# MP1580A
# Portable 2.5G/10G Analyzer
# Operation Manual
# Vol. 1
# Jitter/Wander Measurement

**Fourth Edition**

**Read this manual before using the equipment.**
**Keep this manual with the equipment.**


## ANRITSU CORPORATION

Document No.: M-W1889AE-4.0

# Safety Symbols

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

MP1580A
Portable 2.5G/10G Analyzer
Operation Manual Vol. 1 Jitter/Wander Measurement

1 March 2001 (First Edition)
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Printed in Japan

# For Safety

## WARNING ⚠

1. ALWAYS refer to the operation manual when working near locations at which the alert mark shown on the left is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.
   Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.

2. Measurement Categories
   This instrument is designed for Measurement category I (CAT I). Don't use this instrument at the locations of measurement categories from CAT II to CAT IV.
   In order to secure the safety of the user making measurements, IEC 61010 clarifies the range of use of instruments by classifying the location of measurement into measurement categories from I to IV.
   The category outline is as follows:
   Measurement category I (CAT I):
   Secondary circuits of a device connected to an outlet via a power transformer etc.
   Measurement category II (CAT II):
   Primary circuits of a device with a power cord (portable tools, home appliance etc.) connected to an outlet.
   Measurement category III (CAT III):
   Primary circuits of a device (fixed equipment) to which power is directly supplied from the power distribution panel, and circuits from the distribution panel to outlets.
   Measurement category IV (CAT IV):
   All building service-line entrance circuits through the integrating wattmeter and primary circuit breaker (power distribution panel).

# For Safety

## WARNING ⚠

**or**

**Repair**

WARNING⚠

**Calibration**


**Falling Over**

3. When supplying power to this equipment, connect the accessory 3-pin power cord to a grounded outlet. If a grounded outlet is not available, before supplying power to the equipment, use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.

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

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

6. This equipment should be used in the correct position. 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.
   And also DO NOT use this equipment in the position where the power switch operation is difficult.

# For Safety

## WARNING ⚠

**Battery Fluid**

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

**LCD**

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

# For Safety

## CAUTION ⚠

**Changing Fuse**

CAUTION ⚠

1. Before changing the fuses, ALWAYS remove the power cord from the poweroutlet and replace the blown fuses. ALWAYS use new fuses of the type and rating specified on the fuse marking on the rear panel of the cabinet.

   T 6.3 A indicates a time-lag fuse.

   There is risk of receiving a fatal electric shock if the fuses are replaced with the power cord connected.

**Cleaning**

2. Keep the power supply and cooling fan free of dust.
   - Clean the power inlet regularly. If dust accumulates around the power pins, there is a risk of fire.
   - Keep the cooling fan clean so that the ventilation holes are not obstructed. If the ventilation is obstructed, the cabinet may overheat and catch fire.

# For Safety

## CAUTION ⚠

**Replacing Memory Back-up Battery**

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

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

**Floppy Disk**

Don't place in a dusty area.

Clean the magnetic head periodically for normal operation.

For details on cleaning the head, refer to paragraph E.5 "Cleaning the Floppy Disk Drive" in this manual.

# Equipment Certificate

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

# Anritsu Warranty

Anritsu Corporation will repair this equipment free-of-charge if a malfunction occurs within 1 year after shipment due to a manufacturing fault, provided that this warranty is rendered void under any or all of the following conditions.

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

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

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

# Anritsu Corporation Contact

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

## Notes On Export Management

This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.

Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.

When you dispose of export-controlled items, the products/manuals are needed to be broken/shredded so as not to be unlawfully used for military purpose.

# Power Line Fuse Protection

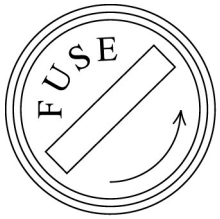
For safety, Anritsu products have either one or two fuses in the AC power lines as requested by the customer when ordering.

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

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

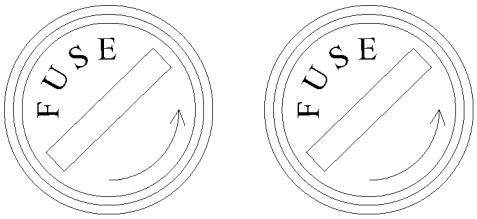
Example 1: An example of the single fuse is shown below:

**Fuse Holder**



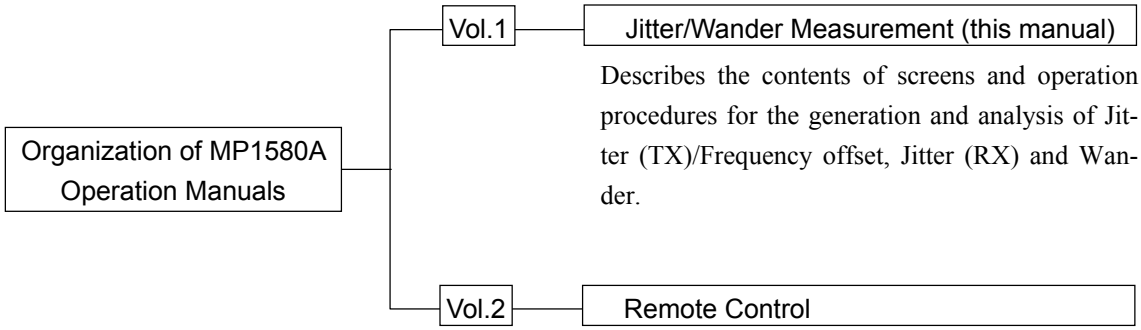

Example 2: An example of the double fuse is shown below:

**Fuse Holders**



# About MP1580A Operation Manuals

MP1580A Portable 2.5G/10G Analyzer Operation Manuals comprise of the following two documents. Use them properly according to the usage purpose.




Describes the contents of screens and operation procedures for the generation and analysis of Jitter (TX)/Frequency offset, Jitter (RX) and Wander.

Describes the remote control and program examples using the GPIB, RS-232C and Ethernet interfaces (MP1580A is compatible with SPCI standard).

## This Operation Manual describes the followings.

This manual (MP1580A Portable 2.5G/10G Analyzer Operation Manual Vol. 1 Remote Control) mainly describes commands and operation procedures for remote control of MP1580A.

## Screen Names

MP1580A has 4 major screens, namely, "Setup", "Test Menu", "Result" and "Analyze", and each major screen has its own subscreens (for details, see "Section 4 Screen Switching and Parameter Setting" of Vol. 1).
For example, if "Setup" is selected as the main screen and "Interface" as the sub-screen, they are stated as the "Setup: Interface" screen in this manual.

## Front Panel Keys

In this manual, (*****) [*****] indicate front panel keys.

# Table of Contents

VI.

# Section 1 General

This section explains the outline of MP1580A Portable 2.5G/10G Analyzer.

# 1.1 Product Outline

When installed with MU150018A 2.5G/10G Jitter Unit, MP1580A Portable 2.5G/10G Analyzer is capable of generating and evaluating Jitter/Wander of 2.5G/10G signal (appropriate Option is need to be mounted for wander generation/evaluation).

It can provide a high-performance jitter solution by using with MP1570A/ MP1570A1 equipped with MU150000A 2.5G/10G Unit, MU150001A/B Optical 2.5G/10G Tx (1.55) Unit and MU150017A/B Optical 2.5G/10G Rx (wide) Unit.

# 1.2 Product Features

The main features of MP1580A are as follows:

- Jitter and wander evaluation of 2488.32 MHz/9953.28 MHz signal can be performed.
- Portable size is easy to use for manufacture/maintenance
- Easy operation for measurement conditions by selecting from menu.
- Plug-in unit structure
- Remote control using the GPIB, RS-232C, and Ethernet is possible. The remote control commands conform to SCPI.
- A maximum of 10 setting conditions can be saved in the internal memory and can be retrieved easily.
- The tracking function enables automatic measurements for jitter tolerance, jitter sweep, frequency sweep and wander sweep by controlling MP1570A/MP1570A1 SONET/SDH/PDH/ATM Analyzer.

# 1.3 Equipment Configuration

## 1.3.1 Equipment Configuration with Standard Accessories

The standard configuration of MP1580A is shown in the table below.

**Main unit (MP1580A)**

| Model | Name | Remarks |
|---|---|---|
| MP1580A | Portable 2.5G/10G Analyzer | |

**Standard accessories**

| Model | Name | Qty | Remarks |
|---|---|---|---|
| W1889AE | MP1580A Portable 2.5G/10G Analyzer Operation Manual Vol. 1 Jitter/Wander Measurement | 1 | |
| W1890AE | MP1580A Portable 2.5G/10G Analyzer Operation Manual Vol. 2 Remote Control | 1 | |
| J0017F | Power supply cord | 1 | 100 V, L-type |
| | or | | |
| J0640A | Power supply cord | | 200 V, L-type |
| F0014 | Fuse 6.3 A | 2 | Normal fusion at 6.3 A |
| | Protective cover | 1 | For front panel protection |

## 1.3.2 Plug-in Unit Configuration

The plug-in units that can be installed on MP1580A are shown in the table below.

| Model/Order No. | Name | Remarks |
|---|---|---|
| MU150018A | 2.5G/10G Jitter Unit | |

## 1.3.3 Application Software Configuration

| Model | Name | Remarks |
|---|---|---|
| MX150002A | Wander (MTIE, TDEV) Measurement Application Software | |

**Application Software Accessories**

| Model | Name | Qty | Remarks |
|---|---|---|---|
| W1892AE | MX150002A Wander (MTIE, TDEV) Measurement Application Software Operation Manual | 1 | Accessory for MX150002A |

***Note:***

Make sure that all items on the configuration list are included.

Contact Anritsu or our dealers if you find missing or damaged parts.

# Section 2 Preparations Before Use

This section describes precautions you need to know before use.

You should thoroughly read this section, as it contains safety information and precautions for avoiding failure during operation.

# 2.1 Installation Site Environmental Conditions

MP1580A operates normally at ambient temperatures from 0 to 40 °C.

However, avoid using MP1580A at any of the following locations:

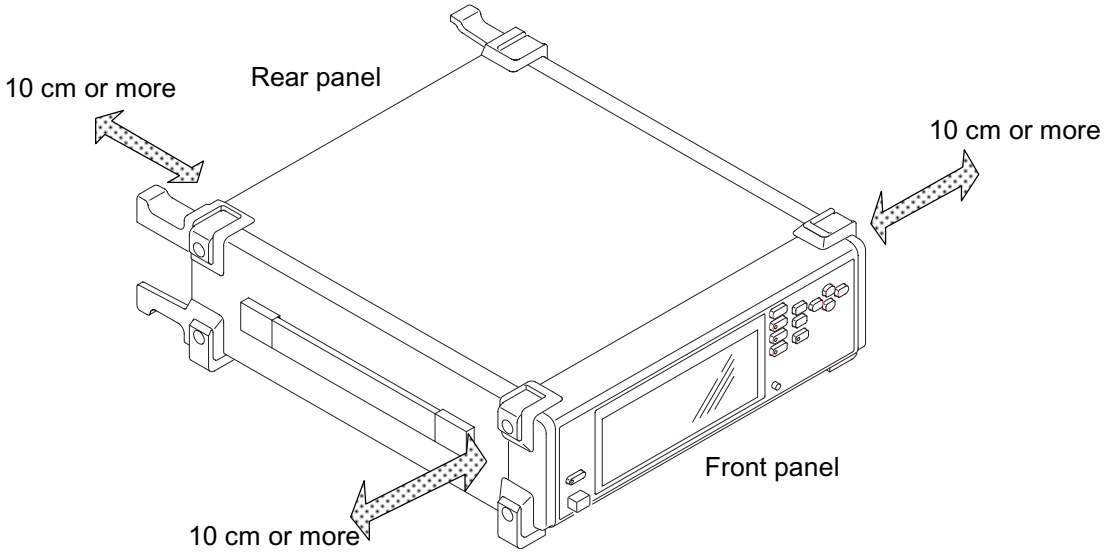
- Where there are strong vibrations
- Where there is high humidity or dust
- Where there is exposure to direct sunlight
- Where there is exposure to corrosive gasses
- Where there are large temperature fluctuations

## CAUTION ⚠

**If MP1580A is operated at a high temperature after being used for a long time at low temperature, there is a risk of short-circuiting caused by condensation. To prevent this, allow MP1580A to dry out completely before turning the power on.**

# 2.2 Distance Between Fan Ventilation Grills and Nearby Equipment

MP1580A has a fan ventilation grill on the rear panel. The rear panel must be at least 10 cm from nearby equipment or other obstacles to allow free air circulation. Insufficient air circulation results in an increase in internal temperature and may cause component damage.



# 2.3 Power Voltage

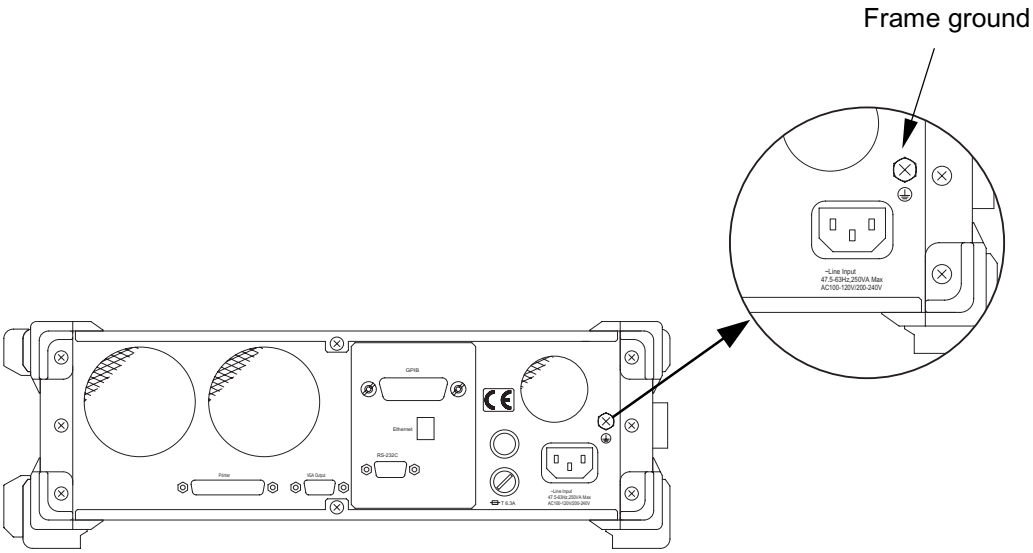
The supplied power must be in the range of AC 100 to 120 V or AC 200 to 230 V and at a frequency of 47.5 to 63 Hz. It is not necessary to set the rating for 100 V or 200 V system.

The power consumption is 250 VA or less.

# 2.4 Grounding

When supplying power to this equipment, connect the accessory 3-core power cord to a 3-pole grounded power outlet.

If a grounded 3-pole outlet is not available, use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground before supplying power to the equipment




## WARNING ⚠

**If power is supplied without grounding the equipment, there is a risk of severe or fatal electric shock. Connect the accessory 3-core power cord to a 3-pole grounded power outlet. Or, connect the ground wire of a conversion adapter or the frame ground on the rear panel of the equipment to ground.**

## 2.5 Connecting the Peripherals

Connect any peripherals, including printer, after turning on the power to MP1580A. Turning the power on after connecting the peripherals may damage MP1580A.

Also be sure to first turn off the peripherals before turning off MP1580A.

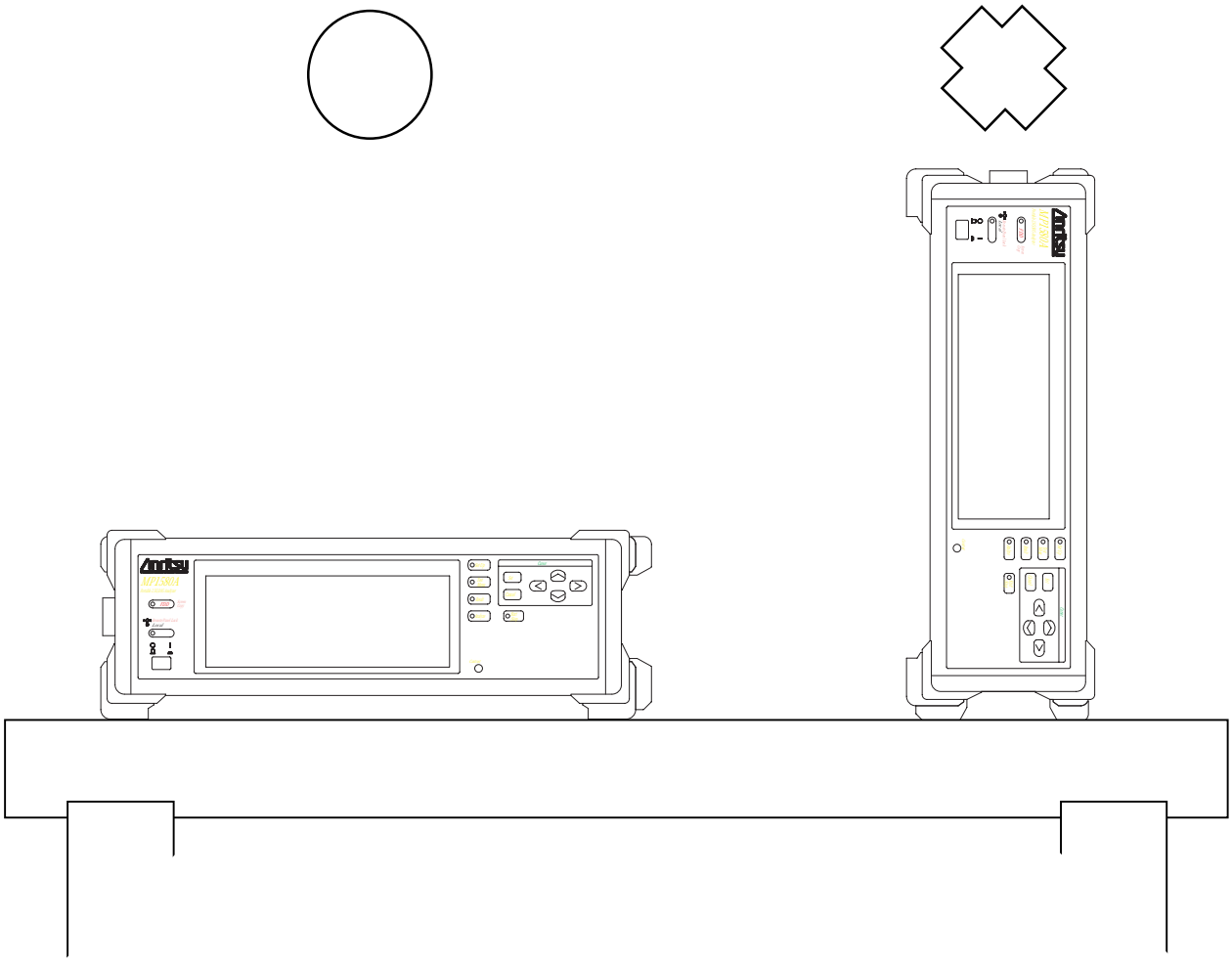
## 2.6 Connecting the Test Devices

Before connecting MP1580A to a device to be measured, check their input and output signal levels. When a signal exceeding the rating is inputted; internal devices may be damaged, resulting in unit failure.

Also be sure not to connect the output connectors each other, or results in unit failure.

## 2.7 Installing MP1580A

Place MP1580A properly to prevent it from falling down.



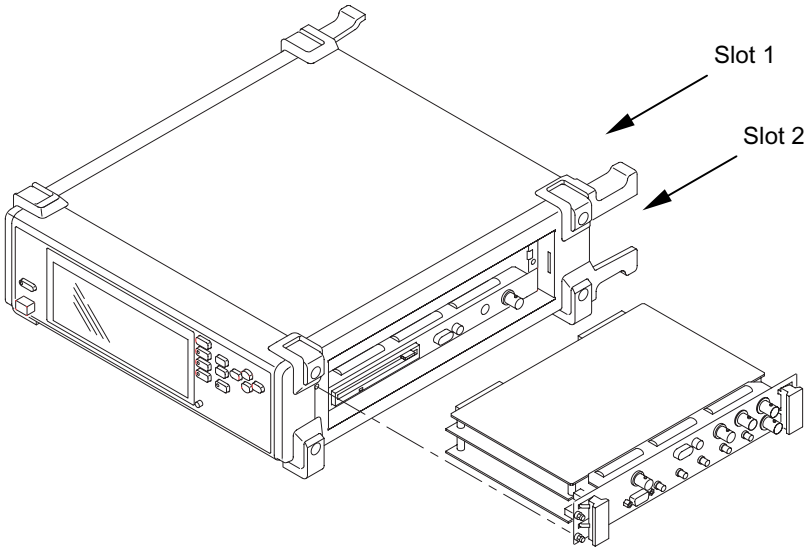
# 2.8 Inserting and Removing Plug-in Unit

Inserting procedure:

## 2.8.1 Inserting Plug-in Unit

(1) Turn off the Power switch of MP1580A.

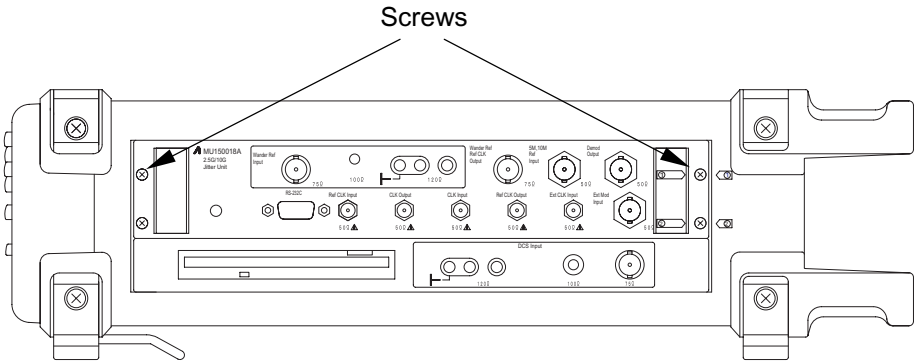
(2) Insert a plug-in unit in a slot on the right side panel.




- Slots are called as Slot 1, Slot 2, from the top one.
- See "2.9 Slots for Inserting Plug-in Units" for details on slot in which the plug-in unit is inserted. (When a plug-in unit is inserted into wrong slot, the unit is not detected as installed and does not function.)

(3) Insert the plug-in unit to the end along the guide rail.

(4) Tighten the left and right screws of the plug-in unit using a screwdriver.



## CAUTION ⚠

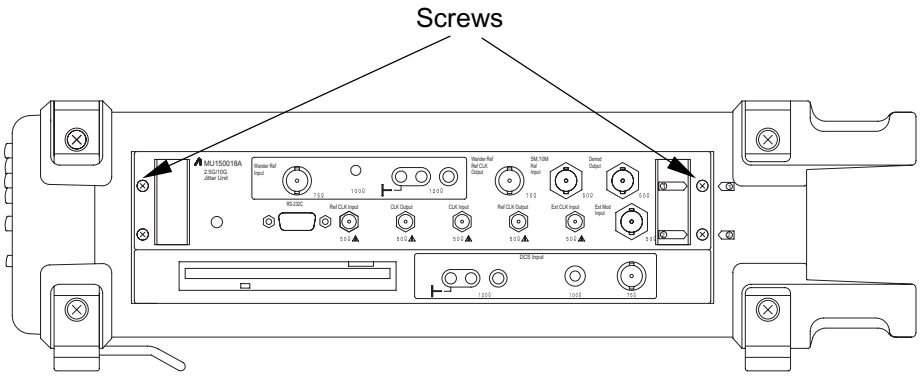
- **When inserting a plug-in unit, make sure that the power switch is turned off. Inserting a plug-in unit while MP1580A is turned on may result in unit failure.**
- **After inserting the plug-in unit, tighten the screws on the right and left sides. The plug-in unit may malfunction if the screws are loose.**
- **Insert a unit into the specified slot. For the slot specifications, see "2.9 Slots for Inserting Plug-in Units".**
- **Do not touch the electric component installed sections of the plug-in units to prevent them from being damaged.**
- **Store any unused plug-in units in the provided cases.**
- **Attach a blank panel to the blank slot.**

## 2.8.2 Removing Plug-in Unit

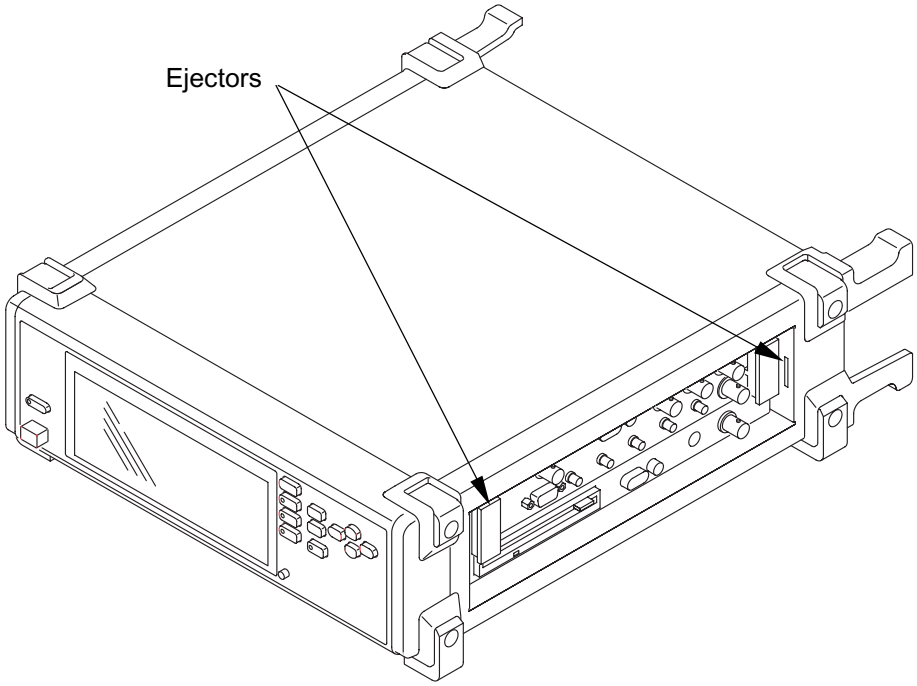
Removing procedure:

(1) Turn off the Power switch of MP1580A.

(2) Loosen the left and right screws of the plug-in unit.




(3) Push the ejectors at both ends of the plug-in unit outward to the direction of the arrows in the figure below.




(4) Gently pull out the plug-in unit while holding the ejectors.

## CAUTION ⚠

- **When removing a plug-in unit, make sure that the power switch is turned off. Removal of a plug-in unit while MP1580A is turned on may result in unit failure.**
- **Do not touch the electric component installed sections of the plug-in units to prevent them from being damaged.**
- **Store the unused plug-in units in the provided cases.**

# 2.9 Slots for Inserting Plug-in Units

The slots where the plug-in units should be inserted are shown in the table below.

**Slots for Inserting Plug-in Units**

| Unit | Slot 1 | Slot 2 |
|---|---|---|
| MU150018A 2.5G/10G Jitter Unit | ○*1 | |
| | | |

○ Plug-in unit can be inserted.

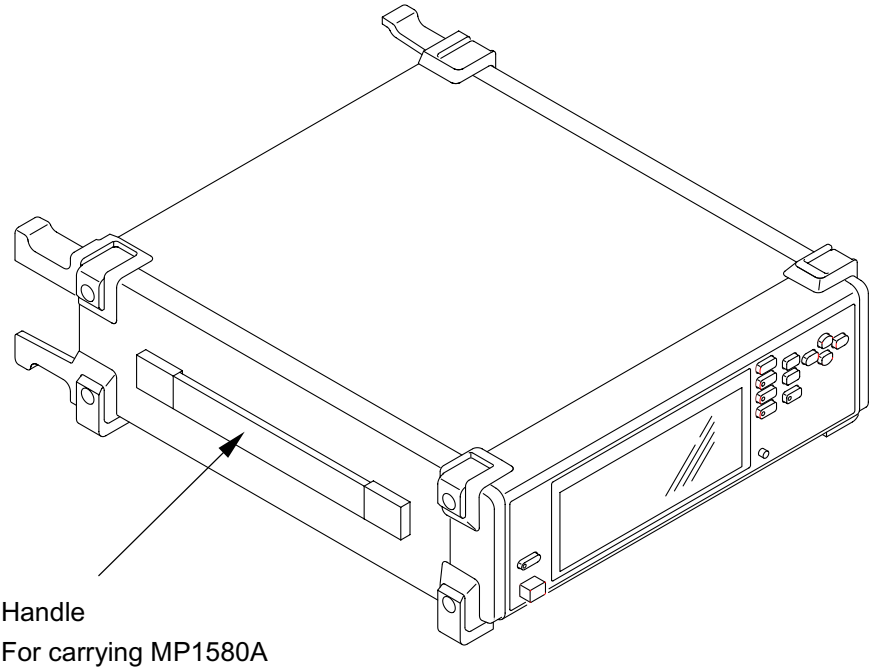
– Plug-in unit cannot be inserted.

*1 Use both Slot 1 and Slot 2.

# Section 3 Panel Description

This section describes names and functions of parts on panels of MP1580A and the units to be installed on it.

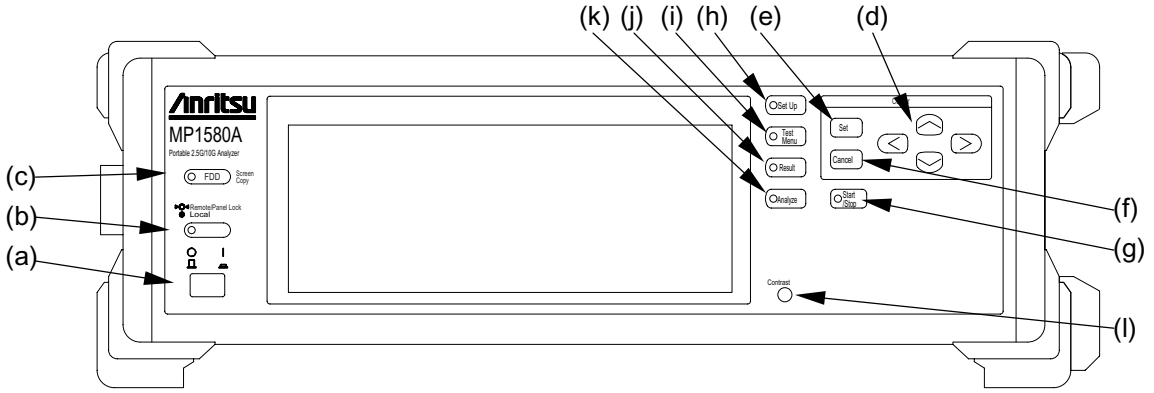
# 3.1 Panel Description of MP1580A

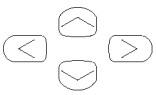


Handle
For carrying MP1580A

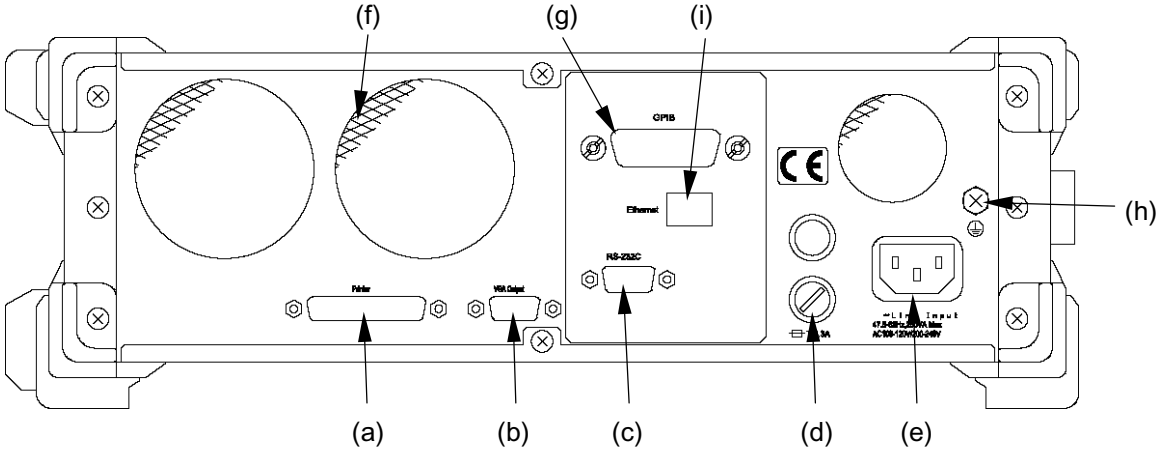
The names and functions of the front, rear and right side panels of MP1580A are described on the following pages.

## 3.1.1 Front Panel



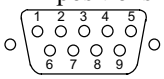

| | | |
|---|---|---|
| (a) |  | Power switch of MP1580A |
| (b) |  | Key to enable the local control (i.e., panel keys are enabled) while MP1580A is in the remote control status. In local control mode, this key switches between enable/disable for key inputs. When key input is disabled, the lamp on this key goes on. |
| (c) |  | Key to save the data displayed on the screen as a bitmap file in a floppy disk. |
| (d) |  | Keys to move the cursor on screen and window.<br>• In the numeric input window, are used to increment/decrement the displayed value.<br>• The displayed value can be changed continuously by holding down one of these keys. |
| (e) |  | Key to open the selection window, numeric input window and character string window at data setting. When these windows are already opened, the item on which the reverse cursor displayed is selected for setting. |
| (f) |  | Key to cancel the selection window, numeric input window and character string window at data setting. The setting before opening the window is retained. |
| (g) |  | Key to start/stop measurement. A lamp on this key lights during measurement. |
| (h) |  | Key to open the Setup main screen.<br>While the Setup main screen is displayed, a lamp on this key lights. |
| (i) |  | Key to open the Test Menu main screen.<br>While the Test Menu main screen is displayed, a lamp on this key lights. |
| (j) |  | Key to open the Result main screen.<br>While the Result main screen is displayed, a lamp on this key lights. |
| (k) |  | Key to open the Analyze main screen.<br>While the Analyze main screen is displayed, a lamp on this key lights. |
| (l) |  | Adjusts display brightness. |

## 3.1.2 Rear Panel




| | | |
|---|---|---|
| (a) | Printer port | Port to output the measured data results to an external printer. This is a Centronics connector.<br>• Printer output for this port can be switched on the "Setup: System" screen. |
| (b) | VGA output | Output connector for the screen display to an external monitor. |
| (c) | RS-232C connector | RS-232C interface connector.<br>• This interface is switched in the "Setup: System" screen (when the RS-232C option is installed.) |

Pin positions

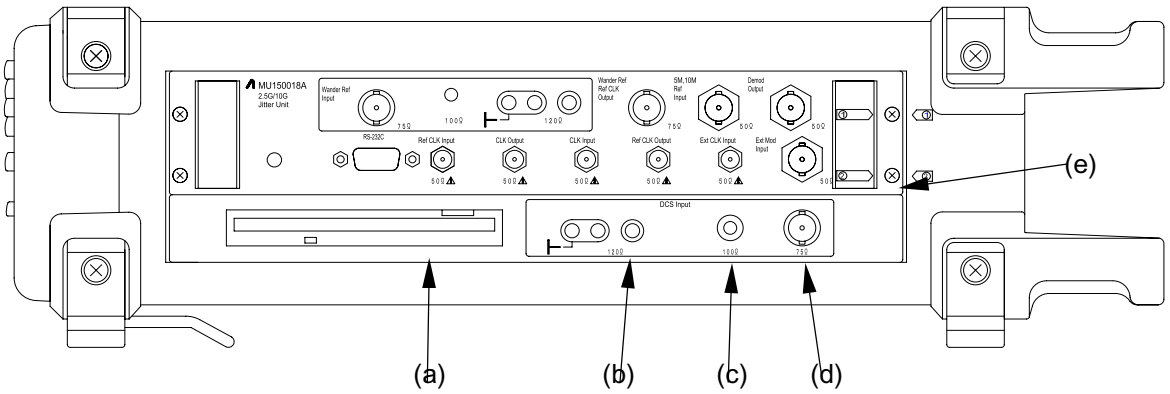



| NO | I/O | Name | |
|---|---|---|---|
| 1 | I | DCD (CD) | Detect |
| 2 | I | RXD (RD) | Receive Data |
| 3 | O | TXD (SD) | Send Data |
| 4 | O | DTR (ER) | Equipment |
| 5 | - | SG | Signal Ground |
| 6 | I | DSR (DR) | Data Set Ready |
| 7 | O | RTS (RS) | Request to Send |
| 8 | I | CTS (CS) | Clear to Send |
| 9 | I | RI (CI) | Call Indication |

Term of I/O in the above table is assumed to be seen from DTE (such as PC) side.

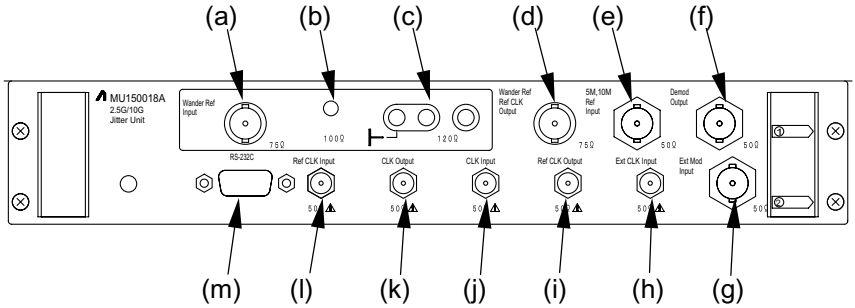
| | | |
|---|---|---|
| (d) | Fuse holder | Holders for AC power fuses. When replacing a blown fuse, be sure to use a new fuse of the same rating. |
| (e) | AC power inlet | Inlet for AC power supply. Use the attached power supply cord. |
| (f) | Fan | Cooling fan. Do not obstruct these openings for airflow. |
| (g) | GPIB connector | GPIB interface connector.<br>• Control mode for this interface can be switched in the "Setup: System" screen (when the GIPB option is installed). |
| (h) | Frame ground | Frame grounding terminal.<br>• When using a 2-pole power supply outlet, be sure to connect this terminal to ground potential before supplying the power. |
| (i) | Ethernet connector | Ethernet interface connector.<br>• This interface is switched in the "Setup: System" screen<br>(When the Ethernet option is installed.) |

## 3.1.3 Right Side Panel




| | | |
|---|---|---|
| (a) | 3.5 inch FDD | Floppy disk drive for saving or recalling the setup conditions, analysis graph data, measurement result and screen display.<br>• The floppy disks used must be of MS-DOS 1.44 MB format.<br>• 2HD disk can be used. |
| | [FD Eject button] | Push button for ejecting the floppy disk. |
| | [Access LED] | LED to be illuminated in green when the inserted floppy disk is being accessed. |
| (b) | DCS Input 120Ω | Clock/data input connector for synchronizing the transmission signal to an external clock. Input the clock, HDB3 data or 64 kHz +8 kHz AMI clock that conform to ITU-T G.703. |
| | Input frequency | 2.048 MHz, 64 kHz+8 kHz |
| | Bit rate | 2.048 Mbit/s |
| | Connector | 3 pin Siemens 120 Ω balanced |
| (c) | DCS Input 100Ω | Clock input connector for synchronizing the transmission signal to an external clock. Input the AMI, B8ZS data or a clock that conform to ANSI T1. |
| | Input frequency | 1.544 MHz |
| | Bit rate | 1.544 Mbit/s |
| | Connector | BANTAM 100 Ω |
| (d) | DCS Input 75Ω | Clock/data input connector for synchronizing the SDH transmission signal to an external clock. Input a clock or HDB3 data that conform to ITU-T G.703. |
| | Input frequency | 2.048 MHz |
| | Bit rate | 2.048 Mbit/s |
| | Connector | BNC 75 Ω unbalanced |
| (e) | Plug-in unit insertion slots | Slots for inserting the plug-in units.<br>• Slots are called as Slot 1, Slot 2, … from the top one.<br>• See "2.9 Slots for Inserting Plug-in Units" for unit and slot combination that can be installed. |

# 3.2 Panel Description of MU150018A Jitter Unit




| | | |
|---|---|---|
| (a) | Wander Ref Input 75Ω | Input connector for the reference signal from an external signal source during wander measurement. |
| | Input frequency/level | 1.544 MHz, 2.048 MHz (CLOCK); 1.125 $V_{OP}$±34%,<br>64 k +8 k; 3.0 $V_{OP}$±24% |
| | Bit rate/level | 2.048 Mbit/s (HDB3); 2.37 $V_{OP}$±10% |
| | Connector | BNC 75 Ω |
| (b) | Wander Ref Input 100Ω | Input connector for the reference signal from an external signal source during wander measurement. |
| | Bit rate/level | 1.544 Mbit/s; 3.0 $V_{OP}$±24% |
| | Connector | Weco310 Compatible 100 Ω |
| (c) | Wander Ref Input 120Ω | Input connector for 2M reference signal from an external signal source during wander measurement. |
| | Bit rate/level | 2.048 Mbit/s; 3.0 $V_{OP}$±24% |
| | Connector | 3-PoleCF 120 Ω |
| (d) | Wander Ref CLK Output 75Ω | Output connector for the reference signal for wander measurement during wander measurement. |
| | Output frequency/level | 1.544 MHz, 2.048 MHz;1.125 $V_{OP}$±0.3825 V, 5 MHz; 0.8 $V_{(p-p)}$ |
| | Connector | BNC 75 Ω |
| (e) | Ext. Ref. Input 5/10 M 50Ω | Input connector for 5 MHz/10 MHz reference signal from an external signal source when the clock is set to "Lock (5 M, 10 M) ". |
| | Input frequency/level | 5, 10 MHz; 0 to +10 dBm |
| | Connector | BNC 50 Ω |
| (f) | Demod Output 50Ω | Output connector for the analog signal of jitter-measurement phase-detection output. |
| | Output frequency/level | 2 UI/20 UI 1 $V_{(p-p)}$±0.2 V at fr=100 kHz<br>1000 UI/4000 UI 1 $V_{(p-p)}$±0.2 V at fr=10 Hz |
| | Connector | BNC 50Ω |
| (g) | Ext Mod Input 50Ω | Input connector for a modulation signal from an external equipment when the jitter generation mode is set to "External". |
| | Input frequency | 0.1 Hz to 80 MHz |
| | Connector | BNC 50 Ω |

| | | |
|---|---|---|
| (h) | Ext CLK Input 50Ω | Input connector for a jitter-added clock signal from an external device.<br>Enabled when "External" is selected for jitter modulation signal source in the "Setup: System" screen. |
| | Input frequency/level | 155.52 MHz; 0.8 $V_{(p-p)}$ ±0.25 V (AC) |
| | Connector | SMA 50 Ω |
| (i) | Ref CLK Output 50Ω | Output connector for the reference clock signal that generated by this unit without jitter or the clock signal inputted from the Ext Clock Input connector. |
| | Output frequency/level | 155.52 MHz; 0.8 $V_{(p-p)}$ ±0.25 V (AC) |
| | Connector | SMA 50 Ω |
| (j) | CLK Input 50Ω | Input connector for a clock signal for jitter measurement. |
| | Input frequency/level | 2488.32 MHz, 9953.28 MHz; 0.8 $V_{(p-p)}$ +0.35 V, 0.8 $V_{(p-p)}$ –0.25 V (AC) |
| | Connector | SMA 50 Ω |
| (k) | CLK Output 50 Ω | Output connector for a clock signal after adding jitter. |
| | Output frequency/level | 2488.32 MHz, 9953.28 MHz; 0.8 $V_{(p-p)}$+ 0.35 V, 0.8 $V_{(p-p)}$ –0.25 V (AC) |
| | Connector | SMA 50Ω |
| (l) | Ref CLK Input 50Ω | Input connector for an external reference signal for jitter measurement using an external reference signal. Enabled when "External" is selected for jitter-measurement reference-signal source in the "Setup: Jitter/Wander" screen. |
| | Input frequency/level | 155.52 MHz; 0.8 $V_{(p-p)}$ ±0.2 V (AC) |
| | Connector | SMA 50 Ω |
| (m) | RS-232C | Output connector for the TIE data measured by this unit to an external PC during wander measurement.<br>This connector is for using the wander measurement application software (MX150001B) on an external PC.<br>Pin numbers and corresponding signal names are shown in the table below. |

| Pin No. | Signal name | Pin No. | Signal name |
|---|---|---|---|
| 1 | CD | 5 | Ground |
| 2 | RD | 6 | DSR |
| 3 | TD | 7 | RTS |
| 4 | DTR | 8 | CTS |
| | | 9 | CI |

***Note:***

A name plate indicating the serial No. and installed options are attached on top panel of the unit.

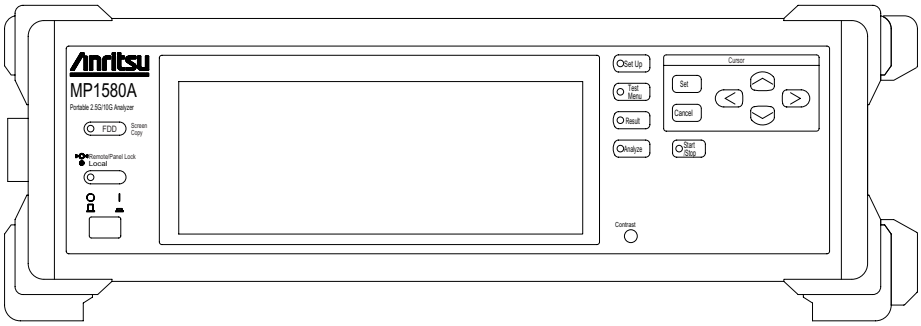
# Section 4 Screen Switching and Parameter Setting

This section describes the screen configuration and parameter setting for MP1580A equipped with MU150018A 2.5/10G Jitter Unit.

# 4.1 Basic Screen Operations

MP1580A provides four main screens: Setup, Test menu, Result and Analyze.

The main screens can be switched using Set Up, Test Menu, Result, or Analyze key on the front panel. For example, while the Setup main screen is being displayed, the Set Up key lamp is illuminated.

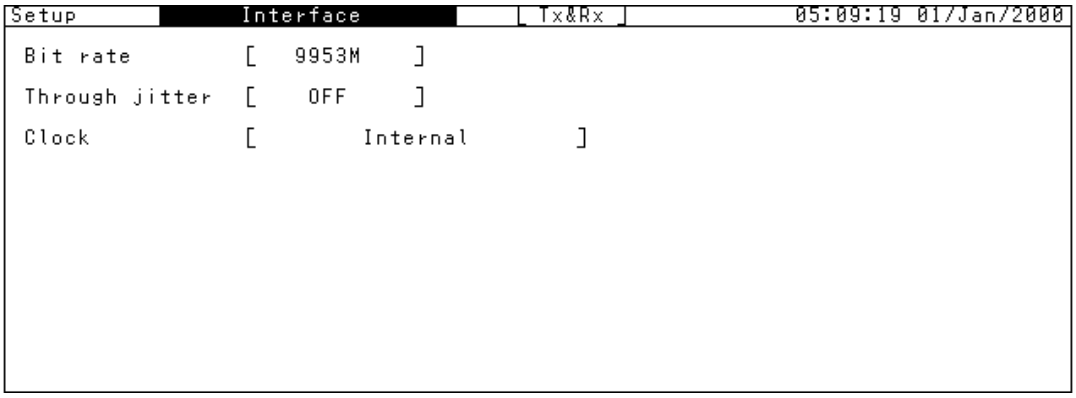



Use ↑, ↓, ← and → keys on the front panel to move the screen cursor, Set key to select or execute the item, and Cancel key to cancel the current selection.

# 4.2 Switching Sub-screens

The Setup, Test menu, Result, and Analyze main screens have their own sub-screens. Sub-screens can be switched in the steps described below.

(1) Using ▲, ▼, ◀ and ▶ keys, move the cursor to the sub-screen menu and click Set.

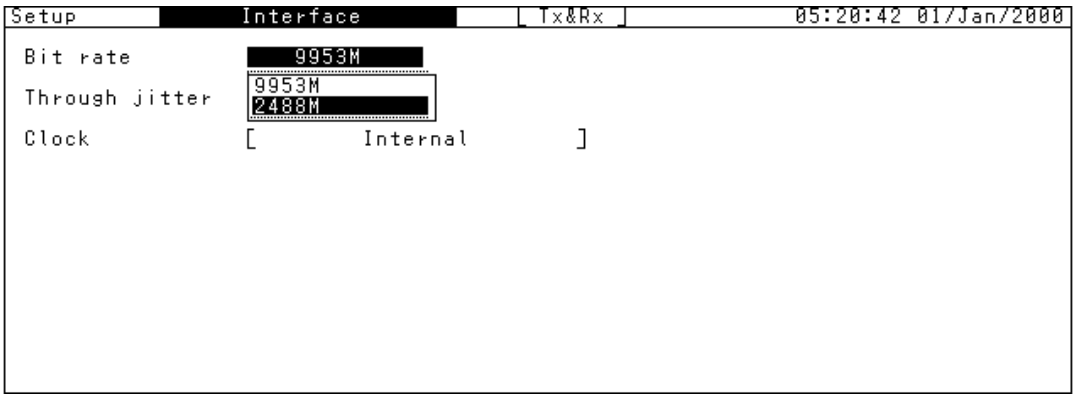



(2) A window opens. Use ▲ and ▼ keys to select the sub-window to be displayed and click Set key. Then the selected window appears.

# 4.3 Windows

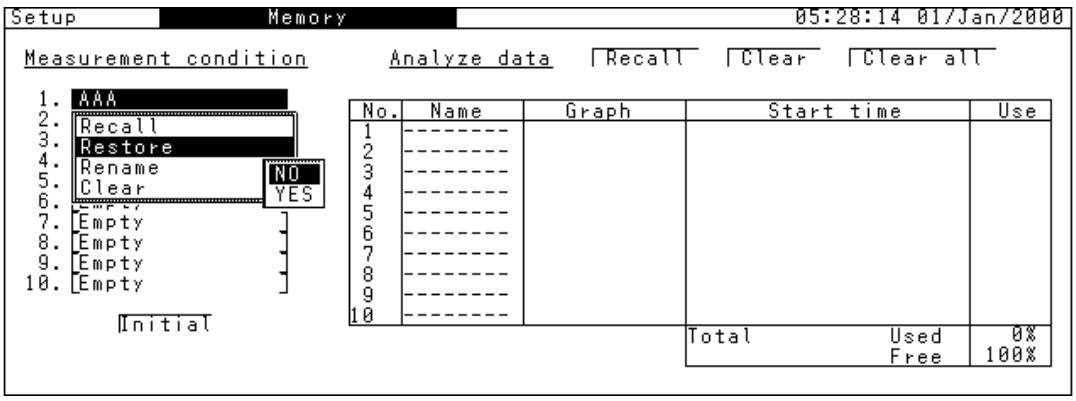
## 4.3.1 Input window

A window that is invoked by moving the cursor to the associated item and clicking Set key is called an input window.




## 4.3.2 Sub-windows

A window that is invoked by moving the cursor to the associated selection item on the menu selection window and clicking Set key is called a sub-window.




## 4.3.3 Entry to a window

There are three types for window entry:

- Selecting items
- Selecting numerical values
- Selecting character string

Sample selections are given below.

### Selecting items

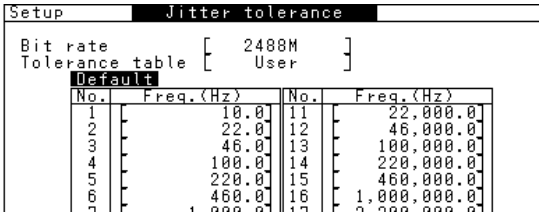
Select one of the available items displayed in the window.

#### Example: Selecting G.825 2M that is the Setup: Jitter tolerance default

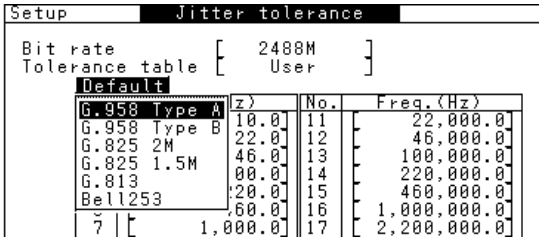
(1) Display Setup: Jitter tolerance.

(2) Set 'Tolerance table' to 'User.'

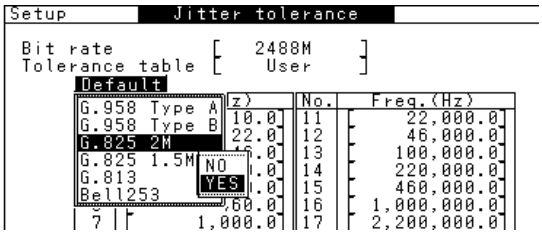
(3) Move the cursor to 'Default.'




(4) Click Set to open the window. From this window, select the target item using ▲ and ▼.




(5) Press Set to open the Yes/No selection window. On this window, select 'Yes' and then click Set to determine the set values.




### Entering numerical values

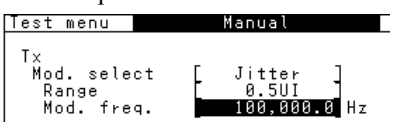
This is enabled for an item that accepts successive numerical values. A window appears, allowing changing the numerical values in each digit, to set numerical values.

#### Example: Changing modulation frequency on Test menu: Manual screen

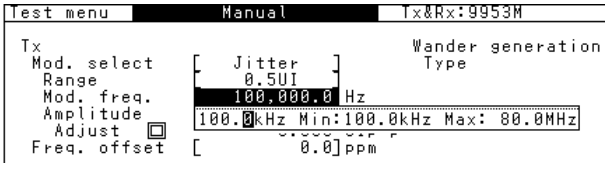
(1) Display Test menu: Manual screen.

(2) Set 'Mod. Select' to 'Jitter.'

(3) Move the cursor to 'Mod. freq.'.




(4) Click Set to open the window.



(5) Using ◁ and ▷, move the cursor to the digit containing the value to be changed.

(6) Using △ and ▽, set the numerical value.

***Note:***

This sample allows entering numerical values and a frequency unit. Numerical values can be set in the range within Min and Max values.

(7) Click Set to determine the settings.

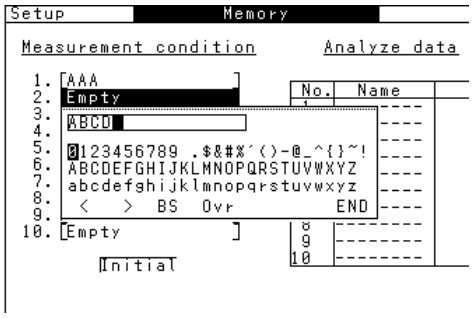
### Selecting character string

This is enabled for an item that accepts a character string. A window opens, allowing selecting alphabetical characters, to set a character string.

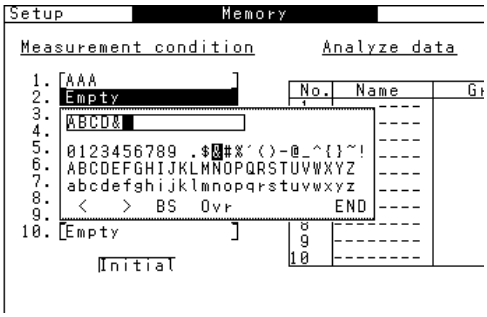
### Example: Entering a title to Peak Jitter screen

(1) Display Setup: Memory screen.

(2) Move the cursor to [Empty] and click Set to open the character string window.




(3) Move the cursor using △, ▽, ◁ and ▷ to specify a character.




(4) Clicking Set with the cursor positioned at ◁ or ▷ causes the cursor to move to the right or left, and clicking Set with the cursor positioned at 'BS' or 'Ins' causes backspacing or inserting operation.

(5) After character string entry is completed, move the cursor to END and click Set. Thus, the entered character string is determined.

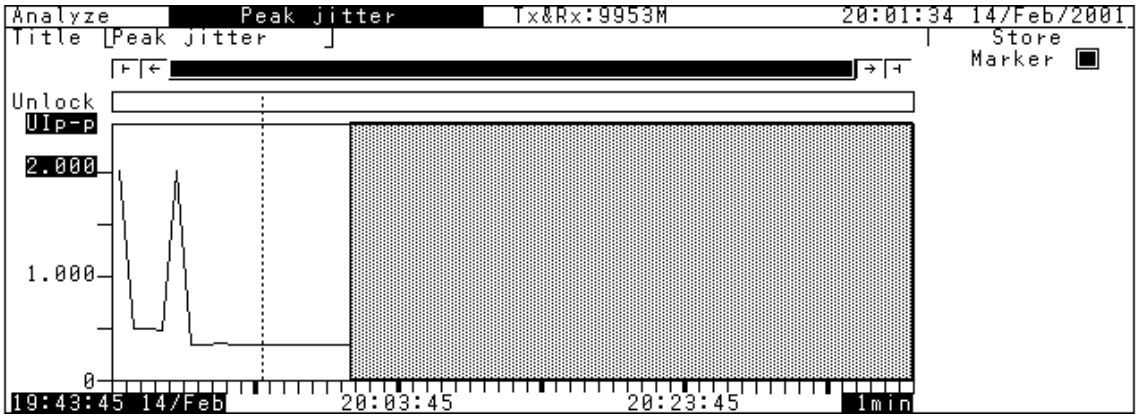
# 4.4 One-shot Entry

For one-shot entry, clicking [Set] causes the set values function to be determined.

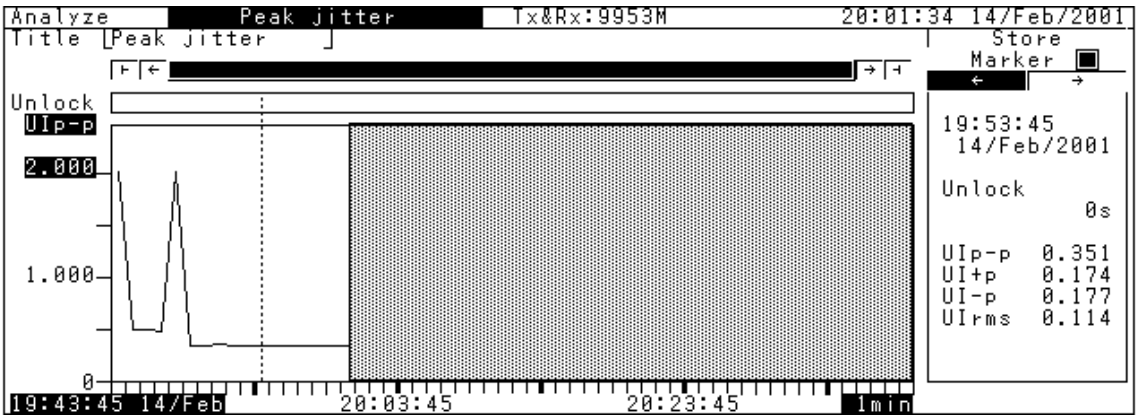
Example: Displaying a marker on Analyze: Peak Jitter screen

(1) Display Analyze: Peak Jitter screen.

(2) Click [Start/Stop] to start the measurement.




(3) When the measurement is over, move the cursor to 'Marker' and click [Set]. Then, the marker appears and the measured values at the marker position are displayed on the screen.

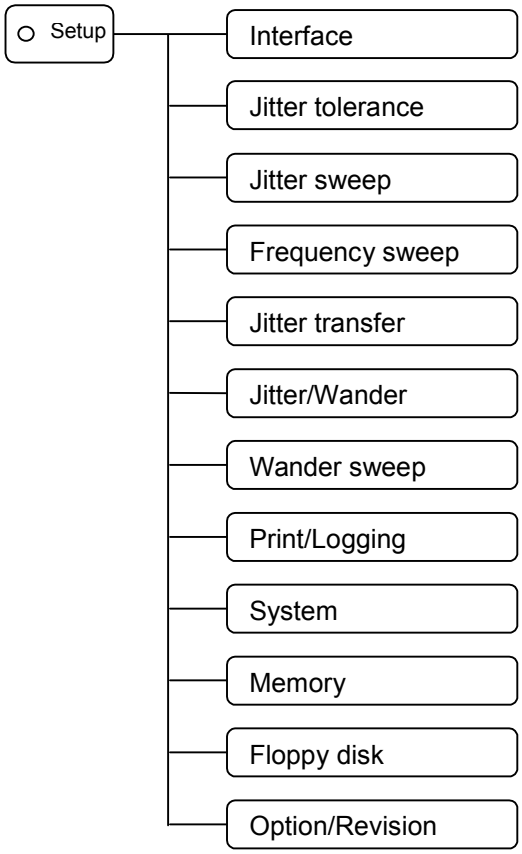


# Section 5 Screen Description

This section describes the screens that can be displayed when MP1580A is equipped with MU150018A 2.5/10G Jitter Unit, and the screen functions/displays related to jitter/wander measurement.

# 5.1 Setup Main Screen

The Setup main screen has the sub-screens listed below.



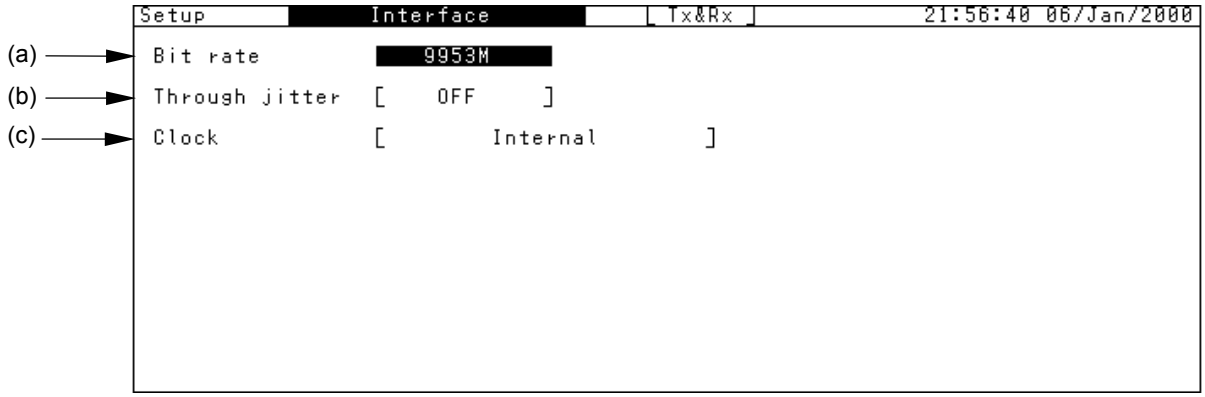

The screen names and functions are as follows:

| Screen name | Description |
|---|---|
| Interface | Sets the basic parameters (bit rate, clock, through jitter, etc.) for the jitter measurement interface. |
| Jitter tolerance | Sets the measurement table and standard mask for automatic jitter tolerance measurement. |
| Jitter sweep | Sets the measurement table for automatic jitter sweep measurement. |
| Frequency sweep | Sets the measurement table and standard mask for automatic frequency sweep measurement. |
| Jitter transfer | Sets the measurement table and standard mask for automatic jitter transfer characteristic measurement. |
| Jitter/Wander | Sets the basic conditions for jitter/wander measurement. |
| Wander sweep | Sets the measurement table for automatic wander sweep measurement. |
| Print/Logging | Sets the conditions for automatic measurement printing and for logging display. |
| System | Sets the timer, graph resolution, remote interface, etc. |
| Memory | Saves/reads the setting data and the analyze data. |
| Floppy disk | Saves data to or reads data from a floppy disk (FD). |
| Option/Revision | Displays unit options and the software revision. |

The following sections describe the sub-screen functions and displays of the Setup main screen related to jitter/wander measurement.

## 5.1.1 Setup: Interface screen

The Setup: Interface screen allows setting the basic parameters (bit rate, clock, through jitter, etc.) for the jitter measurement interface.

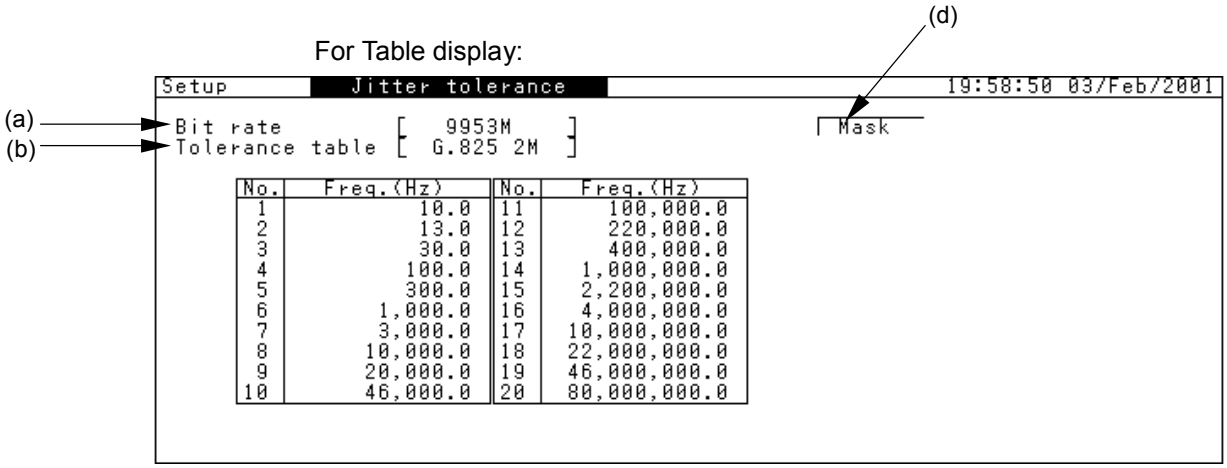



| | Item | Description |
|---|---|---|
| (a) | Bit rate | Selects 9953 M or 2488 M as the bit rate for the transmitted and received signals. |
| (b) | Through jitter | Sets the through jitter to ON/OFF.<br>This item cannot be set in Tx/Rx or Transfer mode. For details, see Section 6.1.3 "Measuring Recovery Data Clock's Jitter and Adding Jitter". |
| (c) | Clock | Specifies the reference clock for transmitted signals. |

## 5.1.2 Setup: Jitter tolerance screen

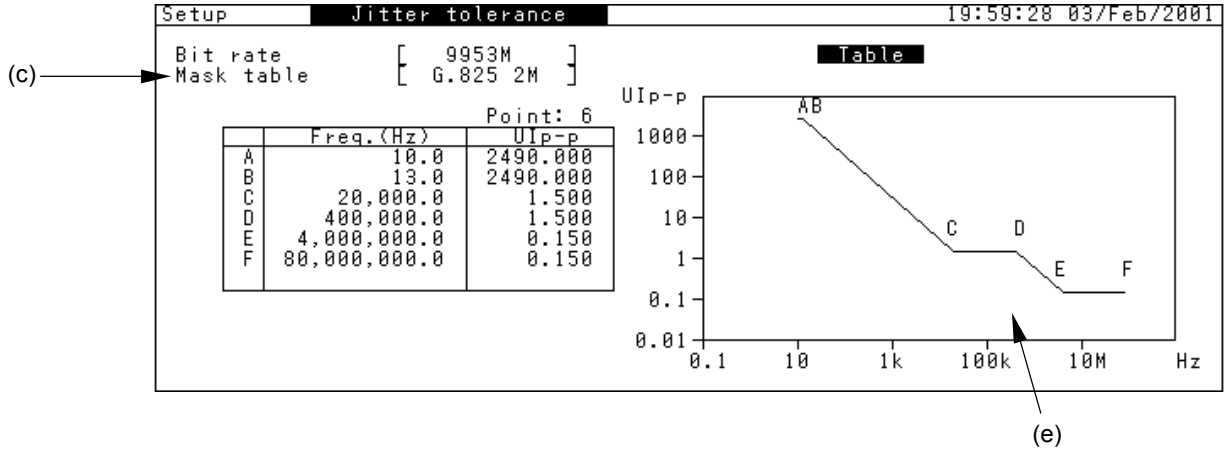
The Setup: Jitter tolerance screen allows setting the standard table and mask for the automatic jitter tolerance measurement. When "Tolerance table" and "Mask table" are set to "User", the standard conditions can be changed.

For Table display:




| No. | Freq.(Hz) | No. | Freq.(Hz) |
|---|---|---|---|
| 1 | 10.0 | 11 | 100,000.0 |
| 2 | 13.0 | 12 | 220,000.0 |
| 3 | 30.0 | 13 | 400,000.0 |
| 4 | 100.0 | 14 | 1,000,000.0 |
| 5 | 300.0 | 15 | 2,200,000.0 |
| 6 | 1,000.0 | 16 | 4,000,000.0 |
| 7 | 3,000.0 | 17 | 10,000,000.0 |
| 8 | 10,000.0 | 18 | 22,000,000.0 |
| 9 | 20,000.0 | 19 | 46,000,000.0 |
| 10 | 46,000.0 | 20 | 80,000,000.0 |

For Mask display:




| | Freq.(Hz) | UIp-p |
|---|---|---|
| A | 10.0 | 2490.000 |
| B | 13.0 | 2490.000 |
| C | 20,000.0 | 1.500 |
| D | 400,000.0 | 1.500 |
| E | 4,000,000.0 | 0.150 |
| F | 80,000,000.0 | 0.150 |

| | Item | Description |
|---|---|---|
| (a) | Bit rate | Selects the setting condition table for automatic measurement, by specifying the bit rate. |
| (b) | Tolerance Table | Selects and displays the standard points for the jitter tolerance output table. The table shows the jitter modulation frequency at each measurement point. |
| (c) | Mask table | Selects the standard line. The table shows the jitter modulation frequency and amplitude at each measurement point. |
| (d) | [Switching between Tolerance table and Mask table] | Switches between Tolerance and Mask tables by one-shot input. |
| (e) | [Standard line graph] | Displays the standard line using a graph. A to F indicate points on the mask table. |

For Tolerance table: User:

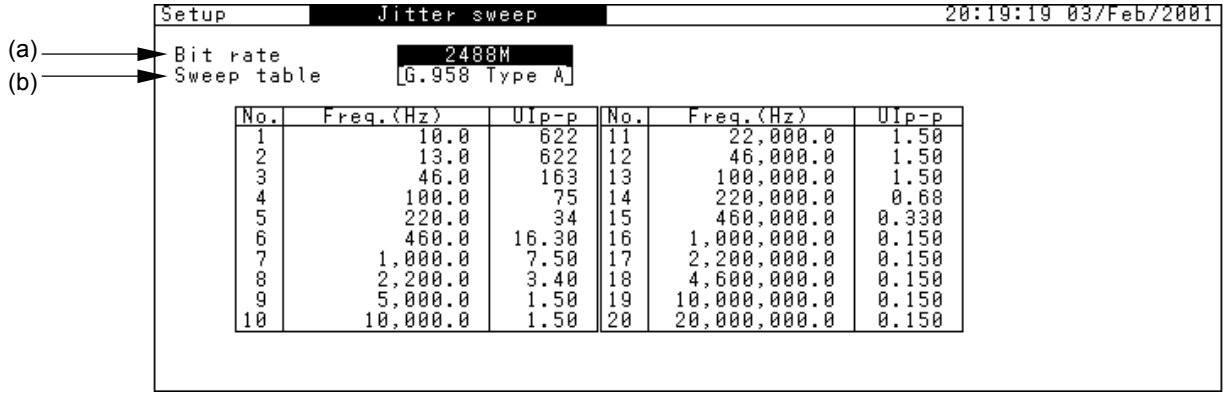
| | Item | Description |
|---|---|---|
| (b) | Tolerance table Default | Initializes the standard points.<br>The setting can be changed when "Tolerance table" is set to "User". |
| | Tolerance table Freq. | Displays the jitter modulation frequency for each standard point. |

For Mask table: User:

| | Item | Description |
|---|---|---|
| (c) | Mask table Default | Initializes the standard line.<br>The set value can be changed when "Mask table" is set to "User". |
| | Mask table Point | Changes the number of points on the standard line.<br>The set value can be changed when "Mask table" is set to "User". |
| | Mask table Freq./UIPP | Sets the frequency and jitter amplitude at each point on the standard line.<br>Clicking Set with the cursor positioned here opens a numerical value input window.<br>From this window, input a desired value.<br>The set value can be changed when "Mask table" is set to "User". |

## 5.1.3 Setup: Jitter sweep screen

The Setup: Jitter sweep screen allows setting the standard table for automatic jitter sweep measurement. When "Sweep table" is set to "User", the standard conditions can be changed.




| No. | Freq.(Hz) | UIp-p | No. | Freq.(Hz) | UIp-p |
|---|---|---|---|---|---|
| 1 | 10.0 | 622 | 11 | 22,000.0 | 1.50 |
| 2 | 13.0 | 622 | 12 | 46,000.0 | 1.50 |
| 3 | 46.0 | 163 | 13 | 100,000.0 | 1.50 |
| 4 | 100.0 | 75 | 14 | 220,000.0 | 0.68 |
| 5 | 220.0 | 34 | 15 | 460,000.0 | 0.330 |
| 6 | 460.0 | 16.30 | 16 | 1,000,000.0 | 0.150 |
| 7 | 1,000.0 | 7.50 | 17 | 2,200,000.0 | 0.150 |
| 8 | 2,200.0 | 3.40 | 18 | 4,600,000.0 | 0.150 |
| 9 | 5,000.0 | 1.50 | 19 | 10,000,000.0 | 0.150 |
| 10 | 10,000.0 | 1.50 | 20 | 20,000,000.0 | 0.150 |

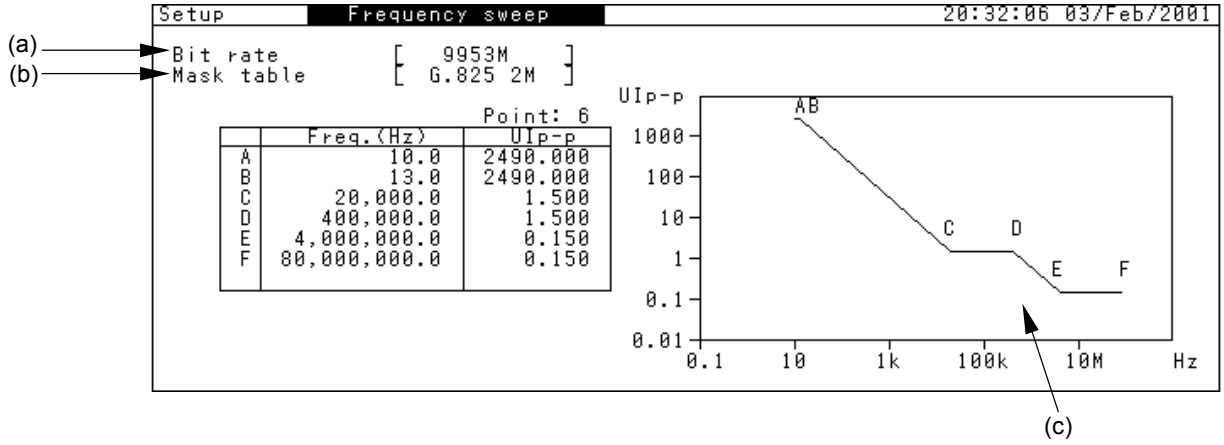
| | Item | Description |
|---|---|---|
| (a) | Bit rate | Selects the setting condition table for automatic measurement by specifying the bit rate. |
| (b) | Sweep table | Displays the jitter modulation frequency and amplitude at each measurement point. |

For Sweep table: User:

| | Item | Description |
|---|---|---|
| (c) | Sweep table Default | Initializes the measurement points.<br>The setting can be changed when "Sweep table" is set to "User". |
| | Sweep table $UI_{p-p}$/Freq. | When "Sweep table" is set to "User", the frequency and amplitude settings can be changed on the numerical value input window. |

## 5.1.4 Setup: Frequency sweep screen

The Setup: Frequency sweep screen allows setting the measurement table and standard mask for automatic frequency sweep measurement. When "Mask table" is set to "User", the set conditions can be changed.




| | Item | Description |
|---|---|---|
| (a) | Bit rate | Selects the setting condition table for automatic measurement by specifying the bit rate. |
| (b) | Mask table | Displays the standard points. |
| (c) | [Graph] | Displays the standard line using a graph.<br>"A" to "D" indicate the points on the mask table. |

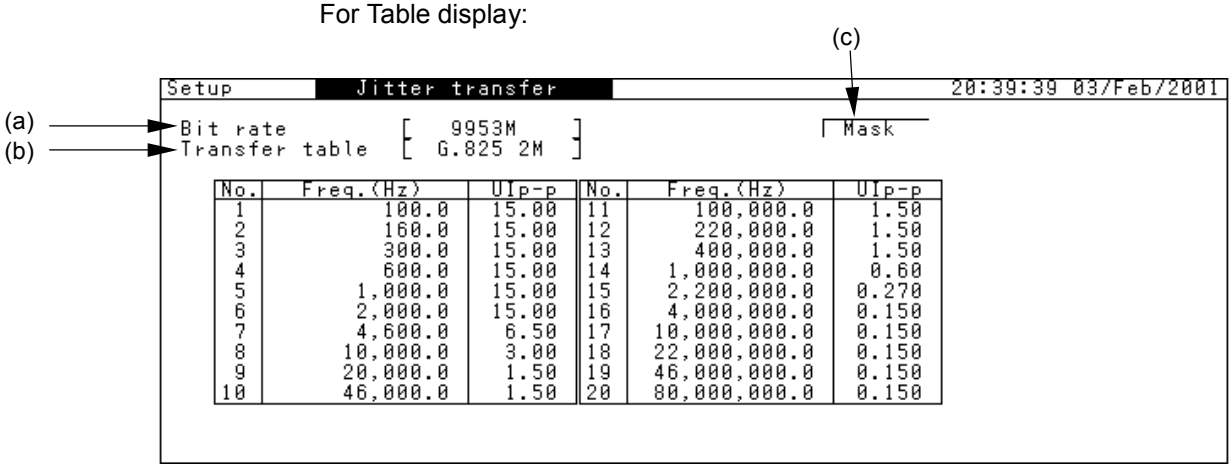
For Mask table: User:

| | Item | Description |
|---|---|---|
| (b) | Mask table Default | Initializes the standard points. |
| | Mask table $UI_{p-p}$/Freq. | When "Mask table" is set to "User", the $UI_{p-p}$ and Freq. settings can be changed on the numerical value input window. |

## 5.1.5 Setup: Jitter transfer screen

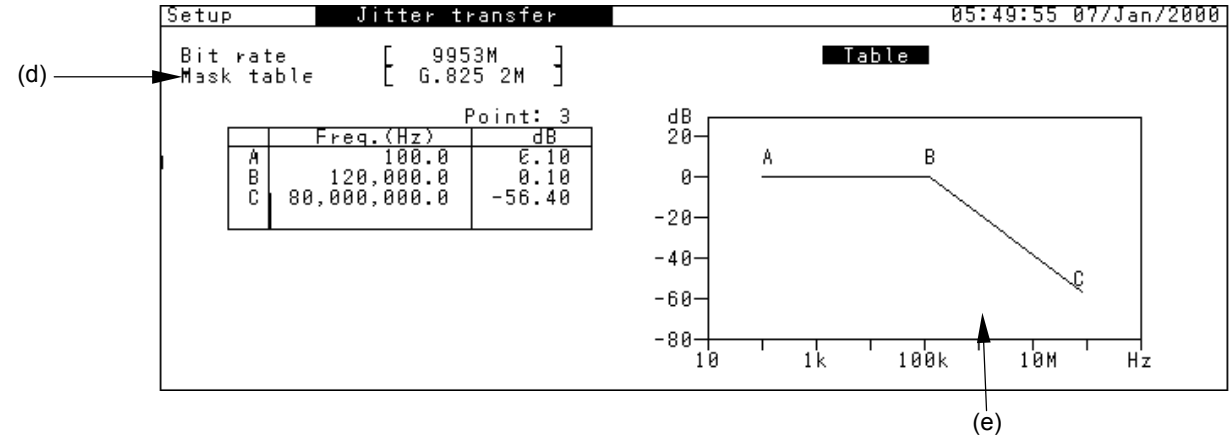
The Setup: Jitter transfer screen allows setting the measurement table and standard mask for automatic jitter transfer characteristic measurement. When "Transfer table" and "Mask table" are set to "User", the standard conditions can be changed.

