatibility  
Incompatible with existing models.
### :SENSe:MEASure:BATHtub:TIME:STARt?

**Response**

- `<year>` = `<NR1 NUMERIC RESPONSE DATA>`
- `<month>` = `<NR1 NUMERIC RESPONSE DATA>`
- `<day>` = `<NR1 NUMERIC RESPONSE DATA>`
- `<hour>` = `<NR1 NUMERIC RESPONSE DATA>`
- `<minute>` = `<NR1 NUMERIC RESPONSE DATA>`
- `<second>` = `<NR1 NUMERIC RESPONSE DATA>`

- `<year>`: 0, 2000 to 2036
- `<month>`: 0 to 12
- `<day>`: 0 to 31
- `<hour>`: 0 to 23
- `<minute>`: 0 to 59
- `<second>`: 0 to 59

Response data is in the form of `year, month, day, hour, minute, second`. If there is no measurement start time data, `“0,0,0,0,0,0”` is returned.

**Function**

Queries the current date and time during the Bathtub measurement.

**Example**

```
> :SENSe:MEASure:BATHtub:TIME:STARt?
< 2012,12,31,23,59,59
```

**Compatibility**

Incompatible with existing models.

### :SENSe:MEASure:BATHtub:TIME:ELAPsed?

**Response**

- `<day>` = `<NR1 NUMERIC RESPONSE DATA>`
- `<hour>` = `<NR1 NUMERIC RESPONSE DATA>`
- `<minute>` = `<NR1 NUMERIC RESPONSE DATA>`
- `<second>` = `<NR1 NUMERIC RESPONSE DATA>`

- `<day>`: 0, 1 to 99
- `<hour>`: 0 to 23
- `<minute>`: 0 to 59
- `<second>`: 0 to 59

Response data is in the form of `day, hour, minute, second`. If there is no measurement start time data, `“0,0,0,0”` is returned.

**Function**

Queries the measurement elapsed time during Bathtub measurement.

**Example**

```
> :SENSe:MEASure:BATHtub:TIME:ELAPsed?
< 31,23,59,59
```

**Compatibility**

Incompatible with existing models.
Chapter 7  Remote Commands

:CALCulate:DATA:BATHtub? <string>

Parameter  
<string>=<STRING PROGRAM DATA>

For details on measurement data <result1>, refer to Table 7.4.4.3-2.
For details on immediate data <result2>, refer to Table 7.4.4.3-3.
For details on statistic data <result3>, refer to Table 7.4.4.3-4.

Table 7.4.4.3-2  Phase vs. BER Measurement Result <result1>

<table>
<thead>
<tr>
<th>Item</th>
<th>&lt;Result1&gt;</th>
<th>Response Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase vs BER (Phase and Error Rate)</td>
<td>Number of measurements 1 to 1000</td>
<td>&quot;BATH:1&quot;...&quot;BATH:1000&quot; Form1</td>
</tr>
<tr>
<td>Histogram (Phase and Error Count)</td>
<td></td>
<td>&quot;HIST:1&quot;...&quot;HIST:1000&quot; Form2</td>
</tr>
</tbody>
</table>

The measurement result for each Phase is delimited by a comma (,) and returned.

Table 7.4.4.3-3  Phase vs. BER Immediate Data <result2>

<table>
<thead>
<tr>
<th>Item</th>
<th>&lt;Result2&gt;</th>
<th>Response Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimum BER</td>
<td>&quot;OPTBer:1&quot;... &quot;OPTBer:1000&quot;</td>
<td>Form3</td>
</tr>
<tr>
<td>Optimum Phase</td>
<td>&quot;OPTPh:1&quot;... &quot;OPTPh:1000&quot;</td>
<td>Form4</td>
</tr>
<tr>
<td>Total Jitter</td>
<td>&quot;TJ:1&quot;... &quot;TJ:1000&quot;</td>
<td>Form4</td>
</tr>
<tr>
<td>Deterministic Jitter</td>
<td>&quot;DJ:1&quot;... &quot;DJ:1000&quot;</td>
<td>Form4</td>
</tr>
<tr>
<td>Random Jitter</td>
<td>&quot;RJ:1&quot;... &quot;RJ:1000&quot;</td>
<td>Form4</td>
</tr>
<tr>
<td>J2</td>
<td>&quot;J2:1&quot;... &quot;J2:1000&quot;</td>
<td>Form4</td>
</tr>
<tr>
<td>J9</td>
<td>&quot;J9:1&quot;... &quot;J9:1000&quot;</td>
<td>Form4</td>
</tr>
</tbody>
</table>

Table 7.4.4.3-4  Phase vs. BER Measurement Statistic Data <result3>

<table>
<thead>
<tr>
<th>Item</th>
<th>&lt;Result3&gt;</th>
<th>Response Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Data</td>
<td>&quot;TOTal&quot;</td>
<td>Form5</td>
</tr>
<tr>
<td>Valid Data</td>
<td>&quot;VALid&quot;</td>
<td>Form5</td>
</tr>
<tr>
<td>Total Jitter Mean</td>
<td>&quot;TJMean&quot;</td>
<td>Form4</td>
</tr>
<tr>
<td>Deterministic Jitter Mean</td>
<td>&quot;DJMean&quot;</td>
<td>Form4</td>
</tr>
<tr>
<td>Random Jitter Mean</td>
<td>&quot;RJMean&quot;</td>
<td>Form4</td>
</tr>
<tr>
<td>J2 Mean</td>
<td>&quot;J2Mean&quot;</td>
<td>Form4</td>
</tr>
<tr>
<td>J9 Mean</td>
<td>&quot;J9Mean&quot;</td>
<td>Form4</td>
</tr>
</tbody>
</table>
7.4 Automatic Measurement Commands

Response

<string>=<STRING RESPONSE DATA>

<table>
<thead>
<tr>
<th>Form</th>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form1 Phase-BER type</td>
<td>&quot;XXXX.XX, Y.YYYYE-YYY&quot;</td>
<td>XXXX.XX: Phase (mUI or PS)</td>
</tr>
<tr>
<td></td>
<td>&quot;-------,-------&quot;</td>
<td>Y.YYYYE-YYY: Error Rate</td>
</tr>
<tr>
<td>Form2 Histogram type</td>
<td>&quot;XXXX.XX, Y.YYYYE-YYY&quot;</td>
<td>XXXX.XX: Phase (mUI or PS)</td>
</tr>
<tr>
<td></td>
<td>&quot;-------,-------&quot;</td>
<td>Y.YYYYE-YYY: Error Count</td>
</tr>
<tr>
<td>Form3 Fraction type 1</td>
<td>&quot;X.XXXXXE-XXX&quot;</td>
<td>When 0.0000E–016 to 1.0000E000</td>
</tr>
<tr>
<td></td>
<td>&quot;-------&quot;</td>
<td>When no data corresponds to the query.</td>
</tr>
<tr>
<td>Form4 Fraction type 2</td>
<td>&quot;XXXX.XX&quot;</td>
<td>When –9999.99 to 9999.99</td>
</tr>
<tr>
<td></td>
<td>&quot;-------&quot;</td>
<td>When no data corresponds to the query.</td>
</tr>
<tr>
<td>Form5 Integer type</td>
<td>&quot;XXXX&quot;</td>
<td>When 0 to 9999</td>
</tr>
<tr>
<td></td>
<td>&quot;----&quot;</td>
<td>When no data corresponds to the query.</td>
</tr>
</tbody>
</table>

Function Queries the Phase vs. BER measurement result.