For Table display:




| No. | Freq.(Hz) | UIp-p | No. | Freq.(Hz) | UIp-p |
|---|---|---|---|---|---|
| 1 | 100.0 | 15.00 | 11 | 100,000.0 | 1.50 |
| 2 | 160.0 | 15.00 | 12 | 220,000.0 | 1.50 |
| 3 | 300.0 | 15.00 | 13 | 400,000.0 | 1.50 |
| 4 | 600.0 | 15.00 | 14 | 1,000,000.0 | 0.60 |
| 5 | 1,000.0 | 15.00 | 15 | 2,200,000.0 | 0.270 |
| 6 | 2,000.0 | 15.00 | 16 | 4,000,000.0 | 0.150 |
| 7 | 4,600.0 | 6.50 | 17 | 10,000,000.0 | 0.150 |
| 8 | 10,000.0 | 3.00 | 18 | 22,000,000.0 | 0.150 |
| 9 | 20,000.0 | 1.50 | 19 | 46,000,000.0 | 0.150 |
| 10 | 46,000.0 | 1.50 | 20 | 80,000,000.0 | 0.150 |

For Mask display:




| | Freq.(Hz) | dB |
|---|---|---|
| A | 100.0 | 0.10 |
| B | 120,000.0 | 0.10 |
| C | 80,000,000.0 | -56.40 |

| | Item | Description |
|---|---|---|
| (a) | Bit rate | Selects the setting condition table for automatic measurement by specifying the bit rate. |
| (b) | Transfer table | Selects the standard points. The table lists the jitter modulation frequency and jitter amplitude at each standard point. |
| (c) | Table/Mask | Switches between "Table" and "Mask" by one-shot input. |
| (d) | Mask table | Selects the standard line. |
| (e) | [Graph] | Displays the standard line using a graph.<br>"A" to "D" indicate the points on the mask table. |

For Transfer table: User:

| | Item | Description |
|---|---|---|
| (b) | Transfer table Default | When "Transfer table" is set to "User" and "User 2" initializes the standard points. |
| | Transfer table Freq./$UI_{p-p}$ | When "Transfer table" is set to "User" and "User 2" sets the jitter frequency and transmited jitter amplitude at each standard point.<br>Clicking Set with the cursor positioned here opens a numerical value input window. On this window, input a desired value. |
| | Transfer table Rx range | When "Transfer table" is set to "User2", sets the measurement range for each measurement point. |

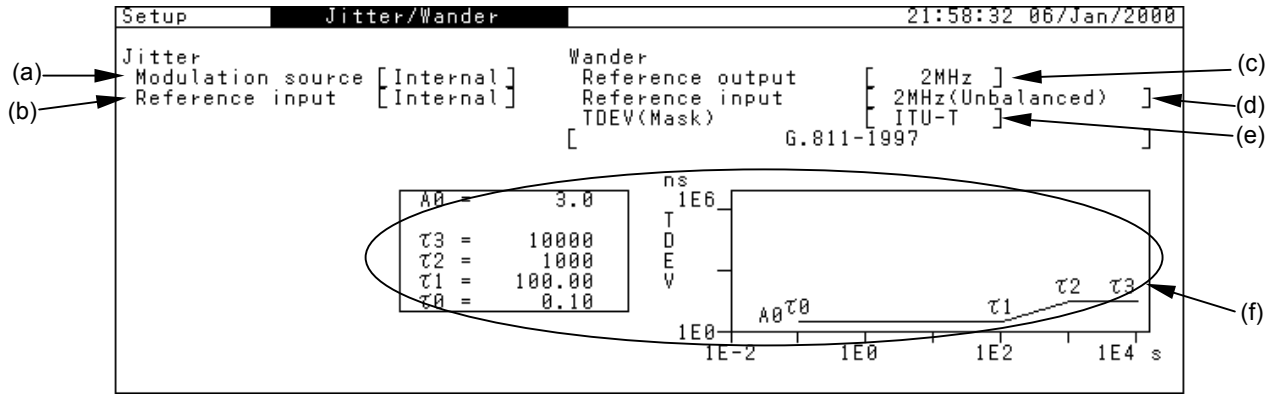
For Mask table: User:

| | Item | Description |
|---|---|---|
| (c) | Mask table Default | Initializes the standard line.<br>• This item is valid when "Mask table" is set to "User". |
| | Mask table Point | Changes the number of standard points.<br>• This item is valid when "Mask table" is set to "User". |
| | Mask table Freq. dB | Sets the frequency and jitter gain at each point on the standard line. Click Set with the cursor positioned here opens a numerical value input window. On this window, input a desired value.<br>• This item is valid when "Mask table" is set to "User". |

## 5.1.6 Setup: Jitter/Wander screen

The Setup: Jitter/Wander screen allows setting basic conditions for jitter/wander measurement.

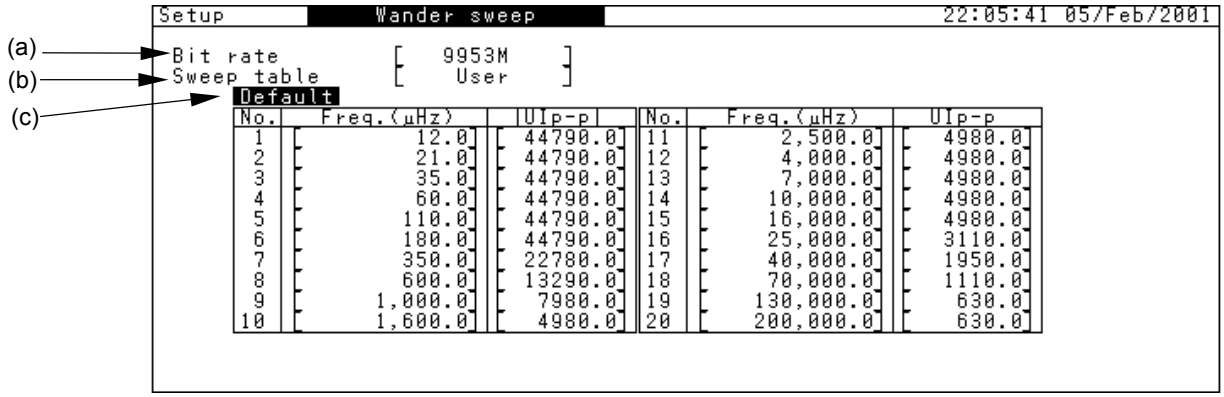
When Option is installed, (e) to (f) appeared:




| | Item | Description |
|---|---|---|
| (a) | Modulation source | Selects the jitter modulation signal source.<br>Internal .....Using the internal signal of MP1580A as the jitter modulation signal source.<br>External .....Using an external signal as the jitter modulation signal source. |
| (b) | Reference input | Sets the reference clock input destination for jitter measurement.<br>Internal .....Using the internal signal of MP1580A as the reference clock.<br>External .....Using an external signal as the reference clock. |
| (c) | Reference output | Sets the wander reference output frequency. |
| (d) | Reference input | Selects the reference signal to be input to the wander reference input. |
| (e) | TDEV (Mask) | Sets the mask standard for TDEV generation.<br>• When "User" is selected, the set value can be changed.<br>• This item can be displayed when Option 03 is installed. |
| (f) | [Standard value and graph display] | Displays the standard value and graph. |

## 5.1.7 Setup: Wander sweep screen

The Setup: Wander sweep screen allows setting the measurement table for automatic wander sweep measurement.




| No. | Freq.(μHz) | UIp-p | No. | Freq.(μHz) | UIp-p |
|---|---|---|---|---|---|
| 1 | 12.0 | 44790.0 | 11 | 2,500.0 | 4980.0 |
| 2 | 21.0 | 44790.0 | 12 | 4,000.0 | 4980.0 |
| 3 | 35.0 | 44790.0 | 13 | 7,000.0 | 4980.0 |
| 4 | 60.0 | 44790.0 | 14 | 10,000.0 | 4980.0 |
| 5 | 110.0 | 44790.0 | 15 | 16,000.0 | 4980.0 |
| 6 | 180.0 | 44790.0 | 16 | 25,000.0 | 3110.0 |
| 7 | 350.0 | 22780.0 | 17 | 40,000.0 | 1950.0 |
| 8 | 600.0 | 13290.0 | 18 | 70,000.0 | 1110.0 |
| 9 | 1,000.0 | 7980.0 | 19 | 130,000.0 | 630.0 |
| 10 | 1,600.0 | 4980.0 | 20 | 200,000.0 | 630.0 |

| | Item | Description |
|---|---|---|
| (a) | Bit rate | Selects the setting condition table for automatic measurement by specifying the bit rate. |
| (b) | Sweep table | Displays the wander modulation frequency and $UI_{p-p}$ at each measurement point on the table. |

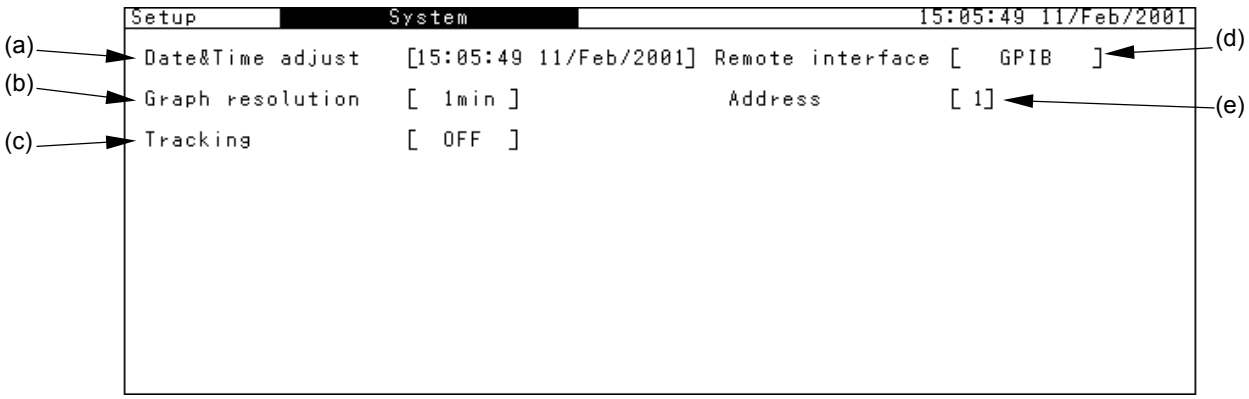
When Sweep table: User:

| | Item | Description |
|---|---|---|
| (c) | Sweep table Default | Initializes the measurement points. |
| | Sweep table $UI_{p-p}$/Freq. | When "Sweep table" is set to "User", the $UI_{p-p}$ and Freq. values can be changed on the numerical value input window. |

## 5.1.8 Setup: System screen

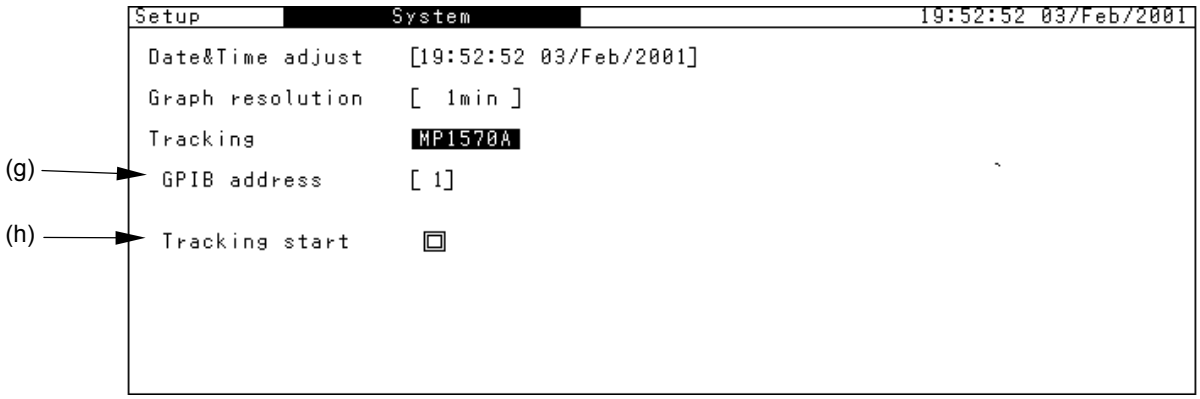
The Setup: System screen allows setting the timer, buzzer, graph resolution, remote interface, etc..

For Tracking [OFF]




| | Item | Description |
|---|---|---|
| (a) | Date & Time adjust | Sets the current Date & Time. |
| (b) | Graph resolution | Selects the interval time for Analyze: Frequency Graph/Analyze Peak Jitter screen. |
| (c) | Tracking | Sets the measuring object instrument used for automatic jitter measurement. |
| (d) | Remote interface | When "Tracking" is set to "OFF", selects the external interface for remote control of MP1580A. See "section 8.4 Remote control" for details |
| (e) | Address | When "Tracking" is set to "OFF", sets the interface address. |

For Tracking [MP1570A]




| | Item | Description |
|---|---|---|
| (g) | GPIB address | Selects the MP1570A's GPIB address in the range of 1 to 30. |
| (h) | Tracking start | Start/stop button for tracking |

***Note:***

After tracking has started, click Set with the cursor positioned at ☐ at "Tracking start" to interrupt tracking. Clicking ☐ again (while tracking is interrupted and MP1570A is changing the settings) may cause error message "The GPIB connection was not established correctly" to appear.

## 5.1.9 Setup: Floppy screen

See "Section 8.1 Floppy disk" for details.

## 5.1.10 Setup: Memory screen

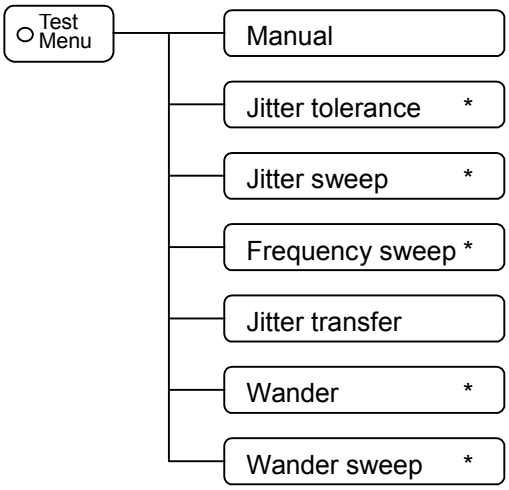
See "Section 8.2 Internal Memory" for details.

## 5.1.11 Setup: Option revision screen

See "Appendix B Options" for details.

# 5.2 Test Menu Main Screen

The Test Menu main screen has the sub-screens listed below.




* These sub-screens are used for tracking, and cannot be displayed during initial setting.
For tracking, see Sections 6.2 "Automatic Jitter Measurement" and 7.2 "Automatic Wander Measurement".

The screen names and functions are shown below:

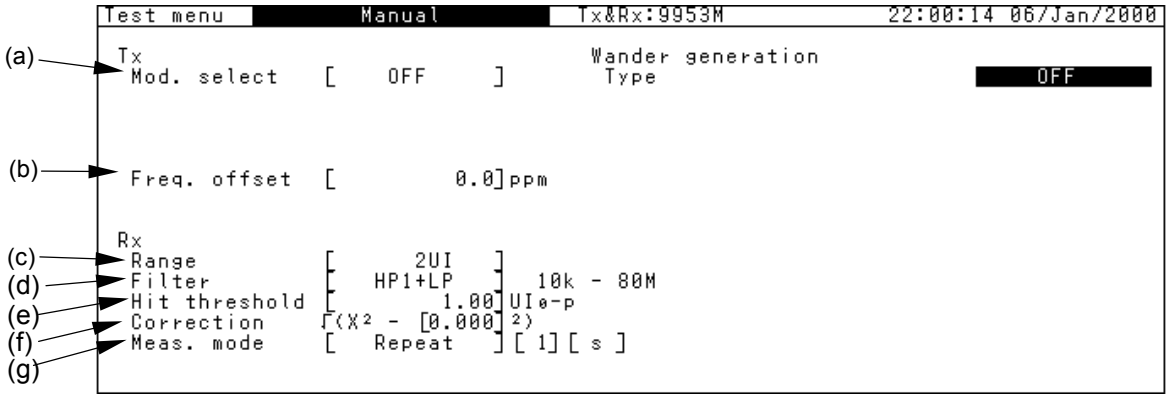
| Screen name | Description |
|---|---|
| Manual | Sets the conditions for manual jitter/wander measurements. |
| Jitter tolerance | Sets the conditions for automatic jitter tolerance measurement. |
| Jitter sweep | Sets the conditions for automatic jitter sweep measurement. |
| Frequency sweep | Sets the conditions for automatic frequency sweep measurement. |
| Jitter transfer | Sets the conditions for automatic jitter transfer characteristic measurement. |
| Wander | Sets the conditions for automatic wander measurement. |
| Wander sweep | Sets the conditions for automatic wander sweep measurement. |

## 5.2.1 Test menu: Manual screen

The Test menu: Manual screen allows setting the conditions for manual jitter/wander measurements.

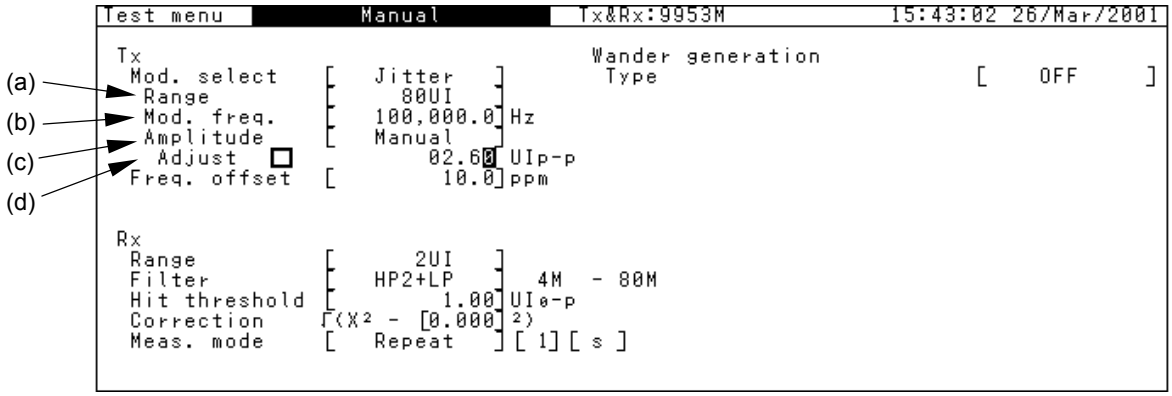
For manual measurement, this screen can be used to set the jitter/wander ON/OFF, jitter/wander amplitude, modulation-frequency, reference-clock frequency offset, etc. On the received side (Rx), this screen can be used to set the jitter/wander range and the filter for measuring the received jitter.

For Tx Mod Select: [OFF]



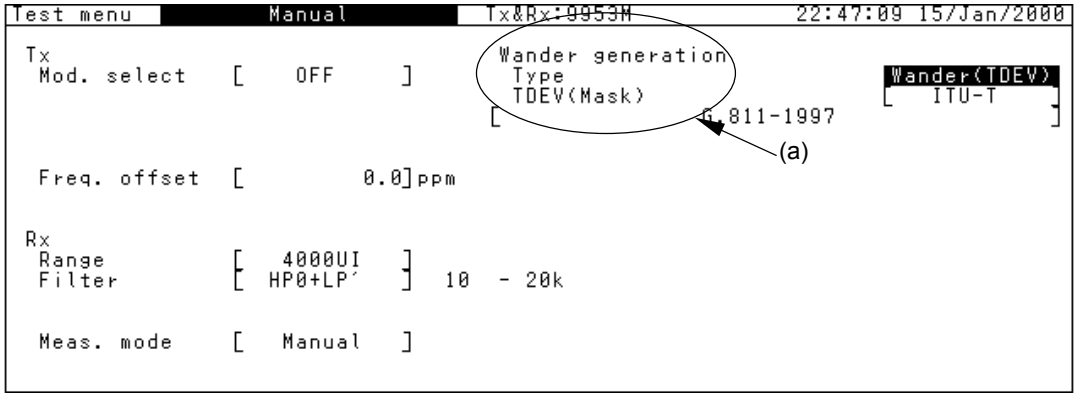

| | Item | Description |
|---|---|---|
| (a) | Mod. select | Selects jitter/wander sine-wave generation from "Clock output". |
| (b) | Freq. offset | Sets the frequency offset. |
| (c) | Rx Range | Switches the range for measuring the received Jitter/Wander. |
| (d) | Filter | Selects the filter for measuring the received Jitter/Wander. The cur-off frequency is displayed on the right side. |
| (e) | Hit threshold | Selects the hit threshold values. |
| (f) | Correction | Sets the RMS offset. |
| (g) | Meas. mode | Sets the measurement mode.<br>* When the measurement mode is Repeat, wander is not measured. |

For Tx Mod Select: [Jitter]




| | Item | Description |
|---|---|---|
| (a) | Tx Range | Selects the range for generating transmited jitter. |
| (b) | Mod. freq. | Sets the modulation frequency.<br>This item is valid when "Jitter modulation source" is "Internal".<br>This item cannot be set when "Mod. Select" is "OFF". |
| (c) | Amplitude | Specifies the jitter amplitude setting method.<br>Manual..... The amplitude can be increased while adjusting with "Adjust".<br>Auto..... The amplitude set at the numerical value input window is used as is for jitter generation.<br>This item cannot be set when "Mod. Select" is "OFF". |
| (d) | Adjust | Sets the jitter amplitude. When this is set to "ON", a numerical value input window appears. On this window, input a desired amplitude value.<br>• This item cannot be set when "Mod.Select" is "OFF".<br>• This is valid when "Jitter modulation source" is "Internal". |

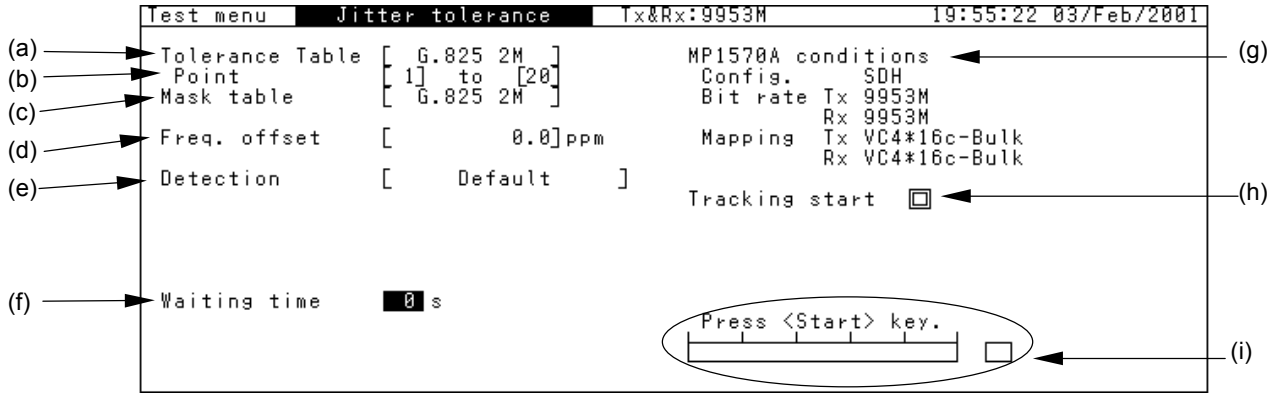
For Tx Mod Select: Off,
Wander generation Type: TDEV, Transient, Signal OFF




| | Item | Description |
|---|---|---|
| (a) | Wander generation Type | Selects the wander to be output from the Wander Ref. Output connector.<br>TDEV..... Adds noise like Gaussian distribution form to the wander reference clock.<br>Transient ..... Adds transient noise to the wander reference clock.<br>Signal OFF ..... Cuts off the wander reference clock. |
| | TDEV (Mask) | Sets the mask standard for generating TDEV. |

## 5.2.2 Test menu: Jitter tolerance screen

The Test menu: Jitter tolerance screen allows setting the conditions for automatic jitter tolerance measurement.



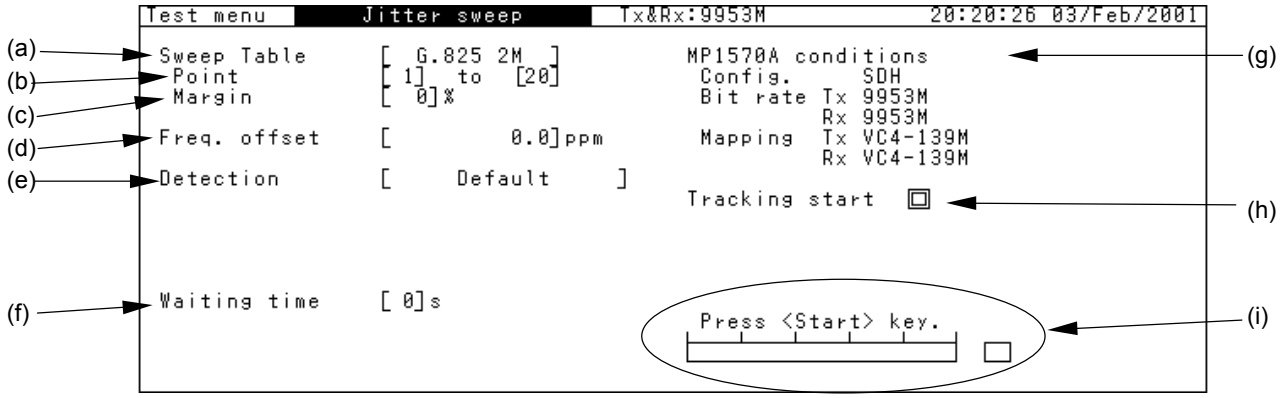

| | Item | Description |
|---|---|---|
| (a) | Tolerance table | Selects the measurement points for jitter tolerance table. |
| (b) | Point | Sets the start and end of 1 to 20 measurement points. |
| (c) | Mask table | Sets the frequency offset. |
| (d) | Freq. offset | Selects the standard line for jitter tolerance measurement. |
| (e) | Detection | Sets the error judgment condition for jitter tolerance measurement. One of the following points is set as the limit point, and the point just before that causing an error is set as the result point.<br>Default..... Point where errors occur continuously for two seconds or more.<br>1 s error ..... Point where errors (equal to or more than the set count occur) or an error (equal to or more than the set rate) occurs, both at Holdtime=1 s.<br>Count..... Point where errors (equal to or more than the set counts) occur during the set Holdtime.<br>Rate ..... Point where errors (equal to or more than the set rate) occur during the set Holdtime.<br>On set of errors..... Point where 2 or more error seconds (ES) at Holdtime=30 s.<br>1 dB power penalty ..... Point where 100 or more errors occur in 1 second. |
| (f) | Waiting time | Sets the interval from ending the measurement at one point to starting the measurement at the next point. |
| (g) | MP1570A conditions | Displays the connection status between MP1580A and MP1570A.<br>A connection error or no tracking status is indicated with "------" |
| (h) | Tracking start ☐ | Start/stop button for tracking |
| (i) | [Bar graph] | Displays the progress from the measurement start to the stop. |

For RX detection: except default condition

| | Item | Description |
|---|---|---|
| (e) | Error | Sets the error type. This item is valid when "Rx Detection" is "1 s error", "Count," "Rate", "Onset of errors" or "1 dB power penalty". |
| | Unit | Sets the threshold value type.<br>• This item is valid when "Detection" is "1 s error". |
| | Threshold | Sets the detection range.<br>• This is item valid when "Detection" is "1 s error", "Count", or "Rate". |
| | Holdtime | When "Detection" is "Count" or "Rate", sets the time for measuring errors after setting the jitter amplitude at each measurement point. |

## 5.2.3 Test menu: Jitter sweep screen

The Test menu: Jitter sweep screen allows setting the conditions for automatic jitter sweep measurement. After starting the measurement by pressing Start/Stop, the measurement progress is displayed at a bar graph on the screen.



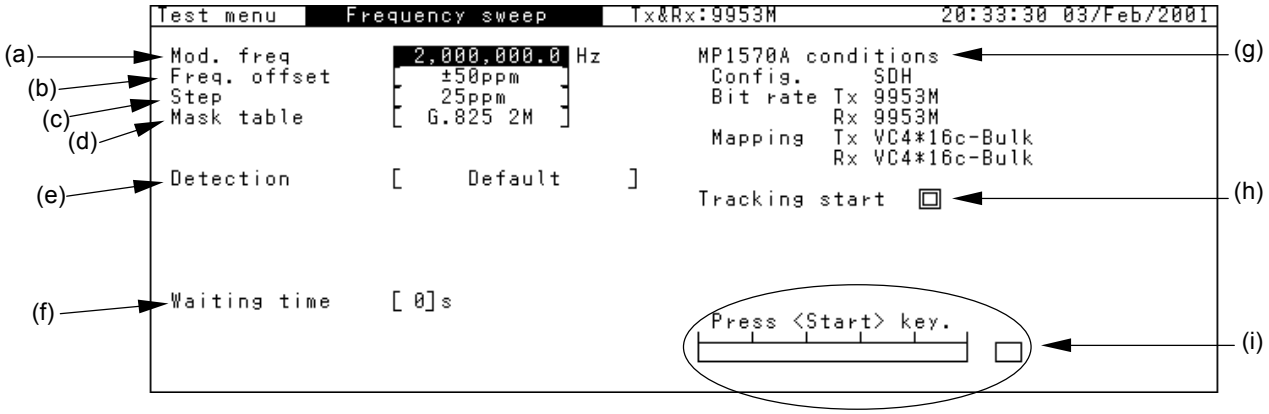

| | Item | Description |
|---|---|---|
| (a) | Sweep table | Selects the measurement point for the jitter sweep measurement output table. |
| (b) | Point | Sets the start and end of measurement points 1 to 20. |
| (c) | Margin | Sets the margin for the jitter sweep standard value.<br>For example, when 80% margin is set for standard mask value 10 UI; 80% of 10 UI, that is, 8-UI jitter is set as a margin, and 18-UI jitter in total is loaded for judging pass/fail. |
| (d) | Freq. offset | Sets the frequency offset. |
| (e) | Detection | Sets the error judgment condition for jitter tolerance measurement.<br>One of the following points is set as the limit point, and the point just before that causing an error is set as the result point.<br>Default .....Point where errors occur continuously for two seconds or more.<br>1 s error.....Point where errors (equal to or more than the set count occur) or an error (equal to or more than the set rate) occurs, both at Holdtime=1 s.<br>Count.....Point where errors (equal to or more than the set counts) occur during the set Holdtime.<br>Rate .....Point where errors (equal to or more than the set rate) occur during the set Holdtime.<br>On set of errors .....Point where 2 or more error seconds (ES) at Holdtime=30 s.<br>1 dB power penalty .....Point where 100 or more errors occur in 1 second. |
| (f) | Waiting time | Sets the interval from ending the measurement at one point to starting the measurement at the next point. |
| (g) | [Connection status display] | Displays the connection status between MP1580A and MP1570A.<br>A connection error or no tracking status is indicated with "------" |
| (h) | Tracking start □ | Start/stop button for tracking |
| (i) | [Bar graph] | Displays the progress from the measurement start to the stop. |

For RX detection: except default condition

| | Item | Description |
|---|---|---|
| (e) | Error | Sets the error type.<br>• This item is valid when "Rx Detection" is "1 s error", "Count", "Rate", "Onset of errors", or "1 dB power penalty". |
| | Unit | Sets the threshold value type.<br>• This item is valid when "Detection" is "1 s error". |
| | Threshold | Sets the detection range.<br>• This is item valid when "Detection" is "1 s error", "Count" or "Rate". |
| | Holdtime | When "Detection" is "Count" or "Rate", sets the time for measuring errors after setting the jitter amplitude at each measurement point. |

## 5.2.4 Test menu: Frequency sweep screen

The Test menu: Frequency sweep screen allows setting the conditions for automatic frequency sweep measurement. When the measurement is started by pressing Start/Stop, the measurement progress is displayed on a bar graph on the screen.




| | Item | Description |
|---|---|---|
| (a) | Tx Mod. freq. | Sets the modulation frequency. |
| (b) | Freq. offset | Sets the offset. |
| (c) | Step | Sets the offset increment. |
| (d) | Mask table | Selects the measurement points. |
| (e) | Rx Detection | Sets the error judgment condition for jitter tolerance measurement. One of the following points is set as the limit point, and the point just before that causing an error is set as the result point.<br>Default .....Point where errors occur continuously for two seconds or more.<br>1 s error.....Point where errors (equal to or more than the set count occur) or an error (equal to or more than the set rate) occurs, both at Holdtime=1 s.<br>Count .....Point where errors (equal to or more than the set counts) occur during the set Holdtime.<br>Rate.....Point where errors (equal to or more than the set rate) occur during the set Holdtime.<br>On set of errors .....Point where 2 or more error seconds (ES) at Holdtime=30 s.<br>1 dB power penalty....Point where 100 or more errors occur in 1 second. |
| (f) | Waiting time | Sets the interval from ending the measurement at one point to starting the measurement at the next point. |
| (g) | [Connection status display] | Displays the connection status between MP1580A and MP1570A. A connection error or no tracking status is indicated with "------" |
| (h) | Tracking start □ | Start/stop button for tracking. |
| (i) | [Bar graph] | Displays the progress from the measurement start to the stop. |

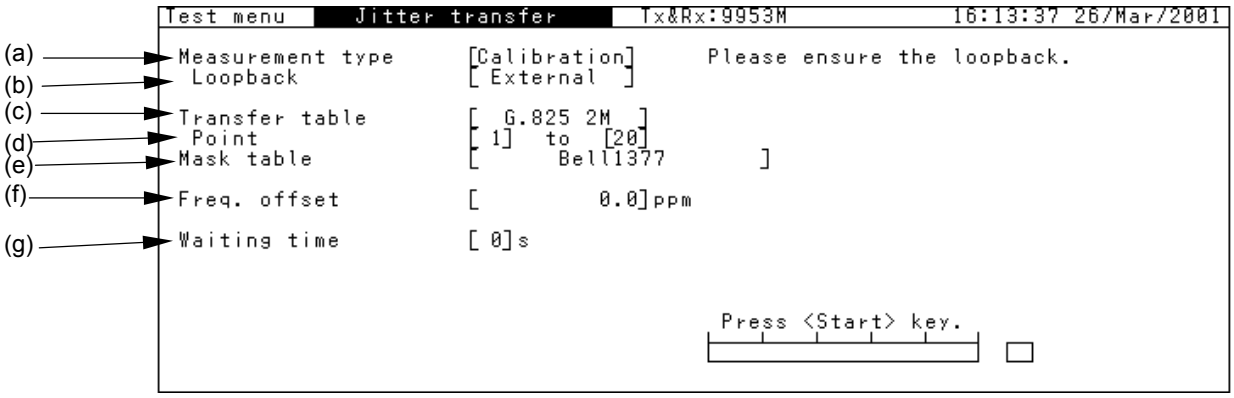
For Rx detection: except default condition

| | Item | Description |
|---|---|---|
| (e) | Error | Sets the error type.<br>• This item is valid when "Rx Detection" is "1 s error", "Count", "Rate", "Onset of errors" or "1 dB power penalty". |
| | Unit | Sets the threshold value type.<br>• This item is valid when "Detection" is "1 s error". |
| | Threshold | Sets the detection range.<br>• This is item valid when "Detection" is "1 s error", "Count", or "Rate". |
| | Holdtime | When "Detection" is "Count" or "Rate", sets the time for measuring errors after setting the jitter amplitude at each measurement point. |

## 5.2.5 Test menu: Jitter transfer screen

The Test menu: Jitter transfer screen allows setting the transfer and mask tables for jitter transfer measurement. For jitter transfer measurement, perform calibration before measurement.

For Measurement type: Loop back [External]



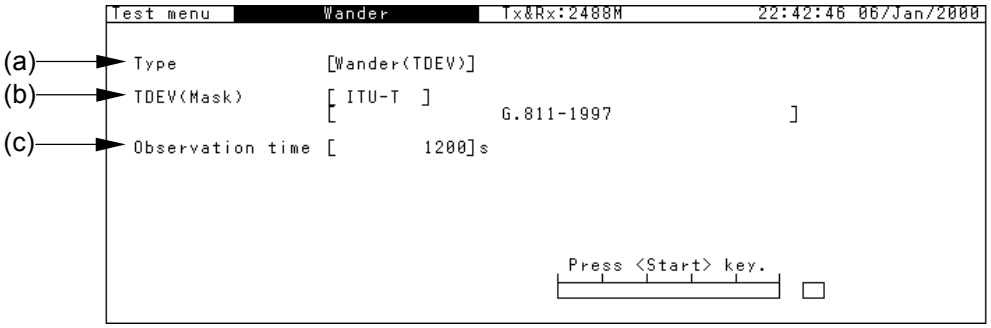

| | Item | Description |
|---|---|---|
| (a) | Measurement type | Selects the measurement type from between Calibration and Measurement. The measurement starts after calibration is over. |
| (b) | Loop back | When "Measurement type" is "Calibration", select the method for inputting the send signal from MP1580A to the receiver of MP1580A.<br>Internal..... Looping back the signal in MP1580A.<br>External..... Connecting a cable to the external connector. |
| (c) | Transfer table | Selects the output table measurement points for jitter transfer characteristic measurement. |
| (d) | Point | Sets the start and stop of measurement points. |
| (e) | Mask table | Selects the standard line for judging the jitter transfer characteristic. |
| (f) | Freq. offset | Sets the frequency offset. |
| (g) | Waiting time | Sets the interval from ending the measurement at one point to starting the measurement at the next point. |

***Note:***

When "Measurement type" is "Calibration" and "Loop back" is "External", a message "Please ensure the loop back" appears.

## 5.2.6 Test menu: Wander screen

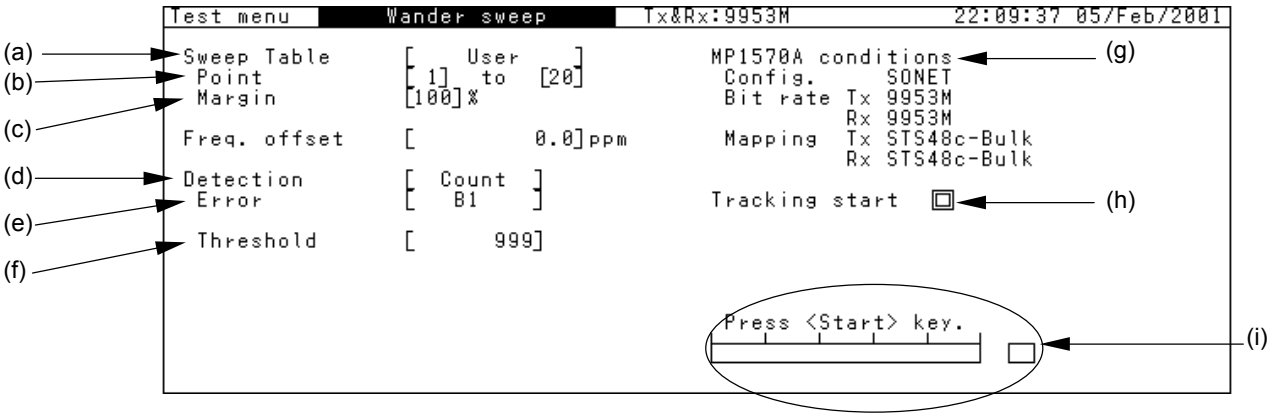
The Test menu: Wander screen allows setting the wander detection conditions.




| | Item | Description |
|---|---|---|
| (a) | Type | Selects the type of wander or noise generation. |
| (b) | Mask | When "Type" is "Wander (TDEV)", selects the standard line for TDEV generation. |
| (c) | Observation time | Sets the measurement time. |
| | Maximum phase deviation | When "Type" is "Transient", sets the margin for transient measurement. |

## 5.2.7 Test menu: Wander sweep screen

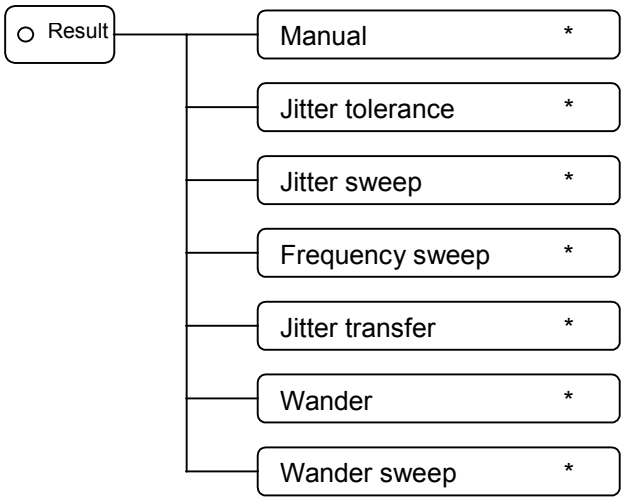
The Test menu: Wander sweep screen allows setting the Wander sweep table.




| | Item | Description |
|---|---|---|
| (a) | Sweep table | Selects the measurement points for the wander sweep measurement output table. |
| (b) | Point | Sets the start and end of measurement points (1 to 20). |
| (c) | Margin | Sets the margin for the jitter sweep standard value.<br>For example, when 80% margin is set for standard mask value 10 UI; 80% of 10 UI, that is, 8 UI jitter is set as a margin, and 18 UI jitter in total is loaded for judging pass/fail. |
| (d) | Detection | Sets the error judgment condition for wander sweep measurement. One of the following points is set as the limit point, and the point just before that causing an error is set as the result point.<br>Count..... Point where errors equal to or more than the set count occur during the set Holdtime.<br>Rate..... Point where errors equal to or more than the set rate occur during the set Holdtime. |
| (e) | Error | Sets the error type.<br>• This item is valid when "Rx Detection" is "Count" or "Rate penalty". |
| (f) | Threshold | Sets the detection range.<br>• This item is valid when "Detection" is "Count" or "Rate". |
| (g) | [Connection status display] | Displays the connection status between MP1580A and MP1570A. A connection error or no tracking status is indicated with "------". |
| (h) | Tracking start ☐ | Start/stop button for tracking |
| (i) | [Bar graph] | Displays the progress from the measurement start to the stop. |

# 5.3 Result Main Screen

The Result main screen has the sub-screens listed below.




* The sub-screens that can be displayed from the Result main screen are limited by the sub-screen selected on the Test Menu main screen.

The screen names and functions are as follows:

| Screen name | Description |
|---|---|
| Manual | Displays the manual jitter/wander measurement result. |
| Jitter tolerance | Displays the automatic jitter tolerance measurement result. |
| Jitter sweep | Displays the automatic jitter sweep measurement result. |
| Frequency sweep | Displays the automatic frequency sweep measurement result. |
| Jitter transfer | Displays the automatic jitter transfer characteristic measurement result. |
| Wander | Displays the automatic wander measurement result. |
| Wander sweep | Displays the automatic wander sweep measurement result. |

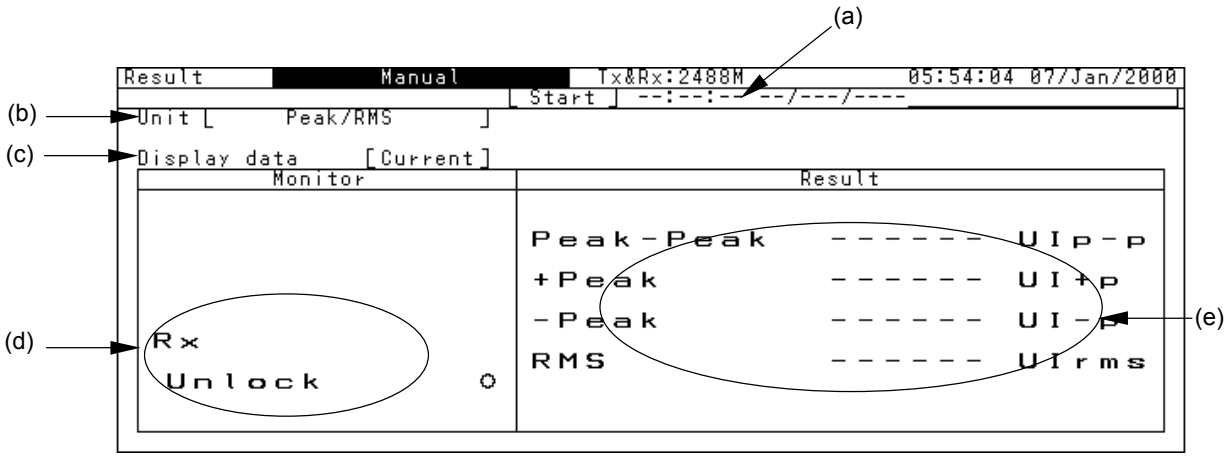
## 5.3.1 Result: Manual screen

The Result: Manual screen displays the jitter/wander measurement result.

For Unit: Peak/RMS

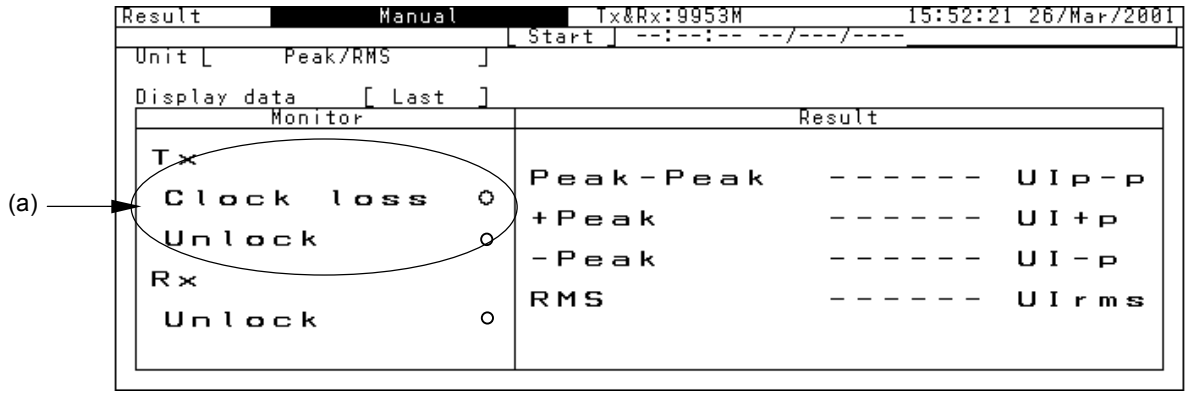
When "Unit" is set to "Peak/RMS", $UI_{p-p}$ (jitter amplitude peak-to-peak value) and $UI_{rms}$ (jitter amplitude effective value) can be displayed.

For Setup: Interface: Clock [Internal] condition




| | Item | Description |
|---|---|---|
| (a) | [Measurement time display] | Displays the measurement start time or measurement elapsed time.<br>Start ..... Displays the measurement start time.<br>Elapsed ..... Displays the measurement elapsed time. |
| (b) | Unit | Selects the jitter/wander measurement result display format. |
| (c) | Display data | Selects the measurement result display method.<br>Current ..... Displaying the measurement result from the start up to the current time.<br>Last..... Displaying the result at the end of measurement. This is useful for repeated measurement for a short period of time. |
| (d) | [Unlock of receive signal display] | Monitors the received signal and displays measurement result for Unlock.<br>○... When no Unlock has occurred, this lamp lights in white.<br>●... When an Unlock has occurred, this lamp lights in red. |
| (e) | [Received signal measurement result display] | Displays the received-signal measurement result.<br>Peak to Peak ... Displaying the maximum amplitude detected from the measurement start to the stop.<br>+Peak..... Displaying the maximum amplitude on the positive side detected from the measurement start to the stop.<br>–Peak..... Displaying the maximum amplitude on the negative side detected from the measurement start to the stop.<br>RMS ..... Displaying the maximum effective value of the phase shift detected from the measurement start to the stop.<br>* When unlock occures on the current/repeat mode, the result is displayed by red characters and values until the end of measurement. |

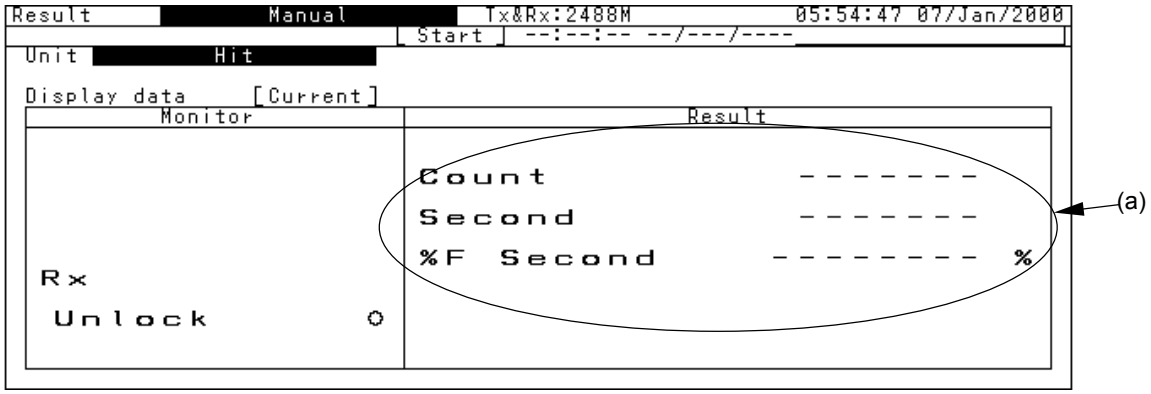
For Setup: Interface: Except Clock [Internal] condition




| | Item | Description |
|---|---|---|
| (a) | [Monitoring transmitted-signal Clock loss and Unlock] | Monitors and displays TX Clock loss and Unlock.<br>○...When neither Clock loss nor Unlock has occurred, this lamp lights in white.<br>●...When either Clock loss or Unlock has occurred, this lamp lights in red.<br>• When "Clock" is set to "Internal" on the Setup: Interface screen, none of the Tx Jitter label, Clock loss lamp, and Unlock lamp appears. |

For Unit: Hit

When "Unit" is set to "Hit", the number of times the jitter amplitude has exceeded the set threshold is displayed.




| | Item | Description |
|---|---|---|
| (a) | [Received signal measurement result display] | Hit Count..... Total number of hits from the measurement start to the stop.<br>Hit Second..... Sum of hit times from the measurement start to the stop.<br>%F Second ..... Ratio (%) of sum of non-hit times (seconds) to total times from the measurement start to the stop. |

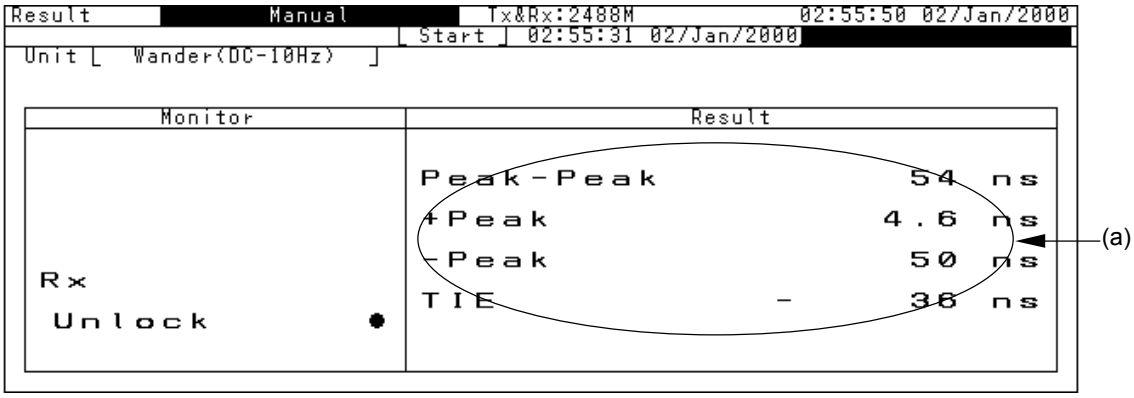
For Unit: Wander

When "Unit" is set to "Wander (DC-10 Hz)", "DC-0.01 Hz", and "0.01-10 Hz" for TIE measurement.

***Note:***

When setting Rx of meas. mode at Test menu: manual screen is Repeat, Wander is not measured.

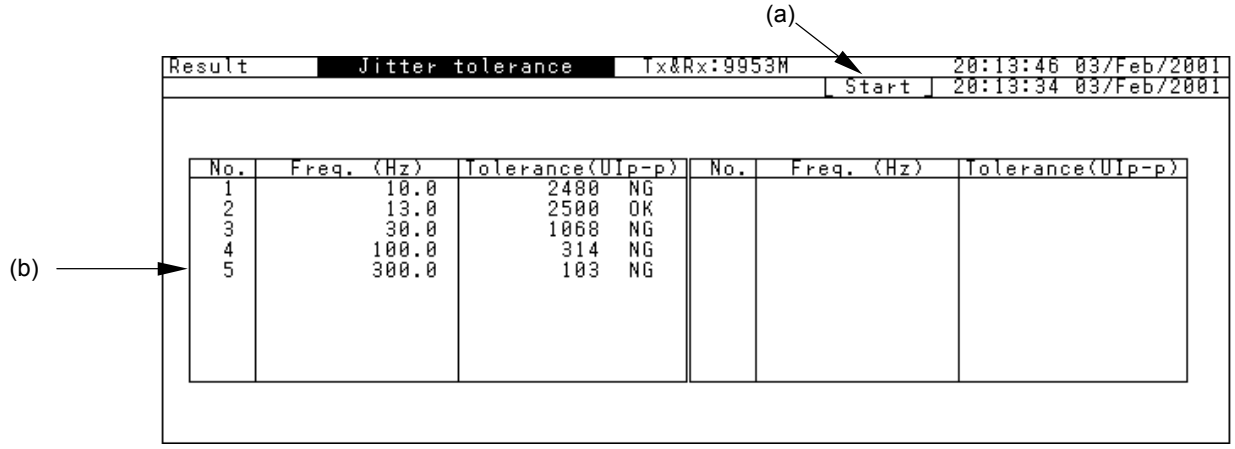
"DC-0.01 Hz" and "0.01-10 Hz" measurement result will begin to display in 120 sec.




| | Item | Description |
|---|---|---|
| (a) | [Received-signal measurement result display] | Displays the received-signal measurement result.<br>Peak to Peak ..... Displaying the maximum amplitude detected from the measurement start to the stop.<br>+Peak..... Displaying the maximum amplitude on the positive side detected from the measurement start to the stop.<br>–Peak..... Displaying the maximum amplitude on the negative side detected from the measurement start to the stop.<br>TIE ..... Displaying the TIE value. |

## 5.3.2 Result: Jitter tolerance screen

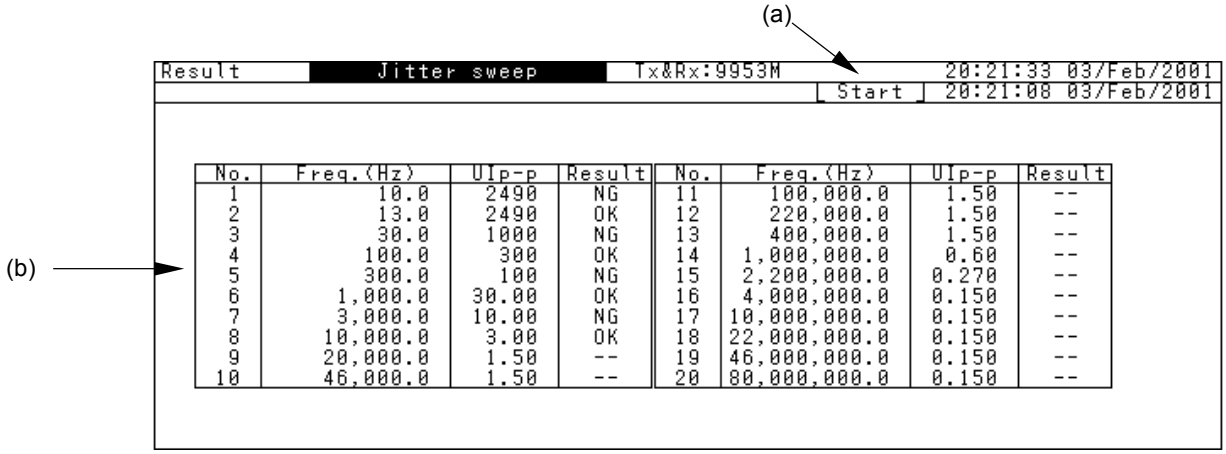
The Result: Jitter tolerance screen displays the automatic jitter tolerance measurement result. The jitter tolerance measurement result is displayed as numerical data together with the measured frequency. The pass/fail judgment result is displayed as "OK" or "NG."




| | Item | Description |
|---|---|---|
| (a) | Start | Displays the measurement start time |
| (b) | [Result] | Displays the jitter tolerance value at each measurement point.<br>OK ..... The tolerance value satisfies the standard value.<br>NG ..... The tolerance value does not satisfy the standard value.<br>-- ..... No measured value exists.<br>• If the tolerance value exceeds the standard value, ">" appears. |

## 5.3.3 Result: Jitter sweep screen

The Result: Jitter sweep screen displays the automatic jitter sweep measurement result as numerical data. The pass/fail judgment result is displayed as "OK" or "NG".

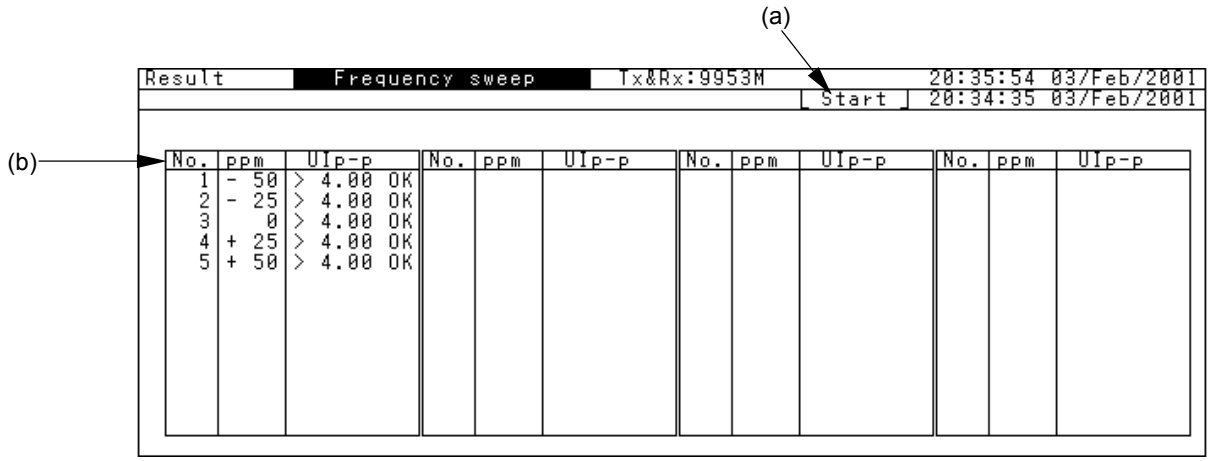



| No. | Freq.(Hz) | UIp-p | Result | No. | Freq.(Hz) | UIp-p | Result |
|---|---|---|---|---|---|---|---|
| 1 | 10.0 | 2490 | NG | 11 | 100,000.0 | 1.50 | -- |
| 2 | 13.0 | 2490 | OK | 12 | 220,000.0 | 1.50 | -- |
| 3 | 30.0 | 1000 | NG | 13 | 400,000.0 | 1.50 | -- |
| 4 | 100.0 | 300 | OK | 14 | 1,000,000.0 | 0.60 | -- |
| 5 | 300.0 | 100 | NG | 15 | 2,200,000.0 | 0.270 | -- |
| 6 | 1,000.0 | 30.00 | OK | 16 | 4,000,000.0 | 0.150 | -- |
| 7 | 3,000.0 | 10.00 | NG | 17 | 10,000,000.0 | 0.150 | -- |
| 8 | 10,000.0 | 3.00 | OK | 18 | 22,000,000.0 | 0.150 | -- |
| 9 | 20,000.0 | 1.50 | -- | 19 | 46,000,000.0 | 0.150 | -- |
| 10 | 46,000.0 | 1.50 | -- | 20 | 80,000,000.0 | 0.150 | -- |

| | Item | Description |
|---|---|---|
| (a) | Start | Displays the measurement start time. |
| (b) | [Result] | Displays the jitter sweep value at each measurement point.<br>OK.....The sweep value satisfies the standard value.<br>NG.....The sweep value does not satisfy the standard value.<br>--.....No measured value exists. |

## 5.3.4 Result: Frequency sweep screen

The Result: Frequency sweep screen displays the automatic frequency sweep measurement result. The measurement result is displayed as numerical data together with the ppm value. The pass/fail judgment result is displayed as "OK" or "NG".

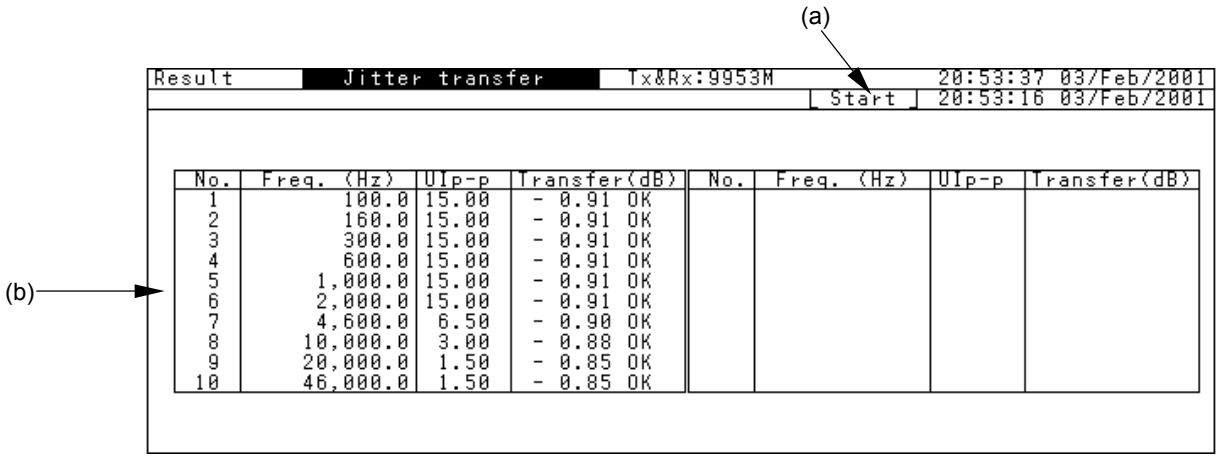



| | Item | Description |
|---|---|---|
| (a) | Start | Displays the measurement start time. |
| (b) | [Result] | Displays the frequency sweep measurement result value at each measurement point.<br>OK.....The sweep value satisfies the standard value.<br>NG.....The sweep value does not satisfy the standard value.<br>--.....No measured value exists.<br>•.....If the result exceeds the standard value, ">" appears. |

## 5.3.5 Result: Jitter transfer screen

The Result: Jitter transfer screen displays the automatic jitter transfer measurement result as numerical data together with the measurement frequency.

The pass/fail judgment result is displayed as "OK" or "NG".



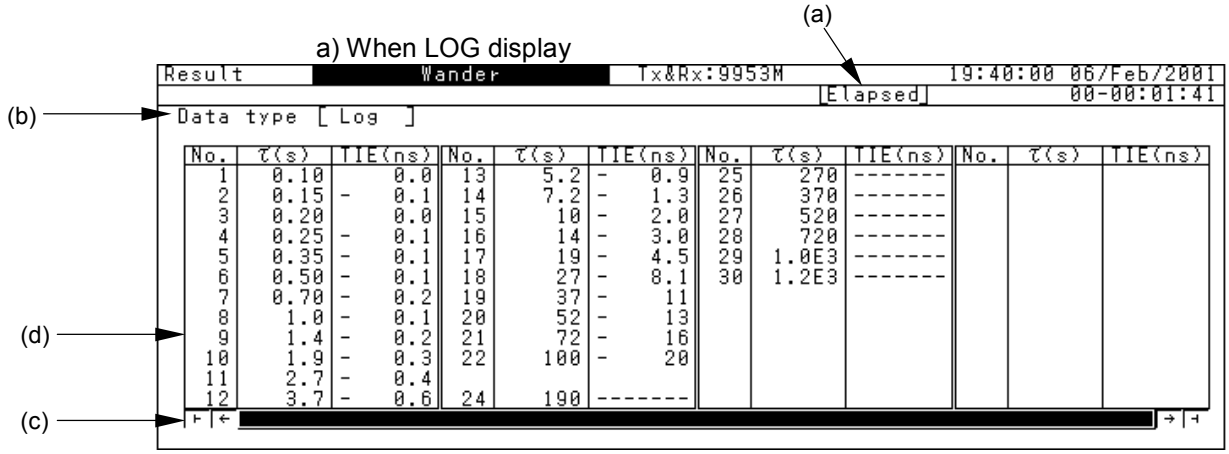

| No. | Freq. (Hz) | UIp-p | Transfer(dB) | No. | Freq. (Hz) | UIp-p | Transfer(dB) |
|---|---|---|---|---|---|---|---|
| 1 | 100.0 | 15.00 | - 0.91 OK | | | | |
| 2 | 160.0 | 15.00 | - 0.91 OK | | | | |
| 3 | 300.0 | 15.00 | - 0.91 OK | | | | |
| 4 | 600.0 | 15.00 | - 0.91 OK | | | | |
| 5 | 1,000.0 | 15.00 | - 0.91 OK | | | | |
| 6 | 2,000.0 | 15.00 | - 0.91 OK | | | | |
| 7 | 4,600.0 | 6.50 | - 0.90 OK | | | | |
| 8 | 10,000.0 | 3.00 | - 0.88 OK | | | | |
| 9 | 20,000.0 | 1.50 | - 0.85 OK | | | | |
| 10 | 46,000.0 | 1.50 | - 0.85 OK | | | | |

| | Item | Description |
|---|---|---|
| (a) | Start | Displays the measurement start time |
| (b) | [Result] | Displays the jitter transfer characteristic value at each measurement point.<br>OK.....The value satisfies the standard value.<br>NG.....The value does not satisfy the standard value.<br>--.....No measured value exists.<br>• When Unlock has occurred, "Unlock" appears in red.<br>• If the result exceeds the standard value, ">" appears. |

## 5.3.6 Result: Wander screen

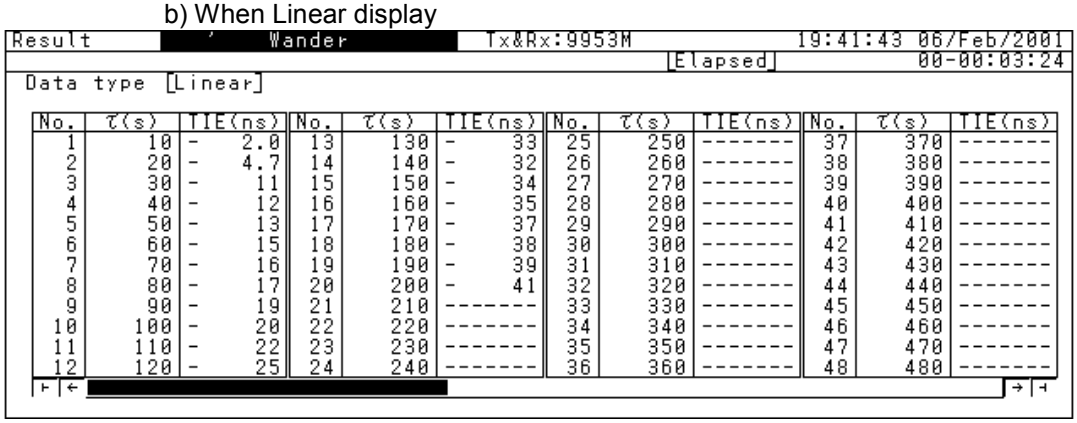
The Result: Wander screen displays the TIE measurement result. "Data type" can be set to "Log" or "Linear". The measurement result can be saved as numerical data.

a) When LOG display




| No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.10 | 0.0 | 13 | 5.2 | - 0.9 | 25 | 270 | ------- | | | |
| 2 | 0.15 | - 0.1 | 14 | 7.2 | - 1.3 | 26 | 370 | ------- | | | |
| 3 | 0.20 | 0.0 | 15 | 10 | - 2.0 | 27 | 520 | ------- | | | |
| 4 | 0.25 | - 0.1 | 16 | 14 | - 3.0 | 28 | 720 | ------- | | | |
| 5 | 0.35 | - 0.1 | 17 | 19 | - 4.5 | 29 | 1.0E3 | ------- | | | |
| 6 | 0.50 | - 0.1 | 18 | 27 | - 8.1 | 30 | 1.2E3 | ------- | | | |
| 7 | 0.70 | - 0.2 | 19 | 37 | - 11 | | | | | | |
| 8 | 1.0 | - 0.1 | 20 | 52 | - 13 | | | | | | |
| 9 | 1.4 | - 0.2 | 21 | 72 | - 16 | | | | | | |
| 10 | 1.9 | - 0.3 | 22 | 100 | - 20 | | | | | | |
| 11 | 2.7 | - 0.4 | | | | | | | | | |
| 12 | 3.7 | - 0.6 | 24 | 190 | ------- | | | | | | |

b) When Linear display

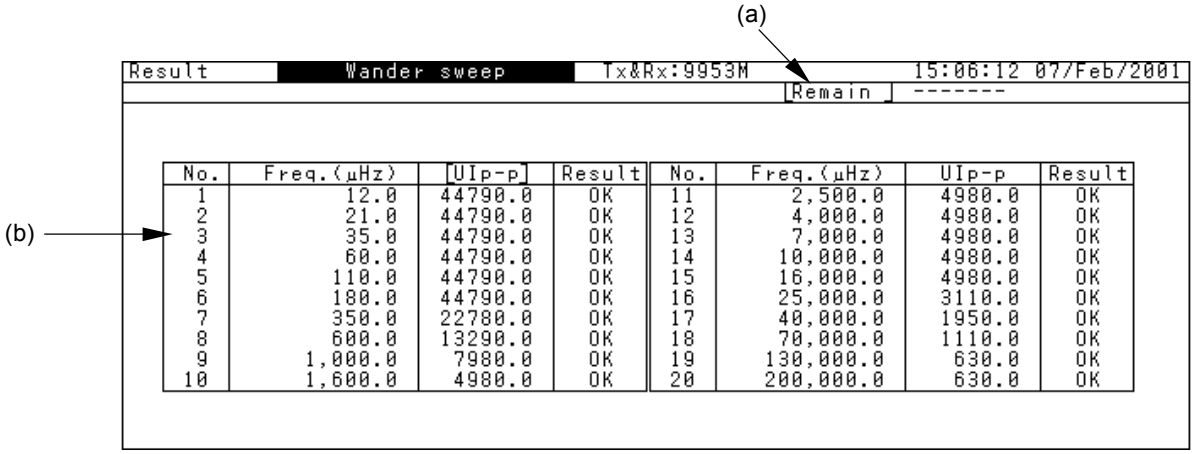



| No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10 | - 2.0 | 13 | 130 | - 33 | 25 | 250 | ------- | 37 | 370 | ------- |
| 2 | 20 | - 4.7 | 14 | 140 | - 32 | 26 | 260 | ------- | 38 | 380 | ------- |
| 3 | 30 | - 11 | 15 | 150 | - 34 | 27 | 270 | ------- | 39 | 390 | ------- |
| 4 | 40 | - 12 | 16 | 160 | - 35 | 28 | 280 | ------- | 40 | 400 | ------- |
| 5 | 50 | - 13 | 17 | 170 | - 37 | 29 | 290 | ------- | 41 | 410 | ------- |
| 6 | 60 | - 15 | 18 | 180 | - 38 | 30 | 300 | ------- | 42 | 420 | ------- |
| 7 | 70 | - 16 | 19 | 190 | - 39 | 31 | 310 | ------- | 43 | 430 | ------- |
| 8 | 80 | - 17 | 20 | 200 | - 41 | 32 | 320 | ------- | 44 | 440 | ------- |
| 9 | 90 | - 19 | 21 | 210 | ------- | 33 | 330 | ------- | 45 | 450 | ------- |
| 10 | 100 | - 20 | 22 | 220 | ------- | 34 | 340 | ------- | 46 | 460 | ------- |
| 11 | 110 | - 22 | 23 | 230 | ------- | 35 | 350 | ------- | 47 | 470 | ------- |
| 12 | 120 | - 25 | 24 | 240 | ------- | 36 | 360 | ------- | 48 | 480 | ------- |

| | Item | Description |
|---|---|---|
| (a) | Start/Elapsed | Displays the measurement start time or elapsed time. |
| (b) | Data type * | Selects the data type of measurement result to be displayed.<br>Linear..... Displaying the measurement result with equal measurement point interval of the measurement time.<br>Log..... Displaying the measurement result with measurement points of the measurement time compressed. |
| (c) | [Scroll] | Clicking Set with the cursor positioned at one of the following scroll symbols causes the measurement data display to be scrolled:<br>⊢ ..... Scrolling to the first page.<br>← .... Scrolling a half page forward.<br>→ .... Scrolling a half page backward.<br>⊣ ..... Scrolling to the last page. |
| (d) | [Result] | Displays the wander characteristic value at each measurement point.<br>--..... No standard value exists.<br>• When Unlock has occurred, "Unlock" appears in red. |

## 5.3.7 Result: Wander sweep screen

The Result: Wander sweep screen displays the automatic wander sweep measurement result as numerical data together with the measurement frequency. The pass/fail judgment result is displayed as "OK" or "NG".

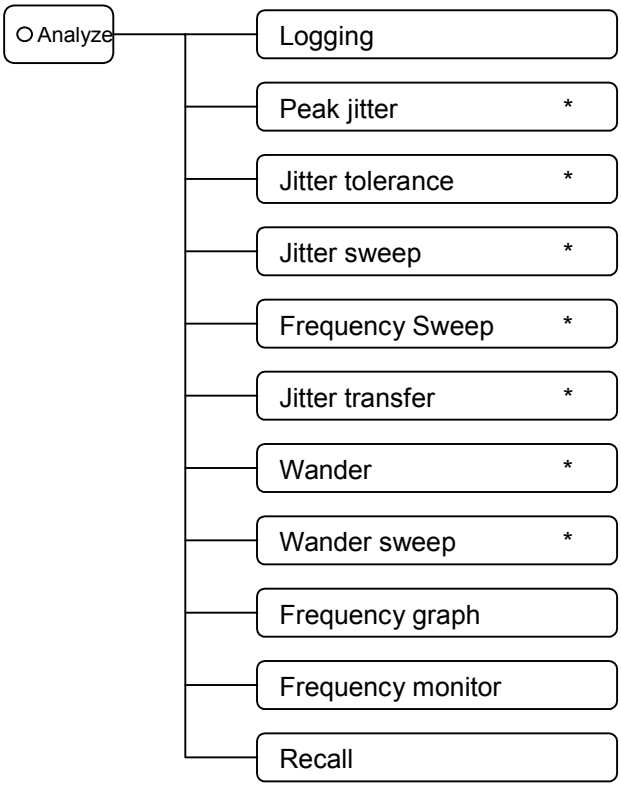



| No. | Freq.(µHz) | UIp-p | Result | No. | Freq.(µHz) | UIp-p | Result |
|---|---|---|---|---|---|---|---|
| 1 | 12.0 | 44790.0 | OK | 11 | 2,500.0 | 4980.0 | OK |
| 2 | 21.0 | 44790.0 | OK | 12 | 4,000.0 | 4980.0 | OK |
| 3 | 35.0 | 44790.0 | OK | 13 | 7,000.0 | 4980.0 | OK |
| 4 | 60.0 | 44790.0 | OK | 14 | 10,000.0 | 4980.0 | OK |
| 5 | 110.0 | 44790.0 | OK | 15 | 16,000.0 | 4980.0 | OK |
| 6 | 180.0 | 44790.0 | OK | 16 | 25,000.0 | 3110.0 | OK |
| 7 | 350.0 | 22780.0 | OK | 17 | 40,000.0 | 1950.0 | OK |
| 8 | 600.0 | 13290.0 | OK | 18 | 70,000.0 | 1110.0 | OK |
| 9 | 1,000.0 | 7980.0 | OK | 19 | 130,000.0 | 630.0 | OK |
| 10 | 1,600.0 | 4980.0 | OK | 20 | 200,000.0 | 630.0 | OK |

| | Item | Description |
|---|---|---|
| (a) | Start/Remain | Displays the measurement start time and remain time. |
| (b) | [Result] | Displays the wander sweep value at each measurement point.<br>OK ..... The value satisfies the standard value.<br>NG ..... The value does not satisfy the standard value.<br>-- ..... No measured value exists. |

# 5.4 Analyze Main Screen

The Analyze main screen has sub-screens shown in the following.



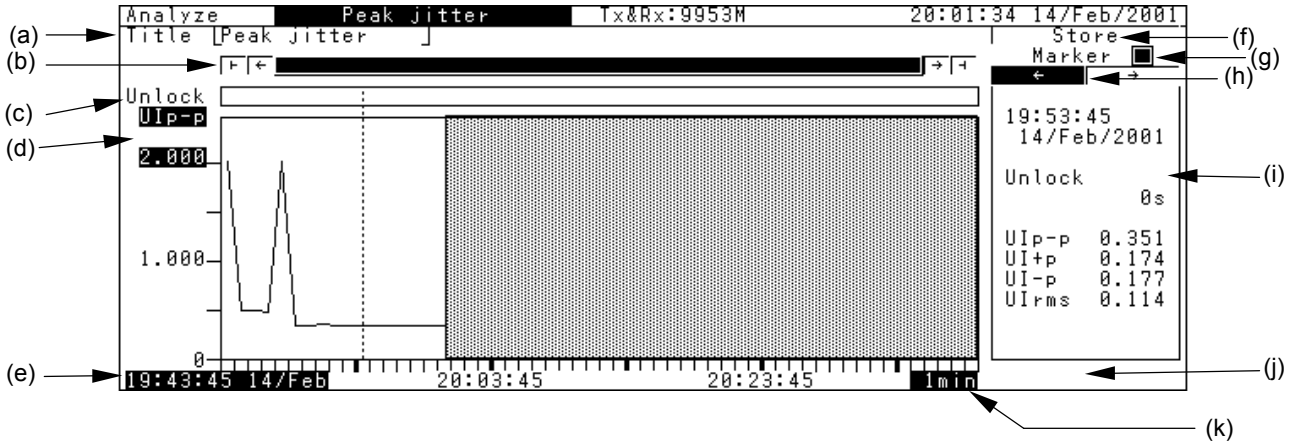

* The sub-screens being displayed on the Analyze main screen are limited by the sub-screen selected from the Test Menu main screen.

The screen names and functions are as follows:

| Screen name | Description |
|---|---|
| Logging | Displays the jitter measurement contents to be printed automatically. |
| Peak jitter | Displays the peak jitter measurement result on a graph. |
| Jitter tolerance | Displays the automatic jitter tolerance measurement result on a graph. |
| Jitter sweep | Displays the automatic jitter sweep measurement result on a graph. |
| Frequency sweep | Displays the automatic frequency sweep measurement result on a graph. |
| Jitter transfer | Displays the automatic jitter transfer characteristic measurement result on a graph. |
| Wander | Displays the automatic wander measurement result on a graph. |
| Wander sweep | Displays the automatic wander sweep measurement result on a graph. |
| Frequency graph | Displays the frequency data on a graph. |
| Frequency monitor | Displays the frequency monitor result as data. |
| Recall | Displays the data read from FD or internal memory. |

## 5.4.1 Analyze: Peak jitter screen

The Analyze: Peak jitter screen displays on a graph the jitter amplitude for peak jitter measurement.



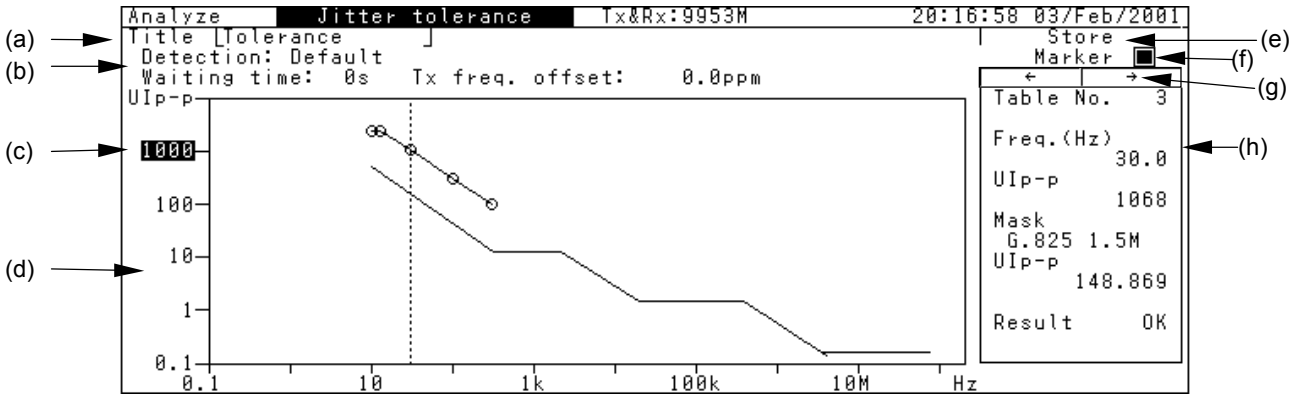

| | Item | Description |
|---|---|---|
| (a) | Title | Inputs the graph title. For input method, see "Section 4.3 Windows". |
| (b) | [Scroll] | Scrolls the graph.<br>⊢ .....Scrolling to the first page.<br>← ....Scrolling a half page forward.<br>→ ....Scrolling a half page backward.<br>⊣ .....Scrolling to the last page. |
| (c) | Unlock | Monitors and Displays unlock signal. |
| (d) | [Scale] | Switches the vertical axis of the graph ($UI_{p-p}$, $UI_{+p}$, $UI_{-p}$, $UI_{rms}$, and jitter amplitude). |
| (e) | [Measurement time display] | Displays the measurement start date and time. |
| (f) | Store | Saves the graph data in memory.<br>See "Section 8.2.6 Saving analysis graph data". |
| (g) | Marker | Sets the marker ON/OFF.<br>□ .....Indicates that the marker is set to OFF.<br>Clicking Set sets the marker to ON.<br>■ .....Indicates that the marker is set to ON<br>Clicking Set sets the marker to OFF. |
| (h) | ← → | With the marker set On and the cursor positioned at [←] and [→], clicking Set displays the numerical data at the measurement point. |
| (i) | [Detailed data display] | Displays the detailed data at the measurement point indicated by the marker. |
| (j) | | Indicates memory-full. |
| (k) | [Interval] | Sets the interval on the horizontal axis of the graph. |

***Note:***

- When starting or restarting a measurement, all data is deleted.
- When an Unlock has occurred, one memory amount appears in red on the graph.

## 5.4.2 Analyze: Jitter tolerance screen

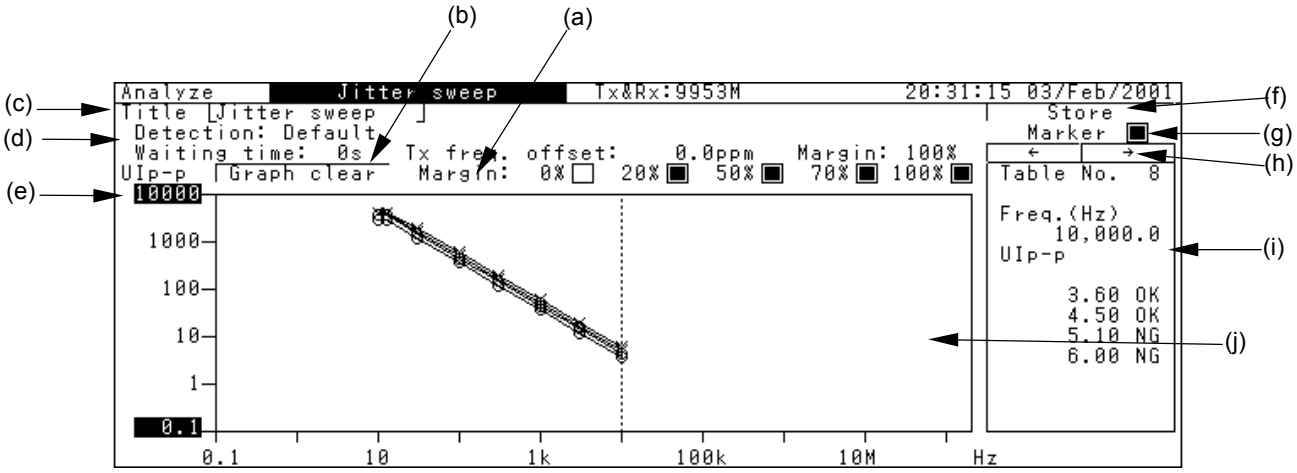
The Analyze: Jitter tolerance screen displays the jitter tolerance automatic measurement result on a graph.




| | Item | Description |
|---|---|---|
| (a) | Title | Inputs the graph title. |
| (b) | [Detection]<br>[Error]<br>[Unit]<br>[Threshold]<br>[Waiting time]<br>[Tx Freq. offset] | Displays the measurement conditions set on the Test menu: Jitter tolerance screen. |
| (c) | [Scale] | Switches the vertical axis of the graph.<br>The graph shows the range of 1 to 1000 $UI_{p-p}$. |
| (d) | [Graph] | Displays the measurement result and standard line. The measurement result satisfying the standard is plotted with "◯", and that unsatisfying the standard is plotted with "×". |
| (e) | Store | Saves the graph data in memory.<br>Click Set and input the file name at the character string input window.<br>• This item appears in 1-screen display mode. |
| (g) | Marker | Sets the marker ON/OFF.<br>☐..... Indicates that the marker is set to OFF.<br>Clicking Set sets the marker to ON.<br>■..... Indicates that the marker is set to ON<br>Clicking Set sets the marker to OFF. |
| (h) | ← → | With the marker set On and the cursor positioned at [←] and [→], clicking Set displays the numerical data at the measurement point. |
| (h) | [Detailed data display] | Displays the detailed data at the measurement point indicated by the marker. |

## 5.4.3 Analyze: Jitter sweep screen

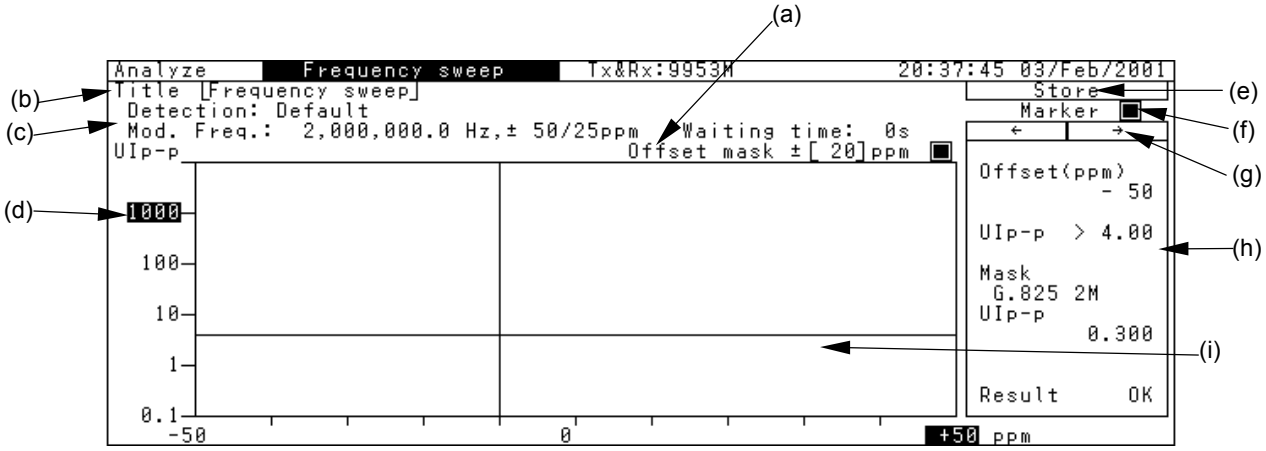
The Analyze: Jitter sweep screen displays the automatic jitter sweep measurement result on a graph.




| | Item | Description |
|---|---|---|
| (a) | Margin (1) to (5) | Selects displaying or hiding of each graph data by one-shot input. |
| (b) | Graph clear | Delete all graph data and measurement result from the screen. |
| (c) | Title | Input the graph title. |
| (d) | [Detection][Error]<br>[Unit][Threshold]<br>[Margin] [Waiting time]<br>[Tx Freq. offset] | Displays the measurement conditions set for the Test menu: Jitter sweep screen. |
| (e) | [Scale]<br><br>[Scale: max]<br>[Scale: min] | Switches the vertical axis of the graph.<br>When MU150018A is installed, the display is as follows:<br>The graph shows the range of 0.01 to 1000 $UI_{p-p}$.<br>The graph shows the range of 0.001 to 1000 $UI_{p-p}$. |
| (f) | Store | Saves the graph data in memory.<br>Clicking Set displays a character string input window.<br>On this window, input the data name and save the data in memory.<br>• This item appears in 1-screen display mode. |
| (g) | Marker | Sets the marker ON/OFF.<br>☐..... Indicates that the marker is set to OFF.<br>Clicking Set sets the marker to ON.<br>■..... Indicates that the marker is set to ON<br>Clicking Set sets the marker to OFF. |
| (h) | ← → | With the marker set On and the cursor positioned at [←] and [→], clicking Set displays the numerical data at the measurement point. |
| (i) | | Displays the detailed data at the measurement point indicated with the marker. |
| (j) | [Graph] | Displays the measurement result and sweep mask.<br>When the error free occurs, the measurement points are displayed with "◯".<br>When the error occurs, the measurement point are displayed with "×". |

## 5.4.4 Analyze: Frequency sweep screen

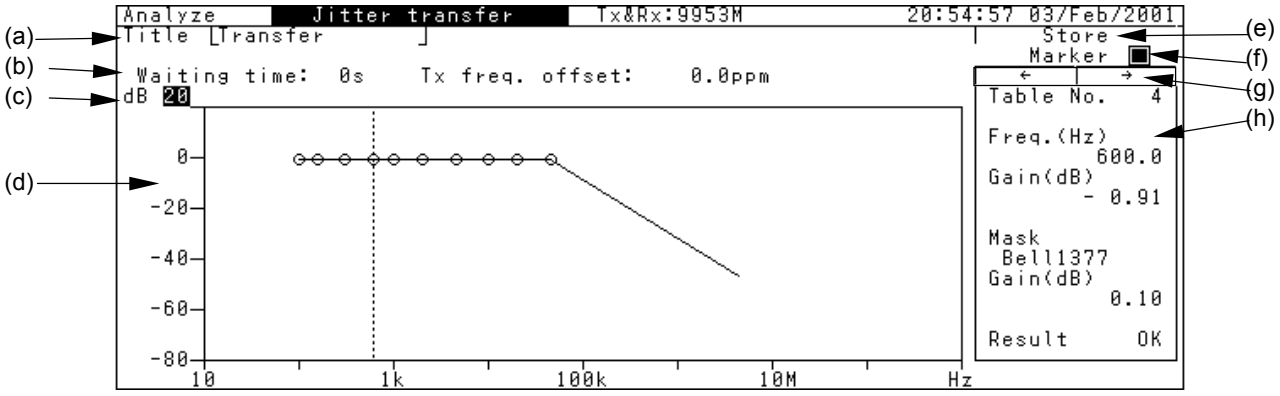
The Analyze: Frequency sweep screen displays the automatic frequency sweep measurement result on a graph.




| | Item | Description |
|---|---|---|
| (a) | Offset mask | Selects displaying or hiding the offset mask line by one-shot input. |
| (b) | Title | Inputs the graph title. |
| (c) | [Mod. freq.][Freq. offset] [Waiting time] [Step] [Offset mask] [Unit] [Detection][Error] [Hold time][Threshold] | Displays the detection conditions set for the Test menu: Freq. sweep screen. |
| (d) | [Scale] | Switches the vertical axis of the graph. Displaying the range of 1 to 1000 $UI_{p-p}$. |
| (e) | Store | Saves the graph data in memory.<br>• This item appears in 1-screen display mode. |
| (f) | Marker | Sets the marker to ON/OFF.<br>☐ .....Indicates that the marker is set to OFF. Clicking [Set] sets the marker to ON.<br>■ .....Indicates that the marker is set to ON. Clicking [Set] sets the marker to OFF. |
| (g) | ← → | With the marker set ON and the cursor positioned at [←] and [→], clicking [Set] displays the numerical data at the measurement point. |
| (h) | | Displays the detailed data at the measurement point indicated with the marker. |
| (i) | [Graph] | Displays the measurement result and standard line.<br>When the error free occurs, the measurement points are displayed with "◯".<br>When the error occurs, the measurement point are displayed with "×". |

## 5.4.5 Analyze: Jitter transfer screen

The Analyze: Jitter transfer screen displays the automatic jitter transfer characteristic measurement result on a graph.

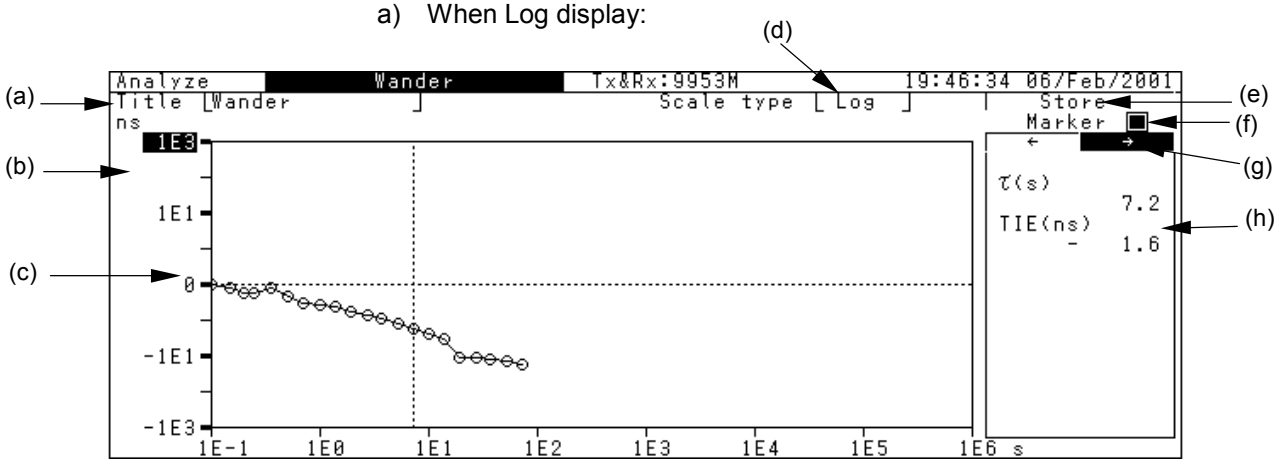



| | Item | Description |
|---|---|---|
| (a) | Title | Inputs the graph title. |
| (b) | [Waiting time]<br>[Tx Freq. offset] | Displays the measurement conditions set for the Test menu: Jitter transfer screen. |
| (c) | [Scale] | Switches the vertical axis of the graph.<br>20 .....Displaying the range of –80 to 10 dB.<br>10 .....Displaying the range of –30 to 10 dB.<br>1 .....Displaying the range of –3 to 1 dB. |
| (d) | [Graph] | Displays the measurement result and standard line. The measurement result satisfying the standard is plotted with "◯", and that unsatisfying the standard is plotted with "×". |
| (e) | Store | Saves the graph data in internal memory.<br>Clicking [Set] with the cursor positioned here displays the character string input window.<br>On this window, input the file name. This item appears in 1-screen display mode. |
| (f) | Marker | Sets the marker to ON/OFF.<br>☐ .....Indicates that the marker is set to OFF.<br>Clicking [Set] sets the marker to ON.<br>■ .....Indicates that the marker is set to ON.<br>Clicking [Set] sets the marker to OFF. |
| (g) | ← → | With the marker set ON and the cursor positioned at [←] and [→], clicking [Set] displays the numerical data at the measurement point. |
| (h) | | Displays the set standard line and the marker value at each measurement point. |

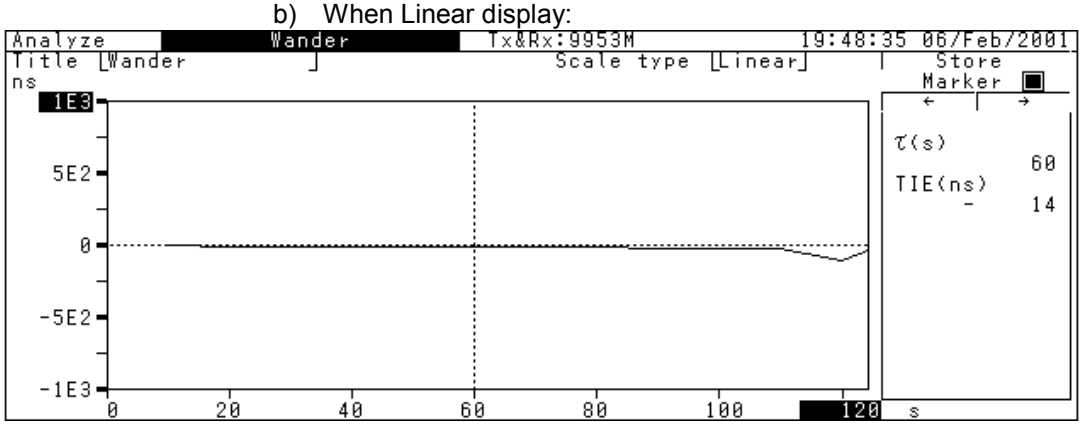
## 5.4.6 Analyze: Wander screen

The Analyze: Wander screen displays the wander measurement result on a graph.

a) When Log display:



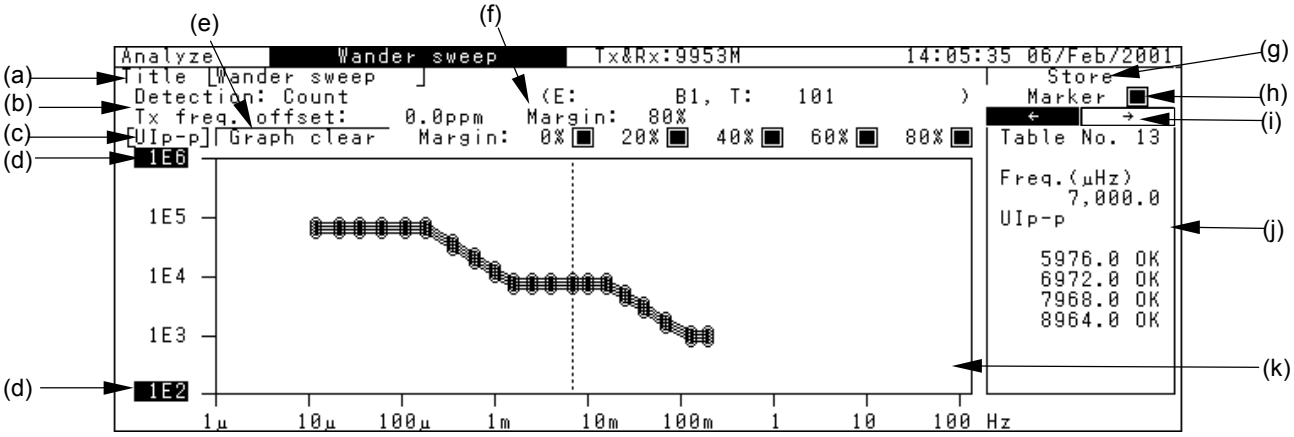

b) When Linear display:




| | Item | Description |
|---|---|---|
| (a) | Title | Inputs the graph title. |
| (b) | [Scale] | Switches the vertical axis of the graph.<br>"Scale: max" is 1E12.<br>"Scale: min" is 1E-12. |
| (c) | [Graph] | Displays the wander measurement result.<br>The measurement points are plotted with "◯". |
| (d) | Scale type | Switches the Log/Linear graph by one-shot entry. |
| (e) | Store | Saves the graph data in memory. For details, see "Section 8.2.6 Saving analysis graph data". |
| (f) | Marker | Sets the marker to ON/OFF.<br>□.....Indicates that the marker is set to OFF.<br>Clicking Set sets the marker to ON.<br>■.....Indicates that the marker is set to ON.<br>Clicking Set sets the marker to OFF. |
| (g) | ← → | With the marker set ON and the cursor positioned at [←] and [→], clicking Set displays the numerical data at the measurement point. |
| (h) | | Displays the detailed data at the measurement point indicated with the marker. |

## 5.4.7 Analyze: Wander sweep screen

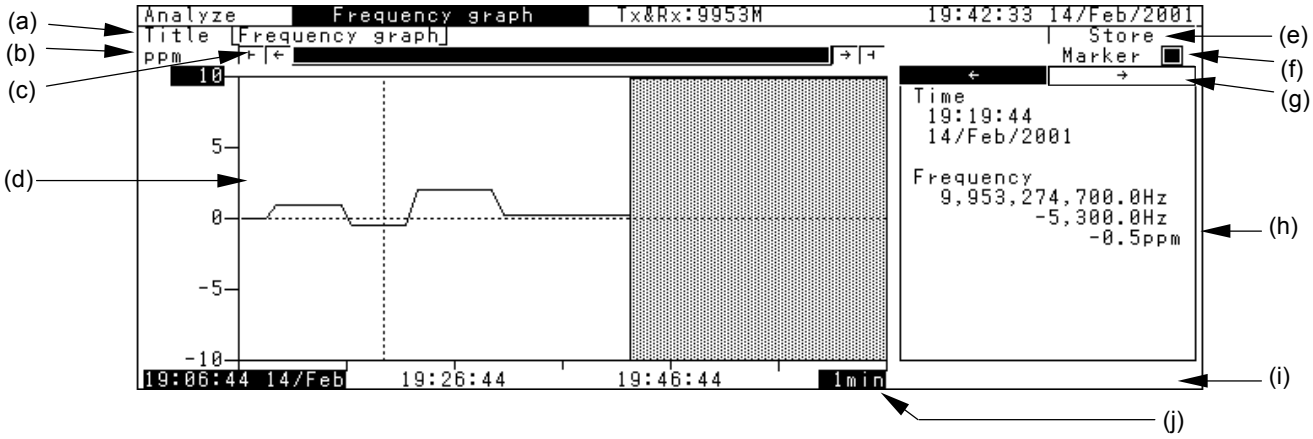
The Analyze: Wander sweep screen displays the wander sweep measurement result on a graph.




| | Item | Description |
|---|---|---|
| (a) | Title | Inputs the graph title. |
| (b) | [Detection][Error]<br>[Unit][Threshold]<br>[Margin]<br>[Waiting time]<br>[Tx Freq. offset] | Displays the detection conditions set for the Test menu: Wander sweep screen. |
| (c) | [UIp-p] | Switches between UIp-p and ns by one-shot input. |
| (d) | [Scale] | Switches the vertical axis of the graph.<br>"Scale: max" is 1E6.<br>"Scale: min" is 1E-6. |
| (e) | Graph clear | Deletes all graph data and measurement results from the screen. |
| (f) | Margin (1) to (5) | Selects to display/hide each graph data by one-shot input. |
| (g) | Store | Saves the graph data in memory. For details, see "Section 8.2.6 Saving analysis graph data". |
| (h) | Marker | Sets the marker to ON/OFF.<br>☐..... Indicates that the marker is set to OFF. Clicking Set sets the marker to ON.<br>■..... Indicates that the marker is set to ON. Clicking Set sets the marker to OFF. |
| (i) | ← → | With the marker set ON and the cursor positioned at [←] and [→], clicking Set displays the numerical data at the measurement point. |
| (j) | | Displays the detailed data at the measurement point indicated with the marker. |
| (k) | [Graph] | Displays the measurement result and sweep mask.<br>When the error free occurs, the measurement points are displayed with "○".<br>When the error occurs, the measurement point are displayed with "×". |

## 5.4.8 Analyze: Frequency graph screen

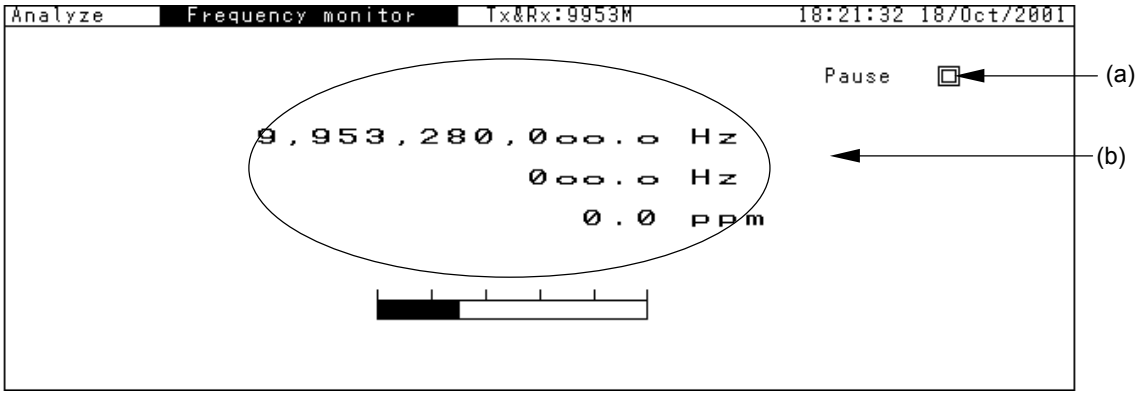
The Analyze: Frequency graph screen displays the fluctuation of the received signal's center frequency in ppm.




| | Item | Description |
|---|---|---|
| (a) | Title | Inputs the graph title. See "Section 4.3 Input Windows". |
| (b) | [Scale] | Switches the vertical axis of the graph.<br>1000 ... Displaying the range of –1000 to +1000 ppm.<br>100 ... Displaying the range of –100 to +100 ppm.<br>10 ... Displaying the range of –10 to +10 ppm. |
| (c) | [Scroll] | Clicking Set with the cursor positioned at one of the scroll symbols scrolls the measurement data display:<br>⊢ ..... Scrolling to the first page.<br>← .... Scrolling a half page forward.<br>→ .... Scrolling a half page backward.<br>⊣ ..... Scrolling to the last page. |
| (d) | [Graph] | Displays the measurement result. |
| (e) | Store | Saves the graph data in memory. For details, see "Section 8.2.6 Saving analysis graph data". |
| (f) | Marker | Sets the marker to ON/OFF.<br>☐ .....Indicates that the marker is set to OFF. Clicking Set sets the marker to ON.<br>■ .....Indicates that the marker is set to ON. Clicking Set sets the marker to OFF. |
| (g) | ← → | With the marker set ON and the cursor positioned at [←] and [→], clicking Set displays the numerical data at the measurement point. |
| (h) | | Displays the detailed data at the measurement point indicated with the marker. |
| (i) | | Indicates memory-full. |
| (j) | [Interval] | Sets the interval on the horizontal axis of the graph. |

## 5.4.9 Analyze: Frequency monitor screen

The Analyze: Frequency monitor screen displays the received signal frequency and ppm value. The gate time changes automatically according to the monitored bit rate. The monitor value is updated at each gate time.




| | Item | Description |
|---|---|---|
| (a) | Pause | Temporarily stops the frequency monitor value. |
| (b) | [Monitor result display] | Displays the frequency monitor value. |

# Section 6 Jitter Application

This section describes the jitter application that uses MP1580A and/or MP1570A equipped with the MU150018A 2.5/10G jitter unit.

- For screen switching and parameter setting procedures, see "Section 4 Screen Switching and Parameter Setting".
- For screen parameters and graphs used in this section, see "Section 5 Screen Description".

# 6.1 Manual Jitter Generation and Measurement

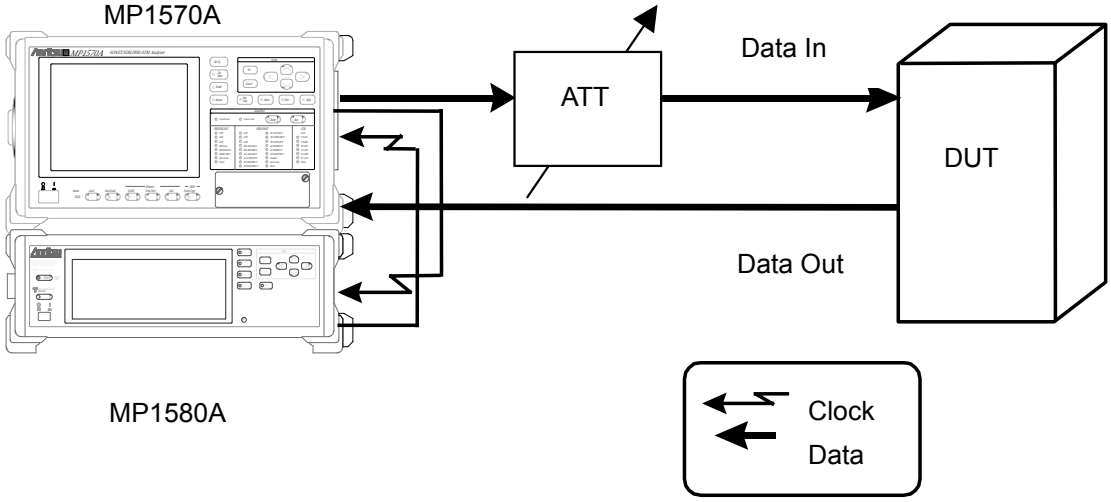
MP1580A allows generating or measuring signals of bit rate 2488 M or 9953 M with jitter modulated. This section describes how to manually generate and measure jitter signals using examples.

## 6.1.1 Adding jitter to transmitted signal using internal signal source

This section describes an example for generating a signal of bit rate 2488 M or 9953 M with jitter modulation using the internal signal source of MP1580A.

Connecting measurement system

Connect MP1580A and MP1570A to the DUT as shown in the figure below.




**Example connection for measurement in the Internal mode**

(1) Connect MP1580A and MP1570A as shown in the diagram on the next page.

(2) Turn ON the power switches of MP1580A and MP1570A.

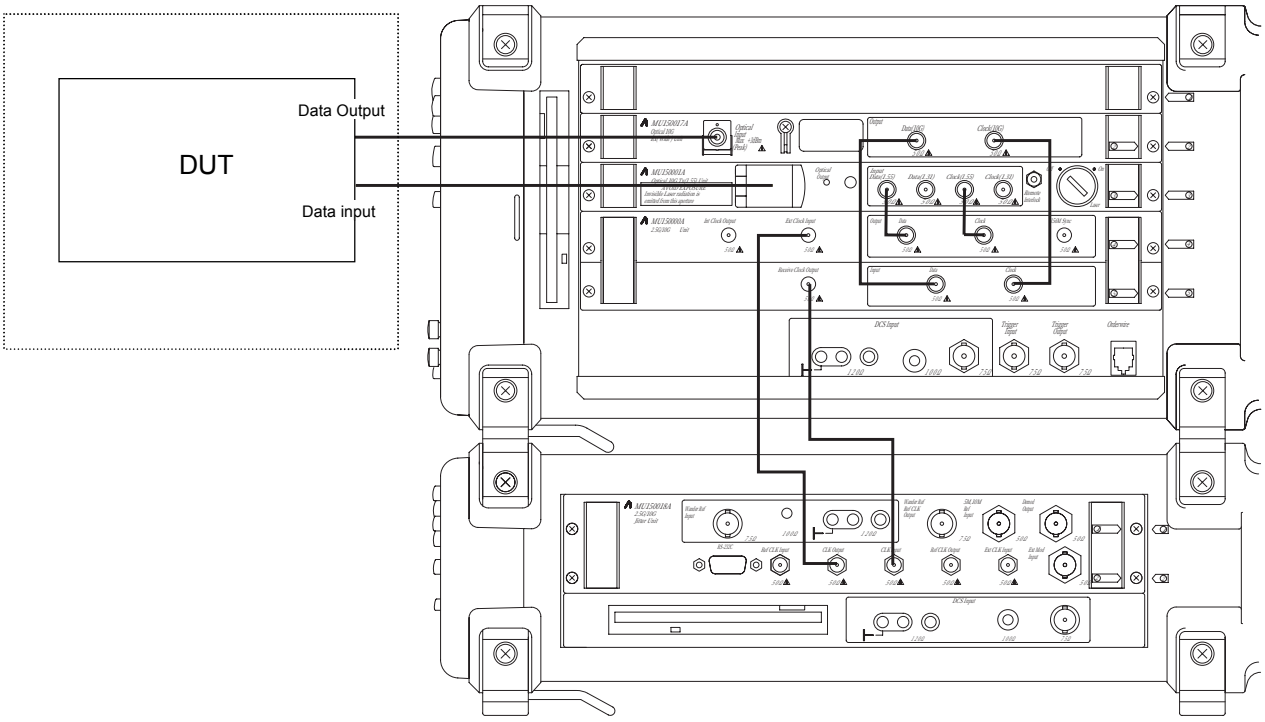
(3) Connect the MU150001A optical output connector to the input connector on the DUT via the optical attenuator using SM optical fiber cable.

(4) Check that the optical output level from the DUT is within the optical input range for MP1570A and, if necessary, connect it to the MU150017A Optical Input connector via the optical attenuator using SM optical fiber cable.

(5) Adjust the variable optical attenuator so that it gives an input level causing no errors in MP1570A.

***Note:***

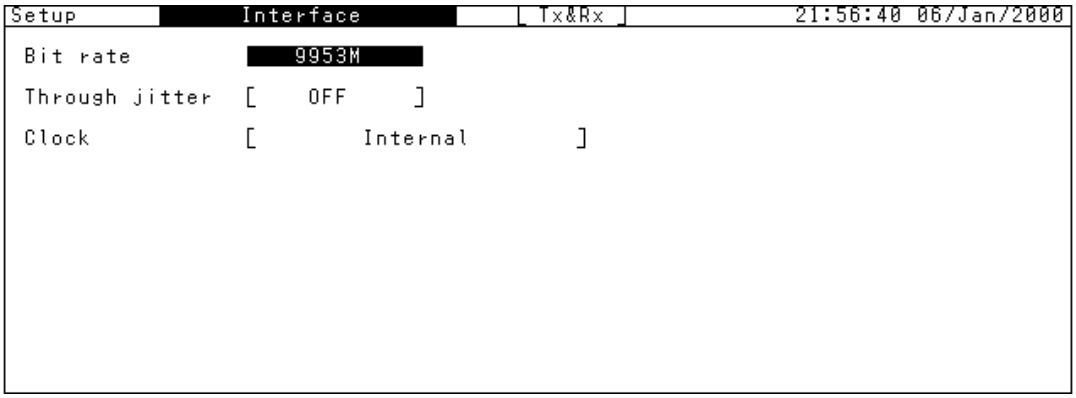
Before making connections, check the input level (see (4) above).



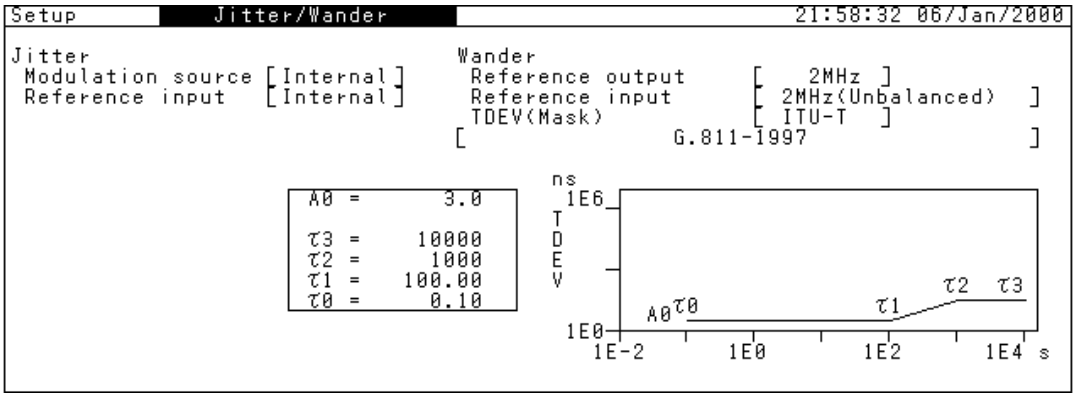

**Unit connection diagram**

Setting procedure

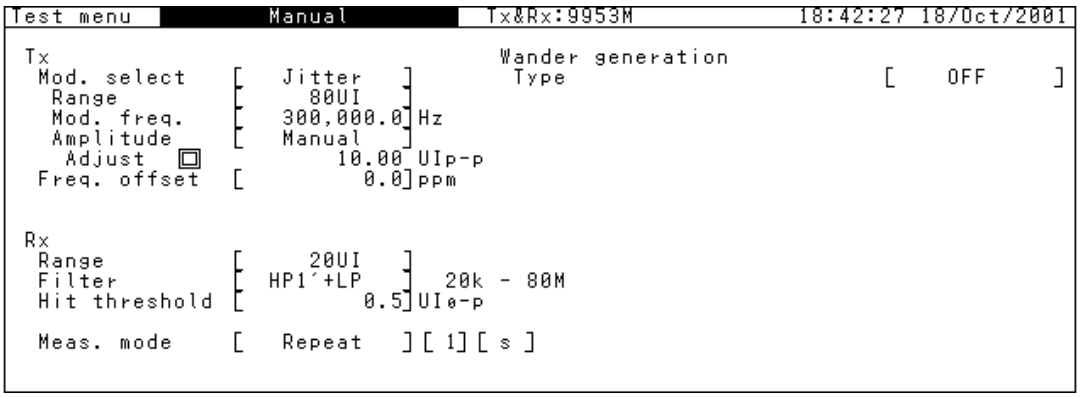
(1) From the Setup: Interface screen, set the basic parameters. Because the internal signal source of MP1580A is to be used as the reference clock, set "Clock" to "Internal".




(2) From the Setup: Jitter/Wander screen, set the jitter signal modulation source.




(3) From the Test menu: Manual screen, set the jitter signal parameters. In the following screen, the amplitude and modulation frequency is set to 10 UI and 300 kHz, respectively.

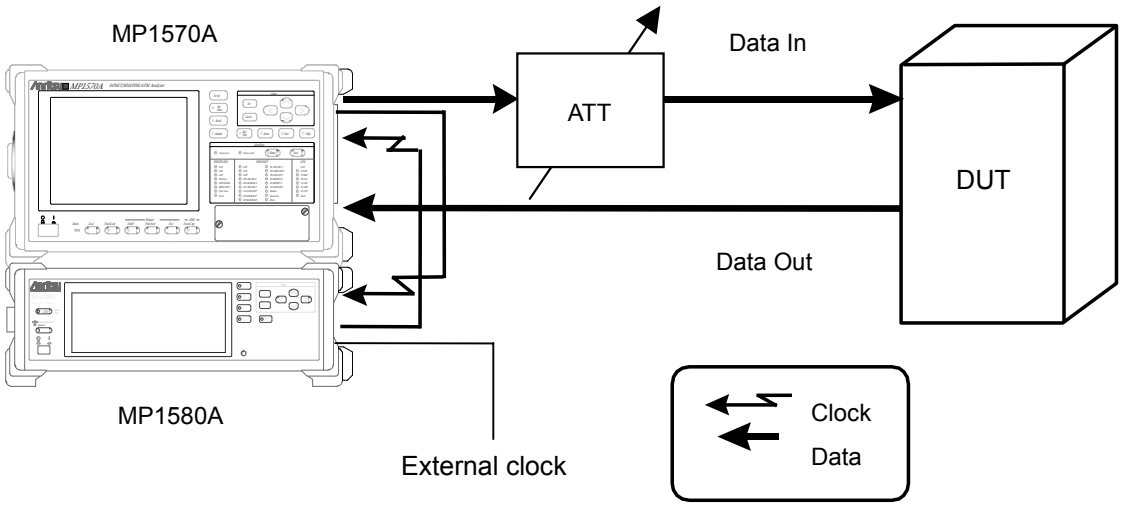


## 6.1.2 Adding jitter to transmitted signal using external input clock

This section describes an example for generating a jitter modulated that signal synchronized with an external clock.

Connecting measurement system

Connect MP1580A and MP1570A to the DUT as shown in the figure below.




**Example connection for measurement with external input clock**

(1) Connect MP1580A and MP1570A as shown in the diagram on the next page.

(2) Turn ON the power switches of MP1580A and MP1570A.

(3) Connect 155.52 MHz external clock to External Clock Input at MU150018A.

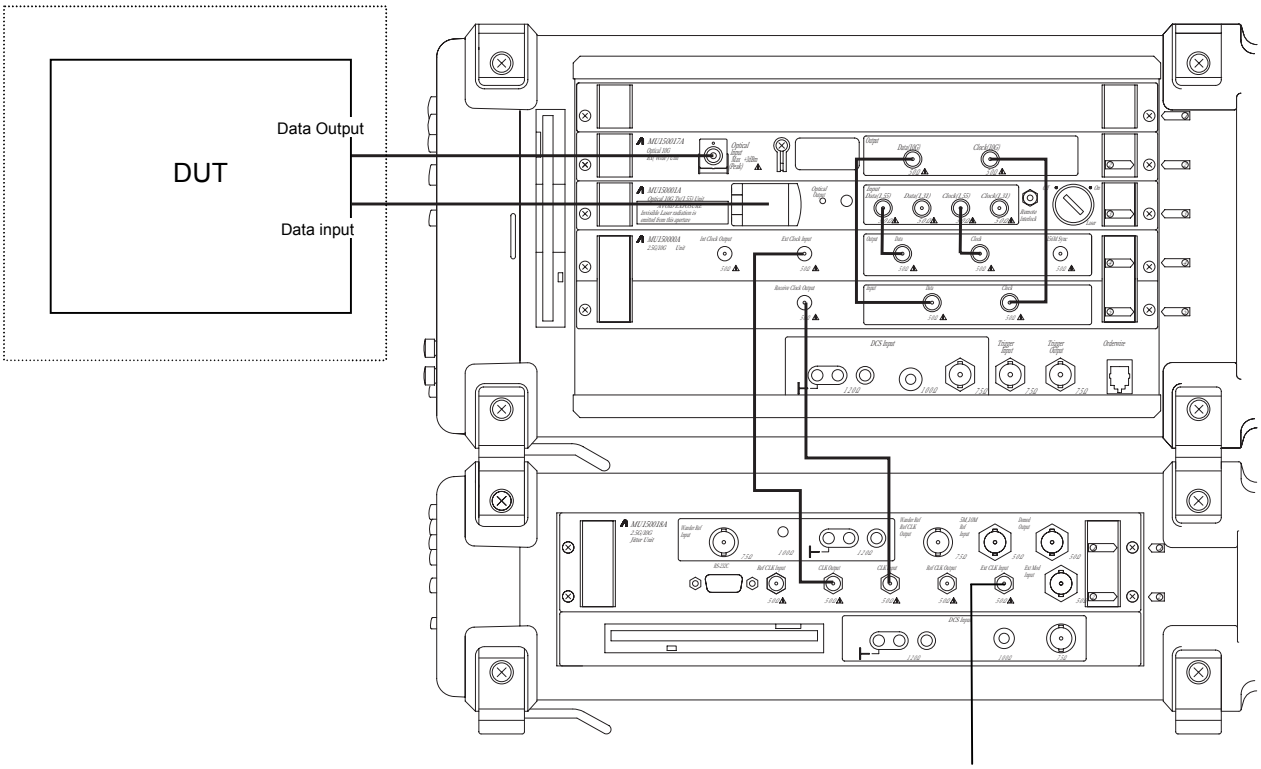
(4) Connect the MU150001A optical output connector to the DUT input connector via the variable optical attenuator using SM optical fiber cable.

(5) Check that the optical output level from the DUT is within the optical input range for MP1570A and, if necessary, connect it to the MU150017A Optical Input connector via the optical attenuator using SM optical fiber cable.

(6) Adjust the variable optical attenuator so that it gives an input level causing no errors in MP1570A.

***Note:***

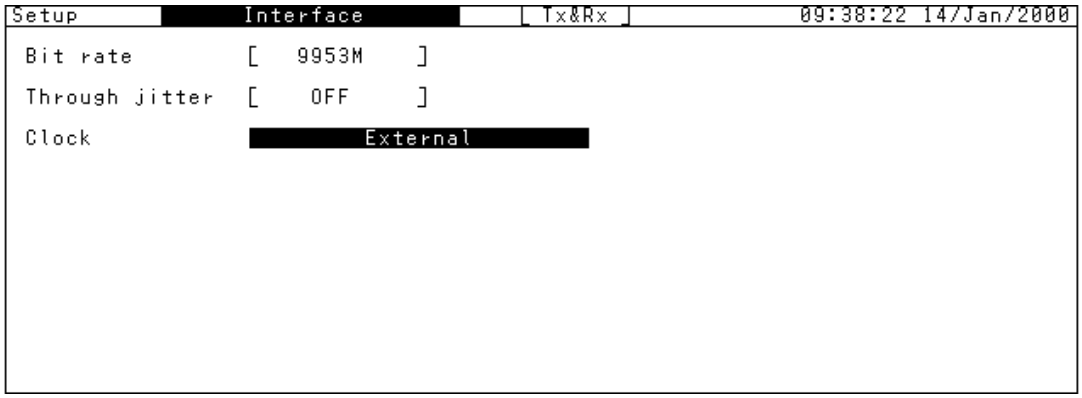
Before making connections, check the input level (see (5) above).



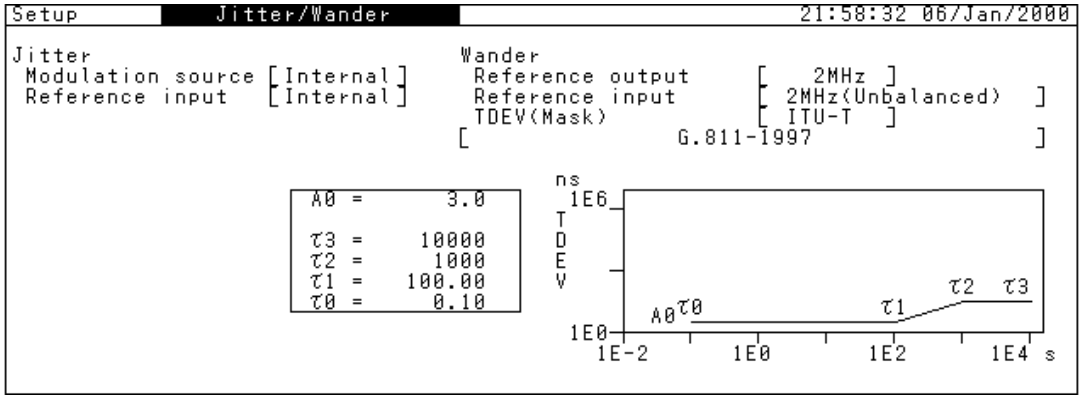

Unit connection diagram

Setting procedure

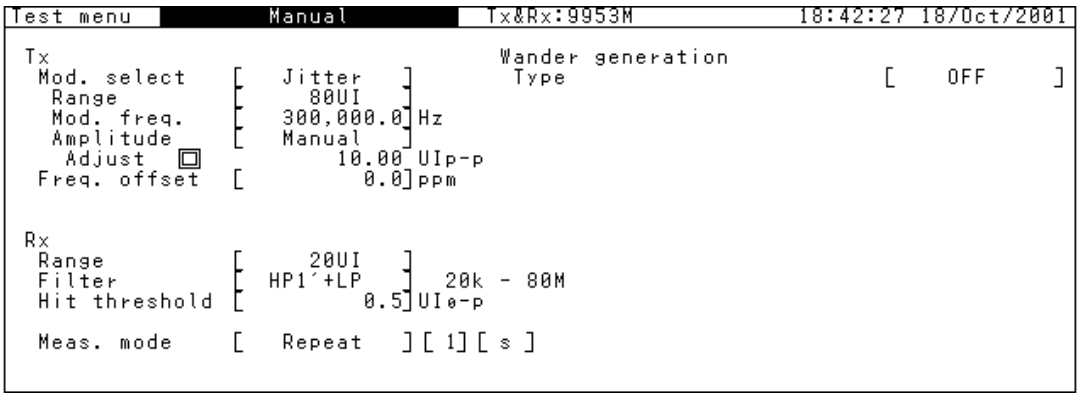
(1) From the Setup: Interface screen, set the basic parameters. Because an external signal is to be used as the reference clock, set "Clock" to "External".




(2) From the Setup: Jitter/Wander screen, set the jitter signal modulation source.




(3) From the Test menu: Manual screen, set the jitter signal parameters. In the following screen, the amplitude and modulation frequency is set to 10 UI and 300 kHz, respectively.

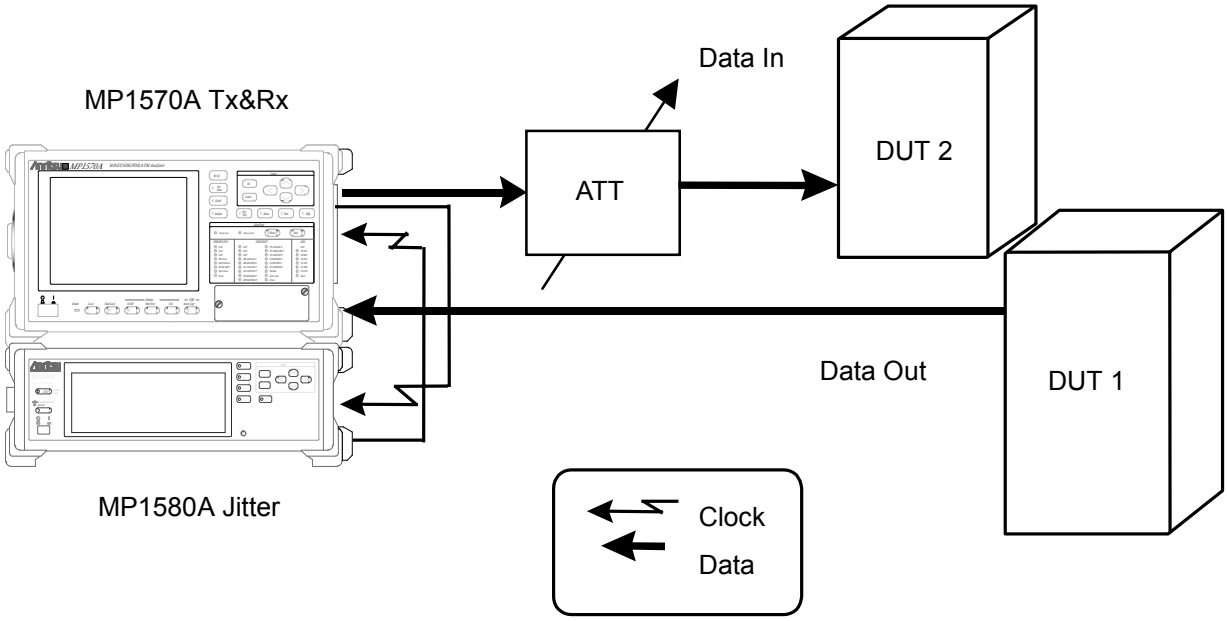


## 6.1.3 Measuring Recovery Data Clock's Jitter and Adding Jitter (through jitter)

This section describes an example for measuring and passing through the recovery data clock and adding jitter to other DUT.

Connecting measurement system

Connect MP1580A and MP1570A to the data transmitted unit as shown in the figure below.




**Example connection for through jitter measurement**

(1) Connect MP1580A and MP1570A as shown in the diagram on the next page.

(2) Turn ON the power switches of MP1580A and MP1570A.

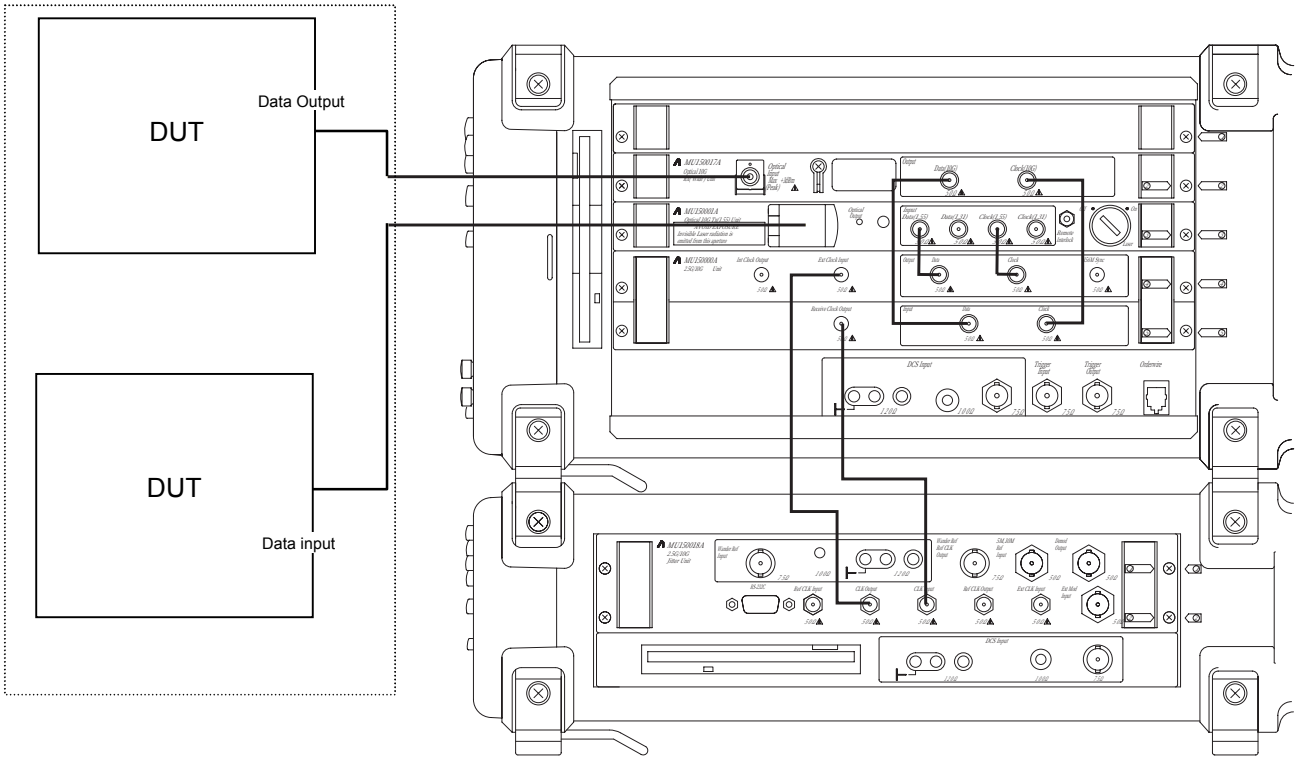
(3) Connect the MU150001A optical output connector to the input connector on DUT-2 via the variable optical attenuator using SM optical fiber cable.

(4) Check that the optical output level from DUT 1 is within the optical input range for MP1570A and, if necessary, connect it to the MU150017A Optical Input connector via the optical attenuator using SM optical fiber cable.

(5) Adjust the variable optical attenuator so that it gives an input level higher by 1 dB than the level causing an error in MP1570A.

***Note:***

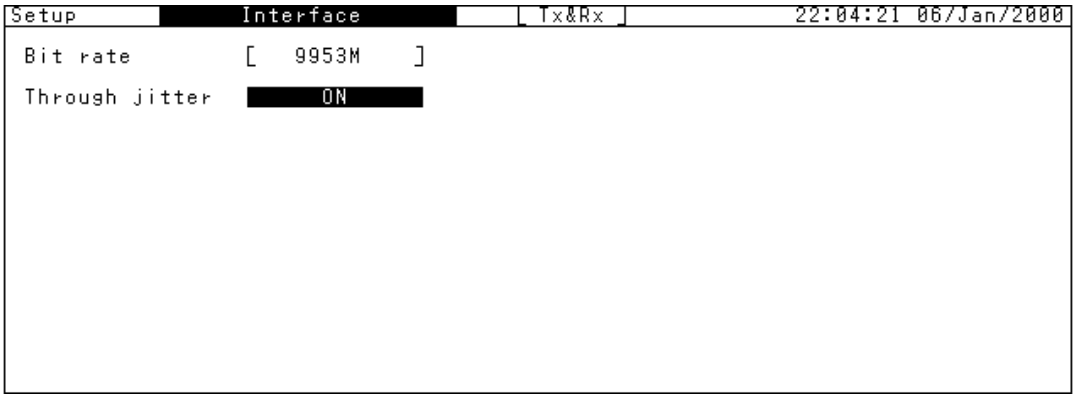
Before making connections, check the input level (see (3) and (4) above).



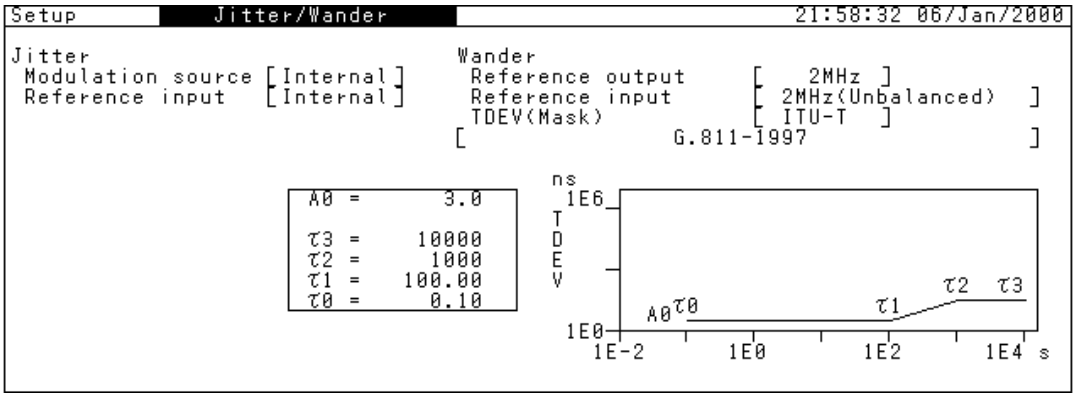

**Unit connection diagram**

Setting procedure

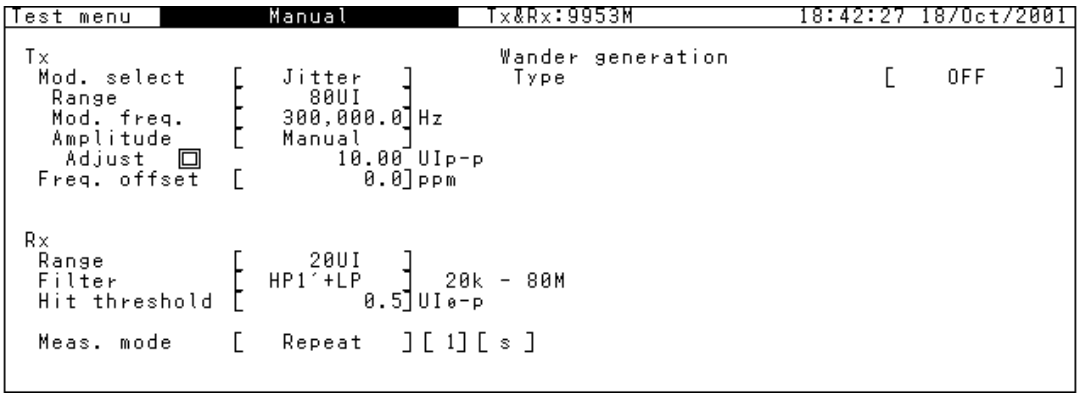
(1) From the Setup: Interface screen, set the basic parameters. Because the received jitter signal is to be passed through and added to the other DUT, set "Through jitter" to "On".




(2) From the Setup: Jitter/Wander screen, set the jitter signal modulation source.




(3) From the Test menu: Manual screen, set the jitter signal parameters. In the following screen, the amplitude and modulation frequency is set to 10 UI and 300 kHz, respectively.

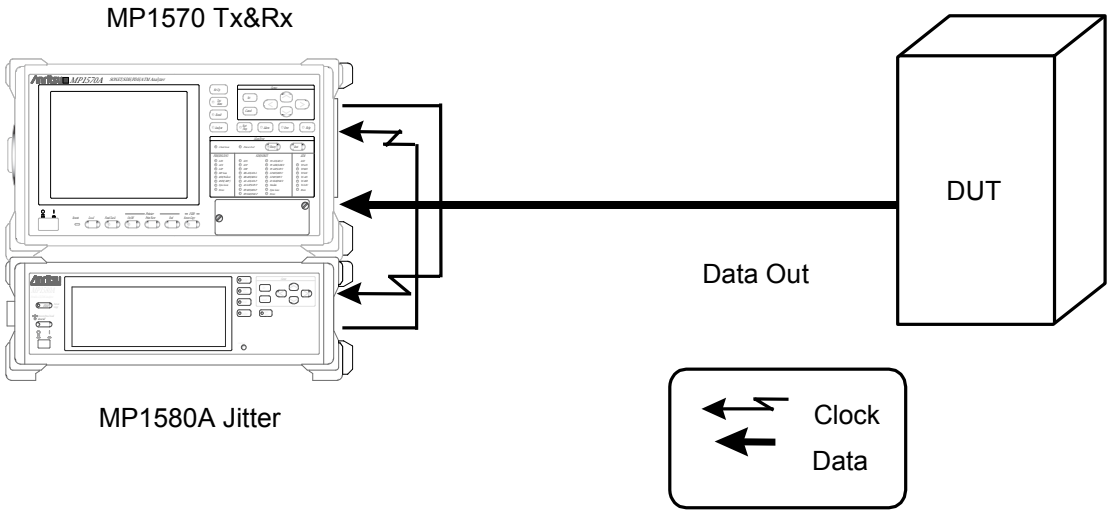


## 6.1.4 Jitter measurement

This section describes an example for measuring the jitter of a clock regenerated from the received data. For evaluating the DUT's jitter characteristic, MP1580A allows $UI_{p-p}$/$UI_{rms}$, Hit, peak jitter, and frequency measurements at the same time.

### Connecting measurement system

Connect MP1580A and MP1570A to the DUT, namely device under test (DUT) as shown in the figure below.




**Example connection for regenerated clock measurement**

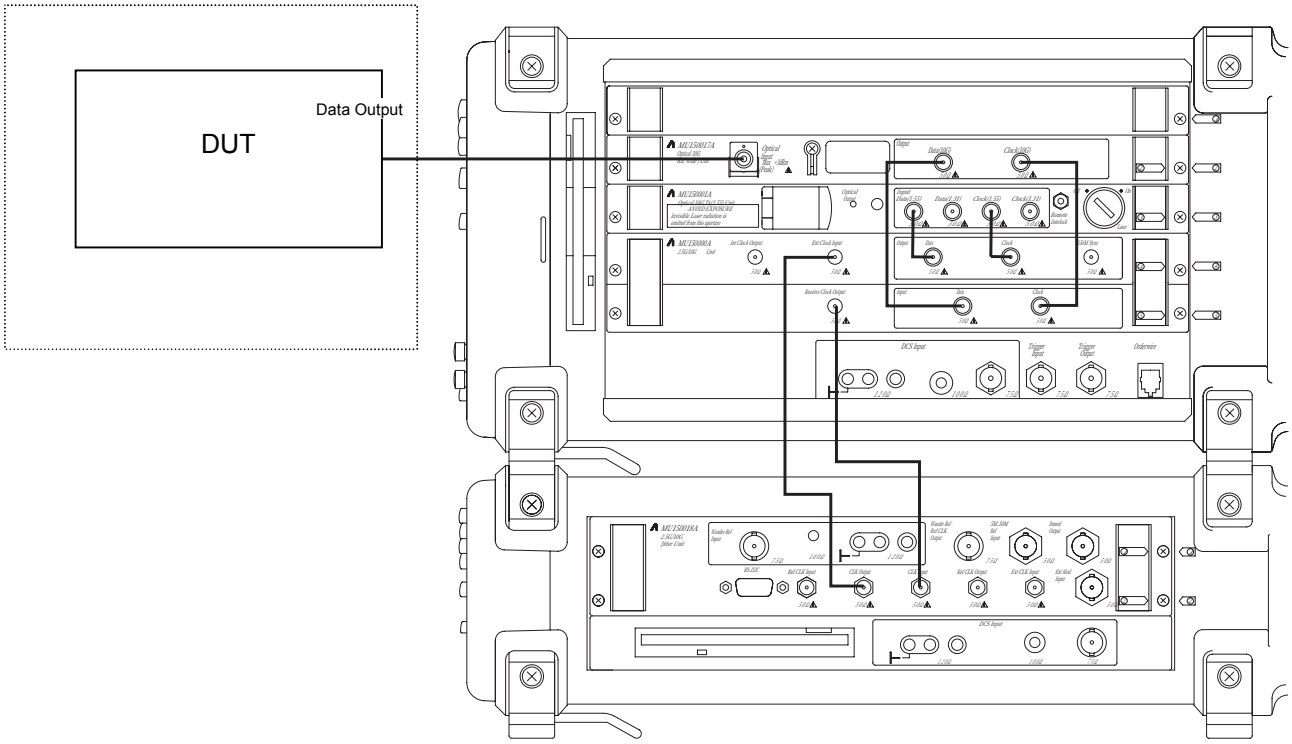
(1) Connect MP1580A and MP1570A as shown in the diagram on the next page.