Example To query the Phase vs. BER the measurement result for the 10th time:

> :CALCulate:DATA:BATHtub? "BATH:10"
< "0,1.2345E–003","20,1.2345E–004","40,1.2345E–005","60,1.2345E–006"

Compatibility Incompatible with existing models.

:CALCulate:DATA:BATHtub:STATus?

Response <string>=<STRING RESPONSE DATA>

""" When no alarm exists.
"Sync Loss" Sync. Loss
"Clock Loss" Clock Loss
"Out of range" Out of range
"Illegal Error" Illegal Error
"Clock Missmatch" Clock Missmatch
"Meas. Threshold exceeded" Number of errors exceeds the target rate

Note:
If two or more alarms have occurred, the one with the highest priority is returned:
Illegal Error > Clock Loss > Sync Loss > Out or range

Function Queries the Q measurement status.

Example

> :CALCulate:DATA:BATHtub:STATus?
< "Sync Loss"
### :CALCulate:DATA:BATHtub:CSTatus?

<table>
<thead>
<tr>
<th>Response</th>
<th>Description</th>
</tr>
</thead>
</table>
| <string>=<STRING RESPONSE DATA> | - "Half Rate" 1/2 clock relative to bit rate  
|                   | - "Quarter Rate" 1/4 clock relative to bit rate  
|                   | - "One eighth Rate" 1/8 clock relative to bit rate  
|                   | - "Clock Mismatch" Problem with “connection to MU181500B” or “clock setting” |

**Function**

To query the correspondence between operating bit rate and input clock when using MU181500B Reference Clock in Bathtub measurement.

**Example**

```
> :CALCulate:DATA:BATHtub:CSTatus?
< "Half Rate"
```

**Compatibility**

Incompatible with existing models.
7.4.4.4 File menu setting commands

Table 7.4.4.4-1 File Menu Setting Commands

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Command</th>
</tr>
</thead>
</table>

:SYSTem:MMEMory:BATHtub:RECall <file_name>

Parameter

- `<file_name>` = STRING PROGRAM DATA
- "<drv>:\[<dir>]\<file>"
- `<drv>` = C, D, E, F
- `<dir>` = <dir1>\<dir2>\...(Omitted for the root directory)
- `<file>` = File name

Function

Opens the Bathtub measurement result data.

Example

> :SYSTem:MMEMory:BATHtub:RECall "C:\Test\example"

Compatibility

Incompatible with existing models.

:SYSTem:MMEMory:BATHtub:STORe <file_name>,<data_type>,<file_type>

Parameter

- `<file_name>` = STRING PROGRAM DATA
- "<drv>:\[<dir>]\<file>"
- `<drv>` = C, D, E, F
- `<dir>` = <dir1>\<dir2>\...(Omitted for the root directory)
- `<file>` = File name
- `<data_type>` = CHARACTER RESPONSE DATA
- PSB Phase vs BER Result
- BIN Binary File
- CSV CSV File
- TXT Text File

Function

Saves the Bathtub measurement result data.

*Note:*

The settings will not be read from the saved file if the file name is changed.

Example

To save the Bathtub measurement result data by specifying the save destination (C:\Test), file name (example), and file format (CSV):

> :SYSTem:MMEMory:BATHtub:STORe "C:\Test\example",PSB,CSV

Compatibility

Incompatible with existing models.
Chapter 8 Maintenance

This chapter describes the maintenance of the MP1862A.

8.1 Daily Maintenance ......................................................... 8-2
8.2 Cautions on Storage .................................................... 8-2
8.3 Transportation .............................................................. 8-3
8.4 Calibration .................................................................... 8-3
8.5 Disposal ........................................................................ 8-4
8.1 Daily Maintenance

- Wipe off any external stains with a cloth damped with diluted mild detergent.
- Vacuum away any accumulated dust or dirt with a vacuum cleaner.
- Tighten any loose parts fixed with screws, using the specified tools.

8.2 Cautions on Storage

Wipe off any dust, soil, or stain on the MP1862A prior to storage. Avoid storing the MP1862A in any of the following locations:

- Where there is direct sunlight
- Where there is dust
- Where humidity is high and dew may accumulate
- Where chemically active gases are present
- Where the MP1862A may become oxidized
- Where strong vibrations are present
- Under either of the following temperature and humidity conditions:
  - Temperature range of ≤−20°C or ≥60°C
  - Humidity range of ≥85%

Recommended storage conditions

In addition to the abovementioned storage cautions, the following environment conditions are recommended for long-term storage.

- Temperature range of 5 to 30°C
- Humidity range of 40 to 75%
- Slight daily fluctuation in temperature and humidity
8.3 Transportation

Use the original packing materials, if possible, when packing the MP1862A for transport. If you do not have the original packing materials, pack the MP1862A according to the following procedure. When handling the MP1862A, always wear clean gloves, and handle it gently so as not to damage it.

<Procedure>
1. Use a dry cloth to wipe off any stain or dust on the exterior of the MP1862A.
2. Check for loose or missing screws.
3. Provide protection for structural protrusions and parts that can easily be deformed, and wrap the MP1862A with a sheet of polyethylene. Finally, cover with moisture-proof paper.
4. Place the wrapped MP1862A into a cardboard box, and tape the flaps with adhesive tape. Furthermore, store it in a wooden box as required by the transportation distance or method.
5. During transportation, place it under an environment that meets the conditions described in Section 8.2 “Cautions on Storage”.

8.4 Calibration

Regular maintenance such as periodic inspections and calibration is essential for the Signal Quality Analyzer Series for long-term stable performance. Regular inspection and calibration are recommended for using the Signal Quality Analyzer Series in its prime condition at all times. The recommended calibration cycle after delivery of the Signal Quality Analyzer Series is twelve months.

If you require support after delivery, 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.

We may not provide calibration or repair if any of the following cases apply.
- Seven or more years have elapsed after production and parts for the instrument are difficult to obtain, or it is determined that reliability cannot be maintained after calibration/repair due to significant wear.
- Circuit changes, repair, or modifications are done without our approval.
- It is determined that the repair cost would be higher than the price of a new item.
8.5 Disposal

Confirm the notes described in the Signal Quality Analyzer Series Installation Guide and observe national and local regulations when disposing of the MP1862A.
Chapter 9 Troubleshooting

This chapter describes how to check for errors that may occur during MP1862A operation.

9.1 Problems That May Occur When Starting MP1862A ... 9-2
9.2 Synchronization Not Established................................. 9-3
### 9.1 Problems That May Occur When Starting MP1862A

#### Table 9.1-1 Remedies for Problems That May Occur When Starting MP1862A

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Location to Check</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>A MP1862A is not recognized.</td>
<td>Are the MP1862A and MP1800A or control PC connected properly?</td>
<td>Refer to Section 2.1 “Preparation Before Use” in this manual.</td>
</tr>
<tr>
<td></td>
<td>Is the MP1862A power switch turned on?</td>
<td>Refer to Section 2.1 “Preparation Before Use” in this manual.</td>
</tr>
<tr>
<td></td>
<td>Is the appropriate software installed?</td>
<td>To check the appropriate modules and software version of the MP1862A, access to “MP1800 Series Signal Quality” on your Web site (<a href="http://www.anritsu.com">http://www.anritsu.com</a>). Right-click the “MP1800 Series Signal Quality” and you can access to your area website. If the appropriate modules are not recognized, it may have failed. 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.</td>
</tr>
</tbody>
</table>
9.2 Synchronization Not Established