(2) Turn ON the power switches of MP1580A and MP1570A.

(3) Check that the optical output level from DUT is within the optical input range for MP1570A and, if necessary, connect it to the MU150017A Optical Input connector via the optical attenuator using SM optical fiber cable.

***Note:***

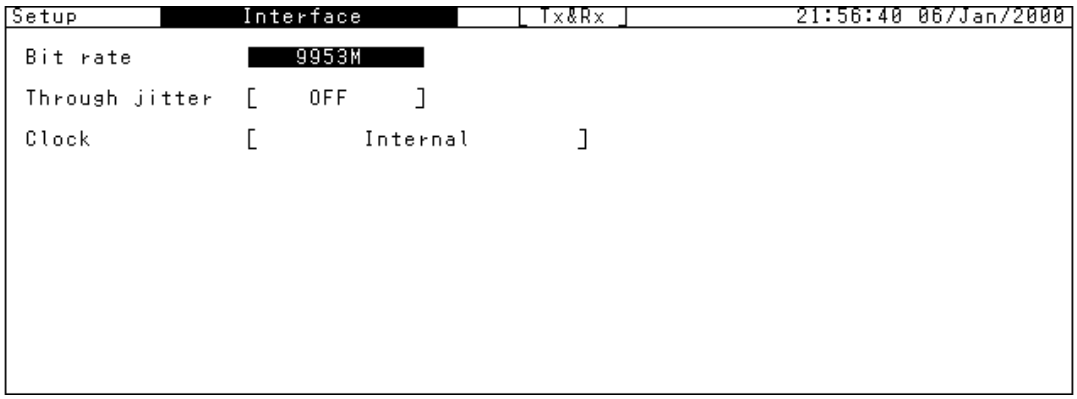
Before making connections, check the input level (see (3) above).



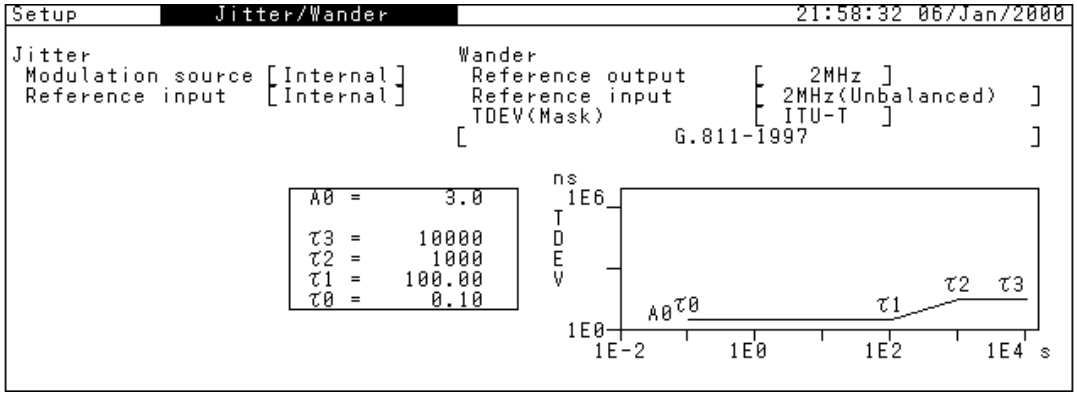

**Unit connection diagram**

Setting procedure

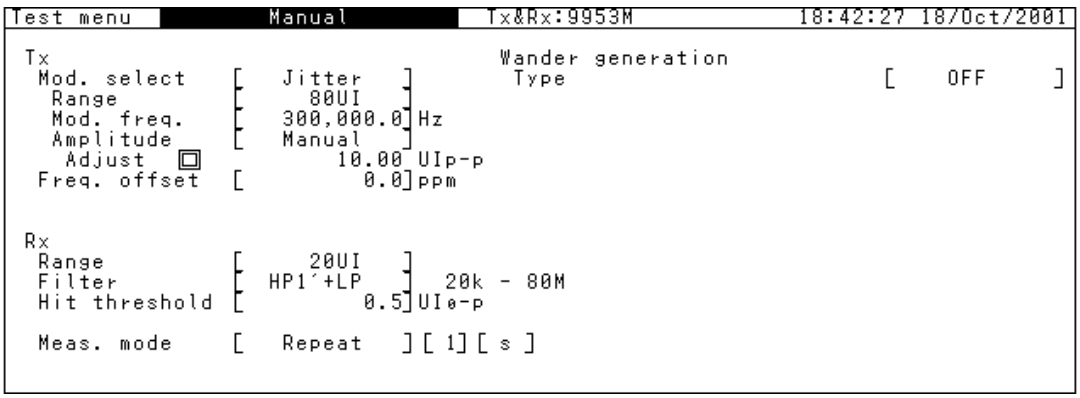
(1) From the Setup: Interface screen, set the basic parameters.




(2) From the Setup: Jitter/Wander screen, set the jitter signal modulation source.



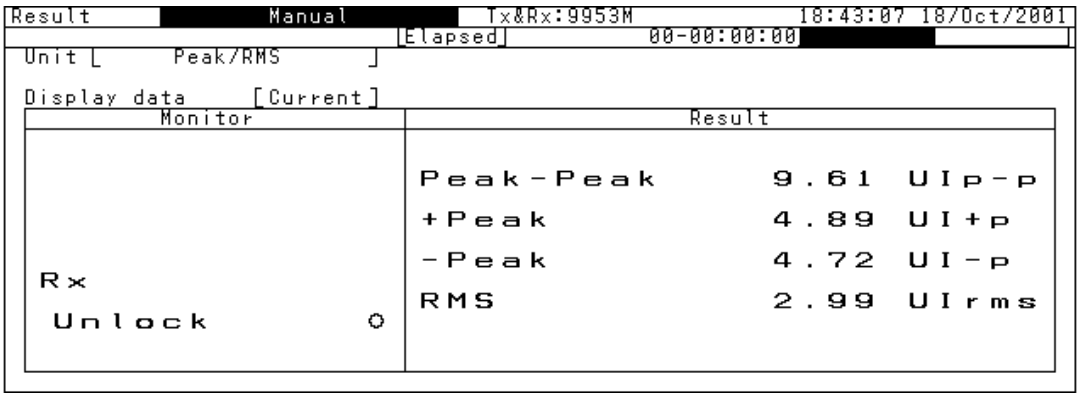

(3) From the Test menu: Manual screen, set the received signal (Rx) parameters.



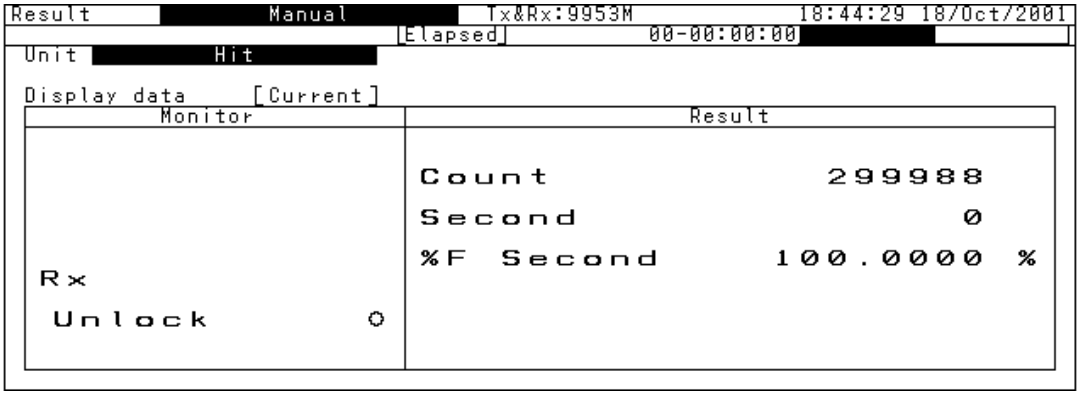
### Starting measurement and displaying measurement result

According to the measurement items and/or graphs to be displayed, select the screen as described below.

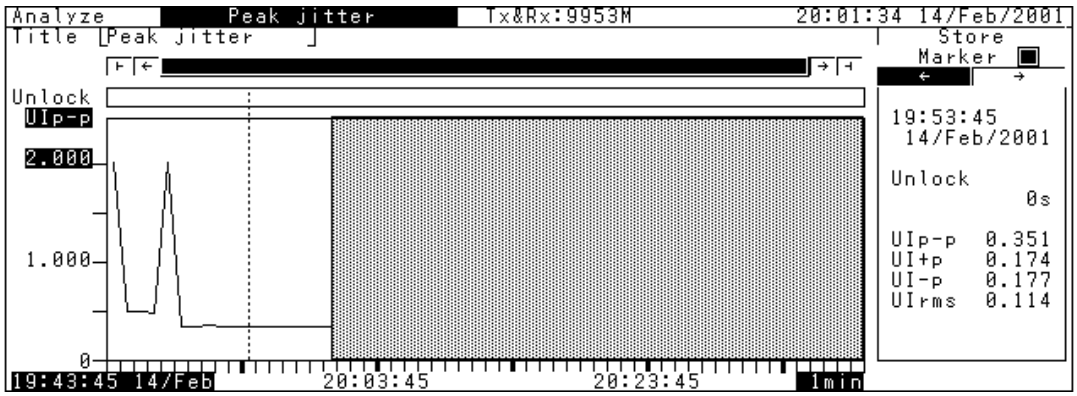
(1) To display the jitter measurement result, select the Result: Manual screen. According to the items to be displayed, set "Unit" for the screen as shown below. To display $UI_{p-p}$ (jitter amplitude peak-to-peak value) and $UI_{rms}$ (jitter amplitude root mean square), set "Unit" to "Peak/RMS". Press Start/Stop to start the measurement and display the measurement result.




To display the number of times the jitter amplitude threshold is exceeded, set "Unit" to "Hit". The measurement result is displayed.



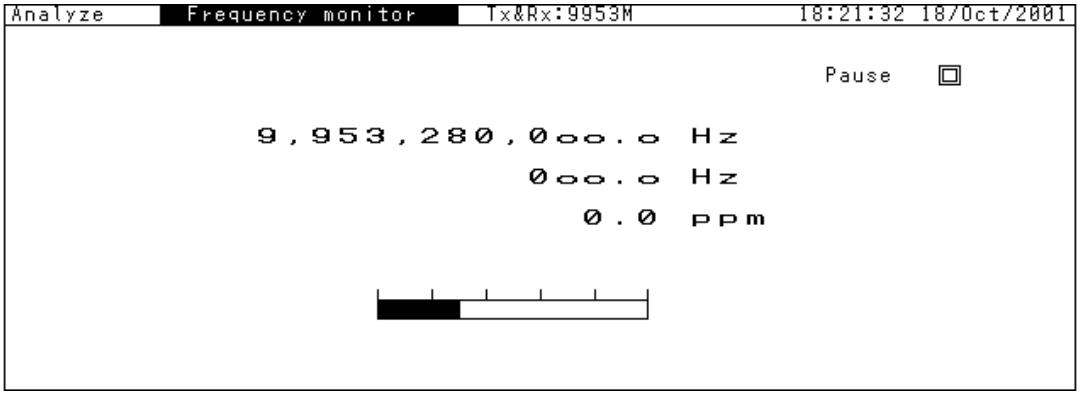
(2) To display a graph of the jitter amplitude obtained by peak jitter measurement, select the Analyze: Peak Jitter screen. Display the measurement result.



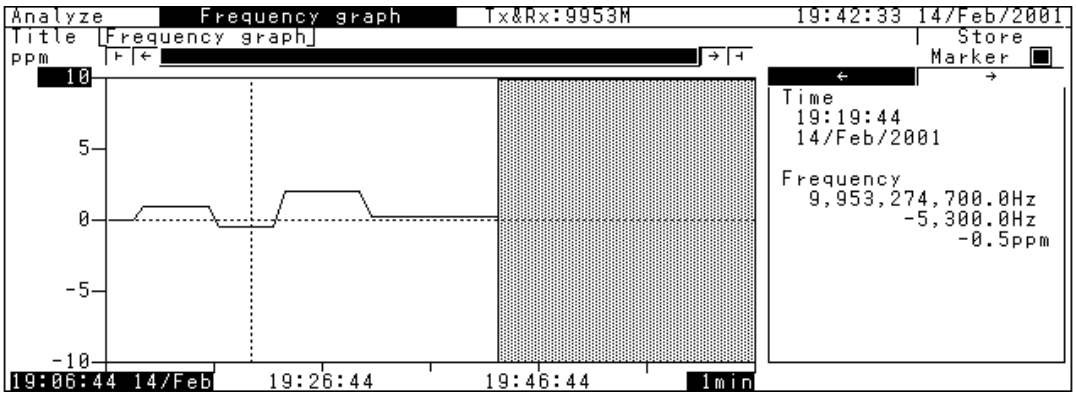

***Note:***

- When starting or restarting measurement, all data is cleared.
- When an Unlock has occurred, one memory segment appears in red on a graph.

(3) To display the received signal frequency, select the Analyze: Frequency monitor screen. Display the measurement result, showing the measurement progress on a bar graph.



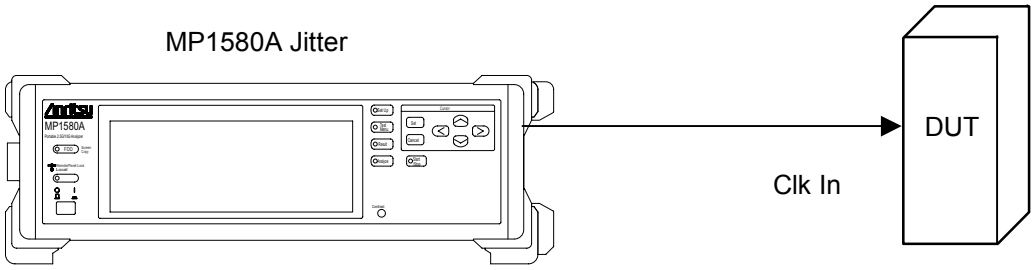
(4) To monitor the received signal frequency, select the Analyze: Frequency graph screen.



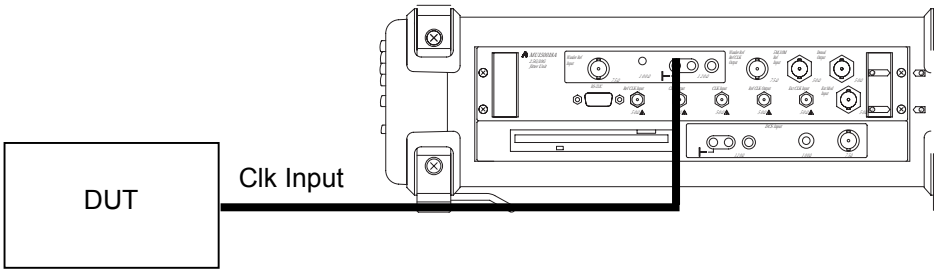
## 6.1.5 Generating jitter using MP1580A alone

This section describes an example for generating a jitter signal using MP1580A alone.

Connecting measurement system




**Example connection for measurement in the Internal mode**



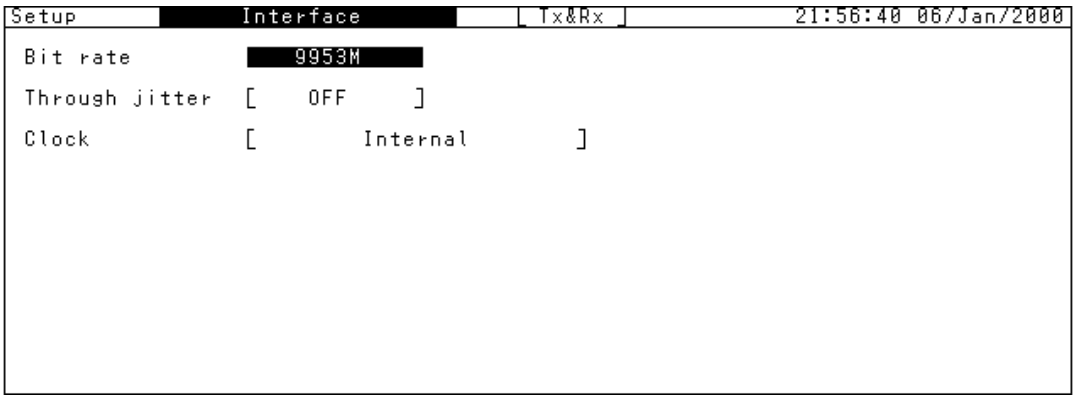

**Unit connection diagram**

(1) Turn ON the power switch of MP1580A.

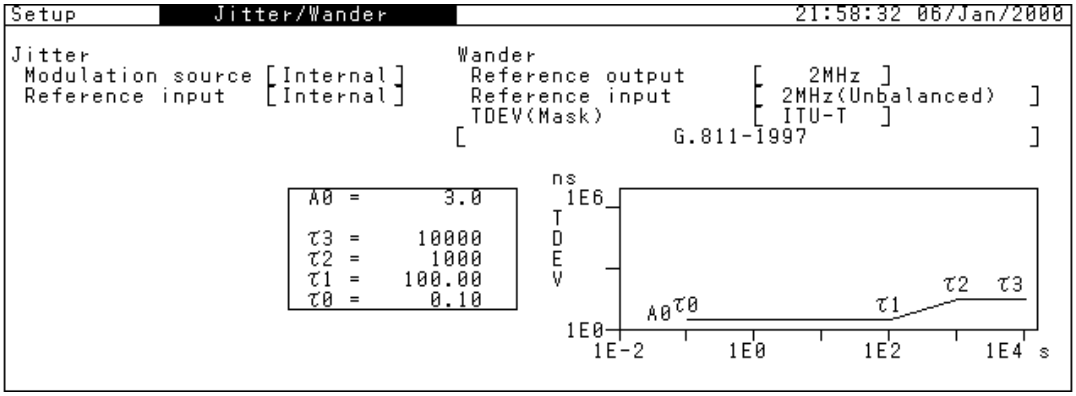
(2) Connect the MP1580A Clk Output connector to the DUT Clk Input connector as shown in the figure above.

Setting procedure

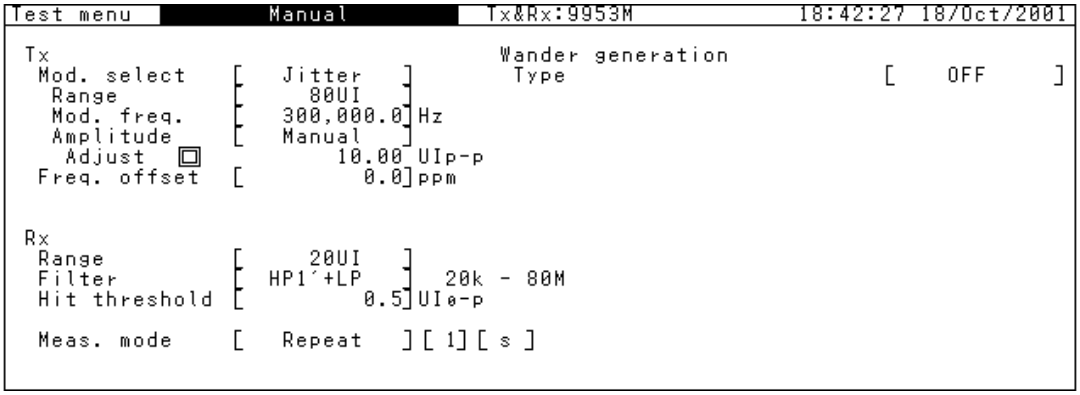
(1) From the Setup: Interface screen, set the basic parameters.




(2) From the Setup: Jitter/Wander screen, set the jitter signal modulation source.




(3) From the Test menu: Manual screen, set the jitter signal parameters. On the following screen, the amplitude and modulation frequency is set to 10 UI and 300 kHz, respectively.

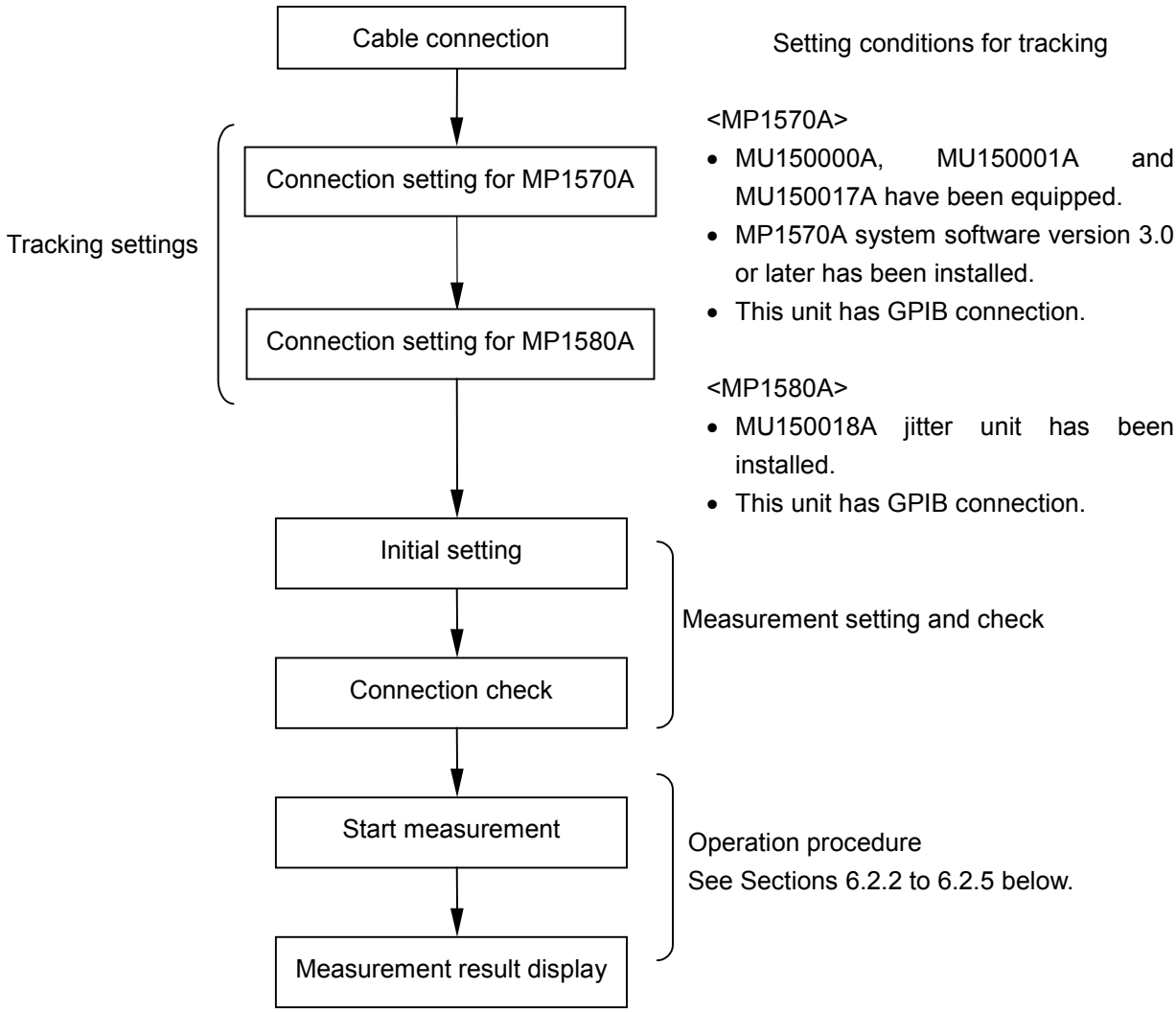


# 6.2 Automatic Jitter Measurement

Automatic jitter measurement can be done in tracking or non-tracking mode. When MP1580A and MP1570A are connected to each other through the GPIB interface, tracking mode allows automatic jitter measurement (measuring the jitter tolerance, jitter sweep, and frequency sweep), controlling MP1570A (device) with MP1580A (controller). Non-tracking mode allows automatic jitter measurement (measuring jitter transfer characteristic), without requiring GPIB connection.

## 6.2.1 Tracking

The flowchart shown below shows how to set tracking and starting measurement.




See the following pages for the steps to set the MP1570A (device) and MP1580A (controller).

Setting MP1570A (device)

(1) From the Setup: Mapping screen, set the following parameters:

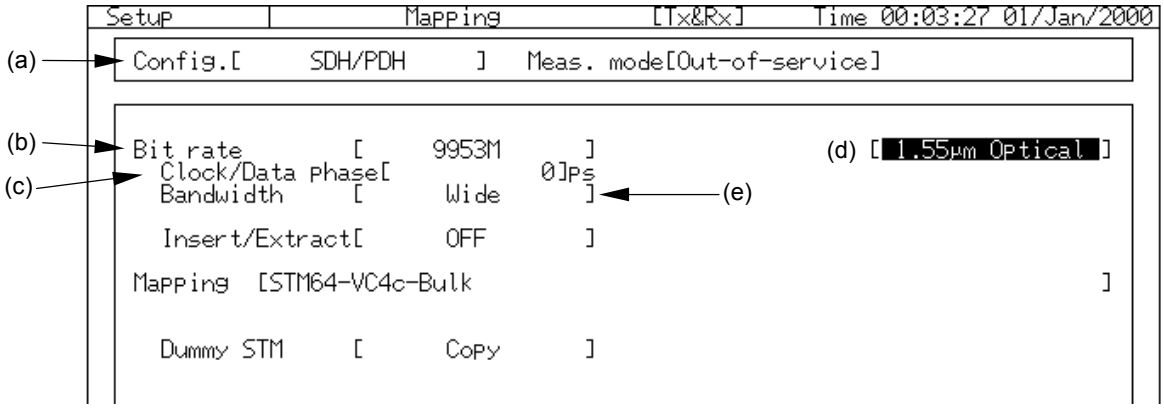
(a) Config..... Set to "SDH" or "Non-Frame pattern".

(b) Bit rate ..... Set the same value as the bit rate set for MU150018A.

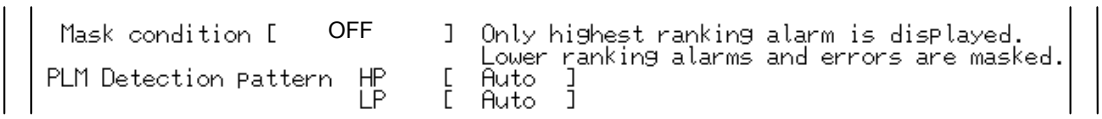
(c) Clock ..... Set to "External".

(d) Optical ..... Select to "Optical" or "Electrical."

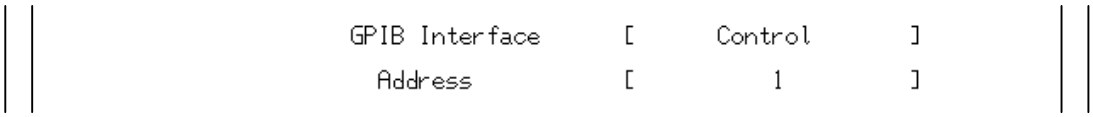
(e) Bandwidth..... When "Optical" is set, select "Wide".




(2) From the Setup: Measurement Condition screen, set "Mask Condition" to "OFF."



(3) From the Setup: System screen, set the GPIB address to "1."



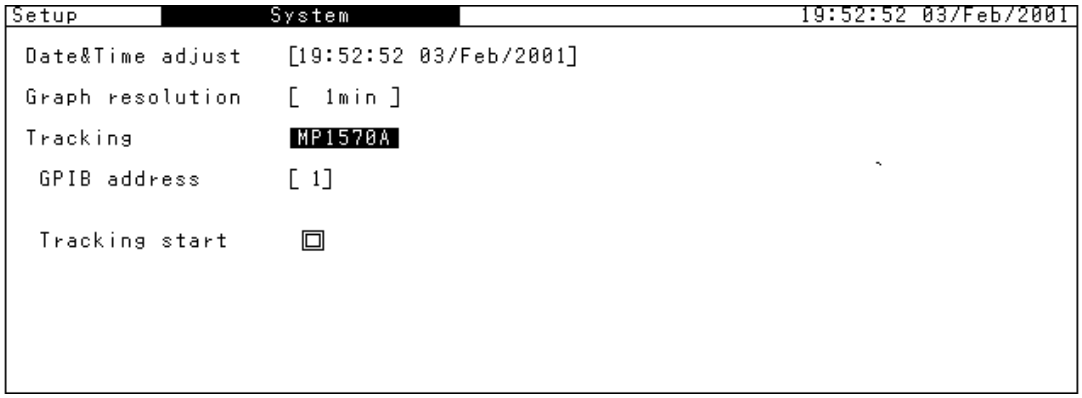

*.....Setting up MP1570A (Bit rate, Clock, and Mask condition) from MP1580A takes about 20 seconds to operate remote access.

Setting MP1580A (controller)

(1) Display the Setup: System screen and set the following values:

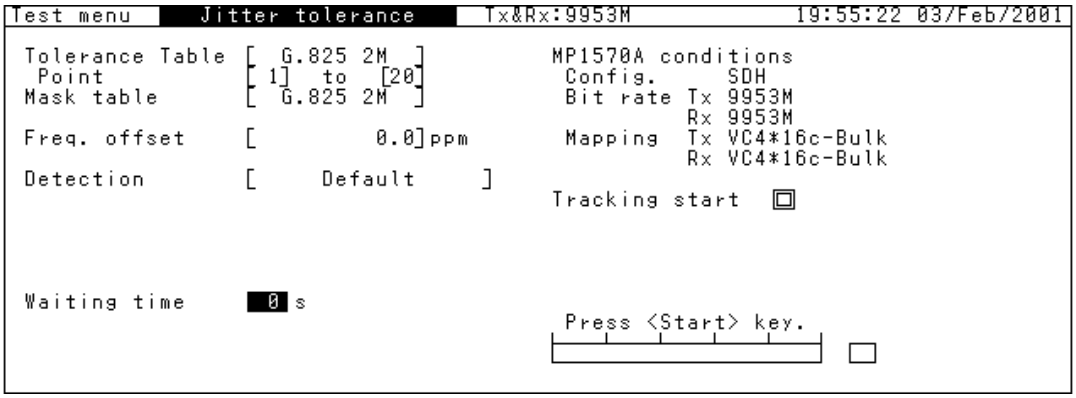
(a) Tracking ..... Set to "MP1570A".

(b) GPIB address..... Set the same value as that set for MP1570A.



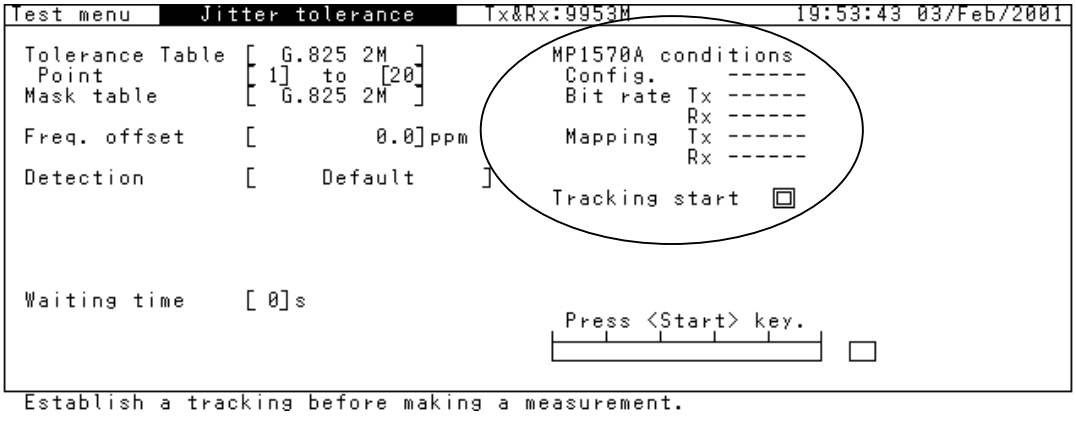

(2) From the Setup: System screen, click Set with the cursor positioned at ☐ for "Tracking start". Then, the communication between MP1570A and MP1580A starts for initialization. Communication takes about 5 seconds. (The communication can be started or stopped also from the Test menu screen.)

(3) From any one of the subscreens of the Test menu main screen, check that tracking has been established. When tracking has been established, the screen is displayed as follows.




***Note:***

When tracking has not been established, "-----" appears as shown below.



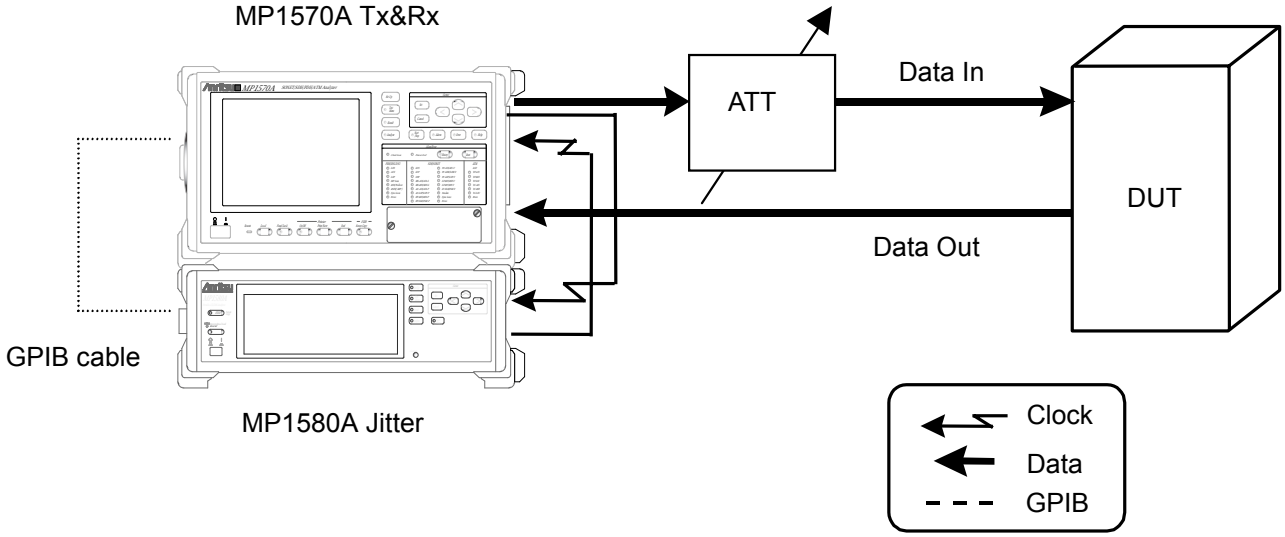

(4) To quit tracking, move the cursor to ☐ for "Tracking start" on the Setup: System screen or each Test menu screen and click Set.

## 6.2.2 Measuring jitter tolerance (tracking measurement)

This section describes an example of a data signal with jitter modulation to DUT and to measure the jitter tolerance point causing by an error.

Connecting measurement system

Connect MP1580A and MP1570A to the DUT, namely device under test (DUT) as shown in the figure below.




(1) Connect MP1580A and MP1570A as shown in the diagram on the next page.

(2) Connect the GPIB ports on the rear side of MP1580A and MP1570A to each other using the GPIB cable as shown in the figure above.

(3) Turn ON the power switches of MP1580A and MP1570A.

(4) Connect the MU150001A optical output connector to the device under test (DUT) input connector via the variable optical attenuator using SM optical fiber cable.

(5) Check that the optical output level from the DUT is within the Optical input range for MP1570A and, if necessary, connect it to the MU150017A Optical Input connector via the optical attenuator using SM optical fiber cable.

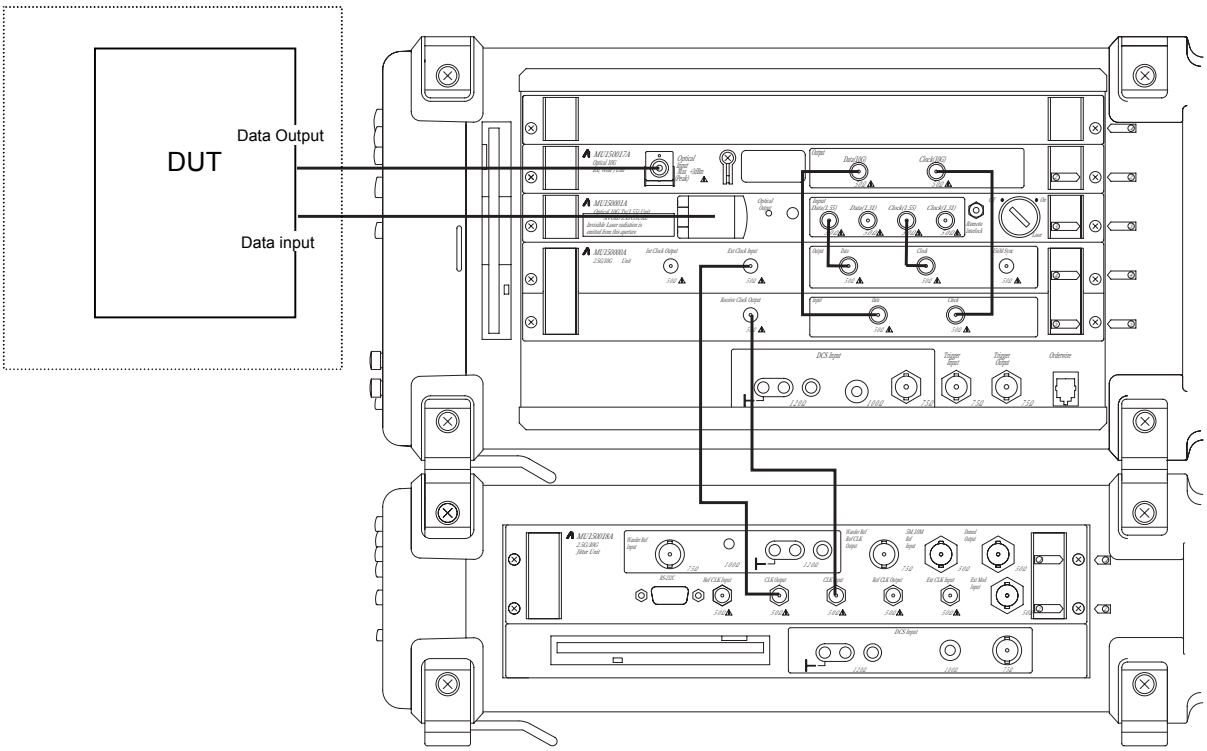
(6) Make connection settings for the MP1580A and MP1570A necessary for automatic measurement (see "Section 6.2.1 Tracking").

(7) From the Test menu screen, check that the MP1580A and MP1570A connections have been established.

(8) Adjust the variable optical attenuator so that it gives an input level higher by 1 dB than the level causing an error in MP1570A.

***Note:***

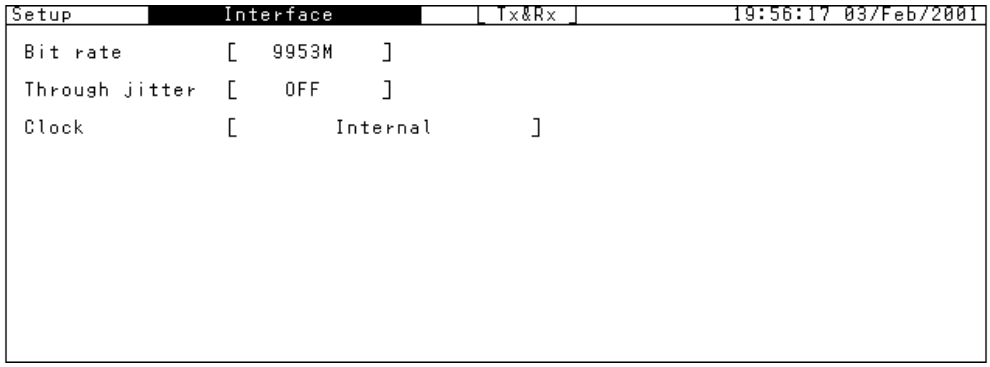
Before making connections, check the input level (see (5) above).




**Unit connection diagram**

Setting procedure

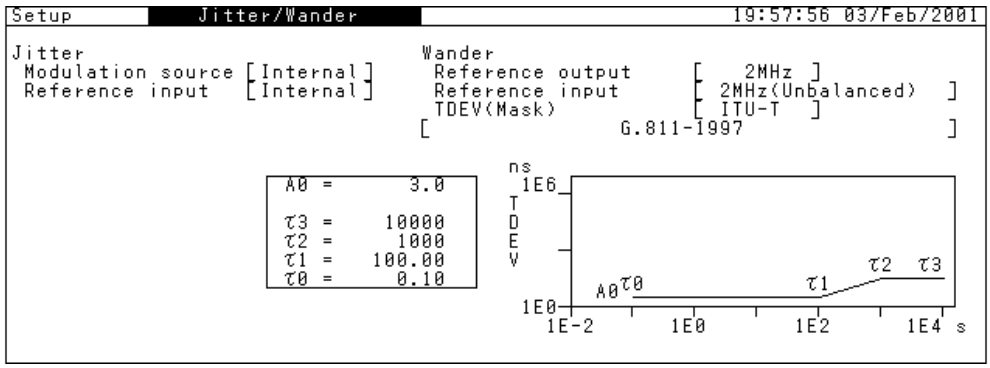
(1) From the Setup: Interface screen, set the basic parameters. The following screen shows an example of using the 9953 M interface for measurement:




***Note:***

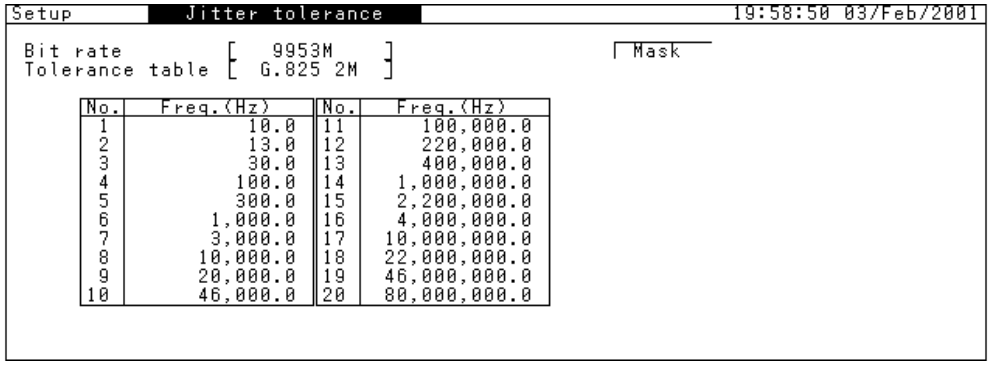
After changing the bit rate, check the settings for the interface ("1.31 μm Optical", "1.55 μm Optical", or "Electrical") and "Bandwidth" from the Setup: Mapping screen for MP1570A. (See "Section 6.2.1 Tracking".)

(2) From the Setup: Jitter/Wander screen, set the jitter signal modulation source.



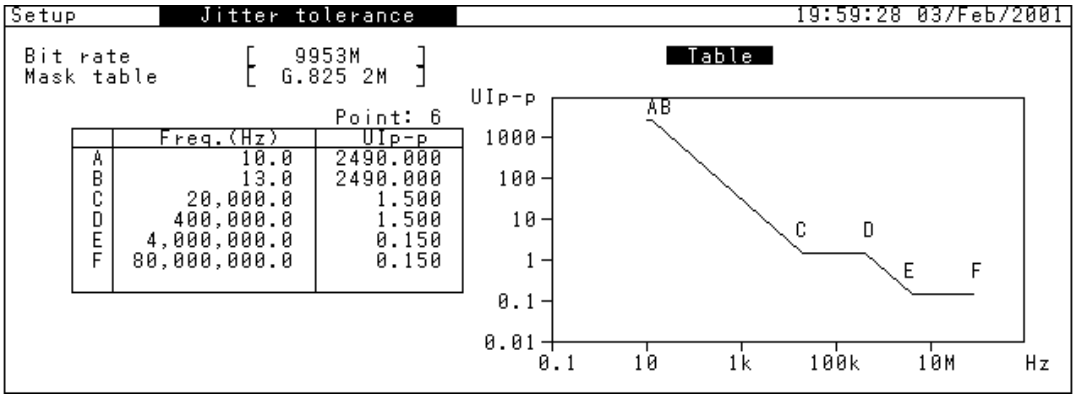

(3) From the Setup: Jitter tolerance screen, set the measurement table and standard mask. Switching between "Tolerance table" and "Mask table" can be done by one-shot entry. When "User" is selected, the standard conditions can be changed.

Table display

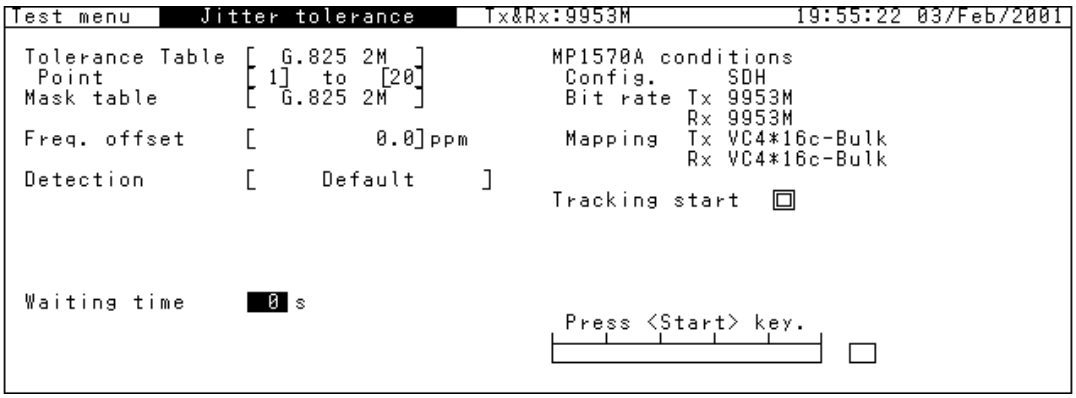



| No. | Freq.(Hz) | No. | Freq.(Hz) |
|---|---|---|---|
| 1 | 10.0 | 11 | 100,000.0 |
| 2 | 13.0 | 12 | 220,000.0 |
| 3 | 30.0 | 13 | 400,000.0 |
| 4 | 100.0 | 14 | 1,000,000.0 |
| 5 | 300.0 | 15 | 2,200,000.0 |
| 6 | 1,000.0 | 16 | 4,000,000.0 |
| 7 | 3,000.0 | 17 | 10,000,000.0 |
| 8 | 10,000.0 | 18 | 22,000,000.0 |
| 9 | 20,000.0 | 19 | 46,000,000.0 |
| 10 | 46,000.0 | 20 | 80,000,000.0 |

Mask display




(4) From the Test menu: Jitter tolerance screen, set the conditions for jitter automatic tolerance measurement. Check the connection status between MP1580A and MP1570A by "MP1570A conditions" on the screen. (When the connections have not been established, "-----" appears.)

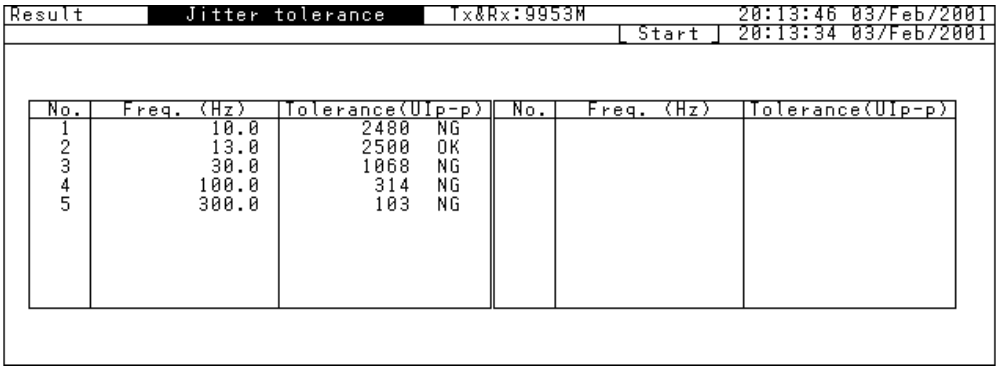



(5) Press Start/Stop to start the measurement and display the measurement progress on a bar graph.

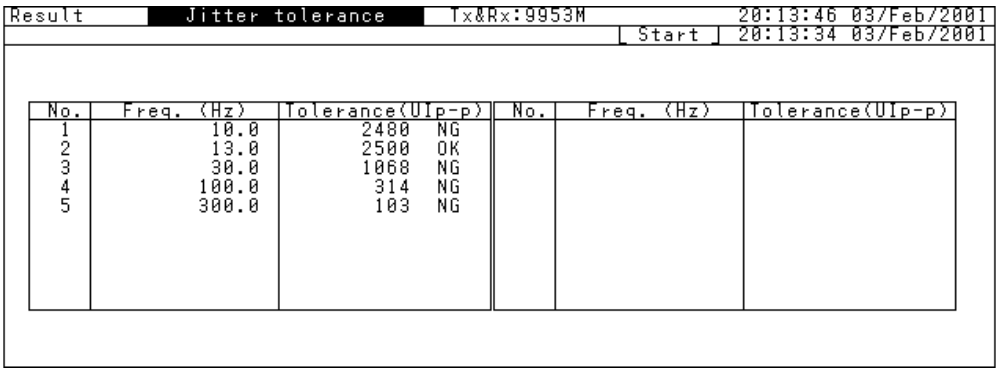
### Displaying measurement result

According to the measurement items and/or graphs to be displayed, select the screen as described below.

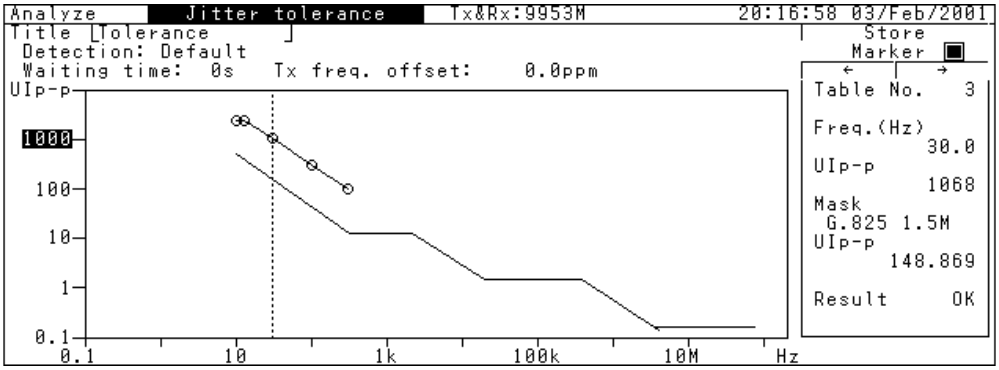
(1) The jitter tolerance measurement result is displayed as numerical data together with the measurement frequency on the Result: Jitter tolerance screen. The pass/fail judgment result is displayed as "OK" or "NG".




(2) After measurement, the "Revaluation" item appears on the Test menu screen. After changing the mask table, clicking Set restarts the revaluation measurement.




(3) The numerical data at measurement points can be displayed on a graph on the Analyze: Jitter tolerance screen. With "Marker" set to "ON" and the cursor positioned at [←] and [→], clicking Set displays the result data at the measurement points.

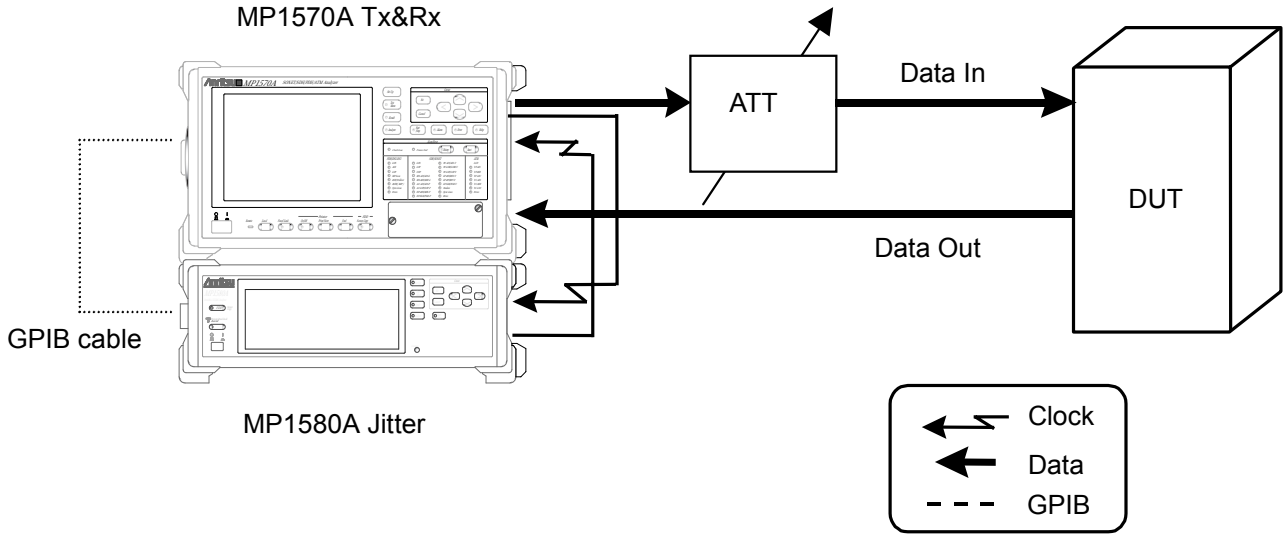


## 6.2.3 Measuring automatic jitter sweep (tracking measurement)

This section describes jitter sweep measurement that allows precisely and speedily measuring presence or absence of errors, while adding the preset jitter value to the DUT.

Connecting measurement system

Connect MP1580A and MP1570A to the DUT, namely device under test (DUT) as shown in the figure below.




**Example connection for jitter sweep measurement**

(1) Connect MP1580A and MP1570A as shown in the diagram on the next page.

(2) Connect the GPIB ports on the rear side of MP1580A and MP1570A to each other using the GPIB cable as shown in the figure above.

(3) Turn ON the power switches of MP1580A and MP1570A.

(4) Connect the MU150001A optical output connector to the input connector on device under test (DUT) via the variable optical attenuator using SM optical fiber cable.

(5) Check that the optical output level from the DUT is within the Optical input range for MP1570A and, if necessary, connect it to the MU150017A Optical Input connector via the optical attenuator using SM optical fiber cable.

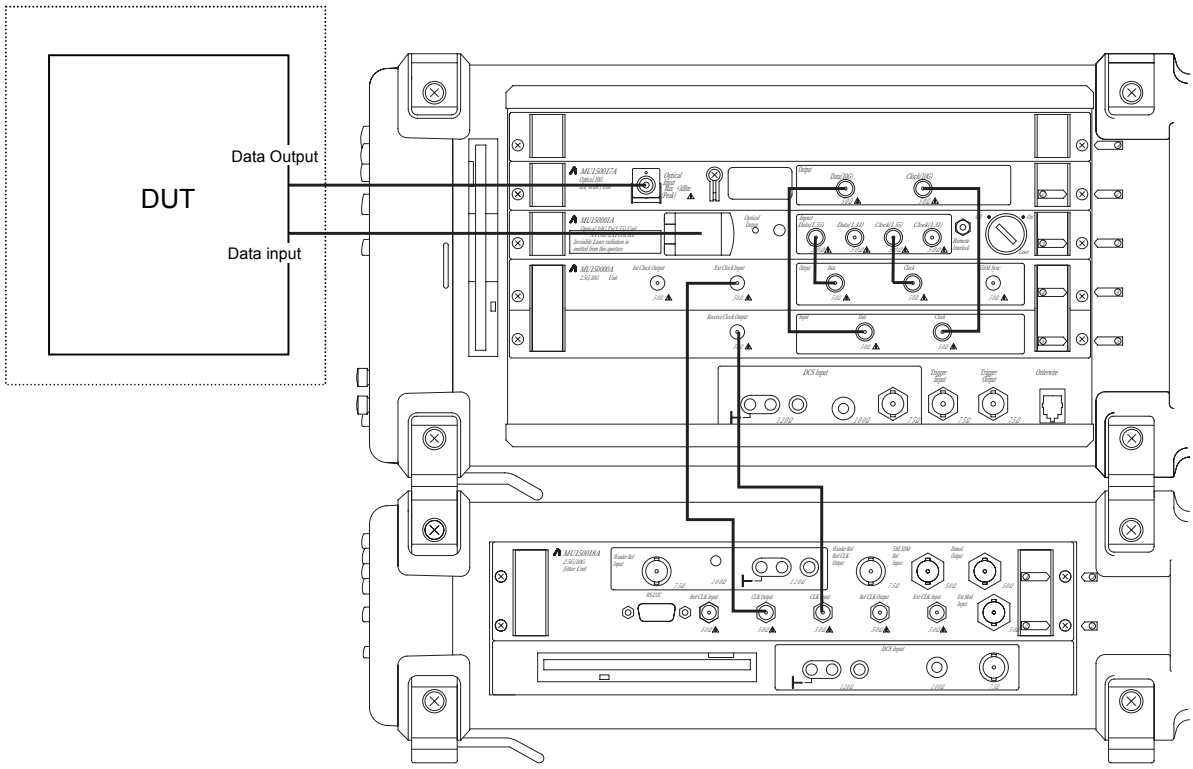
(6) Make connection settings for the MP1580A and MP1570A necessary for automatic measurement. (See "Section 6.2.1 Tracking".)

(7) From the Test menu screen, check that the MP1580A and MP1570A connections have been established.

(8) Adjust the variable optical attenuator so that it gives an input level higher by 1 dB than the level causing an error in MP1570A.

***Note:***

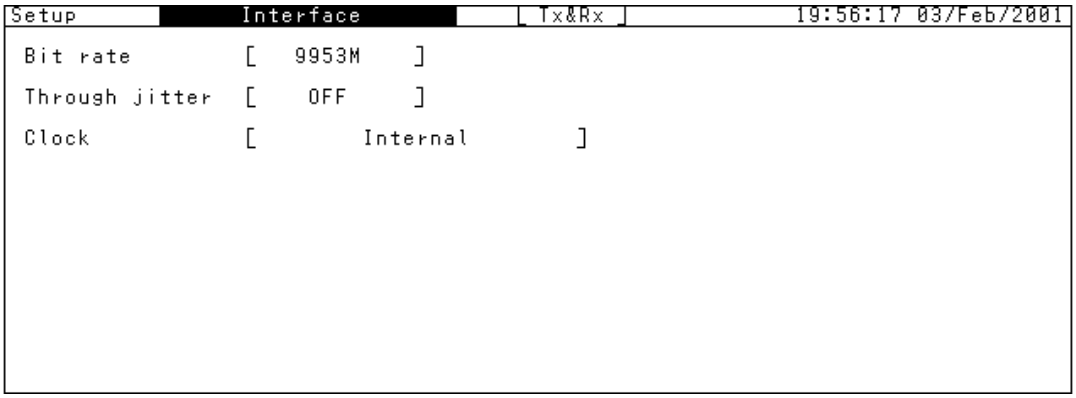
Before making connections, check the input level (see (5) above).




**Unit connection diagram**

Setting procedure

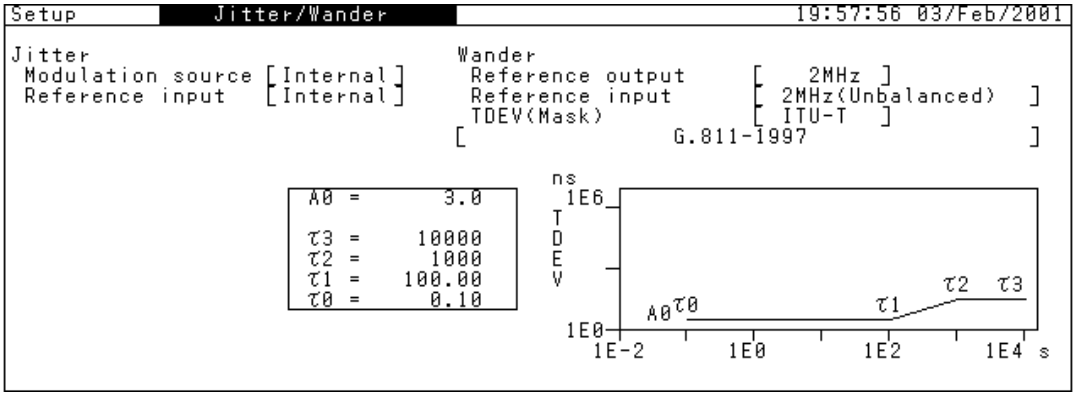
(1) From the Setup: Interface screen, set the basic parameters. The following screen shows an example of using the 9953 M interface for measurement:



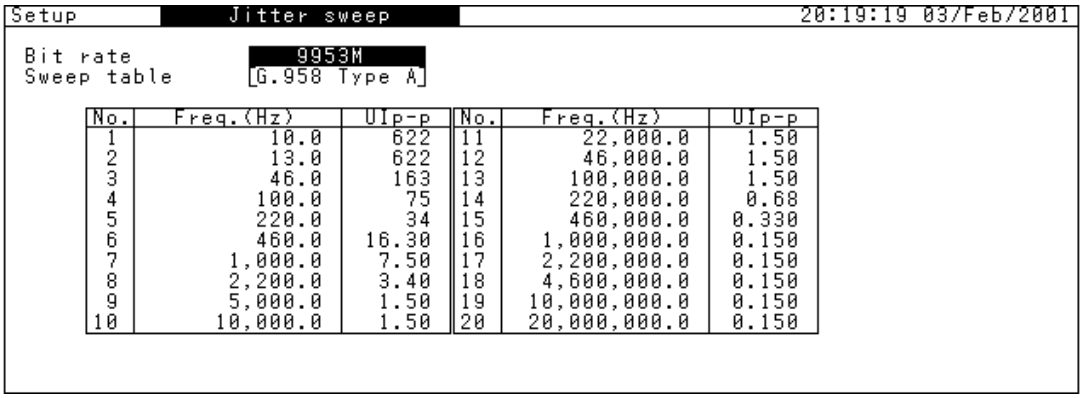

***Note:***

After changing the bit rate, check the settings for the interface ("1.31 µm Optical", "1.55 µm Optical" or "Electrical") and "Bandwidth" from the Setup: Mapping screen for MP1570A. (See "Section 6.2.1 Tracking".)

(2) From the Setup: Jitter/Wander screen, set the jitter signal modulation source.

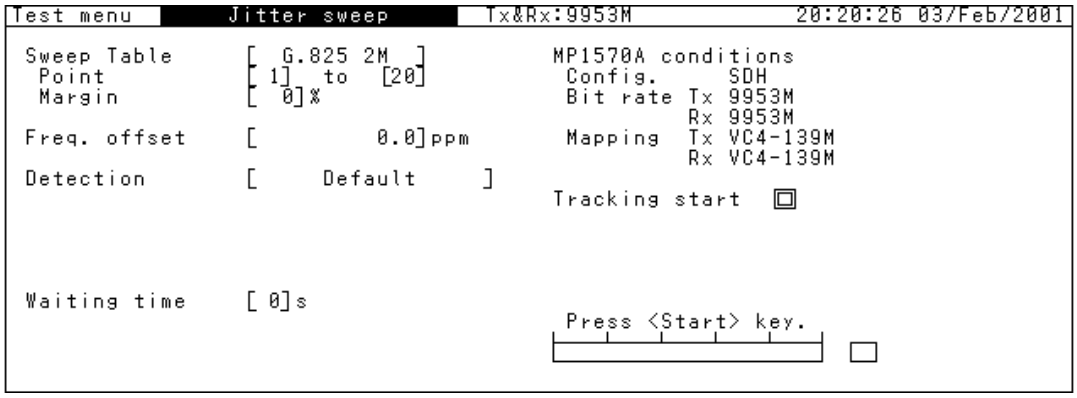



(3) From the Setup: Jitter sweep screen, set the measurement table.
(When "User" is selected, the setting conditions can be changed.)




| No. | Freq.(Hz) | UIp-p | No. | Freq.(Hz) | UIp-p |
|---|---|---|---|---|---|
| 1 | 10.0 | 622 | 11 | 22,000.0 | 1.50 |
| 2 | 13.0 | 622 | 12 | 46,000.0 | 1.50 |
| 3 | 46.0 | 163 | 13 | 100,000.0 | 1.50 |
| 4 | 100.0 | 75 | 14 | 220,000.0 | 0.68 |
| 5 | 220.0 | 34 | 15 | 460,000.0 | 0.330 |
| 6 | 460.0 | 16.30 | 16 | 1,000,000.0 | 0.150 |
| 7 | 1,000.0 | 7.50 | 17 | 2,200,000.0 | 0.150 |
| 8 | 2,200.0 | 3.40 | 18 | 4,600,000.0 | 0.150 |
| 9 | 5,000.0 | 1.50 | 19 | 10,000,000.0 | 0.150 |
| 10 | 10,000.0 | 1.50 | 20 | 20,000,000.0 | 0.150 |

(4) From the Test menu: Jitter sweep screen, set the conditions for automatic jitter sweep measurement. Check the connection between MP1580A and MP1570A by "MP1570A conditions" on the screen. (When the connections have not been established, "-----" appears. In such a case, establish the connections by referring to "Section 6.2.1 Tracking".)

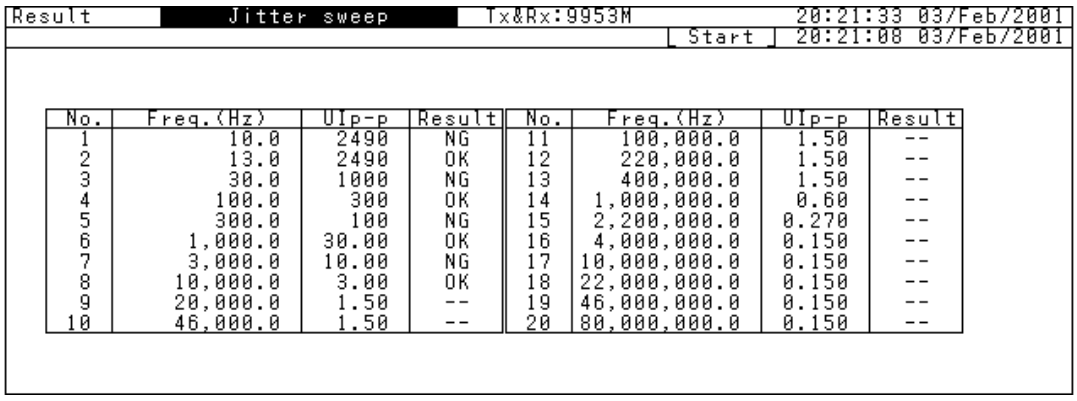



(5) Press Start/Stop to start the measurement, and display the measurement progress on a bar graph on the Test menu: Jitter sweep screen.

### Displaying measurement result

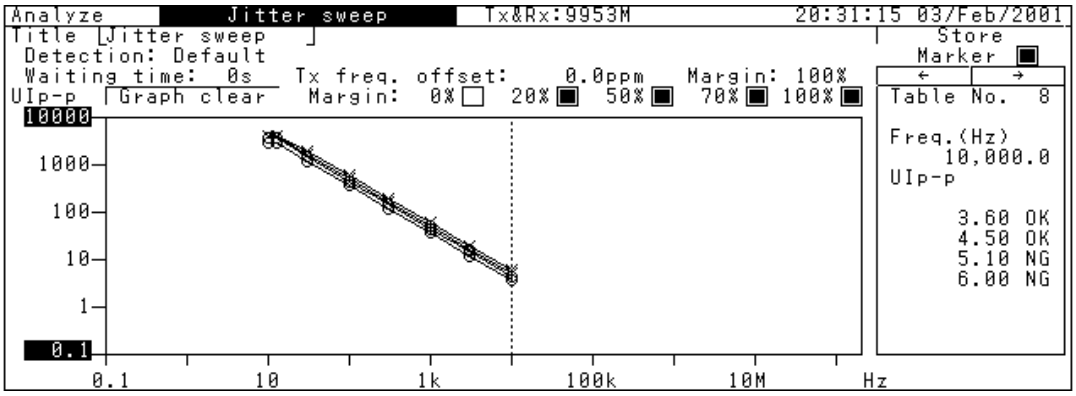
According to the measurement items and/or graphs to be displayed, select the screen as described below.

(1) The jitter sweep measurement result is displayed as numerical data together with the measurement frequency on the Result: Jitter sweep screen. The pass/fail judgment result is displayed as "OK" or "NG".




| No. | Freq.(Hz) | UIp-p | Result | No. | Freq.(Hz) | UIp-p | Result |
|---|---|---|---|---|---|---|---|
| 1 | 10.0 | 2490 | NG | 11 | 100,000.0 | 1.50 | -- |
| 2 | 13.0 | 2490 | OK | 12 | 220,000.0 | 1.50 | -- |
| 3 | 30.0 | 1000 | NG | 13 | 400,000.0 | 1.50 | -- |
| 4 | 100.0 | 300 | OK | 14 | 1,000,000.0 | 0.60 | -- |
| 5 | 300.0 | 100 | NG | 15 | 2,200,000.0 | 0.270 | -- |
| 6 | 1,000.0 | 30.00 | OK | 16 | 4,000,000.0 | 0.150 | -- |
| 7 | 3,000.0 | 10.00 | NG | 17 | 10,000,000.0 | 0.150 | -- |
| 8 | 10,000.0 | 3.00 | OK | 18 | 22,000,000.0 | 0.150 | -- |
| 9 | 20,000.0 | 1.50 | -- | 19 | 46,000,000.0 | 0.150 | -- |
| 10 | 46,000.0 | 1.50 | -- | 20 | 80,000,000.0 | 0.150 | -- |

(2) The jitter sweep automatic measurement result can be displayed on a graph on the Analyze: Jitter sweep screen. With "Marker" set to "ON" and the cursor positioned at [←] and [→], clicking Set displays the result data at the measurement point.

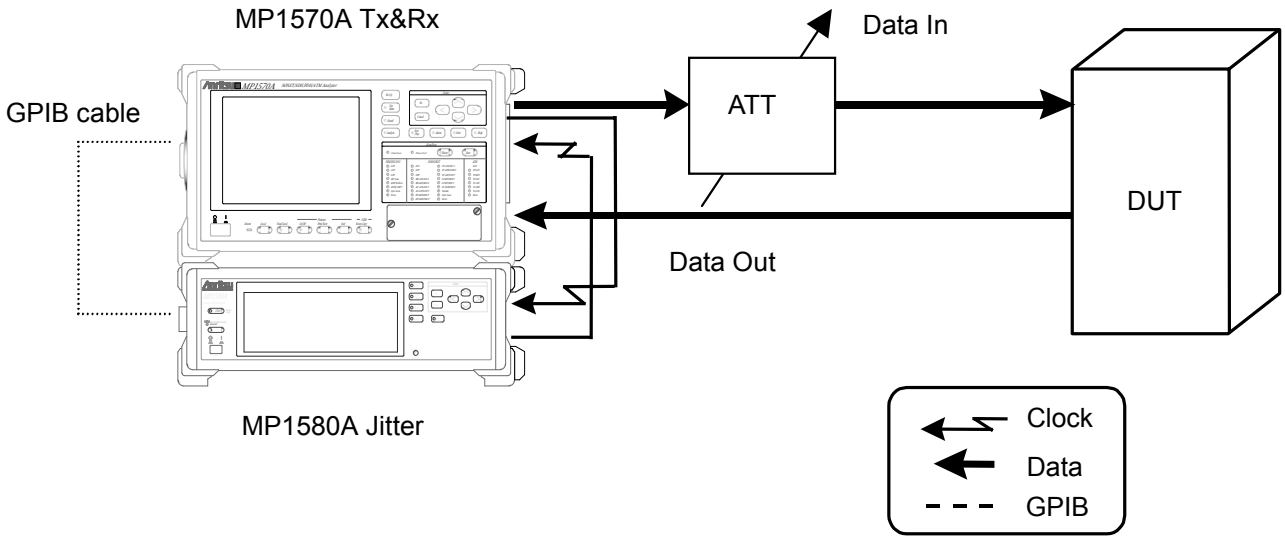


## 6.2.4 Measuring frequency sweep (tracking measurement)

This section describes frequency sweep measurement that allows precisely and speedily measuring presence or absence of errors, while adding the preset modulation frequency to the DUT.

Connecting measurement system

Connect MP1580A and MP1570A to the DUT as shown in the figure below.




**Example connection for frequency sweep measurement**

(1) Connect MP1580A and MP1570A as shown in the diagram on the next page.

(2) Connect the GPIB ports on the rear side of MP1580A and MP1570A to each other using the GPIB cable as shown in the figure above.

(3) Turn ON the power switches of MP1580A and MP1570A.

(4) Connect the MU150001A optical output connector to the input connector on device under test (DUT) via the variable optical attenuator using SM optical fiber cable.

(5) Check that the optical output level from the DUT is within the Optical input range for MP1570A and, if necessary, connect it to the MU150017A Optical Input connector via the optical attenuator using SM optical fiber cable.

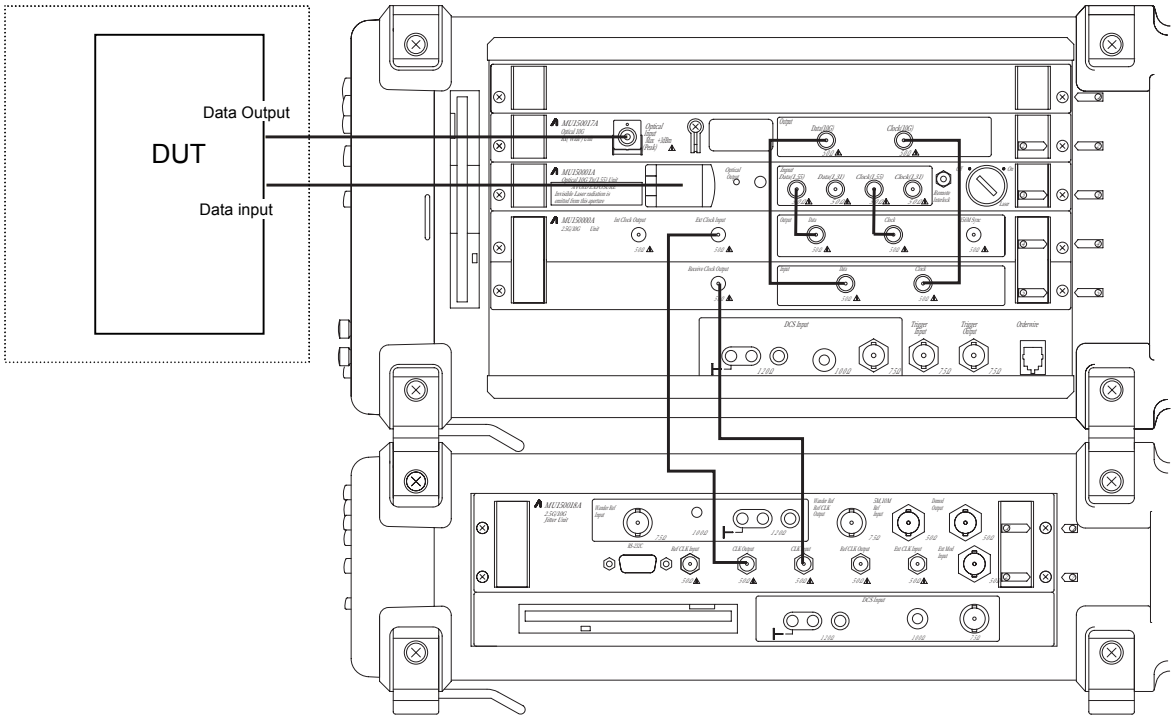
(6) Make connection settings for the MP1580A and MP1570A necessary for automatic measurement. (See "Section 6.2.1 Tracking".)

(7) From the Test menu screen, check the MP1580A and MP1570A connection status.

(8) Adjust the variable optical attenuator so that it gives an input level higher by 1 dB than the level causing an error in MP1570A.

***Note:***

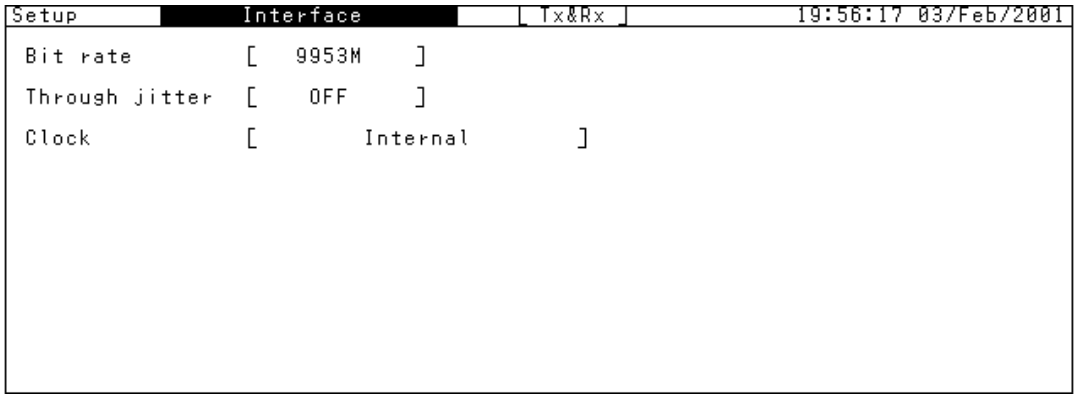
Before making connections, check the input level (see (4) above).




**Unit connection diagram**

Setting procedure

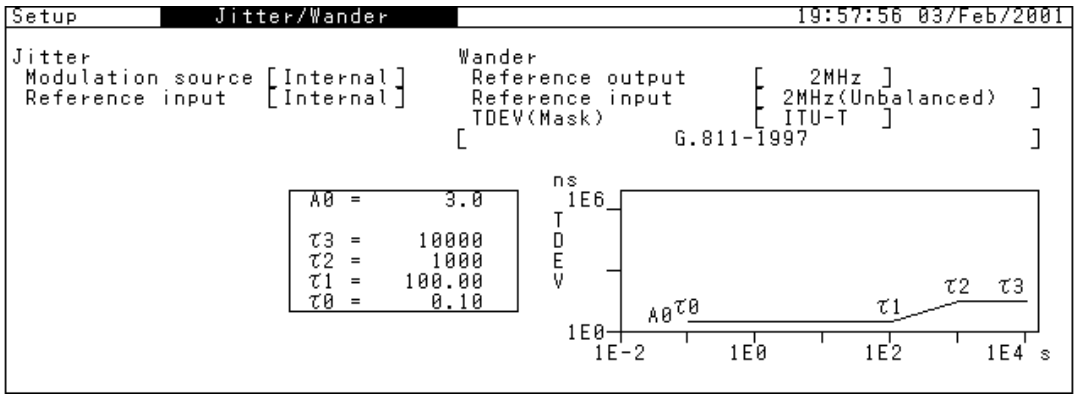
(1) From the Setup: Interface screen, set the basic parameters. The following screen shows an example of using the 9953 M interface for measurement:



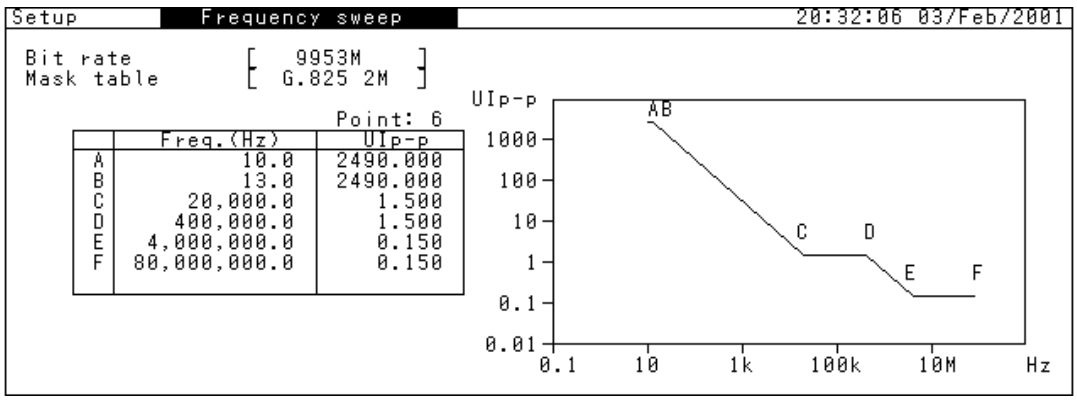

***Note:***

After changing the bit rate, check the settings for the interface ("1.31 µm Optical", "1.55 µm Optical" or "Electrical") and "Bandwidth" from the Setup: Mapping screen for MP1570A. (See "Section 6.2.1 Tracking".)

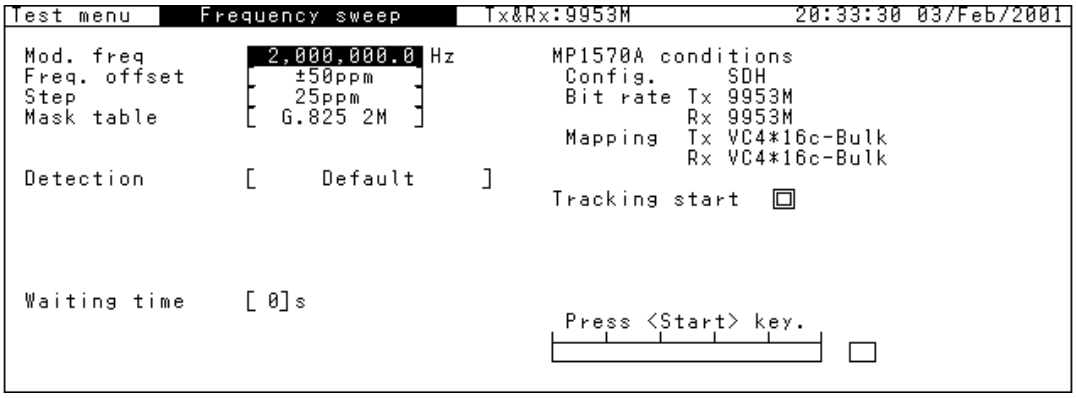
(2) From the Setup: Jitter/Wander screen, set the jitter signal modulation source.




(3) From the Setup: Frequency sweep screen, set Mask table. When "User" is selected, the standard conditions can be changed.

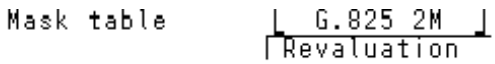


(4) From the Test menu: Frequency sweep screen, set the conditions for automatic frequency sweep measurement. Check the connection between MP1580A and MP1570A by "MP1570A conditions" on the screen. (When the connections have not been established, "-----" appears. In such a case, establish the connections by referring to "Section 6.2.1 Tracking".)




(5) Press Start/Stop to start the measurement and display the measurement progress on a bar graph on the screen.

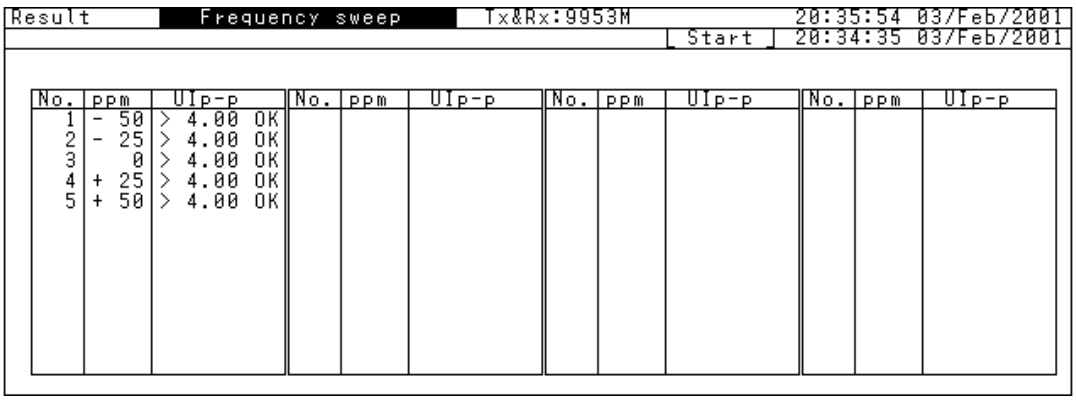
(6) After measurement, the "Revaluation" item appears on the Test menu screen. After changing the mask table, clicking Set restarts the revaluation measurement.



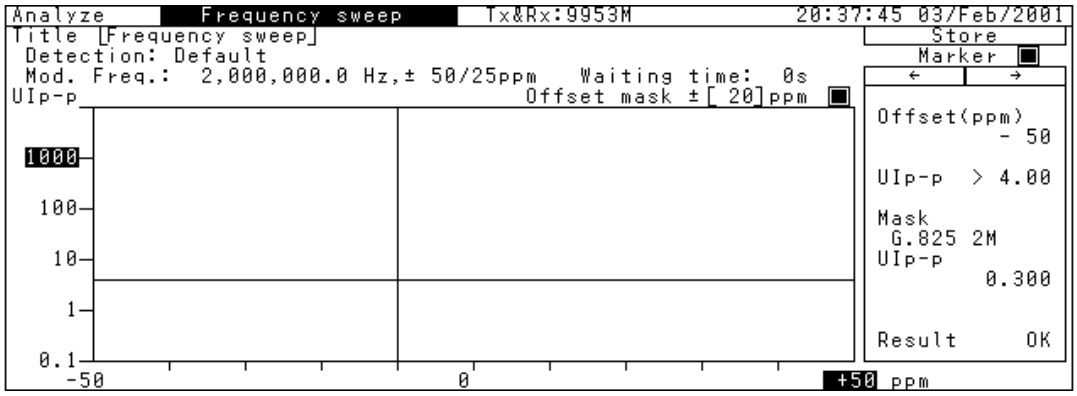

### Displaying measurement result

According to the measurement items and/or graphs to be displayed, select the screen as described below.

(1) The frequency sweep measurement result is displayed as numerical data together with the ppm data on the Result: Frequency sweep screen. The pass/fail judgment result is displayed as "OK" or "NG".



(2) The automatic frequency sweep measurement result can be displayed on a graph on the Analyze: Frequency sweep screen. With "Marker" set to "On" and the cursor positioned at [←] and [→], clicking Set displays the numerical data at the measurement points.



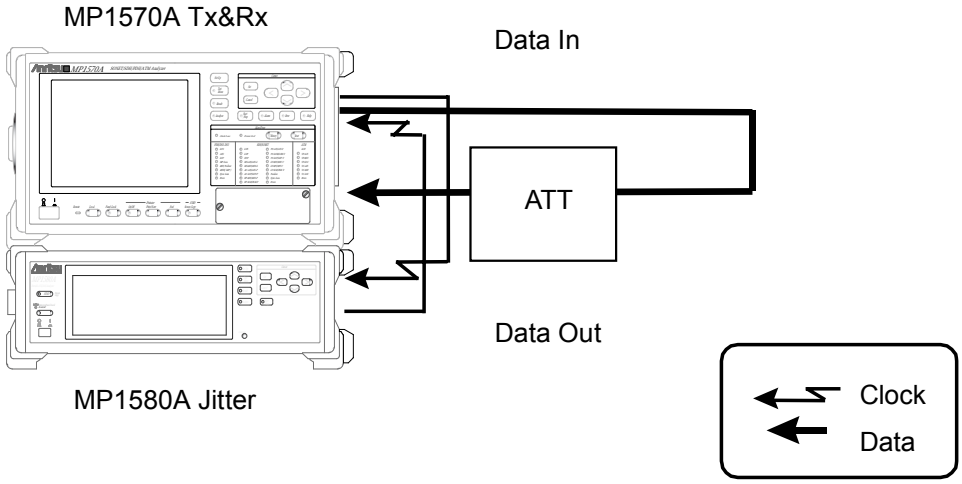
## 6.2.5 Measuring jitter transfer characteristic (non-tracking measurement)

For jitter transfer characteristic measurement, add the preset jitter modulation to the DUT and measure the characteristics of DUT that is attenuated by the jitter modulated. The measurement starts after calibration is over.

Connecting measurement system

For calibration

Start the measurement in the self-loop-back status, without connecting the device under test (DUT).




(1) Connect MP1580A and MP1570A as shown in the figure above.
Connect the units as shown in page 6-42.

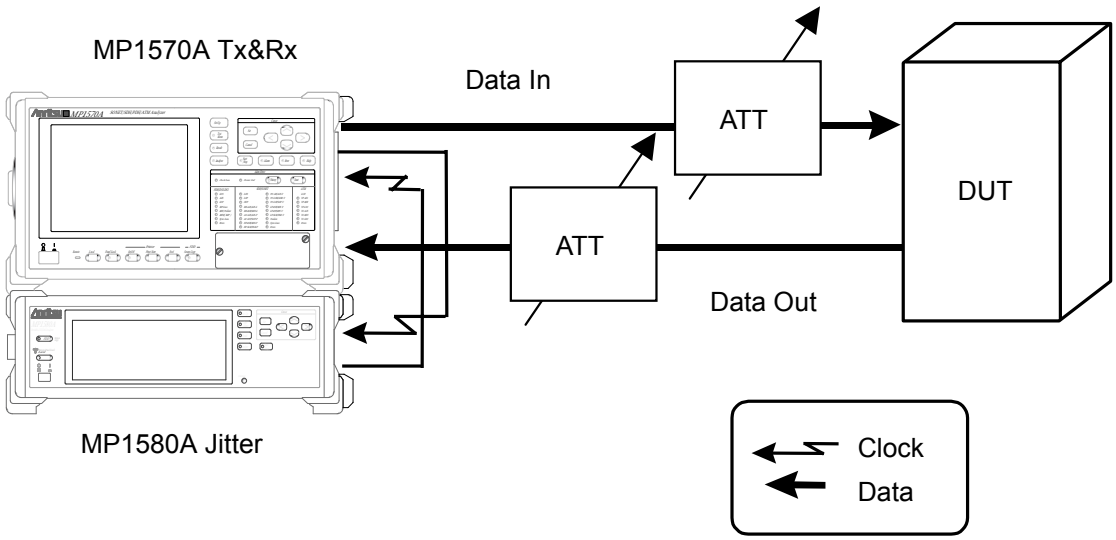
(2) Turn ON the power switches of MP1580A and MP1570A.

(3) Connect the optical output connector of MU150001A to the MU150017A Optical Input connector via the optical attenuator using SM optical fiber cable, so that the optical output of MU150001A is within the range of Optical input range for MP1570A.

(4) From the Setup and Test menu screens, set the calibration conditions. From the Test menu screen, check that "Measurement Type" is set to "Calibration".

For measurement

Connect MP1580A and MP1570A to the device under test (DUT).




**Example connection for measurement**

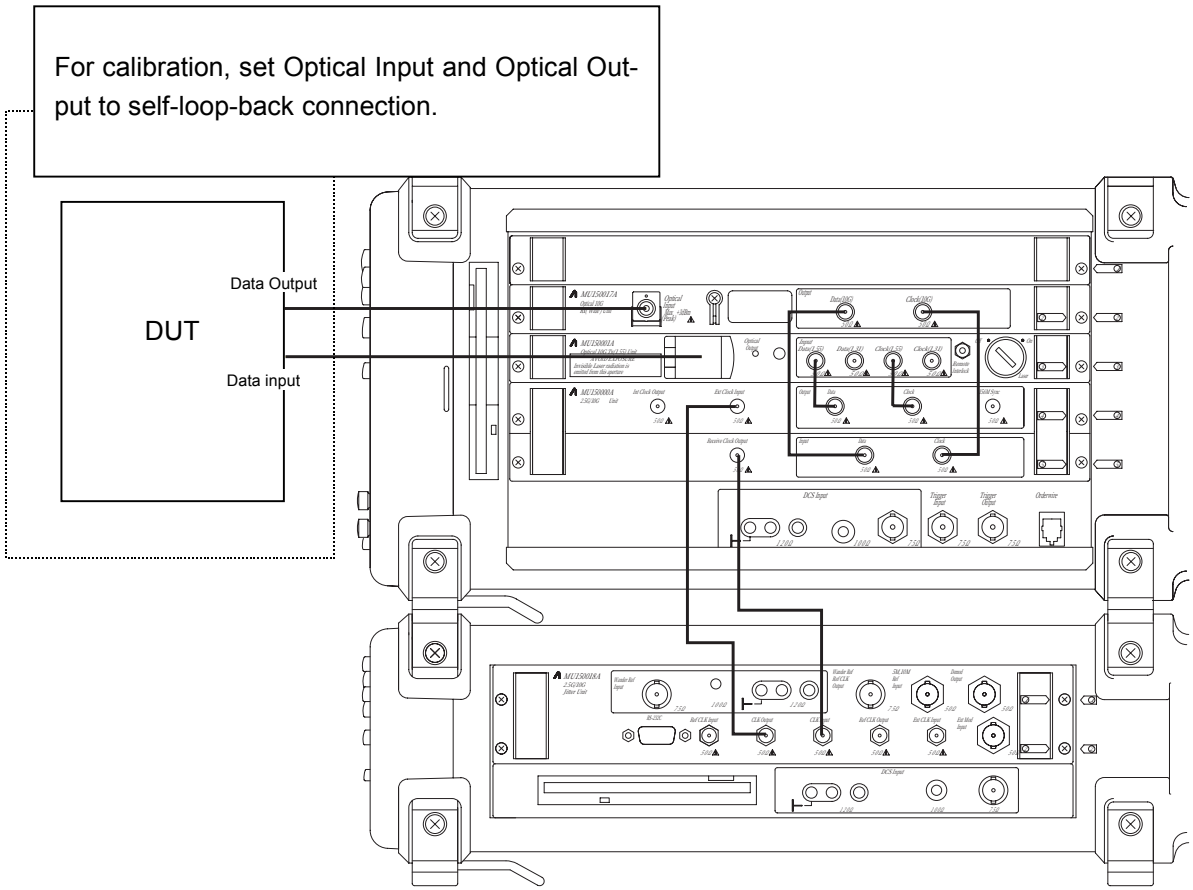
(1) After calibration, make connections as shown in the figure above.
Connect the units as shown in page 6-42.

(2) Connect the optical output of MU150001A to the input connector of DUT via the variable optical attenuator using SM optical fiber cable.

(3) Check that the optical output level from the DUT is within the Optical input range for MP1570A and, if necessary, connect it to the Optical Input connector of MU150017A via the optical attenuator using SM optical fiber cable.

(4) Adjust the variable optical attenuator so that it gives an input level higher by 1 dB than the level causing an error in MP1570A.

(5) From the Setup and Test menu screens, set the measurement conditions as shown in "Setting Procedure". From the Test menu screen, check that "Measurement Type" is set to "Measurement".

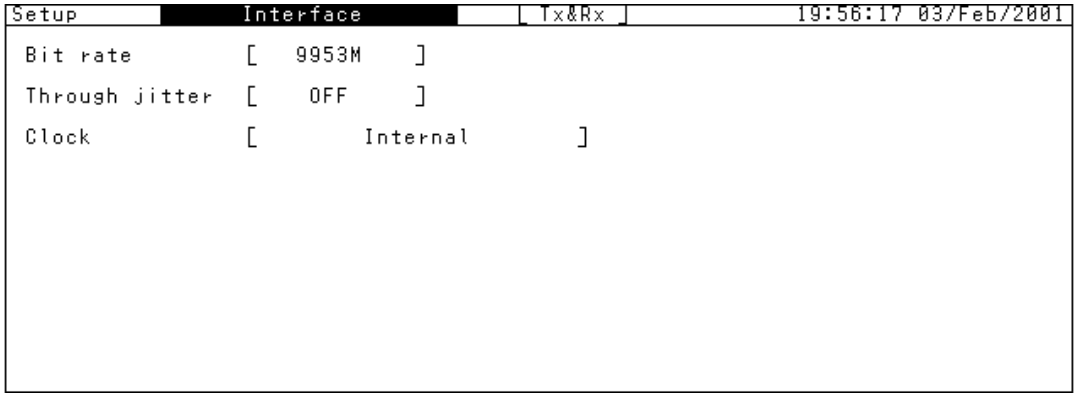



**Unit connection diagram**

Setting procedure

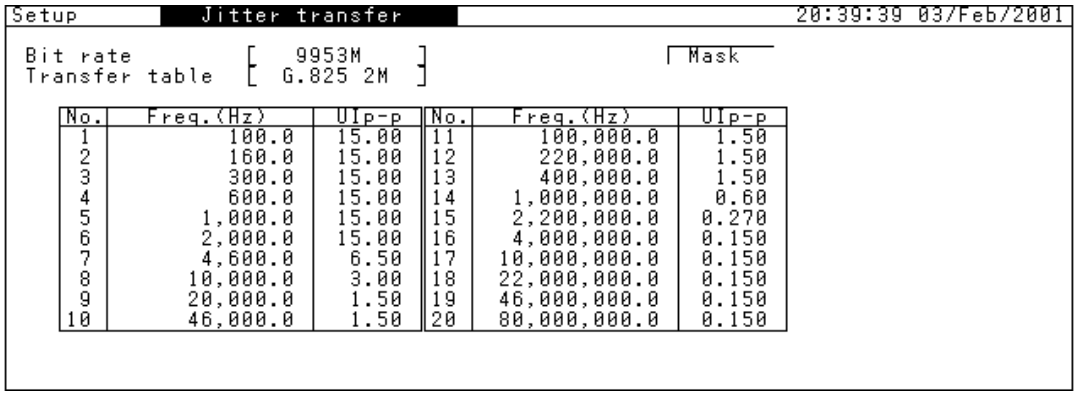
(1) For calibration, make connections in the self-loop-back status.

(2) From the Setup: Interface screen, set the basic parameters.



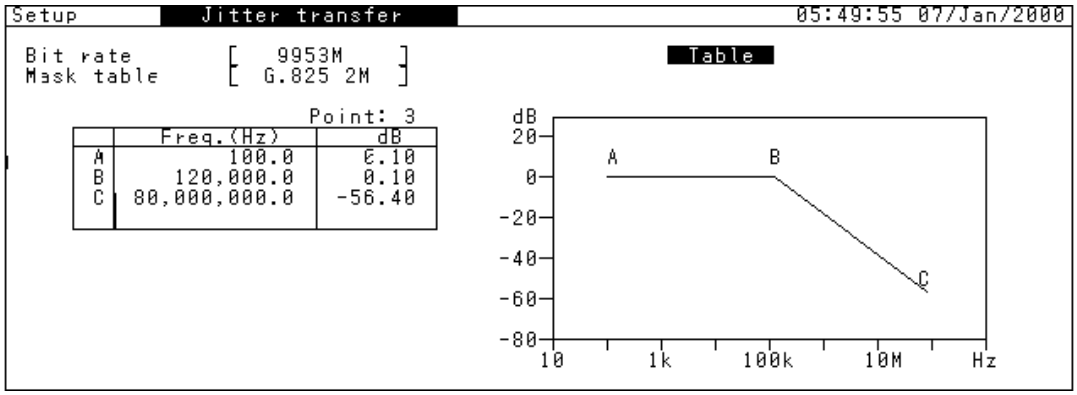

(3) On the Setup: Jitter transfer screen, display "Transfer table" and "Mask table". When "User" is selected, the setting conditions can be changed.

For Table display

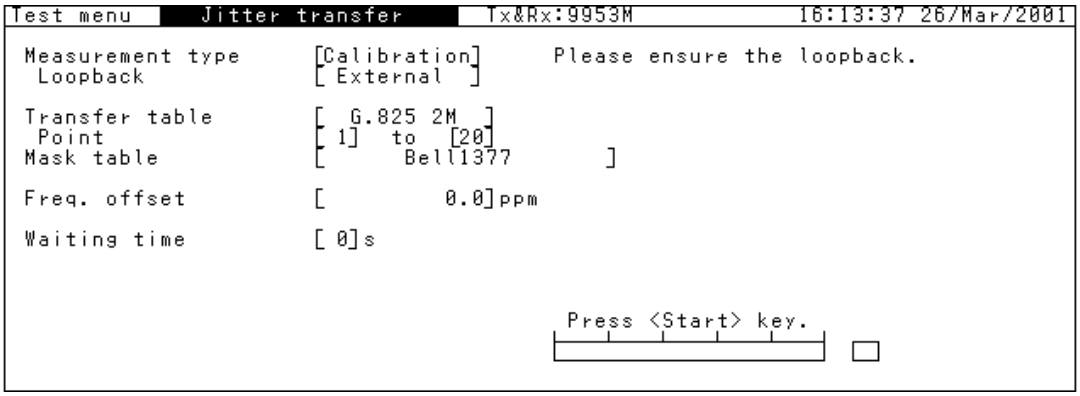



| No. | Freq.(Hz) | UIp-p | No. | Freq.(Hz) | UIp-p |
|---|---|---|---|---|---|
| 1 | 100.0 | 15.00 | 11 | 100,000.0 | 1.50 |
| 2 | 160.0 | 15.00 | 12 | 220,000.0 | 1.50 |
| 3 | 300.0 | 15.00 | 13 | 400,000.0 | 1.50 |
| 4 | 600.0 | 15.00 | 14 | 1,000,000.0 | 0.60 |
| 5 | 1,000.0 | 15.00 | 15 | 2,200,000.0 | 0.270 |
| 6 | 2,000.0 | 15.00 | 16 | 4,000,000.0 | 0.150 |
| 7 | 4,600.0 | 6.50 | 17 | 10,000,000.0 | 0.150 |
| 8 | 10,000.0 | 3.00 | 18 | 22,000,000.0 | 0.150 |
| 9 | 20,000.0 | 1.50 | 19 | 46,000,000.0 | 0.150 |
| 10 | 46,000.0 | 1.50 | 20 | 80,000,000.0 | 0.150 |

For Mask display



(4) From the Test menu: Jitter transfer screen, set "Transfer table" and "Mask table" for calibration. Since external connection loop-back is used in this case, set "Loopback" to "External". Press Start/Stop to start the calibration and display its progress on a bar graph.

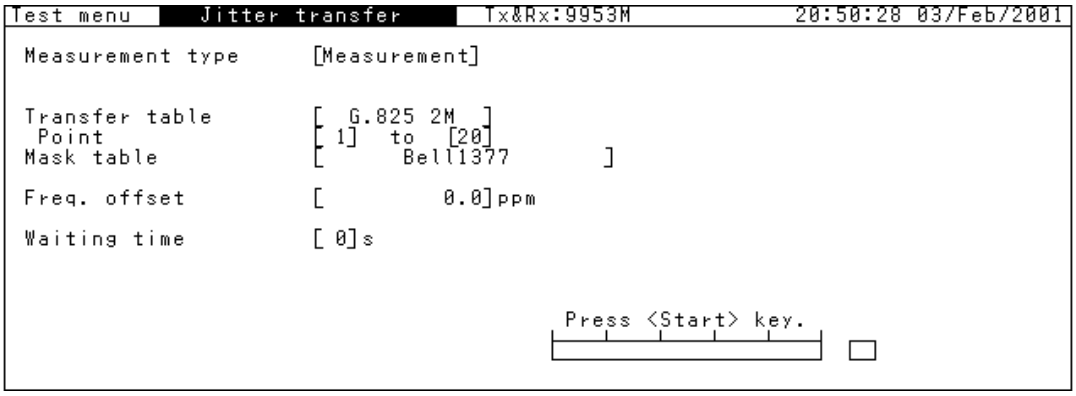



***Note:***

"Ensure the following loopback." appears when "Measurement type" is set to "Calibration" and "Loop back" is set to "External". (See "Section 6.2.1 Tracking".)

(5) After calibration is over, change the connections to those for measurement. (See page 6-40.)

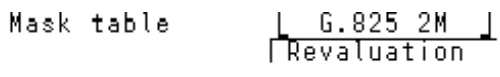
(6) After calibration has been completed, "Measurement type" changes to "Measurement" on the Test menu: Jitter transfer screen. Press Start/Stop to start the measurement, and then the measurement progress on a bar graph is displayed.




***Note:***

After changing the settings, always perform calibration.

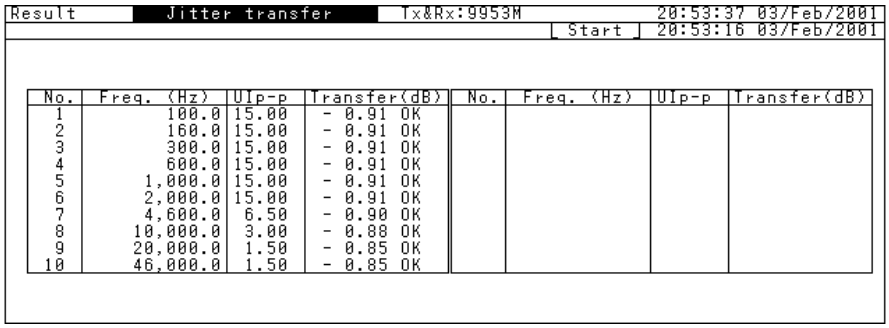
(7) After the measurement is over, the "Revaluation" item appears on the Test menu screen. After changing the mask table, pressing Start/Stop restarts the revaluation measurement.



### Displaying measurement result

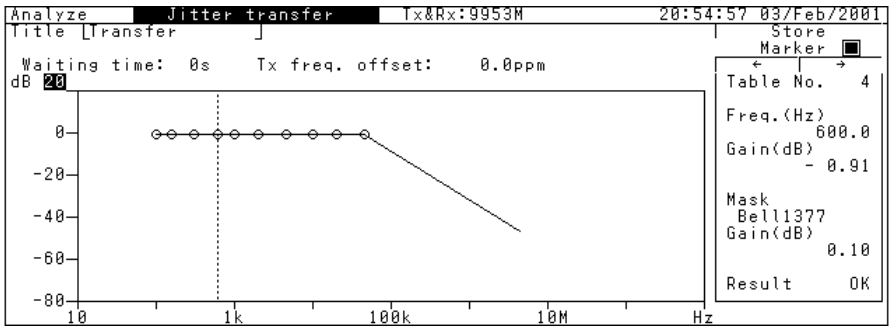
According to the measurement items and/or graphs to be displayed, select the screen as described below.

(1) The jitter transfer characteristic measurement result is displayed as numerical data together with the measurement frequency on the Result: Jitter transfer screen. The pass/fail judgment result is displayed as "OK" or "NG". If an Unlock occurred during measurement, "Unlock" is displayed in red. Unlock time-out is displayed in white.




| No. | Freq. (Hz) | UIp-p | Transfer(dB) | No. | Freq. (Hz) | UIp-p | Transfer(dB) |
|---|---|---|---|---|---|---|---|
| 1 | 100.0 | 15.00 | - 0.91 OK | | | | |
| 2 | 160.0 | 15.00 | - 0.91 OK | | | | |
| 3 | 300.0 | 15.00 | - 0.91 OK | | | | |
| 4 | 600.0 | 15.00 | - 0.91 OK | | | | |
| 5 | 1,000.0 | 15.00 | - 0.91 OK | | | | |
| 6 | 2,000.0 | 15.00 | - 0.91 OK | | | | |
| 7 | 4,600.0 | 6.50 | - 0.90 OK | | | | |
| 8 | 10,000.0 | 3.00 | - 0.88 OK | | | | |
| 9 | 20,000.0 | 1.50 | - 0.85 OK | | | | |
| 10 | 46,000.0 | 1.50 | - 0.85 OK | | | | |

(2) The jitter transfer characteristic measurement result is displayed on the Analyze: Jitter transfer screen. With "Marker" set to "ON" and the cursor positioned at [←] and [→], clicking Set displays the numerical data at the measurement point.



# Section 7 Wander Application

This section describes the wander application that uses MP1580A and MP1570A (or MP1590A/B) equipped with the MU150018A 2.5/10G jitter unit and with Options 02 and 03 necessary for wander measurement.

- For screen switching and parameter setting procedures, see "Section 4 Screen Switching and Parameter Setting".
- For screen parameters and graphs used in this section, see "Section 5 Screen Description".

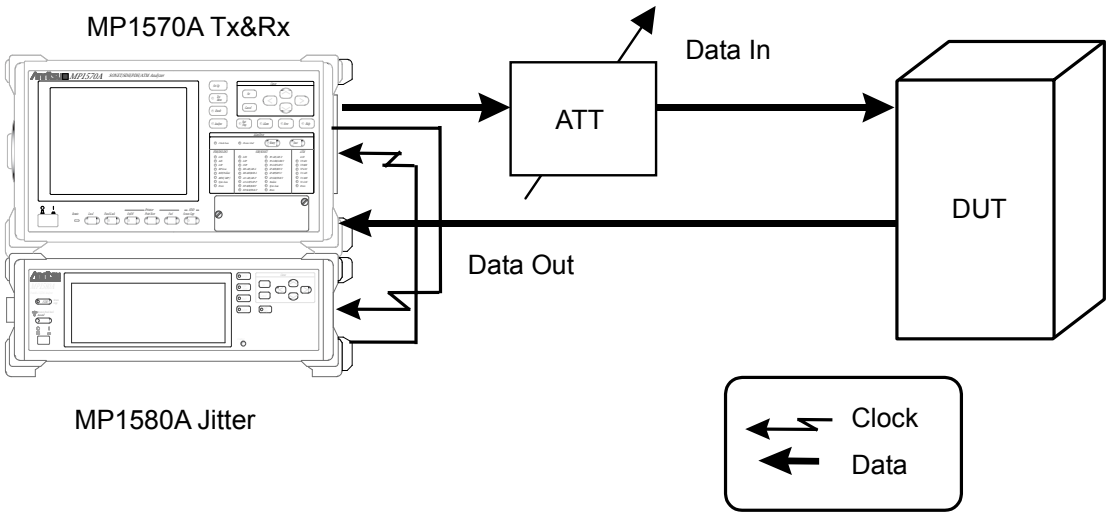
# 7.1 Manual Wander Generation and Measurement for MP1580A+MP1570A

## 7.1.1 Generating signal with sine wave wander added

This section describes how to add sine wave wander to a signal of bit rate 2488 M/9953 M.

Connecting measurement system

Connect MP1580A and MP1570A to the DUT as shown in the figure below.



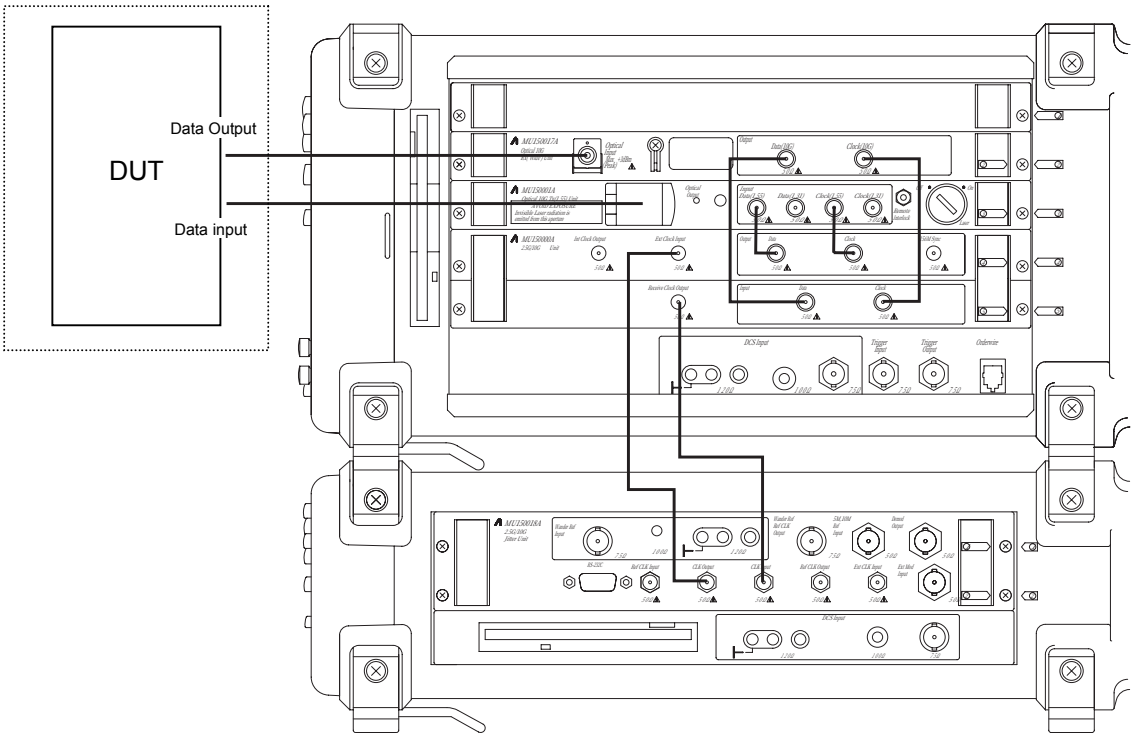

**Example connection for sine wave wander generation**

(1) Connect MP1580A and MP1570A as shown in the diagram on the next page.

(2) Turn ON the power switches for MP1580A and MP1570A.

(3) Connect the optical output connector of MU150001A to the device under test unit (DUT) input connector via the variable optical attenuator using SM optical fiber cable.

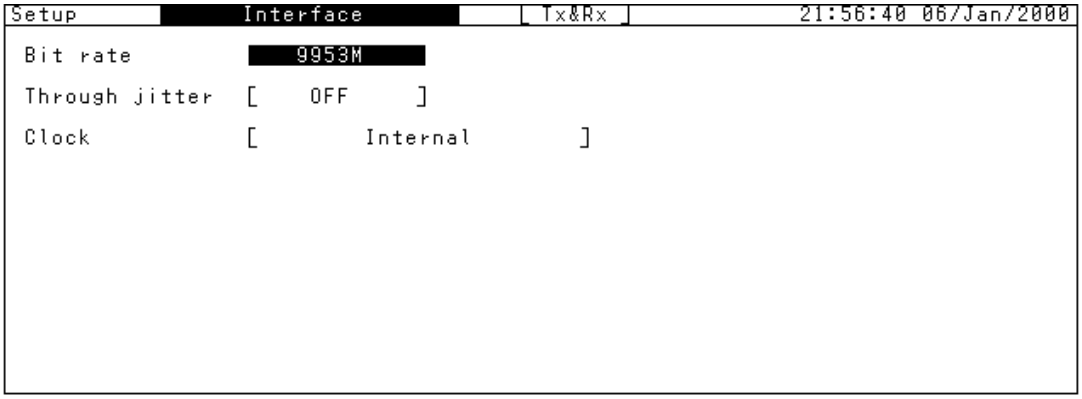
(4) Check that the optical output level from the DUT is within the optical input range for MP1570A and, if necessary, connect it to the MU150017A Optical Input connector via the optical attenuator using SM optical fiber cable.



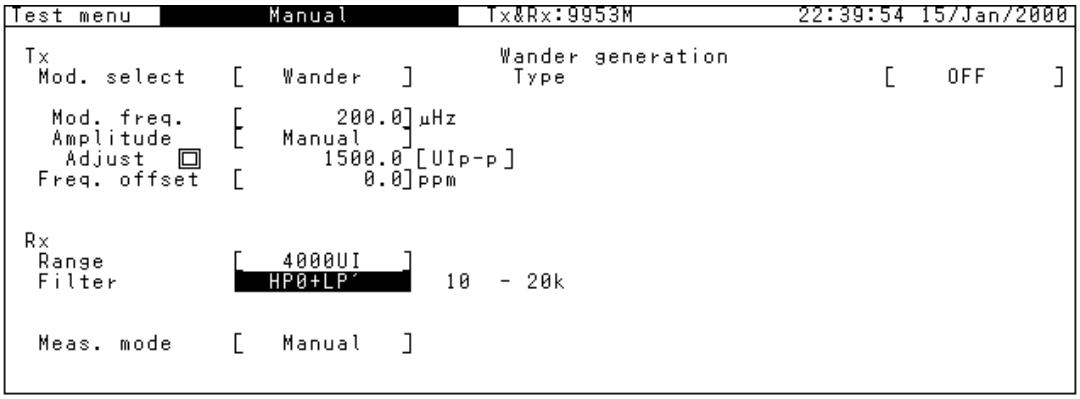

**Unit connection diagram**

Setting procedure

(1) From the Setup: Interface screen, set the basic parameters. Set "Through Jitter" to "OFF". It is not used for wander measurement. Because the MP1580A internal signal source is to be used as the reference clock, set "Clock" to "Internal".




(2) From the Test menu: Manual screen set the wander signal parameters. In the following screen, the modulation frequency and amplitude are set to 200 μHz and 1500 $UI_{p-p}$, respectively.

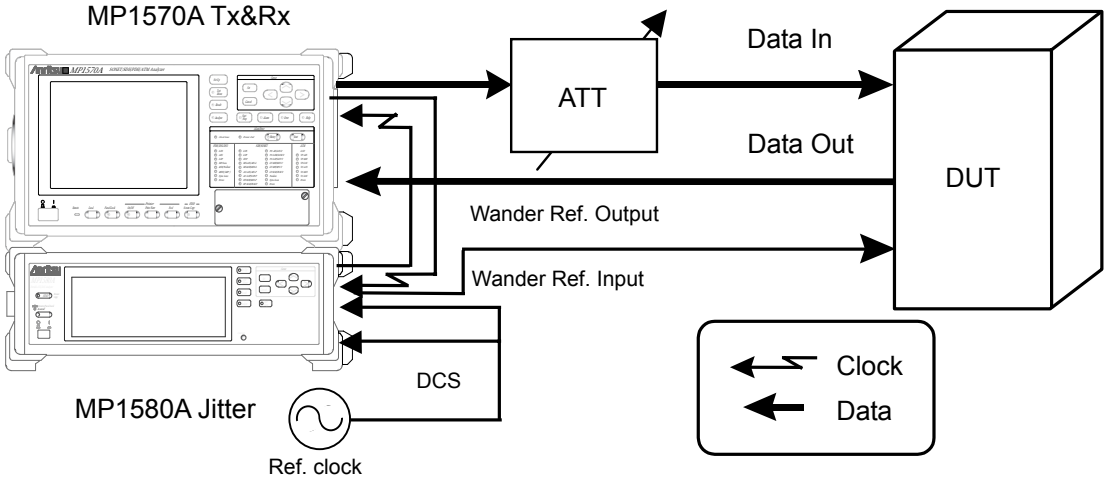


## 7.1.2 Adding phase modulation to wander reference clock

This section describes how to add to the wander reference clock the three types of phase modulation: TDEV mask generation, Transient generation, and Signal OFF generation.

Connecting measurement system

Connect MP1580A and MP1570A to the DUT as shown in the figure below.




**Example connection for TIE measurement**

(1) Connect MP1580A and MP1570A as shown in the diagram on the next page.

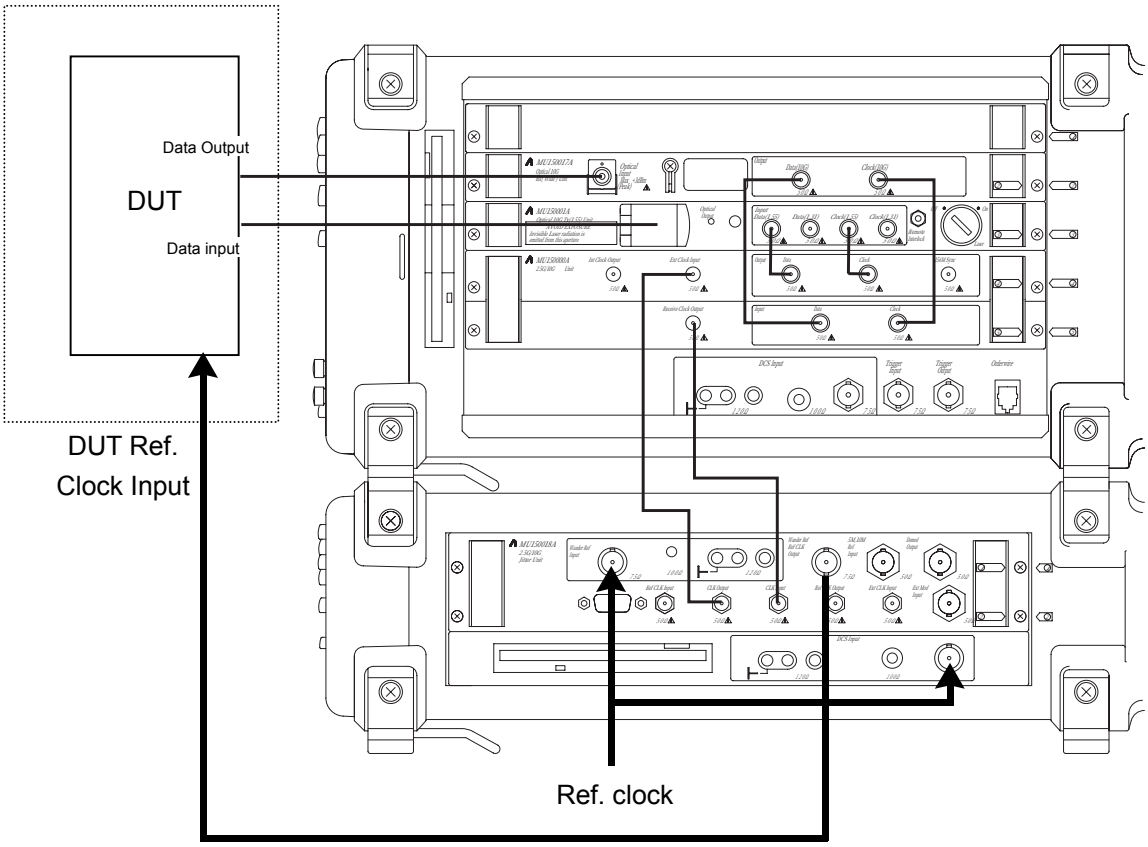
(2) Turn On the power switches for MP1580A and MP1570A.

(3) Connect Ref. clock source to Wander Ref. Input and DCS Input.

(4) Connect Wander Ref. Output to DUT Ref. Input.

(5) Connect the optical output connector of MU150001A to the input connector of device under test (DUT) via the variable optical attenuator using SM optical fiber cable.

(6) Check that the optical output level from the DUT is within the optical input range for MP1570A and, if necessary, connect it to the MU150017A Optical Input connector via the optical attenuator using SM optical fiber cable.

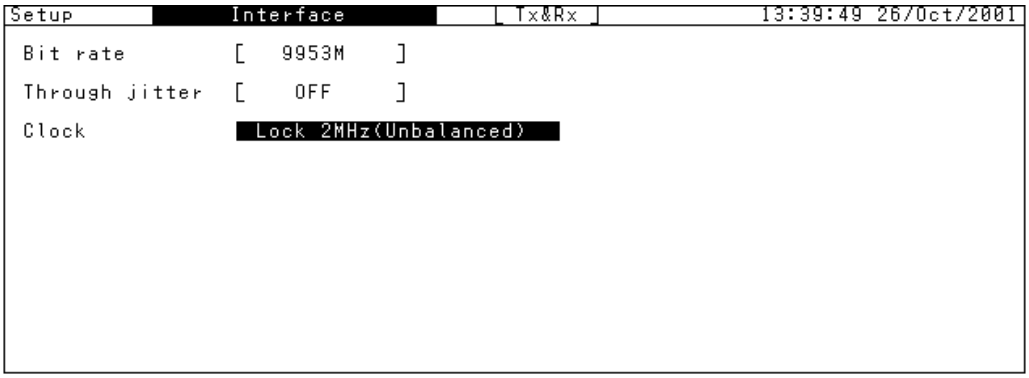



**Unit connection diagram**

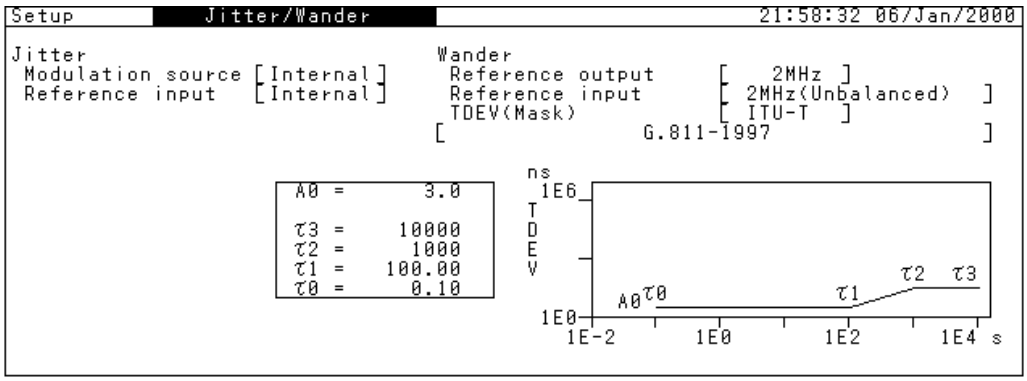
Setting procedure

(1) From the Setup: Interface screen, set the basic parameters. Set "Through Jitter" to "OFF".

External signal source is used as the reference clock, set "Clock" to "external reference clock".

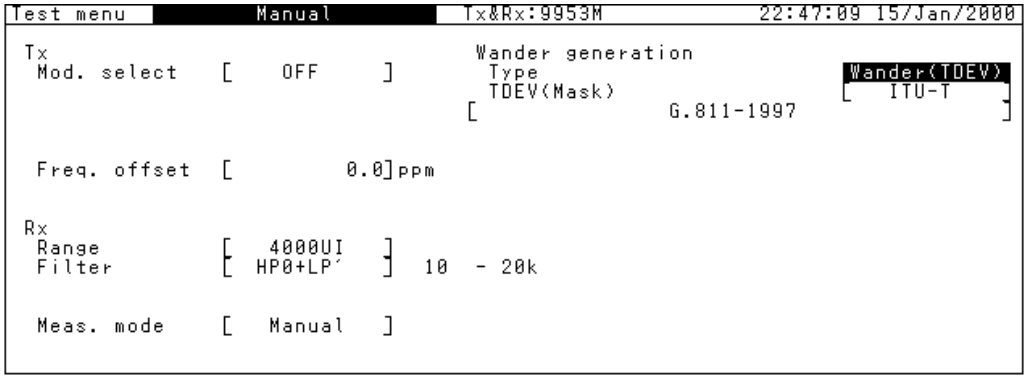



(2) From the Setup: Jitter/Wander screen, set the wander parameters.

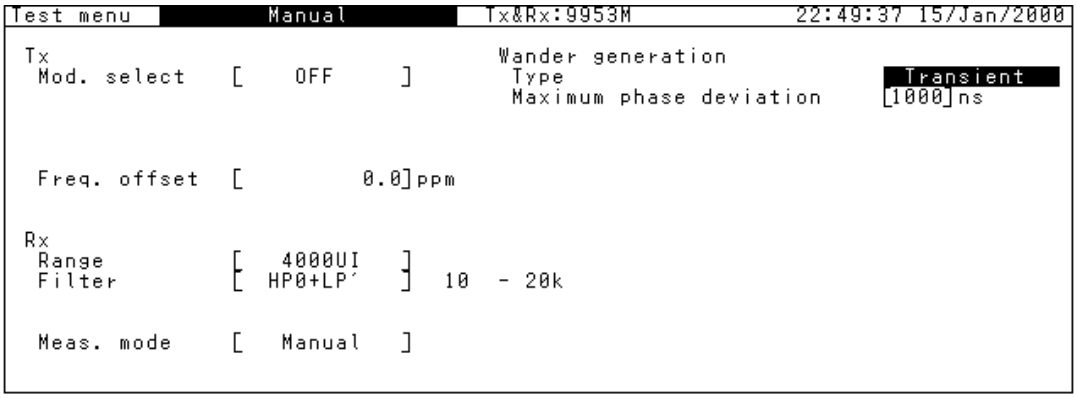



(3) From the Test menu: Manual screen, set the noise to be added to the wander reference clock.

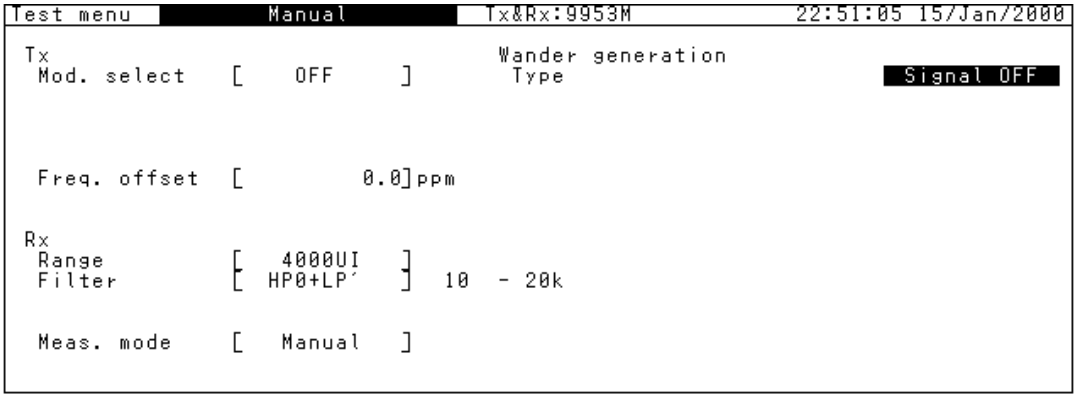
To add noise of Gaussian distribution form to the wander reference clock (TDEV mask), set "Type" to "TDEV" generates from the Wander reference output connector the TDEV output of the frequency set from the Setup: Jitter/Wander screen.



To add transient phase variation to the wander reference clock, set "Type" to "Transient". Pressing Start/Stop generates the transient signal from the Wander reference output connector.




To cut off the wander reference clock, set "Type" to "Signal OFF". Pressing Start/Stop cuts off the output from the Wander reference output connector.

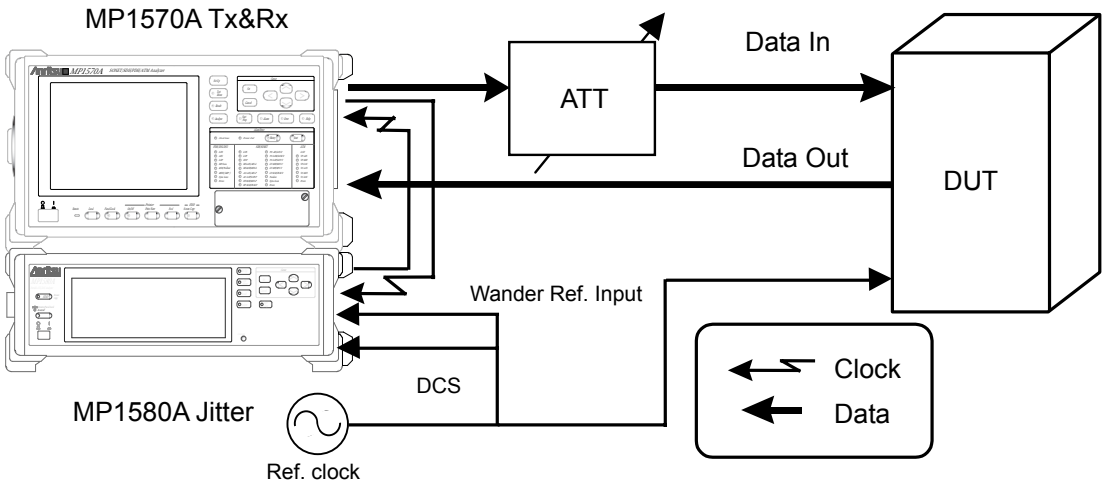


## 7.1.3 TIE manual measurement

This section describes how to measure residual wander for evaluating the DUT's characteristic.

Connecting measurement system

Connect MP1580A and MP1570A to the DUT as shown in the figure below.




**Example connection for TIE measurement**

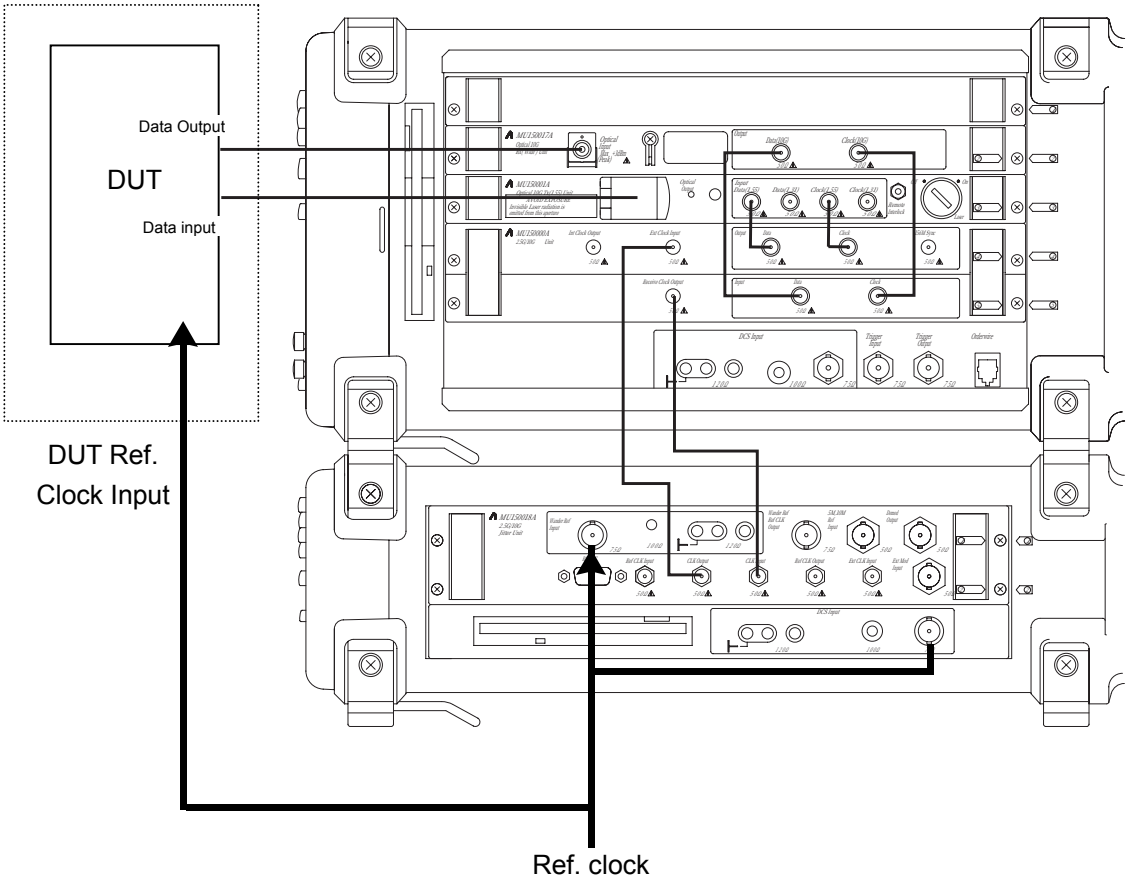
(1) Connect MP1580A and MP1570A as shown in the diagram on the next page.

(2) Turn On the power switches for MP1580A and MP1570A.

(3) Connect Ref. clock source to Wander Ref. Input, DCS Input, and DUT Ref. clock Input.

(4) Connect the optical output connector of MU150001A to the input connector of device under test (DUT) via the variable optical attenuator using SM optical fiber cable.

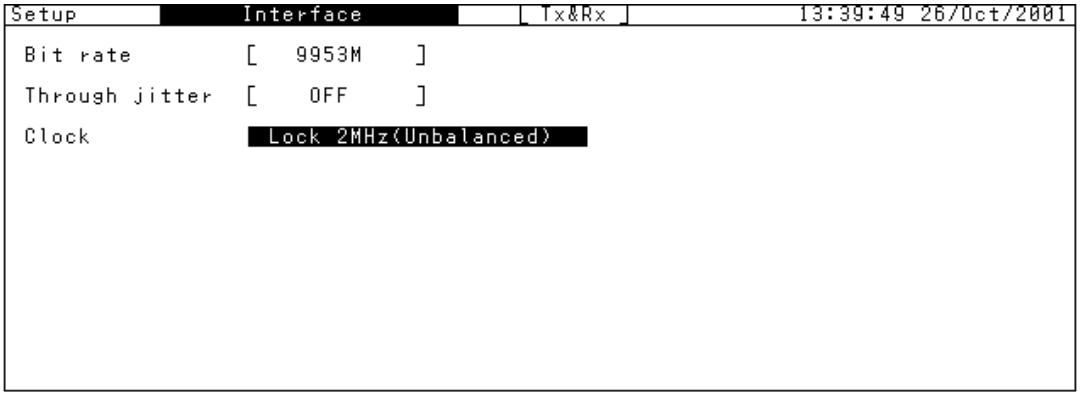
(5) Check that the optical output level from the DUT is within the optical input range for MP1570A and, if necessary, connect it to the MU150017A Optical Input connector via the optical attenuator using SM optical fiber cable.



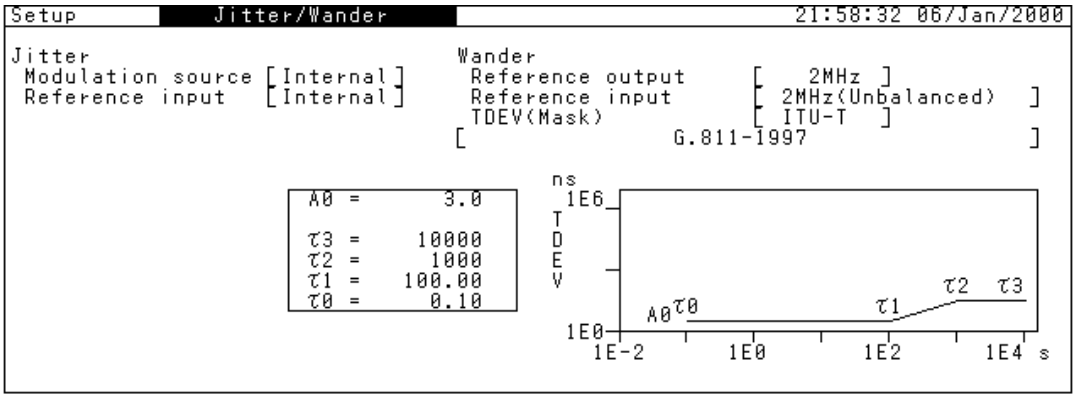

**Unit connection diagram**

Setting procedure

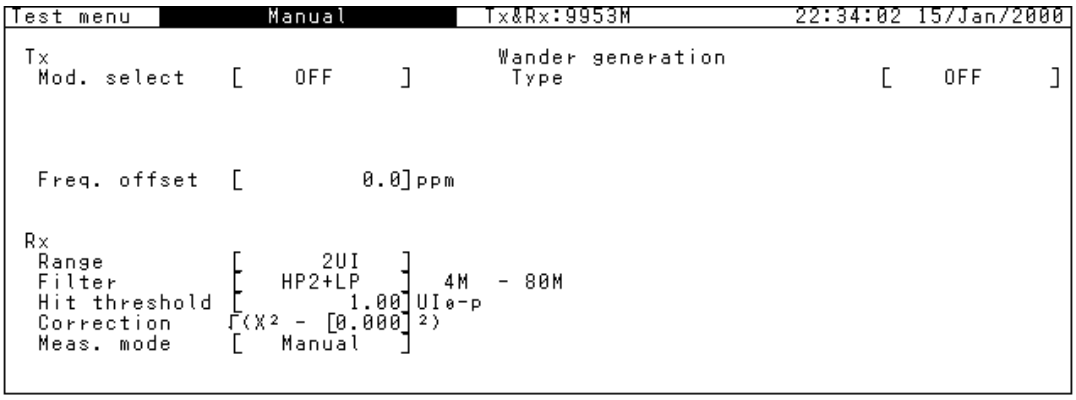
(1) From the Setup: Interface screen, set the basic parameters. Set "Through Jitter" to "OFF" for it is not used for wander measurement.
External clock source is used as the reference clock, set "clock" to "2MHz (Unbalance)".




(2) From the Setup: Jitter/Wander screen, set the wander parameters.




(3) From the Test menu: Manual screen, set the wander signal parameters.

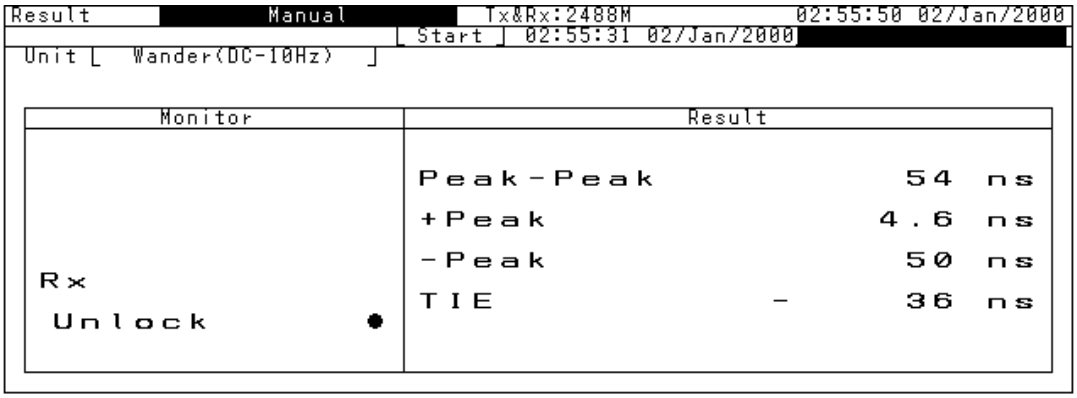


### Displaying measurement result

The TIE measurement result can be displayed on the Result: Manual screen. Pressing Start/Stop starts the measurement and displays the measurement result.

***Note:***

When setting Rx of meas. mode at Test menu: manual screen is Repeat, Wander is not measured.

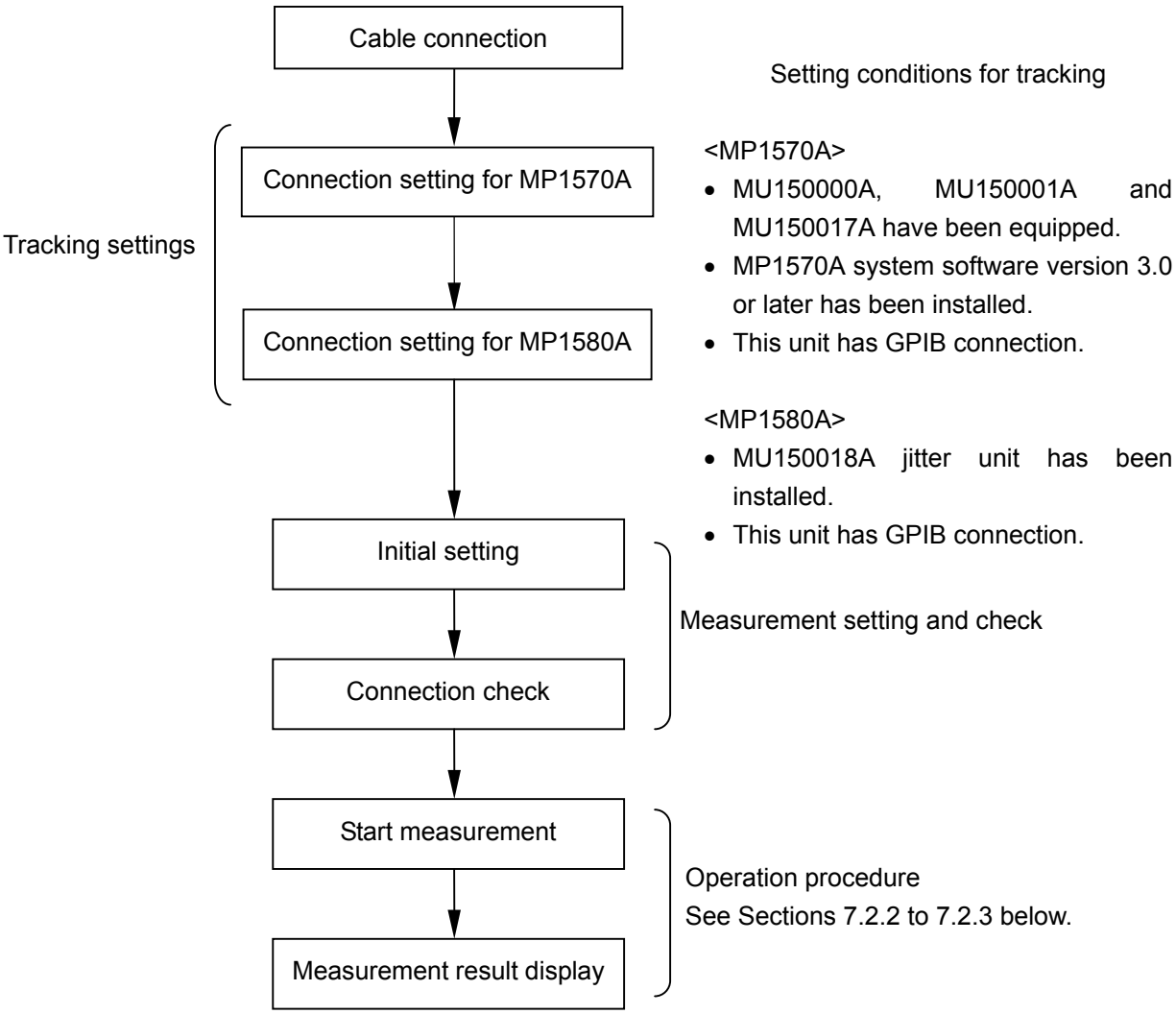


# 7.2 Automatic Wander Measurement for MP1580A+MP1570A

Automatic wander measurement can be done in tracking or non-tracking mode. When MP1580A and MP1570A are connected to each other through the GPIB interface, tracking mode allows automatic wander measurement, controlling MP1570A (device) with MP1580A (controller). Non-tracking mode allows wander automatic measurement without requiring GPIB connection.

## 7.2.1 Tracking

The flowchart shown below shows how to set tracking and starting measurement.




See the following pages for the steps to set the MP1570A (device) and MP1580A (controller).

Setting MP1570A (device)

(1) From the Setup: Mapping screen, set the following parameters:

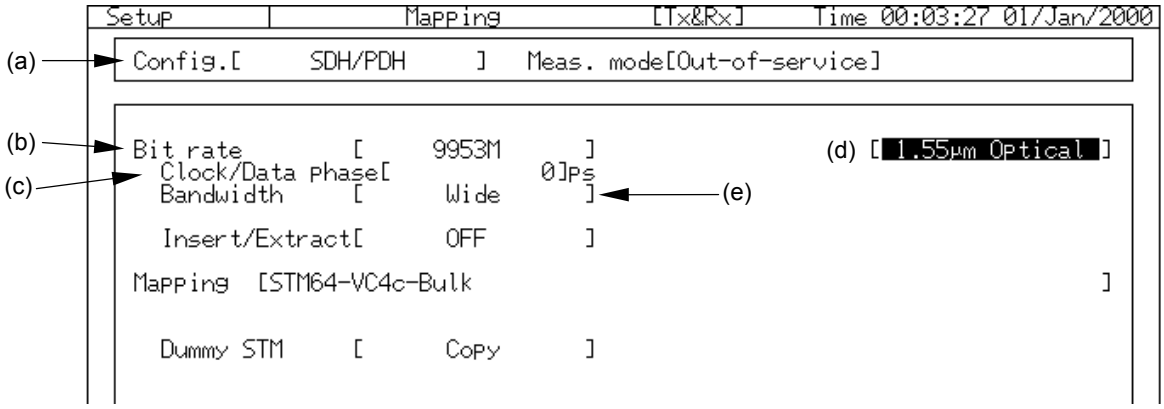
(a) Config..... Set to "SDH" or "Non-Frame pattern".

(b) Bit rate..... Set the same value as the bit rate set for MU150018A.

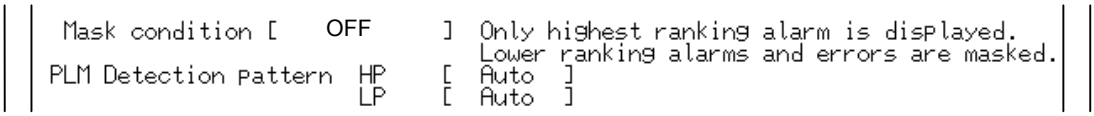
(c) Clock ..... Set to "External".

(d) Optical..... Select to "Optical" or "Electrical".

(e) Bandwidth ..... When "Optical" is set, select "Wide".