- Synchronization cannot be established (error measurement cannot be performed)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Location to Check</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input conditions</td>
<td>Do the quality, status and length of the connection cables comply with the specifications?</td>
<td>Replace with a suitable cable.</td>
</tr>
<tr>
<td></td>
<td>Is the cable connection correct and secure?</td>
<td>Confirm the destination and check if the connector is tightened securely.</td>
</tr>
<tr>
<td></td>
<td>Are the single and differential (50/100 Ω) inputs set correctly?</td>
<td>Set the correct value.</td>
</tr>
<tr>
<td></td>
<td>Is the input level correct?</td>
<td>Check the level by using an oscilloscope, etc.</td>
</tr>
<tr>
<td></td>
<td>Are the input bit rate and clock frequency set correctly?</td>
<td>Set the bit rate and clock frequency correctly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note:</strong> Use the frequency counter to check the current clock frequency.</td>
</tr>
<tr>
<td>Termination conditions</td>
<td>Was the termination potential adjusted?</td>
<td>Set the termination potential correctly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note:</strong> Incorrect setting may result in unit failure.</td>
</tr>
<tr>
<td>Output conditions</td>
<td>Are the connection cables between this module and MU18304xA/B matched?</td>
<td>Check the connection point and tighten the connector.</td>
</tr>
<tr>
<td></td>
<td>Are the connection cables between this module and the MU183040xA/B connected correctly?</td>
<td>Connect MP1862A and MU18304xA/B with cables in the order specified in Chapter 3.</td>
</tr>
<tr>
<td></td>
<td>Are the threshold and phase of MP1862A and MU18304xA/B correct?</td>
<td>Either set Auto Adjust to ON at the MU18304xA/B or run Auto Search or perform manual adjustment.</td>
</tr>
</tbody>
</table>
### Table 9.2-1  Items to be checked (Cont’d)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Location to Check</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Threshold</strong></td>
<td>During differential input, is the difference between the Data and XData threshold voltages above 1.5 V?</td>
<td>The difference value should be within 1.5 V.</td>
</tr>
<tr>
<td></td>
<td>Is the operating limit for Auto Search out of range?</td>
<td>Adjust it manually.</td>
</tr>
<tr>
<td><strong>Phase</strong></td>
<td>Is the operating limit for Auto Search out of range?</td>
<td>Adjust it manually.</td>
</tr>
<tr>
<td><strong>Pattern</strong></td>
<td>Are the MU18302xA/B and MU18304xA/B patterns matched?</td>
<td>Match the patterns.</td>
</tr>
<tr>
<td><strong>Synchronization</strong></td>
<td>Is Auto Sync set to On at the MU18304xA/B?</td>
<td>Set it to On. Re-synchronization is performed automatically.</td>
</tr>
<tr>
<td></td>
<td>Have you tried with a different MU18304xA/B Sync Control setting?</td>
<td>Optimal synchronization method varies according to the pattern type.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Note:</em> Can be set for patterns except PRBS.</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>Is MU18304xA/B Bit/Block Window set to Off?</td>
<td>Set it to Off.</td>
</tr>
<tr>
<td></td>
<td>Is MU18304xA/B External Mask set to Off?</td>
<td>Set it to Off.</td>
</tr>
<tr>
<td></td>
<td>Is the MU18304xA/B Repeat mode set?</td>
<td>Set the Repeat mode.</td>
</tr>
</tbody>
</table>

If a problem cannot be solved using any of the items listed above, perform initialization and check the items again. If the problem still occurs, 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.
Appendix A  List of Initial Settings

Appendix A describes the default settings for MP1862A.
To initialize all the settings to the factory defaults, click the File menu, and then click Initialize.

<table>
<thead>
<tr>
<th>Setting Function</th>
<th>Main Item</th>
<th>Secondary Item</th>
<th>Tertiary Item</th>
<th>Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result</td>
<td>Switch of setting items</td>
<td>Result display format</td>
<td>Error/Alarm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time display format</td>
<td>Date&amp;Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Error/Alarm display</td>
<td>Error/Alarm measurement result zoom display</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>Start of Error/Alarm measurement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stop of Error/Alarm measurement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>Data Input</td>
<td>Input Condition</td>
<td>Single-Ended</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data/XData selection</td>
<td>Data</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data input threshold</td>
<td>0.000 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>XData input threshold</td>
<td>0.000 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data input threshold differential type (Alternate)</td>
<td>Data-Xdata</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data input threshold differential type (Alternate)</td>
<td>0.000 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data input termination setup dialog box display</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data input termination condition</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data input termination voltage</td>
<td>0.00 V</td>
<td></td>
</tr>
<tr>
<td>Clock Input</td>
<td>Selection</td>
<td>External Clock</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clock phase unit</td>
<td>mUI</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clock phase variable (mUI)</td>
<td>0 mUI</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clock phase variable (ps)</td>
<td>0.00 ps</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clock phase calibration</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clock Delay Relative selection</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jitter Input</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clock Input Band</td>
<td>Half Rate Clock</td>
<td></td>
</tr>
<tr>
<td>Misc</td>
<td>Information of linked ED</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Settings for linked ED</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DEMUX/ED Link</td>
<td></td>
<td></td>
<td>OFF</td>
</tr>
</tbody>
</table>
Appendix B  Setting Restrictions

B.1 Combination Function Configuration .....................B-2
B.2 Settings Common in Combination System ...............B-3
B.1 Combination Function Configuration

This section describes the requirements for executing the Combination function by using MU181040A/41A modules.

The following requirement must be satisfied to execute the Combination function:

Requirement for enabling the Combination function
- The model is the MU183040A/B-x20 or MU183041A/B.
### B.2 Settings Common in Combination System

When the MU183040A/B or MU183041A/B is used in a Combination system, some setting items will apply to all the other modules in the Combination system.

Table B.2-1 shows whether the setting items are common or independent in a Combination system.

**Table B.2-1  Common/Independent Setting Items in Combination System**

<table>
<thead>
<tr>
<th>Setting Function</th>
<th>Main Category</th>
<th>Sub-Category</th>
<th>Individual Setting Item</th>
<th>Common/Independent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result</td>
<td>Switch of setting items</td>
<td>Setting display format</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Result display format</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time display format</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Error/Alarm display</td>
<td>Error/Alarm measurement result zoom display</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Error/Alarm measurement result sub window open/close</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Start of Error/Alarm measurement</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stop of Error/Alarm measurement</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Measurement</td>
<td>Measurement period (Gating)</td>
<td>Measurement period unit (Unit)</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measurement period time</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clock count for measurement period</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Error count for measurement period</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Block count for measurement period</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measurement processing method (Cycle)</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measurement result data display (Current)</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Known data processing method (Calculation)</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Known data display update cycle</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Re-synchronization (Auto Sync)</td>
<td>Re-synchronization execution</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Threshold for automatic synchronization function</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Synchronization method</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Synchronization method (Sync Control)</td>
<td>Synchronization method</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unique pattern length for frame synchronization</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRGM pattern start position</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Edit of synchronization mask pattern</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
</tbody>
</table>
## Table B.2-1  Common/Independent Setting Items in Combination System (Cont’d)