(2) From the Setup: Measurement Condition screen, set "Mask Condition" to "OFF".



(3) From the Setup: System screen, set the GPIB address to "1".

```
GPIB Interface      [      Control       ]
  Address           [          1         ]
```

When tracking starts, MP1580A sets the bellow item with remote command.

1) Bitrate (Setup : Mapping)
   Set to same bit rate of MP1580A

2) Clock (Setup : Mapping)
   Set to "External"

3) Mask condition (Setup : Measurement condition)
   Set to "OFF"

Setting up MP1570A (Bit rate, Clock, and Mask condition) from MP1580A takes about 20 seconds to operate remote access.

Two screens of the following are displayed at the tracking.

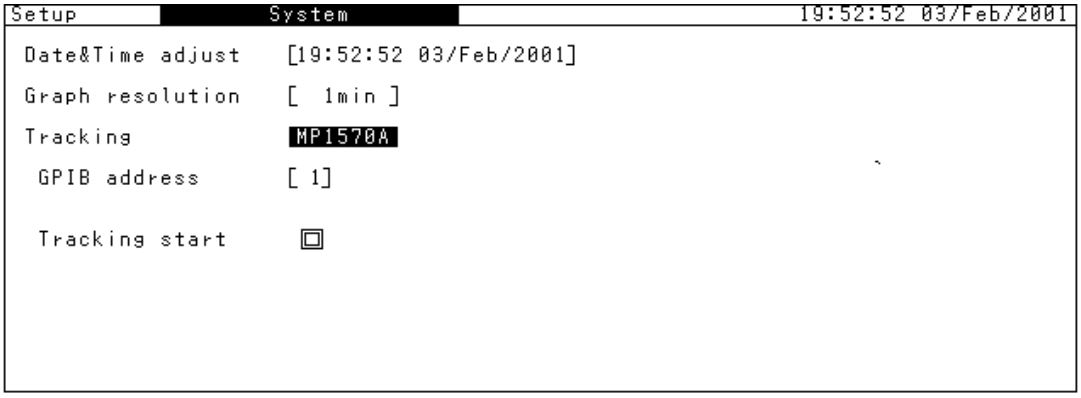
Test menu : Manual
Result : Error Alarm

Setting MP1580A (controller)

(1) Display the Setup: System screen and set the following values:

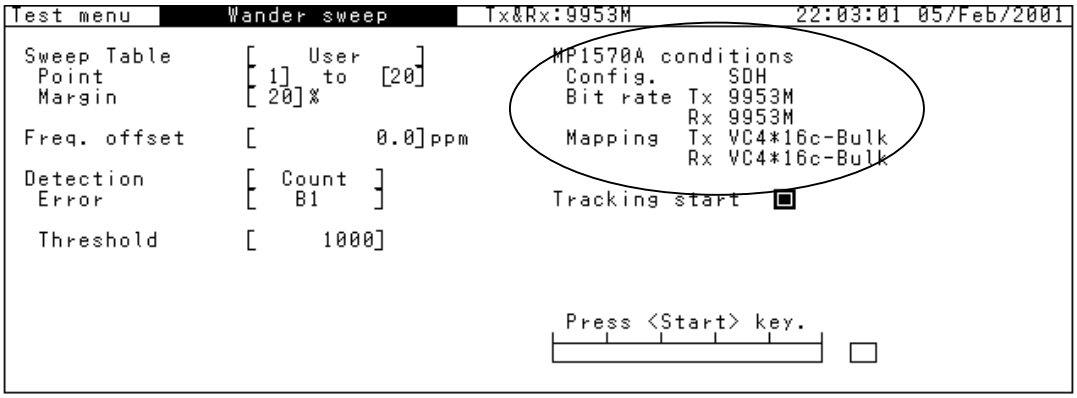
(a) Tracking.....Set to "MP1570A".

(b) GPIB address.....Set the same value as that set for MP1570A.



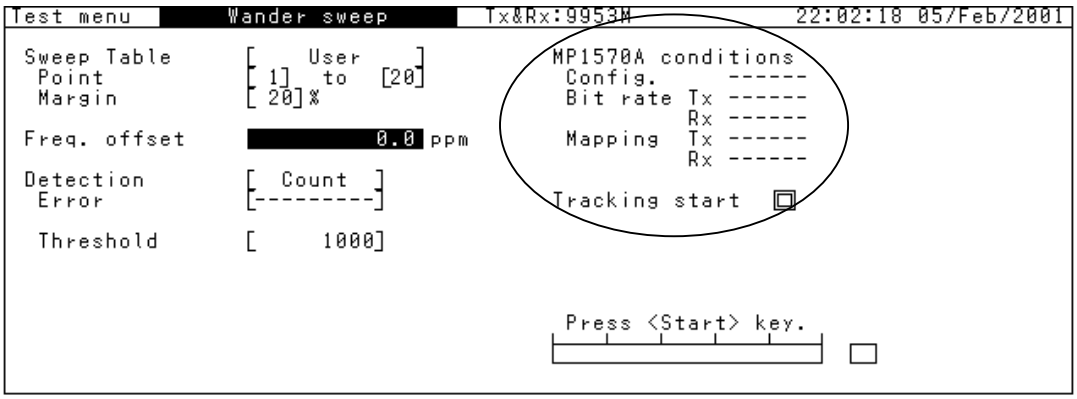

(2) From the Setup: System screen, click Set with the cursor positioned at ☐ for "Tracking start". Then, the communication between MP1570A and MP1580A starts for initialization. Communication takes about 5 seconds. (The communication can be started or stopped also from the Test menu screen.)

(3) From any one of the subscreens of the Test menu main screen, check that tracking has been established. When tracking has been established, the screen is displayed as follows.




***Note:***

When tracking has not been established, "-----" appears as shown below.



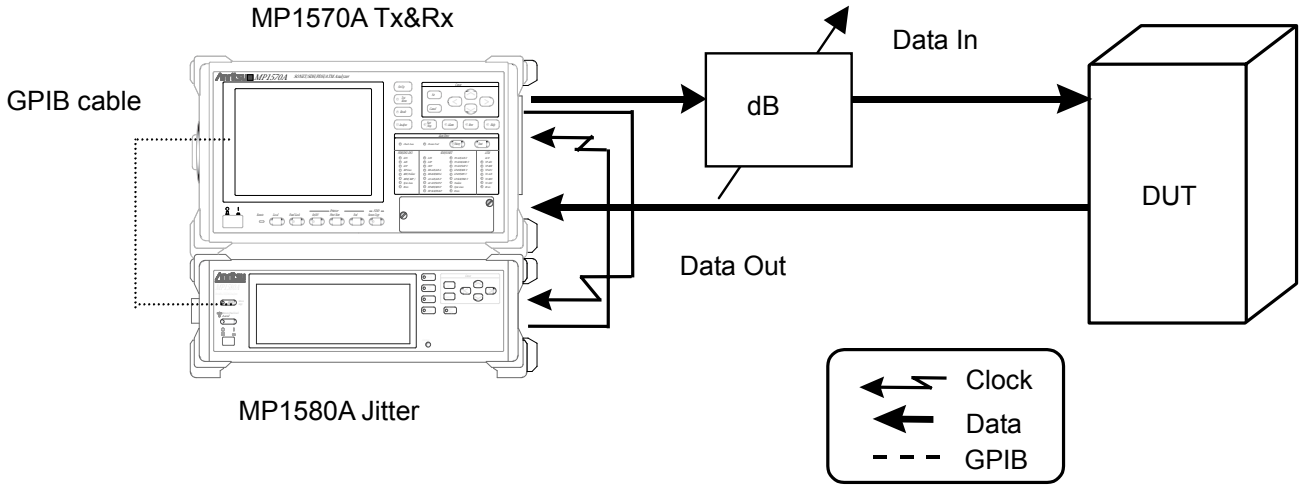

(4) To stop tracking, move the cursor to ☐ for "Tracking start" on the Setup: system screen and click Set.

## 7.2.2 Measuring wander sweep (tracking measurement)

This section describes wander sweep measurement that allows precisely and speedily measuring presence or absence of errors, while adding the preset wander to the DUT.

Connecting measurement system

Connect MP1580A and MP1570A to the DUT, namely device under test (DUT) as shown in the figure below.




**Example connection for wander sweep measurement**

(1) Connect MP1580A and MP1570A as shown in the diagram on the next page.

(2) Connect the GPIB ports on the rear side of MP1580A and MP1570A to each other using the GPIB cable.

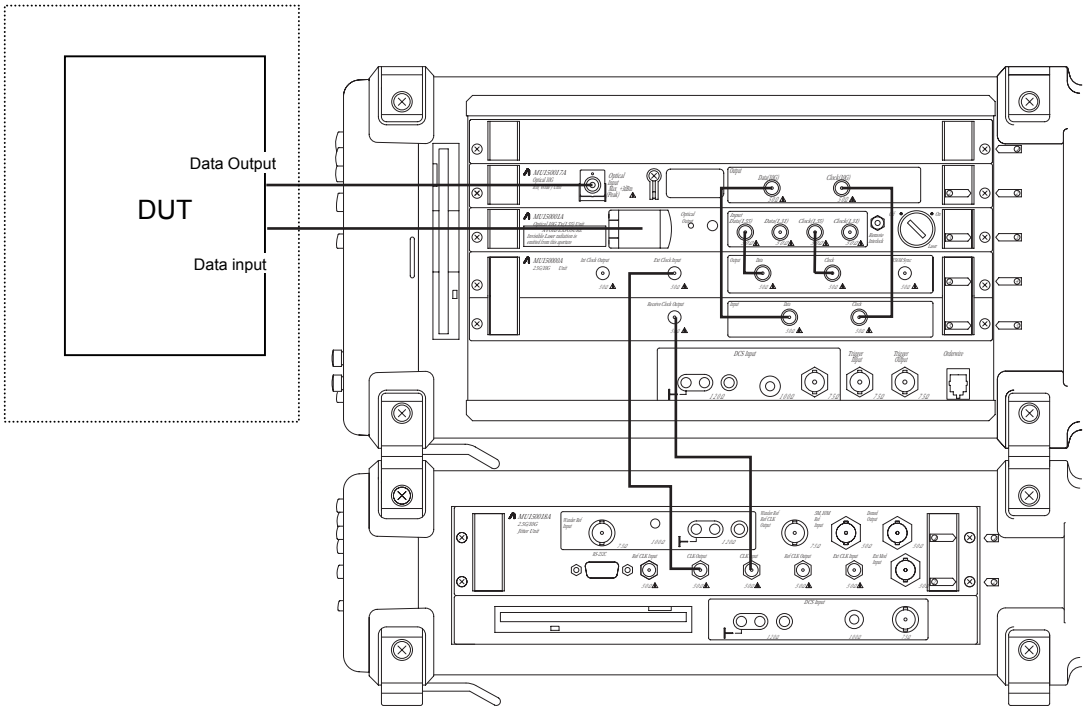
(3) Turn ON the power switches for MP1580A and MP1570A.

(4) Connect the optical output connector of MU150001A to the input connector of device under test (DUT) via the variable optical attenuator using SM optical fiber cable.

(5) Check that the optical output level from the DUT is within the optical input range for MP1570A and, if necessary, connect it to the MU150017A Optical Input connector via the optical attenuator using SM optical fiber cable.

(6) Make connection settings for the MP1580A and MP1570A necessary for automatic measurement (see "Section 7.2.1 Tracking").

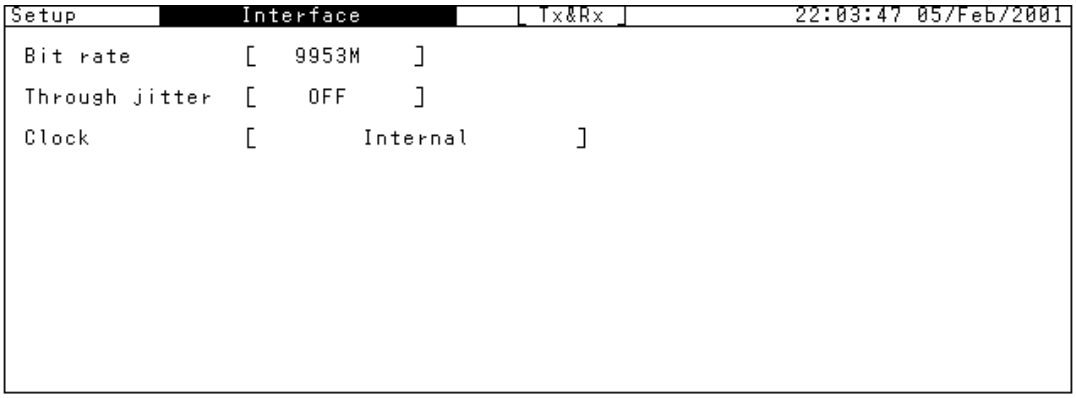
(7) From the Test menu: Wander sweep screen, check the MP1580A and MP1570A connection status.




**Unit connection diagram**

Setting procedure

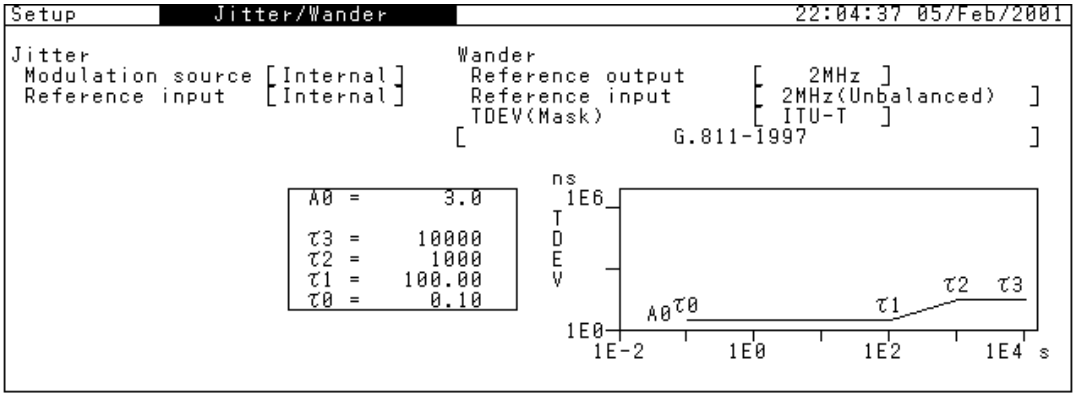
(1) From the Setup: Interface screen, set the basic parameters. The following screen shows an example of using the 9953 M interface for measurement:



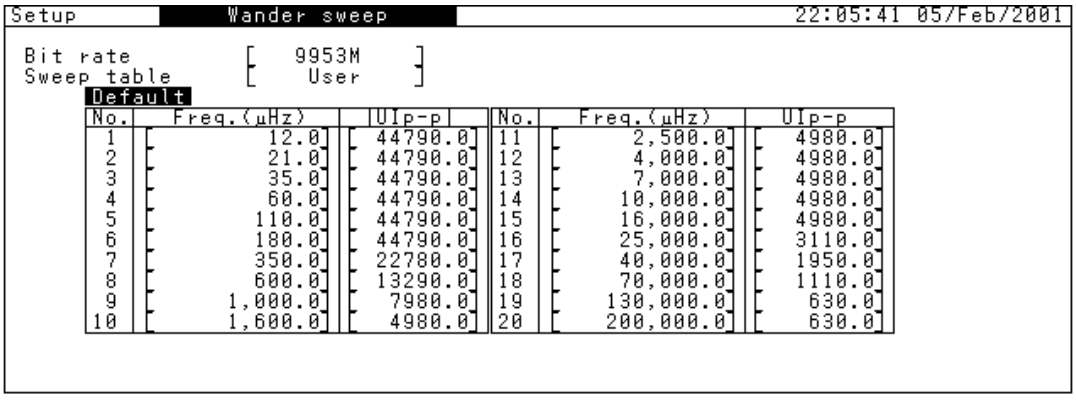

***Note:***

After changing the bit rate, check "Optical 1.31 µm", "Optical 1.55 µm", "Electrical", and "Bandwidth" for the MP1570A input/output.

(2) From the Setup: Jitter/Wander screen, set the wander parameters.

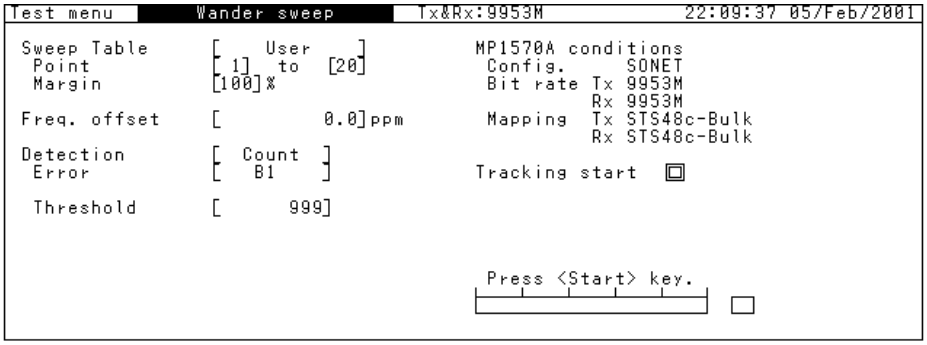



(3) From the Setup: Wander sweep screen, set the sweep table. When "Sweep table" is set to "User", the setting conditions can be changed.




| No. | Freq.(µHz) | UIp-p | No. | Freq.(µHz) | UIp-p |
|---|---|---|---|---|---|
| 1 | 12.0 | 44790.0 | 11 | 2,500.0 | 4980.0 |
| 2 | 21.0 | 44790.0 | 12 | 4,000.0 | 4980.0 |
| 3 | 35.0 | 44790.0 | 13 | 7,000.0 | 4980.0 |
| 4 | 60.0 | 44790.0 | 14 | 10,000.0 | 4980.0 |
| 5 | 110.0 | 44790.0 | 15 | 16,000.0 | 4980.0 |
| 6 | 180.0 | 44790.0 | 16 | 25,000.0 | 3110.0 |
| 7 | 350.0 | 22780.0 | 17 | 40,000.0 | 1950.0 |
| 8 | 600.0 | 13290.0 | 18 | 70,000.0 | 1110.0 |
| 9 | 1,000.0 | 7980.0 | 19 | 130,000.0 | 630.0 |
| 10 | 1,600.0 | 4980.0 | 20 | 200,000.0 | 630.0 |

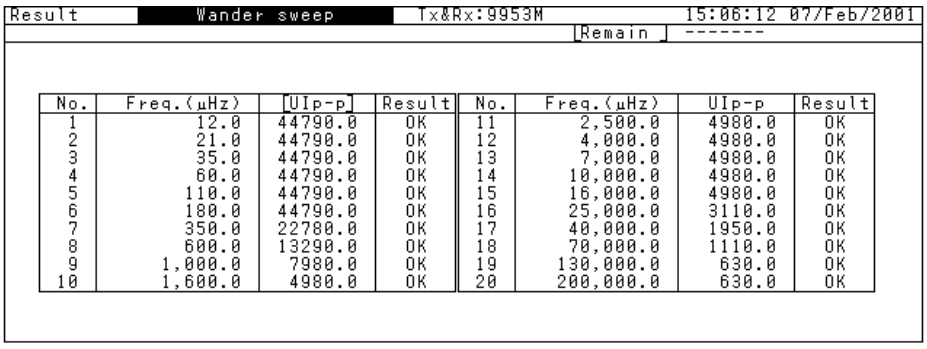
(4) From the Test menu: Wader sweep screen, set the conditions for automatic wader sweep measurement. Check the connection between MP1580A and MP1570A by "MP1570A conditions" on the screen. (When the connections have not been established, "-----" appears. In such a case, establish the connections by referring to "Section 7.2.1 Tracking".)




(5) Press Start/Stop to start the measurement. The measurement progress is displayed on a bar graph on the Test menu: Wander sweep screen.

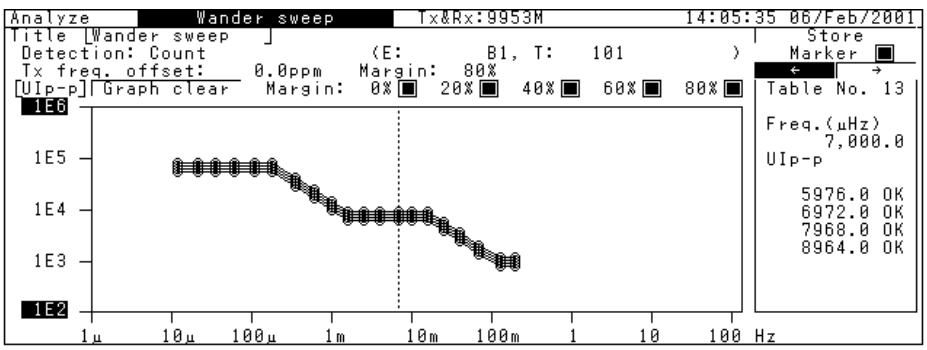
### Displaying measurement result

(1) The wander sweep measurement result is displayed as numerical data together with the measurement frequency on the Result: Wander sweep screen. The pass/fail judgment result is displayed as "OK" or "NG".




| No. | Freq.(μHz) | UIp-p | Result | No. | Freq.(μHz) | UIp-p | Result |
|---|---|---|---|---|---|---|---|
| 1 | 12.0 | 44790.0 | OK | 11 | 2,500.0 | 4980.0 | OK |
| 2 | 21.0 | 44790.0 | OK | 12 | 4,000.0 | 4980.0 | OK |
| 3 | 35.0 | 44790.0 | OK | 13 | 7,000.0 | 4980.0 | OK |
| 4 | 60.0 | 44790.0 | OK | 14 | 10,000.0 | 4980.0 | OK |
| 5 | 110.0 | 44790.0 | OK | 15 | 16,000.0 | 4980.0 | OK |
| 6 | 180.0 | 44790.0 | OK | 16 | 25,000.0 | 3110.0 | OK |
| 7 | 350.0 | 22780.0 | OK | 17 | 40,000.0 | 1950.0 | OK |
| 8 | 600.0 | 13290.0 | OK | 18 | 70,000.0 | 1110.0 | OK |
| 9 | 1,000.0 | 7980.0 | OK | 19 | 130,000.0 | 630.0 | OK |
| 10 | 1,600.0 | 4980.0 | OK | 20 | 200,000.0 | 630.0 | OK |

(2) The wander sweep automatic measurement graph can be displayed on the Analyze: Wander sweep screen. With "Marker" set to "ON" and the cursor positioned at [←] and [→], clicking Set displays the numerical data at the measurement points.

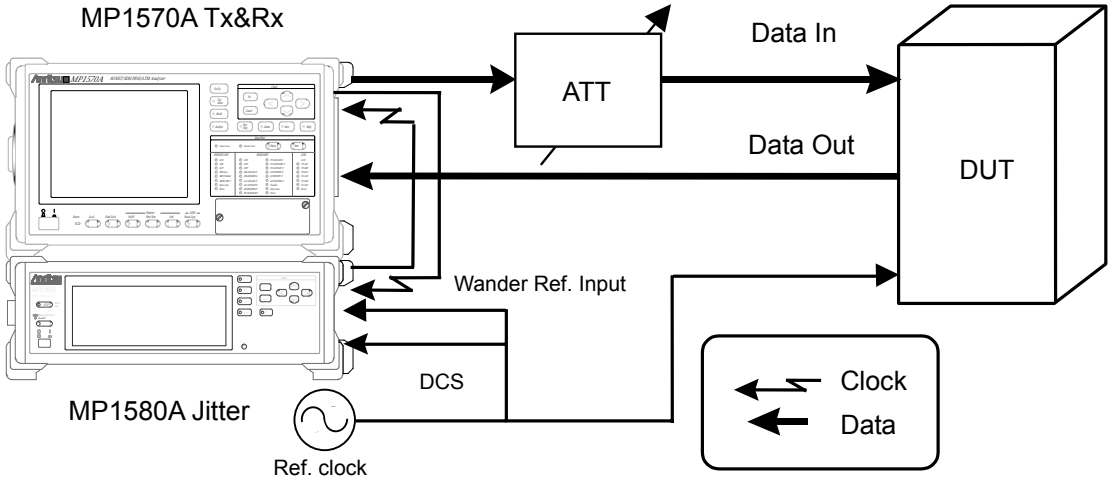


## 7.2.3 TIE Automatic measurement (non-tracking measurement)

This section describes TIE automatic measurement that allows adding the preset TDEV to the DUT for measuring the wander.

### Connecting measurement system

Connect MP1580A and MP1570A to the DUT, namely device under test (DUT) as shown in the figure below.




**Example connection for TIE automatic measurement**

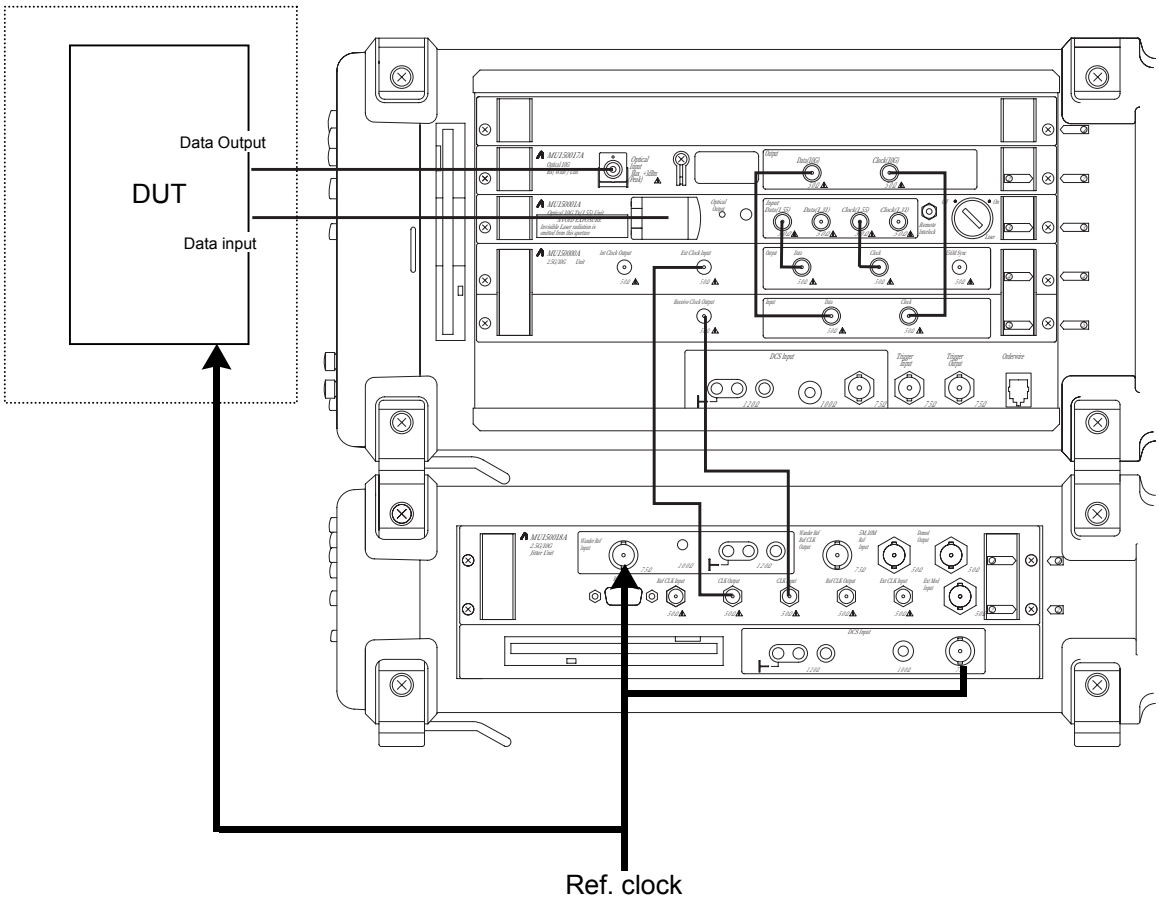
(1) Connect MP1580A and MP1570A as shown in the diagram on the next page.

(2) Turn On the power switches for MP1580A and MP1570A.

(3) Connect Ref. clock source to Wander Ref. Input, DCS Input, and DUT Ref. Input.

(4) Connect the optical output connector of MU150001A to the input connector of device under test (DUT) via the variable optical attenuator using SM optical fiber cable.

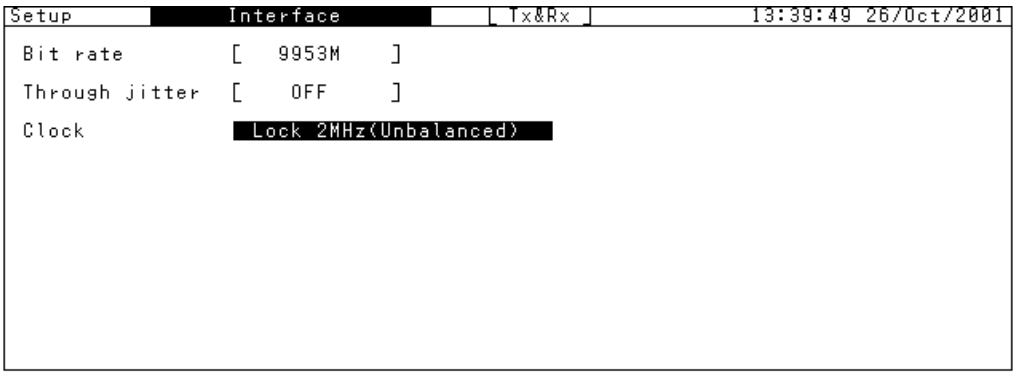
(5) Check that the optical output level from the DUT is within the optical input range for MP1570A and, if necessary, connect it to the MU150017A Optical Input connector via the optical attenuator using SM optical fiber cable.




**Unit connection diagram**

Setting procedure

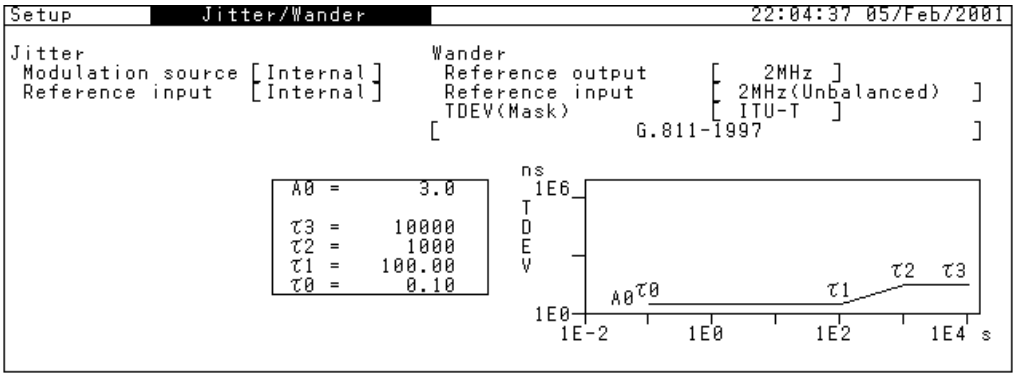
(1) From the Setup: Interface screen, set the basic parameters. The following screen shows an example of using the 9953 M interface for measurement. External clock source is used as the reference clock, set "clock" to "2MHz (Unbalance)".



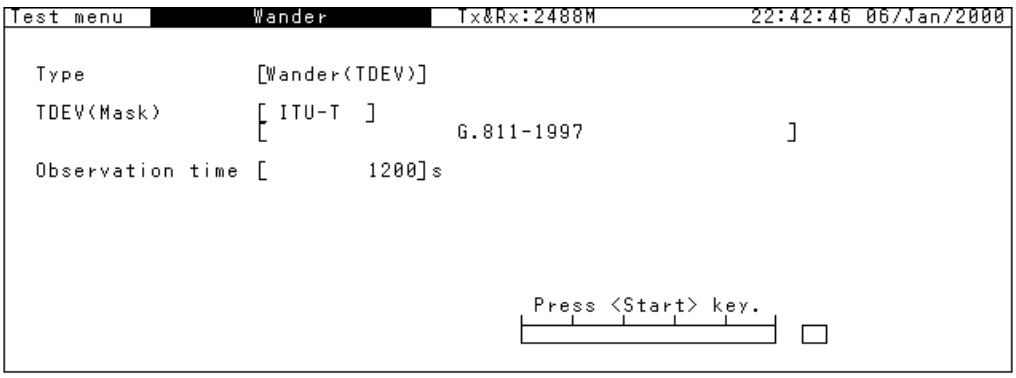

***Note:***

After changing the bit rate, check "Optical 1.31 µm", "Optical 1.55 µm", "Electrical" and "Bandwidth" for the MP1570A input/output.

(2) From the Setup: Jitter/Wander screen, set the wander parameters.




(3) From the Test menu: Wander screen, set the wander detection conditions and measurement time.

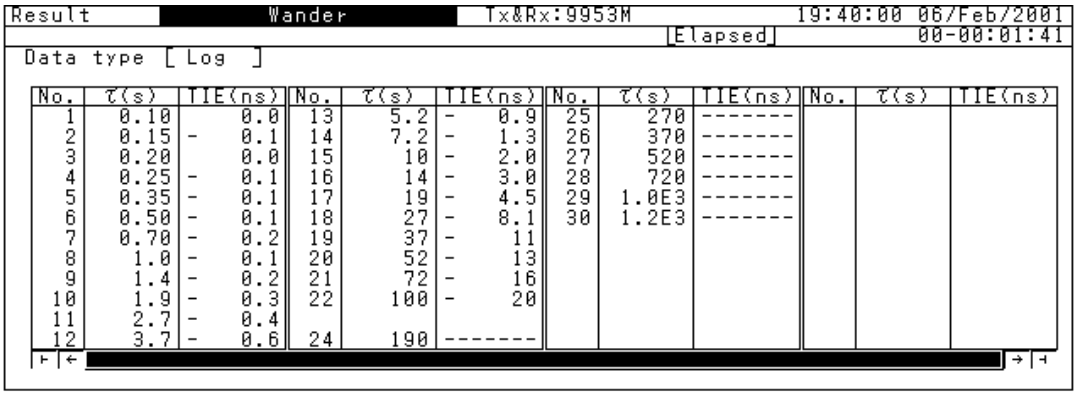



(4) Press Start/Stop to start the measurement. The measurement progress is displayed on a bar graph on the Test menu: Wander screen.

Displaying measurement result

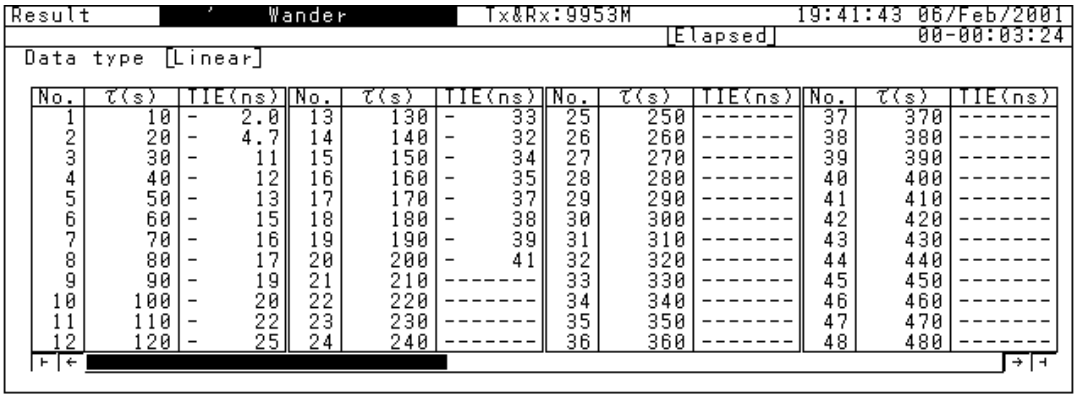
(1) The TIE value is displayed together with the measurement time on the Result: Wander screen. "Data Type" can be set to "Log" or "Linear". The measurement result can be saved as numerical data as is.

When Log display




| No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.10 | 0.0 | 13 | 5.2 | - 0.9 | 25 | 270 | ------- | | | |
| 2 | 0.15 | - 0.1 | 14 | 7.2 | - 1.3 | 26 | 370 | ------- | | | |
| 3 | 0.20 | 0.0 | 15 | 10 | - 2.0 | 27 | 520 | ------- | | | |
| 4 | 0.25 | - 0.1 | 16 | 14 | - 3.0 | 28 | 720 | ------- | | | |
| 5 | 0.35 | - 0.1 | 17 | 19 | - 4.5 | 29 | 1.0E3 | ------- | | | |
| 6 | 0.50 | - 0.1 | 18 | 27 | - 8.1 | 30 | 1.2E3 | ------- | | | |
| 7 | 0.70 | - 0.2 | 19 | 37 | - 11 | | | | | | |
| 8 | 1.0 | - 0.1 | 20 | 52 | - 13 | | | | | | |
| 9 | 1.4 | - 0.2 | 21 | 72 | - 16 | | | | | | |
| 10 | 1.9 | - 0.3 | 22 | 100 | - 20 | | | | | | |
| 11 | 2.7 | - 0.4 | | | | | | | | | |
| 12 | 3.7 | - 0.6 | 24 | 190 | ------- | | | | | | |

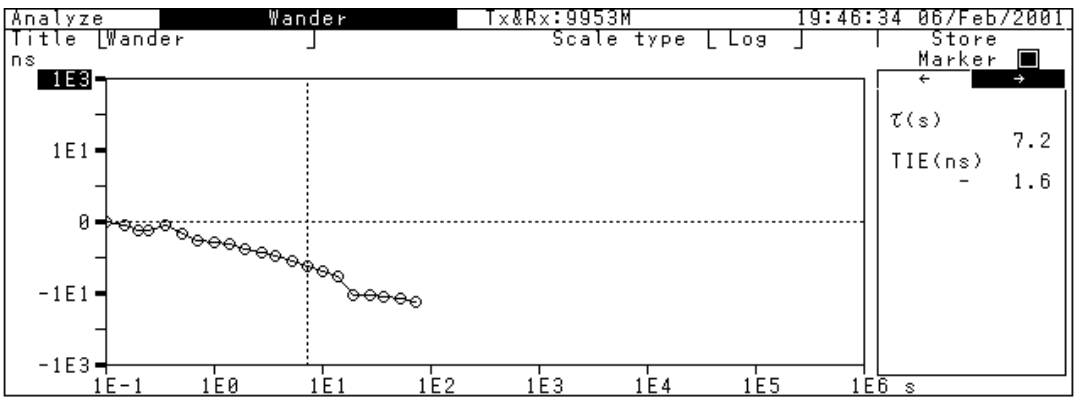
When Linear display



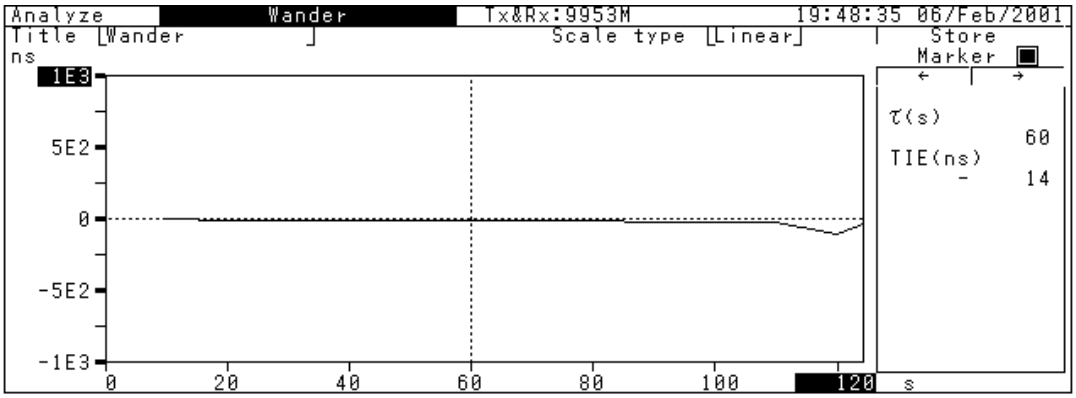

| No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10 | - 2.0 | 13 | 130 | - 33 | 25 | 250 | ------- | 37 | 370 | ------- |
| 2 | 20 | - 4.7 | 14 | 140 | - 32 | 26 | 260 | ------- | 38 | 380 | ------- |
| 3 | 30 | - 11 | 15 | 150 | - 34 | 27 | 270 | ------- | 39 | 390 | ------- |
| 4 | 40 | - 12 | 16 | 160 | - 35 | 28 | 280 | ------- | 40 | 400 | ------- |
| 5 | 50 | - 13 | 17 | 170 | - 37 | 29 | 290 | ------- | 41 | 410 | ------- |
| 6 | 60 | - 15 | 18 | 180 | - 38 | 30 | 300 | ------- | 42 | 420 | ------- |
| 7 | 70 | - 16 | 19 | 190 | - 39 | 31 | 310 | ------- | 43 | 430 | ------- |
| 8 | 80 | - 17 | 20 | 200 | - 41 | 32 | 320 | ------- | 44 | 440 | ------- |
| 9 | 90 | - 19 | 21 | 210 | ------- | 33 | 330 | ------- | 45 | 450 | ------- |
| 10 | 100 | - 20 | 22 | 220 | ------- | 34 | 340 | ------- | 46 | 460 | ------- |
| 11 | 110 | - 22 | 23 | 230 | ------- | 35 | 350 | ------- | 47 | 470 | ------- |
| 12 | 120 | - 25 | 24 | 240 | ------- | 36 | 360 | ------- | 48 | 480 | ------- |

(2) To display the TIE measurement result on a graph, select the Analyze: Wander screen. With "Marker" set to "ON" and the cursor positioned at [←] and [→], clicking Set displays the result data at the measurement points.

When Log display



When Linear display



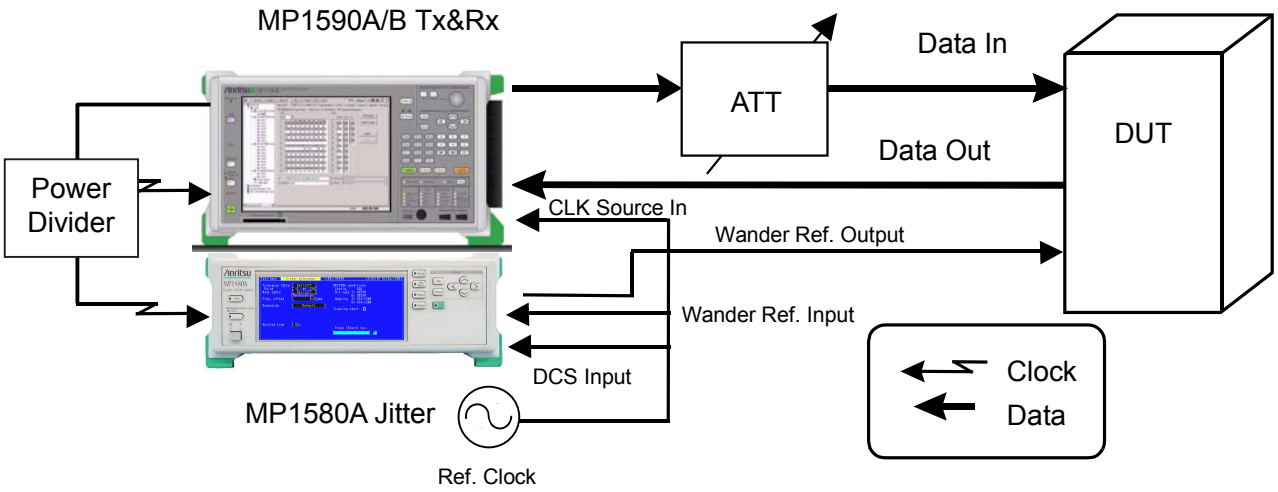
# 7.3 Manual Wander Generation and Measurement for MP1580A+MP1590A/B

## 7.3.1 Adding phase modulation to wander reference clock

This section describes how to add to the wander reference clock the three types of phase modulation: TDEV mask generation, Transient generation, and Signal OFF generation.

Connecting measurement system

Connect MP1580A and MP1590A/B to the DUT as shown in the figure below.




**Example connection for TIE measurement**

(1) Connect MP1580A and MP1590A/B as shown in the diagram on the next page.

(2) Turn On the power switches for MP1580A and MP1590A/B.

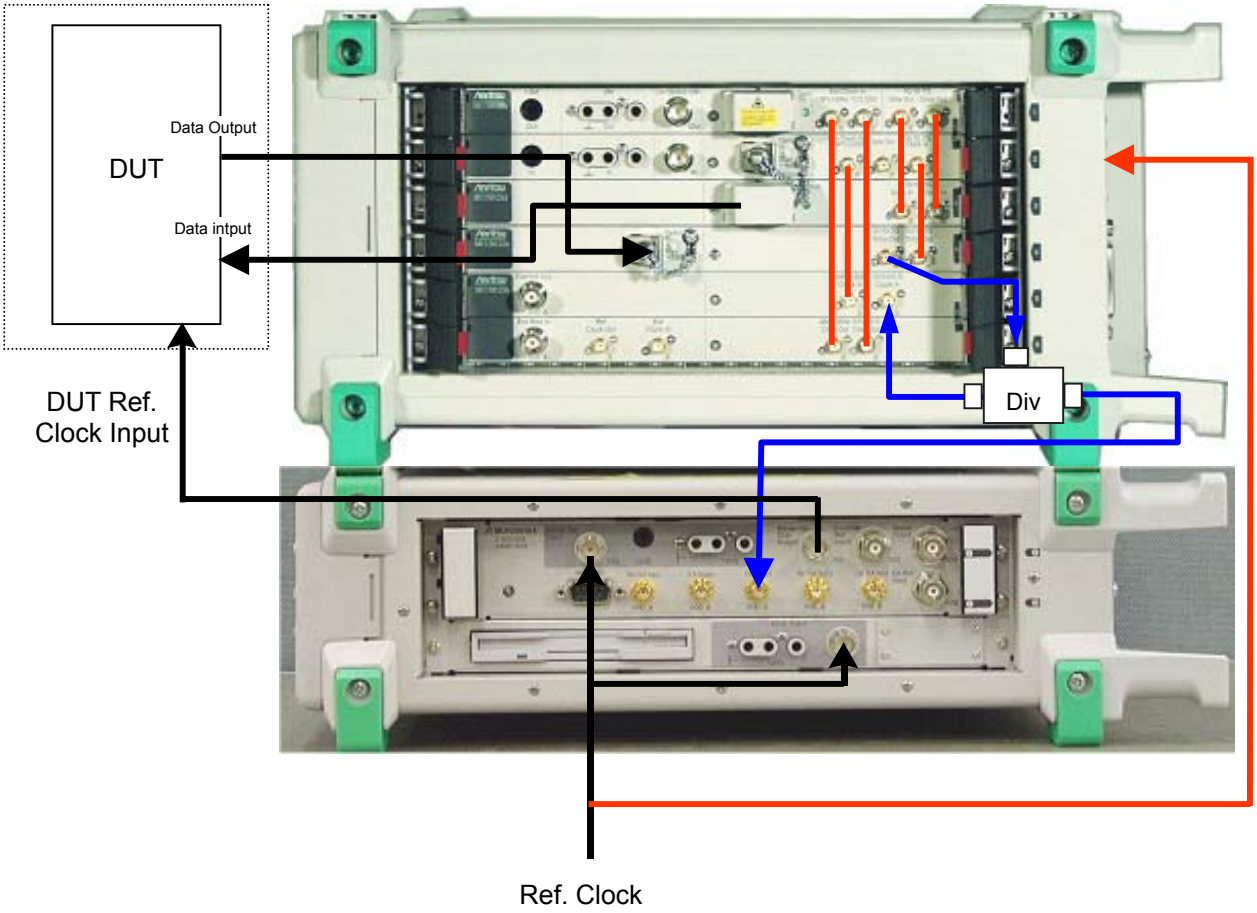
(3) Connect Ref. clock source to DCS Input of MP1580A and CLK Source In of MP1590A/B.

(4) Connect Wander Ref. Output to DUT Ref. Input.

(5) Divide the Receive clock output of MU150123A/B or MU150100A or MU150101A by power divider, and connect one of power divider output to Clock Input of MU150125A and the other output to Clock Input of MP1580A.

(6) Connect the optical output connector of MU150121A/B or MU150134A to the input connector of device under test (DUT) via the variable optical attenuator using SM optical fiber cable.

(7) Check that the optical output level from the DUT is within the optical input range for MP1590A/B and, if necessary, connect it to the MU150123A/B Optical Input connector via the optical attenuator using SM optical fiber cable.

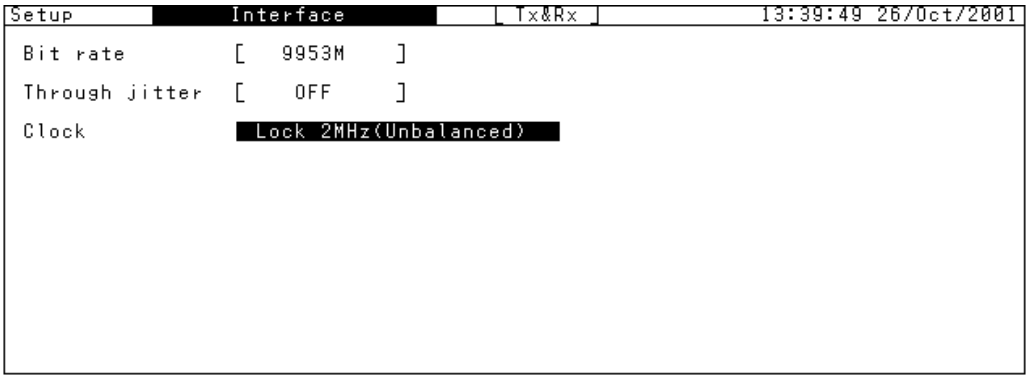



**Unit connection diagram**

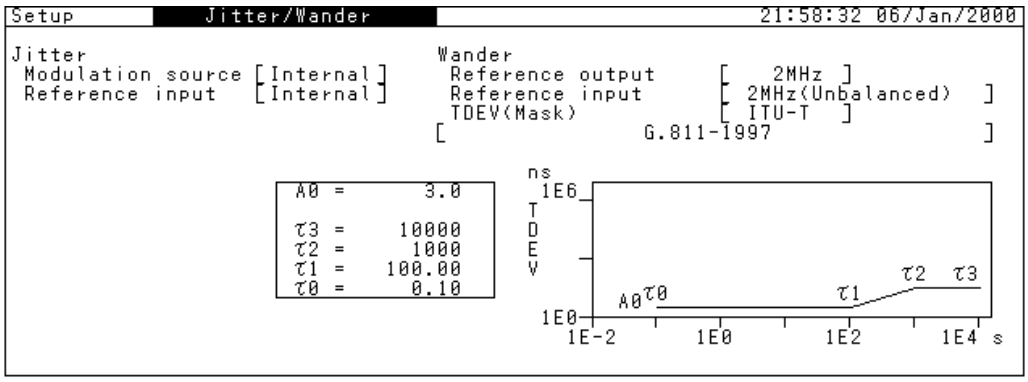
Setting procedure

(1) From the Setup: Interface screen, set the basic parameters. Set "Through Jitter" to "OFF".

External signal source is used as the reference clock, set "Clock" .

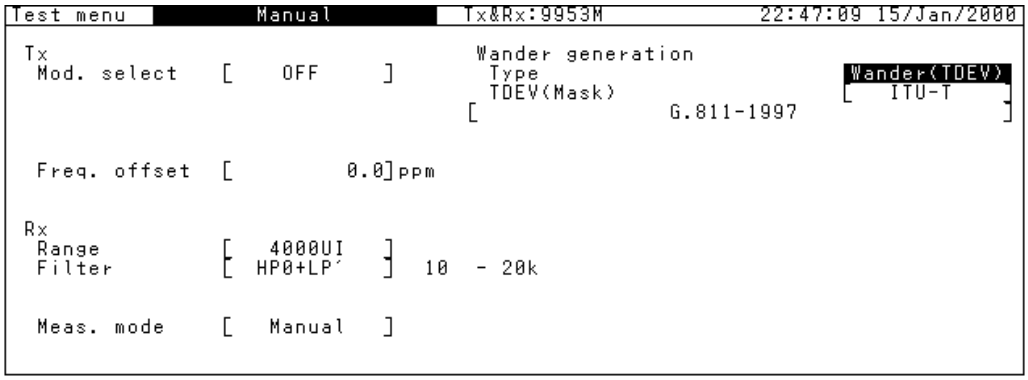



(2) From the Setup: Jitter/Wander screen, set the wander parameters.

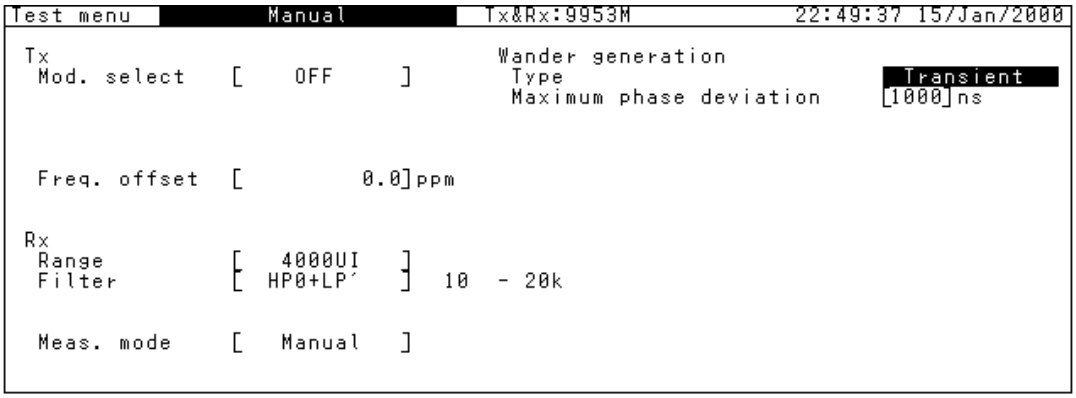



(3) From the Test menu: Manual screen, set the noise to be added to the wander reference clock.

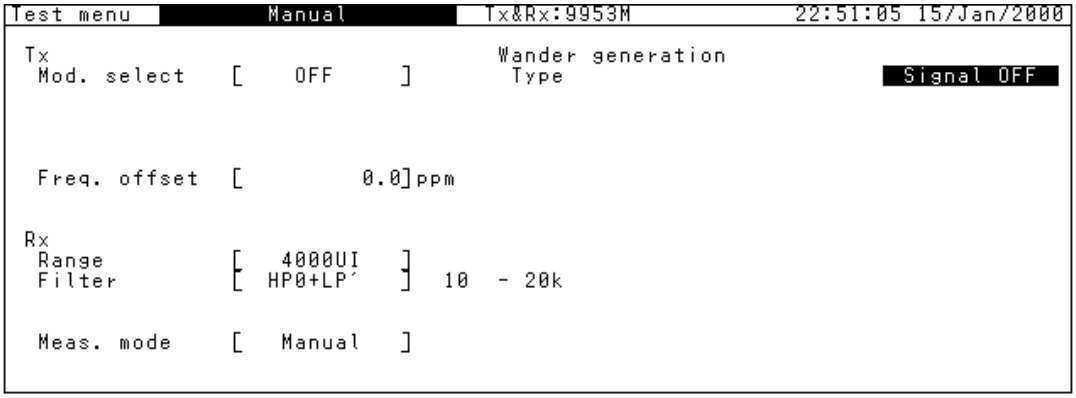
To add noise of Gaussian distribution form to the wander reference clock (TDEV mask), set "Type" to "TDEV" generates from the Wander reference output connector the TDEV output of the frequency set from the Setup: Jitter/Wander screen.



To add transient phase variation to the wander reference clock, set "Type" to "Transient". Pressing Start/Stop generates the transient signal from the Wander reference output connector.




To cut off the wander reference clock, set "Type" to "Signal OFF". Pressing Start/Stop cuts off the output from the Wander reference output connector.

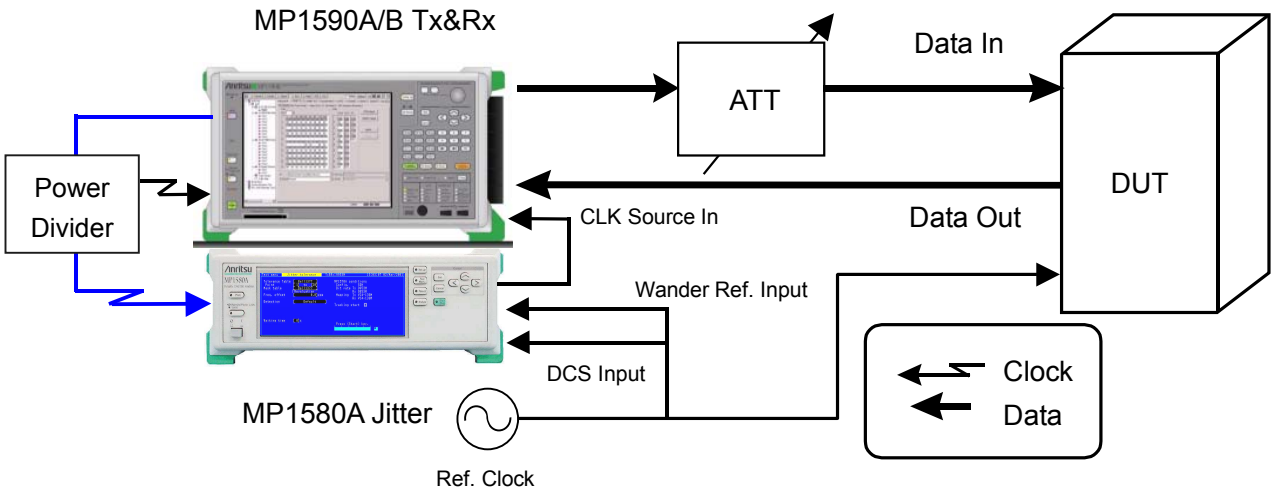


## 7.3.2 TIE manual measurement

This section describes how to measure residual wander for evaluating the DUT's characteristic.

Connecting measurement system

Connect MP1580A and MP1590A/B to the DUT as shown in the figure below.




**Example connection for TIE measurement**

(1) Connect MP1580A and MP1590A/B as shown in the diagram on the next page.

(2) Turn On the power switches for MP1580A and MP1590A/B.

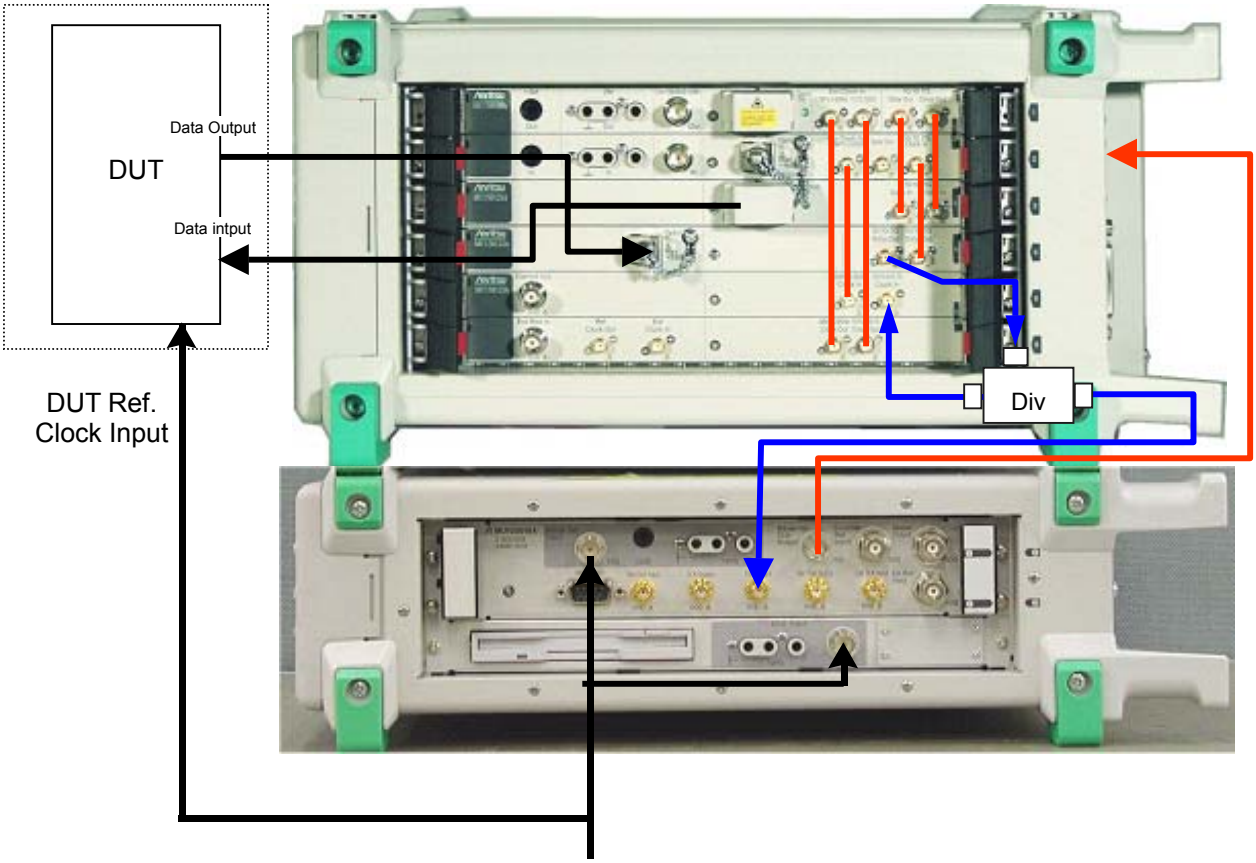
(3) Connect Ref. clock source to Wander Ref. Input, DCS Input of MP1580A, and DUT Ref. clock Input.

(4) Connect Wander Ref. Output of MP1580A to CLK Source In of MP1590A/B.

(5) Divide the Receive clock output of MU150123A/B or MU150100A or MU150101A by power divider, and connect one of power divider output to Clock Input of MU150125A and the other output to Clock Input of MP1580A.

(6) Connect the optical output connector of MU150121A/B or MU150134A to the input connector of device under test (DUT) via the variable optical attenuator using SM optical fiber cable.

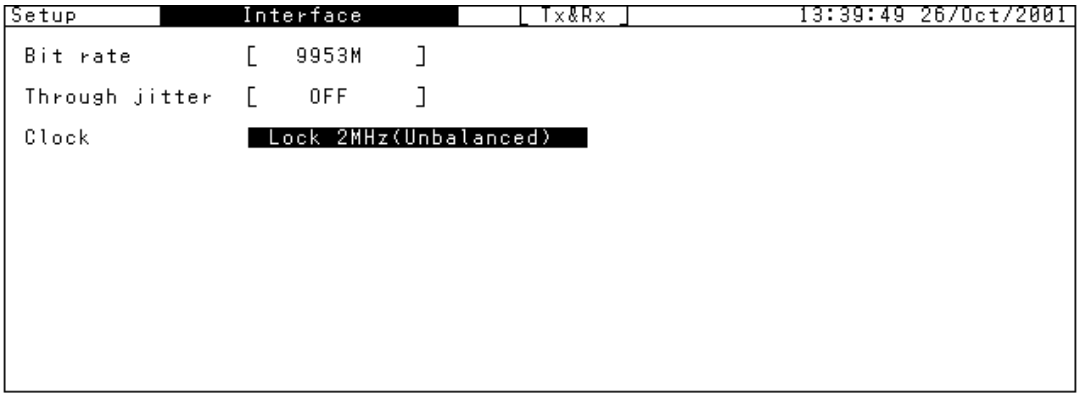
(7) Check that the optical output level from the DUT is within the optical input range for MP1590A/B and, if necessary, connect it to the MU150123A/B Optical Input connector via the optical attenuator using SM optical fiber cable.



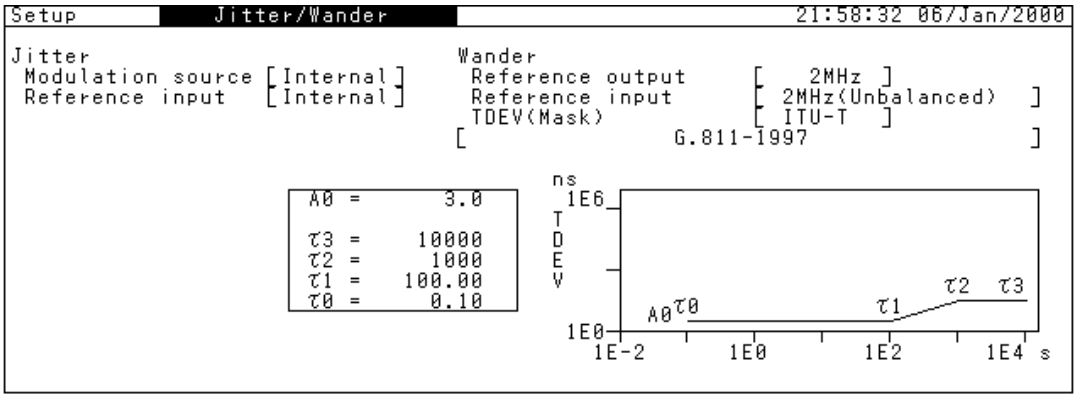

**Unit connection diagram**

Setting procedure

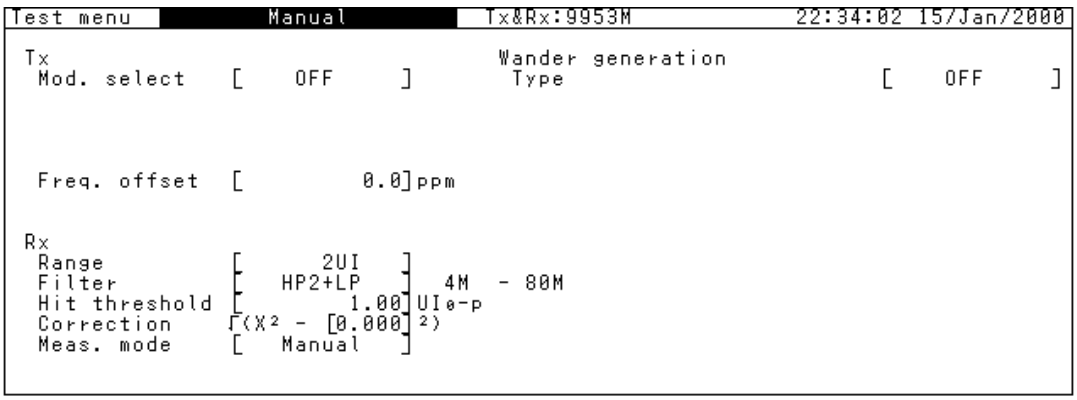
(1) From the Setup: Interface screen, set the basic parameters. Set "Through Jitter" to "OFF" for it is not used for wander measurement.
External clock source is used as the reference clock, set "clock".




(2) From the Setup: Jitter/Wander screen, set the wander parameters.




(3) From the Test menu: Manual screen, set the wander signal parameters.

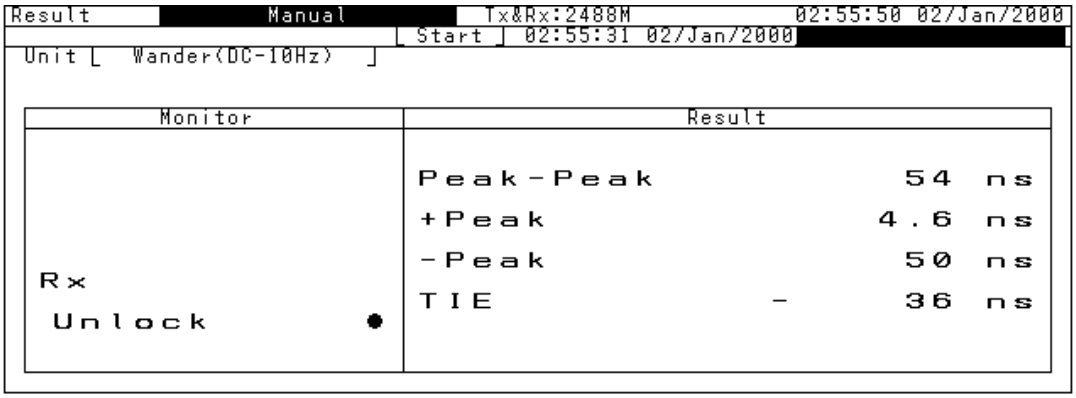


Displaying measurement result

The TIE measurement result can be displayed on the Result: Manual screen. Pressing Start/Stop starts the measurement and displays the measurement result.

***Note:***

When setting Rx of meas. mode at Test menu: manual screen is Repeat, Wander is not measured.



# 7.4 Automatic Wander Measurement for MP1580A+MP1590A/B

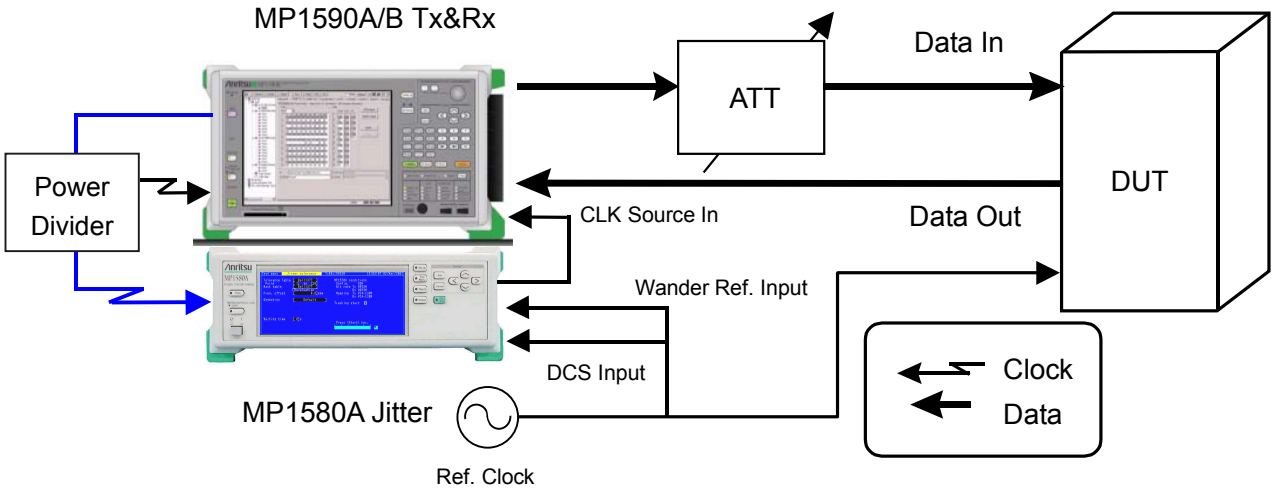
Automatic wander measurement can be done in non-tracking mode. Non-tracking mode allows wander automatic measurement without requiring GPIB connection.

## 7.4.1 TIE Automatic measurement (non-tracking measurement)

This section describes TIE automatic measurement.

### Connecting measurement system

Connect MP1580A and MP1590A/B to the DUT, namely device under test (DUT) as shown in the figure below.




**Example connection for TIE automatic measurement**

(1) Connect MP1580A and MP1590A/B as shown in the diagram on the next page.

(2) Turn On the power switches for MP1580A and MP1590A/B.

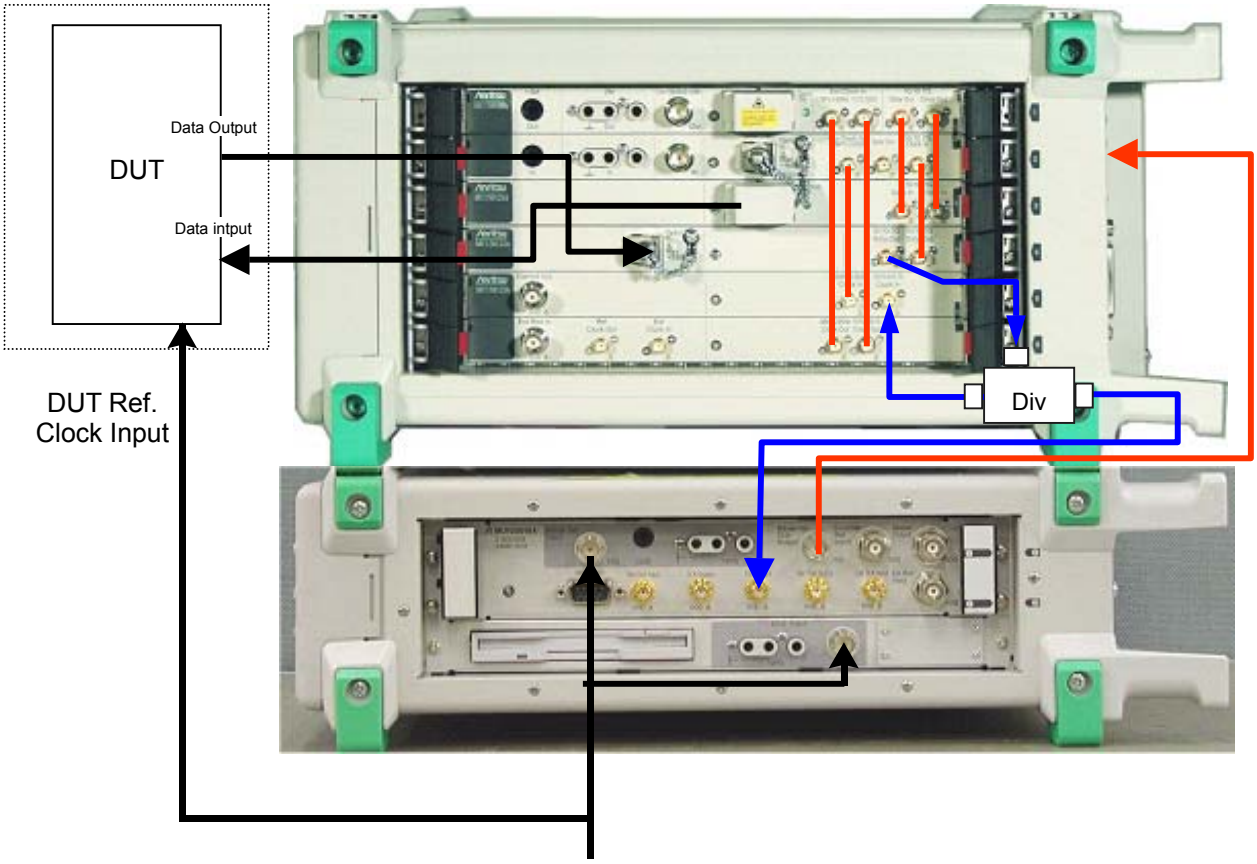
(3) Connect Ref. clock source to Wander Ref. Input, DCS Input of MP1580A, and DUT Ref. Input.

(4) Connect Wander Ref. Output of MP1580A to CLK Source In of MP1590A/B.

(5) Divide the Receive clock output of MU150123A/B or MU150100A or MU150101A by power divider, and connect one of power divider output to Clock Input of MU150125A and the other output to Clock Input of MP1580A.

(6) Connect the optical output connector of MU150121A/B or MU150134A to the input connector of device under test (DUT) via the variable optical attenuator using SM optical fiber cable.

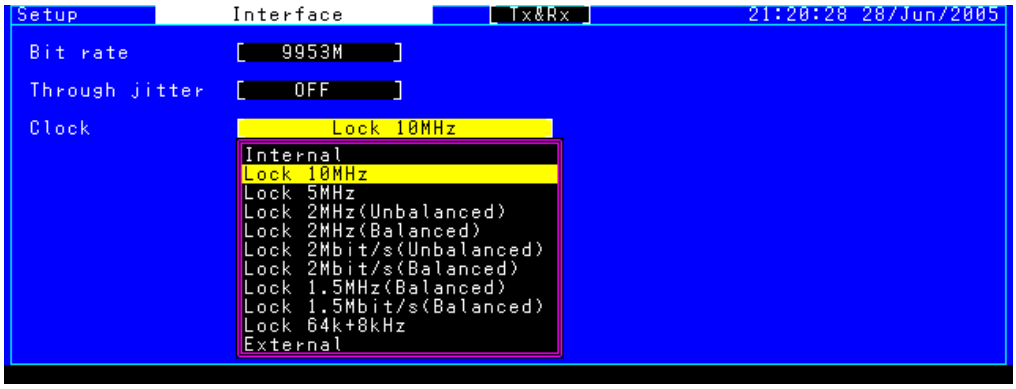
(7) Check that the optical output level from the DUT is within the optical input range for MP1590A/B and, if necessary, connect it to the MU150123A/B Optical Input connector via the optical attenuator using SM optical fiber cable.




**Unit connection diagram**

Setting procedure

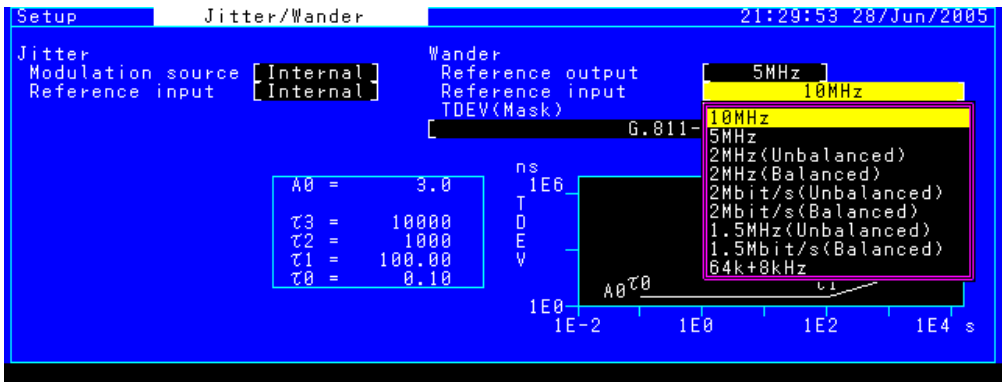
(1) From the Setup: Interface screen, set the basic parameters. The following screen shows an example of using the 9953 M interface for measurement. External clock source is used as the reference clock, set "clock" to "Lock 10 MHz".



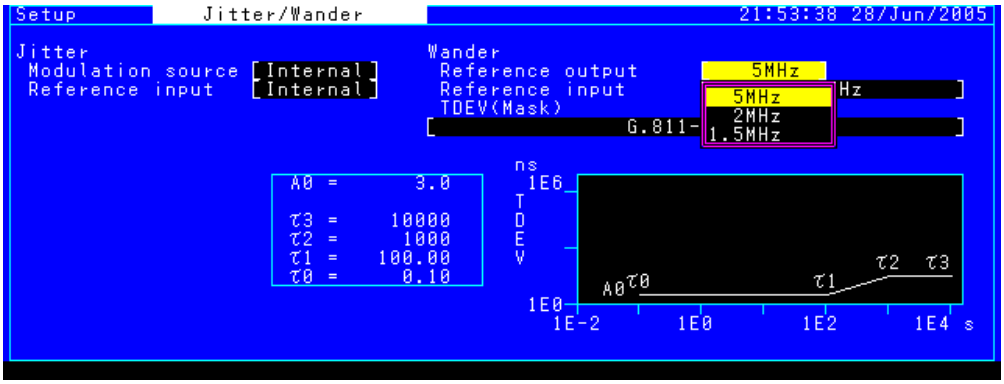

***Note:***

After changing the bit rate, check "Optical 1.31 µm", "Optical 1.55 µm", "Electrical" and "Bandwidth" for the MP1590A/B input/output.

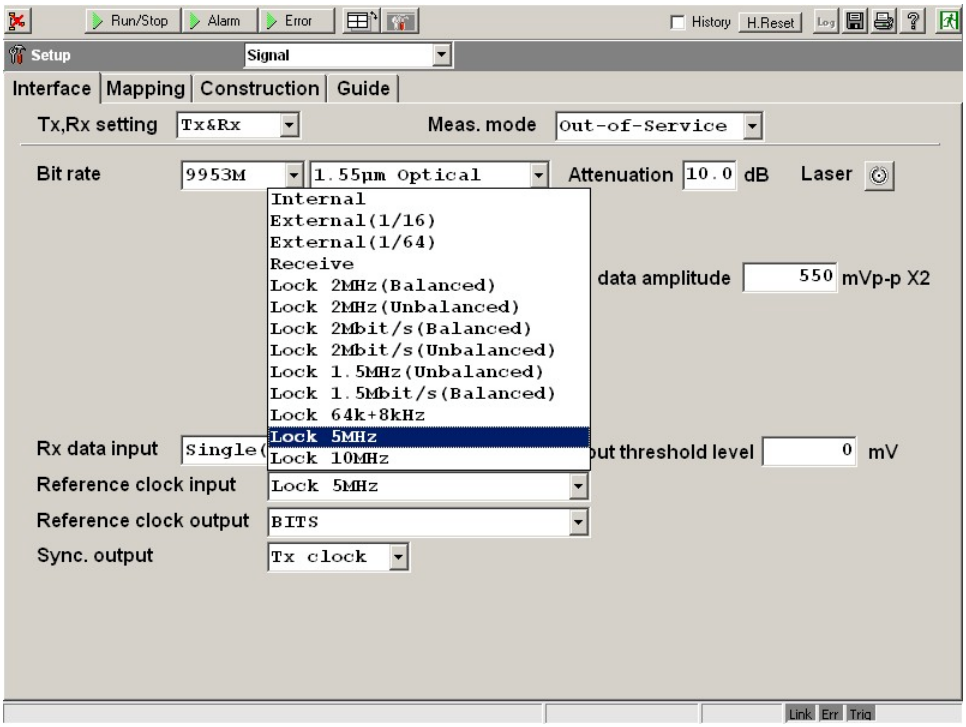
(2) From the Setup: Jitter/Wander screen, set the wander parameters. The following screen shows an example of using the 10 MHz Wander Reference input for measurement. External clock source is used as the reference input, set "Wander Reference input" to "10 MHz".



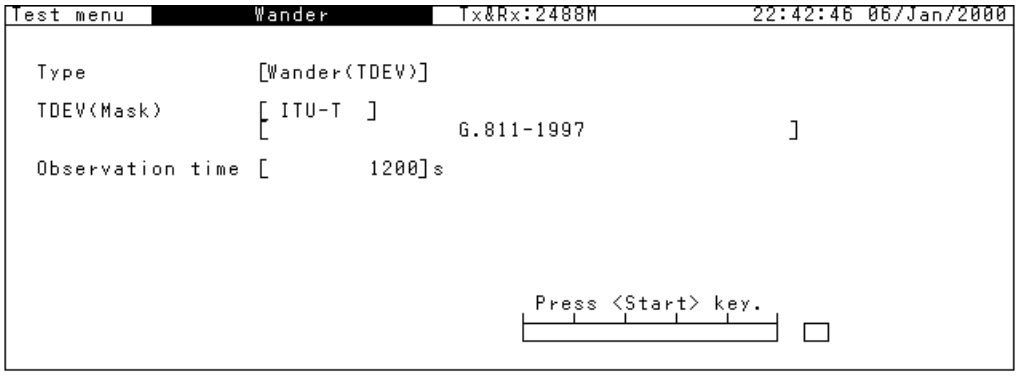
(3) From the Setup: Jitter/Wander screen, set the wander parameters. The following screen shows an example of using the 5 MHz Wander Reference output for measurement. This reference output is used as the reference input of MP1590A/B, set "Wander Reference output" to "5 MHz".




(4) From the Setup of MP1590A/B: Signal screen, set the each parameters. The following screen shows an example of using the 9953 M interface and using the 5 MHz signal as reference clock input. The wander reference output of MP1580A is used as the reference input of MP1590A/B, set "Wander Reference input" to "Lock 5 MHz" and set “Bit rate” to “9953 M”.



(5) From the Test menu: Wander screen, set the wander detection conditions and measurement time.

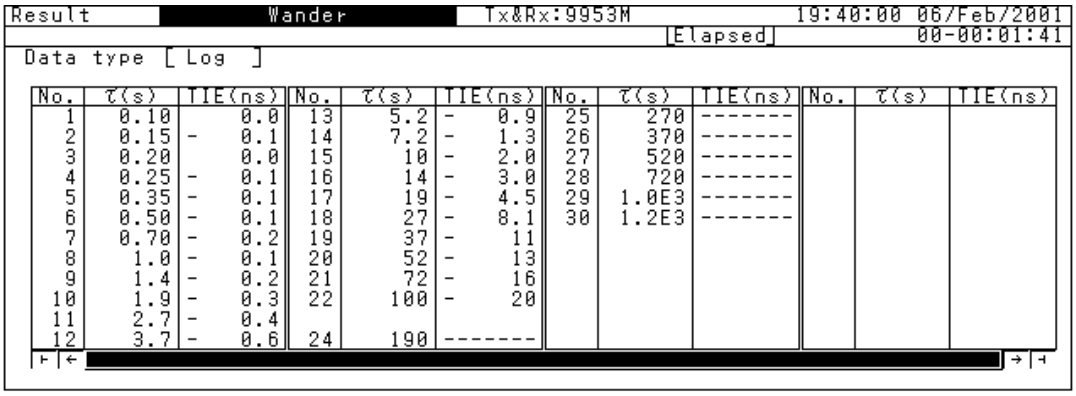



(6) Press Start/Stop to start the measurement. The measurement progress is displayed on a bar graph on the Test menu: Wander screen.

Displaying measurement result

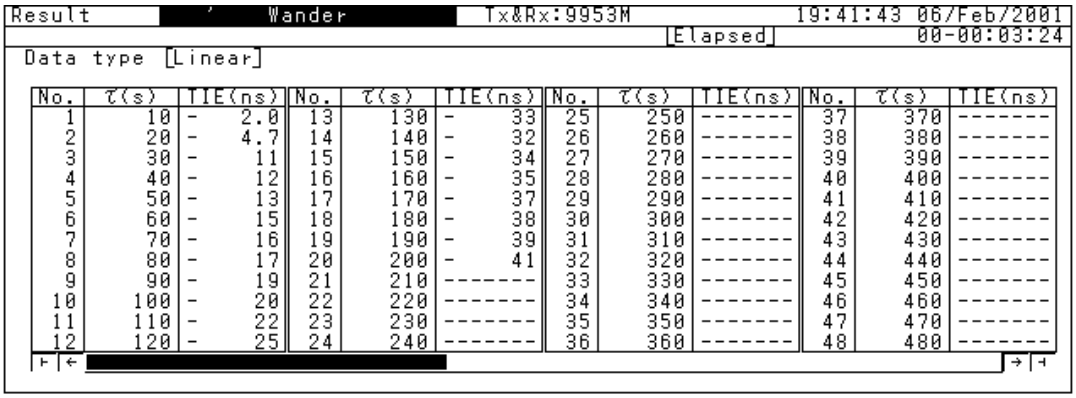
(1) The TIE value is displayed together with the measurement time on the Result: Wander screen. "Data Type" can be set to "Log" or "Linear". The measurement result can be saved as numerical data as is.

When Log display




| No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.10 | 0.0 | 13 | 5.2 | - 0.9 | 25 | 270 | ------- | | | |
| 2 | 0.15 | - 0.1 | 14 | 7.2 | - 1.3 | 26 | 370 | ------- | | | |
| 3 | 0.20 | 0.0 | 15 | 10 | - 2.0 | 27 | 520 | ------- | | | |
| 4 | 0.25 | - 0.1 | 16 | 14 | - 3.0 | 28 | 720 | ------- | | | |
| 5 | 0.35 | - 0.1 | 17 | 19 | - 4.5 | 29 | 1.0E3 | ------- | | | |
| 6 | 0.50 | - 0.1 | 18 | 27 | - 8.1 | 30 | 1.2E3 | ------- | | | |
| 7 | 0.70 | - 0.2 | 19 | 37 | - 11 | | | | | | |
| 8 | 1.0 | - 0.1 | 20 | 52 | - 13 | | | | | | |
| 9 | 1.4 | - 0.2 | 21 | 72 | - 16 | | | | | | |
| 10 | 1.9 | - 0.3 | 22 | 100 | - 20 | | | | | | |
| 11 | 2.7 | - 0.4 | | | | | | | | | |
| 12 | 3.7 | - 0.6 | 24 | 190 | ------- | | | | | | |

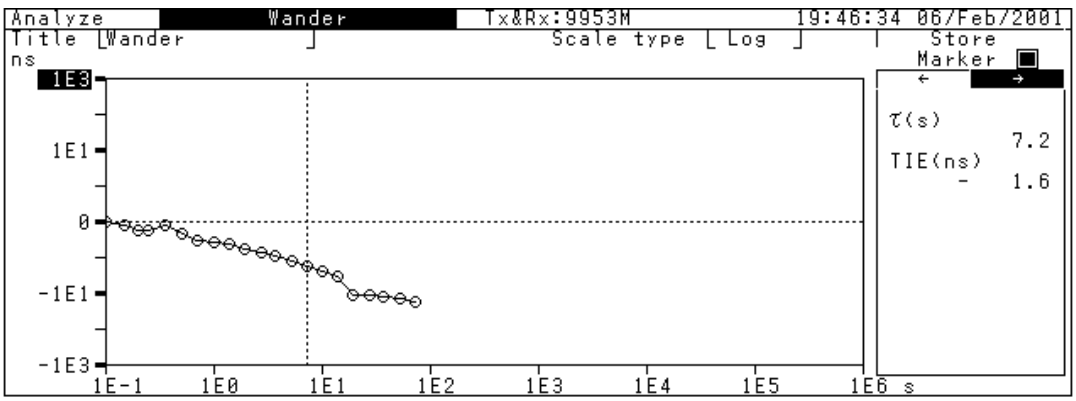
When Linear display



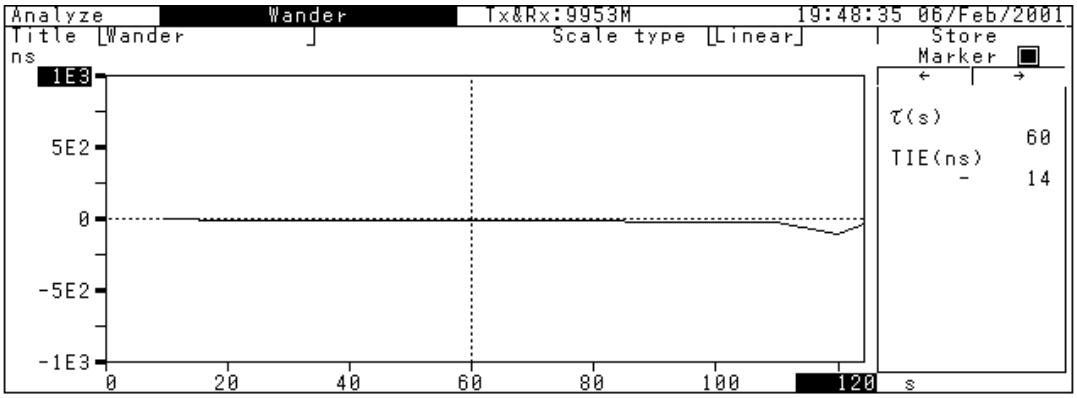

| No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) | No. | τ(s) | TIE(ns) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10 | - 2.0 | 13 | 130 | - 33 | 25 | 250 | ------- | 37 | 370 | ------- |
| 2 | 20 | - 4.7 | 14 | 140 | - 32 | 26 | 260 | ------- | 38 | 380 | ------- |
| 3 | 30 | - 11 | 15 | 150 | - 34 | 27 | 270 | ------- | 39 | 390 | ------- |
| 4 | 40 | - 12 | 16 | 160 | - 35 | 28 | 280 | ------- | 40 | 400 | ------- |
| 5 | 50 | - 13 | 17 | 170 | - 37 | 29 | 290 | ------- | 41 | 410 | ------- |
| 6 | 60 | - 15 | 18 | 180 | - 38 | 30 | 300 | ------- | 42 | 420 | ------- |
| 7 | 70 | - 16 | 19 | 190 | - 39 | 31 | 310 | ------- | 43 | 430 | ------- |
| 8 | 80 | - 17 | 20 | 200 | - 41 | 32 | 320 | ------- | 44 | 440 | ------- |
| 9 | 90 | - 19 | 21 | 210 | ------- | 33 | 330 | ------- | 45 | 450 | ------- |
| 10 | 100 | - 20 | 22 | 220 | ------- | 34 | 340 | ------- | 46 | 460 | ------- |
| 11 | 110 | - 22 | 23 | 230 | ------- | 35 | 350 | ------- | 47 | 470 | ------- |
| 12 | 120 | - 25 | 24 | 240 | ------- | 36 | 360 | ------- | 48 | 480 | ------- |

(2) To display the TIE measurement result on a graph, select the Analyze: Wander screen. With "Marker" set to "ON" and the cursor positioned at [←] and [→], clicking Set displays the result data at the measurement points.

When Log display



When Linear display



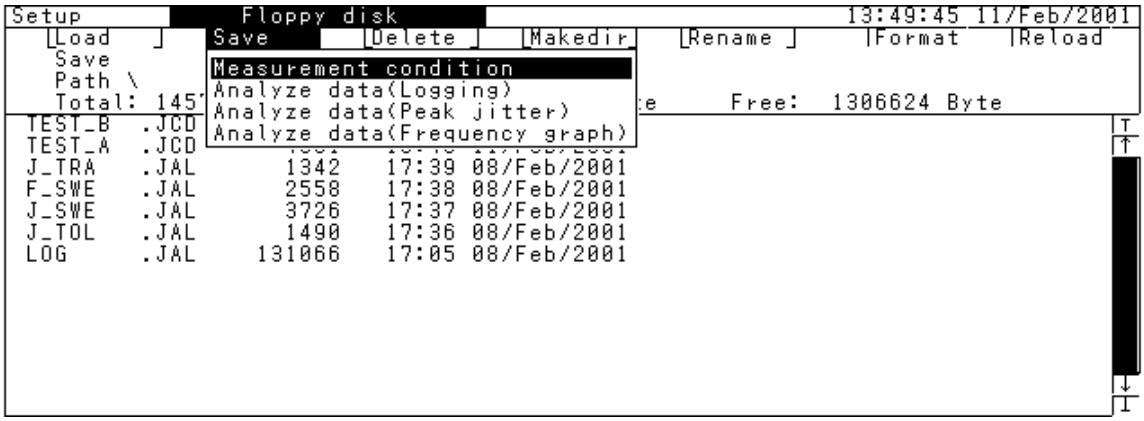
# Section 8 Other Functions

This section describes MP1580A functions not mentioned in the previous sections.

# 8.1 Floppy Disk

This section describes how to save or read measurement conditions or analysis graph data to or from a floppy disk.

## 8.1.1 Saving data to floppy disk




(1) Display the Setup: Floppy disk screen.

(2) Move the cursor to "Save" and click Set.

(3) On the displayed item selection window, move the cursor to the type of data to be saved and click Set.

(4) From the displayed character input window, input the name of the file to be saved.

(5) After inputting the name, move the cursor to "END".

(6) Clicking Set closes the character input window and saves the data.

***Notes:***

- A file name may contain a maximum of 12 characters including the extension, which is automatically added.
- The file is saved in the directory displayed on the screen.
- When the window is closed without setting the file name from the character input window, the data is not saved.

When "Text form" is selected from the character input window, the analysis graph data is saved in the text format. Files saved in the text format cannot be read out by MP1580A. See an example of the analysis graph data file shown below.

Example of analysis graph data text file

[1] "ANRITSU;MP1580A;01.00;A;A_JTLR","J-Tolerance No1","2488M",""↓

[2] "G.825 2M","G.825 2M","-100.0(ppm)","99(s)","1s error;B1;Count;99999"
"Date","Time","$UI_{p-p}$","$UI_{+p}$","$UI_{-p}$","$UI_{rms}$"↓

[3] "SDH","2488M","VC4*16c-Bulk","156M","VC3-45M"

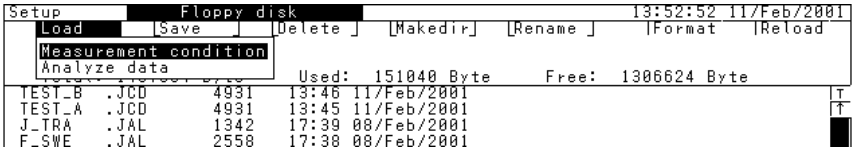
[4] "Frequency(Hz)","Amplitude($UI_{p-p}$)","Amplitude(Mask)($UI_{p-p}$)",
"Result",""↓

[5] 10.0,10.01,"","OK","",""↓
13.0,10.00,"","OK","",""↓
30.0,9.00,"","OK","",""↓
100.0,8.00,"","OK","",""↓
300.0,7.00,"","OK","",""↓
1000.0,6.00,"","OK","",""↓
3000.0,3.00,"","OK","",""↓
10000.0,2.06,"","OK","",""↓
20000.0,2.07,"","OK","",""↓

[6] 10.0,"",1.501,"","",↓
13.0,"",1.501,"","",↓
20000.0,"",0.152,"","",↓
400000.0,"",0.152,"","",↓
•

- All items are delimited with comma (,).
- Symbols [↓] in (1), (2), (3), (4), (5), (6), ... indicate line-feed characters.
  (1) .....Management information
  (2) .....Date, time, jitter tolerance item, error count item, and measurement range item. These items are constant regardless of the settings for MP1580A.
  (3) .....Device information
  (4) .....Frequency, jitter amount, jitter amount (Mask table), and judgment result
  (5) .....Shows analysis data in the same order as in [4] above.
  (6) .....Shows Mask table data in the same order as in [4] above.

## 8.1.2 Reading data from floppy disk




(1) Display the Setup: Floppy disk screen.

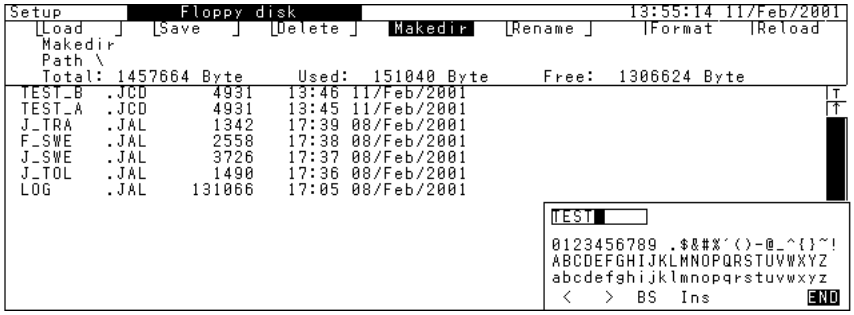
(2) Move the cursor to "Load" and click Set.

(3) On the displayed item selection window, move the cursor to the type of data to be read and click Set.

(4) Files saved on floppy disk are listed. Move the cursor to the file to be read and click Set.

(5) File reading starts.

## 8.1.3 Creating directory



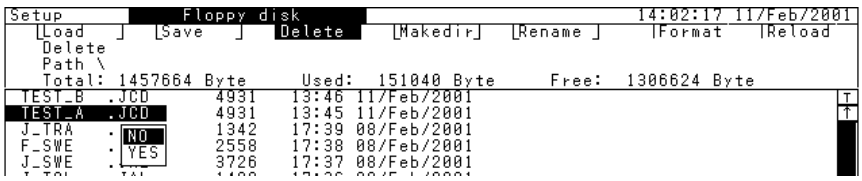

(1) Display the Setup: Floppy disk screen.

(2) Move the cursor to "Makedir" and click Set.

(3) From the displayed character input window, input the directory name.

(4) After inputting the directory name, move the cursor to "END" and click Set. Then the directory is created.

## 8.1.4 Deleting file and directory




(1) Display the Setup: Floppy disk screen.

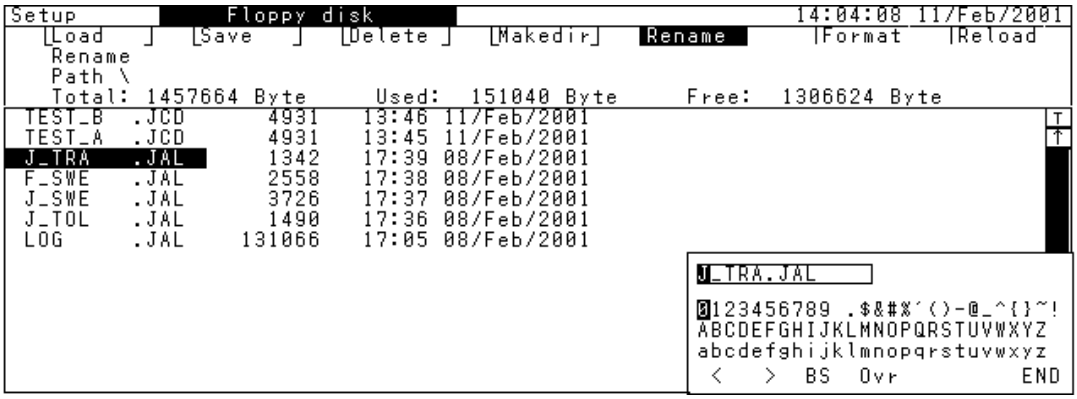
(2) Move the cursor to "Delete" and click Set.

(3) A file list appears. Move the cursor to the file or directory to be deleted and click Set.

(4) A Yes/No confirmation window appears. To delete the file or directory, select "Yes" and click Set.

- When deleting a directory, all files included in the directory must have been deleted in advance.

## 8.1.5 Renaming file




(1) Display the Setup: Floppy disk screen.

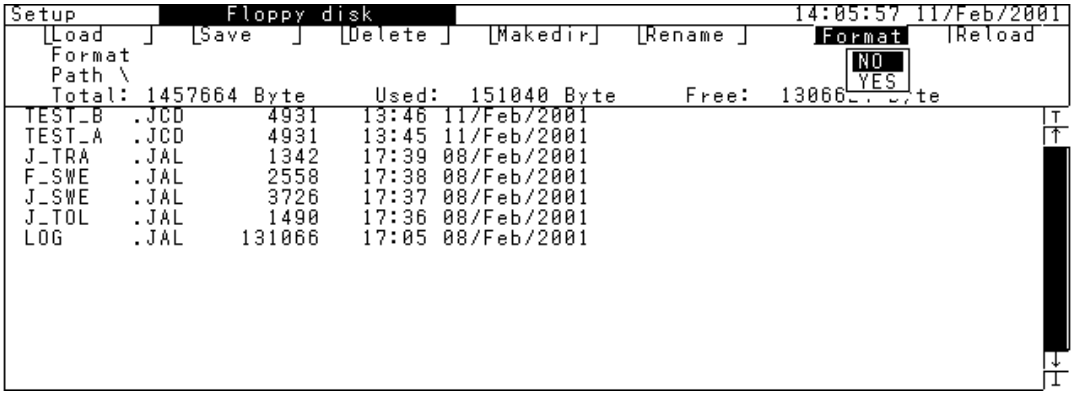
(2) Move the cursor to "Rename" and click Set.

(3) A cursor appears in the file display area. Move the cursor to the file to be renamed and click Set.

(4) A character input window appears. From this window, input a new file name.

(5) After inputting the name, move the cursor to "END" and click Set. Then, the file name is changed.

## 8.1.6 Formatting floppy disk



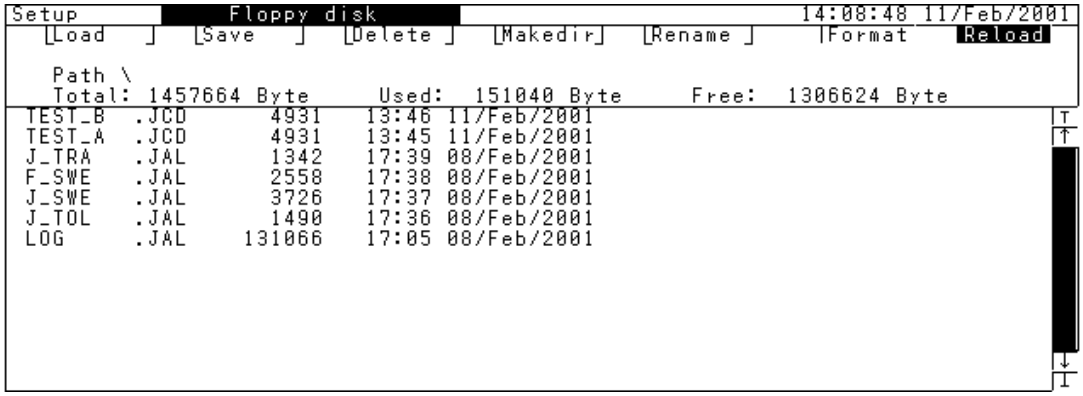

(1) Display the Setup: Floppy disk screen.

(2) Move the cursor to "Format" and click Set.

(3) A Yes/No confirmation window appears. To format the file, select "Yes" and click Set. Floppy disk formatting starts.

- The format type is 1.44 MB.

## 8.1.7 Reloading floppy disk




(1) Display the Setup: Floppy disk screen.

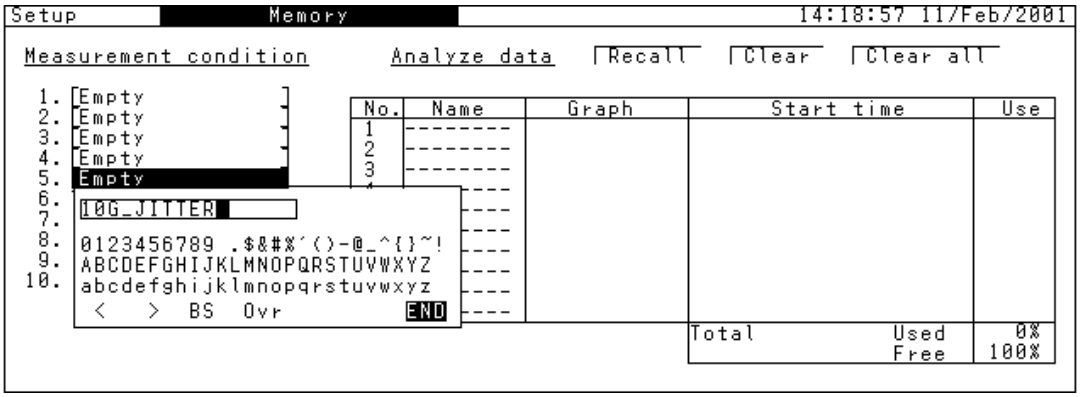
(2) Move the cursor to "Reload" and click Set. Selects the file, then Yes/No confirmation window appears. To reload the floppy disk, select "Yes" and click Set.

# 8.2 Internal Memory

## 8.2.1 Saving measurement conditions

This section describes how to save the measurement conditions.

Example: Saving the measurement conditions under name "10G-JITTER" in memory No. 5.




(1) Display the Setup: Memory screen.

(2) Check that "5." of "Measurement condition" shows "Empty", meaning data empty.

(3) Move the cursor to "5." of "Measurement condition" and click Set.

(4) An item selection window opens. Check that this window shows "Store" and click Set.

(5) A character input window opens. From this window, input character string "10G-JITTER".

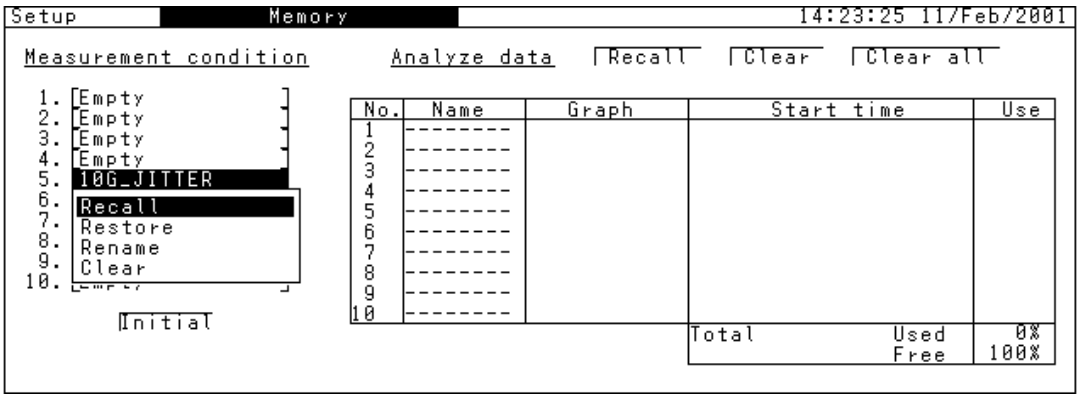
(6) After inputting the character string, move the cursor to "END".

(7) Clicking Set closes the character input window and saves the measurement conditions under name "10G-JITTER " in memory No. 5.

- If the character input window is closed without setting any character string, "Memory*" (*: 1 to 10) is assigned as the initial name.

## 8.2.2 Reading measurement conditions

This section describes how to read the saved measurement conditions.




(1) Display the Setup: Memory screen.

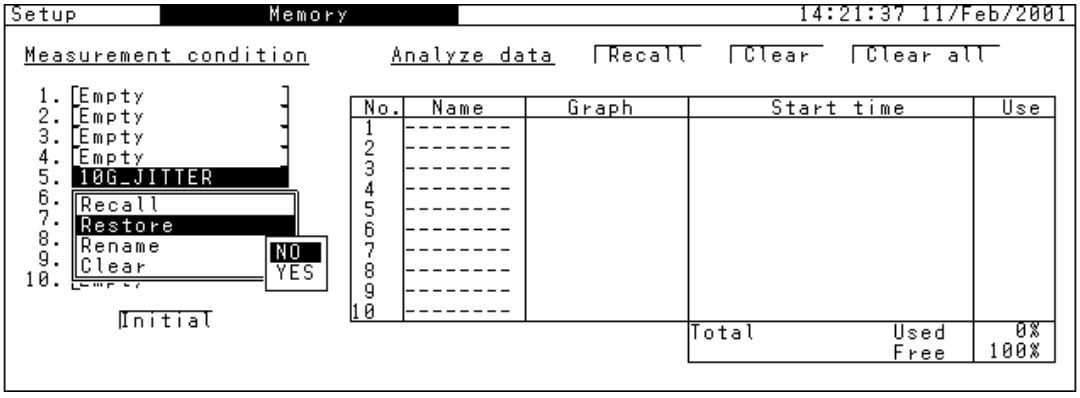
(2) Move the cursor to the memory No. of "Measurement condition" to be read and click Set.

(3) An item selection window opens. On this window, move the cursor to "Recall".

(4) Clicking Set reads the measurement conditions.

## 8.2.3 Overwriting measurement conditions

This section describes how to save the measurement conditions by overwriting.




(1) Display the Setup: Memory screen.

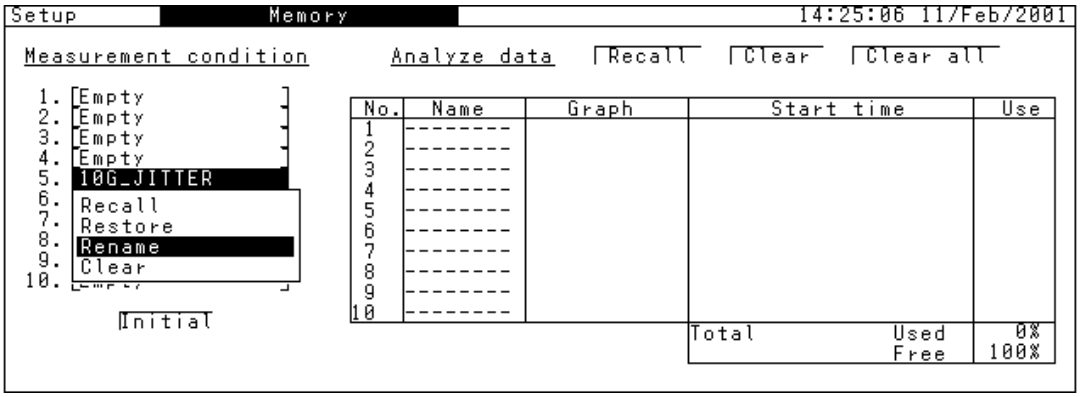
(2) Move the cursor to the memory No. of "Measurement condition" to save data by overwriting and click Set.

(3) An item selection window opens. Move the cursor to "Restore" and click Set.

(4) A Yes/No confirmation window appears. From this window, select "Yes" and click Set. Then, the measurement conditions are saved by overwriting.

## 8.2.4 Renaming measurement conditions file

This section describes how to rename the saved measurement conditions file.




(1) Display the Setup: Memory screen.

(2) Move the cursor to the memory No. of "Measurement condition" to be renamed and click Set.

(3) An item selection window opens. Move the cursor to "Rename" and click Set.

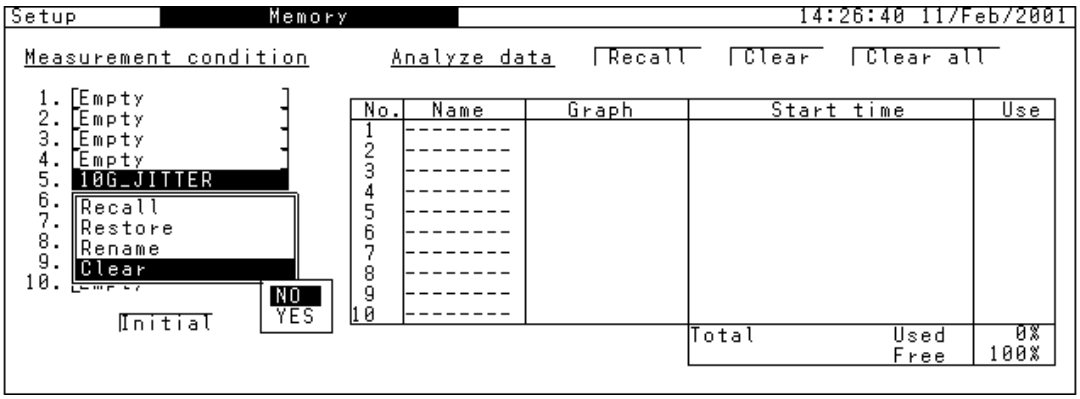
(4) A character input window appears. From this window, input a new file name.

(5) After inputting the name, move the cursor to "END".

(6) Clicking Set closes the character input window and saves the measurement conditions file under the new name.

## 8.2.5 Deleting measurement conditions

This section describes how to delete the saved measurement conditions file.




(1) Display the Setup: Memory screen.

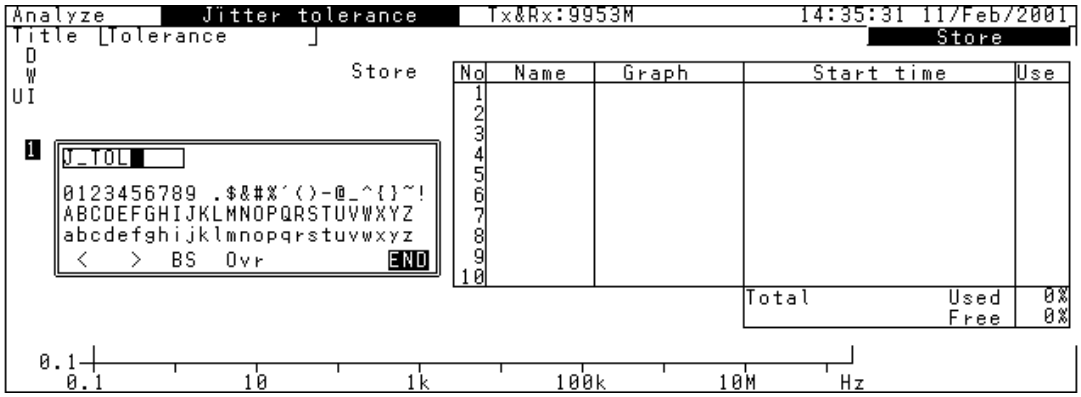
(2) Move the cursor to the memory No. of "Measurement condition" to be deleted and click Set.

(3) An item selection window opens. Move the cursor to "Clear" and click Set.

(4) A Yes/No confirmation window opens. From this screen, select "Yes" and click Set. The measurement conditions file is deleted.

## 8.2.6 Saving analysis graph data

This section describes how to save the analysis graph data, using an example of saving the displayed analysis graph data under name "J-TOLERANCE".




(1) Display the Analyze: Jitter tolerance screen.

(2) Move the cursor to "Store" and click Set.

(3) A memory save window appears. From this window, input character string" J-TOLERANCE".

(4) After inputting the file name, move the cursor to "END".

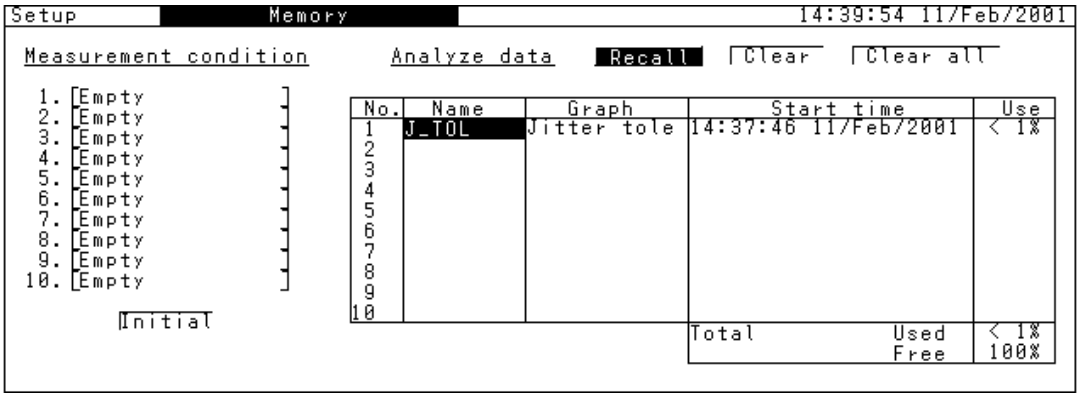
(5) Clicking Set causes the character input window to be closed and the analysis graph data to be saved.

***Notes:***

- A maximum of 10 files can be saved. When 10 files have been saved, no additional files can be saved.
- If the memory save window is closed without setting any file name, "Memory" is assigned as the initial file name.
- If there remains insufficient memory when saving a file, the file cannot be saved.

## 8.2.7 Reading analysis graph data

This section describes how to read analysis data from memory and display it on the screen.




(1) Display the Setup: Memory screen.

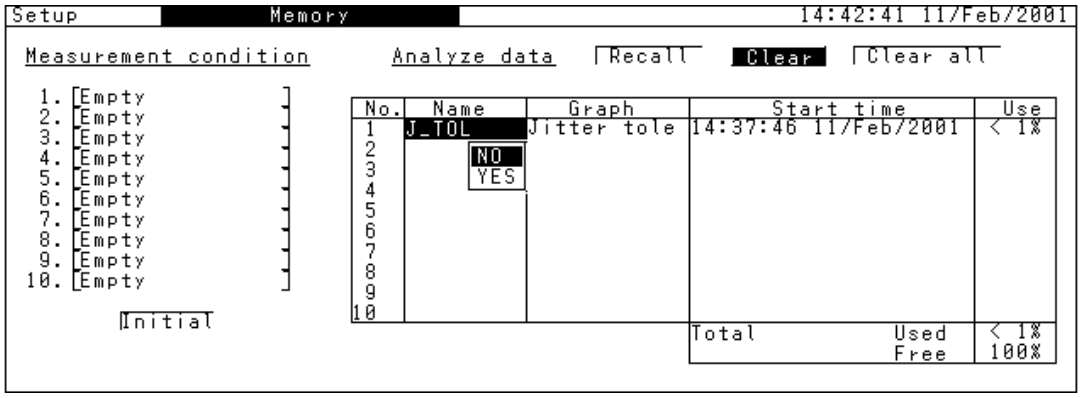
(2) Move the cursor to "Recall" and click Set.

(3) A memory save window appears. On this window, move the cursor to the memory No. to be read and click Set.

(4) When the Analyze screen is invoked, it shows the read analysis data.

## 8.2.8 Deleting analysis graph data

This section describes how to delete the saved analysis data.




(1) Display the Setup: Memory screen.

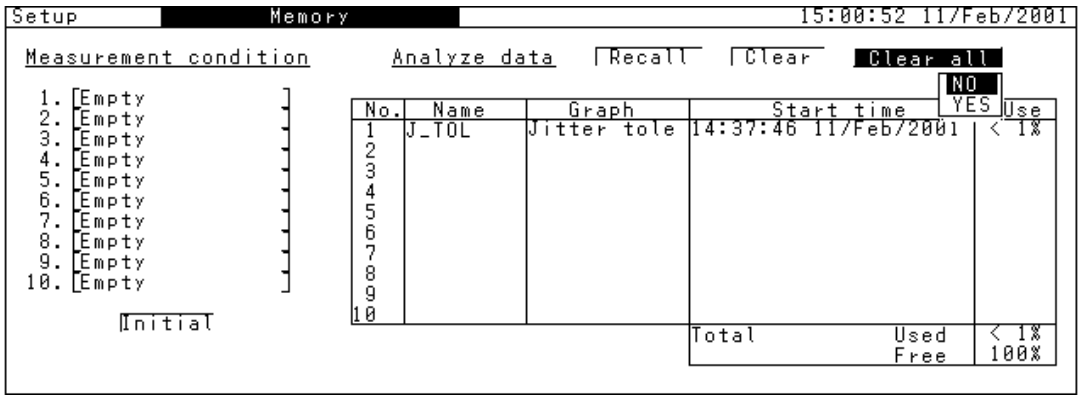
(2) Move the cursor to "Clear" and click Set.

(3) A memory list appears. Move the cursor to the memory No. to be deleted and click Set.

(4) A Yes/No selection window appears. From this window, select "Yes" and click Set. Then, the data is deleted.

## 8.2.9 Deleting all analysis graph data

This section describes how to delete all of the saved analysis data.




(1) Display the Setup: Memory screen.

(2) Move the cursor to "Clear All" and click Set.

(3) A Yes/No selection window appears. From this window, select "Yes" and click Set. Then, all data is deleted.

# 8.3 Outputting to Printer

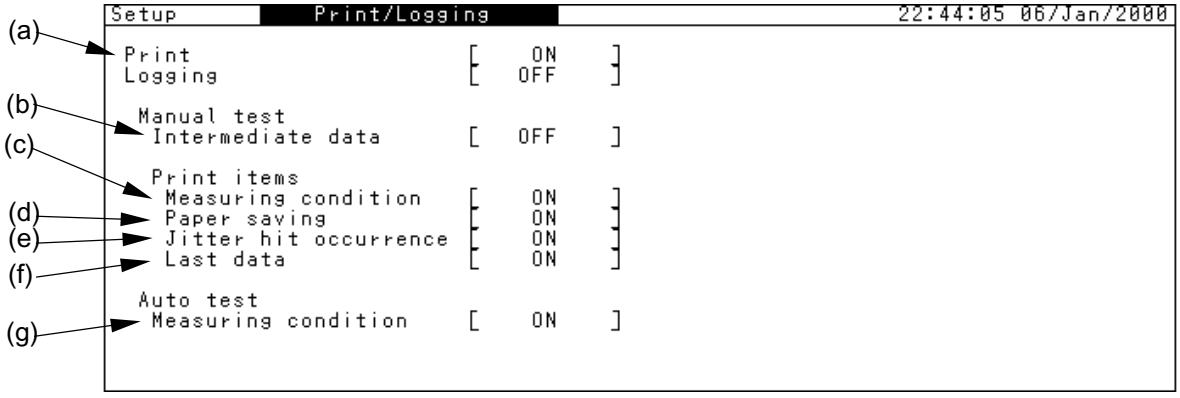
This section describes how to automatically print the measurement result. The following steps should be carried out before starting the measurement:

(1) With the MP1580A power turned ON, connect the printer to the printer port.

(2) Display the Setup: Print/Logging screen.

(3) Move the cursor to "Print", click Set, and check that "Print" is set to "ON". Print details can be selected or set by setting (b) to (g) to ON or OFF.

(4) After the measurement is over, the measurement result is printed out automatically.




(a) Print ..... Sets automatic printing to ON/OFF.

(b) Intermediate data..... Sets conditions for intermediate data printing at the specified intervals during measurement.

OFF ..... Prints no intermediate data.

Individual..... Prints measurement value within the printing time.

Accumulate ..... Prints measurement value accumulated from the measurement start.

- When setting to "Individual" or "Accumulate", also set the print-out period.

(c) Measurement condition.....Set the conditions for printing measurement conditions at the start of manual measurement.

(d) Paper saving ..... Sets paper saving function to ON/OFF.

- To save print paper, printing can be stopped when an error occurs continuously for 10 s. When continuous error occurrence stops, printing restarts.

(e) Jitter Hit occurrence .....Sets printing to ON/OFF for hit occurrence.

(f) Last data .....Set printing to ON/OFF for measurement result data when the measurement is completed.

(g) Measurement condition .....Sets conditions for printing measurement conditions at the start of automatic measurement.

***Note:***

Starting screen copy during printing may prevent normal printing.

# 8.4 Remote Control

MP1580A Jitter Analyzer allows automatic measurement by connecting an external controller. The connection interface can be selected from among GPIB, RS-232C, and Ethernet. For details of the remote control, refer to the separate "MP1580A Jitter Analyzer Operation Manual Vol. 2 Remote Control".

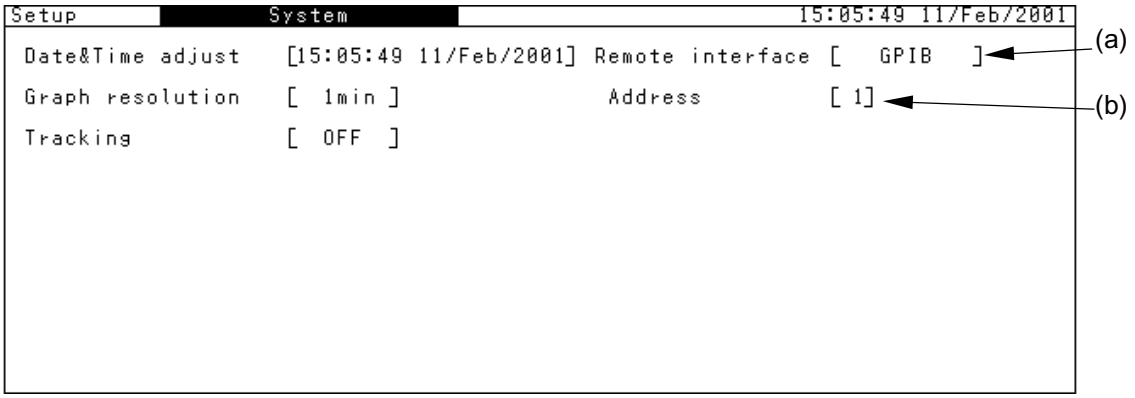
## 8.4.1 Setting GPIB interface

When MP1580A is equipped with a GPIB option, possible to set GPIB functions in the following steps:

(1) Display the Setup: System screen.

(2) Move the cursor to "Remote Interface" and click Set to set GPIB.

(3) Move the cursor to "Address" and click Set. From the invoked numerical value input window, input the interface address.




(a) Remote Interface

Selects the Remote control interface.

GPIB ..... Select when using the GPIB interface for remote control.

(b) Address ..... Select the MP1580A's GPIB address.

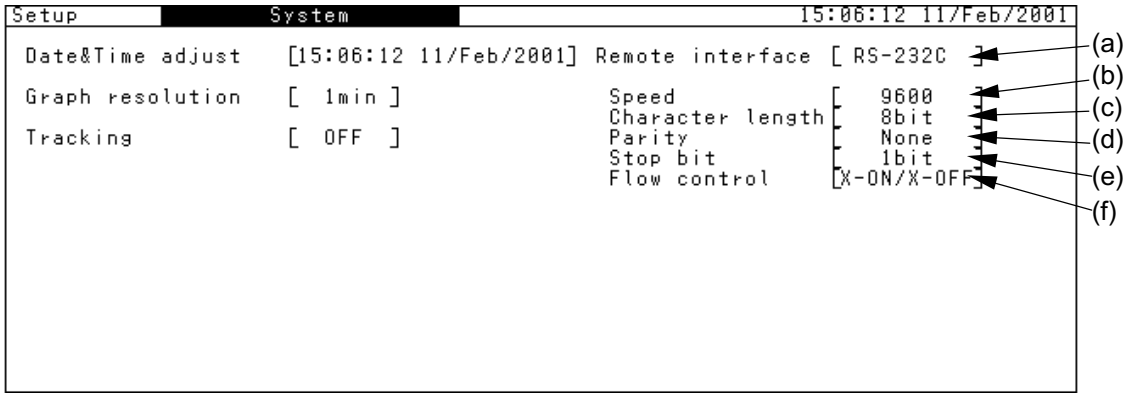
## 8.4.2 Setting RS-232C interface

When MP1580A is equipped with a RS-232C option, possible to set RS-232C functions in the following steps:

(1) Display the Setup: System screen.

(2) Move the cursor to "Remote Interface" and click [Set] to set RS-232C.

(3) Using arrow keys ↑, ↓, ← and/or → and [Set], set items (a) to (f).




(a) Remote Interface ..... Selects the Remote control interface.

RS-232C..... Select when using the RS-232C interface for remote control.

(b) Speed..... Set the baud rate.

(c) Character length ..... Set the bit length.

(d) Parity ..... Set parity.

(e) Stop bit ..... Set the stop bit length.

(f) Flow control ..... Set flow control.

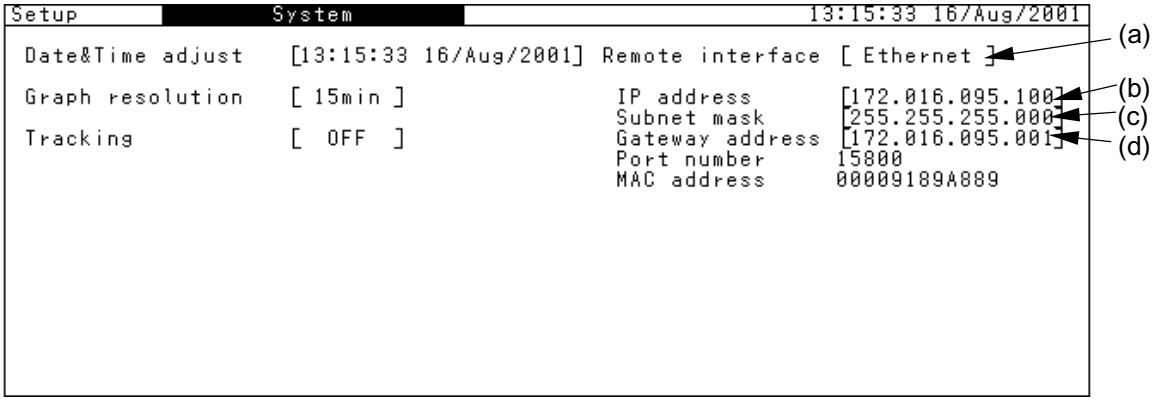
## 8.4.3 Setting Ethernet interface

When MP1580A is equipped with an Ethernet option, possible to set Ethernet functions in the following steps:

(1) Display the Setup: System screen.

(2) Move the cursor to "Remote Interface" and click Set to set Ethernet.

(3) Using arrow keys ∧, ∨, < and/or > and Set, set items (a) to (f).




(a) Remote Interface.....Selects the Remote control interface.

Ethernet.....Select when using the Ethernet interface for remote control.

(b) IP address.....Set the MP1580A's IP address

(c) Subnet mask.....Set the subnet mask address

(d) Gateway address .....Set the gateway address

# 8.5 VGA Output

MP1580A allows outputting the screen being displayed to an external monitor from the VGA port. The procedures are as follows:

(1) With the MP1580A power turned OFF, connect the D-Sub 15-pin monitor cable to the MP1580A.

(2) Turn the MP1580A power ON.

(3) Check the screen displayed on the external monitor.

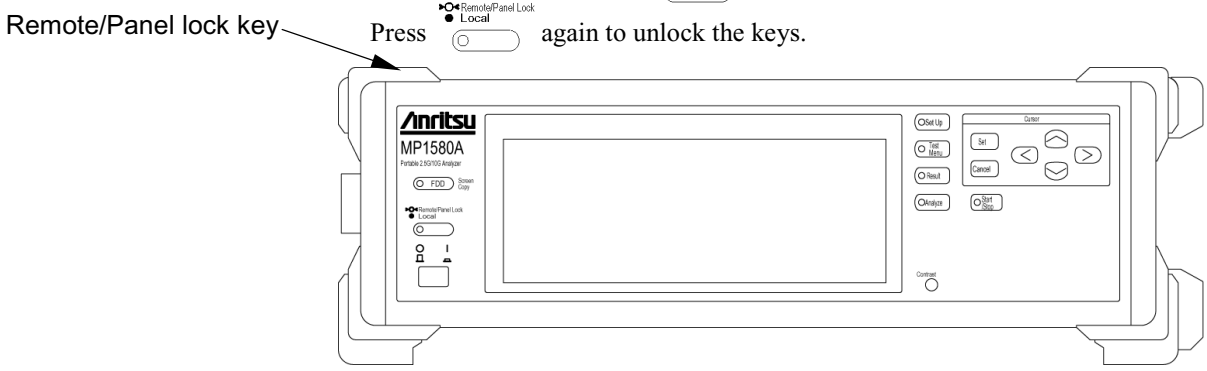
# 8.6 Disabling Key Operations

MP1580A allows locking the panel keys by one-touch operation. The procedures are as follows:

(1) Press Remote/Panel Lock Local .

(2) Check that the Remote/Panel Lock Local lamp lights.

(3) All panel keys other than Remote/Panel Lock Local are disabled.
Press Remote/Panel Lock Local again to unlock the keys.



# 8.7 Setting Clock

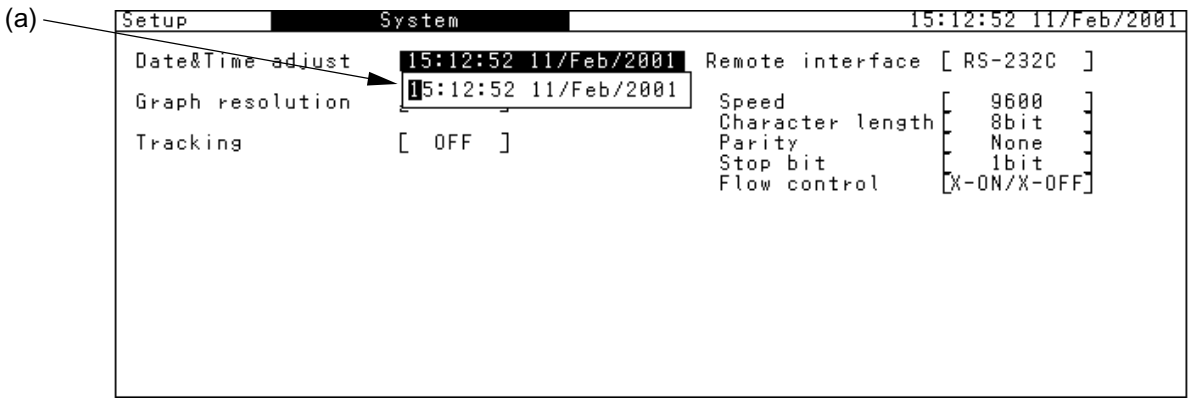
The procedure to set the MP1580A Clock is as follows:

(1) Display the Setup: System screen.

(2) Move the cursor to "Date & Time adjust" and click Set.

(3) Use the up/down/left/right panel keys to set the time, day, month, and year values.

(4) Click Set to set the time and date.




(a) Set the time, day, month, and year in "Date & Time Adjust".

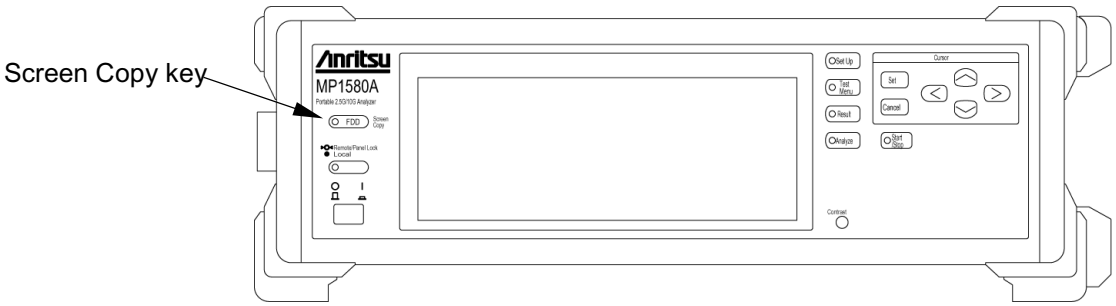
# 8.8 Copying Screen

MP1580A allows saving the displayed screen to a floppy disk in the bitmap format.

The procedures are as follows:

(1) Insert a floppy disk to floppy disk drive (FDD). For disk format, etc., see "Section 8.1 Floppy disk".

(2) Display the screen to be saved, and press FDD Screen Copy to save the screen data to the floppy disk.




- While saving the data, the FDD Screen Copy lamp lights.

(3) When data saving has been completed, the FDD Screen Copy lamp goes OFF. The saved screen's filename becomes "DMPxxxxxx", where "xxxxxx" is automatically assigned number.

***Note:***

Starting screen copy during printing may prevent the normal printing.

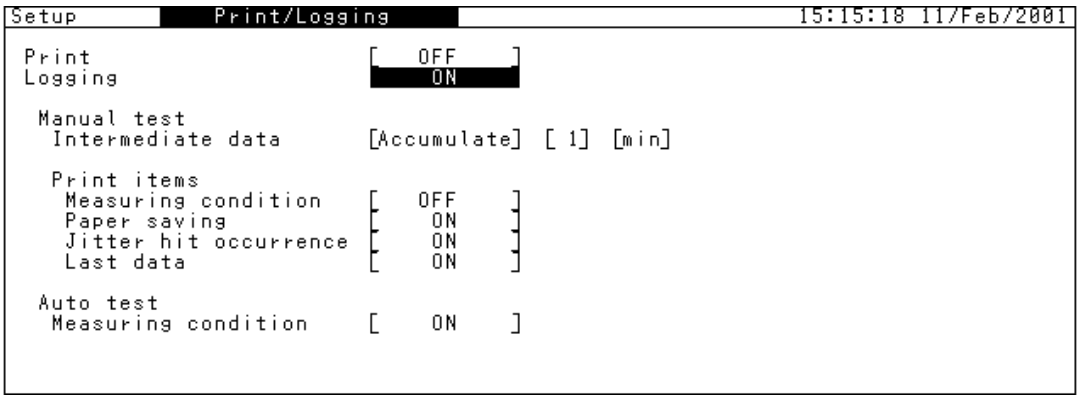
# 8.9 Logging

This section gives the procedures for displaying the automatically print measurement data. These procedures must be carried out before starting the measurement.

Example: Displaying logging data of jitter tolerance measurement.

(1) Display the Setup: Print/Logging screen.

(2) Set "Logging" to "ON".



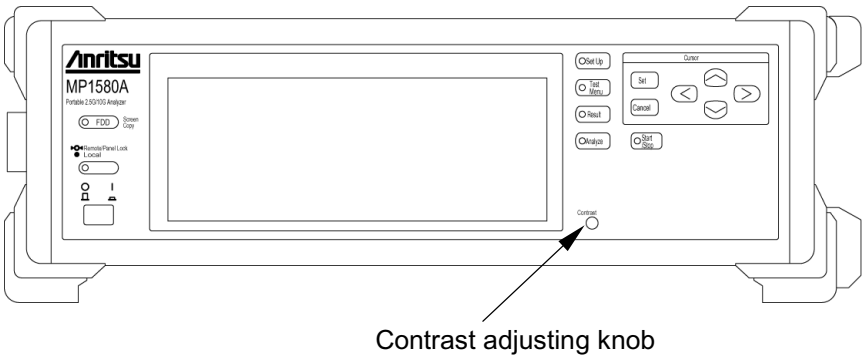

(3) Perform a jitter tolerance measurement.

- For jitter tolerance measurement, see "Section 6.2.2 Measuring jitter tolerance".

(4) Display the Analyze: Logging screen to display the automatically printed jitter tolerance measurement contents.

# 8.10 Contrast

When adjusting the MP1580A screen contrast, use Contrast ◯ knob.



# Section 9 Performance Test

This section describes the procedures for testing the performance of MP1580A.
If the tests described in this section show that any of the rated values are not satisfied, there may exist any troubles. In such a case, please contact Anritsu or one of our agencies.

# 9.1 Clock Output Level

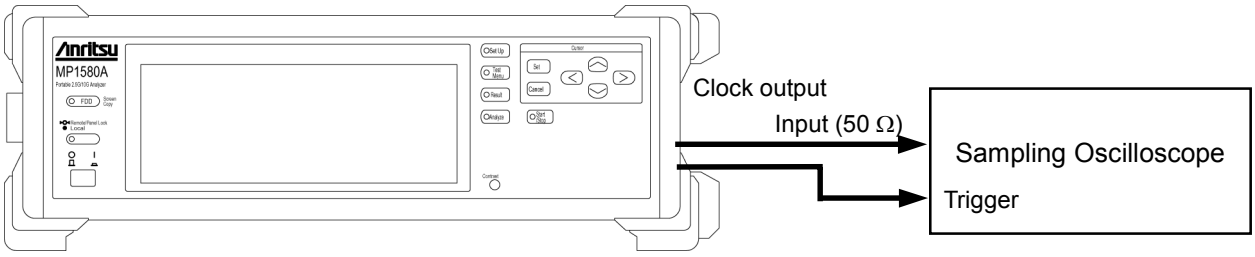
## 9.1.1 Connection

(1) Turn the MP1580A power switch Off.

(2) Mount the 2.5G/10G Jitter unit.

(3) Connect Clock Output and Ref. Clock output as shown in the figure below.

(4) When the connection completes, turn the MP1580A power switch On.




**Clock output performance test**

## 9.1.2 Test procedure

The procedures for the clock output performance test are as follows:

(1) Display the Setup: Interface screen.

(2) Set "Bit rate" to "9953M", "Through Jitter" to "Off," and "Clock" to "Internal".

(3) Display the Test menu: Manual screen.

(4) Set "Tx Jitter" to "Off".

(5) Check the specification as shown in the table 1.

(6) From the Setup: Interface screen, change "Bit rate" setting and repeat steps (1) to (5) above.

**Table 1 Bit Rates and Nominal Frequencies**

| | Bit rate | Nominal frequency | Min. ($V_{(p-p)}$) | Max. ($V_{(p-p)}$) |
|---|---|---|---|---|
| Standard | 2488 M | 2488.32 MHz | 0.55 | 1.15 |
| | 9953 M | 9953.28 MHz | 0.55 | 1.15 |

# 9.2 Jitter Measurement Sensitivity Test

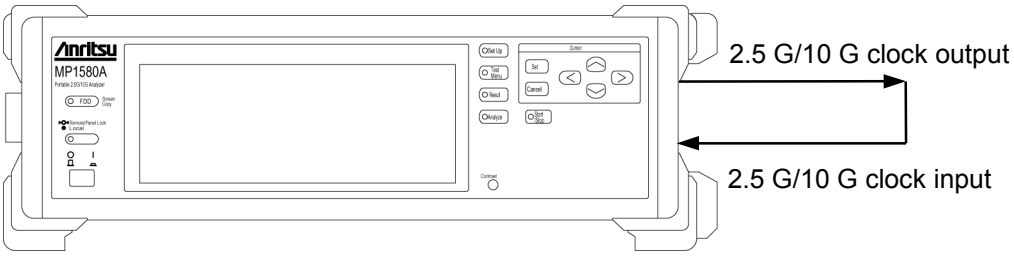
## 9.2.1 Connection

(1) Turn the MP1580A power switch Off.

(2) Mount the 2.5G/10G Jitter unit.

(3) Connect the Clock Output connector and the Clock Input connector using a cable by self-loopback, as shown in the figure below.

(4) When the connection completes, turn the MP1580A power switch On.




**Jitter measurement sensitivity performance test**

## 9.2.2 Test procedure

The procedures for the jitter measurement sensitivity performance test are as follows:

(1) Display the Setup: Interface screen.

(2) Set “Bit rate” as shown on Table 2, “Though jitter” to “Off”, and “Clock” to “Internal”.

(3) Next, display the Test menu: Manual screen.

(4) Setup TX and RX as shown on Table 2.

(5) Display the Result: Manual screen.

(6) Check the RX jitter peak-to-peak value satisfies the specific values shown on Table 2.

(7) Next, display the Test menu: Manual screen.

(8) Check the RX jitter RMS value satisfies the specific values shown on Table 3.

(9) From the Setup: Interface screen, change “Bit rate” to repeat from (3) to (9).

**Table 2 Allowable range for jitter measurement accuracy performance test ($UI_{p-p}$)**

| Interface | TX | | | RX | | Specification | |
|---|---|---|---|---|---|---|---|
| Bit rate | Range | Amplitude | Frequency | Range | Filter | Min. ($UI_{p-p}$) | Max. ($UI_{p-p}$) |
| 2488 | 0.5UI | 0.38 | 300k | 2UI | HP1+LP | 0.253 | 0.506 |
| | 20UI | 1.75 | 100k | 2UI | HP1+LP | 1.525 | 1.97 |
| | 20UI | 12.25 | 100k | 20UI | HP1+LP | 10.827 | 13.642 |
| | 1000UI | 500 | 30 | 1000UI | HP0+LP' | 379.291 | 569.391 |
| 9953 | 0.5UI | 0.38 | 300k | 2UI | HP1'+LP | 0.253 | 0.506 |
| | 80UI | 1.75 | 100k | 2UI | HP1'+LP | 1.518 | 1.963 |
| | 80UI | 12.25 | 100k | 20UI | HP1'+LP | 10.781 | 13.596 |
| | 4000UI | 2000 | 30 | 4000UI | HP0+LP' | 1517.316 | 2277.416 |

**Table 3 Allowable range for jitter measurement accuracy performance test ($UI_{rms}$)**

| Interface | TX | | | RX | | Specification | |
|---|---|---|---|---|---|---|---|
| Bit Rate | Range | Amplitude | Frequency | Range | Filter | Min. ($UI_{rms}$) | Max. ($UI_{rms}$) |
| 2488 | 0.5UI | 0.38 | 300k | 2UI | HP+LP | 0.099 | 0.169 |
| | 20UI | 1.75 | 100k | 2UI | HP+LP | 0.545 | 0.683 |
| | 20UI | 12.25 | 100k | 20UI | HP+LP | 3.939 | 4.661 |
| 9953 | 0.5UI | 0.38 | 300k | 2UI | HP+LP | 0.097 | 0.171 |
| | 80UI | 1.75 | 100k | 2UI | HP+LP | 0.543- | 0.685 |
| | 80UI | 12.25 | 100k | 20UI | HP+LP | 3.929 | 4.671 |

# 9.3 Demodulation Output Signal Sensitivity Test

## 9.3.1 Connection

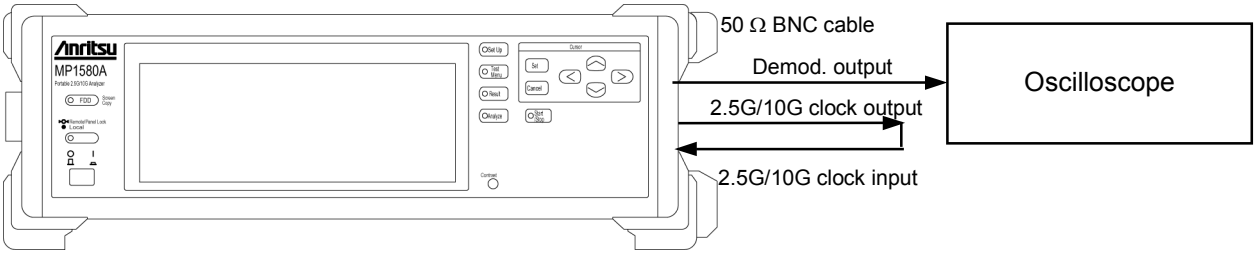
(1) Turn the MP1580A power switch OFF.

(2) Mount the 2.5G/10G Jitter unit.

(3) Connect the Clock Output connector to the Clock Input connector using a cable by self-loopback, as shown in the figure below.

(4) Connect Demod.out to an oscilloscope using a 50 Ω BNC cable.

(5) When the connection completes, turn the MP1580A power switch ON.




## 9.3.2 Test procedure

The procedures for the demodulation output signal sensitivity performance test are as follows:

(1) Display the Setup: Interface screen.

(2) Set “Bit rate” as shown on Table 4, “Though jitter” to “Off”, and “Clock” to “Internal”.

(3) Next, display the Test menu: Manual screen.

(4) Setup TX and RX as shown on Table 4.

(5) Using an oscilloscope, check the demodulation output satisfies the specification values.

(6) From the Setup: Interface screen, change “Bit rate” to repeat from (2) to (5).