<table>
<thead>
<tr>
<th>Setting Function</th>
<th>Main Category</th>
<th>Sub-Category</th>
<th>Individual Setting Item</th>
<th>Common/ Independent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement (Continued)</td>
<td>Measurement condition (Error/Alarm Condition)</td>
<td>Interval for EI and EFI measurements</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Pattern*</td>
<td>Mask</td>
<td>Block Window execution</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Block Window setting</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bit Window execution</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bit Window bit string setting</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>External Mask ON/OFF</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Input</td>
<td>Data input</td>
<td>Input condition</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Differential type</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data/XData selection</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data input threshold</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>XData input threshold</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data input threshold differential type</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data input threshold differential</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data input termination setup dialog box display</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data input termination condition</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data input termination voltage</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td>Clock Input</td>
<td>Selection</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standard for Recovered Clock Bitrate</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recovered Clock Bitrate</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loop Bandwidth</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The value of division for calculating the Loop Bandwidth</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clock phase unit</td>
<td></td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clock phase variable (mUI)</td>
<td></td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clock phase variable (ps)</td>
<td></td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clock phase calibration</td>
<td></td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clock phase reference</td>
<td></td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clock phase variable (reference mUI)</td>
<td></td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clock phase variable (reference ps)</td>
<td></td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clock phase variable (Jitter Input)</td>
<td></td>
<td>Common</td>
<td></td>
</tr>
</tbody>
</table>

*: Settings shared by the PPG are omitted here. For details, refer to the MU183020A 28G/32G bit/s MU183021A 28G/32G bit/s 4ch Pulse Pattern Generator Operation Manual.
### Table B.2-1  Common/Independent Setting Items in Combination System (Cont’d)

<table>
<thead>
<tr>
<th>Setting Function</th>
<th>Main Category</th>
<th>Sub-Category</th>
<th>Individual Setting Item</th>
<th>Common/Independent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capture</td>
<td>Capture Conditions</td>
<td>Capture block division number setting</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Setting Screen</td>
<td>Capture trigger selection</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capture storing position selection</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capture trigger match pattern length setting</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capture trigger pattern format selection</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capture trigger mask pattern editing</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capture trigger match pattern editing</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Capture</td>
<td>Result Acquisition</td>
<td>Selection of how to acquire capture result</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specifying start block to acquire capture result</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specifying block count to acquire capture result</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Capture</td>
<td>Result Bit Pattern Display</td>
<td>Setting line wrapping length of capture data</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Searching error position</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Setting data thinning rate</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Capture</td>
<td>Result Block Display</td>
<td>Searching error position</td>
<td>Common</td>
<td></td>
</tr>
</tbody>
</table>
### Table B.2-1  Common/Independent Setting Items in Combination System (Cont’d)

<table>
<thead>
<tr>
<th>Setting Function</th>
<th>Main Category</th>
<th>Sub-Category</th>
<th>Individual Setting Item</th>
<th>Common/Independent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misc1</td>
<td>Signal generation (Pattern Sequence)</td>
<td>Signal generation method</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Burst signal input</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Burst trigger delay</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Burst trigger delay automatic adjustment</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Burst signal interval</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Burst cycle</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Synchronized output (Aux Output)</td>
<td>Auxiliary output</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Setting auxiliary output 1/N Clock</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Synchronized output position (for Data, PRBS, and Zero Substitution pattern)</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Block No. of synchronized output position (for Mixed-Data pattern)</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Row No. of synchronized output position (for Mixed-Data pattern)</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aux Input</td>
<td>Connector</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Measurement restart condition (Measurement Restart)</td>
<td>Measurement restart upon input threshold change</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measurement restart upon clock phase change</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Misc2</td>
<td>Combination Setting</td>
<td>Operation</td>
<td>Common</td>
<td></td>
</tr>
<tr>
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<td></td>
<td>Combination</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grouping Setting</td>
<td>Grouping item setting</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Auto measurement</td>
<td>Auto Adjust</td>
<td>Item</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slot selection</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Auto Search</td>
<td>Measurement mode</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Item</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slot selection</td>
<td>Independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Eye Diagram/ Eye Margin/ Bathtub/Q measurement</td>
<td>All items</td>
<td>Independent</td>
<td></td>
</tr>
</tbody>
</table>
Appendix C  Performance Test Record Sheet

C.1 Performance Test Record Sheet

Equipment Name: MP1862A 56G/64Gbit/s DEMUX

Serial No.:

Ambient Temperature: °C

Relative Humidity: %

Table C.1-1  Operating Frequency Range

<table>
<thead>
<tr>
<th>Device Name</th>
<th>Options</th>
<th>Specification</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP1862A</td>
<td>No</td>
<td>4 to 28.1 GHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>4 to 32.1 GHz</td>
<td></td>
</tr>
</tbody>
</table>

Table C.1-2 Input level range

<table>
<thead>
<tr>
<th>Device Name</th>
<th>Item</th>
<th>Specification</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP1862A</td>
<td>Data Input</td>
<td>Input amplitude: 0.125 to 1.0 Vp-p</td>
<td></td>
</tr>
<tr>
<td></td>
<td>XData Input</td>
<td>Threshold voltage: No error occurs within the range from –3.5 to +3.3 V</td>
<td></td>
</tr>
</tbody>
</table>
### Table C.1-1  Interface range

<table>
<thead>
<tr>
<th>No.</th>
<th>Termination</th>
<th>Amplitude [Vp-p]</th>
<th>Offset (Vth) [V]</th>
<th>Termination</th>
<th>Threshold voltage [V]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>1.0</td>
<td>–2.500</td>
<td>GND</td>
<td>–2.500</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0.25</td>
<td>–1.127</td>
<td></td>
<td>–1.127</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>0.25</td>
<td>+1.528</td>
<td></td>
<td>+1.528</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>1.0</td>
<td>+2.800</td>
<td></td>
<td>+2.800</td>
</tr>
</tbody>
</table>

### Table C.1-2  Test pattern

<table>
<thead>
<tr>
<th>Option Configuration</th>
<th>Specification</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRBS, $2^n–1 = 7, 9, 10, 11, 15, 20, 23, 31$, Mark ratio: 1/2</td>
<td>No error</td>
<td></td>
</tr>
<tr>
<td>Zero Substitution, Length: $2^n–1$, n = 7, 9, 10, 11, 15, 20, 23 or $2n$, n = 7, 9, 10, 11, 15, 20, 23</td>
<td>No error</td>
<td></td>
</tr>
</tbody>
</table>

### Table C.1-3  Error detection

<table>
<thead>
<tr>
<th>Option Configuration</th>
<th>Specification</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error rate (ER)</td>
<td>$1.0000E−11$</td>
<td></td>
</tr>
<tr>
<td>Error count (EC)</td>
<td>$1.0000E−00$</td>
<td></td>
</tr>
<tr>
<td>Error free interval (EFI)</td>
<td>$99.9900%$</td>
<td></td>
</tr>
<tr>
<td>Error interval (EI)</td>
<td>$1$</td>
<td></td>
</tr>
<tr>
<td>Clock frequency (Frequency)</td>
<td>999500 to 1005000 kHz</td>
<td></td>
</tr>
</tbody>
</table>
Appendix D  Fault Diagnosis Tool

This appendix describes the fault diagnosis tool using the MP1861A and MP1862A, 32G PPG, ED, and synthesizer.

- The fault diagnosis tool diagnoses hardware faults by running loop-back tests on the MP1861A and MP1862A.
- It supports MX180000A version 8.00.00 or later.

D.1  Startup procedure ..............................................D-2
D.2  Execution procedure ..........................................D-3
D.3  Viewing and saving results .................................D-5
D.4  Remote setting ..................................................D-6
D.5  Software Licenses .............................................D-7
D.1 Startup procedure

The startup procedure for the diagnosis tool is shown below.

Select Remote Script Application on the Windows Start menu. The Start menu can be displayed by connecting a keyboard and pressing the Windows key.

![Figure D.1-1  Start button]
D.2 Execution procedure

The diagnosis procedure is shown below.

(1) Once the Remote Script tool has launched, click "File" → "DEMUX Diagnosis" in the menu.

![Figure D.2-1  File menu](image)

(2) Click the Setup button and select the test condition.

![Figure D.2-2  Test condition selection](image)

(3) After selecting the condition, clicking the Guide button displays the connection diagram.
Appendix D  Fault Diagnosis Tool

Figure D.2-3  Connection diagram

(4) Click the Start button to start the diagnosis.

Note:

Executing fault diagnosis initializes the other module settings for the MP1861A and MP1862A.

Figure D.2-4  Starting diagnosis
D.3 Viewing and saving results

The results are displayed once diagnosis is complete.

The diagnosis results are also automatically saved as a log file. The log file name is determined automatically from the time and date.

The destination for saving the log file will be as follows for the default installation configuration.

C:\Anritsu\MP1800A\DiagnosticTool\Script\DemuxDiag\Log

![Figure D.3-1  Displaying diagnosis results](image)
D.4 Remote setting

This tool performs a diagnosis via an Ethernet using remote functions. Set the remote setting to Ethernet in the Setup Utility. For details of the Setup Utility and remote settings, refer to the MX180000A Operation Manual.

Note:
To use Ethernet remote with the MP1800A, Option MP1800-x02 is required.

The remote settings for this tool are set by selecting Tool and then Remote Interface in the menu.

The initial settings are as follows:

Remote Host: 127.0.0.1 (Loopback address)
Remote Port: 5001 (MP1800A default)
D.5 Software Licenses

This instrument comes with the package software as described in Table D.5-1.

For inquiries about software licenses, refer to the Anritsu website (http://www.anritsu.com).

Note, however, that the package software is not covered by the Anritsu Software License Agreement.

<table>
<thead>
<tr>
<th>Package</th>
<th>License</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lua</td>
<td>MIT</td>
</tr>
</tbody>
</table>

Lua:

License for Lua 5.0 and later versions

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Appendix E  Sequence Examples

This appendix describes sequence examples for BER and automatic measurement using 64G MUX and 64G DEMUX with remote commands.

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  E.3.2 Setting example of Test Conditions
    - RF Output / Input ........................................... E-6
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E.1 System Configuration

The system configuration for the sequence examples consists of the MP1800A with the following devices installed. The values of "X" in "MOD-ID X" and ":USB-ID X" should be altered if the device installation locations are changed.

Table E.1-1  System configuration for sequence examples

<table>
<thead>
<tr>
<th>Unit</th>
<th>Module</th>
<th>Module Name</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>UENT (MP1800A)</td>
<td>MOD1</td>
<td>MU181000A</td>
<td>Synthesizer</td>
</tr>
<tr>
<td></td>
<td>MOD2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MOD3</td>
<td>MU183020A</td>
<td>PPG</td>
</tr>
<tr>
<td></td>
<td>MOD4</td>
<td>MU183040B</td>
<td>ED</td>
</tr>
<tr>
<td></td>
<td>MOD5</td>
<td>MU181500B</td>
<td>Jitter Module</td>
</tr>
<tr>
<td></td>
<td>MOD6</td>
<td></td>
<td>The setting procedure, such as for initialization, will differ if the MU181500B is not installed.</td>
</tr>
<tr>
<td>USB7</td>
<td>-</td>
<td>MP1861A</td>
<td>MUX</td>
</tr>
<tr>
<td>USB11</td>
<td>-</td>
<td>MP1862A</td>
<td>DEMUX</td>
</tr>
</tbody>
</table>
Execution examples described from E.2 onward should be used with the examples combined as shown below.

*: Will vary depending on the device configuration and items measured. For specific details, refer to the individual items.
## E.2 Initialization

This section describes an example procedure for enabling MUX and DEMUX after initializing the system.

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:UENT:ID 1</td>
<td>Sets the remote command destination to MP1800A.*1</td>
</tr>
<tr>
<td>:SYST:MEM:INIT</td>
<td>Initializes the system.</td>
</tr>
<tr>
<td>Wait 10000 ms.*2</td>
<td>Initialization takes up to 10 seconds to complete.</td>
</tr>
<tr>
<td>:UENT:ID 1;:MOD:ID 6</td>
<td>Sets the remote command destination to Jitter Module.*1</td>
</tr>
<tr>
<td>:SYST:INP:CSEL INT1</td>
<td>Links the Jitter Module and Synthesizer.</td>
</tr>
<tr>
<td>Wait 1000 ms.*2</td>
<td>Link setting requires about one second.</td>
</tr>
<tr>
<td>:UENT:ID 1;:MOD:ID 3</td>
<td>Sets the remote command destination to PPG.*1</td>
</tr>
<tr>
<td>:SYST:INP:CSEL INT2</td>
<td>Links the PPG and Jitter Module.</td>
</tr>
<tr>
<td>Wait 1000 ms.*2</td>
<td>Link setting requires about one second.</td>
</tr>
<tr>
<td>:SYST:OUTP:CRAT FULL</td>
<td>Sets the PPG Clock Output to &quot;Full Rate&quot;.</td>
</tr>
<tr>
<td>:MCOM:OPER:SETT 2</td>
<td>Sets the PPG combination to &quot;2ch&quot;.</td>
</tr>
<tr>
<td>Wait 5000 ms.*2</td>
<td>Combination setting requires about five seconds.</td>
</tr>
<tr>
<td>:USB:ID 7</td>
<td>Sets the remote command destination to MUX.*1</td>
</tr>
<tr>
<td>:SYST:LINK:MUXP ON</td>
<td>Links the PPG and MUX.</td>
</tr>
<tr>
<td>Wait 3000 ms.*2</td>
<td>Link setting requires about 3 seconds.</td>
</tr>
<tr>
<td>:UENT:ID 1;:MOD:ID 4</td>
<td>Sets the remote command destination to ED.*1</td>
</tr>
<tr>
<td>:MCOM:OPER:SETT 2</td>
<td>Sets the ED combination to &quot;2ch&quot;.</td>
</tr>
<tr>
<td>Wait 5000 ms.*2</td>
<td>Combination setting requires about five seconds.</td>
</tr>
<tr>
<td>:USB:ID 11</td>
<td>Sets the remote destination to DEMUX.*1</td>
</tr>
<tr>
<td>:SYST:LINK:DEM ON</td>
<td>Links the ED and DEMUX.</td>
</tr>
<tr>
<td>Wait 3000 ms.*2</td>
<td>Link setting requires about 3 seconds.</td>
</tr>
</tbody>
</table>

*1: Sets the remote command destination for the MX180000A Main Application.

*2: Wait indicates the recommended wait time for the MX180000A before transmitting the next command. This command is not supported by the MP1800A.
The items shaded in gray in the table above should be replaced with the following remote commands if the MU181500B Jitter Module is not installed in Slot 5 and 6.

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:UENT:ID 1;:MOD:ID 3</td>
<td>Sets the remote command destination to PPG.</td>
</tr>
<tr>
<td>:SYST:INP:CSEL INT</td>
<td>Links the PPG and Synthesizer.</td>
</tr>
<tr>
<td>Wait 1000 ms. *²</td>
<td>Link setting requires about one second.</td>
</tr>
</tbody>
</table>
E.3 Setting Examples of Measurement Conditions

E.3.1 Setting example of Test Conditions - Pattern, Measurement -

This section describes an example procedure for setting measurement conditions.
Test Pattern, Measurement settings apply to the PPG/ED linked to the MUX/DEMUX.