**Table 4 Allowable range for de-modulation output sensitivity performance test**

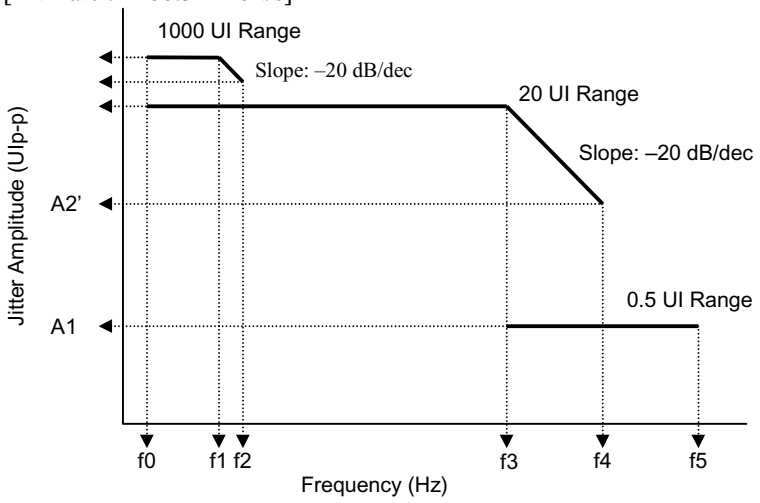
| Interface | TX | | | RX | | Specification | |
|---|---|---|---|---|---|---|---|
| Bit rate | Range | Amplitude | Frequency | Range | Filter | Min. ($V_{(p-p)}$) | Max. ($V_{(p-p)}$) |
| 2488 | 20UI | 2 | 100k | 2UI | HP1+LP | 0.8 | 1.2 |
| | 20UI | 20 | 100k | 20UI | HP1+LP | 0.8 | 1.2 |
| | 1000UI | 1000 | 10 | 1000UI | LP' | 0.8 | 1.2 |
| 9953 | 80UI | 2 | 100k | 2UI | HP1'+LP | 0.8 | 1.2 |
| | 80UI | 20 | 100k | 20UI | HP1'+LP | 0.8 | 1.2 |
| | 4000UI | 4000 | 10 | 4000UI | LP' | 0.8 | 1.2 |

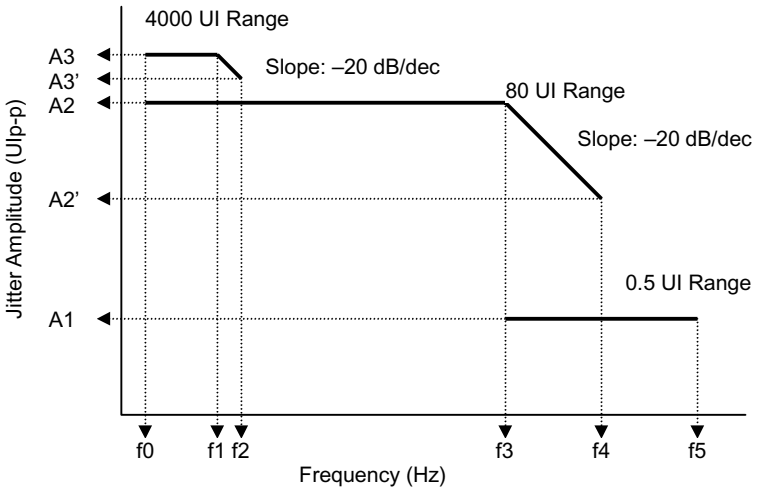
# Appendix

# Appendix A Specifications

| Section No. | Item | Specifications |
|---|---|---|
| 1 | Model/Type | MP1580A (Main Unit) |
| 1.1 | Electric Performance | |
| 1.1.1 | DCS input | 2 M, 1.5 M, 64 k +8 k |
| 1.1.1.1 | Frequency | (2 M) 2.048 MHz ±50 ppm, 2.048 Mbit/s ±50 ppm<br>(1.5 M) 1.544 MHz ±50 ppm, 1.544 Mbit/s ±50 ppm<br>(64 k) 64 kHz +8 kHz ±50 ppm |
| 1.1.1.2 | Interface | (2 M) ITU-T G.703 Table10, HDB3 (2 M)<br>(1.5 M) B8ZS, AMI (1.5 M) ANSI T1.403 |
| 1.1.1.3 | Connectors | BNC75 Ω (2 MHz, 2 Mbit/s)<br>SIEMENS 120 Ω Balanced (2 MHz, 2 Mbit/s, 64k +8 kHz,)<br>BANTAM 100 Ω Balanced (1.5 MHz, 1.5 Mbit/s) |
| 1.2 | Environmental conditions | |
| 1.2.1 | Power supply | 85 to 132 Vac 170 to 250 Vac (Automatic switching between 100 Vac and 200 Vac systems) 47.5 Hz to 63 Hz |
| 1.2.2 | Operating Temperature range | 0 to 40°C (Except for FDD operation) |
| 1.2.3 | Storage Temperature range | –20 to 60°C |
| 1.3 | Mechanical conditions | |
| 1.3.1 | Dimensions | 100 mm (H) × 320 mm (W) × 350 mm (D) except projections |
| 1.3.2 | Mass | 8 kg or less (except units) |
| 2 | Model/Type | MU150018A (Unit) |
| 2.1 | Electrical Performance | |
| | [Jitter occurrence] | |
| 2.1.1 | Clock output | (Jitter = ON) |
| 2.1.1.1 | Frequency | 2488.32 MHz ±100 ppm, 9953.28 MHz ±100 ppm |
| 2.1.1.2 | Level | 0.8 V(p-p) +0.35 V, 0.8 V(p-p) –0.25 V |
| 2.1.1.3 | Termination/connector | 50 Ω/SMA |
| 2.1.2 | Internal Modulation signal | 0.1 Hz to 80 MHz |
| 2.1.2.1 | Frequency range | 0.1 Hz to 1 Hz/ 0.1 Hz Step<br>1 Hz to 99 Hz/ 1 Hz Step<br>100 Hz to 990 Hz/ 10 Hz Step<br>1k Hz to 9.9 kHz/ 0.1 kHz Step<br>10k Hz to 99 kHz/ 1 kHz Step<br>100 kHz to 990 kHz/ 10 kHz Step<br>1 MHz to 9.9 MHz/ 0.1 MHz Step<br>10 MHz to 80 MHz/ 1 MHz Step<br>Frequency accuracy: ±100 ppm |
| 2.1.3 | Ext. Mod. Input | External modulation signal input |
| 2.1.3.1 | Frequency range | 0.1 Hz to 80 MHz |
| 2.1.3.2 | Waveform | Sine wave |

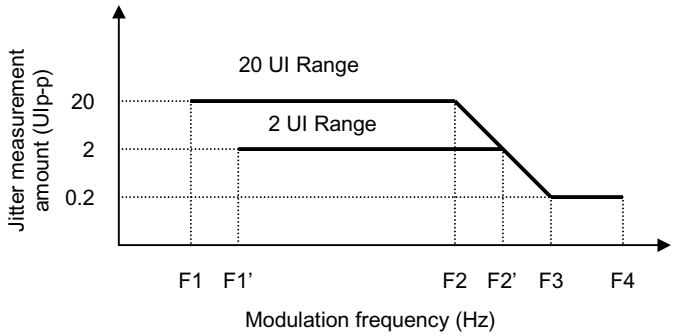
| Section No. | Item | Specifications |
|---|---|---|
| 2.1.3.3 | Sensitivity | For 2488.32 MHz<br>0.5 UI Range: 0.5 $UI_{p-p}$ ±0.075 UI / 2 V(p-p) at fr=300 kHz<br>20 UI Range: 20 $UI_{p-p}$ ±3 UI / 2 V(p-p) at fr=20 kHz<br>1000 UI Range: 1000 $UI_{p-p}$ ±150 UI / 2 V(p-p) at fr=10 Hz<br>For 9953.28 MHz<br>0.5 UI Range: 0.5 $UI_{p-p}$ ±0.075 UI / 0.5 V(p-p) at fr=300 kHz<br>80 UI Range : 80 $UI_{p-p}$ ±12 UI / 2 V(p-p) at fr=20 kHz<br>4000 UI Range: 4000 $UI_{p-p}$ ±600 UI / 2 V(p-p) at fr=10 Hz |
| 2.1.3.4 | Termination/connector | 50 Ω/BNC |
| 2.1.4 | Ref clock Output | |
| 2.1.4.1 | Frequency | 155.52 MHz ±100 ppm |
| 2.1.4.2 | Level | 0.8 V(p-p) ±0.25 V |
| 2.1.4.3 | Termination/connector | AC 50 Ω/SMA |
| 2.1.5 | Wander Ref Clock Output | |
| 2.1.5.1 | Frequency | 1.544 MHz, 2.048 MHz, 5 MHz |
| 2.1.5.2 | Level | 1.125 $V_{op}$ ±0.3825 V: 1.544 MHz, 2.048 MHz<br>0.8 V(p-p) ±0.25 V: 5 MHz |
| 2.1.5.3 | Termination/connector | 75 Ω/BNC |
| 2.1.6 | External Clock Input | |
| 2.1.6.1 | Frequency | 155.52 MHz ±100 ppm |
| 2.1.6.2 | Level | 0.8 V(p-p) ±0.25 V |
| 2.1.6.3 | Termination/connector | AC 50 Ω/SMA |
| 2.1.7 | Jitter modulation | |
| 2.1.7.1 | Range | 0.5 UI(0.000 to 0.505 $UI_{p-p}$/0.001 $UI_{p-p}$ step)<br>20 UI (0.00 to 20.20 $UI_{p-p}$/0.01 $UI_{p-p}$ step)<br>1000 UI ( 0 to 1010 $UI_{p-p}$/1 $UI_{p-p}$ step)<br>AUTO (for automatic measurement only)<br><br>For 9953.28 MHz<br>0.5 UI ( 0.000 to 0.505 $UI_{p-p}$/0.001 $UI_{p-p}$ step)<br>80 UI (0.00 to 80.80 $UI_{p-p}$/0.05 $UI_{p-p}$ step)<br>4000 UI ( 0to 4040 $UI_{p-p}$/2 $UI_{p-p}$ step)<br>AUTO (for automatic measurement only) |

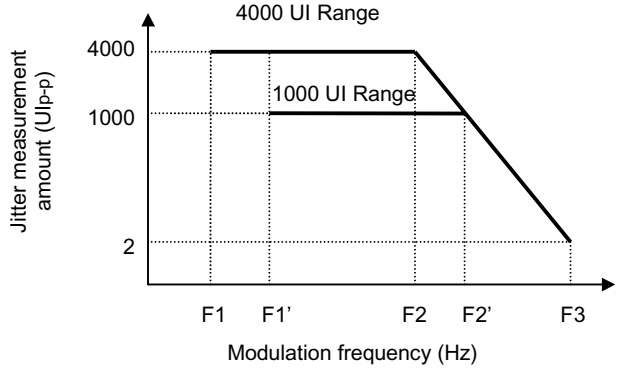
<table>
<tr><th>Section No.</th><th>Item</th><th>Specifications</th></tr>
<tr><td>2.1.7.2</td><td>Modulation value</td><td>Conforming to ITU-T O.172<br><br>[Bit Rate : 2488.32 Mbit/s]<br> 

<table>
<tr><th>Bit Rate (bit/s)</th><th>f0 (Hz)</th><th>f1 (Hz)</th><th>f2 (Hz)</th><th>f3 (KHz)</th><th>f4 (MHz)</th><th>f5 (MHz)</th><th>A1 (UIpp)</th><th>A2' (UIpp)</th><th>A2 (UIpp)</th><th>A3' (UIpp)</th><th>A3 (UIpp)</th></tr>
<tr><td>2488.32 M</td><td>0.1</td><td>15</td><td>600</td><td>100</td><td>2</td><td>20</td><td>0.5</td><td>1</td><td>20</td><td>25</td><td>1000</td></tr>
</table>
[Bit Rate : 9953.28 Mbit/s]<br> 

<table>
<tr><th>Bit Rate (bit/s)</th><th>f0 (Hz)</th><th>f1 (Hz)</th><th>f2 (Hz)</th><th>f3 (kHz)</th><th>f4 (MHz)</th><th>f5 (MHz)</th><th>A1 (UIpp)</th><th>A2' (UIpp)</th><th>A2 (UIpp)</th><th>A3' (UIpp)</th><th>A3 (UIpp)</th></tr>
<tr><td>9953.28 M</td><td>0.1</td><td>15</td><td>600</td><td>100</td><td>2</td><td>80</td><td>0.5</td><td>4</td><td>80</td><td>100</td><td>4000</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Section No.</th><th>Item</th><th>Specifications</th></tr>
<tr><td>2.1.7.3</td><td>Accuracy</td><td>For 2488.32 MHz<br>0.5 UI Range: (±Q% of setting) ±0.02 $UI_{p-p}$<br>20 UI Range: (±Q% of setting) ±0.02 $UI_{p-p}$*1<br>1000 UI Range: (±Q% of setting) ±4.8 $UI_{p-p}$<br><br>For 9953.28 MHz<br>0.5 UI Range: (±Q% of setting) ±0.02 $UI_{p-p}$<br>80 UI Range: (±Q% of setting) ±0.02 $UI_{p-p}$*2<br>4000 UI Range: (±Q% of setting) ±10 $UI_{p-p}$<br>*1: Less than 10% of the setting range, ±0.18 $UI_{p-p}$ is added.<br>*2: Less than 5% of the setting range, ±0.5 $UI_{p-p}$ is added.<br>10 to 5% of the setting range, ±0.18 $UI_{p-p}$ is added.
<table>
<tr><th>Bit rate (Mbit/s)</th><th>Variable error Q</th><th>Frequency Range(Hz)</th></tr>
<tr><td rowspan="4">2488.32</td><td>±12%</td><td>0.1 to 5 k</td></tr>
<tr><td>±8%</td><td>5 k to 500 k</td></tr>
<tr><td>±12%</td><td>500 k to 2 M</td></tr>
<tr><td>±15%</td><td>2 M to 20 M</td></tr>
<tr><td rowspan="4">9953.28</td><td>±12%</td><td>0.1 to 20 k</td></tr>
<tr><td>±8%</td><td>20 k to 500 k</td></tr>
<tr><td>±12%</td><td>500 k to 2 M</td></tr>
<tr><td>±15%</td><td>2 M to 80 M</td></tr>
</table>
</td></tr>
<tr><td></td><td>[Jitter measurement]</td><td></td></tr>
<tr><td>2.1.8</td><td>Clock Input</td><td></td></tr>
<tr><td>2.1.8.1</td><td>Frequency</td><td>2488.32 MHz ±100 ppm, 9953.28 MHz ±25 ppm</td></tr>
<tr><td>2.1.8.2</td><td>Level</td><td>0.8 V(p-p) +0.35 V, 0.8 V(p-p) –0.25 V</td></tr>
<tr><td>2.1.8.3</td><td>Termination/connector</td><td>50 Ω/SMA</td></tr>
<tr><td>2.1.9</td><td>Demod. Output</td><td></td></tr>
<tr><td>2.1.9.1</td><td>Sensitivity</td><td>2 UI Range: 1 V(p-p) ±0.2 V/2 $UI_{p-p}$ at fr=100 kHz<br>20 UI Range: 1 V(p-p) ±0.2 V/20 $UI_{p-p}$ at fr=100 kHz<br>1000 UI Range: 1 V(p-p) ±0.2 V/1000 $UI_{p-p}$ (for 2488 M) at fr=10 Hz<br>4000 UI Range: 1 V(p-p) ±0.2 V/4000 $UI_{p-p}$ (for 9953 M) at fr=10 Hz</td></tr>
<tr><td>2.1.9.2</td><td>Termination/connector</td><td>50 Ω/BNC (Demod. Output)</td></tr>
<tr><td>2.1.10</td><td>Ref .Clock Input</td><td></td></tr>
<tr><td>2.1.10.1</td><td>Frequency</td><td>155.52 MHz ±100 ppm</td></tr>
<tr><td>2.1.10.2</td><td>Level</td><td>0.8 V(p-p) ±0.2 V</td></tr>
<tr><td>2.1.10.3</td><td>Termination/connector</td><td>AC 50 Ω/SMA</td></tr>
<tr><td>2.1.11</td><td>Manual jitter measurement</td><td></td></tr>
<tr><td>2.1.11.1</td><td>Unit</td><td>$UI_{p-p}$, $UI_{+p}$, $UI_{-p}$/$UI_{rms}$</td></tr>
<tr><td>2.1.11.2</td><td>Range</td><td>$UI_{p-p}$ measurement<br>2 UI Range (0.000 to 2.020 $UI_{p-p}$/0.001 $UI_{p-p}$ step)<br>20 UI Range (0.00 to 20.20 $UI_{p-p}$/0.01 $UI_{p-p}$ step)<br>1000 UI Range (0 to 1010 $UI_{p-p}$/1 $UI_{p-p}$ step)<br>4000 UI Range (0 to 4040 $UI_{p-p}$/2 $UI_{p-p}$ step)<br><br>UIrms measurement<br>2 UI Range (0.000 to 0.714 $UI_{rms}$/0.001 $UI_{rms}$ step)<br>20 UI Range (0.00 to 7.14 $UI_{rms}$/0.01 $UI_{rms}$ step)</td></tr>
</table>

<table>
<tr><th>Section No.</th><th>Item</th><th>Specifications</th></tr>
<tr><td>2.1.11.3<br>2.1.11.4<br>2.1.11.5<br>2.1.11.6</td><td>Correction<br>Measurement mode<br>Measurement interval<br>Filter</td><td>0 to 0.714 No compensation at 20 UI<br>Repeat, Single, Manual<br>0.5 to 99.5 s/0.5 s step<br>Conforming to ITU-T O.172<br>LP, HP1+LP, HP1’+LP, HP2+LP, HP+LP, HP’+LP, HP0+LP<br>LP’*, HP0+LP’* (* For 1000/4000 UI Range only)</td></tr>
<tr><td>2.1.11.7</td><td>Measurement range</td><td>
<table>
<tr><th>Bit Rate (Mbit/s)</th><th>HP0 (Hz)</th><th>HP1 (Hz)</th><th>HP1’ (Hz)</th><th>HP2 (Hz)</th><th>HP' (Hz)</th><th>HP (Hz)</th><th>LP (Hz)</th><th>LP’ (Hz)</th></tr>
<tr><td>2488.32</td><td>10</td><td>5 K</td><td>-</td><td>1 M</td><td>-</td><td>12 K</td><td>20 M</td><td>5 k</td></tr>
<tr><td>9953.28</td><td>10</td><td>10 K</td><td>20 K</td><td>4 M</td><td>50 K</td><td>12 K</td><td>80 M</td><td>20 k</td></tr>
</table>


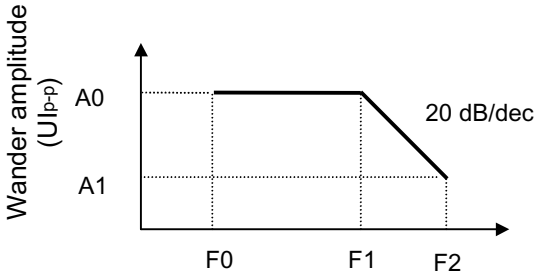
<table>
<tr><th>Bit Rate (Mbit/s)</th><th>Range</th><th>F1 (Hz)</th><th>F1’ (Hz)</th><th>F2 (Hz)</th><th>F2' (Hz)</th><th>F3 (Hz)</th><th>F4 (Hz)</th></tr>
<tr><td rowspan="2">2488.32</td><td>2</td><td>-</td><td>100</td><td>-</td><td>100 K</td><td>1 M</td><td>20 M</td></tr>
<tr><td>20</td><td>10</td><td>-</td><td>10 K</td><td>-</td><td>1 M</td><td>20 M</td></tr>
<tr><td rowspan="2">9953.28</td><td>2</td><td>-</td><td>100</td><td>-</td><td>400 K</td><td>4 M</td><td>80 M</td></tr>
<tr><td>20</td><td>10</td><td>-</td><td>40 K</td><td>-</td><td>4 M</td><td>80 M</td></tr>
</table>


<table>
<tr><th>Bit Rate (Mbit/s)</th><th>Range</th><th>F1 (Hz)</th><th>F1’ (Hz)</th><th>F2 (Hz)</th><th>F2’ (Hz)</th><th>F3 (Hz)</th></tr>
<tr><td>2488.32</td><td>1000</td><td>-</td><td>1</td><td>-</td><td>12.1</td><td>5 K</td></tr>
<tr><td>9953.28</td><td>4000</td><td>1</td><td>-</td><td>12.1</td><td>-</td><td>20 K</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Section No.</th><th>Item</th><th>Specifications</th></tr>
<tr><td>2.1.11.8</td><td>Measurement accuracy</td><td>[UIp-p, UI+p, UI-p]<br><br>2 UI Range: ±R% ±W UIp-p<br>20 UI Range: ±R% ±W UIp-p<br>1000 UI Range: ±R% ±W UIp-p<br>4000 UI Range: ±R% ±W UIp-p<br><br>Note: The measurement frequency range is limited by Rx Range and HPF.<br><br>
<table>
<tr><td rowspan="3">Bit rate (Mbit/s)</td><td colspan="6">W Structured signal (With MU150017A)</td></tr>
<tr><td colspan="2">HP1+LP</td><td colspan="2">HP1'+LP</td><td colspan="2">HP2+LP</td></tr>
<tr><td>2 UI</td><td>20 UI</td><td>2 UI</td><td>20 UI</td><td>2 UI</td><td>20 UI</td></tr>
<tr><td>2488.32</td><td>0.1</td><td>2.0</td><td>-</td><td>-</td><td>0.05</td><td>1.0</td></tr>
<tr><td>9953.28</td><td>-</td><td>-</td><td>0.15</td><td>3.0</td><td>0.05</td><td>1.0</td></tr>
</table>
<br>
<table>
<tr><td></td><td>HP0'+LP</td><td>HP0+LP'</td></tr>
<tr><td></td><td>1000/4000UI</td><td>Container</td></tr>
<tr><td>2488.32</td><td>30</td><td>VC4-16C</td></tr>
<tr><td>9953.28</td><td>120</td><td>VC4-64C</td></tr>
</table>
Info:$2^{23}$-1<br><br>*+10°C to +40°C with input level 2488 M : –12 to –9 dBm<br>9953 M : –10 to –8 dBm<br>** additional 0.01 $UI_{p-p}$/dB at 2488 Mbit/s with input level<–12 dBm<br>additional 0.01 $UI_{p-p}$/dB at 9953 Mbit/s with input level<–10 dBm<br><br>【UIrms】<br>2UI Range:±R% ±Y $UI_{rms}$<br>20UI Range :±R% ±Y $UI_{rms}$<br>
<table>
<tr><td rowspan="3"></td><td colspan="6">W Clock signal</td></tr>
<tr><td colspan="2">HP1+LP</td><td colspan="2">HP1'+LP</td><td colspan="2">HP2+LP</td></tr>
<tr><td>2 UI</td><td>20 UI</td><td>2 UI</td><td>20 UI</td><td>2 UI</td><td>20 UI</td></tr>
<tr><td>2488.32</td><td>0.05</td><td>0.5</td><td>-</td><td>-</td><td>0.03</td><td>0.3</td></tr>
<tr><td>9953.28</td><td>-</td><td>-</td><td>0.05</td><td>0.5</td><td>0.03</td><td>0.3</td></tr>
</table>
*+10°C to +40°C 0: with input level 2488.32 M : –12to –9 dBm<br>9953.28 M : –10to –8 dBm<br>** additional 0.002 UIrms/dB at 2488.32 Mbit/s with input level<–12 dBm<br>additional 0.002 UIrms/dB at 9953.28 Mbit/s with input level<–10 dBm<br>Frequency error [R]<br>
<table>
<tr><td></td><td>HP0+LP'</td></tr>
<tr><td></td><td>1000/4000UI</td></tr>
<tr><td>2488.32</td><td>20</td></tr>
<tr><td>9953.28</td><td>80</td></tr>
</table>
</td></tr>
<tr><td>2.1.12</td><td>Hit measurement</td><td></td></tr>
<tr><td>2.1.12.1</td><td>Hit count</td><td>Counts the number of times for jitter exceeding the set jitter amplitude threshold</td></tr>
<tr><td>2.1.12.2</td><td>Hit second</td><td>Sum of seconds hits occurred</td></tr>
<tr><td>2.1.12.3</td><td>% F second</td><td>Ratio of seconds (no hits occurred) to the measurement period</td></tr>
</table>

<table>
<tr><th>Section No.</th><th>Item</th><th>Specifications</th></tr>
<tr><td>2.1.12.4</td><td>Hit threshold</td><td>2 UI Range: 0.05 to 1 UIo-p/0.01 UIo-p step<br>20 UI Range: 0.5 to 10 UIo-p/0.1 UIo-p step<br>Threshold error: Nominal 5%<br>Sets a hit threshold that is 70% or under of ±Peak value, and performs measurement.<br>(With 20 UI range > 2 UIp-p)</td></tr>
<tr><td>2.1.12.5</td><td>Jitter signal half-width</td><td>100 ns or more</td></tr>
<tr><td>2.1.12.6</td><td>Display range</td><td>Hit count, Hit second: 0 to 999999 to 9.9E15, >9.9E15<br>Hit free second : 0.0000 to 100.0000%</td></tr>
<tr><td>2.1.13</td><td>Jitter tolerance measurement</td><td></td></tr>
<tr><td>2.1.14.1</td><td>Number of points</td><td>Maximum 20</td></tr>
<tr><td>2.1.14.2</td><td>Display</td><td>Graph display<br>Numerical-value display: Pass/fail judgment for mask</td></tr>
<tr><td>2.1.14.3</td><td>Mask selection</td><td>2488.32 M: G958 TypeA, G.958A TypeB, G.825 2 M, G.825 1.5 M, G.813,<br>9953.28 M: Bell253 (SONET) or User</td></tr>
<tr><td>2.1.14.4</td><td>Error judgment</td><td>1 s error :<br>Onset of errors : Hold Time = 30 s<br>1dB Power Penalty : 100 or more errors, observed during 1 second<br>Count : 1 > 99999<br>Rate : >1E-3, >1E-4, >1E-5, >1E-6, >1E-7, >1E-8, >1E-9, >1E-10, >1E-11<br>Default : The judgment condition is that any errors and/or alarms occur for continuous two seconds.</td></tr>
<tr><td>2.1.14.5</td><td>Hold Time</td><td>Sets the period of time for error measurement at each measurement point.<br>1.0 to 99 s/Step 1 s</td></tr>
<tr><td>2.1.14.6</td><td>Waiting Time</td><td>Changes the measurement point, and sets the time interval from jitter-free state to starting next jitter generation.<br>0 to 99/Step 1 s</td></tr>
<tr><td>2.1.14.7</td><td>Set frequency range</td><td><table><tr><th>Bit rate (Mbit/s)</th><th>Set frequency range (Hz)</th></tr><tr><td>2488.32</td><td>0.1 to 20 M</td></tr><tr><td>9953.28</td><td>0.1 to 80 M</td></tr></table></td></tr>
<tr><td>2.1.15</td><td>Jitter transfer measurement</td><td>Measures the jitter transfer for the measured device.</td></tr>
<tr><td>2.1.15.1</td><td>Number of points</td><td>Maximum 20</td></tr>
<tr><td>2.1.15.2</td><td>Display</td><td>Graph display</td></tr>
<tr><td>2.1.15.3</td><td>Level bandwidth selection</td><td>10 Hz</td></tr>
<tr><td>2.1.15.4</td><td>Frequency range selection</td><td><table><tr><th>Bit Rate (Mbit/s)</th><th>Measurement range (Hz)</th></tr><tr><td>2488.32</td><td>100 to 20 M</td></tr><tr><td>9953.28</td><td>100 to 80 M</td></tr></table></td></tr>
<tr><td>2.1.15.5</td><td>Transfer Mask</td><td>2488.32 M: G.958 TypeA, G.958 TypeB, Bell253, ANSI T1.105.03 TypeA<br>ANSI T1.105.03 TypeB or User<br>9953.28 M: Bell1377 or User</td></tr>
<tr><td>2.1.16</td><td>Frequency variation</td><td>(Jitter = ON/OFF)</td></tr>
</table>

| Section No. | Item | Specifications |
|---|---|---|
| 2.1.16.1 | Frequency | 2488.32 MHz, 9953.28 MHz |
| 2.1.16.2 | Variable range/step | ±100.0 ppm / 0.1 ppm (Mod. Select Jitter =ON/OFF) |
| 2.1.16.3 | Accuracy | ±0.1 ppm (Calibration within 60 minutes after power ON, at 23 ±5°C) |
| 2.1.17 | Clock mode | |
| 2.1.17.1 | Termination/connector | For 5 MHz or 10 MHz, use Ext5/10M Ref Input of MU150018A.<br>75 Ω/BNC |
| 2.1.17.2 | Termination/connector | For 155.52 MHz, use External Clock Input of MU150018A.<br>75 Ω/BNC |
| | [Wander generation] | (Wander =ON/OFF) |
| 2.1.18 | Wander signal output | No output for Through and Ext. |
| 2.1.18.1 | Frequency | 2488.32 MHz ±100 ppm, 9953.28 MHz ±100 ppm |
| 2.1.19 | Wander modulation signal | Auto/Manual |
| 2.1.19.1 | Frequency range | 10 µHz to 10 Hz, sine wave<br><br>10 µHz to 99.9 µHz/0.1 µHz step<br>100 µHz to 999 µHz/1 µHz step<br>1.00 mHz to 9.99 mHz/0.01 mHz step<br>10.0 mHz to 99.9 mHz/0.1 mHz step<br>100 mHz to 999 mHz/1 mHz step<br>1.00 Hz to 10.00 Hz/0.01 Hz step |
| 2.1.19.2 | Amplitude | 0 to 400,000 UI/1 $UI_{p-p}$ step<br>Can be switched to display in ns |
| 2.1.19.3 | Phase Modulation | Adds phase modulation to Wander Ref. Output, according to the selected conditions (valid when Option 03 is installed). |




| Bit Rate (MHz) | F0 (Hz) | F1 (Hz) | F2 (Hz) | A0 ($UI_{p-p}$) | A1 ($UI_{p-p}$) | Step ($UI_{p-p}$) |
|---|---|---|---|---|---|---|
| 2488.32 | 10 µ | 400 m | 10 | 400,000 | 16,000 | 1 |
| 9953.28 | 10 µ | 400 m | 10 | 400,000 | 16,000 | 1 |

| Error Q | Freq. Range |
|---|---|
| ± 8% | 10 µHz to 0.125 Hz |
| ±12% | 0.125 Hz to 1 Hz |
| ±15% | 1 Hz to 10 Hz |

| Section No. | Item | Specifications |
|---|---|---|
| 2.1.19.4 | Selection items | OFF :<br>Wander (TDEV) :<br>Transients :<br>Signal OFF: |
| | [Wander measurement] | Valid only when OPT-02 is installed |
| 2.1.20 | Wander measurement signal input | Wander measurement signal input<br>Shares clock input for jitter measurement. |
| 2.1.20.1 | Frequency | 2488.32 MHz ±100 ppm, 9953.28 MHz ±100 ppm |
| 2.1.21 | Wander Ref Input | Wander measurement reference signal input |
| 2.1.21.1 | Frequency | 2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (Clock)<br>1.544 Mbit/s ±50 ppm (AMI/B8ZS) or 1.544 MHz ±50 ppm (Clock)<br>64 k +8 kHz ±50 ppm, 5 MHz ±50 ppm, 10 MHz ±50 ppm |
| 2.1.21.2 | Level | Unbalance: 1.544 MHz, 2.048 MHz (Clock); 1.125 $V_{o\text{-}p}$ ±34% G.703<br>2.048 Mbit/s (HDB3) ; 2.37 $V_{o\text{-}p}$ ±10% G.703<br>Balance : 64 k +8 kHz, 1.544 Mbit/s, 2.048 Mbit/s;<br>3.0 $V_{o\text{-}p}$ ±24% ANSI T1, 102-1987<br>2 MHz (CLOCK) ; 1.45 $V_{o\text{-}p}$ ±24% G.703 |
| 2.1.21.3 | Load/connector | Unbalance: 75 Ω/BNC<br>Balance : 100 Ω/Weco310 Compatible (1.544 Mbit/s)<br>120 Ω/3-Pole CF (64 k+8 kHz,2.048 Mbit/s) |
| 2.1.22 | - | |
| 2.1.23 | RS-232C | For wander measurement data output |
| 2.1.23.1 | Connector | D-SUB 9 pin |
| 2.1.24 | Manual Wander measurement | |
| 2.1.24.1 | Evaluation mode | P-P, +P, –P, TIE |
| 2.1.24.2 | Meas. Mode | Single, Manual |
| 2.1.24.3 | Meas. Internal | 1 to 99/step1 (s, min, h, day) |
| 2.1.24.4 | Upper-limit frequency for measurement | 10 Hz ±10% (–3 dB point): except for transient measurement |
| 2.1.24.5 | Filter characteristic | –20 dB/dec |
| 2.1.24.6 | Ripple | ±0.2 dB (1 to 10 Hz, for 0.1 Hz as reference) |
| 2.1.24.7 | Maximum attenuation | <–30 dB |
| 2.1.24.8 | Sampling period | 25 ms, 1 s, 10 s (selected by MX150001C) |
| 2.1.24.9 | Measurement range | P-P 0.0 to 2E10 ns<br>+P, –P 0.0 to 1E10 ns<br>TIE 0.0 to ±1E10 ns |
| 2.1.24.10 | Measurement time | 1 s to 99 days |
| 2.1.24.11 | Resolution | 0.1 ns |

<table>
<tr><th>Section No.</th><th>Item</th><th>Specifications</th></tr>
<tr><td>2.1.24.12</td><td>Accuracy</td><td>・TIE<br>±0.5%±Z0 (τ)<br><table><tr><td>Z0 (τ) (ns)</td><td>Observation time τ (s)</td></tr><tr><td>2.5+0.0275 τ</td><td>0.05≤τ≤1000</td></tr><tr><td>29+0.001 τ</td><td>τ>1000</td></tr></table></td></tr>
<tr><td>2.1.24.13</td><td>Filter selection</td><td>DC to 0.01 Hz, DC to 10 Hz<br>0.01 Hz to 10 Hz</td></tr>
<tr><td>2.1.24.14</td><td>Filter characteristic</td><td>–20 dB/dec</td></tr>
<tr><td>2.1.25</td><td>Automatic wander measurement</td><td>TIE,MTIE*,TDEV*,<br>* MTIE or TDEV measurement requires MTIE and TDEV application software of MX150002A, that runs on an external PC.</td></tr>
<tr><td>2.1.25.1</td><td>Graph result display item</td><td>Calculates MTIE and TDEV based on the measured TIE data, and displays the result.</td></tr>
<tr><td>2.1.26</td><td>Frequency measurement</td><td></td></tr>
<tr><td>2.1.26.1</td><td>Frequency</td><td>2488.32 MHz ±1000 ppm, 9953.28 MHz ±1000 ppm</td></tr>
<tr><td>2.1.26.2</td><td>Resolution</td><td>0.1 ppm</td></tr>
<tr><td>2.1.26.3</td><td>Accuracy</td><td>±0.1 ppm (Calibration within 60 minutes after power ON, at 23 ±5°C)<br>Except for Lock5M or Lock10M</td></tr>
<tr><td>2.1.26.4</td><td>Range</td><td>[Hz]<br>Display up to nominal frequency x $10^{-7}$<br>[ppm]<br>0.0 to ±1000.0 [ppm]</td></tr>
<tr><td>2.2.1</td><td>General</td><td></td></tr>
<tr><td>2.2.1.1</td><td>Controlled devices</td><td>Device controlled through GPIB interface by using MP1580A equipped with MU150018A unit as the controller.<br>MP1570A SONET/SDH/PDH/ATM Analyzer</td></tr>
<tr><td>2.3.1</td><td>Environmental conditions</td><td></td></tr>
<tr><td>2.3.1.1</td><td>Operating temperature range</td><td>0 to 40°C</td></tr>
<tr><td>2.3.1.2</td><td>Storage temperature range</td><td>–20 to 60°C</td></tr>
<tr><td>2.3.2</td><td>Mechanical conditions</td><td></td></tr>
<tr><td>2.3.2.1</td><td>Dimensions</td><td>45 mm (H) × 255 mm (W) × 167.6 mm (D), without projections</td></tr>
<tr><td>2.3.2.2</td><td>Mass</td><td>2.5 kg or less</td></tr>
</table>

# Appendix B Options

The table below shows the optional items that are available for MP1580A. These items must be installed at our plant.

| Model or Order No. | Item | Remarks |
|---|---|---|
| MP1580A-01 | RS-232C | Option 01 for MP1580A |
| MP1580A-02 | GPIB | Option 02 for MP1580A |
| MP1580A-03 | ETHERNET | Option 03 for MP1580A |
| MP1580A-04 | VGA output | Option 04 for MP1580A |
| MU150018A-02 | Wander measurement | Option 02 for MU150018A<br>2488M/9953M Wander Measurement |
| MU150018A-03 | Wander reference output<br>Phase modulation | Option 03 for MU150018A<br>Wander Generation |

# Appendix C Peripheral Parts

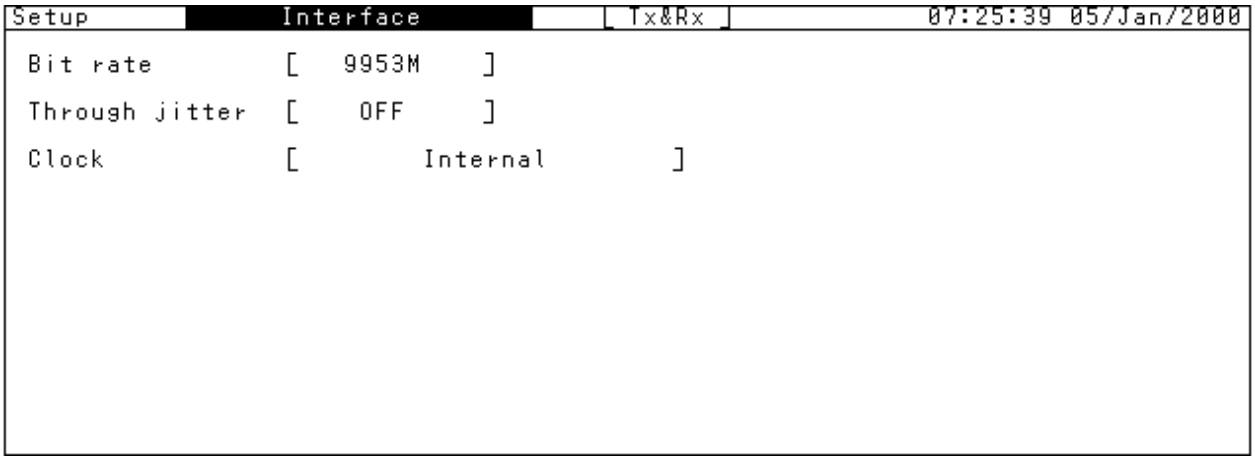
The table below shows the peripheral parts for MP1580A.

| Model or Order No. | Name | Remarks |
|---|---|---|
| MX150002A | Wander (MTIE, TDEV) Measurement Application Software | for MU150018A |
| J0126B | Coaxial cable<br>with BNC plug at both ends, 2 m | 75 Ω, for MP1580A |
| J0776D | Coaxial cable, 2 m | 50 Ω, for MP1580A |
| J0162A | Balanced cable<br>3 pins at both ends (with F plug), 1 m | 120 Ω, for MP1580A/MU150018A |
| J0162B | Balanced cable<br>3 pins at both ends (with F plug), 2 m | 120 Ω, for MP1580A/MU150018A |
| J0845A | Balanced cable<br>3 pins BANTAM at both ends | 100 Ω for MP1580A/MU150018A |
| | Coaxial cable<br>with SMA connector at both ends, 1 m | 50 Ω, for MU10018A |
| J0006 | GPIB cable, 0.5 m | for MP1580A |
| J0007 | GPIB cable, 1 m | for MP1580A |
| J0008 | GPIB cable, 2 m | for MP1580A |
| J1074 | Semi-Rigid cable Tx | Standard accessories |
| J1075 | Semi-Rigid cable Rx | Standard accessories |
| J0166A | RS-232C cable 2 m | |
| B0490 | Joint plate | for MP1580A on MP1570A |
| B0491 | Carrying case | for MP1580A |
| B0492 | Soft case | for MP1580A |

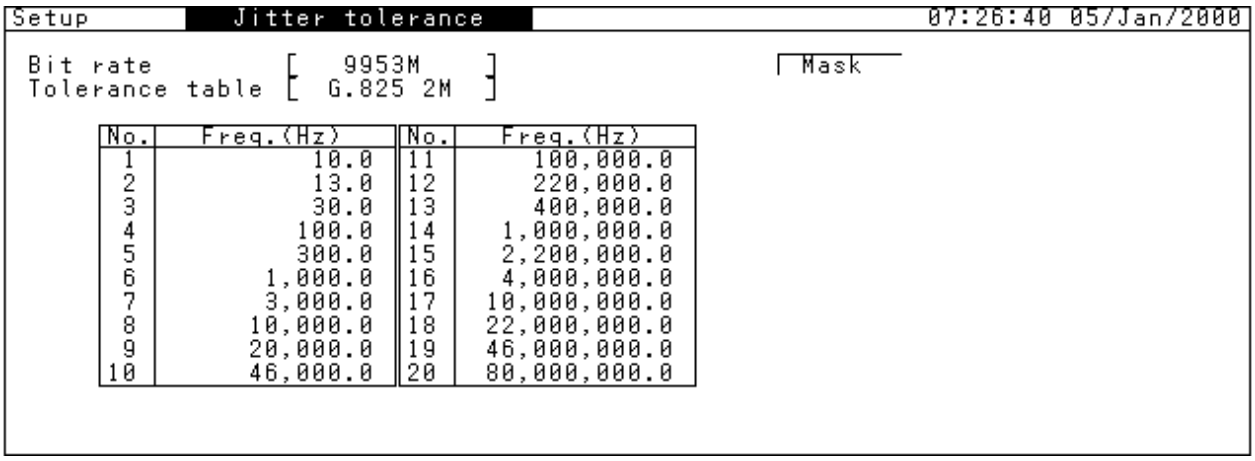
# Appendix D Initial Values

Initial Value/Setting Lists are shown in this appendix.

Initial Value List of Setup: Interface




Initial Value List of Setup: Jitter tolerance




| No. | Freq.(Hz) | No. | Freq.(Hz) |
|---|---|---|---|
| 1 | 10.0 | 11 | 100,000.0 |
| 2 | 13.0 | 12 | 220,000.0 |
| 3 | 30.0 | 13 | 400,000.0 |
| 4 | 100.0 | 14 | 1,000,000.0 |
| 5 | 300.0 | 15 | 2,200,000.0 |
| 6 | 1,000.0 | 16 | 4,000,000.0 |
| 7 | 3,000.0 | 17 | 10,000,000.0 |
| 8 | 10,000.0 | 18 | 22,000,000.0 |
| 9 | 20,000.0 | 19 | 46,000,000.0 |
| 10 | 46,000.0 | 20 | 80,000,000.0 |

Initial Value List of Setup: Jitter sweep

Setup　Jitter sweep　07:27:11 05/Jan/2000

Bit rate [ 9953M ]
Sweep table [ G.825 2M ]

| No. | Freq.(Hz) | UIp-p | No. | Freq.(Hz) | UIp-p |
|---|---|---|---|---|---|
| 1 | 10.0 | 2490 | 11 | 100,000.0 | 1.50 |
| 2 | 13.0 | 2490 | 12 | 220,000.0 | 1.50 |
| 3 | 30.0 | 1000 | 13 | 400,000.0 | 1.50 |
| 4 | 100.0 | 300 | 14 | 1,000,000.0 | 0.60 |
| 5 | 300.0 | 100 | 15 | 2,200,000.0 | 0.270 |
| 6 | 1,000.0 | 30.00 | 16 | 4,000,000.0 | 0.150 |
| 7 | 3,000.0 | 10.00 | 17 | 10,000,000.0 | 0.150 |
| 8 | 10,000.0 | 3.00 | 18 | 22,000,000.0 | 0.150 |
| 9 | 20,000.0 | 1.50 | 19 | 46,000,000.0 | 0.150 |
| 10 | 46,000.0 | 1.50 | 20 | 80,000,000.0 | 0.150 |

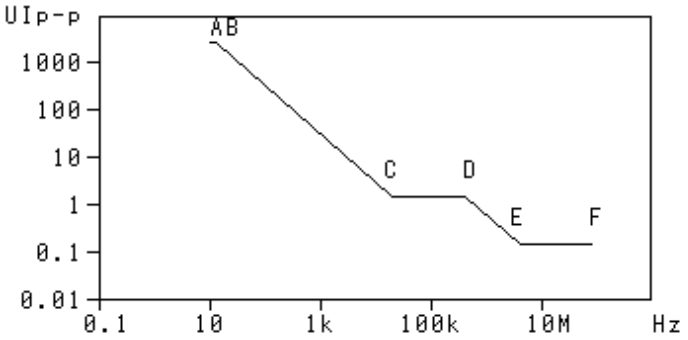
Initial Value List of Setup: Frequency sweep

Setup　Frequency sweep　07:27:42 05/Jan/2000

Bit rate [ 9953M ]
Mask table [ G.825 2M ]

Point: 6

| | Freq.(Hz) | UIp-p |
|---|---|---|
| A | 10.0 | 2490.000 |
| B | 13.0 | 2490.000 |
| C | 20,000.0 | 1.500 |
| D | 400,000.0 | 1.500 |
| E | 4,000,000.0 | 0.150 |
| F | 80,000,000.0 | 0.150 |




Initial Value List of Setup: Jitter transfer

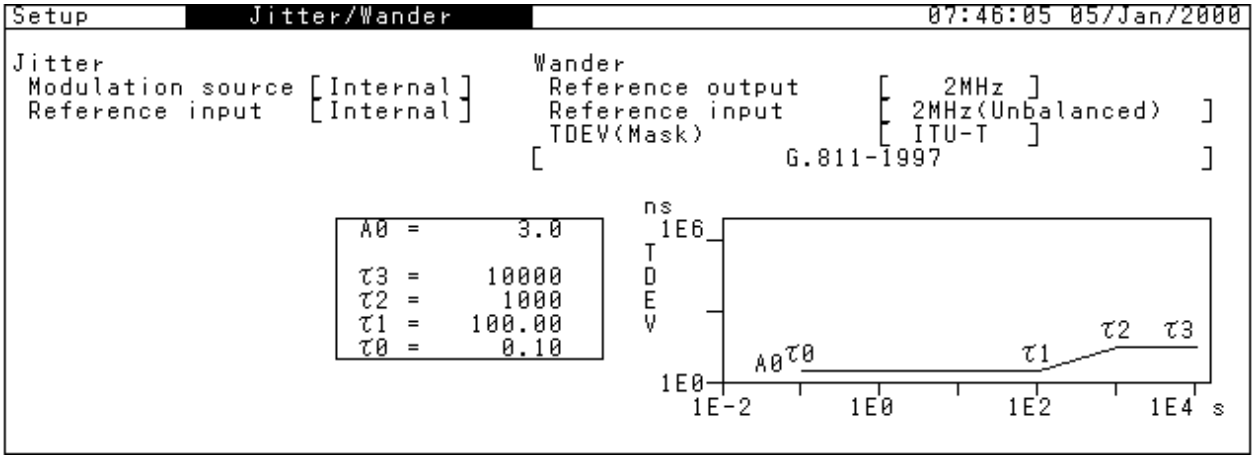
Setup　Jitter transfer　07:28:12 05/Jan/2000

Bit rate [ 9953M ]
Transfer table [ G.825 2M ]

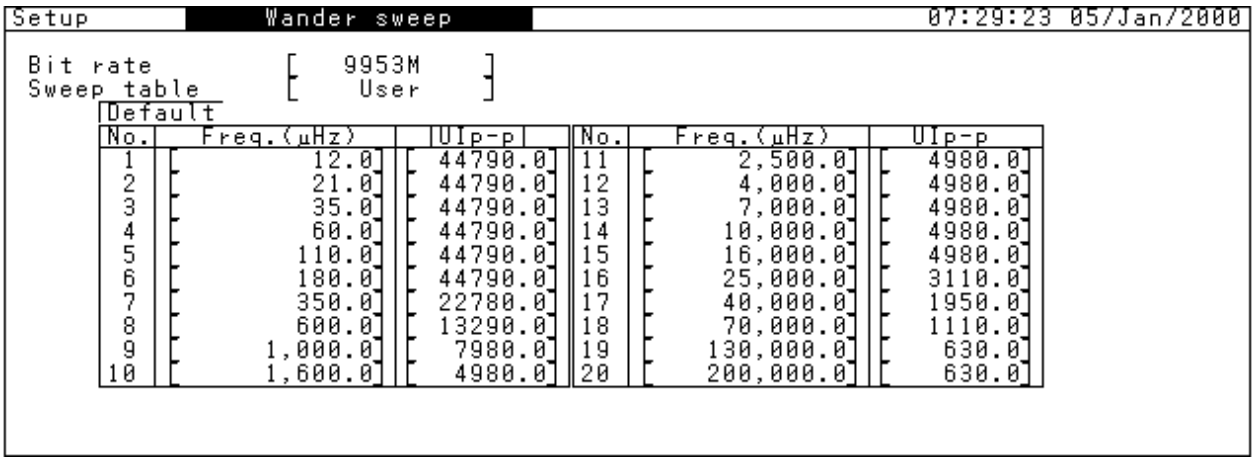
[ Mask

| No. | Freq.(Hz) | UIp-p | No. | Freq.(Hz) | UIp-p |
|---|---|---|---|---|---|
| 1 | 100.0 | 15.00 | 11 | 100,000.0 | 1.50 |
| 2 | 160.0 | 15.00 | 12 | 220,000.0 | 1.50 |
| 3 | 300.0 | 15.00 | 13 | 400,000.0 | 1.50 |
| 4 | 600.0 | 15.00 | 14 | 1,000,000.0 | 0.60 |
| 5 | 1,000.0 | 15.00 | 15 | 2,200,000.0 | 0.270 |
| 6 | 2,000.0 | 15.00 | 16 | 4,000,000.0 | 0.150 |
| 7 | 4,600.0 | 6.50 | 17 | 10,000,000.0 | 0.150 |
| 8 | 10,000.0 | 3.00 | 18 | 22,000,000.0 | 0.150 |
| 9 | 20,000.0 | 1.50 | 19 | 46,000,000.0 | 0.150 |
| 10 | 46,000.0 | 1.50 | 20 | 80,000,000.0 | 0.150 |

Initial Setting List of Setup: Jitter/Wander

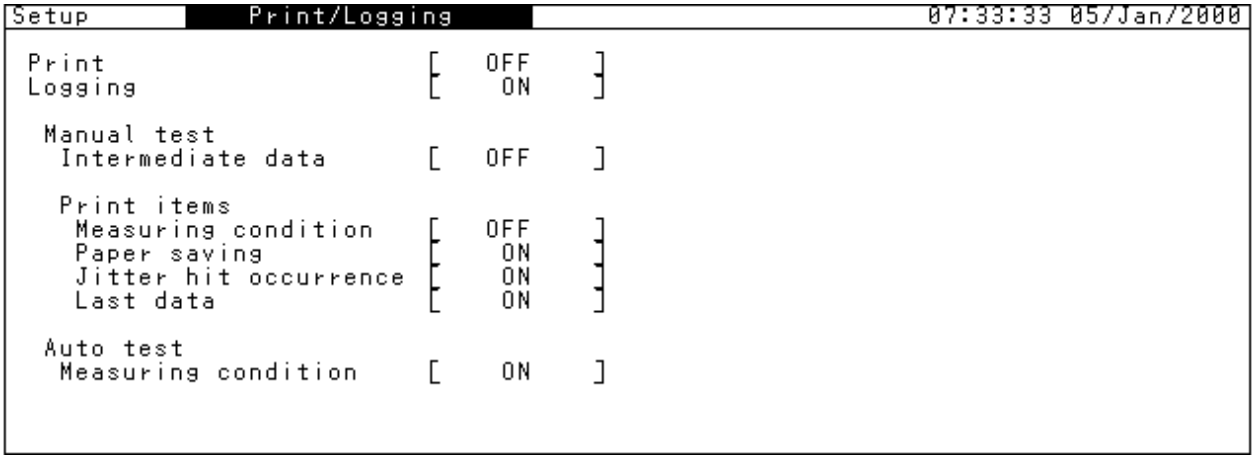



Initial Value List of Setup: Wander sweep

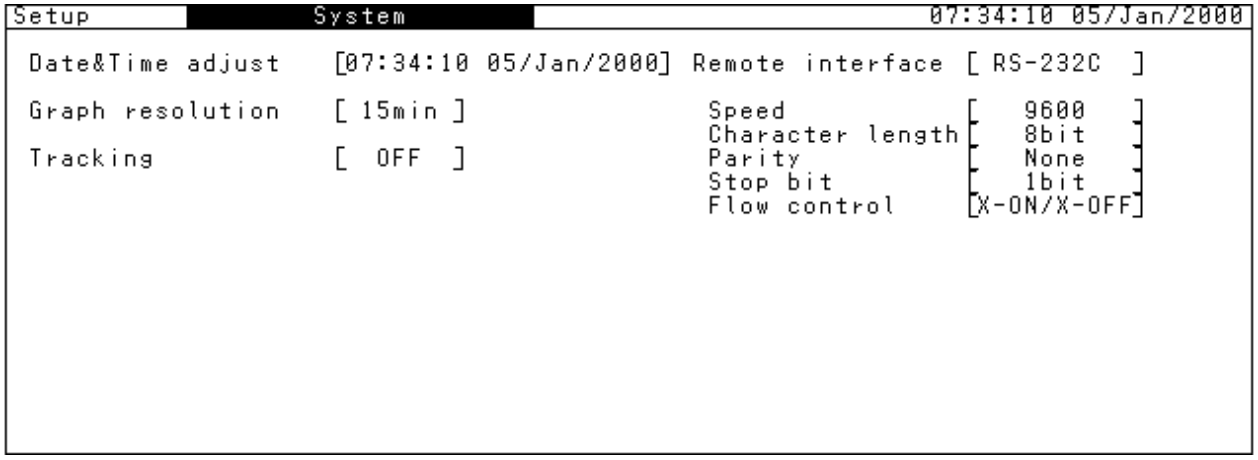



| No. | Freq.(μHz) | UIp-p | No. | Freq.(μHz) | UIp-p |
|---|---|---|---|---|---|
| 1 | 12.0 | 44790.0 | 11 | 2,500.0 | 4980.0 |
| 2 | 21.0 | 44790.0 | 12 | 4,000.0 | 4980.0 |
| 3 | 35.0 | 44790.0 | 13 | 7,000.0 | 4980.0 |
| 4 | 60.0 | 44790.0 | 14 | 10,000.0 | 4980.0 |
| 5 | 110.0 | 44790.0 | 15 | 16,000.0 | 4980.0 |
| 6 | 180.0 | 44790.0 | 16 | 25,000.0 | 3110.0 |
| 7 | 350.0 | 22780.0 | 17 | 40,000.0 | 1950.0 |
| 8 | 600.0 | 13290.0 | 18 | 70,000.0 | 1110.0 |
| 9 | 1,000.0 | 7980.0 | 19 | 130,000.0 | 630.0 |
| 10 | 1,600.0 | 4980.0 | 20 | 200,000.0 | 630.0 |

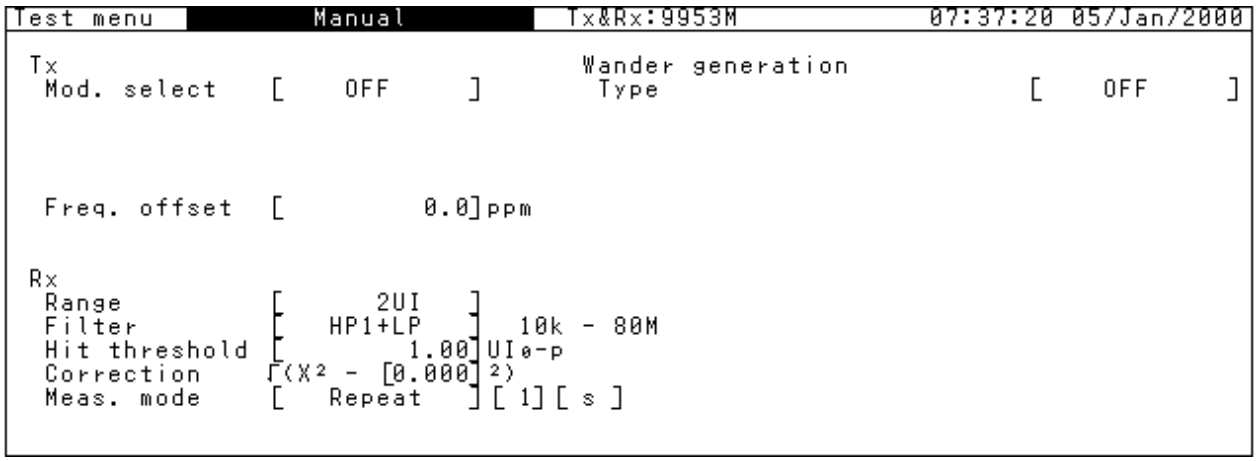
Initial Setting List of Setup: Print/Logging



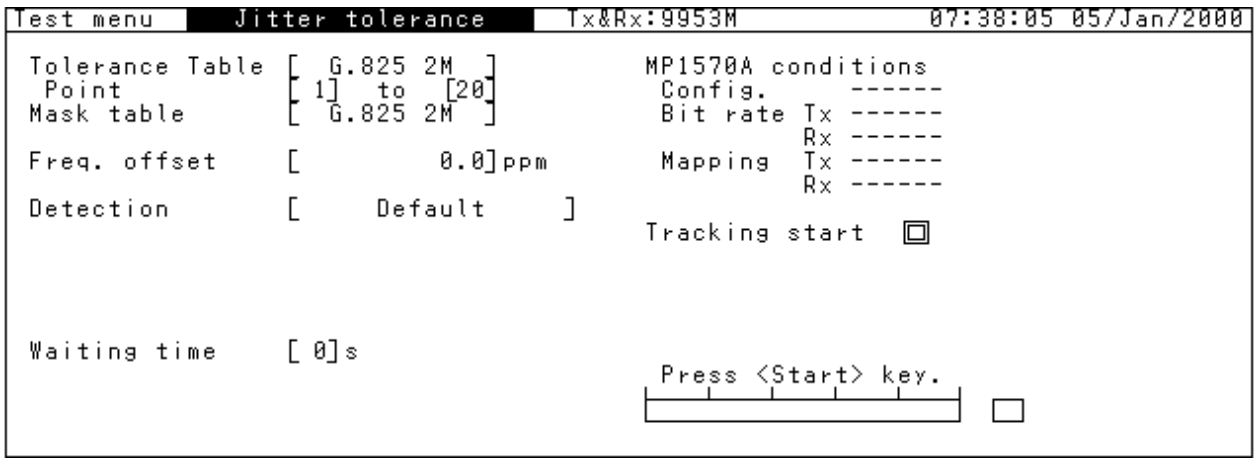
Initial Setting List of Setup: System



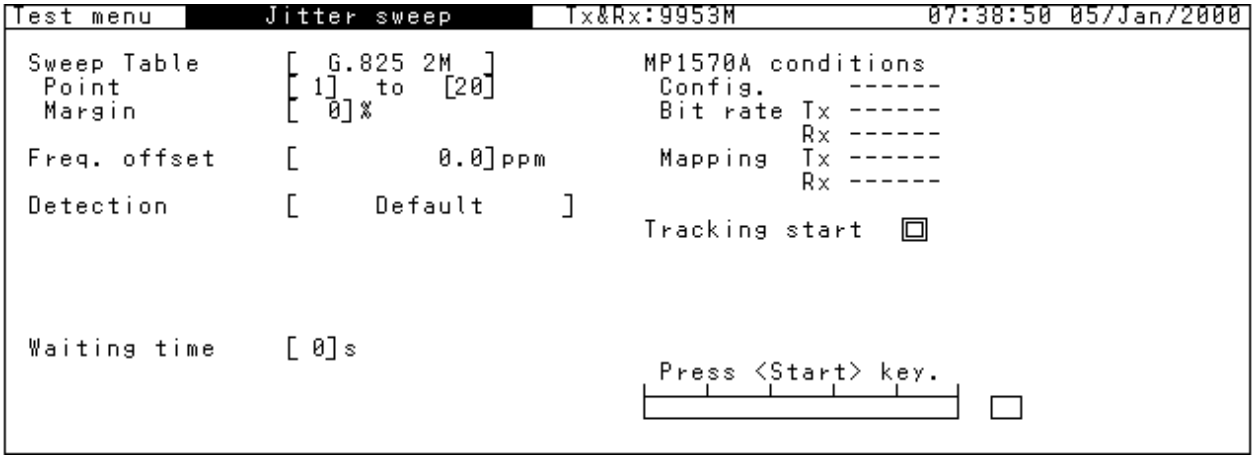

Initial Setting List of Test menu: Manual



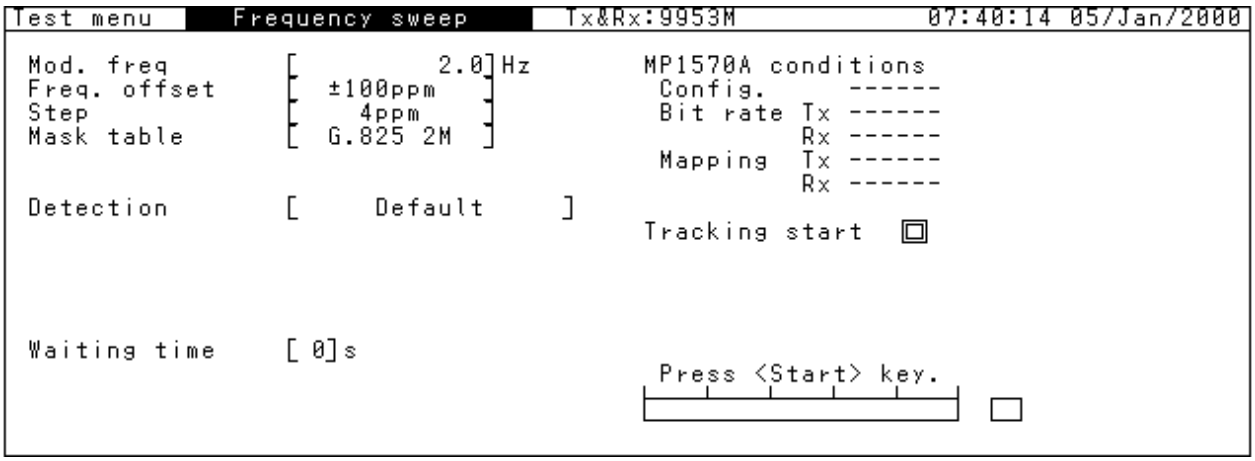

Initial Setting List of Test menu: Jitter tolerance



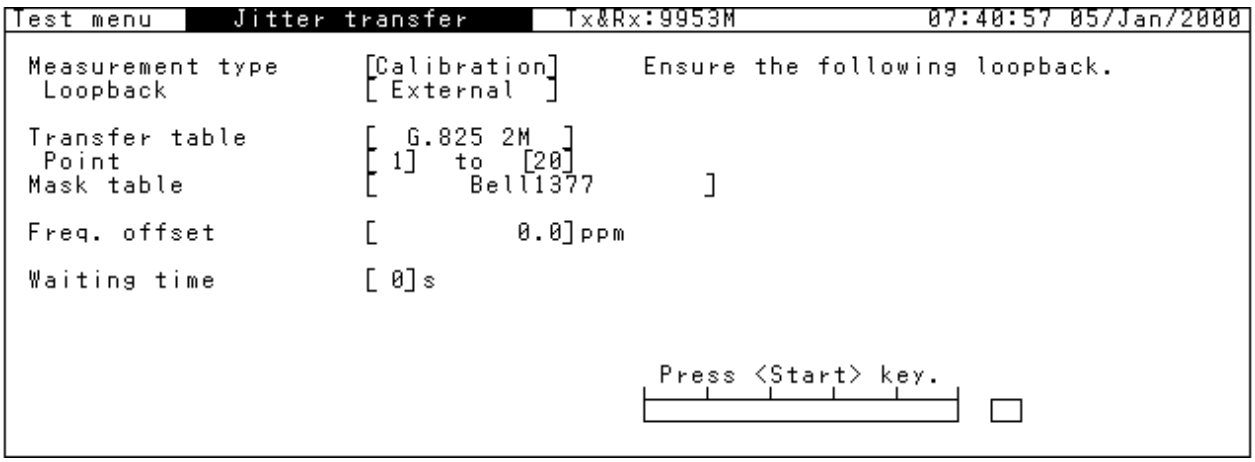
Initial Setting List of Test menu: Jitter sweep



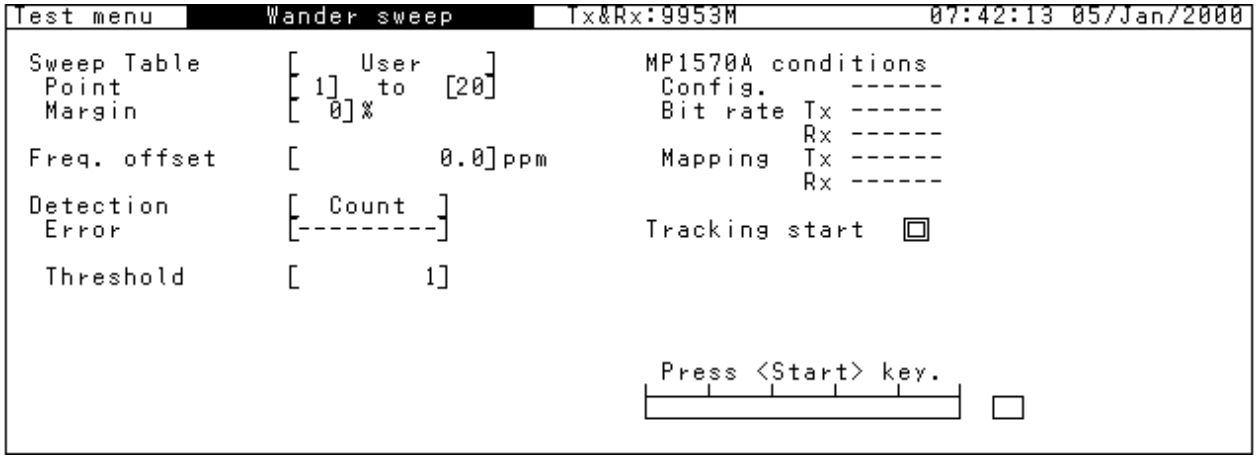

Initial Setting List of Test menu: Frequency sweep



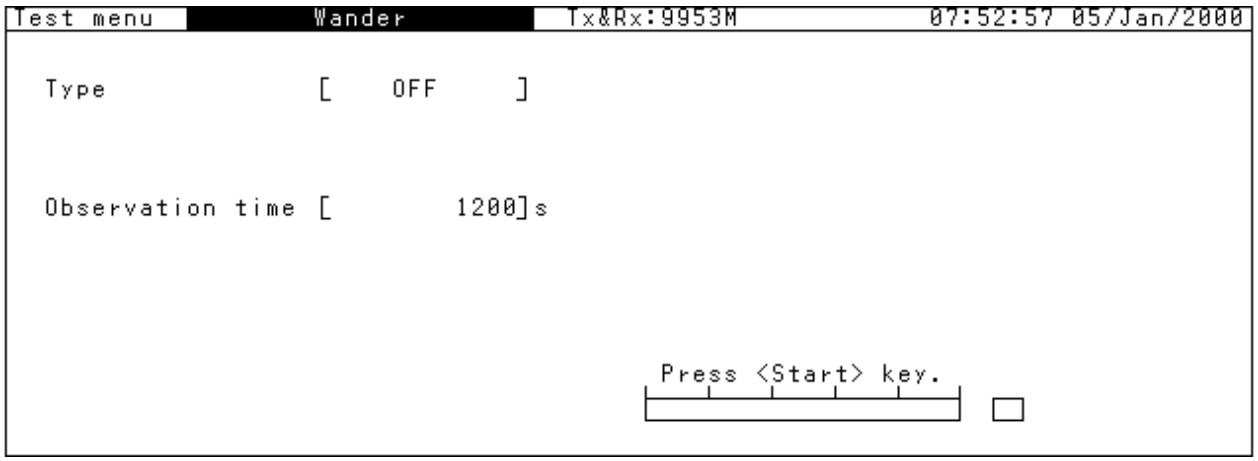

Initial Setting List of Test menu: Jitter transfer



Initial Setting List of Test menu: Wander




Initial Setting List of Test menu: Wander sweep



# Appendix E Daily Maintenance, Storage and Transportation

## E.1 Daily Maintenance

### Stained outer surfaces

Wipe the stained outer surface using a cloth moistened in diluted neutral detergent. Wipe the surface in the same way after operating the equipment at dusty place, or before long-term storage. Do not use thinner or benzene as they may remove the surface paint.

### Stained display screen

Wipe the stained display screen with a soft dry cloth. For a severely stained screen, use a cloth moistened in diluted neutral detergent. Do not use thinner or benzene.

### Loose screws

Tighten loose screws with a screwdriver.

## E.2 Storage

### Precautions on storage

Avoid storing MP1580A in any of the following locations:

- Where the temperature falls out of the –20 to +60°C range.
- Where the humidity falls out of the 20 to 75% range.
- Where it is exposed to direct sunlight.
- Where it is exposed to dust.
- Where condensation may occur due to high humidity.
- Where it is exposed to corrosive gases.

### Recommended storage conditions

If MP1580A is to be stored for a long time, take the precautions mentioned above.
We recommend you to store the equipment in a place that satisfies the following conditions:

- Temperature ..... 5 to 30°C
- Humidity ..... 40 to 75%

# E.3 Transportation

Pay attention to the following points when transporting MP1580A:

- Cover the front panel of MP1580A with a protective cover.
- Insert cushioning materials which were removed when you unpacked MP1570A, into the box.

If you do not have any such cushioning materials, do the following steps:

(1) Apply a protective cover to the front of MP1580A.

(2) Wrap MP1580A in a plastic bag.

(3) Prepare a corrugated cardboard box, wooden box or aluminum case that is larger than MP1580A by 10 to 15 cm in each dimension, and put the cushioning materials at the bottom of the box up to a thickness of 10 to 15 cm.

(4) Put MP1580A wrapped in a plastic bag into the box, and insert the cushioning materials around it.

(5) Seal the box with a string, tape or band.

# E.4 Mounting MP1570A/MP1570A1 on MP1580A

Precautions for mounting MP1570A/MP1570A1 on MP1580A.
Follow the below direction.

(1) Accessories

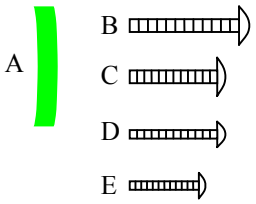
A. Holding plates ×4

B. ϕ5 mm × 47 mm screws (spring washer • flat washers) × 2

C. ϕ5 mm × 37 mm screws (spring washer • flat washers) × 2

D. ϕ4 mm × 37 mm screws (spring washer • flat washers) × 2

E. ϕ4 mm × 27 mm screws (spring washer • flat washers) × 2




(2) Mounting MP1570A/MP1570A1 on MP1580A

1. Place MP1570A/MP1570A1 on MP1580A.
2. Remove the MP1570A's/MP1570A1's 4 side screws at bottom.
3. Remove the MP1580A's/MP1570A1's 4 side screws at upper side.
4. At the left side, place the holding plates, and use C screws for MP1570A/MP1570A1 and E screws 5.for MP1580A to fasten.
5. At the right side, place the holding plates, and use B screws for MP1570A/MP1570A1 and D screws for MP1580A to fasten.

***Note:***

When the MP1570A/MP1570A1 is mounted on the MP1580A, do not try to carry the both MP1570A/MP1570A1 and MP1580A.

# E.5 Cleaning the Floppy Disk Drive

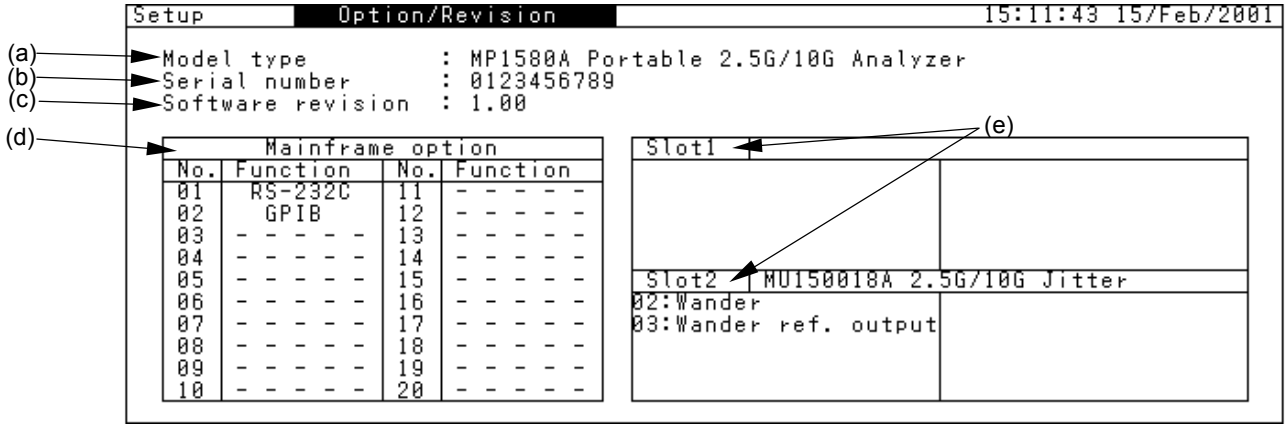
Dust may cause the floppy disk drive to malfunction. Therefore, it is necessary to periodically clean the floppy disk drive. Use a commercially available cleaning disk for the cleaning.

No particular disk is recommended by Anritsu. If you have any questions regarding the purchase of a cleaning disk, please feel free to contact Anritsu Corpolation or your nearest service representative.

If the floppy disk does not work properly even after cleaning, there is a possibility of its failure. In this case please contact Anritsu Corporation or your nearest service representative for repairs.

# Appendix F Revision Numbers of Option and Software

The revision numbers of option and software installed on MP1580A can be displayed on the "Setup: Option/Revision" screen. Here are the details of the display.




Installed on MP1580A.

(a) Model type..... Displays the model name.

(b) Serial numbers..... Displays serial number of MP1580A.

(c) Software revision..... Displays the revision numbers of the software

(d) Mainframe option ..... Displays the numbers and functions of optional items.

(e) Slot 1, Slot 2 ..... Displays the models, names and options of the plug-in units installed in MP1580A.

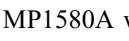
# Appendix G Installation

## G.1 Installing the Application Software

### "Install (Application program)" screen

Install the application software on the "Install (Application program)" screen.

First, insert a floppy disk into the drive.

Turn on the power switch of MP1580A while pressing both  and 

to display the "Install" screen.

This screen displays the startup conditions of installation and guidance massages. Follow the instruction to install the application

# Index

## O



## P



## R



## S



## T



## V



## W