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:UENT:ID 1;:MOD:ID 3</td>
<td>Sets the remote command destination to PPG.</td>
</tr>
<tr>
<td>:SOUR:PATT:TYPE PRBS</td>
<td>Sets the PPG Test Pattern to &quot;PRBS31&quot;.</td>
</tr>
<tr>
<td>:SOUR:PATT:PRBS:LENG 31</td>
<td></td>
</tr>
<tr>
<td>:UENT:ID 1;:MOD:ID 4</td>
<td>Sets the remote command destination to ED.</td>
</tr>
<tr>
<td>:SENS:PATT:TYPE PRBS</td>
<td>Sets the ED Test Pattern to &quot;PRBS31&quot;.</td>
</tr>
<tr>
<td>:SENS:PATT:PRBS:LENG 31</td>
<td></td>
</tr>
<tr>
<td>:SENS:MEAS:EAL:MODE SING</td>
<td>Sets the ED measurement mode to &quot;single&quot;.</td>
</tr>
<tr>
<td>:SENS:MEAS:EAL:UNIT CLOC</td>
<td>Measurement stops when the following</td>
</tr>
<tr>
<td>:SENS:MEAS:EAL:CLOC E_12</td>
<td>measurement cycle conditions are satisfied.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:USB:ID 11</td>
<td>Sets the remote command destination to DEMUX.</td>
</tr>
<tr>
<td>:DEM:DATA:INT DIF50</td>
<td>Sets the DEMUX Data Input Condition to &quot;Differential 50ohm&quot; &quot;Alternate&quot;.</td>
</tr>
<tr>
<td>:DEM:DATA:DIFF ALT</td>
<td></td>
</tr>
<tr>
<td>:USB:ID 7</td>
<td>Sets the remote command destination to MUX.</td>
</tr>
<tr>
<td>:MUX:DATA:TRAC ON</td>
<td>Sets the MUX Data and Xdata output conditions to the same values.</td>
</tr>
<tr>
<td>:MUX:DATA:AMPL DATA, 0.500</td>
<td>Sets the MUX Data Output Amplitude to &quot;0.5 Vpp&quot;.</td>
</tr>
</tbody>
</table>
E.3 Setting Examples of Measurement Conditions

E.3.3 Setting example of Test Conditions - Data Bitrate -

This section describes an example procedure for setting Output Bitrate. The Bitrate settings apply to the PPG/ED linked to the MUX/DEMUX.

**Table E.3.3-1 Setting example of Output Bitrate**

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:UENT:ID 1;:MOD:ID 3</td>
<td>Sets the remote command destination to PPG.</td>
</tr>
<tr>
<td>Wait 10000 ms.*</td>
<td>Up to 10 seconds are required for the system clock to stabilize and for completion of phase adjustment of the Data and Clock input to the MUX.</td>
</tr>
</tbody>
</table>

*: Wait- indicates the recommended wait time for sending the command. This command is not supported by the MP1800A.

E.3.4 Setting example of Test Conditions - Jitter Input-

This section describes an example procedure for setting Jitter Input. The recommended Jitter Input setting varies depending on the measurement conditions.

For Eye Diagram, Eye Margin, and Bathtub measurement:
- Send the following remote commands when the MU181500B Jitter Module is installed.

**Table E.3.4-1 Jitter Input examples with MU181500B installed**

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:USB:ID 7</td>
<td>Sets the remote command destination to MUX.</td>
</tr>
<tr>
<td>:MUX:DATA:JINP OFF</td>
<td>Sets MUX Jitter Input to OFF.</td>
</tr>
<tr>
<td>:USB:ID 11</td>
<td>Sets the remote command destination to DEMUX.</td>
</tr>
<tr>
<td>:DEM:CLOC:JINP OFF</td>
<td>Sets DEMUX Jitter Input to OFF.</td>
</tr>
<tr>
<td>:DEM:CLOC:BAND QUAT</td>
<td>Sets DEMUX Clock Input to Quarter Rate.*</td>
</tr>
<tr>
<td>:UENT:ID 1;:MOD:ID 6</td>
<td>The DEMUX Ext Clk Input and Jitter Module Reference Clock Output must be connected using a coaxial cable.</td>
</tr>
<tr>
<td>:OUTP:AUX:REFC 1</td>
<td>Sets the remote command destination to Jitter Module.</td>
</tr>
<tr>
<td></td>
<td>Sets Reference Clock to 1/1 clock output.</td>
</tr>
</tbody>
</table>

*: Sets the argument as shown below depending on the measurement bit rate.

60 Gbps < Bitrate ≤ 64 Gbps 1/8 Clock Rate(EIGH)
### Sequence Examples

30 Gbps < Bitrate ≤ 60 Gbps Quarter Clock Rate (QUAT)

Bitrate ≤ 30 Gbps Half Clock Rate (HALF)

- Send the following remote commands when the MU181500B (Jitter Module) is not installed.

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:USB:ID 7</td>
<td>Sets the remote command destination to MUX.</td>
</tr>
<tr>
<td>:MUX:DATA:JINP OFF</td>
<td>Sets MUX Jitter Input to OFF.*¹</td>
</tr>
<tr>
<td>:USB:ID 11</td>
<td>Sets the remote command destination to DEMUX.</td>
</tr>
<tr>
<td>:DEM:CLOC:JINP OFF</td>
<td>Sets DEMUX Jitter Input to OFF.*¹</td>
</tr>
<tr>
<td>:DEM:CLOC:BAND HALF</td>
<td>Sets DEMUX Clock Input to Half Rate.</td>
</tr>
</tbody>
</table>

The DEMUX Ext Clk Input and MUX Clk Output (or equivalent signal) must be connected using a coaxial cable.

Send the following remote commands for MX181500A Jitter Application measurement.
MX181500A Jitter Application is launched after this command is sent.
For example command sequences and how to start MX181500A, refer to the MX181500A Operation Manual.

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:USB:ID 7</td>
<td>Sets the remote command destination to MUX.</td>
</tr>
<tr>
<td>:MUX:DATA:JINP ON</td>
<td>Sets MUX Jitter Input to ON.</td>
</tr>
<tr>
<td>:USB:ID 11</td>
<td>Sets the remote command destination to DEMUX.</td>
</tr>
<tr>
<td>:DEM:CLOC:JINP ON</td>
<td>Sets DEMUX Jitter Input to ON.</td>
</tr>
<tr>
<td>:DEM:CLOC:BAND HALF</td>
<td>Sets DEMUX Clock Input to Half Rate.</td>
</tr>
</tbody>
</table>

The DEMUX Ext Clk Input and MUX Clk Output (or equivalent signal) must be connected using a coaxial cable.
E.3 Setting Examples of Measurement Conditions

E.3.5 Setting example of Test Conditions - Data Output ON -

This section describes the procedure for setting the MUX Data Output to ON.

Table E.3.5-1 Setting example of MP1861A Data Output ON

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:USB:ID 7</td>
<td>Sets the remote command destination to MUX.</td>
</tr>
<tr>
<td>:MUX:DATA:OUTP ON</td>
<td>Enables the MUX Data Output.</td>
</tr>
<tr>
<td>:SOUR:OUTP:ASET ON</td>
<td>Enables Data Output for the entire system.</td>
</tr>
<tr>
<td>Wait 6000 ms.*2</td>
<td>The phase of the Data and Clock input to the MUX is automatically adjusted after initialization. About six seconds are required until completion.*1</td>
</tr>
<tr>
<td>:SYST:INP:DCAD:AUTO ON</td>
<td>Enables the function to automatically adjust the phase of the Data and Clock input to the MUX.*2</td>
</tr>
</tbody>
</table>

*1: Wait- indicates the recommended wait time for sending the command. This command is not supported by the MP1800A.

*2: To specify the timing for executing phase adjustment of the Data and Clock input to the MUX, set to OFF. If set to OFF, the Wait processing unit can be replaced using the procedure described in "E.6 Use Example of Status Command".
E.4 Auto Search Execution Example

This section describes an example procedure for Auto Search with respect to DEMUX.

Using Auto Search sets the optimum Vth, Delay for the input Data.

Table E.4-1 Auto Search execution setting example

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:SYST:CFUN OFF</td>
<td>Closes the Automatic Measurement screen currently open.</td>
</tr>
<tr>
<td>:SYST:CFUN ASE32</td>
<td>Opens the Auto Search screen.</td>
</tr>
<tr>
<td>:SENS:MEAS:ASE:STAR</td>
<td>Starts Auto Search. About 20 seconds are required for DEMUX Auto Search (Coarse) to complete. (When the DEMUX Input Condition is Single ended)</td>
</tr>
<tr>
<td>:SENS:MEAS:ASE:STAT?</td>
<td>Determines that Auto Search has started. A return value of &quot;1&quot; indicates that measurement has started.*</td>
</tr>
<tr>
<td>:SENS:MEAS:ASE:STAT?</td>
<td>Determines that Auto Search has ended. A return value of &quot;0&quot; indicates that measurement has ended, and a value of &quot;–1&quot; indicates that measurement failed.*</td>
</tr>
<tr>
<td>:SYST:CFUN OFF</td>
<td>Closes the Auto Search screen.</td>
</tr>
</tbody>
</table>

*: Use processing corresponding to C language "for" and "While" statements for this processing to send queries until the expected value is detected. Set the sending interval between queries to at least 200 ms to avoid overloading the instrument used for the measurement processing. Execute the next command after the expected value has been detected.
E.5 Measurement

E.5.1 BER measurement execution example

This section describes an example procedure for BER measurement.

Table E.5.1-1 BER measurement setting example

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:USB:ID 11;:DISP:ACT 0,11,1</td>
<td>Sets the remote command destination to DEMUX.</td>
</tr>
<tr>
<td>:DEM:MEAS:STAR</td>
<td>Starts BER measurement.</td>
</tr>
<tr>
<td>:DEM:MEAS:EAL:STAT?</td>
<td>Determines that BER measurement has started. A return value of &quot;1&quot; indicates that measurement has started.*</td>
</tr>
<tr>
<td>:DEM:MEAS:EAL:STAT?</td>
<td>Determines that BER measurement has ended. The return value will be &quot;0&quot; when measurement ends if the ED Measurement Conditions are set to &quot;Single&quot;.*</td>
</tr>
<tr>
<td>:DEM:MEAS:STOP</td>
<td>Stops BER measurement after the wait time if the ED measurement cycle is set to &quot;Repeat&quot; or &quot;Untimed&quot;.</td>
</tr>
</tbody>
</table>

*: Use processing corresponding to C language "for" and "While" statements for this processing to transmit queries until the expected value is detected. Set the sending interval between queries to at least 200 ms to avoid overloading the instrument used for the measurement processing. Execute the next command after the expected value has been detected.
E.5.2 Eye Margin measurement execution example

This section describes an example procedure for Eye Margin.

### Table E.5.2-1  Eye Margin measurement setting example

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:UENT:ID 1</td>
<td>Sets the remote command destination to MP1800A.</td>
</tr>
<tr>
<td>:SYST:CFUN OFF</td>
<td>Closes the Automatic Measurement screen currently open.</td>
</tr>
<tr>
<td>:SYST:CFUN EMAR32</td>
<td>Opens the Eye Margin measurement screen.</td>
</tr>
<tr>
<td>:SENS:MEAS:EMAR:MARG:SLOT USB11,1,ON</td>
<td>Sets the measurement target to USB11 (DEMUX).</td>
</tr>
<tr>
<td>:SENS:MEAS:EMAR:MARG:ASE ON,1</td>
<td>Executes Auto Search Coarse when measurement starts.</td>
</tr>
<tr>
<td>:SENS:MEAS:EMAR:MARG:RES COAR</td>
<td>Sets the measurement accuracy to Coarse.</td>
</tr>
<tr>
<td>:SENS:MEAS:EMAR:MARG:THR E_8</td>
<td>Sets the measured BER value to 1E–8.</td>
</tr>
<tr>
<td>:SENS:MEAS:EMAR:STAT?</td>
<td>Determines that Eye Margin measurement has started. A return value of &quot;1&quot; indicates that measurement has started. *1</td>
</tr>
<tr>
<td>:SENS:MEAS:EMAR:STAT?</td>
<td>Determines that Eye Margin measurement has ended. A return value of &quot;0&quot; indicates that measurement has ended, and a value of &quot;–1&quot; indicates that measurement failed. *1</td>
</tr>
<tr>
<td>:SENS:MEAS:STOP</td>
<td>Stops Eye Margin measurement.</td>
</tr>
<tr>
<td>:SYST:MMEM:MARG:STOR &quot;C:\Test\emexample&quot;,CSV</td>
<td>Saves the measurement results in CSV format to a specified folder. *2</td>
</tr>
<tr>
<td>:SYST:MMEM:MARG:STOR &quot;C:\Test\emexample&quot;,BIN</td>
<td>Saves the measurement results in BIN format to a specified folder. *2 *3</td>
</tr>
<tr>
<td>:SYST:CFUN OFF</td>
<td>Closes the Eye Margin measurement screen.</td>
</tr>
</tbody>
</table>

*1: Use processing corresponding to C language "for" and "While" statements for this processing to send queries until the expected value is detected. Set the sending interval between queries to at least 200 ms to avoid overloading the instrument used for the measurement processing. Execute the next command after the expected value has been detected.

*2: If no directory exists for saving measurement results ("C:\Test" in this example), one must be created beforehand by the user. Saving using the same file name ("example" in this example) will overwrite
the previous results. Alter the file name if you wish to repeatedly save results.

*3:  Saved BIN results can be loaded by sending the following command with the Eye Margin measurement screen open.

:SYST:MMEM:MARG:REC "C:\Test\emexample"
E.5.3 Eye Diagram measurement execution example

This section describes an example procedure for Eye Diagram.

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:UENT:ID 1</td>
<td>Sets the remote command destination to MP1800A.</td>
</tr>
<tr>
<td>:SYST:CFUN OFF</td>
<td>Closes the Automatic Measurement screen currently open.</td>
</tr>
<tr>
<td>:SYST:CFUN EDI32</td>
<td>Opens the Eye Diagram measurement screen.</td>
</tr>
<tr>
<td>:SENS:MEAS:EDI:DIAG:SLOT USB11,1,ON</td>
<td>Sets the measurement target to USB11 (DEMUX).</td>
</tr>
<tr>
<td>:SENS:MEAS:EDI:DIAG:TYPE POIN16</td>
<td>Sets the number of measurement points to 16.</td>
</tr>
<tr>
<td>:DISP:RES:EDI:TABLE DIAG</td>
<td>Displays the Eye Diagram Diagram screen.</td>
</tr>
<tr>
<td>:DISP:RES:EDI:ATHR OFF</td>
<td>Clears the measurement and BER value displayed.</td>
</tr>
<tr>
<td>:DISP:RES:EDI:ERAT E_3,1</td>
<td>Sets the measurement and displayed BER value to 1E-3.</td>
</tr>
<tr>
<td>:DISP:RES:EDI:ERAT E_8,1</td>
<td>Sets the measurement and displayed BER value to 1E-8.</td>
</tr>
<tr>
<td>:SENS:MEAS:EDI:STAT?</td>
<td>Determines that Eye Diagram measurement has started. A return value of &quot;1&quot; indicates</td>
</tr>
<tr>
<td></td>
<td>that measurement has started.*1</td>
</tr>
<tr>
<td>:SENS:MEAS:EDI:STAT?</td>
<td>Determines that Eye Diagram measurement has ended. A return value of &quot;0&quot; indicates that</td>
</tr>
<tr>
<td></td>
<td>measurement has ended, and a value of &quot;–1&quot; indicates that measurement failed.*1</td>
</tr>
<tr>
<td>:SENS:MEAS:EDI:SCAL:ASC</td>
<td>Saves the measurement results in CSV format to a specified folder.*2</td>
</tr>
<tr>
<td>:SYST:MMEM:DIAG:STOR</td>
<td>Saves the measurement results in BIN format to a specified folder.*2 *3</td>
</tr>
<tr>
<td>&quot;C:\Test\edexample&quot;,EDG,CSV</td>
<td>Closes the Eye Diagram measurement screen.</td>
</tr>
<tr>
<td>:SYST:MMEM:DIAG:STOR</td>
<td></td>
</tr>
<tr>
<td>&quot;C:\Test\edexample&quot;,EDG,BIN</td>
<td></td>
</tr>
<tr>
<td>:SYST:CFUN OFF</td>
<td></td>
</tr>
</tbody>
</table>

*1: Use processing corresponding to C language "for" and "While" statements for this processing to send queries until the expected value is detected. Set the sending interval between queries to at least 200 ms to avoid overloading the instrument used for the
measurement processing. Execute the next command after the expected value has been detected.

*2: If no directory exists for saving measurement results ("C:\Test" in this example), one must be created beforehand by the user. Saving using the same file name ("example" in this example) will overwrite the previous results. Alter the file name if you wish to repeatedly save results.

*3: Saved BIN results can be loaded by sending the following command with the Bathtub measurement screen open.

:SYST:MMEM:DIAG:REC "C:\Test\edexample",BIN
E.5.4 Bathtub measurement execution example

This section describes an example procedure for Bathtub measurement. This example assumes that DEMUX has been synchronized with the input data by executing Auto Search beforehand. (Refer to E.4 Auto Search Execution Example.)

Table E.5.4-1 Bathtub measurement setting example

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:UENT:ID 1</td>
<td>Sets the remote command destination to MP1800A.</td>
</tr>
<tr>
<td>:SYST:CFUN OFF</td>
<td>Closes the Automatic Measurement screen currently open.</td>
</tr>
<tr>
<td>:SYST:CFUN BTUB32</td>
<td>Opens the Bathtub measurement screen.</td>
</tr>
<tr>
<td>:SENS:MEAS:BATH:SELS USB11,1,ON</td>
<td>Sets the Bathtub measurement target to USB11 (DEMUX).</td>
</tr>
<tr>
<td>:SENS:MEAS:BATH:ASE OFF</td>
<td>Sets so that Auto Search is not performed when measurement starts.</td>
</tr>
<tr>
<td>:SENS:MEAS:BATH:MODE REP</td>
<td>Sets measurement to Repeat mode.</td>
</tr>
<tr>
<td>:SENS:MEAS:BATH:TIM 5</td>
<td>Set the repeat measurement count to five times.</td>
</tr>
<tr>
<td>:SENS:MEAS:BATH:RES:MUI 4</td>
<td>Sets the minimum number of Delay steps to &quot;4 mUI&quot;.</td>
</tr>
<tr>
<td>:SENS:MEAS:BATH:ECO COAR</td>
<td>Determines BER for a measurement point when an error is counted during measurement at that measurement point.</td>
</tr>
<tr>
<td>:SENS:MEAS:BATH:RANG E_10 E_5,E_10</td>
<td>Sets the lower limit for the measured BER range to 1E–10.</td>
</tr>
<tr>
<td>:SENS:MEAS:BATH:CALR</td>
<td>Sets the BER range used for jitter calculation from 1E–5 to 1E–10.</td>
</tr>
<tr>
<td>:SENS:MEAS:BATH:STAT?</td>
<td>Determines that Bathtub measurement has started. A return value of &quot;1&quot; indicates that measurement has started.*1</td>
</tr>
<tr>
<td>:SENS:MEAS:BATH:STOP</td>
<td>Determines that Bathtub measurement has ended. A return value of &quot;0&quot; indicates that measurement has ended.*1</td>
</tr>
<tr>
<td>:SYST:MMEM:BATH:STOR &quot;C:\Test\btexample&quot;,PSB,CSV</td>
<td>Stops Bathtub measurement.</td>
</tr>
<tr>
<td>:SYST:MMEM:BATH:STOR &quot;C:\Test\btexample&quot;,PSB,BIN</td>
<td>Saves the measurement results in CSV format to a specified folder.*2</td>
</tr>
<tr>
<td>:SYST:CFUN OFF</td>
<td>Saves the measurement results in BIN format to a specified folder.*2 *3</td>
</tr>
<tr>
<td></td>
<td>Closes the Bathtub screen.</td>
</tr>
</tbody>
</table>

*1: Use processing corresponding to C language "for" and "While" statements for this processing to send queries until the expected value is detected. Set the sending interval between queries to at least 200 ms to avoid overloading the instrument used for the
measurement processing. Execute the next command after the expected value has been detected.

*2: If no directory exists for saving measurement results ("C:\Test" in this example), one must be created beforehand by the user. Saving using the same file name ("example" in this example) will overwrite the previous results. Alter the file name if you wish to repeatedly save results.

*3: Saved BIN results can be loaded by sending the following command with the Bathtub measurement screen open.

:SYST:MMEM:BATH:REC "C:\Test\btexample"
E.6 Use Example of Status Command

This section describes an example procedure for executing PPG-MUX Adjustment and loading status using remote commands.

<table>
<thead>
<tr>
<th>Remote Commands</th>
<th>Explanation of Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>:USB:ID 7;:DISP:ACT 0,7,1</td>
<td>Sets the remote command destination to MUX.</td>
</tr>
<tr>
<td>INST:MUX:RES</td>
<td>Initializes the status register.</td>
</tr>
<tr>
<td>INST:MUX:PTR 32</td>
<td>Sets the positive logic Transition. Set to 32 (bit 5) here to determine the Adjustment state between PPG-MUX.</td>
</tr>
<tr>
<td>INST:MUX:NTR 0</td>
<td>Sets the negative logic Transition. Set to 0 here, as negative logic is not checked.</td>
</tr>
<tr>
<td>INST:MUX:EVEN?</td>
<td>Clears Event with one query.</td>
</tr>
<tr>
<td>SYST:INP:DCAD</td>
<td>Starts PPG-MUX Adjustment.</td>
</tr>
<tr>
<td>INST:MUX:EVEN?</td>
<td>Determines that Adjustment has started.</td>
</tr>
<tr>
<td>INST:MUX:COND?</td>
<td>Querying continues until the return value is &quot;32&quot;.*</td>
</tr>
</tbody>
</table>

*: Use processing corresponding to C language "for" and "While" statements for this processing to send queries until the expected value is detected. Set the sending interval between queries to at least 200 ms to avoid overloading the instrument used for the measurement processing. Execute the next command after the expected value has been detected.